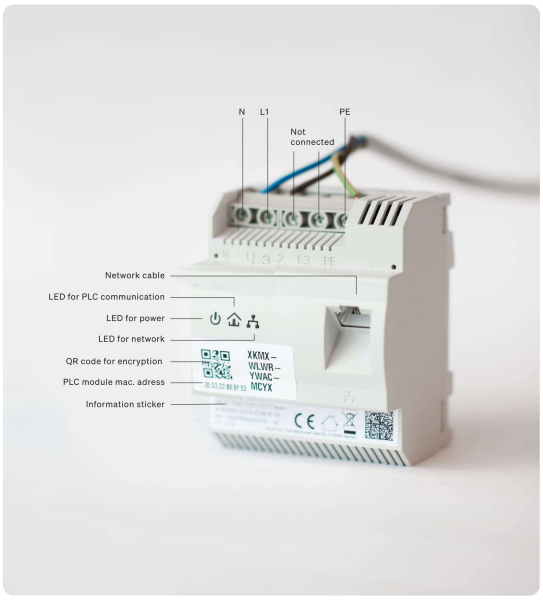
Power Line Communication (PLC) with Zaptec Pro

Power Line Communication (PLC) lets Zaptec Pro charging stations communicate over the power cable instead of a separate network cable. A PLC module converts Ethernet to a signal on the 230 V power line, so the chargers can reach the network without dedicated Ethernet to each unit. PLC is typically used in larger or retrofit installations.

Only qualified personnel should design, install and commission PLC systems. Always follow local regulations and Zaptec documentation.



How PLC works in a Zaptec installation

- Zaptec Pro charging stations are wired 3-phase, but PLC communication always uses one phase + neutral (L1–N) and PE.
- A PLC module is connected to the main power cable and to the network router/switch with an Ethernet cable.
- Chargers on the same cable run communicate with the PLC module over L1–N–PE, and the module forwards traffic to the network.

This removes the need to pull separate Ethernet cables to each charging station.

Requirements and best practices

Follow these rules to keep the PLC network stable.

General requirements

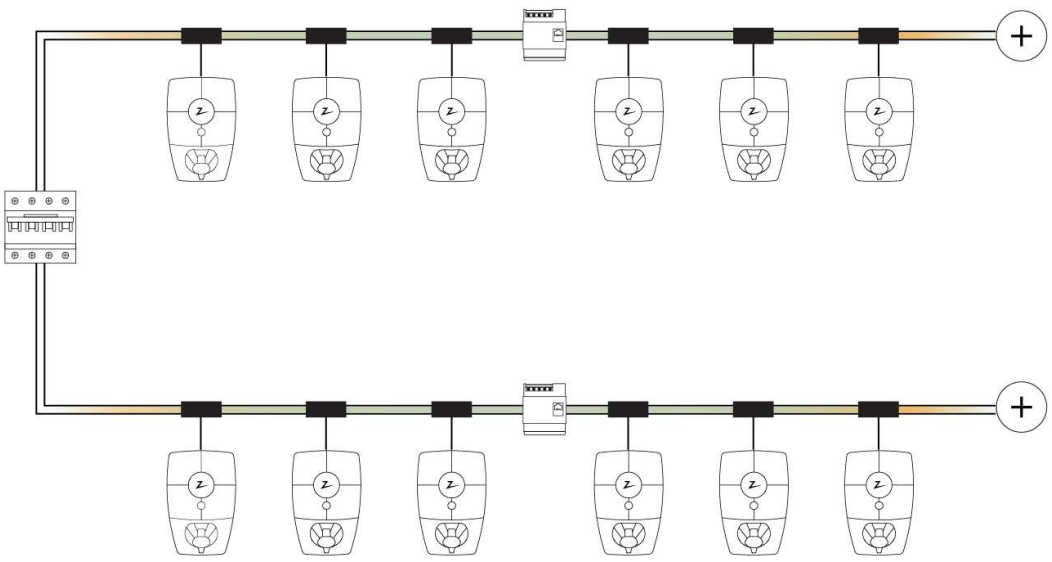
- Use **at least one PLC module per circuit/cable run**.
- Maximum **~30 Zaptec Pro charging stations per PLC module**.
- Total cable length (PLC module to last charger) should be **≤ 90 m**.
- Make sure **protective earth (PE) is continuous and low-impedance**. Poor earthing will reduce PLC range and stability.

