



# Installation Instructions

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**Fronius Galvo 208-240:**

**1.5-1 / 2.0-1**

**2.5-1 / 3.1-1**

**10.0-1 / 11.4-1**

**12.5-1 / 15.0-1**



**EN-US** | Installation instructions



42,0426,0182,EA

017-10082022



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## Explanation of Safety Instructions

### **DANGER!**

**Indicates an immediate danger.**

- ▶ Death or serious injury may result if appropriate precautions are not taken.

### **WARNING!**

**Indicates a possibly dangerous situation.**

- ▶ Death or serious injury may result if appropriate precautions are not taken.

### **CAUTION!**

**Indicates a situation where damage or injury could occur.**

- ▶ Minor injury or damage to property may result if appropriate precautions are not taken.

### **NOTE!**

**Indicates the possibility of flawed results and damage to the equipment.**

## General

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

The inverter is designed and tested according to international safety requirements. Due to its electrical and electronic components, certain precautions must be taken when installing and operating the inverter.

In order to reduce the risk of injury to persons and to ensure safe installation and operation of the inverter, be sure to read these Operating Instructions carefully and follow all instructions and safety instructions.

Failure to observe the Operating Instructions and safety instructions can void the warranty and/or cause damage to the inverters or other property damage!

## Electrical installations

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

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

 **WARNING!**

**Danger from incorrect operation and work that is not carried out properly.**

This can result in severe personal injury and damage to property.

- ▶ Only qualified personnel are authorized to commission your inverter and only within the scope of the respective technical regulations.
- ▶ Read the Installation Instructions and Operating Instructions before installing and commissioning the equipment.

 **WARNING!**

**Danger due to a ground fault. A normally grounded conductor can become ungrounded and live due to a ground fault.**

An electric shock can be fatal.

- ▶ A ground fault must be repaired before operation is resumed.

 **WARNING!**

**Danger of DC voltage from solar modules. When solar modules are grounded, the inverter's insulation monitoring is deactivated.**

An electric shock can be fatal.

- ▶ Ensure that grounded solar modules are double insulated according to Safety Class II.
- ▶ Attach corresponding safety labels to the photovoltaic system where they can be seen easily.
- ▶ Set the inverter so that an error message is displayed if the fuse trips.

**Fire prevention**

 **CAUTION!**

**Danger from faulty or incorrect installations.**

They may result in damage to inverters and other current-carrying components of a photovoltaic system.

Faulty or improper installation may cause overheating of cables and terminals as well as the formation of arcs. This could cause thermal damage, which in turn may lead to fires.

Please note the following when connecting the AC and DC cables:

- ▶ Securely tighten all terminals using the proper torque listed in the Operating Instructions
- ▶ Securely tighten all grounding terminals (PE/GND) using the proper torque listed in the Operating Instructions, even for free grounding terminals
- ▶ Do not overload cables
- ▶ Check cables for damage and correct wiring
- ▶ Follow all Safety Instructions, Operating Instructions, and any local connection regulations
  
- ▶ Always secure the inverter to the mounting bracket with fixing screws using the torque specified in the Operating Instructions.
- ▶ Only start up the inverter with the fixing screws tightened.

**NOTE!**

**Follow general ESD guidelines when handling option cards.**

**NOTE!**

**Fronius will not bear any costs for production downtimes, or for installations, etc., which may arise due to a detected electric arc and its consequences. Fronius accepts no liability for fires which may break out despite integrated arc detection/interruption (e.g., due to a parallel arc).**

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**NOTE!**

**Before an inverter can be reset following a detected electric arc, check the entire affected photovoltaic system for any damage.**

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**Intended Use**

The 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 to be not in conformity with its intended purpose:

- Utilization for any other purpose, or in any other manner
- Alternations to the inverter are not expressly recommended by Fronius
- Installation of components that are not expressly recommended or sold by Fronius.

The manufacturer is not responsible for any damage resulting from improper use. All warranty claims are considered void in such cases.

Proper use also means

- carefully reading and obeying the instructions and all the safety and danger notices in the Operating and Installation Instructions
- compliance with the maintenance operations
- installation as specified in the Installation Instructions

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

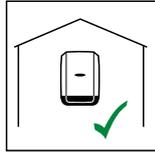
All measures recommended by the solar module manufacturer for maintaining solar module properties must be followed.

Follow all grid operator regulations regarding grid power feed and connection methods.

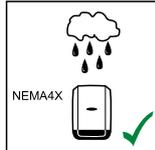
# Installation location and position

## Selecting a location

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

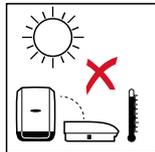


The inverter is suitable for indoor installation.

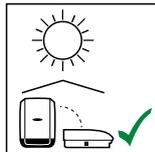


The inverter is suitable for outdoor installation.

Because of its NEMA4X protection class, the inverter is not susceptible to hose water on any side and can also be operated in moist environments.

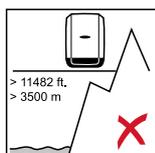


In order to keep inverter heating as low as possible, do not expose the inverter to direct sunlight. The inverter should be installed in a protected location, e.g., near the solar modules or under an overhanging roof.



Altitude above sea level: up to 11,482 ft. (3500 m)

**IMPORTANT!** The inverter must not be installed or operated above an altitude of 11,482 ft (3500 m).

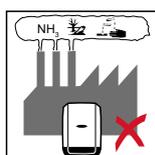


The max. permissible DC voltage of the inverter depends on the altitude:

- 0 - 6561 ft. (0 - 2000 m) ...  $U_{DC\ max} = 550\ V$
- > 6561 - 8202 ft. (> 2000 - 2500 m) ...  $U_{DC\ max} = 540\ V$
- > 8202 - 9842 ft. (> 2500 - 3000 m) ...  $U_{DC\ max} = 480\ V$
- > 9842 - 11,482 ft. (> 3000 - 3500 m) ...  $U_{DC\ max} = 430\ V$

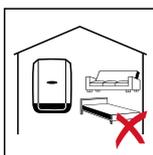
ft. (m)	$U_{DC\ max}$
> 9842 - 11482 ft. (> 3000 - 3500 m)	430 V
> 8202 - 9842 ft. (> 2500 - 3000 m)	480 V
> 6561 - 8202 ft. (> 2000 - 2500 m)	540 V
0 - 6561 ft. (0 - 2000 m)	550 V

The output power reduces when the device temperature is too high, and this may occur earlier than normal at increased altitudes.



Do not install the inverter:

- Where it may be exposed to ammonia, corrosive gases, acids, or salts (e.g., fertilizer storage areas, vent openings for livestock stables, chemical plants, tanneries)



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



Do not install the inverter in:

- Areas where there is an increased risk of accidents from farm animals (horses, cattle, sheep, pigs, etc.)
- Stables or adjoining areas
- Storage areas for hay, straw, chaff, animal feed, fertilizers, etc.



Do not install the inverter in:

- Dusty rooms and environments
- Rooms and areas with large amounts of conductive dust particles (e.g., iron filings)



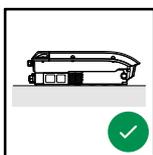
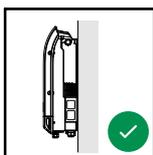
Do not install the inverter in:

- Greenhouses
- Storage or processing areas for fruit, vegetables, or viticulture products
- Areas used in the preparation of grain, green fodder, or animal feeds

**Installation position**



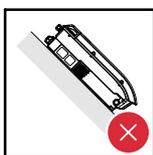
The inverter is suitable for vertical installation on a vertical wall or column.



The inverter is suitable for a horizontal installation position.



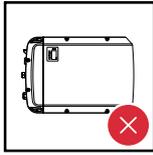
The inverter is suitable for installation on a sloping surface.



Do not install the inverter on a sloping surface with the connections upwards.



Do not install the inverter in a sloping position on a vertical wall or column.



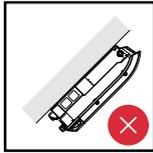
Do not install the inverter in a horizontal position on a vertical wall or column.



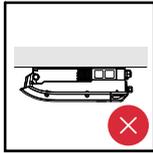
Do not install the inverter with the connections upwards on a vertical wall or column.



Do not install the inverter overhanging with the connections upwards.



Do not install the inverter overhanging with the connections downwards.



Do not install the inverter on the ceiling.

