# Dynamic Power Sharing

## Installation Guide

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ANNEX A 27

# 1 Introduction

# 1 Introduction

The addition of charging points in a building implies an increase of the overall power demand. This usually results in having to increase the overall available power, which is an expensive option and sometimes not the most efficient.

The Dynamic Power Sharing (DPS) monitors a building's demand and compares it to its maximum allowable value. When it is lower than the maximum, it can supply all the remaining available power to reach the maximum to the charging network. Contrarily, if the building's demand is equal or greater than its maximum permitted value, no power will be supplied to the charging stations. It can be seen that just by taking advantage of periods where there is low demand from the building side, the charging network's demand can be satisfied without having to increase the installation's overall power.

To accomplish this smart energy distribution system, the Power Sharing Smart functionality has been enhanced to create Dynamic Power Sharing.

## BENEFITS

The Dynamic Power Sharing has a set of benefits that extend to multiple levels and actors.

**Benefits for the building owner**

- Protection over blackouts: The Dynamic Power Sharing will prevent that the operating of the charging station leads to a blackout.
- Savings up to 40% of current capacity costs: In cases where there is a power limitation the optimization in the use of this power leads to real capacity savings.
- Reduction in installation costs: Since the Power Sharing provides savings regarding installation costs, the Dynamic Power Sharing offers the same savings.

**Benefits for the end users**

- Service available: This configuration allows to increase the number of chargers installed in a building. Taking advantage of periods where the building demand is low, the Dynamic Power Sharing allows for a bigger number of chargers to charge.
- Reduction in price: The capacity and installation costs savings from the building owner can also lead to money savings for the user.
- Reduction in charging time compared to ordinary solutions: The variability in the available power for charging can lead to a bigger power supplied to all chargers, which will result in a reduction of the time of charge.

## SYSTEM COMPONENTS

Dynamic Power Sharing uses an external energy meter installed after the mains breaker to know the power available for the charging network at every moment and dynamically distribute it across the chargers in a smart way.

One DPS-ready charging network consists in one Master charger and up to 24 Slave chargers. The energy meter is connected to the Master charger and transmits measurements of the actual power consumption of all the electrical loads downstream. The Master charger automatically adjusts the total power that is left for charging EVs and distributes it among the Slave chargers and itself.

