# Fronius IG Plus

## 35 / 50 / 70 / 100 / 120 / 150

GB Operating Instructions

Inverter for grid-connected photovoltaic systems



42,0426,0062,EA 03/2009

# Dear reader,

USA

**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 familiarize 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.

# Safety rules

## Safety Rules Explanation

**DANGER!** Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

**WARNING!** Indicates a potentially hazardous situation which, if not avoided, will result in death or serious injury.

**CAUTION!** Indicates a potentially harmful situation which, if not avoided, may result in minor and moderate injury or property damage.

**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," special care is required.

## General

The device is manufactured using state-of-the-art technology and according to recognized 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 operator,
- inefficient operation of the device

All persons involved in commissioning, maintaining and servicing the device must

- be suitably qualified,
- have knowledge of and experience in dealing with electrical installations and
- 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 kept in a legible state
- must not be damaged/marked
- 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" in the operating instructions for the device.

Before switching on the device, remove any faults that could compromise safety.

**Your personal safety is at stake!**

**Utilization in Accordance with "Intended Purpose"**



The device is to be used exclusively for its intended purpose.

Utilization for any other purpose, or in any other manner, shall be deemed to be "not in accordance with the intended purpose." The manufacturer shall not be liable for any damage resulting from such improper use.

Utilization in accordance with the "intended purpose" also includes

- carefully reading and obeying all the instructions and all the safety and danger notices in the operating instructions
- performing all stipulated inspection and servicing work
- installation as specified in the operating instructions

The following guidelines should also be applied where relevant:

- Regulations of the power supply company regarding energy fed into the grid
- Instructions from the solar module manufacturer

**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 is not responsible for any damages resulting from unintended use.

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

**Qualified Service Engineers**



The servicing information contained in these operating instructions is intended only for the use of qualified service engineers. An electric shock can be fatal. Do not perform any actions other than those described in the documentation. This also applies to those who may be qualified.



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 authorized personnel.



Maintenance and repair work must only be carried out by authorized personnel.

It is impossible to guarantee that externally procured parts are designed and manufactured to meet the demands made on them, or that they satisfy safety requirements. Use only original replacement parts (also applies to standard parts).

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

Components that are not in perfect condition must be changed immediately.

**Safety Measures at the Installation Location**

When installing devices with openings for cooling air, ensure that the cooling air can enter and exit unhindered through the vents. Only operate the device in accordance with the degree of protection shown on the rating plate.

**Data Regarding Noise Emission Values**



The inverter generates a maximum sound power level of < 80 dB(A) (ref. 1 pW) when operating under full load in accordance with IEC 62109-1.

The device is cooled as quietly as possible with the aid of an electronic temperature control system, and depends on the amount of converted power, the ambient temperature, the level of soiling of the device, etc.

It is not possible to provide a workplace-related emission value for this device, because the actual sound pressure level is heavily influenced by the installation situation, the power quality, the surrounding walls and the properties of the room in general.

**EMC Device Classifications**



Devices with emission class A:

- are only designed for use in an industrial setting
- can cause grid-bound and emitted interference in other areas

Devices with emission class B:

- satisfy the emissions criteria for residential and industrial areas. This also applies to residential areas in which power is supplied from the public low-voltage grid.

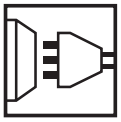
EMC device classification as per the rating plate or technical data

**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 operator is obliged to take appropriate action to rectify the situation.

**Grid Connection**



High-performance devices (> 16 A) can affect the voltage quality of the grid because of a high output current in the main supply.

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

- connection restrictions
- criteria with regard to maximum permissible mains impedance *)
- criteria with regard to minimum short-circuit power requirement *)

*) at the interface with the public grid

see Technical Data

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

**Electrical Installations**



Electrical installations must only be carried out according to relevant national and local standards and regulations.

**Protective Measures against ESD**



Danger of damage to electrical components from electrical discharge. Suitable measures should be taken to protect against ESD when replacing and installing components.

**Safety Measures in Normal Operation**



Only operate the device when all protection devices are fully functional. If the protection devices are not fully functional, there is a risk of

- injury or death to the operator or a third party,
- damage to the device and other material assets belonging to the operator,
- inefficient operation of the device

Any safety devices that are not functioning properly must be repaired by authorized personnel before the device is switched on.

Never bypass or disable protection devices.

**Safety Symbols**



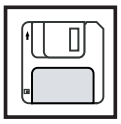
Devices with the CE marking satisfy the essential requirements of the low-voltage and electromagnetic compatibility directives. (Further details can be found in the appendix or the chapter entitled "Technical data" in your documentation.)

**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 be returned to your dealer, or find out about the approved collection and recycling facilities in your area. Ignoring this European Directive may have potentially adverse affects on the environment and your health!

**Backup**



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

**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.

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# General Information

# Protection of Persons and Equipment

USA

**Safety**

**WARNING!** If the equipment is used or tasks are carried out incorrectly, serious injury or damage may result. Only qualified personnel are authorized to install your inverter and only within the scope of the respective technical regulations. It is essential that you read the "Safety regulations" chapter before commissioning the equipment or carrying out maintenance work.

**Protection of Persons and Equipment**

The design and function of the inverter offer a maximum level of safety, both during installation as well as operation.

The inverter provides operator and equipment protection through:

a) galvanic isolation
b) monitoring the grid

**Galvanic (Electrical) Isolation**

The inverter is equipped with a high frequency transformer that ensures galvanic isolation between the DC side and the grid, thus ensuring the highest possible safety.

**Monitoring the Grid**

Whenever conditions in the electric grid are inconsistent with standard conditions (for example, grid switch-off, interruption), the inverter will immediately stop operating and interrupt the supply of power into the grid.

Grid monitoring is carried out using:

- Voltage monitoring
- Frequency monitoring
- Monitoring islanding conditions

# The Fronius IG Plus Unit in the PV System

**General**

The solar inverter is the highly complex link between the solar modules and the public grid.

**Tasks**

The main tasks of the inverter include:

- Converting DC to AC current
- Fully automatic operational management
- Display function and data communication

**Converting DC to AC Current**

The inverter transforms the direct current generated by the solar modules into alternating current. This alternating current is fed into your home system or into the public grid and synchronized with the voltage that is used there.

**IMPORTANT!** The inverter has been designed exclusively for use in grid-connected photovoltaic systems. It cannot generate electric power independently of the grid.

**Fully Automatic Operational Management**

The inverter is fully automatic. Starting at sunrise, as soon as the solar modules generate enough power, the automatic control unit starts monitoring voltage and frequency. As soon as there is a sufficient level of irradiance, your solar inverter starts feeding energy to the grid.

The inverter control system ensures that the maximum possible power output is drawn from the solar modules at all times.
This function is called MPPT (Maximum Power Point Tracking).

As dusk starts and there is no longer sufficient energy available to feed power into the grid, the inverter unit shuts down the grid connection completely and stops operating. All settings and recorded data are saved.

**Display Function and Data Communication**

The display on the inverter is the interface between the inverter and the operator. The design of the display is geared towards simple operation and providing continuous access to system data.

The inverter is equipped with basic logging functions for recording minimum and maximum data on a daily, yearly, and cumulative basis. These values are shown on the display.

A wide choice of data communication products allows for many possibilities of recording and viewing data.

**System Upgrade**

The inverter is designed for various system upgrades, e.g.:

- Upgrades that enable the inverter to communicate with external system upgrades as well as with other inverters
- Datalogger (when using a PC to record and manage data from your photovoltaic system), includes Datalogger and a modem interface

- Various large-format displays
- Fronius Personal Display
- Actuators (e.g.: relays, alarms)
- Interface cards

System upgrades are available as plug-in cards.

**Forced Ventilation**

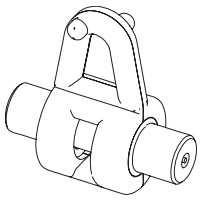
The inverter's temperature-controlled, variable-speed fan with ball-bearing support provides:

- optimal inverter cooling
- efficiency increases
- cooler components, thus improving service life
- least possible energy consumption and lowest possible noise level
- weight reduction due to a reduction of the cooling element surface

**100 kohm Grounding Kit Option**

Along with the solar module ground on the positive or negative pole, solar modules can also be grounded with high resistance on the positive or negative pole.

This requires the 100 kohm Grounding Kit option, which is inserted into the corresponding fuse holder similar to a regular fuse for the solar module ground.



Grounding Kit 100 kOhm

**Power Derating**

Should there be insufficient heat dissipation in spite of the fan operating at maximum speed (for example, inadequate heat transfer away from the heat sinks), the power will be derated to protect the inverter when the ambient temperature reaches 40 °C and above.

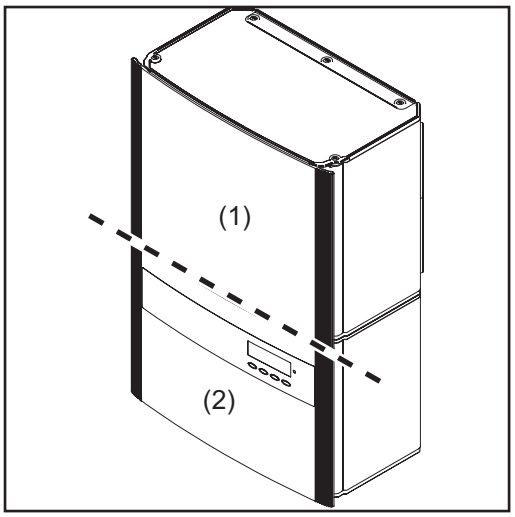
Derating the power reduces the output of the inverter for a short period sufficient to ensure that the temperature will not exceed the permissible limit.
Your inverter will remain ready for operation as long as possible without any interruption.

# Installation and Startup

# Fronius IG Plus Installation and Connection

USA

**Fronius IG Plus Construction**




The power stage set and the connection area are separated from each other for delivery.

(1) Power stage set(s)

(2) Connection area

**Overview**

'Fronius IG Plus Installation and Connection' contains the following sections:

- Choosing the Location
- Fronius IG Plus Connection Options
- Knockouts on the Fronius IG Plus
- Fronius IG Plus Installation
- Connecting the Fronius IG Plus to the Public Grid (AC)
- Connecting Solar Module Strings to the Fronius IG Plus (DC)
- Closing Fronius IG Plus

# Choosing the Location

**Choosing the Location, General**

Please note the following criteria when choosing a location for the inverter:

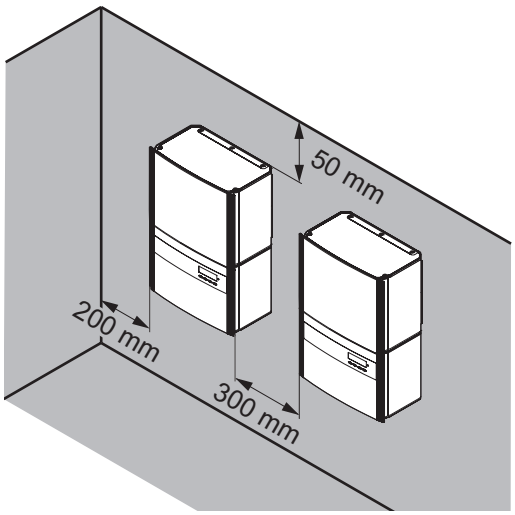
It should only be installed on a stable, vertical wall

Max. ambient temperatures: -20 ? / +50 ?

Relative humidity: 0 - 95 %

For use at altitudes above sea level: up to 2000 m

- There should be a 200 mm (7.8 in) clearance on both sides of the inverter for the cool air vents.
- Maintain a side distance of 300 mm (11.8 in) between individual inverters.




The air flow direction within the inverter is from right to left (cold air intake on right, hot air exit on left).

When installing the inverter in a switch panel cabinet (or similar closed environment), it is necessary to make sure that the hot air that develops will be discharged by forced ventilation.

The inverter is designed for installation both indoors and outdoors.

**Choosing a Location for Inside Installation**

During certain operation phases the inverter may produce a slight noise. For this reason it should not be installed in an occupied living area.

Do not install the inverter in:

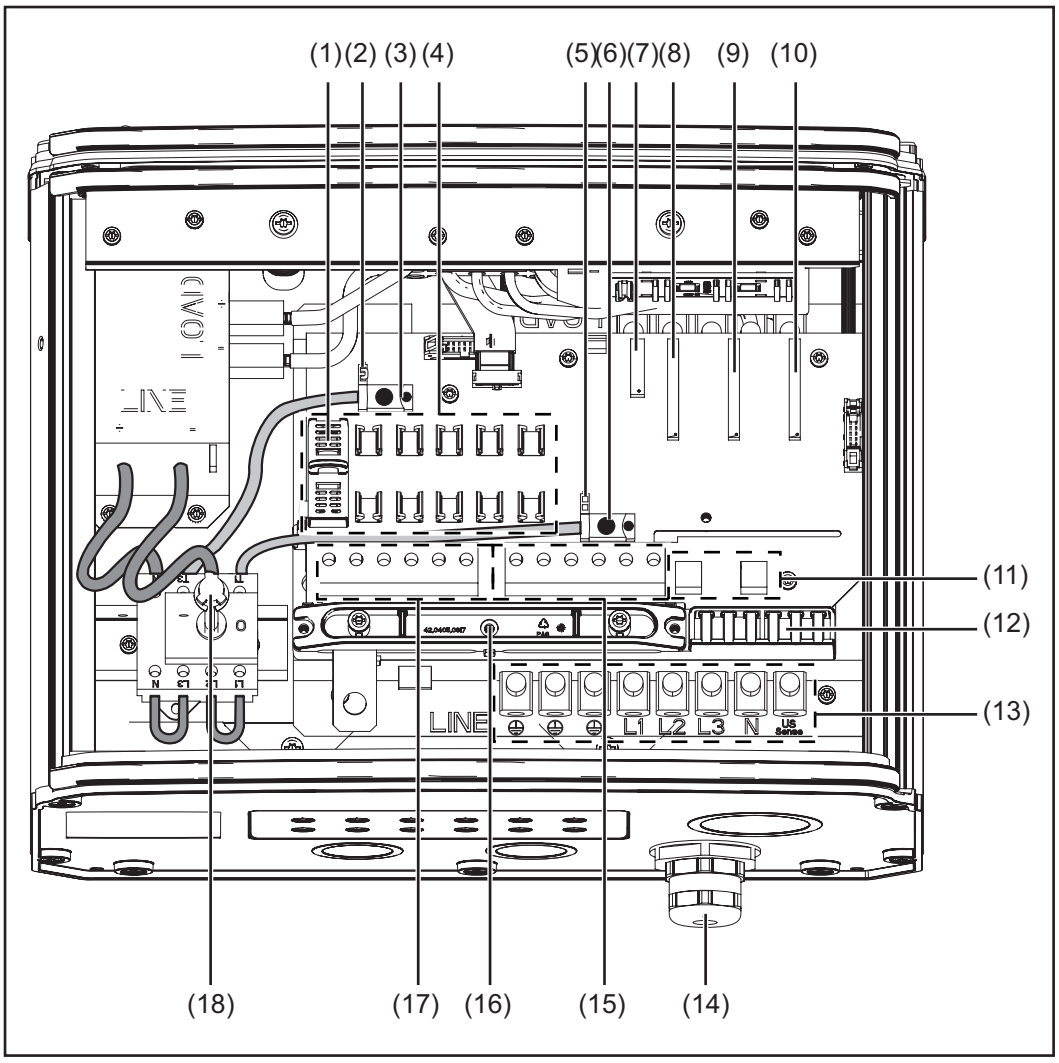
- areas with large amounts of dust
- areas with large amounts of conducting dust particles (e.g., iron filings)
- areas with corrosive gases, acids or salts
- areas where there is an increased risk of accidents, e.g., from farm animals (horses, cattle, sheep, pigs, etc.)
- stables or adjoining areas
- storage areas for hay, straw, chaff, animal feed, fertilizers, etc.
- storage or processing areas for fruit, vegetables or winegrowing products
- areas used in the preparation of grain, green fodder or animal feeds
- greenhouses

**Choosing a Location for Outside Installation**

| |
|---|
| Because of its protection class, the inverter is not susceptible to splash water from any direction. |
| In order to protect the display, the inverter should not be exposed to direct sunlight. Ideally, the inverter should be installed in a protected location, e.g., near the solar modules or under a roof overhang. |

# Fronius IG Plus Connection Options

**Fronius IG Plus Connection Options**




| Item | Description |
|---|---|
| **(1)** | Fuse cover (6 x for string fuses, 1 x for the solar module ground fuse) |
| **(2)** | Jumper slot SMON |
| **(3)** | DC+ main switch cable |
| **(4)** | 6 DC+ fuse holders |
| **(5)** | Jumper slot SMOFF |
| **(6)** | DC- main switch wire |
| **(7)** | Plug-in card for country setup (IG Brain) |
| **(8)** | Open card slot for an option card |
| **(9)** | Open card slot for a second option card |
| **(10)** | Open card slot for a third option card |
| **(11)** | Fuse holder for the solar module ground |
| **(12)** | Strain relief device for plug-in card cable |

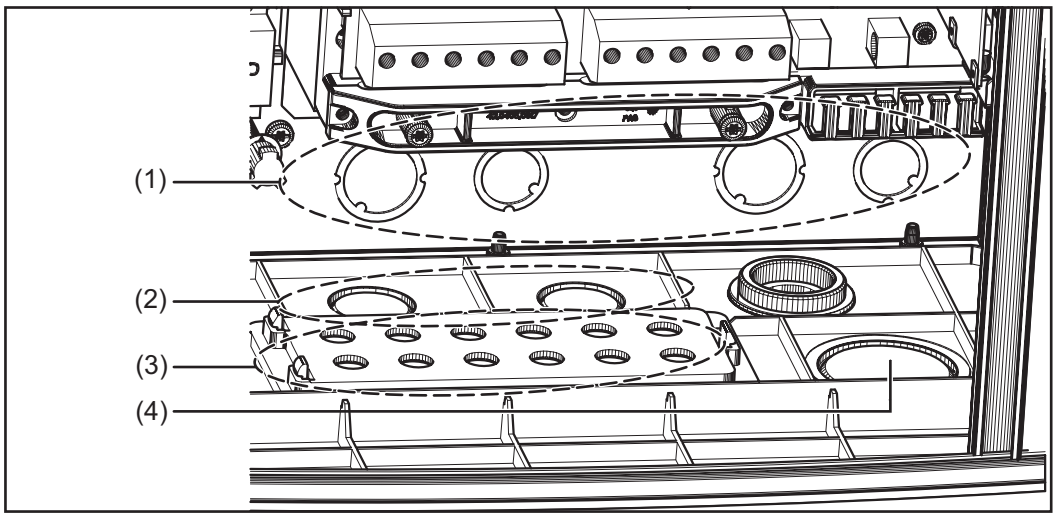
| | |
|---|---|
| **(13)** | AC-side terminals |
| **(14)** | Metric screw joint M32 or M40 (AC connection) |
| **(15)** | 6 DC- terminals |
| **(16)** | Strain relief for solar module strings |
| **(17)** | 6 DC+ terminals |
| **(18)** | DC main switch |

# Knockouts on the Fronius IG Plus

**General**

The inverter contains several knockouts of different sizes. When knocked out, the openings are used for the inputs of various wires.

**Knockouts on the Fronius IG Plus for Wire Inputs**




| Item | Description |
|---|---|
| **(1)** | 4 back cable inputs<br>Diameter 34.5 / 28 and 28 / 22.5 mm<br>Cable openings that lead through the back into the inverter.<br><br>**NOTE!** When using back cable inputs:<br>- seal to degree of protection IP45 before outdoor operation<br>- use an edge guard to avoid damaging the cables |
| **(2)** | 2 cable inputs for M32 metric screw joint<br>(for DC cable with a cable cross section > 16 mm²) |
| **(3)** | 12 cable inputs for 6 solar module strings DC<br>(for a cable diameter of 5 - 9.2 mm) |
| **(4)** | Cable input for plug-in card |

**Removing Knockouts**

The knockouts made from plastic as well as the larger ones made from metal should only be removed from the outside in.

The smaller knockouts made from metal should be removed from the inside out.

You should only remove the number of knockouts required for the available cables (e.g., 6 openings for 3 module strings).

The plastic knockouts are also equipped with centering holes so that they can be drilled out if required.

# Fronius IG Plus Installation

USA

**Fitting Wall Bracket**

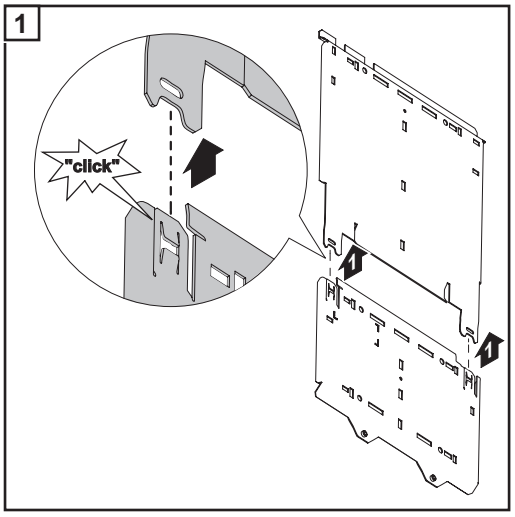
**IMPORTANT!** Depending on the surface, different dowels and screws may be required for installing the wall bracket. Therefore, these dowels and screws are not part of the scope of supply for the inverter. The system installer is responsible for selecting the proper dowels and screws.

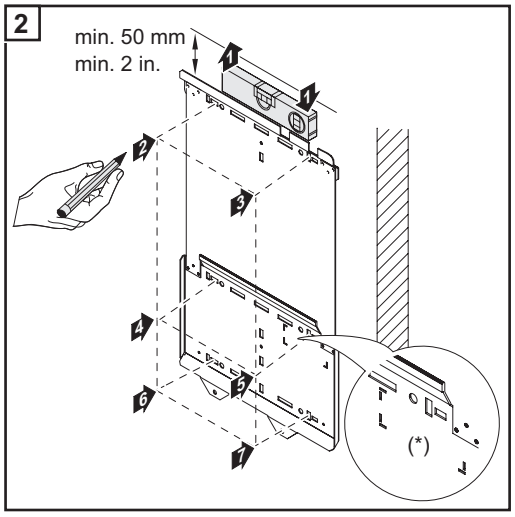
**NOTE!** The Fronius IG Plus should only be installed upright on the wall.

**Only for Fronius IG Plus 120 / 150:**

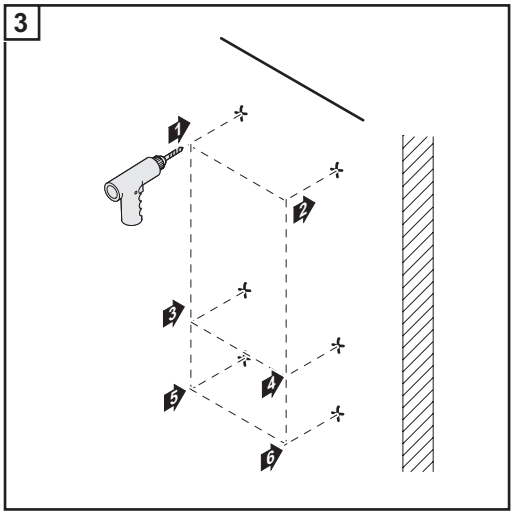
Because of logistical limits, the wall bracket for the Fronius IG Plus 120 and Fronius IG Plus 150 is divided into two parts.

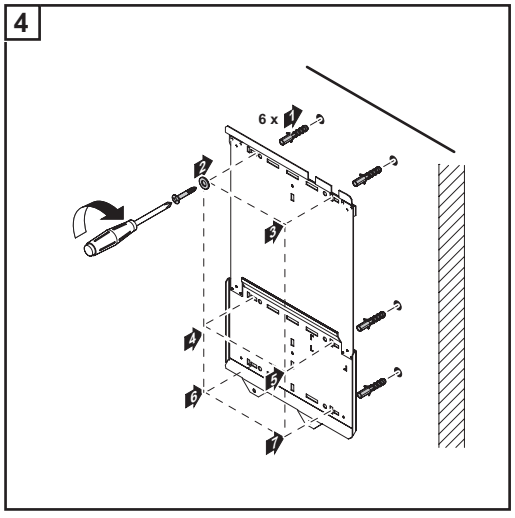
- Assemble wall bracket according to step 1




**IMPORTANT!** Attach the wall bracket so that the display marking (*) on the wall bracket is at eye level.



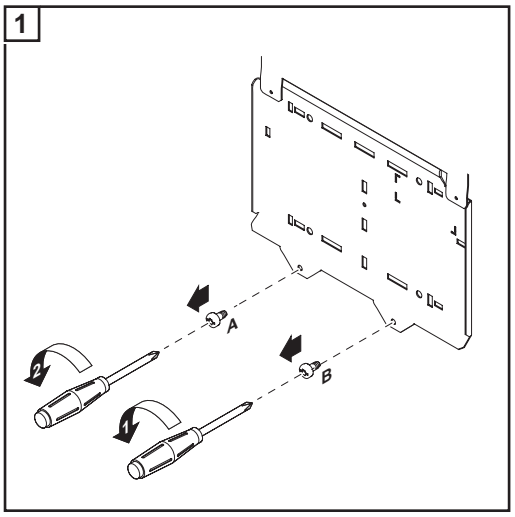



**Fronius IG Plus**
**Installation**

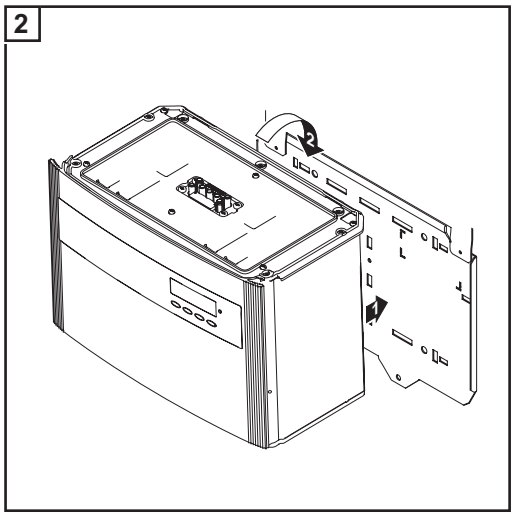
**NOTE!** For inverter assembly, please ensure that:

- the wall bracket is fixed securely to the wall
- the connector is hung and fixed to the wall bracket
- the power stage set is hung on the wall bracket and fixed to the connector

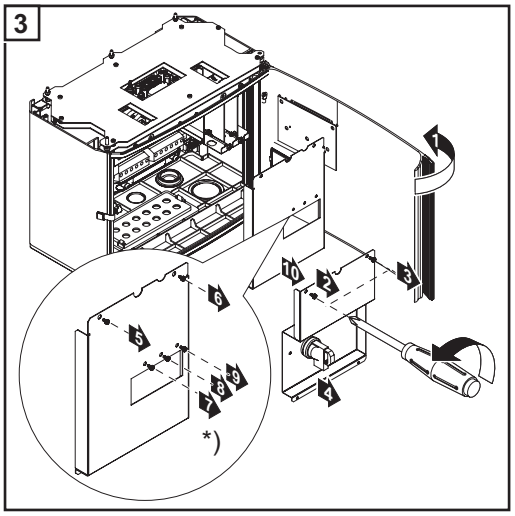
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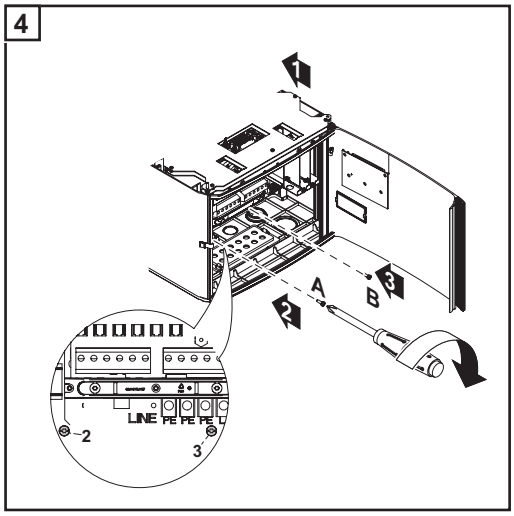

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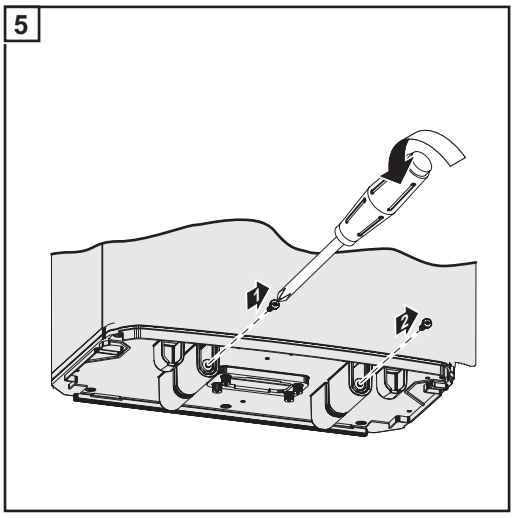



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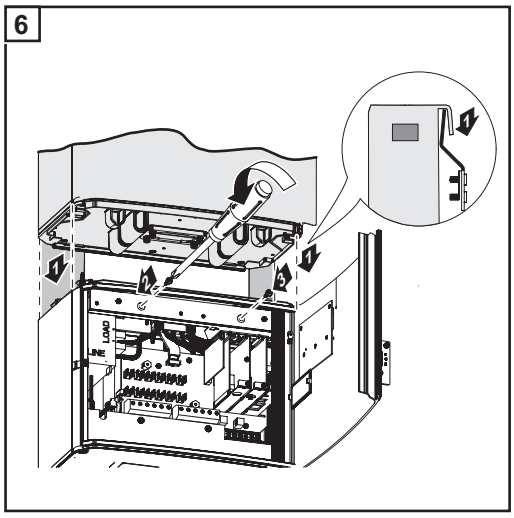



*) Remove all fixing screws from any available option cards.

5



6



# Connecting the Fronius IG Plus to the Public Grid (AC)



**Monitoring the Grid**

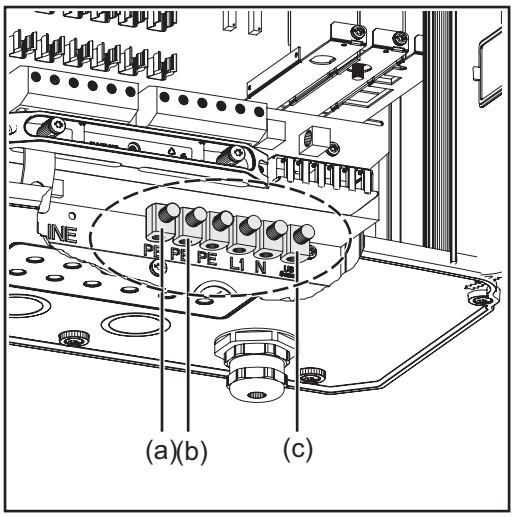
**IMPORTANT!** The resistance in the leads to the AC-side connection terminals must be as low as possible for optimal functioning of grid monitoring.

**Installations with Several Inverters**

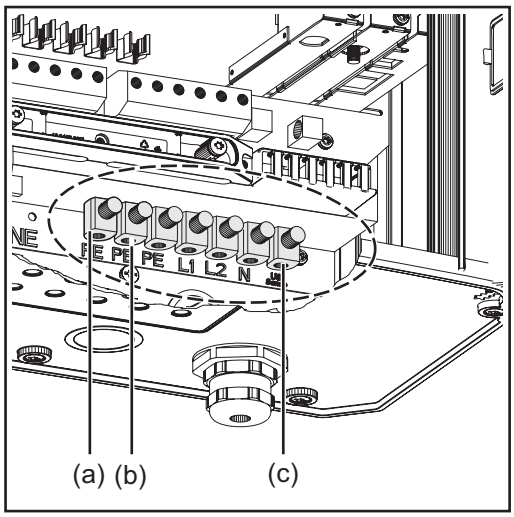
For larger photovoltaic systems, it is possible to connect several inverters in parallel without any problems. To ensure symmetrical feeding, connect the inverters uniformly to all 3 phases.

**AC-Side Terminals**

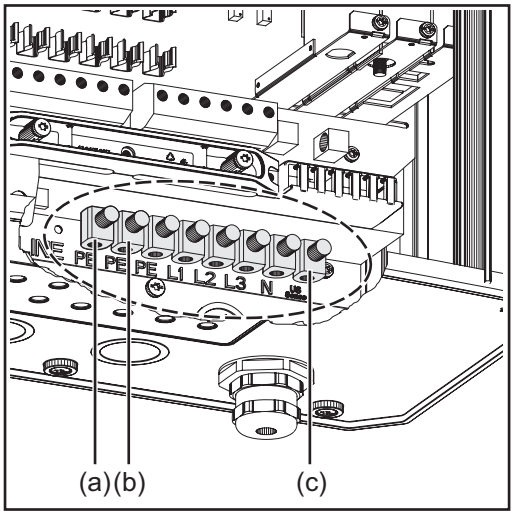
One-Phase Inverters




Two-Phase Inverters




Three-Phase Inverters




Legend:

| | |
|---|---|
| L1 | Phase conductor |
| L2 | Phase conductor |
| L3 | Phase conductor |
| PE | PE conductor *) |
| N | Neutral conductor |
| (a) | Grounding electrode terminal *) |
| (b) | Terminal for possible grounding of the solar module frame |
| (c) | "US Sense" terminal (for USA) *) |

max. cable cross section 25 mm²

*) **IMPORTANT:** Only one PE conductor terminal is available on the Fronius IG Plus 100-2.

**Grid Neutral Conductor**

**NOTE!** Make sure that the grid neutral conductor is grounded.

**Connecting Aluminum Cables**

**NOTE!** The AC side terminals are not designed for connecting aluminum cables.

**Cross Section of AC Wires**

For M32 metric screw joint:
Cable diameter 11 - 21 mm

For M40 metric screw joint:
Cable diameter 19 - 28 mm

If required, use reducers for smaller cable diameters.

**Safety**

**WARNING!** An electric shock can be fatal. Danger due to grid voltage and DC voltage from solar modules.

- The connection area should only be opened by a licensed electrician.
- The separate power stage set area should only be disconnected from the connection area after first being disconnected from the grid power.
- The separate power stage set area should only be opened by Fronius-trained service personnel.

Never work with live wires! Prior to all connection work, make sure that the AC and DC wires are not charged.

**CAUTION!** Danger of damaging the inverter by overloading the grid neutral conductor.

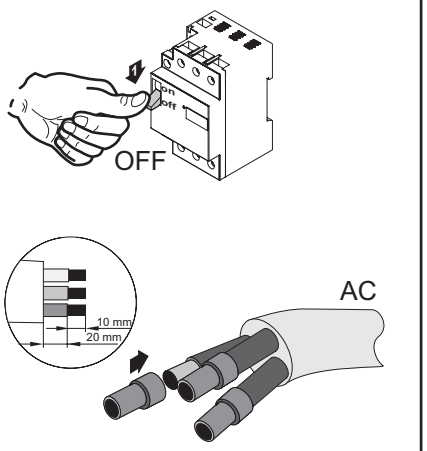
- Do not connect 2-phase and 3-phase devices together to one phase
- Never operate multi-phase devices in one phase

**CAUTION!** Danger of damaging the inverter from improperly connected terminals. Improperly connected terminals can cause thermal damage to the inverter and may cause a fire. When connecting the AC and DC cables, make sure that all terminals are tightened securely using the proper torque.

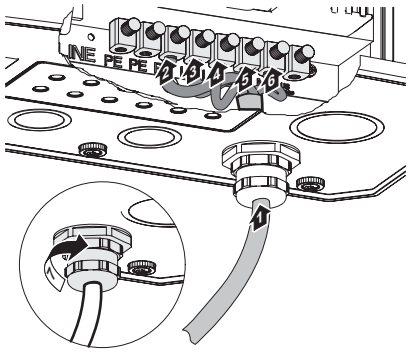
**Connecting the Fronius IG Plus to the Public Grid (AC)**

Only an authorized electrician is permitted to connect this inverter to the public grid.

