OlifeEnergy SmartMeter

Dynamic power control charging station accessory

Revision 2
Date: 3.2.2022
Olife Energy a.s

1 TABLE OF CONTENTS

2   GENERAL INFORMATION

Information from this chapter are universal for every other chapter of this documentation. Please follow it and take it seriously. We are not liable for damage caused by non-following the provided instructions.

1. **Documentation includes:**

   <u>For user:</u>
   - User manual

   <u>For service technician:</u>
   - Installation and regular maintenance manual

2. **Pass this manual to responsible person:**

This manual is determined for the operator of the charger. The manual should be safely stored by the operator. It should be available on any occasion, such as charger configuration, reconfiguration, electrical revisions, etc.

3. **Used symbols:**

Life-threatening danger
or
Severe injury
or
Light injury

Risk of property damage/loss.

Useful information or instruction how to proceed.

2

3 PRODUCT DESCRIPTION

Smartmeter is determined for maximalization of charging an electric vehicle. The Smartmeter protect the local grid from overloading the circuit breaker. The Smartmeter features ripple-control charging and PV excess charging. It is the most suitable for residential buildings and company application.

The OlifeEnergy Smartmeter is electrical appliance. It should be connected by qualified specialist regarding valid law-given requirements in your country. The severe injury, death or property loss might occur when approached and/or operated the wrong way.

Smartemer is designed to measure the consumption of the building in real time. Based on measured data the Smarmeter control the maximum charging power of the OlifeEnergy charging station. One Smartmeter unit is able to control single OlifeEnergy AC charger, including twin-output models.

Installation of more than one Smartmeter units in the same building grid is possible, however not recommended by reason that the ratio of power split between the chargers can not be estimated, nor controlled. Maximum pre-set charging limit will be respected in such an application, but it is possible that one EV will wait for another EV to finish charging before starting its own charging session.

In most application the smartmeter is installed into building's main switchboard. If the requirement is to control secondary circuit, then the smartmeter should be installed into secondary circuit switchboard. The smartmeter is designed for installation on DIN rail.

The current is measured by transformers with split core. The communication with OlifeEnergy charging station is RS485 over the cable standard, or LoRa wireless communication optional.

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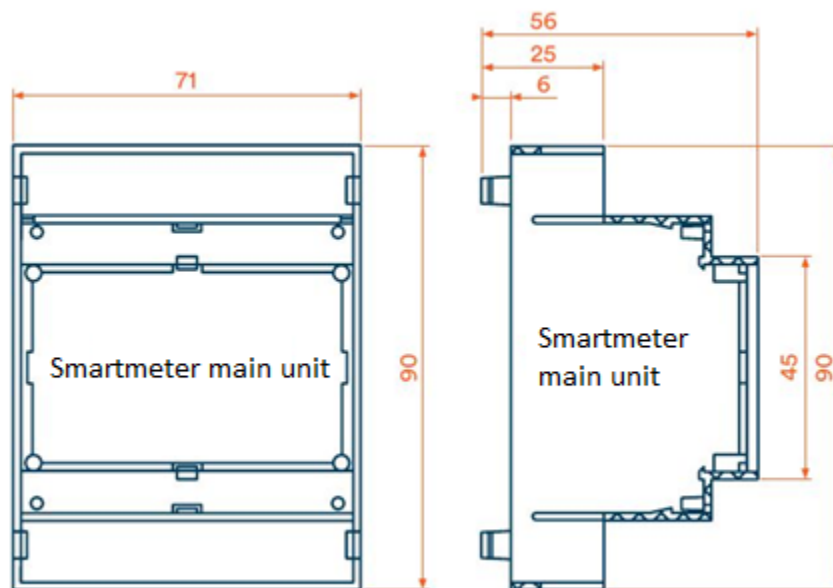# 4 APPLICATION EXAMPLES

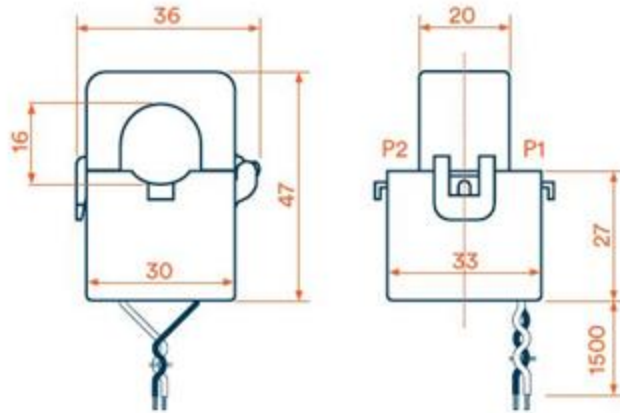Example 1: House **circuit breaker 25A** -> Set **25A** value in Smartmeter settings
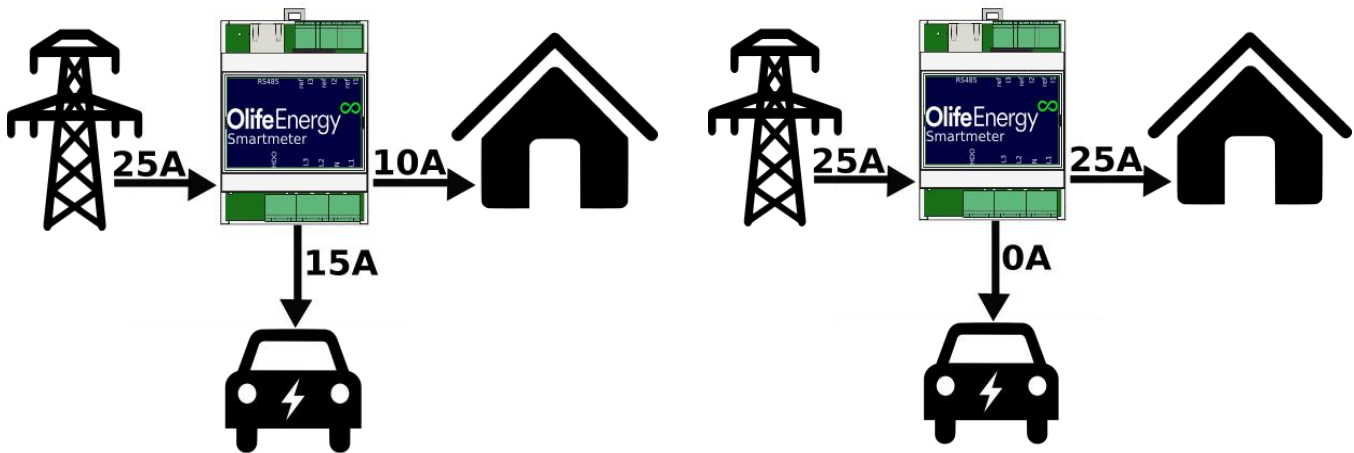
If house consumption is 10A, the car is allowed to charge 15A.