Phase and wiring

- Keep the **same phase order** (L1, L2, L3) through the entire charging system.
- The PLC module must always be wired **1-phase** on **L1–N–PE**.
- Charging stations communicate on **L1 and N**.
- **Do not** connect the PLC module to **L2 or L3**, or three-phase. That increases electrical distance and weakens the signal.

Placement of the PLC module

- Mount the PLC module in an enclosure **close to the chargers**, preferably **in the middle of the cable run,** for even signal distribution.
- If the cable run is long or heavily branched, use **multiple PLC modules on the same circuit**, each serving its own segment.
- The recommended cable length may vary depending on grid type, number of chargers, and noise from the power grid. For example, IT systems require shorter cable runs than TN systems.



The illustration above is not intended to be used as a wiring diagram. The PLC connection must be protected by a suitably rated circuit breaker. The circuit on the left side of the picture illustrates that you might need to have multiple PLC modules on one circuit, depending on the length of the cable.

Factors that affect PLC signal quality

If chargers are frequently offline or show a weak PLC signal, these are the main things that reduce PLC quality.

PLC signal strength decreases with cable length.

- Keep the distance from the PLC module to the last charger within about 90 m.
- Use minimum one PLC module per cable run/course.
- Place the module as close to the chargers as possible, especially if the supply from the switchboard is far away.
- Remember Zaptec Pro communicates via PLC only between L1 + N + PE – feeding the module from L2 or L3 effectively lengthens the communication path.

Each PLC module has a limit on how many chargers it can serve.

- The general recommendation is up to ~30 chargers per PLC module. Exceeding this will typically lead to unstable communication.
- Isolate PLC communication per course by encrypting each PLC module and its chargers with a unique key, and by using at least one PLC module per cable run.

PLC uses PE as part of its reference for the frequency range.

- Poor grounding reduces PLC range and stability. If PE is insufficient or affected by ground faults, the PLC module may not maintain a usable signal.
- Always verify that PE is continuous and correctly connected across the full run.

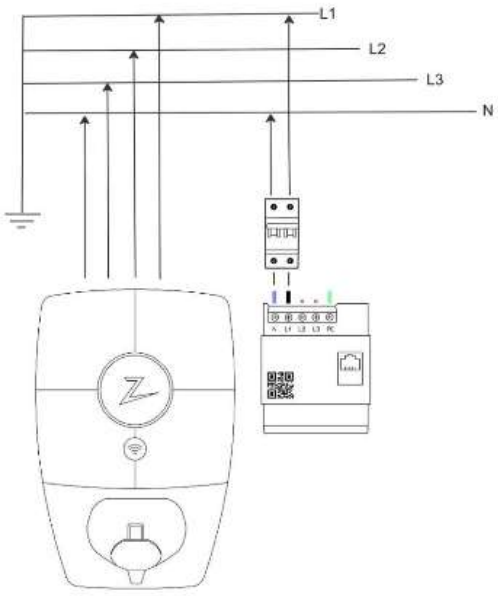
High-frequency noise on the same conductors can disrupt PLC.

- Typical noise sources include frequency converters (VFDs), large motors, welders and heavy switching power supplies.
- It can be hard to map exactly, but stability often improves if you place the PLC module away from the noisiest equipment or install a filter or line choke before the PLC module in very noisy installations.

