GARO Compact/GARO Home installation and operation Version: 1.4

CONTENTS

0.1 DOCUMENT DESCRIPTION

This document describes installation and use of the GARO Compact and GARO Entity home product, which are members of the Entity family. Also, the Entity Balance Load Interface installation is described.

0.2 PRODUCT DESCRIPTION

This product is a GARO charging station for electrical vehicles.

0.2.1 FEATURE DESCRIPTION

Entity is a series of charging stations and load interfaces that can operate together. They are based on the versatile open protocol OCPP, that also makes it possible to integrate them in other systems as well as to include third party OCPP based charging stations in the same systems. GARO Entity Compact/Home is a wallbox that is easy to use, install, and enables advanced functionality. Configuration and operation are supported by the GARO Connect app, available for android and Apple devices.

0.2.2 DEFINITIONS

In the installation, setup and operation of the Entity charging stations, there are several terms and expressions that is important to understand. Read about the most common terms and expressions below.

Charger group: A charger group contains several charging stations at the same location. The charger group manages the access rights to the charging stations within the charger group.

Charging station: A charging station is used for charging EVs. The charging station is connected to a location and an owner. The charging station can be installed and monitored through the GARO Connect app and be part of a charger group.

Connection group: A group of charging station(s) and other devices that shares the same resource, such as a fuse. The connection group is set up to protect fuses from overload and is controlled by one device (either a charging station or a load interface) to act as a master device. Normally, the Connection group also defines how the internet is connected to the units, trough a master. For more information about connection groups, refer to 3.14.1 Dynamic Load Management (DLM) functionality, page 56.

DLM system: DLM stands for Dynamic Load Management and is a software-based solution that is meant to manage the loads of the system of several charging stations in an installation. DLM can be defined as the current limiting logic applied to a connection group.

EV: Electrical vehicle.

EV driver: An EV driver is a person that has access to the charging station(s). The EV driver can be part of an EV driver group and gain access to the charging station (s) with an RFID tag or an app. The EV driver can use the GARO Connect app to monitor charging of an EV.

EV driver group: An EV driver group is a group of EV drivers with the same access rights within the organization. The access rights are managed on an organizational level, which means that the EV driver group can be used at several locations within the organization.

GARO Connect app: The application from which it is possible to install, manage and operate Entity charging stations. For more information about the GARO Connect application, refer to 3.13 GARO Connect, page 33.

Installer: An installer is a certified installer or acts on behalf of a certified installer. The installer is hired by the owner to do the electrical steps of the installation of the charging station(s) and/or a load interface. The installer can see and change settings of the units in the location. The installer provided access to a location with the installation code, just like a key.. The installer can during the first setup act as a temporary owner to assist with the installation.

Load interface: The load interface connects a current metering device to the system. This is needed when a fuse is feeding not only charging stations and needs monitored/dynamic overload protection (DLM)

For more information about load interface, refer to 3.14.1 Dynamic Load Management (DLM) functionality, page 56.

Location: A location is a physical address of where one or several charging station(s) are installed. The location is connected to an owner and can tell EV drivers where it is possible to charge EVs. The location can contain several charging groups. All charging stations within a location normally uses the same grid connection point. A location can be transferred to another owner.

Organization: An organization contains one or several locations. The organization share the same owner(s) and it is possible to create groups of EV drivers to manage access to the charging stations.

Owner: An owner is a person who owns one or several charging stations. This person owns the location(s) and invites the installer to do the installation of the charging station(s). The owner can add other owners, manage access for EV drivers and EV driver groups, manage charger groups and create locations, organizations and EV driver groups. The owner can monitor and control status of the owned charging station(s).

PME: Protective Multiple Earthing. A mandatory safety function only applicable for the United Kingdom (UK).

Unit: A charging station or a load interface.

0.3 INTENDED USE

The product is intended for electrical vehicle charging in mode 3. Do not use the product for any other tasks.

NOTE

Follow local rules and restrictions regarding the product and installation.

1 SAFETY

1.1 SAFETY DEFINITIONS

WARNING

Risk of personal injury or death.

CAUTION

Risk of damage to the product or the adjacent area.

NOTE

Information that is necessary in a given situation.

1.2 SAFETY INSTRUCTIONS FOR INSTALLATION

WARNING

Read and understand the safety warnings below before installation of the product.

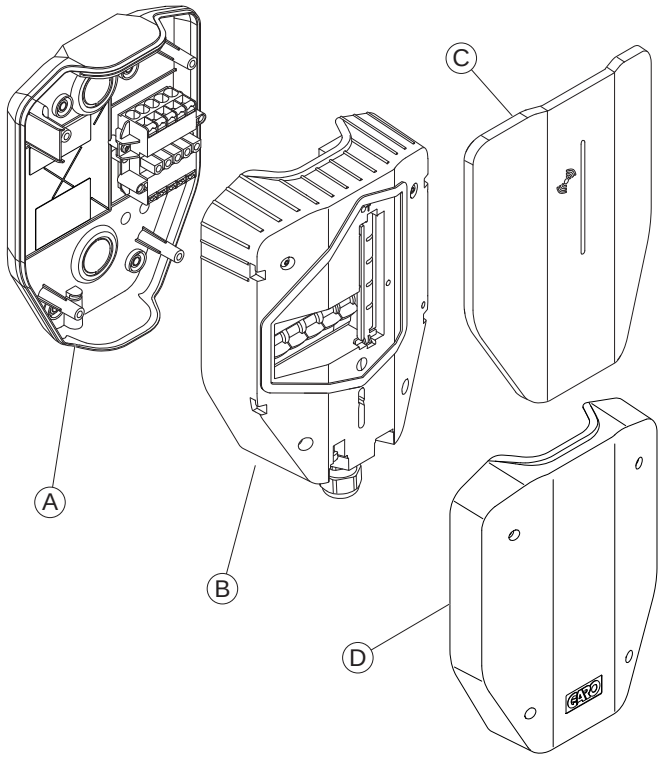
WARNING

Do not use a damaged charging station or a charging station that has a red blinking (slow 0,5 Hz) indication light. If a defect is found, speak to the owner of the charging station. The owner can be found in the GARO Connect app. Only use charging cables with no visible defects and intended for charging the relevant EV. Follow all instructions for the relevant EV.

- Do not remove the screws from the sealed assembly points on the rear side of the charging unit. Removed screws or broken sealing will void the warranty.
- All installation must be carried out by an authorized installer and comply with local country installation regulations. If any questions, please contact your local electrical authority.
- Refer to local standards and regulations not to exceed charging current limitations.
- Ventilation signal from EV is not supported. This means that test of "State D" is not possible.
- If adapter is to be used, make sure that:
  - The adapter is CE or UKCA marked.
  - The adapter is at least IP44 if it is used outdoors.
  - Example of an adapter is a cable type 2 to type 1 or a type 2 to outdoor consumer type outlet, like schuko, CEE or similar.
  - Cord extension set for charging cable is not allowed to be used.
  - Adapter may only be used with Entity Charging station variants with outlet, never on fixed cable variants.
- Cord extension sets for charging cable is not allowed to be used.
- Do not use private power generators as a power source for charging.
- Incorrect installation and testing of the charging station could potentially damage either the EV and/ or the charging station itself.
- Do not operate the charging station in temperatures outside its operating range. Refer to 7.1 Charging station technical data, page 77.
- Avoid high voltage insulation testing on connected charging stations. If insulation testing is necessary, first remove the charging unit from the installation bracket.
- If the charging station is set up without any internet connectivity, it will allow charging up to the maximum current defined for the charging unit. The maximum current can be up to 32 A. Default at delivery, the maximum setting is 16 A. This means that an unconfigured charging station will function without any internet connection, up to 16 A.
- Do not use the product if any parts are damaged.
- Do not connect an EV if the indication light is blinking slowly in red (0,5 Hz).

2 PRODUCT OVERVIEW

2.1 ENTITY COMPACT/HOME CHARGING STATION SYSTEM OVERVIEW



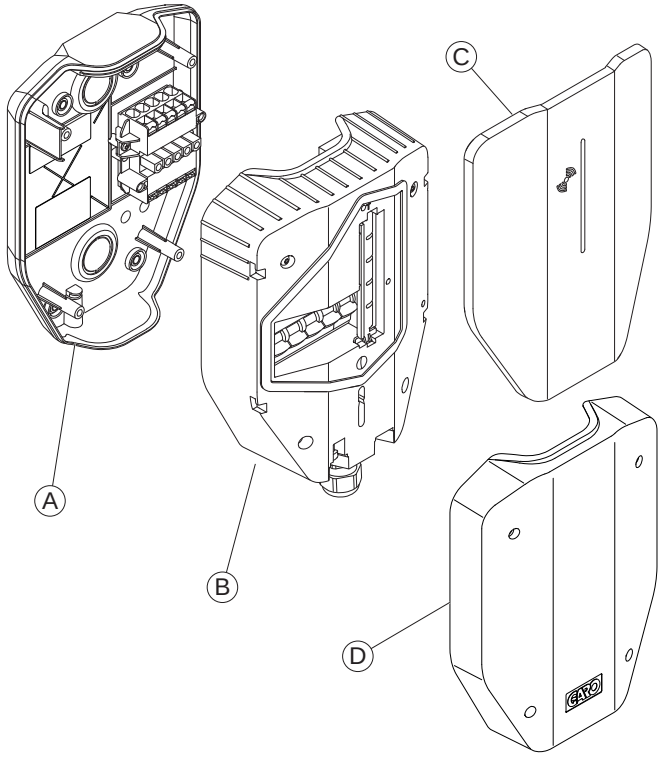
A. Installation bracket.

B. Charging unit.

C. Front cover.

D. Protection cover.

2.2 CHARGING STATION PACKAGING OVERVIEW



Charging station: A+B+C.

Installation bracket (ordered as separate article): A+D.

Charging station (CS)

A charging station is a complete kit, packed in a box. It contains all parts required for EV charging. The product is available in several versions.

Charging unit (CU)

The charging unit is the active part of the charging station. To be plugged into the installation bracket. The charging unit is available in several versions.

Front cover

Front cover for charging units. The front cover is available in several colors.

Installation bracket — single (IB)

The installation bracket is where the physical installation is done. It contains a permanent RFID tag with the identity of the physical charging station.

The protection cover covers the installation in the installation bracket. The protection cover is an accessory that is used for a prepared installation without an attached charging unit.

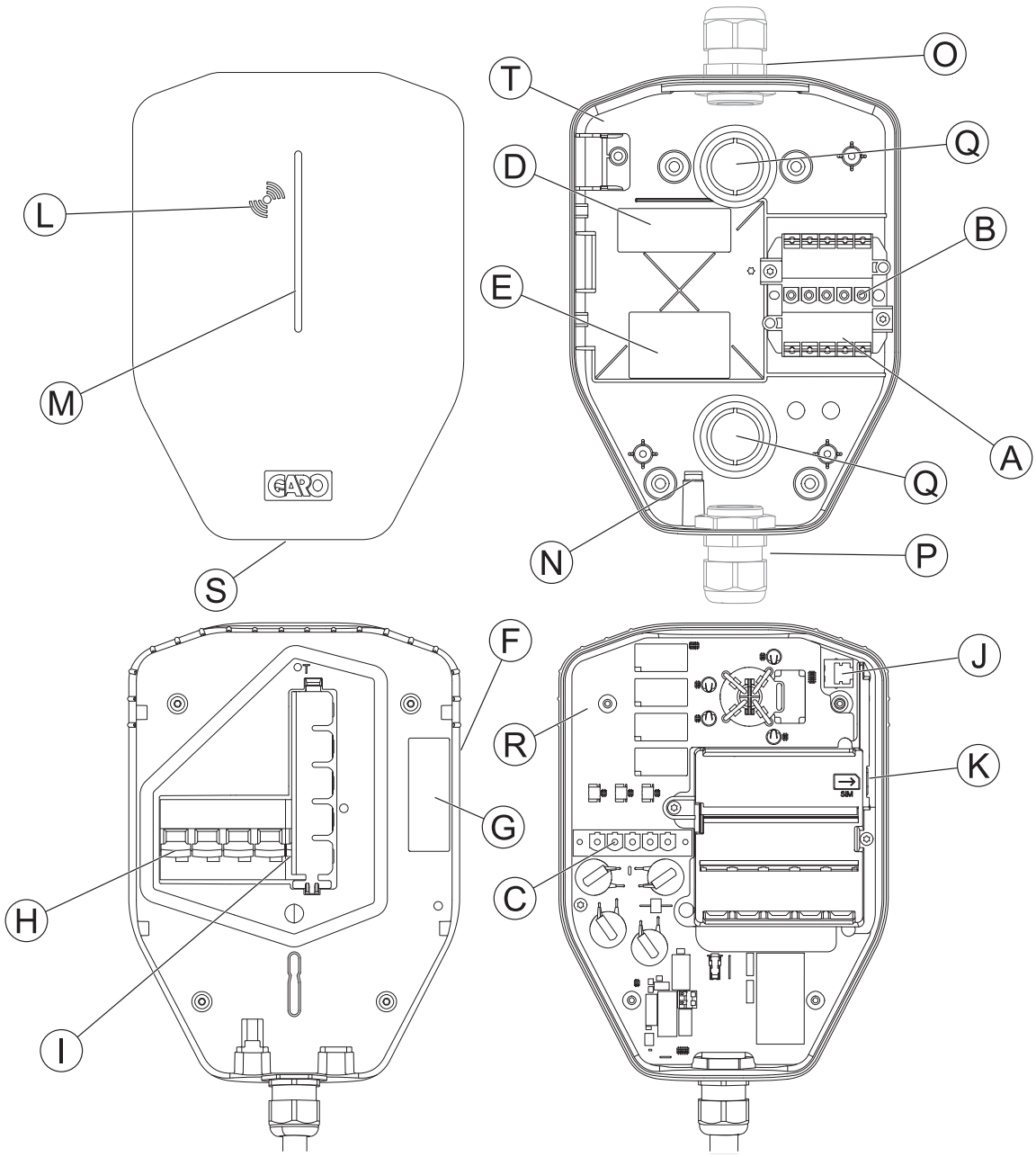
2.3 PRODUCT VARIANTS

The GARO Entity Compact and GARO Entity Home charging station (and separate charging unit) is based on the GARO Entity Compact and is available in several product variants.

The product concept can for special high volume orders be customized to with or without the features listed below:

- Long fixed cable (8 m) or normal fixed cable (5 m).
- 32 A or 20 A fixed cable.
- Three-phase or one-phase.
- With or without PME protection (UK only).

2.4 ENTITY COMPACT/HOME CHARGING STATION OVERVIEW



A. Power connection terminal (in and out).

B. Bracket terminal connector.

C. CU connector.

D. IB ID label.

E. IB/CS type label.

F. CU type label.

G. CU ID label.

H. All-pole circuit breaker, manual reset.

I. PE disconnection relay (PME protection variant only) (for UK only).

J. Ethernet port RJ-45.

K. SIM card slot (size 3 FF/Micro) (Only for Entity Compact).

L. RFID reader area.

M. Indication light.

N. Ethernet cable inlet.

O. Upper cabe inlet position (knockout M32 for grommet).

P. Lower cable inlet position (knockout M32 for grommet).

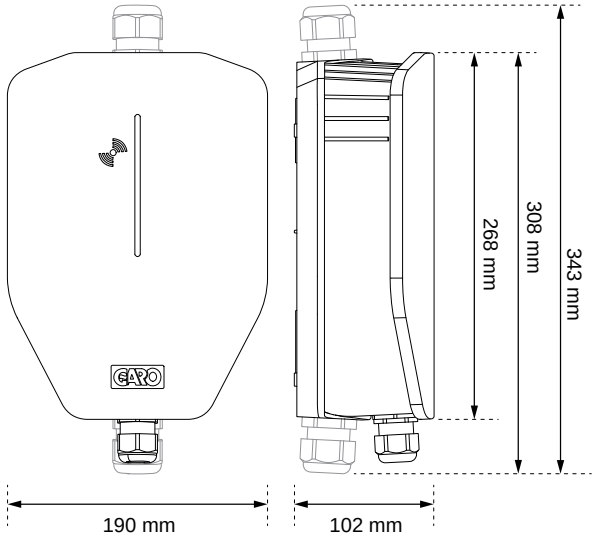
Q. Rear knock-outs (2x) for cable inlet.

R. Sealing label.

S. Front cover lock screw (Torx 20).

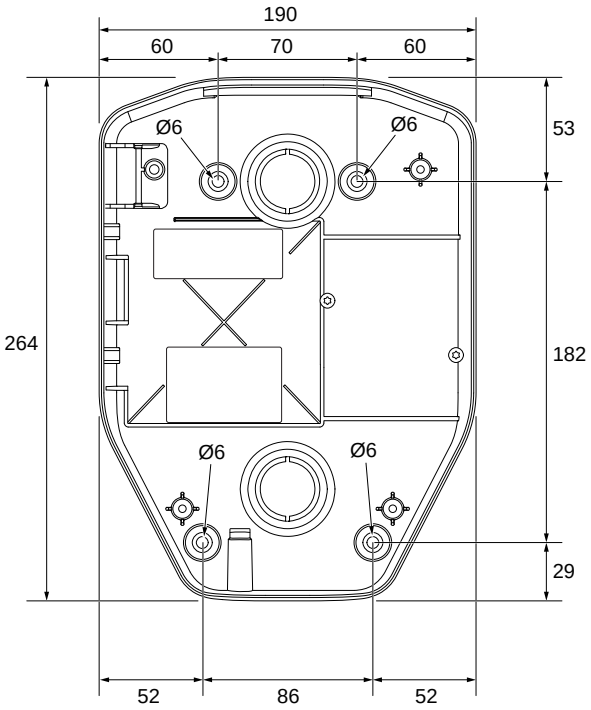
T. RFID for IB ID.

2.5 DIMENSIONS

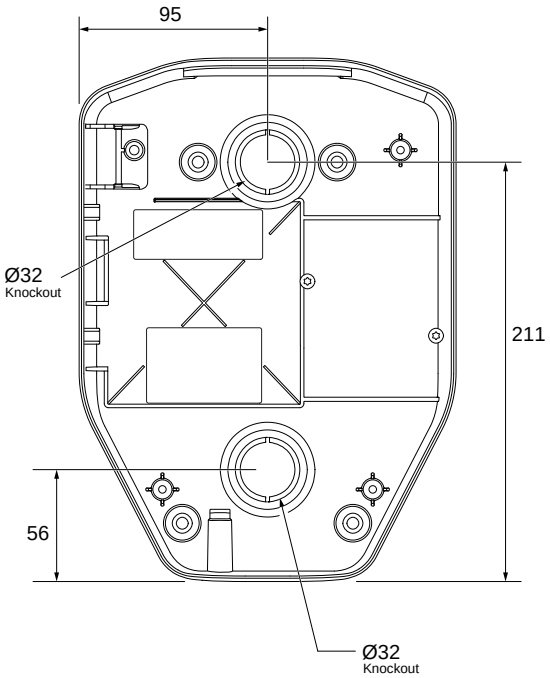


2.5.1 INSTALLATION BRACKET (IB)

Bracket (same for Entity Compact and Entity Home) and hole dimensions:



Bracket and knockout dimensions:



3 INSTALLATION

3.1 TO DO BEFORE INSTALLATION

- Make sure that the correct training is provided to do the installation.

3.2 PERSONNEL REQUIREMENTS

- To safely and correctly install the charging station, only a certified installer or somebody who acts on behalf of a certified installer may perform the installation. Comply with local requirements.
- Only a technically skilled person with the necessary knowledge of the GARO Entity charging station may replace the charging unit.

3.3 PERSONAL PROTECTIVE EQUIPMENT

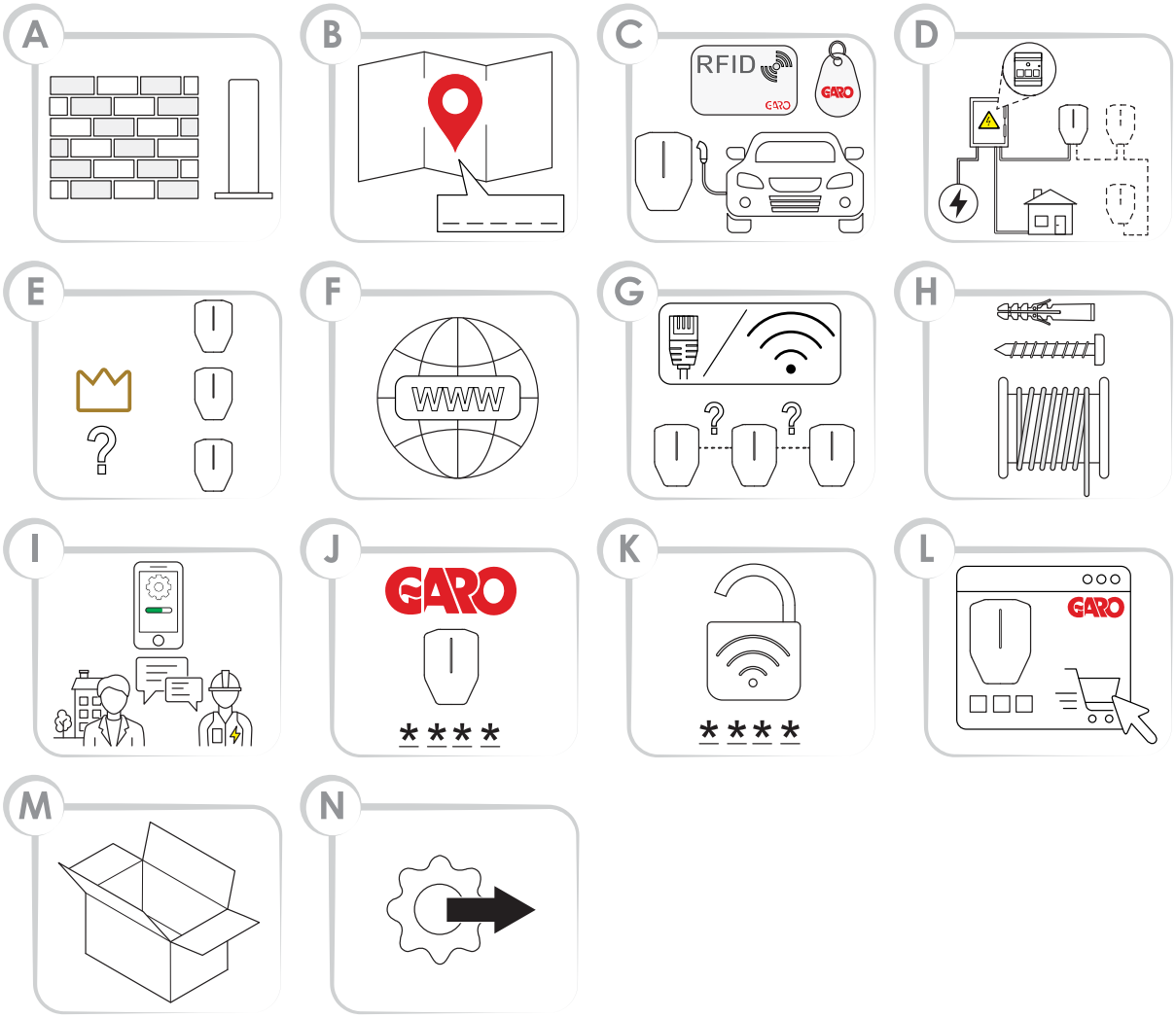
WARNING

Make sure that the correct personal protective equipment for the installation is available. Adapt the personal protective equipment to suit the installation location. Comply with local requirements. Note that more personal protective equipment can be necessary.

- Protective shoes for electricians.
- Protective gloves.
- Protective goggles.
- Protective helmet.
- Hearing protection.
- High visibility clothing.

3.4 TO DO A PLAN FOR THE INSTALLATION

- Prepare the installation location according to the steps that are shown in the illustration.



A. Decide where to put the charging station(s). Make sure that the location is suitable due to weather conditions and preparation for future expansion.

NOTE

Charging station(s) can be attached to a wall, a stand or a pole. Installation accessories are available at GARO.

B. Decide on how to define the location and naming of the charging station(s).

C. Decide on access control for EV drivers. It is possible to control access with the GARO Connect app or RFID tags where controlled authorization is necessary. Those can also be combined in a schedule.

NOTE

RFID tags are available as accessories at GARO.

D. Order the required products, accessories and other material.

E. Plan the power supply and current availability on all levels of the installation. Plan for the DLM (dynamic load management) system setup. Refer to 3.14.1 Dynamic Load Management (DLM) functionality, page 56 .

F. If several charging stations are used, decide which unit (charging station or load interface) that should act as master unit(s). This can be affected by a DLM setup.

G. Decide the internet connection type for the master unit in the connection group (the charging station or a load interface unit(s) managing this role).

H. Decide the connection type between all charging stations, if applicable. If large connection groups are needed for DLM the connection structure needs to be divided into a group structure, with max. 32 units in each group preferably following the DLM structure, and when a mesh Wifi grid is required to be set up.

I. Make sure that the necessary tools and testing instruments for installation are available. Make sure that the correct installation material is available.

J. Decide if the installer or owner should prepare the installation in the GARO Connect app. Refer to 3.13 GARO Connect, page 33.

K. If the owner prepares the installation, use the GARO Connect app to generate the installation code. The owner normally provides the installation code to the installer. However, the first installation can be made by the installer and handed over to the owner.

L. Prepare the Wi-Fi credentials (SSID and password), if Wi-Fi is used for internet connection. The owner of the local Wi-Fi then needs to provide the Wi-Fi credentials to the installer.

M. Unpack the packages from GARO. Inspect the product(s) and accessories while unpacking to make sure that no damage has occurred during transport. Also, make sure that all the necessary product(s) and accessories are available, before the installation is started.

N. Start the physical installation.

3.5 TO GENERATE THE INSTALLATION CODE

An installation code is used as a key for the installer to the location. It is created and used in the GARO Connect app. An installation code must be provided to the installer for correct installation of the charging station. The installation code is owned and generated by the owner. An installation code provides access to a location.

NOTE

A new installation can also be started by the installer that acts as an intermediate owner, which means that the installer hands over the ownership after installation is completed. After such transfer of location, the installer keeps access to the location.

NOTE

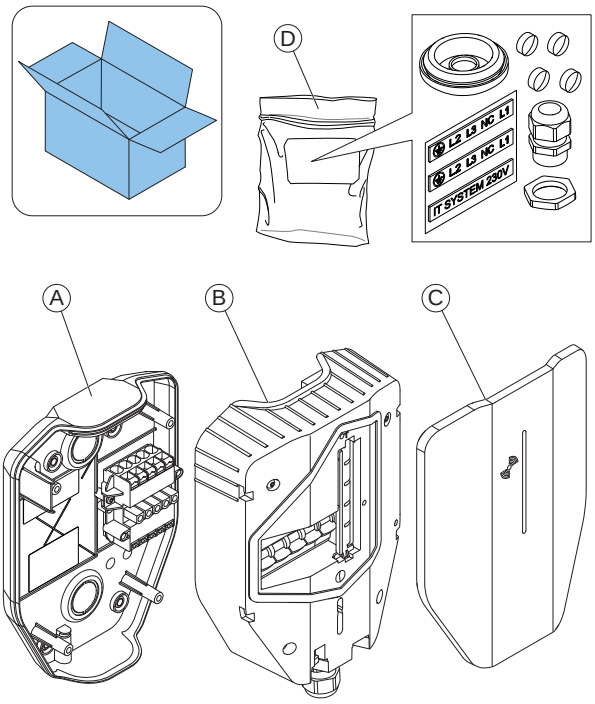
If the installer no longer shall have access to the location, generate a new installation code.

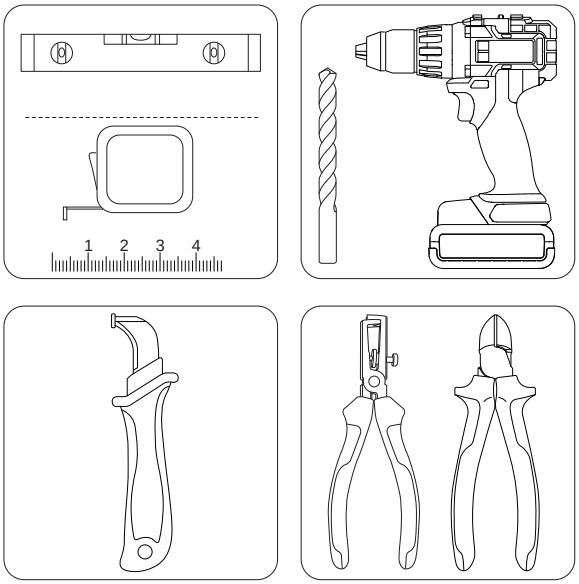
NOTE

There can only be one installation code for each location. However, an installation code can be used by several installers but only 1 installer shall be formally responsible for the installation work. Refer to To prepare the installation (owner), page 39.

3.6 TO DO A CHECK OF THE DELIVERY

- Make sure that the delivery is complete and correct.



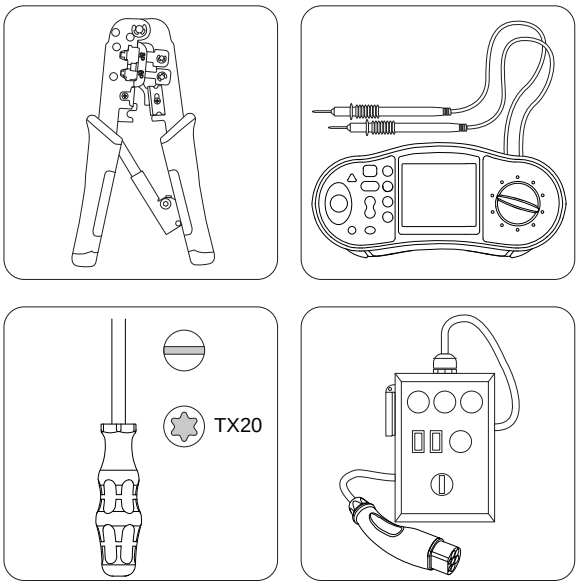


A. Installation bracket

B. Charging unit

C. Protection cover

D. Bag with 1 cable gland, 1 cable grommet, 4 screw covers and 2 stickers (for the IT 230 V system)

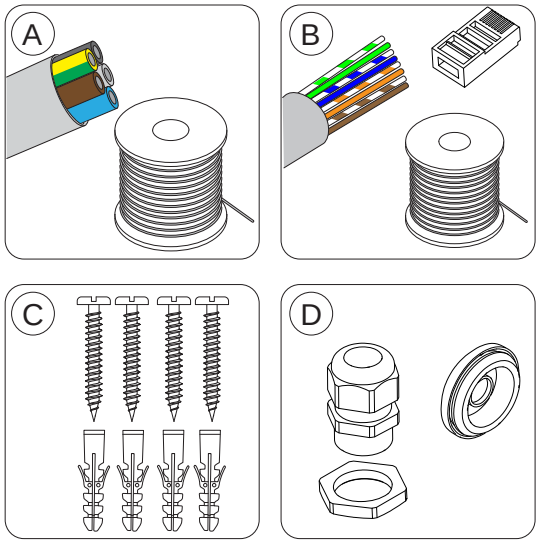


3.7 TO ENSURE THE NECESSARY TOOLS

- Make sure that the necessary tools for the installation are available.

3.8 TO ENSURE THE NECESSARY INSTALLATION MATERIAL

- Make sure that the necessary installation materials are available.