It the house consumption is 25A, the car charging is delayed.

5 DIMENSIONS

Measuring transformers (3 pcs. included in package)

6 INSTALLATION

Caution!
Wrong installation by unauthorized persons can lead to property damage, severe damage, or death!

Caution! Severe injury or death may occur during unauthorized or unskilled maintenance or repair. Any intervention into charger internal component must be done by qualified electronic technician. Any contact of internal components with moisture or water is strictly forbidden.

- Follow the installation manual instructions.

The following pages describe the necessary steps which must be complied for the installation of the charging station. Please follow the process step-by-step, do not change the order of individual steps!

6.1 RECOMMENDED TOOLS

Recommended tools	Size	Description
Flat-tip screwdriver or bit adaptor	3	⬤

6.2 PACKAGE CONTENTS

quantity	item
1	OlifeEnergy SmartMeter
3	Split core current masuring transformers
1	User manual

6.3 SMARTMETER CONNECTION

Caution the SmarMeter is electrical appliance working with grid voltage and current. Sever injury or death might occur when operated wrong way!
The installation should be proceeded only by qualified specialist regarding valid law-given requirements in your country. The Smartmeter cover protection level is IP10, it must be installed in appropriately protected location to secure the safe operation.
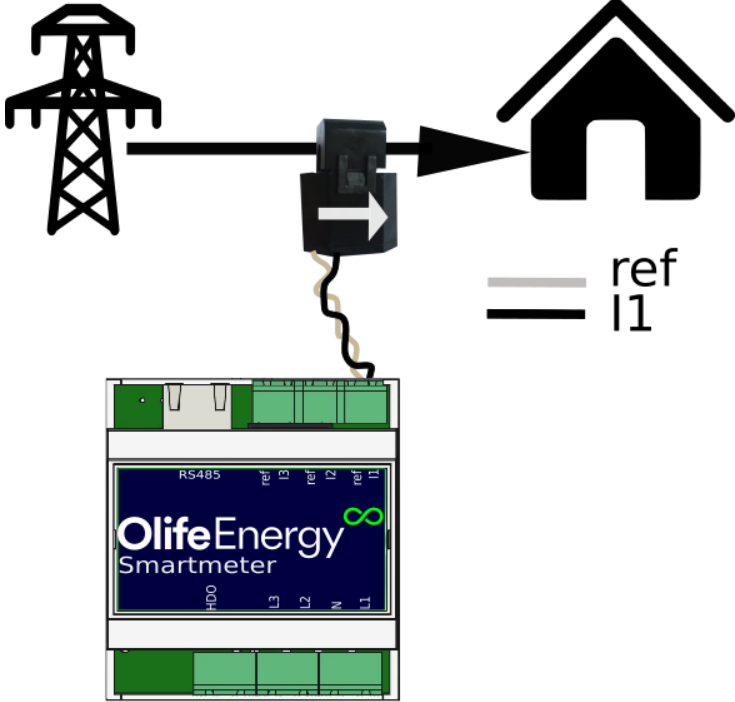
6.4 THE CURRENT TRANSFORMERS CONNECTION

The current transformers are split-core type. The line cable is not necessary to be disconnected from other electrical components during the installation. Do not work under load, switch off the main circuit breaker before the installation!

When installing the current measuring transformers, please pay attention to the arrow at the current transformer. The arrow should match the current withdraw **from the grid to the building.** Also please pay attention to the color code of the wires, which is displayed on the picture below. Line L1 current measuring transformer should be connected following way: white wire into **ref** and black wire into **i1** sockets, as displayed at the picture below

Caution: Pay attention so the current transformer which is measuring the physical **Line 1** would be connected into **i1** socket. The same repeats for **Line 2** connected into **i2** and **Line 3** into **i3** sockets.

Recommended tightening torque is 0,4Nm for all Smartmeter socket connections.

6.5 LINE WIRES AND RS485 COMMUNICATION CONNECTION

	Caution: Pay attention so the current transformer which is measuring the physical **Line 1** would be connected into **i1** socket. The same repeats for **Line 2** connected into **i2** and **Line 3** into **i3** sockets, as displayed at the picture below.

