



Energy Management System Installation and Operation Manual

Europe

Revision Log

Version	Date	Rationale
V1.0	April 25, 2023	Initial version.
V1.1	May 25, 2023	Added a compatible energy meter. Modified the maximum wire length between the primary charger and the meter.
V2.0	Sept. 19, 2023	Optimized the structure. Added PV Hybrid mode w/ multiple chargers. Added EMS mode.

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IMPORTANT

Before installing and operating the Autel Energy Management System, please read this manual carefully, paying extra attention to the important notes.

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1 Using This Manual

This manual is intended to outline the Energy Management System Solution for Autel AC MaxiChargers EU. It describes the operating modes supported by the Autel Energy Management System, the installation instructions, and the app configuration.

This document is intended for the following:

- Owners of Autel AC MaxiChargers
- Certified electricians/installers

1.1 Conventions

The following conventions are used:

1.1.1 Bold Text

Bold text is used to highlight selectable items such as buttons and menu options.

1.1.2 Notes

NOTE

Provides helpful information such as additional explanations, tips, and comments.

IMPORTANT

Reminds you that you must follow the instructions to prepare, set up, configure, and operate.

1.1.3 Hyperlinks

Hyperlinks are available in electronic documents. Blue italic text indicates a selectable hyperlink, and blue underlined text indicates a website link or an email address link.

1.1.4 Illustrations

Illustrations, especially the screenshots of the app interface, used in this document are for reference only. The actual product and screens may differ.

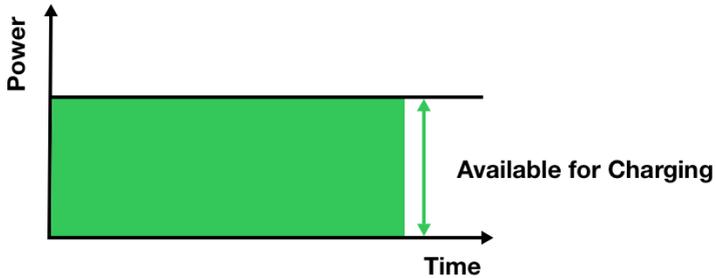
2 Energy Management System

The Autel Energy Management System offers four operating modes. You can select a mode based on the different usage scenarios.

2.1 Operating Modes

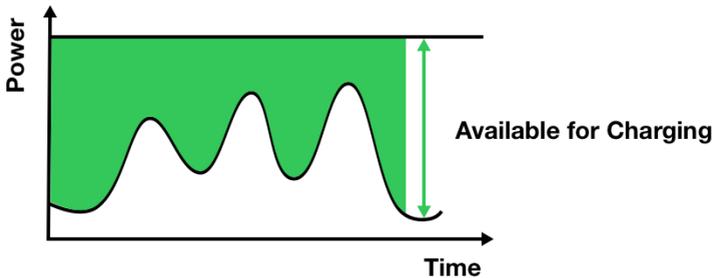
A. DLB Mode

The purpose of DLB mode is to achieve the fastest charging by maximizing power efficiency for the power allocated to the chargers and keeping the system power within a specific range.



B. ALM Mode

ALM mode provides consistent charging of chargers and other loads. The difference between ALM mode and DLB mode is that ALM mode manages load power and charger power at the same time using an external energy meter.



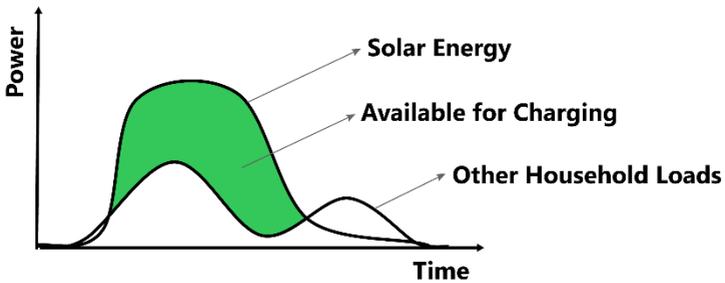
C. PV Hybrid Mode

PV Hybrid mode is achieved using solar energy. In PV Hybrid mode, the renewable electricity will be prioritized for household loads, and the surplus renewable electricity will be provided for your chargers to charge vehicles.

There are three charging modes available to meet your diversified charging demands.

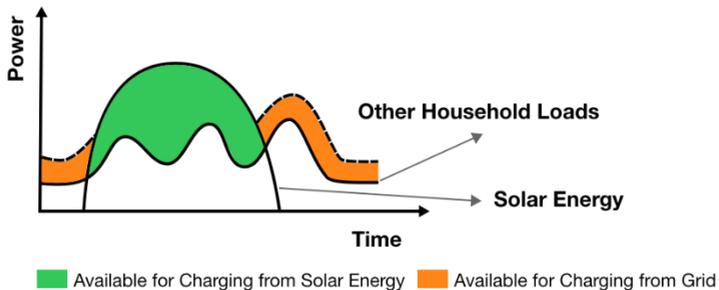
1) Full Green Charging Mode

The primary charger will always dynamically allocate the surplus renewable electricity to all chargers. No grid power will be provided even if the surplus renewable electricity is insufficient.



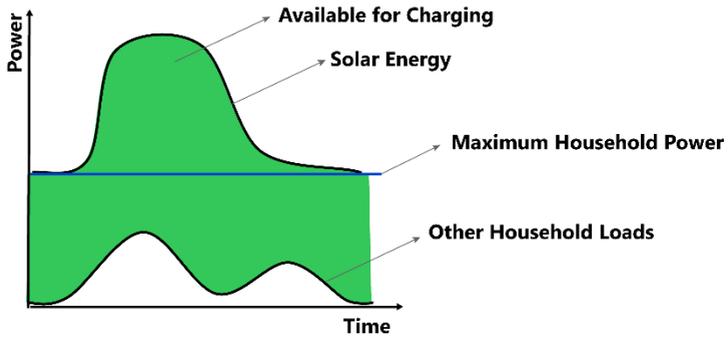
2) Green Priority Charging Mode

When the surplus renewable electricity is more than the sum of the minimum charging power of all chargers, the surplus renewable electricity will be dynamically allocated to all chargers through the primary charger. When the surplus renewable electricity is less than the sum of the minimum charging power of all chargers, the grid will provide extra power to meet the minimum charging power required by the chargers, and all chargers will charge at their minimum charging power.



3) Speed Priority Charging Mode

The chargers will receive power from both the solar energy and the grid power. After supplying power to other household loads, the surplus solar energy and grid power will be utilized to charge the chargers.



D. EMS Mode

In this mode, the third-party EMS assumes the role of the Controller, while the charger operates as the Receiver, adhering to power control commands issued by the EMS. The third-party EMS is responsible for load balancing and managing the power output of all Receivers.

2.2 General Features

General Features of the Operating Modes

Item	DLB Mode	ALM Mode
Primary Charger	1	1
Secondary Charger	Max. 7	Max. 7
Hardware Connection between Charger and Router	Wi-Fi/Ethernet cable	Wi-Fi/Ethernet cable (For multiple chargers.)
Communications Protocol between Primary Charger and Meter	N/A	Modbus
Hardware Connection between Primary Charger and Meter	N/A	RS485 cable
Maximum Length of Ethernet Cable	100 m (328 ft.)	100 m (328 ft.) (For multiple chargers.)
Maximum Length between the Wiring of Primary Charger and Meter	N/A	200 m (656 ft.)

Item	PV Hybrid Mode	EMS Mode
Primary Charger	1	N/A
Secondary Charger	Max. 7	N/A
Hardware Connection between Charger and Router	Wi-Fi/Ethernet cable (For multiple chargers.)	Ethernet cable
Communications Protocol between Primary Charger and Meter	Modbus	N/A
Hardware Connection between Primary Charger and Meter	RS485 cable	N/A
Maximum Length of Ethernet Cable	100 m (328 ft.) (For multiple chargers.)	100 m (328 ft.)
Maximum Length between the Wiring of Primary Charger and Meter	200 m (656 ft.)	N/A

2.3 Physical Devices Needed

Physical Devices Needed

Operating Mode	Devices
DLB Mode	<ul style="list-style-type: none">● Autel AC MaxiChargers● Router● Type A RCDs or equivalent electrical leakage protectors● Ethernet cable
ALM Mode w/ Single Charger	<ul style="list-style-type: none">● Autel AC MaxiCharger● Energy meter● Type A RCD or an equivalent electrical leakage protector● RS485 cable
ALM Mode w/ Multiple Chargers	<ul style="list-style-type: none">● Autel AC MaxiChargers● Energy meter● Router● Type A RCDs or equivalent electrical leakage protectors● Ethernet cable● RS485 cable

Operating Mode	Devices
PV Hybrid Mode w/ Single Charger	<ul style="list-style-type: none"> ● Autel AC MaxiCharger ● Energy meter ● Type A RCD or an equivalent electrical leakage protector ● RS485 cable ● PV panel ● PV inverter
PV Hybrid Mode w/ Multiple Chargers	<ul style="list-style-type: none"> ● Autel AC MaxiChargers ● Energy meter ● Router ● Type A RCDs or equivalent electrical leakage protectors ● Ethernet cable ● RS485 cable ● PV panel ● PV inverter
EMS Mode	<ul style="list-style-type: none"> ● Autel AC MaxiCharger ● EMS controller ● Router or switch ● Type A RCD or an equivalent electrical leakage protector ● Ethernet cable

2.4 App for Configuration

The Autel Energy Management System can be configured via either the Autel Charge app or the Autel Config app.

Download the Autel Charge app by scanning the QR code below or directly from the Apple App Store or Google Play store, depending on the mobile device you are using.

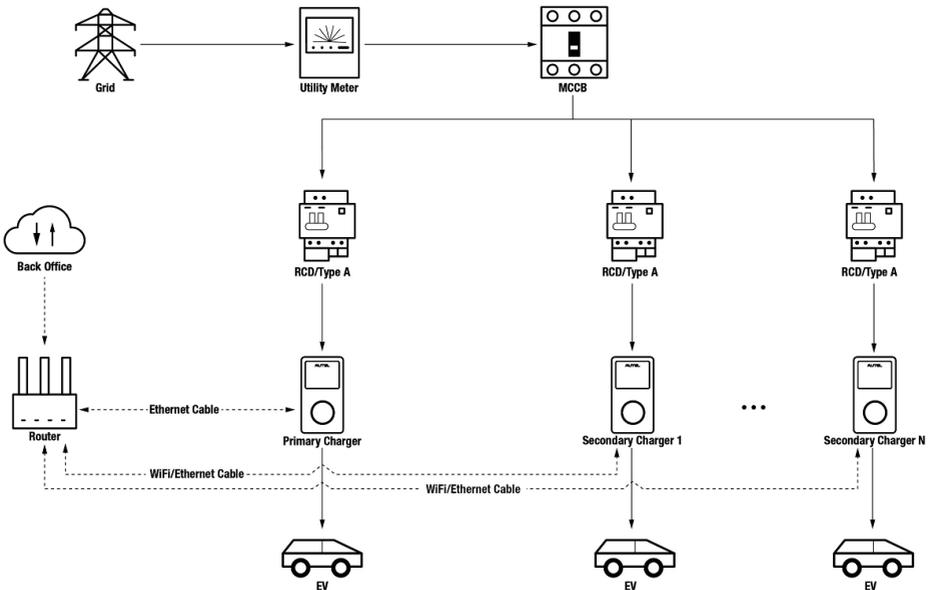


NOTE

The Autel Charge app is used to illustrate the examples in this manual.

3 DLB Mode

DLB mode is implemented when there are multiple chargers and no other loads share the power. To use DLB mode, ensure that all prerequisites are met according to the system diagram.



DLB Mode System Diagram

NOTE

1. To comply with relevant electric leakage protection standards, please use at least a Type A RCD or an equivalent electrical leakage protector that complies with local standards for each MaxiCharger.
2. Installation must be performed by qualified personnel in accordance with local regulations.
3. All chargers connected using DLB mode must be of the same model. (8 chargers at most in this mode.)

