# Fronius CL 36.0 / 48.0 / 60.0 WYE277
# Fronius CL 33.3 / 44.4 / 55.5 DELTA

EN-US

Operating Instructions

Inverter for grid-connected photovoltaic systems

42,0426,0083,EA 008-11022014

# Dear Fronius Customer,



**Introduction**

Thank you for choosing Fronius - and congratulations on your new, high-quality, high-tech Fronius product. This introduction should provide you with general information about the equipment. Please read it carefully to learn about the many great features of your new Fronius product. This is the best way to get the most out of all the advantages that it has to offer.

Please also note the safety information and the safety precautions for the product installation location. Following all product instructions will ensure long-lasting quality and reliability. And these are the essential ingredients for outstanding results.

# IMPORTANT SAFETY INSTRUCTIONS
# SAVE THESE INSTRUCTIONS

**General**

This manual contains important instructions for the Fronius CL, that must be followed during installation and maintenance of the inverter.

The Fronius CL 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 Fronius CL.
To reduce the risk of personal injury and to ensure the safe installation and operation of the Fronius CL, 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 different 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 Fronius inverter and/or other equipment connected to the Fronius inverter or personal injury.

**Electrical installations**

All electrical installations must be made 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.

# Safety Instructions



**Explanation of Safety Warnings!**

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

**„WARNING!“** indicates a potentially dangerous situation. Death or serious injury may result if appropriate precautions are not taken.

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

**NOTE!** Indicates a situation which could adversely affect work results and may cause damage to equipment.

**„Important“** Highlights 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**

This equipment has been manufactured using state-of-the-art technology and in accordance with general safety regulations. However, incorrect operation or misuse may endanger:
- the life and well-being of the operator or third parties
- the equipment and other property of the owner/operator
- the efficient operation of the equipment.

All persons involved with equipment startup, service and maintenance must:
- be suitably qualified
- be familiar with electrical installations
- have completely read and followed these operating instructions

The operating instructions must be available at the equipment location at all times. In addition to the operating instructions, all applicable local rules and regulations regarding accident prevention and environmental protection must also be followed.

All safety instructions and warning signs on the equipment itself:
- must be maintained in legible condition
- must not be damaged
- must not be removed
- must not be covered or painted over

For information about where the safety instructions and warning signs are located on the equipment, please refer to the “General“ section of your equipment’s operating instructions.

Any equipment malfunctions which might impair safety must be remedied immediately before the device is turned on.

**Your safety is at stake.**

**Intended Use**

The equipment may only be operated in compliance with its intended use.

Any other purpose does not constitute intended use. The manufacturer is not responsible for any damages resulting from unintended use.

Intended use also includes:
- reading and complying with all general information as well as safety information and warnings from the operating instructions
- compliance with all inspection and maintenance requirements
- installation as per operating instructions

Where appropriate, the following guidelines should also be applied:
- Utility company regulations regarding grid feed-in
- Information from solar module manufacturer

**Ambient Conditions**

Operation and/or storage of the device outside of the stipulated range does not constitute intended use. The manufacturer is not responsible for any damages resulting from unintended use.

Please refer to the technical data in your operating instructions for information about permitted ambient conditions.

**Qualified Personnel**

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

All cables and wires must be secured, undamaged, insulated and adequately dimensioned. Loose connections, scorched, damaged or under-dimensioned cables and wires must be repaired immediately by an authorized specialist.

Maintenance and repair may only be carried out by an authorized specialist.

The use of third-party parts does not guarantee that they were designed and manufactured according to operational demands and safety requirements. Use only original spare parts (also applies to standard parts).

Do not carry out any alterations, installations or modifications to the device without first obtaining the manufacturer's permission.

Immediately replace any components that are not in perfect condition.

**Safety Precautions at Equipment Location**

When installing devices with air vents, make sure that cool air can flow freely through the vents unobstructed. The device should only be operated in accordance with the protection class listed on the rating plate.

**Information on Noise Emission Values**

The inverter generates a maximum sound power level of <80dB(A) (ref. 1pW) at full-load operation according to IEC 62109-1.

The cooling of the device takes place via an electronic temperature control system at the lowest possible noise level and depends on the power used, ambient temperature and the soiling level of the device, etc.

A workplace-related emissions value cannot be provided for this device because the actual noise level that occurs depends strongly on the installation situation, the grid quality, the surrounding walls and the general properties of the space.

**EMC Device Classifications**

Devices in emission class A:
- Are only designed for use in industrial settings
- Can cause grid-bound and radiated interference in other areas

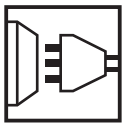
Devices in emission class B:
- Satisfy the emissions criteria for residential and industrial areas. This is also true for residential areas in which the energy is supplied from the public low-voltage grid.

EMC device classification as per the rating plate or technical data

**EMC Precautions**

In special cases, there may still be interference for the specified application area despite maintaining standardized emission limit values (e.g. when sensitive equipment is located at the setup location or when the setup location is near radio or television receivers).
In this case, the operator is obliged to take proper action to rectify the situation.

**Grid connection**



Devices with a high output (> 16 A) can influence the voltage quality of the grid due to a high current input into the main supply.
This can affect several device types in the form of:
- Connection limitations
- Requirements regarding permitted mains impedance *)
- Requirements regarding minimum required short circuit power *)

*) for each interface to the public grid

See technical data

In this case, the operator or the user of the device must make sure whether or not the device may be connected, if necessary by contacting the power supply company.

**Electrical Installations**

Electrical installations may only be carried out in accordance with relevant national and local standards and regulations.

**ESD Precautions**

Danger of damage to electronic components due to electrostatic discharge. Take appropriate ESD precautions when replacing and installing components.

**Safety Precautions in Normal-Operation**

The device should only be operated when all safety equipment is fully functional. If safety equipment is not fully functional, there is a danger to:

- the life and well-being of the operator or third parties
- the equipment and other property of the owner/operator
- the efficient operation of the equipment

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 equipment.

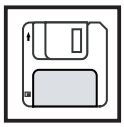
**Safety Markings**

Equipment with the CE marking fulfils the basic requirements of the Guideline Governing Low-Voltage and Electromagnetic Compatibility. (For more information, please see the attachment and/or the “Technical Data“ section in your documentation).

**Disposal**

This device should not be disposed of in residential waste.
To comply with 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 find an approved collection and recycling facility in your area.
Ignoring this EU Directive may have adverse affects on the environment and your health.

**Data Security**



The user is responsible for backing up data relating to changes made to factory settings. The manufacturer will not accept liability if personal settings are deleted.

**Copyright**

The manufacturer maintains the copyright to these operating instructions.

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. We would be grateful for any comments or suggestions regarding improvements and/or error corrections for the operating instructions.

# Table of Contents

# 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.
- 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 provide a maximum level of safety during both installation and 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 (e.g., grid switch-off, interruption), your inverter will immediately stop operating and interrupt the supply of power into the grid.

Grid monitoring take place through:
- monitoring voltage
- monitoring frequency
- monitoring islanding conditions

**Information about Field Adjustable Trip Points**

The inverter is equipped with field adjustable trip points. For further information, please contact Fronius technical support at: 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 positive or negative conductor of the PV array is grounded in the inverter via a fuse. If a ground fault occurs in the DC wiring, the inverter disconnects from the grid.

**Standards and Regulations**

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

- UL1741
- IEEE 1547
- IEEE 1547.1
- ANSI/IEEE C62.41
- C22.2 No. 107.1-01
- FCC Part 15 B

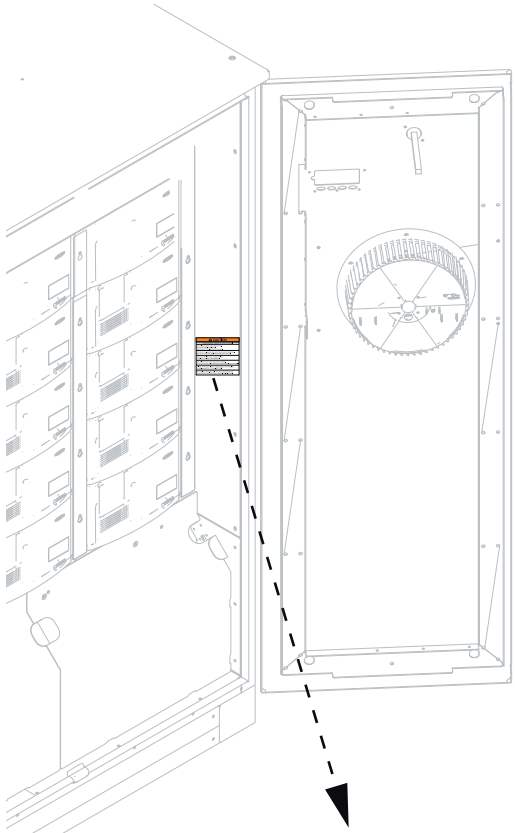
The ground-fault detection and interruption comply with the NEC 690 building code requirements.

**Product Listings and Compliance**

The respective conformity declarations can be found in the appendix to these operating instructions.

**Warning notices affixed to the device**

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



**WARNING! / AVERTISSEMENT !**

**Risk of Electric Shock!**

Do not remove cover. No user serviceable parts inside. Refer servicing to qualified service personnel. Both AC and DC voltage sources are terminated inside this equipment. Each circuit must be individually disconnected before servicing.

When the photovoltaic array is exposed to light, it supplies DC voltage to this equipment. Risk of electric shock from energy stored in capacitor. After disconnecting all sources of supply, wait 5 minutes before removing cover.

**Grounded System:** Normally grounded conductors may be ungrounded and energized when a ground fault is indicated.

**Ungrounded System:** The DC lines of this PV system are not grounded and may be energized.

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**Risque de choc électrique !**

Ne pas ouvrir le coffret. Aucun élément internede l'appareil ne peut être réparé par l'utilisateur. Pour l'assistance faire appel à du personnel qualifié. À l'intérieur de l'appareil, on retrouve les 2 tensions AC et DC. Chaque circuit doit être déconnecté avant chaque réparation ou entretien.

Lorsque le panneau photovoltaïque est exposé à la lumière, il fournit une tension DC à cet appareil. Risque d'électrocution dû à l'énergie stockée dans les condensateurs. Ne pas ouvrir le coffret durant 5 minutes après la déconnexion électrique totale.

**Système mis à la terre** : Lorsqu'un défaut de terre est indiqué, il est possible que des conducteurs normalement mis à la terre ne le soient plus et setrouvent sous tension.

**Système non mis à la terre** : Les câbles CC de ce système photovoltaïque ne sont pas mis à la terre et peuvent être sous tension.

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# Use in accordance with "intended purpose"

**Use in accordance with "intended purpose"**

The Fronius CL solar inverter is designed exclusively to convert direct current from solar modules into alternating current and feed this power into the public grid. The following are deemed not in accordance with the intended purpose:

- Use for any other purpose, or in any other manner
- Alternations to the Fronius CL that are not expressly recommended by Fronius
- Installation of parts that are not expressly recommended or sold by Fronius

The manufacturer is not responsible for any damages resulting from unintended use. In addition, no warranty claims will be entertained.

Use in accordance with the "intended purpose" also includes:

- following all the instructions in these operating instructions
- carrying out all the specified inspection and servicing work

**Field of application**

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

**Photovoltaic system stipulations**

The inverter is designed exclusively to be connected and used with solar modules. Use with other DC generators (e.g., wind generators) is not permitted.

When configuring the photovoltaic system, make sure that all photovoltaic system components are operating completely within their permitted operating range.

All measures recommended by the solar module manufacturer for maintaining solar module properties must be followed.

# Operating Principle

**Fully Automatic Operational Management**

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

**The MIX™ Concept**

MIX = Master Inverter X-change

In the MIX concept, several smaller power stage sets operate instead of one large power stage set:

- When irradiance is low, only 1 - 3 power stage sets turn on in the inverter.
- In this way, the power stage sets operate in a higher partial-load range than a large power stage set.
- The energy can then be converted more efficiently, thus significantly increasing the efficiency.
- The control software alternately assigns the “master power stage set” function to all the power stage sets.
- When irradiance is high, the other power stage sets switch on in sets of 3.
- The “master power stage set” coordinates and controls the operation of the other power stage sets.
- Operating hours per power stage set are decreased, and the service life of the power stage sets is increased along with the yield for partial-load operation.

**Reliability**

The MIX concept ensures a high degree of reliability due to the number of independent power stage sets:
if one power stage set fails, the remaining power stage sets take over for it. Thus energy losses are limited and only occur when irradiance is high.

**Power Derating**

If there is insufficient heat dissipation despite 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.

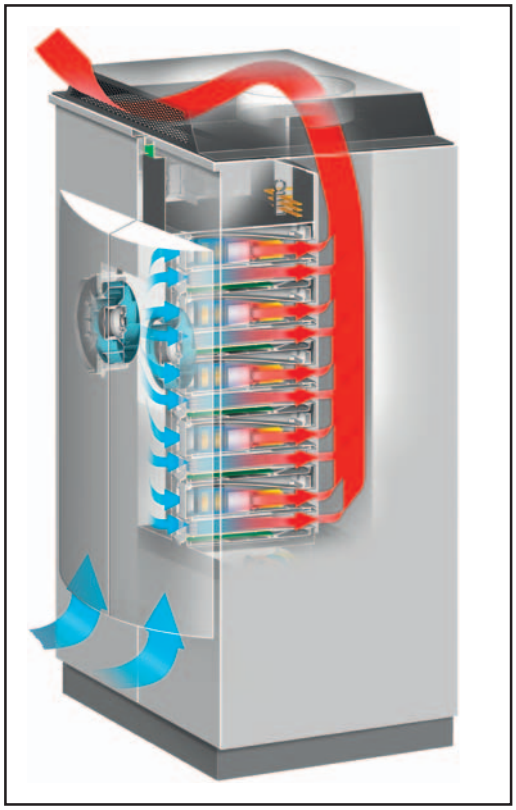
Derating the power reduces the output of the inverter for a short period sufficient to ensure that the temperature will not exceed the permitted limit.
Your inverter will remain ready for operation as long as possible without any interruption.

**Forced Ventilation**

The inverter is cooled through forced ventilation via 2 temperature-controlled fans mounted in the doors. The air drawn in at the front flows into a closed channel through the individual racks containing the power stage sets and then is discharged out the top.
The closed air channel ensures that the power stage sets do not come into contact with the outside air. This ensures that the power stage sets do not get dirty.
The fan speed and the temperature of the supply air are monitored.

The power stage sets are hermetically sealed and have their own fans for circulating the air in the power stage set racks.

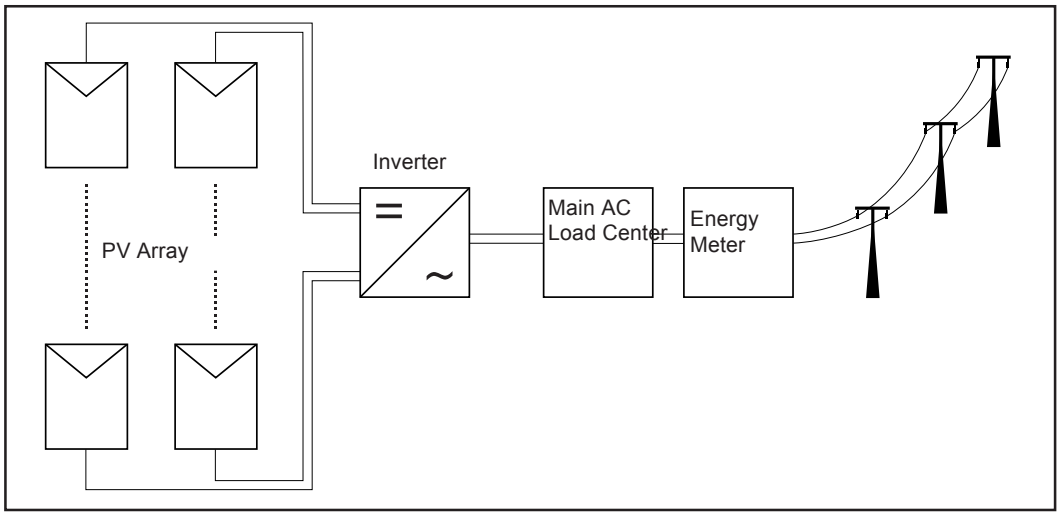
The inverter's speed-controlled fans with ball bearing support ensure:
- optimal inverter cooling
- higher efficiency
- cooler components, thus improving service life
- lowest possible energy consumption and noise level



# The Fronius CL Unit in the PV System

**General**

The Fronius CL 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 into AC current
- Fully automatic operation management
- Display function and data communication

**Converting DC into 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.

**Display function and data communication**

The display on the inverter is the interface between the inverter and the operator. The display has a user-friendly design.

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

**Data Communications Components**

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

- Fronius Datalogger Card / Box
- Fronius Datalogger Web
- Fronius Sensor Card / Box
- Fronius Interface Card / Box
- Fronius String Control 250/25

Data communications components are available as plug-in cards or versions with an external housing. Depending on the version, the inverter can accommodate up to 2 option cards in addition to the standard Fronius Com Card.

**Fronius Com Card**

The Fronius Com Card enables the inverter to communicate with other inverters or external data communications components such as Datalogger, String Controls or third party system monitoring devices.

**Fronius Modbus Card**

The Fronius Modbus Card is a system upgrade used to retrieve data from an inverter via the Modbus protocol.
The Modbus protocol is a master/slave architecture-based communication protocol. The Fronius Modbus Card communicates with the Modbus Master using register addresses.
The Fronius Modbus Card comes standard with the inverter.

Detailed information about the Fronius Modbus Card according to the enclosed "Fronius Modbus Card" operating instructions.

**Fronius Datalogger**

The Fronius Datalogger is used to record and manage data from a photovoltaic system using a PC.

**Fronius Sensor Card / Box**

The Fronius Sensor Card / Box is used to integrate various sensors into Solar Net (e.g., for temperature, irradiance).

**Fronius Interface Card and Fronius Interface Card easy**

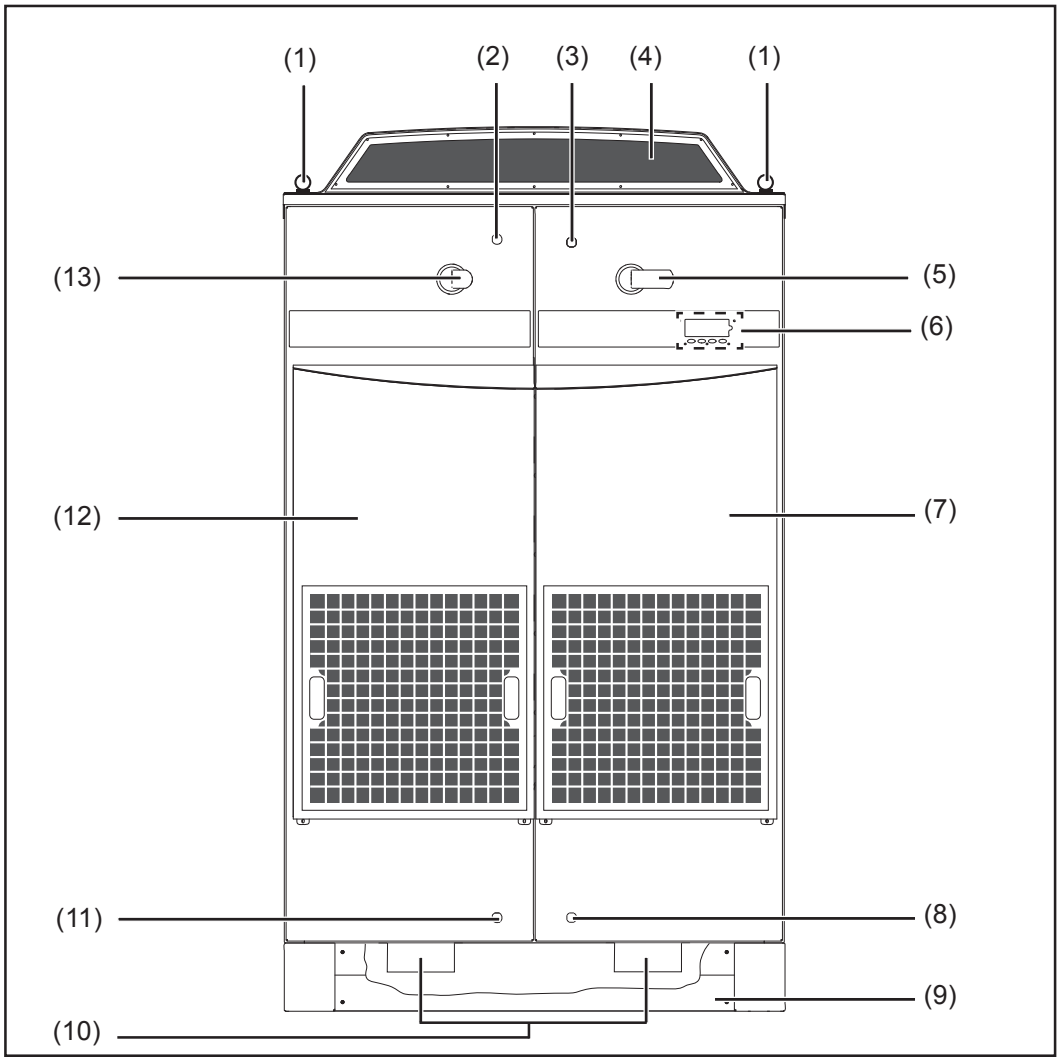
The Fronius Interface Card and the Fronius Interface Card easy are RS 232 interfaces for transmitting various kinds of system data in an open protocol format.

**Fronius String Control 250/25**

The Fronius String Control 250/25 is used to combine and monitor solar module strings.

# Inverter Product Description

**Inverter Product Description (doors closed)**

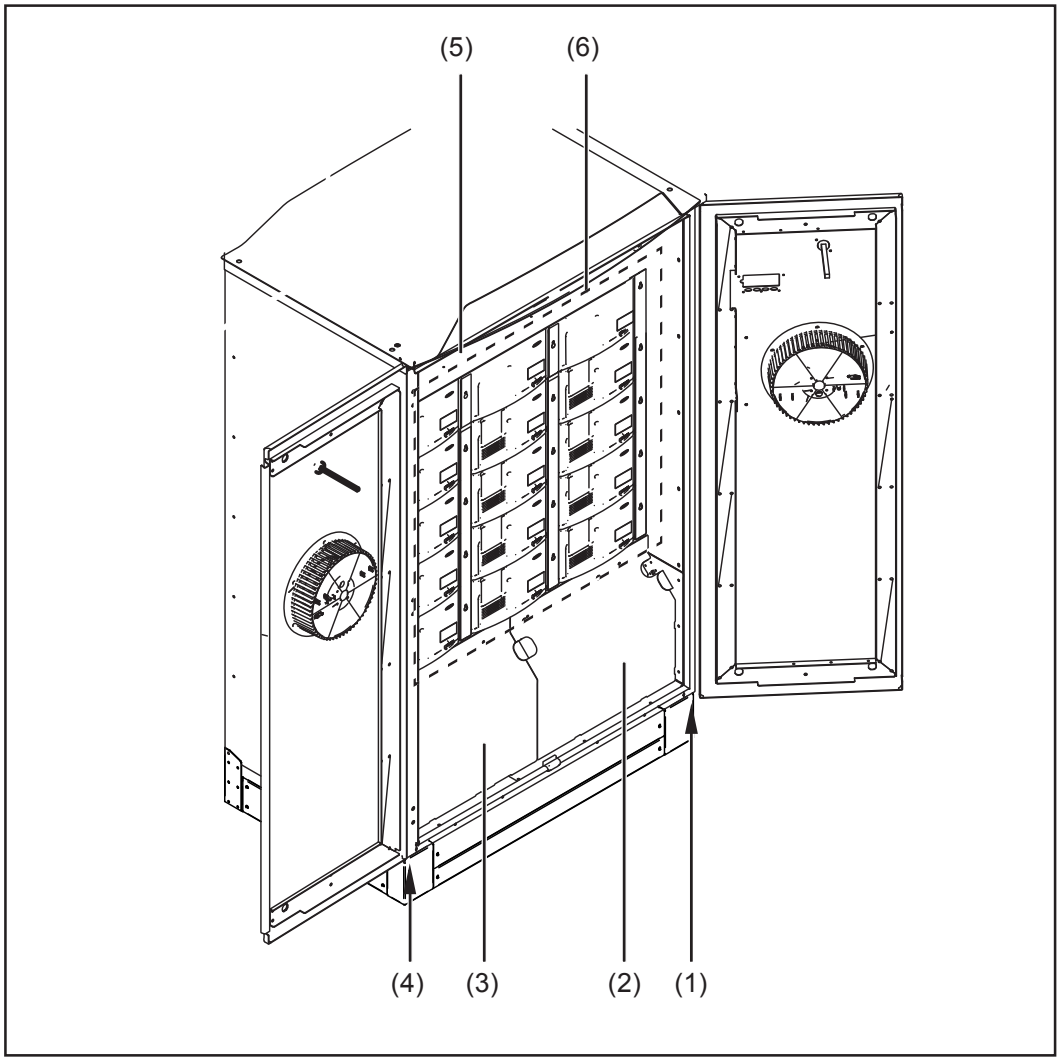



| Item | Description |
|---|---|
| (1) | Ring bolt for transporting by crane (4 x) |
| (2) | Door latch top left |
| (3) | Door latch top right (can be locked) |
| (4) | Exhaust air hood |
| (5) | DC main switch, can be locked when turned off<br><br>**Important!** The doors cannot be opened when the DC main switch is turned on. |
| (6) | Control units (display, keys, Operating Status LED) |
| (7) | Fan cover right |
| (8) | Door latch bottom right (can be locked) |
| (9) | Mounting base with removable side parts<br>Height 5.91 in. (150 mm) |
| (10) | Fork pockets for forklift |
| (11) | Door latch bottom left |

**Closed Inverter Product Description**
(continued)

| Item | Description |
|---|---|
| (12) | Fan cover left |
| (13) | AC main switch, can be locked when turned off<br><br>**Important!** The doors cannot be opened when the AC main switch is turned on. |

**Inverter Product Description (doors opened)**

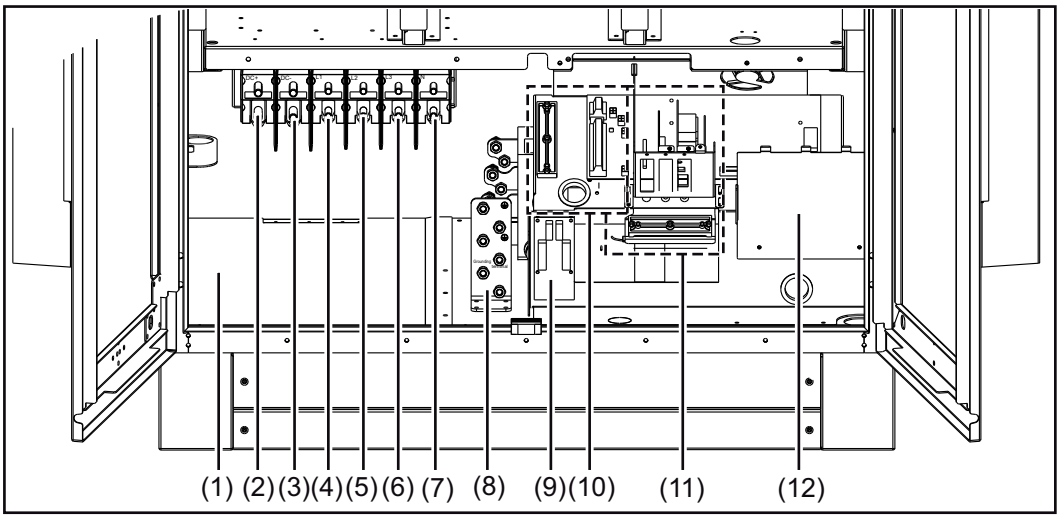



| Item | Description |
|---|---|
| (1) | Door catch right |
| (2) | Cover right |
| (3) | Cover left |
| (4) | Door catch left |
| (5) | Cover top |
| (6) | Power stage set racks (max. 15) |

- The connection area for AC and DC is located under the left cover.
- The connection area for data communication and other options is located under the right cover.

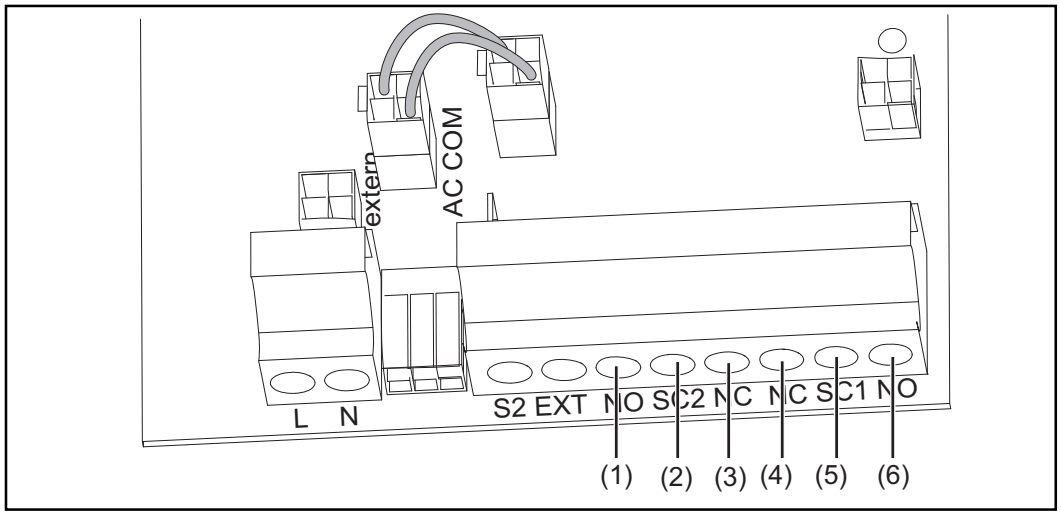
# Connection Area Product Description

**Connection Area Product Description**




| Item | Description |
|---|---|
| (1) | Base cover |
| (2) | DC+ terminal |
| (3) | DC- terminal |
| (4) | AC terminal - phase conductor L1 |
| (5) | AC terminal - phase conductor L2 |
| (6) | AC terminal - phase conductor L3 |
| (7) | AC terminal - neutral conductor N |
| (8) | Ground terminal (e.g., for grid grounding, grounding electrode, (equipment grounding, etc.) |
| (9) | Fuse holder for grounding solar modules either at the positive or at the negative pole |
| (10) | 2 isolated relay contacts, e.g., for connecting and controlling external ventilation:<br>- with terminals<br>- with a strain-relief device |
| (11) | Option area<br>- with standard Fronius Modbus Card for data communication via Modbus RTU Protocol<br>- with a strain-relief device<br><br>Fronius CL - WYE277:<br>- with 2 free slots for option cards<br><br>Fronius CL - DELTA<br>- with 1 free slot for an option card<br>- with standard NL-MON plug-in card |
| (12) | Holder for an option box (e.g., Fronius Datalogger Box) |

**Terminals in the Area of the Isolated Relay Contact**




| Item | Description |
|---|---|
| (1) | NO = normally open contact for relay contact 2 |
| (2) | SC2 = relay contact 2 |
| (3) | NC = break contact for relay contact 2 |
| (4) | NC = break contact for relay contact 1 |
| (5) | SC1 = relay contact 1 |
| (6) | NO = normally open contact for relay contact 1 |

NO = normaly open NC = normaly closed SC = switch contact

Cable cross-section: AWG 16 - AWG 6
Terminal tightening torque: 0.86 - 1.11 ft. lb.
Max. current per relay output: AC max. 277 V / 10 A, DC max. 24 V / 10 A

For assigning various functions to the relay contacts see chapter ‘Installation and Startup’, section ‘Setting Relais Contact Functions’.

**Installation and Connection Accessories**

The inverter comes with several installation and connection accessories in a plastic bag fixed near the bottom to the left inverter side wall.

- 5 x metric screw M5 x 10 mm ($^{3}/_{8}$ in.)
- 5 x metric screw M5 x 16 mm ($^{1}/_{16}$ in.)
- 20 x metric hexagon nut M10, wrench size 17 mm ($^{7}/_{64}$ in.)
- 20 x two-part securing washer NL 10, outside diameter 16.6 mm ($^{3}/_{32}$ in.), pairwise pre-assembled
- 6 x metric hexagon nut M12, wrench size 19 mm ($^{3}/_{16}$ in.)
- 6 x two-part securing washer NL 12, outside diameter 19.5 mm ($^{13}/_{64}$ in.), pairwise pre-assembled
- 2 x copper ring, diameter 13 and 25 x 9.7 mm ($^{33}/_{64}$ and $^{63}/_{64}$ x $^{3}/_{8}$ in.)
- 8 x copper spacer
- 2 x fuse KLKD 30
- 1 x fuse KLKD 3
- 1 x lead through DG 36

# Choosing the Location

**Choosing the Location in General**

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

The inverter is designed for installation both indoors and outdoors.

NEMA 3R protection means that the inverter is not susceptible to water spray from any direction. However, Fronius recommends that the inverter not be exposed to direct moisture or to a direct water jet (e.g., from sprinklers).

**Criteria for Location Selection**

| |
|---|
| Only set up on a firm, flat, level and fireproof surface |
| Max. ambient temperatures: -13 °F / 122 °F (-25 °C / +50 °C) |
| Height above sea level: up to 6562 ft. (2000 m) |
| Keep a min. side distance of 8.5 in. (216 mm) between each inverter or anything to the right or left of the inverters such as walls or DC and AC disconnects. |
| When installing more than one inverter, keep a distance of 1 in. (25.4 mm) between each inverter. |
| The distance between the upper edge of the inverter and the ceiling must be at least 8 in. (200 mm). |
| The air flow direction within the inverter is from front to top (cold air intake front, hot air exit top). |
| When installing the inverter in a closed space, it is necessary to ensure that the hot air that develops will be discharged by forced ventilation. |

**Unsuitable Locations**

Do not install the inverter:
- in areas with large amounts of dust
- in areas with a large amount of conducting dust particles (e.g., iron filings)
- in areas with corrosive gases, acids or salts
- in areas where there is an increased risk of accidents caused by farm animals (horses, cattle, sheep, pigs, etc.)
- in stables or adjoining areas
- in storage areas for hay, straw, chaff, animal feed, fertilizers, etc.
- in storage or processing areas for fruit, vegetables or winegrowing products
- in areas used in the preparation of grain, green fodder or animal feeds
- in greenhouses

# Transport

**Transport**

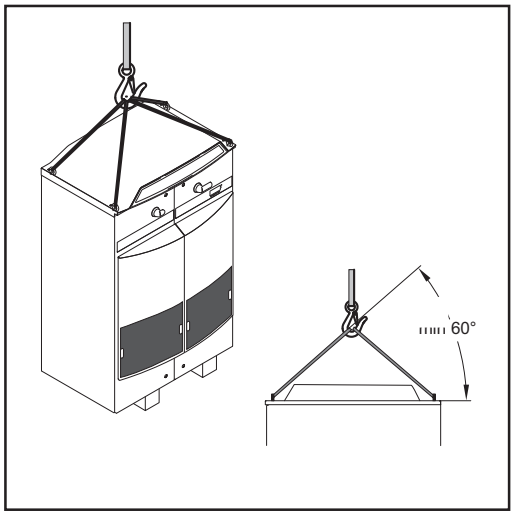
Any transportation equipment used to transport the inverter must be designed to accommodate the weight of the inverter:

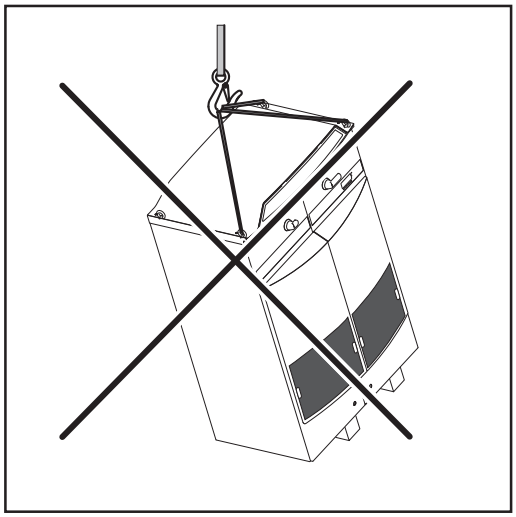
Fronius CL 33.3 DELTA / 36.0 WYE277 ..... 661.00 lbs. (300 kg)
Fronius CL 44.4 DELTA / 48.0 WYE277 ..... 721.00 lbs. (327 kg)
Fronius CL 55.5 DELTA / 60.0 WYE277 ..... 783.00 lbs. (353 kg)

The inverter can be transported as follows:
- using a crane at the ring bolts
- using a crane and forks
- using a forklift or lift truck
- manually

**Crane Transport Using the Ring Bolts**

**WARNING!** Falling devices can be deadly. When transporting the inverter by crane
- Use all 4 ring bolts when transporting by crane
- Select a length for the sling gear (chains, rope, straps, etc.) so that the angle between the sling gear and the horizontal is at least 60°.

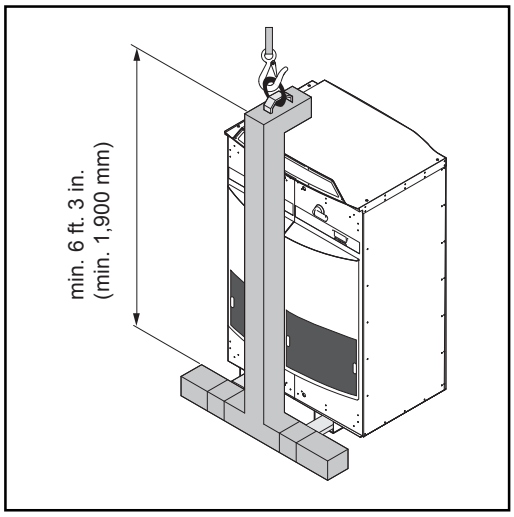


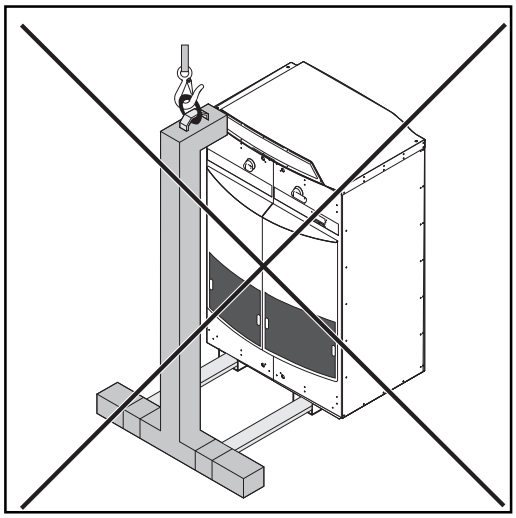



### Crane Transport Using Forks

**WARNING!** Falling devices can be deadly. When transporting the inverter by crane using forks

- The forks must have a clearance height of at least 6 ft. 3 in. (approx. 1,900 mm)
- Insert the forks only into the fork pockets
- The forks should always be inserted completely into the fork pockets
- Secure the inverter so that it cannot slide off of the forks



### Transport Using a Forklift or Lift Truck

**WARNING!** Falling or toppling devices can be deadly.

- Insert the forks of the forklift or lift truck only into the fork pockets
- The forks should always be inserted completely into the fork pockets
- Secure the inverter so that it cannot slide off of the forks
- Do not turn, brake, or accelerate in a sudden, jerking manner

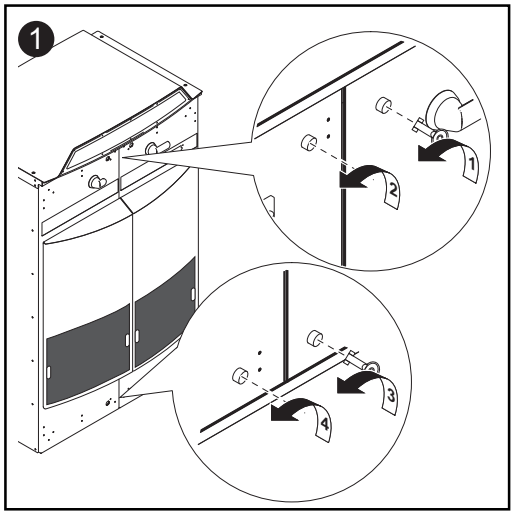
### Manual Transport

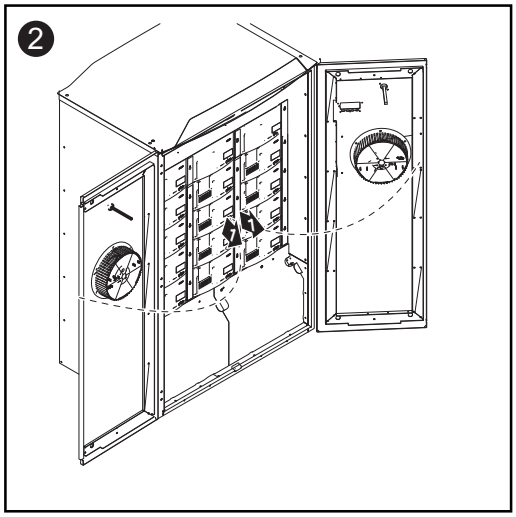
The inverter can also be transported manually if a crane, forklift or lift truck cannot be used.

**NOTE** At least 4 adults are required to manually transport the inverter. Fronius recommends that you remove the power stage sets from the inverter to reduce its weight for manual transport.

# Removing Power Stage Sets

**Opening the Fronius CL**

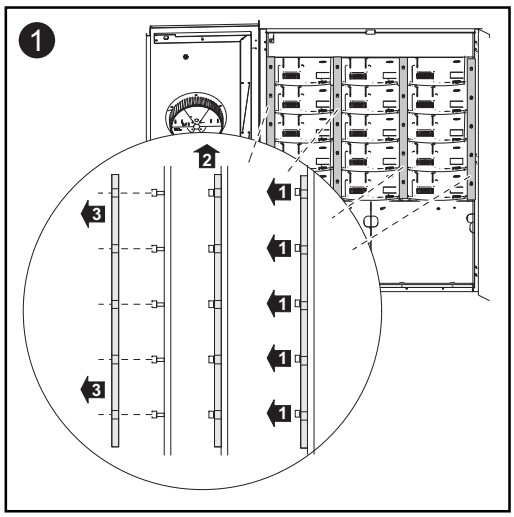


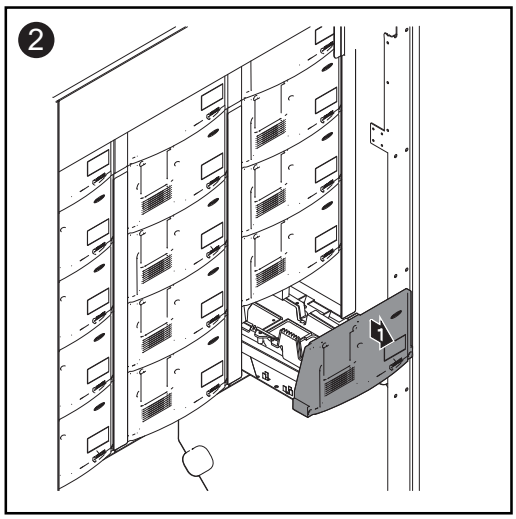

**Removing Power Stage Sets**

**WARNING!** An electrical shock can be fatal. Danger from grid voltage and DC voltage from solar modules.
Do not remove power stage sets under load. Before removing power stage sets, make sure that the AC and DC main switches are turned off in the device interior.

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




- *Unscrew the screws at the 4 rails (4 x 5 screws)*
- *Remove the 4 rails*




- *Remove the power stage sets*

# Requirements for Installing the Fronius CL

**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.

**Using the Mounting Base**

The inverter mustn't be installed or taken in operation without mounting base .
The mounting base with a height of 5.9 in. (150 mm) is primarily used for inverter cabling.

**Use of aluminum wires**

The AC- and DC-side terminals are designed for connecting single-wire, round, aluminum wires.

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

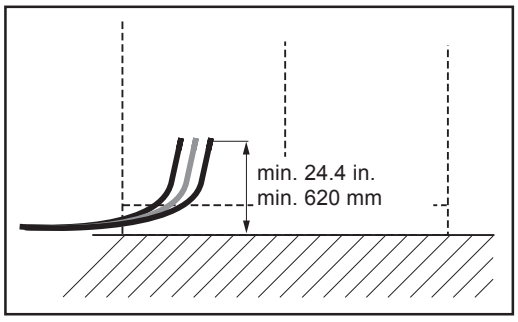
**Inverter Cabling**

For sizing AC and DC cables see section ‘Cross Section of AC and DC Wires’ in these operating instructions.

**NOTE** Only use water tight conduit fittings and conduits for inverter cabling. Conduit fittings and conduits are not included with the inverter.

AC and DC wires as well as data communication cables and grounding cables can be fed into the inverter as follows:
- From the side over the mounting base
- From below

**Side Cabling**

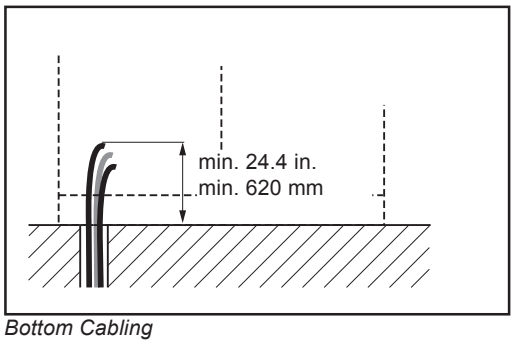



*Side Cabling*

**NOTE** Side cabling is only permitted over the mounting base. Do not make any cable input openings on the side walls of the inverter.

