MENNEKES ECU

Networking, Connection and Load Management

MENNEKES
MY POWER CONNECTION

# Application examples for networking, connection and load management for charging stations with ECU

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# 1 General information

**About this document**

This document is a supplement to the operating and installation manual of the respective charging station. It contains useful information and application examples for networking, connection and load management for charging stations with an ECU (ECU-Firmware 4.53, 4.61 or 5.12.0. Firmware 5.12.0 is approved for calibration law compliant AMTRON® devices only.).

The document is applicable to the following charging stations:

- AMEDIO Professional+, AMEDIO Professional+ PnC, AMEDIO Professional, AMEDIO Professional PnC, AMEDIO Professional+*, AMEDIO Professional+* PnC, AMEDIO Professional*, AMEDIO Professional* PnC: hereinafter referred to as “AMEDIO”
- AMTRON® Professional+, AMTRON® Professional+ E, AMTRON® Professional+ PnC, AMTRON® Professional, AMTRON® Professional E, AMTRON® Professional+*, AMTRON® Professional+* E, AMTRON® Professional+* PnC, AMTRON® Professional*, AMTRON® Professional* E, AMTRON® Professional* PnC: hereinafter referred to as “AMTRON®”



**About the ECUs**

AMEDIO and AMTRON® have one installed ECU (Electronic Control Unit) per charging point (CP). The ECU is used to control the individual charging point as well as for communication between the charging stations and with a Backend-System.

Differences:

| | AMTRON® | AMEDIO |
|---|---|---|
| ECU design | Top-hat rail device | Board |
| Number of ECUs in the charging station | 1 | 2 (These are pre-configured in the AMEDIO as a Master-Slave connection) |

The charging stations can be configured via the Micro-USB port on the ECU or via the RJ45 port.

➔ “2 Configure charging station”

# 2 Configure charging station

The device can be configured and status information can be called-up through an established connection. Configuration occurs via the web interface in a current web browser. The web interface is password-protected.

## 2.1 Configure AMEDIO

**CONNECTIONS**

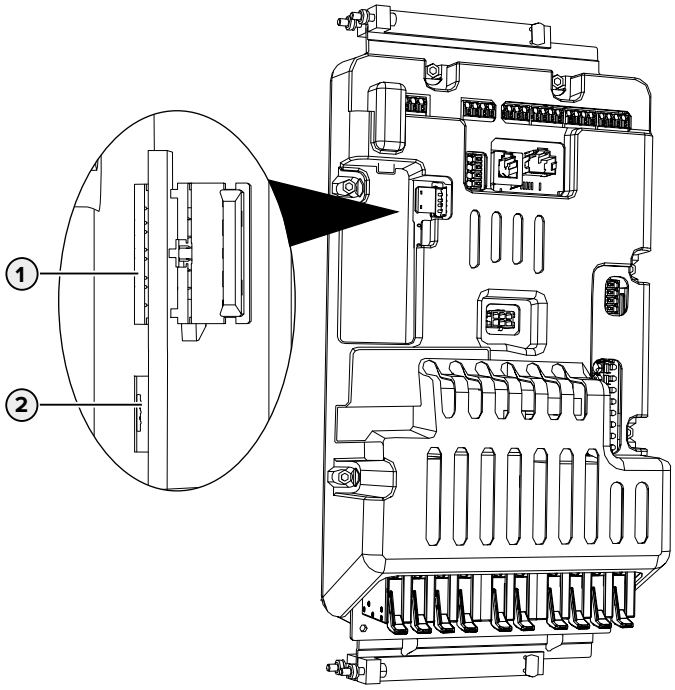



Fig. 1: Connections for the configuration on the ECU (AMEDIO)

| Item | Usage | Connection |
|---|---|---|
| 1 | Slot for a SIM card. | Micro-SIM on the left-hand side (AF1) |
| 2 | Configuration of the device. | Micro-USB on the right-hand side (AF2) |

### 2.1.1 Via USB

- ▶ Connect terminal device (e. g. PC, laptop) und ECU with a USB cable. To do this, use the micro USB connection (**2**) of the ECU on the right-hand-side (AF2).

➔ “Fig. 1: Connections for the configuration on the ECU (AMEDIO)”

If the driver is not installed automatically under the Windows operating system it must be installed manually. Example:

- ▶ Navigate to “Control Panel” > “Device Manager” > “Other devices”.
- ▶ Right-click “RNDIS/Ethernet Gadget” > “Update Drive Software” > “Search for driver software on the computer” > “Select from a list of device drivers on the computer” > “Network Adapter” > “Microsoft Corporation” > “NDIS-compatible remote device”.
- ✓ The driver is being installed.

- ▶ Open the web browser.
  The web interface can be reached via **http://192.168.123.123/operator**

### 2.1.2 Via Ethernet

- ▶ Connect end device (e. g. PC, laptop) and ECU with a ethernet cable. To do this, use the ethernet connection of the ethernet surge protector.
- ▶ Configure the network settings on the end device:
  - IPv4 address: 192.168.124.21
  - Subnet mask: 255.255.255.0
  - Default gateway: 192.168.124.1
- ▶ Open the web browser.
  The web interface can be reached via **http://192.168.124.123/operator**

### 2.1.3 Via the network (“Networked” operating mode)

Once the products are networked, the web interface can also be reached via a terminal device that is located in the same network.

Requirement:

- ✓ The product must be integrated into a network.
- ✓ “4 Set up network”
- ✓ A terminal device (e.g. PC, laptop) must also be included in the network via the router / switch.
- ✓ The IP address of the product must be known.

If the IP address of the product is not known (e.g. due to dynamic IP address configuration by a DHCP server), the IP address can either be set via a network scan (installed as a free tool on the terminal device) or via the web interface of the router / switch.

- ▶ Open the web browser on the terminal device.
- ▶ The web interface can be reached via **http://*IP address*/operator**.

  Example:
  - IP address: 192.168.0.70
  - The web interface can be reached via: http://192.168.0.70/operator

> By entering the relevant IP address in the web browser, **each ECU in the network** can be configured via the terminal device.

**SPECIAL FEATURE**

Although there are two charging points, the AMEDIO is always visible in the network with a single IP address. This is achieved by running the two charging points of the AMEDIO charging station on different ports. The master charging point always runs on port 81 and the slave charging point on port 82.

Example:

- Master charging point: 192.168.0.70:81
- Slave charging point: 192.168.0.70:82

### 2.1.4 Master / slave connection

> Both charge points in the device are pre-configured as a master / slave connection (for OCPP).
>
> - Perform configuration tasks only via the master web interface. Most of the settings are automatically adopted for the slave charge point or they are not relevant to the slave charge point.
> - The settings that need to be made separately via the slave web interface are shown in this document.
>
>  ▶ To do this, open the web interface of the slave ECU.
>
>  ➔ “Fig. 2: Selection page: Master - Slave”

✓ A selection page opens where you can choose whether to configure the master ECU or the slave ECU.

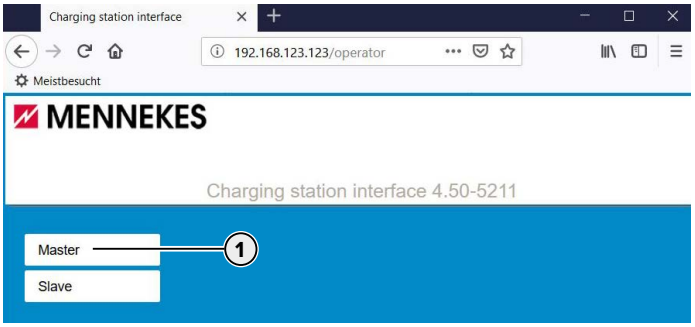


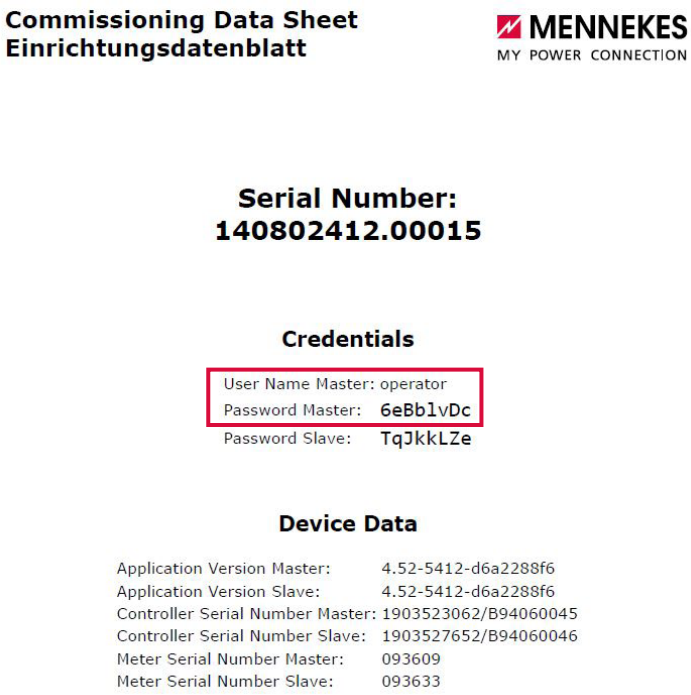

Fig. 2: Selection page: Master - Slave

- ▶ Open the web interface of the master ECU (**1**).

### 2.1.5 Enter password

▶ Enter password.

🗐 Password: See Commissioning Data Sheet.



**Commissioning Data Sheet**
**Einrichtungsdatenblatt**

MENNEKES
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**Serial Number:**
**140802412.00015**

**Credentials**

User Name Master: operator
Password Master: 6eBblvDc
Password Slave: TqJkkLZe

**Device Data**

| | |
|---|---|
| Application Version Master: | 4.52-5412-d6a2288f6 |
| Application Version Slave: | 4.52-5412-d6a2288f6 |
| Controller Serial Number Master: | 1903523062/B94060045 |
| Controller Serial Number Slave: | 1903527652/B94060046 |
| Meter Serial Number Master: | 093609 |
| Meter Serial Number Slave: | 093633 |

Fig. 3: Commissioning Data Sheet for AMEDIO (example)

✓ The web interface for the configuration opens.

➔ “2.3 Structure of the web interface”

## 2.2 Configure AMTRON®

**CONNECTIONS**


Fig. 4: Connections for the configuration on the ECU (AMTRON®)

| Item | Use | Connection |
|---|---|---|
| 1 | Slot for a SIM card | Micro-SIM |
| 2 | Configuration of the device | Micro-USB |

### 2.2.1 Via USB

- ▶ Connect terminal device (e. g. PC, laptop) und ECU with the provided USB cable. To do this use the Micro-USB port (**2**) of the ECU.

➔ “Fig. 4: Connections for the configuration on the ECU (AMTRON®)”

If the driver is not installed automatically under the Windows operating system it must be installed manually. Example:

- ▶ Navigate to “Control Panel > ”Device Manager“ > ”Other devices".
- ▶ Right-click “RNDIS/Ethernet Gadget” > “Update Drive Software” > “Search for driver software on the computer” > “Select from a list of device drivers on the computer > ”Network Adapter“ > ”Microsoft Corporation“ > ”NDIS-compatible remote device".

✓ The driver is being installed.

- ▶ Open the web browser.

  The web interface can be reached via **http://192.168.123.123/operator**

### 2.2.2 Via Ethernet

Requirements:

✓ The accessory kit for local networking of multiple devices is installed.

🗐 Installation manual of the accessory kit.

▶ Connect end device (e. g. PC, laptop) and ECU with a ethernet cable. To do this, use the ethernet connection of the USB to Ethernet adapter.

▶ Configure the network settings on the end device:

- IPv4 address: 192.168.124.21
- Subnet mask: 255.255.255.0
- Default gateway: 192.168.124.1

▶ Open the web browser.

The web interface can be reached via **http://192.168.124.123/operator**

### 2.2.3 Via the network (“Networked” operating mode)

Once the products are networked, the web interface can also be reached via a terminal device that is located in the same network.

Requirement:

✓ The product must be integrated into a network.

➔ “4 Set up network”

✓ A terminal device (e.g. PC, laptop) must also be included in the network via the router / switch.

✓ The IP address of the product must be known.

If the IP address of the product is not known (e.g. due to dynamic IP address configuration by a DHCP server), the IP address can either be set via a network scan (installed as a free tool on the terminal device) or via the web interface of the router / switch.

▶ Open the web browser on the terminal device.

▶ The web interface can be reached via **http://*IP address*/operator**.

Example:

- IP address: 192.168.0.70
- The web interface can be reached via: http://192.168.0.70/operator

By entering the relevant IP address in the web browser, **each ECU in the network** can be configured via the terminal device.

### 2.2.4 Enter password

▶ Enter password.

🗐 Password: See Commissioning Data Sheet.

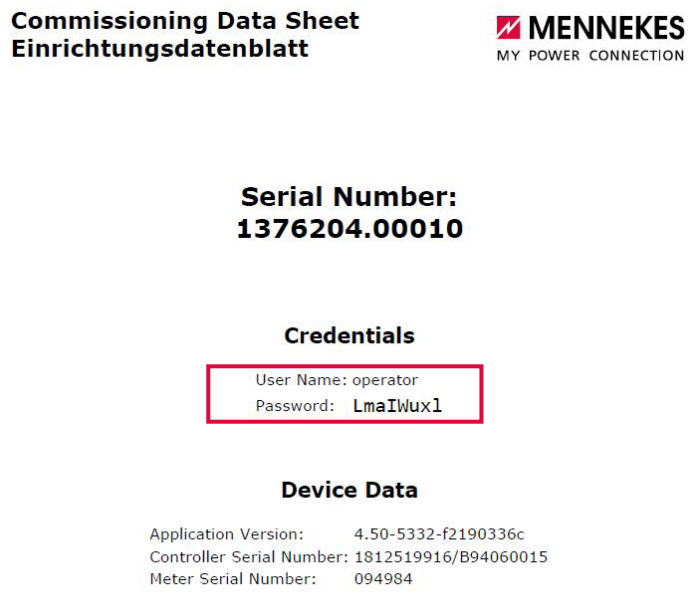



Fig. 5: Commissioning Data Sheet for AMTRON® (example)

✓ The web interface for the configuration opens.

➔ “2.3 Structure of the web interface”

## 2.3 Structure of the web interface

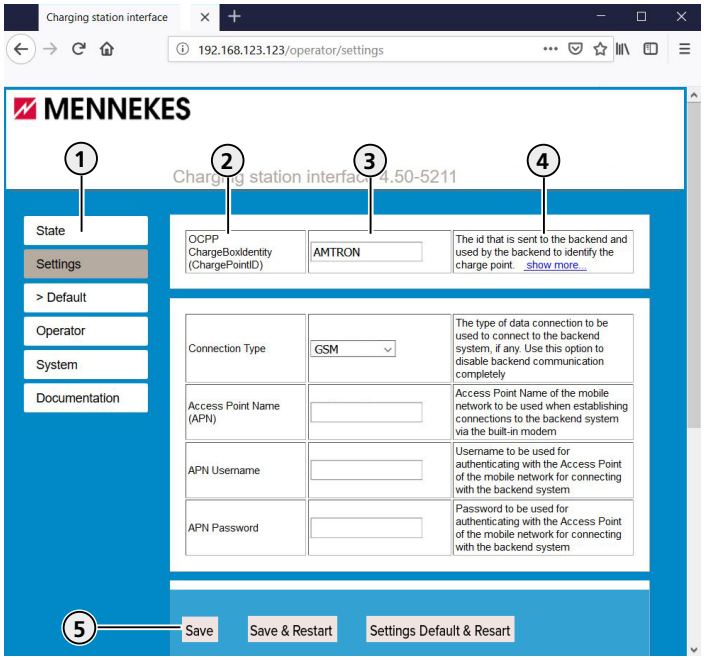



Fig. 6: Structure of the web interface

1. Menu
2. Parameter
3. Setting / Status
4. Comment / information
5. Buttons for saving, restarting and loading presets

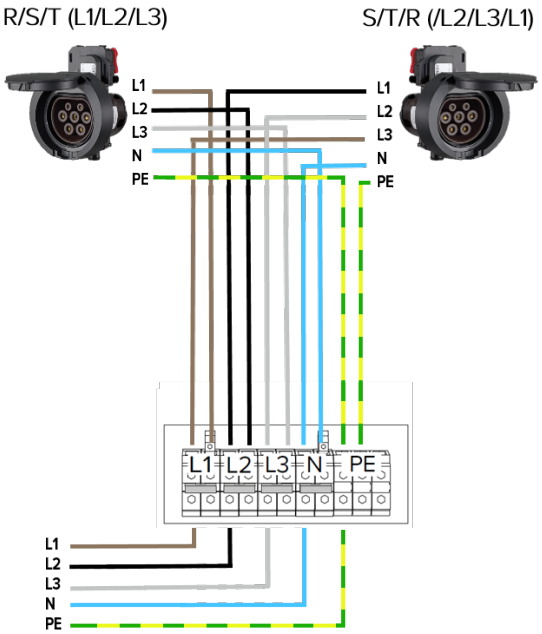
The following menus are displayed in the web interface:

- “State”
- “Settings”
- “> Default”
- “Operator”
- “System”
- “Documentation”

# 3 Power supply connection diagram for AMEDIO

## 3.1 Three-phase operation (delivery state)

To ensure that the network load is distributed as evenly as possible, the connection of the right-hand charging socket is phase-shifted by 120° (see illustration). This favours the network load for single-phase vehicle charging because charging takes place on two different phases.