1




2




Tightening torque for terminals: 2 Nm

**Recommendation for the AC-Side Overcurrent Protection**

| Inverter | Number of phases | Nominal output | Fuse protection |
|---|---|---|---|
| Fronius IG Plus 35 - 1 | 1 | 3.5 kW | 1 x C 20 A |
| Fronius IG Plus 50 - 1 | 1 | 4 kW | 1 x C 25 A |
| Fronius IG Plus 70 - 1 | 1 | 6.5 kW | 1 x C 40 A |
| Fronius IG Plus 70 - 2 | 2 | 6.5 kW | 2 x C 20 A |
| Fronius IG Plus 100 - 1 | 1 | 8 kW | 1 x C 50 A |
| Fronius IG Plus 100 - 2 | 2 | 8 kW | 2 x C 25 A |
| Fronius IG Plus 120 - 3 | 3 | 10 kW | 3 x C 20 A |
| Fronius IG Plus 150 - 3 | 3 | 12 kW | 3 x C 25 A |

**NOTE!** A residual current circuit breaker for the AC connecting cable may be required depending on local regulations, the power supply company as well as other conditions. A type A residual current circuit breaker is generally sufficient in this case. However, false alarms can be triggered for the residual current circuit breaker in individual cases and depending on local conditions. For this reason, Fronius recommends that you use a residual current circuit breaker suitable for a frequency converter.

**NOTE!** Three-phase inverters only: When using a residual current circuit breaker, the voltage difference between the PE conductor and the N neutral conductor cannot be higher than 8 V.

# Connecting Solar Module Strings to the Fronius IG Plus (DC)

**General Information about Solar Modules**

In order to select suitable solar modules and get the most efficient use out of the inverter, please note the following points:

- If irradiance is constant and the temperature is falling, the open circuit voltage of the solar modules will increase. Open circuit voltage may not exceed 600 V.

  Whenever the open circuit voltage of the solar modules exceeds 600 volts, the inverter may be damaged, and all warranty rights will become null and void.
- More exact values for dimensioning solar modules for the chosen installation location can be provided using suitable calculation programs like the Fronius Solar.configurator (available at http.//www.fronius.com).

**NOTE!** Before connecting solar modules:

- make sure that the voltage specified by the manufacturer corresponds to the actual measured voltage
- determine whether or not a solar module ground is required

**Safety**

**WARNING!** An electric shock can be fatal. Danger due to grid voltage and DC voltage from solar modules.

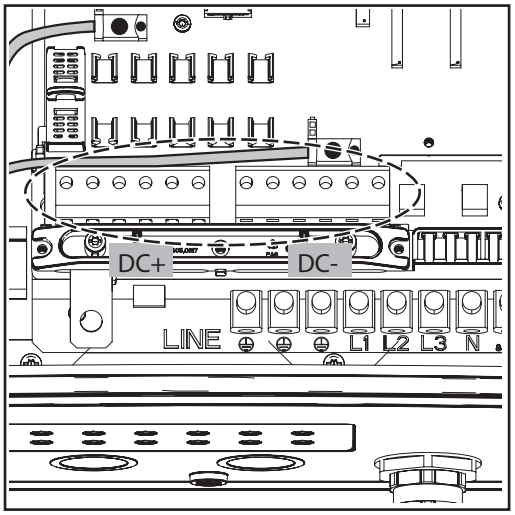
- The connection area should only be opened by a licensed electrician.
- The separate power stage set area should only be disconnected from the connection area after first being disconnected from the grid power.
- The separate power stage set area should only be opened by Fronius-trained service personnel.

Never work with live wires! Prior to all connection work, make sure that the AC and DC wires are not charged.

The DC main switch is only used to switch off power to the power stage set. When the DC main switch is turned off, the connection area is still energized.

**CAUTION!** Danger of damaging the inverter from improperly connected terminals. Improperly connected terminals can cause thermal damage to the inverter and may cause a fire. When connecting the AC and DC cables, make sure that all terminals are tightened securely using the proper torque.

**DC-Side Terminals**




**Connecting Aluminum Cables (DC)**

The DC-side terminals are designed for connecting single-wire, round and sector-pattern aluminum cables. The following points must be taken into account when connecting aluminum cables due to the non-conducting oxide layer of aluminum:

- The reduced rated currents for aluminum cables
- The connection requirements listed below

**Reduced rated currents for aluminum cables:**

| Rated cross section | Reduced rated current |
|---|---|
| 2.5 mm² | 20 A |
| 4 mm² | 27 A |
| 6 mm² | 35 A |
| 10 mm² | 48 A |
| 16 mm² | 64 A |

**NOTE!** Take into account local specifications when configuring cable cross sections.

**Connection requirements:**

1 Carefully clean off the oxide layer of the stripped cable end by scraping, e.g., using a knife

**IMPORTANT!** Do not use brushes, files or sandpaper. Aluminum particles may get stuck and can transfer to other cables.

2 After removing the oxide layer of the cable end, rub in a neutral grease, e.g., acid- and alkali-free Vaseline.

3 Then immediately connect to the terminal.

Repeat the steps above whenever the cable is disconnected and then reconnected.

**Polarity Reversal of Solar Module Strings**

The inverter comes standard with 6 metal bolts in fuse holders in the connection area. The inverter is designed so that a reverse polarity of all solar module strings will not cause any damage to the inverter when these metal bolts are used.

**CAUTION!** However, there is a risk of damage and fire to the inverter due to reverse polarity of a solar module string when the metal bolts are used.
The reverse polarity of a solar module string can cause an unacceptable thermal load, which can lead to an inverter fire.
When using metal bolts, always make sure that the polarity is correct before connecting the individual solar module strings.

If string fuses are used instead of the metal bolts, the reverse polarity of an individual solar module string can cause damage to the inverter and cause an inverter fire.

**CAUTION!** Risk of damage and fire to inverter due to reverse polarity of solar module strings when using string fuses.
Reverse polarity of solar module strings can lead to an unacceptable overload to a string fuse being used. This can cause a strong arc, which can lead to an inverter fire.
When using string fuses, always make sure that the polarity is correct before connecting the individual solar module strings.

**Overview**

'Connecting Solar Module Strings to the Fronius IG Plus (DC)' includes the following sections:

- Ungrounded System: Connecting Solar Module Strings
- Criteria for the Proper Selection of String Fuses
- Ungrounded System: Connecting Solar Module Strings with a Cable Cross Section > 16 mm²

- Solar Module Ground at Negative Pole: Connecting Solar Module Strings
- Criteria for the Proper Selection of String Fuses
- Solar Module Ground at Negative Pole: Connecting Solar Module Strings with a Cable Cross Section > 16 mm²
- Solar Module Ground at Negative Pole for Fronius IG Plus

- Solar Module Ground at Positive Pole: Connecting Solar Module Strings
- Criteria for the Proper Selection of String Fuses
- Solar Module Ground at Positive Pole: Connecting Solar Module Strings with a Cable Cross Section > 16 mm²
- Solar Module Ground at Positive Pole for Fronius IG Plus

# Ungrounded System: Connecting Solar Module Strings

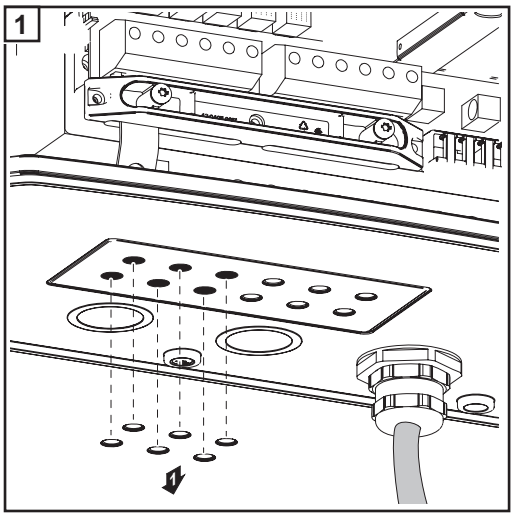


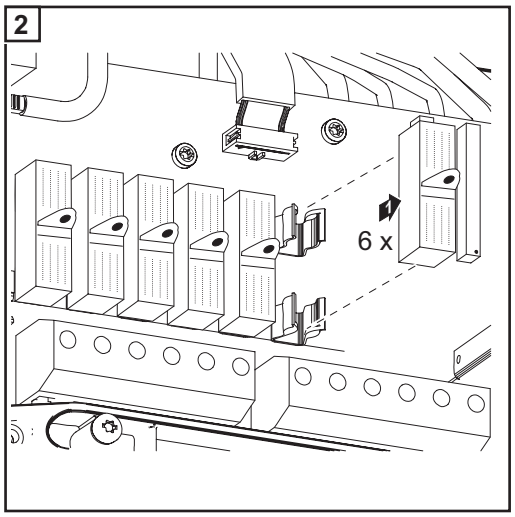
**Wire Cross Section of Solar Module Strings**

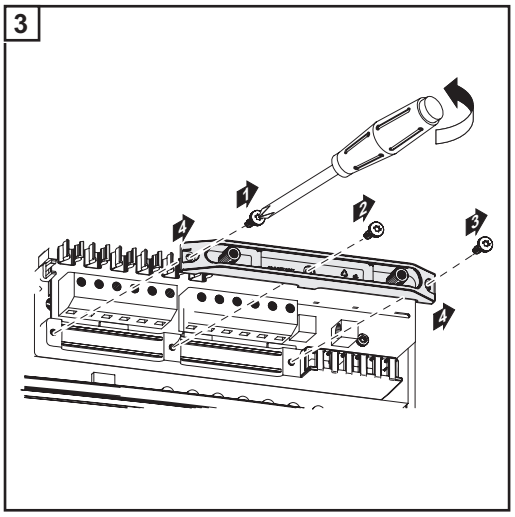
The cable cross section for solar module strings should be a maximum of 16 mm² per cable.

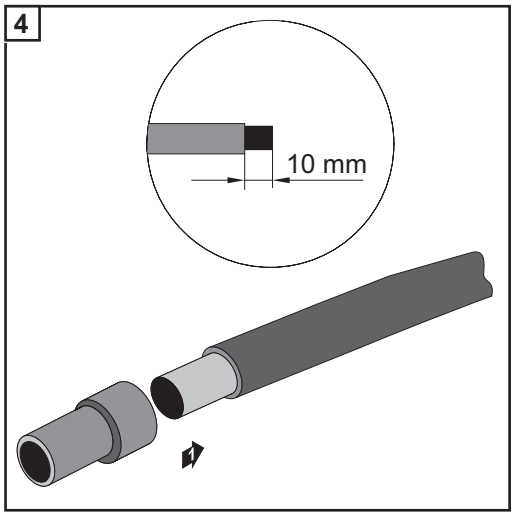
**NOTE!** To ensure an effective strain relief device for solar module strings, only use cable cross sections of the same size.

**Ungrounded System: Connecting Solar Module Strings**



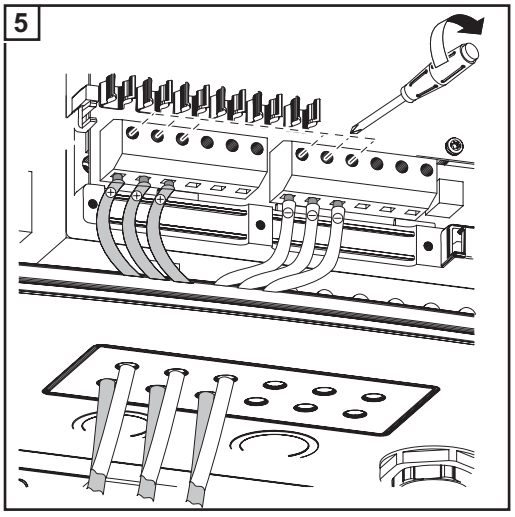



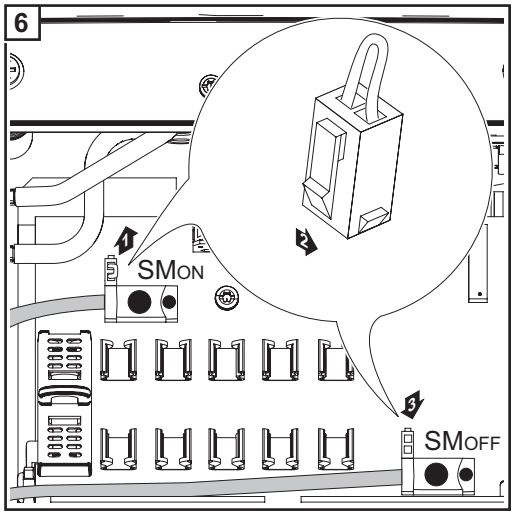




**CAUTION!** Danger of damaging the inverter by overload.

- Only connect a maximum of 20 A to an individual DC terminal.
- Connect the DC+ and DC- cables to the correct DC+ and DC- terminals on the inverter.

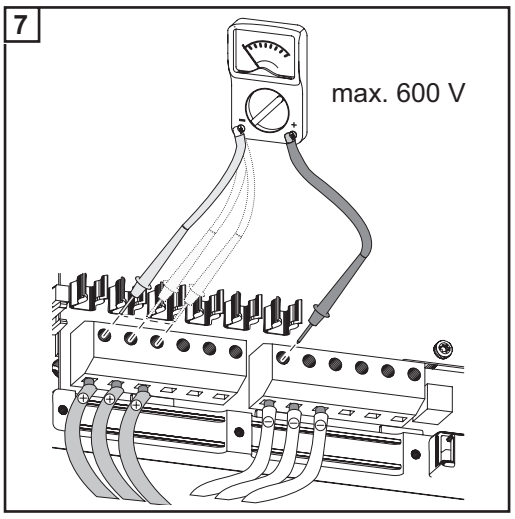


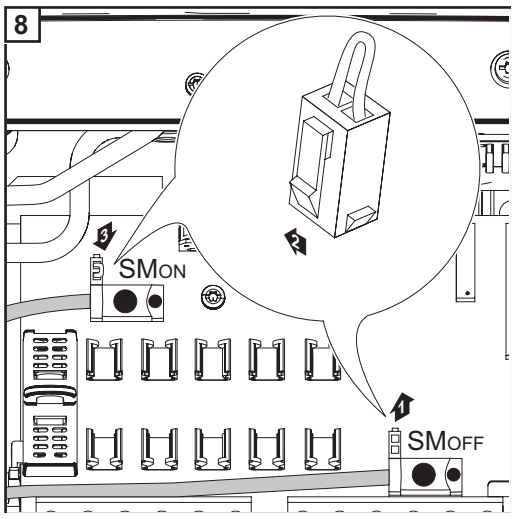




Tightening torque of terminals:
1.2 - 1.5 Nm

**IMPORTANT!**

- Set the jumper from the '$SM_{ON}$' position to the '$SM_{OFF}$' position for correct measurement results
- Check the polarity and voltage of the solar module strings: the voltage should be a max. of 600 V, the difference between the individual solar module strings should be a max. of 10 V.

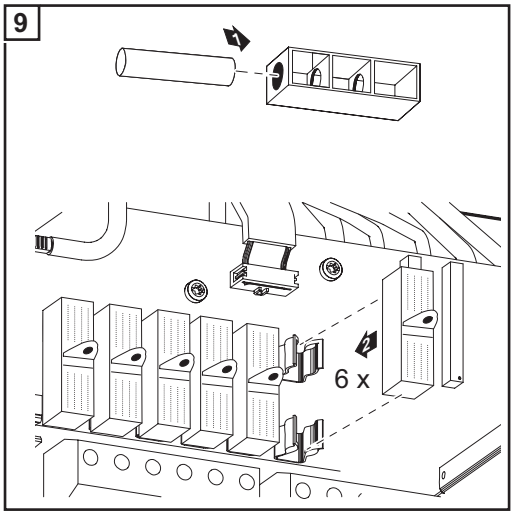


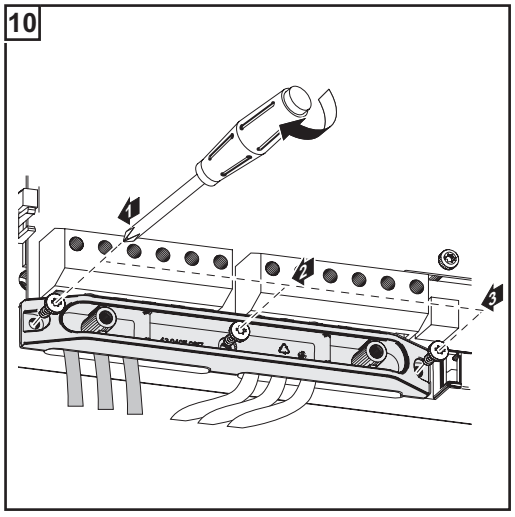




**IMPORTANT!**

- When connecting solar module strings, you should use metal bolts or string fuses with fuse covers in the fuse holders depending on the solar module manufacturer's instructions.

  The metal bolts are included in the inverter scope of delivery.
- Place metal bolts with fuse covers in the fuse holders for unoccupied DC+ terminals.




For more information about string fuses, please see 'Criteria for the Proper Selection of String Fuses.'

**Selecting String Fuses**

If the solar module manufacturer requires the use of string fuses for operation:

- Select string fuses according to the information from the solar module manufacturer or according to "Criteria for the Proper Selection of String Fuses" (max. 20 A per solar module string, max. 6 solar module strings)

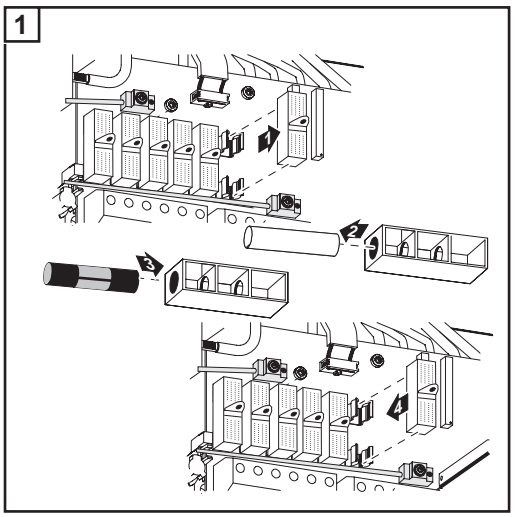
**IMPORTANT!**

- Please follow solar module safety instructions
- Follow all solar module manufacturer requirements

**Inserting String Fuses**

**NOTE!** If the solar module manufacturer requires the use of string fuses:

- Insert fuses with a fuse cover in the respective fuse holder
- Do not operate the inverter without fuse covers




**WARNING!** An electric shock can be fatal. Danger from DC voltage from solar modules. Fuse covers are for installation purposes only. They offer no protection against contact.

# Criteria for the Proper Selection of String Fuses

**General**

The use of string fuses in the inverter also adds fuse protection to the solar modules.
A crucial factor for the fuse protection of solar modules is the maximum short circuit current $I_{sc}$ of the respective solar module.

**Criteria for the Proper Selection of String Fuses**

The following criteria must be fulfilled for each solar module string when using fuse protection:

- $I_N > 1.5 \times I_{SC}$
- $I_N < 2.0 \times I_{SC}$
- $V_N$ >/= 600 V DC
- Fuse dimensions: Diameter 10.3 x 35 - 38 mm

| | |
|---|---|
| $I_N$ | Nominal current rating of fuse |
| $I_{SC}$ | Short circuit current for standard test conditions (STC) according to solar module data sheet |
| $V_N$ | Nominal voltage rating of fuse |

**Effects of Using Underrated Fuses**

In underrated fuses, the nominal current value is less than the short circuit current of the solar module.
Effect:
The fuse may trip in intensive lighting conditions.

**Fuse Recommendations**

**NOTE!** Only select fuses suitable for a voltage of 600 V DC.

You should only use the following fuses, which have been tested by Fronius, to ensure problem-free fuse protection:

- Littelfuse KLKD fuses
- Cooper Bussmann PV fuses

Fronius shall not be liable for any damage or other incidents resulting from the use of other fuses. In addition, all warranty claims are forfeited.

**Application Example**

e.g.: Maximum short circuit current ($I_{SC}$) of the solar module = 5.75 A

According to the criteria for selecting the correct fuse, the fuse must have a nominal current greater than 1.5 times the short circuit current:
5.75 A x 1.5 = 8.625 A

The fuse that should be selected according to the "Fuses" table:
KLK D 9 with 9.0 A and 600 V AC / DC

**Fuses**

| Nominal current value | Fuse | Nominal current value | Fuse |
|---|---|---|---|
| 1.0 A | KLK D 1 | 6.0 A | KLK D 6 |
| 1.5 A | KLK D 1 1/2 | 7.0 A | KLK D 7 |
| 2.0 A | KLK D 2 | 8.0 A | KLK D 8 |
| 2.5 A | KLK D 2 1/2 | 9.0 A | KLK D 9 |
| 3.0 A | KLK D 3 | 10.0 A | KLK D 10 |
| 3.5 A | KLK D 3 1/2 | 12.0 A | KLK D 12 |
| 4.0 A | KLK D 4 | 15.0 A | KLK D 15 |
| 5.0 A | KLK D 5 | 20.0 A | KLK D 20 |

"Fuses" Table: Excerpt of Suitable Fuses, e.g., Littelfuse Fuses

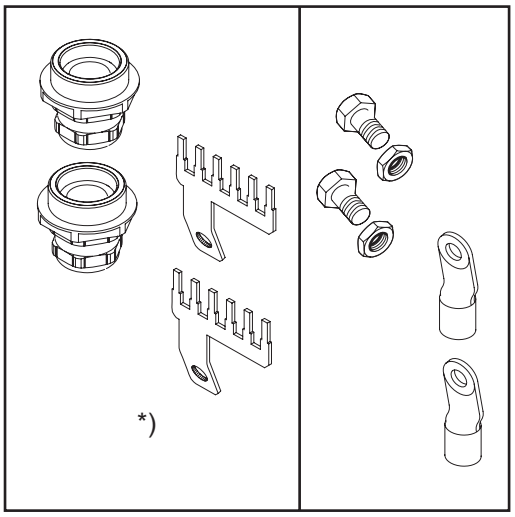
# Ungrounded System: Connecting Solar Module Strings with a Cable Cross Section > 16 mm²

**General**

As an option, you can also connect DC cables to the inverter with a cross section > 16 mm², e.g., when the DC cables from the solar modules are combined outside of the inverter into a large string.

**Additionally Required Components**

The following additional components are required for connecting DC cables with a cross section > 16 mm²:




- 2 M32 metric screw joints (degree of protection min. IP45)
- 2 connection distributors

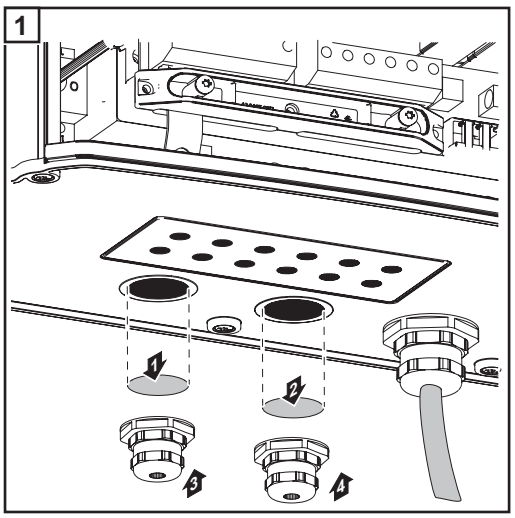
  *)
  Metric screw joints and connection distributors are available from Fronius as an option.

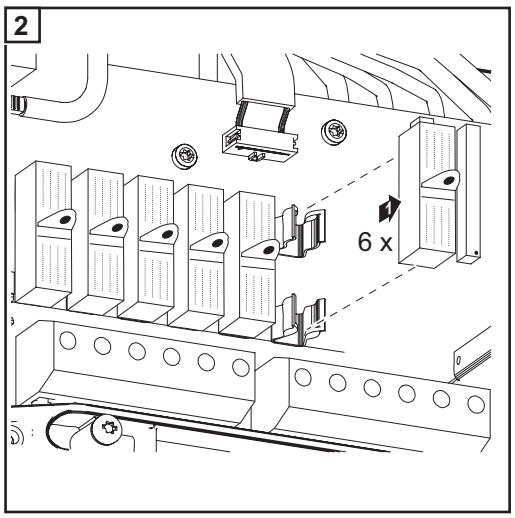
- 2 cable lugs for the DC cables

  Select cable lugs that match the available DC cables

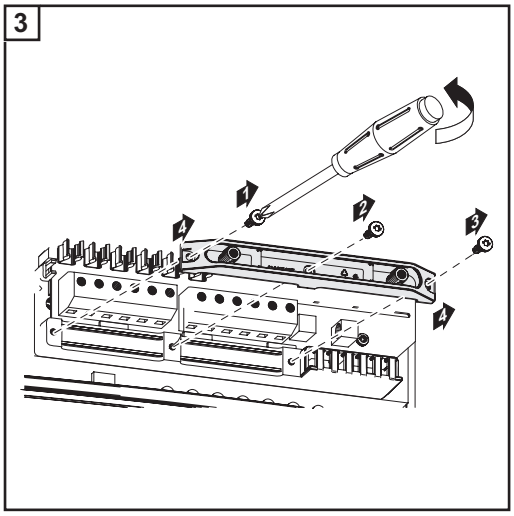
- 2 M10 screws
- 2 M10 hexagon nuts

**Ungrounded System: Connecting Solar Module Strings with a Cable Cross Section > 16 mm²**

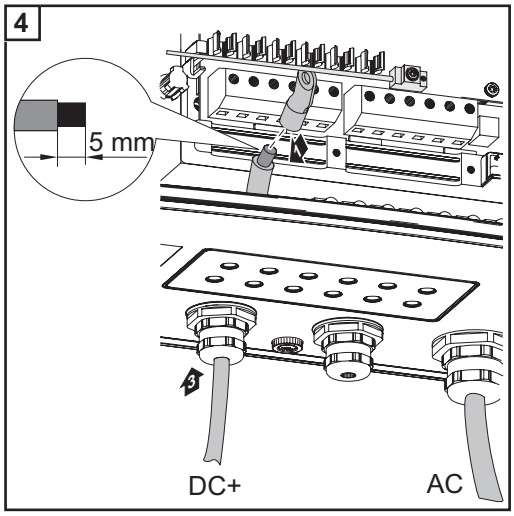


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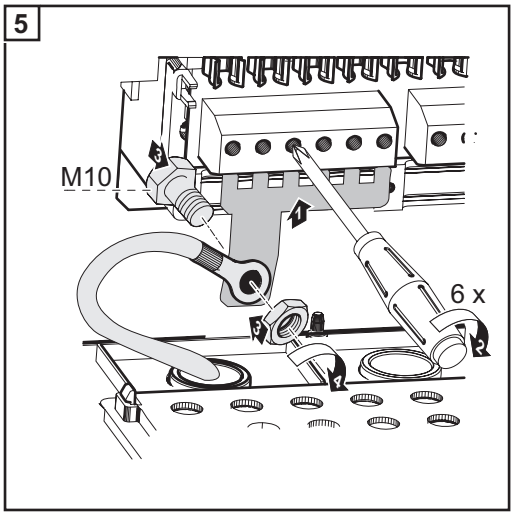


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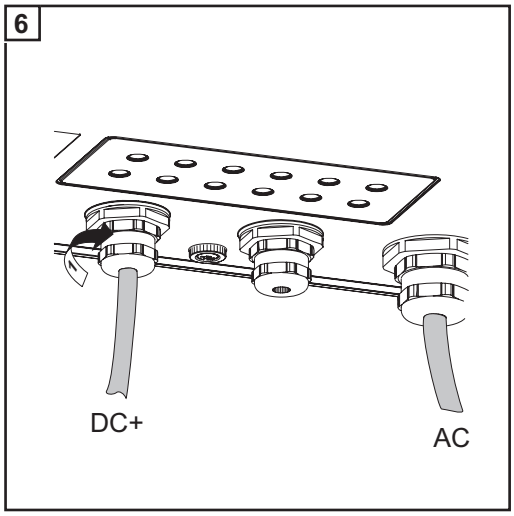



**CAUTION!** Danger of damaging the inverter by overload. Connect the DC+ and DC- cables to the correct DC+ and DC- terminals on the inverter.

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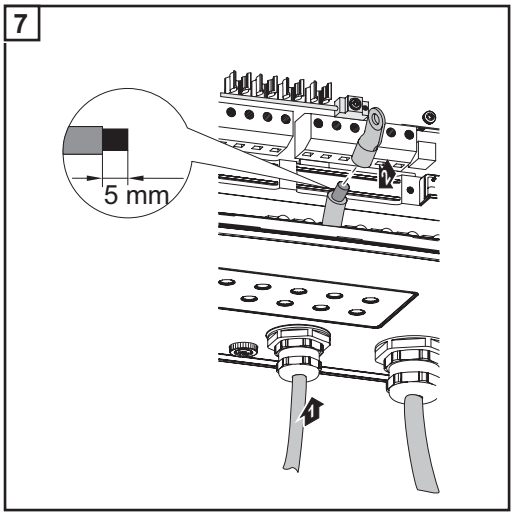



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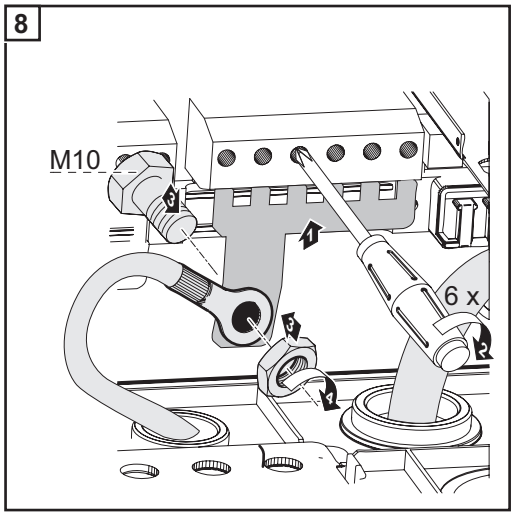



Tightening torque of terminals:
1.2 - 1.5 Nm

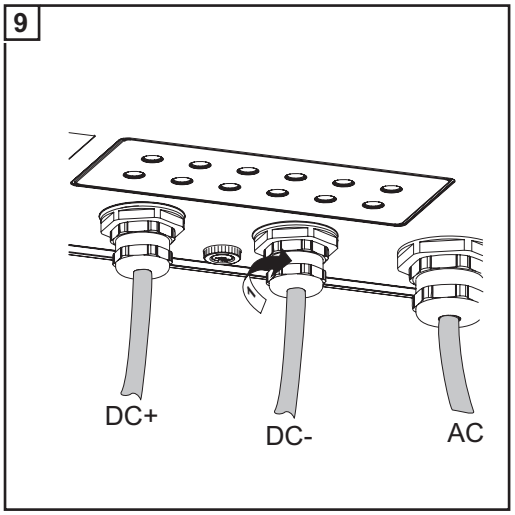
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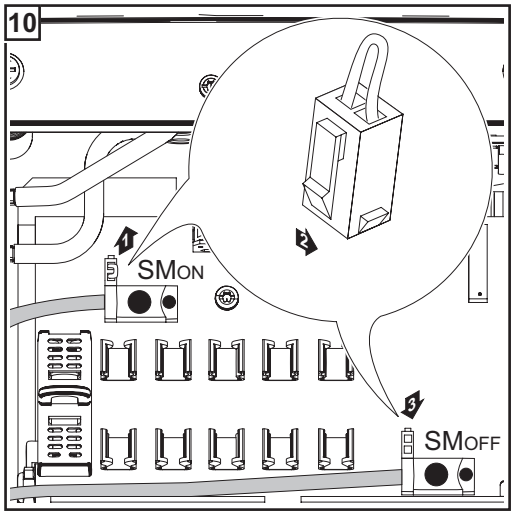



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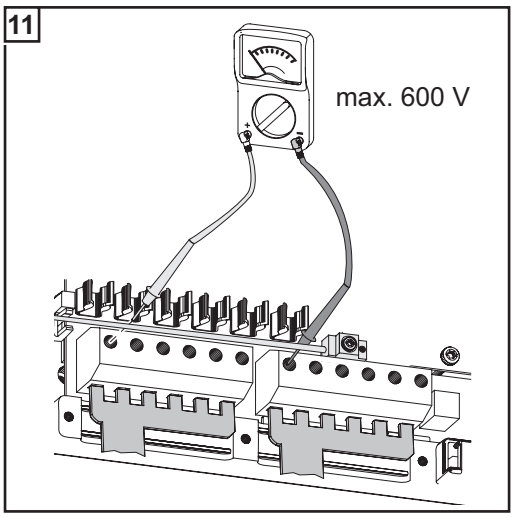

Tightening torque of terminals:
1.2 - 1.5 Nm

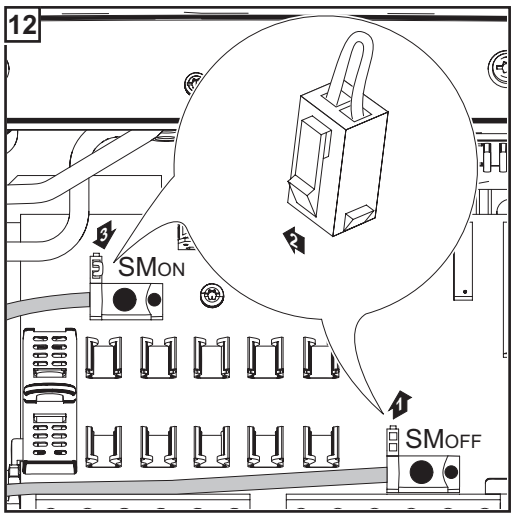


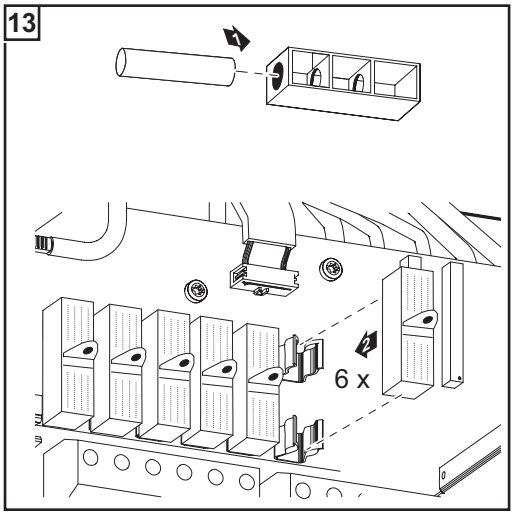




**IMPORTANT!**

- Set the jumper from the '$SM_{ON}$' position to the '$SM_{OFF}$' position for correct measurement results
- Check the polarity and voltage of the DC cables strings: The voltage should be a max. of 600 V.




**IMPORTANT:** When using connection distributors, insert 6 metal bolts with fuse covers in the fuse holders. The metal bolts are included in the inverter scope of delivery.

# Solar Module Ground at Negative Pole: Connecting Solar Module Strings



**General**

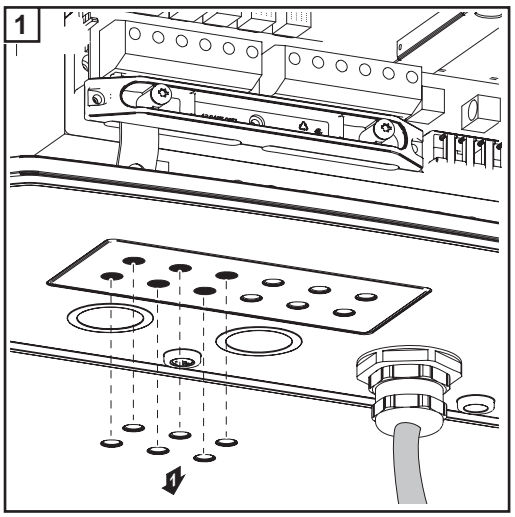
The following steps are only necessary when the solar module manufacturer requires a solar module ground at the negative pole.

