Fronius String Control 250/25

USA Operating Instructions

Data Communication

42,0426,0082,EA 012010

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 String Control 250/25, that must be followed during installation and maintenance.

The Fronius String Control 250/25 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 String Control 250/25.
To reduce the risk of personal injury and to ensure the safe installation and operation of the Fronius String Control 250/25, you must carefully read and follow all instructions and safety instructions in this manual.

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 string Control 250/25 and/or other equipment connected to the Fronius String Control 250/25 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

DANGER!

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

WARNING!

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

CAUTION!

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

NOTE

“NOTE“ indicates a situation which could adversely affect work results and may cause damage to equipment.

Important

“Important“ indicates practical tips and other useful information. It is not a signal word for a harmful or dangerous situation.

Please pay special attention when one of the above symbols appears in the manual.

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

General
(continued)

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 service information in these operating instructions is only intended for qualified personnel. An electrical shock can be fatal. Please do not carry out any activities other than those referred to in the documentation even if you are suitably qualified.

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.

USA

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 of emission class A:
- Are only for use in industrial areas.
- Can cause line-bound and radiated interference in other areas.

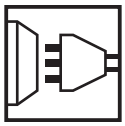
Devices of emission class B:
- Meet the emission requirements for residential and industrial areas. This is also true for residential areas in which the energy is supplied from the public low voltage grid.

EMC device classification as per 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.

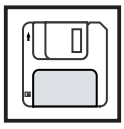
Safety Markings

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



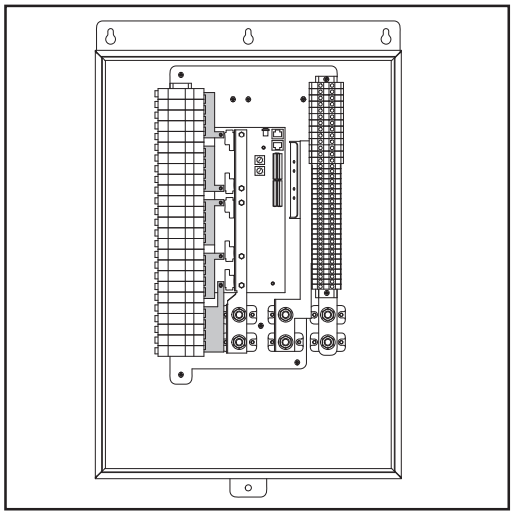
The user is responsible for backing up data relating to changes made to factory settings. The manufacturer will not accept liability if personal settings are deleted.

Copyright

Contents

General

Device Concept



Fronius String Control 250/25 (open)

The Fronius String Control 250/25 is designed for use in grid-connected photovoltaic systems with several solar module strings.

Up to 25 solar module strings can be integrated at the input of the Fronius String Control 250/25 to reduce these at the output to one DC+ and DC- main line.
The Fronius String Control 250/25 monitors the incoming solar module strings to detect errors in the solar module field.

Status messages can be sent via e-mail or SMS when using the „Fronius Solar.access“ software together with the “Fronius Datalogger.“
This allows a defective solar module to be detected quickly.

Functional Principle

- Each set of 5 incoming solar module strings is grouped into one measuring channel.
- 5 measuring channels record the total current of the respective connected solar module strings over the entire charging day.
- In the evening, the Fronius String Control 250/25 calculates an average value for all measuring channels.
- The Fronius String Control 250/25 compares the current of each measuring channel with the average value of all measuring channels.
- If the Fronius String Control 250/25 detects that one of the measuring channels deviates too much from the average, a status message is sent to the Fronius Datalogger.
- The permitted deviation from the average is freely definable.

Other System Requirements

- Fronius Datalogger
- PC with Fronius Solar.access software installed

Intended Use

The device is intended solely for use as a collector and measuring device for the solar module DC strings.
The device may be operated only with the following inverters:
- Fronius CL 33.3 DELTA / 44.4 DELTA / 55.5 DELTA
- Fronius CL 36.0 WYE 277 / 48.0 WYE 277 / 60.0 WYE 277

Any other purpose does not constitute intended use.
The manufacturer shall not be liable for any damage resulting from such improper use.

Intended use also includes following all information from the operating instructions.

Scope of Supply

- 1 Fronius String Control 250/25
- 1 silicone tube

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.

Standards and Regulations

Your Fronius String Control 250/25 complies with the requirements for the following standards "Inverters, converters and controllers for use in independent power systems":
- UL1741-2005
- ANSI / IEEE C62.41
- C22.2 No. 107.1-01 (Sep. 2001)

Product listings and compliance

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

Abbreviations and Descriptions Used

DC cable ‘OUT’	DC output cable from Fronius String Control 250/25 to inverter. The polarity of the DC cable ‘OUT’ depends on how the solar module strings are connected to the Fronius String Control 250/25.
DC cable ‘IN’	Solar module strings from the solar modules to the Fronius String Control 250/25. Each solar module string has one DC+ cable and one DC- cable.

Product Description

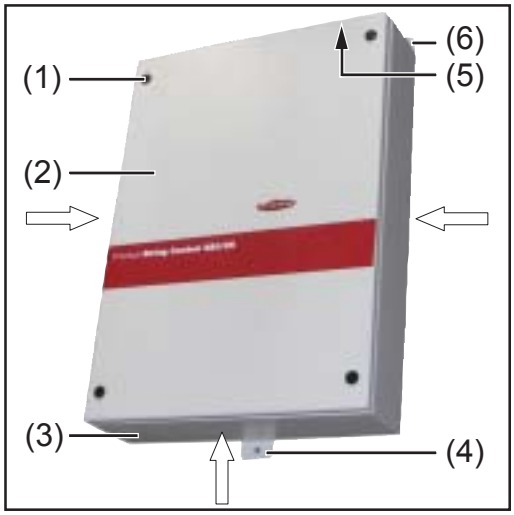
USA

Safety

WARNING! Operating the device incorrectly can cause serious injury and damage. The following documentation should be read and understood in its entirety before the described functions are carried out:

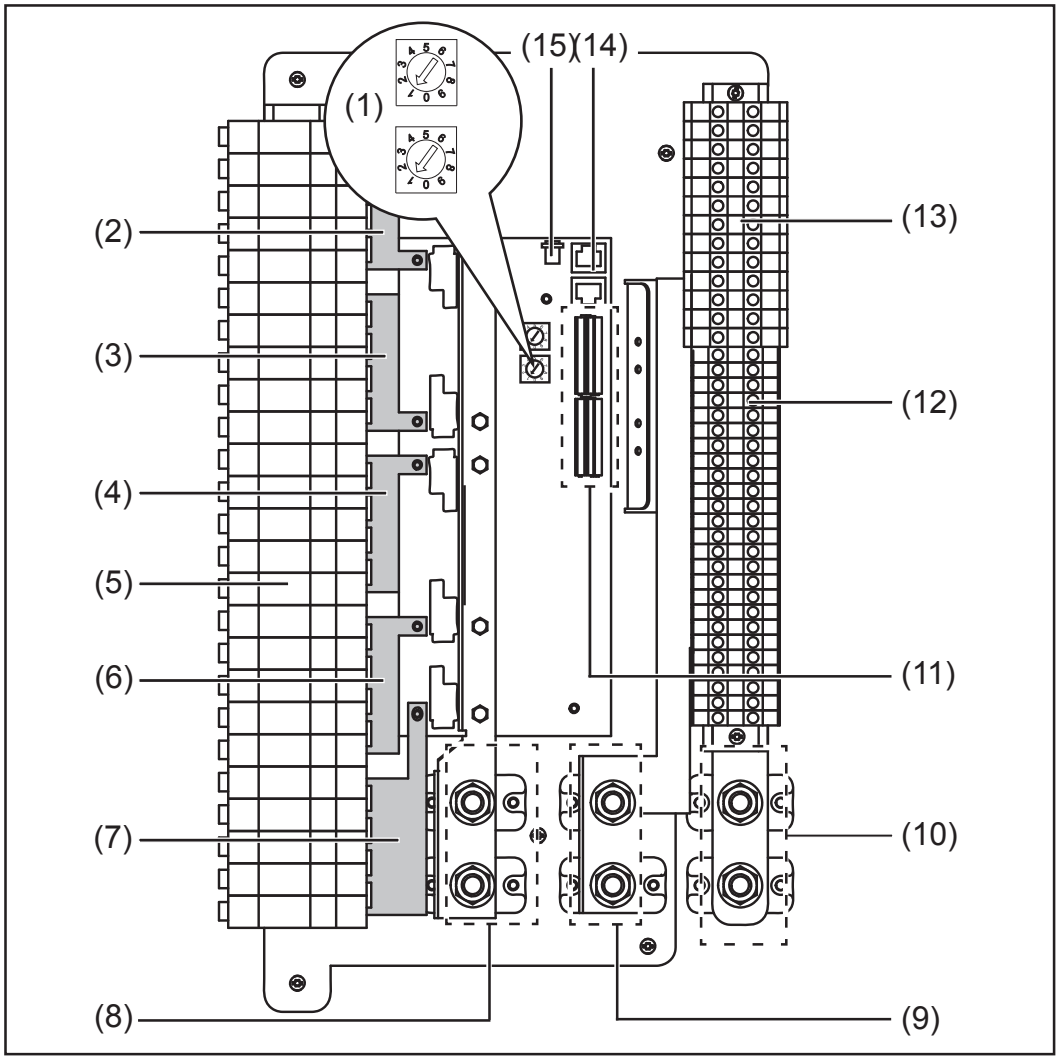
- These operating instructions
- All system component operating instructions including safety instructions

Fronius String Control 250/25 - Housing



Item	Description
(1)	Cover screws (4 x)
(2)	Cover
(3)	Membrane
(4)	Lower mounting clip
(5)	Housing ground (inside the housing)
(6)	Upper mounting clip
⇨	Sides for possible cable input openings

Fronius String Control 250/25 - Connection Area



Item	Description
(1)	Address switches
(2)	Measuring channel 5
(3)	Measuring channel 4
(4)	Measuring channel 3
(5)	25 Terminals with fuse holders for DC cable ‘IN’ cable cross section AWG 14 - AWG 8
(6)	Measuring channel 2
(7)	Measuring channel 1
(8)	Connection 2 x M12 for DC cables ‘OUT’
(9)	Connection 2 x M12 for DC cables ‘OUT’
(10)	Connection 2 x M12 for grounding
(11)	2 x 8 Pressure type terminals for data communication cable cable cross section max. AWG 14
(12)	25 Terminals for DC cable ‘IN’ cable cross section AWG 14 - AWG 8
(13)	13 Grounding terminals (e.g. for grounding of max. 25 solar module frames) cable cross section max. AWG 6

Fronius String Control 250/25 - Connection Area
(continued)

Item	Description
(14)	2 RJ 45 connections for data communication cable
(15)	Connection for external 12 V DC power supply

Fronius String Control 250/25 Installation

Wall anchors and Screws

Depending on the surface, different wall anchors and screws may be required for installing the Fronius String Control 250/25. Therefore, these wall anchors and screws are not included with the Fronius String Control 250/25. The installer is responsible for selecting the proper wall anchors and screws.