1. OlifeEnergy AC charging station (any model):

The circuit breaker 4A for protecting the input power wires is optionally possible to use of higher value, such as 6A or 10A. As the secondary protection level the Smartmeter is equipped with internal fuses (not user repairable).
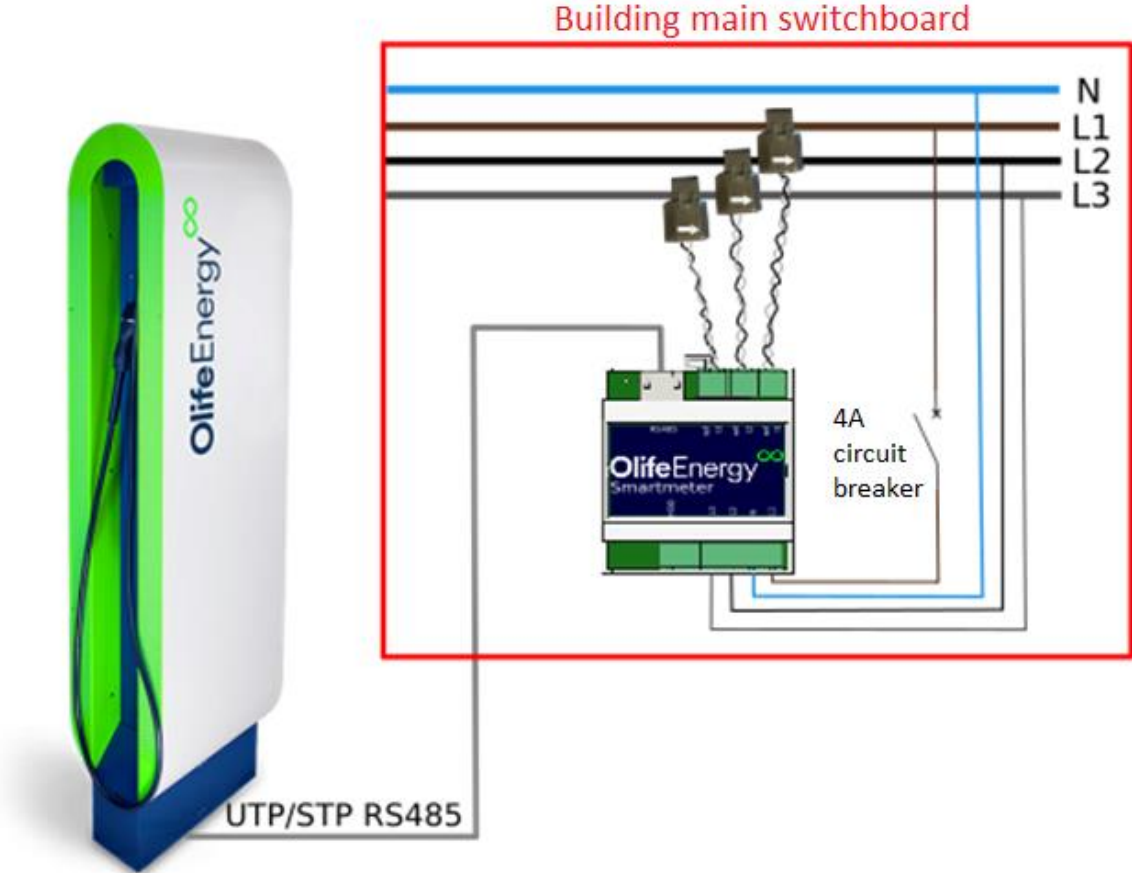
6.6 LINE WIRES AND LORA WIRELESS COMMUNICATION CONNECTION

> **ℹ** **Caution:** Pay attention so the current transformer which is measuring the physical **Line 1** would be connected into **i1** socket. The same repeats for **Line 2** connected into **i2** and **Line 3** into **i3** sockets, as displayed at the picture below.
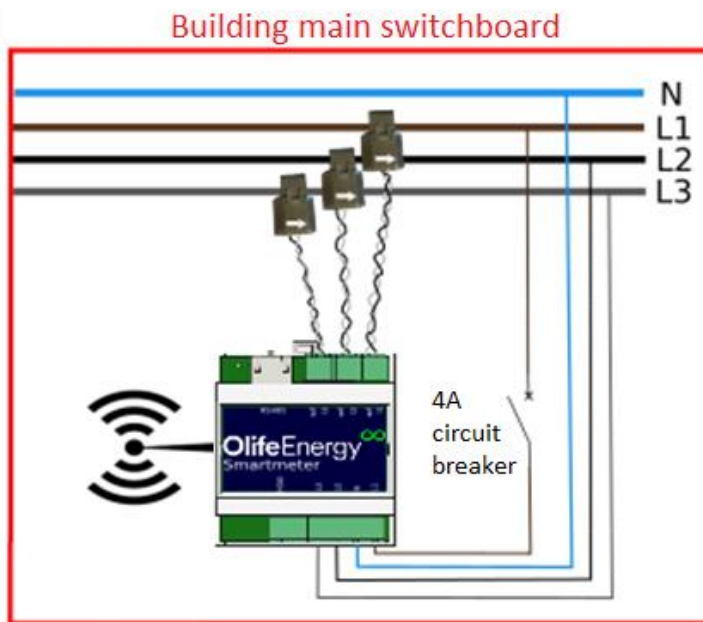

The circuit breaker 4A for protecting the input power wires is optionally possible to use of higher value, such as 6A or 10A. As the secondary protection level, the Smartmeter is equipped with internal fuses (not user repairable).

