sonnen

User Manual for Operators

sonnenHome Charger 2

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EN

IMPORTANT

→ This entire document must be read carefully.

→ This document must be kept for reference purposes.

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1 Information about this document

This document describes the operation of the sonnenHome Charger 2 charging station.

ⓘ INFO	People with colour blindness require support in assigning all error displays.

→ Make sure you read this entire document carefully.

→ Keep this document for reference purposes.

1.1 Designations in this document

The following designations are used in this document:

Complete designation	Designation in this document
sonnenHome Charger 2	Charging station

1.2 Explanation of symbols

⚠ DANGER	**Extremely dangerous situation leading to certain death or serious injury if the safety information is not observed.**
⚠ WARNING	**Dangerous situation leading to potential death or serious injury if the safety information is not observed.**
⚠ CAUTION	**Dangerous situation leading to potential injury if the safety information is not observed.**
NOTICE	**Indicates actions that may cause material damage.**
ⓘ INFO	**Important information not associated with any risks to people or property.**

Symbol	Meaning
→	Work step
1. 2. 3. ...	Work steps in a defined order
✓	Condition
•	List

1.3 Change history

Version / Date	Changes compared to the previous version
01 / 05-09-2025	Proper use [P. 5] updated. Description of charging modes [P. 12] updated. Information on calibration legislation [P. 21] added. Restarting the charging station [P. 23] added.
00 / 03-04-2025	Initial creation.

2 Safety

2.1 Proper use

The charging station is suitable for charging electric and hybrid vehicles in accordance with IEC 61851-1, charging mode 3.

In this charging mode, the charging station ensures the following:

- The current is only activated when the vehicle is connected correctly.
- The maximum amperage has been balanced.

The charging station has a display that lets you follow the measurement process during the charging operation.

Improper use poses a risk of death or injury to the user or third parties as well as damage to the product and other items of value.

The following points must be observed at all times in order to ensure **proper use**:

- The charging station must be fully installed in accordance with the installation instructions.
- The installation, electrical connection and commissioning of the charging station must be carried out by an authorised and qualified electrician.
- The charging station must only be used in a technically proper condition.
- The charging station must never be commissioned if the connection cable or plug is visibly damaged.
- The charging station must be connected to a sonnenBatterie storage system. It cannot be operated without a storage system, as it is controlled by it.
- The charging station is compatible with sonnenBatterie storage systems from the eighth generation onwards. Older storage systems cannot be combined with the charging station.
- One charging station can be operated per storage system. It is not permitted to combine multiple charging stations (sonnenHome Charger 2 or sonnenCharger) with one storage system. A storage system cascade can also only be combined with one charging station.
- The charging station must only be used at a suitable installation location.
- The charging station must only be used with a stable internet connection.
- The transport and storage conditions must be observed.

Especially the following uses are not permissible:

- Improper use.
- Installation, commissioning and repairs by unqualified personnel (not a qualified electrician).
- Unauthorised conversion of the device without the approval of the manufacturer.
- Charging cable extended with an extension cable or adapter.
- Other devices connected to the charging station.
- Use of non-original spare parts.
- Improper disposal after decommissioning.
- Operation in flammable environments or areas at risk of explosion.
- Operation in locations at risk of flooding.
- Bypassing, blocking or tampering with protective devices.

Danger due to electrical voltage

- Dangerously high voltage inside the charging station which poses a risk of electrical shock.
- The charging station does not have its own power switch. The protective devices installed on the mains side are used for mains disconnection, too.

Installing the charging station

- The local legal requirements for electrical installations, fire protection, safety regulations and escape routes at the planned installation site must be observed.
- Qualified electricians must be properly grounded during the installation of the charging station.
- When the charging station is opened, professional precautions must be taken to prevent and protect against electrostatic discharge (ESD).
- Grounded anti-static wristbands must be worn when handling boards that are electrostatic hazards. The professional ESD protective precautions must be observed. Wristbands must only be worn when mounting and connecting the charging unit. Wristbands must never be worn at a live charging station.
- The charging station must not be installed in potentially explosive atmospheres (Ex zones).
- The charging station must not be installed in environments with ammonia or air containing ammonia.
- The charging station must not be installed outdoors during rainy weather.
- The charging station should be protected from damage caused by frost, hail and the like.

Connecting the charging station to electricity

- All three phases must be electrically connected. The phase change occurs automatically.
- Each charging station must be protected by its own residual current circuit breaker and circuit breaker in the connection installation.
- Before connecting the charging station to electricity, make sure that the electrical connections are de-energised.
- Ensure that the correct connection cable is used for the electrical mains connection.
- Do not leave the charging station unattended with the installation cover open.
- Change the setting of the DIP switches only when the device is switched off.
- Take note of any registrations required with the power grid operator.

Commissioning the charging station

- The charging station must only be commissioned by an authorised and qualified electrician.
- The correct connection of the charging station must be checked by a qualified electrician before commissioning.
- Do not connect a vehicle when the charging station is being used for the first time.
- Before commissioning, check the charging station for visual damage. The commissioning of a damaged charging station or charging station with a damaged charging cable/connector is not permitted.

Operating the charging station

ⓘ INFO	Ensure that only persons who have read this document have access to the charging station.

- The charging station may only be operated as described in the product documentation.

- Visually inspect the charging station for damage before use. If damaged, do not use the charging station.
- Ensure that the charging cable and connector are protected against being driven on, trapped or subjected to other mechanical hazards.
- Protect the charging cable and connector from contact with external heat sources, water, dirt and chemicals.
- Take the charging station out of operation if the charging station, cable, connector or socket are damaged.
- The cover of the installation area must not be removed during operation.
- Do not remove markings, warning symbols or the type plate from the charging station.
- Only pull out the charging cable holding the charging connector.
- Do not expose the charging cable to any tensile load.
- The charging cable must be hung in the cable holder provided when not in use. The charging connector must be locked into place in the holder. The charging cable is wrapped around the cable holder loosely in a way that does not touch the ground.

ⓘ INFO	Failure to comply with the warranty conditions and the information specified in the installation and operating instructions will invalidate all warranty and guarantee claims.

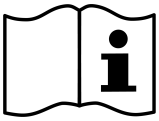
2.2 Qualified electricians

Installation and commissioning must be performed by authorised electricians only. Installation by unqualified and/or unauthorised persons may cause injury and/or component damage.

People who meet the following requirements are generally considered authorised electricians:

- The electrician must be a person with a technical knowledge or sufficient experience to enable him/her to avoid dangers which electricity may create.
- The electrician has successfully completed the sonnen certification training and participated in the product-specific trainings.