Recommended Screws for Mounting

In most cases, you should use 1/4 in. or 5/16 in. stainless steel or aluminium screws capable of supporting 46.26 lbs.

Installation Position

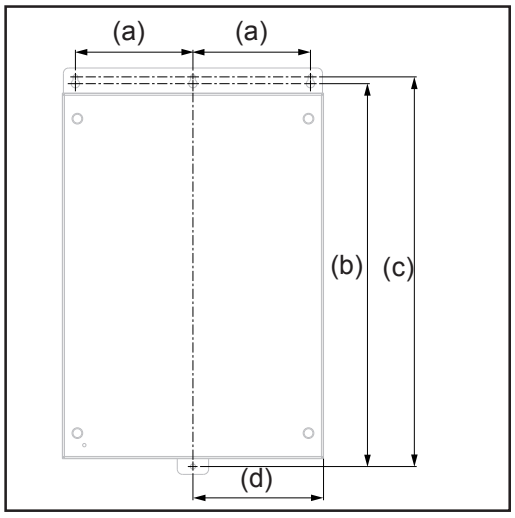
The Fronius String Control 250/25 can be installed in any position from horizontal to vertical. However, the cable inputs and outputs should point downwards as much as possible.

Selecting a Location

When selecting the location, please observe the following criteria:

- Install on a solid surface.
- The ambient temperature may not fall below -13 °F (-25 °C) nor exceed + 140 °F (+60 °C).
- NEMA 3R protection means that the Fronius String Control 250/25 is not susceptible to water spray from any direction. However, the manufacturer recommends, if possible, that the String Control 250/25 not be exposed to direct moisture or to a direct water jet (e.g., from sprinklers).
- Protect from direct sunlight and direct exposure to the elements.
- Install under the solar modules where possible.

Drilling Pattern



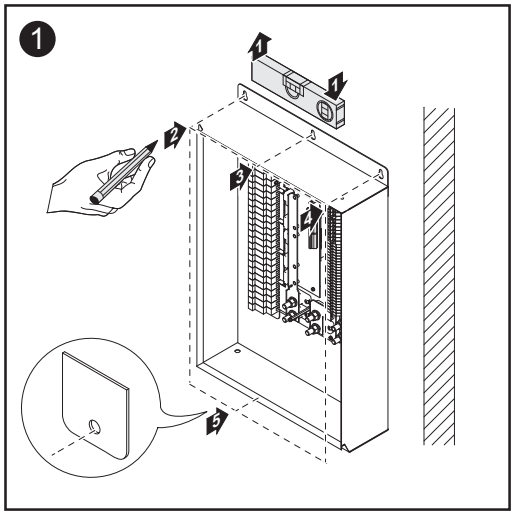
(a) = 8.858 in (225 mm)

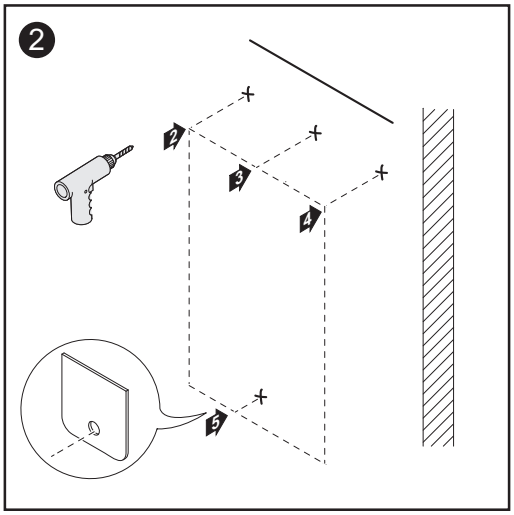
(b) = 28.858 in. (733 mm)

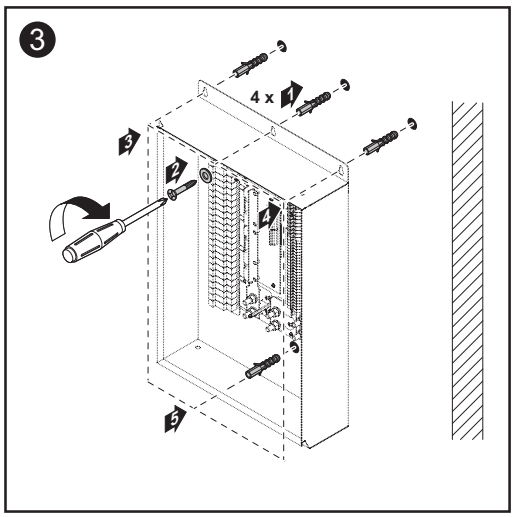
(c) = 29.4 in. (746 mm)

(d) = 9.843 in. (250 mm)

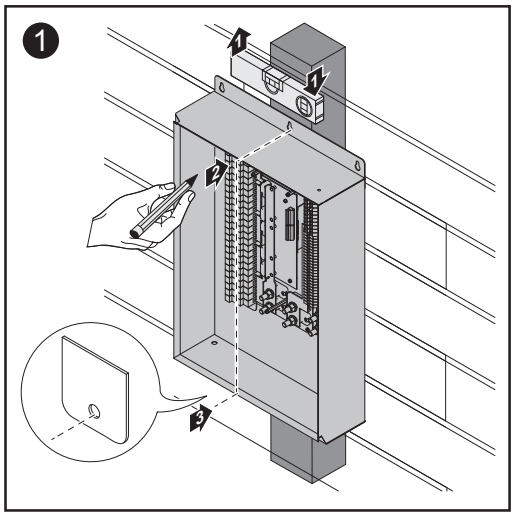
Attaching the Fronius String Control 250/25 to a Concrete or Brick Wall