3.1 Installation Guide

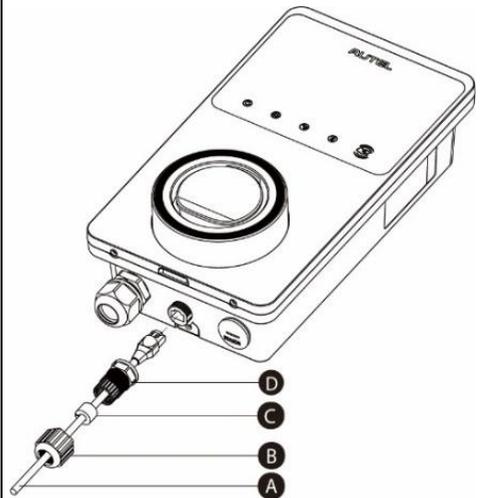
Before proceeding with the installation, we assume that you have already installed other devices. Therefore, this guide will only cover the necessary installation steps that follow.

Wiring Ethernet Cable

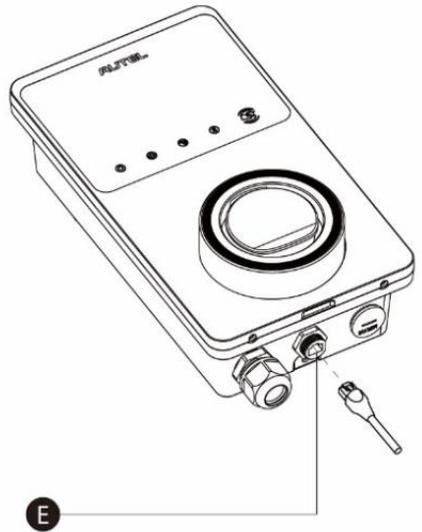
Both the primary charger and its secondary chargers need to be connected to the same LAN/WLAN:

1. The primary charger must establish a LAN/WLAN connection via an Ethernet cable.

1. Keep the power turned off during wiring.
2. Insert one end of the Ethernet cable with RJ45 plug into the RJ45 port on the charger.
 - Put the Ethernet cable with RJ45 plug (A) through the nut (B) and the waterproof cap (D). (Leave some space between them.)
 - Connect the sealing ring (C) via its opening to the Ethernet cable and insert it into the waterproof cap.
 - Screw the nut into the waterproof cap and make sure they are securely fastened.



- Insert the RJ45 plug of the Ethernet cable into the RJ45 port (E) on the bottom of the charger.
3. Insert the other end of the Ethernet cable with RJ45 plug into the RJ45 port on the router.



NOTE

This manual uses AC Wallbox as an example for wiring Ethernet cable. There may be difference among chargers. Refer to the corresponding charger's manual for reference.

2. Secondary chargers can connect to the LAN/WLAN via either Ethernet cables or Wi-Fi.
- a) When connecting to the LAN/WLAN via Ethernet cables, the instructions are the same as that of the primary charger.
 - b) When connecting to the LAN/WLAN via Wi-Fi, refer to the **STEPS 1–5** in [3.2](#).

3.2 Configuration

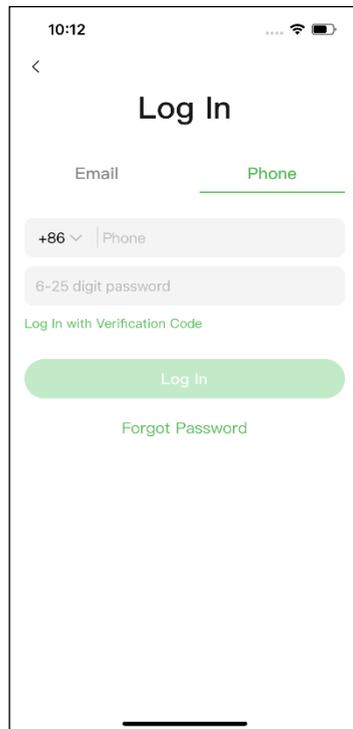
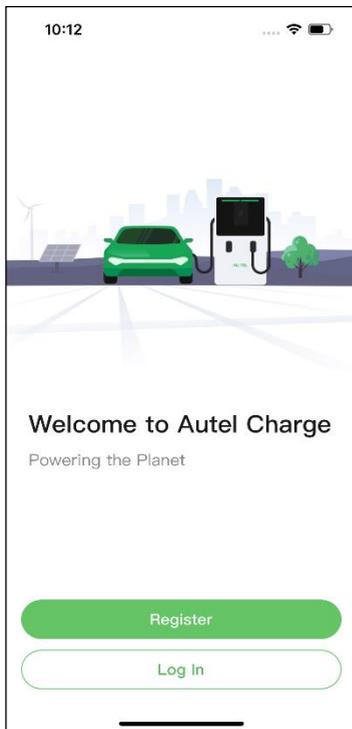
Follow the steps below to activate DLB mode via the Autel Charge app once you have installed and wired all the units according to the system diagram.

1. Download the Autel Charge app.

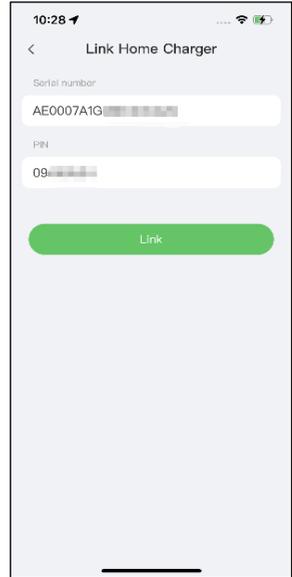
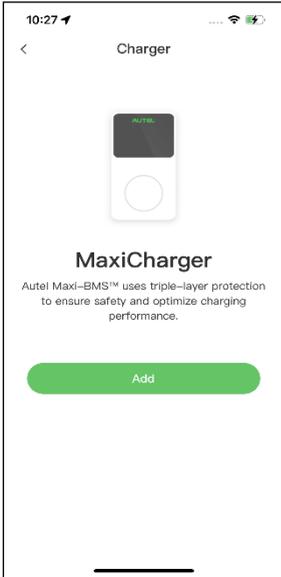
NOTE

Make sure all Autel AC MaxiChargers and the Autel Charge app are running the latest software versions.

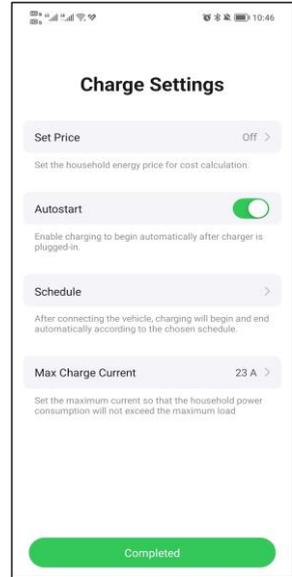
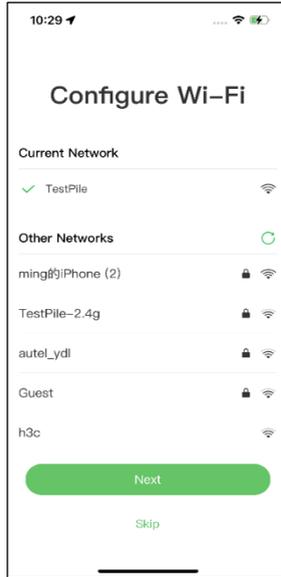
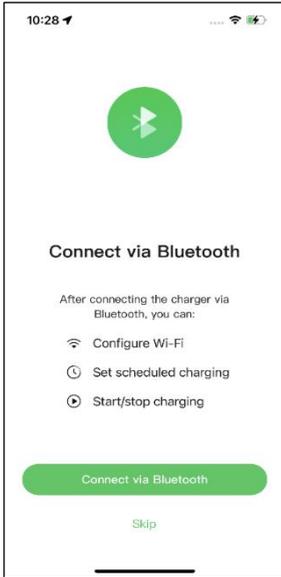
2. Log in to your Autel Charge app using your account and password, or register if you don't yet have an Autel Charge account.



- 3. Add a charger.** After successfully logging in, tap **Add** to continue. Scan the QR code on the Quick Reference Guide to acquire the serial number and PIN of the charger, or tap **Enter Terminal Number** to manually enter the serial number and PIN. Tap **Link** after confirmation.



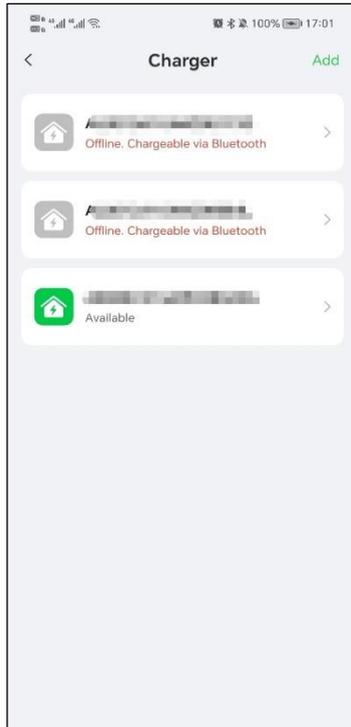
- 4. Establish a communication between the charger and the Autel Charge app.** After adding the charger, if you define the charger as the primary charger, tap **Connect via Bluetooth** to establish a communication, then configure Wi-Fi for the charger. Tap **Completed** on the Charge Settings screen to proceed.



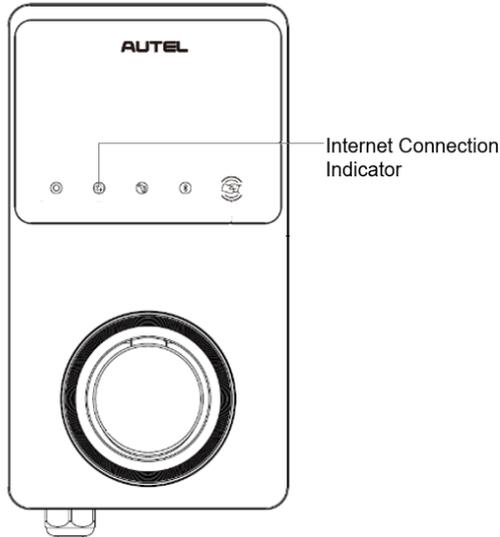
5. Add secondary chargers. Tap **Add** on the upper-right corner in the following screen and follow **STEPS 3–4** to add more chargers and configure their Wi-Fi.

NOTE

1. Bluetooth can only be connected to one charger at a time. Switching the operation to another charger will disconnect the Bluetooth connection with the existing charger and connect it to a new charger. Therefore, if you define the charger as a secondary charger, you need to tap **Skip** on the Connect via Bluetooth screen, and configure Wi-Fi manually.
2. All chargers added must be on the same Wi-Fi network.



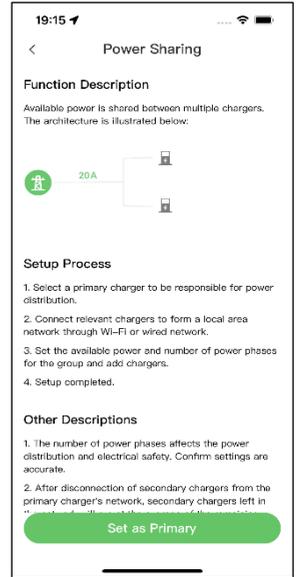
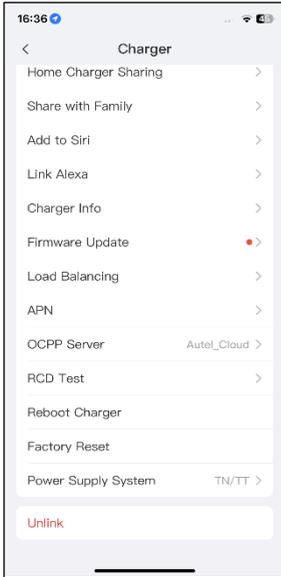
After adding chargers and configuring them to the same Wi-Fi network, you can check if the chargers are configured for smart charging by viewing the Internet Connection Indicator.