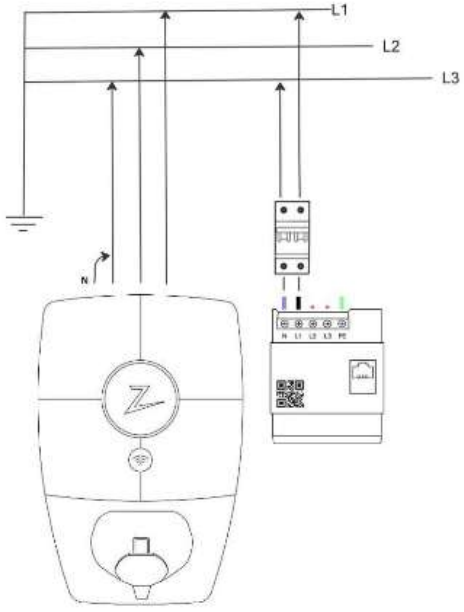
Installing the PLC module

Zaptec Pro is wired 3-phase, and the PLC is wired 1-phase. If the PLC modules are fully encrypted, configure the charging stations as described in the procedure supplied with the PLC module. In the table below, you can see installation diagrams for TN and IT/TT grids.

1. Mount the PLC module on a DIN rail, close to the charging stations, preferably in the middle of the installation for even signal distribution.
2. Connect to the main power cabling and a standard Ethernet cable.
3. It is recommended to install a 10A fuse before the PLC module.
4. The module is usually mounted after a 63A course, but the connection terminals are 1.5-2.5 mm². This also simplifies any troubleshooting and restart of the PLC module.



TN GRID



IT GRID

Configure the PLC network

After the PLC is mounted, connect the charging stations to the PLC network using the Zaptec App.

There are two main cases, depending on when the PLC module was produced.

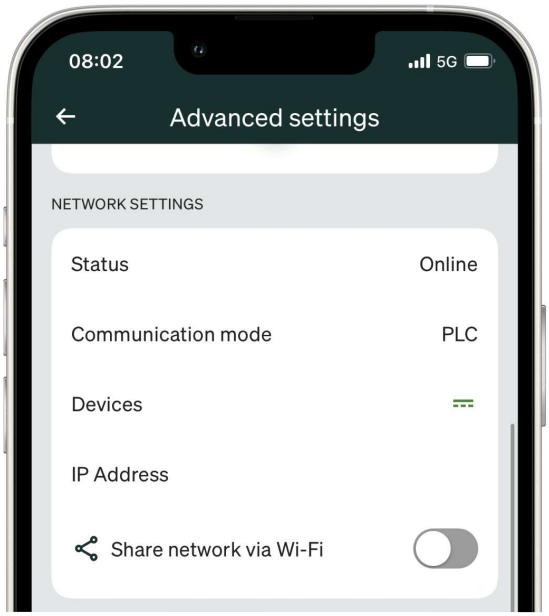
PLC modules with QR code (after Nov 2019)

These modules are pre-encrypted and marked with a QR code. Repeat these steps for each charger:

1. Open the Zaptec App and tap the three-dot icon (top-right).
2. Select **Configure products** and connect via Bluetooth using the PIN code.
3. Go to **Network Settings** > **Configure PLC.**

4. Tap **Scan network name** and use the camera to scan the QR code on the PLC module.
    - iPhone users can also upload a photo from the gallery.
5. Tap **Save** to connect.

The charger is now connected to that encrypted PLC network.



PLC modules without QR code (before Nov 2019)

Use the existing network key to add another charging station.