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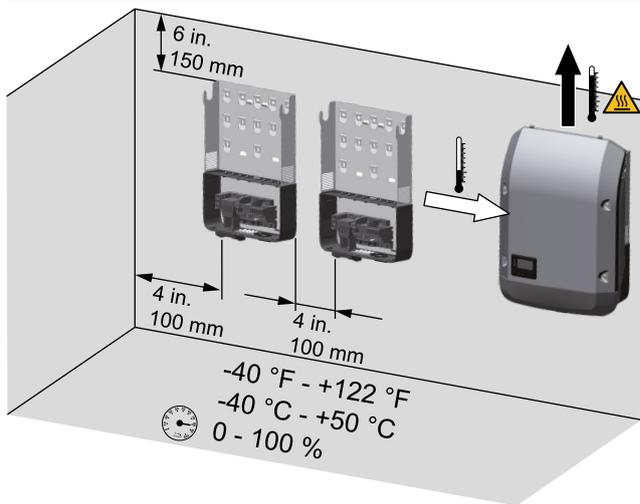
**General location selection**

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

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Only install on a solid, non-flammable surface

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Max. ambient temperatures:  
 -40°F to +122°F  
 (-40°C to +50°C)

Relative humidity:  
 0 - 100%

The air flow direction within the inverter is from left to top (cold air intake on the left, hot air outflow at the top).

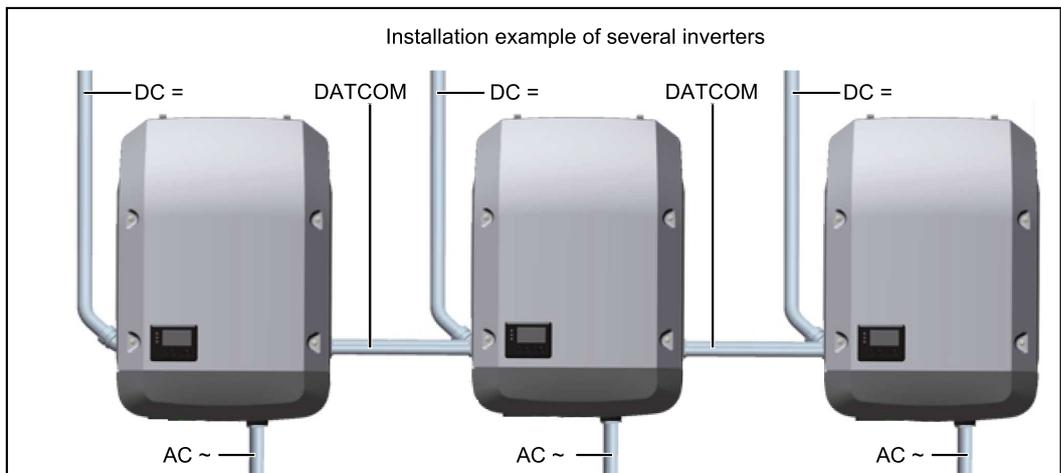
The waste air can reach a temperature of 70°C.

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

If you wish to install the inverter on the outer walls of cattle stables, it is important to keep a minimum clearance of 2 m between all sides of the inverter and air vents and other openings.

The place of installation should not be exposed to ammonia, corrosive gases, salts, or acids.

**Example: Installation of several inverters**





# Preparation



# Attaching the Mounting Bracket

## Safety

### **WARNING!**

#### **Danger of residual voltage from capacitors.**

An electric shock can be fatal.

- ▶ Wait until the capacitors have discharged. Discharge takes 3 minutes.

### **WARNING!**

#### **Danger due to insufficient ground conductor connection.**

This can result in severe personal injury and damage to property.

- ▶ The housing screws provide an adequate ground conductor connection for grounding the housing and should not be replaced under any circumstances by other screws that do not provide a reliable ground conductor connection.

### **CAUTION!**

#### **Danger due to soiling or water on the terminals and contacts in the connection area.**

The inverter may be damaged.

- ▶ When drilling, make sure that terminals and contacts in the connection area do not become soiled or wet.
- ▶ The mounting bracket without integrated inverter does not correspond to the degree of protection according to the data sheet. For this reason do not leave the mounting bracket exposed to environmental influences without the inserted inverter.
- ▶ Protect the mounting bracket from soiling and moisture during installation.

### **NOTE!**

#### **Protection class NEMA4X is only ensured when the inverter is mounted and firmly screwed into the wall bracket.**

The mounting bracket without inverter has no NEMA protection.

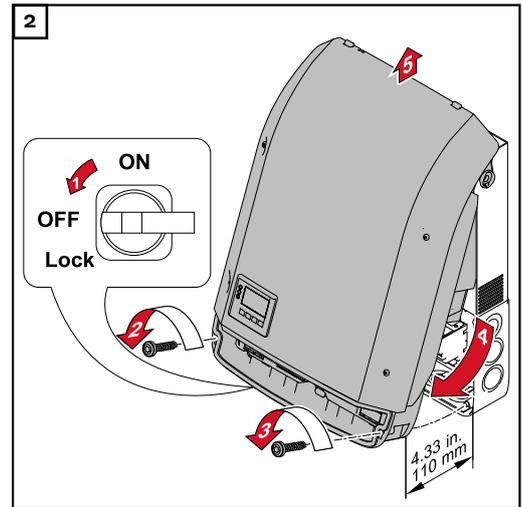
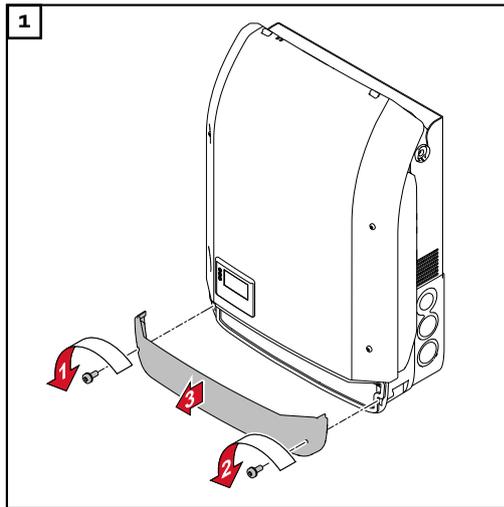
## Selecting Dowels and Screws

**Important!** Depending on the surface, different mounting materials may be required for installing the mounting bracket. These mounting materials are not part of the scope of delivery for the inverter. The installer is responsible for selecting the proper mounting materials.

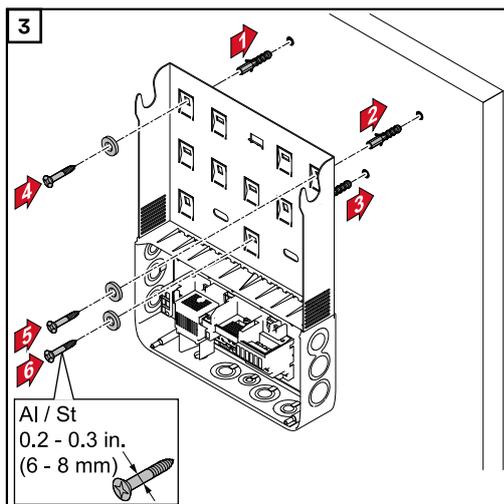
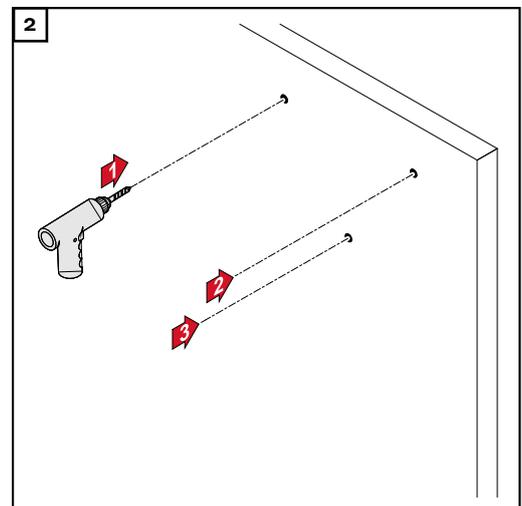
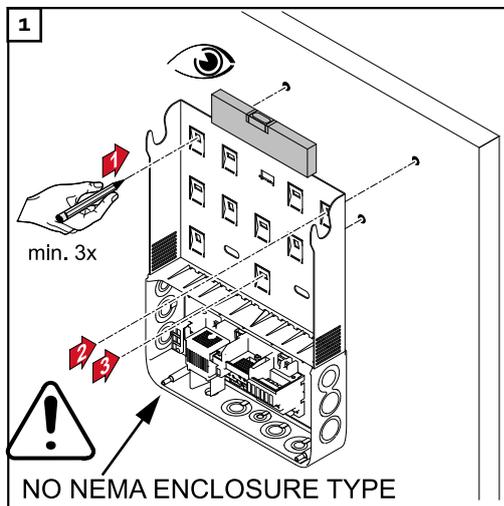
## Screw recommendation

For the installation of the inverter we recommend steel or aluminum screws with a diameter of 0.2–0.3 in. (6–8 mm).

