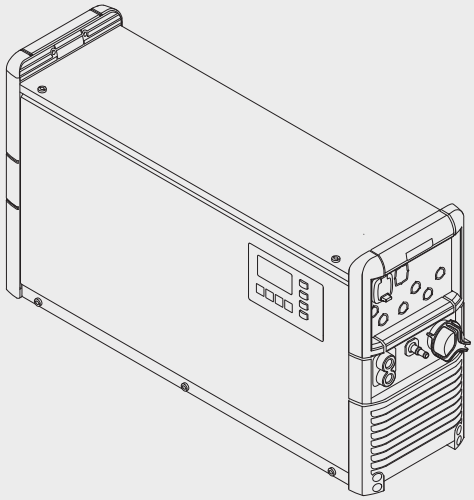
/ **Perfect Charging** / Perfect Welding / Solar Energy

# Selectiva
# 2100 / 2120 / 2140
# 2160 / 2180 / 2200
# 4060 / 4075 / 4090
# 4120 / 4140 / 4160
# 8040 / 8060 / 8075
# 8090 / 8120 / 8140
# 8160 / 8180

EN

Operating Instructions

Battery charging system



42,0426,0151,EN 001-24052017

# Dear reader,



**Introduction**

Thank you for the trust you have placed in our company and congratulations on buying this high-quality Fronius product. These instructions will help you familiarise yourself with the product. Reading the instructions carefully will enable you to learn about the many different features it has to offer. This will allow you to make full use of its advantages.

Please also note the safety rules to ensure greater safety when using the product. Careful handling of the product will repay you with years of safe and reliable operation. These are essential prerequisites for excellent results.

The latest version of the operating instructions can be found on the Fronius website www.fronius.com.

**Explanation of safety symbols**

**DANGER!** Indicates immediate and real danger. If it is not avoided, death or serious injury will result.

**WARNING!** Indicates a potentially dangerous situation. Death or serious injury may result if appropriate precautions are not taken.

**CAUTION!** Indicates a situation where damage or injury could occur. If it is not avoided, minor injury and/or damage to property may result.

**NOTE!** Indicates a risk of flawed results and possible damage to the equipment.

**IMPORTANT!** Indicates tips for correct operation and other particularly useful information. It does not indicate a potentially damaging or dangerous situation.

If you see any of the symbols depicted in the "Safety rules" chapter, special care is required.

# Contents

# Safety rules



## General

The device is manufactured using state-of-the-art technology and according to recognised safety standards. If used incorrectly or misused, however, it can cause:
- injury or death to the operator or a third party,
- damage to the device and other material assets belonging to the operating company,
- inefficient operation of the device.

All persons involved in commissioning, operating, maintaining and servicing the device must:
- be suitably qualified,
- read and follow these operating instructions carefully.

The operating instructions must always be at hand wherever the device is being used. In addition to the operating instructions, attention must also be paid to any generally applicable and local regulations regarding accident prevention and environmental protection.

All safety and danger notices on the device
- must be 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, rectify any faults that could compromise safety.
**This is for your personal safety!**

## Proper use

The device is to be used exclusively for its intended purpose. Any use above and beyond this purpose is deemed improper. The manufacturer is not liable for any damage, or unexpected or incorrect results arising out of such misuse.

Proper use includes:
- carefully reading and obeying all operating instructions and safety and danger notices
- performing all stipulated inspection and maintenance work
- following all instructions from the battery and vehicle manufacturers

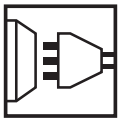
Proper handling of the device is essential for it to function correctly. The device must never be pulled around by the cable.

## 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 shall not be held liable for any damage arising from such usage.

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

## Mains connection



Devices with a higher rating may affect the energy quality of the mains due to their current consumption.

This may affect a number of types of device in terms of:
- connection restrictions
- criteria with regard to the maximum permissible mains impedance *)
- criteria with regard to the minimum short-circuit power requirement *)

*) at the interface with the public grid
see Technical Data

In this case, the plant operator or the person using the device should check whether the device may be connected, where appropriate by discussing the matter with the power supply company.

**NOTE!** Ensure that the mains connection is earthed properly

## Dangers from mains current and charging current

Anyone working with chargers exposes themselves to numerous dangers e.g.:
- risk of electrocution from mains current and charging current
- hazardous electromagnetic fields, which can risk the lives of those using cardiac pacemakers

An electric shock can be fatal. Every electric shock is potentially life threatening. To avoid electric shocks while using the charger:
- do not touch any live parts inside or on the outside of the charger.
- under no circumstances touch the battery poles
- do not short-circuit the charger lead or charging terminals

All cables and leads must be secured, undamaged, insulated and adequately dimensioned. Loose connections, scorched, damaged or inadequately dimensioned cables and leads must be immediately repaired by authorised personnel.

## Dangers from acid, gases and vapours

Batteries contain acid which is harmful to the eyes and skin. During charging, gases and vapours are released that can harm health and are highly explosive in certain circumstances.

- Only use the chargers in well ventilated areas to prevent the accumulation of explosive gases. Battery areas are not deemed to be hazardous areas provided that a concentration of hydrogen of less than 4 % can be guaranteed by the use of natural or forced ventilation.
- Maintain a distance of at least 0.5 m (19.69 in.) between battery and charger during the charging procedure. Possible sources of ignition, such as fire and naked lights, must be kept away from the battery
- The battery connection (e.g. charging terminals) must not be disconnected for any reason during charging

- On no account inhale any of the gases and vapours released
- Make sure the area is well ventilated.
- To prevent short circuits, do not place any tools or conductive metals on the battery

- Battery acid must not get into the eyes, onto the skin or clothes. Wear protective goggles and suitable protective clothing. Rinse any acid splashes thoroughly with clean water, and seek medical advice if necessary.

**General information regarding the handling of batteries**

- Protect batteries from dirt and mechanical damage.
- Store charged batteries in a cool place. Self discharge is kept to a minimum at approx. +2 °C (35.6 °F).
- Every week, perform a visual inspection to ensure that the acid (electrolyte) level in the battery is at the Max. mark.
- If any of the following occurs, do not start the device (or stop immediately if already in use) and have the battery checked by an authorised workshop:
  - uneven acid levels and/or high water consumption in individual cells caused by a possible fault.
  - heating of the battery over 55 °C (131 °F).

**Protecting yourself and others**

While the charger is in operation, keep all persons, especially children, out of the working area. If, however, there are people in the vicinity,
- warn them about all the dangers (hazardous acids and gases, danger from mains and charging current, etc.),
- provide suitable protective equipment.

Before leaving the work area, ensure that people or property cannot come to any harm in your absence.

**Safety measures in normal operation**

Chargers with a ground conductor must only be operated on a mains supply with a ground conductor and a socket with a ground conductor contact. If the charger is operated on a mains supply without a ground conductor or in a socket without a ground conductor contact, this will be deemed gross negligence. The manufacturer shall not be held liable for any damage arising from such usage.

- Only operate the charger in accordance with the degree of protection shown on the rating plate.
- Never operate the charger if there is any evidence of damage.
- Arrange for the mains cable to be checked regularly by a qualified electrician to ensure the ground conductor is functioning properly.
- Any safety devices and parts that are not functioning properly or are in imperfect condition must be repaired by a qualified technician before switching on the charger.
- Never bypass or disable protection devices.
- After installation, an accessible mains plug is required.

**EMC Device Classifications**

Devices in emission class A:
- Are only designed for use in industrial settings
- Can cause line-bound and radiated interference in other areas

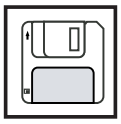
Devices in emission class B:
- Satisfy the emissions criteria for residential and industrial areas. This is also true for residential areas in which the energy is supplied from the public low-voltage mains.

EMC device classification as per the rating plate or technical data.

**EMC measures**

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).
If this is the case, then the operating company is obliged to take appropriate action to rectify the situation.

**Data protection**



The user is responsible for the safekeeping of any changes made to the factory settings. The manufacturer accepts no liability for any deleted personal settings.

**Maintenance and repair**

Under normal operating conditions, the device requires only a minimum of care and maintenance. However, it is vital to observe some important points to ensure it remains in a usable condition for many years.
- Before switching on, always check the mains plug and cable as well as charger leads and charging terminals for any signs of damage.
- If the surface of the device housing is dirty, clean with a soft cloth and solvent-free cleaning agent only

Maintenance and repair work must only be carried out by authorised personnel. Use only original replacement and wearing parts (also applies to standard parts). It is impossible to guarantee that bought-in parts are designed and manufactured to meet the demands made on them, or that they satisfy safety requirements.

Do not carry out any modifications, alterations, etc. to the device without the manufacturer's consent.

**Obligations of the operator**

The operator must only allow persons to work with the device who:
- are familiar with the fundamental instructions regarding safety at work and accident prevention and have been instructed in how to use the device
- have read and understood these operating instructions, especially the section "safety rules", and have confirmed as much with their signatures
- are trained to produce the required results.

Checks must be carried out at regular intervals to ensure that operators are working in a safety-conscious manner.

## Safety inspection

The manufacturer recommends that a safety inspection of the device is performed at least once every 12 months.

A safety inspection should be carried out by a qualified electrician
- after any changes are made
- after any additional parts are installed, or after any conversions
- after repair, care and maintenance has been carried out
- at least every twelve months.

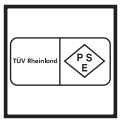
For safety inspections, follow the appropriate national and international standards and directives.

Further details on safety inspections can be obtained from your service centre. They will provide you on request with any documents you may require.

## Safety symbols

Devices with the CE mark satisfy the essential requirements of the low-voltage and electromagnetic compatibility directives.


Devices displaying this TÜV test mark satisfy the requirements of the relevant standards in Canada and USA.




Devices displaying this TÜV test mark satisfy the requirements of the relevant standards in Japan.


Devices displaying this TÜV test mark and the mark on the rating plate satisfy the requirements of the relevant standards in Australia.


Devices displaying this EAC mark of conformity satisfy the requirements of the relevant standards in Russia, Belarus, Kazakhstan, Armenia and Kyrgyzstan.

## Disposal

Do not dispose of this device with normal domestic waste! To comply with the European Directive on Waste Electrical and Electronic Equipment and its implementation as national law, electrical equipment that has reached the end of its life must be collected separately and returned to an approved recycling facility. Any device that you no longer require must either be returned to your dealer or given to one of the approved collection and recycling facilities in your area. Ignoring this European Directive may have potentially adverse affects on the environment and your health!

## Copyright

# General information

**Device concept**

The three-phase battery charging systems for 24 V, 48 V and 80 V batteries are fitted with intelligent charging technology. The successful Active Inverter Technology with the revolutionary Ri charging process adapts itself to the requirements of the battery and only charges the battery with the current that it actually needs.

The technology is embedded in a robust industry-standard housing. The exceptionally compact design complies with all safety standards, requires less installation space and protects the components to ensure a long service life.

Fitted with a graphical display, an integrated datalogger, new interfaces and additional options, the device is perfectly equipped for the future.

**Proper use / intended purpose**

**WARNING!** If an unsuitable battery is connected to the charger, there is a risk of serious injury or damage from escaping gases, fire or explosion. Never connect a battery to the charger unless it is compatible in terms of its type, voltage and capacity and corresponds to the charger settings.

Any use above and beyond this purpose is deemed improper. The manufacturer shall not be liable for any damage resulting from such use.

Proper use also includes
- carefully reading and following all Operating Instructions, safety and danger notices
- performing all stipulated inspection and maintenance work
- following all instructions from the battery and vehicle manufacturers

**Mains connection**

**WARNING!** An electric shock due to a fault current can be fatal. If required, nothing other than a type B residual current circuit breaker should ever be used for connecting the device to the mains.

**WARNING!** Operating the equipment incorrectly can cause serious injury and damage. Do not use the functions described here until you have fully read and understood the following documents:
- Operating Instructions
- All the Operating Instructions for the system components, especially the safety rules
- Battery and vehicle manufacturer's Operating Instructions and safety rules

**WARNING!** Risk of serious injury and damage due to faulty or insufficient power supply. The power supply requirements detailed in "Technical data" must be met.

**Charging leads**

**WARNING!** There is a risk of very serious injury and damage if charging leads are left lying around. People may become entangled in or trip over loose, unwound cables. Lay the charging leads so that no one can trip over or become entangled in them.

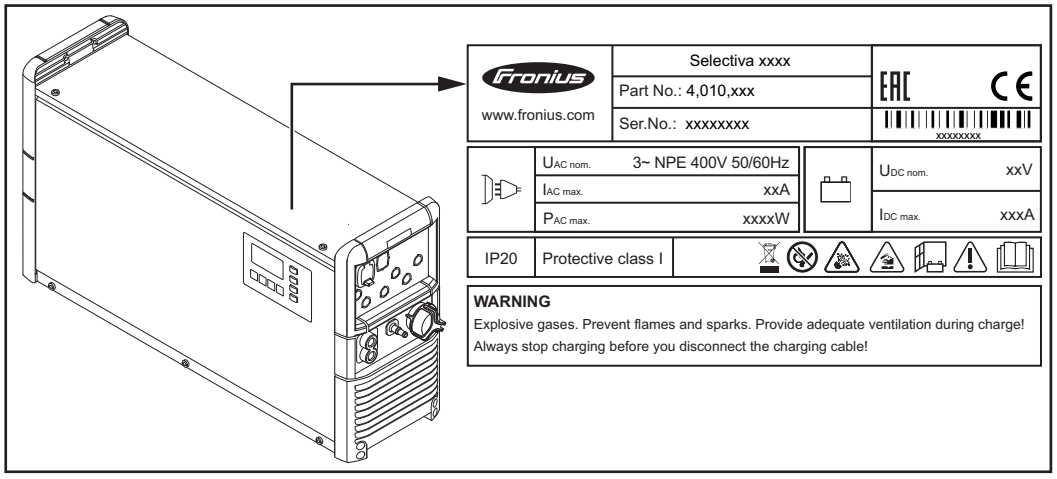
**WARNING!** There is a high risk of very serious injury and damage if the charging plug is pulled out during the charging process. The sparks caused by this can ignite the charging gases that build up during the charging process, causing a fire or an explosion. After the charging process has completed, wind up the charging leads, or if available, place them on the cable holder.

