Plusrite® AUSTRALIA PTY LTD

# User and Installation Manual

G R E E N S M A R T

6.

User and Installation Manual

CONTENTS

# 1. Introduction

DLB box is a home energy managing solution including EV charger as the main equipment.
Making the dynamic loads balancing between home applications and EV charger.

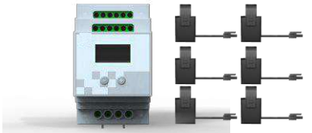
DLB in Grid Mode: Automatically adjust the power of EV charger to avoid over-load of home line.
DLB in PV Mode: Optimize the PV power using with EV charger.

## 1.1. Features and Functions

- Bidirectional current/power measurement on Grid only or Grid+PV
- Voltage measurement
- OLED screen
- Two Buttons Control
- RS485 communication via RJ45 connector (Wireless solution is available)

User and Installation Manual

## 1.2. Parameter table

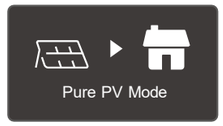
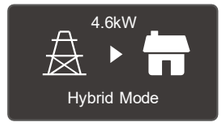
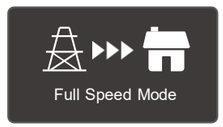
| |  |  |
|---|---|---|
| Model | DLB Box | DLB Box |
| Phase | Single Phase | Three Phase |
| Operating Mode | PV | PV |
| Extreme Mode | ✓ | ✓ |
| Night Automatic Full Speed Mode | ✓ | ✓ |
| Mode switch | ✓ | ✓ |
| Number of Current Transformers | 2 | 6 |
| Rated input voltage | 12V | |
| Standby/working power consumption | <1W | |
| Working temperature | -30°C~55°C | |
| Storage temperature | -40°C~80°C | |
| Working humidity | 5%-95% | |
| Maximum detection current | 100A | |
| Maximum detection voltage | 230±10% | |
| Display | OLED | |
| Distance between DLB box and EV charger support | More than 300M | |
| Current Transformer Default Length | 1.5m(Can be customized up to 15 meters) | |
| Installation | Rail installation/Screw fixing | |
| Communication | RS485 (Via RJ45 connector) | |
| Dimensions | 54.8mm*99.6mm*66mm | |
| Weight (The CT clip is not included) | 0.163kg | |

# 2. Working Mode Description

Grid Mode:

After set the over-load value via DLB box or APP according to the fuse of main line, the Grid mode DLB will limit the charger and home applications work below the value and protect the house circuit from over-load.

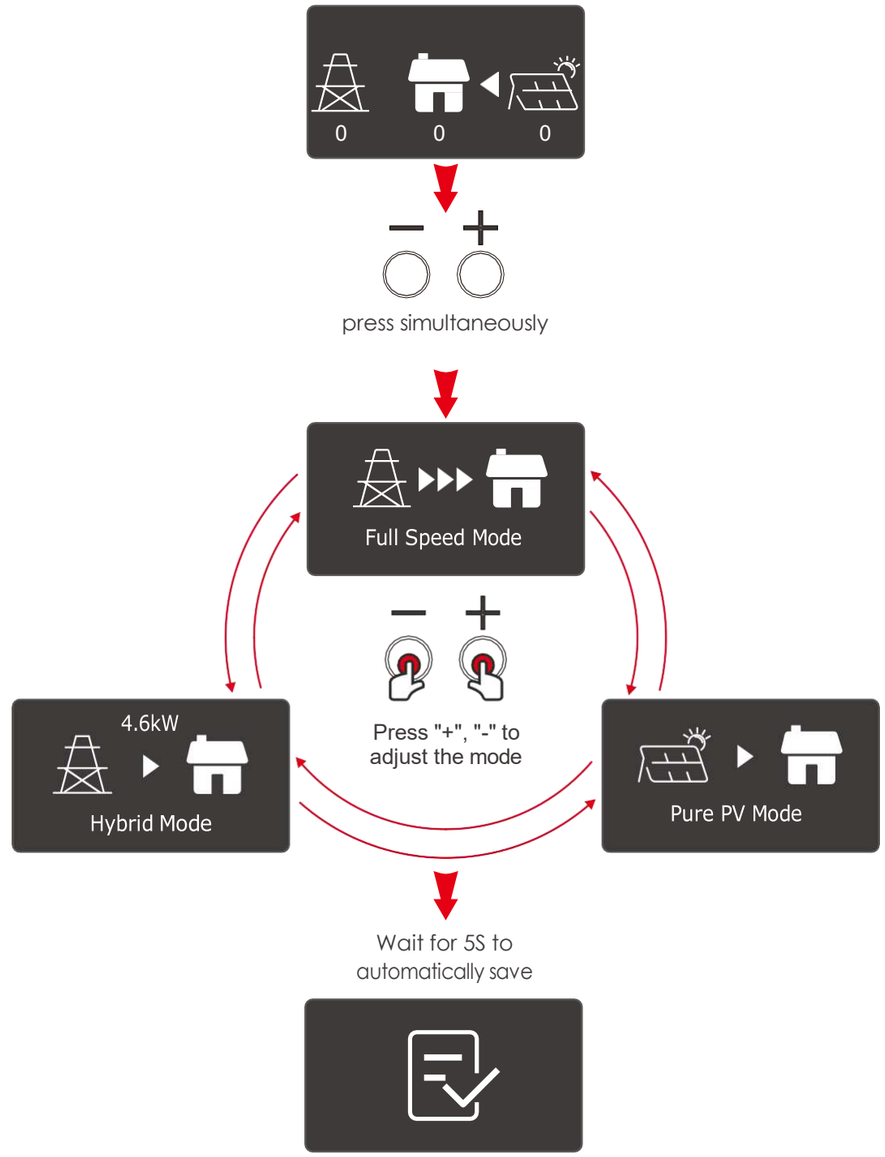
PV mode DLB supports Pure PV, Hybrid and Full Speed modes; You can select one of the modes to make the DLB work as the way.  And you can active Night Full Speed Mode and Extreme Mode to meet your requirements.