2.3 Symbols on the outside of the charging station

Symbol	Meaning
	CE mark. The product meets the requirements of the applicable EU Directives.
	WEEE mark. The product must not be disposed of in household waste, dispose of it through environmentally friendly collection centres.
	Observe the documentation. The documentation contains safety information.

3 Product description

3.1 System components

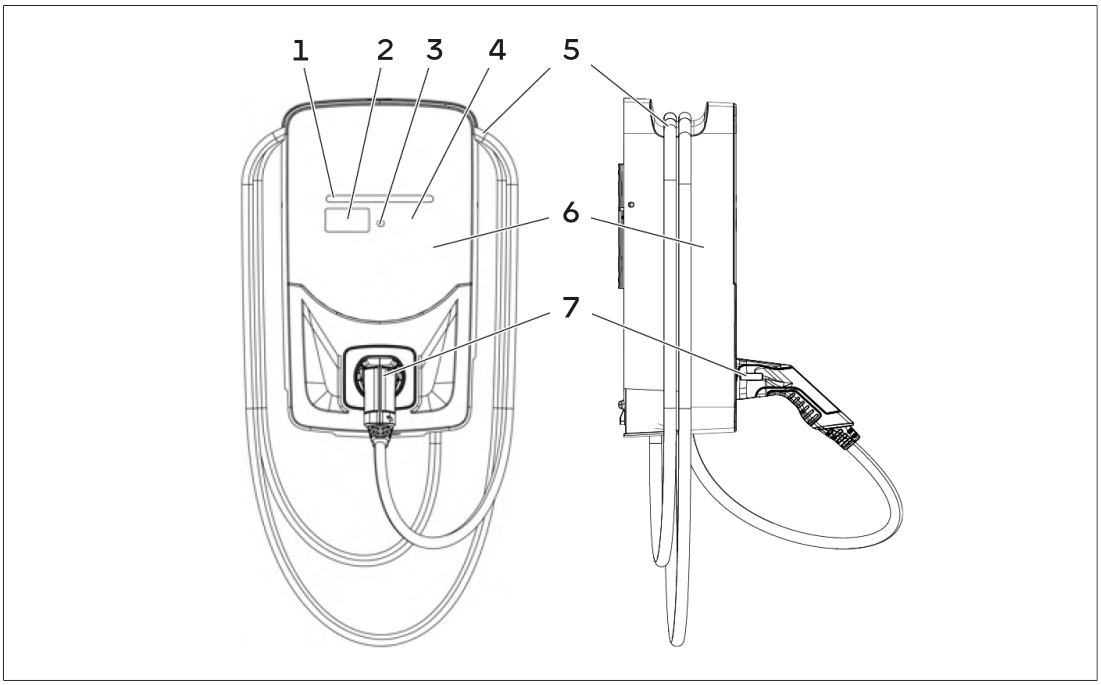


Illustration 1: sonnenHome Charger 2

1 LED indicator
2 Display (calibration legislation/MID)
3 Ambient light/brightness sensor
4 RFID reader
5 Charging cable holder
6 Design cover
7 Charging connector holder

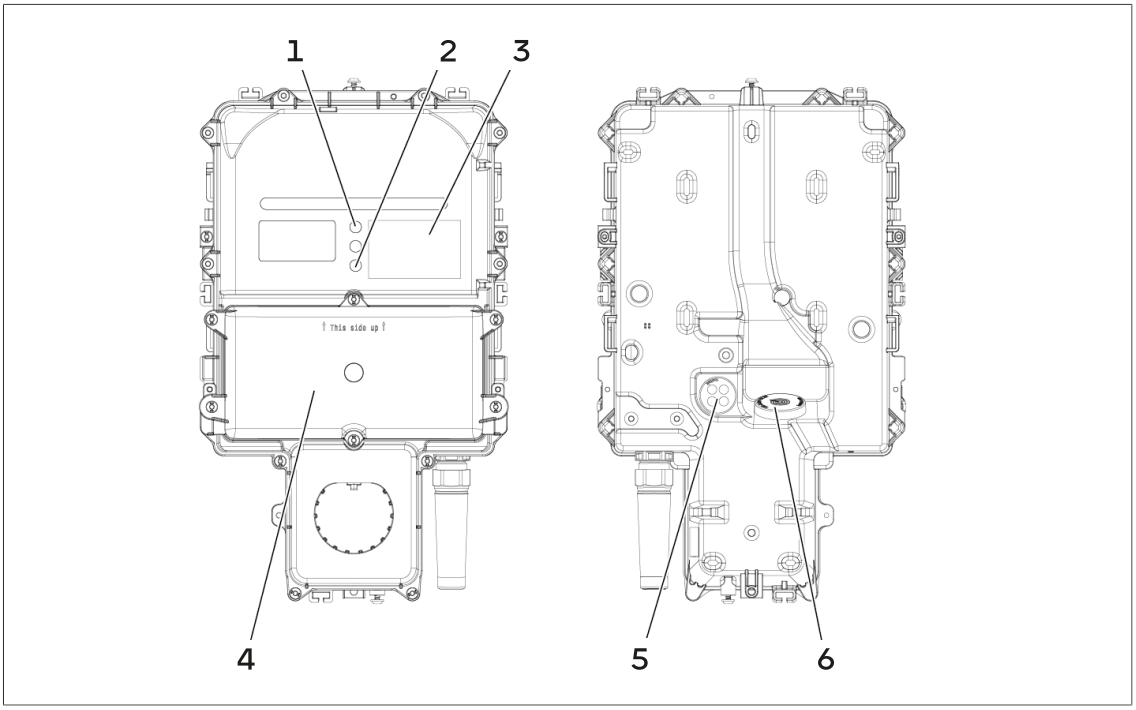


Illustration 2: Overview of basic housing without Design cover

1 MID – visual test output
2 Calibration legislation – visual test output
3 Type plate
4 Installation cover
5 Signal line cable entry
6 Mains connection cable entry

3.2 Type plate

The type plate is shown below. This type plate contains information about the charging station in general and in relation to the Measuring Instruments Directive (MID).

The bottom-right area of the type plate is a free field reserved for the calibration mark.