## Correct battery configuration

**WARNING!** If an unsuitable battery is connected to the charger, there is a danger of serious injury or damage from escaping gases, fire or explosion. Never connect a battery to the charger unless it is compatible in terms of its type, voltage and capacity and corresponds to the charger settings.

## Warning notices on the device

A number of safety symbols can be seen on the charger's rating plate. 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. The device must be disconnected from the mains before starting any work with the housing open. A suitable measuring instrument must be used to ensure that electrically charged components (e.g. capacitors) are fully discharged. Ensure that the device remains disconnected from the mains until all work has been completed.

Do not use the functions until you have read all the Operating Instructions.

Possible sources of ignition, such as fire, sparks and naked flames, must be kept away from the battery.

Risk of explosion! Oxyhydrogen is generated in the battery during charging.

Battery acid is corrosive and MUST be kept away from eyes, skin and clothes.

Ensure an adequate supply of fresh air during charging. Set up the device at least 0.5 m (1 ft. 7.69 in.) above the floor.

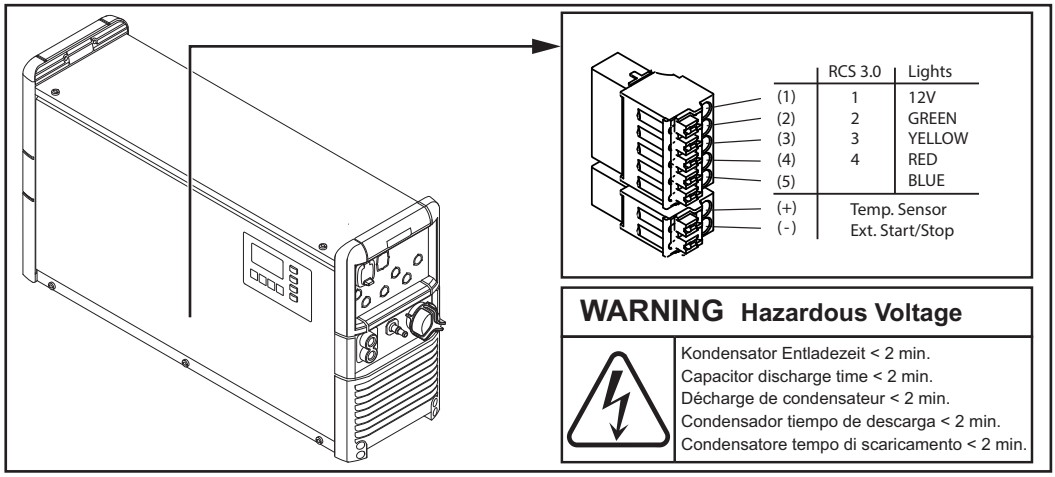
The charger can cause DC fault currents in the ground conductor. If a fault current protection device (RCD) is used on the mains side to protect against electric shock, it must conform to Type B.

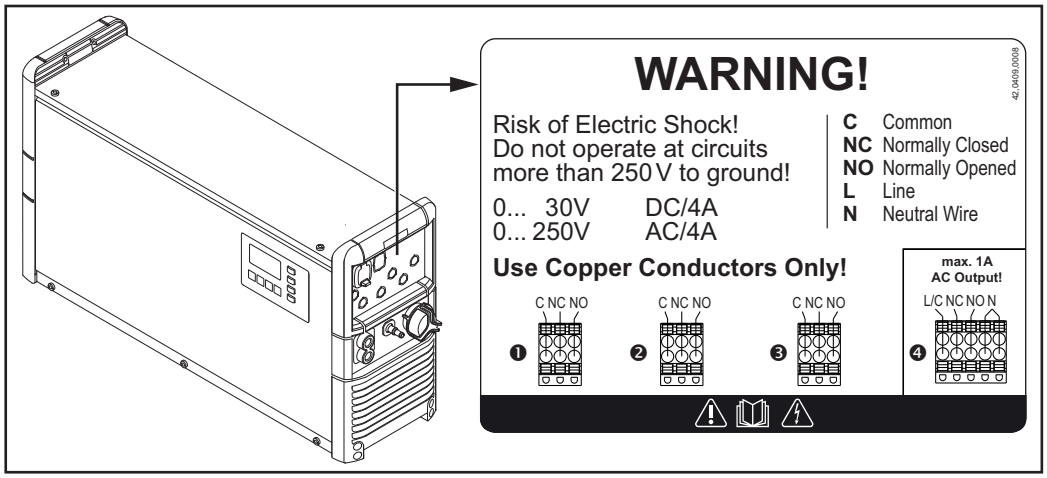
Do not dispose of used devices with domestic waste. Dispose of them according to the safety rules.

## Warning notices inside the charger

**WARNING!** An electric shock can be fatal. The housing must never be opened by anyone other than a service technician trained by the manufacturer. The device must be disconnected from the mains before starting any work with the housing open. A suitable measuring instrument must be used to ensure that electrically charged components (e.g. capacitors) are fully discharged. Use an easily legible and understandable warning sign to ensure that the charger is not reconnected to the mains supply before all the work has been completed.

Inside the device:




## Setup regulations

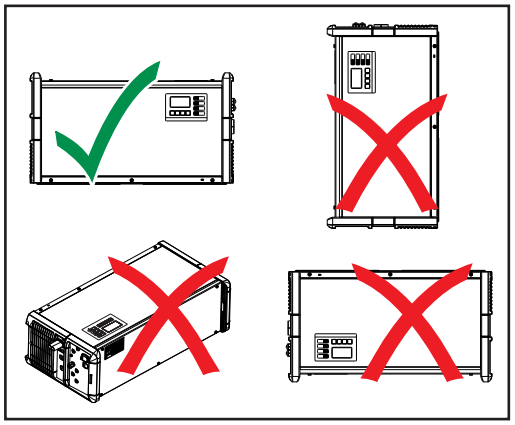
**WARNING!** Toppling or falling devices can cause life-threatening injuries. Make sure that all system components are securely in position when setting them up. If using a floor bracket or wall bracket, always make sure that all the securing elements are seated securely.

Devices weighing more than 25 kg (55.12 lb.) must be carried by at least two people.

If mounting on shelves, the shelf must be capable of supporting the weight of the device.

The device is tested to IP20 protection, meaning:
- Protection against penetration by solid foreign bodies with diameters exceeding 12.5 mm (0.49 in.)
- No protection against water

The device can be set up and operated in dry, closed areas that comply with degree of protection IP20. Exposure to wet conditions should be avoided.



The device may only be operated in a horizontal position.

The air surrounding the charger must be kept free from battery acid vapour as far as possible. You should therefore avoid mounting the device directly above the battery that is to be charged.

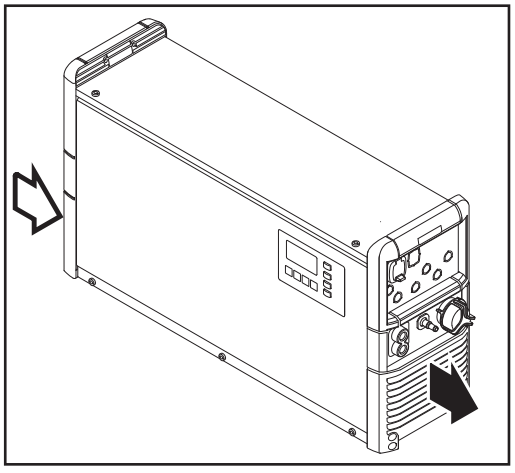
**Cooling air**

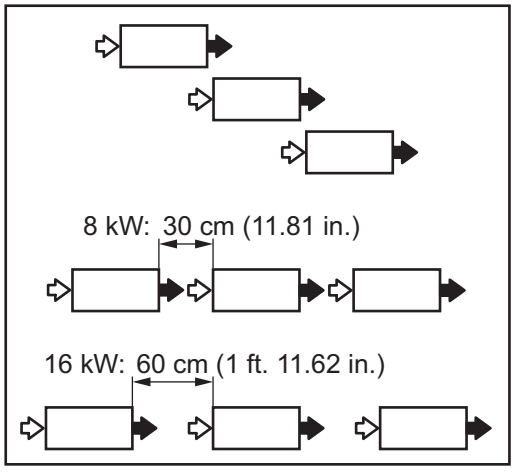
The charger must be set up in such a way that the cooling air can flow unimpeded through the vents in the housing that are provided for that purpose. Ensure that there is always a minimum clearance of f 0.2 m (7.874 in.) around the air inlets and outlets. The surrounding air must be free from

- excessive dust
- electrically conductive particles (carbon black or swarf)
- heat sources

Cooling air is drawn in and flows out as indicated by the arrows in the following illustrations.

**NOTE!** Air inlets and outlets must never be covered, not even partially. If several chargers are set up one behind the other, they should be offset.






If the chargers are arranged in a line one behind the other without being offset, the space between the chargers must be as follows:

- Selectiva 8 kW: Minimum distance 30 cm (11.81 in)
- Selectiva 16 kW: Minimum distance 60 cm (1 ft. 11.62 in.)

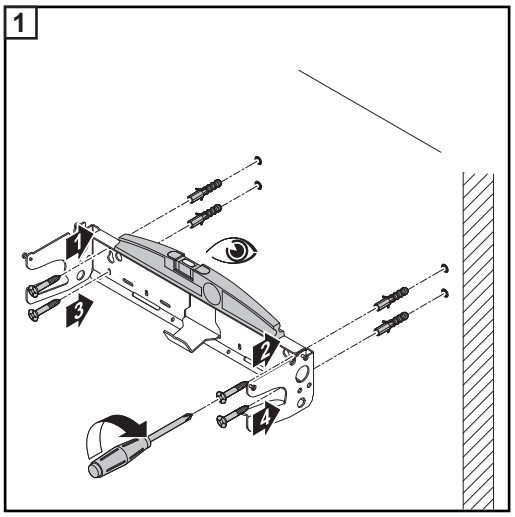
## Wall bracket

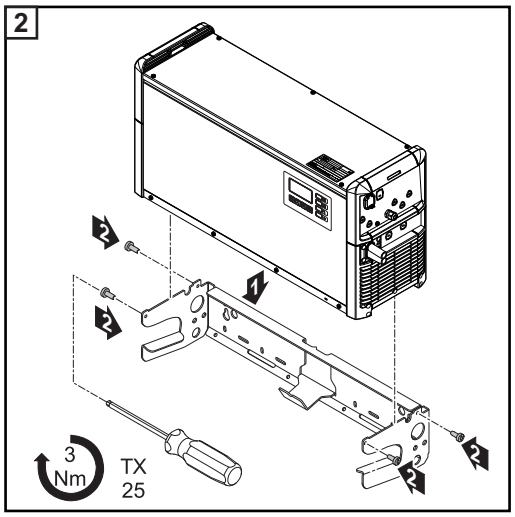
**WARNING!** Work that is carried out incorrectly and falling chargers can cause serious injury and damage. This installation must only be carried out by trained and qualified personnel. Take note of the safety rules in the charger Operating Instructions.

Different wall plugs and screws will be required depending on the supporting surface. Wall plugs and screws are therefore not included in the scope of supply. The installer is responsible for selecting the right wall plugs and screws.

**WARNING!** Risk of serious damage or injury from objects being dropped or falling over.

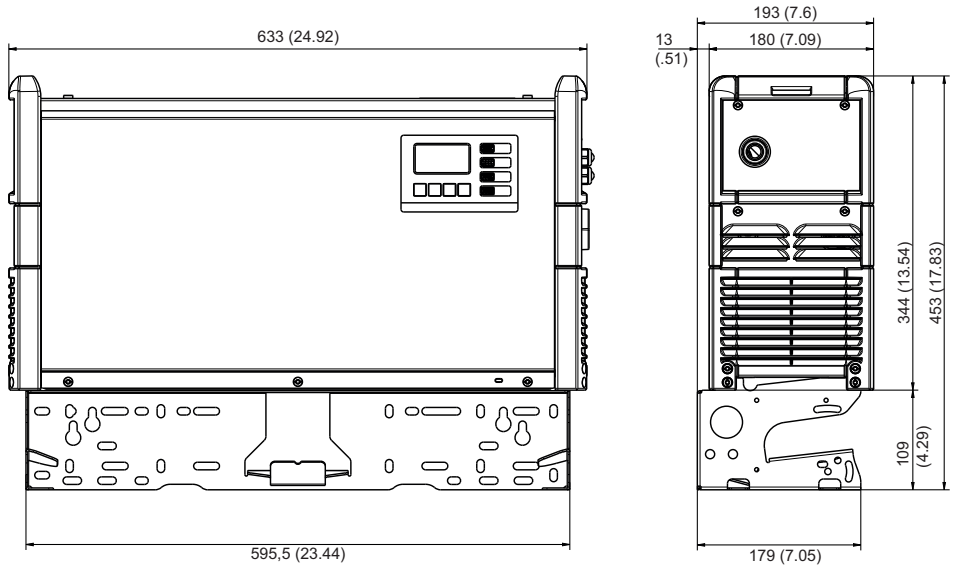
- Ensure that all screw connections are secure
- Must only be used with a Fronius Selectiva 8/16 kW charger
- Ensure the device is level when mounting