| | |
|---|---|
| Pure PV Mode<br>  | DLB solution measures and manages the energy flow of house, prevents PV energy from flowing to the grid.<br><br>In the case of PV power overflow, DLB will increase the power to charger and the charger consumes the overflown power.<br><br>Once the PV power decreases and the grid power starts to flow into the house applications. The charger will reduce the charging power to avoid using grid power. EV charger is limited to consume grid power. |
| Hybrid Mode<br>  | The grid power allowed to EV charger is not 0 anymore, in hybrid mode, EV charger consumes a certain of grid power. |
| Full Speed Mode<br>  | The grid power is not limited anymore, the system always ensure EV charger is fully operated. |
| Night Full Speed Mode | If you prefer the charger work at full speed from 20:00pm until 6:00am. To avoid the charger doesn't work at night without PV power, please active the mode in APP. |
| Extreme Mode | If you prefer the charger stop charging and avoid using too much grid power in the case of PV power generation is not enough to maintain the minimum current of the EV charger(6A),please active the mode in APP. When the EV charger has enough current (eg 10A), restart charging. |

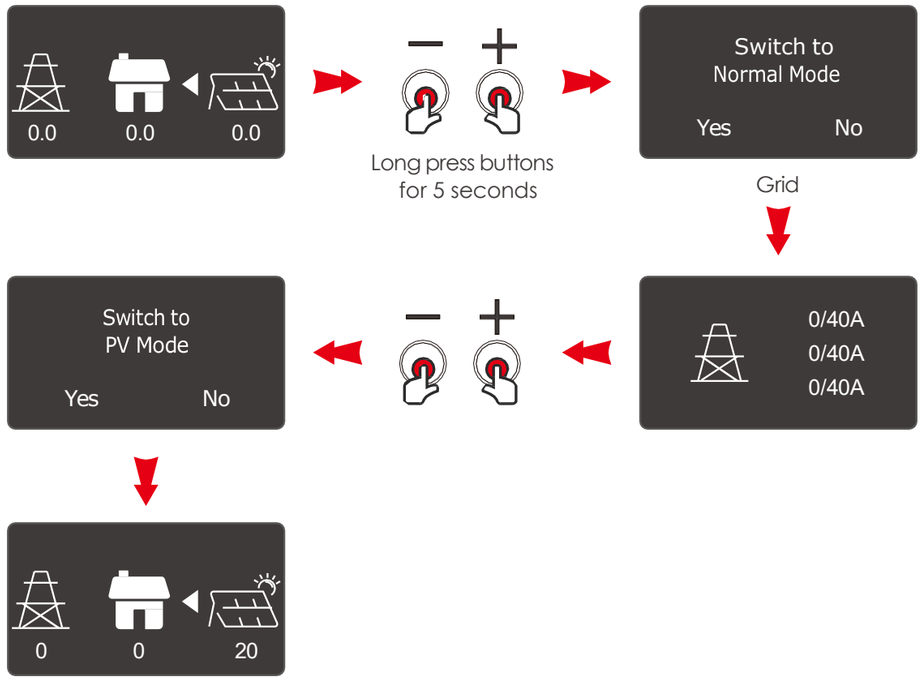


# 3. Introduction to Mode Setting

## 3.1.How to set Pure PV mode, hybrid mode and full speed mode



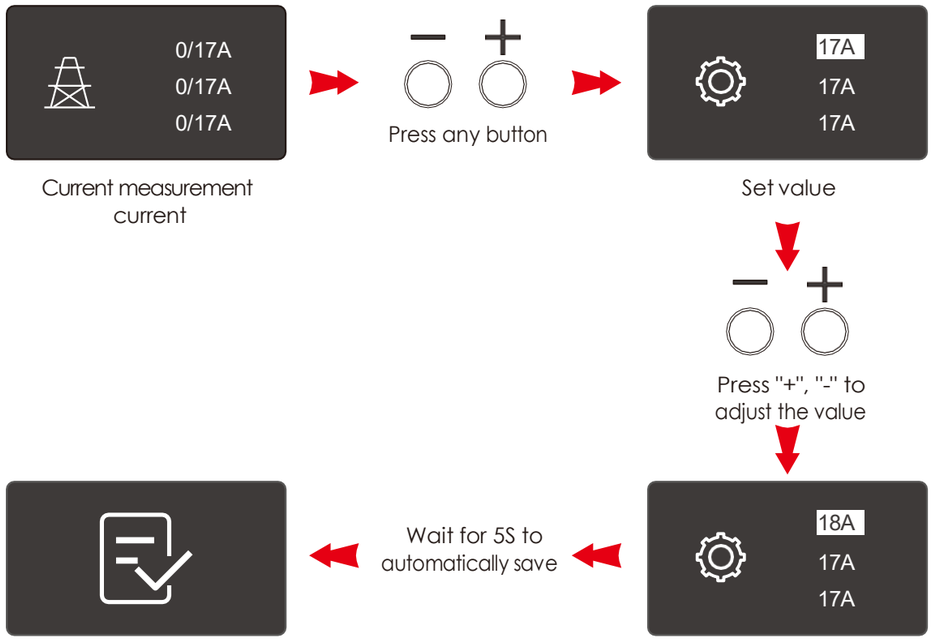
## 3.2.How to switch between Grid mode and PV mode