A. Power cable.

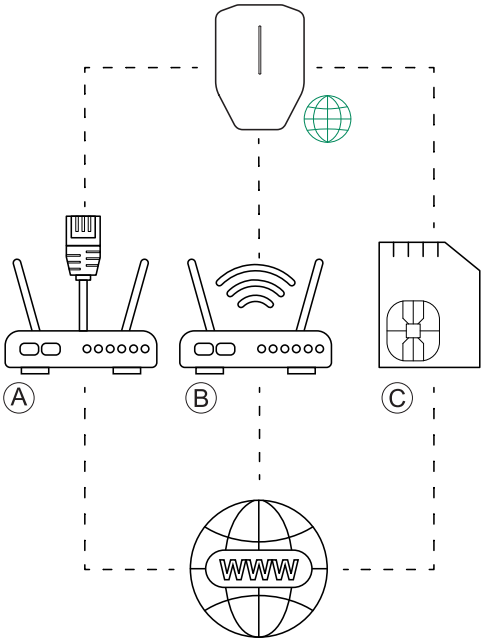
B. Ethernet cable with suitable RJ45 plug, if ethernet is used.

C. Screws and plugs that are suitable for the wall material, at a maximum diameter of 6 mm and a maximum screw head diameter of 14 mm.

D. Cable grommets (M32) that is suitable for the entry point of the power cable. The product is delivered with a cable grommet (M32). For cables that enter from the top or bottom of the charging station, use a IP54 cable grommet with an integrated cable strain relief function as a minimum requirement. If mounted at the back, use the grommet.

3.9 TO DECIDE INTERNET CONNECTION TYPE

1. Decide what internet connection should be used for the installation. There are 3 types of internet connections that are possible to use for operation.



   a. Ethernet cable from a router/switch.

   b. Local Wi-Fi connection from the building where the installation is set up.

NOTE

Only use 2,4 GHz when connecting. 5GHz cannot be used.

   c. Built-in communication modem with SIM card (Only applicable for the Entity Compact).

NOTE

The listed order is also the automatic priority order for connection types.

2. If several charging stations are interconnected to form a connection group, internet should be connected to the connection master (acting internet connection point).

3.10 TO CONNECT SEVERAL CHARGING STATIONS

NOTE

Several charging stations can be connected as one cable multidrop/daisy chaining. Maximal prefuse is 80A type C.

If DLM is used, all charging stations must be on the same LAN/IP-network.

3.10.1 BEFORE SETUP

Before choosing the connection type between several charging stations, first choose the internet connection type for the communication master unit.

After selecting internet connectivity, it is time to plan for the inter-connectivity. There are 3 connection types available: 1) ethernet cable, 2) Wi-Fi (through the LAN of a building) or 3) mesh Wi-Fi.

All units are connected through a group structure of connection groups for communication. In most cases, those groups can follow the group structure of the DLM power distribution. The exceptions are mainly large groups on same DLM level (>32 units) or when inter communication is changed to start a mesh Wi-Fi group.

NOTE

A connection group, setup by assigning a communication master role to a unit, is limited to max. 32 units. If more units need to be used in the system, then subgroups need to be introduced.

A unit acting as master for a subconnection group must be connected via an ethernet cable or Wi-Fi to the LAN.

A meshed Wi-Fi group must be "started" by a unit acting as communication master.

Several mesh Wi-Fi groups can be set up, but only in parallell, not as a “meshgroup” of a meshgroup.

A mesh network is dynamically optimizing the connection paths used. All units in the meshgroup are acting as a repeater, but always just "mesh in- mesh out". So mesh is a good alternative "far out" in a network when cable cannot be used.

External IT-infrastructure is usually required to build large installations. As long as the same LAN (VLAN) is used, it is recommended to use cable-based internet through a router, or if not possible, a mobile communication-based router.

The external IT-network is built up of switches, preferably forming star-connected networks. GARO Entity Compact has only 1 ethernet RJ-45 port.

The mesh Wi-Fi system contributes to an easy installation. However, large distances or radio obstacles may require physical ethernet cable connections. Cable connection is always a good recommendation.

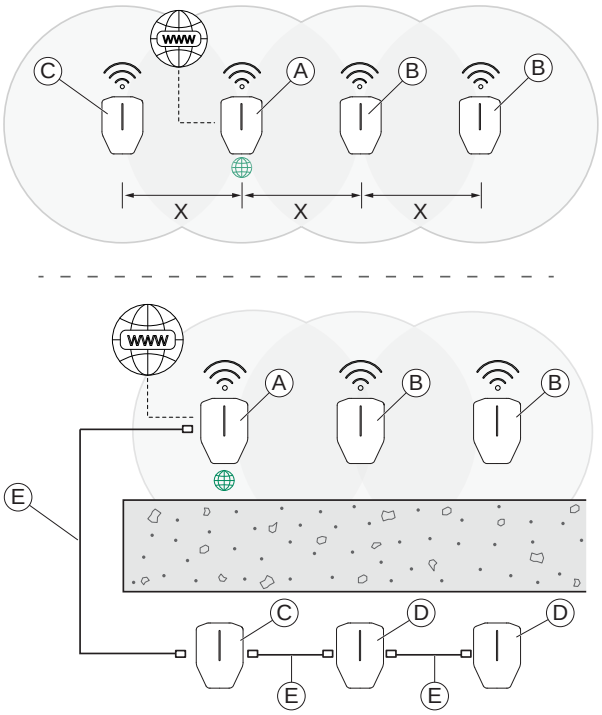
Units can also be inter-connected through an existing Wi-Fi. However, this requires that the Wi-Fi is a part of the same LAN that the other units are connected to. One example is when a "radiojump" is required, longer than a normal Wi-Fi range, then any external point-to-point ethernet extender can be used. The use of a Wi-Fi makes the installation and the replacement of a charging unit more complex. A non-master unit can never just be "plug and play" replaced if a Wi-Fi is used as connection type.

NOTE

A system of charging stations is always highly dependent on both internet connectivity and a robust inter-communication based on traditional LAN-technology.

3.10.2 SIMPLE SETUP SCENARIOS

The connection type between the connection master charging station (A) and the other charging stations (B, C, D) in the same installation depends on distance and radio obstacles. The following scenarios are some common setups with several charging stations.



Scenario 1: If the distance (X) between the charging stations is short and there are no radio obstacles, it is possible to use a Wi-Fi mesh connection between the connection master charging station (A), and the other charging stations (B and C). However, it is always preferable to use an ethernet cable.

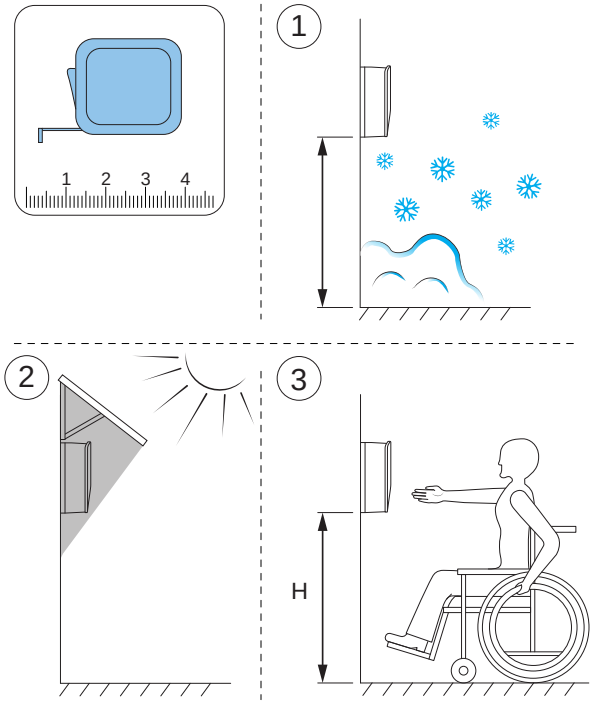
Scenario 2: If the distance between the master charging station (A) and the charging stations (C) are long or there are thick walls or other radio obstacles, an ethernet cable or other external LAN infrastructure (E) must be used. If there are several charging stations (D) behind the obstacle, they can all be connected to a chained connection from a charging station (C) with an ethernet cable as long as each cable distance is not too long (recommended maximum 100 m).

3.11 TO DECIDE THE POSITION OF THE CHARGING STATION

1. Install the charging station at applicable height. Avoid installation in direct sunlight and do not install the charging station on a hot surface. Make sure that the position of the charging station is approved from an accessibility perspective. Comply with local requirements.

NOTE

According to standard EN61851-1 11.7, the height from the ground (H in picture below) should be within the range of 0.5 m-1.5 m. Avoid installing the charging station where snow can block access to the charging station.



2. GARO Entity PRO is available with Type 2 Outlet or Type 2 fixed cable. Fixed cable is convenient and easy to use, but can be damaged in public use. Evaluate what is best in the application.
3. Make sure that the position of the charging station is approved from an accessibility perspective. Comply with local requirements.

3.12 CABLE INSTALLATION

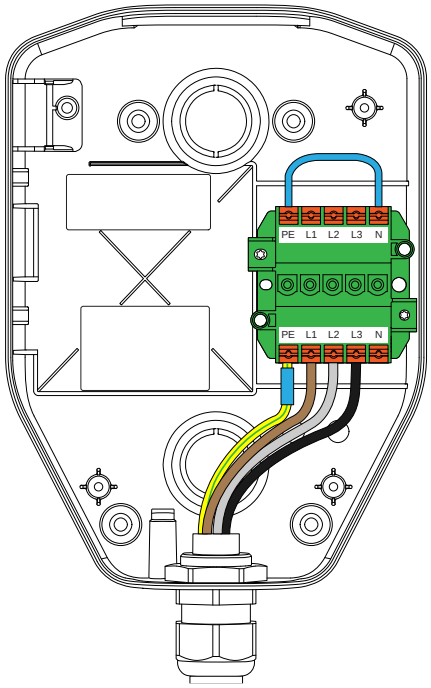
The GARO Entity is designed to work with both 400 V TN-S (default) and 230 V IT/TT.

If a 230 V IT system is to be used, the marking of the installation bracket should be updated, using the supplied marking stickers.

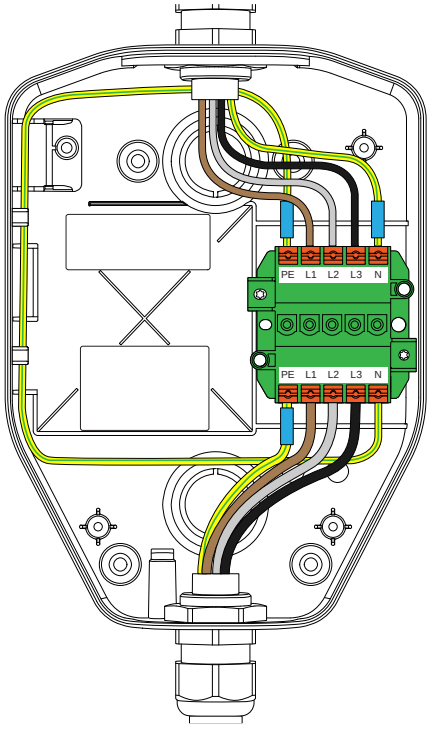
Once connected, the charging station will detect what voltage system is uses. The only setting required is phase connections. Refer to .

As retro-fit, a charging station (CS) may need to be installed to a 400 V TN-C. However, TN-C is not recommended and requires that the PEN conductor area is considered. If TN-C is required, see some recommendations below.

- Case 1: Use one side of the installation terminal to "create" the N, bridge N and PE. Connect PEN to the PE terminal.



- Case 2: In a daisy-chain connection it is recommended to use green/yellow tape, blue tape and connect the PEN according to picture.



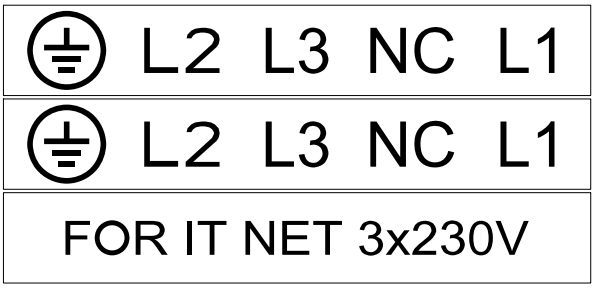
As alternative, a separate PEN terminal block with 3 terminals, to be used for with "creation" of a neutral conductor, can be used.

3.12.1 TO INSTALL THE STICKERS FOR IT 230 V

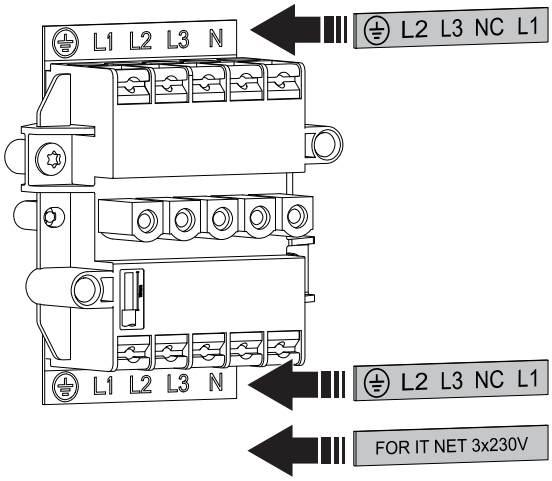
NOTE

This instruction is only valid for IT 230 V systems.

1. Locate the stickers on the installation bracket.

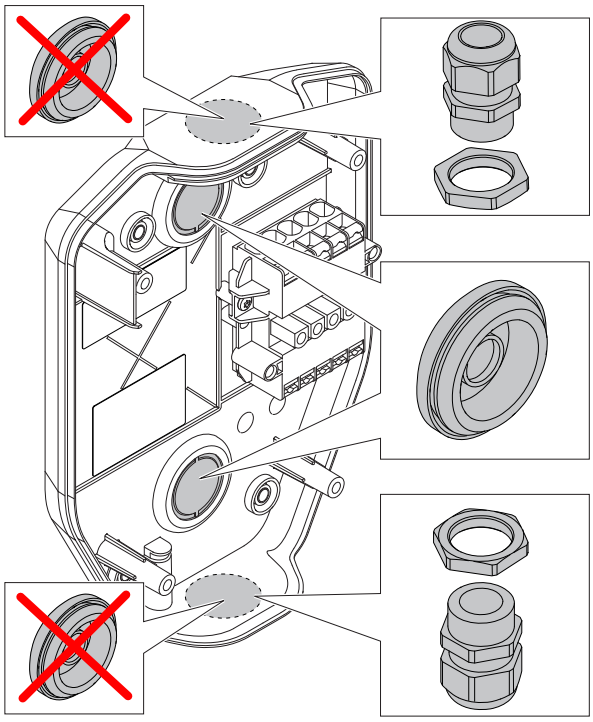


2. Install the new stickers supplied with the installation bracket. Install the new stickers onto the old stickers. Also, attach the "FOR IT NET 3x230V" label on the bracket.



3.12.2 TO PREPARE THE INSTALLATION BRACKET FOR THE CABLE INSTALLATION

1. Decide the inlet points for the power cable.



   a. Remove the knock-out from the inlet hole of the power cable.

   b. If there are several charging stations to be daisy-chained with the same feeding cable, also remove the knock-out for the outlet hole of the second power cable.

   c. Insert a suitable cable gland/grommet in the knock-out hole.

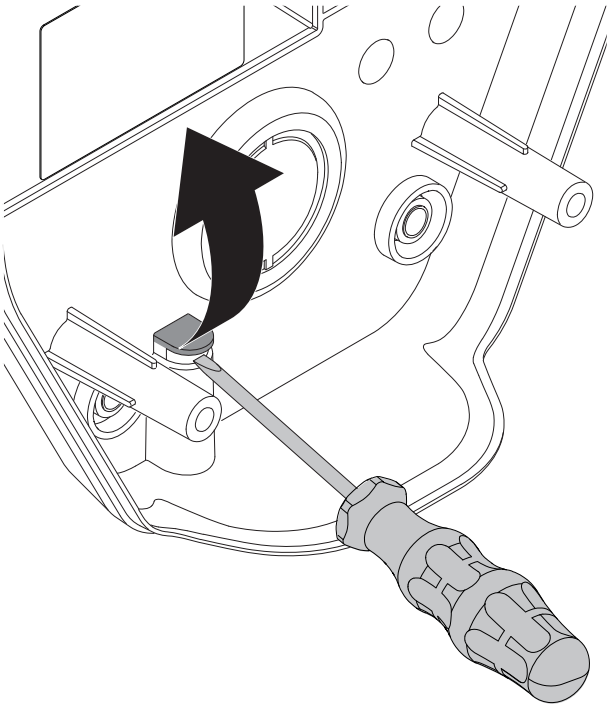
2. If the connection to internet, or other charging station, is decided to be via an ethernet cable, prepare the inlet of the ethernet cable(s).

NOTE

If the top cable entry positions are used, they must be firmly sealed with approved IP54 cable gland. The cable gland must also secure cable force strain relief. The rear positions are preferably sealed using "skin type" cable grommets.

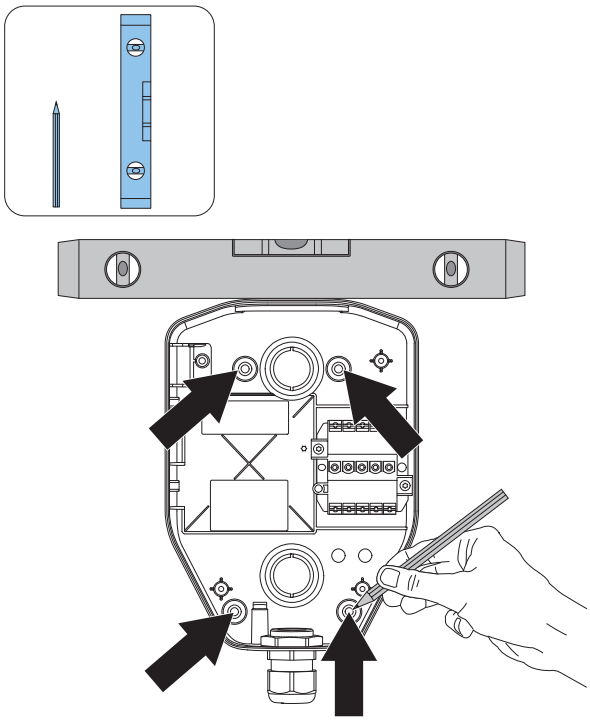
NOTE

It is possible to install the ethernet cable in several ways, but there are dedicated break-outs for the ethernet cable in the installation bracket. Maximum cable diameter for the break-out is 8 mm.To seal the hole, either use a non-silicone material or simply put a piece of tape on the cable to achieve a firm fit. A cable-tie can be used for strain relief.

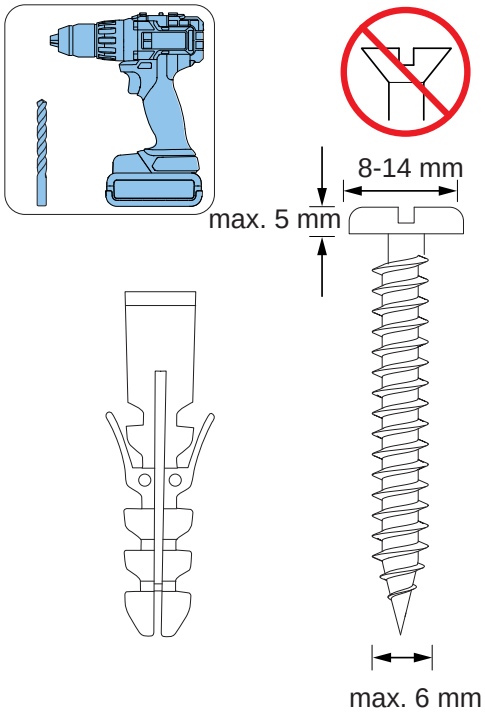


3.12.3 TO INSTALL THE INSTALLATION BRACKET TO A WALL

1. Decide the position of the charging station. Refer to 3.4 To do a plan for the installation, page 13.
2. Hold the installation bracket as a template against the wall.

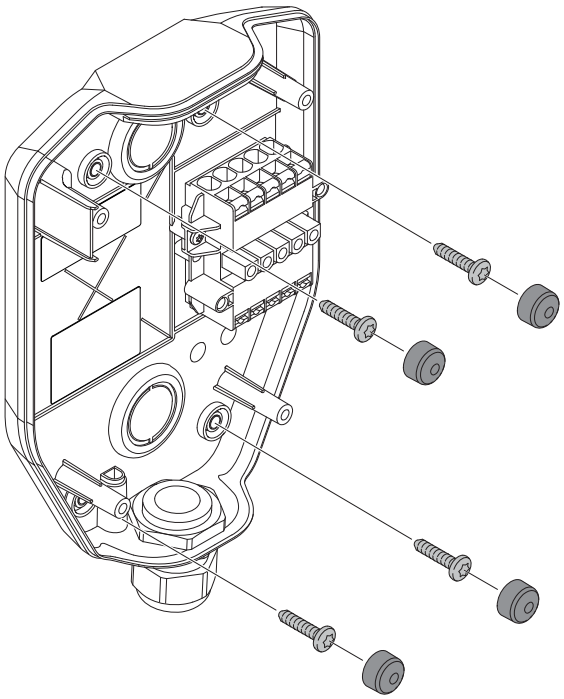


3. Use a spirit level to make sure that the installation bracket is straight.
4. Use a pen to mark the drill holes on the wall, if needed.
5. Choose appropriate screws for the wall material. If it is necessary, also choose appropriate plugs and drill for the wall material.



6. Drill the holes and attach the plugs if it is necessary.

7. Attach the installation bracket to the wall with the screws.



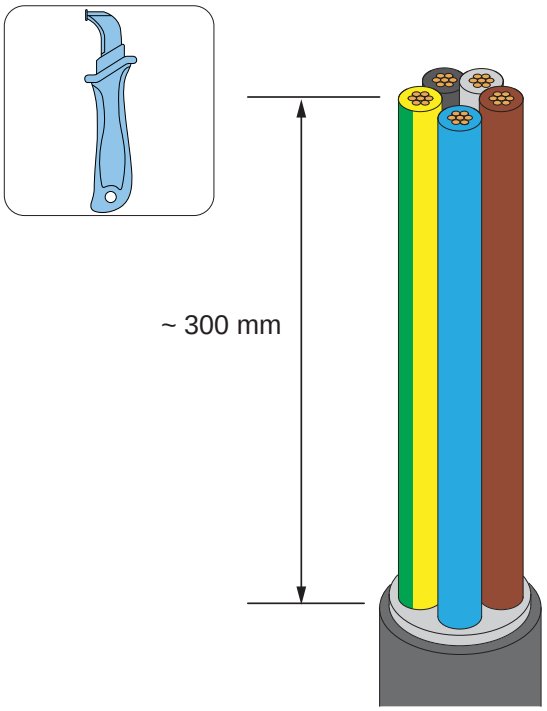
8. Attach the screw covers to the screws.

NOTE

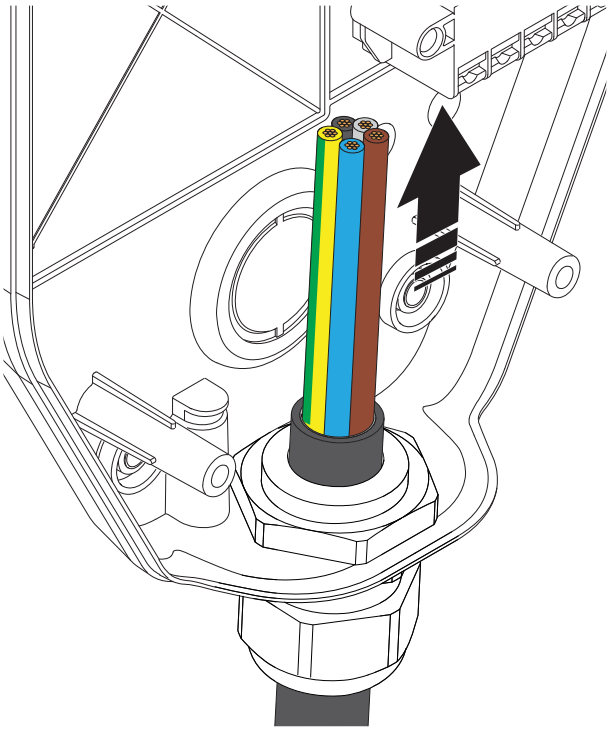
Ground stands and polemont fixtures are available as accessories. The workflow is similar. See separate manuals for those accessories.

3.12.4 TO PREPARE THE POWER CABLE FOR INSTALLATION

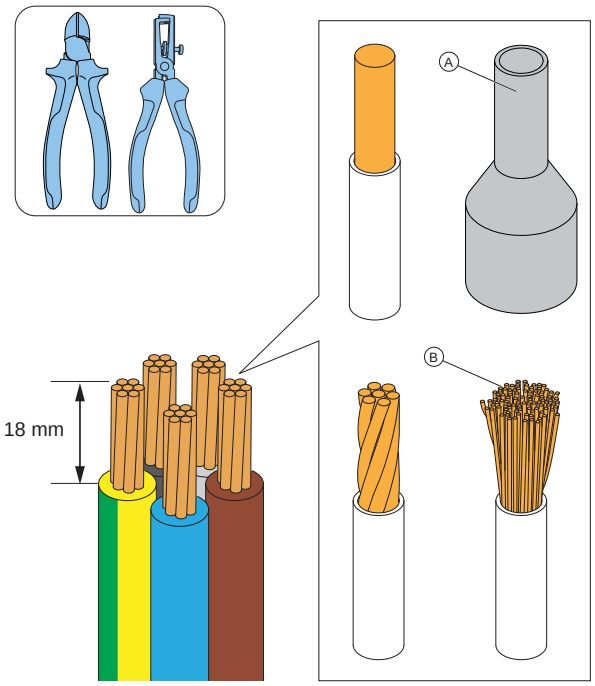
1. Dismantle approximately 300 mm of the power cable.

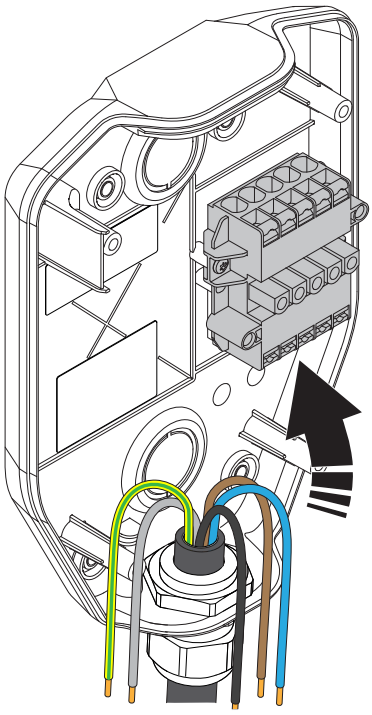


2. Thread the power cable through the gland/ grommet in the power cable inlet hole. (In this example the bottom hole is used).



3. Tighten the cable grommet.
4. Cut the wires to the exact length for the installation.
5. Dismantle the wires. Use a wire ferrule (A) for strained power wire conductors (B).





CAUTION

Make sure that the protective earth wire is a little bit longer than the other wires.

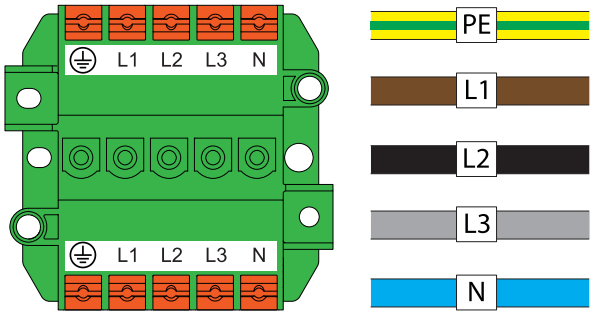
3.12.5 TO CONNECT THE POWER CABLE TO THE TERMINAL

Electric vehicles charge on three, (two) or one phases. Phase loads must be addressed, especially when installing several charging stations in a location. GARO Entity Compact acting in DLM will, in case of limitations, switch to one phase charging, using the phase connected to terminal L1. (If current capacity is available on this phase).

It is highly recommended to rotate phases one step for each charging station. The rotation must also be configured in the GARO connect app to reflect exactly how each charging station is connected to the grid.

1. Mount the wires of the power cable according to power system.

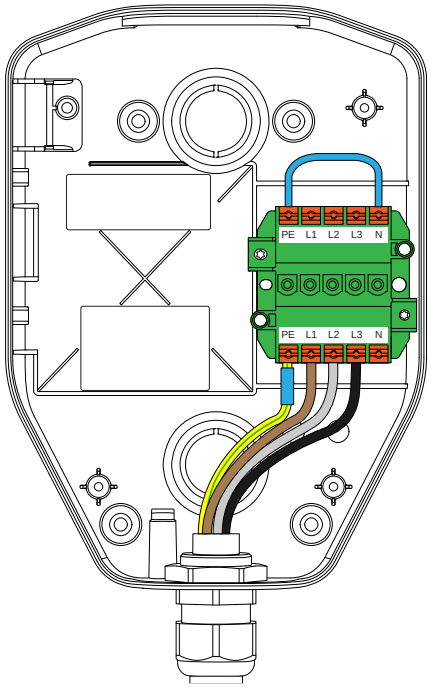
a. TN-S

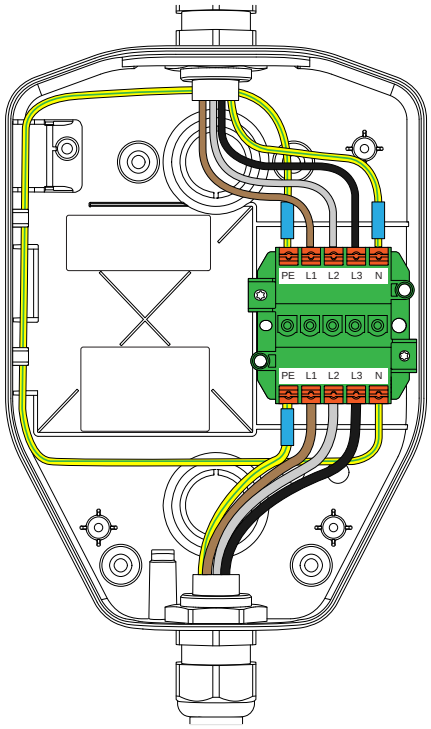


TN400 V

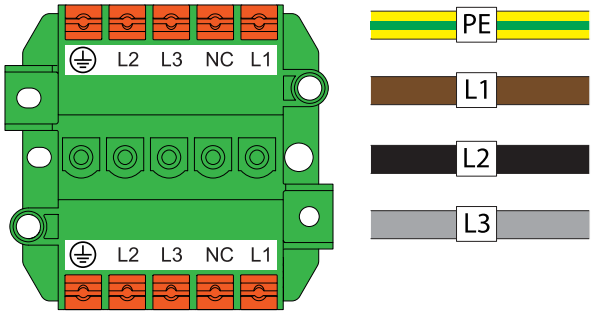
PE	L1	L2	L3	N	Description
PE	L1			N	TN 1x230V L1
PE	L2			N	TN 1x230V L2
PE	L3			N	TN 1x230V L3
PE	L1	L2		N	TN 2x230V L1 - L2
PE	L2	L3		N	TN 2x230V L2 - L3
PE	L3	L1		N	TN 2x230V L3 - L1
PE	L1	L2	L3	N	TN 3x400V
PE	L2	L3	L1	N	TN 3x400V rotated + 120 deg
PE	L3	L1	L2	N	TN 3x400V rotated + 240 deg

b. TN-C





c. IT 230V system (mainly used in Norway).