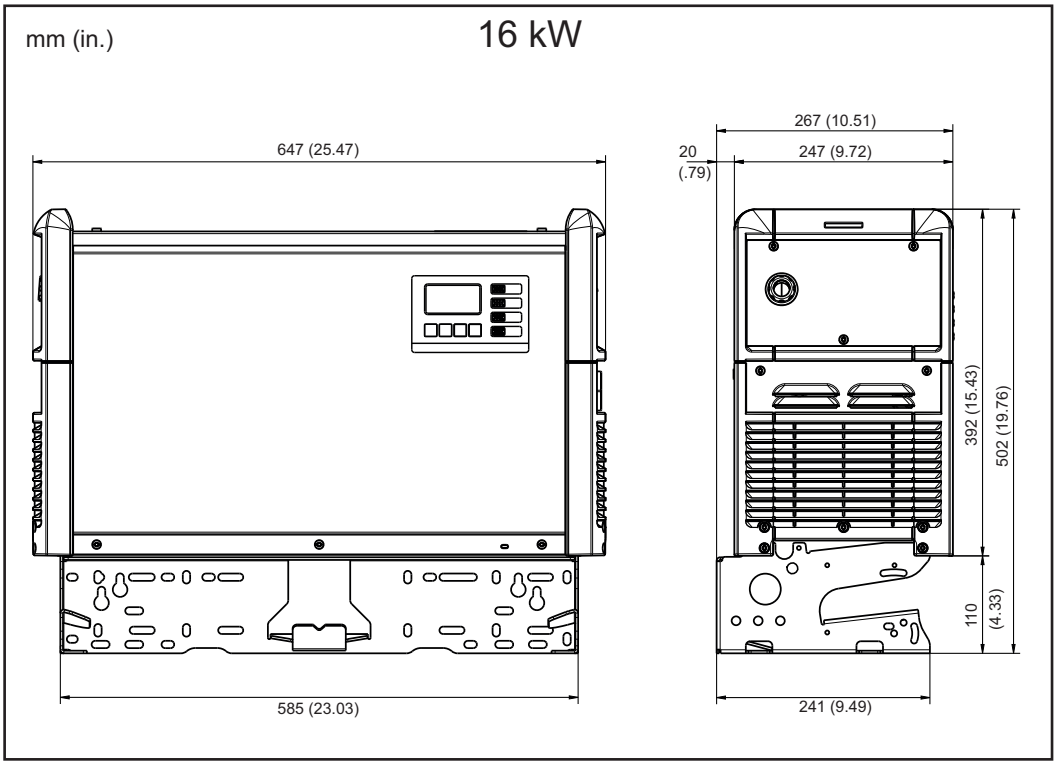


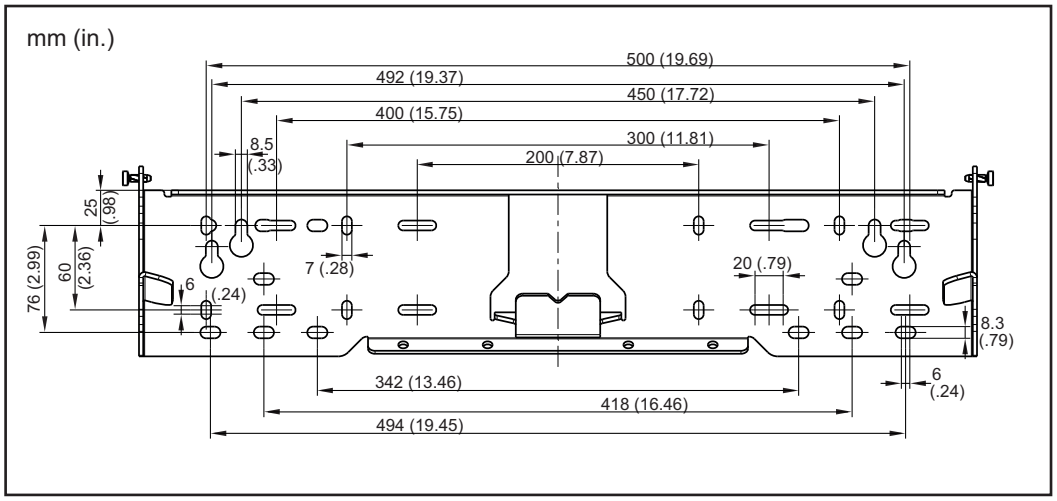




mm (in.)

8 kW





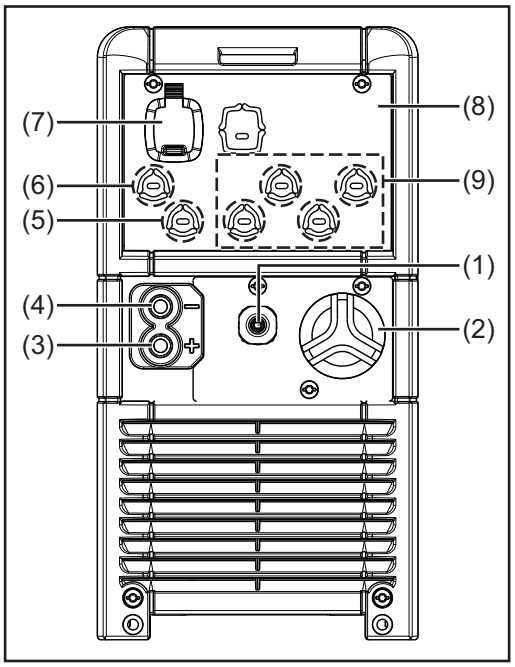

*Drilling template*

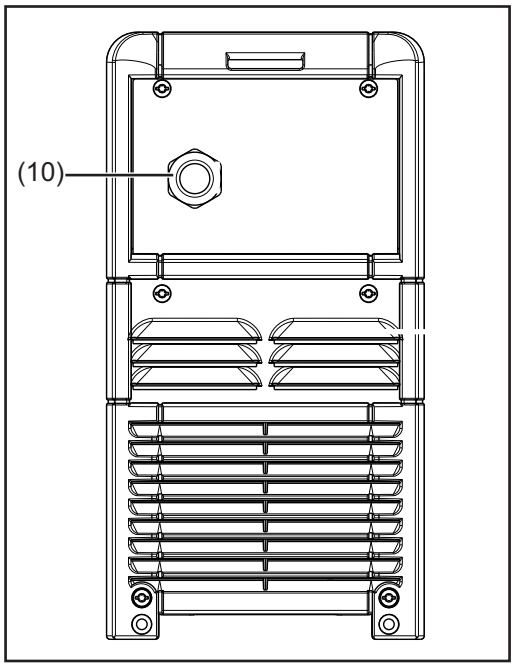
**Weight of wall bracket:**

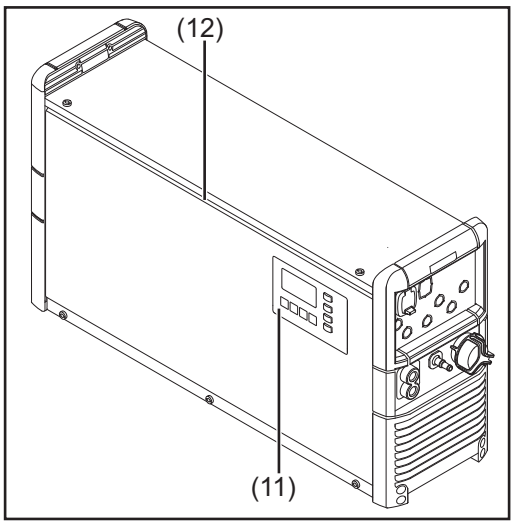
| | |
|---|---|
| 8 kW | 1.8 kg (3.97 lb) |
| 16 kW | 3.15 kg (6.49 lb) |

# Control elements and connections

**Controls and connections**




| No. | Function |
|---|---|
| (1) | **Position for internal electrolyte circulation option**<br>Compressed air outlet |
| (2) | **Position for internal electrolyte circulation option**<br>Air intake with air filter (12) |
| (3) | **(+) Charging lead** |
| (4) | **(-) Charging lead** |

| No. | Function |
|---|---|
| (5) | **Position for external start/stop option or temperature-controlled charging option** |
| (6) | **Position for the remote control system or 12 V charging lights options** |
| (7) | **USB port**<br>The USB port allows a USB flash drive to be used to update the device and also to log the charging parameters while charging is in progress. The maximum supply current is 0.5 A. |
| (8) | **CAN connection area option *** |
| (9) | **Positions for relay-related options**<br>(e.g. Aquamatic control)<br>More information can be found in the "Options" section |

| | |
|---|---|
| **(10)** | **Mains cable** |
| **(11)** | **Control panel** |
| **(12)** | **Optional LED strip**<br>lights up in different colours depending on the state of charge, as explained in the "Control panel" section |

* The CAN connection area can only be accessed by removing the connection plate on the front of the device. The following warning notices must be obeyed:

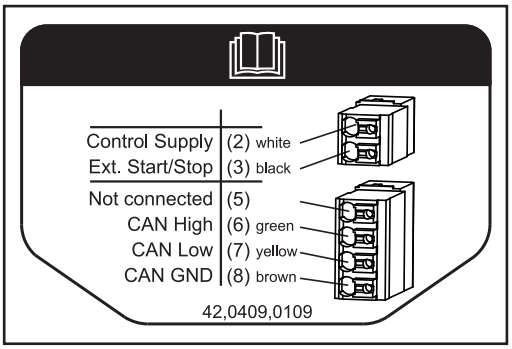
**WARNING!** An electric shock can be fatal. Only trained service technicians may open the housing. This includes removing the connection plate. The device must be disconnected from the mains before starting any work with the housing open. A suitable measuring instrument must be used to ensure that electrically charged components (e.g. capacitors) are fully discharged. Use an easily legible and understandable warning sign to ensure that the charger is not reconnected to the mains supply before all the work has been completed.

**WARNING!** Work that is carried out improperly can cause serious injury or damage. Connection work on the device must only be carried out by qualified specialist technicians. If there are Installation Instructions or User Information for the optional component concerned, then all warning notices and instructions therein must be obeyed.

Once the connection work is complete, a safety inspection must be carried out in accordance with relevant national and international standards and directives. Further details on safety inspections can be obtained from your authorised service centre. They will provide you with any documents you may require on request.

The figure shows the connections in the CAN connection area.

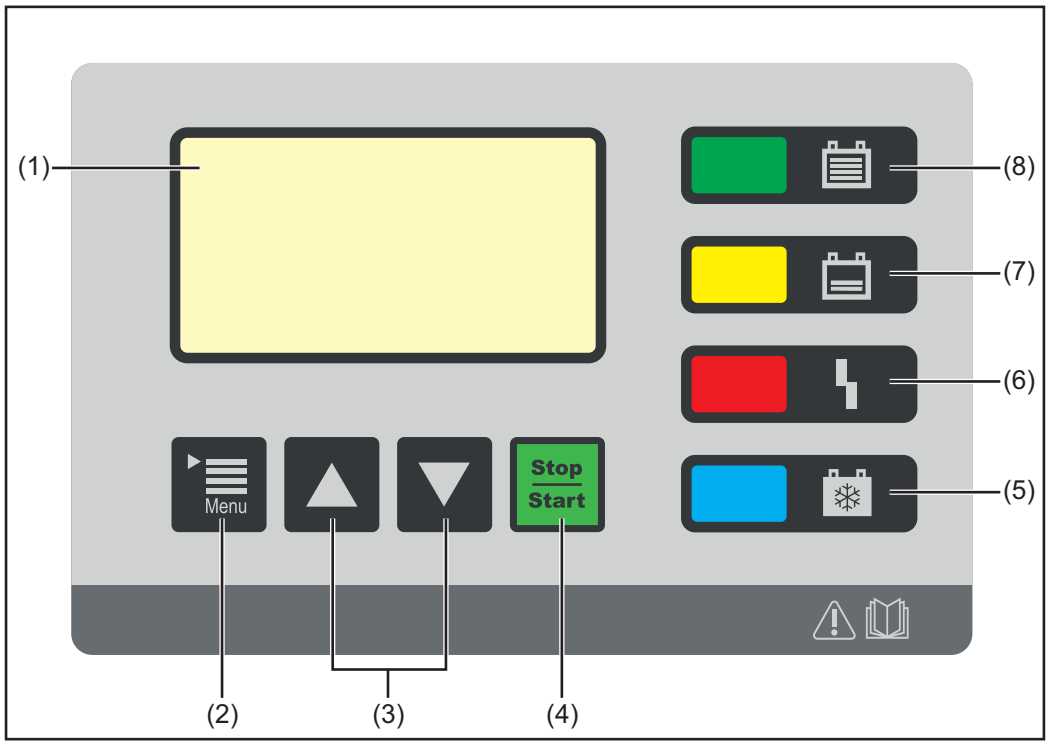
The CAN connection area is located behind the connection plate on the front of the device. The warning notices listed above apply to the CAN connection area.




| | |
|---|---|
| (2) | Control voltage - white |
| (3) | External start/stop - black |

| | |
|---|---|
| (5) | Not assigned |
| (6) | CAN High - green |
| (7) | CAN Low - yellow |
| (8) | CAN GND - brown |

## Control panel




| No. | Function |
|---|---|
| (1) | **Display**<br>Displays the current charging parameters<br>Displays settings |
| (2) | **"Menu" key**<br>Selects the desired menu<br>Selects the appropriate symbol to return to the previous display |
| (3) | **"Up/Down" keys**<br>Selects the desired menu item<br>Sets the desired value |
| (4) | **"Stop/Start" key**<br>For interrupting and resuming the charging process<br>Confirms a menu item or setting |
| (5) | **"Battery cooled down" indicator (blue)**<br>Indicates that a battery has cooled down and is ready for use<br>**On steady:** After charging has finished, the set cooling time or optionally the battery temperature has been reached.<br>**Flashes every second:** The water refill indicator has also tripped.<br>More information can be found under "Additional functions" in the "Display" section. |
| (6) | **"Fault" indicator (red)**<br>**On steady:** The charger outputs an error. The current conditions do not allow proper charge. While the red indicator is on, charging cannot take place (charging interrupted). The relevant status code appears in the display.<br>**Flashes briefly every 3 seconds:** The charger outputs a warning. Charging is continued despite the adverse charging parameters. The relevant status code and the state of charge appear alternately on the display. |

| | |
|---|---|
| **(7)** | **"Charge" indicator (orange)**<br>**Lit:** during charging<br>**Flashes:** If charging has been interrupted |
| **(8)** | **"Battery charged" indicator (green)**<br>**On steady:** Charging ended<br>**Flashes every second:** Charging ended. The water refill indicator has also tripped. |

# Charging the battery

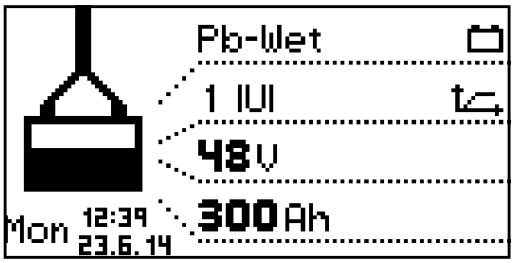
## Charging

**WARNING!** Risk of serious injury or damage from escaping battery acid or explosion if faulty batteries are charged. Before charging, ensure that the battery to be charged is fully functional.