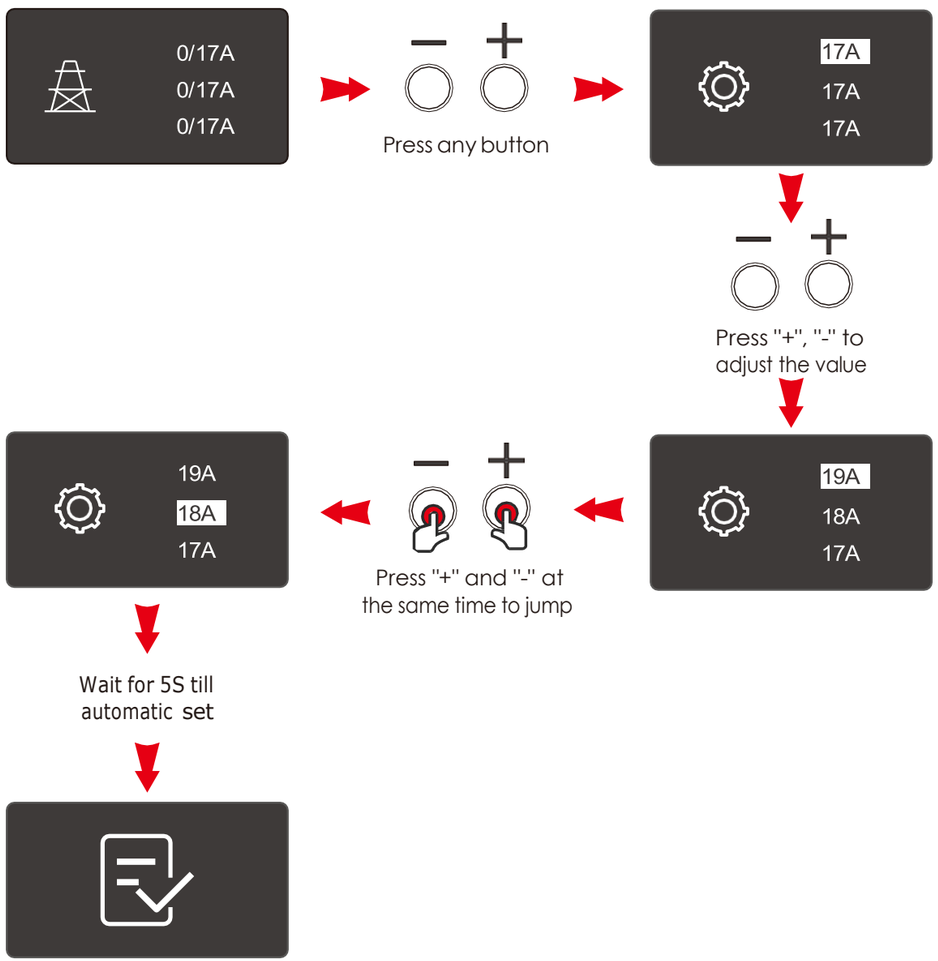



## 3.3.How to set the overload value for the distribution board in Grid mode

- For 1 Phase DLB box

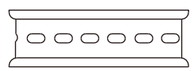


- For 3 Phase DLB box



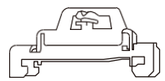



## 4. Accessories



Din rail 105mm

X1



Din rail fixing parts

X2

M4*30 expansion screw kit

X2

Current Transformer
(1-phasel DLB)*1
(3-phase DLB)*3
or
(1-phase Solar DLB)*2
(3-phase Solar DLB)*6

X1

Network cable - 5m
(RJ45 TIA/EIA-568B
8-core cat5 twisted pair cables)

X1

Solar DLB box

X1

voltage acquisition cable-1m

X1

## 5. Safety Instruction

Don't install the DLB with power supply or power ON to avoid electric shock.

Supervision should be provided when the DLB is used around children.

Do not install or use the DLB box near flammable, explosive, irritating or combustible materials, chemicals or vapors.

Use the DLB only within the specified range of operation parameters.

Do not spray water or any other liquid directly on the DLB box.

If the DLB box is defective, broken, worn, damaged or otherwise malfunctioning, or cannot operate or continues to operate, please stop using the DLB box.

Do not attempt to disassemble, repair, tamper with or modify the DLB box.

