cabur®

CONNECTING ENERGY
SINCE 1952

Cabur EVO EV Smart Chargers

Installation and operating manual

EV SMART charger

Contents

Markings

CE

UK CA

Point of contact under Directive 2014/35/EU:
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1 Revision history

Version	Date	Author	Notes
0.1	20/01/2023	Cabur Technical Office	Preliminary version (English) derived from Italian version 0.4
0.2	03/04/2023	Cabur Technical Office	Pictures from English version of the APP added
0.3	19/04/2023	Cabur Technical Office	Details about current transformer setup for power management mode
0.4	03/05/2023	Cabur Technical Office	Info about language settings added

2 Introduction

This manual introduces the Cabur EV EVO Charging Line products for EV battery charging and provides all the necessary information about their installation process and their usage.

 **Important**: Please read carefully this manual before installing and using the charger.

 **Important**: All the installation operations must be performed by qualified personnel only.

2.1 General information

2.1.1 About this manual

- The present manual must be available to all the persons who take care of the charger installation and usage
- The installation and commissioning of the charger must be performed by authorized and qualified personnel only in compliance to all the safety related regulations and laws
- The charger producer is not responsible for any damage due to an incorrect or missing application of the rules contained in the present manual
- Due to the continuous improvement process, the charger producer has the right to apply changes to the product whenever needed
- The reproduction of this manual is not allowed without the written authorization by Cabur s.r.l.

2.1.2 About safety

The product conforms with the state of the art and the applicable safety and health regulations.

Nevertheless, the following risks can be caused by incorrect operations or misuse:

- Hazards to life and limb of the user or third parties
- Perils to the product and other material assets of the operator
- Risks for the efficient use of the product

It is mandatory to apply the following rules:

- The input voltage must be disconnected before any maintenance operation on the charger.
- Please be sure the input voltage is not present by means of dedicated measures with appropriate tools
- Before switching on the charger, the earth cable connection must be checked
- The input cables, the plugs and all the necessary accessories for the installation must be carefully selected in compliancy with the current regulations and laws (see paragraph 6.5)
- An MGT protection device must be installed to protect the charger input (see paragraph 6.3)
- No cable adapter or patch or cord set extension is allowed for the charger cord set

- The EV must be blocked before connecting for charging
- It is prohibited to remove, modify, bridge or bypass any protective, safety or monitoring equipment and, in general, it is prohibited to apply modifications to the charger
- It is prohibited to reconfigure or modify the product
- The product may only be operated in perfect conditions

2.1.3 About maintenance

- Do not open the charger
- Do not touch the electronic parts/boards
- Do not install or use the charger if it is damaged
- The charger must be repaired by authorized personnel only
- Use a soft cloth with neutral detergent liquid, suitable for plastic surfaces, to clean the charger

3 Warranty and liability

The warranty period of the charging station is specified by the official Cabur's selling conditions.

This operating manual serves to ensure fault-free and safe use of the product; compliance with its content is a prerequisite for the fulfilment of any warranty claims.

Excluded from the warranty are such defects that result from any arrangement and assembly not effected by the producer, insufficient equipment, failure to observe the installation requirements and conditions of use, excessive load on the components beyond the capacities specified by the seller, negligent or incorrect handling and use of unsuitable operating materials.

This also applies to defects that are attributable to material provided by the user.

In particular, claims for damages expire in the event of:

- Inappropriate use
- Modifications or additions
- Repairs carried out improperly
- Disasters, foreign body impact and force majeure

The producer is also not liable for damage caused by the actions of third parties, atmospheric discharges, overvoltage and events related to chemical influences.

The warranty does not apply to the replacement of parts that are subject to natural wear and tear.

4 Limits of use

This charger is an electrical equipment designed for charging battery electric vehicles (BEV).

The plug and the socket compliant to EN 62196 (alternating current charging, MODE 3) are used for charging BEVs.

The charger is suitable for indoor and outdoor usage. The product is built according to the state of the art and the generally accepted safety regulations. Nevertheless, during its use hazards to life and limb of the operator or third parties may occur or the product and other material assets may be negatively affected. Intended use includes observing the operating manual and compliance with the maintenance requirements.

Only use the product if it is in technically perfect condition. Use the product as intended and in a safe way.

In case of malfunctions or damages that could impact safety please contact a qualified technician and inform the producer.

 The charging station must be mounted on a wall or on its own stand and installed in a stable way. It is not allowed to operate the charging station in a loose state (not steadily mounted) because this would not comply with the ratings.

 Unmounting, tampering with or deactivating the safety devices is forbidden.

 No technical changes may be made to the product without consulting the manufacturer Furthermore, liability and warranty claims are excluded in case of non-compliance with the intended use.

 The product may only be operated under the operating conditions specified in the documentation

 This documentation is mandatorily to be read by qualified personnel for installation and initial operation, as well as by the user for the Installation and Instruction Manual of the product.

 For what concerns users, unattended operation of the product is only allowed if they

- have read and understood this Installation and Instruction Manual
- have read and understood all the safety instructions

 For what concerns the qualified personnel (electrical engineering/technician specialist), only qualified personnel are allowed to perform installation, initial operation, inspection and configuration work. The qualified personnel must have read and understood this manual.

5 Technical data

Product data			
			
Model	**EVEVO7S/C**	**EVEVO11S/C**	**EVEVO22S/C**
Power	3.5-7.4kW	3.5-11kW	3.5-22kW
Charging mode	MODE 3 CASE B/C (plug/cable)		
Connector standard	Type 2		
Dimensions (W x H x D)	260x260x100 mm		
Weight	2.5/5.1kg		
Enclosure material	PC+ASA (UL94-V0)		
Mounting	Wall / Stand		
Electrical data			
Grid voltage	230 V±15%	400V±15% (3-phase) 230 V±15% (1-phase)	400V±15% (3-phase) 230 V±15% (1-phase)
Grid frequency	50/60Hz ±1%		
Grid configuration	TN/TT/IT(up to 240Vac)	TN/TT/IT(3P+N+PE) (3-phase) TN/TT/IT(1P+N+PE or 2P+PE) (1-phase)	TN/TT/IT(3P+N+PE) (3-phase) TN/TT/IT(1P+N+PE or 2P+PE) (1-phase)
Efficiency	＞99%		
Earth leakage protection	DC Leak (6ma)		

Start charging	RFID Card APP OCPP Free mode		
Indicators	Front LED (red, blue, green)		
Connectivity	WIFI / Ethernet / 4G / Bluetooth / RS-485		
Communication protocol	OCPP1.6J		
Backgrounf functions	Remote update		
Reports	Charging reports Error reports		
Safety protections	Overcurrent Overvoltage Undervoltage High temperature (plug and relays) CP fault protection Relay fault protection/		
IP degree	IP55 (CASE B) / IP65 (CASEC)		
Operating temperature	-25°C to +50°C		
Operating humidity	≤95%RH	≤95%RH	≤95%RH
Certificazioni			
Standards	**IEC 61851-1:2017 – EN 61851-1:2019**		
CE certificates	**CE - UKCA**		

The integrated protections are not automatically or remotely reclosed as prescribed by the IEC 61851-1.

6 Installation

The following paragraphs describe the charger installation process.

The installation must be performed by qualified personnel only.

6.1 Installation conditions / Environmental requirements

The charger can be used outdoors. Pay attention to the operating environment to meet the equipment operation, otherwise it will affect the service life of the equipment. The following

conditions are mandatory for a correct installation of the device (see also paragraph 4 “Technical data”):

- Operation temperature must be within the range -25 ℃ up to 50 ℃
- Operation humidity must be ≤ 95%
- Avoid installation places affected by strong vibrations and mechanical shocks
- Keep away the charger from explosives or dangerous materials, conductive media and harmful gases, all of them can damage the electrical insulation
- The use environment should be kept clean, no mold is allowed, and it should be kept away from moisture, dust, flammable gas, flammable liquid, etc., away from heat sources and corrosive environments

The altitude of the installation site must be ≤ 2000 m.

6.2 Installation accessories

The following accessories are needed for the charger installation process:

- This manual
- The certificate of conformity
- The expansion screws (4 pieces, provided with the charger), to fix the charger to the wall
- The mounting template (provided with the charger), to identify the correct position of the mounting holes on the wall

The anti-theft stainless screw (provided with the charger)

6.3 Installation of the protection against short circuit

The charger itself has an overcurrent protection integrated function. Nevertheless, a short-circuit protection device shall be installed at the upper level, for example in the control panel, for short-circuit protection purpose.
If the short-circuit protection device is not installed, the charger cannot be used.

The rated current of the supply circuit short-circuit protection device must be in line with the current used by the charger.
If the charger is used at full load, the rated current should be 40A, otherwise the charger will not work properly.


It is mandatory to install a circuit breaker with C or B curve, at least 32A, before the charger input. In case of uncertainties about how to choose the appropriate short-circuit protection device, please contact the manufacturer.

6.4 Installation of the protection against residual current

In compliancy with the IEC 61851-1 standard, the charger contains an appropriate circuit that ensures the disconnection of the supply in case of DC fault current above 6mA (DC Leak protection circuit).

No external installation of any type B RCD is prescribed.

 **An external type A RCD, with supply disconnection in case of fault current above 30mA shall be installed in the upstream side.**

 The protection device selection and installation must be performed by qualified personnel only.

6.5 Overvoltage protection

The charger is compliant to the Overvoltage Category III

6.6 Installation cables

The cable for connecting the mains supply to the charger must have a section in the following range 6-10 mm2.

 The cable selection must be done by the qualified personnel involved in the installation process, taking into account the national regulations for the safety and the state of the art of the electrical installations.

6.7 Supported power supply systems

Both single-phase and three-phase chargers support the following power supply systems.

- TN-S
- TN-C
- TN-C-S
- TT
- IT (only single-phase products are supported)

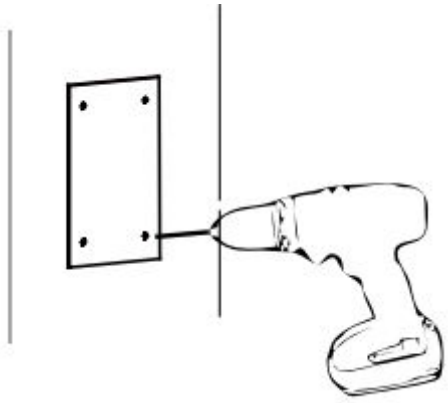
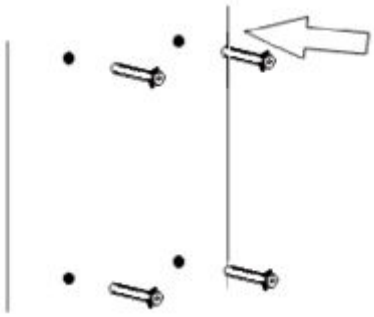
For single-phase charger, in a power supply system with a neutral line, the voltage between the phase line and the neutral line cannot be higher than the rated voltage requirement (240VAC).

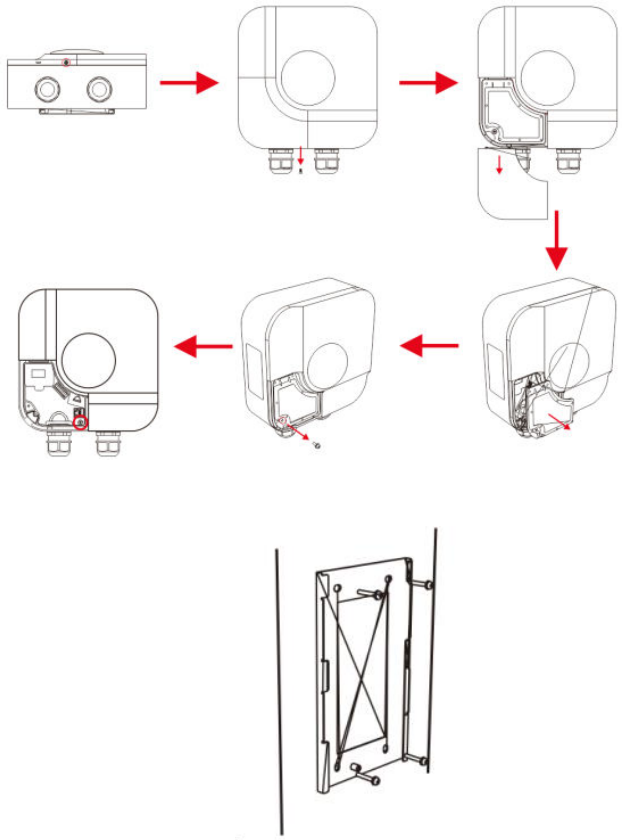
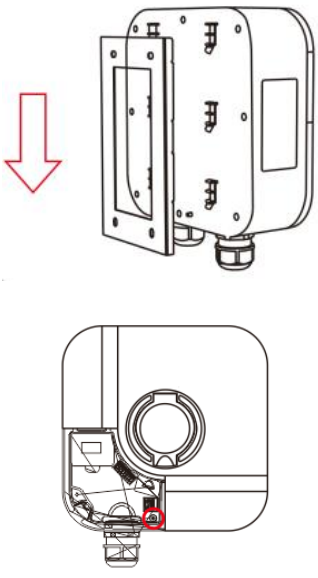
In a power supply system without a neutral line, the voltage between the two phase lines cannot be higher than the rated voltage requirement (240VAC).