**WARNING!** Risk of serious injury and damage from incorrect charging settings or a defective battery. Before beginning the charging process, ensure that the settings on the charger for the battery to be charged are correct and that the battery is functioning properly.

**NOTE!** The device may be damaged if the charging plug contacts are very dirty. The resulting increase in contact resistance can lead to overheating and subsequent destruction of the charging plug. Keep the charging plug contacts free from impurities and clean them if necessary.

1 Plug the charger into the electrical mains supply



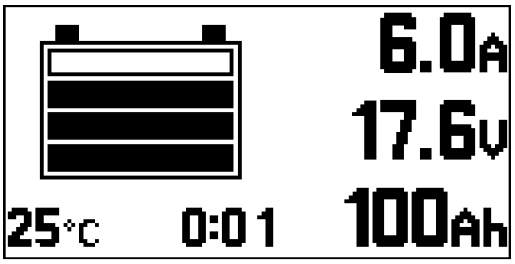

The display appears in standard mode. The display shows the charger parameters:
- Type of battery (e.g. wet)
- Charging characteristic (e.g. IUI)
- Nominal voltage (e.g. 48 V)
- Capacity (e.g. 300 Ah)
- Day of the week, date and time

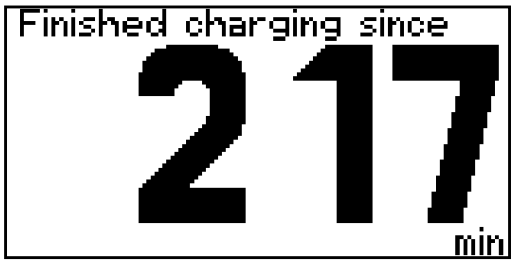
The charger parameters can be set individually. More information on the charger parameters can be found under "Configuration mode" in the "Display functions" chapter. Ensure that the battery to be charged matches the configuration of the battery charging system.

2 Connect the charging plug
or connect the
(+) charging lead to the positive pole of the battery and the
(-) charging lead to the negative pole of the battery

The charger detects that the battery is connected and starts charging. If start-up delay is activated, then charging will start at the end of the set delay time. For more information, see "Configuration mode" in the "Display" section.

During the charging process the display shows the following values:
- Current charging current (A)
- Current charging voltage (V)
- The charge already input (Ah)
- Battery temperature with the "temperature-controlled charging" option
- The time (hh:mm) since charging started

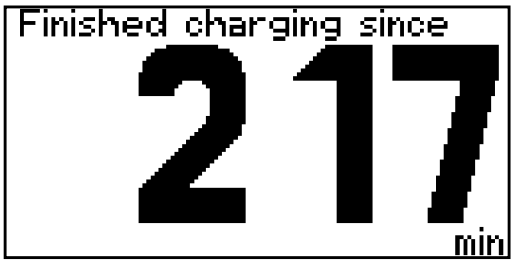


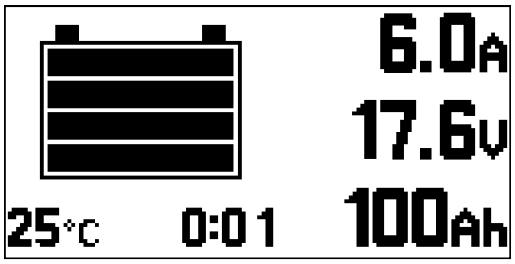



The battery symbol indicates the current state of charge. The greater the number of bars that are displayed, the further advanced the charging process is. As soon as the battery is fully charged, a minute counter will appear (see figure on right). This counts the minutes since the end of charging; when a number of chargers are being used, this makes it easier to decide which battery will have already cooled down most.

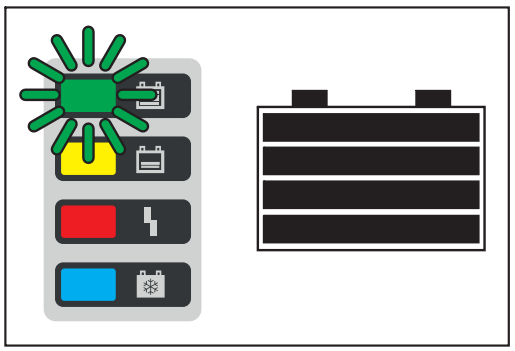
If, however, the standard display is still to be shown rather than the minute counter:

1 Use the "Up/Down" keys to toggle between the minute counter and standard display




When the battery is fully charged all 4 bars of the battery symbol appear black. As soon as the battery is fully charged, the charger begins conservation charging.



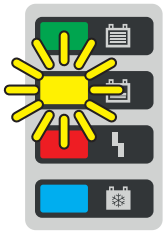
- All bars are displayed
- The green "Battery charged" indicator is on
- The battery is always ready to use
- The battery can remain connected to the charger for as long as required
- Conservation charging counteracts battery self-discharge

## Interrupting charging

To interrupt the charging process:


1 Press the "Stop/Start" key

While the charging progress is interrupted:



The "Charge" indicator (yellow) flashes

To resume the charging process:


2 Press the "Stop/Start" key again

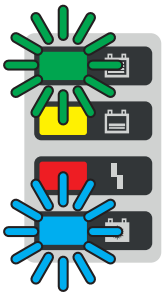
As long as a battery is connected to the charger, only the charging process can be interrupted and resumed using the "Stop/Start" key. Display modes can be changed using the "Menu" key as described in the "Display" section, but this is only possible when there is no battery connected to the charger.

## Stopping charging

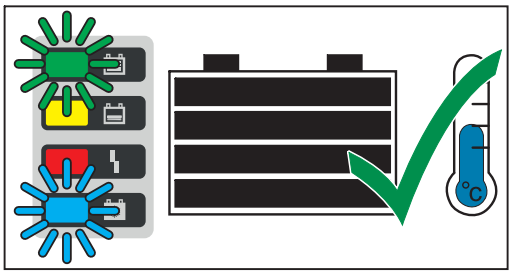
**WARNING!** Risk of serious injury or damage from ignition of oxyhydrogen through sparks generated when the charging leads are disconnected. Before disconnecting or unplugging the charging plug, first stop the charging process by pressing the "Stop/Start" key.

**NOTE!** The battery may be damaged if it is disconnected from the charger before the charging process is complete. Only disconnect the battery from the charger when it is fully charged (green "Battery charged" indicator lights up).

As soon as the battery is fully charged and has cooled down, the following indicators light up:



- "Battery charged" indicator (green)
- "Battery cooled down" indicator (blue)



For an optimal battery life, only disconnect the battery from the battery charging system when the blue "Battery cooled" indicator is showing in addition to the green indicator, in accordance with the explanation below. If several battery charging systems are in use, first disconnect the battery which has been fully charged for the longest (the coolest).

To stop the charging process:


1 Press the "Stop/Start" key

2 Unplug the charging plug
or disconnect the
(-) charging lead from the negative pole of the battery and the
(+) charging lead from the positive pole of the battery

# Display



**Overview of modes**

The device has the following modes:

Standard mode
In standard mode the display shows the charging parameters

Statistics mode
Visualises the frequency of the device operating modes and shows the total number of charging actions. Also shows an overview of the total and average Ah produced and energy consumed per charge

History mode
Provides information about the parameters for all the stored charging processes

Configuration mode
Configuration mode enables all the settings for the device and the charging process to be adjusted

USB mode
USB mode enables a device to be updated, device configurations to be saved and loaded, and the charging parameters to be recorded during the charging process - all using a USB flash drive

As long as a battery is connected to the battery charging system, the charging process can only be interrupted and resumed using the "Stop/Start" key. Display modes can be changed using the "Menu" key as described in the following sections that explain the individual modes, but this is only possible when there is no battery connected to the battery charging system.

During a pause in the charging process the menu selection is available, however only in a limited form. In this case the modes described below are available as follows:

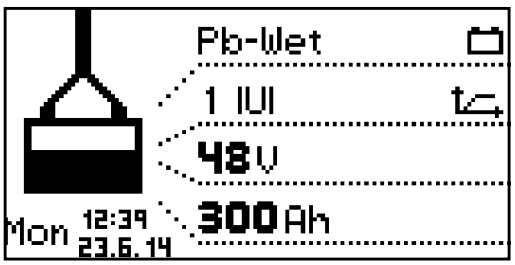
Statistics mode and history mode remain unrestricted.

In configuration mode the following data is available:
- Date and time
- Device serial number
- Hardware version and serial number
- Software: main software, secondary software and primary software

In USB mode all options except for "Update" and "Load configuration" are available.

**Standard mode**

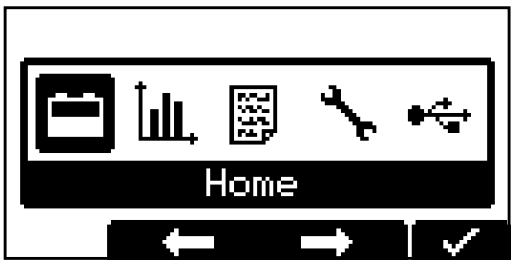
Once the mains plug has been connected to the electrical mains supply, the display will automatically operate in standard mode.




In standard mode, the display shows the following charger parameters:
- Type of battery (e.g. wet)
- Charging characteristic (e.g. IUI)
- Nominal voltage (e.g. 48 V)
- Capacity (e.g. 300 Ah)
- Day of the week, date and time

The charger parameters can be set individually. More information can be found in the "Configuration mode" section.

## Menu selection




Change from standard mode to the menu selection as follows:


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

Change from all other modes to the menu selection as follows:


1 Press the "Menu" key briefly

To select the desired mode:

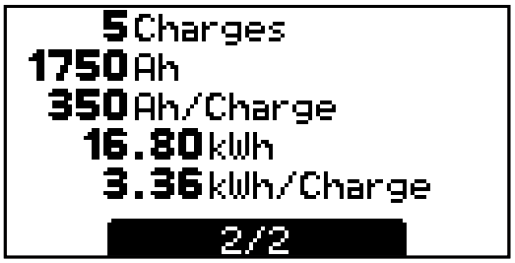
2 Use the "Up/Down" keys to select the symbol for the desired mode
- e.g. the battery symbol for standard mode


3 Use the "Stop/Start" key to confirm the "Tick" symbol

## Statistics mode


In statistics mode, horizontal bars display the frequency of the following device operating statuses:
- Idle
- Charging
- Floatingcharge
- Cooldown
- Error

1 Use the "Up/Down" keys to toggle between page 1/2 and page 2/2

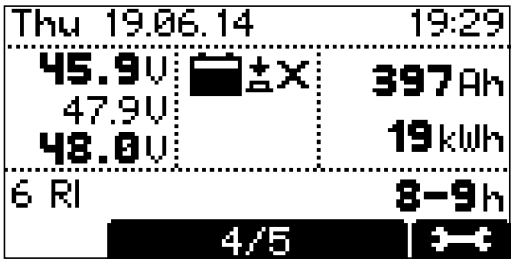


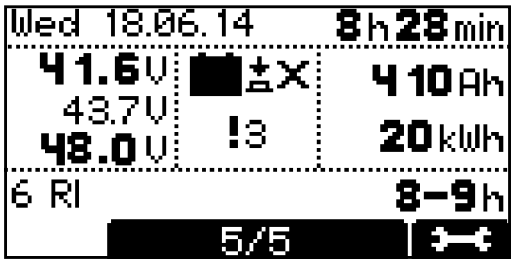

Page 2/2 shows the following values:
- Total number of charges
- Total Ah output
- Average Ah output per charge
- Total energy consumed (kWh)
- Average energy consumed (kWh) per charge

The consumed energy display is a standard value and can deviate by up to 5% from the actual amount of energy. At lower power levels the deviation may be higher.

## History mode

History mode provides information about the parameters for all the stored charging processes. In order to show changing or different displays, two versions of the display window are shown below:




1 Use the "Up/Down" keys to scroll between the pages for each stored charging process

Text content of the display window:
- Start date of charge, e.g. Thursday 19/06/14
- Start time of charge, e.g. 19:29 or charging period, e.g. 8 h 28 min
- Voltage at charge start, e.g. 45.9 V
- Voltage after 5 minutes, e.g. 47.9 V
- Voltage at charge end, e.g. 58.2 V
- Input Ah, e.g. 397 Ah
- Input kWh, e.g. 19 kWh
- Charging characteristic, e.g. 6 RI
- Set charging period, e.g. 8-9 h or set Ah, e.g. 400 Ah or set charge end time (not shown)

**Symbols shown:**


- Full battery:
  Charging has been completed


- Empty battery:
  Charging has not been completed

- Exclamation mark with number:
  Warning has been output with the corresponding status code. More information can be found in the "Status codes" section.

- Symbol with number:
  Error has been output with the corresponding status code. More information can be found in the "Status codes" section.


