



SHIFTING THE LIMITS

Fronius IG 2000 / 3000 / 2500-LV Fronius IG 4000 / 5100 / 4500-LV

Operating Instructions

EN-US

Inverter for grid-connected photo-voltaic systems



42,0410,1089

005-10082015



Dear reader,

Introduction

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

IMPORTANT SAFETY INSTRUCTIONS

SAVE THESE INSTRUCTIONS

General

These operating instructions contain important instructions that must be followed during installation and maintenance of the inverter.

The inverter is designed and tested according to international safety requirements, but as with all electrical and electronic equipment, certain precautions must be observed when installing and/or operating the inverter.

To reduce the risk of personal injury and to ensure the safe installation and operation of the inverter, you must carefully read and follow all instructions and safety instructions in these operating instructions.

Failure to follow these instructions and other relevant safety procedures may result in voiding of the warranty and/or damage to the inverter or other property.

Safety instructions

The following section "Safety instructions" contains various warnings. A Warning describes a hazard to equipment or personnel. It calls attention to a procedure or practice, which, if not correctly performed or adhered to, could result in damage to or destruction of part or all of the inverter and/or other equipment connected to the inverter or personal injury.

Electrical installations

All electrical installations must be carried out in accordance with the National Electrical Code, ANSI/NFPA 70, and any other codes and regulations applicable to the installation site.

For installations in Canada, the installations must be done in accordance with applicable Canadian standards.

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Safety rules

Explanation of Safety Instructions



DANGER! Indicates an immediate danger. Death or serious injury may result if appropriate precautions are not taken.



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



CAUTION! Indicates a situation where damage or injury could occur. Minor injury or damage to property may result if appropriate precautions are not taken.



NOTE! Indicates the possibility of flawed results and 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 $< 80 \text{ dB(A)}$ (ref. 1 pW) when operating under full load in accordance with IEC 62109-1:2010.

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

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

EMC Device Classifications



Devices in emission class A:

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

Devices in emission class B:

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

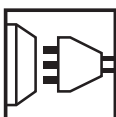
EMC device classification as per the rating plate or technical data.

EMC Measures



In certain cases, even though a device complies with the standard limit values for emissions, it may affect the application area for which it was designed (e.g., when there is sensitive equipment at the same location, or if the site where the device is installed is close to either radio or television receivers). If this is the case, then the operator is obliged to take appropriate action to rectify the situation.

Grid Connection



High-performance devices ($> 16 \text{ A}$) 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 safety devices are fully functional. If the safety 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 operating company
- inefficient operation of the device

Safety equipment that is not fully functional must be repaired by an authorized specialist before the device is turned on.

Never bypass or disable safety devices.

Safety Symbols



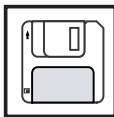
Devices with the CE marking satisfy the essential requirements of the low-voltage and electromagnetic compatibility directives. Further details can be found in the appendix or the chapter entitled "Technical data" in your documentation.

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 effects on the environment and your health!

Backup



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

Copyright



Copyright of these operating instructions remains with the manufacturer.

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! An electric shock can be fatal. Danger from 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.



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

Information on "field adjustable trip points"

The inverter is equipped with field adjustable trip points. For further information, please contact Fronius technical support at the following e-mail address: pv-us-support@fronius.com.

FCC compliance



This device complies with Part 15 of the FCC Rules. Operation is subject to the following conditions:

- (1) This device may not cause harmful interference, and
- (2) This device must accept any interference received, including interference that may cause undesired operation.

Ground fault detector / interrupter

The inverter is equipped with a ground fault detection and interruption (GFDI) circuit as required by UL 1741 and the National Electrical code.
Depending on the system configuration either the PV array's negative or positive conductor is connected to the grounding system in the inverter. If a ground fault occurs in the DC wiring, the inverter disconnects from the grid.

Standards and regulations

Your inverter complies with the requirements for the following standards "Inverters, converters and controllers for use in independent power systems":

- UL1741
- IEEE 1547

The ground-fault detection and interruption is in compliance with NEC 690 building code requirements.

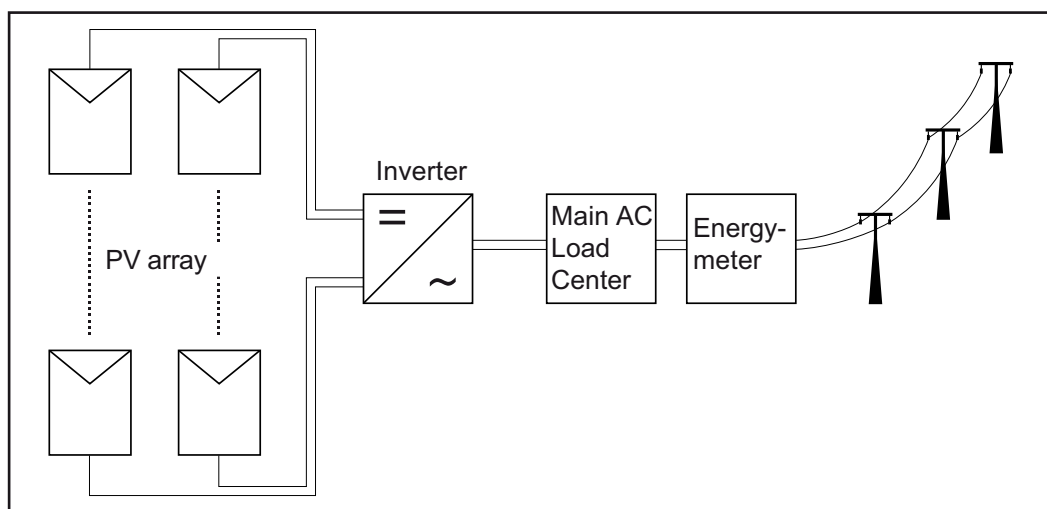
Declaration of conformity

Relevant declarations of conformity can be found in the appendix to these operating instructions.

The Fronius IG 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 operation management

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

The control system of the inverter ensures that the maximum possible power output is drawn from the solar modules at all times.

This function is called MPPT (Maximum Power Point Tracking).

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

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.

Data Communications Components

The inverter is designed for various data communications components, e.g.:

- Data communications components that enable the inverter to communicate with external components as well as other inverters
- Datalogger and modem interface as well as an Ethernet/Internet connection (for using a PC to record and manage data from your photovoltaic system)
- Various large-format displays
- Fronius Personal Display
- Actuators (e.g.: relays, alarms)
- Interface cards

Data communications components 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

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 Installation and Connection

Safety



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

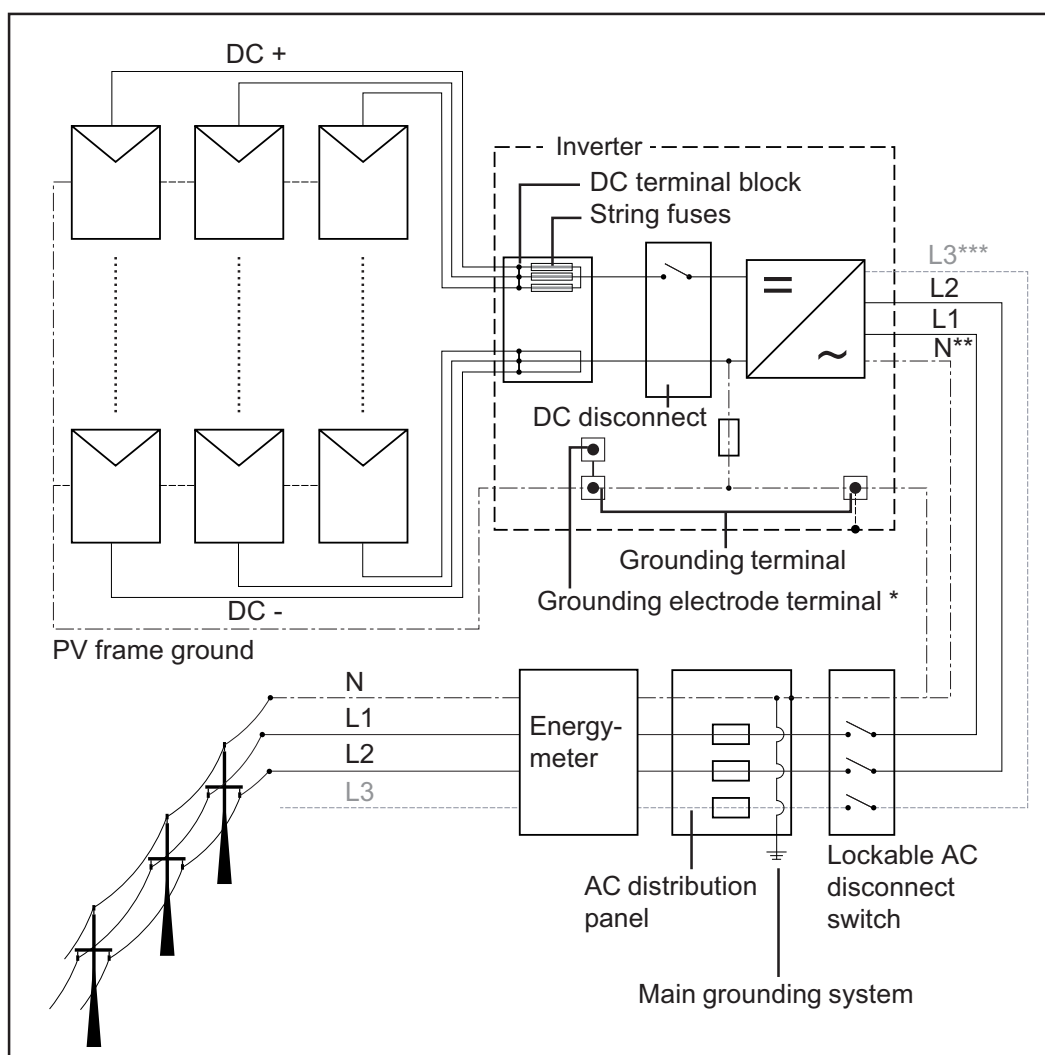
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- The separate power stage set area should only be opened by Fronius-trained service personnel.

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



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.

Connection diagram



* may be required by local authorities

** may be required depending on grid configuration

*** depending on inverter type

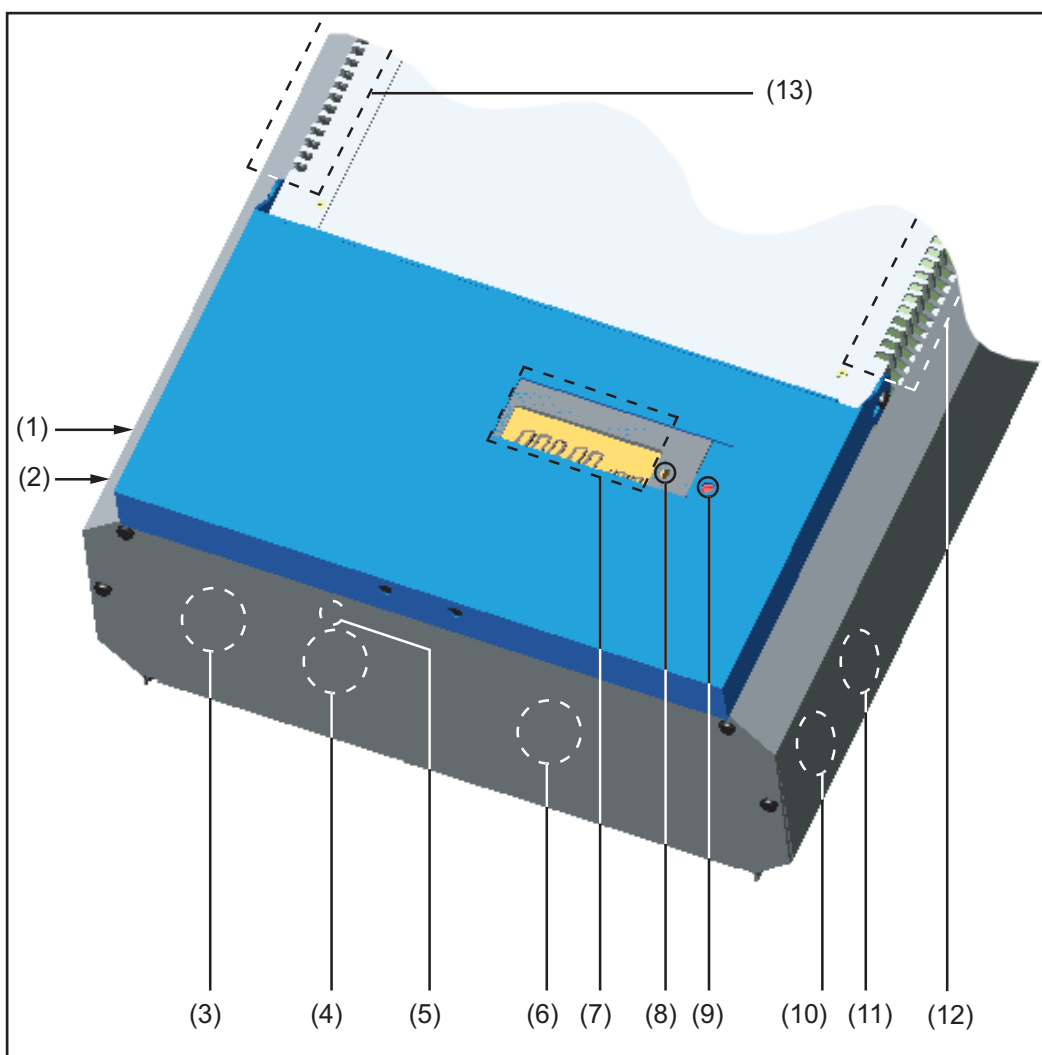
Overview

'Fronius IG installation and connection' contains the following sections:

- Connection options and Knockouts
- Choosing the location
- Inverter installation
- Connecting the inverter to the public grid (AC)
- Connecting solar module strings

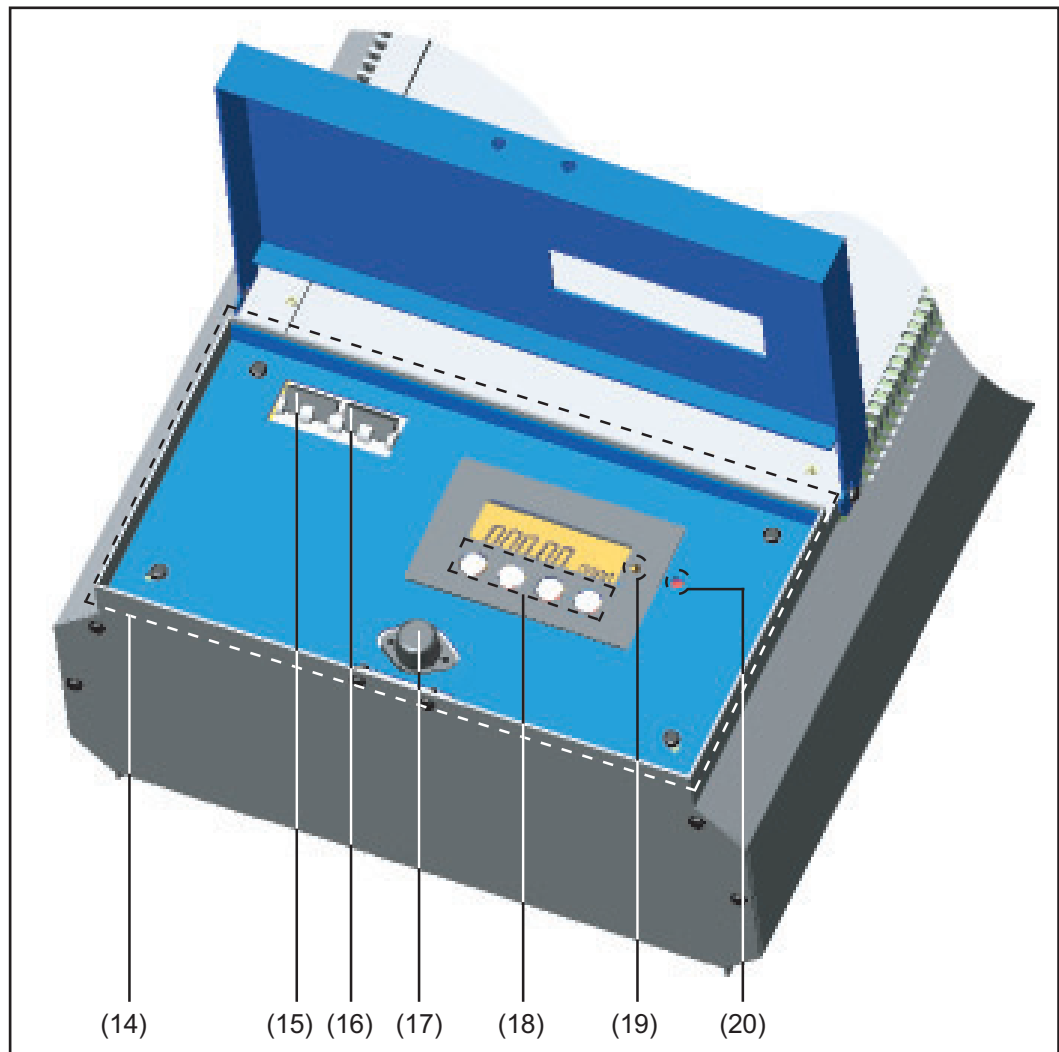
Connection Options and Knockouts

Connection Options and Knockouts



Item	Description
(1)	Knockout for 1/2 in. / 3/4 in. conduit fitting (DC-cables)
(2)	Knockout for 1/2 in. / 3/4 in. conduit fitting (DC-cables)
(3)	Knockout for 1/2 in. / 3/4 in. conduit fitting (AC-cables)
(4)	Knockout for 1/2 in. / 3/4 in. conduit fitting (AC-cables)
(5)	Knockout for grounding electrode (may be required by local authorities)
(6)	Knockout for 1/2 in. / 3/4 in. conduit fitting (data communication cables)
(7)	Display
(8)	LED for operating status
(9)	LED for GFDI status
(10)	Knockout for 1/2 in. / 3/4 in. conduit fitting (data communication cables)
(11)	Knockout for 1/2 in. / 3/4 in. conduit fitting (data communication cables)
(12)	Air vents - Intake
(13)	Air vents - Exhaust

Connection area opened:



Item	Description
(14)	Connection area (to be opened only by qualified electrical professionals)
(15)	AC-disconnect
(16)	DC-disconnect
(17)	GFDI fuse
(18)	Menu keysn
(19)	LED for operating status
(20)	LED for GFDI status

Choosing the Location

Choosing the location in general

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

Installation only on a solid vertical wall:

- min. 3 ft. (0.9 m) above the ground
- max. 6.5 ft. (2 m) above the ground

Max. ambient temperatures: -13 °F / +122 °F (-25 °C / +50 °C)

Relative humidity: 0 - 95 %

For use at altitudes above sea level: up to 6561 ft. (2000 m)

- Keep a minimum distance of 8 in. (20 cm) between each inverter or anything to the right or left of the inverters such as walls or DC and AC disconnects.
For optimal airflow and cooling efficiency in locations with temperatures exceeding 104 °F (40 °C), the manufacturer recommends a distance of 10 - 12 in. (25 - 30 cm).
- When installing more than one inverter, keep a distance of 12 in. (30 cm) between each inverter. In locations with temperatures exceeding 104 °F (40 °C), more than 12 inches is desirable..

