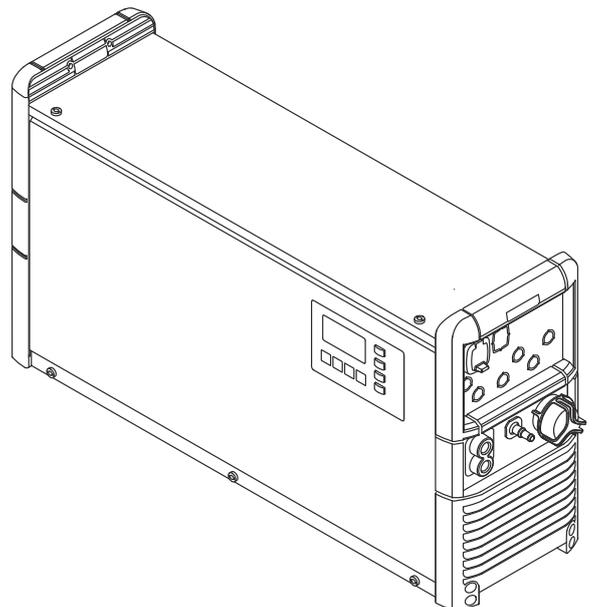


Operating Instructions

Selectiva 4.0
8 - 18 kW



EN-US | Operating instructions



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Safety Instructions

General

The device has been manufactured in line with the state of the art and according to recognized safety standards. If used incorrectly or misused, however, it can cause:

- Serious or fatal injury to the operator or third parties
 - Damage to the device and other material assets belonging to the operating company
 - Inefficient operation of the device
-

All persons involved in the commissioning, operation, maintenance, and servicing of the device must:

- Be suitably qualified
 - Have fully read and precisely followed these Operating Instructions
-

The Operating Instructions must always be kept to hand wherever the device is being used. In addition to the Operating Instructions, all applicable local rules and regulations regarding accident prevention and environmental protection must also be followed.

All safety and danger notices on the device:

- Must be kept in a legible state
 - Must not be damaged
 - Must not be removed
 - Must not be covered, pasted, or painted over
-

For the location of the safety and danger notices on the device, refer to the section headed "General information" in the Operating Instructions for the device. Before switching on the device, eliminate any faults that could compromise safety.

Your personal safety is at stake!

Explanation of Safety Instructions

DANGER!

Indicates an immediate danger.

- ▶ Death or serious injury may result if appropriate precautions are not taken.
-

WARNING!

Indicates a possibly dangerous situation.

- ▶ Death or serious injury may result if appropriate precautions are not taken.
-

CAUTION!

Indicates a situation where damage or injury could occur.

- ▶ Minor injury or damage to property may result if appropriate precautions are not taken.
-

NOTE!

Indicates the possibility of flawed results and damage to the equipment.

Environmental conditions

Operation or storage of the device outside the stipulated area will be deemed as not in accordance with the intended purpose. The manufacturer accepts no liability for any damage resulting from improper use.

For exact information on permitted environmental conditions, please refer to the "Technical data" chapter.

Mains connection

Devices with a high output can influence the energy quality of the grid due to their current consumption.

This may affect a number of device types in terms of:

- Connection restrictions, requirements regarding maximum permissible grid impedance *) or
- criteria regarding the minimum required short circuit power *).

*) both at the interface with the public grid

See technical data

In this case, the operator or the person using the device should check whether or not the device is allowed to be connected, where appropriate through discussion with the grid operator.

IMPORTANT! Ensure secure grounding of the mains connection.

Dangers due to grid and charging current

Working with battery chargers poses a number of dangers, such as:

- Electrical hazard due to grid and charging current
- Hazardous electromagnetic fields that may pose a risk of death for individuals with pacemakers.

An electric shock can be fatal. Every electric shock poses a risk of death. To prevent electric shock during operation:

- Do not touch any voltage-carrying parts inside or outside of the device.
- Never touch the battery poles.
- Do not short-circuit the charging cable or charging terminals.

All cables and leads must be secured, undamaged, insulated, and adequately dimensioned. Loose connections, scorched, damaged, or under-dimensioned cables and leads must be repaired immediately by an authorized specialist.

Danger due to acids, gases, and vapors

Batteries contain acids which pose a risk to the eyes and skin. Furthermore, charging batteries produces gases and vapors that may be hazardous to your health and are highly explosive under certain circumstances.

Only use battery chargers in well ventilated rooms in order to prevent the accumulation of explosive gases. Battery charging rooms are not considered at risk of explosion if a hydrogen concentration of less than 4 % is guaranteed by natural or artificial ventilation.

During charging, observe a minimum distance of 0.5 m (19.69 in.) between the battery and battery charger. Keep potential sources of ignition such as fire and open flames away from the battery.

Never disconnect the battery (e.g., charging terminals) during charging.

Never breathe in the gases and vapors produced by the battery – ensure there is a sufficient supply of fresh air.

Do not place any tools or electrically conductive metals on the battery, in order to prevent short circuits.

Never allow battery acid to come into contact with your eyes, skin, or clothing. Wear eye protection and appropriate protective clothing. Rinse away any splashed acid immediately and thoroughly with clean water, and consult a physician if necessary.

General information on working with batteries

- Protect batteries from dirt and mechanical damage.
 - Store charged batteries in cool rooms. The lowest self discharge occurs at approx. +2°C (35.6°F).
 - Refer to the specifications of the battery manufacturer or conduct weekly visual inspections to ensure that the battery is filled with acid (electrolyte) up to the maximum marking.
 - Do not start operating the device, or immediately stop operation, and have the battery inspected by an authorized specialist if:
 - The acid level is uneven or there is high water consumption in individual cells caused by a possible defect
 - The battery heats up to an impermissible level, above 55°C (131°F)
-

Personal protection and protection of others

- Keep persons, especially children, away from the device and working area during operation. However, if persons are in the vicinity:
- Inform them of any dangers (hazardous acids and gases, risk due to grid and charging current, etc.),
 - Provide suitable protective equipment.

Before leaving the working area, ensure that no personal injury or property damage can occur in your absence.

Safety measures in normal operation

Operate devices with ground conductors only on a grid with a ground conductor and a socket with a ground conductor contact. Operating the device on a grid without a ground conductor or on a socket without a ground conductor contact is considered gross negligence. The manufacturer accepts no liability for any damage resulting from improper use.

Only operate the device in accordance with the protection class shown on the rating plate.

Never commission the device if it is damaged.

Have the grid and device supply lead regularly inspected by an electrician to ensure that the ground conductor is functioning properly.

Safety devices that are not fully functional and components with defects must be repaired by an authorized specialist before the device is turned on.

Never bypass or disable protection devices.

A freely accessible mains plug is required after installation.

EMC device classifications	<p>Devices in emission class A:</p> <ul style="list-style-type: none"> - Are only designed for use in industrial areas - Can cause wiring-related or radiated interference in other areas. <hr/> <p>Devices in emission class B:</p> <ul style="list-style-type: none"> - Satisfy the emissions criteria for residential and industrial areas. This is also true for residential areas in which the energy is supplied from the public low-voltage grid. <hr/> <p>EMC device classification as per the rating plate or technical data.</p>
EMC Measures	<p>In certain cases, even though a device complies with the standard limit values for emissions, it may affect the application area for which it was designed (e.g., when there is sensitive equipment at the same location, or if the site where the device is installed is close to either radio or television receivers).</p> <p>If this is the case, then the operating company is obliged to take appropriate action to rectify the situation.</p>
Data backup	<p>The user is responsible for backing up any changes made to the factory settings. The manufacturer accepts no liability for any deleted personal settings.</p>
Maintenance	<p>Before each start-up, check the mains plug and mains cable and charging cables and charging terminals for damage.</p> <p>If dirt accumulates on the device, clean the surface of the device housing with a soft cloth and only with solvent-free cleaning agents.</p>
Repair	<p>Repair work must only be carried out by authorized personnel. Use only original spare and wearing parts (also applies to standard parts). It is impossible to guarantee that third-party parts are designed and manufactured to meet the demands made on them, or that they satisfy safety requirements.</p> <hr/> <p>Do not carry out any alterations, installations, or modifications to the device without first obtaining the manufacturer's permission.</p>
Obligations of the operating company	<p>The operating company must only allow persons to work with the device if they:</p> <ul style="list-style-type: none"> - are familiar with the basic occupational safety and accident prevention regulations and are trained in handling the device, - have read and understood these Operating Instructions, especially the "Safety rules" section, and have confirmed this with their signature, - are trained according to the requirements for the work results. <hr/> <p>The safety-conscious work of the personnel must be checked regularly.</p>
Safety Inspection	<p>The manufacturer recommends that a safety inspection of the device be performed at least every 12 months.</p>

A safety inspection by a certified electrician is recommended

- after changes,
- after alterations,
- after repair, service and maintenance,
- at least every 12 months.

For the safety inspection, follow the appropriate national and international standards and guidelines.

You can obtain more information about the safety inspection from your service center. The service center will provide the necessary documents upon request.

Markings on the device

Devices bearing the CE label satisfy the essential requirements of applicable directives.

Devices bearing the EAC mark of conformity satisfy the requirements of the relevant standards for Russia, Belarus, Kazakhstan, Armenia, and Kyrgyzstan.

Disposal

Waste electrical and electronic equipment must be collected separately and recycled in an environmentally sound manner in accordance with the European Directive and national law. Used equipment must be returned to the distributor or through a local authorized collection and disposal system. Proper disposal of the used device promotes sustainable recycling of material resources. Failure to observe this may lead to potential health/environmental impacts.

Packaging materials

Separate collection. Check your municipality's regulations. Reduce the volume of the box.

Copyright

Copyright of these Operating Instructions remains with the manufacturer.

Text and illustrations were accurate at the time of printing. Fronius reserves the right to make changes. The contents of the Operating Instructions shall not provide the basis for any claims whatsoever on the part of the purchaser. If you have any suggestions for improvement, or can point out any mistakes that you have found in the Operating Instructions, we will be most grateful for your comments.

Power categories

General

The kW specification for the power categories refers to the housing design and is not directly related to the actual device power.

8 kW 400 V

Selectiva
2100 / 2120 / 2140 / 2160 / 2180 / 2200 / 2225
4060 / 4075 / 4090 / 4090A / 4120 / 4120A / 4140 / 4140A / 4160 / 4160A /
4185
8040 / 8060 / 8060A / 8075 / 8075A / 8090 / 8090A / 8110

16 kW 220 V

Selectiva
4120 / 4140 / 4160

16 kW 400 V

Selectiva
4210
8120 / 8140 / 8160 / 8180 / 8210

18 kW 400 V

Selectiva
2250 / 2300 / 2350
4250 / 4300 / 4325

General information

Device concept

The battery chargers are characterized by intelligent charging technology. The Active Inverter Technology with the Ri charging process adapts to the needs of the battery and only charges the current that is really needed into the battery.

The technology is enclosed in a robust industry-standard housing. The compact design meets all requirements for safety standards, reduces space requirements, and protects the components for a long service life.

Featuring a graphic display, an integrated datalogger, new interfaces, and additional options, the device is perfectly equipped for the future.

Intended use

The battery charger is intended to charge the following listed batteries. Any other use is deemed to be "not in accordance with the intended purpose". The manufacturer shall not be liable for any damage resulting from such improper use. Intended use also means

- Following all the instructions in these Operating Instructions
- Regularly checking the mains cable and charging cable



WARNING!

Danger from charging dry batteries (primary cells) and non-rechargeable batteries.

Serious personal injury and property damage due to leaking batteries may result.

- ▶ Only charge the types of battery listed below.
-



WARNING!

Danger from charging unsuitable batteries.

Serious personal injury and property damage as a result of escaping gases, ignition, or explosion may result.

- ▶ Only connect batteries to the battery charger which are suitable for the battery charger in terms of their type, voltage, and capacity and which correspond to the settings on the battery charger.
-

The battery charger is designed for charging lead acid batteries, NiCd batteries, and Li-ion batteries.

- Pb-WET batteries (PzS, GiS, etc.):
Vented lead acid batteries with liquid electrolyte.
- Pb-GEL batteries (PzV, GiV, etc.):
Valve-regulated, sealed lead acid batteries (VRLA) with fixed electrolyte (gel or fleece).
- NiCd batteries:
Vented or sealed NiCd batteries with liquid electrolyte.
- Pb-CSM-WET batteries (Copper Stretch Metal):
Vented lead acid CSM batteries with liquid electrolyte.
- Lead Crystal batteries:
Type EVFJ/CNFJ Lead Crystal batteries.
- PzQ batteries:
For heavy-duty applications.

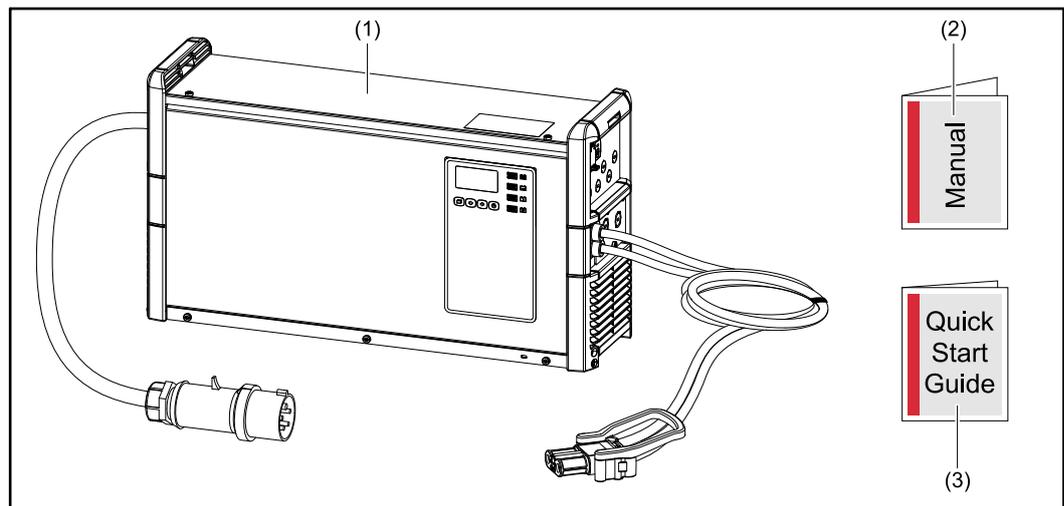
Only certified, intrinsically safe batteries may be used when charging Li-ion batteries.

For charging Li-ion batteries, a customer characteristic must be used that is specifically designed for the battery. A standard charging process for Li-ion batteries is not pre-installed in the battery charger.

- Li-ion batteries:
LFP, LTO, NMC, NCA, NCO, LMO, LCO.

The device must be handled correctly in order for it to work. Never pull on the cable when handling the device.

Scope of supply



- (1) Battery charger
- (2) Operating Instructions
- (3) Quick Start Guide

Mains connection

WARNING!

Danger from electrical current.

This may result in serious injuries or death.

- ▶ Before starting work, switch off all devices and components involved, and disconnect them from the grid.
- ▶ Secure all devices and components involved so they cannot be switched back on.
- ▶ If necessary, only use a type B residual current circuit breaker for the grid connection of the device.

WARNING!

Danger from incorrect operation and work that is not carried out properly.

This can result in severe personal injury and damage to property.

- ▶ All the work and functions described in this document must only be carried out by trained and qualified personnel.
- ▶ Read and understand this document.
- ▶ Read and understand all the Operating Instructions for the system components, especially the safety rules.

 **WARNING!**

Danger due to faulty or insufficient grid power supply.

This can result in severe personal injury and damage to property.

- ▶ The requirements for the grid power supply according to the "Technical data" chapter must be fulfilled.