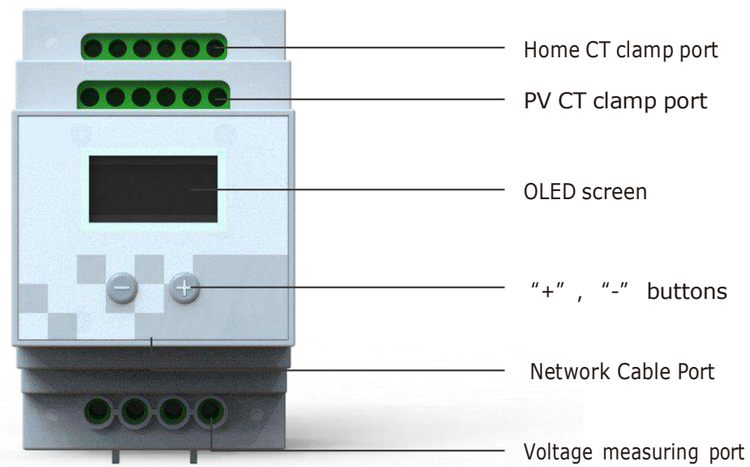
Do not apply strong force or impact to the DLB box, or apply tension, twist, tangle, drag or step on the DLB box to prevent damage to it or any of its components.

Do not touch the terminals of DLB box with sharp metal objects.

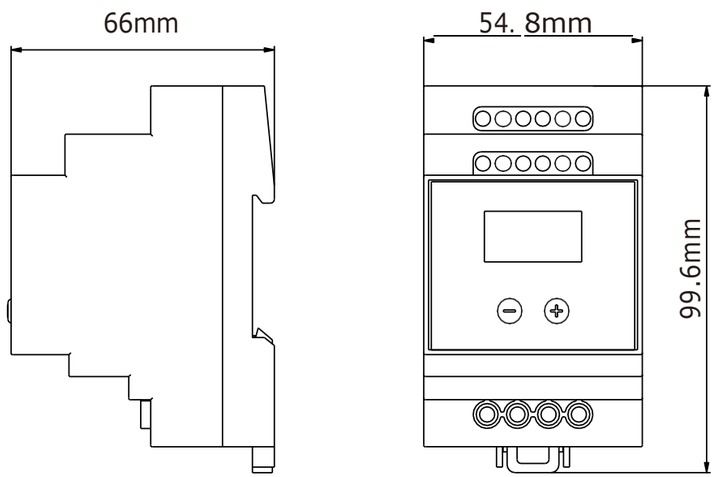
Read the manual before installation.

User and Installation Manual

## 6. DLB Box Description




### Dimensions of DLB

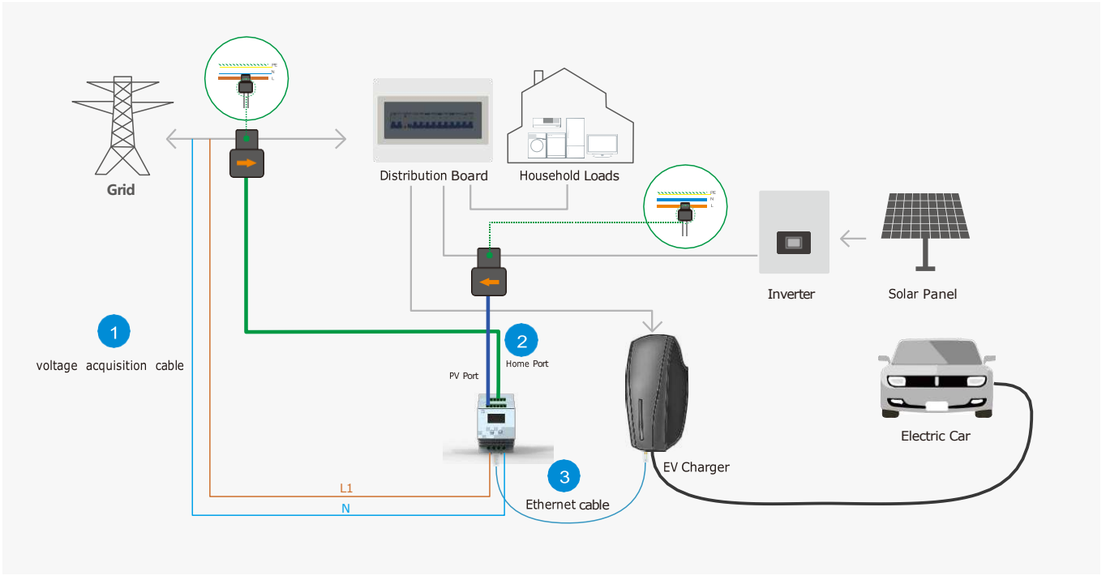


# 7. Installation

Please note that the household main cable mentioned in all installation steps means the cable include some or all of home applications and also EV charger.