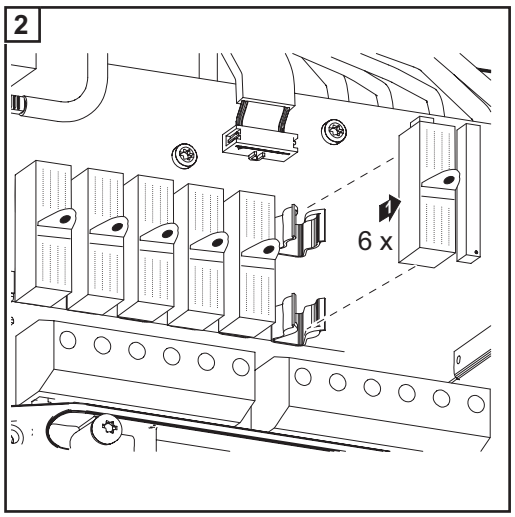
**Wire Cross Section of Solar Module Strings**

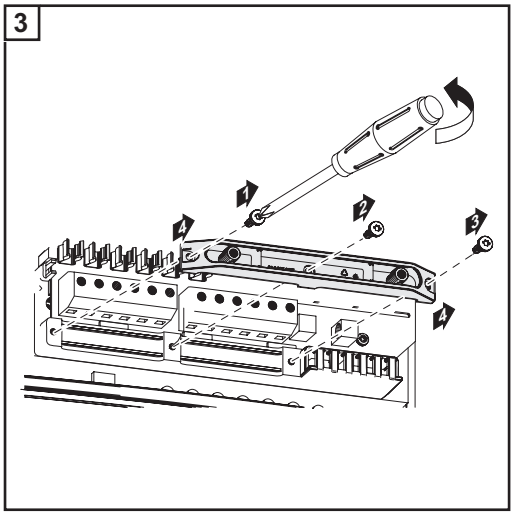
The cable cross section for solar module strings should be a maximum of 16 mm² per cable.

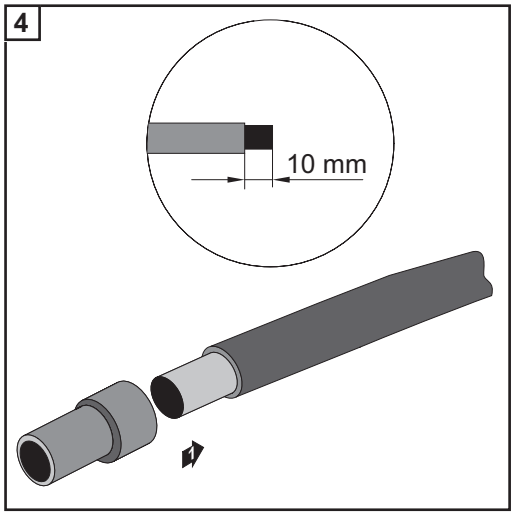
**NOTE!** To ensure an effective strain relief device for solar module strings, only use cable cross sections of the same size.

**Solar Module Ground at Negative Pole: Connecting Solar Module Strings**



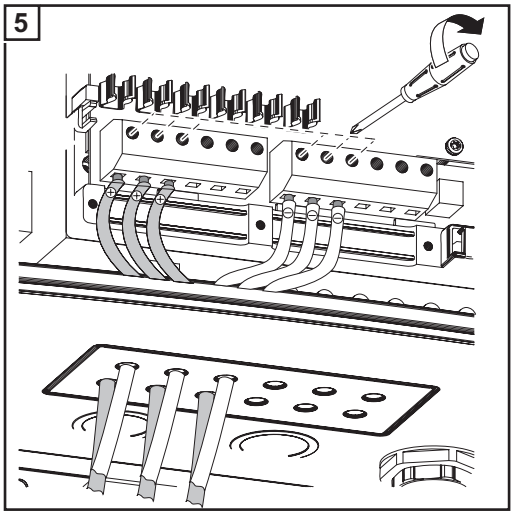



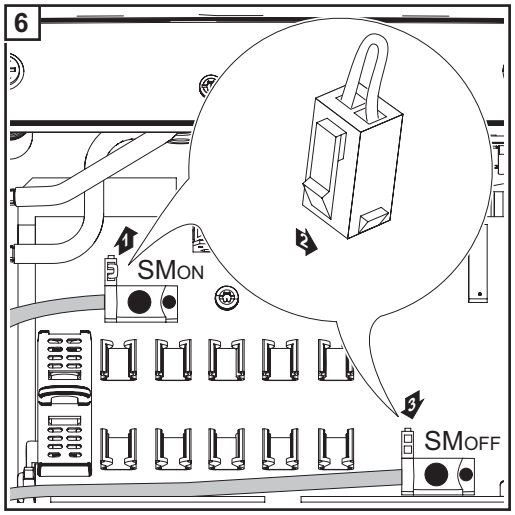




**CAUTION!** Danger of damaging the inverter by overload.

- Only connect a maximum of 20 A to an individual DC terminal.
- Connect the DC+ and DC- cables to the correct DC+ and DC- terminals on the inverter.

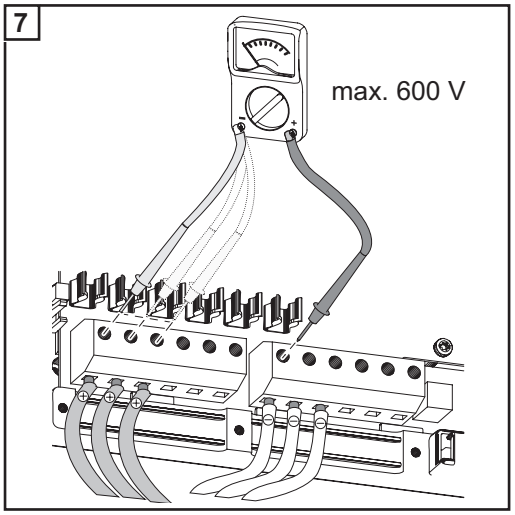


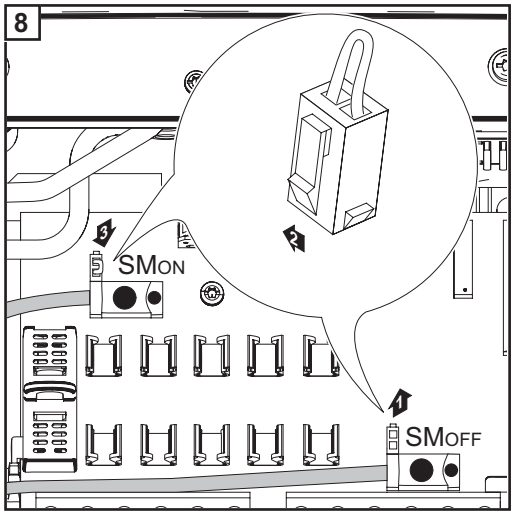




Tightening torque of terminals:
1.2 - 1.5 Nm

**IMPORTANT!**

- Set the jumper from the '$SM_{ON}$' position to the '$SM_{OFF}$' position for correct measurement results
- Check the polarity and voltage of the solar module strings: the voltage should be a max. of 600 V, the difference between the individual solar module strings should be a max. of 10 V.

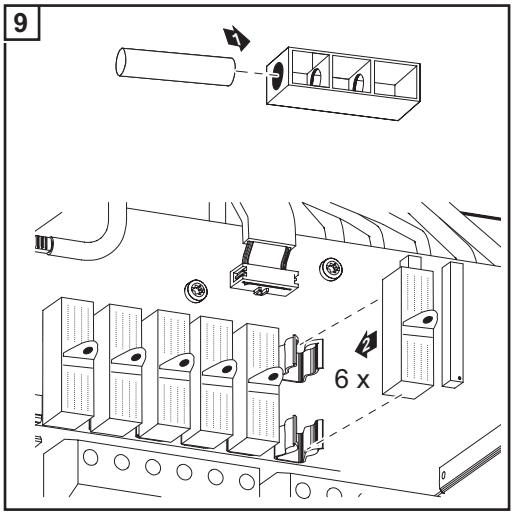


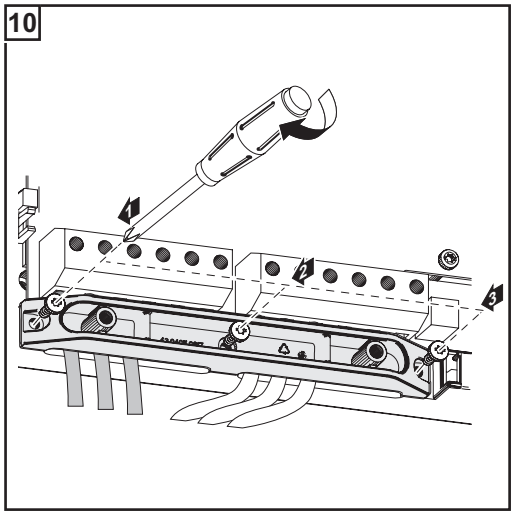




**IMPORTANT!**

- When connecting solar module strings, you should use metal bolts or string fuses with fuse covers in the fuse holders depending on the solar module manufacturer's instructions.

  The metal bolts are included in the inverter scope of delivery.
- Place metal bolts with fuse covers in the fuse holders for unoccupied DC+ terminals.




For more information about string fuses, please see 'Criteria for the Proper Selection of String Fuses.'

**Selecting String Fuses**

If the solar module manufacturer requires the use of string fuses for operation:

- Select string fuses according to the information from the solar module manufacturer or according to "Criteria for the Proper Selection of String Fuses" (max. 20 A per solar module string, max. 6 solar module strings)

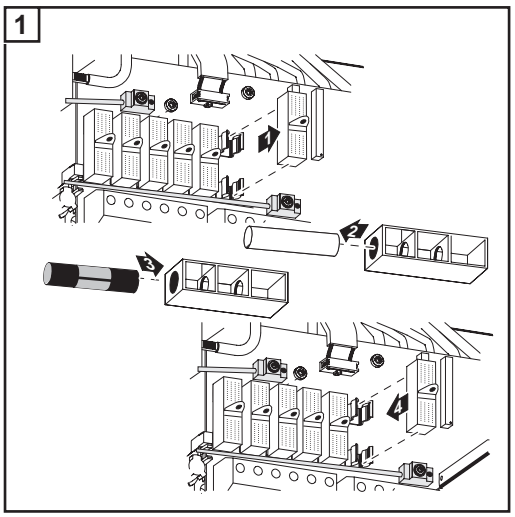
**IMPORTANT!**

- Please follow solar module safety instructions
- Follow all solar module manufacturer requirements

**Inserting String Fuses**

**NOTE!** If the solar module manufacturer requires the use of string fuses:

- Insert fuses with a fuse cover in the respective fuse holder
- Do not operate the inverter without fuse covers




**WARNING!** An electric shock can be fatal. Danger from DC voltage from solar modules. Fuse covers are for installation purposes only. They offer no protection against contact.

# Criteria for the Proper Selection of String Fuses

**General**

The use of string fuses in the inverter also adds fuse protection to the solar modules.
A crucial factor for the fuse protection of solar modules is the maximum short circuit current $I_{sc}$ of the respective solar module.

**Criteria for the Proper Selection of String Fuses**

The following criteria must be fulfilled for each solar module string when using fuse protection:

- $I_N > 1.5 \times I_{SC}$
- $I_N < 2.0 \times I_{SC}$
- $V_N >/= 600$ V DC
- Fuse dimensions: Diameter 10.3 x 35 - 38 mm

| | |
|---|---|
| $I_N$ | Nominal current rating of fuse |
| $I_{SC}$ | Short circuit current for standard test conditions (STC) according to solar module data sheet |
| $V_N$ | Nominal voltage rating of fuse |

**Effects of Using Underrated Fuses**

In underrated fuses, the nominal current value is less than the short circuit current of the solar module.
Effect:
The fuse may trip in intensive lighting conditions.

**Fuse Recommendations**

**NOTE!** Only select fuses suitable for a voltage of 600 V DC.

You should only use the following fuses, which have been tested by Fronius, to ensure problem-free fuse protection:

- Littelfuse KLKD fuses
- Cooper Bussmann PV fuses

Fronius shall not be liable for any damage or other incidents resulting from the use of other fuses. In addition, all warranty claims are forfeited.

**Application Example**

e.g.: Maximum short circuit current ($I_{SC}$) of the solar module = 5.75 A

According to the criteria for selecting the correct fuse, the fuse must have a nominal current greater than 1.5 times the short circuit current:
5.75 A x 1.5 = 8.625 A

The fuse that should be selected according to the "Fuses" table:
KLK D 9 with 9.0 A and 600 V AC / DC

**Fuses**

| Nominal current value | Fuse | Nominal current value | Fuse |
|---|---|---|---|
| 1.0 A | KLK D 1 | 6.0 A | KLK D 6 |
| 1.5 A | KLK D 1 1/2 | 7.0 A | KLK D 7 |
| 2.0 A | KLK D 2 | 8.0 A | KLK D 8 |
| 2.5 A | KLK D 2 1/2 | 9.0 A | KLK D 9 |
| 3.0 A | KLK D 3 | 10.0 A | KLK D 10 |
| 3.5 A | KLK D 3 1/2 | 12.0 A | KLK D 12 |
| 4.0 A | KLK D 4 | 15.0 A | KLK D 15 |
| 5.0 A | KLK D 5 | 20.0 A | KLK D 20 |

"Fuses" Table: Excerpt of Suitable Fuses, e.g., Littelfuse Fuses

# Solar Module Ground at Negative Pole: Connecting Solar Module Strings with a Cable Cross Section > 16 mm²

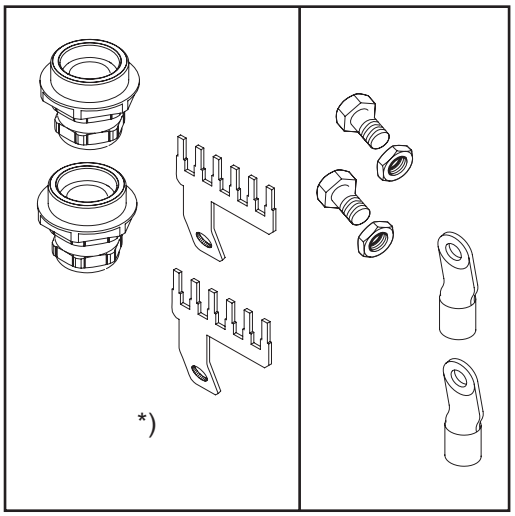
**General**

The following steps are only necessary when the solar module manufacturer requires a solar module ground at the negative pole.

As an option, you can also connect DC cables to the inverter with a cross section > 16 mm², e.g., when the DC cables from the solar modules are combined outside of the inverter into a large string.

**Additionally Required Components**

The following additional components are required for connecting DC cables with a cross section > 16 mm²:




- 2 M32 metric screw joints (degree of protection min. IP45)
- 2 connection distributors

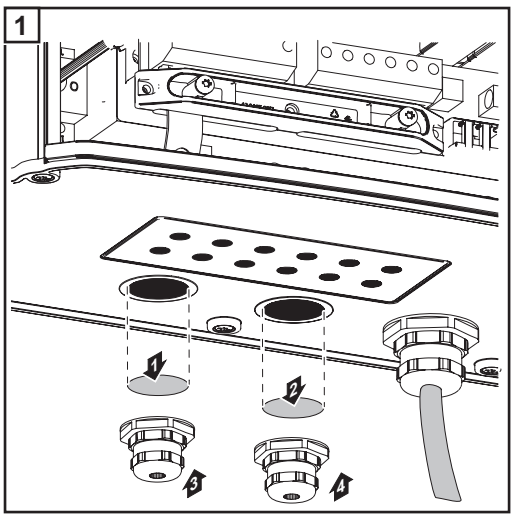
  *)
  Metric screw joints and connection distributors are available from Fronius as an option.

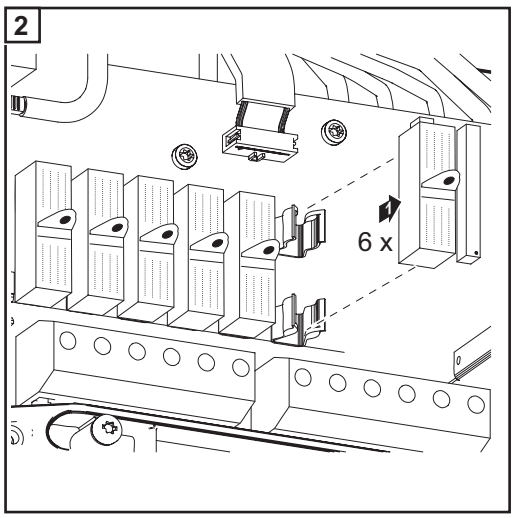
- 2 cable lugs for the DC cables

  Select cable lugs that match the available DC cables

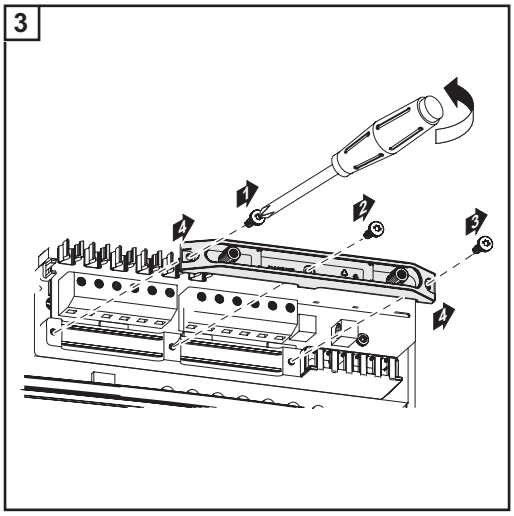
- 2 M10 screws
- 2 M10 hexagon nuts

**Solar Module Ground at Negative Pole: Connecting Solar Module Strings with a Cable Cross Section > 16 mm²**

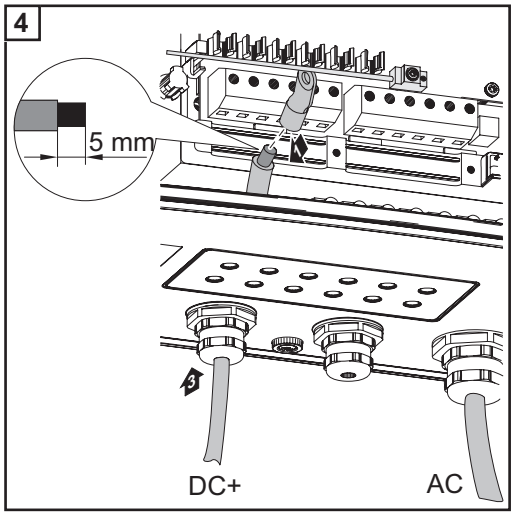


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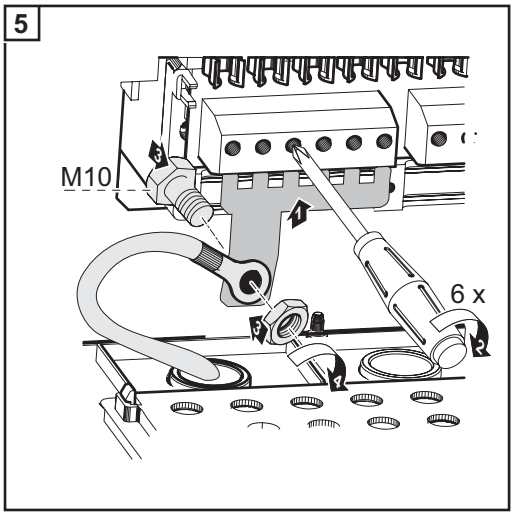


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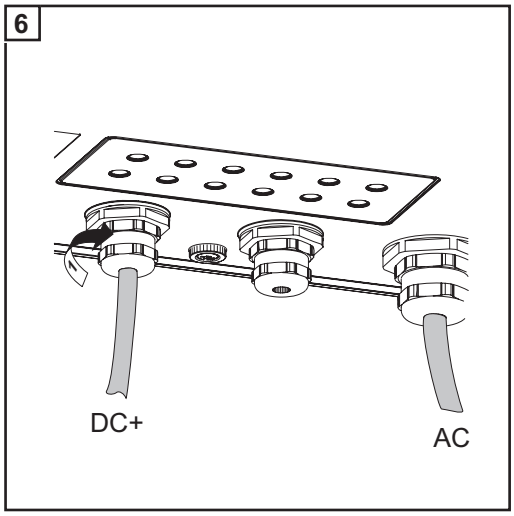



**CAUTION!** Danger of damaging the inverter by overload. Connect the DC+ and DC- cables to the correct DC+ and DC- terminals on the inverter.

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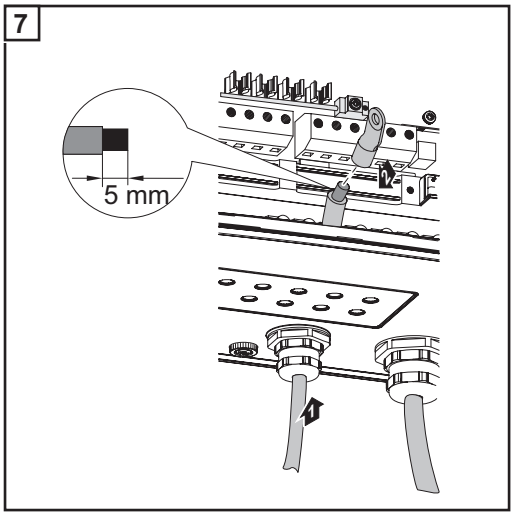



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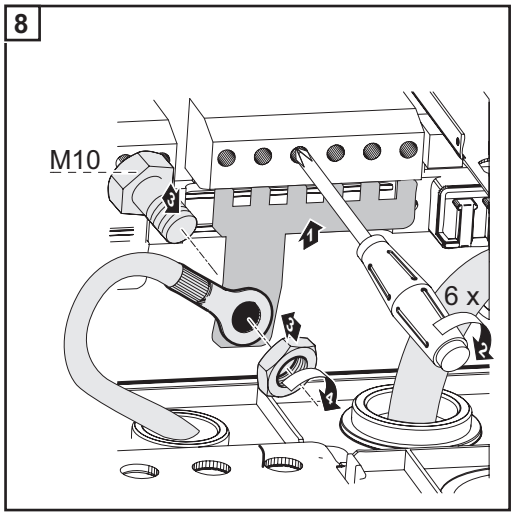



Tightening torque of terminals:
1.2 - 1.5 Nm

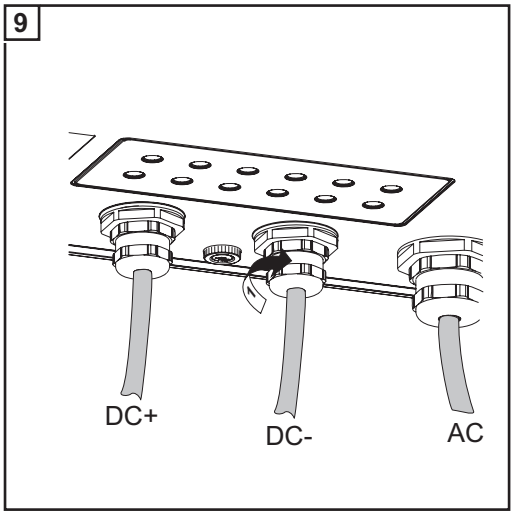
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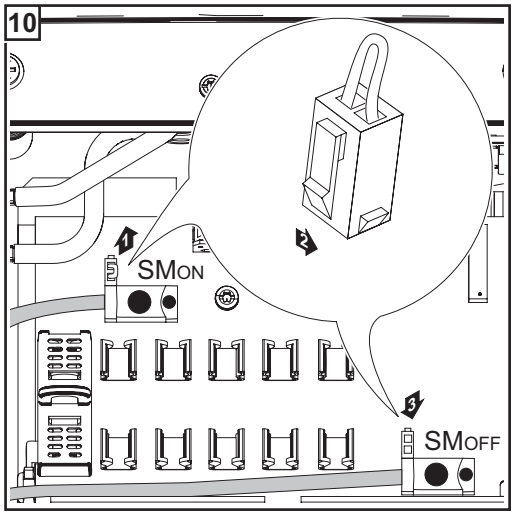



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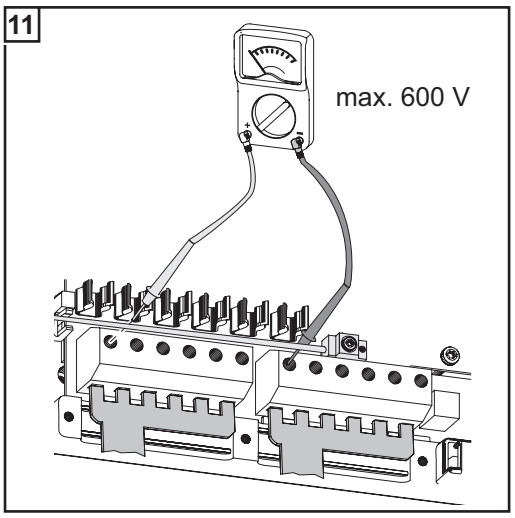

Tightening torque of terminals:
1.2 - 1.5 Nm

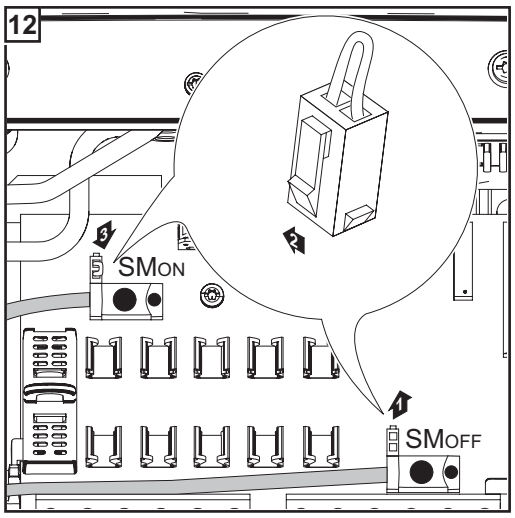


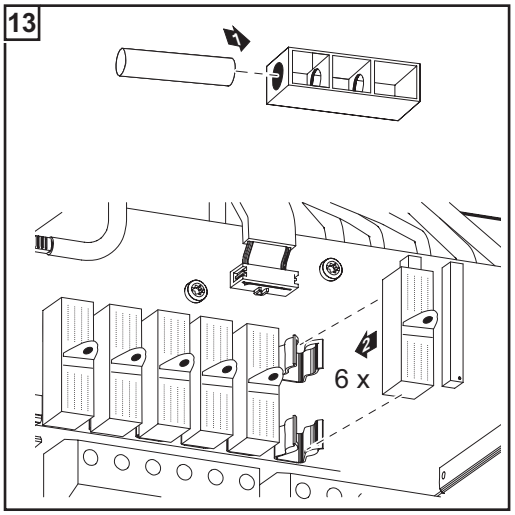




**IMPORTANT!**

- Set the jumper from the '$SM_{ON}$' position to the '$SM_{OFF}$' position for correct measurement results
- Check the polarity and voltage of the DC cables strings: The voltage should be a max. of 600 V.




**IMPORTANT:** When using connection distributors, insert 6 metal bolts with fuse covers in the fuse holders. The metal bolts are included in the inverter scope of delivery.

# Solar Module Ground at Negative Pole for Fronius IG Plus



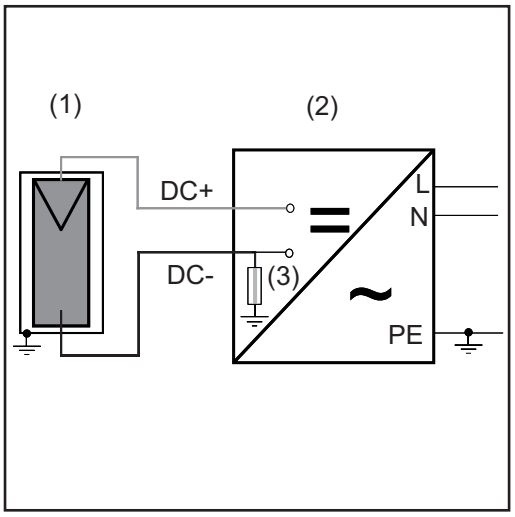
**General**

Some manufacturers of solar modules stipulate that the module must be grounded.

**IMPORTANT:** Take into account the following points if a solar module ground is required:

- Specifications of the solar module manufacturer regarding polarity and required type of solar module ground
- National provisions

**Solar Module Ground at Negative Pole**

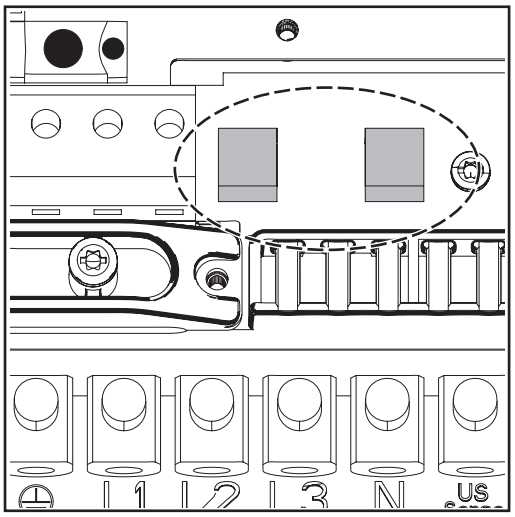



Example:
Solar module ground at negative pole with fuse or high ohm resistor

(1) Solar module
(2) Inverter
(3) Fuse / High ohm resistor

**Solar Module Ground at Negative Pole for Fronius IG Plus**

You can ground solar modules in the Fronius IG Plus using a fuse or a high ohm resistor.




Fuse holder on the Fronius IG Plus for the solar module ground

Fronius recommends a fuse with 1 A and a dimension of 10 x 38 mm for solar module grounding.

For solar module grounding using a high ohm resistor, Fronius exclusively recommends the "100 kohm Grounding Kit" option.

## Safety

**WARNING!** An electric shock can be fatal. Danger from DC voltage from solar modules. The inverter's insulation monitoring is deactivated when the solar modules are grounded.

- Ensure that grounded solar modules are designed so that they are isolated according to Protection Class II
- Place the relevant safety sticker in a clearly visible place on the photovoltaic system
- Set the inverter so that an error message is displayed if the fuse trips.




Safety Label for the Solar Module Ground

**IMPORTANT:** Safety labels and the fuse for solar module grounding are not included in the inverter scope of delivery, and must be obtained separately.

## Setting Inverters for Grounded Solar Modules

The inverter's insulation monitoring is deactivated when the solar modules are grounded. For this reason, you must make a setting in the 2nd level of the Setup menu so that an error message is displayed when the ground fuse is triggered. A code is required to access the 2nd level of the Setup menu. This code can be requested from Fronius. Additional information regarding accessing the 2nd level of the Setup menu will be provided along with the code.

## Solar Module Ground: Inserting Fuse or "100 kohm Grounding Kit" Option

**NOTE!** If the solar module manufacturer requires a ground for solar modules at the negative pole:

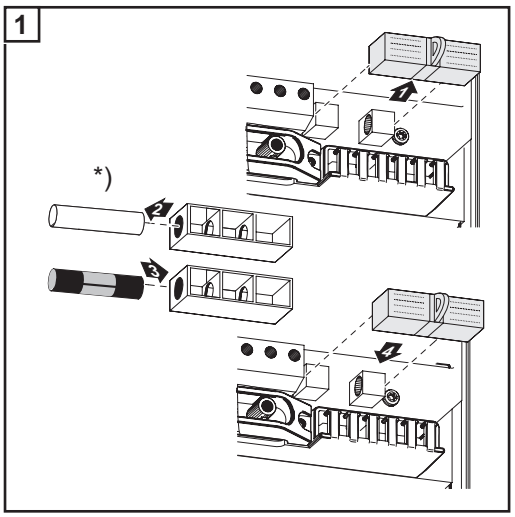
- Insert the "100 kohm Grounding Kit" option into the fuse holder completely with the plastic jacket
- Do not operate the inverter without the plastic jacket when using the "100 kohm Grounding Kit" option

or

- Insert the fuse with a fuse cover in the fuse holder
- Do not operate the inverter without a fuse cover

**WARNING!** An electric shock can be fatal. Danger from DC voltage from solar modules. Fuse covers are for installation purposes only. They offer no protection against contact.
The DC main switch is only used to switch off power to the power stage set. When the DC main switch is turned off, the solar module ground at the negative pole remains unaffected. Never touch the DC+ and DC-.

**Inserting a fuse:**

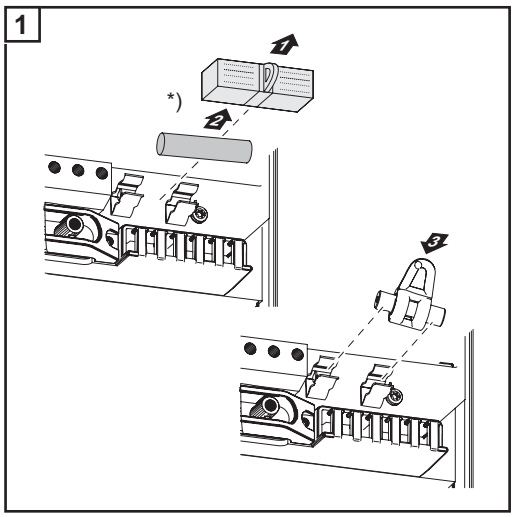



*) The plastic bolts are included in the inverter scope of delivery

Fronius recommends a fuse with 1 A and a dimension of 10 x 38 mm for solar module grounding.

Inserting the fuse will ground the solar module at the negative pole.

**Inserting the "100 kohm Grounding Kit" option:**




*) Remove standard fuse holder with plastic bolt

Insert the "100 kohm Grounding Kit" option into the fuse holder completely with the plastic jacket

Inserting the "100 kohm Grounding Kit" option grounds the solar module at the negative pole via a high ohm resistor.

**Opening Fronius IG Plus for Service/Maintenance**

Procedure for opening the inverter for service or maintenance:

1. Disconnect AC and DC supply from the inverter
2. Open the connection area
3. Turn off DC main switch
4. Allow the capacitors to discharge (5 minutes)
5. Remove metal covers
6. If present, remove the fuse for the solar module ground
7. If present, remove string fuses
8. Disconnect DC wire
9. Disconnect AC wire

# Solar Module Ground at Positive Pole: Connecting Solar Module Strings

**General**

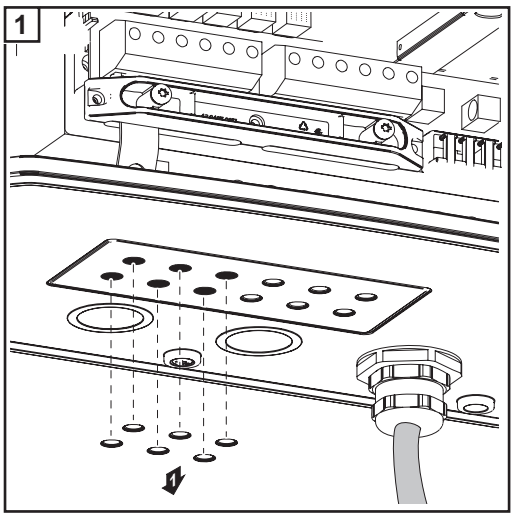
The following steps are necessary when the solar module manufacturer requires a solar module ground at the positive pole.

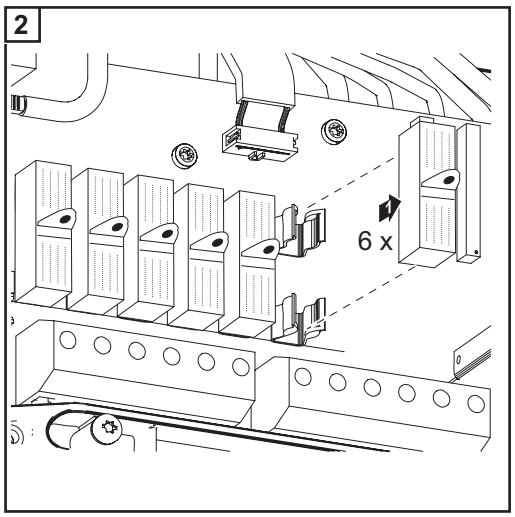
**Wire Cross Section of Solar Module Strings**

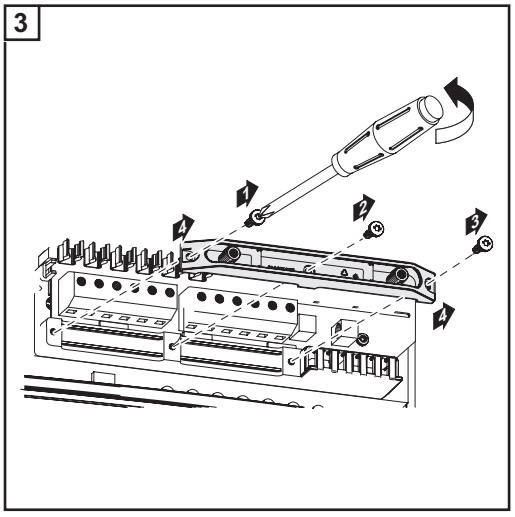
The cable cross section for solar module strings should be a maximum of 16 mm² per cable.