**Bottom Cabling**

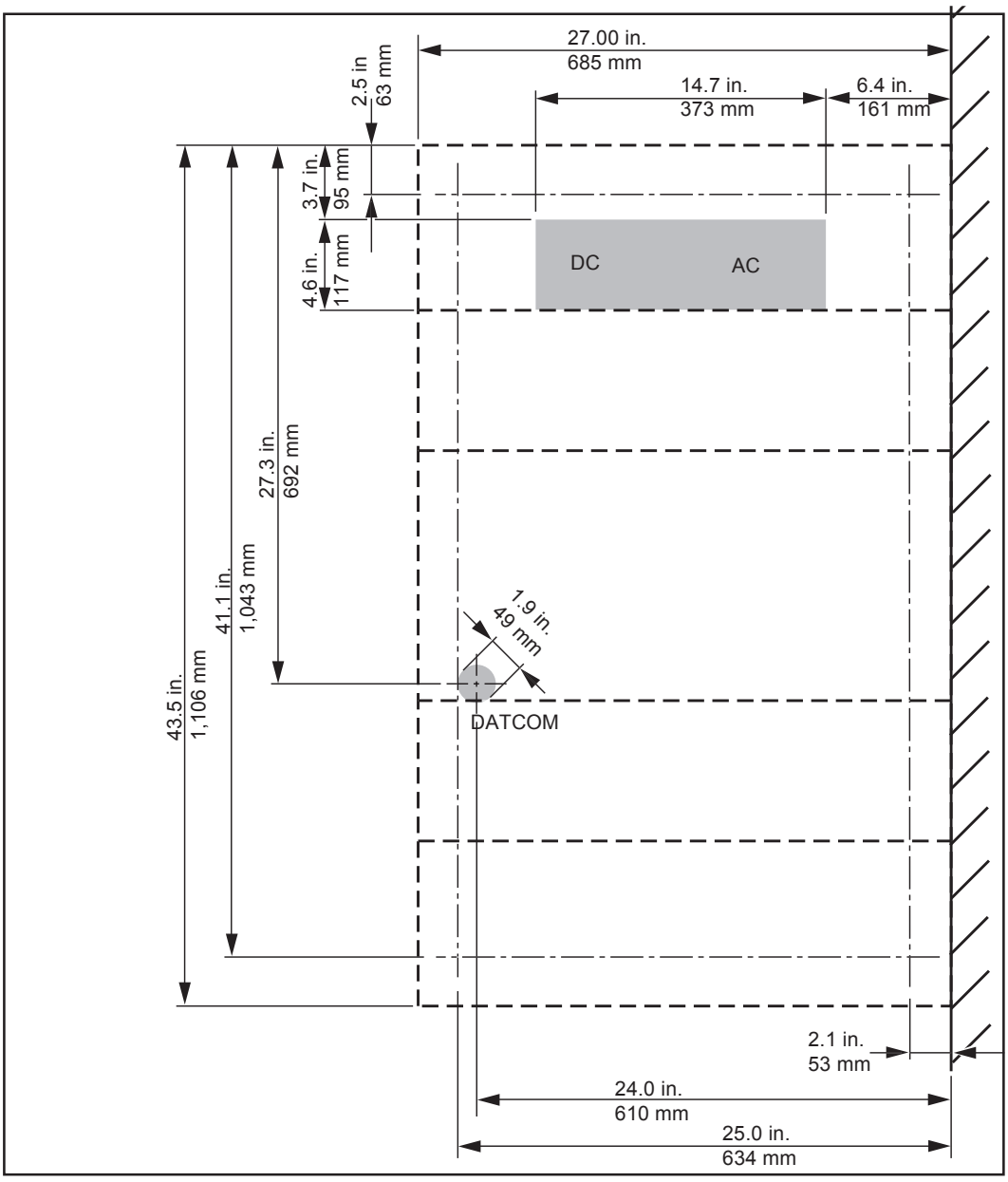
- All AC and DC cables, grounding cables and data communictaion cables to be connected must protrude out of the base at least 24.4 in. (620 mm) before inverter setup.
- If possible, data communications cables for connecting option cards should also protrude out of the base.
- Cables must be positioned as per the „Space Requirement (Top View)“ illustration so that there will be sufficient space for setting up the inverter.




*Bottom Cabling*

Legend for “Space Requirement (Top View)“ illustration:

- Area for cabling
- Outline of inverter
- Drilling pattern for fixing the mounting base



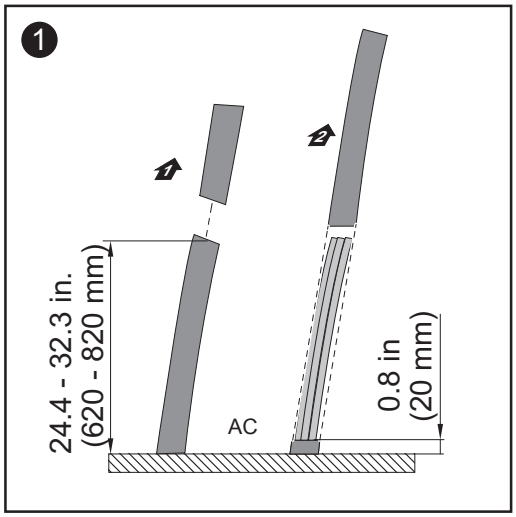

*Space Requirement (Top View)*

# Fronius CL Installation

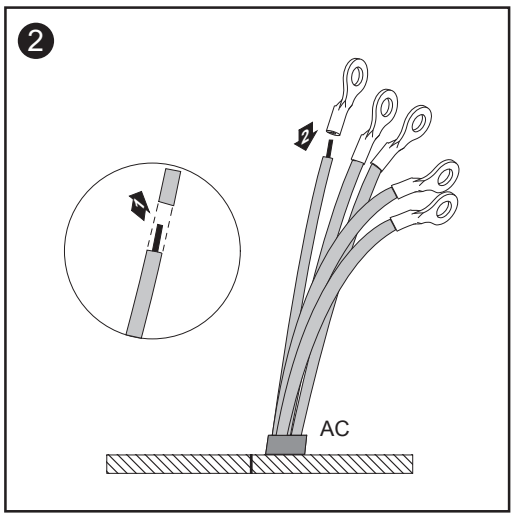
**Safety**

**WARNING!** Toppling or falling devices can be deadly. Install the inverter on a level and stable surface.

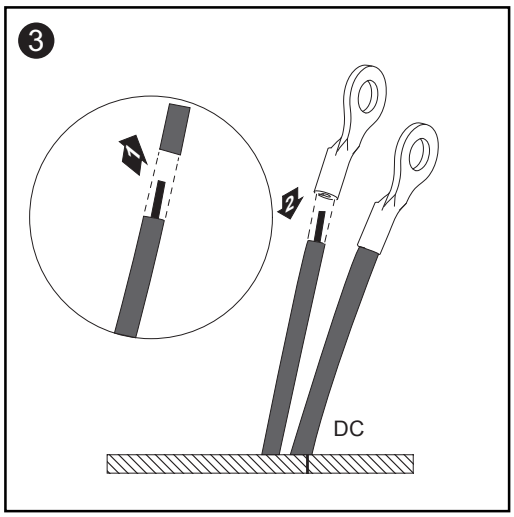
**Preparing AC and DC Wires**




- Cut the AC and DC cables as well as grounding cables so that 24.4 - 32.3 in. (620 - 820 mm) protrudes from the base
- Strip the AC cable so that approx. 0.8 in. (20 mm) of the insulation remains



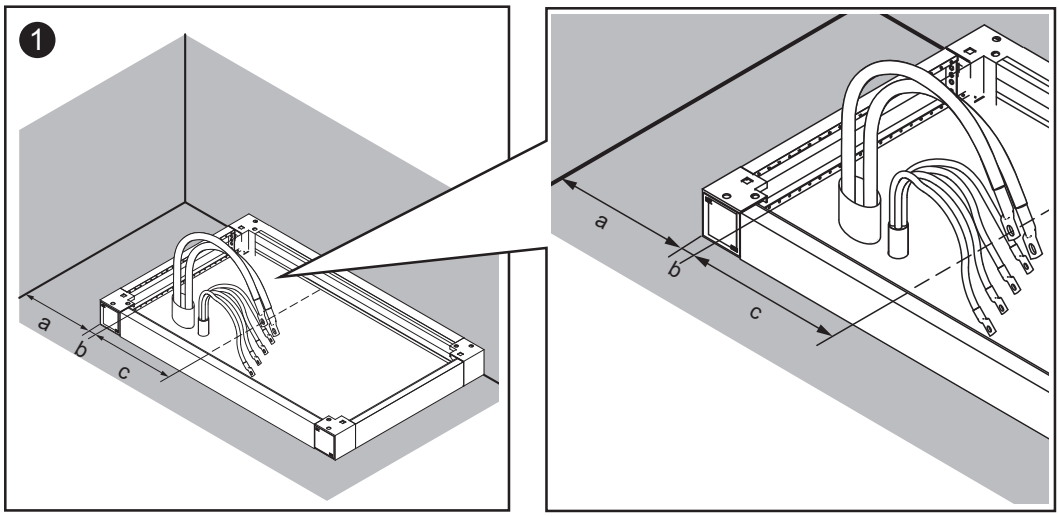

- Strip AC wires and grounding cables
- Attach the cable lugs




- Strip DC wires and DC grounding cables
- Attach the cable lugs

**Positioning the Mounting Base**

**NOTE** When positioning the mounting base, make sure that the AC and DC wires, grounding cables and data communication cables on the left are located 3.7 in. (95 mm) up to a max. of 8.4 in. (212 mm) from the left outside edge of the mounting base.




Side distance to wall:
a = min. 8.4 in
(min. 212 mm)

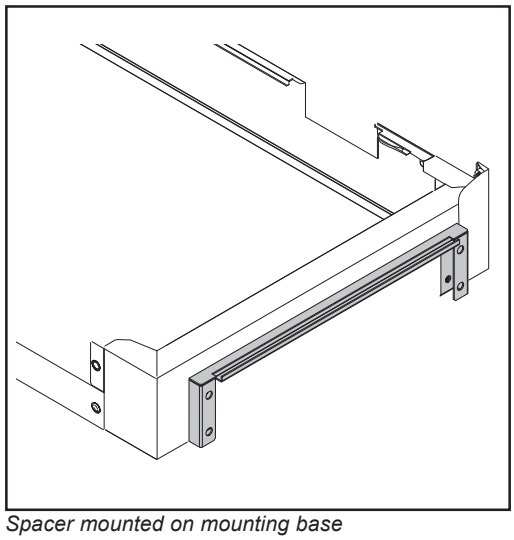
Distance:
b = 3.7 in (max. 117 mm)
(95 mm)

Area for cabling:
c = max. 4.6 in.

**Installation of several inverters**

**NOTE** When installing several inverters side by side, keep a minimum side distance of 1 in. (25.4 mm) between the inverters.

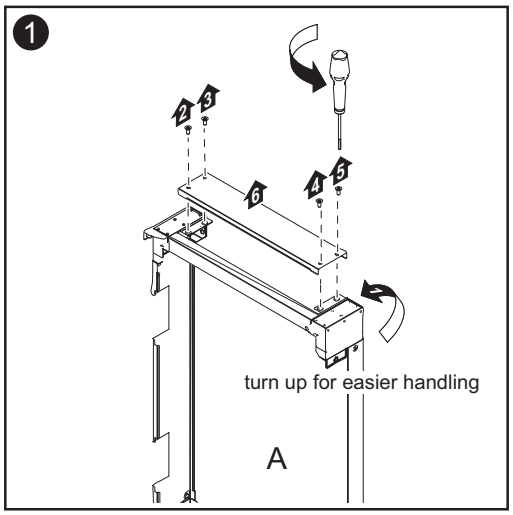
This minimum side distance is guaranteed by mounting the spacer on the inverter's optional mounting base.
The next inverter can be attached directly to the spacer of the previous inverter.

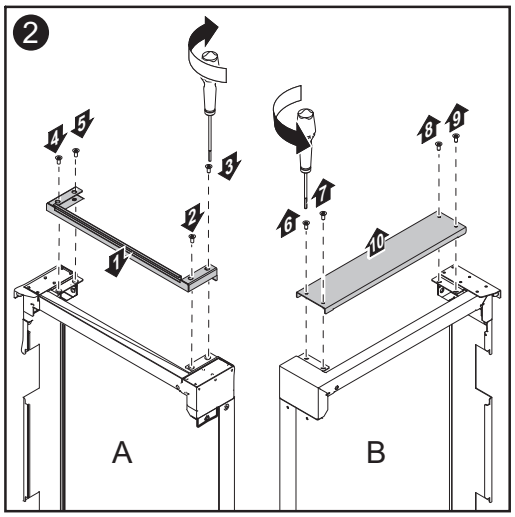


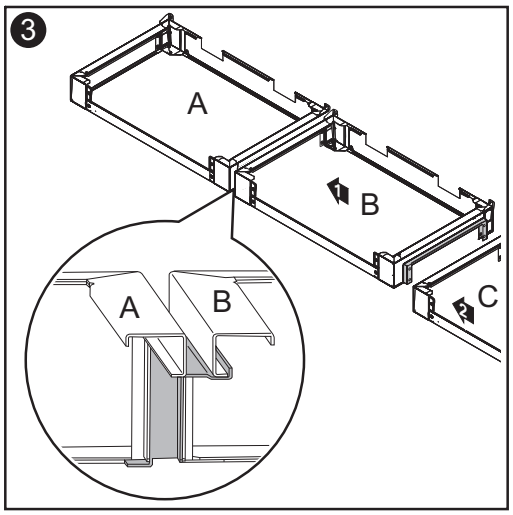
*Spacer mounted on mounting base*

The spacer is delivered with the mounting base. For mounting the spacer on the mounting base follow the work steps beside.

**Installation of several inverters**
(continued)



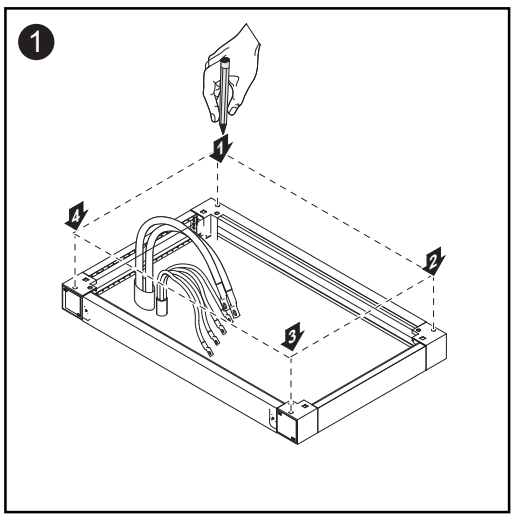



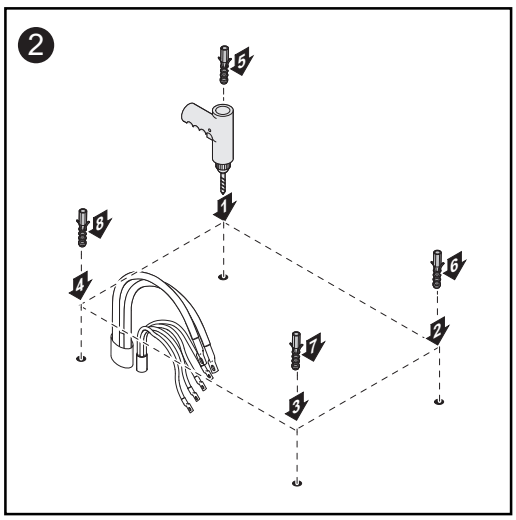




For installing the inverters back-to-back the mounting bases can be attached directly to each other.

**Important** Take care of the mounting base' front edge and back edge!

**Installing the Mounting Base**

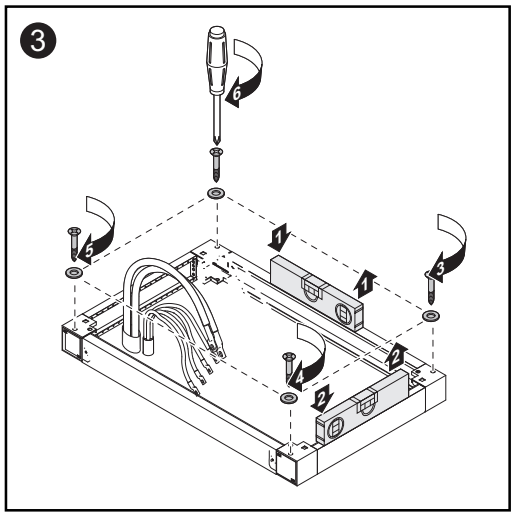


**Installing the Mounting Base** (continued)

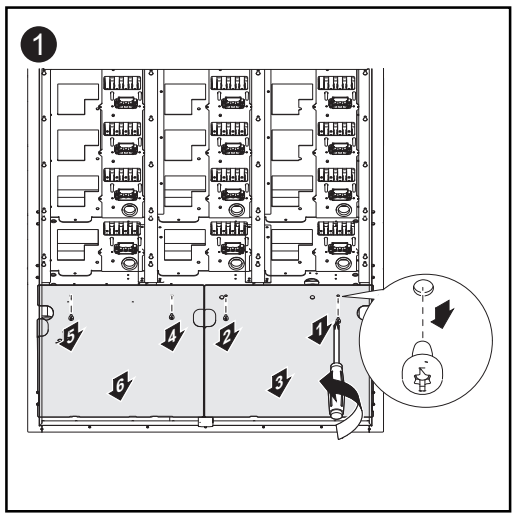
**Important** Different dowels and screws are required for installation of the mounting base depending on the surface used. Therefore, dowels and screws are not included with the inverter. The installer is responsible for selecting the proper dowels and screws.

**NOTE** To avoid warping of inverter doors, the mounting base should only be attached in a 100% level position.

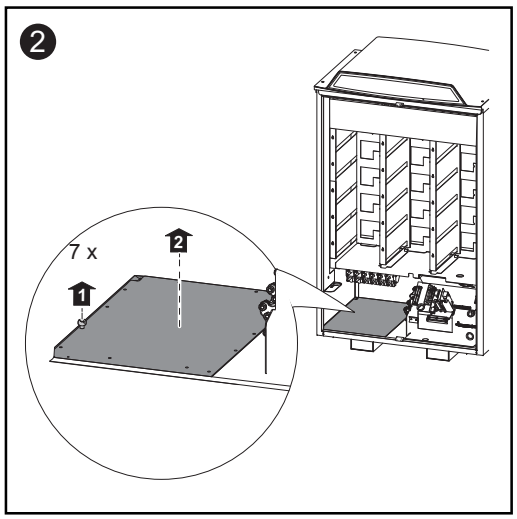



**Preparing the Fronius CL**

**CAUTION!** An inadequate grounding conductor connection can cause serious injuries to persons and damage to (or loss of) property. The screws on the covers provide an adequate grounding conductor connection for the housing ground and should not under any circumstances be replaced by other screws that do not provide a proper grounding conductor connection.




- Open inverter
- Remove 2 x 2 screws
- Remove 2 covers



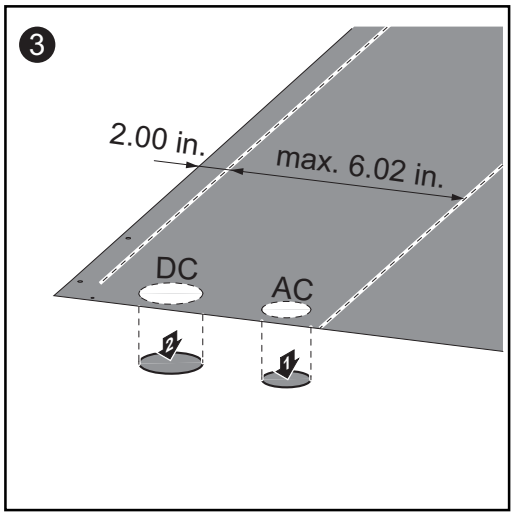

- Remove 7 screws
- Remove the base cover

**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

**Preparing the Fronius CL** (continued)

**Important** Use a suitable tool to knock out wire input openings from the base cover corresponding to the diameter of the AC and DC wires / conduits. Follow all safety instructions from the tool manufacturer.




- Knock out wire input openings for AC and DC wires, for grounding cables and data communication cabels

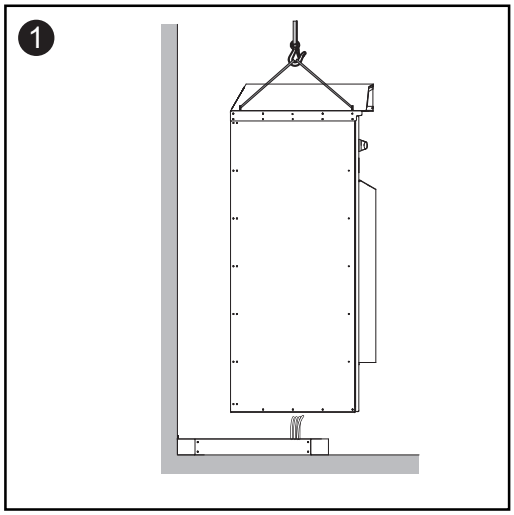
**Positioning the Fronius CL on the Mounting Base**

**WARNING!** Toppling or falling devices can be deadly. When sliding the inverter back on the mounting base, make sure that the inverter does not slip off the mounting base sideways.

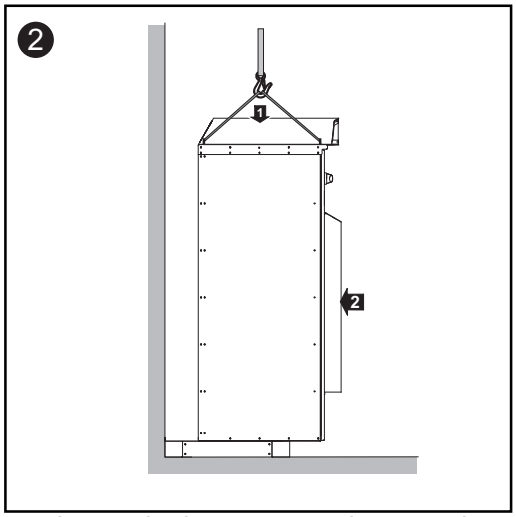
**NOTE** When positioning the inverter on the mounting base, make sure that
- The AC and DC wires, grounding cables and data communication cables are not broken, kinked, crushed or otherwise damaged in any way
- The 2 square tubes for the fork pockets are in the corresponding openings on the mounting base.

The inverter can be positioned on the mounting base as follows:
- Using a crane
- Using a crane and forks, a forklift or a lift truck
- Manually

**Positioning the Fronius CL on the Mounting Base Using a Crane**

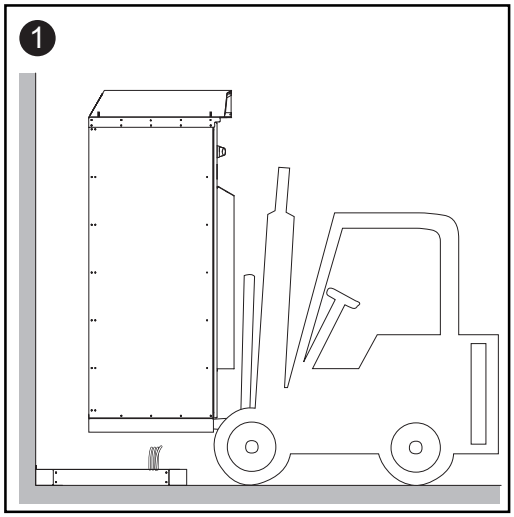



- Position the inverter over the mounting base using a crane
- Insert AC and DC wires, grounding cables and data communication cables into the inverter

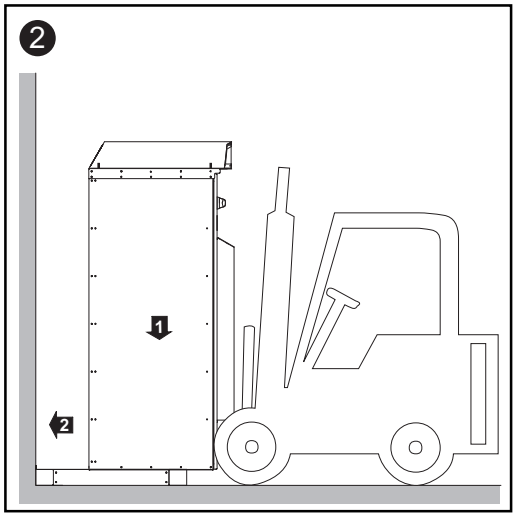



- Lower the inverter onto the mounting base
- Slide the inverter backwards until it engages at the stop

**Positioning the Fronius CL on the Mounting Base Using a Crane and Forks, a Forklift or a Lift Truck**

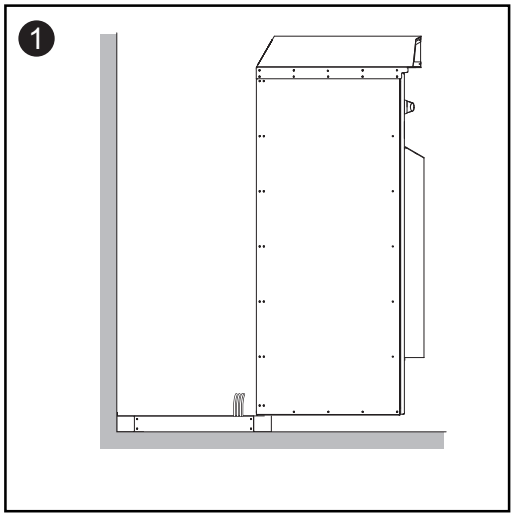



- Position the inverter over the mounting base, e.g., using a forklift
- Insert AC and DC wires, grounding cables and data communication cables into the inverter

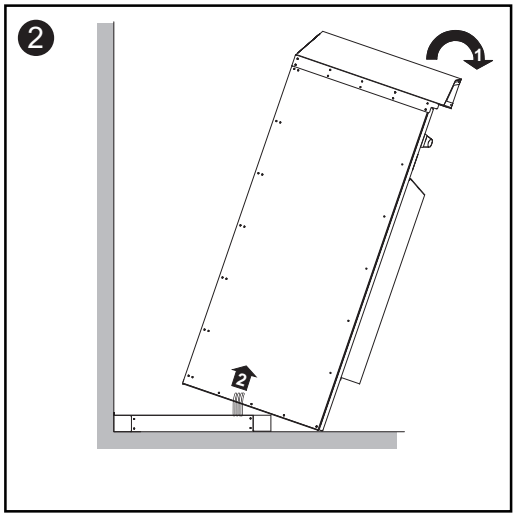



- Lower the inverter onto the mounting base
- Slide the inverter backwards until it engages at the stop

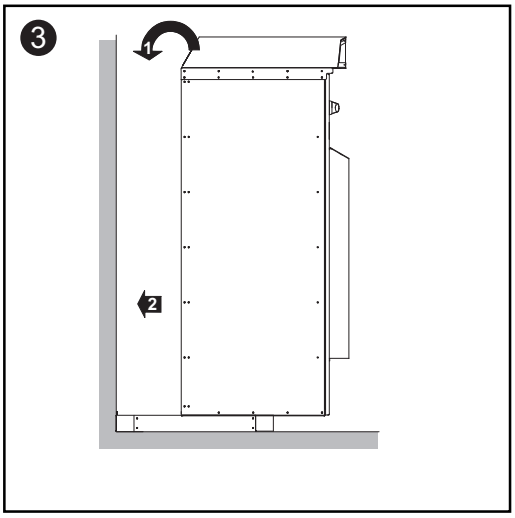
**Manually Positioning the Fronius CL on the Mounting Base**




- Position the inverter on the mounting base so that the back edge of the inverter lies on the front edge of the mounting base

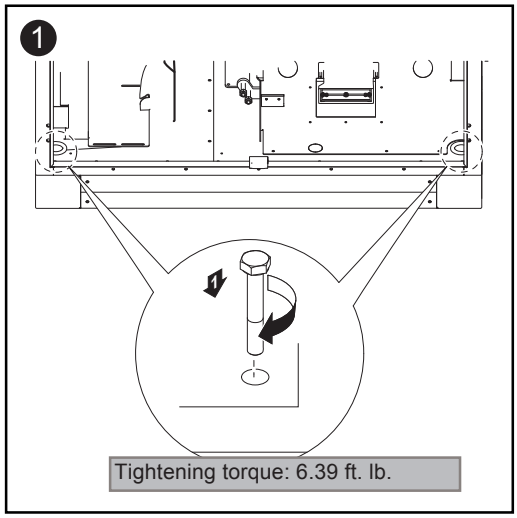


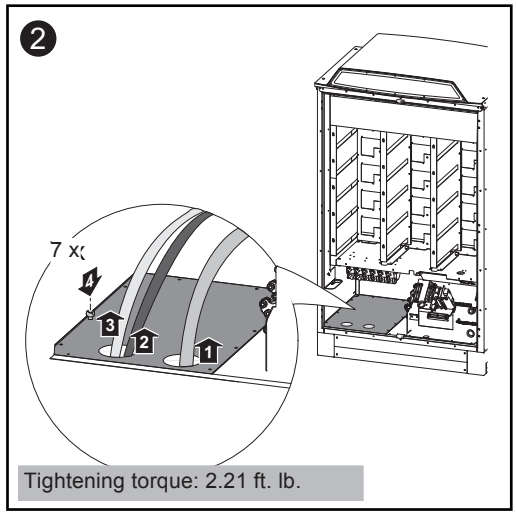

- Carefully tip the inverter forward
- Insert AC and DC wires, grounding cables and data communication cables into the inverter




- Lower the inverter onto the mounting base
- Slide the inverter backwards until it engages at the stop

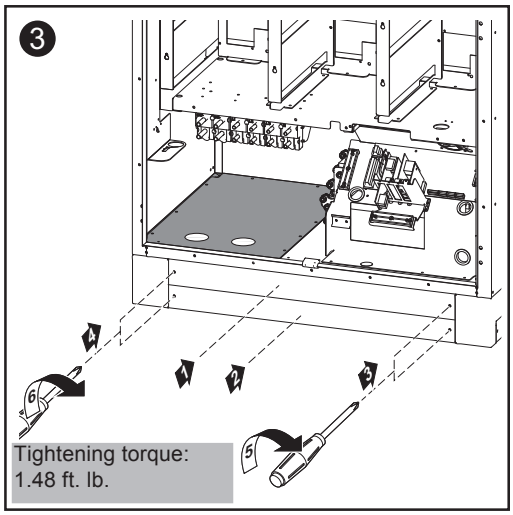
**Securing the Fronius CL to the Mounting Base**




- Run AC and DC wires, grounding cables and data communication cables through the wire input openings that you made in the base cover
- Replace base cover
- Secure base cover using 7 screws

**NOTE** To prevent damage to the AC and DC wires from the rough edges of wire input openings, run the wires through conduits or install a suitable edge guard (e.g., a rubber bushing).




- Place front cover to the mounting base
- secure front cover with 2 x 2 screws

# Cross Section of AC and DC Wires

**Maximum Wire Cross Section**

**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 copper wire up to a max. 350 MCM, min. 194 °F (90 °C) for all AC cable connections to the Fronius CL.
- Use copper wire up to a max. 350 MCM, min. 194°F (90°C) for all DC cable connections to the Fronius CL.
- Use copper wires for all grounding cables.
- See NEC section 250 for correct grounding.
- Use only solid or stranded wire. Do not use fine stranded wire.

**Minimum Cross Section of AC Wires**

**AC copper wires:**

| Fronius CL | AC wire 208 V | AC wire 240 V | AC wire 277 V |
|---|---|---|---|
| 33.3 DELTA | AWG 2 | AWG 2 | - |
| 44.4 DELTA | AWG 1/0 | AWG 1/0 | - |
| 55.5 DELTA | AWG 2/0 | AWG 2/0 | - |
| 36.0 WYE277 | - | - | AWG 6 |
| 48.0 WYE277 | - | - | AWG 4 |
| 60.0 WYE277 | - | - | AWG 3 |

*Minimum cross section of AC copper wires (for an ambient temperature of 122 °F / 50 °C)*

**AC aluminium wires:**

| Fronius CL | AC wire 208 V | AC wire 240 V | AC wire 277 V |
|---|---|---|---|
| 33.3 DELTA | AWG 1/0 | AWG 1/0 | - |
| 44.4 DELTA | AWG 3/0 | AWG 3/0 | - |
| 55.5 DELTA | 250 MCM | 250 MCM | - |
| 36.0 WYE277 | - | - | AWG 4 |
| 48.0 WYE277 | - | - | AWG 2 |
| 60.0 WYE277 | - | - | AWG 1 |

*Minimum cross section of AC aluminium wires (for an ambient temperature of 122 °F / 50 °C)*

**NOTE** Voltage drop and other considerations may dictate larger size wires be used.

**Minimum Cross Section of DC Wires**

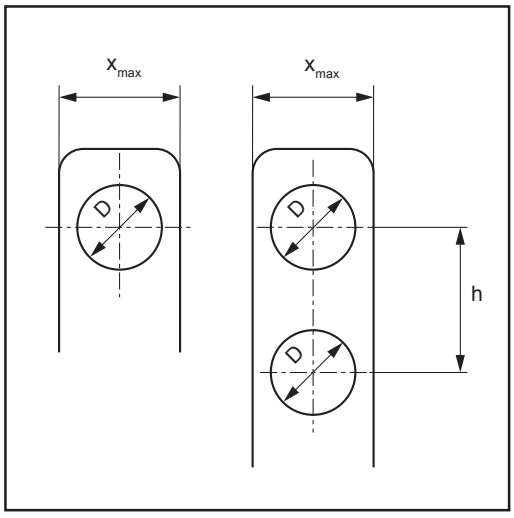
Size the DC wire according to the max. DC current of the connected PV array:

The required wire cross section can also be achieved by using 2 wires. In this case, the cross section of both wires should be about the same size.

**NOTE** Voltage drop and other considerations may dictate larger size wires be used.

**Cable Lugs for AC and DC Wires**

Either single hole cable lugs or double hole cable lugs can be used for AC, DC and grounding wires as per the following specification:



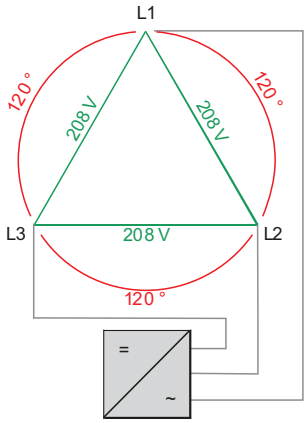
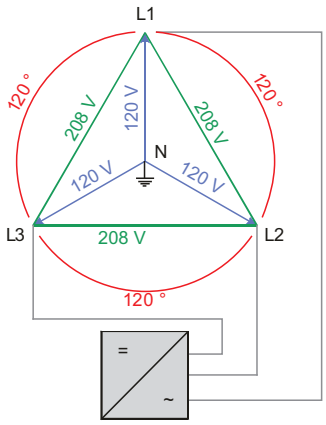
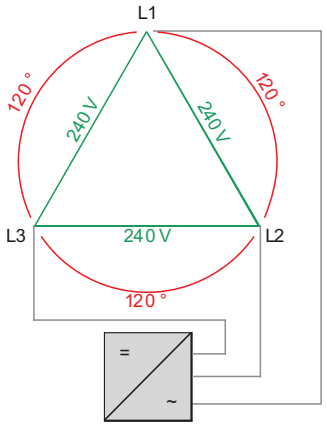

| | D | $x_{max}$ | h |
|---|---|---|---|
| AC | 0.4 in. (M10) | 1.6 in. (40 mm) | 1.5 in. (38.1 mm) |
| DC | 0.5 in. (M12) | 1.6 in. (40 mm) | 1.5 in. (38.1 mm) |
| GND ⏚ | 0.4 in (M10) | 1.6 in. (40 mm) | 1.5 in. (38.1 mm) |
| GET | 0.4 in (M10) | 1.6 in. (40 mm) | 1.5 in. (38.1 mm) |

Cable lugs must meet national specifications and guidelines.

# Connecting the Fronius CL to the Public Grid (AC)

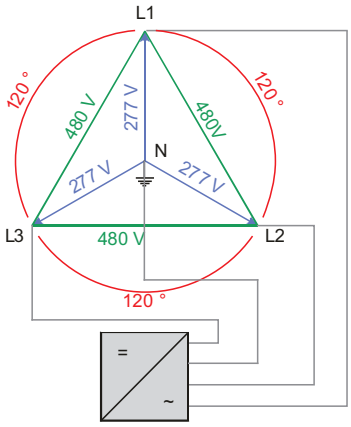
## Overview of Available Power Grids

Fronius CL inverters can be connected to the following power grids:

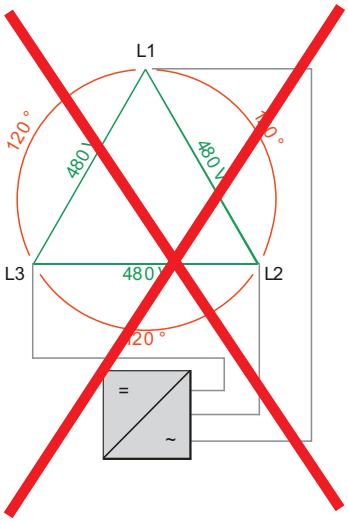
| Grid | Inverter |
|---|---|
| 208 V Delta<br>  | Fronius CL 33.3 DELTA<br>Fronius CL 44.4 DELTA<br>Fronius CL 55.5 DELTA |
| 208 V Delta: 120 V WYE<br>  | Fronius CL 33.3 DELTA<br>Fronius CL 44.4 DELTA<br>Fronius CL 55.5 DELTA |
| 240 V Delta<br>  | Fronius CL 33.3 DELTA<br>Fronius CL 44.4 DELTA<br>Fronius CL 55.5 DELTA |

## Overview of Available Power Grids (continued)

| Grid | Inverter |
|---|---|
| 480 V Delta: 277 V WYE | Fronius CL 36.0 WYE277<br>Fronius CL 48.0 WYE277<br>Fronius CL 60.0 WYE277 |




480 V Delta

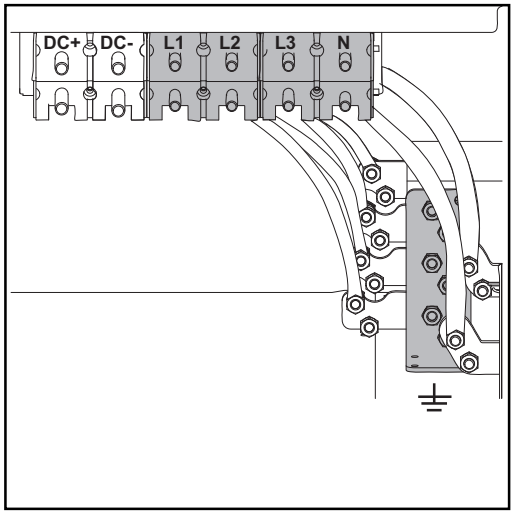



**NOTE** Do not connect Fronius CL inverters to the 480 V Delta power grid.

## Monitoring the Grid

**NOTE** For optimal functioning of grid monitoring, the resistance in the leads to the AC-side terminals must be as low as possible.

## AC Terminals




Legend:

L1 AC terminal for phase conductor L1
L2 AC terminal for phase conductor L2
L3 AC terminal for phase conductor L3
N AC terminal for neutral conductor N
⏚ Ground terminal

**NOTE**

- The neutral conductor is not bonded to ground internally.
- Make sure that the grid neutral conductor is grounded.

**Possible Connections to the Ground terminal**

The following components can be connected or grounded at the ground terminal:

Grounding electrode:
may be required depending on local regulations

Grounding of photovoltaic components (e.g., solar module frames):
The size of the wire usually corresponds to the largest wire in the DC system.

Grid grounding / Grounding conductor:
The inverter must be connected via the ground clamp to the AC grid grounding.

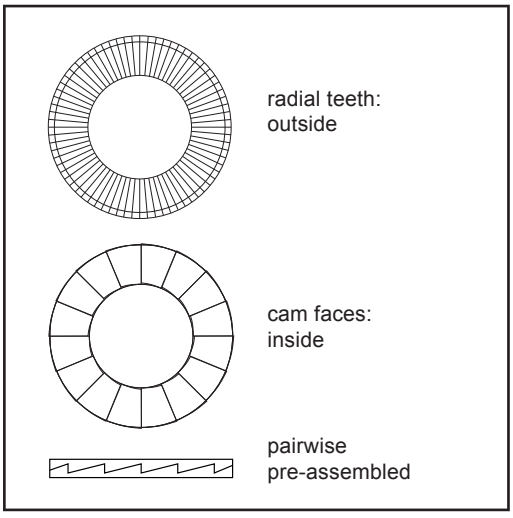
**NOTE**
- Use copper or aluminum wires for all grounding cables
- Use only solid or stranded wire. Do not use fine stranded wire.
- See NEC section 250 for correct grounding.

**Safety**

**WARNING!** An electrical shock can be fatal. Danger from grid voltage and DC voltage from solar modules.
- Never work with live wires! Prior to all connection work, make sure that the AC and DC wires are not charged.
- Only a licensed electrician is permitted to connect this inverter to the public grid.
- Power stage sets should only be opened by Fronius-trained service personnel.

**CAUTION!** Danger of damaging the inverter by overloading the grid neutral conductor.
- Do not combine 3-phase devices on one phase
- Do not operate multi-phase devices as single-phase under any circumstances

**CAUTION!** Danger of damaging the inverter due to improperly connected wires. Improperly connected wires can cause thermal damage to the inverter and may cause a fire. When connecting AC and DC wires:
- only use the installation and connection accessories as part of the shipment
- make sure that all cable connections are properly secured applying the correct tightening torque.




Two-part securing washers in two sizes are included with the installation and connection accessories.
These two-part securing washers with cam faces on one side and radial teeth on the opposite side are pairwise pre-assembled, cam face to cam face.

**NOTE** If a two-part securing washer is split, make sure that the two parts are mounted cam face to cam face only!

**Connecting aluminium wires**

**NOTE** When connecting aluminium wires::

- observe national and international guidelines regarding the connection of aluminium wires
- follow the instructions of the wire manufacturer
- check every year that the wires are securely attached in accordance with the specified torque
- follow the connection requirements listed below

**Connection Requirements:**

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

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

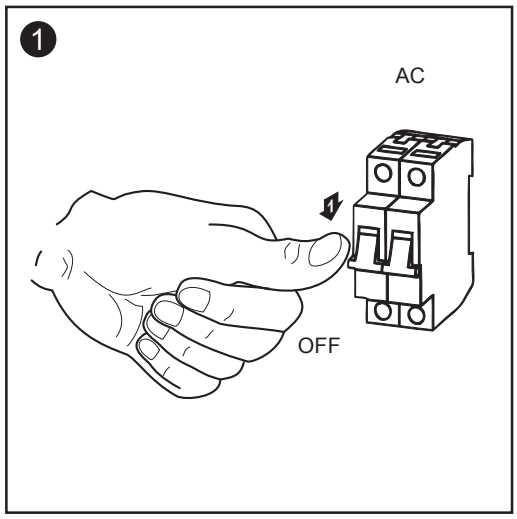
2. After removing the oxide layer of the cable end, rub in an acid- and alkali-free grease.

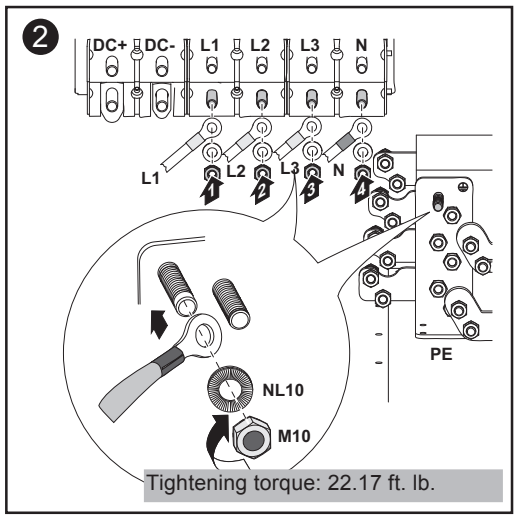
3. Then immediately fix it to a cable lug suitable for aluminium wires.

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

**Connecting the Fronius CL to the Public Grid (AC)**

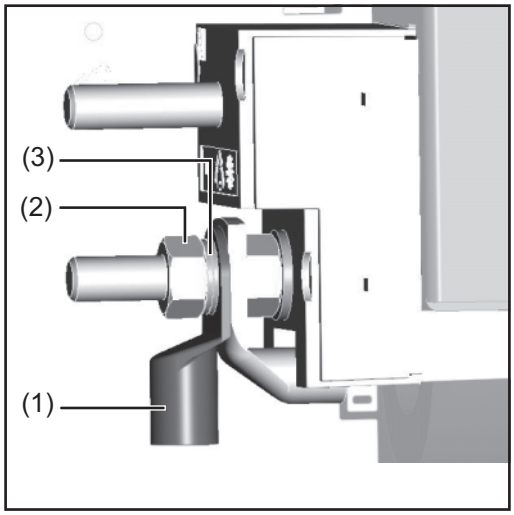
**NOTE** The phases should be connected in the proper order: GND, L1, L2, L3 and N.



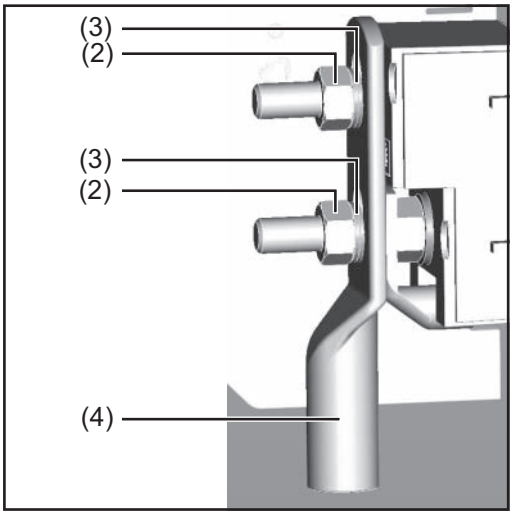




**NOTE** Form a min. 4 in. wire loop using all wires.

## AC Connection Examples




*AC connection with single hole cable lug*




*AC connection with double hole cable lug*

(1) single hole cable lug
(2) metric hexagon nut M10, wrench size 17 mm ($^{7}/_{64}$ in.)
(3) two-part securing washer NL 10, outside diameter 16.6 mm ($^{3}/_{32}$ in.)
(4) double hole cable lug

## 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:

| Fronius CL | Overcurrent Protection | | |
|---|---|---|---|
| | **208 V** | **240 V** | **277 V** |
| 33.3 DELTA | 125 A | 100 A | - |
| 44.4 DELTA | 175 A | 150 A | - |
| 55.5 DELTA | 200 A | 175 A | - |
| 36.0 WYE | - | - | 60 A |
| 48.0 WYE | - | - | 80 A |
| 60.0 WYE | - | - | 90 A |

# Connecting DC Wires to the Fronius CL

**General Information about Solar Modules**

In order to select suitable solar modules and get the most efficient use out of the Fronius CL, 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 Fronius CL 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**

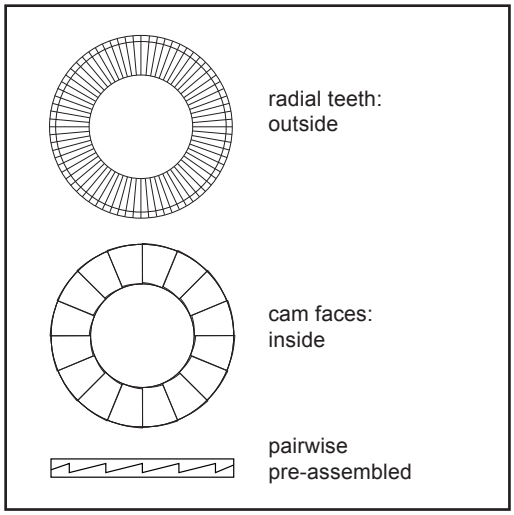
**WARNING!** An electrical shock can be fatal. Danger from grid voltage and DC voltage from solar modules.
- Never work with live wires! Prior to all connection work, make sure that the AC and DC wires are not charged.
- Only a licensed electrician is permitted to connect this inverter to the public grid.
- Power stage sets should only be opened by Fronius-trained service personnel.