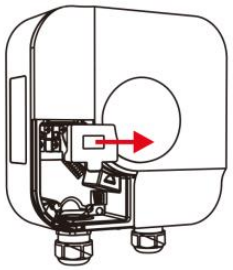
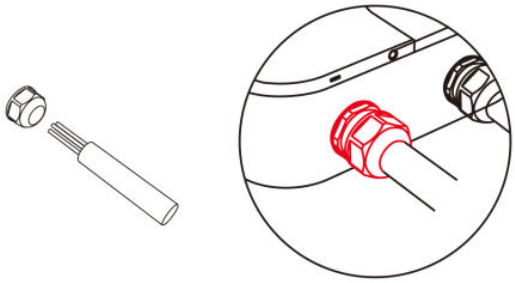
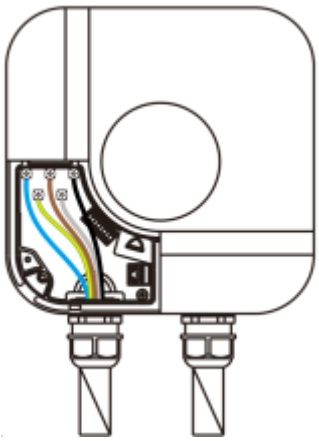
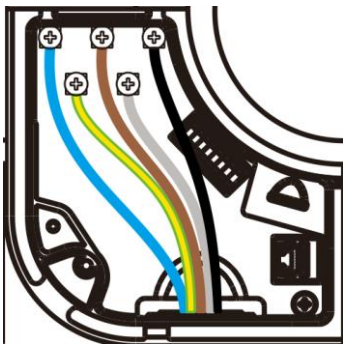
For three-phase charger, in a power supply system with a neutral line, the voltage between the phase lines and the neutral line cannot be higher than the rated voltage requirement (240VAC).

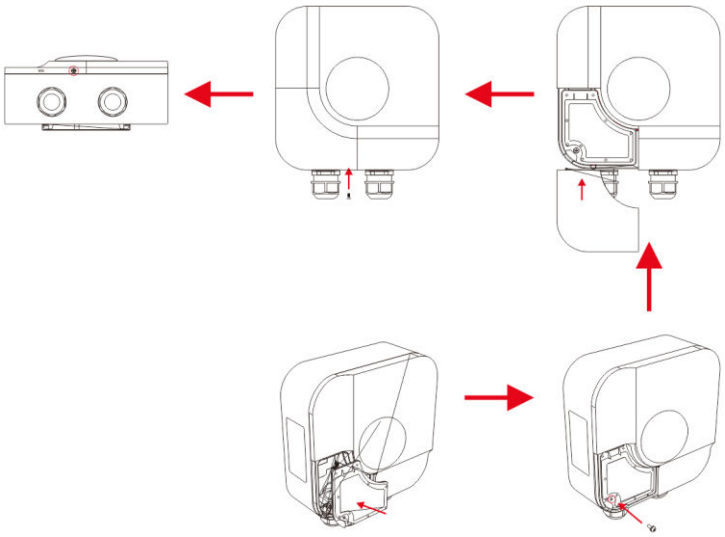
6.8 Installation steps

In the following all the steps to perform for a correct installation of the wallbox:

Step n.	Description	Picture
1	Open the package which contains the charger and its accessories. Package content: ▪ the charger ▪ four expansion screws ▪ a mounting template ▪ a mounting metal bracket (already attached to the charger rear side)	
2	Lean the mounting template against the wall. The height from the centre of the template to the ground should be determined according to the user experience (1500mm is recommended). Check the template is fully horizontally aligned. Mark the expansion screw holes positions on the wall. Create the screw holes with a tool.	
3	Insert the four expansion bolts into the four holes and just push them manually or, in case of resistance, by means of an hammer	

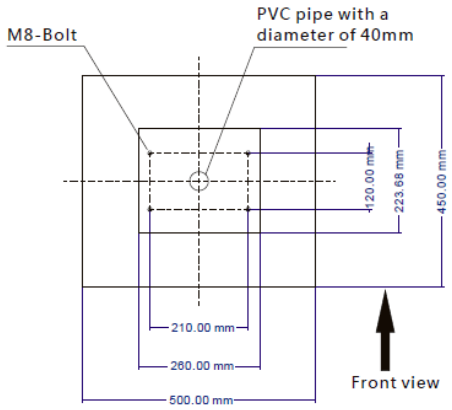
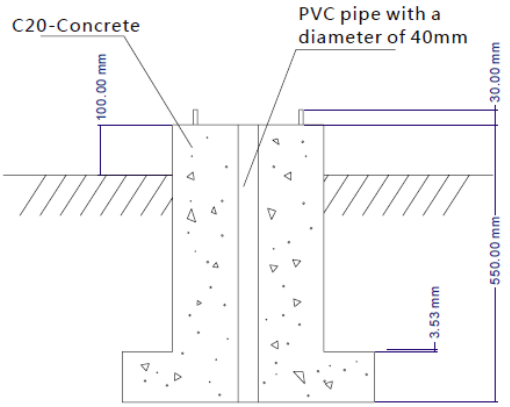
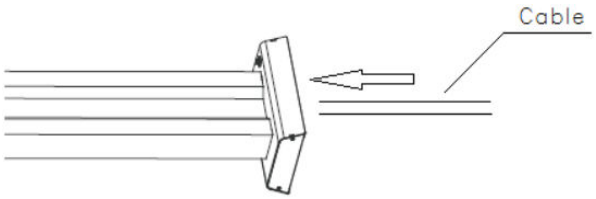
Step n.	Description	Picture
4	Open the front cover in the left bottom corner (this ca be done following the steps in the picture, removing the bottom screw and then removing the internal protection cover also) Remove the anti-theft screw (highlighted by the red circle in the picture). The metal bracket is already attached to the charger and must be disconnected to perform these operations. Fix the metal bracket to the wall using the expansion screws.	
5	Hang the charger on the wall mounted bracket. This is done just sliding, from top to bottom, the charger into the bracket binaries Fix the anti-theft screw again.	

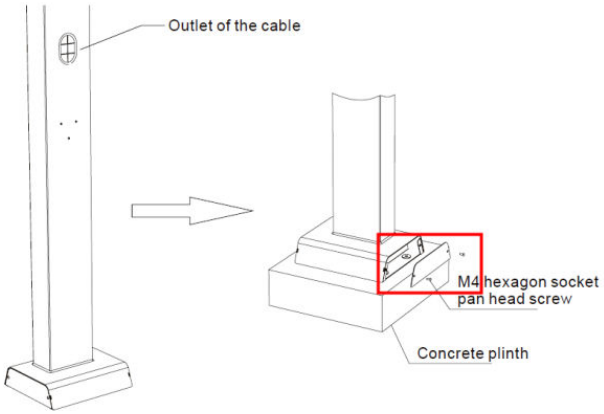
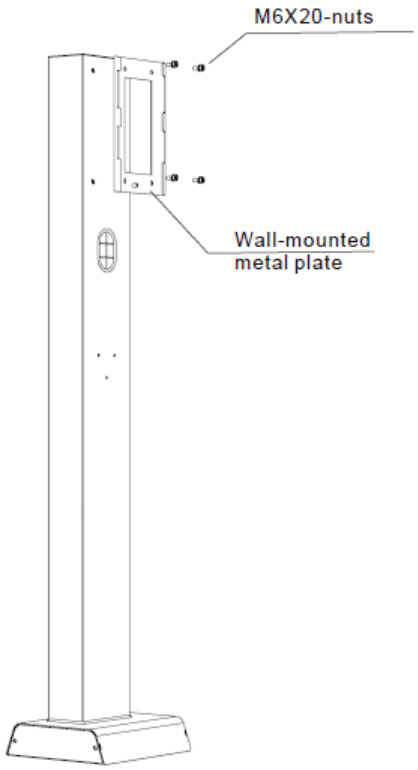
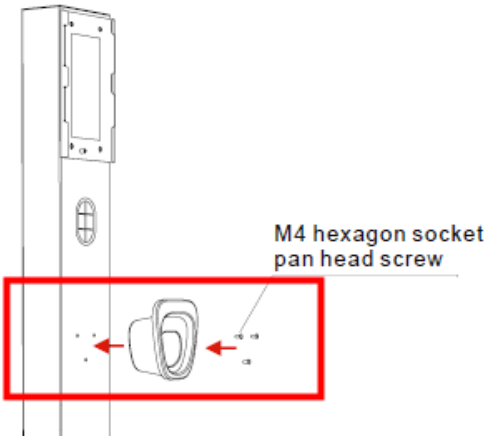
Step n.	Description	Picture
6	Remove the plastic cover which protects the power supply terminal blocks	
7	Make the power supply cable slide into the cable gland until it arrives at the supply terminal blocks Make sure the input cable is not powered. Connect the cables to the terminal blocks and fix them with the screws. The polarities of the cables must be respected. In addition to the cable gland, which must be strictly closed, the usage of a cable fixing mechanism could be considered if the weight of the cable risk to make it disconnected. An example of a 3-phase installation is in the picture.	  

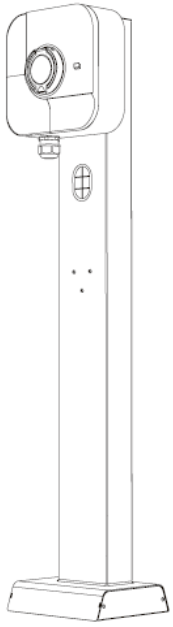
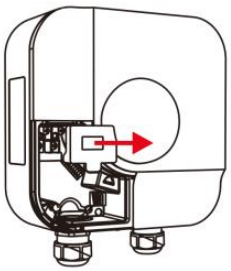
Step n.	Description	Picture
8	Insert and close both the protection and the front covers again	
9	The installation is completed **Important note:** the front cover must be correctly installed and closed before using the charger. Do not use the device if the cover cannot be closed for any reason.	

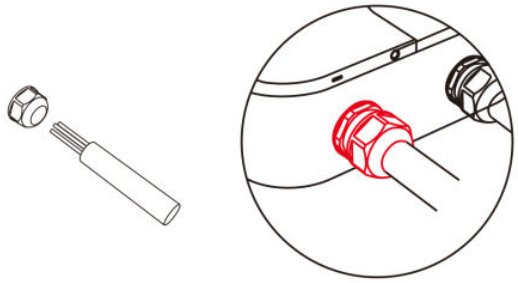
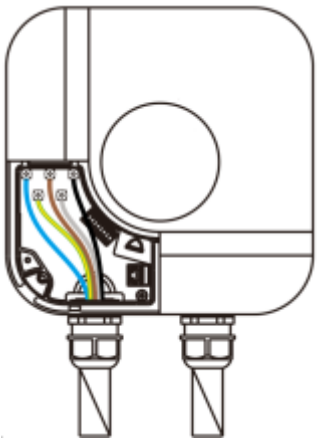
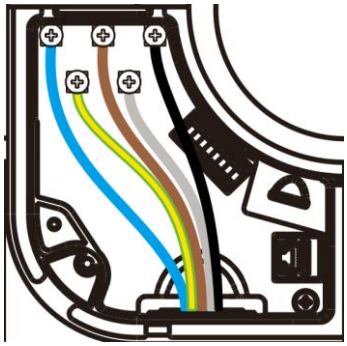
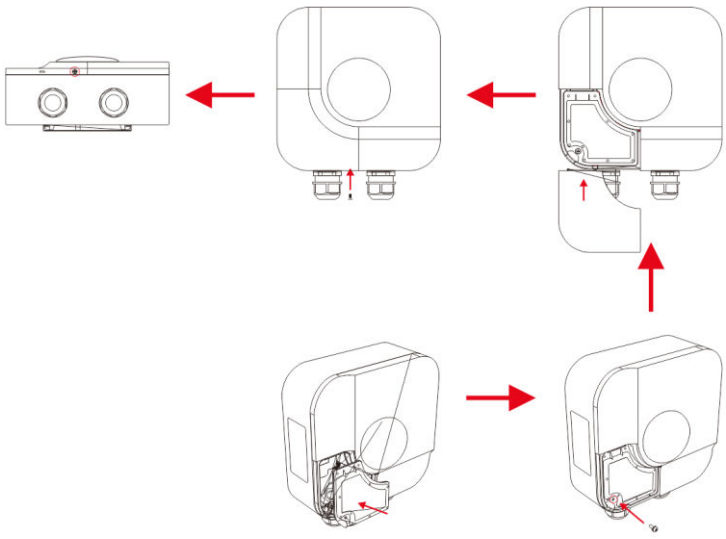
6.9 Installation on stand

If the user decides not to install on the wall but on the dedicated stand (the stand is provided as accessory), the following steps shall be performed. Please note that, in this case, the screws and fixing accessories must be provided by the installer depending on the different conditions of the installation site.

Passo	Descrizione	Foto
1	Select a stable and solid concrete platform to fix the stand. In case such a platform is not available, pour a dedicated platform. The platform must be equipped with M10 bolts and a 40 mm diameter PVC conduit embedded below the base. The top part of the platform must be flat to have a safe and stable installation, avoiding dangerous breaks of the stand. In case of newly poured concrete platform, wait until it is solidified before proceeding.	
2	The depth of the M10 bolts buried in the poured platform shall be not less than 150mm, while the exposed length is recommended to be in the range from 15 to 30mm. The power cables, arriving through the PVC conduit shall be pulled out not less than 1.3m from the ground, to allow an easy installation of the cable.	
3	Incline the stand in order to insert the cable through the bottom side. Make the cable pass through, until it reaches the outlet in the middle of the stand. Pull the cable out of this outlet	

Passo	Descrizione	Foto
4	Put the stand in the vertical position and use the M10 nuts together with flat washers to secure the stand base to the concrete platform. An M6x20 bolt needs to be added to the stainless-steel nut at the bottom of the stand to provide ground protection.	
5	Remove the wall mounted metal plate that comes with the charger. Then remove the four M6x20 bolts on the stand hanging plate. Finally align the holes of the two metal plates and fix them using the M6x20 bolts. Fix the cable support, if available (CASE C).	 

