Fronius IG Plus

30 V / 35 V / 50 V / 70 V

100 V / 120 V / 150 V

GB Operating Instructions

Inverter for grid-connected photovoltaic systems

Fronius

POWERING YOUR FUTURE

42,0426,0062,EA 02/2011

Dear reader,

GB

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.

Contents

Safety rules

Safety Rules Explanation

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

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

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

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

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

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

General

The device is manufactured using state-of-the-art technology and according to recognized safety standards. If used incorrectly or misused, however, it can cause

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

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

- be suitably qualified,
- have knowledge of and experience in dealing with electrical installations and
- read and follow these operating instructions carefully

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

All safety and danger notices on the device

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

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

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

Your personal safety is at stake!

Utilization in Accordance with "Intended Purpose"

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

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

Utilization in accordance with the "intended purpose" also includes

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

The following guidelines should also be applied where relevant:

- Regulations of the 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.

Qualified Service Engineers

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

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

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

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

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

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

Safety Measures at the Installation Location

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

Data Regarding Noise Emission Values

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

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

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

EMC device classifications

Devices with emission class A:

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

Devices with emission class B:

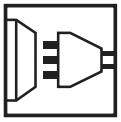
- satisfy the emissions criteria for residential and industrial areas. This is also true for residential areas in which the energy is supplied from the public low voltage grid.

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.

Protective Measures against ESD

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

Safety Measures in Normal Operation

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

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

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

Never bypass or disable protection devices.

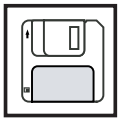
Safety Symbols

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

Disposal

Do not dispose of this device with normal domestic waste! To comply with the European Directive 2002/96/EC on Waste Electrical and Electronic Equipment and its implementation as national law, electrical equipment that has reached the end of its life must be collected separately and returned to an approved recycling facility. Any device that you no longer require must be returned to your dealer, or you must locate the approved collection and recycling facilities in your area. Ignoring this European Directive may have potentially adverse affects on the environment and your health!

Backup



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

Copyright

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.

General Information

Protection of Persons and Equipment

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.

Monitoring the Grid

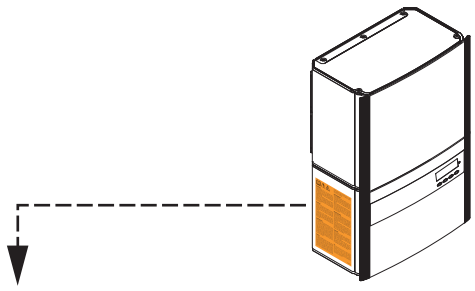
Whenever conditions in the electric grid are inconsistent with standard conditions (for example, grid switch-off, interruption), the inverter will immediately stop operating and interrupt the supply of power into the grid.

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.



WARNUNG!
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.
Endladezeit der Kondensatoren abwarten. Die Entladezeit beträgt 5 Minuten. Der Neutralleiter 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 con-duttore 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 ontlaadtijd 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 licencí. Samostatnou oblast výkonového dílu lze od přípojné oblasti odpojit pouze, je-li odpojena 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.

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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

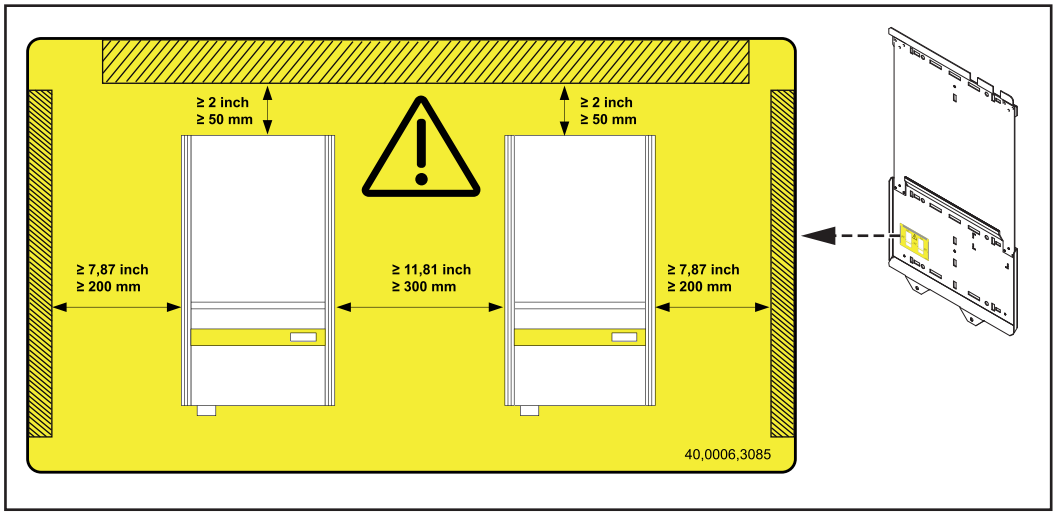
Dangerous electrical voltages

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

General

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

Tasks

The main tasks of the inverter include:

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

Converting DC to AC Current

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

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

Fully Automatic Operational Management

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

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

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

Display function and data communication

The display on the inverter is the interface between the inverter and the operator. The design of the display is geared towards simple operation and 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.

System Upgrade

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

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

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

System upgrades are available as plug-in cards.

Forced Ventilation

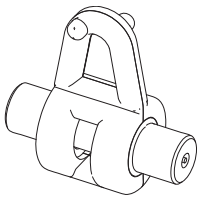
The inverter's temperature-controlled, variable-speed fan with ball-bearing support provides:

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

100 kohm Grounding Kit Option

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

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



Grounding Kit 100 kOhm

Power derating

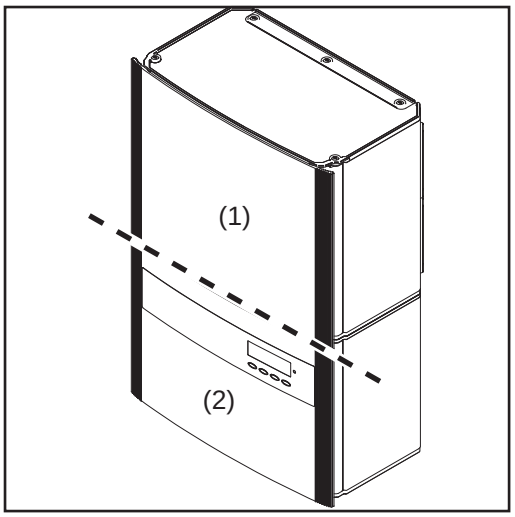
Should there be insufficient heat dissipation in spite of the fan operating at maximum speed (for example, inadequate heat transfer away from the heat sinks), the power will be derated to protect the inverter when the ambient temperature reaches approx. 40 °C and above.

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.

Installation and Startup

Fronius IG Plus Installation and Connection

Fronius IG Plus Construction



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

(1) Power stage set(s)

(2) Connection area

Overview

‘Fronius IG Plus Installation and Connection’ contains the following sections:

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

Choosing the Location

Choosing the Location, General

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

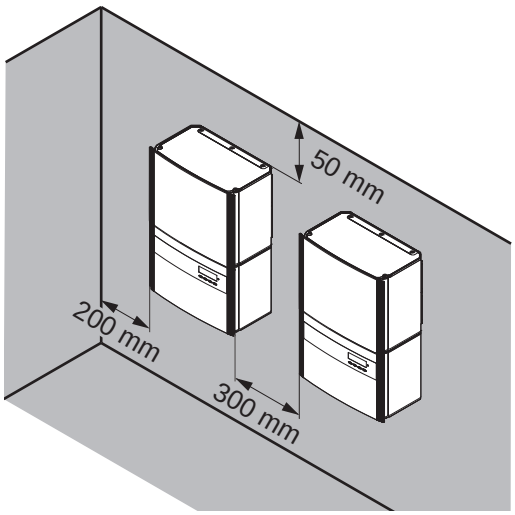
It should only be installed on a stable, vertical wall

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

Relative humidity: 0 - 95 %

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

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



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

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

The inverter is designed for installation both indoors and outdoors.

Choosing a Location for Inside Installation

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

Do not install the inverter in:

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

Choosing a location for outdoor installation

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.

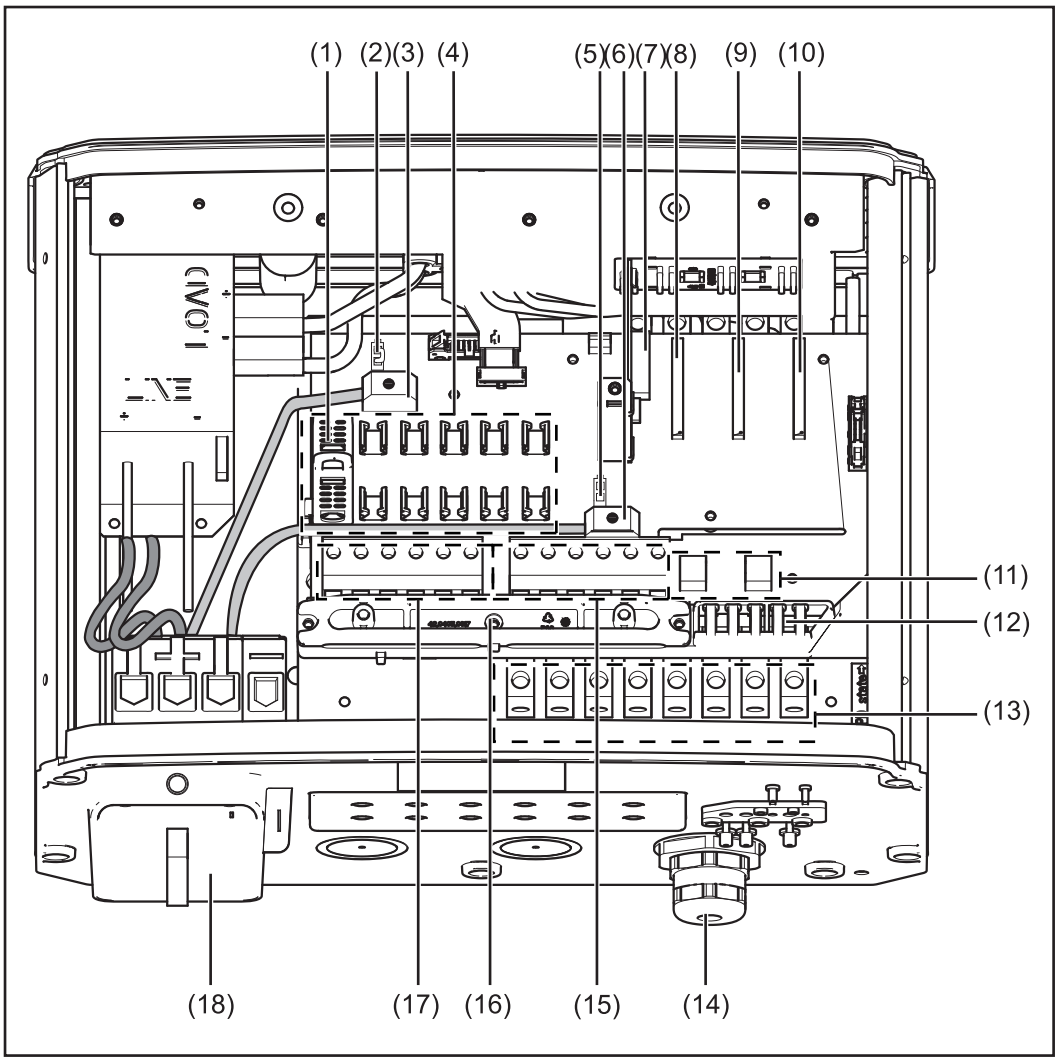
In order to protect the display, the inverter should not be exposed to direct sunlight. Ideally, the inverter should be installed in a protected location, e.g., near the solar modules or under a roof overhang.

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

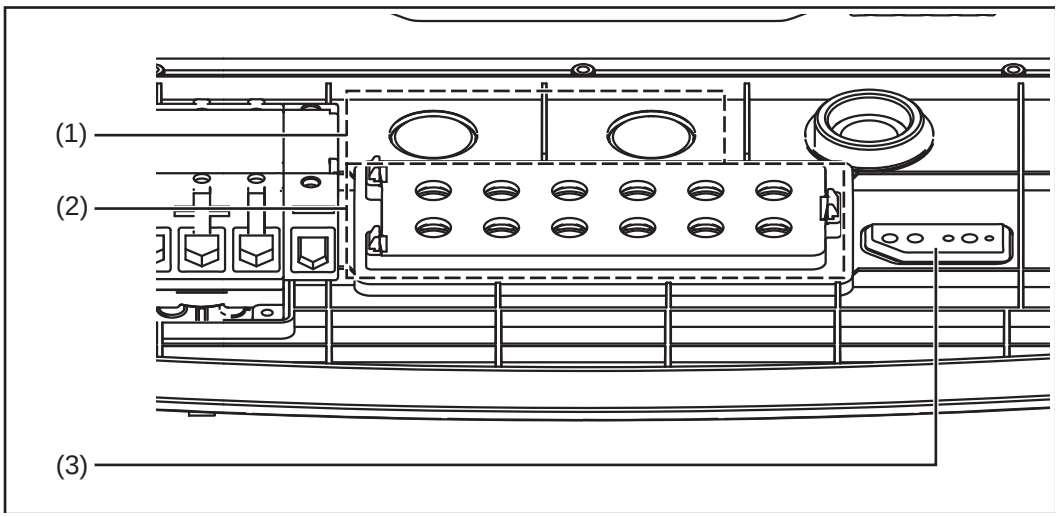
Item	Description
(16)	Strain relief for solar module strings
(17)	6 DC+ terminals
(18)	DC main switch

Knockouts on the Fronius IG Plus

General

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

Knockouts on the Fronius IG Plus for wire inputs



Item	Description
(1)	2 cable inputs for M32 metric screw joint (for DC cables with a cross section > 16 mm²)
(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).

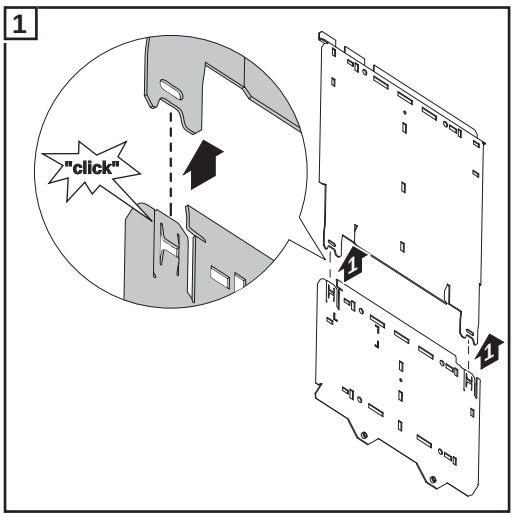
The plastic knockouts are also equipped with centering holes so that they can be drilled out if required.

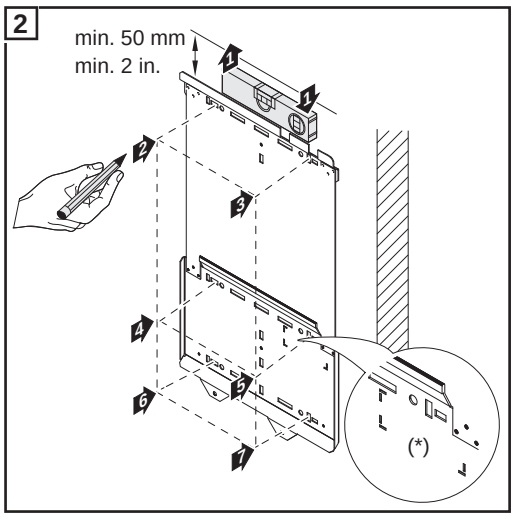
Fronius IG Plus Installation

Attaching the wall bracket

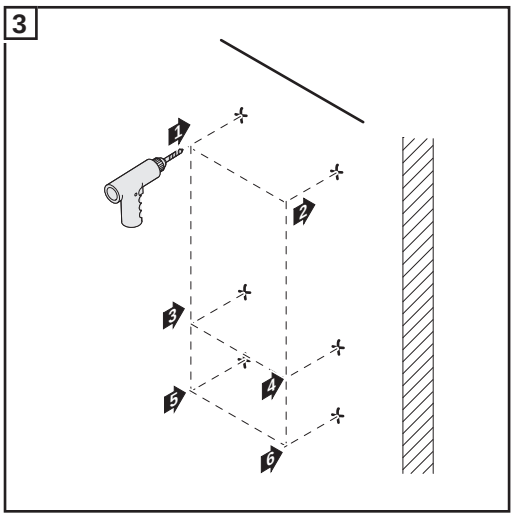
IMPORTANT! Depending on the surface, different dowels and screws may be required for installing the wall bracket. Therefore, these dowels and screws are not part of the scope of supply for the inverter. The system installer is responsible for selecting the proper dowels and screws.

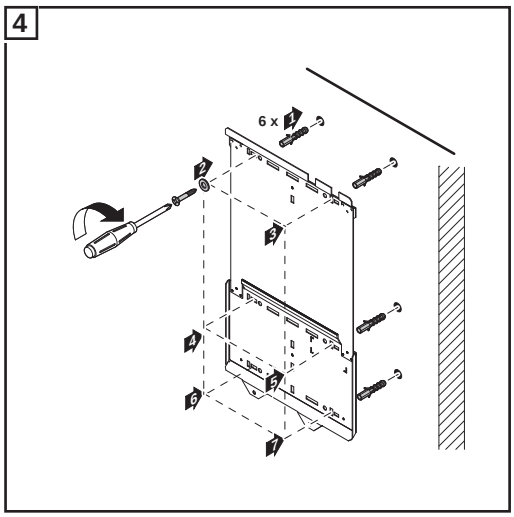
NOTE! The Fronius IG Plus should only be installed upright on the wall.





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

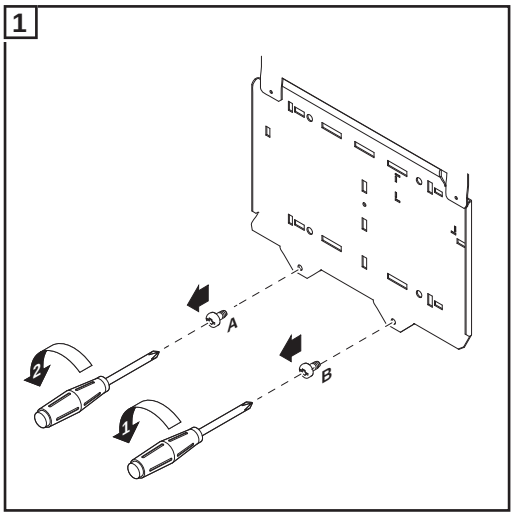
- The vacuum lifting pads must be designed for the weight of the connection area and power stage set.
- Follow all safety instructions from the vacuum lifting pad manufacturer.
- Vacuum lifting pads are not part of the scope of delivery for the inverter.

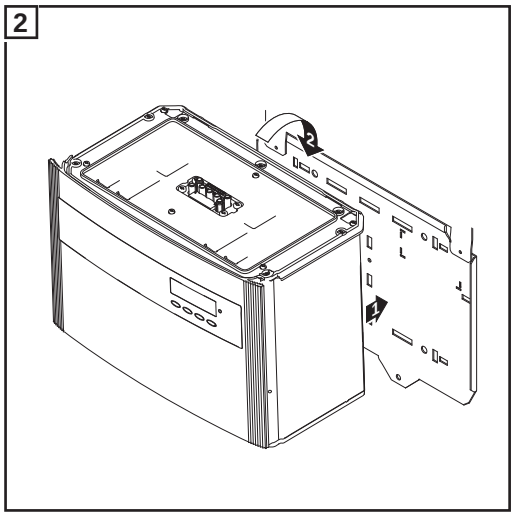
Weight information for the connection area and power stage set:

Inverter	Connection area	Power stage set
Fronius IG Plus 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 70 V-1	9,85 kg	26,10 kg
Fronius IG Plus 70 V-2	9,85 kg	26,10 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 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





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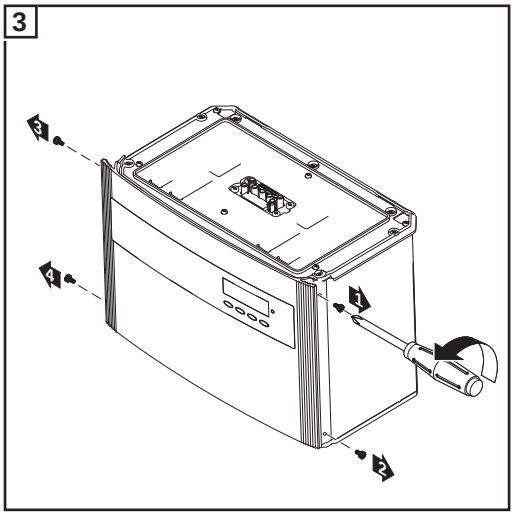

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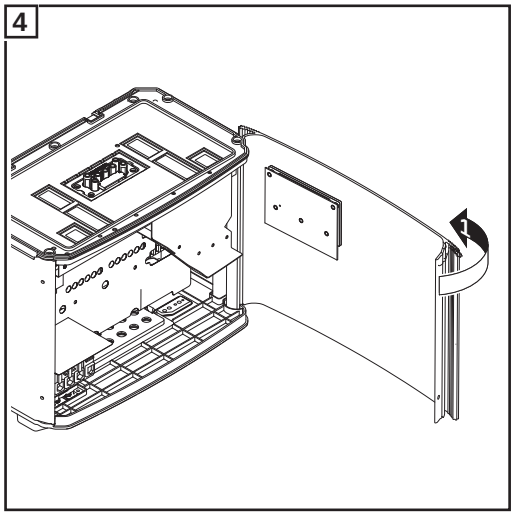

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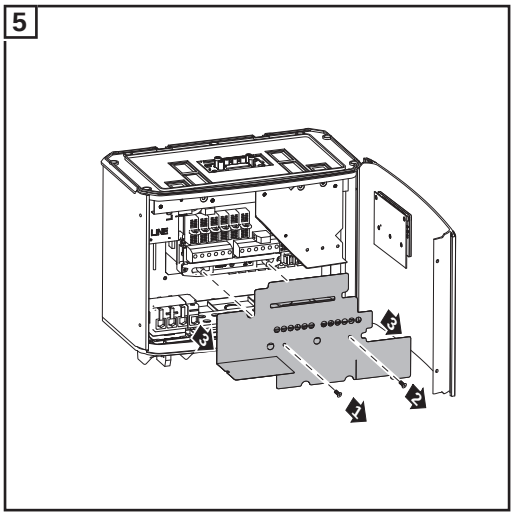

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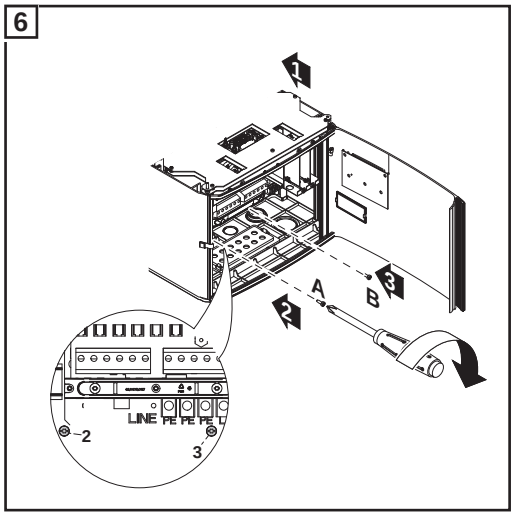

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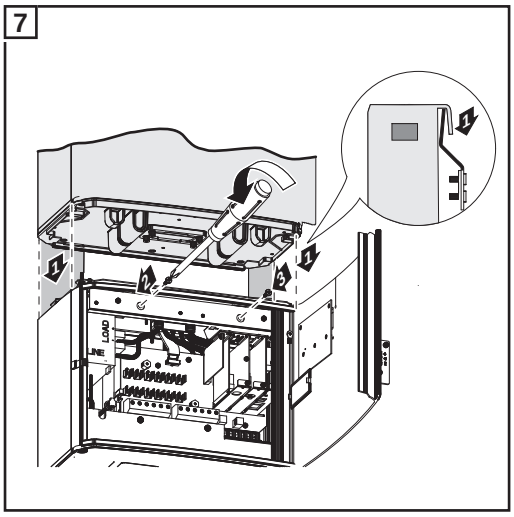


Use the screws in the bag attached to the wall bracket to secure the power stage set to the connection area.

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

Monitoring the Grid

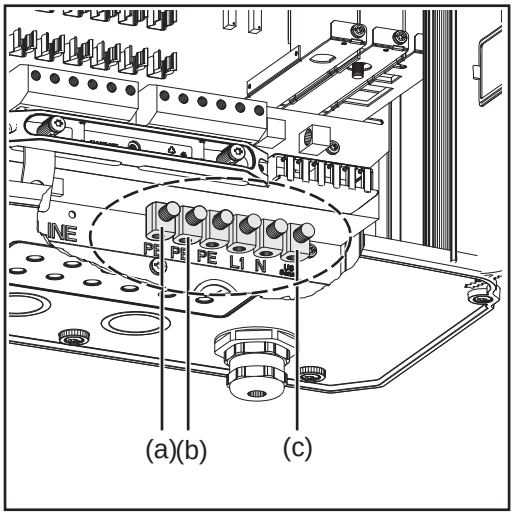
IMPORTANT! The resistance in the leads to the AC-side connection terminals must be as low as possible for optimal functioning of grid monitoring.

Installations with Several Inverters

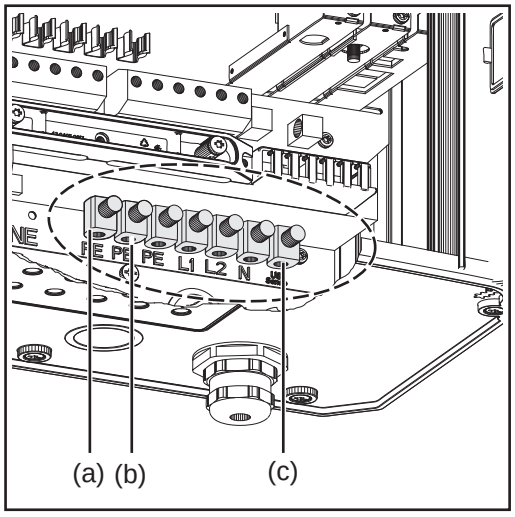
For larger photovoltaic systems, it is possible to connect several inverters in parallel without any problems. To ensure symmetrical feeding, connect the inverters uniformly to all 3 phases.

AC-Side Terminals

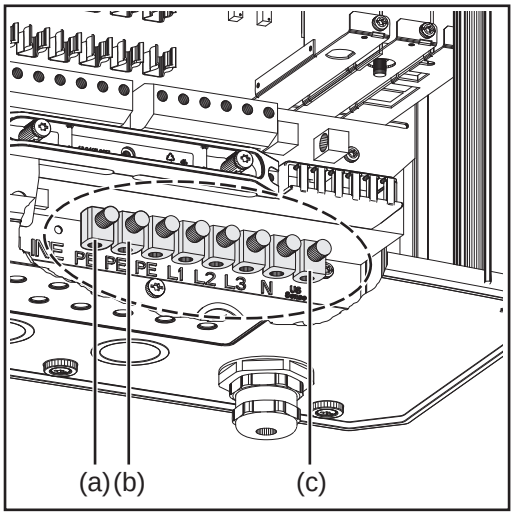
One-Phase Inverters



Two-Phase Inverters



Three-Phase Inverters



Legend:

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

max. cable cross section 25 mm²

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

Grid Neutral Conductor

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

Connecting Aluminum Cables

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

Cross Section of AC Wires

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

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

If required, use reducers for smaller cable diameters.

Safety

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

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

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

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

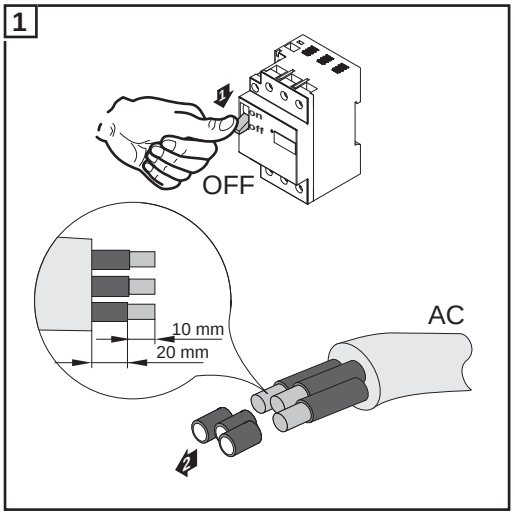
- Do not connect 2-phase and 3-phase devices together to one phase
- Never operate multi-phase devices in one phase

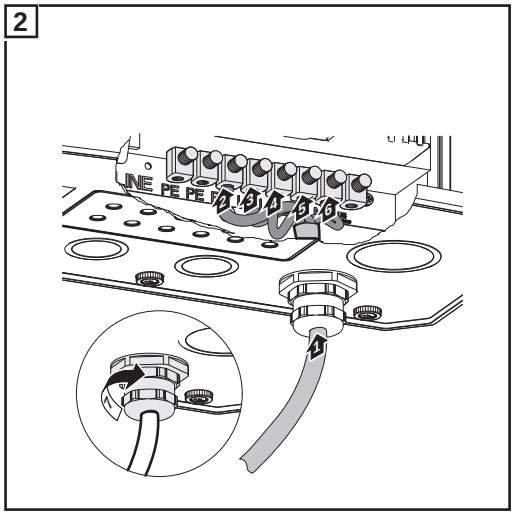
CAUTION! Danger of damaging the inverter from improperly connected terminals. Improperly connected terminals can cause thermal damage to the inverter and may cause a fire. When connecting the AC and DC cables, make sure that all terminals are tightened securely using the proper torque.