- Key symbol with a tick:
  Charging was stopped properly using the "Stop/Start" key


- Key symbol with a cross:
  Charging was stopped without using the "Stop/Start" key


- Charging details - Display of certain battery data at the beginning and end of the charging process:
  Number of cells
  Ah
  Characteristic
  Type of battery

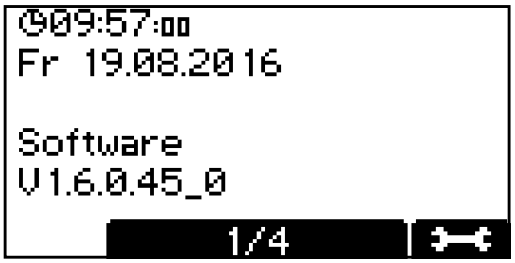
---

**Configuration mode**

Configuration mode provides the following setting options:
- "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. Only use the automatic number of cells selection function with batteries with the following nominal voltage values:
12 V and 24 V with 24 V devices
24 V and 48 V with 48 V devices
The automatic selection function must not be used with deep discharged batteries.

  - "Additional functions":
    for individual adaptation options for the charging characteristic
- "Additional functions": Additional functions
  - Blue LED
  - External start/stop
  - Refill indicator
- "General options": General options
  - Language
  - Contrast
  - Time (hh:mm:ss)
    Time zone
    Daylight saving time/normal time
  - Date (dd:mm:yy)
  - AC current limiter
  - Length of charging lead (m)
  - Charging lead cross section ($mm^2$)
  - Code for accessing the configuration menu activated/deactivated
  - Time interval for the parameter recorded on the USB flash drive (s)
- "Reset Factory Settings": resets settings to those when the charger left the factory or optionally to Fronius defaults
  - includes a double-check prompt ("OK?") that requires the operator to reconfirm that this step is intended



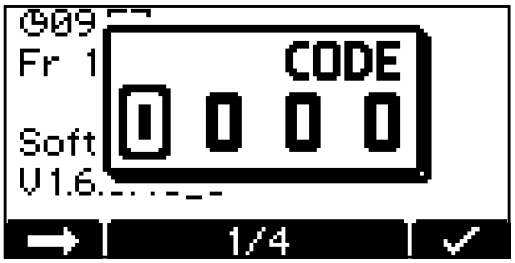

First the screen will appear in its initial format, showing the date, time and software version.

1 The "Up/Down" keys can be used to retrieve the following information:
- Serial number of the device plus serial number and version of the configuration memory
- PC board for controller/power electronics: hardware version and serial number
- Software: main software, secondary software, primary software

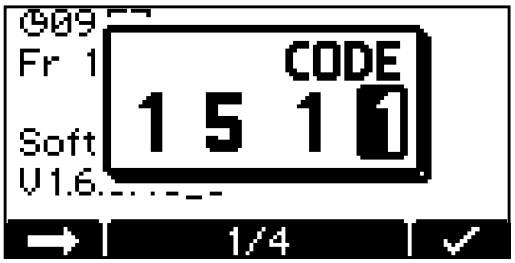
The procedure for opening the configuration menu is as follows:


1 Press the "Stop/Start" key

You will be prompted to enter a code:




The code required is "1511", and is entered as follows:



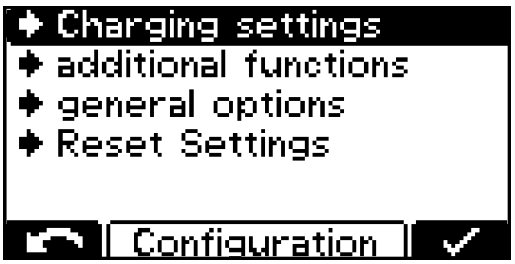

1 Using the "Up/Down" keys, enter the first digit of the code

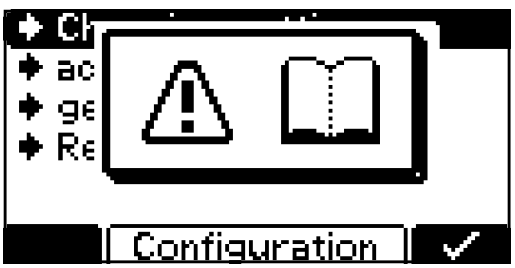

2 Press the "Menu" key to move to the next digit of the code

3 Continue to follow the procedure described above until the complete code has been entered


4 Use the "Stop/Start" key to confirm the code entered

You will now be prompted to select one of the main menu items for the configuration mode:




When you select a menu item you may be presented with a symbol prompting you to read the Operating Instructions. Confirm this prompt by pressing the "Stop/Start" key again.

The procedure for navigating the configuration menu and its submenus is as follows:

1 Use the "Up/Down" keys to select the desired menu item


2 Use the "Stop/Start" key to confirm the menu item, and reconfirm any double-check prompt (e.g. "OK?")

3 Use the "Up/Down" keys as necessary to choose an item e.g. "Off/On" or enter a value

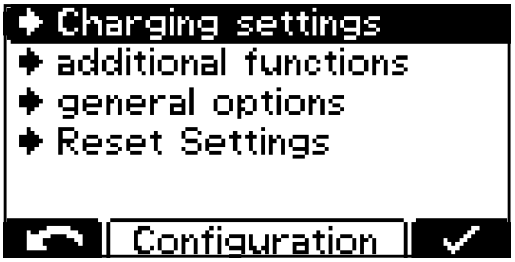

4 Use the "Stop/Start" key to confirm what you have entered

5 If the cursor should move to another setting or position after confirmation of the previous setting, then the procedure described in points (3) and (4) should be repeated

To exit the current menu:


6 Press the "Menu" key to return to the higher-level menu

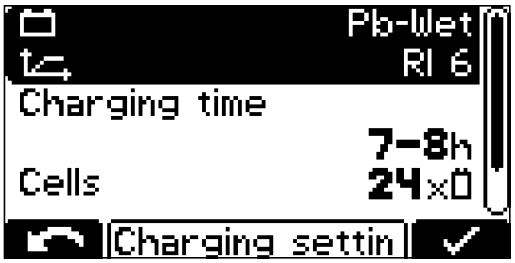
For an example, see the explanation below of how to set the charging parameters:

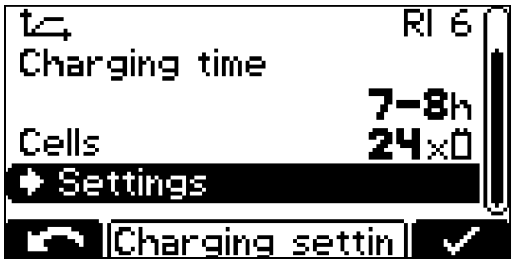



1 Use the "Up/Down" keys to select the "Charging settings" menu item


2 Use the "Stop/Start" key to confirm this menu item

The choice of settings for the "Charging settings" menu item will now be displayed:




the display may vary depending on the selection made. If the "Pb-Wet" type of battery has been selected in combination with the "RI" characteristic ("Curve") as in the example here, then the title "Ah" is replaced by the "Charging time" setting.

Both the start and end time can be set for this charging time period. The starting time can be deselected as required; the charging time then bases itself exclusively on the specified charge end time following a manual charge start.

When applying the settings, the user will be guided through the menu in much the same way as a wizard function.

3 Use the "Up/Down" keys to select the desired parameter (e.g. "Cells")


4 Use the "Stop/Start" key to confirm the parameter

5 Use the "Up/Down" keys to set the desired value (e.g. "24" for the number of battery cells)

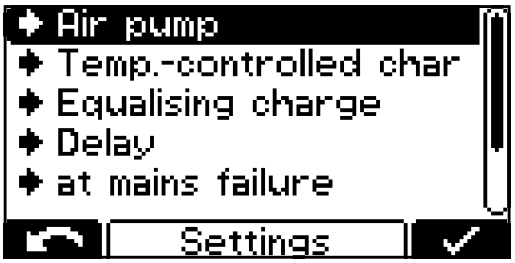

6 Use the "Stop/Start" key to confirm what you have entered

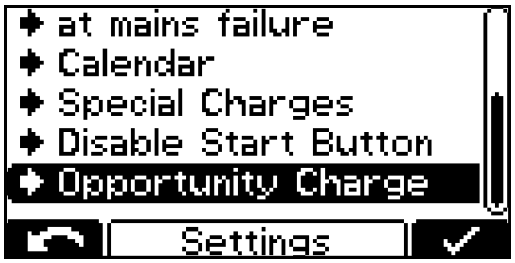
---

**-> Settings**

Below is a detailed description of the "-> Settings" menu item for the "Charging settings" menu item discussed above. Navigation is performed as described in the "Configuration mode" section.

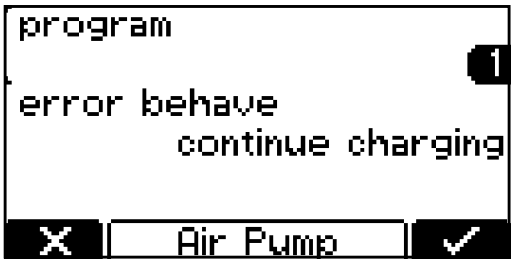
A list appears with the following selection options:



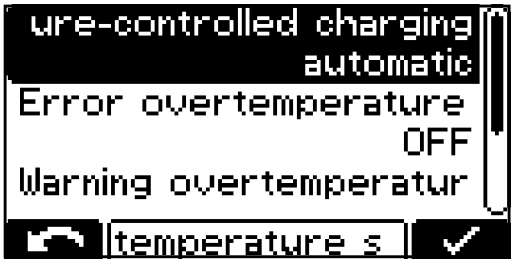

The individual selection options are explained in greater detail below:

Electrolyte circulation ("Air Pump"):




The following settings are available for electrolyte circulation:
- Off:
  - Electrolyte circulation switched off
- Continuous operation ("continuous"):
  - Electrolyte circulation permanently on
- Program 1 to 5:
  - Default electrolyte circulation programs
  - More information on the programs can be found under "Electrolyte circulation" in the "Options" section
- Automatic:
  - Automatic adjustment of the electrolyte circulation as dictated by the situation
- "User" - "On"/"Off":
  - Individual setting of the electrolyte circulation
  - The settings for "On" and "Off" determine the pulse/pause ratio of the air flow intervals

Temperature-controlled charging:




The following settings are available for temperature-controlled charging:
- automatic/OFF/required:
  - automatic ... Temperature-dependent adjustment of the charging characteristic
  - OFF ... The measured battery temperature is not taken into account
  - required ...
    Charging only starts when a temperature sensor is connected
- Error overtemperature ON/OFF:
  - ON ... Error message in the event of battery overtemperature
    Charging process stops and can only be continued once the battery has cooled down and been reconnected
  - OFF ... No error message in the event of battery overtemperature
- Warning overtemperature ON/OFF:
  - ON ... Warning in the event of battery overtemperature
  - OFF ... No battery overtemperature warning

equalising charge ("equalize charge"):
- OFF:
  There is no equalising charge.

- Delay:
  If the battery remains connected to the charger for the duration of the equalising charge delay ("equalize charge delay"), then a special type of charging takes place. This prevents acid stratification.
- Weekday:
  Specify the weekday on which the equalising charge is to take place.

Delay:

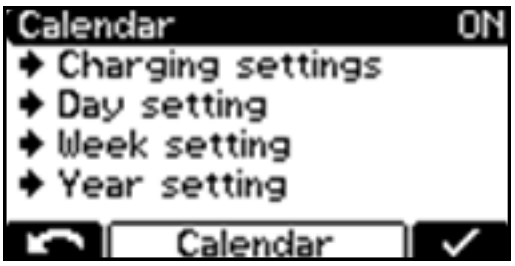
charge start delay:
Delay time (minutes) of actual start of charging relative to the moment when charge start was initiated

charge end delay:
Delay time (minutes) before charge end is signalled (e.g. green indicator) relative to the moment when charging actually stopped

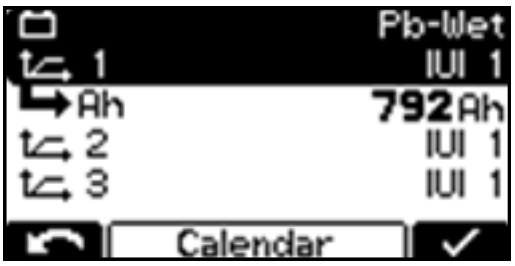
at mains failure restart charging:
If this option is chosen, the charging process is restarted automatically as soon as the mains supply becomes available again after a disruption to the electrical mains supply.

Calendar:

The calendar function allows charging to be started automatically according to the following criteria:
- Time window in which charging may not be started if a battery is connected
- Time window in which charging is to be started using a defined characteristic 1 if a battery is connected
- Time window in which charging is to be started using a defined characteristic 2 if a battery is connected

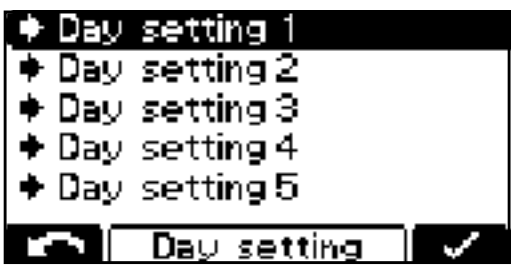



1 To activate the calendar function, select the "ON" setting and confirm




The first menu item "Charging settings" allows three characteristics to be defined:
- Type of battery for every characteristic: e.g. Pb-Wet
- Curve settings when selecting the relevant characteristic

Additional settings can be found under the "Calendar" function:




Day Setting 1-5:

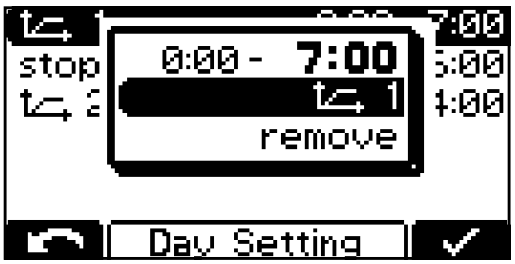
The day settings allow up to five different charging start time profiles to be defined with the following settings:


- Symbol for characteristic 1:
  Time window in which charging is to be started using characteristic 1 (e.g. 0:00-6:00)
- Stop:
  Time window in which charging must not take place (e.g. 06:00-20:00)
- Symbol for characteristic 2:
  Time window in which charging is to be started using characteristic 2 (e.g. 20:00-24:00)

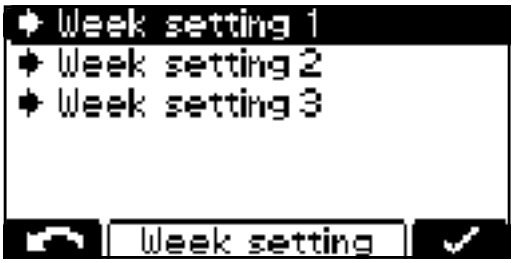
**NOTE!** Ongoing charging operations are unaffected by the set time windows. If in the example above a battery is connected at 05:45, the charge end time is governed according to need and is not interrupted by the end time specified for the set time window (06:00 in the example).