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

No objects are to be located within a distance of 6 in. around the air vents on both sides of the inverter.

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

NEMA 3R protection means that the inverter is not susceptible to water spray from any direction.

However, the manufacturer recommends, if possible, that the inverter not be exposed to direct moisture or to a direct water jet (e.g., from sprinklers).

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 Installation

General

IMPORTANT! Depending on the surface, different wall anchors and screws may be required for installing the wall bracket. These wall anchors and screws are not part of the scope of delivery for the inverter. The installer is responsible for selecting the proper wall anchors and screws.



NOTE! The inverter is designed only for a vertical installation position.

Recommended screws for mounting plate assembly

In most cases, you should use 1/4 in. or 5/16 in. stainless steel or aluminum screws capable of supporting:

- 26 lbs. for Fronius IG 2000 / 3000 / 2500-LV
- 42 lbs. for Fronius IG 4000 / 5000 / 4500-LV

Attaching the mounting plate - mounting height

IMPORTANT! Keep a minimum distance under the inverter corresponding to the 'NEC 110.26 for code compliant disconnect location. If the DC disconnect is to be code compliant, it must be readily accessible (NEC 690.14 (B) (1)).

The DC disconnect is in the lower left part of the inverter. When choosing the inverter mounting height, ensure a height that keeps the display slightly below eye level for best possible readability of the display.

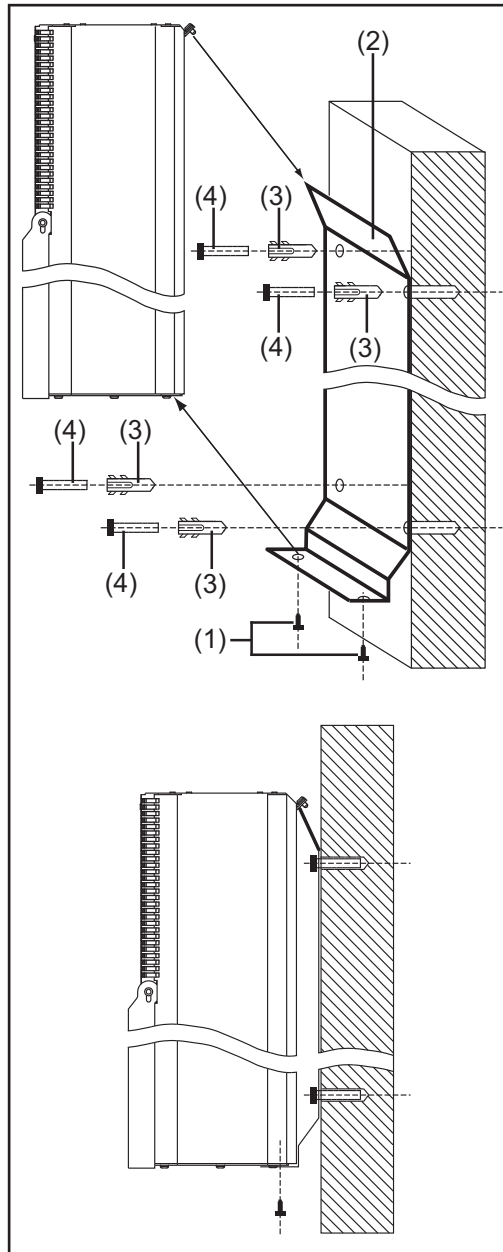
Inverter Installation

As your inverter is delivered, the mounting plate is fixed to the inverter by two screws on the bottom of the inverter.



CAUTION! Danger of injury by falling equipment. The inverter may become dislodged and fall from the mounting plate if the unit is not fixed to the mounting plate.

Fix the inverter to the mounting plate using the two screws that were removed in step 1.



1 Loosen the screws (1) on the bottom of the inverter and remove the mounting plate (2)

2 Triangulate the positions of the screws on the mounting plate using the pre-drilled holes when possible

The three vertically aligned holes for single stud mounting will suit most installations.

3 Fix the mounting plate (2) to the wall using four suitable wall anchors (3) and screws (4)

4 Attach the inverter to the bottom of the mounting plate (2) by using the screws (1), that were removed in step 1



NOTE! If you modify the inverter enclosure with custom openings you will be required to return the unit for repair in the event of a warranty-related issue rather than doing an inverter exchange.

Knockouts for grounding electrode may be required by local authorities.

Connecting the Fronius IG to the Public Grid (AC)

General

Your inverter needs to be connected to the AC disconnect, to the DC disconnect and to the equipment grounding according to the following steps.
AC and DC are switched separately.

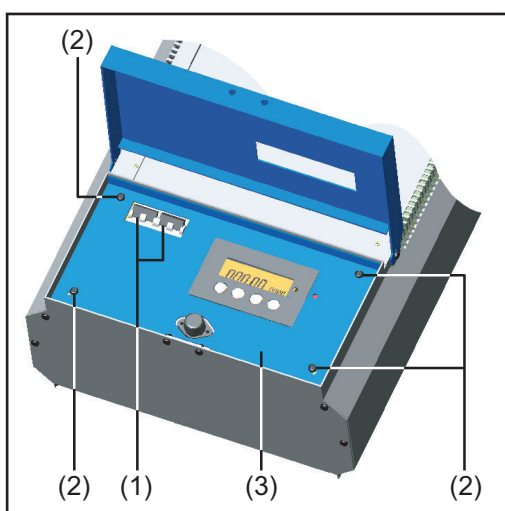
Inverter configuration for connection to grids without neutral

The inverter comes from the factory pre-configured for grid connection with neutral. For a connection to grids without neutral the inverter must be reconfigured by setting a jumper in the connection area.



WARNING! An electric shock can be fatal. Danger from 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.

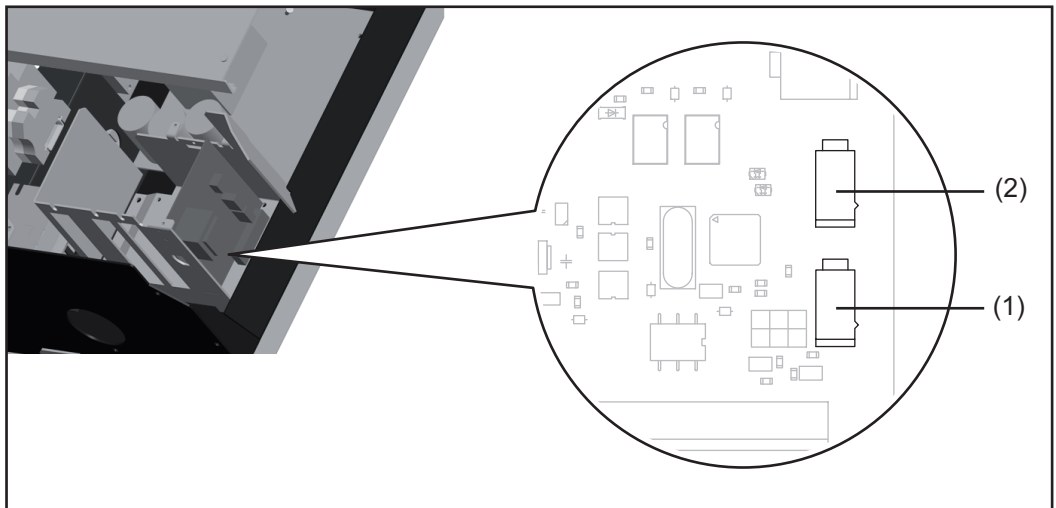


- 1** Make sure, that the inverter is fixed properly to the mounting plate
- 2** Open the connection area as shown in the figure
- 3** Set the internal AC- and DC disconnects (1) to the "OFF" position
- 4** Remove the four screws (2) on the inverter's faceplate (3)



NOTE! When removing the display faceplate covering the connection area do not pinch, bend or strain the ribbon cable for the display.

- 5** Remove the display faceplate (3) covering the connection area



Jumper positions for neutral conductor in the grid:

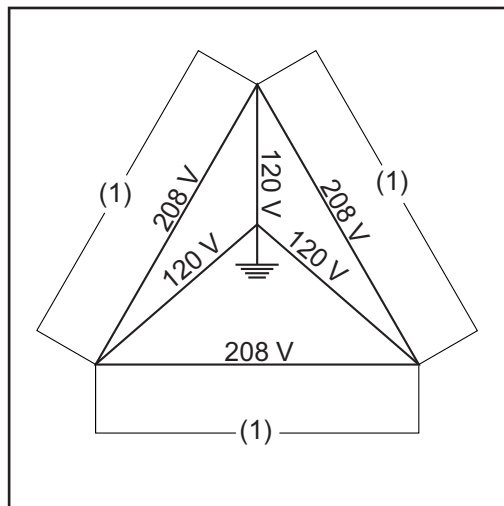
- (1) public grid **with** neutral conductor - factory setting (Enable)
- (2) public grid **without** neutral conductor (Disable)

6 Set the jumper to the referred position

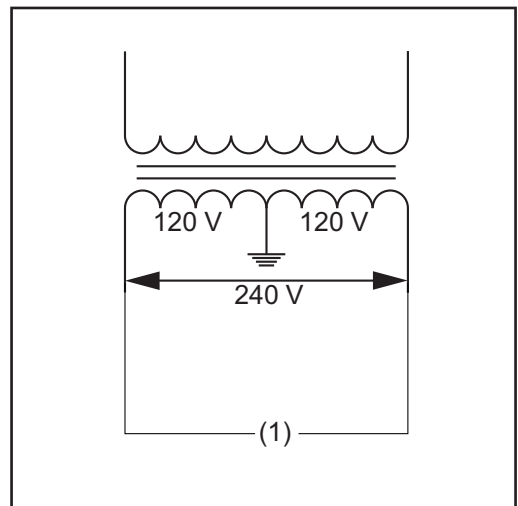
Overview of available grids

Inverters can be connected to the following grids:

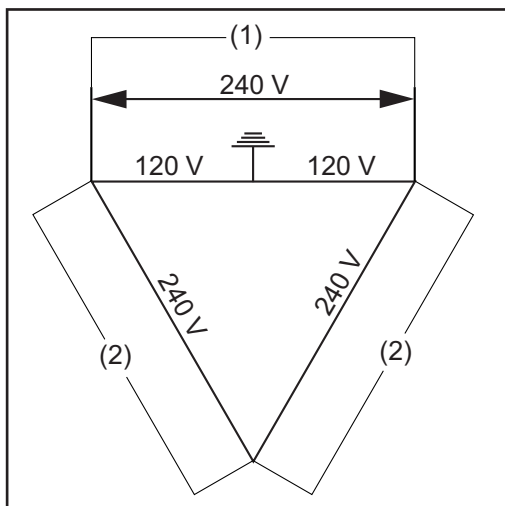
208 V Delta : 120 V WYE



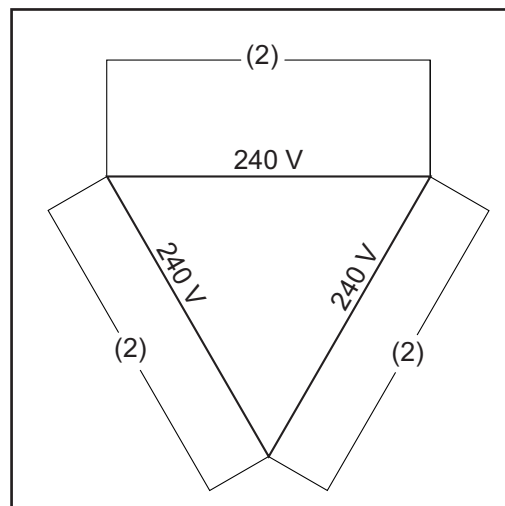
240 V : 120 V Split Phase



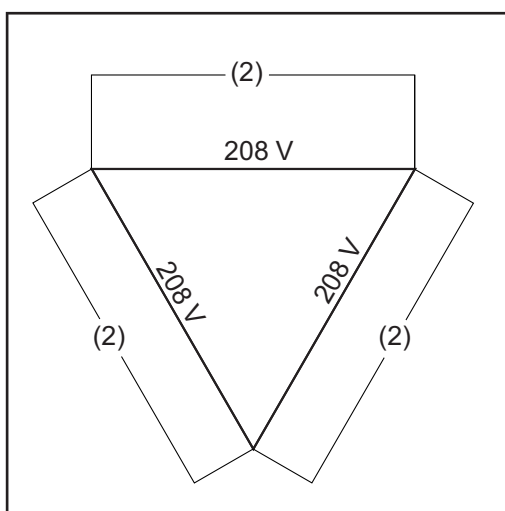
240 V Delta : 120 V Stinger



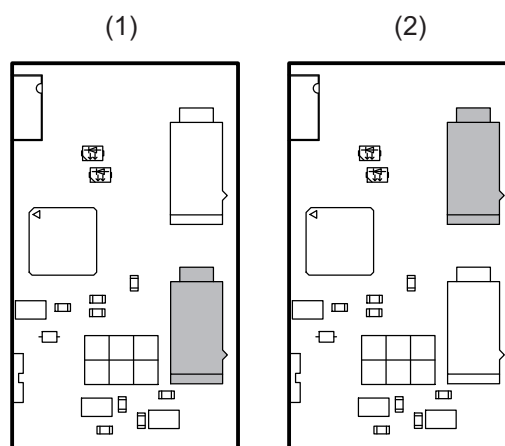
240 V Delta



208 V Delta



Jumper positions:



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.

Systems with more than one inverter

For larger photovoltaic systems, it is possible to connect several inverters in parallel without any problems.

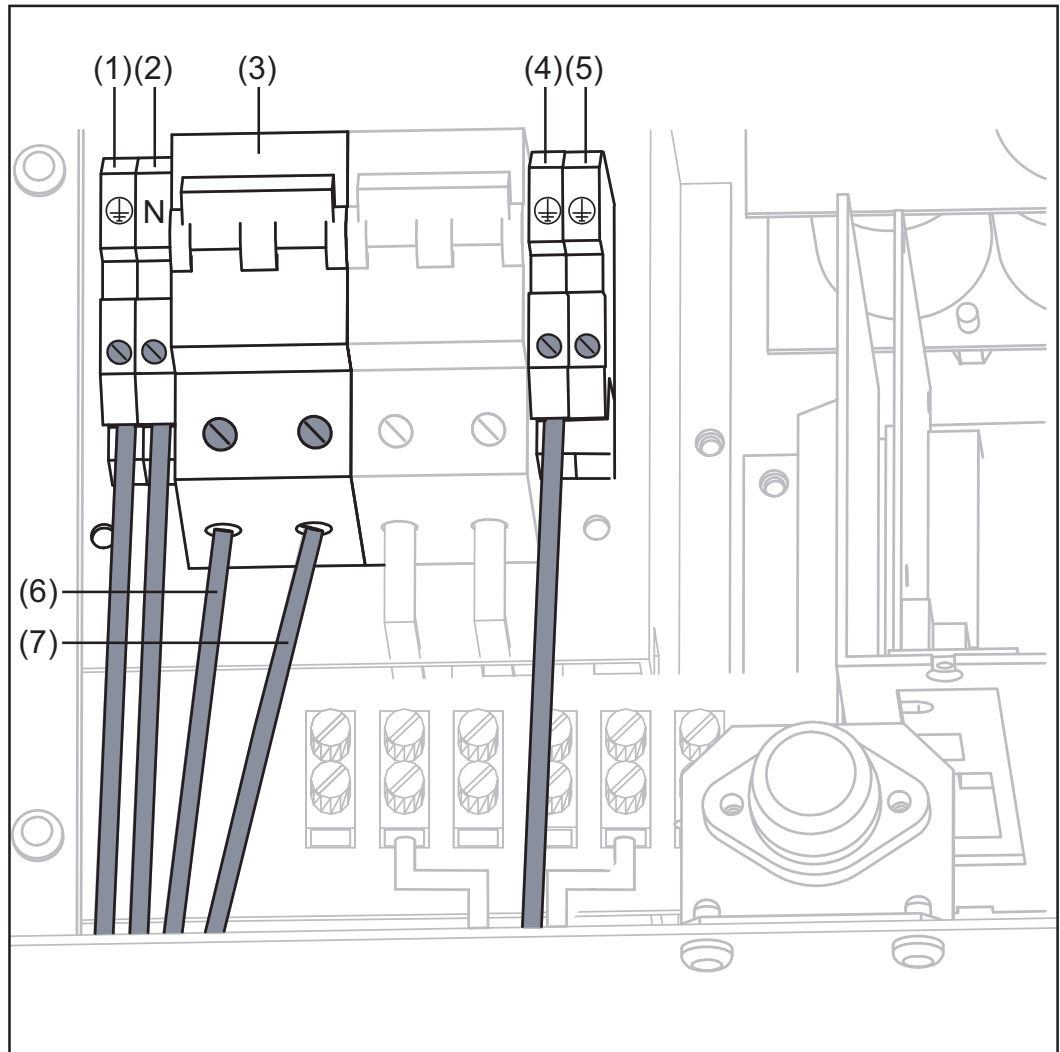


NOTE! The inverters Fronius IG 2500-LV and Fronius IG 4500-LV are designed to be connected to three-phase systems. Utilities generally allow up to 6 kVA of unbalance, but check with your utility and try to balance the installation. Try to balance the installation.

The connection to the grid should be done in the following way:

- Connect Fronius IG No. 1, No. 4, No. 7, ... to L1 and L2
- Connect Fronius IG No. 2, No. 5, No. 8, ... to L2 and L3
- Connect Fronius IG No. 3, No. 6, No. 9, ... to L1 and L3

AC-side terminals and grounding terminals



The white plastic divider that separates the AC from the DC connection area is not shown in the figure.

- (1) Grid grounding / Grounding conductor
The inverter must be connected via the grounding terminal to the AC grid grounding.

NOTE!

- Use copper wires for all grounding cables.
- Use only solid or stranded wire. Do not use fine stranded wire.
- See NEC section 250 for correct grounding.

- (2) = Neutral conductor N



NOTE! The neutral conductor is not bonded to ground internally.

- (3) AC disconnect

- (4) Grounding of photovoltaic components (e.g., solar module frames)
The ground for photovoltaic components such as solar module frames must be connected at the grounding terminals. The size of the wire usually corresponds to the largest wire in the DC system.

- (5) Grounding Electrode Terminal (GET)
A grounding electrode terminal may be required depending on local regulations

(6) = Phase conductor L1

(7) = Phase conductor L2

Cross section of AC wires



WARNING! An electric shock can be fatal. Inadequately sized electrical components can cause serious injuries to persons and damage to (or loss of) property.