IT230 V

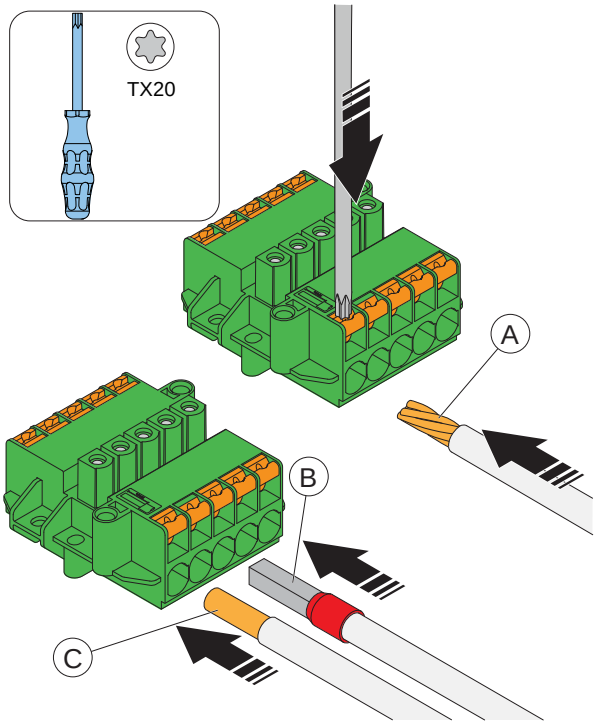
PE	L2	L3	NC	L1	Description
PE	L2			L1	IT 2x230V L1-L2
PE	L3			L2	IT 2x230V L2-L3
PE	L1			L3	IT 2x230V L3-L1

PE	L2	L3		L1	IT 3x230V
PE	L3	L1		L2	IT 3x230V rotated +120 deg
PE	L1	L2		L3	IT 3x230V rotated +240 deg

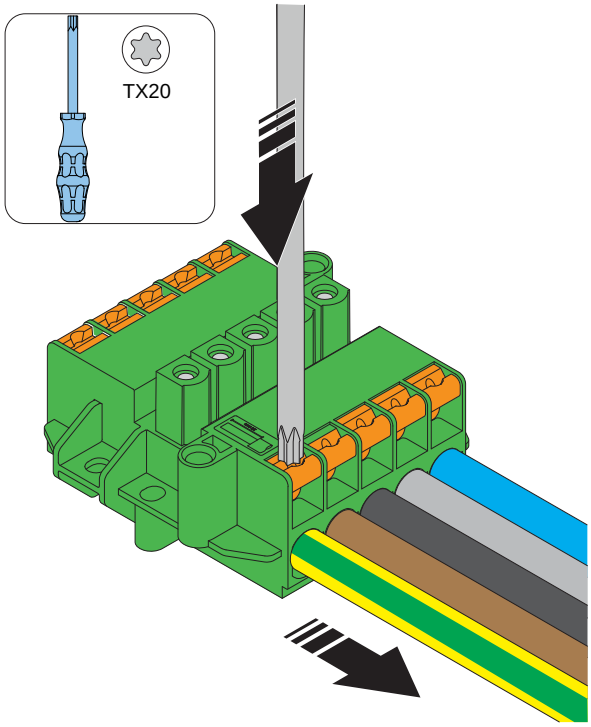
2. Install the wires to the terminal block.

   a. If the wires have strained conductors (A), use a TX20 screwdriver and push the orange button to open the terminal.

   b. If the wires have cable ferrules (B) or solid conductors (C), push the wires into the terminal.



3. To remove any wire, push a TX20 screwdriver on the terminal and pull the wire out.



3.12.6 TO INSTALL A SECOND POWER CABLE (DAISY-CHAINING METHOD)

If several charging stations are fed by the same power cable in a daisy chain, a second power cable can also be connected to the terminal.

1. Dismantle the second power cable for installation.
2. Install the wires of the second power cable to the terminal.

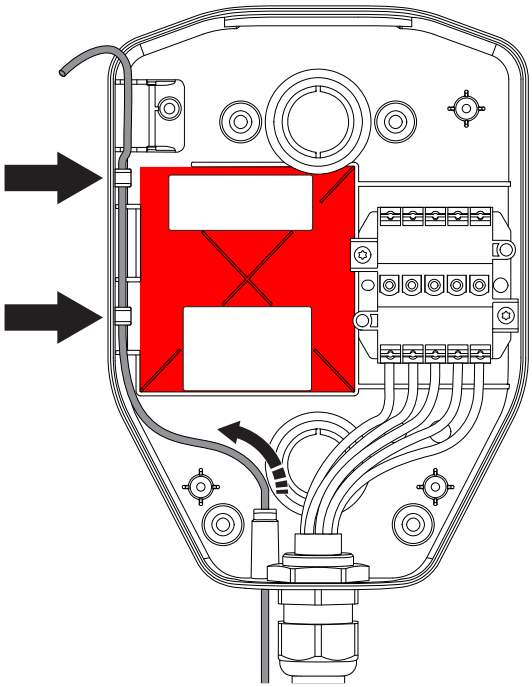
3.12.7 TO PREPARE THE INSTALLATION BRACKET WITH AN ETHERNET CABLE

NOTE

It is recommended to use a highly flexible cable inside the charging station

If ethernet should be used, the installation bracket must be prepared with the ethernet cable.

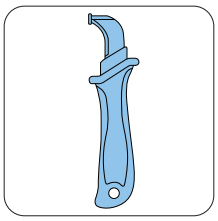
1. Thread the ethernet cable, through the installation bracket.

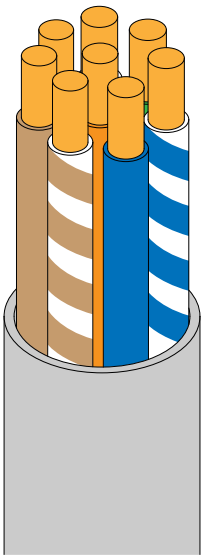


NOTE

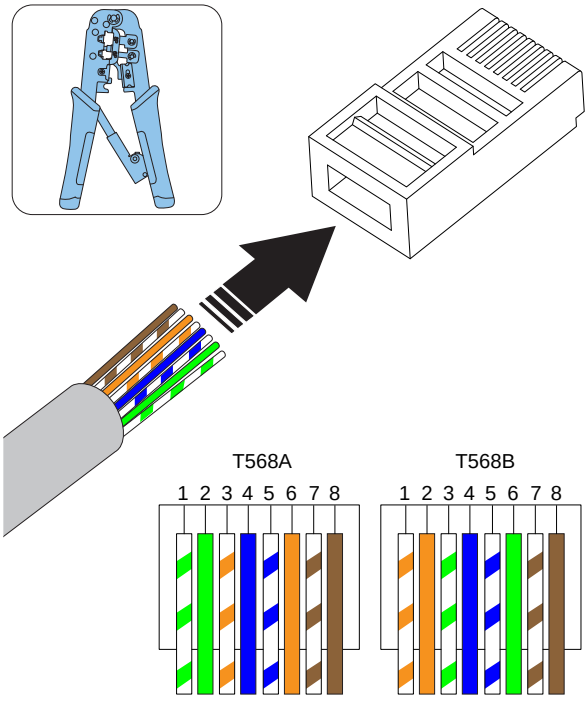
The recommended length for the ethernet cable inside the installation bracket is 400 mm. Since the marked "no Connection"-area cannot be used for cabling, the special marked sidepath must be used to pass the cable from the lower to the upper part of the installation bracket.

2. Secure the ethernet cable(s) from pull-out forces, for example with a cable strap.
3. Dismantle the ethernet cable.





4. Put a piece of tape on the cable to increase the cable diameter and to tighten/seal the hole in the installation bracket.
5. Install the ethernet cable to a RJ45 plug.



NOTE

Both shielded or unshielded ethernet cables are possible to use, depending on installation conditions. Make sure that any shielded detail is isolated inside the charging station. Shielded parts or wires must be installed so they can not reach any high voltage part of the charging station

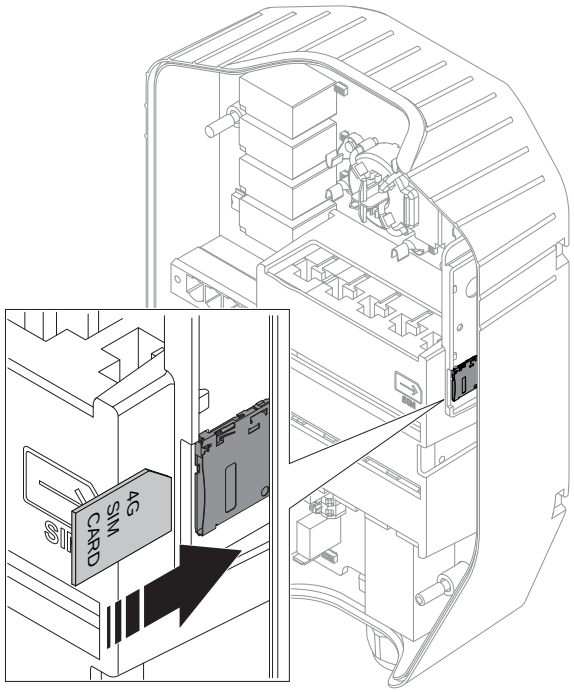
3.12.8 TO CONNECT THE CHARGING STATION TO THE INTERNET WITH A COMMUNICATION MODEM

NOTE

SIM card is only applicable for the Entity Compact.

Connection to the internet with the built-in modem requires a SIM card (SIM card size: 3 FF = Micro = 15x25 mm).

1. Turn the charging unit rear side up.
2. Install the SIM card to the dedicated slot in the charging station.



NOTE

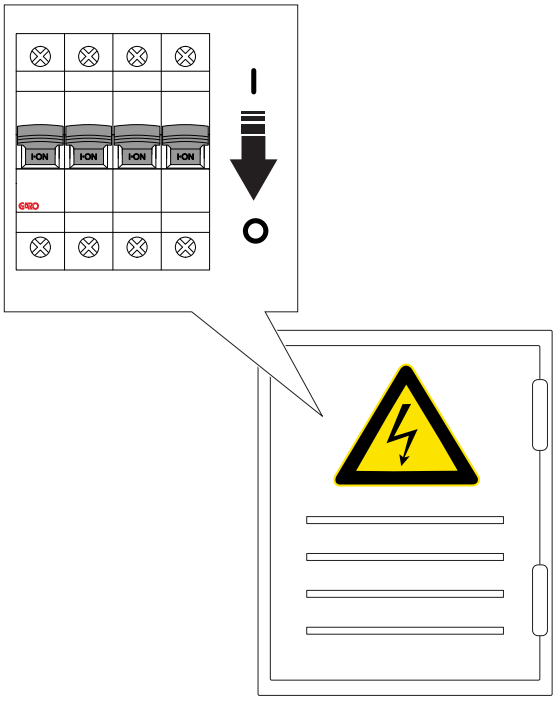
Some charging units are supplied with a SIM card (standard) attached.

3.12.9 TO DO A TEST OF THE POWER CONNECTION

WARNING

Electrical power can cause serious personal injury or death.

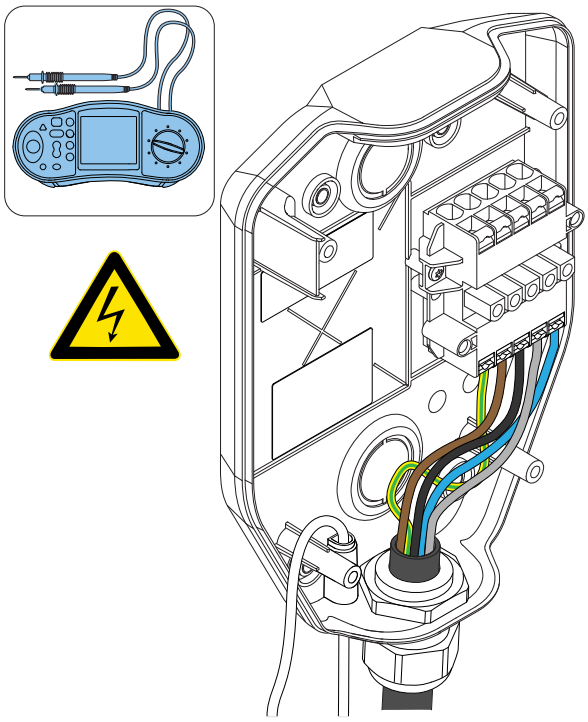
1. Make sure that the power/voltage is off.



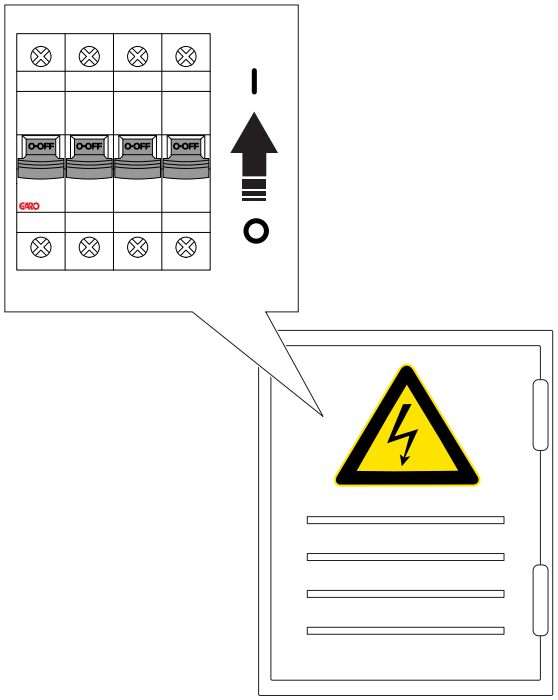
2. Do a visual inspection and make sure that nobody accidentally can access the installation bracket(s). Make sure that it is safe to apply power/voltage to all parts of the installation.
3. Do a test of the PE continuity.

CAUTION

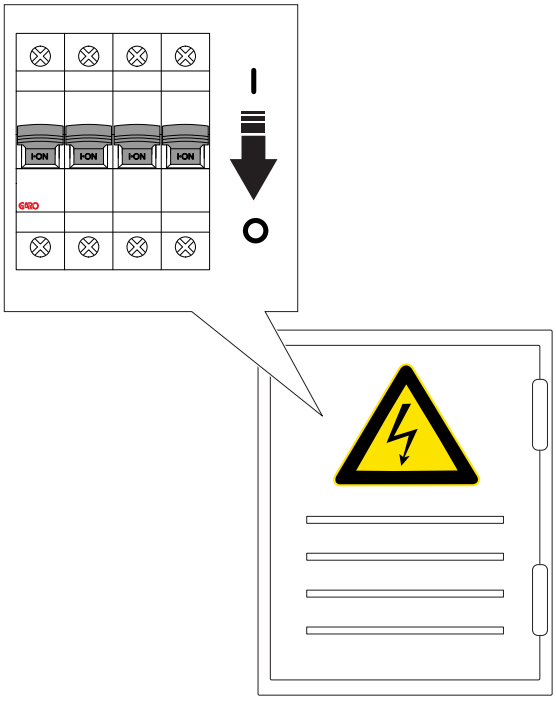
Do not do a test of the insulation with any charging unit attached, as that can cause damages to the charging unit(s).



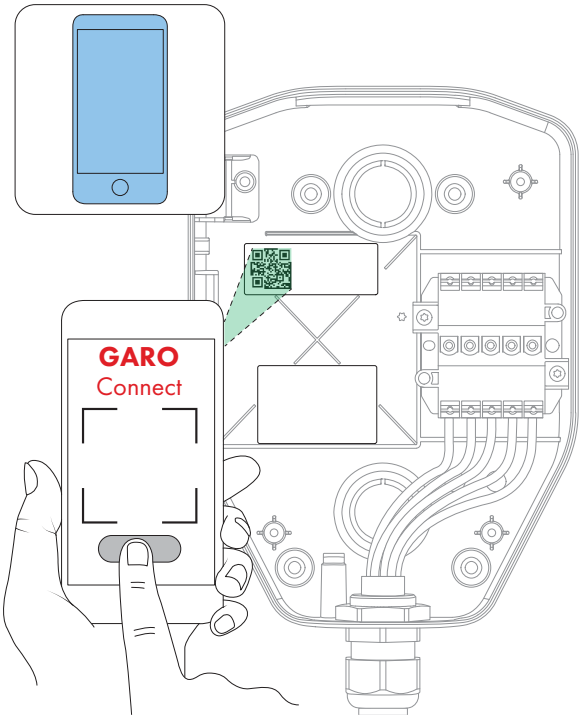
4. Switch the power/voltage to on.



5. Do a check of the voltage and phase sequence in the installation bracket terminal. Make sure that the voltage and phase sequence matches the planned setup.
6. Switch the power/voltage to off.



7. Read the QR code on the installation bracket using the Gar Connect App. At this step, it is time to connect the charging station, created in the GARO Connect App to the physical installation bracket. Refer to 3.13 GARO Connect, page 33 for more information about the procedure and functions of the GARO Connect app.



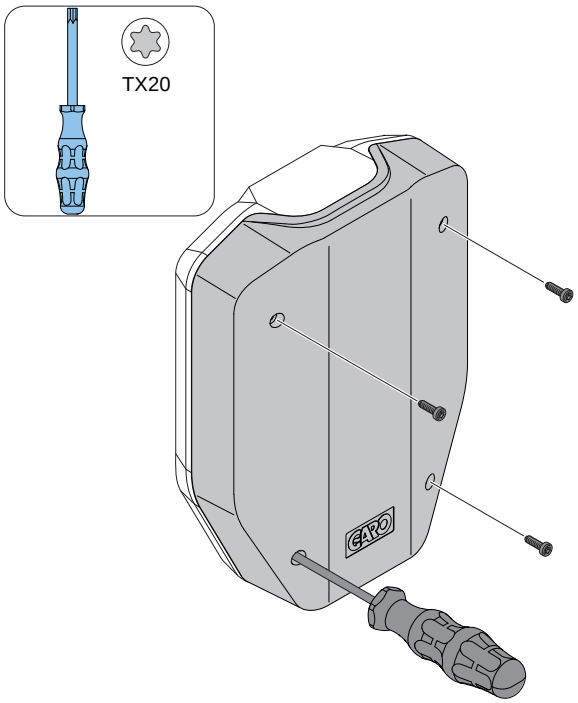
CAUTION

If the charging station is set up without any internet connectivity, it will allow charging at maximum current defined by the attached charging unit. The default setting is 16 A. Can be adjusted as parameter.

3.12.10 TO INSTALL A PROTECTION COVER

The protection cover is used to protect the installation bracket if a charging unit should not be attached from the start or temporary removed. When the protection cover is installed, the installation bracket is protected from damage before installation of the charging unit.

1. Attach the protection cover to the installation bracket.
2. Tighten the screws with a Torx TX20 until the protection cover is tight against the installation bracket (max. 2,9 Nm).

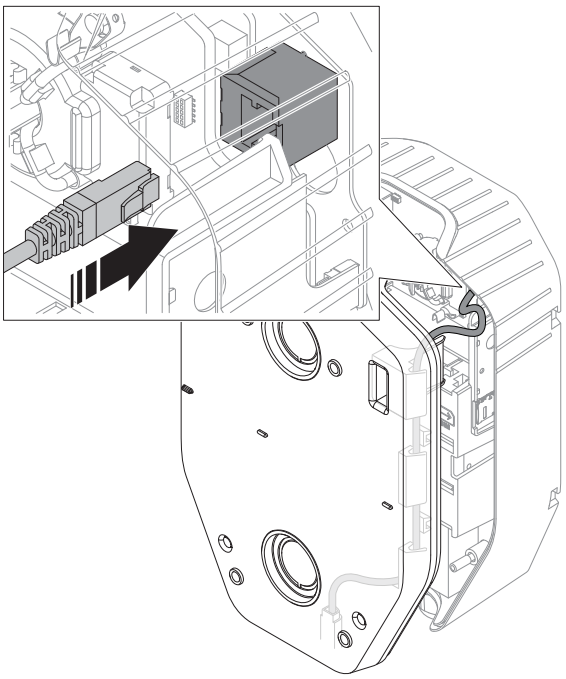


If the installation bracket is configured and prepared as a charging station, the function of the charging station is to be tested using a CU.

After this test, the CU can be removed and replaced with a protection cover.

3.12.11 TO ATTACH THE CHARGING UNIT TO THE INSTALLATION BRACKET

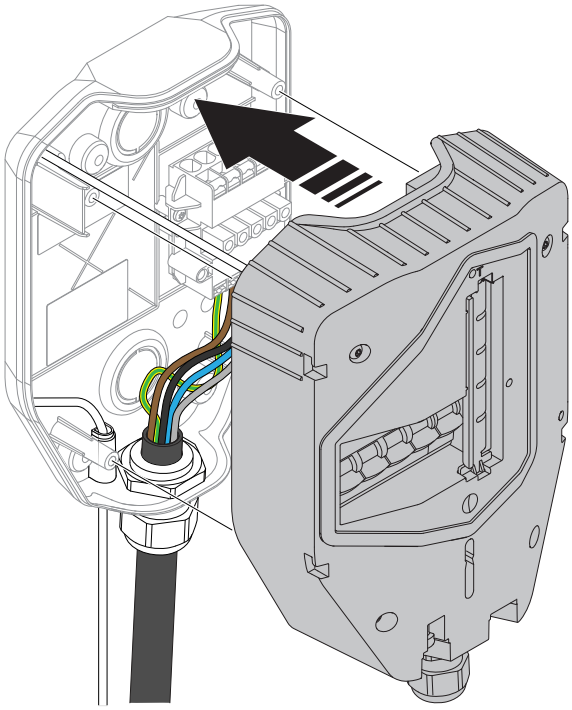
1. If applicable, install the ethernet cable(s) in the ethernet ports on the charging unit.



2. Attach the charging unit to the installation bracket. Press equally on the charging unit with both hands.

CAUTION

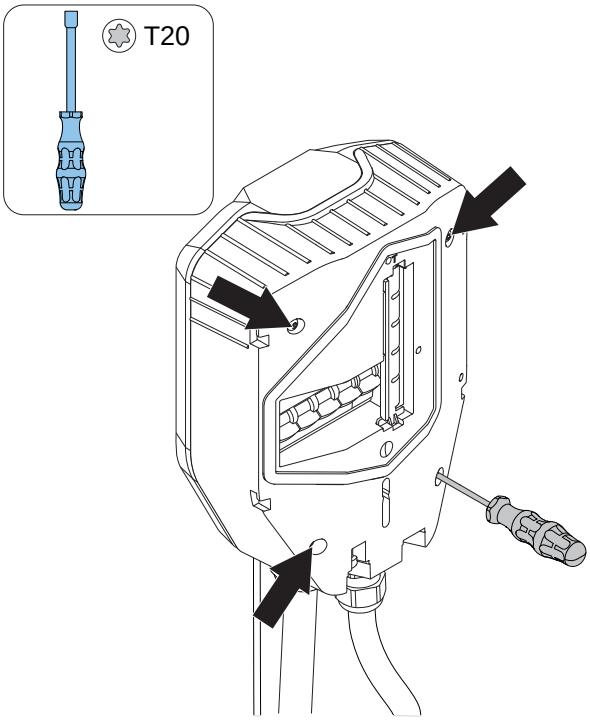
Make sure that no cables get pinched and that the charging unit can meet the edges of the installation bracket.



3. Use a Torx TX20 and tighten the 4 screws until the charging unit is tight against the installation bracket (max. 2,9 Nm).

CAUTION

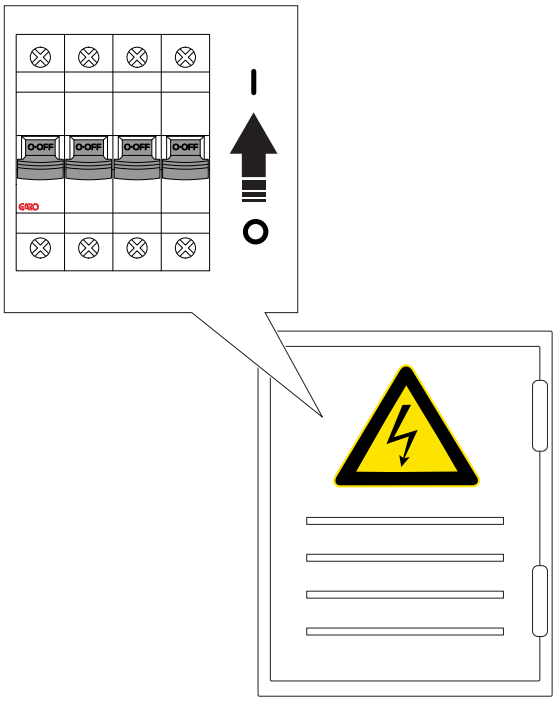
Do not overtighten the screws.



4. Switch the power/voltage to on.

WARNING

Electrical power can cause serious personal injury or death.



NOTE

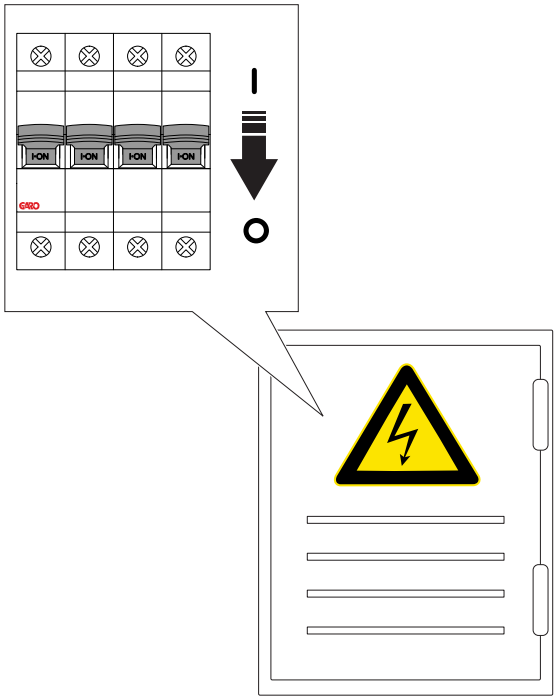
If the charging station needs manual internet settings, that is if it shall act as connection master with a local Wi-Fi as the internet connection, then at this time the internet connectivity settings in the GARO Connect app should be made. Refer to Transfer location, page 55.

3.12.12 TO DO A FINAL FUNCTIONALITY TEST OF THE PRODUCT

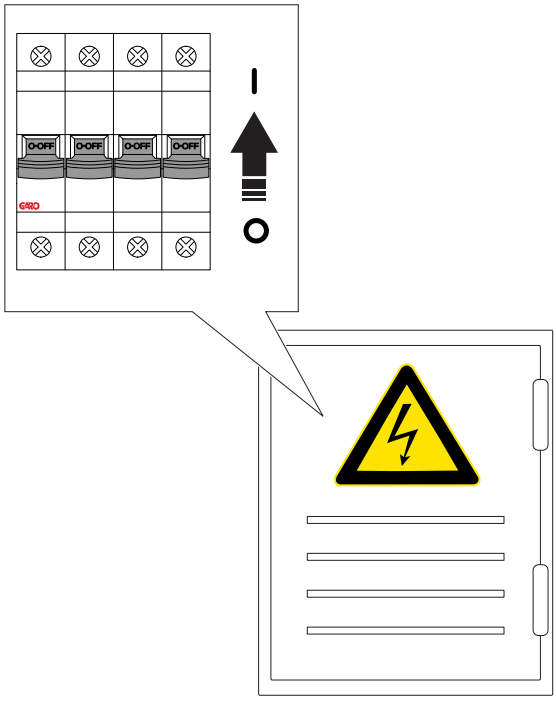
CAUTION

If the charging station needs reduced installed current settings, make sure this setting done before testing with high power, such as EV charging.

1. Switch the power/voltage to off.

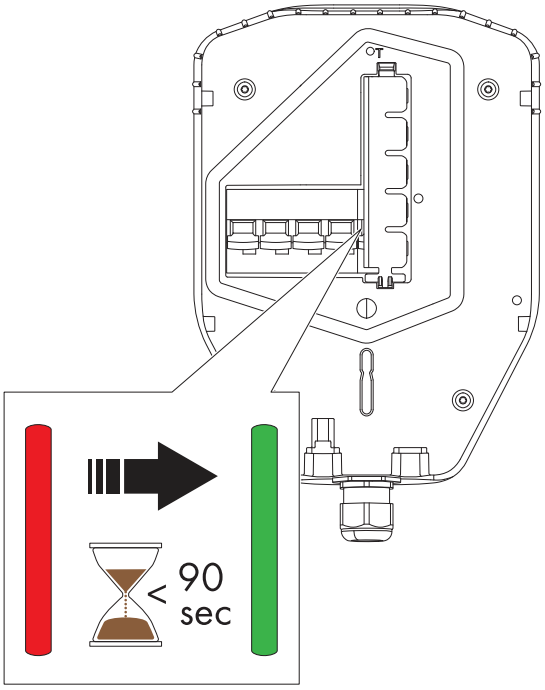


2. Do a test of the PE continuity.
3. Switch the power/voltage to on.

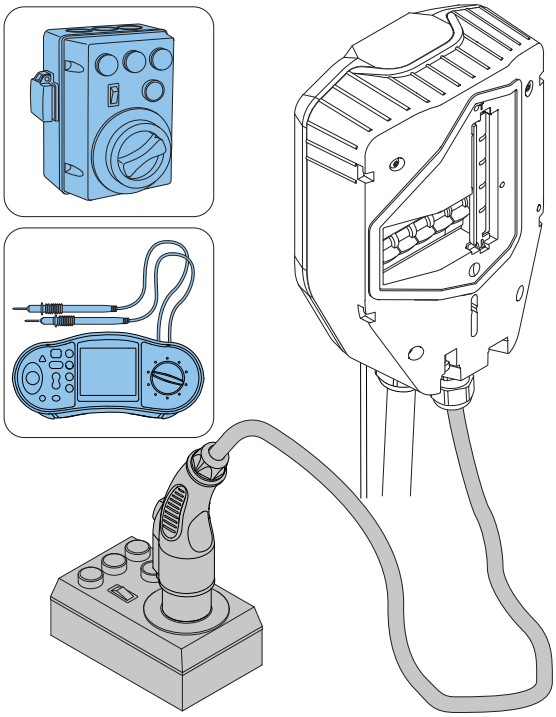


4. After the power is switched on, the Charging Station will startup. This can take up to 90 seconds. Progress is indicated by red LED-segments on the indication light. A fixed green light indicates when the charging station is ready given that the all-pole

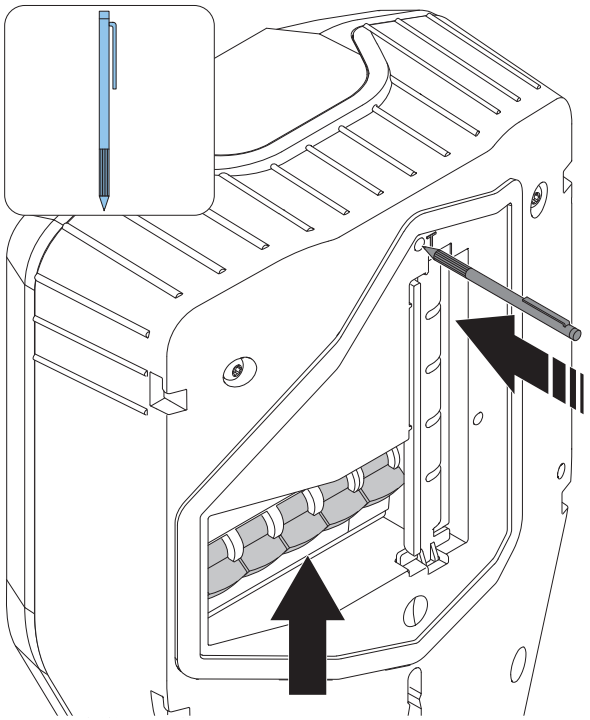
breaker is ON. If it is not, then the light will be blinking red.