6.7 RIPPLE CONTROL CHARGING (OPTIONAL FEATURE)

The Smartmeter is equipped with input for ripple control signal which is used in some countries to switch before tariffs. The input is 230VAC tolerant – route the phase line from ripple-controlled relay or from other appliance controlled by the ripple control relay (in most occasions the water heater).

6.8 SMARTMETER RS485 COMMUNICATION CONNECTION – THE OLIFE ENERGY CHARGER SIDE

OlifeEnergy AC/DoubleBox models   OlifeEnergy Wallbox
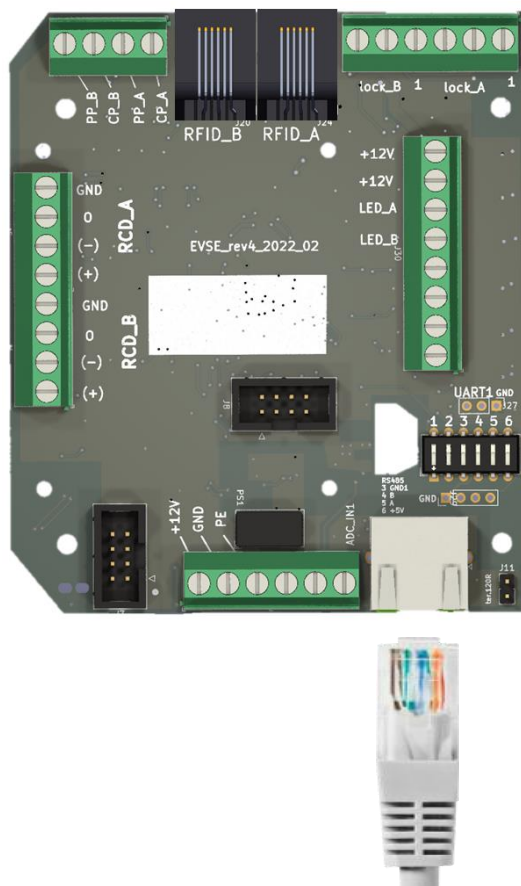
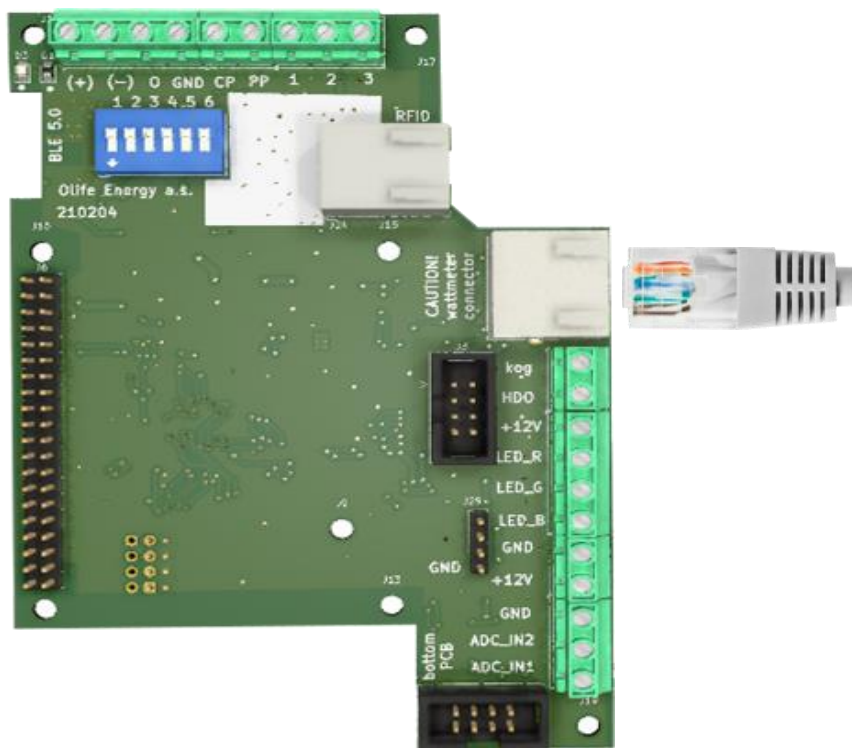Connect the RJ45 ended UTP/STP cable into RJ socket inside the OlifeEnergy charger. The RJ port description at the PCB is "RS485".

⚠️ **Caution! If you have the OlifeEnergy charger in "SMART" version, there is one more RJ45 port inside the charger at the separate PCB (Raspberry Pi). Do not use the Raspberry PCB port, use the port displayed at the picture above instead!**

7 SMARTMETER FIRST STARTUP, THE SETTINGS

7.1 THE CONNECTION CHECK

Please proceed the double checking of all connections of the Smartmeter before first powering up. The checking procedure must be processed with all power disconnected from the system! The check must be performed to verify all objects connected to grid:

- meets the requiremens of the law-given standards
- are appropriately selected and installed
- are not visibly damaged
- are selected in accordance on current-transfer ability and the voltage drop
- All neutral conductors are used and correctly described

Also verify:

- Current measuring transformers polarity
- Colors of the wires
- Phase sequence
- If the L1 measuring transformer is connected it i1 input, and repeat for L2 and L3
- If the smartmeter, transformers and/or it's wirings are not visibly damaged
- If all connections are appropriately tightened (recommended torque 0.4 Nm)

It is recommended to perform visual check of the Smarmeter device at least once per 6 calendar months.