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

**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.

**CAUTION!** Danger of damaging the inverter due to improperly connected wires. Improperly connected wires can cause thermal damage to the inverter and may cause a fire. When connecting AC and DC wires:
- only use the installation and connection accessories as part of the shipment
- make sure that all cable connections are properly secured applying the correct tightening torque.

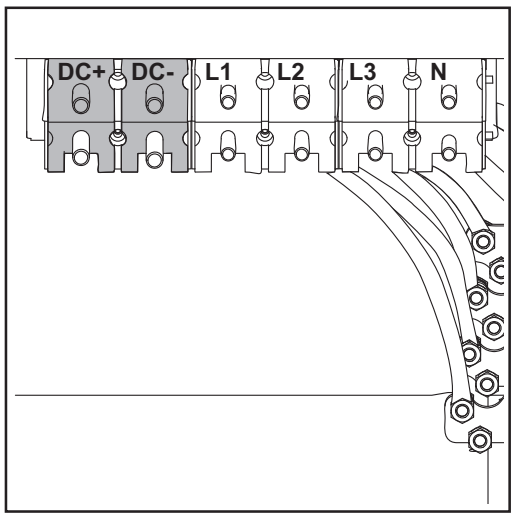
**Safety**
(continued)




Two-part securing washers in two sizes are included with the installation and connection accessories.
These two-part securing washers with cam faces on one side and radial teeth on the opposite side are pairwise pre-assembled, cam face to cam face.

**NOTE** If a two-part securing washer is split, make sure that the two parts are mounted cam face to cam face only!

**DC Terminals**




**Connecting aluminium wires**

**NOTE** When connecting aluminium wires::

- observe national and international guidelines regarding the connection of aluminium wires
- follow the instructions of the wire manufacturer
- check every year that the wires are securely attached in accordance with the specified torque
- follow the connection requirements listed below

**Connection Requirements:**

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

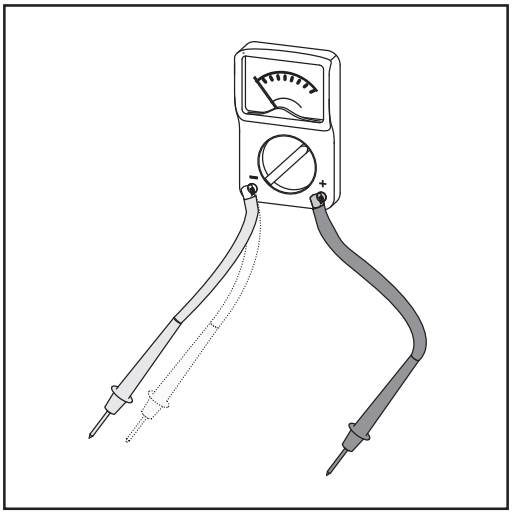
**IMPORTANT** Do not use brushes, files or sandpaper. Aluminum particles may get stuck and can transfer to other cables.

2. After removing the oxide layer of the cable end, rub in an acid- and alkali-free grease.

3. Then immediately fix it to a cable lug suitable for aluminium wires.

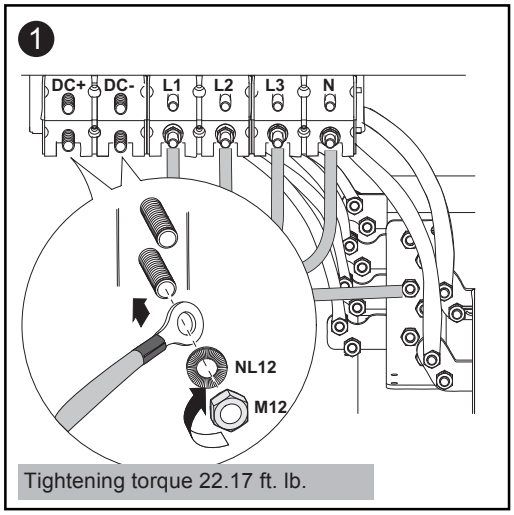
Repeat the steps above whenever the cable is disconnected and then reconnected.

## Connecting DC Wires



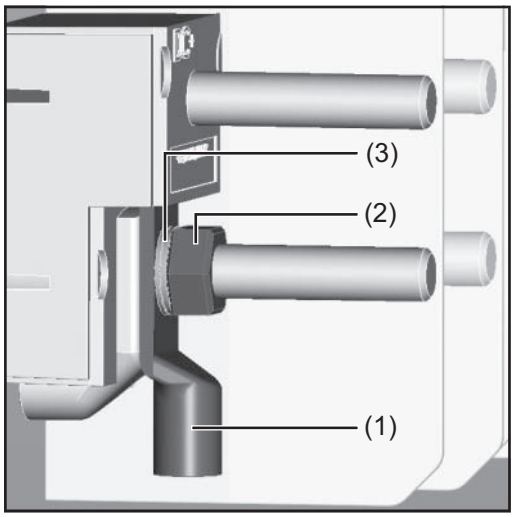
**NOTE** Connecting the DC wiring with the wrong polarity may cause damage to the inverter. Check both the polarity and the open circuit voltage.

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

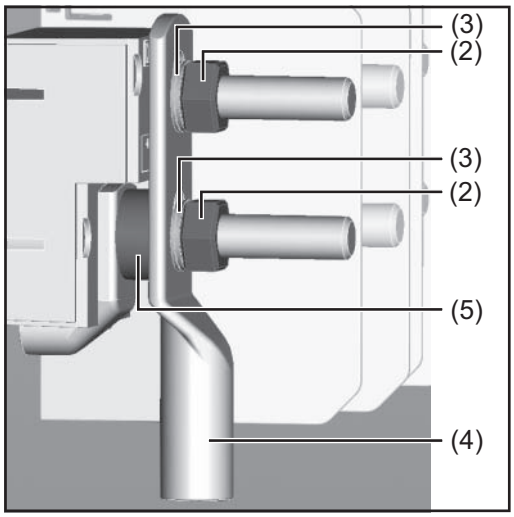



**NOTE** Form a min. 4 in. wire loop using all wires.

## DC Connection Examples

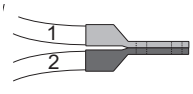


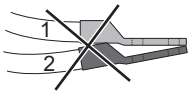

*DC connection with single hole cable lug and one cable*



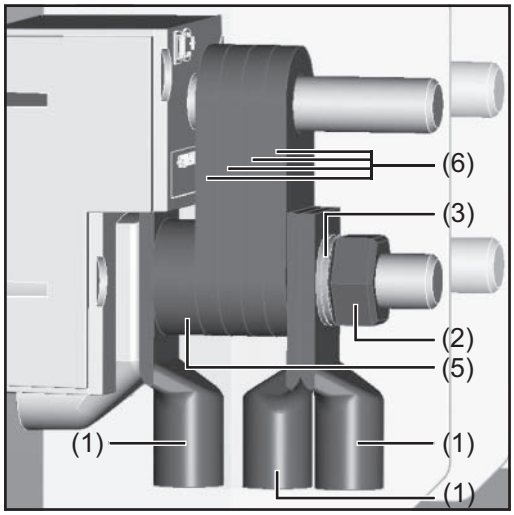

*DC connection with double hole cable lug and one cable*

**Important** When connecting 2 wires make sure that both cable lugs are placed upon each other upside down.

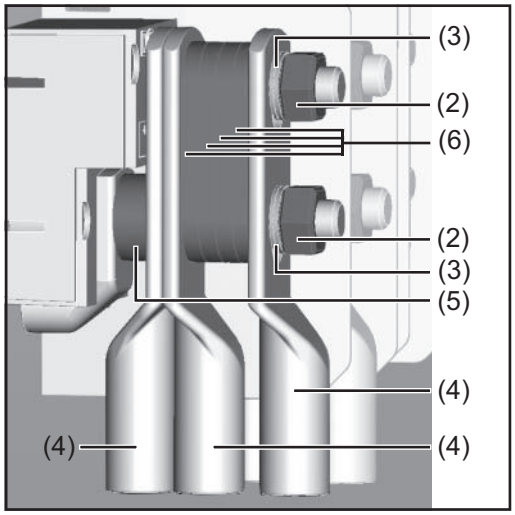


## DC Connection Examples
(continued)




*DC connection with single hole cable lug and three cables*




*DC connection with double hole cable lug and three cables*

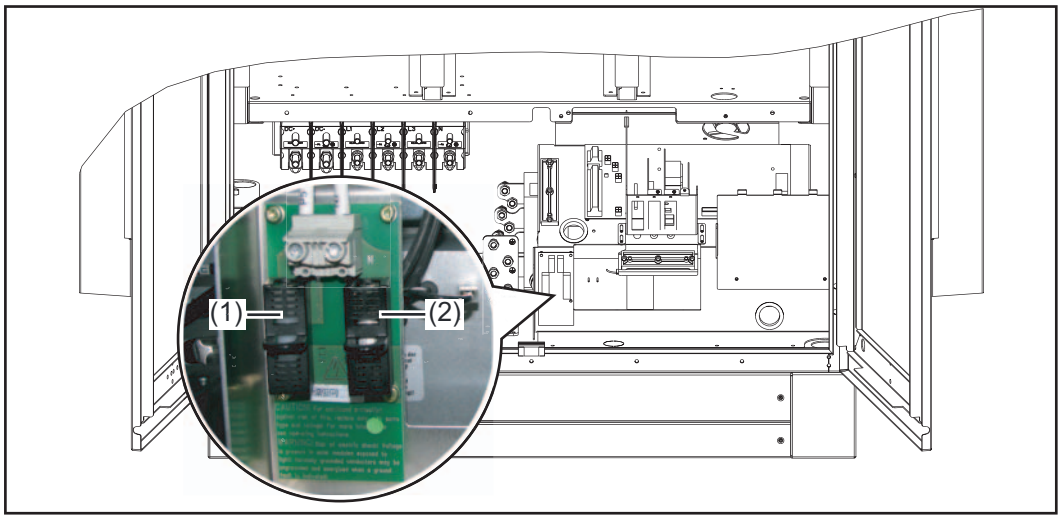
**NOTE** When connecting three cables consider an overcurrent protection according to NEC article 240!

(1) single hole cable lug
(2) metric hexagon nut M12, wrench size 19 mm ($^{3}/_{16}$ in.)
(3) two-part securing washer NL 12, outside diameter 19.5 mm ($^{13}/_{64}$ in.)
(4) double hole cable lug
(5) copper ring, diameter 13 and 25 x 9.7 mm ($^{33}/_{64}$ and $^{63}/_{64}$ x $^{3}/_{8}$ in.)
(6) copper spacer

# Fronius CL Solar Module Ground

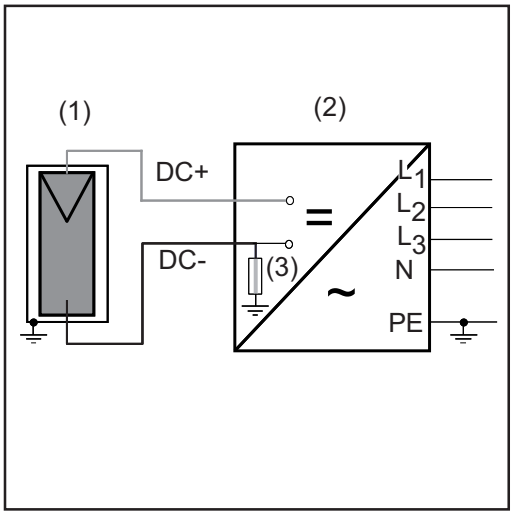
**General**

The inverter allows you to ground solar modules via a fuse in the connection area either at the negative pole or the positive pole.

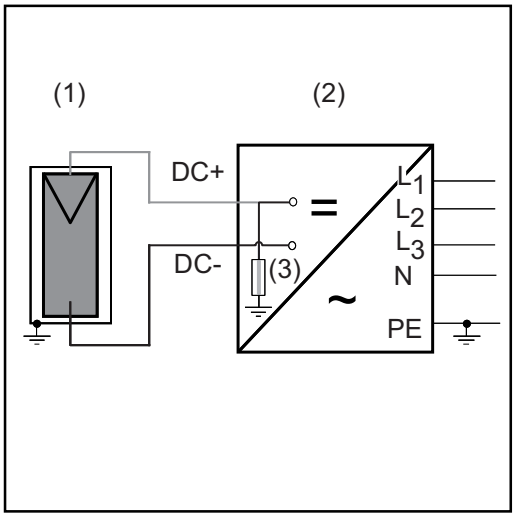



(1) Fuse holder for solar module ground at the positive pole
(2) Fuse holder for solar module ground at the negative pole

**Solar Module Ground via Fuse**




*Solar Module Ground at Negative Pole (Fuse Holder for Solar Module Ground at Positive Pole Not Used)*




*Solar Module Ground at Positive Pole (Fuse Holder for Solar Module Ground at Negative Pole Not Used)*

(1) Solar module (2) Inverter (3) Fuse

Depending on the inverter output, Fronius recommends fuses with the following nominal current values for the solar module ground:

- Fronius CL 33.3 DELTA: 2 A
- Fronius CL 44.4 DELTA: 2 A
- Fronius CL 55.5 DELTA: 3 A
- Fronius CL 36.0 WYE: 2 A
- Fronius CL 48.0 WYE: 2 A
- Fronius CL 60.0 WYE: 3 A

Fuse dimensions: 13/32 x 1 1/2 in. (10 x 38 mm)

## Safety

**WARNING!** An electrical 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.

**WARNING!** An electrical shock can be fatal. Danger from DC voltage from solar modules.
The DC main switch is only used to switch off power to power stage sets. When the DC main switch is turned off, any solar module ground installed remains unaffected. Never touch the DC+ and DC-.

## Solar Module Ground at Negative Pole

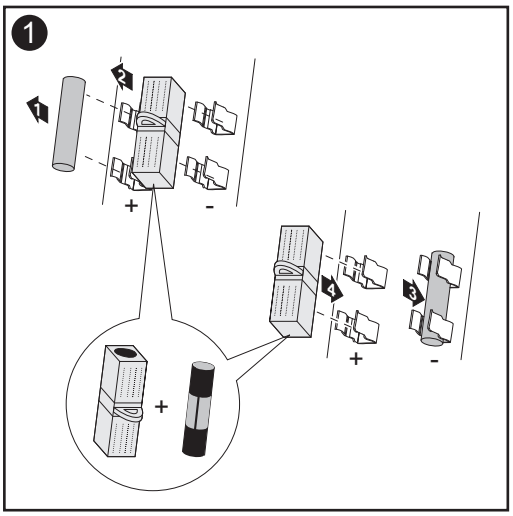
The Fronius CL is designed for a solar module ground at the negative pole. The inverter comes supplied with a corresponding fuse in the right fuse holder for a solar module ground at the negative pole.
The left fuse holder for the solar module ground at the positive pole must have a plastic bolt inserted.

**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.

⚠ POSITIVE GROUNDED SOLAR MODULES ⚠

## Solar Module Ground at Positive Pole - Inserting Fuse

The Fronius CL is designed for a solar module ground at the negative pole. For solar module ground at the positive pole the fuse must be inserted into the corresponding fuse holder as follows:




**Important** The right fuse holder for the solar module ground at the negative pole must have a plastic bolt inserted.

Inserting the fuse at the positive pole grounds the solar module.

When the solar module is grounded at the positive pole:

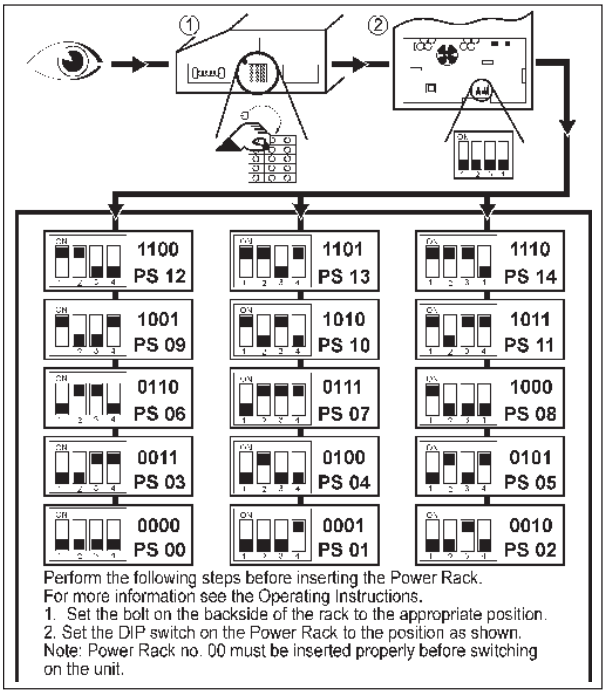
**NOTE** Do not connect the ground to the positive DC line at any point! This is already done within the inverter. If positive DC lines are connected to the DC terminals or prior to this to the ground, this will circumvent the GFDI protection system, preventing your inverter from properly detecting a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

⚠ POSITIVE GROUNDED SOLAR MODULES ⚠

# Inserting Power Stage Sets

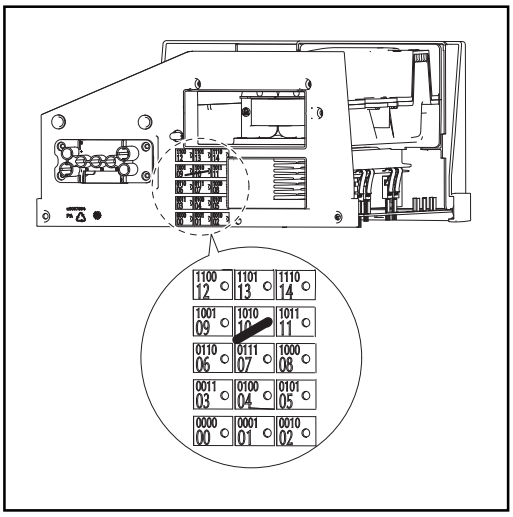
**Overview**

A sticker is located in the inverter on the top cover. The sticker provides an overview of the steps required for inserting power stage sets. A detailed description of the sticker can be found in ‘Troubleshooting and Maintenance’ in the ‘Replacing Power Stage Sets’ section.

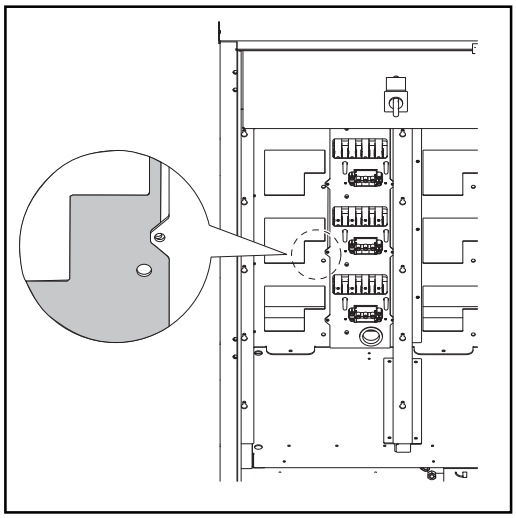



**General**

One slot in the inverter is assigned to each power stage set rack. In order to avoid mixing up the slots, positioning bolts are used on the back of the power stage set racks and a corresponding recess is available for the slot.

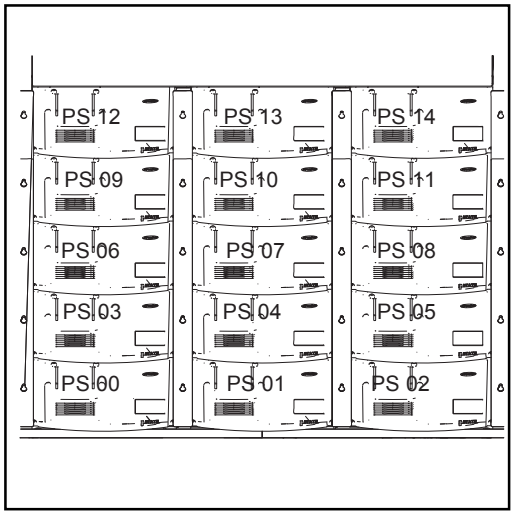



*Positioning Bolt on the Back of the Power Stage Set*



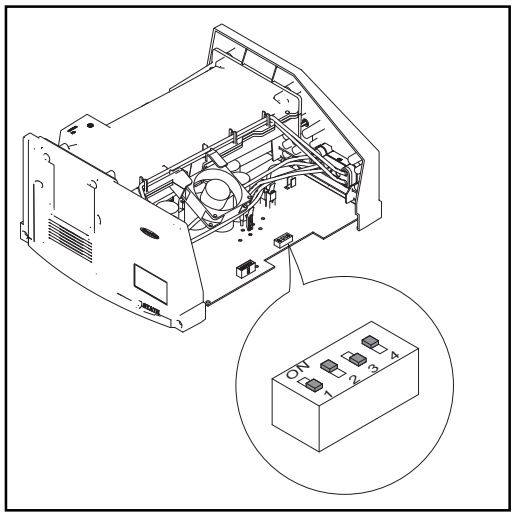
*Opening for the Slot*

**Slot Arrangement**



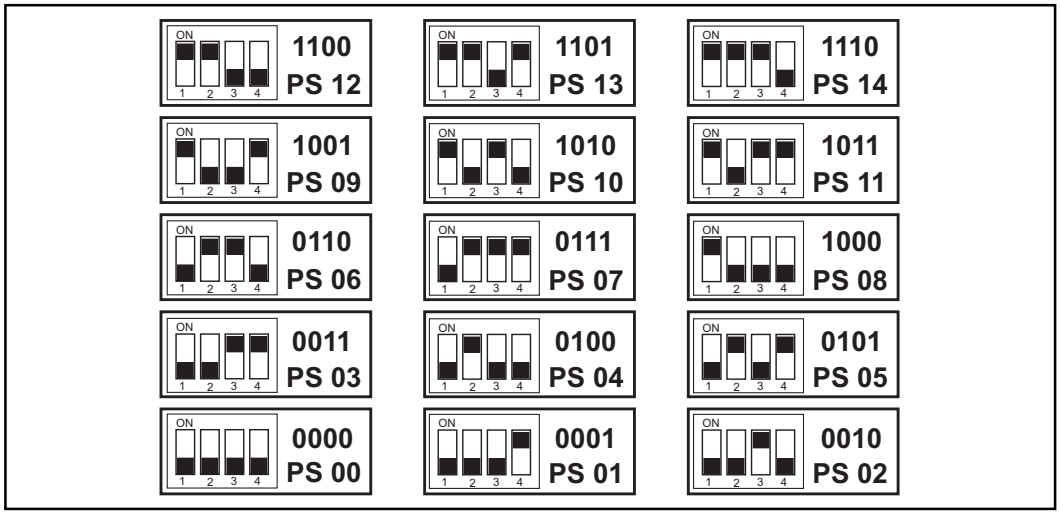

**Dip Switches for Identifying Power Stage Set Racks**

A dip switch on the front of the power stage set is used to identify each individual power stage set in the inverter. The dip switch must be set exactly for each individual slot.




*Dip Switches on the Front of the Power Stage Set*

**Dip Switch Settings for Each Slot**



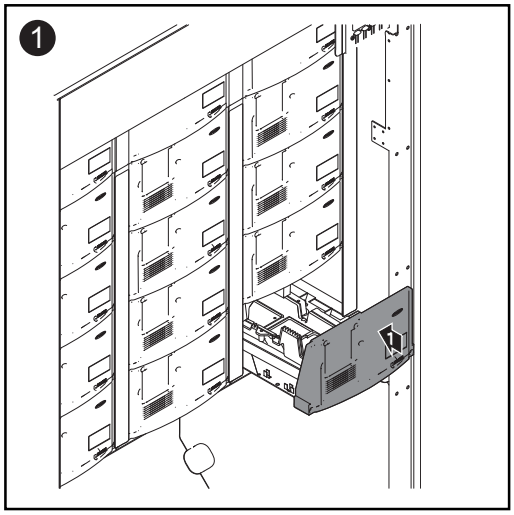
## Inserting Power Stage Sets

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

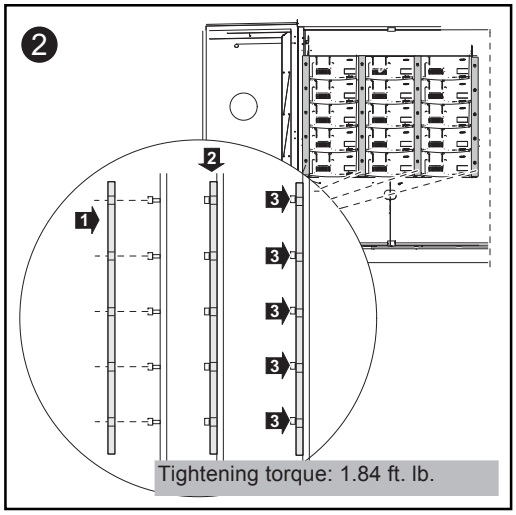
- The connection area should only be opened by a licensed electrician.
- Never work with live wires! Prior to all connection work, make sure that the AC and DC wires are not charged.
- DC and AC main switch are only used to switch off power to the power stage set. When DC and AC main switch are turned off, the connection area is still energized.

**NOTE** Check the following before inserting power stage sets into the inverter:

- The location of the positioning bolt
- Whether or not the dip switch is set for the slot



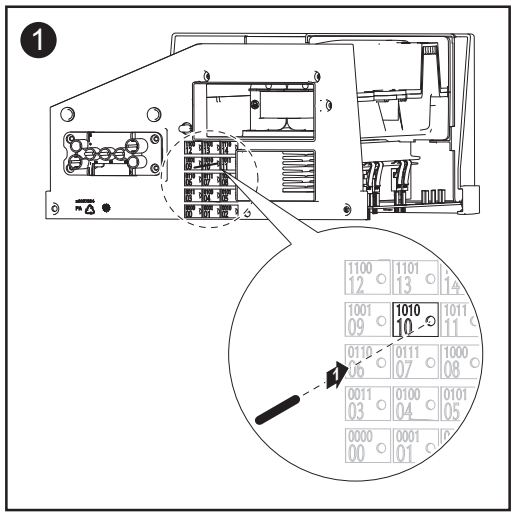

**Important** When inserting power stage sets, the plastic front of the power stage set must be inserted flat against the side metal supports.
If a power stage set cannot be inserted completely into the inverter, then the power stage set has been inserted into the wrong slot.



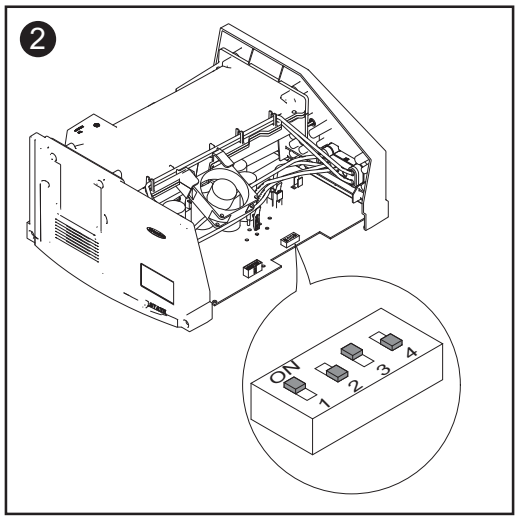

- Insert 4 rails
- Secure rails using 4 x 5 screws

**Application Example**

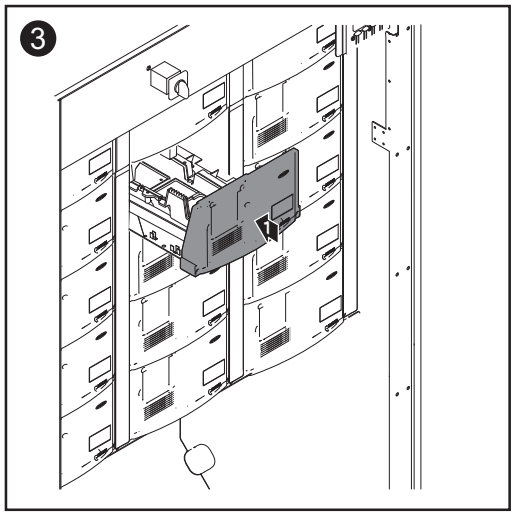
Inserting power stage set PS 10:



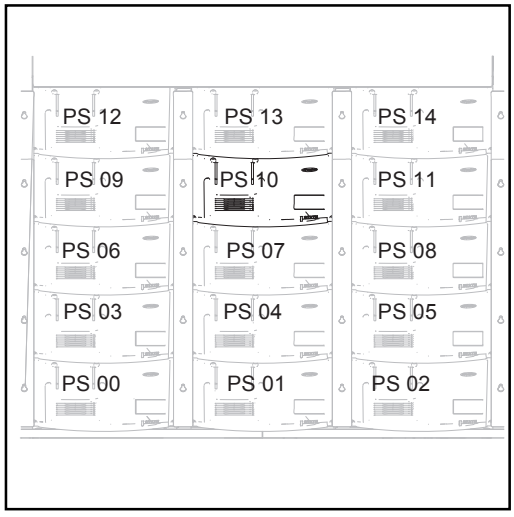

- Insert positioning bolt into no. 10




- Set the dip switch for PS 10 as per „Dip Switch Settings for Each Slot“: 1 - 0 - 1 - 0




- Insert power stage set PS 10 into the slot for PS 10

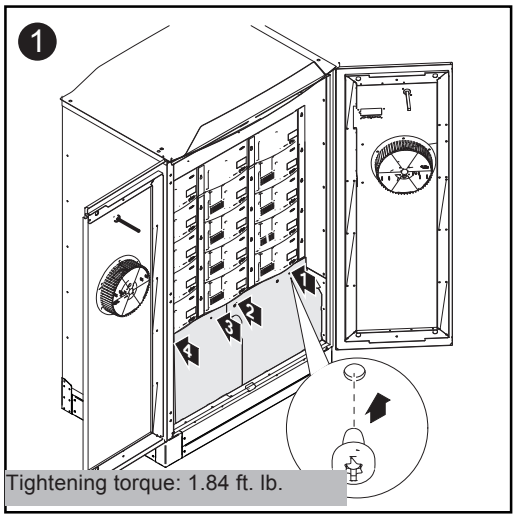



*Slot for Power Stage Set PS 10*

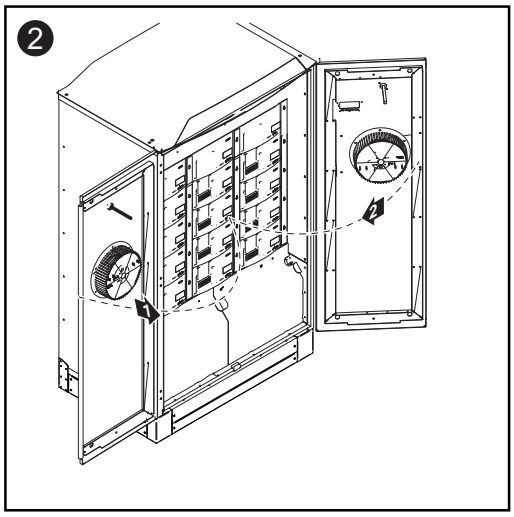
# Closing the Fronius CL

**Closing the Fronius CL**

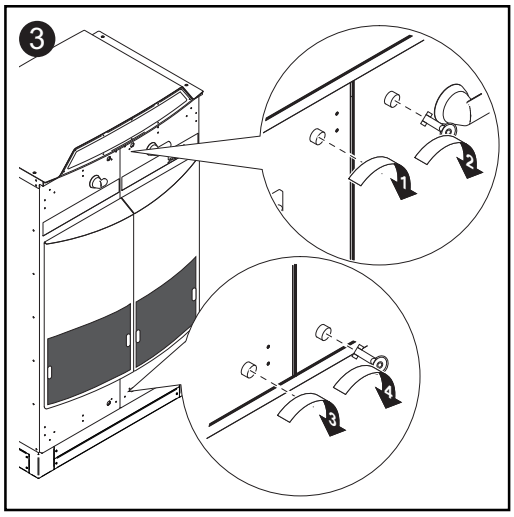
**CAUTION!** An inadequate grounding conductor connection can cause serious injuries to persons and damage to (or loss of) property. The screws on the covers provide an adequate grounding conductor connection for the housing ground and should not under any circumstances be replaced by other screws that do not provide a proper grounding conductor connection.




- Replace covers
- Secure with screws




- Close doors




- Close door latches

# Start-up Operation

**Factory Pre-set Configuration**

Your Fronius CL has been pre-configured in the factory and is ready for operation. You only have to set the available power grid for start-up for the inverters.

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

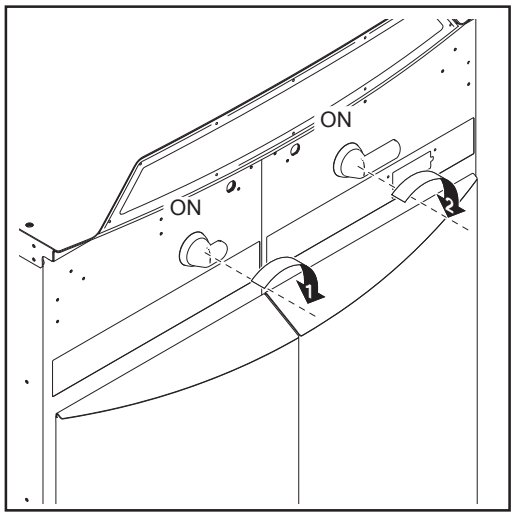
**Requirements for Start-up Operation**

- Fronius CL connected to the public grid (AC)
- Fronius CL connected to the solar modules (DC)
- All power stage sets inserted
- Power stage sets secured via rails
- All covers attached
- Doors closed and locked

**Start-up Operation**

**NOTE** Flip the AC main switch and the DC main switch to Position - ON - only when:

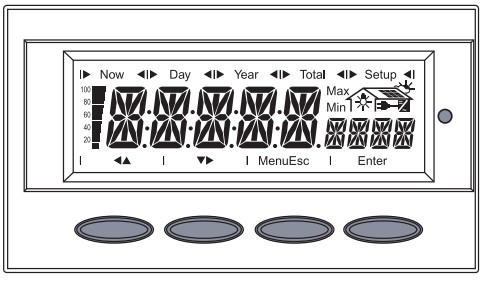
- the inverter doors are totally closed
- the door latches are totally closed




1. If available, turn on the external AC disconnect
2. Flip AC main switch on the inverter to position - ON -
3. Flip DC main switch to position - ON -

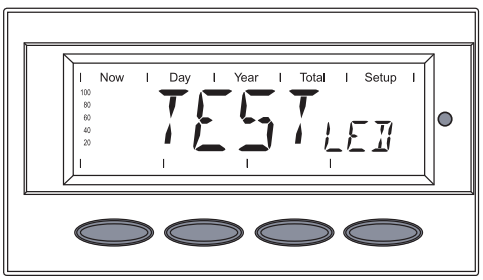
As soon as the photovoltaic modules produce sufficient power, the Operating Status LED lights up orange.

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




The screen displays the startup phase.

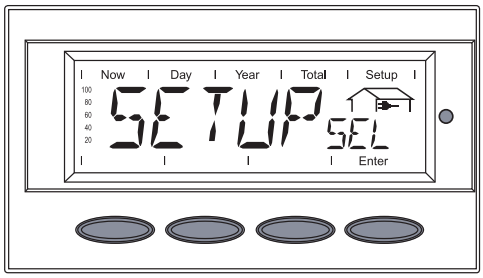
- Segment test
  All display elements light up for about one second




- The inverter goes through a master check list for several seconds

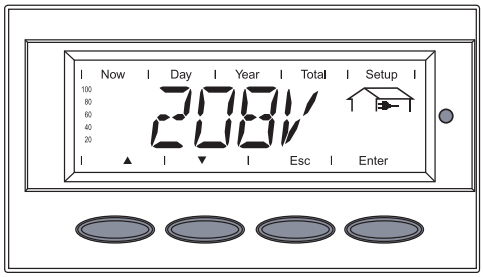
  The display shows 'TEST' and indicates the respective component that is being tested (for example, 'LED')

**Start-up Operation**
(continued)




- The grid selection phase begins. ‘SETUPSEL’ is displayed.

4. Press the ‘Enter’ key



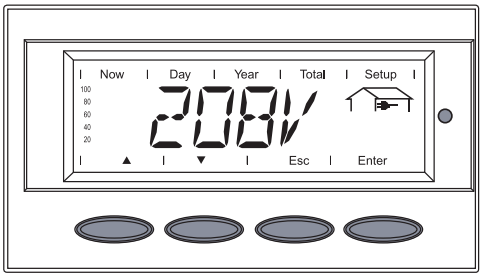

The first grid selection option is shown (e.g., 208 V)

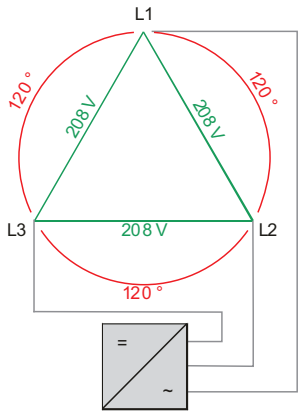
5. Select the public grid

**Selecting the Public Grid**

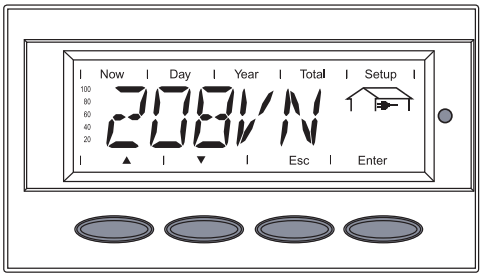
1. Use the ‘Up’ and ‘Down’ keys to select the desired grid:

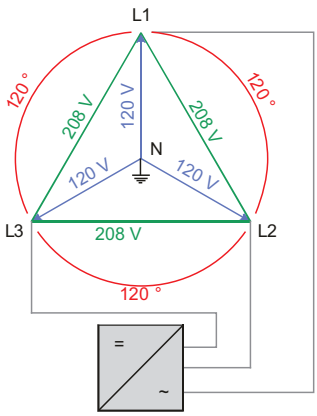
▲ ▼



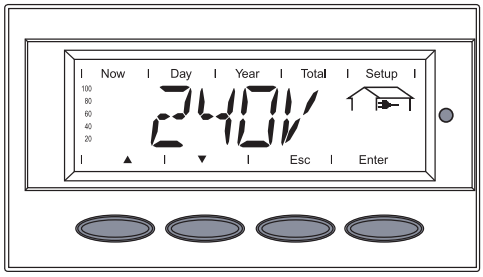

Grid voltage 208 V Delta
No neutral conductor in the system
Neutral conductor monitoring is deactivated

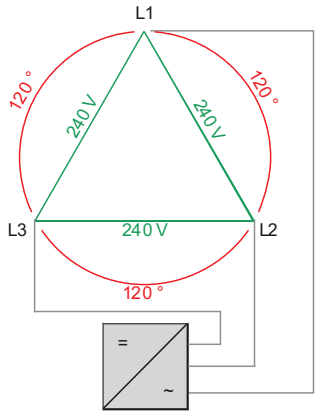


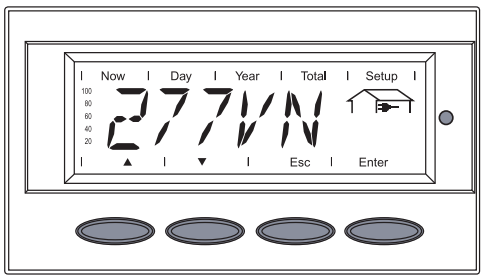

Grid voltage 208 V Delta: 120 V WYE
Neutral conductor available in the system
Neutral conductor monitoring is activated

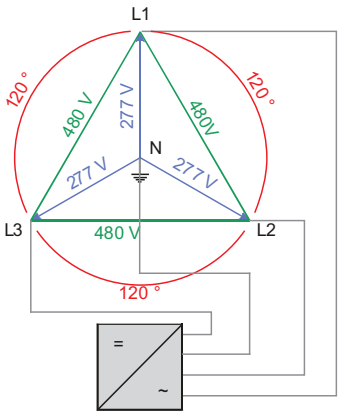
**Selecting the Public Grid**
(continued)




Grid voltage 240 V Delta
No neutral conductor in the system
Neutral conductor monitoring is deactivated



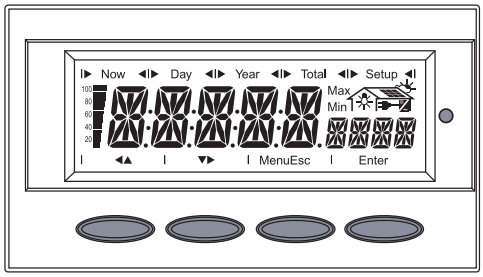




Grid voltage 480 V Delta: 277 V WYE
Neutral conductor available in the system
Neutral conductor monitoring is activated

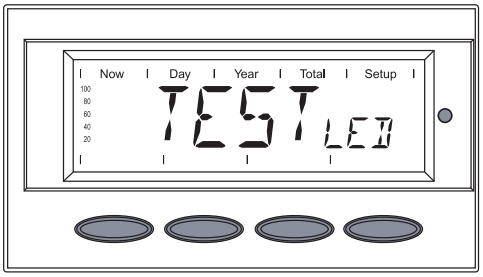
2. Press the ‘Enter’ key 2x to confirm your grid selection (or use the ‘Esc’ key to return to grid selection)

   The startup phase restarts with the segment test.

**Startup Phase during Startup Operation**

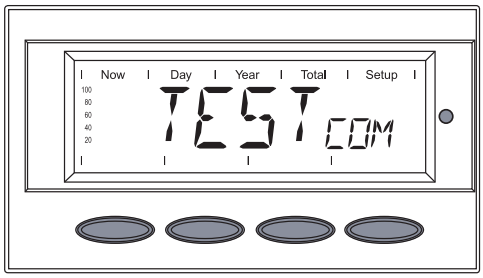



- Segment test
  All display elements light up for about one second

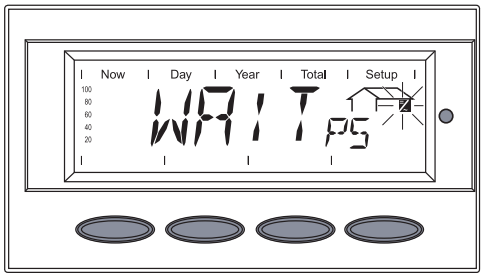



- The Fronius CL goes through a master check list for several seconds The display shows ‘TEST’ and indicates the respective component that is being tested (for example, ‘LED’)

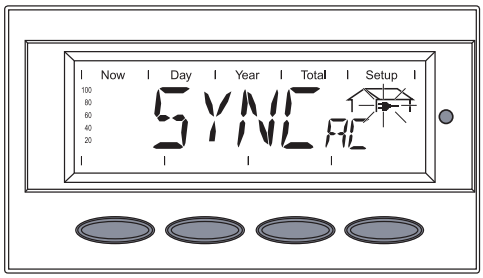
**Startup Phase during Startup Operation**
(continued)



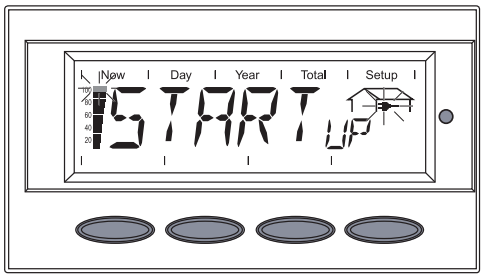

- 'TEST$_{COM}$' is shown



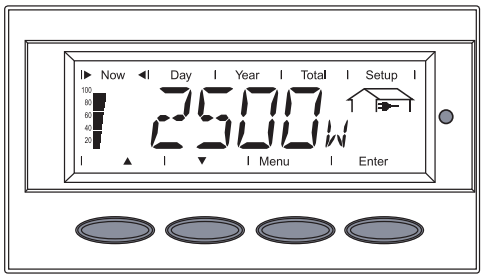

- Synchronization with grid:
'WAIT$_{PS}$' is displayed, the inverter icon flashes: The Fronius CL is waiting for all power stage sets in the network to be on stand-by. This procedure takes place dependent on the DC voltage.




Next, the display shows 'SYNC$_{AC}$,' the grid icon flashes




- Startup test:
Before the Fronius CL starts feeding energy into the grid, the conditions of the grid are tested in detail in accordance with regulations. The display shows 'START$_{UP}$'



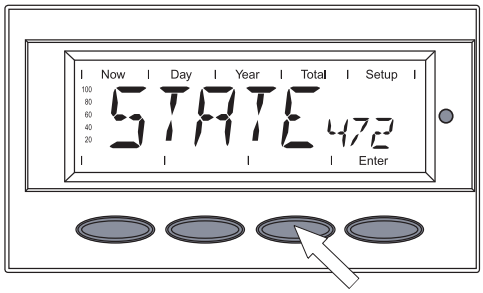

- Operation of feeding energy into the grid:
After selecting the grid and when the tests are concluded, the Fronius CL starts feeding energy into the grid.
The display shows the present power feeding into the grid.
The Operating Status LED lights up green, and the Fronius CL starts operating.

