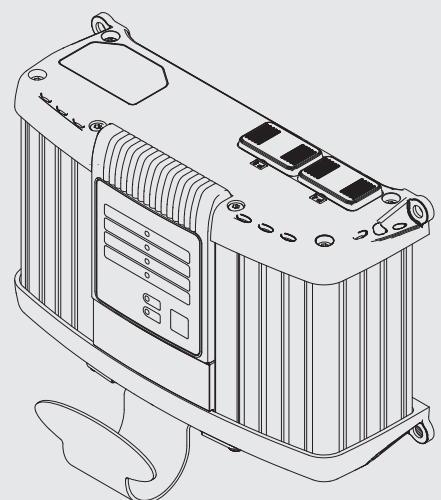


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2015E / 2020E / 2032E / 2040E**

Operating Instructions

Battery charging system

EN





# Dear reader,

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## **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](http://www.fronius.com)".



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# Safety rules

## 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.

## 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

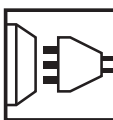


Operation or storage of the device outside the stipulated area will be deemed as "not in accordance with the intended purpose". The manufacturer shall not be liable for any damage resulting from such improper use.

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

---

## Mains connection



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

---

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


- connection restrictions
- criteria with regard to the maximum permissible mains impedance <sup>\*)</sup>
- criteria with regard to the minimum short-circuit power requirement <sup>\*)</sup>

<sup>\*)</sup> 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.

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

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## EMC measures

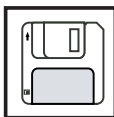


In certain cases, even though a device complies with the standard limit values for emissions, it may affect the application area for which it was designed (e.g. when there is sensitive equipment at the same location, or if the site where the device is installed is close to either radio or television 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.

**Warranty and liability**



The warranty period for the charger is 2 years from the date of invoice. However, the manufacturer will not accept any liability if the damage was caused by one or more of the following:

- Use of the charger "not in accordance with the intended purpose"
- Improper installation and operation
- Operating the charger with faulty protection devices
- Non-compliance with the operating instructions
- Unauthorised modifications to the charger
- Catastrophes caused by the activities of third parties and force majeure

**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.

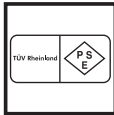
**Safety symbols**



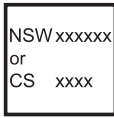
Devices with the CE mark satisfy the essential requirements of the low-voltage and electromagnetic compatibility directives.



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.

---

## Disposal



Do not dispose of this device with normal domestic waste! To comply with the European Directive 2002/96/EC 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 effects on the environment and your health!

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## Copyright



Copyright of these operating instructions remains with the manufacturer.

The text and illustrations are all technically correct at the time of printing. We reserve the right to make changes. The contents of the operating instructions shall not provide the basis for any claims whatsoever on the part of the purchaser. If you have any suggestions for improvement, or can point out any mistakes that you have found in the instructions, we will be most grateful for your comments.

# General information

## Principle



The main feature of the new Active Inverter Technology is intelligent charging. This means that the charging behaviour adapts itself automatically to the age and state of charge of the battery. This innovation extends the battery life and reduces the amount of maintenance required, while at the same time improving cost-effectiveness.

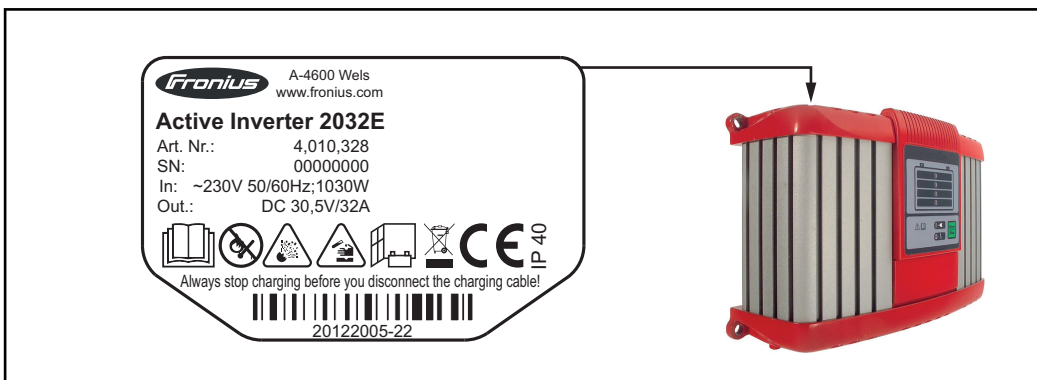
Active Inverter Technology is based on an inverter with active rectification and an intelligent safety cut-out. The charging current and voltage are held constant by a digital control that is not affected by any fluctuations in the mains voltage.