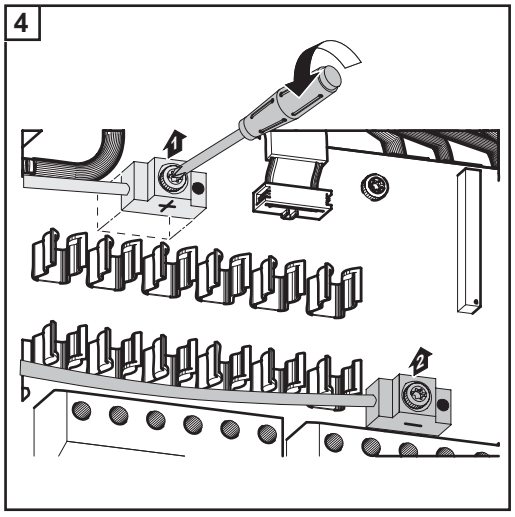
**NOTE!** To ensure an effective strain relief device for solar module strings, only use cable cross sections of the same size.

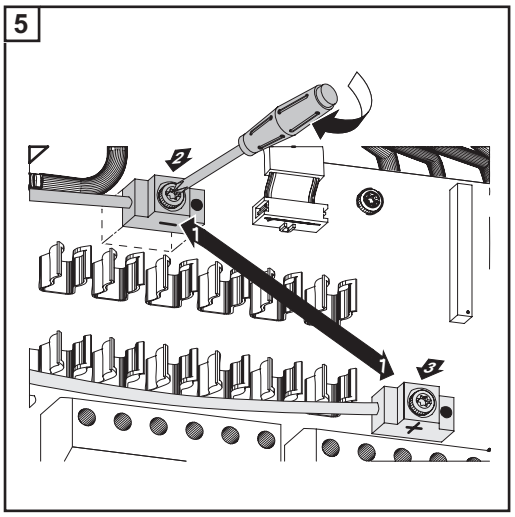
**Solar Module Ground at Positive Pole: Connecting Solar Module Strings**

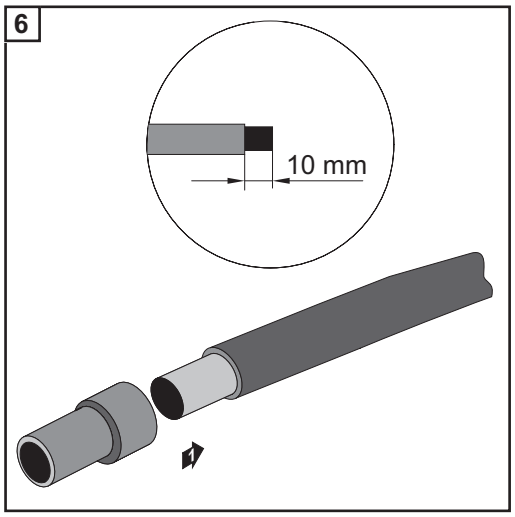




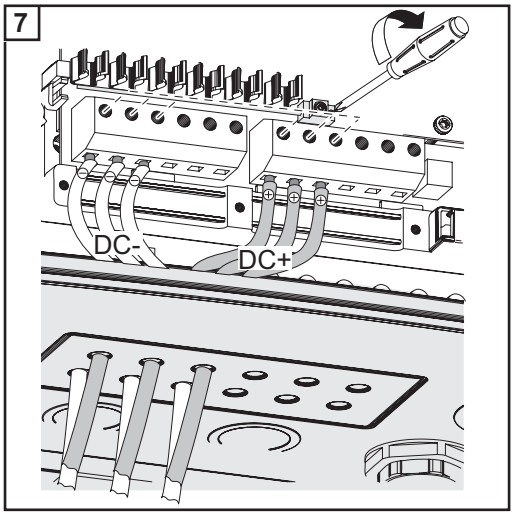

After disconnecting the DC main switch cable:

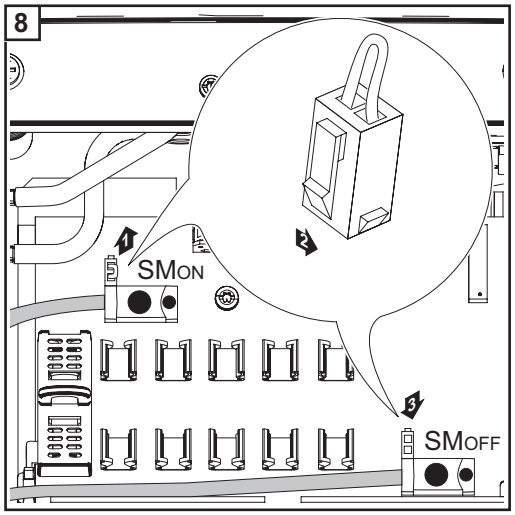
- Connect the DC+ cable to the DC- connection as per step 5
- Connect the DC- cable to the DC+ connection as per step 5

**NOTE!** Identify the reversed polarity accordingly with (+) and (-).

**CAUTION!**

- Only connect a maximum of 20 A to an individual DC terminal.
- Connect the DC+ and DC- cable to the right connection of the inverter's DC terminals.
- Connect the DC- cable to the left connection of the inverter's DC terminals.

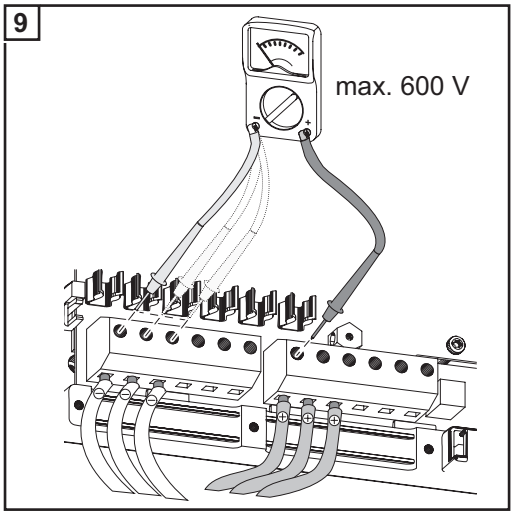


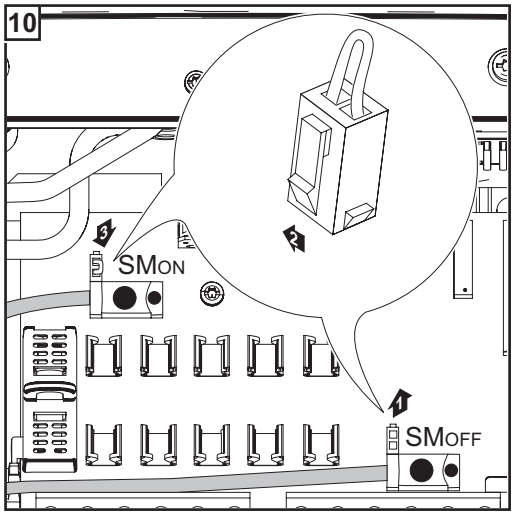




Tightening torque of terminals:
1.2 - 1.5 Nm

**IMPORTANT!**

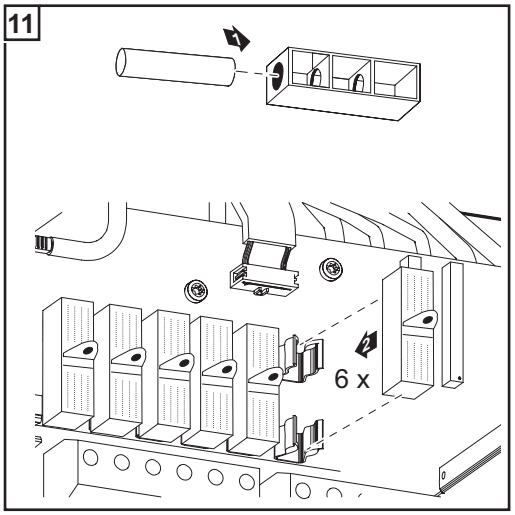
- Set the jumper from the '$SM_{ON}$' position to the '$SM_{OFF}$' position for correct measurement results
- Check the polarity and voltage of the solar module strings: the voltage should be a max. of 600 V, the difference between the individual solar module strings should be a max. of 10 V.

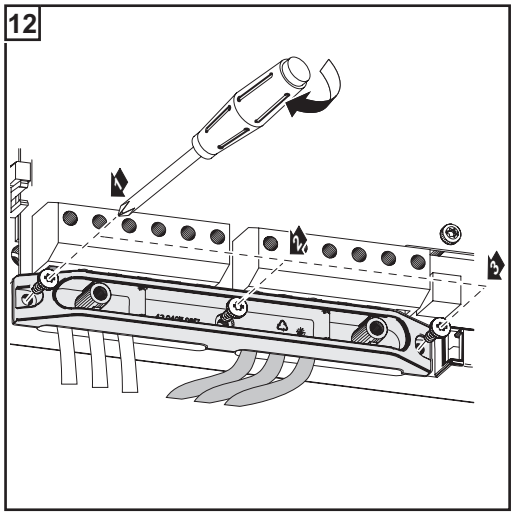



**IMPORTANT!**

- When connecting solar module strings, you should use metal bolts with fuse covers in the fuse holders depending on the solar module manufacturer's instructions.
  The metal bolts are included in the inverter scope of delivery.
- Place metal bolts with fuse covers in the fuse holders for unoccupied DC+ terminals.




**Selecting String Fuses**

If the solar module manufacturer requires the use of string fuses for operation:

- Select string fuses according to the information from the solar module manufacturer or according to "Criteria for the Proper Selection of String Fuses" (max. 20 A per solar module string, max. 6 solar module strings)

**IMPORTANT!**

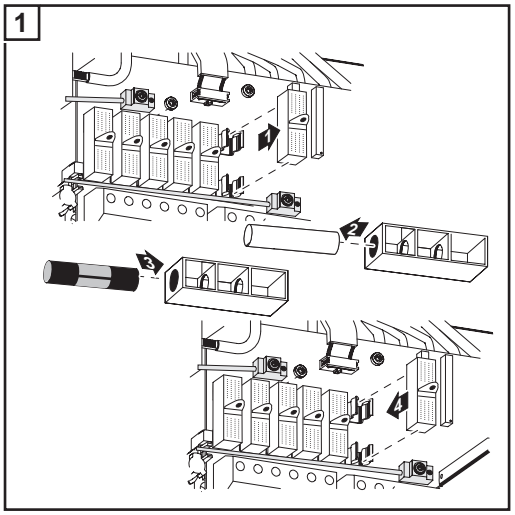
- Please follow solar module safety instructions
- Follow all solar module manufacturer requirements

**Inserting String Fuses**

**NOTE!** If the solar module manufacturer requires the use of string fuses:

- Insert fuses with a fuse cover in the respective fuse holder
- Do not operate the inverter without fuse covers

1




**WARNING!** An electric shock can be fatal. Danger from DC voltage from solar modules. Fuse covers are for installation purposes only. They offer no protection against contact.

# Criteria for the Proper Selection of String Fuses

**General**

The use of string fuses in the inverter also adds fuse protection to the solar modules.
A crucial factor for the fuse protection of solar modules is the maximum short circuit current $I_{sc}$ of the respective solar module.

**Criteria for the Proper Selection of String Fuses**

The following criteria must be fulfilled for each solar module string when using fuse protection:

- $I_N > 1.5 \times I_{SC}$
- $I_N < 2.0 \times I_{SC}$
- $V_N >/= 600$ V DC
- Fuse dimensions: Diameter 10.3 x 35 - 38 mm

| | |
|---|---|
| $I_N$ | Nominal current rating of fuse |
| $I_{SC}$ | Short circuit current for standard test conditions (STC) according to solar module data sheet |
| $V_N$ | Nominal voltage rating of fuse |

**Effects of Using Underrated Fuses**

In underrated fuses, the nominal current value is less than the short circuit current of the solar module.
Effect:
The fuse may trip in intensive lighting conditions.

**Fuse Recommendations**

**NOTE!** Only select fuses suitable for a voltage of 600 V DC.

You should only use the following fuses, which have been tested by Fronius, to ensure problem-free fuse protection:

- Littelfuse KLKD fuses
- Cooper Bussmann PV fuses

Fronius shall not be liable for any damage or other incidents resulting from the use of other fuses. In addition, all warranty claims are forfeited.

**Application Example**

e.g.: Maximum short circuit current ($I_{SC}$) of the solar module = 5.75 A

According to the criteria for selecting the correct fuse, the fuse must have a nominal current greater than 1.5 times the short circuit current:
5.75 A x 1.5 = 8.625 A

The fuse that should be selected according to the "Fuses" table:
KLK D 9 with 9.0 A and 600 V AC / DC

**Fuses**

| Nominal current value | Fuse | Nominal current value | Fuse |
|---|---|---|---|
| 1.0 A | KLK D 1 | 6.0 A | KLK D 6 |
| 1.5 A | KLK D 1 1/2 | 7.0 A | KLK D 7 |
| 2.0 A | KLK D 2 | 8.0 A | KLK D 8 |
| 2.5 A | KLK D 2 1/2 | 9.0 A | KLK D 9 |
| 3.0 A | KLK D 3 | 10.0 A | KLK D 10 |
| 3.5 A | KLK D 3 1/2 | 12.0 A | KLK D 12 |
| 4.0 A | KLK D 4 | 15.0 A | KLK D 15 |
| 5.0 A | KLK D 5 | 20.0 A | KLK D 20 |

"Fuses" Table: Excerpt of Suitable Fuses, e.g., Littelfuse Fuses

# Solar Module Ground at Positive Pole: Connecting Solar Module Strings with a Cable Cross Section > 16 mm²

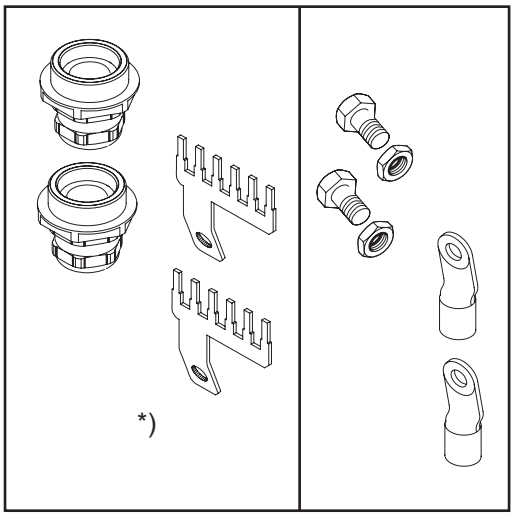
**General**

The following steps are only necessary when the solar module manufacturer requires a solar module ground at the negative pole.

As an option, you can also connect DC cables to the inverter with a cross section > 16 mm², e.g., when the DC cables from the solar modules are combined outside of the inverter into a large string.

**Additionally Required Components**

The following additional components are required for connecting DC cables with a cross section > 16 mm²:




- 2 M32 metric screw joints (degree of protection min. IP45)
- 2 connection distributors

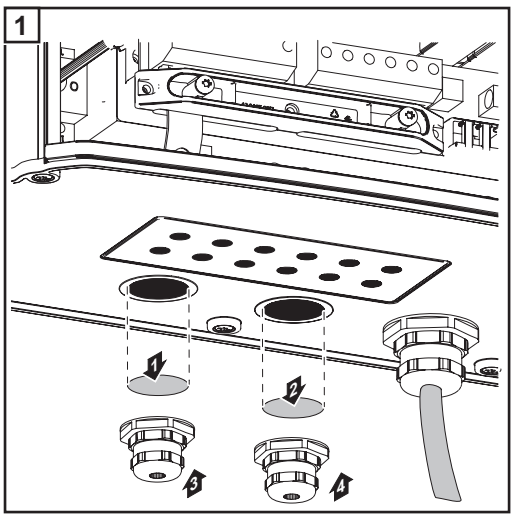
  *)
  Metric screw joints and connection distributors are available from Fronius as an option.

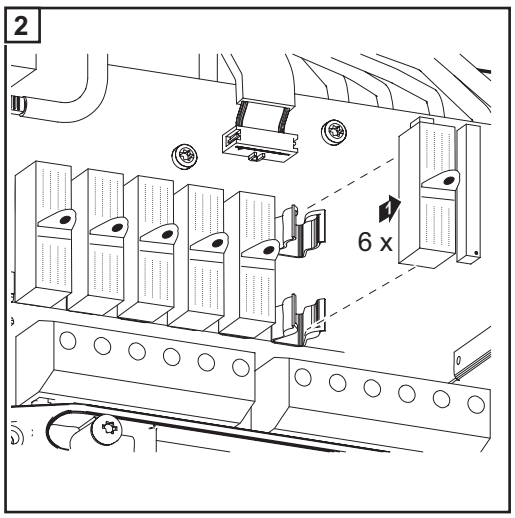
- 2 cable lugs for the DC cables

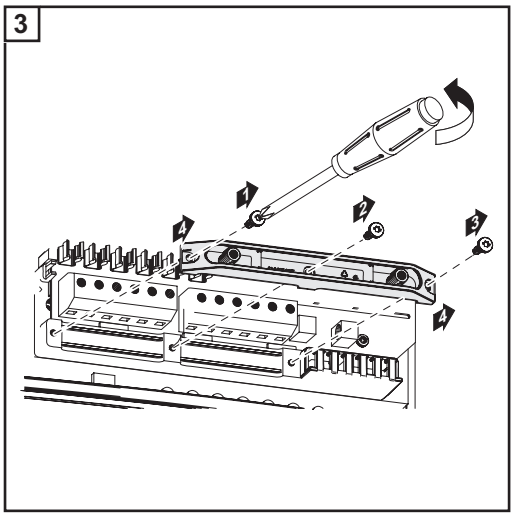
  Select cable lugs that match the available DC cables

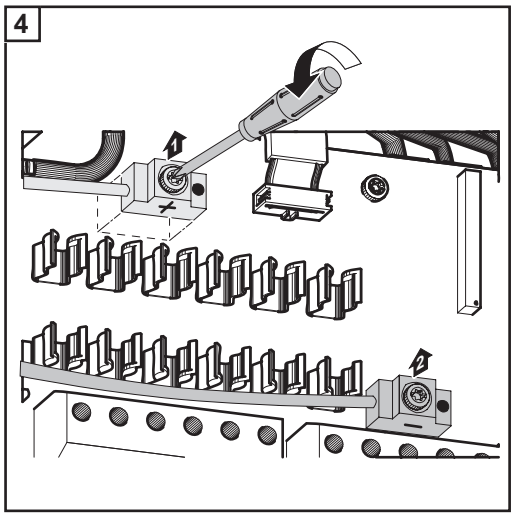
- 2 M10 screws
- 2 M10 hexagon nuts

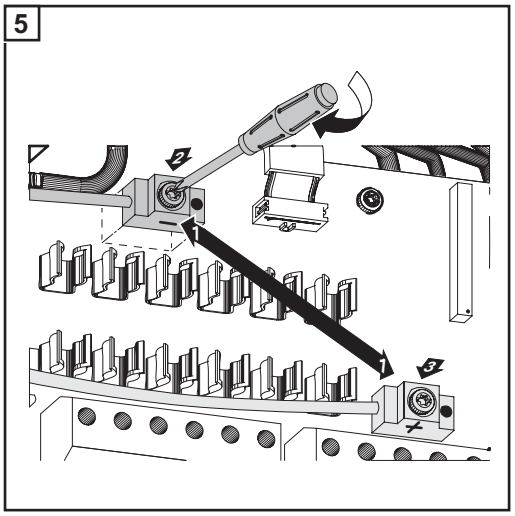
**Solar Module Ground at Positive Pole: Connecting Solar Module Strings with a Cable Cross Section > 16 mm²**

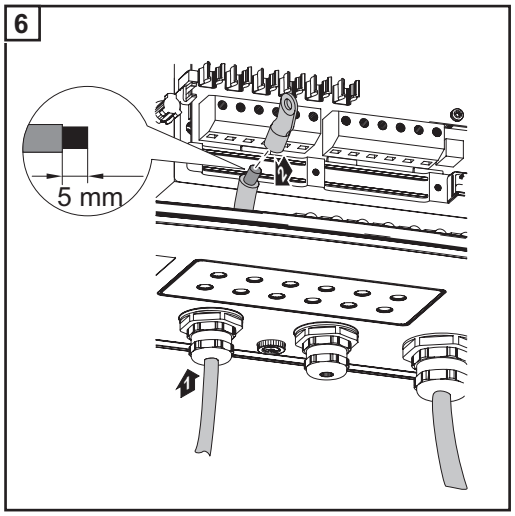





After disconnecting the DC main switch cable:

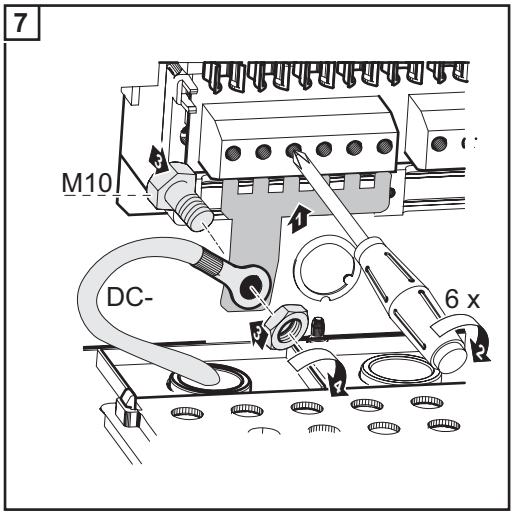
- Connect the DC+ cable to the DC- connection as per step 5
- Connect the DC- cable to the DC+ connection as per step 5

**NOTE!** Identify the reversed polarity accordingly with (+) and (-).

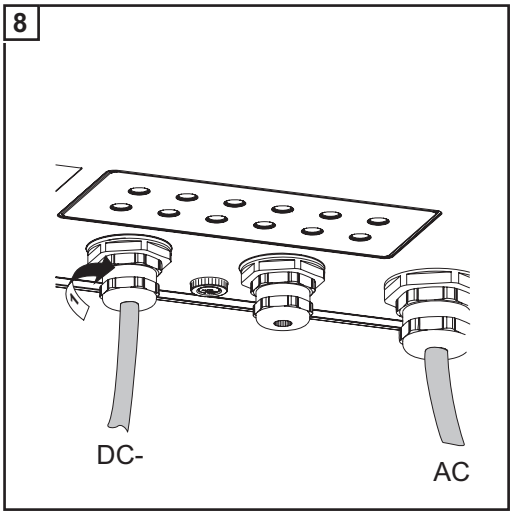
**CAUTION!** Danger of damaging the inverter by overload.

- Connect the DC+ cable to the right connection of the inverter's DC terminals.
- Connect the DC- cable to the left connection of the inverter's DC terminals.

7

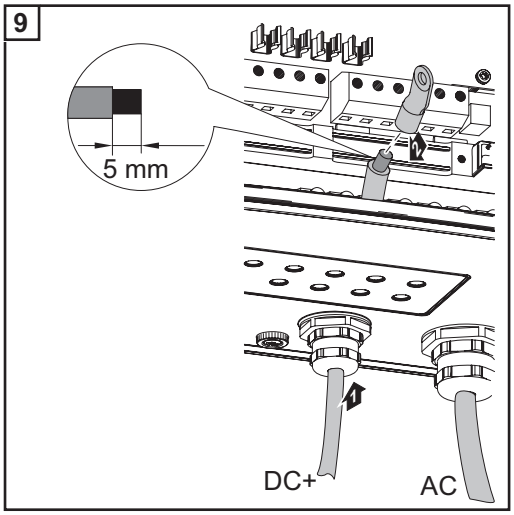



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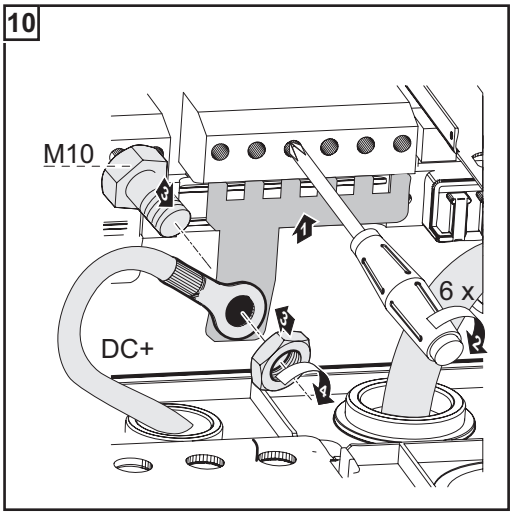



Tightening torque of terminals:
1.2 - 1.5 Nm

9

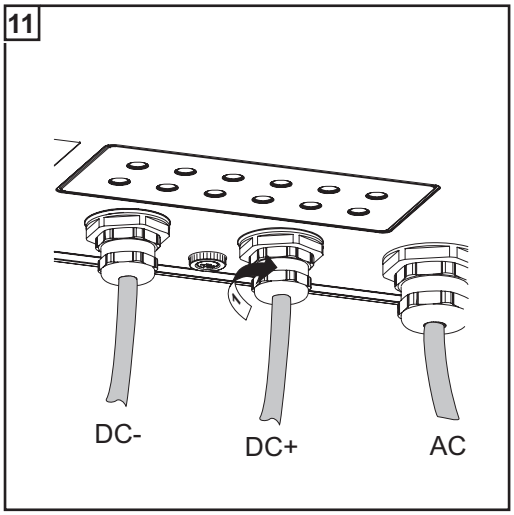



10

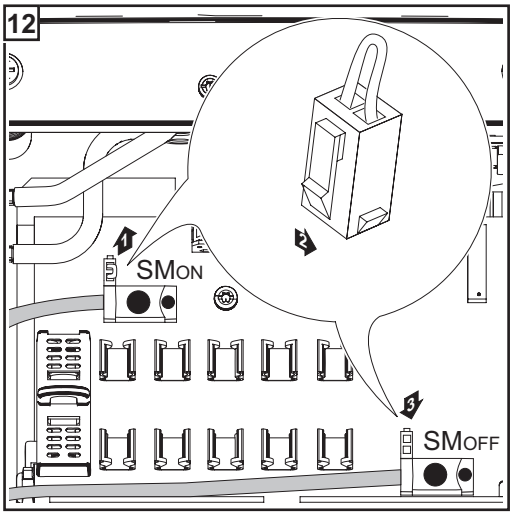



Tightening torque of terminals:
1.2 - 1.5 Nm

11



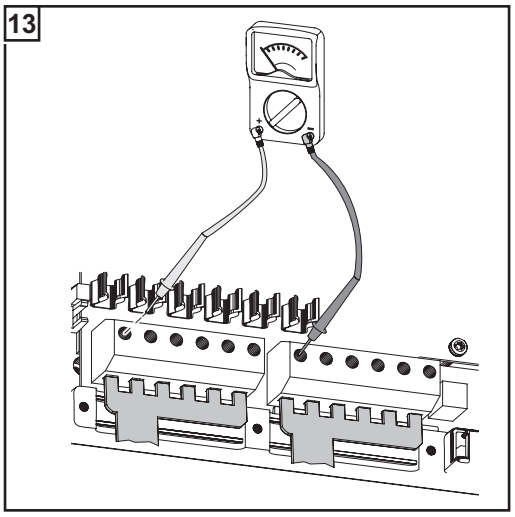

12



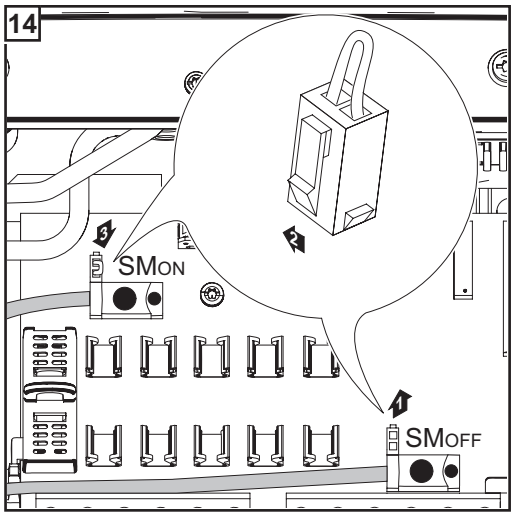
**IMPORTANT!**

- Set the jumper from the '$SM_{ON}$' position to the '$SM_{OFF}$' position for correct measurement results
- Check the polarity and voltage of the DC cables strings: The voltage should be a max. of 600 V.

13

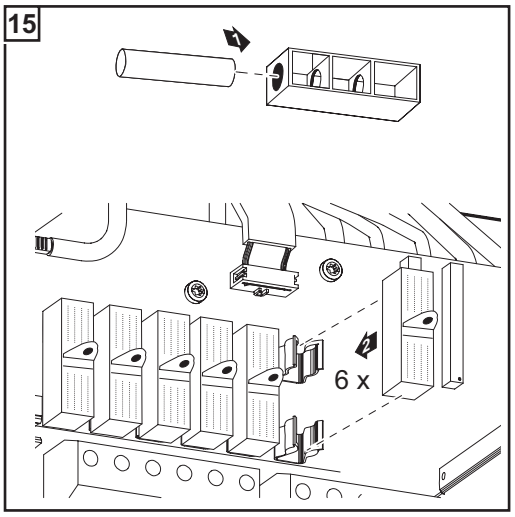


14




**IMPORTANT!** When using connection distributors, insert 6 metal bolts with fuse covers in the fuse holders. The metal bolts are included in the Fronius IG Plus scope of delivery.

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# Solar Module Ground at Positive Pole for Fronius IG Plus

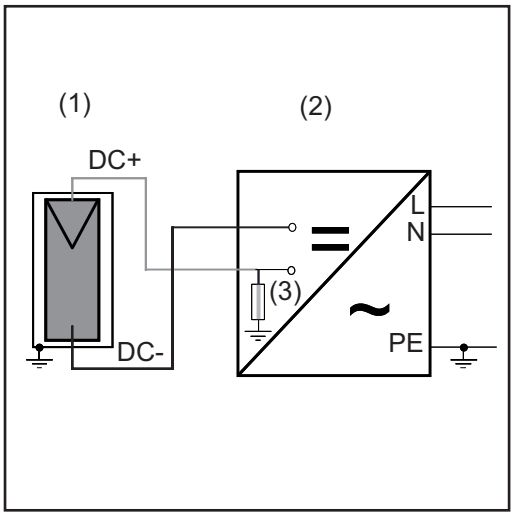
**General**

Some manufacturers of solar modules stipulate that the module must be grounded.

**IMPORTANT:** Take into account the following points if a solar module ground is required:

- Specifications of the solar module manufacturer regarding polarity and required type of solar module ground
- National provisions

**Solar Module Ground at Positive Pole**

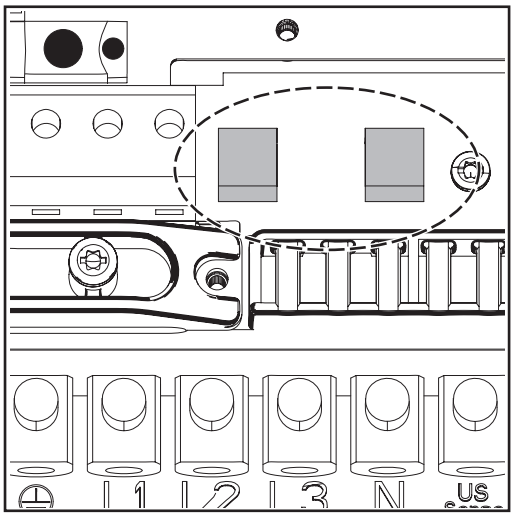



Example:
Solar module ground at positive pole with fuse or high ohm resistor

(1) Solar module
(2) Inverter
(3) Fuse / High ohm resistor

**Solar Module Ground at Positive Pole for Fronius IG Plus**

You can ground solar modules in the Fronius IG Plus using a fuse or a high ohm resistor.




Fuse holder on the Fronius IG Plus for the solar module ground

Fronius recommends a fuse with 1 A and a dimension of 10 x 38 mm for solar module grounding.

For solar module grounding using a high ohm resistor, Fronius exclusively recommends the "100 kohm Grounding Kit" option.

## Safety

**WARNING!** An electric shock can be fatal. Danger from DC voltage from solar modules. The inverter's insulation monitoring is deactivated when the solar modules are grounded.

- Ensure that grounded solar modules are designed so that they are isolated according to Protection Class II
- Place the relevant safety sticker in a clearly visible place on the photovoltaic system
- Set the inverter so that an error message is displayed if the fuse trips.




Safety Label for the Solar Module Ground

**IMPORTANT:** Safety labels and the fuse for solar module grounding are not included in the inverter scope of delivery, and must be obtained separately.

## Setting Inverters for Grounded Solar Modules

The inverter's insulation monitoring is deactivated when the solar modules are grounded. For this reason, you must make a setting in the 2nd level of the Setup menu so that an error message is displayed when the ground fuse is triggered. A code is required to access the 2nd level of the Setup menu. This code can be requested from Fronius. Additional information regarding accessing the 2nd level of the Setup menu will be provided along with the code.

## Solar Module Ground: Inserting Fuse or "100 kohm Grounding Kit" Option

**NOTE!** If the solar module manufacturer requires a ground for solar modules at the positive pole:

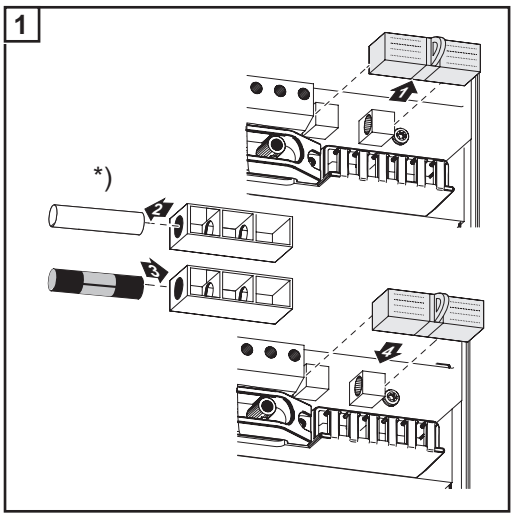
- Insert the "100 kohm Grounding Kit" option into the fuse holder completely with the plastic jacket
- Do not operate the inverter without the plastic jacket when using the "100 kohm Grounding Kit" option

or

- Insert the fuse with a fuse cover in the fuse holder
- Do not operate the inverter without a fuse cover

**WARNING!** An electric shock can be fatal. Danger from DC voltage from solar modules. Fuse covers are for installation purposes only. They offer no protection against contact.
The DC main switch is only used to switch off power to the power stage set. When the DC main switch is turned off, the solar module ground at the negative pole remains unaffected. Never touch the DC+ and DC-.

**Inserting a fuse:**

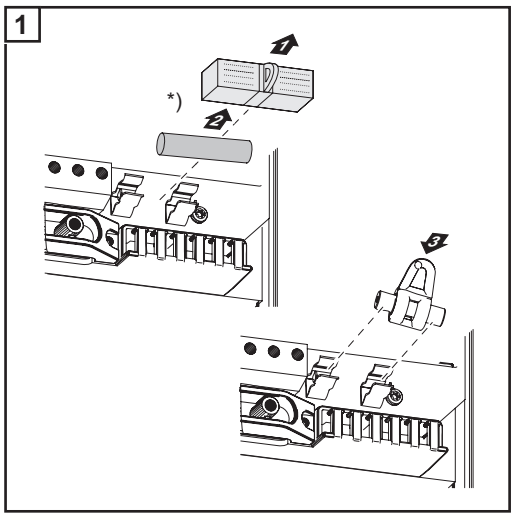



*) The plastic bolts are included in the inverter scope of delivery

Fronius recommends a fuse with 1 A and a dimension of 10 x 38 mm for solar module grounding.

Inserting the fuse will ground the solar module at the positive pole.

**Inserting the "100 kohm Grounding Kit" option:**




*) Remove standard fuse holder with plastic bolt

Insert the "100 kohm Grounding Kit" option into the fuse holder completely with the plastic jacket

Inserting the "100 kohm Grounding Kit" option grounds the solar module at the positive pole via a high ohm resistor.