If you performed all recommended steps of above mentioned first startup instructions without any errors or additional questions, you can power up the Smartmeter by 4A current breaker installed at the Smarmeter input (or equivalent value). Next step is the settings.

7.2 SMARTPHONE APPLICATION

The configuration of the Smartmeter is processed through smartphone application.The smartphone application name is Olife Energy and can be downloaded at GooglePlay for Android based smartphones or at the Apple Store for iOs based devices.

The connection to the Smartmeter is processed by OlifeEnergy charging station itself through bluetooth wireless connection with your smartphone. Please take in advance that you connect with your smartphone into the Smartmeter through the charger, not directly to the Smartmeter! Therefore, you must stand next to the charger with your phone, not next to the Smartmeter, when performing the configuration. .

In the application overview you can watch the real time values of charging power and capacity charged. In the setting you can configure following details which determines the behavior of Smartmeter functionality.
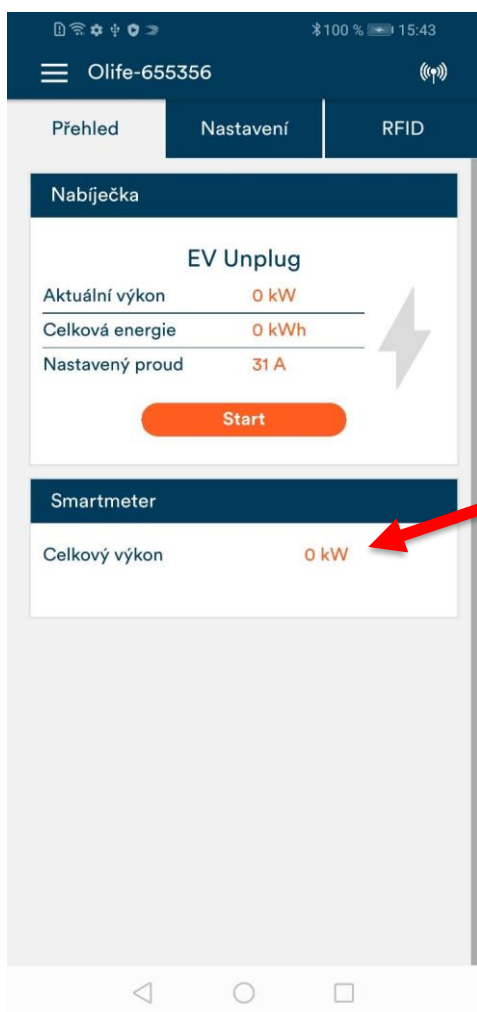
In this field the summary of withdrawn power at all lines measured by Smartmeter is displayed. During the first startup please verify if the displayed value matches the reality. If the measured value is wrong, please verify following:

-   The arrow symbol at current transformers matches the direction of the power **withdrawn from the grid to the building.**
-   Colors of the wires appropriately connected to the Smartmeter main unit.
-   Phase-sequence of the lines
-   If L1 transformer is really measuring L1 line, L2 and L3 accordingly
-   The application should display positive values during the charging, unless the power is not really being supplied to the grid.
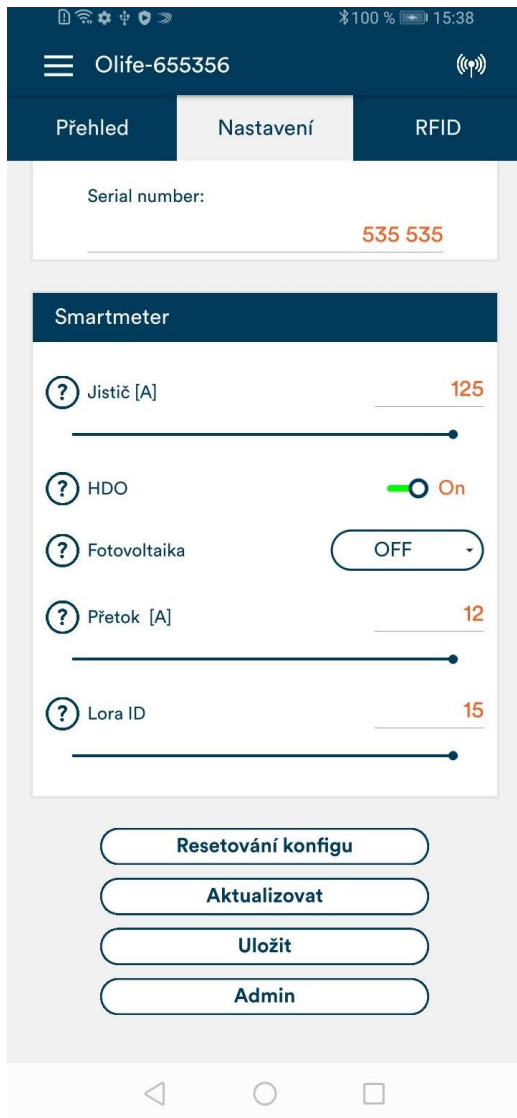
7.3 DYNAMIC CHARGING POWER CONTROL REGARDING AVAILABLE CAPACITY

CIRCUIT BREAKER SETTINGS:

This value determines desired level of circuit breaker overload protection. If the total sum of the currents in the monitored building or dedicated circuit is higher than value set here, the charging power of the charger is decreased. The measuring range is 0-125 [A].

7.4 RIPPLE CONTROL CHARGING

Ripple charging settings
If this parameter is active, the charging is allowed only if 230VAC ±10% is present at the Smartmeter main unit "HDO" marked socket. If the voltage is not present the charging is prohibited.
If you desire to charge your vehicle outside of ripple controlled tariff window, turn off this option in the smartphone application.