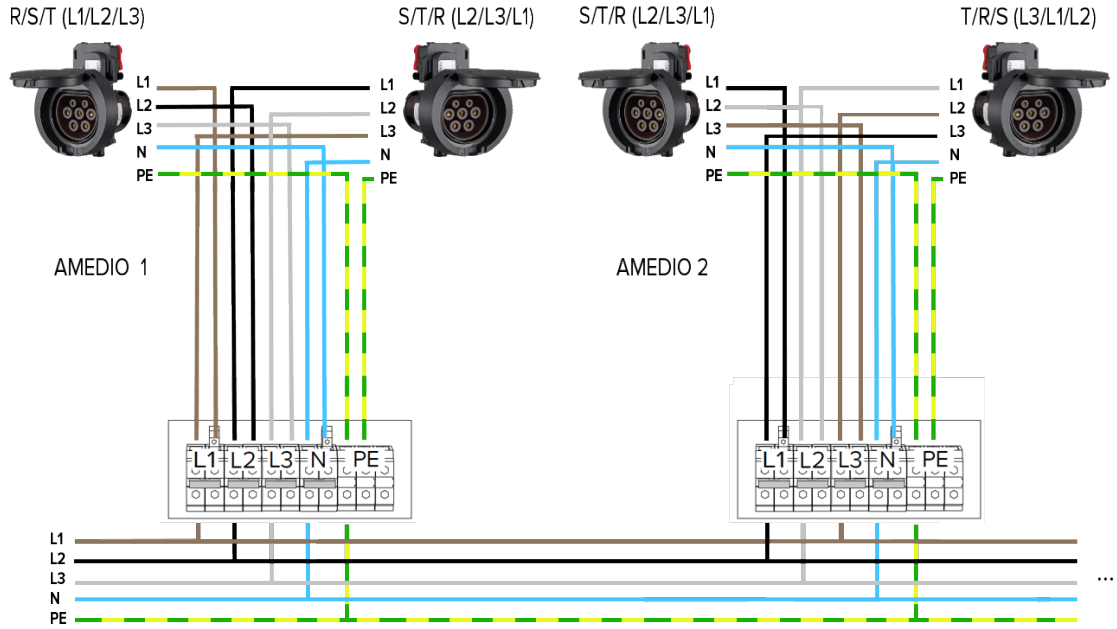

**SETTINGS IN THE WEB INTERFACE**

In the delivery state, in the menu “Operator” of the web interface, the following settings are selected for each charging point (CP):

| Parameter | Setting | |
|---|---|---|
| | CP 1 / left-hand ECU | CP 2 / right-hand ECU |
| Phase connected to the Charge Point | Three-phase system | |
| Phase rotation of the Charge Point | R/S/T (L1/L2/L3) | S/T/R (L2/L3/L1) |

## 3.2 Three-phase operation of several charging stations

To ensure that the network load is distributed as evenly as possible, we recommend connecting the supply lines to the terminals of the AMEDIO with phase reversal (see illustration).




This illustration is incomplete. More AMEDIOs can be connected to the same power supply using the above principle of phase reversal. From a fourth connected AMEDIO, the recommended phase position and the necessary settings in the web interface are repeated.

| Connected AMEDIOs | Charging points | Input terminal | | |
|---|---|---|---|---|
| | | L1 | L2 | L3 |
| AMEDIO 1 | CP 1 / left-hand ECU | L1 | L2 | L3 |
| | CP 2 / right-hand ECU | L2 | L3 | L1 |
| AMEDIO 2 | CP 1 / left-hand ECU | L2 | L3 | L1 |
| | CP 2 / right-hand ECU | L3 | L1 | L2 |
| AMEDIO 3 | CP 1 / left-hand ECU | L3 | L1 | L2 |
| | CP 2 / right-hand ECU | L1 | L2 | L3 |
| AMEDIO 4 (cf. AMEDIO 1) | CP 1 / left-hand ECU | L1 | L2 | L3 |
| | CP 2 / right-hand ECU | L2 | L3 | L1 |
| ... | ... | ... | ... | ... |

### Settings in the Web Interface

To allow the correct assignment between each charging point and the applied phase position, the correct phase position for each charging point must be set in the web interface. As a result, an overload can be prevented when operating load management, for example.

▶ In the web interface, navigate to the menu “Operator” and select the following settings:

| | **AMEDIO 1** | |
|---|---|---|
| | Setting | |
| Parameter | CP 1 / left-hand ECU | CP 2 / right-hand ECU |
| Phase connected to the Charge Point | Three-phase system | |
| Phase rotation of the Charge Point | R/S/T (L1/L2/L3) | S/T/R (L2/L3/L1) |

| | **AMEDIO 2** | |
|---|---|---|
| | Setting | |
| Parameter | CP 1 / left-hand ECU | CP 2 / right-hand ECU |
| Phase connected to the Charge Point | Three-phase system | |
| Phase rotation of the Charge Point | S/T/R (L2/L3/L1) | T/R/S (L3/L1/L2) |

| | **AMEDIO 3 (not shown in the illustration)** | |
|---|---|---|
| | Setting | |
| Parameter | CP 1 / left-hand ECU | CP 2 / right-hand ECU |
| Phase connected to the Charge Point | Three-phase system | |
| Phase rotation of the Charge Point | T/R/S (L3/L1/L2) | R/S/T (L1/L2/L3) |

▶ Click the “Save & Restart” button.

## 3.3 Single-phase operation of AMEDIO

For single-phase operation of AMEDIO, a number of settings must be changed.

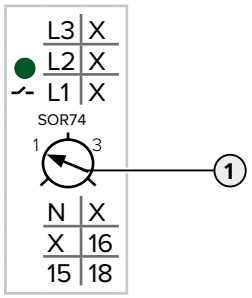
**SETTING THE PHASE SEQUENCE RELAY**

**1. Setting the phase sequence relay**

The potentiometer at both phase sequence relays must be changed over to operate the device in single-phase.

The phase sequence measuring relay is located on the second top-hat rail from the top.

Operating and installation manual: “3.3 Device setup”




▶ Adjust potentiometer (**1**) to position 1 using a slotted screwdriver.

| Setting | Description |
|---|---|
| 1 | Single-phase operation |
| 3 | Three-phase operation |

## Reconnect Jumpers

**2. Reconnect the jumpers at the terminals of the power supply**

The jumpers at the terminals of the power supply have to be reconnected for single-phase operation.

**ATTENTION**

**Material damage as a result of incorrectly reconnected jumpers**

A short-circuit will occur whenever the jumpers are configured for single-phase operation and the device is connected for three-phase operation. This can result in damage to the circuit breakers in the indoor breaker box.

- ▶ Set up jumpers according to the device connection.

- ▶ Use a slotted screwdriver for removing jumpers (except for the jumper at terminals N).
- ▶ Connect a jumper between the L1 and L2 terminals.
- ▶ Check that the jumper is tightly fitted and can only be removed by using a tool.

Position of jumpers for single-phase operation:

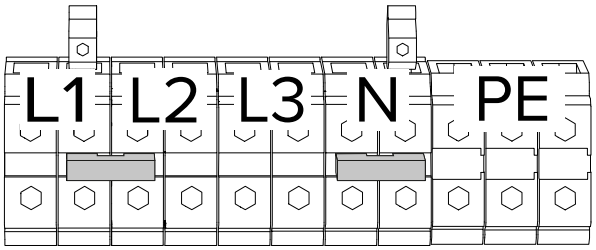



Fig. 7: Position of jumpers for single-phase operation

Only two jumpers are required for single-phase operation.

Position of jumpers for three-phase operation (condition at the time of delivery):

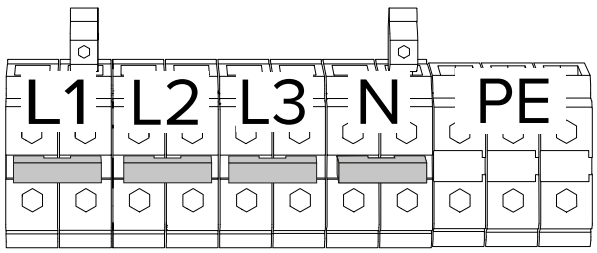



Fig. 8: Position of jumpers for three-phase operation (condition at the time of delivery)

## CONNECT THE DEVICE TO THE SINGLE-PHASE POWER SUPPLY

### 3. Connect the device to the single-phase power supply

The device can be connected in a TN / TT network. The device can only be connected in an IT network under the following conditions:

- Connection to a 230 / 400 V IT network is not permitted.
- Connection to an IT network with 230 V external line voltage over a residual current circuit breaker is permissible, provided that the maximum contact voltage does not exceed 50 V AC when the first error occurs.

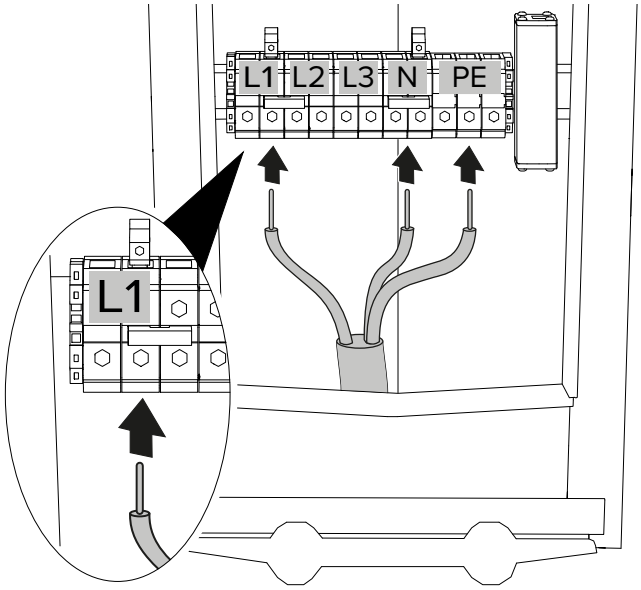



Fig. 9: Power supply connection (single-phase operation)

- ▶ Strip the supply line.
- ▶ Strip conductors 12 to 18 mm.
- ▶ Connect the supply cable to the terminals as per the terminal labelling.

Several devices can be connected in series (loop through supply cable).

- ▶ Comply with the connection data for the terminals and the maximum back-up fuse.

Operating and installation manual: “4 Technical data”

When routing the supply line, comply with the permissible bending radius.

- ▶ Use terminals L1, N and PE.

The terminal on the **right-hand side** of the two L1 terminals has to be used for single-phase operation.

➔ “Fig. 9: Power supply connection (single-phase operation)”

▶ Check whether the individual cores are connected correctly and that the screws are tightened.

## Settings in the Web Interface

### 4. Web interface

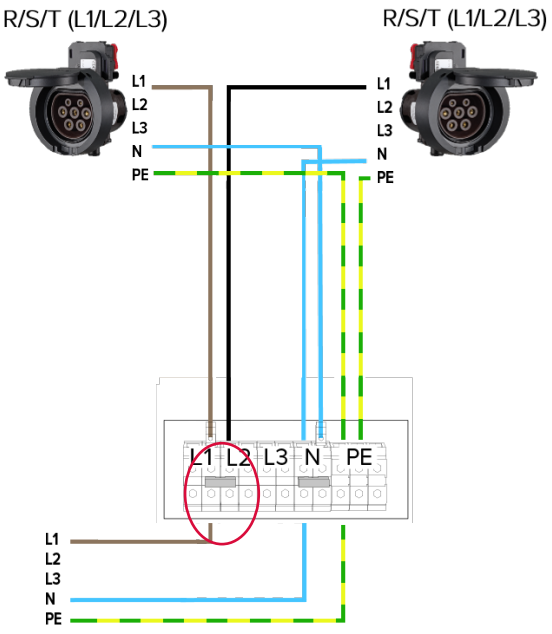
To operate the device on a single phase, it is necessary to change two parameters in the master web interface and in the slave web interface.

▶ In the web interface, navigate to the menu “Operator” and select the following settings:

| Parameter | Setting | |
|---|---|---|
| | CP 1 / left-hand ECU | CP 2 / right-hand ECU |
| Phase connected to the Charge Point | Single-phase system | |
| Phase rotation of the Charge Point | R/S/T (L1/L2/L3) | R/S/T (L1/L2/L3) |

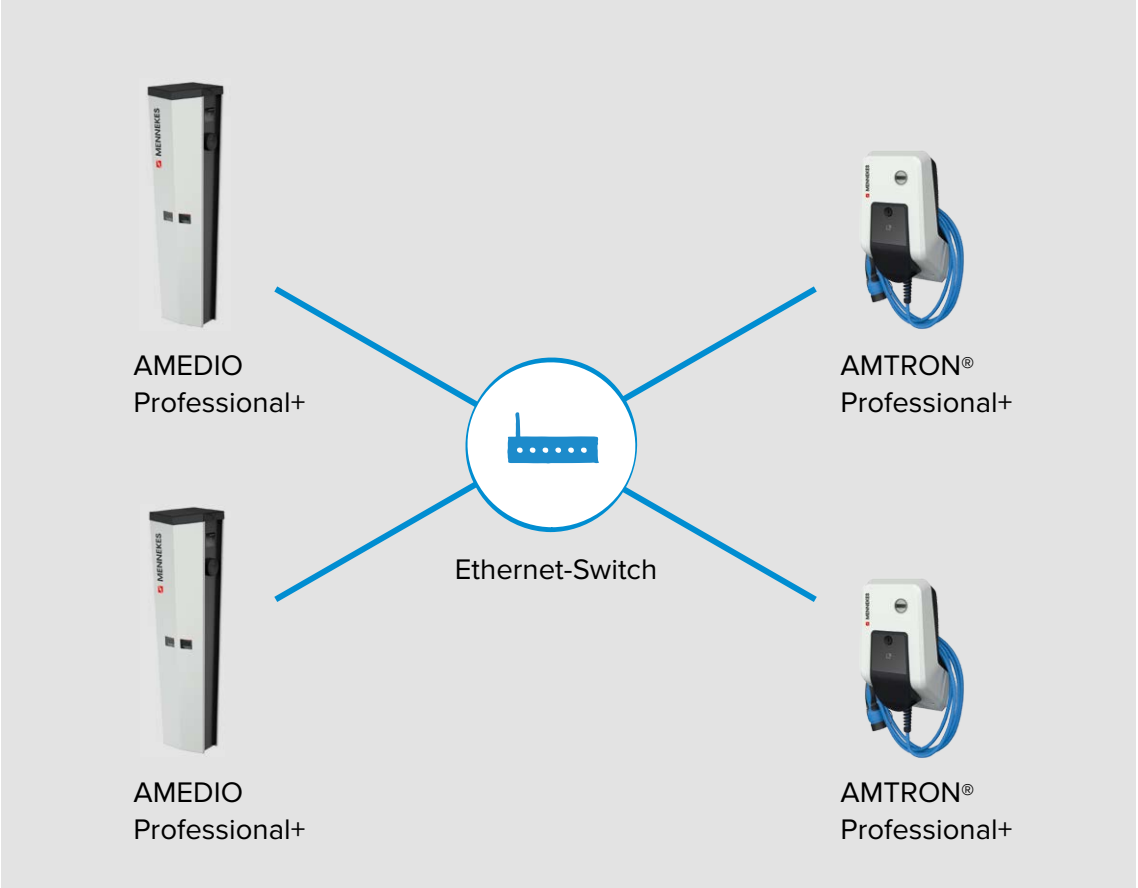
## Power supply connection diagram

After the changes, the power supply connection diagram looks as follows:



# 4 Set up network

In order to network several charging stations, all charging stations must be networked to a switch using a network cable (not included in the scope of delivery). The wiring must be carried out in star topology. The Ethernet cables may not exceed 100 m in length.




Local networking can be used for the following functions:

- Connection of several charging points to a Backend-System via a SIM card (wireless communication).
- Connection of several charging points to a Backend-System over local internet.
- Operation of local and dynamic load management (DLM).

## 4.1 Set up network with dynamic IP addresses (DCHP)

From ECU-Firmware 4.61, the IP addresses of all charging points in the network can be assigned dynamically. Should an older ECU-Firmware have been installed, the IP addresses must be assigned manually (statically).