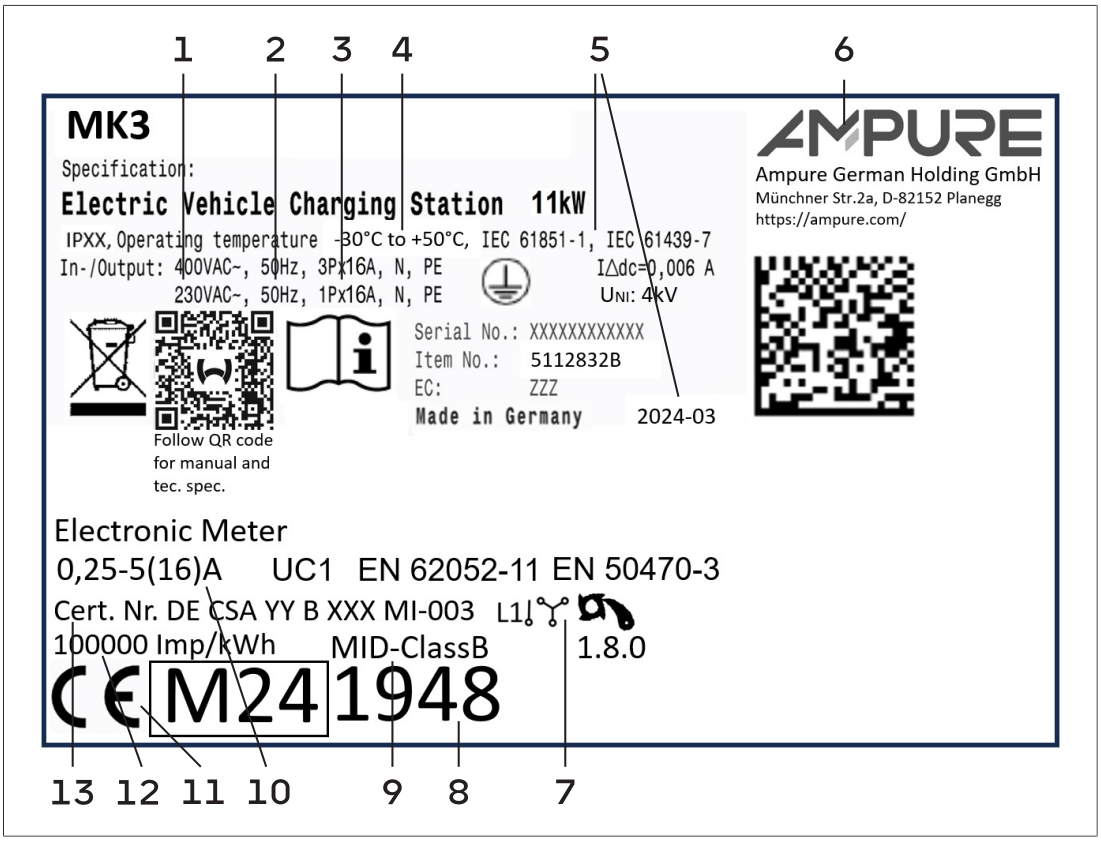


Illustration 3: Example of a charging station type plate

Item	MID-relevant information
1	Reference voltage
2	Reference frequency
3	The number of phases and the number of conductors for which the meter is suitable
4	Operating temperature range
5	Serial number and year of manufacture
6	Manufacturer's name
7	Number of phases, number of conductors and non-return device
8	Metrology labelling
9	Meter accuracy class
10	I min. I ref. and I max.
11	Conformity marking
12	Meter constant
13	Number of the EU type examination certificate issued by the European Union

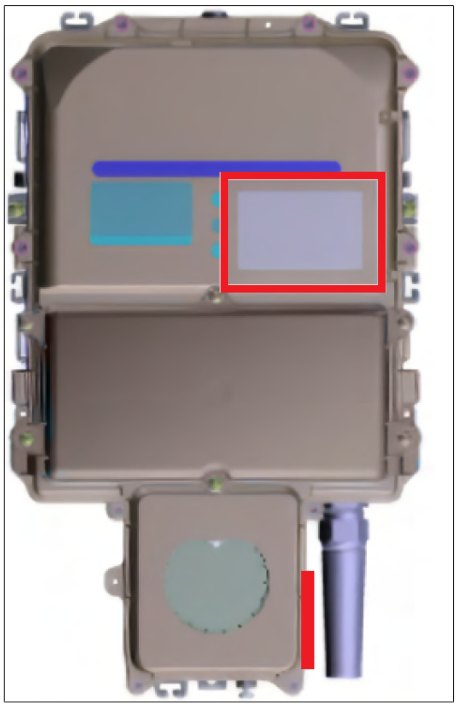


Illustration 4: Position of the type plate

The charging station described in this document is the **sonnenHome Charger 2.** The exact device description corresponding to the material number, which consists of a seven-digit number and a letter, is specified on the type plate.

Information compliant with calibration legislation

A second type plate is located at the bottom right of the charging station. This type plate concerns calibration legislation and is described in the supplementary calibration legislation document[1].

3.3 Model overview

Permanently attached charging cable (type 2) with charging connector holder

Cable length: 7.5 m

Meter: compliant with calibration legislation

Max. charging output: 11 kW with 3-phase connection

[1] https://help.ampure.com/en/eu/ampure-boost-supporting-documents

4 Operation

ⓘ INFO	A permanent internet connection is part of the warranty conditions and a prerequisite for the full functionality of the charging station.

ⓘ INFO	Changes to the settings in the local Ampure dashboard are not allowed as they jeopardise smooth operation. Failure to comply with this requirement may result in the invalidation of the warranty.

4.1 Prerequisites for operation

- The charging station has been installed by a qualified electrician.
- The charging station is connected to the network infrastructure in the household so that it is on the same network as the storage system (the storage system and the charging station are connected to the same switch, router, or hub).
- The charging station is intelligently controlled by the storage system. To ensure smooth operation, the storage system must run in “Automatic - Optimization” mode. This mode is automatically set when the charging station is started up.
  - The charging station can be used straight away (see Start charging session [P. 20]).
  - Use the sonnen App to discover additional features and note the additional information provided there. Without the sonnen App, charging is only possible in Power Mode.

Illustration 5: Logo of sonnen App and QR code for download

4.2 Charging modes

The charging station has three charging modes: Power Mode, Smart Mode and Eco Mode.

Power Mode ensures that the electric vehicle is charged as quickly as possible. Eco Mode primarily charges the electric vehicle with self-generated energy. In intelligent Smart Mode, Power Mode and Eco Mode are optimally coordinated so that your vehicle is charged with as much self-generated energy as possible at a specific time.

The three charging modes can be selected via the sonnen App.

Good to know

- Regardless of the manufacturer, a wallbox (charging station) can only offer the electric vehicle a maximum charging current. The vehicle itself decides whether it wants to accept less power (e. g., to maintain temperature ranges). Expect the vehicle to charge more slowly than expected.
- PV surplus is the electricity generated by the PV system that remains after all electrical consumers in the house have been supplied. Only when more PV electricity is produced than the consumers in the house currently need can the surplus

electricity be used to charge the electric vehicle (PV surplus charging). PV surplus charging occurs in Eco Mode and, if applicable, in Smart Mode. It is important that the PV surplus is high enough for charging to begin (see next point).