Internet Connection Indicator

Indicator	Status	Description
Internet Connection Indicator	Steady On	Network connected; Smart charging not enabled.
	Steady Off	Network not connected.
	Blink Fast	Smart charging enabled; Connection NORMAL.
	Blink Slow	Smart charging enabled; Connection ABNORMAL.

- 6. Set primary charger.** Tap **Account** > **Charger**. Select the charger connected to Bluetooth from the chargers list, then tap **Load Balancing** > **Power Sharing**. A brief description about this mode will display on the screen. Tap **Set as Primary** to designate the charger as the primary charger.

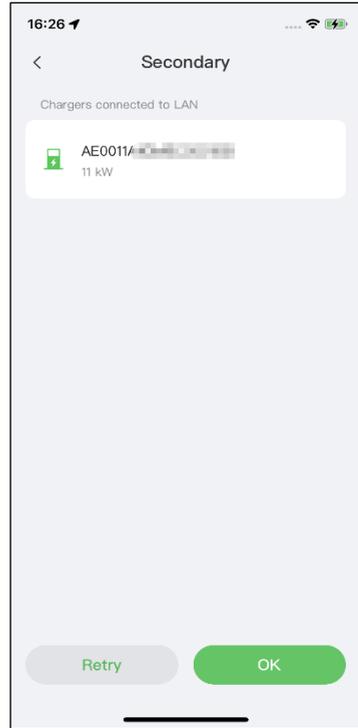
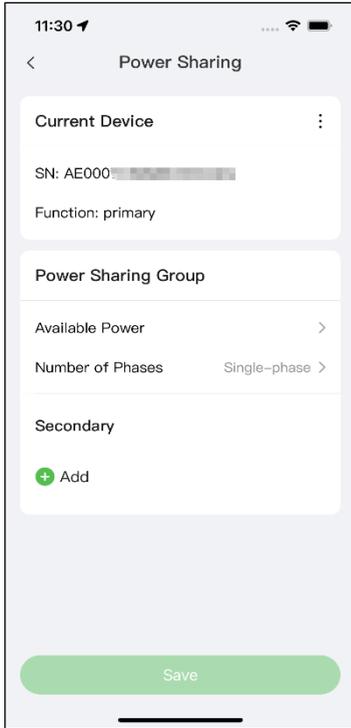


7. Set up DLB mode. After designating the primary charger, you must configure it for DLB mode.

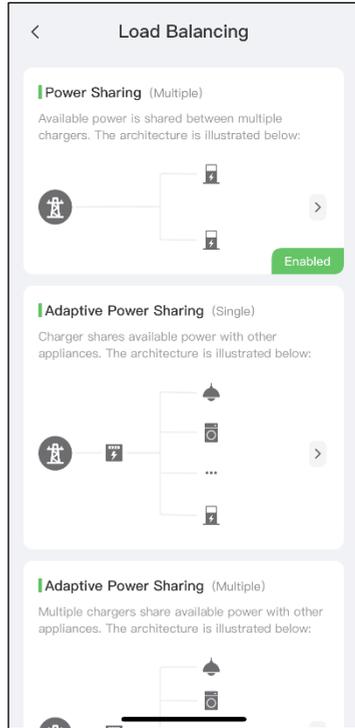
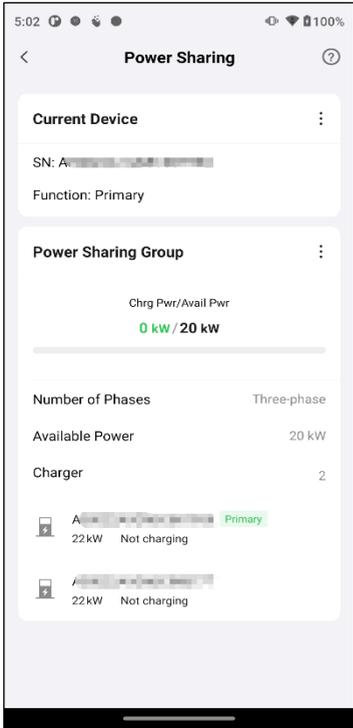
- ✓ **Available Power (kW):** you must enter the available power that the system can supply to the chargers. This value must be expressed as a whole number.

The value of the available power should be within the following range:

- Maximum Value: lower than the upstream MCB/RCBO rated power.
 - Minimum Value: higher than the minimum power of one charger (1.4 kW for single-phase, 4.2 kW for three-phase) x N (N represents the number of chargers in the device group.)
- ✓ **Number of Phases:** select **Single-phase** or **Three-phase** based on your power supply mode.
 - ✓ **Add secondary chargers:** tap **Add** to display other chargers connected to the same network. Tap **OK** once you have confirmed.

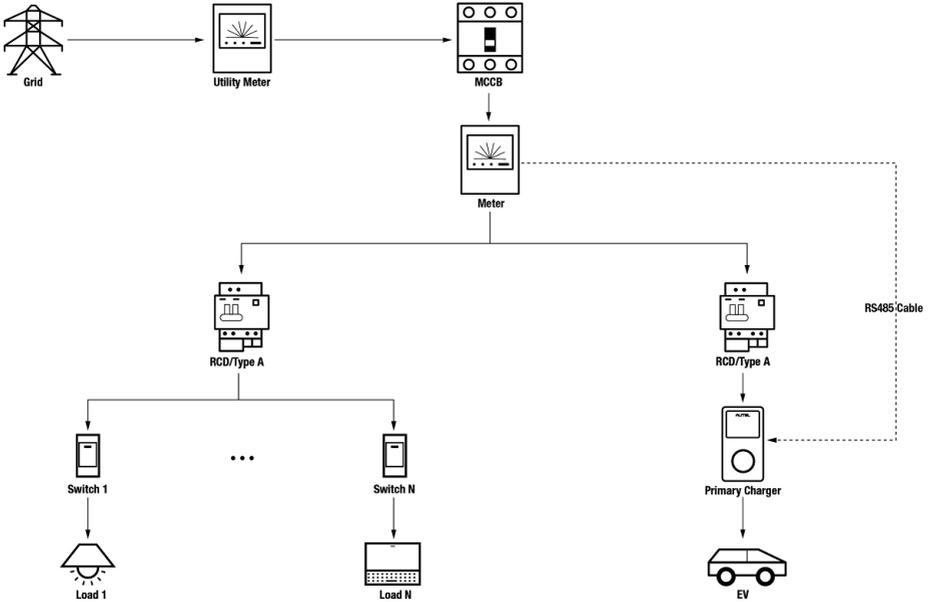


8. Confirm configuration. After all the settings above are completed, tap **Save** on the Power Sharing screen. The real-time charging details will display on the screen. Tap the “<” icon on the upper-left corner of the charging details screen to return to the mode selection screen. The **Enabled** tag will appear on this mode, indicating that DLB mode is activated and your chargers can be charged according to your settings.



4 ALM Mode w/ Single Charger

ALM mode w/ single charger is suitable for cases where there is a single charger sharing power with other loads.



ALM Mode System Diagram (w/ Single Charger)

NOTE

1. To comply with relevant electric leakage protection standards, please use at least a Type A RCD or an equivalent electrical leakage protector that complies with local standards.
2. Installation must be performed by qualified personnel in accordance with local regulations.

4.1 Installation Guide

Before proceeding with the installation, we assume that you have already installed other devices. Therefore, this guide will only cover the necessary installation steps that follow.

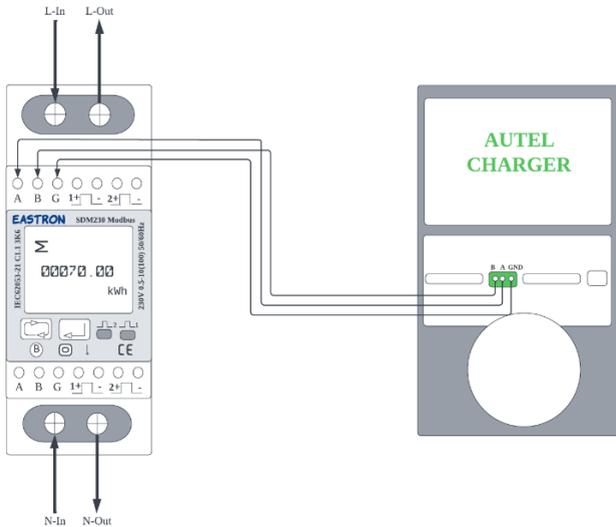
Wiring RS485 Cable

An RS485 cable is required for establishing a communication between the primary charger and the meter.

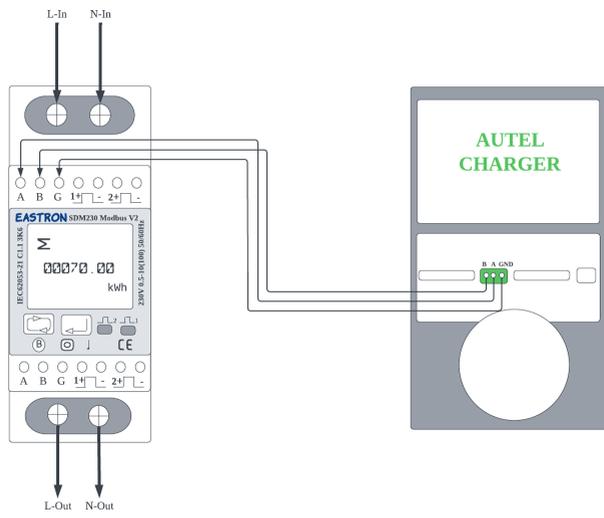
To save time in purchasing an appropriate energy meter, the recommended AC energy meters are listed below, which can be purchased from local distributors.

- ◆ Single-phase ≤ 100 A for EU market: SDM230-Modbus V1
- ◆ Single-phase ≤ 100 A for UK market: SDM230-Modbus V2
- ◆ Single-phase > 5 A, ≤ 9999 A: SDM120CTM
- ◆ Three-phase ≤ 100 A: SDM630-Modbus V2
- ◆ Three-phase > 100 A, ≤ 250 A: SDM630MCT V2

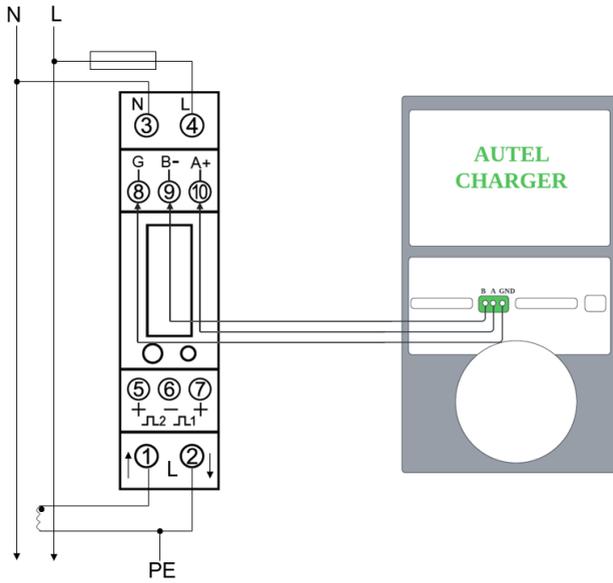
After the meter is properly installed and connected to upstream MCB/RCBO, wire an RS485 cable between the charger and meter.