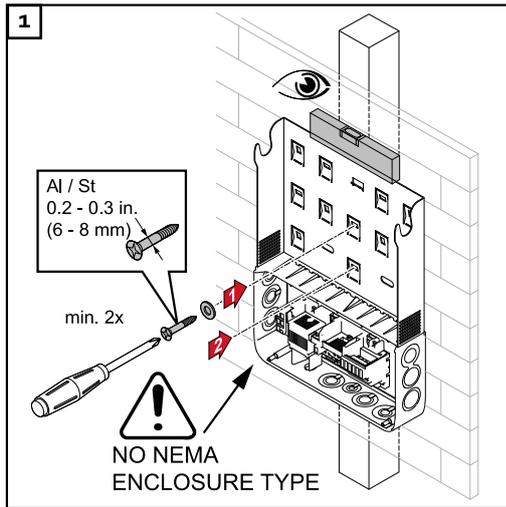
## Opening the in- verter



## Installing the mounting bracket on a brick or concrete wall

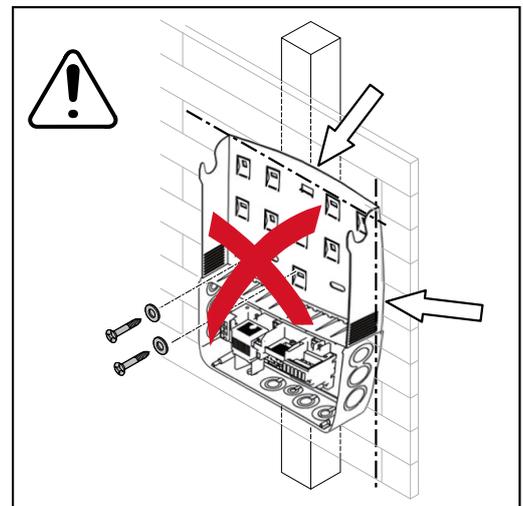
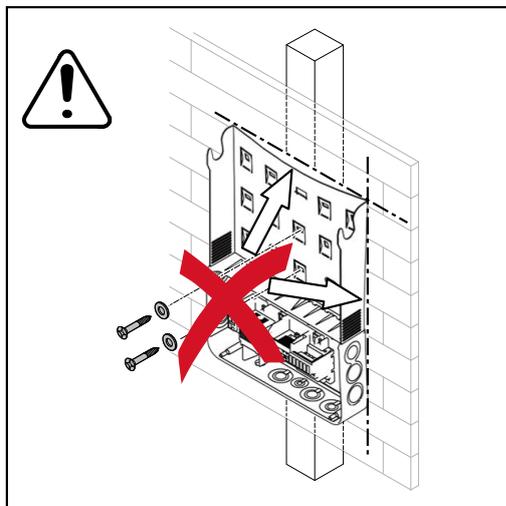
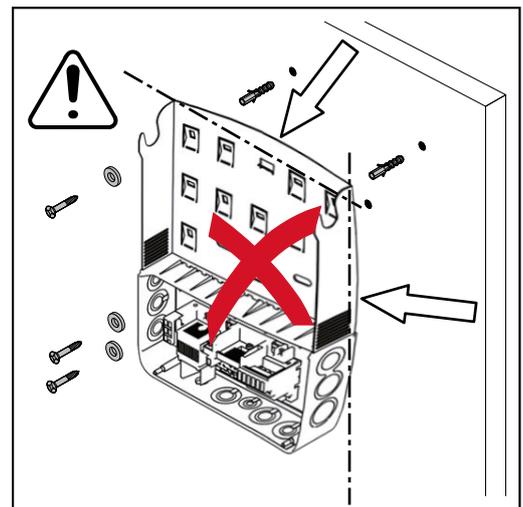
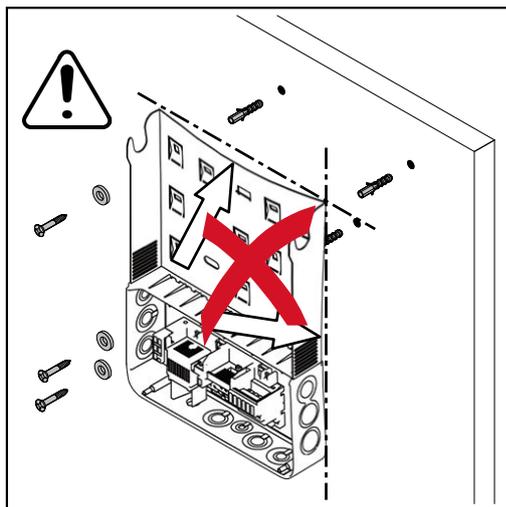


### Fitting the mounting bracket to a timber wall



### Do not warp or deform the mounting bracket

When attaching the wall bracket to the wall or to a column, make sure that the wall bracket is not warped or deformed.



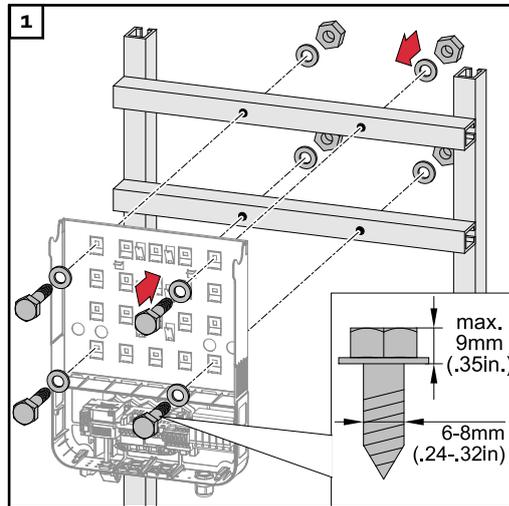
## Attaching the mounting bracket to a metal carrier

### NOTE!

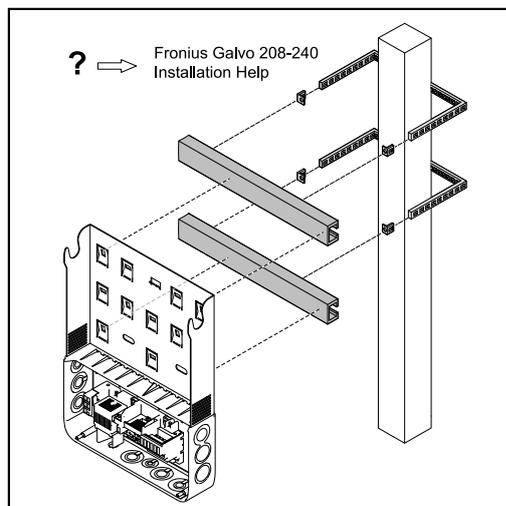
When mounted on metal supports, the inverter must not be exposed to rainwater or splashing water from the rear.

Provide suitable rainwater protection or splash water protection.

The mounting bracket must be secured in at least four places.



## Installing the inverter on a mast



Example of a mast mounting kit

When mounting the inverter on a mast or a vertical carrier, Fronius recommends the use of a standard mast fixing kit.

The kit can be used to mount the inverter on round or rectangular masts with various cross-sections.

# Notes on the Knockouts

## Safety

**⚠ CAUTION!**

**Danger of short circuit from 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 connection area of the inverter,
- ▶ any metal pieces that do fall into the connection area are removed immediately.

**NOTE!**

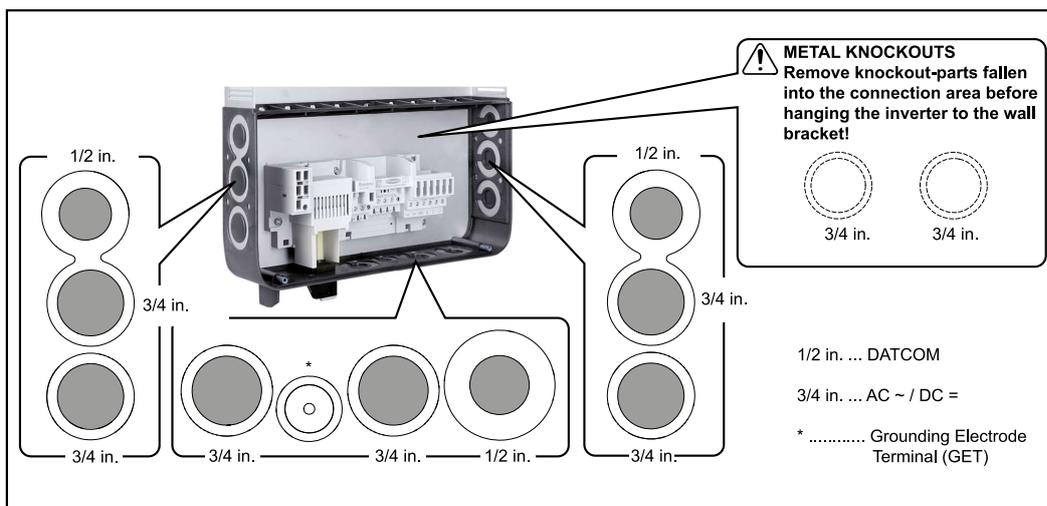
**When using the cable inlets at the back, take care to seal them according to protection class NEMA4X before operating outdoors.**

**NOTE!**

**When installing outdoors, only use waterproof conduit fittings and conduits.**

Conduit fittings and conduits are not part of the scope of supply for the inverter.