## Device concept

The compact design reduces space requirements and makes portable use considerably easier. Add to this the fact that the active inverters can be used "on-board". In addition to its many existing features, the charger has a modular design that makes it easy to upgrade; it is therefore ideally equipped for future requirements. A wide range of options is available.

## 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.



-  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. Fit device at least 50 cm above the floor.
-  Do not dispose of used chargers with domestic waste. Dispose of them according to safety rules.

# Before commissioning

---

## Safety



**WARNING!** Incorrect operation may result in serious injury or damage. Do not use the functions described here until you have thoroughly read and understood the following documents:

- Operating instructions
- All the operating instructions for the system components, especially the safety rules
- Battery and vehicle manufacturers' operating instructions and safety rules

---

## Proper use

The charger is only suitable for charging batteries as detailed in the accompanying characteristic data sheet. Any use above and beyond this purpose is deemed improper. The manufacturer shall not be held liable for any damage arising from such usage. Proper use also includes

- complying with all the operating instructions
- regular checking of the mains and charger leads



**WARNING!** Charging dry batteries (primary cells) and non-rechargeable batteries can cause serious injury or damage, and is therefore prohibited.

---

## Mains connection

The rating plate, which is located on the housing, contains information about the permitted mains voltage. The device is designed for this mains voltage only. The required fuse protection for the mains lead can be found in the accompanying characteristic data sheet. If there is no mains cable or mains plug on your version of the appliance, fit one that conforms to national standards.



**NOTE!** An inadequately dimensioned electrical installation can cause serious damage. The mains lead and its fuse must be dimensioned to suit the local power supply. The technical data shown on the rating plate applies.

---

## Safety strategy - standard protection devices

The new chargers are not just characterised by purely functional features. In terms of safety, the active inverters are also equipped to the highest standards.

The following safety features come as standard:

- Voltage-free and spark-free terminals protect against explosions
- Reverse polarity protection prevents the battery or charger from being damaged or destroyed
- Short-circuit protection provides effective protection for the charger. The fuse does not need to be replaced in the event of a short circuit
- A charging time monitor provides effective protection against overcharging and destruction of the battery
- Overtemperature protection through derating (charging current reduced if the temperature rises above the permitted level)

# Control elements and connections

## General



**NOTE!** As a result of firmware updates, you may find that there are functions available on your device that are not described in these operating instructions or vice versa. Certain illustrations may also differ slightly from the actual controls on your device, but these controls function in exactly the same way.



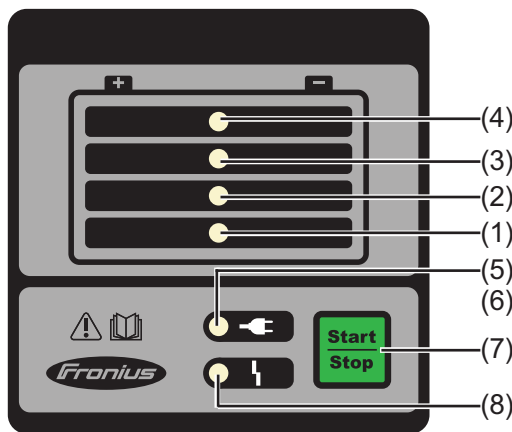
**WARNING!** Operating the equipment incorrectly can cause serious injury and damage. Do not use the functions described here until you have thoroughly read and understood the following documents:

- these operating instructions
- all the operating instructions for the system components, especially the safety rules

