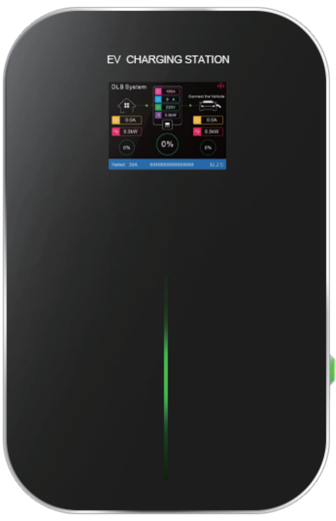
Dynamic load balancing

MANUAL


EV CHARGING STATION
DLB System

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1. Safety

Please make sure you have fully read and understood the instructions in this manual before you start installing or using the product. If you fail to follow the instructions from this manual you can put persons, surroundings, the environment and the product at risk. Store this manual in an accessible place for future reference.

Always comply with the information, such as labels and the nameplate attached directly to the product and keep the information in a legible condition.Always comply with any applicable laws and regulations that have not been accounted for in this manual.

Security Warning

⚠ ATTENTION

Non-compliance with the operating instructions can cause serious consequences.

Manufacturer does not assume any liability for damage caused by disregarding operating instructions or other warnings marked on the device.

High voltage can cause fire hazards! Never use the device if the housing is damaged or opened! This product is not suitable for people with limited mobility, sensory or psychological disabilities, and those who lack use experience or a certain degree of knowledge.

⚠ IMPORTANT SAFETY INSTRUCTIONS WARNING!

▲This product should only be installed, repaired or maintained by authorized electricians and in accordance with national guidelines for electrical installations. All applicable local, regional and national regulations for electrical installations must be respected.

▲Regularly check if the charger has visible damage.Do not use a damaged product.

▲Make sure that all safety facilities and connections are available, properly installed and undamaged at all times and are tested regularly to ensure they can operate normally.

▲Make sure that the input voltage, frequency, circuit breakers and other conditions of the device meet the specifications before the device is powered on. It's important to observe the maximum permissible charging current of the connection.

▲Before powering on the device, please confirm that the device is properly grounded to avoid unnecessary accidents. If a grounded fault occurs, it is assumed that the cable carries voltage. Please make sure there is no high-voltage power in the system before inspecting the device.

▲Please insulate the unnecessarily exposed metal parts of all tools to prevent them from touching the metal frame, which may cause short circuit.

▲To ensure the service life and stable operation of the charging station, the operating environment should be kept as clean as possible with a relatively stable temperature and humidity. The charging station must not be used in flammable environment or environments with volatile gas.

▲Do not use the charger when the inside of the charging plug is wet.

▲Do not modify, retrofit, or change any part by yourself under any circumstances.

▲Please do not use this product as a toy. Please take good care of children to ensure that they will not play with this device as a toy nor put fingers into the charging connector when the power plug is still connected.

▲The circuit to which the charger is to be connected must be equipped with a residual current circuit breaker.

⚠ NOTE

Please do not use it for other purposes except electric car charging. Do not try to disassemble the device by yourself under any circumstances. Otherwise, the internal precision parts may be damaged, and you will not be able to apply for after-sales service.

2. Introduction of Besen Load Balancing

- Household load balancing adopts the one-to-one wireless communication connection between DLB System and charging stations with real-time data;
- The DLB System defaults as the master device, and the charging station defaults as the slave device;
- Users can view the Total Current through the DLB System to know the current consumption of household equipment;
- The user needs to set the current parameter MAINS of the DLB System;
- When the power consumption peaks, the charging station will reduce the charging current, and when the power consumption is low, the charging station will increase the charging current.

3. Description

This Charger is a Mode 3 charger for charging electric vehicles (EV) that complies with the IEC61851 standard.

This Charger is equipped with several features to optimise power consumption and charging performance.

Dynamic Load Balancing

- The load balancing system consists of DLB System and charging stations;
- One-to-one wireless communication between DLB System and charging stations;
- DLB System shell is suitable for standard rail installation;
- The load balancing system collects the current consumption of household appliances and adjusts the current of the charging station to rise or fall;
- The DLB System supports current collection from a three -circuit busbar;
- System parameters and status can be configured through the OLED display and buttons of the DLB System.