- All electrical installations must be carried out in accordance with the National Electrical Code, ANSI/NFPA 70, and any other codes and regulations applicable to the installation site.
- For installations in Canada, the installations must be done in accordance with applicable Canadian standards.
- Use minimum AWG 12, min. 167 °F (75 °C), copper wire for the AC connection of the FRONIUS IG 2000, 3000 and 2500-LV.
- Use minimum AWG 10, min. 167 °F (75 °C), copper wire for the AC connection of the FRONIUS IG 4000, 5100 and 4500-LV.
- Use minimum AWG 14, min. 167 °F (75 °C), copper wire for all grounding wires (see NEC table 250.122).
- Voltage drop and other considerations may dictate larger size wires be used.
- Use only solid or stranded wire. Do not use fine stranded wire.

Safety

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



WARNING! An electric shock can be fatal. Danger from 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.



CAUTION! Danger of damaging the inverter due to an overload of the grid neutral conductor.

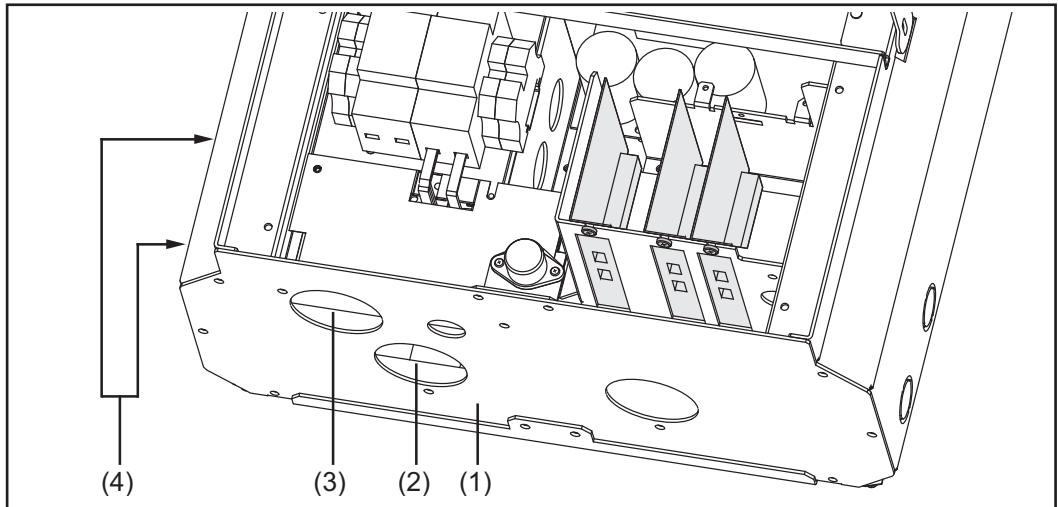
- Do not connect 2-phase and 3-phase devices to one phase
- Never operate multiphase devices in one phase



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.

Removing knockouts and mounting conduits

Available knockouts:

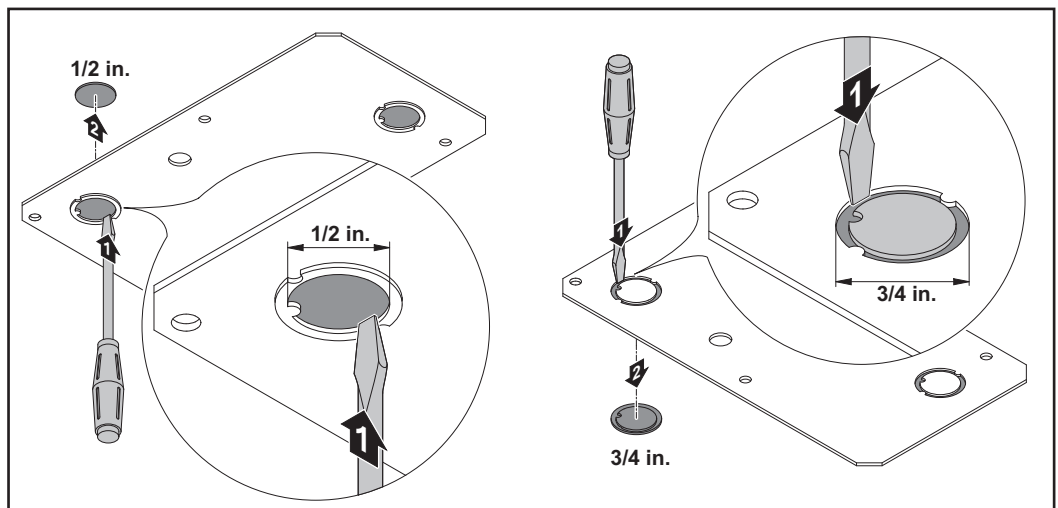


- (1) Connecting plate
- (2) Knockout 1/2 in. / 3/4 in. for DC cables
- (3) Knockout 1/2 in. / 3/4 in. for AC cables
- (4) Knockouts on inverter side 1/2 in. / 3/4 in. for AC or DC cables



CAUTION! Danger of short circuit by loose metal parts from knockouts. Loose metal parts in the inverter may cause short circuits when the inverter is powered up. When removing knockouts, make sure that

- no loose metal parts fall into the inverter,
- any metal pieces that do fall into the inverter are removed immediately.



Removing knockouts

- 1** Remove knockouts for AC and DC cables on the inverter side or on the inverter underside according to the figure



NOTE! Procedure for removing knockouts for conduit fittings with a diameter exceeding 3/4 in.:

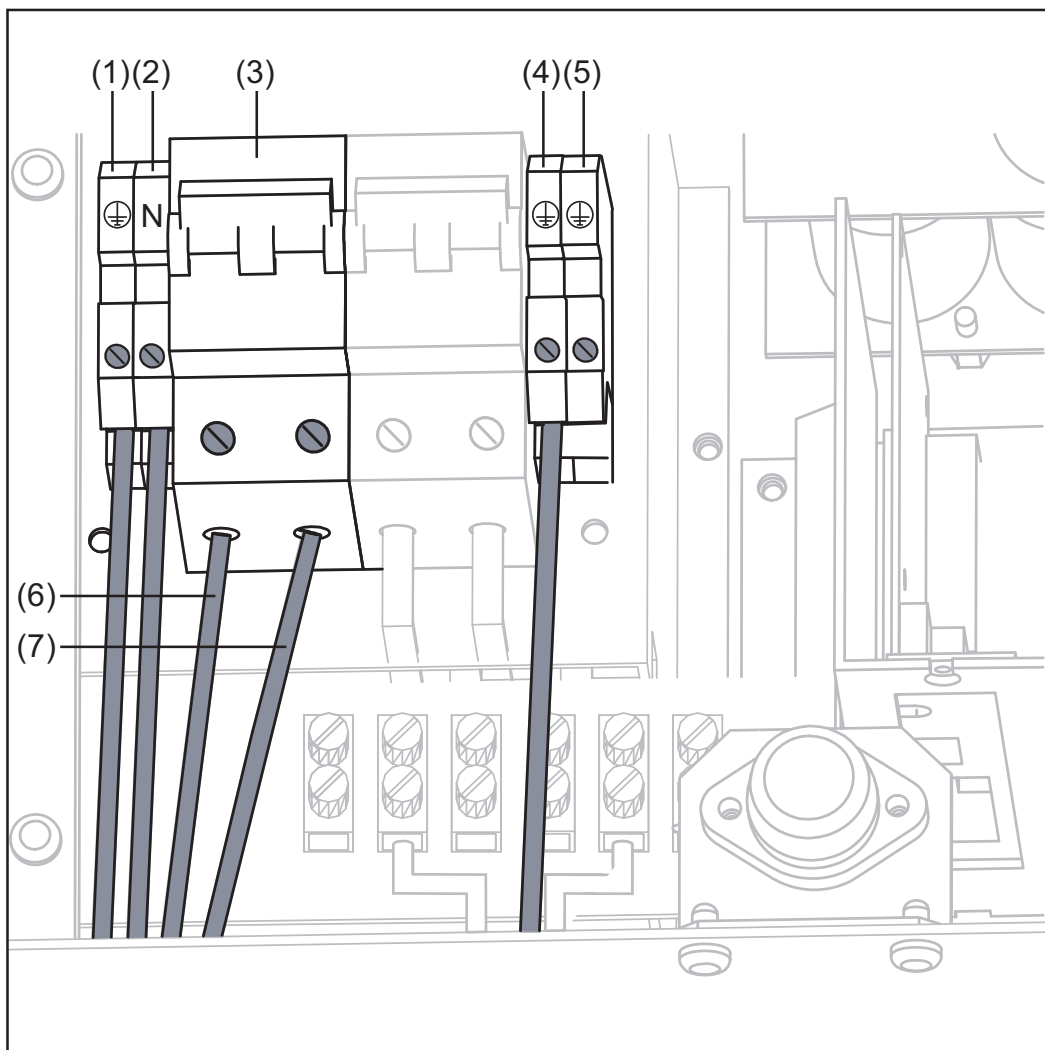
- Remove connecting plate (2)
- Remove knockouts
- Fix the connecting plate (2) again



NOTE! Use only water tight conduit fittings and conduits. Conduit fittings and conduits are not part of the scope of supply for the inverter.

- 2** Insert a 1/2 or 3/4 in. conduit fitting in the knockouts labeled "AC" and fasten it
- 3** Insert a 1/2 or 3/4 in. conduit fitting in the knockout labeled "DC" and fasten it

Connecting the inverter to the public grid (AC)



- 1** Insert the AC cables and the grounding cables through the AC conduits into the inverter
- 2** Connect AC cables to the AC terminals L1 (6), L2 (7) and N (2)
- 3** Connect grounding cables to the ground terminal (4)

Tightening torque = 1.7 ft. lb.



NOTE! Form a min. 4 in. wire loop using all wires

Recommendation for the AC-side overcurrent protection



NOTE! To reduce the risk of fire, connect only to a circuit provided with branch circuit overcurrent protection in accordance with the National Electrical Code, ANSI / NFPA 70, at a MAXIMUM of:

- 20A ... IG 2000 / 3000 / 2500-LV (15 A is permissible)
- 30A ... IG 4000 / 5100 / 4500-LV (25 A is permissible with the IG 4000)

Additional external AC and/or DC disconnect

Depending on the installation, an additional external AC and/or DC disconnect may be required if the inverter is installed in a location not easily accessible to utility or fire personnel. Contact your local authorities for additional information.

Connecting Solar Module Strings to the Fronius IG (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:

- The open circuit voltage of the solar modules increases as the temperature decreases (assuming constant irradiance). The open circuit voltage should never rise above 600 V regardless of temperature and an irradiance of 1000 W/m².
If the open circuit voltage exceeds 600 volts, the inverter may be damaged, and all warranty rights will become null and void.
- More exact data for sizing the solar array for the particular location can be obtained using calculation tools such as the Fronius Configuration Tool (available at <http://www.fronius-usa.com>).
- See NEC table 690.7 for the appropriate code-related voltage adjustment factor for crystalline silicon modules, or use the manufacturer's specified voltage coefficient.

Safety



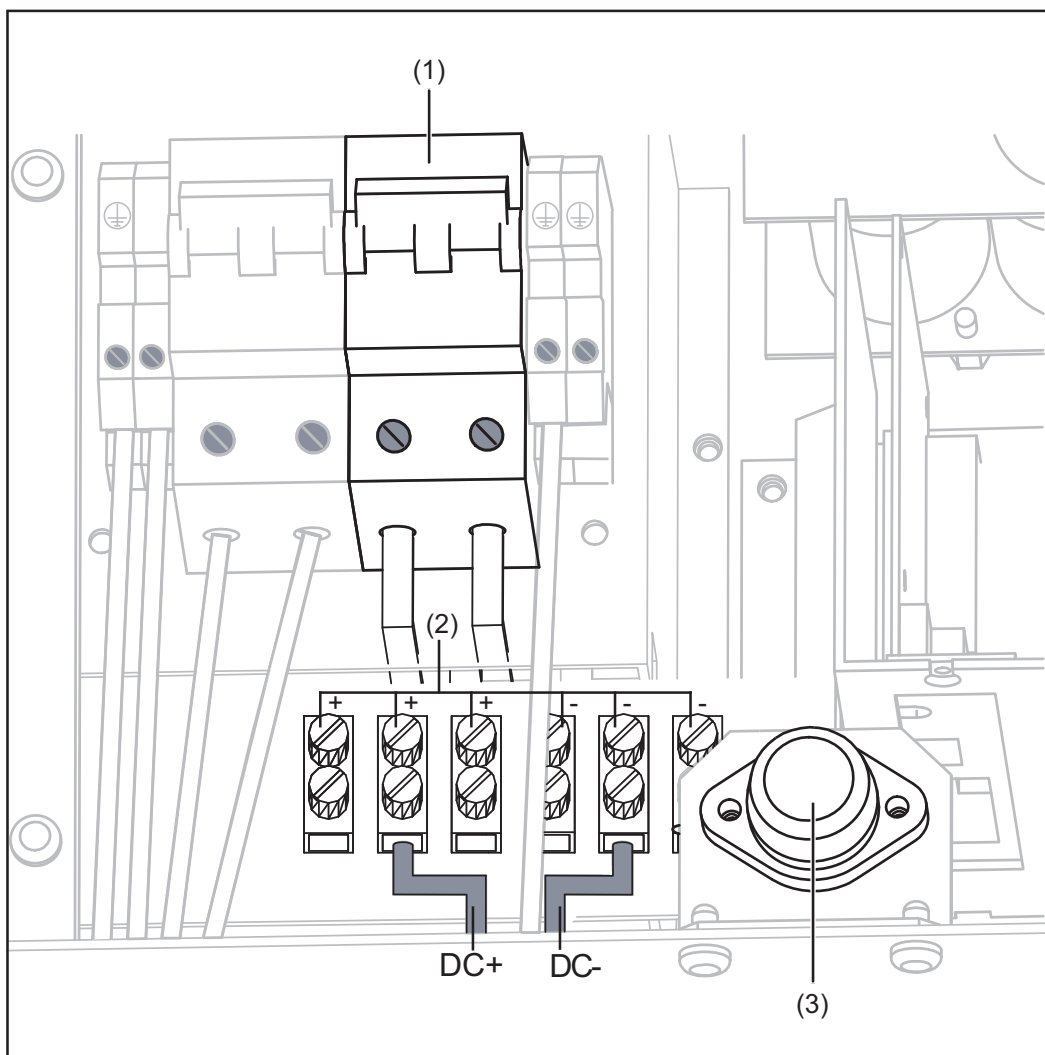
WARNING! An electric shock can be fatal. Danger due to grid voltage and DC voltage from solar modules.

- 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.



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 terminals



The white plastic divider that separates the AC from the DC connection area is not shown in the figure.

- | | |
|-----|-------------------|
| (1) | DC disconnect |
| (2) | DC terminal block |
| (3) | GFDI fuse |

Solar module ground

The inverter is equipped with a ground-fault detection and interruption (GFDI) circuit as required by UL 1741 and the National Electrical code. The array's negative conductor is connected to the grounding system in the inverter.



WARNING! An electric shock can be fatal. Normally grounded conductors may be ungrounded and energized when a ground fault is indicated. The ground fault has to be repaired before operation is resumed



NOTE! Do not connect the ground to the negative DC line at any point! This is already done within the inverter. If negative DC lines are connected to the DC terminals or prior to this to the ground, this will circumvent the GFDI protection system, preventing your inverter from properly detecting a fault current.

In addition, turning the DC disconnect to the OFF/open circuit condition will not disconnect the array from ground, as it only disconnects the DC positive.

Wire cross section of solar module strings



WARNING! An electric shock can be fatal. Inadequately sized electrical components can cause serious injuries to persons and damage to (or loss of) property.

- All electrical installations must be carried out in accordance with the National Electrical Code, ANSI/NFPA 70, and any other codes and regulations applicable to the installation site.
- For installations in Canada, the installations must be done in accordance with applicable Canadian standards.
- Use minimum AWG 14, min. 167 °F (75 °C), copper wire for all grounding wires (see NEC table 250.122).
- Use minimum AWG 14, min. 167 °F (75 °C), copper wire for the DC connection of the FRONIUS IG 2000, 3000 and 2500-LV.
- Use minimum AWG 14, min. 167 °F (75 °C), copper wire for the DC connection of the FRONIUS IG 4000, 5100 and 4500-LV.
- Voltage drop and other considerations may dictate larger size wires be used.
- Use only solid or stranded wire. Do not use fine stranded wire.

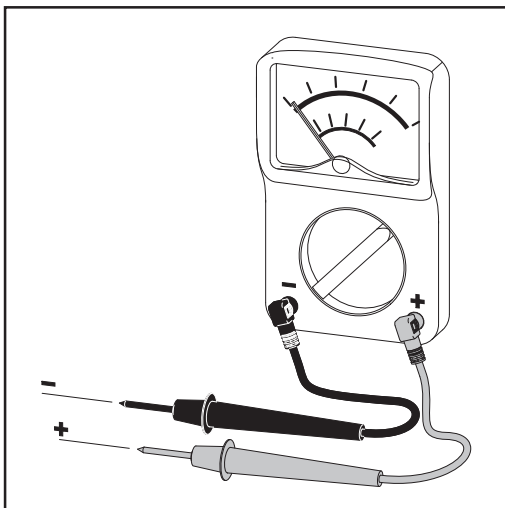


NOTE! To ensure an effective strain relief device for solar module strings, only use cable cross sections of the same size.

Connecting solar module strings

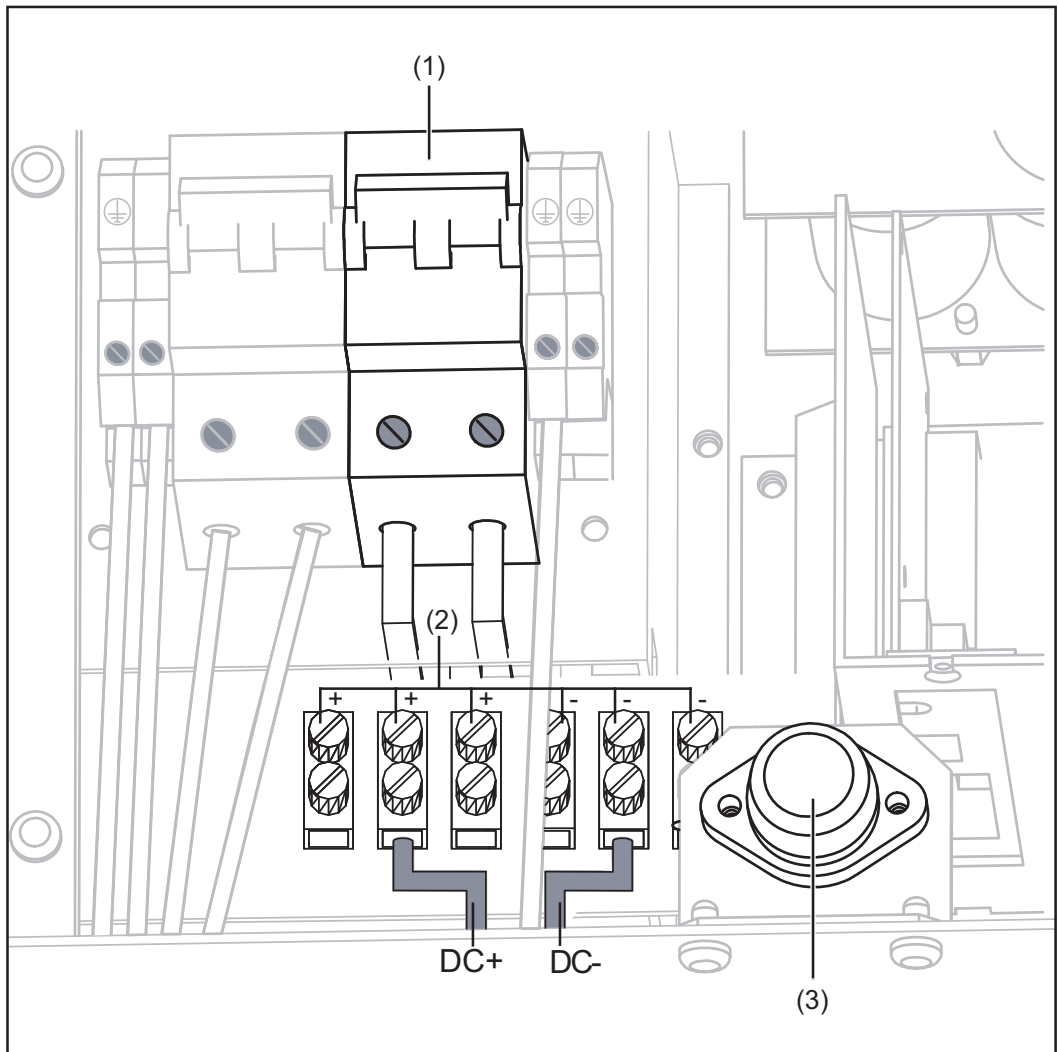


NOTE! Use only water tight conduit fittings and conduits. Conduit fittings and conduits are not part of the scope of supply for the inverter.