Charging cable

 **WARNING!**

Danger from flying sparks due to improper disconnection of the charging plug.

This can result in severe personal injury and damage to property. The resulting sparks can ignite the charging gases that form during charging and cause a fire or explosion

- ▶ End the charging process via the battery charger and, after the charging cables have cooled down, wind them up or, if available, place them on the cable holder.

Correct routing of the mains/charging cables

 **WARNING!**

Danger due to charging cables lying around.

This can result in severe personal injury and damage to property. Personnel can get caught or trip on unplugged, loose cables.

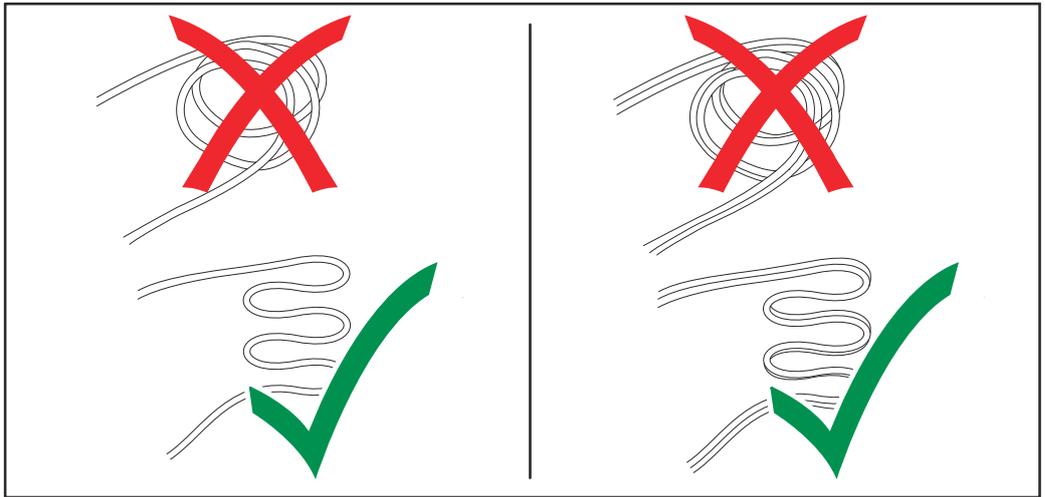
- ▶ Lay charging cables so that no one can trip over them or get caught on them.

 **CAUTION!**

Danger due to overheating as a result of incorrectly laid mains/charging cables.

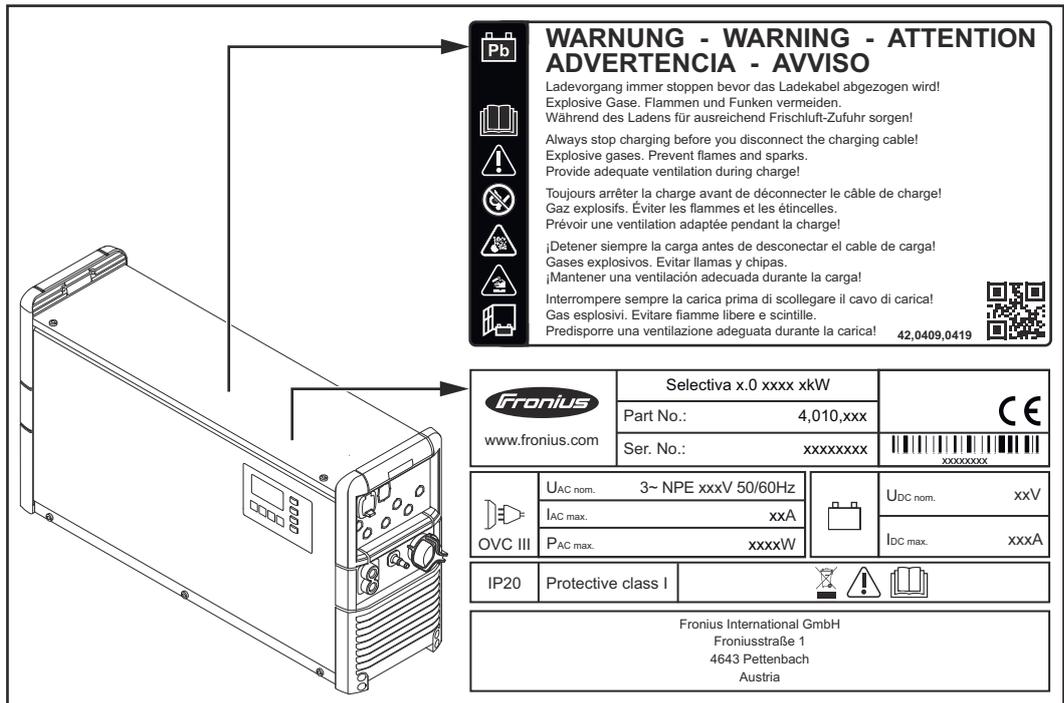
Risk of damage to the mains/charging cables.

- ▶ The mains/charging cable may only be replaced by a qualified electrician.
- ▶ Lay the mains/charging cable without a loop.
- ▶ Do not cover the mains/charging cable.
- ▶ Charging cables longer than 5 m (16 ft. 4.85 in.) must be laid individually (no bundling).
- ▶ Charging cables longer than 5 m (16 ft. 4.85 in.) can have an increased surface temperature (be aware of hot surfaces).
- ▶ In the following cases, pay special attention that the surface temperature of the charging cables does not exceed 80°C (176°F):
 - Ambient temperature is 30°C (86°F) or more
 - Cross-section of the charging cable is 95 mm² or more
 - Length of the charging cable is 5 m (16 ft. 4.85 in.) or more



Warning notices on the device

A number of safety symbols can be seen on the battery charger. The safety symbols must not be removed or painted over.



An electric shock can be fatal. The housing must never be opened by anyone other than a service technician trained by the manufacturer. Before working with the housing open, the device must be disconnected from the grid. A suitable measuring device must be used to ensure that electrically charged components (e.g., capacitors) are completely discharged. Ensure that the device remains disconnected from the grid until all work is complete.



Use functions only after reading the Operating Instructions in full.



Keep potential sources of ignition such as fire, sparks, and open flames away from the battery.



Danger of explosion! Oxyhydrogen forms in the battery during charging.



Battery acid is corrosive and must never come into contact with your eyes, skin, or clothing.



Ensure there is a sufficient supply of fresh air during charging.



The charger can cause DC residual currents in the ground conductor. If a residual current device (RCD) is used on the grid side to protect against electric shock, this must be a type B RCD.



Do not dispose of the product with domestic waste, but in accordance with the disposal regulations for waste electrical and electronic equipment applicable at the place of installation.

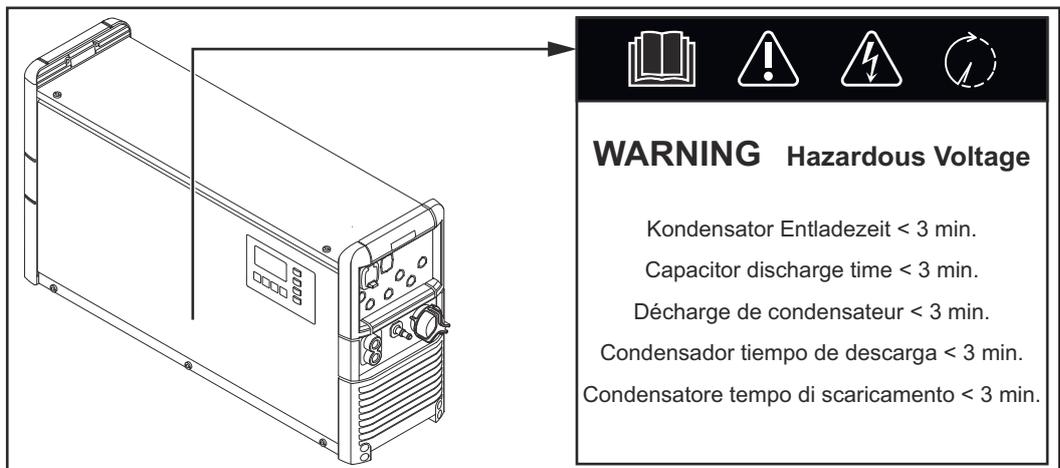
**Warning notices
inside the device**

 **WARNING!**

Danger from electrical current.

This may result in serious injuries or death.

- ▶ The housing must never be opened by anyone other than a service technician trained by the manufacturer.
- ▶ Before starting work, switch off all devices and components involved, and disconnect them from the grid.
- ▶ Secure all devices and components involved so they cannot be switched back on.
- ▶ After opening the device, use a suitable measuring instrument to check that electrically charged components (such as capacitors) have been discharged.
- ▶ With the aid of a clearly legible, understandable warning sign, ensure that the device remains disconnected from the grid until all work has been completed.



Site selection and wall mounting

Setup regulations

WARNING!

Danger from devices falling or toppling over.

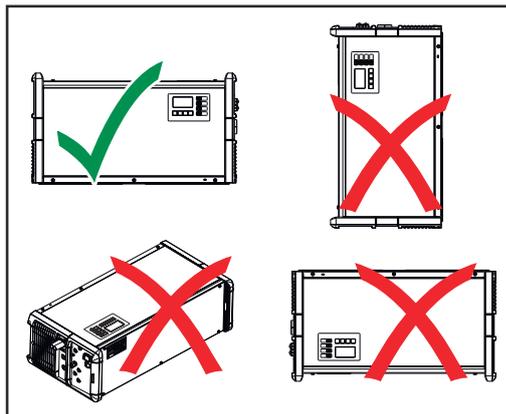
This can result in severe personal injury and damage to property.

- ▶ Set up all system components in a stable position.
- ▶ When using a floor bracket or wall bracket, always ensure that all fastening elements are firmly seated.
- ▶ Devices weighing more than 25 kg (55.12 lb.) must be carried by at least 2 persons.
- ▶ When mounted on a shelf, the load capacity of the shelf must at least correspond to the weight of the device.

The device has been tested according to protection class 20. This means:

- Protection against the penetration of solid foreign bodies with a diameter of more than 12.5 mm (0.49 in.).
- No protection against water.

The device can be set up and operated in dry, closed rooms in accordance with protection class 20. Avoid exposure to moisture.



The permissible operating position of the device is horizontal.

Cooling air

The device must be set up so that cooling air can flow through the housing openings provided unhindered. There must always be a minimum distance of 0.2 m (7.874 in.) from the air inlet and outlet openings. The ambient air must be free from:

- Excessive dust exposure
- Electrically conductive particles (carbon black or metal chips)
- Heat sources
- Battery acid vapors

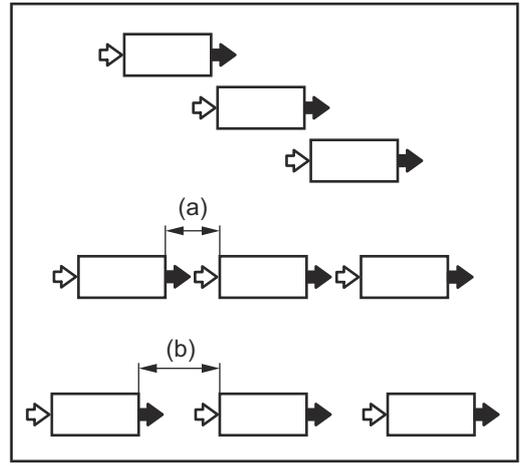
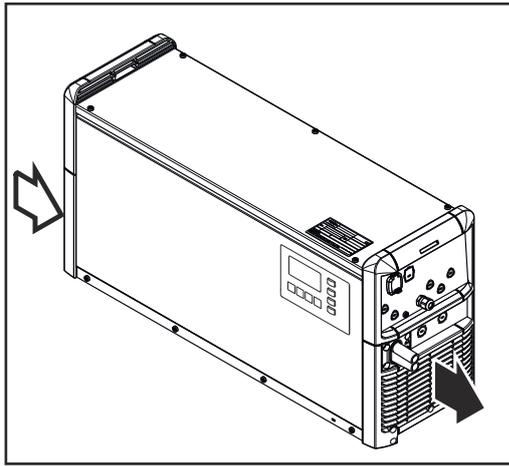
The cooling air flows in and out as indicated by the arrow symbols in the following illustrations.

CAUTION!

Danger due to partially or completely covered air intake and outlet openings.

This can result in damage to property.

- ▶ The setup of several devices one behind the other should be staggered.



If the devices are arranged in a line one behind the other without being staggered, the distance between the devices must be as follows:

- a) 8 kW: Minimum distance 30 cm (11.81 in.)
- b) 16–18 kW: Minimum distance 60 cm (1 ft. 11.62 in.)

Wall bracket

WARNING!

Danger from incorrectly performed work and falling equipment.

This can result in severe personal injury and damage to property.

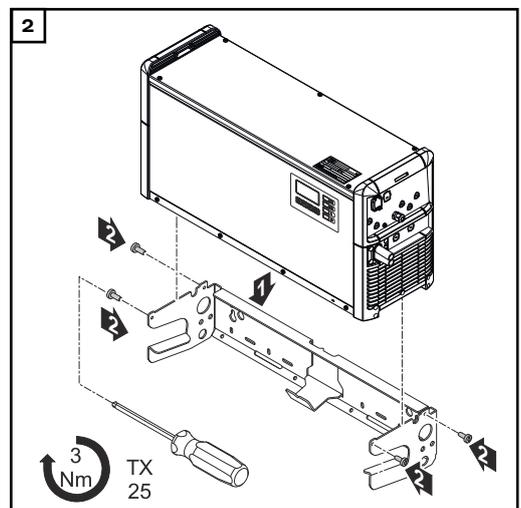
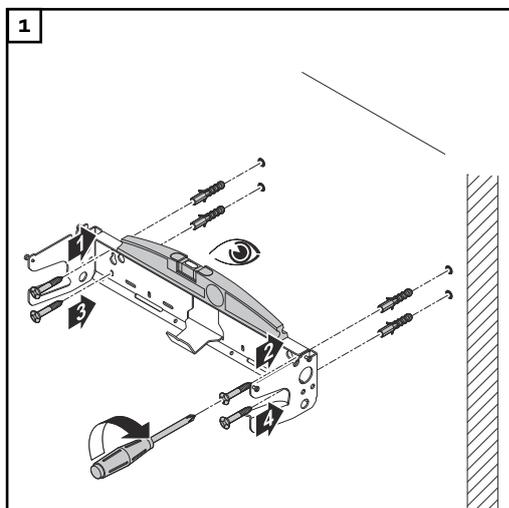
- ▶ The mounting must only be carried out by trained and qualified personnel.
- ▶ Depending on the substrate, different dowels and screws are required. Therefore, they are not included in the scope of delivery.
- ▶ The system installer is responsible for selecting the proper dowels and screws.