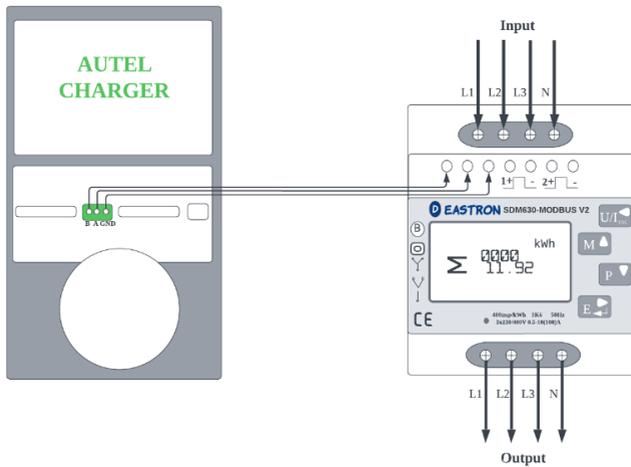
SDM230-Modbus V1 Energy Meter and Autel Charger Wiring Diagram



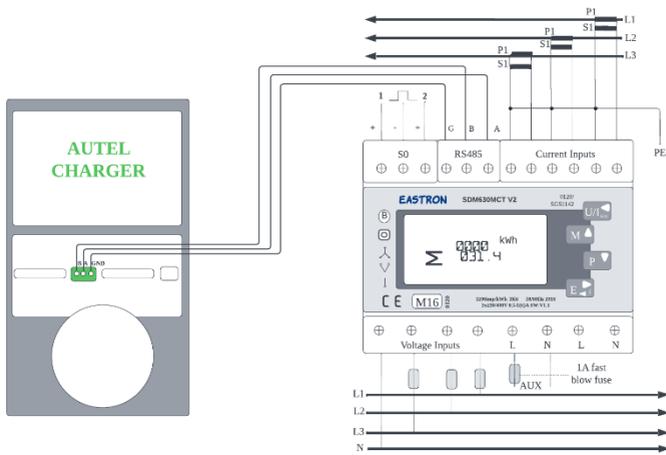
SDM230-Modbus V2 Energy Meter and Autel Charger Wiring Diagram



SDM120CTM Energy Meter and Autel Charger Wiring Diagram



SDM630-Modbus V2 Energy Meter and Autel Charger Wiring Diagram



SDM630MCT V2 Energy Meter and Autel Charger Wiring Diagram

NOTE

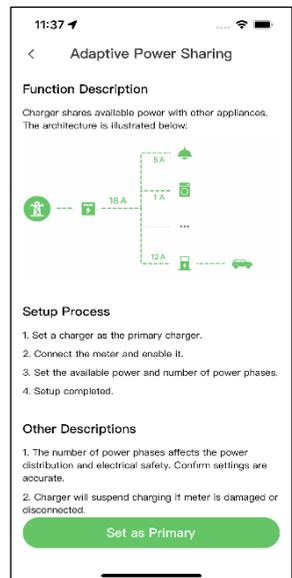
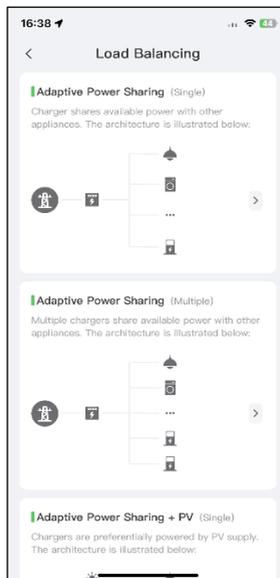
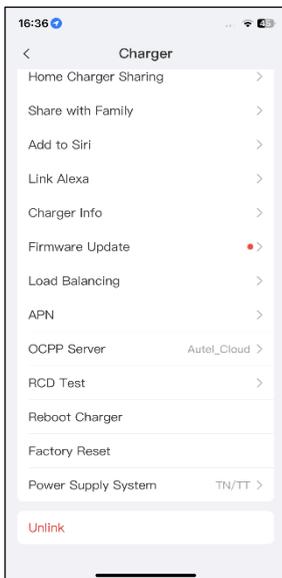
1. Always keep the power turned off during wiring.
2. Ground wiring is not necessary in many cases. Determine whether to ground according to the local regulations. The above diagrams are presented in the form of grounding.
3. The CT sensors should be grounded to local PE due to the need for surge current protection.
4. In order for the meter to measure data accurately, it needs to be configured correctly. Please refer to the meter's user manual for configuration instructions.

4.2 Configuration

Follow the steps below to activate ALM mode w/ a single charger via the Autel Charge app once you have installed and wired all the units according to the system diagram.

1. Follow the STEPS 1–4 in 3.2 to operate.

2. Set primary charger. Tap **Account** > **Charger**. Select the charger connected to Bluetooth from the chargers list, then tap **Load Balancing** > **Adaptive Power Sharing (Single)**. A brief description about this mode will display on the screen. Tap **Set as Primary** to designate the charger as the primary charger.

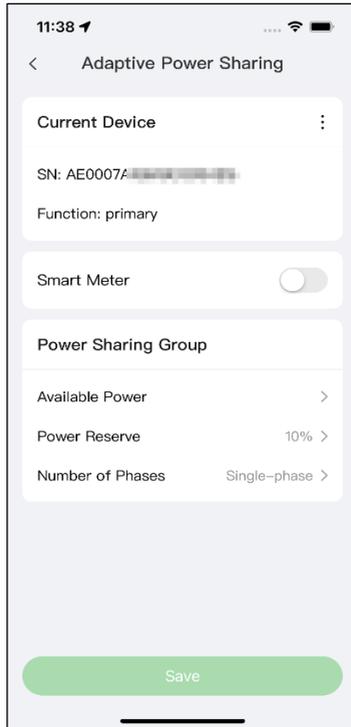


3. Set up ALM mode w/ single charger. After setting the primary charger, you need to complete the settings to set up ALM mode w/ single charger.

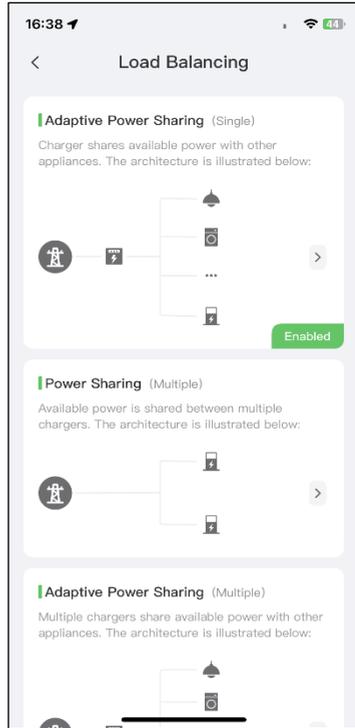
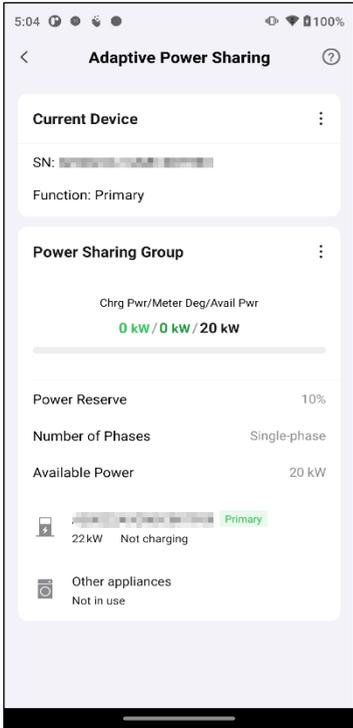
- ✓ **Smart Meter:** toggle the **Smart Meter ON**.
- ✓ **Available Power (kW):** you need to enter the available power that the system can supply to the chargers. You must enter a whole number.

The value of the available power should be within the following range:

- Maximum Value: lower than the upstream MCB/RCBO rated power.
 - Minimum Value: higher than the minimum power of one charger (1.4 kW for single-phase, 4.2 kW for three-phase) x N (N represents the number of chargers in the device group.)
-
- ✓ **Power Reserve:** you must enter the power reserve for the charger, namely the reserved power not used for charging.
 - The range of the power reserve is from 0–50%. The maximum reserved power that can be entered is 50% of the total home power.
 - The default setting of the power reserve is 10%, which is used for the dynamic power change caused by load switching in and out.
 - ✓ **Number of Phases:** select **Single-phase** or **Three-phase** based on your power supply mode.

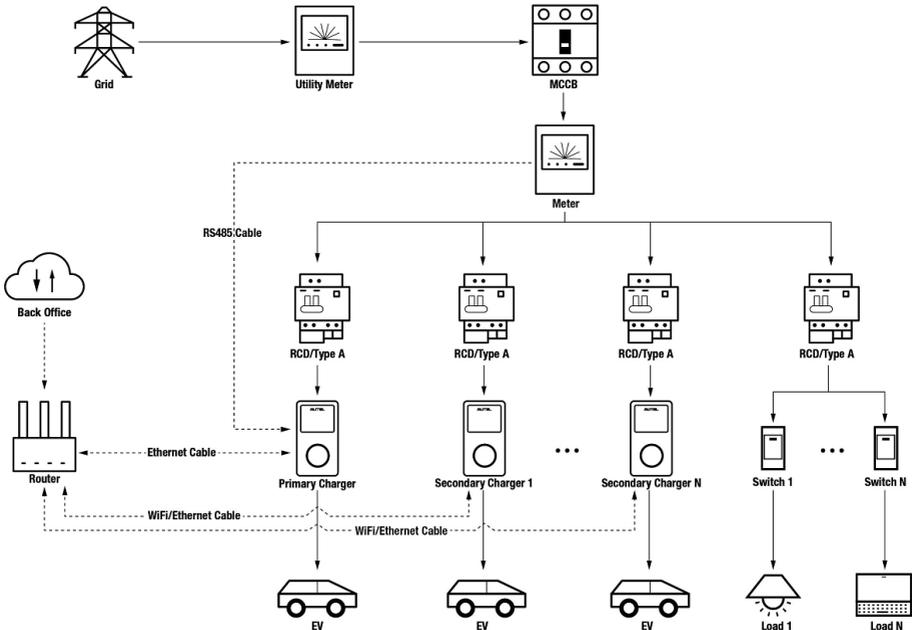


- 4. Confirm configuration.** After all the settings above are completed, tap **Save** on the Adaptive Power Sharing screen. The real-time charging details will display on the screen. Tap the “<” icon on the upper-left corner of the charging details screen to return to the mode selection screen. The **Enabled** tag will appear on this mode, indicating that the ALM mode w/ single charger is activated and your charger can now be charged according to your settings.



5 ALM Mode w/ Multiple Chargers

ALM mode w/ multiple chargers is suitable for cases where there are multiple chargers sharing power with other loads.



ALM Mode System Diagram (w/ Multiple Chargers)

NOTE

1. To comply with relevant electric leakage protection standards, please use at least a Type A RCD or an equivalent electrical leakage protector that complies with local standards for each MaxiCharger.
2. Installation must be performed by qualified personnel in accordance with local regulations.
3. All chargers connected using ALM mode must be of the same model. (8 chargers at most in this mode.)

5.1 Installation Guide

Before proceeding with the installation, we assume that you have already installed other devices. Therefore, this guide will only cover the necessary installation steps that follow.

Wiring RS485 Cable

The recommended meters and the RS485 cable wiring instructions are the same, so no details on that will be provided here. Refer to the RS485 cable wiring in [4.1](#).