Passo	Descrizione	Foto
6	Hang the charger on the stand just sliding it bottom side on the dedicated binaries and check it is stable. Each stand can be mounted with two back-to-back chargers. Fix the anti-theft screw again to secure the device to the stand.	
7	Remove the plastic cover which protects the power supply terminal blocks	

Passo	Descrizione	Foto
8	Make the power supply cable slide into the cable gland until it arrives at the supply terminal blocks Make sure the input cable is not powered. Connect the cables to the terminal blocks and fix them with the screws. The polarities of the cables must be respected. In addition to the cable gland, which must be strictly closed, the usage of a cable fixing mechanism could be considered if the weight of the cable risk to make it disconnected. An example of a 3-phase installation is in the picture.	  
9	Insert and close both the protection and the front covers again	

Passo	Descrizione	Foto
10	The installation is completed **Important note:** the front cover must be correctly installed and closed before using the charger. Do not use the device if the cover cannot be closed for any reason.	

7 Connectivity

The following communication interface are present on the charger:

- WiFi
- Ethernet
- 4G
- Bluetooth
- RS-485

8 Operations

After the charger is installed, it is ready for charging the EVs. The following describes the operating elements and the display/indicators elements of the charger.

8.1 Operating elements

8.1.1 Display areas

The charger has two display areas, AREA1 and AREA2, on its front side

Each area has its own specific function, as summarized in the following table:

Area	Tipo	Descrizione
AREA1	LED indicator	A LED belt is placed all around the charger and assumes different colours to indicate the current status (see table below)
AREA2	RFID area	RFID card tap area

8.1.2 Status LED indicator (AREA1)

The following table presents the status information displayed by the frontal LED:

Colour	Blinking mode	Status
White	No blinking	Power on self-test: the charger is switching on and performing the power on tests
Green	Blinking slowly	Stand-By mode: the charger is on, available for charging
Blue	Fast blinking	Pause during the charging process
Blue	No blinking	Charging mode setup: the charger is preparing to start the charging process
Blue	Blinking slowly	Charging mode: the charging process is ongoing
Red		Error mode: errors are detected by the internal protections (details can be found in the APP)

8.1.3 RFID card area (AREA2)

This is the area where the RFID card is operative. The RFID card is used to start or stop the charging process. In order to perform these operations, the user should lay the card near to the two rectangles on the front side.

8.2 Mobile APP

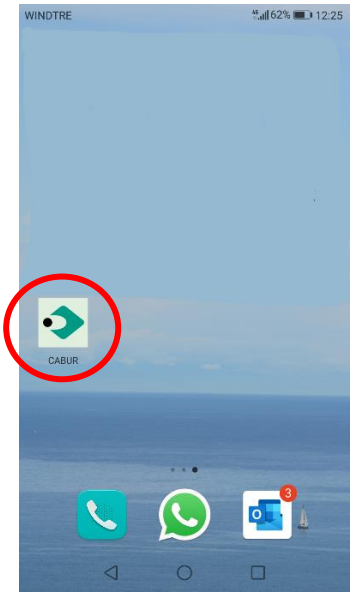
The **EV EVO** mobile APP can be connected to the charger through the Bluetooth interface. The APP is used to completely manage the charger (EV EVO is the name of the application).

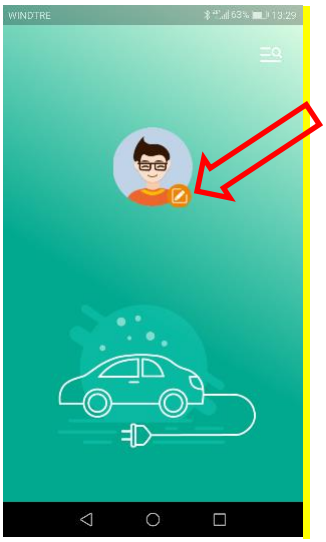
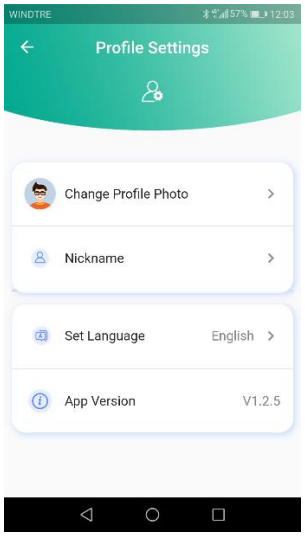
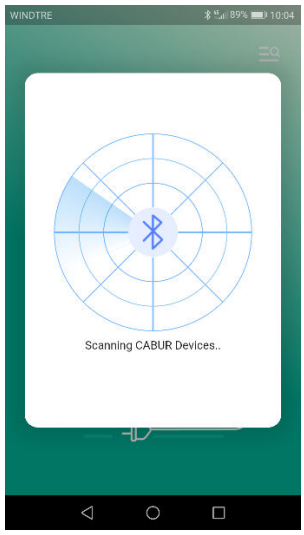
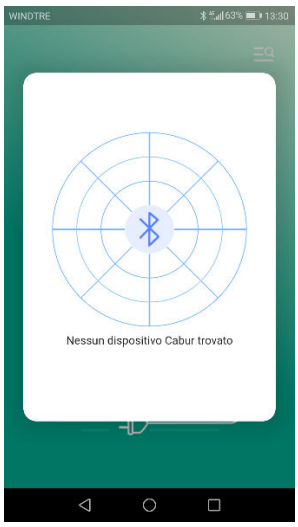
The APP can be downloaded from the most common digital stores:

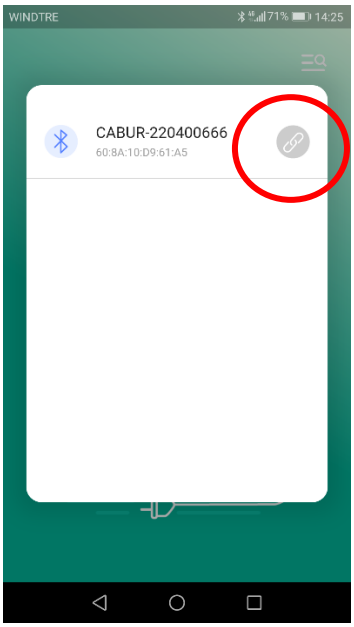
8.2.1 Before using the APP

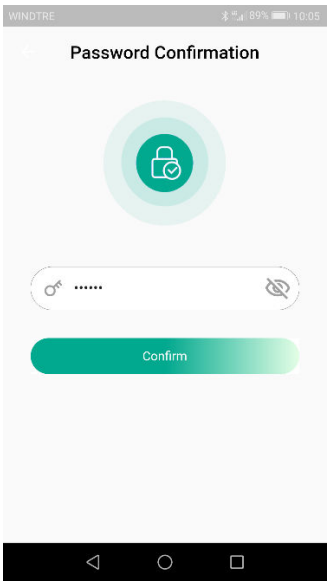
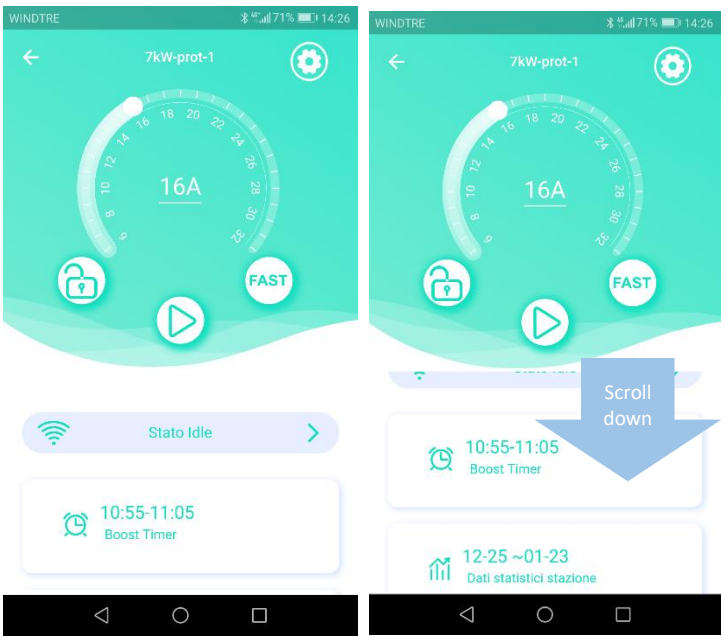
After downloading and installing the APP, before starting to use it, the Bluetooth interface must be enabled.

8.2.2 First connection of the APP

Step	Description	Picture
1	Be sure the Bluetooth is enabled	
2	Be sure the Bluetooth is not connected to other devices	
3	Open the EV EVO APP by clicking on the icon, as shown in the picture	
4	In case the Bluetooth is not enabled (OFF), the screenshot in the picture is presented until the Bluetooth is ON	

Step	Description	Picture
5	When the Bluetooth is ON the following screen appears. Clicking on the pencil icon indicated by the red arrow, the user can access the setting page for nickname and language.	 
	Clicking on the top right icon, the Bluetooth device searching process starts.	 
6	If no compatible Bluetooth devices are found, the screen clearly indicates that, with a “No Cabur Devices found” alert	

Step	Description	Picture
7	As soon as compatible devices are found, the user should click on the red circled symbol to connect	
8	Click again on the selected device	

Step	Description	Picture
9	Select a password (this operation must be done only at the first connection; the password is automatically remembered from the second connection on)	
10	The APP home page appears (on some mobile devices it could be necessary to scroll down to see the complete page)	

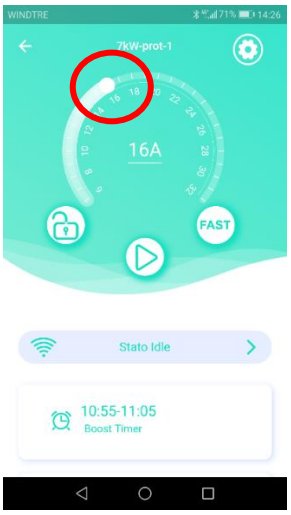
8.2.3 Statistical data view

The statistical data can be viewed, in a summarized graphical way, in the APP home page.

Step	Description	Picture
1	To get this view, the user should click on the tab in the red circle	
2	The page containing the statistical data is opened	

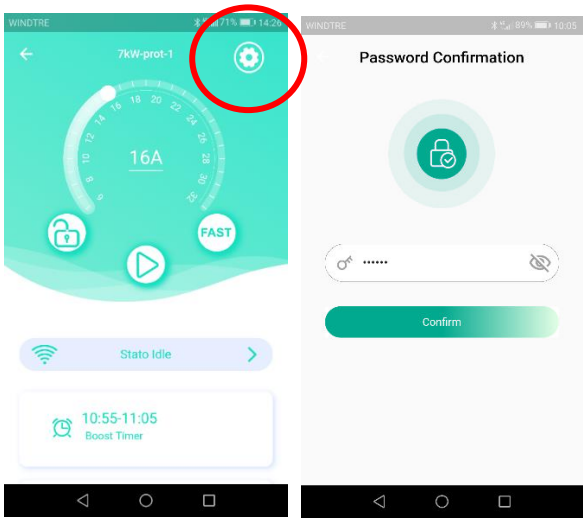
8.2.4 Power level configuration

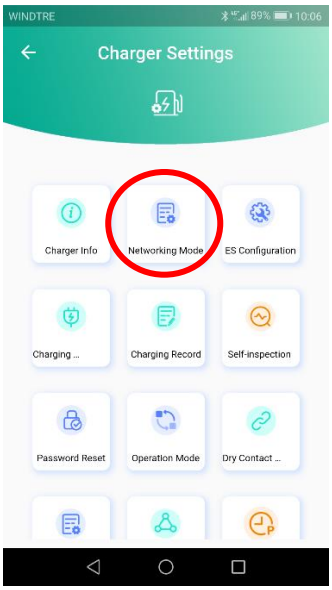
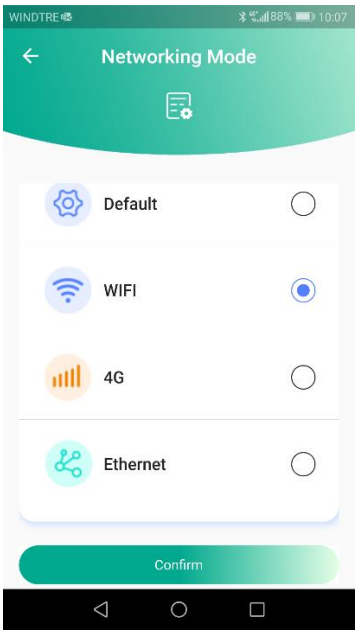
In the APP home page, it is possible to configure the power level in static mode (no automatic power management in this case)

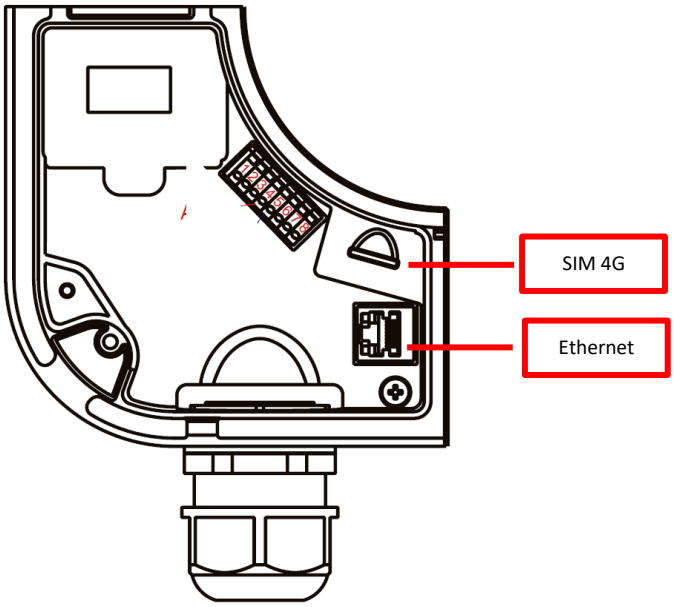
Step	Description	Picture
1	To set the power level, the cursor should be moved to the selected value on the power circle. The set value is also numerically displayed in the centre. The set value represents, from now on, the maximum power value the charger will provide to the EV.	