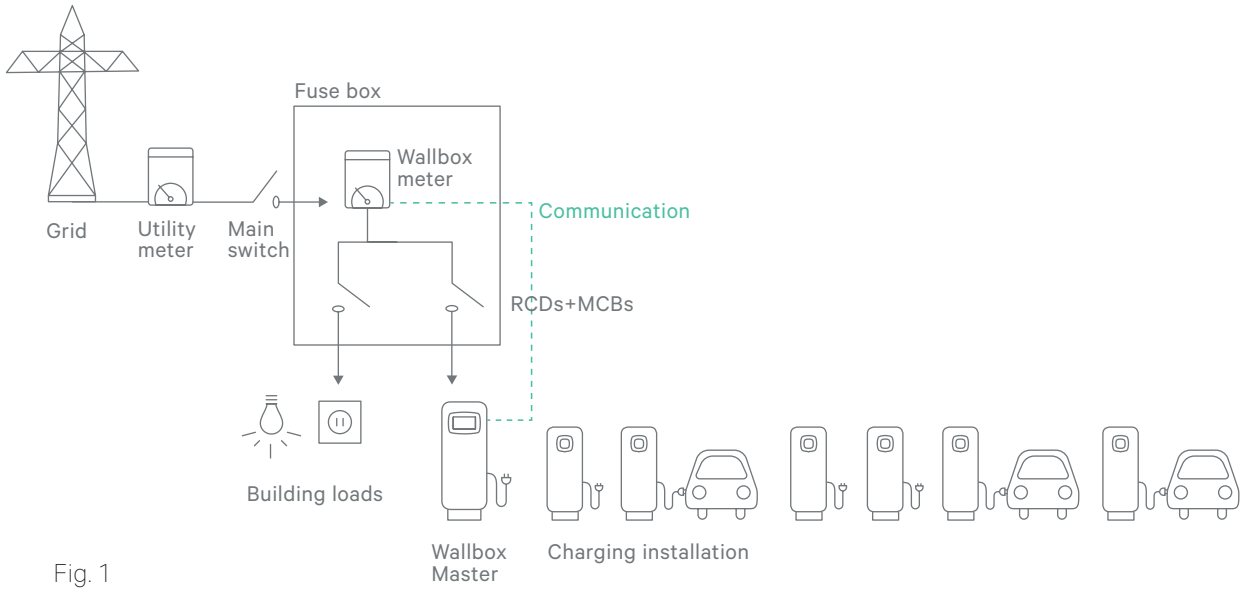



Fig. 1

# 2 Important notes

## 2 Important notes

- This feature is supported by the following Wallbox chargers: Commander, Commander 2, Copper C, Copper S, Copper SB, Pulsar Plus, Pulsar (only as slave).
- A Wallbox Pro license is required to activate Dynamic Power Sharing on your charger. The charger must be installed following the instructions of the product Installation Guide that is delivered with the charger as well as of this guide.
- Only energy meters that are delivered by Wallbox are compatible with this feature.
- Only qualified technicians are allowed to perform the installation as it is described in this document.
- Before the installation of Dynamic Power Sharing, the charger must be powered off and its cover removed. After, the charger must be properly closed as defined in the Installation Guide.

# 3 Required material and tools

## 3 Required material and tools

One energy meter

Two or more Wallbox chargers

UTP and STP cable

myWallbox account

- Access to the main fuse box is necessary for the installation of the energy meter.
- Cable between Master charger and Energy Meter: an STP Class 5E cable, 2 twisted pair, is recommended. The length depends on the customer setup, while a maximum of 500 m can be installed.
- Cable between chargers: UTP Cat 5E, 1 twisted pair, is recommended. A total maximum length of 250 m can be installed.

# 4 Summary of characteristics

## 4 Summary of characteristics

| | |
|---|---|
| Quantity of Master chargers (all models except Pulsar) | 1 |
| Quantity of Slave chargers (all models) | 1-24 |
| Quantity of Energy meters (only the models supplied by Wallbox are supported) | 1 |
| Communication protocol between chargers | CAN |
| Communication protocol between Master charger and power meter | Modbus RTU |
| Maximum total length of charging network | 250 m |
| Maximum length between Master charger and energy meter | 500 m |
| Terminating chargers | 2 (at the ends of the charging network) |
| Configurable maximum phase current | Charging network MCB rated current |
| Configurable installation maximum current | Installation main switch rated current |

# 5 Installation

# 5 Installation

The installation of a charging network with Dynamic Power Sharing can be split in two parts:

- Installation of the charging network
- Installation of the meter

**Existing installation**

In case the charging network is already installed in non-Power Sharing Smart configuration, power off and carefully open all chargers before continuing with next steps. In case of a Power Sharing Smart charging network, power off and carefully open only the Master charger before continuing with steps in section 5.2. For safety opening, follow the instructions in section "Opening the device" into the product Installation Guide.

**New installation**

In case of a new installation, first carefully read this manual for determining the cabling requirements of the installation. Once cabling and charger positions are clear, proceed by installing the chargers at the selected locations according to the product Installation Guide and the indications provided in the following sections.

## 5.1 Installation of the charging network

**Positioning in the system (T/NT chargers)**

When installing the Wallbox in a Dynamic Power Sharing network, the location is important to be taken into account.

The Master charger communicates with the Slave chargers through a cabling system that connects the chargers in a chain: one charger is connected to the next one.