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

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

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 30 V-1	1	3 kW	1 x C 20 A
Fronius IG Plus 35 V-1	1	3,5 kW	1 x C 20 A
Fronius IG Plus 50 V-1	1	4 kW	1 x C 25 A
Fronius IG Plus 70 V-1	1	6,5 kW	1 x C 40 A
Fronius IG Plus 70 V-2	2	6,5 kW	2 x C 20 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 120 V-3	3	10 kW	3 x C 20 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)

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.

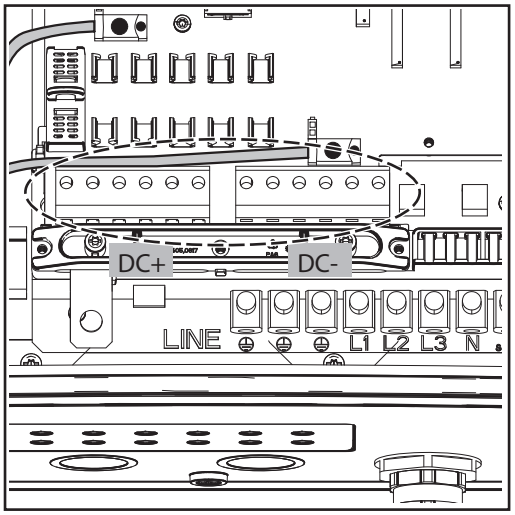
- The connection area should only be opened by a licensed electrician.
- The separate power stage set area should only be disconnected from the connection area after first being disconnected from the grid power.
- The separate power stage set area should only be opened by Fronius-trained service personnel.

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 mm²	20 A
4 mm²	27 A
6 mm²	35 A
10 mm²	48 A
16 mm²	64 A

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

Connection requirements:

1 Carefully clean off the oxide layer of the stripped cable end, 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.

Overview

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

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

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

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

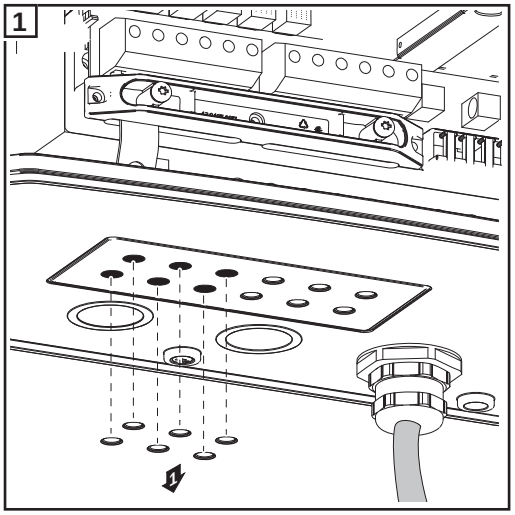
Ungrounded System: Connecting Solar Module Strings

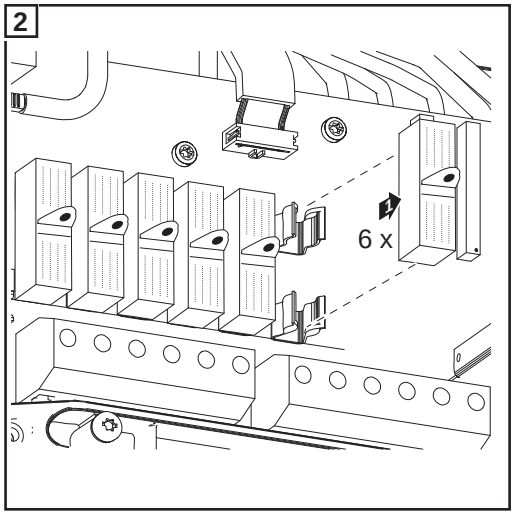
Wire Cross Section of Solar Module Strings

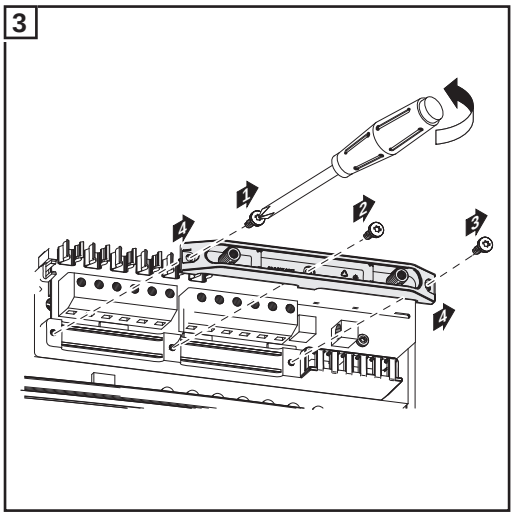
The cable cross section for solar module strings should be a maximum of 16 mm² per cable.

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

Ungrounded system: Connecting solar module strings







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

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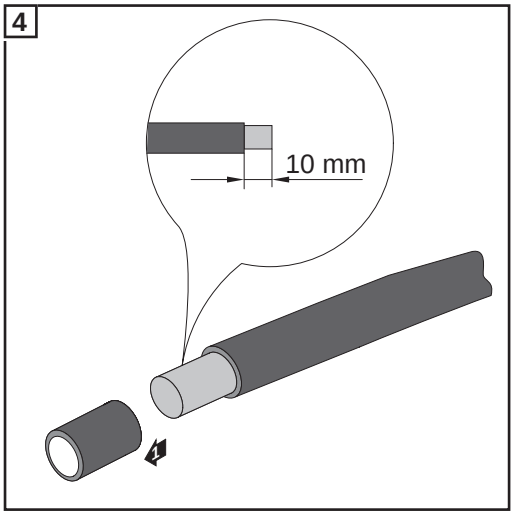

CAUTION! Danger of damaging the inverter by overload.

- 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.

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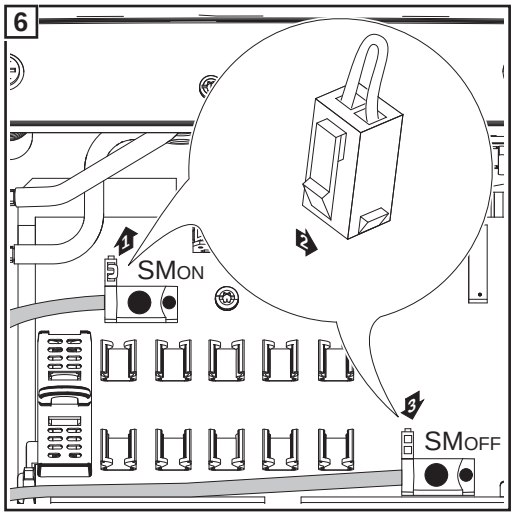
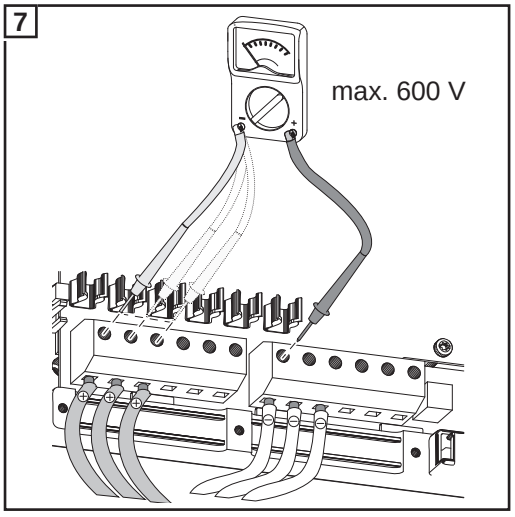
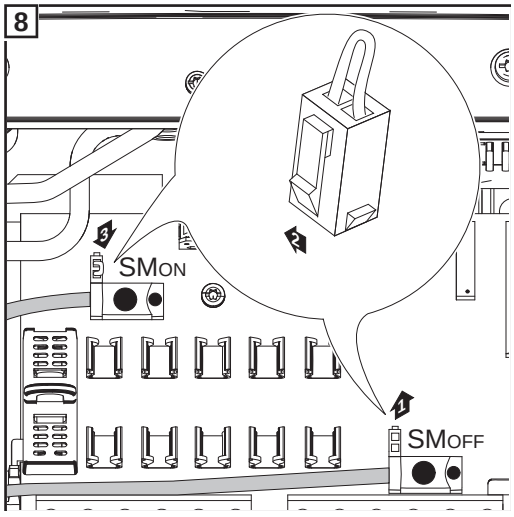


Tightening torque of terminals:
1.2 - 1.5 Nm

IMPORTANT!

- Set the jumper from the 'SM_{ON}' position to the 'SM_{OFF}' position for correct measurement results
- Check the polarity and voltage of the 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.

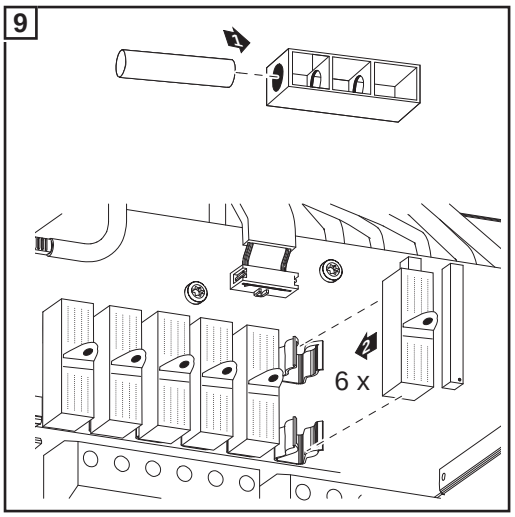


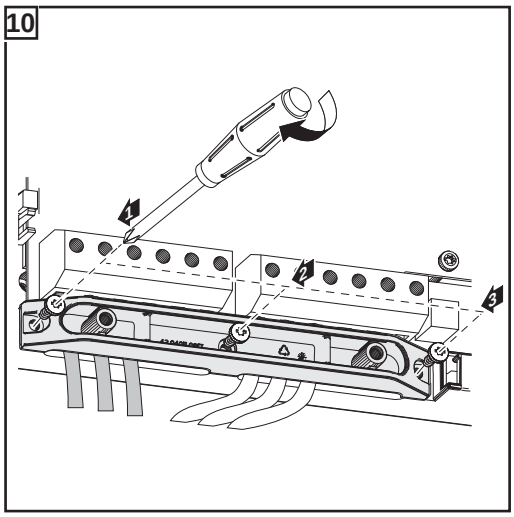


IMPORTANT!

- 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

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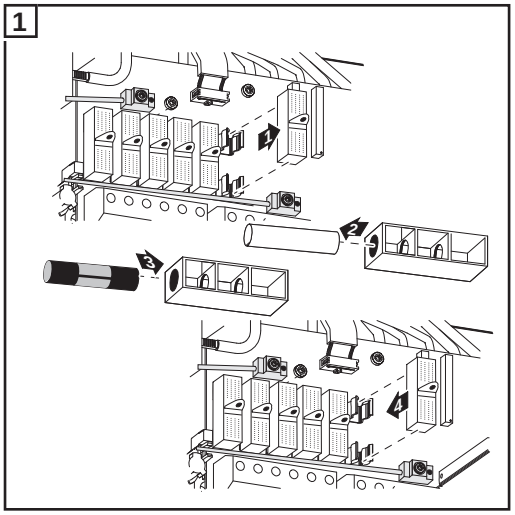


WARNING! An electric shock can be fatal. Danger from DC voltage from solar modules. Fuse covers are for installation purposes only. They offer no protection against contact.

Criteria for the Proper Selection of String Fuses

General

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

Criteria for the Proper Selection of String Fuses

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

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

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

Effects of Using Underrated Fuses

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 A x 1.5 = 8.625 A

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

Fuses

Nominal current	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
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

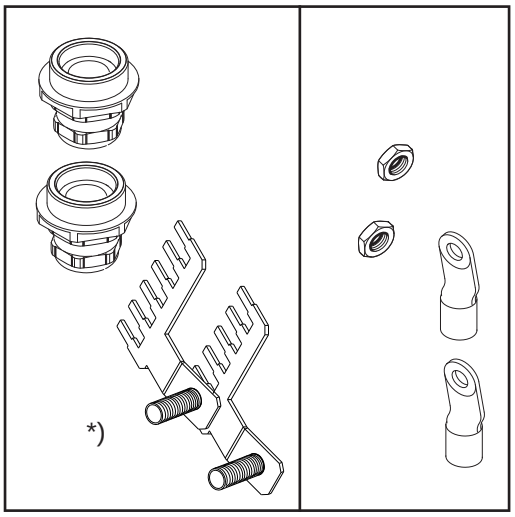
Ungrounded System: Connecting Solar Module Strings with a Cable Cross Section > 16 mm²

General

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

Additional components required

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



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

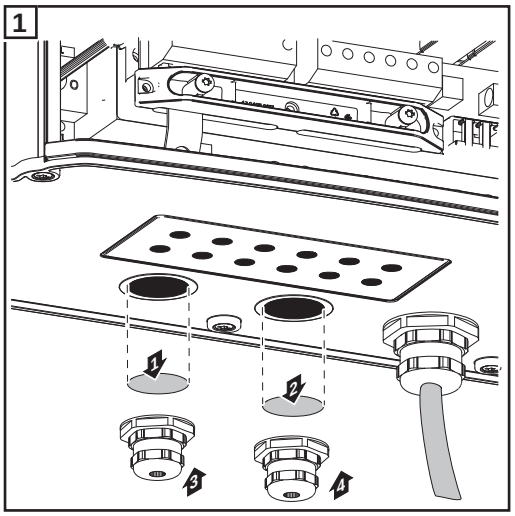
  *)
  Metric screw joints and connection distributors are available from Fronius as an option.

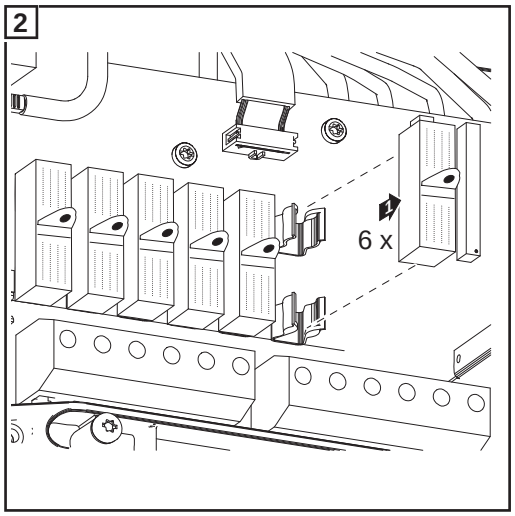
- 2 M10 cable lugs

  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 mm²





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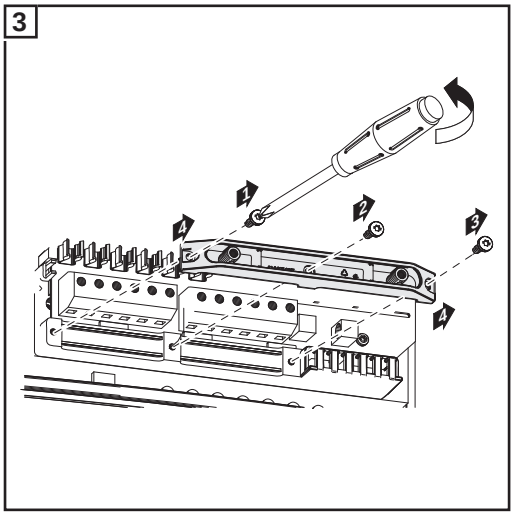

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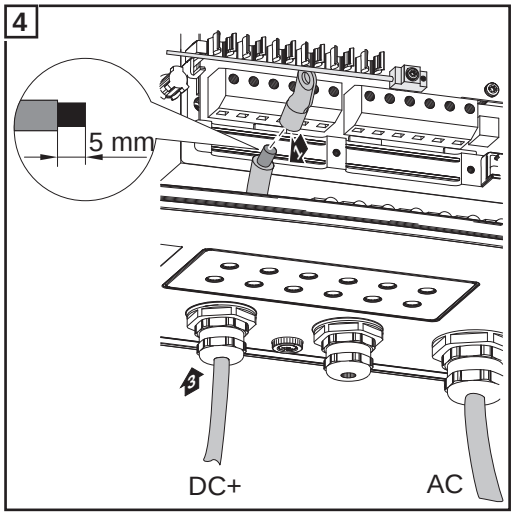

CAUTION! Danger of damaging the inverter by overload. Connect the DC+ and DC- cables to the correct DC+ and DC- terminals on the inverter.

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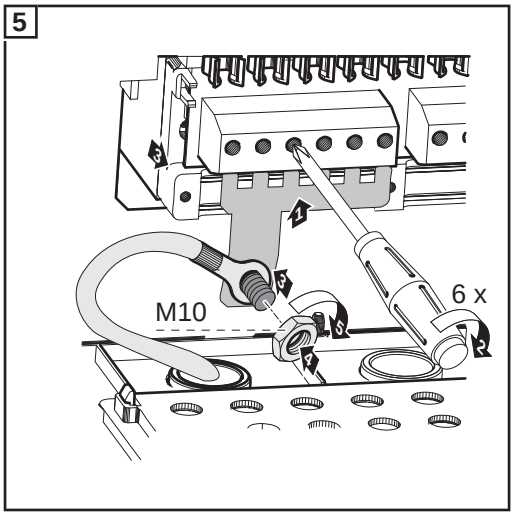

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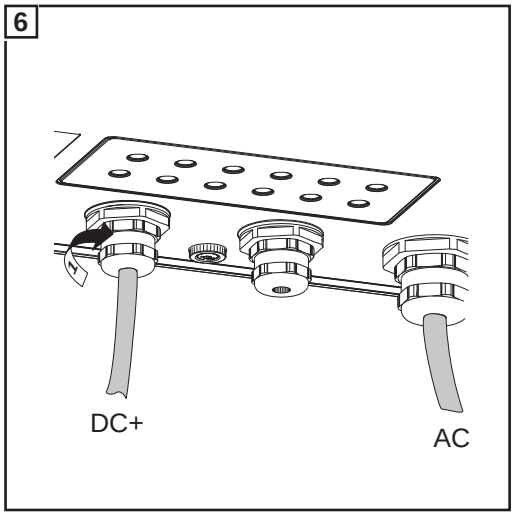
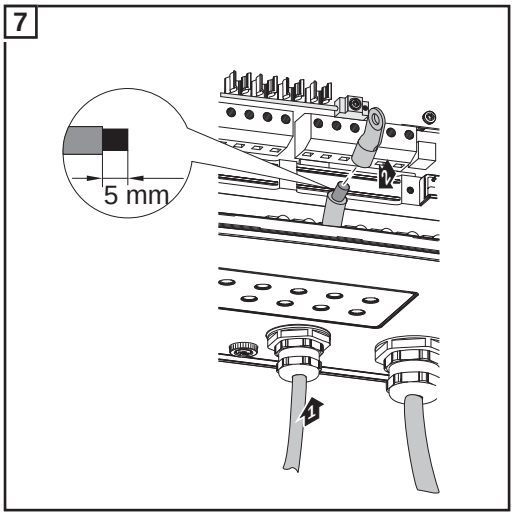


Tightening torque of terminals:
1.2 - 1.5 Nm
Tightening torque of hexagon nut on the connection distributor:
max. 15 Nm

7



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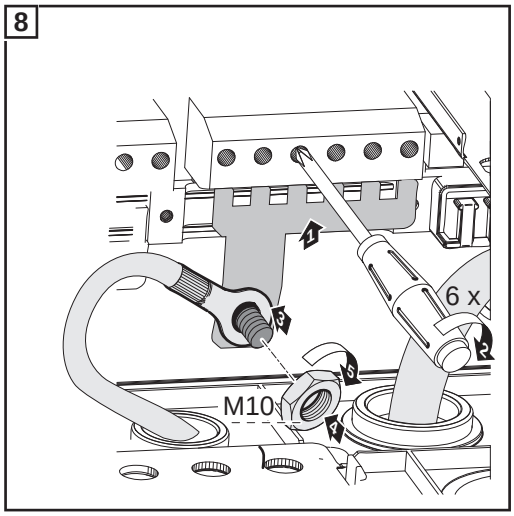
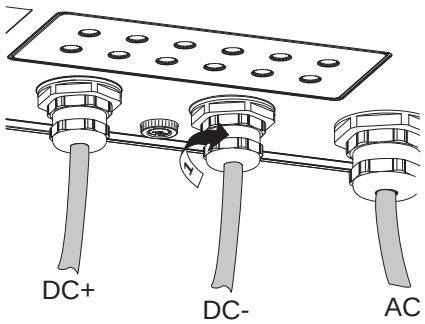


Tightening torque of terminals:
1.2 - 1.5 Nm
Tightening torque of hexagon nut on the connection distributor:
max. 15 Nm

9



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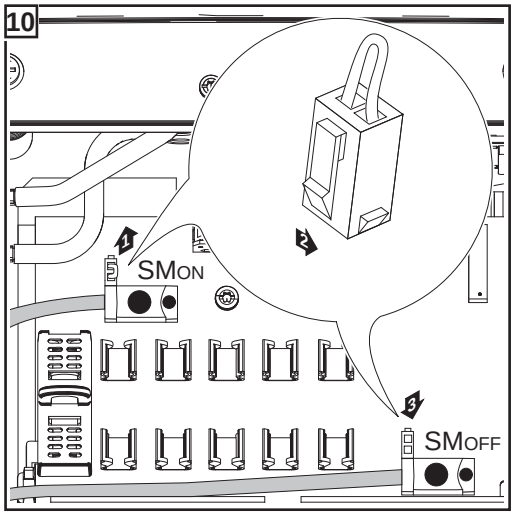
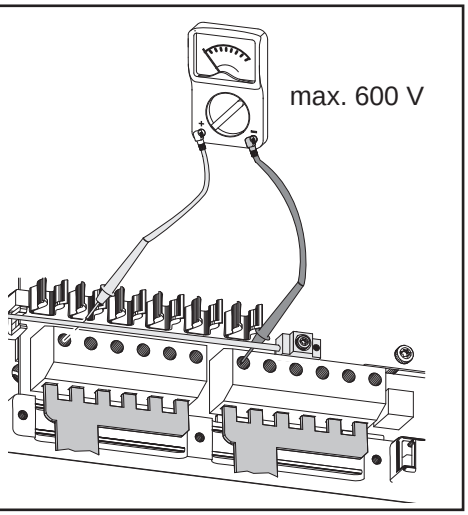


IMPORTANT!

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

11



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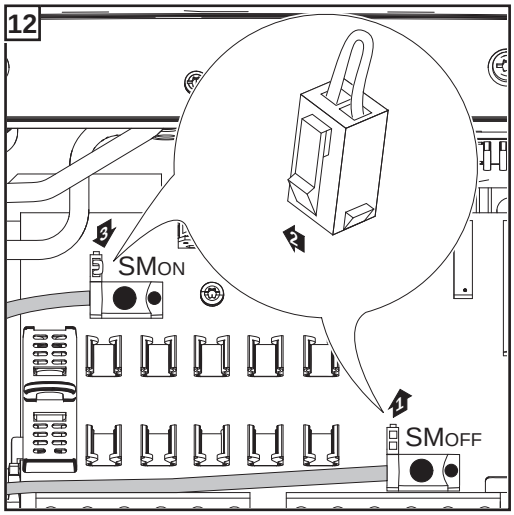
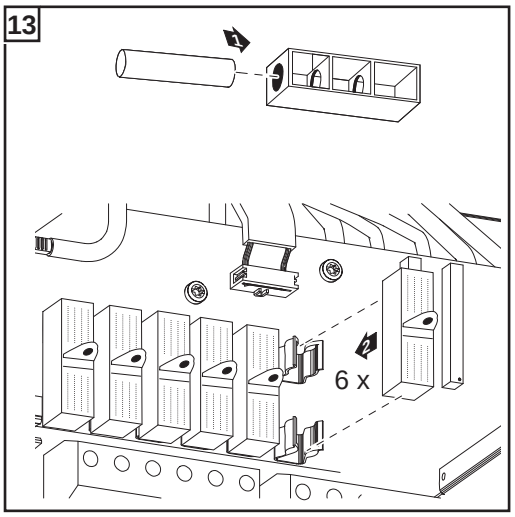




IMPORTANT When using connection distributors, insert 6 metal bolts with fuse covers in the fuse holders. The metal bolts are included in the inverter scope of delivery.

Solar Module Ground at Negative Pole: Connecting Solar Module Strings

General

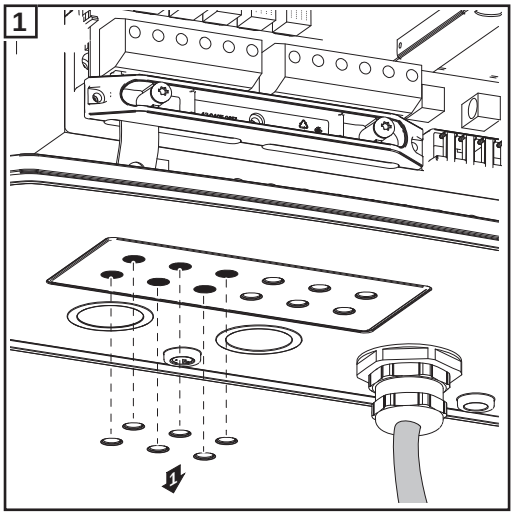
The following steps are only necessary when the solar module manufacturer requires a solar module ground at the negative pole.

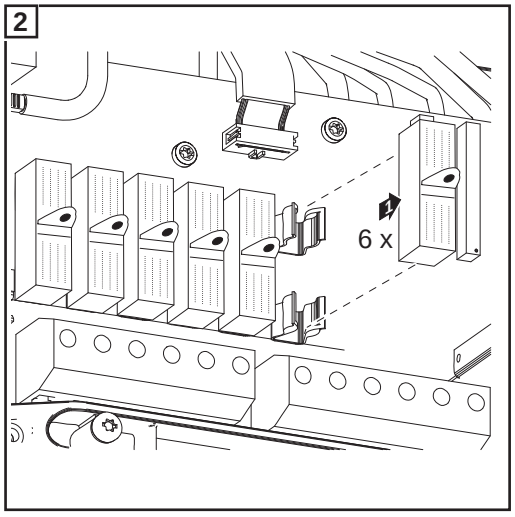
Wire Cross Section of Solar Module Strings

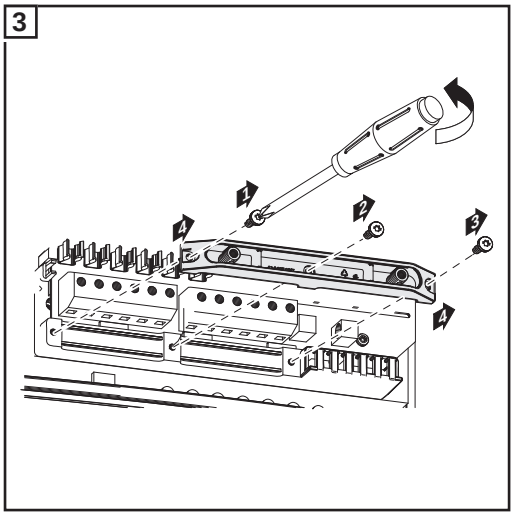
The cable cross section for solar module strings should be a maximum of 16 mm² per cable.

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

Solar module ground at negative pole: Connecting solar module strings

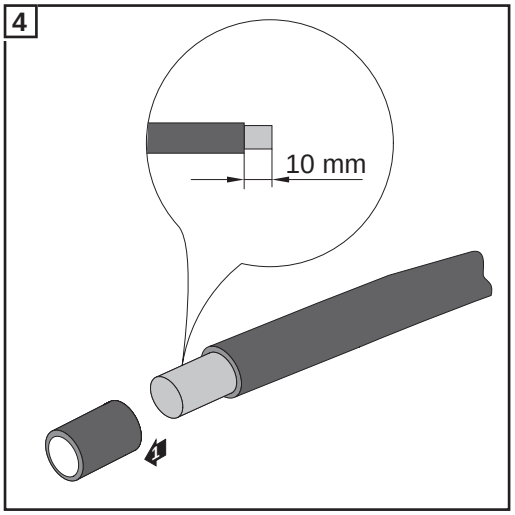






NOTE! Finely stranded cables up to conductor class 5 can be connected to the DC-side terminals without wire end ferrules.

