



SHIFTING THE LIMITS



**Fronius IG Plus**  
**25 V / 30 V / 35 V / 50 V / 55 V / 60 V**  
**70 V / 80 V / 100 V / 120 V / 150 V**

EN-US

Operating Instructions

Inverter for grid-connected photo-voltaic systems





# Dear reader,

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## **Introduction**

Thank you for the trust you have placed in our company and congratulations on buying this high-quality Fronius product. These instructions will help you 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.



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# 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

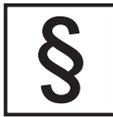
For the location of the safety and danger notices on the device, refer to the section headed "General" in the operating instructions for the device.

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

**Your personal safety is at stake!**

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**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 utility 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.

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**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 62109-1:2010.

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 in emission class A:

- Are only designed for use in industrial settings
- Can cause line-bound and radiated interference in other areas

Devices in emission class B:

- Satisfy the emissions criteria for residential and industrial areas. This is also true for residential areas in which the energy is supplied from the public low-voltage grid.

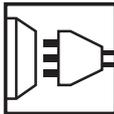
EMC device classification as per the rating plate or technical data.

**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.

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**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.

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**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

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

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Never bypass or disable protection devices.

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**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.

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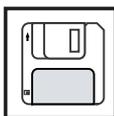
**Disposal**



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 you must locate the approved collection and recycling facilities in your area. Ignoring this European Directive may have potentially adverse effects on the environment and your health!

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**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.

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**Copyright**



Copyright of these operating instructions remains with the manufacturer.

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

# Protection of Persons and Equipment

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## 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 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.

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## Monitoring the Grid

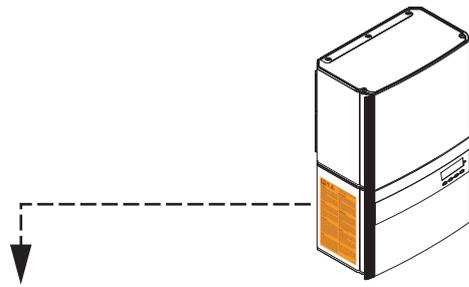
Whenever conditions in the electric grid are inconsistent with standard conditions (for example, grid switch-off, interruption), the inverter will immediately stop operating and interrupt the supply of power into the grid.

Grid monitoring is carried out using:

- Voltage monitoring
  - Frequency monitoring
  - Monitoring islanding conditions
- 

## Warning notices affixed to the device

The inverter contains warning notices and safety symbols. These warning notices and safety symbols must NOT be removed or painted over. The notices and symbols warn against operating the equipment incorrectly, as this may result in serious injury and damage.



#### WARNING!

Der Anschlussbereich darf nur von lizenzierten Elektro-Installateuren geöffnet werden. Der separate Bereich der Leistungsteile darf nur im spannungsfreien Zustand vom Anschlussbereich getrennt werden. Der separate Bereich der Leistungsteile darf nur durch geschultes Servicepersonal geöffnet werden.

Entladezeit der Kondensatoren abwarten. Die Entladezeit beträgt 5 Minuten. Der Neutraleiter des Netzes muss geerdet sein. Dem Licht ausgesetzte Solarmodule erzeugen gefährliche Spannung. Vor Arbeiten an den Solarmodulen den DC-Trenner betätigen und wenn vorhanden die Modulerdung aufheben.

#### WARNING!

The connection area should only be opened by a licensed electrician. The separate power module area should only be disconnected from the connection area after first being disconnected from the mains power. The separate power module area should only be opened by a trained service personnel.

You must wait until the capacitors have discharged. Discharge takes 5 minutes. The network neutral conductor must be grounded. Solar modules exposed to light create dangerous voltage. Activate the DC disconnect and disengage the module ground, if available, before working on the solar modules.

#### ¡ADVERTENCIA!

Sólo instaladores eléctricos oficiales pueden abrir la zona de conexión. La zona separada de las partes de potencia sólo se puede separar de la zona de conexión cuando se encuentra en el estado sin tensión. Sólo el personal de servicio formado puede abrir la zona separada de las piezas conductoras. Esperar el tiempo de descarga de los condensadores. El tiempo de descarga es de 5 minutos. El conductor neutro de la red debe estar conectado a tierra. Los módulos solares expuestos a la luz generan una tensión peligrosa. Antes de realizar trabajos en los módulos solares, activar el seccionador DC y anular la puesta a tierra del módulo, si ésta existe.

#### AVVISO!

La scatola dei collegamenti deve essere aperta soltanto da installatori elettrici qualificati. La zona separata delle fonti d'energia può essere staccata dalla scatola dei collegamenti solo in assenza di tensione. La zona separata delle fonti d'energia può essere aperta solo da personale addestrato del servizio di assistenza. Attendere il tempo di scaricamento dei condensatori. Il tempo di scaricamento è di 5 minuti. Il conduttore neutro della rete deve essere messo a terra. I moduli solari esposti alla luce generano

tensione pericolosa. Prima di effettuare lavori sui moduli solari, azionare il separatore CC e annullare la messa a terra dei moduli, se presente.

#### AVERTISSEMENT !

Seuls des installateurs agréés sont habilités à ouvrir la zone de raccordement. Le bloc indépendant des étages de puissance ne doit être séparé de la zone de raccordement que si l'ensemble est hors tension. Seuls des installateurs formés sont habilités à ouvrir le bloc indépendant des étages de puissance.

Attendre l'expiration de la durée de décharge des condensateurs. Cette durée correspond à 5 minutes. Le conducteur neutre du secteur doit être mis à la terre. Les modules solaires exposés à la lumière produisent une tension dangereuse. Avant toute intervention sur les modules solaires, activer le sectionneur DC et, si elle existe, supprimer la mise à la terre de module.

#### WAARSCHUWING!

Het aansluitgedeelte mag uitsluitend worden geopend door elektromonteurs die hiertoe zijn bevoegd. Het afzonderlijke deel van het vermogensgedeelte mag alleen in spanningsvrije toestand worden gescheiden van het aansluitgedeelte. Het afzonderlijke deel van het vermogensgedeelte mag uitsluitend worden geopend door geschoolde onderhoudsmedewerkers.

Wacht tot de condensatoren volledig zijn ontladen. De ontladtid bedraagt 5 minuten. De nulleiding van het net moet zijn geaard. Fotovoltaïsche modules die aan licht zijn blootgesteld, produceren een gevaarlijke spanning. Voordat u werkzaamheden verricht aan de fotovoltaïsche modules, moet u de DC-scheider bedienen en (indien aanwezig) de aarding van de module uitschakelen.

#### VAROVÁNÍ!

Prostor připojení smí otevřít pouze elektromontér s příslušnou licenci. Samostatnou oblast výkonového dílu lze od přípojné oblasti odpojit pouze, je-li odpojona od proudu. Samostatnou oblast výkonového dílu smí otevírat pouze vyškolený odborný personál.

Vyčkejte na vybití kondenzátorů. Doba vybití je 5 minut. Neutrální síťový vodič musí být uzemněn. Solární moduly vystavené světlu vytvářejí nebezpečné napětí. Před zahájením práce na solárních modulech aktivujte oddělovač DC a deaktivujte uzemnění modulu, je-li k dispozici.

#### 경고

연결 영역은 면허가 있는 전기 기사만 열 수 있습니다. 별도의 전력 모듈 영역은 주 전원으로부터 먼저 차단한 후에만 연결 영역으로부터 차단시킬 수 있습니다. 별도의 전력 모듈 영역은 교육을 받은 서비스 직원만 열 수 있습니다. 콘덴서가 방전될 때까지 기다려야 합니다. 방전은 5분이 소요됩니다. 네트워크 중성선은 접지되어야 합니다. 태양전지판이 빛에 노출되면 위험 전압이 발생합니다. 가능하면 DC를 차단하고 모듈 접지를 해제한 후에 태양전지판을 작동하십시오.

42.0409.3296

**Safety symbols:**



Risk of serious injury and damage due to incorrect operation



Do not use the functions described until you have thoroughly read and understood the following documents:

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



Dangerous electrical voltages

**Text of warning notices:**

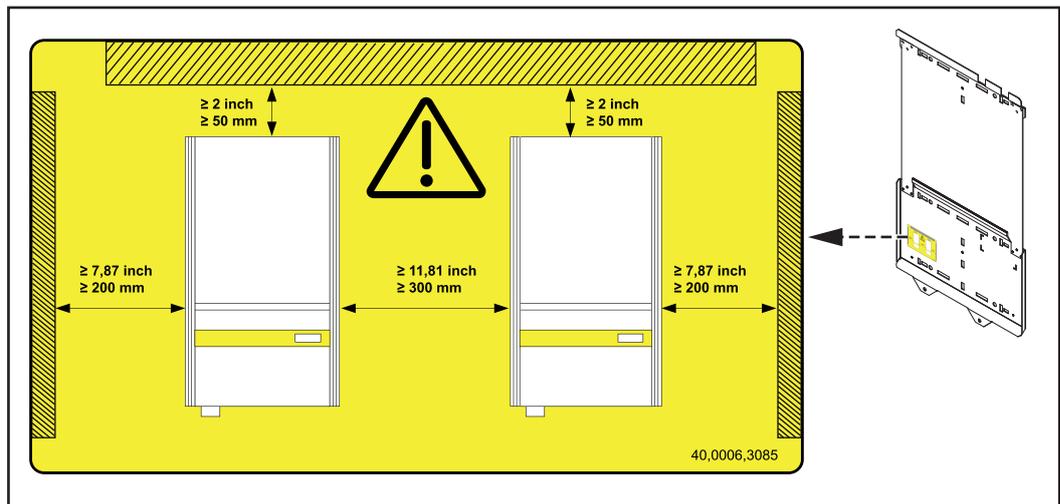
**WARNING!**

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 trained service personnel.

You must wait until the capacitors have discharged. Discharge takes 5 minutes. The neutral conductor of the grid must be grounded. Solar modules exposed to light create dangerous voltage. Activate the DC disconnect and disengage the module ground, if available, before working on the solar modules.

**Warning notice on the wall bracket**

The wall bracket contains a warning notice regarding the installation of several inverters next to each other. This warning notice must not be removed or painted over. It warns against incorrect installation, which could result in property damage.



The spacing information listed in the warning notice from the wall/ceiling to the inverter and from inverter to inverter must be observed when installing several inverters next to each other.

# The Fronius IG Plus Unit in the PV System

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

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**Tasks**                        The main tasks of the inverter include:

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

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**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.

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

The control system of the inverter 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 shuts down the grid connection completely and stops operating. All settings and recorded data are saved.

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**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 making system data available as long as the inverter operates.

The inverter is equipped with a basic logging function to monitor minimum and maximum data on a daily and a cumulative basis. These values are shown on the display.

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

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**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.

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**Forced Ventilation**

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

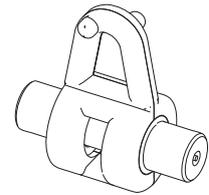
- optimal inverter cooling
- efficiency increases
- cooler components, thus improving service life
- least possible energy consumption and lowest possible noise level
- weight reduction due to a reduction of the cooling element surface

---

**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

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**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 approx. 40 °C and above.

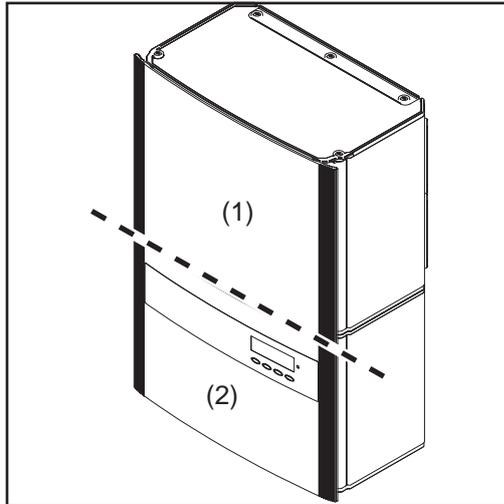
Derating the power reduces the output of the inverter for a short period sufficient to ensure that the temperature will not exceed the permissible limit.

Your inverter will remain ready for operation as long as possible without any interruption.

# Fronius IG Plus Installation and Connection

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## Inverter 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:

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It should only be installed on a stable, vertical wall

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Max. ambient temperatures: -20 °C / +55 °C

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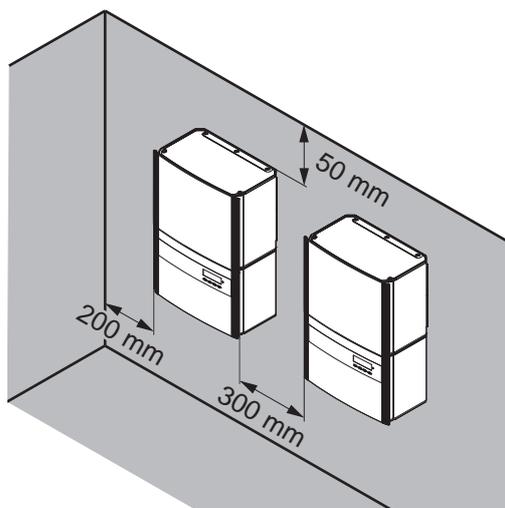
Relative humidity: 0 - 95 %

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

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- 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.




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

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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.

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The inverter is designed for installation both indoors and outdoors.

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## Choosing a Location for Inside Installation

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

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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
-

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**Choosing a location for outdoor installation**

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Because of its degree of protection, the inverter is not susceptible to splash water from any direction.

However the manufacturer recommends, if possible, not to expose the inverter to direct weathering, in order to prevent water deposits caused by rain or snow.

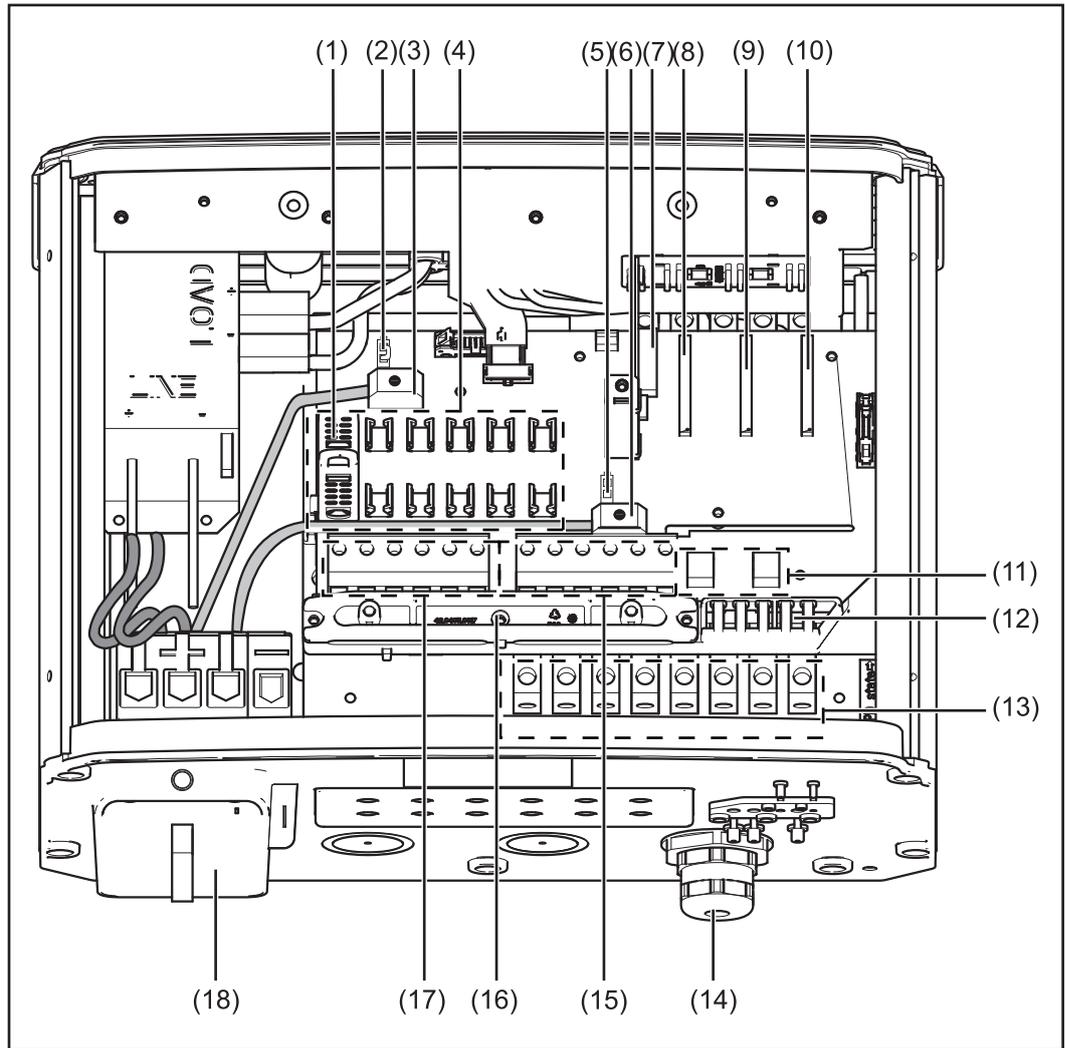
In order to protect the display, the inverter should not be exposed to direct sunlight. Ideally, the inverter should be installed in a protected location, e.g., near the solar modules or under a roof overhang.

Do not install the inverter:

- where it can be exposed to ammonia, corrosive gasses, acids or salts (e.g., fertilizer storage areas, vent openings of livestock stables, chemical plants, tanneries)
-

# 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 wire
(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 solar module ground
(12)	Strain relief 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

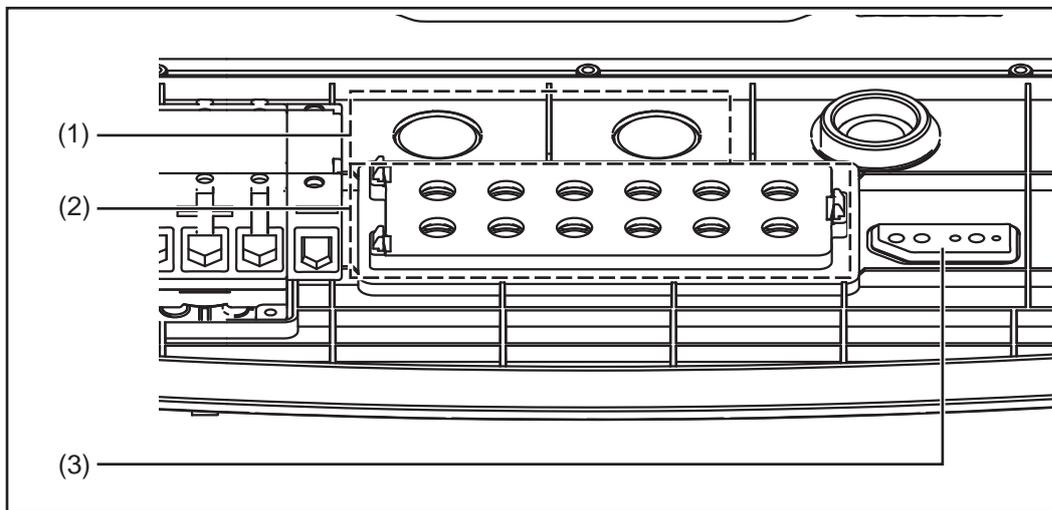
<b>Item</b>	<b>Description</b>
(17)	6 DC+ terminals
(18)	DC main switch

# 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)	2 cable inputs for M32 metric screw joint (for DC cables with a cross section > 16 mm <sup>2</sup> )
(2)	12 cables inputs for 6 solar module strings DC (for a cable diameter of 5 - 9.2 mm)
(3)	Sealing insert (cable input for plug-in card wire)

## 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).

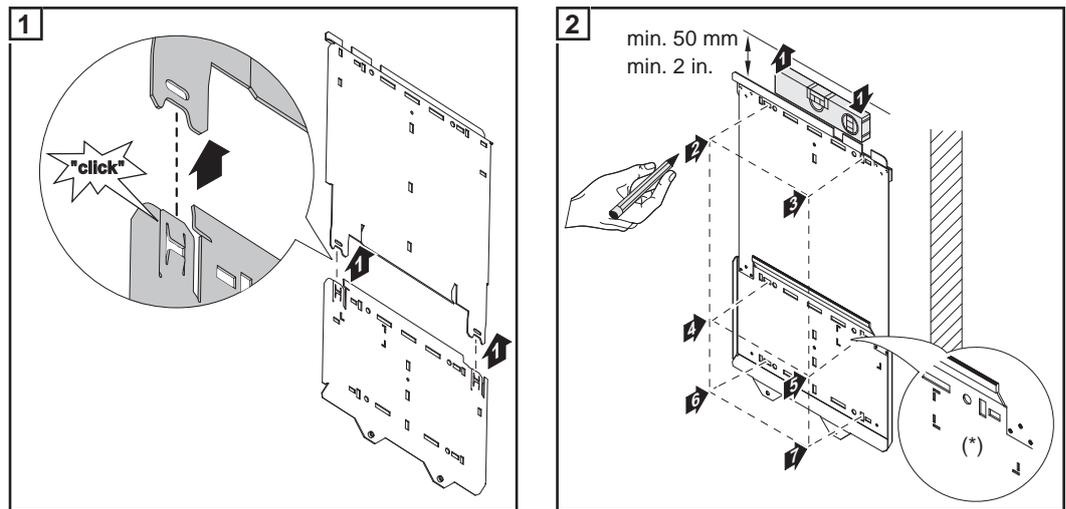
The plastic knockouts are also equipped with centering holes so that they can be drilled out if required.

# Fronius IG Plus Installation

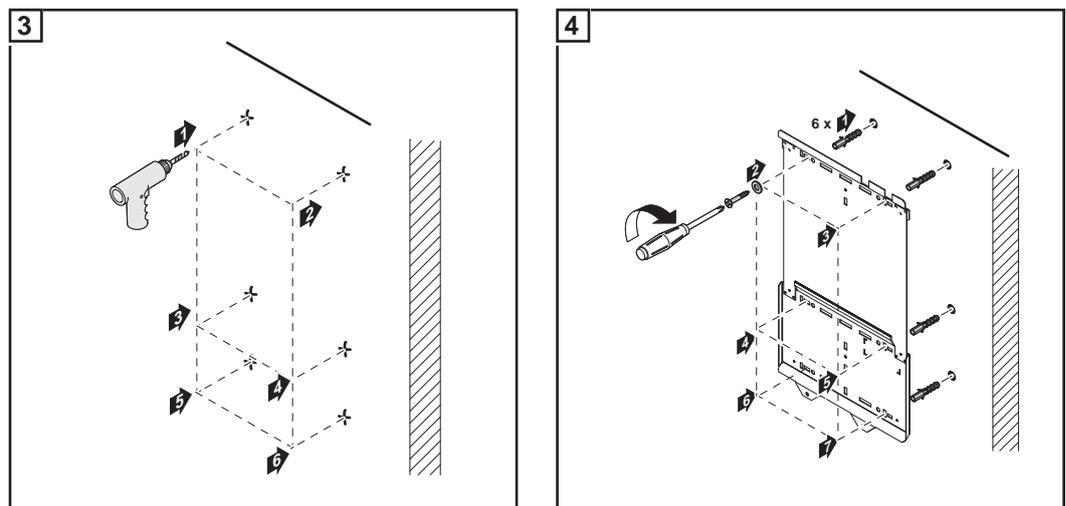
## Attaching the wall bracket

**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.



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



## Lifting the Fronius IG Plus

Fronius recommends using a commercially-available vacuum lifting pad for flat surfaces to lift the connection area and power stage set.

### **IMPORTANT**

- The vacuum lifting pads must be designed for the weight of the connection area and power stage set.
- Follow all safety instructions from the vacuum lifting pad manufacturer.
- Vacuum lifting pads are not part of the scope of delivery for the inverter.

Weight information for the connection area and power stage set:

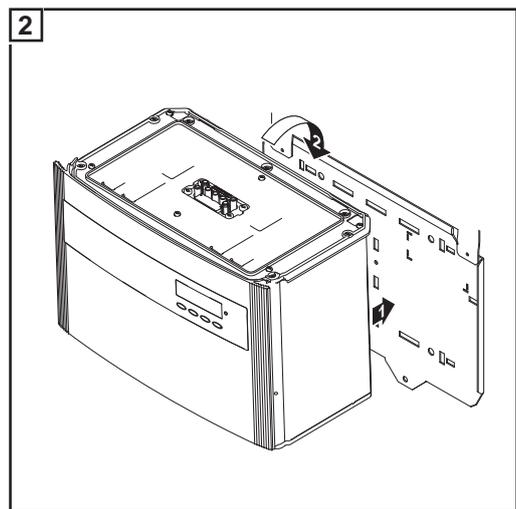
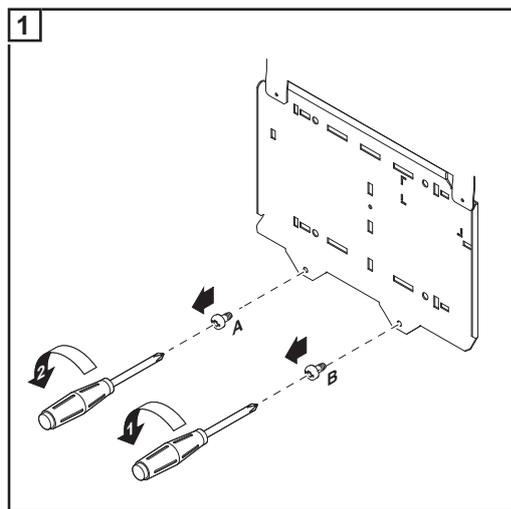
Inverter	Connection area	Power stage set
Fronius IG Plus 25 V-1	9.85 kg	13.95 kg
Fronius IG Plus 30 V-1	9.85 kg	13.95 kg
Fronius IG Plus 35 V-1	9.85 kg	13.95 kg
Fronius IG Plus 50 V-1	9.85 kg	13.95 kg
Fronius IG Plus 55 V-1	9,85 kg	26,10 kg
Fronius IG Plus 55 V-2	9,85 kg	26,10 kg
Fronius IG Plus 55 V-3	11.05 kg	38.15 kg
Fronius IG Plus 60 V-1	9.85 kg	26.10 kg
Fronius IG Plus 60 V-2	9.85 kg	26.10 kg
Fronius IG Plus 60 V-3	11.05 kg	38.15 kg
Fronius IG Plus 70 V-1	9.85 kg	26.10 kg
Fronius IG Plus 70 V-2	9.85 kg	26.10 kg
Fronius IG Plus 80 V-3	11.05 kg	38.15 kg
Fronius IG Plus 100 V-1	10.80 kg	26.10 kg
Fronius IG Plus 100 V-2	10.85 kg	26.10 kg
Fronius IG Plus 100 V-3	11.05 kg	38.15 kg
Fronius IG Plus 120 V-3	11.05 kg	38.15 kg
Fronius IG Plus 150 V-3	11.05 kg	38.15 kg

**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





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

## Monitoring the Grid

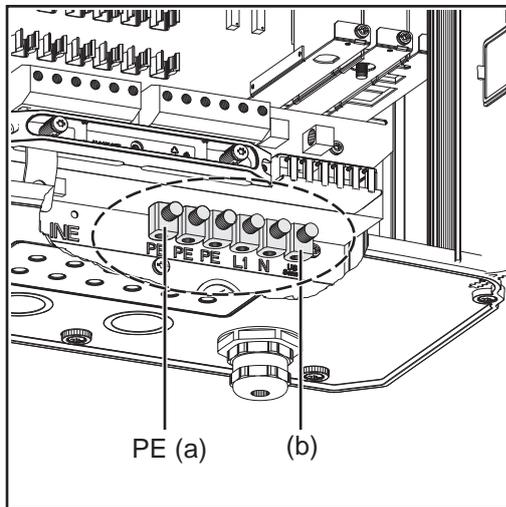
**IMPORTANT!** The resistance in the leads to the AC-side connection terminals must be as low as possible for optimal functioning of grid monitoring.

## Installations with Several Inverters

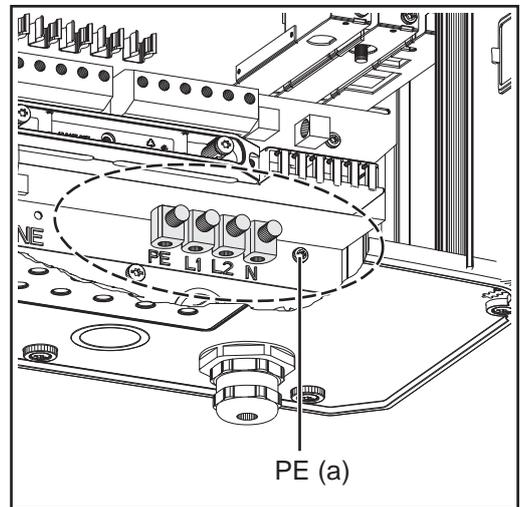
For larger photovoltaic systems, it is possible to connect several inverters in parallel without any problems. To ensure symmetrical feeding, connect the inverters uniformly to all 3 phases.

## AC-side terminals

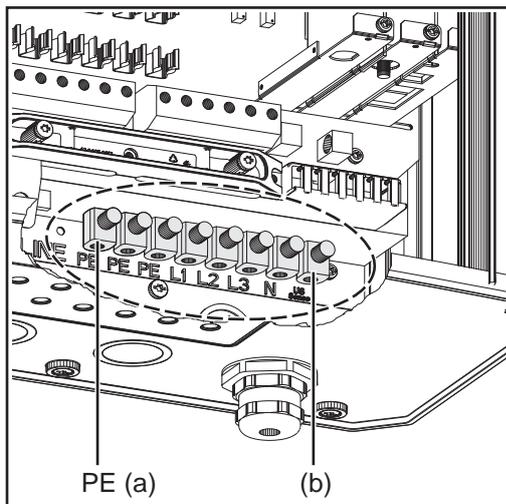
Single-phase inverter



Two-phase inverter



Three-phase inverter



### Legend:

- L1 Phase conductor
- L2 Phase conductor
- L3 Phase conductor
- N Neutral conductor
- PE Ground conductor/grounding
- PE (a) Connection option for additional grounding
- (b) "US Sense" terminal (for USA)

Max. cable cross-section:  
 25 mm<sup>2</sup> - for flexible cables  
 35 mm<sup>2</sup> - for rigid cables

---

## Mains Neutral Conductor



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

The neutral conductor must be connected in order to operate the inverter.



**NOTE!** If the neutral conductor is too small it can adversely affect the inverter's feed-in of power to the mains. The neutral conductor must therefore be the same size as the other live conductors: L1, L2 and L3.

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## Connecting Aluminum Cables



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

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## 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.

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## 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.

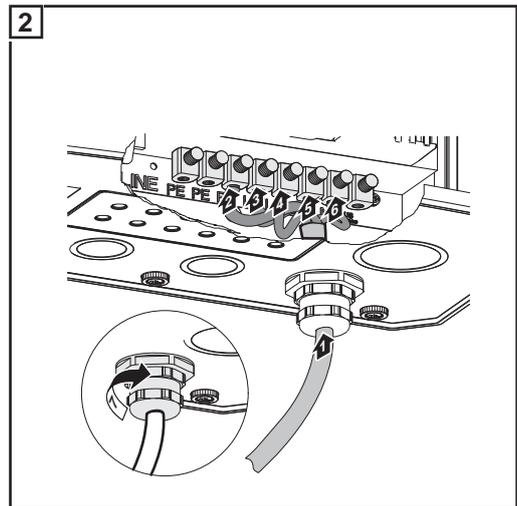
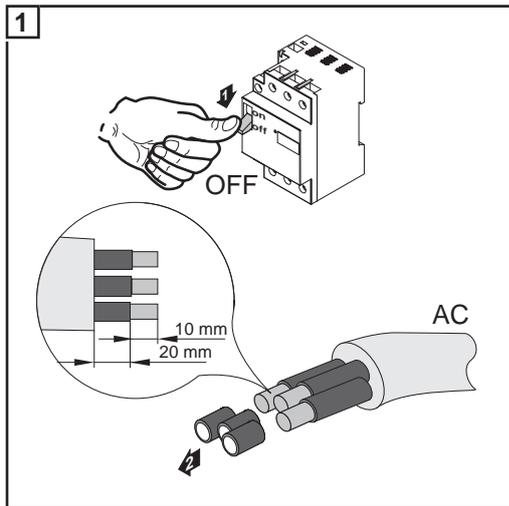
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## Connecting the Fronius IG Plus to the public grid (AC)

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



**NOTE!** Finely stranded cables up to conductor class 5 can be connected to the AC-side terminals without wire end ferrules.



Terminal tightening torque: 2 Nm

**Maximum AC-side overcurrent protection**

Inverter	Number of phases	Nominal output	Fuse protection
Fronius IG Plus 25 V-1	1	2.6 kW	1 x C 25 A
Fronius IG Plus 30 V-1	1	3 kW	1 x C 25 A
Fronius IG Plus 35 V-1	1	3.5 kW	1 x C 25 A
Fronius IG Plus 50 V-1	1	4 kW	1 x C 25 A
Fronius IG Plus 55 V-1	1	5 kW	1 x C 50 A
Fronius IG Plus 55 V-2	2	5 kW	2 x C 25 A
Fronius IG Plus 55 V-3	3	5 kW	3 x C 25 A
Fronius IG Plus 60 V-1	1	6 kW	1 x C 50 A
Fronius IG Plus 60 V-2	2	6 kW	2 x C 25 A
Fronius IG Plus 60 V-3	3	6 kW	3 x C 25 A
Fronius IG Plus 70 V-1	1	6.5 kW	1 x C 50 A
Fronius IG Plus 70 V-2	2	6.5 kW	2 x C 25 A
Fronius IG Plus 80 V-3	3	7 kW	3 x C 25 A
Fronius IG Plus 100 V-1	1	8 kW	1 x C 50 A
Fronius IG Plus 100 V-2	2	8 kW	2 x C 25 A
Fronius IG Plus 100 V-3	3	8 kW	3 x C 25 A
Fronius IG Plus 120 V-3	3	10 kW	3 x C 25 A
Fronius IG Plus 150 V-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 grounding conductor and the N neutral conductor cannot be higher than 8 V.

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

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## 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.

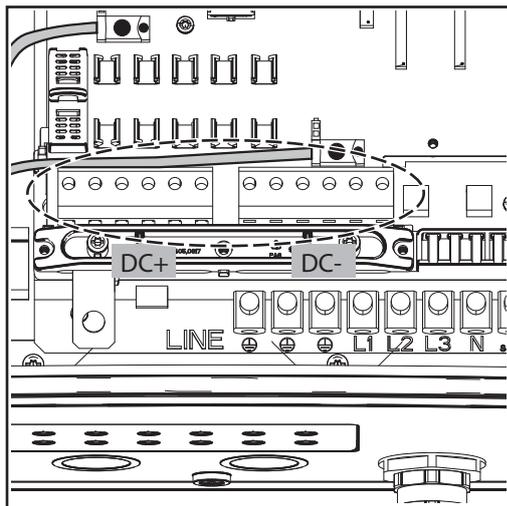
Never work with live wires! Prior to all connection work, make sure that the AC and DC wires are not charged.

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 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 mm <sup>2</sup>	20 A
4 mm <sup>2</sup>	27 A
6 mm <sup>2</sup>	35 A
10 mm <sup>2</sup>	48 A
16 mm <sup>2</sup>	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, 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 slugs 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 slugs 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 slugs 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 slugs, always make sure that the polarity is correct before connecting the individual solar module strings.

If string fuses are used instead of the metal slugs, 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.