➔ “4.2 Set up network with static IP addresses”

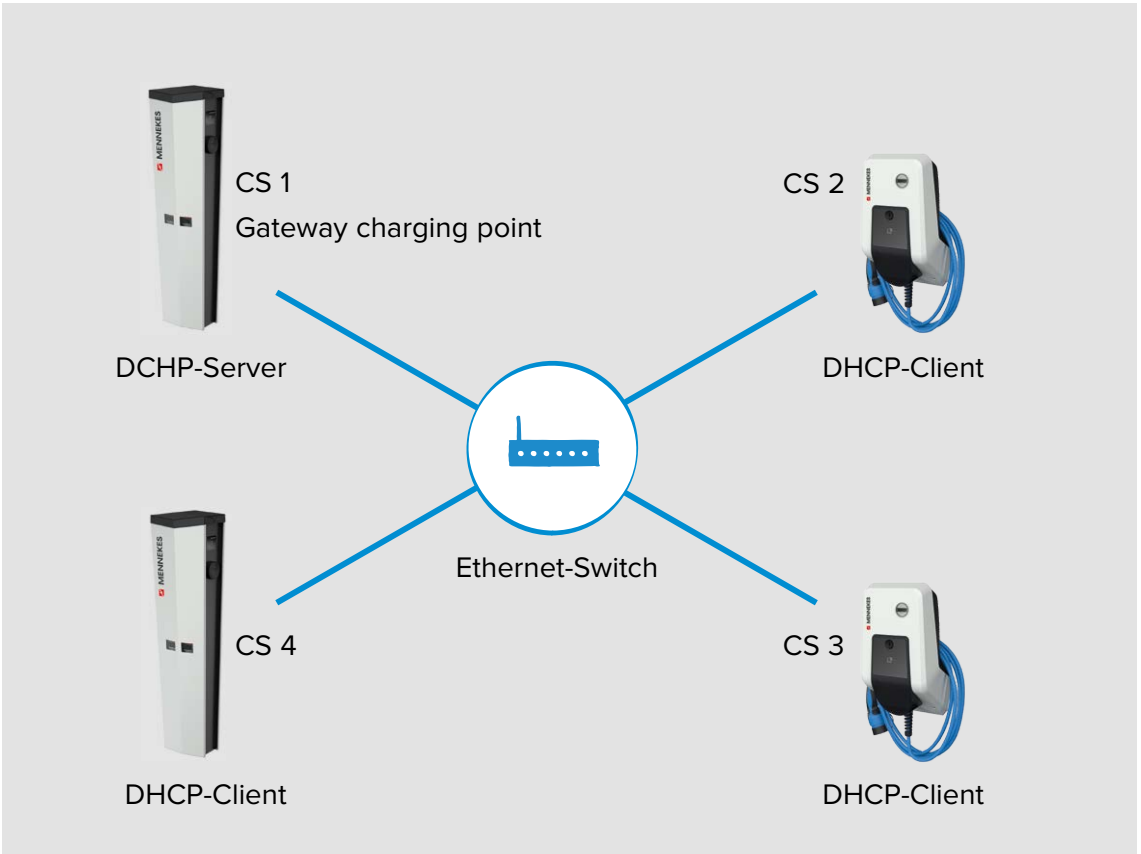
### 4.1.1 ECU as DHCP server with networking via a switch

The easiest way to set up a network is to use the ECU as a DHCP server and network the charging stations via a switch.

To connect to the backend system via a SIM card (mobile communications) with dynamic IP address configuration, it is necessary to use an ECU as a DHCP server.

➔ “5 Connection of several charging points to a Backend-System via a SIM card”

If the charging points are connected via a switch, the charging points can be configured for the network communication. The dynamic IP address assignment for the ECUs in the network is made by any desired ECU in the same network, which is configured as a DHCP-Server. One ECU in the network must therefore be configured as a DHCP-Server and all other ECUs as a DHCP-Client:



The ECU that is configured as a DHCP-Server must be the same ECU that will subsequently be configured as the Gateway for communication with the Backend-System.

➔ “5 Connection of several charging points to a Backend-System via a SIM card”

**SETTINGS IN THE WEB INTERFACE**

When configuring the DHCP server, no DHCP client must be present in the network. These must first be deactivated or disconnected from the switch.

▶ In the web interface of the DHCP server, navigate to the “Operator” menu.

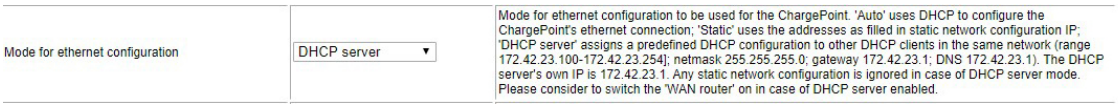



Fig. 10: web interface of the DHCP server for configuring dynamic IP addresses

▶ Set the following parameters in the web interface of the DHCP server:

| Parameter | Web interface setting - CS 1 / DHCP server (Gateway charging point) |
|---|---|
| Mode for network configuration | DCHP Server |

- As of ECU firmware 4.61, the parameter is called “Mode for Ethernet configuration”.
- Preset: “Auto (DHCP client)”. For the DHCP clients, the parameter must be set to “Auto (DHCP Client)”.

▶ Click the “Save & Restart” button.

▶ Reactivate the DHCP clients or reconnect them to the switch (only if the configuration takes place via the network).

Required settings:

| | Web interface setting | | | |
|---|---|---|---|---|
| Parameter | CS 1 / DHCP server (Gateway charging point) | CS 2 / DHCP client | CS 3 / DHCP client | ... |
| Mode for network configuration | DCHP Server | Auto (DHCP Client) | Auto (DHCP Client) | Auto (DHCP Client) |

✓ The charging stations are now networked. By entering the relevant IP address in the web browser, **each ECU in the network** can be configured via the terminal device.

**In ECU Firmware 4.61**

In ECU firmware 4.61, IP address configuration takes place step by step (incremental). It begins with 172.42.23.100 and ends with 172.42.23.254.
Alternatively, the IP address can be determined via a network scan (install as a free tool on the end terminal).

**In ECU Firmware 5.12.0**

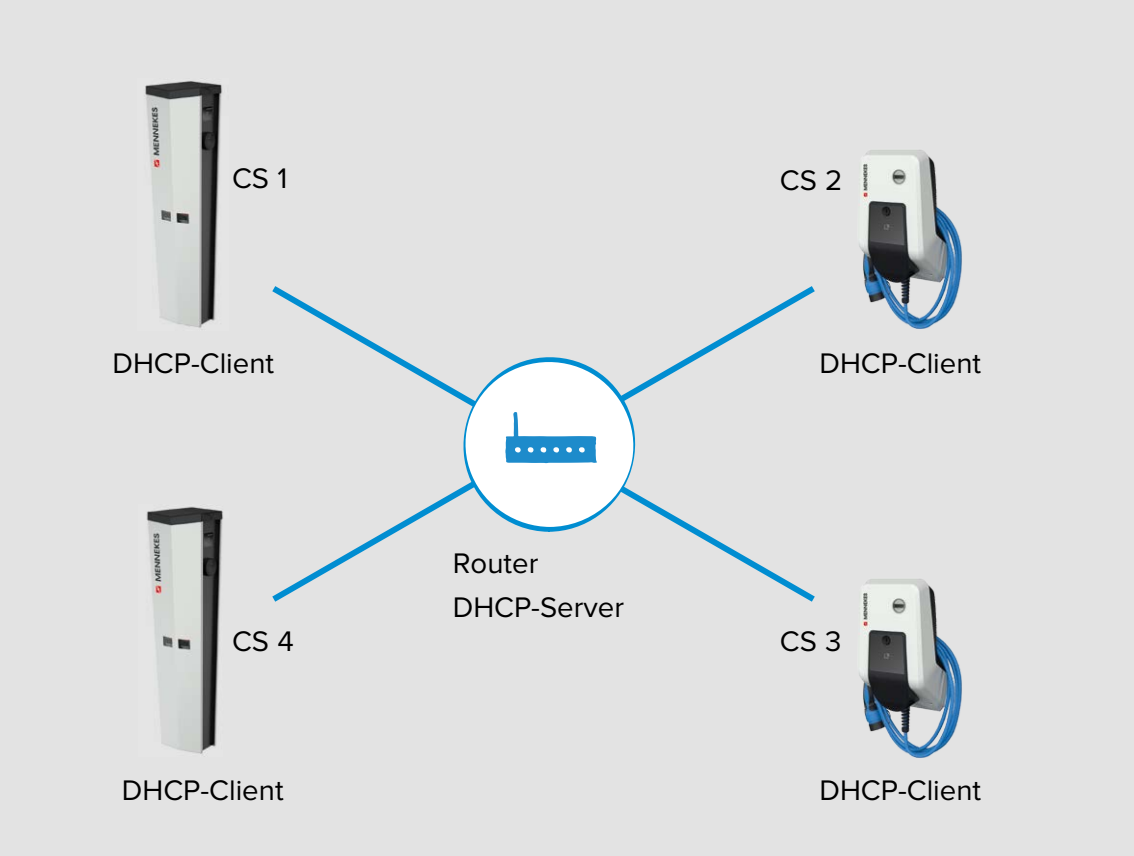
IP address configuration in ECU firmware 5.12.0 takes place step by step (incremental). It begins with 172.16.23.100 and ends with 172.16.23.254.
Alternatively, the IP address can be determined via a network scan (install as a free tool on the end terminal).

### 4.1.2 Router as a DHCP-Server

For a connection to the Backend-System over local internet it is necessary to use the router with the internet connection as a DHCP-Server.
➔ “6 Connection of several charging points to a Backend-System over local internet”

As an alternative, the IP addresses can also be assigned manually (statically).
➔ “4.2 Set up network with static IP addresses”

If the charging points are connected via a router, the charging points can be configured for the network communication. The dynamic IP address assignment for the ECUs in the network is made by a router in the same network, which is configured as a DHCP-Server. All ECUs must be configured as a DHCP-Client.




**SETTINGS IN THE WEB INTERFACE**

▶ In the web interface, navigate to the menu “Operator” .

| | | |
|---|---|---|
| Mode for network configuration | Auto (DHCP) | Mode for network configuration to be used for the ChargePoint. 'Auto' uses DHCP to configure the ChargePoint's network connection; 'Manual config' uses the addresses as filled in above. |

Fig. 11: Web interface of all ECUs for configuring dynamic IP addresses

- From ECU-Firmware 4.61, the parameter is called “Mode for ethernet configuration”.
- Present: “Auto (DHCP Client)”. For the DHCP clients, the parameter must be set to “Auto (DHCP Client)”.

Required settings:

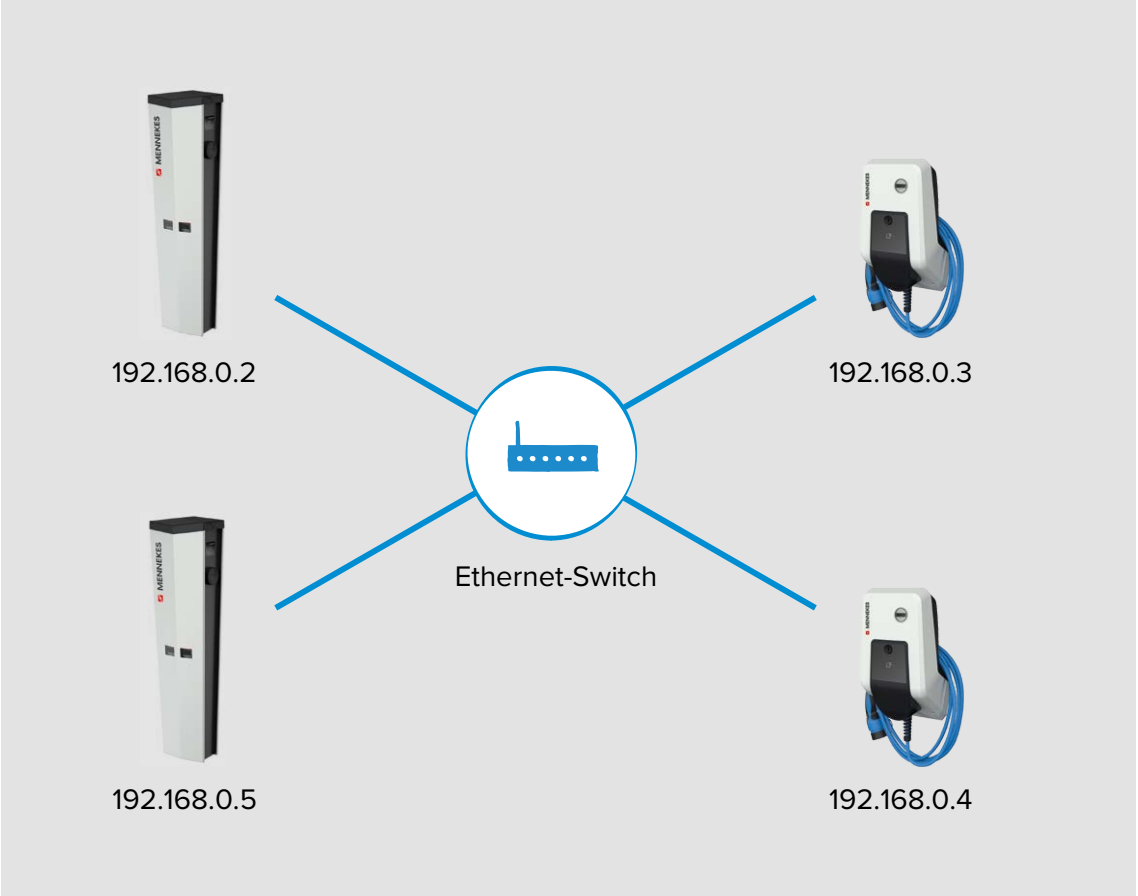
| | Web interface setting | | | |
|---|---|---|---|---|
| Parameter | CS 1 / DHCP-Client | CS 2 / DHCP-Client | CS 3 / DHCP-Client | ... |
| Mode for network configuration | Auto (DHCP Client) | Auto (DHCP Client) | Auto (DHCP Client) | Auto (DHCP Client) |

✓ The charging stations are now networked. By entering the relevant IP address in the web browser, **each ECU in the network** can be configured via the terminal device.

If the IP address of the product is not known (e.g. due to dynamic IP address configuration by a DHCP server), the IP address can either be set via a network scan (installed as a free tool on the terminal device) or via the web interface of the router / switch.

## 4.2 Set up network with static IP addresses

As an alternative to the dynamically assigned IP addresses, the ECUs can also be assigned static IP addresses.




IP addresses can be configured in two ways:

1. Via the USB port of each charging station (chapter 4.2.1)

   To do this, it is necessary to open each charging station and connect a USB cable to each ECU (see chapter “2.1.1 Via USB” (AMEDIO) resp. “2.2.1 Via USB” (AMTRON®)).

2. Via the network (chapter 4.2.2)

   All charging stations in the network can be configured via the end terminal. The charging stations do not have to be opened in this case (see chapter “2.1.3 Via the network (“Networked” operating mode)” (AMEDIO) resp. “2.2.3 Via the network (“Networked” operating mode)” (AMTRON®)).

### 4.2.1 Via the USB port of each charging station

**Settings in the Web Interface**

▶ In the web interface, navigate to the menu “Operator”.

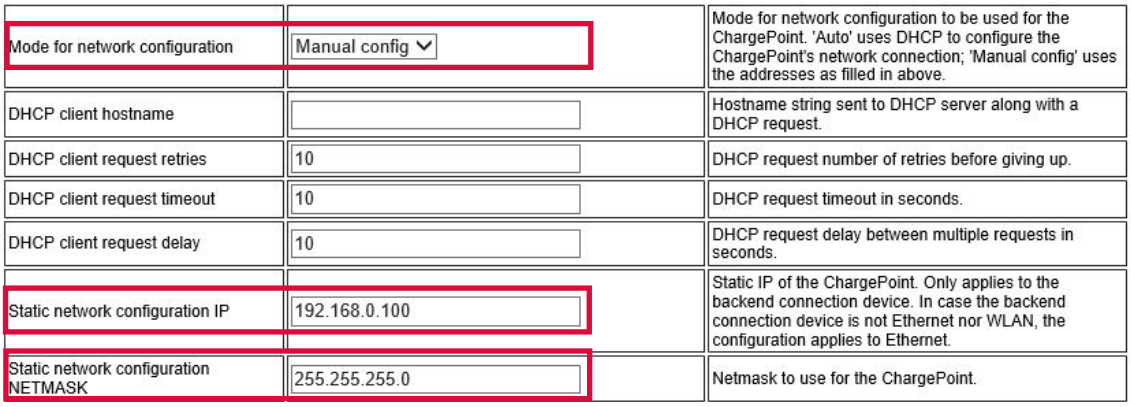



Fig. 12: Web interface for configuring static IP addresses

▶ Set the following parameters in the web interface(s):

| Parameter | Web interface settings | Special feature |
|---|---|---|
| Mode for network configuration | Mode for network configuration of charging point.<br>▶ Set “Manual config”. | Only for ECU-Firmware 4.53. |
| Mode for ether-net configuration | Mode for network configuration of charging point.<br>▶ Set “Static”. | Only for ECU-Firmware 4.61. |
| Static network configuration IP | IP address for static IP address configuration.<br>▶ Enter static IP address. | |
| Static network configuration NETMASK | Network screen for static IP address configuration.<br>▶ Enter network screen. | |

The static IP address is selected depending on the switch. Requirement:

✓ The IP addresses of the ECUs should be numbered consecutively.

✓ An IP address must not be assigned twice within a network.

▶ Click the “Save & Restart” button.

✓ The charging stations are now networked. By entering the relevant IP address in the web browser, **each ECU in the network** can be configured via the terminal device.

**SPECIAL FEATURE OF THE AMEDIO**

Although there are two charging points, the AMEDIO is always visible in the network with a single IP address. This is achieved by running the two charging points of the AMEDIO charging station on different ports. The master charging point always runs on port 81 and the slave charging point on port 82.

Example:

- Master charging point: 192.168.0.70:81
- Slave charging point: 192.168.0.70:82

### 4.2.2 Via the network

> **i** In the delivered condition, all charging stations have the same static IP address. The static IP address must therefore be set for each charging station individually and in sequence. Only the charging station that is currently being configured and the charging stations that have already been configured may be switched on or integrated in the network.