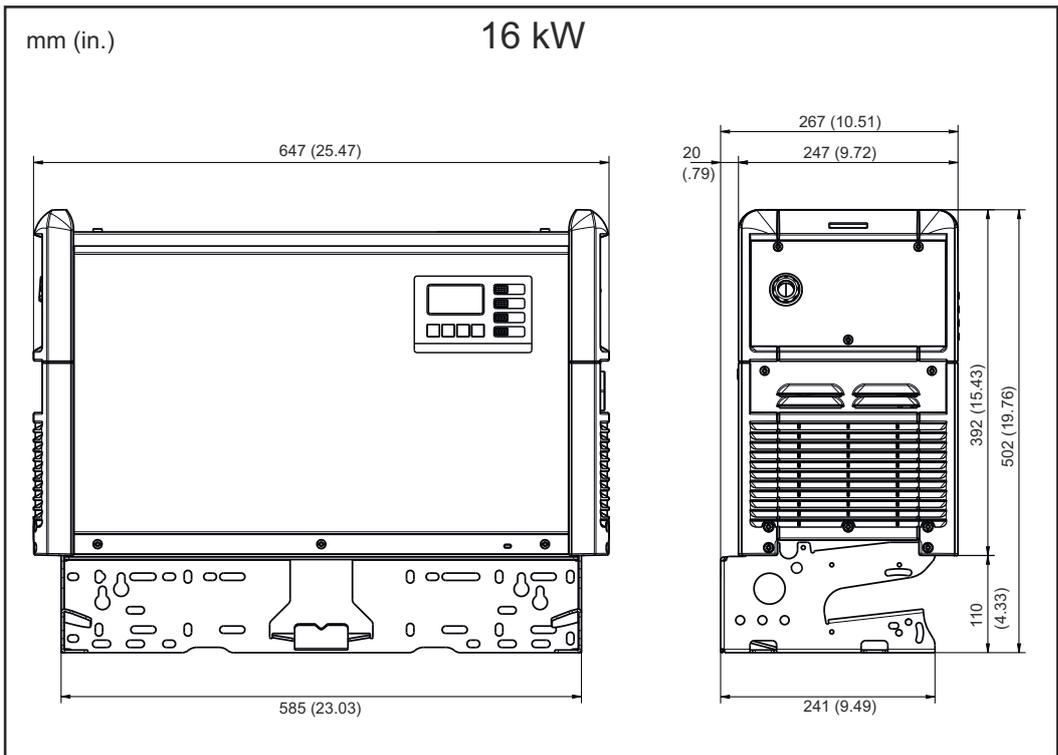
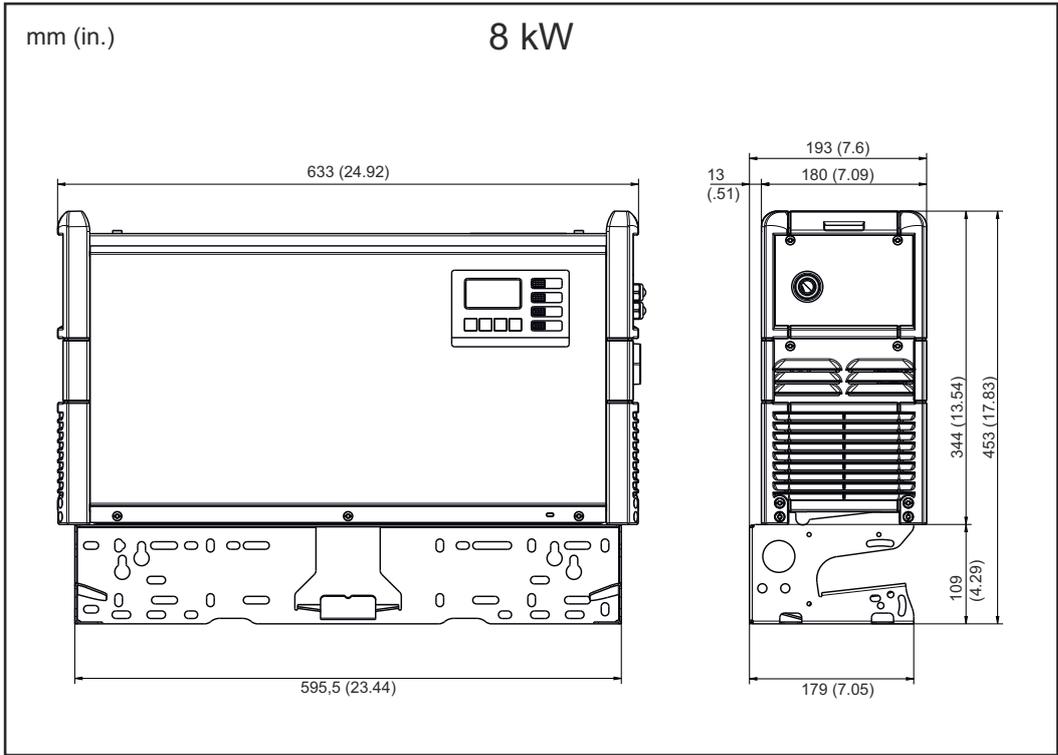
WARNING!

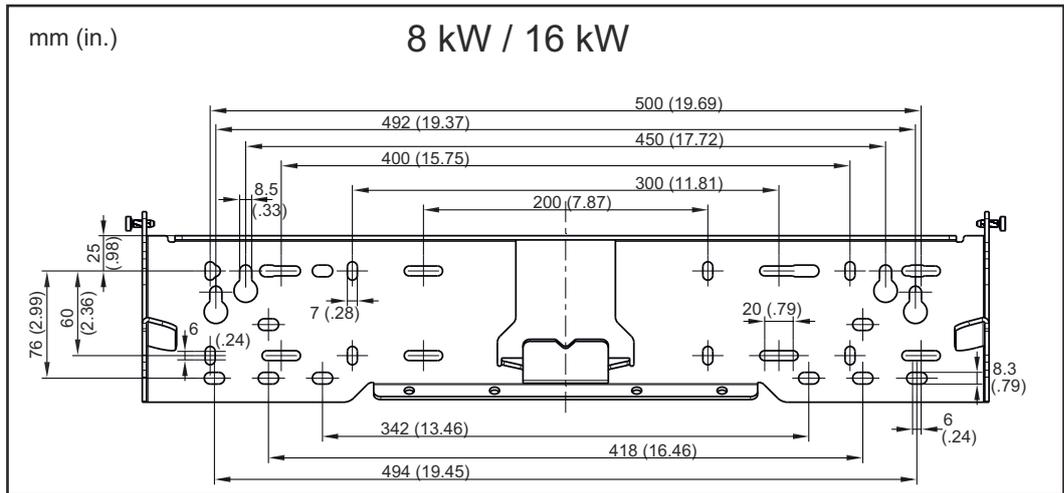
Danger from devices falling or toppling over.

This can result in severe personal injury and damage to property.

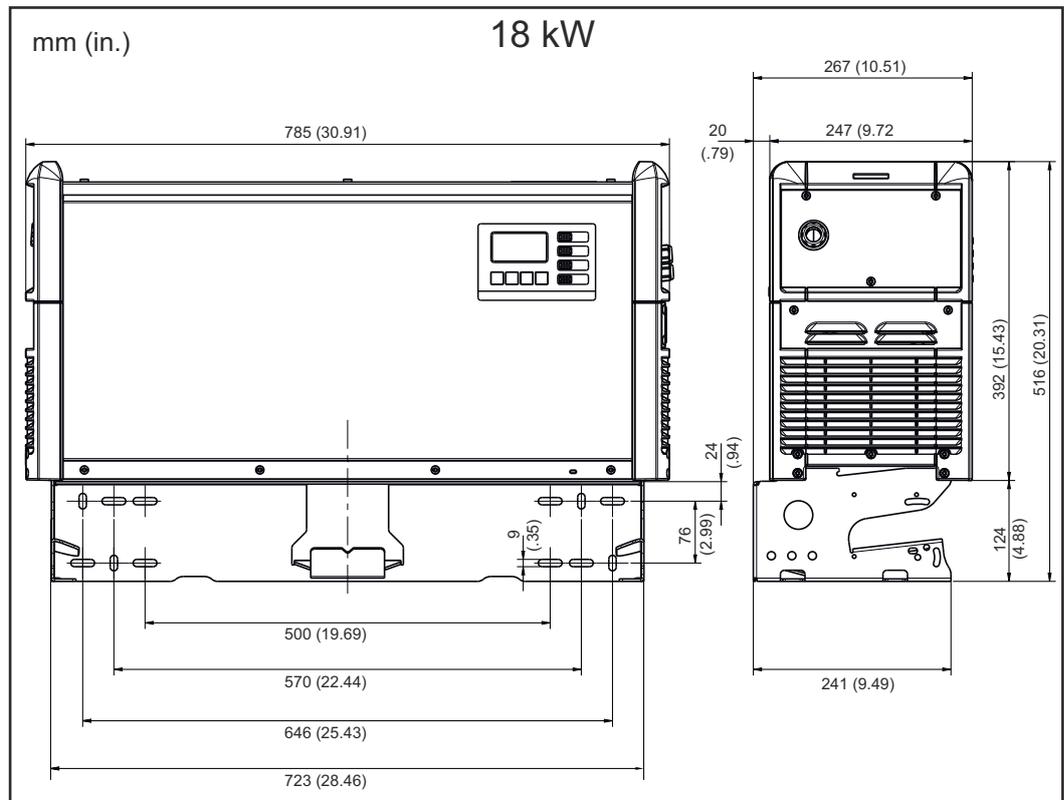
- ▶ Only use this wall bracket with a Fronius Selectiva 8–18 kW battery charger.
- ▶ Mount the device horizontally.







Hole pattern

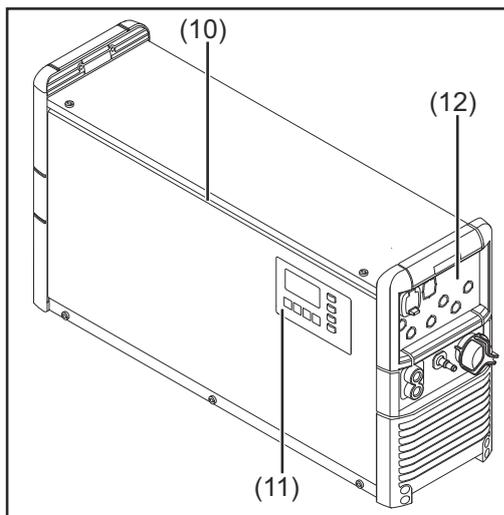
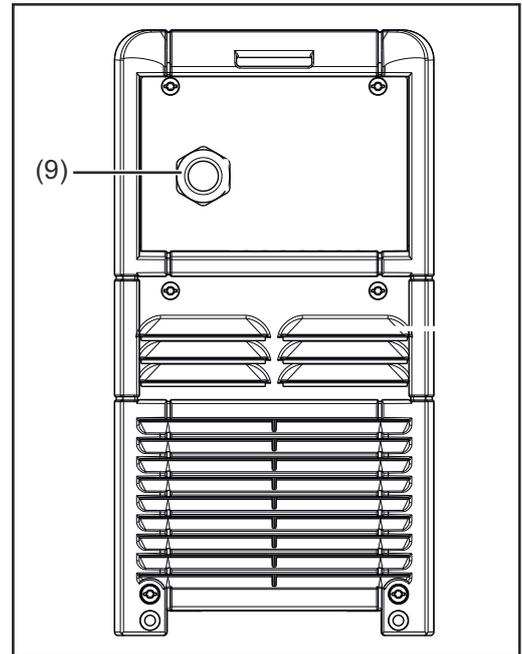
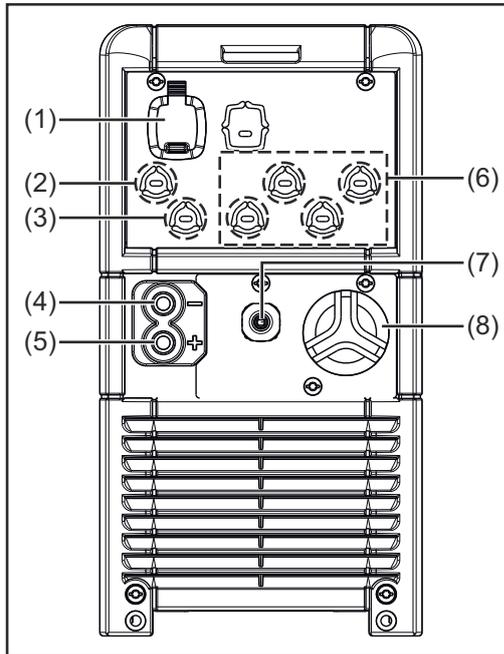


Weight of the wall bracket:

8 kW	1.80 kg (3.97 lb)
16 kW	3.15 kg (6.49 lbs.)
18 kW	4.30 kg (9.48 lb)

Operating controls and connections

Operating controls and connections



No.	Function
(1)	USB port The USB port allows a USB thumb drive to be used to update the device and also to log the charging parameters while charging is in progress. A maximum supply current of 0.5 A is available.
(2)	Position for the remote control system option or 13 V charging lights option.
(3)	Position for the external start/stop option or temperature-controlled charging option.

No.	Function
(4)	(-) Charging cable
(5)	(+) Charging cable
(6)	Positions for relay-specific options. (e.g. Aquamatic control) Detailed information can be found in the "Options" chapter.
(7)	Position for the internal electrolyte circulation option. Compressed air output

(8) Position for the internal electrolyte circulation option.

Air intake with air filter

(9) Mains cable

(10) LED strip option.

Lights up in the appropriate colors depending on the state of charge, according to the indicators explained in the "Control panel" section.

(11) Control panel

(12) Connection area for options

The connection area is only accessible by removing the connection plate on the front of the device.

To do this, follow the warnings in the "Safety" section of the "Options" chapter.

Option plug

Pin	Plug Code	Plug 18p	Plug Code	Pin
17	G / 2	● ●	13V / 1	18
15	Y / 3	● ●	R / 4	16
13	B	● ●	Dete	14
11		● ●	C2 G	12
9	C1 G	● ●	13V O	10
7	C1 L	● ●	C2 L	8
5	C1 H	● ●	C2 H	6
3		● ●		4
1	- St	● ●	+ St	2

Connections for 18-pin option plug on the P-Control PC board inside the housing

Pin	Plug Code	Function	
17	G/2	Ext. LED Green Remote Control wire 2	
15	Y/3	Ext. LED Yellow Remote Control wire 3 CBG Easy Detect*°	
13	B	Ext. LED Blue CBG Easy GND*°	
11			
9	C1 G	CAN 1GND wire brown	
7	C1 L	CAN 1Low wire yellow	
5	C1 H	CAN 1High wire green	
3			
1	- St	Temperature Controlled Charging*° Extern Start / Stop°	

Pin	Plug Code	Function	
18	13V/1	13 V Power Supply	Ext. LED Remote Control wire 1 CBG Easy VCC*°
16	R/4	Extern LED Red Remote Control wire 4	
14	Dete	Detect wire white	
12	C2 G	CAN 2GND wire brown	
10	13V O	13 V Power Supply wire white	
8	C2 L	CAN 2Low wire yellow	
6	C2 H	CAN 2High wire green	
4			
2	+ St	Temperature Controlled Charging*° Extern Start / Stop°	



Gateway Link*

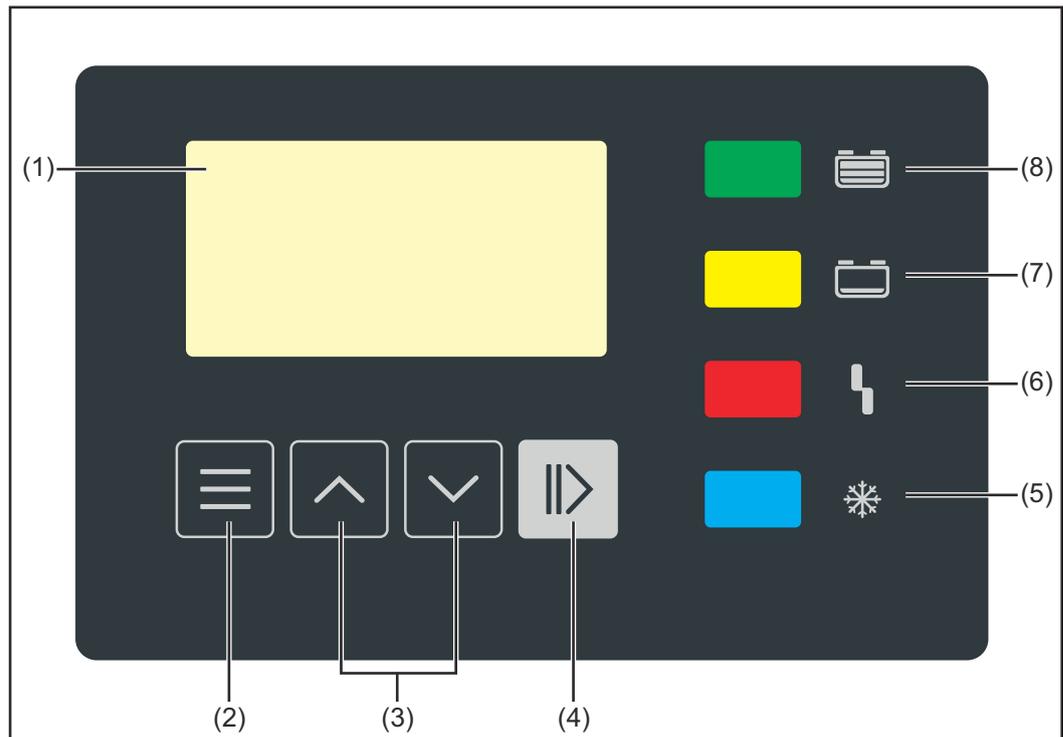
* not available for Selectiva UL



TagID Link*° / Battery Link*

° not available for SelectION

Control panel



No.	Function
(1)	Display
(2)	"Menu" button Select the desired menu. Return to the higher-level selection.
(3)	"Up/Down" buttons Select the desired menu item. Set the desired value.
(4)	"Pause/Start" button Pause and resume the charging process. Confirm a menu item or setting.
(5)	"Battery cold" indicator (blue) Signals a cooled down battery ready for use. Lights up continuously: At the end of charging, the set cooling time or, optionally, the battery temperature has been reached. Flashes every second: The water refill indicator has also been activated. Detailed information can be found in the Additional functions in configuration mode section of the "Display" chapter.
(6)	"Error" indicator (red) Lights up continuously: The device outputs an error. The current situation does not allow for proper charging. While the red indicator is lit, charging cannot take place (charging paused). The relevant status code appears on the display. Flashes briefly every 3 s: The device outputs a warning. Charging parameters are unfavorable, but charging continues. The relevant status code and the state of charge appear alternately on the display.