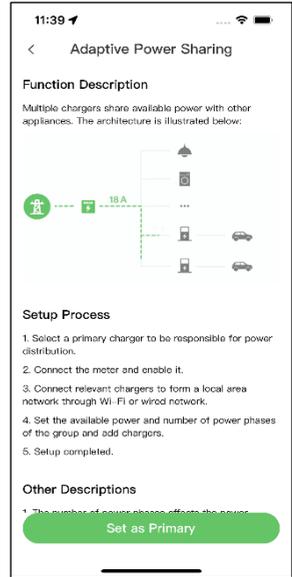
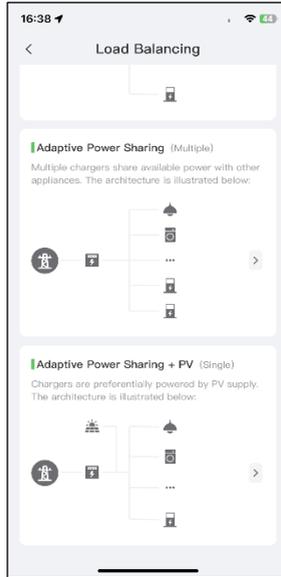
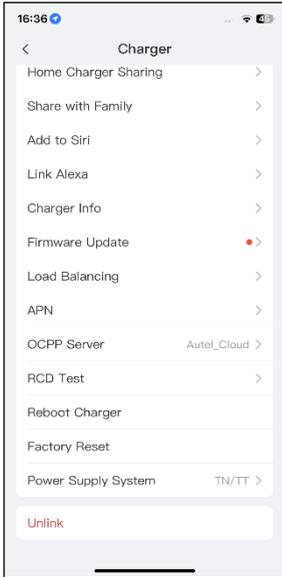
Wiring Ethernet Cable

The Ethernet cable wiring is the same as that described in the previous chapter, so no details on that will be provided here. Refer to the Ethernet cable wiring in [3.1](#).

5.2 Configuration

Follow the steps below to activate ALM mode w/ multiple chargers via the Autel Charge app once you have installed and wired all the units according to the system diagram.

- 1. Follow the STEPS 1–5 in [3.2](#) to operate.**
- 2. Set primary charger.** Tap **Account** > **Charger**. Select the charger connected to Bluetooth from the chargers list, then tap **Load Balancing** > **Adaptive Power Sharing (Multiple)**. A brief description about this mode will display on the screen. Tap **Set as Primary** to set the charger as primary charger.



3. Set up ALM mode w/ multiple chargers.

After designating the primary charger, you need to complete the settings to set up ALM mode w/ multiple chargers.

- ✓ **Smart Meter:** toggle the **Smart Meter** ON.
- ✓ **Available Power (kW):** you need to enter the available power the system can supply to the chargers. You must enter a whole number.

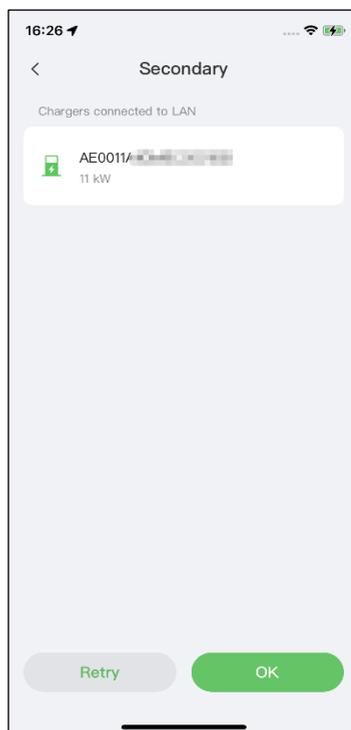
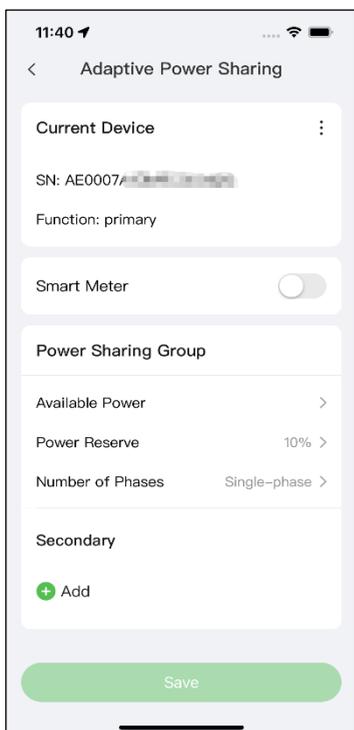
The value of the available power should be within the following range:

- Maximum Value: lower than the upstream MCB/RCBO rated power.
- Minimum Value: higher than the minimum power of one charger (1.4 kW for single-phase, 4.2 kW for three-phase) x N (N represents the number of chargers in the device group.)

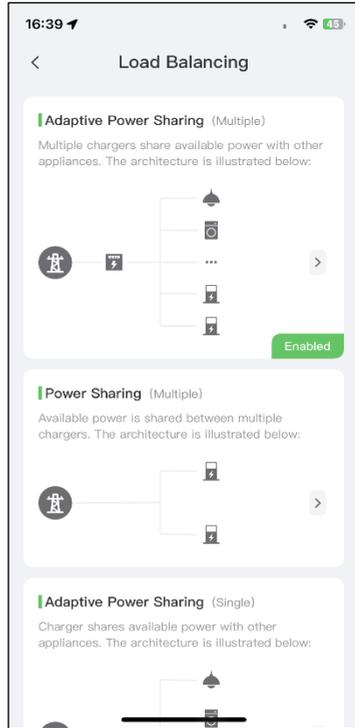
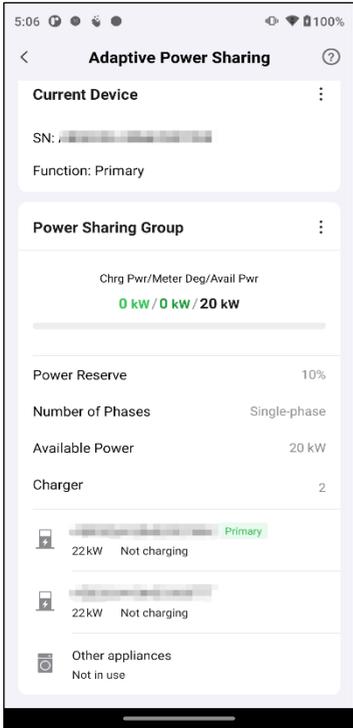
- ✓ **Power Reserve:** you must enter the power reserve for the chargers, namely the reserved power not used for charging.
 - The range of the power reserve is from 0–50%. The maximum reserved power that can be entered is 50% of the total home power.

- The default setting of the power reserve is 10%, which is used for the dynamic power change caused by load switching in and out.

- ✓ **Number of Phases:** select **Single-phase** or **Three-phase** based on your power supply mode.
- ✓ **Add Secondary Chargers:** tap **Add** to display other chargers connected to the same network. Tap **OK** once you have confirmed.

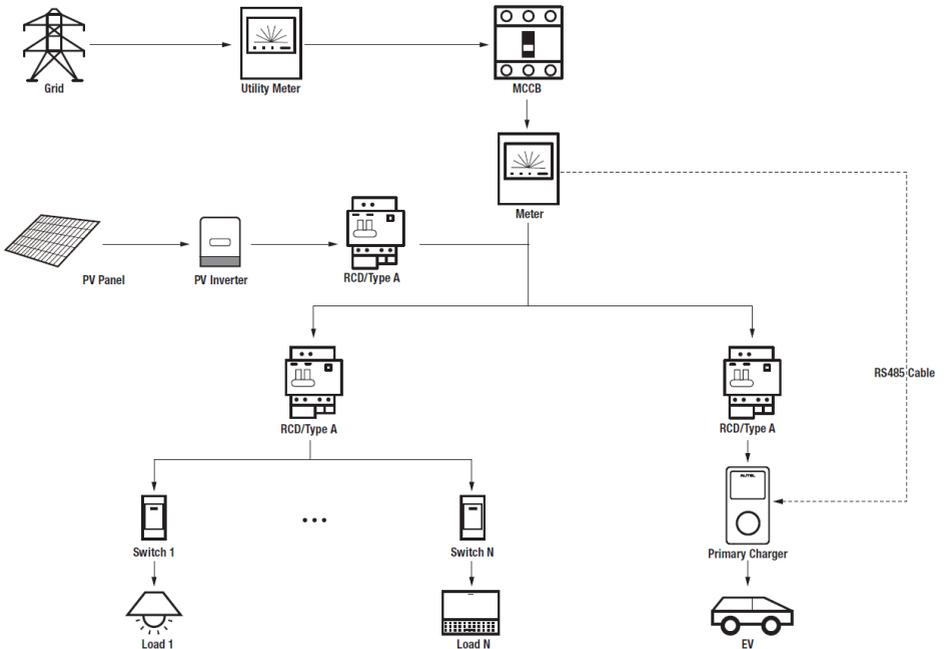


4. Confirm configuration. After all the settings above are completed, tap **Save** on the Adaptive Power Sharing screen. The real-time charging details will display on the screen. Tap the “<” icon on the upper-left corner of the charging details screen to return to the mode selection screen. The **Enabled** tag will appear on this mode, indicating that ALM mode w/ multiple chargers is activated and your chargers can now be charged according to your settings.



6 PV Hybrid Mode w/ Single Charger

PV Hybrid mode w/ single charger is suitable for cases where solar energy and electricity are used at the same time, and the solar energy is used preferentially to supply power for the charger and other loads.



PV Hybrid Mode System Diagram (w/ Single Charger)

NOTE

1. To comply with relevant electric leakage protection standards, please use at least a Type A RCD or an equivalent electrical leakage protector that complies with local standards.
2. Installation must be performed by qualified personnel in accordance with local regulations.

6.1 Installation Guide

Before proceeding with the installation, we assume that you have already installed other devices. Therefore, this guide will only cover the necessary installation steps that follow.

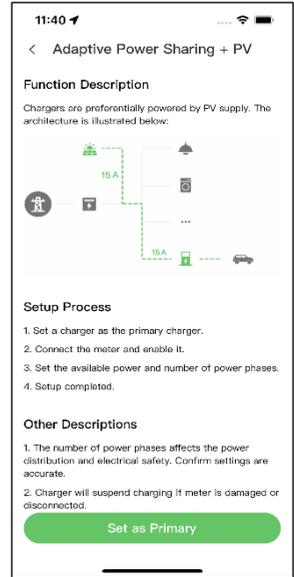
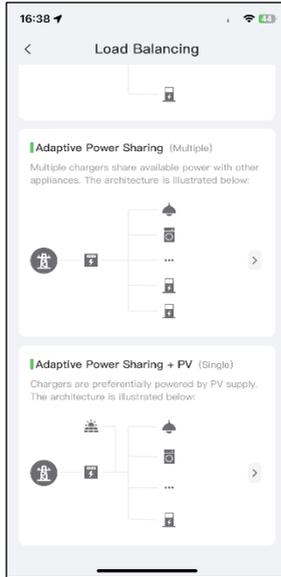
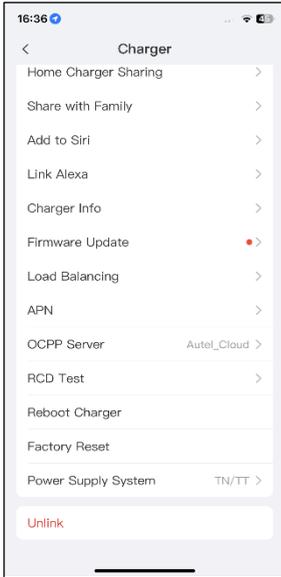
Wiring RS485 Cable

The recommended meters and the RS485 cable wiring instructions are the same, so no details on that will be provided here. Refer to the RS485 cable wiring in [4.1](#).

6.2 Configuration

Follow the steps below to activate PV Hybrid mode w/ a single charger via the Autel Charge app once you have installed and wired all the units according to the system diagram.

1. **Follow the STEPS 1–4 in [3.2](#) to operate.**
2. **Set primary charger.** Tap **Account** > **Charger**. Select the charger connected to Bluetooth from the chargers list, then tap **Load Balancing** > **Adaptive Power Sharing + PV (Single)**. A brief description about this mode will appear on the screen. Tap **Set as Primary** to designate the charger as the primary charger.