- ▶ Deactivate all charging stations or disconnect them from the Ethernet switch.
- ▶ Reactivate the first charging station or reconnect it to the Ethernet switch.

**SETTINGS IN THE WEB INTERFACE**

- ▶ In the web interface, navigate to the “Operator” menu.

| | | |
|---|---|---|
| Mode for network configuration | Manual config | Mode for network configuration to be used for the ChargePoint. 'Auto' uses DHCP to configure the ChargePoint's network connection; 'Manual config' uses the addresses as filled in above. |
| DHCP client hostname | | Hostname string sent to DHCP server along with a DHCP request. |
| DHCP client request retries | 10 | DHCP request number of retries before giving up. |
| DHCP client request timeout | 10 | DHCP request timeout in seconds. |
| DHCP client request delay | 10 | DHCP request delay between multiple requests in seconds. |
| Static network configuration IP | 192.168.0.100 | Static IP of the ChargePoint. Only applies to the backend connection device. In case the backend connection device is not Ethernet nor WLAN, the configuration applies to Ethernet. |
| Static network configuration NETMASK | 255.255.255.0 | Netmask to use for the ChargePoint. |

Fig. 13: web interface for configuring static IP addresses

▶ Set the following parameters in the web interface:

| Parameter | Web interface settings | Special note |
|---|---|---|
| Mode for network configuration | Mode for network configuration of the charging point.<br>▶ Set “Manual config”. | For ECU firmware 4.53 only. |
| Mode for Ethernet configuration | Mode for network configuration of the charging point.<br>▶ Set “Static”. | For ECU firmware 4.61 only. |
| Static network configuration IP | IP address for static IP address configuration.<br>▶ Enter static IP address. | |
| Static network configuration NETMASK | Network screen for static IP address configuration.<br>▶ Enter network screen. | |

The static IP address is selected in accordance with the switch. Requirement:

✓ The IP addresses of the ECUs should be numbered consecutively.

✓ An IP address must not be configured twice within a network.

If the networked charging stations are connected to a backend system via a SIM card and the IP address of the gateway charging point is already known, the IP address can also be entered directly in the parameter “Static network configuration GATEWAY”.

➔ “5.3 Additional settings for local networking with statically assigned IP addresses”

▶ Click the “Save & Restart” button.

▶ Activate the second charging station or connect it to the Ethernet switch and perform the above settings.

▶ ...

✓ The charging stations are now networked. By entering the relevant IP address in the web browser, **each ECU in the network** can be configured via the terminal device.

**Special Feature of the AMEDIO**

Although there are two charging points, the AMEDIO is always visible in the network with a single IP address. This is achieved by running the two charging points of the AMEDIO charging station on different ports. The master charging point always runs on port 81 and the slave charging point on port 82.

Example:

- Master charging point: 192.168.0.70:81
- Slave charging point: 192.168.0.70:82

## 4.3 Integrating the product into an existing network

To integrate the product into an existing network, observe the following sequence:

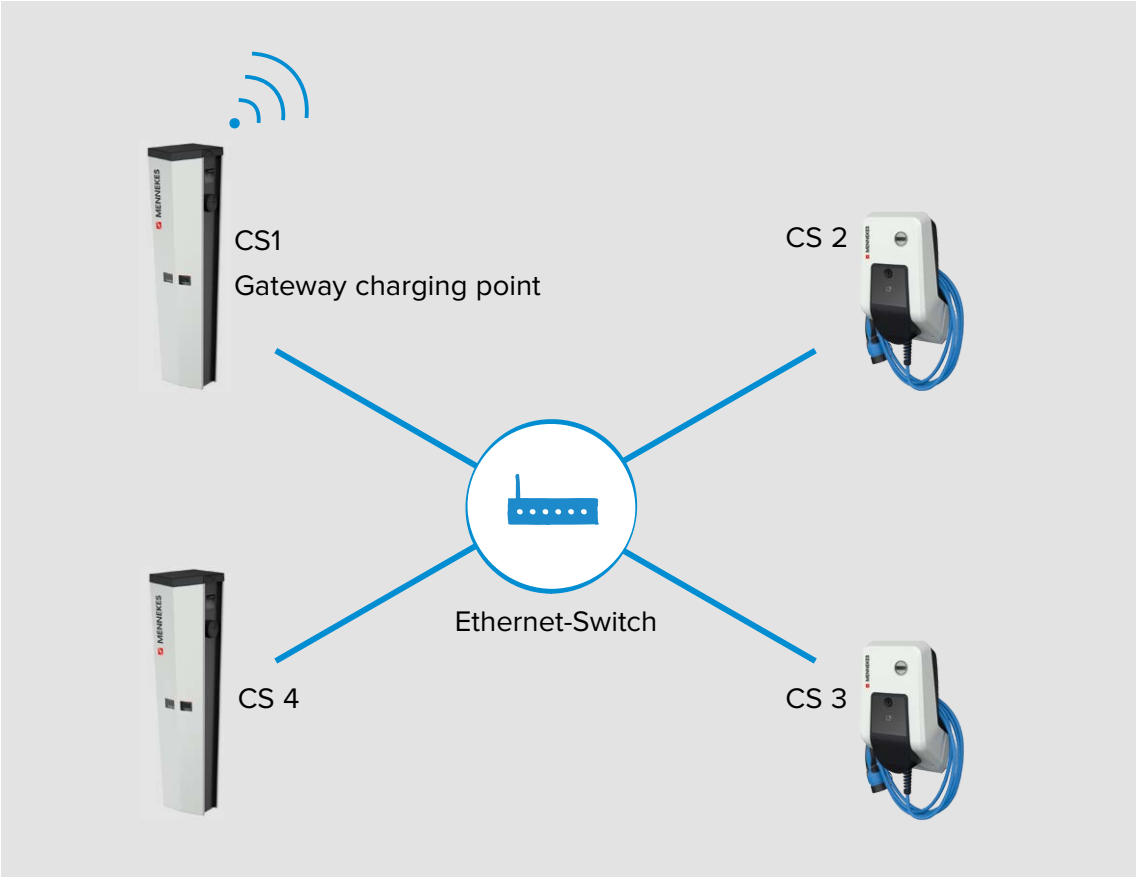
1. Install and network the product.
2. Integrate the product into the network via the web interface.
3. Update the firmware of all networked products.

> The **same firmware version** must be installed on all products before performing a function test or starting a charging process. Otherwise, functions may be impaired or malfunctions may occur.

4. Configure the product in the backend system (if necessary).
5. Perform a function test or start the charging process.

# 5 Connection of several charging points to a Backend-System via a SIM card

If several charging points are to be connected to a Backend-System via a SIM card, one charging point in the network must be configured as a Gateway. The Gateway charging point acts as an interface between the locally networked charging points on one side and the Backend-System on the other.



The connection to a backend system of charging stations with an ECU differs from the connection to a backend system of charging stations with an ACU.
The main difference is that, for charging stations with an ECU, each charging point (with AMTRON®) or each master charging point (with AMEDIO) can communicate with the backend system via dedicated OCPP. The backend URL must be registered in the web interface of each ECU (with AMTRON®) or each master ECU (with AMEDIO).
The gateway charging point with the integrated mobile communications modem acts exclusively as a router for the remaining charging points in the network.

Requirement:

✓ The **same firmware version** must be installed on all products. Otherwise, functions may be impaired or malfunctions may occ

Requirements for the network:

✓ The IP address assignment is made either statically or dynamically. For a dynamic IP address assignment it is necessary to use the ECU as a DHCP-Server.

➔ “4.2 Set up network with static IP addresses”

➔ “4.1.1 ECU as DHCP server with networking via a switch”

Requirements for the Gateway charging point:

✓ Each charging point with an integrated wireless communication modem can be configured as a Gateway (all device variants with a “+” in the name have an integrated wireless communication modem).

✓ The Gateway charging point must have a Micro-SIM card for wireless communication.

✓ When connecting to a network in which the ECU functions as a DHCP server (“4.1.1 ECU as DHCP server with networking via a switch”): The charging point that is configured as a DHCP server must also be the gateway charging point.

**Special Feature of the AMEDIO**

✓ The following applies for AMEDIO: A master charging point must be configured as a Gateway, as only the master charging point contains a wireless communication modem.

Further requirements:

✓ The charging stations must be on the same network.

➔ “4 Set up network”

✓ The network must have only one Gateway charging point.

✓ For the Gateway functionality, communication with the Backend-System must be via OCPP-J 1.6.

✓ The maximum number of charging points that are connected to a Backend-System via wireless communication must be selected depending on the network quality at the location and the available data volume. MENNEKES recommends connecting a maximum of 50 charging

points to a Backend System via a SIM card.

**SPECIAL FEATURE OF THE ECU-FIRMWARE 4.53**

- The following applies to the ECU-Firmware 4.53:
  The connection of multiple charging points to a Backend-System via a Gateway can only be done with the assignment of a static IP address.
  ➔ “4.2 Set up network with static IP addresses”

## 5.1 Define Gateway charging point

The charging point with the integrated SIM card (“Connection type” = “GSM”) could define as a Gateway over the “WAN router” = “On” parameter.

▶ In the web interface of the Gateway charging point, navigate to the menu “Operator”.

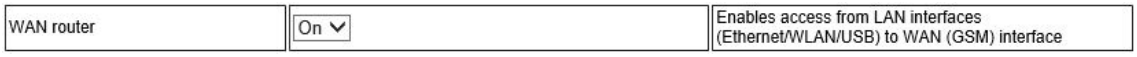



Fig. 14: Web interface for configuring the Gateway charging point

▶ Set the following parameters in the web interfaces:

| | Settings | | | |
|---|---|---|---|---|
| Parameter | CS1 / Gateway charging point | CS2 | CS3 | ... |
| Connection type | ▶ Select “GSM”. | ▶ Select “Ethernet”. | ▶ Select “Ethernet”. | ▶ Select “Ethernet”. |
| WAN router | ▶ Select “On”. | ▶ Select “Off”. | ▶ Select “Off”. | ▶ Select “Off”. |

▶ Click the “Save & Restart” button.

## 5.2 Select OCPP communication protocol

▶ In the web interface, navigate to the menu “Settings”.

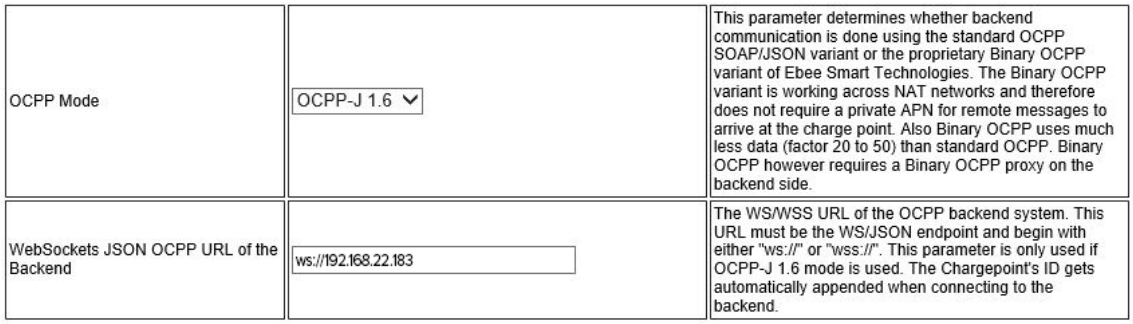



Fig. 15: Web interface of the Gateway charging point for configuring the OCPP communication protocol

▶ Set the following parameters in the web interfaces:

| | Settings | | | |
|---|---|---|---|---|
| Parameter | CS1 / Gateway charging point | CS2 | CS3 | ... |
| OCPP mode | ▶ Select “OCPP-J 1.6”. | ▶ Select “OCPP-J 1.6”. | ▶ Select “OCPP-J 1.6”. | ▶ Select “OCPP-J 1.6”. |
| WebSocket JSON OCPP URL of Backend | Enter the WS / WSS-URL of the OCPP Backend-System. | Enter the WS / WSS-URL of the OCPP Backend-System. | Enter the WS / WSS-URL of the OCPP Backend-System. | Enter the WS / WSS-URL of the OCPP Backend-System. |

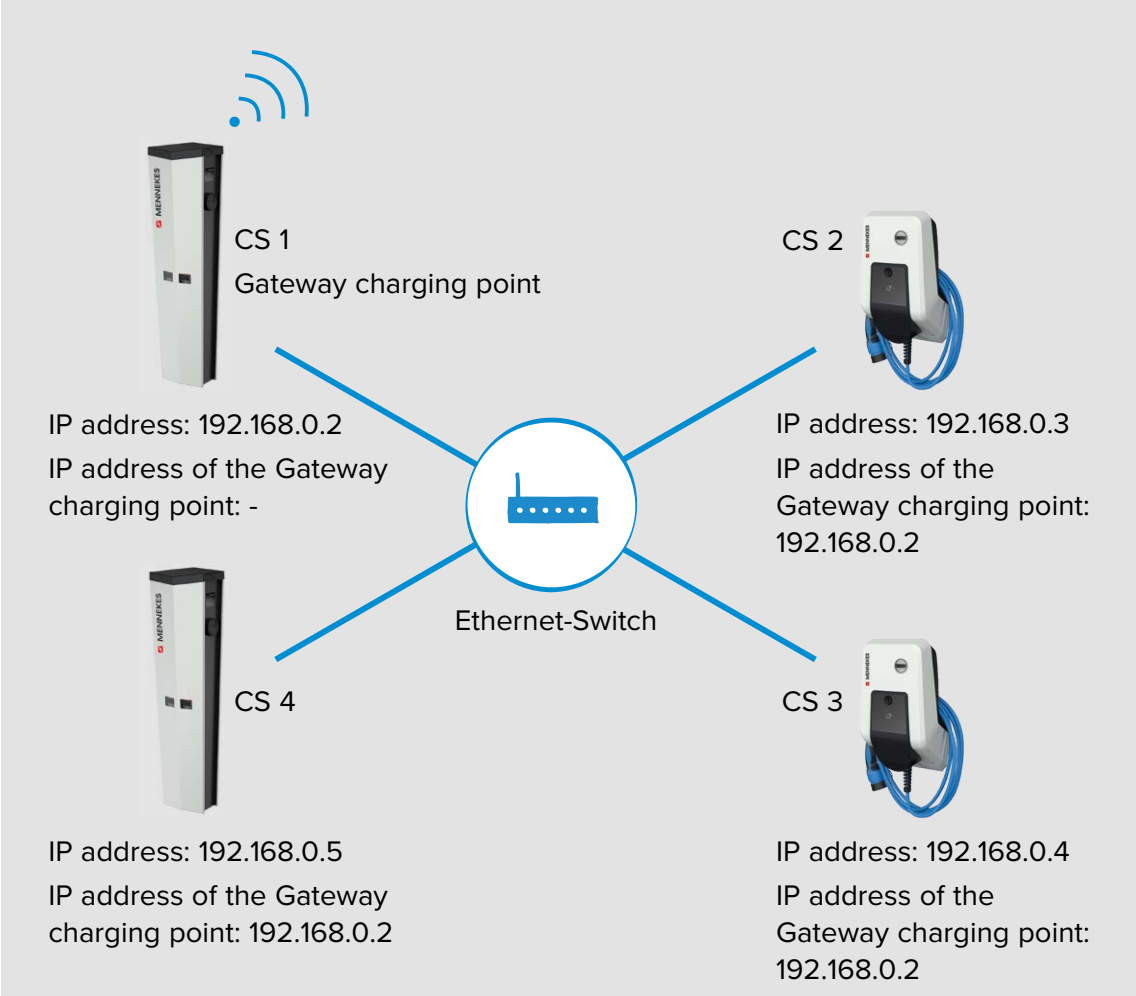
▶ Click the “Save & Restart” button.

## 5.3 Additional settings for local networking with statically assigned IP addresses

The following configurations only need to be implemented if the IP addresses were assigned manually (statically).

➔ “4.2 Set up network with static IP addresses”

If the IP addresses of all charging points in the network were assigned manually (statically), in addition to the manually entered IP address of the charging point, the IP address of the Gateway charging point in each charging point (except for the actual Gateway charging point) must also be specified.



**SETTINGS IN THE WEB INTERFACE**

▶ In the web interface of the Gateway charging point, navigate to the menu “Operator”.

| | | |
|---|---|---|
| WAN router | On | Enables access from LAN interfaces (Ethernet/WLAN/USB) to WAN (GSM) interface |
| Mode for network configuration | Manual config | Mode for network configuration to be used for the ChargePoint. 'Auto' uses DHCP to configure the ChargePoint's network connection; 'Manual config' uses the addresses as filled in above. |
| DHCP client hostname | | Hostname string sent to DHCP server along with a DHCP request. |
| DHCP client request retries | 10 | DHCP request number of retries before giving up. |
| DHCP client request timeout | 10 | DHCP request timeout in seconds. |
| DHCP client request delay | 10 | DHCP request delay between multiple requests in seconds. |
| Static network configuration IP | 192.168.0.2 | Static IP of the ChargePoint. Only applies to the backend connection device. In case the backend connection device is not Ethernet nor WLAN, the configuration applies to Ethernet. |
| Static network configuration NETMASK | 255.255.255.0 | Netmask to use for the ChargePoint. |
| Static network configuration GATEWAY | | Gateway to use for the ChargePoint. |

Fig. 16: Web interface of the Gateway charging point for configuring the static IP addresses

The parameter “Static network configuration GATEWAY” must remain empty for the Gateway charging point.