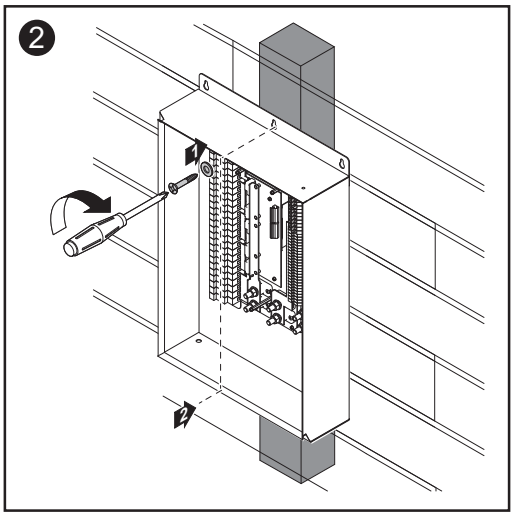




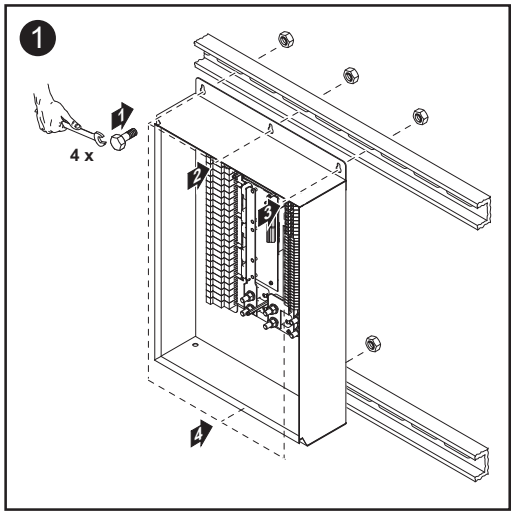


Attaching the Fronius String Control 250/25 to a Wooden Wall





Attaching the Fronius String Control 250/25 to a Metal Carrier



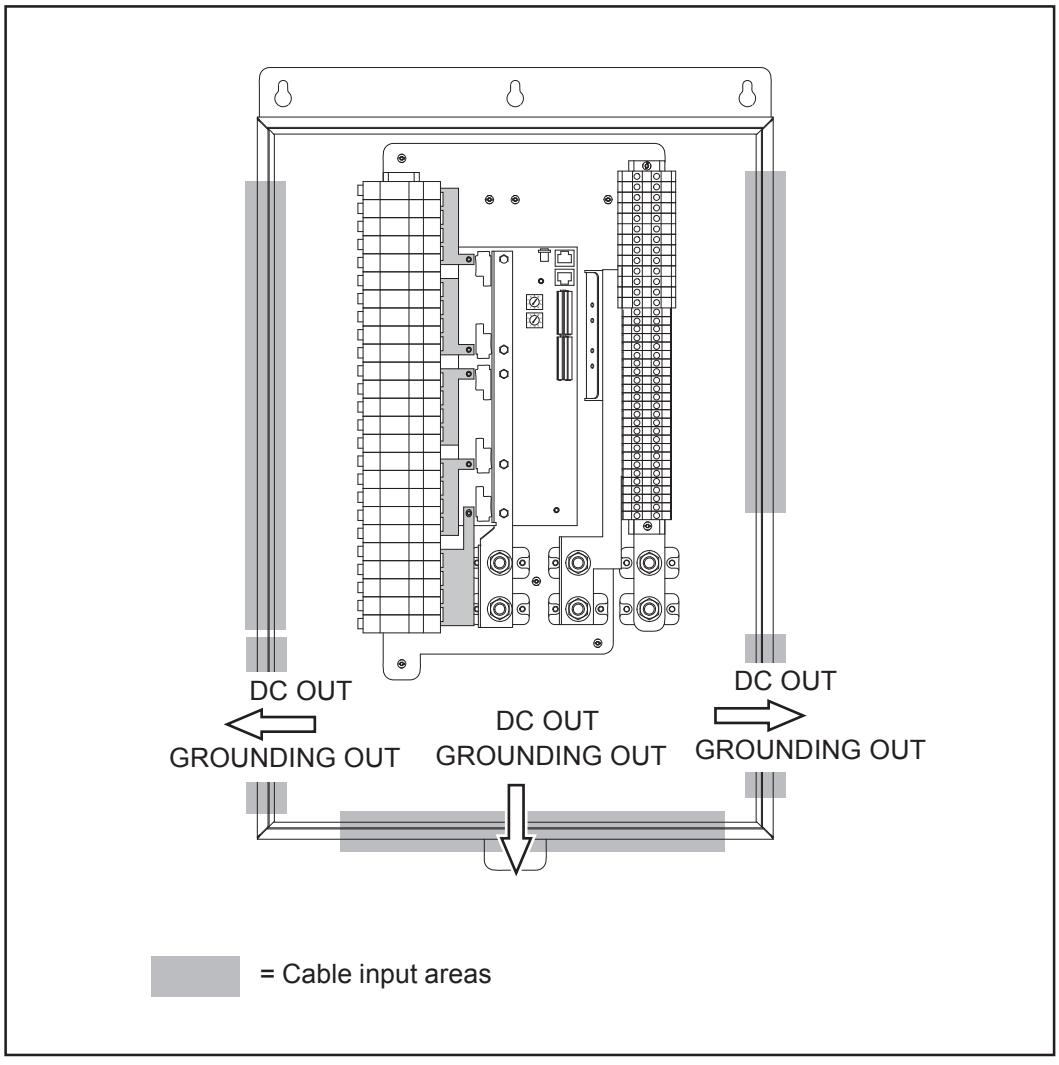
Knocking out Cable Input Openings and Mounting Conduits on the Fonius String Control 250/25

General

Required cable input openings have to be knocked out of the Fronius String Control 250/25 housing with a proper knock out tool.
Take care that safety notes and rating plates located on the housing are not damaged when knocking out cable input openings.

Cable Input Areas

Generally cables can be lead into the Fronius String Control 250/25 from below or sidwise.
The following figure shows all possible cable input areas and the appropriate measurements. On grey marked areas cable input openings can be knocked out on the Fronius String Control 250/25.



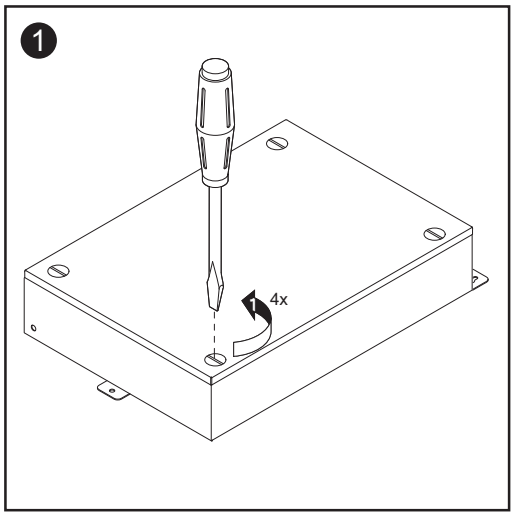
Maximum Conduit Size

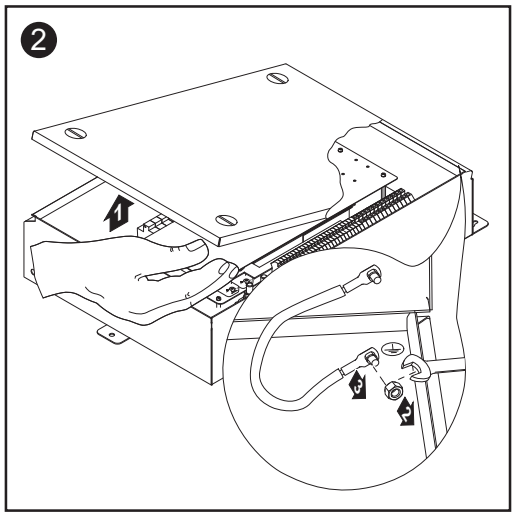
The Fronius String Control 250/25 is dimensioned for a maximum conduit size of 4 in.

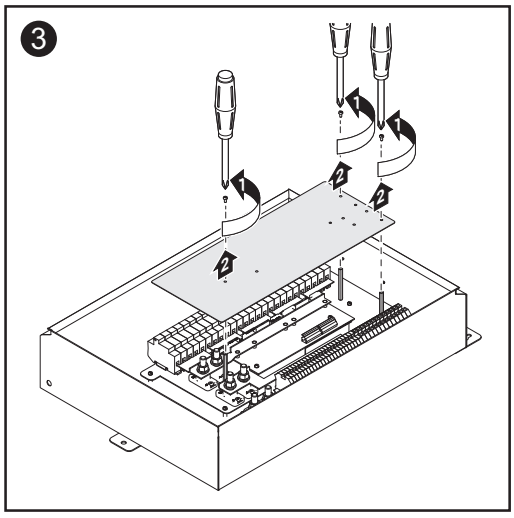
Recommendation for Inserting Cables

Fronius recommends inserting all cables from below into the Fronius String Control 250/25.
The following working steps refer to inserting cables from below. Connecting sidewise inserted cables is similar and will not be described in these operating instructions.

Preparation



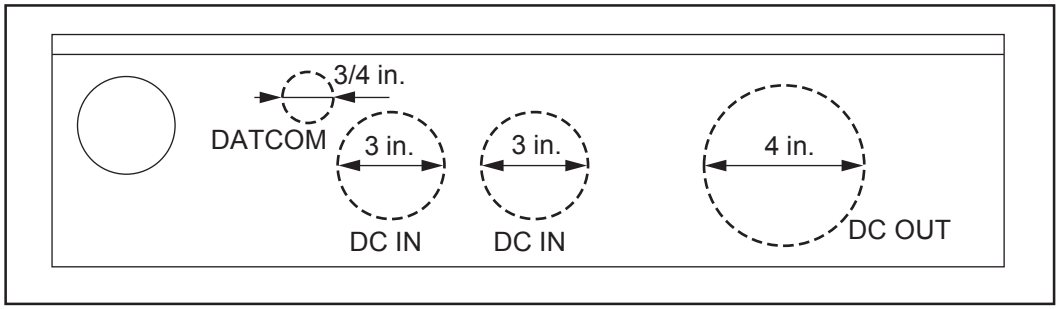




Knocking out Cabel Input Openings on the Fonius String Control 250/25

CAUTION! Danger of short circuit by loose metal parts from knockouts. Loose metal parts in the Fronius String Control 250/25 may cause short circuits when the Fronius String Control 250/25 is powered up. When removing knockouts, make sure that:

- no loose metal parts fall into the fronius string Control 250/25
- any metal pieces that do fall into the Fronius String Control 250/25 are removed immediately



Example of possible cable input openings

1 Knock out the required cable input openings using a proper knock out tool

Consider safety notes of the knock out tool manufacturer

Mounting Conduits on the Fronius String Control 250/25

NOTE! Only use water tight conduit fittings and conduits for outdoor installations.
Conduit fittings and conduits are not included with the Fronius String Control 250/25.

1 Mount conduits and conduit fittings according to the cable input openings

Connecting Solar Module Strings to the Fronius String Control 250/25

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 at constant irradiance and when temperature decreases. The open circuit voltage should never rise above the admissible inverter voltage, assuming an irradiance of 1000 W/m² and a temperature of 14 °F (-10 °C). Whenever the open-circuit voltage of the solar modules exceeds the admissible inverter voltage, the inverter may be damaged, and all warranty rights will become null and void.
- More exact data for sizing the solar array for the particular location can be obtained using calculation tools such as the Fronius Configuration Tool (available on 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 DC voltage from solar modules.

- Make sure that the input and output sides in front of the device are not charged before connecting anything.
- Any and all connections should only be carried out by qualified electricians.
- Follow the safety rules in these operating instructions.

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 in accordance with the National Electrical Code, ANSI/NFPA 70, and any other codes and regulations applicable to the installation site.
- For installations in Canada the installations must be done in accordance with applicable Canadian standards.
- Use minimum AWG 12, min. 194 °F (90 °C), copper wire for all grounding wires .
- For appropriate grounding see NEC table 250.122.
- Use minimum AWG 12 to maximum AWG 8, min. 194 °F (90 °C), copper or aluminium wire for all DC wiring connections to the Fronius String Control 250/25. Voltage drop and other considerations may dictate larger size wires be used.
- Use only solid or stranded wire. Do not use fine stranded wire.