## 7.1. Installation of single-phase DLB system

### 7.1.1. Single-phase DLB system - installation diagram

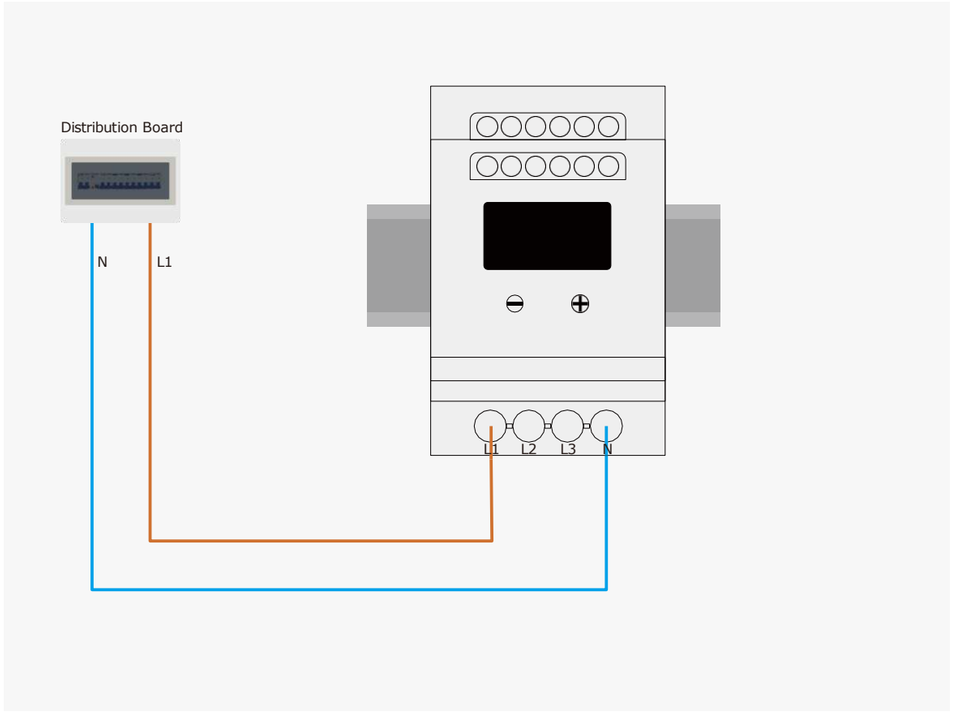



The installation of a single-phase DLB system is divided into three steps:
1. Install the voltage acquisition cable;
2. Install the CT clamp;
3. Connect the DLB and the EV Charger with a Ethernet cable.

User and Installation Manual

### 7.1.2. Install the voltage acquisition cable

- Connect the live wire L1 of the household main cable with the voltage measuring port L1 with the voltage acquisition cable.
- Connect the neutral wire N of the household main cable with the voltage measuring port N with the voltage acquisition cable.




### 7.1.3. Install the CT and cable

Note the arrow on CT before installation:
The arrow on CT means the current direction of the cable being measured.
Please ensure all CTs are installed in correct direction to make the system work.

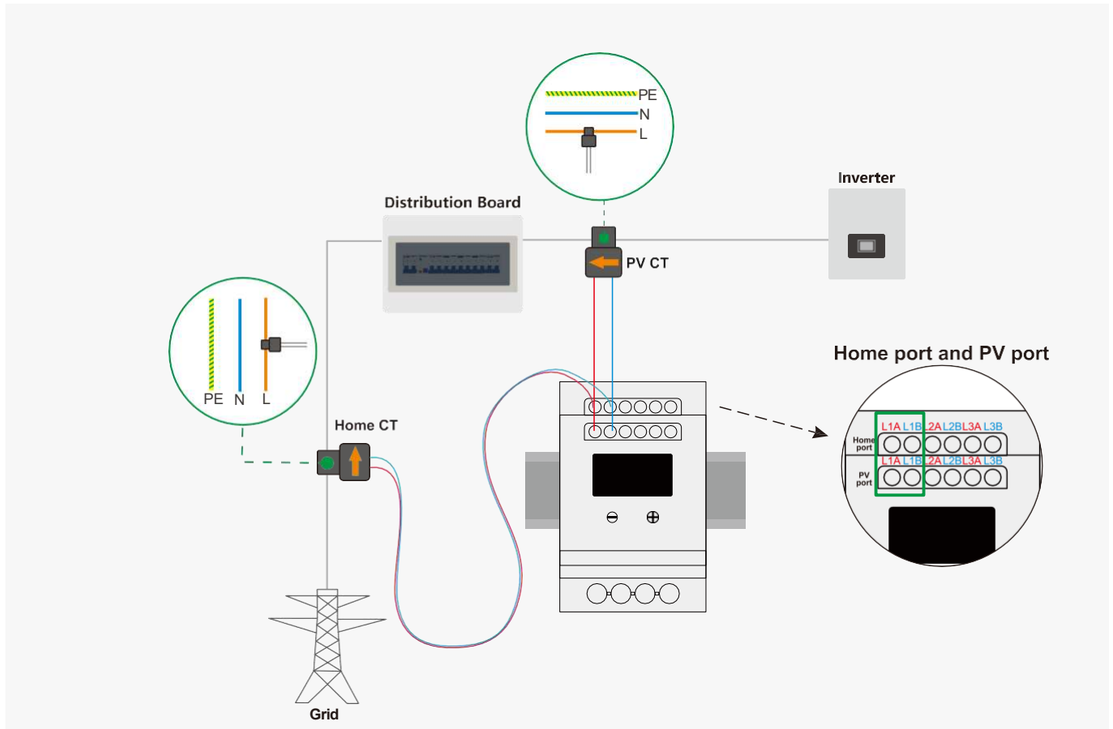
A total of two CT clamps are required: one for the grid side and the other for the PV side.

