# APstorage Sea Family ELS Series PCS Installation & User Manual

（For North America）


Rev1.1 2024-11-04

# Table of Contents

# 1. Important Safety Instructions

This manual contains important instructions to be followed during installation and maintenance of the APstorage PCS. To reduce the risk of electrical shock and ensure the safe installation and operation of the APstorage PCS, the following symbols appear throughout this document to indicate dangerous conditions and important safety instructions.

**DANGER:** This indicates a hazardous situation, which if not avoided, will result in death or serious injury.

**WARNING:** This indicates a situation where failure to follow instructions may be a safety hazard or cause equipment malfunction. Use extreme caution and follow instructions carefully.

**NOTE:** This indicates information that is very important for optimal system operation. Follow instructions closely.

## 1.1 Safety Instructions

**IMPORTANT SAFETY INSTRUCTIONS. SAVE THESE INSTRUCTIONS.** This guide contains important instructions that you must follow during installation and maintenance of the PCS. Failing to follow any of these instructions may void the warranty. Follow all of the instructions in this manual. These instructions are key to the installation and maintenance of the APstorage PCS. These instructions are not meant to be a complete explanation of how to design and install APstorage PCSs. All installations must comply with national and local electrical codes and standards.

**DANGER:**
- Only qualified professionals should install and/or replace the APstorage PCS.
- Perform all electrical installations in accordance with local codes.
- To reduce risk of burns, do not touch the body of the PCS.

**WARNING:**
- Do NOT attempt to repair the APstorage PCS. If it shows abnormal performance, Contact APsystems Customer Support to obtain adequate support. Damaging or opening the APstorage PCS will void the warranty.

**NOTE:**
- Before installing or using the APstorage PCS, please read all instructions and Cautionary markings in the technical documents and on the APstorage PCS.

## 1.2 Radio Interference Statement

This equipment could radiate radio frequency energy which might cause interference to radio communications if you do not follow the instructions when installing and using the equipment. But there is no guarantee that interference will not occur in a particular installation. If this equipment causes interference to radio or television reception, the following measures might resolve the issues:

A) Relocate the receiving antenna and keep it well away from the equipment.

B) Consult the dealer or an experienced radio / TV technician for help.

Changes or modifications not expressly approved by the party responsible for compliance may void the user's authority to operate the equipment.

# 1. Important Safety Instructions

## 1.3 Communication Disclaimer

The EMA system provides a friendly interface to monitor the working status of the whole energy storage system. At the same time, it can also help to locate problems during system maintenance. If communication has been lost for more than 24 hours, please contact the technical support of APsystems.

## 1.4 Symbols replace words on the equipment, on a display, or in manuals

| | |
|---|---|
| APstorage | Trademark. |
|  | Caution, risk of electric shock. |
|  | Caution, hot surface. |
|  | NOTICE, danger! This device directly connected with electricity generators and public grid. |
| **Qualified personnel** | Person adequately advised or supervised by an electrically skilled person to enable him or her to perceive risks and to avoid hazards which electricity can create. For the purpose of the safety information of this manual, a "qualified person" is someone who is familiar with requirements for safety, electrical system and EMC and is authorized to energize, ground, and tag equipment, systems, and circuits in accordance with established safety procedures. The inverter and storage system may only be commissioned and operated by qualified personnel. |

# 2. APstorage PCS Introduction

**ELS series PCS is APtorage's Sea family product and the PCS is a battery Power Conversion System.**
APsystems PCS, together with a compatible battery ( not offered by APsystems), becomes a complete and independent AC coupling storage solution for residential PV installations. It can be used with any new or already installed PV systems without changing equipment in place.

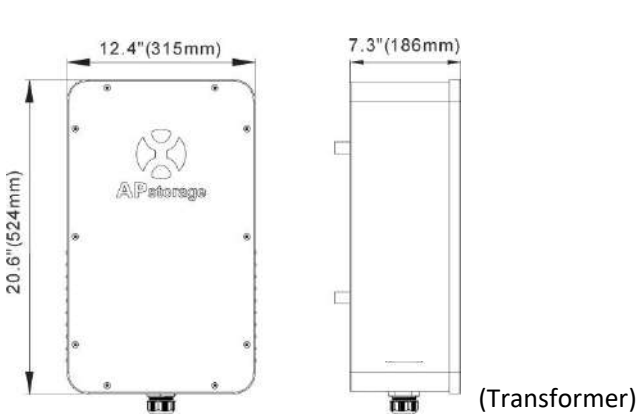
Power Conversion System（PCS）


* The image shown here is for reference only. The actual product received may differ.

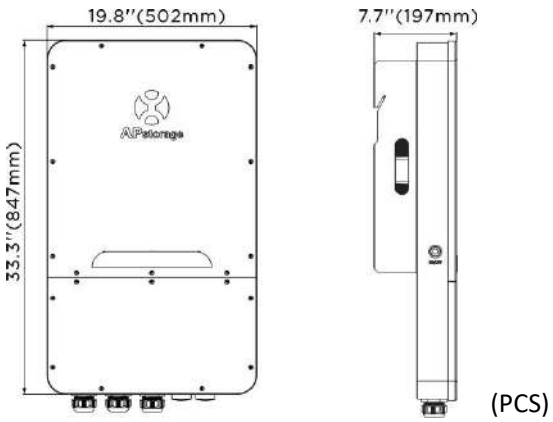
One PCS can be connected up to 20kWh compatible battery (see battery compatibility list). When multiple battery packs are connected, they need to be connected in parallel. (see connection diagram in the Battery User Manual)

APstorage will help home-owners to optimize their utility bill, offering full flexibility to manage their Electrical consumption. Several modes are available. (Backup power supply mode, Self-consumption mode, Peak-Shaving mode and Advanced mode)

## 2.1 Dimensions




(Transformer)




(PCS)

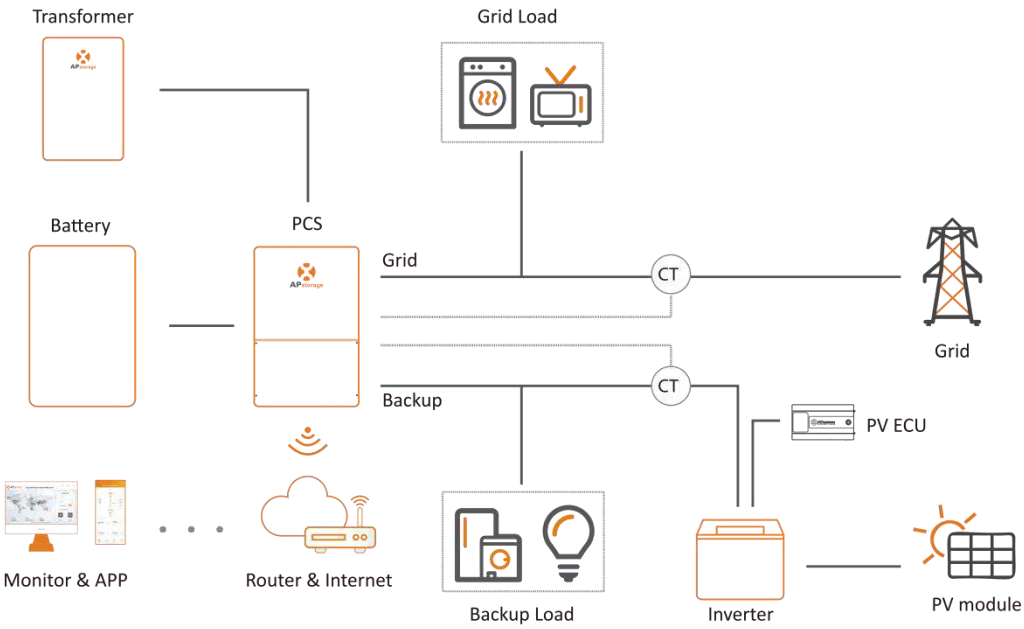
# 2. APstorage PCS Introduction

## 2.2 Basic System Architecture

**A typical APstorage system includes three main elements:**

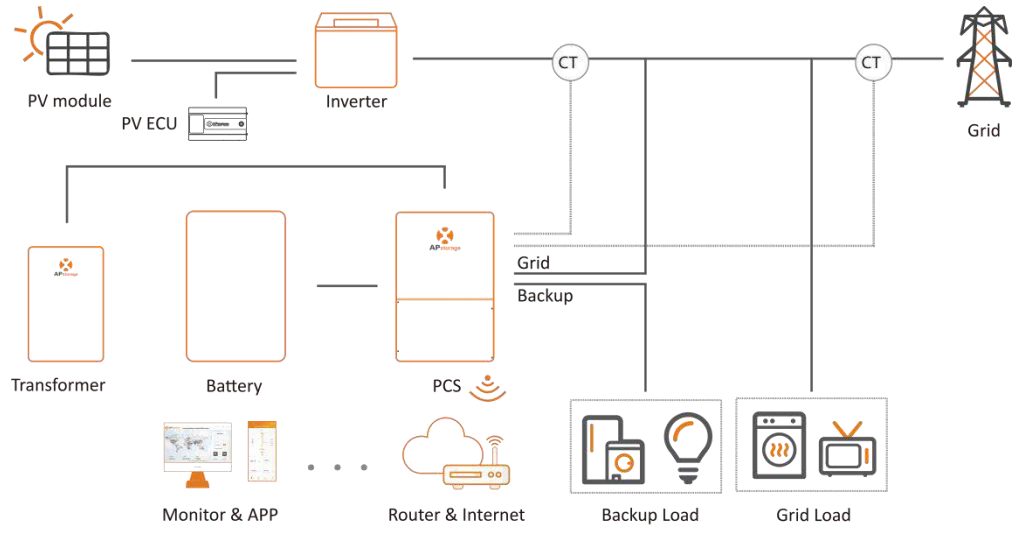
- APstorage PCS, which is a smart battery Power Conversion System.
  The PCS includes an integrated ECU (Energy Communication Unit) to ensure monitoring of the overall system once up and running.
- A compatible Battery pack. (see battery compatibility list)
- Auto-Transformer T-A.

**Option 1 :**
**PV system working off-grid**




In option 1, Off grid function only compatible with APsystems DS3&DS3D microinverters (fully compatible).

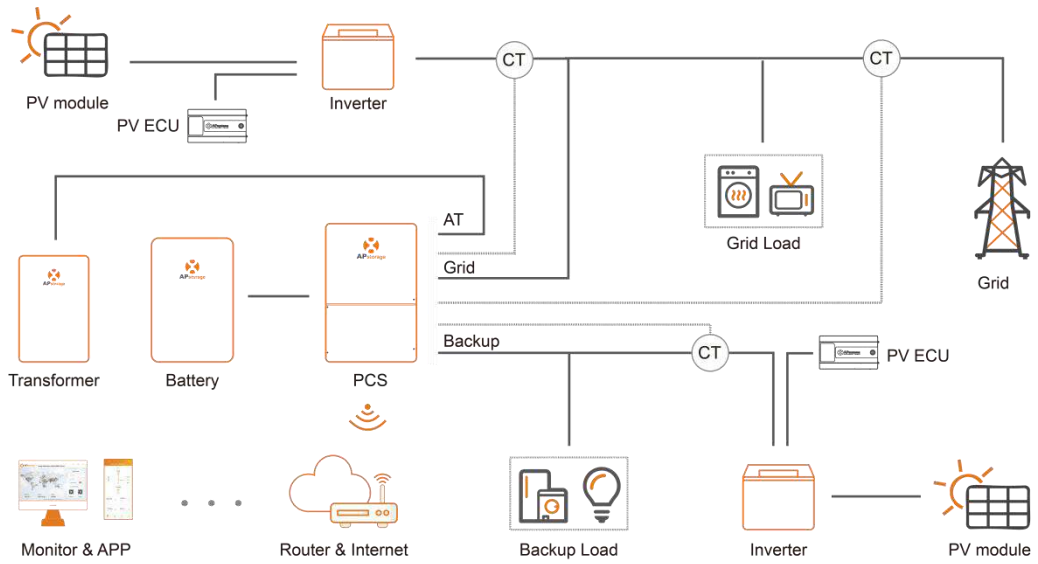
**Option 2 :**
**PV system not working off-grid**




**NOTA**: Se o sinal sem fio na área onde o PCS está fraco, é necessário adicionar um amplificador de sinal Wi-Fi em um local adequado entre o roteador e o PCS.

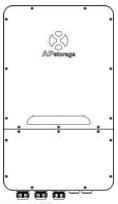
# 2. APstorage PCS Introduction

**Option 3 :**
**mix of option 1 and 2 following the conditions above**




**NOTE:** In a Storage System with APstorage PCS, the battery is one of the key components. Therefore, it is necessary to keep the installation environment well ventilated, please refer to Battery user manual.

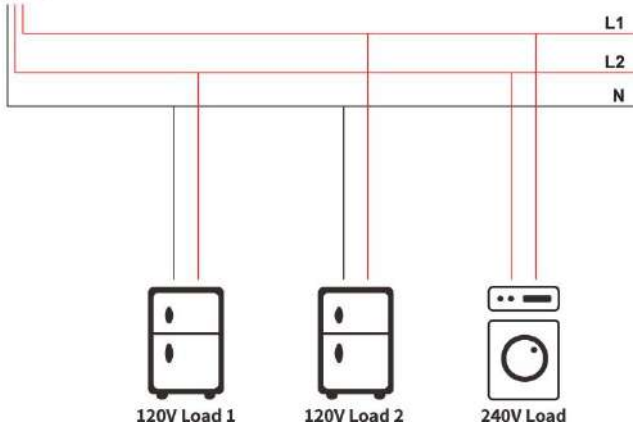
## 2.3 Back-up Load Configuration



Case1. If there is no 240V load, 120V load1 or load2 total Max power ≤2.5kVA.

Case2. If there is 240V load and power is P1, P1 ≤5kVA, 120V load1 or load2 total Max power ≤(5-P1)/2 kVA

L1 or L2 Max continuous current carrying capacity ≤ 21A




Backup Port

**NOTE:** The 120V and 240V load configuration of auto-transformer should meet the below requirements. It is stipulated that the 120V load received by L1N and L2N do not exceed 2.5kW respectively. If there is 240V load, 240V load power needs to be subtracted and distributed equally. For example, 240V load power is P1， then (5kw-P1) / 2 is the remaining 120V power of the assembleable L1N and L2N. The imbalance load cannot exceed the new power distribution.
**L1N: voltage between L1 and Neutral line**
**L2N: voltage between L2 and Neutral line**

# 2. APstorage PCS Introduction

## 2.4 LED

There are eight LED indicators on the PCS unit, indicating the working state of the PCS.


| LED | Condition | Description |
|---|---|---|
| **SYSTEM** | | The system is operating |
| | | The system is starting up |
| | | The system shutdown |
| **GRID** | | The grid exists and is connected |
| | | The grid exists but is not connected |
| | | The grid does not exist |
| **BACK UP** | | The backup system is operating |
| | | The backup is off |
| **ENERGY** | | Buy energy from grid |
| | | Zero output |
| | | Supplying energy to grid |
| | | The grid is not connected or system is not operating |
| **BATTERY** | | The battery is charging |
| | | The battery is discharging |
| | | The battery SOC is low |
| | | The battery is disconnected |
| **WI-FI** | | The WiFi is connected to the router |
| | | The WiFi is not connected to the router |
| | | The WiFi function is closed |
| **COM** | | The battery and the internet communication are normal |
| | | The battery communication is normal, but the internet communication |
| | | The battery communication is abnormal, but the internet communication is normal |
| | | The battery and the internet communication are abnormal |
| **FAULT** | | Fault has occurred |
| | | Back up output overload |
| | | No fault |

: light on

: light off

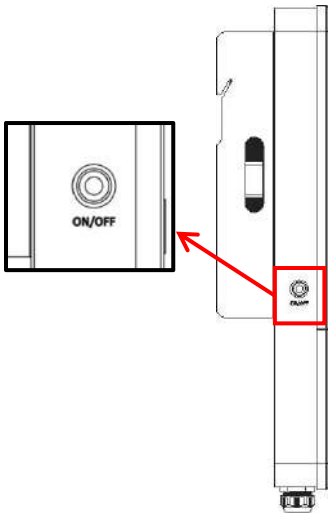
: Every 2 seconds light on for 1 second.

: Every 5 seconds light on for 1 second.

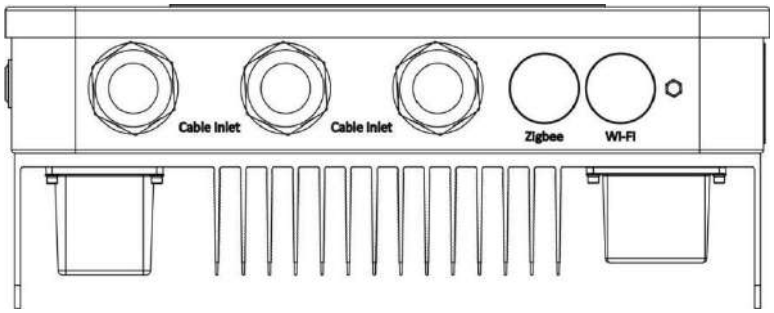
# 2. APstorage PCS Introduction

## 2.5 PCS Power ON/OFF

Once the pcs has been properly installed and the batteries are connected well, simply press On/Off button (located on the left side of the case) to turn on the pcs and press On/Off button (ON/OFF button is switched off) to turn off the pcs.