NOTE! Connecting the DC wiring with the wrong polarity may cause damage to the inverter. Check both the polarity and the open circuit voltage.

The DC Voltage must not exceed 600 V, regardless of temperature.



To access the DC terminals, bend upward the white plastic divider.

It is possible to connect up to 3 PV-strings in parallel within the Fronius IG inverter.

- 1** Insert the DC cables and the grounding cables through the DC conduit into the inverter
- 2** Connect the DC cables to the DC terminal block:
 - connect the positive (+) cables to the "DC+" terminals
 - connect the negative (-) cables to the "DC-" terminals
- 3** Connect grounding cables to free grounding terminals

Tightening torque = 1.7 ft. lb.



NOTE! Form a min. 4 in. wire loop using all wires.

Commissioning

Factory pre-set configuration

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

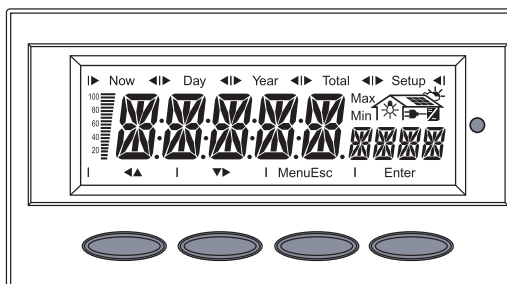
To change your inverter settings, please see section 'The setup menu' in the chapter 'Operation.'

Commissioning

- 1 Close the connection area
- 2 If available, turn on an external AC disconnect
- 3 Switch AC disconnect on the inverter to the "ON" position
- 4 Switch DC disconnect on the inverter to the "ON" position

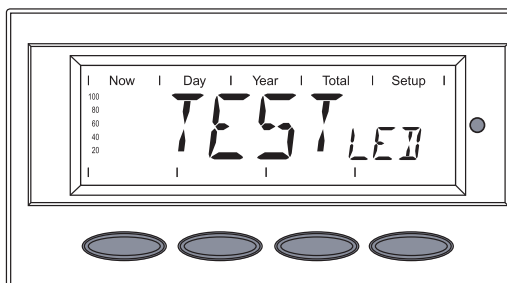
As soon as the photovoltaic modules produce sufficient power, the Operating Status LED lights up orange.

The orange LED indicates that the feed-in mode of the inverter will begin shortly.



The screen displays the startup phase.

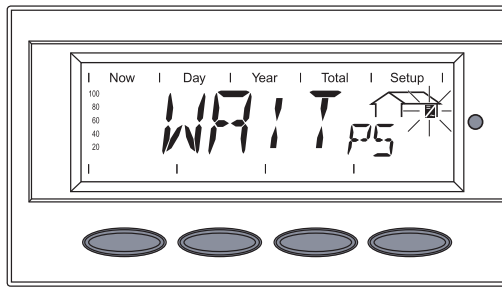
- Segmenttest
All display elements light up for about one second.



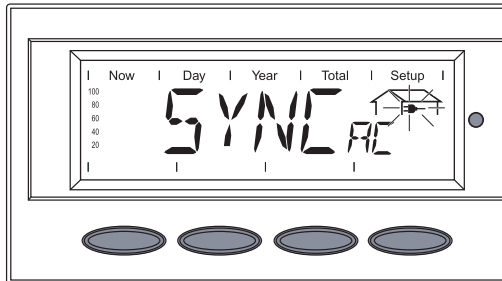
- The inverter goes through a master check list for several seconds. The display shows 'TEST' and indicates the respective component that is being tested (for example, 'LED').



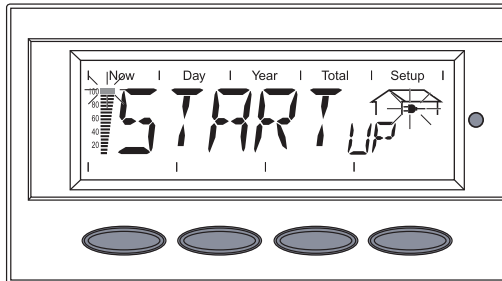
- 'TEST COM' is shown.



- Synchronization with grid:
'WAIT PS' is displayed, the inverter icon flashes: the inverter is waiting for all power stage sets in the network to be on stand-by. This procedure takes place dependent on the DC voltage.



- Next, the display shows 'SYNC AC,' the grid icon flashes.



- Startup test:
Before the inverter starts feeding energy into the grid, the conditions of the grid are tested in detail in accordance with local regulations. The display shows 'START UP.'



- Operation of feeding energy into the grid:
After selecting the grid and when the tests are concluded, the inverter starts feeding energy 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.

IMPORTANT! For more information about the startup phase, please see the chapter 'Operation', section 'Product description Fronius IG' (Startup Phase, Test Procedure).

Inserting Option Cards

Suitable option cards

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

- Datalogger and modem interface, Ethernet/Internet connection (for using a PC to record and manage data from your photovoltaic system)
- Fronius Interface Card Easy (sends all relevant working parameters in a well defined RS-232 protocol)
- Fronius Personal Display
- Various large displays (Fronius Public Display)
- Sensors (temperature sensors / irradiation sensors / ...)

System upgrades are available as plug-in cards and as external boxes.

Safety



WARNING! An electric shock can be fatal. Danger from 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.
- All electrical installations must be carried out in accordance with the National Electrical Code, ANSI/NFPA 70, and any other codes and regulations applicable to the installation site.
- For installations in Canada, the installations must be done in accordance with applicable Canadian standards.



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.

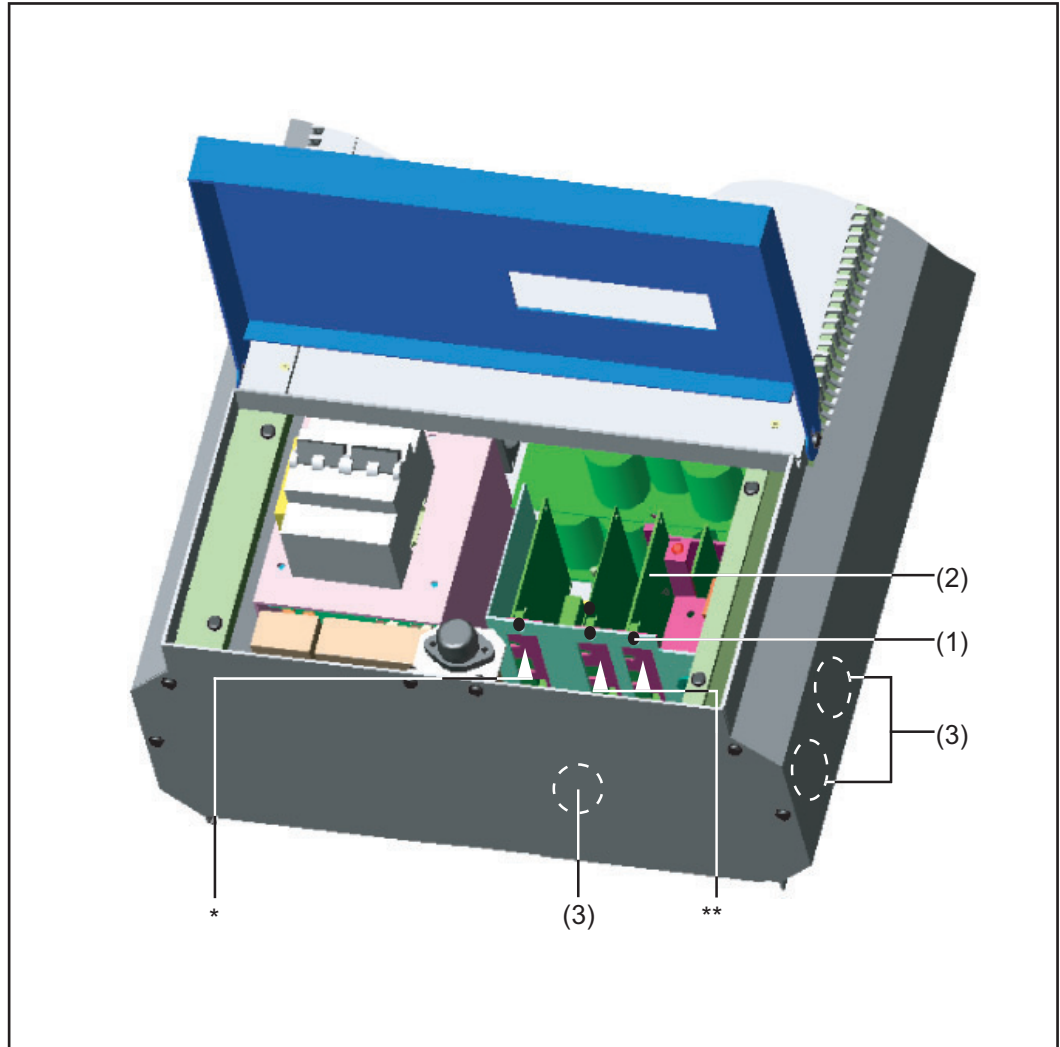


NOTE! Follow general ESD precautions when handling option cards.

Inserting and connecting option cards

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

- 1** Switch the AC and DC disconnect on the inverter to the OFF position
- 2** Open connection area



* Insert the Com Card in the left-most slot named "ENS"

** Insert any of the following cards in option slot 1 or 2:
Datalogger Card, Personal Display Card, Interface Card easy, Sensor Card

- 3** Insert option card (2) into a free slot
- 4** Tighten option card (2) with fastening screw (1)



CAUTION! Danger of short circuit by loose metal parts from knockouts. Loose metal parts in the inverter may cause short circuits when the inverter is powered up. When removing knockouts, make sure that

- no loose metal parts fall into the inverter,
- any metal pieces that do fall into the inverter are removed immediately.

- 5** Remove knockouts (3) for data communication cables



NOTE! Use only water tight conduit fittings and conduits. Conduit fittings and conduits are not part of the scope of supply for the inverter.

- 6** Insert a 1/2 or 3/4 in. conduit fitting in the knockout (3) labeled "DatCom" and fasten it

- 7 Insert data communication cables through the DatCom conduit and connect them to the sockets "IN" and "OUT"

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

- 8 Close the connection area
- 9 Switch the AC and DC disconnects on the inverter to the "ON" position

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 that enables several inverters to be linked with the data communications components.

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 data transmissions and ensures that even large volumes of data are distributed quickly and securely.

The 'Fronius Com Card' is used to integrate the 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 Datalogger.

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

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

Different system upgrades are detected automatically by Solar Net.

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

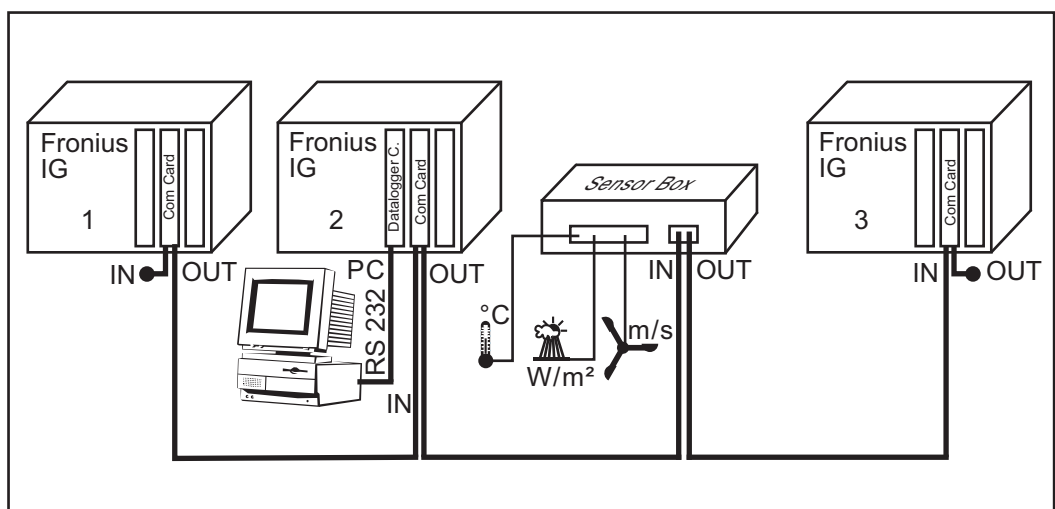
In order to uniquely identify each inverter in Solar Net, each inverter must also be assigned an individual number.

You can assign individual numbers as per 'The setup menu' section in this manual.

More detailed information on the individual data communications components can be found in the relevant operating instructions or on the Internet at <http://www.fronius-usa.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 units and one Fronius Sensor Box:

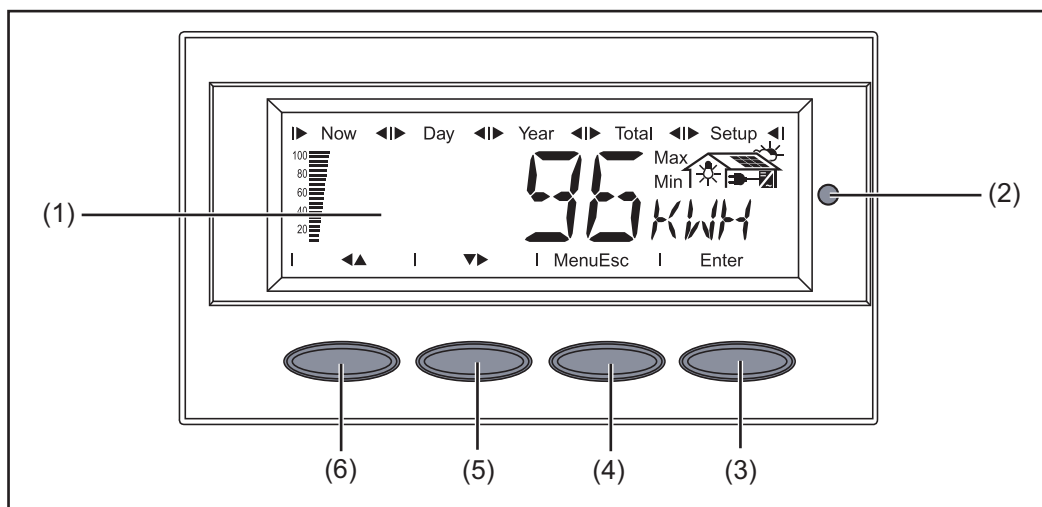
- all Fronius IG units have one 'Fronius COM Card'
- one Fronius IG has a 'Fronius Datalogger Card' (no. 2)
- Fronius Datalogger has two RS-232 interfaces for connecting to a PC and a modem

Option cards communicate within the Fronius IG 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.

Operation

Product description

Controls and Indicators

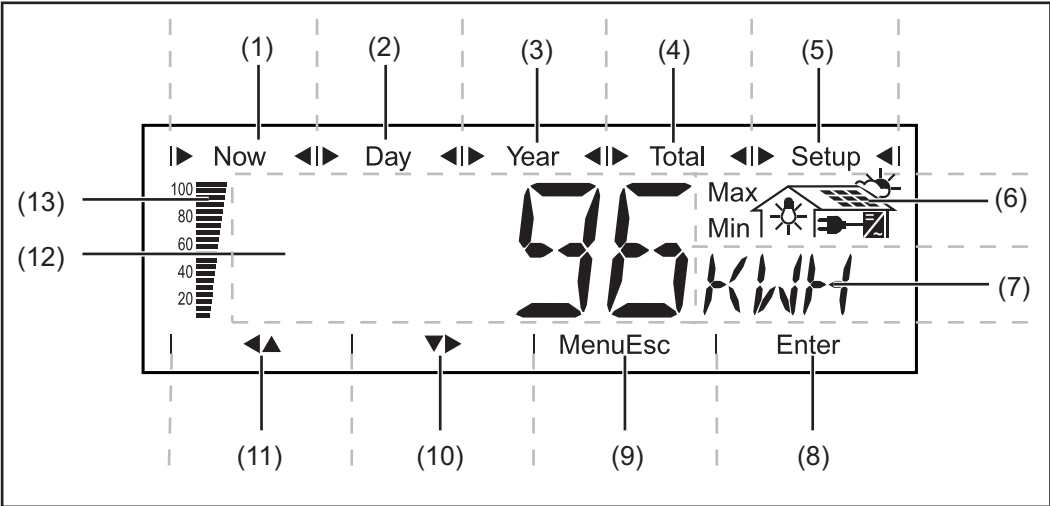


Item	Function
(1)	Display for displaying values, settings and menus
(2)	Operating Status LED for displaying the operating status
(3)	LED GFDI-Status for displaying the GFDI status
(4)	"Enter" key for confirming a selection
(5)	"Menu / Esc" key for scrolling through menu options for exiting the Setup menu
(6)	"Down/Right" key depending on the selection: for navigating down for navigating right
(7)	"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).

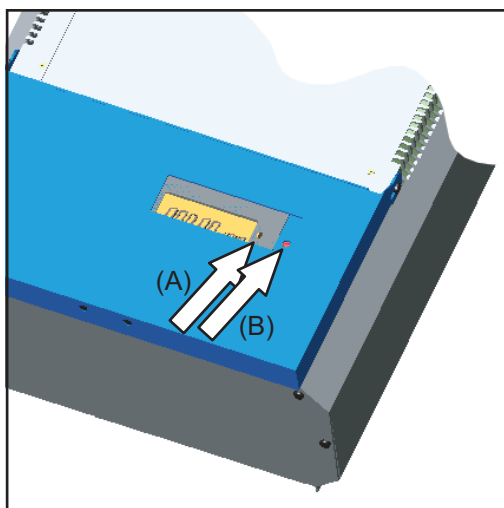
Min The value shown represents the minimum value within the period of observation (depending on which display mode is selected).