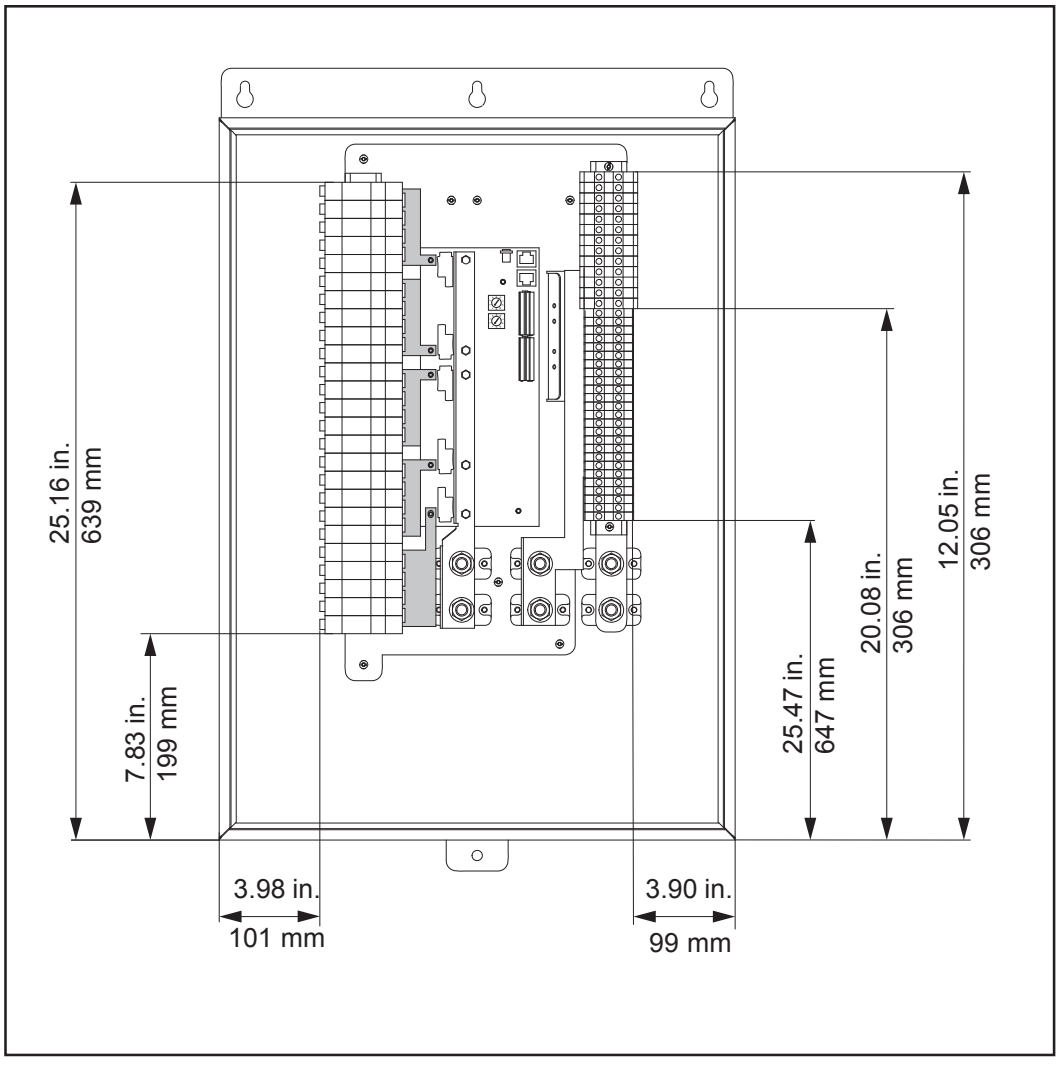
CAUTION! Danger of damaging the Fronius String Control 250/25 from improperly connected terminals. Improperly connected terminals can cause thermal damage to the Fronius String Control 250/25 and may cause a fire. When connecting all DC 'IN' and DC 'OUT' cables, make sure that all terminals are tightened securely using the proper torque.

USA

Necessary Inside Cable Length of the Fronius String Control 250/25

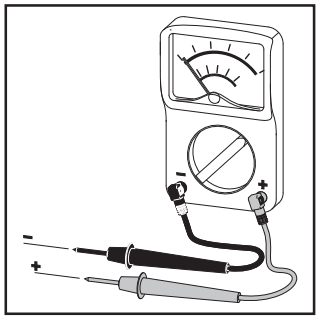
To ensure problem-free DC cable connections to the terminals, all DC cables inside the Fronius String Control 250/25 must have a certain minimum length.
Depending on which side the DC cables are inserted from into the Fronius String Control 250/25, different minimum lengths of the DC cables are needed.

For the minimum inside cable length of the Fronius String Control 250/25:
- consider the guidelines in the following figure
- consider the mandatory forming of a min. 4 in. wire loop



Notes for Connecting Solar Module Strings to the Fronius String Control 250/25

NOTE! Connecting the DC wiring with the wrong polarity may cause damage to the Fronius String Control 250/25.
Check both the polarity and the open circuit voltage.



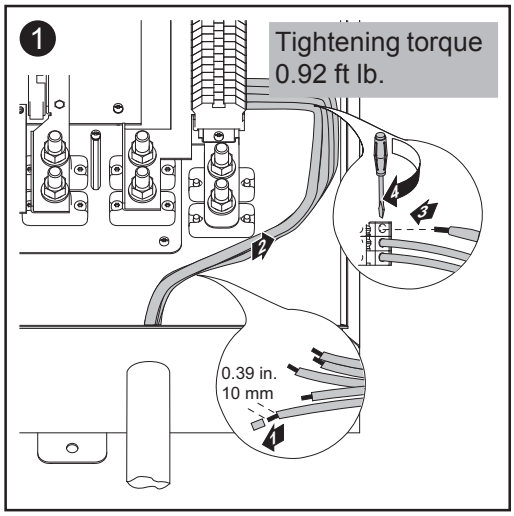
The DC Voltage must not exceed 600 V, regardless of temperature.

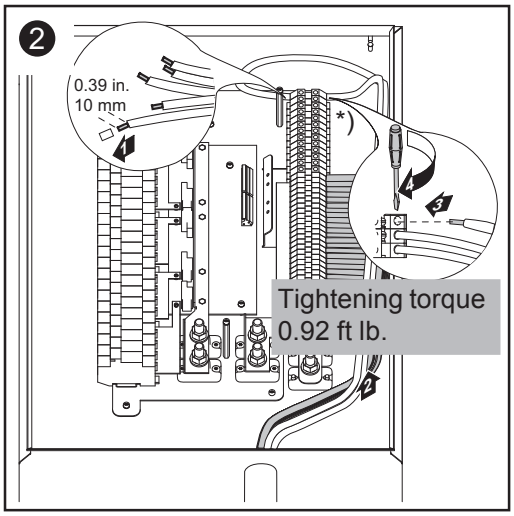
NOTE! When connecting fewer than 25 solar module strings, we recommend assigning an equal number of DC cables to the measuring channels as much as possible.
For example: When connecting 15 solar module strings, connect 3 DC cables per measuring channel. If possible, leave individual terminals free between the DC cables.

NOTE! When connecting Aluminium cables:
- consider national and international rules for connecting Aluminium cables
- consider technical information of the cable manufacturer

Connecting Solar Module Strings to the Fronius String Control 250/25

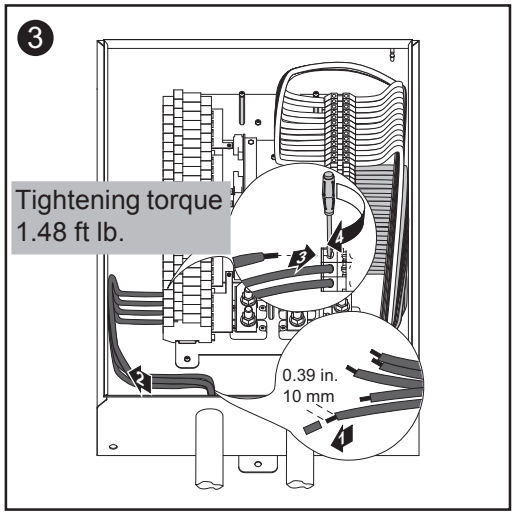
CAUTION! Danger of damaging the Fronius String Control 250/25 by overload. Connect a maximum of 20 A to any DC input terminal, maximum 50 A per measuring channel.

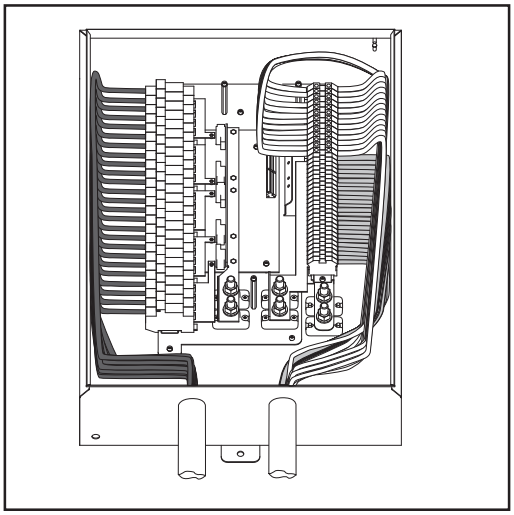




*) Connect grounding cables (e.g. from solar module frame) if available. The third grounding terminal from top can only be connected from the side near the housing.

Connecting Solar Module Strings to the Fronius String Control 250/25
(continued)





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

Connecting the Fronius String Control 250/25 to the Inverter

Safety

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

- Make sure that the input and output sides in front of the device are not charged before connecting anything.
- Any and all connections should only be carried out by qualified electricians.
- Follow the safety rules in these operating instructions.

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 in accordance with the National Electrical Code, ANSI/NFPA 70, and any other codes and regulations applicable to the installation site.
- For installations in Canada the installations must be done in accordance with applicable Canadian standards.
- Use minimum AWG 12, min. 194 °F (90 °C), copper wire for all grounding wires .
- For appropriate grounding see NEC table 250.122.
- Use maximum 250 MCM for cable input from below and 350 MCM for sidewise cable input, min. 194 °F (90 °C), copper wire for all DC wiring connections to the inverter. Voltage drop and other considerations may dictate larger size wires be used.
- 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.