## General



The wall bracket contains several knockouts of different sizes. When knocked out, the openings are used for feeding in the various cables:

1/2 in. for data communication cable (DATCOM)

3/4 in. for AC and DC cables

\* A grounding electrode terminal (GET) may be required depending on local regulations.

The cable for the grounding electrode terminal can be fed through the designated opening on the underside of the wall bracket.

**IMPORTANT!** The knockouts on the rear of the wall bracket are made of metal.

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**Knocking or drilling out knockouts**

**IMPORTANT!** The side knockouts and the knockouts on the underside of the wall bracket may be knocked out using a hammer or screwdriver, or drilled out using a step drill.  
The knockouts at the back may only be drilled out using a step drill.



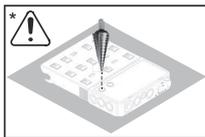
Use suitable eye protection when knocking/drilling out the knockouts.

Only knock out knockouts using a hammer or screwdriver from the inside outwards.

Only use suitable step drills to drill out the knockouts.  
Do not use spiral drills for drilling out!

Only drill out knockouts using a step drill from the outside inwards.

When drilling out using a step drill, ensure that the DC disconnect and the AC/DC connection block are not damaged.



When drilling out the knockouts at the back, place the mounting bracket on an even surface with the back upwards so that shavings and pieces of metal can fall out of the mounting bracket.

Attach appropriate conduits to all knocked/drilled out knockouts.  
In the event of installation outside, only use watertight conduits and conduit fittings.  
Conduits and conduit fittings are not included with the inverter.

**AC~**



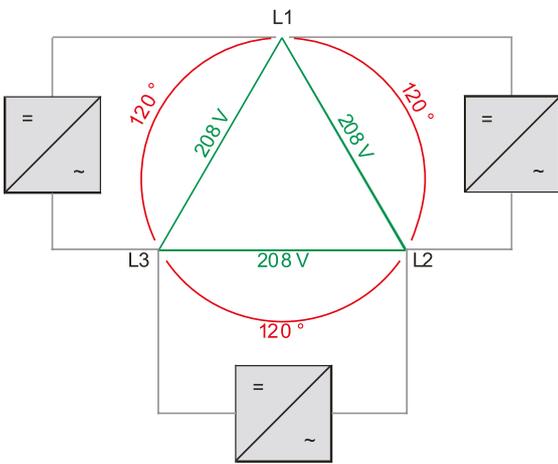
# Suitable Grids

## Suitable Grids

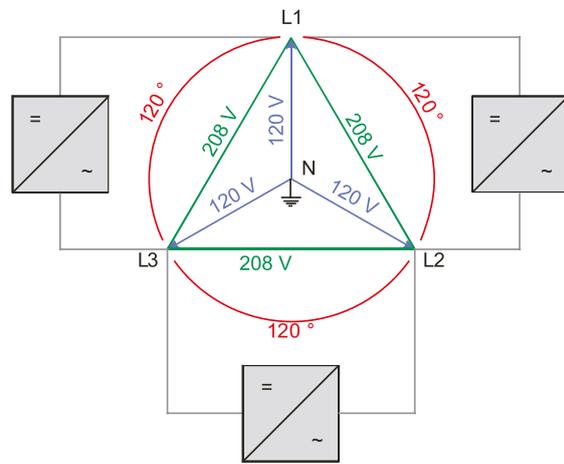
Inverters can be operated on the following grids:

- 208 V Delta, without neutral conductor
- 208 V Delta: 120 V WYE, with neutral conductor
- 220 V Delta, without neutral conductor
- 220 V Delta: 127 V WYE, with neutral conductor
- 240 V Delta, without neutral conductor
- 240 V: 120 V WYE, with neutral conductor
- 240 V: 120 V split phase, with neutral conductor

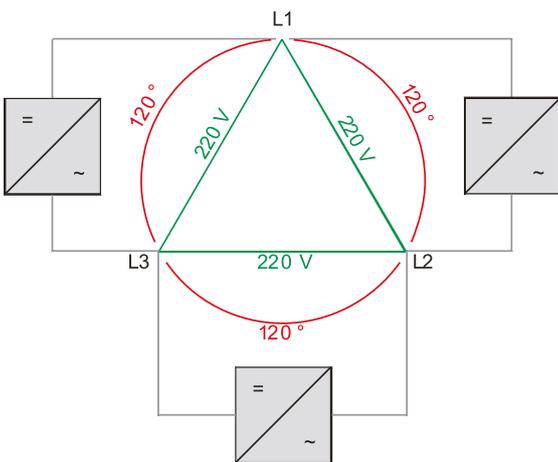
**208 V Delta Setup: 208**  
No neutral conductor



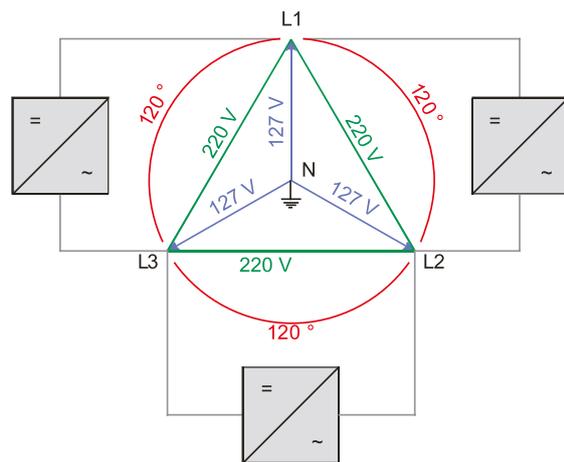
**208 V Delta: 120 V WYE Setup: 208N**  
Neutral conductor available



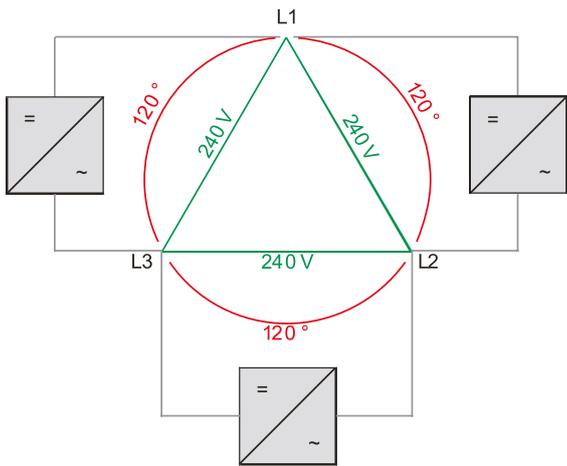
**220 V Delta Setup: 220**  
No neutral conductor



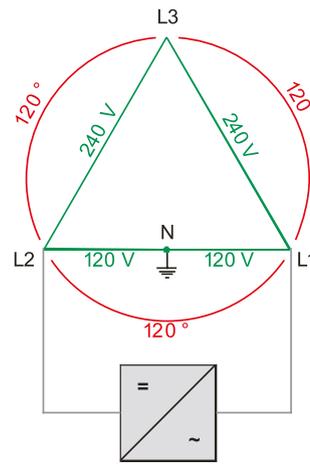
**220 V Delta: 127 V WYE Setup: 220N**  
Neutral conductor available



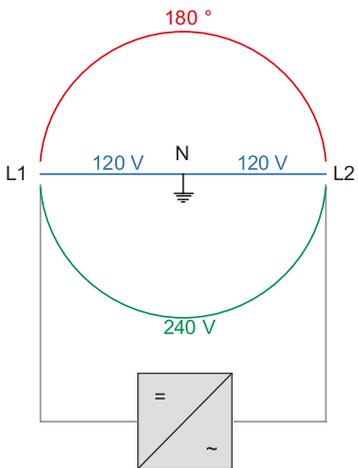
**240 V Delta Setup: 240**  
No neutral conductor



**240 V: 120 V Stinger Setup: 240N**  
Neutral conductor available



**240 V: 120 V Split phase Setup: 240N**  
Neutral conductor available



# Connecting the inverter to the public grid (AC side)

## Safety



### WARNING!

#### **Danger from grid voltage and DC voltage from solar modules that are exposed to light.**

An electric shock can be fatal.

- ▶ Prior to any connection work, ensure that the inverter is de-energized on the AC side and the DC side.
- ▶ The DC main switch is used only to switch off power to the power stage set. When the DC main switch is turned off, the connection area is still energized.
- ▶ Maintenance and service work on the inverter power stage set should only be carried out by Fronius-trained service technicians.
- ▶ All maintenance and service work should only be carried out when the inverter and the mounting bracket have been disconnected from each other.
- ▶ The inverter must only be disconnected from the mounting bracket after being disconnected from the mains power.
- ▶ Only an authorized electrician is permitted to connect this inverter to the public grid.



### WARNING!

#### **Inadequately sized electrical components can cause serious injury and damage to property.**

An electric shock can be fatal.