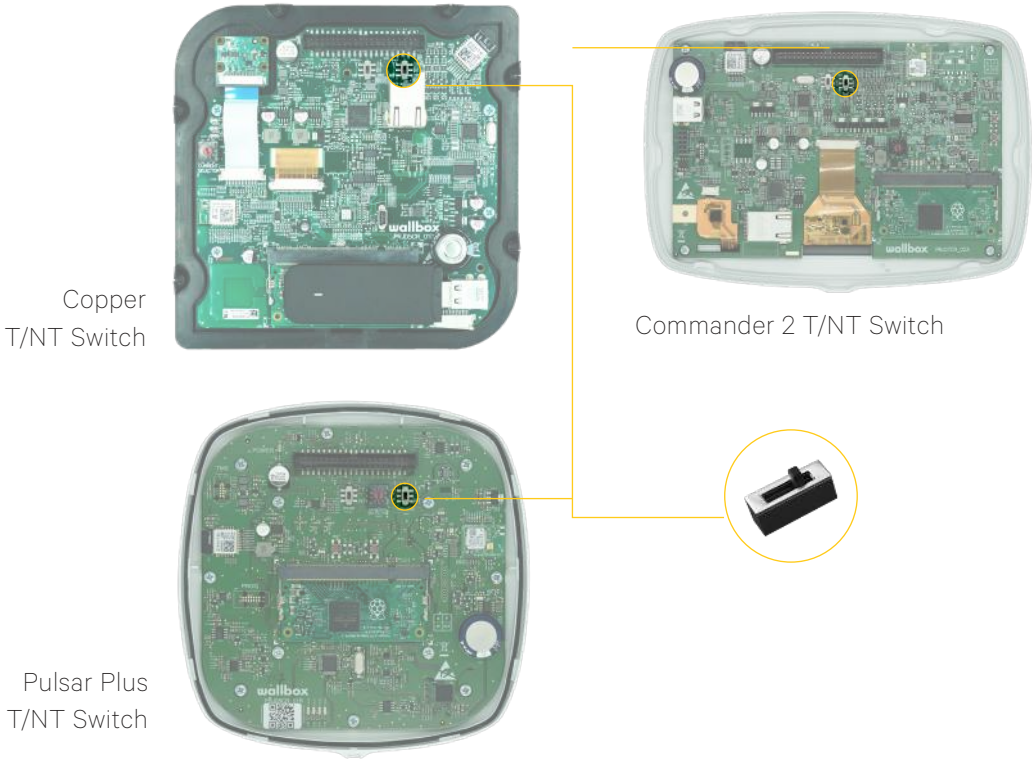
The chargers at the ends of the communication chain must be configured as Terminating (T) chargers while the chargers in between the ends must be configured as Non-terminating (NT).

Each charger includes an electric element that defines whether it is T or NT:

- Commander 2, Pulsar Plus and Copper*: Defined by the position of the corresponding switch on the control circuit.
- Commander or Pulsar: Pre-defined factory setting. A specific Part Number must be specified when ordering the unit. Indicated with a -P- in the Part Number (ex. WBXX-X-X-X-**P-**XXX-X).

*In this document, Copper C, Copper S and Copper SB are referred as Copper

## 5.1 Installation of the charging network

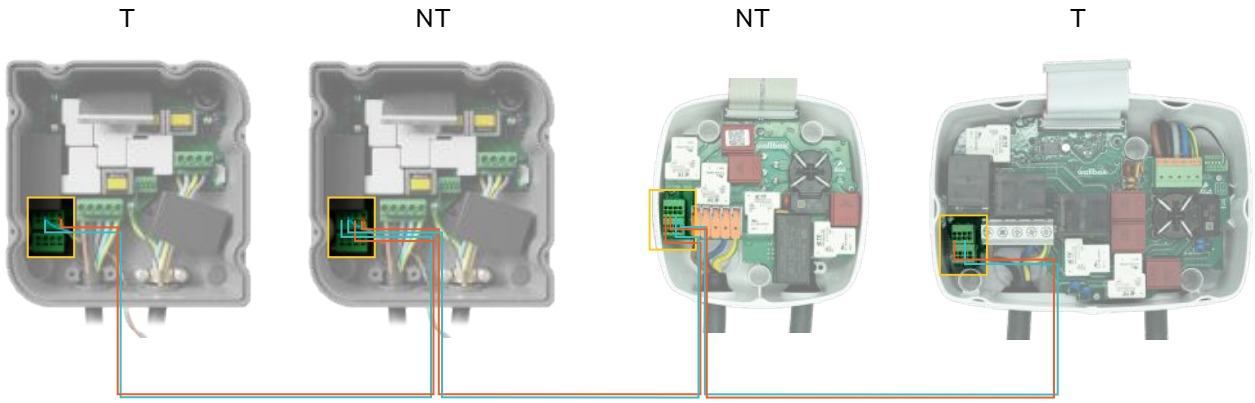



### 5.2 Cabling installation

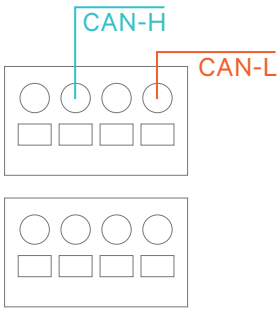
- The communication cable consists of two lines: CAN-low (CAN-L) and CAN-high (CAN-H).
- We recommend to use the following cable-type: Ethernet Class 5E no shield, 1 twisted pair.
- The total maximum length of the cabling between the ends of the network is 250 m.