8.2.5 Network configuration

The network configuration menu allows the network type selection and the configuration of the related parameters

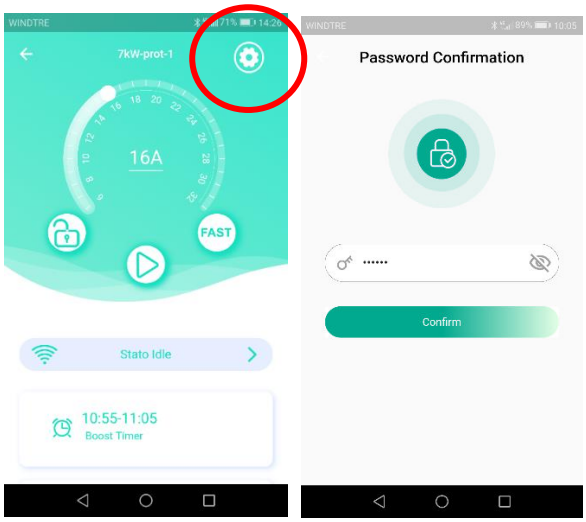
Step	Description	Picture
1	Click on the configuration icon (the top right icon in the red circle). Insert the user password (the same used in the first-time connection)	

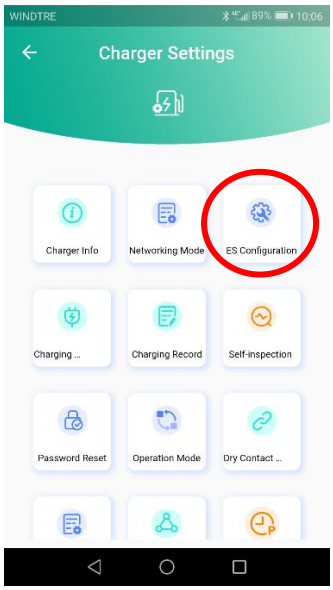
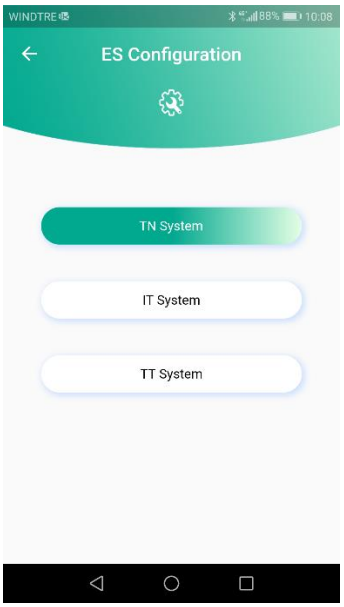
Step	Description	Picture
2	In the configuration page, click on the "**Networking type"** tab	
3	A new page appears with the complete list of the available communication interfaces. As soon as a network type is selected, its parameters must be set with dedicated fields that are displayed accordingly. ⚠Note: at the end of the configuration be sure to click on the "Confirm" button at the end of the page (scroll down till the end of the page if the button is not visible) ⚠Note: at the end of the network configuration the charger automatically restarts. Wait until the restart process is completed before proceeding	

Step	Description	Picture
4	The physical connectors associated to the different network interfaces are displayed in the picture. In order to access the connectors, refer to the installation paragraph.	

8.2.6 Grid type configuration

The grid type configuration menu allows the grid type selection and the related parameter configurations

Step	Description	Picture
1	Click on the configuration icon (the top right icon in the red circle). Insert the user password (the same used in the first-time connection)	

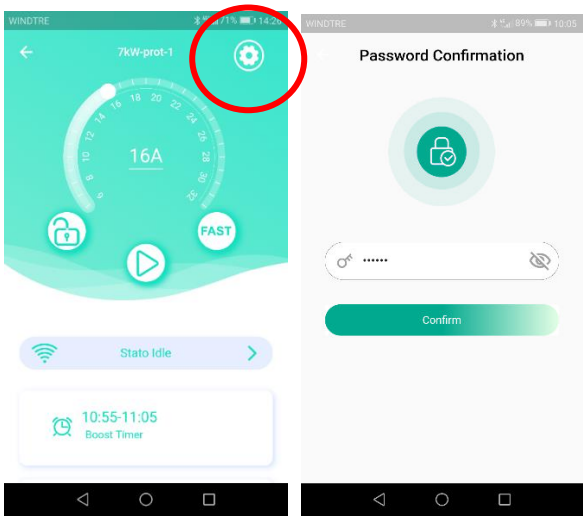
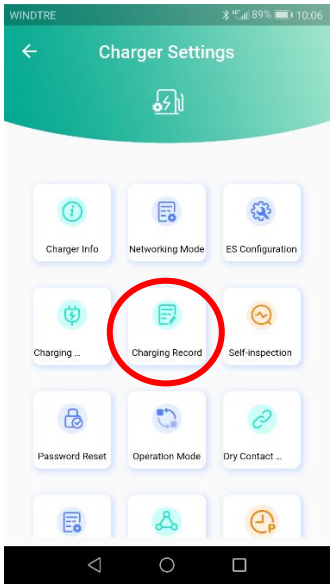
Step	Description	Picture
2	In the configuration page, click on the “ES Configuration” tab (Electric System Configuration)	
3	Select the most appropriate grid type TN / TT / IT. Note: for IT systems the maximum allowed voltage is 240 Vac	

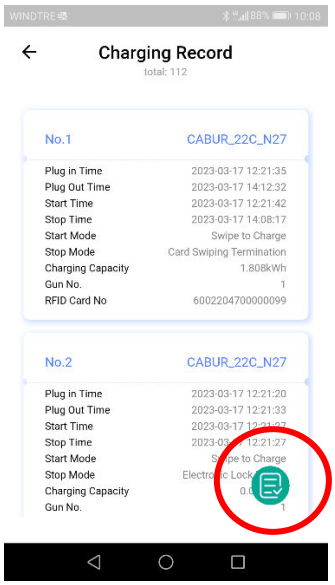
8.2.7 Charging mode configuration

See paragraph 9

8.2.8 Charging reports

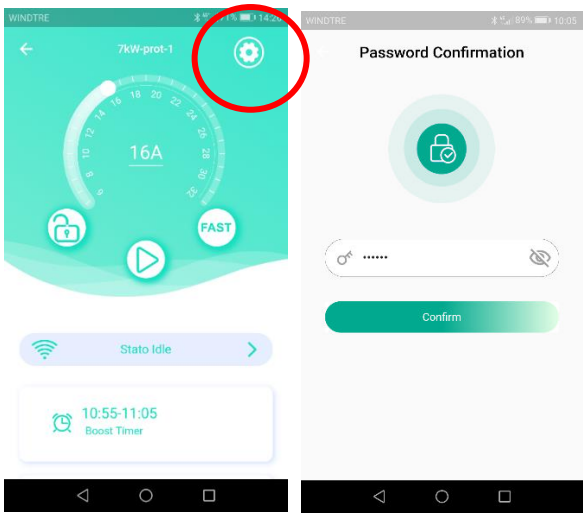
The charging reports menu allows the visualization and the .csv file export of the charging reports

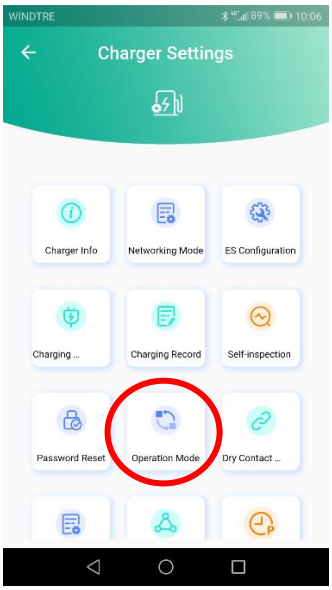
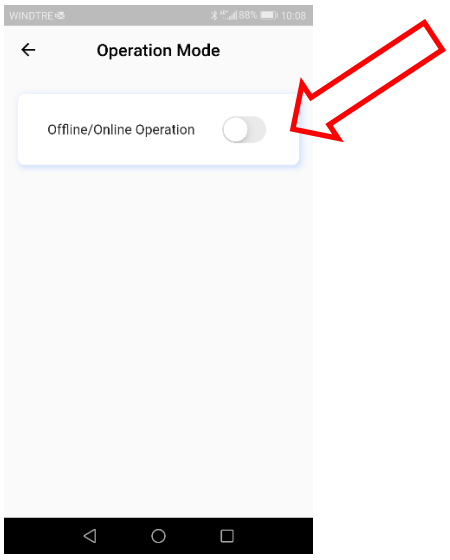
Step	Description	Picture
1	Click on the configuration icon (the top right icon in the red circle). Insert the user password (the same used in the first-time connection)	
2	In the configuration page, click on the “Charging record” tab	

Step	Description	Picture
3	The report page is displayed It is possible to export the reports in .csv format by clicking on the right-bottom button	

8.2.9 Operating mode configuration (online/offline)

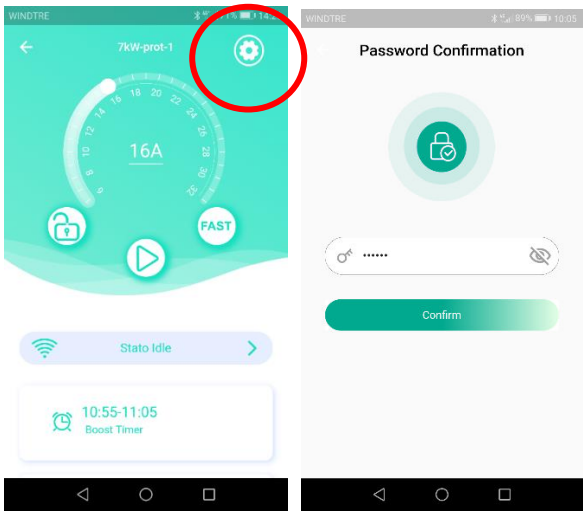
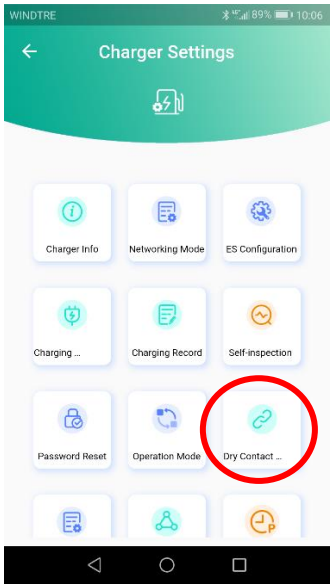
The operating mode menu allows to set the charger in offline (local) or online (OCPP based) mode

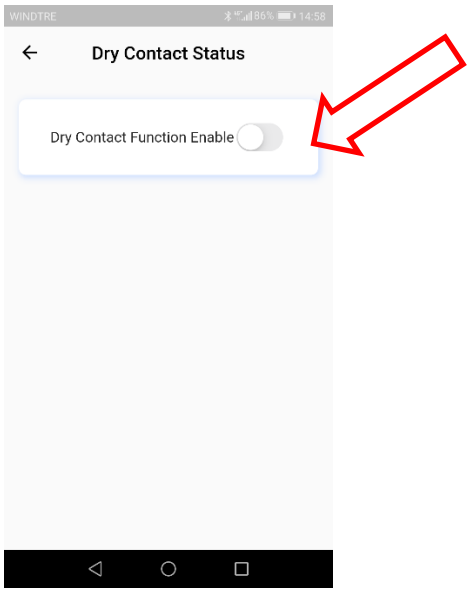
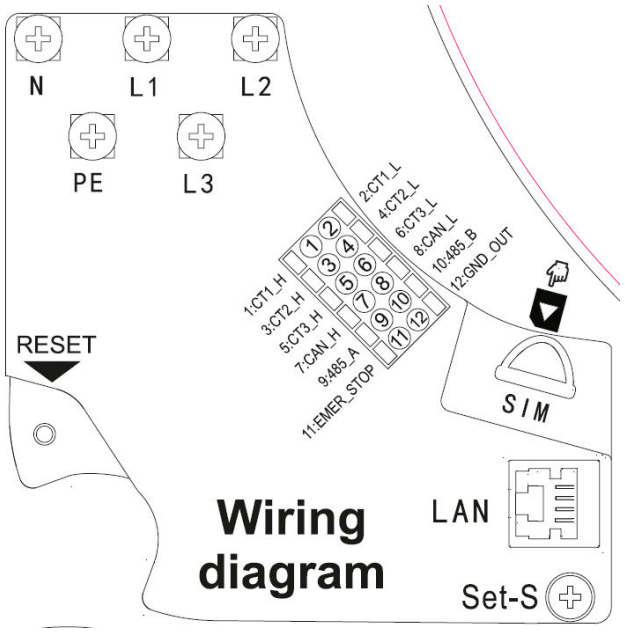
Step	Description	Picture
1	Click on the configuration icon (the top right icon in the red circle). Insert the user password (the same used in the first-time connection)	