## Control panel



**NOTE!** The control panel (LED version) is explained below.



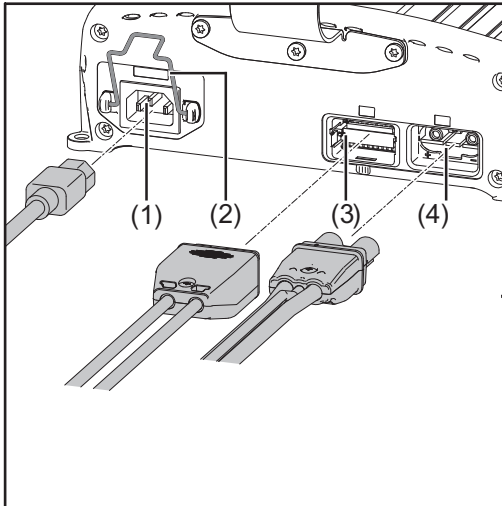
- |     |   |
|-----|---|
| (1) | State of charge indicator 25%                                     |
| (2) | State of charge indicator 50%                                     |
| (3) | State of charge indicator 75%                                     |
| (4) | State of charge indicator 100%                                    |
| (5) | Ready indicator   |
| (6) | -   |
| (7) | Start/Stop and setup button                                       |
|     | - for interrupting and restarting charging                        |
|     | - for selecting the characteristic type (press and hold for 10 s) |
| (8) | Error indicator   |

## Plugging in options



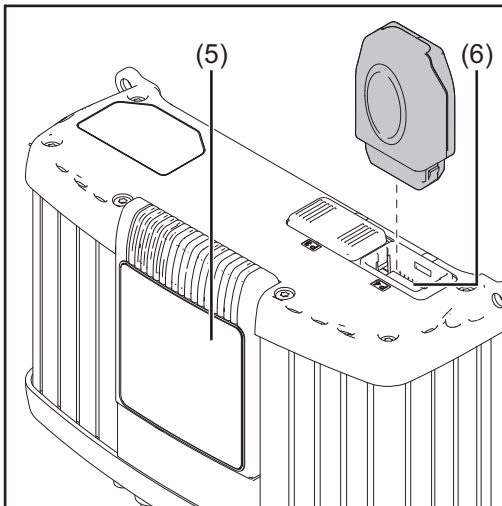
**NOTE!** Danger of damage to charger and accessories. Only plug in options and system add-ons when the mains plug is unplugged and the charging cables are disconnected from the battery.

## Connections



Bottom of housing

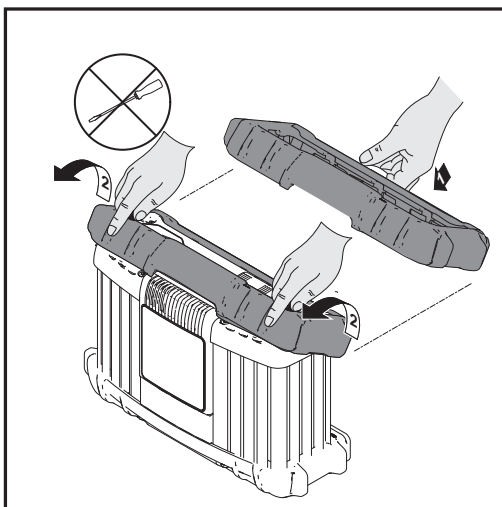
No.	Function
(1)	AC input - mains socket
(2)	Mains cable safety bow for fitting the mains cable
(3)	Connection P2 - I/O port for options on the I/O port
(4)	Connection P1 - charger lead socket also for external stop and temperature-controlled charging options



Top of housing

No.	Function
(5)	Display
(6)	Connection P4 - Multi Port for connecting a status lamp, USB dongle

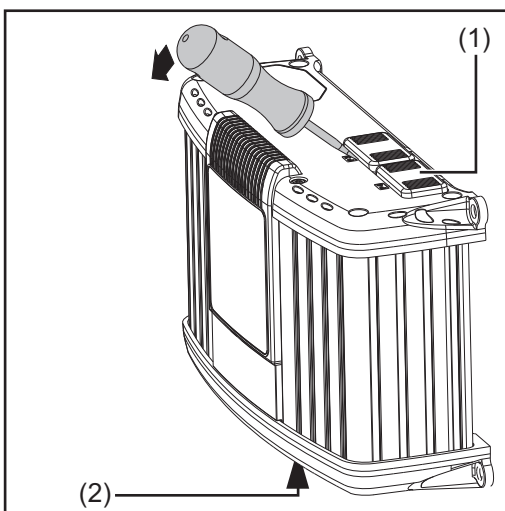
## Edge guard option



**NOTE!** The edge guard removal process is the reverse of the fitting process.



**Removing covers  
for connections  
and options**



- If necessary, use a screwdriver to remove:
- Cover (1) for connection P4 - Multi Port
  - Cover (2) for connection P2 - I/O port