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. Additionally, turning the DC disconnect to the off/open-circuit condition will not disconnect the array from ground, as it only disconnects the DC positive.

Safety
(continued)

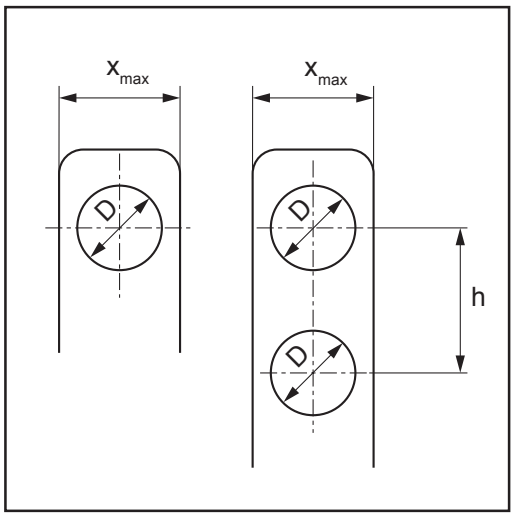
Consider the maximum inverter current, when sizing the DC cables ‘OUT’.

For the required cable cross section you can also use 2 cables. In this case the cable cross section of both cables should be approximately of the same size.

CAUTION! Danger of damaging the Fronius String Control 250/25 from improperly connected terminals. Improperly connected terminals can cause thermal damage to the Fronius String Control 250/25 and may cause a fire. When connecting all DC ‘IN’ and DC ‘OUT’ cables, make sure that all terminals are tightened securely using the proper torque.

Cable Lugs for DC Cable ‘OUT’

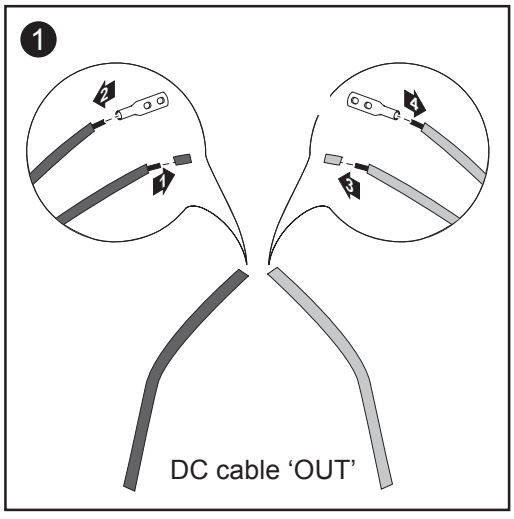
For DC cables ‘OUT’ single hole and 2-hole cable lugs according the following specification can be used:

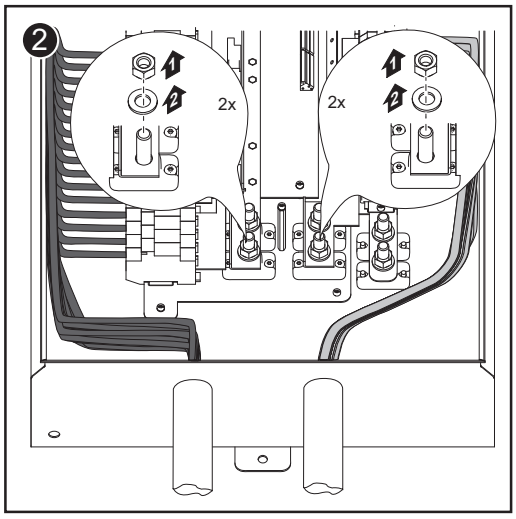


D	x_{max}	h
0.47 in. (M12)	1.14 in. (29 mm)	1.50 in. (38.1 mm)

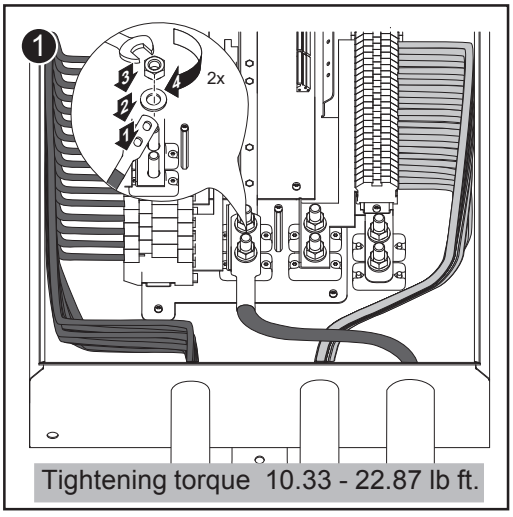
Cable lugs must comply with national regulations and guide lines.

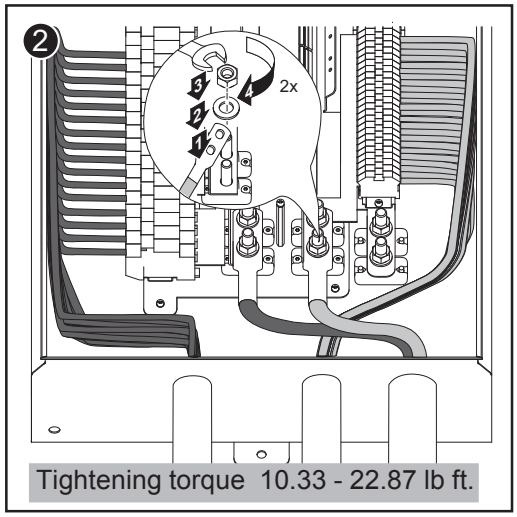
Preparation



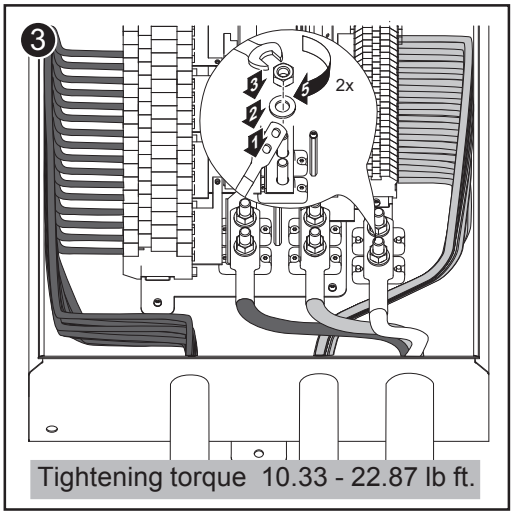


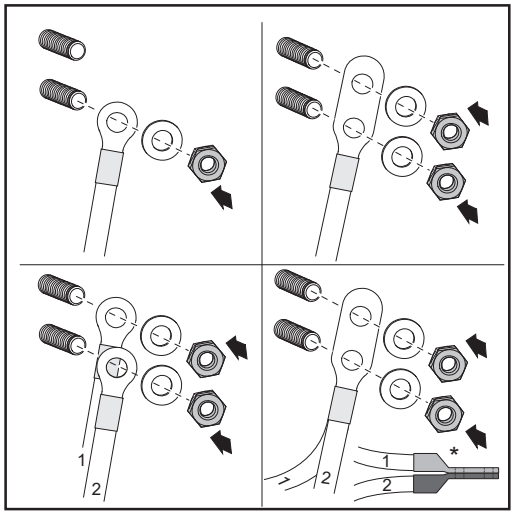
Connecting DC Cable ‘OUT’ to the Fronius String Control 250/25





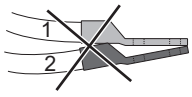
NOTE! Label the DC cables ‘OUT’ according to their designated polarity.





Connection of 1 or 2 cables per DC output

* **Important!** When connecting 2 cables with a 2-hole cable lug consider, that both cable lugs may only be put together on their flat side.



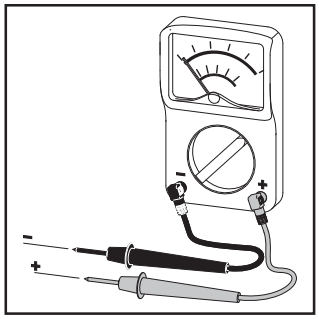
NOTE!
Form a min. 4 in. wire loop using all wires.

Connecting the Fronius String Control 250/25 to the Inverter

1 Connect the DC cable ‘OUT’ to the inverter as per the inverter operating instructions.

NOTE! Note the following points when connecting:
- String fuses must always be in the ungrounded conductor
- Connect the DC cable ‘OUT’ to the inverter with the correct polarity.

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.

Criteria for the Proper Selection of String Fuses

General

The use of string fuses in the Fronius String Control 250/25 also adds fuse protection to the solar modules.
A crucial factor for the fuse protection of solar modules is the maximum short circuit current I_{SC} of the respective solar module.

Criteria for the Proper Selection of String Fuses

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

- $I_N > 1.56 \times I_{SC}$
- $I_N < 2.00 \times I_{SC}$
- $V_N \geq$ max. input voltage of inverter being used:
  FRONIUS CL ..... 600 V DC

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

NOTE! The string fuse size must not be greater than the maximum fuse current rating of the PV module as provided on the PV module manufacturers data sheet. If no maximum fuse size is indicated, please contact the PV module manufacturer.

Effects of Using Underrated Fuses

With underrated fuses, the nominal current rating of the fuse is less than the short circuit current of the solar module.
Effect:
The fuse may blow under intensive irradiance conditions.

Fuse Recommendations - Application Example

NOTE! Only select fuses whose nominal voltage is higher or equal to the max. input voltage of the inverter being used.