7.5 CHARGING FROM PHOTOVOLTAIC SYSTEM WITH GRID FEEDING ALLOWED:

Caution. By the IEC 61851-1 standard the electric vehicle charging stations are not allowed to charge with current under **6A per line**. By this reason OlifeEnergy Smartmeter allows you to set the **GRID-FEED CHARGING** parameter to allow partial charging from grid-fed energy and partially from grid. This is especially useful for all photovoltaic charging applications where grid-feed power 6A per phase (1380W) is reached rarely or not at all.

GRID-FEED charging settings:

- ○ 1F – monitors the grid-feed occasions at one line only, at the line where the most energy is being fed to the grid. If the grid-feed power reach pre-set level, the charging is activated.
- ○ 3F – monitors the average grid-fed energy at all lines. If this value reches the pre-set value, the charging is activated.

After any of above-mentioned GRID-FEED charging parameters is set the behavior of the system is following: If the grid-feed energy from photovoltaics reaches the value pre-set by the smartphone app, the charging of the electric vehicle starts. Any power on the top of 6A will be withdrawn from the grid. Settings range is 0-12 [A].

Example: If the pre-ser value of the "**GRID-FEED charging**" parameter is set to **4A**, the charging starts whenever minimum **4A** is being fed **to the grid**. Therefore vehicle will be charged by 6A technical minimum, being 4A from the photovoltaics and 2A from the grid.

8 INSTALLATION AND SETTINGS OF WIRELESS COMMUNICATION MODULE (LORA)

LoRa technology based wireless communication module is possible to be purchased and installed in all OlifeEnergy chargers and Smartmeters produced after 1st January 2022. The wireless communication modules set consist of two Rx/Tx modules. One is determined for installation into the charger, second one is for installation into the Smartmeter.

> The wireless module uses the LoRa communication protocol with frequency 868 Mhz. The working range differs with the environment. Considering the similar frequency range, the ability of the signal to pass through objects is similar as it is with cell-phone signal. In open areas the working range of the module can exceed 100 meters.

> **Caution! Danger of severe injury or death. The installation should be handled by trained professional. It is mandatory to work on the device only with power shut off and the charger input power wires disconnected.**

8.1 SETTING THE LORA ADDRESS OF THE CHARGER AND THE SMARTMETER

If your OlifeEneregy charging station and the Smartmeter are equipped by wireless communication module, it is sometimes necessary to change the channel on which LoRa transmit and receive the signal. This might be required especially if you install the wireless communication module to the charger, which was produced without it, or if you need more wireless communicating OlifeEnergy chargers to operate in the same area.

For the OlifeEnergy charger the channel is possible to change with smartphone application.The range is 0-15 [-]. After setting the ID in the charging station settings in smartphone app please reset the charger thought he application, or by breaking the power to the charging station.

The same ID must be set at the SmartMeter as well. This settings perform with DIP switches at some older Smartmeters.
Caution! Always operate the DIP switches with power disconnected from the Smartmeter.
The setting of the DIP switch can be done according to following table. The ID set in the charger must be the same as the Address (from 0 to 15). DIP switch is accessible under the front cover of the Smartmeter, see chapter 8.2.

Address: 0 — ON: ; OFF: 1 2 3 4 5 6

Address: 4 — ON: 3; OFF: 1 2 4 5 6

Address: 8 — ON: 4; OFF: 1 2 3 5 6

Address: 12 — ON: 3 4; OFF: 1 2 5 6

Address: 1 — ON: 1; OFF: 2 3 4 5 6

Address: 5 — ON: 1 3; OFF: 2 4 5 6

Address: 9 — ON: 1 4; OFF: 2 3 5 6

Address: 13 — ON: 1 3 4; OFF: 2 5 6

Address: 2 — ON: 2; OFF: 1 3 4 5 6

Address: 6 — ON: 2 3; OFF: 1 4 5 6

Address: 10 — ON: 2 4; OFF: 1 3 5 6

Address: 14 — ON: 2 3 4; OFF: 1 5 6

Address: 3 — ON: 1 2; OFF: 3 4 5 6

Address: 7 — ON: 1 2 3; OFF: 4 5 6

**Address: 11** — ON: 1 2 4; OFF: 3 5 6

Address: 15 — ON: 1 2 3 4; OFF: 5 6

8.2 WIRELESS COMMUNICATION MODULE INSTALLATION ON THE SIDE OF SMARTMETER

First remove the front cover of the Smartmeter with flat-tip screwdriver. Insert the tip of the screwdrivers to holes at the in the middle of the shorter edge of the cover. Move the screwdriver carefully in the way to twist the cover from its position.
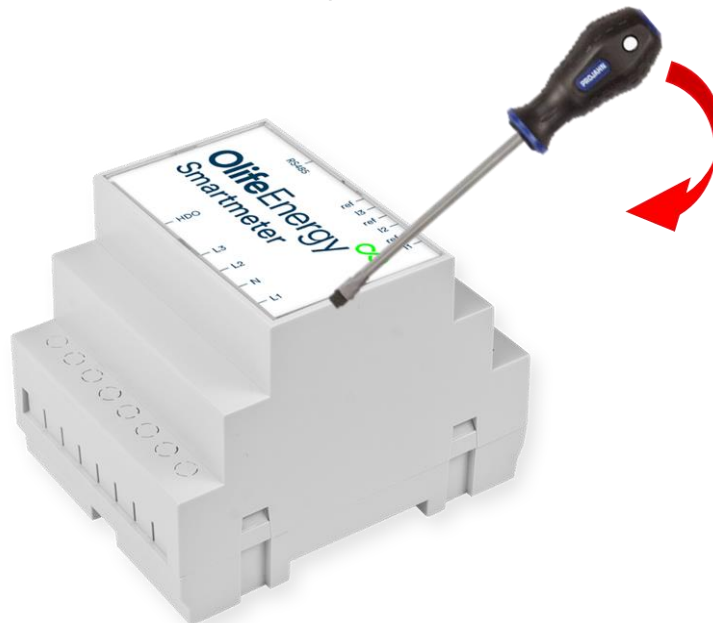
As the next step inert the wireless communication module into the socket.