(7) **"Charge" indicator (yellow)**

Lights up: during charging.

Flashes: when charging has been paused.

(8) **"Battery is charged" indicator (green)**

Lights up continuously: Charge complete.

Flashes every second: Charge complete. The water refill indicator has also been activated. Detailed information can be found in the **Additional functions in configuration mode** section of the "Display" chapter.

Charging the battery

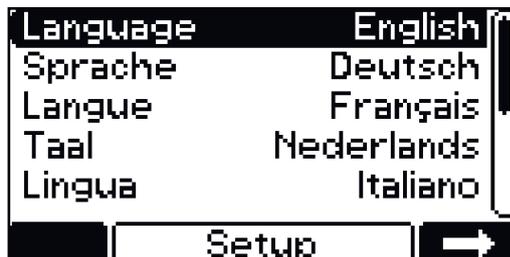
Starting for the first time

When the battery charger is connected to the grid for the first time, the device is in SETUP mode.

In this mode, the following basic settings must be made or confirmed:

- Language (English, German, French, etc.)
- Date, time, and time zone
- Units: metric / imperial
- Charging cable length and charging cable cross-section
- Type of battery, curve, number of cells, and charging time or battery capacity

1 Connect the mains plug of the battery charger to the electrical grid.



- 2** Use the "Up/Down" buttons to select the desired menu language.
- 3** Confirm with the "Pause/Start" button.

English is set as the default language.



- 4** Use the "Up/Down" buttons to select the time zone.
- 5** Confirm with the "Pause/Start" button.

The time zone UTC+1 Central European Time (Berlin) is set as default.



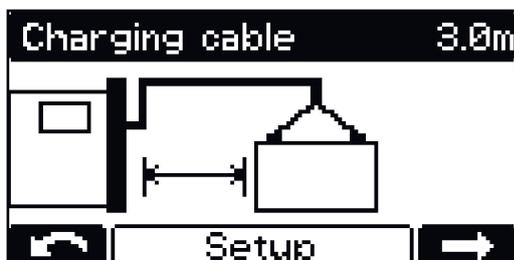
- The following settings must be made:
- Daylight saving time ON/OFF
 - Hour format
 - Time
 - Date

- 6** Use the "Up/Down" buttons to select the desired setting.
- 7** Press the "Pause/Start" button to confirm each setting.

Daylight saving time ON and the 24-hour format are set as default.



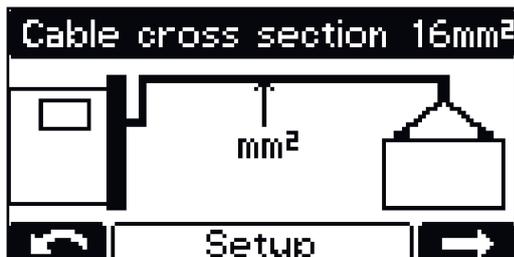
- 8** Use the "Up/Down" buttons to select the desired setting (metric / imperial).
- 9** Confirm with the "Pause/Start" button.



- 10 Use the "Up/Down" buttons to set the appropriate charging cable length (m / ft).
- 11 Confirm with the "Pause/Start" button.

The battery charger is configured with the correct charging cable length according to the order.

An incorrectly set charging cable length can have a negative effect on the charging process!



- 12 Use the "Up/Down" buttons to set the appropriate charging cable cross-section (mm² / AWG).
- 13 Confirm with the "Pause/Start" button.

The battery charger is configured with the correct charging cable cross-section according to the order.

An incorrectly set charging cable cross-section can have a negative effect on the charging process!



- 14 If the displayed charging configuration is correct, confirm the charging configuration with the "Pause/Start" button.

The battery charger is pre-configured according to the order.

If the battery charger has been ordered without an additional configuration, the following settings are set as default:

- Type of battery Pb-WET (for PzS, GiS)
- Curve 6 - RI
- Maximum number of cells intended for the battery charger
- Charging time 7–8 h

If the configuration does not match the battery used, the parameters must be adjusted accordingly.

Detailed information on the battery charger parameters can be found in the "Configuration mode" section of the "Display" chapter [Configuration mode](#).

Starting the charging process

WARNING!

Danger from leaking battery acid or explosion when charging defective batteries.

This can result in severe personal injury and damage to property.

- ▶ Before starting the charging process, make sure that the battery to be charged is undamaged.

⚠ WARNING!

Danger due to incorrect type of battery and incorrect charging settings.

This can result in severe personal injury and damage to property.

- ▶ Before starting the charging process, make sure that the correct type of battery is set on the battery charger.
- ▶ The following settings must be made for the individual types of battery before charging:
 - Charging curve
 - Nominal voltage (number of battery cells)
 - Battery capacity (Ah) or charging time (h)

Detailed information on the battery charger parameters can be found in the **Configuration mode** section of the "Display" chapter.

⚠ CAUTION!

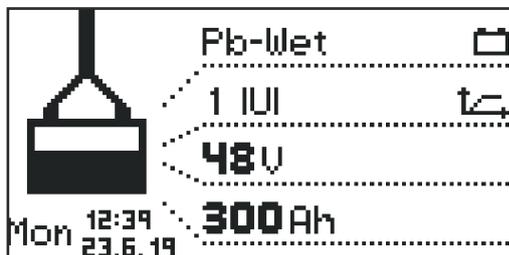
Danger of damage to property due to heavy contamination of the charging plug contacts.

Due to the increased contact resistance, overheating and subsequent destruction of the charging plug can occur.

- ▶ Keep the charging plug contacts free of contamination and clean if necessary.

- 1** Connect the mains plug of the battery charger to the electrical grid.

A prompt appears, asking whether the correct parameters have been set for the battery to be charged.



The display then appears in standard mode. The display shows the battery charger parameters:

- Type of battery (e.g., Pb-WET)
- Charging curve (e.g., IUI)
- Nominal voltage (e.g., 48 V)
- Capacity (e.g., 300 Ah)
- Weekday, time, and date

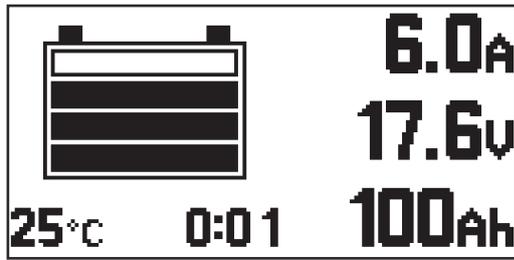
The battery charger parameters can be set individually. Detailed information on the battery charger parameters can be found in the **Configuration mode** section of the "Display" chapter. Make sure that the battery to be charged corresponds to the battery charger configuration.

- 2** Plug in the charging plug.

The battery charger detects the connected battery and starts charging. If the start-up delay is activated, the charging process starts after the set delay time has elapsed. Detailed information can be found in the **Configuration mode** section of the "Display" chapter.

During the charging process the display shows the following values:

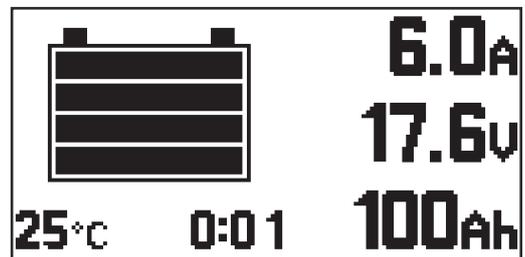
- Current charging current (A)
- Current charging voltage (V)
- Charge delivered (Ah)
- Battery temperature with the "Temperature-controlled charging" option
- Time (hh:mm) from start of charge



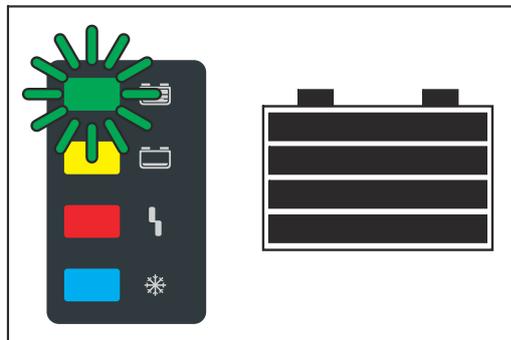
The battery symbol indicates the current state of charge. The more bars are displayed, the further the charging process has progressed. As soon as the battery is fully charged, a minute counter appears (figure on the right). This counts the minutes since the end of charging and makes it easier to judge which battery has cooled down the most when using several battery chargers.

If you still want the standard display to be shown instead of the minute counter:

- 1 Use the "Up/Down" buttons to switch between the minute counter and the standard display.



When the battery is fully charged, all 4 bars of the battery symbol appear in black. As soon as the battery is fully charged, the green indicator lights up.



- The battery is always ready for use.
- The battery can remain connected to the battery charger for any amount of time.
- The conservation charge counteracts self discharge of the battery.

Pausing the charging process

Pause the charging process as follows:

- 1 Press the "Pause/Start" button.



While charging is paused:

- The "Charge" indicator flashes (yellow).

Resume the charging process as follows:

- 2 Press the "Pause/Start" button again.

As long as a battery is connected to the battery charger, the charging process can be paused and resumed by pressing the "Pause/Start" button. It is only possible to change the display modes with the "Menu" button, as described in the "Display" chapter, after disconnecting the battery from the battery charger.

Ending the charging process

WARNING!

Danger due to oxyhydrogen ignition caused by sparks when disconnecting the charging cables.

This can result in severe personal injury and damage to property.

- ▶ Before disconnecting or unplugging the charging plug, end the charging process by pressing the "Pause/Start" button.

WARNING!

Danger if the plug connection is disconnected during the charging process

This can result in severe personal injury and damage to property.

- ▶ Do not disconnect the plug connection while the charging process is running.
- ▶ Do not touch live contacts on the charging plug.

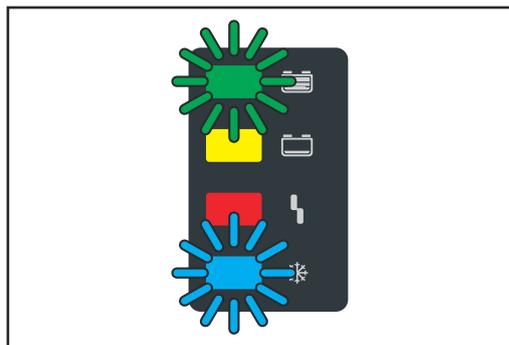
CAUTION!

Danger of battery damage when disconnecting the battery from the battery charger if the charging process is not yet fully completed.

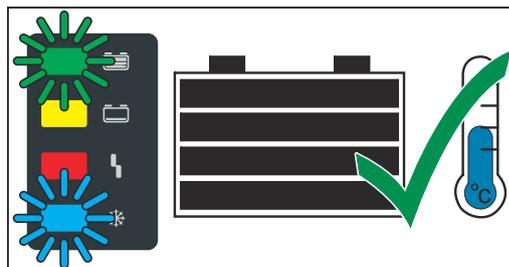
This can result in damage to the battery.

- ▶ Do not disconnect the battery from the battery charger until it is fully charged (green "Battery is charged" indicator lights up).

Once the battery is fully charged and cooled down, the following indicators light up:



- "Battery is charged" indicator (green)
- "Battery cold" indicator (blue)



For optimum battery life, do not disconnect the battery from the battery charger until the blue "Battery cold" indicator lights up in addition to the green indicator, as explained below. If several battery chargers are in use, remove the battery that has been fully charged (coolest) for the longest time first.

End the charging process as follows:

- 1** Press the "Pause/Start" button.

2 Disconnect the charging plug.

When the charging contacts are open, the automatic open-circuit detection ensures that the charging contacts are voltage-free.

Display

Overview of display modes

No.	Function
	Standard mode In standard mode, the display shows the charging parameters.
	Statistics mode Visualizes the frequency of the operating states of the device and shows the total number of charges, as well as an overview of the absolute and average Ah delivered and energy consumed per charge.
	History mode Provides information regarding the parameters of all stored charging processes.
	Configuration mode Configuration mode enables all settings to be made for the device and the charging process.
	USB mode USB mode supports a device update, the backup and uploading of device configurations, as well as logging of charging parameters during the charging process via USB thumb drive.

As long as a battery is connected to the battery charger, the charging process can only be interrupted and resumed by pressing the "Pause/Start" button. It is only possible to change the display modes with the "Menu" button after disconnecting the battery from the battery charger. A detailed description of the display modes is given in the following chapter.

A limited menu selection is available while charging has been paused.

NOTE!

A limited menu selection is available while charging has been paused.

Menu selection



Switch to the menu selection from standard mode as follows:

- 1 Press and hold the "Menu" button for approx. 5 seconds.

Switch to the menu selection from the other modes as follows:

- 1 Press the "Menu" button briefly.

Open the desired mode:

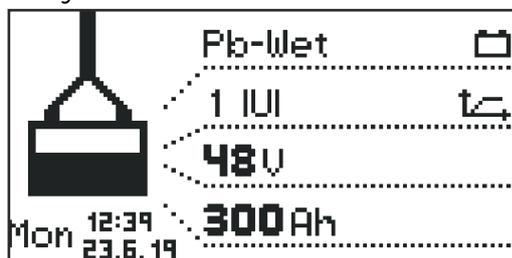
- 2 Use the "Up/Down" buttons to select the symbol for the desired mode.
 - e.g. the battery symbol for standard mode

3 Press the "Pause/Start" button to confirm the "check mark" symbol.

Standard mode

Standard mode

After connecting the mains plug to the electrical network, the display is automatically in standard mode.