Example: Maximum short circuit current (I_{SC}) of the solar module = 5.75 A

According to the criteria for selecting the correct fuse, the fuse must have a nominal current greater than 1.56 times the short circuit current:
5.75 A x 1.56 = 8.97 A

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

Fuses

Nominal current value	Fuse	Nominal current value	Fuse
4.0 A	KLK D 4	9.0 A	KLK D 9
5.0 A	KLK D 5	10.0 A	KLK D 10
6.0 A	KLK D 6	12.0 A	KLK D 12
7.0 A	KLK D 7	15.0 A	KLK D 15
8.0 A	KLK D 8	20.0 A	KLK D 20

‘Fuses’ table: Excerpt of suitable fuses, e.g. Littelfuse fuses

Inserting String Fuses

Safety

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

- Make sure that the input and output sides in front of the device are not charged before connecting anything.
- Any and all connections should only be carried out by qualified electricians.
- Follow the safety rules in these operating instructions.

Selecting String Fuses

Only use fuses for solar modules that meet the proper requirements for string fuses from the solar module manufacturer or as per the „Criteria for the Proper Selection of String Fuses“ section:

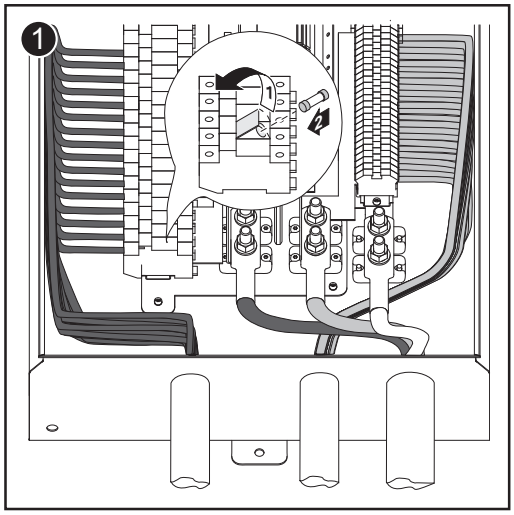
- max. 20 A per fuse holder
- max. 25 solar module strings
- max. 50 A per measuring channel
- max. 250 A of total input current
- Fuse dimensions: Diameter 0.41 x 1.38 - 1.50 in. (10,3 x 35 - 38 mm)

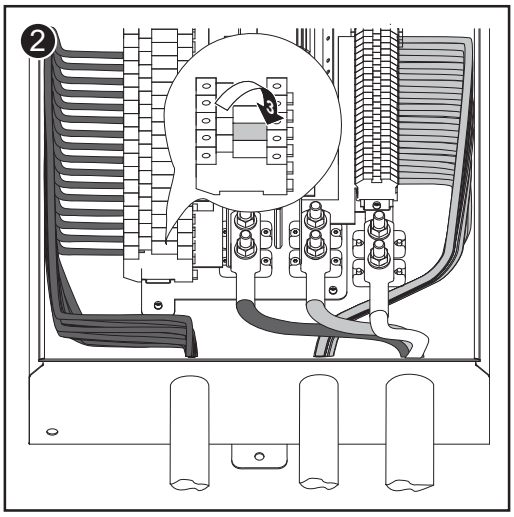
Important

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

Inserting String Fuses

NOTE Insert string fuses in the fuse holders corresponding to the number of available solar modules.





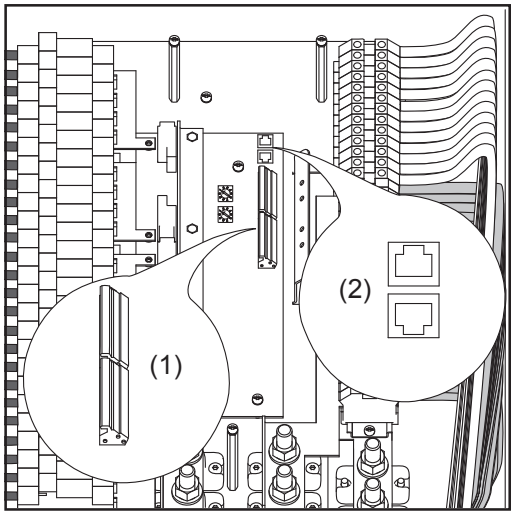
Connecting Data Communication Cables to the Fronius String Control 250/25

USA

Connection Options

There are two options for connecting the Fronius String Control 250/25 to Solar Net:

- Via connection-ready data communication cables with RJ 45 plugs
  Recommended cable size: CAT 5
- Via unterminated multi-core data communication cables
  Max. cable cross section 2.5 mm²



(1) Terminals for unterminated multi-core data communication cables

(2) RJ 45 connections

Additional Insulation for Data Communication Cables

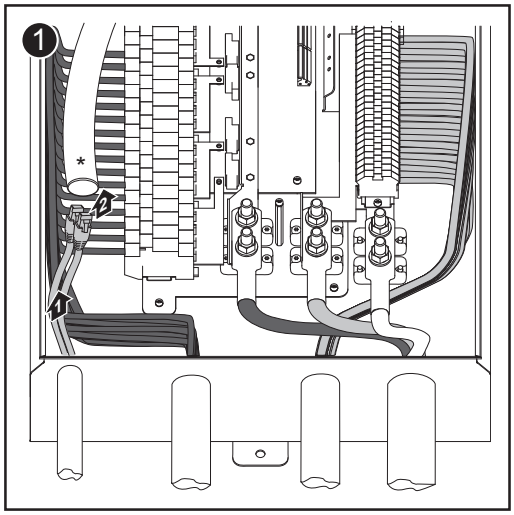
Important! A silicone tube is included with the Fronius String Control 250/25 for additional data communication cable insulation.
When laying the data communication cables on the inside of the Fronius String Control 250/25, the data communication cables must be fed through the silicone tube.

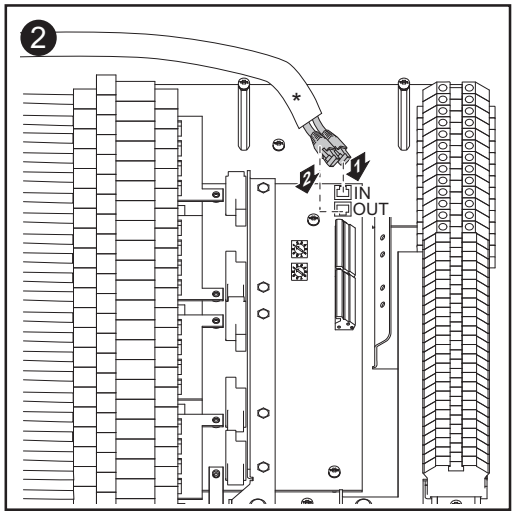
Safety

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

- Make sure that the input and output sides in front of the device are not charged before connecting anything.
- Any and all connections should only be carried out by qualified electricians.
- Follow the safety rules in these operating instructions.

Connecting RJ 45 Data Communication Cables to the Fronius String Control 250/25





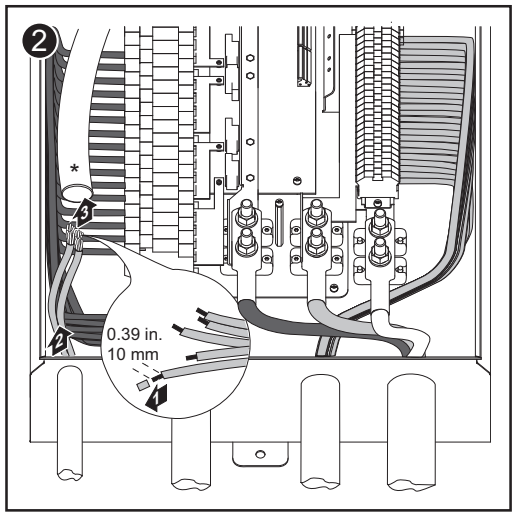
* Silicon tube

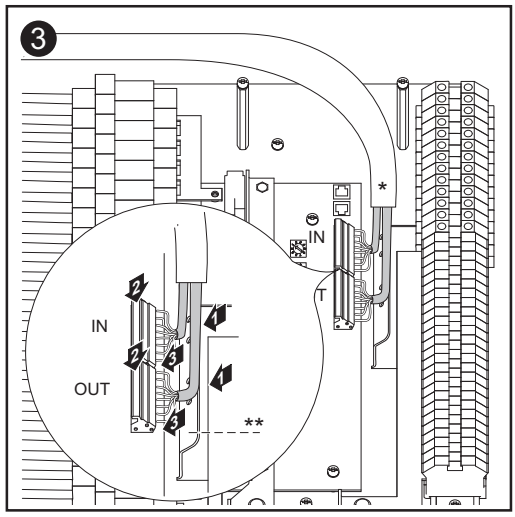
NOTE! Procedure when only 1 data communication cable is being connected to the Fronius String Control 250/25 (e.g., when the Fronius String Control 250/25 is the last component in a Solar Net):

- Insert the termination plug in the free RJ 45 connection. The termination plug is included with the Fronius Datalogger.

Connecting Unterminated Multi-core Data Communication Cables to the Fronius String Control 250/25

1. Strip approx. 2 - 3 in. (50 - 70 mm) of insulation from the end of the data communication cables





* Silicon tube
** Fixing lug

Important! You must know the assignment of each individual wire when connecting the wires to the terminals.

4. Fix the data communicaton cables to the fixing lug using cable ties

Connecting Unterminated Multi-core Data Communication Cables to the Fronius String Control 250/25 (continued)

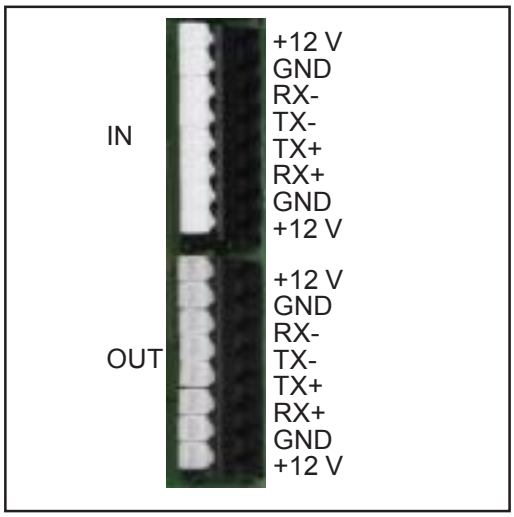
NOTE! Procedure when only 1 unterminated multi-core data communication cable is being connected to the Fronius String Control 250/25 (e.g., when the Fronius String Control 250/25 is the last component in a Solar Net):

- If the data communication cable is connected to the „IN“ terminals, connect the termination plug to the „OUT“ RJ 45 connection.
- If the data communication cable is connected to the „OUT“ terminals, connect the termination plug to the „IN“ RJ 45 connection.