## 5.1 Installation of the charging network

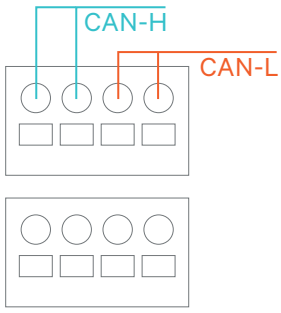
### CABLING COPPER, COMMANDER 2 AND PULSAR PLUS



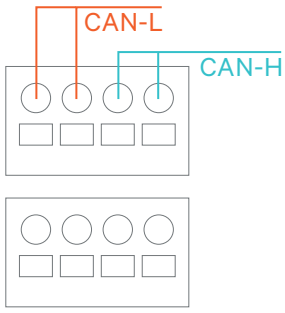

Copper, Commander 2 and Pulsar Plus have two slots for input and output cabling so the conjunction is done inside the charger.



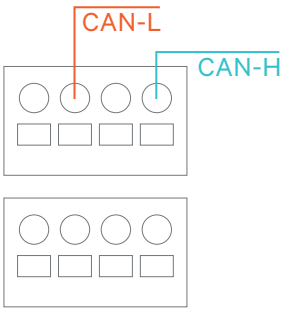

Copper
T connection




Copper
NT connection

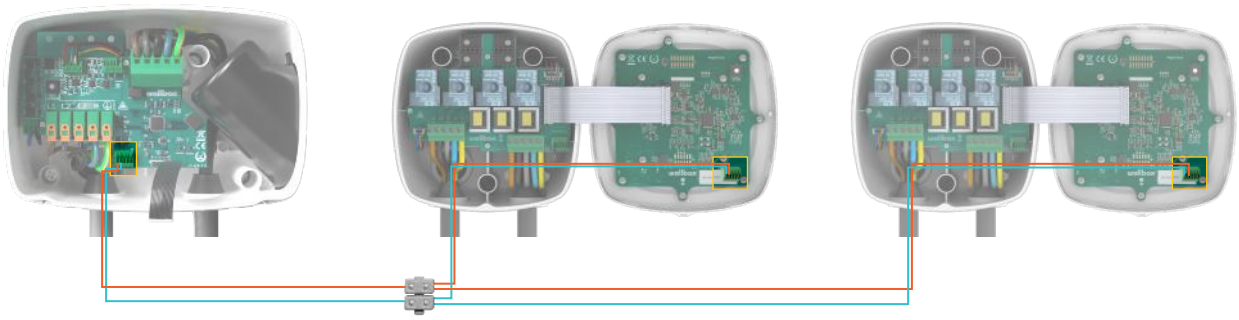



Pulsar Plus or
Commander 2
NT connection



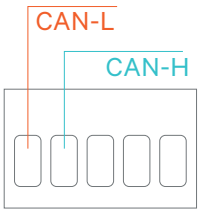

Pulsar Plus or
Commander 2
T connection

CABLING COMMANDER AND PULSAR

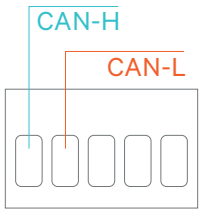


Commander and Pulsar only have one slot so the conjunction is done with a connection strip.

⚠ Always ensure the watertightness of the connection strip.




Commander connection




Pulsar connection

⚠ The cabling polarity must always be respected:
CAN-H must be connected to CAN-H terminal.
CAN-L must be connected to CAN-L terminal.

## 5.2 Installation of the energy meter

### Location of the energy meter

As shown in Fig. 1, the energy meter (labeled as “Wallbox Meter”) must be installed at the main branch after the main switch of the electrical installation and before the split in branches.

Install the energy meter to the mains according to its Installation Guide.

### Cabling of the energy meter

After the energy meter has been installed according to its Installation Guide on the correct position, it must be connected to the Master charger of the charging network.

The Annex “A” describes the cabling setup to the currently supported energy meters.

# 6 Configuration

# 6 Configuration

## 6.1 Master/Slave setup and powering on

Each Dynamic Power Sharing network consists of 1 Master charger and up to 24 Slave chargers. The role of a charger within the network can be configured according to the following table:

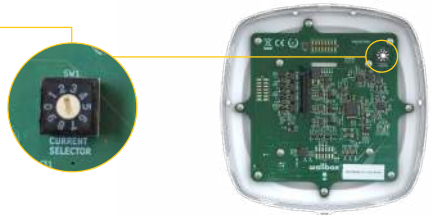
| Charger | Master | Slave |
|---|---|---|
| Copper | ✓ | ✓ |
| Commander 2 | ✓ | ✓ |
| Commander | ✓ | ✓ |
| Pulsar Plus | ✓ | ✓ |
| Pulsar | | ✓ |

Any combinations are possible.