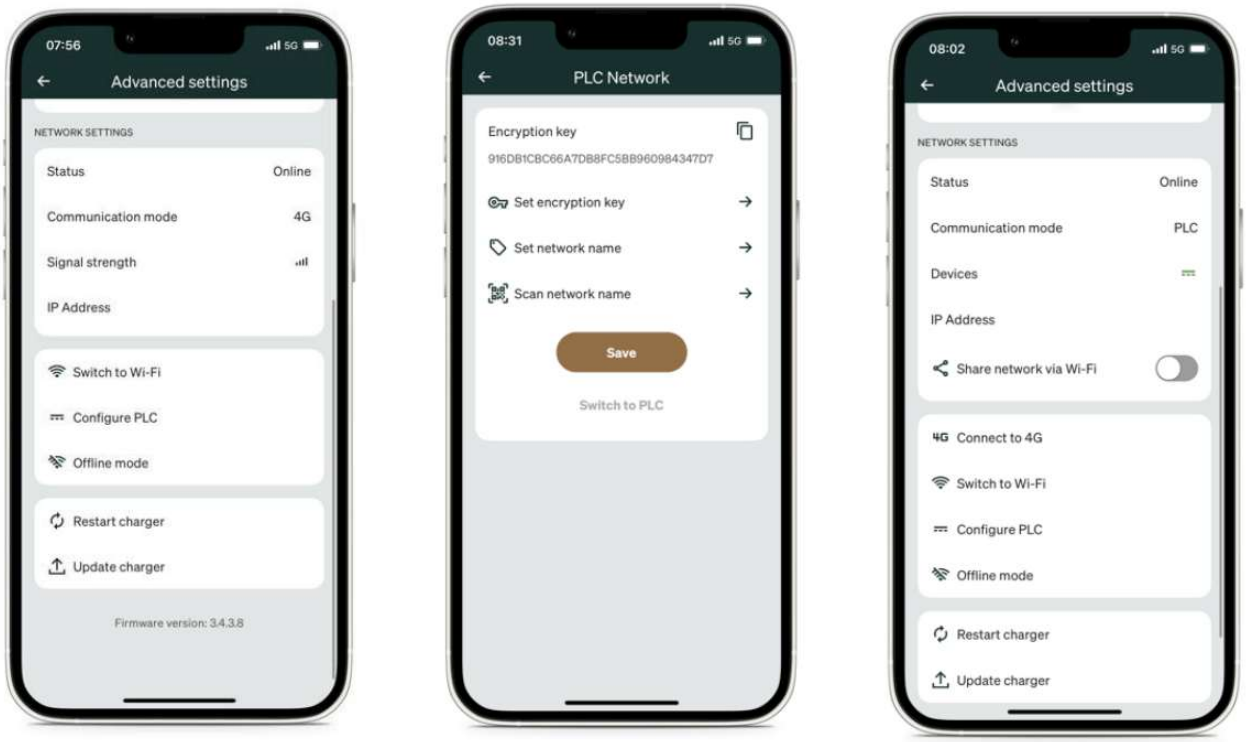
First charger on the PLC network

1. Open the Zaptec App and tap the three-dot icon (top-right).
2. Select **Configure products** and connect via Bluetooth using the PIN code.
3. In **Configure PLC** for that charger, define or enter a **PLC network key**.

Additional chargers on the same PLC segment

1. In the app, connect to a charger that is already online via PLC.
2. Go to **Network Settings** → **Configure PLC** and copy the **network key**.
3. Follow the same procedure on the new charging station and paste the network key in the last paragraph under **Set network key**, then tap **Save.**

All chargers on the same cable run and PLC module must share the same key. Use different keys for different circuits/cable runs to keep PLC traffic separated between courses.



PLC module indicator lights

Icon	Color	Status
	Green	PLC module has power. If it has no light, it is not.
	Red	A blinking or steady red light means that the PLC is communicating with chargers.
	Green	PLC is not communicating – often caused by **mismatched encryption keys** or no active chargers on the line.
	Green	PLC module is connected to a network device (router/switch) on an open port. If it has no light, it has no Ethernet link.

If PLC communication is unstable

If chargers are frequently offline or PLC signal strength is low:

- Double-check the **design limits** (number of chargers, cable length, module placement).
- Verify **wiring and phase** (L1–N–PE only) and **earthing quality**.
- Confirm that **all chargers on a run have the same PLC key**, and different runs have different keys.
- Look for obvious **noise sources** on the same course (VFDs, large motors, welders, etc.) and, if possible, separate them.

If problems remain after these checks, collect this information before contacting support.

- Photos of the PLC module and its wiring.
- An overview of how many chargers are on each PLC module and the approximate cable length.
- A list or screenshot of chargers that are offline or have a weak PLC signal.

This information makes it much easier to see whether the issue is design-related or a specific fault.

Configuration video

Watch the configuration video.

Need more help? Contact support

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