- Most electric vehicles only accept charging currents greater than approximately 4.2 kW for 3-phase installations and greater than 1.4 kW for 1-phase installations. Depending on the model, even higher minimum outputs may be necessary. To charge with PV surplus, the PV surplus must therefore be above this threshold.
- The charging station can automatically switch between 1- and 3-phase operation. Therefore, a PV surplus of 1.4 kW is sufficient to start the charging process with PV surplus charging in Eco or Smart Mode.
- The charging capacity depends on other conditions and may be lower, e.g., due to the current temperature of the vehicle battery, its state of charge, and the size of your home connection.

4.2.1 Power mode

The electric vehicle is charged as quickly as possible or at the power setting you have selected. PV generation, the storage system battery, and, if that is not sufficient, grid power are used. The maximum charging power can be set in the sonnen App. The charging power may differ from the set charging power. Please refer to the information in the section Good to know [P. 12].

4.2.2 Smart Mode

Smart Mode maximizes the use of self-generated electricity from the PV system while ensuring that the electric vehicle is charged by the specified departure time.

Select when you want your vehicle to be charged. The charging station first uses the charging logic of Eco Mode to charge as much of your own PV electricity as possible and only switches automatically to the charging logic of Power Mode when necessary to achieve the charging target. To do this, it uses PV surplus, the battery of the storage system, and grid power.

If the PV surplus is not high enough to start the charging process, charging is paused (charging interruption) if the time remaining until the target time allows. Charging automatically resumes when there is sufficient PV surplus again.

To activate Smart Mode in the sonnen App, the target day with the target time and the current and target charge status of the vehicle battery must be specified.

Please note that the charging target cannot be achieved if this would require exceeding the defined charging power of the vehicle and the charging station. In this case, the charging station will immediately charge at the maximum possible power to get as close as possible to the charging target.

NOTICE! Not every vehicle allows the charging process to be interrupted. Please take this into account when adding the vehicle in the **sonnen App** or in the Cars section of the charging station settings. If charging interruption is deactivated for the selected vehicle, charging will continue at the minimum required charging power when the necessary charging power is not reached, to ensure that your charging target can be achieved in any case.

Tip: Make sure that the correct vehicle is always selected. This tells the charging station how much capacity the vehicle battery has and allows it to optimally adjust the charging logic accordingly. For example, if the battery of the connected vehicle is significantly smaller than that of the selected vehicle, charging from the grid may start earlier than from the PV system or storage system. This means that more electricity than necessary is drawn from the grid.

4.2.3 Eco Mode

Charging the electric vehicle with PV surplus.

This charging mode is best suited when there is no fixed time at which the vehicle is to be used again. This allows you to benefit from a fully green-charged electric vehicle.

Surplus occurs when the current household consumption is already completely covered. This means that household consumption is primarily supplied with PV electricity. Only when more PV electricity is produced than the electrical consumers in the house require is the surplus electricity used to charge the vehicle (PV surplus charging). From a surplus of approx. 1.4 kW, the 1-phase charging process begins, and from approx. 4.2 kW, the 3-phase charging process begins. The charging station automatically switches between 1-phase and 3-phase charging.

To avoid frequent switching and interruptions, charging is supported by electricity from the storage system (if possible) or from the grid during short drops in PV generation. If the PV surplus is absent for a longer period of time, the following procedure is used:

- The vehicle can interrupt and restart charging (pause): It switches to 1-phase charging if there is sufficient PV surplus. If there is still not enough PV generation for this, the charging process is interrupted and resumed at a later time.
- The vehicle cannot interrupt and restart charging (pause): The charging process ends completely.

These vehicle-specific settings for charging interruption can be adjusted in the sonnen App in the Cars section of the charging station settings.

Depending on the size of the vehicle battery, the size of the PV system, consumption in the home, and weather conditions, it may take a long time to fully charge the electric vehicle.

4.3 Dynamic phase change

The charging station can switch dynamically between phases. This means that the charging station switches down to single-phase charging if there is not enough PV surplus for 3-phase charging (or 2-phase charging for certain electric vehicles) in Eco or Smart Mode. This means that less PV surplus is required to continue charging, which significantly optimizes self-consumption.

Background: Typically, electric vehicles require a minimum current of 6 A per phase for charging. With a mains voltage of approx. 230 V, this corresponds to:

- at least 1,380 W for 1-phase charging,
- at least 4,140 W for 3-phase charging.

By switching from 3-phase to 1-phase charging, only a PV surplus of around 1,400 W is required to start the charging process via PV generation. However, there are also vehicles that require a higher or lower charging current. You can adjust this in the sonnen App in the Cars section of the charging station settings.

To avoid excessive switching and to protect the electronics, the switching operations are limited. Before switching from 3-phase to 1-phase charging, support is provided briefly from the storage system or the grid, if possible. If the PV surplus is still below 4,140 W after this, operation switches to 1-phase charging until there is sufficient PV surplus for 3-phase charging again.

4.4 Displays

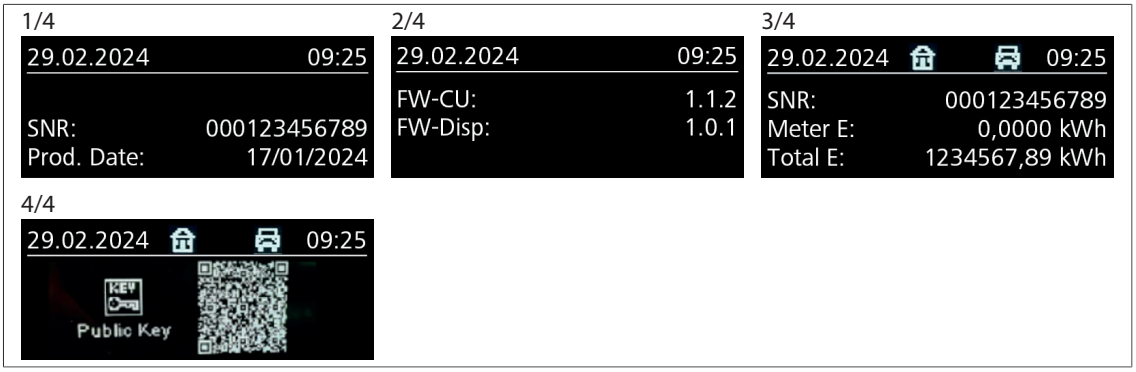
The charging station is equipped with a display compliant with calibration legislation and the MID. The displays are largely defined by the specifications of the MID/ calibration legislation.

The charging process (duration, energy) can be monitored via the display. The display remains as it is until the next charging session. Until that time, an objection can be made if the data is incorrect.

The time shown on the display refers to UTC (Coordinated Universal Time). This eliminates the need to change the time for daylight saving time and standard time.