The master can be set at any position within the group (T or NT).

The role of each charger must be configured using the rotary switch before powering the charger on (see product Installation Guide for position of the rotary switch)::

| Position | Configuration |
|---|---|
| 0 | Slave |
| 8 or 9 | Master |
| Any other | Stand-alone (see Installation Guide) |




Once the role of all chargers is set with the rotary switch, the system can be powered on.

The Master charger will automatically detect the Slave chargers as well as the energy meter.

## 6.2 Network Configuration

Once the system has been powered on, Dynamic Power Sharing functionality must be configured on the Master charger only. This can be done using either the Wallbox App or the touchscreen in Commander and Commander 2.

The chargers will stay in Unconfigured status while the Master is not properly configured (see section “Status notification”).

> A myWallbox account with Wallbox Pro license is needed in order to configure this functionality. For more information see the corresponding product User Guide.

The Dynamic Power Sharing requires four parameters to be configured on the Master charger:

### 1. NUMBER OF CHARGERS IN THE POWER SHARING SYSTEM

- This number must include the master charging station.

### 2. MAXIMUM CURRENT PER PHASE

- This value refers to the maximum current that can be supplied to the charging network.
- Typically this value is the rated current of the MCB that protects the chargers branch.

### 3. MINIMUM CURRENT PER CHARGER

- While the standards define a minimum current of 6 A (default value), some cars need to have a minimum current of 10 A.
- Default value is 6 A

### 4. MAINS BREAKER MAXIMUM CURRENT

- This value refers to the maximum current that can be supplied to the electrical installation to which the charging network belongs. Typically this value is the rated current of the mains circuit breaker that protects the electrical installation.

In Commander, access the configuration menu through Settings -> System -> Dynamic Power Sharing.

Commander

In Commander 2, access through Menu -> Settings -> Dynamic Power Sharing.

Commander 2

In the Wallbox App, once connected and synchronized with the charger, access through Configuration Menu -> Dynamic Power Sharing.

All master chargers

Once the role of all chargers is set with the rotary switch, the system can be powered on.

The Master charger will automatically detect the Slave chargers as well as the energy meter.

## 6.3 Status notification

### 6.3.1 Network not configured

This is the initial status after power on the setup.

Commander

All chargers

Commander 2

### 6.3.2 Master paired

The network has been successfully set. All chargers are connected with the master.

Commander

All master chargers

Commander 2

### 6.3.3 Master not paired

The number of chargers in the configuration does not match the number of chargers that are connected and detected by the Master. Review sections 2 and 3 to make sure all steps are being understood.

Commander

All master chargers

Commander 2

### 6.3.4 Slave paired

Slave connected with the master. The installation has been successful.

Commander

All chargers

Commander 2

### 6.3.5 Slave not paired

The slave is not successfully connected with the master on the DPS network.

This state is reached after 30 seconds without successful communication.

In this state, the charger status indicator (Halo or RGB LED) will blink **fast** in Ready, Connected and Charging state. Remember that in this state the slave can only charge at 6 A.

Commander

All chargers

Commander 2

Pulsar / Pulsar Plus

READY
slave not paired

CONNECTED
slave not paired

CHARGING
slave not paired

### 6.3.6 In queue

Not enough power available for this charger.

- If the power has already been reduced to the minimum, the newly plugged cars will go into this state.
- Once the system has enough power available (e.g. a car has been fully charged) it will start charging.
- In this state, the charger status indicator (Halo or RGB LED) will blink.

Commander

Commander 2

All chargers

Pulsar / Pulsar Plus

# 7 Troubleshooting

# 7 Troubleshooting

**Upgrading from older Power Sharing versions**

As Power Sharing is a functionality that is working across our charging stations, and not only on a single one, all chargers must work the same way.

Therefore, when upgrading from an older version of Power Sharing Smart, you need to update the Software of all of the chargers in the network. Our User Guides explain the update process.

**Charger(s) have a red LED/HALO/screen**

- After the start up, this is the default colour on a Power Sharing Smart net. If it lasts more than around 30 seconds, then check that the net is configured properly. If not, set the net configuration and wait from 5 to 30 seconds.
- Make sure that the amount of chargers in the configuration include the Master.
- Make sure that the maximum current per phase is set properly and that is higher than the minimum to be assigned.