▶ In the web interfaces of the networked charging points, navigate to the menu “Operator”.

| | | |
|---|---|---|
| WAN router | Off | Enables access from LAN interfaces (Ethernet/WLAN/USB) to WAN (GSM) interface |
| Mode for network configuration | Manual config | Mode for network configuration to be used for the ChargePoint. 'Auto' uses DHCP to configure the ChargePoint's network connection; 'Manual config' uses the addresses as filled in above. |
| DHCP client hostname | | Hostname string sent to DHCP server along with a DHCP request. |
| DHCP client request retries | 10 | DHCP request number of retries before giving up. |
| DHCP client request timeout | 10 | DHCP request timeout in seconds. |
| DHCP client request delay | 10 | DHCP request delay between multiple requests in seconds. |
| Static network configuration IP | 192.168.0.3 | Static IP of the ChargePoint. Only applies to the backend connection device. In case the backend connection device is not Ethernet nor WLAN, the configuration applies to Ethernet. |
| Static network configuration NETMASK | 255.255.255.0 | Netmask to use for the ChargePoint. |
| Static network configuration GATEWAY | 192.168.0.2 | Gateway to use for the ChargePoint. |

Fig. 17: Web interface of the networked charging points for configuring static IP addresses

In the parameter “Static network configuration GATEWAY”, the IP address of the Gateway charging point (parameter “Static network configuration IP”) must be entered for each networked charging point.

Example:

| | Settings | | | | Special feature |
|---|---|---|---|---|---|
| Parameter | CS 1 / Gateway charging point | CS 2 | CS 3 | ... | |
| Mode for network configuration | Manual config | Manual config | Manual config | Manual config | Only for ECU-Firmware 4.53. |
| Mode for ethernet configuration | Static | Static | Static | Static | Only from ECU-Firmware 4.61. |
| Static network configuration IP | 192.168.0.2 | 192.168.0.3 | 192.168.0.4 | 192.168.0. ... | |
| Static network configuration NETMASK | 255.255.255.0 | 255.255.255.0 | 255.255.255.0 | 255.255.255.0 | |
| Static network configuration GATEWAY | | 192.168.0.2 | 192.168.0.2 | 192.168.0.2 | |

# 6 Connection of several charging points to a Backend-System over local internet

Requirement for the network:

✓ The charging points are networked locally via a router that has an Internet connection. The connection to the router can be made with either static IP address configuration (chapter “4.2 Set up network with static IP addresses”) or dynamic IP address configuration (chapter “4.1.2 Router as a DHCP-Server”).

**SETTINGS IN THE WEB INTERFACE**

▶ In the web interfaces of the networked charging points, navigate to the menu “Settings”.

| | | |
|---|---|---|
| Connection Type | Ethernet | The type of data connection to be used to connect to the backend system, if any. Use this option to disable backend communication completely |
| OCPP Mode | OCPP-J 1.6 | This parameter determines whether backend communication is done using the standard OCPP SOAP/JSON variant or the proprietary Binary OCPP variant of Ebee Smart Technologies. The Binary OCPP variant is working across NAT networks and therefore does not require a private APN for remote messages to arrive at the charge point. Also Binary OCPP uses much less data (factor 20 to 50) than standard OCPP. Binary OCPP however requires a Binary OCPP proxy on the backend side. |
| WebSockets JSON OCPP URL of the Backend | ws://192.168.22.183 | The WS/WSS URL of the OCPP backend system. This URL must be the WS/JSON endpoint and begin with either "ws://" or "wss://". This parameter is only used if OCPP-J 1.6 mode is used. The Chargepoint's ID gets automatically appended when connecting to the backend. |
| HTTP Basic Authentication password | NuLRhQdeM6jttw51Myh4 | The password to be used for HTTP Basic Authorization. If left empty, HTTP Basic Authorization is not used. |

Fig. 18: Web interface for configuring a connection to a Backend-System via local internet

▶ Set the following parameters in the web interfaces of every charging station:

| Parameter | Web interface settings |
|---|---|
| Connection type | ▶ Select “Ethernet”. |
| OCPP Mode | ▶ Select “OCPP-J 1.6”. |
| WebSocket JSON OCPP URL of Backend | ▶ Enter the WS / WSS-URL of the OCPP Backend-System. |
| HTTP Basic Authentication Password | Only available from ECU-Firmware 4.61.<br>▶ Enter the password for HTTP Basic Authentication.<br>An empty field prevents the HTTP Basic Authentication. |

Information concerning OCPP and the password for HTTP Basic Authentication are provided by your Backend-System operator.

We recommend using a secure Internet connection to communicate with the backend system. This can be done, for example, via a SIM card provided by the backend system operator or via a connection secured by TLS.
In the case of access via the public Internet, at least the HTTP basic authentication should be activated, otherwise the data will be transmitted in a format that is readable for unauthorised third parties.

▶ Click the “Save & Restart” button.

# 7 Operation of local and dynamic load management (DLM)

The main purpose of load management is to ensure that as many vehicles as possible can be charged simultaneously, without overloading the power supply. The available energy must be distributed to the connected vehicles as evenly as possible. In the process, the vehicles must be charged with the highest possible charging current.

There are two principles concerning the supply of the entire charging infrastructure at the location:

- The value of the maximum upper current limit is static and corresponds, for example, to the value of the building connection or the back-up fuse of the charging infrastructure.
- The value of the maximum upper current limit is dynamic and is regulated, for example, as a function of the other consumers at the location.

Load management in this form offers the following advantages:

- Cost reduction / cost avoidance
  - Peak load avoidance
  - Reduced expansion of the grid connection
  - Energy consumption during favourable tariff periods
  - Optimal use of renewable energy
- Flexibility and convenience
  - Increase availability of charging points
  - Intelligent, dynamic controls for fastest possible , cost-optimised charging

The various options (use cases) for load management and the necessary configurations are described below.

Requirement:

✓ The **same firmware version** must be installed on all products. Otherwise, functions may be impaired or malfunctions may occur.

✓ The charging stations must be on a network.

➔ “4 Set up network”

## General

In load management, one of the charging points in the network always assumes the coordination function. This charging point, which is also referred to as the DLM-Master, distributes the maximum available energy proportionately to the remaining charging points in the network. Any charging point in the network can be configured as the DLM-Master in the web interface (regardless of whether it is already configured as a Gateway charging point). All other charging points must be configured as DLM-Satellites.


Operating principle:

- Load management distributes the maximum available power to the connected vehicles.
- Load management responds as a function of all internal phase-accurate measurements.
- All current charging currents are considered in “real time”.
- Load management regulates the connected vehicles in the entire charging point network on an equal basis. Regulation takes place in 1 A steps.
- If the charging current on the vehicle side is reduced at the end of the charging process or to pause the charge, the released power reserve is distributed to the other connected vehicles.

- If an external meter is connected to the DLM-Master, the maximum available power depends on the remaining power consumption at the location and is automatically reduced or increased according to the load. If an external meter is connected, therefore, additional power consumers (outside the charging infrastructure) can be considered.

### VIEW NETWORKED CHARGING STATIONS

Once a DLM-Master has been defined in the web interface, the new menu "> DLM" is displayed.

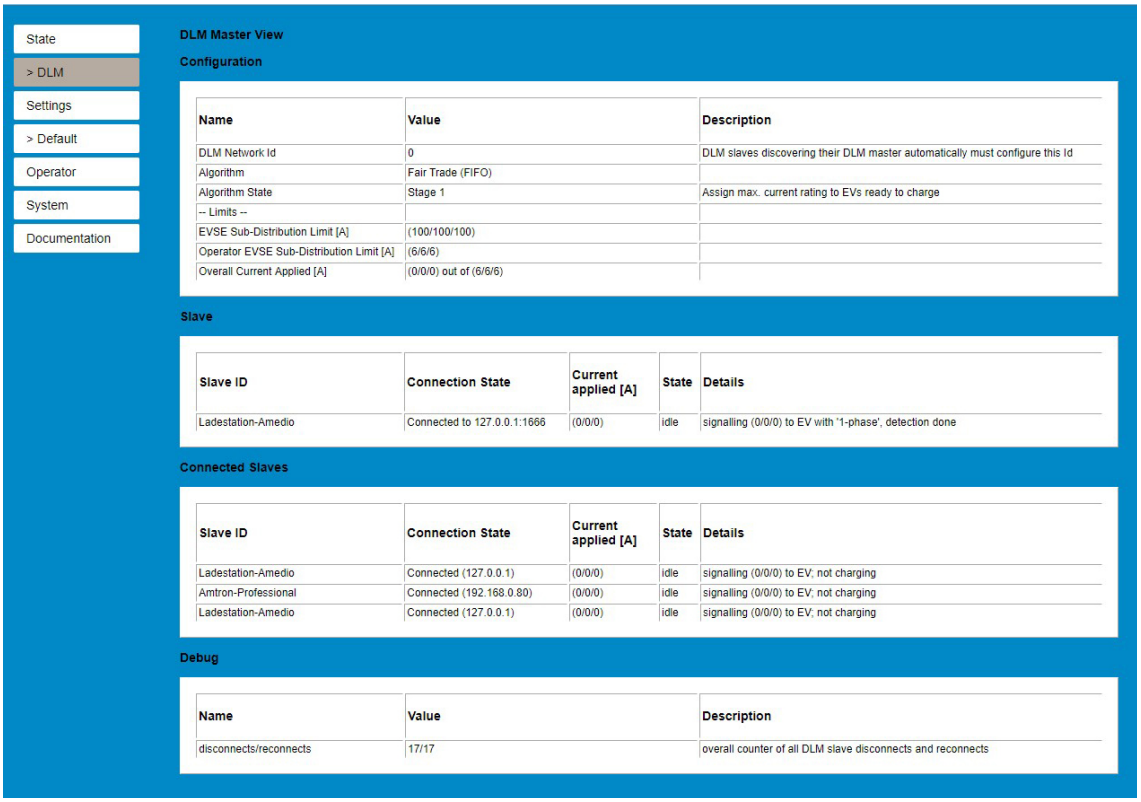



Fig. 19: Web interface menu > DLM (example: ECU Firmware 4.61)

You cannot make any settings here. Information is provided about the network connection of the respective charging station. The web interface of the DLM-Master (see Fig. 19) also provides information on the network settings and the status of the networked charging stations.

In load management, the DLM-Master takes account of each ECU in the network individually. Therefore, the energy is always distributed to the number of ECUs in the network and not to the number of charging stations.

## 7.1 Use case 1: Car park with two charging points

Load management is not configured in the delivery state, hence Use case 1 must be considered here.

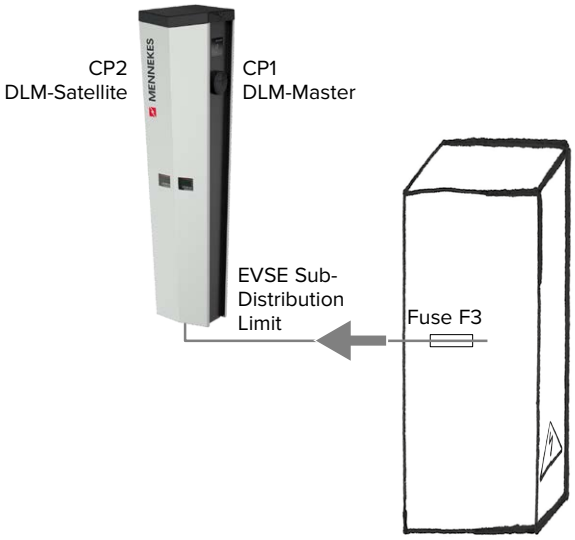
Application field:

For cost reasons, it may be appropriate during the installation not to lay the supply line for the full capacity of the charging station (e.g. for AMEDIO 64 A (2 × 22 kW)), but limit it to 32 A, for example. Load management allows a connected vehicle to charge with 32 A. As soon as another vehicle is connected, the charging power is limited to 16 A per charging point. This means that the fuse F3 does not trip.

Objective of load management:

The total charging current of both charging points must not exceed the rated current of fuse F3, so that the power supply and the operational reliability of the charging station are always ensured.

**CONNECTION**



**Settings in the Web Interface**

▶ In the web interface, navigate to the menu “Operator”.

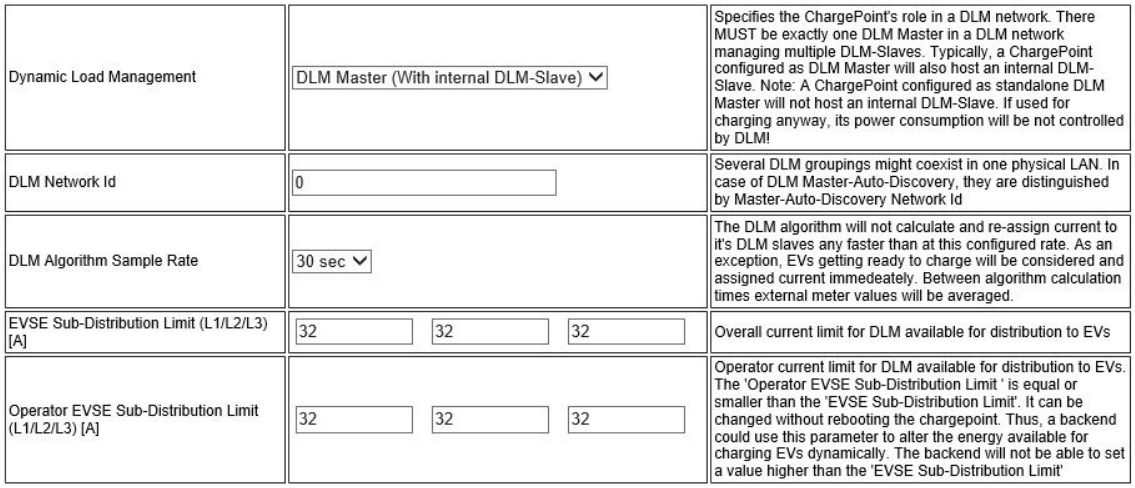



Fig. 20: Web interface of the DLM-Master for configuring load management

In the web interface of the DLM-Master under the parameters “EVSE Sub-Distribution Limit” and “Operator EVSE Sub-Distribution Limit”, the maximum connection current of the charging station must be configured with 32 A for all three phases.

▶ In the web interface, set the following parameters for each charging point:

| Parameter | Description |
|---|---|
| Dynamic Load Management | Used to set the charging point function for load management in a DLM-Network. The charging point that is assigned the setting “DLM Master (With internal DLM-Slave)” or “DLM Master (Standalone)” is the DLM-Master. The charging point that is assigned the setting “DLM Slave (Master-Auto-Discovery)” is the DLM-Satellite. |
| DLM Network Id | The charging points must be assigned to the same DLM-Network. |
| EVSE Sub-Distribution Limit (L1/L2/L3) [A] | Maximum mains current available for load management.<br>This parameter must be set for the DLM-Master only. |
| Operator EVSE Sub-Distribution Limit (L1/L2/L3) [A] | Upper current limit for load management. This value is smaller than or equal to the value for “EVSE Sub-Distribution Limit (L1/L2/L3) [A]”.<br>This parameter must be set for the DLM-Master only. |

▶ Click the “Save & Restart” button.

✓ Load management now ensures that the outer conductor currents in the supply line are limited to the respective current value.

Example:

| Parameter | Settings | | | | | |
|---|---|---|---|---|---|---|
| | CP 1 / DLM-Master | | | CP 2 / DLM-Satellite | | |
| Dynamic Load Management | DLM Master (with internal DLM-Slave) | | | DLM Slave (Master-Auto-Discovery) | | |
| DLM Network Id | 0 | | | 0 | | |
| EVSE Sub-Distribution Limit (L1/L2/L3) [A] | 32 | 32 | 32 | - | - | - |
| Operator EVSE Sub-Distribution Limit (L1/L2/L3) [A] | 32 | 32 | 32 | - | - | - |

If necessary, a load profile for 24 hours can be set up.

➔ “7.7 Static load profile for 24 hours”

## 7.2 Use case 2: Car park with several charging points

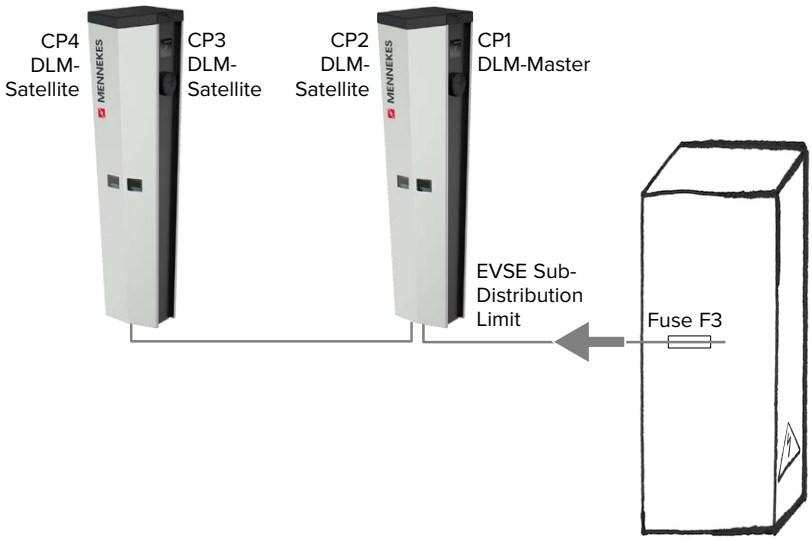
Application field:

For cost reasons, it may be appropriate during the installation not to lay the supply line for the full capacity of the charging point network (all charging stations on one supply line), but to limit the capacity. All connected vehicles charge with full charging power until the maximum current for the supply line has been reached. If another vehicle is plugged into a charging point, load management distributes the charging currents intelligently to all vehicles.