4



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.

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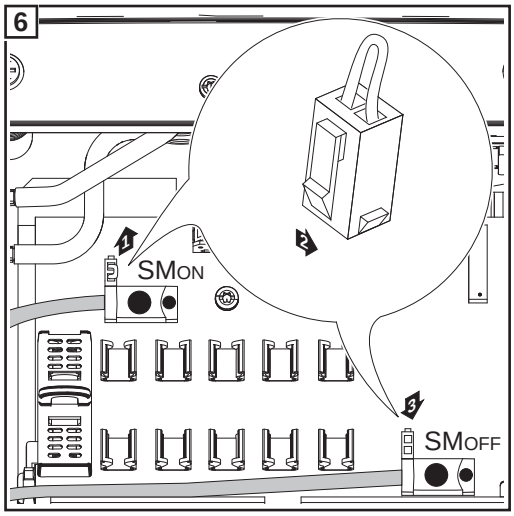
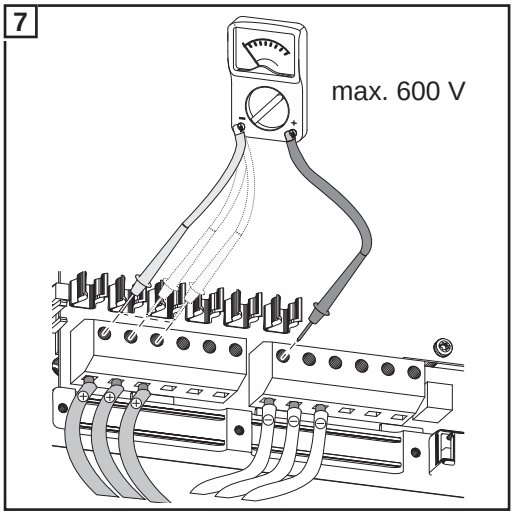
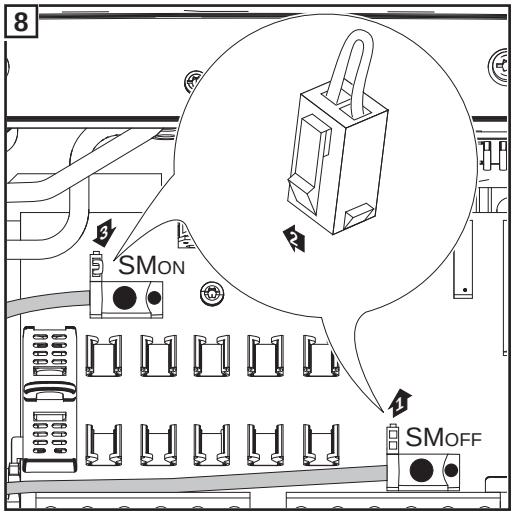


Tightening torque of terminals:
1.2 - 1.5 Nm

IMPORTANT!

- Set the jumper from the 'SM_{ON}' position to the 'SM_{OFF}' position for correct measurement results
- Check the polarity and voltage of the 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.

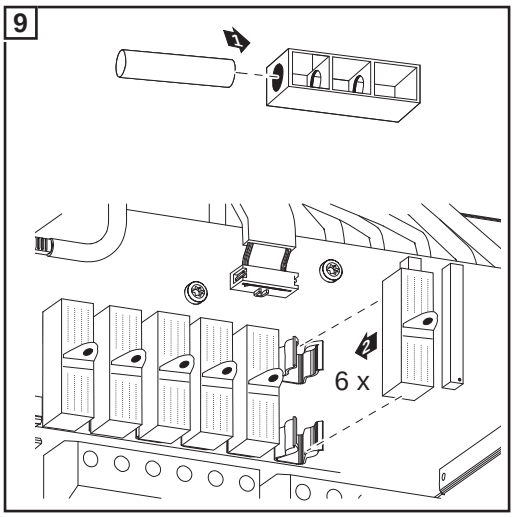


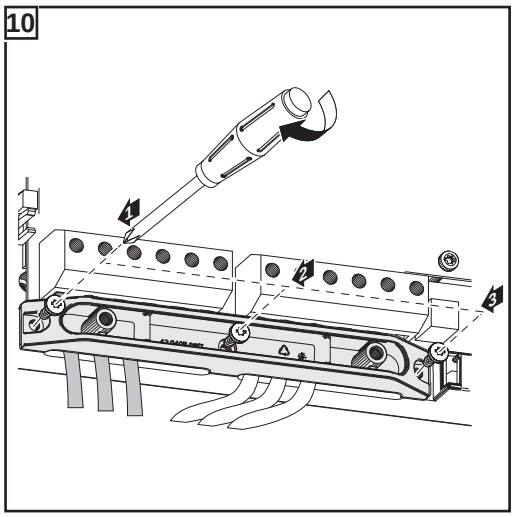


IMPORTANT!

- 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

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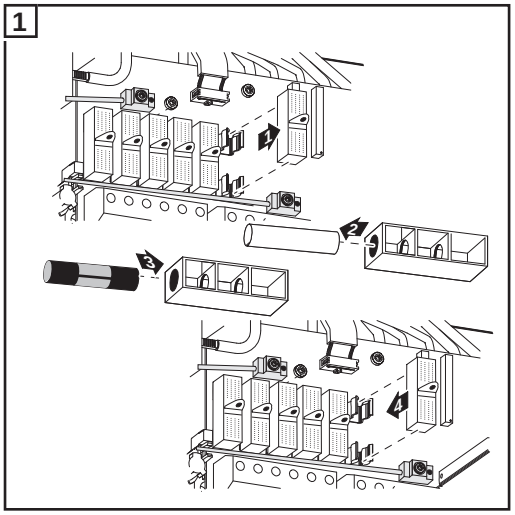


WARNING! An electric shock can be fatal. Danger from DC voltage from solar modules. Fuse covers are for installation purposes only. They offer no protection against contact.

Criteria for the Proper Selection of String Fuses

General

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

Criteria for the Proper Selection of String Fuses

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

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

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

Effects of Using Underrated Fuses

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 A x 1.5 = 8.625 A

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

Fuses

Nominal current	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
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

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

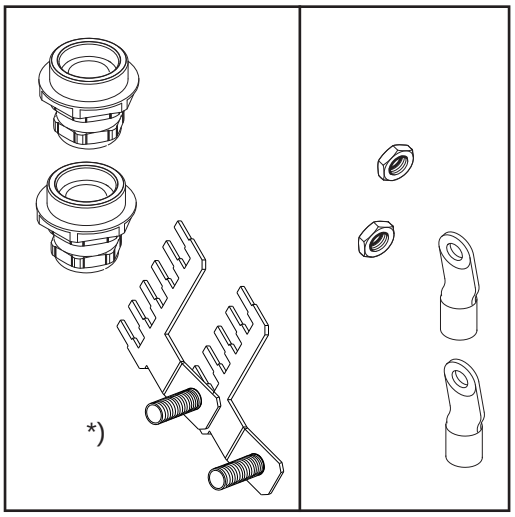
General

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

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

Additional components required

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



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

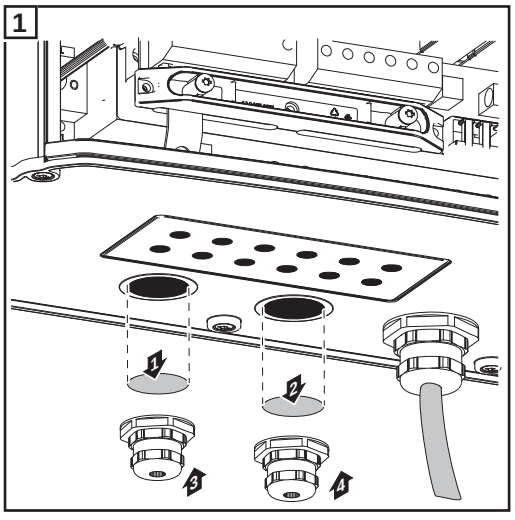
  *)
  Metric screw joints and connection distributors are available from Fronius as an option.

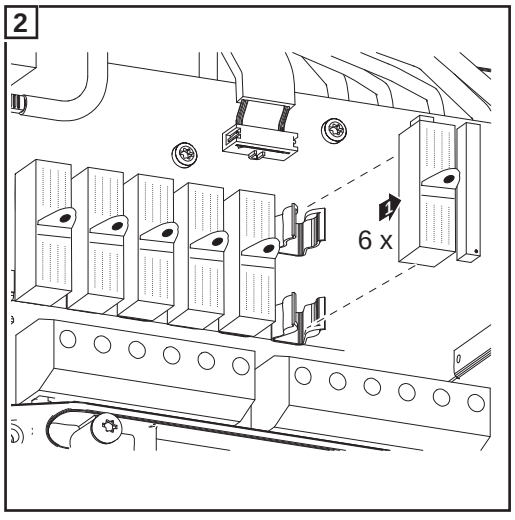
- 2 M10 cable lugs

  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 mm²





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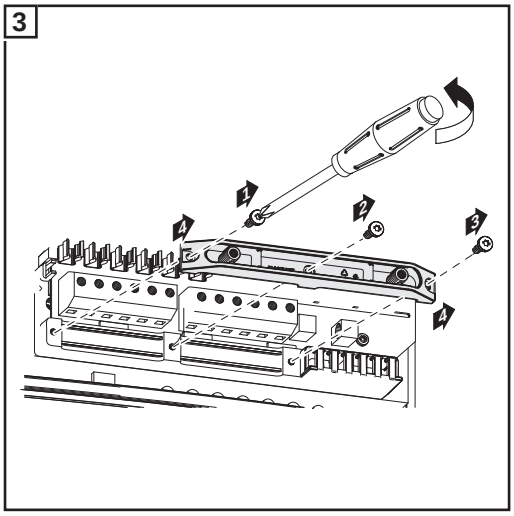

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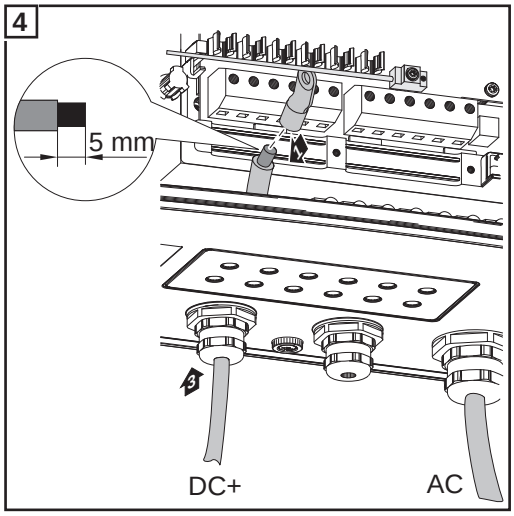
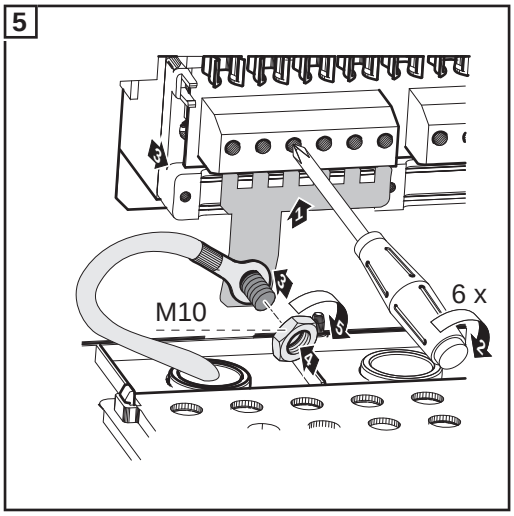


CAUTION! Danger of damaging the inverter by overload. Connect the DC+ and DC- cables to the correct DC+ and DC- terminals on the inverter.

5



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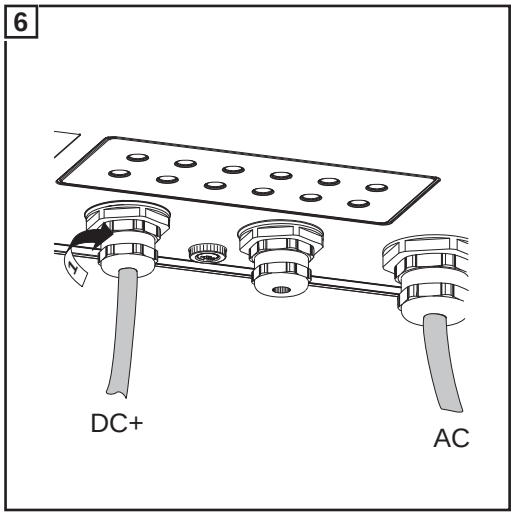
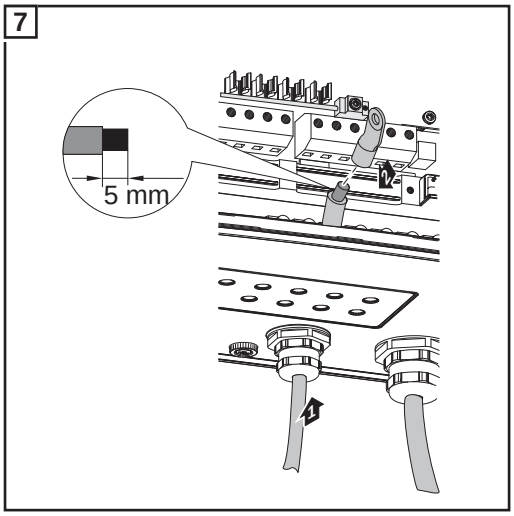


Tightening torque of terminals:
1.2 - 1.5 Nm
Tightening torque of hexagon nut on the connection distributor:
max. 15 Nm

7



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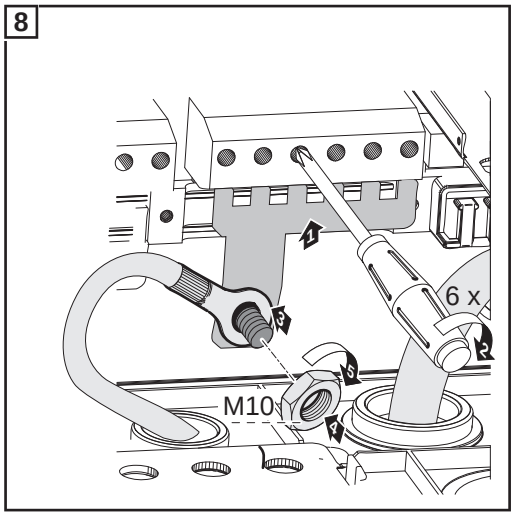

Tightening torque of terminals:
1.2 - 1.5 Nm
Tightening torque of hexagon nut on the connection distributor:
max. 15 Nm

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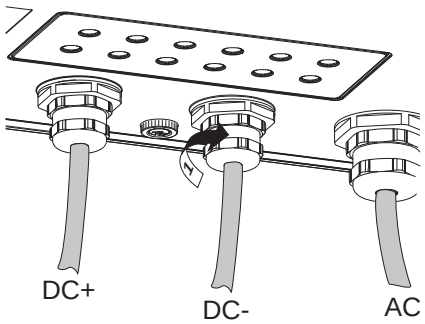

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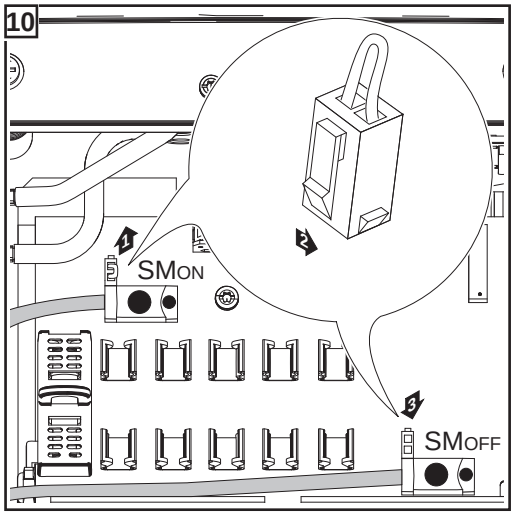
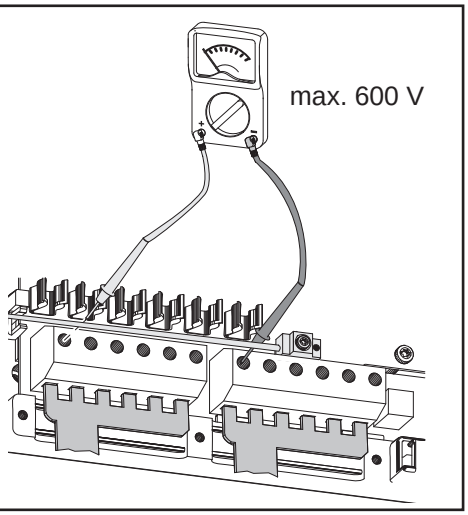


IMPORTANT!

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

11



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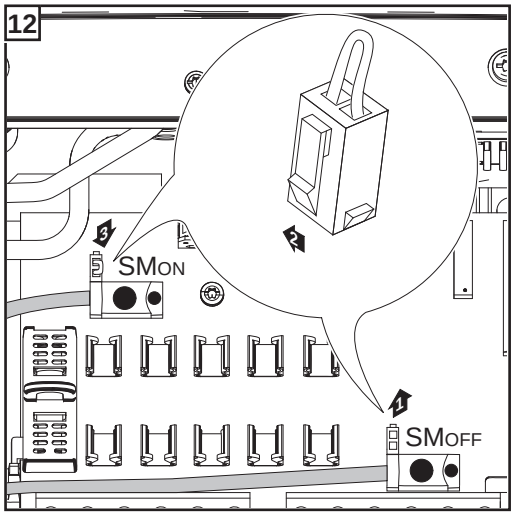
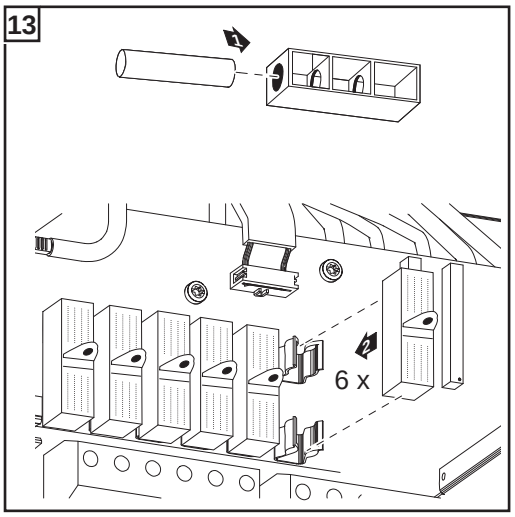




IMPORTANT When using connection distributors, insert 6 metal bolts with fuse covers in the fuse holders. The metal bolts are included in the inverter scope of delivery.

Solar Module Ground at Negative Pole for Fronius IG Plus

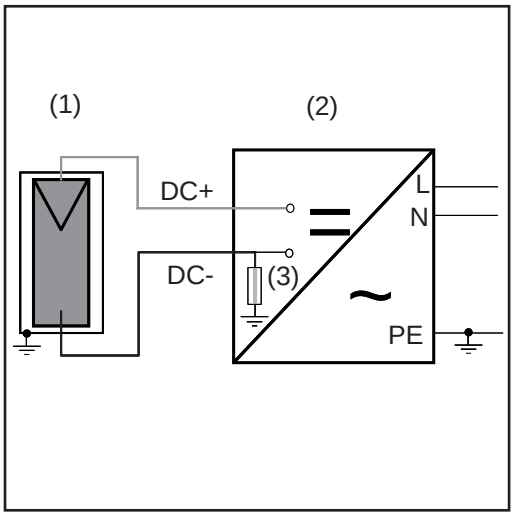
General

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

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

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

Solar Module Ground at Negative Pole

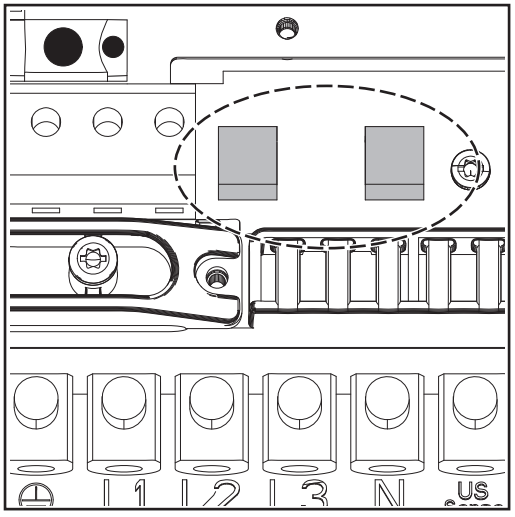


Example:
Solar module ground at negative pole with fuse or high ohm resistor

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

Solar Module Ground at Negative Pole for Fronius IG Plus

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



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

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

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

Safety

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

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

Safety Label for the Solar Module Ground

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

Setting inverters for grounded solar modules

When solar modules are grounded, the inverter's insulation monitoring is deactivated. For this reason, you must make a setting in the 2nd 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).
A code is required to access the 2nd level of the Setup menu. This code can be obtained from Fronius. Additional information regarding accessing the 2nd level of the Setup menu will be provided along with the code.

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

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

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

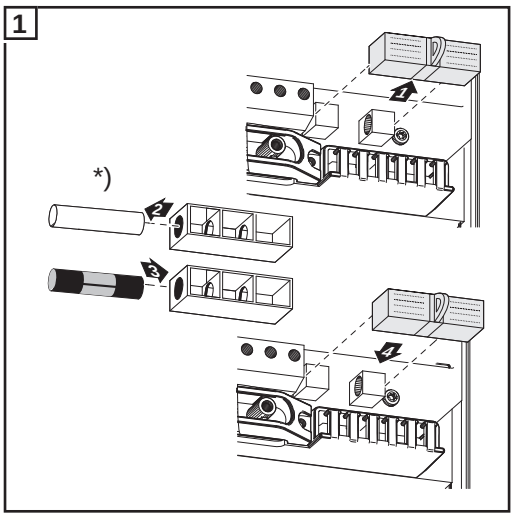
or

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

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

The DC main switch is only used to switch off power to the power stage set. When the DC main switch is turned off, the solar module ground at the negative pole remains unaffected. Never touch the DC+ and DC-.

Inserting a fuse:

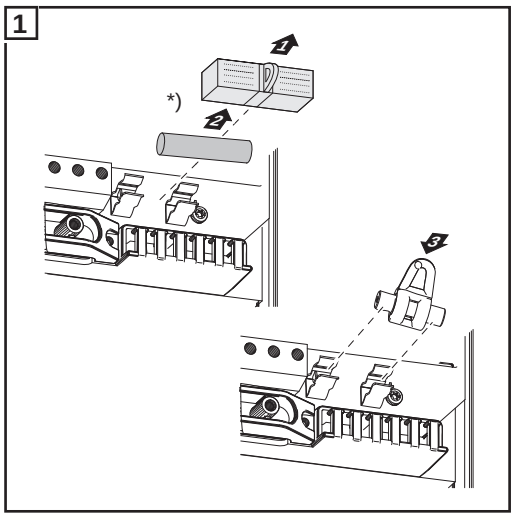


*) The plastic bolts are included in the inverter scope of delivery

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

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

Inserting the "100 kohm Grounding Kit" option:



*) Remove standard fuse holder with plastic bolt

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

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

Opening Fronius IG Plus for Service/Maintenance

Procedure for opening the inverter for service or maintenance:

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

Solar Module Ground at Positive Pole: Connecting Solar Module Strings

General

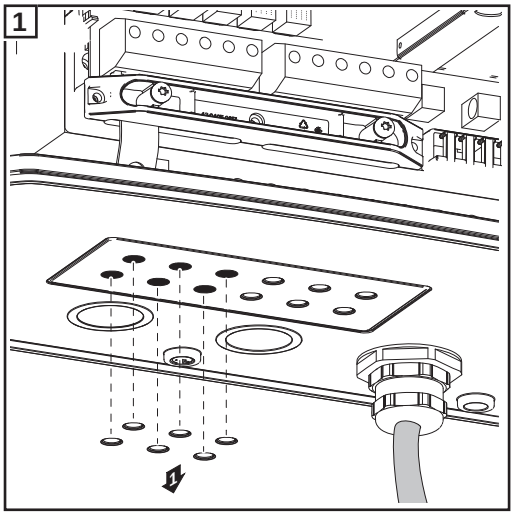
The following steps are necessary when the solar module manufacturer requires a solar module ground at the positive pole.

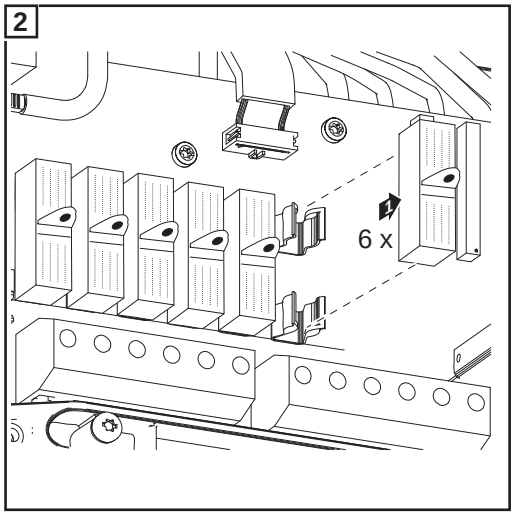
Wire Cross Section of Solar Module Strings

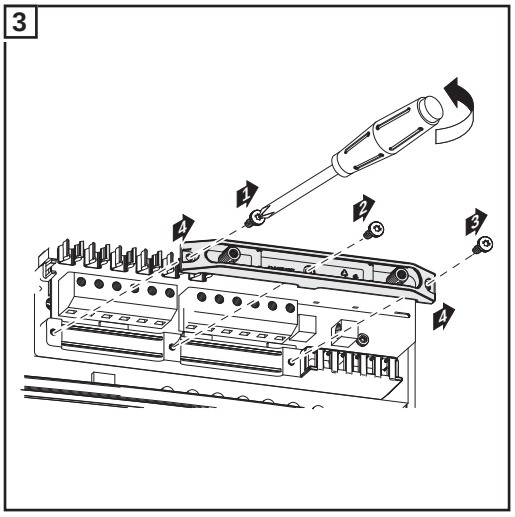
The cable cross section for solar module strings should be a maximum of 16 mm² per cable.

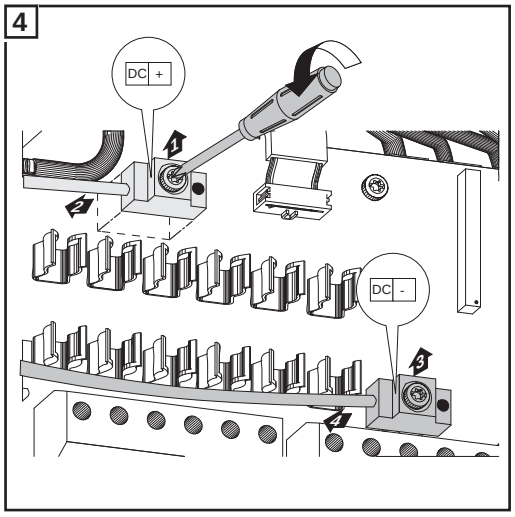
NOTE! To ensure an effective strain relief device for solar module strings, only use cable cross sections of the same size.