**Charger(s) have a blinking green LED/HALO or Commander / Commander 2 shows the message "Slave not paired with the power sharing network" on the Power Sharing menu**

- Poor contact on the CAN communication cables. Check that all the communication cables are properly connected on the chargers (see section 2).
- Wrong resistor value between CAN communication lines. Power o all the chargers and measure the electrical resistance between CAN-H and CAN-L, it must be around 60 Ohms. If not, please check again section 5.

**Resistor's value between communication lines is different than 60 Ohms**

- If it is higher is because there's only one charger with the terminal resistors. If it is lower is because there are more than 2 charger with terminal resistors.
- Make sure that the two ends of the line have the "T" switch (if there's the switch) selected or that the resistors are on the corresponding chargers (see section 5).
- If the resistor value is not around 60 Ohm but the configuration is correct, a charger may be faulted.
- To ease the searching of the faulty unit remove the CAN cables of the chargers and check the resistor value in each one with, if possible, the switch in T position.
- The T chargers should have a 120 Ohm resistance between lines while the NT should have an open line.

### The Master charger does not detect the energy meter

The Master charger automatically detects the energy meter if both devices are correctly connected and powered on. When the communication with the energy meter has been established, a thunder icon is displayed on the screen of Commander, Commander 2 and Copper, and an icon “RxTx” is displayed on the screen of power meters EM112 and EM340.

- Check that the RS485 cable is properly connected to both devices according to indications in Annex A.
- Check that the RS485 switch on the Master if it is a Pulsar Plus or Commander 2.

### Erratic behaviour

- Poor contact on the communication cables. Check that all the CAN communication cables are properly connected on the chargers and the RS485 communication cable is properly connected between the Master and the energy meter.
- Wrong configuration on the Master.
- Wrong resistor value between communication lines. Power o all the chargers and measure the Ohm resistor between CAN-H and CAN-L, it must be around 60 Ohms. If not, please check again section 2.

### Charger keeps waiting for current even though there’s no other car

- The current assignation may last up to 30 seconds.
- Make sure that there are no schedules programmed.
- Check that the master and slaves are all paired. If not the maximum current per phase will be diminished 6 A per charger not paired.

# ANNEX

## ANNEX A.1 Carlo Gavazzi EM340 / EM112

The energy meter Carlo Gavazzi EM 340 is used for a 3-phase installation and the model EM112 for a 1-phase installation.

Fig. A1.1 shows the cabling between the energy meter and the Wallbox. Please mind the required short-circuit between the pins T and A- of the energy meter.

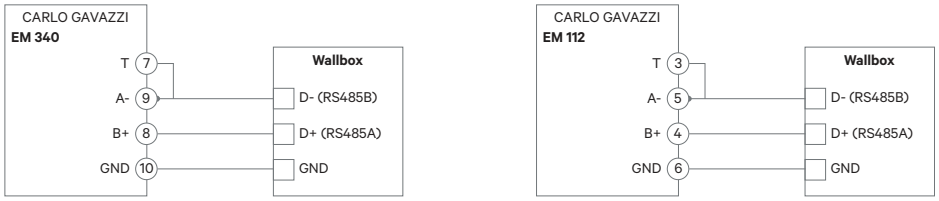



*Fig. A1.1: Cabling in specified energy meters*

For installing the EM112 or EM340 in supply schemes with neutral line, follow the instructions of the manufacturer's manual delivered with the energy meter.

In the event that the supply scheme does not include a neutral line connection and/or the line-to-line voltage is below 260V, please connect the Carlo Gavazzi EM112 energy meter as shown in Fig. A1.2:

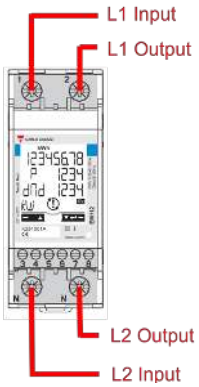



*Fig. A1.2 Power lines installation on an EM112 without neutral line and/or line-to-line voltage below 260V.*

In the following page Fig. A1.3, Fig. A1.4, Fig. A1.5 and Fig. A1.6 show where to connect the cabling to the Wallbox.

Depending on the model, the Wallbox may label RS485A for D+ and RS485B for D-.