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
-  ... appears with data readings that are related to environmental conditions, like sunlight insolation and temperature (optional)

Item	Function
	 ... appears with data readings that are transmitted by the consumption sensor (optional)
(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
(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 and GFDI Status LED



Position of Operating Status LED (A) and the GFDI Status LED (B) on the inverter

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

Operating Status LED Explanation (A)

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.

Operating Status LED (A)	Explanation
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.
GFDI Status LED (B)	Explanation
remains dark	there is no ground fault in the PV system; the system is working properly
lights up red	- a ground fault is detected and the GFDI fuse is blown - the inverter does not feed energy to the grid - the ground fault needs to be removed and the GFDI fuse needs to be changed (see section "Ground fault indication" in the chapter "Status Diagnosis and Troubleshooting")

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."

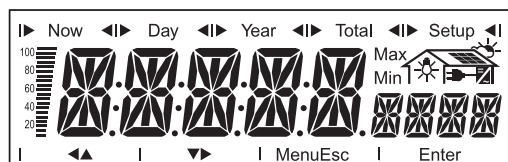
Startup Phase and Grid Feed-in Mode

Startup phase

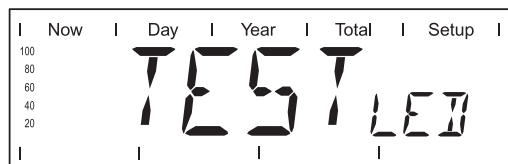
The inverter carries out a self test after being turned on automatically. Then a test of the public grid is carried out. This test takes five minutes. During the startup sequence the illumination of the Operating Status LED is yellow.

Test procedure

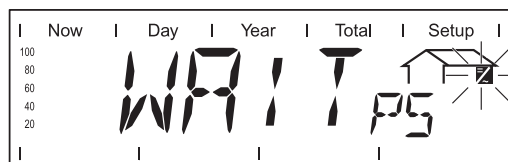
1. Segment test
All display elements light up for about one second



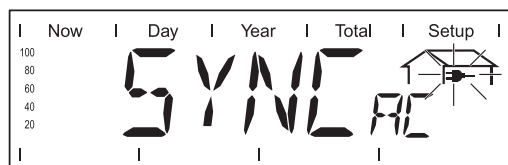
2. Self test of essential inverter components
 - The inverter goes through a master check list for several seconds
 - The display shows 'TEST' and indicates the respective component that is being tested (for example, 'LED')



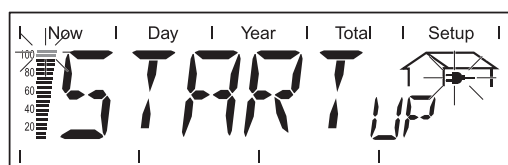
3. Synchronization with grid:
 - 'WAIT PS' is displayed, the inverter icon flashes: The inverter is waiting for all power stage sets in the network to be on stand-by. This procedure takes place dependent on the DC voltage



- Next, the display shows 'SYNC AC,' the grid icon flashes.



4. Startup test
 - Before the inverter starts feeding energy into the grid, the conditions of the grid are tested in accordance with local regulations.
 - The display shows 'START UP.'

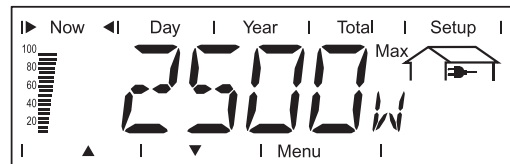


The startup test takes five minutes. The time elapsed is indicated by a bar shrinking from the top down.

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

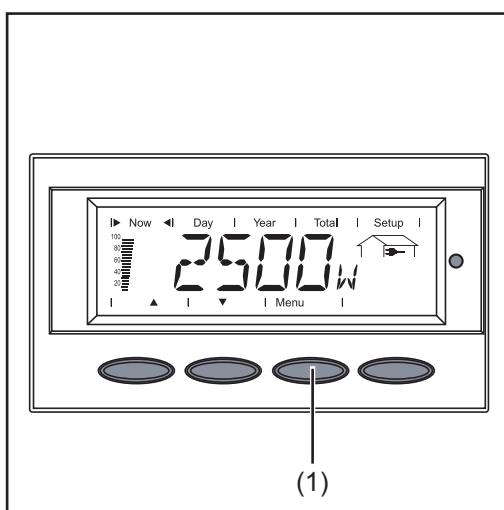
- 1 Press any key

The display illumination is activated.

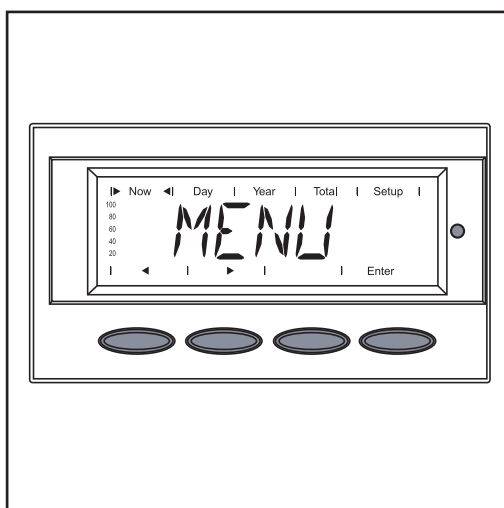
If no key is pressed for 30 seconds, the display backlight goes out (provided that the display illumination is set to automatic in the Setup menu).

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

Accessing the Menu Level



- 1 Press the "Menu" key (1)



"Menu" will appear on the display

The inverter is now in the menu level.

From the menu level you can

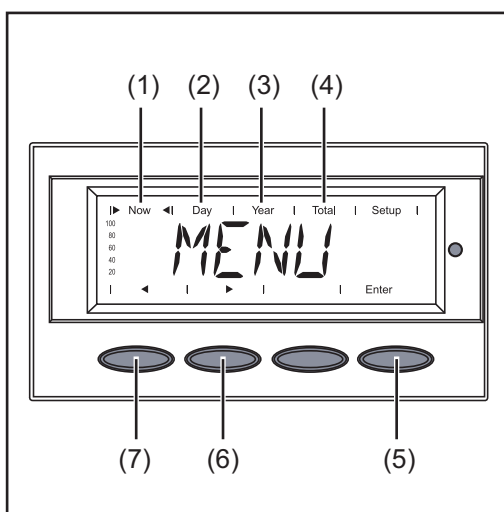
- set the desired display mode
- access the Setup menu

The Display Modes

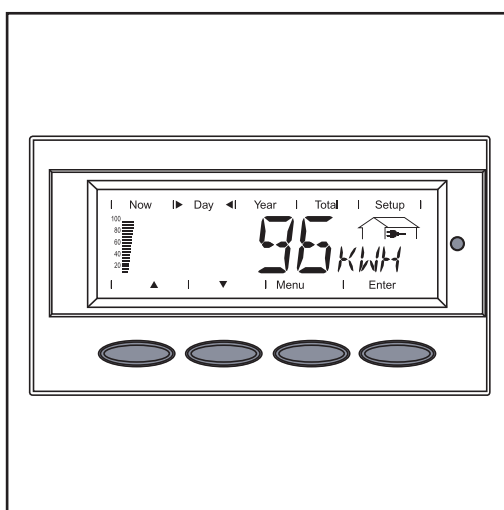
The Display Modes

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

Selecting a Display Mode



- 1 Accessing the menu level
- 2 Use the "left" (7) or "right" (6) keys to select your preferred display mode (1) - (4)
- 3 Press "Enter" (5)



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

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

Overview of Display Values

Display mode	Symbol	Unit	Optional	Display value
"Now"		W	-	Output power
		V	-	Grid voltage
		A	-	Output current
		Hz	-	Grid frequency
		V	-	Solar module voltage
		A	-	Solar module current
		°F	x	solar module temperature
		-	-	GFDI status
		W	x	energy as read by consumption meter
		°F	x	ambient temperature
		W/m ²	x	irradiance
		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
		kWh / MWh	x	output reading of consumption meter
		°F	x	max. solar module temperature
		°F	x	min. solar module temperature
		°F	x	max. ambient temperature
		°F	x	min. ambient temperature
		W/m ²	x	max. irradiance
		HH:MM	-	Service hours completed by the inverter

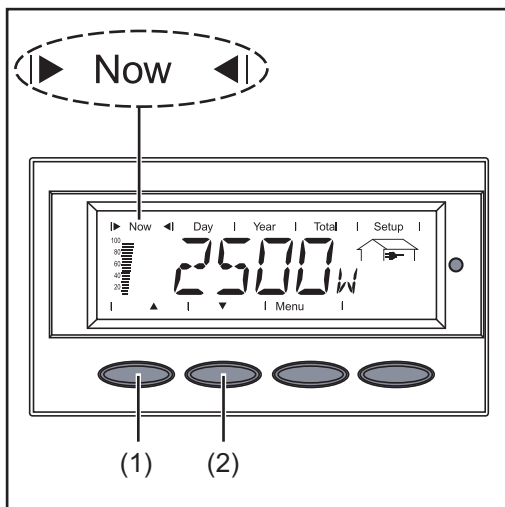
x

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



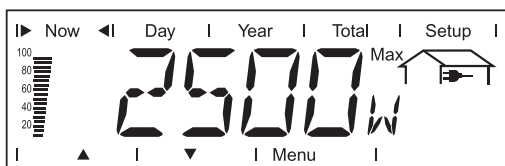
- 1 Select the "Now" display mode

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

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

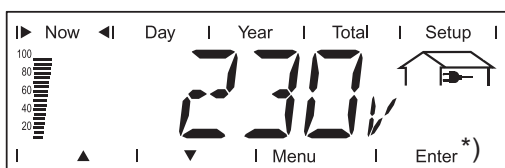
Scroll back using the "Up" key (1)

Display values in the 'Now' display mode



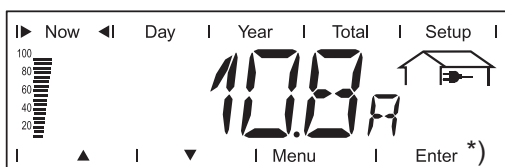
Output power

power supplied to grid at the particular moment (Watts)



AC grid voltage

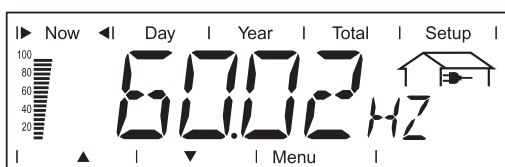
(Volts)



Output current

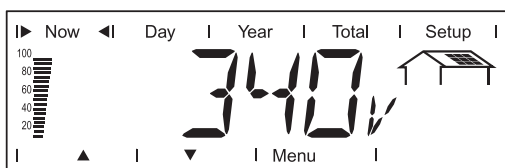
current supplied to the grid at the particular moment (Amperes)

*) only for multi-phase inverters



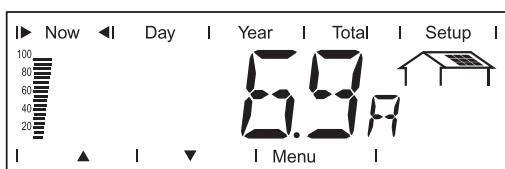
Grid frequency

(Hertz)

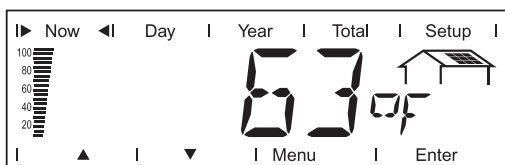


Solar module voltage

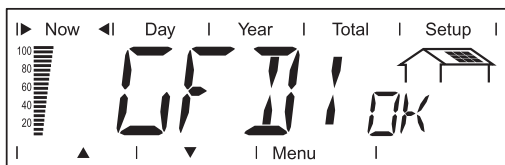
voltage of the solar array at the particular moment (Volts)

**Solar module current**

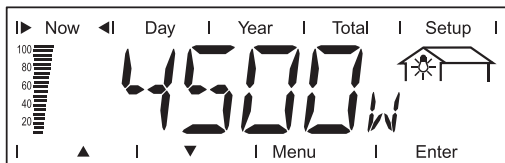
current supplied by solar array at the particular moment (Amperes)

**Solar module temperature (optional Sensor Card/Box)**

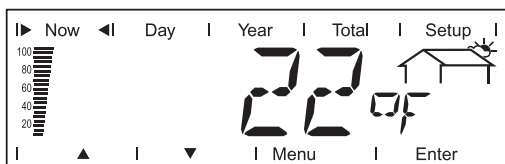
temperature at solar modules, temperature sensor No.1 (°F)

**GFDI status**

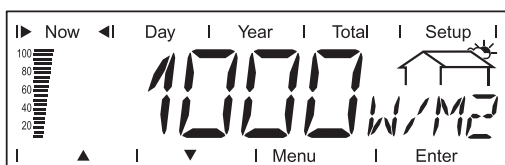
if there is no ground fault in the system "GFDI OK" is displayed

**Output reading of consumption meter (optional Sensor Card/Box)**

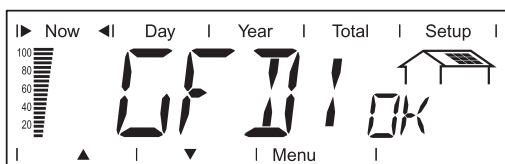
present power drawn from the grid (Watts)

**Ambient temperature (optional Sensor Card/Box)**

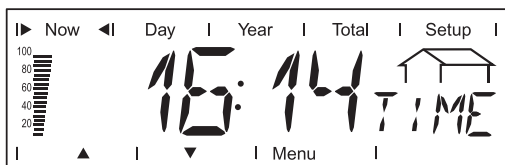
Temperatur-Sensor No. 2 (°F)

**Irradiance (optional Sensor Card/Box)**

the sunlight's power per square meter (W/m²)

**GFDI status**

If there is no ground fault in the system, 'GFDI OK' is displayed

**Time (optional datalogger)**

When the time on the inverter or on a datalogger 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

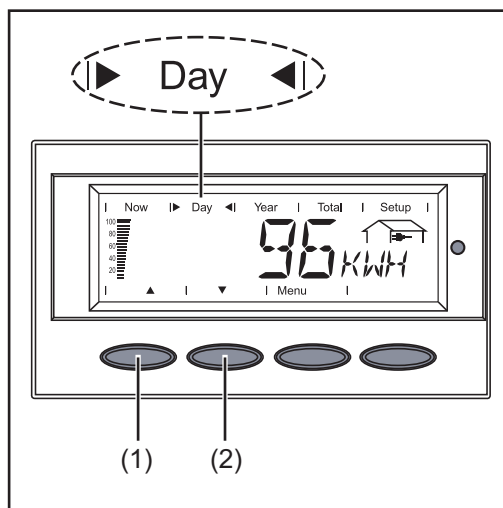
For the inverter the day begins when it switches on. If the DC supply line is disconnected and no Fronius Datalogger is connected, the following parameters within the display mode 'Day' will be reset after repeating the start-up:

- yield (currency can be selected)
- CO₂ reduction (lbs.)
- maximum power supplied (Watts)
- maximum grid voltage (Volts)
- minimum grid voltage (Volts)
- energy as read by consumption meter
- operating hours for Fronius IG Plus unit

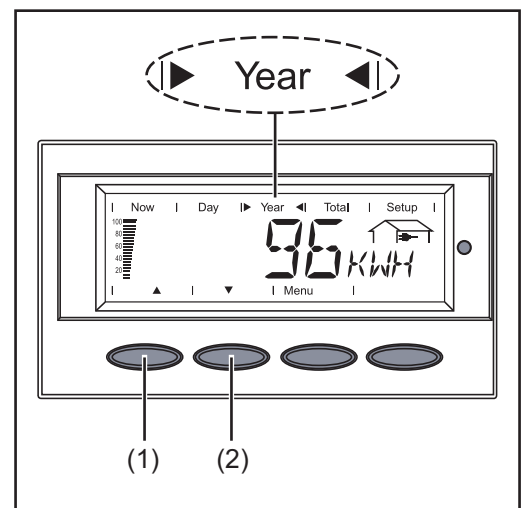
If an optional datalogger is available, the display values listed always apply for the whole day.

Selecting "Day / Year / Total" Display Mode

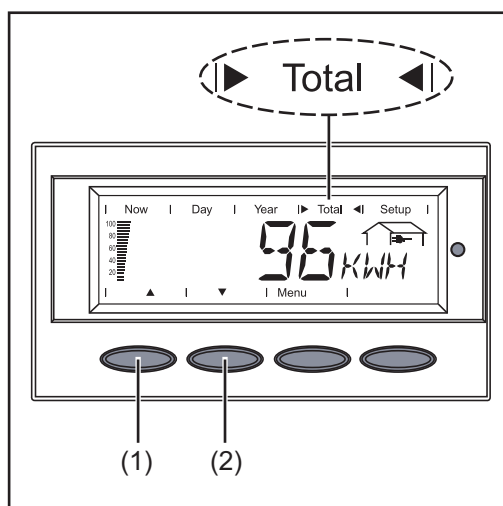
First Display Value in the "Day" Display Mode:



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 supplied during the monitored period (kWh / MWh)

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



Yield

Money earned during the monitored period (set currency and price per kWh in set-up 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 energy supplied. The factory setting depends on the respective country-specific setting.



CO2 reduction

CO2 emissions saved during the monitored period

(lb or T; pounds or tons)

The area for unit display switches between 'lb' 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.

This factory setting for this is 1.3 lb/kWh.