Step	Description	Picture
2	In the configuration page, click on the “Operating mode” tab	
3	The configuration page is displayed. Set the configuration switch based on the following details: • Offline: the switch is not activated (local mode) • Online: the switch is activated (OCPP)	

8.2.10 Remote activation contact configuration (dry contact)

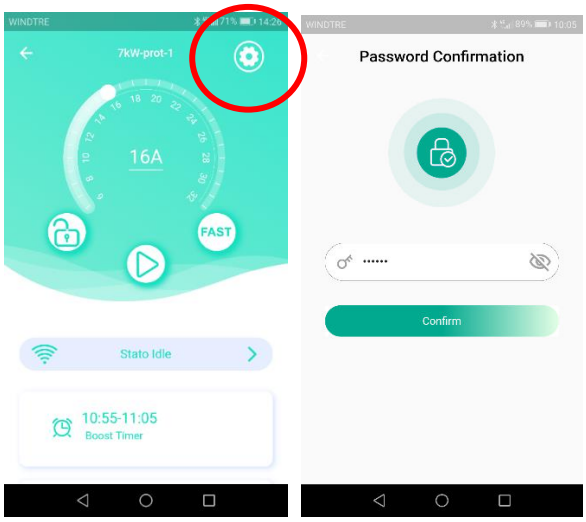
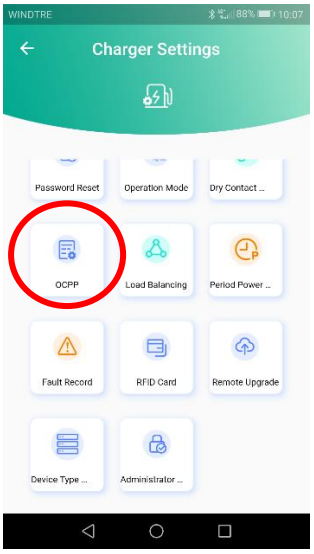
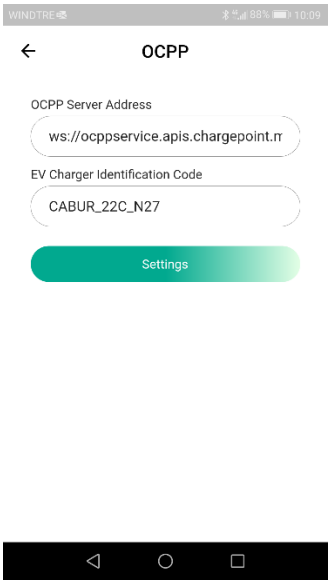
The dry contact menu allows to configure the device in order to start or stop charging based on a remote relay contact.

Step	Description	Picture
1	Click on the configuration icon (the top right icon in the red circle). Insert the user password (the same used in the first-time connection)	
2	In the configuration page, click on the “Dry contact” tab	

Step	Description	Picture
3	The dry contact mode is activated when the switch is activated	
3	When the dry contact mode is enabled, the charger starts/stops charging based on the relay contact on pin 11 (EMER_STOP) and 12 (GND_OUT), as displayed in the picture: • If the contact is closed: the charger is ON • If the contact is open: the charger is OFF ⚠ Note: when the dry contact mode is set the RFID authentication is not working	

8.2.11 OCPP configuration

The OCPP menu allows to set all the parameters for the OCPP platform connection

Step	Description	Picture
1	Click on the configuration icon (the top right icon in the red circle). Insert the user password (the same used in the first-time connection)	
2	In the configuration page, click on the “OCPP” tab	
3	Set all the OCPP parameters as provided by the OCPP platform administrator (the parameters in the picture are presented only as an example)	

The charger supports the OCPP 1.6J protocol. The supported OCPP commands are listed in the following table:

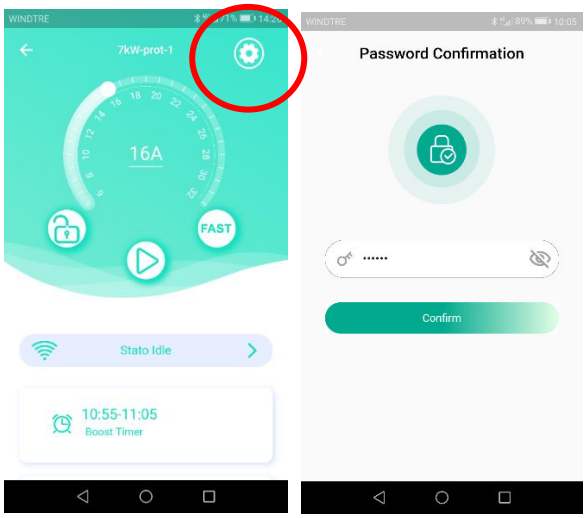
OCPP 1.6J – Supported commands			
Command	**Supported**	**Limitations**	**Notes**
CancelReservation	YES		
ChangeAvailability	YES		
ChangeConfiguration	YES	X	Refer to the "OCPP variables" table
ClearCache	NO		
ClearChargingProfile	YES		
DataTransfer	YES	X	To be agreed with the OCPP platform administrator
GetCompositeSchedule	YES	X	The last 24 hours schedule is given back
GetConfiguration	YES		
GetDiagnostics	YES	X	To be agreed with the OCPP platform administrator
GetLocalListVersion	YES		
RemoteStartTransaction	YES		
RemoteStopTransaction	YES		
ReserveNow	YES		
Reset	YES		
SendLocalList	YES		
SetChargingProfile	YES	X	The variable RecurrencyKind (Weekly) is not supported
TriggerMessage	YES		
UnlockConnector	YES		
UpdateFirmware	YES		
Authorize	YES		
BootNotification	YES		
DiagnosticsStatusNotification	YES		
FirmwareStatusNotification	YES		
Heartbeat	YES		
MeterValues	YES	X	Supported fields: Energy.Active.Import.Register Current.Import Voltage Power.Active.Import Current.Offered
StartTransaction	YES		
StatusNotification	YES		
StopTransaction	YES		

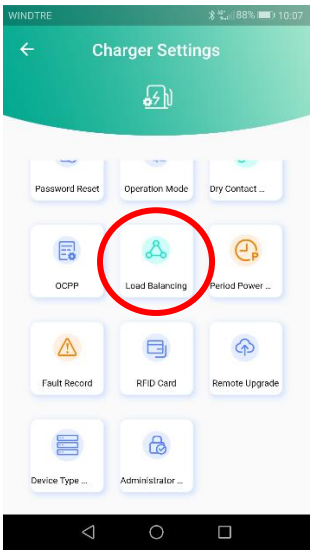
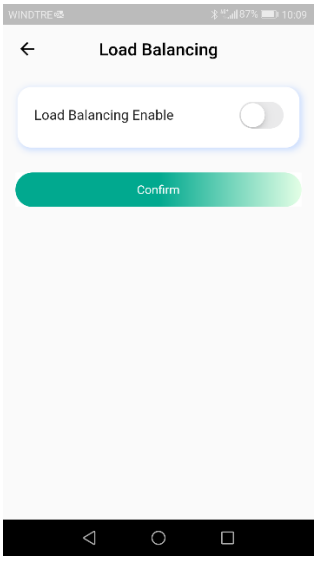
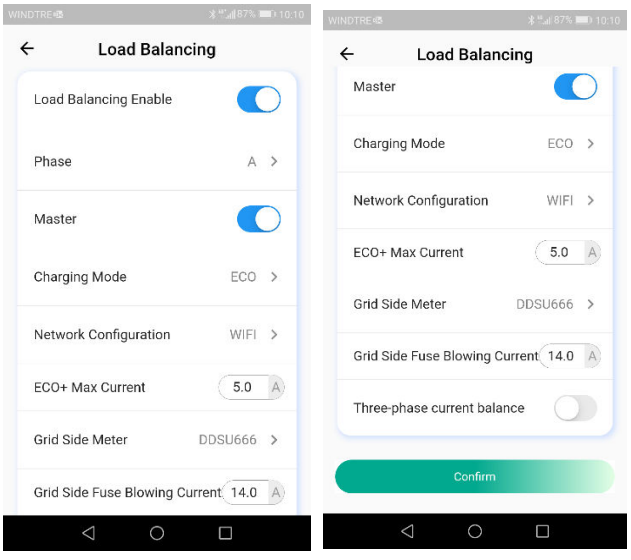
OCPP 1.6J – OCPP variables	
Variable	**Default value**
StopTransactionOnEVSideDisconnect	TRUE
AuthorizationCacheEnable	FALSE
ConnectionTimeOut	0
MinimumStatusDuration	0
BlinkRepeat	0
LightIntensity	100
MaxEnergyOnInvalid	0
ResetRetries	1
MeterValuesSampledData	Energy.Active.Import.Register, Current.Import, Voltage
MeterValuesAlignedData	Energy.Active.Import.Register, Current.Import, Voltage
StopTxnAlignedData	Energy.Active.Import.Register
StopTxnSampledData	Energy.Active.Import.Register
ConnectorPhaseRotation	Unknown

8.2.12 Dynamic power management and load balancing

The load balancing menu allows to setup the dynamic power management and/or the load balancing functionalities.

Note: the dynamic power management and load balancing functionalities need and external meter or current transformer to work properly

Step	Description	Picture
1	Click on the configuration icon (the top right icon in the red circle). Insert the user password (the same used in the first-time connection)	

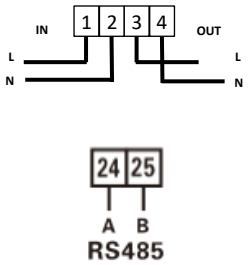
Step	Description	Picture
2	In the configuration page, click on the “Load balancing” tab	
3	The power management/load balancing modes are activated by the switch in the picture ⚠ Note: when the switch is activated the user will access to the configuration fields for all the involved parameters	
4	The parameters to be set are in the picture. Please refer to the following table for details about the parameters. When the configuration is completed, be sure to click the “Confirm” button at the end of the page.	

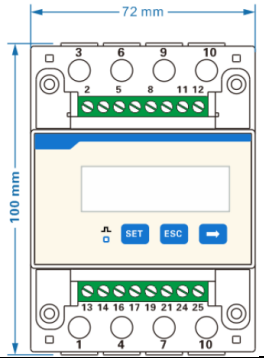
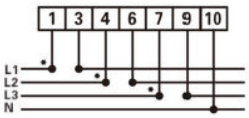
Step	Description	Picture
	Power management/Load balancing parameters: • **Master:** configuration of the charger as a MASTER or as a SLAVE device. The MASTER device is the one which is directly connected to the external mater or current transformer. Only one single MASTER device is allowed in a multi-charger system controlled by the same meter • **Charging modes (photovoltaic support):** ○ **FAST**: the charging process both uses the grid and the green energy (PV and storage) at their maximum available value ○ **ECO**: the charging process is supplied only by the green energy, if the available current is 6 A or more. If the available green current is below 6 A, the grid will add the necessary power, as an integration, in order to make the system charging at 6 A ○ **ECO+**: the charging process is supplied only by the green energy, if the available current is 6 A or more, but the charging current is limited at 6 A. If the available green current is below 6 A, the grid will add the necessary power selectable in the range 0-5 A only, in order to make the system charging at 6 A. If the available current, even adding the maximum grid contribution, remains below 6 A, the charge process is stopped • **Meter:** configuration parameters for the external RS-485 meter or the external current transformer • **Maximum current:** maximum grid current value	

8.2.13 Connection to the external meter

The way to connect and configure the external meter, which supports the power management mode, is presented in the following.

The external meter models to be used are in the following table, both for single-phase and three-phase operation (note: only the meter models in the tables are compatible):

Supply mode	Brand	Model	Description	Picture	Connection scheme
SINGLE PHASE	CHINT	DDSU666 **CABUR CODE:** EVDDSU6661PH	1-phase digital energy meter RS-485 Modbus		

Supply mode	Brand	Model	Description	Picture	Connection scheme
THREE PHASE	CHINT	DTSU666 **CABUR CODE:** EVDTSU6663PH	3-phase digital energy meter RS-485 Modbus	 	 

Important note: in case of IT system, the power management function cannot be performed. This is due to the fact that the meter does not support IT grid configurations.
In IT systems, the charger can therefore be used in the standard mode, with no power management function.