**Important** For more information about the startup phase, please see chapter 'Operation', section 'Product Description Fronius CL' (Startup Phase, Test Procedure).

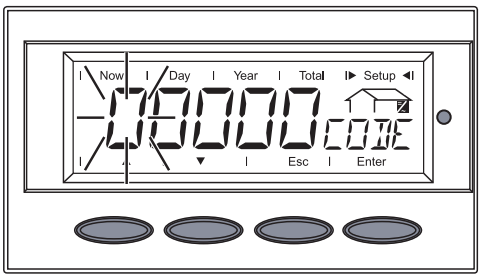
**Setting inverter for solar module ground at the positive pole**

If the inverter will be operated with solar modules that require a solar module ground at the positive pole, the corresponding grounding method must be set in the ‘Basic Service’ menu.
For accessing the ‘Basic Service’ menu the access code ‘22742’ must be entered.

If solar modules are connected to the inverter that require a solar module ground at the positive pole, the status message 472 "Ground fault detected" will be displayed after the inverter is turned on and the startup phase is completed




1. Press the unassigned ‘Menu/Esc’ key 5 x




‘CODE’ is displayed, the first digit flashes.

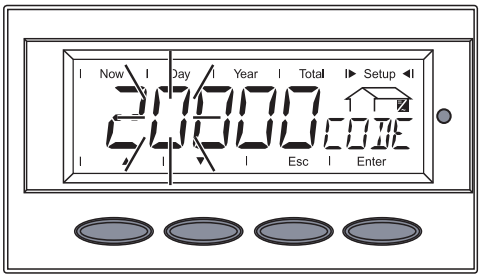
2. Enter the access code 22742:

   Use the ‘Up’ and ‘Down’ keys to select the value for the first digit of the access code

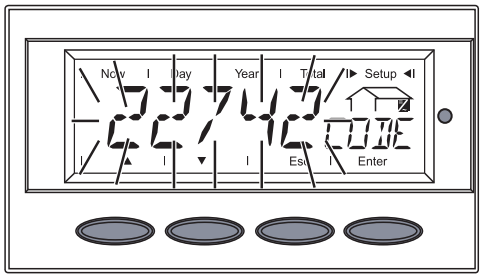
   ▲ ▼

3. Press the ‘Enter’ key

   The second digit flashes.

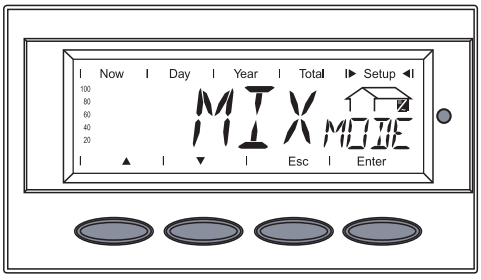



4. Repeat steps 2 and 3 for the second, third, fourth and fifth digit of the access code until ...



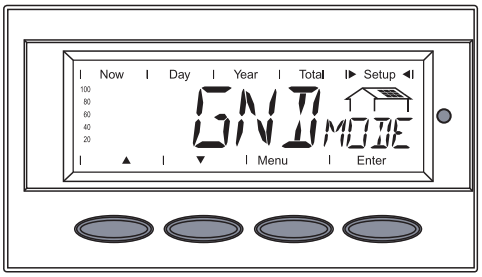

... the access code flashes.

5. Press the ‘Enter’ key

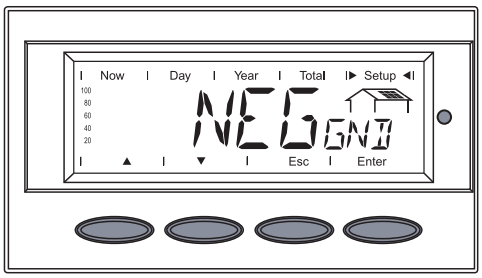



The inverter is in the ‘Basic Service’ menu, the first parameter ‘MIX MODE’ is displayed.

**Setting inverter for solar module ground at the positive pole** (continued)

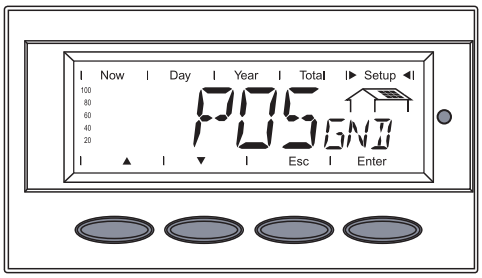



6. Use the ‘Up’ or ‘Down’ keys to select the 'GNDMODE' parameter
   ▲ ▼
7. Press the ‘Enter’ key




The set grounding mode is displayed.

8. Use the ‘Up’ and ‘Down’ keys to select the corresponding ‘POS GND’ grounding method:
   ▲ ▼




POS = solar module ground at positive pole

9. Press the ‘Enter’ key to apply the required grounding mode
10. Press the ‘Esc’ key to exit the Basic Service menu

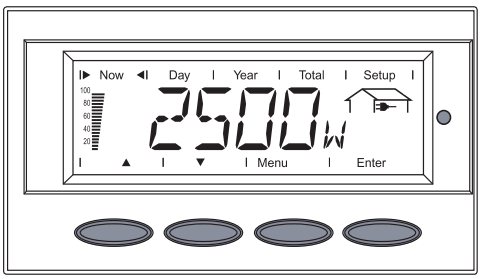
⚠ POSITIVE GROUNDED SOLAR MODULES ⚠

# Selecting the Interface Protocol and Setting the Inverter Baud Rate

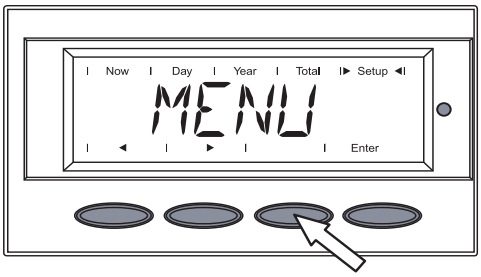
**General**

If a data communication connection is required between the inverter and other Fronius data communication components, the ‘Interface protocol’ must be set in the ‘Basic Service’ menu.

**Entering the access code**




1. Press the ‘Menu’ key

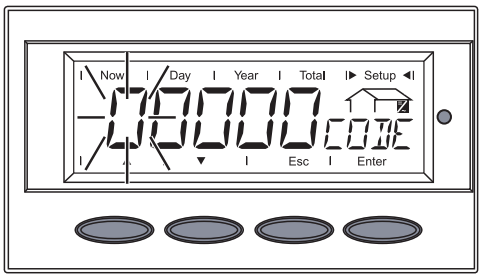



‘Menu’ is shown.

2. Select the ‘Setup’ mode using the ‘Left’ or ‘Right’ keys

◀ ▶

3. Press the unoccupied ‘Menu/Esc’ key 5 x



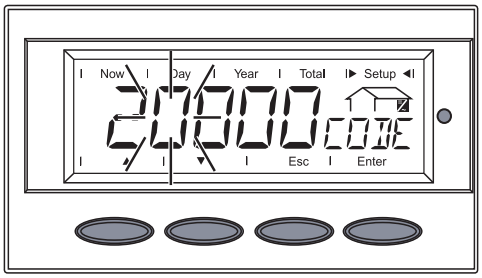

‘CODE’ is displayed, the first digit flashes.

4. Enter the access code 22742:

Use the ‘Up’ and ‘Down’ keys to select a value for the first digit of the access code

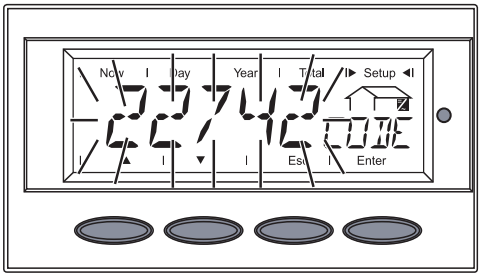
▲ ▼

5. Press the ‘Enter’ key




The second digit flashes.

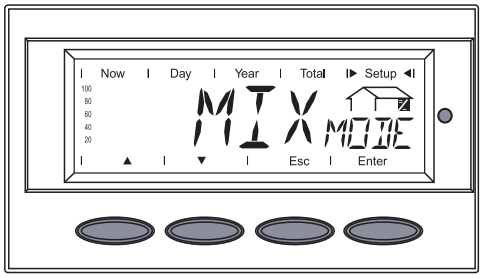
6. Repeat steps 4 and 5 for the second, third, fourth and fifth digit of the access code until ...




... the access code flashes.

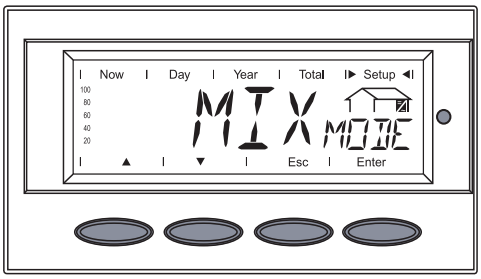
7. Press the ‘Enter’ key

**Entering the access code** (continued)

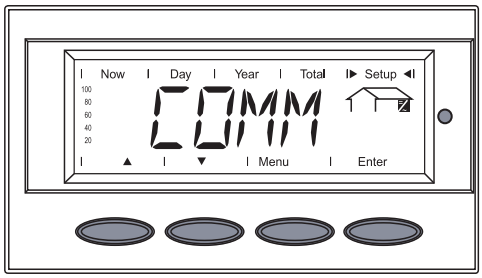



The inverter is now in the ‘Basic Service’ menu, the first parameter ‘MIX MODE’ is displayed.

**Selecting the interface protocol for communication with other data communication components**



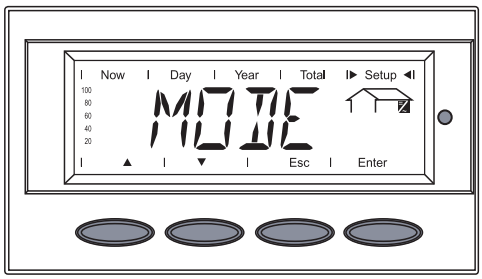

The inverter is in the ‘Basic Service’ menu, the first parameter ‘MIX MODE’ is displayed.




1. Use the ‘Up’ and ‘Down’ keys to select the ‘COMM’ parameter

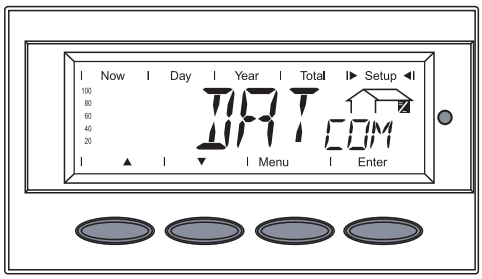
   ▲ ▼

2. Press the ‘Enter’ key

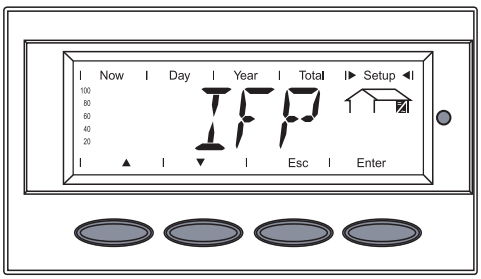



‘MODE’ is shown.

3. Press the ‘Enter’ key




The set protocol type is displayed.

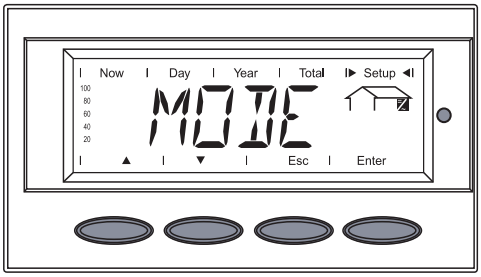



4. Use the ‘Up’ and ‘Down’ keys to select the ‘IFP’ protocol type (interface protocol):

   ▲ ▼

5. Press the ‘Enter’ key to apply the ‘IFP’ protocol type.

**Selecting the interface protocol for communication with other data communication components** (continued)

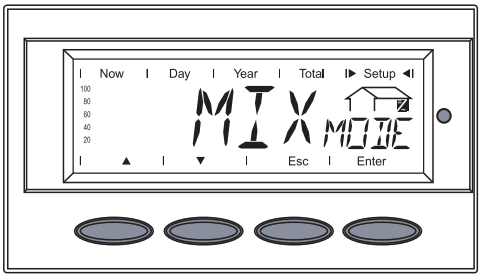



The ‘IFP’ protocol type is applied, ‘MODE’ is displayed.

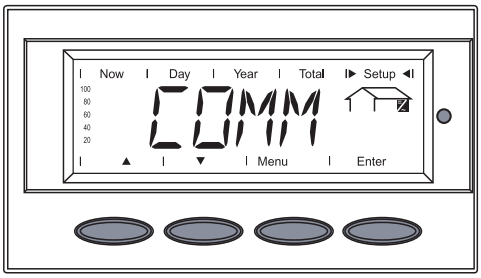
For setting the inverter baud rate without exiting the ‘Basic Service’ menu follow the steps in the enclosed section ‘Setting the Inverter baud rate’, starting from step 3.

6. Press the ‘Esc’ key 2 x to exit the ‘Basic Service’ menu

**Setting the inverter baud rate**



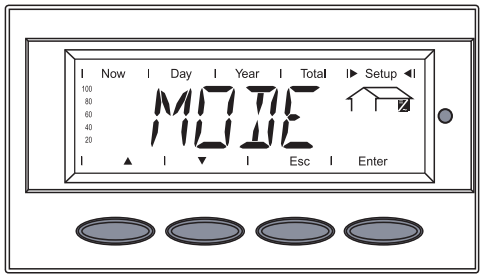

The inverter is in the ‘Basic Service’ menu, the first parameter ‘MIX MODE’ is displayed.



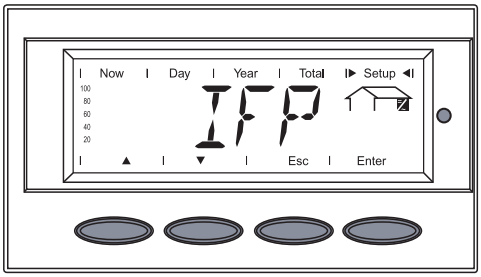

1. Use the ‘Up’ and ‘Down’ keys to select the ‘COMM’ parameter

▲ ▼

2. Press the ‘Enter’ key



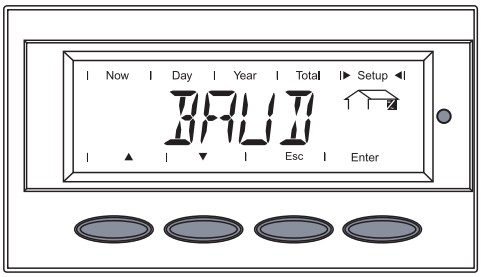

MODE’ is shown.




3. Use the ‘Up’ and ‘Down’ keys to select the ‘IFP’ parameter

▲ ▼

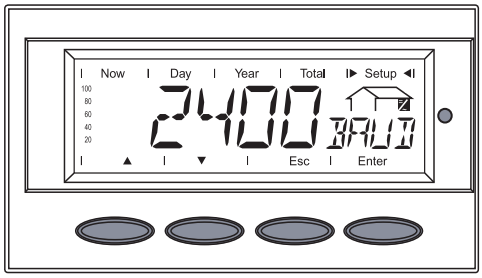
4. Press the ‘Enter’ key




‘BAUD’ is displayed

5. Press the ‘Enter’ key

**Setting the inverter baud rate**
(continued)

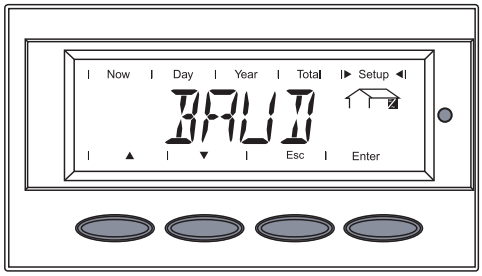



The set baud rate is displayed.

6. Use the ‘Up’ and ‘Down’ keys to select the desired baud rate: 2400 / 4800 / 9600 / 14400 / 19200

▲ ▼

7. Press the ‘Enter’ key




The selected baud rate is applied, ‘BAUD’ is displayed.

8. Press the ‘Esc’ key 3 x to exit the ‘Basic Service’ menu

The inverter begins the startup phase after exiting the ‘Basic Service’ menu.

# Setting the Relay Contact Functions

**General**

According to the assigned relay contact functions the isolated relay contacts at the inverter's connection area can be used for several tasks, e.g.:

- connecting and controlling external ventilation
- giving out an acoustic or visual signal

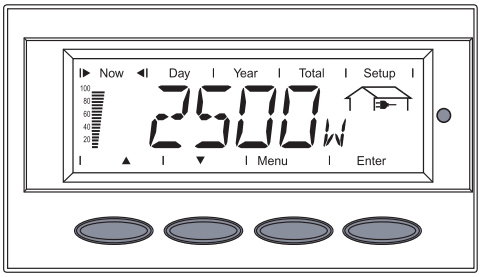
**Possible Functions of Relay Contacts**

| Function number | Activation criterion[1] for the switch contact | Deactivation criterion[2] for the switch contact | Description |
|---|---|---|---|
| 1 | - | - | not available on US devices |
| 2 | Power feed-in possible on DC side | Power feed-in not possible on DC side | Shut-down of external components over night (e.g., 60 Hz transformer) |
| 3 | Cabinet fan in operation | Cabinet fan not in operation | External ventilation / air conditioning can be activated |
| 4 | Max. interior temperature >/= 104 °F | Max. interior temperature </= 86 °F | |
| 5 | Max. interior temperature >/= 122 °F | Max. interior temperature </= 104 °F | |
| 6 | Triggering of continual[3] and temporary[4]) service codes | Error confirmation per key press / per Solar Net command | Status display / Relay contact trips |
| 7 | Triggering of continual[4] service codes | Error confirmation per key press / per Solar Net command | Status display / Relay contact trips |
| 8 | Inverter in feed-in mode | Inverter not in feed-in mode | Control of motorized stop valve |

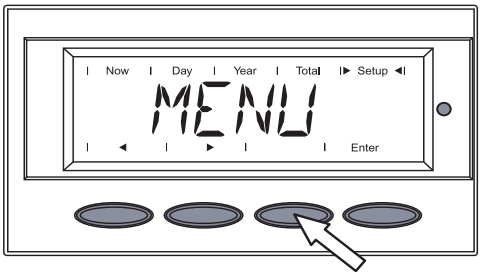
1) Activation = switch contact closes / opens
2) Deactivation = switch contact opens / closes
3) Continual service codes (e.g., for an inverter malfunction or shutdown, when the service code is displayed longer than 4 h 15 min.)
4) Temporary service codes (e.g., brief interruption of feed-in operation, a service code is triggered more than 50 x per day)

**Entering the access code**

The ‘Relay contact functions’ must be set in the ‘Basic Service’ menu.




1. Press the ‘Menu’ key

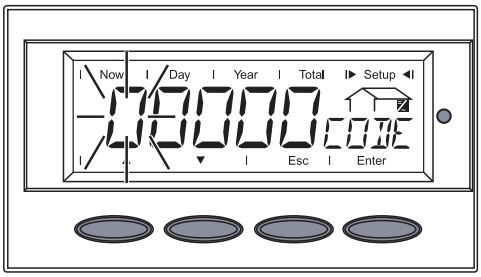



‘Menu’ is shown.

2. Select the ‘Setup’ mode using the ‘Left’ or ‘Right’ keys

◀ ▶

3. Press the unoccupied ‘Menu/Esc’ key 5 x



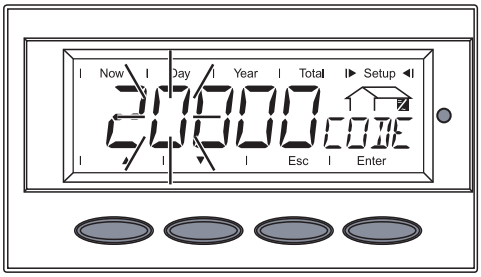

‘CODE’ is displayed, the first digit flashes.

4. Enter the access code 22742:

Use the ‘Up’ and ‘Down’ keys to select a value for the first digit of the access code

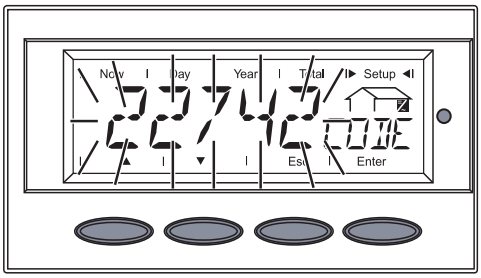
▲ ▼

5. Press the ‘Enter’ key



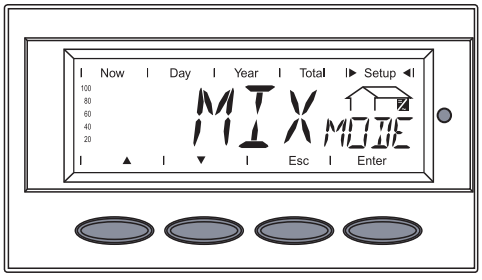

The second digit flashes.

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



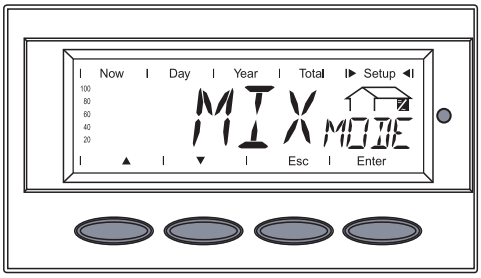

... the access code flashes.

7. Press the ‘Enter’ key

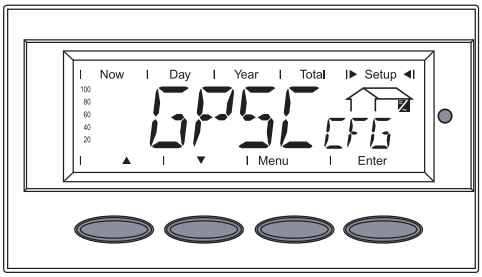



The inverter is now in the ‘Basic Service’ menu, the first parameter ‘MIX MODE’ is displayed.

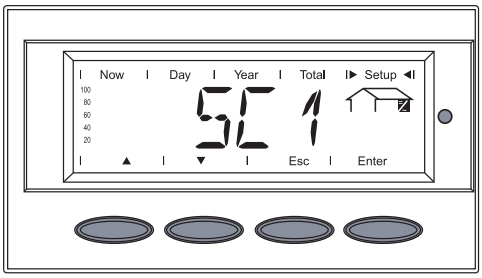
**Setting the relay contact functions**




The inverter is in the ‘Basic Service’ menu, the first parameter ‘MIX MODE’ is displayed.

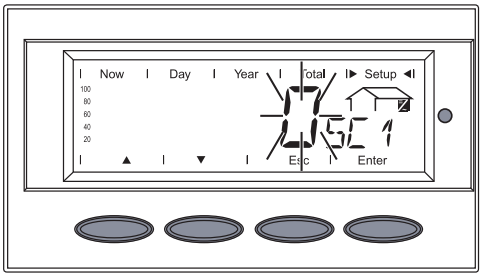



1. Use the ‘Up’ and ‘Down’ keys to select the ‘GPSC CFG’ parameter
   ▲ ▼
2. Press the ‘Enter’ key



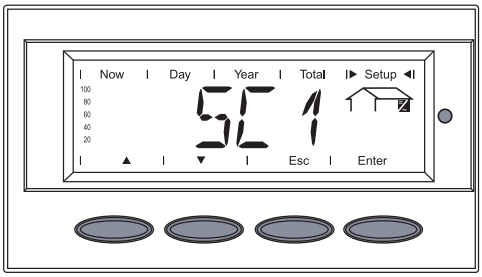

‘SC1’ is shown.

3. Use the ‘Up’ and ‘Down’ keys to select the relay contact:
   SC1 = relay contact 1
   SC2 = relay contact 2
   ▲ ▼
4. Press the ‘Enter’ key




The set relay contact function is displayed, the digit flashes.

5. Use the ‘Up’ and ‘Down’ keys to select a value from 2 - 8 for the relay contact function as per section “Possible Functions of Relay Contacts“
   ▲ ▼
6. Press the ‘Enter’ key
   The selected relay contact function is applied, the presently set relay contact is shown, e.g. ‘SC1’.




7. Press the ‘Esc’ key 3 x to exit the ‘Basic Service’ menu

# Inserting Option Cards

**Safety**

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

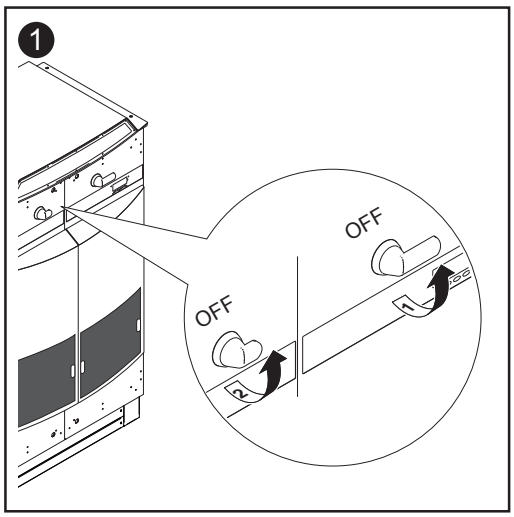
- Never work with live wires! Prior to all connection and maintenance work, make sure that the AC and DC wires are not charged.
- The connection area should only be opened by a licensed electrician.
- Power stage sets should only be opened by Fronius-trained service personnel.
- All electrical installations must be 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.

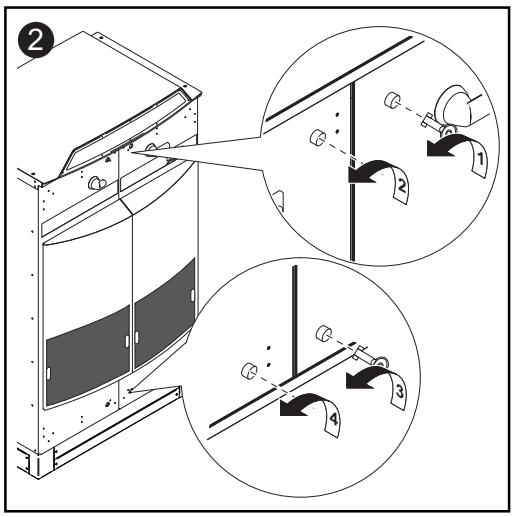
**WARNING!** An electrical shock can be fatal. Danger from residual voltage from capacitors.
You must wait until the capacitors have discharged. Discharge takes 5 minutes.

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

**Opening the Fronius CL**

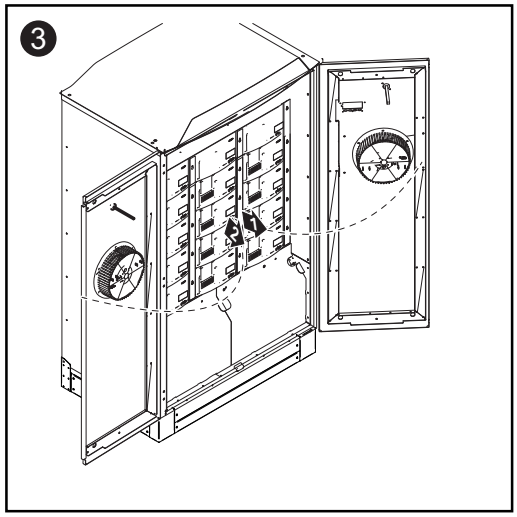
When adding option cards to the Fronius CL, please follow all inverter safety instructions and information.

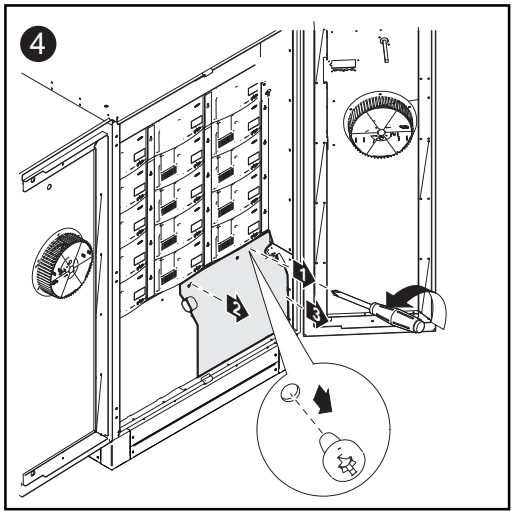


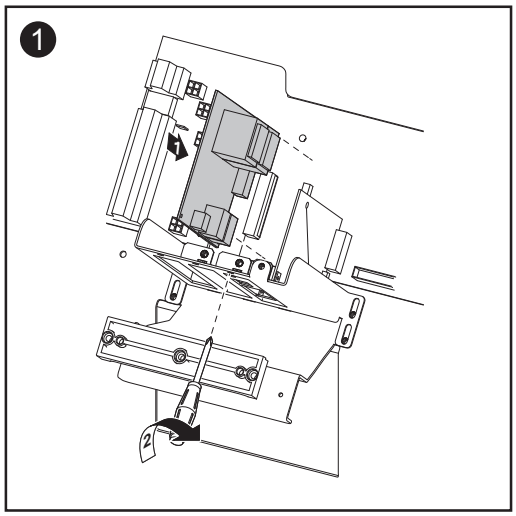

**CAUTION!** An inadequate grounding conductor connection can cause serious injuries to persons and damage to (or loss of) property. The screws on the covers provide an adequate grounding conductor connection for the housing ground and should not under any circumstances be replaced by other screws that do not provide a proper grounding conductor connection.

**Opening the Fronius CL** (continued)



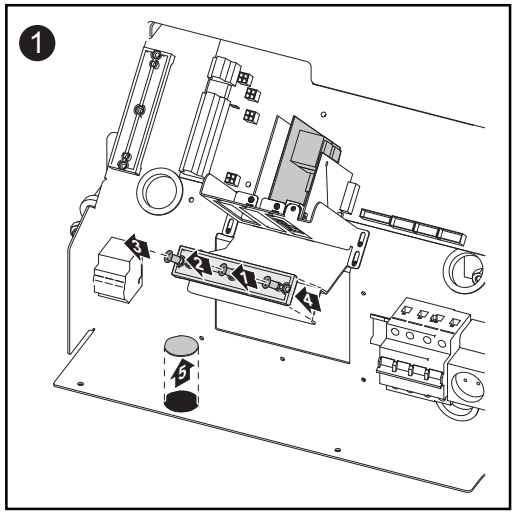

**Inserting Option Cards**




- Insert option cards into free slots and secure.

**Connecting Option Cards, Laying Data Communication Wires**

**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



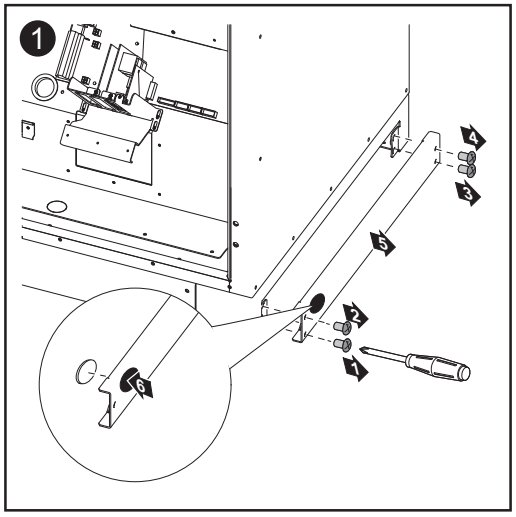

- Remove strain-relief device
- Remove the knockouts

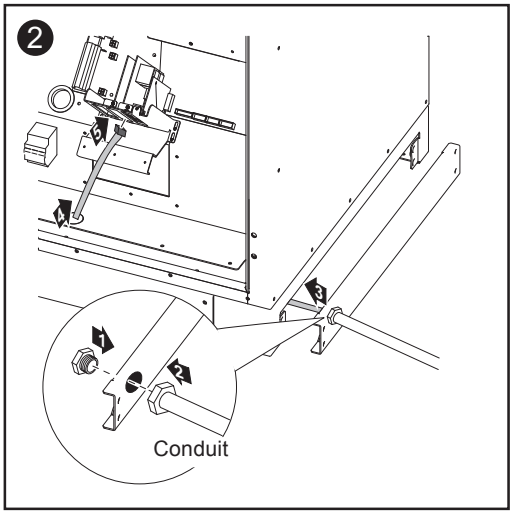
**Connecting Option Cards, Laying Data Communication Wires**
(continued)

Only when data communication cables run into the inverter from the side:

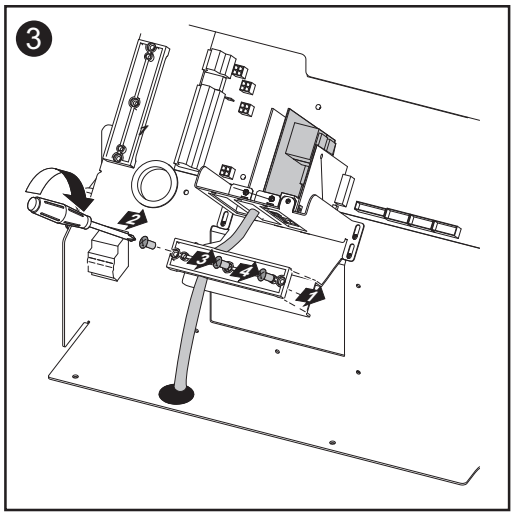
**Important** Use a suitable tool to break out the wire input openings corresponding to the diameter of the data communication cables from the side of the mounting base. Follow all safety instructions from the tool manufacturer.

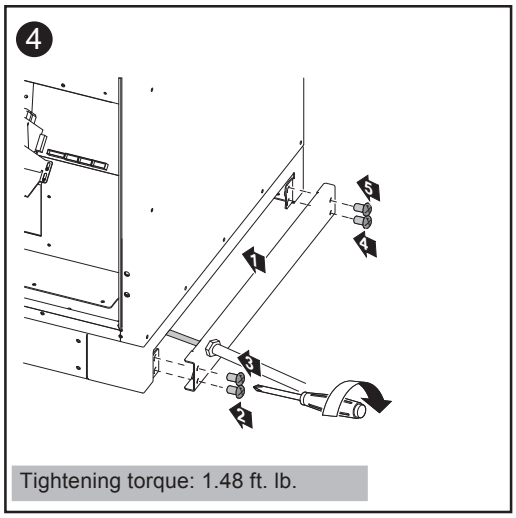
**NOTE** Only use water tight conduit fittings and conduits for inverter cabling. Conduit fittings and conduits are not included with the inverter.



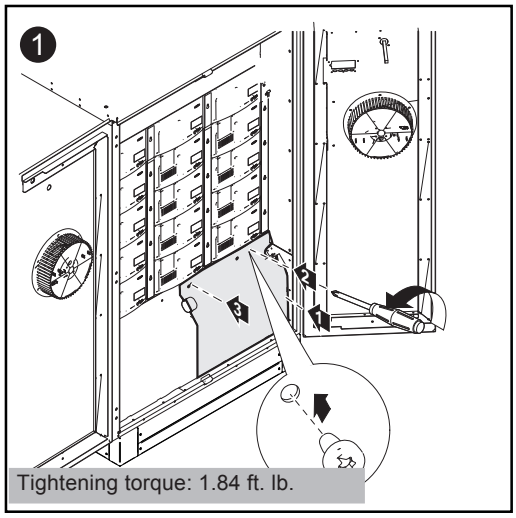

**NOTE** To prevent damage to the data communication cables from the rough edges of wire input openings, install a suitable edge guard in the knockout and wire input opening on the side of the mounting base (e.g., a rubber bushing).



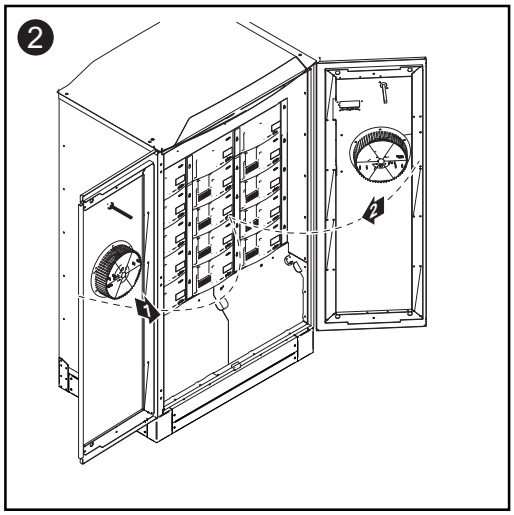



## Closing the Fronius CL

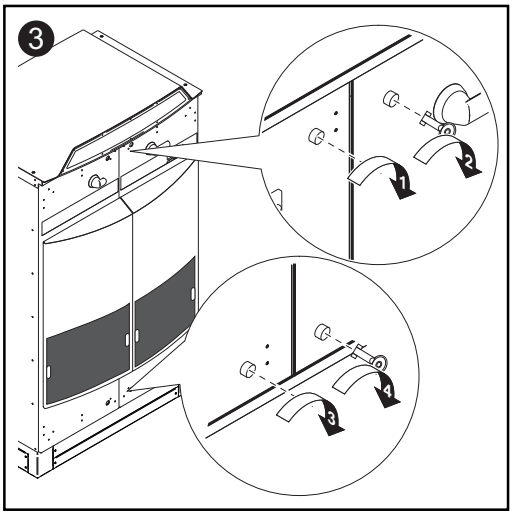
**CAUTION!** An inadequate grounding conductor connection can cause serious injuries to persons and damage to (or loss of) property. The screws on the covers provide an adequate grounding conductor connection for the housing ground and should not under any circumstances be replaced by other screws that do not provide a proper grounding conductor connection.




- Replace right cover
- Secure with screws




- Close doors




- Close door latches

# Solar Net and Data Communication

**Solar Net**

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 data communications components.

**Data Communication**

The core of Solar Net and thus data communication is the **Fronius Datalogger**. It coordinates data transmissions and ensures that even large volumes of data are distributed and stored quickly and securely.

The '**Fronius Com Card**' is used to integrate an inverter into Solar Net.

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

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

The first inverter with a 'Fronius Com Card' can be positioned up to 3281. ft. (1000 m) away from the last inverter or component.

Different data communications components are detected automatically by Solar Net.

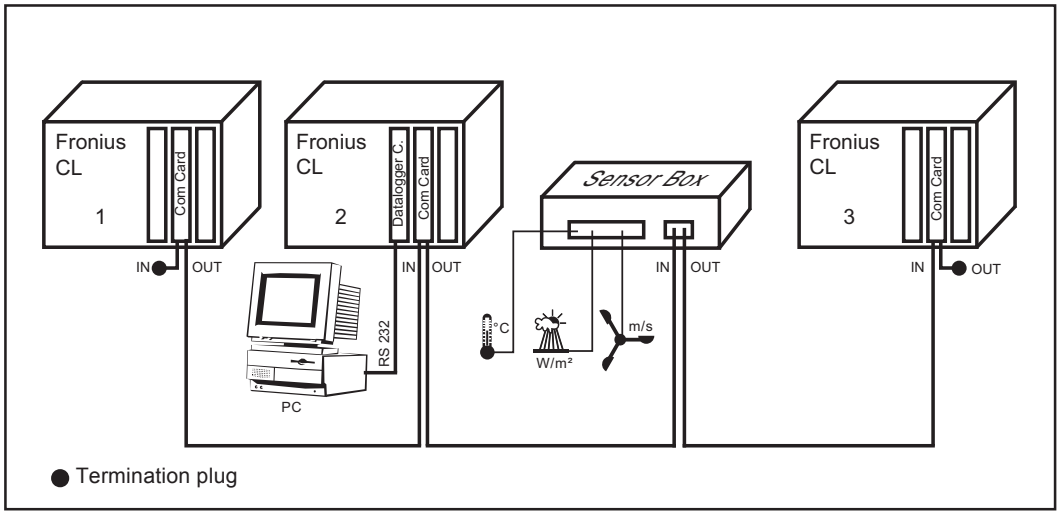
In order to distinguish among several identical data communications components, each one must be assigned a unique number.

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 these operating instructions.

More detailed information on the individual data communication component can be found in the relevant operating instructions or online at http://www.fronius-usa.com.

**Application Example**

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

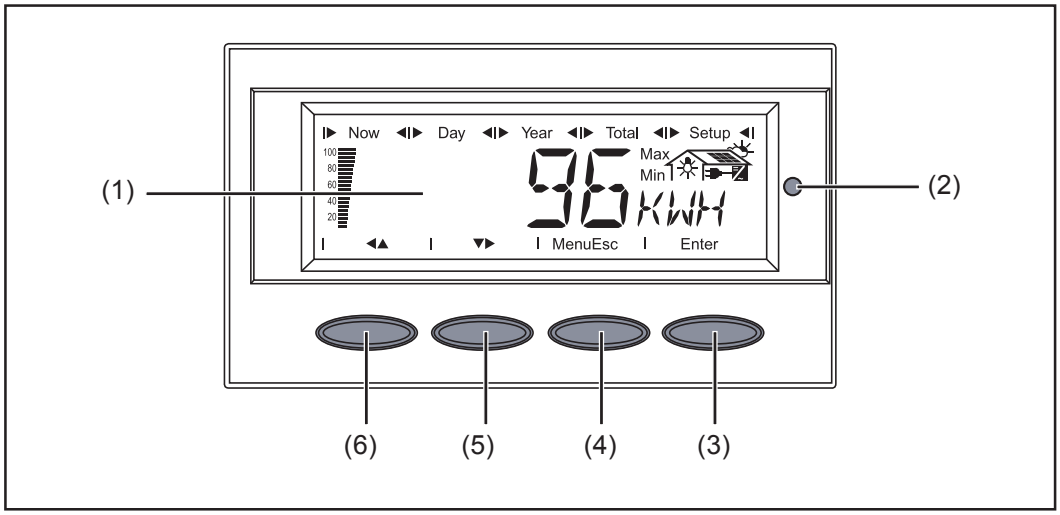



*Data network with 3 Fronius CL units and one Sensor Box:*
- *all Fronius CL units have one 'Fronius Com Card'*
- *one Fronius CL has a 'Fronius Datalogger card' (no. 2)*
- *Fronius Datalogger has two RS-232 interfaces for connecting to a PC and a modem*

Option cards communicate within the inverter via its internal network. External communication (Solar Net) takes place via '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.

# Keys and Symbols

**Keys and Symbols**




*Keys and Symbols on the Inverter*

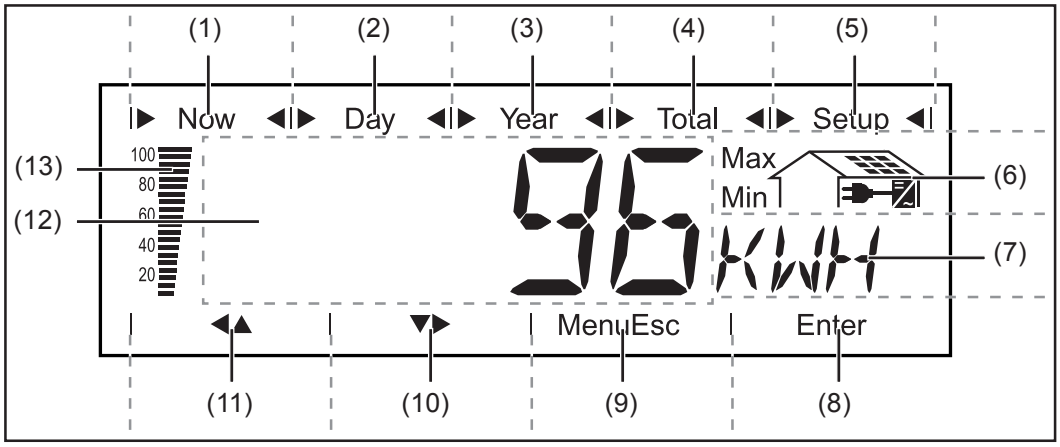
| Item | Function |
|---|---|
| (1) | Display<br>for displaying values, settings and menus |
| (2) | Operating Status LED<br>for displaying the operating status |
| (3) | 'Enter' key<br>for confirming a selection |
| (4) | 'Menu / Esc' key<br>for changing the menu level<br>for exiting the Setup menu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

**Display**

Power for the display comes from the solar modules via safety-low voltage. Therefore, the display is available only during daylight hours.

**Important** The inverter display is not a calibrated measuring instrument. A slight deviation of a few percentage points is intrinsic to the system. A calibrated meter is required to make calculations for the utility company.

**Display**
(continued)




*Display*

| 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 — Indicates the maximum value within the period of observation (depending on the display mode chosen) |
| | Min — Indicates the minimum value within the period of observation (depending on the display mode chosen) |
| | **Important** The min. and max. values may not correspond to the absolute extreme values, as the measured data are recorded at two second intervals. |
| | ... appears with data readings that are directly related to the solar modules |
| | ... appears with AC data readings that are directly related to the grid |
| | ... appears with data readings that are directly related to the inverter |
| (7) | Area for display unit<br>for displaying the applicable measuring unit |
| (8) | Icon for the ‘Enter’ key |
| (9) | Icons for the ‘Menu/Esc’ key |
| (10) | Icons for the ‘Down/Right’ key |
| (11) | Icons for the ‘Left/Up’ key |
| (12) | Area for data<br>for displaying the data value measured |
| (13) | Output bar (not active during setup settings)<br>indicates the output power at a given moment - independent from the display mode chosen. The screen displays % of the maximum possible output power of your solar inverter. |

## Operating Status LED

*Position of Operating Status LED on the Inverter*

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

| Operating Status LED | Explanation |
|---|---|
| lights up green | A green light starts as soon as the inverter has completed the startup phase, and stays green as long as the operation of feeding power into the grid continues.<br>It indicates problem-free operation of the photovoltaic equipment. |
| flashes green | The photovoltaic equipment is operating without fault, an additional message is shown on the screen.<br><br>When a status code is shown, rectify the relevant condition by going to the ‘Maintenance and Service’ chapter, ‘Status Diagnosis and Troubleshooting’ section. The status message can be acknowledged by pressing the ‘Enter’ key. |
| lights up orange | The inverter will enter the automatic startup phase as soon as the photovoltaic modules yield sufficient power output |
| flashes orange | when a warning is shown on the screen<br>or<br>the inverter has been set to standby operation in the setup menu (manual shutoff of operation).<br><br>The next day, operation will resume automatically.<br><br>During the time the LED flashes orange, the operation can be resumed manually at any time (see section ‘The Setup Menu’) |
| lights up red | General status: the respective status code is shown on the screen |
| remains dark | There is no connection to the solar modules<br>no power output from modules due to darkness |

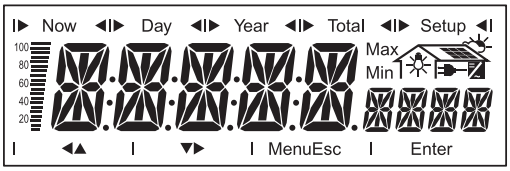
A list of most status codes, the corresponding status information, their status causes and repair measures can be found in the chapter ‘Troubleshooting and Maintenance’, section ‘Status Diagnosis and Troubleshooting’.