DIP switch for LoRa ID setting
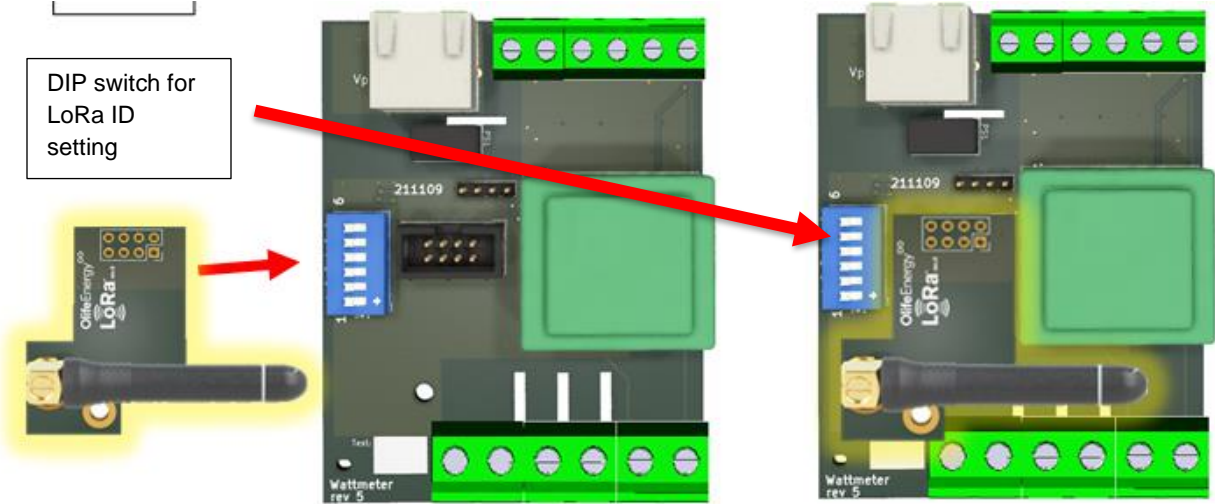
Wireless communication module (LoRa)

Smartmeter without communication module installed.

Smartmeter with communication module installed.

⚠️ **Caution! Be gentle when attaching the module into the socket. Damage of the pins might occur if the module is installed wrong way.**
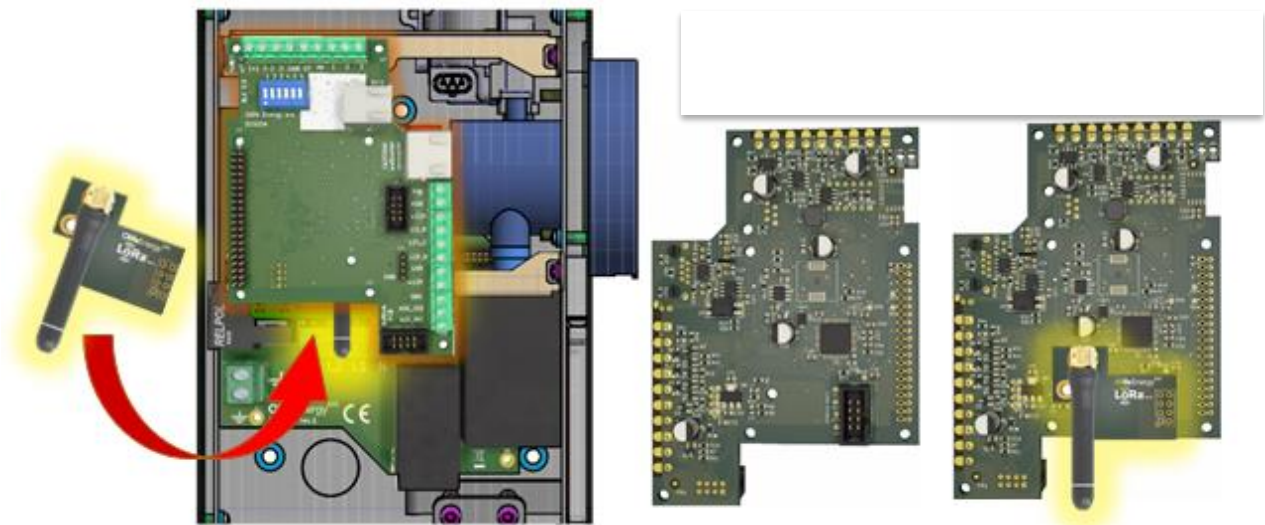
8.3 INSTALLATION AND SETTING OF THE WIRELESS COMMUNICATION MODULE AT THE SIDE OF THE OLIFEENERGY WALLBOX CHARGER

Remove the front cover of the wallbox according to OlifeEnergy Wallbox user manual.