## 2.6 PCS Connection Port




**Cable inlet:**

① DC cable: Connect the positive and negative terminals of the battery.
② AC cable: AC grid port is connected to power grid and AC backup port is off grid output.
③ Transformer cable: Connect to the Auto-transformer.
④ Internet cable: Connect the Internet port into the router.
⑤ CT cable: Connect the PV CT or Grid CT cable to the PCS.

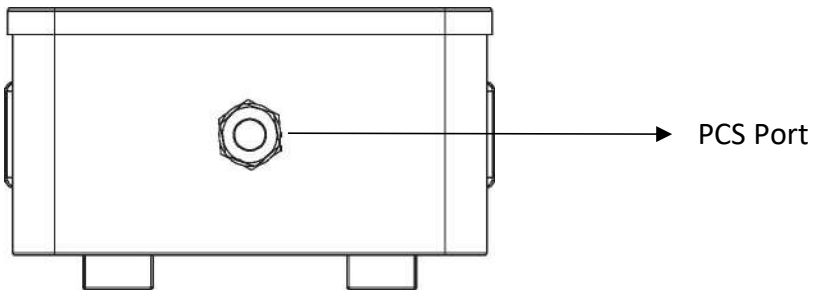
**Zigbee:**

Use for Zigbee communication.

**Wifi:**

Use for Wifi communication.

## 2.7 Transformer (T-A) Connection Port

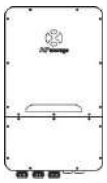
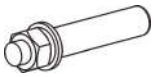
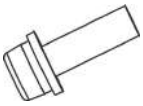
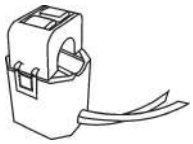
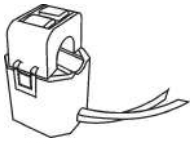
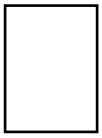



**PCS Port:** Connect to the PCS.

# 3. Installation

## 3.1 Packing List

### 3.1.1 PCS Packing List

| KITS | PICTURES |
|---|---|
| PCS |  ×1 |
| Wall-mounted Bracket |  ×1 |
| Expansion screw (M8*70) |  ×3 |
| Fixing screw (M6×22) |  ×1 |
| 200A CT（Current transformer） |  Grid CT ×2 |
| 80A CT（Current transformer） |  PV CT ×2 |
| Quick Installation Guide |  ×1 |

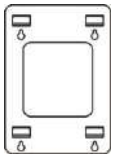
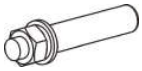
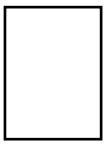
**NOTE:** The expansion screws are applicable only to cement concrete walls. For other types of walls, install expansion screws based on the wall type.

**NOTE:** The customer will need to purchase a combiner box for parallel connection of the batteries. Combiner box requirements: rated current of each connector ≧ 100A.

# 3. Installation

### 3.1.2 Transformer (T-A) Packing List

Transformer (T-A) is delivered with below accessories.

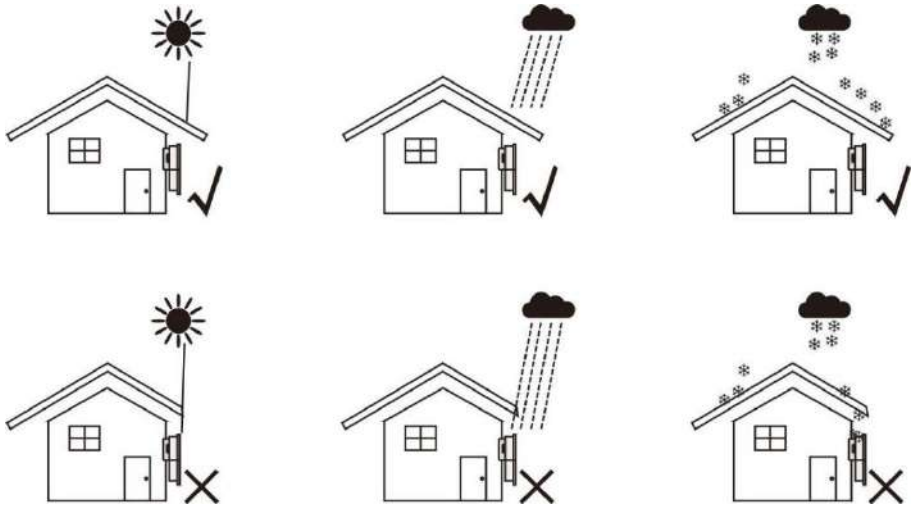
| KITS | PICTURES |
|---|---|
| Transformer (T-A) |  ×1 |
| Wall-mounted Bracket |  ×1 |
| Expansion screw (M8*70) |  ×4 |
| Datasheet |  ×1 |

**NOTE:** The expansion screws are applicable only to cement concrete walls. For other types of walls, install expansion screws based on the wall type.

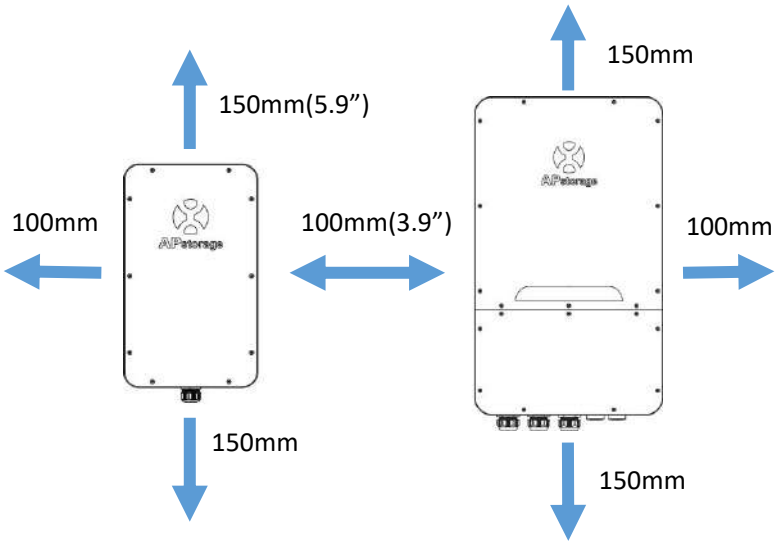
# 3. Installation

## 3.2 Select Mounting Location

1. PCS should be installed on a solid surface, where is suitable for PCS's dimensions and weight.
2. Do not install PCS in a confined space with no ventilation.
3. If the PCS is installed outside, it should be protected under shelter from direct sunlight or bad weather conditions (like snow, rain, lightning, etc). Fully shielded installation locations are preferred.



4. Install the APstorage vertically on the wall.
5. Make sure that the PCS is mounted "face-up": Product logo is visible after installation.
6. Leave enough space around APstorage. The specific requirements are as follows:



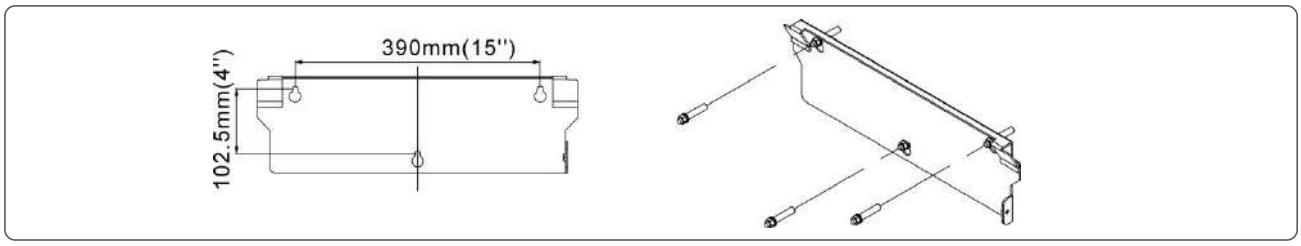

**WARNING:** APstorage PCS cannot be installed near flammable, explosive or strong electro-magnetic equipment.

# 3. Installation

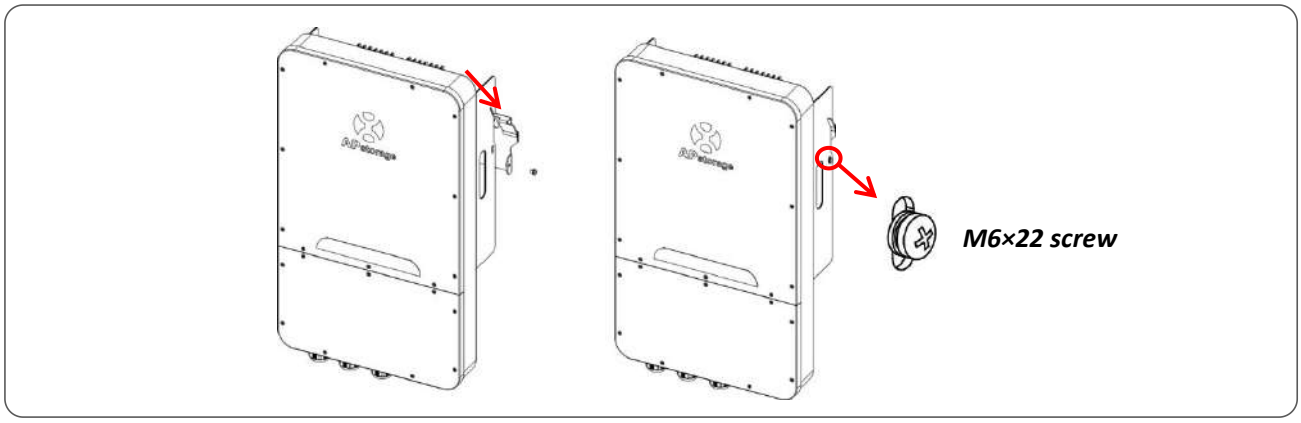
## 3.3 PCS Installation Steps

① Mark the holes position on the wall and drill holes according to wall type and expansion screws type. The configured expansion screw is drilled with a diameter of 12mm(0.5”) and a depth of 50-55mm(1.9-2.2”).

② Put the expansion screws into the holes on the wall. Use a wrench to tighten the hex nuts, so that the expansion screws sleeve are fully expanded. Then remove the hex nuts. Hang the wall mounting bracket into the expansion screws, and use the hex nuts to fix it firmly. Make sure that the wall mounting bracket is horizontal after installation.



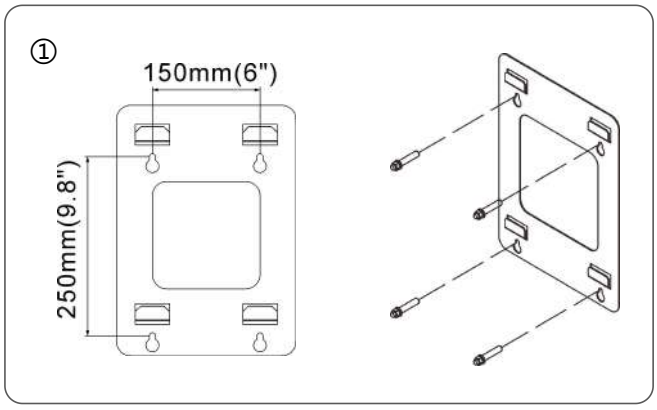

③ Lift the PCS to hang it into the wall mounting bracket, and fix the PCS on wall mounting bracket with the M6×22mm screw.

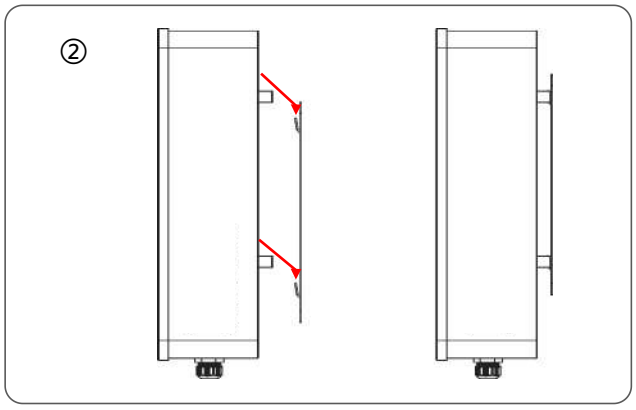



## 3.4 Transformer Installation Steps

① Mark the holes position on the wall and drill holes according to wall type and expansion screws type. Fix the wall mounting bracket horizontally on the wall. For drilling and installation of expansion screws, refer to PCS.

② Clip the Transformer to the 4 buckles of the wall mounting bracket.

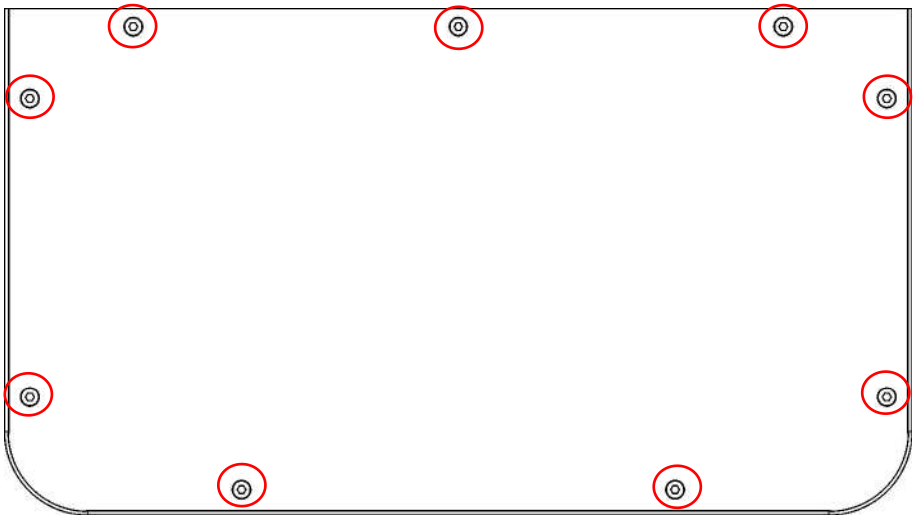


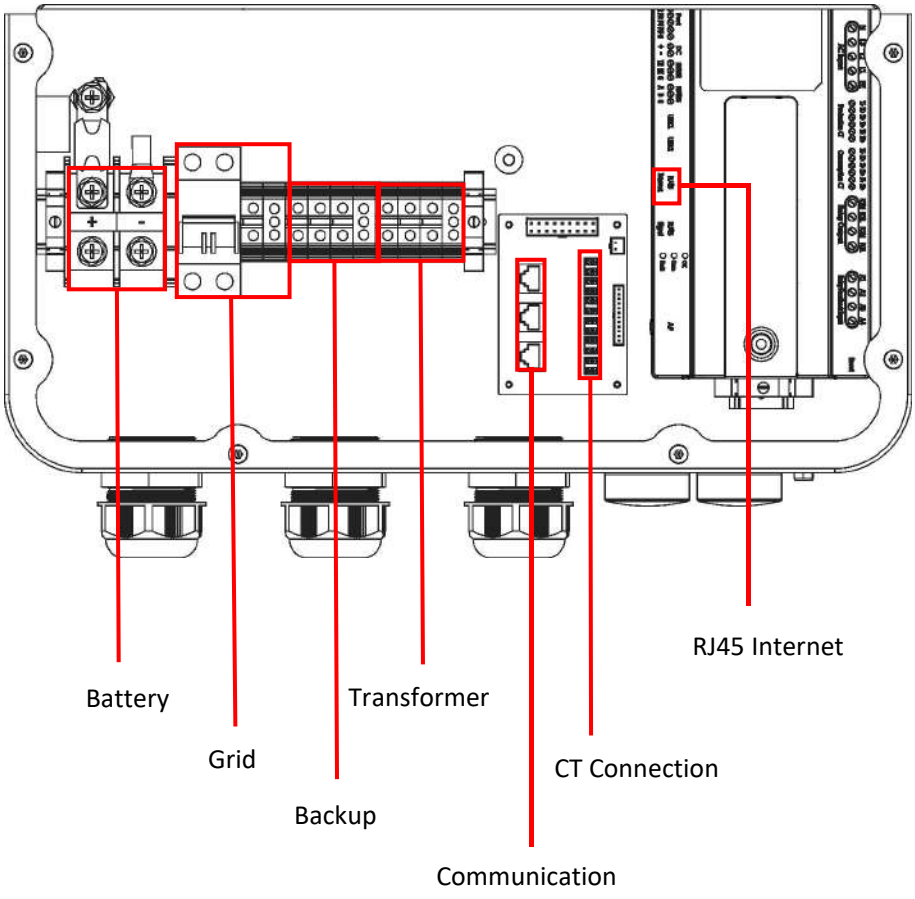



# 3. Installation

## 3.5 PCS Wiring

When wiring, you need to remove the lower cover first, just unscrew the 9 locking screws.