# Startup Phase and Grid Feed-in Mode

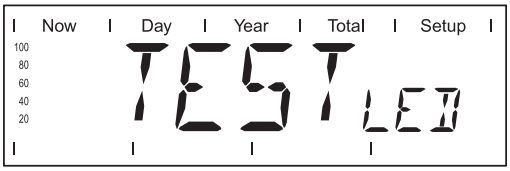
**Startup Phase**

The Fronius CL 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.

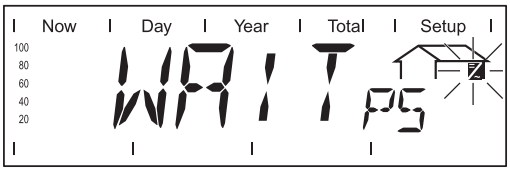
**Test Procedure**



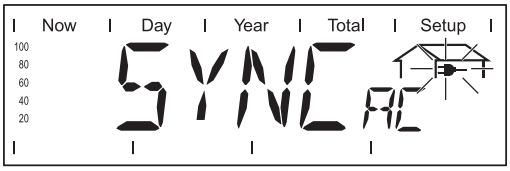

1. Segment test
   All display elements light up for about one second.



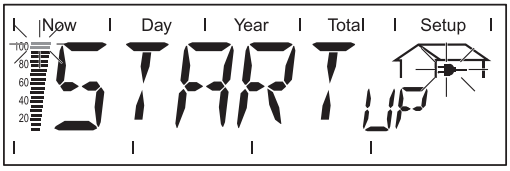

2. Self test of essential inverter components
   - The inverter goes through a master check list for several seconds
   - The display shows ‘TEST’ and indicates the respective component that is being tested (for example, ‘LED’)




3. Synchronization with grid
   - ‘WAITPS’ 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 ‘SYNCAC,’ the grid icon flashes.



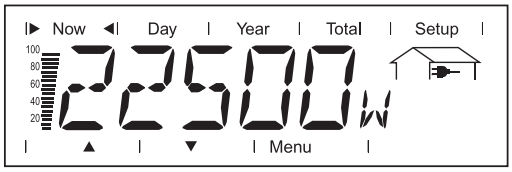

4. Startup test
   - Before the inverter starts feeding energy into the grid, the conditions of the grid are tested in accordance with local regulations.
   - The display shows ‘STARTUP.’

   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**

- After the tests are completed, 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.

# Navigation in the Menu Level

**Activating Display Backlight**

1. Press any key

   The display backlight is activated.

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

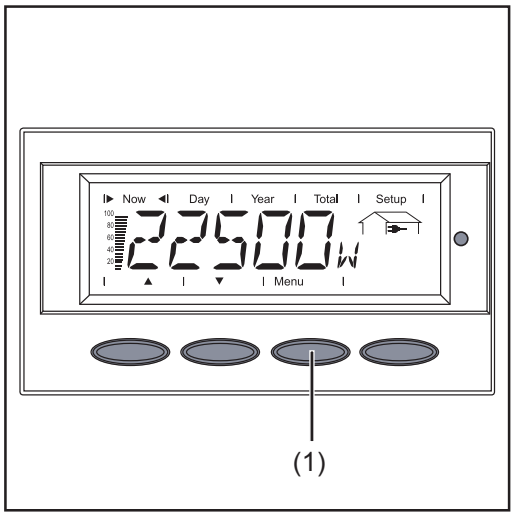
**Automatic Deactivation of Display Illumination / Switching to the 'Now' Display Mode**

If no key is pressed for 2 minutes,

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

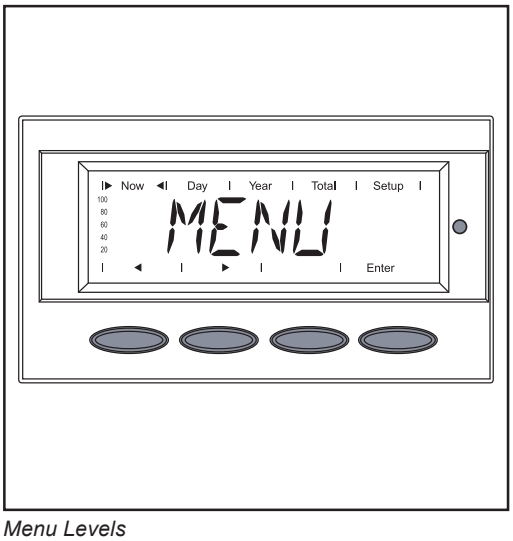
The inverter switches to the "Now" display mode or startup phase from anywhere within the display modes or the Setup menu.

**Accessing Menu Levels**




*Accessing Menu Levels*

1. Press the 'Menu' key (1)




*Menu Levels*

'Menu' appears 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

# Display Modes

**Display Modes**

The following display modes are available for the inverter:

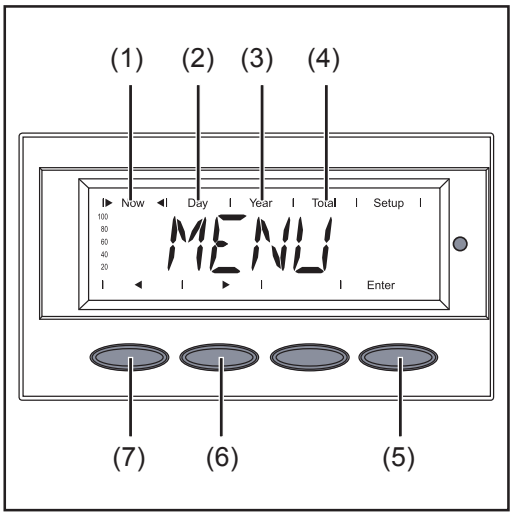
‘Now’ display mode ..... shows present time data

‘Day’ display mode ..... shows data for a period when DC power is present

‘Year’ display mode ..... shows data for the present calendar year - only available in combination with optional Fronius Datalogger

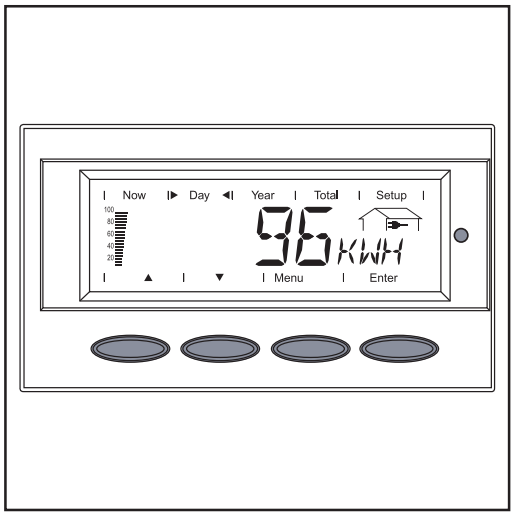
‘Total’ display mode ..... shows data since your inverter first started operating

**Selecting a Display Mode**




*Selecting a Display Mode*

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




*Example: ‘Day’ Display Mode*

The selected display mode is shown.

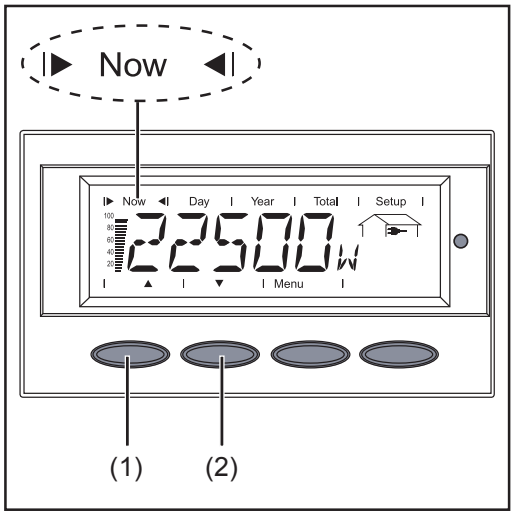
**Overview of Display Values**

| Display mode | Icon | Unit | Optional | Display value |
|---|---|---|---|---|
| 'Now' |  | W | - | output power |
| |  | V | - | AC grid voltage |
| |  | A | - | output current |
| |  | Hz | - | Grid frequency |
| |  | V | - | DC array voltage |
| |  | A | - | Module current |
| |  | MOhm | - | insulation resistance |
| | | HH:MM | x | Time |
| |  | ° F | - | Supply air temperature |
| |  | rpm | - | Speed of left fan |
| |  | rpm | - | Speed of right fan |
| 'Day' |  | kWh / MWh | - | Energy supplied |
| 'Year' |  | Currency | - | Yield |
| 'Total' |  | lb / T | - | $CO_2$ reduction |
| |  | W | - | Maximum output power |
| |  | V | - | Maximum grid voltage |
| |  | V | - | Minimum grid voltage |
| |  | V | - | Maximum array voltage |
| | | HH:MM | - | Operating hours of the inverter |

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

# Display Values in the ‘Now’ Display Mode

**Selecting the ‘Now’ Display Mode**




*First Display Values in the ‘Now’ Display Mode*

1. Select the ‘Now’ display mode

   The first display value appears in the ‘Now’ display mode.

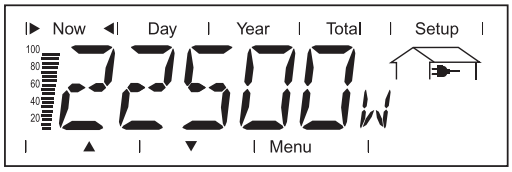
2. Use the ‘Down’ (2) key to scroll to the next display value

   ▼

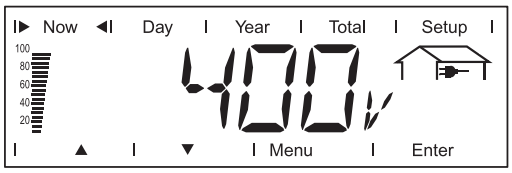
   Scroll back using the ‘Up’ key (1)

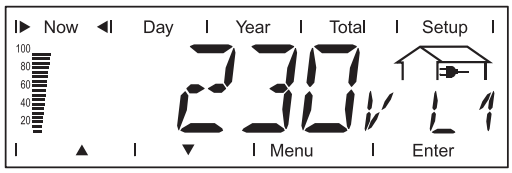
   ▲

**Display Values in the ‘Now’ Display Mode**




**Output power**
power supplied to the grid at the particular moment (Watts)

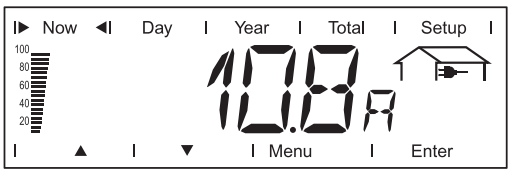



*For Example, Phase Voltage for Phase L1*

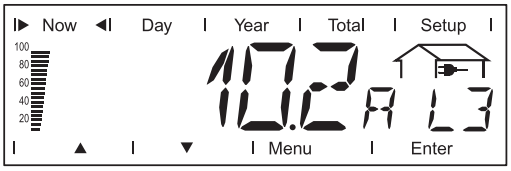
**AC grid voltage**
External conductor voltage (Volts)

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

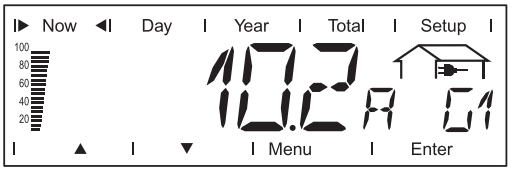



**Output current**
current supplied to the grid at the particular moment (Amperes)

**Display Values in the 'Now' Display Mode**
(continued)

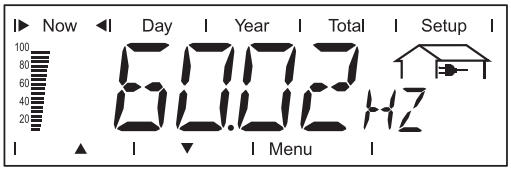



*For Example, Phase Current for Phase L3 (WYE)*

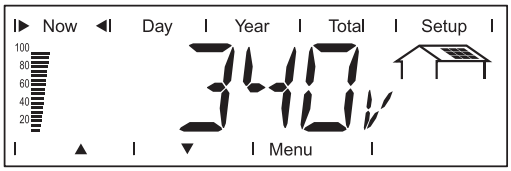



*For Example, Power Stage Set Current for Power Stage Set G1 (DELTA)*

- You can display the phase current for WYE devices and the current of individual power stage sets for DELTA devices by pressing the 'Enter' key.
- You can display the phase current of other phases for WYE devices and the current of other power stage sets for DELTA devices by pressing the 'Up' and 'Down' keys.
- You can return to the menu level by pressing the 'Menu' key.

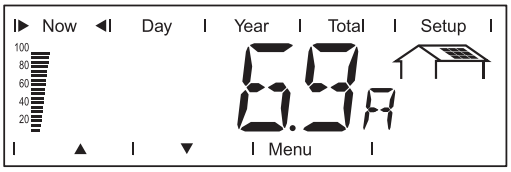



**Grid frequency**
(Hertz)

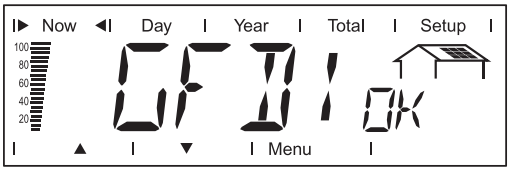



**DC array voltage**
voltage of the solar array at the moment of data display (Volts)

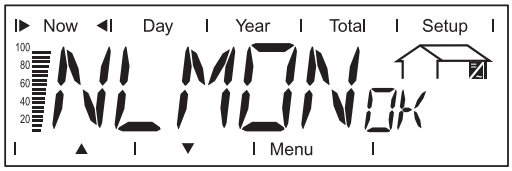
The voltage shown while AC power is supplied is called MPP voltage (MPP = maximum power point).



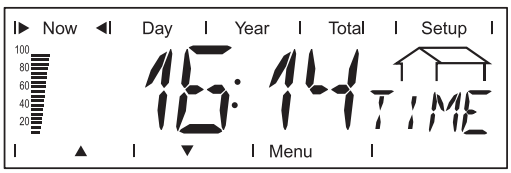

**Module current**
current supplied by solar array at the moment of data display (Amperes)




**GFDI status**
If there is no ground fault in the system, 'GFDIOK' is displayed

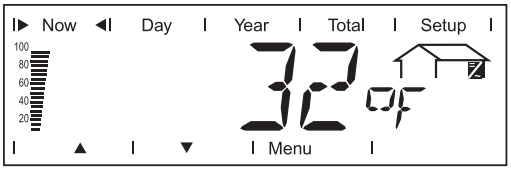



**NL-MON Communication**
When there is communication with the 'NL-MON' plug-in card, 'NLMONOK' is displayed.

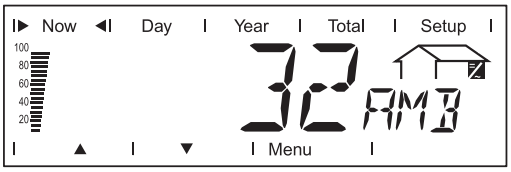


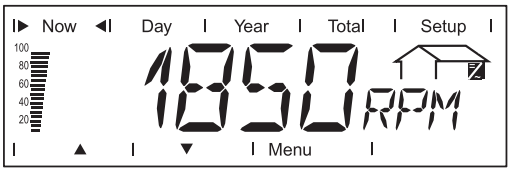

**Time of day (optional Fronius Datalogger)**
When the time on the inverter or on a dataloggere is changed, this changes the time on all devices connected via Solar Net.

**Display Values in the ‘Now’ Display Mode**
(continued)

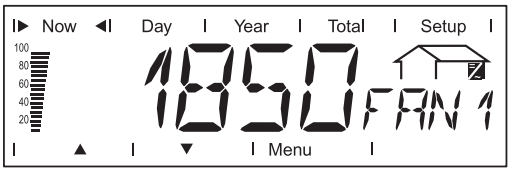


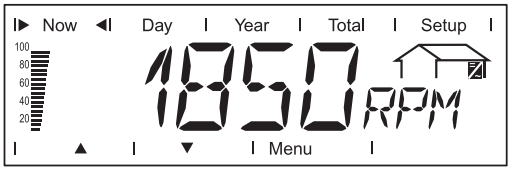

**Supply air temperature**
Temperature of the supply air used to cool the inverter (° F)
The area for unit display switches between ‘°F’ and ‘AMB.’



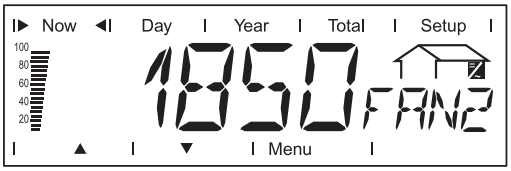




**Speed of left fan - FAN 1**
(rpm - revolutions per minute)
The area for unit display switches between ‘RPM’ and ‘FAN1.’




**Speed of right fan - FAN 2**
(rpm - revolutions per minute)
The area for unit display switches between ‘RPM’ and ‘FAN2.’




**Options**

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

# Display Values in the ‘Day / Year / Total’ Display Modes

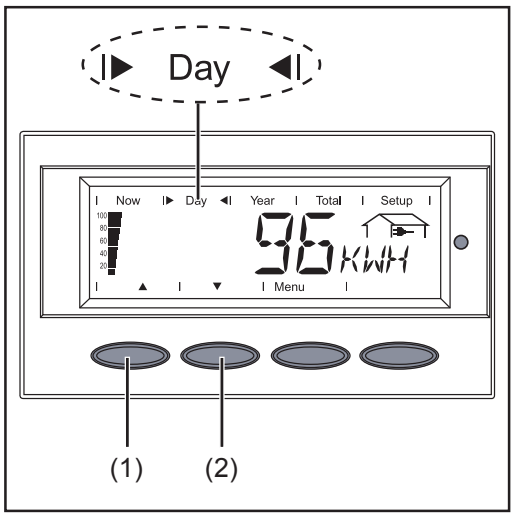
**General**

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 re-set after repeating the start-up:

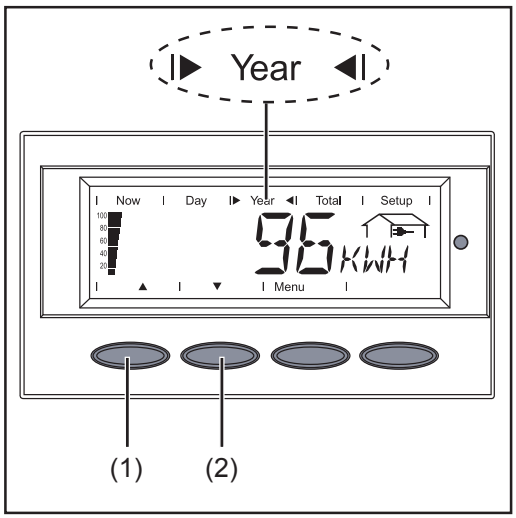
- yield (currency can be selected)
- $CO_2$ reduction (lbs.)
- maximum output power (Watts)
- maximum grid voltage (Volts)
- minimum grid voltage (Volts)
- energy supplied (kWh)
- operating hours of the inverter

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

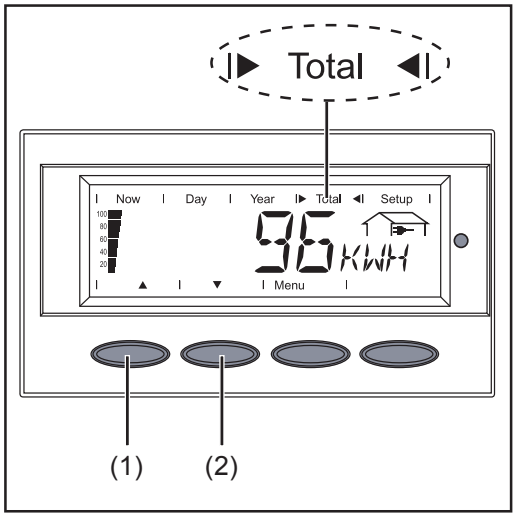
**Selecting ‘Day / Year / Total’ Display Modes**




*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. Selecting ‘Day / Year / Total’ Display Modes

   The First Display Value in the ‘Day / Year / Total’ Display Mode is Shown.

2. Use the ‘Down’ (2) key to scroll to the next display value

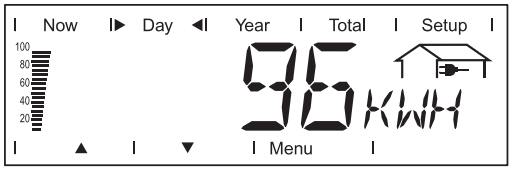
   ▼

   Scroll back using the ‘Up’ key (1)

   ▲

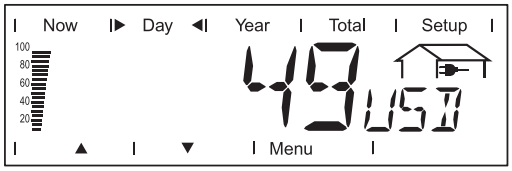
**Important** The ‘Year’ display mode is only supported when the Fronius Datalogger option is installed. This data communications component includes a real-time clock.

**Display Values in the ‘Day / Year / Total’ Display Modes**




**Energy supplied**
Energy supplied during the monitored period (kWh / MWh)

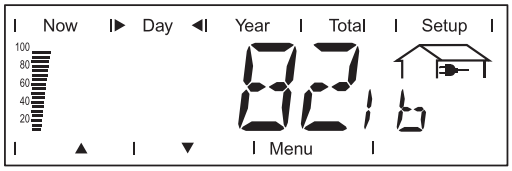
Due to the variety of different monitoring systems, there can be deviations between the readings of other metering instruments as compared to the readings from the inverter. For determining the energy supplied to the grid, only the readings of the calibrated meter supplied by the electric utility company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

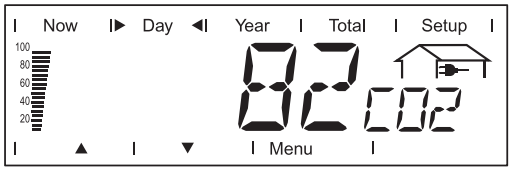



**Yield**
Money earned during the monitored period (set currency and price per kWh in setup menu)

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

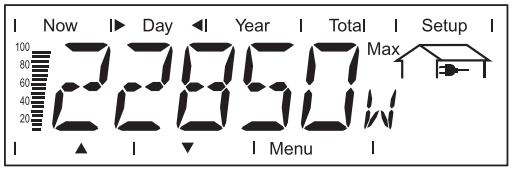
‘The Setup Menu’ section describes how to set the currency and rate for the energy supplied. The factory setting depends on the respective country-specific setting.



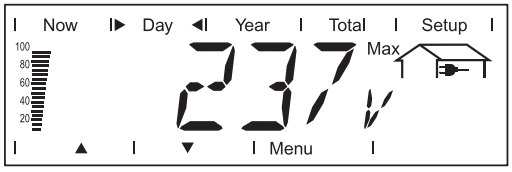




**$CO_2$ reduction**
$CO_2$ emissions saved during the monitored period
(lb or T, pounds or tons)
The area for unit display switches between ‘lb,’ ‘T’ and ‘CO2.’

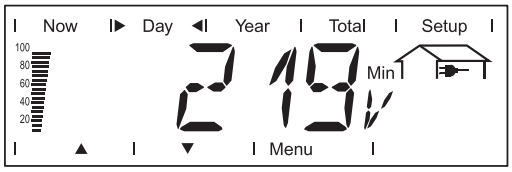
The $CO_2$ meter gives an indication of $CO_2$ emissions that would be released during the generation of the same amount of electricity in a combustion power plant.
This is set for 1.3 lb/kWh in the factory




**Maximum output power**
Highest output power during observation period (watts)

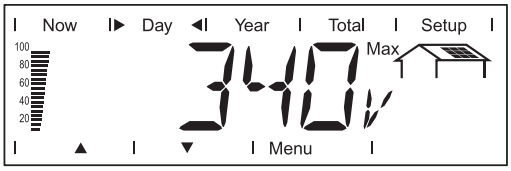



**Maximum grid voltage**
Highest reading of grid voltage (V) during observation period

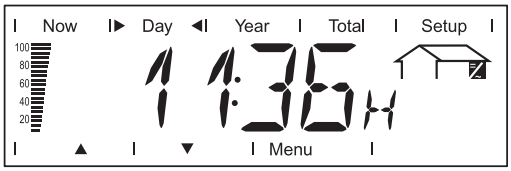



**Minimum grid voltage**
Lowest reading of grid voltage (V) during observation period

**Display Values in the ‘Day / Year / Total’ Display Modes**
(continued)




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




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

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

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

**Options**

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

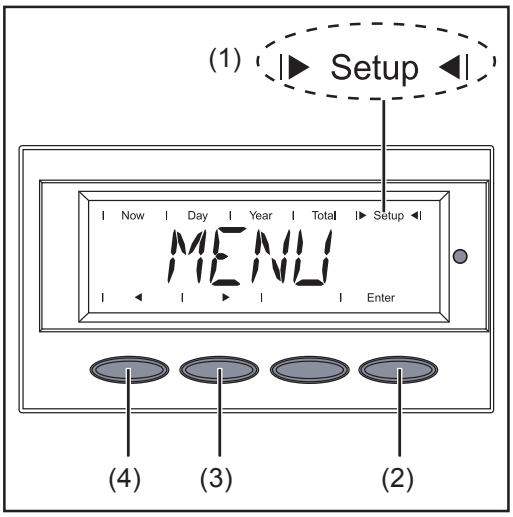
# The Setup Menu

**Default Settings**

The inverter is designed for fully automatic operation. No manual control is necessary for feeding the power it generates into the grid.

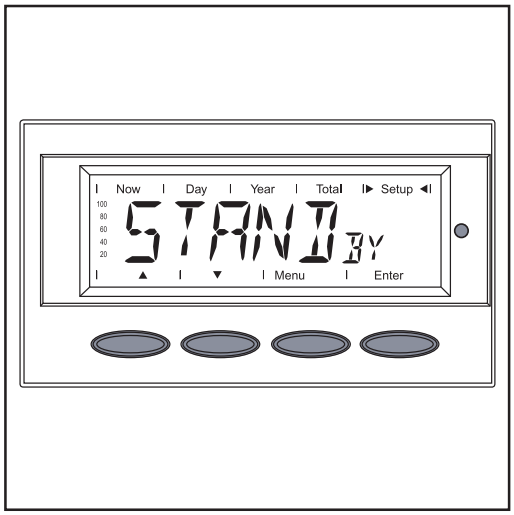
The Setup menu enables you to easily customize the inverter's preset parameters to your needs.

**Accessing the Setup Menu**




*'Setup' Mode Selected in the Menu Level*

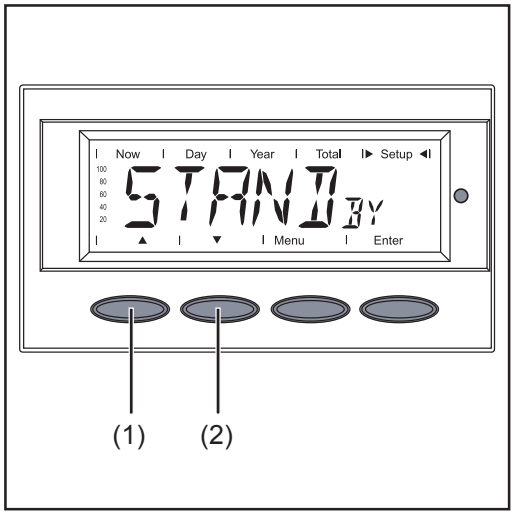
1. Switch to the menu level (press the 'Menu' key)
2. Select the 'Setup' (1) mode using the 'Left' (4) or 'Right' (3) keys
3. Press 'Enter' (2)



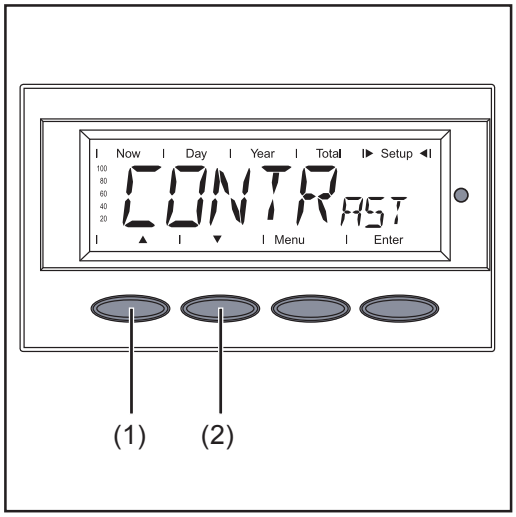

*'STANDBY' Menu Item*

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

## Scrolling through Menu Items



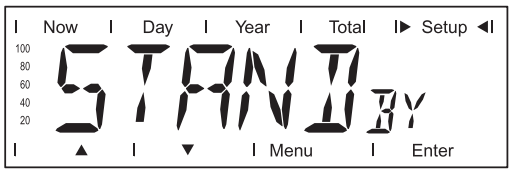

*Example: 'STANDBY' Menu Item*




*Example: 'CONTRAST' Menu Item*

1. Access the setup menu
2. Scroll through the available menu items using the 'Up' (1) and 'Down' (2) keys
   ▲ ▼

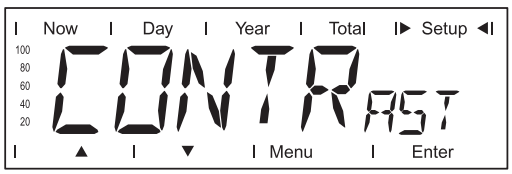
## Menu Items in the Setup Menu




**STANDBY**
Manual activation / deactivation of Stand-by operation using the 'Enter' key

| | |
|---|---|
| Unit | - |
| Setting range | Enter |
| Factory setting | 'Standby' deactivated |

- During standby operation the electronic system of the power stage is switched off. 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')

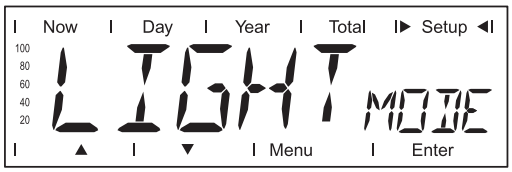



**CONTRAST**
set contrast on LCD display

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

Since contrast depends on temperature, it may be necessary to adjust the menu item 'Contrast' when ambient conditions change

**Menu Items in the Setup Menu**
(continued)




**LIGHTMODE**
default setting of display backlight

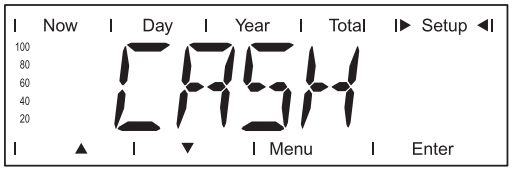
| | |
|---|---|
| Unit | - |
| Setting range | AUTO / ON / OFF |
| Factory setting | AUTO |

AUTO: The display backlight will stop 2 minutes after the last key has been pressed.

ON: The display will remain illuminated whenever power is supplied to the grid

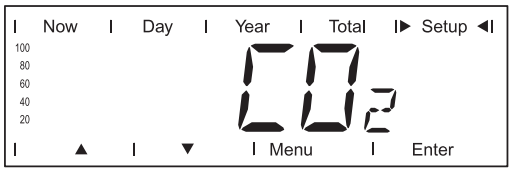
OFF: The display backlight will be permanently off.

**Important** The 'Light Mode' menu item only applies to the display backlight. The LCD display will still remain on during operation. Its energy consumption is less than one mW (1/1000 W).



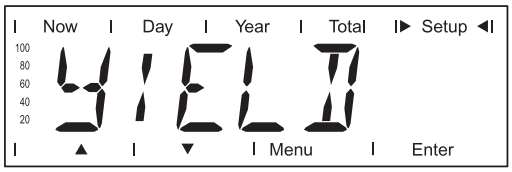

**CASH**
setting of currency and rate for invoicing the energy supplied

| | |
|---|---|
| Unit | - |
| Setting range | Currency / Charge rate/kWh |
| Factory setting | USD |




**$CO_2$**
$CO_2$ reduction factor setting

| | |
|---|---|
| Unit | lb/kWh |
| Setting range | 00.01 - 99.99 |
| Factory setting | 1.3 |



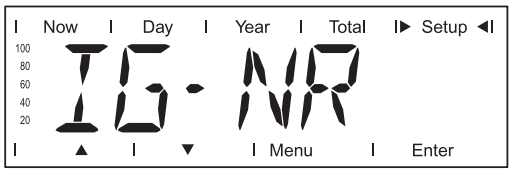

**YIELD**
Setting of
- an OFFSET value for the Total energy display
- a measurement correction value for the Day, Year and Total energy display

| | |
|---|---|
| Unit | - |
| Setting range | OFFSET / CALI. |
| Factory setting | - |

OFFSET: Preset value for the energy supplied, added to the actual energy supplied (e.g., transfer value at the exchange of the inverter)
Setting range: 5 digits + SI prefix (k..., M...)

CALI.: Preset correction value, so that the data shown on the inverter display corresponds to the calibrated data shown on the electric meter
Setting range: -5.0 - +5.0 % in increments of 0.1

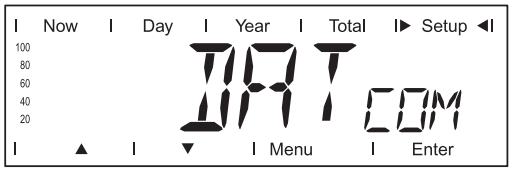
**Menu Items in the Setup Menu**
(continued)




**IG-NR**
Number (address) setting for the inverter in a setup comprising multiple inverters linked together

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

**Important** Each inverter must be assigned its own address when using multiple inverters in a data communications system.



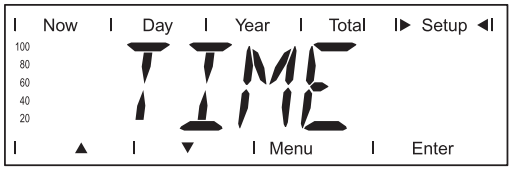

**DATCOM**
indicates status of data transmission, activates the Signal Card, resets the Personal Display Card and Interface Card

| | |
|---|---|
| Unit | - |
| Display range | OKCOM / ERRORCOM / IFP |
| Testing range | SIGCDTEST / SIGCDNI, PDCDRST / PDCDNI, IFCDRST / IFCDNI, TAC |
| Factory setting | - |

| | |
|---|---|
| OKCOM | Data connection available |
| ERRORCOM | Data connection faulty or DATCOM is not installed |
| IFP | Data transmission via interface protocol selected |
| SIGCDTEST | Function test for the Fronius Signal Card option *) |
| SIGCDNI | Fronius Signal Card not installed |
| PDCDRST | Reset Fronius Personal Display Card |
| PDCDNI | Fronius Personal Display Card not installed |
| IFCDRST | Reset Fronius Interface Card |
| IFCDNI | Fronius Interface Card not installed |
| TAC ON | Function test for the Fronius Power Relay Card (TAC) option *) |

*) The Fronius Signal Card and Fronius Power Relay Card (TAC) options are not available for the Fronius CL. These functions were implemented without additional option cards on the "Snowball" PC board (fan controller) via the potential-free relays.

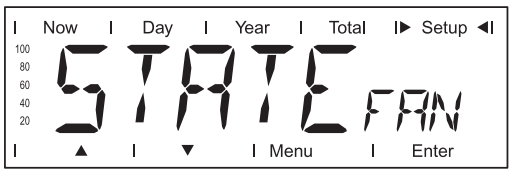
**Menu Items in the Setup Menu**
(continued)




**TIME**
setting of date and time

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

The ‘Time’ menu item is only supported when the Fronius Datalogger option is installed.

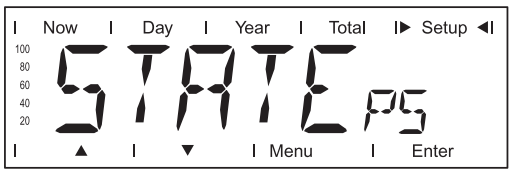



**STATEFAN**
fan status indicator

| | |
|---|---|
| Unit | - |
| Display area | N.I.FAN / SAFETYX and STOPX / SELF and TEST / O.K.FAN |
| Factory setting | - |

| | |
|---|---|
| N.I.FAN | No communication between the inverter control unit (IG Brain) and the fan controller (Snowball) |
| SAFETYX and STOPx | Fans are stopped for safety reasons;<br>‘x’ describes the error:<br>0 ... general error (over-temperature, overcurrent)<br>1 ... left fan malfunction<br>2 ... right fan malfunction<br>3 ... left and right fan malfunction<br>4 ... fan in connection area malfunction<br>5 ... left fan and fan in connection area malfunction<br>6 ... right fan and fan in connection area malfunction<br>7 ... all 3 fans malfunction |
| SELF and TEST | Running a self test |
| O.K.FAN | Fans are OK and operating normally |

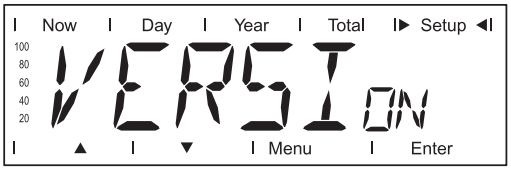
When there is a communication connection and no self test has been run, you can trigger the fan controller self test by pressing the ‘Enter’ key.
- ‘TEST’ is displayed after pressing the ‘Enter’ key.
- Repressing ‘Enter’ triggers the fan controller self test. The display then switches back to the ‘STATEFAN’ menu item.




**STATEPS**
Status display of power stage sets PS00 - max. PS14, the last error that has occurred can be displayed.

**Important** State 306 (Power Low) and 307 (DC-Low) appear naturally every morning and evening due to low solar irradiance. These status messages are not the result of a fault.

**Menu Items in the Setup Menu**
(continued)




**VERSION**
displays the version number and serial number of the electronic components (e.g., IG-Brain, power stage sets, display)

| | |
|---|---|
| Unit | - |
| Display area | MAINCTRL / LCD / PS (PS00, PS01 ... PS14) / SNOWBALL |
| Factory setting | - |
| MAINCTRL | Version information of the IG-Brain unit (inverter controller) |
| LCD | Version information of the display |
| PS | Version information of the power stage sets (PS00 - PS14) |
| SNOWBALL | Version information of the Snowball PC board (controls the fan among other things) |

# Setting and Displaying Menu Items

**General Menu Item Settings**

1. Access the Setup menu
2. Use the ‘Up’ and ‘Down’ keys to select the desired menu item
3. Press the ‘Enter’ key
4. Use the ‘Up’ and ‘Down’ keys to change the value of the menu item

To save the changed values:

5. Press the ‘Enter’ key
   - the changed values are saved in the menu item
   - the presently selected menu item is shown

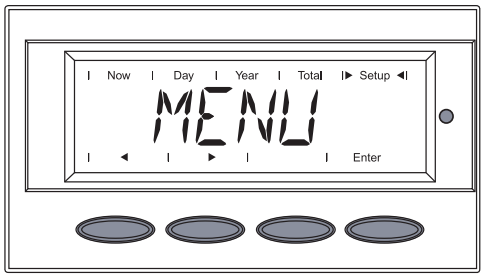
To not save the changed values:

5. Press the ‘Esc’ key
   - the changed values are not saved in the menu item
   - the presently selected menu item is shown

**Exiting a Menu Item**

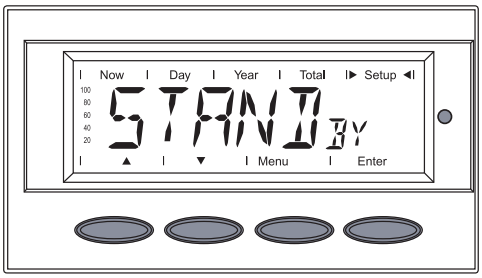
1. To exit a menu item, press the ‘Menu / Esc’ key

The menu level is displayed:



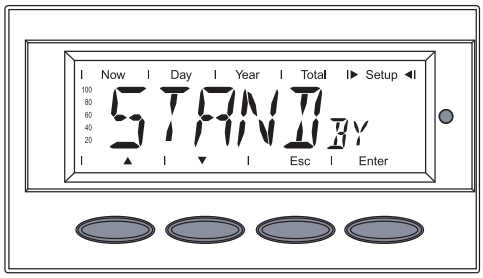

If no key is pressed for 2 minutes,
- the inverter switches to the ‘Now’ display mode from anywhere within the Setup menu
- the display illumination turns off
- the present output power is displayed

**Setting Standby Mode - Manual Shutoff of Feeding Energy into the Grid**




1. Select the ‘Standby’ menu item
2. Press the ‘Enter’ key

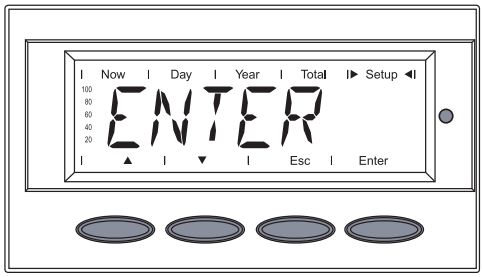
**Setting Standby Mode - Manual Shutoff of Feeding Energy into the Grid**
(continued)




The display switches between ...

‘STANDBY’

and ...

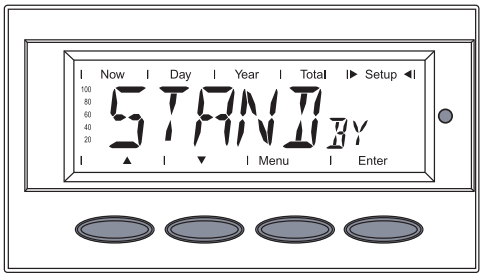



‘ENTER’

The Standby mode is now activated (manual shutoff of feeding energy into the grid).

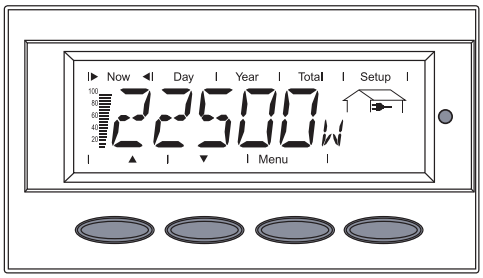
The Operating Status LED lights up orange.

**Restoring the Grid Feed**



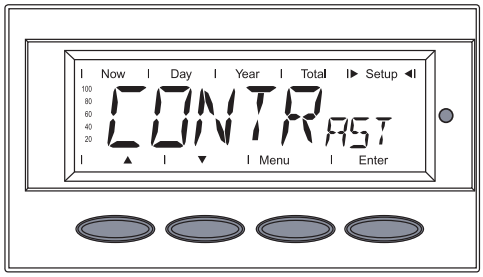

1. Select the ‘Standby’ menu item
2. Press the ‘Enter’ key

The inverter switches to the Startup phase.

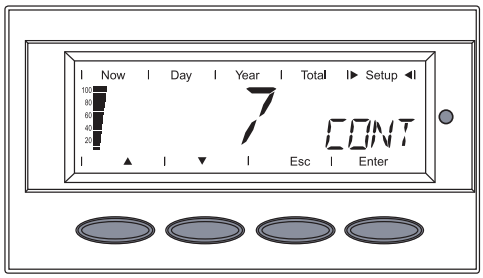



After a successful startup, the Operating Status LED will be green. The present power feed will be displayed.

**Setting the Display Contrast**

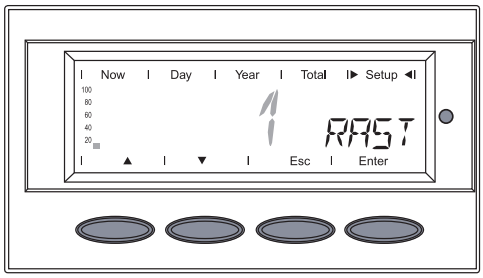



1. Select the ‘CONTRAST’ menu item
2. Press the ‘Enter’ key



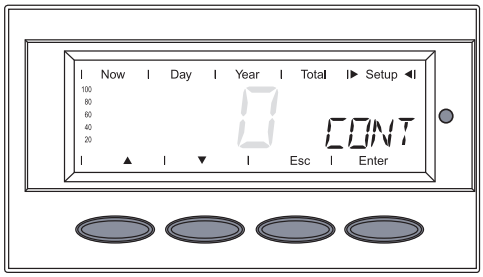

Setting ‘7’ for maximum possible contrast is shown.

## Setting the Display Contrast (continued)



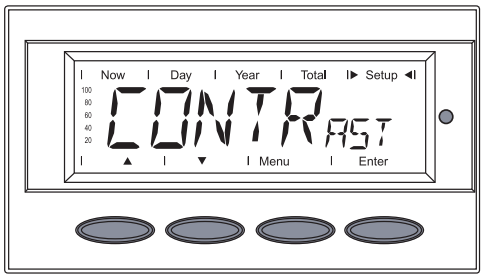

3. Use the ‘Up’ and ‘Down’ keys to select the desired level of contrast

▲ ▼



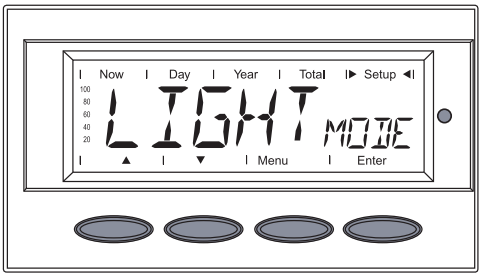

Setting ‘0’ for the minimum possible contrast

4. Press the ‘Enter’ key to accept the setting

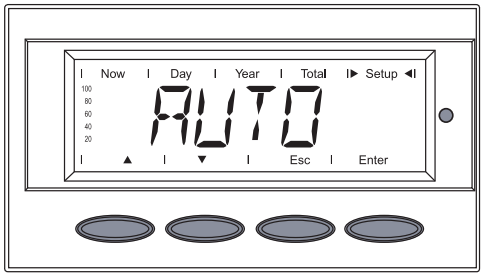



The set contrast is applied. The ‘Contrast’ menu item is displayed.