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## Overview

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

- Ungrounded System: Connecting Solar Module Strings
- Ungrounded System: Connecting Solar Module Strings with a Cable Cross Section > 16 mm<sup>2</sup>
  
- Solar Module Ground at Negative Pole: Connecting Solar Module Strings
- Solar Module Ground at Negative Pole: Connecting Solar Module Strings with a Cable Cross Section > 16 mm<sup>2</sup>
- Solar Module Ground at Negative Pole for Fronius IG Plus
  
- Solar Module Ground at Positive Pole: Connecting Solar Module Strings
- Solar Module Ground at Positive Pole: Connecting Solar Module Strings with a Cable Cross Section > 16 mm<sup>2</sup>
- Solar Module Ground at Positive Pole for Fronius IG Plus
  
- Criteria for the Proper Selection of String Fuses

# Ungrounded System: Connecting Solar Module Strings

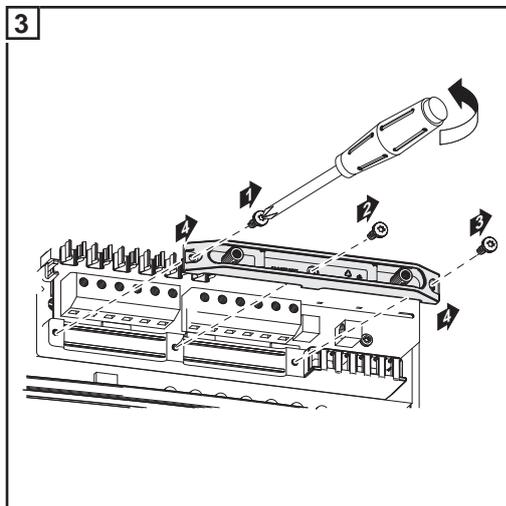
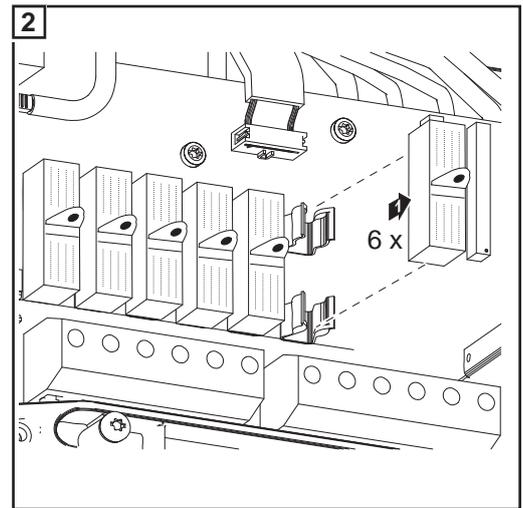
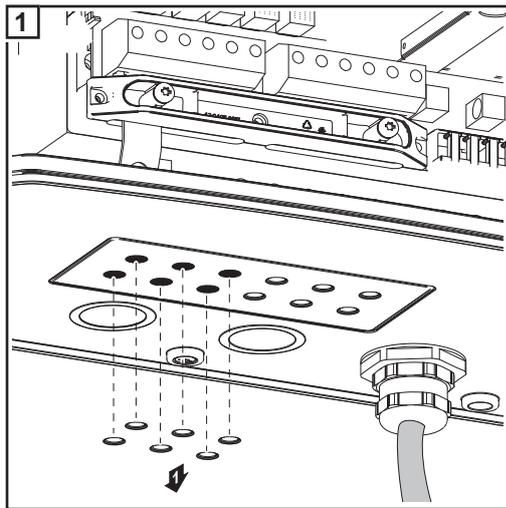
## Wire Cross Section of Solar Module Strings

The cable cross section for solar module strings should be a maximum of 16 mm<sup>2</sup> per cable.

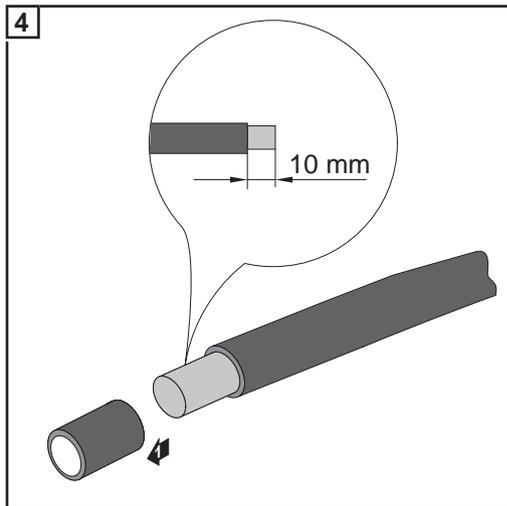


**NOTE!** To ensure an effective strain relief device for solar module strings, only use cable cross sections of the same size.

## Ungrounded system: Connecting solar module strings

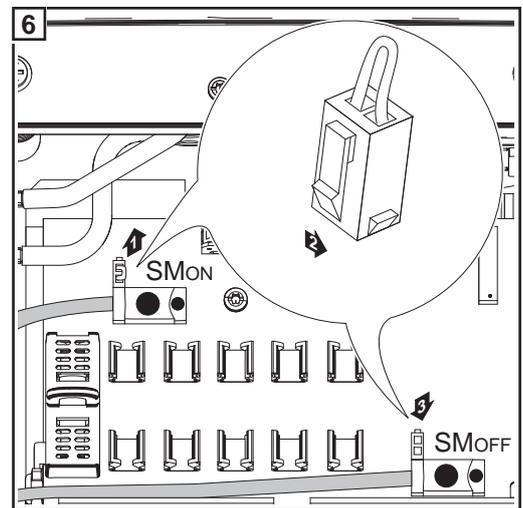
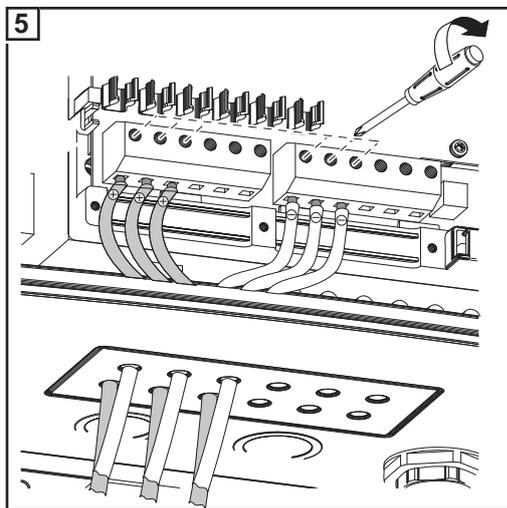


**NOTE!** Finely stranded cables up to conductor class 5 can be connected to the DC-side terminals without wire end ferrules.



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

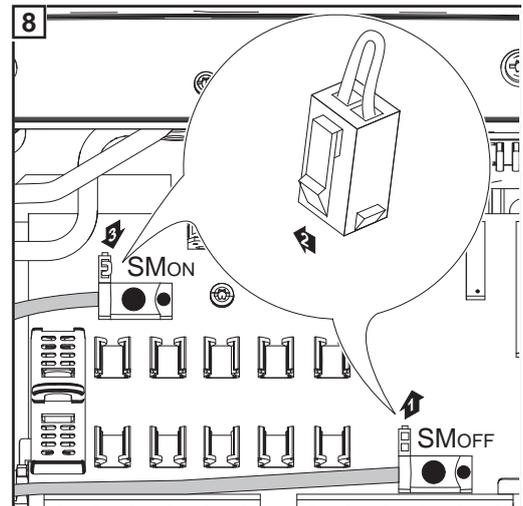
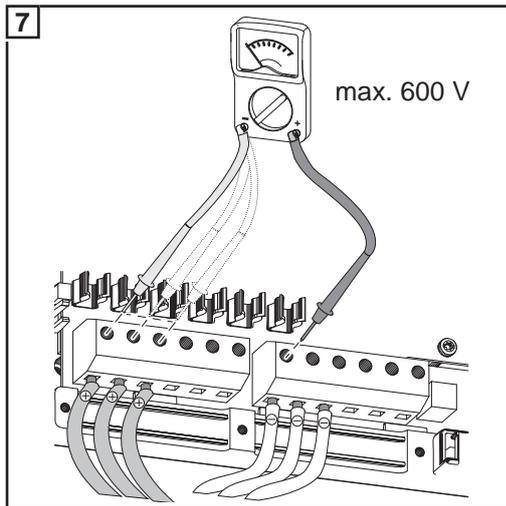
- Only connect a maximum of 20 A to an individual DC terminal.
- Connect the DC+ and DC- cables to the correct DC+ and DC- terminals on the inverter.



Tightening torque of terminals:  
1.2 - 1.5 Nm

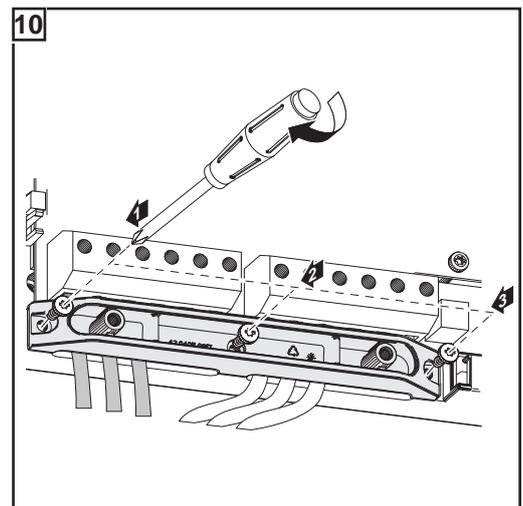
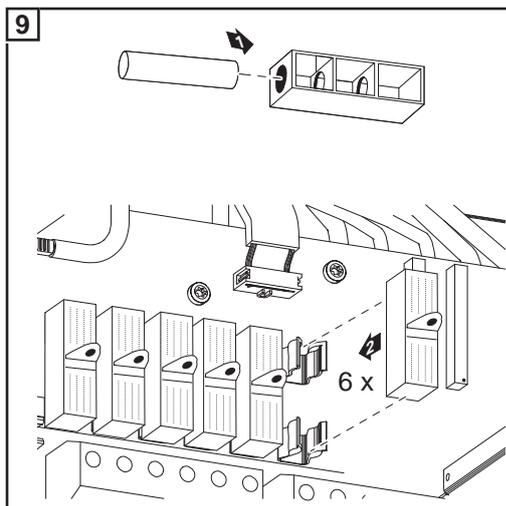
**IMPORTANT!**

- Set the jumper from the 'SM<sub>ON</sub>' position to the 'SM<sub>OFF</sub>' 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 on string fuses, see the section "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!**

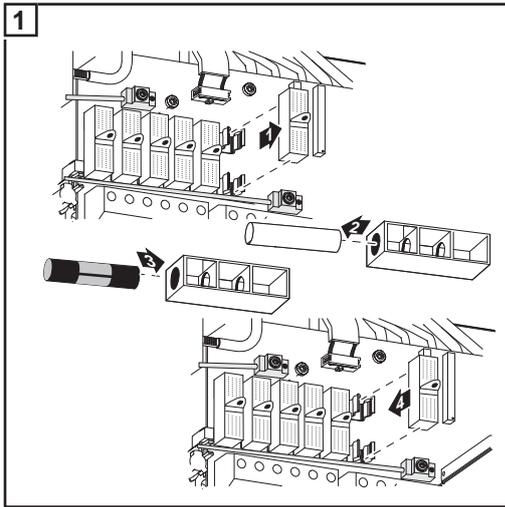
- Please follow solar module safety instructions
- Follow all solar module manufacturer requirements

**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.

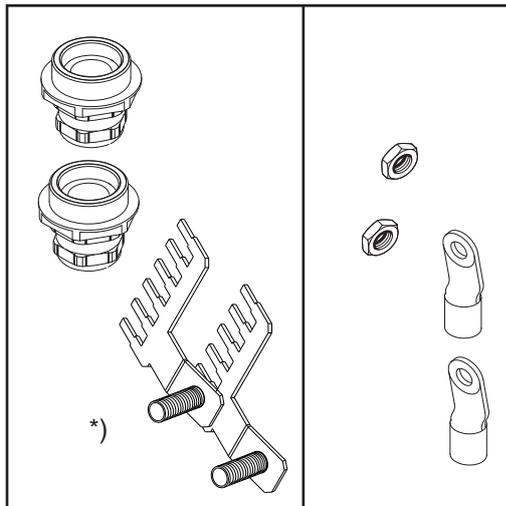
# Ungrounded System: Connecting Solar Module Strings with a Cable Cross Section > 16 mm<sup>2</sup>

**General**

As an option, you can also connect DC cables to the inverter with a cross section > 16 mm<sup>2</sup>, e.g., when the DC cables from the solar modules are combined outside of the inverter into a large string.

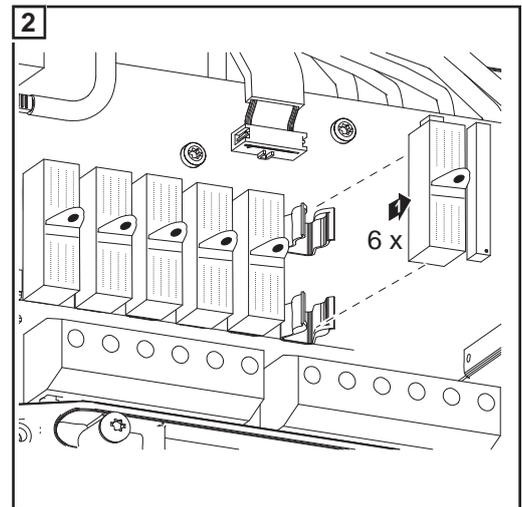
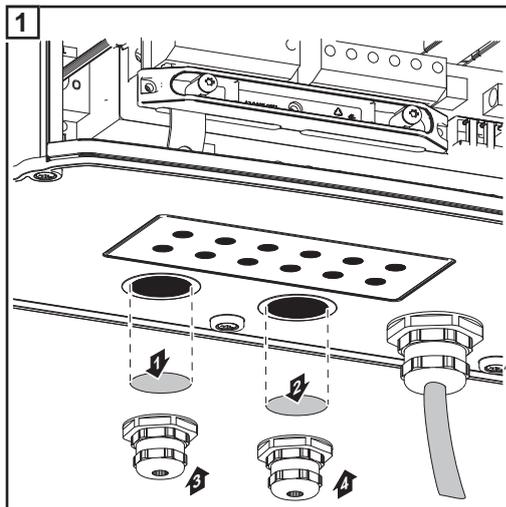
**Additional components required**

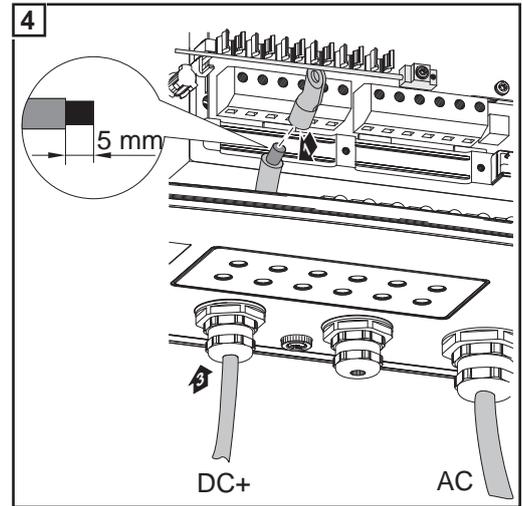
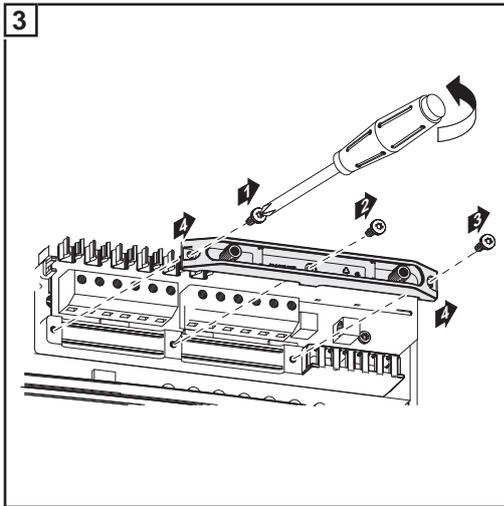
The following additional components are required for connecting DC cables with a cross section > 16 mm<sup>2</sup>:



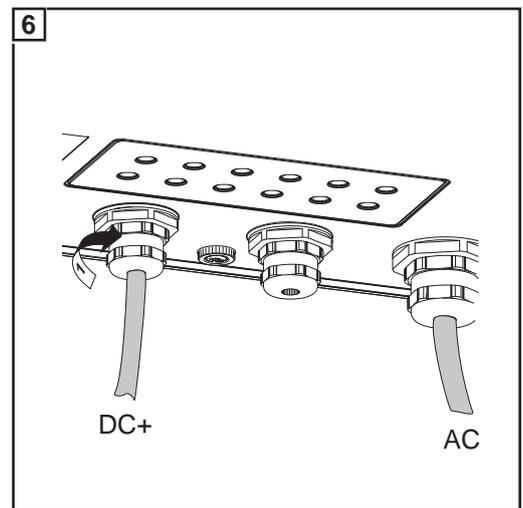
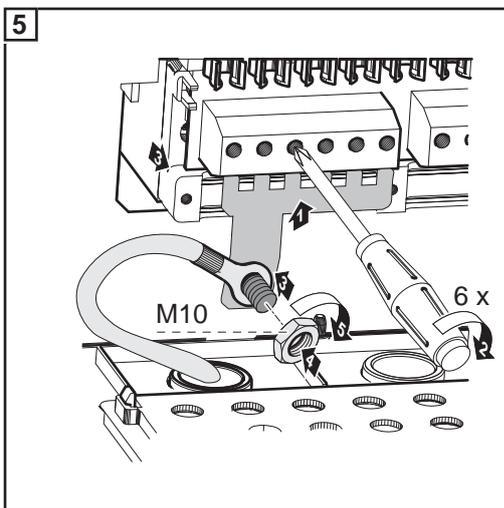
- 2 M32 metric screw joints (degree of protection min. IP45)
- 2 connection distributors
  
- \*) Metric screw joints and connection distributors are available from Fronius as an option.
  
- 2 M10 cable lugs
  
- Select cable lugs that match the available DC cables
  
- 2 M10 hexagon nuts

**Ungrounded system: Connecting solar module strings with a cable cross section > 16 mm<sup>2</sup>**

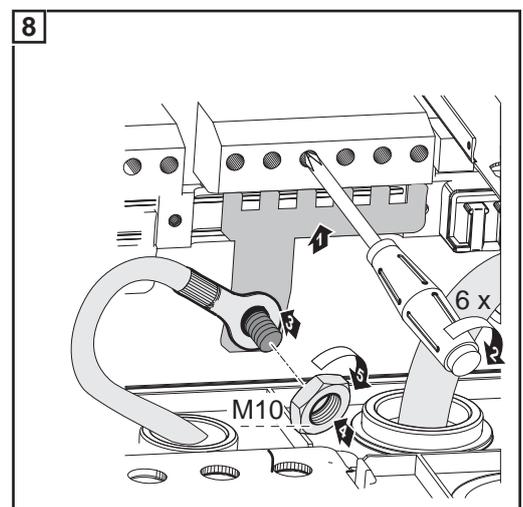
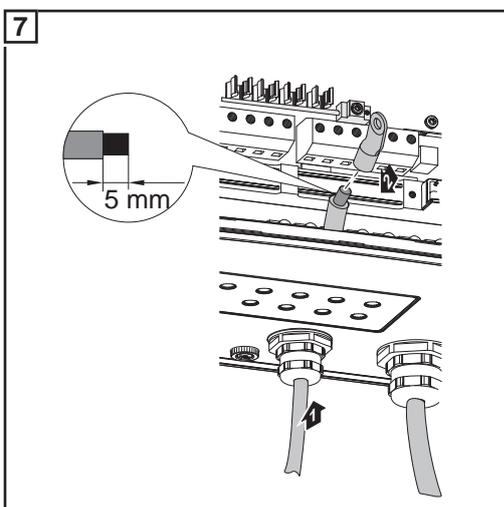




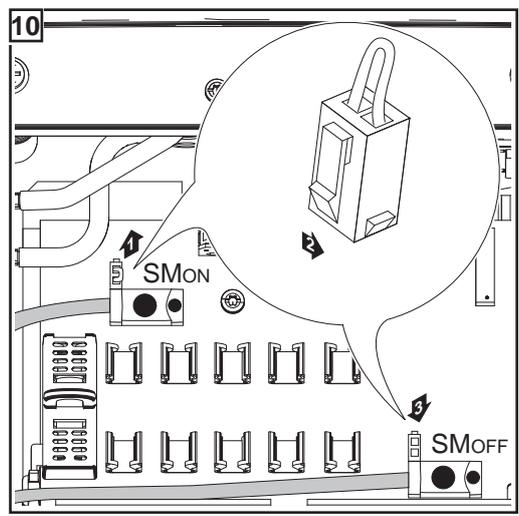
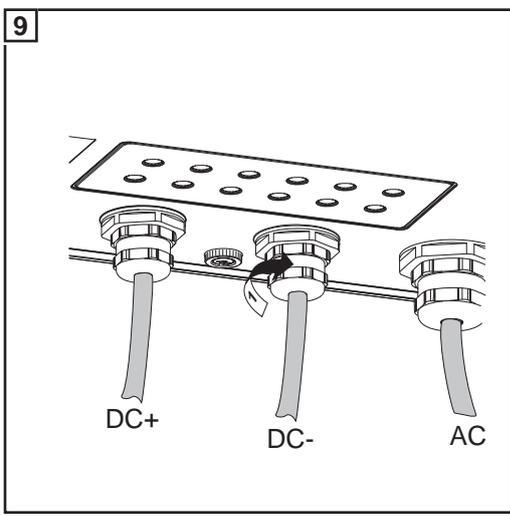
**CAUTION!** Danger of damaging the inverter by overload. Connect the DC+ and DC- cables to the correct DC+ and DC- terminals on the inverter.



Tightening torque of terminals:  
1.2 - 1.5 Nm  
Tightening torque of hexagon nut on the  
connection distributor:  
max. 15 Nm

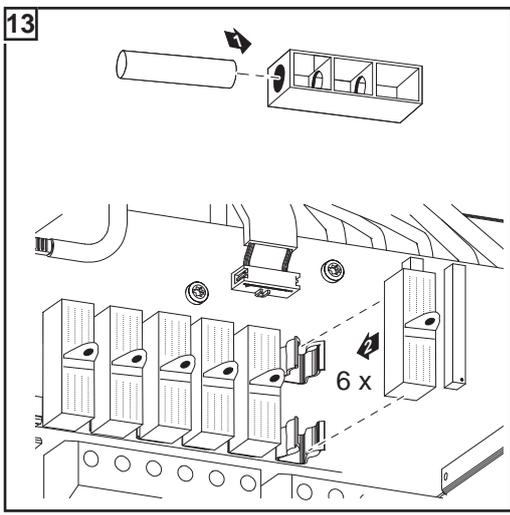
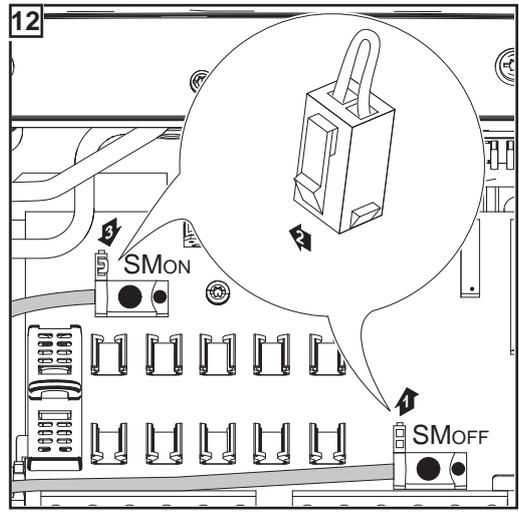
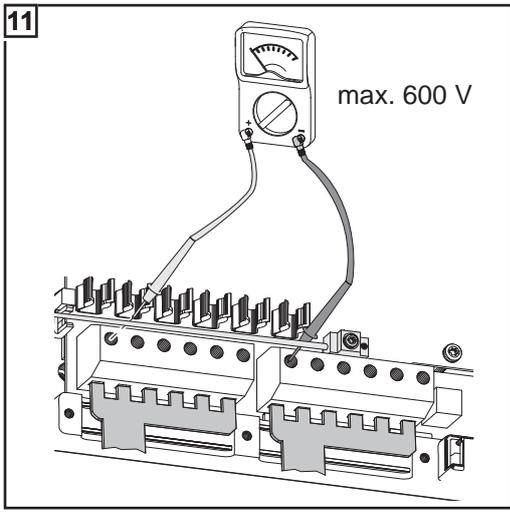


Tightening torque of terminals:  
1.2 - 1.5 Nm  
Tightening torque of hexagon nut on the  
connection distributor:  
max. 15 Nm



**IMPORTANT!**

- Set the jumper from the 'SM<sub>ON</sub>' position to the 'SM<sub>OFF</sub>' 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.

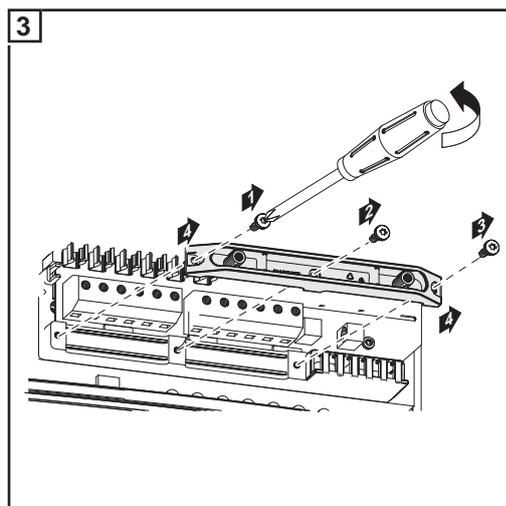
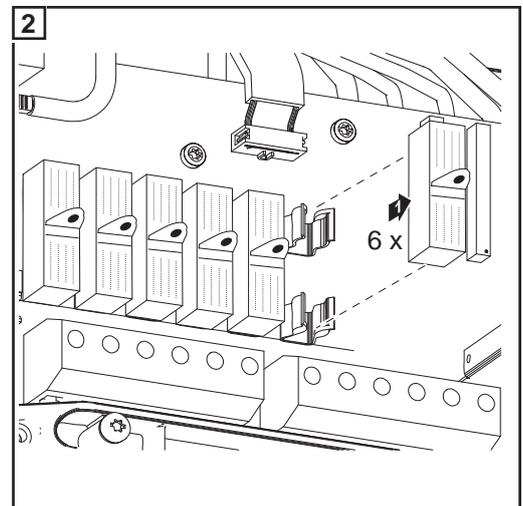
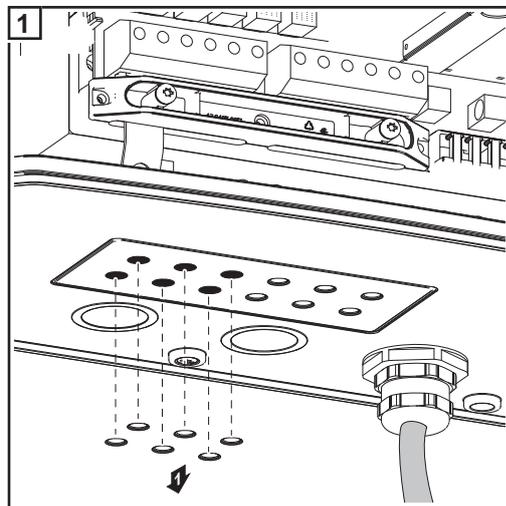
## Wire Cross Section of Solar Module Strings

The cable cross section for solar module strings should be a maximum of 16 mm<sup>2</sup> per cable.

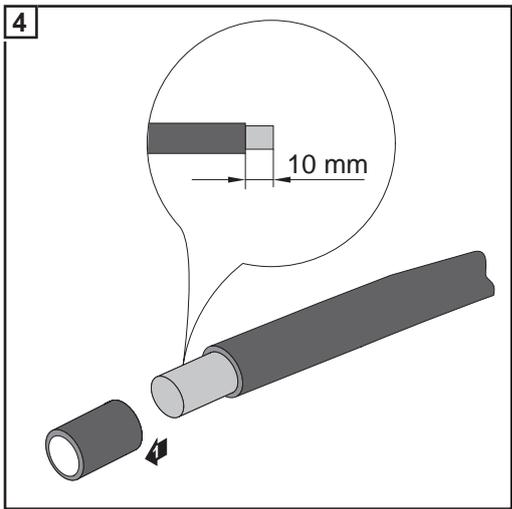


**NOTE!** To ensure an effective strain relief device for solar module strings, only use cable cross sections of the same size.

## Solar module ground at negative pole: Connecting solar module strings

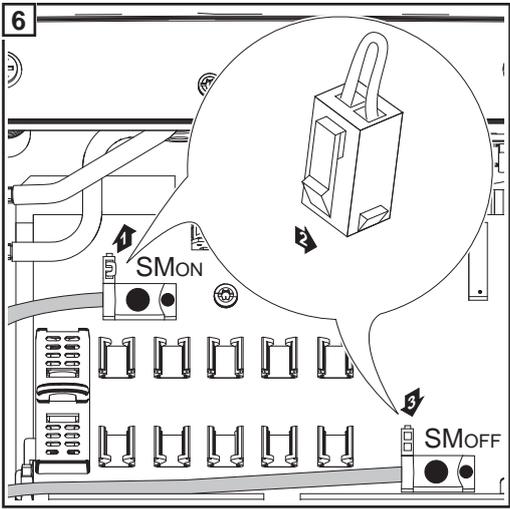
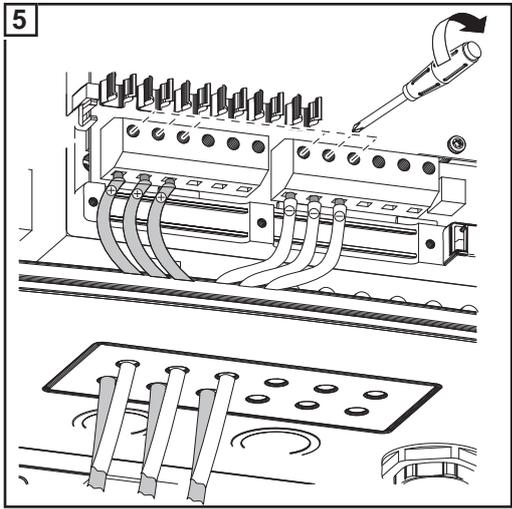


**NOTE!** Finely stranded cables up to conductor class 5 can be connected to the DC-side terminals without wire end ferrules.



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

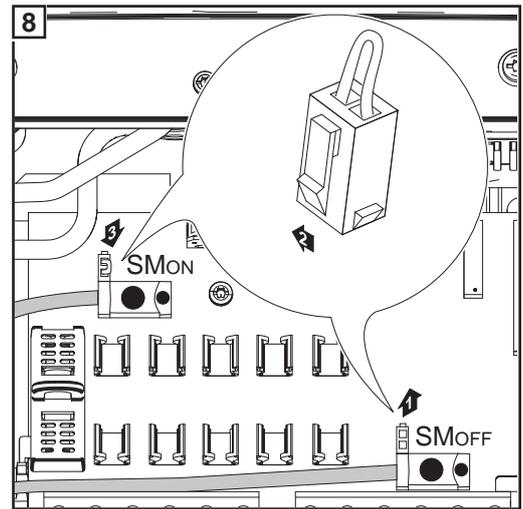
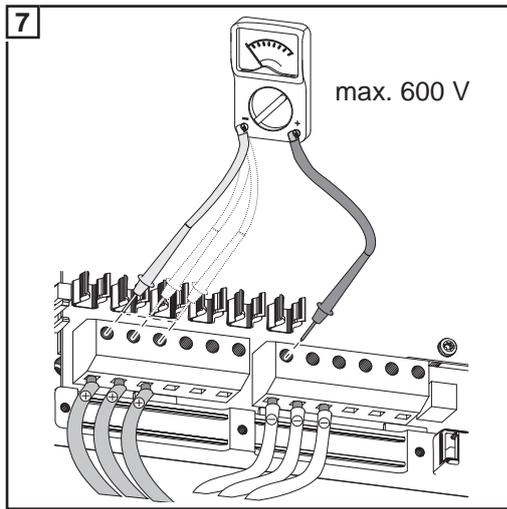
- Only connect a maximum of 20 A to an individual DC terminal.
- Connect the DC+ and DC- cables to the correct DC+ and DC- terminals on the inverter.



Tightening torque of terminals:  
1.2 - 1.5 Nm

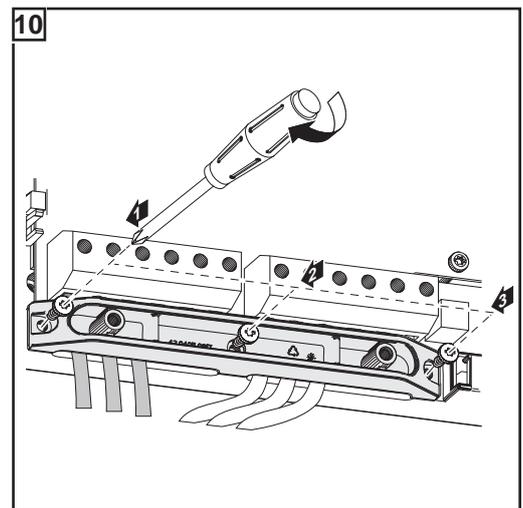
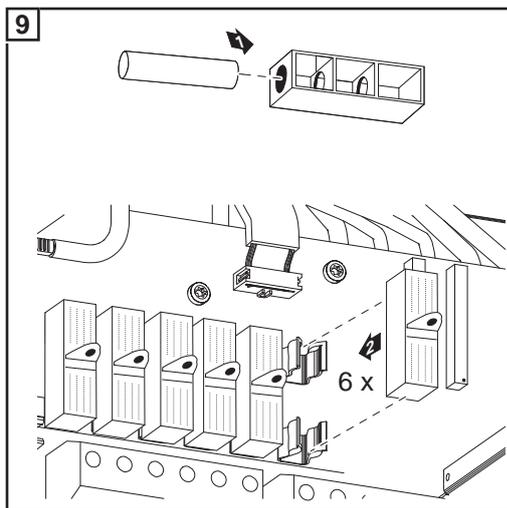
**IMPORTANT!**

- Set the jumper from the 'SM<sub>ON</sub>' position to the 'SM<sub>OFF</sub>' 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 on string fuses, see the section "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!**

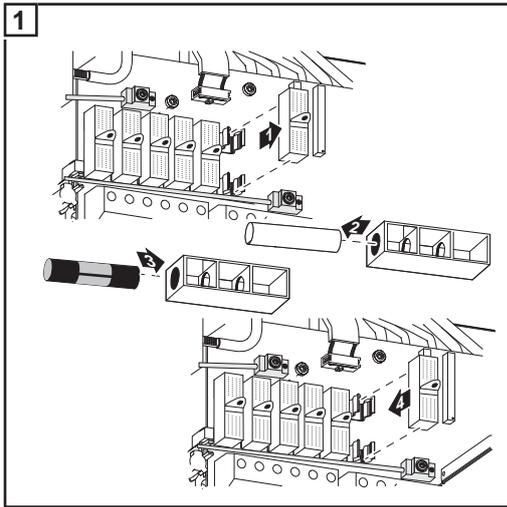
- Please follow solar module safety instructions
- Follow all solar module manufacturer requirements

**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.

# Solar Module Ground at Negative Pole: Connecting Solar Module Strings with a Cable Cross Section > 16 mm<sup>2</sup>

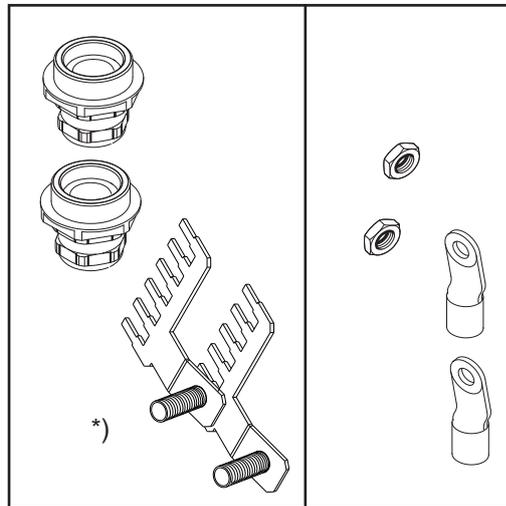
## General

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 mm<sup>2</sup>, e.g., when the DC cables from the solar modules are combined outside of the inverter into a large string.