Solar module ground at positive pole: Connecting solar module strings





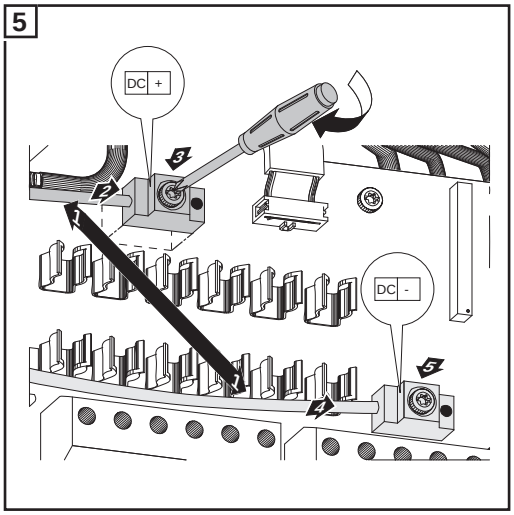




After disconnecting the DC main switch cable:

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

5



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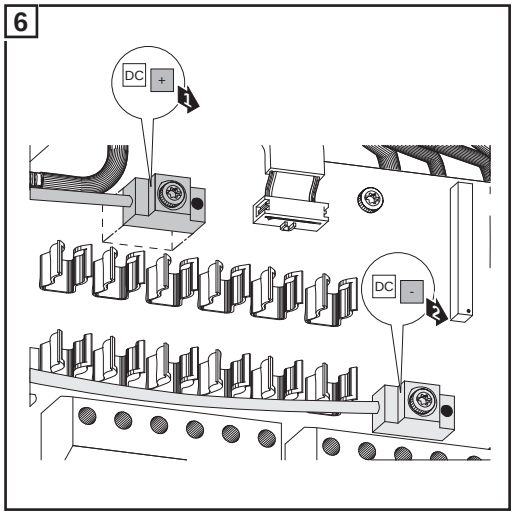

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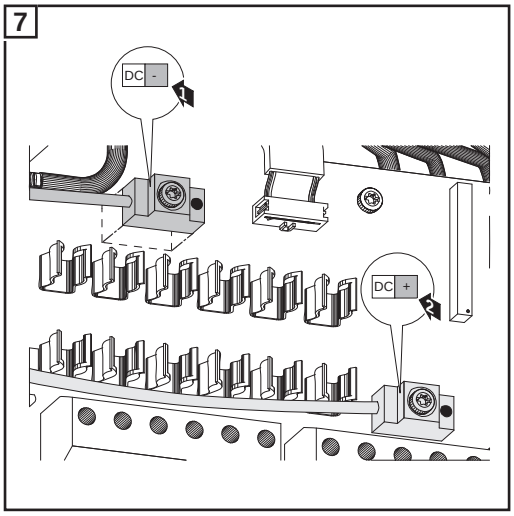
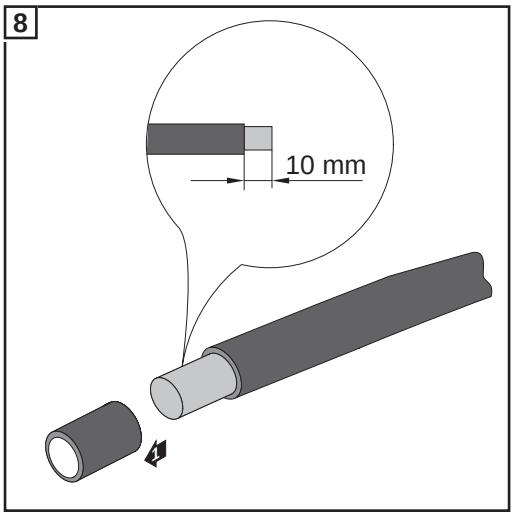


NOTE! Finely stranded cables up to conductor class 5 can be connected to the DC-side terminals without wire end ferrules.

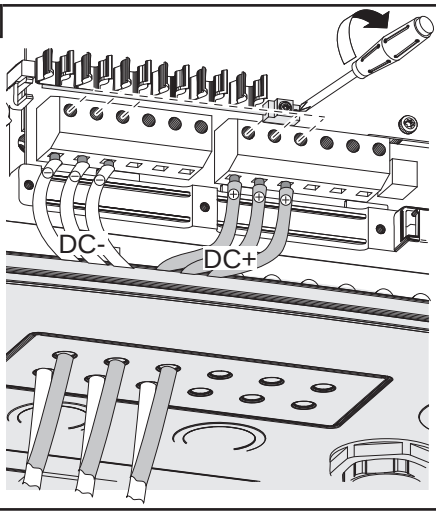
8



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

9



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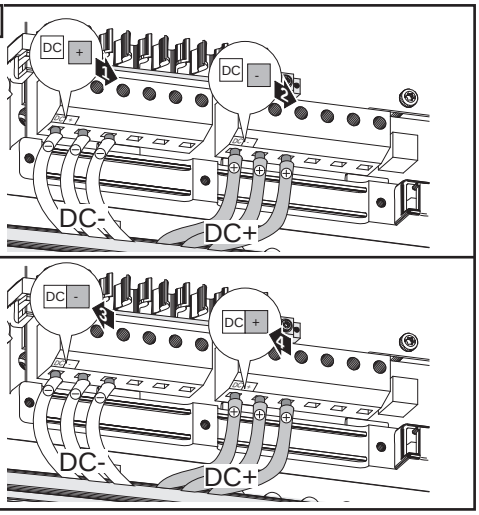
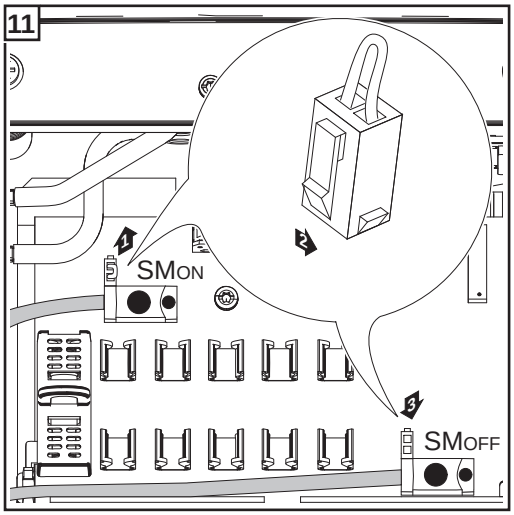


Tightening torque of terminals:
1.2 - 1.5 Nm

IMPORTANT!

- Set the jumper from the 'SM_{ON}' position to the 'SM_{OFF}' position for correct measurement results
- Check the polarity and voltage of the 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.

11



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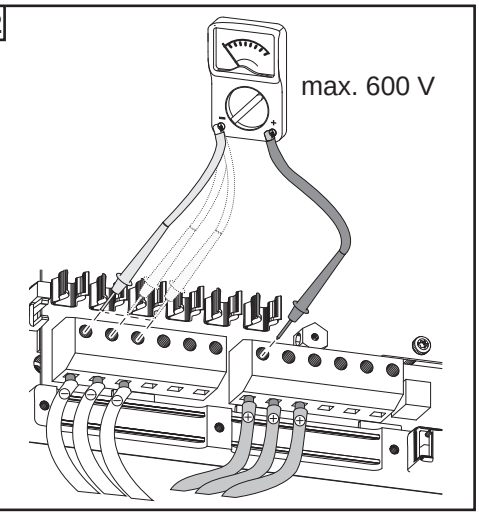
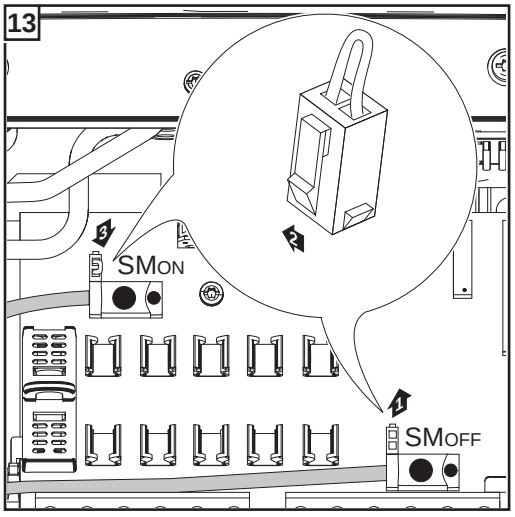
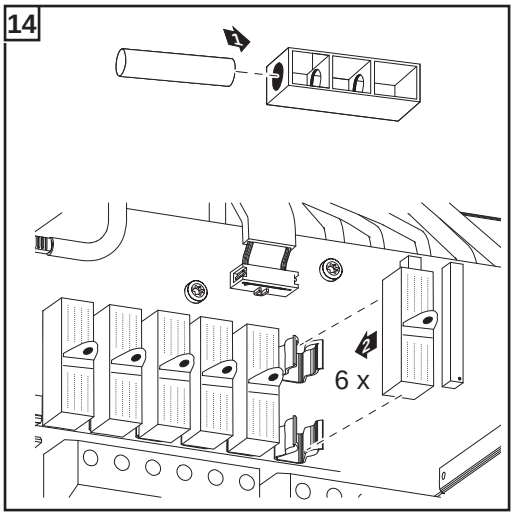
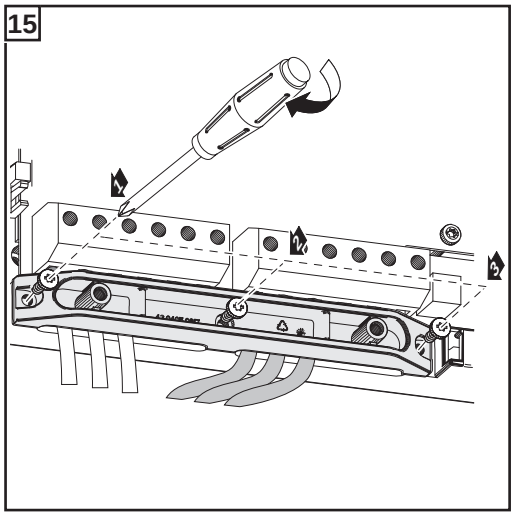




IMPORTANT!

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





Selecting String Fuses

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

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

IMPORTANT!

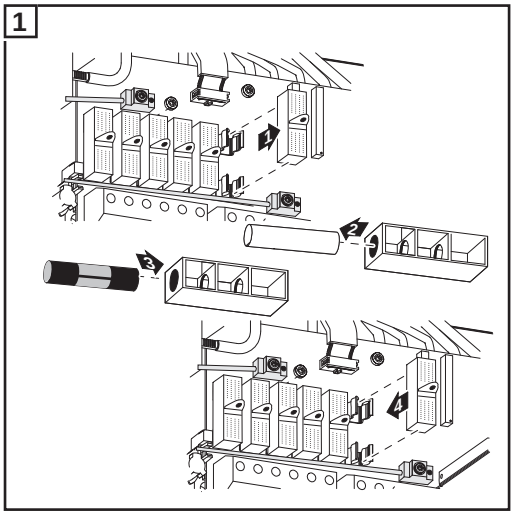
- Please follow solar module safety instructions
- Follow all solar module manufacturer requirements

Inserting String Fuses

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

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

1



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

Criteria for the Proper Selection of String Fuses

General

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

Criteria for the Proper Selection of String Fuses

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

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

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

Effects of Using Underrated Fuses

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 A x 1.5 = 8.625 A

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

Fuses

Nominal current	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
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

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

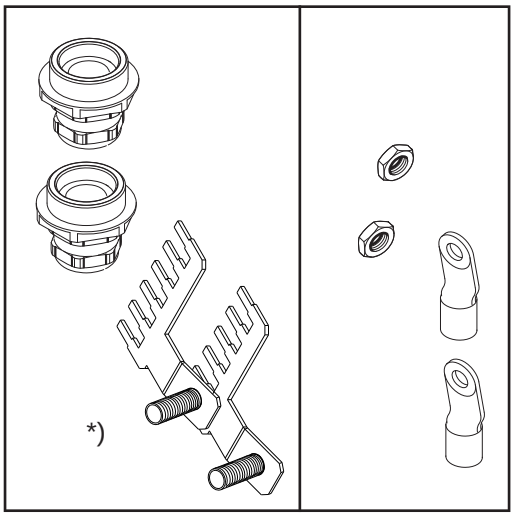
General

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

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

Additional components required

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



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

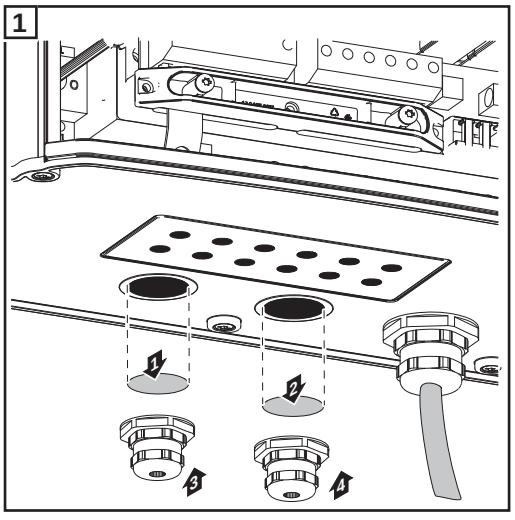
  *)
  Metric screw joints and connection distributors are available from Fronius as an option.

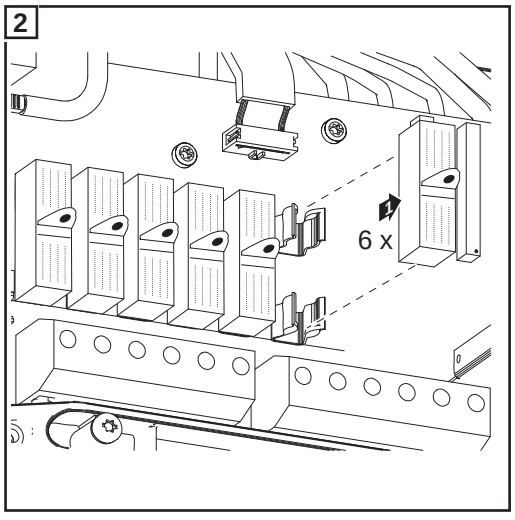
- 2 M10 cable lugs

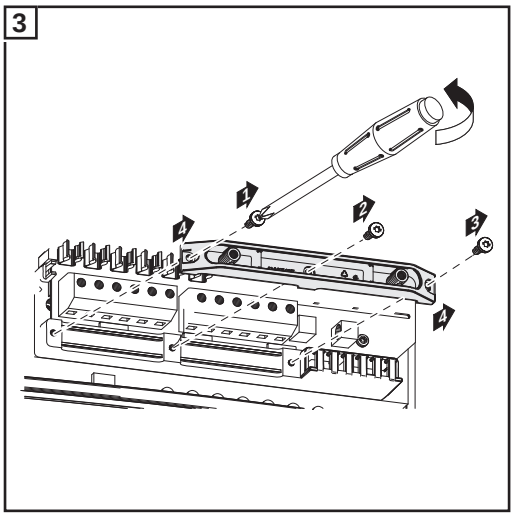
  Select cable lugs that match the available DC cables

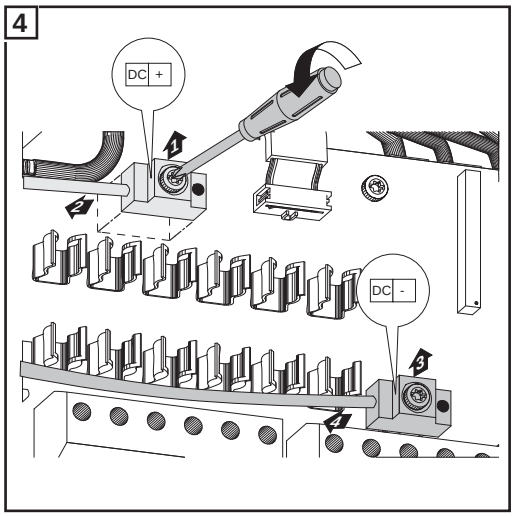
- 2 M10 hexagon nuts

Solar module ground at positive pole: Connecting solar module strings with a cable cross section > 16 mm²



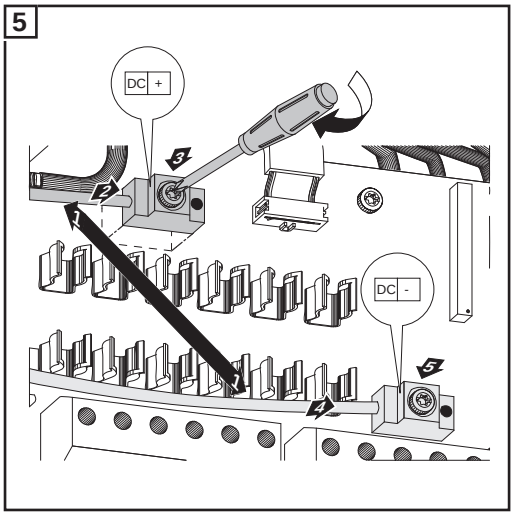


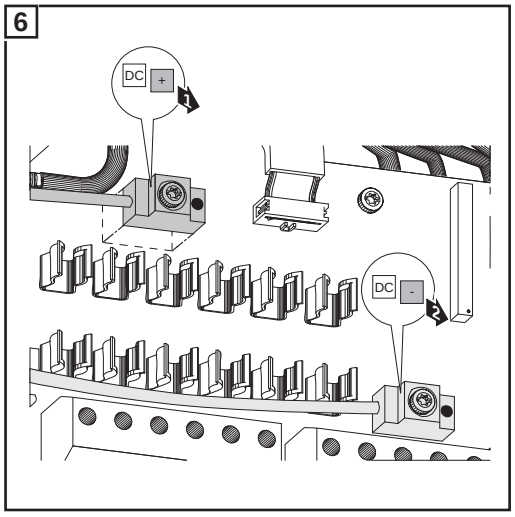


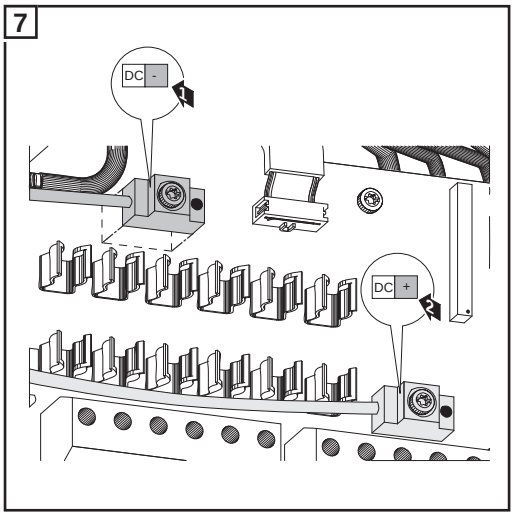


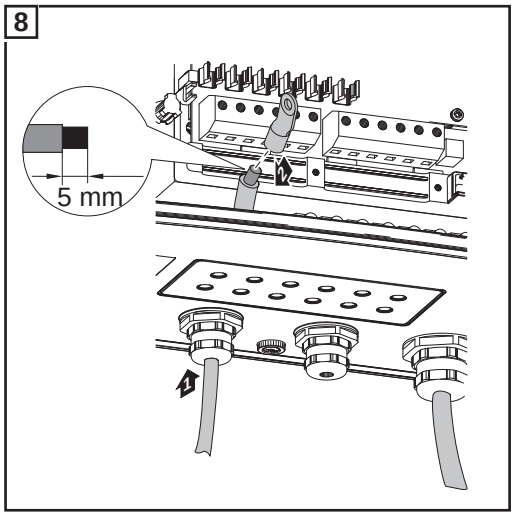
After disconnecting the DC main switch cables:

- 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





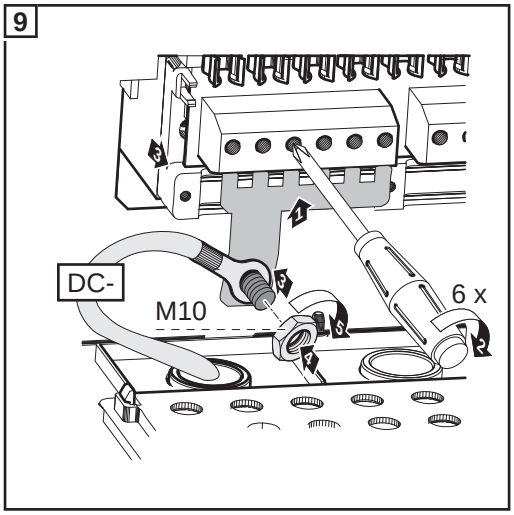




CAUTION! Danger of damaging the inverter by overload.

- 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

9



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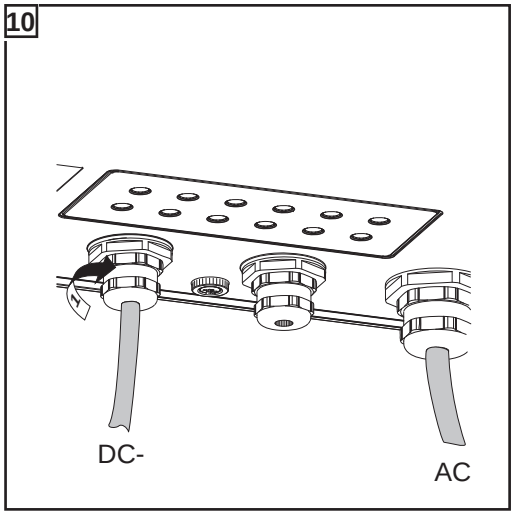
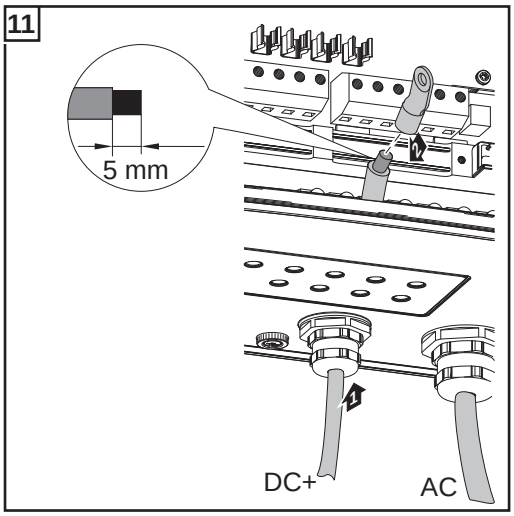


Tightening torque of terminals:
1.2 - 1.5 Nm
Tightening torque of hexagon nut on the connection distributor:
max. 15 Nm

11



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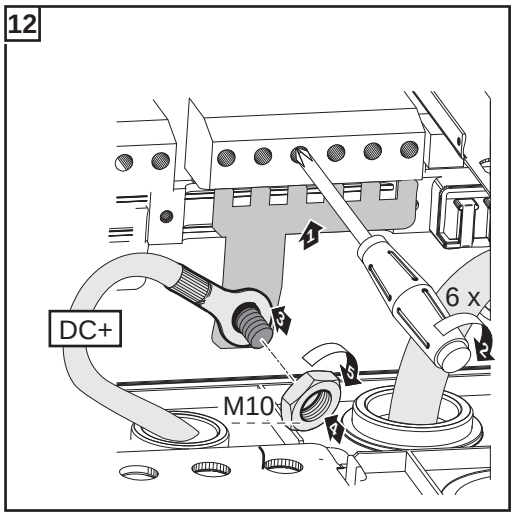
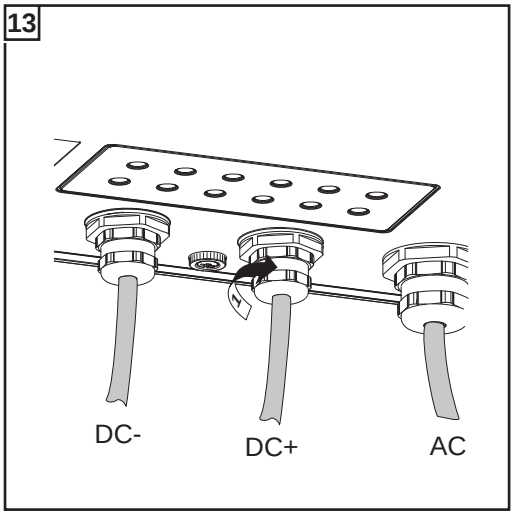
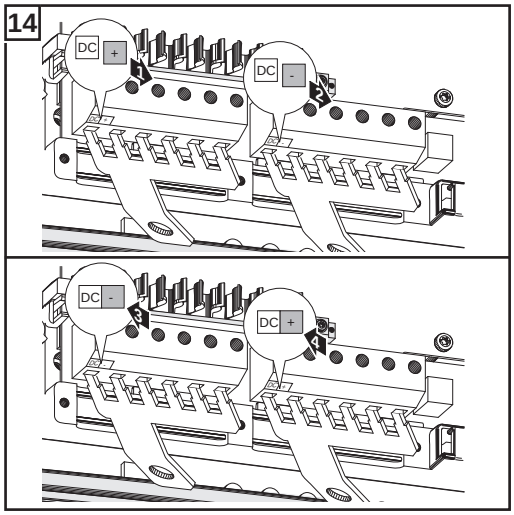


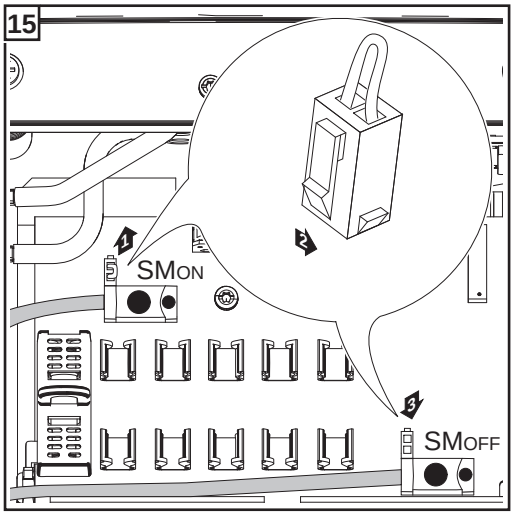
Tightening torque of terminals:
1.2 - 1.5 Nm
Tightening torque of hexagon nut on the connection distributor:
max. 15 Nm

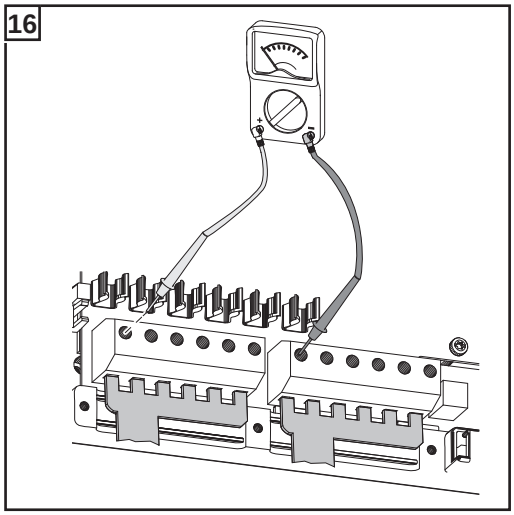


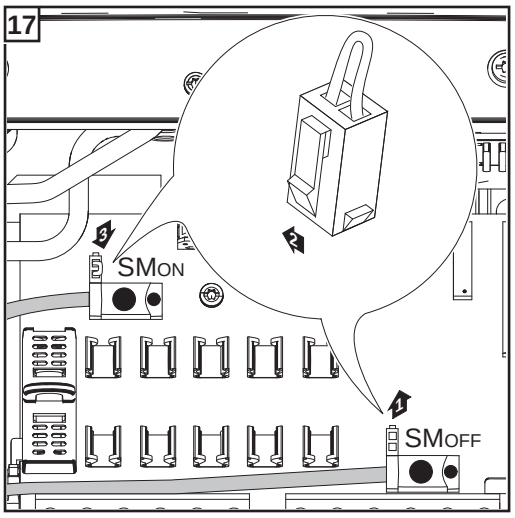


IMPORTANT!

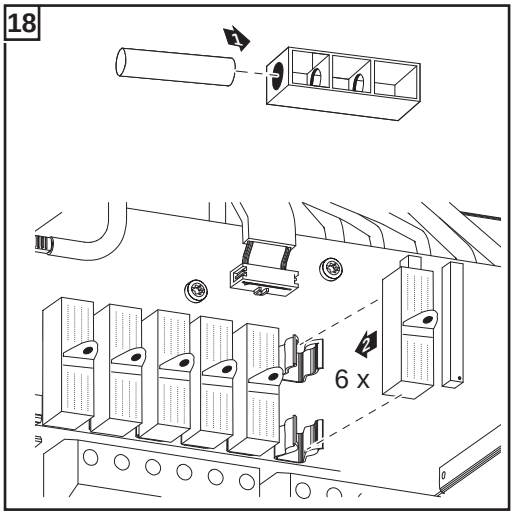
- Set the jumper from the 'SM_{ON}' position to the 'SM_{OFF}' position for correct measurement results
- Check the polarity and voltage of the DC cables strings: The voltage should be a max. of 600 V.







IMPORTANT! When using connection distributors, insert 6 metal bolts with fuse covers in the fuse holders. The metal bolts are included in the Fronius IG Plus scope of delivery.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1
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6 x

Solar Module Ground at Positive Pole for Fronius IG Plus

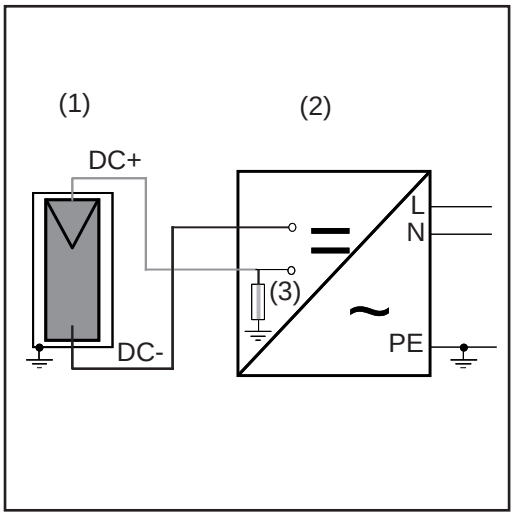
General

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

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

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

Solar Module Ground at Positive Pole

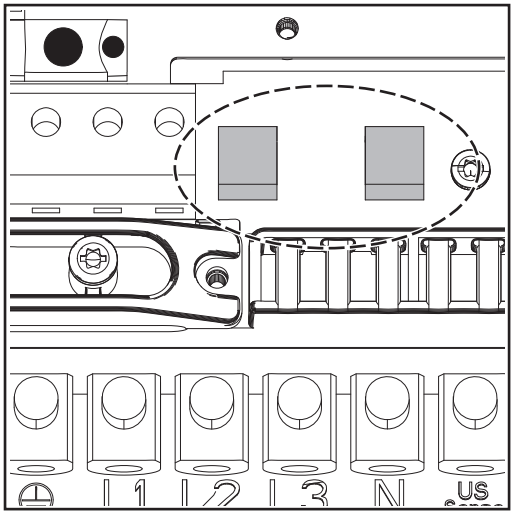


Example:
Solar module ground at positive pole with fuse or high ohm resistor

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

Solar Module Ground at Positive Pole for Fronius IG Plus

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



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

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

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

Safety

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

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

Safety Label for the Solar Module Ground

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

Setting inverters for grounded solar modules

When solar modules are grounded, the inverter's insulation monitoring is deactivated. For this reason, you must make a setting in the 2nd 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).
A code is required to access the 2nd level of the Setup menu. This code can be obtained from Fronius. Additional information regarding accessing the 2nd level of the Setup menu will be provided along with the code.