## Setting the Display Illumination




1. Select the ‘LIGHTMODE’ menu item
2. Press the ‘Enter’ key

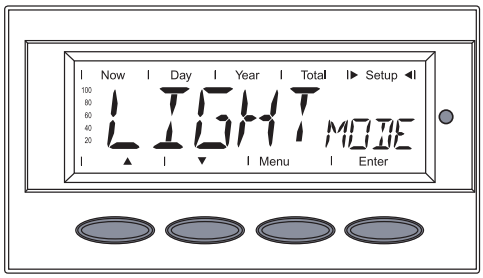



The ‘AUTO’ setting is shown.

3. Use the ‘Up’ and ‘Down’ keys to select the desired setting for the display illumination

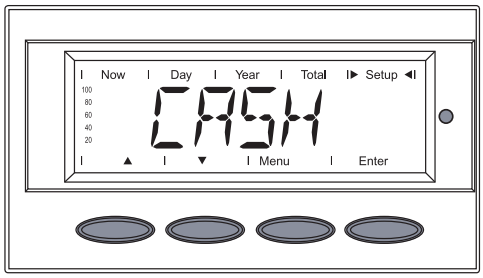
▲ ▼

4. Press the ‘Enter’ key to accept the setting

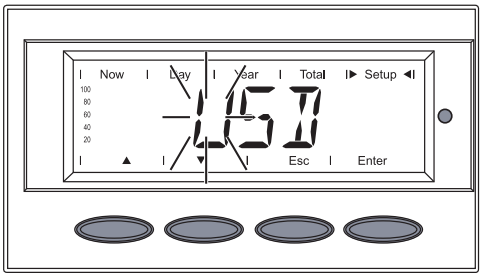



The display illumination setting is applied. The ‘LIGHTMODE’ menu item is displayed.

## Setting the Currency and Rate




1. Select the ‘CASH’ menu item
2. Press the ‘Enter’ key

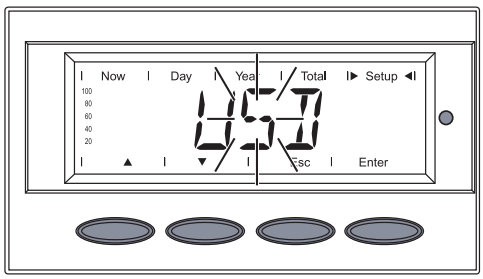



The **currency** is shown
Factory setting = ‘USD’
The first of 3 characters flashes.

3. Use the ‘Up’ and ‘Down’ keys to select a letter for the first character

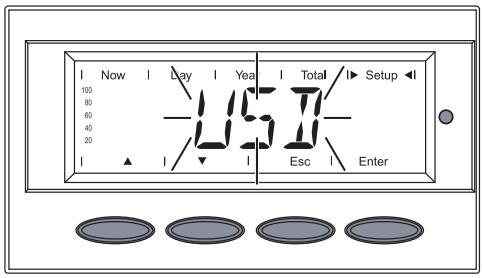
▲ ▼

4. Press the ‘Enter’ key



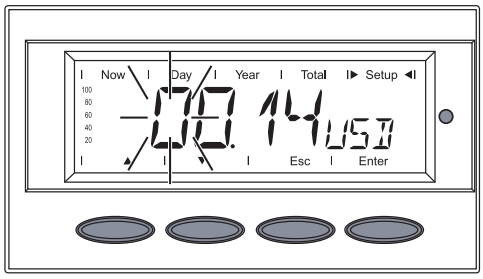

The second digit flashes.

5. Repeat steps 3 and 4 for the second and third characters until ...




The set currency flashes.

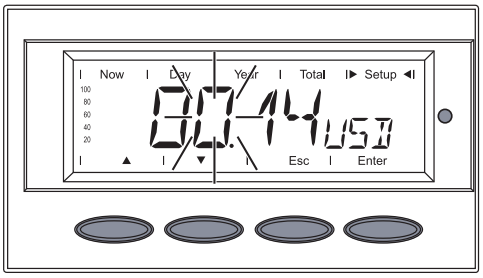
6. Press the ‘Enter’ key




The currency is applied. The **charge rate** is displayed in kWh/currency
factory setting = 0.14 USD / kWh
The first digit flashes.

7. Use the ‘Up’ and ‘Down’ keys to select a value for the first digit (e.g., 0)

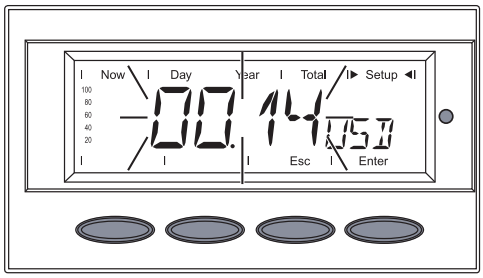
▲ ▼




8. Press the ‘Enter’ key
The second digit flashes.

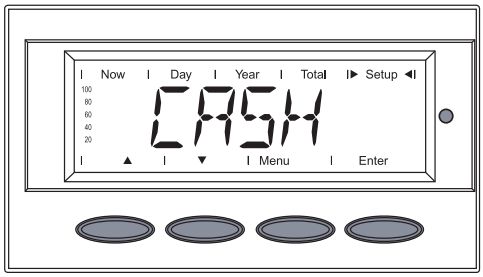
9. Repeat steps 7 and 8 for the first, second and third digit after the decimal point until ...

## Setting the Currency and Rate (continued)



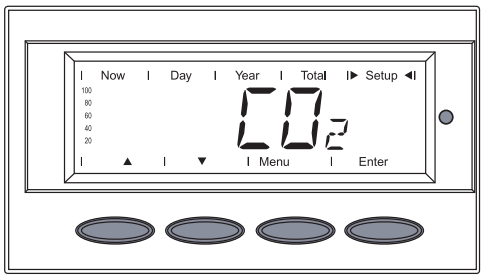

The set rate for energy supplied flashes.

10. Press the ‘Enter’ key

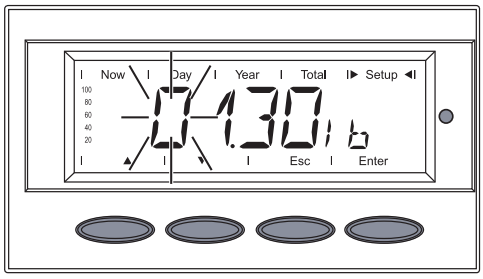



The charge rate is applied. The ‘Cash’ menu item is displayed.

## Setting the $CO_2$ Reduction Factor

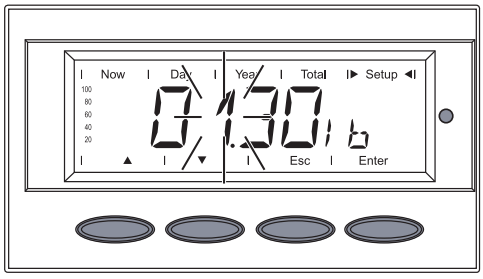



1. Select the ‘$CO_2$’ menu item
2. Press the ‘Enter’ key



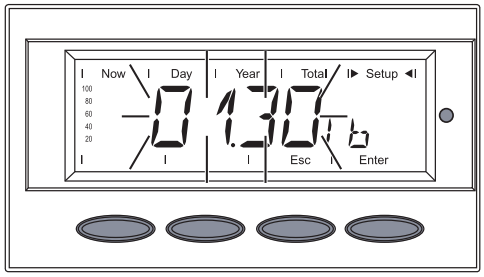

The $CO_2$ reduction factor is shown. The first digit flashes.

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




The second digit point flashes.

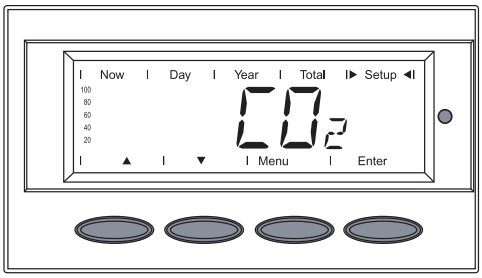
5. Repeat steps 3 and 4 for the first, second and third digit after the decimal point until ...




The set $CO_2$ reduction factor flashes.

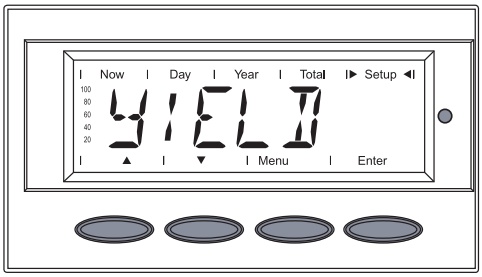
6. Press the ‘Enter’ key

**Setting the $CO_2$ Reduction Factor** (continued)

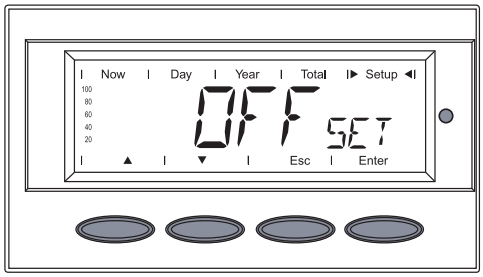



The set CO2 reduction factor is applied. The '$CO_2$' menu item is displayed.

**Setting the Offset Value for Total Energy Display and Measure-ment Correction Value**

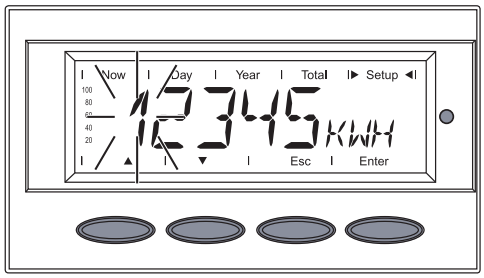



1. Select the 'YIELD' menu item
2. Press the 'Enter' key




'OFFset' is shown

3. Press the 'Enter' key

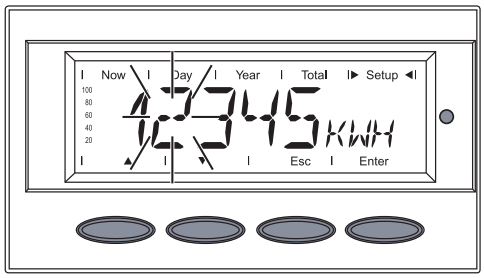



The **Yield Offset value** is shown, the first digit flashes.

3. Use the 'Up' and 'Down' keys to select a value for the first digit

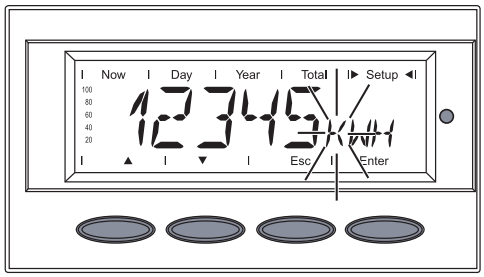
▲ ▼

4. Press the 'Enter' key




The second digit of the Yield Offset value flashes.

5. Repeat steps 3 and 4 for the second, third, fourth and fifth digit until ...




The SI prefix flashes.

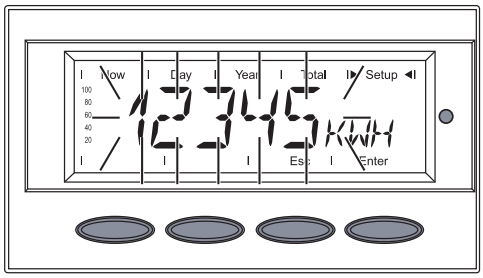
6. Use the 'Up' and 'Down' keys to select the SI prefix:

▲ ▼

1 kWh = 1,000 Wh
1 MWh = 1,000,000 Wh

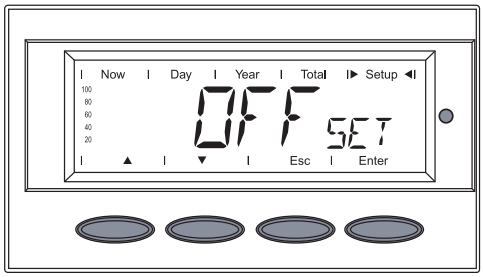
7. Press the 'Enter' key

**Setting the Offset Value for Total Energy Display and Measure-ment Correction Value**
(continued)




The Yield Offset value and the unit flash.

8. Press the ‘Enter’ key

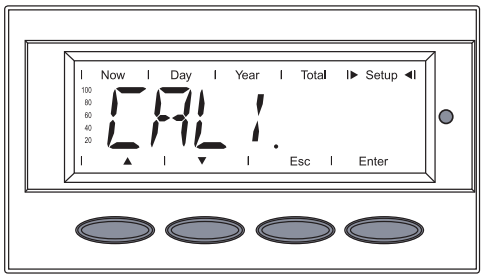



The Yield Offset value and the SI prefix are applied.

‘OFFset’ is shown

9. Press the ‘Up’ or ‘Down’ key

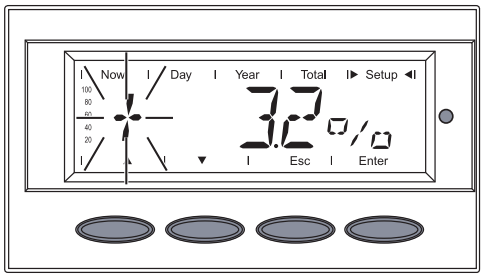
▲ ▼




‘CALI.’ is shown

**Important** In order to align the inverter effectively, the inverter must be measured against a meter of known accuracy before entering the calibration factor.

10. Press the ‘Enter’ key

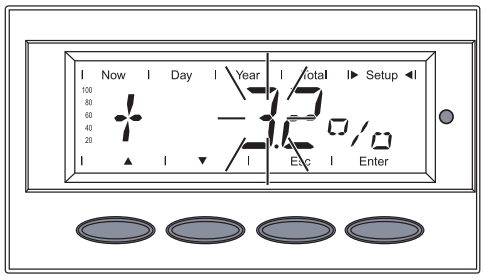



The correction value in % is shown, the digit for the sign flashes.

11. Use the ‘Up’ and ‘Down’ keys to select a sign for the correction value

▲ ▼

12. Press the ‘Enter’ key

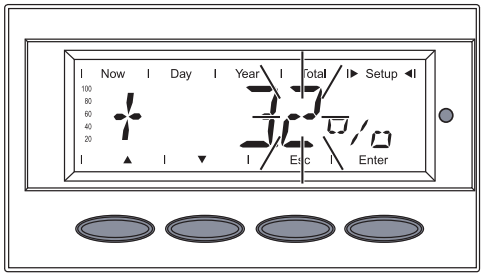



The first digit of the correction value flashes.

13. Use the ‘Up’ and ‘Down’ keys to select a value for the first digit

▲ ▼

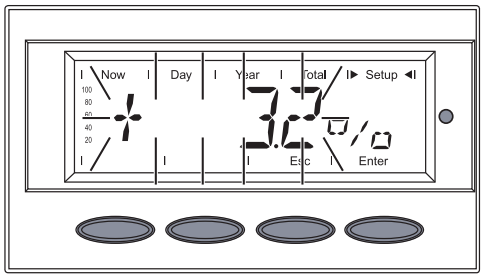
14. Press the ‘Enter’ key




The first digit after the decimal point flashes.

15. Repeat steps 13 and 14 for the first, second and third digit after the decimal point until ...

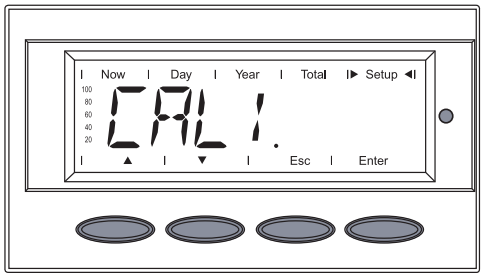
**Setting the Offset Value for Total Energy Display and Measure-ment Correction Value**
(continued)




The set correction value flashes.

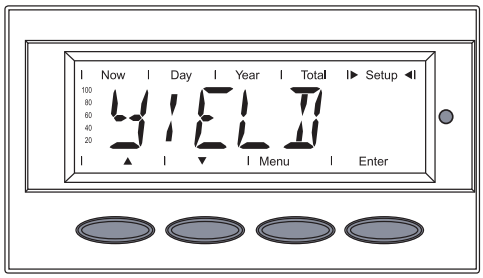
16. Press the ‘Enter’ key

The set correction value is applied.



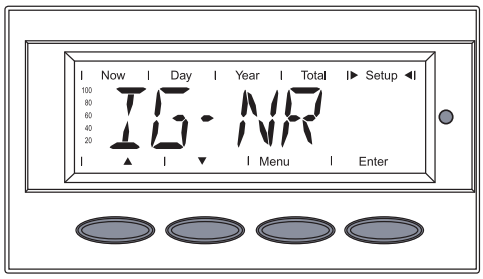

‘CALI.’ is shown

17. Press the ‘Esc’ key

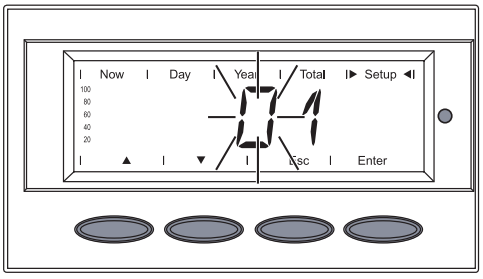



The ‘YIELD’ menu item is displayed.

**Setting the Inverter Number**




1. Select the ‘IG-NR’ menu item
2. Press the ‘Enter’ key

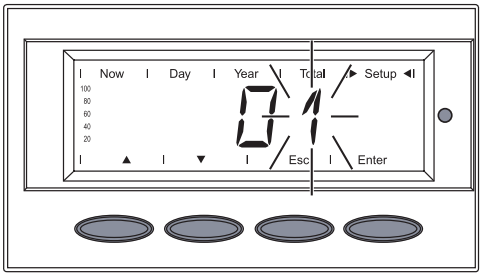



The inverter number is shown, the first digit flashes.

3. Use the ‘Up’ and ‘Down’ keys to select a value for the first digit

▲ ▼

4. Press the ‘Enter’ key



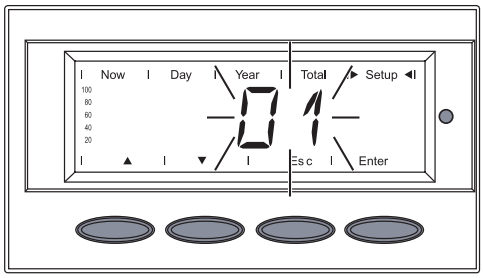

The second digit flashes.

5. Use the ‘Up’ and ‘Down’ keys to select a value for the second digit

▲ ▼

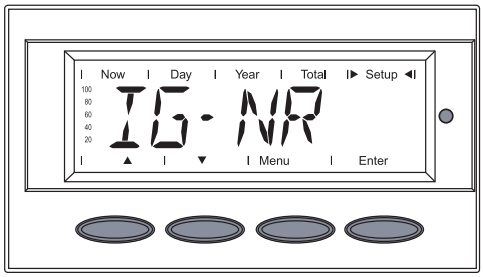
6. Press the ‘Enter’ key

**Setting the Inverter Number** (continued)



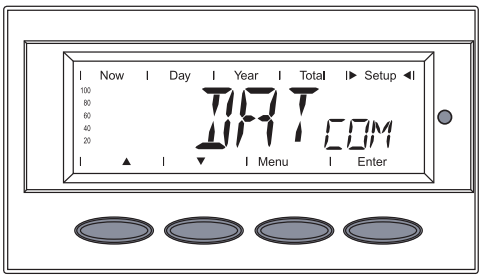

The inverter number flashes.

7. Press the ‘Enter’ key




The inverter number is applied. The ‘IG-Nr.’ menu item is displayed.

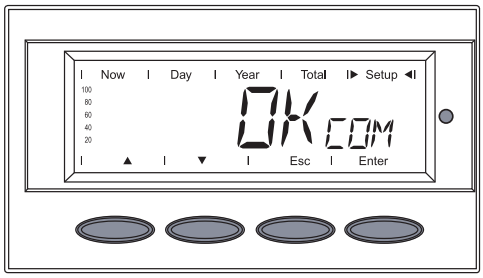
**Displaying and Setting Parameters in the ‘DATCOM’ Menu Item**




1. Select the ‘DATCOM’ menu item
2. Press the ‘Enter’ key

The following displays depend on whether
- a data connection is available
- a data connection is faulty or an option is not installed

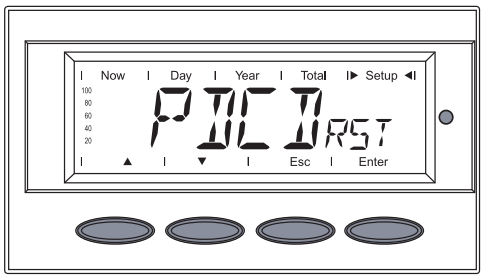
**Data connection available**



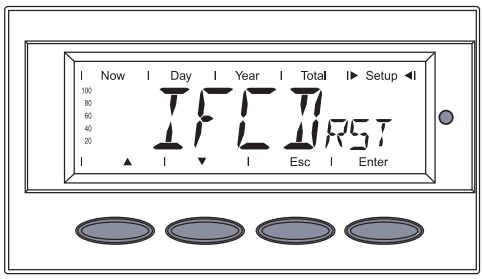

If there is a data connection available, ‘OKCOM’ is shown.

3. Use the ‘Down’ key to access the ‘Signal Card Test’

▼



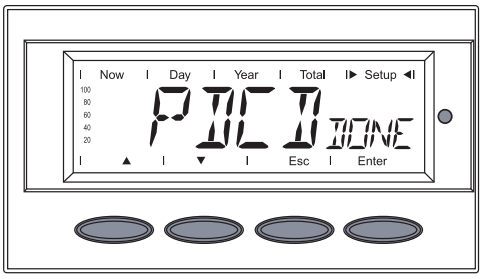

e.g., Reset Personal Display Card (‘PDCDRST’) ...




... or Reset Interface Card (‘IFCDRST’)

4. Press the ‘Enter’ key

**Displaying and Setting Parameters in the 'DATCOM' Menu Item** (continued)

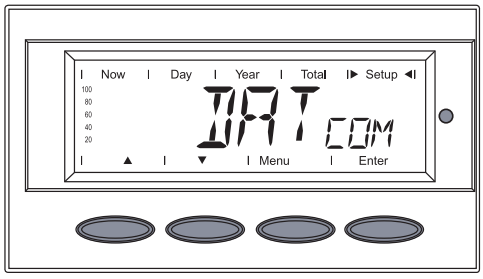



'PDCDDONE' ...

... or ...

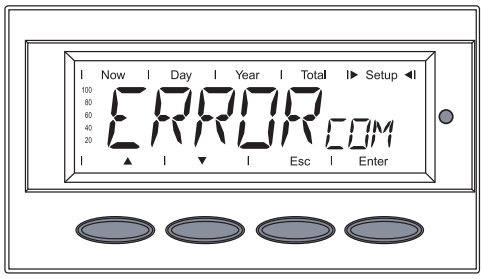
'IFCDDONE' is shown

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




The 'DATCOM' menu item is displayed.

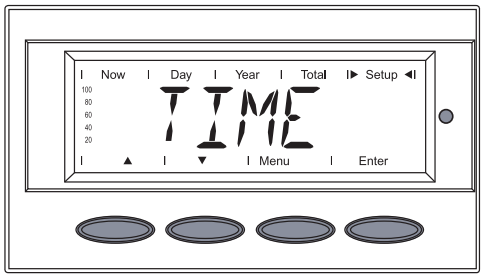
**Data connection faulty or DATCOM is not installed**



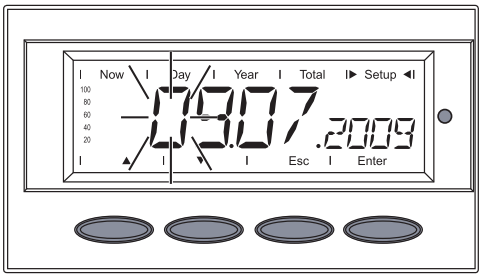

If there is a faulty data connection or options are not installed, 'ERROR COM' is displayed.

3. Press the "Esc" key to exit the "DATCOM" menu item.

**Setting the Time and Date**




1. Select the 'TIME' menu item
2. Press the 'Enter' key

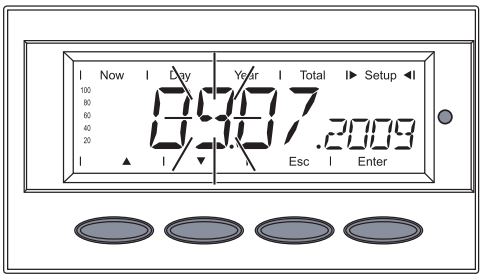



The **date** is shown (DD.MM.YYYY), the first digit for the day flashes.

3. Use the 'Up' and 'Down' keys to select a value for the first day digit

▲ ▼

4. Press the 'Enter' key



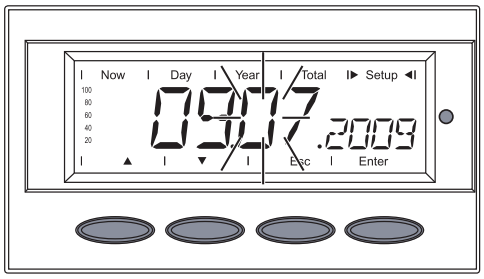

The second day digit flashes.

5. Use the 'Up' and 'Down' keys to select a value for the second day digit

▲ ▼

6. Press the 'Enter' key

**Setting the Time and Date**
(continued)

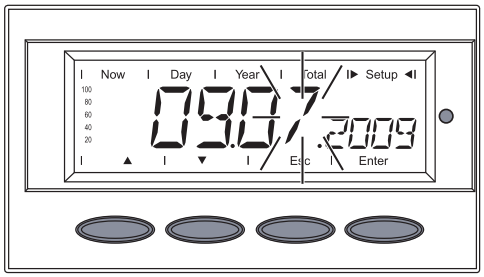



The first digit for the month flashes.

7. Use the ‘Up’ and ‘Down’ keys to select a value for the first month digit

▲ ▼

8. Press the ‘Enter’ key

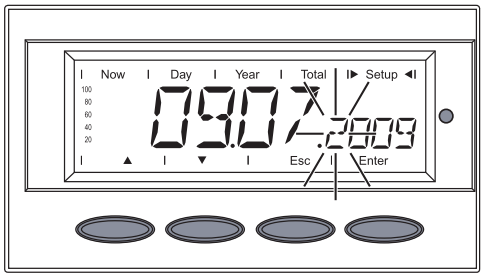



The second digit for the month flashes.

9. Use the ‘Up’ and ‘Down’ keys to select a value for the second month digit

▲ ▼

10. Press the ‘Enter’ key

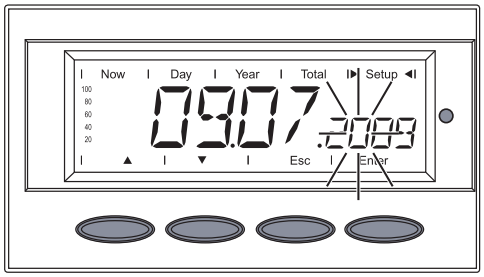



The first digit for the year flashes.

11. Use the ‘Up’ and ‘Down’ keys to select a value for the first year digit

▲ ▼

12. Press the ‘Enter’ key

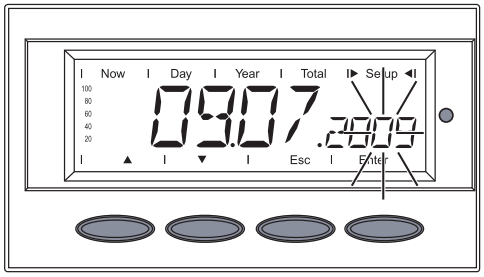



The second digit for the year flashes.

13. Use the ‘Up’ and ‘Down’ keys to select a value for the second year digit

▲ ▼

14. Press the ‘Enter’ key

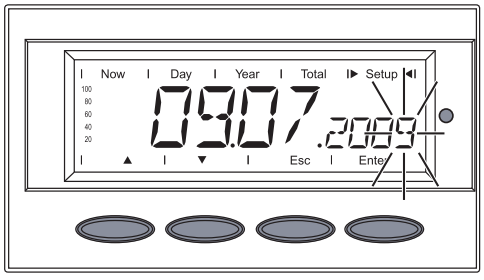



The third digit for the year flashes.

15. Use the ‘Up’ and ‘Down’ keys to select a value for the third year digit

▲ ▼

16. Press the ‘Enter’ key



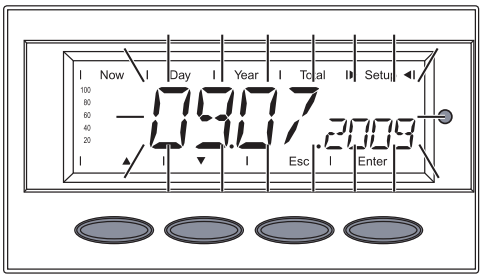

The fourth digit for the year flashes.

17. Use the ‘Up’ and ‘Down’ keys to select a value for the fourth year digit

▲ ▼

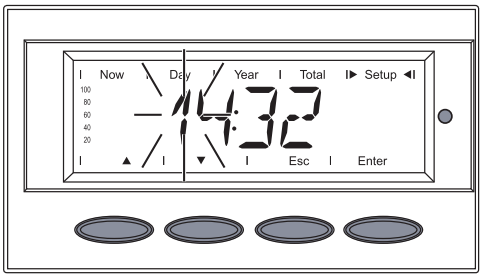
18. Press the ‘Enter’ key

**Setting the Time and Date**
(continued)




The set date then flashes.

19. Press the ‘Enter’ key

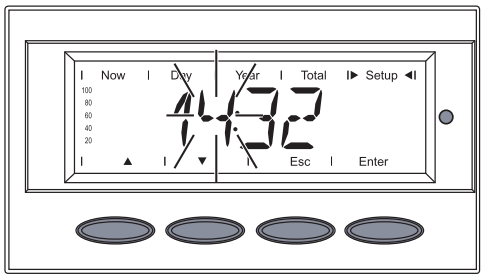



The **time** is shown (HH:MM, 0 - 24 h), the first digit for the hour flashes.

20. Use the ‘Up’ and ‘Down’ keys to select a value for the first hour digit

▲ ▼

21. Press the ‘Enter’ key

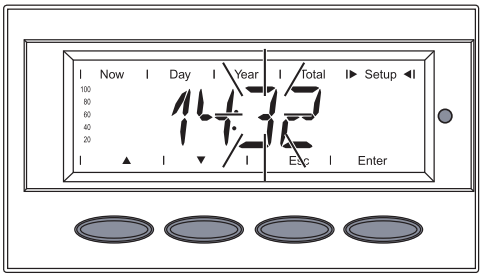



The second digit for the hour flashes.

22. Use the ‘Up’ and ‘Down’ keys to select a value for the second hour digit

▲ ▼

23. Press the ‘Enter’ key

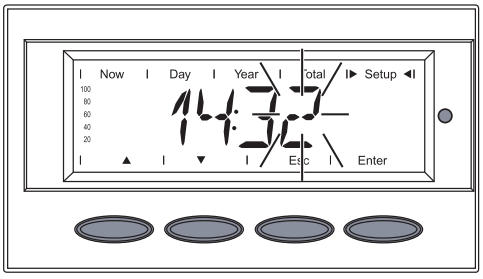



The first digit for the minutes flashes.

24. Use the ‘Up’ and ‘Down’ keys to select a value for the first minutes digit

▲ ▼

25. Press the ‘Enter’ key

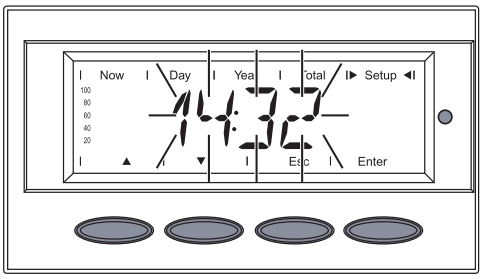



The second digit for the minutes flashes.

26. Use the ‘Up’ and ‘Down’ keys to select a value for the second minutes digit

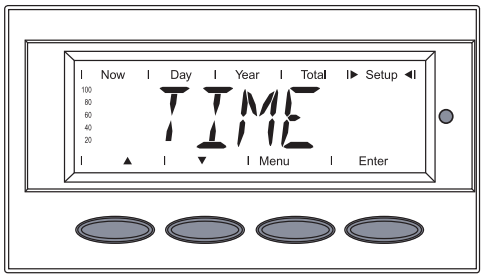
▲ ▼

27. Press the ‘Enter’ key
The set time flashes.



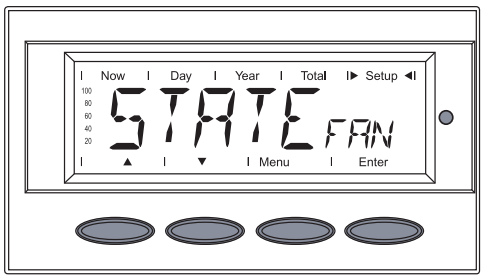

28. Press the ‘Enter’ key to apply the time

## Setting the Time and Date (continued)

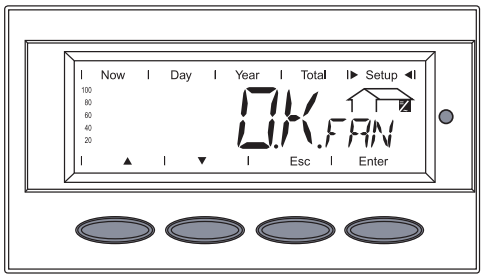



The ‘TIME’ menu item is displayed.

## Displaying the Status of the Fans



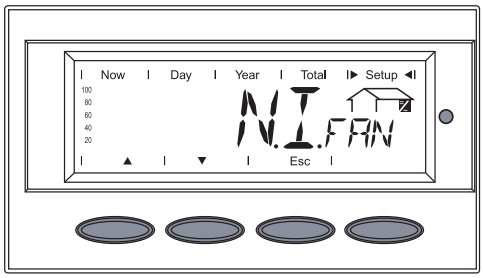

1. Select the ‘STATEFAN’ menu item
2. Press the ‘Enter’ key



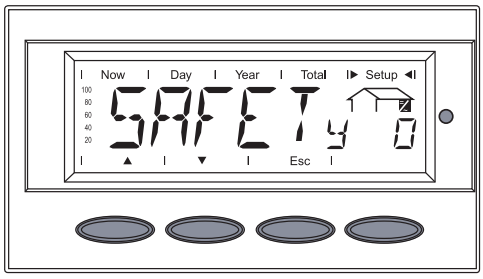

The present status of the fans is displayed.

O.K.FAN = All fans are OK and operating normally

Other possible fan status indicators:



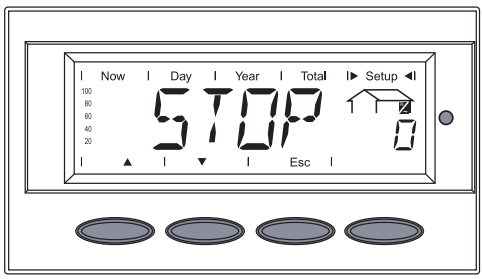

N.I.FAN = No communication between the inverter control unit (IG Brain) and the fan controller (Snowball)




SAFETY0 ... 7 and STOP0 ... 7 = Fans are stopped for safety reasons

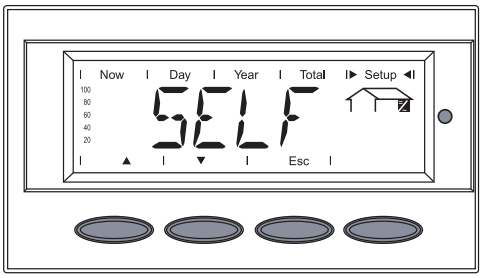
0 ... 7 describes the error:

0 general error (over-temperature, overcurrent)
1 left fan malfunction
2 right fan malfunction,
etc.



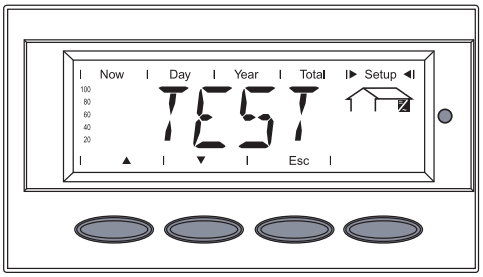

The display switches between ‘SAFETY’ and ‘STOP.’

**Displaying the Status of the Fans**
(continued)



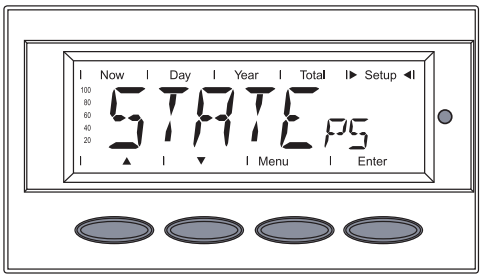

SELF and TEST = self test of fan controller being run

The display switches between ‘SELF’ and ...

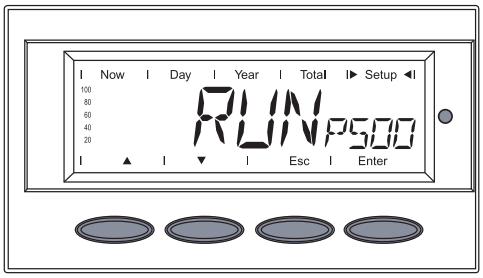



... ‘TEST.’

**Displaying the Status of the Power Stage Sets**

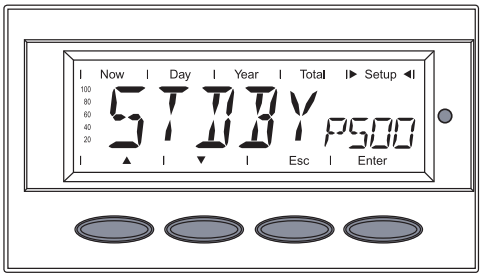



1. Select the ‘STATEPS’ menu item
2. Press the ‘Enter’ key




The status of the first power stage set PS00 is shown,
Example: RUNPSOO.

RUN = active grid feed

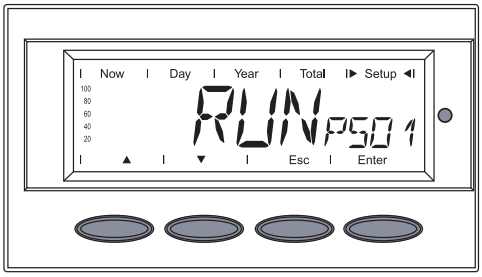



or: STDBYPSOO

STDBY = standby (no grid feed)

3. Use the ‘Up’ and ‘Down’ keys to select the desired power stage set: PS00 - max. PS14

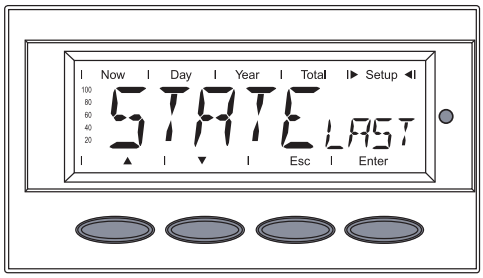
▲ ▼




The status of the selected power stage set is shown, e.g.: RUNPSO1

4. Press the ‘Enter’ key to display the last status message saved

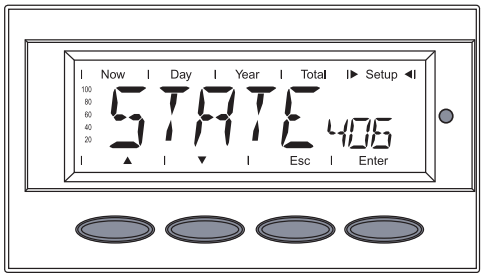
**Displaying the Status of the Power Stage Sets** (continued)




The display switches between ...

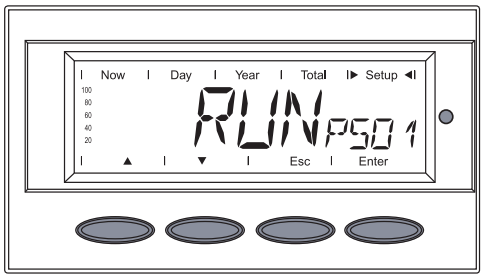
'STATE$_{LAST}$'

and ...



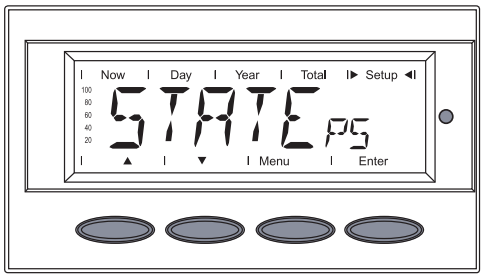

... the last saved status message.

5. Press the 'Esc' key



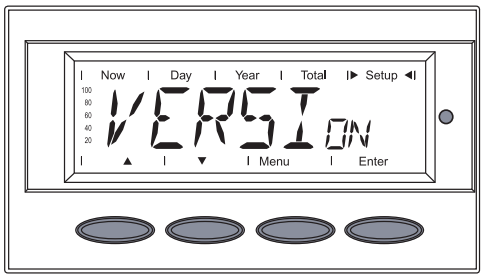

The status of the presently selected power stage set is shown again.

6. Press the 'Esc' key

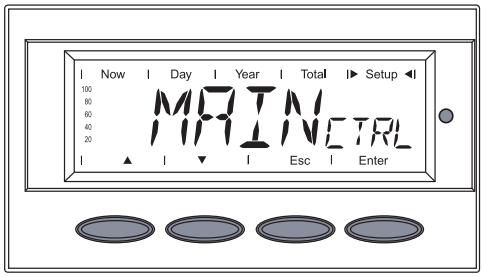



The 'STATE$_{PS}$' menu item is displayed.

**Displaying the Version**




1. Select the 'VERSI$_{ON}$' menu item
2. Press the 'Enter' key



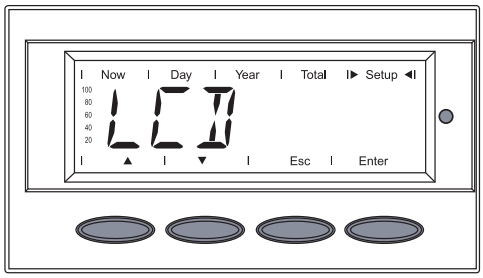

'MAIN$_{CTRL}$' is displayed

MAIN$_{CTR}$ = IG-Brain unit

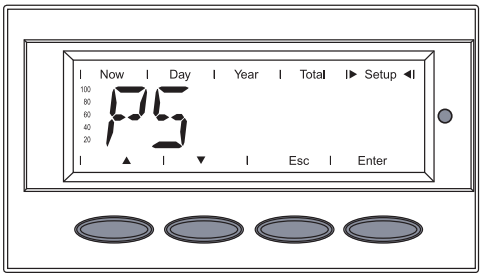
3. Use the 'Up' and 'Down' keys to select the desired component:

▲ ▼

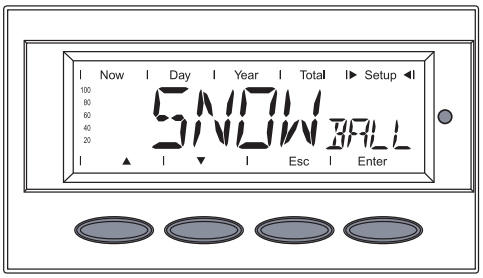
**Displaying the Version**
(continued)




LCD = display



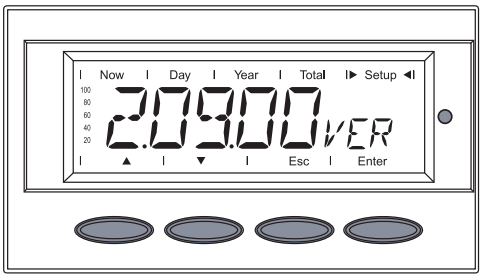

PS = power stage set




SNOWBALL = e.g., fan controller

4. Press the ‘Enter’ key

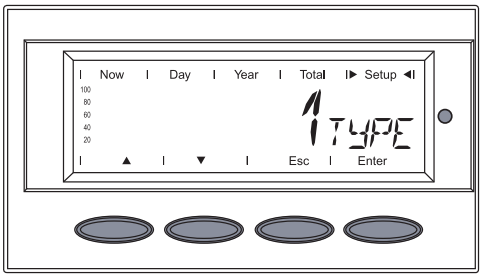
**Important**
Only when selecting the power stage set (PS):
- The first power stage set ‘PS 00’ is shown
- Use the ‘Up’ and ‘Down’ keys to select the desired power stage set
- Press the ‘Enter’ key




The version number (VER) of the selected component is displayed.

5. Press the ‘Down’ key to display the component ID

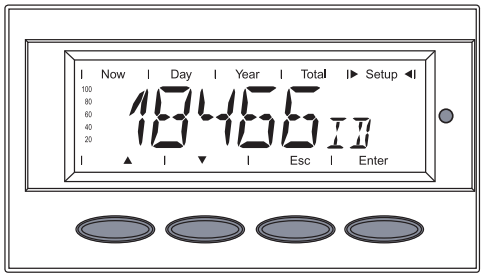
▼




The component ID (TYPE) of the selected component is displayed.

6. Press the ‘Down’ key to display the ID number

▼

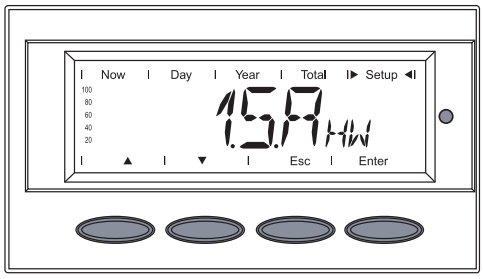



The identification number (ID) of the selected component is displayed.