Meter configuration parameters		
Parameter type	**Parameter value**	**Notes**
Code (only for 3-phase model))	701	The code is used to unblock protected accesses (the default code value is 701)
Serial configuration	8 bits, no parity, 1 stop bit	-
Baud Rate	9600bps	-
Address ModBus	2	-

8.2.14 1-phase meter configuration

The 1-phase meter configuration is performed through its ModBus interface.
In alternative the meter can be configured by means of its frontal button:

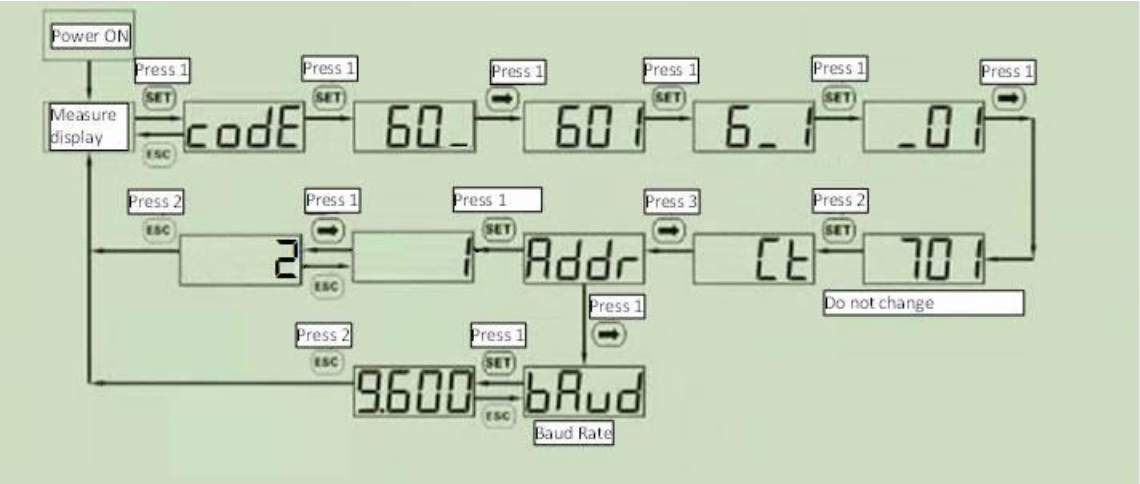
- switch the device on simply connecting it to the 1-phase power supply
- push the frontal button for at least 5 s
- during this time the display values rotate in a fast sequence
- release the button
- wait for the protocol indication to appear (“ModBus should appear)
- push the button once: the display shows the serial interface parameters. Select 8n1 = 8 bits, no parity, 1 stop bit
- wait for the new display indication (the ModBus address), this happens automatically, no needed actions

- When the ModBus address configuration page appears, push the configuration button in order to have address = 2 (it is sufficient pushing the button twice, in case the value is overpassed it is necessary to increase the address value up to its wrap-up value and restart from 1)
- After that, the baud rate is automatically set to 9600, no action needed

Note: the meter configuration instructions are only provided for convenience purposes. Please refer to the meter official manual for the configuration process details.

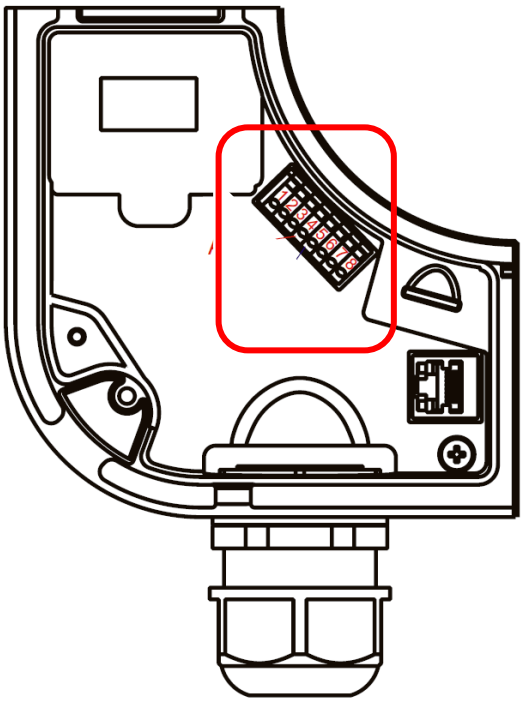
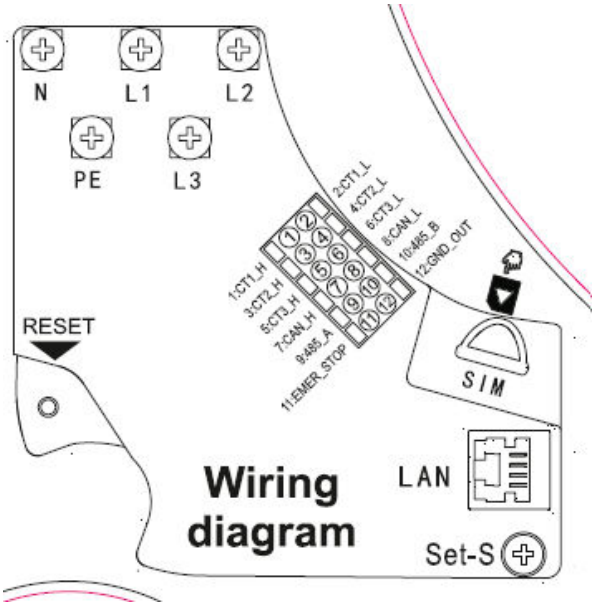
8.2.15 3-phase meter configuration

The sequence to program the 3-phase meter is presented in the following picture:



Note: the meter configuration instructions are only provided for convenience purposes. Please refer to the meter official manual for the configuration process details.

In the following, the instructions are given to connect the external meter to the charger:

Connection of the meter to the charger		
Step	**Description**	**Picture**
1	The external meter is connected to the charger through an RS-485 bus. The RS-485 terminal blocks can be reached removing the charger cover and then by removing the inner cover which protects the supply terminal blocks. The RS-485 wires are connected to the bus connector (terminal block) on the charger, as presented in the picture (boxed in red). The RS-485 cables are inserted through the same access path used for the supply cables. the power supply must be disconnected in this phase	
2	The RS-485 signals from the meter shall be connected as in the picture respectively for • RS-485 A • RS-485 B These signals must be connected to the terminals 24 and 25 of the meter (please see the meter connection scheme).	
3	After the external meter is connected, the charger must be closed again with its covers. This is extremely important for functional and, mainly, for safety reasons.	

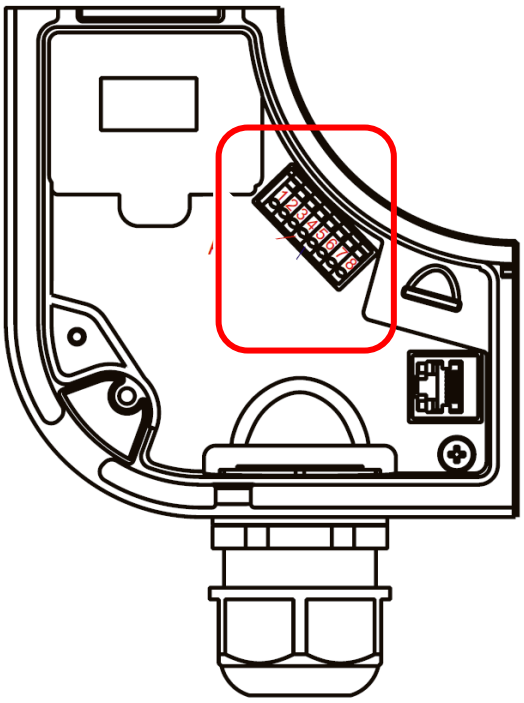
Important: the other loads have higher priority than the charger

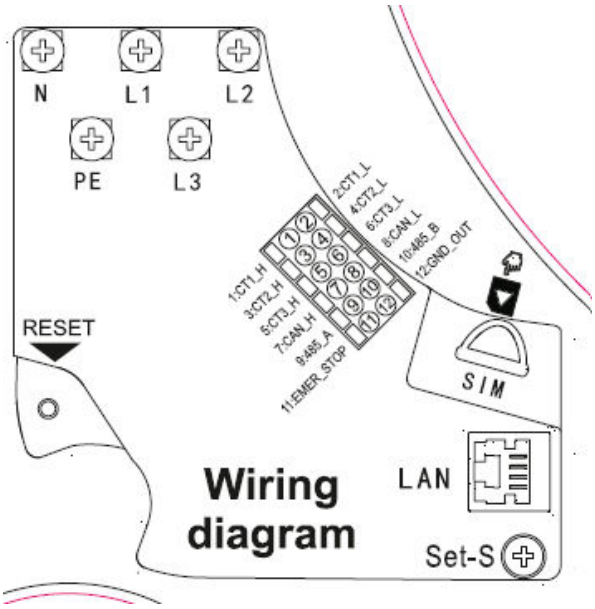
Important: the charger parameters must be configured only by qualified personnel

8.2.16 Connection to the external current transformer

In alternative to the digital meter, as presented in the previous chapter, a current transformer can be used.

The current transformer must be connected as in the following:

Connection of the current transformer to the charger		
Step	**Description**	**Picture**
1	The external current transformer is connected to the charger through the RS-485 bus. The RS-485 terminal block (it is not the same used for the digital meter connection) is accessed by removing the front cover (see installation paragraph). The RS-485 cables are inserted through the same access path used for the supply cables. the power supply must be disconnected in this phase	

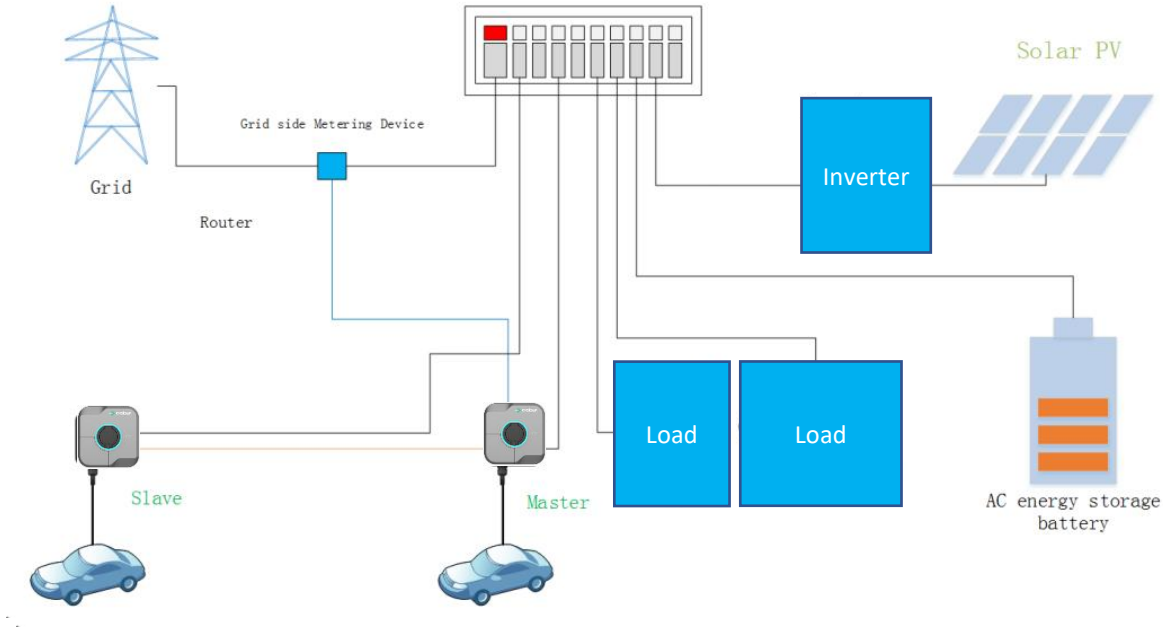
Connection of the current transformer to the charger		
Step	**Description**	**Picture**
2	The signals of the current transformer must be connected as in the following: <u>1-phase:</u> only one transformer, TA1, with the following connections: TA1 white cable - pin (1) CT1_H TA1 black cable - pin (2) CT1_L <u>3-phase:</u> three transformers, TA1, TA2, TA3, with the following connections: TA1 white cable - pin (1) CT1_H TA1 black cable - pin (2) CT1_L TA2 white cable - pin (3) CT2_H TA2 black cable - pin (4) CT2_L TA3 white cable - pin (5) CT3_H TA3 black cable - pin (6) CT3_L ⚠ check that the transformer is mounted in the correct direction. The arrow must have the same direction of the flowing current (see picture)	 
3	After the external meter is connected, the charger must be closed again with its covers. This is extremely important for functional and, mainly, for safety reasons.	

8.2.17 MASTER – SLAVE connection

In this type of connection two chargers share, in a balanced way, the available power between them and the rest of the loads in the system.

One of the chargers is identified as the MASTER and it is connected to the external power meter, which measures the total power flow in the system.