- ▶ All electrical connections must be established in accordance with the national standard (e.g., for the US National Electrical Code, ANSI/NFPA 70) and any other regulations applicable to the installation site.
- ▶ Installations in Canada must be carried out in accordance with applicable Canadian standards.
- ▶ Use min. 167°F (75°C) copper wire for all grounding wires (see NEC table 250.122).
- ▶ Use for all AC/DC wires, min. 167°F (75°C).
- ▶ Voltage drop and other considerations, such as improving power quality, may mean larger cable cross sections need to be used.
- ▶ Use only solid or stranded wire. Do not use fine stranded wire.



### WARNING!

#### **Danger from work that is not carried out properly**

This can result in severe personal injury and damage to property.

- ▶ The surge protection device should only be installed and connected by licensed electricians.
- ▶ Observe the safety rules!
- ▶ Prior to any installation and connection work, ensure that the inverter is de-energized on the AC side and the DC side.

**⚠ CAUTION!**

**Danger due to improperly connected terminals.**

This can result in thermal damage to the inverter, which can lead to fires.

- ▶ When connecting the AC and DC cables, make sure that all terminals are tightened securely using the proper torque.

**⚠ CAUTION!**

**Fire hazard due to incorrectly designed AC fuse.**

This can result in thermal damage to the inverter, which can lead to fires.

- ▶ Only connect to a circuit provided with branch circuit overcurrent protection in accordance with the National Electrical Code, ANSI / NFPA 70.
- ▶ Observe maximum values for branch circuit overcurrent protection.

**NOTE!**

**When connecting aluminum cables:**

- ▶ Follow all national and international guidelines regarding the connection of aluminum cables.
- ▶ Follow the instructions of the cable manufacturer, especially the note about whether an annual check to ensure that the cables are firmly attached should be performed.

**NOTE!**

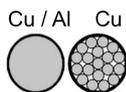
**Form a min. 4 in. (100 mm) cable loop with all cables.**

**NOTE!**

**To enable trouble-free operation of the inverter:**

- ▶ Make sure that the grid's neutral conductor is grounded. For insulated networks (without grounding), this is not the case, and operation of the inverter is not possible.
- ▶ A neutral conductor is required for measurement purposes when operating the inverter. The neutral conductor must have a current carrying capacity of at least 1 A.

**Permitted cables** Cables with the following design can be connected to the AC and DC terminals of the inverter:



- Copper or aluminum: round, solid
- Copper: round, fine-stranded, up to conductor class 4

Cable cross-sections:  
Cu: min. AWG 14 – max. AWG 6  
Al: AWG 6

Tightening torque of the terminals:  
16 lbf.in / 1.33 t. lb. / 1.8 Nm

---

## Preparing Aluminum Cables for Connection

The AC-side terminals are designed for connecting single-wire, round aluminum cables. Due to the reaction of aluminum with air that creates a tough, non-conductive oxide layer the following points must be considered when connecting aluminum cables:

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

Always follow the instructions of the cable manufacturer when using aluminum cables.

Take into account local specifications when configuring cable cross sections.

### 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 a neutral grease, e.g., acid-free and alkali-free Vaseline
- 3 Then immediately connect it to the terminal

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

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## Monitoring the grid

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

# Notes on grid connection

## Grid Connection

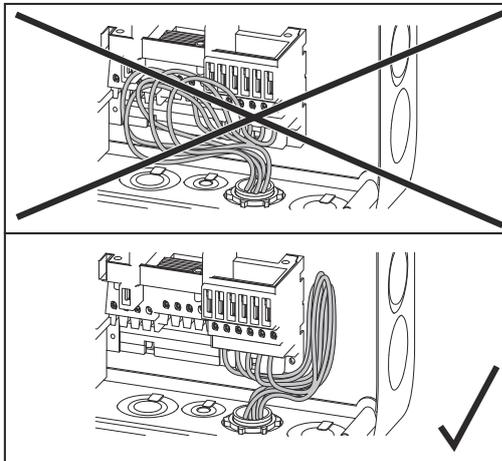
### NOTE!

In order to ensure a proper ground connection, all three GND ground terminals must be tightened with the specified torque during installation.

### NOTE!

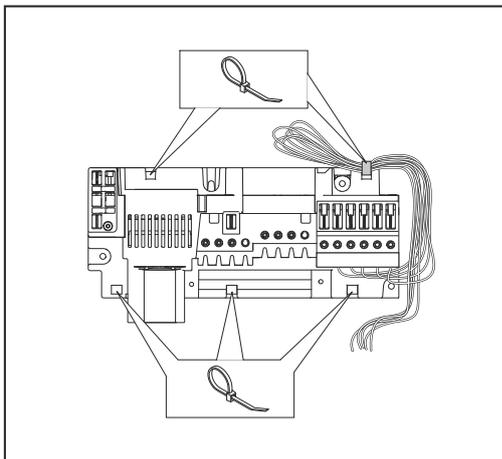
When connecting the AC cable to the AC terminal, create loops of min. 4 in. (102 mm) with the AC cables.

**IMPORTANT!** The GND ground conductor of the AC cable must be laid so that this is the last to be disconnected. Cut GND ground conductors longer, for example, and make them into a loop.



If AC cables are laid over the shaft of the DC main switch, or across the DC main switch connection block, they could be damaged when the inverter swivels in, or the inverter could be prevented from swiveling in.

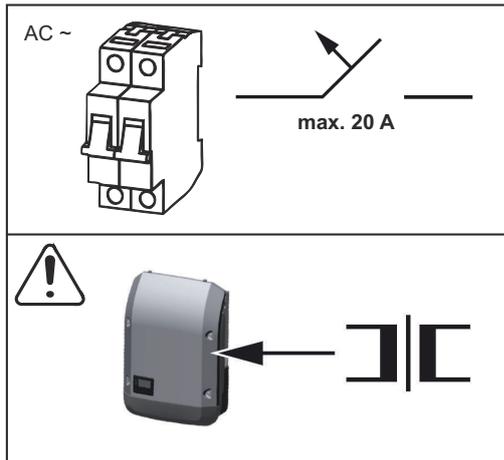
**IMPORTANT!** Do not lay the AC cable over the DC main switch or across the DC main switch connection block.



If long AC or DC cables are laid in the connection area in cable loops, fix the cables to the lugs designed for this purpose on the top and bottom of the connection block using cable ties.

Example: AC cable

**Maximum AC-side Overcurrent Protection**



Inverter	Number of phases	Max. output	Max. protection
Fronius Galvo 208-240 1.5-1	1 / 2	1500 W	20 A
Fronius Galvo 208-240 2.0-1	1 / 2	2000 W	20 A
Fronius Galvo 208-240 2.5-1	1 / 2	2500 W	20 A
Fronius Galvo 208-240 3.1-1	1 / 2	3100 W	20 A

**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.

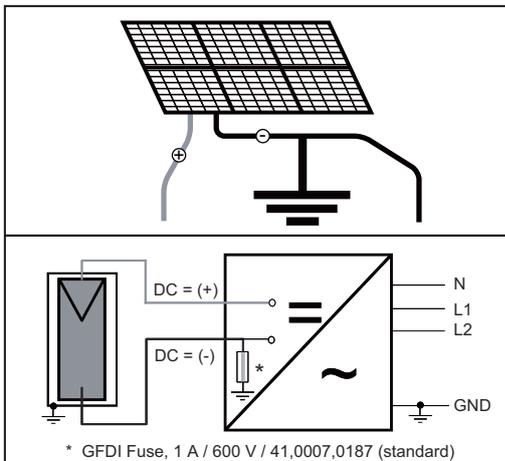


**DC=**



# Notes on Solar Module Grounding in the Inverter

## Notes on solar module ground in the inverter



The inverter comes with a GFDI fuse for negatively grounded solar modules as standard.

**CAUTION** when using ungrounded solar modules!

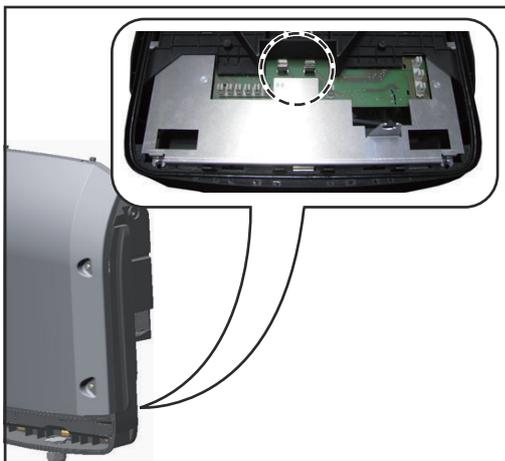
For ungrounded solar modules:

- Remove the GFDI fuse
- Adjust the grounding settings in the BASIC menu

**⚠ WARNING!**

**An electric shock can be fatal.**

Danger of residual voltage from capacitors. When removing the GFDI fuse following commissioning of the inverter, wait until the capacitors have discharged. Discharge takes 3 minutes.