## Additional components required

The following additional components are required for connecting DC cables with a cross section > 16 mm<sup>2</sup>:



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

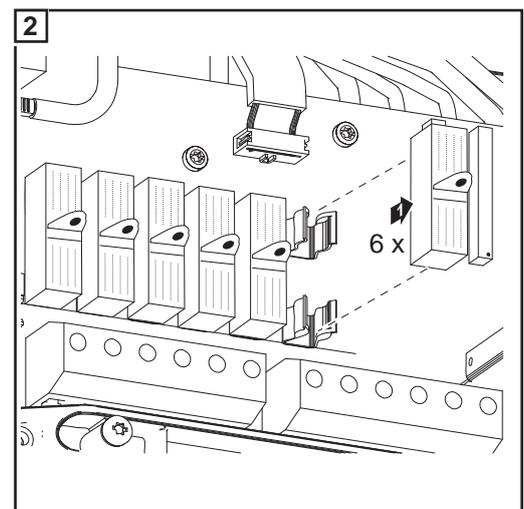
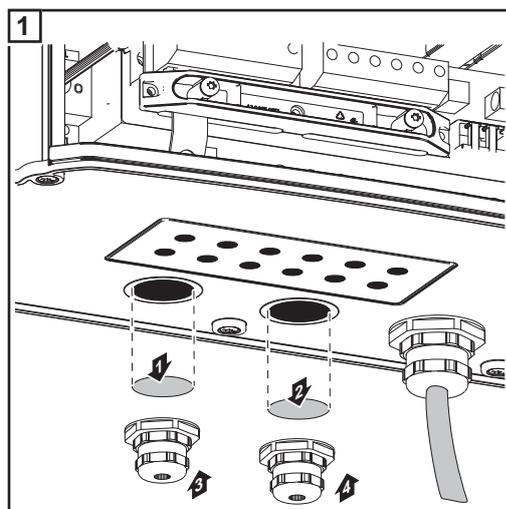
\*) Metric screw joints and connection distributors are available from Fronius as an option.

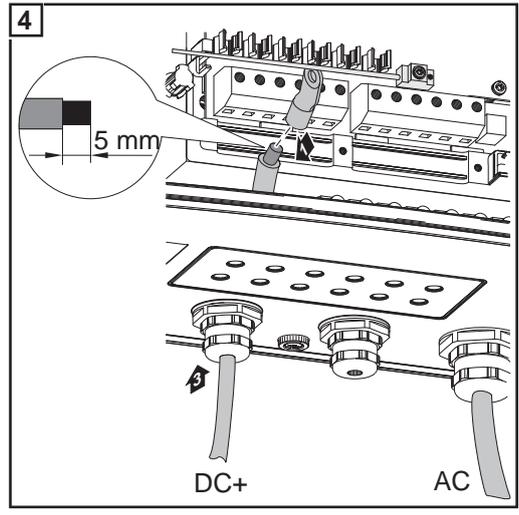
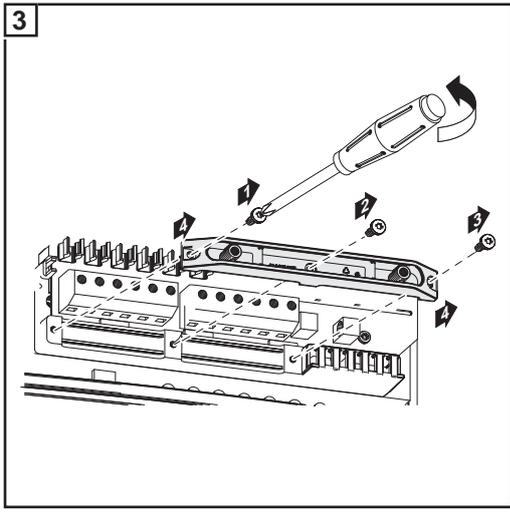
- 2 M10 cable lugs

Select cable lugs that match the available DC cables

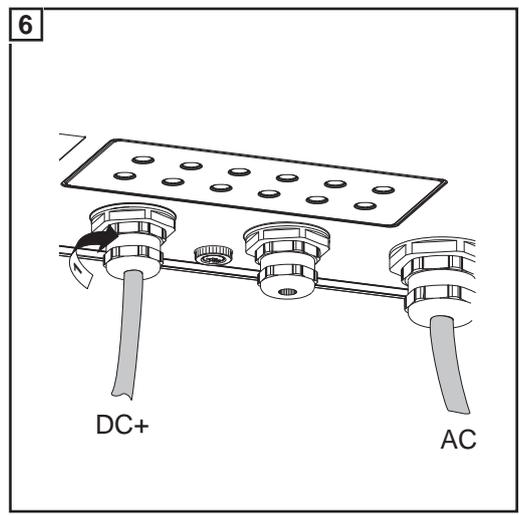
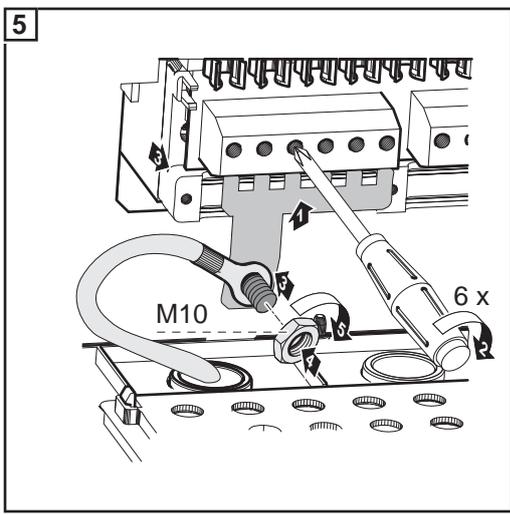
- 2 M10 hexagon nuts

## Solar module ground at negative pole: Connecting solar module strings with a cable cross section > 16 mm<sup>2</sup>

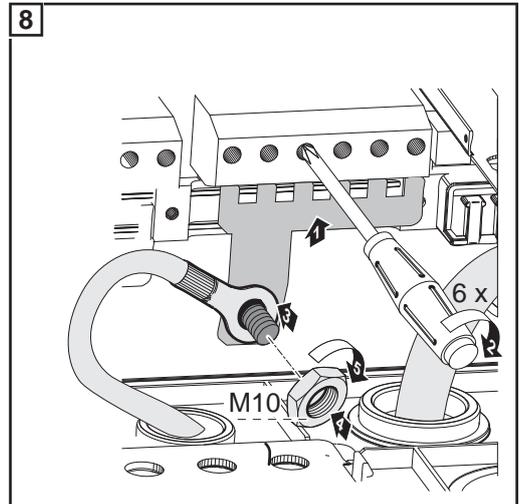
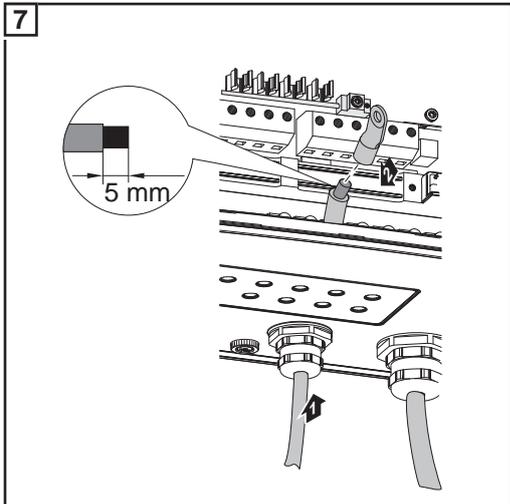




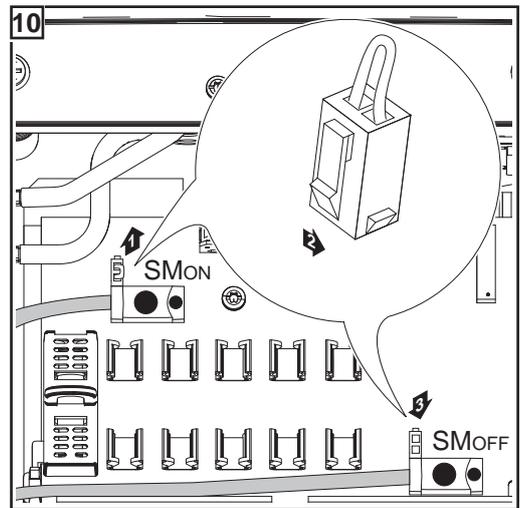
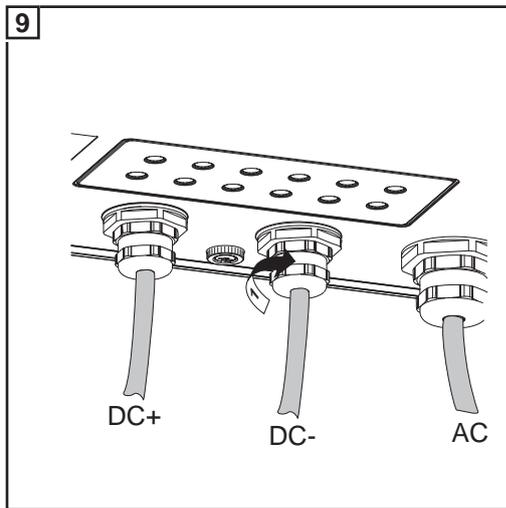
**CAUTION!** Danger of damaging the inverter by overload. Connect the DC+ and DC- cables to the correct DC+ and DC- terminals on the inverter.



Tightening torque of terminals:  
1.2 - 1.5 Nm  
Tightening torque of hexagon nut on the  
connection distributor:  
max. 15 Nm

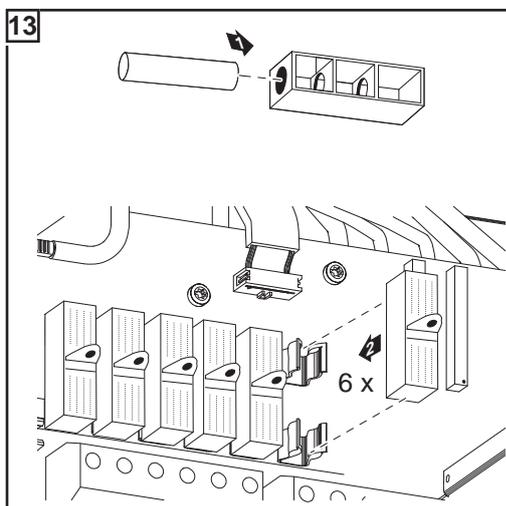
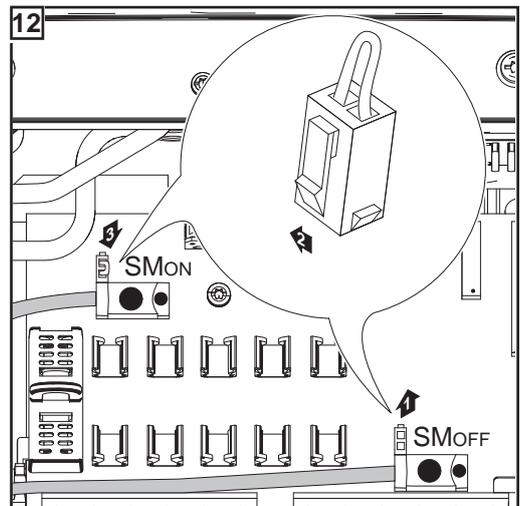
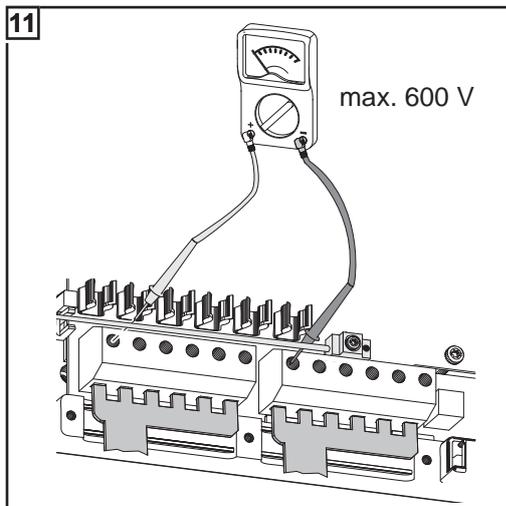


Tightening torque of terminals:  
1.2 - 1.5 Nm  
Tightening torque of hexagon nut on the  
connection distributor:  
max. 15 Nm



**IMPORTANT!**

- Set the jumper from the 'SM<sub>ON</sub>' position to the 'SM<sub>OFF</sub>' 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

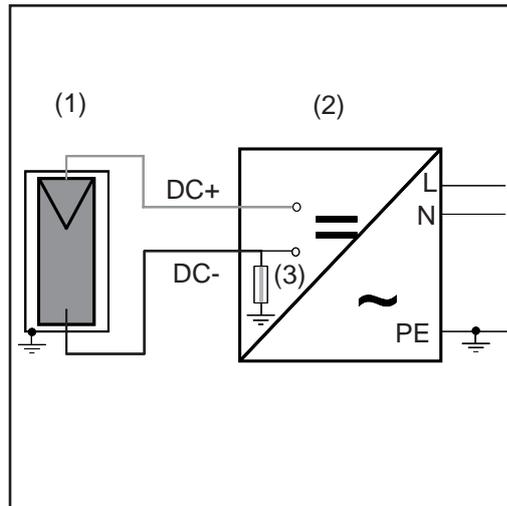
## General

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



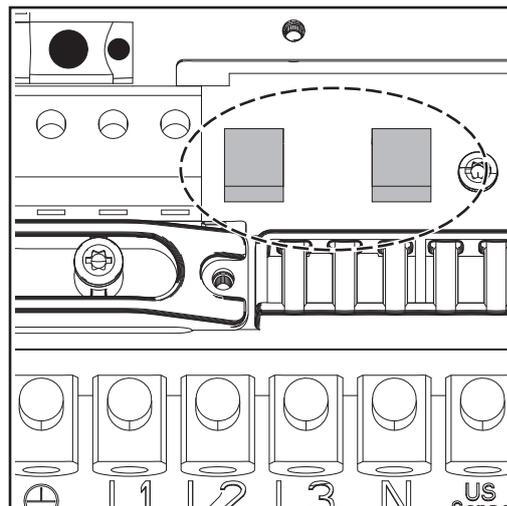
Example:

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

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

## Solar Module Grounding 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 Solar Module Grounding

Fronius recommends a 1A fuse, size 10 x 38 mm for solar module grounding.

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



**WARNING!** An electric shock can be fatal. Incorrect or insufficient solar module grounding may result in an electric shock.

If the solar module manufacturer requires solar module grounding in the inverter, this may only be provided via the specified fuse or the high ohm resistor "Grounding Kit 100 kohm" in compliance with IEC 62109-2.

## Safety



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

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



Safety label for the solar module ground

**IMPORTANT!** The safety labels and fuse for the solar module ground are not included in the inverter scope of supply and must be obtained separately.

## Setting inverters for grounded solar modules

When solar modules are grounded, the inverter's insulation monitoring must be deactivated. For this reason, the inverter must be configured in the second level of the Setup menu so that an error message is displayed or the inverter turns off when the ground fuse is blown (depending on the country setup). The access code 22742 must be entered in order to access the second level of the Setup menu.

## 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

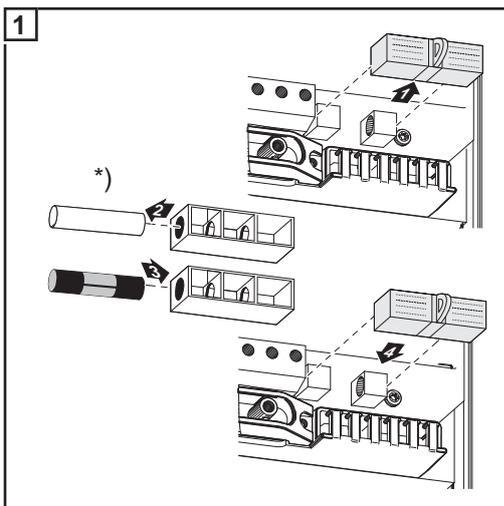
- Insert the fuse with a fuse cover in the fuse holder
- Do not operate the inverter without a fuse cover



**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:**

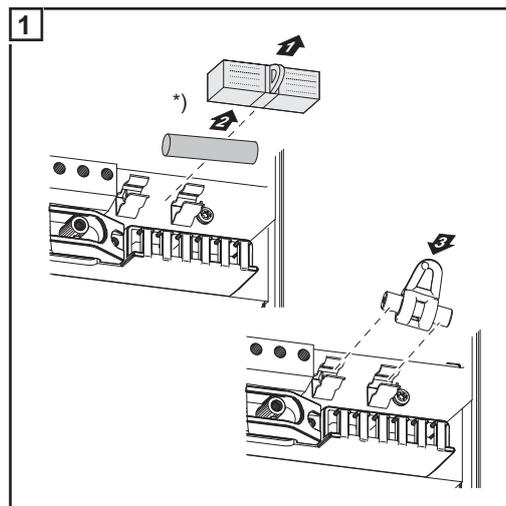


\*) The plastic bolts are included in the inverter scope of delivery

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.

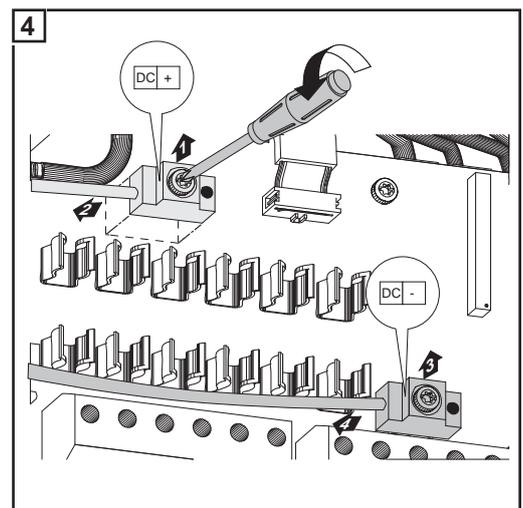
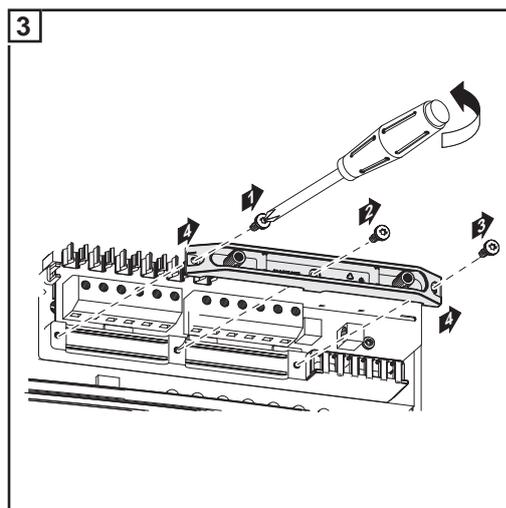
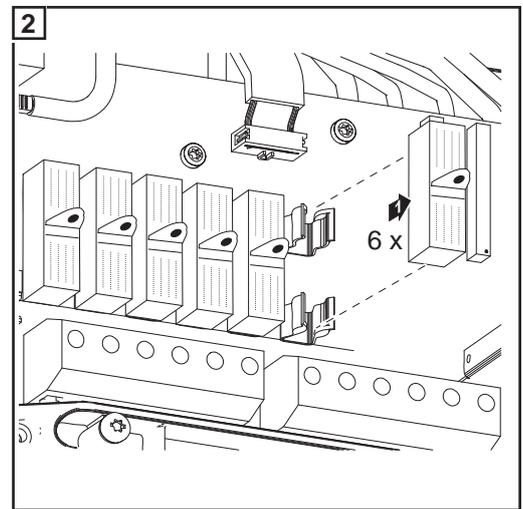
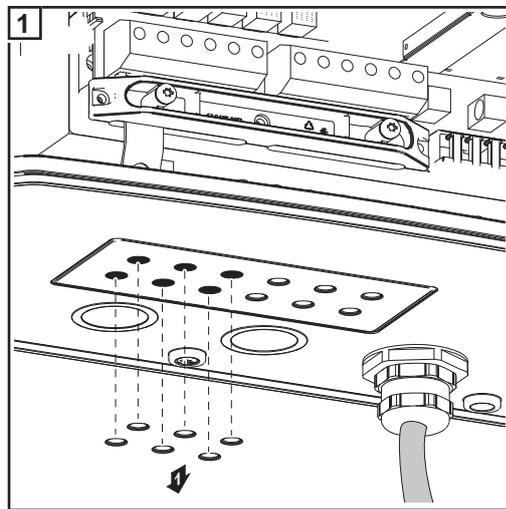
## Wire Cross Section of Solar Module Strings

The cable cross section for solar module strings should be a maximum of 16 mm<sup>2</sup> per cable.



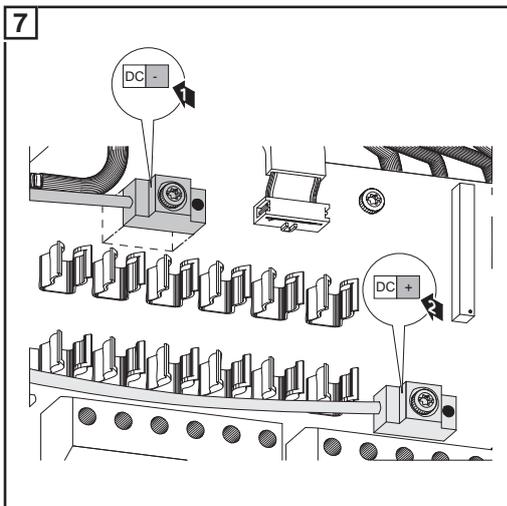
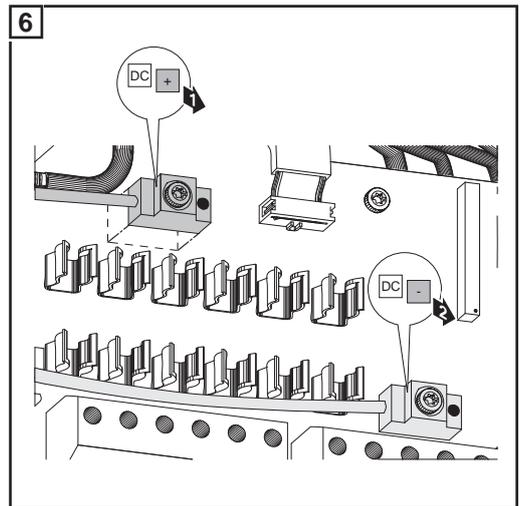
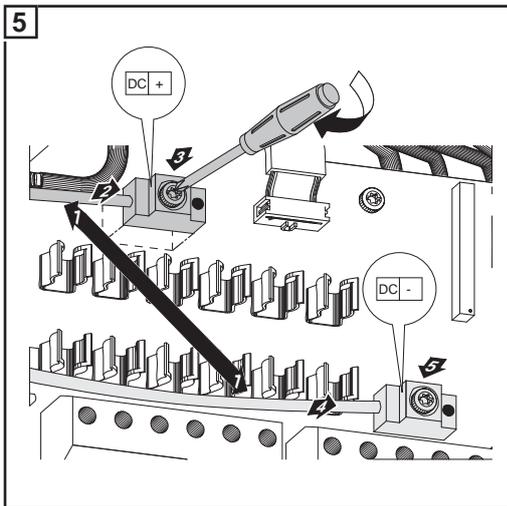
**NOTE!** To ensure an effective strain relief device for solar module strings, only use cable cross sections of the same size.

## Solar module ground at positive pole: Connecting solar module strings

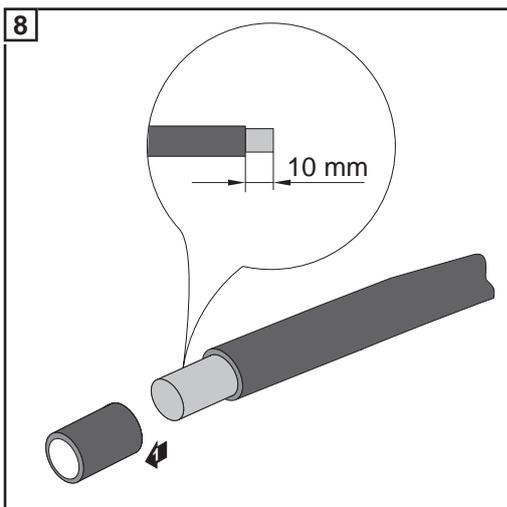


After disconnecting the DC main switch cable:

- Connect the DC+ cable to the DC- connection as per step 5
- Connect the DC- cable to the DC+ connection as per step 5
- Identify the reversed polarity with (+) and (-) according to steps 6 and 7

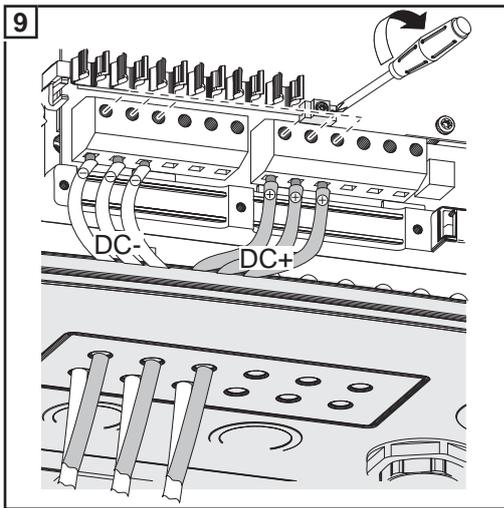


**NOTE!** Finely stranded cables up to conductor class 5 can be connected to the DC-side terminals without wire end ferrules.

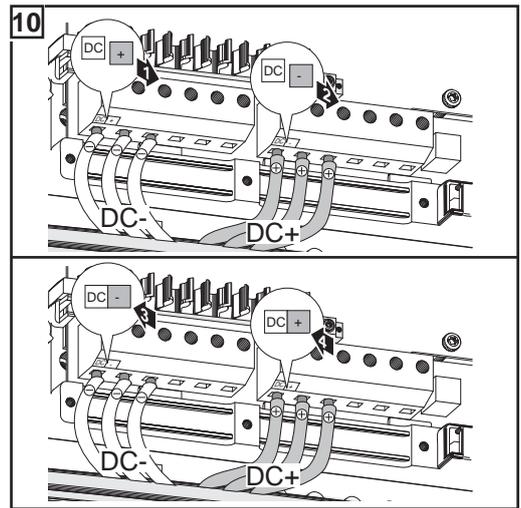


**CAUTION!** Danger of damaging the inverter by overload.

- Only connect a maximum of 20 A to an individual DC terminal.
- Connect the DC+ cable to the right connection block of the inverter's DC terminals.
- Connect the DC- cable to the left connection block of the inverter's DC terminals.
- Identify the reversed polarity with (+) and (-) according to step 10

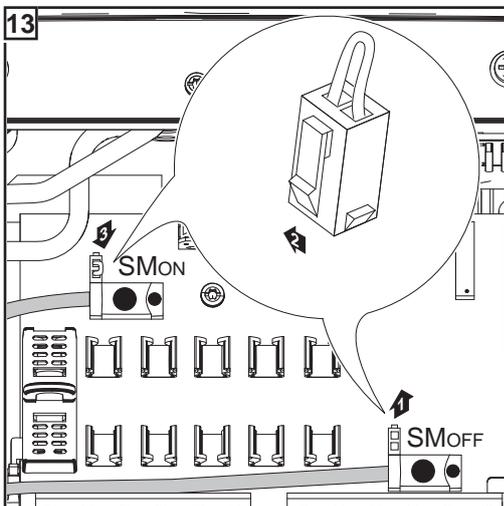
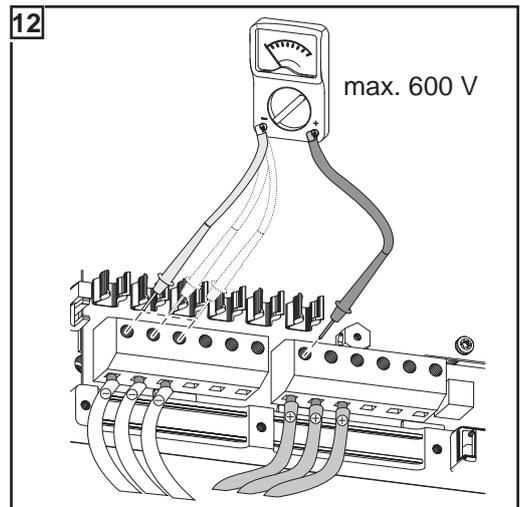
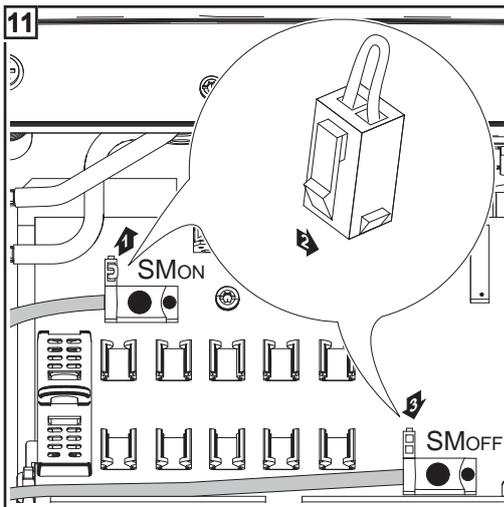


Tightening torque of terminals:  
1.2 - 1.5 Nm



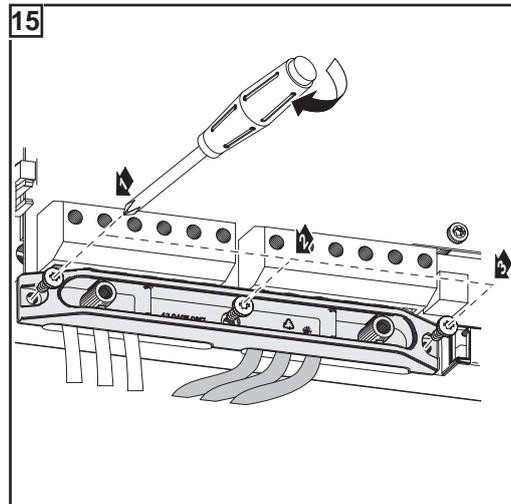
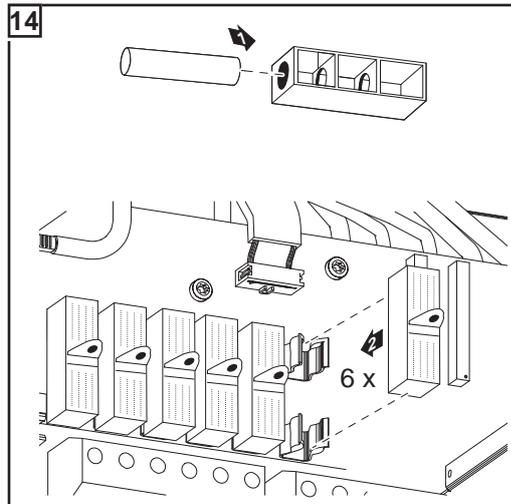
**IMPORTANT!**

- Set the jumper from the 'SM<sub>ON</sub>' position to the 'SM<sub>OFF</sub>' 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!**

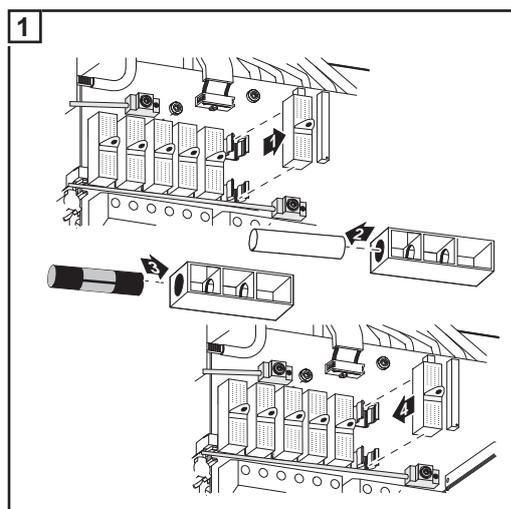
- Please follow solar module safety instructions
- Follow all solar module manufacturer requirements

**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



**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.

# Solar Module Ground at Positive Pole: Connecting Solar Module Strings with a Cable Cross Section > 16 mm<sup>2</sup>

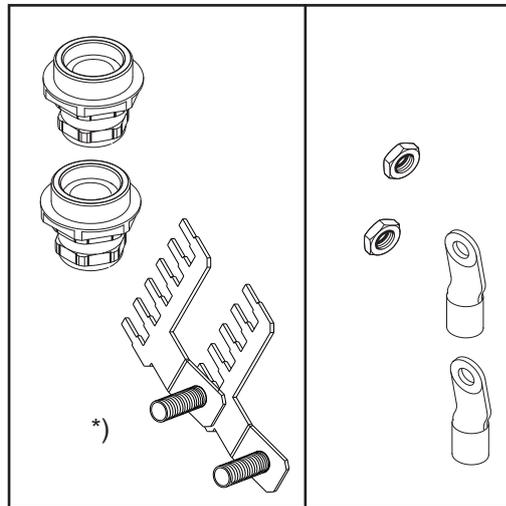
## General

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 mm<sup>2</sup>, e.g., when the DC cables from the solar modules are combined outside of the inverter into a large string.