LoRa wireless communication module should be installed into top PCB, but from its **bottom side!** Please follow the instructions from the picture below.

⚠️ **Caution! Be gentle when attaching the module into the socket. Damage of the pins might occur if the module is installed wrong way.**

8.4 INSTALLATION AND SETTING OF THE WIRELESS COMMUNICATION MODULE AT THE SIDE OF THE OLIFEENERGY DOUBLEBOX AND AC STAND CHARGERS
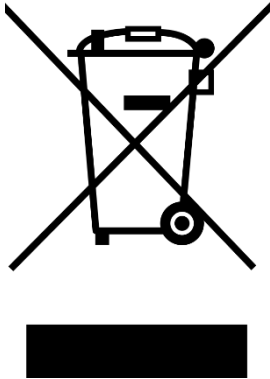
Caution! Be gentle when attaching the module into the socket. Damage of the pins might occur if the module is installed wrong way.
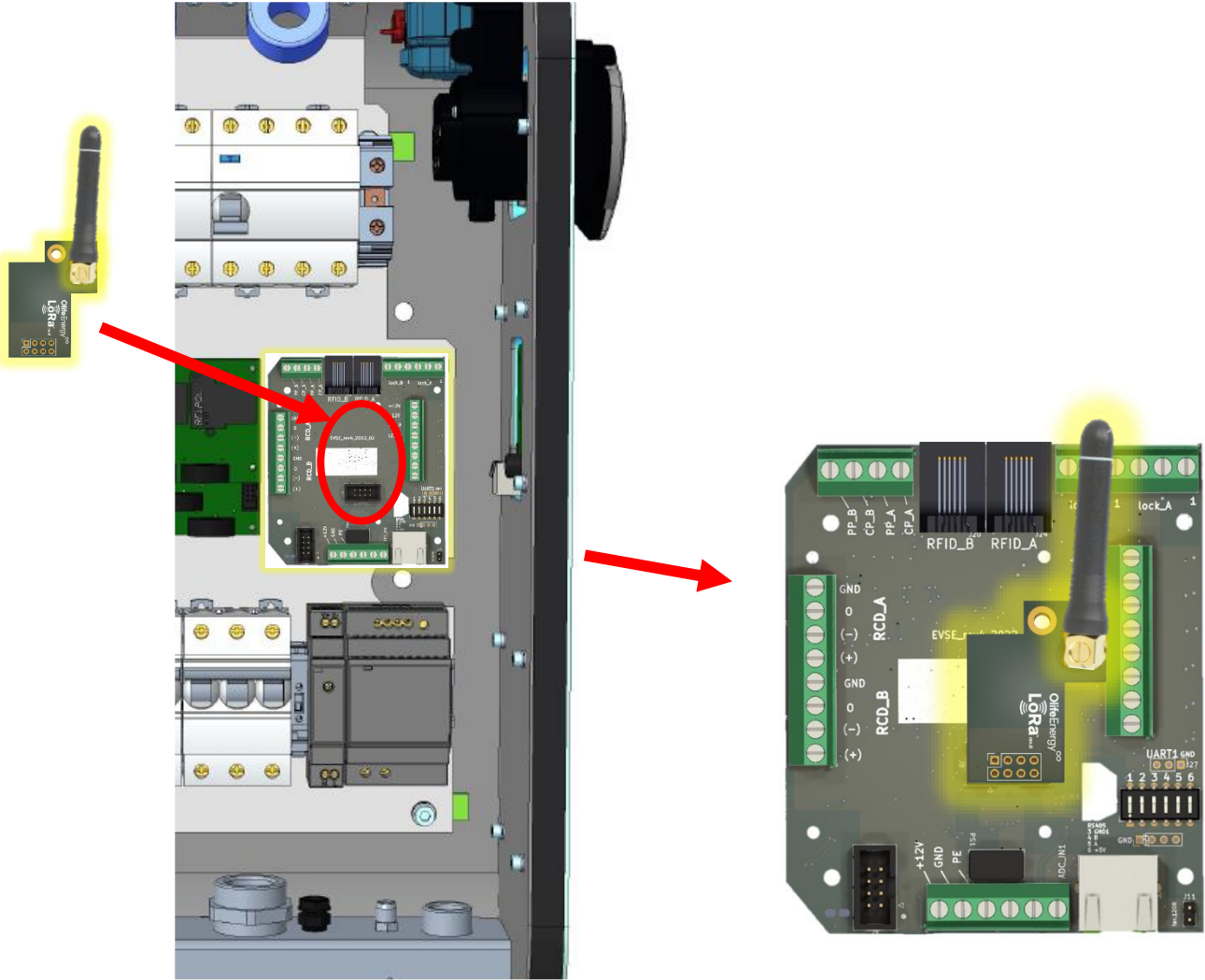
9 USER INFORMATION FOR DISPOSAL OF ELECTRICAL AND ELECTRONIC EQUIPMENT:

9.1 HOUSEHOLDS

This symbol at the product or its documentation means that the product is not ment to be disposed with municipal waste. Please dispose the product at the collection places determine to collect the electrical and electronic waste, it will be collected for free.

By correct disposal of this product you can help to sustain valuable nature resources and you help to prevent potential negative impact on our environment and human health, which might be endangered by wrong disposal of this product. Please ask more from your local authorities or appropriate waste collection center.

You might be subject of penalization if you dispose this product wrong way, according to your local and national rules.

9.2 COMPANY AND ENTERPRISE

For right disposal of electric and electronic appliances please request additional information from dedicated manager or salesmen of this product.

10 CONTACT

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