5. Set the charging station to state B. Shown with a blue solid light indication.



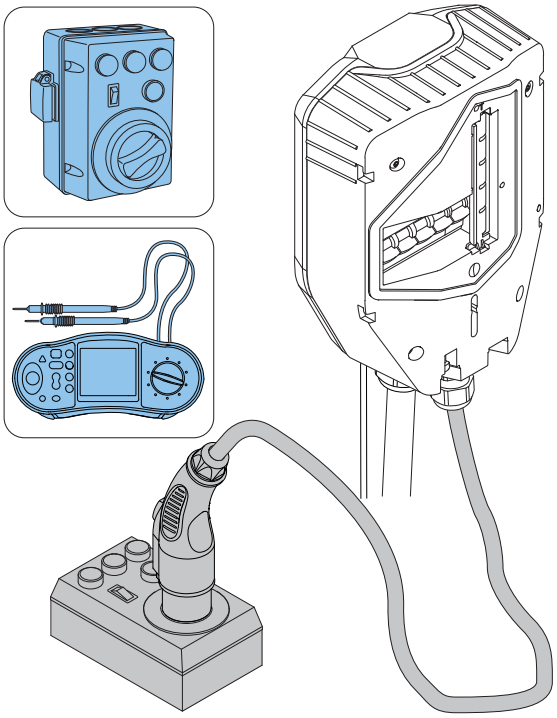
6. Set the charging station to state C. Shown with a blue pulsating light indication.
7. Do a check of the voltage in the Type 2 connection.
8. Press the test button (T) on the charging unit for approximately 1 sec., but not more than 5 sec.! Make sure that the all-pole circuit breaker is triggered.



NOTE

A triggered all-pole breaker is indicated by blinking red. The indication starts after some 15 seconds after the breaker is triggered.

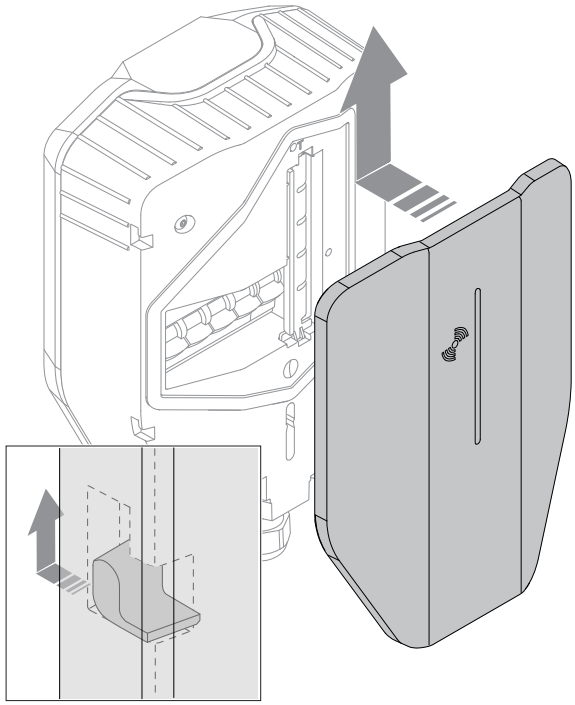
9. Reset the all-pole circuit breaker. Refer to 5.5 To do a reset after a minor ground fault, page 73.
10. Do a test of the earth faults (AC and DC) with a test instrument.



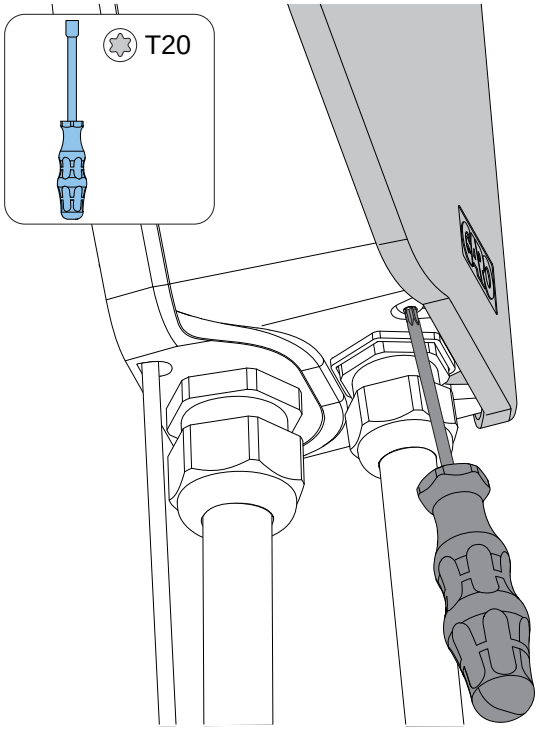
11. If necessary, reset the all-pole circuit breaker. Refer to 5.5 To do a reset after a minor ground fault, page 73.
12. Set the charging station to state A.
13. Disconnect the test equipment.
14. Test charging an EV.

3.12.13 TO MOUNT THE FRONT COVER OF THE CHARGING UNIT

1. Mount the front cover of the charging unit.



2. Use a Torx screwdriver to lock the front cover at the bottom of the charging unit. Tighten the screw with a maximum of 2 Nm.



3. After the final testing, the installation of the charging unit can be declared ready in the app, The charging unit becomes available to use and visible to EV drivers with access rights.

NOTE

If the charging station is part of a connection group for DLM, it is recommended to complete the whole installation of the connection group and to test it, before the installation is handed over to owner for operation, refer to 3.14.3 To install the load interface in an electrical cabinet, page 61.

3.13 GARO CONNECT

3.13.1 THE GARO CONNECT APP

The GARO connect app is to be used for the installation, management and operation of the GARO Entity charging station. The instructions in this manual are intended as an overview of the setup and functions of the GARO Connect app.

The GARO Connect app can be downloaded from Google Play or App store on a digital device. Register as a new user in the GARO Connect app. Use an e-mail address as usename.

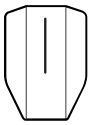
3.13.2 GARO CONNECT APP INSTALLATION PROCESS OVERVIEW

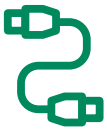
The GARO Connect app is based on a standard/ startup process for both the owner of the charging station, and the installer of the charging station. The illustration shows the process from both perspectives.

1. Owner (or installer): Consult a GARO representative for correct choice of product variant.
2. Owner and installer: Prepare the installation and choose location.
3. Owner and installer: Choose product(s) and accessories.
4. Installer and owner: Receive delivery of product(s) and accessories.
5. Owner and installer: Download the GARO Connect app.
6. Owner (or installer on behalf of the owner): Prepare the installation and invite the installer.
7. Installer: Install the charging stations(s) (CS(s)).
8. Installer: Install the load interface(s) (LI).
9. Installer: Follow the installation guide in the administrative tool - the GARO Connect app.
10. Installer: Apply power/voltage to the charging station.
11. Installer: Perform a test of the installation.
12. Installer and owner: Declare installation as complete in the GARO Connect app. Do the handover to the owner.
13. Owner and/or EV driver: Charge an EV.

14. Owner: Manage access control for EV drivers and monitor the system.

3.13.3 GARO CONNECT APP SYMBOLS OVERVIEW

Icon	Icon name	Icon information
	Location	Click the icon to see a map of available locations.
	Edit	Click the icon to make changes to the settings.
	Charging station	The icon is the symbol for charging station.
	Settings	Click the icon to adjust the settings of the product.
	Add	Click the icon to add a location, group, charging station, etcetera.
	DLM Master	The icon is shown beside the DLM master unit (charging station or load interface). A unit can only have one DLM master role. A unit can act both as DLM master and as communication master.
	Communication master	The icon is shown beside the communication master unit, (charging station or load interface), i. e., the acting master of a network group. The communication master unit acts as a gateway to the internet or acting as master/starting point of a Wi-Fi mesh group.
	No internet	The icon informs that there is no internet. The communication master unit must have internet access via ethernet cable, Wi-Fi or modem (Modem only applicable for Entity Compact).

	Internet connection active via Wi-Fi	The icon informs that a radio based internet connection link is active and working. The icon also informs that the internet connection is available direct (to the internet connectivity master) or indirect to a non-master unit through a functional interconnection. The communication master unit must have internet access via ethernet cable, Wi-Fi or modem (Modem only applicable for Entity Compact).
	Internet connection active via ethernet cable	The icon informs that a internet connection link via an ethernet cable is active and working (working=green). The icon also informs that the internet connection is available direct (to the internet connectivity master) or indirect to a non-master unit through a functional interconnection. The communication master unit must have internet access via ethernet cable, Wi-Fi or modem.
	No internet connection	No internet connection.
	Complete or selected	The icon shows that a step is complete.
	Continue	Click the icon to continue the installation process.
	Back or return	Click the icon to revert to the previous step.
	User manual	Click the icon to access the operator and installation manual of the product.
	Main menu	Click the icon to choose action in the main menu.

	Installer tool	The Installer symbol is shown when using the installer pages of the app. The installer pages are shown with a yellow background. Using the Installer tool comes with installer responsibility.
	Charging cable type 2	The icon is for the charging cable Type 2 that is connected to the charging station. This means that the charging station has a fixed cable. Only possible for GARO Entity CS.
	Type 2 outlet	The icon is for the Type 2 outlet, which can be used to charge the EV.
	Grid	A grid used to visualize the grid level of powerflow in the charging station (CS) status.
	List view	Features/functions are arranged as a list. It is possible to start charging by swiping an item in the list.
	Gallery view	Features/functions are arranged as symbols.

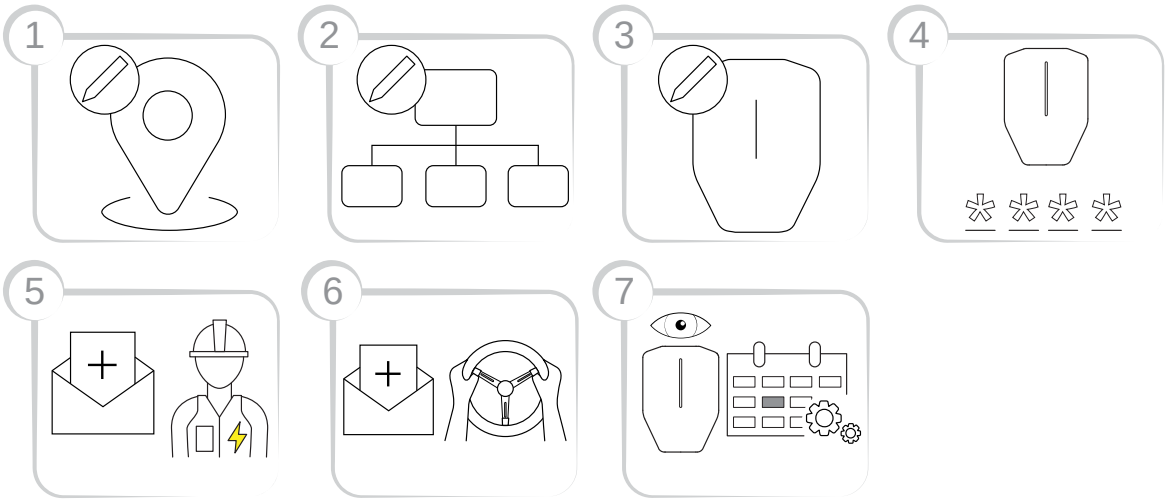
3.13.4 OWNER

The Owner is the person who owns one or several charging stations and the location. The Owner invites the installer to do all or part of the installation of the charging station(s). As an owner, all tools and settings are available in the GARO Connect app to easily manage the charging station(s).

NOTE

A new installation (a location with charging station(s)) can also be set up by the installer, who can act as a temporary owner. After installation, the installer can transfer the location, that is the complete control of the product(s) to the owner. After such transfer of location, the installer keeps access to the location.

The GARO Connect app installation process for the Owner:



1. Create or choose a location. The “home” location is the default location.

NOTE

It is recommended to change the name of the default location ("home"). Preferably, the name should specify the physical place of the unit and also provide the address and coordinates.

2. Create an organization if it is needed. This is not mandatory for every installation. Add more persons as owners.
3. Create the logical charging station(s) (CS) in the GARO Connect app. The logical charging station(s) (CS) is later tied to a physical charging station (CS) by the Installer by scanning the installation bracket.
4. Generate an installation code.

   To access a location for installation, the owner of the location creates/generates a 12 letter installation code that works like a key to the location. The code can be handed over to an installer by email, paper or any other media. The installer must have the code to start an installation. If a new installation code is generated by the owner, the old code becomes invalid and cannot be used. A location is normally equal to an electrical mains system of a building/site/area. The installation code is only required 1 time per location and installer.
5. Invite an installer to install the product(s).
6. When installation is complete, the charging station can be operated.
7. Invite EV drivers and manage EV driver access control if needed. This is not mandatory for every installation.

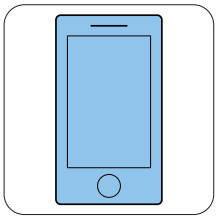
8. Monitor the system of charging station(s) (CS). Ensure maintenance routines are followed. Refer to 5 Maintenance, page 72.

To prepare the installation (owner)

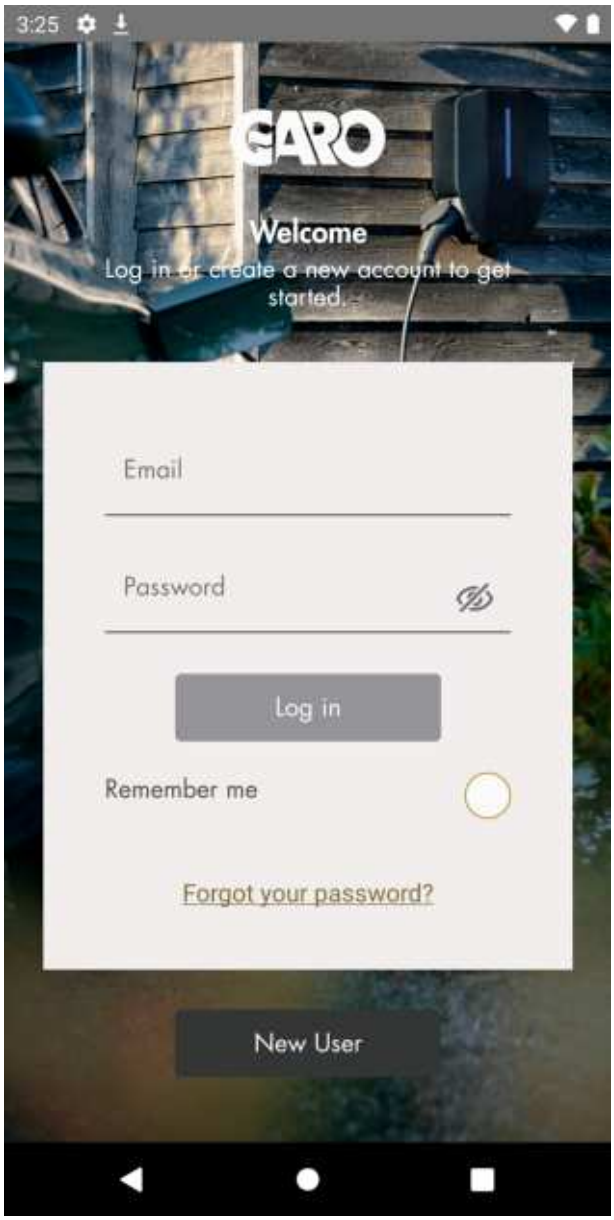
NOTE

These instructions are for the owner. To see the whole process overview of the GARO Connect app, refer to 3.13.2 GARO Connect app installation process overview, page 34. To see the overview of the symbols and buttons in the GARO Connect app, refer to .

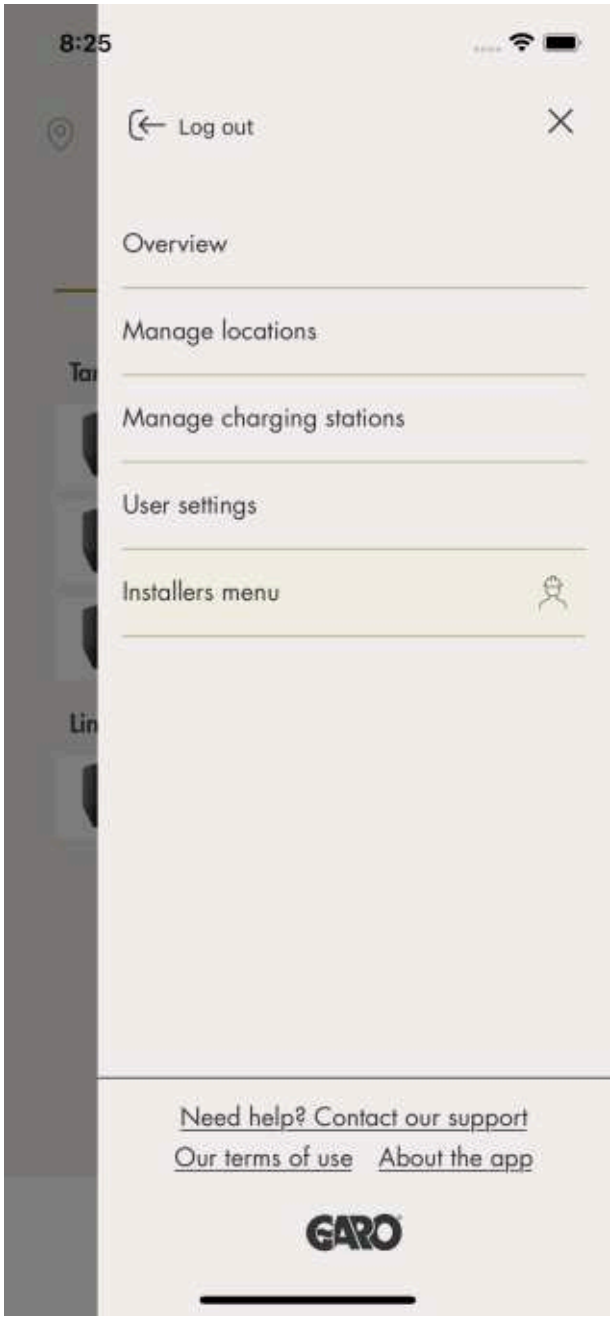
1. Download the GARO Connect app.



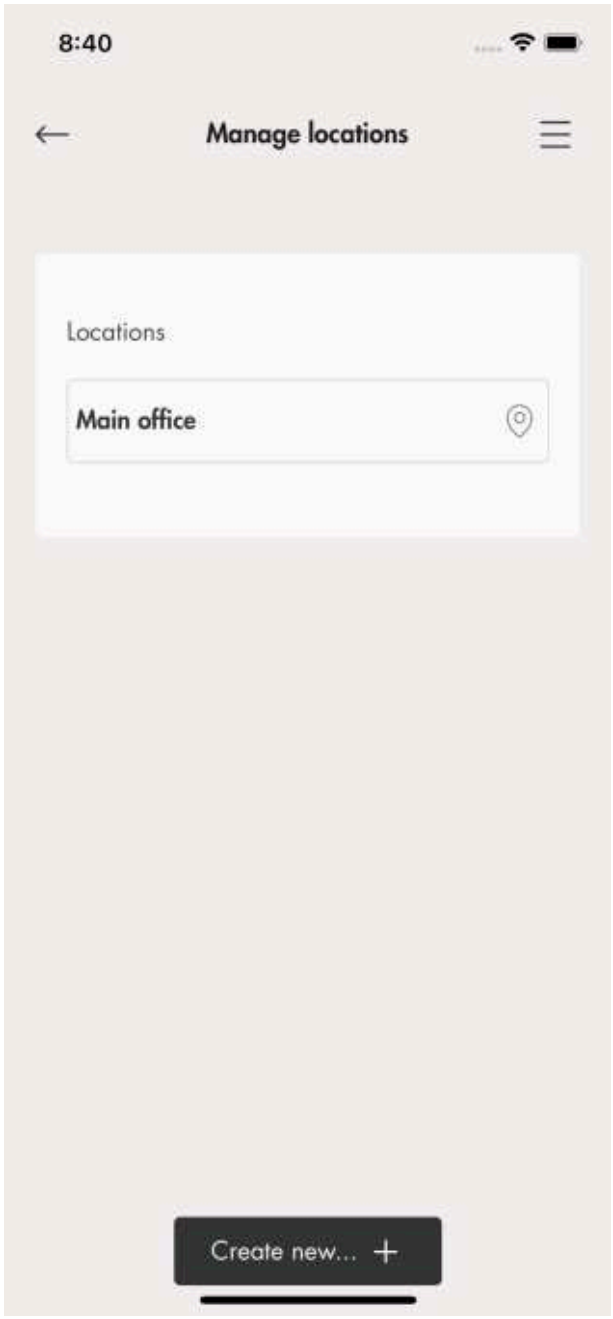
2. Create a new account in the GARO Connect app. Follow the instructions on the screen.
3. Log on to the GARO Connect app with provided credentials.



4. Select *Manage Locations*.



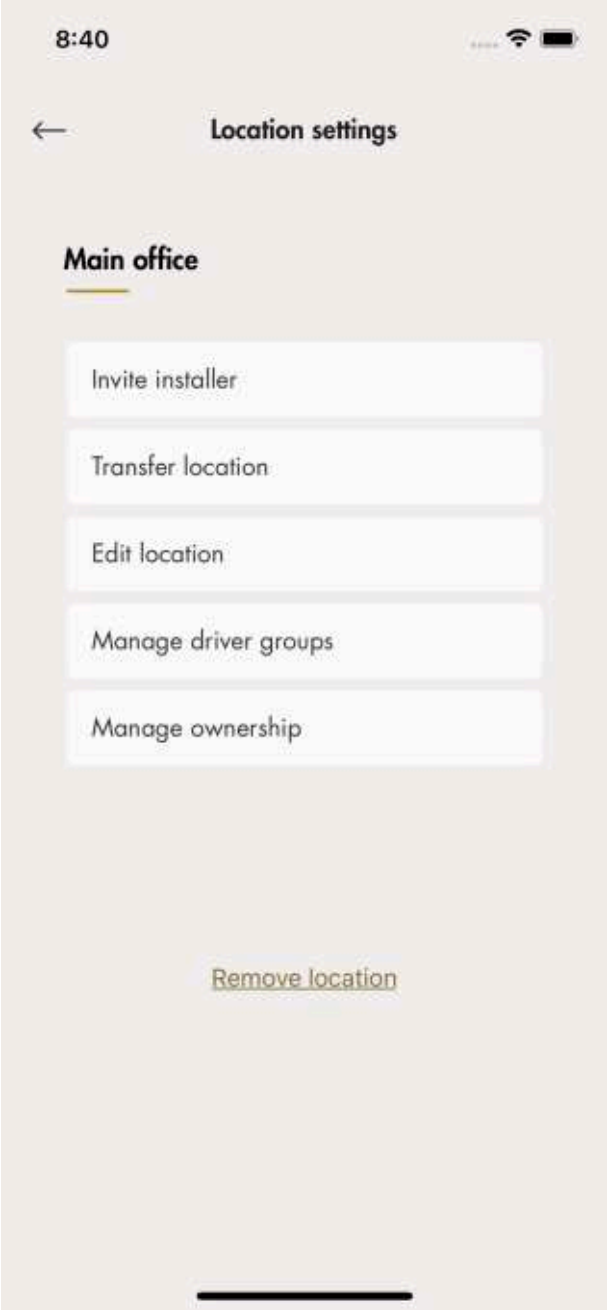
5. Choose location.

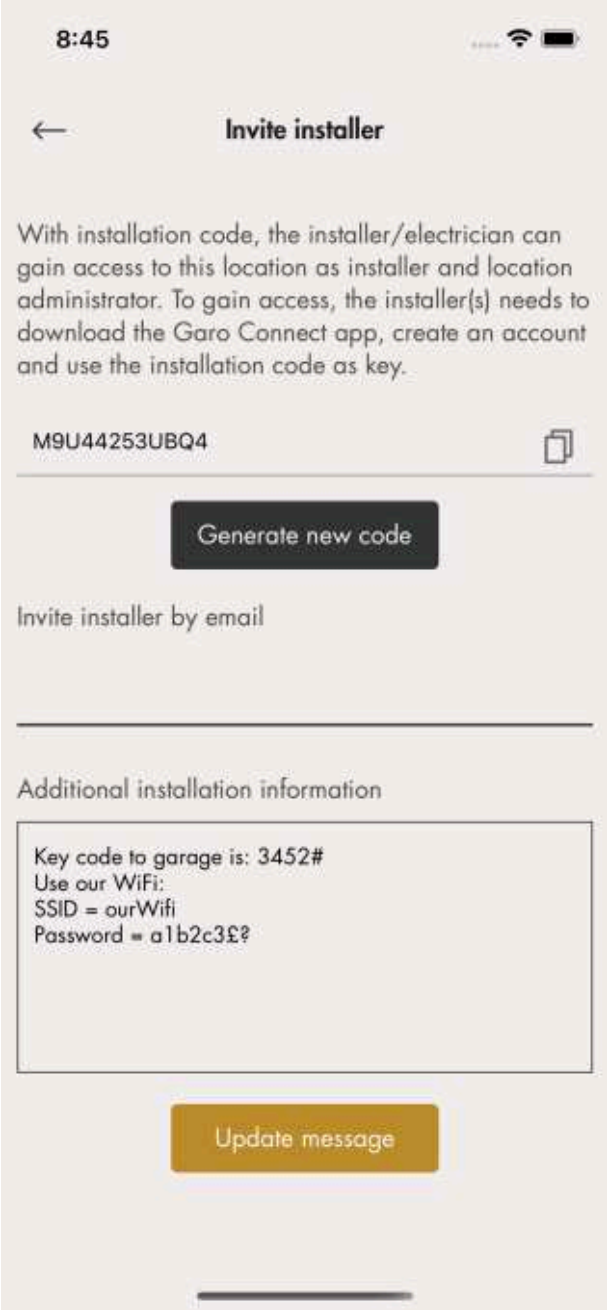


6. Select *Invite Installer*.

NOTE

It is recommended to change name of the default location ("home"). Preferably, the name should specify the physical place of the unit and also provide the address and coordinates. In this example, the location is called Main office. To change the name of a location, click the location and choose *Edit location*.





NOTE

The installer can create and install charging stations once invited with the installation code from the owner.

7. Generate an installation code. An e-mail can be generated to the installer through the GARO Connect app. This is not mandatory, any communication channel is fine.

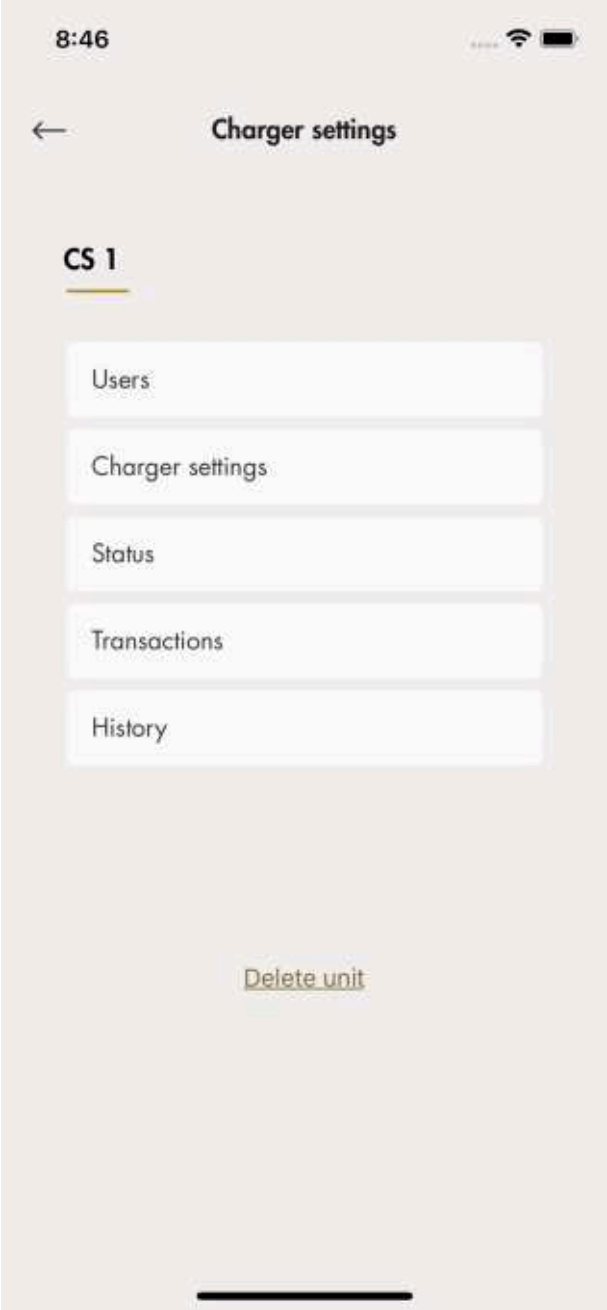
   A message to the installer concerning the location or installation can be tied to the location, for example the Wi-Fi credentials if a local Wi-Fi is to be used.

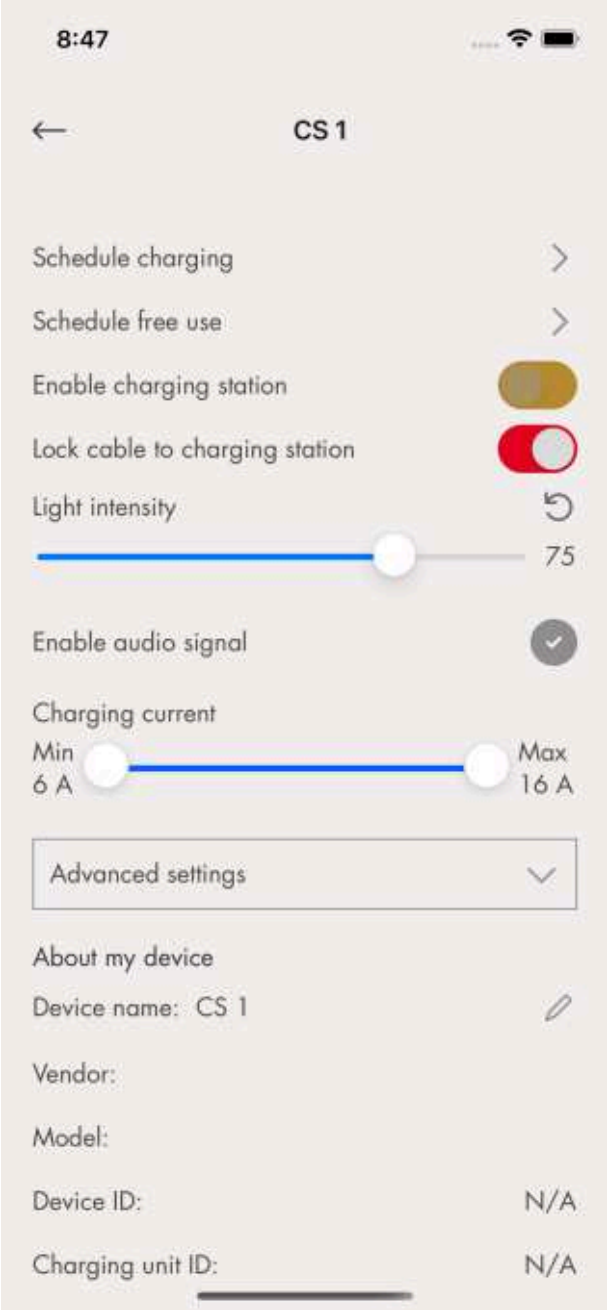
Charger settings

The features available under *Charger settings (owner)* are not mandatory.