**Opening Fronius IG Plus for Service/Maintenance**

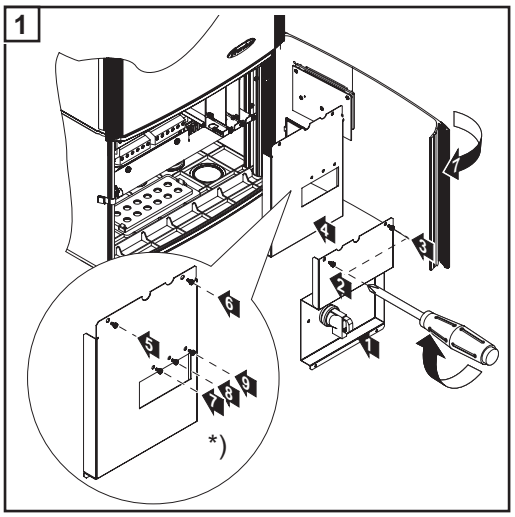
Procedure for opening the inverter for service or maintenance:

1 Disconnect AC and DC supply from the inverter
2 Open the connection area
3 Turn off DC main switch
4 Allow the capacitors to discharge (5 minutes)
5 Remove metal covers
6 If present, remove the fuse for the solar module ground
7 If present, remove string fuses
8 Disconnect DC wire
9 Disconnect AC wire

# Closing Fronius IG Plus



**Closing Fronius IG Plus**




*) Attach all fixing screws for any available option cards.

# Inserting Option Cards

**Suitable Option Cards**

There are several options and system upgrades available for the inverter, e.g.:

- Datalogger and modem interfaces (for using a PC to record and manage data from your photovoltaic system)
- Various large displays (public display)
- Actuators / relays / alarms (signal card)

System upgrades come in the form of plug-in cards. The inverter can be equipped with three option cards.

**Safety**

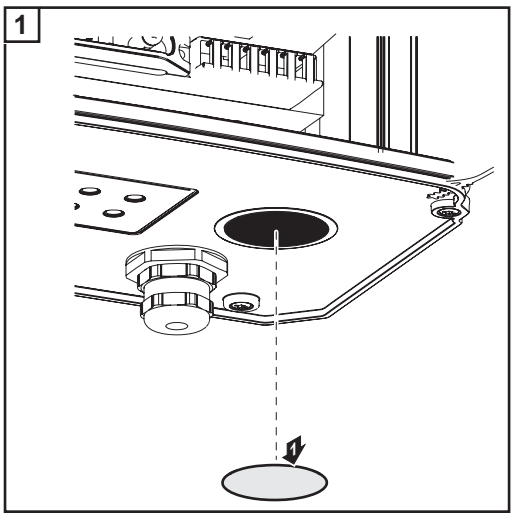
**WARNING!** An electric shock can be fatal. Danger due to grid voltage and DC voltage from solar modules.

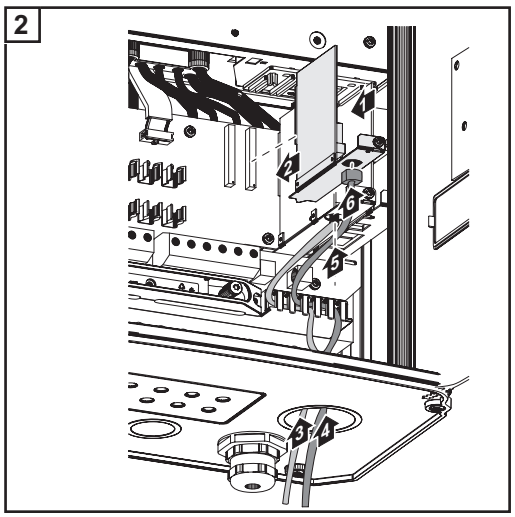
- The connection area should only be opened by a licensed electrician.
- Never work with live wires! Prior to all connection work, make sure that the AC and DC wires are not charged.

**WARNING!** An electric shock can be fatal. Danger from residual voltage from capacitors.
You must wait until the capacitors have discharged. Discharge takes 5 minutes.

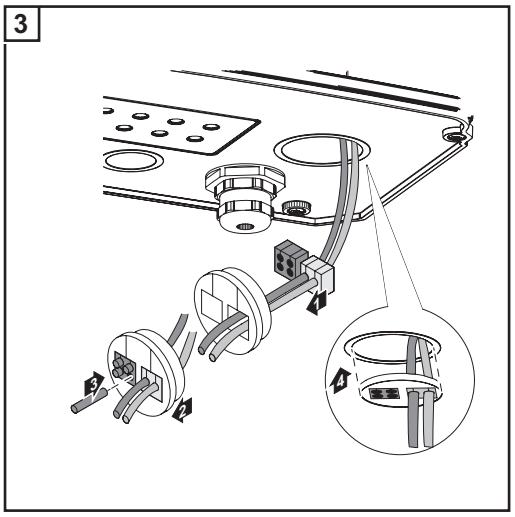
**NOTE!** Follow general ESD precautions when handling option cards.

**Inserting Option Cards into the Fronius IG Plus**




**IMPORTANT:** Depending on the number of option card cables, please use corresponding square sealing inserts.

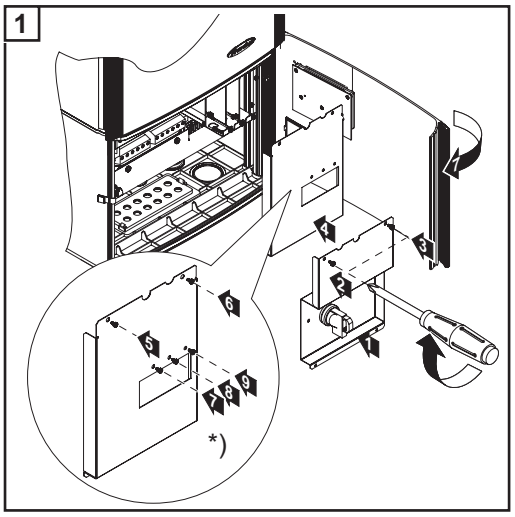



Square sealing inserts are part of the option card scope of delivery.

The round sealing insert is included in the "Fronius Com Card" option scope of delivery.

**IMPORTANT:** When networking several DATCOM components, a terminating plug must be placed on each free IN and/or OUT connection of a DATCOM component.

**Closing Fronius IG Plus**




*) Attach all fixing screws for any available option cards.

# Data Communication and Solar Net

**Solar Net and Data Interface**

Fronius developed Solar Net to make these add-on system components flexible and capable of being used in a wide variety of different applications. Solar Net is a data network which enables several inverters to be linked with the system upgrades.

Solar Net is a bus system. A single cable is all that is required for one or more inverters to communicate with all system upgrade components.

The core of the Solar Net is the Fronius Datalogger. It coordinates the data traffic and makes sure that even large volumes of data are distributed quickly and reliably.

The 'Fronius COM Card' option is required to integrate an inverter into Solar Net.

**Important** Every inverter that is to be monitored using a Datalogger requires a 'Fronius COM Card.' In this case, the 'Fronius Com Card' serves as a link between the internal network of the inverter and the Solar Net interface of the Fronius Datalogger.

**Important** Each inverter can only have one 'Fronius Com Card.' A network may only contain one Fronius Datalogger.

The first inverter with a 'Fronius COM card' can be up to 1000 m (3280 ft) away from the last inverter with a 'Fronius COM card.'

Different system upgrades are detected automatically by Solar Net.

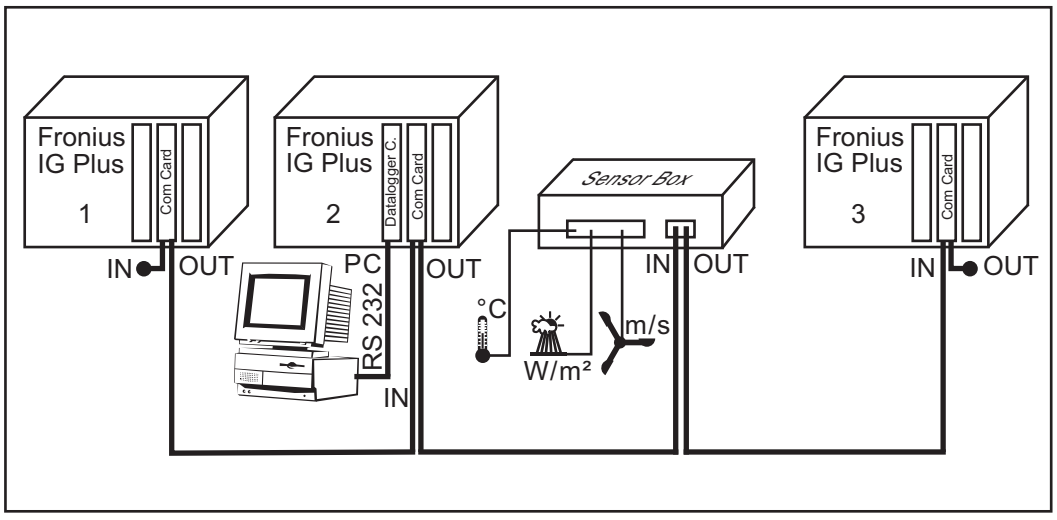
In order to distinguish between several identical system upgrades, each one must be assigned a unique number.

In order to uniquely identify each inverter in Solar Net, each inverter must also be assigned an individual number. You can assign individual numbers as per 'The Setup Menu' section in this manual.

More detailed information on the individual system upgrades can be found in the relevant operating instructions or on the Internet at http:\\www.fronius.com.

**Example**

Logging and archiving inverter and sensor data using a Fronius Datalogger and Fronius Sensor Box:




= Terminating plug

Illustration explanation: Data network with 3 Fronius IG Plus units and one Fronius Sensor Box:

- all Fronius IG Plus units have one 'Fronius COM Card'
- one Fronius IG Plus has a 'Fronius Datalogger Card' (no. 2)
- Fronius Datalogger has two RS-232 interfaces for connecting to a PC and a modem

Option cards communicate within the Fronius IG Plus via its internal network. External communication (Solar Net) takes place via the 'Fronius Com Cards.' Each 'Fronius Com Card' is equipped with two RS485 interfaces - an input and an output. RJ45 plug connectors are used to connect to these cards.

# Commissioning

**Factory Configuration**

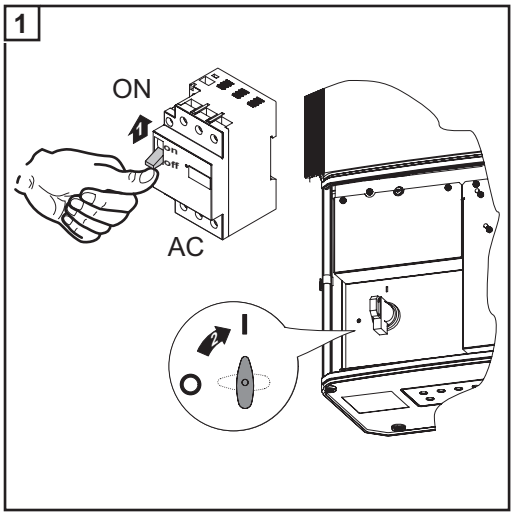
The inverter has been pre-configured in the factory and is ready for operation.

To change your inverter settings, please see "The Setup Menu" section in these instructions.

**Commissioning**

Once the inverter has been connected to the solar modules (DC) and the public grid (AC), turn the main switch to position - 1 -.

**NOTE!** Regardless of whether bolts or fuses are used, do not operate the inverter without fuse covers.

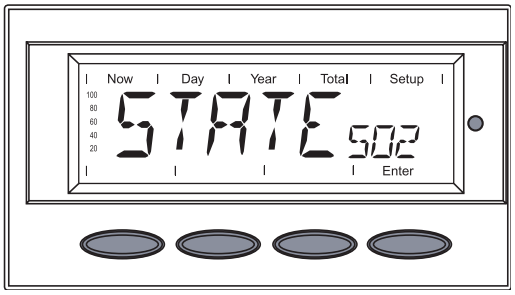



- As soon as the photovoltaic modules produce sufficient power, the Operating Status LED lights up orange. The screen displays the startup phase. The orange LED indicates that the inverter feed-in mode will begin shortly.
- Once the inverter has completed its automatic startup, the Operating Status LED will be green.
- Provided that power continues to feed into the grid, the Operating Status LED will remain green to confirm that the inverter is functioning correctly.

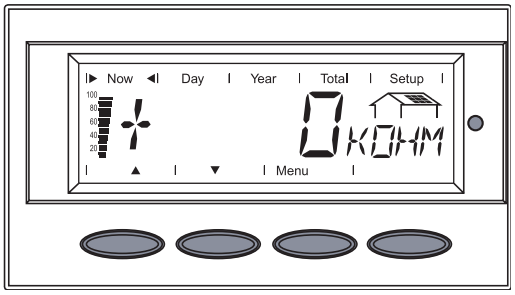
**Setting Inverters for Available Solar Module Ground**

**NOTE!** If a solar module ground is used, the corresponding grounding mode must be set in the 'Basic Service Menu' after the inverter is turned on.
A 5-character access code is required to access the 'Basic Service Menu.' This access code will be provided by Fronius upon request.

If a solar module ground is being used, the status message 502 "Insulation value too low" will be displayed after the inverter is turned on and upon completion of the startup phase.

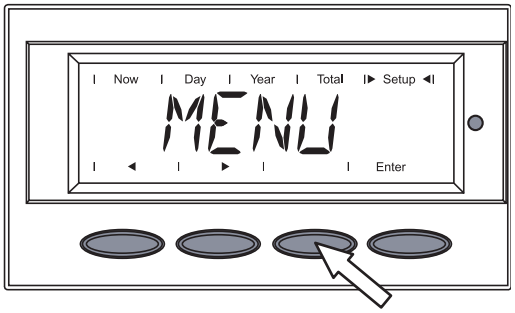



1 Confirm the status message by pressing the "Enter" key




The current insulation value is displayed.

2 Press the "Menu" key

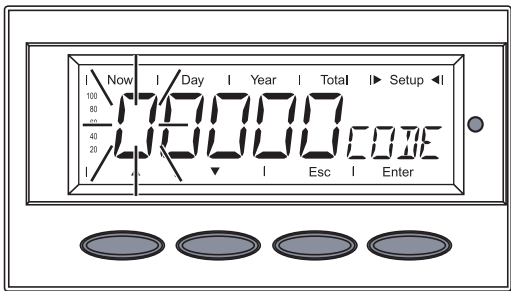



The "menu" is displayed.

3 Select the "Setup" mode using the "Left" or "Right" keys

◀ ▶

4 Press the unassigned "Esc" key 5 x

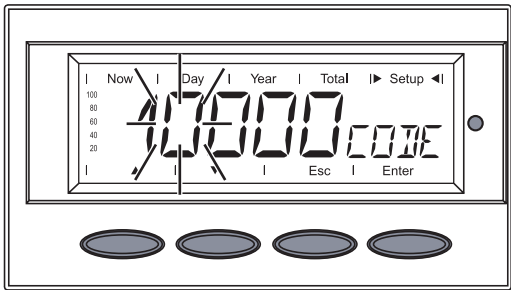



"CODE" is displayed, the first digit flashes.

5 Use the "Up" and "Down" keys to select the value for the first digit of the access code

▲ ▼

6 Press the "Enter" key

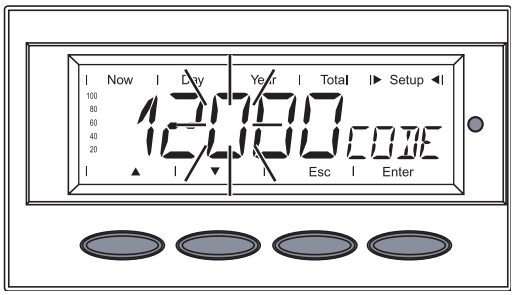



The second digit flashes.

7 Use the "Up" and "Down" keys to select a value for the second digit of the access code

▲ ▼

8 Press the "Enter" key

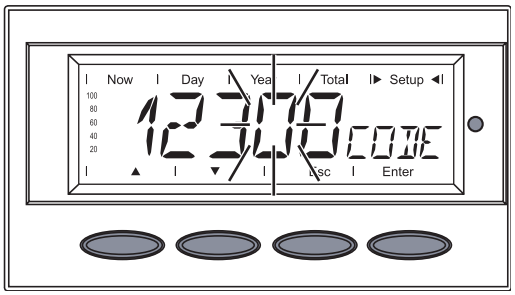



The third digit flashes.

9 Use the "Up" and "Down" keys to select a value for the third digit of the access code

▲ ▼

10 Press the "Enter" key

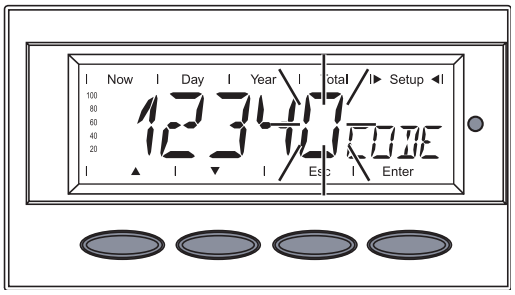



The fourth digit flashes.

11 Use the "Up" and "Down" keys to select a value for the fourth digit of the access code

▲ ▼

12 Press the "Enter" key

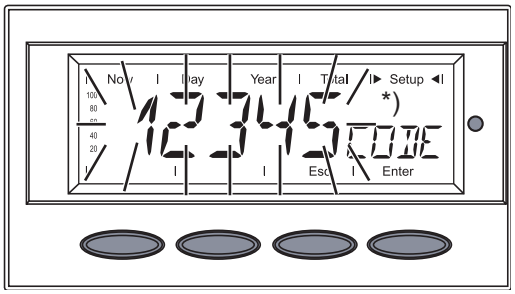



The fifth digit flashes.

13 Use the "Up" and "Down" keys to select a value for the fifth digit of the access code

▲ ▼

14 Press the "Enter" key

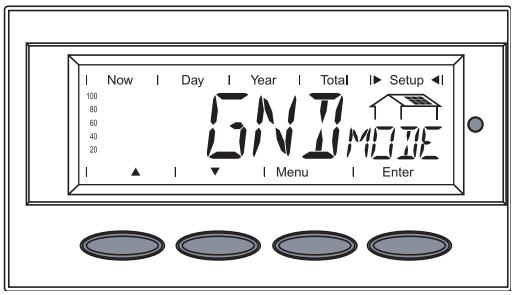



The access code flashes.
*) ... Code example

15 Press the "Enter" key

The inverter is now in the Basic Service menu, the first parameter is displayed:

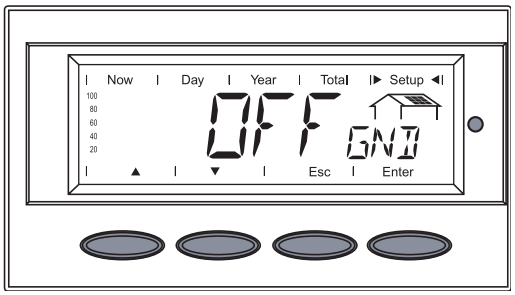
- 'MIXMODE' for multiphase inverters
- 'DCMODE' for one-phase inverters




16 Use the "Up" or "Down" keys to select the 'GNDMODE' parameter

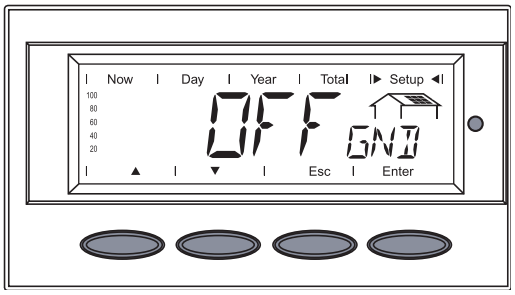
▲ ▼

17 Press the "Enter" key

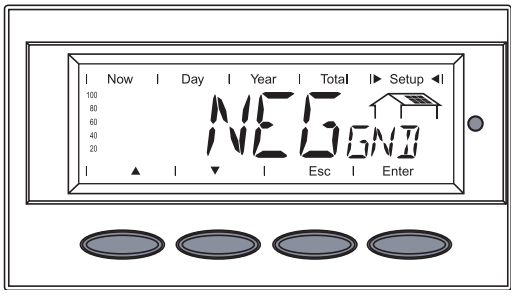



The grounding mode is displayed.

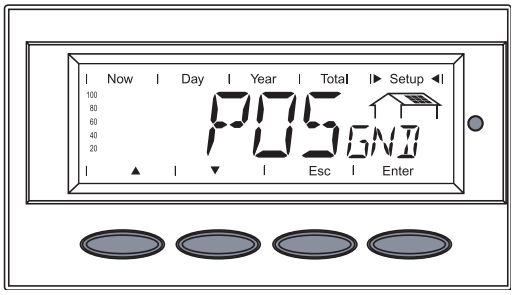
18 Use the "Up" and "Down" keys to select the grounding mode:
▲ ▼



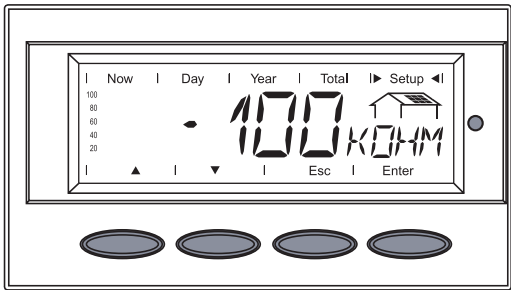

OFF = no solar module ground (factory setting)



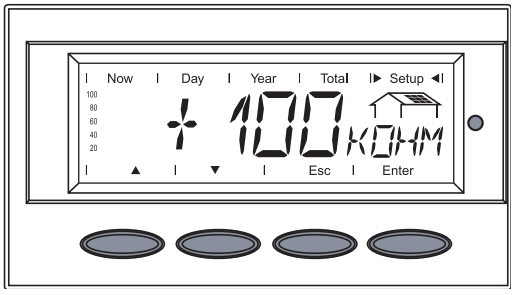

NEG = solar module ground at negative pole




POS = solar module ground at positive pole




-100 kohm = solar module ground at negative pole using high ohm resistor




+100 kohm = Solar module ground at positive pole using high ohm resistor

19 Press the "Enter" key to apply the required grounding mode

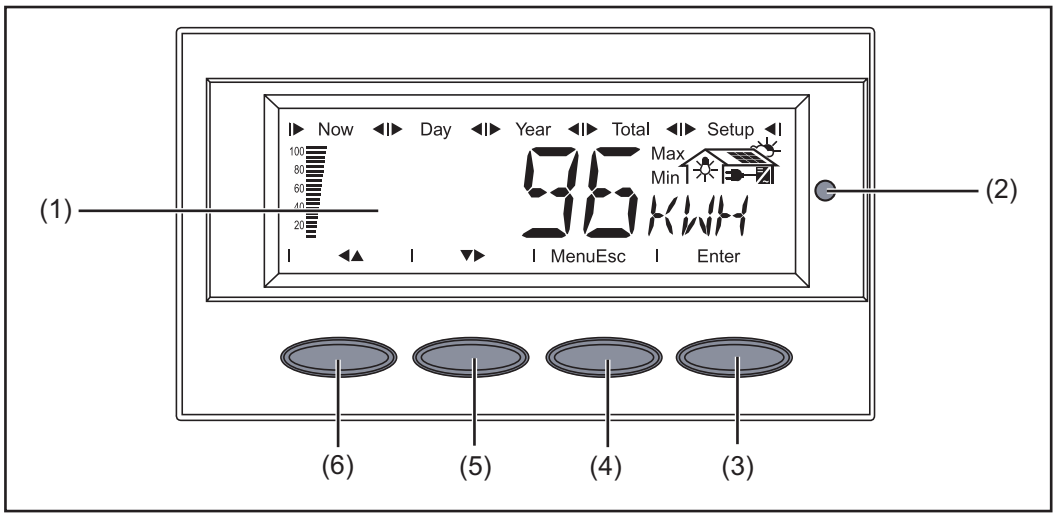
20 Press the "Esc" key to exit the Basic Service menu

# Operation

# Product Description Fronius IG Plus

USA

**Controls and Indicators**

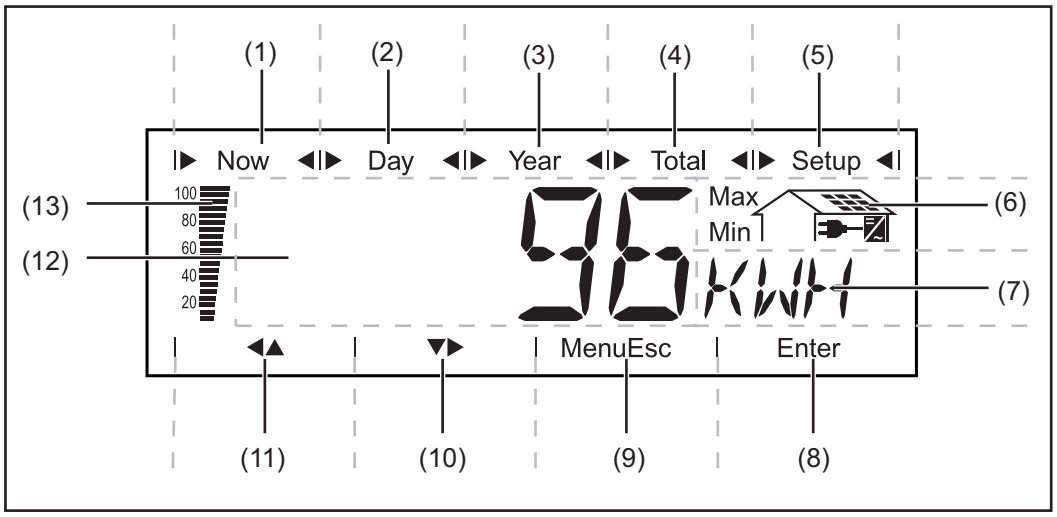



| Item | Function |
|---|---|
| **(1)** | Display<br>for displaying values, settings and menus |
| **(2)** | Operating Status LED<br>for displaying the operating status |
| **(3)** | "Enter" key<br>for confirming a selection |
| **(4)** | "Menu / Esc" key<br>for scrolling through menu options<br>for exiting the Setup menu |
| **(5)** | "Down/Right" key<br>depending on the selection:<br>for navigating down<br>for navigating right |
| **(6)** | "Left/Up" key<br>depending on the selection:<br>for navigating left<br>for navigating up |

**Display**

The display unit's power is supplied via the safety-low voltage of the solar modules, which means that the display unit can be used in the daytime.

**IMPORTANT!** The inverter display is not a calibrated measuring instrument. A slight inaccuracy of a few percent is intrinsic to the system. A calibrated meter will be needed to make calculations for the power supply company.




| Item | Function |
|---|---|
| **(1)** | Icons for the "Now" display mode |
| **(2)** | Icons for the "Day" display mode |
| **(3)** | Icons for the "Year" display mode |
| **(4)** | Icons for the "Total" display mode |
| **(5)** | Icons for the "Setup" display mode |
| **(6)** | Icons for operating conditions |

Max — The value shown represents the maximum value within the period of observation (depending on which display mode is selected).

Min — The value shown represents the minimum value within the period of observation (depending on which display mode is selected).

Important The minimum and maximum values displayed do not represent the absolute extreme values, because data is recorded only at two-second intervals.

... appears when values are displayed which are directly associated with the solar modules

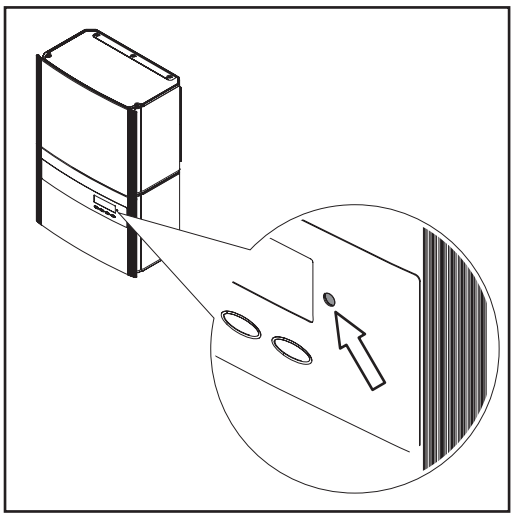
... appears when values are displayed which are directly associated with the public grid

... appears with data readings that are directly related to the inverter

| | |
|---|---|
| **(7)** | Range for display unit<br>for displaying the applicable measuring unit |
| **(8)** | Icon for the "Enter" key |
| **(9)** | Icons for the "Menu/Esc" key |
| **(10)** | Icons for the "Down/Right" key |
| **(11)** | Icons for the "Left/Up" key |
| **(12)** | Range for display value<br>for displaying the value |

| Item | Function |
|---|---|
| **(13)** | Output bar (not active during setup)<br>indicates the output power fed into the grid at a given moment - regardless of the display mode chosen. The screen displays % of the maximum possible output power of your solar inverter |

**Operating Status LED**



Position of Operating Status LED on the inverter

Depending on the operating status, the Operating Status LED assumes different colors:

| Operating Status LED | Explanation |
|---|---|
| Steady green | The LED stays lit after the automatic startup phase of the inverter as long as power is being fed into the grid.<br>It indicates problem-free operation of the photovoltaic system. |
| Flashing green | The photovoltaic system is working correctly, a status code is on the display.<br><br>When a status code is shown, rectify the relevant condition by going to the "Maintenance and Service" chapter, "Status Diagnosis and Troubleshooting" section. The status code can be acknowledged by pressing the "Enter" key. |
| Steady orange | The inverter enters an automatic startup phase as soon as the solar modules are delivering sufficient power after sunrise. |
| Flashes orange | A warning is shown on the display<br>or<br>the inverter has been set to standby operation in the Setup menu (= manual shutoff of operation).<br><br>The next day, operation will resume automatically.<br><br>During the time the LED flashes orange, operation can be resumed manually at any time (see section "The Setup Menu") |
| Steady red | General status: the respective status code is shown on the screen |
| Remains dark | There is no connection to the solar modules,<br>no solar module power due to darkness. |

A list of most status codes, the corresponding status information, their status causes and repair measures can be found in the chapter "Troubleshooting and Maintenance," section "Status Diagnosis and Troubleshooting."

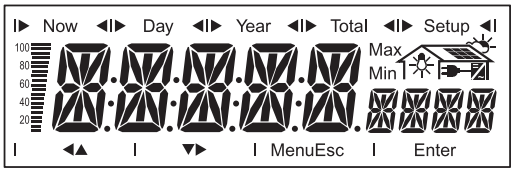
# Startup Phase and Grid Feed-in Mode

**Startup Phase**

After switching on automatically, the inverter goes through a self-test, followed by an extensive test of the public grid. This test can take from several seconds up to several minutes depending on local regulations. During the startup phase, the illumination of the Operating Status LED is yellow.

**Test Procedure**

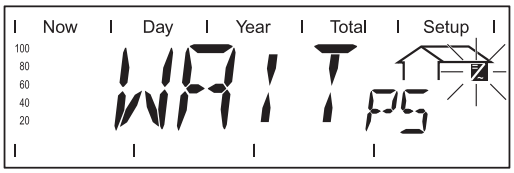
1. Segment test
   All display elements light up for about one second



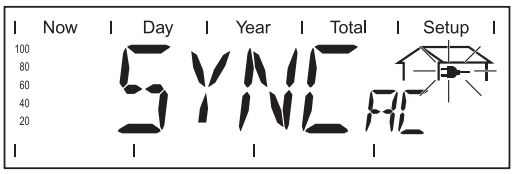

2. Self test of important inverter components
   - The inverter goes through a master check list for several seconds
   - The display will show "TEST" as well as the component currently being tested (e.g., "LED")



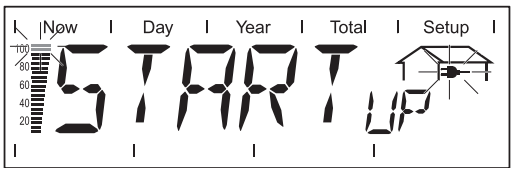

3. Synchronization with grid:
   - "WAIT PS" is displayed, the inverter icon flashes: The inverter waits for all power stage sets on the grid to be operational. This procedure is dependent on the DC voltage.




   - Next, the display shows "SYNC AC," the grid icon flashes




4. Startup test
   - Before the inverter begins feeding power into the grid, grid conditions are tested according to local regulations.
   - The display shows "START UP"

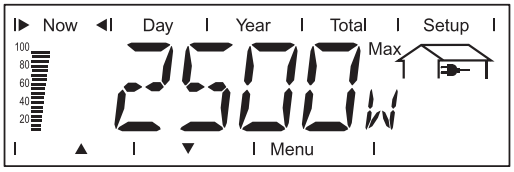


The startup test can take anything from just a few seconds up to several minutes depending on national regulations. The time elapsed is indicated by a bar shrinking from the top down.

Whenever two scale divisions stop flashing and disappear, 1/10 of the total duration of the test is over.

**Operation of Feeding Energy into the Grid**

- Once the tests have been completed, the inverter starts feeding power into the grid.
- The display shows the present power feeding into the grid.
- The Operating Status LED lights up green, and the inverter starts operating.



# Navigation in the Menu Level

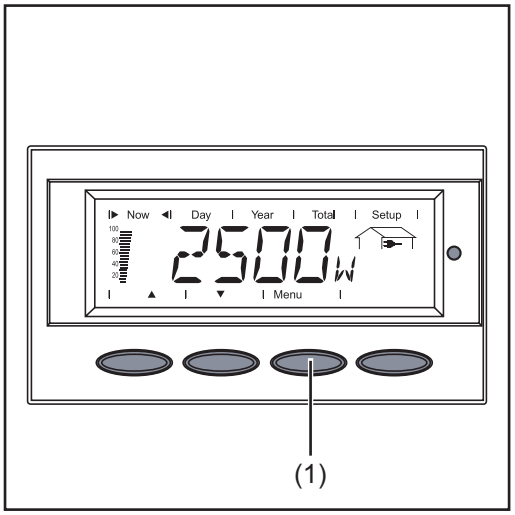
**Activating Display Illumination**

1 Press any key

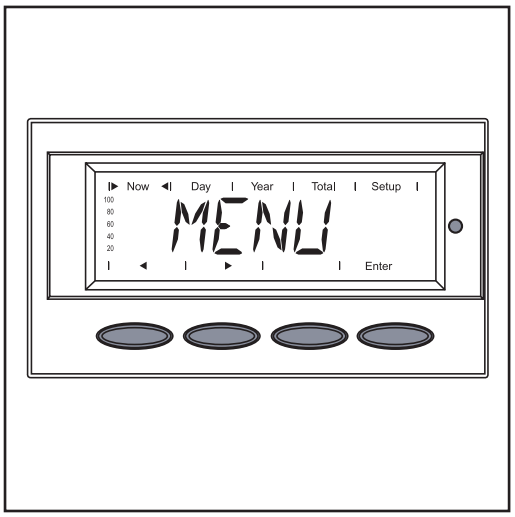
The display backlight is activated.

If no key is pressed for 30 seconds or more, the display backlight will go off again. The setup menu also offers a choice between a permanently lit or permanently dark display.

**Accessing the Menu Level**




1 Press the "Menu" key (1)




"Menu" will appear on the display

The inverter is now in the menu level.