In standard mode, the display shows the battery charger parameters:

- Type of battery (e.g., Pb-WET)
- Charging characteristic (e.g., IUI)
- Nominal voltage (e.g., 48 V)
- Capacity (e.g., 300 Ah)
- Weekday, date and time

The battery charger parameters are individually adjustable. Detailed information can be found in the "Configuration mode" section.

Statistics mode

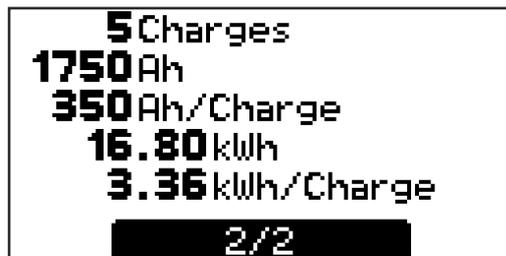
Statistics mode



In statistics mode, horizontal bars visualize the frequency of the following operating states of the device:

- Idle
- Charging
- Conservation charge
- Cooldown
- Error

1 Use the "Up/Down" buttons to switch between page 1/2 and page 2/2.



Page 2/2 shows the following values:

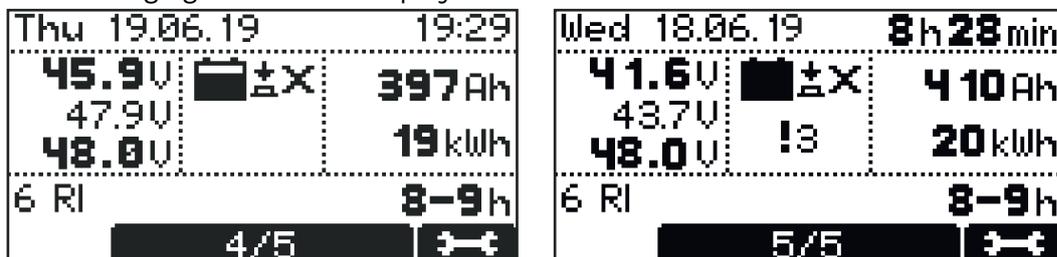
- Total number of charges.
- Total Ah delivered.
- Average Ah delivered per charge.
- Total energy consumed (kWh).
- Average energy consumed (kWh) per charge.

The display of the consumed energy is intended as a guide value and may deviate from the actual amount of energy by up to 5% at the rated power. The deviation may be higher at lower power.

History mode

History mode

History mode provides information regarding the parameters of all stored charging processes. The display window is shown twice below in order to be able to show changing or different displays:

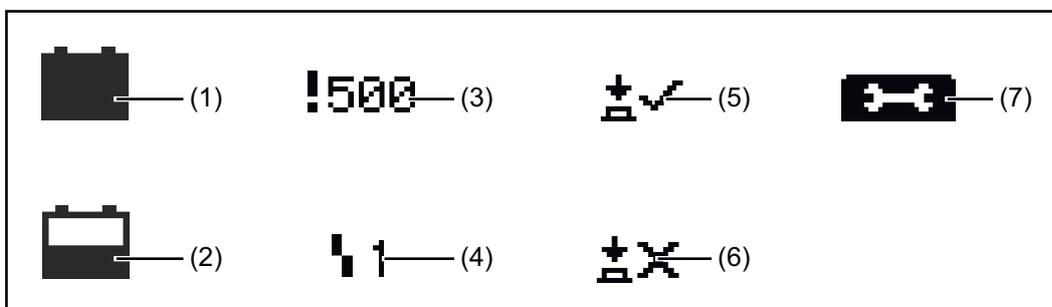


- 1 Use the "Up/Down" buttons to switch between the pages for each saved charging process.

Contents of the display window

- Start date of the charge, e.g.: Thursday, 19.06.14.
- Start time of the charge, e.g.: 19:29 or charging time, e.g.: 8 h 28 min.
- Voltage at start of charging: e.g.: 45.9 V.
- Voltage after 5 minutes: e.g.: 47.9 V.
- Voltage at end of charging: e.g.: 48.0 V.
- Input power Ah, e.g.: 397 Ah.
- Input power kWh, e.g.: 19 kWh.
- Charging curve, e.g.: 6 RI.
- Set charging period, e.g.: 8–9 h or set Ah, e.g.: 400 Ah or set time of end of charge (not shown).

Displayed symbols



No.	Function
(1)	Full battery Charge completed.
(2)	Empty battery Charge not completed.
(3)	Exclamation mark with number Warning issued, with code for the corresponding status code. Detailed information can be found in the Status codes section.
(4)	Symbol with number Error issued, with code for the corresponding status code. Detailed information can be found in the Status codes section.

(5) Button symbol with check mark

Charge was correctly ended with the "Pause/Start" button.

(6) Button symbol with cross

Charge was ended without pressing the "Pause/Start" button.

(7) Charge details

Display of certain battery data at the beginning and at the end of the charge:

Number of cells

Ah

Curve

Type of battery

Configuration mode

Overview of the setting options in configuration mode

Charging settings: Settings for the battery

- Type of battery, e.g., "Wet".
- Charging characteristic, e.g., "IU".
- Capacity (Ah) or charging time (h), depending on the charging characteristic.
- Cells: Voltage (V) and number of battery cells or automatic setting of the number of cells.

CAUTION!

Risk of damage to the battery due to incorrectly set values.

This can result in damage to property.

- ▶ Only use the automatic setting of the number of cells for batteries with the following nominal voltage values: 12 V and 24 V for 24 V devices, 24 V and 48 V for 48 V devices.
- ▶ Do not use the automatic setting of the number of cells on deeply discharged batteries.

- Further settings:
For individual adjustment of the charging characteristic.

Additional functions: Additional functions

General options: General settings

Reset Settings

Entering the configuration mode

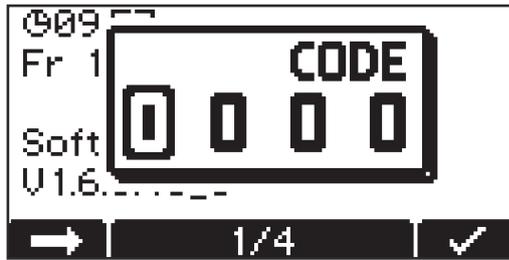


First, the screen appears in the basic settings with display of date and time, as well as the software version.

- 1 Use the "Up/Down" buttons to call up the following information:
 - Device serial number as well as serial number and version of the configuration memory.
 - PC board for control/power electronics: Hardware version and serial number.
 - Software: Main software, secondary software, primary software, and curve block version.

Enter the configuration menu as follows:

- 1 Press the "Pause/Start" button.

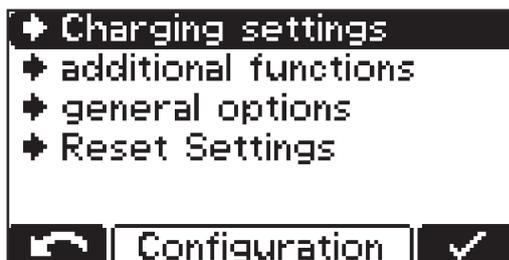


A prompt for the code appears.

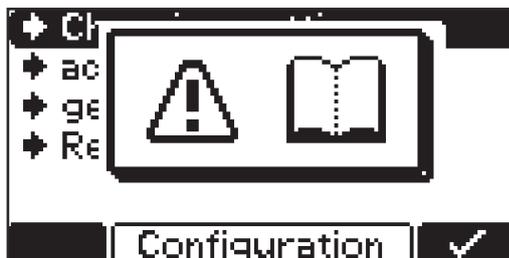


Enter the required code "1511" as follows:

- 1 Use the "Up/Down" buttons to enter the first digit of the code.
- 2 Press the "Menu" button to move to the next digit of the code.
- 3 Continue as described above until the complete code is entered.
- 4 Confirm entry with the "Pause/Start" button.



The selection of the main menu items for configuration mode appears.



When selecting a menu item, you may be prompted to read the Operating Instructions. Confirm this prompt by pressing the "Pause/Start" button again.

Navigate through the configuration menu and its submenus as follows:

- 1 Use the "Up/Down" buttons to select the desired menu item.
- 2 Press the "Pause/Start" button to confirm the menu item and confirm any confirmation prompts (e.g., "OK?") again.
- 3 If necessary, use the "Up/Down" buttons to make a selection, e.g., "Off/On" or enter a value.
- 4 Press the "Pause/Start" button to confirm the entry.
- 5 If the cursor moves to the next setting or digit after confirming, proceed again as described in points (3) and (4)

To exit the current menu:

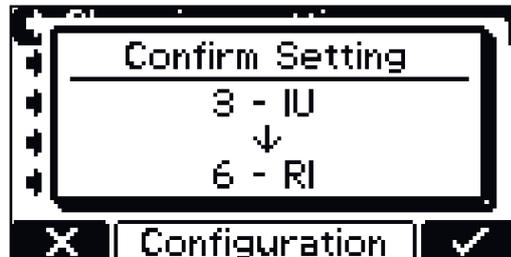
- 6 Press the "Menu" button to return to the higher-level selection.

Exiting configuration mode

If one or more relevant settings for the charging process are changed in configuration mode, another prompt appears when exiting configuration mode, asking whether the setting in question should be applied.

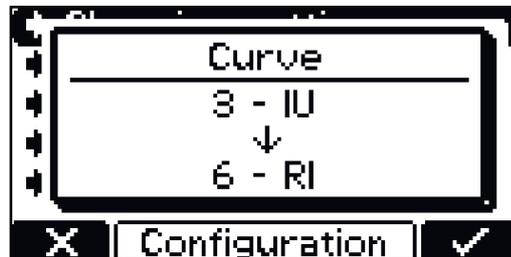
The following settings must be confirmed when exiting configuration mode:

- Curve
- Battery capacity in Ah (RI curve excluded)
- Number of cells
- Equalizing charge ON/OFF
- CAN protocol



Example:

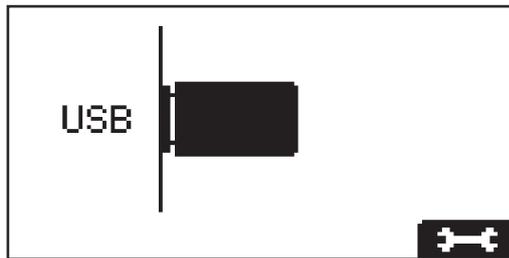
Change to the curve from 3 - IUI (Pb-WET) to 6 - RI (Pb-WET).



If the setting is not confirmed, the battery charger returns to configuration mode and the setting can be changed to the desired value.

USB mode in configuration mode

USB mode



In USB mode, the display shows whether a USB thumb drive is plugged in.

The USB thumb drive must meet the following specifications:

- Formatting: FAT32
- 32 Gigabyte maximum
- No multiple partitioning

The **I-SPoT-VIEWER** software (www.fronius.com/i-spot) supports the visualization and evaluation of the data on the USB thumb drive.

To start a data download, confirm this again with the "Pause/Start" button. If this repeated confirmation with the "Pause/Start" button is not carried out, the download starts automatically after one minute.

While a charging process is in progress, the USB thumb drive may be connected after pressing the "Pause/Start" button. It is only possible to read data and not to perform an update or load a configuration.

Safely remove

- Safely remove the USB thumb drive once the desired action is complete.

Update

- A list of suitable update files stored on the USB thumb drive opens.
- The desired file is selected and confirmed in the same way as scrolling through the settings.
- Do not rename the automatically assigned file name of the update file!
- The latest firmware is available in the **download area** of the Fronius website.
- Firmware installation instructions are included in the zip file of the download.

Download

- The data of the logged charging parameters stored in the datalogger of the device are saved for the I-SPoT VIEWER on the USB thumb drive.
- Events as well as device settings and user curves (configuration) are also saved.
- The following time ranges can be selected for the data logger:
 - 1 month
 - 3 months
 - All
 - Since last time

Download optional

The following options are available:

- I-SPoT VIEWER
The logged data is saved in the same way as for the "Download", but only with the data for the I-SPoT VIEWER.
- Save data logger
The logged data is saved in the same way as for the "Download", but as "csv" files rather than in the I-SPoT VIEWER format.
(Automatically created folder structure for the ".csv" files: *
Fronius\- Save events.
Events are saved on the USB thumb drive.
- Save configuration.
The device settings are saved on the USB thumb drive.

Load configuration

- Loads a suitable device configuration stored on the USB thumb drive into the device.

Load dealer text

- Here a text file can be loaded from the USB thumb drive, which is displayed as soon as the device is in an error state.
 - The text file can contain the contact details of the distributor, for example.
 - The file must be saved on the USB thumb drive in the ".txt" format in "unicode".
 - The file name must be "dealer.txt".
 - The number of characters is limited to 99.
- * If a USB thumb drive is plugged in during charging, the csv files are saved directly on the USB thumb drive. The folder structure, which is also created automatically, contains the "Datalog" folder instead of the "Charges" folder.

Charging settings in configuration mode

Overview of charging settings

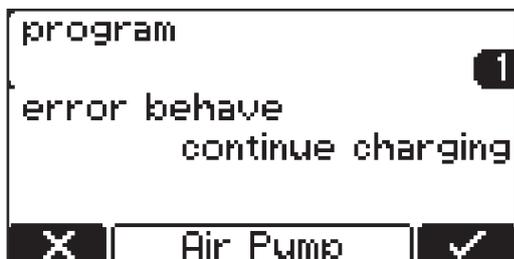
Below is a detailed explanation of the "Settings" menu item, selected under the aforementioned "Charging settings" menu item. Navigation is carried out as described in the [Configuration mode](#) section.

A list appears with the following selection options:



The individual selection options are explained in detail below.

Electrolyte circulation



Electrolyte circulation "Air Pump"(not available with the Selectiva 220 V version):

The sequential control of the electrolyte circulation takes place via the battery charger control unit. Several selection options are available for this purpose.

The following settings are available for the electrolyte circulation:

Off

- Electrolyte circulation switched off.

Continuous

- Electrolyte circulation constantly switched on.

Program 1 to 5

- Factory-set programs for the electrolyte circulation and their relevant parameters can be found in the table in the "Settings" section of the "Display" chapter.

Automatic

- Automatic adjustment of the flow rate of the electrolyte circulation based on the set battery parameters.

User "On"/"Off"

- Individual setting for the electrolyte circulation.
- The "On" and "Off" settings determine the pulse/pause ratio of the airflow intervals.

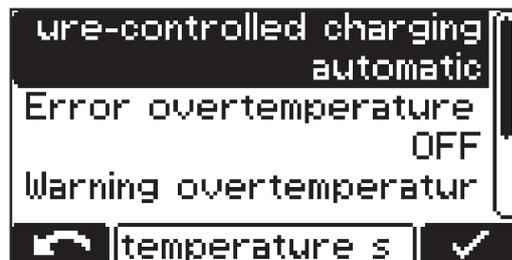
Factory-set programs for the electrolyte circulation and the relevant parameters are shown in the table below:

Program	ON 1	OFF 1	Repeat	ON 2	OFF 2
1	30 min	25 min	1 x	5 min	25 min
2	3 min	10 min	4 x	3 min	20 min
3	3 min	12 min	1 x	3 min	12 min
4	5 min	10 min	3 x	5 min	20 min
5	2,5 min	7,5 min	1 x	2,5 min	7,5 min

In each of these programs, the solenoid valve picks up for an "ON 1" time and drops out for an "OFF 1" time. This process repeats as many times as specified for "Repeat". After this number of repetitions has elapsed, the "ON 2" and "OFF 2" times continue until the end of charging.