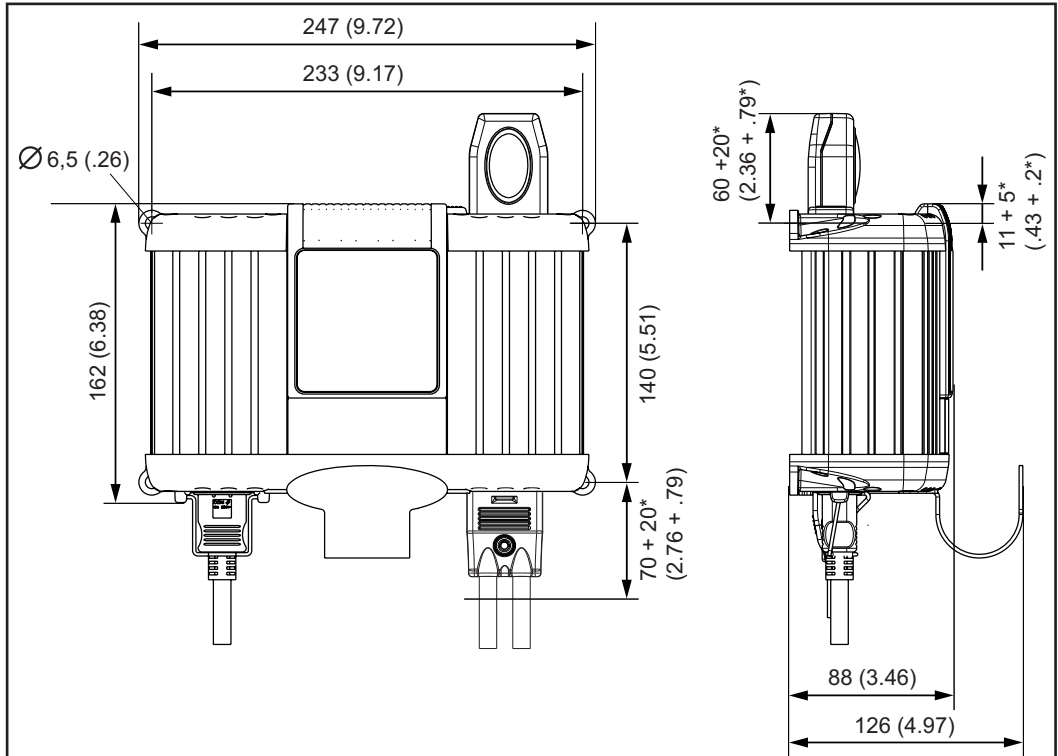
Leave covers (1) and (2) in place on unused P2 and P4 connections.

## Installation

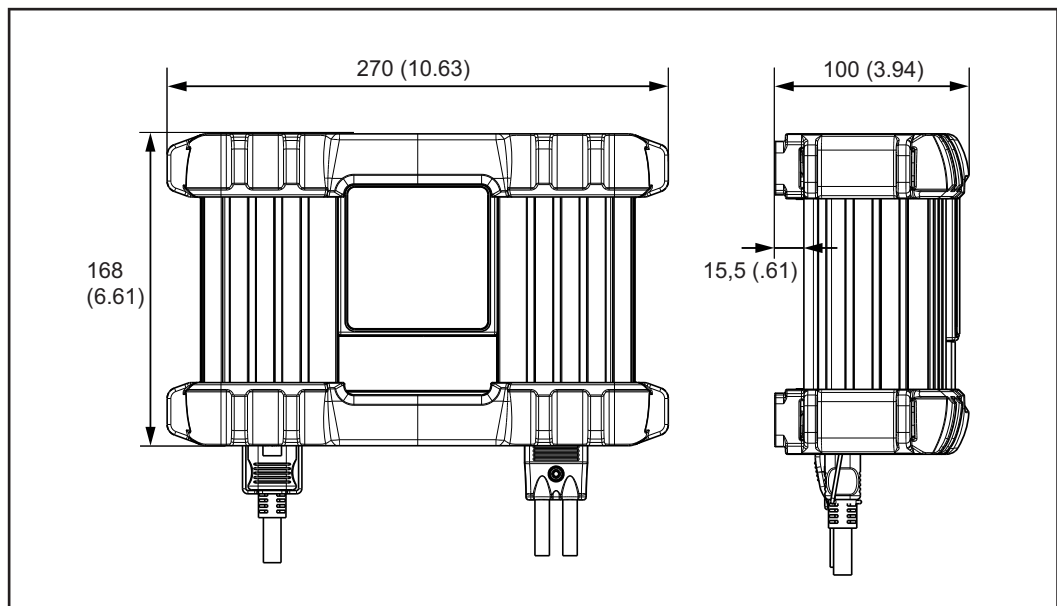
If installing the charger on a firm base, use the drilling template enclosed in the packaging.