From the menu level you can
- set the desired display mode
- access the Setup menu

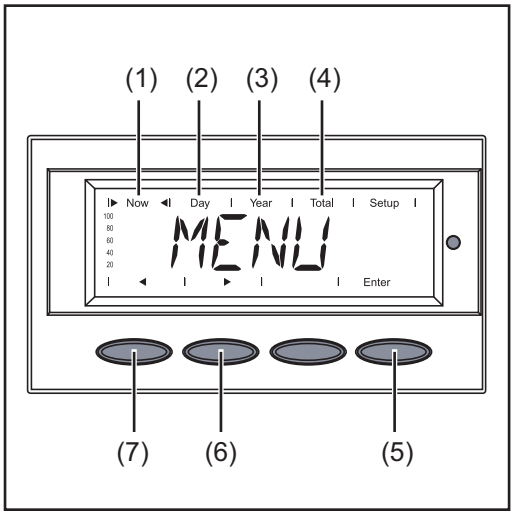
# The Display Modes



**The Display Modes**

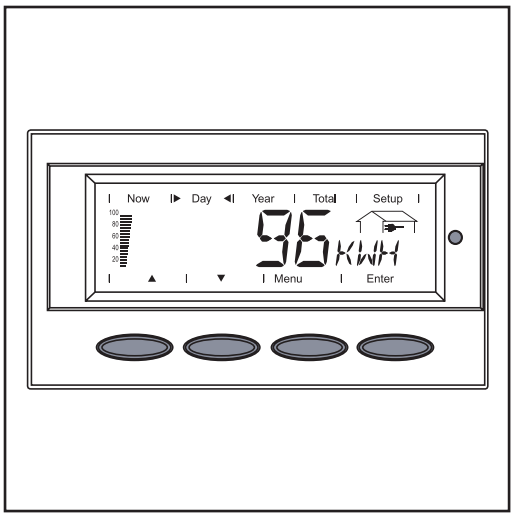
| | | |
|---|---|---|
| "Now" display mode | ..... | Displays real-time values |
| "Day" display mode | ..... | Displays values for power fed into the grid during that day |
| "Year" display mode | ..... | Displays values for the present calendar year - only available in combination with optional Fronius Datalogger |
| "Total" display mode | ..... | Displays values for power fed into the grid since the inverter was started for the first time |

**Selecting a Display Mode**




1. Accessing the menu level
2. Use the "left" (7) or "right" (6) keys to select your preferred display mode (1) - (4)

   ◀ ▶
3. Press "Enter" (5)




The selected display mode is shown, e.g., "Day" display mode.

**IMPORTANT!** The "Year" menu option is supported only when the optional Fronius Datalogger is connected. This system upgrade includes a real-time clock.

**Overview of Display Values**

| Display mode | Symbol | Unit | Optional | Display value |
|---|---|---|---|---|
| "Now" | | W | - | Output power |

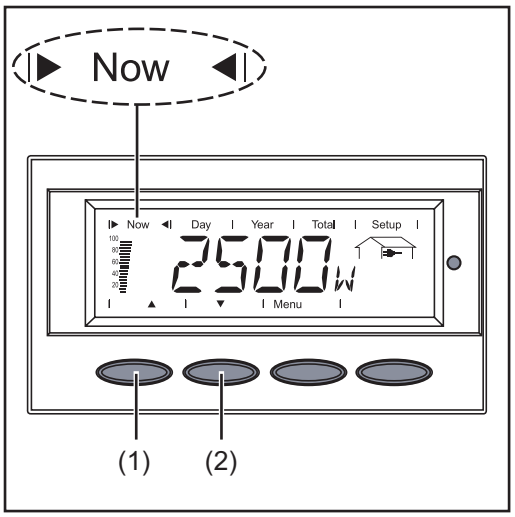
| Display mode | Symbol | Unit | Optional | Display value |
|---|---|---|---|---|
| | | V | - | Grid voltage |
| | | A | - | Output current |
| | | Hz | - | Grid frequency |
| | | V | - | Solar module voltage |
| | | A | - | Solar module current |
| | | Mohm | - | Insulation resistance |
| | | HH:MM | x | Time |
| "Day" | | kWh / MWh | - | Energy fed into the grid |
| "Year" | | Currency | - | Return |
| "Total" | | kg / T | - | $CO_2$ reduction |
| | | W | - | Max. output power |
| | | V | - | Maximum grid voltage |
| | | V | - | Minimum grid voltage |
| | | V | - | Maximum array voltage |
| | | HH:MM | - | Service hours completed by the inverter |

x Optional
If the DatCom component for the required options are not available, the message "N.A." (not available) is shown.

# Display Values in "Now" Display Mode

USA

**Selecting the "Now" Display Mode**



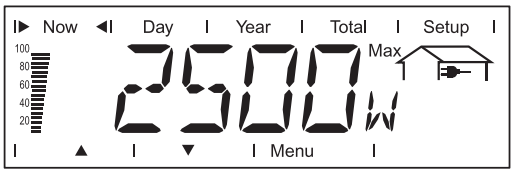

1 Select the "Now" display mode

The first display value in the "Now" display mode appears

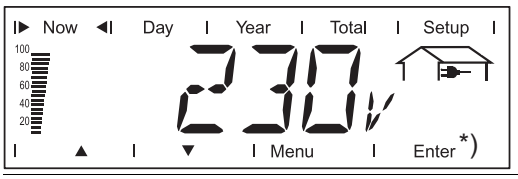
2 Use the "Down" (2) key to scroll to the next display value

Scroll back using the "Up" key (1)

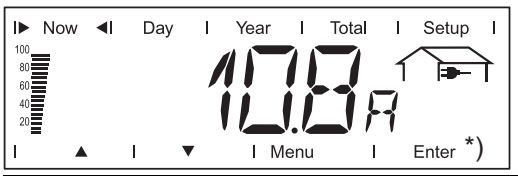
**Display Values in "Now" Display Mode**




**Output power**
power (in watts) currently being fed into the grid

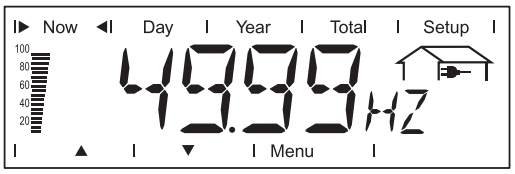



**Grid voltage**
(volts)

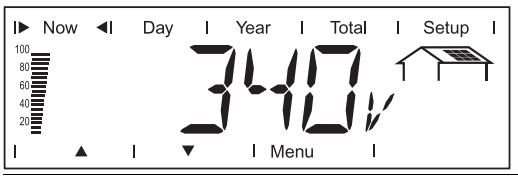



**Output current**
current supplied to the grid at that particular moment (amperes)

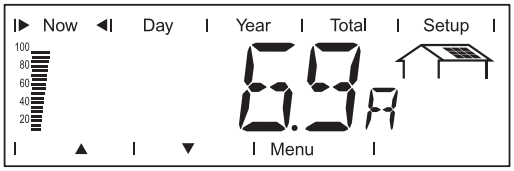
*) only for multiphase inverters



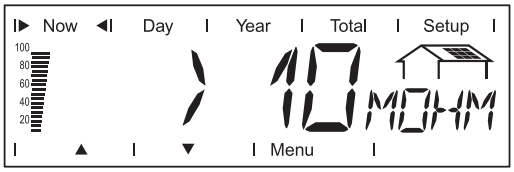

**Grid frequency**
(hertz)




**Solar module voltage**
voltage of the solar modules at the moment of data display (volts)




**Solar module current**
current supplied by solar modules at the moment of data display (amperes)

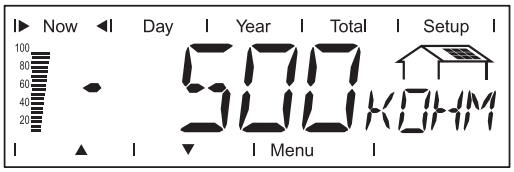



**Insulation resistance of photovoltaic system**
(Mohm)
for ungrounded solar modules

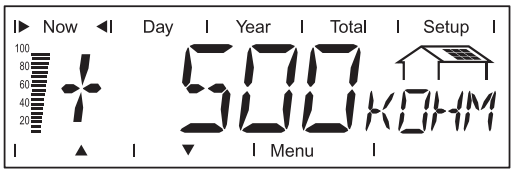
**WARNING!** An electric shock can be fatal. The positive and negative poles of the photovoltaic system should never be touched with an insulation resistance of < 500 kohm. An insulation resistance of < 500 kohm may be due to an inadequately insulated DC lead or defective solar modules. In the event that the insulation resistance is too low, you must contact your Fronius service partner.

The insulation resistance is the resistance between the positive or negative poles of the photovoltaic system and the ground potential. If an insulation resistance > 500 kohm is shown, this means that the photovoltaic system is adequately insulated.
An insulation resistance of less than 500 kohm indicates an error.

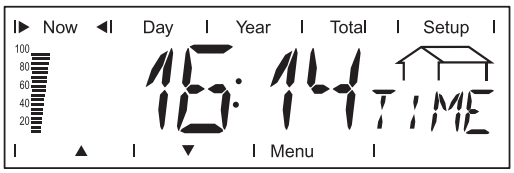
When the insulation resistance is less than 10 Mohm, the display differentiates between:
- negative potential of the ground (polarity sign '-')
- positive potential of the ground (polarity sign '+')




Display example of a negative potential (polarity sign "-")
Short circuit between DC lead and ground




Display example of a positive potential (polarity sign '+')
Short circuit between DC+ lead and ground




**Time of the day (optional datalogger)**
When the time on the inverter or a system upgrade is changed, this changes the time on all devices connected via Solar Net.

**Options**

If the DatCom component for the required options are not available, the message "N.A." (not available) is shown.

# Display Values in "Day / Year / Total" Display Modes

USA

**General**

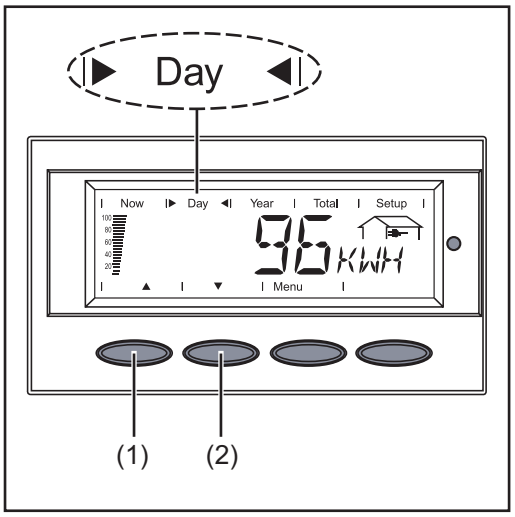
For the inverter, the day begins when it switches on. If the DC supply line is disconnected, the following parameters within the "Day" display mode will be reset after repeating the startup:

- Return (currency can be selected)
- $CO_2$ reduction (kg)
- Maximum output power (watts)
- Maximum grid voltage (volts)
- Minimum grid voltage (volts)
- Service hours completed by the inverter

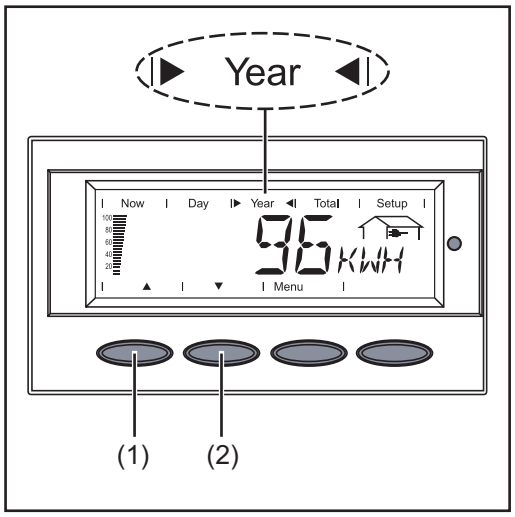
If an optional Fronius Datalogger is available, the display values listed always apply to the whole day.

**Selecting "Day / Year / Total" Display Mode**

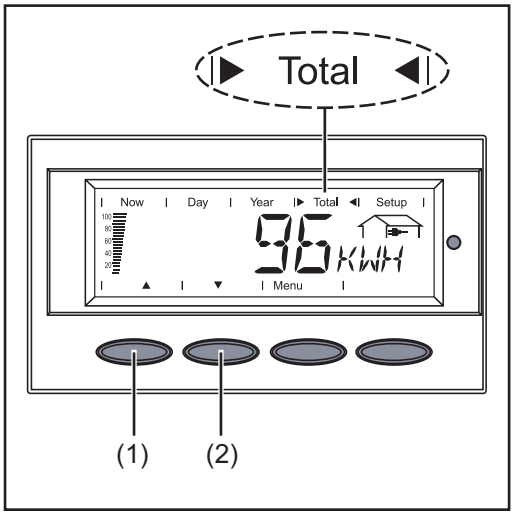
First Display Value in the "Day" Display Mode:




First Display Value in the "Year" Display Mode:



First Display Value in the "Total" Display Mode:



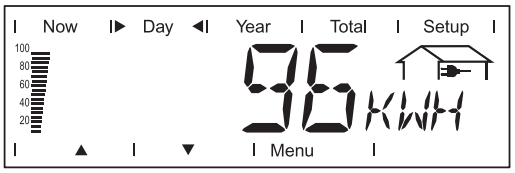

1 Select the "Day" or "Year" or "Total" display mode

The first display value in the selected display mode appears.

2 Use the "Down" (2) key to scroll to the next display value

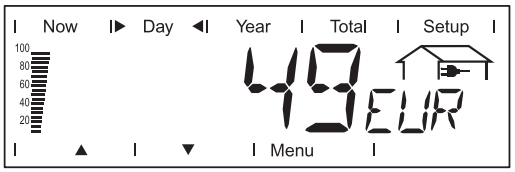
Scroll back using the "Up" key (1)

**Display Values in "Day / Year / Total" Display Modes**




**Output energy**
Energy fed into the grid over the period of time in question (kWh / MWh)

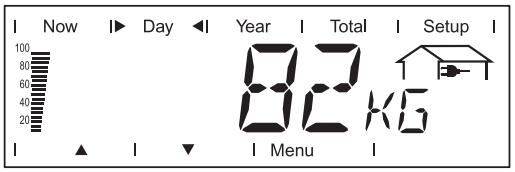
Due to the variety of different monitoring systems, there can be deviations between the readings of other metering instruments as compared to the readings from the inverter. For determining the output energy, only the readings of the calibrated meter supplied by the electric utility company are relevant.

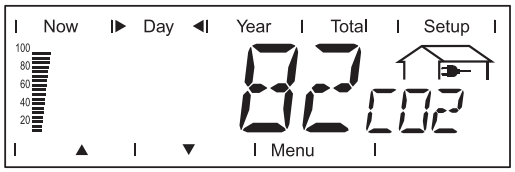



**Return**
**Amount of money earned during the period of time in question (currency can be selected in the Setup menu)**

As was the case for the output energy, readings may differ from those of other instruments.

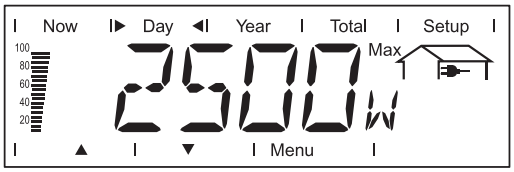
The "Setup Menu" section describes how to set the currency and charge rate. The factory setting depends on the respective country settings.



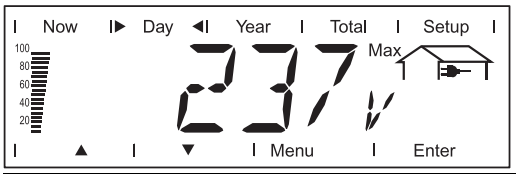



**CO2 reduction**
CO2 emissions saved over the respective time period
(kg / T, T = tons)
The display unit will alternate between "kg" or "T" and "CO2."

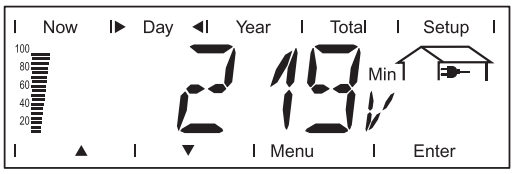
The value for the CO2 reduction corresponds to the CO2 emissions that would have been emitted by a caloric power plant generating the same amount of energy.
This is preset to 0.59 kg/kWh at the factory (source: DGS - German Society for Solar Energy).



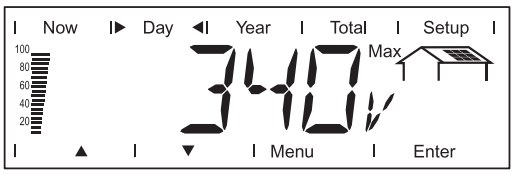

**Maximum output power**
**Highest output power of the inverter during observation period (watts)**



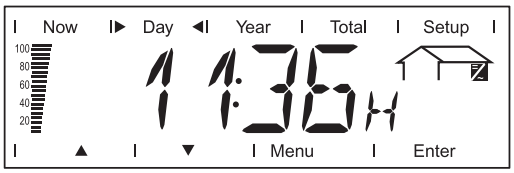

**Maximum grid voltage**
Highest reading of grid voltage (V) during observation period




**Minimum grid voltage**
Lowest reading of grid voltage (V) during observation period




**Maximum solar module voltage**
Highest reading of solar module voltage (V) during observation period




**Operating hours**
Duration of inverter operation
(HH:MM)

The operating hours are shown in hours and minutes up to 999 hours and 59 minutes ('999:59'). From then on only full hours are displayed.

Although the inverter does not operate during the night, all data required for the sensor card option are recorded around the clock.

**Options**

If the DatCom component for the required options are not available, the message "N.A." (not available) is shown.

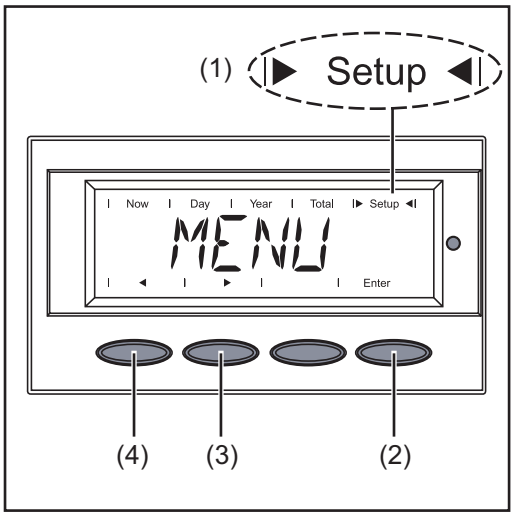
# The Setup Menu

**Presetting**

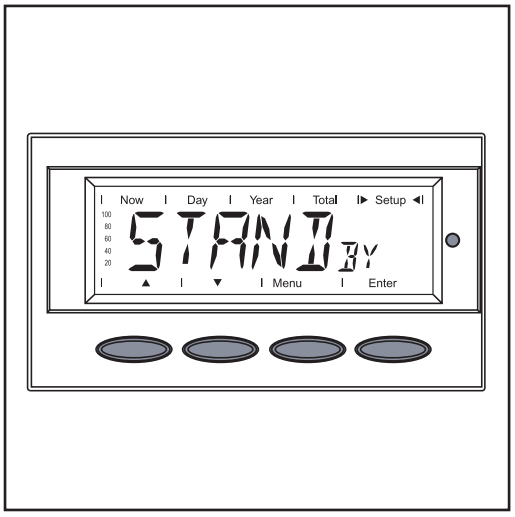
The inverter is pre-configured and ready to use. No manual control is necessary for feeding the power it generates into the grid.

The setup menu allows easy readjustment of the inverter's preset parameters to your needs.

**Accessing the Setup Menu**



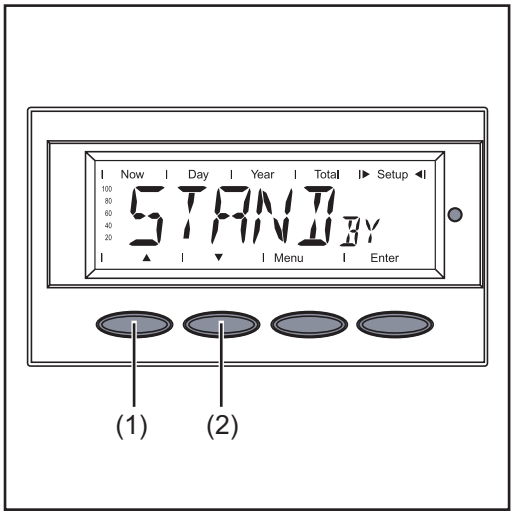

1. Switch to the menu level (press the "Menu" key)
2. Select the "Setup" (1) mode using the "Left" (4) or "Right" (3) keys
3. Press "Enter" (2)



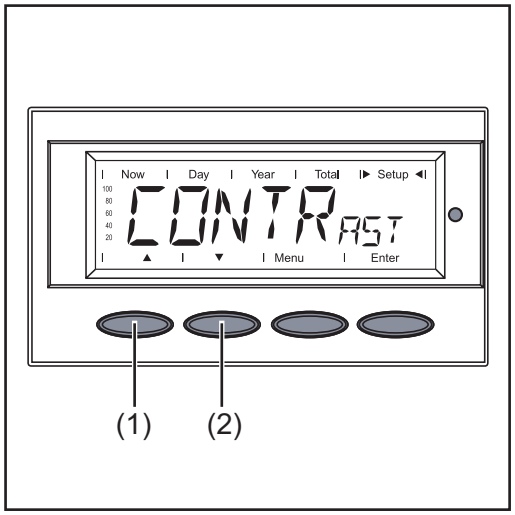

The Setup Menu's first menu item "STAND-BY" is shown.

**Scrolling through Menu Items**

Example: "STANDBY" menu item




Example: "CONTRAST" menu item

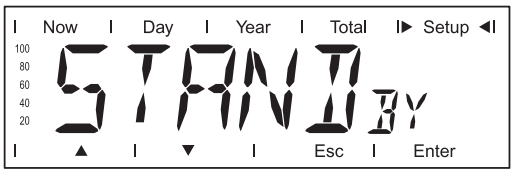



1 Access the Setup menu

2 Scroll through the available menu items using the "Up" (1) and "Down" (2) keys

# Menu Items in the Setup Menu

**STANDBY**

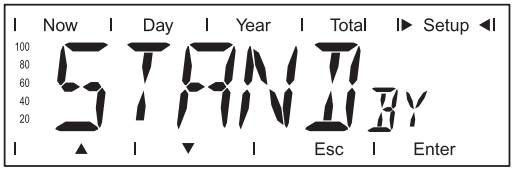


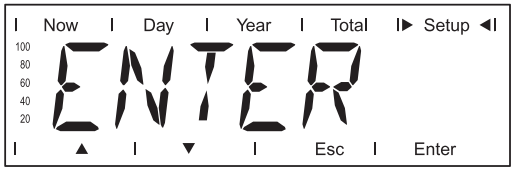

Manual activation / deactivation of Standby operation using the "Enter" key

| | |
|---|---|
| Unit | - |
| Setting range | Enter |
| Factory setting | Automatic operation of feeding energy into the grid (Standby deactivated) |

- The power electronics are switched off in standby mode. No power is fed into the grid.
- The Operating Status LED flashes orange.
- The orange flashing Operating Status LED stops at dusk.
- After the subsequent sunrise, the power supply operation into the grid is resumed automatically (after completion of the startup phase the LED is illuminated green).
- Grid supply operation can be resumed at any time whenever the LED is flashing orange (deactivate "STANDBY").

If the Standby mode is activated by pressing the "Enter" key, the display alternates between "STANDBY" and "Enter:"

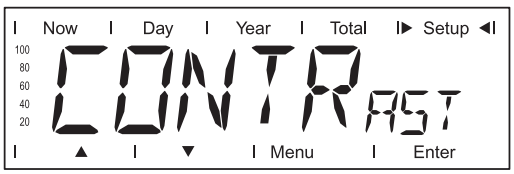



To maintain Standby operation:
- Press the "Esc" key

To end Standby operation:
- Press the "Enter" key

**CONTRAST**

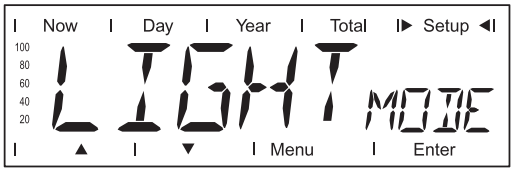



Contrast setting on LCD display

| | |
|---|---|
| Unit | - |
| Setting range | 0 - 7 |
| Factory setting | 7 |

Since contrast depends on temperature, it may be necessary to adjust the "CONTRAST" menu item when ambient conditions change.

**LIGHT MODE**



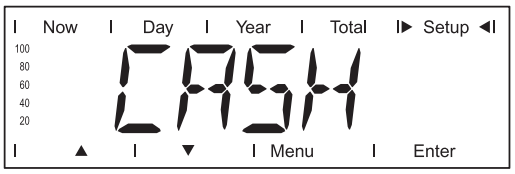

Initial setting for display illumination.

| | |
|---|---|
| Unit | - |
| Setting range | AUTO / ON / OFF |
| Factory setting | AUTO |

| | |
|---|---|
| AUTO: | The display illumination will stop 30 seconds after the last time a key has been pressed. |
| ON: | The display will remain illuminated whenever power is supplied to the grid. |
| OFF: | The display illumination will be permanently off. |

**IMPORTANT!** The "LIGHT MODE" setting only relates to the display's background illumination. The LCD display will still remain on during operation. Its energy consumption is less than one mW (1/1000 W).

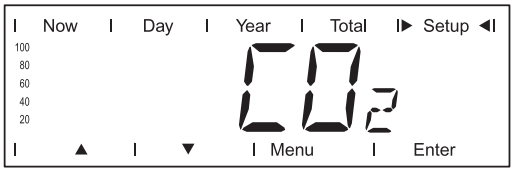
**CASH**




Sets the currency and charge rate for the output energy to the grid

| | |
|---|---|
| Unit | - |
| Display area | Currency / Charge rate / kWh |
| Factory setting | (depends on the country setting) |

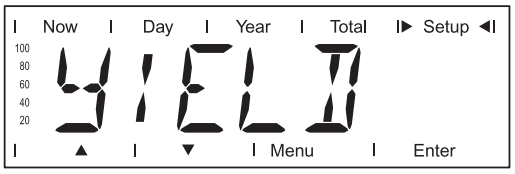
**CO2**




Setting of CO2 reduction factor

| | |
|---|---|
| Unit | kg/kWh, T/kWh |
| Setting range | 00,01 - 99,99 |
| Factory setting | 0.59 kg/kWh |

**YIELD**




Setting
- an OFFSET value for the total energy display
- a measurement correction value for the Day, Year and Total energy display

| | |
|---|---|
| Setting range | OFF SET / CALI. |

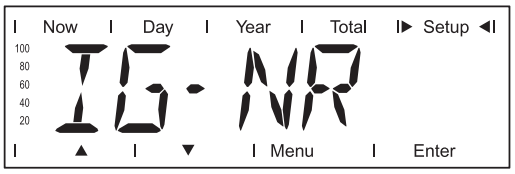
**OFF SET**
Preset value for the output energy, added to the actual output energy (e.g., transfer value upon replacement of the inverter) and the SI prefix

| | |
|---|---|
| Unit | Wh / kWh / MWh |
| Setting range | 5-digit + k... / M...<br><br>1 kWh = 1000 Wh<br>1 MWh = 1000000 Wh |
| Factory setting | 0 |

**CALI.**
Preset correction value, so that the data shown on the inverter display corresponds to the calibrated data shown on the electric meter

| | |
|---|---|
| Unit | % |
| Setting range | -5.0 - +5.0 in increments of 0.1 |
| Factory setting | 0 |

**IG no.**

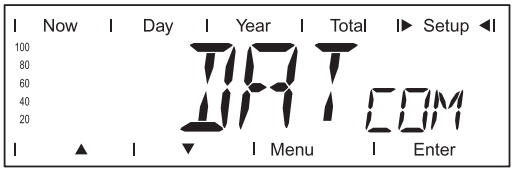



Number setting (address) of the inverter in a setup comprising multiple solar inverters linked together

| | |
|---|---|
| Unit | - |
| Setting range | 01 - 99 (100th inverter = 00) |
| Factory setting | 1 |

**IMPORTANT!** Each inverter must be assigned its own address when connecting several inverters in a data communications system.

**DAT COM**




Indicates status of data transmission, function test or activates and resets various option (e.g., Fronius Signal Card, Fronius Personal Display Card, Fronius Interface Card, Fronius TAC Card, etc.)

| | |
|---|---|
| Setting range | Displays OK COM or ERROR COM;<br>SIGCD TEST / PDCD RST / IFCD RST / TAC ON |

**OK COM / ERROR COM**
Displays data communication available via Solar Net or an error that occurred in data communication

Examples of options:

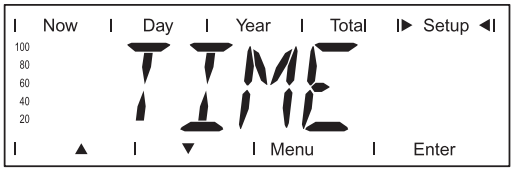
**SIGCD TEST**
Function test for the Fronius Signal Card option

**PDCD RST**
Resets the Fronius Personal Display Card option

**IFCD RST**
Resets the Fronius Interface Card option

**TAC ON**
Function test for the Fronius Power Relay Card (TAC) option

**TIME**

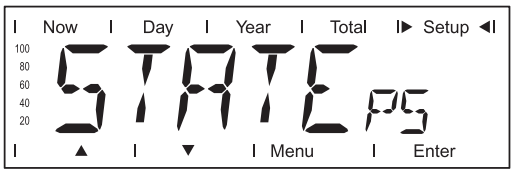



Date and time setting

| | |
|---|---|
| Unit | DDMMYYYY, HH:MM |
| Setting range | Date / Time |
| Factory setting | - |

**IMPORTANT!** The "TIME" menu item is only supported when the Fronius Datalogger option is installed.

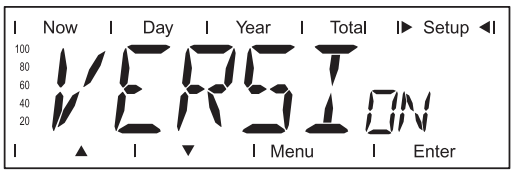
**STATE PS**




Status display of power stage sets; the last error that has occurred can be displayed

**IMPORTANT!** Due to the low level of irradiance early in the morning and in the evening, the status codes 306 (power low) and 307 (DC low) are displayed routinely at these times of day. These status messages do not indicate any kind of fault.

**VERSION**




Displays the version number and serial number of electronic components (e.g., IG Brain, power stage sets, display, country setup)

| | |
|---|---|
| Unit | - |
| Display area | MAIN CTRL / LCD / PS (PS00, PS01, PS02) / SETUP |
| Factory setting | - |

| | |
|---|---|
| MAINCTRL | Version data of IG Brain unit (inverter control) |
| LCD | Display version data |
| PS | Power stage set version data (PS00 - max. PS02) |
| SETUP | Display of current country setup<br>The current country setup is displayed (2-3 letters) by pressing the "Enter" key, e.g., "DE" for Germany country setup;<br>Exit the Country Setup display by pressing the "Esc" key |

# Setting and Displaying Menu Items

USA

**Setting Menu Items - General**

1 Access the Setup menu

2 Use the "Up" or "Down" keys to select the desired menu item
▲ ▼

3 Press the "Enter" key

**The first digit of a value to be set flashes:**

4 Use the "Up" and "Down" keys to select a value for the first digit
▲ ▼

5 Press the "Enter" key

The second digit of the value flashes.

6 Repeat steps 4 and 5 until ...

the entire value flashes.

7 Press the "Enter" key

8 Repeat steps 4 - 6 for units or other values to be set until the unit or value flashes.

9 Press the "Enter" key to save and apply the changes.

Press the "Esc" key to not save the changes.

The currently selected menu item is displayed.

**The available settings are displayed:**

4 Use the "Up" and "Down" keys to select the desired setting
▲ ▼

5 Press the "Enter" key to save and apply the selection.

Press the "Esc" key to not save the selection.

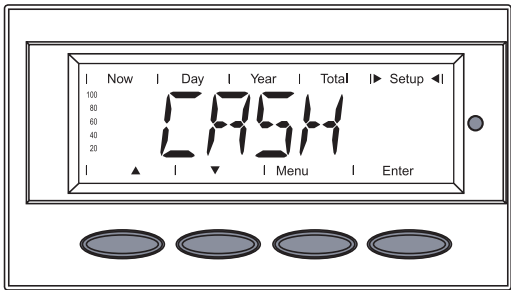
The currently selected menu item is displayed.

**Examples of Setting and Displaying Menu Items**

The following examples describe how to set and display menu items:

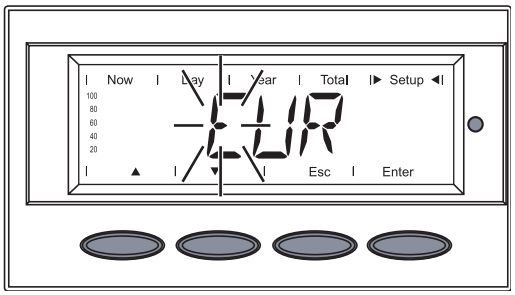
- Setting the Currency and Charge Rate
- Displaying and Setting Parameters in the "DATCOM" Menu Item
- Setting Time and Date

**Setting the Currency and Charge Rate**




1 Select the "CASH" menu item

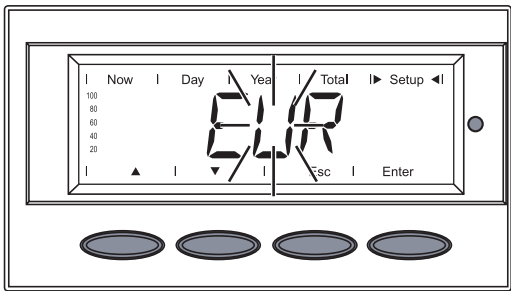
2 Press the "Enter" key




The currency is displayed, factory setting = "EUR";
The first character flashes.

3 Use the "Up" and "Down" keys to select a letter for the first character
▲ ▼

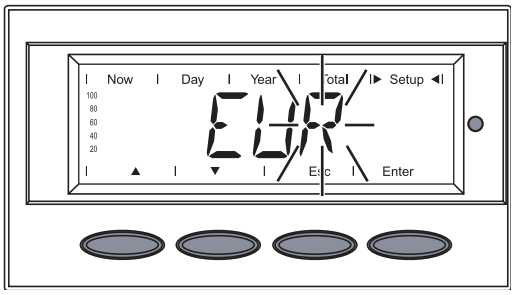
4 Press the "Enter" key




The second character flashes.

5 Use the "Up" and "Down" keys to ▲ ▼ select a letter for the second character

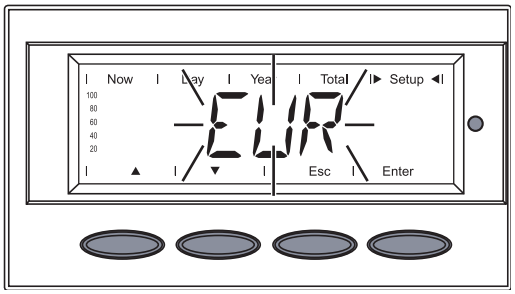
6 Press the "Enter" key




The third character flashes.

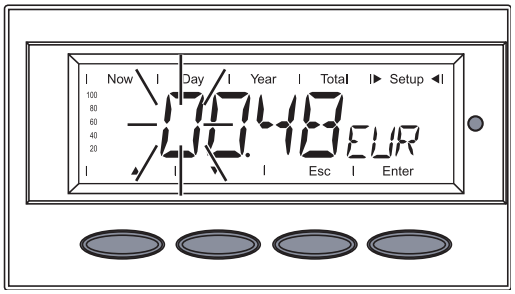
7 Use the "Up" and "Down" keys to select a letter for the third character
▲ ▼

8 Press the "Enter" key




The set currency flashes.

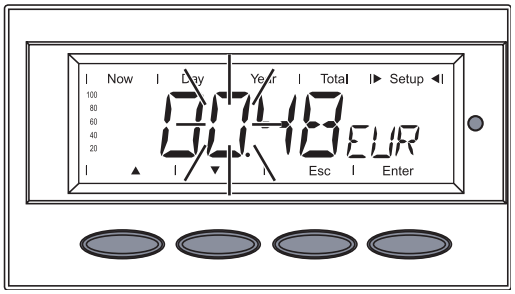
9 Press the "Enter" key




The charge rate in kWh/currency is displayed, factory setting = EUR 0.48 / kWh
The first digit flashes.

10 Use the "Up" and "Down" keys to select a value for the first digit (e.g., 0)
▲ ▼

11 Press the "Enter" key

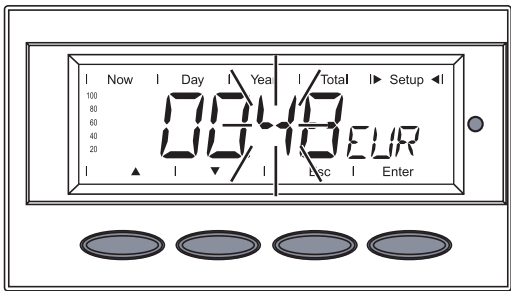



The second digit flashes.