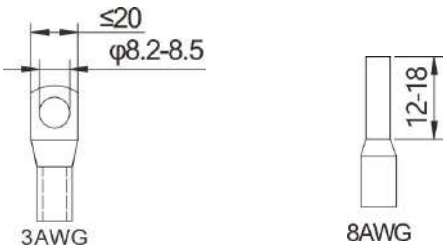




# 3. Installation

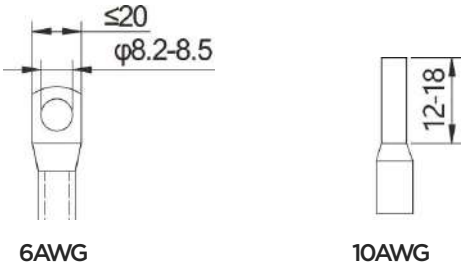
When wiring, you need to crimp appropriate terminals on the cable (as shown for dimensions). ***The cables and terminals need to be prepared by yourself or purchased from APsystems.***

The terminals for DC cable　　The terminals for AC cable




***ELS-5K*** *Recommend minimum cable：DC cable 3AWG / AC cable option 1 or 3 : 8AWG, option 2 : 11AWG (see chap 2.2)*

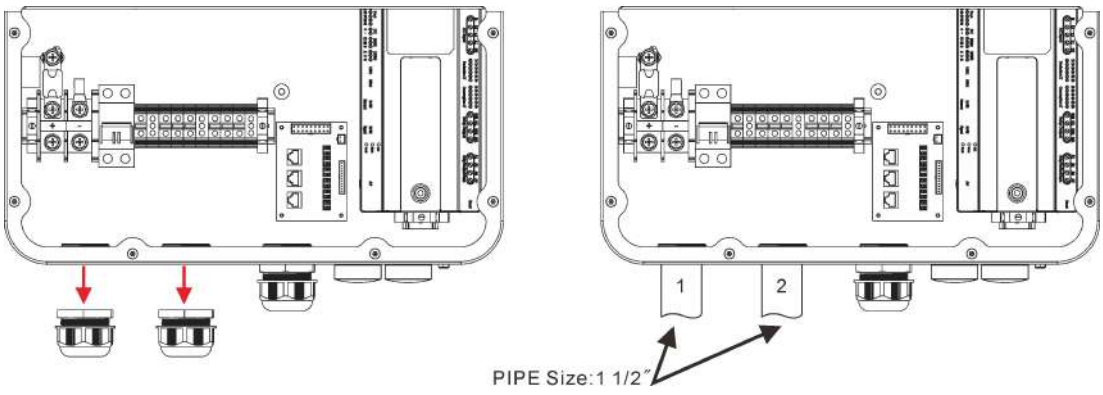
The terminals for DC cable　　The terminals for AC cable

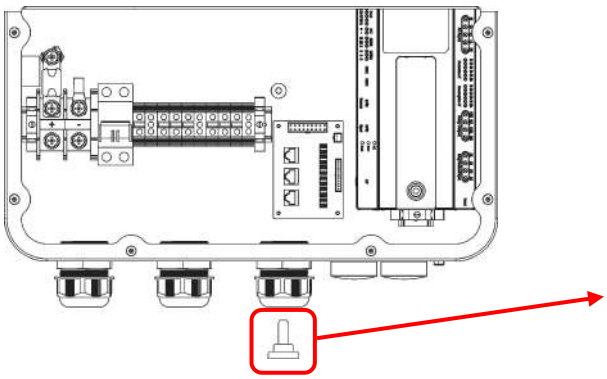



***ELS-3K*** *Recommend minimum cable：DC cable 6AWG / AC cable option 1 or 3 : 10AWG, option 2 : 11AWG (see chap 2.2)*

PCS has been installed with cable glands before delivery. If connection is required through pipe **(prepare pipe yourself)**, remove cable glands on the casing first.

**WARNING: Do not drill holes in the casing at any location, otherwise we will not provide warranty.**



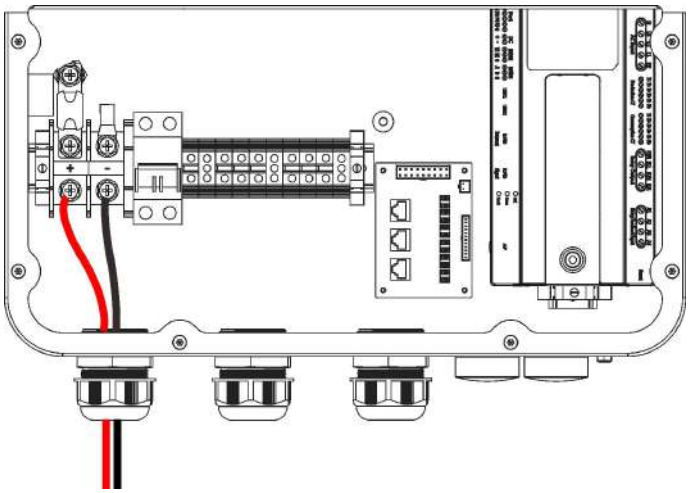
If the two cable inlets are not sufficient, take out the stopper of the cable gland, the third cable inlet can be used.

# 3. Installation

### 3.5.1 DC Wiring

Connect the DC cable to the PCS through the cable gland. As shown, connect wire + & - to Battery connector.

*Torque value：40lb.in*



BAT+ BAT- Wire+: Red/Orange; Wire-: Black

***NOTE: APstorage ELS/ELT series PCS are DC/AC isolated, so the battery ground should not be connected to AC ground. Leave battery ground point floating could ensure the system working safely and stably.***

### 3.5.2 AC Wiring

3.5.2.1 Connect the grid AC cables to the PCS through the cable gland. As shown, connect wire L1 and wire L2 to grid breaker, connect wire N to the Terminal block, and connect wire PE to the earth terminal block.

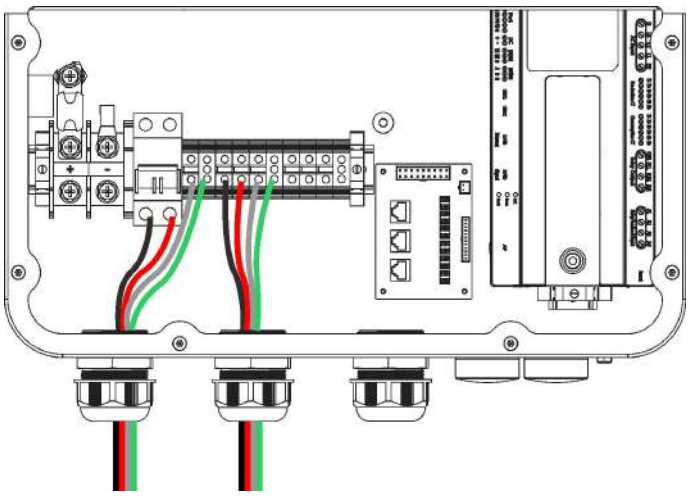
*Torque value：10.53lb.in*

***Do not loosen the screw to the end when removing wires, otherwise the terminal may be damaged.***

3.5.2.2 Connect the backup AC cables to the PCS through the cable gland. As shown, connect wire L1 , wire L2 and N to the terminal block , and connect wire PE to the earth terminal Block.

*Torque value：10.53lb.in*

***Do not loosen the screw to the end when removing wires, otherwise the terminal may be damaged.***



L1 L2 N PE
GRID

L1 L2 N PE
BACKUP

L1-Black; L2-Red; N-White; PE-Green

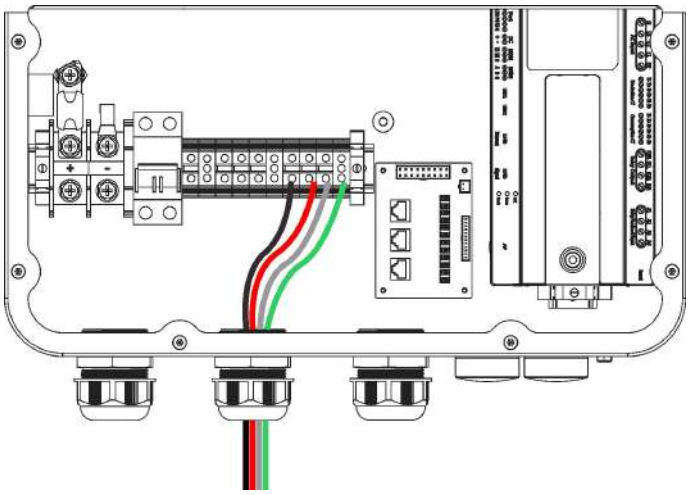
# 3. Installation

### 3.5.3 Transformer Wiring

3.5.3.1 Connect the backup AC cables to the PCS through the cable gland. As shown, connect wire L1 , wire L2 and N to the terminal block , and connect wire PE to the earth terminal Block.

*Torque value：10.53lb.in*

***Do not loosen the screw to the end when removing wires, otherwise the terminal may be damaged.***

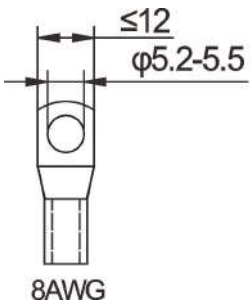


L1-Black; L2-Red; N-White; PE-Green

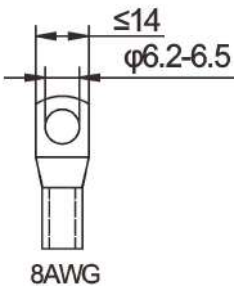
L1 L2 N PE
Transformer T-A

**NOTE:** Make sure to connect the two live wire to L1 and L2, connect the neutral wire to N, otherwise the precision of the CT will be affected.

When Transformer wiring, you need to crimp appropriate terminals on the cable (as shown for dimensions). ***The terminals need to be prepared by yourself or purchased from APsystems.***




Transformer T-A(5KVA)

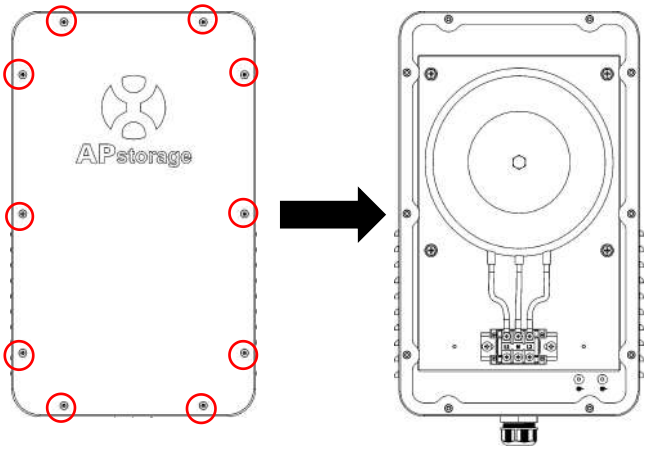



Transformer T-A(10KVA)

*option 1 or 3 : mini 8AWG,*
*option 2 : mini 11AWG (see chap 2.2)*

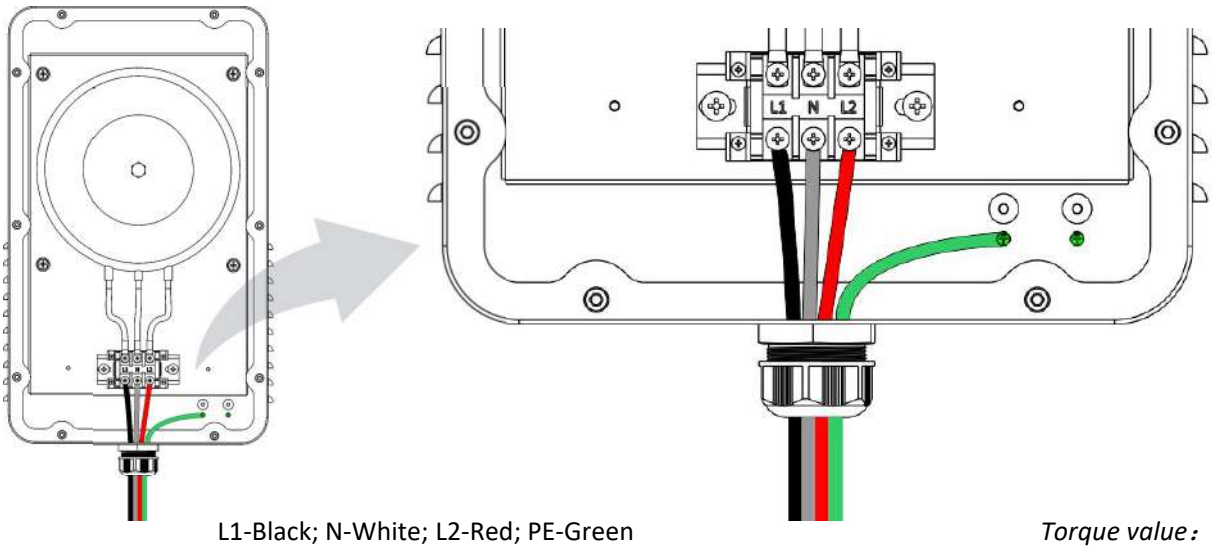
# 3. Installation

**When wiring, you need to remove the cover first, just unscrew the 10 locking screws.**




Connect the transformer cable.