Note:

Skip the installation of CT clamp at PV side, if:

1. Your system doesn't have PV cable;
2. You don't need any PV data or function.

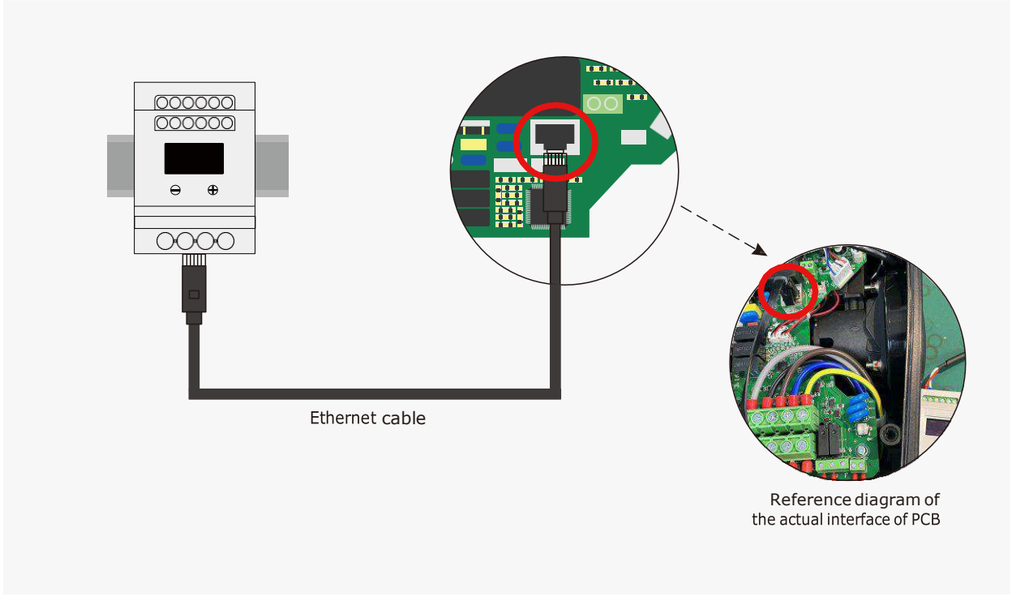
- Home CT: Connect the CT clamp with the live wire L of the household main cable and connect the CT red wire to L1A on the DLB home port and the CT blue wire to L1B on the DLB home port.
- PV CT : Connect the CT clamp with the PV cable L and connect the CT red wire to L1A on the DLB PV port and the CT blue wire to L1B on the DLB PV port.





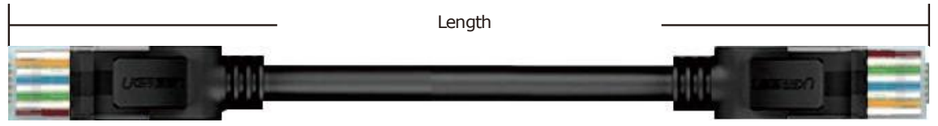

## 7.1.4.Install the Ethernet cable

- Insert one end of the ethernet cable into the RJ45 port of the DLB, and the other end into the RJ45 port on the PCB of the charger.




Reference diagram of the actual interface of PCB

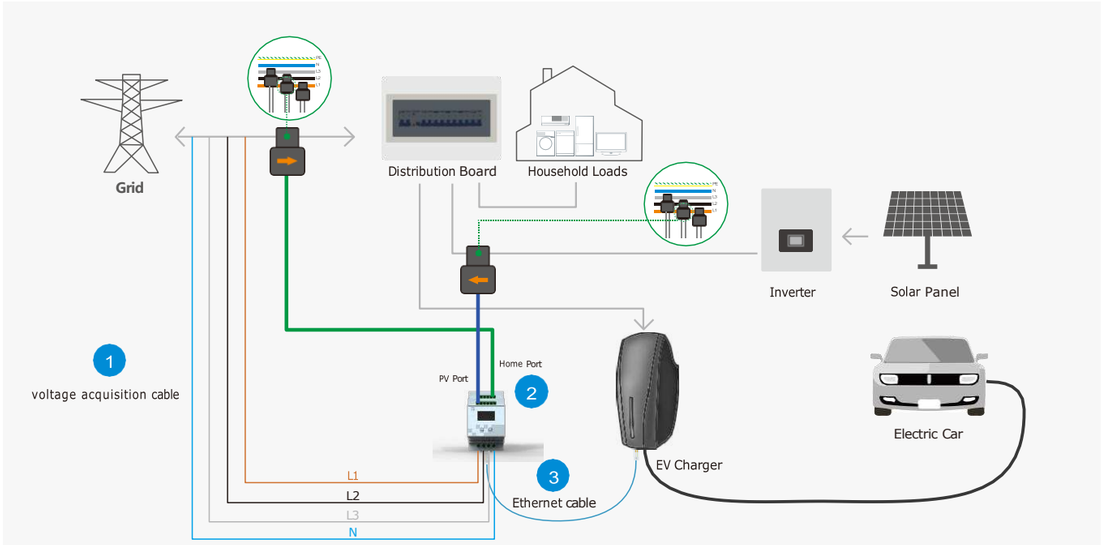
- Ethernet cable Recommended




| RJ45 | 8-core cat5 twisted pair cables | RJ45 |
|---|---|---|
| TIA/EIA-568B | | TIA/EIA-568B |