12 Use the "Up" and "Down" keys to select a value for the second digit (e.g., 0)

▲ ▼

13 Press the "Enter" key

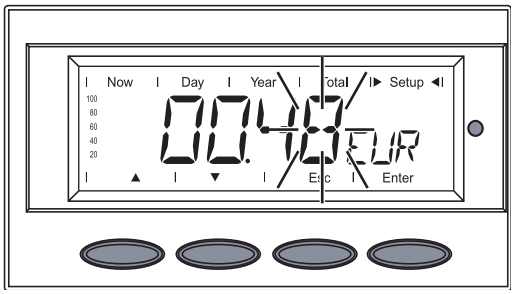



The first digit after the decimal point flashes.

14 Use the "Up" and "Down" keys to select a value for the first digit after the decimal point (e.g., 4)

▲ ▼

15 Press the "Enter" key



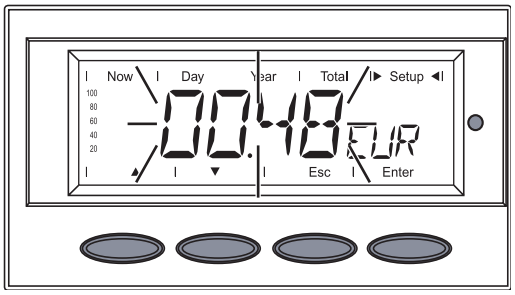

The second digit after the decimal point flashes.

16 Use the "Up" and "Down" keys to select a value for the second digit after the decimal point (e.g., 8)

▲ ▼

The values that can be set range from 00.01 to 99.99.

17 Press the "Enter" key



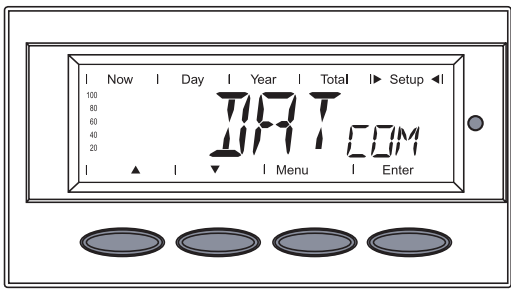

The set charge rate flashes.

18 Press the "Enter" key

The currency and the charge rate are applied.

19 Press the "Esc" key to exit the "CASH" menu item

**Displaying and Setting Parameters in the "DATCOM" Menu Item**



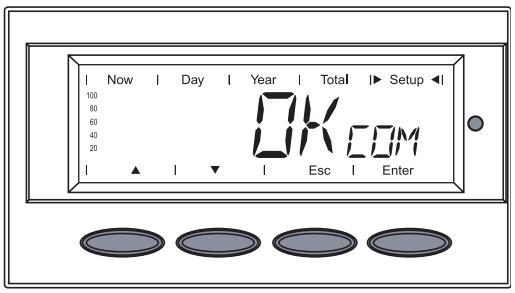

1 Select the "DATCOM" menu item

2 Press the "Enter" key

The following displays depend on whether

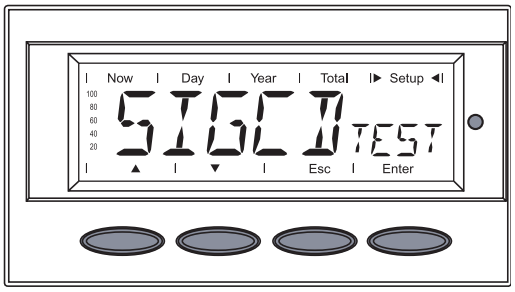
- a data connection has been established
- a data connection is faulty or an option is not installed

**Available data connection**



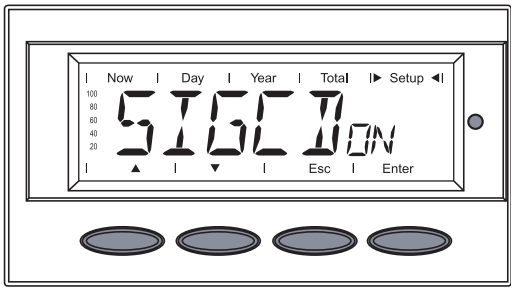

If there is a data connection available, "OK-COM" is shown.

3 Use the "Down" key to access the "signal card test"
▼




"SIGCDTEST" is displayed

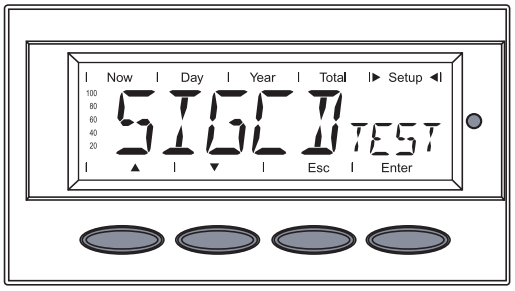
4 Press the "Enter" key




The "Signal Card Test" starts, "SIGCD ON" appears on the display.

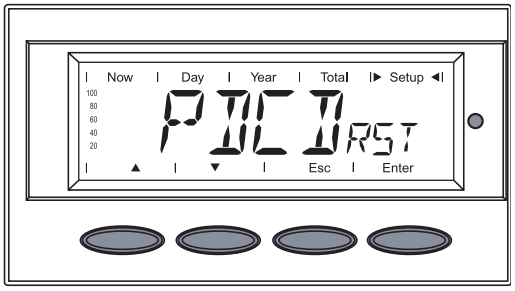
If the "signal card" is active, it will emit an acoustic signal in confirmation.
**IMPORTANT!** If no acoustic signal is heard, the signal lines should be checked.

5 Press the "Esc" key to exit the "Signal Card Test"

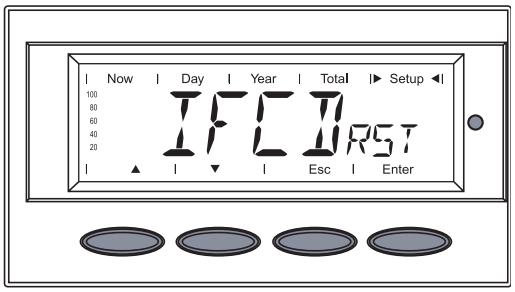



"SIGCD TEST" is displayed

6 Use the "Down" key to select additional options:
▼

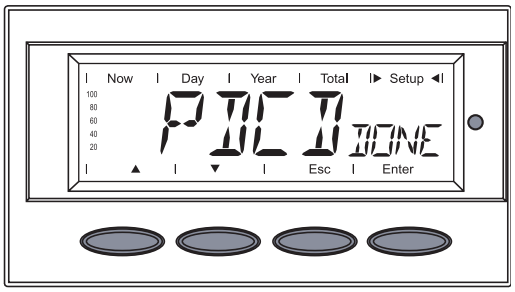



e.g., Reset Personal Display Card ("PDCD RST") ...




...or reset Interface Card ("IFCD RST")

7 Press the "Enter" key




"PDCD DONE"...

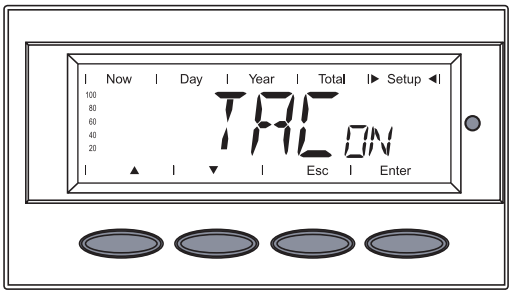
...or...

"IFCD DONE" is displayed

8 Press the "Esc" key to exit the current option

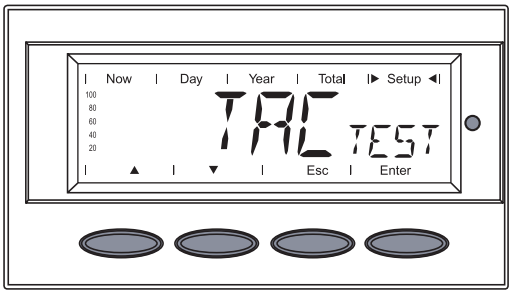
9 Use the "Down" key to select additional options:

▼




"TAC ON" is displayed

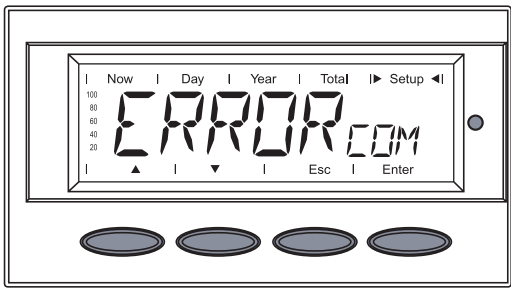
10 To test the function of the Fronius Power Relay Card option, press the "Enter" key




"TAC TEST" is displayed, the AC relay switches off and the AC connection to the inverter is interrupted (no grid feed).

11 Press the "Esc" key 2x to exit the "DATCOM" menu item

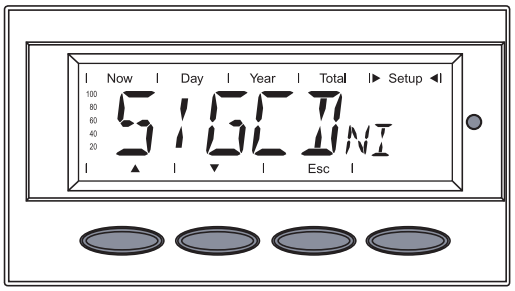
**Data connection faulty or DATCOM is not installed**




If there is a faulty data connection or options are not installed, "ERROR COM" is displayed.

3 Select the respective option using the "Down" key

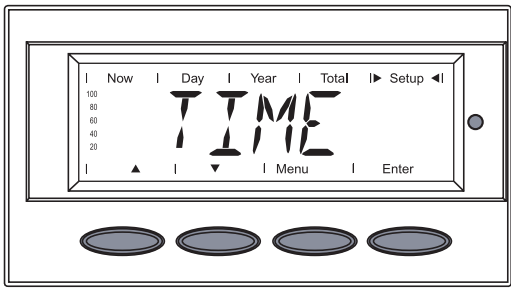
▼



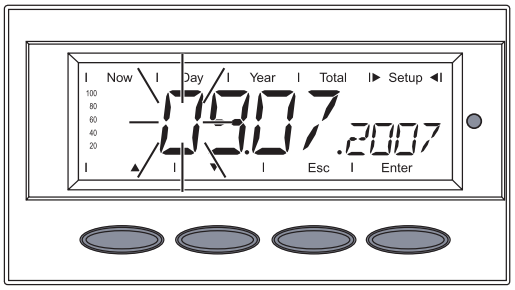

"SIGCD NI" (Signal Card not installed) or
"PDCD NI" (Personal Display Card not installed) or
"IFCD NI" (Interface Card not installed) or
"TAC NI" (TAC Card not installed)
is displayed.

4 Press the "Esc" key to exit the "DATCOM" menu item

**Setting Time and Date**

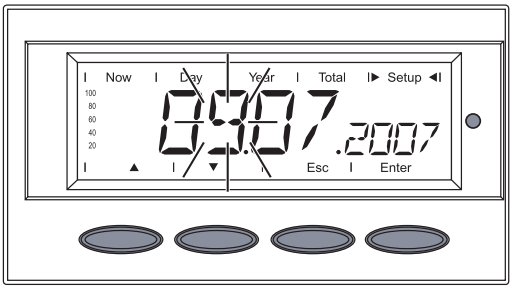



1 Select the "TIME" menu item
2 Press the "Enter" key



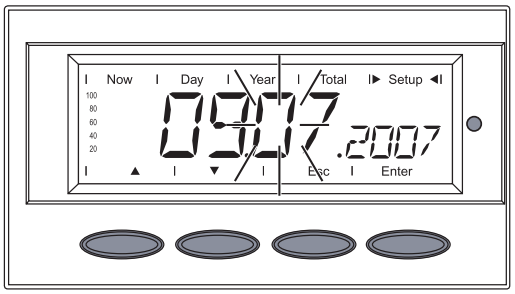

The **date** is displayed (DD.MM.YYYY), the first digit for the day flashes.

3 Use the "Up" and "Down" keys to select a value for the first day digit
▲ ▼
4 Press the "Enter" key



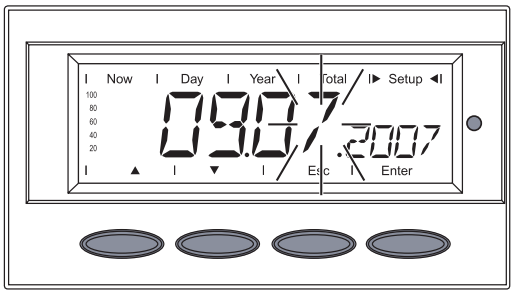

The second digit for the day flashes.

5 Use the "Up" and "Down" keys to select a value for the second day digit
▲ ▼
6 Press the "Enter" key




The first digit for the month flashes.

7 Use the "Up" and "Down" keys to select a value for the first month digit
▲ ▼
8 Press the "Enter" key

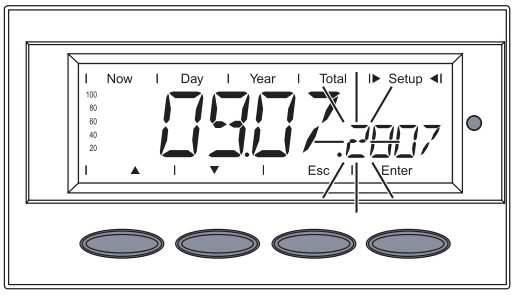



The second digit for the month flashes.

9 Use the "Up" and "Down" keys to select a value for the second month digit

▲ ▼

10 Press the "Enter" key

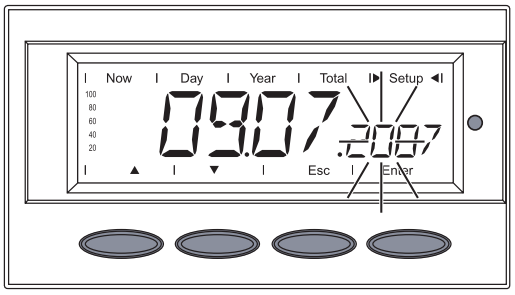



The first digit for the year flashes.

11 Use the "Up" and "Down" keys to select a value for the first year digit

▲ ▼

12 Press the "Enter" key

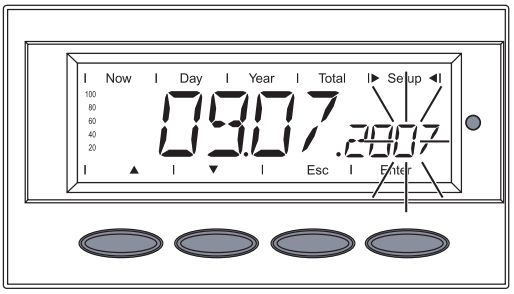



The second digit for the year flashes.

13 Use the "Up" and "Down" keys to select a value for the second year digit

▲ ▼

14 Press the "Enter" key

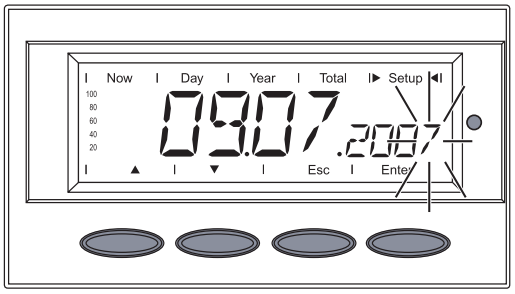



The third digit for the year flashes.

15 Use the "Up" and "Down" keys to select a value for the third year digit

▲ ▼

16 Press the "Enter" key

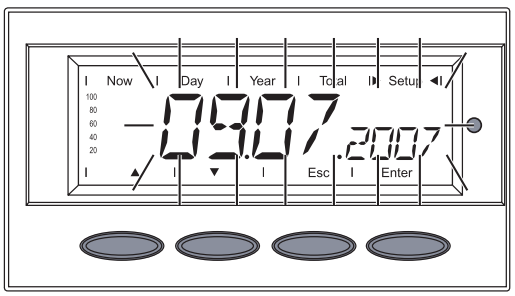



The fourth digit for the year flashes.

17 Use the "Up" and "Down" keys to select a value for the fourth year digit

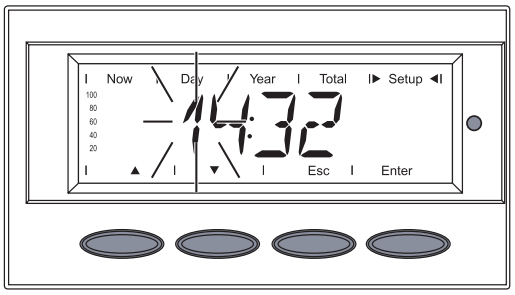
▲ ▼

18 Press the "Enter" key




The set date then flashes.

19 Press the "Enter" key

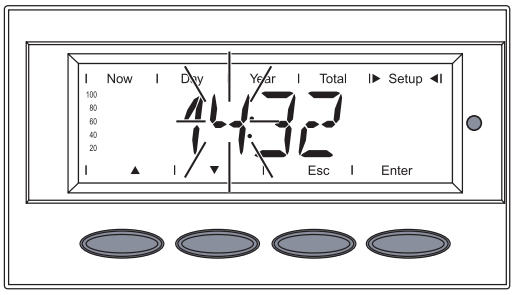



The **time** is displayed (HH:MM), the first digit for the hour flashes.

**20** Use the "Up" and "Down" keys to select a value for the first hour digit

▲ ▼

**21** Press the "Enter" key

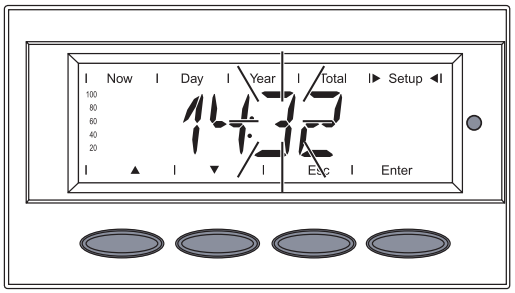



The second digit for the hour flashes.

**22** Use the "Up" and "Down" keys to select a value for the second hour digit

▲ ▼

**23** Press the "Enter" key

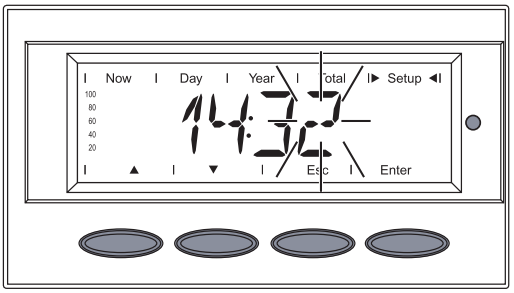



The first digit for the minutes flashes.

**24** Use the "Up" and "Down" keys to select a value for the first minutes digit

▲ ▼

**25** Press the "Enter" key

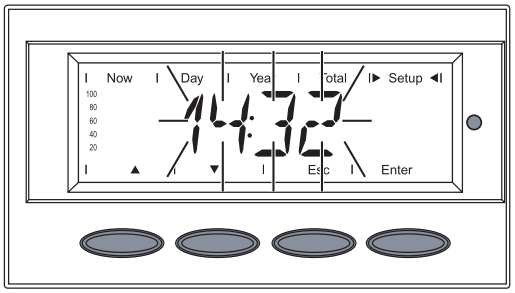



The second digit for the minutes flashes.

**26** Use the "Up" and "Down" keys to select a value for the second minutes digit

▲ ▼

**27** Press the "Enter" key




The set time flashes.

**28** Press the "Enter" key to apply the time

**29** Press the "Esc" key to exit the "TIME" menu item

# Troubleshooting and Maintenance

# Status Diagnosis and Troubleshooting



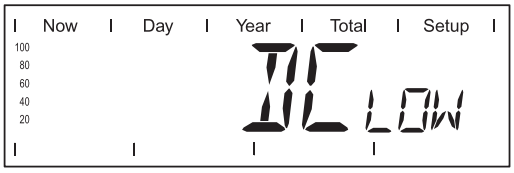
**Displaying Status Codes**

Your inverter is equipped with a self diagnostic system that automatically identifies a large number of possible operation issues by itself and displays them on the screen. This enables you to know immediately if there are any malfunctions in the inverter, the photovoltaic system or any installation or operating errors.

Whenever the self diagnostic system has identified a particular issue, the respective status code is shown on the screen.

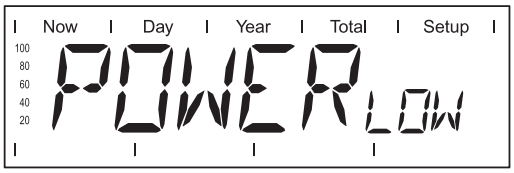
**IMPORTANT!** Status codes may sometimes appear briefly as a result of the control response from the inverter. If it subsequently continues to operate normally, there has not been a system error.

**Normal Operation Status Codes**




The open circuit voltage of the solar modules is too low.

As soon as the open circuit voltage exceeds 290 V, the inverter starts synchronizing with the grid (display shows "SYNC AC").




The total power output of the solar modules is insufficient.

After a short time the inverter resumes grid synchronization (display shows "SYNC AC").

**Total Failure**

If the display remains dark for a long time after sunrise:

- Check the open circuit voltage of the solar modules at the connections of the inverter:

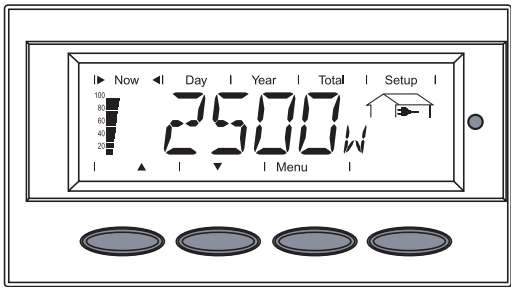
  Open circuit voltage < 265 V ... error in the photovoltaic system

  Open circuit voltage > 265 V ... may indicate a basic fault in the inverter. In this case, notify a Fronius-trained service engineer.

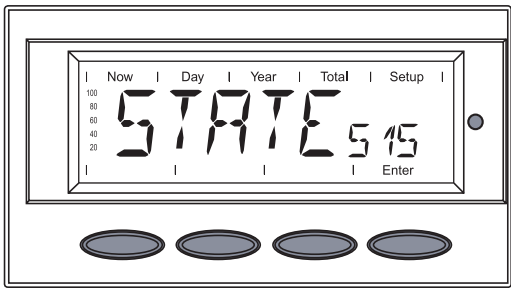
**Status Codes on Fronius IG Plus with Several Power Stage Sets**

A special status diagnostic is run if an error occurs in an inverter with several power stage sets.

It is also possible to call up status codes even if there is no actual error in existence. This form of status polling may be found in the section "The Setup Menu."

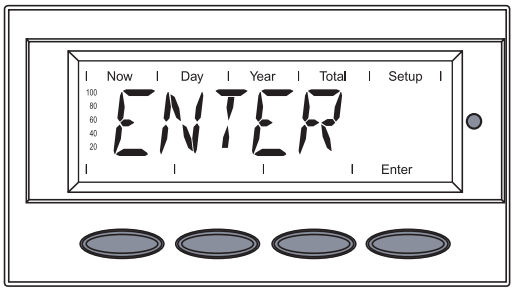



Display during normal operation



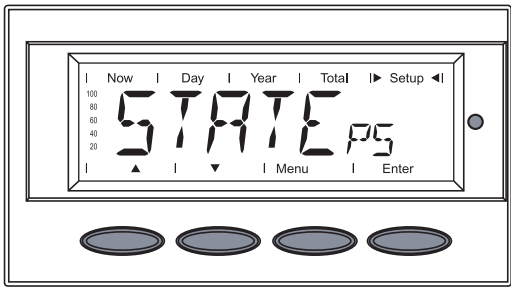

When there is an error in one of the two power stage sets, the display flashes between "STATE" and the corresponding status code
(e.g., "STATE 515")

and



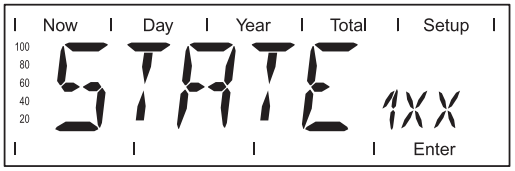

"ENTER"

- Press the "Enter" key twice




- The status display of the power stage sets "STATE PS" appears
- Press the "Enter" key

**Class 1 Status Codes**




Class 1 status codes are typically temporary. Their cause lies in the public grid.

The initial response of the inverter is to disconnect itself from the grid. The grid is subsequently checked for the stipulated monitoring period. If after the end of this period no further defect is identified, your inverter resumes operating and feeding power into the grid.

**IMPORTANT!** The 2nd position x defines the exact network point for the following status codes:
0 = several / all 3 phases
1 = L1
2 = L2
3 = L3

| | |
|---|---|
| **1x2** | |
| AC voltage too high | |
| Behavior | Grid conditions are thoroughly tested and as soon as they are again within the permissible range, the inverter will resume feeding power into the grid. |
| Remedy | Check grid connections and fuses<br>Should the status code persist, you should contact your system installer |
| **1x3** | |
| AC voltage too low | |
| Behavior | Grid conditions are thoroughly tested and as soon as they are again within the permissible range, the inverter will resume feeding power into the grid. |
| Remedy | Check grid connections and fuses<br>Should the status code persist, you should contact your system installer |
| **1x5** | |
| AC frequency too high | |
| Behavior | Grid conditions are thoroughly tested and as soon as they are again within the permissible range, the inverter will resume feeding power into the grid. |
| Remedy | Check grid connections and fuses<br>Should the status code persist, you should contact your system installer |
| **1x6** | |
| AC frequency too low | |
| Behavior | Grid conditions are thoroughly tested and as soon as they are again within the permissible range, the inverter will resume feeding power into the grid. |
| Remedy | Check grid connections and fuses<br>Should the status code persist, you should contact your system installer |
| **1x7** | |
| No AC grid detected | |
| Behavior | Grid conditions are thoroughly tested and as soon as they are again within the permissible range, the inverter will resume feeding power into the grid. |

| | |
|---|---|
| Remedy | Check grid connections and fuses<br>Should the status code persist, you should contact your system installer |

**108**

Islanding detected

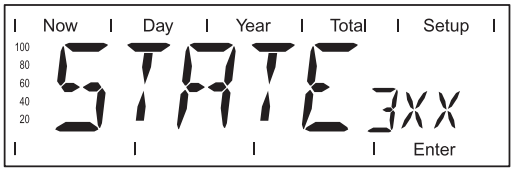
| | |
|---|---|
| Behavior | Grid conditions are thoroughly tested and as soon as they are again within the permissible range, the inverter will resume feeding power into the grid. |
| Remedy | Should the status code persist, you should contact your system installer |

**109**

General grid error
This error is always displayed first for grid errors. After reviewing all power stage sets, the grid error is specified in more detail: 1x1 / 1x4 or the display remains at "109" (e.g., when 2 phases report "104" and one phase "101")

| | |
|---|---|
| Behavior | Grid conditions are thoroughly tested and as soon as they are again within the permissible range, the inverter will resume feeding power into the grid. |
| Remedy | Check grid connections and fuses<br>Should the status code persist, you should contact your system installer |

## Class 3 Status Codes




Class 3 comprises status codes that may appear during power feed-in mode that do not cause a permanent interruption of the operation of feeding power into the grid.

After automatic disconnection from the grid and waiting for its conditions to return to those stipulated, your inverter will try to resume feed-in operation.

**301**

Overcurrent (AC)

| | |
|---|---|
| Behavior | Short interruption of power feeding into the grid, caused by overcurrent<br>The inverter returns to the startup phase. |
| Remedy | Fault is rectified automatically<br>Should the status code persist, you should contact your system installer |

**302**

Overcurrent (DC)

| | |
|---|---|
| Behavior | Short interruption of power feeding into the grid, caused by overcurrent<br>The inverter returns to the startup phase. |

| | |
|---|---|
| Remedy | Fault is rectified automatically<br>Should the status code persist, you should contact your system installer |

**303**

Over-temperature buck converter

| | |
|---|---|
| Behavior | Short interruption of power feeding into the grid caused by over-temperature<br>The inverter returns to the startup phase. |
| Remedy | Fault is rectified automatically<br>If this status code keeps recurring, contact your system installer |

**304**

Over-temperature cooling element

| | |
|---|---|
| Behavior | Short interruption of power feeding into the grid caused by over-temperature.<br>The inverter returns to the startup phase. |
| Remedy | Fault is rectified automatically<br>If this status code keeps recurring, contact your system installer |

**305**

No power transfer to grid possible

| | |
|---|---|
| Behavior | Continual interruption of grid feed operation |
| Remedy | Should the status code persist, you should contact your system installer |

**"POWER LOW" (306)**

Intermediate circuit voltage has dropped below permissible threshold value for feed in.
This error is shown on the inverter in plain text.

| | |
|---|---|
| Behavior | Short interruption of power feeding into the grid.<br>The inverter returns to the startup phase. |
| Remedy | Fault is rectified automatically<br>If this status code keeps recurring, contact your system installer |

**"DC LOW" (307)**

DC input voltage is too low for feed in.
This error is shown on the inverter in plain text.

| | |
|---|---|
| Behavior | Short interruption of power feeding into the grid.<br>The inverter returns to the startup phase. |
| Remedy | Fault is rectified automatically<br>If this status code keeps recurring, contact your system installer |

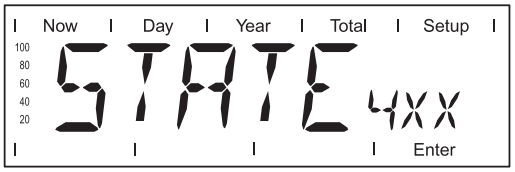
**308**

Intermediate circuit voltage too high.

| | |
|---|---|
| Behavior | Short interruption of power feeding into the grid.<br>The inverter returns to the startup phase. |

| | |
|---|---|
| Remedy | Fault is rectified automatically<br>If this status code keeps recurring, contact your system installer |

## Class 4 Status Codes




Class 4 status codes may require the intervention of a trained Fronius service engineer.

**401**

Communication with power stage set not possible

| | |
|---|---|
| Behavior | The inverter will automatically attempt to connect again and, if possible, resume feeding power into the grid. |
| Remedy | Check grid connections and fuses.<br>If the status code remains on the display: notify a Fronius-trained service technician |

**402**

Communication with EEPROM not possible

| | |
|---|---|
| Behavior | The inverter will automatically attempt to connect again and, if possible, resume feeding power into the grid. |
| Remedy | If the status code remains on the display: notify a Fronius-trained service technician |

**403**

EEPROM defective

| | |
|---|---|
| Behavior | The inverter will automatically attempt to connect again and, if possible, resume feeding power into the grid. |
| Remedy | If the status code remains on the display: notify a Fronius-trained service technician |

**406**

One or both temperature sensors are faulty

| | |
|---|---|
| Behavior | The inverter disconnects from the grid for safety reasons. |
| Remedy | If the status code remains on the display: notify a Fronius-trained service technician |

**407**

Cooling element temperature sensor faulty

| | |
|---|---|
| Behavior | The inverter disconnects from the grid for safety reasons. |
| Remedy | If the status code remains on the display: notify a Fronius-trained service technician |

**408**

Direct current feed in

| | |
|---|---|
| Behavior | The inverter disconnects from the grid for safety reasons. |
| Remedy | If the status code remains on the display: notify a Fronius-trained service technician |

**412**

The "fixed voltage" setting has been selected instead of MPP voltage operation and the voltage is set to a value that is too low, or the DC voltage exceeds allowable limits.

| | |
|---|---|
| Behavior | Fixed voltage lower than the current MPP voltage. |
| Remedy | Check the module voltage and change the solar module connection if the input voltage is too high.<br>If the status code remains on the display: notify a Fronius-trained service technician |

**413**

Control problems

| | |
|---|---|
| Behavior | The inverter briefly disconnects from the grid due to significant changes to grid conditions. |
| Remedy | If the status code remains on the display: notify a Fronius-trained service technician |

**414**

EEPROM defective

| | |
|---|---|
| Behavior | Memory component erased |
| Remedy | If the status code remains on the display: notify a Fronius-trained service technician |

**416**

Communication with IG Brain not possible.

| | |
|---|---|
| Behavior | The Operating Status LED lights up orange, then the inverter attempts a restart. |
| Remedy | If the status code remains on the display: notify a Fronius-trained service technician |

**417**

Two power stage sets have the same PCB number

| | |
|---|---|
| Behavior | The inverter stops feeding power into the grid, the display shows a critical error via a red Operating Status LED |
| Remedy | If the status code remains on the display: notify a Fronius-trained service technician |

**419**

Two or more power stage sets with an identical software serial number detected.

| | |
|---|---|
| Behavior | The inverter stops feeding power into the grid, the display shows a critical error via a red Operating Status LED |
| Remedy | If the status code remains on the display: notify a Fronius-trained service technician |

**421**

PCB number has been set incorrectly

| | |
|---|---|
| Behavior | The inverter stops feeding power into the grid, the display shows a critical error via a red Operating Status LED |
| Remedy | If the status code remains on the display: notify a Fronius-trained service technician |

**425**

Communication with the power stage set is not possible

| | |
|---|---|
| Behavior | The Operating Status LED lights up orange, then the inverter attempts a restart. |
| Remedy | If the status code remains on the display: notify a Fronius-trained service technician |

**431**

All power stage sets are in boot mode.

| | |
|---|---|
| Behavior | The inverter stops feeding power into the grid, the display shows a critical error via a red Operating Status LED |
| Remedy | Update firmware via Bootloader or Fronius Solar.update/IG Plus |

**Alternating SLAVE / DC LOW or alternating SLAVE / POWER LOW (439)**

The MPP master power stage set is switched off because of an error in a slave power stage set (in balance mode).

| | |
|---|---|
| Behavior | The inverter stops feeding power into the grid, the display shows a critical error via a red Operating Status LED |
| Remedy | If the status code remains on the display: notify a Fronius-trained service technician |

**442**

No phase master for a phase

| | |
|---|---|
| Behavior | The inverter stops feeding power into the grid, the display shows a critical error via a red Operating Status LED |
| Remedy | If the status code remains on the display: notify a Fronius-trained service technician |

**443**

Energy transfer not possible

| | |
|---|---|
| Behavior | The inverter stops feeding power into the grid, the display shows a critical error via a red Operating Status LED |

| | |
|---|---|
| Remedy | If the status code remains on the display: notify a Fronius-trained service technician |

**445**

Invalid power stage set configuration

| | |
|---|---|
| Behavior | The inverter stops feeding power into the grid, the display shows a critical error via a red Operating Status LED |
| Remedy | If the status code remains on the display: notify a Fronius-trained service technician |

**450**

The monitoring of the power stage set main processor "Guard" is active

| | |
|---|---|
| Behavior | The inverter stops feeding power into the grid, the display shows a critical error via a red Operating Status LED |
| Remedy | If the status code remains on the display: notify a Fronius-trained service technician |

**451**

The EEPROM Guard Control is defective

| | |
|---|---|
| Behavior | The inverter stops feeding power into the grid, the display shows a critical error via a red Operating Status LED |
| Remedy | If the status code remains on the display: notify a Fronius-trained service technician |

**452**

Communication between "Guard" and the digital signal processor (DSP) has been interrupted

| | |
|---|---|
| Behavior | The inverter stops feeding power into the grid, the display shows a critical error via a red Operating Status LED |
| Remedy | If the status code remains on the display: notify a Fronius-trained service technician |

**453**

Error in grid voltage recording

| | |
|---|---|
| Behavior | The inverter stops feeding power into the grid, the display shows a critical error via a red Operating Status LED |
| Remedy | If the status code remains on the display: notify a Fronius-trained service technician |

**454**

Error in grid frequency recording

| | |
|---|---|
| Behavior | The inverter stops feeding power into the grid, the display shows a critical error via a red Operating Status LED |
| Remedy | If the status code remains on the display: notify a Fronius-trained service technician |

**455**

Reference power source for AC measurement is operating outside of tolerances

| | |
|---|---|
| Behavior | The inverter stops feeding power into the grid, the display shows a critical error via a red Operating Status LED |
| Remedy | If the status code remains on the display: notify a Fronius-trained service technician |

**456**

Error during anti-islanding test

| | |
|---|---|
| Behavior | The inverter stops feeding power into the grid, the display shows a critical error via a red Operating Status LED |
| Remedy | If the status code remains on the display: notify a Fronius-trained service technician |

**457**

Grid relay stuck

| | |
|---|---|
| Behavior | The inverter stops feeding power into the grid, the display shows a critical error via a red Operating Status LED |
| Remedy | If the status code remains on the display: notify a Fronius-trained service technician |

**460**

Reference power source for the digital signal processor (DSP) is operating outside of tolerances

| | |
|---|---|
| Behavior | The inverter stops feeding power into the grid, the display shows a critical error via a red Operating Status LED |
| Remedy | If the status code remains on the display: notify a Fronius-trained service technician |

**461**

Error in DSP data memory

| | |
|---|---|
| Behavior | The inverter stops feeding power into the grid, the display shows a critical error via a red Operating Status LED |
| Remedy | If the status code remains on the display: notify a Fronius-trained service technician |

**464**

Display error
The software and/or hardware versions of the display and IG Brain are not compatible.

| | |
|---|---|
| Behavior | The inverter stops feeding power into the grid, the display shows a critical error via a red Operating Status LED |
| Remedy | Update firmware via Bootloader or Fronius Solar.update/IG Plus |

**465**

Display error
The UI command sent from the IG Brain is not recognized by the present display version.

| | |
|---|---|
| Behavior | The inverter stops feeding power into the grid, the display shows a critical error via a red Operating Status LED |
| Remedy | If the status code remains on the display: notify a Fronius-trained service technician |

**466**

Display error
The display was not detected.

| | |
|---|---|
| Behavior | The inverter stops feeding power into the grid, the display shows a critical error via a red Operating Status LED |
| Remedy | Check the display for damage, connect display, check ribbon wire for damage, check IG Brain for damage<br>If the status code remains on the display: notify a Fronius-trained service technician |

**467**

The display has not received a start command from the IG Brain for longer than 6 s.

| | |
|---|---|
| Behavior | The inverter will automatically attempt to connect again and, if possible, resume feeding power into the grid. |
| Remedy | If the status code remains on the display: notify a Fronius-trained service technician |

**469**

Throttle connected to wrong poles

| | |
|---|---|
| Behavior | The inverter stops feeding power into the grid, the display shows a critical error via a red Operating Status LED |
| Remedy | Properly connect throttle<br>If the status code remains on the display: notify a Fronius-trained service technician |

**470**

The buck converter relay does not open at high DC voltage

| | |
|---|---|
| Behavior | The inverter stops feeding power into the grid, the display shows a critical error via a red Operating Status LED |
| Remedy | Check system configuration<br>If the status code remains on the display: notify a Fronius-trained service technician |

**471**

Defective fuse for the solar module ground has not yet been replaced.
This status code is displayed when the fuse for the solar module ground has not been replaced within a certain period of time after status code 551 is triggered.