3.1 Charging station Component

COMPONENTS IN THE BOX (MODE C - With cable)

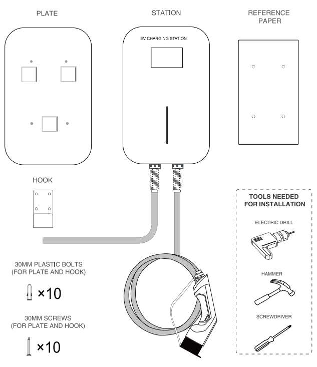


PLATE
STATION
REFERENCE PAPER
EV CHARGING STATION
HOOK
TOOLS NEEDED FOR INSTALLATION
ELECTRIC DRILL
HAMMER
SCREWDRIVER
30MM PLASTIC BOLTS (FOR PLATE AND HOOK)
×10
30MM SCREWS (FOR PLATE AND HOOK)
×10

COMPONENTS IN THE BOX (MODE A - With socket)

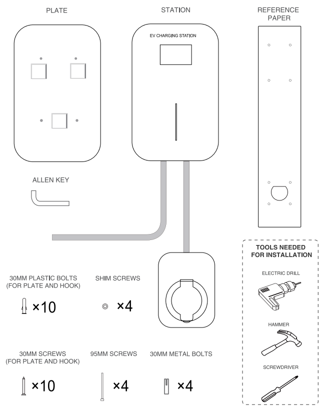
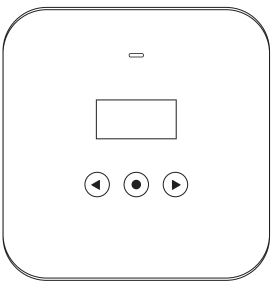
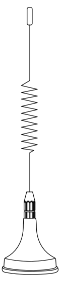
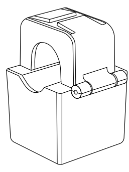


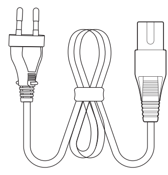
PLATE
STATION
REFERENCE PAPER
EV CHARGING STATION
ALLEN KEY
TOOLS NEEDED FOR INSTALLATION
ELECTRIC DRILL
HAMMER
SCREWDRIVER
30MM PLASTIC BOLTS (FOR PLATE AND HOOK)
×10
SHIM SCREWS
×4
30MM SCREWS (FOR PLATE AND HOOK)
×10
95MM SCREWS
×4
30MM METAL BOLTS
×4

3.2 DLB System Component


DLB System (host)
X1


Antenna
X1


Open Type Current Transformer
x1 (for single phase)
x3 (for three phase)


DLB System Power Cord
X1

4. Technical Data

4.1 CHARGING STATION DATA

Mode C	Mode A
Phase Mode: Single / Three Phase	Phase Mode: Single / Three Phase
Installation Method: Wall/Stand	Installation Method: Wall/Stand
Mode C (with cable)	Mode A (with socket)
Certificate: CE	Certificate: CE
IP Rating: IP66	IP Rating: IP66
Rated Voltage: 230V-400VAC±10% 50Hz±10%	Rated Voltage: 230V-400VAC±10% 50Hz±10%
Rated Current: 16/32A	Rated Current: 16/32A
Maximum Power: 3.84/7.68/11/22kW	Maximum Power: 3.84/7.68/11/22kW
Operating Temperature:-25°C~40°C	Operating Temperature:-25°C~40°C
Enclosure Material: ABS + PC alloy	Enclosure Material: ABS + PC alloy
Start Mode: Button(default) / RFID(optional) / APP via Bluetooth (Optional)	Start Mode: Button(default) / RFID(optional) / APP via Bluetooth (Optional)

4.2 DLB system Data

DLB System power supply:	input 85-264V AC 50/60Hz ;
Current transformer:	detection range 0~100A, accuracy 2.0 % ;
Wireless frequency:	863MHz/928MHz ;
Housing dimensions:	96 * 96 * 39mm
Working temperature:	-25°C ~ +50°C .

5. Transportation&Storage

5.1 Transport

Transport the product in the original packaging, or suitable replacement packaging that provides adequate protection from vibrations, bumps, moisture, dust, and debris.

Be careful not to drop the product and prevent it from moving or bumping into objects while transporting.Excessive vibrations could loosen wire connections and cause the product to malfunction.