- Charger settings

  The settings for each charging station can be changed. Click on applicable charging station, then *Charger Settings* and follow the instructions in the app.





- Enable charging station

  Under *Manage charging stations > Charging Settings*, each charging station can be enabled/ disabled by the owner. If the charging station is disabled, the charging station cannot be used.

- Charging station access

  Each charging station can be set to free use (default). This enables access for everybody. If the EV driver identifies before connecting to the EV, the charging transaction is registered to the EV driver.

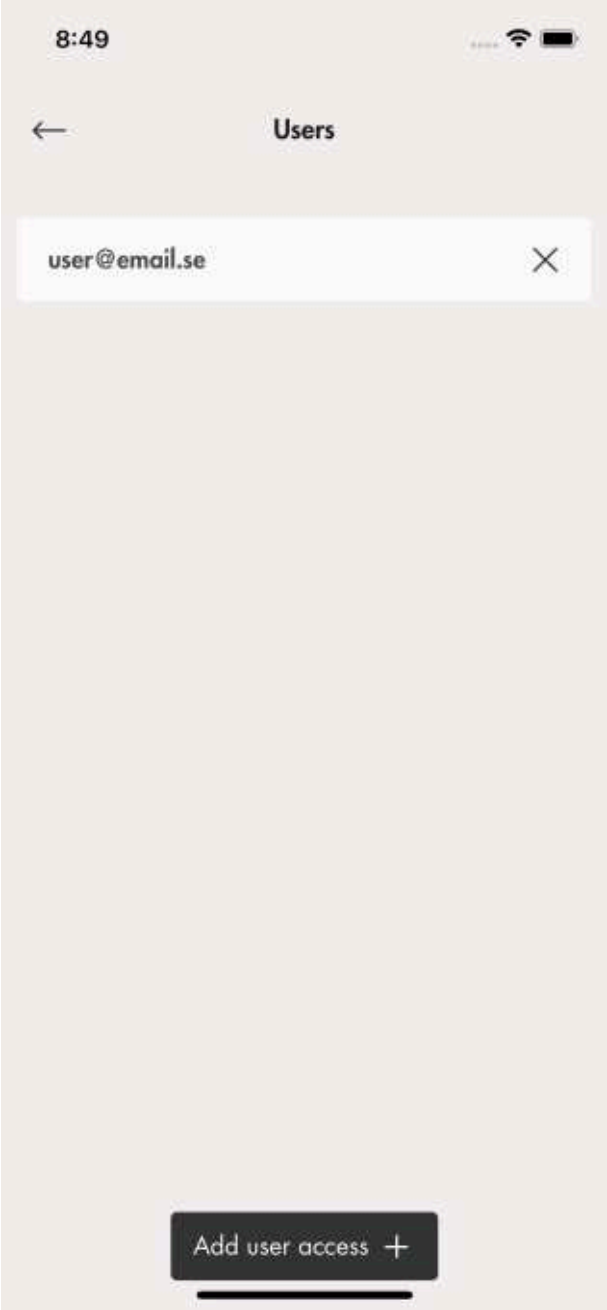
  At delivery the free use is enabled by default. The charging station is at that time not set up for access control. Free use can be used, even if the charging station has defined EV drivers, those rights can be seen as “overridden” by the free use.

- Invite drivers

The owner can invite EV drivers from the app. Click *Charger Settings*, select *Users* and follow the instructions in the GARO Connect app. EV drivers can be added individually or through an EV driver group.

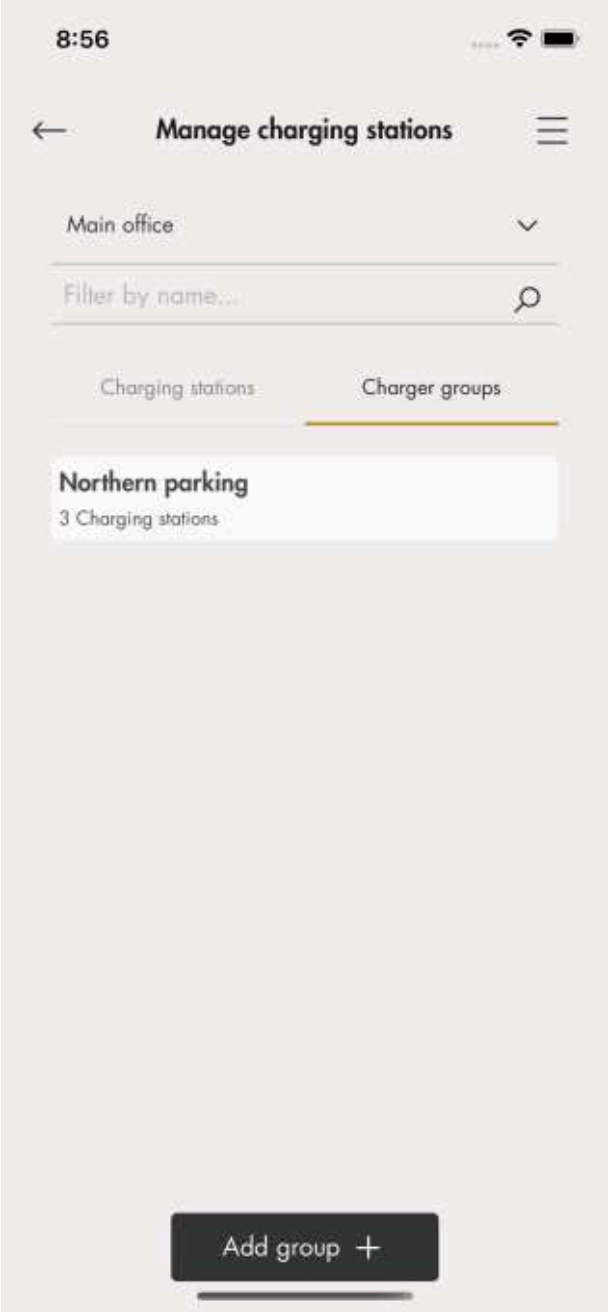
NOTE

If the EV driver does not have a GARO Connect account, an invitation email will be sent to that EV driver.



- Create a charger group for the charging stations

A charger group is used to manage access control of several charging stations, for example “Northern parking”. Access control can be done both on individual level and on group level. It is not mandatory to create charger groups during the installation process. It is possible to create charger groups at a later time.



- Cluster EV drivers

  EV drivers can be managed in clusters called EV driver groups, which makes access management easier. EV driver groups are related to the

organization, which means they can be used in several locations within an organization.

The organization is a good tool when administrating several locations.

- Advanced owner tools

  Additional owners can be added and removed to a location and organization. However, an organization and location must always have at least 1 owner.

  A location can also be handed over to another owner (example "sold to").

The owner is normally given default access to use the charging stations of the location.

3.13.5 INSTALLER

The installer is a certified installer or acts on behalf of a certified installer. The installer is hired by the owner to perform the electrical steps of the installation of the charging station(s) that is connected to a location.

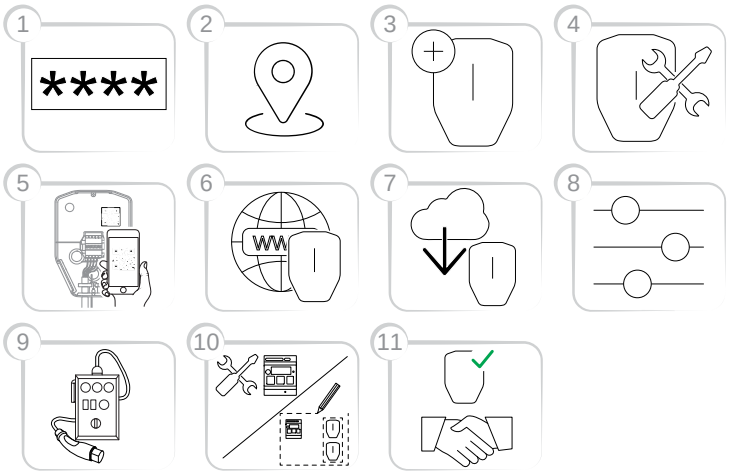
To access a location for installation, the owner of the location creates/generates an installation code. The installation code is a 12-letter code that works like a key to the location. The code can be handed over to an installer by mail, paper or any other media. Installer must have the code to start an installation at an existing location.

If a new installation code is generated by the owner, the old one is invalid, like a key.

The installation process of the installer is described in the illustration below. For a full instruction, refer to .

NOTE

When a new installation at a new location is started, the installer can act as a temporary owner and then hand over ownership of the product(s) to the owner. After such transfer of location, the installer keeps access to the location.



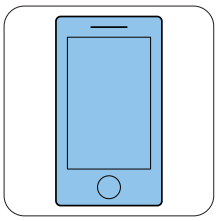
1. Enter the installation code in the GARO Connect app. The installation code is related to a location.
2. Select the location that the owner has set up.
3. Create or choose charging station.
4. Perform the physical installation. Refer to 3 Installation, page 12.
5. Connect the selected, logical CS to a physical installation bracket, by scanning the IB QR code.
6. Set up the internet connection for the charging station(s).
7. Perform any necessary firmware updates. This can also be performed later.
8. Perform the configuration settings.
9. Create connection groups and install load interfaces (if needed).
10. Perform test charging to make sure that the charging station(s) operate correctly.
11. Declare the installation as complete in the GARO Connect app and hand over the installation to the owner. If the installer created the location, it should be transferred to the real owner.

To prepare the installation (installer)

NOTE

These instructions are for the installer. To see the whole process overview of the GARO Connect app, refer to 3.13.2 GARO Connect app installation process overview, page 34. To see the overview of the symbols and buttons in the GARO Connect app, refer to .

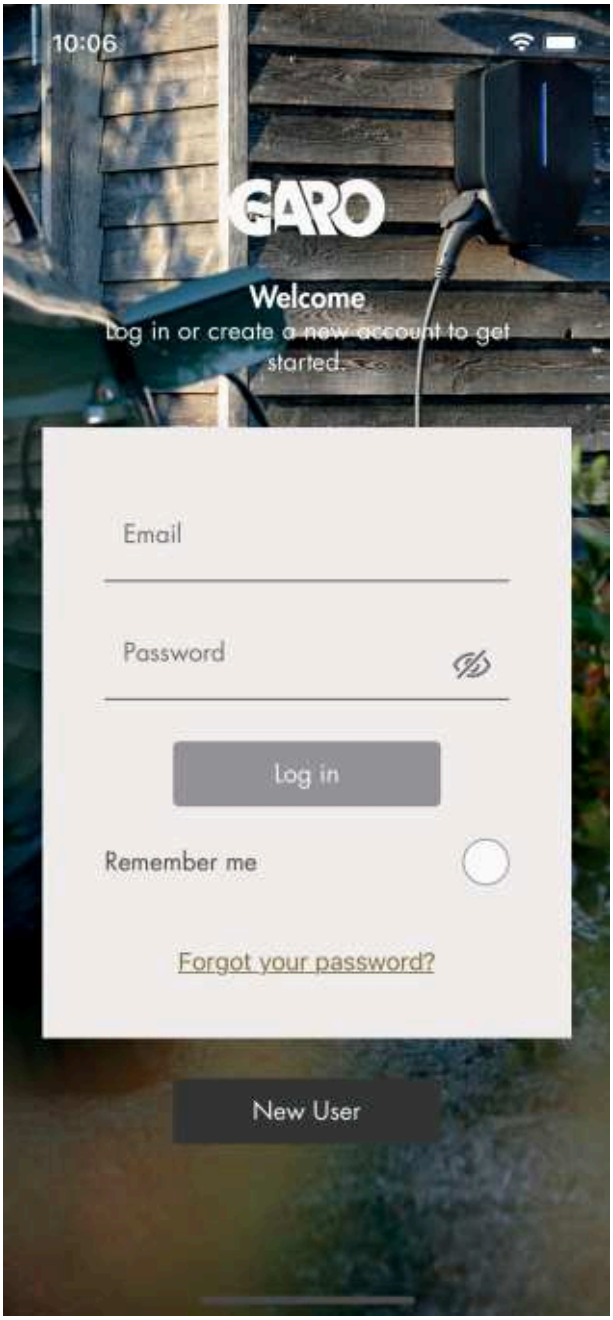
1. Download the GARO Connect app.



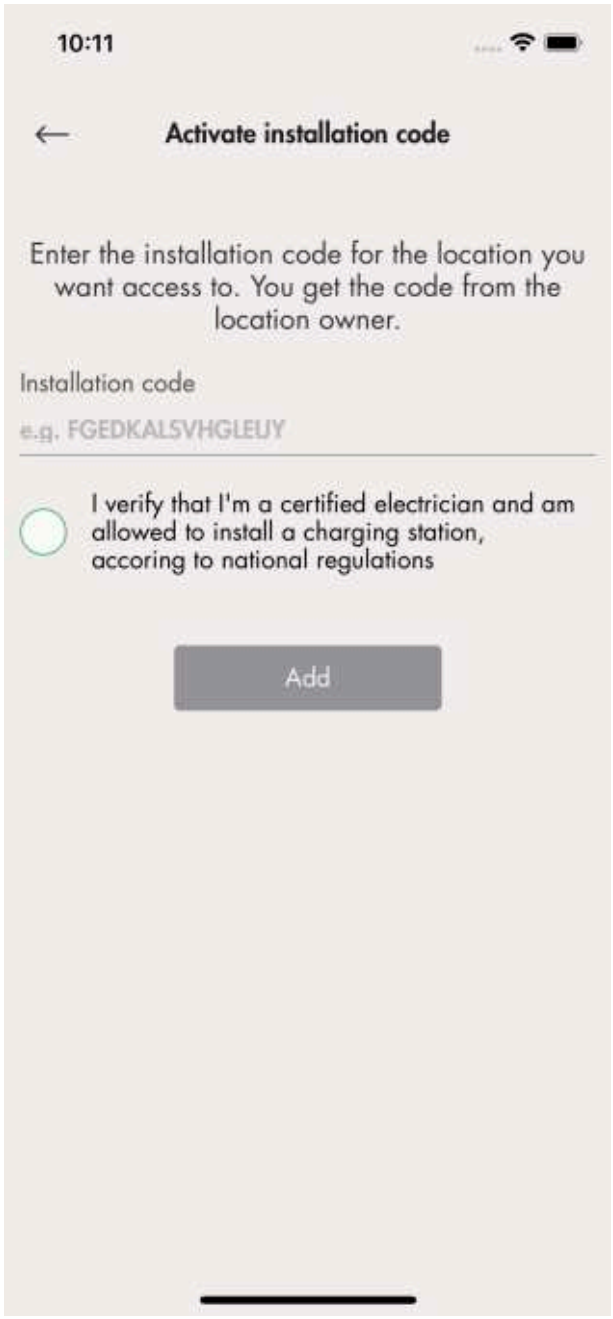
GET IT ON Google Play

Download on the App Store

2. Log on to the app with the provided credentials. If it is the first time logging in, edit personal settings.



3. Choose *Install chargers*.
   If the owner has sent an invitation, the invitation screen will automatically show. Go to Step 4.



4. Enter the installation code provided by the owner.

NOTE

To access a location for installation, the owner of the location creates/generates a 12–letter installation code that works like a key to the location. The code can be handed over to an installer by mail, paper or any other media. The installer must have the code to start an installation. If a new installation code is generated by the owner, the old code becomes invalid and cannot be used. A location is normally equal to an electrical mains system of a building/site/area.

5. Click the charging station to be installed and perform the installation, following the guided steps. Start with the master charging station.

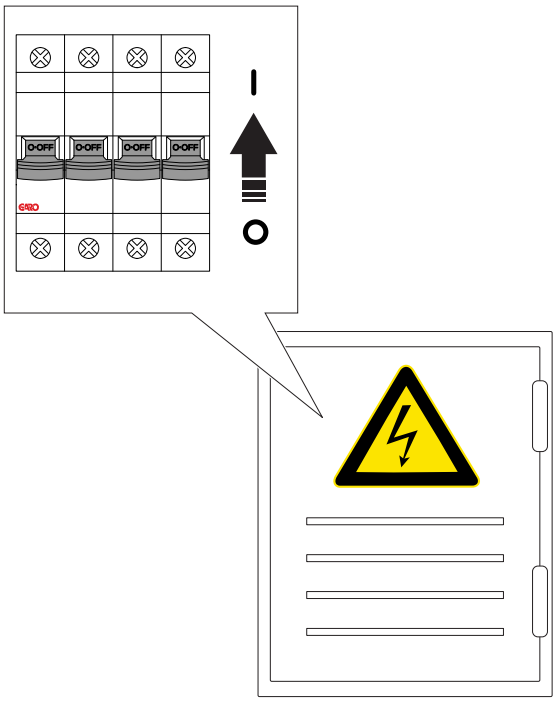
6. The installation guide displays. Each step must be completed in order to finalize the installation.

7. Physical installation
   a. Install the charging station(s). Refer to 3 Installation, page 12.

b. Set the power to on.

WARNING

Electrical power can cause serious personal injury or death.



c. Wait for the charging unit to start. This takes up to 90 seconds and is shown with a green light indication given that the all-pole breaker is on, (else red).

8. Internet and cloud connection

   Internet to a CS is connected in this priority:

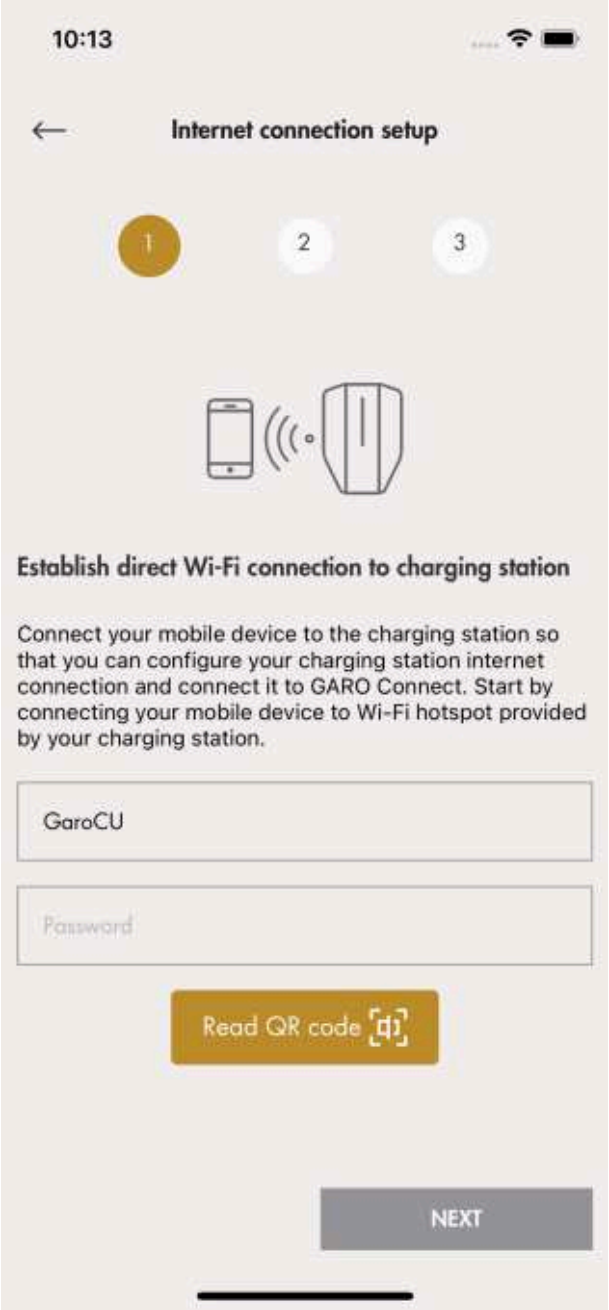
   1. Ethernet cable

   2. Mesh Wi-Fi (if the charging station is part of a connection group)

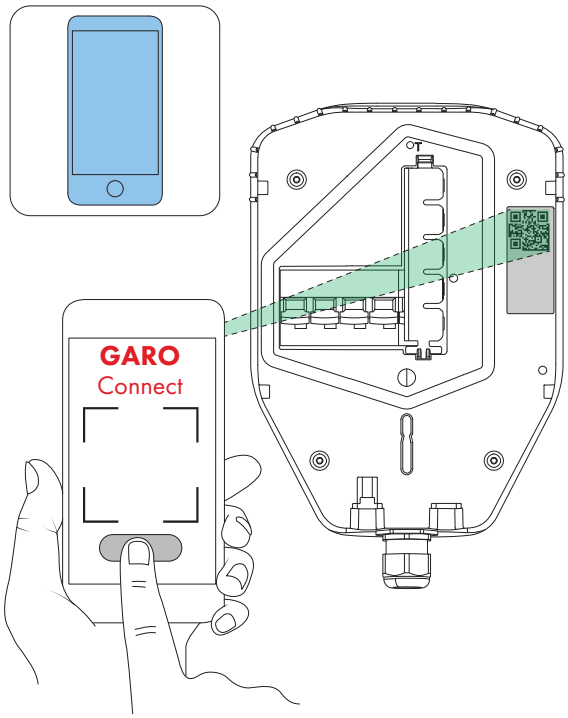
   3. Local Wi-Fi (requires manual setting)

   4. Modem (Only applicable for Entity Compact).

   The internet should connect automatically. If it does not, or if a local Wi-Fi is used, then a local connection between the device (mobile with app) and the charging station will be established. Once this connection is established, internet connectivity can be managed manually.

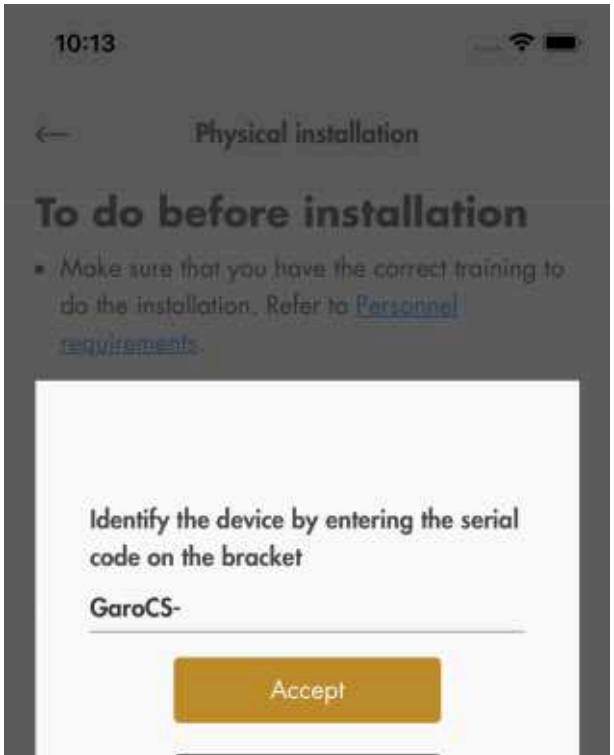


a. If a charging station is configured to use a local Wi-Fi for internet access, a direct connection must be set up between the device (mobile with app) and the charging station. To set up a direct connection, use the charging unit ID label to enter the credentials to the GARO Connect app. The QR code is scanned via the GARO Connect app.

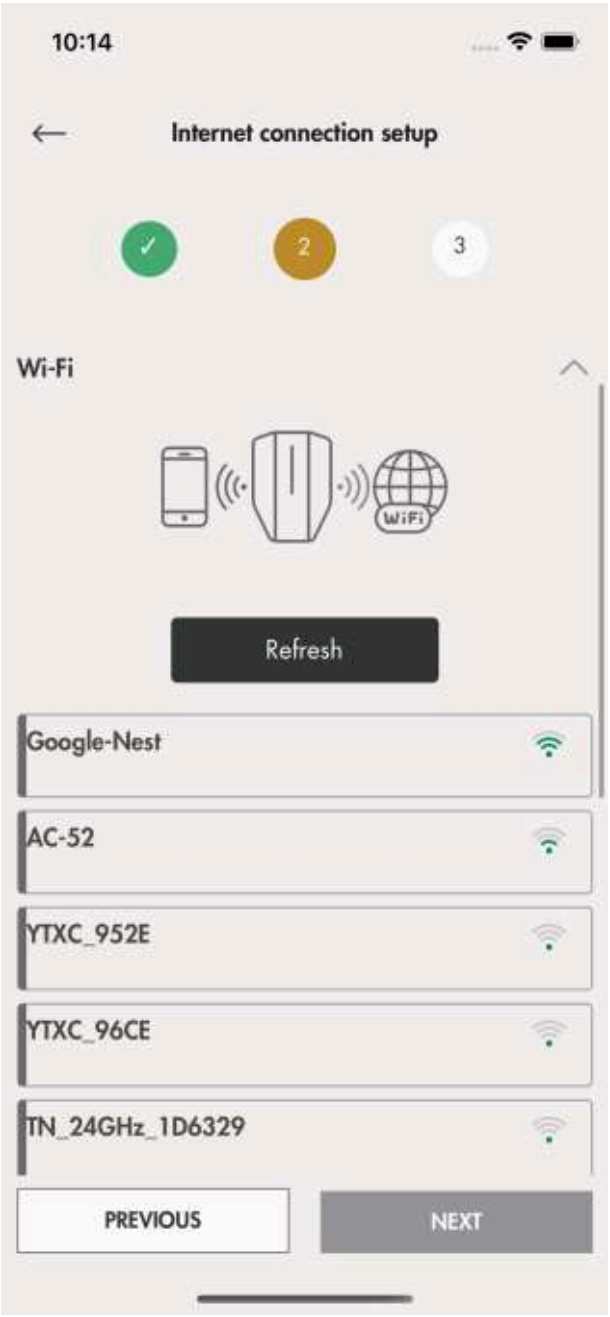


NOTE

It is also possible to enter the Wi-Fi credentials as plain text in the GARO Connect app, if the QR code can not be used.

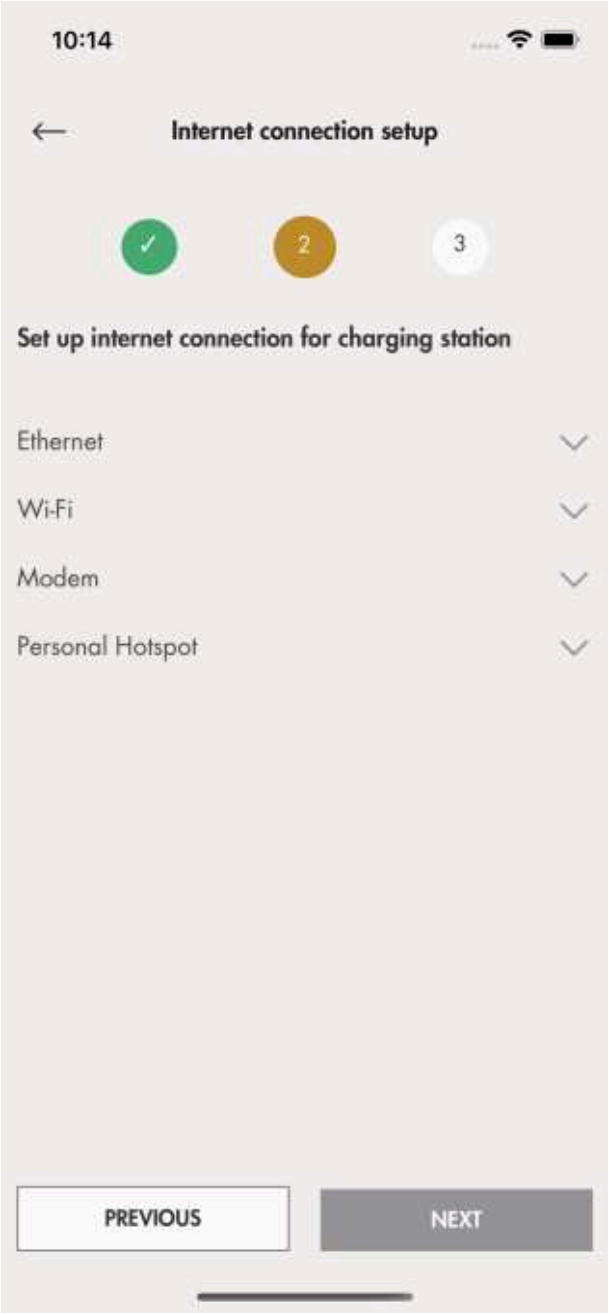


b. Choose preferred internet connection and click *Next*.
If the ethernet cable is connected to the internet, the charging unit will automatically connect through the cable. If neither ethernet nor Wi-Fi is available the charging unit will automatically connect through the modem. If the charging station is configured as part of a connection group trough a mesh Wi-Fi then the charging station will automatically be connected via this mesh Wi-Fi group.

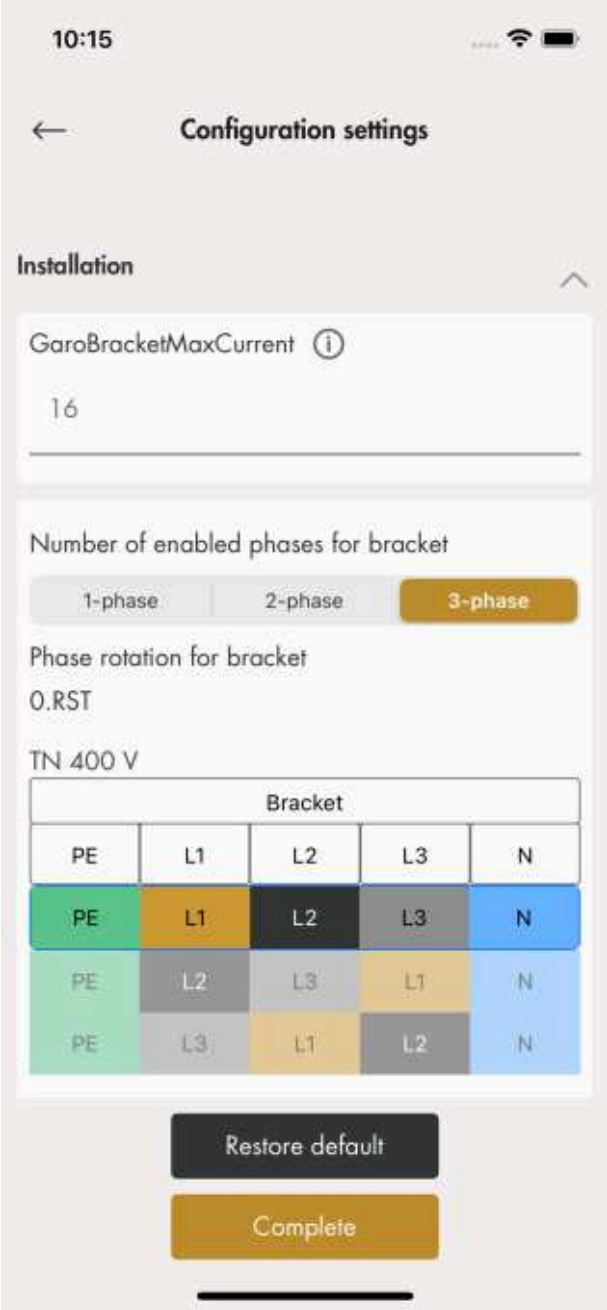


c. The Internet icon will turn green connected to the internet.

d. Close the connection to the charging station. Once the internet is connected to the charging station, the device (mobile with app) will communicate with the charging station over the internet, so the direct connection shall be closed.