The other charger, defined as the SLAVE, is connected to the MASTER through the ethernet cable and receives by the MASTER the instruction about how the power must be shared

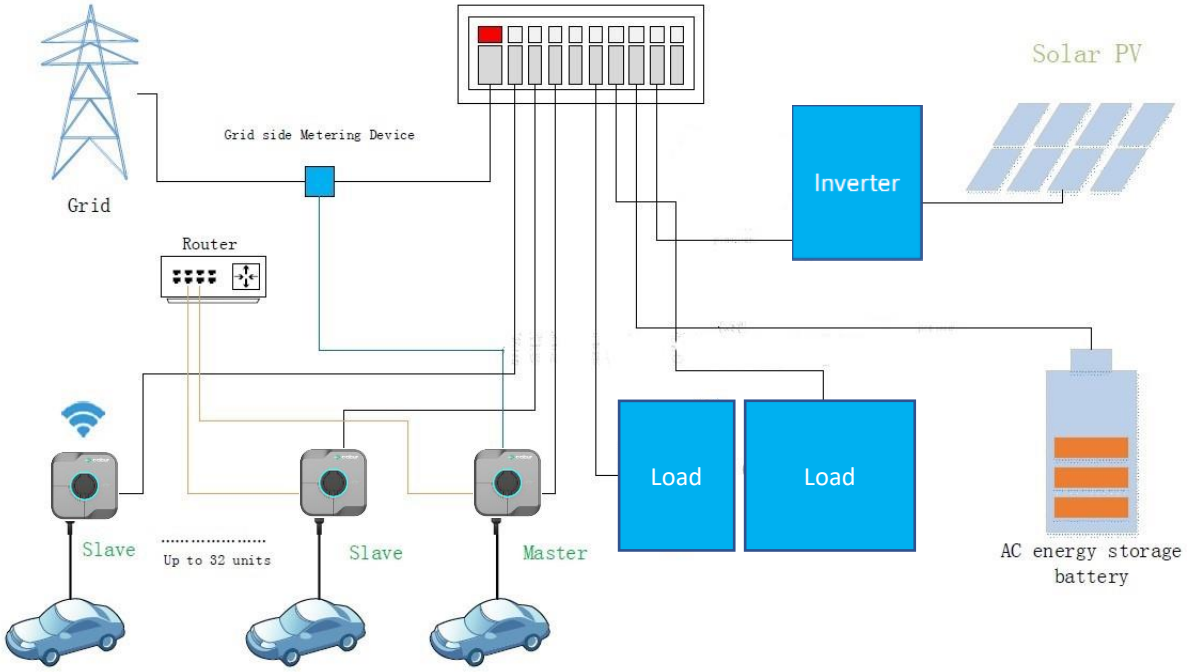


8.2.18 MASTER-MULTI-SLAVE connection

In this type of connection, the chargers share, in a balanced way, the available power between them and the rest of the loads in the system.
One of the chargers is identified as the MASTER and it is connected to the external power meter, which measures the total power flow in the system.

The other chargers, defined as the SLAVEs, are connected to the MASTER through the ethernet cable or by the wifi interface (in both cases a network equipment is needed) and receive from the MASTER the instructions about how sharing the power.
The sharing algorithm between the chargers follows a priority scheme privileging the first charger which starts recharging.

An example of the sharing algorithm, considering a four-charger scenario, is presented in the following paragraph table.



Sharing algorithm in MASTER-MULTI-SLAVE connection

The S1, S2, S3, S4 chargers, in sequence, start their charge operations at the T1, T2, T3, T4 times respectively.

In this example we consider to have a maximum available current of 50 A

The available current will be shared between the chargers. The charger which starts before has higher priority (a higher available current value).

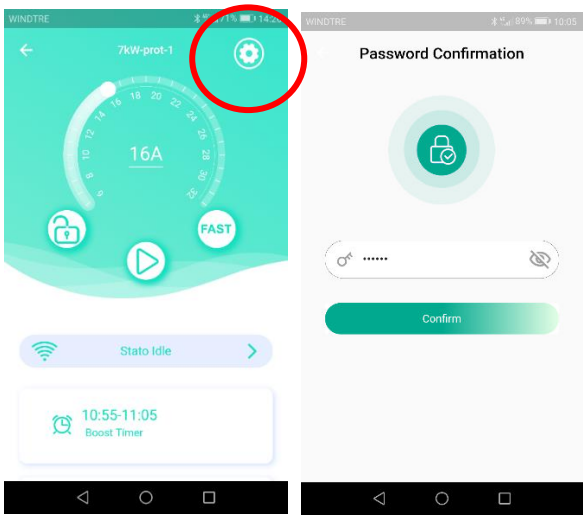
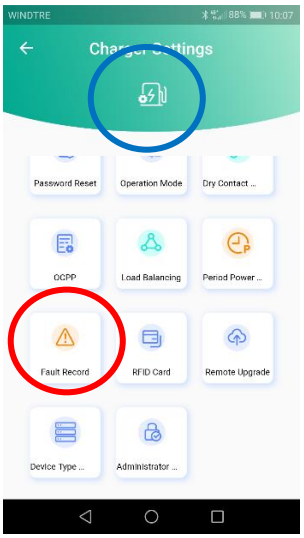
The remaining chargers, which start later, will have a proportional, but decreasing, current value assigned.

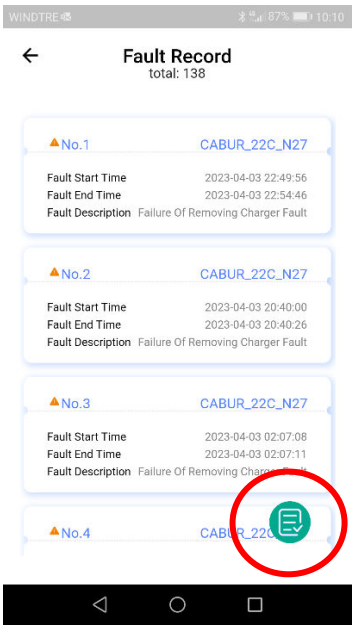
	S1	S2	S3	S4	Totale
T1	32 A	Not charging	Not charging	Not charging	<50 A
T2	32 A	18 A	Not charging	Not charging	=50 A
T3	32 A	18 A	6A (not available)	Not charging	>50 A
T3	27.9 A	16.1 A	6 A	Not charging	=50 A
T4	27.9 A	16.1 A	6 A	6A (not available)	>50 A
T4	23.8 A	14.2 A	6 A	6 A	=50 A

The power sharing mechanism proceeds until the all chargers have at least 6 A each, also considering the highest priority chargers (note that no charging process is possible, in AC, if the available current is below 6 A).

8.2.19 Error reports

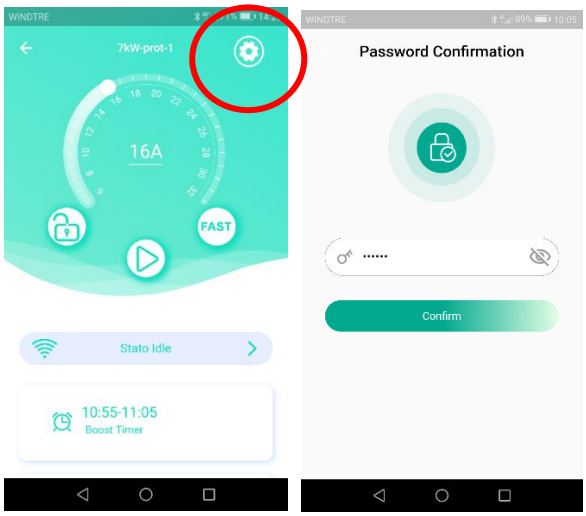
This menu allows to check the list of the errors

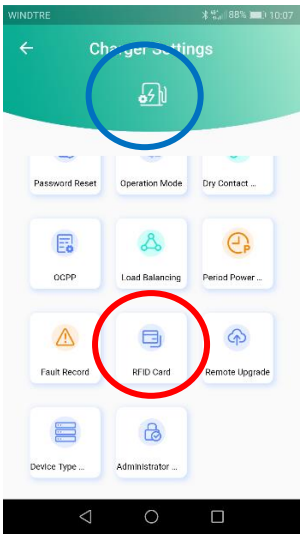
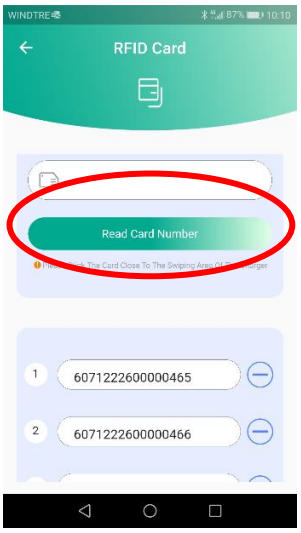
Step	Description	Picture
1	Click on the configuration icon (the top right icon in the red circle). Insert the user password (the same used in the first-time connection)	
2	⚠ This is a hidden menu. To make it appear, click on the blue circled icon for 5 times and insert the access password when requested In the configuration page, click on the “Fault Record” tab	

Step	Description	Picture
3	The page in the picture is displayed presenting the details of every single fault occurred. It is possible to export the error in .csv format by clicking the highlighted button.	

8.2.20 RFID cards registration

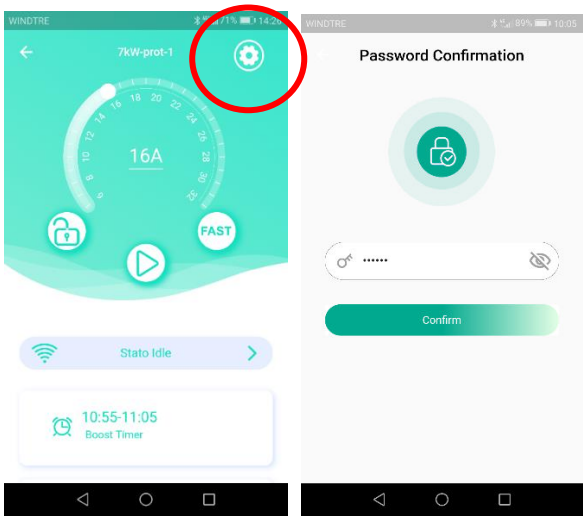
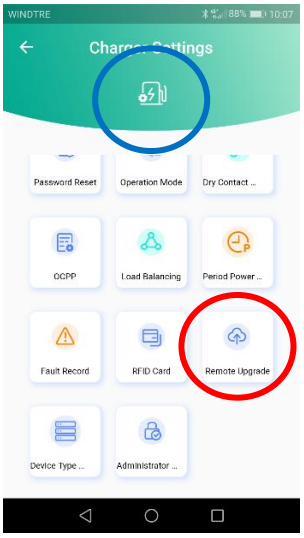
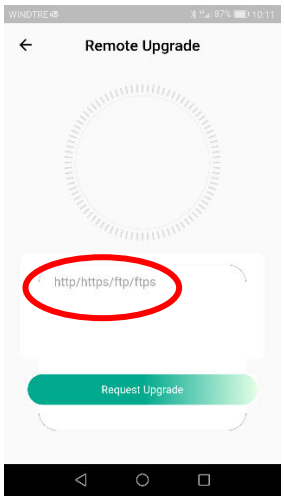
The RFID card menu allows to register the new RFID cards in the charger memory and to view the previously registered ones.

Step	Description	Picture
1	Click on the configuration icon (the top right icon in the red circle). Insert the user password (the same used in the first-time connection)	

Step	Description	Picture
2	⚠ This is a hidden menu. To make it appear, click on the blue circled icon for 5 times and insert the access password when requested In the configuration page, click on the “RFID card” tab	
3	To register a new card: • click on the green button to read the card • hold the card near to the reader • the read number will be displayed in the field above the green button • click on the + button at the end of the page • the card should be added and should be visible within the list of the registered ones	

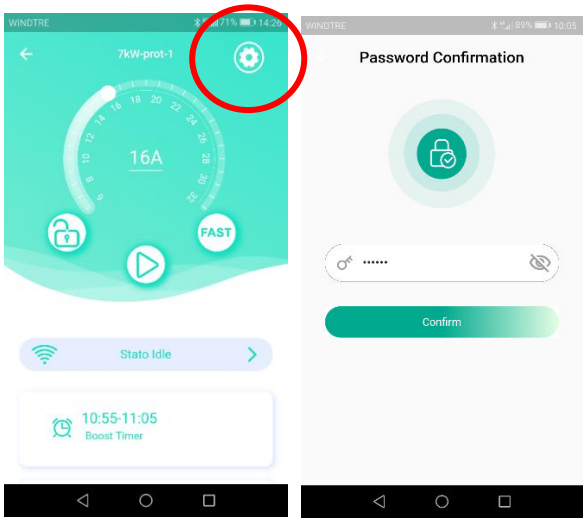
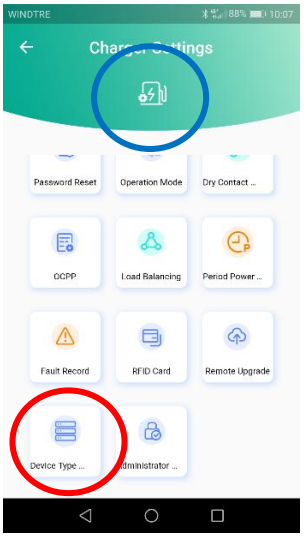
8.2.21 System Update

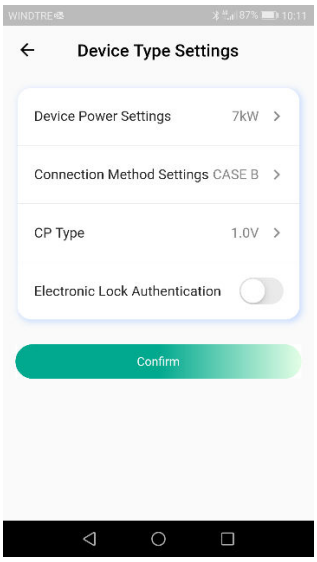
The system update menu allows to remotely update the system FW.