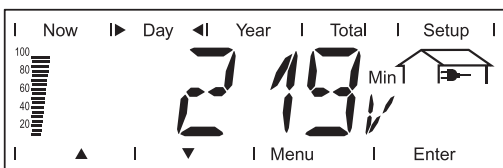
Maximum output power

Highest output power during the observation period (watts)



Maximum grid voltage

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



Minimum grid voltage

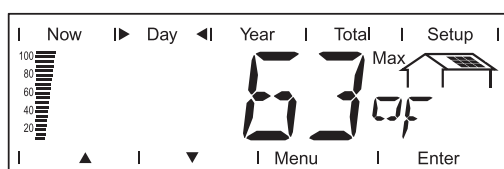
Lowest reading of grid voltage (V) during the observation period



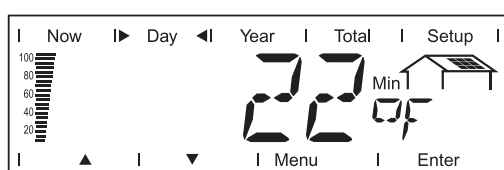
Maximum solar module voltage
Highest reading of solar module voltage (V) during the observation period



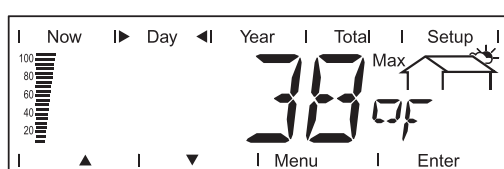
Energy consumption meter reading (optional Sensor Card/Box and consumption sensor)
energy consumed during observation period (kWh / MWh)



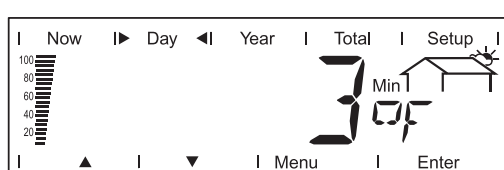
Maximum solar module temperature (optional Sensor Card/Box)
highest temperature reading at solar modules during observation period (°F)
temperature sensor No. 1



Minimum solar module temperature (optional Sensor Card/Box)
lowest temperature reading at solar modules during observation period (°F)
temperature sensor No. 1



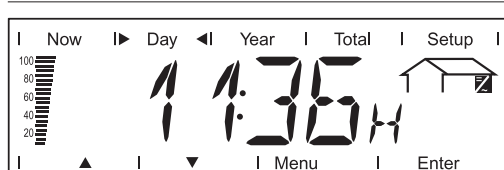
Maximum ambient temperature (optional Sensor Card/Box)
highest ambient temperature reading during observation period (°F)
temperature sensor No. 2



Minimum ambient temperature (optional Sensor Card/Box)
lowest ambient temperature reading during observation period (°F)
temperature sensor No. 2



Maximum irradiance (optional Sensor Card/Box)
highest irradiance during observation period (W/m²)



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.

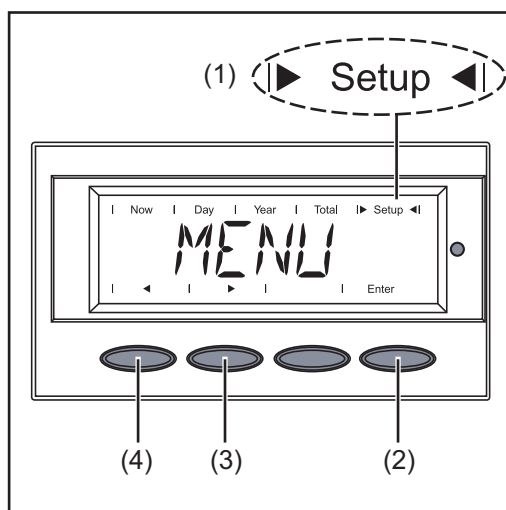
The Setup Menu

Presetting

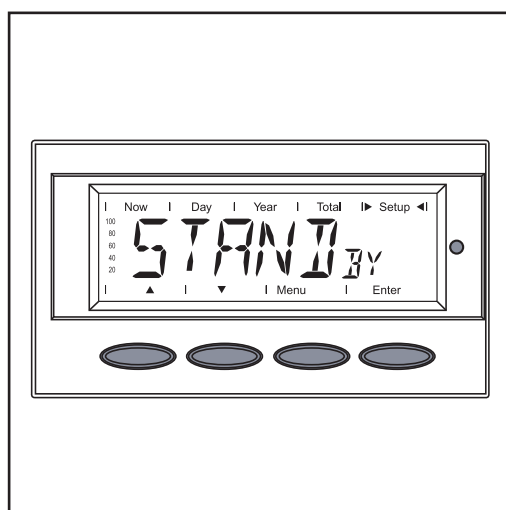
The inverter is pre-configured and ready to use. No manual control is necessary for feeding the power it generates into the grid.

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

Accessing the Setup Menu



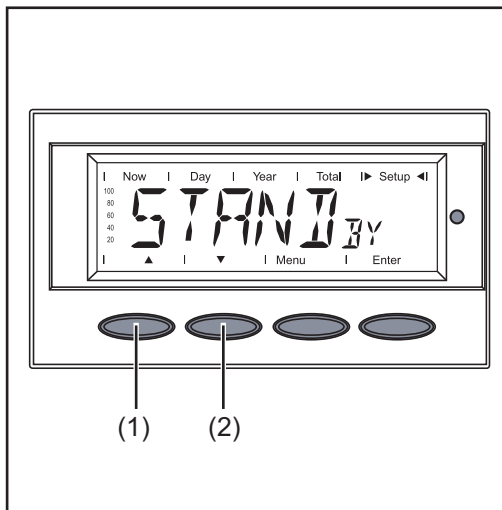
- 1** Switch to the menu level (press the "Menu" key)
- 2** Select the "Setup" (1) mode using the "Left" (4) or "Right" (3) keys
- 3** Press "Enter" (2)



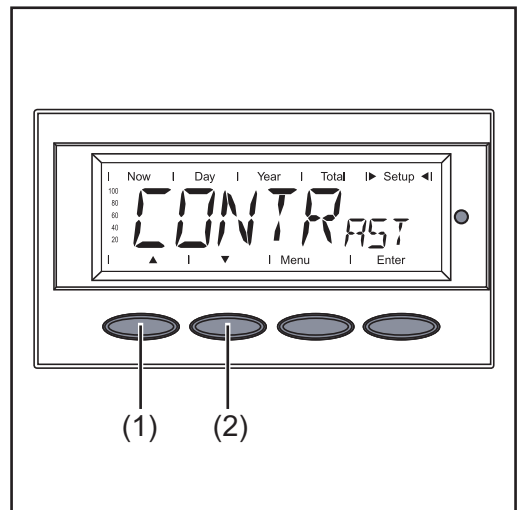
The Setup Menu's first menu item "STAND-BY" is shown.

Scrolling through Menu Items

Example: "STANDBY" menu item



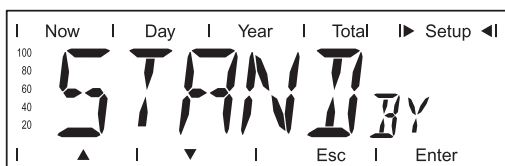
Example: "CONTRAST" menu item



- 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

STANDBY

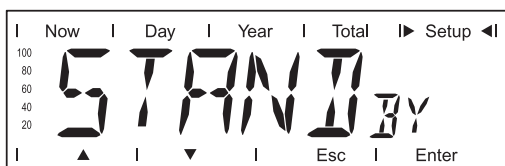


Manual activation / deactivation of Standby operation using the "Enter" key

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:"



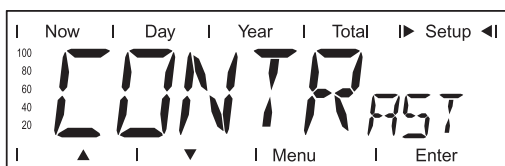
To maintain Standby operation:

- Press the "Esc" key

To end Standby operation:

- Press the "Enter" key

CONTRAST

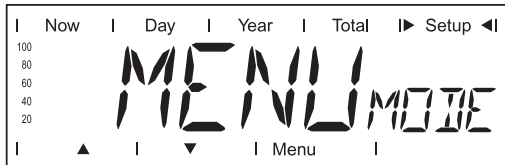


Contrast setting on LCD display

Unit	-
Setting range	0 - 7
Factory setting	7

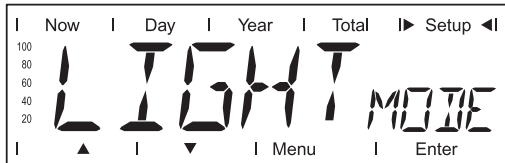
Since contrast depends on temperature, it may be necessary to adjust the "CONTRAST" menu item when ambient conditions change.

MENU MODE



'MENU MODE' cannot be selected.

LIGHT MODE



Initial setting for display illumination.

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

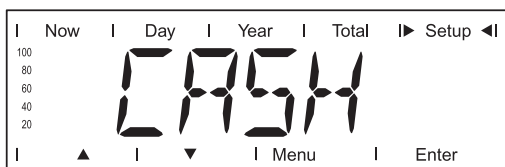
AUTO: The display illumination will stop 30 seconds after the last time a key has been pressed.

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).

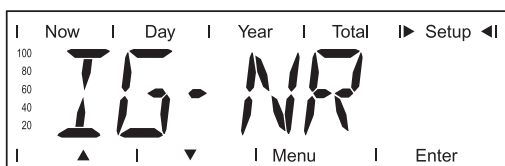
CASH



Setting of currency and rate for invoicing the energy supplied

Unit	-
Display area	Currency / Charge rate/kWh
Factory setting	USD

IG no.

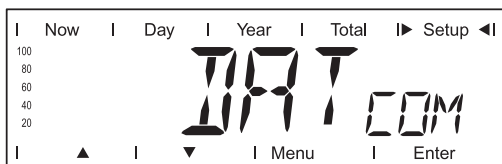


Number setting (address) of the inverter in a setup comprising multiple solar inverters linked together

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, resets the Personal Display Card and Interface Card

Setting range

Displays OK COM or ERROR COM;
PDCD RST / IFCD RST

OK COM / ERROR COM

Displays data communication available via Solar Net or an error that occurred in data communication

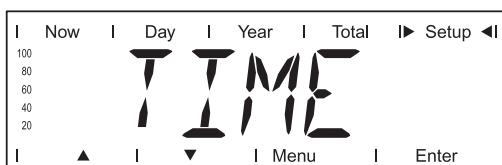
PDCD RST

Resets the Fronius Personal Display Card option

IFCD RST

Resets the Fronius Interface Card option

TIME



Date and time setting

Unit

DDMMYYYY, HH:MM

Setting range

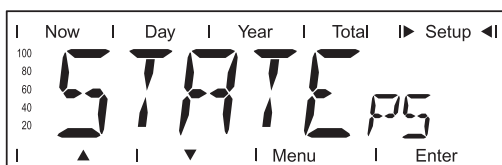
Date / Time

Factory setting

-

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

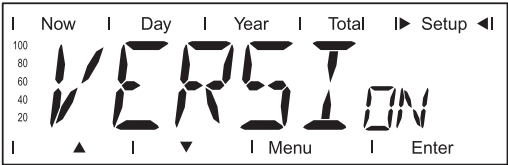
STATE PS



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

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

VERSION



displays the version number and serial number of the electronic components (e.g. IG control unit and the power stage sets)

Unit	-
Display area	MAIN CTRL / PS (PS00, PS01)
Factory setting	-
MAINCTRL	Version information of the IG control unit (inverter controller)
PS	Version information of the power stage sets (PS00 - PS01)

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

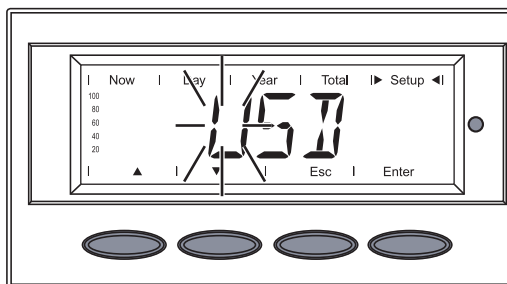
The following examples describe how to set and display menu items:

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

Setting the currency and rate

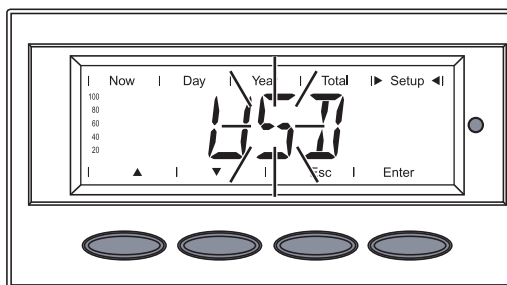


- 1 Select the 'CASH' menu item
- 2 Press the 'Enter' key



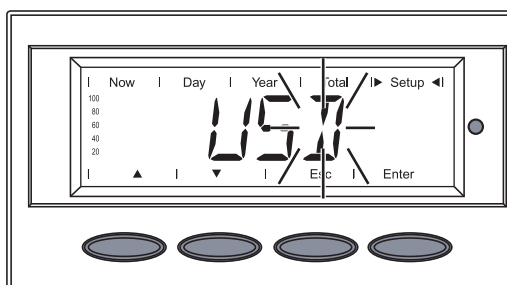
The currency is display, factory setting = 'USD';
The first character flashes.

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



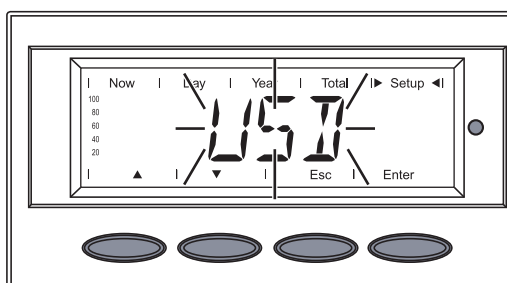
The second character flashes.

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



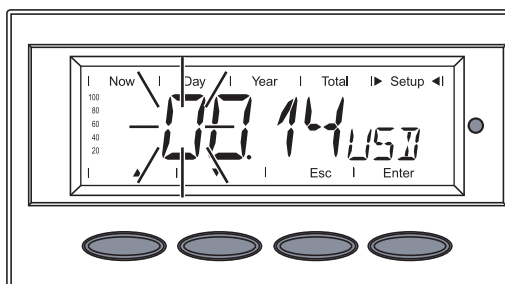
The third character flashes.

- 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

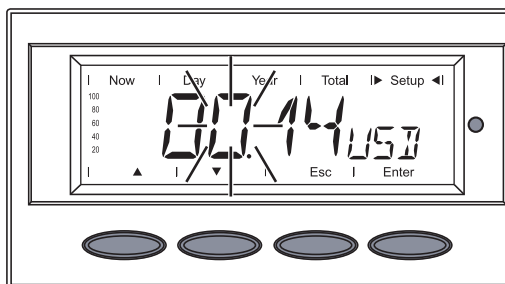


The rate for energy supplied is now displayed in kWh / currency, factory setting = 0.14 USD / kWh;
The first digit flashes.

- 10** Use the 'Up' and 'Down' keys to select a value for the first digit (e.g., 0)



- 11** Press the 'Enter' key

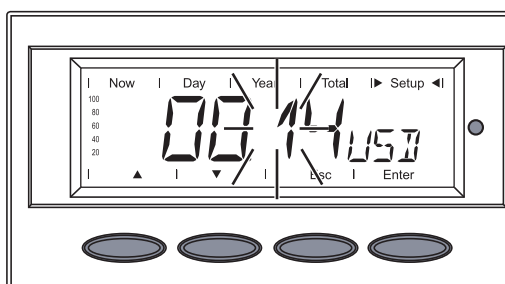


The second digit flashes.

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



- 13** Press the 'Enter' key

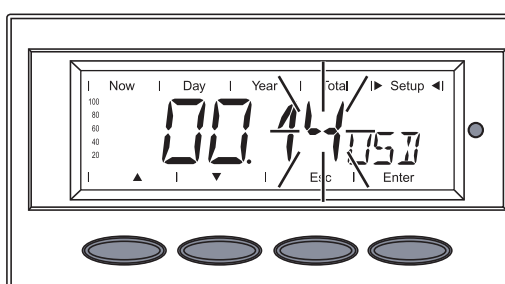


The first digit after the decimal point flashes.

- 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



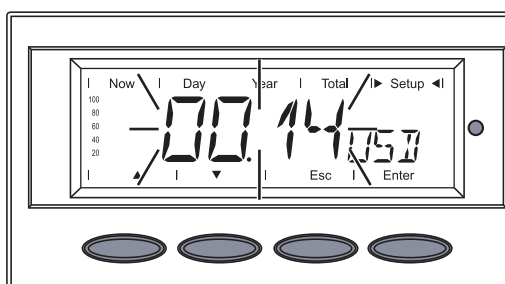
The second digit after the decimal point flashes.

- 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



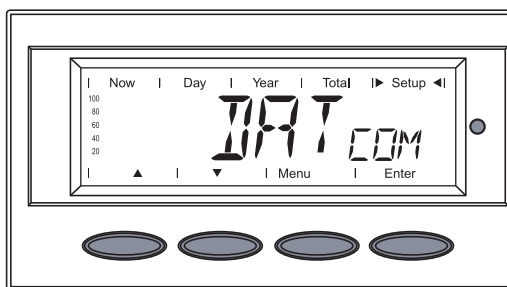
The set rate for energy supplied flashes.

- 18** Press the 'Enter' key

The currency and the rate for supplied energy are now accepted.

- 19** Press the 'Esc' key to exit the 'CASH' menu item

Displaying and Setting Parameters in the "DAT-COM" Menu Item



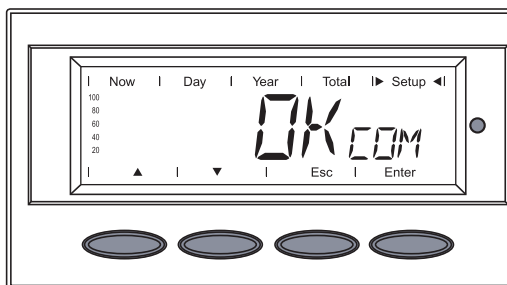
1 Select menu item 'DATCOM'

2 Press the 'Enter' key

The following displays depend on whether

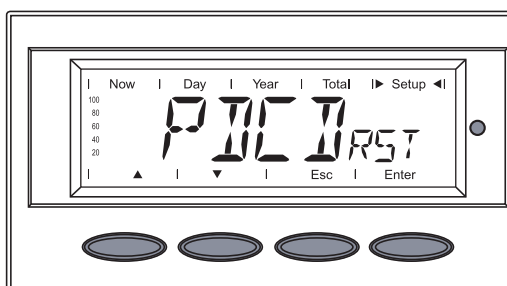
- a data connection is available
- a data connection is faulty or an option is not installed

Available data connection

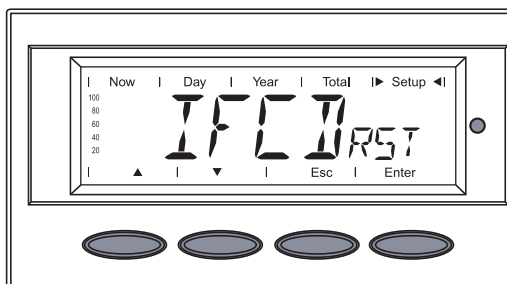


If there is a data connection available, 'OK-COM' is shown.

3 Use the 'Down' key to select available data:



e.g. Reset Personal Display Card ('PDCDRST') ...



... or Reset Interface Card ('IFCDRST')

4 Press the 'Enter' key



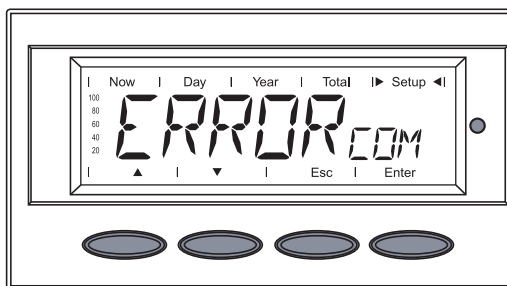
'PDCD DONE'...

...Or...