9. Firmware update
   Firmware can always be updated, but never downgraded as this is not allowed due to cyber security. It is highly recommended to enable automatic update of firmware (default setting).

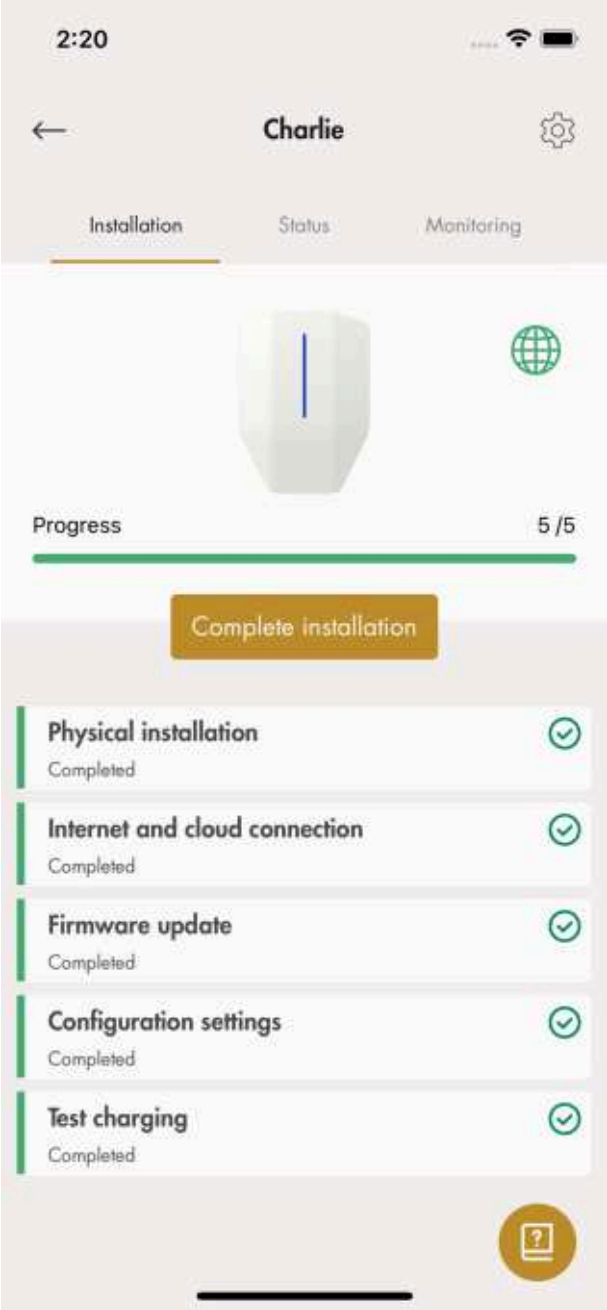


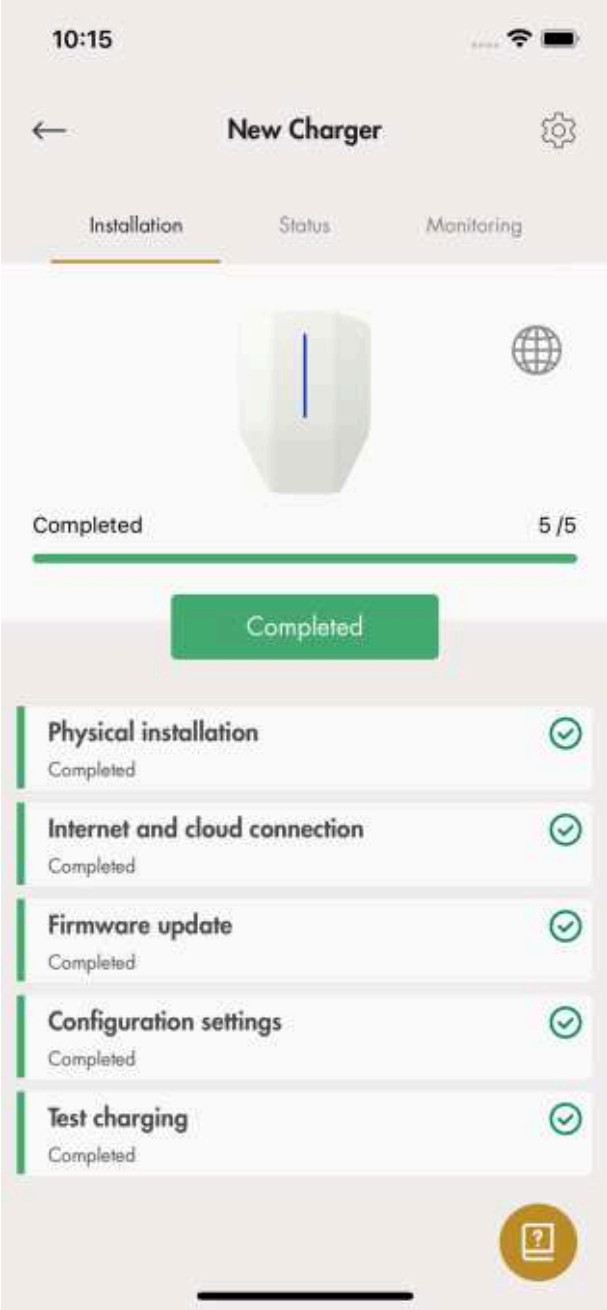
10. Configuration settings
    There are several configuration settings that are possible to adjust with the GARO Connect app. In the GARO Connect app, information is available as support for each available setting. If it is necessary, speak to the GARO support organization for further assistance.

NOTE

For information on the different parameters, click the "**"I"** icon.

11. Test charging and finalize installation
    Finalize the installation by testing the charging station with an EV tester or an EV.





12. Declare installation as completed

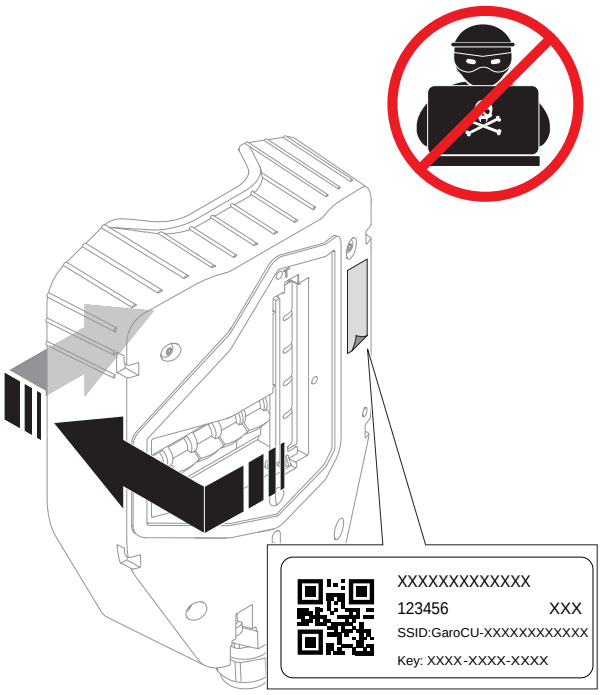
    After final testing, the installation of the charging unit can be declared ready in the app by clicking on Completed. It then becomes available to use and visible to the owner.

NOTE

After the installation is complete each charging station can be activated and deactivated. An inactivated charging station is indicated as red.

13. Remove the ID label from the charging unit.

    The Wi-Fi credentials on this label can be used to gain unauthorized access to the charging station. For this reason, the information should be considered as sensitive. Place it on a safe space location, for example on the rear side of the charging unit.



DLM settings (installer)

The DLM function is common, but not mandatory.

- Create connection group(s) for the charging stations.

  Connection group(s) can be created to control maximal current consumption by the charging stations, in order to protect fuses or other electrical system components from overload. The connection group concept is also used as default structure for internet connectivity. It is possible to include a connection group with another connection group as a subgroup. Up to 4 group levels can be set up.

  A connection group for DLM is always defined by a maximal current.

- DLM for a cable connected to a single charging stating can be managed by a charging station acting as DLM master. To act as a DLM master for other loads or a higher level of power distribution, a load inter face is required.

Before setup

Before choosing the connection type between several charging stations, first choose the internet connection type for the communication master unit.

After selecting internet connectivity, it is time to plan for the inter-connectivity. There are 3 connection types available: 1) ethernet cable, 2) Wi-Fi (through the LAN of a building) or 3) mesh Wi-Fi.

All units are connected through a group structure of connection groups for communication. In most cases, those groups can follow the group structure of the DLM power distribution. The exceptions are mainly large groups on same DLM level (>32 units) or when inter communication is changed to start a mesh Wi-Fi group.

NOTE

A connection group, setup by assigning a communication master role to a unit, is limited to max. 32 units. If more units need to be used in the system, then subgroups need to be introduced.

A unit acting as master for a subconnection group must be connected via an ethernet cable or Wi-Fi to the LAN.

A meshed Wi-Fi group must be "started" by a unit acting as communication master.

Several mesh Wi-Fi groups can be set up, but only in parallell, not as a “meshgroup” of a meshgroup.

A mesh network is dynamically optimizing the connection paths used. All units in the meshgroup are acting as a repeater, but always just "mesh in- mesh out". So mesh is a possible alternative "far out" in a network when cable cannot be used.

External IT-infrastructure is usually required to build large installations. As long as the same LAN (VLAN) is used, it is recommended to use cable-based internet through a router, or if not possible, a mobile communication-based router.

The external IT-network is built up of switches, preferably forming star-connected networks. However, the built-in 2-port switch of the Entity PRO charging station and Entity Balance Advance, can be used to build a long chain of installation. A disadvantage is that a service break in one unit disturbes the units that follow. GARO Entity Compact has only 1 ethernet RJ-45 port.

NOTE

GARO Entity Compact has only 1 ethernet RJ-45 port so ethernet cable wiring to several charging stations requires external switches, not a "daisy chain". Instead it is always based on switch, forming star topologies.

The mesh Wi-Fi system contributes to an easy installation. However, large distances or radio obstacles may require physical ethernet cable connections. Cable connection is a good recommendation.

Units can also be inter-connected through an existing Wi-Fi. However, this requires that the Wi-Fi is a part of the same LAN that the other units are connected to. One example is when a "radiojump" is required, longer than a normal Wi-Fi range, then any external point-to-point ethernet extender can be used. The use of a Wi-Fi makes the installation and the replacement of a charging unit more complex. A non-master unit can never just be "plug and play" replaced if a Wi-Fi is used as connection type.

NOTE

A system of charging stations is always highly dependent on both internet connectivity and a robust inter-communication based on traditional LAN-technology.

Transfer location

If the installation is done on behalf of the owner, transfer location to the "real" owner.

To do this, click on Transfer location and follow the instructions in the GARO Connect app.

1. Create a unit, add a name for it and select GARO Entity Balance.
2. Select the created unit to define how the load interface shall fit into the group structure.
3. The installation guide displays. Each step must be completed in order to finalize the installation, refer to Transfer location, page 55.
4. Physical installation. Refer to 3.14.3 To install the load interface in an electrical cabinet, page 61.
5. Connect the created load interface in the app to a physical load interface by scanning the QR code on the load interface or enter the serial code to confirm the unit and click complete. At this point, the physical DLM is connected to the unit, created in the GARO Connect App.
6. Internet connectivity

   Follow the same process as described for charging stations, refer to .

   The difference lies in that a load interface does not contain any built-in modem, and is therefore not an option for a load interface acting internet connectivity master.

NOTE

The load interface ID label contains login credentials for the load interface and should be considered as sensitive information from a cyber security perspective.

7. Firmware update

   Firmware can always be updated, but never downgraded as this is not allowed due to cyber security risks. It is highly recommended to enable automatic update of firmware (default setting). A software update over a modem can sometimes be very time consuming. It is possible to update at a later date, refer to Transfer location, page 55
8. Configuration settings

   As the main function of the load interface is to monitor current, the main setting is to select what type of input to use. The input type is dependent of the variant of load interface. i.e. Balance basic or Balance advanced. Use the guided settings to define the input to be used. There are several additional advanced configuration settings that are possible to adjust with the GARO Connect app. For information on the different parameters, click the "**I**" icon.
9. Functional test

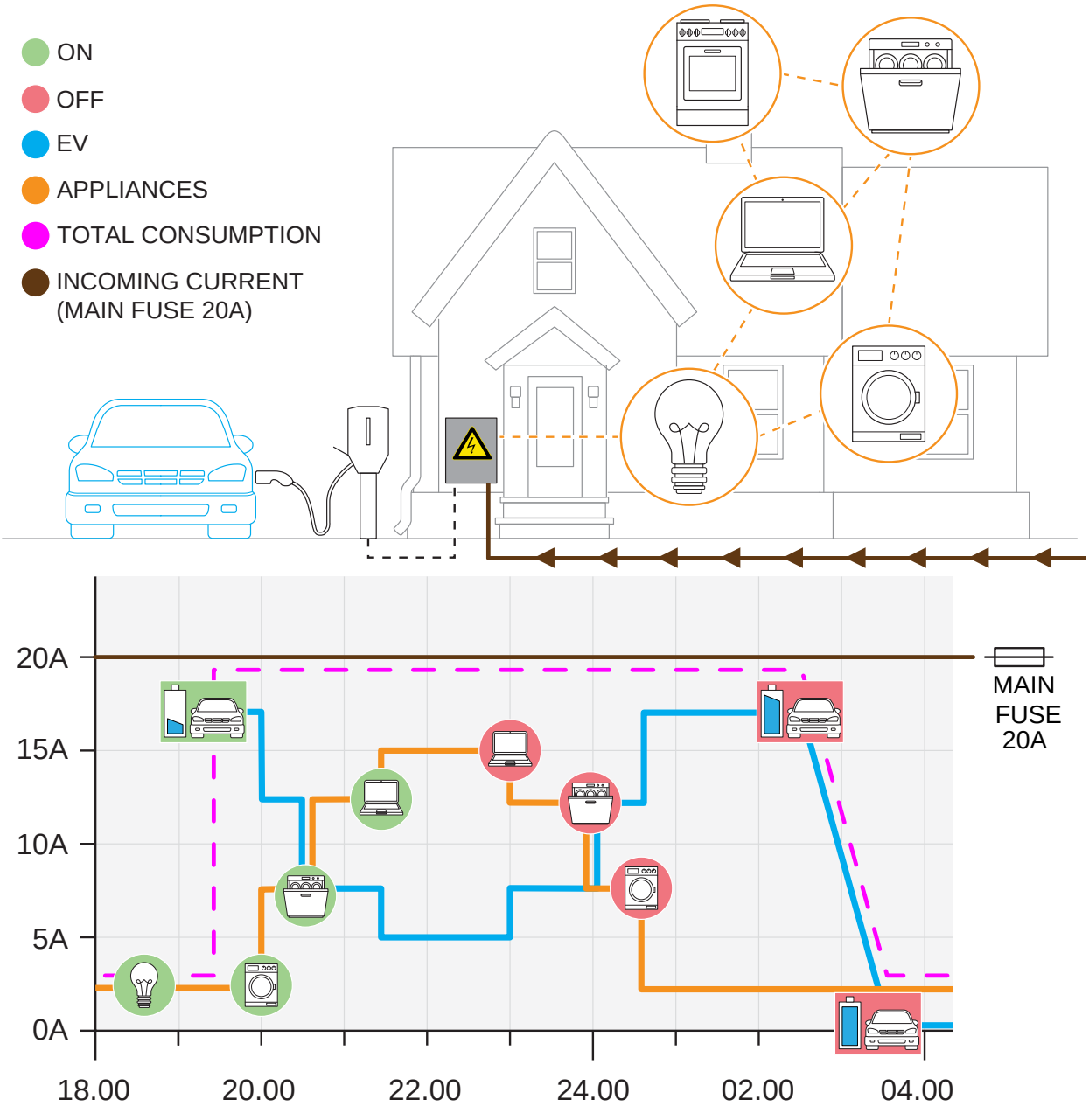
   Perform the necessary functionality tests such as testing the load management setup to ensure the current is limited at high load conditions.
10. Declare the installation complete in the app.

3.14 DYNAMIC LOAD MANAGEMENT (DLM)

3.14.1 DYNAMIC LOAD MANAGEMENT (DLM) FUNCTIONALITY

Dynamic Load Management (DLM) is based on a grouping of loads that share a specific critical equipment, such as a fuse. Each load management group is based on one master device (charging station or load interface) in the load management group. The master device should preferably be the connection point for internet, but this is not a requirement. Any single unit of the group can be an internet connectivity point and act as communication master to a group. The load management group is also defined by a maximum current, which is typically the same size (Ampere) as the fuse that is to be protected from overload.

The load management group either consists of either 1 or several charging station(s), where the real current is calculated as the sum of all charging station currents, or several charging stations together with other loads. If the load management group consists of other loads as well, then the real current needs to be monitored, using a load interface. The load interface acts as DLM master of this load management group. The charging stations (and possible subgroups) will share the remaining current (unused fuse capacity) to prevent overload.



The real current is measured by current transformers or energy meter, and transferred into the system with a load interface. It is possible to define several connection groups as a hierarchy of maximum four levels.

NOTE

Internet connection is necessary for configuration but not for operation.

The load interface transfers current information to the DLM system by reading a current transformer or an energy meter, and act as master unit for DLM in the connection group. In that case, internet connection for access control is recommended to be done through the master load interface. The load interface can be connected to internet via Wi-Fi or ethernet. Refer to 3.14.3 To install the load interface in an electrical cabinet, page 61. It can also participate in a Wi-Fi Mesh network.

The load interface is necessary in most installations and all settings are done in the GARO Connect app. The communication platform is in the same network as the charging station(s).

NOTE

The load interface is available in two versions, GARO Entity Balance Basic and GARO Entity Balance Advanced. The difference lies in connectivity. GARO Entity Balance Basic should fit most installations. If the Utility meter contains HAN, then this is recommended to be used.

If the group contains local production (like PV/solar panels) with a net output power that can get close to the max. current, then a separate energy meter for bidirectional power is required. Only current transformers are not capable to detect power direction.

Multi-Level Load Management

The GARO Entity system is prepared to work with the load interface, to support multi-level load management. This means that current limitations can be managed on several (up to 4) levels of the installation.

The fist level could be a fuse, feeding a group of charging stations. If a connection group contains only charging stations, then no load interface is required, total current is calculated by adding the charging station currents.

The second level could be the fuse feeding the building where the charging stations are connected.

A third level could be the main fuses to the location.

Up to 4 levels are possible to configure with the app-based user interface. These settings are made by the installer.

By using the GARO Connect app, any limitation that occurs can be analyzed to see what causes the limitation.

NOTE

A unit (a load interface or charging station) can only have 1 master role. If a multi-level DLM only consists of only charging stations (no other loads), a load interface must be introduced on the second level to manage the superior group.

DLM Algorithm:

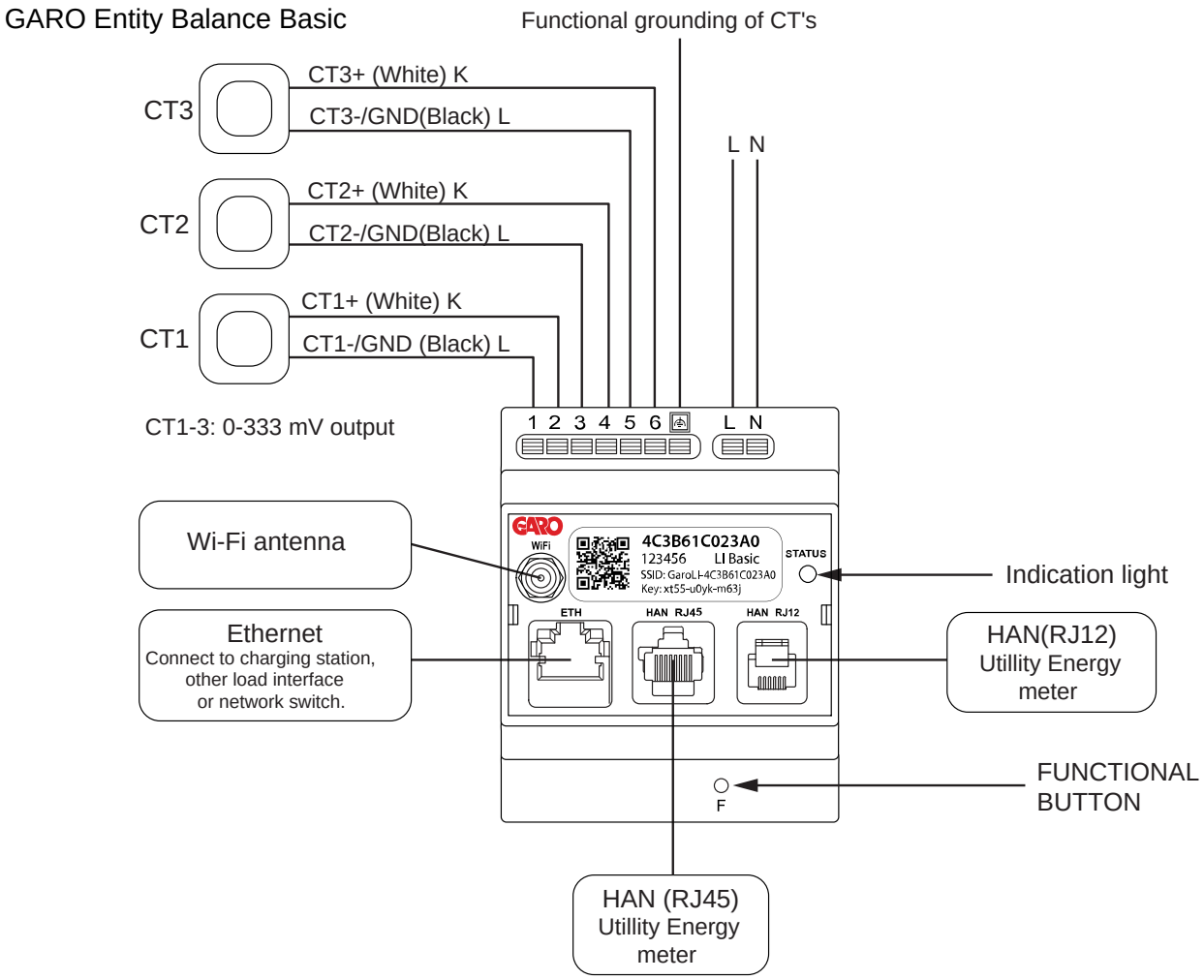
If the total current consumption exceeds the set limit, then the current consumption is limited to within the group and all charging station are allowed the same current. First 3-phase is allowed to all.

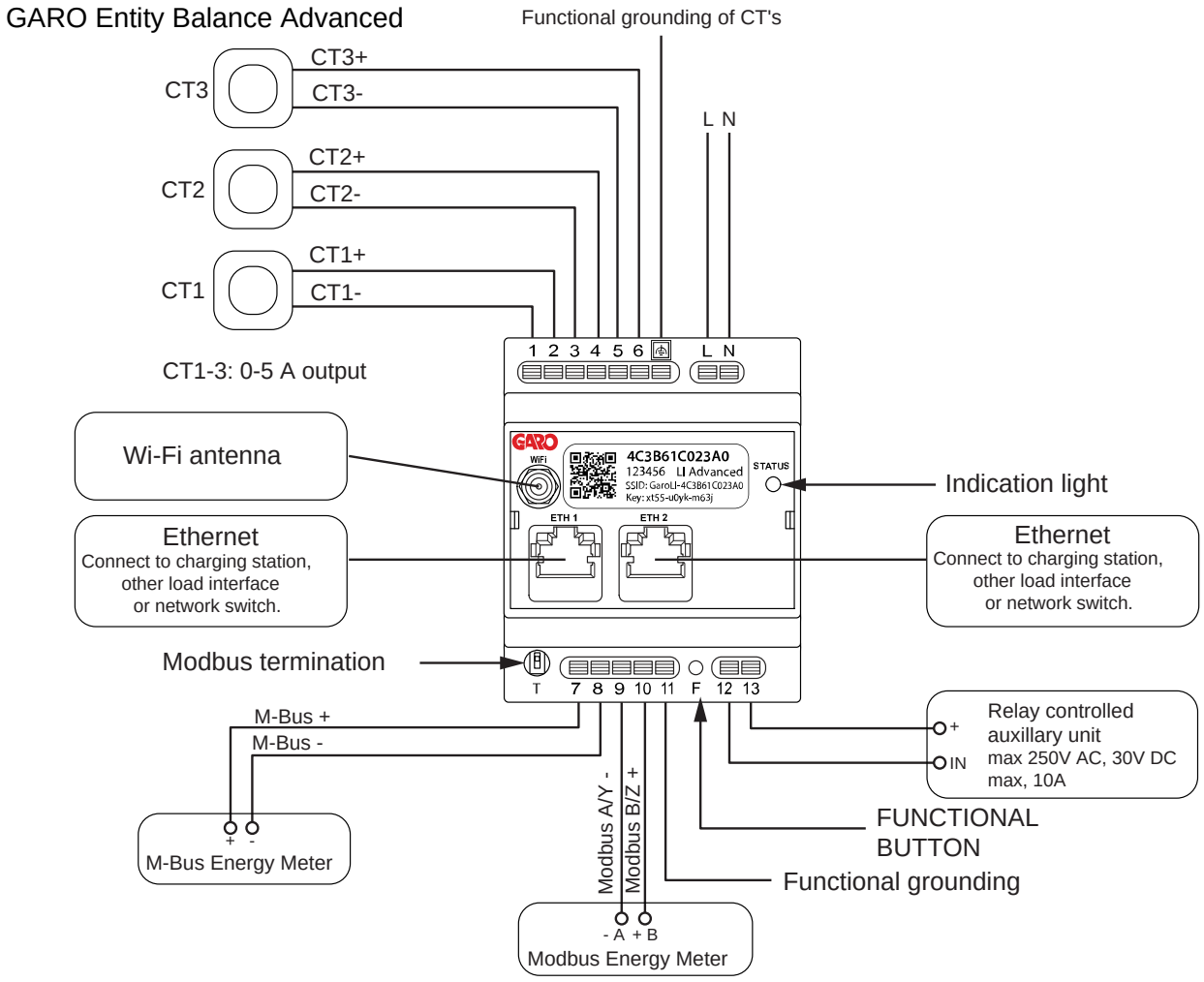
If 3-phase power is not available for minimum charging current of a charging station, but there is still current capacity on any single phase (1-phase), then charging can be continued on this/those individual phase(s) available on some single phase.

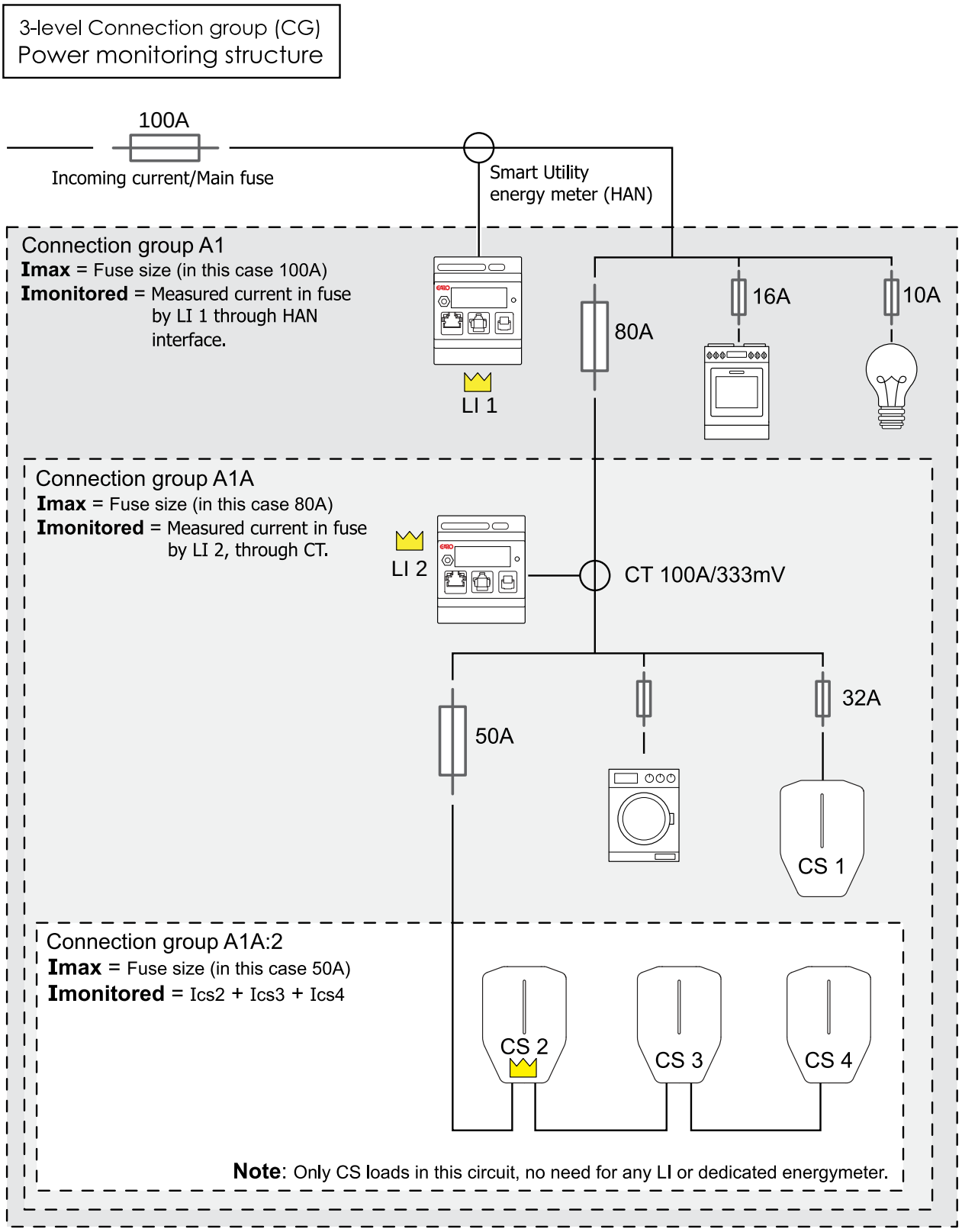
Some models of charging stations have a built-in phase management system, that can select the 1–phase system fully dynamically to select the correct phase(s).

If all current capacity is used up, and a new EV is trying to start, then the EV's will be served in that order they connected.