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

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

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

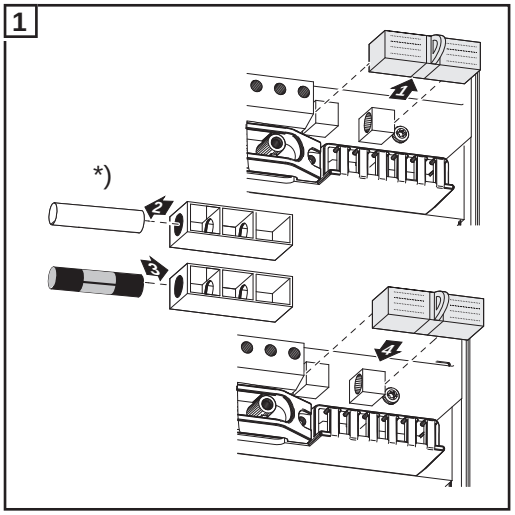
or

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

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

The DC main switch is only used to switch off power to the power stage set. When the DC main switch is turned off, the solar module ground at the negative pole remains unaffected. Never touch the DC+ and DC-.

Inserting a fuse:

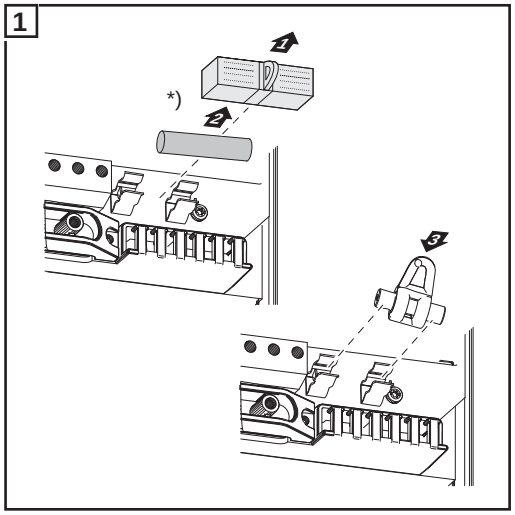


*) The plastic bolts are included in the inverter scope of delivery

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

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

Inserting the "100 kohm Grounding Kit" option:



*) Remove standard fuse holder with plastic bolt

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

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

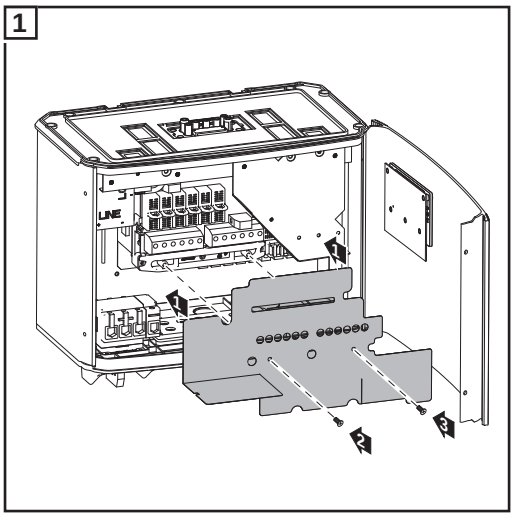
Opening Fronius IG Plus for Service/Maintenance

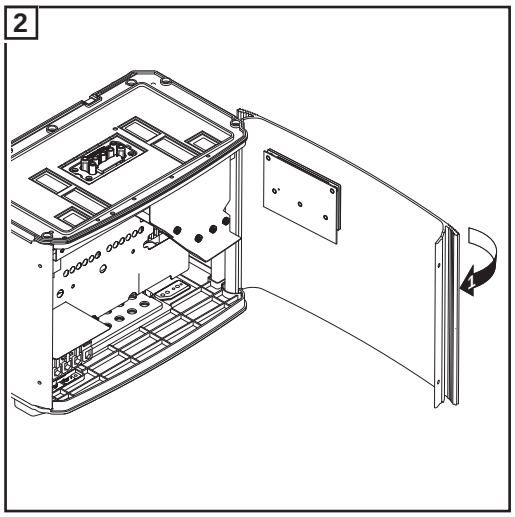
Procedure for opening the inverter for service or maintenance:

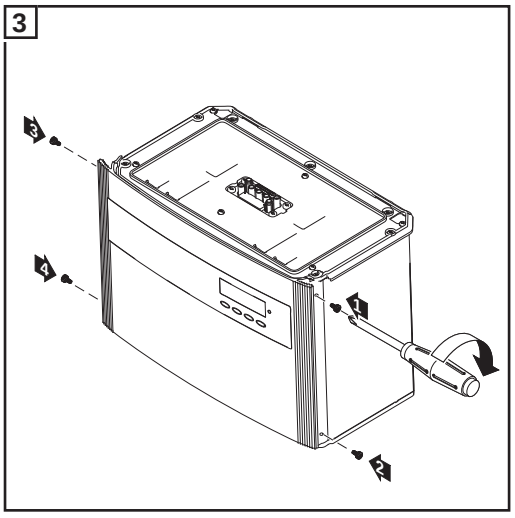
1. Disconnect AC and DC supply from the inverter
2. Open the connection area
3. Turn off DC main switch
4. Allow the capacitors to discharge (5 minutes)
5. Remove metal covers
6. If present, remove the fuse for the solar module ground
7. If present, remove string fuses
8. Disconnect DC wire
9. Disconnect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

Closing Fronius IG Plus

Closing Fronius IG Plus







Inserting Option Cards

GB

Suitable Option Cards

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

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

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

Safety

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

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

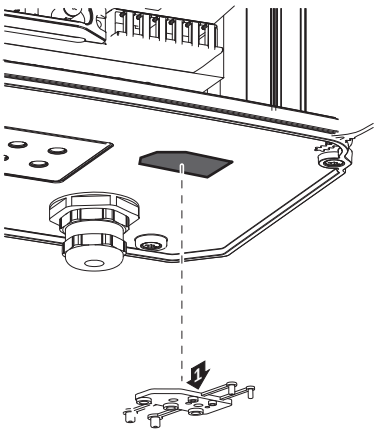
WARNING! An electric shock can be fatal. Danger from residual voltage from capacitors.

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

NOTE! Follow general ESD precautions when handling option cards.

Inserting option cards into the Fronius IG Plus

1



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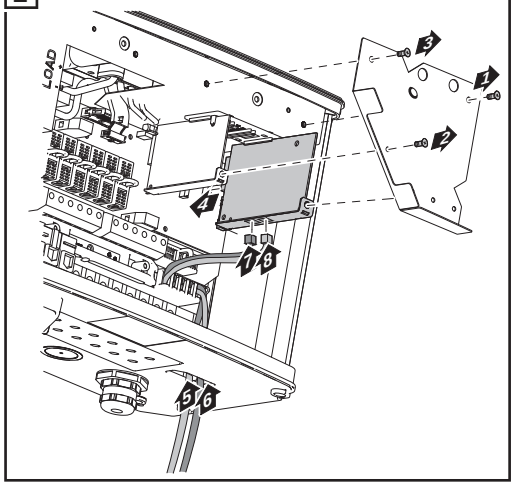
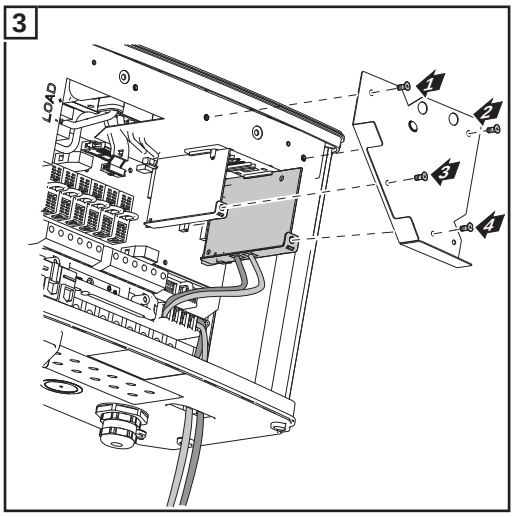
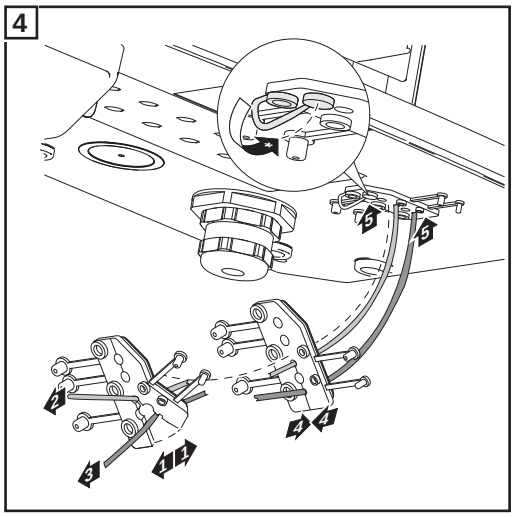


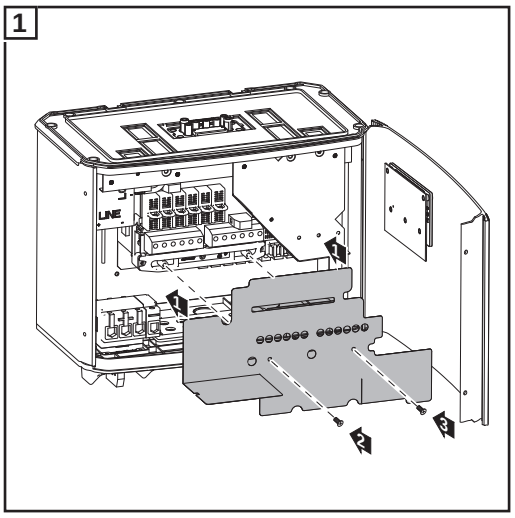


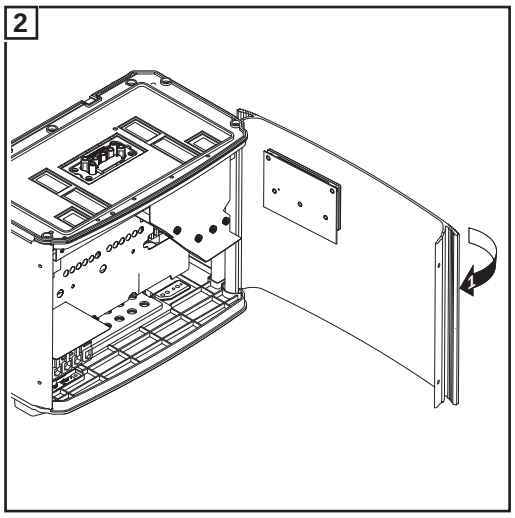


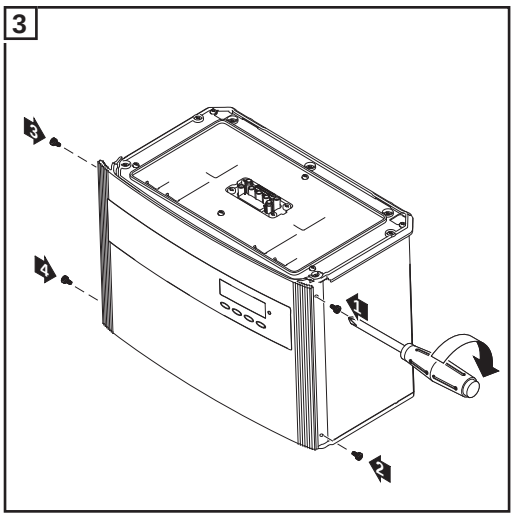
IMPORTANT! When networking several DATCOM components, a termination plug must be placed on each free IN and/or OUT connection of a DATCOM component.

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.

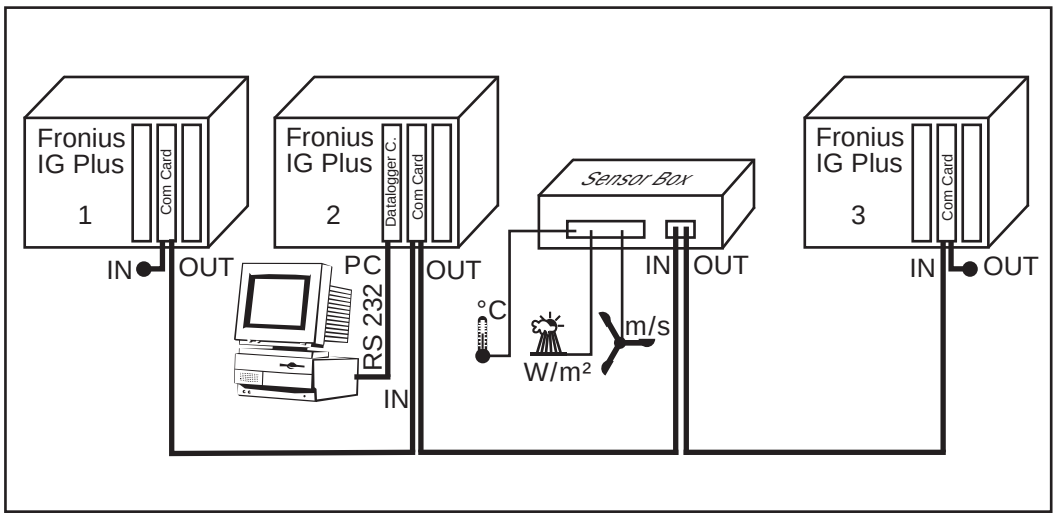
In order to distinguish between several identical system upgrades, each one must be assigned a unique number.

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.

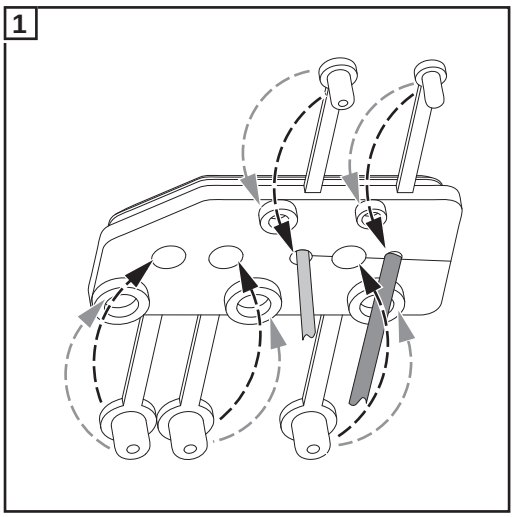
Start-up operation

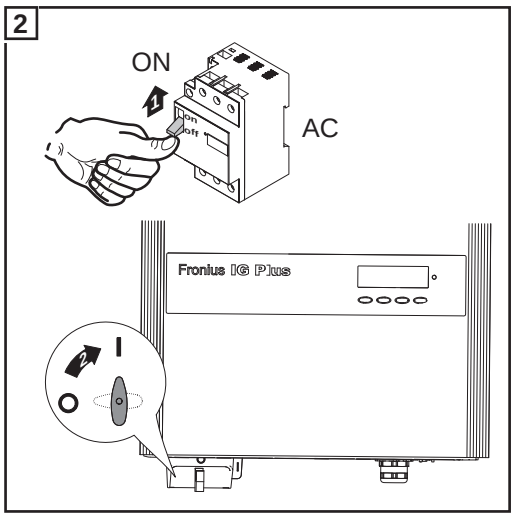
Once the inverter has been connected to the solar modules (DC) and the public grid (AC), turn the main switch to position - 1 -.

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





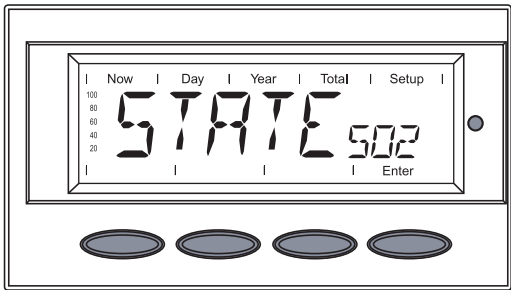
- As soon as the photovoltaic modules produce sufficient power, the Operating Status LED lights up orange. The screen displays the startup phase. The orange LED indicates that the feed-in mode of the inverter will begin shortly.
- After the automatic inverter start, the Operating Status LED lights up 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

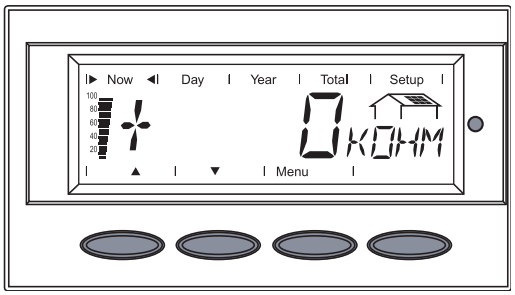
NOTE! If a solar module ground is used, the corresponding grounding mode must be set in the 'Basic Service Menu' after the inverter is turned on.

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.

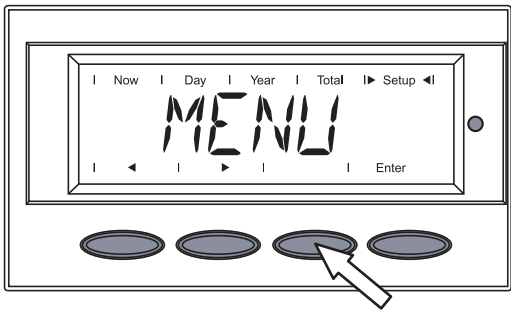


1 Confirm the status message by pressing the "Enter" key



The current insulation value is displayed.

2 Press the "Menu" key

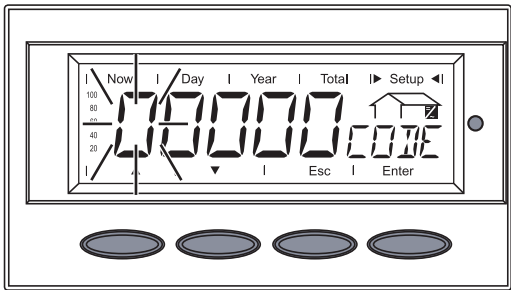


The "menu" is displayed.

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

◀ ▶

4 Press the unassigned "Esc" key 5 x

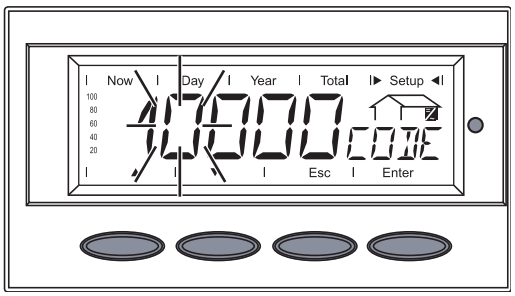


"CODE" is displayed, the first digit flashes.

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

▲ ▼

6 Press the "Enter" key

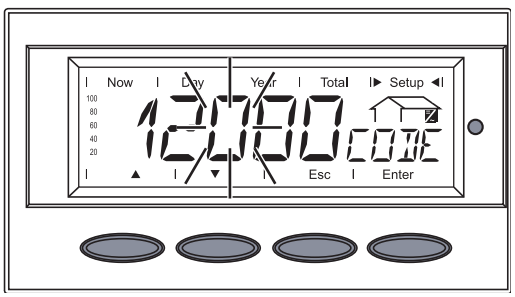


The second digit flashes.

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

▲ ▼

8 Press the "Enter" key

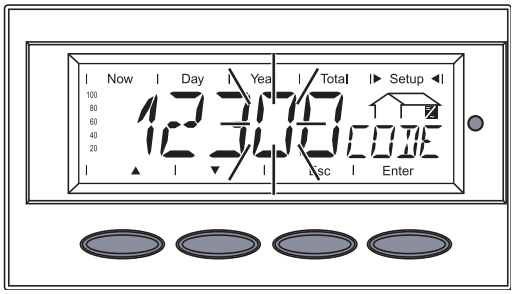


The third digit flashes.

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

▲ ▼

10 Press the "Enter" key

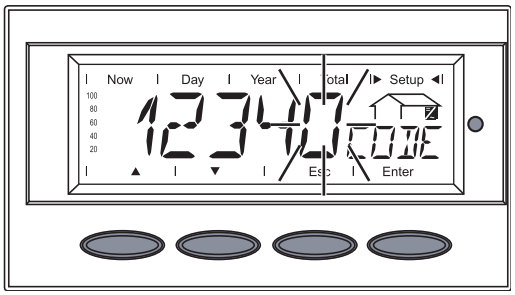


The fourth digit flashes.

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

▲ ▼

12 Press the "Enter" key

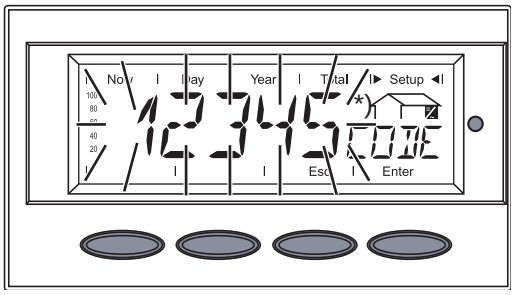


The fifth digit flashes.

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

▲ ▼

14 Press the "Enter" key

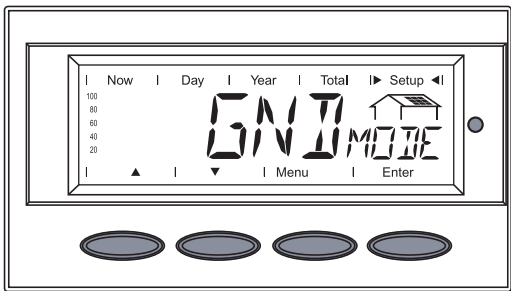


The access code flashes.
*) ... Code example

15 Press the "Enter" key

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

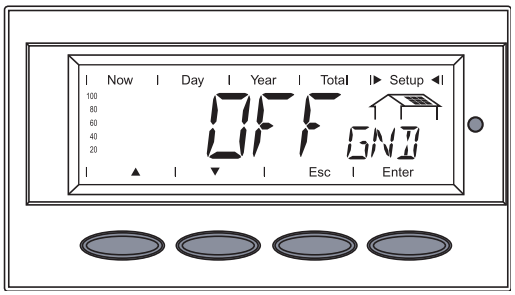
- 'MIXMODE' for multiphase inverters
- 'DCMODE' for one-phase inverters



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

▲ ▼

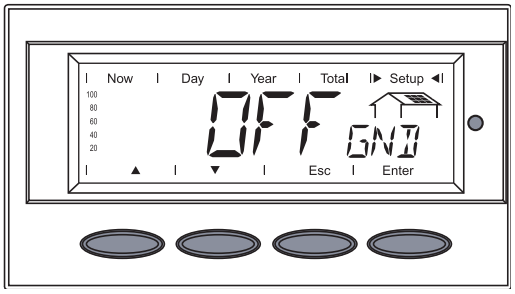
17 Press the "Enter" key



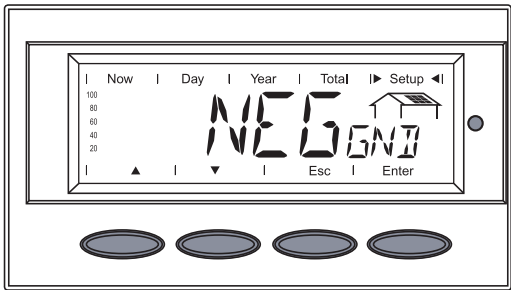
The grounding mode is displayed.

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

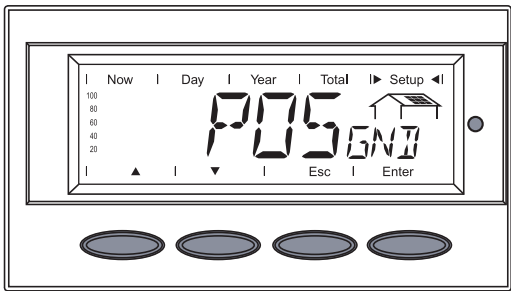
▲ ▼



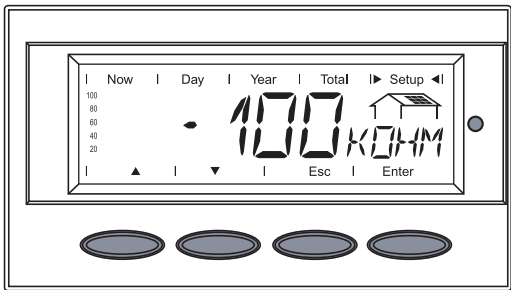
OFF = no solar module ground (factory setting)



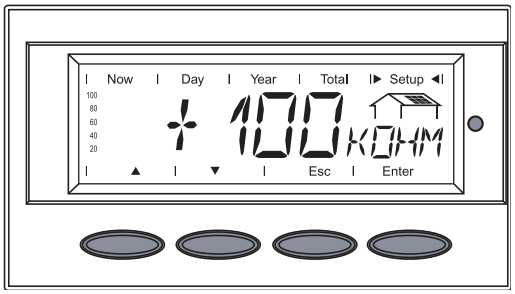
NEG = solar module ground at negative pole



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

Operation

Product Description Fronius IG Plus

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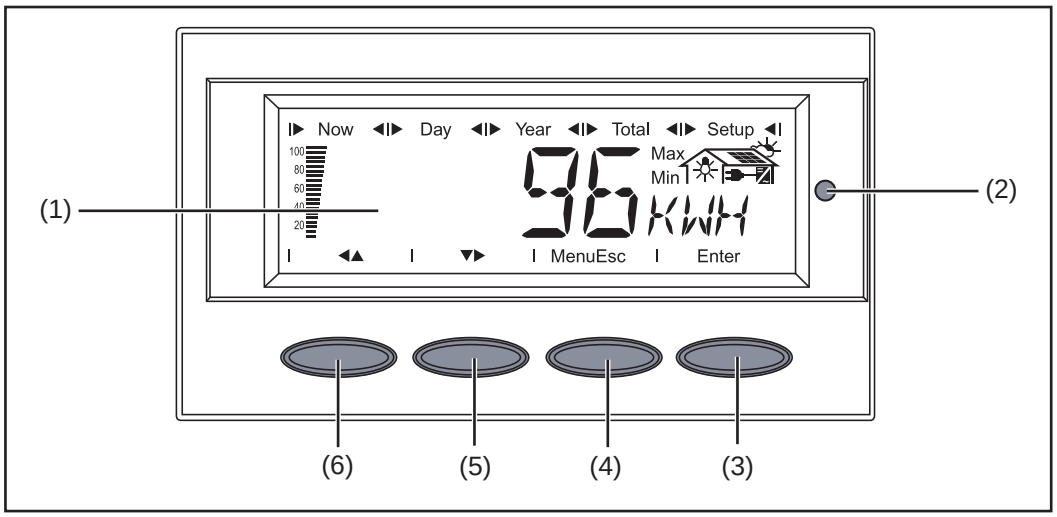
Controls and Indicators

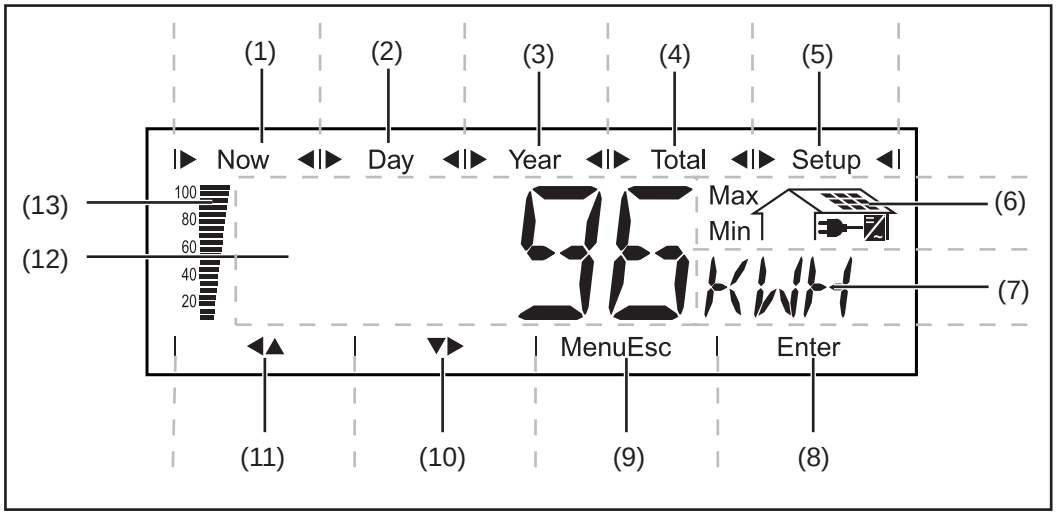


Item	Function
(1)	Display for displaying values, settings and menus
(2)	Operating Status LED for displaying the operating status
(3)	"Enter" key for confirming a selection
(4)	"Menu / Esc" key for scrolling through menu options for exiting the Setup menu
(5)	"Down/Right" key depending on the selection: 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

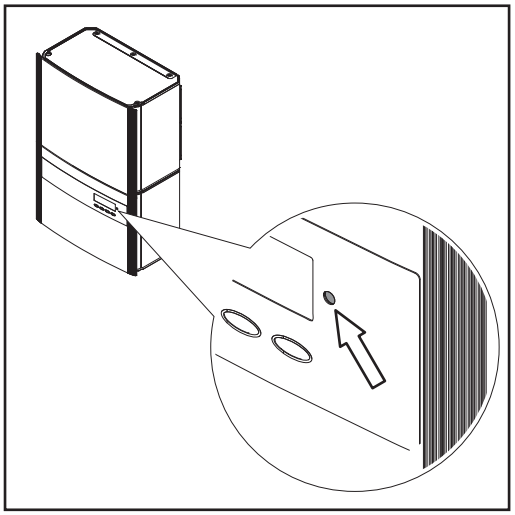
... appears when values are displayed which are directly associated with the public grid

... 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
(12)	Range for display value for displaying the value

Item	Function
(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."