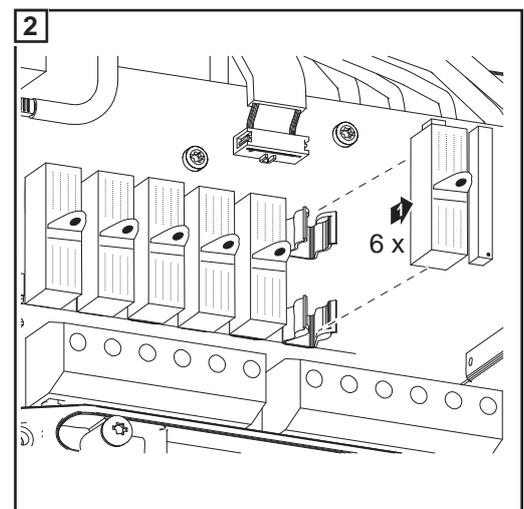
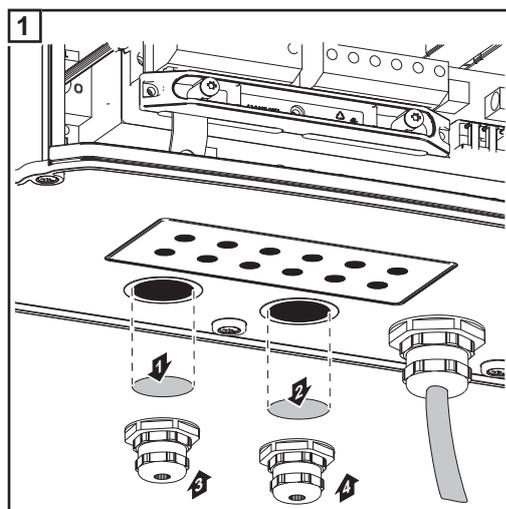
## Additional components required

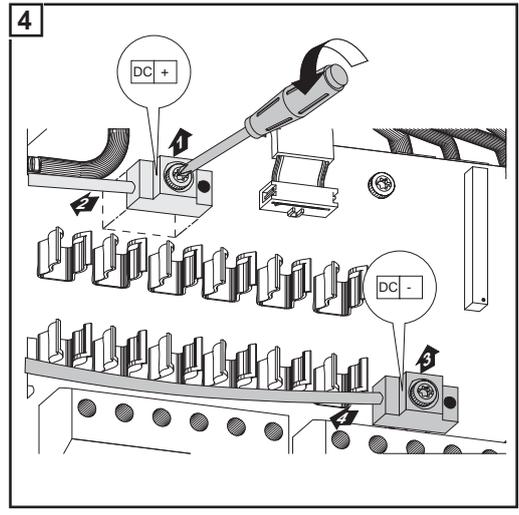
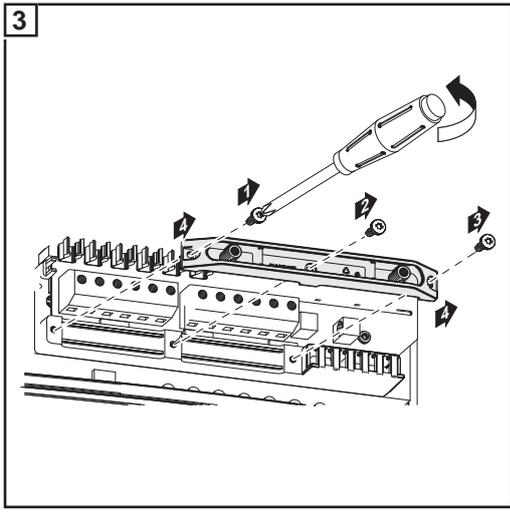
The following additional components are required for connecting DC cables with a cross section > 16 mm<sup>2</sup>:



- 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 M10 cable lugs
- Select cable lugs that match the available DC cables
- 2 M10 hexagon nuts

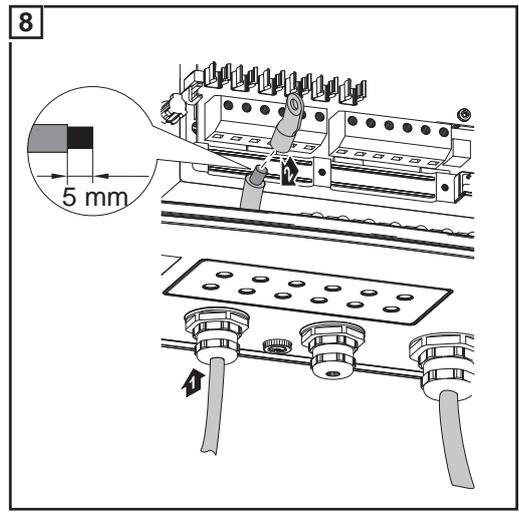
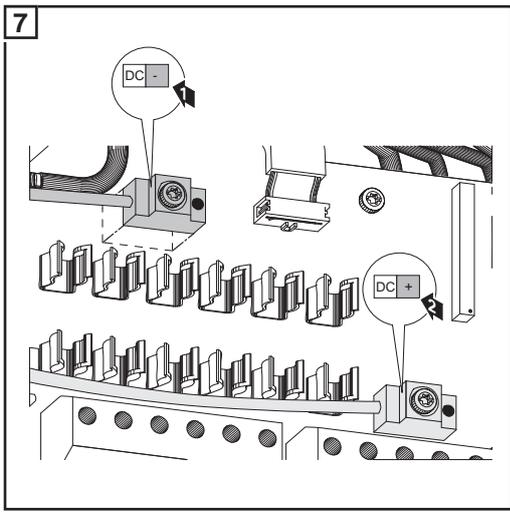
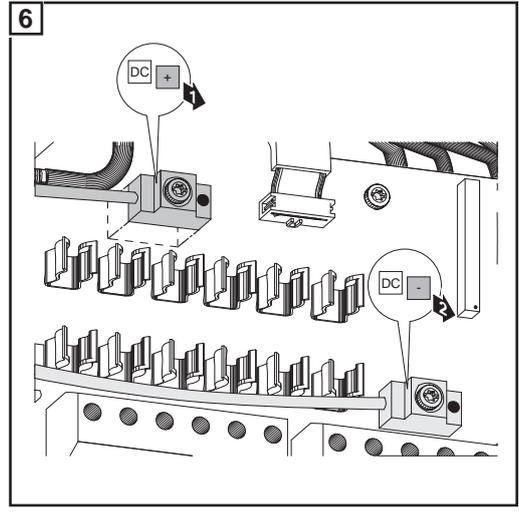
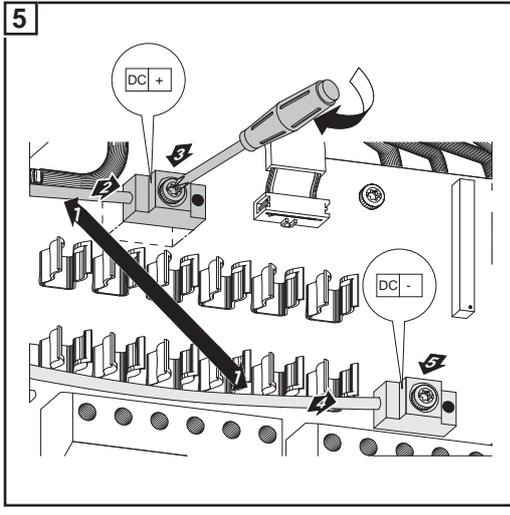
## Solar module ground at positive pole: Connecting solar module strings with a cable cross section > 16 mm<sup>2</sup>





After disconnecting the DC main switch cables:

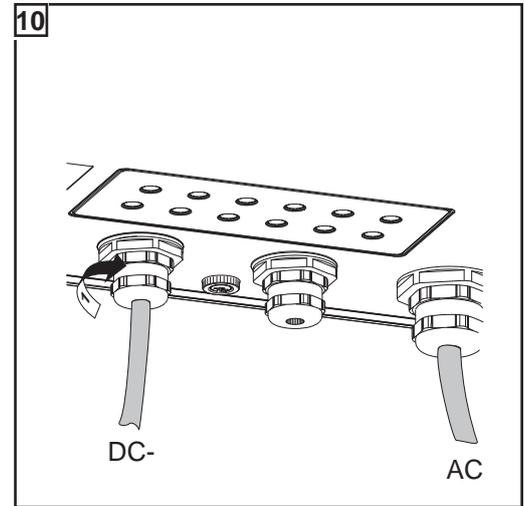
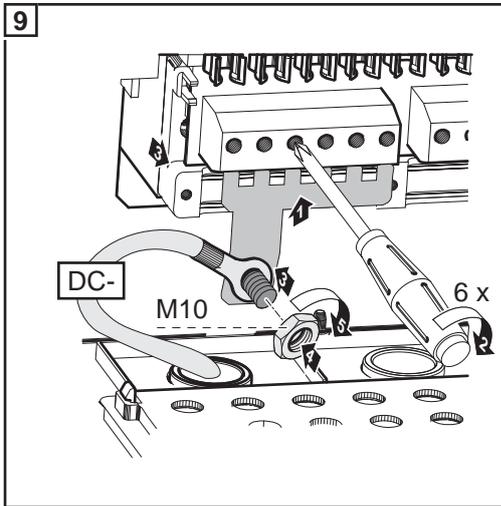
- Connect the DC+ cable to the DC- connection as per step 5
- Connect the DC- cable to the DC+ connection as per step 5
- Identify the reversed polarity with (+) and (-) according to steps 6 and 7



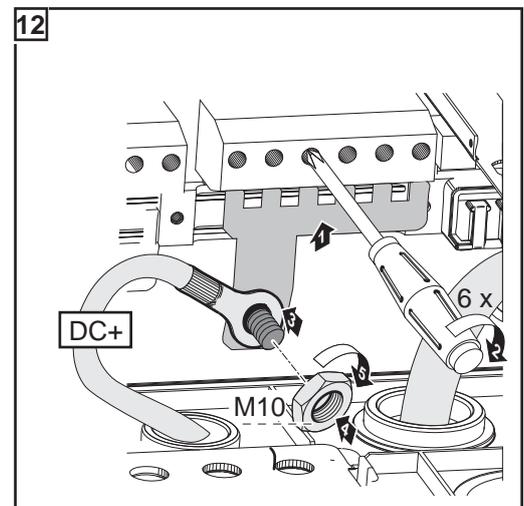
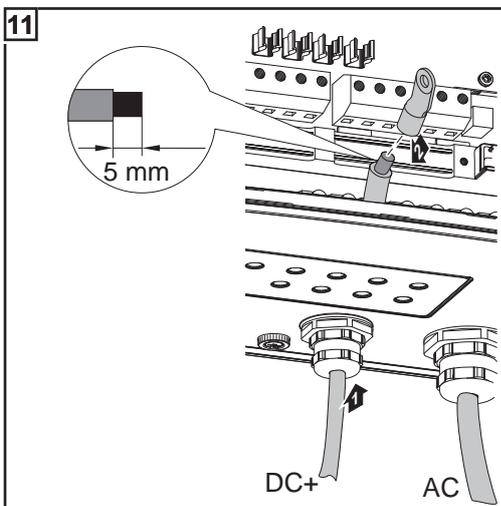


**CAUTION!** Danger of damaging the inverter by overload.

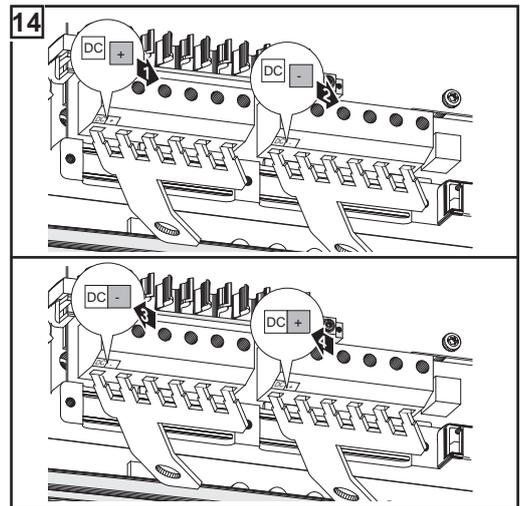
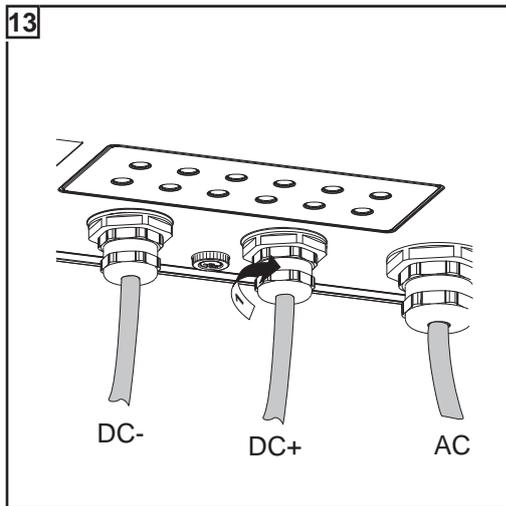
- Connect the DC+ cable to the right connection block of the inverter's DC terminals.
- Connect the DC- cable to the left connection block of the inverter's DC terminals.
- Identify the reversed polarity with (+) and (-) according to step 14



Tightening torque of terminals:  
1.2 - 1.5 Nm  
Tightening torque of hexagon nut on the  
connection distributor:  
max. 15 Nm

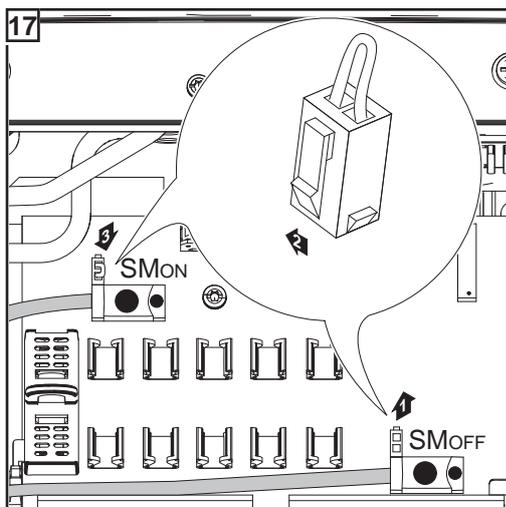
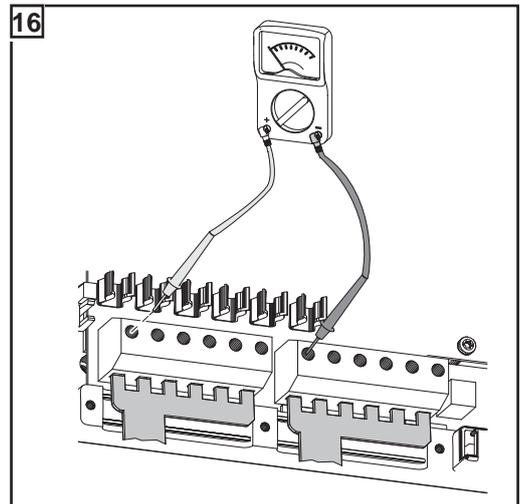
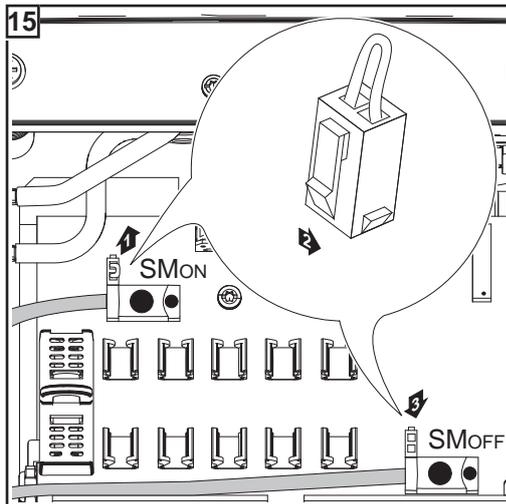


Tightening torque of terminals:  
1.2 - 1.5 Nm  
Tightening torque of hexagon nut on the  
connection distributor:  
max. 15 Nm

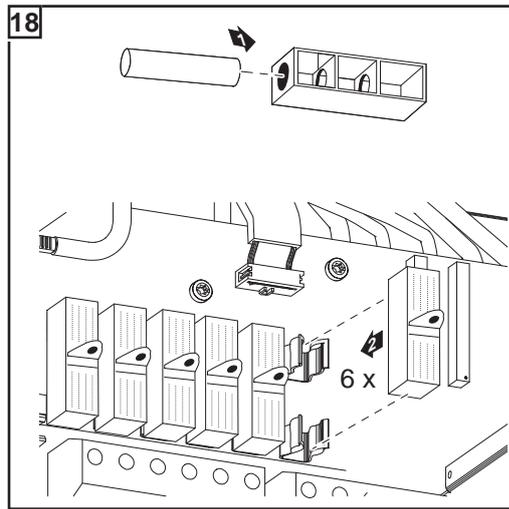


**IMPORTANT!**

- Set the jumper from the 'SM<sub>ON</sub>' position to the 'SM<sub>OFF</sub>' 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 Fronius IG Plus scope of delivery.



# Solar Module Ground at Positive Pole for Fronius IG Plus

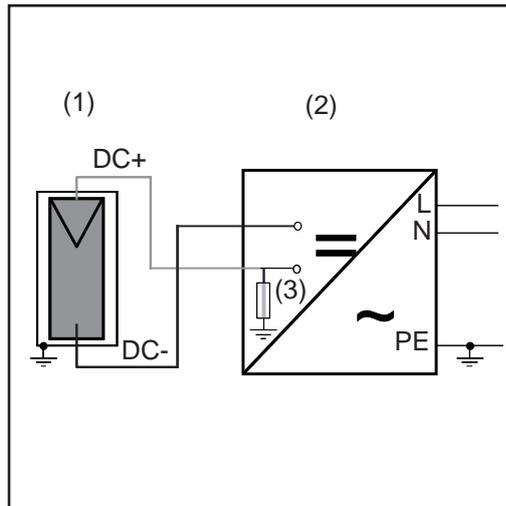
## General

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



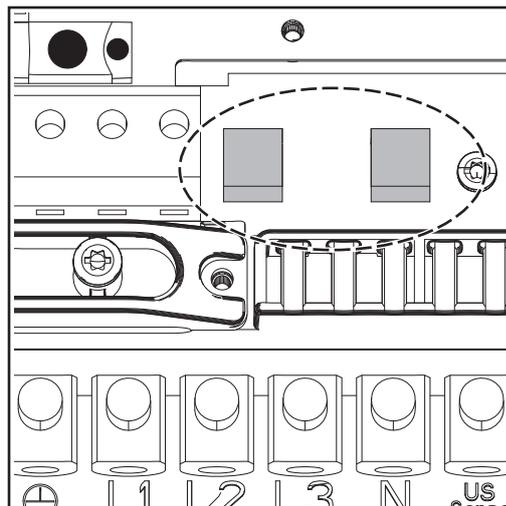
Example:

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

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

## Solar Module Grounding 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 Solar Module Grounding

Fronius recommends a 1A fuse, size 10 x 38 mm for solar module grounding.

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



**WARNING!** An electric shock can be fatal. Incorrect or insufficient solar module grounding may result in an electric shock.

If the solar module manufacturer requires solar module grounding in the inverter, this may only be provided via the specified fuse or the high ohm resistor "Grounding Kit 100 kohm" in compliance with IEC 62109-2.

## Safety



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

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



Safety label for the solar module ground

**IMPORTANT!** The safety labels and fuse for the solar module ground are not included in the inverter scope of supply and must be obtained separately.

## Setting inverters for grounded solar modules

When solar modules are grounded, the inverter's insulation monitoring must be deactivated. For this reason, the inverter must be configured in the second level of the Setup menu so that an error message is displayed or the inverter turns off when the ground fuse is blown (depending on the country setup). The access code 22742 must be entered in order to access the second level of the Setup menu.

## 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

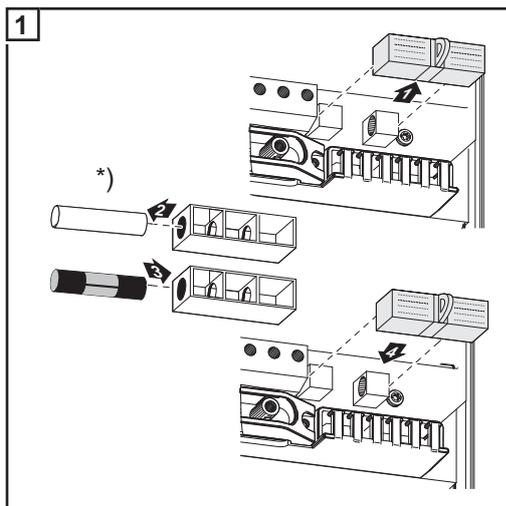
- Insert the fuse with a fuse cover in the fuse holder
- Do not operate the inverter without a fuse cover



**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:**

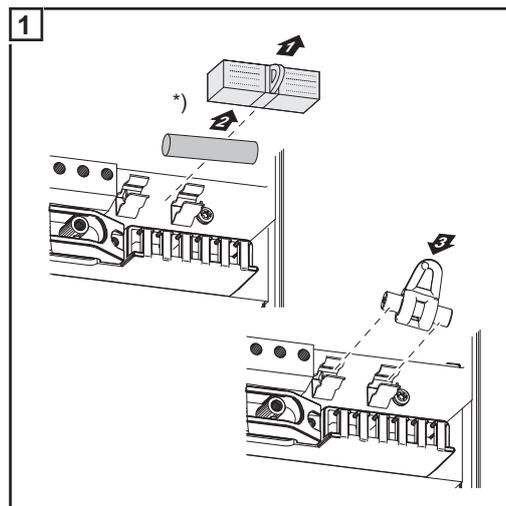


\*) The plastic bolts are included in the inverter scope of delivery

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

# 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:

- $I_N > 1.5 \times I_{SC}$
- $I_N < 2.0 \times I_{SC}$
- $V_N \geq 600 \text{ V DC}$
- 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** With underrated fuses, the nominal current value may be 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:

$$5.75 \text{ A} \times 1.5 = 8.625 \text{ A}$$

The fuse that should be selected according to the "Fuses" table:

KLK D 9 with 9.0 A and 600 V AC / DC

---

**Fuses**

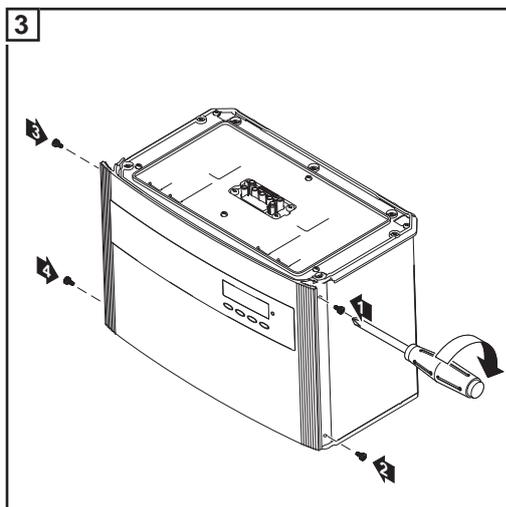
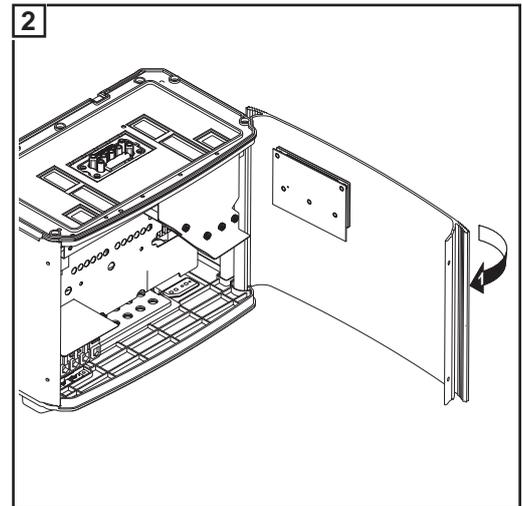
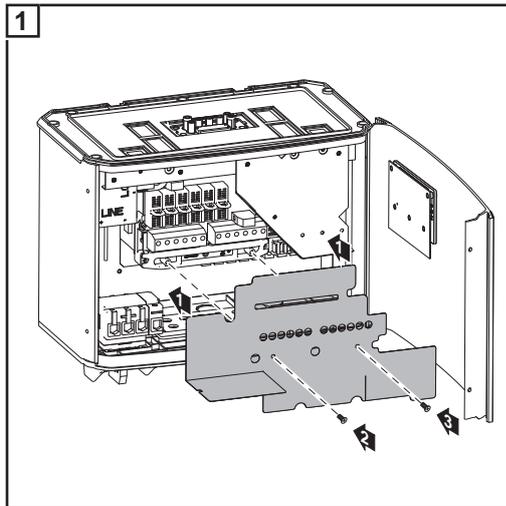
Nominal current	Fuse	Nominal current	Fuse
4.0 A	KLK D 4	9.0 A	KLK D 9
5.0 A	KLK D 5	10.0 A	KLK D 10

<b>Nominal current</b>	<b>Fuse</b>	<b>Nominal current</b>	<b>Fuse</b>
6.0 A	KLK D 6	12.0 A	KLK D 12
7.0 A	KLK D 7	15.0 A	KLK D 15
8.0 A	KLK D 8	20.0 A	KLK D 20

'Fuses' table: Extract of suitable fuses, e.g. Littelfuse fuses

# Closing Fronius IG Plus

## Closing Fronius IG Plus



# 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.

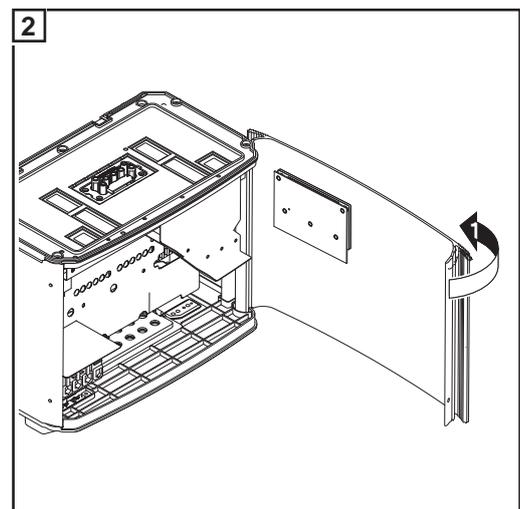
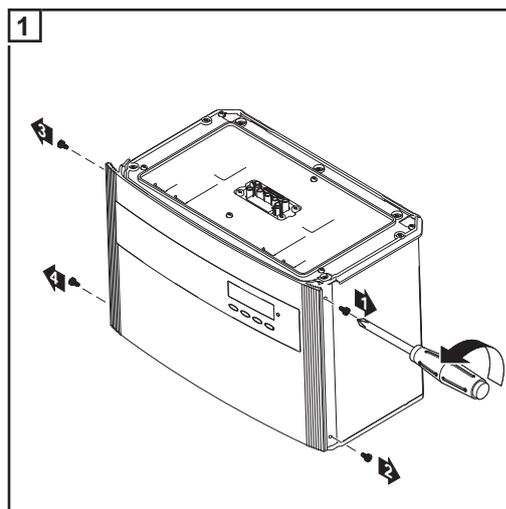
 **WARNING!** An electric shock can be fatal. Danger from residual voltage from capacitors.

You must wait until the capacitors have discharged. Discharge takes 5 minutes.

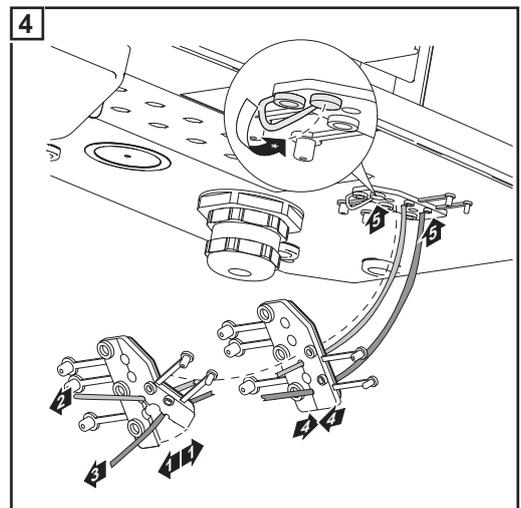
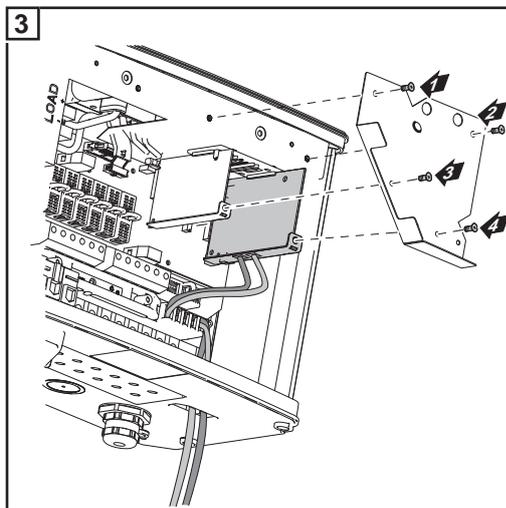
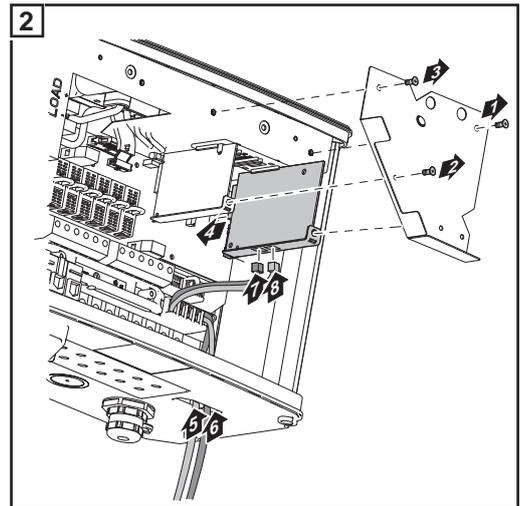
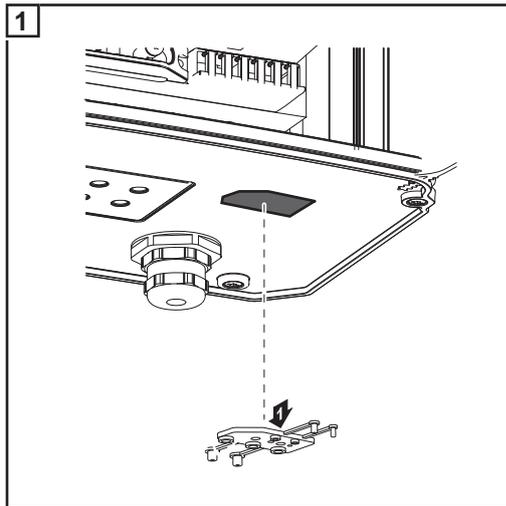
 **NOTE!** Follow general ESD precautions when handling option cards.

## Opening Fronius IG Plus

When adding option cards to the inverter, please follow all inverter safety instructions and information.



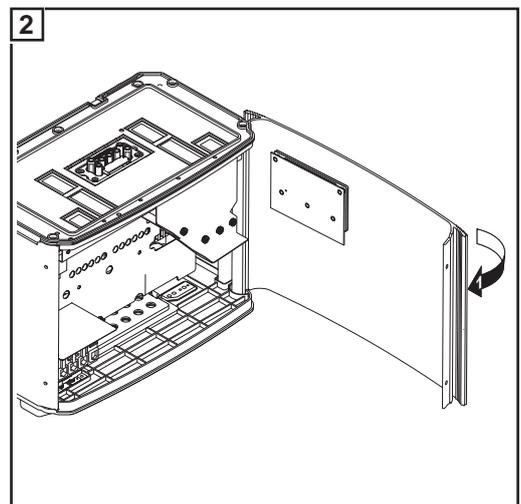
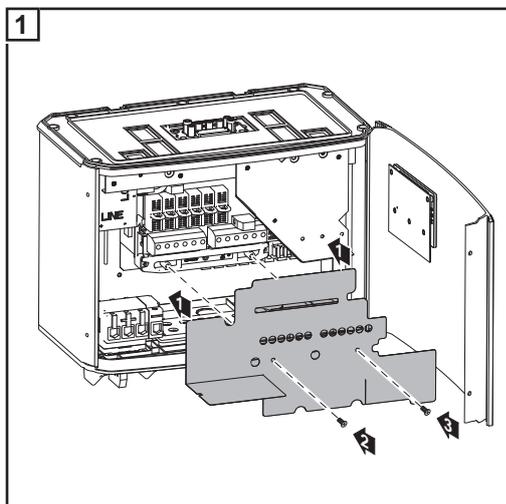
**Inserting option cards into the Fronius IG Plus**

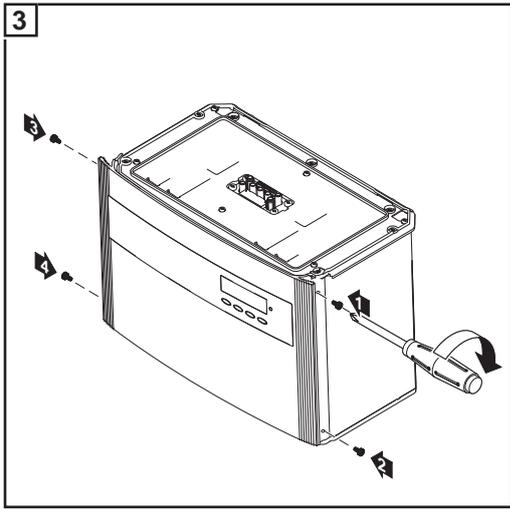


**IMPORTANT!** When networking several DATCOM components, a termination plug must be placed on each free IN and/or OUT connection of a DATCOM component.

**IMPORTANT!** Close any unused openings at the sealing insert using corresponding blanking plugs.

**Closing Fronius IG Plus**





# 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.

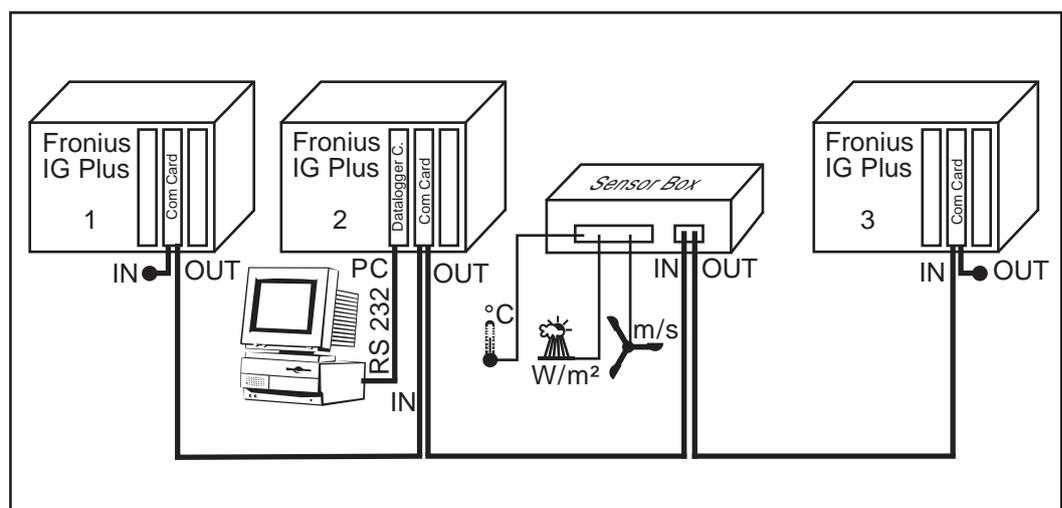
In order to distinguish between several identical system upgrades, each one must be assigned a unique number.

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.

## Start-up operation

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

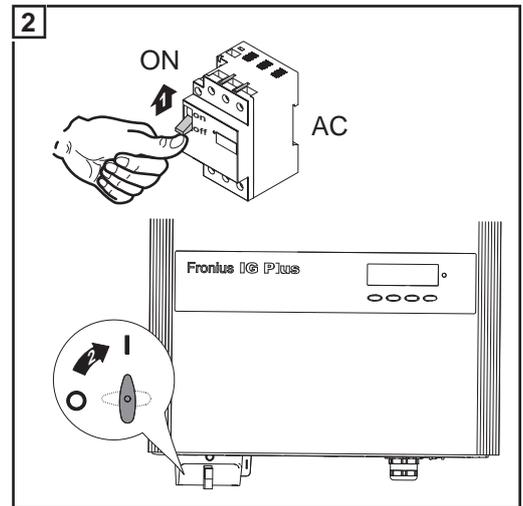
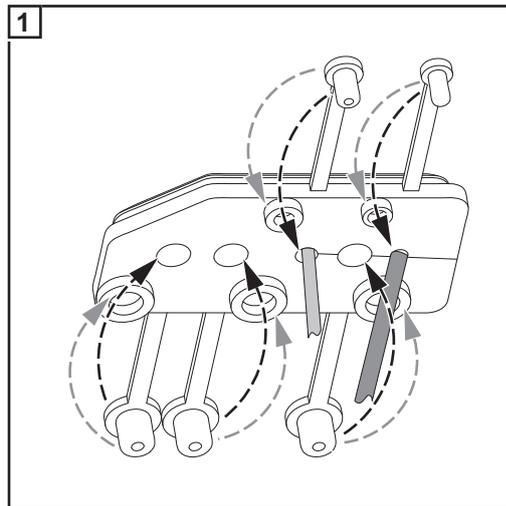


**NOTE!** Regardless of whether bolts or fuses are used, do not operate the inverter without fuse covers.



**NOTE!** To ensure the degree of protection at the inverter:

- Insert blanking plugs into all openings at the sealing insert in which there are no cables
- If cables are run through the sealing insert, insert the remaining blanking plugs in the recesses located on the outside



- 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 feed-in mode of the inverter will begin shortly.
- After the automatic inverter start, the Operating Status LED lights up 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.

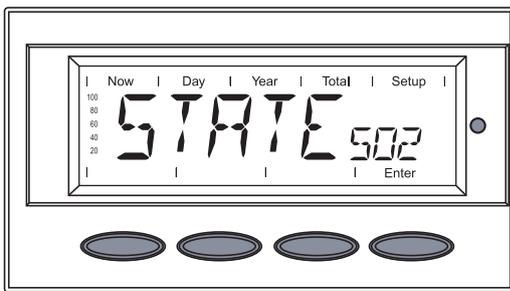
## Setting Inverters for Available Solar Module Ground



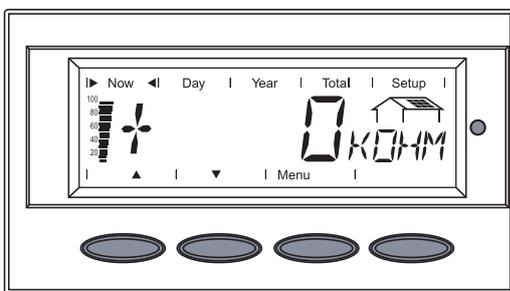
**NOTE!** If a solar module ground is used, the corresponding grounding mode must be set in the 'Basic Service Menu' after the inverter is turned on.

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.

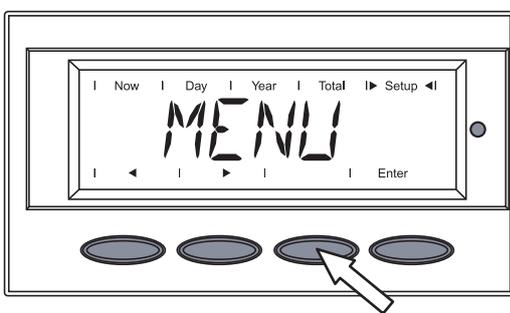


**1** Confirm the status message by pressing the "Enter" key



The current insulation value is displayed.

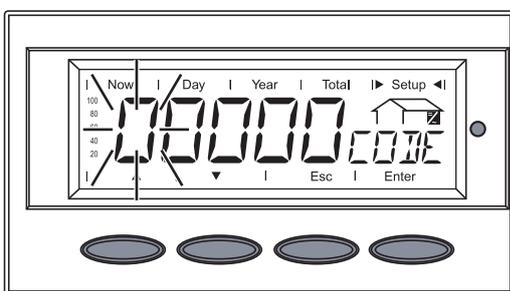
**2** Press the "Menu" key



The "menu" is displayed.

