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Fronius Galvo
1.5-1 / 2.0-1
2.5-1 / 3.0-1 / 3.1-1
Dummy

EN

Operating Instructions

Grid-connected inverter

42,0410,1984 011-27092016

Dear reader,

Introduction

Thank you for the trust you have placed in our company and congratulations on buying this high-quality Fronius product. These instructions will help you familiarise yourself with the product. Reading the instructions carefully will enable you to learn about the many different features it has to offer. This will allow you to make full use of its advantages.

Please also note the safety rules to ensure greater safety when using the product. Careful handling of the product will repay you with years of safe and reliable operation. These are essential prerequisites for excellent results.

Explanation of safety symbols

DANGER! Indicates immediate and real danger. If it is not avoided, death or serious injury will result.

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

CAUTION! Indicates a situation where damage or injury could occur. If it is not avoided, minor injury and/or damage to property may result.

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

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

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

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Safety rules

General

The device is manufactured using state-of-the-art technology and according to recognised safety standards. If used incorrectly or misused, however, it can cause:
- injury or death to the operator or a third party,
- damage to the device and other material assets belonging to the operator,
- inefficient operation of the device.

All persons involved in commissioning, maintaining and servicing the device must
- be suitably qualified,
- have knowledge of and experience in dealing with electrical installations and
- read and follow these operating instructions carefully.

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

All safety and danger notices on the device
- must be in a legible state,
- must not be damaged,
- must not be removed,
- must not be covered, pasted or painted over.

The terminals can reach high temperatures.

Only operate the device when all protection devices are fully functional. If the protection devices are not fully functional, there is a risk of
- injury or death to the operator or a third party,
- damage to the device and other material assets belonging to the operator,
- inefficient operation of the device.

Any safety devices that are not functioning properly must be repaired by a suitably qualified engineer before the device is switched on.

Never bypass or disable protection devices.

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

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

This is for your personal safety!

Environmental conditions

Operation or storage of the device outside the stipulated area will be deemed as "not in accordance with the intended purpose". The manufacturer shall not be held liable for any damage arising from such usage.

For exact information on permitted environmental conditions, please refer to the "Technical data" in the operating instructions.

Qualified service engineers

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

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

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

It is impossible to guarantee that bought-in parts are designed and manufactured to meet the demands made of them, or that they satisfy safety requirements. Use only original spare parts (also applies to standard parts).

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

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

Noise emission values

The inverter generates a maximum sound power level of < 59 dB(A) (ref. 1 pW) when operating under full load in accordance with IEC 62109-1:2010.

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

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

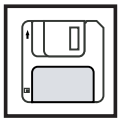
EMC measures

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

Disposal

To comply with the European Directive 2002/96/EC on Waste Electrical and Electronic Equipment and its implementation as national law, electrical equipment that has reached the end of its life must be collected separately and returned to an approved recycling facility. Any device that you no longer require must either be returned to your dealer or given to one of the approved collection and recycling facilities in your area. Ignoring this European Directive may have potentially adverse affects on the environment and your health!

Data protection



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

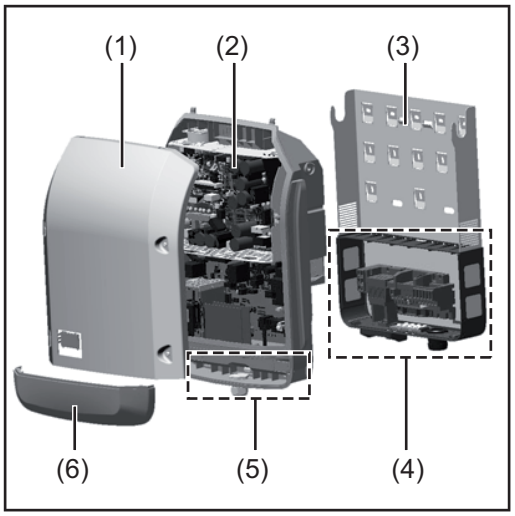
Copyright

Copyright of these operating instructions remains with the manufacturer.