'IFCDDONE' is shown

5 Press the 'Esc' key 2x to exit menu item 'DATCOM'

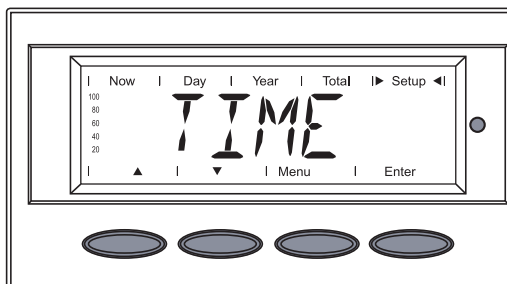
Data connection faulty or an option is not installed



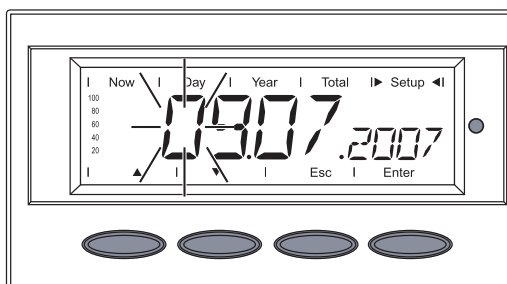
If there is a faulty data connection or options are not installed 'ERROR.COM' is shown.

- 3 Press the 'Esc' key to exit menu item 'DATCOM'

Setting Time and Date

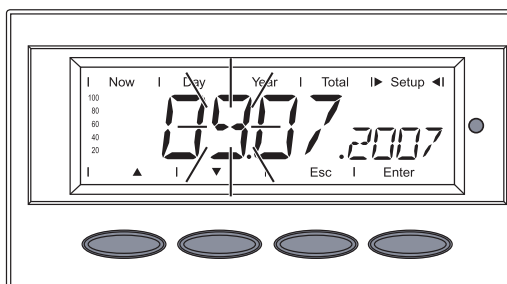


- 1 Select the "TIME" menu item
- 2 Press the "Enter" key



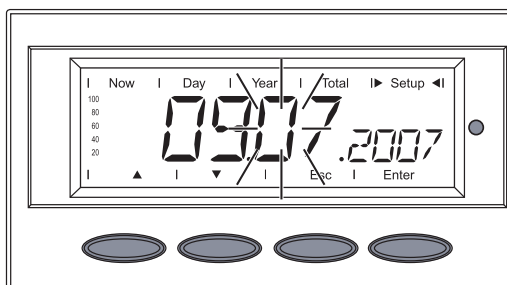
The **date** is displayed (DD.MM.YYYY), the first digit for the day flashes.

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



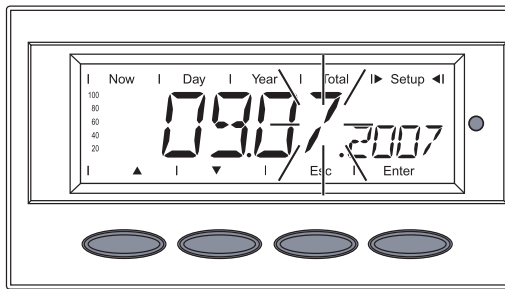
The second digit for the day flashes.

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



The first digit for the month flashes.

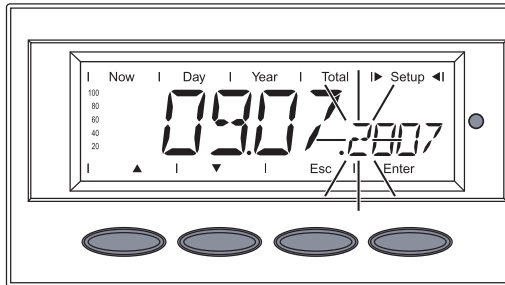
- 7 Use the "Up" and "Down" keys to select a value for the first month digit
▲ ▼
- 8 Press the "Enter" key



The second digit for the month flashes.

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

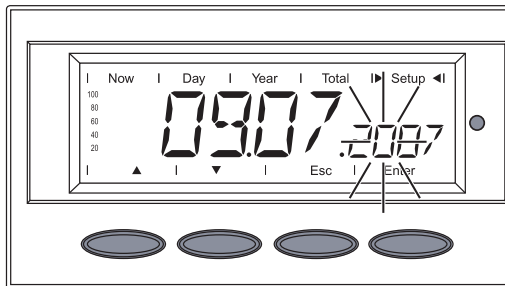
- 10** Press the "Enter" key



The first digit for the year flashes.

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

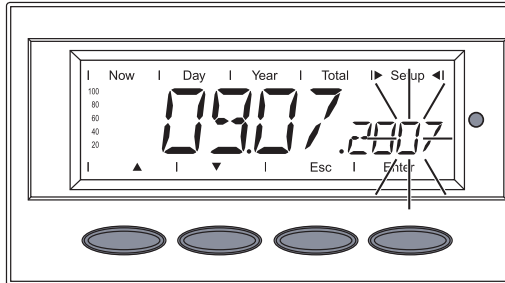
- 12** Press the "Enter" key



The second digit for the year flashes.

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

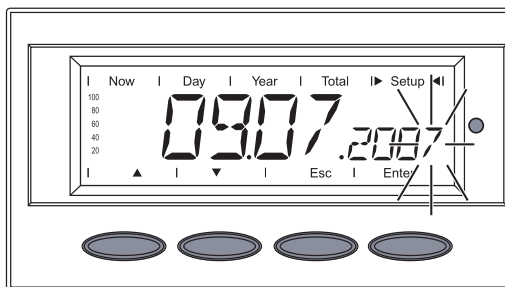
- 14** Press the "Enter" key



The third digit for the year flashes.

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

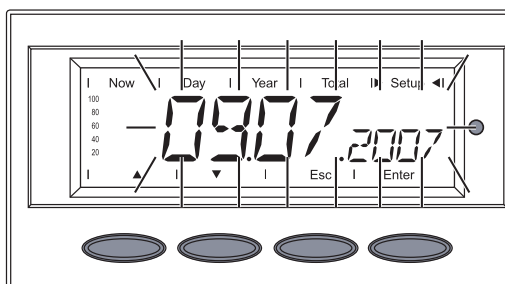
- 16** Press the "Enter" key



The fourth digit for the year flashes.

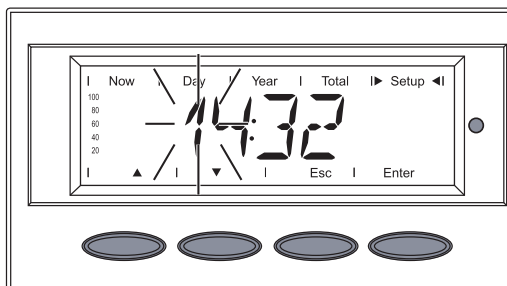
- 17** Use the "Up" and "Down" keys to select a value for the fourth year digit
▲ ▼

- 18** Press the "Enter" key



The set date then flashes.

- 19** Press the "Enter" key

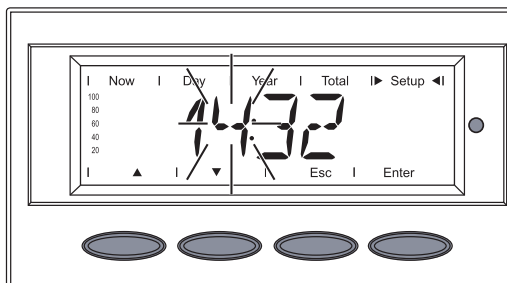


The **time** is displayed (HH:MM), the first digit for the hour flashes.

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



- 21** Press the "Enter" key

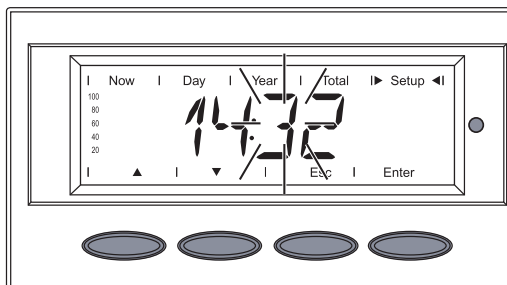


The second digit for the hour flashes.

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



- 23** Press the "Enter" key

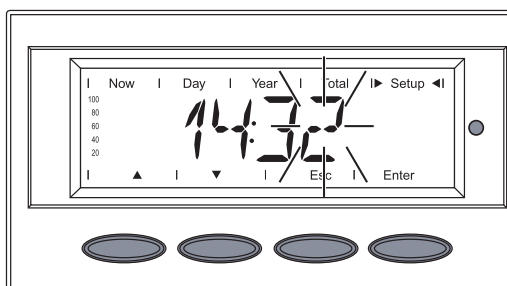


The first digit for the minutes flashes.

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



- 25** Press the "Enter" key

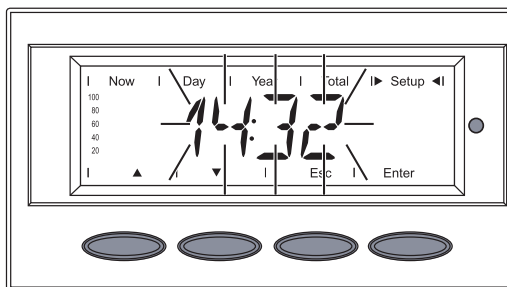


The second digit for the minutes flashes.

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



- 27** Press the "Enter" key



The set time flashes.

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

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

Troubleshooting and Maintenance

Status Diagnosis and Troubleshooting

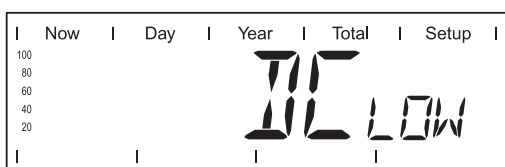
Displaying Status Codes

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

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

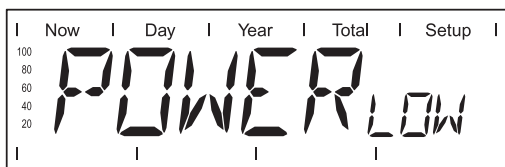
IMPORTANT! Status codes may sometimes appear briefly as a result of the control response from the inverter. If it subsequently continues to operate normally, there has not been a system error.

Normal Operation Status Codes



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

As soon as the open circuit voltage exceeds 150 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 < 170 V ... error in the photovoltaic system

Open circuit voltage > 170 V ... may indicate a basic fault in the inverter. In this case, notify a Fronius-trained service engineer.

Ground fault indication

If a ground fault occurs in the DC cabling, the inverter disconnects from the grid. The fault is indicated by the red ground-fault LED and the service code "434" is shown on the display. In this situation, the inverter is blocked from reconnection to the grid until the following actions are taken:

- Switch the AC and DC disconnect to position "OFF" (open-circuit)
- Remove the ground fault in your photovoltaic system
- Test the GFDI fuse and replace if necessary



NOTE! When a defective fuse is changed, only replace it with a "Littlefuse KLKD 1 AMP 600V" fuse.

- Switch the AC and DC disconnect to position "ON" (closed circuit)

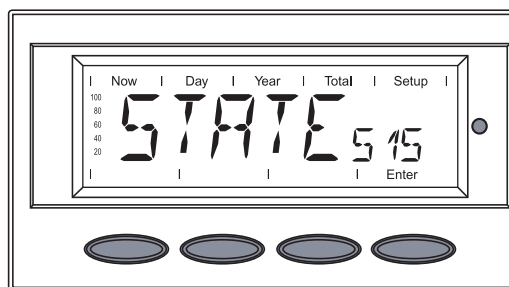
Status Codes on Fronius IG with Several Power Stage Sets

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."

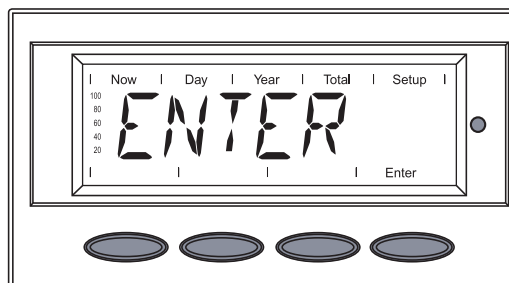


Display during normal operation



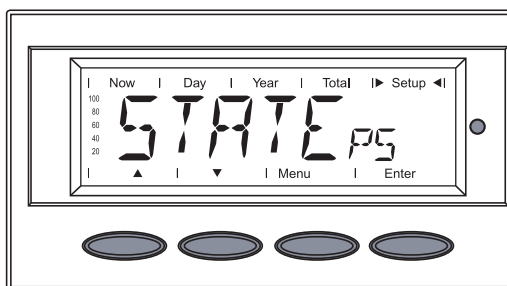
When there is an error in one of the power stage sets, the display flashes between "STATE" and the corresponding status code (e.g., "STATE 515")

and



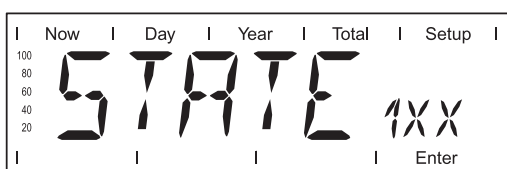
"ENTER"

- 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.

101

Grid voltage not within admissible range

Behavior	Grid voltage is thoroughly tested and as soon as it is 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

104

Grid frequency not within admissible range

Behavior	Grid frequency is thoroughly tested and as soon as it is 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

107

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

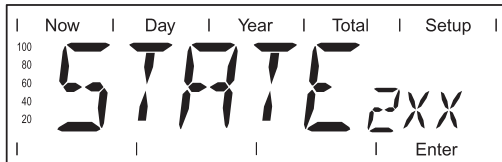
Islanding detected

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

Class 2 Status Codes

Status codes of class 2 are typically temporary. Their cause lies in the grid.

The first reaction of the inverter is to disconnect from the grid. Subsequently, the grid will be checked for the duration of the observation period stipulated. If after the end of this period no further defect is identified, the inverter resumes operating and feeding power into the grid.

221

Grid voltage (L1/N) exceeds admissible limits

Behavior

As soon as the grid voltage has returned to admissible range, the inverter resumes feeding power into the grid.

Remedy

Check grid voltage; if the status code persists you should contact your electrical contractor

222

Grid voltage (L1/N) below admissible limits

Behavior

As soon as the grid voltage has returned to admissible range, the inverter resumes feeding power into the grid.

Remedy

Check grid voltage; if the status code persists you should contact your electrical contractor

223

Grid voltage (L2/N) exceeds admissible limits

Behavior

As soon as the grid voltage has returned to admissible range, the inverter resumes feeding power into the grid.

Remedy

Check grid voltage; if the status code persists you should contact your electrical contractor

224

Grid voltage (L2/N) below admissible limits

Behavior As soon as the grid voltage has returned to admissible range, the inverter resumes feeding power into the grid.

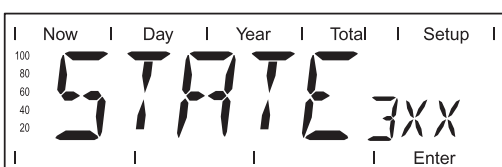
Remedy Check grid voltage; if the status code persists you should contact your electrical contractor

225

No grid voltage detected

Behavior As soon as the grid conditions have returned to admissible range, the inverter resumes feeding power into the grid.

Remedy Check grid connections and fuses; if the status code does not disappear you should contact your electrical contractor

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 AC side**

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 DC side**

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

'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

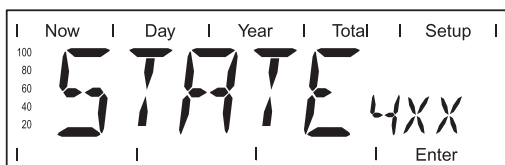
'DC LOW' (307)

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

* Service code 303 and 304 are shown briefly under certain circumstances. A brief display of the service codes 303 and 304 does not mean there is a fault.

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

409

No +15V supply available for the control electronics

Description	The inverter does not connect to the grid.
Remedy	If status code persists: Contact a Fronius-trained service technician

410

Service plug was not inserted in its original position

Description	2-pole plug inserted in the wrong socket.
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	If the status code persists, you should contact a Fronius-trained service technician, or remove excess solar modules so DC voltage fits within inverter limits. If 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 PCB 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

PCB 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

434

Ground fault detected

Description	Inverter is blocked from feeding energy into the grid.
Remedy	Remove the ground fault in your photovoltaic system Change GFDI fuse

446

Internal communication error with the NL-MON plug-in card

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

447

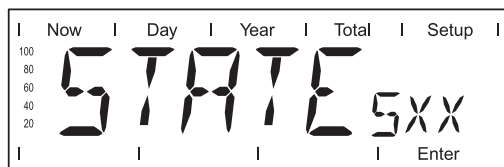
GFDI stopped grid monitoring

Description	If it is possible, your inverter will resume the power feeding operation after successfully completing another attempt to connect
Remedy	If status code persists: Contact a Fronius-trained service technician

448

The neutral conductor N is not connected

Description	The inverter disconnects from the grid for safety reasons.
Remedy	If status code persists: Contact a Fronius-trained service technician

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 service code is acknowledged by pressing a key (the inverter, however, continues working normally in the background).