**3** Select the "Setup" mode using the "Left" or "Right" keys  
◀ ▶

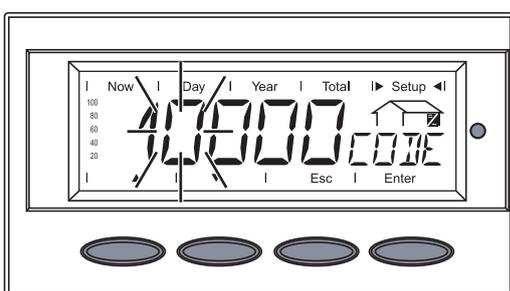
**4** Press the unassigned "Esc" key 5 x



"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  
▲ ▼

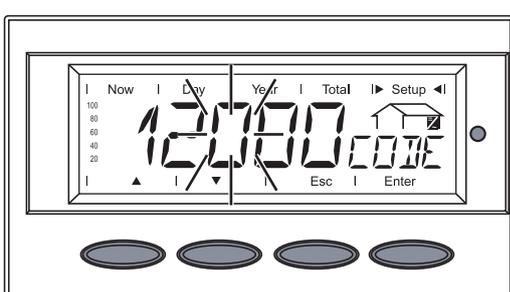
**6** Press the "Enter" key



The second digit flashes.

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

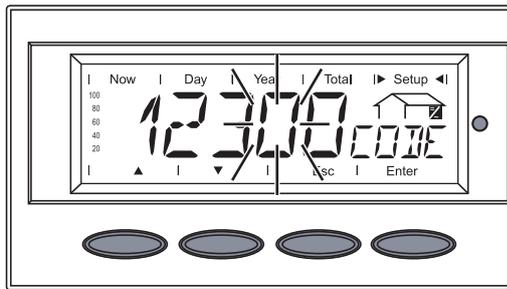
**8** Press the "Enter" key



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

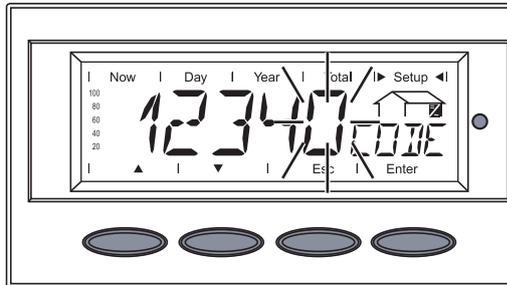


The fourth digit flashes.

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



- 12** Press the "Enter" key

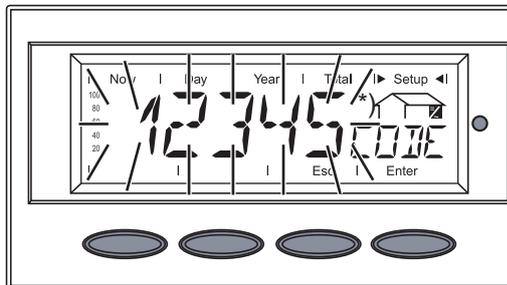


The fifth digit flashes.

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



- 14** Press the "Enter" key



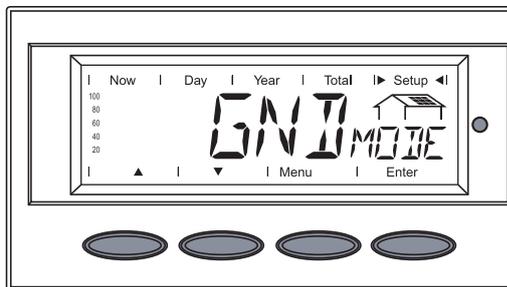
The access code flashes.

\*) ... Code example

- 15** Press the "Enter" key

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

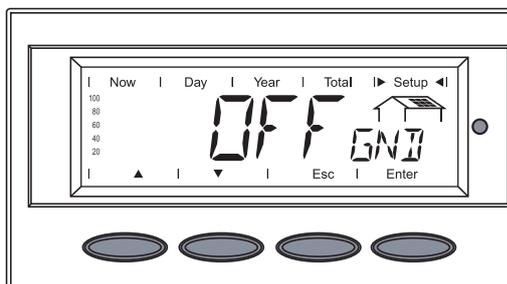
- 'MIXMODE' for multiphase inverters
- 'DCMODE' for one-phase inverters



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

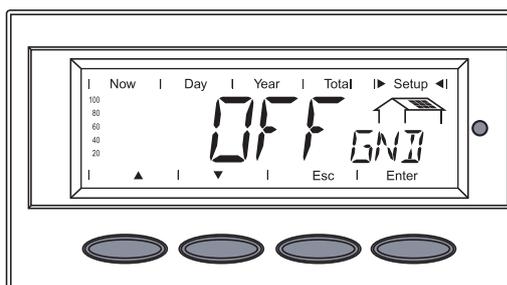


- 17** Press the "Enter" key

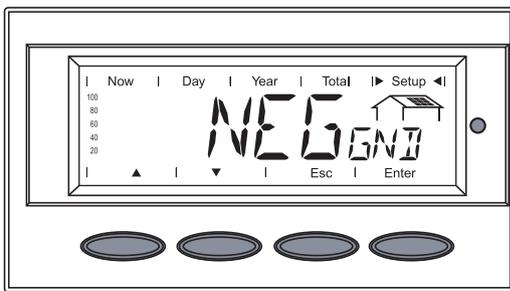


The grounding mode is displayed.

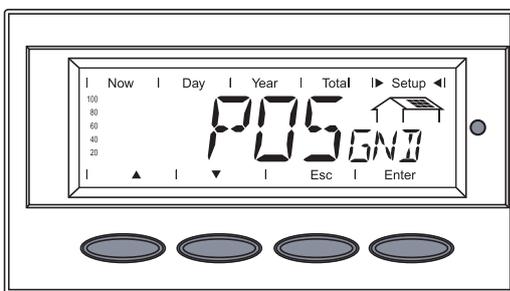
- 18** Use the "Up" and "Down" keys to select the grounding mode:



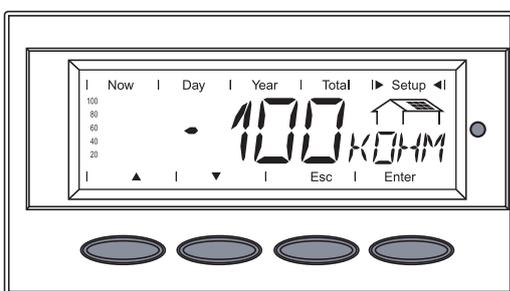
OFF = no solar module ground (factory setting)



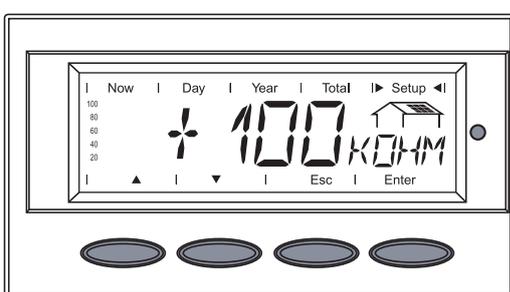
NEG = solar module ground at negative pole



POS = solar module ground at positive pole



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



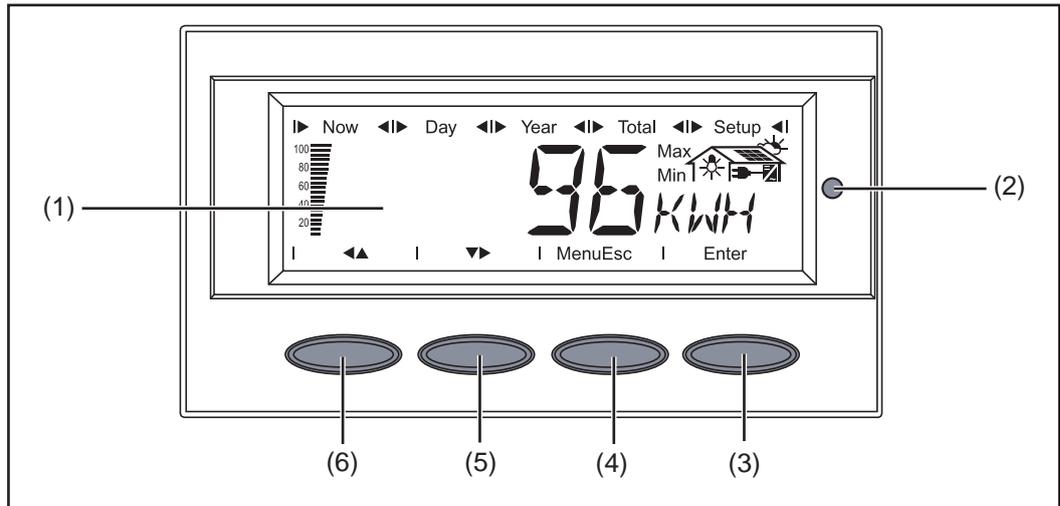
+100 kohm = Solar module ground at positive pole using high ohm resistor

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

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

# Product Description Fronius IG Plus

## Controls and Indicators

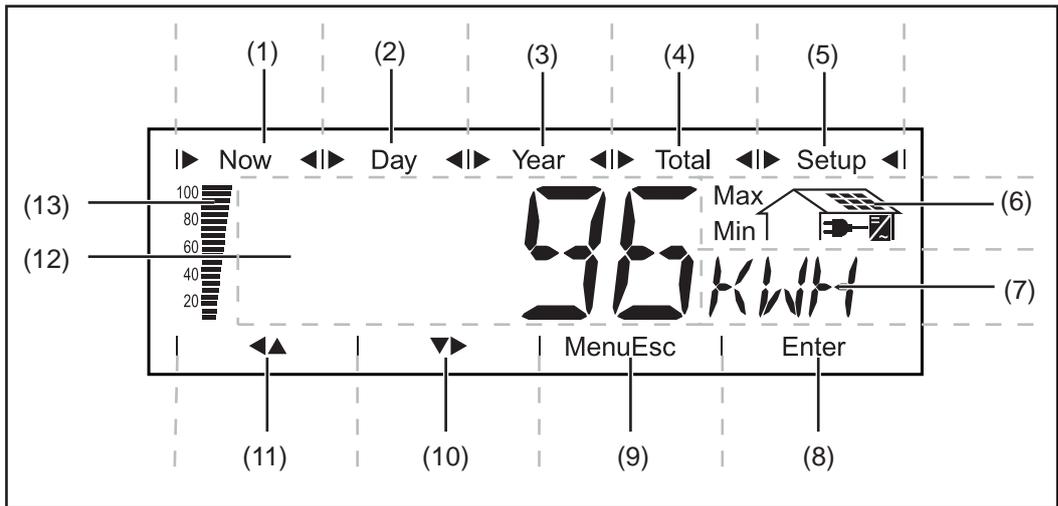


Item	Function
(1)	Display for displaying values, settings and menus
(2)	Operating Status LED for displaying the operating status
(3)	"Enter" key for confirming a selection
(4)	"Menu / Esc" key for scrolling through menu options for exiting the Setup menu
(5)	"Down/Right" key depending on the selection: for navigating down for navigating right
(6)	"Left/Up" key depending on the selection: for navigating left 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 only 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 are recorded only at two-second intervals.

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

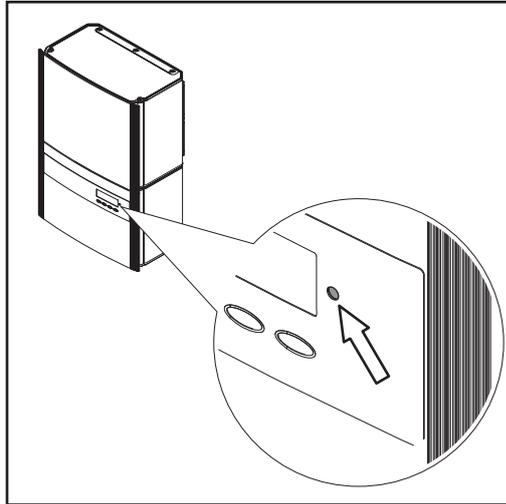
 ... appears when values are displayed which are directly associated with the public grid

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

(7)	Range for display unit 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

Item	Function
(12)	Range for display value for displaying the value
(13)	Output bar (not active during setup) 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. It indicates problem-free operation of the photovoltaic system.
Flashing green	The photovoltaic system is working correctly, a status code is on the display.  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 or the inverter has been set to standby operation in the Setup menu (= manual shutoff of operation).  The next day, operation will resume automatically.  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, no solar module power due to darkness.

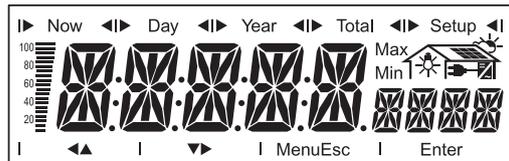
A list of most status codes, the corresponding status information, their status causes and repair measures can be found in the chapter "Troubleshooting and Maintenance," section "Status Diagnosis and Troubleshooting."

# Startup Phase and Grid Feed-in Mode

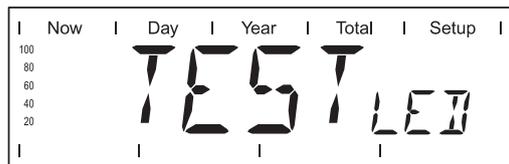
**Startup phase** The inverter carries out a self test after being turned on automatically. Then a test of the public grid is carried out. This test can take from several seconds up to several minutes depending on local regulations. During the startup sequence the illumination of the Operating Status LED is orange.

**Test Procedure**

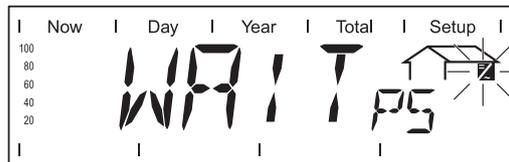
1. Segment test  
All display elements light up for about one second



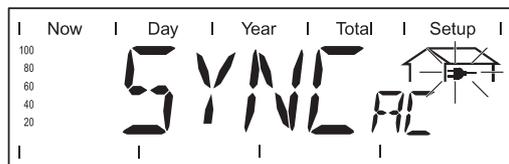
2. Self test of important inverter components
  - The inverter goes through a master check list for several seconds
  - The display will show "TEST" as well as the component currently being tested (e.g., "LED")



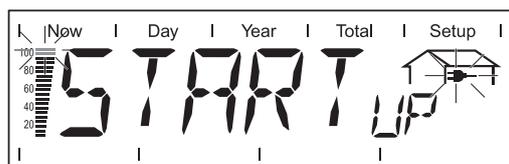
3. Synchronization with grid:
  - "WAIT PS" is displayed, the inverter icon flashes: The inverter waits for all power stage sets on the grid to be operational. This procedure is dependent on the DC voltage.



- 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 de-

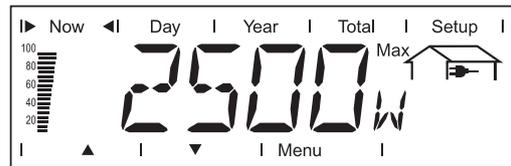
pending on national regulations. The time elapsed is indicated by a bar shrinking from the top down.

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 illumination is activated.

If no key is pressed for 30 seconds, the display backlight goes out (provided that the display illumination is set to automatic in the Setup menu).

The Setup menu also offers a choice between a permanently lit or permanently dark display.

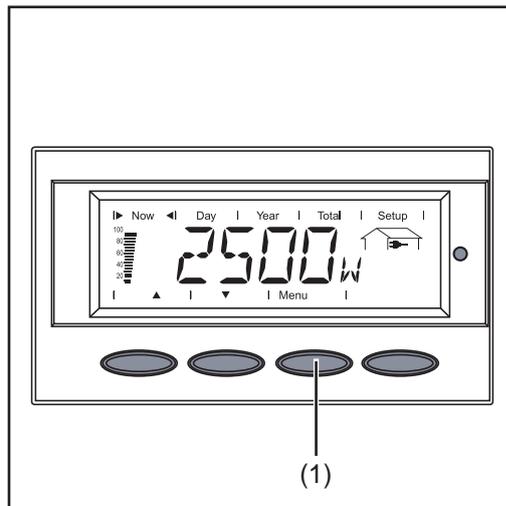
## Automatic switch to the "Now" display mode or the startup phase

If no key is pressed for 2 minutes:

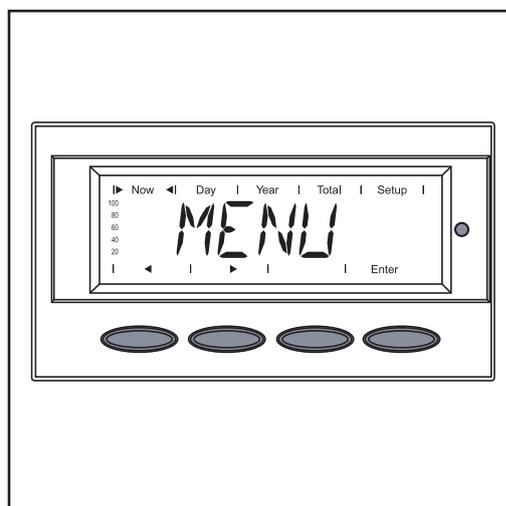
- While power is being fed into the grid, the inverter automatically switches to the "Now" display mode and the present output power is displayed.
- If the inverter is not feeding power into the grid, the inverter automatically switches to the startup phase for synchronization with the grid.

The inverter switches to the "Now" display mode or startup phase from anywhere within the display modes or the Setup menu.

## 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

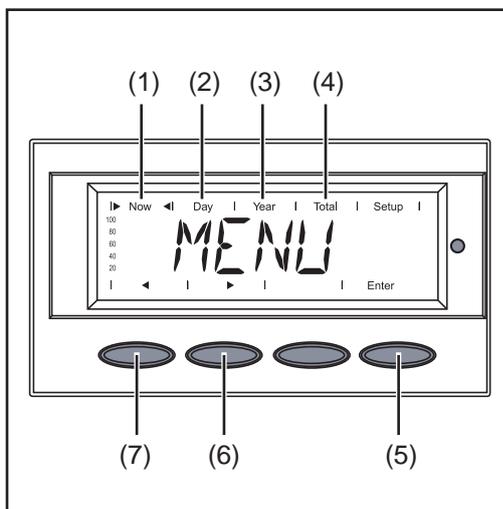
- set the desired display mode
- access the Setup menu

# The Display Modes

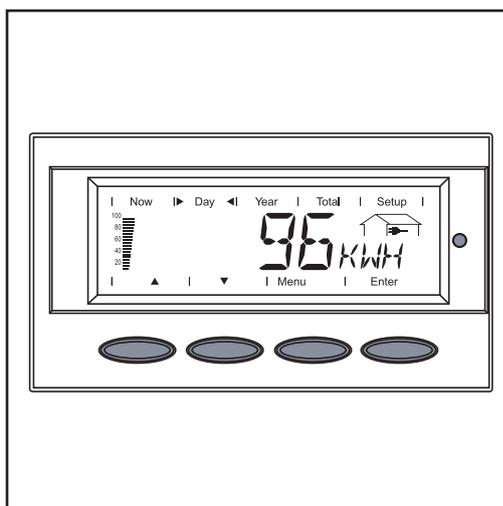
## The Display Modes

"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.

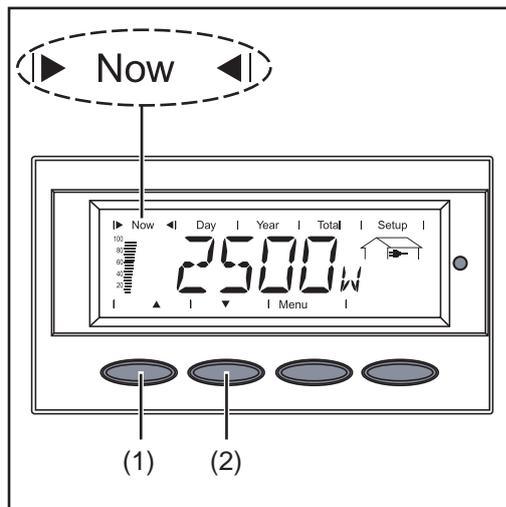
Overview of Display Values

Display mode	Symbol	Unit	Optional	Display value
"Now"		W	-	Output power
		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 <sub>2</sub> 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 is not available, the message "N.A." (not available) is shown.

# Display Values in "Now" Display Mode

## Selecting the "Now" Display Mode



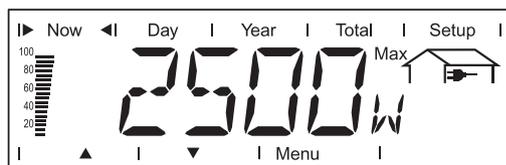
- 1 Select the "Now" display mode

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 the "Now" display mode



### Output power

Power (in watts) currently being fed into the grid

The "Enter" key is active for the output power display if at least one of the following functions is available on the inverter:

- Reactive power mode
- Remote-controlled effective power reduction
- GVPR (**G**rid **V**oltage-dependent **P**ower **R**eduction)

The availability of a function depends on the country setup, device-specific settings and the software version of electronic assemblies.

Reactive power mode:

- The current apparent power for the device is displayed in VA by pressing the "Enter" key.
- The current operating mode can be displayed by pressing the "Up" and "Down" keys.

Remote-controlled effective power reduction (if there is a Fronius Power Control Box/Card in the Solar Net and a power reduction has been triggered by the utility company):

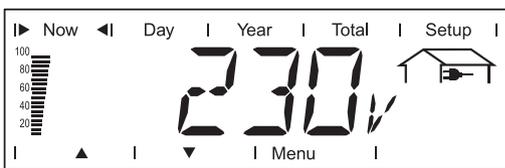
- Pressing the "Enter" key will display the power reduction as a percentage.
- You can display how long the power reduction has been in effect by pressing the "Up" and "Down" keys.

GVPR:

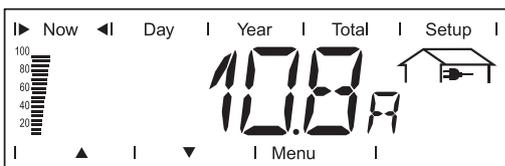
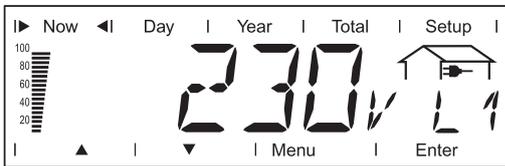
- Pressing the "Enter" key will display the activation time in SEC/GVPR (alternating).

You can use the "Up" and "Down" keys after pressing the "Enter" key to scroll through the existing parameters.

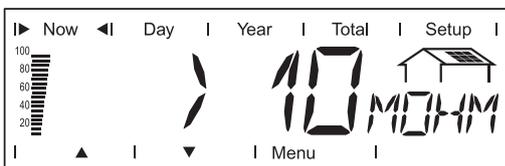
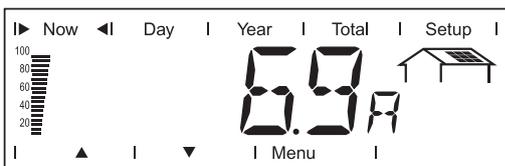
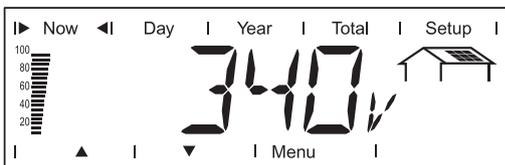
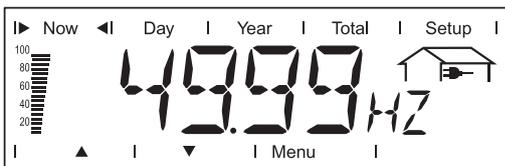
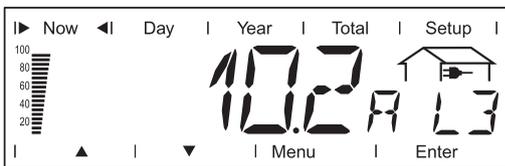
- You can return to the menu level by pressing the "Menu" key.



For example, phase voltage for phase L1:



For example, phase current for phase L3:



**Grid voltage**  
External conductor voltage (volts)

The "Enter" key is active for multi-phase inverters.

- The phase voltage can be displayed by pressing the "Enter" key.
- The phase voltage of the other phases can be displayed by pressing the "Up" and "Down" keys.
- You can return to the menu level by pressing the "Menu" key.

**Output current**  
Current (in amperes) supplied to the grid at any particular moment

The "Enter" key is active for multi-phase inverters.

- The phase current can be displayed by pressing the "Enter" key.
- The phase current of the other phases can be displayed by pressing the "Up" and "Down" keys.
- You can return to the menu level by pressing the "Menu" key.

**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

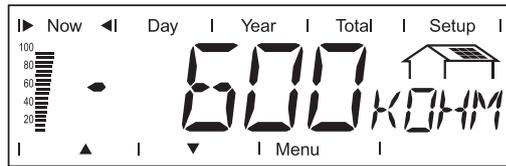
**WARNING!** An electric shock can be fatal. The positive and negative poles of the photovoltaic system should never be touched if the insulation resistance is less than 600 kOhm. An insulation resistance of < 600 kOhm may be due to an inadequately insulated DC lead or defective solar modules. In the 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 pole of the photovoltaic system and the earth potential. If an insulation resistance of > 600 kOhm is shown, this means that the photovoltaic system is adequately insulated.

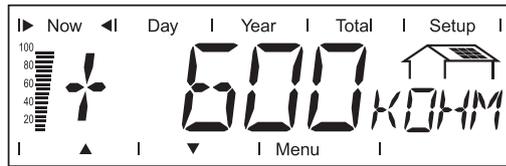
An insulation resistance of less than 600 kOhm indicates an error.

When the insulation resistance is less than 10 MOhm, the display differentiates between:

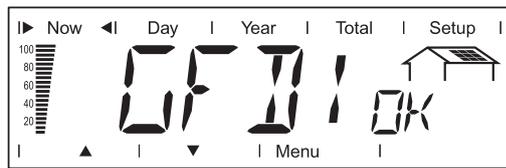
- negative potential of the ground (polarity sign '-')
- positive potential of the ground (polarity sign '+')



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

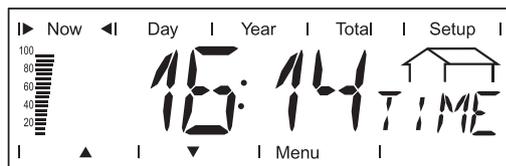


Display example of a positive potential (polarity sign '+')  
Short circuit between DC+ lead and ground



**GFDI status**  
for grounded solar modules  
'GFDI OK' is displayed if there is no ground fault in the system

GFDI = Ground Fault Detector Interruptor



**Time (datalogger option)**  
When the time on the inverter or a system add-on is changed, this changes the time on all devices connected via Solar Net.

## Options

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

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

## General

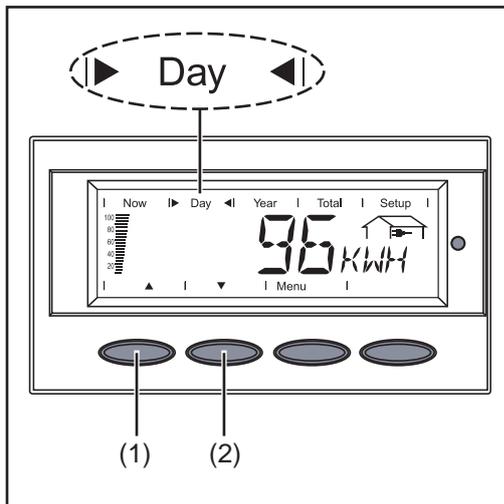
For the inverter, the day begins when it switches on. If the DC supply line is disconnected, the following parameters within the "Day" display mode will be reset after repeating the startup:

- Return (currency can be selected)
- CO<sub>2</sub> reduction (kg)
- Maximum output power (watts)
- Maximum grid voltage (volts)
- Minimum grid voltage (volts)
- Service hours completed by the inverter

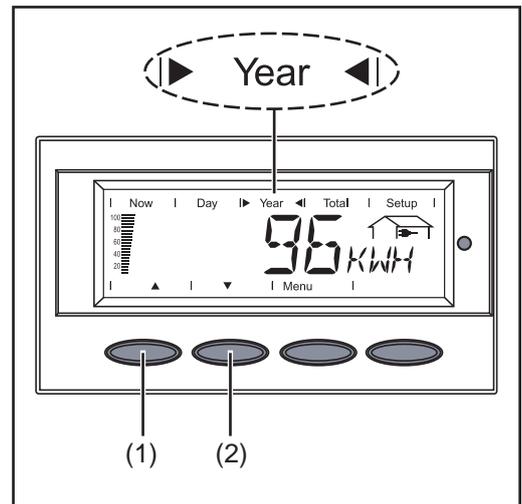
If an optional Fronius Datalogger is available, the display values listed always apply to the whole day.

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

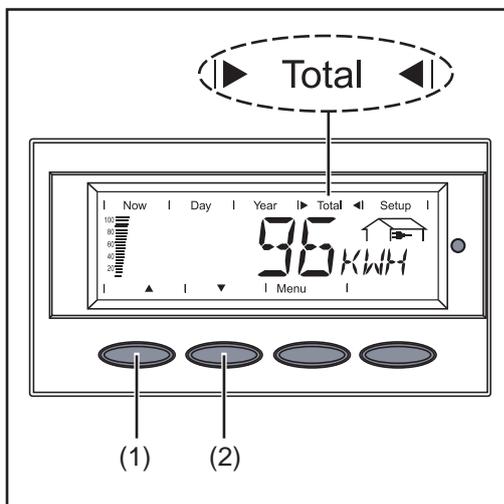
First Display Value in the "Day" Display Mode:



First Display Value in the "Year" Display Mode:



First Display Value in the "Total" Display Mode:



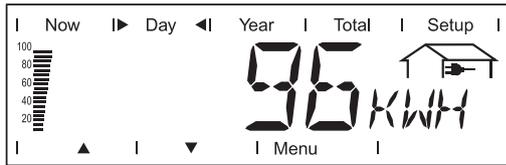
- 1 Select the "Day" or "Year" or "Total" display mode

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)

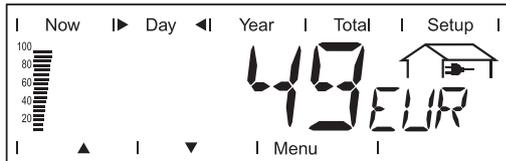
**Display values in the 'Day / Year / Total' display modes**



**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 and the readings from the inverter. For determining the energy supplied to the grid, only the readings of the calibrated meter supplied by the electric utility company are relevant.

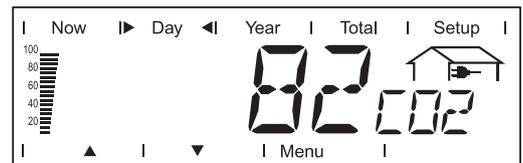
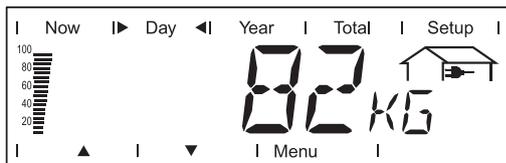


**Yield**

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 rate for the output energy. The factory setting depends on the respective country-specific setting.



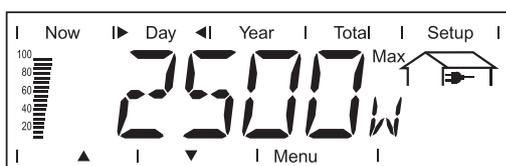
**CO2 reduction**

CO2 emissions saved during the monitored period (kg / T; T = tons)

The area for unit display switches between 'kg' or 'T' and 'CO2.'

The CO2 meter gives an indication of CO2 emissions that would be released during the generation of the same amount of electricity in a combustion power plant.

The factory setting is 0.59 kg / kWh (source: DGS - the German Society for Solar Energy).



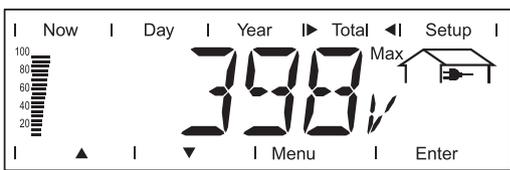
**Maximum output power**

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

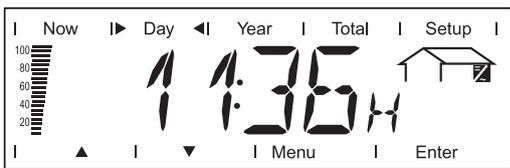
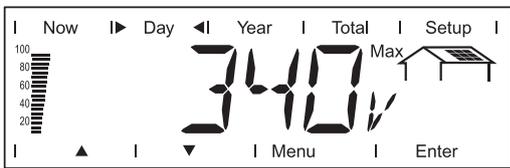
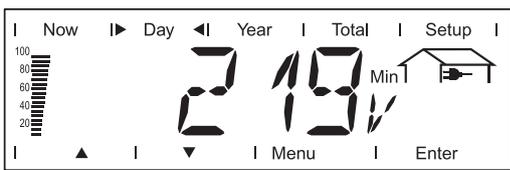
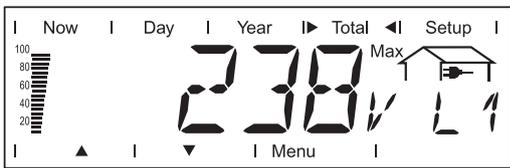


**Maximum grid voltage**

Highest reading of grid voltage (V) during observation period



For example, maximum phase voltage for phase L1:



The 'Enter' key is active in the 'Total' display mode depending on the country set-up or the device-specific settings.

- The maximum phase voltage measured during the time in question can be displayed by pressing the 'Enter' key.
- The maximum phase voltage of the other phases measured during the time in question can be displayed by pressing the 'Up' and 'Down' keys.
- You can return to the menu level by pressing the 'Menu' key.

**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**

Indicates how long the inverter has been operating (HH:MM)

Duration of operation is shown in hours and minutes up to 999 h and 59 min (display: '999:59'). After that only full hours are displayed.

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

**Options**

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

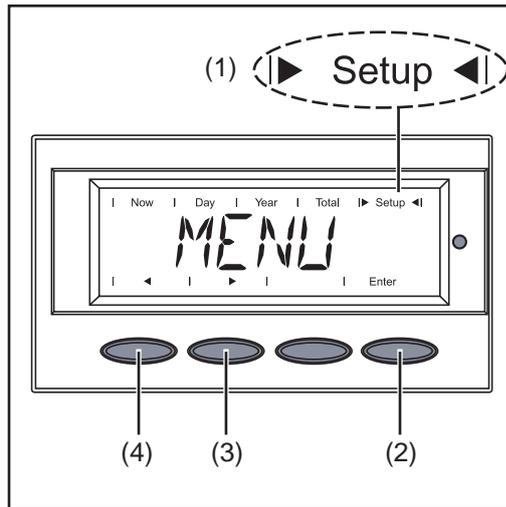
# The Setup Menu

## Presetting

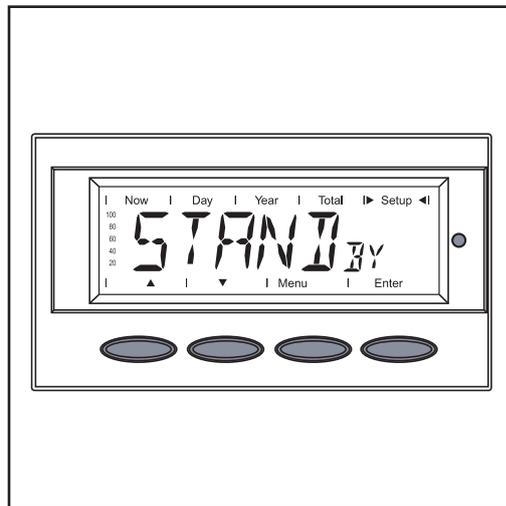
The inverter is pre-configured and ready to use. No manual control is necessary for feeding the power it generates into the grid.