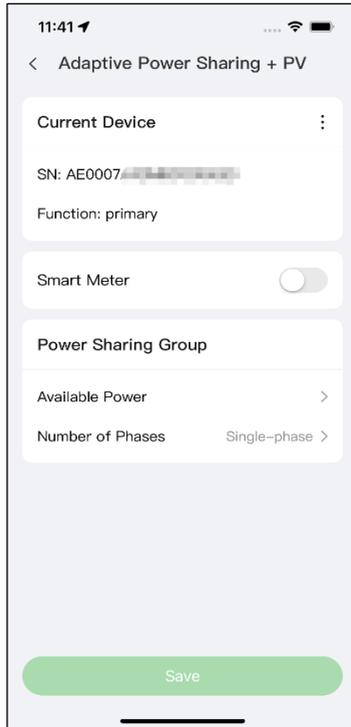
3. Set up PV Hybrid mode w/ single charger. After designating the primary charger, you need to complete the settings to configure PV Hybrid mode w/ single charger.

- ✓ **Smart Meter:** toggle the **Smart Meter ON**.
- ✓ **Available Power (kW):** you need to enter the available power that the system can supply to the chargers. You must enter a whole number.

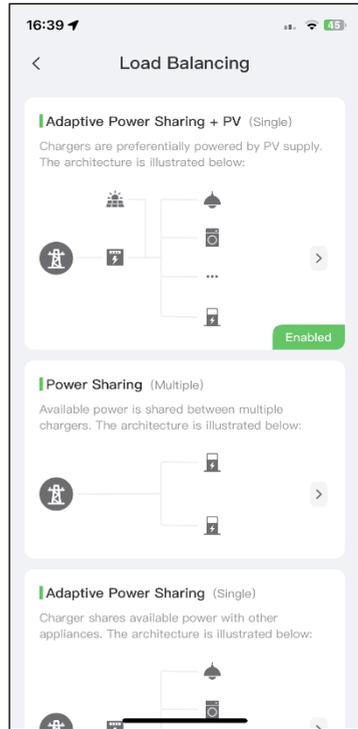
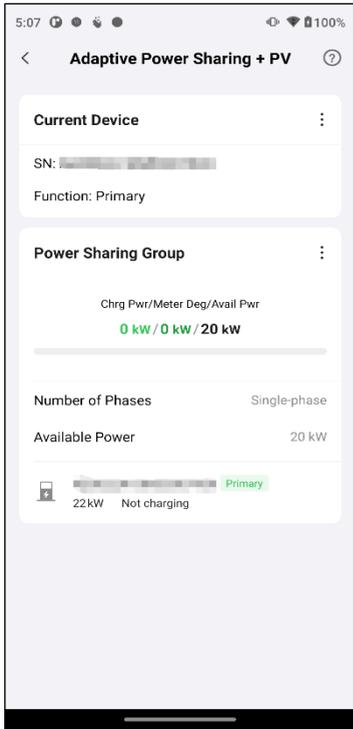
The value of the available power should be within the following range:

- Maximum Value: lower than upstream MCB/RCBO rated power.
- Minimum Value: higher than the minimum power of one charger (1.4 kW for single-phase, 4.2 kW for three-phase) x N (N represents the number of chargers in the device group.)

- ✓ **Number of Phases:** select **Single-phase** or **Three-phase** based on your power supply mode.

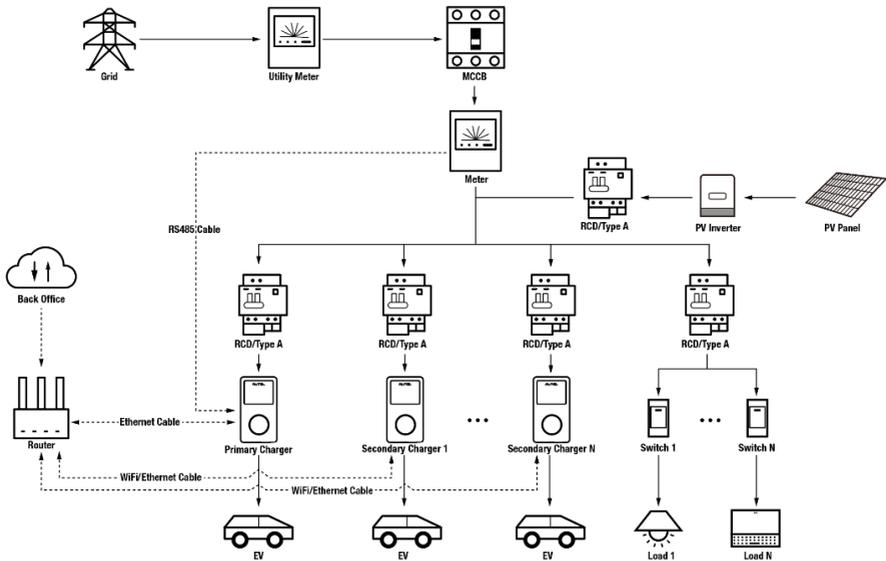


- 4. Confirm configuration.** After all the settings above are completed, tap **Save** on the Adaptive Power Sharing + PV screen. The real-time charging details will display on the screen. Tap the “<” icon on the upper-left corner of the charging details screen to return to the mode selection screen. The **Enabled** tag will appear on this mode, indicating that PV Hybrid mode w/ single charger is activated. Your charger can now be charged according to your settings.



7 PV Hybrid Mode w/ Multiple Chargers

PV Hybrid mode w/ multiple chargers is suitable for cases where solar energy and electricity are used at the same time, and the solar energy is used preferentially to supply power for multiple chargers and other loads.



PV Hybrid Mode System Diagram (w/ Multiple Chargers)

NOTE

1. To comply with relevant electric leakage protection standards, please use at least a Type A RCD or an equivalent electrical leakage protector that complies with local standards for each MaxiCharger.
2. Installation must be performed by qualified personnel in accordance with local regulations.
3. All chargers connected using PV Hybrid mode must be of the same model. (8 chargers at most in this mode.)

7.1 Installation Guide

Before proceeding with the installation, we assume that you have already installed other devices. Therefore, this guide will only cover the necessary installation steps that follow.

Wiring RS485 Cable

The recommended meters and the RS485 cable wiring instructions are the same, so no details on that will be provided here. Refer to the RS485 cable wiring in [4.1](#).

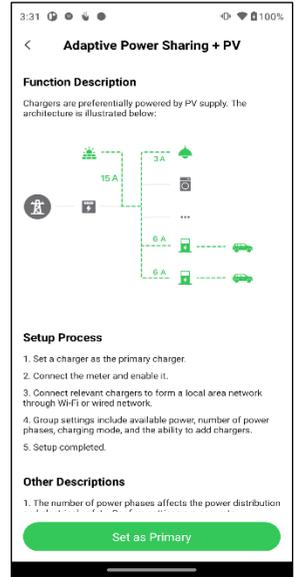
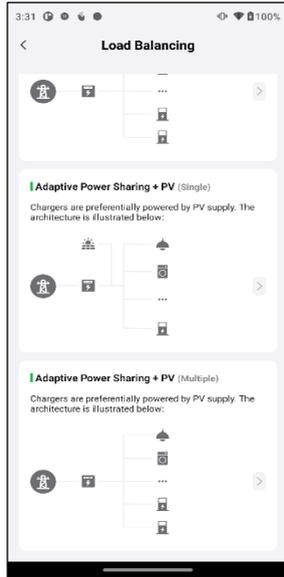
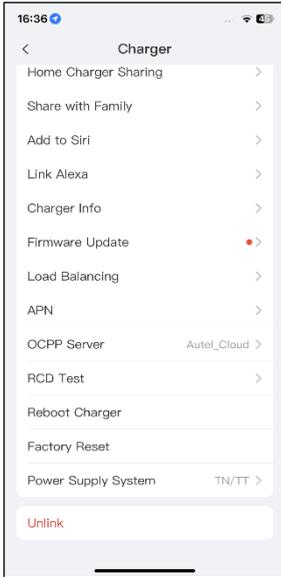
Wiring Ethernet Cable

The Ethernet cable wiring is the same as that described in the previous chapter, so no details on that will be provided here. Refer to the Ethernet cable wiring in [3.1](#).

7.2 Configuration

Follow the steps below to activate PV Hybrid mode w/ multiple chargers via the Autel Charge app once you have installed and wired all the units according to the system diagram.

- 1. Follow the STEPS 1–5 in [3.2](#) to operate.**
- 2. Set primary charger.** Tap **Account** > **Charger**. Select the charger connected to Bluetooth from the chargers list, then tap **Load Balancing** > **Adaptive Power Sharing + PV (Multiple)**. A brief description about this mode will display on the screen. Tap **Set as Primary** to set the charger as primary charger.

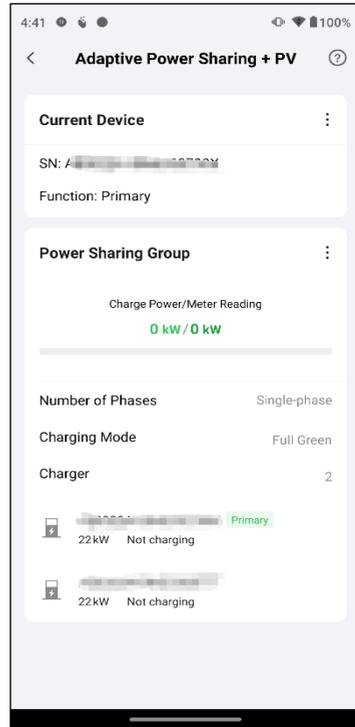
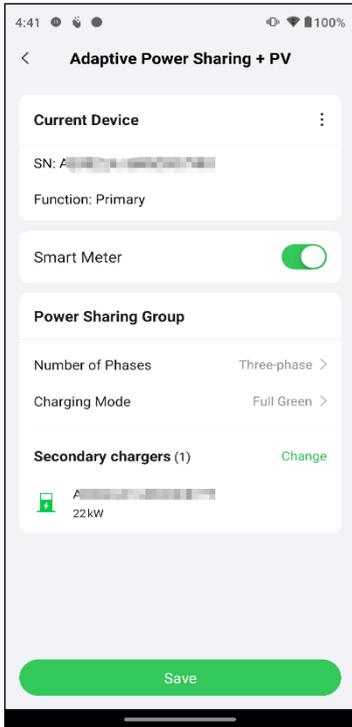


3. Set up PV Hybrid mode w/ multiple chargers. After designating the primary charger, you need to complete the settings to configure PV Hybrid mode w/ multiple chargers. There are three charging modes available. The settings vary depending on the charging modes.

a) Full Green Charging Mode

- ✓ **Smart Meter:** toggle the **Smart Meter ON**.
- ✓ **Number of Phases:** select **Single-phase** or **Three-phase** based on your power supply mode.
- ✓ **Charging Mode:** Select **Full Green** from the charging mode options.
- ✓ **Add Secondary Chargers:** tap **Add** to display other chargers connected to the same network. Tap **OK** once you have confirmed.

Tap **Save** once you have completed the settings. Then the real-time charging details will display on the screen.



b) Green Priority Charging Mode

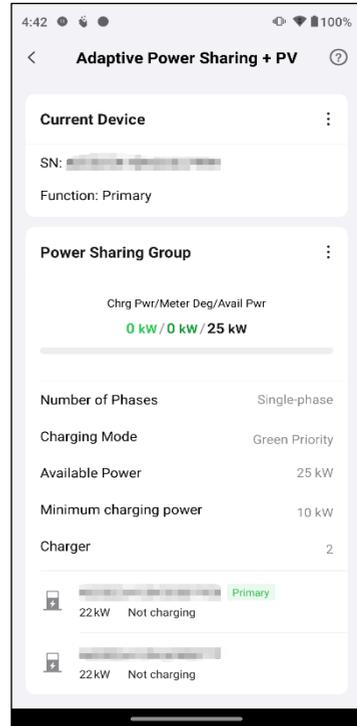
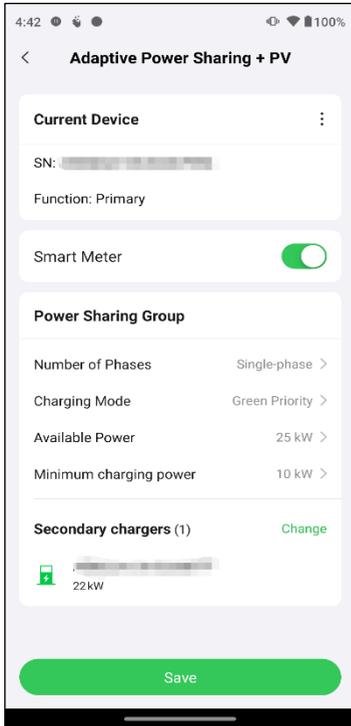
- ✓ **Smart Meter:** toggle the **Smart Meter** ON.
- ✓ **Number of Phases:** select **Single-phase** or **Three-phase** based on your power supply mode.
- ✓ **Charging Mode:** Select **Green Priority** from the charging mode options.
- ✓ **Available Power (kW):** you need to enter the available power that the system can supply to the chargers. You must enter a whole number.