7. Press the ‘Down’ key to display the hardware version

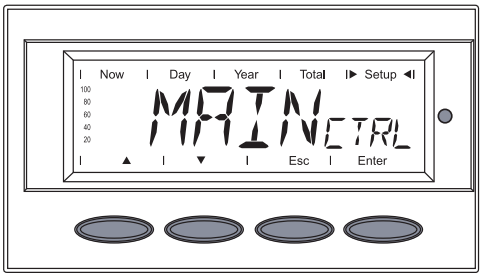
▼

**Displaying the Version**
(continued)



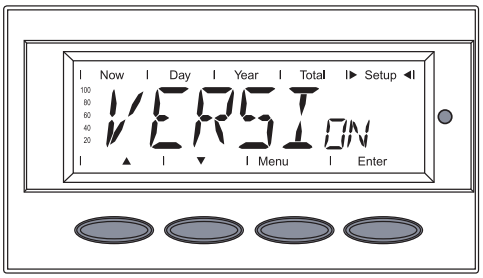

The hardware version (HW) of the selected component is displayed.

8. Press the ‘Esc’ key




The last selected component is shown (e.g .:

9. Press the ‘Esc’ key



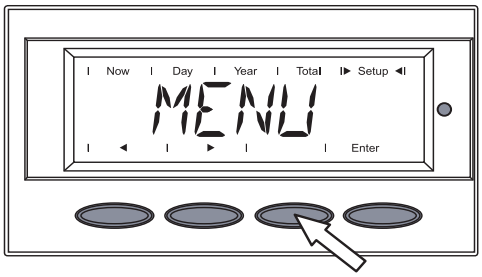

The ‘VERSION’ menu item is displayed.

# Setup Lock function

**General**

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

**Activating/ deactivating the "Setup Lock" function**

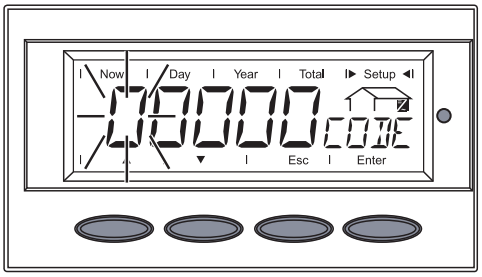



1. Press the ‘Menu’ key

   ‘Menu’ is shown.

2. Select the ‘Setup’ mode using the ‘Left’ or ‘Right’ keys

   ◀ ▶

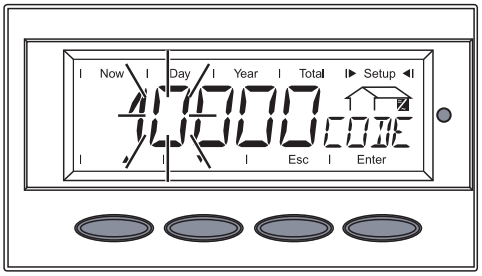



3. Press the unoccupied ‘Menu/Esc’ key 5 x

   ‘CODE‘ is displayed, the first digit flashes.

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

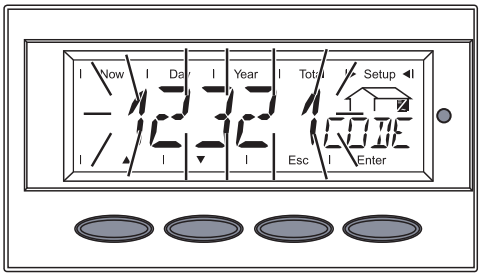
   ▲ ▼




5. Press the ‘Enter‘ key

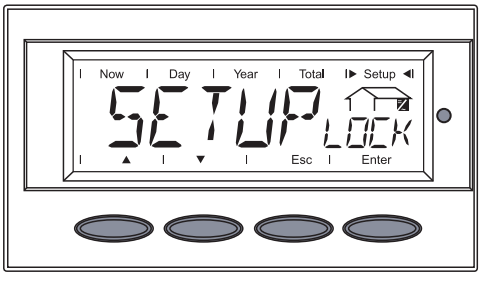
   The second digit flashes.

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




   ... the access code flashes.

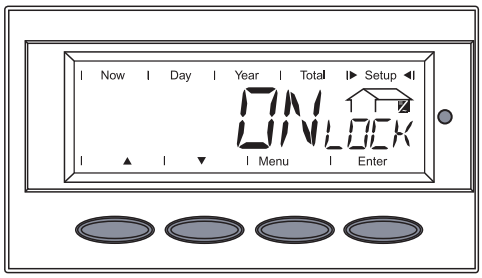
7. Press the ‘Enter‘ key

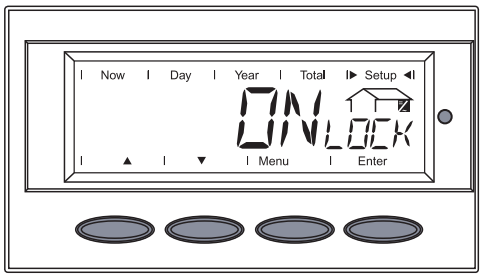



   ‘SETUPLOCK‘ is displayed.

8. Press the ‘Enter‘ key

**Activating/ deactivating the "Setup Lock" function**
(continued)




'ONLOCK' is displayed.

7. Use the 'Up' and 'Down' keys to select the desired function
▲ ▼

ONLOCK = 'SETUPLOCK' function is activated (the Setup menu cannot be accessed)

OFFLOCK = 'SETUPLOCK' function is deactivated (the Setup menu can be accessed)

9. Press the 'Enter' key to apply the function

# 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 grid, the photovoltaic system or any installation or operating errors.

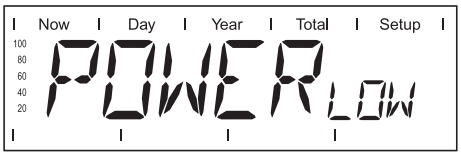
Whenever the self diagnostic system has identified a particular issue, the respective status code is shown on the screen.

**Important** Display of a status code for a short time may be the result of the control procedures of your inverter. If it subsequently continues to operate normally, there has not been a system error.

**Normal Operation Status Codes**


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

As soon as the open circuit voltage exceeds 265 V, the inverter starts synchronizing with the grid (display shows ‘SYNCAC’).




The total power output of the solar modules is insufficient.

After a short time the inverter resumes grid synchronization (display shows ‘SYNCAC’).

**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 inverter:

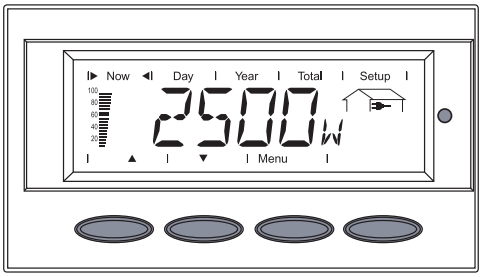
  Open circuit voltage < 265 V ... Error in the photovoltaic system

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

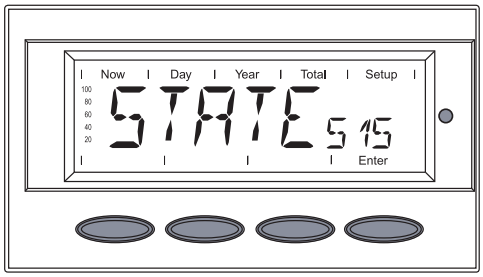
**Power Stage Set Error Status Codes**

A special status code is triggered when there is an error in the inverter in one of the power stage sets.

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




Display in normal operation

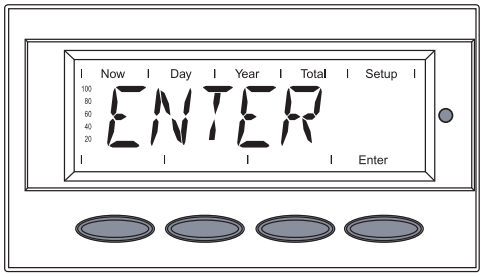


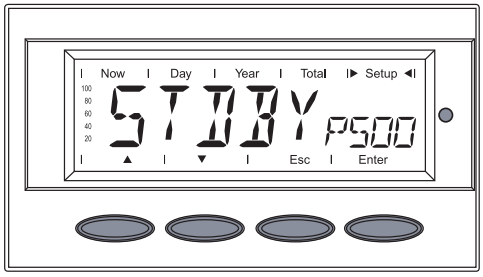

When there is an error in one of the power stage sets, the display flashes between ‘STATE’ and the corresponding status message (e.g., ‘STATE 515’)

and

‘ENTER’

- Press the ‘Enter’ key

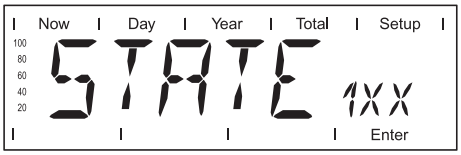



- The status display of the power stage set with the error appears, e.g. ‘STDBY$_{PS00}$’
- Press the ‘Enter’ key

  Additional information can be found in ‘The Setup Menu’ section, ‘STATE$_{PS}$’ menu item

## Class 1 Status Codes




Status codes of class 1 are typically temporary.Their cause lies in the grid.

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

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

---

**1x2**
AC voltage too high

| | |
|---|---|
| Description | Grid conditions are being tested and as soon as they are again within the permissible range, the inverter will resume feeding power into the grid. |
| Remedy | Check grid connections and fuses<br>If this status message keeps recurring, contact your system installer |

---

**1x3**
AC voltage too low

| | |
|---|---|
| Description | Grid conditions are being tested and as soon as they are again within the permissible range, the inverter will resume feeding power into the grid. |
| Remedy | Check grid connections and fuses<br>If this status message keeps recurring, contact your system installer |

---

**1x5**
AC frequency too high

| | |
|---|---|
| Description | Grid conditions are being tested and as soon as they are again within the permissible range, the inverter will resume feeding power into the grid. |
| Remedy | Check grid connections and fuses<br>If this status message keeps recurring, contact your system installer |

---

**1x6**
AC frequency too low

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

---

**1x7**
No AC grid detected

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

---

**Class 1 Status Codes**
(continued)

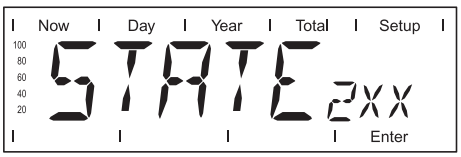
**108**
Islanding detected

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

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

| | |
|---|---|
| Description | Grid conditions are being tested and as soon as they are again within the permissible range, the inverter will resume feeding power into the grid. |
| Remedy | Check grid connections and fuses<br>If this status message keeps recurring, 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 Fronius CL is to disconnect from the grid. Then, the grid will be checked for the duration of the observation period stipulated (five minutes).
If after the end of this period no further defect is identified, the Fronius CL resumes operating and feeding power into the grid.

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

**2x2**
Grid voltage exceeds admissible limits

| | |
|---|---|
| Description | As soon as the grid voltage has returned to the permitted range, the Fronius CL resumes feeding power into the grid. |
| Remedy | Check grid voltage, if the status code persists you should contact your system installer. |

**2x3**
Grid voltage below admissible limits

| | |
|---|---|
| Description | As soon as the grid voltage has returned to the permitted range, the Fronius CL resumes feeding power into the grid. |
| Remedy | Check grid voltage, if the status code persists you should contact your system installer. |

**207**
No grid voltage detected

| | |
|---|---|
| Description | As soon as the grid conditions have returned to the permitted range, the Fronius CL resumes feeding power into the grid. |
| Remedy | Check grid connections and fuses; if the status code does not disappear you should contact your system installer. |

## Class 2 Status Codes (continued)

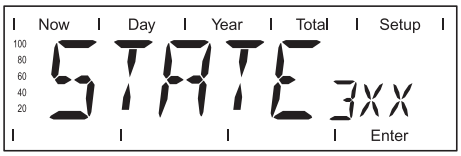
**208**
Jumper Test Failed

| | |
|---|---|
| Description | Even though a ‘NLMON‘ Card (SW V > 1.0.0) is installed, at least one jumper on the ‘Snowball‘ PC board is not switched to position - ON - |
| Remedy | Switch jumper on the ‘Snowball‘ PC board to position - ON - |

**210**
Grid contactor open or supply phase for grid contactor has failed

| | |
|---|---|
| Description | No grid feed.<br>Measurement and monitoring relay has triggered |
| Remedy | Should the status code persist, you should contact your system installer |

## Class 3 Status Codes




Class 3 comprises status codes that may appear during operation of feeding power supply 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**
Over-current (AC)

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

**302**
Over-current (DC)

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

**304**
Over-temperature DC-side

| | |
|---|---|
| Description | Short interruption of power feeding into the grid caused by overtemperature<br>The inverter returns to the startup phase |
| Remedy | Error is corrected automatically<br>Should the status code persist, you should contact your system installer |

**305**
No power transfer to grid possible

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

**Class 3 Status Codes**
(continued)

**'POWERLOW' (306)**
Intermediate circuit voltage has dropped below permissible threshold value for feed in.
This error is shown on the inverter with the plain text message 'POWER LOW'.

| | |
|---|---|
| Description | Short interruption of power feeding into the grid<br>The inverter returns to the startup phase |
| Remedy | Error is corrected automatically<br>Should the status code persist, you should contact your system installer |

**'DCLOW' (307)**
DC-input voltage is too low for feed in
This error is shown on the inverter with the plain text message 'DC LOW'.

| | |
|---|---|
| Description | Short interruption of power feeding into the grid<br>The inverter returns to the startup phase |
| Remedy | Error is corrected automatically<br>Should the status code persist, you should contact your system installer |

**308**
Intermediate circuit voltage too high

| | |
|---|---|
| Description | Short interruption of power feeding into the grid<br>The inverter returns to the startup phase |
| Remedy | Error is corrected automatically<br>Should the status code persist, you should contact your system installer |

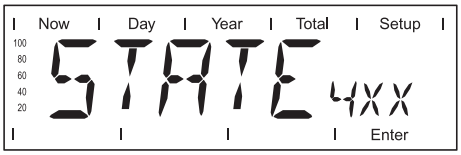
**309**
Power Low / Slave
(only in Balance mode)

| | |
|---|---|
| Description | Short interruption of power feeding into the grid, caused by the message from a slave power stage set<br>The inverter returns to the startup phase |
| Remedy | Error is corrected automatically<br>Should the status code persist, you should contact your system installer |

**310**
DC Low / Slave
(only in Balance mode)

| | |
|---|---|
| Description | Short interruption of power feeding into the grid, caused by the message from a slave power stage set<br>The inverter returns to the startup phase |
| Remedy | Error is corrected automatically<br>Should the status code persist, you should contact your system installer |

## Class 4 Status Codes




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

**401**
No internal communication with power stage

| | |
|---|---|
| Description | The inverter will automatically attempt to connect again and, if possible, resume feeding power into the grid |
| Remedy | If service code persists, you should 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 service 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 service 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 service 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 service 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 a value that is too low, or the 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 modules so DC voltage fits within inverter limits.<br>If service 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 service code persists, contact a Fronius-trained service technician |

**414**
EEPROM faulty

| | |
|---|---|
| Description | Memory deleted |
| Remedy | If service code persists, contact a Fronius-trained service technician |

**Class 4 Status Codes**
(continued)

**416**
Communication with IG-Brain not possible

| | |
|---|---|
| Description | The Operating Status LED lights up orange, then the inverter attempts a restart |
| Remedy | If service code persists, contact a Fronius-trained service technician |

**417**
The same ID number is set at the dip switch of two power stage sets.

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

**421**
The sequence of the ID numbers set on the dip switches do not match, e.g., 0-1-3-2 instead of 0-1-2-3.

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

**425**
Communication with the power stage set is lost briefly

| | |
|---|---|
| Description | The Operating Status LED lights up orange, then the inverter attempts a restart |
| Remedy | If service code persists, contact a Fronius-trained service technician |

**431**
All power stage sets are in Boot mode (e.g., when a firmware update process is aborted)

| | |
|---|---|
| Description | The inverter stops feeding power into the grid, the display shows a critical error via a red Operating Status LED |
| Remedy | Update firmware using Bootloader or IG.Update |

**Switches between SLAVE / DCLow or SLAVE / POWERLow (439)**
The MPP master power stage set is switched off because of an error in a slave power stage set (in the balance mode)

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

**442**
No phase master for a phase

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

**Class 4 Status Codes**
(continued)

**443**
Energy transfer not possible

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

**445**
Invalid power stage set configuration

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

**446**
Internal communication error with NL-MON

| | |
|---|---|
| Description | The inverter will automatically attempt to connect again and, if possible, resume feeding power into the grid |
| Remedy | If service code persists, contact a Fronius-trained service technician |

**447**
Grid monitoring via NL-MON interrupted

| | |
|---|---|
| Description | The inverter will automatically attempt to connect again and, if possible, resume feeding power into the grid |
| Remedy | If service code persists, contact a Fronius-trained service technician |

**448**
Neutral conductor N not connected

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

**450**
The monitoring of the power stage set main processor ‘Guard’ is not active (no ‘Guard’ processor was found during the boot process).

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

**451**
The ‘Guard’ processor memory is defective

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

**452**
Communication between ‘Guard’ and the digital signal processor (DSP) has been interrupted

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

**Class 4 Status Codes**
(continued)

**453**
Error in grid voltage recording

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

**454**
Error in grid frequency recording

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

**455**
Reference power source is operating outside of tolerances

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

**456**
Error during anti-islanding test

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

**457**
The grid relay cannot be opened due to a fault (e.g., stuck grid relay contacts).

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

**460**
Reference power source for the digital signal processor (DSP) is operating outside of tolerances

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

**461**
Error in DSP data memory

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

**464**
Display error
The software and/or hardware versions of the display and IG Brain are not compatible.

| | |
|---|---|
| Description | The inverter stops feeding power into the grid, the display shows a critical error via a red Operating Status LED |
| Remedy | Update firmware using Bootloader or IG.Update |

**Class 4 Status Codes**
(continued)

**465**
Display error
The UI command sent from the IG Brain is not recognized by the present display version.

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

**466**
Display error
The display was not detected.

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

**467**
The display has not received a start command from the IG Brain for longer than 6 s

| | |
|---|---|
| Description | The inverter will automatically attempt to connect again and, if possible, resume feeding power into the grid |
| Remedy | If service code persists, contact a Fronius-trained service technician |

**469**
Throttle connected to wrong poles

| | |
|---|---|
| Description | The inverter stops feeding power into the grid, the display shows a critical error via a red Operating Status LED |
| Remedy | Properly connect throttle<br>If service code persists, contact a Fronius-trained service technician |

**471**
Defective fuse for solar module ground has not yet been replaced.
This status message is displayed when the fuse for the solar module ground has not been replaced after a specific period of time after the status code 551 is displayed.

| | |
|---|---|
| Description | The inverter stops feeding power into the grid, the display shows a critical error via a red Operating Status LED |
| Remedy | Insert new fuse for the solar module ground so that the solar modules are grounded at the negative or positive pole.<br>Error is corrected automatically<br>Should the status code persist, you should contact your system installer |

**472**
Ground fault detected
(ground fault = one of the current-carrying DC conductors or solar module interconnect cables touches the ground wire or a grounded component)

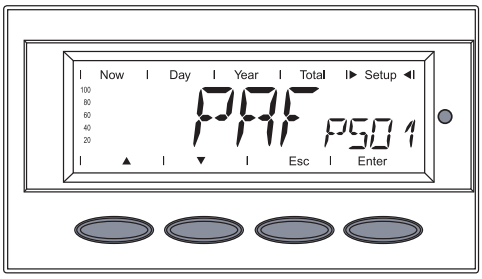
| | |
|---|---|
| Description | Inverter is blocked from feeding energy into the grid |
| Remedy | Replace GFDI fuse |

## Class 4 Status Codes (continued)

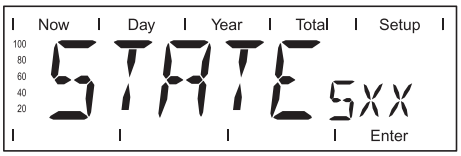
**473**
Incorrect phase allocation

| | |
|---|---|
| Description | The setting of the dip switch on the power stage set does not match the slot (dip switch set incorrectly or incorrect slot) |
| Remedy | Set the dip switch for the respective slot |

You can check the ‘STATEPS’ menu item in the Setup menu to see which dip switch is affected. ‘PAF’ and the number of the power stage set are displayed:




## 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

**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: still, communication is not presently 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 |

**Class 5 Status Codes**
(continued)

**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 |

**513**
Power stage set in boot mode

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

**514**
Too few power stage sets detected

| | |
|---|---|
| Description | Warning message from one of the power stage sets, second power stage set working normally |
| Remedy | If service code persists, contact a Fronius-trained service technician |

**515**
Faulty plug connections or a power stage set has reported status code 473 (incorrect phase allocation)

| | |
|---|---|
| Description | Temperature sensor on cooling element faulty or not connected properly |
| Remedy | If service code persists, contact a Fronius-trained service technician |

**516**
Too many status codes present for one of the power stage sets

| | |
|---|---|
| Description | It is not possible to activate all power stage sets |
| Remedy | Carry out an analysis. Please see the section ‘The Setup Menu,’ menu item ‘STATEPS.’ If service code persists, contact a Fronius-trained service technician |

**517**
Change of master has taken place

| | |
|---|---|
| Description | Transformer not connected / not plugged in<br>Bridge short-circuit<br>Detection of intermediate circuit voltage damaged |
| Remedy | The possible faults listed above should be checked. If service code persists, contact a Fronius-trained service technician. |

**530**
Fan supply voltage exceeds limits

| | |
|---|---|
| Description | Fan not functioning, possibly power derating |
| Remedy | Contact a Fronius-trained service technician |

**531**
Over-temperature fan controller

| | |
|---|---|
| Description | Fan not functioning, possibly power derating |
| Remedy | Check ventilation slots on option rack<br>Contact a Fronius-trained service technician |

**Class 5 Status Codes**
(continued)

**532**
Supply air temperature sensor defective

| | |
|---|---|
| Description | Temperature sensor defective or not connected |
| Remedy | Contact a Fronius-trained service technician |

**533**
Fan controller temperature sensor defective

| | |
|---|---|
| Description | Fan not functioning, possibly power derating |
| Remedy | Contact a Fronius-trained service technician |

**534**
Fan voltage exceeds limits during fan controller self test

| | |
|---|---|
| Description | Fan not functioning, possibly power derating |
| Remedy | Contact a Fronius-trained service technician |

**535**
Fan defect detected during fan controller self test,

| | |
|---|---|
| Description | Target speed of one or both fans not reached<br>Fan not functioning, possibly power derating |
| Remedy | Check ‘STATE FAN’ in the Setup menu to determine which fan is affected |

**536**
Fan defect detected during operation
Target speed not reached during operation

| | |
|---|---|
| Description | Target speed of one or both fans not reached<br>Fan not functioning, possibly power derating |
| Remedy | Check ‘STATE$_{FAN}$’ in the Setup menu to determine which fan is affected |

**537**
High speed differences between the fans

| | |
|---|---|
| Description | Target speed of one or several roof fans not reached<br>Roof fan not functioning, possibly power derating |
| Remedy | Check ‘STATE FAN’ in the Setup menu to determine which fan is affected |

**540**
Overcurrent detected by fan controller

| | |
|---|---|
| Description | Target speed of one or several roof fans not reached<br>Roof fan not functioning, possibly power derating |
| Remedy | Contact a Fronius-trained service technician |

**541**
Communications error with fan controller

| | |
|---|---|
| Description | Target speed of one or several roof fans not reached<br>Roof fan not functioning, possibly power derating |
| Remedy | Contact a Fronius-trained service technician |

**551**
Fuse for solar module ground is defective

| | |
|---|---|
| Description | The fuse for the solar module ground is defective. Replace the fuse to protect the solar module. |
| Remedy | Insert new fuse for the solar module ground so that the solar modules are grounded at the negative or positive pole.<br>Error is corrected automatically<br>If this status message keeps recurring, contact your system installer |

**Class 5 Status Codes**
(continued)

**553**
Phase master deactivated due to frequently occurring errors

| | |
|---|---|
| Description | A reintegration of the power stage set into the Mix network will be attempted at a later time |
| Remedy | If service code persists, contact a Fronius-trained service technician |

**554**
NL-Mon EEPROM error

| | |
|---|---|
| Description | Default set switch off limits were restored automatically |
| Remedy | System-specific changes in the service menu ‘Advanced’ have to be made again;<br>If service code persists, contact a Fronius-trained service technician |

**555**
Power stage set fan defective (slot fan 1)

| | |
|---|---|
| Description | The fan is sending no speed signal or an invalid speed signal |
| Remedy | Check plug connection, replace fan |

**557**
Max. power input of fan controller exceeded

| | |
|---|---|
| Description | The inverter continues to operate, power derating |
| Remedy | Contact a Fronius-trained service technician |

**558**
Feature deactivated

| | |
|---|---|
| Description | A feature had to be deactivated (e.g., after component replacement).<br>The status message is no longer displayed after the next DC disconnect. |
| Remedy | Confirm error |

**561**
Temperature Derating Warning

| | |
|---|---|
| Description | Due to a too high ambient temperature the inverter reduces the output. |
| Remedy | Reduce the inverter ambient temperature |

**Customer Service**

**Important** Please contact your Fronius dealer or a Fronius-trained service partner if
- an error appears frequently or for a long period of time
- an error appears that is not listed in the tables

Fronius Technical Support can be reached 9 am to 9 pm eastern time at (810) 220-4414 or (219) 734-550087.

# Maintenance

**Safety**

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

- Never work with live wires! Prior to all connection and maintenance work, make sure that the AC and DC wires are not charged.
- The connection area should only be opened by a licensed electrician.
- Power stage sets should only be opened by Fronius-trained service personnel.
- The DC main switch is only used to switch off power to the power stage sets. When the DC main switch is turned off, the connection area is still energized. A solar module ground at the positive or negative poles still remains in effect. Never touch the DC+ and DC-.
- These servicing instructions are for use by qualified personnel only. To reduce the risk of electric shock, do not perform any servicing other than that specified in the operating instructions.

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

**CAUTION!** An inadequate grounding conductor connection can cause serious injuries to persons and damage to (or loss of) property. The screws on the covers provide an adequate grounding conductor connection for the housing ground and should not under any circumstances be replaced by other screws that do not provide a proper grounding conductor connection.

**General**

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

**Opening the Fronius CL for Service/Maintenance**

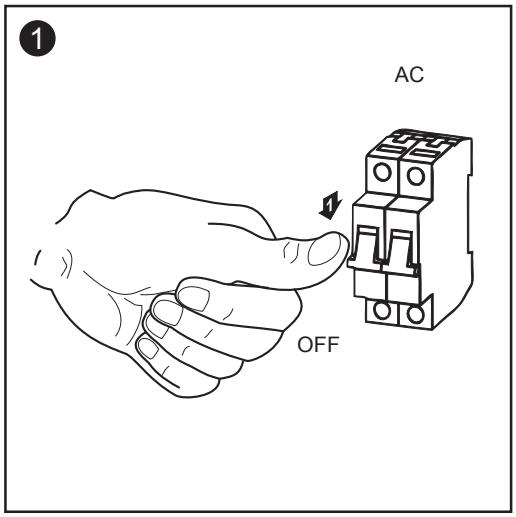
Procedure for opening the inverter for service or maintenance:

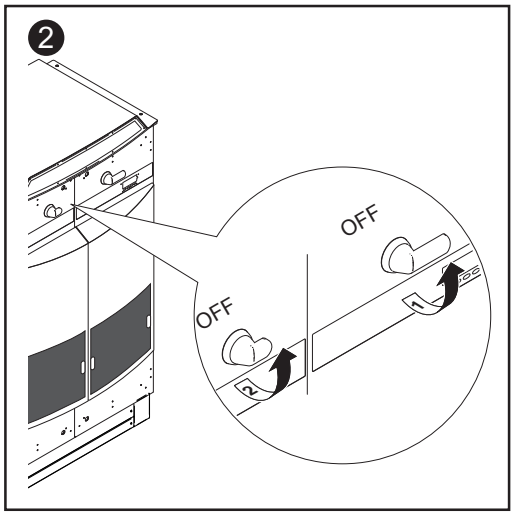
1. Disconnect the AC and DC supply from the inverter
2. Turn off the AC and DC main switches
3. Allow the capacitors to discharge (5 minutes)
4. Unlock doors
5. Open doors
6. Remove covers
7. If available, remove the fuse for solar module ground
8. Disconnect DC wires
9. Disconnect AC wires

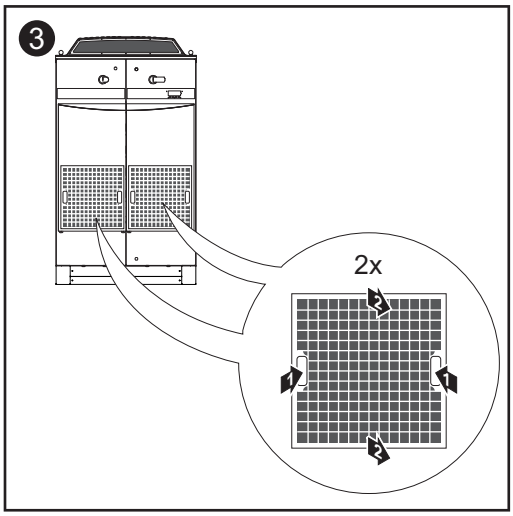
**Operation in Dusty Environments**

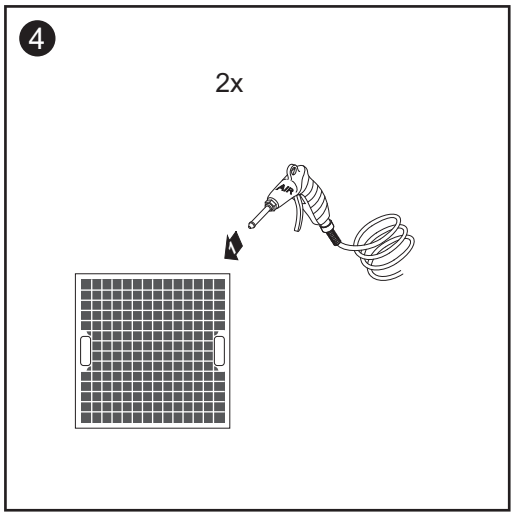
When operating the inverter in extremely dusty environments or as required: as required, clean the fan filter grates using clean compressed air.

**IMPORTANT** Do not blow any dust or dirt into the inverter!

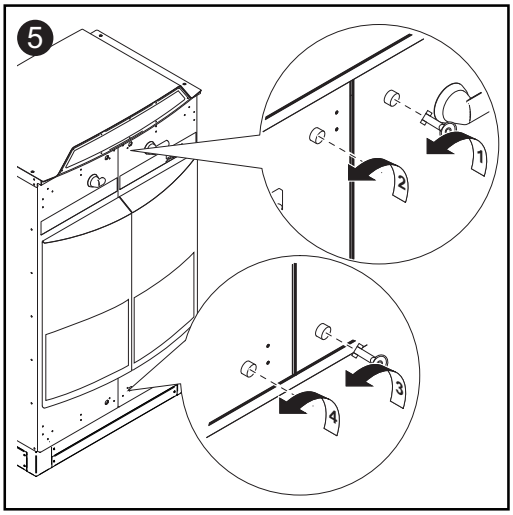


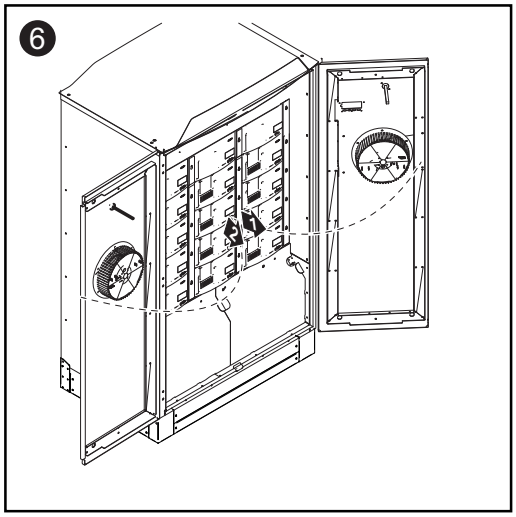



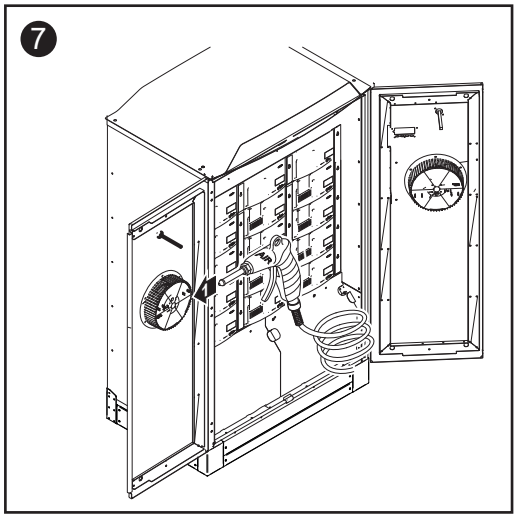



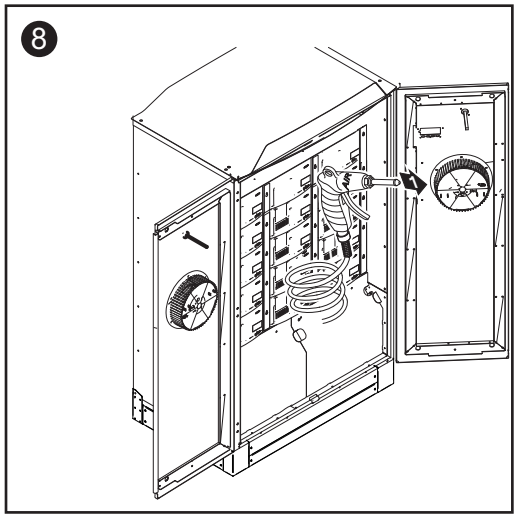

- Push at the handles and remove the filter grates

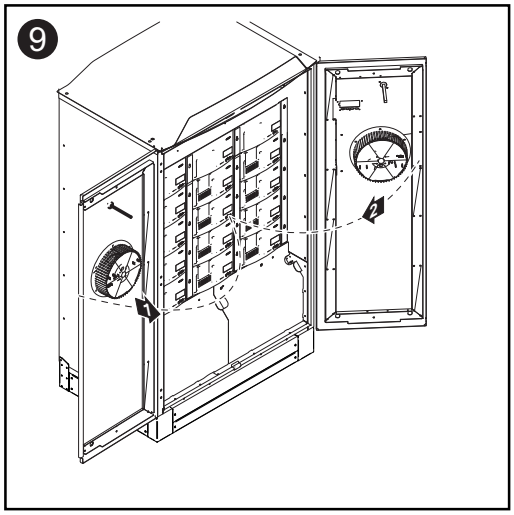


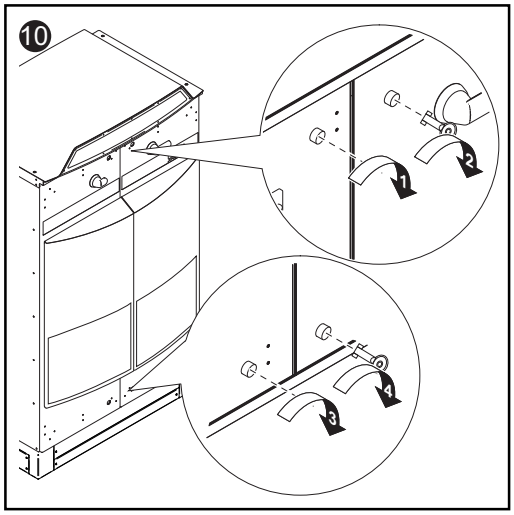
**Operation in Dusty Environments**
(continued)



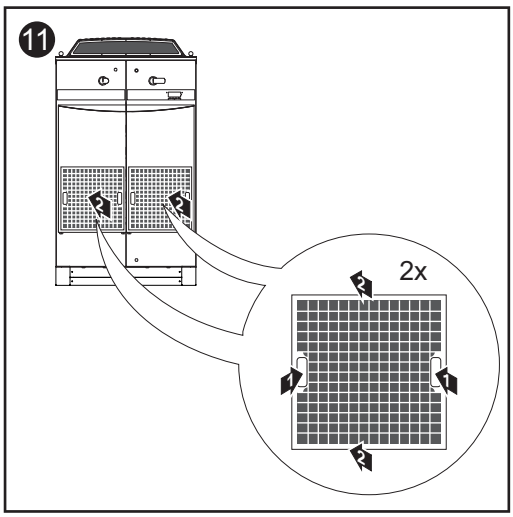




- Close doors




- Close door latches




- Push at the handles and insert the filter grates

**CAUTION!** Risk of damage to the inverter by pollution. Operating the inverter without filter grates leads to pollutioning of the inverter, what can result in thermal, electrical, electronic, and other disorders.
Operate the inverter only with inserted filter grtes!

# Replacing Solar Module Ground Fuses

**Safety**

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

- Never work with live wires! Prior to all connection and maintenance work, make sure that the AC and DC wires are not charged.
- The connection area should only be opened by a licensed electrician.
- Power stage sets should only be opened by Fronius-trained service personnel.
- The DC main switch is only used to switch off power to power stage sets. When the DC main switch is turned off, the connection area is still energized. A solar module ground at the positive or negative poles still remains in effect. Never touch the DC+ and DC-.
- These servicing instructions are for use by qualified personnel only. To reduce the risk of electric shock, do not perform any servicing other than that specified in the operating instructions.

**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.

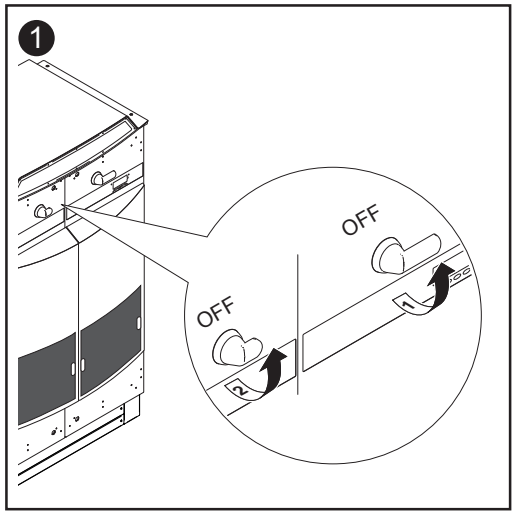
**WARNING!** An electrical shock can be fatal. Danger from residual voltage from capacitors.
You must wait until the capacitors have discharged. Discharge takes 5 minutes.

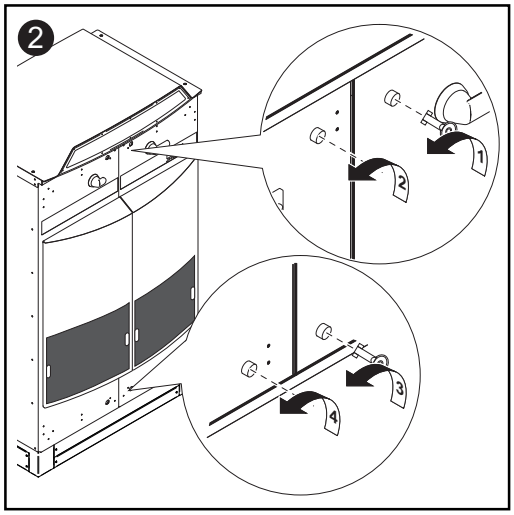
**CAUTION!** An inadequate grounding conductor connection can cause serious injuries to persons and damage to (or loss of) property. The screws on the covers provide an adequate grounding conductor connection for the housing ground and should not under any circumstances be replaced by other screws that do not provide a proper grounding conductor connection.

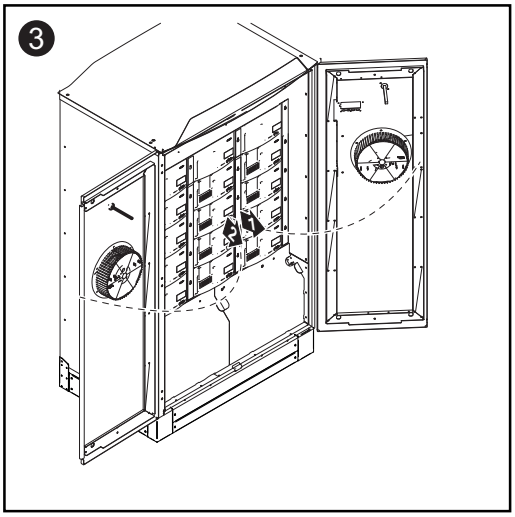
**NOTE** Only use fuses for the solar module ground that comply with the following fuse data:

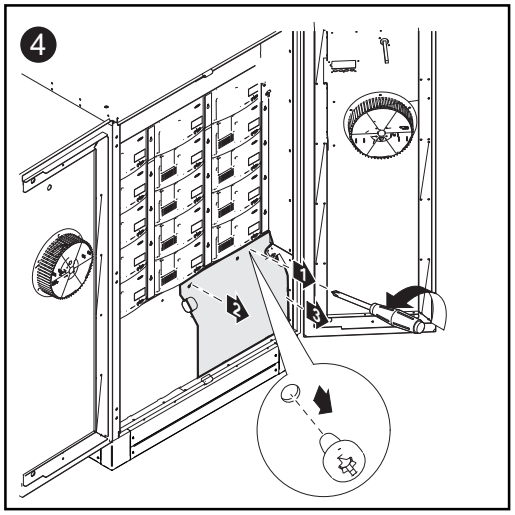
- Diameter 13/32 x 1 1/2 in. (10 x 38 mm)
- 600 V DC
- 2 A for Fronius CL DELTA 33.3 / 44.4
- 2 A for Fronius CL WYE277 36.0 / 48.0
- 3 A for Fronius CL DELTA 55.5
- 3 A for Fronius CL WYE277 60.0

**Opening the Fronius CL**



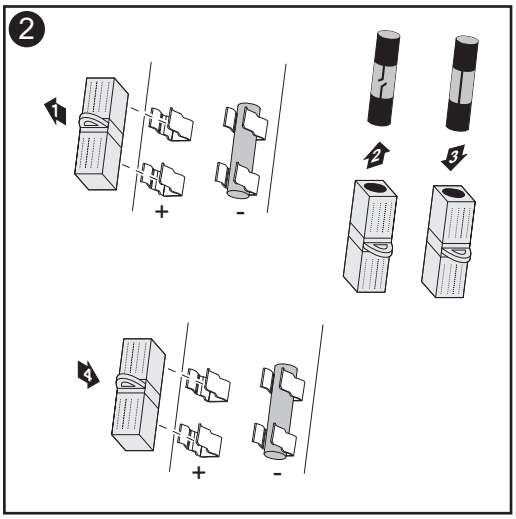



⚠ POSITIVE GROUNDED SOLAR MODULES ⚠

**Replacing Solar Module Ground Fuses at the Positive Pole**

1. Test the left fuse holder for the solar module ground at the positive pole for continuity.
   Measurement points: Ground terminal and above the fuse holder

2. 


**Important** The right fuse holder for the solar module ground at the negative pole must have a plastic slug inserted.

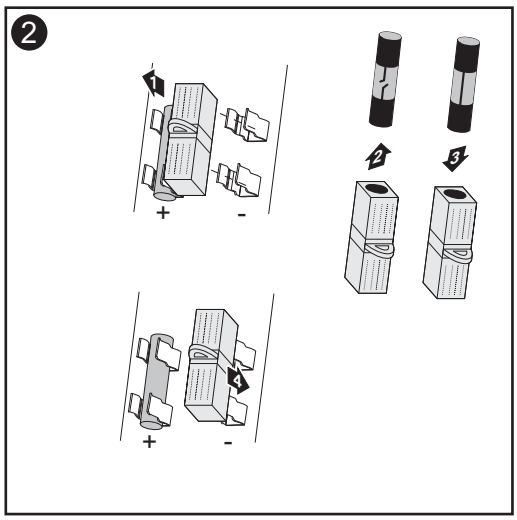
Inserting the fuse at the positive pole grounds the solar module.

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

⚠ POSITIVE GROUNDED SOLAR MODULES ⚠

**Replacing Solar Module Ground Fuses at the Negative Pole**

1. Test the right fuse holder for the solar module ground at the negative pole for continuity.
   Measurement points: Ground terminal and above the fuse holder

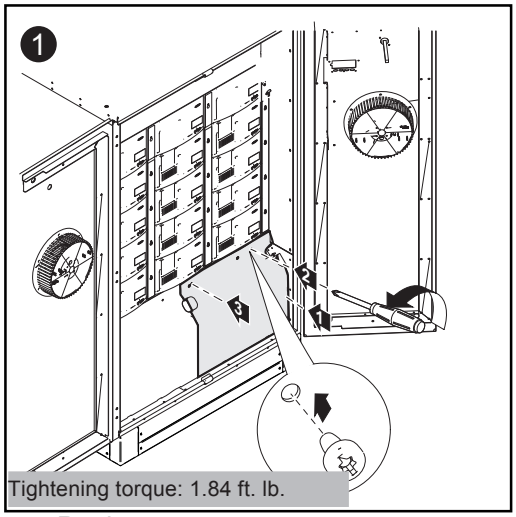
2. 


**Important** The left fuse holder for the solar module ground at the positive pole must have a plastic slug inserted.

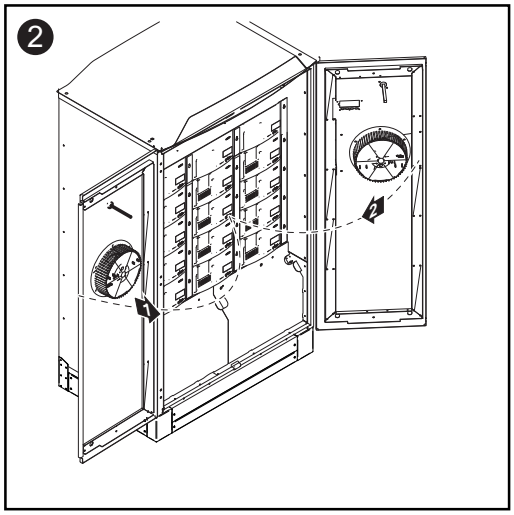
Inserting the fuse at the negative pole grounds the solar module.