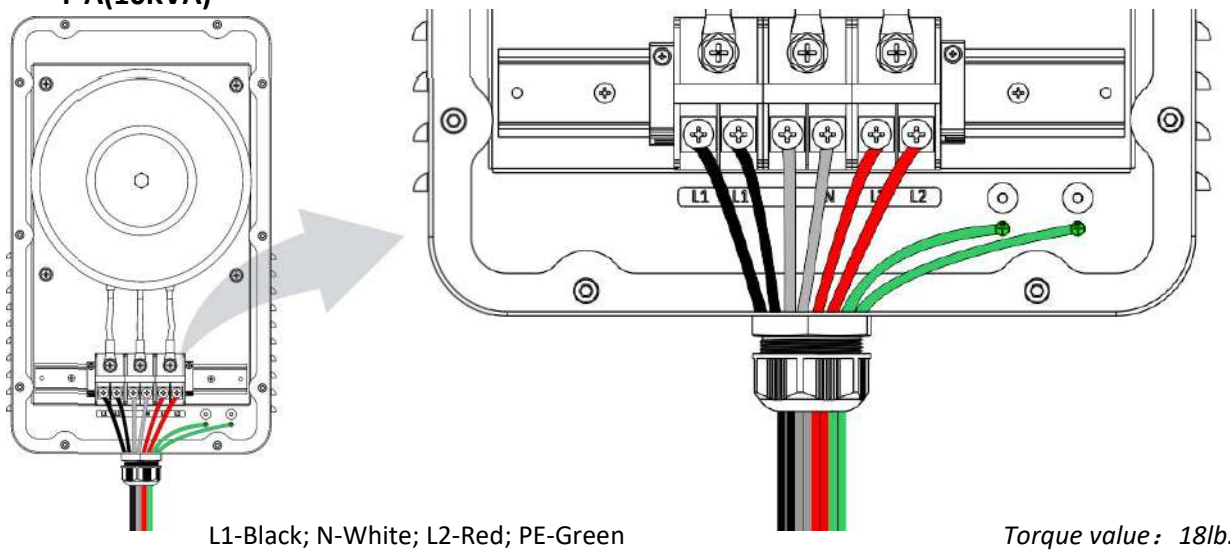
**T-A(5KVA)**




L1-Black; N-White; L2-Red; PE-Green

*Torque value： 18lb.in*

**T-A(10KVA)**




L1-Black; N-White; L2-Red; PE-Green

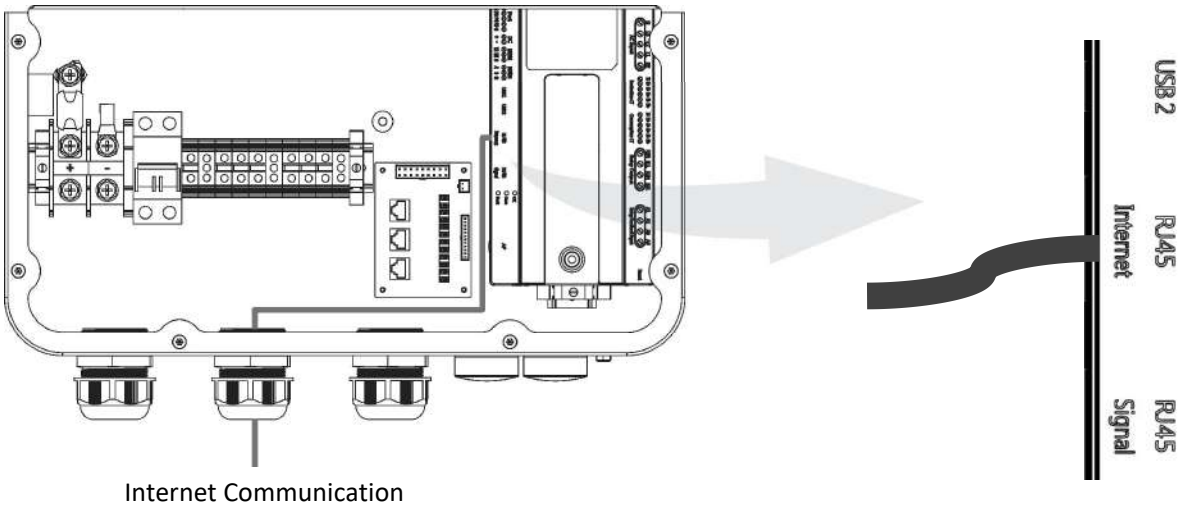
*Torque value： 18lb.in*

# 3. Installation

### 3.5.4 Communication Wiring

3.5.4.1 Internet Communication

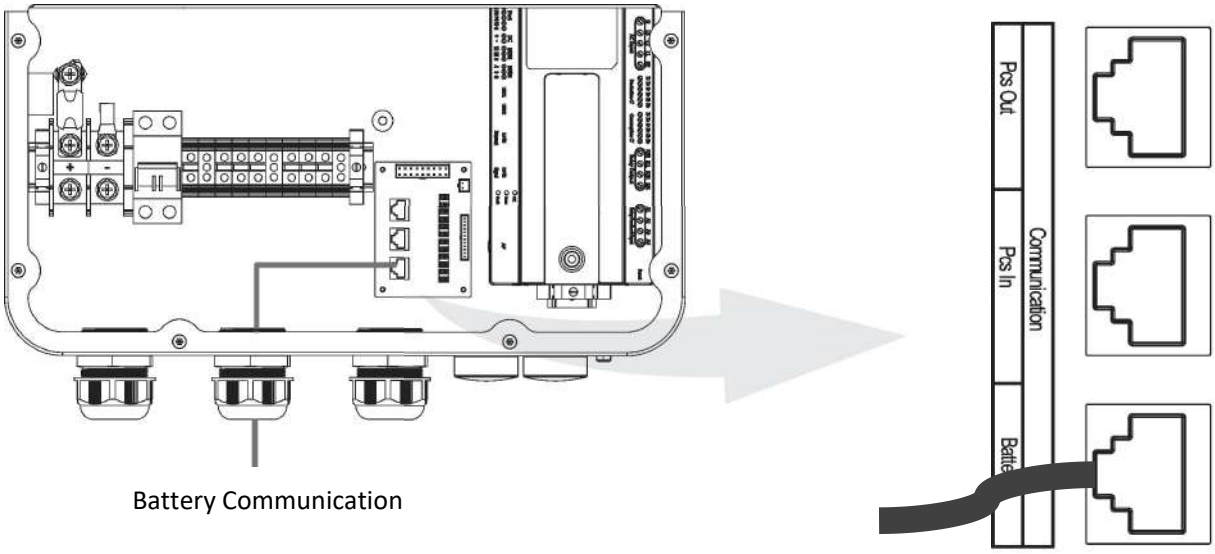
Using the Internet cable, connect the Internet port into the router. The PCS also can be connected to the router via Wi-Fi, please refer to the chapter 5.4.3.1.




Internet Communication

3.5.4.2 Battery Communication

Connect the Battery's RJ45 port to PCS's RJ45 port.



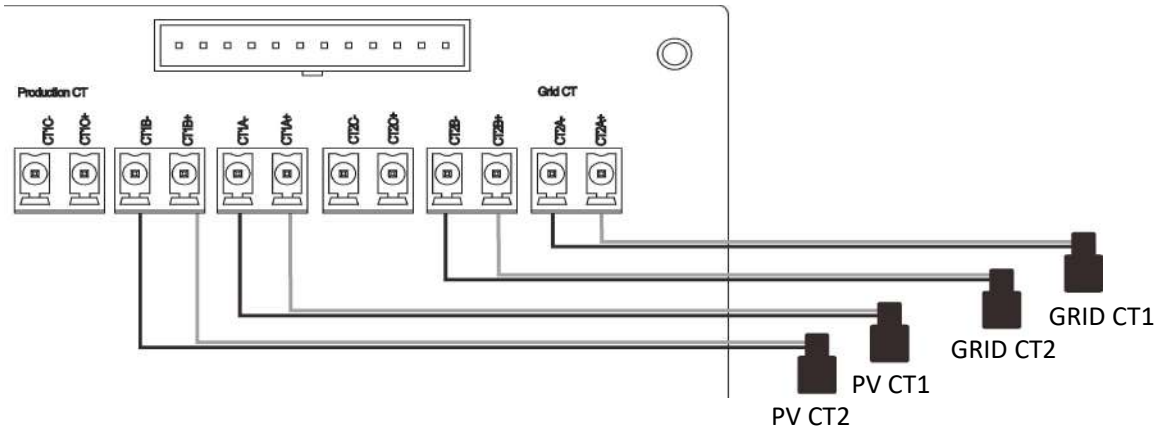

Battery Communication

| RJ45-PIN | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Battery | NC | NC | NC | CAN-H | CAN-L | NC | 485-B | 485-A |

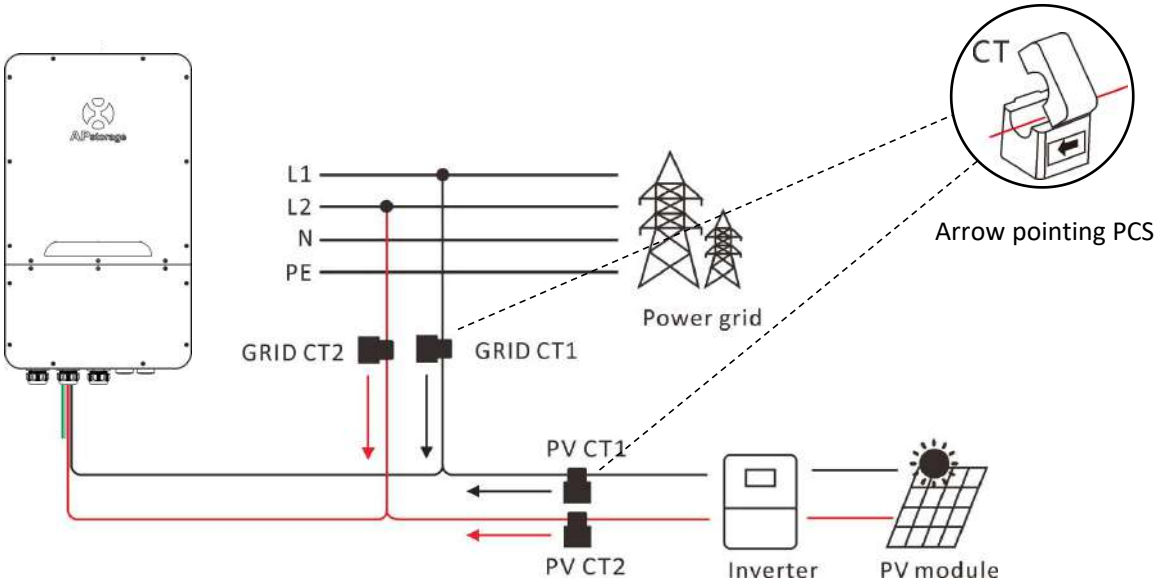
# 3. Installation

### 3.5.5 CT Wiring

Connect the PV CT cable to the PV CT port of the PCS. Connect the GRID CT cable to the GRID CT port of the PCS.




**The direction of CTs:** *The arrows on the GRID CT should point from grid to distribution box and the arrows on the PV CT from PV to distribution box.*



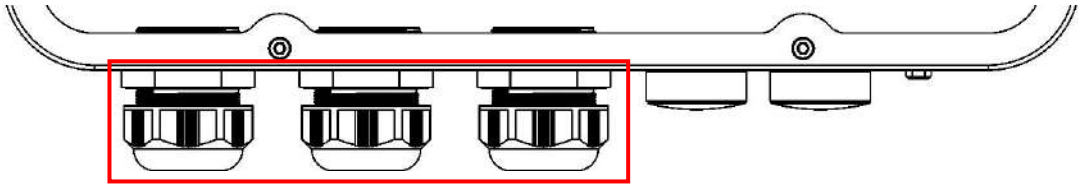

GRID CTx2: 200A

Distribution box ← Grid

PV CTx2: 80A

Distribution box ← PV

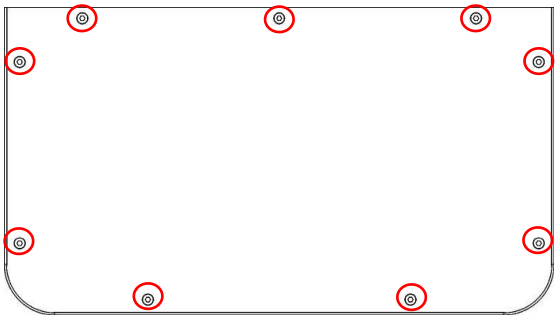
# 3. Installation



**NOTE:** After having completed the wiring, the nuts of the cable gland must be tightened.

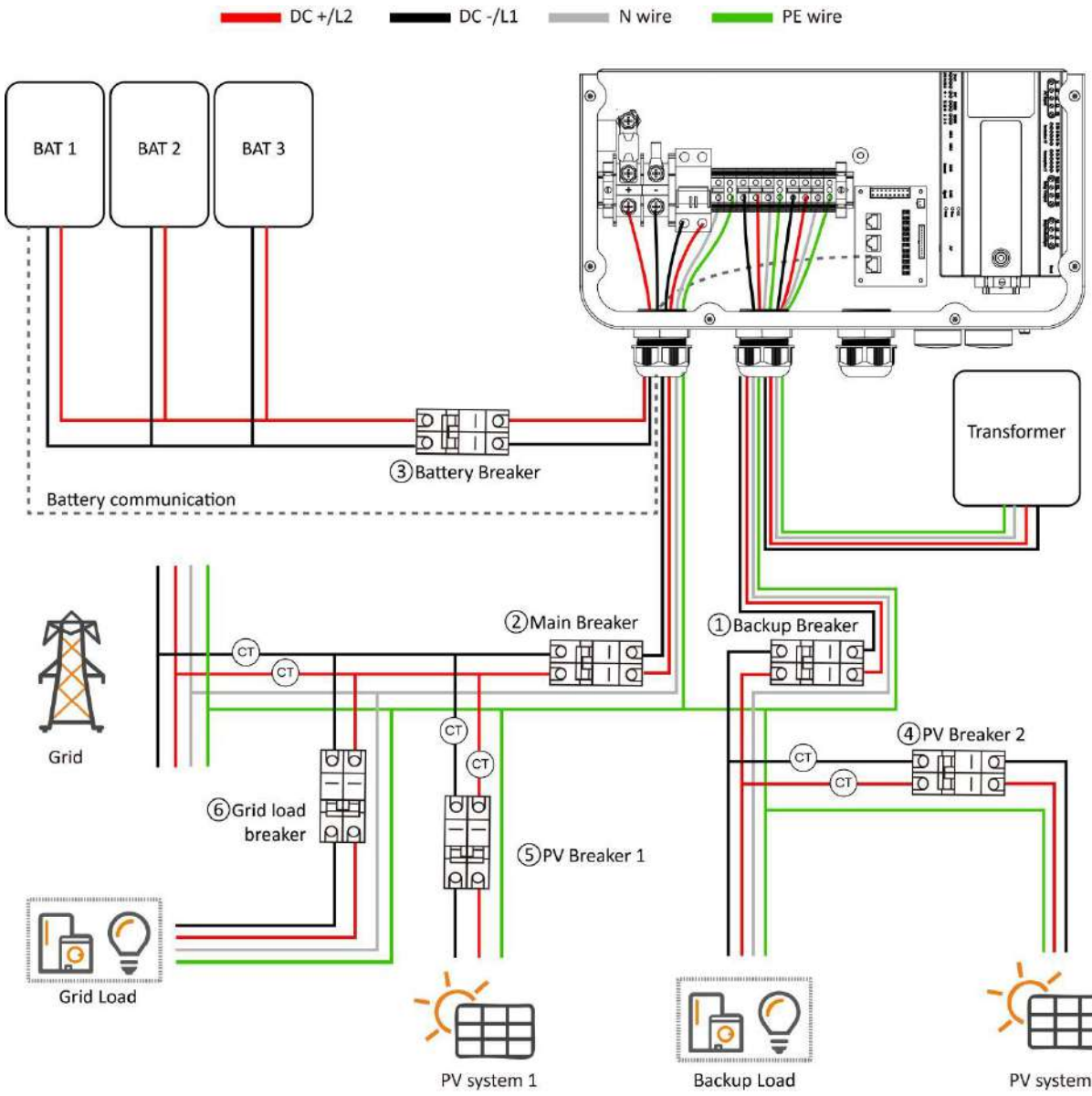
## 3.6 Install the Lower Cover

As shown, screw the 9 screws back.



# 3. Installation

## 3.7 Wiring Diagram




PV system option 2 (see chap 2.2)

PV system option 1 (see chap 2.2)

ELS-5K:

① Backup Breaker: 30A AC Breaker
② Main Breaker : 60A AC Breaker
③ Battery Breaker: 125A DC Breaker
④ PV Breaker 2: 30A AC Breaker

ELS-3K:

① Backup Breaker: 25A AC Breaker
② Main Breaker : 50A AC Breaker
③ Battery Breaker: 100A DC Breaker
④ PV Breaker 2: 25A AC Breaker

⑤ PV Breaker 1: Depends on PV system 1
⑥ Grid Load Breaker: Depends on Grid Load

# 3. Installation

## 3.8 Start-up sequence

### 3.8.1 Power ON

Once the unit has been properly installed and the batteries are connected well, turn on the batteries, then turn on the battery breaker. Simply press On/Off button(located on the left side of the case) to turn on the PCS, then turn on the grid breaker, backup breaker and main breaker to power the system.

### 3.8.2 Check the system

Please refer to chapter 5.4.1 to check the system.

### 3.8.2 Power Off

Turn off the battery breaker, then simply press On/Off button (located on the left side of the case) to turn off the PCS, then turn off the grid breaker, backup breaker and main breaker to power the system. Finally, turn off the batteries.

**WARNING:** Installation must be performed with care.
Before making the final DC connection or closing DC breaker/disconnect, be sure positive(+) must be connect to positive(+) and negative(-) must be connected to negative(-). Reverse polarity connection on battery will damage the inverter.

**WARNING:** The installer is responsible for providing overcurrent protection.To reduce the risk of fire, install a circuit breaker or overcurrent device on both positive(+) and negative(-) conductors to protect the system.

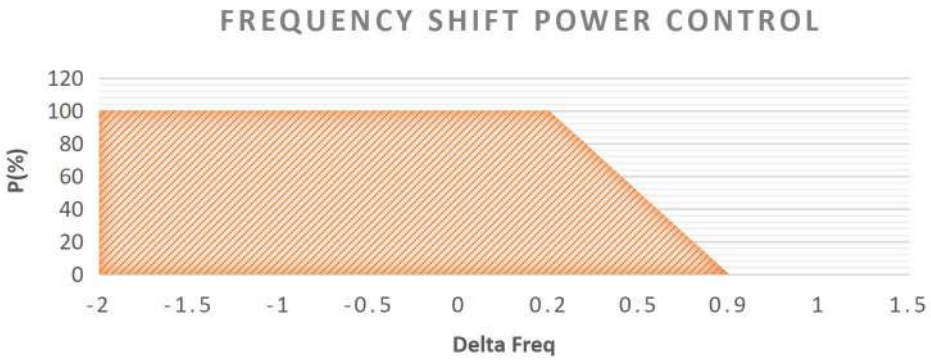
# 4. Off-Grid AC Coupling Installation

## 4.1 Frequency Shift Power Control

### Functional Overview

If the PV inverter is connected to the off-grid side of the PCS in the system, the PCS must be able to limit its output power. This limitation is necessary when the battery of the PCS is fully charged and the available power of the photovoltaic system exceeds the power demand of the connected load. In order to prevent the battery from overcharging, the PCS uses the measured the photovoltaic power and the requested charging power from battery to adjust the frequency of the microgrid, and the photovoltaic inverter adjusts the output power by detecting the change of the frequency of the microgrid.

The frequency shift power control function is enabled by default. At the same time, it is necessary to ensure that the PV module 2 is correctly connected to the Production CTs, the PV inverter function is enabled, and is set according to the APstorage over-frequency load reduction parameter setting table.




Example PV Inverter Function showing Power vs Delta Frequency

In the graph above, the horizontal axis is variation of the frequency, 0 is the rated frequency. The vertical axis represents the percentage of the current power to the rated power. The photovoltaic power changes with the microgrid frequency controlled by the PCS.

**NOTE:** The frequency change curve shown in above figure is only for display purposes. The specific parameters of the photovoltaic inverter and PCS are set according to the local certification standards and APstorage over-frequency load reduction parameter setting table.

# 4. Off-Grid AC Coupling Installation

## 4.2 PV System Switch

### Functional Overview

If the PV inverter cannot control its the power through Frequency Shift Power Control, we propose the PV System Switch solution. Through the PV System Switch, we can disable the photovoltaic inverter to prevent the battery from being fully charged and the photovoltaic Situations where power cannot be stopped.We can control off-grid energy storage photovoltaic systems by opening and closing GEN relays:

A) Backup contactor: when the Battery SOC is lower than the lower limit of Backup SOC protection, the PCS stops supplying power to the load to ensure that the battery does not enter a state of power loss. When there is enough solar power to meet the starting conditions of PV module 2, PV module 2 charges the battery through the PCS.