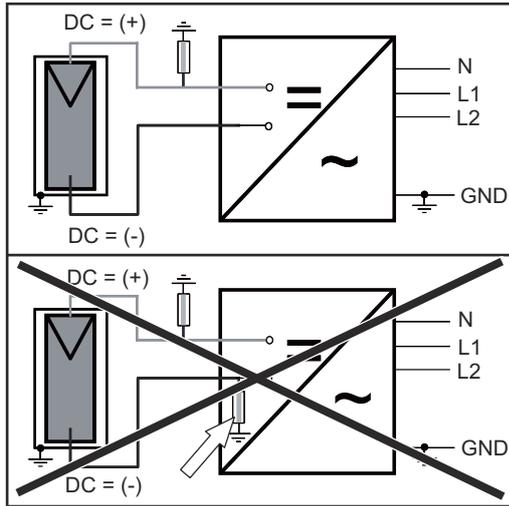


The fuse holder for the grounding of the solar modules is located on the reverse of the inverter.

*Fuse holder for solar module ground at the negative pole*

The inverter may also be operated with solar modules which require grounding on the positive pole.

**IMPORTANT!** The grounding of the solar modules on the positive pole does not work via the fuse in the inverter, and instead must be carried out via a separate fuse outside of the inverter. The GFDI monitoring of the inverter remains in place.



Solar module ground at positive pole

For solar modules grounded on the positive pole:

- Remove the GFDI fuse in the inverter
- Install GFDI fuse outside of the inverter
- Adjust the grounding settings in the BASIC menu

Solar modules grounded on the negative pole ungrounded solar modules	NEC2014
Solar modules grounded on the positive pole	NEC2011

# Notes on DC Connection

## Safety

### **WARNING!**

#### **Danger from grid voltage and DC voltage from solar modules that are exposed to light.**

An electric shock can be fatal.

- ▶ Prior to any connection work, ensure that the inverter is de-energized on the AC side and the DC side.
- ▶ The DC main switch is used only to switch off power to the power stage set. When the DC main switch is turned off, the connection area is still energized.
- ▶ Maintenance and service work on the inverter power stage set should only be carried out by Fronius-trained service technicians.
- ▶ All maintenance and service work should only be carried out when the inverter and the mounting bracket have been disconnected from each other.
- ▶ The inverter must only be disconnected from the mounting bracket after being disconnected from the mains power.
- ▶ Only an authorized electrician is permitted to connect this inverter to the public grid.

### **WARNING!**

#### **Inadequately sized electrical components can cause serious injury and damage to property.**

An electric shock can be fatal.

- ▶ All electrical connections must be established in accordance with the national standard (e.g., for the US National Electrical Code, ANSI/NFPA 70) and any other regulations applicable to the installation site.
- ▶ Installations in Canada must be carried out in accordance with applicable Canadian standards.
- ▶ Use min. 167°F (75°C) copper wire for all grounding wires (see NEC table 250.122).
- ▶ Use for all AC/DC wires, min. 167°F (75°C).
- ▶ Voltage drop and other considerations, such as improving power quality, may mean larger cable cross sections need to be used.
- ▶ Use only solid or stranded wire. Do not use fine stranded wire.

### **WARNING!**

#### **Danger from work that is not carried out properly**

This can result in severe personal injury and damage to property.

- ▶ The surge protection device should only be installed and connected by licensed electricians.
- ▶ Observe the safety rules!
- ▶ Prior to any installation and connection work, ensure that the inverter is de-energized on the AC side and the DC side.

 **WARNING!**

**Danger due to incorrect or insufficient solar module grounding.**

An electric shock can be fatal.

- ▶ The inverter is designed for solar module grounding at the negative pole as standard. Solar module grounding is carried out via a GFDI fuse in the inverter.
- ▶ When operating ungrounded solar modules, remove the GFDI fuse before starting operation and adjust the inverter grounding settings accordingly.
- ▶ When operating solar modules with grounding at the positive pole, the solar modules are not grounded via the fuse in the inverter, but rather must be grounded externally to the inverter.

 **CAUTION!**

**Danger due to improperly connected terminals.**

This can result in thermal damage to the inverter, which can lead to fires.

- ▶ When connecting the AC and DC cables, make sure that all terminals are tightened securely using the proper torque.

 **CAUTION!**

**Danger due to overload on the inverter.**

The inverter may be damaged.

- ▶ Only connect a maximum of 20 A to each DC terminal.
- ▶ Connect the DC+ and DC- cables to the correct DC+ and DC- terminals on the inverter.
- ▶ Observe the maximum DC input voltage.

**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 PV modules from ground, as it only disconnects the DC positive.

**NOTE!**

**When connecting aluminum cables:**

- ▶ Follow all national and international guidelines regarding the connection of aluminum cables.
- ▶ Follow the instructions of the cable manufacturer.
- ▶ Perform an annual check to ensure that the cables are firmly attached according to the proper torque.

**NOTE!**

**When connecting DC cables, ensure the polarity is correct.**

**NOTE!**

**Form a min. 4 in. (100 mm) cable loop with all cables.**

**NOTE!**

To ground solar module frames or mounts, you must observe both the relevant instructions from the solar module manufacturer and national guidelines.

**General Information about Solar Modules**

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

- The open circuit voltage of the solar modules increases as the temperature decreases (assuming constant irradiance). The open circuit voltage must not exceed the following values depending on the altitude:  
 0–6561 ft. (0–2000 m) ... UDC max = 550 V  
 > 6561–8202 ft. (> 2000–2500 m) ... UDC max = 540 V  
 > 8202–9842 ft. (> 2500–3000 m) ... UDC max = 480 V  
 > 9842 –11482 ft. (> 3000–3500 m) ... UDC max = 430 V

Open circuit voltage which exceeds the given values will damage the inverter and void all warranty entitlements.

- Note the temperature coefficients in the solar module data sheet.
- More exact data for sizing the solar modules can be obtained using calculation tools such as the Fronius Configuration Tool (available at <http://www.solarweb.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.

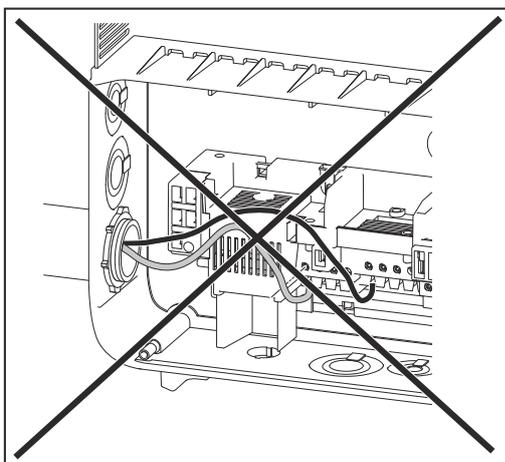
**NOTE!**

Before connecting solar modules, make sure that the voltage specified by the manufacturer corresponds to the actual measured voltage.

Note the safety instructions and specifications of the solar module manufacturer regarding solar module grounding.

**Inverter DC Connection**

**IMPORTANT!** Check the polarity and voltage of the solar module strings. The difference between the individual solar module strings may not exceed 10 V.



If DC cables are laid over the shaft of the DC main switch, or across the DC main switch connection block, they could be damaged when the inverter swivels in, or the inverter could be prevented from swiveling in.

**IMPORTANT!** Do not lay the DC cable over the DC main switch or across the DC main switch connection block.

# Notes on Laying Data Communication Cables

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## Laying Data Communication Cables

**IMPORTANT!** Inverters may not be operated with an option card and two broken-out option card divisions.

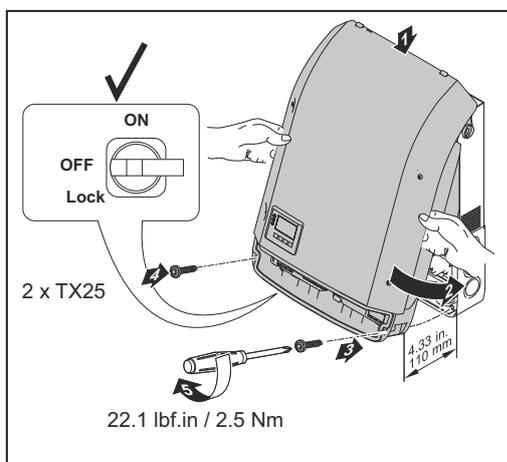
In this case, a corresponding blanking cover (42,0405,2020) is optionally available from Fronius.

**IMPORTANT!** If data communication cables are to be used in the inverter, please note the following points:

- provide your own conduits for the data communication cables
- lay the communication cable in the supplied protective hose
- knock out the corresponding opening
- clean the knocked out opening
- insert the supplied cable bushing into the opening (if both openings have been knocked out, an additional cable bushing 42,0405,2019 is required)
- clip the inverter in the wall bracket
- insert the data communication cable through the cable bushing from the back
- when swiveling the inverter into place, ensure that the cables are not kinked, trapped, or damaged in any other way do not form any loops with the data communication cables
- lay data communication cables in the inverter data communication area and connect to the Solar Net connection sockets "IN" and "OUT," insert the termination plugs in the remaining Solar Net connection sockets.