The text and illustrations are all technically correct at the time of printing. We reserve the right to make changes. The contents of the operating instructions shall not provide the basis for any claims whatsoever on the part of the purchaser. If you have any suggestions for improvement, or can point out any mistakes that you have found in the instructions, we will be most grateful for your comments.

General

Device concept



Device construction:

(1) Housing cover
(2) Inverter
(3) Wall bracket
(4) Connection area incl. DC main switch
(5) Data communication area
(6) Data communication cover

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

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

The design and function of the inverter provide a maximum level of safety during both installation and operation.

The inverter monitors automatically the public grrid. Whenever conditions in the electric grid are inconsistent with standard conditions (for example, grid switch-off, interruption), the inverter will immediately stop operating and interrupt the supply of power into the grid. Grid monitoring is carried out using voltage monitoring, frequency monitoring and monitoring islanding conditions.

The inverter is fully automatic. Starting at sunrise, as soon as the solar modules generate enough energy, the inverter starts monitoring grid voltage and frequency. As soon as there is a sufficient level of irradiance, the solar inverter starts feeding energy into the grid.
The inverter ensures that the maximum possible power output is drawn from the solar modules at all times.
As there is no longer sufficient energy available to feed power into the grid, the inverter shuts down the grid connection completely and stops operating. All settings and recorded data are saved.

If the inverter temperature exceeds a certain value, the inverter derates automatically the actual output power for self protection.
The cause for a to high inverter temperature can be found in a high ambient temperature or an inadequate heat transfer away (eg for installation in control cabinets without proper heat dissipation).

Proper use

The solar inverter is intended exclusively to convert direct current from solar modules into alternating current and to feed this into the public grid.
Utilisation not in accordance with the intended purpose comprises:
- utilisation for any other purpose or in any other manner
- making any modifications to the inverter that have not been expressly approved by Fronius
- the installation of parts that are not distributed or expressly approved by Fronius.

Fronius shall not be liable for any damage resulting from such action.
No warranty claims will be entertained.

Proper use includes:
- carefully reading and obeying all the instructions and all the safety and danger notices in the operating instructions
- performing all stipulated inspection and maintenance work
- installation as specified in the operating instructions

When designing the photovoltaic system, ensure that all of its components are operated within their permitted operating ranges at all times.

Observe all the measures recommended by the solar module manufacturer to ensure the lasting maintenance of the properties of the solar module.

Obey the regulations of the energy supply company regarding feeding energy into the grid.

Warning notices on the device

There are warning notices and safety symbols on and in the inverter. These warning notices and safety symbols must not be removed or painted over. They warn against operating the device incorrectly, as this may result in serious injury and damage.

Safety symbols:

Risk of serious injury and damage due to incorrect operation

Do not use the functions described here until you have fully read and understood the following documents:
- these operating instructions
- all the operating instructions for the system components of the photovoltaic system, especially the safety rules

Dangerous electrical voltage

Wait for the capacitors to discharge.

Text of the warning notices:

WARNING!
An electric shock can be fatal. Make sure that both the input side and output side of the device are de-energised before opening the device. Wait for the capacitors to discharge (3 minutes).

Controlling the inverter via Demand Response Modes (DRM)

IMPORTANT! To control the inverter via DRM, a Fronius DRM interface (item number 4,240,005) is required in the inverter.
Installation is described in the installation instructions for the Fronius DRM interface. The installation instructions for the Fronius DRM interface are available at the following link on the Fronius homepage:

http://www.fronius.com/QR-link/4204102292

Notes for a dummy device

A dummy device is not suitable for the operative connection to a photovoltaic system and may only be taken into operation for demonstration purposes.

IMPORTANT! With a dummy device never connect live DC cables to the DC terminals.

Attaching not-energized cables or cable pieces for demonstration purposes is permitted.