B) When the battery SOC is greater than Backup SOC limit, Backup Loads can be enabled.

C) PV contactor: when the battery SOC is greater than the upper limit of off-grid charging SOC, PCS will disconnect the photovoltaic inverter to prevent battery overcharging and ensure the normal operation of Backup Load.

D) When the battery SOC is lower than the upper limit of off-grid charging SOC recovery, PCS will wake up PV module 2 which will supply power to the energy storage system.

## 4.3 PV System to APstorage Pairing

1. Determine the maximum single load power rating (kW) to be backed up and select the absolute minimum number of PCS units required to meet the requirements of 2017 NEC 690.10->710.15(A). Up to 2 ELS 5K units can be connected in parallel.

2. Calculate the required energy storage capacity (kWh) based on the backup load estimate for the user-defined time period, capacity and the minimum number of batteries required.

3. Calculate the maximum power (PV module 2) of the photovoltaic system connected to the PCS in Table 1. Note the number is different if the PV inverter has Frequency Curtailment and/or not.

If the total power of the photovoltaic system is greater than the maximum power, the excess power (PV System1) is connected to the grid side.

# 4. Off-Grid AC Coupling Installation

**Table 1: The maximum power of the photovoltaic system for storage system backup**

| **ELS-5** units<br>（1unit per 5kWac） | Battery power（kWac） | Max PV system power in System 2 with Frequency Shifting (kWac) |
|---|---|---|
| 1 | ⩽6.25 | Battery power |
| 1 | ⩾6.25 | 6.25 |

| **ELS-3** units<br>（1unit per 3.68kWac） | Battery power（kWac） | Max PV system power in System 2 with Frequency Shifting (kWac) |
|---|---|---|
| 1 | ⩽4.6 | Battery power |
| 1 | ⩾4.6 | 4.6 |

| **ELS-5** units<br>（1unit per 5kWac） | Battery power（kWac） | Max PV system power in System 2 without Frequency Shifting (kWac) |
|---|---|---|
| 1 | ⩽5 | Battery power |
| 1 | ⩾5 | 5 |

| **ELS-3** units<br>（1unit per 3.68kWac） | Battery power（kWac） | Max PV system power in System 2 without Frequency Shifting (kWac) |
|---|---|---|
| 1 | ⩽3.68 | Battery power |
| 1 | ⩾3.68 | 3.68 |

Two calculation examples are given below for reference:
Step 1: Figure out Battery Max Charge Power.
Step 2: Figure out PCS Charge Power
Step 3: Take the smaller number
Step 4: Multiply by 1.25 (If using Frequency Power Control)

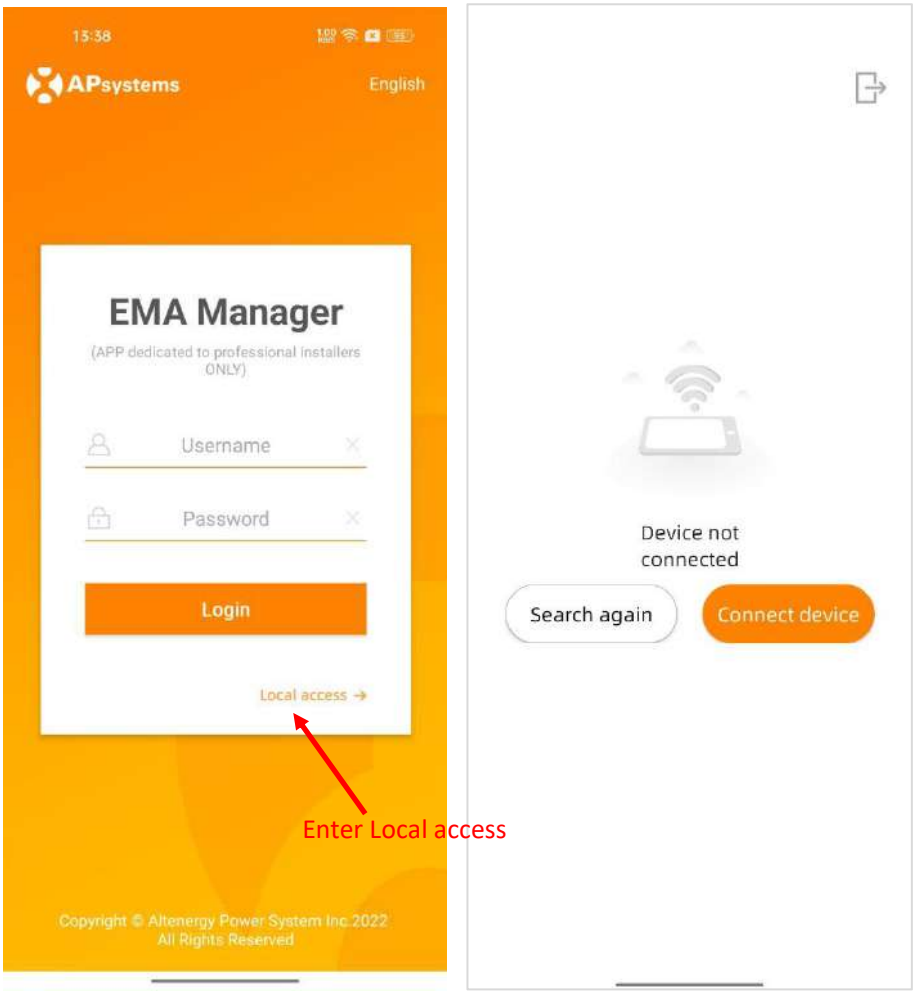
**Table 2: Examples Calculation of Off-grid Solar**

| Examples Calculation of Off-grid Solar |
|---|
| 1 ELS-5K+1 APbattery-48V/5.76kWh<br><br>1. Battery Power = 2.5kW<br>2. ELS Power =5kW<br>3. 2.5kW is smaller<br>Battery Power 2.5kW is the largest off-grid PV capacity |

# 5. APstorage User Interface

Professional and certified Installer can commission, monitor and maintain the APstorage solution and performance via the EMA Manager APP. Please search for the APP in APP Store or Google Play, or use mobile browser to scan the QR codes to download the APP. (EMA App is for end-users, EMA Manager is for installers). You can also click on the link below to download the APP: http://q-r.to/1OrC

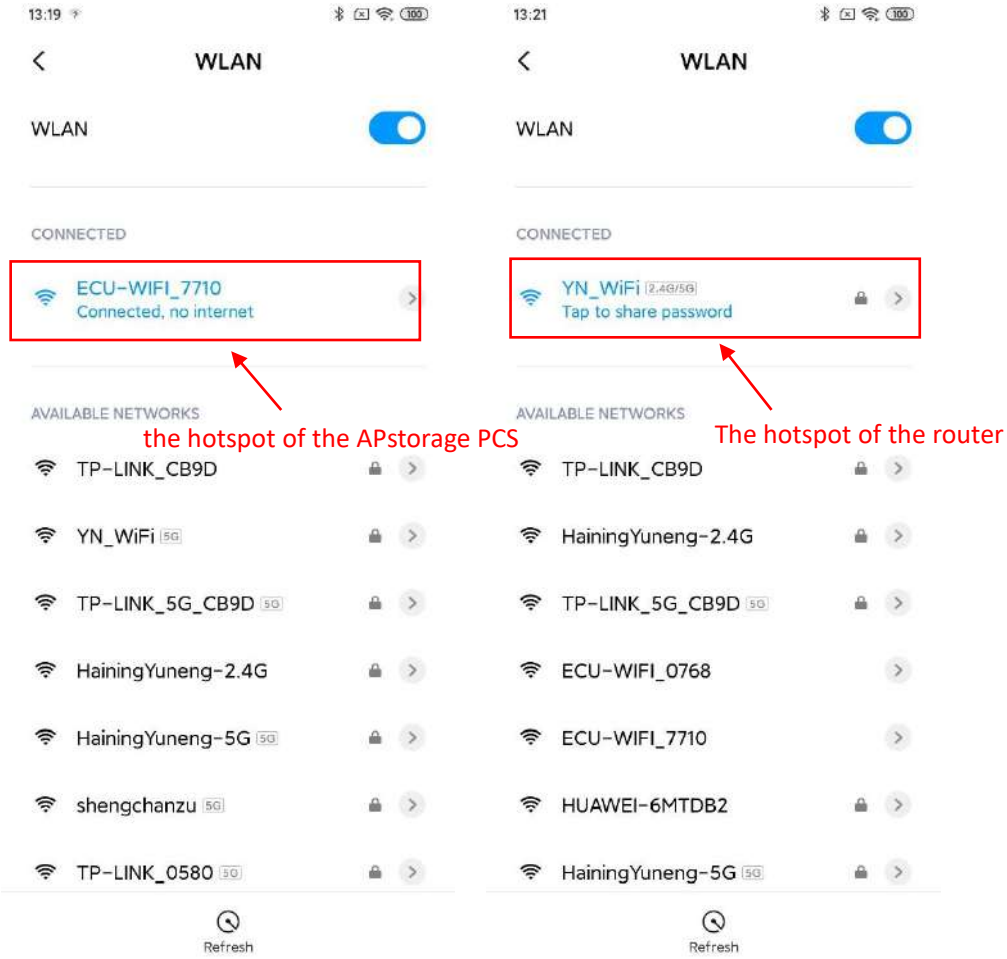
The APstorage PCS has been designed with local connection and management functionality. You can access this local functionality through EMA Manager.
Click "***Local access***" to enter this function.




You will be noticed if your smartphone or tablet is not initially connected to the hotspot of the APstorage PCS or the router to which the APstorage PCS is connected.

- Step1: Open Wi-Fi setting in your smartphone, connect to the hotspot of the APstorage PCS, the format of the hotspot is ECU-WIFI_XXXX, XXXX being the last four digits of the built-in ECU. Also you can connect to the router which the APstorage PCS is connected to.

# 5. APstorage User Interface



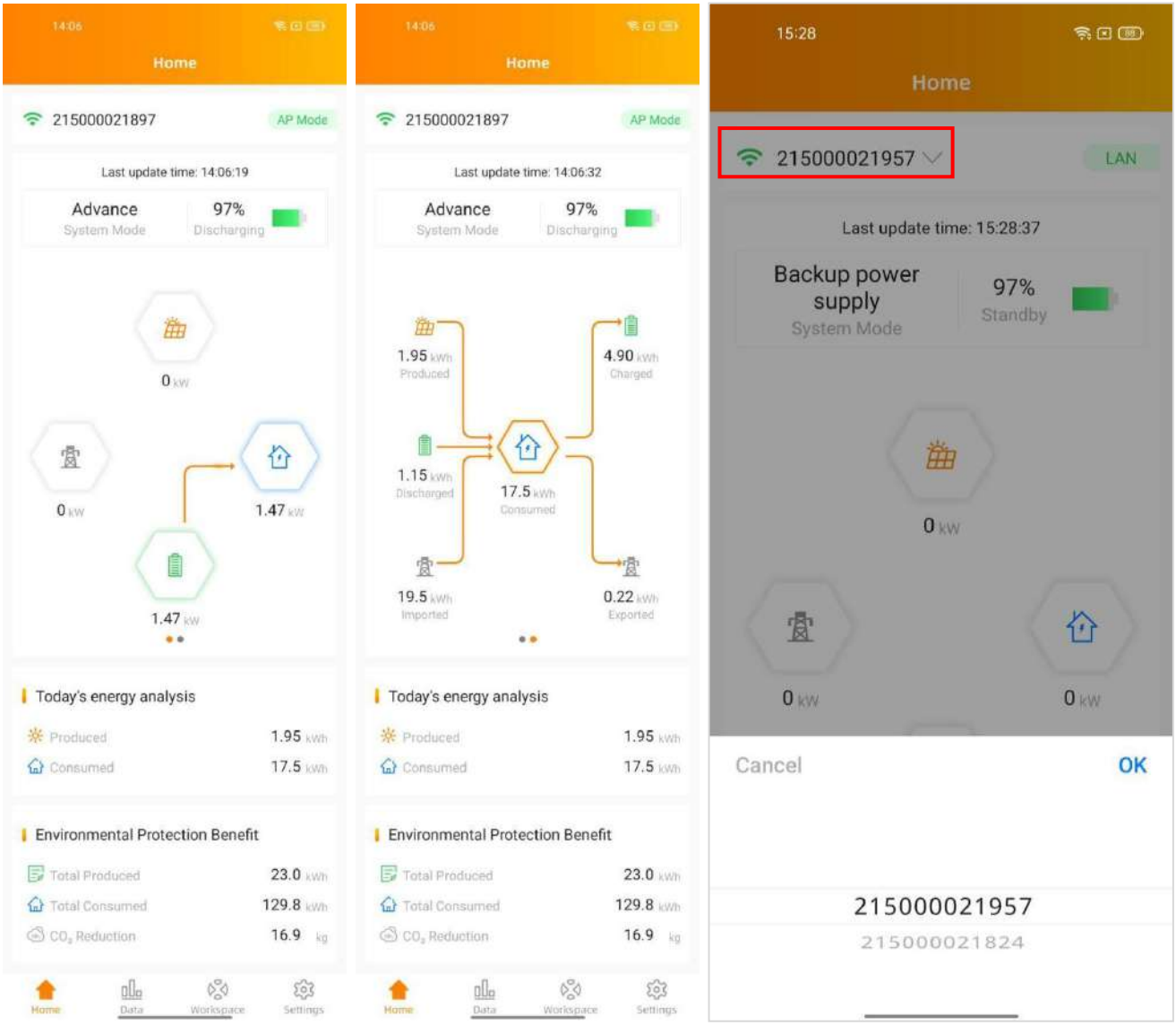

- Step 2: Open EMA Manager.
- Step 3: Click "***Local access***"

You can use this APP to connect the APstorage PCS to the router via Lan or Wlan. (Please refer to chapter 5.3.3)

# 5. APstorage User Interface

## 5.1 Home Page

5.1.1 You can view the system ID, charge and discharge status, real-time power, SOC, today's charged energy, total charged energy since installed, and $CO_2$ reduction.




By clicking the drop-down box above, switch the devices in the local area network.

**NOTE:** Switching is only possible when the phone and the device are connected to the same router.

# 5. APstorage User Interface

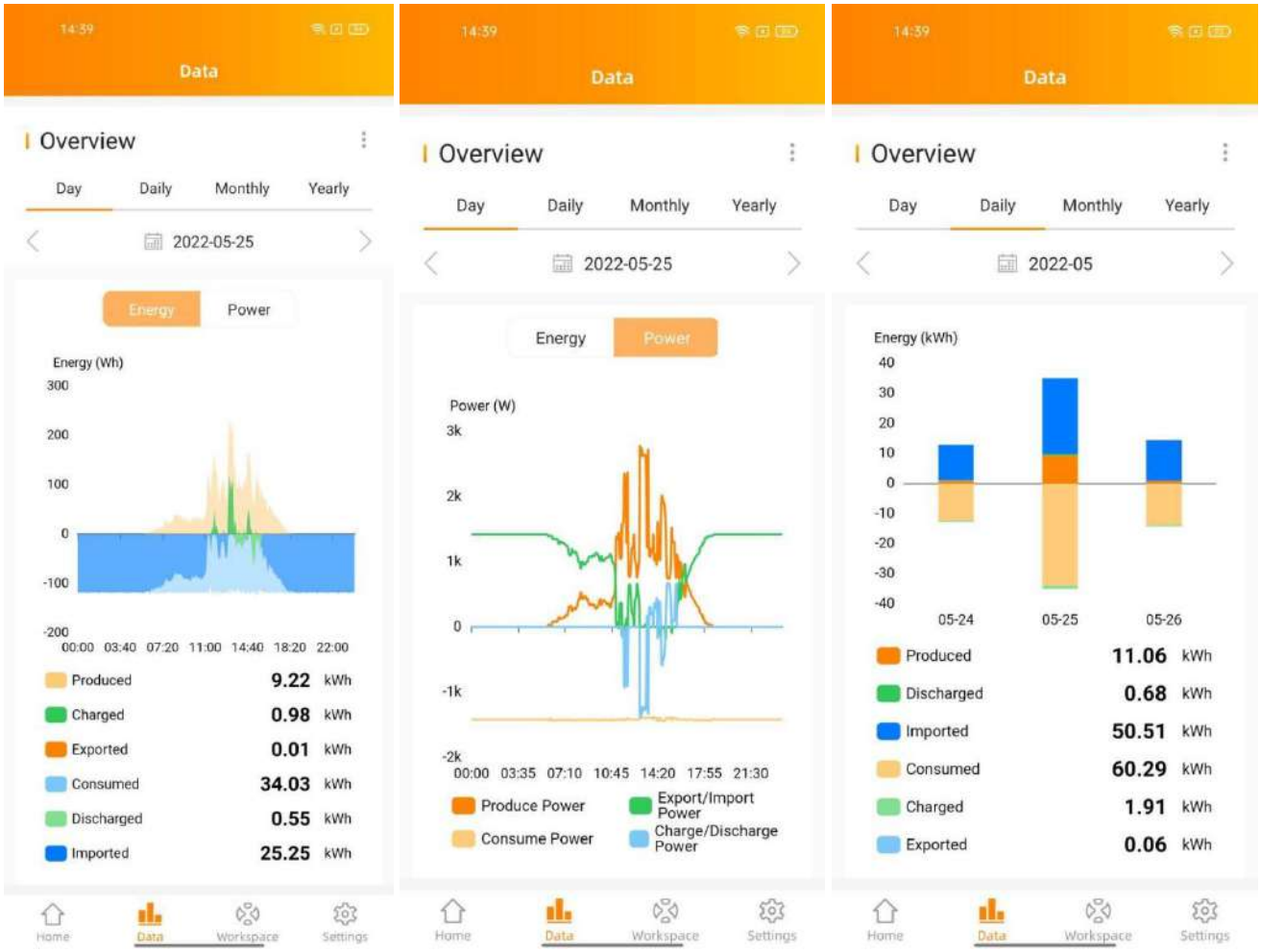
## 5.2 Data

5.2.1 Data overview

This page is used to display the system overview. Select a date to view the system's power summary information and power distribution information and its graph.