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)

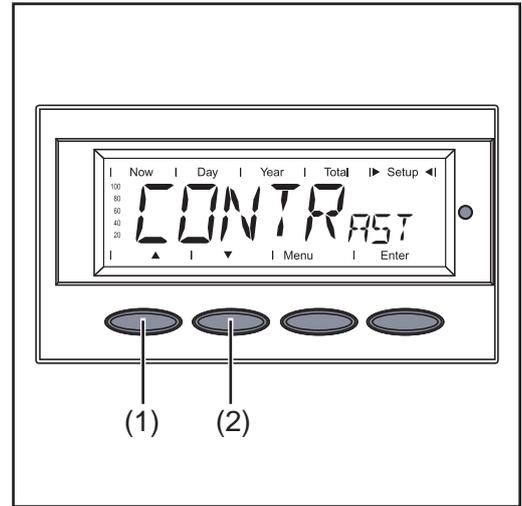
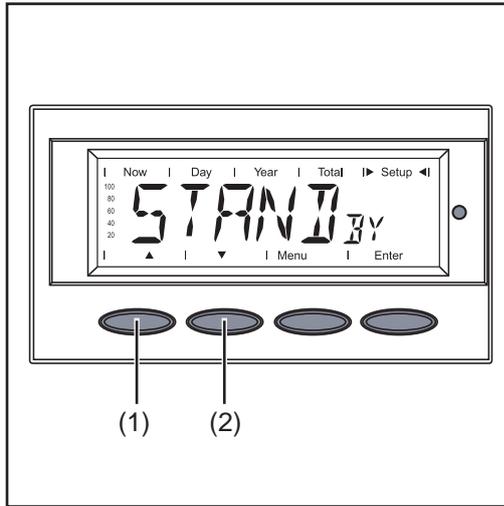


The Setup Menu's first menu item "STANDBY" is shown.

### Scrolling through Menu Items

Example: "STANDBY" menu item

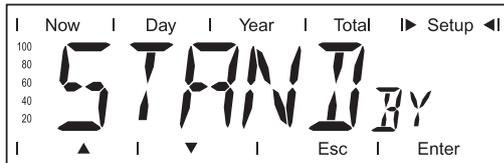
Example: "CONTRAST" menu item



- 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

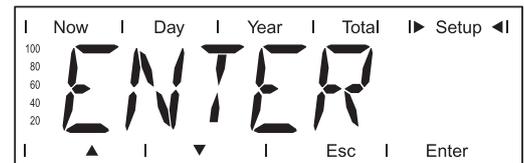
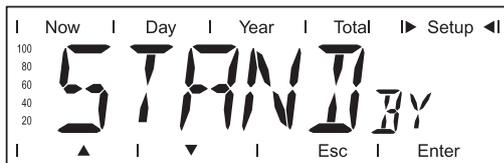


Manual activation / deactivation of Standby operation using the "Enter" key

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:"



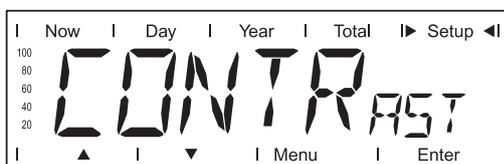
To maintain Standby operation:

- Press the "Esc" key

To end Standby operation:

- Press the "Enter" key

## CONTRAST

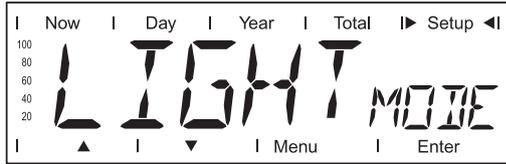


Contrast setting on LCD display

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**



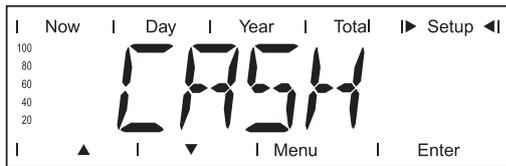
Initial setting for display illumination.

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).

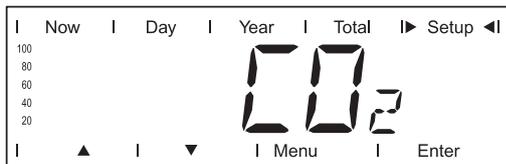
**CASH**



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)

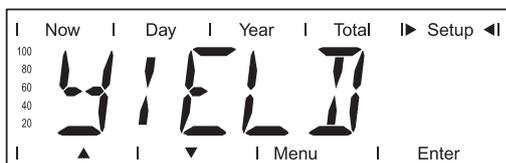
**CO2**



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

Offset is an amount of energy (in Wh, kWh, or MWh) that can be added to the lifetime total energy output of the inverter to give it a 'head start.'

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

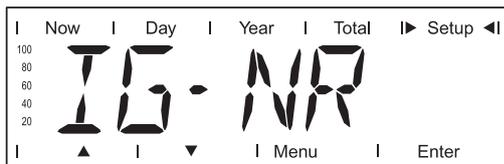
### CALI.

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.



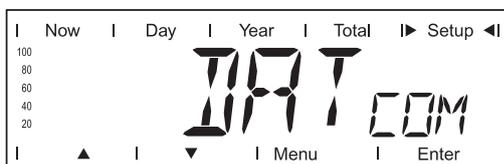
Number setting (address) of the inverter in a setup comprising multiple solar inverters linked together

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;  
SIGCD TEST / PDCD RST / IFCD RST / TAC TEST

### 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

When the "Energy Management" function is activated, the function test for the Fronius Signal Card cannot be carried out.

**PDCD RST**

Resets the Fronius Personal Display Card option

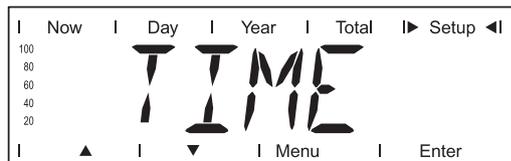
**IFCD RST**

Resets the Fronius Interface Card option

**TAC TEST**

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

**TIME**

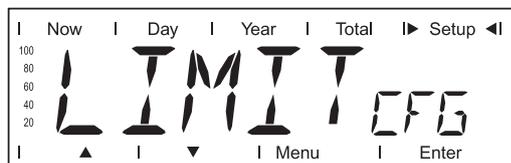


Date and time setting

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.

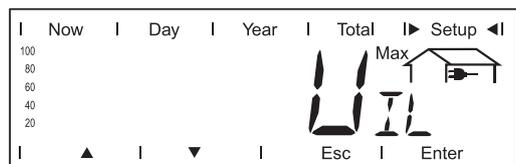
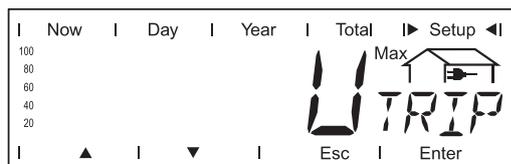
**LIMIT CFG**



Used to display settings relevant to a power supply company. The displayed values depend on the respective country setup or device-specific inverter settings.

Display range U IL Max / U IL/TRIP\* Max / U IL Min / U IL/TRIP\* Min / U OL Max / U OL/TRIP\* Max / U OL Min / U OL/TRIP\* Min / U RC Max / U RC Min / U LL  
 FREQ IL Max / FREQ IL/TRIP\* Max / FREQ IL Min / FREQ IL/TRIP\* Min / FREQ OL Max / FREQ OL/TRIP\* Max / FREQ OL Min / FREQ OL/TRIP\* Min / FREQ RE Max / FREQ RE Min  
 START TIME/INIT\* / START TIME/RCON\*  
 AGF / EMI COMP / POWER LIM / MIX MODE

\* Alternating display, e.g.:



IL "Inner Limit"  
 OL "Outer Limit"

Different clearing times can be assigned to the inner limit IL and the outer limit OL depending on the country setup or device-specific settings.

E.g.:

- Short clearing time for a deviation from the outer limit
- Longer clearing time for a deviation from the inner limit

**U IL Max**

Upper inner grid voltage limit in V

**U IL/TRIP Max**

Clearing time for exceeding the upper inner grid voltage limit in P\*\*

**U IL Min**

Lower inner grid voltage limit in V

**U IL/TRIP Min**

Clearing time for falling below the lower inner grid voltage limit in P\*\*

**U OL Max**

Upper outer grid voltage limit in V

**U OL/TRIP Max**

Clearing time for exceeding the upper outer grid voltage limit in P\*\*

**U OL Min**

Lower outer grid voltage limit in V

**U OL/TRIP Min**

Clearing time for falling below the lower outer grid voltage limit in P\*\*

**U RC Max**

"Reconnection"

Upper voltage limit for reconnection to the public grid after disconnection due to an unacceptable parameter deviation

**U RC Min**

"Reconnection"

Lower voltage limit for reconnection to the public grid after disconnection due to an unacceptable parameter deviation

**U LL**

"Longtime Limit"

Voltage limit in V for the voltage average determined over a longer time period

**FREQ IL Max**

Upper inner grid frequency limit in Hz

**FREQ IL/TRIP Max**

Clearing time for exceeding the upper inner grid frequency limit in P\*\*

**FREQ IL Min**

Lower inner grid frequency limit in Hz

**FREQ IL/TRIP Min**

Clearing time for falling below the lower inner grid frequency limit in P\*\*

**FREQ OL Max**

Upper outer grid frequency limit in Hz

**FREQ OL/TRIP Max**

Clearing time for exceeding the upper outer grid frequency limit in P\*\*

**FREQ OL Min**

Lower outer grid frequency limit in Hz

**FREQ OL/TRIP Min**

Clearing time for falling below the lower outer grid frequency limit in P\*\*

\*\* P = grid periods; 1 P corresponds to 20 ms at 50 Hz and 16.66 ms at 60 Hz

**FREQ RC Max**

"Reconnection"

Upper grid frequency limit for reconnection to the public grid after disconnection due to an unacceptable parameter deviation

**FREQ RC Min**

"Reconnection"

Lower grid frequency limit for reconnection to the public grid after disconnection due to an unacceptable parameter deviation

**START TIME/INIT**

Startup time of the inverter in s

**START TIME/RCON**

Reconnection time in s after a grid error

**AGF**

"Advanced Grid Features"

Display range	Q MODE / GPIS / GFPR / FULL/LVRT
Q MODE	Mode for reactive power specification <ul style="list-style-type: none"> <li>- CONST / COSP*** Constant cos phi specification</li> <li>- CONST / Q REL*** Constant specification of the relative reactive power in %</li> <li>- CONST / Q ABS*** Constant specification of an absolute reactive power in var</li> <li>- COSP (P) cos phi specification depending on the effective power</li> <li>- Q (U) Relative reactive power specification regarding the current grid voltage</li> <li>- Q (P) Relative reactive power specification depending on the effective power</li> <li>- OFF The inverter is operating in the pure effective power range (cos phi = 1)</li> </ul>
GPIS	"Gradual Power Increment at Startup" SoftStart function regarding how fast the inverter should increase the power
	ON / OFF / N.A.

GFPR	"Grid Frequency Depending Power Reduction" Power reduction depending on the grid frequency
	ON / OFF / N.A.
FULL / LVRT***	"Low Voltage Ride Through" Function for bridging a grid voltage gap that was caused by grid voltage parameters outside of the limits
	ON / OFF / N.A.

### EMI COMP

Compensation of the EMC filter during operation

ON / OFF / N.A.

### POWER LIM

Constant apparent power limiting

### MIX MODE

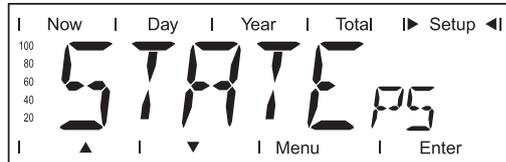
DC operating type

\*\*\* alternating display

N.A. not available

- Press the "Enter" key to display the respective value
- Press "Esc" to exit the displayed value

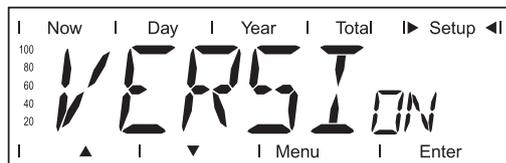
## STATE PS



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 The current country setup is displayed (2-3 letters) by pressing the "Enter" key, e.g., "DE" for Germany country setup; Exit the Country Setup display by pressing the "Esc" key

# Setting and Displaying Menu Items

## 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

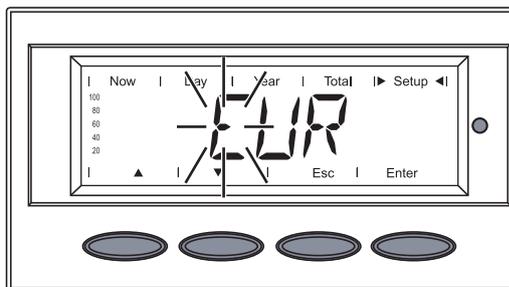
The following examples describe how to set and display menu items:

- 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

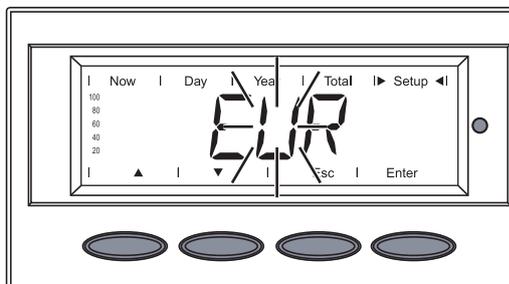


- 1 Select the "CASH" menu item
- 2 Press the "Enter" key



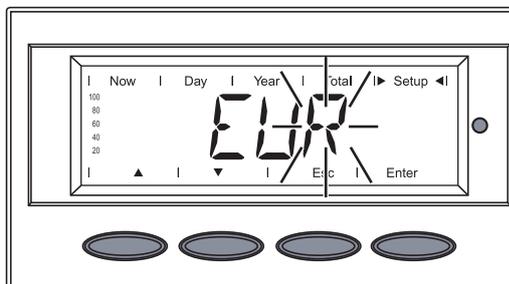
The currency is displayed, factory setting = "EUR";  
The first character flashes.

- 3 Use the "Up" and "Down" keys to select a letter for the first character  
▲ ▼
- 4 Press the "Enter" key



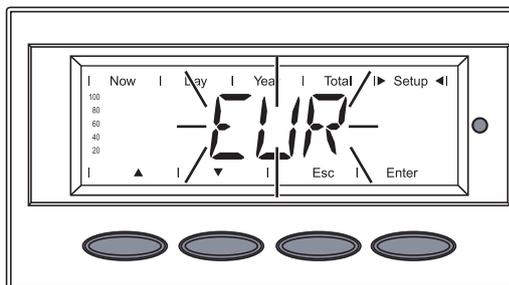
The second character flashes.

- 5 Use the "Up" and "Down" keys to select a letter for the second character  
▲ ▼
- 6 Press the "Enter" key



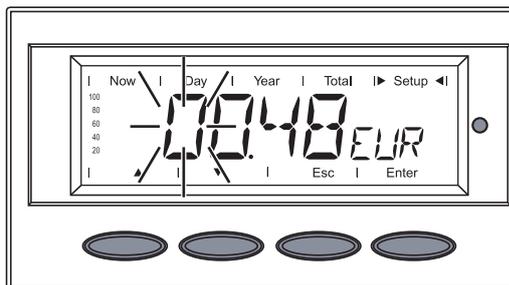
The third character flashes.

- 7 Use the "Up" and "Down" keys to select a letter for the third character  
▲ ▼
- 8 Press the "Enter" key



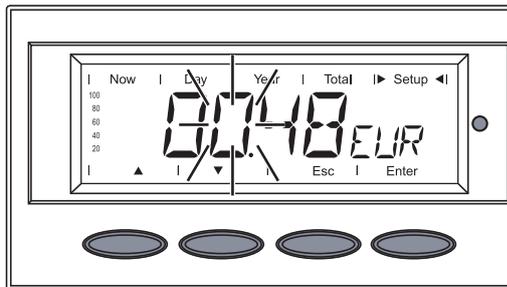
The set currency flashes.

- 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

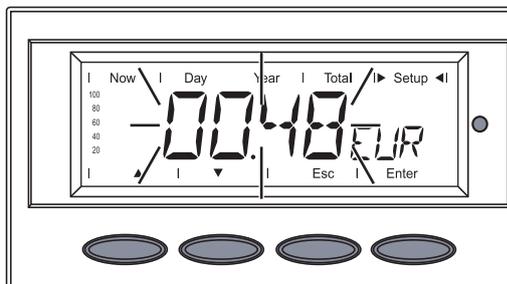


The second digit after the decimal point flashes.

- 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



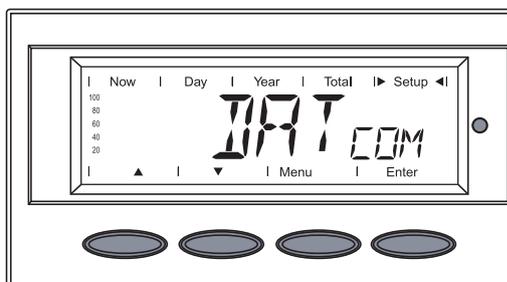
The set charge rate flashes.

- 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



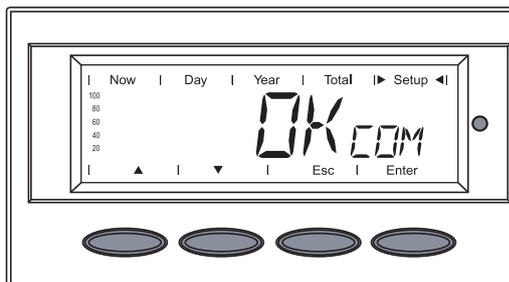
- 1** Select the "DATCOM" menu item

- 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.

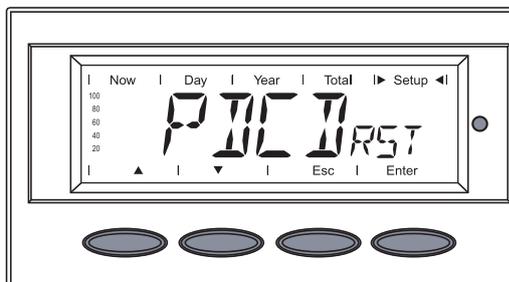
**IMPORTANT!** If no acoustic signal is heard, the signal lines should be checked.

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

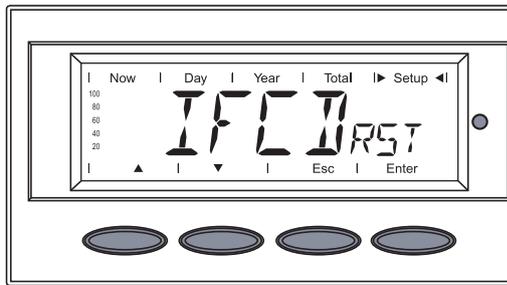


"SIGCD TEST" is displayed

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

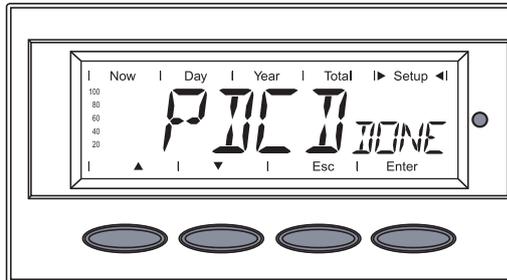


e.g., Reset Personal Display Card ("PDCD RST") ...



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

**7** Press the "Enter" key



"PDCD DONE"...

...or...

"IFCD DONE" is displayed

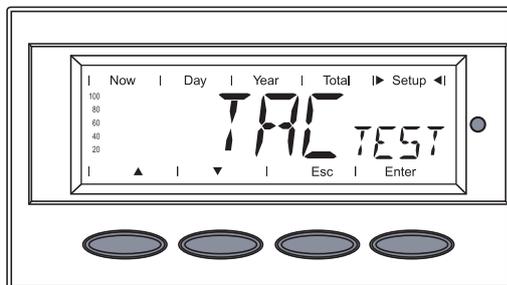
**8** Press the "Esc" key to exit the current option

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



"TAC ON" is displayed

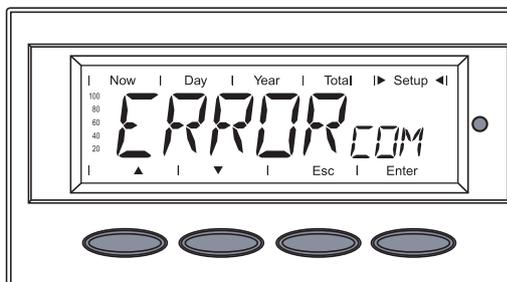
**10** To test the function of the Fronius Power Relay Card option, press the "Enter" key



"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

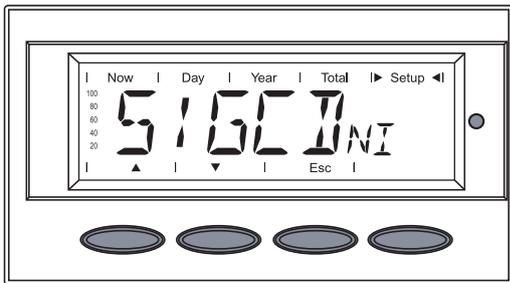
### Data connection faulty or DATCOM is not installed



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

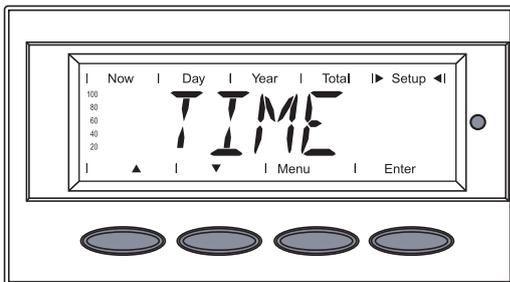




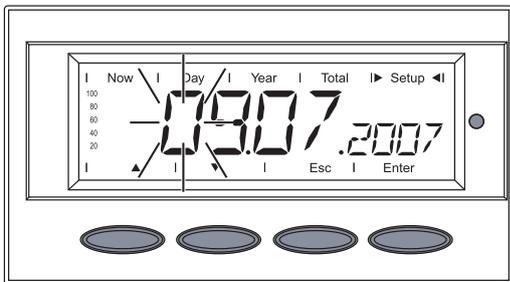
"SIGCD NI" (Signal Card not installed) or "PDCD NI" (Personal Display Card not installed) or "IFCD NI" (Interface Card not installed) or "TAC NI" (TAC Card not installed) is displayed.

- 4 Press the "Esc" key to exit the "DAT-COM" menu item

Setting Time and Date

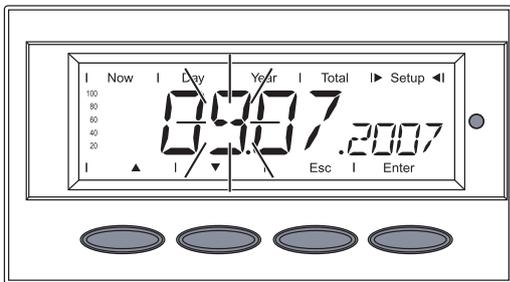


- 1 Select the "TIME" menu item
- 2 Press the "Enter" key



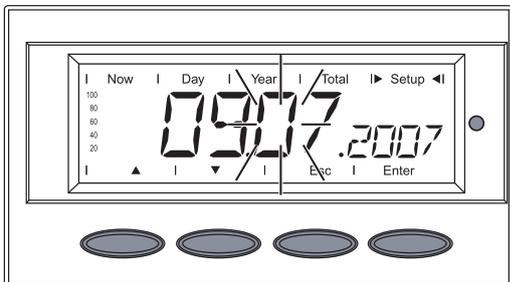
The **date** is displayed (DD.MM.YYYY), the first digit for the day flashes.

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



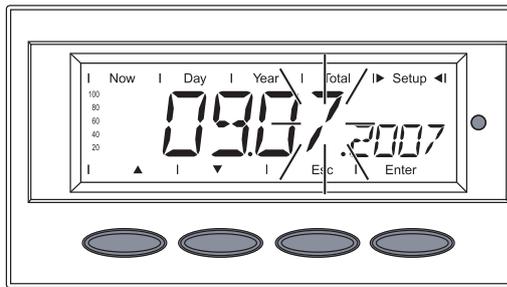
The second digit for the day flashes.

- 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.

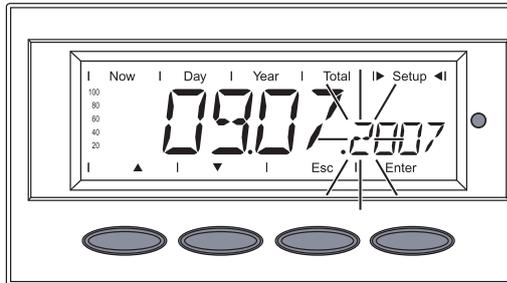
- 7 Use the "Up" and "Down" keys to select a value for the first month digit  
▲ ▼
- 8 Press the "Enter" key



The second digit for the month flashes.

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

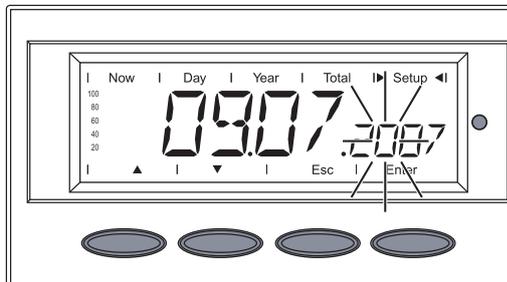
- 10** Press the "Enter" key



The first digit for the year flashes.

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

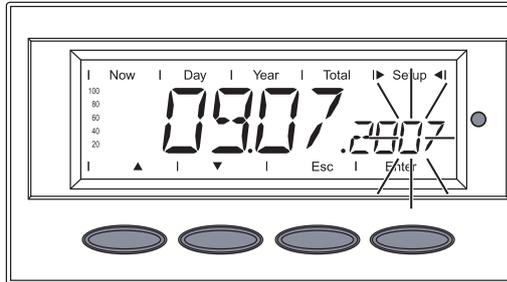
- 12** Press the "Enter" key



The second digit for the year flashes.

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

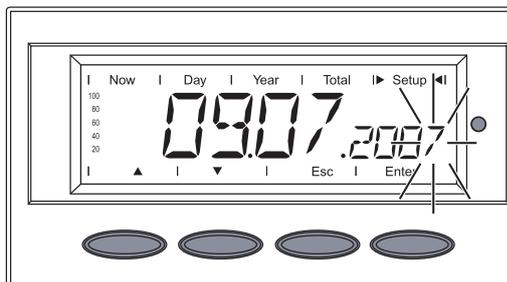
- 14** Press the "Enter" key



The third digit for the year flashes.

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

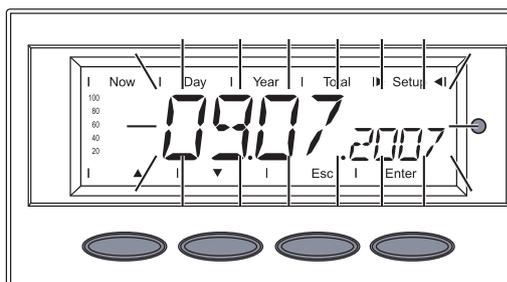
- 16** Press the "Enter" key



The fourth digit for the year flashes.

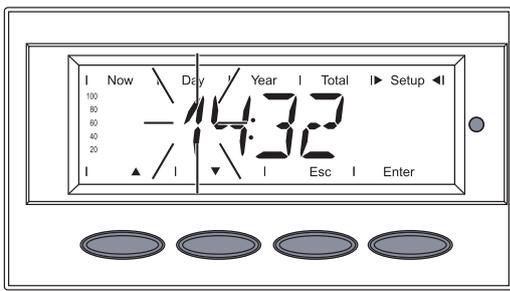
- 17** Use the "Up" and "Down" keys to select a value for the fourth year digit  
▲ ▼

- 18** Press the "Enter" key



The set date then flashes.

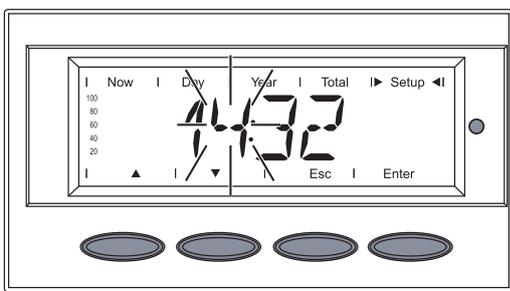
- 19** Press the "Enter" key



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  
▲ ▼

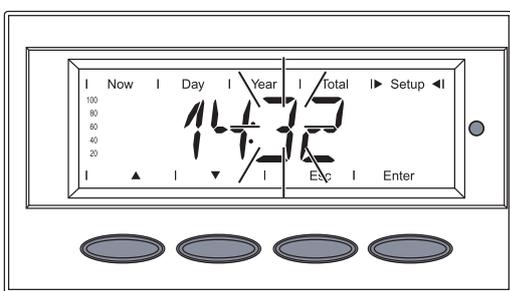
- 21 Press the "Enter" key



The second digit for the hour flashes.

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

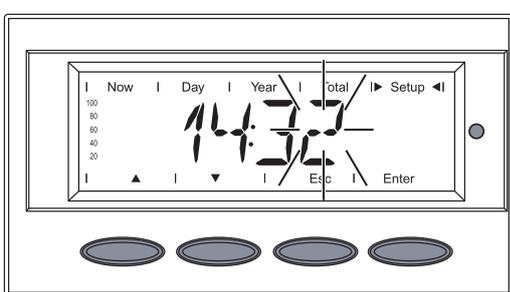
- 23 Press the "Enter" key



The first digit for the minutes flashes.

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

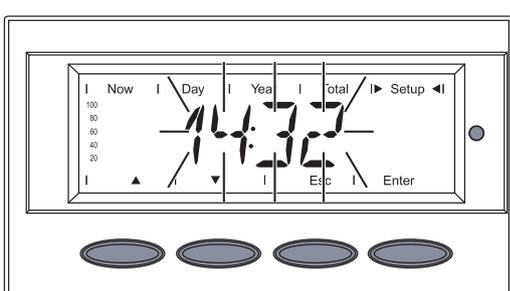
- 25 Press the "Enter" key



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

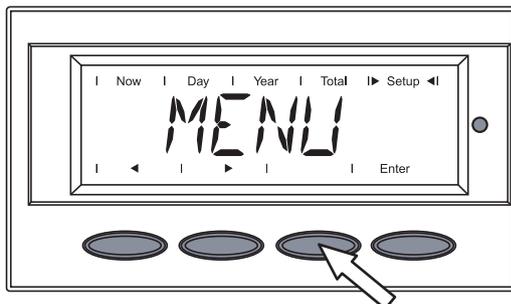
- 29 Press the "Esc" key to exit the "TIME" menu item

# Setup Lock function

## General

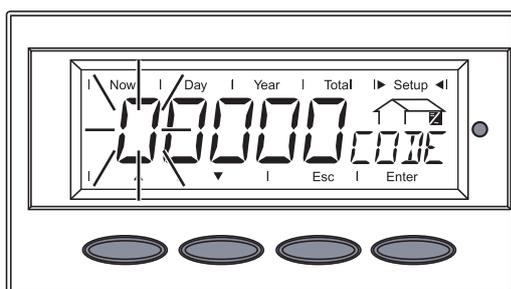
The inverter comes equipped with the "Setup Lock" function. When the "Setup Lock" function is active, the Setup menu cannot be accessed, e.g., to protect against setup data being changed by accident. You must enter code 12321 to activate / deactivate the "Setup Lock" function.

## Activating/deactivating the "Setup Lock" function



- 1 Press the "Menu" key

"Menu" is shown.

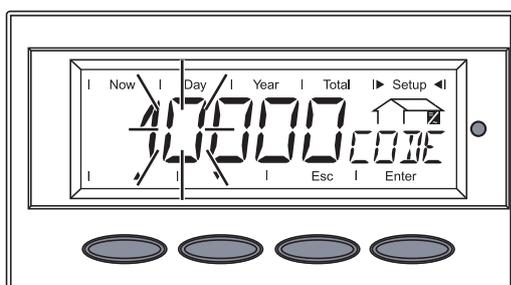


- 2 Select the "Setup" mode using the "Left" or "Right" keys



- 3 Press the unoccupied "Esc" key 5 x

"CODE" is displayed, the first digit flashes.

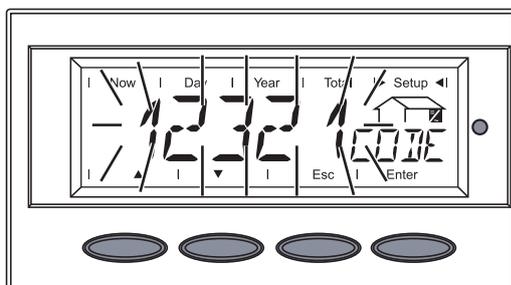


- 4 Enter the access code 12321: Use the "Up" and "Down" keys to select a value for the first digit of the access code



- 5 Press the "Enter" key

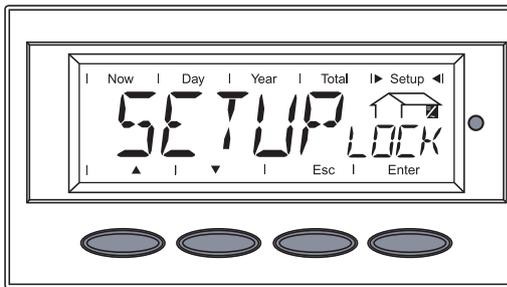
The second digit flashes.



- 6 Repeat steps 4 and 5 for the second, third, fourth and fifth digit of the access code until ...

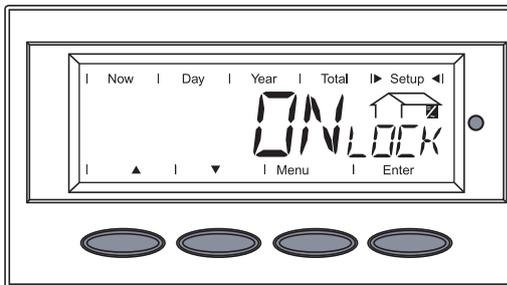
... the access code flashes.

- 7 Press the "Enter" key



"SETUP LOCK" is displayed.

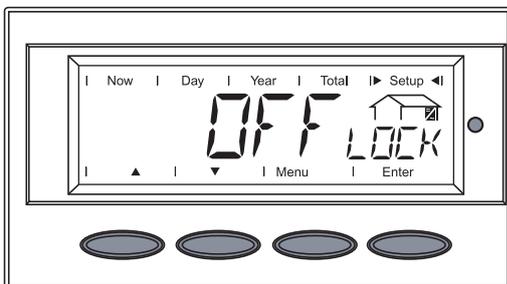
- 8 Press the "Enter" key



"ON LOCK" is displayed.

- 9 Use the "Up" and "Down" keys to select the desired function  
▲ ▼

ON LOCK = "Setup Lock" function is activated (the Setup menu cannot be accessed)



OFF LOCK = "Setup Lock" function is deactivated (the Setup menu can be accessed)

- 10 Press the "Enter" key to apply the function

# Select Log Entry function

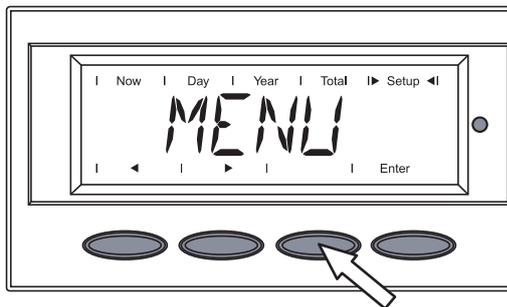
## General

The inverter is equipped with a simple logging function that can record up to 5 grid errors. The 5 most recent grid errors are saved together with the time the error occurred according to the total operating hours counter. When there are more than 5 errors, the oldest error is deleted.

A grid error is saved when it is different than the most recent error.

Code 22564 must be entered to access saved grid errors.

## 'Select Log Entry' function - access saved grid errors



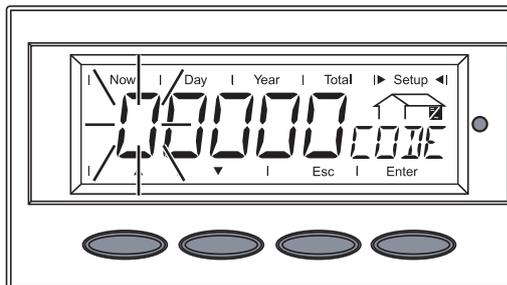
- 1 Press the "Menu" key

"Menu" is shown.

- 2 Select the "Setup" mode using the "Left" or "Right" keys



- 3 Press the unassigned "Esc" key five times



"CODE" is displayed, the first digit flashes.