If the battery is connected during the "stop" time window, charging is started automatically during the next time window.

If charging is started manually during the "stop" time window, charging will always take place using characteristic 1.

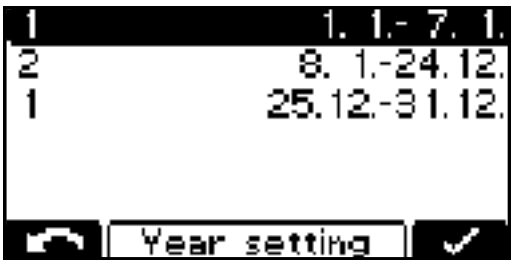



Additional settings:
- Change the allocated characteristic: characteristics symbol
- Remove the selected characteristic: "remove"

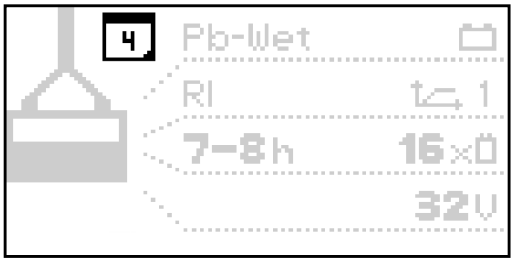



Week Setting:
- Three different week settings can be defined.


A previously created day setting can be assigned to any day of the week.

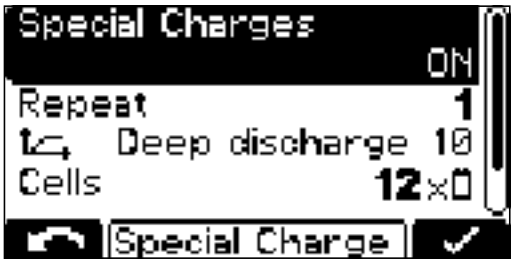



Year Setting:
- Multiple periods throughout the year may be defined, each containing a single week setting (e.g. 1/1 - 7/1).




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

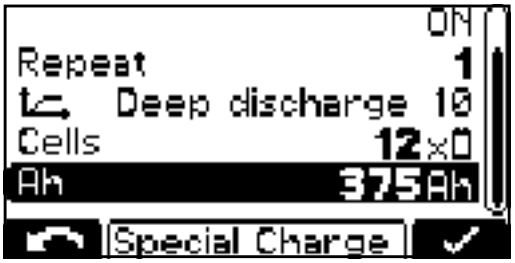
Special Charges:




Selecting "Special Charges" allows one or more of the alternative charging types to be performed temporarily:
- ON: Function activated
- OFF: Function deactivated

The "repeat" setting defines how often the alternative charging mode should be performed until the device reverts to the original charging parameters again:
- Setting range: 1 to 99 repetitions

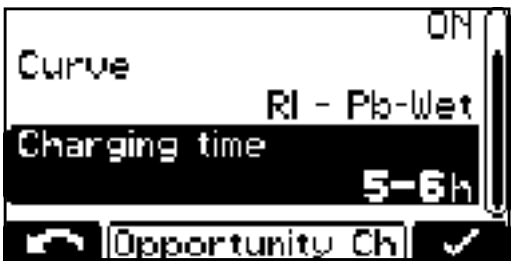
Disable Start Button:
- ON:
  The charging process cannot be started using the "Stop/Start" key; one reason for this is to prevent unauthorised intervention.
- OFF:
  The charging process can be started using the "Stop/Start" key.




The following settings are also possible:
- Characteristic:
  e.g. "Deep discharge 10"
- Number of battery cells:
  "Cells" - e.g. 12x
- Battery capacity in Ah:
  e.g. 375 Ah

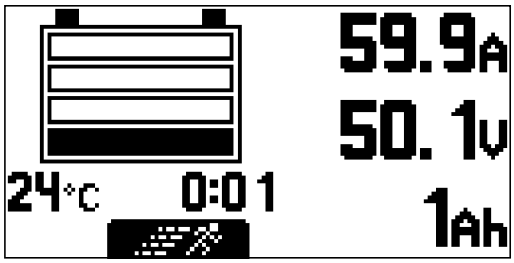
Special function "Opportunity Charge":


To extend the usage interval of a battery, it is possible to re-charge it at a time when it will not be needed, e.g. during scheduled plant shutdowns.
- ON: Function activated
- OFF: Function deactivated



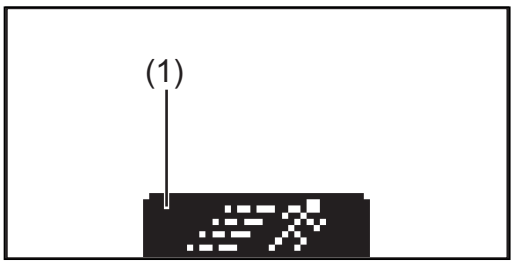

The following curve settings are available:
- Curve - e.g. RI - Pb-Wet
- Charging time - e.g. 5-6 h

When opportunity charging is "ON" and a battery is connected, the following appears:


- Figure on left: display when RI characteristic is selected
- Figure on right: display for other characteristics (e.g. IUI)

To start opportunity charging:
- Use the "Up" key to select the runner symbol (1)





- Figure on left: "Runner symbol" (1)
- Figure on right: indication when opportunity charging starts

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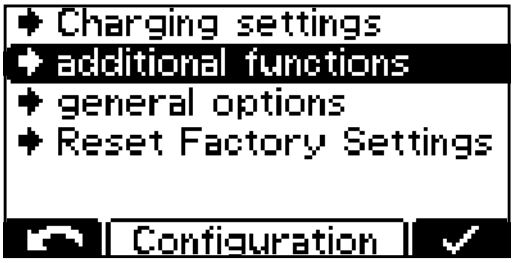
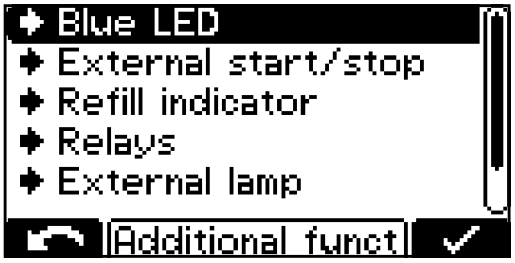
**Additional functions**

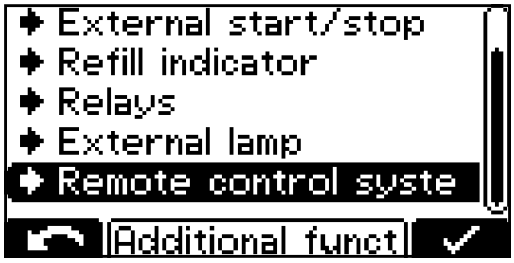
The following contains a detailed description of the "additional functions" menu item in configuration mode. Navigation is performed as described in the "Configuration mode" section.




1 Select the "additional functions" menu item

A list appears with the following selection options:




The individual selection options are explained in greater detail below:

Setting the "Blue LED" indicator:
Time (minutes) that must be allowed to pass before the blue "battery cooled down" indicator should come on to indicate that a battery has cooled down sufficiently. The time from the end of charging is used as the setting.

In conjunction with the "Temperature-controlled charging" option, a temperature value can be set here. The blue "battery cooled down" indicator will light up to signal a sufficiently-cooled battery once the temperature drops below this value.

External start/stop:


The following settings are available when external start/stop is selected:

- Start:
  normal 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

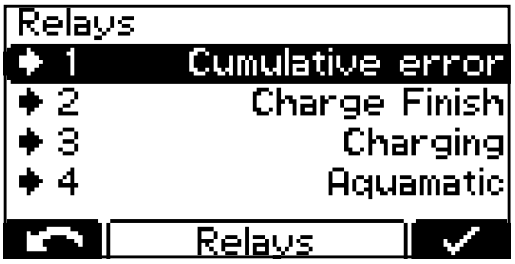
  normal OFF:
  - Charging starts when a battery is connected
- Stop:
  normal ON:
  - Charging is interrupted when an external switch is opened
  - Or when the charging plug is disconnected by opening the auxiliary contacts

  normal OFF:
  - Opening of an external switch or the auxiliary contacts is ignored
- Button:
  The function of the "OK/STOP" key can be simulated using an external button

Refill Indicator:
The refill indicator is a message that appears as soon as the battery needs topping up with distilled water. The time at which refilling is deemed necessary can be defined as follows:

- Every nth week and weekday
  - e.g. top up with water every fortnight on a Friday
- If set to "off", the refilling request does not have to be confirmed

Relay board ("Relays"):



When a relay board has been selected, one of the following functions can be set for each of the 4 terminals (-> 1) to (-> 4), viewed from left to right:

- Aquamatic
  - Signal to activate a solenoid valve, for example
  - "Standard" program with preconfigured factory settings
  - "User" with user-defined settings
  - More information about the Aquamatic control can be found under "Aquamatic control" in the "Options" section.
- Charging
- Charge 50 %
- Charge 80 %
- Charge Finish
- Main Charge Finished
  - Signal to indicate that the main charge phase has finished
- Charging not complete
  - Signal if the battery is prematurely disconnected from the charger
  - Can be set from 1 to 10 s
- Charge OK
  - Battery is being charged or is already fully charged
- Common error ("Cumulative Error"):
  - Signal in the event of an error
  - A power failure can also be displayed as an error if required (setting "ON")
  - Freely-defined text, which could for example include the contact details of the dealer, can be displayed if the device is in an error state. More information can be found in the "USB mode" section.
- Cumulative error + warning
  - In the same way as for the "Cumulative Error" function, the corresponding relay trips as soon as an error or warning is detected
- Signal Lamp:
  - One or more suitable lamps can be connected to the relay board to indicate the state of charge or operating status of the charger.
  - More information can be found under "Signal lamp" in the "Options" section.
- Immobiliser
- ON:
  - The relay picks up permanently as soon as the charger is connected to the mains.
- Refill Indicator:
  - Signals that the battery needs topping up with distilled water.
  - More information can be found under "Additional functions" in the "Display" section.
- Battery Cold
- External Air pump for electrolyte circulation ("External Air Pump")
  - The settings are applied as described under "-> Settings" for the electrolyte circulation (Air Pump)

More information on the relay board can be found in the "Options" section.

External lamp setting ("External lamp"):
as described under "Charging Lights" in the "Options" section, suitable signal lamps can be connected to indicate the state of charge or operating status of the charger. The following settings are available:

- normal (conventional signal lamps)
- RGB (LED strips)

Remote control system:


The contrast for the remote control system can be adjusted.

at mains failure restart charging:
If this option is chosen, the charging process is restarted automatically as soon as the mains supply becomes available again after a disruption to the electrical mains supply.

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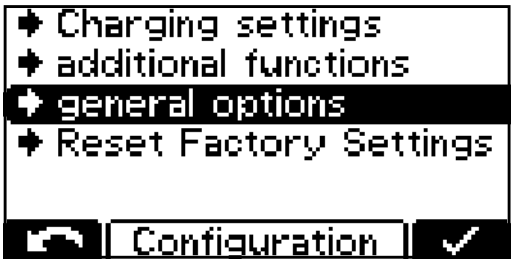
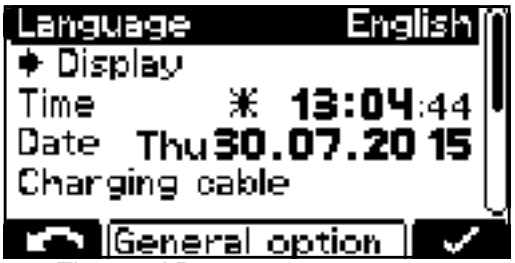
**General options**

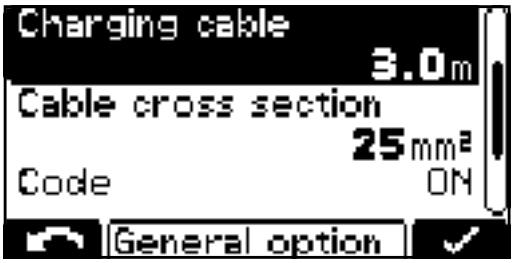
A detailed explanation of the "general options" menu item in configuration mode can be found below. Navigation is performed as described in the "Configuration mode" section.



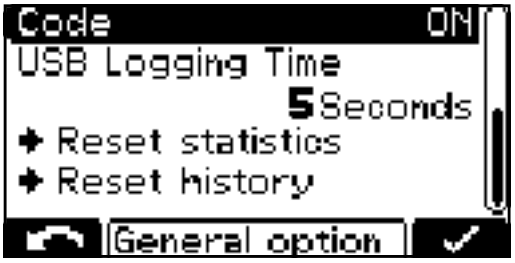

1 Select the "general options" menu item




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 / normal time
  - Predefined time zones
  - User-defined time zones




- Basic length of charging cable in m (Charging Cable)
- Cable cross section (mm²)
- Code entry required / not required to access configuration mode (Code ON / OFF)




- Time interval (s) for recording charging parameters on the USB stick (USB Logging Time)
- Reset statistics
- Reset history

For more detailed information on the statistics and history, please refer to the "Statistics mode" and "History mode" sections.