Click on the "Energy" or "Power" buttons to view the energy and power chart of the system for the day.

Select Daily, Monthly or Yearly to display the current month, current year, and historical data.

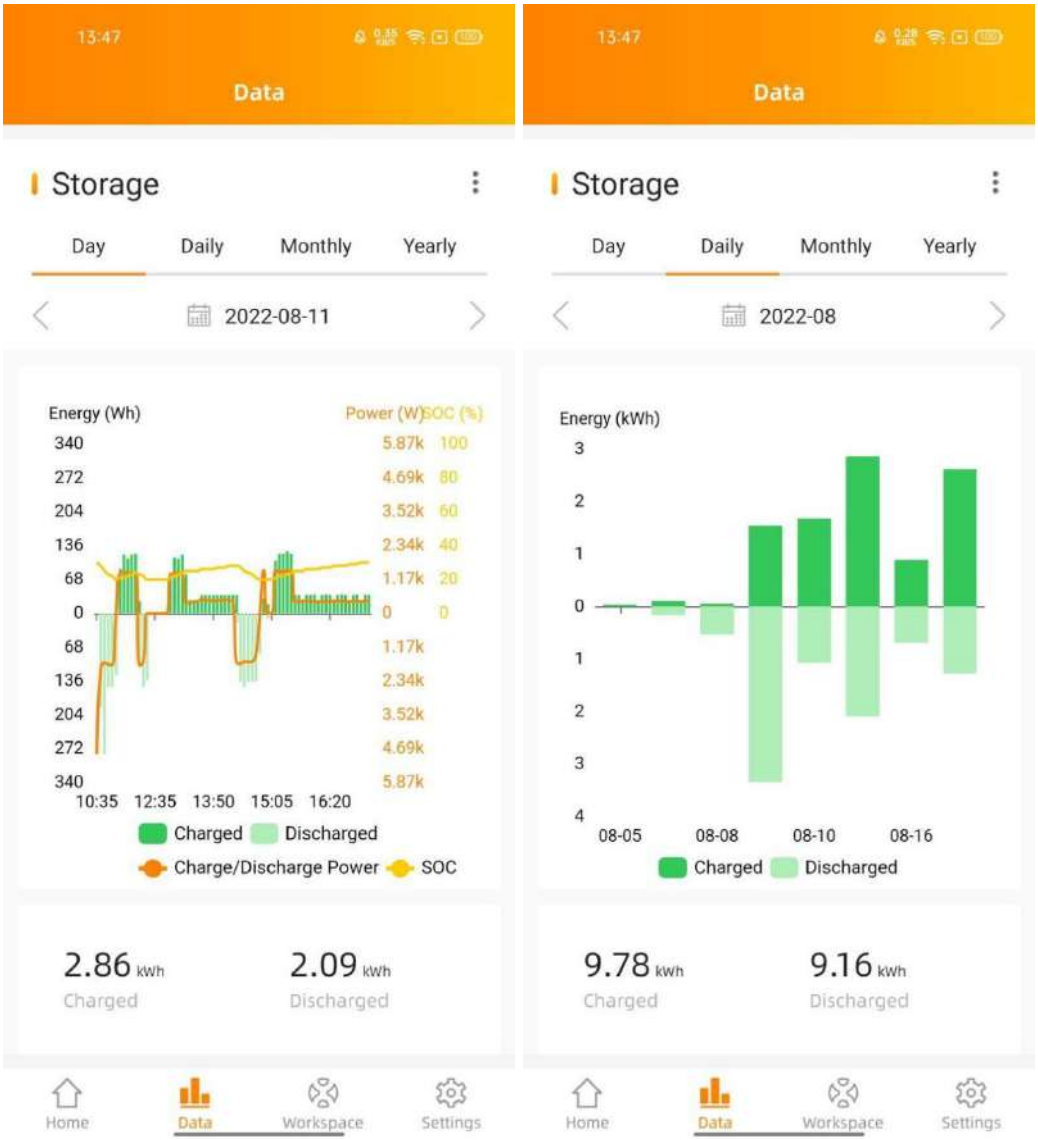


# 5. APstorage User Interface

5.2.2 Storage data

The daily energy storage power curve is displayed on this page. Select a date to view the historical power and electricity curve of energy storage.

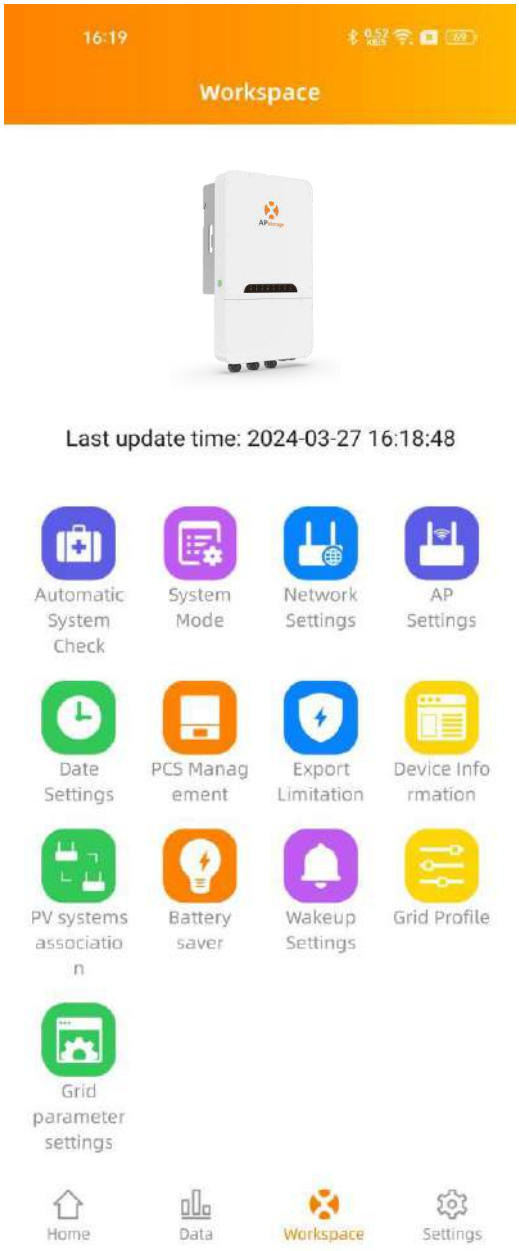
Select Daily, Monthly or Yearly to display the current month, current year, and historical data curve.



# 5. APstorage User Interface

## 5.3 Workspace

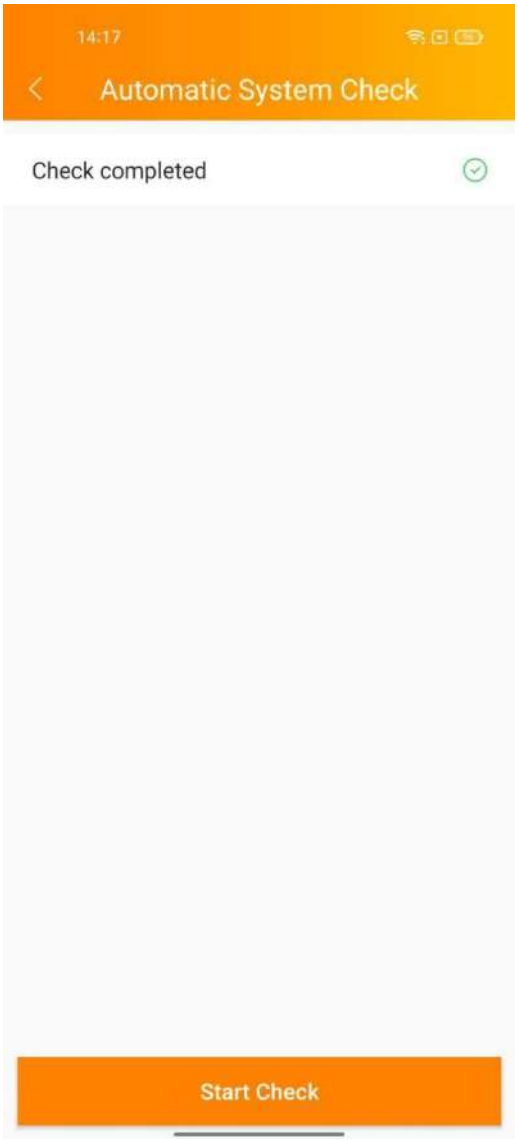
The workspace displays the latest communication time, and currently supported function catalog.
Click the corresponding button to enter the function page.



# 5. APstorage User Interface

5.3.1 Automatic System Check

Enter the Automatic System Check interface, you can check the PCS information. If there is an alarm, you can click to view the detailed information.



# 5. APstorage User Interface

5.3.2 System Mode

The system mode of the APstorage PCS includes backup power supply mode, residual power Self-Consumption mode, advanced mode and Peak-Shaving mode. If you need to set the system working mode, please select the corresponding working mode and set the parameters, and then click "OK".

**Backup power supply mode:**

Emergency power supply (EPS) mode, the system charge when grid connected and discharge when off grid.

**Self-Consumption mode:**

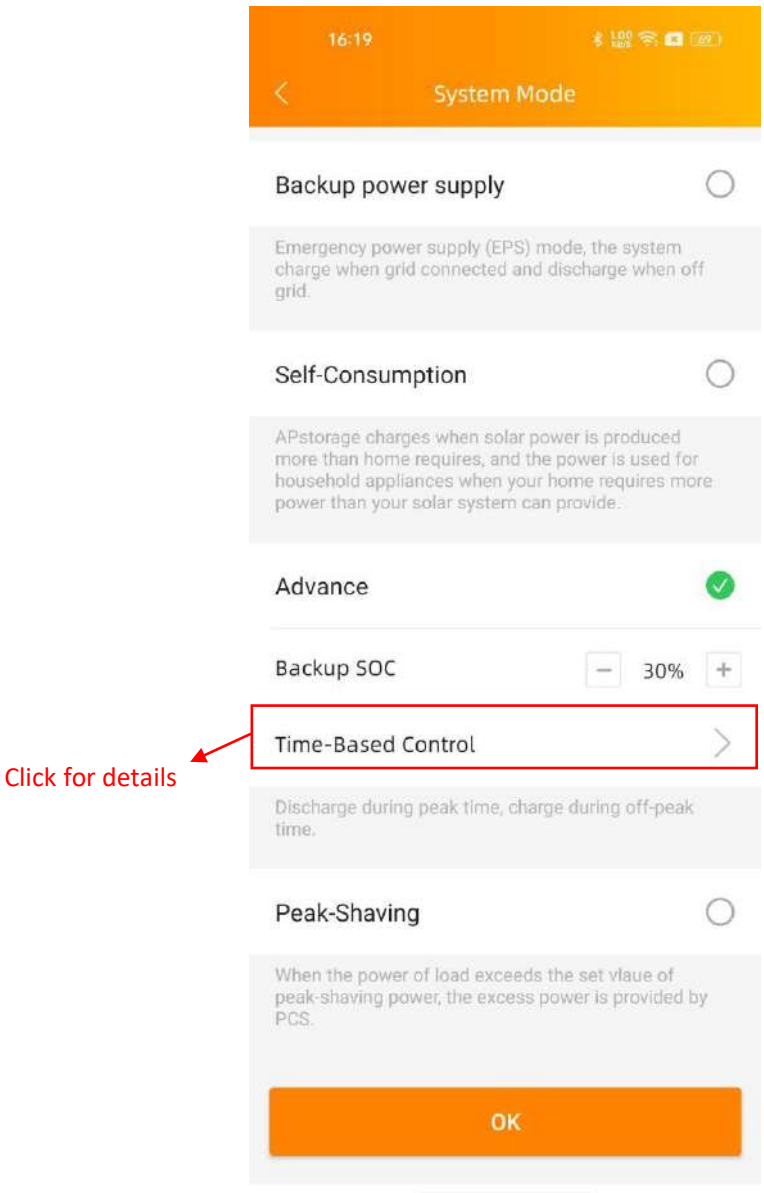
APstorage charges when solar power is produced more than home requires, and the power is used for household appliances when your home requires more power than your solar system can provide.

**Advanced mode:**

Discharge during peak time, charge during off-peak time.

**Peak-Shaving mode:**

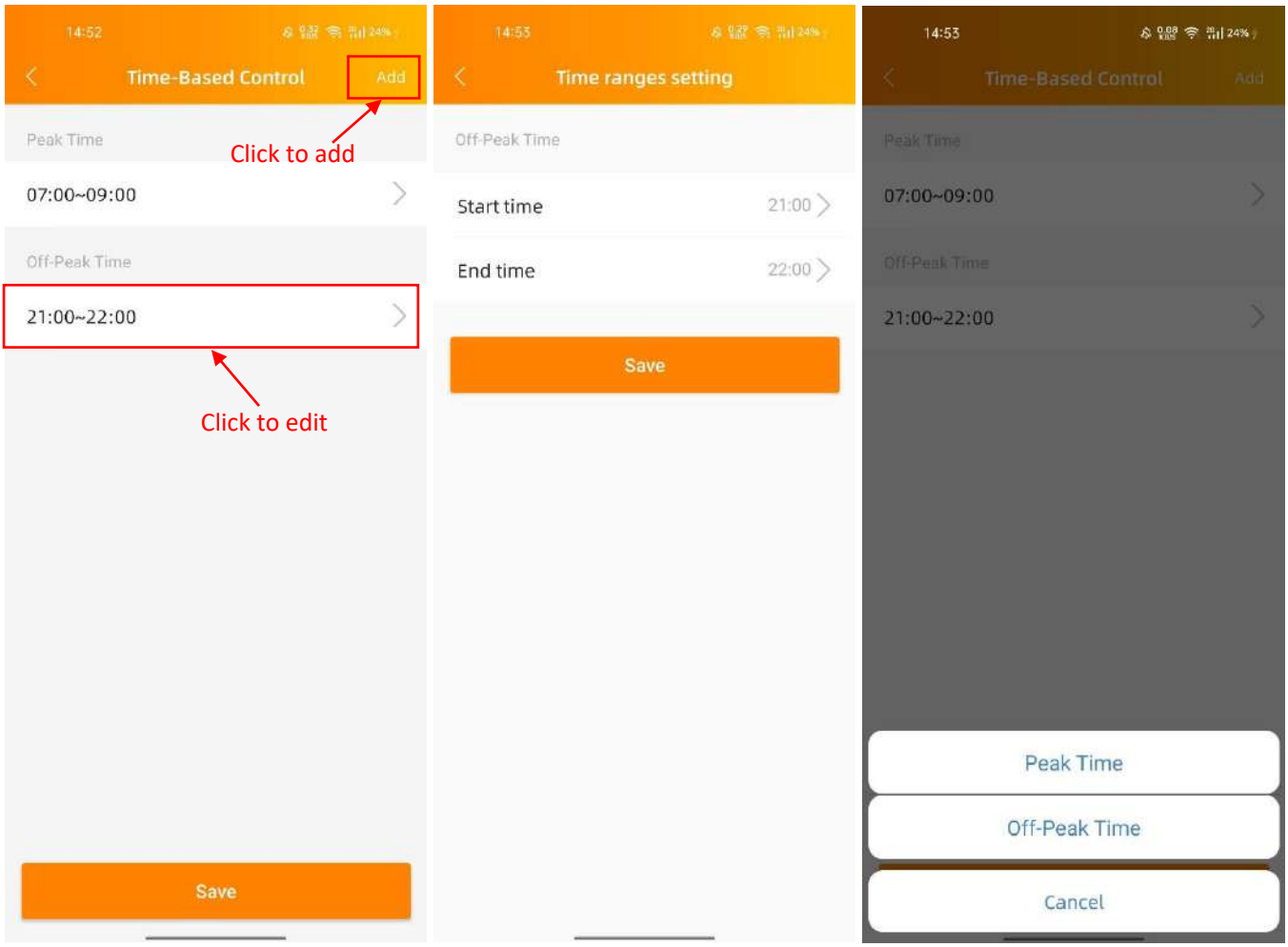
Input peak-shaving power,when the power of load exceeds the set value of peak-shaving power, the excess power is provided by PCS.