- 4 Enter the access code 22564: Use the "Up" and "Down" keys to select a value for the first digit of the access code

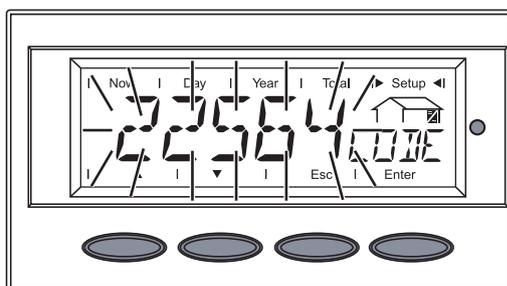


- 5 Press the "Enter" key



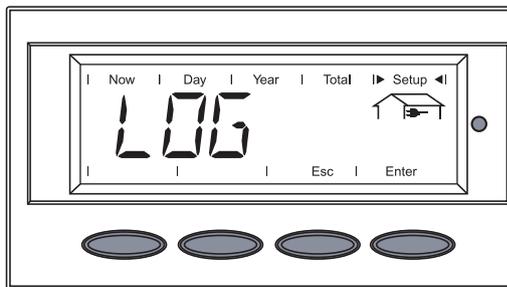
The second digit flashes.

- 6 Repeat steps 4 and 5 for the second, third, fourth and fifth digits of the access code until ...

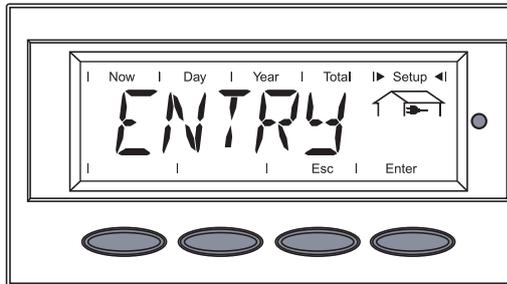


... the access code flashes.

- 7 Press the "Enter" key



"LOG" and ...



... "ENTRY" are displayed alternately.

**8** Press the "Enter" key



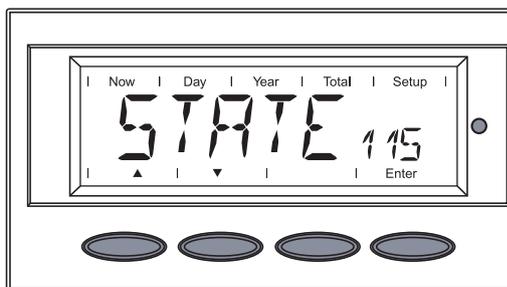
The first saved grid error "LOG 1" is shown.

**9** Use the "Up" and "Down" keys to select the desired grid error  
▲ ▼

LOG 1 ... contains the most recent grid error

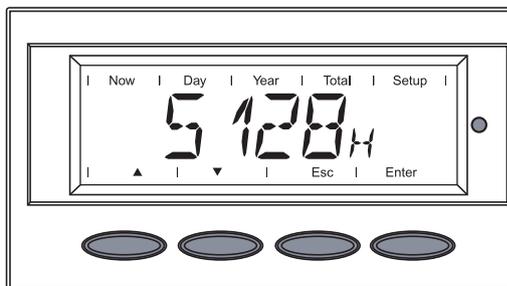
LOG 5 ... contains the oldest grid error

**10** Press the "Enter" key to display the grid error



The corresponding status code is displayed (e.g. STATE 115 = AC frequency in phase 1 is too high)

**11** Press the "Up" or "Down" key  
▲ ▼



The time when the grid error occurred (according to the total operating hours counter) is displayed.

**12** Press "Esc" twice to exit the "Select Log Entry" function



**NOTE!** If the status code "STATE ----" and time "0:00 H" are displayed, then a save location was selected at which no AC error has yet been logged.

# Energy Management function

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## General

The inverter is fitted with an "Energy Management" function.  
Via the "Energy Management" function, a potential-free switch contact can be triggered so that this functions as an actuator.  
A user connected to the switch contact can thus be controlled by assigning a power feed dependent switch-on or switch-off point.

The "Energy Management" function is only available if the "Fronius Signal Card" option is installed in the inverter.

When the "Energy Management" function is active,

- the basic function of the Fronius Signal Card is deactivated automatically and
- the potential-free switch contact of the Fronius Signal Card is triggered accordingly.



**NOTE!** The buzzer on the Fronius Signal Card can only be switched on or off by setting the "Buz." jumper on the Fronius Signal Card appropriately.

If the "Buz." jumper is in the "on" position, the acoustic signal sounds for as long as the potential-free contact of the Fronius Signal Card is switched on as a result of the "Energy Management" function.

For further information, refer to the Fronius Signal Card operating instructions.

The switch contact is switched off

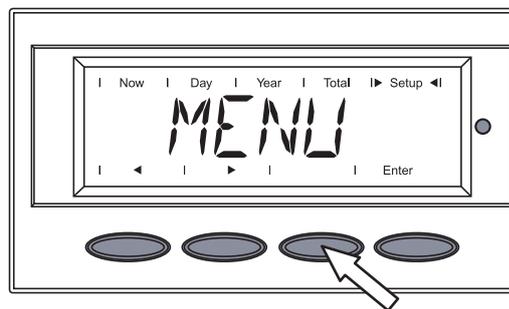
- when no current is being fed into the public mains supply by the inverter;
- when the inverter is switched manually to standby mode;
- if there is an effective power setting of <10% of the power rating (e.g. via the Fronius Power Control Card/Box);
- if there is insufficient solar irradiation (status codes "POWER LOW" and "DC LOW").

In the "Basic Service Menu" you can activate the "Energy Management" function and set a switch-on and switch-off point.

For access to the "Basic Service Menu," the code 22742 must be entered.

---

## Activating the "Energy Management" function



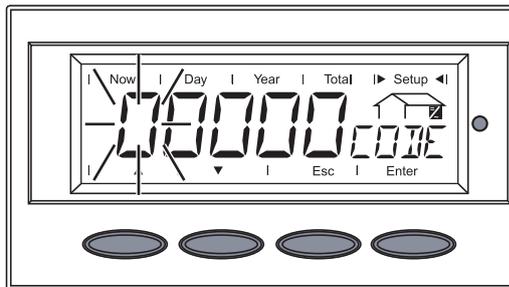
- 1 Press the "Menu" key

"Menu" is displayed.

- 2 Select the "Setup" mode using the "Left" or "Right" keys



- 3 Press the unassigned "Esc" key five times

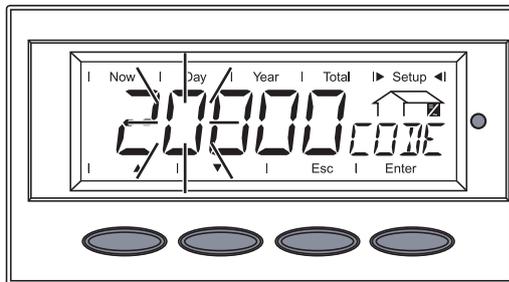


"CODE" is displayed, the first digit flashes.

- 4 Enter the access code 22742: Use the "Up" and "Down" keys to select a value for the first digit of the access code

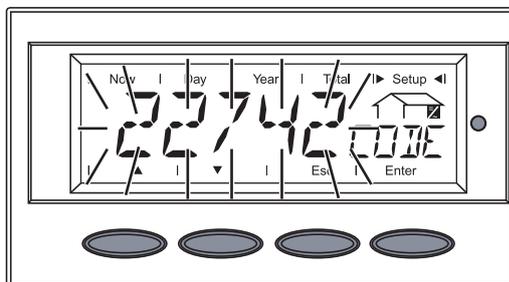


- 5 Press the "Enter" key



The second digit flashes.

- 6 Repeat steps 4 and 5 for the second, third, fourth and fifth digits of the access code until...

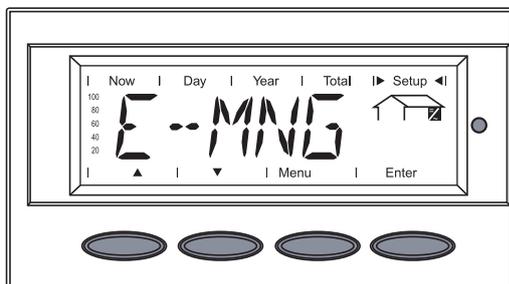


the access code flashes.

- 7 Press the "Enter" key

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

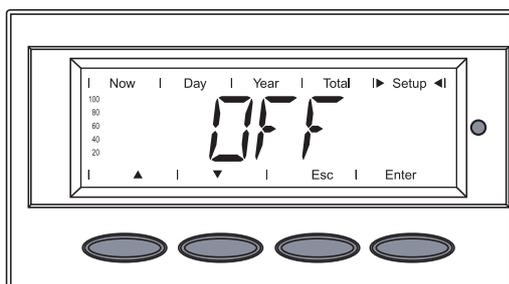
- "MIXMODE" for multiphase inverters
- "DCMODE" for single-phase inverters



- 8 Use the "Up" or "Down" keys to select the "E-MNG" parameter



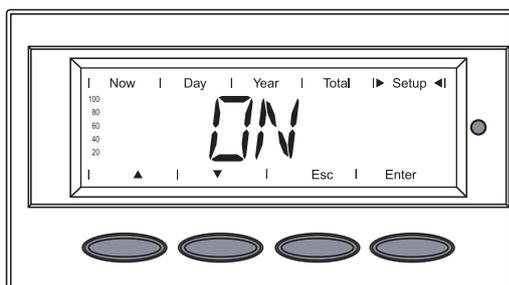
- 9 Press the "Enter" key



The current "Energy Management" status is displayed.

OFF The "Energy Management" function is deactivated (factory setting)

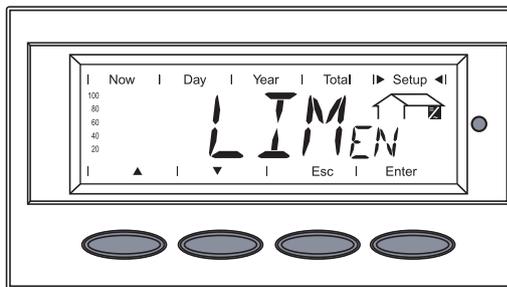
ON The "Energy Management" function is activated



- 10 To activate the Energy Management function, select "ON" using the "Up" or "Down" keys:



- 11 Press the "Enter" key

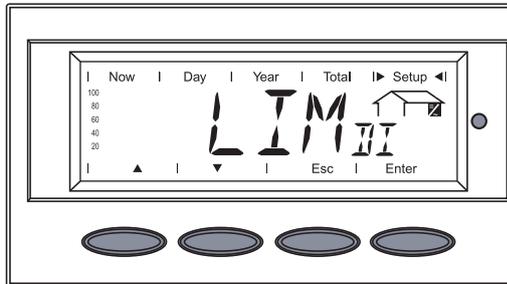


Effective power limits are displayed:

LIM EN = Limit engage (switch-on point)

Effective power limit, beyond which the switch contact is switched on

Factory setting: 20% of the power rating



LIM DI = Limit disengage (switch-off point)

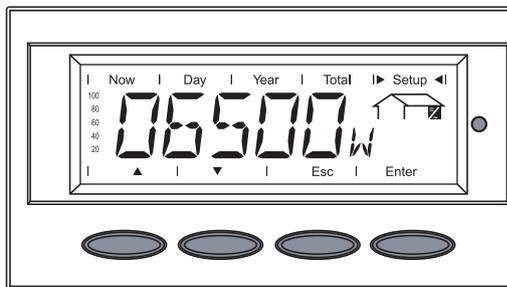
Effective power limit, beyond which the switch contact is switched off

Factory setting: 0

**12** Use the "Up" and "Down" keys to select the desired effective power limit:



**13** Press the "Enter" key



The current switch-on or switch-off point is displayed in W

**14** Altering the switch-on or switch-off point

To alter the switch-on or switch-off point:

a) Press the "Enter" key

The first digit of the value flashes.

b) Assign the appropriate value to a flashing digit using the "Up" or "Down" keys

c) Press the "Enter" key

d) Repeat the process for each digit until the whole value of the switch-on or switch-off point is flashing.

e) Press the "Enter" key

The value currently set for the switch-on or switch-off point is displayed.

f) Press the "Esc" key

The corresponding effective power limit is displayed.

Press the "Esc" key 3 times to exit the "Basic Service" menu.

### Notes on configuring the switch-on and switch-off points

Pay attention to the following when configuring the switch-on and switch-off points:

Insufficient difference between the switch-on point and the switch-off point or power fluctuations can cause frequent switching cycles.

To avoid excessive switching on and off, the difference between the switch-on and switch-off points should be at least 100 - 200 W.

When selecting the switch-off point, consider the power consumption of the connected user.

When selecting the switch-on point also bear in mind the weather conditions and the expected solar radiation.

---

**Example**

Switch-on point 'LIM EN' = 2000 W

Switch off point 'LIM DI' = 1800 W

If the inverter supplies 2000 W or more, the potential free signal contact on the Fronius Signal Card is switched on.

If the inverter output sinks below 1800 W, the signal contact is switched off.

Possible applications:

Operation of a heat pump or an air-conditioning system, using as much self-produced power as possible.

# Status Diagnosis and Troubleshooting

---

## Displaying Status Codes

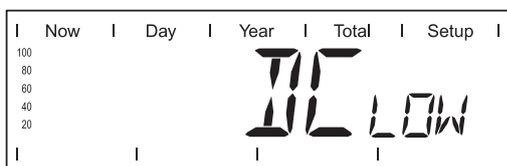
Your inverter is equipped with a self diagnostic system that automatically identifies a large number of possible operation issues by itself and displays them on the screen. This enables you to know immediately if there are any malfunctions in the inverter, the photovoltaic system or any installation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

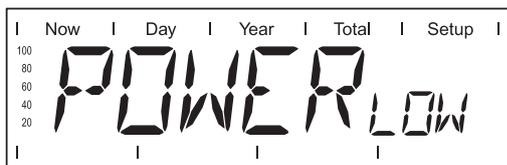
---

## Normal Operation Status Codes



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

As soon as the open circuit voltage exceeds 265 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

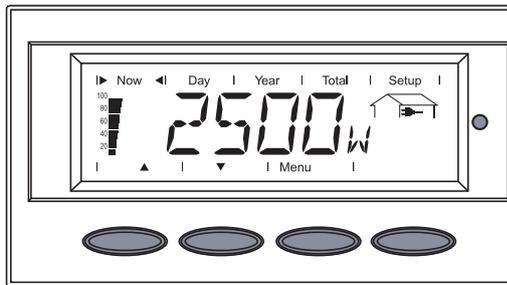
Open circuit voltage > 265 V ... may indicate a basic fault in the inverter. In this case, notify a Fronius-trained service engineer.

---

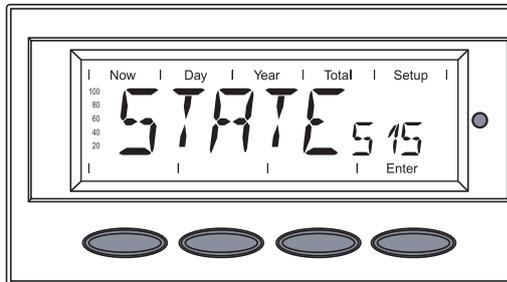
## Status Codes on Inverters with Several Power Stage Sets

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."

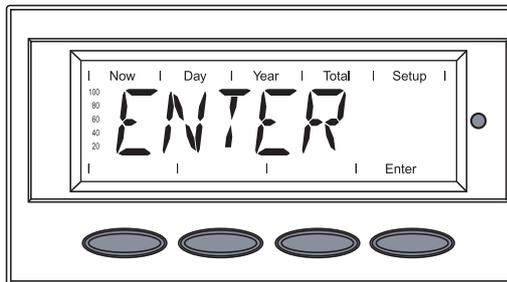


Display during normal operation



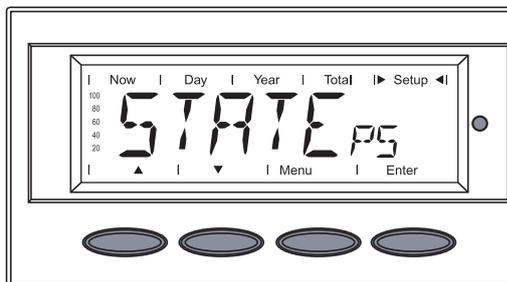
When there is an error in one of the power stage sets, the display flashes between "STATE" and the corresponding status code (e.g., "STATE 515")

and



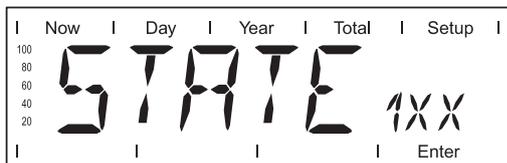
"ENTER"

- 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  
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, breakers and disconnect  
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  
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  
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  
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**

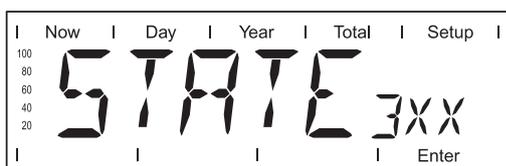
**General grid error**

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  
Should the status code persist, you should contact your system installer

**Class 3 status codes**



Class 3 comprises status codes that may appear during feed-in operation and 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)**

**Description** Short interruption of power feeding into the grid due to overcurrent.  
The inverter returns to the startup phase.

**Remedy** Fault is rectified automatically  
If this status code keeps recurring, contact your system installer

**302**

**Overcurrent (DC)**

**Description** Short interruption of power feeding into the grid due to overcurrent.  
The inverter returns to the startup phase.

**Remedy** Fault is rectified automatically  
If this status code keeps recurring, contact your system installer

**303**

**Over-temperature buck converter**

Description	Short interruption of power feeding into the grid due to over-temperature. The inverter returns to the startup phase.
Remedy	Fault is rectified automatically If this status code keeps recurring, contact your system installer

---

### 304

Over-temperature cooling element

Description	Short interruption of power feeding into the grid due to over-temperature. The inverter returns to the startup phase.
Remedy	Fault is rectified automatically If this status code keeps recurring, contact your system installer

---

### 305

No power transfer to grid possible

Description	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.

Description	Short interruption of power feeding into the grid. The inverter returns to the startup phase.
Remedy	Fault is rectified automatically 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.

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

---

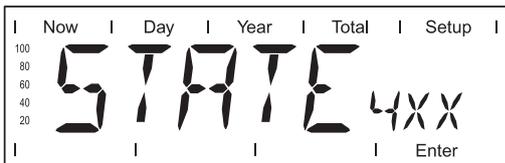
### 308

Intermediate circuit voltage too high.

Description	Short interruption of power feeding into the grid. The inverter returns to the startup phase.
Remedy	Fault is rectified automatically 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 technician.

**401**

No internal communication with power stage set

**Description** The inverter will automatically attempt to connect again and, if possible, resume feeding power into the grid

**Remedy** Check grid connections and fuses  
If status code persists: Contact a Fronius-trained service technician

**402**

Communication with EEPROM not possible

**Description** The inverter will automatically attempt to connect again and, if possible, resume feeding power into the grid.

**Remedy** If status code persists: Contact a Fronius-trained service technician

**403**

EEPROM faulty

**Description** The inverter will automatically attempt to connect again and, if possible, resume feeding power into the grid.

**Remedy** If status code persists: Contact a Fronius-trained service technician

**406**

One or both temperature sensors are defective

**Description** The inverter disconnects from the grid for safety reasons.

**Remedy** If status code persists: Contact a Fronius-trained service technician

**407**

Temperature sensor at cooling element defective

**Description** The inverter disconnects from the grid for safety reasons.

**Remedy** If status code persists: Contact a Fronius-trained service technician

**408**

Direct current feed in

**Description** The inverter disconnects from the grid for safety reasons.

Remedy	If status code persists: Contact a Fronius-trained service technician
<hr/>	
<b>412</b>	
The "fixed voltage" setting has been selected instead of MPP voltage operation and the voltage is set to too low a value, or DC voltage exceeds allowable limits.	
Description	Fixed voltage lower than the current MPP voltage.
Remedy	Remove excess solar modules so DC voltage fits within inverter limits If the status code persists: Contact a Fronius-trained service technician
<hr/>	
<b>413</b>	
Control problems	
Description	The inverter briefly disconnects from the grid if AC voltage or frequency are out of range.
Remedy	If status code persists: Contact a Fronius-trained service technician
<hr/>	
<b>414</b>	
EEPROM faulty	
Description	Memory deleted
Remedy	If status code persists: Contact a Fronius-trained service technician
<hr/>	
<b>416</b>	
Communication with IG Brain not possible.	
Description	The Operating Status LED lights up orange, then the inverter attempts a restart.
Remedy	If status code persists: Contact a Fronius-trained service technician
<hr/>	
<b>417</b>	
Two power stage sets have the same PC board number	
Description	The inverter stops feeding power into the grid, the display shows a critical error via a red Operating Status LED
Remedy	If status code persists: Contact a Fronius-trained service technician
<hr/>	
<b>419</b>	
Two or more power stage sets with an identical software serial number detected.	
Description	The inverter stops feeding power into the grid, the display shows a critical error via a red Operating Status LED
Remedy	If status code persists: Contact a Fronius-trained service technician
<hr/>	

**421**

PC board number has been set incorrectly

Description The inverter stops feeding power into the grid, the display shows a critical error via a red Operating Status LED.

Remedy If status code persists: Contact a Fronius-trained service technician

---

**425**

Communication with the power stage set is not possible

Description The Operating Status LED lights up orange, then the inverter attempts a restart.

Remedy If status code persists: Contact a Fronius-trained service technician

---

**431**

All power stage sets are in boot mode

Description The inverter stops feeding power into the grid, the display shows a critical error via a red Operating Status LED.

Remedy Update firmware using Bootloader or Fronius Solar.update/IG Plus

---

**Switches between SLAVE / DC LOW or SLAVE / POWER LOW (439)**

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

Description The inverter stops feeding power into the grid, the display shows a critical error via a red Operating Status LED.

Remedy If status code persists: Contact a Fronius-trained service technician

---

**Switches between SLAVE / DC LOW or SLAVE / POWER LOW (439)**

The MPP master power stage set is switched off because of a faulty GFDI grounding fuse.

Description The inverter stops feeding power into the grid, the display shows a critical error via a red Operating Status LED.

Remedy Check the GFDI grounding fuse and replace it, if necessary. If status code persists: Contact a Fronius-trained service technician

---

**442**

No phase master for a phase

Description The inverter stops feeding power into the grid, the display shows a critical error via a red Operating Status LED.

Remedy If status code persists: Contact a Fronius-trained service technician

---

**443**

Energy transfer not possible

Description                      The inverter stops feeding power into the grid, the display shows a critical error via a red Operating Status LED.

Remedy                              If status code persists: Contact a Fronius-trained service technician

---

**445**

Invalid power stage set configuration

Description                      The inverter stops feeding power into the grid, the display shows a critical error via a red Operating Status LED.

Remedy                              If status code persists: Contact a Fronius-trained service technician

---

**450**

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

Description                      The inverter stops feeding power into the grid, the display shows a critical error via a red Operating Status LED.

Remedy                              If status code persists: Contact a Fronius-trained service technician

---

**451**

The EEPROM Guard Control is defective

Description                      The inverter stops feeding power into the grid, the display shows a critical error via a red Operating Status LED.

Remedy                              If status code persists: Contact a Fronius-trained service technician

---

**452**

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

Description                      The inverter stops feeding power into the grid, the display shows a critical error via a red Operating Status LED.

Remedy                              If status code persists: Contact a Fronius-trained service technician

---

**453**

Error in grid voltage recording

Description                      The inverter stops feeding power into the grid, the display shows a critical error via a red Operating Status LED.

Remedy                              If status code persists: Contact a Fronius-trained service technician

---

**454**

Error in grid frequency recording

Description	The inverter stops feeding power into the grid, the display shows a critical error via a red Operating Status LED.
Remedy	If status code persists: Contact a Fronius-trained service technician

**455**

Reference power source for AC measurement is operating outside of tolerances

Description	The inverter stops feeding power into the grid, the display shows a critical error via a red Operating Status LED.
Remedy	If status code persists: Contact a Fronius-trained service technician

**456**

Error during anti-islanding test

Description	The inverter stops feeding power into the grid, the display shows a critical error via a red Operating Status LED.
Remedy	If status code persists: Contact a Fronius-trained service technician

**457**

Grid relay stuck

Description	The inverter stops feeding power into the grid, the display shows a critical error via a red Operating Status LED.
Remedy	If status code persists: Contact a Fronius-trained service technician

**460**

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

Description	The inverter stops feeding power into the grid, the display shows a critical error via a red Operating Status LED.
Remedy	If status code persists: Contact a Fronius-trained service technician

**461**

Error in DSP data memory

Description	The inverter stops feeding power into the grid, the display shows a critical error via a red Operating Status LED.
Remedy	If status code persists: Contact a Fronius-trained service technician

**464**

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

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

Remedy	Update firmware using 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.

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

Remedy	If status code persists: Contact a Fronius-trained service technician
--------	---

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#### 466

##### Display error

The display was not detected.

Description	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 If status code persists: Contact a Fronius-trained service technician
--------	---

---

#### 467

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

Description	The inverter will automatically attempt to connect again and, if possible, resume feeding power into the grid.
-------------	--

Remedy	If status code persists: Contact a Fronius-trained service technician
--------	---

---

#### 469

Output choke connected to wrong poles

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

Remedy	Properly connect output choke If status code persists: Contact a Fronius-trained service technician
--------	--

---

#### 470

The buck converter relay does not open at high DC voltage

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

Remedy	Check system configuration If status code persists: Contact a Fronius-trained service technician
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#### 471

Defective fuse for 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 after a specific period of time after the status code 551 is displayed.

Description	The inverter stops feeding power into the grid, the display shows a critical error via a red Operating Status LED.
Remedy	Insert new fuse for the solar module ground so that the solar modules are grounded at the negative or positive pole. Fault is rectified automatically 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

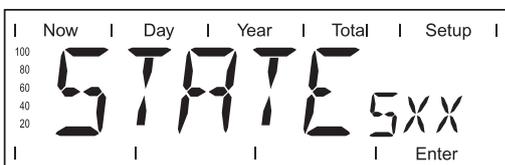
Description	The inverter stops feeding power into the grid, the display shows a critical error via a red Operating Status LED.
Remedy	Insert new high ohm resistor for solar module ground. Remedy external insulation fault Fault is rectified automatically If this status code keeps recurring, contact your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

**475**

DC insulation fault  
The insulation value of the DC terminals to the protective earth (PE) is  $\leq 500$  kilohms

Description	The inverter interrupts feed-in operation
Remedy	Correct insulation fault

**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
- error message disappears

**502**

DC insulation fault

Description	While automatically measuring the insulation, the inverter has detected an insulation fault to the ground.
Remedy	Check the insulation of your photovoltaic system The status code reappears: contact your system installer

**504**

No Solar Net communication possible

Description	Inverter address issued twice.
Remedy	Change inverter address (section: 'The Setup menu')

Description	The Solar Net components required are in the inverter: However, communication is still not currently possible.
Remedy	Status code will disappear after changing the inverter address
<b>505</b>	
EEPROM faulty	
Description	Data from the Setup menu are lost.
Remedy	Remedied automatically
<b>506</b>	
EEPROM faulty	
Description	Data from the 'Total' menu are lost.
Remedy	Remedied automatically
<b>507</b>	
EEPROM faulty	
Description	Data from the 'Day' / 'Year' menu are lost.
Remedy	Remedied automatically
<b>508</b>	
Inverter address incorrect	
Description	Address for data communication is no longer saved.
Remedy	Set address again
<b>509</b>	
24h no feed in	
Description	Example: solar modules covered with snow
Remedy	Example: remove snow from solar modules
<b>510</b>	
EEPROM faulty	
Description	SMS settings were restored to default.
Remedy	If necessary, reconfigure SMS
<b>511</b>	
EEPROM faulty	
Description	Sensor card settings were restored to default
Remedy	If necessary, reconfigure measuring channels
<b>512</b>	
Too many power stage sets in the system	

Description	The Solar Net components required are in the inverter: However, communication is still not currently possible.
Remedy	Status code will disappear after changing the inverter address
<b>505</b>	
EEPROM faulty	
Description	Data from the Setup menu are lost.
Remedy	Remedied automatically
<b>506</b>	
EEPROM faulty	
Description	Data from the 'Total' menu are lost.
Remedy	Remedied automatically
<b>507</b>	
EEPROM faulty	
Description	Data from the 'Day' / 'Year' menu are lost.
Remedy	Remedied automatically
<b>508</b>	
Inverter address incorrect	
Description	Address for data communication is no longer saved.
Remedy	Set address again
<b>509</b>	
24h no feed in	
Description	Example: solar modules covered with snow
Remedy	Example: remove snow from solar modules
<b>510</b>	
EEPROM faulty	
Description	SMS settings were restored to default.
Remedy	If necessary, reconfigure SMS
<b>511</b>	
EEPROM faulty	
Description	Sensor card settings were restored to default
Remedy	If necessary, reconfigure measuring channels
<b>512</b>	
Too many power stage sets in the system	

Description	The Solar Net components required are in the inverter: However, communication is still not currently possible.
Remedy	Status code will disappear after changing the inverter address
<b>505</b>	
EEPROM faulty	
Description	Data from the Setup menu are lost.
Remedy	Remedied automatically
<b>506</b>	
EEPROM faulty	
Description	Data from the 'Total' menu are lost.
Remedy	Remedied automatically
<b>507</b>	
EEPROM faulty	
Description	Data from the 'Day' / 'Year' menu are lost.
Remedy	Remedied automatically
<b>508</b>	
Inverter address incorrect	
Description	Address for data communication is no longer saved.
Remedy	Set address again
<b>509</b>	
24h no feed in	
Description	Example: solar modules covered with snow
Remedy	Example: remove snow from solar modules
<b>510</b>	
EEPROM faulty	
Description	SMS settings were restored to default.
Remedy	If necessary, reconfigure SMS
<b>511</b>	
EEPROM faulty	
Description	Sensor card settings were restored to default
Remedy	If necessary, reconfigure measuring channels
<b>512</b>	
Too many power stage sets in the system	

Description	Too many power stage sets have been detected in the system.
Remedy	If status code persists: Contact 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 status code persists: Contact a Fronius-trained service technician
--------	---

**515**

Faulty plug connections

Description	Temperature sensor on cooling element faulty or not connected properly.
-------------	---

Remedy	If status code persists: Contact a Fronius-trained service technician
--------	---

**516**

Status codes present for one of the power stage sets.

Description	It is not possible to activate all power stage sets
-------------	---

Remedy	Carry out analysis. For more information, see the 'The setup menu' section. If status code persists: Contact a Fronius-trained service technician
--------	---

**517**

Change of master has taken place.

Description	Transformer not connected / not plugged in Bridge short-circuit Detection of intermediate circuit voltage damaged
-------------	---

Remedy	Check possible errors referred to in 'Description.' If status code persists: Contact a Fronius-trained service technician
--------	---

**550**

String fuse defective.

Description	One or more string fuses are defective.
-------------	---

Remedy	Test string fuses and replace any that are defective
--------	--

**550**

Jumper set incorrectly

Description The jumper on the C-Box PC board was not reset to the 'SMon' position after the solar module strings were checked

Remedy Set the jumper on the C-Box PC board 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 new fuse for the solar module ground so that the solar modules are grounded at the negative or positive pole.  
Fault is rectified automatically  
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 status code persists: Contact a Fronius-trained service technician

---

**558**

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

Description A feature had to be deactivated (e.g., after component replacement).  
The status code is no longer displayed after the next DC disconnect.

Remedy Confirm error, update firmware using Bootloader or Fronius Solar.update/IG Plus, if required  
(The inverter will also operate problem-free without updating the firmware)

---

**559**

"Low Voltage Ride Through" event

Description Grid voltage parameters outside of the limits have caused a grid voltage gap. The inverter attempts to bridge the grid voltage gap.

Remedy Fault is corrected automatically when grid parameters return to normal  
If this status code keeps recurring, contact your system installer

---

**560**

Power reduction due to over-frequency

Description The inverter reduces output power due to excessive grid frequency in order to stabilize the grid.

Remedy	Fault is corrected automatically when the grid frequency returns to normal If this status code keeps recurring, contact your system installer
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**561**

Power reduction due to excessive power stage set temperature

Description	The inverter reduces output power due to excessive ambient temperature.
-------------	---

Remedy	Error is corrected automatically after cooling down
--------	---

---

**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.

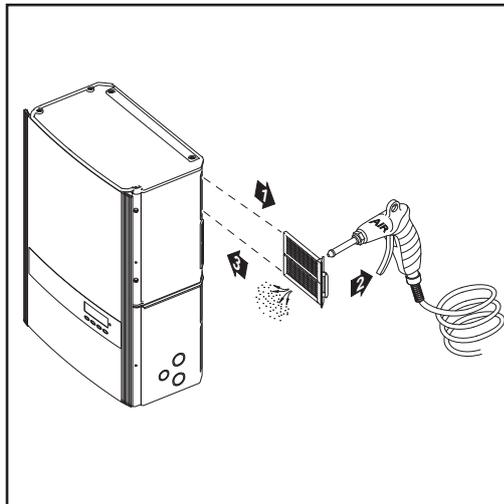
---

## 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.

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## 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.

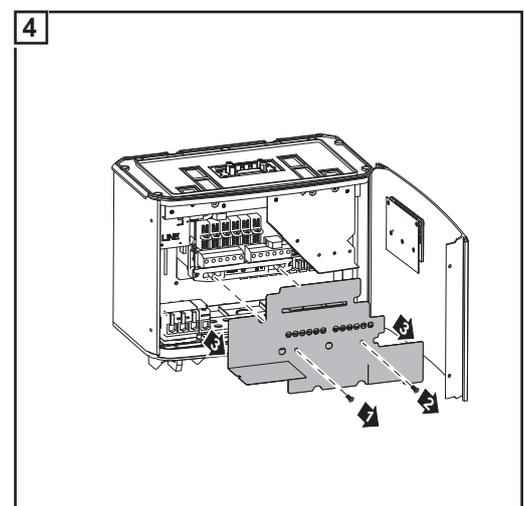
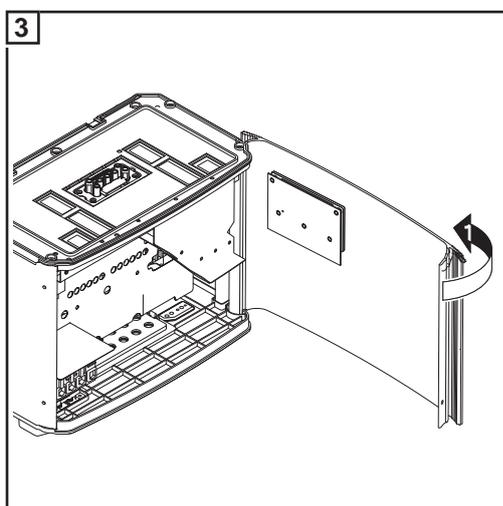
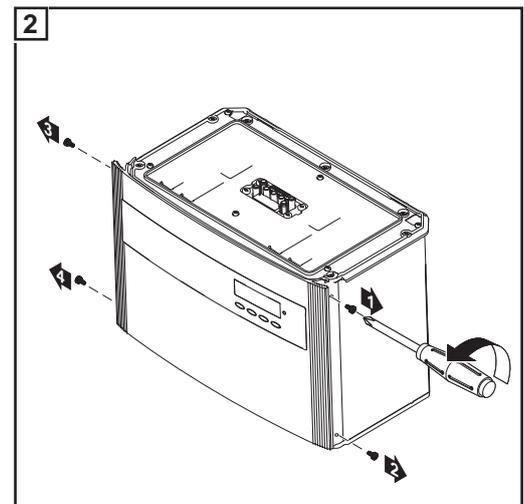
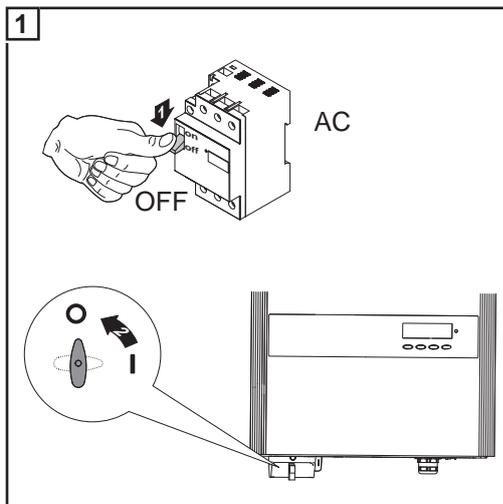
The DC main switch is only used to switch off power to the power stage set. When the DC main switch is turned off, the connection area is still energized.