5.2 Storage

Always disconnect the product from the power supply when storing the product.

Store the product in environmental conditions within the limits stated in chapter 3 this manual.

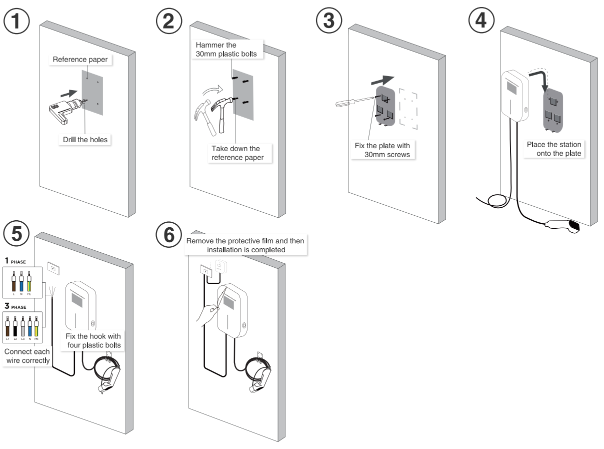
Store the product in the original packaging or a suitable replacement packaging to protect the product from moisture, dust, and debris.

Do not store anything on top of the product.

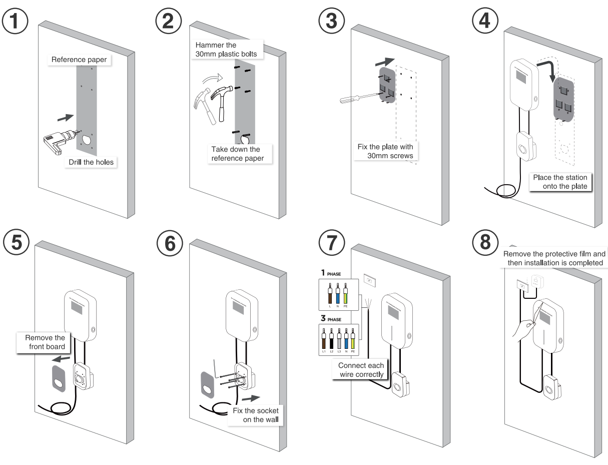
6. Installation

6.1 Charging Station Installation

(MODE C - With cable)

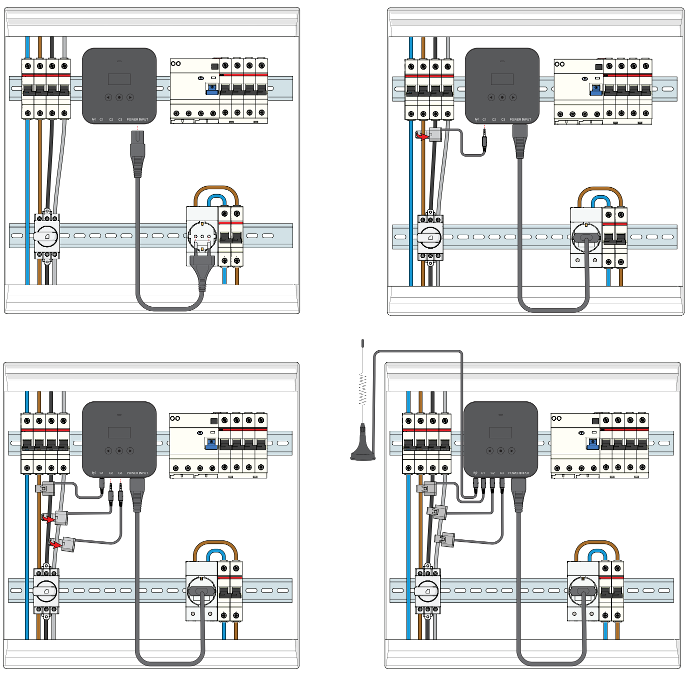

①
Reference paper
Drill the holes
②
Hammer the 30mm plastic bolts
Take down the reference paper
③
Fix the plate with 30mm screws
④
Place the station onto the plate
⑤
1 PHASE
L N PE
3 PHASE
L1 L2 L3 N PE
Connect each wire correctly
Fix the hook with four plastic bolts
⑥
Remove the protective film and then installation is completed

(MODE C - With socket)


①
Reference paper
Drill the holes
②
Hammer the 30mm plastic bolts
Take down the reference paper
③
Fix the plate with 30mm screws
④
Place the station onto the plate
⑤
Remove the front board
⑥
Fix the socket on the wall
⑦
1 PHASE
L N PE
3 PHASE
L1 L2 L3 N PE
Connect each wire correctly
⑧
Remove the protective film and then installation is completed

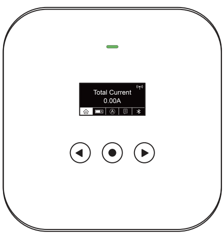
6.2 Load Balancing System Installation

Wiring Instructions (The diagram below illustrates a three-phase device.)