If the charger is installed in a switch cabinet (or a similar sealed area), then forced-air ventilation must be provided to ensure adequate heat dissipation. There must be a clearance of 10 cm (3.94 in.) all around the charger.

The space requirement measurements in mm (inches) illustrated below are given to ensure that there is easy access to the plug connections:

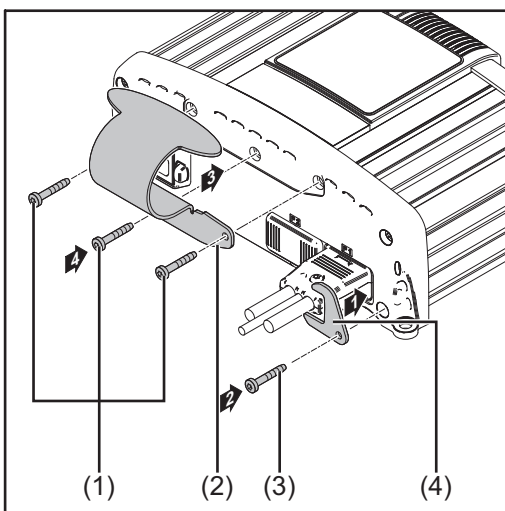


*\*Space for installation/removal*



*Space requirements with edge protector (\*Space for installation/removal)*

**Fitting the optional bracket and strain relief device for the charger lead**



**IMPORTANT!** The torque for all screws is 2.5 Nm.

To fit the bracket:

- Undo screws (1)
- Fit bracket (2) using the previously removed screws

To fit the strain-relief device:

- Undo screw (3)
- Fit charger lead strain relief device (4) using the previously undone screw

# Charging the battery

## Starting charging



**CAUTION!** Danger of damage if attempting to charge a faulty battery or using the incorrect charging voltage. Before beginning charging, ensure that the battery to be charged is fully functional and the charging voltage of the device matches the battery voltage.

- 1 Connect the mains cable to the charger and plug into the mains
- 2 Charger is on standby. Ready indicator lit
- 3 Select characteristic type according to the battery to be charged

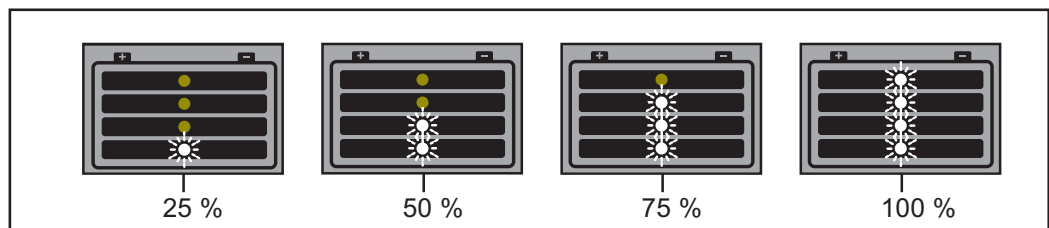


**NOTE!** Information on which characteristic type to select can be found in the "Set-up menu" section or the enclosed characteristic data sheet.

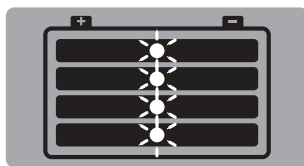


**WARNING!** Danger of serious injury or damage from incorrectly connected charging plugs. Connect charger leads to correct poles and ensure proper electrical connection to the battery poles.

- 4 If using the vehicle power supply, switch off the ignition and all other devices consuming power
- 5 Connect the red charger lead to the positive pole (+) on the battery
- 6 Connect the black charger lead to the negative pole (-) on the battery
- 7 Charging begins automatically after approx. 2 seconds
- 8 A set of four LEDs shows the battery's state of charge



- 9 Conservation charging: once the battery is fully charged, the charger automatically switches to conservation charging to prevent the battery from self-discharging. The battery can remain connected to the charger for any length of time.