3.14.2 LOAD INTERFACE INSTALLATION OVERVIEW

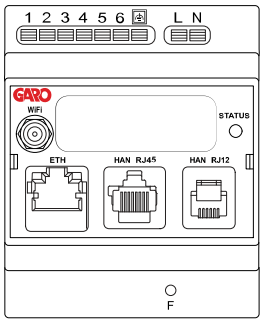



GARO Entity Balance Advanced
Functional grounding of CT's
CT3
CT3+
CT3-
CT2
CT2+
CT2-
CT1
CT1+
CT1-
L N
1 2 3 4 5 6
L N
CT1-3: 0-5 A output
Wi-Fi antenna
Ethernet
Connect to charging station,
other load interface
or network switch.
Modbus termination
4C3B61C023A0
123456 LI Advanced
SSID: GaroLI-4C3B61C023A0
Key: xt55-u0yk-m63j
STATUS
Indication light
ETH 1
ETH 2
Ethernet
Connect to charging station,
other load interface
or network switch.
T
7 8 9 10 11 F 12 13
M-Bus +
M-Bus -
+ -
M-Bus Energy Meter
Modbus A/Y -
Modbus B/Z +
- A + B
Modbus Energy Meter
+
IN
Relay controlled
auxillary unit
max 250V AC, 30V DC
max, 10A
FUNCTIONAL
BUTTON
Functional grounding

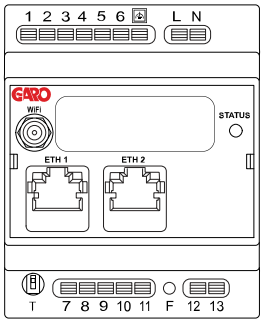

3-level Connection group (CG)
Power monitoring structure
100A
Incoming current/Main fuse
Smart Utility
energy meter (HAN)
Connection group A1
Imax = Fuse size (in this case 100A)
Imonitored = Measured current in fuse by LI 1 through HAN interface.
LI 1
80A
16A
10A
Connection group A1A
Imax = Fuse size (in this case 80A)
Imonitored = Measured current in fuse by LI 2, through CT.
LI 2
CT 100A/333mV
50A
32A
CS 1
Connection group A1A:2
Imax = Fuse size (in this case 50A)
Imonitored = Ics2 + Ics3 + Ics4
CS 2
CS 3
CS 4
Note: Only CS loads in this circuit, no need for any LI or dedicated energymeter.

3.14.3 TO INSTALL THE LOAD INTERFACE IN AN ELECTRICAL CABINET

GARO Entity Balance Basic



GARO Entity Balance Advanced

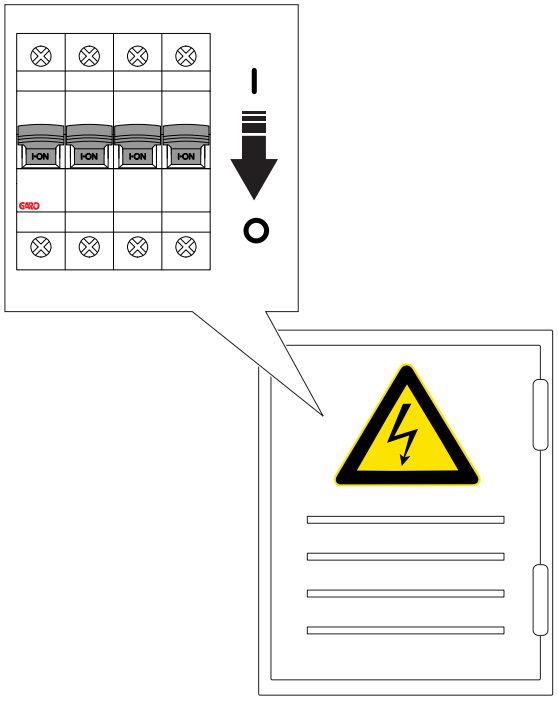


This is a general instruction of the load interface installation. The load interface is intended to act as an interface to the power and current meters as input to the DLM system of GARO Entity charging stations. The procedure differs between different installations and can also differ due to national regulations. The load interface unit is designed for DIN rail mounting. Two different load interface units are available at GARO: GARO Entity Balance basic and GARO Entity Balance advanced.

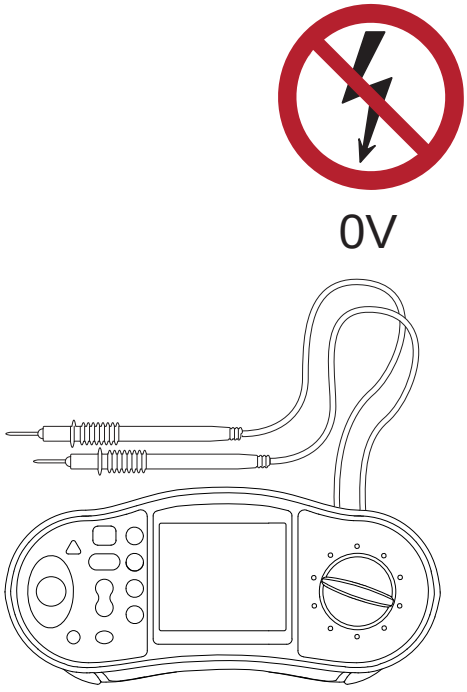
NOTE

This chapter shows the installation of the GARO Entity Balance BASIC model. The process for the GARO Entity Balance ADVANCED is similar. If the group contains local production (like PV/solar panels) with a net output power that can get close to the max. current, then a separate energy meter for bidirectional power is required. Only current transformers (CT) are not capable to detect power direction.

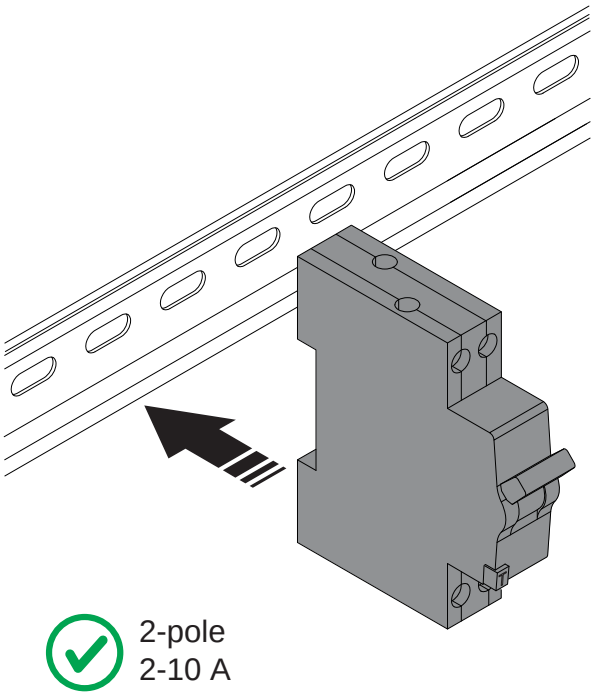
1. Turn the power/voltage off by an appropriate insulating main switch.



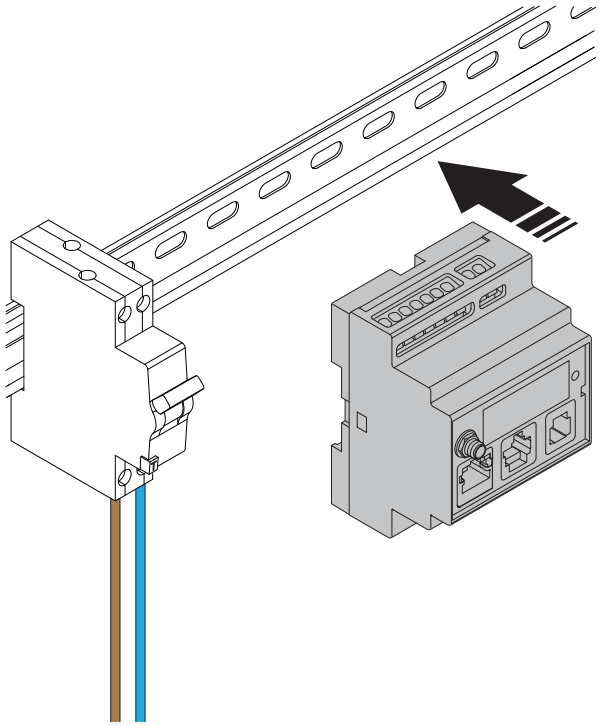
2. Make sure that the power/voltage is off.



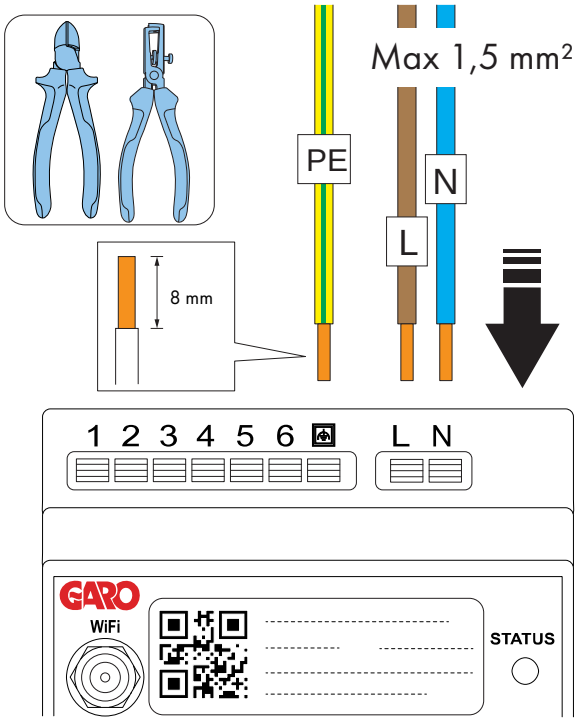
3. Install an insulating and protection device (RCBO or MCB) on a DIN rail (A). The load interface normally requires an individual insulating and protection device for 230 V. For this purpose it is recommended to use a 2–pole 2–10 A RCBO.



4. Install the load interface unit (C) on the DIN rail.



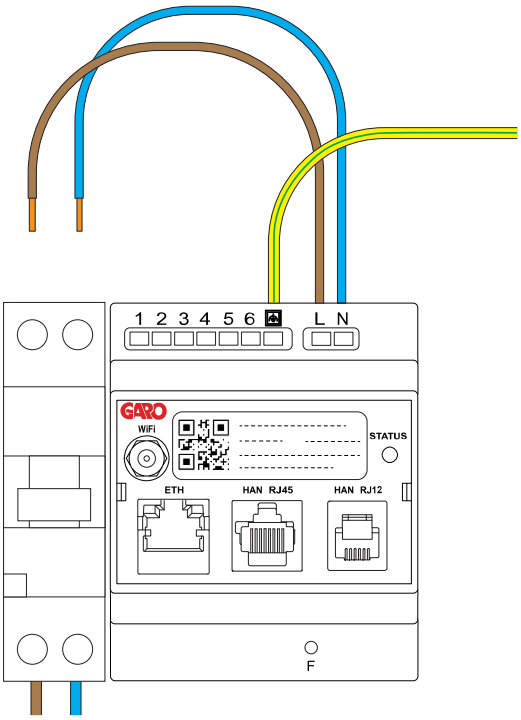
5. Dismantle the wires and connect the load interface to the 230V AC. Refer to the electrical schedule for all electrical connections.



6. Connect the load interface to the protection device.

NOTE

Functional Ground connection (here shown as PE) is only recommended to use when connecting current transformers. However, it may also contribute to Wi-Fi performance, since antenna groundplane is enhanced.



7. If current is measured using current transformer, choose the correct current transformer (CT) for the installation.

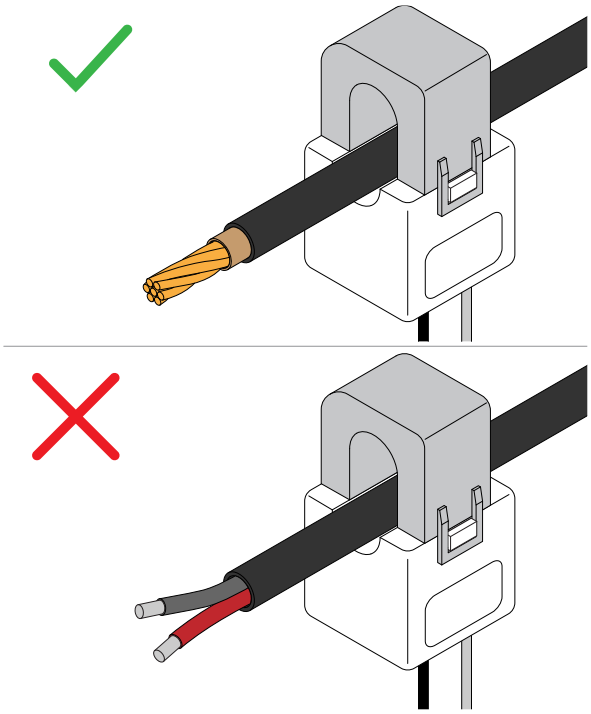
WARNING

Make sure that you choose a current transformer (CT) that is suitable for your installation. Current transformers of 2 output types can be used. 0-333 mV or 0 – 5 A output range. For easy installation, GARO recommends the 0-333 mV type when possible.

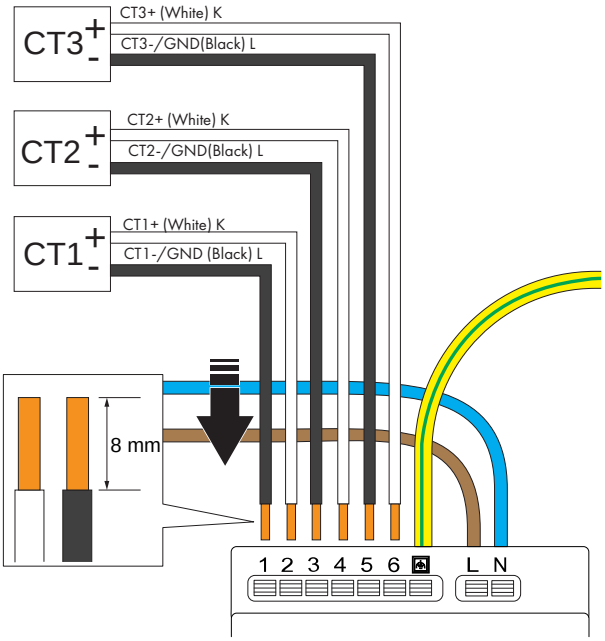
0–333 mV is only valid for GARO Entity Balance basic and 0–5 A is only valid for GARO Entity Balance ADVANCED. Take notice: 0-5 A output types of current transformer must never be exposed to open circuit conditions.

NOTE

This chapter shows the installation of the GARO Entity Balance basic and the GARO 0-333 mV CT clamps that are available as accessory. The process for the GARO Entity Balance advanced is similar.



8. Dismantle the current transformer wires and connect the current transformer to the load interface.

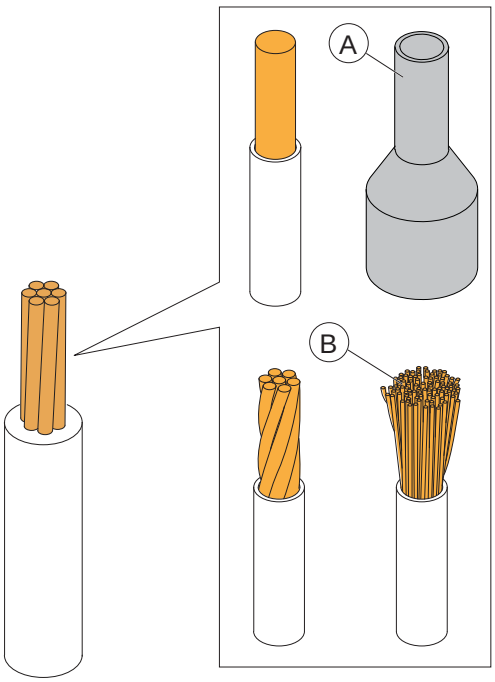


CT1-3: 0-333 mV (Basic)
CT1-3: 0-5 A (Advanced)

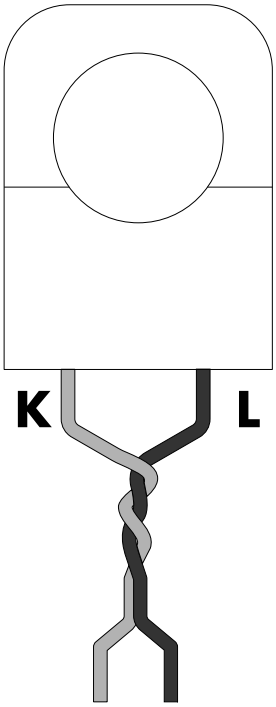
Use a wire ferrule (A) for strained wires (B).

NOTE

The functional grounding connector next to the PE conductor is internally connected to one of each current transformer pole (no. 1, 3, 5). This in order to provide a defined voltage potential. It is recommended that the functional grounding conductor is connected to a ground potential, such as the PE conductor.

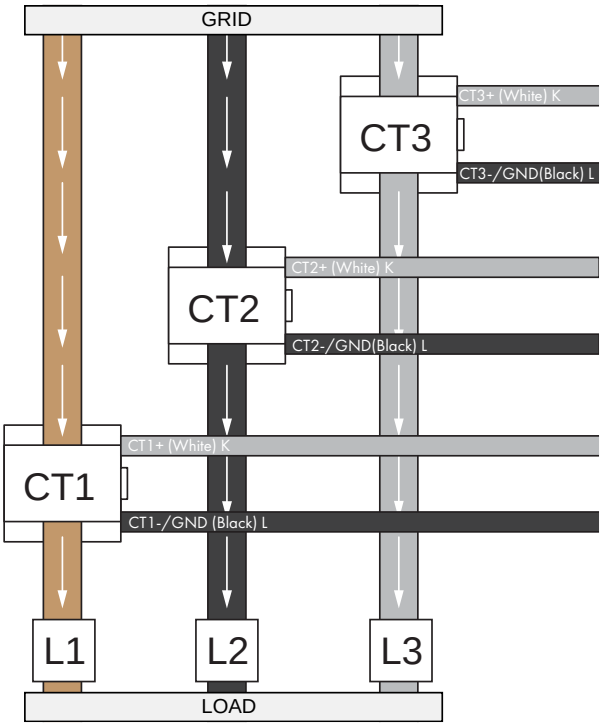


The input terminals 1, 3 and 5 are internally connected to PE in the load interface.

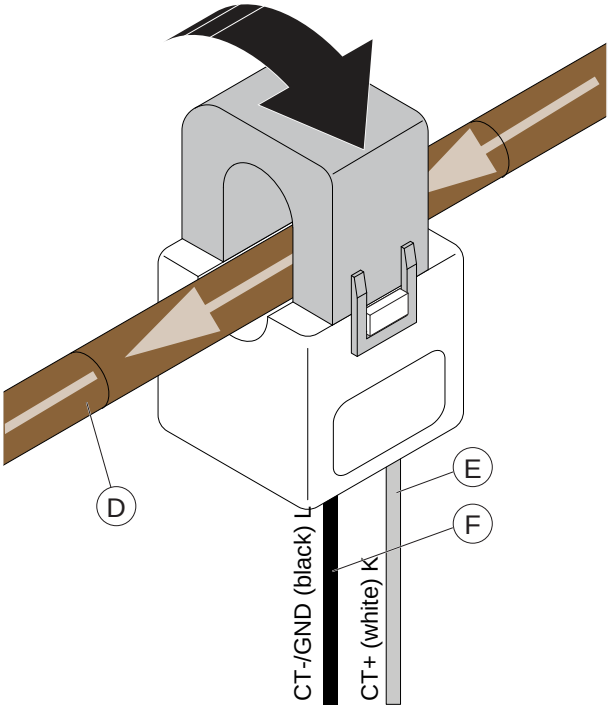


Wires -L are recommended to be light-twisted as pairs, to reduce induced disturbances.

9. Attach the current transformer conductors to the measured current.



10. Make sure that the metal contact surfaces are really clean before closing the current transformer (CT) clamps. Close the current transformer (CT) clamp. A click is heard when it locks.



CAUTION

Note the current direction of the cable (D) and the position of the positive (K) and negative (L) cable of the current transformer (CT) clamp.

11. The GARO Entity Balance BASIC is prepared for HAN communications to the modern main utility meters, based on RJ12 or RJ45 connections. HAN is only available on GARO Entity Balance basic.

NOTE

HAN:

Several grid utility companies require an owner to formally order an activation of the HAN-port. To clarify what applies for a specific location, contact applicable grid utility company.

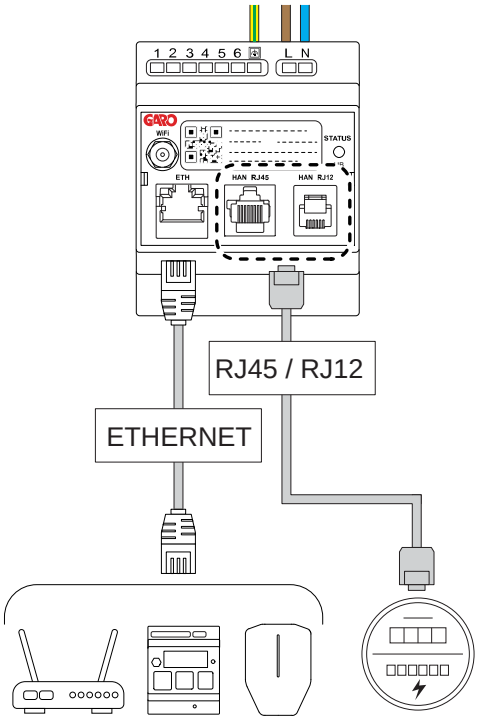
The HAN utility energy meter must also have an integrated 5VDC source in the HAN RJ12 connector. Not all HAN-meters are equipped with an integrated 5VDC source in the HAN RJ12 connector. If the HAN-meter is without a 5VDC source, an active adapter can be used instead. If other components/receivers need to use the RJ12 HAN port, use a passive "Y-splitter".

12. Also, the energy meters can be used as traditional energy meters: Apart form the HAN utility energy meter, traditional energy meters based on M-bus or Modbus can be used also by GARO Entity Advanced. To use the traditional energy meters it is necessary to make sure that the communication parameters match in the settings in the GARO Connect app vs. the energy meter.

NOTE

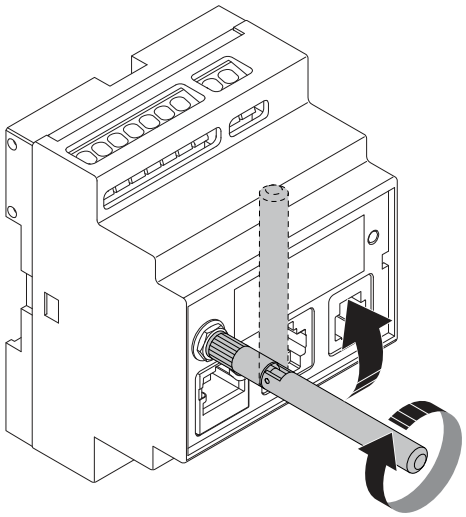
A load interface can be used in systems with local production (PV/solar inverters or battery systems). In such a case, it is important to keep track on the power direction. This can only be performed using a dual-direction capable energy meter. Current transformers on their own cannot provide that information.

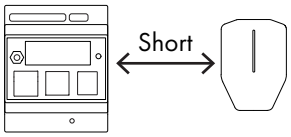
13. The load Interface is a part of the total GARO Entity charging station communication network, that could be based on either ethernet cable, Wi-Fi mesh or a Wi-Fi that is part of an existing IT infrastructure. The GARO Entity Balance basic has 1 RJ-45 Ethernet port. The GARO Entity Balance advanced has 2 RJ-45 Ethernet ports.



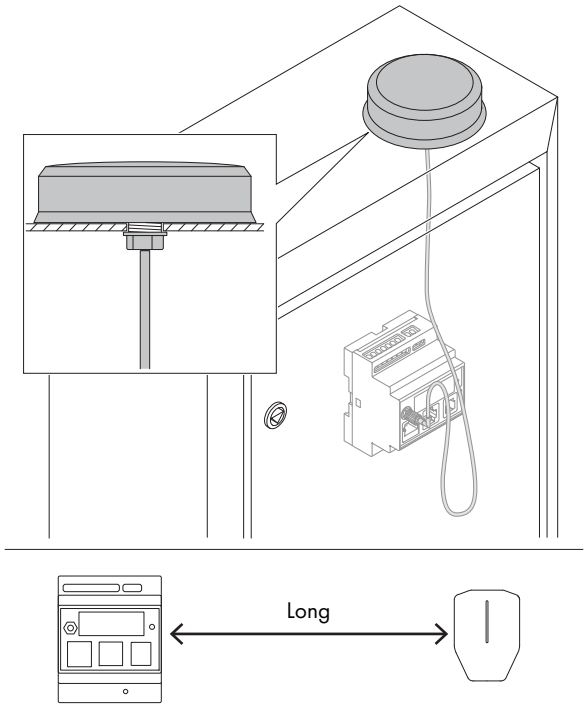
14. It is always recommended to connect an antenna even if a Wi-Fi or a mesh Wi-Fi is not used.

15. The short external antenna is supplied with the product. Use this antenna if the distance to the charging station is short. There are several factors that can lower the range of the antenna (i.e. obstacles, metal cabinet, other radio equipment, etc.).

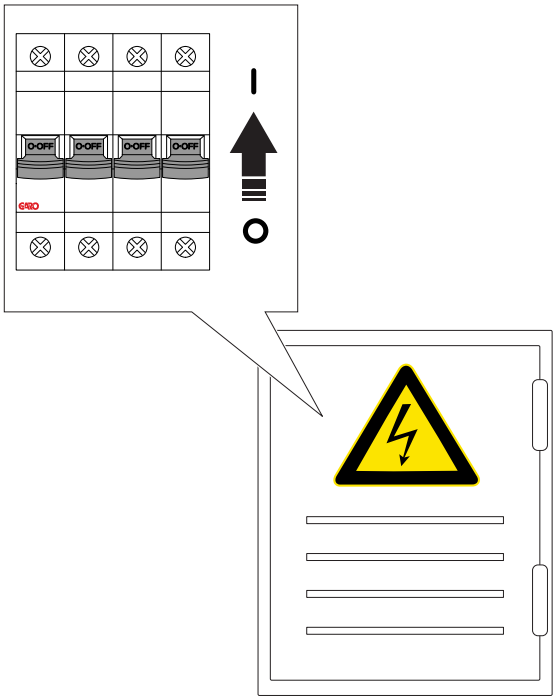




16. A long range, panel-mounted, circular disc Wi-Fi antenna is available as accessory at GARO. It is used when the distance to the Wi-Fi or mesh Wi-Fi node (= other entity unit) is long or obstacles can occur. Assembly instructions are supplied with the external antenna. If the load interface is mounted inside a metal cabinet, it is highly recommended to use the external disc antenna.

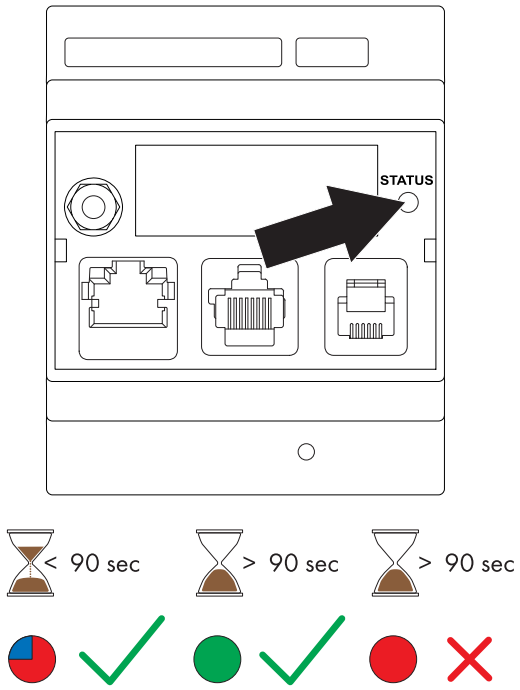


17. Turn the power/voltage on.



18. The light indicator on the front panel turns red at power/voltage up. Make sure that the indicator light on the load interface turns green. This can take 60–90 seconds.

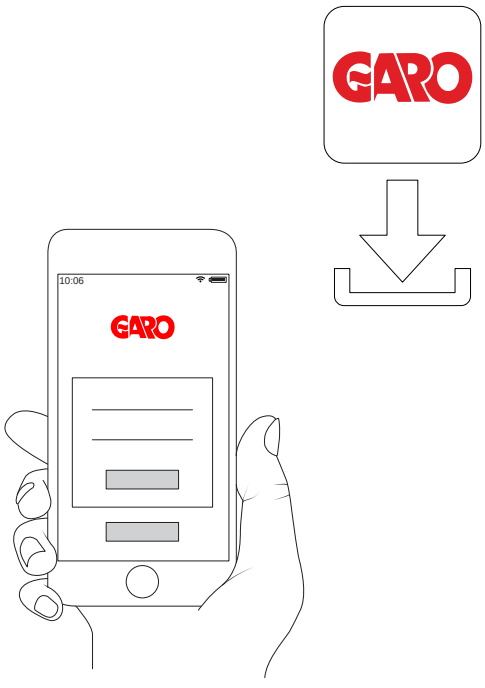
    The last few seconds before turning green, the light turns blue. This is to indicate that the firmware starts operating correctly. However, the most important step is the green light.



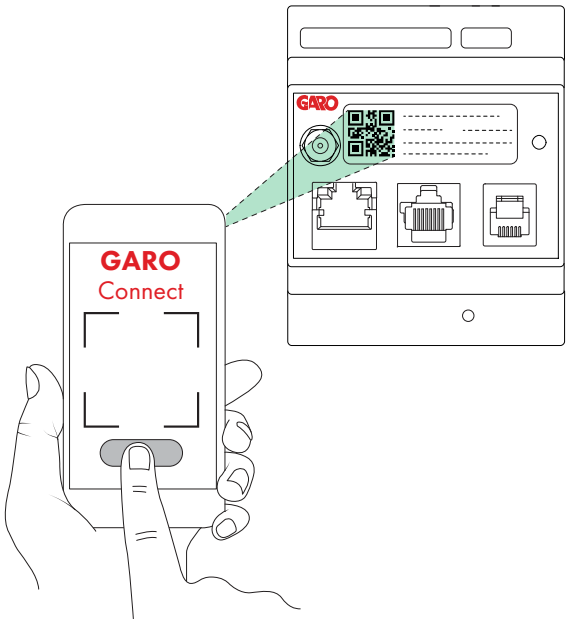
NOTE

If the light indicator on the power unit does not turn green within 90 seconds of powering up the power unit, refer to .

19. Download the GARO Connect app on AppStore or Google Play store.



20. Configure the settings in the GARO Connect app.
    Scan the QR code on the load interface.



21. Test the load management setup to ensure that the current is limited at high load conditions.

    Testing the DLM:

    The first step is always to verify that the measured DLM current is correct. Check the energy meter or other current meter.

    Testing a DLM system can be challenging. A small installation at a private home, with 1 charging station and 1 load interface is usually easy to verify. An example is charging an EV while using heavy electric consumer equipment in the house (the stove, water heaters). Larger sites are more complex to verify and may require many EVs. A possibility is to temporary adjust the DLM limit current down to a level that is more "possible" to affect by whatever loads that can be used.