- The DLB System is installed in the distribution box, and the antenna should be installed outside the distribution box;
- The charging station is installed under the same incoming cable as the household appliance;
- The current transformer is installed at the front end of the input busbar cables, enabling accurate measurement of the current consumption of all electrical devices;
- The incoming cable of the charging station is connected to the corresponding L, N, PE interface according to the labels;
- Charging stations need to be protected by circuit breakers and residual current circuit breakers;
- Note: For three-phase setups, the DLB box detects the phase with the highest current load (L1, L2, or L3) in the household.
- For example, if the mains is set to be 96A in total, namely 32A per phase, and that L1 is currently drawing 22A, making it the phase with the highest load, the remaining maximum capacity allocated to the charging station will be 10A per phase.
- Consequently, the charging station will charge at a maximum current of approximately 10A.

7. Load Balancing Configuration


Total Current
0.00A

- The wireless DLB System supports OLED display, and the screen displays current data and balance status;
- There are three setting buttons below the OLED display, which are used for all parameter settings of load balancing and interface navigation;
- Left button: ◀ used to switch interface or busbar current reduction setting;
- Right button: ▶ used to switch interface or busbar current increase setting;
- Middle button: ● used in the setting menu bar to select or confirm the setting;

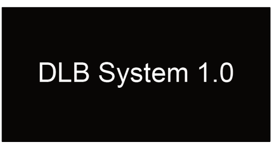
Note: The recommended MAINS value for the DLB system is 80% of the rated current of the bus breaker. For a three-phase system, the MAINS parameter is calculated as the total current of L1 + L2 + L3.

Example: If the customer's three-phase incoming total rated current is 32A per phase, the MAINS value is calculated as: MAINS = 32A*80%+32A*80%+32A*80%=76A.

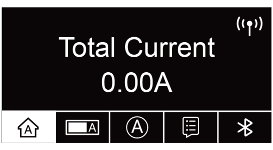
8. Menu Navigation

- Status displays Total Current: The transformer detects the current and displays the total current consumed by all household appliances in real time;
- Status displays Available Current: According to the MAINS parameter setting, the remaining current that the busbar cable can carry is displayed;
- Status displays ((ı)) : WiFi has been connected;
- Status displays ((ı̽)): WiFi is not connected;
- Parameter setting MAINS: set the maximum carrying current of the mains busbar, the default current is 100A;
- Parameter setting SLAVE: the charging station of the slave machine, scan the device number of the currently connected slave machine, and the default network does not need to be set;
- Parameter setting Bluetooth: DLB System Bluetooth name, APP connection to cancel the network and restore factory settings, no need to set.

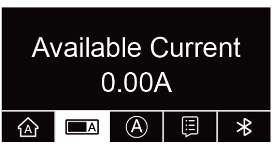
9. Introduction to Load Balancing Interface Display