Temperature-controlled charging

Temperature-controlled charging:



The following settings are available for temperature-controlled charging:

automatic/OFF/required

- automatic ... Temperature-dependent adjustment of the charging curve.
- OFF ... The measured battery temperature is not taken into account.
- required ... Charging only starts when the temperature sensor is connected.

Error overtemperature ON/OFF

- ON ... An error message is output in the event of a battery overtemperature. The charging process stops and can only be continued after the battery has cooled down and been reconnected.
- OFF ... No error message in the event of a battery overtemperature.

Warning overtemperature ON/OFF

- ON ... A warning is output in the event of a battery overtemperature.
- OFF ... No warning in the event of a battery overtemperature.

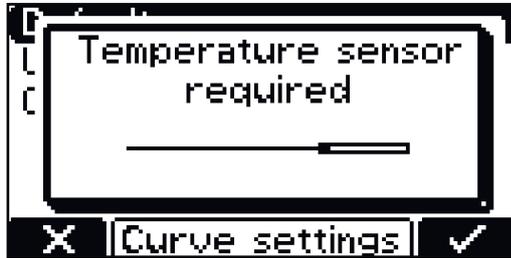
For certain curves, an external temperature sensor is required. If such a curve is selected in configuration mode, a message is displayed indicating that an external temperature sensor is required.

The following curves require an external temperature sensor:

- 28 - FCC IUI - CSM WET
- 30 - FCC IUI - WET



If a curve is selected that requires an external temperature sensor, a message appears.



1 Confirm the message by pressing the "Pause/Start" button.

Equalizing charge

Equalizing charge

OFF

- No equalizing charge takes place.

Delay

- If the battery remains connected to the battery charger for the duration of the set equalising charge delay, a special form of charging takes place. This prevents acid stratification.
- The parameters for current (amperes/100 ampere hours), voltage (volts/cell), and duration of the equalizing charge can be changed.

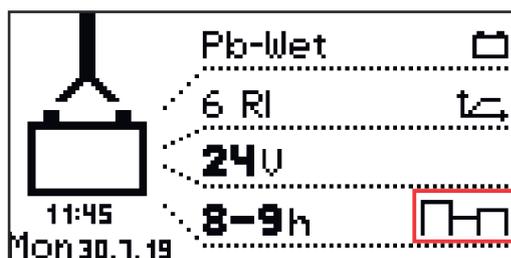
Weekday

- Specification of the day of the week on which the equalizing charge is to take place.
- The parameters for current (amperes/100 ampere hours), voltage (volts/cell), and duration of the equalizing charge can be changed.

Manual

- An equalizing charge can be activated manually by pressing a button on the display.
- The equalizing charge starts after the set delay with the set parameters.
- The parameters for current (amperes/100 ampere hours), voltage (volts/cell), and duration of the equalizing charge can be changed.
- This function is only available for Pb-WET curves.

If a setting for the equalizing charge is activated, a symbol next to the set ampere hours/the set charging time in the home screen indicates whether the equalizing charge is being carried out or can be started.



Delay

Delay

Charge start delay

- Delay time (minutes) between the activation time of the charge start and the actual charge start.

Charge end delay

- Delay time (minutes) between the signaled charge end (e.g., green indicator) and the actual charge end.

at mains failure restart charging

- If this option is activated, the charging process is automatically restarted after a fault in the electrical grid as soon as the electrical grid is available again.

at mains failure

- Restart charging
- Automatic/continue charging

If the "Restart charging" option is activated, the charging process is automatically restarted after a fault in the electrical grid as soon as the electrical grid is available again.

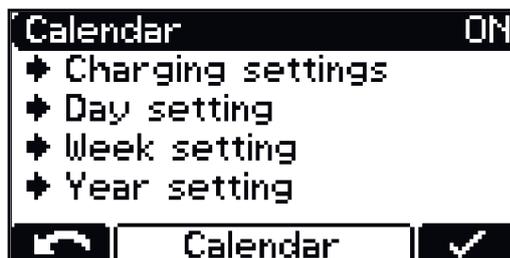
If the "Automatic/continue charging" option is activated, the charging process is automatically continued after a fault in the electrical grid as soon as the electrical grid is available again.

Calendar

calendar

The calendar function enables charging to be started automatically according to the following criteria:

- Time window within which charging should not be started when a battery is connected.
- Time window within which a defined curve 1 should be started when a battery is connected.
- Time window within which a defined curve 2 should be started when a battery is connected.



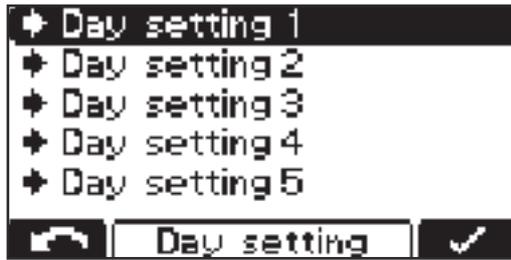
- 1** To activate the calendar function, select and confirm the "ON" setting.



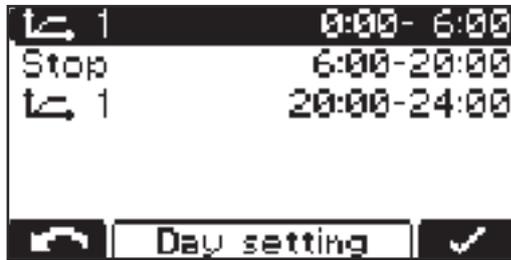
"Charging settings" menu item:

- Type of battery for all curves: e.g. Pb-WET.
- Curve settings when the corresponding curve is selected.

Further settings are possible within the calendar function:



"Day setting 1-5":
The day settings allow up to 5 different charge start time profiles to be defined, with the following setting options:

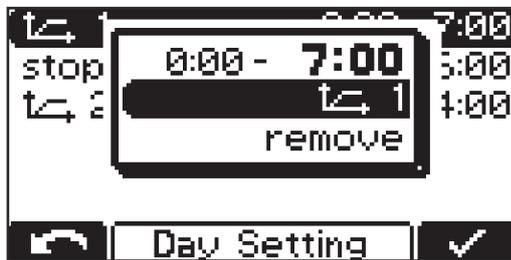


- Symbol for curve 1:
Time window within which curve 1 should be started (e.g.: 0:00–6:00)
- Stop:
Time window within which no charging should take place (e.g.: 6:00–20:00)
- Symbol for curve 1:
Time window within which curve 1 should be started (e.g.: 20:00–24:00)

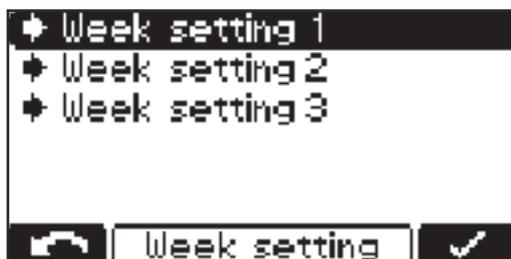
NOTE!

Ongoing charges are not influenced by the set time windows.

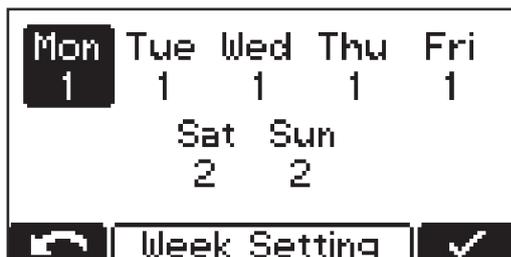
- ▶ If a battery is connected at 05:45 in the above example, charging is stopped when necessary and is not interrupted by the specified charge end time (6:00 in the example) of the set time window.
- ▶ If the battery is connected within the stop time window, charging will start automatically in the next time window. If a manual charge start is triggered during the stop time window, charging always takes place with curve 1.



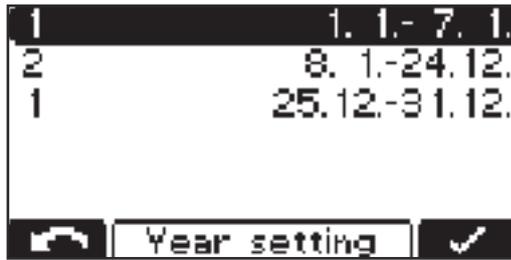
- Additional setting options:
- Change the assigned curve: curve symbol.
 - Remove the curve in question: "remove".



"Week setting":
- It is possible to configure 3 different week settings.

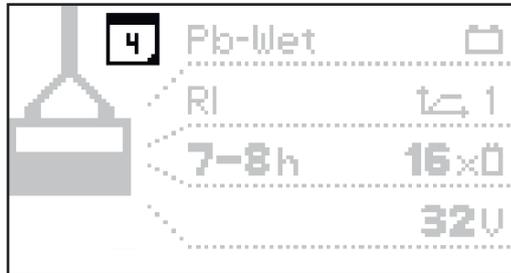


Each day of the week can be assigned one of the previously created day settings.



"Year setting":

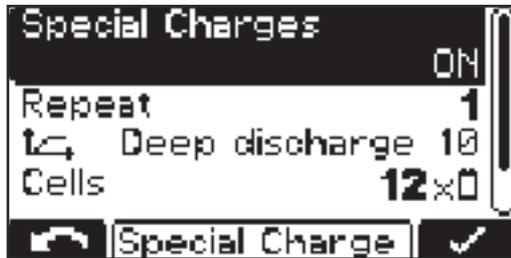
- It is possible to assign a week setting to several calendar periods (e.g., 1.1.-7.1.).



When the calendar function is activated, a calendar symbol (here with the number "4" as the current date) appears in the display.

Special charges

Special Charges



The "Special Charges" selection allows you to temporarily carry out one or more charges that differ from the usual type of charge.

The "Repeat" setting defines how often the special charge is to be carried out until charging is permanently resumed with the original charge parameters:

Setting range

- 1 to 99 repetitions

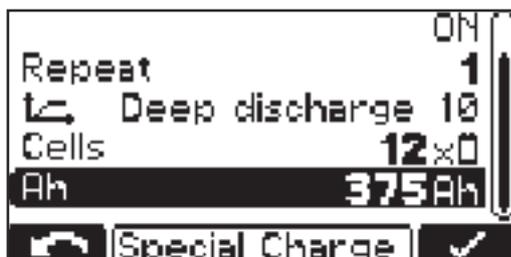
Disable Start Button

ON

- It is not possible to start the charging process using the "Pause/Start" button, which prevents unauthorized access, for example.

OFF

- It is possible to start the charging process using the "Pause/Start" button.

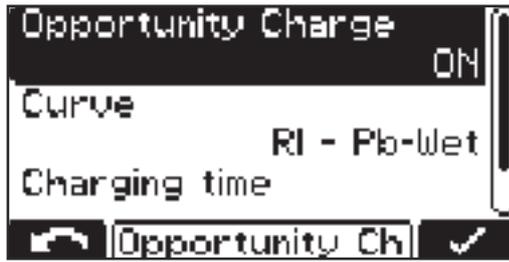


The following settings are also possible:

- Curve:
e.g. "Deep discharge 10"
- "Cells" - e.g. 12x
- Battery capacity in Ah:
e.g. 375 Ah

**Special function
- opportunity
charging**

Special function - Opportunity Charge



In order to extend the operating interval of the battery, it is possible, for example, to recharge the battery during a break in operation.



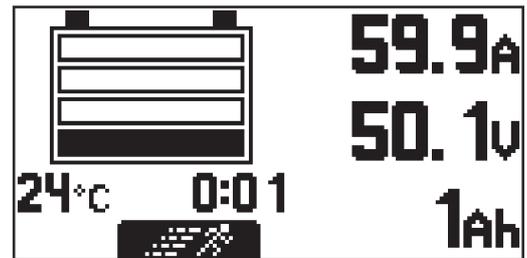
The following curve settings are possible:

- "Curve" - e.g. RI - Pb-WET
- "Charging time" - e.g. 5-6 h

With opportunity charge set to "ON" and the battery connected, the following display appears:



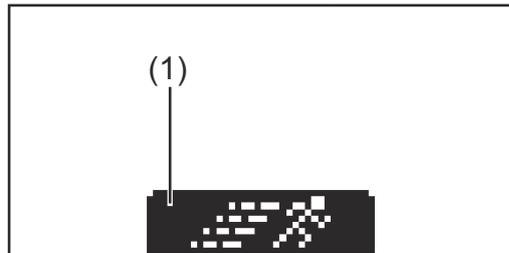
Display when RI curve is selected



Display for other curves (e.g. IUI)

Start opportunity charge:

- Select the "Runner symbol" (1) with the "Up" button.



Runner symbol (1)



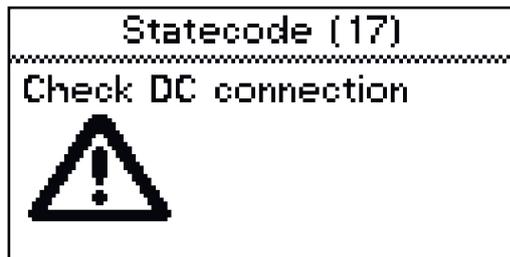
Display at start of opportunity charge

DC-Connection

DC-Connection:



The Check DC-Connection setting is located in the DC Connection menu. If Check DC-connection is switched on ("ON"), the connection between the battery charger and the battery is checked during the charging process.



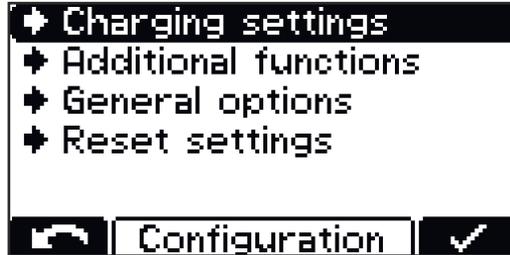
If problems occur with the DC-Connection during the charging process, status code 17 is set when Check DC-Connection is active.

A connection problem can occur, for example, if the charging contacts are worn or dirty.

Additional functions in configuration mode

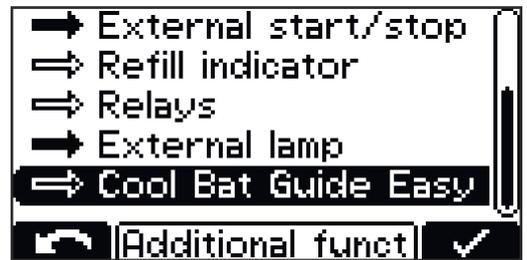
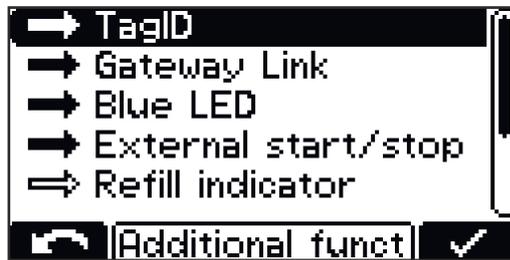
Overview of additional functions

Detailed explanation of the ("Additional Functions") menu item in configuration mode. Navigation is carried out as described in the "Configuration mode" section.



1 Select the ("Additional Functions") menu item.

A list appears with the following selection options, which represents an active function with a filled arrow:



The individual selection options are explained in detail below:

TagID

Detailed information can be found in the chapter "Overview of available options" and the accompanying user information.

Gateway Link

Detailed information can be found in the chapter "Overview of available options" and the accompanying user information.

Setting for the "Blue LED" indicator

Setting for the time (minutes) after which the blue "Battery cold" indicator should light up to indicate that the battery is sufficiently cooled down. The set value is the time from the charge end.

In conjunction with the "Temperature-controlled charging" option, it is possible to set a temperature value below which the blue "Battery cold" indicator should light up to indicate that the battery is sufficiently cooled down.