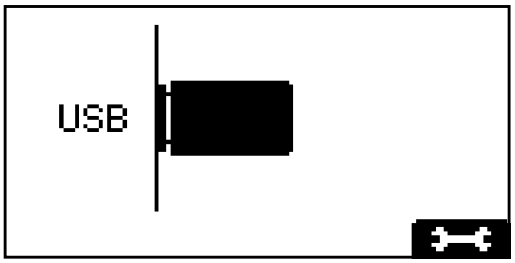
**Reset settings**

The menu item below "General options" offers two alternative ways of resetting all the settings:


Reset Factory Settings:
- Resets to factory settings

Reset Default Settings:
- Resets settings to Fronius defaults

**USB mode**




In USB mode, the display shows whether or not a USB flash drive is connected.

The USB flash drive must conform to the following specifications:
- Formatting: FAT32
- 32 Gigabyte maximum
- No multiple partitioning

The I-SPoT VIEWER software supports the visualisation and evaluation of data on the USB flash drive. The I-SPoT VIEWER software can be found online at the following address: http://www.fronius.com/i-spot.

Only insert the USB flash drive when charging is not in progress or if the charging process has been interrupted.

If the charging process is only interrupted, not completed, it is only possible to read out data. A new update or configuration cannot be loaded.


1 Use the "Stop/Start" key to access the following settings

2 Use the "Up/Down" keys to scroll between the settings


3 Use the "Stop/Start" key to confirm the desired setting

A USB flash drive may be connected while charging is in progress, after the "Stop/Start" key has been pressed. However, this can only be to read out data. An update or new configuration cannot be loaded.

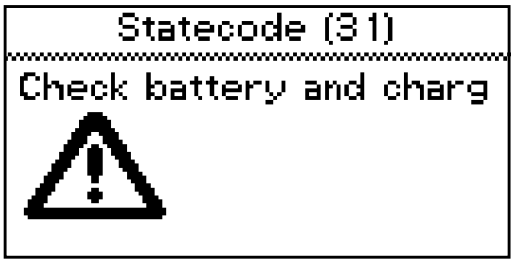

- **Safely remove**
  Safely remove the USB flash drive as soon as the desired action has been completed.
- **Update**
  A list of the suitable update files stored on the USB flash drive opens.
  Select and confirm the desired file in the same way as scrolling through the settings.
  Do not change the automatically assigned file names of the update file!
- **Download**
  The data relating to the logged charging parameters stored in the device's datalogger is saved to the USB flash drive for the I-SPoT VIEWER.
  Additionally, events - such as the device settings and user curves (configuration) - are saved.
  The following time ranges can be selected for the datalogger:
  - 1 month
  - 3 months
  - All
  - Since the last save
- **Download optional**
  The following options are available:
  - I-SPoT VIEWER
    The logged data is saved in the same way as for the "Download" function, but saving only the I-SPoT VIEWER data.
  - Save datalogger
    The logged data is saved in the same way as for the "Download" function, but is saved not in the I-SPoT VIEWER format, but as ".csv" files
    (Automatic folder structure for the ".csv" files: *
    Fronius\<device serial number>\Charges\<yyyymmdd>\<hhmmss.csv>
  - Save events
    Events are saved to the USB flash drive.
  - Save configuration
    The device settings are saved to the USB flash drive.


- **Load configuration**
  Loads onto the device one of the suitable device configurations stored on the USB flash drive
- **Load dealer text**
  A text file can be loaded from the USB flash drive that is displayed as soon as the device enters an error state. The text file can, for example, contain the contact details of

the dealer. The file must be saved on the USB flash drive as a ".txt" file in "unicode" format. The file name must be "dealer.txt". The number of characters is restricted to 99.

* If a USB flash drive is connected while charging is in progress, the .csv files are saved directly to the USB flash drive. The folder structure here is also created automatically and differs due to the presence of the "Datalog" folder instead of the "Charges" folder.

## Status codes




If a fault occurs during operation, specific status codes may be displayed. Faults can result from the following:
- Battery is connected with reverse polarity
- The voltage of the connected battery is unsuitable
- The device has overheated
- There is a software or hardware fault

If an error message appears on the display and if you cannot resolve the error yourself:

1 Note the displayed status code: e.g. "Statecode (31)"

2 Note the configuration of the device

3 Contact After-Sales Service
Freely-defined text, which could for example include the contact details of the dealer, can be displayed if the device is in an error state. More information can be found in the "USB mode" section.

| **Status codes caused by external factors** | |
|---|---|
| **Number** | **Cause** |
| (11) | Mains overvoltage or undervoltage |
| (12) | Phase failure (device continues charging with reduced power) |
| (13) | External temperature sensor faulty |
| (14) | Electrolyte circulation faulty (pressure switch not switching) |

| **Status codes in the event of a battery fault** | |
|---|---|
| **Number** | **Cause** |
| (22) | Battery undervoltage |
| (23) | Battery overvoltage |
| (24) | Battery too hot (with external temperature sensor only) |
| (25) | Battery too cold (with external temperature sensor only) |
| (26) | Cell fault detected |
| (29) | Battery is connected with reverse polarity |

| **Status codes in the event of a charging error** | |
|---|---|
| **Number** | **Cause** |
| (31) | Timeout in I1 phase |

| Status codes in the event of a charging error | |
|---|---|
| **Number** | **Cause** |
| (32) | Timeout in U1 phase |
| (34) | Ah limit exceed |
| (35) | Timeout in I2 phase |
| (36) | Target voltage in I2 phase not reached (with format characteristic only) |
| (37) | Problem with RI charge |
| (38) | Set charging time cannot be reached |

| Status codes in the event of a fault in the primary circuit | |
|---|---|
| **Number** | **Cause** |
| (500) | Module 1 (top) temperature sensor faulty |
| (501) | Module 2 (top) temperature sensor faulty |
| (502) | PCB temperature sensor faulty |
| (503) | Primary overtemperature |
| (504) | Fan blocked/faulty |
| (505) | Intermediate circuit over/undervoltage |
| (506) | Intermediate circuit imbalance |
| (507) | Primary supply voltage outside the tolerance |
| (508) | Power failure |
| (509) | Wrong device configuration |
| (510) | Primary EEPROM faulty |
| (527) | Phase shifter overcurrent |
| (530) | Communication error |
| (532) | Microcontroller error (e.g. Division by 0) |
| (533) | Reference voltage outside the tolerance |
| (534) | Start-up error |
| (535) | PFC overcurrent |
| (536) | Phase shifter or PFC faulty |

| Status codes in the event of a fault in the secondary circuit | |
|---|---|
| **Number** | **Cause** |
| (520) | Secondary temperature sensor faulty |
| (521) | Secondary overtemperature |
| (522) | Output fuse faulty |
| (523) | Secondary supply voltage outside the tolerance |
| (524) | Secondary reference voltage outside the tolerance |
| (525) | Current offset |
| (526) | Current offset outside the tolerance |
| (527) | Power module overcurrent (primary) |
| (529) | No secondary communication |
| (530) | No primary communication |
| (531) | Secondary EEPROM faulty |
| (532) | Microcontroller error (e.g. Division by 0) |
| (537) | Voltage measurement faulty |
| (570) | Secondary relay cannot be switched |

| Status codes in the event of a fault in the secondary circuit | |
|---|---|
| **Number** | **Cause** |
| (571) | ADC/SPI error |

| Status codes in the event of a fault in the controller | |
|---|---|
| **Number** | **Cause** |
| (540) | CFM missing/faulty |
| (541) | No secondary communication |
| (542) | Secondary initialisation failed |
| (543) | Program/memory fault in characteristic control |
| (544) | Program/memory fault in characteristic control |
| (545) | Primary initialisation failed |
| (546) | Update failed |
| (547) | Load/save settings failed |
| (548) | Load/save characteristic settings failed |
| (549) | Charging process could not be continued after a power outage (e.g. due to a fault in the backup battery) |
| (550) | Time not set |
| (551) | Hardware change detected |
| (552) | CFM invalid |

# Options



**Safety**

In order to connect optional components it may be necessary to open the housing. The following warning notices must be obeyed:

**WARNING!** An electric shock can be fatal. The housing must never be opened by anyone other than a service technician trained by the manufacturer. The device must be disconnected from the mains before starting any work with the housing open. A suitable measuring instrument must be used to ensure that electrically charged components (e.g. capacitors) are fully discharged. Use an easily legible and understandable warning sign to ensure that the charger is not reconnected to the mains supply before all the work has been completed.

**WARNING!** Work that is carried out improperly can cause serious injury or damage. All work involved with connecting optional components must only be carried out by qualified specialist technicians. If there are installation instructions or a leaflet for the optional component concerned, then all warning notices and instructions therein must be obeyed.

In the case of all optional components with electrical connections, once the connection work is complete, a safety inspection must be carried out in accordance with relevant national and international standards and directives. Further details on safety inspections can be obtained from your authorised service centre. They will provide you on request with any documents you may require.

**Electrolyte circulation**

**NOTE!** Risk of damage to air pump from the ingress of electrolyte from the battery or from operation without any back pressure. Always set up the charger at least 0.5 m (1 ft. 7.69 in.) above the battery to be charged. Always use an undamaged connecting hose provided specifically for this purpose to connect the charger's compressed air outlet to the battery.

**NOTE!** Failure to observe the permitted mains voltage tolerance can cause malfunctions and damage. For the electrolyte circulation option, a restricted mains voltage tolerance vis-à-vis the charger of 207 V to 250 V applies.

The electrolyte circulation option features an air pump integrated in the charger. This introduces air into the battery through capillary tubes that are provided specifically for this purpose. This allows intensive mixing of the electrolyte to take place. The benefit is reduced heating of the battery, and consequently longer battery-life, plus reduced water loss during charging.

If a pump fault or leaks in the connection with the battery result in a fault being detected, then the status code "Statecode 14" will appear on the display. One way in which this fault can be indicated is by using an external indicator lamp to show a common error.

The electrolyte circulation cycle is controlled by the charger's control system. A number of selection options are available for this purpose in the configuration menu. More information can be found under "Additional functions" in the "Display" section.

The default preconfigured programs 1 to 5 are among these selection options. The relevant parameters for these programs are listed in the table below together with a subsequent explanation.

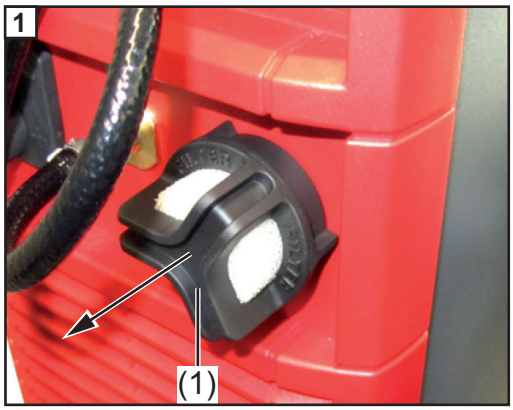
| Program | ON 1 | OFF 1 | Repeat | ON 2 | OFF 2 |
|---|---|---|---|---|---|
| 1 | 30 min | 25 min | 1 x | 5 min | 25 min |

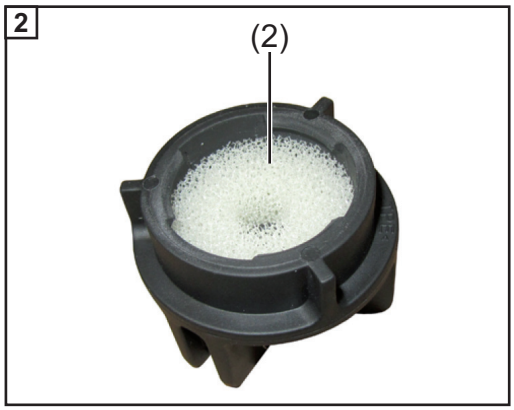
| | | | | | |
|---|---|---|---|---|---|
| 2 | 3 min | 10 min | 4 x | 3 min | 20 min |
| 3 | 3 min | 12 min | 1 x | 3 min | 12 min |
| 4 | 5 min | 10 min | 3 x | 5 min | 20 min |
| 5 | 2.5 min | 7.5 min | 1 x | 2.5 min | 7.5 min |

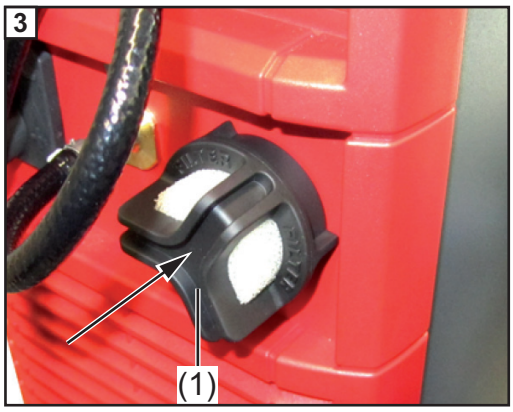
In each of these programs, the solenoid valve opens for a time "ON 1" and closes for a time "OFF 1". This process is repeated for the number of times specified under "Repeat". After this number of repetitions has been completed, the process continues with the "ON 2" and "OFF 2" times until charging is completed.