4 OPERATION

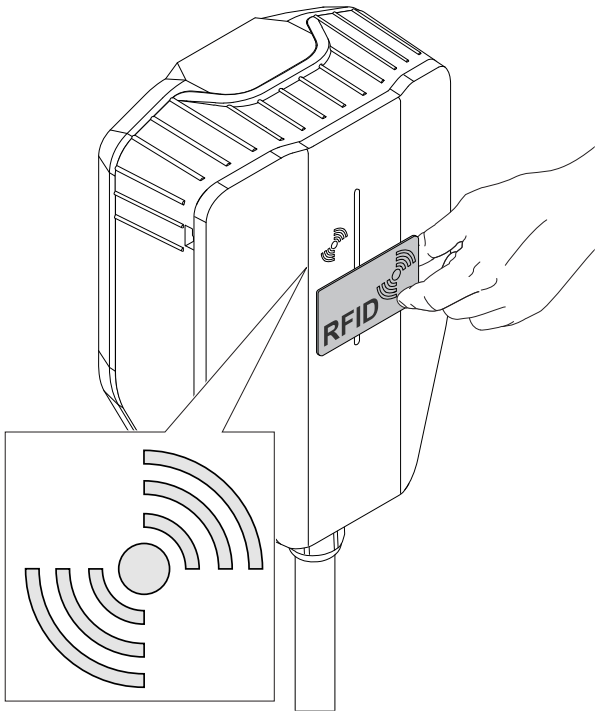
WARNING

Read and understand the safety chapter before operation of the product. Refer to 1.1 Safety definitions, page 6.

4.1 TO CHARGE AN ELECTRICAL VEHICLE

1. Connect the charging cable to the EV.
2. If the charging stations gives a yellow blinking light indication, authorization is necessary. Do one of the steps that follow:

   a. Either hold one of the RFID tags against the RFID reader area on the charging station



   b. OR log on to the GARO Connect app and choose *Charge and use*. Choose location and charging station. Swipe or press to start.

   The charging starts after authorization. Charging is indicated as blue.

NOTE

If the charging station is set to free charge mode (default), no authorization will be necessary and the charging starts immediately. If an EV-driver, uses "freecharge" without using the app or RFID, (not necessary), the "freecharged" energy will not be logged to the EV-driver's registered consumption. But if the EV-driver identifies themselves on a freecharge charging station, then the charged energy is registered to the EV-driver.

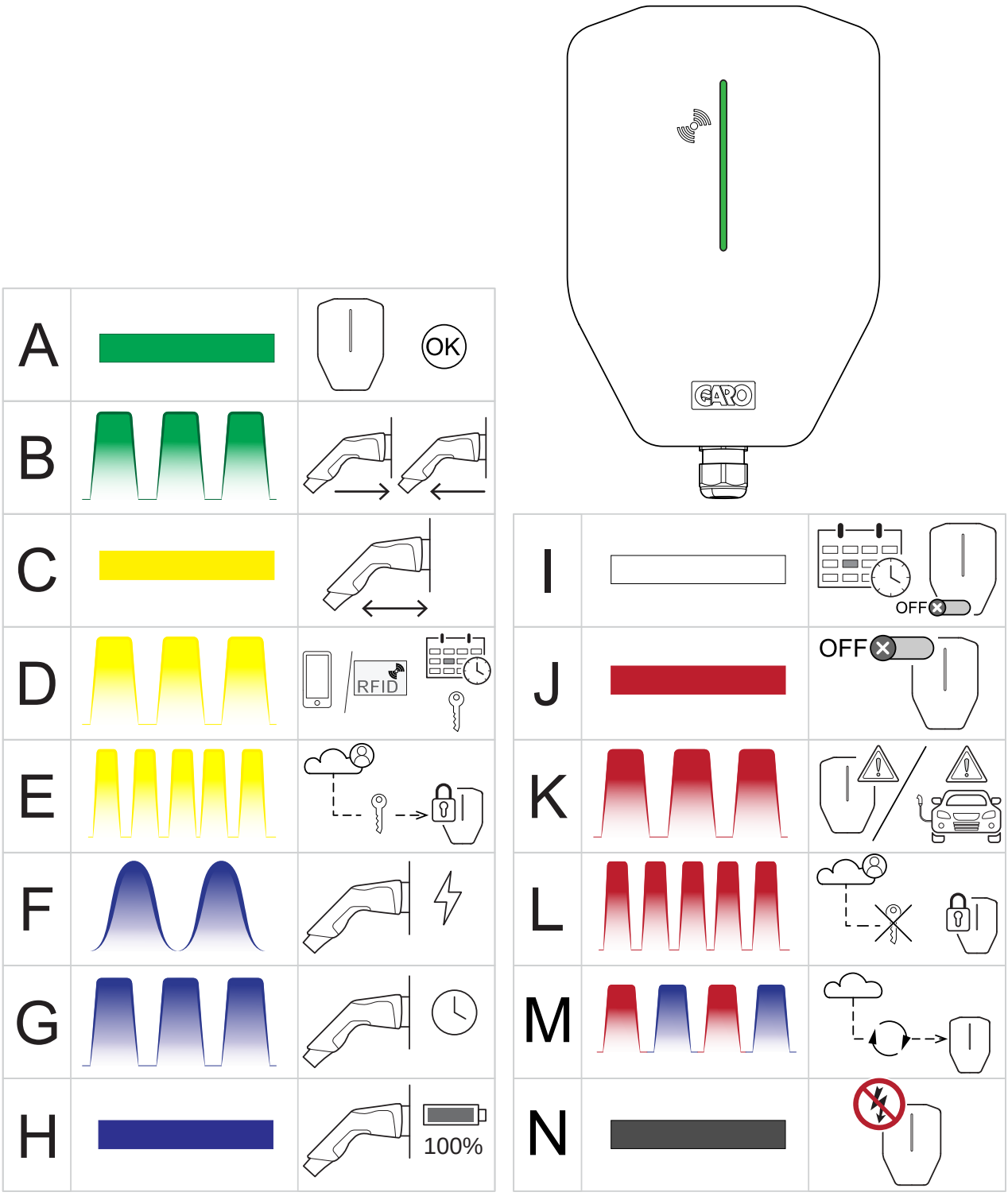
NOTE

The following settings are also available in the GARO Connect app.

- Schedule the charging.
- Manage personal settings and the personal RFID tags.
- Monitor the charging process.
- Do a check of the status and location of charging stations that are accessible to the user.

  Also, ongoing sessions can be monitored and the charging history analyzed.

4.1.1 INDICATION LIGHT



	When	Meaning
A	Green solid light.	The charging station is available for charging.
B	Green slow blinking light, 1 Hz.	The charging station waits for either a connection to or a disconnection of an EV.
C	Yellow solid light.	The Type 2 contact is not in correct position. Try to reconnect.
D	Yellow slow blinking light, 1 Hz.	The charging station is reserved or awaits authorization by the EV Driver.
E	Yellow fast blinking light, 10 Hz.	The authorization of the EV driver is checked.
F	Blue pulsating light, 1 Hz.	The EV charges.
G	Blue slow blinking light.	The charging awaits the time schedule to start the charging process.
H	Blue solid light.	The charging process is finished by the EV.
I	White fixed light.	The charging station is in a schedule controlled off-state, waiting for a scheduled charging event.
J	Red solid light.	The charging station is deactivated by GARO Connect app or the external enable signal. Example: A schedule that does not yet enable charging.
K	Red slow blinking light, 0.5 Hz.	Error in the charging station or the EV. Disconnect the EV and retry. If the breaker has tripped, a manual reset is required.
L	Red fast blinking light for 3 seconds, 10 Hz.	The charging station cannot find authorization for the EV driver.
M	Red and blue slow blinking light, 1 Hz.	Software update in progress.
N	No light.	The charging station has no power or the intensity of the indication light is reduced.

4.2 TO SCHEDULE CHARGING

1. Open the GARO Connect app on a mobile device.
2. Navigate to *Overview*.
3. In the view *Charging stations* click the charging station to set a schedule.

4. Scheduled charging is indicated by: White light when not activated, green light when activated and blue when both activated and an EV is connected.
5. Click *Schedule Charging* in the view that opens.
6. Follow the instructions in the GARO Connect app to set the time for charging.

4.3 TO MONITOR THE CHARGING PROCESS

1. Open the GARO Connect app on a mobile device.
2. Navigate to *Charge and use* .
3. In this view it is possible to navigate to each charging station that is in use by an EV Driver account/identity up to the same access level. The charging process can be started, stopped and charging scheduled, see the status of the charging station and the charging capacity.

4.4 TO STOP THE CHARGING OF THE ELECTRICAL VEHICLE

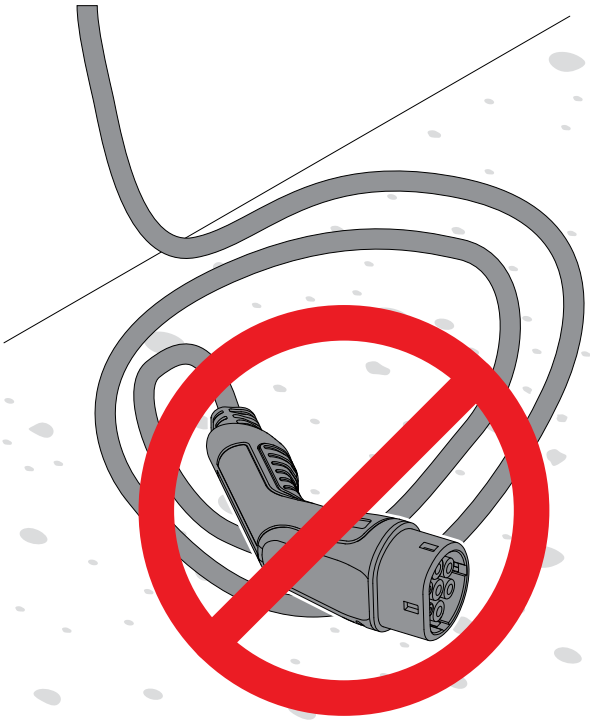
1. Do one of the procedures that follow to stop the charging.
   a. Follow the instructions for the electrical vehicle, i.e. the EV will initiate a charging stop.
   b. Use a RFID that is connected to same EV D driver that started the charging. Only the EV driver that started the charging can stop it.
   c. Use the GARO Connect app and log in as the EV driver that started the charging.
2. Disconnect the cable to the electrical vehicle.

CAUTION

The Type 2 connector is locked during charging in the charging station and the electrical vehicle inlet. Do not force the Type 2 connector or charging cable as this can cause damage to the product or the electrical vehicle.

CAUTION

Do not leave the Type 2 contact on the ground. Always hang it up or store it in a dry location.



5 MAINTENANCE

5.1 TO CLEAN THE CHARGING STATION

- Use a damp cloth to clean the exterior of the charging station.

CAUTION

Do not use running water or a hard brush to clean the charging station, it can cause damage.

5.2 TO DO A VISUAL CHECK OF THE CHARGING STATION

1. Make sure that the charging station is clean.
2. Do a visual check of the charging station, Type 2 connector and the power cable. Do a check for damages such as cracks or deformation.

WARNING

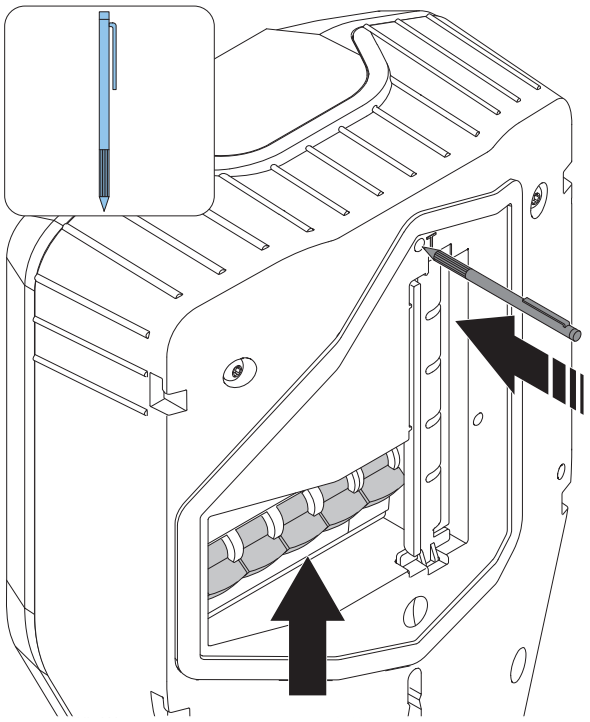
Do not use a damaged charging station. Turn off the electric power and disable the charging station in the GARO Connect app. Contact an authorized service center.

5.3 TO DO A FACTORY RESET

CAUTION

The GARO support organization should approve a factory reset. The factory reset should only be done as a last resort in case of errors, such as lost contact to the network or the GARO Connect app.

1. Stop charging and disconnect any EV.
2. Remove the front cover of the charging unit.
3. Do a long press, approximately 20 seconds, on the test button (T) with the designation "T". Use a pen or similar. When pressing the button, the circuit breaker will trip. The indication turns a blinking red.



4. After the light goes off, release the button and the circuit breaker can be re closed. Refer to 5.5 To do a reset after a minor ground fault, page 73.
5. Wait for the device to restart and the light to turn green.

5.4 TO DO AN EARTH FAULT TEST

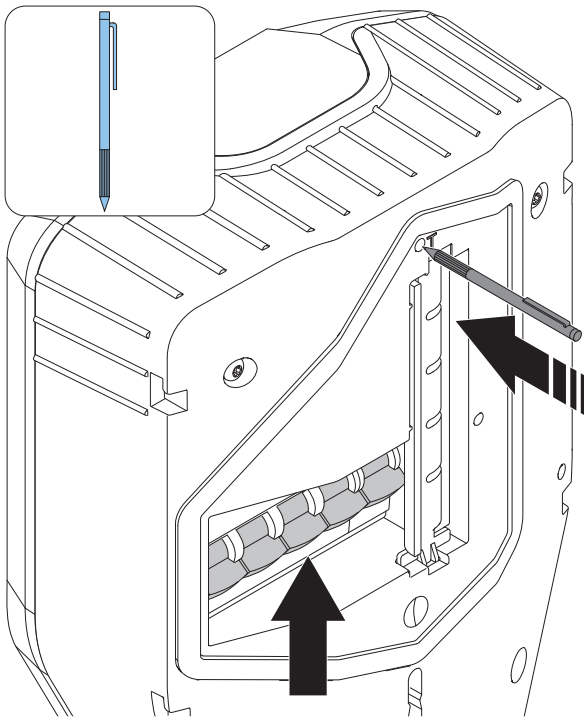
NOTE

Do an earth fault test regularly, it is recommended to do twice per year.

1. Remove the front cover of the charging station.
2. Do a short press (max. 1 second) on the test button (T) with the designation "T". Use a pen or similar.

NOTE

When the test button is pressed, the indication light becomes blinking red and the circuit breaker trips.



3. Unplug the electric vehicle (EV).
4. If the charging station still indicates red, the circuit breaker needs to be reset. Open the front cover of the charging station.
5. Lift the switch arm up to reset the circuit breaker.

NOTE

The circuit breaker can have 4 or 2 poles (three- or one-phase versions).

5.5 TO DO A RESET AFTER A MINOR GROUND FAULT

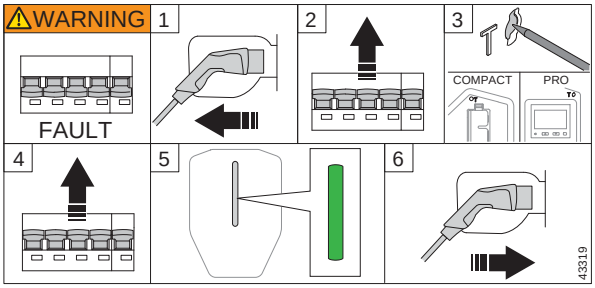
The charging station can be configured to enable early detection of a ground fault or overload by an EV. This is a setting made by the installer. This is indicated by a slow blinking (0.5 Hz) red indication light.

As charging is stopped, disconnect the EV. The charging station will reset after a few seconds. A green light indicates if all is OK.

If no green light lights up, contact the owner of the charging station to perform a reset of the circuit breaker.

5.6 TO DO A RESET OF A TRIPPED CIRCUIT BREAKER

If the circuit breaker trips, the light status indication on the charging unit becomes a slow blinking (0.5 Hz) red. If it is configured, a notification is sent to the owner and the EV driver that uses the charging station, in the GARO Connect app. The circuit breaker can trip either due to an earth fault, short circuit or overload.



1. If there is an EV connected to the charging station, unplug the Type 2 charging connector. Unlock and remove the front cover of the charging unit, refer to . Do a visual check of all cables and connectors.
2. Lift the switch arm up to reset the circuit breaker.
3. Do an earth fault test, refer to . This should trip the circuit breaker.
4. Reset the circuit breaker.
5. Wait for the indication light to turn green. Put the front cover back on. If the circuit breaker trips immediately, do not use the charging station. Contact an installer or a service center.
6. Connect and charge the electrical vehicle again.

CAUTION

Do not perform repeated tests on a faulty EV or charging station. This may result in damages to the EV or charging station.

If the circuit breaker does not trip again, reinstall the front cover of the charging unit.

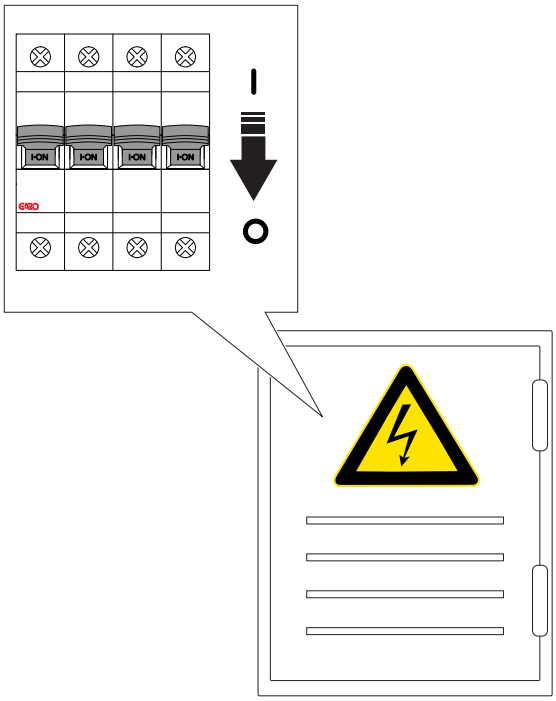
5.7 TO REPLACE A CHARGING UNIT

WARNING

Necessary knowledge to replace a charging unit is required. If unsure, speak to an installer.

If the charging unit is damaged, it is necessary to replace it. To replace a single charging station, or a master charging station, or a charging station connected to a local Wi-Fi, a smartphone and the Garo Connect app are required. Refer to 3.13 GARO Connect, page 33.

1. Turn the power/voltage off.



2. Unlock and remove the front cover of the charging unit, refer to .
3. Remove the 4 screws (TX20) that hold the charging unit to the installation bracket, and pull the charging unit out of the installation bracket.
4. Never leave an installation bracket empty. If the installation bracket is not used, it should be protected by a cover. The cover is available as a separate part. Refer to3.12.13 To mount the front cover of the charging unit, page 32
5. Disconnect the ethernet cable, if used, from the charging unit.
6. Examine the installation bracket for damages.
   a. If the installation bracket is damaged, an installer must remove it from the wall or pole and install a new installation bracket. This requires that the charging station must be installed again, connecting it to the new identity of the installation bracket.

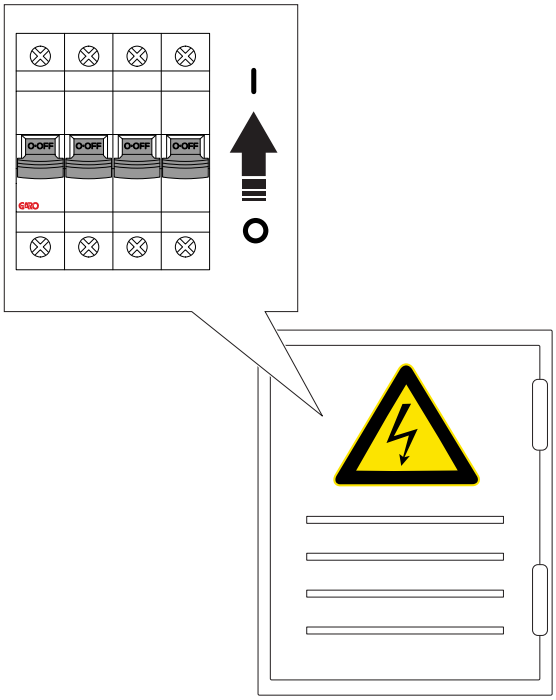
WARNING

Only an authorized installer, or a person acting on behalf of an authorized installer, may replace the installation bracket.

NOTE

Only 1 installation bracket can be installed, connected to 1 charging station in the GARO Connect app. If an installation bracket is to be reused in another location, it must first be deleted from the first location.

7. Unpack and inspect the new charging unit.
8. Connect the ethernet cable if used to the new charging unit.
9. Attach the new charging unit to the installation bracket. Refer to 3.12.11 To attach the charging unit to the installation bracket, page 29.
10. If the charging station uses a local Wi-Fi for internet access, do the internet settings through the GARO Connect app. This also applies to single/ standalone charging stations. Refer to 3.9 To decide internet connection type, page 16.
11. Attach and lock the front cover of the charging unit. Refer to 3.12.13 To mount the front cover of the charging unit, page 32
12. Turn the power/voltage on.



13. Allow the charging unit to download software settings.
14. Do a functional test of the charging unit. Refer to 3.12.12 To do a final functionality test of the product, page 30.

5.8 PME - PROTECTIVE MULTIPLE EATHING (UK VERSIONS ONLY)

Some variants of charging units are equipped with Protective Multiple Earthing (PME) protection. By monitoring the phase voltage, a fault in the grid-connected earth connection (PEN conductor) can be detected. Detection level is phase voltage <207 V OR >253 V. In case of detected fault, any charging is stopped, the EV is isolated (Live, Neutral and PE). The charging station indicates blinking red.

Action when triggered:

(A red, slow blinking (0.5 Hz) indication on the charging station LED, an error message can be read in the GARO Connect app). A notification is sent to the user and the owner if configured.

1. Disconnect the EV.
2. Contact the installer to investigate the root cause of the problem. Reset the circuit breaker.
3. Press the test button marked "T" to conduct a ground fault test. The circuit breaker should then trip. Refer to 5.4 To do an earth fault test, page 72.

If the test is OK and no further uncertainty exists, then the charging station can be used in normal operation. The voltage level can be monitored in the GARO Connect app.

CAUTION

Never use the charging station if any uncertainty exists regarding PEN status or voltage levels.

5.9 SERVICE

The owner of a location is responsible for keeping the installation in a safe condition. One recommended way to fulfil this is to set up a service agreement with a service provider.

CAUTION

Service must only be performed by approved personnel.

Contact GARO to set up a service agreement.

5.10 REPAIR

CAUTION

All repair work must be done by GARO approved service centers.

NOTE

Warranty is void if the sealing label on the back of the charging unit is broken.

6 TROUBLESHOOTING

6.1 TROUBLESHOOTING

Problem	Solution
No light on the indication light on the charging station.	Do a check of the power supply to the charging station. Startup takes approximately up to 2 minutes. Do a check of the light intensity setting. If the light intensity is set near 0, it results in no visible light.
The indication light shows a blinking red light (0.5 Hz).	Disconnect the EV. Let the owner do a reset of the circuit breaker. Refer to . If the above measures to not help, do not use the charging station. Contact the installer or GARO support.
The indication light shows a fixed red light.	The charging station (CS) is deactivated by the owner using the Garo Connect app. Example: A charging station is scheduled by by the owner. The charging station indicates a red light when not active, as the charging station is not at that moment available for charging.
The indication light shows a slow blinking yellow light.	Before starting the charging process, do a check of the Type 2 connectors. Once authentication is received, connect the EV.
The charging power is too low.	Let the owner do a check of the power and current status in the GARO Connect app. The signalled current, that is what the charging station allows the EV to use, can be reduced due to load balance and thermal derating. This information is also available in the GARO Connect app.
There is no charging power but the indication light shows a blue blinking light.	Let the owner do a check of the power and current status in the GARO Connect app. The signalled current, that is what the charging station allows the EV to use, can be reduced due to load balance and thermal derating. This information is also available in the GARO Connect app. No invitation email received from owner or system. Solution: Check if the email is in blocked in the junk email inbox.

7 TECHNICAL DATA

7.1 CHARGING STATION TECHNICAL DATA

Product type	GARO Entity Compact and GARO Entity Home
Standards	**IEC 61851-1** **IEC 62955** IEC 61439-7 EN 60898-1 EN 61008-1
EMC classification	2014/30/EU
Installation method	Wall in a single and/or double installation bracket. (Stand and pole mount fixtures are available as accessories)
Installation environment	Indoor/outdoor
Location type	Non-restricted access
Rated voltage	TN 2-3 phase 400 VAC 50 Hz TN 1 phase 230 VAC 50 Hz IT/TT 2-3 phase 230 VAC 50 Hz
Rated current	32 A or 20 A depending on fixed cable version. The default setting is always 16 A. The maximum installed current for the charging station (CS) is set by the Installer.
Installation systems	TN, IT and TT systems
Charging type	Type 2/Mode 3
Charging method	AC charging
Protection class	IP54
Protection class Installation bracket (With protection cover or Charging unit)	IP54
Protection class Installation bracket (Without protection cover or Charging unit)	IP20

Mechanical impact resistance	IK10
Temperature range	-40 °C - +40 °C. Charging current is reduced at higher temperatures.
Maximum operational altitude	2000 m
Weight	4–6 kg with cable (depending on product variant)
Cable length	4.5 m/5 m/8 m **NOTE** IEC 61851-1 allows max. 7.5 m.
Size single version charging station, height x width x depth	268x190xx102 mm
Residual current limit	30mA AC/6mA DC
Rated short-time withstand current	10 kA
Rated conditional short-circuit current of an assembly	10 kA
Short-circuit protective device type	C
Rated impulse withstand voltage	4 kV
Rated insulation voltage	230 V/400 V
Over voltage category	III
Rated diversity factor (RDF)	1
Pollution degree	2
EMC environmental condition	A
RFID Frequency Band	13.56 MHz
RFID output power	250 mW
SIM (Only applicable for Entity Compact).	3 FF = Micro = 15x25 mm
Modem	LTE (4G) (Depending on version)

Wi-Fi	802.11 g 2.4 GHz
Maximum pre-fuse to terminal	80 A Char. C
Installation power cable limitations	Maximum 16 mm^2, outer diameter: maximum 24 mm^2
Power connection terminals	2.5–16 mm^2, spring type
Warranty	2 years
Design product life cycle	10 years installation/30 000 hours charging at 20 °C
Appliance class. Protection against electric shock	Class I equipment with PE connection

7.2 LOAD INTERFACE TECHNICAL DATA

Standards	EN 62368-1
EMC Classification	2014/30/EU
Installation method	DIN rail.
Installation environment	Indoor/outdoor electrical cabinet.
Location type	Restricted access.
Rated voltage	TN/IT/TT 1-phase 230 VAC 50 Hz
Rated current	13 mA
Installation systems	TT, IT and TT system.
Power	<3W
Protection class	IP20. Appliance class protection against electric shock: Class II
Temperature range	-20 °C to +50 °C
Weight	0.2 kg
Dimensions (heightxwidthxdepth)	86x72x49 + antenna 110 mm (4 DIN modules).
Color	Grey

Recommended protective pre-fuse	max. C 10 A
Overvoltage category	III (OVC 3)
Rated impulse withstand voltage	4 kV
Rated insulation voltage	230 V
Antenna connection	SMA male.

Type	**Load interface, basic**	**Load interface, advanced**
Interface to Entity charging station(s)	1x Ethernet RJ45, Wi-Fi 2.4 GHz, mesh	2x Ethernet RJ45, Wi-Fi 2.4 GHz, mesh
HAN RJ-45 input EN 13757-2	1	N/A
HAN RJ-12 input	1	N/A
Current transformer input 0–333 mV	x3	N/A
Current transformer input 0-5 A	N/A	x3
M-Bus input	N/A	1
Modbus input RS-485	N/A	1
Relay output 12-230 V, 1 A	N/A	1

Implemented energy meters modbus	**Implemented enerymeters M-bus**
Garo GNM3D-RS 485	Garo GNM3D-Mbus
Garo GNM3D-LP RS485	Garo GNM3D-LP Mbus
Garo GMI3D-LP RS485	
Carlo Gavazzi EM210 with Rogowski	

Energy meters are implemented over time. Contact GARO for accurate list or question.

7.3 ACCESSORIES

For available accessories, refer to the GARO website at www.garo.com.

SOURCE CODE

The software included in this product contains copyrighted software that is licensed under LGPL-2.1, GPL-2.0, and GPL-3.0 and other open source licenses. A copy of the licenses are available in a separate document. Source code can be obtained from GARO for a period of 3 years after the final shipment of the product, which may be no earlier than 2025–01–01 for a fee. For order and payment of the source code document, please contact:

GARO E-Mobility AB

Box 203

335 33 Gnosjö, Sweden

e-mobility@garo.se

EC DECLARATION OF CONFORMITY

Dokument/document		Utgåva datum/edition date
Försäkran om överensstämmelse/ Declaration of conformity		2023-09-25
Avdelning/department		
Produkt/Product		
Ansvarig/prepared	Version	Sida/page
Bo Eriksson	1	1 av/of 1

Manufacturer/Tillverkare: *GARO AB*
Box 203
S-335 25 GNOSJÖ
Sweden
Telephone: *+46 (0)370 33 28 00*
Internet: www.garo.se

UK Address: Unit 16, Urban Express Park, Aston Hall Rd, Birmingham B6 7FH

Agent of equipment/Materielslag: Electric Charging Station for EV with Radio Equipment / Laddstation för elbil med tillhörande radio utrustning

Trade Mark/Varumärke: GARO

Type Designation/Typbeteckning: ECC… serie

We hereby declare under our sole responsibility that our product fulfils the requirements of following EC directives/
Vi intygar härmed under vårt ensamma ansvar att vår produkt uppfyller krav enligt följande EU direktiv:

☐ **The Low Voltage Directive (LVD) 2014/35/EU** / Lågspänningsdirektivet (LVD) 2014/35/EU.
☐ **Electromagnetic compatibility (EMC) 2014/30/EU** / Elektromagnetisk kompatibilitet (EMC) 2014/30/EU.
☒ **Radio Equipment Directive 2014/53/EU (RED)** / Radiodirektivet (RED) 2014/53/EU.
☒ **RoHS Directive (RoHS) 2011/65/EU** / RoHS direktivet (RoHS) 2011/65/EU.
☒ **The Electrical Equipment Safety Regulations 2016/UK** / 2016 No 1101
☒ **The Electromagnetic Compatibility Regulations 2016/UK** / 2016 No 1091
☒ **The Restriction of the Use of Hazardous Substances in Electrical and Electronic Equipment Regulations 2012/UK** / 2012 No 3032

The following harmonised standards (latest edition) or technical specifications which comply with good engineering practice in safety matters in force within the EU/UK have been used in the design:/
Följande harmoniserade standarder (senaste utgåva) eller tekniska specifikationer som uppfyller god säkerhetsteknik praxis inom EU/UK har använts i konstruktionen:

EN IEC 61851-1:2019
IEC/TS 61439-7:2020
EN 62311:2020
IEC 62955:2018
EN 60898-1
EN 61008-1
IEC 61851-21-2:2018 Other than residential environments
IEC 61000-6-3:2006/A1:2010
IEC 61000-6-2:2005
ETSI EN 301 489-17 V3.2.4
ETSI EN 301 489-52 V1.1.2
ETSI EN 301 489-1 V2.2.3
ETSI EN 301 489-3 V2.1.2

GARO AB
Company/Företag

Gnosjö 2023-09-25
Place Date/Ort Datum

Sign/Underskrift

CTO
Position/Befattning

Bo Eriksson
Sign in printed letters/Namnförtydligande