- press any key
- error message disappears

501

One of the two fans is defective

Description	Low power generation because the temperature in the unit is too high.
Remedy	If status code persists: Contact a Fronius-trained service technician

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 metering 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

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

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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

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

Appendix

Technical Data

Fronius IG 2000

Input data

Recommended PV power	1500 - 2500 Wp
MPP voltage range	150 - 400 V DC
Max. input voltage (at 1000 W/m ² / 14 °C in an open circuit)	500 V DC
Nominal input voltage	280 V
Nominal input current	7.2 A
Max. input current	13.6 A
Max. array short circuit current	25 A

Output data

Nominal output power (P_{nom})	1800 W
P_{nom} at +122 °F (50 °C)	1800 W
Max. output power	2000 W
Nominal AC output voltage	240 V
Grid voltage tolerance	+10 / -12 %
Operating AC voltage range default,	212 - 264 V
Adjustment range for voltage,	180 - 270 V
Voltage trip limit accuracy	± 1.5 % of nominal value
Nominal output current	7.5 A AC
Number of phases	1
Maximum continuous utility backfeed current *	0 A
Synchronization in-rush current *	0 A
Maximum output fault current / duration	8.35 A / 60 ms
Nominal output frequency	20 A
Operating frequency range	60 Hz
Adjustment range for frequency	59.3 - 60.5 Hz
Frequency trip limit accuracy	57.0 - 60.5 Hz
Frequency clearing times	± 0.02 Hz
Harmonic distortion	< 5 %
Power factor (at nominal output power)	1

* assured by electrical design of the inverter

General data

Maximum efficiency	95.2 %
Night consumption	< 0.15 W
Consumption during operation	7 W
Cooling	Controlled forced ventilation
Degree of protection	NEMA 3R
Unit dimensions w x h x d	18.5 x 16.33 x 8.71 in. 470 x 418 x 223 mm
Weight	26 lbs. 11.8 kg
Permissible ambient temperature (with 95% rel. humidity)	-13 °F - +122 °F - 25 °C - +50 °C

Safety equipment

Ground fault protection	internal GFDI (Ground Fault Detector/Interrupter)
Islanding protection	integrated
Protection against reverse polarity	integrated
Over temperature	output power derating / active cooling

Fronius IG 3000

Input data

Recommended PV power	2000 -3300 Wp
MPP voltage range	150 - 400 V DC
Max. input voltage (at 1000 W/m ² / 14 °C in an open circuit)	500 V DC
Nominal input voltage	280 V
Nominal input current	10.0 A
Max. input current	18 A
Max. array short circuit current	25 A

Output data

Nominal output power (P _{nom})	2500 W *
P _{nom} at +122 °F (50 °C)	2000 W
Max. output power	2700 W
Nominal AC output voltage	240 V
Grid voltage tolerance	+10 / -12 %
Operating AC voltage range default,	212 - 264 V
Adjustment range for voltage,	180 - 270 V
Voltage trip limit accuracy	± 1.5 % of nominal value
Nominal output current	10.4 A AC
Number of phases	1
Maximum continuous utility backfeed current **	0 A
Synchronization in-rush current **	0 A
Maximum output fault current / duration	11.25 A / 60 ms
Nominal output frequency	20 A
Operating frequency range	60 Hz
Adjustment range for frequency	59.3 - 60.5 Hz
Frequency trip limit accuracy	57.0 - 60.5 Hz
Frequency clearing times	± 0.02 Hz
Harmonic distortion	< 5 %
Power factor (at nominal output power)	1

* Valid to 104 °F (40 °C) when DC operating voltage is above 200 V

** assured by electrical design of the inverter

General data

Maximum efficiency	95.2 %
Night consumption	< 0.15 W
Consumption during operation	7 W
Cooling	Controlled forced ventilation
Degree of protection	NEMA 3R
Unit dimensions w x h x d	18.5 x 16.33 x 8.71 in. 470 x 418 x 223 mm
Weight	26 lbs. 11.8 kg
Permissible ambient temperature (with 95% rel. humidity)	-13 °F - +122 °F - 25 °C - +50 °C

Safety equipment

Ground fault protection	internal GFDI (Ground Fault Detector/Interrupter)
Islanding protection	integrated
Protection against reverse polarity	integrated
Over temperature	output power derating / active cooling

Fronius IG 2500-LV
Input data

Recommended PV power	1800 -3000 Wp
MPP voltage range	150 - 400 V DC
Max. input voltage (at 1000 W/m ² / 14 °C in an open circuit)	500 V DC
Nominal input voltage	280 V
Nominal input current	8.6 A
Max. input current	16.9 A
Max. array short circuit current	25 A

Output data

Nominal output power (P _{nom})	2150 W *
P _{nom} at +122 °F (50 °C)	2000 W
Max. output power	2350 W
Nominal AC output voltage	208 V
Grid voltage tolerance	+10 / -12 %
Operating AC voltage range default,	183 - 229 V
Adjustment range for voltage,	180 - 240 V
Voltage trip limit accuracy	± 1.5 % of nominal value
Nominal output current	10.4 A AC
Number of phases	1
Maximum continuous utility backfeed current **	0 A
Synchronization in-rush current **	0 A
Maximum output fault current / duration	11.25 A / 60 ms
Nominal output frequency	20 A
Operating frequency range	60 Hz
Adjustment range for frequency	59.3 - 60.5 Hz
Frequency trip limit accuracy	57.0 - 60.5 Hz
Frequency clearing times	± 0.02 Hz
Harmonic distortion	< 5 %
Power factor (at nominal output power)	1

* Valid to 104 °F (40 °C) when DC operating voltage is above 200 V

** assured by electrical design of the inverter

General data

Maximum efficiency	94.4 %
Night consumption	< 0.15 W
Consumption during operation	7 W
Cooling	Controlled forced ventilation
Degree of protection	NEMA 3R
Unit dimensions w x h x d	18.5 x 16.33 x 8.71 in. 470 x 418 x 223 mm
Weight	26 lbs. 11.8 kg
Permissible ambient temperature (with 95% rel. humidity)	-13 °F - +122 °F - 25 °C - +50 °C

Safety equipment

Ground fault protection	internal GFDI (Ground Fault Detector/Interrupter)
Islanding protection	integrated
Protection against reverse polarity	integrated
Over temperature	output power derating / active cooling

Fronius IG 4000

Input data

Recommended PV power	3000 -5400 Wp
MPP voltage range	150 - 400 V DC
Max. input voltage (at 1000 W/m ² / 14 °C in an open circuit)	500 V DC
Nominal input voltage	280 V
Nominal input current	16.3 A
Max. input current	26.1 A
Max. array short circuit current	40 A

Output data

Nominal output power (P _{nom})	4000 W
P _{nom} at +122 °F (50 °C)	4000 W
Max. output power	4000 W
Nominal AC output voltage	240 V
Grid voltage tolerance	+10 / -12 %
Operating AC voltage range default,	212 - 264 V
Adjustment range for voltage,	180 - 270 V
Voltage trip limit accuracy	± 1.5 % of nominal value
Nominal output current	16.7 A AC
Number of phases	1
Maximum continuous utility backfeed current *	0 A
Synchronization in-rush current *	0 A
Maximum output fault current / duration	16.7 A / 60 ms
Nominal output frequency	30 A
Operating frequency range	60 Hz
Adjustment range for frequency	59.3 - 60.5 Hz
Frequency trip limit accuracy	57.0 - 60.5 Hz
Frequency clearing times	± 0.02 Hz
Harmonic distortion	< 5 %
Power factor (at nominal output power)	1

* assured by electrical design of the inverter

General data

Maximum efficiency	95.2 %
Night consumption	< 0.15 W
Consumption during operation	15 W
Cooling	Zwangsbelüftung
Degree of protection	NEMA 3R
Unit dimensions w x h x d	28.34 x 16.46 x 8.78 in. 720 x 418 x 223 mm
Weight	41.8 lbs. 19 kg
Permissible ambient temperature (with 95% rel. humidity)	-13 °F - +122 °F - 25 °C - +50 °C

Safety equipment

Ground fault protection	internal GFDI (Ground Fault Detector/Interrupter)
Islanding protection	integrated
Protection against reverse polarity	integrated
Over temperature	output power derating / active cooling

Fronius IG 5100

Input data

Recommended PV power	4000 - 6300 Wp
MPP voltage range	150 - 400 V DC
Max. input voltage (at 1000 W/m ² / 14 °C in an open circuit)	500 V DC
Nominal input voltage	280 V
Nominal input current	20.8 A
Max. input current	33.2 A
Max. array short circuit current	40 A

Output data

Nominal output power (P _{nom})	5100 W *
P _{nom} at +122 °F (50 °C)	4200 W
Max. output power	5100 W
Nominal AC output voltage	240 V
Grid voltage tolerance	+10 / -12 %
Operating AC voltage range default,	212 - 264 V
Adjustment range for voltage,	180 - 270 V
Voltage trip limit accuracy	± 1.5 % of nominal value
Nominal output current	21.3 A AC
Number of phases	1
Maximum continuous utility backfeed current **	0 A
Synchronization in-rush current **	0 A
Maximum output fault current / duration	21.3 A / 60 ms
Nominal output frequency	30 A
Operating frequency range	60 Hz
Adjustment range for frequency	59.3 - 60.5 Hz
Frequency trip limit accuracy	57.0 - 60.5 Hz
Frequency clearing times	± 0.02 Hz
Harmonic distortion	< 5 %
Power factor (at nominal output power)	1

* Valid to 104 °F (40 °C) when DC operating voltage is above 200 V

** assured by electrical design of the inverter

General data

Maximum efficiency	95.2 %
Night consumption	< 0.15 W
Consumption during operation	15 W
Cooling	Controlled forced ventilation
Degree of protection	NEMA 3R
Unit dimensions w x h x d	28.34 x 16.46 x 8.78 in. 720 x 418 x 223 mm
Weight	41.8 lbs. 19 kg
Permissible ambient temperature (with 95% rel. humidity)	-13 °F - +122 °F - 25 °C - +50 °C

Safety equipment

Ground fault protection	internal GFDI (Ground Fault Detector/Interrupter)
Islanding protection	integrated
Protection against reverse polarity	integrated
Over temperature	output power derating / active cooling

Fronius IG 4500-LV
Input data

Recommended PV power	3600 -5500 Wp
MPP voltage range	150 - 400 V DC
Max. input voltage (at 1000 W/m ² / 14 °C in an open circuit)	500 V DC
Nominal input voltage	280 V
Nominal input current	18.3 A
Max. input current	29.3 A
Max. array short circuit current	40 A

Output data

Nominal output power (P _{nom})	4500 W *
P _{nom} at +122 °F (50 °C)	4200 W
Max. output power	4500 W
Nominal AC output voltage	208 V
Grid voltage tolerance	+10 / -12 %
Operating AC voltage range default,	183 - 229 V
Adjustment range for voltage,	180 - 240 V
Voltage trip limit accuracy	± 1.5 % of nominal value
Nominal output current	21.6 A AC
Number of phases	1
Maximum continuous utility backfeed current **	0 A
Synchronization in-rush current **	0 A
Maximum output fault current / duration	21.6 A / 60 ms
Nominal output frequency	30 A
Operating frequency range	60 Hz
Adjustment range for frequency	59.3 - 60.5 Hz
Frequency trip limit accuracy	57.0 - 60.5 Hz
Frequency clearing times	± 0.02 Hz
Harmonic distortion	< 5 %
Power factor (at nominal output power)	1

* Valid to 104 °F (40 °C) when DC operating voltage is above 200 V

** assured by electrical design of the inverter

General data

Maximum efficiency	94.4 %
Night consumption	< 0.15 W
Consumption during operation	15 W
Cooling	Controlled forced ventilation
Degree of protection	NEMA 3R
Unit dimensions w x h x d	28.34 x 16.46 x 8.78 in. 720 x 418 x 223 mm
Weight	41.8 lbs. 19 kg
Permissible ambient temperature (with 95% rel. humidity)	-13 °F - +122 °F - 25 °C - +50 °C

Safety equipment

Ground fault protection	internal GFDI (Ground Fault Detector/Interrupter)
Islanding protection	integrated
Protection against reverse polarity	integrated
Over temperature	output power derating / active cooling

Field adjustable trip points

Field adjustable trip points	208 V	240 V
Nominal AC output voltage, Line-to-Line, [V]	208	240
Operating AC voltage range default, Line-to-Line, [V]	183-229	212-264
Adjustment range for voltage, Line-to-Line, [V]	180-240	180-270
Voltage trip limit accuracy Line-to-Line, [% of nominal value]	± 1,5	± 1,5
Nominal output frequency [Hz]	60	60
Operating frequency range [Hz]	59.3-60.5	59.3-60.5
Adjustment range for frequency [Hz]	57.0-60.5	57.0-60.5
Frequency trip limit accuracy, [Hz]	± 0,02	± 0,02
Reconnect time, [s]	305	305
Adjustment range for reconnect time, [s]	1-999	1-999
Operating AC voltage range Line-to-Neutral, [V]	106 - 132	106 - 132
Adjustment range for voltage Line-to-Neutral, [V]	60 - 144	60 - 144
Voltage trip limit accuracy Line-to-Neutral, [% of nominal value]	± 1,5	± 1,5

Relevant standards and directives

- UL 1741
- IEEE 1547
- IEEE 1547.1
- ANSI/IEEE C62.41
- FCC Part 15 A & B
- NEC Article 690
- C22. 2 No. 107.1-01 (September 2001)

Warranty and Disposal

Fronius Manufacturer's Warranty

Detailed warranty terms and conditions specific to your country can be found online: www.fronius.com/solar/warranty

To take advantage of the full warranty duration for your newly installed Fronius inverter or accumulator, register your product at: www.solarweb.com.

Disposal

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



Certificate of Compliance

Certificate: 1878274

Master Contract: 203213

Project: 2365464

Date Issued: December 23, 2010

Issued to: Fronius International GmbH

Guenter Fronius Strasse 1

Wels-Thalheim, 4600

Austria

Attention: Mr. Christian Ing. Lehner

The products listed below are eligible to bear the CSA Mark shown with adjacent indicators 'C' and 'US' for Canada and US or with adjacent indicator 'US' for US only or without either indicator for Canada only.



Rob Hempstock

Issued by: Rob Hempstock, ASCT.

PRODUCTS

CLASS 5311 09 - POWER SUPPLIES - Distributed Generation Power Systems Equipment

CLASS 5311 89 - POWER SUPPLIES - Distributed Generation - Power Systems Equipment
- Certified to U.S. Standards

Utility Interactive Inverter, Models IG 2000 NEG, IG 2000 POS, IG 3000 NEG, IG 3000 POS, IG 2500-LV NEG, IG 2500-LV POS, IG 4000 NEG, IG 4000 POS, IG 5100 NEG, IG 5100 POS, IG 4500-LV NEG, and IG 4500-LV POS, permanently connected.

For details related to rating, size, configuration, etc., reference should be made to the CSA Certification Record, the Descriptive Report or Attachment A.

Notes:

1. All models meet the surge requirements of IEEE C62.41.2-2002, Location Category B (6kV). Tests were performed using ring wave and combination waveforms, both polarities, for common mode and differential mode coupling, 20 pulses each test. After surge testing the units were operational with control functionally verified by frequency and voltage disconnect tests.

APPLICABLE REQUIREMENTS



Certificate: 1878274

Master Contract: 203213

Project: 2365464

Date Issued: December 23, 2010

CSA-C22.2 No. 107.1-01 - General Use Power Supplies

*UL Std No. 1741-Second Edition - Inverters, Converters, Controllers and Interconnection System Equipment for Use With Distributed Energy Resources

*Note: Conformity to UL 1741-Second Edition (January 28, 2010) includes compliance with applicable requirements of IEEE 1547 and IEEE 1547.1



Letter of Attestation

Document: 2361219

Master Contract: 203213

Project: 2594468

Date Issued: March 18, 2013

Issued to: Fronius International GmbH
Guenter Fronius Strasse 1
Wels-Thalheim, 4600
Austria

CSA Group, Certification and Testing hereby confirms that it has completed an evaluation of Inverter Integral 5% Meter Performance for the following Utility Interactive Photovoltaic Inverters:

Models IG 2000 NEG, IG 2000 POS, IG 3000 NEG, IG 3000 POS, IG 2500-LV NEG, and IG 2500-LV POS, IG 4000 NEG, IG 4000 POS, IG 5100 NEG, IG 5100 POS, IG 4500-LV NEG, and IG 4500-LV POS.

Models Fronius IG Plus 3.0-1 UNI, Fronius IG Plus 3.8-1 UNI, SunPower SPR-3300f, SunPower SPR-4000f, Fronius IG Plus 5.0-1 UNI, Fronius IG Plus 6.0-1 UNI, Fronius IG Plus 7.5-1 UNI, SunPower SPR-6500f, SunPower SPR-8000f, Fronius IG Plus 10.0-1 UNI, Fronius IG Plus 11.4-1 UNI, Fronius IG Plus 12.0-3 WYE277, Fronius IG Plus 11.4-3 Delta and SunPower SPR-12000f.

Models Fronius IG Plus V 3.0-1 UNI, Fronius IG Plus A 3.0-1 UNI, Fronius IG Plus V 3.8-1 UNI, Fronius IG Plus A 3.8-1 UNI, SPR-3301f-1 UNI, SPR-3301f-A-1 UNI, SPR-3801f-1 UNI, SPR-3801f-A-1 UNI, Fronius IG Plus V 5.0-1 UNI, Fronius IG Plus A 5.0-1 UNI, Fronius IG Plus V 6.0-1 UNI, Fronius IG Plus A 6.0-1 UNI, Fronius IG Plus V 7.5-1 UNI, Fronius IG Plus A 7.5-1 UNI, SPR-6501f-1 UNI, SPR-6501f-A-1 UNI, SPR-7501f-1 UNI, SPR-7501f-A-1 UNI, SPR-10001f-1 UNI, SPR-10001f-A-1 UNI, Fronius IG Plus V 10.0-1 UNI, Fronius IG Plus A 10.0-1 UNI, Fronius IG Plus V 11.4-1 UNI, Fronius IG Plus A 11.4-1 UNI, SPR-11401f-1 UNI, SPR-11401f-A-1 UNI, Fronius IG Plus V 12.0-3 WYE277, Fronius IG Plus A 12.0-3 WYE277, Fronius IG Plus V 11.4-3 Delta, Fronius IG Plus A 11.4-3 Delta, SPR-11401f-3 208/240 Delta, SPR-11401f-A-3 208/240 Delta, SPR-12001f-3-277WYE and SPR-12001f-A-3-277WYE.

Models Fronius CL 33.3 Delta, Fronius CL 44.4 Delta, Fronius CL 55.5 Delta, Fronius CL 36.0 WYE277, Fronius CL 48.0 WYE277 and Fronius CL 60.0 WYE277.

CSA Group, Certification and Testing hereby attests that the product identified above and described in CSA reports 1878274, 2065918, 2308317, and 2308316 complies with the following standards/tests, to the extent applicable:



Certificate: 2361219

Master Contract: 203213

Project: 2594468

Date: March 18, 2013

The testing of the subject inverters were completed according to the following sections of the California Public Utilities Commission California Solar Initiative Program Handbook, June 2010, entitled Appendix C: Inverter Integral 5% Meter Performance Specification and Test Requirements.

- *Test 1: No Load Test*
- *Test 2: Load Performance Test*
- *Test 3: Effect of Variation of Voltage*
- *Test 4: Effect of Variation of Frequency*
- *Test 5: Effect of Internal Heating*
- *Test 6: Stability of Performance (Self Certified by Client)*
- *Test 7: Independence of Elements*
- *Test 8: Insulation*
- *Test 9a: Voltage Interruptions from Short Circuits*
- *Test 9b: Voltage Interruptions from Loss of Control*
- *Test 10: Effect of High Voltage Line Surges*
- *Test 11: Effect of Variation of Ambient Temperature*
- *Test 12: Electrical Fast/Transient Burst*
- *Test 13: Effect of electrical oscillatory Surge Withstand Capabilities (SWC) Test*
- *Test 14: Effect of Radio Frequency Interference (N/A, meets FCC Part 15 Compliance)*
- *Test 15: Effect of Frequency Conducted and Radiated Emission (N/A, meets FCC Part 15 Compliance)*
- *Test 16: Effect of Electrostatic Discharge (ESD)*
- *Test 17: Effect of Operating Temperature*
- *Test 18: Effect of Relative Humidity*

Notes:

1. For summary of test set up and test results refer to CSI Meter Attestation Report and Appendix A.
2. The above inverter models are CSA Certified to Standard UL1741 2nd Edition and are currently listed on the CEC Eligible Inverter Listings.

Issued by:

Rob Hempstock, AScT

THIS LETTER OF ATTESTATION DOES NOT AUTHORIZE THE USE OF THE CSA MARK ON THE SUBJECT PRODUCTS.

QUOTATIONS FROM THE TEST REPORT OR THE USE OF THE NAME OF THE CANADIAN STANDARDS ASSOCIATION AND CSA GROUP OR ITS REGISTERED TRADEMARK, IN ANY WAY, IS NOT PERMITTED WITHOUT PRIOR WRITTEN CONSENT OF THE CANADIAN STANDARDS ASSOCIATION OPERATING AS CSA GROUP, CERTIFICATION AND TESTING DIVISION.

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