## 7.2. Installation of three-phase DLB system

### 7.2.1. Three-phase DLB system - installation diagram

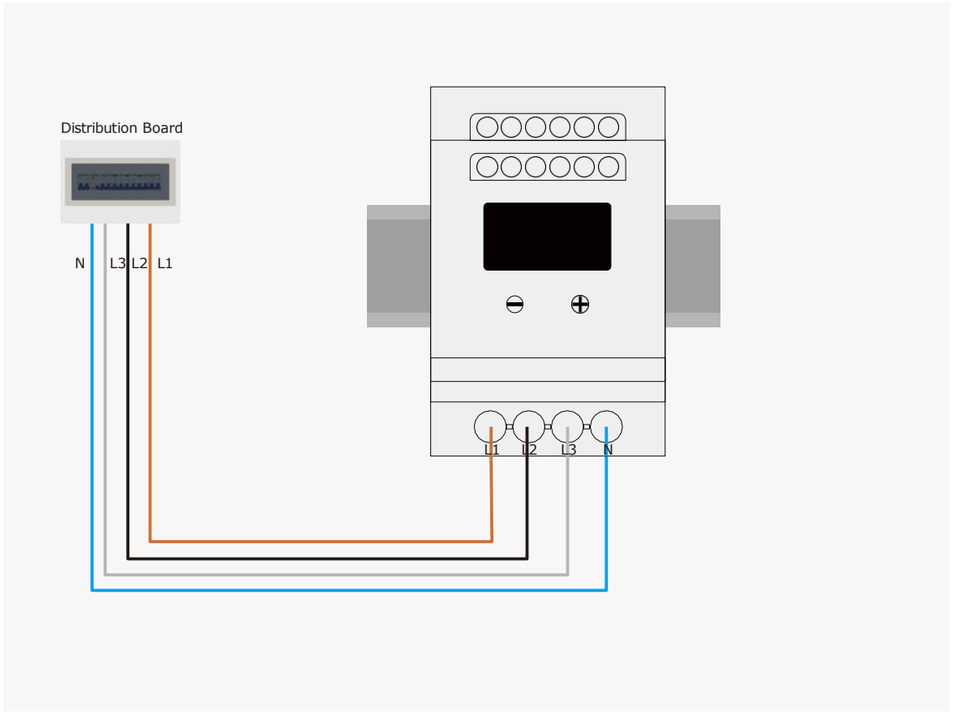



The installation of a three-phase DLB system is divided into three steps:
1. Install the voltage acquisition cable;
2. Install the CT clamp;
3. Connect the DLB and the EV Charger with a Ethernet cable.



### 7.2.2. Install the voltage acquisition cable

- Connect the live wires L1, L2 and L3 of the household main cable with the voltage measuring ports L1, L2 and L3 respectively with the voltage acquisition cable.
- Connect the neutral wire N of the household main cable with the voltage measuring port N with the voltage acquisition cable.




### 7.2.3. Install the CT and cable

Note the arrow on CT before installation:
The arrow on CT means the current direction of the cable being measured.
Please ensure all CTs are installed in correct direction to make the system work.

A total of six CT clamps are required, three for the grid side and the other three for the PV side.

Note:

Skip the installation of CT clamp at PV side, if:

1. Your system doesn't have PV cable;
2. You don't need any PV data or function.

- Home CT: Connect the CT clamps with the live wires L1, L2 and L3 of the household main cable and connect the CT red wires to L1A, L2A and L3A on the DLB home port and the CT blue wires to L1B, L2B and L3B on the DLB home port respectively.

| Home CT | | | |
|---|---|---|---|
| NO. | Position (household main cable) | Red wire | Blue wire |
| 1 | L1 | L1A (Home port) | L1B (Home port) |
| 2 | L2 | L2A (Home port) | L2B (Home port) |
| 3 | L3 | L3A (Home port) | L3B (Home port) |

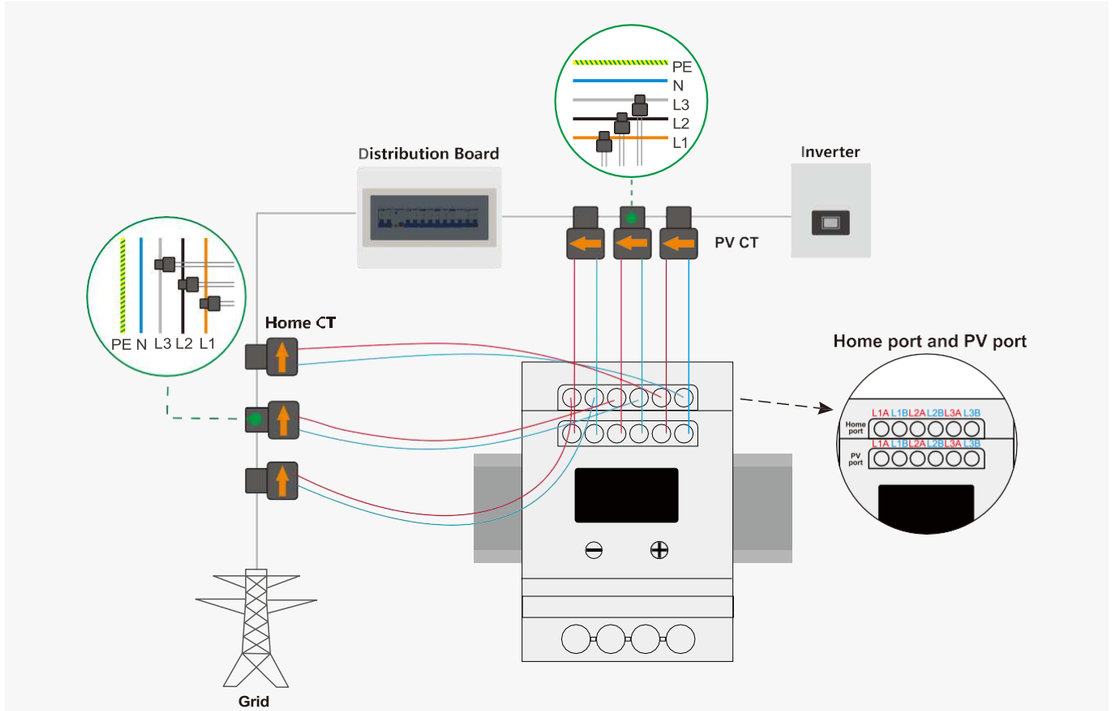
**In the table, L1A, L2A, L3A, L1B, L2B, and L3B refer to the corresponding port of the DLB home port.**