Display standby mode

The display goes into standby mode when the charging station is not in use. In this mode, 4 different screens are displayed, including the public key. The screens change at a defined interval.



Display charging mode

The displays enable users to see where the invoice items in their electricity bill arise from.

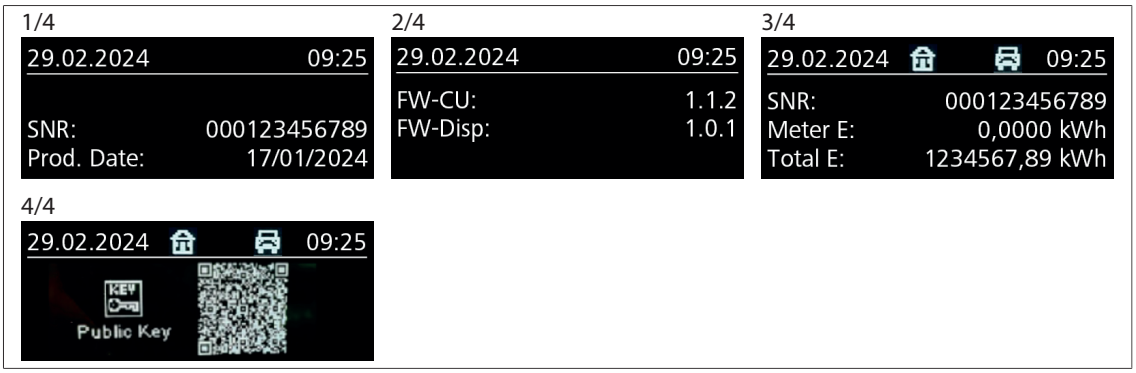
The displays can be distinguished into the following four sequences:

- Booting the charging station
- Starting the charging session
- During the charging session
- Finishing the charging session

In each sequence, different screens change at a defined interval (e.g. 5 seconds).

In the sequence 'During the charging session', the flow of energy between the charging station and the vehicle is illustrated with an animated arrow (>>).

Booting the charging station:



Starting the charging session:

During the charging session:

Finishing the charging session:

The following table explains the information on the display.

Display	Explanation
1 Date	Presented in the format dd.mm.yyyy
2 Time	UTC, Display in 24-hour format
3 SNR	Serial number of the meter
4 Prod. date	Date of manufacture of the charging station
5 FW CU	Firmware of the control unit
6 FW disp	Firmware of the display unit
7 Meter E*	Total charging energy (meter/MID) in kWh (uncompensated, non-resettable energy register), OBIS code (simplified): 1.8.0
8 Total E*	Total charging energy of the charging station in kWh (compensated, non-resettable energy register), OBIS code (simplified): 1.8.0
9 Price[2]	Price in EUR/kWh
10 Power	Charging output of the charging station in kW
11 Duration	Charging time of the current charging session in the format hh:mm:ss
12 Charged E	Energy charged in the charging station's current charging session in kWh (compensated, resettable energy register)
13 Key - QR code	Numerical sequences relevant for calibration legislation, assigned for each charging point. They allow charging point users to check the accuracy of measurements taken remotely.

The values marked with an asterisk (*) are the results of calibrated functions.
For the values 'Meter E' and 'Total E', the number of decimal places (digits to the right of the decimal point) is adjusted in line with the amount of energy displayed. Four decimal places are displayed for small amounts of energy; two decimal places are displayed for larger amounts of energy.

INFO

Values that are not displayed cannot be used for billing purposes.

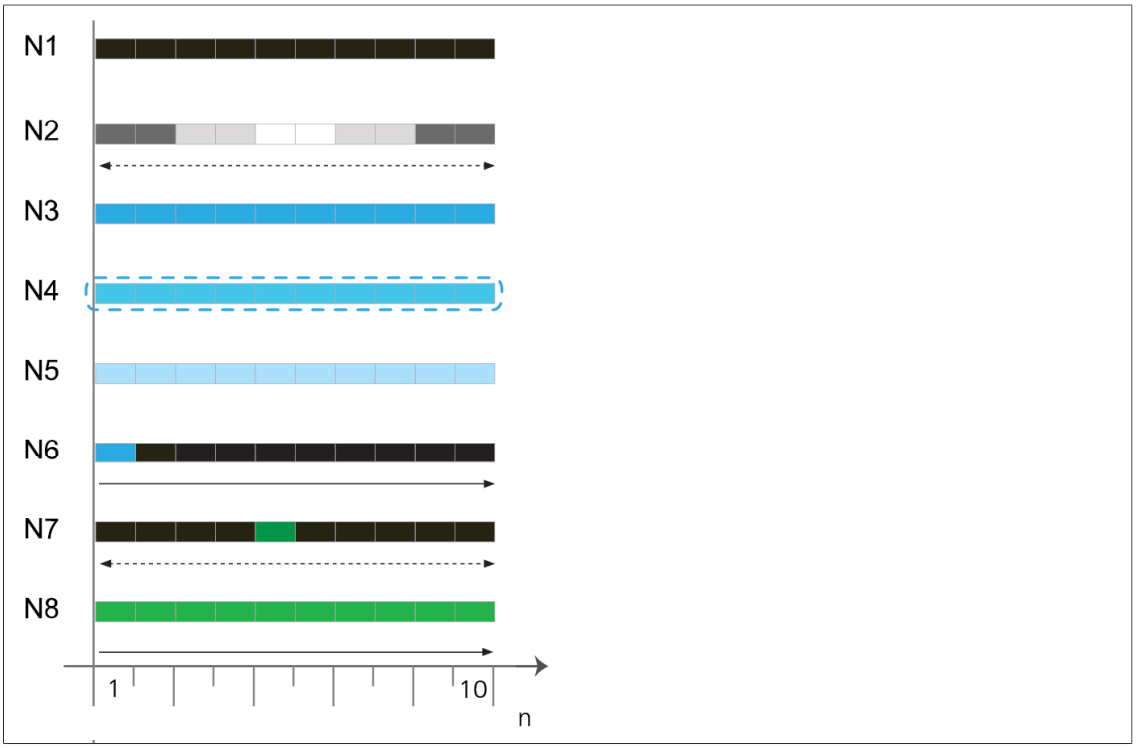
When displayed values are based on uncalibrated functions, they are purely informational and cannot be used for billing purposes.