**External start/
stop**

External start/stop	
	Normal
Start	OFF
Stop	OFF
Contact detection	ON

← External start/stop ✓

The following settings are available for external start/stop:

Button

- The function of the "Pause/Start" button can be simulated by means of an external button.

Normal

- Start ON:
Charging starts when an external switch is closed and a battery is detected or when the charging plug is connected by closing the auxiliary contacts and a battery is detected.
- Start OFF:
Charging starts when a battery is connected.
- Stop ON:
Charging is interrupted when an external switch is opened or when the charging plug is disconnected by opening the auxiliary contacts.
- Stop OFF:
The opening of an external switch or the auxiliary contacts is ignored.

Contact detection

- ON:
If a battery is connected when "Start ON" is set and the external start/stop contact is not closed, the status code (16) "External start/stop is not closed" appears.
If charging has been started when "Stop ON" is set, the external start/stop contact is opened and the battery is not fully charged, and the status code (16) "External start/stop is not closed" appears.
- OFF:
Contact detection is not executed.

Refill indicator

The refill indicator is activated as soon as it is necessary to add distilled water to the battery. The time of the refill request can be defined as follows:

Every x-th week and weekday

- e.g. refill water every 2nd week on Friday

When "OFF" is set, the refill request does not have to be confirmed.

Relay board

Relays	
➔ 1	Cumulative error
➔ 2	Charge Finish
➔ 3	Charging
➔ 4	Aquamatic

← Relays ✓

Under Relay board, one of the following functionalities can be set for each of the 4 terminals, viewed from left to right:

Aquamatic control

- Signal, e.g. for actuating a solenoid valve
- "Standard" program with settings pre-configured at the factory
- "User" program with user-defined setting options
- For more information on the Aquamatic control, see the "Aquamatic control" section of the "Options" chapter.

Charging

Charge 50%

Charge 80%

Charge Finish

Main Charge Finished

- Signal when main charging phase is finished

Charge Not Complete

- Signal if the battery is prematurely disconnected from the battery charger
- Can be set from 1 to 10 s

Charge OK

- Battery is being charged or is already fully charged

Common Error

- Signal in the event of an error
- A power failure can be displayed as an error ("ON" setting).
- If the device is in an error state, a freely defined text can be displayed, which can contain the contact details of the distributor, for example. Detailed information can be found in the "USB mode" section.

Common Error + Warning

- In the same way as the "Common Error" function, the corresponding relay picks up as soon as an error or warning is present.

Signal Lamp

- It is possible to connect one or more suitable lamps to the relay board to indicate the state of charge or the operating status of the battery charger.
- Detailed information can be found in the "Signal lamp" section of the "Options" chapter.

Immobilizer Device

ON

- The relay picks up continuously as soon as the battery charger is connected to the grid.

Refill Indicator

- Indicates that it is necessary to refill the battery with distilled water.
- Detailed information can be found in the "Additional functions" section of the "Display" chapter.

Battery Cold

External Air Pump

- The settings are made as explained in section "-> Settings" for "Air Pump".

Detailed information on the relay board can be found in the "Options" chapter.

Setting for external indicator

According to the "Charging lights" section of the "Options" chapter, suitable external indicators can be connected in order to visualize the state of charge or the operating status of the battery charger. The following settings are available:

- Normal (conventional external indicators)
 - RGB (LED strips)
-

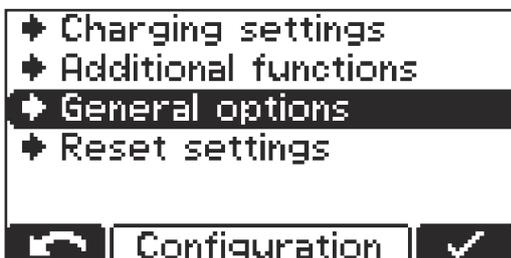
Cool Bat Guide Easy

Detailed information can be found in the chapter "Overview of available options".

General settings in configuration mode

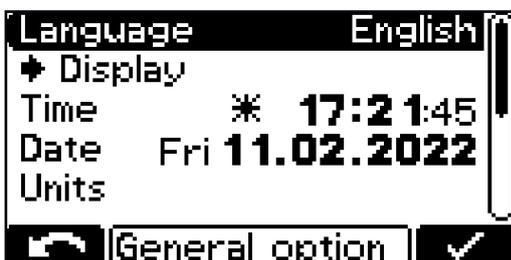
Overview of general settings

Detailed explanation of the "General options" menu item in configuration mode.



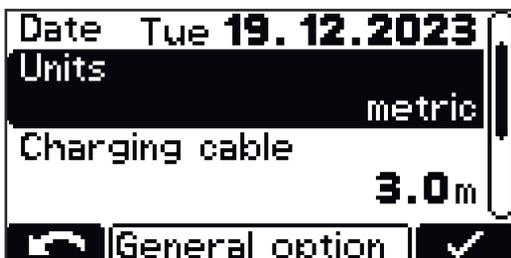
- 1 Select the "General options" menu item.

A list appears with the following selection options:



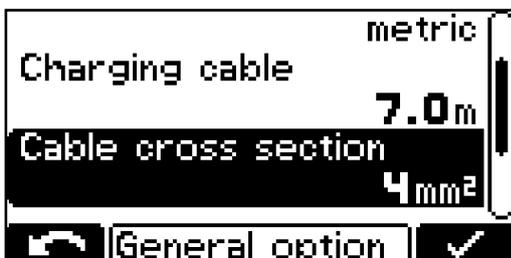
- Language
- Display settings
 - Contrast
 - LED brightness
 - Show Ah at charge end ON/OFF
- Time and Date
 - Daylight saving time/standard time
 - Predefined time zones
 - User-defined time zones
- Units:
 - metric / imperial

Unit



- Setting the units to be displayed (metric / imperial).

Charging cable settings



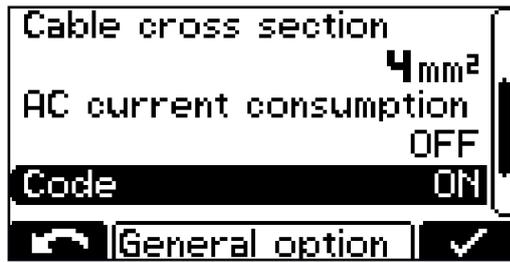
Charging cable:

- Simple length of the charging cable (m / ft)

Cable cross section:

- Cross section of the charging cable (mm² / AWG)

AC current limitation



- Adaptation of the maximum device current to the electrical installation on site, or to the device plug which has been installed on the device.

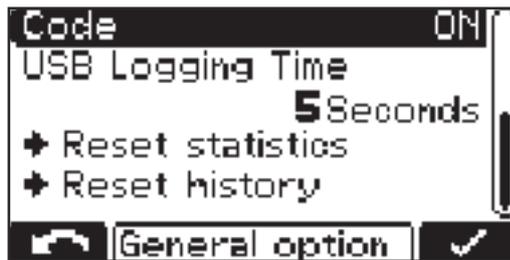


- The minimum and maximum values differ for the different device classes. The minimum value is approx. 25% of the maximum nominal current of the device concerned.

Code

Code entry required/not required to enter configuration mode ("Code ON/OFF")

USB time interval



- Time interval for the charging parameters logged on the USB thumb drive (s) ("USB Logging Time")

Reset statistics

Reset history

Detailed information regarding statistics and history can be found in the "Statistics mode" and "History mode" sections.

Resetting settings

Resetting settings

The menu item offers 2 possibilities to reset all settings made:



Reset Factory Settings:

- Reset the settings made to the factory settings.

Reset Default Settings:

- Resetting the settings made to the manufacturer's default settings.

Overview of available options

Safety

The housing has to be partially opened to connect the options.

WARNING!

Danger of electric shock.

This may result in serious injuries or death.

- ▶ The housing must never be opened by anyone other than a service technician trained by the manufacturer.
 - ▶ Before working with the housing open, the device must be disconnected from the grid.
 - ▶ A suitable measuring device must be used to ensure that electrically charged components (e.g., capacitors) are completely discharged.
 - ▶ With the aid of a clearly legible, understandable warning sign, ensure that the device remains disconnected from the grid until all work has been completed.
-

WARNING!

Danger due to work that is not carried out properly.

This can result in severe personal injury and damage to property.

- ▶ All work involved with connecting optional components must only be carried out by service technicians trained by the manufacturer.
 - ▶ If there are Installation Instructions or User Information for the optional component concerned, then all warning notices and instructions therein must be obeyed.
 - ▶ For all options with electrical connections, a safety inspection must be carried out in accordance with the applicable national and international standards and guidelines after connection work has been carried out.
 - ▶ You can obtain more information about the safety inspection from the authorized service body.
 - ▶ The service body will provide the necessary documents upon request.
-

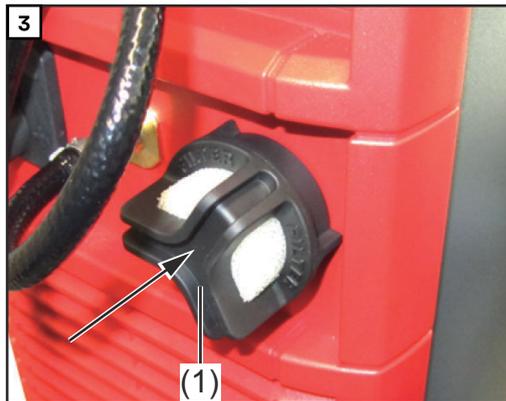
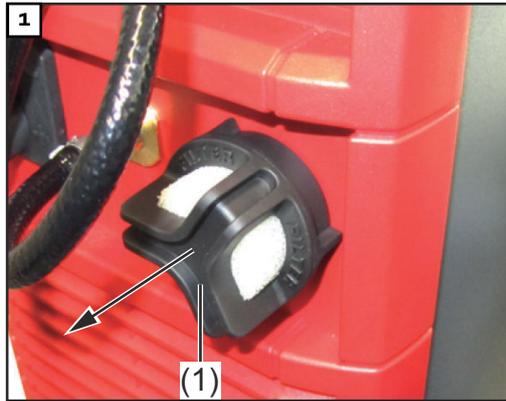
Electrolyte circulation (not available with Selectiva 3x220 16 kW variants)

The electrolyte circulation option has an air pump integrated into the battery charger. This delivers air into the battery via specially designed capillary tubes. This results in an intensive mixing of the electrolyte. The benefit is reduced battery heating, a longer battery life, and less water loss during charging.

The sequential control of the electrolyte circulation takes place via the battery charger control unit. Several selection options are available in the configuration menu for this purpose. Detailed information can be found in the [Overview of additional functions](#) section of the "Display" chapter.

Cleaning the air filter insert

Clean the air filter insert for the integrated air pump once a year. If there is a lot of dust, shorten the cleaning interval accordingly. It is necessary to remove the air filter insert (2) for cleaning purposes. Remove the air filter (1) by pulling it off and then reinstall it as follows:



External start/stop

The external start/stop option prevents spark formation at the charging plug if it is disconnected during charging. Special contacts inside the charging plug register a disconnection. These contacts are leading in comparison to the main contacts. An immediate charging stop is triggered. There is therefore no wear on the main contacts and the level of safety against oxyhydrogen ignition is increased.

Temperature-controlled charging

The temperature-controlled charging option continuously regulates the charging voltage according to the current battery temperature. This significantly extends the battery-life, especially when used in cold rooms.

Relay board

WARNING!

Risk of Electric Shock!
Do not operate at circuits more than 250V to ground!

0... 30V	DC/4A	C Common
0... 250V	AC/4A	NC Normally Closed
		NO Normally Opened
		L Line
		N Neutral Wire

Use Copper Conductors Only!

①

②

③

④

42.0499.0108

The optional relay board enables the external evaluation of the battery charger's operating states and the state of charge of the connected battery. It is also possible to supply one or more external loads with input voltage L-N. This requires an existing neutral conductor in the electrical network.

Enclosed is an overview of options directly related to the relay board. These relay board-specific options are controlled via the outputs of the relay board:

- Aquamatic control
- Charging
- Charge 50%
- Charge 80%
- Charge Finish
- Main Charge Finished
- Charge OK
- Charge Not Complete
- Signal if the battery is prematurely disconnected from the battery charger
- Common Error
- Common Error + Warning
- Signal Lamp
- Immobilizer Device
- ON
- Refill Indicator
- Battery Cooled
- External Air Pump (Electrolyte Circulation)

An explanation of the configuration for the outputs of the relay board can be found in the Operating Instructions for the battery charger: Chapter "Additional functions in configuration Mode" of the section [Overview of additional functions](#).

Wall and floor bracket	The robust wall and floor bracket ensures safe installation at the place of use. Detailed information can be found in the corresponding Installation Instructions.
LED strip	The LED strip serves as a status indicator and lights up in the corresponding colors in the same way as the display elements of the control panel. An LED strip including diffuser is installed in the gap between the front wall of the housing and the upper part of the housing.
Protection class 23	The protection class 23 option increases the protection class of the device from protection class 20 to protection class 23. Detailed information can be found in the corresponding User Information.
Air filter	In dusty environments, the air filter prevents contamination of the inside of the device. This prevents any reduction in performance or other impairment of the device. Detailed information can be found in the corresponding User Information. Cleaning interval as required (manufacturer's recommendation: monthly)
"Mobile" set	A carrying strap in combination with a handle tube increases the mobility of the device. The "Mobile" set is not available for devices in the 18 kW power category.

Remote control system The remote control system allows full operation of the device from a distance of up to 30 m (98 ft., 5.1 in.). This option includes a complete control panel in an aluminum housing.

Cool Bat Guide Easy The Cool Battery Guide Easy system indicates which battery has been connected for the longest and coolest via a blue LED strip.

Gateway The gateway is the link between the battery charger and Charge&Connect. Detailed information can be found in the corresponding User Information.

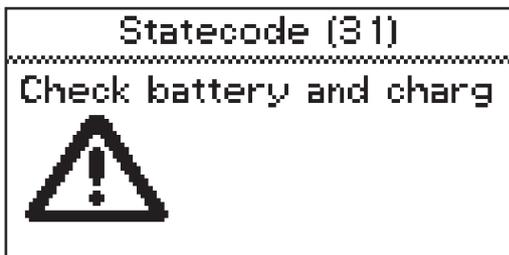
Gateway Link The Gateway Link enables the easy connection of the gateway to the battery charger. The gateway can be connected without opening the battery charger.

TagID The TagID is an electronic measurement and control system that exchanges battery data with the battery charger and optimizes charging.

TagID Link The TagID Link enables the exchange of relevant battery data between the TagID and the battery charger.

Status codes

Status codes



If a fault occurs during operation, specific status codes may be displayed. This can be caused by the following:

- Battery error
- A battery with an unsuitable voltage has been connected.
- The device has overheated.
- A software or hardware error has occurred.

Battery error:

If the battery reports an error state, the battery charger will display this error as a battery error including the corresponding error number of the battery. The respective error explanation can be found in the Operating Instructions for the battery.

If an error message appears on the display and the error cannot be rectified independently:

- 1 Note down the displayed status code: e.g., "Statecode (31)".
- 2 Note the configuration of the device.
- 3 Contact your authorized Service Partner.
If the device is in an error state, a freely defined text can be displayed, which can contain the contact details of the distributor, for example.