# Notes on Clipping the Inverter into the Wall Bracket

## Clipping the Inverter into the Wall Bracket



The side areas of the housing lid are designed to function as carrying grips and/or handles.

### NOTE!

**For safety reasons, the inverter is fitted with a locking mechanism, which only allows the inverter to be swiveled into the wall bracket when the DC main switch is switched off.**

- ▶ Only swivel and clip the inverter into the wall bracket when the DC main switch is switched off.
- ▶ Do not apply force when swiveling and clipping the inverter in.

The fixing screws in the inverter data communication area are to be used to fix the inverter to the wall bracket. Fixing screws must be properly tightened to ensure correct contact between the inverter and wall bracket.

### CAUTION!

**Danger of damage to the inverter if screws are not properly tightened.**

Screws that are not properly tightened can cause arcs to occur during inverter operation, which could lead to a fire. Always tighten fixing screws with the specified torque.

# Notes on Anti-theft device

## Anti-Theft Device

An optional anti-theft device is included in the scope of delivery. If required, the anti-theft device is installed before the inverter is screwed to the wall bracket.

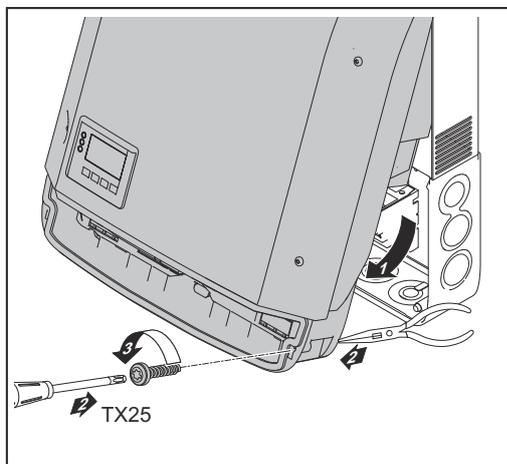
To ensure that the fixing screws cannot fall out in the inverter's data communications area, these are fitted with a screw release.

To remove the fixing screw from the inverter

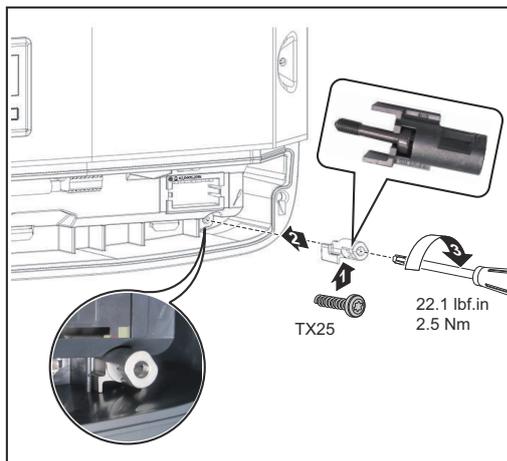
- Push the fixing screw upwards from the other side e.g. using needle-nose pliers
- Undo the fixing screw

## Installing the Anti-Theft Device

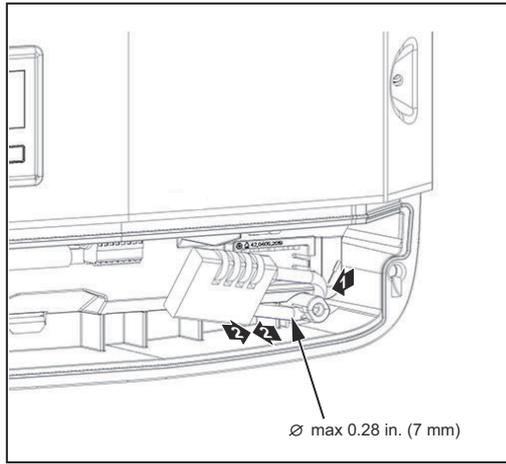
**IMPORTANT!** Please refer to the instructions for attaching the inverter to the wall bracket.



- 1 Swing the inverter out
- 2 Push the fixing screw upwards from the other side e.g. using needle-nose pliers
- 3 Undo the fixing screw



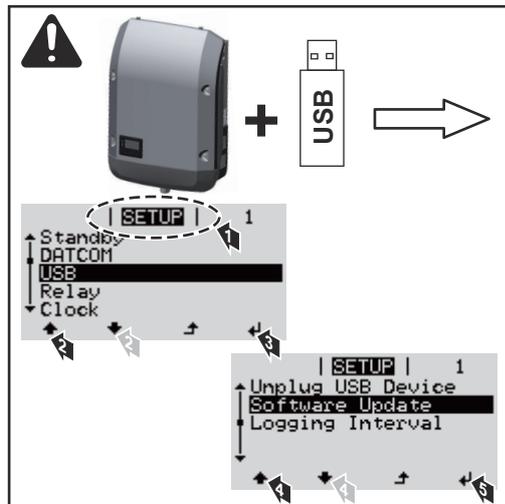
- 4 Insert the fixing screw into the anti-theft device
- 5 Insert the anti-theft device plus fixing screw into the inverter
- 6 Swing the inverter in
- 7 Tighten both fixing screws to the specified torque



- 8** Fit the padlock to the anti-theft device

# Notes on Software Updates

## Notes on Software Updates



- 1 Insert the USB stick in the inverter data communication area
- 2 Access the Setup menu
- 3 Select the "USB" menu item
- 4 Select "Update Software"
- 5 Install the update

# USB Stick as a Data Logger and for Updating Inverter Software

## USB Flash Drive as a Data Logger

A USB flash drive connected to the USB A socket can act as a data logger for an inverter.

The logging data that is saved on the USB flash drive can be viewed directly in third-party applications (e.g., Microsoft® Excel) at any time via the included CSV file.

Older Excel versions (up to Excel 2007) have a row limit of 65536.

## Data on the USB stick

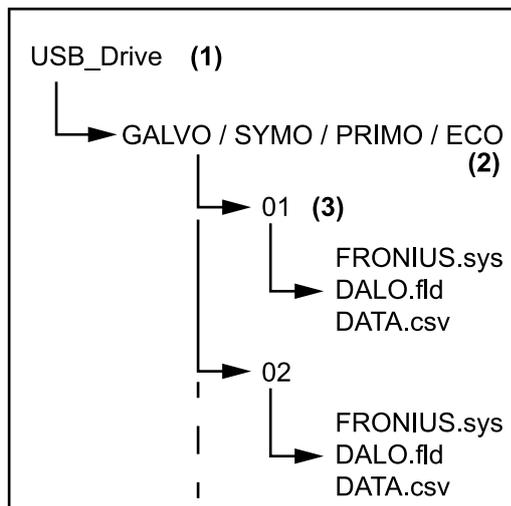
If the USB stick is used as a datalogger, three files are automatically created:

- FRONIUS.sys system file:  
This file saves information from the inverter that is irrelevant to the customer. The file must not be deleted individually. Only delete all files together (sys, fld, csv).

- DALO.fld log file:  
Log file for reading out data in Fronius Solar.access.

You can find additional information on the Fronius Solar.access Software in the "DATCOM Detail" operating instructions at <http://www.fronius.com>

- DATA.csv log file:  
A log file for reading out data in a spreadsheet program (e.g., Microsoft® Excel)



- (1) USB root directory
- (2) Fronius inverter (Fronius Galvo, Fronius Symo, Fronius Primo, or Fronius Eco)
- (3) Inverter number – can be set in the setup menu under DATCOM

If multiple inverters exist with the same inverter number, the three files are saved in the same folder. A number is appended to the file name (e.g., DALO\_02.fld)

Data structure on the USB stick

Structure of the CSV file:

	(1)	(2)	(3)	(4)	(5)	(6)	(7)					
	A	B	C	D	E	F	G	H				
1	SerialNr.:123456789987456321'											
2	Date	Time	Inverter No.	Device Type	Periode [s]	Energy [Ws]	Energy L[Var]	Energy C[Var]				
3	30.03.2013	17:15:19	1	247								
4	30.03.2013	17:15:19	1	247								
5	30.03.2013	17:15:19	1	247								
6	30.03.2013	17:15:20	1	247								
	I	J	K	L	M	N	O	P	(9)	Q	R	S
	Uac L1 [V]	Uac L2 [V]	Uac L3 [V]	Iac L1 [A]	Iac L2 [A]	Iac L3 [A]	Udc S1[V]	Idc S1[A]	Description			
									Display Information			
									V0.1.5 Build 0			
									28.03.2013 23:59:49 Info 017, Counter 0092			
									Logging Start			

- (1) ID
- (2) Inverter no.
- (3) Inverter type (DATCOM code)
- (4) Logging interval in seconds
- (5) Energy in watt-seconds with reference to the logging interval
- (6) Inductive reactive power
- (7) Capacitive reactive power
- (8) Averages over the logging interval (AC voltage, AC current, DC voltage, DC current)
- (9) Additional information

### Data Amount and Memory Capacity

One USB thumb drive with a memory capacity of 1 GB, for example, can record logging data at a logging interval of 5 minutes for approx. 7 years.