4.5 LED indicators

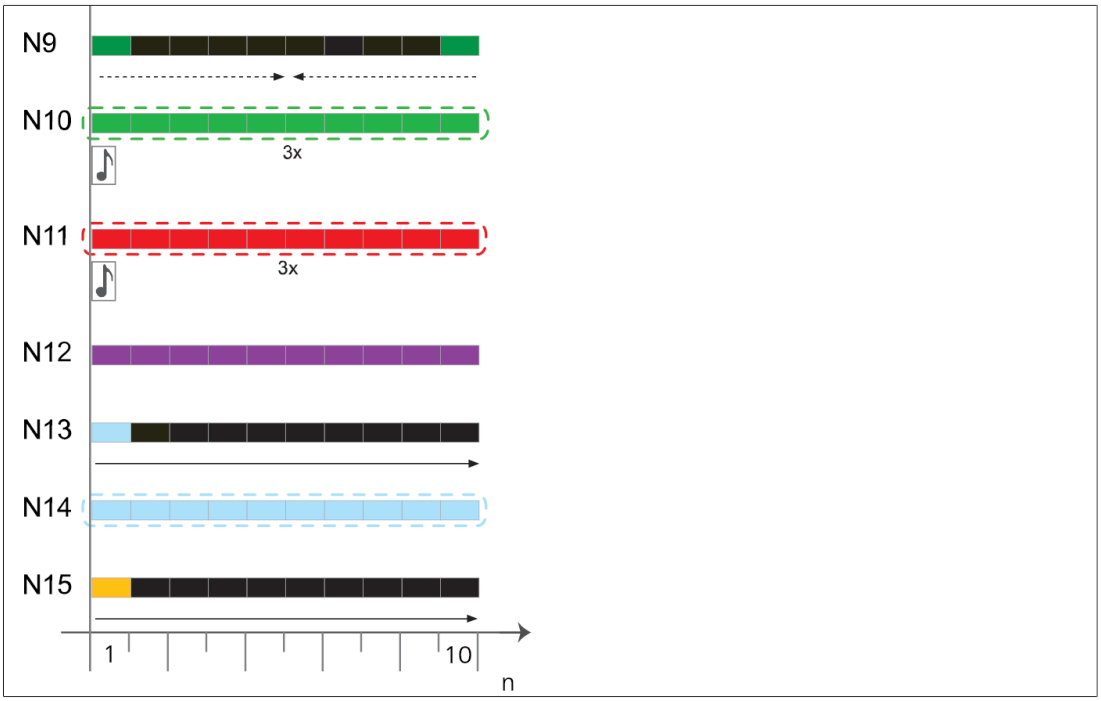
The charging station is equipped with a light sensor that regulates the brightness of the LED indicators based on the configured dimming value and the actual lighting conditions.

[2] Will be adjustable in the future after an over-the-air (OTA) update.

Operation and error indicators

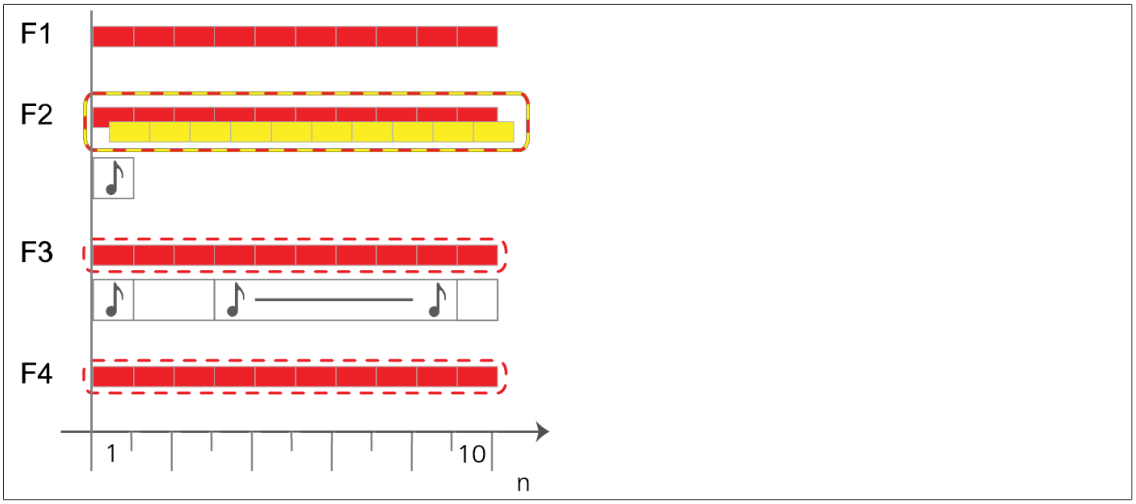


Operation indicator	Description
N1	LED bar does not light up: charging station is off.
N2	White chase light goes back and forth: charging station is booting (rebooting), updating or is in the RFID card linking mode.
N3	LED bar lights up blue: ready for user action, charging cable not connected to vehicle // Authorized charging via key card deactivated (switches to standby after approx. 60 sec. – N7). **or** If charging finished: If vehicle is ISO 15118-compatible: the LED bar lights up blue in 10% increments according to the charge level. If vehicle is not ISO 15118-compatible: the LED bar lights up completely blue.
N4	LED bar pulsing blue: charging connector connected to the vehicle. The charging station has detected that the vehicle is connected, but the charging session has not yet started or has been interrupted.
N5	LED bar lights up light blue: the charging session is interrupted and paused.
N6	LED bar has progressing blue light: the charging station is in use, the vehicle is charging. If vehicle is ISO 15118-compatible: the LED bar progresses in 10% increments as the charge level increases. If vehicle is not ISO 15118-compatible: the LED bar progresses cyclically from 0% to 100%.
N7	Green LED flashes on and off: the charging station is in standby mode.
N8	LED bar lights up green: the charging station is ready for operation and waiting for authentication // Authorized charging via key card activated.



Operation indicator	Description
N9	Green LED runs together from outside to inside: card detected / authentication process with RFID card detected // Authorized charging via key card activated.
N10	LED bar flashes green 3 times and an audible signal sounds for 0.3 s: RFID card detected and accepted // Authorized charging via key card activated.
N11	LED bar flashes red 3 times and an audible signal sounds for 0.3 s: RFID card not accepted // Authorized charging via key card activated.
N12[3]	LED bar lights up purple: the charging station is reserved.
N13	LED bar has progressing blue light: the charging station is in use but is charging at reduced power due to corresponding external control (e.g. DNO or HEMS). If vehicle is ISO 15118-compatible: the LED bar progresses in 10% increments as the charge level increases. If vehicle is not ISO 15118-compatible: the LED bar progresses cyclically from 0% to 100%.
N14	LED bar pulsing light blue: external limitation to 0 A (e.g. DNO or HEMS) or delay (‘randomised delay’ according to UK requirements).
N15	LED bar has progressing dark yellow light: the charging station is running very hot and charging at reduced power. After a cooling-down period, the charging station resumes the normal charging process. If vehicle is ISO 15118-compatible: the LED bar progresses in 10% increments as the charge level increases. If vehicle is not ISO 15118-compatible: the LED bar progresses cyclically from 0% to 100%.