# 5. APstorage User Interface

5.3.2.1 Time-Based Control

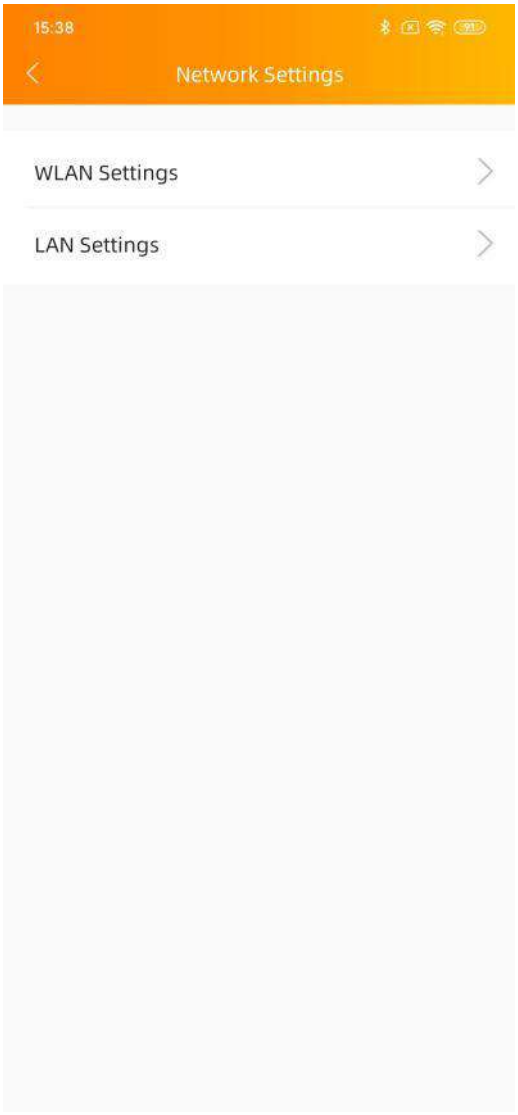
Click “Time-Based Control”, you can view the list of peak times and off-peak times currently set. You can edit the time ranges by clicking on it. Click on the "Add" button to select the peak time or off-peak time to be added.



# 5. APstorage User Interface

5.3.3 Network Setting

Click the button to enter the WLAN Settings or LAN Settings page.

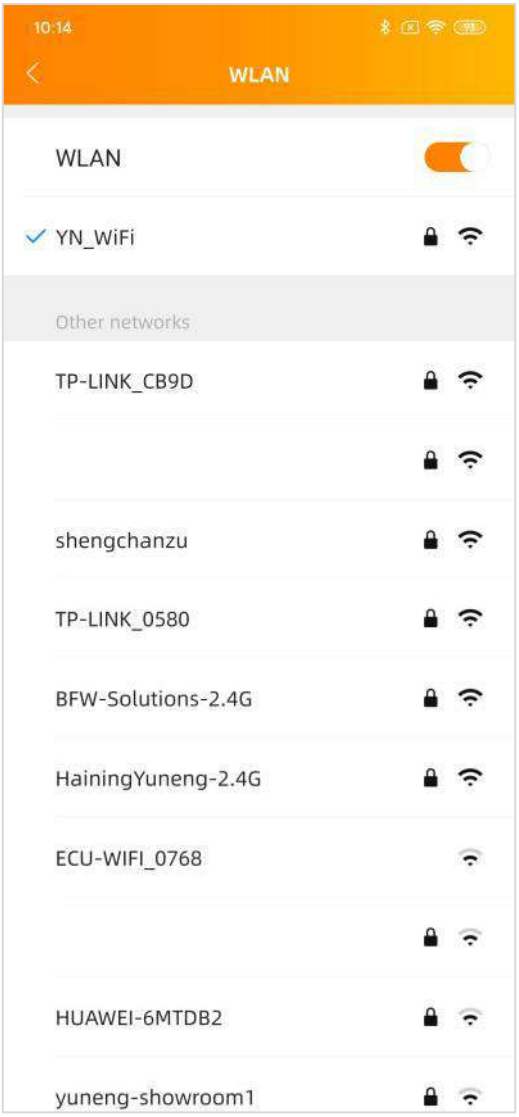


# 5. APstorage User Interface

5.3.3.1 WLAN Settings

This interface will display the WLAN connection status of the ECU. Scroll down the screen and the available SSID will be displayed. Click SSID, and enter the password.

After entering the password, the ECU will restart. Please reconnect the ECU.



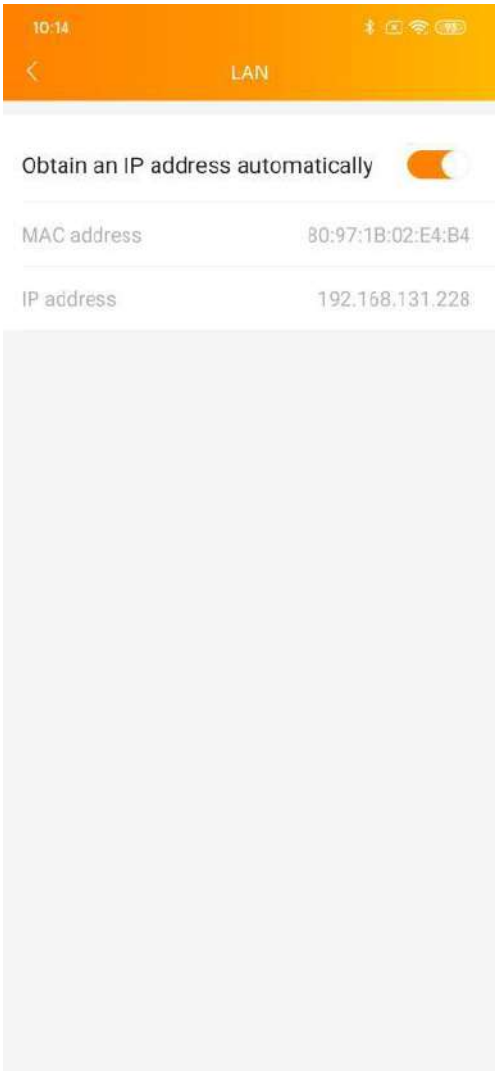
# 5. APstorage User Interface

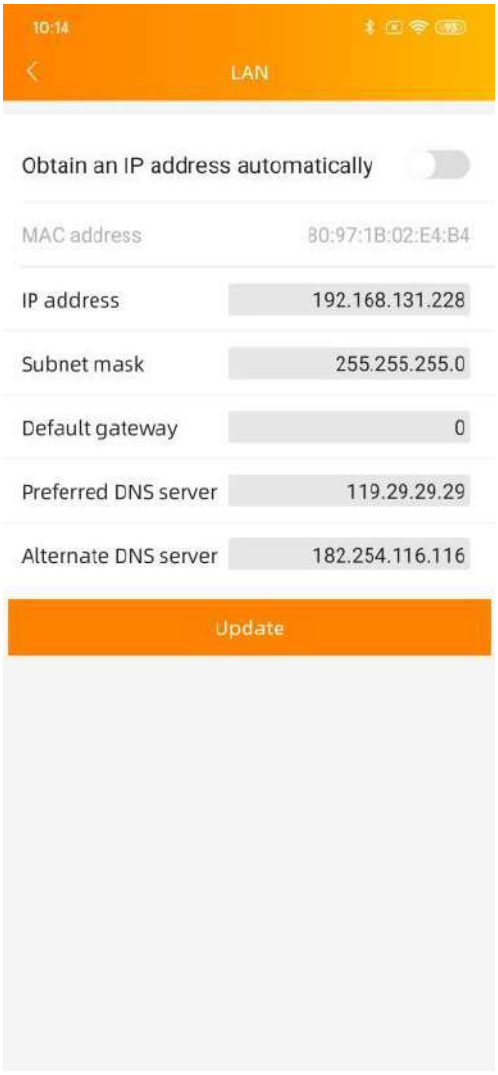
5.3.3.2 LAN Settings

The LAN setting of ECU is divided into automatically obtaining IP address and using fixed IP address.

Obtaining an IP address automatically (recommended) means that the router will automatically assign the IP to the ECU.

When using a fixed IP, please enter the IP address, subnet mask, default gateway, preferred DNS server and alternate DNS server.

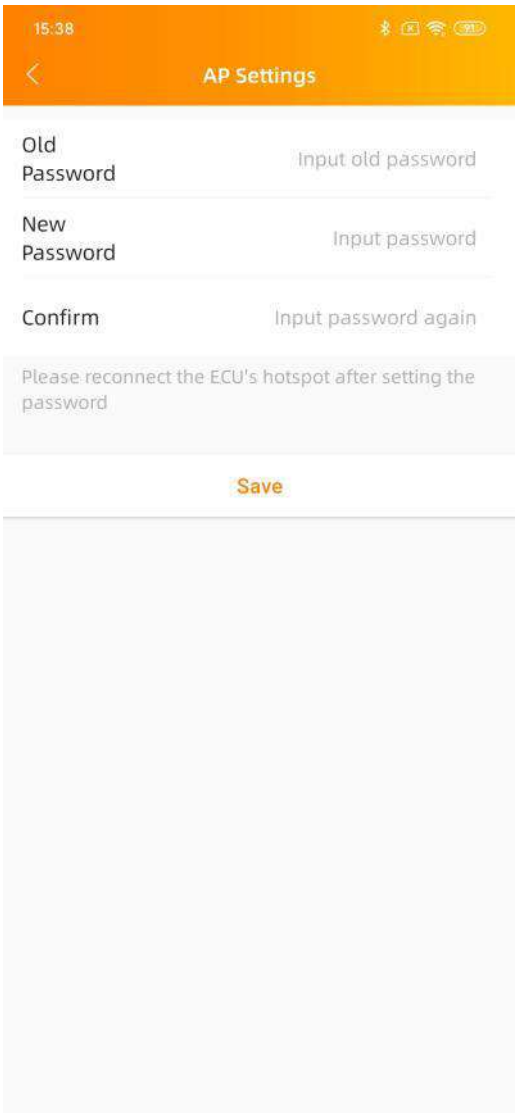


# 5. APstorage User Interface

5.3.4 Hotspot Settings

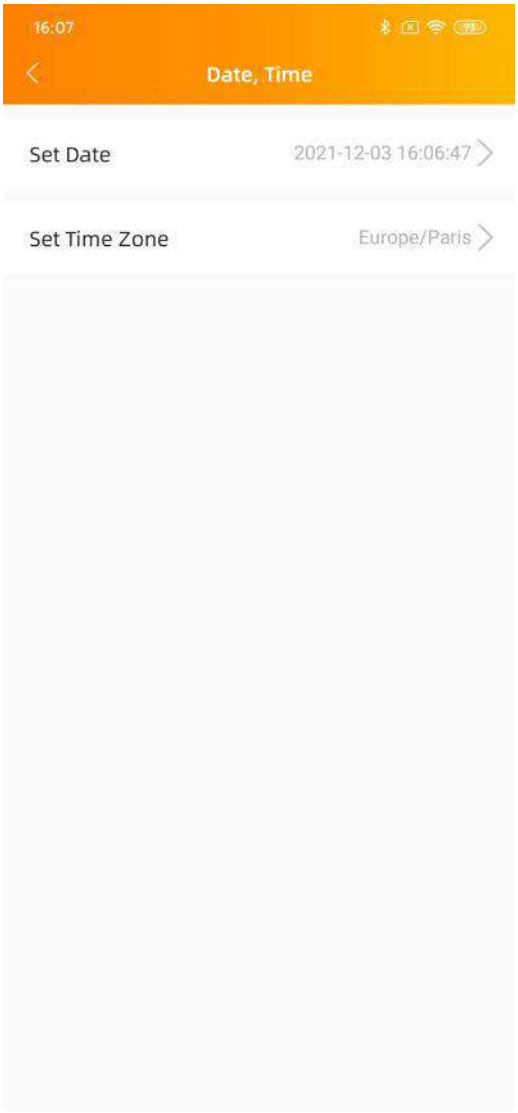
Enter the hotspot setting interface, you can change the hotspot password of the ECU. After setting the password, please reconnect to the hotspot of the ECU.



# 5. APstorage User Interface

5.3.5 Data Settings

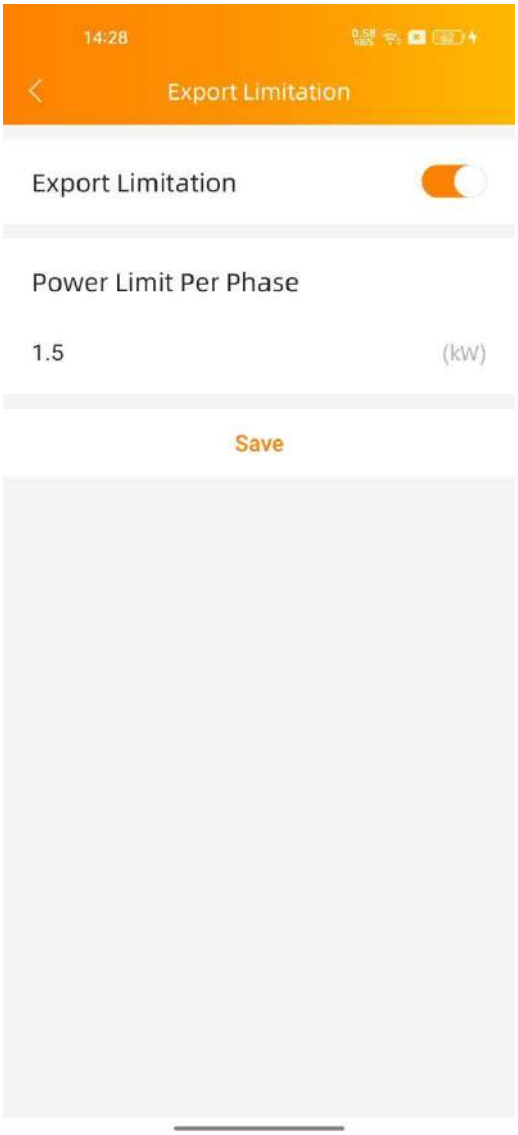
After entering this page, the time will be displayed on the right. Click on the date, time, and time zone to modify.



5.3.6 Export Limitation

When the APstorage PCS is associated to an APsystems PV system, if needed, the Export Limitation function can limit the PV output power to the grid, and the user can set the maximum allowable reverse current power when the Export Limitation function is turned on.

**NOTE:** The minimum reverse current power power is set to 0.1KW.



# 5. APstorage User Interface

5.3.7 Device Information

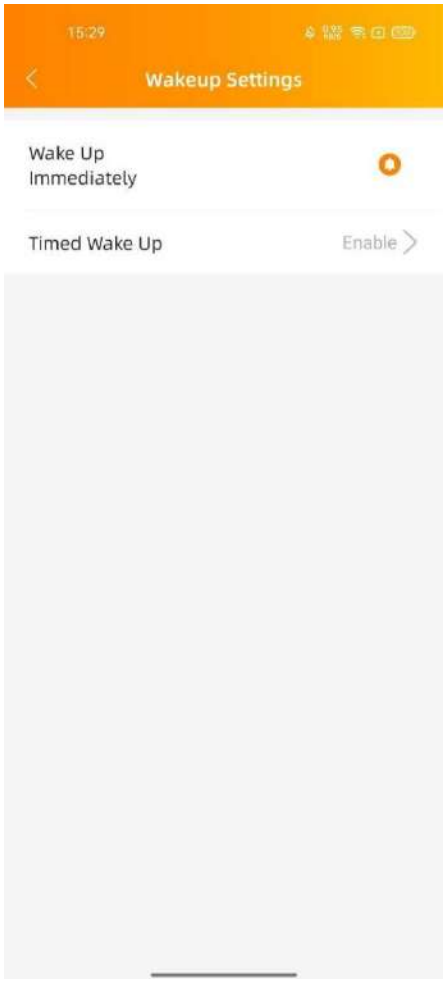
The device information page displays the device ID, device type, PCS number, battery capacity, device version number, wired and wireless network MAC, currently connected router SSID, IP address.