A dummy device can be identified by the device rating plate:

Fronius www.fronius.com	CE		
Model No.		OVC 3	OVC 2
Part No.			
Ser. No.			
IEC62109-1/-2 / EN61000-3-2/-3 / EN61000-6-2/-3 / EN62233			
CEI 0-21			
VDE 0126-1-1	ÖVE/ÖNORM E 8001-4-712		
VDE-AR-N 4105	Safety Class 1	IP 65	

$U_{AC\ nom}$	220 V	230 V
$f_{AC\ nom}$	50 / 60 Hz	
Grid	1~NPE	
$I_{AC\ nom}$	14.1 A	13.5 A
$I_{AC\ max}$	15.0 A	
S_{max}	3100 VA	
P_{max} ($\cos\varphi$=0.95)	2945 W	
$\cos\varphi$	0.85-1 ind./cap.	
$U_{DC\ mpp}$	165 - 440 V	
$U_{DC\ max}$	550 V	
$I_{DC\ max}$	20.7 A	
$I_{sc\ pv}$	31.0 A	

DUMMY

Device rating plate of a dummy device

Data communication and Solar Net

Fronius Solar Net and data interface

Fronius Solar Net was developed to make system add-ons flexible to use in a variety of different applications. Fronius Solar Net is a data network that enables multiple inverters to be linked up using system add-ons.

It is a bus system that uses a ring topology. One suitable cable is sufficient for communication between one or several inverters that are connected on the Fronius Solar Net using a system add-on.

Fronius Solar Net automatically recognises a wide variety of system add-ons.

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

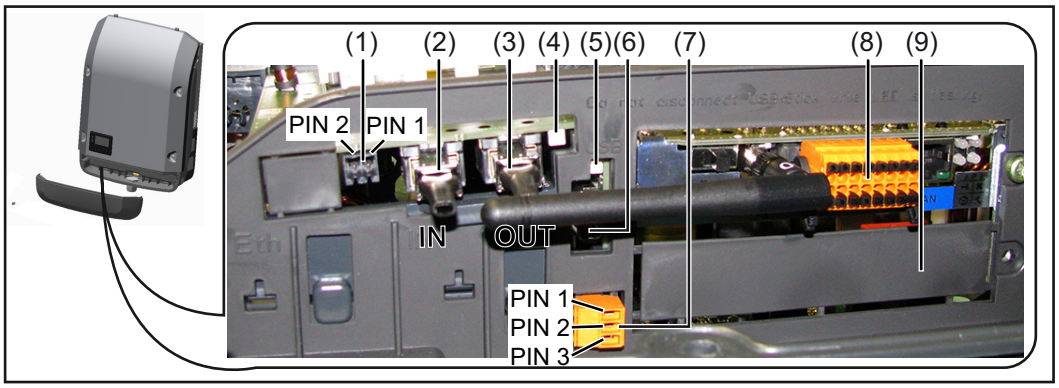
Similarly, every inverter on the Fronius Solar Net must be assigned a unique number. Refer to the section entitled 'The SETUP menu item' for instructions on how to assign a unique number.

More detailed information on the individual system add-ons can be found in the relevant operating instructions or on the internet at www.fronius.com

More detailed information on cabling DATCOM components can be found at:

→ http://www.fronius.com/QR-link/4204101938

Data communication area



Depending on the model, the inverter may be equipped with the Fronius Datamanager plug-in card.

Item	Designation
(1)	Switchable multifunction current interface. For more details, refer to the section below entitled "Explanation of the multifunction current interface" Use the 2-pin mating connector supplied with the inverter to connect to the multifunction current interface.

Item	Designation
(2) (3)	Fronius Solar Net connection / interface protocol IN Fronius Solar Net connection / interface protocol OUT 'Fronius Solar Net' / interface protocol input and output for connecting to other DATCOM components (e.g. inverter, sensor box, etc.) If several DATCOM components are linked together, a terminating plug must be connected to every free IN or OUT connection on a DATCOM component. For inverters with a Fronius Datamanager plug-in card, two terminating plugs are supplied with the inverter.
(4)	The 'Solar Net' LED indicates whether the Fronius Solar Net power supply is available
(5)	The 'Data transfer' LED flashes while the USB flash drive is being accessed. The USB flash drive must not be removed while recording is in progress.
(6)	USB A socket for connecting a USB flash drive with maximum dimensions of 65 x 30 mm (2.6 x 2.1 in.) The USB flash drive can function as a datalogger for an inverter. The USB flash drive is not included in the scope of supply of the inverter.
(7)	Floating switch contact with mating connector max. 250 V AC / 4 A AC max. 30 V DC / 1 A DC max. 1.5 mm² (AWG 16) cable cross-section Pin 1 = NO contact (Normally Open) Pin 2 = C (Common) Pin 3 = NC contact (Normally Closed) Use the mating connector supplied with the inverter to connect to the floating switch contact.
(8)	Fronius Datamanager with WLAN antenna or cover for option card compartment
(9)	Cover for option card compartment