Objective of load management:

The total charging current of all charging points must not exceed the rated current of fuse F3, so that the power supply and the operational reliability of the AMEDIOs are always ensured.

## Connection




## Settings in the Web Interface

▶ In the web interface, navigate to the menu “Operator”.

| | | |
|---|---|---|
| Dynamic Load Management | DLM Master (With internal DLM-Slave) | Specifies the ChargePoint's role in a DLM network. There MUST be exactly one DLM Master in a DLM network managing multiple DLM-Slaves. Typically, a ChargePoint configured as DLM Master will also host an internal DLM-Slave. Note: A ChargePoint configured as standalone DLM Master will not host an internal DLM-Slave. If used for charging anyway, its power consumption will be not controlled by DLM! |
| DLM Network Id | 0 | Several DLM groupings might coexist in one physical LAN. In case of DLM Master-Auto-Discovery, they are distinguished by Master-Auto-Discovery Network Id |
| DLM Algorithm Sample Rate | 30 sec | The DLM algorithm will not calculate and re-assign current to it's DLM slaves any faster than at this configured rate. As an exception, EVs getting ready to charge will be considered and assigned current immedeately. Between algorithm calculation times external meter values will be averaged. |
| EVSE Sub-Distribution Limit (L1/L2/L3) [A] | 100 100 100 | Overall current limit for DLM available for distribution to EVs |
| Operator EVSE Sub-Distribution Limit (L1/L2/L3) [A] | 100 100 100 | Operator current limit for DLM available for distribution to EVs. The 'Operator EVSE Sub-Distribution Limit ' is equal or smaller than the 'EVSE Sub-Distribution Limit'. It can be changed without rebooting the chargepoint. Thus, a backend could use this parameter to alter the energy available for charging EVs dynamically. The backend will not be able to set a value higher than the 'EVSE Sub-Distribution Limit' |

Fig. 21: Web interface of the DLM-Master for configuring load management

▶ In the web interface, set the following parameters for each charging point:

| Parameter | Description |
|---|---|
| Dynamic Load Management | Used to set the charging point function for load management in a DLM-Network. The charging point that is assigned the setting “DLM Master (With internal DLM-Slave)” is the DLM-Master. The charging point that is assigned the setting “DLM Slave (Master-Auto-Discovery)” is the DLM-Satellite. |
| DLM Network Id | The charging points must be assigned to the same DLM-Network. |
| EVSE Sub-Distribution Limit (L1/L2/L3) [A] | Maximum mains current available for load management.<br>This parameter must be set for the DLM-Master only. |
| Operator EVSE Sub-Distribution Limit (L1/L2/L3) [A] | Upper current limit for load management. This value is smaller than or equal to the value for “EVSE Sub-Distribution Limit (L1/L2/L3) [A]”.<br>This parameter must be set for the DLM-Master only. |

▶ Click the “Save & Restart” button.

✓ Load management now ensures that the outer conductor currents in the supply line are limited to the respective current value.

Example:

| Parameter | Settings | | | | | |
|---|---|---|---|---|---|---|
| | CP 1 / DLM-Master | | | CP2 / CP3 / CP4 / DLM-Satellite | | |
| Dynamic Load Management | DLM Master (with internal DLM-Slave) | | | DLM Slave (Master-Auto-Discovery) | | |
| DLM Network Id | 0 | | | 0 | | |
| EVSE Sub-Distribution Limit (L1/L2/L3) [A] | 100 | 100 | 100 | - | - | - |
| Operator EVSE Sub-Distribution Limit (L1/L2/L3) [A] | 100 | 100 | 100 | - | - | - |

If necessary, a load profile for 24 hours can be set up.

➔ “7.7 Static load profile for 24 hours”

## 7.3 Use case 3: Car park with several charging stations and common power connection

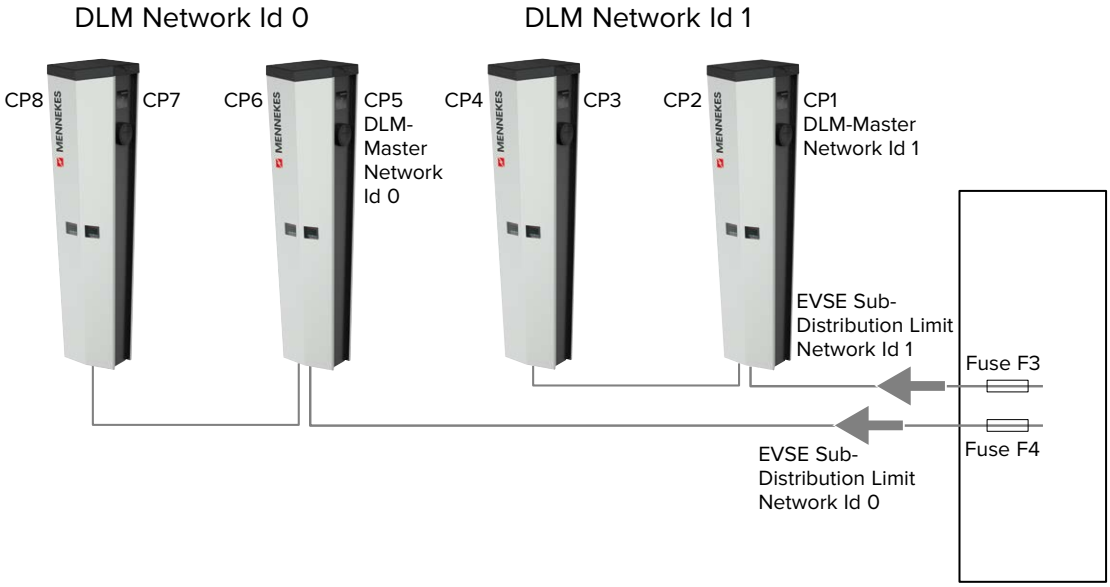
Application fields:

- For cost reasons, it may be appropriate during the installation not to lay the supply line for the full capacity of all charging stations on each respective supply line, but to limit the capacity. All connected vehicles charge with full charging power until the maximum current for the supply line has been reached. If another vehicle is plugged into a charging point, load management distributes the charging currents intelligently to all vehicles.
- The charging points can be connected to different supply lines and still be in the same network (e.g. for common communication with a Backend-System). By assigning a load management network ID (“DLM Network Id”), load management can be operated separately for each supply line.

Objective of load management:

To ensure the power supply and operational reliability of a network of defined charging points.

**CONNECTION**



### Settings in the Web Interface

▶ In the web interface, navigate to the menu “Operator”.

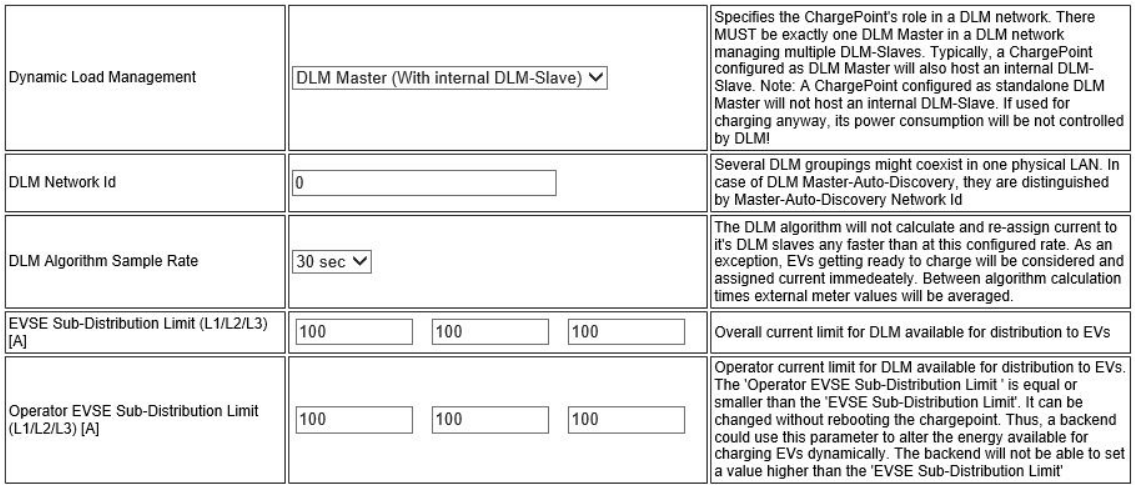



Fig. 22: Web interface of the DLM-Master for configuring load management

▶ In the web interface, set the following parameters for each charging point:

| Parameter | Description |
|---|---|
| Dynamic Load Management | Used to set the charging point function for load management in a DLM-Network. The charging point that is assigned the setting “DLM Master (With internal DLM-Slave)” is the DLM-Master. The charging point that is assigned the setting “DLM Slave (Master-Auto-Discovery)” is the DLM-Satellite. |
| DLM Network Id | The charging points that are supplied by the same supply line must be assigned to the same DLM-Network. |
| EVSE Sub-Distribution Limit (L1/L2/L3) [A] | Maximum mains current available for load management.<br>This parameter must be set for the DLM-Master only. |
| Operator EVSE Sub-Distribution Limit (L1/L2/L3) [A] | Upper current limit for load management. This value is smaller than or equal to the value for “EVSE Sub-Distribution Limit (L1/L2/L3) [A]”.<br>This parameter must be set for the DLM-Master only. |

▶ Click the “Save & Restart” button.

✓ Load management now ensures that the outer conductor currents in the supply line are limited to the respective current value.

Example:

| Parameter | Setting for DLM Network Id 0 | | | | | |
|---|---|---|---|---|---|---|
| | CP 5 / DLM-Master | | | CP6 / CP7 / CP8 / DLM-Satellite | | |
| Dynamic Load Management | DLM Master (with internal DLM-Slave) | | | DLM Slave (Master-Auto-Discovery) | | |
| DLM Network Id | 0 | | | 0 | | |
| EVSE Sub-Distribution Limit (L1/ L2/L3) [A] | 100 | 100 | 100 | - | - | - |
| Operator EVSE Sub-Distribution Limit (L1/L2/L3) [A] | 100 | 100 | 100 | - | - | - |

| Parameter | Setting for DLM Network Id 1 | | | | | |
|---|---|---|---|---|---|---|
| | CP 1 / DLM-Master | | | CP2 / CP3 / CP4 / DLM-Satellite | | |
| Dynamic Load Management | DLM Master (with internal DLM-Slave) | | | DLM Slave (Master-Auto-Discovery) | | |
| DLM Network Id | 1 | | | 1 | | |
| EVSE Sub-Distribution Limit (L1/ L2/L3) [A] | 100 | 100 | 100 | - | - | - |
| Operator EVSE Sub-Distribution Limit (L1/L2/L3) [A] | 100 | 100 | 100 | - | - | - |

If necessary, a load profile for 24 hours can be set up.

➔ “7.7 Static load profile for 24 hours”

## 7.4 Use case 4: Consideration of dynamic measured values of an external meter (Standalone application with one charging point and Master-Satellite application with several charging stations and common power connection)

Requirement:

- ✓ The load management system can not distribute the power supply dynamically to the individual charging points. Therefore, the connection lines of the charging stations must be designed for the full capacity of all connected charging stations. Alternatively, a maximum charging current can be assigned to the charging points. To do this, the parameter “Operator Current Limit (A)” must be set in the master web interface and in the Slave web interface in such a way that the sum of all charging currents in a DLM-Network does not exceed the capacity of the connecting cables.
- ✓ All charging stations must have been assigned the same DLM Network Id.
- ✓ A network-compatible Modbus meter with Ethernet interface and TCP/IP protocol (e.g. Siemens PAC 2200) must be installed in the power distribution and integrated via the switch into the same network as the charging stations.

Objective of load management:

To ensure the power supply and operational reliability of a network of charging points.

Application field:

To prevent an overload at the building connection with one or more charging points (blackout protection / overload protection), it is necessary to record the current values from the building connection with an additional external energy meter. The energy meter also takes account of other consumers in the building.

The external meter can be placed in such a way that only the external consumers are measured (see “7.4.1 Option 1: Meter measures external consumers only”) or that the external consumers and the charging stations are measured (see “7.4.2 Option 2: Meter measures external consumers and charging stations (total consumption)”).

**COMPATIBLE METERS**

The ECU is compatible with the following meters:

**Siemens PAC 2200:**

- Indirect measurement via a transducer (5 A):
  - 7KM2200-2EA30-1JA1 (with MID approval)
  - 7KM2200-2EA30-1EA1 (without MID approval)

- Direkt measurement (bis 65 A)
  - 7KM2200-2EA40-1JA1 (with MID approval)
  - 7KM2200-2EA40-1EA1 (without MID approval)

**Phoenix EEM-MB371-EIP 2907976:**

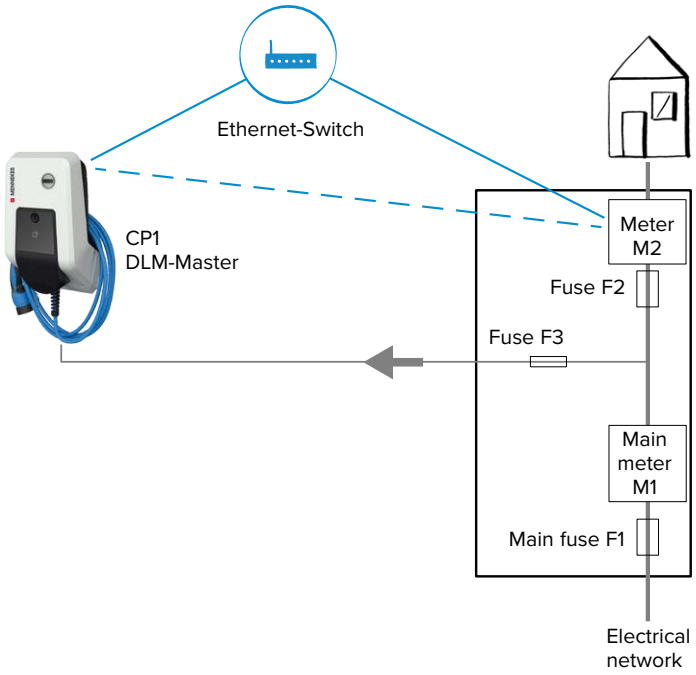
This meter additionally enables a direct connection of Rogowski coils.

### 7.4.1 Option 1: Meter measures external consumers only

The DLM-Master queries at regular intervals the current consumption measured by the meter M2. The DLM-Master subtracts the current consumption at meter M2 from the set value in the parameter “Main Distribution Limit (L1/L2/L3) [A]” and makes the remaining power available to the charging stations. The charging current is distributed evenly to all connected vehicles. Networking between the energy meter and the charging station can be established via a direct connection or via an Ethernet switch, if, for example, several charging stations are to be networked.

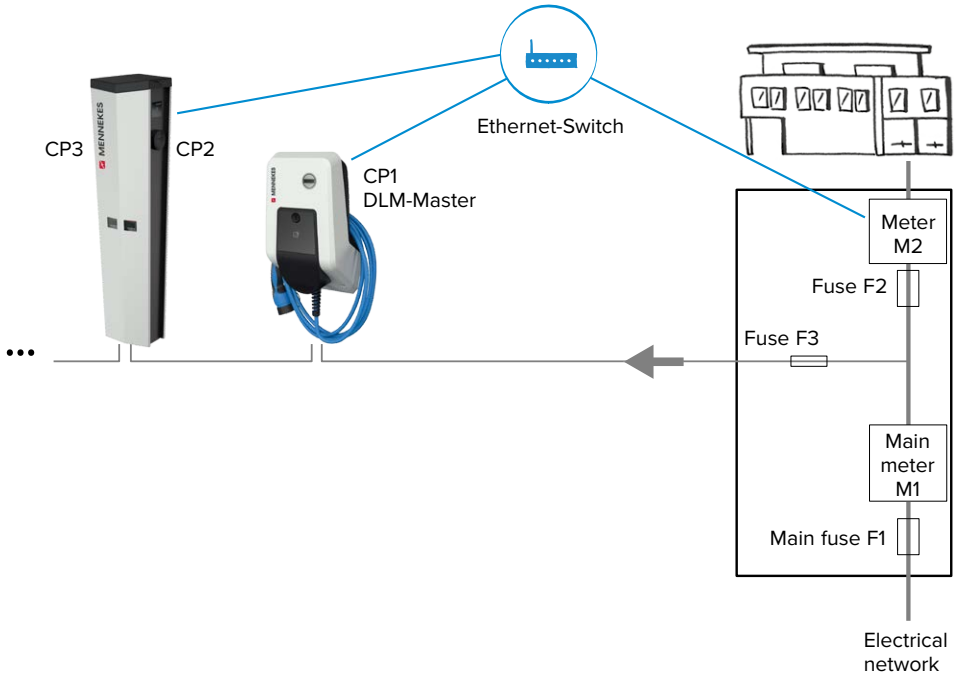
**CONNECTION EXAMPLE: SINGLE-FAMILY HOUSE (STANDALONE)**

**EXTERNAL METER FOR EXTERNAL USE ONLY**




**CONNECTION EXAMPLE: APARTMENT BUILDING (MASTER-SATELLITE)**

**EXTERNAL METER FOR EXTERNAL USE ONLY**



### Settings in the Web Interface

▶ In the web interface of the DLM-Master, navigate to the menu “Operator”.