[3] Currently not used, can be used later after an over-the-air (OTA) update.



Error indicator	Description
F1	LED bar lights up red: the charging station is not operable
F2	LED bar alternates between red and yellow, and an audible signal sounds for 0.5 s when the following occurs: • Possibility 1: excess temperature. The charging function is interrupted. After a cooling-down period, the charging station resumes the normal charging process. • Possibility 2: installation error at the charging station connection; phase monitoring is active; supply voltage is outside the valid range. → Rotating field/phase sequence (clockwise rotation field required), mains frequency, DIP switch setting and earth resistance to be checked by a qualified electrician. • Possibility 3: vehicle error. → Reconnect the vehicle. • Possibility 4: internal error at low voltage (e.g. 12 V supply). → To be checked by a qualified electrician.
F3	LED bar pulsing red; an audible signal sounds for 0.5 s and after a 1 s pause again for 5 s: there is a safety hazard and the charging station has switched off. → To be checked by a qualified electrician. → **DANGER! Note the risk of electrocution. Fatal injuries may occur!** Switch off the electrical power supply to the charging station in the installation and secure it against being switched back on. Only after doing that, disconnect the charging cable from the vehicle.
F4	LED bar pulsing red: there is an error and the charging station output has switched off. → To be checked by a qualified electrician.

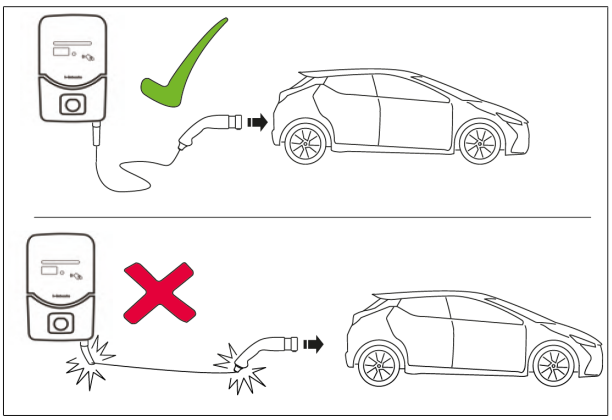
NOTICE! During a firmware update, the LED indicator may flash red/red-yellow/purple alternately. This is not an error. A firmware update can take up to 20 minutes.

ⓘ INFO	ISO 15118 is an international standard that regulates communication between electric vehicles (EVs) and charging stations. The charging station is equipped with hardware that complies with current communication standards.

4.6 Start charging session

INFO	Always observe the vehicle requirements before starting to charge a vehicle.

Park the vehicle near the charging station in a way that the charging cable will not be tense:



Action	Description
→ Connect the charging connector to vehicle.	Example depending on the status – here in standby mode: The LED initially green on and off (standby) may briefly change to a pulsing blue LED bar and, when the charging session is started, progress in 10% increments (vehicle ISO 15118-compatible) or progress continuously in blue (cyclically 0% to 100%) (vehicle not ISO 15118-compatible).

The charging station starts charging in the charging mode most recently activated with the last active vehicle. The charging mode or the vehicle can be changed via the sonnen App.

4.7 Stop charging session

The vehicle has ended the charging session automatically:

Action	Description
→ Unlock the vehicle if necessary. → Disconnect the charging connector from the vehicle. → Depending on the variant, remove the charging connector or place it in the park position.	When the vehicle is charged and the charging session ended, the LED lights up blue according to the charge level (10% increments) if the vehicle is ISO 15118-compliant. If the vehicle is not ISO 15118-compliant, the entire LED lights up blue.

If the vehicle does not end the charging session automatically:

Action	Description
→ Stop the charging session from the vehicle.	Charging session is interrupted. When the vehicle is charged and the charging session ended, the LED lights up blue according to the charge level (10% increments) if the vehicle is ISO 15118-compliant. If the vehicle is not ISO 15118-compliant, the entire LED lights up blue.

4.8 Authentication at the charging station

Authorization is deactivated by default, meaning that the vehicle can be charged directly without authorization using a key card (RFID card).

Authorization can be activated and the supplied key cards can be programmed in the sonnen App settings. To do this, follow the steps in the sonnen App.

When activated, the key card must be presented each time the vehicle is connected in order to activate the charging process.

If the charging processes are to be used for billing, authorization must be active.

Two key cards are included in the scope of delivery. Additional key cards can be added. If you need additional key cards, you can order them from your specialist partner or use your own RFID cards. All ISO 14443 A-compatible RFID cards can be used for authorization.

ⓘ INFO	A green LED bar on the charging station indicates a locked state, i.e., active authorization.

4.9 Calibration legislation

ⓘ INFO	The charging station is certified in accordance with Module B and Module D as compliant with calibration law according to MessEV and MessEG. The product is launched on the market in compliance with calibration law. After the calibration period of 8 years has expired, the charging station must be recalibrated if this is relevant for billing purposes. Please contact your local calibration office for this. The year of initial calibration can be found on the type plate.

The charging station has a measuring clock that complies with German measurement and calibration law (MessEG) and the measurement and calibration ordinance (MessEV), thus fulfilling the requirements for legally compliant billing of charging processes to the tax office, employer, or third parties.

Why are calibrated measurements important?

Charging processes with monetary benefits or tax relevance are subject to requirements for transparent, verifiable, and tamper-proof measurement data. A calibrated measurement offers maximum security in the following areas:

- Billing an employer for a company car.
- Tax claims as business expenses to the tax office.
- In the case of shared use, for legally compliant billing to third parties.

Using the charging station and calibration data

1. Assigning charging

If individual charging processes are to be assigned to different vehicles or persons, for example a private car and a company car, then use one key card per vehicle/user. You can activate and program the cards using the sonnen app. This allows you to record charging processes for different vehicles or purposes separately in accordance with calibration law. Before each charging process, hold the correct key card briefly against the charging station's reader field; only then will the charging process start.

Alternatively, you can use the "Free Charging" option in the sonnen App (default setting upon delivery). In this case, all charging processes are assigned to a virtual RFID card. The measured values are calibrated, but it is not possible to assign individual charging sessions (retrospectively).

Tip: For self-employed people, we recommend at least two cards: one for business and one for private charging.

Please note: Make sure that the charging station has a stable internet connection. To ensure that the data provided complies with calibration regulations, a maximum of ten charging processes are possible without an internet connection at a time.

2. Measurement data and documentation of charging processes

The charging station stores all charging processes in the sonnen cloud in an **unalterable** form in accordance with legal requirements (§14 MessEG, PTB specifications). The data includes:

- The RFID used
- Date & time (start/end)
- Energy charged in kWh (calibrated)
- Status verification

Accessing the data

You can download your charging history as a .CSV file in the sonnen App in the submenu of the charging station **Historical Data**.