The value of the available power should be within the following range:

- Maximum Value: lower than upstream MCB/RCBO rated power.
- Minimum Value: higher than the minimum power of one charger (1.4 kW for single-phase, 4.2 kW for three-phase) x N (N represents the number of chargers in the device group.)

- ✓ **Minimum Charging Power (kW):** the sum of the minimum charging power of all chargers.
- ✓ **Add Secondary Chargers:** tap **Add** to display other chargers connected to the same network. Tap **OK** once you have confirmed.

Tap **Save** once you have completed the settings. Then the real-time charging details will display on the screen.



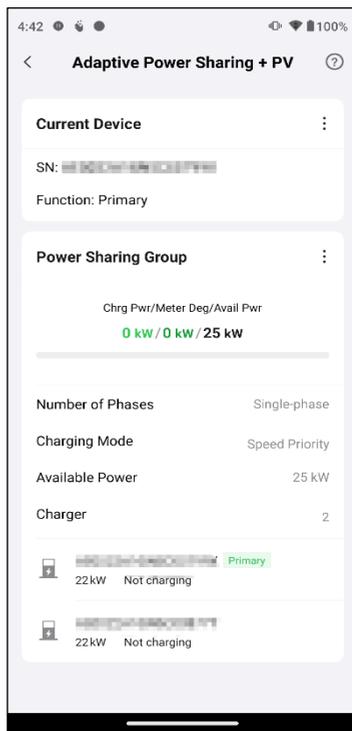
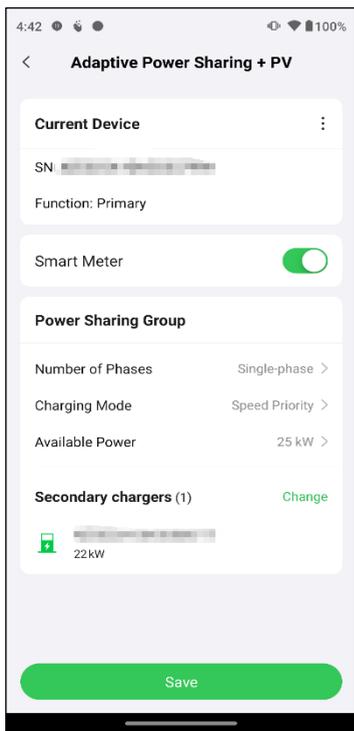
c) Speed Priority Charging Mode

- ✓ **Smart Meter:** toggle the **Smart Meter** ON.
- ✓ **Number of Phases:** select **Single-phase** or **Three-phase** based on your power supply mode.
- ✓ **Charging Mode:** Select **Speed Priority** from the charging mode options.
- ✓ **Available Power (kW):** you need to enter the available power that the system can supply to the chargers. You must enter a whole number.
The value of the available power should be within the following range:

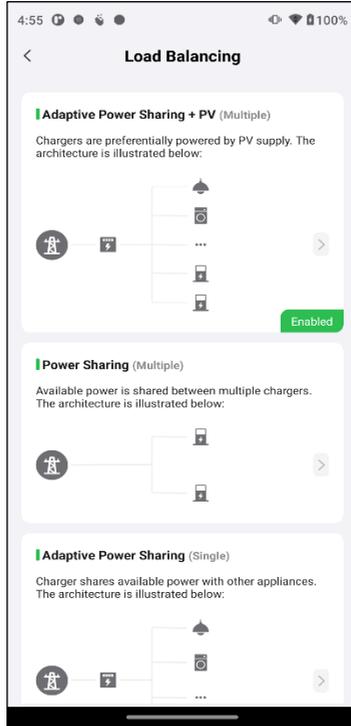
- Maximum Value: lower than upstream MCB/RCBO rated power.
- Minimum Value: higher than the minimum power of one charger (1.4 kW for single-phase, 4.2 kW for three-phase) x N (N represents the number of chargers in the device group.)

✓ **Add Secondary Chargers:** tap **Add** to display other chargers connected to the same network. Tap **OK** once you have confirmed.

Tap **Save** once you have completed the settings. Then the real-time charging details will display on the screen.

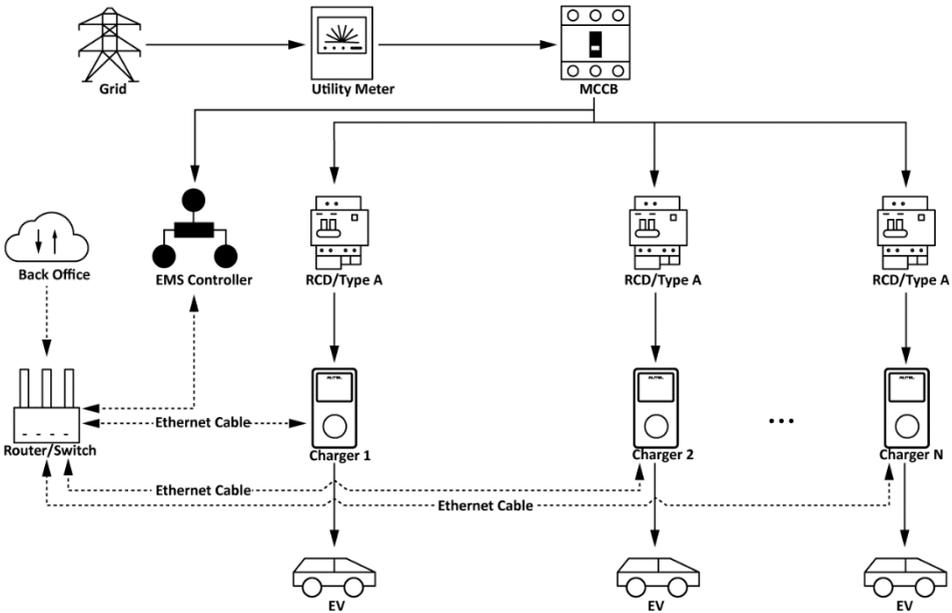


- 4. Confirm configuration.** Tap the “<” icon on the upper-left corner of the charging details screen to return to the mode selection screen. The **Enabled** tag will appear on this mode, indicating that PV Hybrid mode w/ multiple chargers is activated. Your chargers can now be charged according to your settings.



8 EMS Mode

This chapter offers a detailed guide on integrating EMS with the charger, allowing the EMS to remotely control the charger using the Modbus TCP protocol. In this mode, all requests are initiated by the EMS, and the charger responds accordingly.



EMS Mode System Diagram

NOTE

1. To comply with relevant electric leakage protection standards, please use at least a Type A RCD or an equivalent electrical leakage protector that complies with local standards.
2. Installation must be performed by qualified personnel in accordance with local regulations.

8.1 Installation Guide

Before proceeding with the installation, we assume that you have already installed other devices. Therefore, this guide will only cover the necessary installation steps that follow.

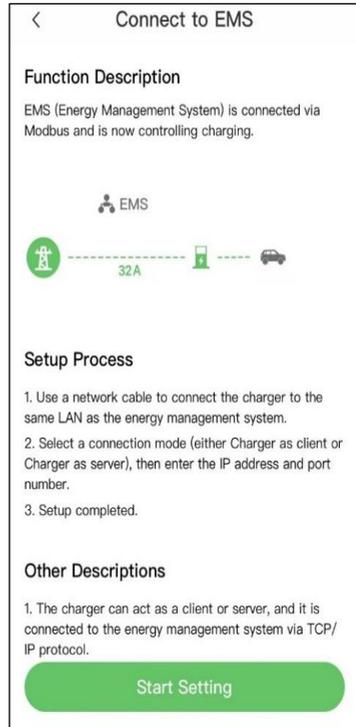
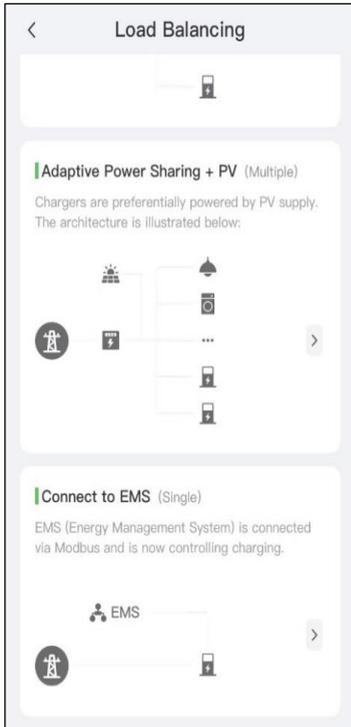
Wiring Ethernet Cable

The Ethernet cable wiring is the same as that described in the previous chapter, so no details on that will be provided here. Refer to the Ethernet cable wiring in [3.1](#).

8.2 Configuration

Follow the steps below to connect your charger to the EMS via the Autel Charge app after the wiring is finished.

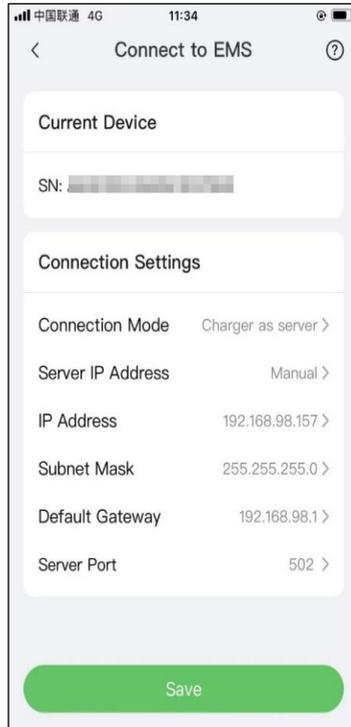
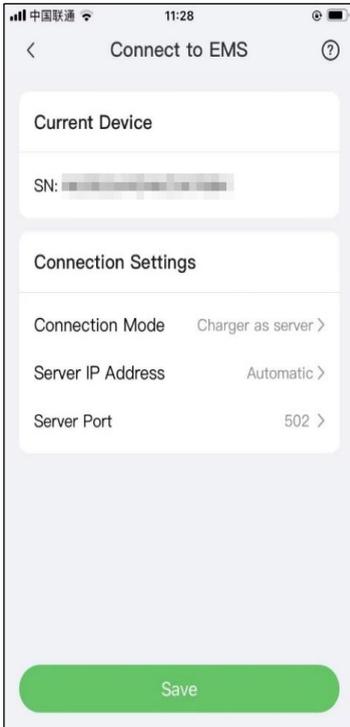
- 1. Follow the STEPS 1–4 in [3.2](#) in to operate.**
- 2. Start Setting.** Tap **Account** > **Charger**. Select the charger from the chargers list, then tap **Load Balancing** > **Connect to EMS**. A brief description about this mode will appear on the screen. Tap **Start Setting** to continue.



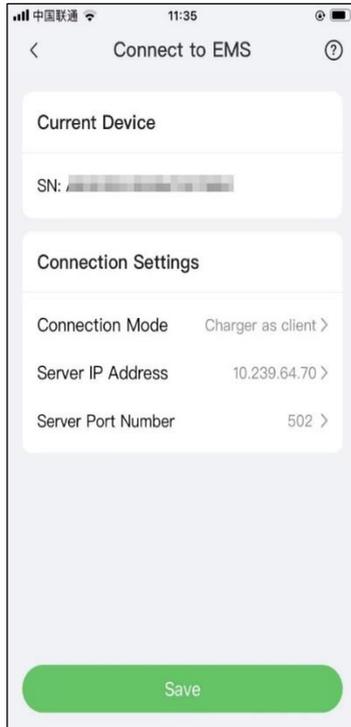
3. Select a connection mode.