## ANNEX A.1 Carlo Gavazzi EM340 / EM112

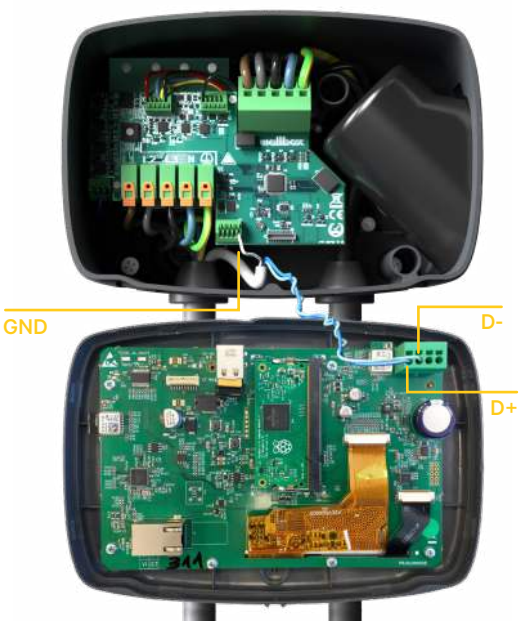



Fig. A1.3: Cabling in a Commander Wallbox

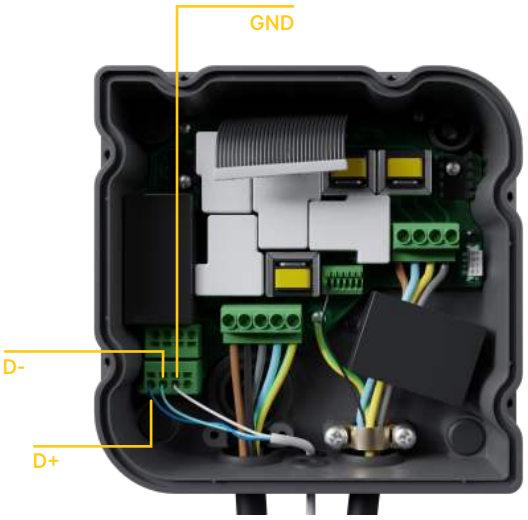



Fig. A1.4: Cabling Installation in a Copper Wallbox

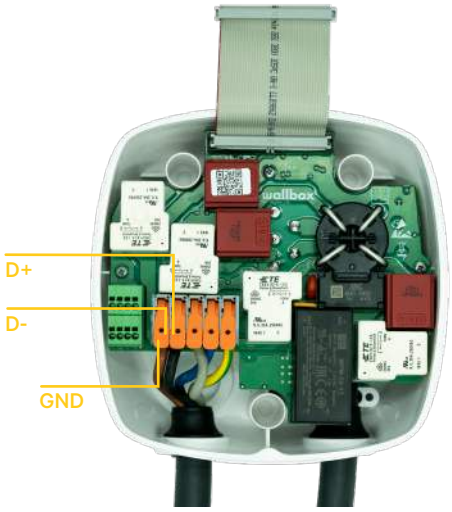



Fig. A1.5 Cabling Installation in a Wallbox Pulsar Plus

Fig. A1.6 Cabling Installation in a Wallbox Commander 2

## ANNEX A.2 Temco SPM1-100-AC

The energy meter Temco SPM1-100-AC is used for a 1-phase installation with up to 100 A.

The Temco power meter needs to be clipped to the mains power cable (schematic location shown in Fig. 1), with the current flowing in the direction as shown in Fig A2.1.

Only the phase-cable must be drawn through the clamp. The neutral-cable must not be drawn through.

Fig. A2.1: Energy Meter connection diagramm

Fig. A2.2 shows the cabling between the energy meter and the Wallbox. The numbers are refering to the Fig. A2.1. Before turning on the system it is important to check again that the connection of “GND” and “12 V” has been done correctly.

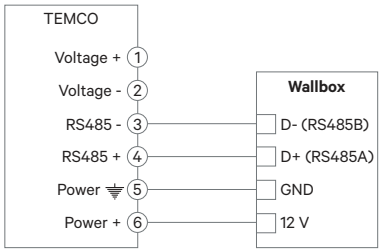



Fig. A2.2: Cabling in Temco energy meter

In the following page Fig. A2.3, Fig. A2.4, Fig. A2.5 and Fig. A2.6 show where to connect the cabling to the Wallbox.