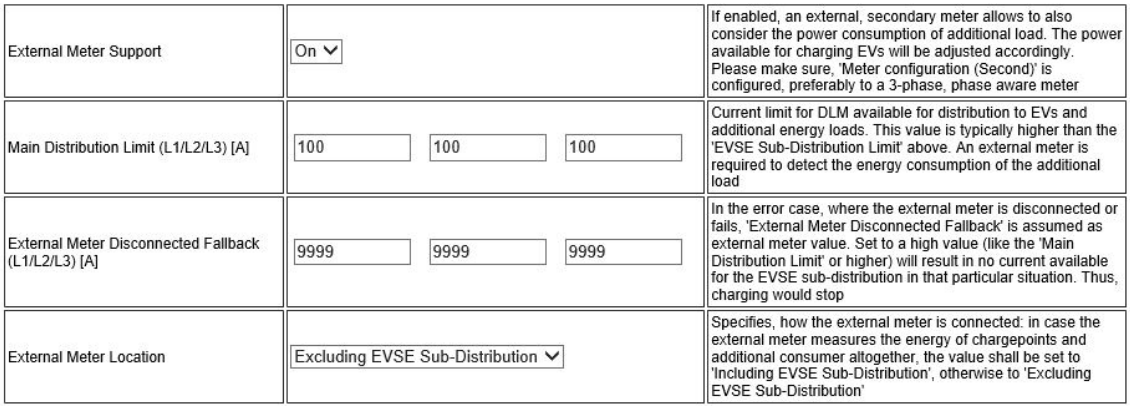



Fig. 23: Web interface of the DLM-Master for configuring load management

▶ In the web interface of the DLM-Master, set the following parameters:

| Parameter | Description |
|---|---|
| External Meter Support | This setting specifies whether an external energy meter is connected for additional consumers. |
| Main Distribution Limit (L1/L2/L3) [A] | Upper current limit for load management and for additional consumers. Rated current of the main fuse. |
| External Meter Disconnected Fallback (L1/L2/L3) [A] | Upper current limit if no external energy meter is connected.<br>■ External Meter Disconnected Fallback = 0: No charging current is provided to the charging stations.<br>■ External Meter Disconnected Fallback = 9999: The charging stations are provided with the entire power supply. |
| External Meter Location | This setting specifies how the external energy meter is connected.<br>■ “Including EVSE Sub-Distribution”: Used to detect charging points and additional consumers.<br>■ “Excluding EVSE Sub-Distribution”: Used to detect external consumers only. |

- From ECU-Firmware 4.61 there is an additionally parameter “External Load Headroom (L1/L2/L3) [A]”. In this parameter a safety distance to the parameter “Main Distribution Limit (L1/L2/L3) [A]” can be set.
- From ECU-Firmware 4.61 the parameter “External Meter Disconnected Fallback (L1/L2/L3) [A]” is called “External Load Fallback (L1/L2/L3) [A]”.

Example:

| Parameter | Settings<br>CP1 / DLM-Master | | |
|---|---|---|---|
| External Meter Support | On | | |
| Main Distribution Limit (L1/L2/L3) [A] | 100 | 100 | 100 |
| External Load Headroom (L1/L2/L3) [A] | 0 | 0 | 0 |
| External Meter Disconnected Fallback (L1/L2/L3) [A] | 50 | 50 | 50 |
| External Meter Location | Excluding EVSE-Sub Distribution | | |

**Select meter**

Additionally the used meter has to be selected.

▶ In the web interface of the DLM-Master, navigate to the menu “Operator”.

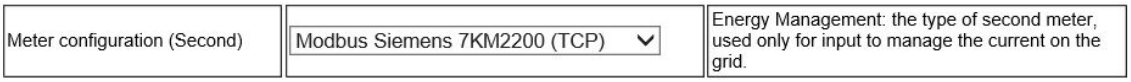



Fig. 24: Web interface of the DLM-Master for selecting the meter

▶ In the web interface of the DLM-Master, set the following parameter:

| Parameter | Description |
|---|---|
| Meter configuration (second) | Setting which meter was used. |

▶ Click the “Save & Restart” button.

If necessary, a load profile for 24 hours can be set up.

➔ “7.7 Static load profile for 24 hours”

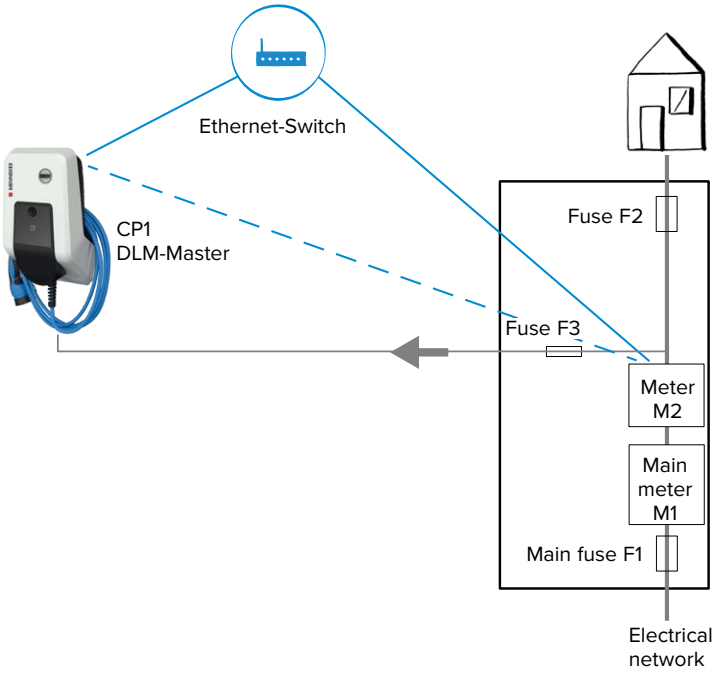
### 7.4.2 Option 2: Meter measures external consumers and charging stations (total consumption)

The DLM-Master queries at regular intervals the current consumption measured by the meter M2. The DLM-Master regulates the individual charging currents of the charging points so that the measured value of the meter M2 does not exceed the set value “Main Distribution Limit (L1/L2/L3) [A]”. The charging current is distributed evenly to all connected vehicles.

Networking between the energy meter and the charging station can be established via a direct connection or via an Ethernet switch, if, for example, several charging stations are to be networked.

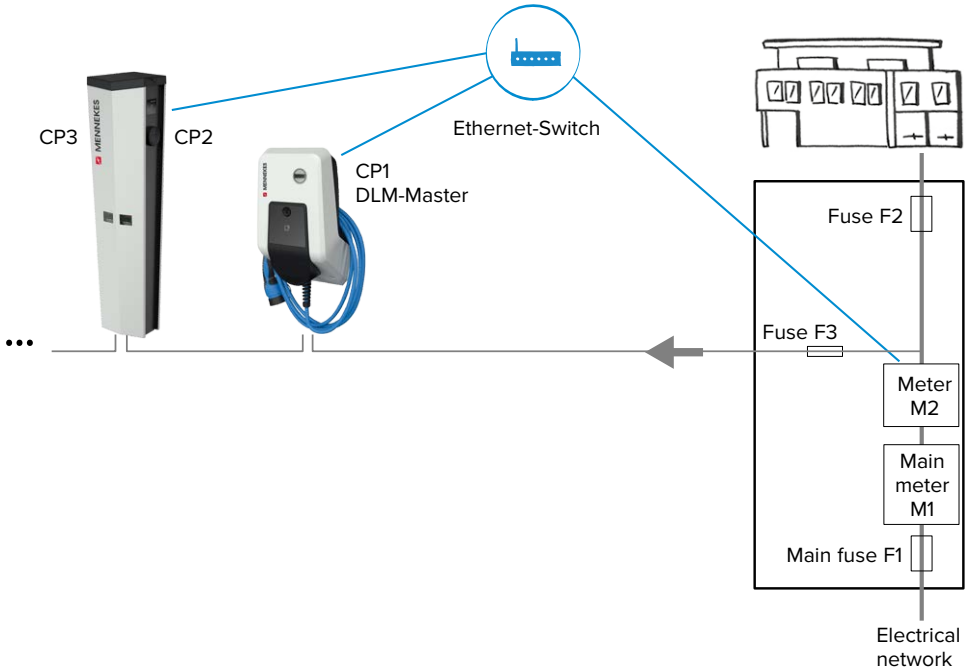
**CONNECTION EXAMPLE: SINGLE-FAMILY HOUSE (STANDALONE)**

**EXTERNAL METER FOR TOTAL CONSUMPTION**




**CONNECTION EXAMPLE: APARTMENT BUILDING (MASTER-SATELLITE)**

**EXTERNAL METER FOR TOTAL CONSUMPTION**



### Settings in the Web Interface

▶ In the web interface of the DLM-Master, navigate to the menu “Operator”.

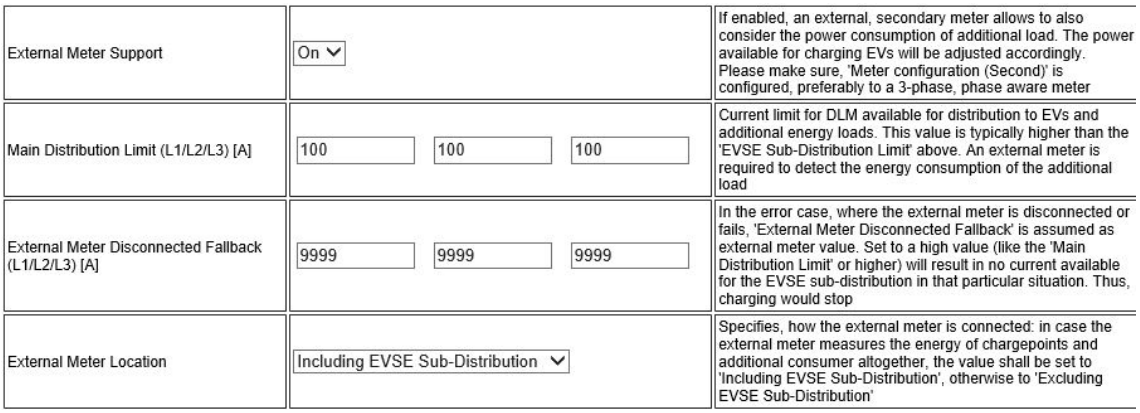



Fig. 25: Web interface of the DLM-Master for configuring load management

▶ In the web interface of the DLM-Master, set the following parameters:

| Parameter | Description |
|---|---|
| External Meter Support | This setting specifies whether an external energy meter is connected for additional consumers. |
| Main Distribution Limit (L1/L2/L3) [A] | Upper current limit for load management and for additional consumers. Rated current of the main fuse. |
| External Meter Disconnected Fallback (L1/L2/L3) [A] | Upper current limit if no external energy meter is connected.<br>■ External Meter Disconnected Fallback = 0: No charging current is provided to the charging stations.<br>■ External Meter Disconnected Fallback = 9999: The charging stations are provided with the entire power supply. |
| External Meter Location | This setting specifies how the external energy meter is connected.<br>■ “Including EVSE Sub-Distribution”: Used to detect charging points and additional consumers.<br>■ “Excluding EVSE Sub-Distribution”: Used to detect external consumers only. |

- From ECU-Firmware 4.61 there is an additionally parameter “External Load Headroom (L1/L2/L3) [A]”. In this parameter a safety distance to the parameter “Main Distribution Limit (L1/L2/L3) [A]” can be set.
- From ECU-Firmware 4.61 the parameter “External Meter Disconnected Fallback (L1/L2/L3) [A]” is called “External Load Fallback (L1/L2/L3) [A]”.

Example:

| Parameter | Settings<br>CP1 / DLM-Master | | |
|---|---|---|---|
| External Meter Support | On | | |
| Main Distribution Limit (L1/L2/L3) [A] | 100 | 100 | 100 |
| External Load Headroom (L1/L2/L3) [A] | 0 | 0 | 0 |
| External Meter Disconnected Fallback (L1/L2/L3) [A] | 50 | 50 | 50 |
| External Meter Location | Including EVSE Sub-Distribution | | |

**Select meter**

Additionally the used meter has to be selected.

▶ In the web interface of the DLM-Master, navigate to the menu “Operator”.

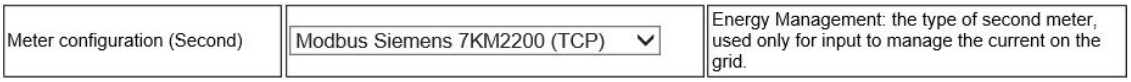



Fig. 26: Web interface of the DLM-Master for selecting the meter

▶ In the web interface of the DLM-Master, set the following parameter:

| Parameter | Description |
|---|---|
| Meter configuration (second) | Setting which meter was used. |

▶ Click the “Save & Restart” button.

If necessary, a load profile for 24 hours can be set up.

➔ “7.7 Static load profile for 24 hours”

### 7.4.3 Configuration when using an energy meter

▶ Navigate to the “Operator” menu and make the following parameter settings:

| Parameter | Setting |
|---|---|
| Dynamic Load Management - DLM Master/Slave | ▶ Select “DLM Master (with internal DLM-Slave)”. |
| EVSE Sub-Distribution Limit (L1/L2/L3) [A] | Maximum mains current available for load management |
| Operator EVSE Sub-Distribution Limit (L1/L2/L3) [A] | Upper current limit for load management. This value can be changed during operation (e.g. temporarily from the backend system) |
| External meter support | ▶ Select “On”. |
| Main Distribution Limit (L1/L2/L3) [A] | Upper current limit for load management including the additional consumers (rated current of the main fuse at the building connection) |
| External Meter Location | This setting specifies how the external energy meter is connected.<br>■ “Including EVSE Sub-Distribution”: Used to detect charging points and additional consumers.<br>■ “Excluding EVSE Sub-Distribution”: Used to detect external consumers only. |
| Meter configuration (second) | Setting for which energy meter was used. |
| IP address of the second meter | IP address of the energy meter |
| Port number of the second meter | Port number of the energy meter |

▶ When the configuration is complete, click the “Save & Restart” button.

**Query the IP address and port number of the Siemens 7KM2200 (TCP) energy meter**

The F1, F2, F3 and F4 keys on the energy meter are required for this.

▶ Press the F4 key to open the menu.

▶ Press the F2 key and navigate to “Settings”.

▶ Press the F4 key to open “Settings”.

▶ Press the F3 key several times and navigate to “Communication”.

▶ Press the F4 key to open “Communication”.

▶ Press the F4 key to open “Modbus TCP”.

▶ Press the F3 key and navigate to “IP: IP address of the meter”. Make a note of the IP address of the energy meter.

▶ Press the F3 key several times and navigate to “Modbus Port”. Make a note of the port number of the energy meter.

▶ Press the F1 key 4 times to close the menu.

**AVAILABLE FROM ECU FIRMWARE 5.12.0**

## 7.5 Use case 5: Downgrade when using the Siemens 7KM2200 energy meter (TCP)

Requirement:

✓ The use of the digital input for downgrade is only available from ECU firmware 5.12.0.

✓ The external energy meter Siemens 7KM2200 (TCP) was integrated in the network and configured.

➔ “7.4.3 Configuration when using an energy meter”

The digital input of the energy meter can be used as a downgrade input to reduce the current for one charging point or several charging points in a network.

There are two options for controlling the digital input:

- via an external 12 V DC or 24 V DC control signal
- via a coupling relay and an additional power supply

**Control via an external 12 V DC or 24 V DC control signal**

The control signal can be generated, for example, by an external load shedding relay or an external timer. As soon as the 12 V DC or 24 V DC control signal is applied to the digital input of the energy meter, the charging current is reduced according to the set configuration.

**Control via a coupling relay and additional power supply**

The digital input can be controlled with a coupling relay (**S0**) and an additional power supply (**1**).

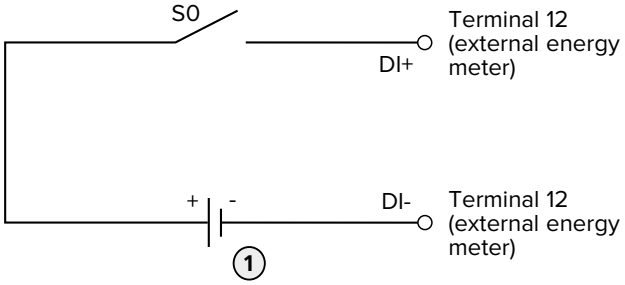



Fig. 27: Control via a coupling relay and additional power supply

1 External power supply, max. 30 V DC

**Installation**

▶ Connect the external control system to terminal 12 of the digital input.