**Cleaning the air filter insert**

The air filter insert for the integrated air pump should be cleaned once a year. In dusty environments, the cleaning interval should be shortened accordingly. The air filter insert (2) must be removed for cleaning. Remove the air filter (1) by pulling it out and then refit it as follows:



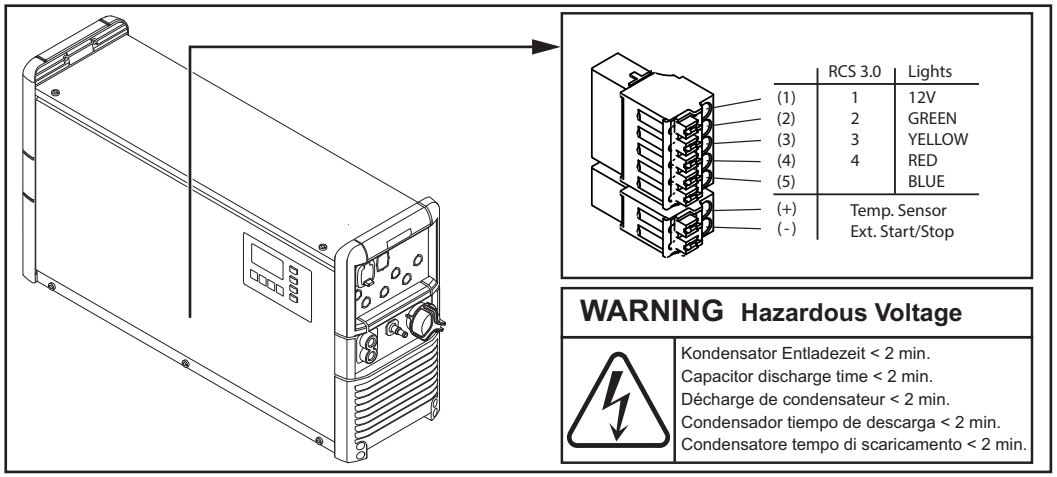




**External start/ stop**

The external start/stop option prevents sparking if the charging plug is disconnected during charging. Dedicated auxiliary contacts inside the plug detect the removal of a shorting jumper in the counterpart before the main contacts have even become separated. This triggers an immediate stop to charging. As a result there is no wear to the main contacts, and this arrangement safeguards more effectively against an oxyhydrogen explosion.

## Charging lights




Suitable signal lamps can be connected to the connections inside the device as illustrated in order to indicate the state of charge or operating status of the charger. Each signal lamp must have a working voltage of 12 V, and the total current drawn by all the lamps must not exceed 0.5 A. Connections (1) to (5) in the Figure are assigned as shown below. It is advisable to use the lamp colours shown below:

| Connection | Function | Colour |
|---|---|---|
| (1) | 12 V power supply | |
| (2) | Battery is fully charged | green |
| (3) | On: battery is being charged<br>Flashing: charging has been interrupted | yellow |
| (4) | An error has occurred (common error) | red |
| (5) | The battery has already cooled down and is ready for use | blue |

If the RGB setting (LED strip) is set in the menu, then connection 3 (YELLOW) is not supported. The normal setting (conventional signal lamp) or RGB (LED strip) for the "External Lamp" function is explained under "Additional functions" in the "Display" section.

## Temperature-controlled charging

The temperature-controlled charging option always adjusts the charging voltage according to the current temperature of the battery. This results in considerably longer battery-life, especially where batteries are used in cold stores.

## CAN card

**WARNING!** Risk of serious injury and damage from using the CAN card for safety-critical functions. Do not use the CAN card for safety-critical functions.

The optional CAN card enables the charger's operating statuses and the connected battery's state of charge to be evaluated externally.

More information on the CAN card can be found in the instructions supplied with the CAN card option.

## Relay board

**WARNING!** Risk of serious injury and damage from using the relay board for safety-critical functions. Do not use the relay board for safety-critical functions.

**NOTE!** Failure to observe the permitted mains voltage tolerance can cause malfunctions and damage. For the relay board option, a restricted mains voltage tolerance vis-à-vis the charger of 207 V to 250 V applies.

The optional relay board enables the charger's operating statuses and the connected battery's state of charge to be evaluated externally. One or more external consumers can also be supplied with 230 V AC. A neutral conductor in the electrical mains supply is a prerequisite for this. The configuration of the relay board outputs is explained in the Operating Instructions for the charger: "Additional functions" in the "Display" section.

More information on the relay board can be found in the instructions supplied with the relay board option.

There follows an overview of the options that are directly connected with the relay board. These relay-connected options are activated through the relay board outputs:

- Aquamatic
- Charging
- Charge 50%
- Charge 80 %
- Charge Finish
- Main Charge Finished
- Charge OK
- Charging not complete
  - Signal if the battery is prematurely disconnected from the charger
- Cumulative error
- Cumulative error + warning
- Signal Lamp
- Immobiliser device
- ON
- Refill indicator
- Battery Cold
- External air pump (electrolyte circulation)

**Aquamatic control**

The Aquamatic control contains the controller for a solenoid valve that automatically tops up the water in the battery to be charged.

- Standard setting:
  - At the start of the recharging phase, the solenoid valve opens for 12 seconds and then closes for 4 seconds
  - This cycle is repeated 26 times
- USER setting:
  - Configurable "ON" time (solenoid valve opens) after the end of the main charge phase

**Charging**

The "Charging" option is suitable for actuating a signal lamp for instance. While charging is in progress, the corresponding relay picks up automatically.

**Charge 50%**

Like the "Main charge finished" function, the relevant relay switches as soon as the battery is 50% charged.

**Charge 80%**

Like the "Main charge finished" function, the relevant relay switches as soon as the battery is 80% charged.

| | |
|---|---|
| **Charging not complete** | The "Charging not complete" option lends itself to the actuation of an audible alarm device, for example. If the battery is disconnected from the charger before the charging process is complete, the relay switches for an adjustable time of 1 to 10 seconds. |
| **Charge finish** | The "Charge finish" option is suitable for actuating a signal lamp for instance. Once the configured charging characteristic is fully completed, the corresponding relay picks up automatically. |
| **Main charge finished** | The "Main charge finished" option is suitable for actuating a signal lamp for instance. When the main charge phase finishes, the corresponding relay picks up automatically. |
| **Common error message** | The "Common error message" option is suitable for actuating a signal lamp for instance. Each time an error is detected, the relevant relay picks up automatically. |
| **Common error + warning** | In the same way as for the "Common error" function, the corresponding relay trips as soon as an error or warning is detected. |
| **Signal lamp** | As an alternative to the charging lights, one or more suitable lamps can be connected to the relay board to indicate the state of charge or operating status of the charger. These lamps can be designed for a voltage of up to 30 V DC or up to 250 V AC on a starpoint-earthed network.<br><br>If the lamp circuit is potential-free, then the switching current must not exceed 4 A. A lamp that is actuated by the 230 V supply relay must be operated with an output current of max. 1 A. |
| **Immobiliser** | If the charger is built into the vehicle as an on-board device, then the optional immobiliser will prevent the vehicle from being started unintentionally whilst charging is taking place. This protects the vehicle, the battery and the charger leads from damage.<br><br>As soon as the vehicle is connected up to the mains supply, the corresponding relay picks up and blocks the ignition signal for instance. Another example is the actuation of a suitable signal lamp to convey the message visually that charging is currently in progress. |
| **Battery cooled down** | The corresponding relay switches automatically once the time set in the menu has passed. |
| **External air pump - electrolyte circulation** | This option enables an external air pump to be activated by a relay contact in the sense of the "electrolyte circulation" option. |

| | |
|---|---|
| **Wall bracket** | The robust wall bracket ensures safe fitting on site. More information can be found in the corresponding Installation Instructions. |
| **Floor bracket** | The robust floor bracket ensures safe fitting on site. More information can be found in the corresponding Installation Instructions. |
| **LED strip** | The LED strip acts as a status indicator and lights up in the same colours as the display elements on the control panel. An LED strip including a diffuser is installed in the gap between the front wall and upper part of the housing. |
| **IP 23** | The IP 23 option increases the IP protection rating of the device from IP 20 to IP 23. More detailed information can be found in the corresponding User Information. |
| **Air filter** | In dusty environments, the air filter prevents the inside of device from becoming dirty. This avoids a possible reduction in power or other problem. More detailed information can be found in the corresponding User Information. |
| **"Mobile" kit** | A carrying strap and handle improve the mobility of the device. |
| **RCS 3.0 remote indication** | The remote indication allows the device to be fully controlled from a distance of up to 30 m (98 ft., 5.1 in.). This option includes a full control panel in an aluminium housing that provides IP42 protection. |

# Technical data



**Selectiva 8 kW**

**WARNING!** An electric shock due to a fault current can be fatal. Nothing other than a type B residual current circuit breaker should ever be used for connecting the device to the mains.

| | |
|---|---|
| Mains voltage (-10% / +30%) [1]<br>Optional: | 3~ NPE 400 V / 50/60 Hz<br>3~ PE 400 V / 50/60 Hz |
| Mains fuse protection [2] | 16 A |
| Minimum mains lead cross section | 2.5 mm² (0.003875 in²) |
| Duty cycle | 100% |
| EMC device class | B |
| Protection class | 1 |
| Max. permitted mains impedance $Z_{max}$ at PCC [3] | none |
| Degree of protection [4] | IP 20 |
| Overvoltage category | III |
| Operating temperature [5] | -20 °C to +40 °C<br>(-4 °F to 104 °F) |
| Storage temperature | -25 °C to +80 °C<br>(-13 °F to 176 °F) |
| Relative humidity | maximum 85% |
| Maximum altitude above sea level | 2000 m (6561 ft.) |
| Marks of conformity | according to rating plate |
| Product standard | EN62477-1 |
| Dimensions l x w x h | 633 x 180 x 344 mm<br>(24.92 x 7.09 x 13.54 in.) |
| Weight (with standard mains and charging leads) | 23 kg (50.71 lb) |
| Pollution level | 3 |

1) The device is approved for operation on neutral-earthed mains networks with a maximum outer conductor nominal voltage of 400 V. A mains voltage tolerance of-10% / +15% applies for the electrolyte circulation and relay board options.

2) If the charger is protected by a 32 A fuse, the thermal stress of the automatic circuit breaker must not exceed 82000 A²s.
The earth leakage current is less than 3.5 mA.

3) Interface to a 230/400 V, 50 Hz public grid

4) For indoor use only, do not expose to rain or snow

5) A high ambient temperature may result in power degradation (derating).

Cable lengths must not exceed 30 m (98 ft. 5.1 in.).

| **Device-specific data** | | | | |
|---|---|---|---|---|
| **Device** | **Max. AC current** | **Max. AC power** | **Nominal voltage** | **Max. charging current** |
| Selectiva 2100 | 11 A | 3900 W | 24 V | 100 A |
| Selectiva 2120 | 12.5 A | 4600 W | 24 V | 120 A |
| Selectiva 2140 | 14.5 A | 5400 W | 24 V | 140 A |
| Selectiva 2160 | 10 A | 6100 W | 24 V | 160 A |

| Device-specific data | | | | |
|---|---|---|---|---|
| **Device** | **Max. AC current** | **Max. AC power** | **Nominal voltage** | **Max. charging current** |
| Selectiva 2180 | 11 A | 6800 W | 24 V | 180 A |
| Selectiva 2200 | 11 A | 6900 W | 24 V | 200 A |
| Selectiva 4060 | 12.5 A | 4600 W | 48 V | 60 A |
| Selectiva 4075 | 15 A | 5700 W | 48 V | 75 A |
| Selectiva 4090 | 11 A | 6800 W | 48 V | 90 A |
| Selectiva 4120 | 14 A | 8800 W | 48 V | 120 A |
| Selectiva 4140 | 15 A | 9500 W | 48 V | 140 A |
| Selectiva 4160 | 15.5 A | 9600 W | 48 V | 160 A |
| Selectiva 8040 | 8.5 A | 5000 W | 80 V | 40 A |
| Selectiva 8060 | 12 A | 7500 W | 80 V | 60 A |
| Selectiva 8075 | 14.5 A | 9100 W | 80 V | 75 A |
| Selectiva 8090 | 14.5 A | 9200 W | 80 V | 90 A |

## Selectiva 16 kW

**WARNING!** An electric shock due to a fault current can be fatal. Nothing other than a type B residual current circuit breaker should ever be used for connecting the device to the mains.

| | |
|---|---|
| Mains voltage (-10% / +30%) [1)]<br>Optional: | 3~ NPE 400 V / 50/60 Hz<br>3~ PE 400 V / 50/60 Hz |
| Mains fuse protection [2)] | 32 A |
| Minimum mains lead cross section<br>Selectiva 8120 / 8140<br>Selectiva 8160 / 8180 | <br>4 mm² (0.0062 in²)<br>6 mm² (0.0093 in²) |
| Duty cycle | 100% |
| EMC device class | B |
| Protection class | 1 |
| Max. permitted mains impedance $Z_{max}$ at PCC [3)] | According to the "Device-specific data" table below |
| Degree of protection [4)] | IP 20 |
| Overvoltage category | III |
| Operating temperature [5)] | -20 °C to +40 °C<br>(-4 °F to 104 °F) |
| Storage temperature | -25 °C to +80 °C<br>(-13 °F to 176 °F) |
| Relative humidity | maximum 85% |
| Maximum altitude above sea level | 2000 m (6561 ft.) |
| Marks of conformity | according to rating plate |
| Product standard | EN62477-1 |
| Dimensions l x w x h | 647 x 247 x 392 mm<br>(25.47 x 9.72 x 15.43 in.) |
| Weight (with standard mains and charging leads) | 36.8 kg (81.13 lb) |
| Pollution level | 3 |

1) The device is approved for operation on neutral-earthed mains networks with a maximum outer conductor nominal voltage of 400 V. A mains voltage tolerance of -10% / +15% applies for the electrolyte circulation and relay board options.
2) The earth leakage current is less than 3.5 mA.
3) Interface to a 230/400 V, 50 Hz public grid
4) For indoor use only, do not expose to rain or snow
5) A high ambient temperature may result in power degradation (derating).

Cable lengths must not exceed 30 m (98 ft. 5.1 in.).

**Device-specific data**

| Device | Max. AC current | Max. AC power | Nominal voltage | Max. charging current | $Z_{max}$ |
|---|---|---|---|---|---|
| Selectiva 8120 | 24.5 A | 14800 W | 80 V | 120 A | 96 mOhm |
| Selectiva 8140 | 28 A | 17200 W | 80 V | 140 A | 82 mOhm |
| Selectiva 8160 | 29.5 A | 18200 W | 80 V | 160 A | 74 mOhm |
| Selectiva 8180 | 29.5 A | 18300 W | 80 V | 180 A | 67 mOhm |

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Under http://www.fronius.com/addresses you will find all addresses of our sales branches and partner firms!