The Status Verification column shows whether the charging and transmission of data to the sonnen Cloud has been carried out in accordance with calibration regulations and whether the data can be used for billing purposes.

You can further edit the downloaded data in CSV format, e.g., filter out certain times or only certain RFID cards. Although it is possible to change the charging data itself, we strongly advise against doing so, as the use of altered data in business transactions could be considered document forgery or fraud.

All original calibration data is stored in the sonnen Cloud in an audit-proof manner. Special software (https://safe-ev.org/de/) is required to read this original data, and it can only be done transaction by transaction. This should only be necessary in the event of tax audits or inquiries by the tax office, in which case these files serve as original receipts. If you need the original data, please contact sonnen Service.

Please note: Charging processes without or with incorrect RFID identification cannot be correctly assigned retrospectively – always use the RFID function consistently!

4.10 Restarting the charging station

To restart the charging station, the circuit breaker (fuse) for the charging station in the electrical distribution box must be switched off and then on again. After restarting, wait at least five minutes before starting a charging process.

If you have any questions about this, please contact the electrician who installed the charging station.

5 Grid outage

In the event of a power failure, the charging process is terminated.

Grid outage in storage system with emergency power solution

If an emergency power solution is available, the charging process can be started by manually disconnecting and reconnecting the plug.

Please note that the vehicle's battery is usually significantly larger than that of the storage system and will therefore discharge quickly. In addition, the storage system is limited by its maximum discharge capacity. If more power is drawn by electrical consumers than the storage system can provide, the storage system detects an overload and terminates the emergency power supply.

6 Technical data

INFO The charging station is not suitable for 3-phase IT networks.

Electrical characteristics of the charging station

Description	Data
Nominal current [A] (configurable connection values)	16 Three-phase The charging station is configurable in 1 A increments
Nominal voltage [V/AC]	230/400 (Europe): Tolerance range -18% to +13%
Mains frequency [Hz]	50 (±10%, for MID-compliant/calibration-legislation-compliant use ±2%)
Mains topology	TN/TT (3-phase)
EMC class	Electromagnetic interference: Class B (residential, business, commercial) Electromagnetic immunity: Residential, business, commercial and industrial areas
Overvoltage category	III according to EN 60664
Protection class	I
Required protective devices	Type A residual-current devices (RCD) and miniature circuit breakers must be provided on the installation side based on the country in question.
Integrated protective device	DC residual current protection 6 mA
Phase rotation	Automatic phase sequence detection with error detection if the phase sequence is incorrect.
Standby power loss [W]	< 6
Mounting type	Wall-mounted or standing (fixed)
Cable entry	Surface-mounted or flush-mounted
Electrical connection/input terminal	Cross section of the connection cable (Cu) taking into account the local requirements, laws and standards (permanent electrical connection): • Rigid (min.–max.): 2.5–16 mm² • Flexible (min.–max.): 2.5–16 mm² • Flexible (min.–max.) with wire end ferrule: 2.5–16 mm² Depending on the cable and the type of installation, the recommended minimum cross section for a standard installation is: • 6 mm² (for 16 A)
Charging cable	Type 2 charging cable: up to 16 A/400 VAC according to EN 62196-1 and EN 62192-2, length: 7.5 m
Output voltage [V/AC]	230/400
Max. charging output [kW]	11

Technical data for integrated meter

Description	Data
Integrated meter	• MID-compliant variant • Charging connector discharge point: accuracy class A according to EN IEC 62052-11:2021/A11:2022 and EN 50470-3:2022 (variant compliant with calibration legislation)
Meter type	3-phase meter
Minimum current (meter) I_{min} [A]	0.25
Nominal current (meter) I_n [A]	5
Maximum current (meter) I_{max} [A]	16
Starting current (meter) I_{st} [A]	0.02

Description	Data
Transition current (meter) I_{tr} [A]	0.5
Nominal voltage (meter) U_n [V]	3x230/400
Nominal frequency (meter) f_n [A]	50
Pulse output (meter) [Imp/kWh]	100,000
Rated surge voltage (meter) [kV]	Min. 4
Electromagnetic environment (meter)	E2 according to 2014/32/EU Measuring Instruments Directive
Utilisation category (UC)	UC1 compliant with EN 62052-31
Verification of measurement data	https://transparenz.software/

INFO For integration in a specific environment, please also observe the requirements and instructions of the provider.

Communication & functions

Description	Data
Authentication	• RFID reader: Mifare Classic 1K and NXP Mifare Ultralight EV1 128 bytes, type A (ISO 14443 A) • sonnen app
Indicators	RGB LEDs, buzzer, display (calibration)
Network interfaces	• LAN (RJ45) - 10/100 BASE-TX • RFID
RFID modules	• Frequency: 13.56 MHz • Transmit power: <0 dB□A / m (max) at a distance of 10 m
Communication protocols	In use: OCPP 1.6 J (OCPP 2.0.1 ready*) Other: Modbus TCP, Modbus RTU, EEBus (ready*), IEC 61851-1 (Annex A), ISO 15118-2 (ready*)
External interfaces	• Potential-free contact for ripple control receiver (DNO) • RJ45 for network connection

Mechanical characteristics

Description	Data
Dimensions (WxHxD) [mm]	294x506x160
Weight [kg]	7.8
IP protection class, device	IP65
Protection against mechanical impact	IK10

Ambient conditions

Description	Data
Location of installation	No direct sunlight (recommended)
Operating temperature range [°C]	-30 to +50
Operating temperature limits for measuring accuracy (meter) [°C]	-30 to +50
Temperature behaviour	To prevent the charging station from exceeding the temperature limits, the charging current may be reduced or switch off.
Storage and transport temperature range [°C]	-40 to +85
Permissible relative humidity [%]	5 to 95, non-condensing
Altitude [m]	Max. 3,000 (above sea level)
Regulations and directives	• CE conformity • 2014/53/EU Radio Equipment Directive • 2011/65/EU RoHS Directive • 2001/95/EC General Product Safety

Description	Data
	• 2012/19/EU Waste Electrical and Electronic Equipment Directive • 1907/2006 REACH Regulation • 2014/32/EU Measuring Instruments Directive (MID) • German Measuring and Calibration Regulation and Measuring and Calibration Act (MessEG and MessEV respectively)

*Required components installed, can be used later after product launch via over-the-air (OTA) update.

Glossary

DNO
: Distribution network operator

ESD
: Electrostatic discharge

HEMS
: Home Energy Management System

LED
: Light-emitting diode

MID
: Measurement Instruments Directive

RFID
: Radio-frequency identification

https://documents.sonnen.de/s/manual-Charger-2-en

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