The termination plug is supplied with the Fronius Datalogger.

USA

Terminal assignments



Connecting an External Power Supply

General

The Fronius String Control 250/25 is supplied power through Solar Net. The power supply from Solar Net, however, may no longer be sufficient when combined with additional DATCOM components or when data communication cables exceed a length of 100 m.
In this case, an external power supply is available.

For reasons of access, Fronius recommends that the external power supply be plugged into another DATCOM component rather than the Fronius String Control 250/25 whenever possible.

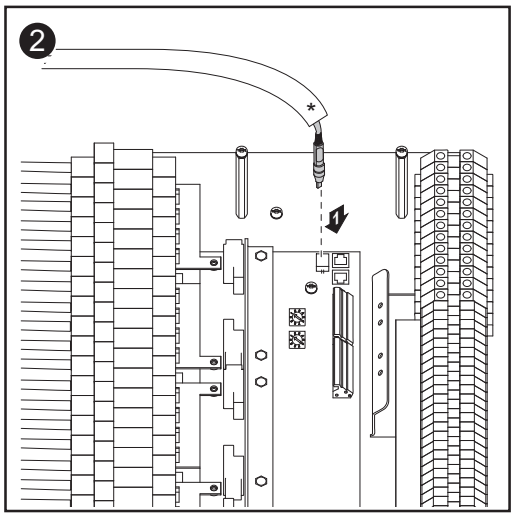
If there is no other easier connection option, the following describes the work steps involved in connecting the external power supply to the Fronius String Control 250/25.

Safety

WARNING! An electrical shock can be fatal. Danger from DC voltage from solar modules.
- Make sure that the input and output sides in front of the device are not charged before connecting anything.
- Any and all connections should only be carried out by qualified electricians.
- Follow the safety rules in these operating instructions.

Connecting an External Power Supply

❶ Feed the power supply cable into the Fronius String Control 250/25 (e.g. together with data communication cables within the silicon tube)



* Silicon tube

Setting the Address

USA

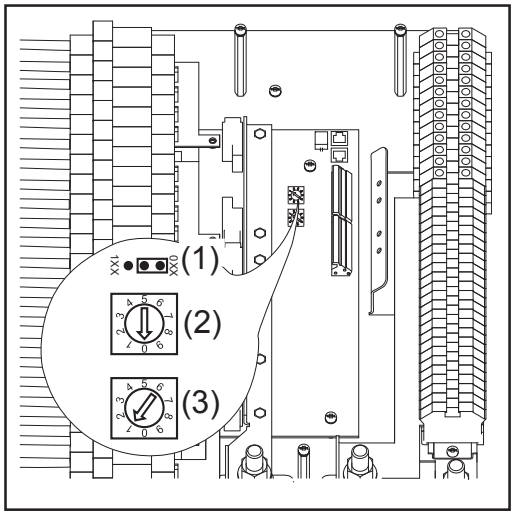
Safety

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

- Make sure that the input and output sides in front of the device are not charged before connecting anything.
- Any and all connections should only be carried out by qualified electricians.
- Follow the safety rules in these operating instructions.

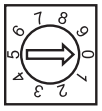
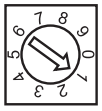
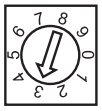
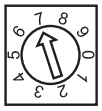
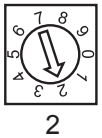
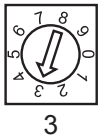
General

Solar Net allows up to 200 Fronius String Control 250/25's to operate simultaneously. The individual Fronius String Controls are assigned addresses to distinguish them from one another.
The address switch is used to set the address (0 to 199):



(1) Jumper for the hundreds' place
(2) Setting dial for the tens' place
(3) Setting dial for the ones' place

Setting the Address - Examples

Fronius String Control 250/25 No. 1	 0	 0	 1
Fronius String Control 250/25 No. 37	 0	 3	 7
Fronius String Control 250/25 No. 123	 1	 2	 3

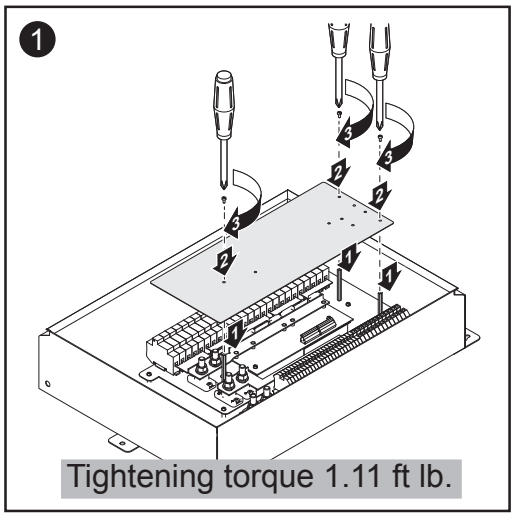
Installing the Protection Against Contact and Closing the Fronius String Control 250/25

Safety

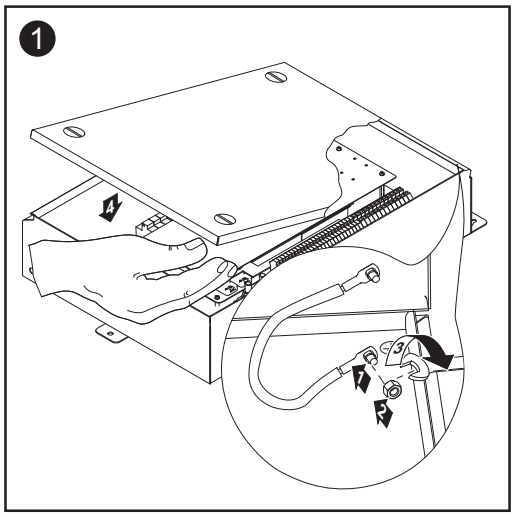
WARNING! An electrical shock can be fatal. Danger from DC voltage from solar modules.

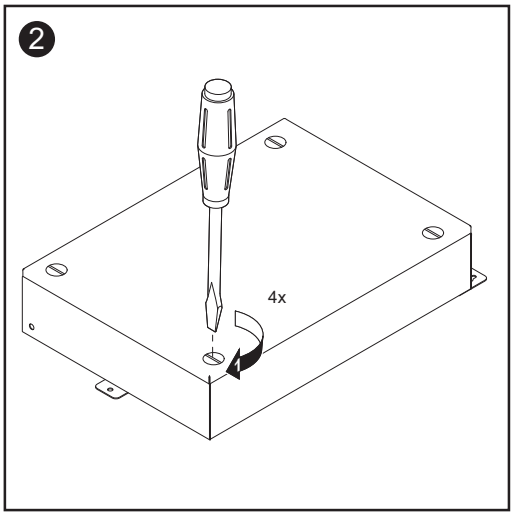
- Make sure that the input and output sides in front of the device are not charged before connecting anything.
- Any and all connections should only be carried out by qualified electricians.
- Follow the safety rules in these operating instructions.

Installing Protection Against Contact



Closing the Fronius String Control 250/25





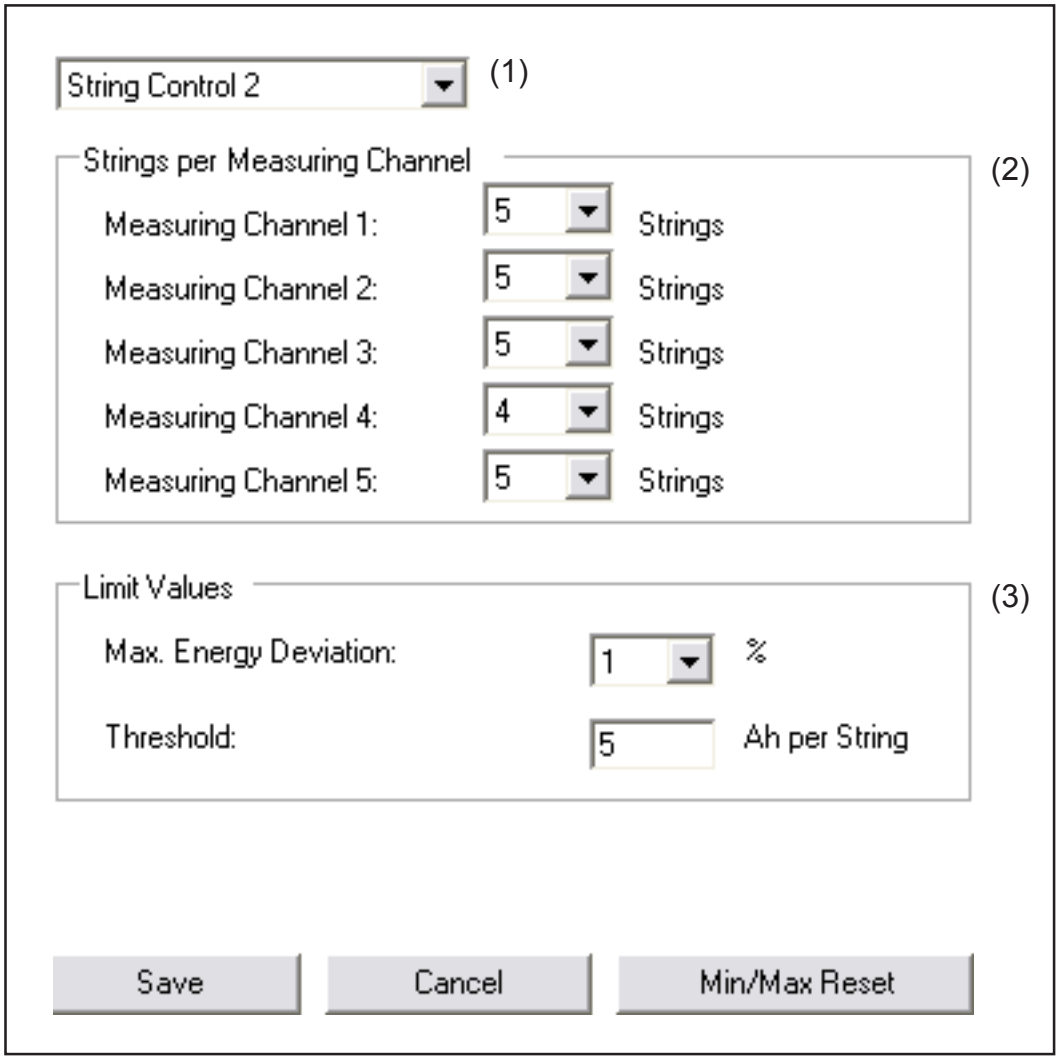
Settings

General

Settings for the Fronius String Control 250/25 are made in the “Fronius Solar.access“ software.