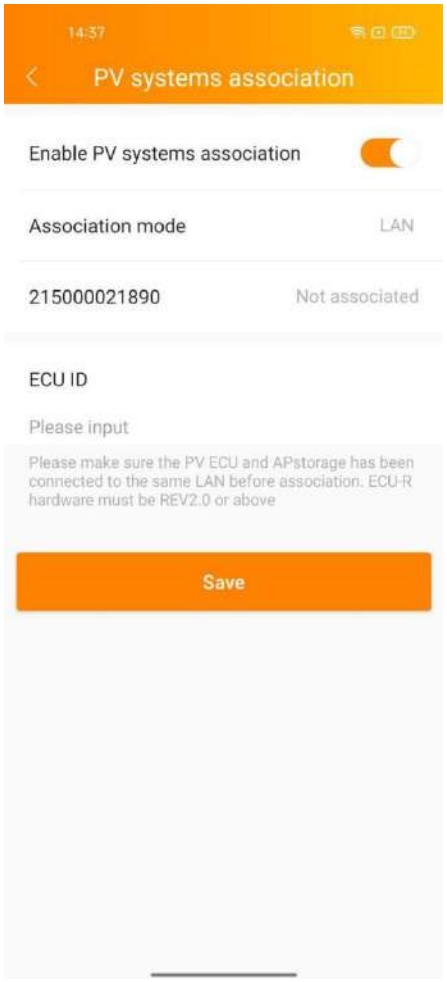
# 5. APstorage User Interface

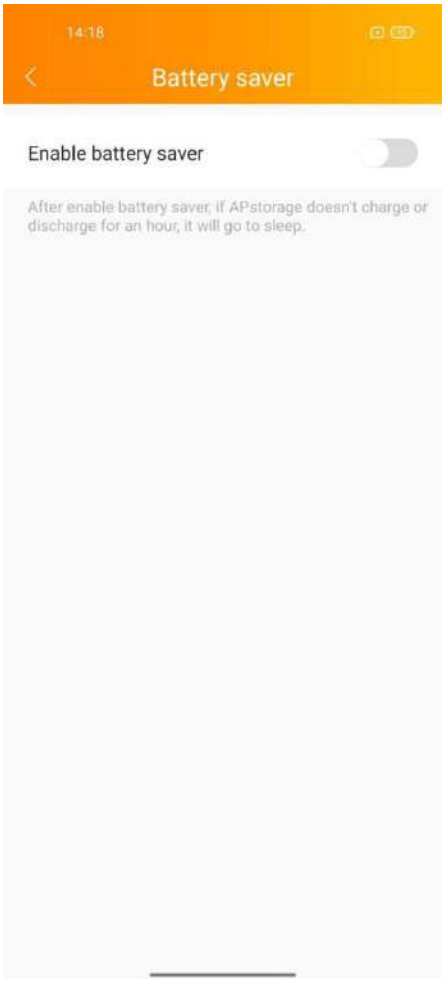
5.3.8 PV systems association
Enter this page, you can view the current association status.
If you have installed APsystems microinverters with an ECU, you can associate the APstorage with the PV system. Enter the PV ECU's ID, then click Save, the APstorage will associate with PV system automatically. It is necessary if you want to turn on Export Limitation function.

5.3.9 Battery saver
Enter this page, you can enable the "battery saver" function. After enabling the "battery saver" function, if PCS doesn't charge or discharge for an hour, it will go to sleep.

5.3.10 Wakeup Settings
Wakeup Settings is used for system wake-up related settings.
When system enters into sleeping mode, you can wake it up by clicking on "Wake Up Immediately".



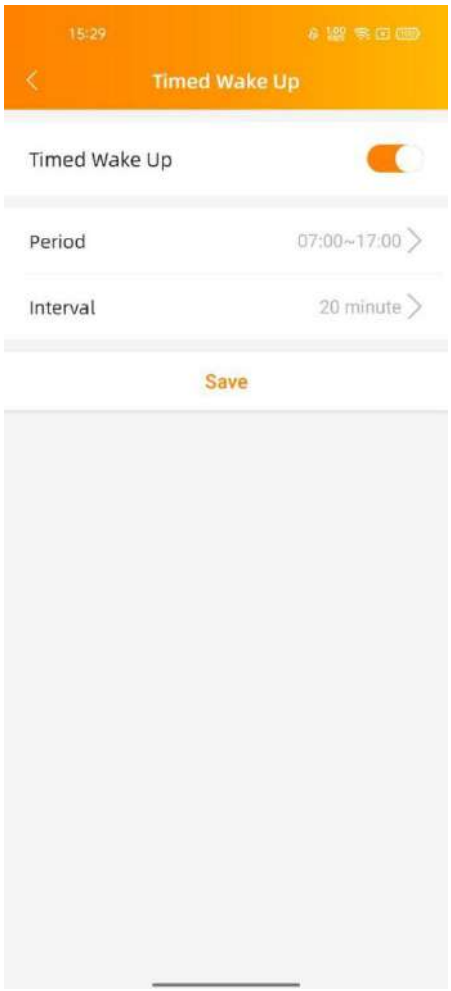



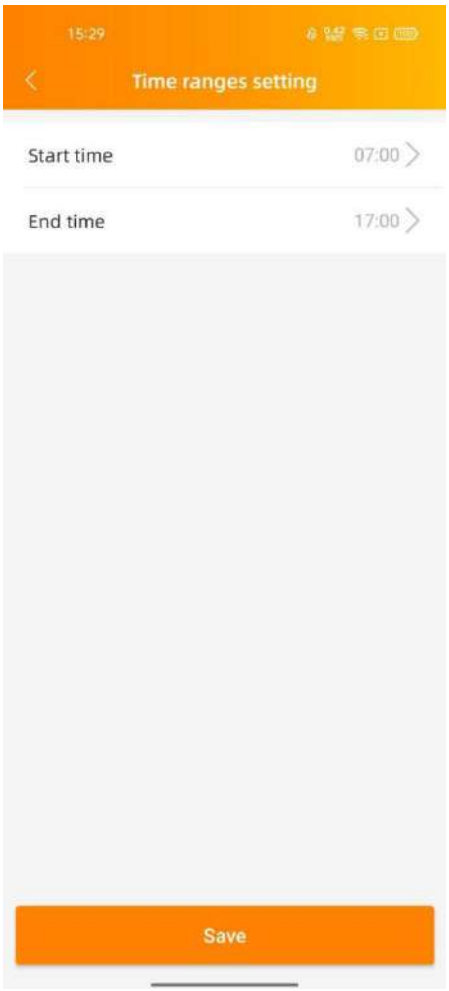



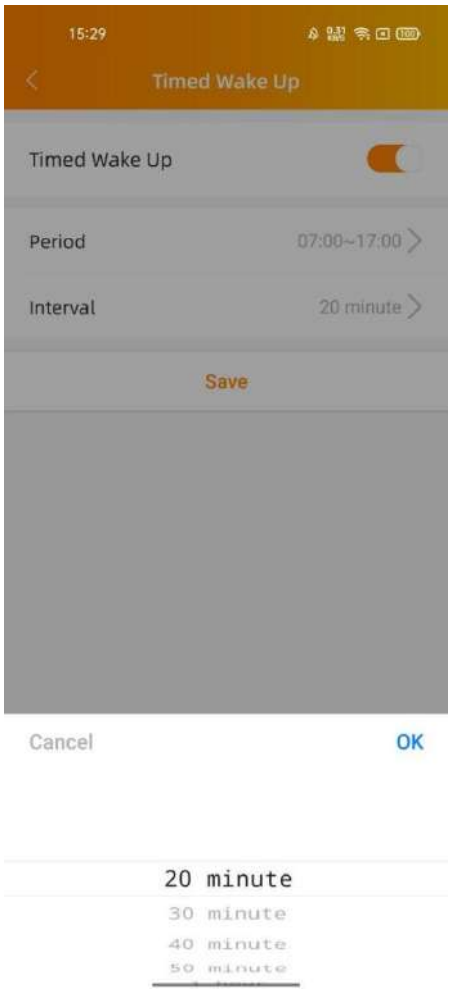
# 5. APstorage User Interface

5.3.10.1 Timed Wake Up

On this page, you can set the wake-up time period and interval, the system will wake up at the set time interval within the set time period.



# 5. APstorage User Interface

5.3.11 Grid Profile

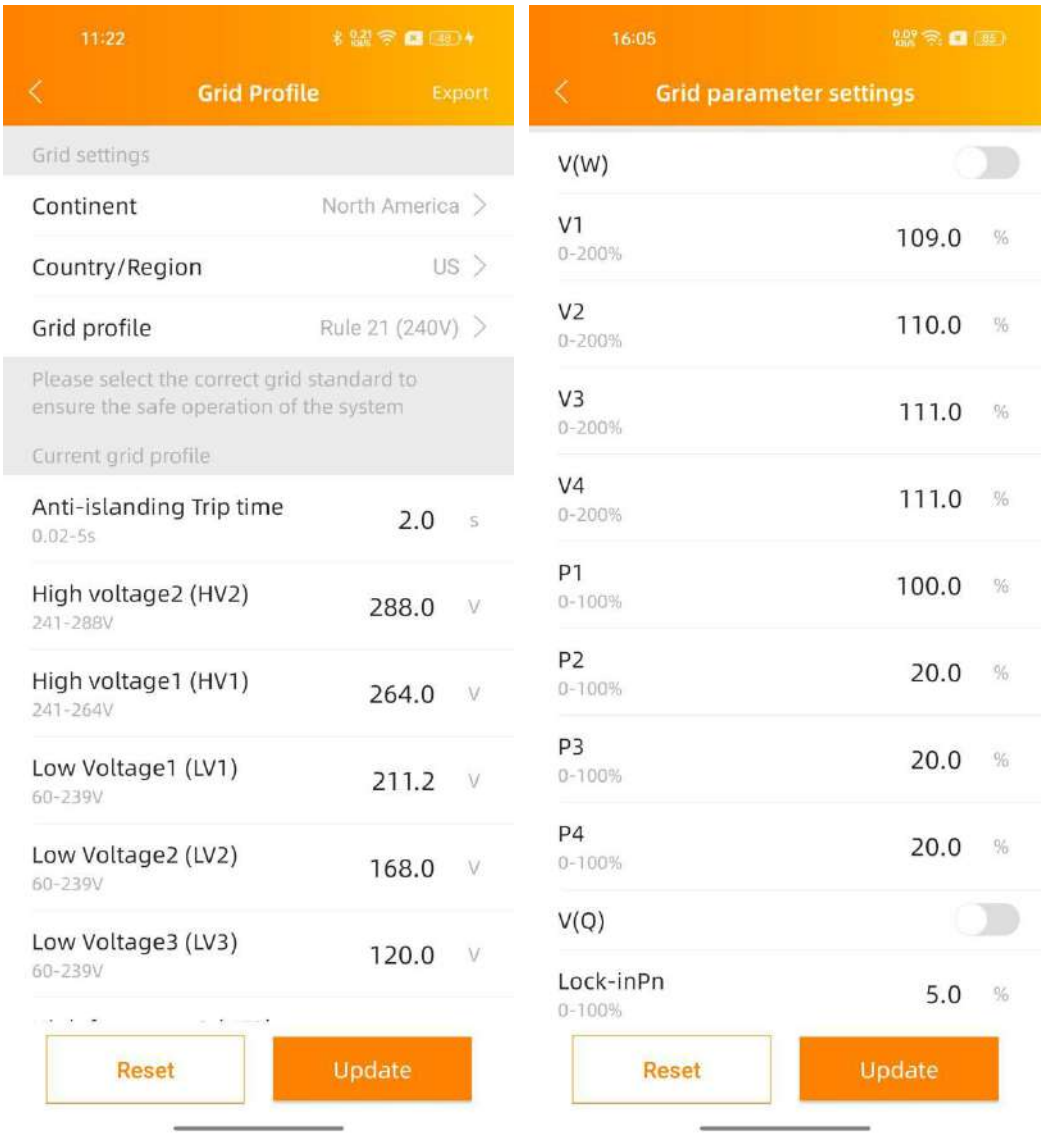
Choosing the correct grid profile can make the system work more stably.

Please select the "Continent"- "Country/Region"-"Grid Profile", and then click the "Update" button to set the grid profile .

If you need to enable the “Off-grid Charging” function, please set up the power grid and go to ” Remote Control”-“ECU-remote” (4.3) to enable the “Off-grid Charging” function.

5.3.12 Grid parameter settings

Adjust the Over voltage power limit, Q (U) mode, P (Q), and Specific Power Factor mode of PCS according to the set values.

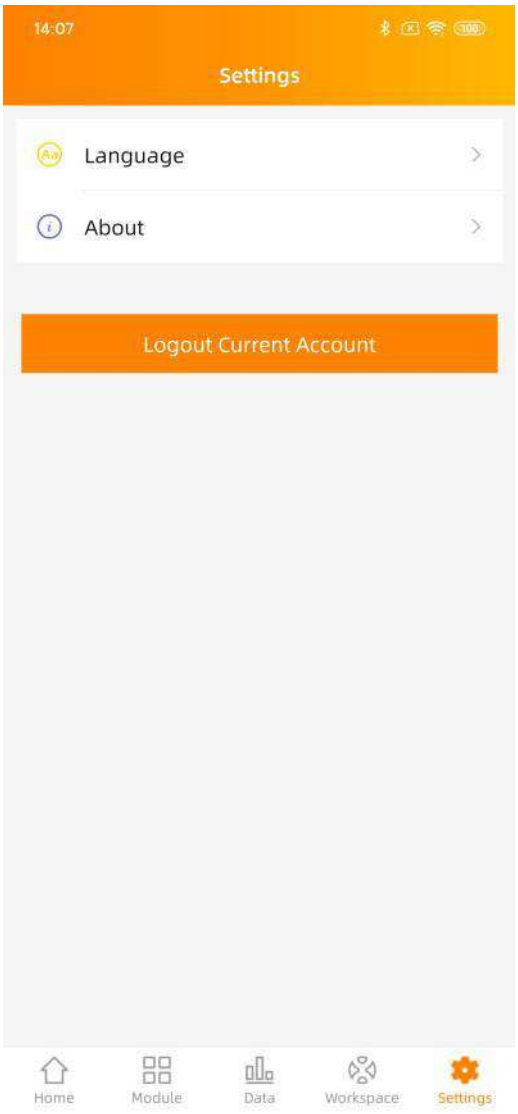



**NOTE:** Please select the correct grid standard to ensure the safe operation of the system.

# 5. APstorage User Interface

## 5.4 Settings

Select "Language" to set the APP language, and "About" to view the APP introduction.



# 6. ELS-5K/3K Technical Data

| Model | ELS-5K | ELS-3K |
|---|---|---|
| Region | NA | |
| **General Specification** | | |
| Dimensions W/H/D | 33.3"×19.8"×7.7" (847mm × 502mm × 197mm) | |
| Weight | 64lbs (29kg) | 63lbs (28.7kg) |
| Maximum Efficiency | 96.5% | |
| Temperature Range | -25°C-65°C (-13°F-149°F) | |
| Ingress Protection | Type 4X | |
| Relative Humidity | 10%-90% | |
| Ventilation | Natural convection | |
| Communication Ports | Ethernet/ Wireless/RS485/CAN | |
| Grid Regulation<br>Safety and EMC Compliance | UL1741; CSA C22.2 No. 107.1-16; CA Rule21(UL1741SA);<br>ANSI/CAN/UL-9540(For energy storage system)<br>FCC part15; ICES-003 | |
| Warranty | 10 years | |
| **Battery Input/Output Data** | | |
| DC Battery Input Voltage | 40-60VDC | |
| Battery Capacity | 50~800Ah | |
| Charging Strategy for Li-Ion Battery | Self-adaption to BMS | |
| Max Continuous Charge Current | 110A | 85A |
| Max Continuous Discharge Current | 110A | 85A |
| **AC Input/Output Data (On-grid)** | | |
| Max. Continuous Output Power | 5000VA | 3680VA |
| Max. Continuous Output Current | 20.8A | 15.3A |
| Max. Continuous Input Power | 10000VA | 7360VA |
| Max. Continuous Current From Utility Grid | 41.6A | 30.6A |
| Max. Output Fault Current (AC) and Duration | 60.66Apk, 10.5ms; 9.32Arms @3cycles; 7.23Arms @5cycles | |
| Nominal Output Voltage | 240V | |
| Nominal Output Voltage Range | 211-264V(1) | |
| Nominal Output Frequency/Range | 60Hz/59.3-60.5Hz(1) | |
| Output Power Factor | >0.99(Adjustable from 0.8 leading to 0.8 lagging) | |
| THD | <3% | |
| Grid Connection | Single-phase | |
| **AC Input/Output Data (Backup)** | | |
| Max. Input/Output Apparent Power@240V | 5000VA | 3680VA |
| Peak Output Apparent Power@240V | 7500VA(10s) | 5520VA(10s) |
| Max. Input/Output Current | 20.8A | 15.3A |
| Nominal Input/Output Voltage L1-L2/L-N | 240Vac/120Vac (with external transformer) | |
| Nominal Output Frequency | 60Hz | |

*(1) Voltage/frequency range can be adjusted if required by local utility*

# 7. T-A Technical Data

| Model | T-A（5KVA） | T-A（10KVA） |
|---|---|---|
| General Specification | | |
| Dimensions W/H/D | 20.6”x 12.4”x 4.3”(524mm × 315mm × 186mm) | |
| Weight | 67.2lbs (30.5kg) | 90lbs (41kg) |
| Temperature Range | -13°F-149°F (-25°C-65°C) | |
| Ingress Protection | Type 4X | |
| Relative Humidity | <95% | |
| Ventilation | Natural convection | |
| Technical Data | | |
| Input/output voltage | 120 / 240Vac | |
| Nominal AC Output Power | 5kVA | 10KVA |
| Peak Output Power | 7.5KVA | 15KVA |
| Frequency | 60Hz | |
| Max. Continuous Output Current per Phase@ 120V | 41.67A | 83.34A |
| Split Phase Imbalance @Rate Power | Up to 41.67A difference between phase | Up to 83.34A difference between phase |

# 8. Contact Information

**APsystems America**

8627 N Mopac Expy, Suite 150, Austin, TX 78759

Mail: info.usa@APsystems.com

Web: usa.APsystems.com