Explanation of the multifunction current interface

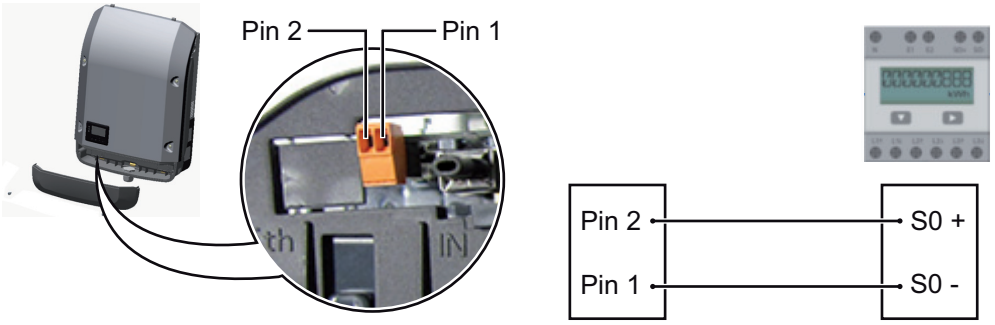
Various wiring variants can be connected to the multifunction current interface. However, these cannot be operated simultaneously. For example, if an S0 meter is connected to the multifunction current interface, it is not possible to connect a signal contact for overvoltage protection (or vice versa).

Pin 1 = measurement input: max. 20 mA, 100 Ohm measurement resistor (load impedance)
Pin 2 = max. short circuit current 15 mA, max. open circuit voltage 16 V DC or GND

Wiring diagram variant 1: Signal contact for overvoltage protection
Depending on the setting in the Basic menu, the DC OVP option (overvoltage protection) either outputs a warning or an error on the display. Further information on the DC OVP option can be found in the installation instructions.

Wiring diagram variant 2: S0 meter
A meter for recording the self-consumption of each S0 can be connected directly to the inverter. This S0 meter can be positioned directly at the feed-in point or in the consumption branch. As one of the settings on the Fronius Datamanager website, a dynamic power reduction can be set under the "EVU Editor" menu subitem (see Fronius Datamanager operating instructions under
www.fronius.com/QR-link/4204260173DE)

IMPORTANT! In order to connect an S0 meter to the inverter, it may be necessary to update the inverter firmware.



Requirements for the S0 meter:
- Must comply with the IEC62053-31 Class B standard
- Max. voltage 15 V DC
- Max. current when ON 15 mA
- Min. current when ON 2 mA
- Max. current when OFF 0.15 mA

Recommended max. pulse rate of the S0 meter:

PV output kWp [kW]	Max. pulse rate per kWp
30	1000
20	2000
10	5000
≤ 5.5	10,000

Description of the 'Fronius Solar Net' LED

The 'Solar Net' LED is on:
the power supply for data communication within the Fronius Solar Net / interface protocol is OK

The 'Solar Net' LED flashes briefly every 5 seconds:
data communication error in the Fronius Solar Net
- Overcurrent (current flow > 3 A, e.g. resulting from a short circuit in the Fronius Solar Net ring)
- Undervoltage (not a short circuit, voltage in Fronius Solar Net < 6.5 V, e.g. if there are too many DATCOM components on the Fronius Solar Net and not enough electrical power is available)

  In this case, power for the DATCOM components must be supplied by connecting an additional power supply to one of the DATCOM components.