▶ Via the menu of the energy meter in the display, configure the digital input to “HT/NT circuit”.

**Web interface of the ECU**

▶ Navigate to the “Operator” menu and make the following parameter settings:

| Parameter | Setting |
|---|---|
| Meter Digital Input Config | ▶ Select “On”. |
| Meter Digital Input Current Offset (L1/L2/ L3) [A] | The value by which the upper current limit for load management (parameter “Operator EVSE Sub-Distribution Limit (L1 / L2 / L3) [A]”) is reduced as soon as voltage is applied to the external energy meter |

▶ When the configuration is complete, click the “Save & Restart” button.

In the menu “> DLM” in the parameter “Operator EVSE Sub-Distribution Limit [A]”, it is possible to check whether the upper current limit is reduced as soon as voltage is applied to the external energy meter.

**Configuration of the digital input on the Siemens 7KM2200 energy meter (TCP)**

The F1, F2, F3 and F4 keys on the energy meter are required for this.

▶ Press the F4 key to open the menu.
▶ Press the F2 key and navigate to “Settings”.
▶ Press the F4 key to open “Settings”.
▶ Press the F3 key several times and navigate to “Integrated I/O”.
▶ Press the F4 key to open “Integrated I/O”.
▶ Press the F3 key and navigate to “Dig. input”.
▶ Press the F4 key to open “Dig. input”.
▶ Press the F4 key to open “Action”.
▶ Press the F3 key and navigate to “HT/NT”.
▶ Press the F4 key to confirm “HT/NT”.
▶ Press the F1 key 4 times to close the menu.

**AVAILABLE FROM ECU FIRMWARE 5.12.0**

## 7.6 Use case 6: Activate the interface (Modbus TCP server) for energy management systems

From ECU firmware 5.12.0, it is possible for the charging station to be controlled by an energy management system.

▶ In the web interface of each charging point, navigate to the “Operator” menu.

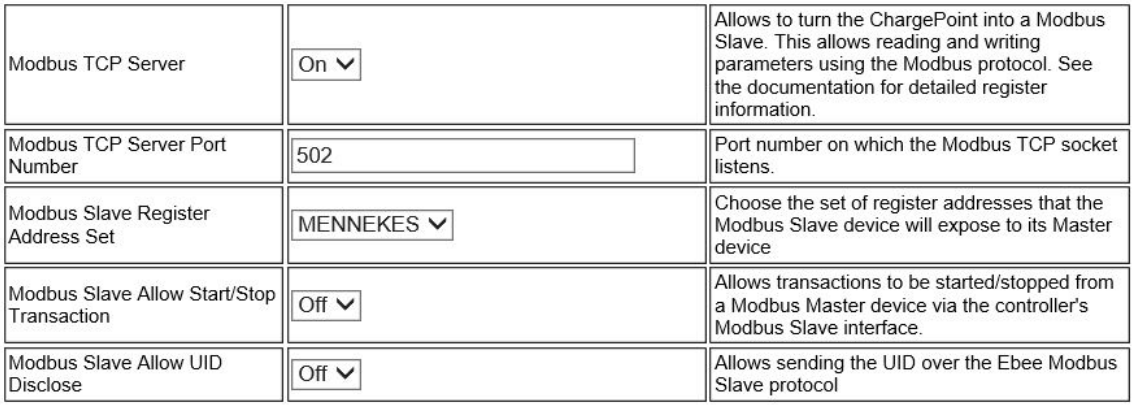



Fig. 28: web interface for configuring the “Modbus TCP Server” interface

▶ In the web interface for each charging point, set the following parameter:

| Parameter | Setting |
|---|---|
| Modbus TCP Server | ▶ Select “On”. |
| Modbus TCP Server Port Number | TCP port number on which the Modbus TCP socket accepts connections |
| Slave Register Address Set mode | ▶ Select “MENNEKES”. |
| Modbus Slave Allow Start / Stop Transaction | ▶ Select “On”. |
| Modbus Slave Allow UID Disclose | Setting to determine whether the energy management system is allowed to read out the UID of the RFID card of the current charging process |

The Modbus register table can be made available on request.

**Special Feature from ECU Firmware 5.12.0**

## 7.7 Static load profile for 24 hours

From ECU firmware 5.12.0, it is possible to store a load profile for 24 hours, for example in order to bypass known, everyday bottlenecks in the power supply.

The configured current limit values are not exceeded by the DLM.

▶ Navigate to the “Operator” menu and make the following parameter settings:

| Parameter | Setting |
|---|---|
| Maximum Current Scheduler | ▶ Select “On”. |

✓ The following screen appears for setting the load profile:

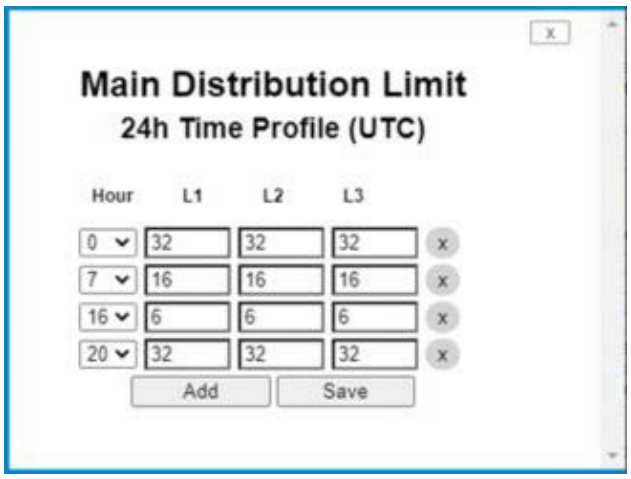



Fig. 29: setting the load profile (example)

The settings in the above example (Fig. 29) lead to the following load profile:

| Time (UTC) | Max. charging current [A] | | |
|---|---|---|---|
| | L1 | L2 | L3 |
| 0 - 7 hrs | 32 | 32 | 32 |
| 7 - 16 hrs | 16 | 16 | 16 |
| 16 - 20 hrs | 6 | 6 | 6 |
| 20 - 0 hrs | 32 | 32 | 32 |

▶ When the configuration is complete, click the “Save & Restart” button.

The listed times refer to universal time (UTC). In countries in other time zones (e.g. UTC+1), the times must be adjusted accordingly. If necessary, the times must also be adjusted according to summer and winter time.

# 8 Unbalanced load prevention

Unbalanced load refers to the uneven loading of the outer conductors of a three-phase alternating current network. To avoid unbalanced load, the load must be distributed evenly to the three outer conductors. In Germany, according to the technical connection conditions (TAB), the grid operator is limited to an asymmetry of up to 20 A at the grid connection point. An unbalanced load of the charging station can be prevented via the web interface.

**POSSIBLE APPLICATIONS**

An unbalanced load can be prevented in the following situations:

- Standalone charging point (e.g. AMTRON® Professional+ ; operating mode “Standalone Autostart”):
  - For a charging point, this setting prevents a single-phase load of more than 20 A from being applied, as otherwise an unbalanced load would arise.
  - For charging points with a connected external meter, the charging point is always controlled in such a way that an overload does not occur at the point where the external meter is connected. In this way, other consumers are also considered. Thus the maximum difference between two phases will never be more than 20 A.
- Two charging points in one charging station (e.g. AMEDIO Professional+ ; operating mode “Standalone Autostart”):
  - With two charging points in a network, the setting always refers to the combination of the two charging points. Here, too, this ensures that an unbalanced load never occurs on the supply line to the charging station.
  - With two charging points and one external meter in a network, an unbalanced load is prevented at the point of the external meter. In this way, other consumers are also considered.
- Several charging points (e.g. AMEDIO Professional+ ; operating mode “networked”):
  - With several charging points in a network, the setting always refers to the combination of all charging points. Here, too, this ensures that an unbalanced load never occurs on the supply line to the charging stations.
  - With several charging points and one external meter in a network, an unbalanced load is prevented at the point of the external meter. In this way, other consumers are also considered.

### Settings in the Web Interface

In the web interface, navigate to the menu “Operator”.

| | | |
|---|---|---|
| Dynamic Load Management | DLM Master (With internal DLM-Slave) | Specifies the ChargePoint's role in a DLM network. There MUST be exactly one DLM Master in a DLM network managing multiple DLM-Slaves. Typically, a ChargePoint configured as DLM Master will also host an internal DLM-Slave. Note: A ChargePoint configured as standalone DLM Master will not host an internal DLM-Slave. If used for charging anyway, its power consumption will be not controlled by DLM! |
| DLM Network Id | 0 | Several DLM groupings might coexist in one physical LAN. In case of DLM Master-Auto-Discovery, they are distinguished by Master-Auto-Discovery Network Id |
| DLM Algorithm Sample Rate | 30 sec | The DLM algorithm will not calculate and re-assign current to it's DLM slaves any faster than at this configured rate. As an exception, EVs getting ready to charge will be considered and assigned current immedeately. Between algorithm calculation times external meter values will be averaged. |
| EVSE Sub-Distribution Limit (L1/L2/L3) [A] | 100 100 100 | Overall current limit for DLM available for distribution to EVs |
| Operator EVSE Sub-Distribution Limit (L1/L2/L3) [A] | 80 80 80 | Operator current limit for DLM available for distribution to EVs. The 'Operator EVSE Sub-Distribution Limit ' is equal or smaller than the 'EVSE Sub-Distribution Limit'. It can be changed without rebooting the chargepoint. Thus, a backend could use this parameter to alter the energy available for charging EVs dynamically. The backend will not be able to set a value higher than the 'EVSE Sub-Distribution Limit' |
| External Input 1 Config | DISABLE | Adds a configurable offset to 'EVSE Sub-Distribution Limit' based on GPI External Input 1 |
| External Input 2 Config | DISABLE | Adds a configurable offset to 'EVSE Sub-Distribution Limit' based on GPI External Input 2 |
| External Meter Support | Off | If enabled, an external, secondary meter allows to also consider the power consumption of additional load. The power available for charging EVs will be adjusted accordingly. Please make sure, 'Meter configuration (Second)' is configured, preferably to a 3-phase, phase aware meter |
| Current Imbalance Prevention | On | If enabled, DLM will not exceed the 'Current Imbalance Limit' configured |
| Current Imbalance Limit | 20 | |

Fig. 30: Web interface of the DLM-Master for configuring the prevention of an unbalanced load

The following settings are necessary to set the unbalanced load prevention:

| Parameter | Description |
|---|---|
| Dynamic Load Management | Used to set the charging point function for load management in a DLM-Network. The charging point that is assigned the setting “DLM Master (With internal DLM-Slave)” or “DLM Master (Standalone)” is the DLM-Master. The charging point that is assigned the setting “DLM Slave (Master-Auto-Discovery)” is the DLM-Satellite. |
| Current Imbalance Prevention | This setting specifies whether current imbalances should be limited. The individual phase currents are limited so that the value difference between the individual phase currents does not exceed the value for “Current Imbalance Limit”.<br>This parameter must be set for the DLM-Master only. |
| Current Imbalance Limit | Maximum value difference between individual phase currents (in A).<br>This parameter must be set for the DLM-Master only. |

Example:

| Parameter | Settings | |
|---|---|---|
| | CP 1 / DLM-Master | CP 2 / DLM-Satellite |
| Dynamic Load Management | DLM Master<br>(with internal DLM-Slave) | DLM Slave<br>(Master-Auto-Discovery) |
| Current Imbalance Prevention | On | - |
| Current Imbalance Limit | 20 | - |

# 9 Downgrade

The relay for the downgrade input is only included in the AMEDIO Professional+* 22 and AMEDIO Professional+* 22 PnC.

Alternatively, the digital input of the Siemens 7KM2200 (TCP) energy meter can be used as a downgrade input.

➔ “7.5 Use case 5: Downgrade when using the Siemens 7KM2200 energy meter (TCP)”

The maximum power that is distributed to all connected charging points can be reduced via the downgrade input. You can control the downgrade input, for example, by means of the following criteria or systems:

- Electricity rate
- Time
- Load shedding
- Manual control
- External load management

To reduce the power via the downgrade input, an external 230 V control signal is required per charging point. The control signal can be generated, for example, by an external load shedding relay or an external timer. As soon as the 230 V control signal is applied to the relay, the charging current is reduced according to the set configuration of the parameter “Internal Input 1 Current Offset (L1/L2/L3) [A]”.

**ATTENTION**

**Damage to the device due to improper installation**

Improper installation can damage the device or lead to malfunctions. Observe the following requirements during the installation:

- ▶ The control signal voltage must not exceed 230 V.
- ▶ Select suitable cable routing to avoid interference.
- ▶ Provide for secure separation of the remaining installation from the highest occurring voltage.

Observe the circuit diagram.

Requirement:

✓ The control system is installed externally.

Observe the operating and installation manual.

**SETTINGS IN THE WEB INTERFACE**

▶ In the web interface, navigate to the menu “Operator”.

| | | |
|---|---|---|
| Dynamic Load Management | DLM Master (With internal DLM-Slave) | Specifies the ChargePoint's role in a DLM network. There MUST be exactly one DLM Master in a DLM network managing multiple DLM-Slaves. Typically, a ChargePoint configured as DLM Master will also host an internal DLM-Slave. Note: A ChargePoint configured as standalone DLM Master will not host an internal DLM-Slave. If used for charging anyway, its power consumption will be not controlled by DLM! |
| DLM Network Id | 0 | Several DLM groupings might coexist in one physical LAN. In case of DLM Master-Auto-Discovery, they are distinguished by Master-Auto-Discovery Network Id |
| DLM Algorithm Sample Rate | 30 sec | The DLM algorithm will not calculate and re-assign current to it's DLM slaves any faster than at this configured rate. As an exception, EVs getting ready to charge will be considered and assigned current immedeately. Between algorithm calculation times external meter values will be averaged. |
| EVSE Sub-Distribution Limit (L1/L2/L3) [A] | 100 100 100 | Overall current limit for DLM available for distribution to EVs |
| Operator EVSE Sub-Distribution Limit (L1/L2/L3) [A] | 80 80 80 | Operator current limit for DLM available for distribution to EVs. The 'Operator EVSE Sub-Distribution Limit ' is equal or smaller than the 'EVSE Sub-Distribution Limit'. It can be changed without rebooting the chargepoint. Thus, a backend could use this parameter to alter the energy available for charging EVs dynamically. The backend will not be able to set a value higher than the 'EVSE Sub-Distribution Limit' |
| External Input 1 Config | ENABLE OPTO 2 | Adds a configurable offset to 'EVSE Sub-Distribution Limit' based on GPI External Input 1 |
| Ext. Input 1 Current Offset (L1/L2/L3) [A] | 16 16 16 | Offset added to 'EVSE Sub-Distribution Limit' case external input 1 is high. Note: currently only negative values are supported |
| External Input 2 Config | DISABLE | Adds a configurable offset to 'EVSE Sub-Distribution Limit' based on GPI External Input 2 |

Fig. 31: Web interface of the DLM-Master for configuring Downgrade

▶ In the web interface, set the following parameters of the DLM-Master:

| Parameter | Description |
|---|---|
| External Input 1 Config | Activation of the relay for controlling via the downgrade input.<br>This parameter must be set for the DLM-Master only. |
| External Input 1 Current Offset (L1/L2/ L3) [A] | Current value by which the charging current is reduced when the downgrade is active.<br>This parameter must be set for the DLM-Master only. |

▶ Click the “Save & Restart” button.

Example:

| Parameter | Settings | | |
|---|---|---|---|
| Internal Input 1 Config | ENABLE OPTO 2 | | |
| Internal Input 1 Current Offset (L1/L2/L3) [A] | 16 | 16 | 16 |

Set ENABLE OPTO 2“. The input ”OPTO 1" is not assigned.

# 10 Glossary

| Term | Explanation |
|---|---|
| DLM-Network / DLM-Master / DLM-Satellite or DLM-Slave (designation in the web interface menu) | DLM = Dynamic Load Management<br>Load management reduces the charging currents of all charging points in a DLM-Network as soon as the sum of all charging currents exceeds the adjustable current limit for load management.<br>Load management can operate in a DLM-Network or at stand-alone charging points. |
| ECU | ECU = **Electronic Control Unit**<br>Unit for control and communication |
| Gateway charging point | The Gateway charging point acts in the network as a portal through which the entire network is connected to a Backend-System. The Gateway charging point can be any charging point (for AMEDIO: Master charging point) that has a wireless communication modem and a Micro-SIM card for wireless communication. |
| CP | CP = **Charging Point** |
| CS | CS = **Charging Station** |
| Master / Slave (AMEDIO only) | Both charging points in the AMEDIO are pre-configured as a master/slave connection (for OCPP). Both charging points can be configured via the Slave-ECU.<br>■ Master-ECU = ECU on the left-hand side = AF1<br>■ Slave-ECU = ECU on the right-hand side = AF2 |
| Network | An Ethernet network (referred to here as “network”) consists of a number of charging stations that are networked via Ethernet. Local networking can be used for the following functions:<br>■ Operation of load management<br>■ Connection of several charging points to a Backend-System via a SIM card (wireless communication)<br>It is possible to build a DLM-Network and a network for connection to a Backend-System together in a network. |

MENNEKES

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