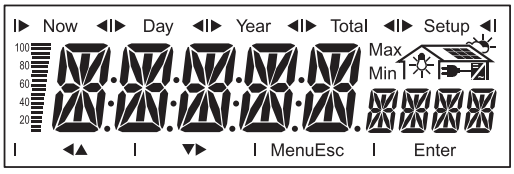
Startup Phase and Grid Feed-in Mode

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.

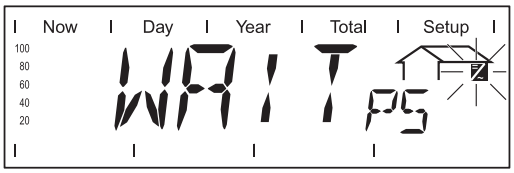
Test Procedure

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

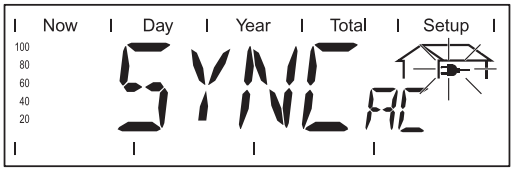


2. Self test of important inverter components
   - The inverter goes through a master check list for several seconds
   - The display will show "TEST" as well as the component currently being tested (e.g., "LED")

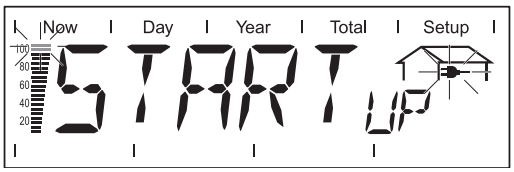
3. Synchronization with grid:
   - "WAIT PS" is displayed, the inverter icon flashes: The inverter waits for all power stage sets on the grid to be operational. This procedure is dependent on the DC voltage.



   - 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"

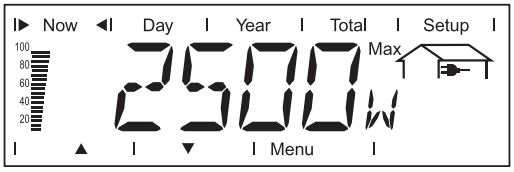


The startup test can take anything from just a few seconds up to several minutes depending on national regulations. The time elapsed is indicated by a bar shrinking from the top down.

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

Operation of Feeding Energy into the Grid

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



Navigation in the Menu Level

Activating display illumination

1 Press any key

The display 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.

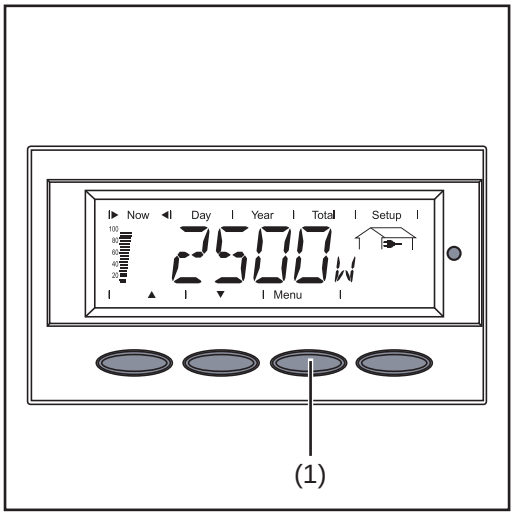
Automatic switch to the "Now" display mode or the startup phase

If no key is pressed for 2 minutes:

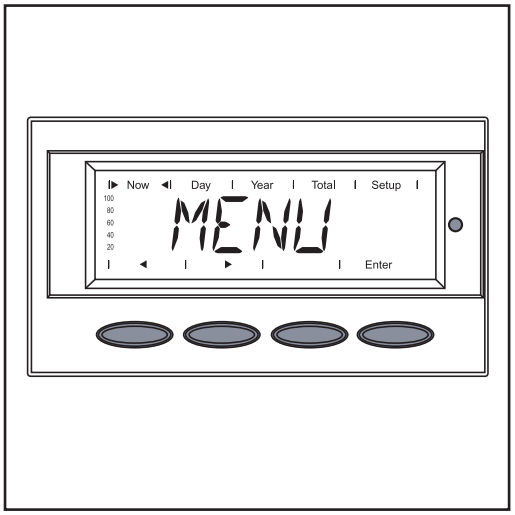
- While power is being fed into the grid, the inverter automatically switches to the "Now" display mode and the present output power is displayed.
- If the inverter is not feeding power into the grid, the inverter automatically switches to the startup phase for synchronization with the grid.

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.

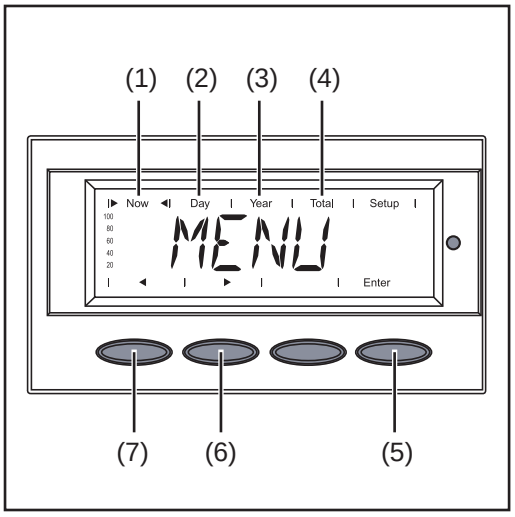
From the menu level you can
- set the desired display mode
- access the Setup menu

The Display Modes

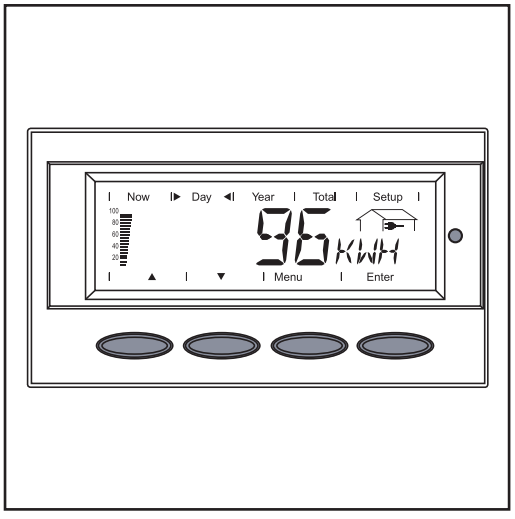
The Display Modes

"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

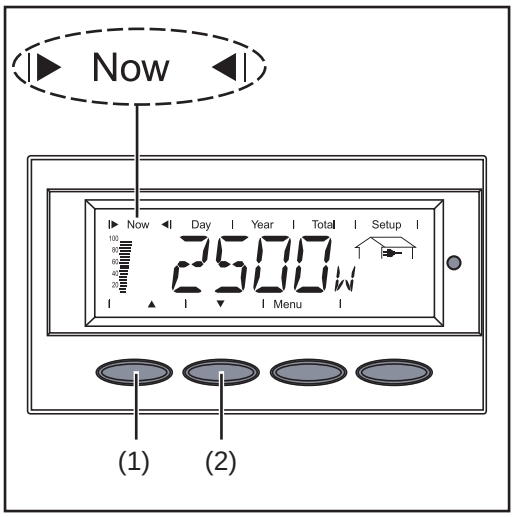
Display mode	Symbol	Unit	Optional	Display value
"Now"		W	-	Output power

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

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

Display Values in "Now" Display Mode

Selecting the "Now" Display Mode



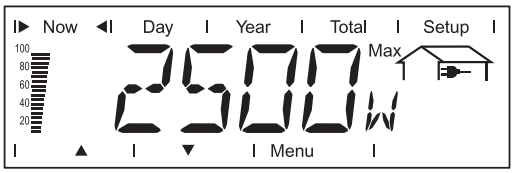
1 Select the "Now" display mode

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 depending on the country setup or the device-specific settings.

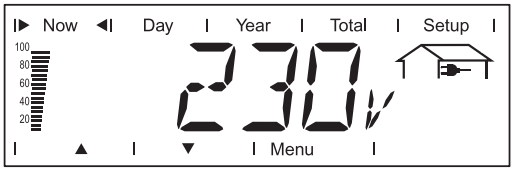
- The present apparent power for the device can be displayed in VA by pressing the "Enter" key.
- The present operating mode can be displayed by pressing the "Up" and "Down" keys.

The "Enter" key can also be active if a Fronius Power Control Box is located in the Solar Net and power reduction has been triggered by the utility company.

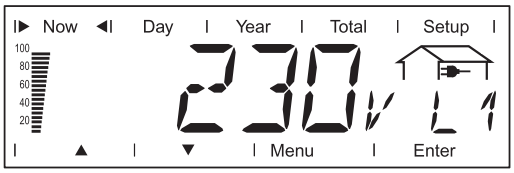
- The power reduction is displayed as a % by pressing the "Enter" key.
- You can display how long the power reduction has been in effect by pressing the "Up" and "Down" keys.

In cases where both are occurring, you can display the apparent power by pressing the "Enter" key. Then you can scroll through the remaining parameters using the "Up" and "Down" keys.

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



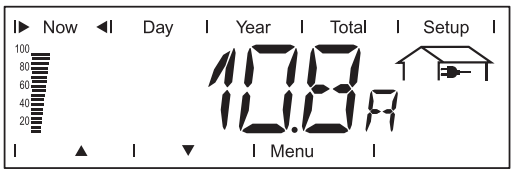
For example, phase voltage for phase L1:



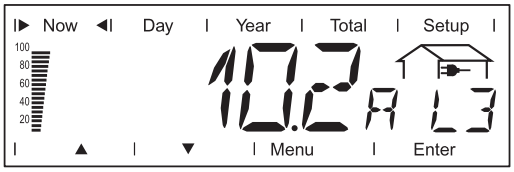
Grid voltage
External conductor voltage (volts)

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.



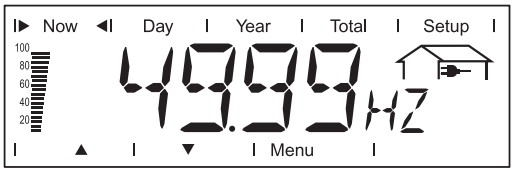
For example, phase current for phase L3:



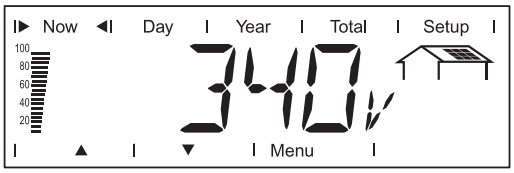
Output current
Current supplied to the grid at the particular moment (amperes)

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

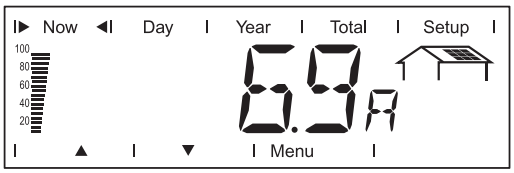
- The phase current can be displayed by pressing the "Enter" key.
- The phase current of the other phases can be displayed by pressing the "Up" and "Down" keys.
- You can return to the menu level by pressing the "Menu" key.



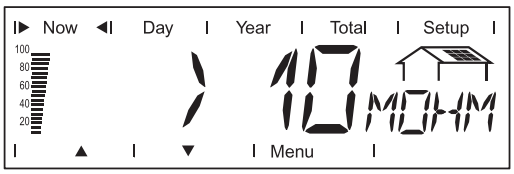
Grid frequency
(hertz)



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
(megaohms)
For ungrounded solar modules

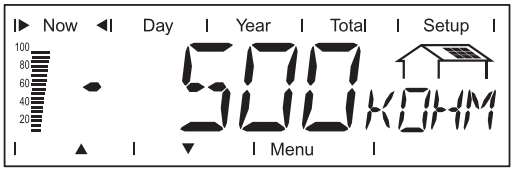
WARNING! An electric shock can be fatal. The positive and negative poles of the photovoltaic system should never be touched with an insulation resistance of < 500 kohm. An insulation resistance of < 500 kohm may be due to an inadequately insulated DC lead or defective solar modules. In the event that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

The insulation resistance is the resistance between the positive or negative pole of the photovoltaic system and the earth potential. If an insulation resistance > 500 kilohms is shown, this means that the photovoltaic system is adequately insulated.

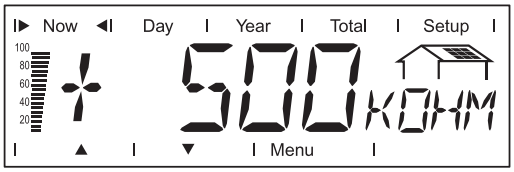
An insulation resistance of less than 500 kilohms indicates an error.

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

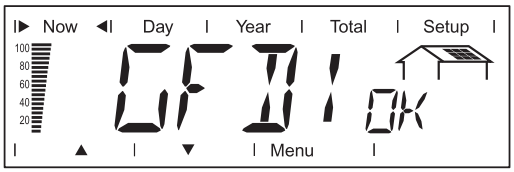
- negative potential of the ground (polarity sign '-')
- positive potential of the ground (polarity sign '+')



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

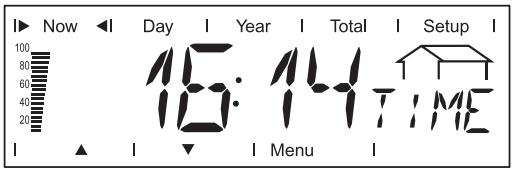


Display example of a positive potential (polarity sign '+')
Short circuit between DC+ lead and ground



GFDI status
For grounded solar modules
If there is no ground fault in the system, "GFDI OK" is displayed

GFDI = Ground Fault Detector Interruptor



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

Options

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

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

General

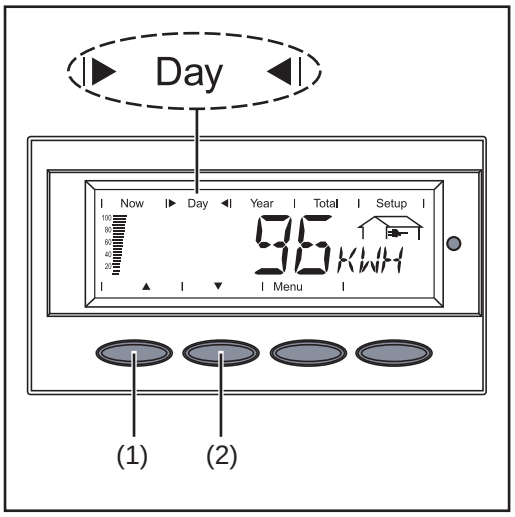
For the inverter, the day begins when it switches on. If the DC supply line is disconnected, the following parameters within the "Day" display mode will be reset after repeating the startup:

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

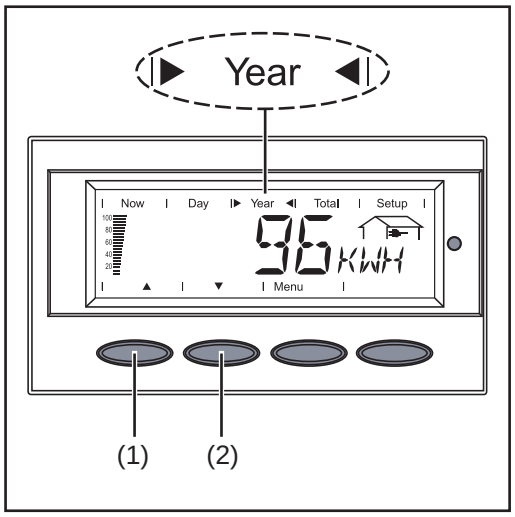
If an optional Fronius Datalogger is available, the display values listed always apply to the whole day.

Selecting "Day / Year / Total" Display Mode

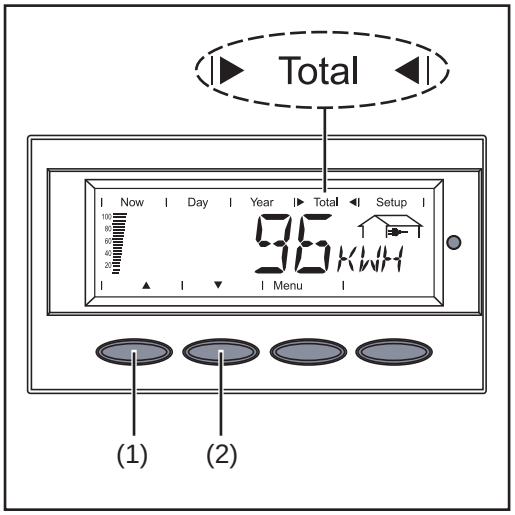
First Display Value in the "Day" Display Mode:



First Display Value in the "Year" Display Mode:



First Display Value in the "Total" Display Mode:



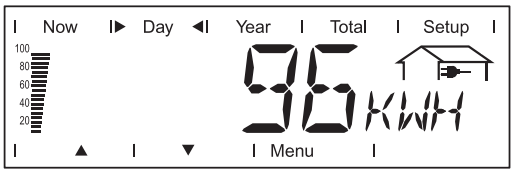
1 Select the "Day" or "Year" or "Total" display mode

The first display value in the selected display mode appears.

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

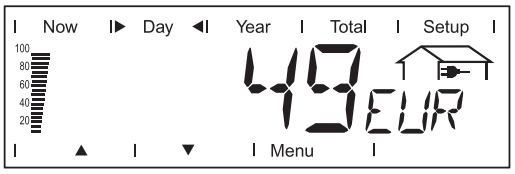
Scroll back using the "Up" key (1)

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



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

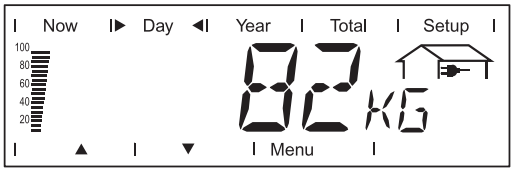
Due to the variety of different monitoring systems, there can be deviations between the readings of other metering instruments and the readings from the inverter. For determining the energy supplied to the grid, only the readings of the calibrated meter supplied by the electric utility company are relevant.

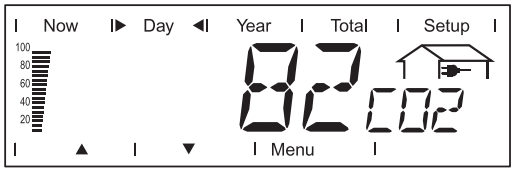


Yield
Amount of money earned during the period of time in question (currency can be selected in the Setup menu)

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

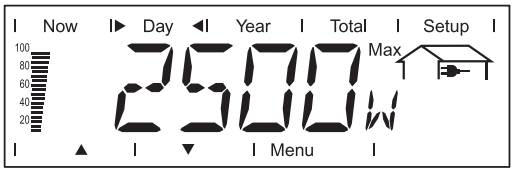
'The Setup menu' section describes how to set the currency and rate for the output energy. The factory setting depends on the respective country-specific setting.



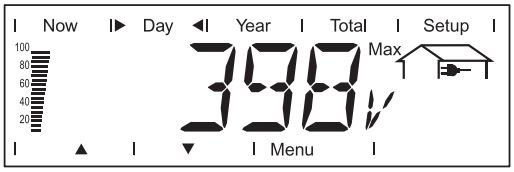


CO2 reduction
CO2 emissions saved during the monitored period
(kg / T; T = tons)
The area for unit display switches between ‘kg’ or ‘T’ and ‘CO2.’

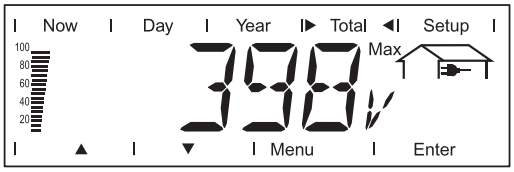
The CO2 meter gives an indication of CO2 emissions that would be released during the generation of the same amount of electricity in a combustion power plant.
The factory setting is 0.59 kg / kWh (source: DGS - the German Society for Solar Energy).



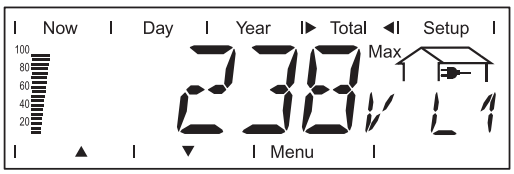
Maximum output power
Highest output power of the inverter during observation period (watts)



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

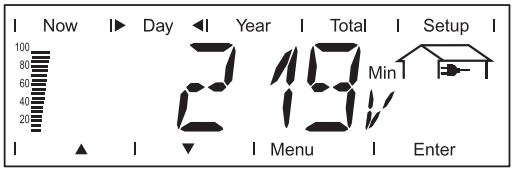


For example, maximum phase voltage for phase L1:

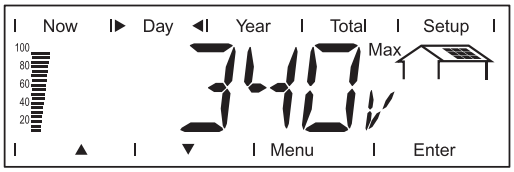


The 'Enter' key is active in the 'Total' display mode depending on the country set-up or the device-specific settings.

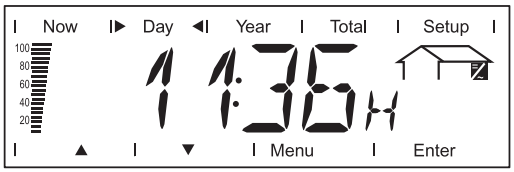
- The maximum phase voltage measured during the time in question can be displayed by pressing the 'Enter' key.
- The maximum phase voltage of the other phases measured during the time in question can be displayed by pressing the 'Up' and 'Down' keys.
- You can return to the menu level by pressing the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

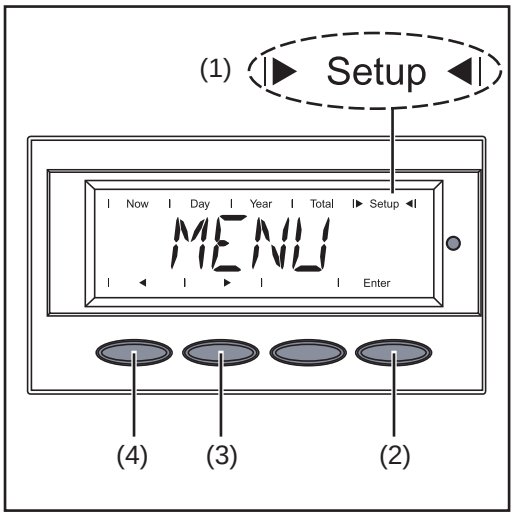
The Setup Menu

Presetting

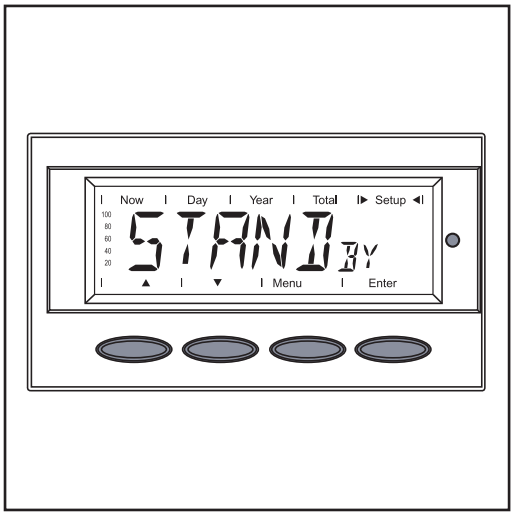
The inverter is pre-configured and ready to use. No manual control is necessary for feeding the power it generates into the grid.

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

Accessing the Setup Menu



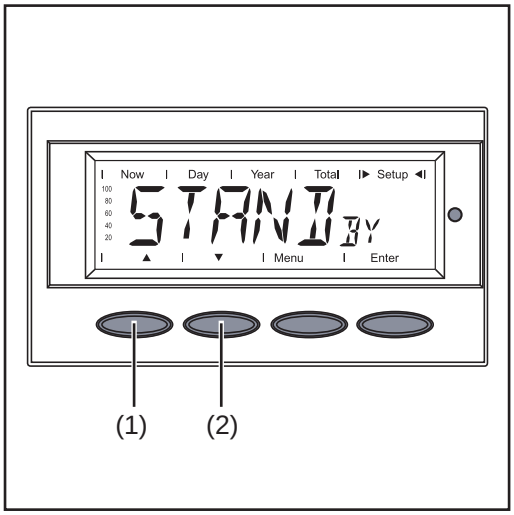
1. Switch to the menu level (press the "Menu" key)
2. Select the "Setup" (1) mode using the "Left" (4) or "Right" (3) keys
3. Press "Enter" (2)



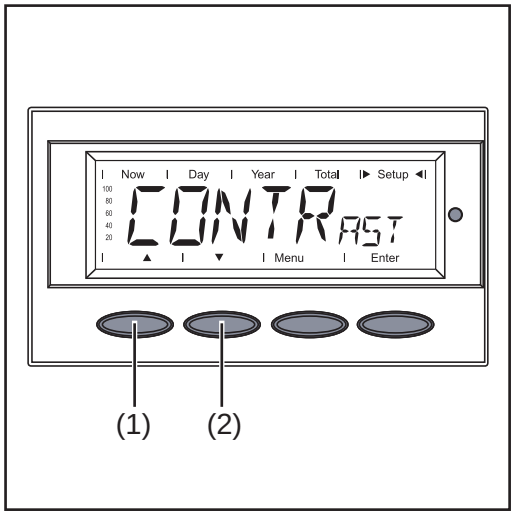
The Setup Menu's first menu item "STAND-BY" is shown.

Scrolling through Menu Items

Example: "STANDBY" menu item



Example: "CONTRAST" menu item



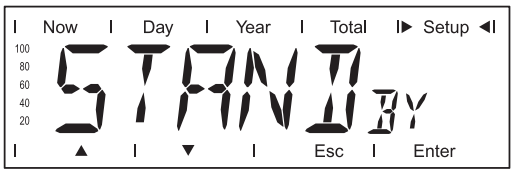
1 Access the Setup menu

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

Menu Items in the Setup Menu

GB

STANDBY

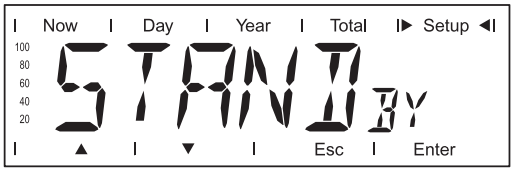


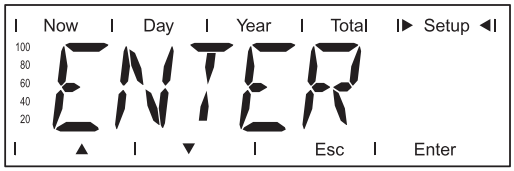
Manual activation / deactivation of Standby operation using the "Enter" key

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:"





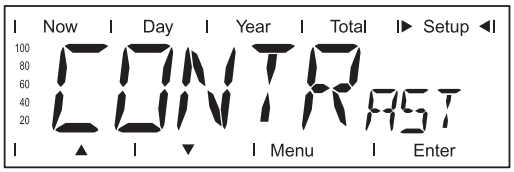
To maintain Standby operation:

- Press the "Esc" key

To end Standby operation:

- Press the "Enter" key

CONTRAST

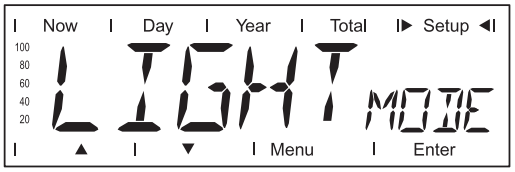


Contrast setting on LCD display

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



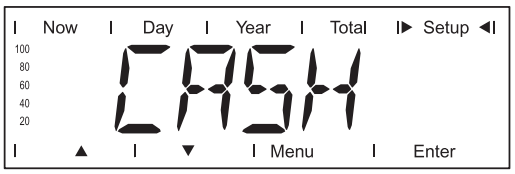
Initial setting for display illumination.