Status codes with an external cause

No.	Cause/Remedy
(11)	Check mains voltage
(12)	Check grid (phase failure)
(13)	External temperature sensor defective
(14)	Electrolyte circulation defective (pressure switch does not switch)
(15)	No control voltage detected
(16)	External start/stop is not closed.
(17)	Open circuit detection triggered several times during a charge (e.g., worn charging contacts)

Status codes in the event of a battery fault

No.	Cause/Remedy
(22)	Battery undervoltage
(23)	Battery overvoltage

(24)	Battery too hot (only with external temperature sensor)
(25)	Battery undertemperature (only with external temperature sensor)
(26)	Cell defect detected
(27)	Battery not supported
(28)	Battery heavily discharged - safety charge in progress
(29)	Incorrect battery polarity
(30)	Thermal runaway

Status codes in the event of a charging error

No.	Cause/Remedy
(31)	Time exceeded in the I1 phase
(32)	Time exceeded in the U1 phase
(33)	Battery overvoltage in the I2 phase
(34)	Ah exceeded
(35)	Time exceeded in the I2 phase
(36)	Target voltage in the I2 phase not reached (only with format characteristic)
(37)	RI charge error
(38)	Set charging time cannot be reached
(39)	Time exceeded during RI charge

Status codes in the event of a CAN error (battery)

No.	Cause/Remedy
(51)	Battery not responding
(52)	Battery data cannot be queried
(53)	Battery voltage not supported
(54)	Communication error
(55)	Battery error
(56)	Battery does not switch on
(57)	Message time limit exceeded
(58)	Login failed

Status codes in the event of a gateway error

No.	Cause/Remedy
-----	--------------

- | | |
|-------|---|
| (101) | CAN Connect setting is active and no CAN connection could be established to the gateway for at least 2 minutes. |
| (102) | Gateway has no connection to the back-end. |
| (103) | Gateway is online but has no charger or another charger registered. |

Status codes in the event of a TagID error

No.	Cause/Remedy
-----	--------------

- | | |
|-------|---|
| (200) | Set technology on the battery charger is not compatible with the connected battery. |
| (201) | The nominal voltage of the battery is not supported by the battery charger or is prevented by a battery charger setting |
| (202) | The battery charger power is not high enough to charge the connected battery |
| (203) | CAN communication to TagID could not be established |
| (204) | TagID data could not be read |
| (205) | TagID update could not be performed |
| (206) | TagID temperature sensor is defective |
| (207) | TagID voltage sensor is defective |
| (208) | Battery master data of the TagID is invalid or not available |
| (209) | Defective EEPROM memory |
| (210) | Defective flash memory |
| (211) | Invalid device signature |
| (212) | TagID data could not be written |
| (213) | The charger power is not sufficient to charge the battery in the desired charging time |
| (214) | Too much power dissipation on the DC path |
| (215) | TagID level sensor is mounted in the wrong cell or is defective |
| (216) | TagID software crash |

Status codes in the event of an error in the primary circuit

No.	Cause/Remedy
-----	--------------

- | | |
|-------|--|
| (500) | Temperature sensor module 1 (top) defective |
| (501) | Temperature sensor module 2 (bottom) defective |
| (502) | Temperature sensor PCB defective |
| (503) | Primary overtemperature |

(504)	Fan blocked/defective
(505)	Over-/undervoltage in intermediate circuit
(506)	Asymmetry in intermediate circuit
(507)	Primary supply voltage out of tolerance
(508)	Grid failure
(509)	Incorrect device configuration
(510)	Primary EEPROM faulty
(527)	Phaseshifter overcurrent
(528)	High charge relay switched off during load operation
(530)	Communication problem
(532)	Microcontroller error (e.g., division by 0)
(533)	Reference voltage out of tolerance
(534)	Startup problem
(535)	PFC overcurrent
(536)	Phaseshifter or PFC faulty

Status codes in the event of an error in the secondary circuit

No.	Cause/Remedy
(520)	Secondary temperature sensor defective
(521)	Secondary overtemperature
(522)	Output fuse defective
(523)	Secondary supply voltage out of tolerance
(524)	Secondary reference voltage out of tolerance
(525)	Current offset
(526)	Current offset out of tolerance
(527)	Power module overcurrent (primary)
(529)	No secondary communication
(530)	No primary communication
(531)	Secondary EEPROM defective
(532)	Microcontroller error
(537)	Voltage measurement faulty
(570)	Secondary relay cannot be switched
(571)	ADC/SPI problem

Status codes in the event of an error in the control system

No.	Cause/Remedy
(540)	Configuration memory block missing/defective
(541)	No secondary communication
(542)	Secondary Init failed
(543)	Program/memory error in the characteristic control
(544)	Program/memory error in the characteristic control
(545)	Primary Init failed
(546)	Update failed
(547)	Load/save settings failed
(548)	Load/save characteristic settings failed
(549)	Charge could not be continued after a grid failure
(550)	Time not set
(551)	Hardware change detected
(552)	Configuration memory block invalid
(553)	Primary update failed
(554)	Communication faulty
(555)	Incorrect device software
(557)	Interruption of the InterLock communication
(558)	The second device, which is connected via the InterLock, has an error
(559)	The second device, which is connected via the InterLock option, is incompatible with this device

Technical data

Selectiva 8 kW
400 V

WARNING!

Danger of electric shock due to a residual current can be fatal.

Only use a type B residual current circuit breaker for the mains connection of the device.

Mains voltage (-10%/+30%) ¹⁾ Optional:	3~ NPE 400 V / 50/60 Hz 3~ PE 400 V / 50/60 Hz
Mains fuse ²⁾	16 A
Minimum mains lead cross section	2.5 mm ² (0.003875 in. ²)
Duty cycle	100%
EMC emission class	B
Safety class	I
Max. permitted grid impedance Z_{\max} on PCC ³⁾	None
Protection class ⁴⁾	Protection class 20
Overvoltage category	III
Operating temperature ⁵⁾	-20°C to +40°C (-4°F to 104°F)
Storage temperature	-25°C to +80°C (-13°F to 176°F)
Relative humidity	max. 85%
Maximum altitude above sea level	2000 m (6561 ft)
Mark of conformity	According to rating plate
Product standard	EN 62477-1
Dimensions L x W x H	633 x 180 x 344 mm (24.92 x 7.09 x 13.54 in)
Weight (with standard grid and charging cable)	23 kg (50.71 lbs.)
Pollution degree	3

- 1) The device may be operated on grids that are grounded at the neutral point with a maximum outer conductor nominal voltage of 400 V. A mains voltage tolerance L-N of 207 V to 250 V applies to the electrolyte circulation and relay board options.
- 2) Only use a type B residual current circuit breaker for the mains connection of the device.
If the device is protected with a 32 A fuse, the thermal rating of the automatic circuit breaker must not exceed 82,000 A²s.
The leakage current to ground is less than 3.5 mA.
- 3) Interface to a 230/400 V and 50 Hz public grid.
- 4) For indoor use only, must not be exposed to rain or snow.

- 5) At a high ambient temperature, a power reduction may occur (power de-rating).

Device-specific data				
Device	Max. AC current	Max. AC power	Nominal voltage	Max. charging current
2100 8 kW	6.7 A	3860 W	24 V	100 A
2120 8 kW	7.8 A	4590 W	24 V	120 A
2140 8 kW	9.0 A	5350 W	24 V	140 A
2160 8 kW	10.1 A	6090 W	24 V	160 A
2180 8 kW	11.2 A	6860 W	24 V	180 A
2200 8 kW	12.3 A	7610 W	24 V	200 A
2225 8 kW	13.7 A	8560 W	24 V	225 A
4060 8 kW	7.3 A	4610 W	48 V	60 A
4075 8 kW	9.0 A	5710 W	48 V	75 A
4090 8 kW	10.6 A	6820 W	48 V	90 A
4090A 8 kW	10.4 A	6810 W	48 V	90 A
4120 8 kW	13.8 A	9050 W	48 V	120 A
4120A 8 kW	13.7 A	9040 W	48 V	120 A
4140 8 kW	14.4 A	9340 W	48 V	140 A
4140A 8 kW	14.3 A	9280 W	48 V	140 A
4160 8 kW	14.5 A	9390 W	48 V	160 A
4160A 8 kW	14.4 A	9370 W	48 V	160 A
4185 8 kW	15.3 A	9950 W	48 V	185 A
8040 8 kW	8.2 A	5000 W	80 V	40 A
8060 8 kW	12.0 A	7440 W	80 V	60 A
8060A 8 kW	11.8 A	7440 W	80 V	60 A
8075 8 kW	14.1 A	9110 W	80 V	75 A
8075A 8 kW	14.0 A	9110 W	80 V	75 A
8090 8 kW	14.2 A	9210 W	80 V	90 A
8090A 8 kW	14.1 A	9190 W	80 V	90 A
8110 8 kW	15.1 A	9740 W	80 V	110 A

**Selectiva 16 kW
220 V**

⚠ WARNING!

Danger of electric shock due to a residual current can be fatal.

Only use a type B residual current circuit breaker for the mains connection of the device.

Mains voltage (-10%/+30%) ¹⁾ Optional:	3~ NPE 220 V / 50/60 Hz 3~ PE 220 V / 50/60 Hz
Mains fuse ²⁾	32 A
Minimum cross-section of the mains lead Selectiva 4120 Selectiva 4140/4160	4 mm ² (0.0062 in. ²) 6 mm ² (0.0093 in. ²)
Duty cycle	100%
EMC emission class	B
Safety class	I
Max. permitted grid impedance Z_{max} on PCC ³⁾	According to the "Device-specific data" table below
Protection class ⁴⁾	Protection class 20
Oversvoltage category	III
Operating temperature ⁵⁾	-20°C to +40°C (-4°F to 104°F)
Storage temperature	-25°C to +80°C (-13°F to 176°F)
Relative humidity	max. 85%
Maximum altitude above sea level	3000 m (9842 ft)
Mark of conformity	According to rating plate
Product standard	EN 62477-1
Dimensions L x W x H	647 x 247 x 392 mm (25.47 x 9.72 x 15.43 in)
Weight (with standard grid and charging cable)	34.84 kg (76.81 lbs.)
Pollution degree	3

- 1) The device may be operated on grids that are grounded at the neutral point with a maximum outer conductor nominal voltage of 220 V.
- 2) Only use a type B residual current circuit breaker for the mains connection of the device. The leakage current to earth is less than 3.5 mA.
- 3) Interface to a 127/220 V and 50 Hz public grid.
- 4) For indoor use only, must not be exposed to rain or snow.
- 5) At a high ambient temperature, a power reduction may occur (power derating).

Device-specific data						
Device	Max. AC current	Max. AC power	Nominal voltage		Max. charging current	Z_{\max}
4120 3x220 16 kW	28.5 A	9070 W	48 V		120 A	203 mOhm
4140 3x220 16 kW	29.6 A	9390 W	48 V		140 A	183 mOhm
4160 3x220 16 kW	29.9 A	9490 W	48 V		160 A	156 mOhm

**Selectiva 16 kW
400 V**

⚠ WARNING!

Danger of electric shock due to a residual current can be fatal.

Only use a type B residual current circuit breaker for the mains connection of the device.

Mains voltage (-10%/+30%) ¹⁾ Optional:	3~ NPE 400 V / 50/60 Hz 3~ PE 400 V / 50/60 Hz
Mains fuse ²⁾	32 A
Minimum cross-section of the mains lead Selectiva 4210/8120/8140 Selectiva 8160/8180/8210	4 mm ² (0.0062 in. ²) 6 mm ² (0.0093 in. ²)
Duty cycle	100%
EMC emission class	B
Safety class	I
Max. permitted grid impedance Z_{\max} on PCC ³⁾	According to the "Device-specific data" table below
Protection class ⁴⁾	Protection class 20
Oversvoltage category	III
Operating temperature ⁵⁾	-20°C to +40°C (-4°F to 104°F)
Storage temperature	-25°C to +80°C (-13°F to 176°F)
Relative humidity	max. 85%
Maximum altitude above sea level	2000 m (6561 ft)
Mark of conformity	According to rating plate
Product standard	EN 62477-1
Dimensions L x W x H	647 x 247 x 392 mm (25.47 x 9.72 x 15.43 in)
Weight (with standard grid and charging cable)	36.8 kg (81.13 lb)
Pollution degree	3

- 1) The device may be operated on grids that are grounded at the neutral point with a maximum outer conductor nominal voltage of 400 V. A mains voltage tolerance L-N of 207 V to 250 V applies to the electrolyte circulation and relay board options.
- 2) Only use a type B residual current circuit breaker for the mains connection of the device. The leakage current to earth is less than 3.5 mA.
- 3) Interface to a 230/400 V and 50 Hz public grid.
- 4) For indoor use only, must not be exposed to rain or snow.
- 5) At a high ambient temperature, a power reduction may occur (power de-rating).

Device-specific data					
Device	Max. AC current	Max. AC power	Nominal voltage	Max. charging current	Z_{max}
4210 16 kW	27.6 A	15860 W	48 V	210 A	107 mOhm
8120 16 kW	23.8 A	14830 W	80 V	120 A	96 mOhm
8140 16 kW	27.5 A	17270 W	80 V	140 A	82 mOhm
8160 16 kW	30.3 A	18150 W	80 V	160 A	74 mOhm
8180 16 kW	30.6 A	18260 W	80 V	180 A	67 mOhm
8210 16 kW	30.9 A	18430 W	80 V	210 A	67 mOhm

**Selectiva 18 kW
400 V**

⚠ WARNING!

Danger of electric shock due to a residual current can be fatal.

Only use a type B residual current circuit breaker for the mains connection of the device.

Mains voltage (-10%/+30%) ¹⁾ Optional:	3~ NPE 400 V / 50/60 Hz 3~ PE 400 V / 50/60 Hz
Mains fuse ²⁾ Selectiva 2250/2300/2350 Selectiva 4250/4300/4325	16 A/32 A ³⁾ 32 A
Minimum cross-section of the mains lead Selectiva 2250/2300 / 2350 Selectiva 4250/4300/4325	4 mm ² (0.0062 in. ²) 6 mm ² (0.0093 in. ²)
Duty cycle	100%
EMC emission class	B
Safety class	I
Max. permitted grid impedance Z_{max} on PCC ⁴⁾	According to the "Device-specific data" table below
Protection class ⁵⁾	Protection class 20
Overtoltage category	III
Operating temperature ⁶⁾	-20°C to +40°C (-4°F to 104°F)
Storage temperature	-25°C to +80°C (-13°F to 176°F)
Relative humidity	max. 85%
Maximum altitude above sea level	2000 m (6561 ft)
Mark of conformity	According to rating plate
Product standard	EN 62477-1
Dimensions L x W x H	785 x 247 x 392 mm (30.91 x 9.72 x 15.43 in)
Weight (with standard grid and charging cable)	47 kg (103.62 lbs.)
Pollution degree	3

- 1) The device may be operated on grids that are grounded at the neutral point with a maximum outer conductor nominal voltage of 400 V. A mains voltage tolerance L-N of 207 V to 250 V applies to the electrolyte circulation and relay board options.
- 2) Only use a type B residual current circuit breaker for the mains connection of the device. The leakage current to earth is less than 3.5 mA.
- 3) Selectiva 2250/2300/2350: If the charger is protected with a 32 A fuse, the thermal rating of the automatic circuit breaker must not exceed 210000 A²s.
- 4) Interface to a 230/400 V and 50 Hz public grid.
- 5) For indoor use only, must not be exposed to rain or snow.

- 6) At a high ambient temperature, a power reduction may occur (power de-rating).

Device-specific data					
Device	Max. AC current	Max. AC power	Nominal voltage	Max. charging current	Z_{max}
2250 18 kW	15.3 A	9690 W	24 V	250 A	None
2300 18 kW	15.6 A	9890 W	24 V	300 A	None
2350 18 kW	15.9 A	10060 W	24 V	350 A	None
4250 18 kW	30.2 A	18650 W	48 V	250 A	93 mOhm
4300 18 kW	30.7 A	19500 W	48 V	300 A	80 mOhm
4325 18 kW	31 A	19620 W	48 V	325 A	75 mOhm



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