- PV port: Connect the CT clamps with the PV cables L1, L2 and L3 and connect the CT red wires to L1A, L2A and L3A on the DLB PV port and the CT blue wires to L1B, L2B and L3B on the DLB PV port respectively.

| PV CT | | | |
|---|---|---|---|
| NO. | Position (PV cable) | Red wire | Blue wire |
| 1 | L1 | L1A (PV port) | L1B (PV port) |
| 2 | L2 | L2A (PV port) | L2B (PV port) |
| 3 | L3 | L3A (PV port) | L3B (PV port) |

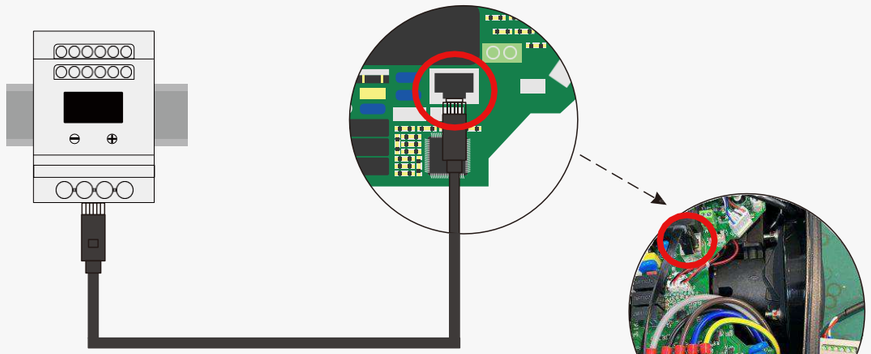
**In the table, L1A, L2A, L3A, L1B, L2B, and L3B refer to the corresponding port of the DLB PV port.**

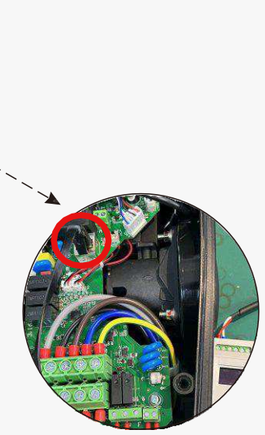
User and Installation Manual



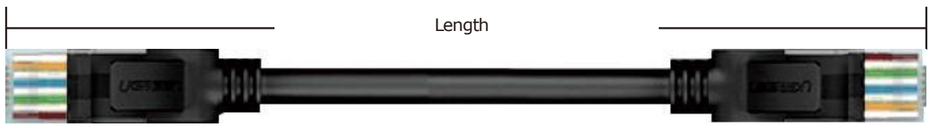
### 7.2.4. Install the Ethernet cable

- Insert one end of the ethernet cable into the RJ45 port of the DLB, and the other end into the RJ45 port on the PCB of the charger.



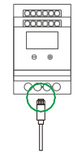
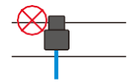
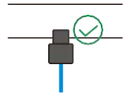
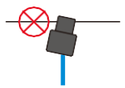
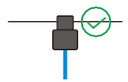
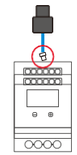
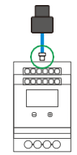


Reference diagram of the actual interface of PCB

- Ethernet cable Recommended






## 8. Troubleshooting

| LED light status | Fault type | Potential Cause | Action |
|---|---|---|---|
| Yellow light on for 1s; Red light flashes 1 time<br>The yellow light of the charger light board lights for 1s, then the red light flashes for one time, and this happened in turn. | DLB offline |  RS485 cable is damaged |  Replace Rs485 cable |
| | |  Rs485 cable is not connected firmly |  Reconnect |
| Yellow light on for 1s; The red light flashes twice in a row<br>The yellow light of the charger light board lights on for 1s,and then the red light flashes twice in succession.This happens in turn. | DLB current abnormal |  CT is clamped on the wrong power cord |  Check if the CT position is correct |
| | |  CT open coil is not connected firmly |  Reconnect |
| | |  The connection between the CT cable and the DLB is loose |  Reconnect |
| | | The DLB box doesn't measure the charging current of EV charger, check whether the cable is connected. | Check if the CT position is correct |