**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



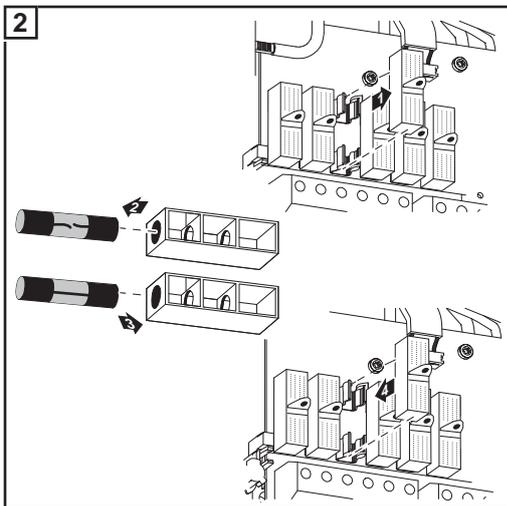
### Replacing Fuses

- 1 Test the fuse holder at the terminal for continuity



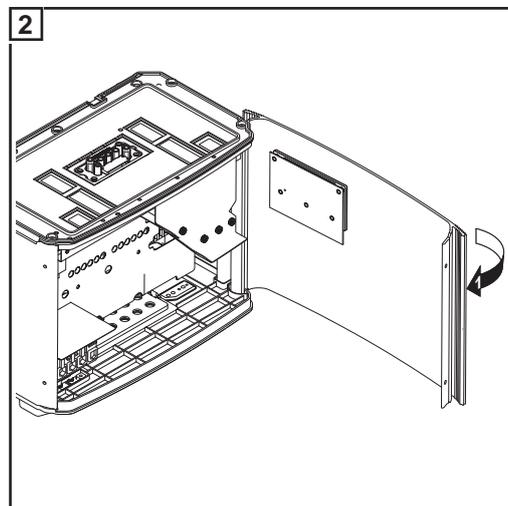
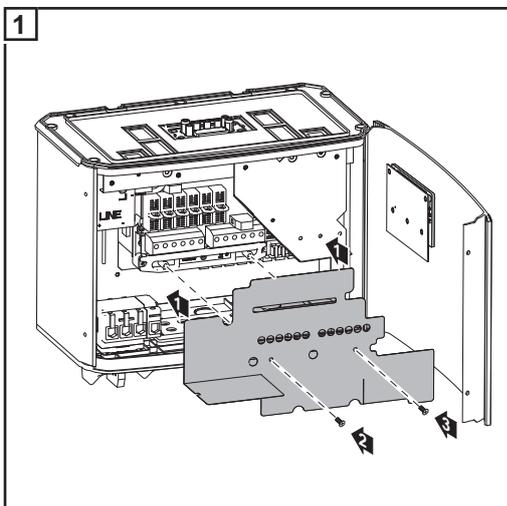
**NOTE!** Only use fuses for solar modules that meet the criteria for the proper selection of string fuses.

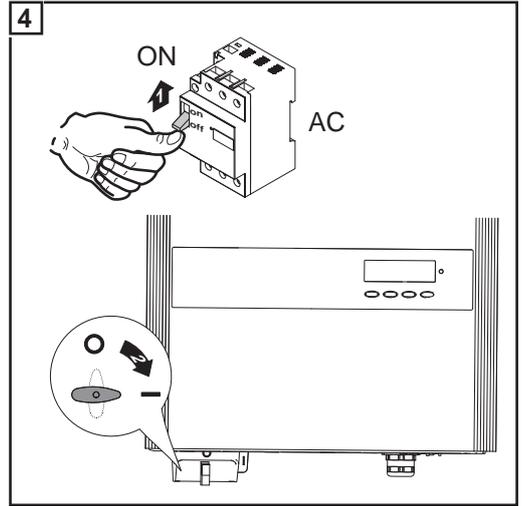
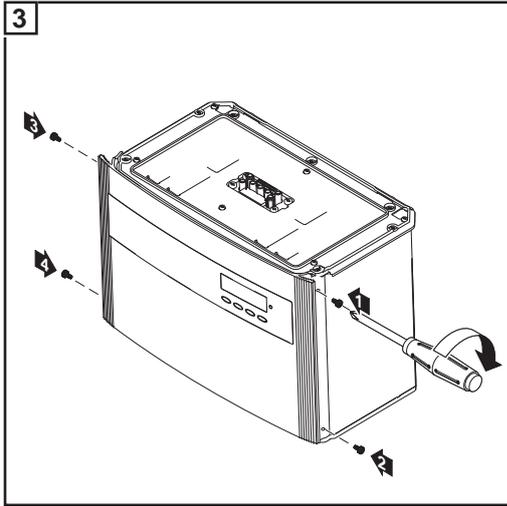
Fuse dimensions: Diameter 10.3 x 35 - 38 mm



- 3 After replacing the fuse:
  - Find out and correct the cause for the defective fuse

### Finally...





# Technical data

## Fronius IG Plus 25 V-1

### Input data

MPP voltage range	230 - 500 V DC
Max. input voltage (at 1000 W/m <sup>2</sup> / -10 °C in an open circuit)	600 V DC
Max. input current	11.9 A DC
Max. array short circuit current	17.9 A

### Output data

Nominal output power ( $P_{nom}$ )	2.6 kW
Max output power	2.6 kW
Nominal AC output voltage	1 ~ NPE 230 V
Grid voltage tolerance	+10 / -15 % <sup>1)</sup>
Nominal output current (single phase)	11.3 A AC
Nominal frequency	50 - 60 Hz <sup>1)</sup>
Harmonic distortion	< 3,0 %
Power factor (cos phi)	1 0.75 - 1 ind./cap. <sup>2)</sup>
Max. permitted grid impedance $Z_{max}$ at PCC <sup>3)</sup>	None
Maximum continuous utility backfeed current <sup>4)</sup>	0 A <sup>5)</sup>
Synchronization in-rush current <sup>6)</sup>	0 A <sup>5)</sup>
Maximum output fault current / duration	346 A / 3.24 $\mu$ s

### General data

Maximum efficiency	95.7 %
Euro. efficiency	94.6 %
Night consumption	0.23 W
Cooling	Controlled forced-air ventilation
Degree of protection	IP 54 in Australia, IP 44
Dimensions h x w x d	673 x 434 x 250 mm
Weight	23.8 kg
Permissible ambient temperature (with 95% rel. humidity)	- 20 °C - +55 °C
EMC emissions class	B
Over-voltage category (OVC)	AC 3 / DC 2

### Safety equipment

DC insulation measurement	Warning / Shutdown <sup>7)</sup> at $R_{ISO} < 600$ kilohms
DC over-voltage protection	integrated
Protection against reverse polarity	integrated
Manifestation of DC overload	Operating point shift

**Fronius IG Plus  
30 V-1**

Input data

MPP voltage range	230 - 500 V DC
Max. input voltage (at 1000 W/m <sup>2</sup> / -10 °C in an open circuit)	600 V DC
Max. input current	13.8 A DC
Max. array short circuit current	20.7 A

Output data

Nominal output power (P <sub>nom</sub> )	3.0 kW
Max output power	3.0 kW
Nominal AC output voltage	1 ~ NPE 230 V
Grid voltage tolerance	+10 / -15 % <sup>1)</sup>
Nominal output current (single phase)	13.0 A AC
Nominal frequency	50 - 60 Hz <sup>1)</sup>
Harmonic distortion	< 3,0 %
Power factor (cos phi)	1 0.75 - 1 ind./cap. <sup>2)</sup>
Max. permitted grid impedance Z <sub>max</sub> at PCC <sup>3)</sup>	None
Maximum continuous utility backfeed current <sup>4)</sup>	0 A <sup>5)</sup>
Synchronization in-rush current <sup>6)</sup>	0 A <sup>5)</sup>
Maximum output fault current / duration	346 A / 3.24 μs

General data

Maximum efficiency	95,7 %
Euro. efficiency	94,8 %
Night consumption	0.23 W
Cooling	Controlled forced-air ventilation
Degree of protection	IP 54 in Australia, IP 44
Dimensions h x w x d	673 x 434 x 250 mm
Weight	23.8 kg
Permissible ambient temperature (with 95% rel. humidity)	- 20 °C - +55 °C
EMC emissions class	B
Over-voltage category (OVC)	AC 3 / DC 2

Safety equipment

DC insulation measurement	Warning / Shutdown <sup>7)</sup> at R <sub>ISO</sub> < 600 kilohms
DC over-voltage protection	integrated
Protection against reverse polarity	integrated
Manifestation of DC overload	Operating point shift

**Fronius IG Plus  
35 V-1**
**Input data**

MPP voltage range	230 - 500 V DC
Max. input voltage (at 1000 W/m <sup>2</sup> / -10 °C in an open circuit)	600 V DC
Max. input current	16.2 A DC
Max. array short circuit current	24.3 A

**Output data**

Nominal output power (P <sub>nom</sub> )	3.5 kW
Max output power	3.5 kW
Nominal AC output voltage	1 ~ NPE 230 V
Grid voltage tolerance	+10 / -15 % <sup>1)</sup>
Nominal output current (single phase)	15.2 A AC
Nominal frequency	50 - 60 Hz <sup>1)</sup>
Harmonic distortion	< 3,0 %
Power factor (cos phi)	1 0.75 - 1 ind./cap. <sup>2)</sup>
Max. permitted grid impedance Z <sub>max</sub> at PCC <sup>3)</sup>	None
Maximum continuous utility backfeed current <sup>4)</sup>	0 A <sup>5)</sup>
Synchronization in-rush current <sup>6)</sup>	0 A <sup>5)</sup>
Maximum output fault current / duration	346 A / 3.24 μs

**General data**

Maximum efficiency	95,7 %
Euro. efficiency	95,0 %
Night consumption	0.23 W
Cooling	Controlled forced-air ventilation
Degree of protection	IP 54 in Australia, IP 44
Dimensions h x w x d	673 x 434 x 250 mm
Weight	23.8 kg
Permissible ambient temperature (with 95% rel. humidity)	- 20 °C - +55 °C
EMC emissions class	B
Over-voltage category (OVC)	AC 3 / DC 2

**Safety equipment**

DC insulation measurement	Warning / Shutdown <sup>7)</sup> at R <sub>ISO</sub> < 600 kilohms
DC over-voltage protection	integrated
Protection against reverse polarity	integrated
Manifestation of DC overload	Operating point shift

**Fronius IG Plus  
50 V-1**

Input data

MPP voltage range	230 - 500 V DC
Max. input voltage (at 1000 W/m <sup>2</sup> / -10 °C in an open circuit)	600 V DC
Max. input current	18.6 A DC
Max. array short circuit current	27.9 A

Output data

Nominal output power (P <sub>nom</sub> )	4 kW
Max output power	4 kW
Nominal AC output voltage	1 ~ NPE 230 V
Grid voltage tolerance	+10 / -15 % <sup>1)</sup>
Nominal output current (single phase)	17.4 A AC
Nominal frequency	50 - 60 Hz <sup>1)</sup>
Harmonic distortion	< 3,0 %
Power factor (cos phi)	1 0.75 - 1 ind./cap. <sup>2)</sup>
Max. permitted grid impedance Z <sub>max</sub> at PCC <sup>3)</sup>	261 megaohms
Maximum continuous utility backfeed current <sup>4)</sup>	0 A <sup>5)</sup>
Synchronization in-rush current <sup>6)</sup>	0 A <sup>5)</sup>
Maximum output fault current / duration	346 A / 3.24 μs

General data

Maximum efficiency	95,7 %
Euro. efficiency	95 %
Night consumption	0.23 W
Cooling	Controlled forced-air ventilation
Degree of protection	IP 54 in Australia, IP 44
Dimensions l x w x h	673 x 434 x 250 mm
Weight	23.8 kg
Permissible ambient temperature (with 95% rel. humidity)	- 20 °C - +55 °C
EMC emissions class	B
Over-voltage category (OVC)	AC 3 / DC 2

Safety equipment

DC insulation measurement	Warning / Shutdown <sup>7)</sup> at R <sub>ISO</sub> < 600 kilohms
DC over-voltage protection	integrated
Protection against reverse polarity	integrated
Manifestation of DC overload	Operating point shift

**Fronius IG Plus  
55 V-1,  
Fronius IG Plus  
55 V-2**
**Input data**

MPP voltage range	230–500 V DC
Max. input voltage (at 1000 W/m <sup>2</sup> / -10 °C in an open circuit)	600 V DC
Max. input current	37.1 A DC
Max. short circuit current of the solar modules	22.9 A

**Output data**

Nominal output power (P <sub>nom</sub> )	5 kW
Max. output power	5 kW
Nominal mains voltage	1 ~ NPE 230 V 2 ~ NPE 400 / 230 V
Mains voltage tolerance	+10 / -15% <sup>1)</sup>
Nominal output current	single-phase 21.7 A AC two-phase 10.9 A AC
Nominal frequency	50 - 60 Hz <sup>1)</sup>
Distortion factor	< 3 %
Power factor (cos phi)	1 0.75 - 1 ind./cap. <sup>2)</sup>
Max. permitted mains impedance Z <sub>max</sub> at PCC <sup>3)</sup>	single-phase 207 mOhm two-phase none
Max. recovery current <sup>4)</sup>	0 A <sup>5)</sup>
Switch-on current pulse <sup>6)</sup>	0 A <sup>5)</sup>
Maximum output fault current / duration	426 A / 125 μs

**General data**

Maximum efficiency	95.7%
Europ. efficiency	94.9 %
Night consumption	single-phase 0.36 W two-phase 0.50 W
Cooling	Controlled forced-air ventilation
Degree of protection	IP 54 in Australia, IP 44
Dimensions h x w x d	968 x 434 x 250 mm
Weight	36.9 kg
Permissible ambient temperature (at 95% rel. humidity)	- 20 °C - +55 °C
EMC emission class	B
Overvoltage category (OVC)	AC 3 / DC 2

**Safety equipment**

DC insulation measurement	Warning / Shutdown <sup>7)</sup> at R <sub>ISO</sub> < 600 kOhm
DC overvoltage protection	integrated
Reverse polarity protection	integrated
Manifestation of DC overload	Operating point shift

**Fronius IG Plus  
55 V-3**

Input data

MPP voltage range	230 - 500 V DC
Max. input voltage (at 1000 W/m <sup>2</sup> / -10 °C in an open circuit)	600 V DC
Max. input current	22.8 A DC
Max. array short circuit current	34.2 A

Output data

Nominal output power (P <sub>nom</sub> )	5 kW
Max output power	5 kW
Nominal AC output voltage	3 ~ NPE 400 / 230 V
Grid voltage tolerance	+10 / -15 % <sup>1)</sup>
Nominal output current (three-phase)	7.3 A AC
Nominal frequency	50 - 60 Hz <sup>1)</sup>
Harmonic distortion	< 3.0 %
Power factor (cos phi)	1 0.75 - 1 ind./cap. <sup>2)</sup>
Max. permitted grid impedance Z <sub>max</sub> at PCC <sup>3)</sup>	None
Maximum continuous utility backfeed current <sup>4)</sup>	0 A <sup>5)</sup>
Synchronization in-rush current <sup>6)</sup>	0 A <sup>5)</sup>
Maximum output fault current / duration	504 A / 30.26 ms

General data

Maximum efficiency	95.9 %
Euro. efficiency	94.9 %
Night consumption	1.72 W
Cooling	Controlled forced-air ventilation
Degree of protection	IP 54 in Australia, IP 44
Dimensions h x w x d	1263 x 434 x 250 mm
Weight	49.2 kg
Permissible ambient temperature (with 95% rel. humidity)	- 20 °C - +55 °C
EMC emissions class	B
Over-voltage category (OVC)	AC 3 / DC 2

Safety equipment

DC insulation measurement	Warning / Shutdown <sup>7)</sup> at R <sub>ISO</sub> < 600 kilohms
DC over-voltage protection	integrated
Protection against reverse polarity	integrated
Manifestation of DC overload	Operating point shift

**Fronius IG Plus  
60 V-1,  
Fronius IG Plus  
60 V-2**
**Input data**

MPP voltage range	230 - 500 V DC
Max. input voltage (at 1000 W/m <sup>2</sup> / -10°C in an open circuit)	600 V DC
Max. input current	27.5 A DC
Max. short circuit current of the solar modules	41.3 A

**Output data**

Nominal output power (P <sub>nom</sub> )	6 kW
Max output power	6 kW
Nominal mains voltage	1 ~ NPE 230 V 2 ~ NPE 400 / 230 V
Mains voltage tolerance	+10 / -15% <sup>1)</sup>
Nominal output current	single-phase 26.1 A AC two-phase 13.0 A AC
Nominal frequency	50 - 60 Hz <sup>1)</sup>
Distortion factor	< 3.0%
Power factor (cos phi)	1 0.75 - 1 ind./cap. <sup>2)</sup>
Max. permitted mains impedance Z <sub>max</sub> at PCC <sup>3)</sup>	single-phase 173 mOhm two-phase none
Max. recovery current <sup>4)</sup>	0 A <sup>5)</sup>
Switch-on current pulse <sup>6)</sup>	0 A <sup>5)</sup>
Maximum output fault current / duration	426 A / 125 μs

**General data**

Maximum efficiency	95.7%
Europ. efficiency	95.0%
Night consumption	single-phase 0.36 W two-phase 0.50 W
Cooling	Controlled forced-air ventilation
Degree of protection	IP 54 in Australia, IP 44
Dimensions h x w x d	968 x 434 x 250 mm
Weight	36.9 kg
Permissible ambient temperature (at 95% rel. humidity)	- 20 °C - +55 °C
EMC emission class	B
Overvoltage category (OVC)	AC 3 / DC 2

**Safety equipment**

DC insulation measurement	Warning / Shutdown <sup>7)</sup> at R <sub>ISO</sub> < 600 kOHM
DC overvoltage protection	integrated
Reverse polarity protection	integrated
Manifestation of DC overload	Operating point shift

**Fronius IG Plus  
60 V-3**

Input data

MPP voltage range	230 - 500 V DC
Max. input voltage (at 1000 W/m <sup>2</sup> / -10 °C in an open circuit)	600 V DC
Max. input current	27.5 A DC
Max. array short circuit current	41.3 A

Output data

Nominal output power (P <sub>nom</sub> )	6 kW
Max output power	6 kW
Nominal AC output voltage	3 ~ NPE 400 / 230 V
Grid voltage tolerance	+10 / -15 % <sup>1)</sup>
Nominal output current (three-phase)	8.7 A AC
Nominal frequency	50 - 60 Hz <sup>1)</sup>
Harmonic distortion	< 3.0 %
Power factor (cos phi)	1 0.75 - 1 ind./cap. <sup>2)</sup>
Max. permitted grid impedance Z <sub>max</sub> at PCC <sup>3)</sup>	None
Maximum continuous utility backfeed current <sup>4)</sup>	0 A <sup>5)</sup>
Synchronization in-rush current <sup>6)</sup>	0 A <sup>5)</sup>
Maximum output fault current / duration	504 A / 30.26 μs

General data

Maximum efficiency	95.9 %
Euro. efficiency	95.0 %
Night consumption	1.72 W
Cooling	Controlled forced-air ventilation
Degree of protection	IP 54 in Australia, IP 44
Dimensions h x w x d	1263 x 434 x 250 mm
Weight	49.2 kg
Permissible ambient temperature (with 95% rel. humidity)	- 20 °C - +55 °C
EMC emissions class	B
Over-voltage category (OVC)	AC 3 / DC 2

Safety equipment

DC insulation measurement	Warning / Shutdown <sup>7)</sup> at R <sub>ISO</sub> < 600 kilohms
DC over-voltage protection	integrated
Protection against reverse polarity	integrated
Manifestation of DC overload	Operating point shift

**Fronius IG Plus  
70 V-1,  
Fronius IG Plus  
70 V-2**

Input data		
MPP voltage range		230 - 500 V DC
Max. input voltage (at 1000 W/m <sup>2</sup> / -10 °C in an open circuit)		600 V DC
Max. input current		30 A DC
Max. array short circuit current		45.0 A
Output data		
Nominal output power (P <sub>nom</sub> )		6.5 kW
Max output power		6.5 kW
Nominal AC output voltage		1 ~ NPE 230 V 2 ~ NPE 400 / 230 V
Grid voltage tolerance		+10 / -15 % <sup>1)</sup>
Nominal output current	single phase two-phase	28.3 A AC 14.1 A AC
Nominal frequency		50 - 60 Hz <sup>1)</sup>
Harmonic distortion		< 3.0 %
Power factor (cos phi)		1 0.75 - 1 ind./cap. <sup>2)</sup>
Max. permitted grid impedance Z <sub>max</sub> at PCC <sup>3)</sup>	single-phase two-phase	161 milliohms none
Maximum continuous utility backfeed current <sup>4)</sup>		0 A <sup>5)</sup>
Synchronization in-rush current <sup>6)</sup>		0 A <sup>5)</sup>
Maximum output fault current / duration		426 A / 125 µs
General data		
Maximum efficiency		95.7 %
Euro. efficiency		95.1 %
Night consumption		0.36 W
Cooling		Controlled forced-air ventilation
Degree of protection		IP 54 in Australia, IP 44
Dimensions h x w x d		968 x 434 x 250 mm
Weight		36.9 kg
Permissible ambient temperature (with 95% rel. humidity)		- 20 °C - +55 °C
EMC emissions class		B
Over-voltage category (OVC)		AC 3 / DC 2
Safety equipment		
DC insulation measurement		Warning / Shutdown <sup>7)</sup> at R <sub>ISO</sub> < 600 kilohms
DC over-voltage protection		integrated
Protection against reverse polarity		integrated
Manifestation of DC overload		Operating point shift

**Fronius IG Plus  
80 V-3**

Input data

MPP voltage range	230 - 500 V DC
Max. input voltage (at 1000 W/m <sup>2</sup> / -10 °C in an open circuit)	600 V DC
Max. input current	32.0 A DC
Max. array short circuit current	48.0 A

Output data

Nominal output power (P <sub>nom</sub> )	7 kW
Max output power	7 kW
Nominal AC output voltage	3 ~ NPE 400 / 230 V
Grid voltage tolerance	+10 / -15 % <sup>1)</sup>
Nominal output current (three-phase)	10.2 A AC
Nominal frequency	50 - 60 Hz <sup>1)</sup>
Harmonic distortion	< 3.0 %
Power factor (cos phi)	1 0.75 - 1 ind./cap. <sup>2)</sup>
Max. permitted grid impedance Z <sub>max</sub> at PCC <sup>3)</sup>	None
Maximum continuous utility backfeed current <sup>4)</sup>	0 A <sup>5)</sup>
Synchronization in-rush current <sup>6)</sup>	0 A <sup>5)</sup>
Maximum output fault current / duration	504 A / 30.26 μs

General data

Maximum efficiency	95.9 %
Euro. efficiency	95.1 %
Night consumption	1.72 W
Cooling	Controlled forced-air ventilation
Degree of protection	IP 54 in Australia, IP 44
Dimensions h x w x d	1263 x 434 x 250 mm
Weight	49.2 kg
Permissible ambient temperature (with 95% rel. humidity)	- 20 °C - +55 °C
EMC emissions class	B
Over-voltage category (OVC)	AC 3 / DC 2

Safety equipment

DC insulation measurement	Warning / Shutdown <sup>7)</sup> at R <sub>ISO</sub> < 600 kilohms
DC over-voltage protection	integrated
Protection against reverse polarity	integrated
Manifestation of DC overload	Operating point shift

**Fronius IG Plus  
100 V-1,  
Fronius IG Plus  
100 V-2**

## Input data

MPP voltage range	230 - 500 V DC
Max. input voltage (at 1000 W/m <sup>2</sup> / -10 °C in an open circuit)	600 V DC
Max. input current	37.1 A DC
Max. array short circuit current	55.7 A

## Output data

Nominal output power (P <sub>nom</sub> )	8 kW
Max output power	8 kW
Nominal AC output voltage	1 ~ NPE 230 V 2 ~ NPE 400 / 230 V
Grid voltage tolerance	+10 / -15 % <sup>1)</sup>
Nominal output current	single-phase 34.8 A AC two-phase 17.4 A AC
Nominal frequency	50 - 60 Hz <sup>1)</sup>
Harmonic distortion	< 3 %
Power factor (cos phi)	1 0.75 - 1 ind./cap. <sup>2)</sup>
Max. permitted grid impedance Z <sub>max</sub> at PCC <sup>3)</sup>	single-phase 131 milliohms two-phase 262 milliohms
Maximum continuous utility backfeed current <sup>4)</sup>	0 A <sup>5)</sup>
Synchronization in-rush current <sup>6)</sup>	0 A <sup>5)</sup>
Maximum output fault current / duration	426 A / 125 µs

## General data

Maximum efficiency	95.7 %
Euro. efficiency	95.2 %
Night consumption	single-phase 0.36 W two-phase 0.50 W
Cooling	Controlled forced-air ventilation
Degree of protection	IP 54 in Australia IP 44
Dimensions h x w x d	968 x 434 x 250 mm
Weight	36.9 kg
Permissible ambient temperature (with 95% rel. humidity)	- 20 °C - +55 °C
EMC emissions class	B
Over-voltage category (OVC)	AC 3 / DC 2

## Safety equipment

DC insulation measurement	Warning / Shutdown <sup>7)</sup> at R <sub>ISO</sub> < 600 kilohms
DC over-voltage protection	integrated
Protection against reverse polarity	integrated
Manifestation of DC overload	Operating point shift

**Fronius IG Plus  
100 V-3**

Input data

MPP voltage range		230 - 500 V DC
Max. input voltage (at 1000 W/m <sup>2</sup> / -10 °C in an open circuit)		600 V DC
Max. input current	three-phase	36.7 A DC
Max. array short circuit current	three-phase	55.1 A

Output data

Nominal output power (P <sub>nom</sub> )		8 kW
Max output power		8 kW
Nominal AC output voltage		3 ~ NPE 400 / 230 V
Grid voltage tolerance		+10 / -15 % <sup>1)</sup>
Nominal output current	three-phase	11.6 A AC
Nominal frequency		50 - 60 Hz <sup>1)</sup>
Harmonic distortion		< 3 %
Power factor (cos phi)		1 0.75 - 1 ind./cap. <sup>2)</sup>
Max. permitted grid impedance Z <sub>max</sub> at PCC <sup>3)</sup>	three-phase	none
Maximum continuous utility backfeed current <sup>4)</sup>		0 A <sup>5)</sup>
Synchronization in-rush current <sup>6)</sup>		0 A <sup>5)</sup>
Maximum output fault current / duration	three-phase	504 A / 30.26 ms

General data

Maximum efficiency	three-phase	95.9 %
Euro. efficiency	three-phase	95.3 %
Night consumption	three-phase	1.72 W
Cooling		Controlled forced-air ventilation
Degree of protection		IP 54 in Australia IP 44
Dimensions h x w x d	three-phase	1263 x 434 x 250 mm
Weight	three-phase	49.2 kg
Permissible ambient temperature (with 95% rel. humidity)		- 20 °C - +55 °C
EMC emissions class		B
Over-voltage category (OVC)		AC 3 / DC 2

Safety equipment

DC insulation measurement	Warning / Shutdown <sup>7)</sup>	at R <sub>ISO</sub> < 600 kilohms
DC over-voltage protection		integrated
Protection against reverse polarity		integrated
Manifestation of DC overload		Operating point shift

**Fronius IG Plus  
120 V-3**
**Input data**

MPP voltage range	230 - 500 V DC
Max. input voltage (at 1000 W/m <sup>2</sup> / -10 °C in an open circuit)	600 V DC
Max. input current	46.2 A DC
Max. array short circuit current	69.3 A

**Output data**

Nominal output power (P <sub>nom</sub> )	10 kW
Max output power	10 kW
Nominal AC output voltage	3 ~ NPE 400 / 230 V
Grid voltage tolerance	+10 / -15 % <sup>1)</sup>
Nominal output current (three-phase)	14.5 A AC
Nominal frequency	50 - 60 Hz <sup>1)</sup>
Harmonic distortion	< 3.0 %
Power factor (cos phi)	1 0.75 - 1 ind./cap. <sup>2)</sup>
Max. permitted grid impedance Z <sub>max</sub> at PCC <sup>3)</sup>	None
Maximum continuous utility backfeed current <sup>4)</sup>	0 A <sup>5)</sup>
Synchronization in-rush current <sup>6)</sup>	0 A <sup>5)</sup>
Maximum output fault current / duration	504 A / 30.26 ms

**General data**

Maximum efficiency	95.9 %
Euro. efficiency	95.4 %
Night consumption	1.72 W
Cooling	Controlled forced-air ventilation
Degree of protection	IP 54 in Australia, IP 44
Dimensions h x w x d	1263 x 434 x 250 mm
Weight	49.2 kg
Permissible ambient temperature (with 95% rel. humidity)	- 20 °C - +55 °C
EMC emissions class	B
Over-voltage category (OVC)	AC 3 / DC 2

**Safety equipment**

DC insulation measurement	Warning / Shutdown <sup>7)</sup> at R <sub>ISO</sub> < 600 kilohms
DC over-voltage protection	integrated
Protection against reverse polarity	integrated
Manifestation of DC overload	Operating point shift

**Fronius IG Plus  
150 V-3**

Input data

MPP voltage range	230 - 500 V DC
Max. input voltage (at 1000 W/m <sup>2</sup> / -10 °C in an open circuit)	600 V DC
Max. input current	55.6 A DC
Max. array short circuit current	83.4 A

Output data

Nominal output power (P <sub>nom</sub> )	12 kW
Max output power	12 kW
Nominal AC output voltage	3 ~ NPE 400 / 230 V
Grid voltage tolerance	+10 / -15 % <sup>1)</sup>
Nominal output current (three-phase)	17.4 A AC
Nominal frequency	50 - 60 Hz <sup>1)</sup>
Harmonic distortion	< 3.0 %
Power factor (cos phi)	1 0.75 - 1 ind./cap. <sup>2)</sup>
Max. permitted grid impedance Z <sub>max</sub> at PCC <sup>3)</sup>	None
Maximum continuous utility backfeed current <sup>4)</sup>	0 A <sup>5)</sup>
Synchronization in-rush current <sup>6)</sup>	0 A <sup>5)</sup>
Maximum output fault current / duration	504 A / 30.26 μs

General data

Maximum efficiency	95.9 %
Euro. efficiency	95.4 %
Night consumption	1.72 W
Cooling	Controlled forced-air ventilation
Degree of protection	IP 54 in Australia, IP 44
Dimensions h x w x d	1263 x 434 x 250 mm
Weight	49.2 kg
Permissible ambient temperature (with 95% rel. humidity)	- 20 °C - +55 °C
EMC emissions class	B
Over-voltage category (OVC)	AC 3 / DC 2

Safety equipment

DC insulation measurement	Warning / Shutdown <sup>7)</sup> at R <sub>ISO</sub> < 600 kilohms
DC over-voltage protection	integrated
Protection against reverse polarity	integrated
Manifestation of DC overload	Operating point shift

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**Explanation of footnotes**

- 1) The values provided are standard values. If required, the inverter can be customized for a specific country.
- 2) Depending on the country setup or device-specific settings (ind. = inductive; cap. = capacitive)
- 3) PCC = interface to the public grid
- 4) Max. current from the inverter to the solar module when there is an error in the inverter, or when the insulation between the AC and DC wires is defective.
- 5) Assured by electrical design of the inverter
- 6) Peak current when turning on the inverter
- 7) Depending on the country setup

# Relevant Standards and Directives

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## **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.

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## **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.

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## **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.

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## **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).

# Terms and conditions of warranty and disposal

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## **Fronius manufacturer's warranty**

All inverters delivered by Fronius worldwide are subject to the 60-month Fronius manufacturer's warranty which starts on the date of installation and can be extended for a fee.

Fronius guarantees that your inverter will function correctly for the duration of this warranty period.

The detailed, country-specific warranty terms and conditions can be provided by the relevant system installer or can be found online at <http://www.fronius.com/Solar/Warranty>

To make a claim under the Fronius manufacturer's warranty, you will need to provide the invoice associated with the relevant product, your warranty terms and conditions and, where applicable, any additional warranty certificate you may have obtained to extend the warranty.

Fronius therefore recommends that you print an up-to-date copy of the warranty terms and conditions after commissioning the inverter.

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## **Disposal**

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



**EG-KONFORMITÄTSERKLÄRUNG 2012**  
**EC-DECLARATION OF CONFORMITY 2012**  
**DECLARATION DE CONFORMITE DE LA CE, 2012**

Wels-Thalheim, 2012-11-21

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 its sole  
responsibility that the following  
product:

se déclare seule responsable du fait  
que le produit suivant:

Fronius IG Plus 25V-1 / 30V-1  
/ 35V-1 / 50V-1 / 55V-1 /  
60V-1 / 55V-2 / 60V-2 / 70V-1  
/ 70V-2 / 100V-1 / 100V-2 /  
55V-3 / 60V-3 / 80V-3 /  
100V-3 / 120V-3 / 150V-3  
Solar-Wechselrichter

Fronius IG Plus 25V-1 / 30V-1  
/ 35V-1 / 50V-1 / 55V-1 /  
60V-1 / 55V-2 / 60V-2 / 70V-1  
/ 70V-2 / 100V-1 / 100V-2 /  
55V-3 / 60V-3 / 80V-3 /  
100V-3 / 120V-3 / 150V-3  
Photovoltaic inverter

Fronius IG Plus 25V-1 / 30V-1  
/ 35V-1 / 50V-1 / 55V-1 /  
60V-1 / 55V-2 / 60V-2 / 70V-1  
/ 70V-2 / 100V-1 / 100V-2 /  
55V-3 / 60V-3 / 80V-3 /  
100V-3 / 120V-3 / 150V-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  
IEC 62109-1:2010  
IEC 62109-2:2011  
EN 50178:1997  
EN 61000-3-2:2006  
EN 61000-3-11:2000  
EN 61000-3-12:2005  
EN 61000-6-2:2005  
EN 61000-6-3:2007  
EN 62233:2008

European Standards including  
relevant amendments  
IEC 62109-1:2010  
IEC 62109-2:2011  
EN 50178:1997  
EN 61000-3-2:2006  
EN 61000-3-11:2000  
EN 61000-3-12:2005  
EN 61000-6-2:2005  
EN 61000-6-3:2007  
EN 62233:2008

Normes européennes avec  
amendements correspondants  
IEC 62109-1:2010  
IEC 62109-2:2011  
EN 50178:1997  
EN 61000-3-2:2006  
EN 61000-3-11:2000  
EN 61000-3-12:2005  
EN 61000-6-2:2005  
EN 61000-6-3:2007  
EN 62233:2008

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

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

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

**CE 2012**

ppa. Mag.Ing.H.Hackl

DE German

Deutsch

EN English

English

FR French

Française

Abgesandt: 10. Nov. 2009  
wj

Deutsche Gesetzliche  
Unfallversicherung



Fachausschuss Elektrotechnik

Fachausschuss Elektrotechnik  
Gustav-Heinemann-Lifer 130  
Prüf- und Zertifizierungsstelle  
50868 Köln

FRONIUS International GmbH  
Günter Fronius-Str.1  
4600 Wels-Thalheim  
Austria

Ihr Zeichen:  
Ihre Nachricht vom:  
Unser Zeichen UB.010.17 Pl/wi  
(bitte stets angeben):  
Ansprechperson: Herr Pohl  
E-Mail: pohl.wolfgang@bgete.d  
Datum: 10.11.2009

ø Herren Pohl  
Vorgang + C

## Unbedenklichkeitsbescheinigung 09017 (Prüfschein)

<b>Erzeugnis:</b>	Selbsttätig wirkende Schaltstelle
<b>Typ:</b>	IG Plus V
<b>Bestimmungsgemäße Verwendung:</b>	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 integrierter Bestandteil der PV-Wechselrichter: Fronius IG Plus V
<b>Prüfgrundlagen:</b> DIN V VDE V 0126-1-1: 2006-02	„Selbsttätige Schaltstelle zwischen einer netzparallelen Erzeugungsanlage und dem öffentlichen Niederspannungsnetz“

Das mit Prüfbericht 2.03.02013.1.0 vom 30.10.2009 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 gilt befristet bis:

**31.12.2014**

- Mehlem -  
Leiter der Prüf- und  
Zertifizierungsstelle

## Document of Compliance 09017

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

The safety concept of the above product tested with the report of 30.10.2009, ref. 2.03.02013.1.0 (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:

**31.12.2014**



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