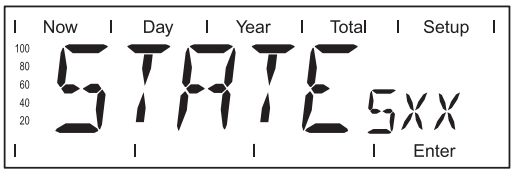
| | |
|---|---|
| Behavior | The inverter stops feeding power into the grid, the display shows a critical error via a red Operating Status LED |
| Remedy | Insert a new fuse for the solar module ground to ground solar modules at the negative and positive poles.<br>Fault is rectified automatically<br>If this status code keeps recurring, contact your system installer |

**474**

Short circuit between DC connection and ground (external insulation fault)
High ohm resistor for solar module ground is defective

| | |
|---|---|
| Behavior | The inverter stops feeding power into the grid, the display shows a critical error via a red Operating Status LED |
| Remedy | Insert new high ohm resistor for solar module ground.<br>Remedy external insulation fault<br>Fault is rectified automatically<br>If this status code keeps recurring, contact your system installer |

## Class 5 Status Codes




Class 5 status codes generally do not impair the operation of feeding power into the grid. They will be displayed until the status code is acknowledged by pressing a key (the inverter, however, continues working normally in the background).

- Press any key
- The error message disappears from the display

**502**

Insulation value too low

| | |
|---|---|
| Description | While automatically measuring the insulation, the inverter has detected an insulation fault to the ground. |
| Remedy | Check the insulation of your photovoltaic system<br>If the status code reappears: contact your system installer |

**504**

No Solar Net communication possible

| | |
|---|---|
| Description | The inverter address has been assigned twice. |
| Remedy | Change inverter address (section: "The Setup Menu") |
| Description | The Solar Net components required are in the inverter: However, no communication is possible. |
| Remedy | Status code will disappear after changing the inverter address |

**505**

EEPROM defective

| | |
|---|---|
| Description | Data from the Setup menu are lost. |
| Remedy | Fault rectified automatically |

**506**

EEPROM defective

| | |
|---|---|
| Description | Data from the "Total" menu are lost. |
| Remedy | Fault rectified automatically |

**507**

EEPROM defective

| | |
|---|---|
| Description | Data from the "Day" / "Year" menu are lost. |
| Remedy | Fault rectified automatically |

**508**

Inverter address is incorrect

| | |
|---|---|
| Description | The address for data communication is no longer stored. |
| Remedy | Redefine address |

**509**

24h no feed in

| | |
|---|---|
| Description | e.g.: Solar modules covered with snow |
| Remedy | e.g.: Remove snow from solar modules |

**510**

EEPROM defective

| | |
|---|---|
| Description | SMS settings have been reset to their defaults. |
| Remedy | Reconfigure SMS if necessary |

**511**

EEPROM defective

| | |
|---|---|
| Description | Sensor card settings were restored to their default. |
| Remedy | Reconfigure measuring channels if necessary |

**512**

Too many power stage sets in the system

| | |
|---|---|
| Description | Too many power stage sets have been detected in the system. |
| Remedy | If the status code remains on the display: notify a Fronius-trained service technician |

**513**

Power stage set in boot mode

| | |
|---|---|
| Description | One or more power stage sets cannot be activated because they are in boot mode. |
| Remedy | Update power stage set firmware |

**514**

No communication with one of the power stage sets

| | |
|---|---|
| Description | Warning message from one of the power stage sets, second power stage set working normally |
| Remedy | If the status code remains on the display: notify a Fronius-trained service technician |

**515**

Faulty plug connections

| | |
|---|---|
| Description | Temperature sensor at cooling element defective or not plugged in. |
| Remedy | If the status code remains on the display: notify a Fronius-trained service technician |

**516**

Status messages have been received from a power stage set.

| | |
|---|---|
| Description | The power stage sets cannot all be activated |
| Remedy | Analyze the messages. Please see section entitled "The Setup Menu." If the status message remains on the display: notify a Fronius-trained service technician |

**517**

Master has been changed.

| | |
|---|---|
| Description | Transformer not connected/plugged in<br>Bridge short circuit<br>Detection of intermediate circuit voltage damaged |
| Remedy | Check possible errors referred to in "Description." If the status message remains on the display: notify a Fronius-trained service technician |

**550**

String fuse defective.

| | |
|---|---|
| Description | One or more string fuses are defective. |
| Remedy | Measure string fuses and replace any that are defective |

**550**

Jumper set incorrectly

| | |
|---|---|
| Description | The jumper on the Print C-Box was not reset to the "SMon" position after the solar module strings were checked |
| Remedy | Set the jumper on the Print C-Box to the "SMon" position |

**551**

Fuse for solar module ground is defective

| | |
|---|---|
| Description | The fuse for the solar module ground is defective, replace the fuse to protect the solar module. |

| | |
|---|---|
| Remedy | Insert a new fuse for the solar module ground to ground solar modules at the negative and positive poles.<br>Fault is rectified automatically<br>If this status code keeps recurring, contact your system installer |

**553**

Phase master deactivated due to frequently occurring errors

| | |
|---|---|
| Description | A reintegration of the power stage set into the Mix network will be attempted at a later time. |
| Remedy | If the status code remains on the display: notify a Fronius-trained service technician |

**558**

Feature deactivated (e.g., control of inverter via the Fronius Power Control Box option)

| | |
|---|---|
| Description | A feature had to be deactivated (e.g., after component replacement).<br>The status message is no longer displayed after the next DC disconnect. |
| Remedy | Confirm error, update firmware via Bootloader or Fronius Solar.update/IG Plus if necessary<br>(The inverter will also operate problem-free without updating the firmware.) |

## Customer Service

**IMPORTANT!** Please contact your Fronius dealer or a Fronius-trained service technician if

- an error appears frequently or for a long period of time
- an error appears that is not listed in the tables

# Maintenance

## Safety

**WARNING!** An electric shock can be fatal. Danger due to grid voltage and DC voltage from solar modules.

- The connection area should only be opened by a licensed electrician.
- The separate power stage set area should only be disconnected from the connection area after first being disconnected from the grid power.
- The separate power stage set area should only be opened by Fronius-trained service personnel.

Never work with live wires! Prior to all connection work, make sure that the AC and DC wires are not charged.

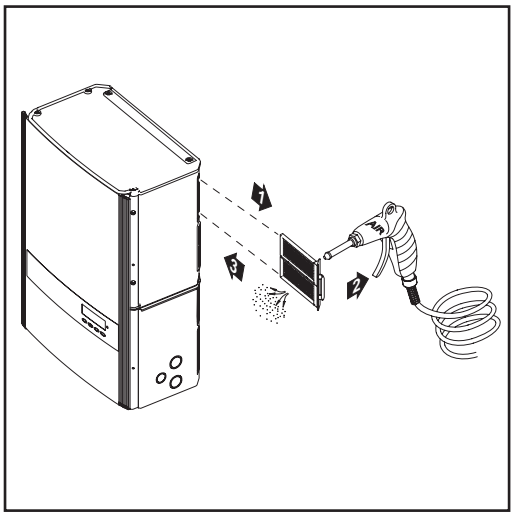
The DC main switch is only used to switch off power to the power stage set. When the DC main switch is turned off, the connection area is still energized.

**WARNING!** An electric shock can be fatal. Danger from residual voltage from capacitors.
You must wait until the capacitors have discharged. Discharge takes 5 minutes.

## General

The inverter is designed so that it does not require additional maintenance. However, there are a few points to keep in mind during operation to ensure that the inverter functions optimally.

## Operation in Dusty Environments



When operating the inverter in extremely dusty environments:
Remove the fan cover and clean the integrated fly screen as required

## Opening Fronius IG Plus for Service/Maintenance

Procedure for opening the inverter for service or maintenance:

1. Disconnect AC and DC supply from the inverter
2. Open the connection area
3. Turn off DC main switch
4. Allow the capacitors to discharge (5 minutes)

5 Remove metal covers
6 If present, remove the fuse for the solar module ground
7 If present, remove string fuses
8 Disconnect DC wire
9 Disconnect AC wire

# Replacing String Fuses

**Safety**

**WARNING!** An electric shock can be fatal. Danger due to grid voltage and DC voltage from solar modules.

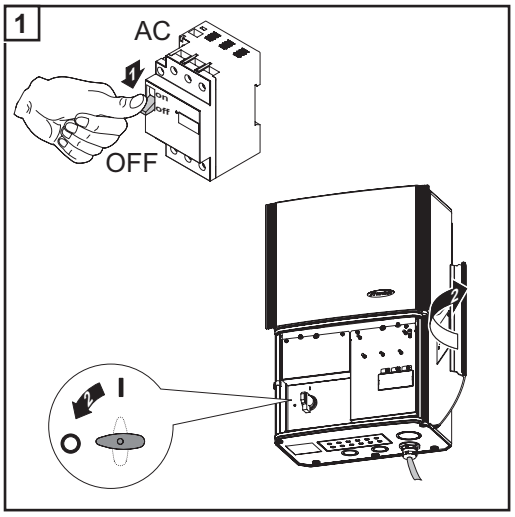
- The connection area should only be opened by a licensed electrician.
- The separate power stage set area should only be disconnected from the connection area after first being disconnected from the grid power.
- The separate power stage set area should only be opened by Fronius-trained service personnel.

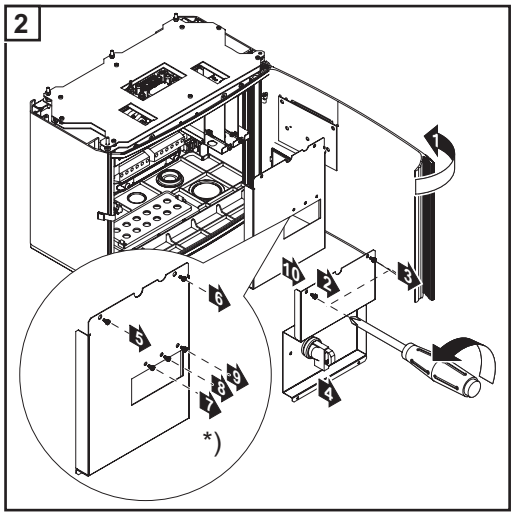
Never work with live wires! Prior to all connection work, make sure that the AC and DC wires are not charged.

The DC main switch is only used to switch off power to the power stage set. When the DC main switch is turned off, the connection area is still energized.

**WARNING!** An electric shock can be fatal. Danger from residual voltage from capacitors.
You must wait until the capacitors have discharged. Discharge takes 5 minutes.

**Preparation**



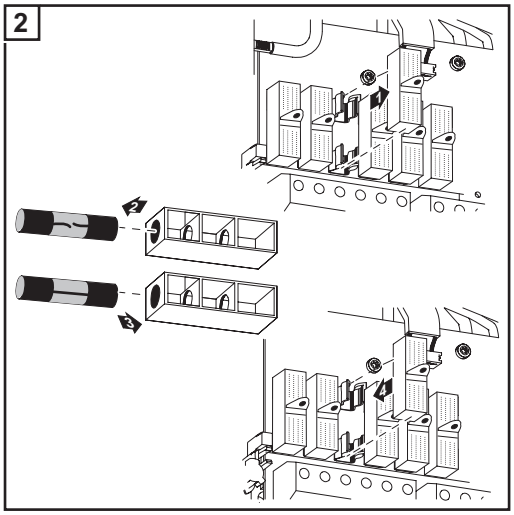

*) Remove all fixing screws from any available option cards.

**Replacing Fuses**

1 Test the fuse holder at the terminal for continuity

**NOTE!** Only use fuses for solar modules that meet the criteria for the proper selection of string fuses.
Fuse dimensions: Diameter 10.3 x 35 - 38 mm

2

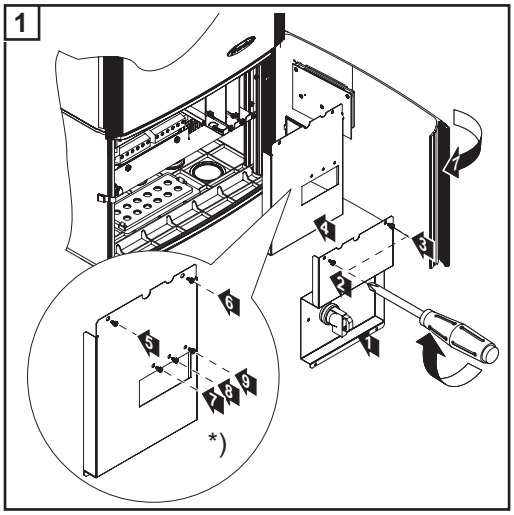


3 After replacing the fuse:

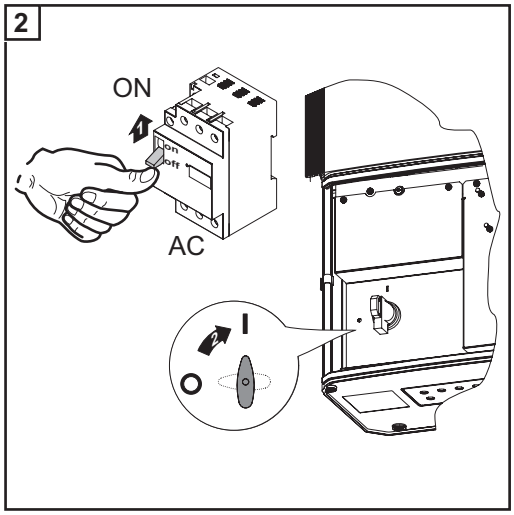
- Find out and correct the cause for the defective fuse

**Finally...**

1




2




*) Attach all fixing screws for any available option cards.

# Appendix

# Technical Data



**Fronius IG Plus 35**

Input data

| | |
|---|---|
| MPP voltage range | 230 - 500 V DC |
| Max. input voltage (at 1000 W/m² / -10 °C (14 °F) in an open circuit) | 600 V DC |
| Max. input current | 16 A DC |

Output data

| | |
|---|---|
| Nominal output power ($P_{nom}$) | 3.5 kW |
| Max. output power | 3.5 kW |
| Nominal AC output voltage | 1 ~ NPE 230 V |
| Grid voltage tolerance | +10 / -15 % [1)] |
| Nominal output current (single phase) | 15.2 A AC |
| Nominal frequency | 50 - 60 Hz [1)] |
| Distortion factor | < 3,5 % |
| Power factor cos phi | 1 |
| Max. permitted mains impedance Zmax at PCC[2)] | none |

General data

| | |
|---|---|
| Maximum efficiency | 96 % |
| Euro. max. efficiency | 95,0 % |
| Power consumption at night | < 1 W |
| Cooling | Controlled forced-air ventilation |
| Degree of protection | IP 44 |
| Dimensions l x w x h | 244 x 434 x 631 mm |
| Weight | 25 kg |
| Permissible ambient temperature (with 95% rel. humidity) | - 20 °C - +50 °C |
| EMC emission class | B |

Protective equipment

| | |
|---|---|
| DC insulation measurement | Warning when $R_{ISO}$ < 500 kOHM |
| DC overvoltage protection | integrated |
| Protection against reversed polarity | integrated |
| Manifestation of DC overload | Operating point shift |

**Fronius IG Plus 50**

Input data

| | |
|---|---|
| MPP voltage range | 230 - 500 V DC |
| Max. input voltage<br>(at 1000 W/m² / -10 °C (14 °F) in an open circuit) | 600 V DC |
| Max. input current | 18.3 A DC |

Output data

| | |
|---|---|
| Nominal output power ($P_{nom}$) | 4 kW |
| Max. output power | 4 kW |
| Nominal AC output voltage | 1 ~ NPE 230 V |
| Grid voltage tolerance | +10 / -15 % [1)] |
| Nominal output current (single phase) | 17.4 A AC |
| Nominal frequency | 50 - 60 Hz [1)] |
| Distortion factor | < 3,5 % |
| Power factor cos phi | 1 |
| Max. permitted mains impedance Zmax at PCC[2)] | 261 mohm |

General data

| | |
|---|---|
| Maximum efficiency | 96 % |
| Euro. max. efficiency | 95,1 % |
| Power consumption at night | < 1 W |
| Cooling | Controlled forced-air ventilation |
| Degree of protection | IP 44 |
| Dimensions l x w x h | 244 x 434 x 631 mm |
| Weight | 25 kg |
| Permissible ambient temperature<br>(with 95% rel. humidity) | - 20 °C - +50 °C |
| EMC emission class | B |

Protective equipment

| | |
|---|---|
| DC insulation measurement | Warning when $R_{ISO}$ < 500 kOHM |
| DC overvoltage protection | integrated |
| Protection against reversed polarity | integrated |
| Manifestation of DC overload | Operating point shift |

**Fronius IG Plus 70**

Input data

| | |
|---|---|
| MPP voltage range | 230 - 500 V DC |
| Max. input voltage<br>(at 1000 W/m² / -10 °C (14 °F) in an open circuit) | 600 V DC |
| Max. input current | 29.7 A DC |

Output data

| | |
|---|---|
| Nominal output power ($P_{nom}$) | 6.5 kW |
| Max. output power | 6.5 kW |
| Nominal AC output voltage | 1 ~ NPE 230 V<br>2 ~ NPE 400 / 230 V |
| Grid voltage tolerance | +10 / -15 % [1)] |
| Nominal output current one-phase<br>two-phase | 28.3 A AC<br>14.1 A AC |
| Nominal frequency | 50 - 60 Hz [1)] |
| Distortion factor | < 3,5 % |
| Power factor cos phi | 1 |
| Max. permitted mains impedance Zmax at PCC[2)] | One-phase 161 mohm<br>two-phase none |

General data

| | |
|---|---|
| Maximum efficiency | 96 % |
| Euro. max. efficiency | 95,4 % |
| Power consumption at night | < 1 W |
| Cooling | Controlled forced-air ventilation |
| Degree of protection | IP 44 |
| Dimensions l x w x h | 244 x 434 x 962 mm |
| Weight | 38 kg |
| Permissible ambient temperature (with 95% rel. humidity) | - 20 °C - +50 °C |
| EMC emission class | B |

Protective equipment

| | |
|---|---|
| DC insulation measurement | Warning when $R_{ISO}$ < 500 kOHM |
| DC overvoltage protection | integrated |
| Protection against reversed polarity | integrated |
| Manifestation of DC overload | Operating point shift |

**Fronius IG Plus 100**

Eingangsdaten

| | |
|---|---|
| MPP voltage range | 230 - 500 V DC |
| Max. input voltage (at 1000 W/m² / -10 °C (14 °F) in an open circuit) | 600 V DC |
| Max. input current | 36.6 A DC |

Output data

| | |
|---|---|
| Nominal output power ($P_{nom}$) | 8 kW |
| Max. output power | 8 kW |

| | |
|---|---|
| Nominal AC output voltage | 1 ~ NPE 230 V<br>2 ~ NPE 400 / 230 |
| Grid voltage tolerance | +10 / -15 % [1] |
| Nominal output current one-phase<br>two-phase | 34.8 A AC<br>17.4 A AC |
| Nominal frequency | 50 - 60 Hz [1] |
| Distortion factor | < 3,5 % |
| Power factor cos phi | 1 |
| Max. permitted mains impedance Zmax at PCC[2] | One-phase 131 mohm<br>two-phase 262 mohm |

General data

| | |
|---|---|
| Maximum efficiency | 96 % |
| Euro. max. efficiency | 95,5 % |
| Power consumption at night | < 1 W |
| Cooling | Controlled forced-air ventilation |
| Degree of protection | IP 44 |
| Dimensions l x w x h | 244 x 434 x 962 mm |
| Weight | 38 kg |
| Permissible ambient temperature (with 95% rel. humidity) | - 20 °C - +50 °C |
| EMC emission class | B |

Protective equipment

| | |
|---|---|
| DC insulation measurement | Warning when $R_{ISO}$ < 500 kOHM |
| DC overvoltage protection | integrated |
| Protection against reversed polarity | integrated |
| Manifestation of DC overload | Operating point shift |

**Fronius IG Plus 120**

Input data

| | |
|---|---|
| MPP voltage range | 230 - 500 V DC |
| Max. input voltage (at 1000 W/m² / -10 °C (14 °F) in an open circuit) | 600 V DC |
| Max. input current | 45.78 A DC |

Output data

| | |
|---|---|
| Nominal output power ($P_{nom}$) | 10 kW |
| Max. output power | 10 kW |
| Nominal AC output voltage | 3 ~ NPE 400 / 230 V |
| Grid voltage tolerance | +10 / -15 % [1] |
| Nominal output current (three-phase) | 14.5 A AC |

| | |
|---|---|
| Nominal frequency | 50 - 60 Hz [1)] |
| Distortion factor | < 3,5 % |
| Power factor cos phi | 1 |
| Max. permitted mains impedance Zmax at PCC[2)] | none |

General data

| | |
|---|---|
| Maximum efficiency | 96 % |
| Euro. max. efficiency | 95,5 % |
| Power consumption at night | < 1 W |
| Cooling | Controlled forced-air ventilation |
| Degree of protection | IP 44 |
| Dimensions l x w x h | 244 x 434 x 1,221 mm |
| Weight | 49 kg |
| Permissible ambient temperature (with 95% rel. humidity) | - 20 °C - +50 °C |
| EMC emission class | B |

Protective equipment

| | |
|---|---|
| DC insulation measurement | Warning when $R_{ISO}$ < 500 kOHM |
| DC overvoltage protection | integrated |
| Protection against reversed polarity | integrated |
| Manifestation of DC overload | Operating point shift |

**Fronius IG Plus 150**

Input data

| | |
|---|---|
| MPP voltage range | 230 - 500 V DC |
| Max. input voltage (at 1000 W/m² / -10 °C (14 °F) in an open circuit) | 600 V DC |
| Max. input current | 54.9 A DC |

Output data

| | |
|---|---|
| Nominal output power ($P_{nom}$) | 12 kW |
| Max. output power | 12 kW |
| Nominal AC output voltage | 3 ~ NPE 400 / 230 V |
| Grid voltage tolerance | +10 / -15 % [1)] |
| Nominal output current (three-phase) | 17.4 A AC |
| Nominal frequency | 50 - 60 Hz [1)] |
| Distortion factor | < 3,5 % |
| Power factor cos phi | 1 |
| Max. permitted mains impedance Zmax at PCC[2)] | none |

General data

| | |
|---|---|
| Maximum efficiency | 96 % |
| Euro. max. efficiency | 95,5 % |
| Power consumption at night | < 1 W |
| Cooling | Controlled forced-air ventilation |
| Degree of protection | IP 44 |
| Dimensions l x w x h | 244 x 434 x 1,221 mm |
| Weight | 49 kg |
| Permissible ambient temperature (with 95% rel. humidity) | - 20 °C - +50 °C |
| EMC emission class | B |

Protective equipment

| | |
|---|---|
| DC insulation measurement | Warning when $R_{ISO}$ < 500 kOHM |
| DC overvoltage protection | integrated |
| Protection against reversed polarity | integrated |
| Manifestation of DC overload | Operating point shift |

**Explanation of Footnotes**

1) The values provided are standard values. The inverter can be customized to the respective country according to the requirements.

2) PCC = interface to the public grid

# Relevant Standards and Directives



**CE Conformity Marking**

The equipment complies with all the requisite and relevant standards and directives that form part of the relevant EU directive, and therefore is permitted to display the CE mark.

**Parallel Operation of In-Plant Power Generation Systems**

The inverter complies with the

- "Guidelines for connection and parallel operation of in-plant generation systems with the low-voltage grid" published by the German Electricity Industry Association (VDEW)
- "Technical guidelines for parallel operation of in-plant generation systems with distribution networks" published by the Association of Austrian Electricity Companies.

**Circuit to Prevent Islanding**

The inverter has a circuit for preventing islanding which is approved by the Professional Association for Precision Mechanics and Electronic Engineering in accordance with DIN VDE 0126-1-1.

**Grid Failure**

The standard measurement and safety procedures integrated into the inverter ensure that the power feed is immediately interrupted in the event of a grid failure (shut-off by the utility or damage to lines).

**Relevant Standards and Directives**

- "Safety requirements for photovoltaic energy generation plants" (ÖNORM/ÖVE E2750), to the extent that these regulations are applicable to the inverter

# Warranty and Disposal

**Fronius Manufacturer's Warranty**

Fronius IG Plus inverters come standard with a manufacturer's warranty of 60 months from the date of installation. Fronius guarantees that your photovoltaic inverter will function correctly during this period.

**Extended Warranty**

An extended warranty can be purchased up to 6 months after the date of installation. Applications for an extended warranty after this date can be rejected by Fronius.

**Services within the Warranty Period**

If a defect should occur within the agreed upon warranty period for which Fronius is responsible, Fronius has the option of

- repairing the defect at Fronius or onsite
- providing an equivalent replacement device or new device
- having a trained Fronius Service Partner (FSP) carry out these services

**Transport**

Fronius pays the transport costs for the inverter:

- in countries with a national Fronius subsidiary
- in countries of the EU
- in Switzerland
- between the respective national or nearest Fronius subsidiary and the retail site of the official Fronius sales partner from which the device was purchased.

Transport costs are not paid:

- from or to EU overseas territories
- from or to countries outside of the EU provided that there are no national Fronius subsidiaries there (see point on "Geographic Validity").

For return transportation, devices or components must be packed in their original or equivalent packaging.

**When making a warranty claim, attention should be paid to the following**

The following are required as proof of your warranty claim: purchase invoice, serial number of the device, and the commissioning log (transfer date, commissioning date, report from the power supply company).
The procedure for a warranty claim must be coordinated with Fronius. This is the only way to ensure that the above mentioned warranty services will be provided free of charge for the warrantee.
If the device is replaced, the remaining warranty time will be transferred to the replacement device. This will be registered automatically by Fronius. You will not receive a new certificate.

**Scope and Validity of Manufacturer's Warranty**

The manufacturer's warranty is only valid for the inverter that is uniquely identified by the serial number. Other photovoltaic system components as well as Fronius system upgrades (e.g., plug-in cards) are not covered by the warranty.

**Exceptions to the Fronius Manufacturer's Warranty**

Defects are not covered by the manufacturer's warranty if they are caused by the following:

- Non-compliance with operating instructions, installation instructions and maintenance instructions
- Errors during device installation
- Errors during device commissioning
- Damage during device transport
- Improper or incorrect operation of the device
- Insufficient device ventilation
- Tampering with the device by personnel not trained by Fronius
- Non-compliance with safety instructions and installation standards
- Acts of God (storm, lightning strike, overvoltage, fire, etc.)

This manufacturer's warranty also does not cover damages to the inverter that are attributed to the other system components as well as damages that do not adversely affect the proper functioning of the inverter, e.g., "cosmetic defects."

The warranty does not cover travel and accommodation costs or assembly and installation costs onsite.

Changes to the existing PV system, the building installation and the like, as well as any expenditure of time and the costs resulting from this are not covered by the warranty.

No compensation is provided for lost power that has not been fed into the grid or for energy consumption that does not take place and the like.

**Geographical Validity**

These warranty conditions are not valid for the United States of America (USA).

As of September 2009, there are national Fronius subsidiaries in the following countries outside of the EU, Switzerland and the USA:

- Brazil
- Canada
- Mexico
- Norway
- Ukraine

Current information about this can be found on our website at www.fronius.com.

**Other Legal Information**

Along with the Fronius manufacturer's warranty, there are also warranty rights stipulated by law that are not affected by this manufacturer's warranty.
Claims that exceed those rights named in the warranty conditions are not covered by the manufacturer's warranty unless Fronius is legally liable for them. In such cases, please see your device vendor. Claims under the Product Liability Law remain unaffected.
The general terms and conditions located on our website (www.fronius.com) under "Legal info" are in effect unless these warranty conditions allow more favorable provisions.
Previously valid warranty conditions are replaced by these conditions.

**Disposal**

Should your inverter be replaced at some future date, Fronius will accept the obsolete equipment back and provide for its proper recycling.

## EU-KONFORMITÄTSERKLÄRUNG 2009
## EC-DECLARATION OF CONFORMITY 2009
## DECLARATION DE CONFORMITE DE LA CE, 2009

Wels-Thalheim, 2009-07-21

Die Firma

Manufacturer

La compagnie

**FRONIUS INTERNATIONAL GMBH**
Günter Fronius Straße 1, A-4600 Wels-Thalheim

erklärt in alleiniger Verantwortung, dass folgendes Produkt:

Hereby certifies on it´s sole responsibility that the following product:

se déclare seule responsable du fait que le produit suivant:

Fronius IG Plus 35-1 / 50-1 / 70-1 / 70-2 / 100-1 / 100-2 / 120-3 / 150-3
Solar-Wechselrichter

Fronius IG Plus 35-1 / 50-1 / 70-1 / 70-2 / 100-1 / 100-2 / 120-3 / 150-3
Photovoltaic inverter

Fronius IG Plus 35-1 / 50-1 / 70-1 / 70-2 / 100-1 / 100-2 / 120-3 / 150-3
Onduleur solaire

auf das sich diese Erklärung bezieht, mit folgenden Richtlinien bzw. Normen übereinstimmt:

which is explicitly referred to by this Declaration meet the following directives and standard(s):

qui est l'objet de la présente déclaration correspondent aux suivantes directives et normes:

Richtlinie 2006/95/EG
Elektrische Betriebsmittel
Niederspannungsrichtlinie

Directive 2006/95/EC
Electrical Apparatus
Low Voltage Directive

Directive 2006/95/CE
Outillages électriques
Directive de basse tension

Richtlinie 2004/108/EG
Elektromag. Verträglichkeit

Directive 2004/108/EC
Electromag. compatibility

Directive 2004/108/CE
Électromag. Compatibilité

Europäische Normen inklusive zutreffende Änderungen
EN 50178:1997
EN 61000-3-2:2006
EN 61000-3-3:1995
EN 61000-3-11:2000
EN 61000-3-12:2005
EN 61000-6-2:2005
EN 61000-6-3:2007
EN 50366:2003

European Standards including relevant amendments
EN 50178:1997
EN 61000-3-2:2006
EN 61000-3-3:1995
EN 61000-3-11:2000
EN 61000-3-12:2005
EN 61000-6-2:2005
EN 61000-6-3:2007
EN 50366:2003

Normes européennes avec amendements correspondants
EN 50178:1997
EN 61000-3-2:2006
EN 61000-3-3:1995
EN 61000-3-11:2000
EN 61000-3-12:2005
EN 61000-6-2:2005
EN 61000-6-3:2007
EN 50366:2003

Die oben genannte Firma hält Dokumentationen als Nachweis der Erfüllung der Sicherheitsziele und die wesentlichen Schutzanforderungen zur Einsicht bereit.

Documentation evidencing conformity with the requirements of the Directives is kept available for inspection at the above Manufacture´s.

En tant que preuve de la satisfaction des demandes de sécurité la documentation peut être consultée chez la compagnie susmentionnée.

CE 2009

ppa. Mag.Ing.H.Hackl

Deutsche Gesetzliche Unfallversicherung

Fachausschuss „Elektrotechnik"

Fachausschuss „Elektrotechnik" • Postfach 510580 • 50941 Köln

Fronius International GmbH
Günter Fronius Str.1
4600 Wels
Austria

Ihr Zeichen
Ihre Nachricht vom
Unser Zeichen UB.010.17 Pl/Ow
(bitte stets angeben)
Ansprechpartner/in Herr Pohl
Telefon 0221 3778-6312
Fax 0221 3778-6322
E-Mail pohl.wolfgang@bgfe.de
Datum 19.05.2008

## Unbedenklichkeitsbescheinigung 08014

**Erzeugnis:** Selbsttätig wirkende Schaltstelle

**Typ:** Fronius IG Plus, Setup DE, FRA, AUT, GRE, POR, EXC

**Bestimmungsgemäße Verwendung:** Selbsttätig wirkende, dem VNB unzugängliche Schaltstelle als Sicherheitsschnittstelle zwischen einer Eigenerzeugungsanlage und dem Niederspannungsnetz. Gleichwertiger Ersatz für eine jederzeit dem VNB zugängliche Schaltstelle mit Trennfunktion. Die Schaltstelle ist integraler Bestandteil der PV-Wechselrichter Typ: Fronius IG Plus und wirksam in den Setup-Varianten: DE, FRA, AUT, GRE, POR, EXC

**Prüfgrundlage:**
DIN V VDE V 0126-1-1: 2006-02 „Selbsttätige Schaltstelle zwischen einer netzparallelen Erzeugungsanlage und dem öffentlichen Niederspannungsnetz"

Das mit Bericht vom 02.07.2007 Az. 2.04.00403.1.0 (arsenal research) geprüfte Sicherheitskonzept des o.g. Erzeugnisses, entspricht den zum Zeitpunkt der Ausstellung dieser Bescheinigung geltenden sicherheitstechnischen Anforderungen für die aufgeführte bestimmungsgemäße Verwendung.

Die Unbedenklichkeitsbescheinigung wird spätestens am

**31.12.2012**

ungültig.

- Mehlem -
Leiter der Prüf- und Zertifizierungsstelle

## Document of Compliance 07013

**Product:** Automatic switching center

**Type:** Fronius IG Plus, Setup DE

**Intended Use:** Automatic switching center inaccessible to the DSO as a safety interface between an in-plant generation system and the low-voltage grid. Also a backup for a switching center always accessible to the DSO with an isolation function. The switching center is an integral part of the PV inverter type: Fronius IG Plus and operational in the setup versions: DE, FR, AUT, GRE, POR, EXC.

**Test specification:**
DIN V VDE 0126-1-1: 2006-02 „Automatic switching center between a parallel net generation system and the public low-voltage grid“

The safety concept of the above product tested with the report of 02.07.2007, ref. 2.04.00403.1.0 (arsenal research) corresponds to the safety requirements for the intended purpose valid at the time this certificate was issued.

This document of compliance is valid until:

**31.12.2012**

# Fronius Worldwide - www.fronius.com/addresses


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