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).

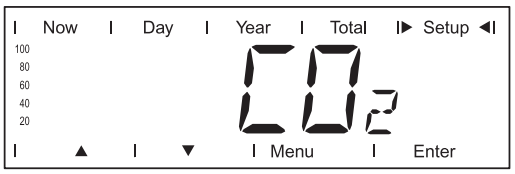
CASH



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)

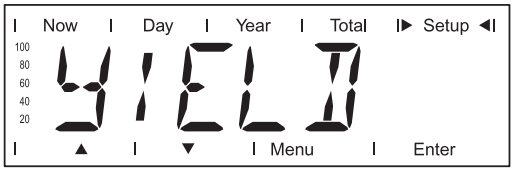
CO2



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.

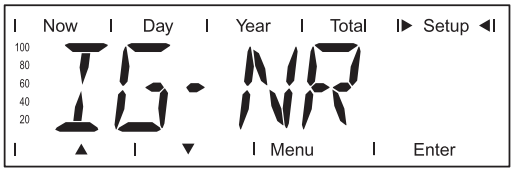
OFF SET
Offset is an amount of energy (in Wh, kWh, or MWh) that can be added to the lifetime total energy output of the inverter to give it a 'head start.'

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.

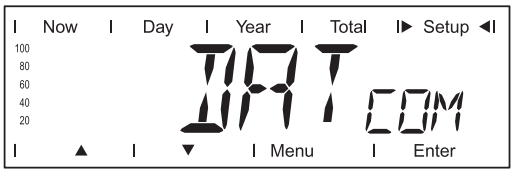


Number setting (address) of the inverter in a setup comprising multiple solar inverters linked together

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 ON

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

Examples of options:

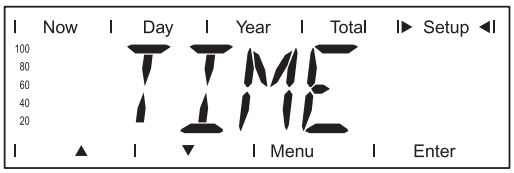
SIGCD TEST
Function test for the Fronius Signal Card option

PDCD RST
Resets the Fronius Personal Display Card option

IFCD RST
Resets the Fronius Interface Card option

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

TIME

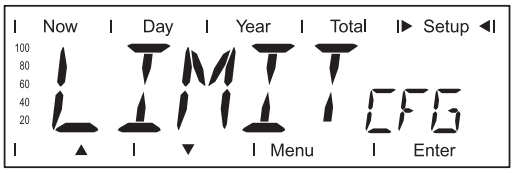


Date and time setting

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

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

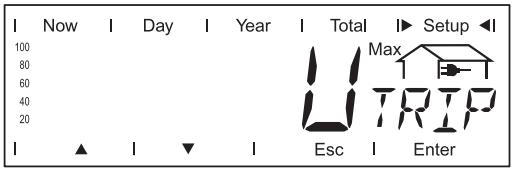
LIMIT CFG

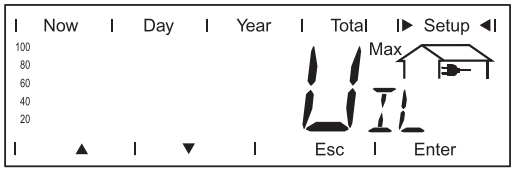


Used to display settings relevant to a utility company. The displayed values depend on the respective country setup or device-specific inverter settings.

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 / 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.
Example:

- 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 reconnecting to the public grid after disconnection due to an unacceptable parameter deviation

U RC Min
"Reconnection"
Lower voltage limit for reconnecting 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 16.66 ms

FREQ RC Max
"Reconnection"
Upper grid frequency limit for reconnecting to the public grid after disconnection due to an unacceptable parameter deviation

FREQ RC Min
"Reconnection"
Lower grid frequency limit for reconnecting 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 - CONST / COSP*** Constant cos phi specification - CONST / Q REL*** Constant specification of the relative reactive power in % - CONST / Q ABS*** Constant specification of an absolute reactive power in VA - COSP (P) cos phi specification depending on the effective power - Q (U) Relative reactive power specification regarding the current grid voltage - Q (P) Relative reactive power specification depending on the effective power - OFF The inverter is operating in the pure effective power range (cos phi = 1)
GPIS	"Gradual Power Increment at Startup" Soft start 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

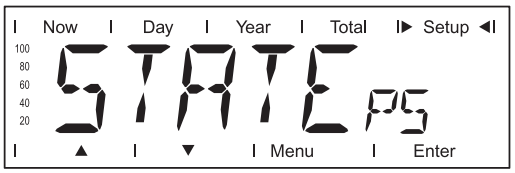
ON / OFF / N.A.

MIX MODE
DC operating mode

*** alternating display
N.A. not available

- Press 'Enter' to display the respective value
- Press 'Esc' to exit the displayed value

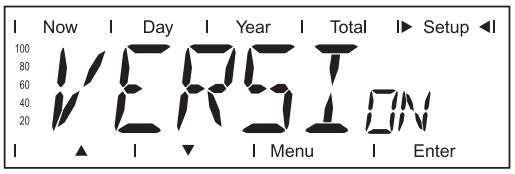
STATE PS



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.

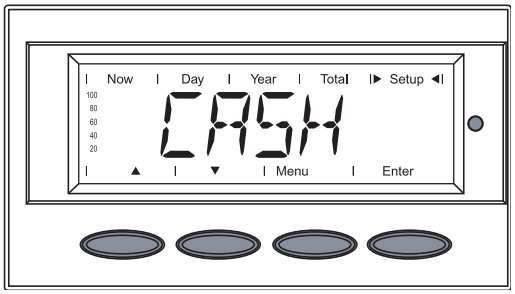
The currently selected menu item is displayed.

Examples of Setting and Displaying Menu Items

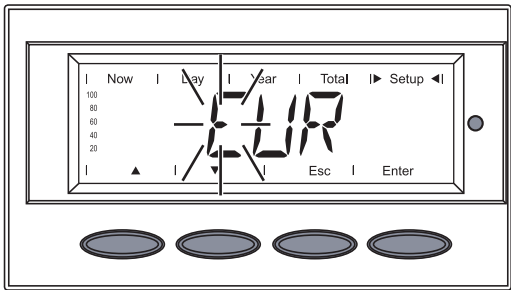
The following examples describe how to set and display menu items:

- 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



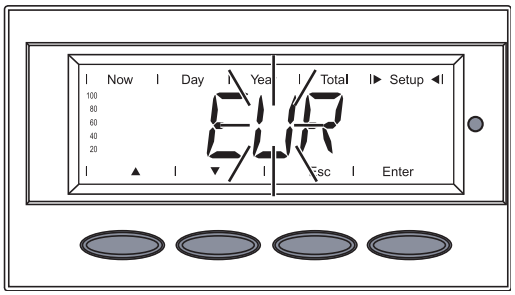
1. Select the "CASH" menu item
2. Press the "Enter" key



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
▲ ▼

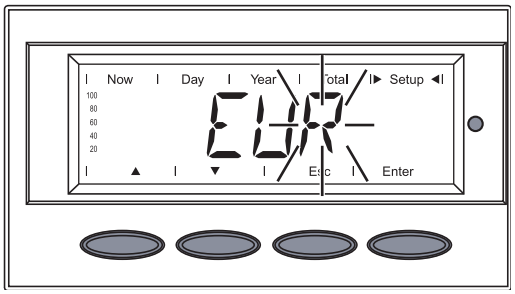
4 Press the "Enter" key



The second character flashes.

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

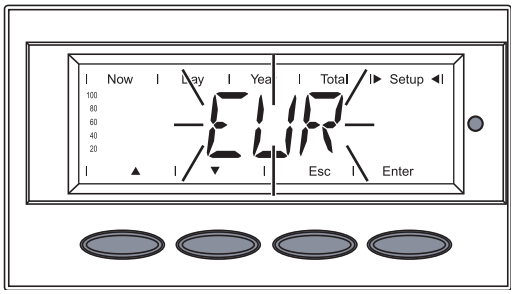
6 Press the "Enter" key



The third character flashes.

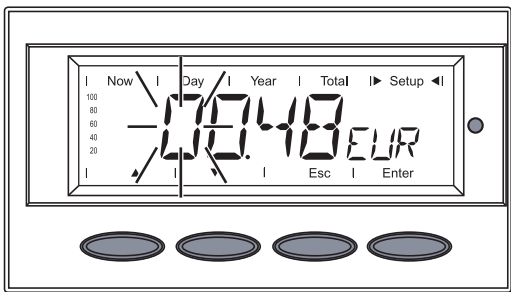
7 Use the "Up" and "Down" keys to select a letter for the third character
▲ ▼

8 Press the "Enter" key



The set currency flashes.

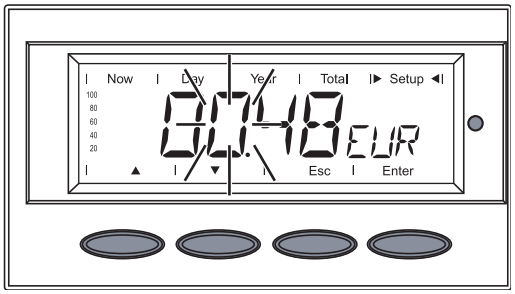
9 Press the "Enter" key



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

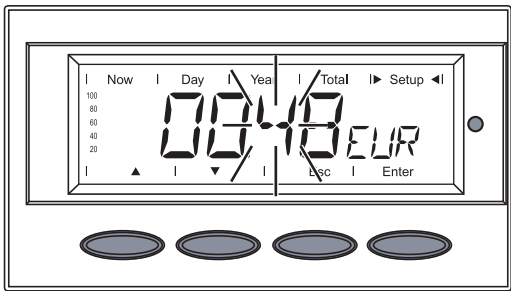


The second digit flashes.

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

▲ ▼

13 Press the "Enter" key

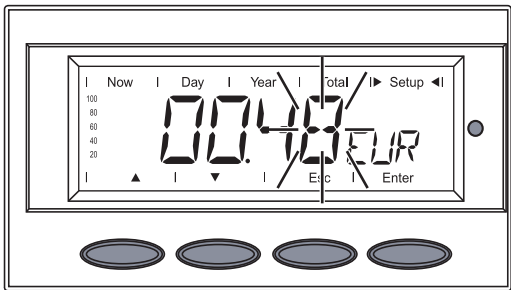


The first digit after the decimal point flashes.

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



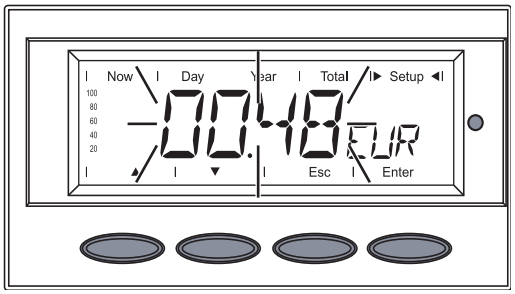
The second digit after the decimal point flashes.

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



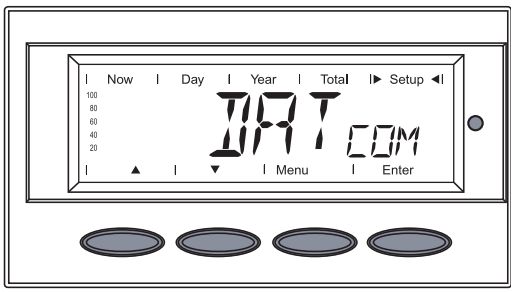
The set charge rate flashes.

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



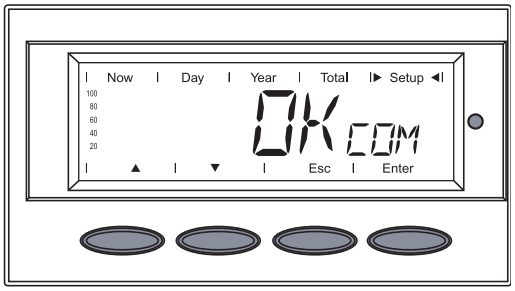
1 Select the "DATCOM" menu item

2 Press the "Enter" key

The following displays depend on whether

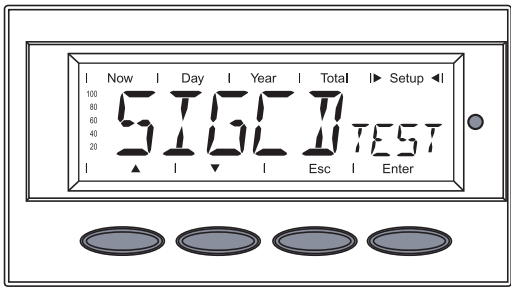
- a data connection has been established
- a data connection is faulty or an option is not installed

Available data connection



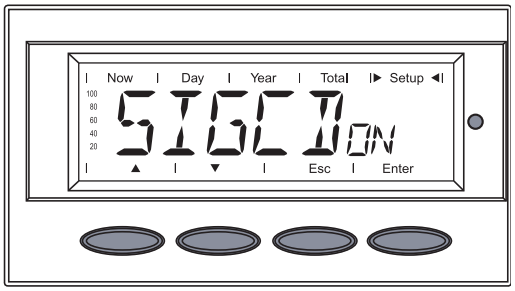
If there is a data connection available, "OK-COM" is shown.

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



"SIGCDTEST" is displayed

4 Press the "Enter" key

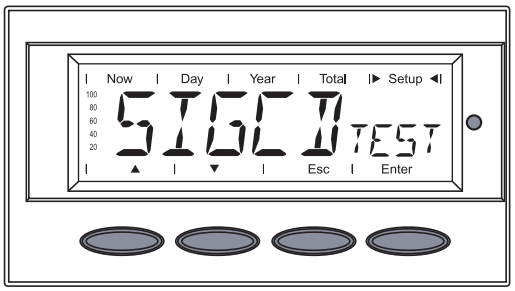


The "Signal Card Test" starts, "SIGCD ON" appears on the display.

If the "signal card" is active, it will emit an acoustic signal in confirmation.

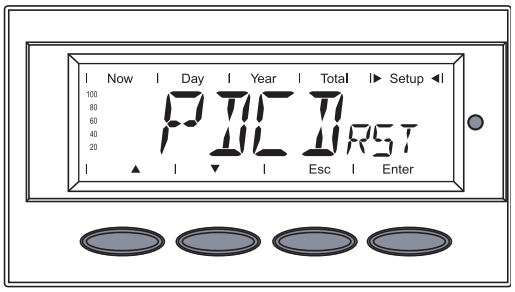
IMPORTANT! If no acoustic signal is heard, the signal lines should be checked.

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

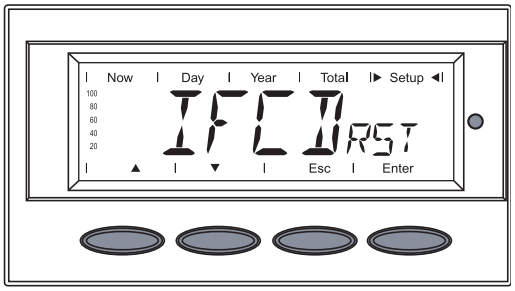


"SIGCD TEST" is displayed

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

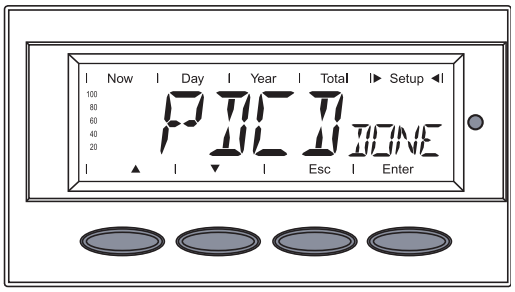


e.g., Reset Personal Display Card ("PDCD RST") ...



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

7 Press the "Enter" key



"PDCD DONE"...

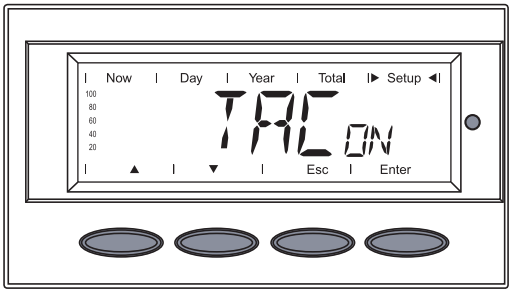
...or...

"IFCD DONE" is displayed

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

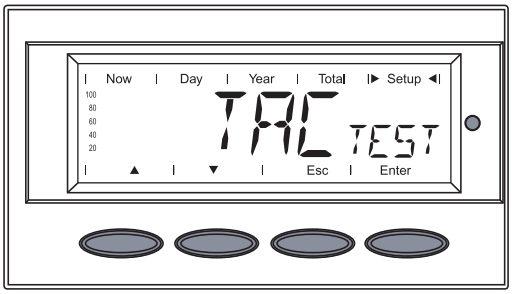
9 Use the "Down" key to select additional options:

▼



"TAC ON" is displayed

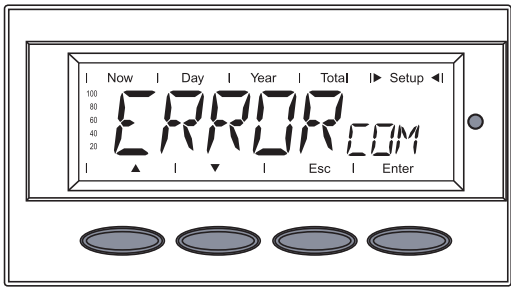
10 To test the function of the Fronius Power Relay Card option, press the "Enter" key



"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

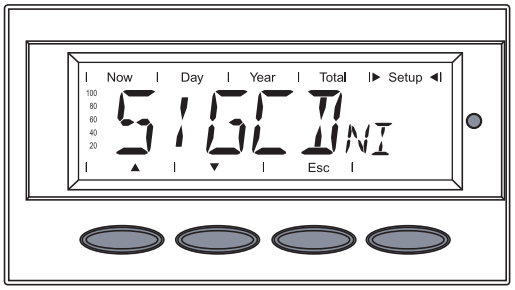
Data connection faulty or DATCOM is not installed



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

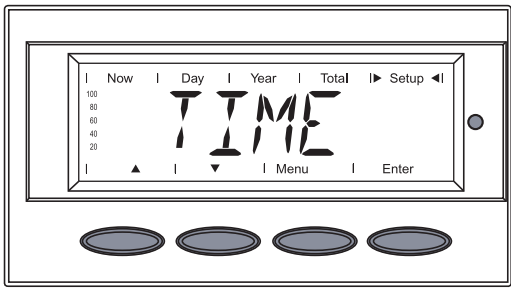
▼



"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.

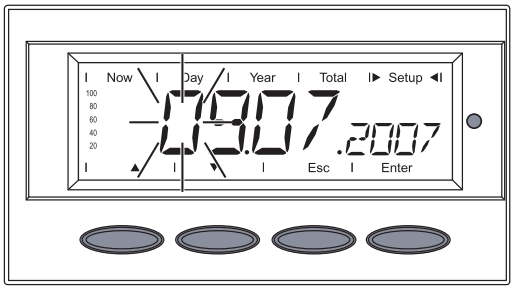
4 Press the "Esc" key to exit the "DATCOM" menu item

Setting Time and Date



1 Select the "TIME" menu item

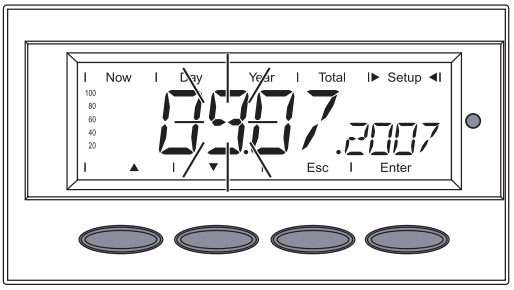
2 Press the "Enter" key



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

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

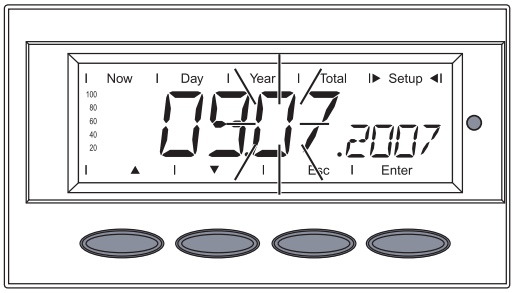
4 Press the "Enter" key



The second digit for the day flashes.

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

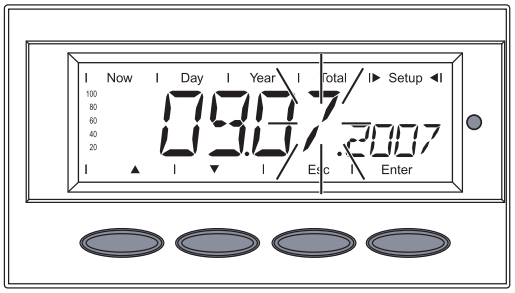
6 Press the "Enter" key



The first digit for the month flashes.

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

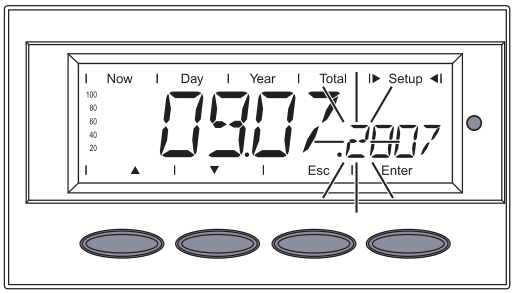
8 Press the "Enter" key



The second digit for the month flashes.

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

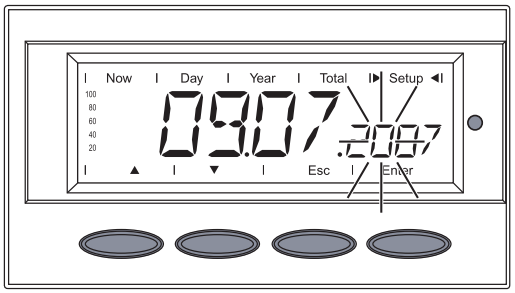
10 Press the "Enter" key



The first digit for the year flashes.

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

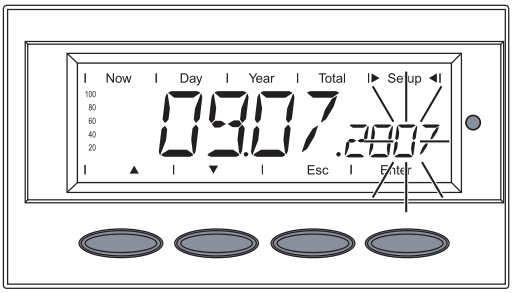
12 Press the "Enter" key



The second digit for the year flashes.

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

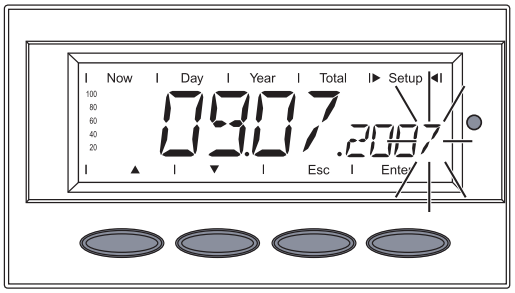
14 Press the "Enter" key



The third digit for the year flashes.

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

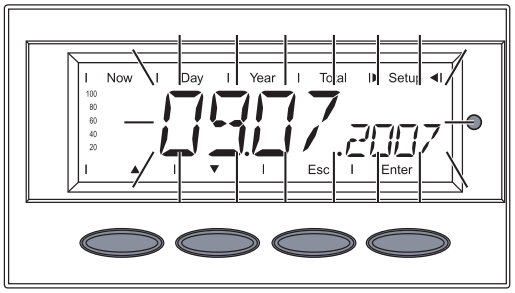
16 Press the "Enter" key



The fourth digit for the year flashes.

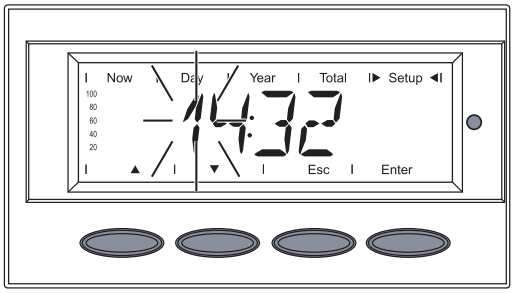
17 Use the "Up" and "Down" keys to select a value for the fourth year digit ▲ ▼

18 Press the "Enter" key



The set date then flashes.

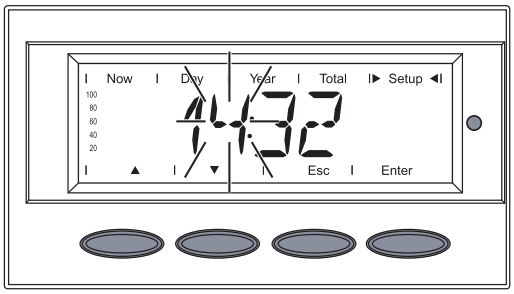
19 Press the "Enter" key



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

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

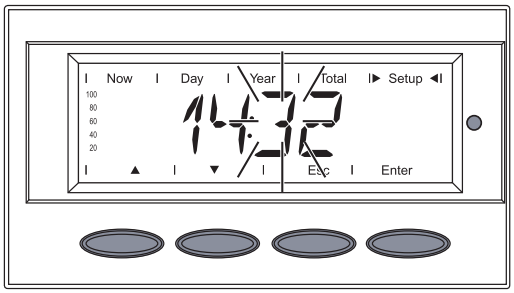
21 Press the "Enter" key



The second digit for the hour flashes.

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

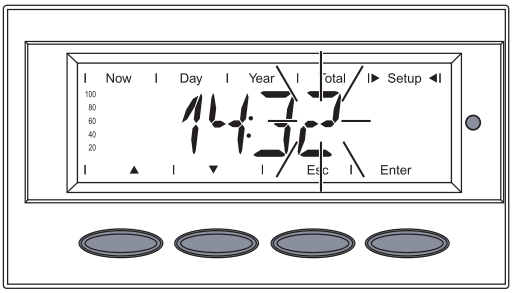
23 Press the "Enter" key



The first digit for the minutes flashes.

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

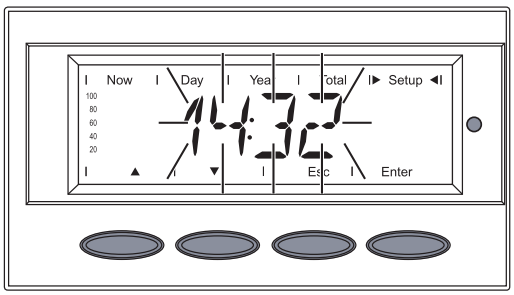
25 Press the "Enter" key



The second digit for the minutes flashes.

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

27 Press the "Enter" key



The set time flashes.

28 Press the "Enter" key to apply the time

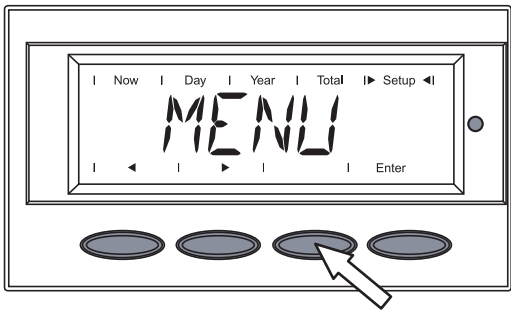
29 Press the "Esc" key to exit the "TIME" menu item

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

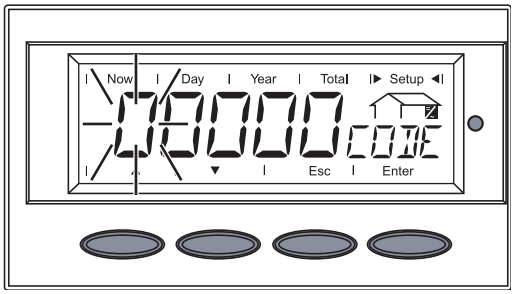


1 Press the "Menu" key

"Menu" is shown.