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

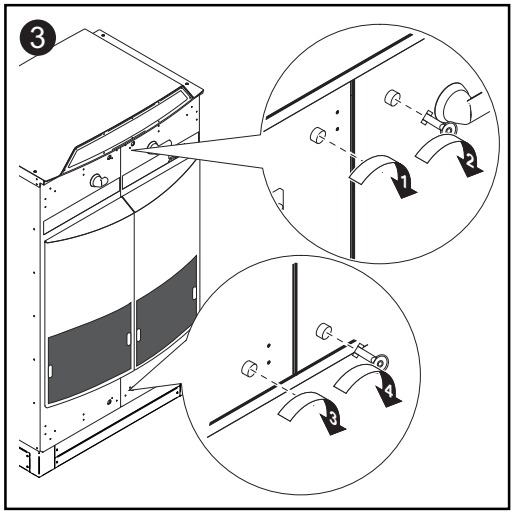
**Closing the Fronius CL**




- Replace covers
- Secure with screws




- Close doors




- Close door latches

# Replacing Power Stage Sets

**Safety**

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

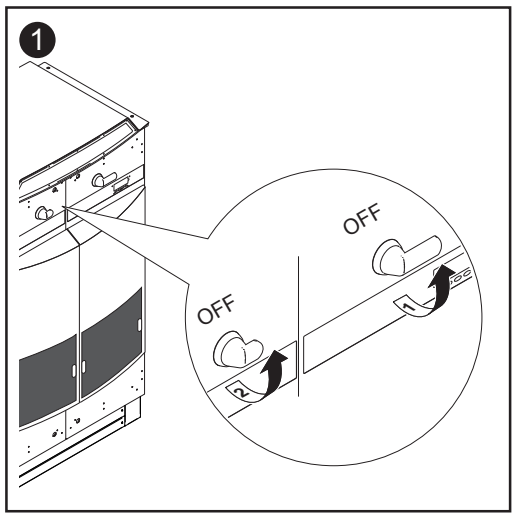
- Never work with live wires! Prior to all connection and maintenance work, make sure that the AC and DC wires are not charged.
- The connection area should only be opened by a licensed electrician.
- Power stage sets should only be opened by Fronius-trained service personnel.
- The DC main switch is only used to switch off power to power stage sets. When the DC main switch is turned off, the connection area is still energized. A solar module ground at the positive or negative poles still remains in effect. Never touch the DC+ and DC-.
- These servicing instructions are for use by qualified personnel only. To reduce the risk of electric shock, do not perform any servicing other than that specified in the operating instructions.

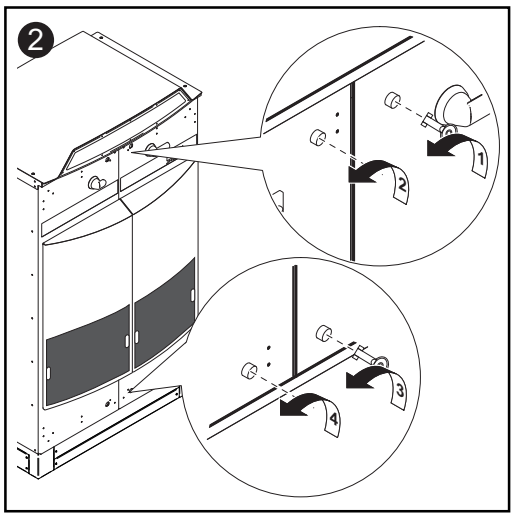
**WARNING!** An electrical shock can be fatal. Danger from residual voltage from capacitors.
You must wait until the capacitors have discharged. Discharge takes 5 minutes.

**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.

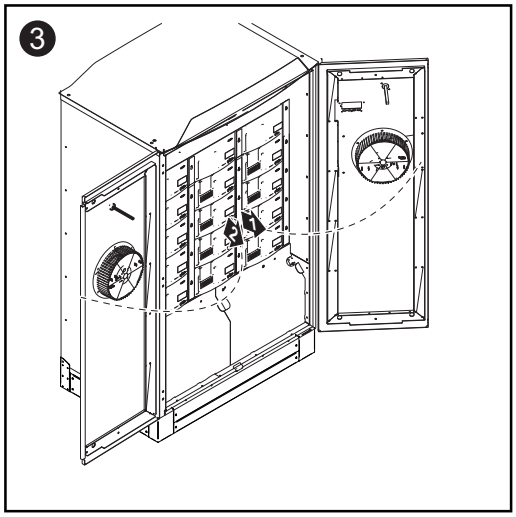
**CAUTION!** An inadequate grounding conductor connection can cause serious injuries to persons and damage to (or loss of) property. The screws on the covers provide an adequate grounding conductor connection for the housing ground and should not under any circumstances be replaced by other screws that do not provide a proper grounding conductor connection.

**Opening the Fronius CL**

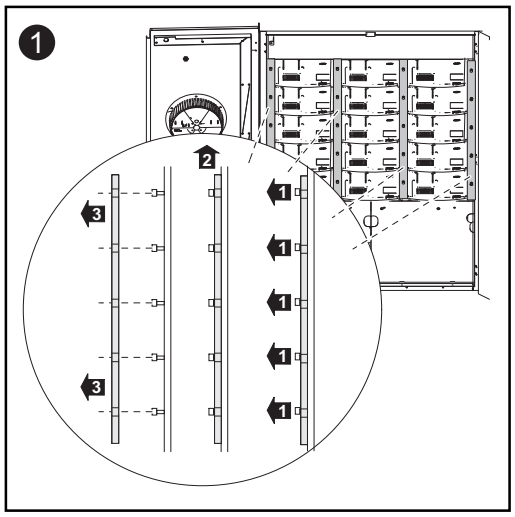


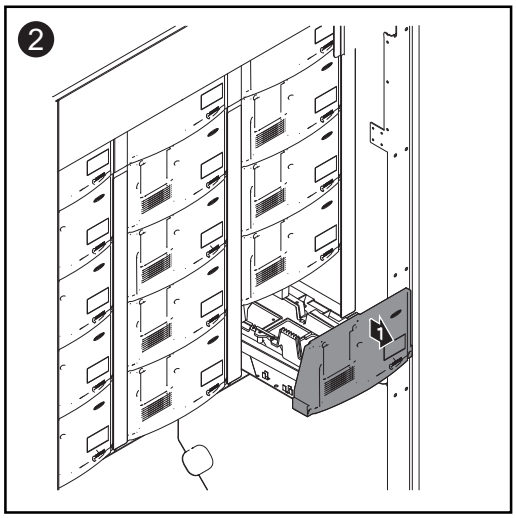
**Opening the Fronius CL**
(continued)




**Removing Defective Power Stage Sets**



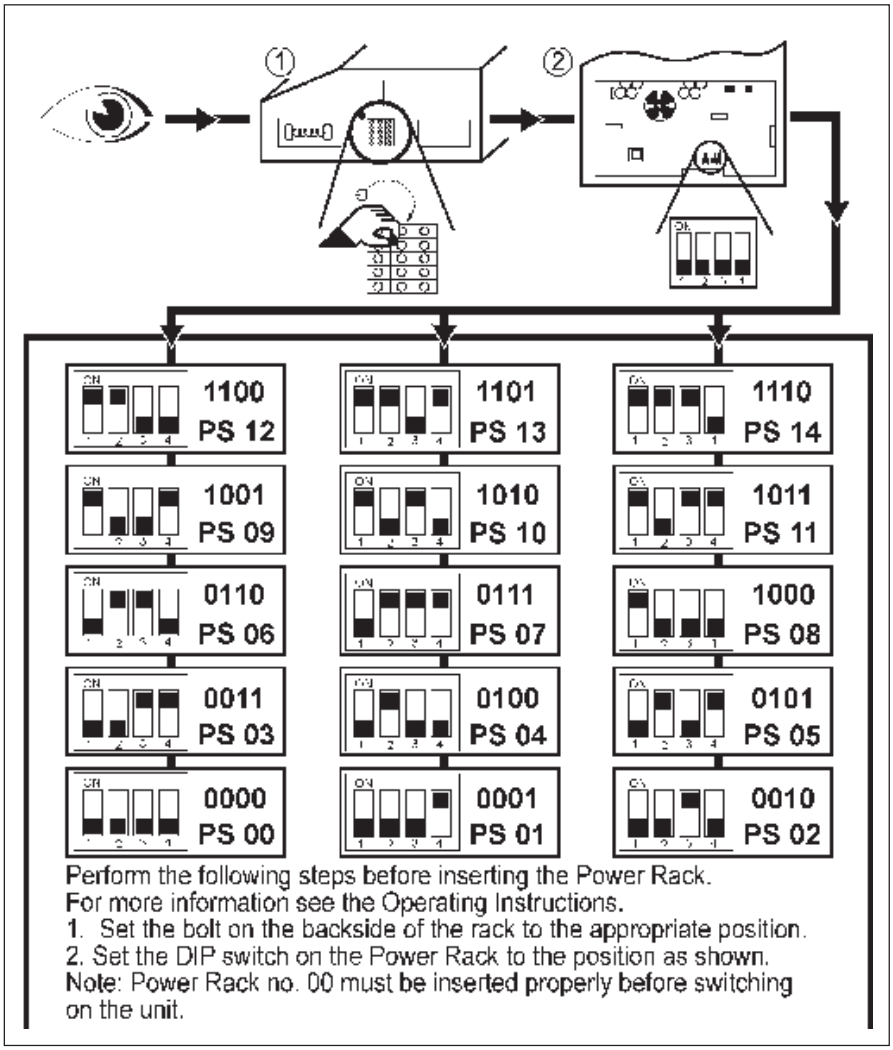

- Unscrew the screws on the left and right rails from the defective power stage set (2 x 5 screws)
- Remove rails



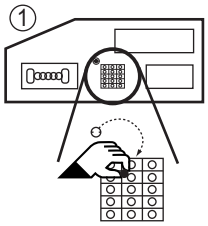
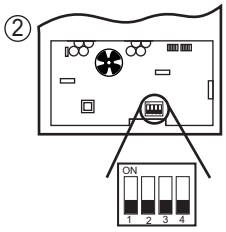

- Remove defective power stage set

**Sticker for Replacing Power Stage Sets**

A sticker is located in the inverter on the top cover. The sticker provides an overview of the steps required for inserting replacement power stage sets.

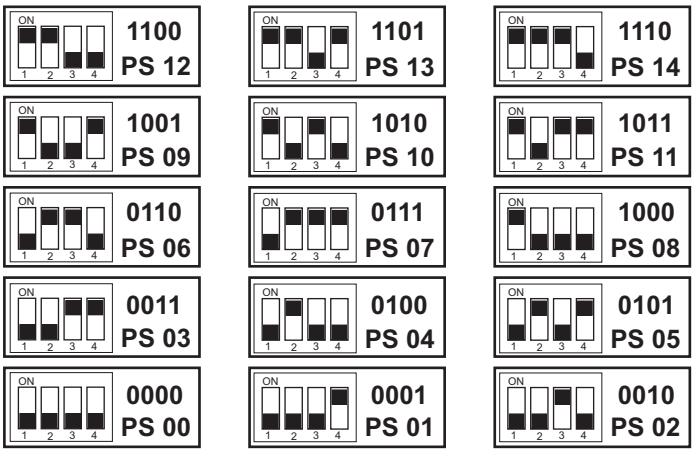



**Symbols on the sticker:**

| | |
|---|---|
|  | - Check |
|  | - Break off positioning bolt on the back of the new power stage set rack<br>- Insert positioning bolt into the correct position for the power stage set rack |
|  | - Set the dip switch on the power stage set front for the respective slot |

**Sticker for Replacing Power Stage Sets**
(continued)

**Arrangement of slots and dip switch settings:**




**Text on sticker:**

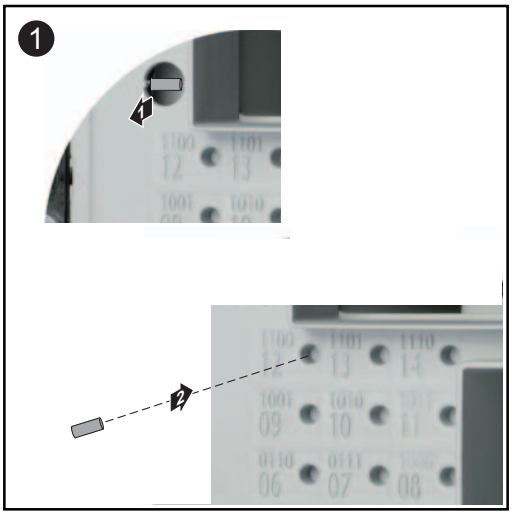
Perform the following steps before inserting the Power Rack.
For more information see the Operating Instructions.
1. Set the bolt on the backside of the rack to the appropriate position.
2. Set the DIP switch on the Power Rack to the position as shown.
Note: Power Rack no. 00 must be inserted properly before switching on the unit.

Carry out the following steps before inserting the power stage set rack:

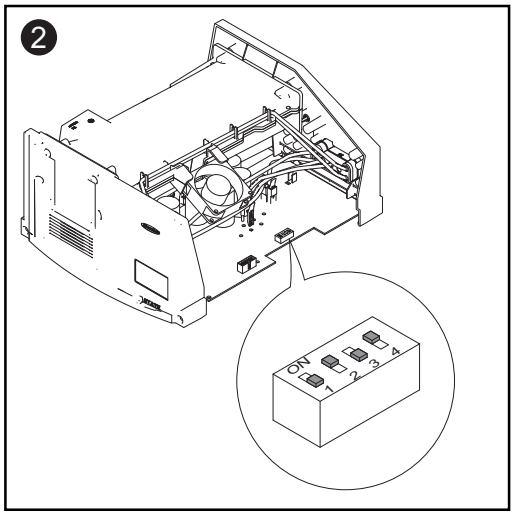
1. Insert positioning bolt into the correct position on the back of the power stage set rack
2. Set the dip switch on the power stage set front according to the diagram

**NOTE** Power stage set No. 00 must be inserted properly before switching on the inverter.

**Inserting Replacement Power Stage Sets**



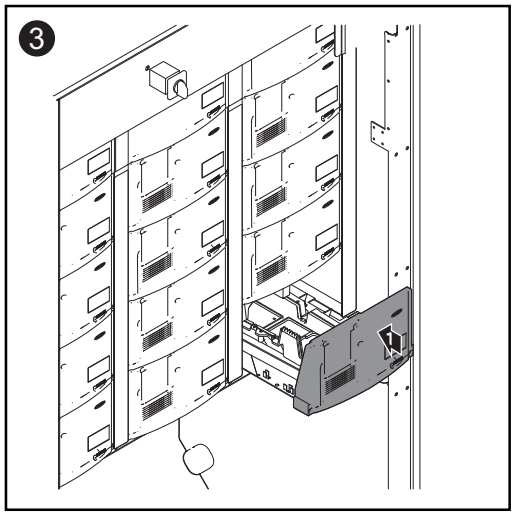

- Break off positioning bolt and insert into the correct position

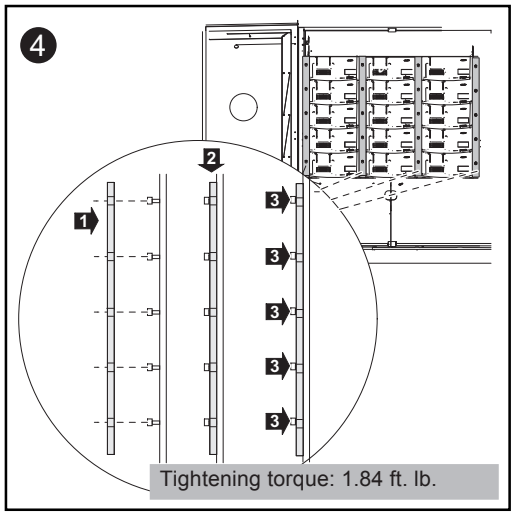



- Set dip switch according to the diagram

**Inserting Replacement Power Stage Sets** (continued)

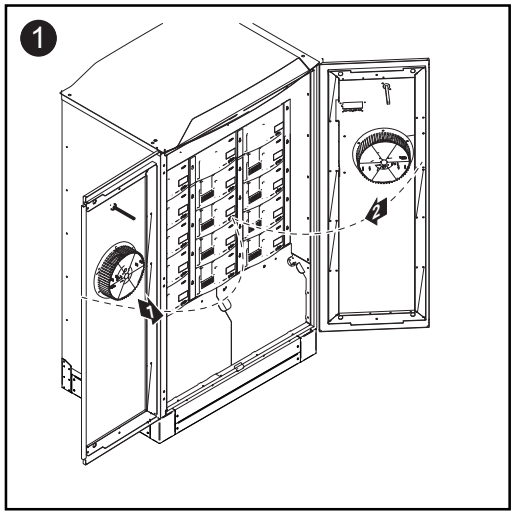
**Important** When inserting power stage sets, the plastic front of the power stage set must be inserted flat against the side metal supports.
If a power stage set cannot be inserted completely into the inverter, then the power stage set has been inserted into the wrong slot.



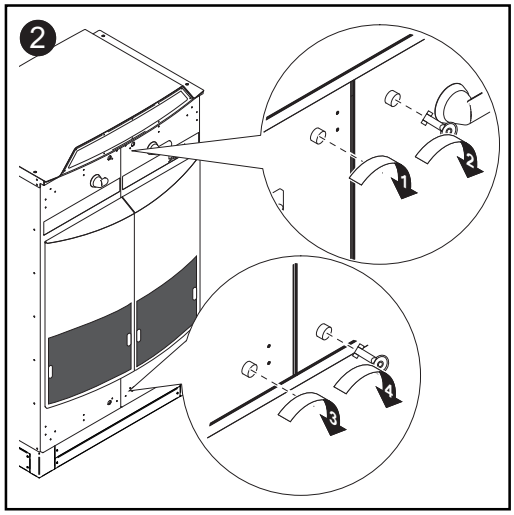




- Insert the left and right rails for the replaced power stage set
- Secure rails using 2 x 5 screws

**Closing the Fronius CL**




- Close doors




- Close door latches

# Technical Data

**Fronius CL 33.3**
**DELTA**

## Input data

| | | |
|---|---|---|
| Recommended PV power | | 28.3 - 39.0 kWp |
| MPPT voltage range | | 230 - 500 V DC |
| Max. input voltage<br>(at 1000 W/m² / 14 °F in open circuit operation) | | 600 V DC |
| Nominal input voltage | | 390 V |
| Nominal input current | | 91.8 A |
| Maximum usable input current | | 155.7 A |
| Max. array short circuit current | | 195 A |

## Output data

| | | |
|---|---|---|
| Nominal output power ($P_{nom}$) | | 33,300 W |
| $P_{nom}$ at +122 °F (50 °C) | at 208 V<br>at 240 V | 30,200 W<br>33,300 W |
| Maximum continuous output power | | 33,300 W |
| Nominal AC output voltage | | 208 V / 240 V |
| Max. permitted grid impedance Zmax at PCC [1)] | | n.a. |
| Operating AC voltage range default | at 208 V<br>at 240 V | 183 - 229 V<br>211 - 264 V |
| Adjustment range for voltage, | at 208 V<br>at 240 V | 105 - 248 V<br>121 - 287 V |
| Voltage trip limit accuracy | | 1.5 % of nominal value |
| Voltage clearing times | | 0.016 - 4.25 s |
| Nominal output current | at 208 V<br>at 240 V | 92.4 A AC<br>80.1 A AC |
| Number of phases | | 3 |
| Maximum output current | at 183 V<br>at 211 V | 93.5 A<br>91.1 A |
| Max. continuous utility backfeed current [2)] | | 0 A |
| Synchronization in-rush current [2)] | | 0 A |
| Maximum output fault current / duration | | 1,120 A / 426.4 µs |
| Nominal output frequency<br>60 Hz | | |
| Operating frequency range | | 59.3 - 60.5 Hz |
| Adjustment range for frequency | | 57.0 - 60.48 Hz |
| Frequency trip limit accuracy | | 0.05 Hz |
| Frequency clearing times | | 0.016 - 300 s |
| Total harmonic distortion | | < 3 % |
| Power factor | | 1 |

**Fronius CL 33.3**
**DELTA**
(continued)

## General data

| | | |
|---|---|---|
| Maximum efficiency | | 95.9 % |
| CEC efficiency | at 208 V<br>at 240 V | 94.5 %<br>95.0 % |
| Consumption in standby (night) | | < 5 W |
| Consumption during operation | | 65 W |
| Cooling | | controlled forced ventilation |
| Protection type | | NEMA 3R |
| Unit dimensions (w x h x d) | | 43.50 x 76.57 x 31.38 in.<br>1,105 x 1,945 x 797 mm |
| Weight without power stage sets | | 478 lbs.<br>217 kg |
| Weight with power stage sets | | 661.00 lbs.<br>300 kg |
| Shipping dimensions (w x h x d) | | |
| without mounting base | | 47.24 x 79.92 x 39.37 in.<br>1,200 x 2,030 x 1,000 mm |
| with mounting base | | 47.24 x 87.40 x 39.37 in.<br>1,200 x 2,220 x 1,000 mm |
| Shipping weight | | |
| without mounting base | | 716.50 lbs.<br>325 kg |
| with mounting base | | 738.55 lbs.<br>335 kg |
| EMC emissions class | | B |
| Over-voltage category (OVC) | | AC 3 / DC 4 |
| Permitted ambient temperature<br>(with 95% rel. humidity) | | -13 °F - +122 °F<br>-25 °C - +50 °C |
| Permitted storage temperature<br>(with 95% rel. humidity) | | -134 °F - +140 °F<br>-25 °C - +60 °C |

## Protection devices

| | |
|---|---|
| Ground fault protection | internal GFDI<br>(Ground Fault Detector/Interrupter) |
| Islanding protection | integrated |
| DC reverse polarity protection | integrated |
| Over temperature | output power derating / active cooling |

**Fronius CL 36.0**
**WYE277**

## Input data

| | |
|---|---|
| Recommended PV power | 30.6 - 42.1 kWp |
| MPPT voltage range | 230 - 500 V DC |
| Max. input voltage<br>(at 1000 W/m² / 14 °F in open circuit operation) | 600 V DC |
| Nominal input voltage | 390 V |
| Nominal input current | 99.3 A |
| Maximum usable input current | 168.3 A |
| Max. array short circuit current | 210 A |

## Output data

| | | |
|---|---|---|
| Nominal output power ($P_{nom}$) | | 36,000 W |
| $P_{nom}$ at +122 °F (50 °C) | | 36,000 W |
| Maximum continuous output power | | 36,000 W |
| Nominal AC output voltage | | 277 V |
| Max. permitted grid impedance Zmax at PCC [1)] | | n.a. |
| Operating AC voltage range default | at 277 V | 244 - 305 V |
| Adjustment range for voltage, | at 277 V | 140 - 324 V |
| Voltage trip limit accuracy | | 1.5 % of nominal value |
| Voltage clearing times | | 0.016 - 4.25 s |
| Nominal output current | at 277 V | 43.3 A |
| Number of phases | | 3 |
| Maximum output current | at 244 V | 54.0 A |
| Max. continuous utility backfeed current [2)] | | 0 A |
| Synchronization in-rush current [2)] | | 0 A |
| Maximum output fault current / duration | | 1,020 A / 510.4 µs |
| Nominal output frequency | | 60 Hz |
| Operating frequency range | | 59.3 - 60.5 Hz |
| Adjustment range for frequency | | 57.0 - 60.48 Hz |
| Frequency trip limit accuracy | | 0.05 Hz |
| Frequency clearing times | | 0.016 - 300 s |
| Total harmonic distortion | | < 3 % |
| Power factor | | 1 |

**Fronius CL 36.0**
**WYE277**
(continued)

## General data

| | | |
|---|---|---|
| Maximum efficiency | | 95.9 % |
| CEC efficiency | at 277 V | 95.5 % |
| Consumption in standby (night) | | < 5 W |
| Consumption during operation | | 65 W |
| Cooling | | controlled forced ventilation |
| Protection type | | NEMA 3R |
| Unit dimensions (w x h x d) | | 43.50 x 76.57 x 31.38 in.<br>1,105 x 1,945 x 797 mm |
| Weight without power stage sets | | 478.00 lbs.<br>217 kg |
| Weight with power stage sets | | 661.00 lbs.<br>300 kg |
| Shipping dimensions (w x h x d) | | |
| without mounting base | | 47.24 x 79.92 x 39.37 in.<br>1,200 x 2,030 x 1,000 mm |
| with mounting base | | 47.24 x 87.40 x 39.37 in.<br>1,200 x 2,220 x 1,000 mm |
| Shipping weight | | |
| without mounting base | | 716.50 lbs.<br>325 kg |
| with mounting base | | 738.55 lbs.<br>335 kg |
| EMC emissions class | | B |
| Over-voltage category (OVC) | | AC 3 / DC 4 |
| Permitted ambient temperature<br>(with 95% rel. humidity) | | -13 °F - +122 °F<br>-25 °C - +50 °C |
| Permitted storage temperature<br>(with 95% rel. humidity) | | -13 °F - +140 °F<br>-25 °C - +60 °C |

## Protection devices

| | |
|---|---|
| Ground fault protection | internal GFDI<br>(Ground Fault Detector/Interrupter) |
| Islanding protection | integrated |
| DC reverse polarity protection | integrated |
| Over temperature | output power derating / active cooling |

**Fronius CL 44.4**
**DELTA**

## Input data

| | |
|---|---|
| Recommended PV power | 37.8 - 52.0 kWp |
| MPPT voltage range | 230 - 500 V DC |
| Max. input voltage<br>(at 1000 W/m² / 14 °F in open circuit operation) | 600 V DC |
| Nominal input voltage | 390 V |
| Nominal input current | 122.4 A |
| Maximum usable input current | 207.6 A |
| Max. array short circuit current | 259 A |

## Output data

| | | |
|---|---|---|
| Nominal output power ($P_{nom}$) | | 44,400 W |
| $P_{nom}$ at +122 °F (50 °C) | at 208 V<br>at 240 V | 40,300 W<br>44,400 W |
| Maximum continuous output power | | 44,400 W |
| Nominal AC output voltage | | 208 V / 240 V |
| Max. permitted grid impedance Zmax at PCC [1)] | | n.a. |
| Operating AC voltage range default | at 208 V<br>at 240 V | 183 - 229 V<br>211 - 264 V |
| Adjustment range for voltage, | at 208 V<br>at 240 V | 105 - 248 V<br>121 - 287 V |
| Voltage trip limit accuracy | | 1.5 % of nominal value |
| Voltage clearing times | | 0.016 - 4.25 s |
| Nominal output current | at 208 V<br>at 240 V | 123.2 A<br>106.8 A |
| Number of phases | | 3 |
| Maximum output current | at 183 V<br>at 211 V | 124.7 A<br>121.5 A |
| Max. continuous utility backfeed current [2)] | | 0 A |
| Synchronization in-rush current [2)] | | 0 A |
| Maximum output fault current / duration | | 1,120 A / 426.4 µs |
| Nominal output frequency | | 60 Hz |
| Operating frequency range | | 59.3 - 60.5 Hz |
| Adjustment range for frequency | | 57.0 - 60.48 Hz |
| Frequency trip limit accuracy | | 0.05 Hz |
| Frequency clearing times | | 0.016 - 300 s |
| Total harmonic distortion | | < 3 % |
| Power factor | | 1 |

**Fronius CL 44.4**
**DELTA**
(continued)

## General data

| | | |
|---|---|---|
| Maximum efficiency | | 95.9 % |
| CEC efficiency | at 208 V<br>at 240 V | 94.5 %<br>95.0 % |
| Consumption in standby (night) | | < 5 W |
| Consumption during operation | | 85 W |
| Cooling | | controlled forced ventilation |
| Protection type | | NEMA 3R |
| Unit dimensions (w x h x d) | | 43.50 x 76.57 x 31.38 in.<br>1,105 x 1,945 x 797 mm |
| Weight without power stage sets | | 478.00 lbs.<br>217 kg |
| Weight with power stage sets | | 721.00 lbs.<br>327 kg |
| Shipping dimensions (w x h x d) | | |
| without mounting base | | 47.24 x 79.92 x 39.37 in.<br>1,200 x 2,030 x 1,000 mm |
| with mounting base | | 47.24 x 87.40 x 39.37 in.<br>1,200 x 2,220 x 1,000 mm |
| Shipping weight | | |
| without mounting base | | 776.03 lbs.<br>352 kg |
| with mounting base | | 798.07 lbs.<br>362 kg |
| EMC emissions class | | B |
| Over-voltage category (OVC) | | AC 3 / DC 4 |
| Permitted ambient temperature<br>(with 95% rel. humidity) | | -13 °F - +122 °F<br>-25 °C - +50 °C |
| Permitted storage temperature<br>(with 95% rel. humidity) | | -13 °F - +140 °F<br>-25 °C - +60 °C |

## Protection devices

| | |
|---|---|
| Ground fault protection | internal GFDI<br>(Ground Fault Detector/Interrupter) |
| Islanding protection | integrated |
| DC reverse polarity protection | integrated |
| Over temperature | output power derating / active cooling |

**Fronius CL 48.0**
**WYE277**

## Input data

| | | |
|---|---|---|
| Recommended PV power | | 40.8 - 56.2 kWp |
| MPPT voltage range | | 230 - 500 V DC |
| Max. input voltage<br>(at 1000 W/m² / 14 °F in open circuit operation) | | 600 V DC |
| Nominal input voltage | | 390 V |
| Nominal input current | | 132.3 A |
| Maximum usable input current | | 224.4 A |
| Max. array short circuit current | | 281 A |

## Output data

| | | |
|---|---|---|
| Nominal output power ($P_{nom}$) | | 48,000 W |
| $P_{nom}$ at +122 °F (50 °C) | | 48,000 W |
| Maximum continuous output power | | 48,000 W |
| Nominal AC output voltage | | 277 V |
| Max. permitted grid impedance Zmax at PCC [1)] | | n.a. |
| Operating AC voltage range default | at 277 V | 244 - 305 V |
| Adjustment range for voltage, | at 277 V | 140 - 324 V |
| Voltage trip limit accuracy | | 1.5 % of nominal value |
| Voltage clearing times | | 0.016 - 4.25 s |
| Nominal output current | at 277 V | 57.8 A |
| Number of phases | | 3 |
| Maximum output current | at 244 V | 72.0 A |
| Max. continuous utility backfeed current [2)] | | 0 A |
| Synchronization in-rush current [2)] | | 0 A |
| Maximum output fault current / duration | | 1,020 A / 510.4 µs |
| Nominal output frequency | | 60 Hz |
| Operating frequency range | | 59.3 - 60.5 Hz |
| Adjustment range for frequency | | 57.0 - 60.48 Hz |
| Frequency trip limit accuracy | | 0.05 Hz |
| Frequency clearing times | | 0.016 - 300 s |
| Total harmonic distortion | | < 3 % |
| Power factor | | 1 |

**Fronius CL 48.0**
**WYE277**
(continued)

## General data

| | | |
|---|---|---|
| Maximum efficiency | | 95.9 % |
| CEC efficiency | at 277 V | 95.5 % |
| Consumption in standby (night) | | < 5 W |
| Consumption during operation | | 85 W |
| Cooling | | controlled forced ventilation |
| Protection type | | NEMA 3R |
| Unit dimensions (w x h x d) | | 43.50 x 76.57 x 31.38 in.<br>1,105 x 1,945 x 797 mm |
| Weight without power stage sets | | 478.00 lbs.<br>217 kg |
| Weight with power stage sets | | 721 lbs.<br>327 kg |
| Shipping dimensions (w x h x d) | | |
| without mounting base | | 47.24 x 79.92 x 39.37 in.<br>1,200 x 2,030 x 1,000 mm |
| with mounting base | | 47.24 x 87.40 x 39.37 in.<br>1,200 x 2,220 x 1,000 mm |
| Shipping weight | | |
| without mounting base | | 776.03 lbs.<br>352 kg |
| with mounting base | | 798.07 lbs.<br>362 kg |
| EMC emissions class | | B |
| Over-voltage category (OVC) | | AC 3 / DC 4 |
| Permitted ambient temperature<br>(with 95% rel. humidity) | | -13 °F - +122 °F<br>-25 °C - +50 °C |
| Permitted storage temperature<br>(with 95% rel. humidity) | | -13 °F - +140 °F<br>-25 °C - +60 °C |

## Protection devices

| | |
|---|---|
| Ground fault protection | internal GFDI<br>(Ground Fault Detector/Interrupter) |
| Islanding protection | integrated |
| DC reverse polarity protection | integrated |
| Over temperature | output power derating / active cooling |

**Fronius CL 55.5**
**DELTA**

## Input data

| | | |
|---|---|---|
| Recommended PV power | | 47.2 - 65.0 kWp |
| MPPT voltage range | | 230 - 500 V DC |
| Max. input voltage<br>(at 1000 W/m² / 14 °F in open circuit operation) | | 600 V DC |
| Nominal input voltage | | 390 V |
| Nominal input current | | 153.0 A |
| Maximum usable input current | | 259.5 A |
| Max. array short circuit current | | 324 A |

## Output data

| | | |
|---|---|---|
| Nominal output power ($P_{nom}$) | | 55,500 W |
| $P_{nom}$ at +122 °F (50 °C) | at 208 V<br>at 240 V | 50,400 W<br>55,500 W |
| Maximum continuous output power | | 55,500 W |
| Nominal AC output voltage | | 208 V / 240 V |
| Max. permitted grid impedance Zmax at PCC [1)] | n.a. | |
| Operating AC voltage range default | at 208 V<br>at 240 V | 183 - 229 V<br>211 - 264 V |
| Adjustment range for voltage, | at 208 V<br>at 240 V | 105 - 248 V<br>121 - 287 V |
| Voltage trip limit accuracy | | 1.5 % of nominal value |
| Voltage clearing times | | 0.016 - 4.25 s |
| Nominal output current | at 208 V<br>at 240 V | 154.0 A AC<br>133.5 A AC |
| Number of phases | | 3 |
| Maximum output current | at 183 V<br>at 211 V | 155.9 A<br>151.9 A |
| Max. continuous utility backfeed current [2)] | | 0 A |
| Synchronization in-rush current [2)] | | 0 A |
| Maximum output fault current / duration | | 1,020 A / 426.4 µs |
| Nominal output frequency | | 60 Hz |
| Operating frequency range | | 59.3 - 60.5 Hz |
| Adjustment range for frequency | | 57.0 - 60.48 Hz |
| Frequency trip limit accuracy | | 0.05 Hz |
| Frequency clearing times | | 0.016 - 300 s |
| Total harmonic distortion | | < 3 % |
| Power factor | | 1 |

**Fronius CL 55.5**
**DELTA**
(continued)

## General data

| | | |
|---|---|---|
| Maximum efficiency | | 95.9 % |
| CEC efficiency | at 208 V<br>at 240 V | 94.5 %<br>95.0 % |
| Consumption in standby (night) | | < 10 W |
| Consumption during operation | | 105 W |
| Cooling | | controlled forced ventilation |
| Protection type | | NEMA 3R |
| Unit dimensions (w x h x d) | | 43.50 x 76.57 x 31.38 in.<br>1,105 x 1,945 x 797 mm |
| Weight without power stage sets | | 478.00 lbs.<br>217 kg |
| Weight with power stage sets | | 783 lbs.<br>355 kg |
| Shipping dimensions (w x h x d) | | |
| without mounting base | | 47.24 x 79.92 x 39.37 in.<br>1,200 x 2,030 x 1,000 mm |
| with mounting base | | 47.24 x 87.40 x 39.37 in.<br>1,200 x 2,220 x 1,000 mm |
| Shipping weight | | |
| without mounting base | | 837.76 lbs.<br>380 kg |
| with mounting base | | 859.80 lbs.<br>390 kg |
| EMC emissions class | | B |
| Over-voltage category (OVC) | | AC 3 / DC 4 |
| Permitted ambient temperature<br>(with 95% rel. humidity) | | -13 °F - +122 °F<br>-25 °C - +50 °C |
| Permitted storage temperature<br>(with 95% rel. humidity) | | -13 °F - +140 °F<br>-25 °C - +60 °C |

## Protection devices

| | |
|---|---|
| Ground fault protection | internal GFDI<br>(Ground Fault Detector/Interrupter) |
| Islanding protection | integrated |
| DC reverse polarity protection | integrated |
| Over temperature | output power derating / active cooling |

**Fronius CL 60.0**
**WYE277**

## Input data

| | |
|---|---|
| Recommended PV power | 51.0 - 70.2 kWp |
| MPPT voltage range | 230 - 500 V DC |
| Max. input voltage<br>(at 1000 W/m² / 14 °F in open circuit operation) | 600 V DC |
| Nominal input voltage | 390 V |
| Nominal input current | 165.4 A |
| Maximum usable input current | 280.5 A |
| Max. array short circuit current | 351.0 A |

## Output data

| | | |
|---|---|---|
| Nominal output power ($P_{nom}$) | | 60,000 W |
| $P_{nom}$ at +122 °F (50 °C) | | 60,000 W |
| Maximum continuous output power | | 60,000 W |
| Nominal AC output voltage | | 277 V |
| Max. permitted grid impedance Zmax at PCC [1)] | | n.a. |
| Operating AC voltage range default | at 277 V | 244 - 305 V |
| Adjustment range for voltage, | at 277 V | 140 - 324 V |
| Voltage trip limit accuracy | | 1.5 % of nominal value |
| Voltage clearing times | | 0.016 - 4.25 s |
| Nominal output current | at 277 V | 72.2 A |
| Number of phases | | 3 |
| Maximum output current | at 244 V | 90.0 A |
| Max. continuous utility backfeed current [2)] | | 0 A |
| Synchronization in-rush current [2)] | | 0 A |
| Maximum output fault current / duration | | 1,020 A / 510.4 µs |
| Nominal output frequency | | 60 Hz |
| Operating frequency range | | 59.3 - 60.5 Hz |
| Adjustment range for frequency | | 57.0 - 60.48 Hz |
| Frequency trip limit accuracy | | 0.05 Hz |
| Frequency clearing times | | 0.016 - 300 s |
| Total harmonic distortion | | < 3 % |
| Power factor | | 1 |

**Fronius CL 60.0**
**WYE277**
(continued)

## General data

| | | |
|---|---|---|
| Maximum efficiency | | 95.9 % |
| CEC efficiency | at 277 V | 95.5 % |
| Consumption in standby (night) | | < 10 W |
| Consumption during operation | | 105 W |
| Cooling | | controlled forced ventilation |
| Protection type | | NEMA 3R |
| Unit dimensions (w x h x d) | | 43.50 x 76.57 x 31.38 in.<br>1,105 x 1,945 x 797 mm |
| Weight without power stage sets | | 478.0 lbs.<br>217 kg |
| Weight with power stage sets | | 783 lbs.<br>355 kg |
| Shipping dimensions (w x h x d) | | |
| without mounting base | | 47.24 x 79.92 x 39.37 in.<br>1,200 x 2,030 x 1,000 mm |
| with mounting base | | 47.24 x 87.40 x 39.37 in.<br>1,200 x 2,220 x 1,000 mm |
| Shipping weight | | |
| without mounting base | | 837.76 lbs.<br>380 kg |
| with mounting base | | 859.80 lbs.<br>390 kg |
| EMC emissions class | | B |
| Over-voltage category (OVC) | | AC 3 / DC 4 |
| Permitted ambient temperature<br>(with 95% rel. humidity) | | -13 °F - +122 °F<br>-25 °C - +50 °C |
| Permitted storage temperature<br>(with 95% rel. humidity) | | -13 °F - +140 °F<br>-25 °C - +60 °C |

## Protection devices

| | |
|---|---|
| Ground fault protection | internal GFDI<br>(Ground Fault Detector/Interrupter) |
| Islanding protection | integrated |
| DC reverse polarity protection | integrated |
| Over temperature | output power derating / active cooling |

**Explanation of Footnotes**

1) PCC = interface to the public grid
2) assured by electrical design of the inverter

**Field Adjustable Trip Points**

| Field adjustable trip points | 208 V | 240 V | 277 V |
|---|---|---|---|
| Nominal AC output voltage, Line-to-Line, [V] | 208 | 240 | 277 |
| Operating AC voltage range default, Line-to-Line, [V] | 183-229 | 211-264 | n. a. |
| Adjustment range for voltage, Line-to-Line, [V] | 105-248 | 121-287 | n. a. |
| Voltage trip limit accuracy, Line-to-Line [% of nominal value] | 1.5 | 1.5 | 1.5 |
| Operating AC voltage range, Line-to-Neutral, [V] | 106-132 | 106-132 | 244-305 |
| Adjustment range for voltage, Line-to-Neutral , [V] | 60-144 | 60-144 | 139-324 |
| Adjustment range for voltage clearing time [s] | 0.016-4.25 | 0.016-4.25 | 0.016-4.25 |
| Voltage trip limit accuracy, Line-to-Neutral [% of nominal value] | 1.5 | 1.5 | 1.5 |
| Nominal output frequency [Hz] | 60 | 60 | 60 |
| Operating frequency range [Hz] | 59.3-60.5 | 59.3-60.5 | 59.3-60.5 |
| Adjustment range for frequency [Hz] | 57.0-60.48 | 57.0-60.48 | 57.0-60.48 |
| Adjustment range for frequency clearing time [s] | 0.016-300 | 0.016-300 | 0.016-300 |
| Frequency trip limit accuracy [ms] | 33.33 (1) | 33.33 (1) | 33.33 (1) |
| Detection time [ms] | 25 (2) | 25 (2) | 25 (2) |
| Trip Time accuracy [ms] | 33.33 (1) | 33.33 (1) | 33.33 (1) |
| Reconnect time default [s] | 300 | 300 | 300 |
| Adjustment range for reconnect time [s] | 5-900 | 5-900 | 5-900 |

(1) 33.33 ms are equivalent to 2 cycles
(2) 25 ms are equivalent to 1.5 cycles

# Relevant Standards and Directives

**Relevant Standards and Directives**

- UL 1741
- IEEE 1547
- IEEE 1547.1
- ANSI/IEEE C62.41
- FCC Part 15 B
- NEC Article 690
- C22. 2 No. 107.1-01

**Grid Failure**

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

# Warranty and Disposal

**FRONIUS USA limited 5-Year Warranty**

At Fronius, we have been designing and manufacturing high quality power electronics equipment for over 60 years. And all our production facilities are ISO 9001 certified.

You will probably not encounter any service-related issues with your Fronius CL solar inverter.
However, in the unlikely event that within Five (5) years from the original purchase you discover a problem caused by defects in either workmanship or materials, we will see that the device is either repaired or replaced. Repair or replacement depends on Fronius' evaluation of the issue and what we decide makes the most sense according to the situation.
The warranty is based on the inverter's serial number, allowing the warranty to be transferred to another owner if the Fronius CL solar inverter remains installed in the original installation location. Because the warranty is tied to the serial number, there is no paperwork to transfer the warranty to a new owner.

Fronius CL solar inverters are designed to withstand normal operating conditions and typical wear and tear when the Fronius CL solar inverter is used for its original intent, in compliance with the Fronius CL Installation and Operational Manual(s) supplied with the original equipment.
This warranty does not cover damages by improper installation or operation, misuse, abuse, manipulation, alterations or repair attempts, accidents, fire, floods, acts of God, and incidental or consequential damage caused by defects with other components of the solar system. This warranty does not extend beyond the original cost of the Fronius CL solar inverter.

**Policy and Procedure for Warranty Returns and Repairs**

To obtain service you must follow this policy and procedure for warranty returns and repairs:

- All returned Fronius CL solar inverters require a Returned Merchandise Authorization Number (RMA).
- A request for an RMA number requires the following information:
  - Proof of purchase in the form of the original invoice
  - Model number of the Fronius CL solar inverter
  - Serial number of the Fronius CL solar inverter
  - Description of the problem
  - Shipping address for the repaired or replaced equipment
- All Fronius CL solar inverters authorized for return by FRONIUS USA must be returned in their original shipping container or packaging providing equal protection.
- Shipping costs to FRONIUS USA and back to the purchaser of repaired or replacement Fronius CL solar inverters is the responsibility of FRONIUS USA
- The warranty period of any repaired or replacement inverter is 12 months after shipment from FRONIUS USA or the original warranty period which ever is greater
- Labor costs related to uninstalling the defective equipment and re-installing the repaired or replacement equipment are not covered under the warranty.

Some states do not allow the exclusion or limitation of incidental or consequential damages. This warranty gives you specific legal rights, and you may also have other rights, which vary from state to state.

FRONIUS USA LLC General Terms and Conditions apply.

**Policy and Procedure for Warranty Returns and Repairs** (continued)

Contact your local dealer or FRONIUS Service Partner for immediate handling of warranty issues. For service assistance to resolve a Fronius CL solar inverter problem, or for product information please contact:

Fronius USA LLC Solar Electronics Division
6797 Fronius Drive, Portage, IN 46368
E-Mail: pv-us@fronius.com
Telephon: (219) 734-550087
http://www.fronius-usa.com

**Disposal of Obsolete Equipment - Recycling**

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:** 2223511 **Master Contract:** 203213

**Project:** 2567728 **Date Issued:** October 23, 2012

**Issued to:** **Fronius International GmbH**

**Guenter Fronius Strasse 1**
**Wels-Thalheim, 4600**
**Austria**
**Attention: Ing. Christian 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 Fronius CL Series, permanently connected, 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.

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

Notes:

1. Inverter 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 have been evaluated for use in utility-interactive applications.

2. 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**

CAN/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 (January 28, 2010)

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

# *Supplement to Certificate of Compliance*

**Certificate:** 2223511 **Master Contract:** 203213

***The products listed, including the latest revision described below, are eligible to be marked in accordance with the referenced Certificate.***

## Product Certification History

| Project | Date | Description |
|---|---|---|
| 2567728 | October 23, 2012 | Update report 2223511 to include optional IP & Signal Cards and alternate components. |
| 2523163 | May 14, 2012 | Update report 2223511 to include alternate construction. |
| 2461341 | October 3, 2011 | Update report 2223511 to include alternate construction. |
| 2441000 | August 5, 2011 | Update report 2223511 to include PV-AFCI Card, PV-AFCI-NL Card, WILL-XBEE Card, WILL-MODB Card and dust protection filters. |
| 2417686 | May 2, 2011 | Update report 2223511 to include alternate components. |
| 2365463 | December 13, 2010 | Update report 2223511 to include alternate construction and -25C operating temperature range. |
| 2308316 | October 22, 2010 | Update Report 2223511 to include alternate construction. |
| 2223511 | April 8, 2010 | Evaluation of Utility Interactive Inverter, Model Fronius CL. (C/US) |

# Fronius Worldwide - www.fronius.com/addresses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E-Mail: pv-us@fronius.com
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**Under http://www.fronius.com/addresses you will find all addresses of our sales branches and partner firms!**

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