The charger can be connected to the EMS as TCP server or TCP client. Select a connection mode based on the scenarios.

- ◆ If the charger is used as a TCP server, it acts as a host, waiting for the EMS to establish a connection and send requests or data. Select **Charger as server** to continue.
 - Choose the desired method to access the IP address after selecting the Charger as server mode: **automatic** or **manual**.
 - a) The automatic method allows for automatic retrieval of the IP address, subnet mask, and gateway.
 - b) On the other hand, the manual method requires manual input of these details.
 - c) Then input the port number and tap **Save** to finish the setup.



- ◆ If the charger is used as a TCP client, it initiates the connection to the EMS. Select **Charger as client** to continue. Then input the server IP address, port number and tap **Save** to finish the setup.



NOTE

The Modbus TCP server port is 502 by default.

- 4. Confirm configuration.** Tap the “<” icon on the upper-left corner of the Connect to EMS screen to return to the Load Balancing screen. The **Enabled** tag will appear on this mode, indicating that the charger has been successfully connected to the EMS.

< Load Balancing

Connect to EMS (Single)

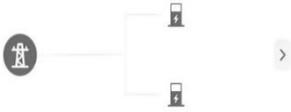
EMS (Energy Management System) is connected via Modbus and is now controlling charging.



The diagram shows a circular icon representing a charger on the left, connected by a line to a square icon representing an EMS system on the right. Above the EMS icon is the text 'EMS'. A right-pointing arrow is located to the right of the EMS icon. Below the diagram is a green button with the text 'Enabled'.

Power Sharing (Multiple)

Available power is shared between multiple chargers. The architecture is illustrated below:



The diagram shows a circular icon representing a charger on the left, connected by a line to a junction point. From this junction point, two lines branch out to two separate square icons representing other chargers on the right. A right-pointing arrow is located to the right of the second charger icon.

Adaptive Power Sharing (Single)

Charger shares available power with other appliances. The architecture is illustrated below:

8.3 Modbus Register

8.3.1 Read Input Register

The function code is 04(hex04). The Modbus implementation enables to read 1–125 contiguous input registers. Here is an example of request and response:

Request			Response		
Function Code	1 Byte	0x04	Function Code	1 Byte	0x04
Starting Address	2 Bytes	0x0000 to 0xFFFF	Byte Count	1 Byte	2xN
Quantity of Input Register	2 Bytes	0x0001 to 0x007D	Input Register	N x Bytes	Value

8.3.2 Read Holding Register

The function code is 03(hex03). The Modbus implementation enables to read 1–125 contiguous holding registers. Here is an example of request and response:

Request			Response		
Function Code	1 Byte	0x03	Function Code	1 Byte	0x03
Starting Address	2 Bytes	0x0000 to 0xFFFF	Byte Count	1 Byte	2xN

Request			Response		
Quantity of Holding Register	2 Bytes	0x0001 to 0x007D	Holding Register	N x Bytes	Value

8.3.3 Write Single Holding Register

The function code is 06(hex06). The Modbus implementation enables to write only 1 holding register. Here is an example of request and response:

Request			Response		
Function Code	1 Byte	0x06	Function Code	1 Byte	0x06
Register Address	2 Bytes	0x0000 to 0xFFFF	Register Address	2 Bytes	0x0000 to 0xFFFF
Register Value	2 Bytes	0x0000 to 0xFFFF	Register Value	2 Bytes	0x0000 to 0xFFFF

8.3.4 Write Multiple Holding Registers

The function code is 16(hex10). The Modbus implementation enables to write multiple holding registers and the data is packed into 2 bytes per register. Here is an example of request and response:

Request			Response		
Function Code	1 Byte	0x10	Function Code	1 Byte	0x10
Starting Address	2 Bytes	0x0000 to 0xFFFF	Starting Address	1 Byte	0x0000 to 0xFFFF
Quantity of Holding Register	2 Bytes	0x0001 to 0x007B	Quantity of Holding Register	2 Bytes	1 to 123 (0x7B)
Byte Count	1 Byte	2xN			
Register Value	N x 2 Bytes	Value			

8.3.5 Register Specifications

Modbus Parameters (Holding Register)

Register	Name	Description	Type	Unit
0000	Limit Control Mode	Charging Mode: 0 – Power Mode 1 – Current Mode	UINT16	/

Register	Name	Description	Type	Unit
0001	Link Type	Enumeration Value: 0 – RS485 1 – TCP	UINT16	/
0002	Comm Timeout Time	Communication Timeout	UINT16	Second
0003	Slave ID	Slave address, 1/bit Default: 1	UINT16	/
0004	Slave ID Confirm	Slave address modification confirm, 1/bit Default: 1	UINT16	/

NOTE

To change the slave ID, start by setting the register 0003, followed by setting the register 0004, ensuring the input data remains consistent.

Read-only Register (Input Register) Address 0100~1999

Register + Offset	Name	Description	Type	Unit
0100	Product Type	Type of product	ASCII	/
0130	Firmware Version	Firmware version of TCU	ASCII	/
1000x	State	Charging state 0 – Available 1 – Preparing _Tagld _Ready 2 – Preparing _EV _Ready 3 – Charging 4 – Suspended EV 5 – Suspended EVSE 6 – Finishing 7 – Reserved 8 – Unavailable 9 – Unavailable FW Update 10 – Faulted 11 – Unavailable Connection Object	UINT16	/

Register + Offset	Name	Description	Type	Unit
1100x	Charging Voltage	Current charging voltage *Available for DC charging connector	UINT32	0.01 V
1200x	Charging Current	Current charging current *Available for DC charging connector	UINT32	0.01 A
1300x	Charging Power	Current charging power *Available for DC charging connector	UINT32	1
1400x	Charge Time	Time from charging start	UINT16	Sec
1500x	Charged Energy	Charged energy of current charging session	UINT16	KWh/100

NOTE

For the State item in the above table, when Connector ID is 0, only Available, Unavailable, and Faulted can be set.

Read and Write Register (Holding Register) Address 1600~1999

Register + Offset	Name	Description	Type	Unit
1600x	Power Limit Value	Limit value of charging power	UINT32	W
1700x	Current Limit Value	Limit value of charging current	UINT32	0.01 A
1800x	Offline Power Value	Limit value of offline power	UINT32	W
1900x	Offline Current Value	Limit current of offline current	UINT32	0.01 A

The offset “x” marked in red above is ruled as follows:

Offset	Description
0	Charger, 0# Connector
4	1# Connector
8	2# Connector
12	3# Connector
16	4# Connector

Offset	Description
20	5# Connector
24	6# Connector
28	7# Connector
32	#8 Connector

Read-only Register (Input Register) Address 10000~18999

Register + Offset	Name	Description	Type	Unit
1y000	State	Charging state 0 – Available 1 – Preparing _TagId _Ready 2 – Preparing _EV _Ready 3 – Charging 4 – Suspended EV 5 – Suspended EVSE 6 – Finishing 7 – Reserved 8 – Unavailable 9 – Unavailable FW Update	UINT16	/

Register + Offset	Name	Description	Type	Unit
		10 – Faulted 11 – Unavailable Connection Object		
1y001	Charging Voltage	Current charging voltage *Available for DC charging connector	UINT32	0.01 V
1y003	Charging Current	Current charging current *Available for DC charging connector	UINT32	0.01 A
1y005	Charging Power	Current charging power *Available for DC charging connector	UINT32	1 W
1y007	Charge Time	Time from charging start	UINT16	Sec
1y008	Charged Energy	Charged energy of current charging session	UINT16	KWh/100
1y009	L1 Voltage	Current charging voltage of L1 line *Available for AC charging connector	UINT32	0.01 V

Register + Offset	Name	Description	Type	Unit
1y011	L2 Voltage	Current charging voltage of L2 line *Available for AC charging connector	UINT32	0.01 V
1y013	L3 Voltage	Current charging voltage of L3 line *Available for AC charging connector	UINT32	0.01 V
1y015	L1 Current	Current charging current of L1 line *Available for AC charging connector	UINT32	0.01 A
1y017	L2 Current	Current charging current of L2 line *Available for AC charging connector	UINT32	0.01 A
1y019	L3 Current	Current charging current of L3 line *Available for AC charging connector	UINT32	0.01 A

Register + Offset	Name	Description	Type	Unit
1y021	L1 Power	Current charging power of L1 line *Available for AC charging connector	UINT32	1 W
1y023	L2 Power	Current charging power of L2 line *Available for AC charging connector	UINT32	1 W
1y025	L3 Power	Current charging power of L3 line *Available for AC charging connector	UINT32	1 W
1y100	SN	SN of charger	ASCII	32 bytes

NOTE

1. The “y” marked in red above means the connector ID.
2. For the State item in the above table, when Connector ID is 0, only Available, Unavailable, and Faulted can be set.

Read and Write Register (Holding Register) Address 20000~28999

Register	Name	Description	Type	Unit
2y000	Power Limit Value	Limit value of charging power	UINT32	W
2y002	Current Limit Value	Limit value of charging current	UINT32	0.01 A
2y004	Offline Power Value	Limit value of offline power	UINT32	W
2y006	Offline Current Value	Limit current of offline current	UINT32	0.01 A

NOTE

The “y” marked in red above means the connector ID.

The connector ID and its meanings are as follows:

Connector ID	Description
0	Charger, 0# Connector
1	1# Connector
2	2# Connector
3	3# Connector

Connector ID	Description
4	4# Connector
5	5# Connector
6	6# Connector
7	7# Connector
8	#8 Connector

9 Energy Management Strategies

Autel energy management system solution is developed through repeated configuration and verification. Below are the Autel energy management system strategies.

DLB Mode

- Reserved Power = Maximum Power Configured in DLB Setting / Number of Chargers Configured in the DLB System
- Allocated Power for Each Offline Charger = Maximum Power Configured in DLB Setting / Number of Chargers Configured in the DLB System
- Offline Power = Allocated Power for Each Offline Charger x Number of Offline Chargers
- Allocated Power for Each Remaining Online Charger in Charging = (Maximum Power Configured in DLB Setting - Reserved Power - Offline Power) / Number of Online Chargers in Charging

NOTE

When all chargers are online and charging, the reserved power is 0.

ALM Mode

- Allocable Power = Maximum Power Configured in ALM Setting x (1 - 5% - Reserved Power Percentage in the Charging Station in ALM Setting)
- Offline Power = Minimum Charging Power for Charger x Number of Offline Chargers
- Allocated Power for Each Online Charger in Charging = (Allocable Power – Household Loads – Offline Power) / Number of Online Chargers in Charging
- Allocated Power for Each Offline Charger = Minimum Charging Power for Charger

NOTE

1. If the calculated online allocated power is lower than the minimum charging power, the last activated charger will pause charging and will resume charging when the online chargers can be charged using the minimum charging power.
2. If the meter is abnormal, all chargers will pause charging.

Minimum Power

- a) When using a single-phase power supply, the minimum power is 1.4 kW.
- b) When using a three-phase power supply, the minimum power is 4.2 kW.

PV Hybrid Mode

- **Full Green Charging Mode**

Allocated Power = Solar Energy – Household Loads

- **Green Priority Charging Mode**

- a) **When Solar Energy > Household Loads + Minimum Charging Power for Charger**

Allocated Power = Solar Energy – Household Loads

- b) **When Solar Energy ≤ Household Loads + Minimum Charging Power for Charger**

Allocated Power = Minimum Charging Power for Charger

- **Speed Priority Charging Mode**

Allocated Power = Solar Energy + Available Energy – Household Loads

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