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

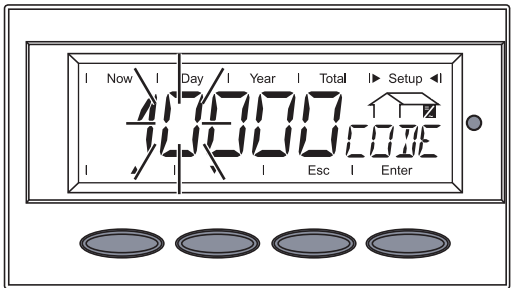
3 Press the unoccupied "Esc" key 5 x



"CODE" is displayed, the first digit flashes.

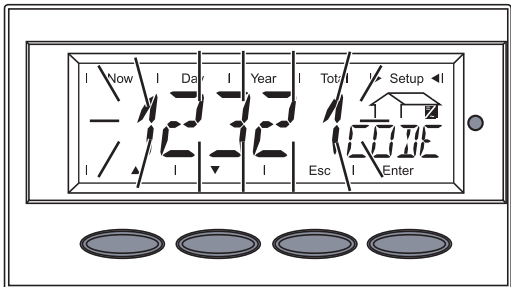
4 Enter the access code 12321: Use the "Up" and "Down" keys to select a value for the first digit of the access code ▲ ▼

5 Press the "Enter" key



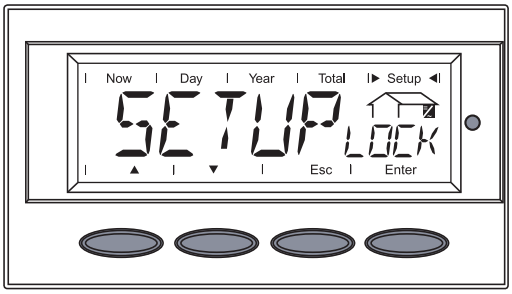
The second digit flashes.

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



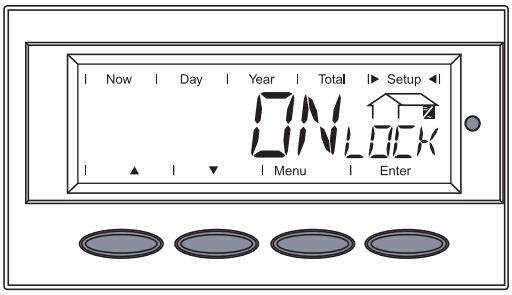
... the access code flashes.

7 Press the "Enter" key



"SETUP LOCK" is displayed.

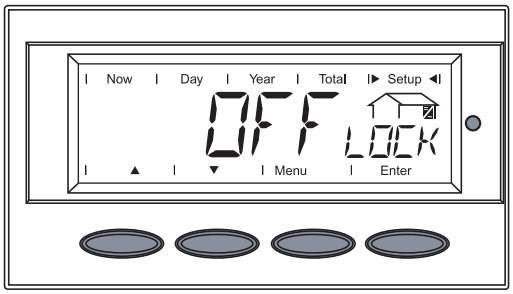
8 Press the "Enter" key



"ON LOCK" is displayed.

7 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)

8 Press the "Enter" key to apply the function

Troubleshooting and Maintenance

Status Diagnosis and Troubleshooting

GB

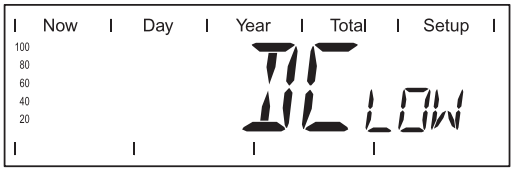
Displaying Status Codes

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.

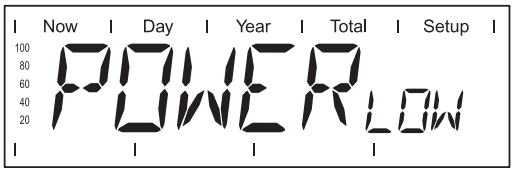
IMPORTANT! Status codes may sometimes appear briefly as a result of the control response from the inverter. If it subsequently continues to operate normally, there has not been a system error.

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:

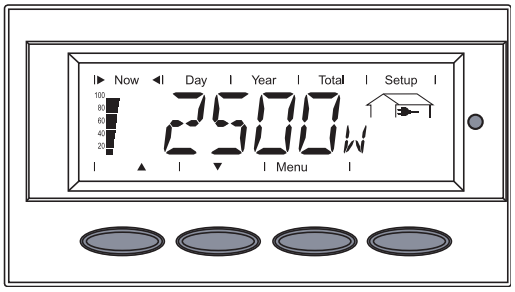
  Open circuit voltage < 265 V ... error in the photovoltaic system

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

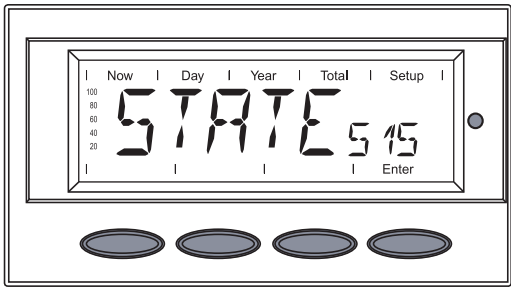
Status Codes on Fronius IG Plus with Several Power Stage Sets

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

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

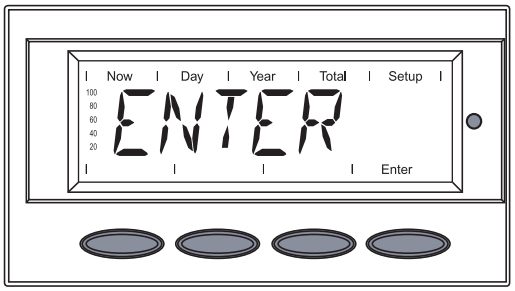


Display during normal operation



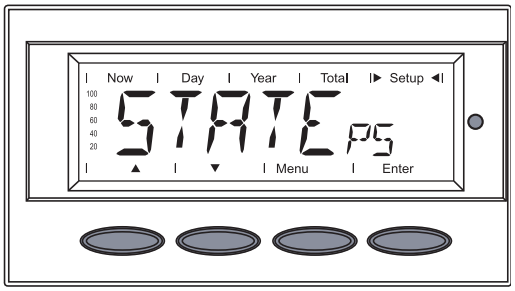
When there is an error in one of the power stage sets, the display flashes between "STATE" and the corresponding status code
(e.g., "STATE 515")

and



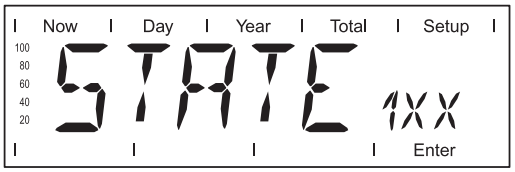
"ENTER"

- 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

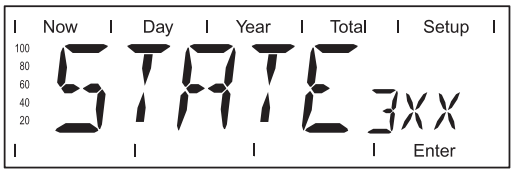
Behavior	Grid conditions are thoroughly tested and as soon as they are again within the permissible range, the inverter will resume feeding power into the grid.
Remedy	Should the status code persist, you should contact your system installer

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.

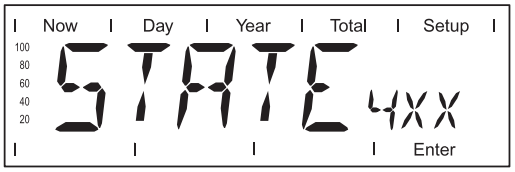
Description	Short interruption of power feeding into the grid. The inverter returns to the startup phase.
Remedy	Fault is rectified automatically If this status code keeps recurring, contact your system installer

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

412

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

413

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

414

EEPROM faulty

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

416

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

417

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

419

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

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 fauilty 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

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

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

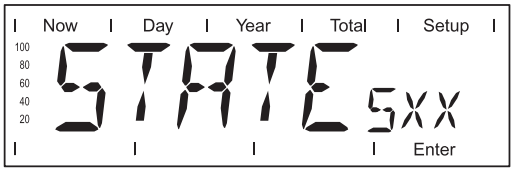
Description	The inverter stops feeding power into the grid, the display shows a critical error via a red Operating Status LED.
Remedy	Insert new high ohm resistor for solar module ground. Remedy external insulation fault Fault is rectified automatically If this status code keeps recurring, contact your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

475

DC insulation fault
The insulation value of the DC terminals to the protective earth (PE) is ≤ 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

505

EEPROM faulty

Description	Data from the Setup menu are lost.
Remedy	Remedied automatically

506

EEPROM faulty

Description	Data from the ‘Total’ menu are lost.
Remedy	Remedied automatically

507

EEPROM faulty

Description	Data from the ‘Day’ / ‘Year’ menu are lost.
Remedy	Remedied automatically

508

Inverter address incorrect

Description	Address for data communication is no longer saved.
Remedy	Set address again

509

24h no feed in

Description	Example: solar modules covered with snow
Remedy	Example: remove snow from solar modules

510

EEPROM faulty

Description	SMS settings were restored to default.
Remedy	If necessary, reconfigure SMS

511

EEPROM faulty

Description	Sensor card settings were restored to default
Remedy	If necessary, reconfigure measuring channels

512

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

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.

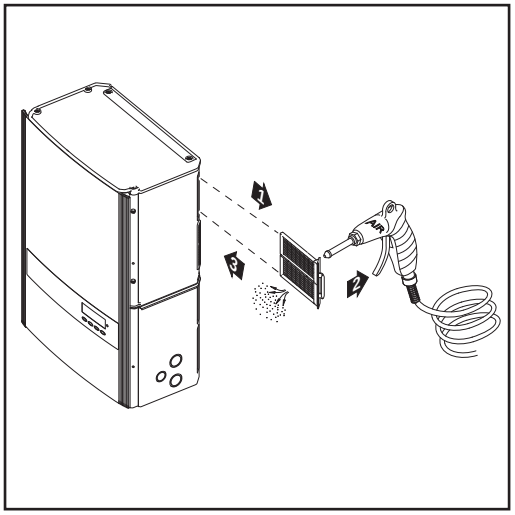
Never work with live wires! Prior to all connection work, make sure that the AC and DC wires are not charged.

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.

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.

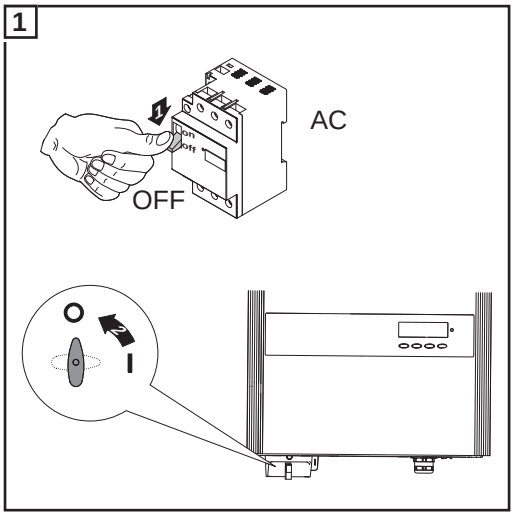
Never work with live wires! Prior to all connection work, make sure that the AC and DC wires are not charged.

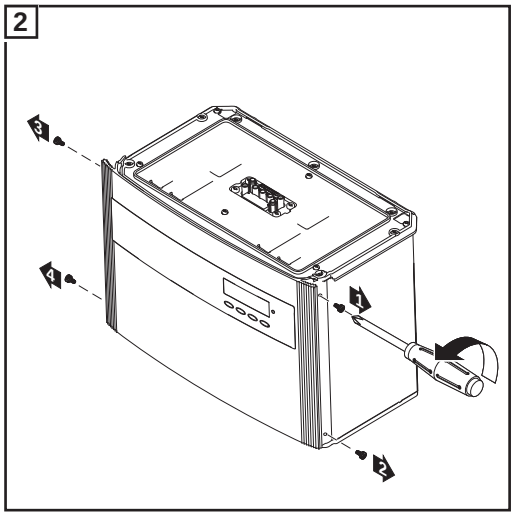
The DC main switch is only used to switch off power to the power stage set. When the DC main switch is turned off, the connection area is still energized.

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





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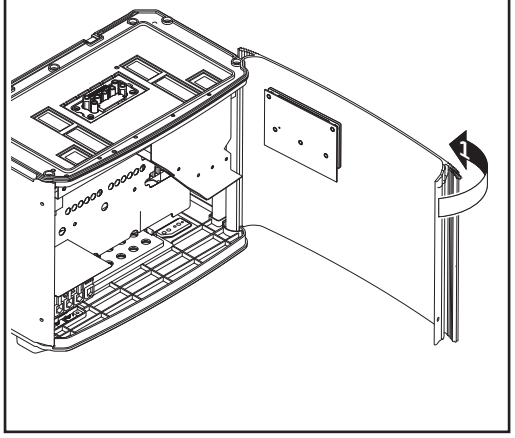

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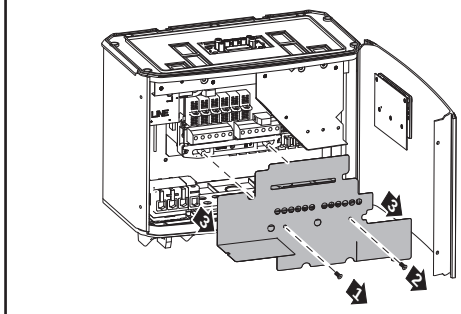


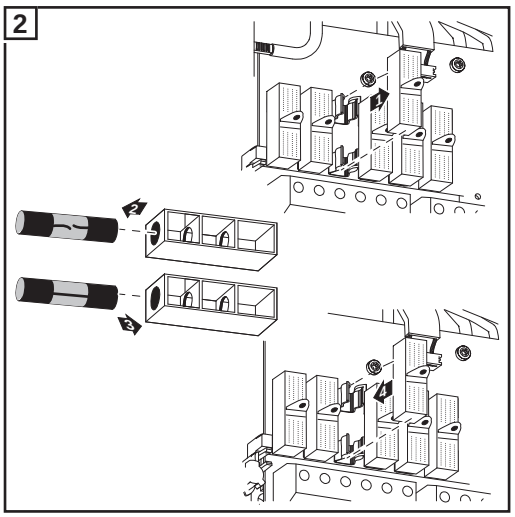
Replacing Fuses

1 Test the fuse holder at the terminal for continuity

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

Fuse dimensions: Diameter 10.3 x 35 - 38 mm

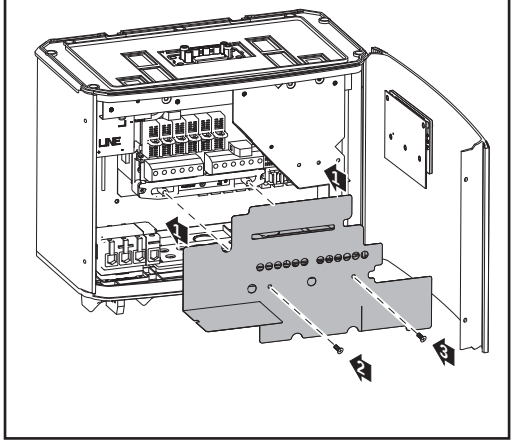
2



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

Finally...

1



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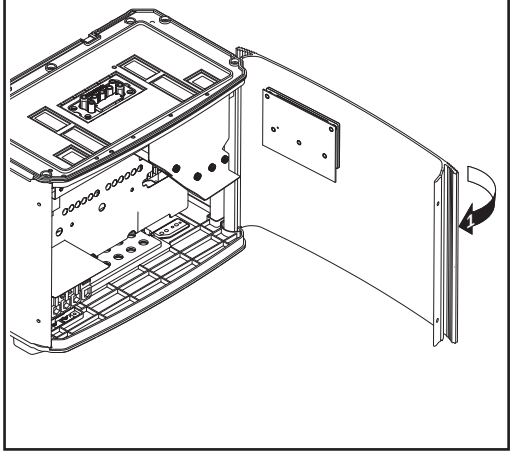

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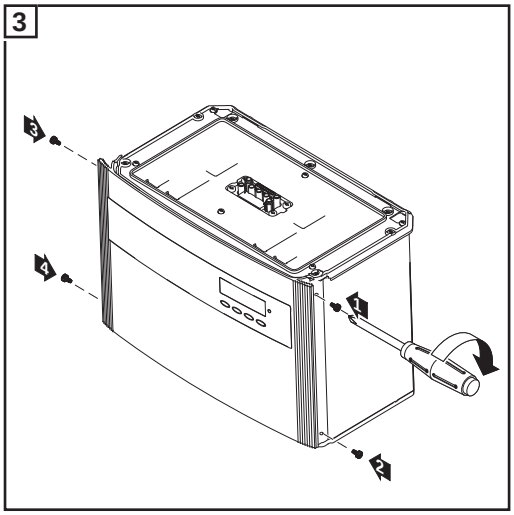

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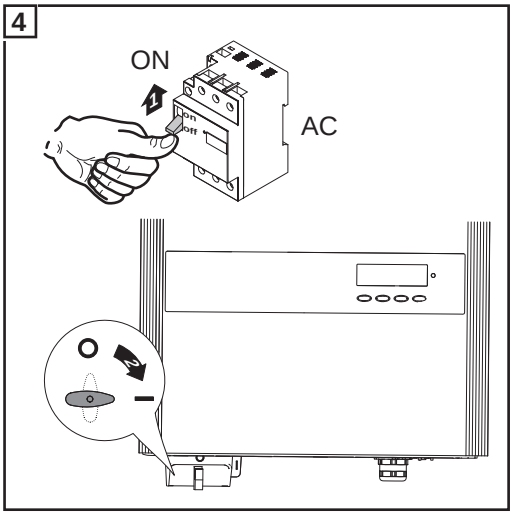

Appendix

Technical Data

GB

Fronius IG Plus 30 V

Input data

MPP voltage range	230 - 500 V DC
Max. input voltage (at 1000 W/m² / -10 °C in an open circuit)	600 V DC
Max. input current	13.8 A DC

Output data

Nominal output power (P_{nom})	3.0 kW
Max output power	3.0 kW
Nominal AC output voltage	1 ~ NPE 230 V
Grid voltage tolerance	+10 / -15 % [1)]
Nominal output current (single phase)	13.0 A AC
Nominal frequency	50 - 60 Hz [1)]
Harmonic distortion	< 3,0 %
Power factor (cos phi)	1 0.85 - 1 ind./cap.[3)]
Max. permitted grid impedance Zmax at PCC[2)]	None

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 ?
EMC emissions class	B
Over-voltage category (OVC)	AC 3 / DC 2

Safety equipment

DC insulation measurement	Warning / Shutdown [4)] at R_{ISO} < 500 kilohms
DC over-voltage protection	integrated
Protection against reverse polarity	integrated
Manifestation of DC overload	Operating point shift

Fronius IG Plus 35 V

Input data

MPP voltage range	230 - 500 V DC
Max. input voltage (at 1000 W/m² / -10 °C in an open circuit)	600 V DC
Max. input current	16.2 A DC

Output data

Nominal output power (P_{nom})	3.5 kW
Max output power	3.5 kW
Nominal AC output voltage	1 ~ NPE 230 V
Grid voltage tolerance	+10 / -15 % [1]
Nominal output current (single phase)	15.2 A AC
Nominal frequency	50 - 60 Hz [1]
Harmonic distortion	< 3,0 %
Power factor (cos phi)	1 0.85 - 1 ind./cap.[3]
Max. permitted grid impedance Zmax at PCC[2]	None

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 ?
EMC emissions class	B
Over-voltage category (OVC)	AC 3 / DC 2

Safety equipment

DC insulation measurement	Warning / Shutdown [4] at R_{ISO} < 500 kilohms
DC over-voltage protection	integrated
Protection against reverse polarity	integrated
Manifestation of DC overload	Operating point shift

Fronius IG Plus 50 V

Input data

MPP voltage range	230 - 500 V DC
Max. input voltage (at 1000 W/m² / -10 °C in an open circuit)	600 V DC
Max. input current	18.6 A DC

Output data

Nominal output power (P_{nom})	4 kW
Max output power	4 kW
Nominal AC output voltage	1 ~ NPE 230 V
Grid voltage tolerance	+10 / -15 % [1)]
Nominal output current (single phase)	17.4 A AC
Nominal frequency	50 - 60 Hz [1)]
Harmonic distortion	< 3,0 %
Power factor (cos phi)	1 0.85 - 1 ind./cap.[3)]
Max. permitted grid impedance Zmax at PCC[2)]	261 megaohms

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 ?
EMC emissions class	B
Over-voltage category (OVC)	AC 3 / DC 2

Safety equipment

DC insulation measurement	Warning / Shutdown [4)] at R_{ISO} < 500 kilohms
DC over-voltage protection	integrated
Protection against reverse polarity	integrated
Manifestation of DC overload	Operating point shift

Fronius IG Plus 70 V

Input data

MPP voltage range	230 - 500 V DC
Max. input voltage (at 1000 W/m² / -10 °C in an open circuit)	600 V DC
Max. input current	30 A DC

Output data

Nominal output power (P_{nom})	6.5 kW
Max output power	6.5 kW
Nominal AC output voltage	1 ~ NPE 230 V 2 ~ NPE 400 / 230 V
Grid voltage tolerance	+10 / -15 % [1)]
Nominal output current single phase two-phase	28.3 A AC 14.1 A AC
Nominal frequency	50 - 60 Hz [1)]
Harmonic distortion	< 3,0 %
Power factor (cos phi)	1 0.85 - 1 ind./cap.[3)]
Max. permitted grid impedance Zmax at PCC[2)]	single-phase 161 milliohms two-phase none

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 ?
EMC emissions class	B
Over-voltage category (OVC)	AC 3 / DC 2

Safety equipment

DC insulation measurement	Warning / Shutdown [4)] at R_{ISO} < 500 kilohms
DC over-voltage protection	integrated
Protection against reverse polarity	integrated
Manifestation of DC overload	Operating point shift

Fronius IG Plus 100 V

Input data

MPP voltage range		230 - 500 V DC
Max. input voltage (at 1000 W/m² / -10 °C in an open circuit)		600 V DC
Max. input current		37.1 A DC

Output data

Nominal output power (P_{nom})		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 % [1]
Nominal output current	single-phase two-phase	34.8 A AC 17.4 A AC
Nominal frequency		50 - 60 Hz [1]
Harmonic distortion		< 3 %
Power factor (cos phi)		1 0.85 - 1 ind./cap.[3]
Max. permitted grid impedance Zmax at PCC[2]	single-phase two-phase	131 milliohms 262 milliohms

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 ?
EMC emissions class		B
Over-voltage category (OVC)		AC 3 / DC 2

Safety equipment

DC insulation measurement	Warning / Shutdown [4] at R_{ISO} < 500 kilohms
DC over-voltage protection	integrated
Protection against reverse polarity	integrated
Manifestation of DC overload	Operating point shift

Fronius IG Plus 120 V

Input data

MPP voltage range	230 - 500 V DC
Max. input voltage (at 1000 W/m² / -10 °C in an open circuit)	600 V DC
Max. input current	46.2 A DC

Output data

Nominal output power (P_{nom})	10 kW
Max output power	10 kW
Nominal AC output voltage	3 ~ NPE 400 / 230 V
Grid voltage tolerance	+10 / -15 % [1)]
Nominal output current (three-phase)	14.5 A AC
Nominal frequency	50 - 60 Hz [1)]
Harmonic distortion	< 3,0 %
Power factor (cos phi)	1 0.85 - 1 ind./cap.[3)]
Max. permitted grid impedance Zmax at PCC[2)]	None

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 ?
EMC emissions class	B
Over-voltage category (OVC)	AC 3 / DC 2

Safety equipment

DC insulation measurement	Warning / Shutdown [4)] at R_{ISO} < 500 kilohms
DC over-voltage protection	integrated
Protection against reverse polarity	integrated
Manifestation of DC overload	Operating point shift

Fronius IG Plus 150 V

Input data

MPP voltage range	230 - 500 V DC
Max. input voltage (at 1000 W/m² / -10 °C in an open circuit)	600 V DC
Max. input current	55.6 A DC

Output data

Nominal output power (P_{nom})	12 kW
Max output power	12 kW
Nominal AC output voltage	3 ~ NPE 400 / 230 V
Grid voltage tolerance	+10 / -15 % [1)]
Nominal output current (three-phase)	17.4 A AC
Nominal frequency	50 - 60 Hz [1)]
Harmonic distortion	< 3,0 %
Power factor (cos phi)	1 0.85 - 1 ind./cap.[3)]
Max. permitted grid impedance Zmax at PCC[2)]	None

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 ?
EMC emissions class	B
Over-voltage category (OVC)	AC 3 / DC 2

Safety equipment

DC insulation measurement	Warning / Shutdown [4)] at R_{ISO} < 500 kilohms
DC over-voltage protection	integrated
Protection against reverse polarity	integrated
Manifestation of DC overload	Operating point shift

Explanation of footnotes

1) The values provided are standard values. The inverter can be customized to the respective country according to the requirements.
2) PCC = interface to the public grid
3) Depending on the country setup or device-specific settings (ind. = inductive; cap. = capacitive)
4) Depending on the country setup

Relevant Standards and Directives

CE Conformity Marking

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

Parallel Operation of In-Plant Power Generation Systems

The inverter complies with the

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

Circuit to Prevent Islanding

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

Grid Failure

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

Warranty and Disposal

Fronius Manufacturer's Warranty

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

Extended warranty

An extended warranty can be purchased up to 6 months after the date of installation. Applications for an extended warranty after this date can be rejected by Fronius.
You can apply for an extended warranty of up to 10, 15 or 20 years for Fronius IG Plus inverters.

Services within the Warranty Period

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

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

Transport

Fronius pays the transport costs for the inverter:

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

Transport costs are not paid:

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

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

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

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

Scope and Validity of Manufacturer's Warranty

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

Exceptions to the Fronius manufacturer's warranty

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

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

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

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

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

Due to technological progress, the possibility exists that a replacement or new device of similar value provided may not be compatible with the system monitoring or other components installed onsite (e.g., Fronius DATCOM) Any charges or costs arising from this are not covered by the warranty.

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

Geographical Validity

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

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

- Brazil
- Canada
- Mexico
- Norway
- Ukraine

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

Other Legal Information

Along with the Fronius manufacturer's warranty, there are also warranty rights stipulated by law that are not affected by this manufacturer's warranty.
Claims that exceed those rights named in the warranty conditions are not covered by the manufacturer's warranty unless Fronius is legally liable for them. In such cases, please see your device vendor. Claims under the Product Liability Law remain unaffected.

The general terms and conditions located on our website (www.fronius.com) under "Legal info" are in effect unless these warranty conditions allow more favorable provisions. Previously valid warranty conditions are replaced by these conditions.

Disposal

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

EU-KONFORMITÄTSERKLÄRUNG 2011
EC-DECLARATION OF CONFORMITY 2011
DECLARATION DE CONFORMITE DE LA CE, 2011

Wels-Thalheim, 2011-03-04

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 30V-1 / 35V-1 / 50V-1 / 70V-1 / 70V-2 / 100V-1 / 100V-2 / 120V-3 / 150V-3
Solar-Wechselrichter

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

Fronius IG Plus 30V-1 / 35V-1 / 50V-1 / 70V-1 / 70V-2 / 100V-1 / 100V-2 / 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
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 50366:2003

European Standards including relevant amendments
IEC 62109-1:2010
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 50366:2003

Normes européennes avec amendements correspondants
IEC 62109-1:2010
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 50366:2003

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

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

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

CE **2011**

ppa. Mag.Ing.H.Hackl

Abgesandt 10. NOV. 2009

Deutsche Gesetzliche Unfallversicherung

Fachausschuss Elektrotechnik

Fachausschuss Elektrotechnik
Gustav-Heinemann-Ufer 130
Prüf- und Zertifizierungsstelle
50968 Köln

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

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

ø Herren Pohl
Vorgang + C

Unbedenklichkeitsbescheinigung 09017
(Prüfschein)

Erzeugnis:	Selbsttätig wirkende Schaltstelle
Typ:	IG Plus V
Bestimmungsgemäße Verwendung:	Selbsttätig wirkende, dem VNB unzugängliche Schaltstelle als Sicherheitsschnittstelle zwischen einer Eigenerzeugungsanlage und dem Niederspannungsnetz. Gleichwertiger Ersatz für eine jederzeit dem VNB zugängliche Schaltstelle mit Trennfunktion. Die Schaltstelle ist integrierter Bestandteil der PV-Wechselrichter: Fronius IG Plus V
Prüfgrundlagen: 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: 2006-02	„Automatic switching center between a parallel net generation system and the public low-voltage grid“

The safety concept of the above product tested with the report of 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

Fronius Worldwide - www.fronius.com/addresses

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http://www.fronius-usa.com

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