#### CSV file

CSV files can store only 65,535 rows (data records) (up to Microsoft® Excel version 2007, afterwards there is no limit).

At a logging interval of 5 minutes, the 65,535 rows are written within approx. 7 months (CSV data size of approx. 8 MB).

To avoid a loss of data, the CSV file should be backed up to a PC within these 7 months and deleted from the USB thumb drive. If the logging interval is set longer, this time frame is extended accordingly.

#### FLD file

The FLD file should not be larger than 16 MB. At a logging interval of 5 minutes, this corresponds to a storage duration of approx. 6 years.

If the file exceeds this 16 MB limit, it should be backed up to a PC, and all data should be deleted from the USB thumb drive.

After you have backed up the data and removed it from the USB thumb drive, the thumb drive should be immediately reinserted so that it can record logging data; no further steps are required.

**Notice!** A full USB thumb drive can lead to loss of data or overwriting of data. When inserting the USB thumb drive, make sure that it has a sufficient memory capacity.

**NOTE!****Risk from a full USB thumb drive.**

This can result in the loss of data or data being overwritten.

- ▶ When inserting the USB thumb drive, make sure that it has a sufficient memory capacity.

**Buffer Memory**

If the USB flash drive is removed (e.g., to back up data), the logging data is written to a buffer memory in the inverter.

As soon as the USB flash drive is reinserted, the data is automatically transferred from the buffer memory to the USB flash drive.

The buffer memory can store a maximum of 6 logging points. Data is logged only during inverter operation (power greater than 0 W). The logging interval is set to 30 minutes. This results in a time span of 3 hours for recording data in the buffer memory.

When the buffer memory is full, the oldest data in the buffer memory is written over with the new data.

**IMPORTANT!** The buffer memory requires a constant power supply.

If there is an AC power outage during operation, all data in the buffer memory is lost. The automatic night switch-off must be deactivated so that data is not lost at night (set "Night Mode" setup parameter to ON – see the Operating Instructions for Datamanager 2.0 and the sections "Setting and Displaying Menu Items," "Displaying and Setting Parameters in the 'DATcom' Menu Item").

For Fronius Eco or Fronius Symo 15.0-3 208, the buffer memory also works with pure DC voltage.

**Suitable USB Thumb Drives**

Due to the number of USB thumb drives on the market, we cannot guarantee that every USB thumb drive will be recognized by the inverter.

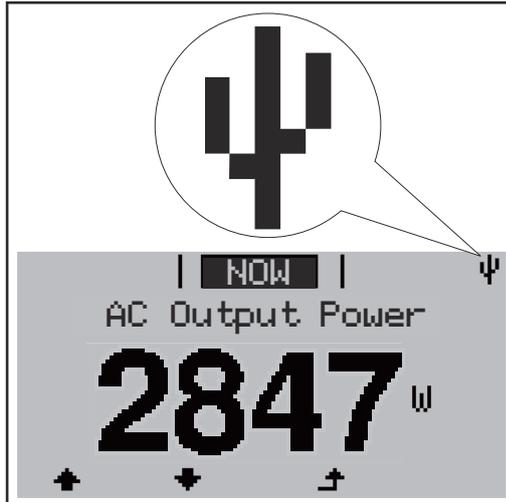
Fronius recommends using only certified, industrial USB thumb drives (look for the USB-IF logo).

The inverter supports USB thumb drives using the following file systems:

- FAT12
- FAT16
- FAT32

Fronius recommends that the USB thumb drive only be used for recording logging data or for updating the inverter software. USB thumb drives should not contain any other data.

USB symbol on the inverter display, e.g., in the 'NOW' display mode:



When the inverter recognizes a USB thumb drive, the USB symbol will appear at the top right of the display.

When inserting the USB thumb drive, make sure that the USB symbol is displayed (it may also be flashing).

**Notice!** Please be aware that in outdoor applications the USB thumb drive may only function in a limited temperature range. Make sure, for example, that the USB thumb drive will also function at low temperatures for outdoor applications.

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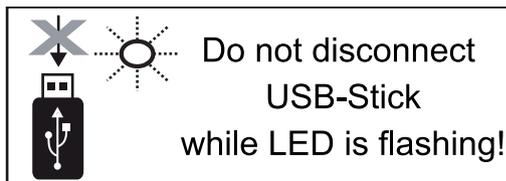
### USB Stick for Updating Inverter Software

The USB stick can be used to help end customers update inverter software via the USB menu item in the SETUP menu item: the update file is first saved on the USB stick and then transferred to the inverter. The update file must be saved in the USB stick root directory.

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### Removing the USB Stick

Safety information for removing a USB stick



**IMPORTANT!** To prevent a loss of data, the connected USB stick should only be removed under the following conditions:

- via the SETUP and "Safely remove USB / hardware" menu items
- when the "Data Transfer" LED is no longer flashing or illuminated.

# Notes on Maintenance

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## Maintenance

**Notice!** For a horizontal installation position and installation outside: perform an annual check to ensure that all screw connections are tightly fastened.

Maintenance and service work may only be carried out by Fronius-trained service technicians.

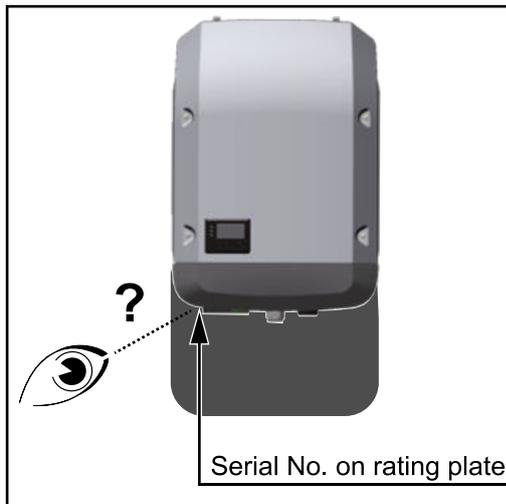
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## Cleaning

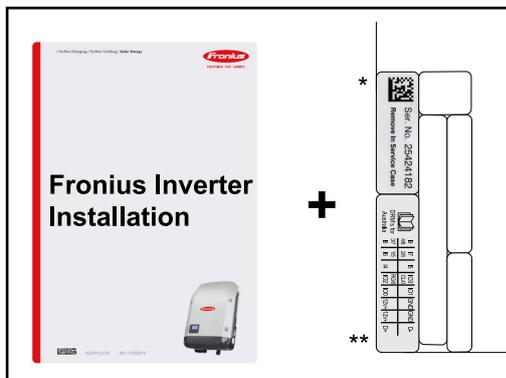
Wipe the inverter, if necessary, with a damp cloth.  
Do not use cleaning agents, scouring agents, solvents, or similar products to clean the inverter.

# Serial Number Sticker for Customer Use

## Serial number sticker for customer use



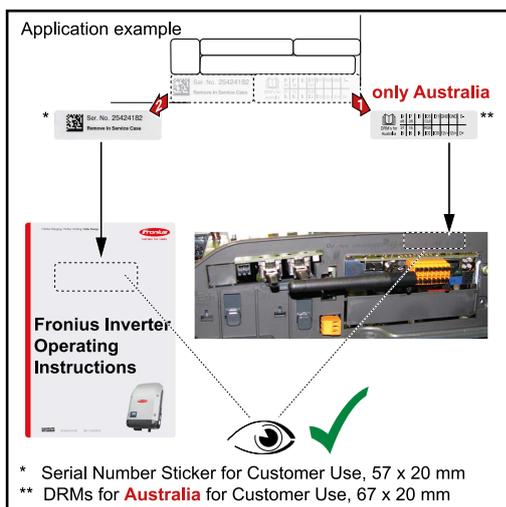
The inverter's serial number can be found on the rating plate on the bottom of the inverter. The installation position may make it difficult to access or read the serial number, e.g. if the inverter has been installed in a dark or shaded area.



Two serial number stickers are enclosed with the Installation Instructions for the inverter:

- \* 57 x 20 mm
- \*\* 67 x 20 mm

The customer can attach these stickers themselves in a clearly visible place, e.g. on the front of the inverter or on the Operating Instructions.



Application example: Serial number stickers on the Operating Instructions or on the front of the inverter

Australia only: Affix DRM Australia sticker in Datamanager area.









[fronius.com/en/solar-energy/installers-partners/products-solutions/monitoring-digital-tools](https://fronius.com/en/solar-energy/installers-partners/products-solutions/monitoring-digital-tools)

MONITORING &  
DIGITAL TOOLS

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Under [www.fronius.com/contact](http://www.fronius.com/contact) you will find the addresses of all Fronius Sales & Service Partners and locations.