DLB System 1.0

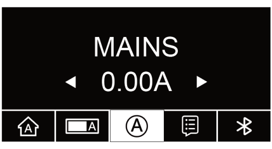
startup screen


Total Current
0.00A

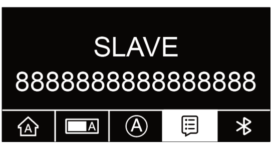
total current interface


Available Current
0.00A

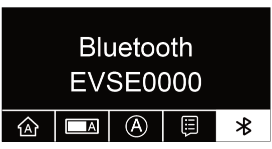
available current interface


MAINS
◀ 0.00A ▶

Set Mains Bus Current Interface


SLAVE
8888888888888888

Slave Address Interface

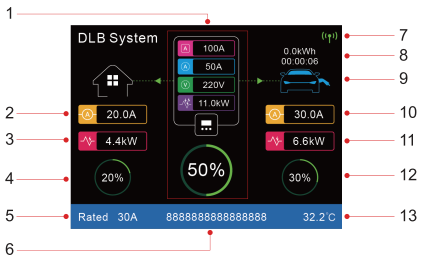

Bluetooth
EVSE0000

Bluetooth Name Interface

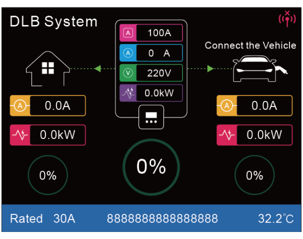
10. DLB System Indicator Status

Status	🟦 (blue)	🟩 (green)	🟥 (red)
DLB System sends data	Flashing	off	off
DLB System receives data	off	Flashing	off
Offline	off	off	Flashing
Not networked	off	off	Stays on

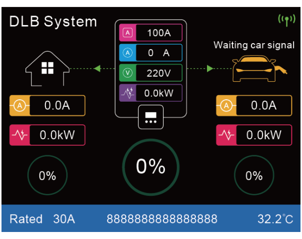
11. Introduction to the Interface Display of Load Balancing Charging Stations


1
2
3
4
5
6
7
8
9
10
11
12
13
DLB System
100A
50A
220V
11.0kW
0.0kWh
00:00:06
20.0A
4.4kW
20%
50%
30.0A
6.6kW
30%
Rated 30A
8888888888888888
32.2°C

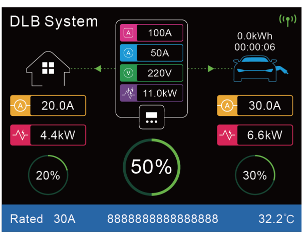
1. Set busbar current, busbar usage current, busbar usage power, busbar usage percentage.
2. Residential usage current.
3. Residential usage power.
4. Residential usage percentage.
5. Charging station’s rated current.
6. Charger ID.
7. Wireless networking status.
8. Charging amount, charging time.
9. Charging status.
10. Charging current.
11. Charging power.
12. Charging percentage.
13. Working temperature.


DLB System
100A
0 A
220V
0.0kW
Connect the Vehicle
0.0A
0.0kW
0%
0%
0.0A
0.0kW
0%
Rated 30A
8888888888888888
32.2°C

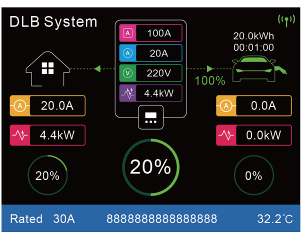
Connecting to the vehicle interface


DLB System
100A
0 A
220V
0.0kW
Waiting car signal
0.0A
0.0kW
0%
0%
0.0A
0.0kW
0%
Rated 30A
8888888888888888
32.2°C

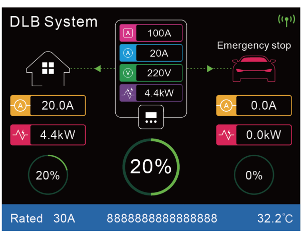
Waiting for car signal interface


DLB System
100A
50A
220V
11.0kW
0.0kWh
00:00:06
20.0A
4.4kW
20%
50%
30.0A
6.6kW
30%
Rated 30A
8888888888888888
32.2°C

Charging interface


DLB System
100A
20A
220V
4.4kW
20.0kWh
00:01:00
100%
20.0A
4.4kW
20%
20%
0.0A
0.0kW
0%
Rated 30A
8888888888888888
32.2°C

Charging completed interface


DLB System
100A
20A
220V
4.4kW
Emergency stop
20.0A
4.4kW
20%
20%
0.0A
0.0kW
0%
Rated 30A
8888888888888888
32.2°C

Fault reporting interface

For serious faults, the system cannot recover automatically. In order to remind the user that this fault has occurred, the system will automatically count down for 10 seconds to restart after the user disconnects the charging gun.

Special Scenarios

Uncontrolled vehicles: some vehicles cannot cooperate with charging stations for dynamic balance adjustment. These vehicles typically only have a few gears for current regulation, such as 6A, 8A, 16A, and don’t support adjustments for dynamic balance during charging.

Therefore, it's essential to verify whether your vehicle supports linear current regulation when using dynamic balance charging stations.