Initial Steps

- Install Fronius Solar.access software on a PC
- Administration / Create PV System
- PV Systems / [System Name] / Settings / String Control



Possible Settings for the Fronius String Control 250/25

(1) Select the number (address) of the Fronius String Control 250/25 to be set
(2) Strings per Measuring Channel
(3) Limit Values:
- Max. Energy Deviation in %
- Threshold Value in Ah per String

Strings per Measuring Channel

Enter the number of solar module strings for each measuring channel. This results in automatic compensation of measuring channel deviations, which would only be required if there were a different number of strings per channel.

Max. Energy Deviation

The 5 measuring channels record the total current of the respective connected solar module strings over the entire charging day. In the evening, the Fronius String Control 250/25 averages all measuring channels and compares the current of each measuring channel with the average value of all channels.
If the Fronius String Control 250/25 detects that one of the measuring channels deviates too much from the average, a status message is sent to the Fronius Datalogger.

The percentage deviation above which a measuring channel is considered faulty is defined in the “Max. Energy Deviation“ input field.

Standard value for max. energy deviation: 5 - 10 %

If applicable, observe information from the solar module manufacturer.

Threshold

Minimum electric charge (Ah) at which evaluation is to start. This prevents possible status messages in bad weather.

Display of Data and Status Messages

Data Display

Current data from the Fronius String Control 250/25 are displayed in:
PV Systems / [System Name] / Real-time / String Control

Status Messages

Status messages generated by the Fronius String Control 250/25 are sent to the datalogger. The datalogger processes this as it would a status message generated by the inverter. Status messages can be sent as an SMS, fax or e-mail. For further details please refer to the DATCOM operating instructions.

The Fronius String Control 250/25 service codes are states 901 to 905. These service codes indicate an excessive deviation in measuring channels 1 to 5.

We recommend that you activate the earnings comparison in the “Settings - General“ menu. This provides you with a list of service messages each time data are downloaded from the datalogger to the PC. This list provides a quick overview of all the messages from the inverter and the Fronius String Control 250/25.

Replacing String Fuses

Safety

WARNING! Operating the equipment incorrectly can cause serious injury and damage. The following activities must only be carried out by trained and qualified personnel. Follow the safety rules in these operating instructions.

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

- Make sure that the input and output sides in front of the device are not charged before conducting maintenance work.
- Never remove a fuse while it is under load.

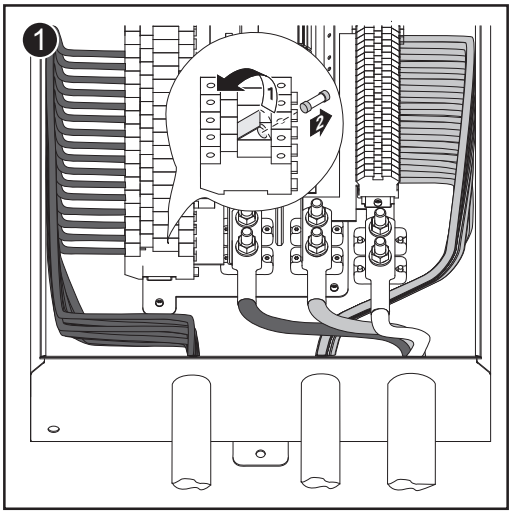
Preparation

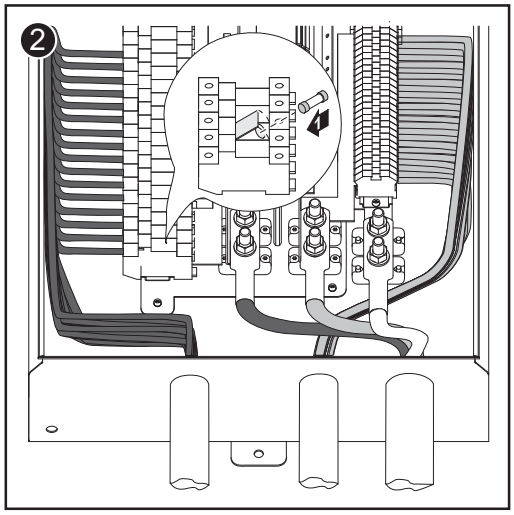
1. Interrupt the connection to the AC supply lines
2. Attach a clearly legible and easy-to-understand warning sign to prevent anyone from switching it back on or from reconnecting any open or interrupted connections
3. Check to make sure that solar module strings are deenergized
4. Short circuit solar module strings
5. Remove the cover
6. Test the fuse holder at the terminals for continuity

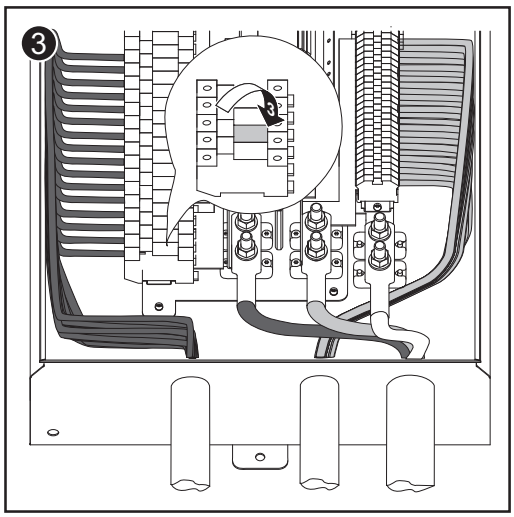
Replacing String Fuses

NOTE! Only use fuses for solar modules that meet the proper requirements for string fuses.
Fuse dimensions: Diameter 0.41 x 1.38 - 1.50 in. (10.3 x 35 - 38 mm)

Replacing String Fuses (continued)







4. Find out and correct the cause of the defective fuse

Finally...

1. Reattach the cover
2. Remove the short circuit to the solar module strings
3. Reconnect solar module strings to the Fronius String Control 250/25
4. Reestablish the connection to the AC supply lines

Technical Data

Input data

DC input voltage range	0 - 600 V
Max. input voltage (at 1000 W/m² / 14°F in open circuit operation)	600 V
Max. array short circuit current per string (1.25 * Imax)	12.5 A
Max. number of strings (with solar module fuse)	25
Admissible cable cross section (for DC cable 'IN')	min. AWG 12 - max. AWG 8 Cu and Al solid and stranded conductors
Number of measuring channels	5
Max. current per measuring chanenel	50 A
Max. input current per fuse holder	20 A
Max. fuse size (10 x 38 class CC fuse)	20 A, 600 V
Number of grounding terminals	25
Admissible cable cross section for grounding cables	min. AWG 12 - max. AWG 6 Cu and Al solid and stranded conductors

Output data (to the inverter)

Max. continuous DC current	250 A
Admissible cable cross section for DC cables 'OUT' cable outlet from below cable outlet from side	 250 MCM 350 MCM Cu solid and stranded conductors
Number of DC+ output terminals	1
Number of DC- output terminals	1
Number of grounding terminals	1
Connection possibilities per output pole or grounding terminal	2 x M12 (0.47 in.)
Max. number of cables per output pole or grounding terminal	2
Cable lugs for output poles or grounding terminal	single hole cable lug or 2-hole cable lug

General Data

Protection type	NEMA 3R
Protection class	Type 1 (grounded)
Ambient conditions	-13°F - +140°F -25°C - +60°C
Dimensions w x h x d (without mounting clips)	27.56 x 19.53 x 5.00 in. 700 x 496 x 127 mm
Dimensions w x h x d (with mounting clips)	30.63 x 19.53 x 5.00 in. 778 x 496 x 127 mm
Weight	26.46 lbs. 12 kg
Relative humidity	0 - 95 % (non condensing)
Housing material	Aluminium
Power supply	via Solar Net optional UL listed Class 2 (12V DC)
communication protocol	SolarNet, RS 485
Connectors for data communication	2 x RJ 45 or 2 x 8 pressure type terminals

CSA INTERNATIONAL

Certificate of Compliance

Certificate: 2198229 **Master Contract:** 203213

Project: 2198229 **Date Issued:** 2010/04/17

Issued to: **Fronius International GmbH**

Guenter Fronius Strasse 1
Wels-Thalheim, 4600
Austria
Attention: Josef Feichtinger

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.

C US

Ernesto Lopez, AScT.

Issued by: Ernesto Lopez, 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

Combiner Box, "Fronius String Control 250/25" Model 4.240.140.800.

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.

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)

DQD 507 Rev. 2009-09-01

CSA INTERNATIONAL

Supplement to Certificate of Compliance

Certificate: 2198229 **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
2198229	2010/04/17	Evaluation of Combiner Box, Model String Control 250/25 to the Requirements of CSA 107.1 and UL 1741 (C/US)

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