Step	Description	Picture
1	Click on the configuration icon (the top right icon in the red circle). Insert the user password (the same used in the first-time connection)	
2	⚠ This is a hidden menu. To make it appear, click on the blue circled icon for 5 times and insert the access password when requested In the configuration page, click on the “Remote Upgrade” tab	
3	The page in the picture is displayed Insert in the indicated field the URL of the update FW download FTP site. ⚠ Please contact the manufacturer customer service to get the FTP site URL, in case needed. Start the upgrade process with the “Request Upgrade” button ⚠ Note: the charger must be online to perform this operation	

8.2.22 System parameter configuration

The system configuration menu allows to set the system parameters

Step	Description	Picture
1	Click on the configuration icon (the top right icon in the red circle). Insert the user password (the same used in the first-time connection)	
2	⚠ This is a hidden menu. To make it appear, click on the blue circled icon for 5 times and insert the access password when requested In the configuration page, click on the “Device Type Settings” tab	

Step	Description	Picture
3	The page with all the main parameter is displayed: • Power a. 7kW (1-phase) b. 22kW (3-phase) • CASE a. B: no cable b. C: with cable • CP type • Connector inter-block enable	

9 Charging process

Before starting the charging process the user must be sure the plug is correctly connected to the EV.

In the **CASE B** mode (no integrated cable) connect the cable to the charger and then to the EV on the other side.

In the **CASE C** mode (integrated cable) connect the cable to the EV.

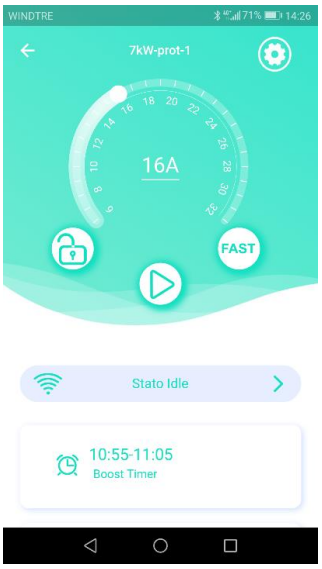
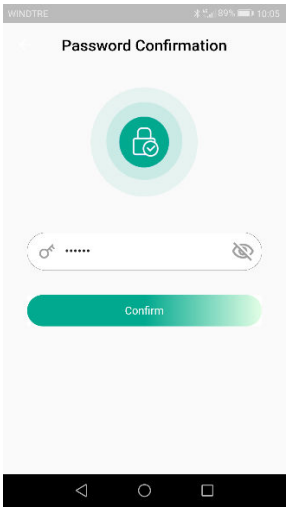
The charging process can start in three different modes:

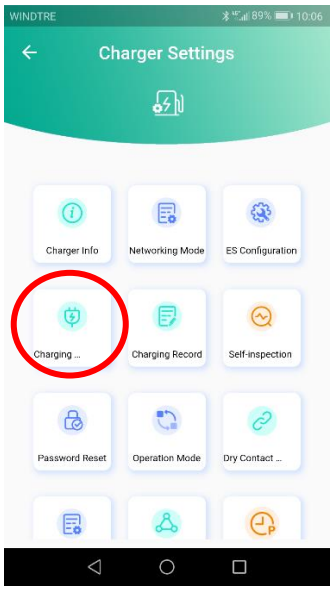
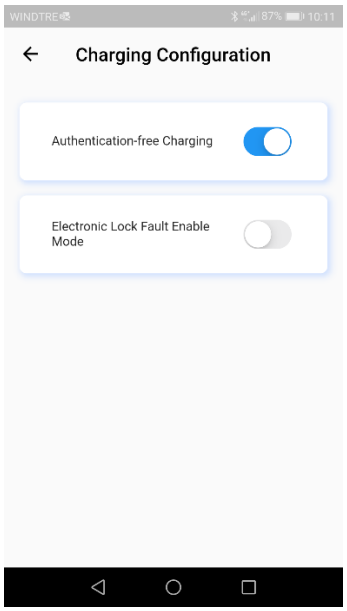
- with no authentication (FREE mode)
- by the APP (APP mode)
- by the RFID authentication (RFID mode)

9.1 FREE mode

If the FREE mode is set, the charging process starts automatically after the charging cable is connected to the vehicle.

To enable the FREE mode please follow the steps in the following table:

Step	Description	Picture
1	Open the APP. The home page is displayed.	
2	Click on the configuration icon (the top right icon in the red circle).	
3	Insert the user password (the same used in the first-time connection) and click on the “Confirm” button	

Step	Description	Picture
4	The menu page appears. Click on the “Charging mode” menu tab, as identified in the picture	
5	Enable the FREE mode by the switch. The charge process will start, from now on, with no authentication.	

Warning: the charging connector cannot be disconnected during the charging process

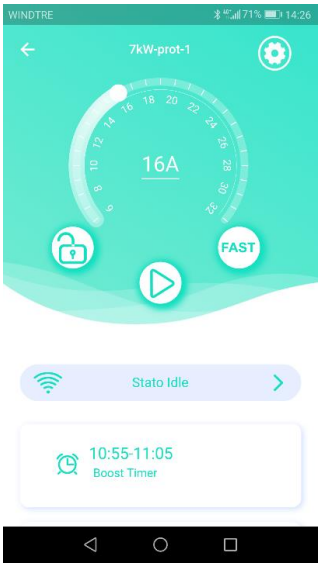
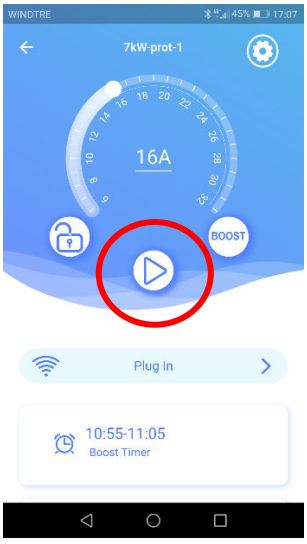
To stop the charging process it is often necessary to open the car.

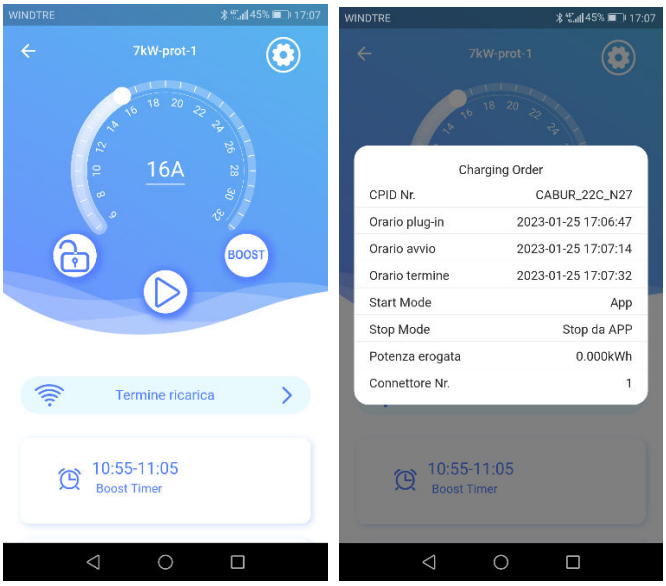
Warning: for the CASE B mode (without the integrated cable), there is an electronic lock inside the charger to keep the electrical connection stable during the charging process. When charging is completed or a fault occurs, the electronic lock will automatically unlock, please do not pull it forcibly otherwise.

9.2 APP mode

If the APP mode is set, the charging process is started using the APP.

To enable the APP mode please follow the steps in the following table:

Step	Description	Picture
1	Open the APP. The home page is displayed.	
2	When the vehicle is connected and ready to charge, the home page of the APP changes its background colour to blue. Note: the front LED on the charger becomes blue too. Click on the red-circled button to start the charging process. The button aspect changes to “pause”	

Step	Description	Picture
3	The status of the charger is also displayed in the page in the status box	
4	To stop the charging process, click again on the centre button. After the process is stopped the summary of the process data appears automatically on the page. The process is completed and the vehicle can be disconnected.	

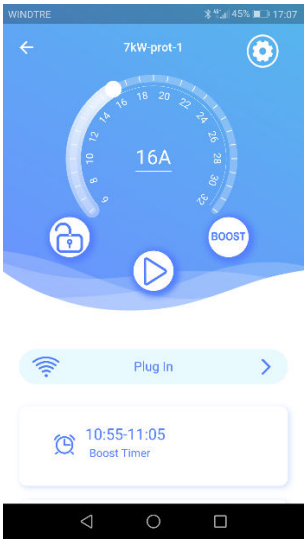
Warning: the charging connector cannot be disconnected during the charging process

Warning: for the CASE B mode (without the integrated cable), there is an electronic lock inside the charger to keep the electrical connection stable during the charging process. When charging is completed or a fault occurs, the electronic lock will automatically unlock, please do not pull it forcibly otherwise.

9.3 RFID mode

If the APP mode is set, the charging process is started by using the RFID card for authentication.

To use the RFID mode please follow the steps in the following table.
The RFID mode is active when the FREE mode is disabled.
The APP mode will work even when the RFID mode is set.

Step	Description	Picture
1	The vehicle is connected to the charger. The front LED (AREA1) change its colour to blue indicating the plug-in status of the vehicle. Note: the APP home page background colour changes to blue accordingly	
2	To start charging, hold the RFID card near to the AREA 2 part of the charger	
3	To stop charging, hold the RFID card near to the AREA 2 part of the charger again ⚠ Note: use the same card already used for starting the process ⚠ Note: the RFID card must be registered on the charger before being used (see “RFID card registration” paragraph)	

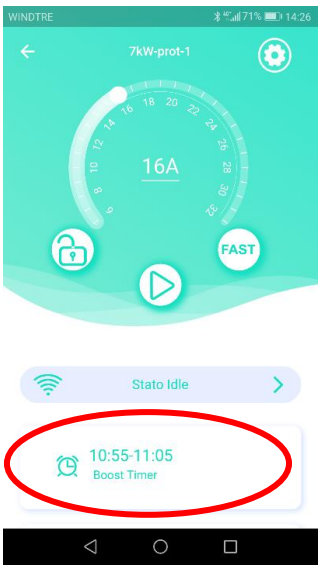
Warning: the charging connector cannot be disconnected during the charging process

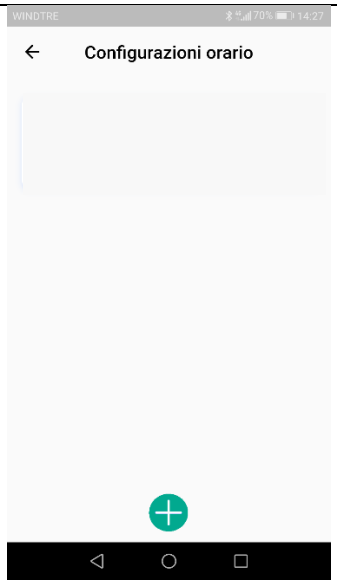
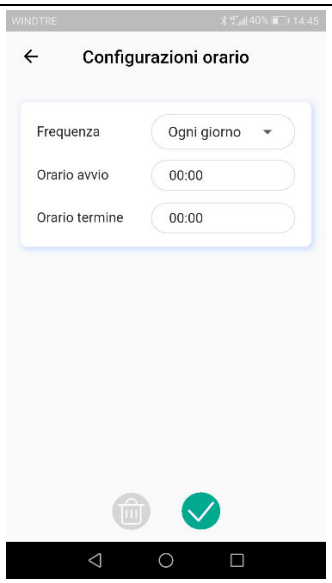
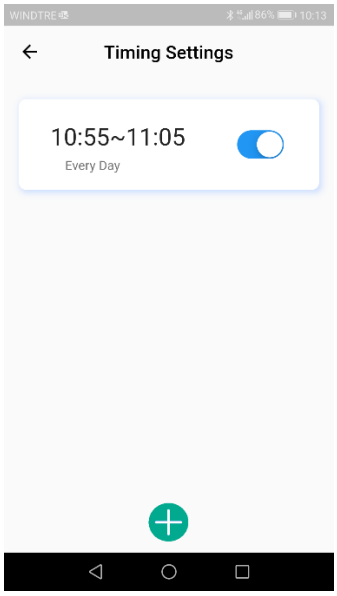
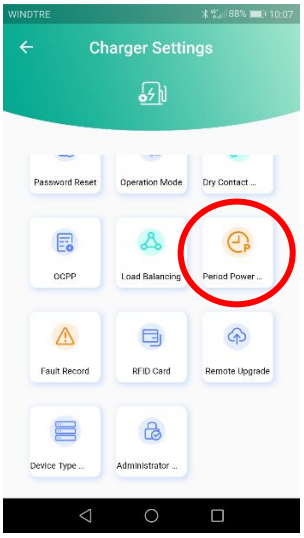
Warning: for the CASE B mode (without the integrated cable), there is an electronic lock inside the charger to keep the electrical connection stable during the charging process. When charging is completed or a fault occurs, the electronic lock will automatically unlock, please do not pull it forcibly otherwise.

9.4 Scheduled start/stop (BOOST mode) and power level programming

The charging power level can be scheduled with a dedicated programming (BOOST mode). The charging start/stop time can be programmed too.

Note: to have the automatic start/stop behaviour the FREE mode must be enabled (see paragraph 9.1). In this case the start /stop schedule is set by the BOOST menu.

Step	Description	Picture
1	Open the APP. The home page is displayed. Click on the BOOST Timer tab at the end of the page	
2	The page in the picture is displayed. Click on "+" to add a new schedule. Fill the timing form and click the confirm button at the end to save the configuration. A time interval in which the charger will operate in BOOST mode (automatic start/stop) is set.	

		  
3	Enter in the "Power Period" configuration menu to set the power level to be used in the BOOST schedule.	

4	Different time schedule can be set and added as per the user needs.