## Finishing charging



**CAUTION!** Risk of sparks if the charging plugs are disconnected too soon. Press the Start/Stop button to finish charging.

- 1 Press the Stop/Start button to complete charging
- 2 Disconnect the black charger lead from the negative pole (-) on the battery
- 3 Disconnect the red charger lead from the positive pole (+) on the battery

---

## Interrupting charging



**NOTE!** Risk of damage to connection sockets and connecting plugs. Do not disconnect or unplug charger leads while charging.

- 1 Press the Stop/Start button while charging
  - The process is interrupted
  - **Ready** indicator flashes
  
- 2 Press the Stop/Start button again to continue charging

# Setup menu

---

**General remarks** Select the characteristic type in the Setup menu depending on either the battery to be charged or the requirement as specified in the accompanying characteristic data sheet.

---

## Accessing the Setup menu



**NOTE!** Do not connect the charger lead to the battery. A characteristic type cannot be selected when the charging plugs are connected.

- 1 Connect the mains cable to the charger and plug into the mains
- 2 Charger is on standby - ready indicator is lit
- 3 Press and hold the Start/Stop button for approx. 10 seconds to call up the Setup menu
- 4 Ready indicator goes out. The charger is in Setup mode. The display also shows the selected characteristic type



## Selecting the characteristic type

- 1 Press the Start/Stop button to select the characteristic type according to the enclosed characteristic data sheet
- 2 If there is no further selection within 10 seconds, the selected characteristic type is saved.



**NOTE!** Do not connect a battery during these 10 seconds.

Continue as described in the "Charging the battery" section.



- 4 Ready indicator lights up. Once the new characteristic type has been selected, the charger is automatically ready for the next charging sequence.

# Troubleshooting

## Safety



**WARNING!** An electric shock can be fatal. Before opening the device:

- Unplug the device from the mains
- Disconnect battery connection
- Put up an easy-to-understand warning sign to stop anybody inadvertently switching it back on again
- Using a suitable measuring instrument, check to make sure that electrically charged parts (e.g. capacitors) have been discharged



**CAUTION!** Failure to connect a correctly-dimensioned earth lead may result in serious injury or damage. The housing screws provide a suitable PE conductor connection for earthing (grounding) the housing and must NOT be replaced by any other screws that do not provide a reliable PE conductor connection.

## Protection devices

### Ready indicator flashing, error indicator flashing:



Cause: Mains fault - mains voltage outside the tolerance range  
Remedy: Check mains conditions

### Ready indicator lit, error indicator flashing:



Cause: Short circuit on the charging plug or charger lead. Short circuit detection active  
Remedy: Check charger leads, contacts and battery poles

Cause: Battery overvoltage or undervoltage  
Remedy: Select correct charging characteristic/function, or set correct battery voltage

### Ready indicator flashing, error indicator lit:



Cause: Polarity reversal of charger leads. Reverse polarity protection has tripped.  
Remedy: Connect battery poles correctly

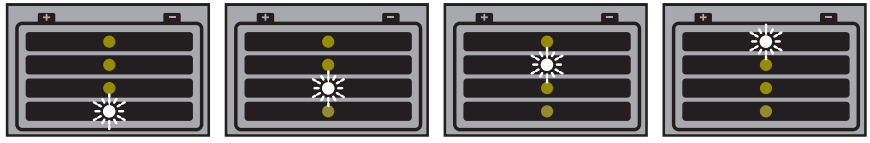
### Charger switches off during charging:

Cause: Ambient temperature too high. Overtemperature protection active  
Remedy: Allow device to cool down. Charging will recommence automatically once the device has cooled sufficiently. If not, have it checked by a workshop.

---

## Charging errors

Ready indicator lit, error indicator flashing, SOC indicator 1/2/3/4 flashing:



Cause: Timeout in the corresponding charging phase or battery capacity too high

Remedy: Select correct characteristic type according to the enclosed characteristic data sheet and charge again

Cause: Battery faulty (cell short circuit, heavy sulphation)

Remedy: Check battery and replace if necessary

Cause: Optional external temperature sensor has tripped due to over- or under-temperature

Remedy: Allow battery to cool, or charge battery in a more suitable area

---



# Technical data

---

**Explanation**

The technical data can be found on the characteristic data sheet enclosed with the charger.

# Fronius Worldwide - [www.fronius.com/addresses](http://www.fronius.com/addresses)

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<http://www.fronius.com>

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