## ANNEX A.2 Temco SPM1-100-AC

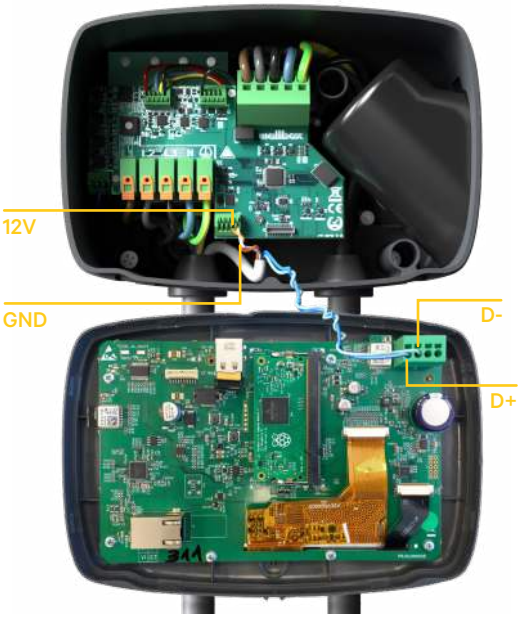



Fig. A2.3: Cabling in a Commander Wallbox

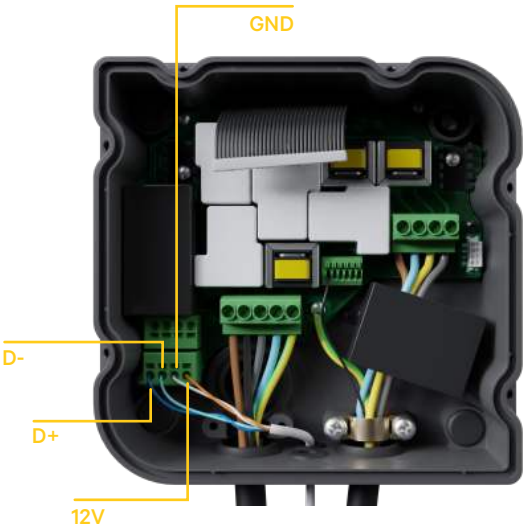



Fig. A2.4: Cabling Installation in a Copper Wallbox

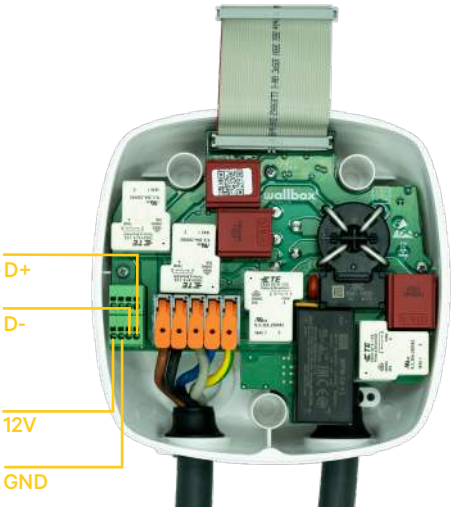



Fig. A2.5 Cabling Installation in a Wallbox Pulsar Plus

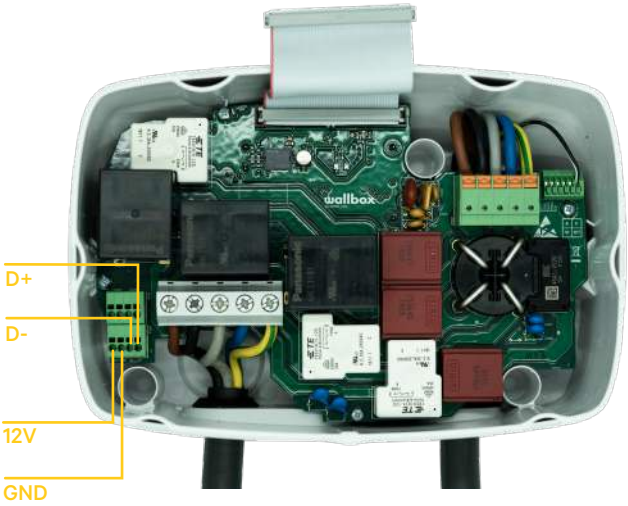



Fig. A2.6 Cabling Installation in a Wallbox Commander 2

# ANNEX A.3

In the cover of your Pulsar Plus remember to set the RS485 switch to “T”

Fig. A3.1 Setting the RS485 switch to “T”

In the cover of your Commander 2 remember to set the RS485 switch to “T”

Fig. A3.2 Setting the RS485 switch to “T”