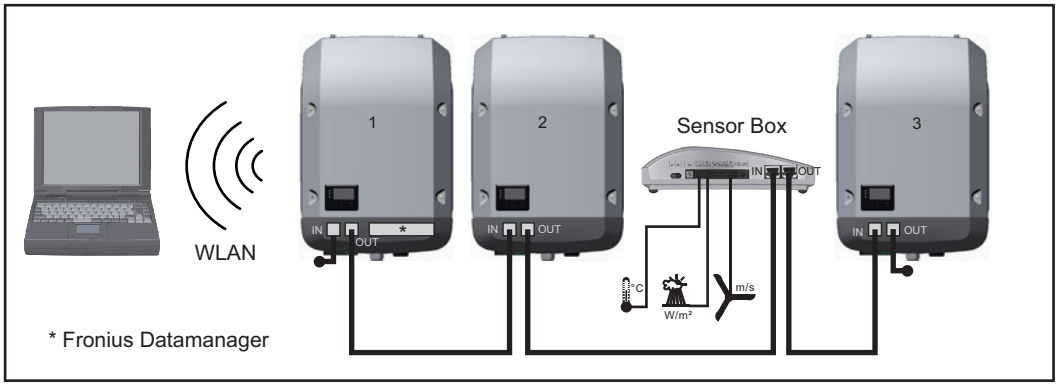
  To detect the presence of an undervoltage, check some of the other DATCOM components for faults as required.

After cutting out because of overcurrent or undervoltage, the inverter attempts to restore the power supply in the Fronius Solar Net every 5 seconds while the fault is still present.

Once the fault is rectified, power to the Fronius Solar Net will be restored within 5 seconds.

Example

Recording and archiving data from the inverter and sensor using a Fronius Datamanager and a Fronius Sensor Box:



Data network with 3 inverters and a Fronius Sensor Box:
- *Inverter 1 with Fronius Datamanager*
- *Inverters 2 and 3 without Fronius Datamanager!*

= Terminating plug

The external communication (Fronius Solar Net) takes place on the inverter via the data communication area. The data communication area contains two RS 422 interfaces as inputs and outputs. RJ45 plug connectors are used to make the connection.

IMPORTANT! Since the Fronius Datamanager functions as a data logger, the Fronius Solar Net ring must not include any other data logger.
Only one Fronius Datamanager per Fronius Solar Net ring!
Any other Fronius Datamanagers must be removed and the unoccupied option card compartment sealed off using the blanking cover (42,0405,2020 - available from Fronius as an optional extra); alternatively, use an inverter without Fronius Datamanager (light version).

Installing option cards in the inverter

Information on installing option cards in the inverter and connecting the data communication cable can be found in the installation instructions.

System monitoring

General

Where no special device model is present, the inverter is fitted with WLAN-compatible Fronius Datamanager 2.0 system monitoring as standard.
Among other things, system monitoring includes the following functions:

- Own web page displaying current data and a wide range of different setting options
- Option of connecting directly to Fronius Solar.web
- Automatic sending of service messages by SMS or e-mail in the event of a fault
- Internet connection via WLAN or LAN
- Option of controlling the inverter by specifying power limit values, minimum or maximum running times or target running times
- Control of the inverter via Modbus (tcp / rtu)
- Assignment of control priorities
- Control of the inverter by means of connected meters (Fronius Smart Meter or S0 meter)
- Control of the inverter via a ripple control signal recipient (e.g. specification of reactive power or effective power)
- Dynamic power reduction, taking self-consumption into account

Further information on Fronius Datamanager 2.0 can be found online in the Fronius Datamanager 2.0 operating instructions.

Fronius Datamanager during the night or when the available DC voltage is insufficient

The Night Mode parameter under "Display Settings" in the Setup menu is preset to OFF in the factory.
For this reason the Fronius Datamanager cannot be accessed during the night or when the available DC voltage is insufficient.

To nevertheless activate the Fronius Datamanager, switch the inverter off and on again at the mains and press any key on the inverter display within 90 seconds.

See also the chapters on "The Setup menu items", "Display settings" (Night Mode).

Using for the first time

NOTE! Starting the Fronius Datamanager 2.0 for the first time can be made significantly easier with the aid of the Fronius Solar.web App.
The Fronius Solar.web App is available in the relevant App store.

GET IT ON Google play

Download on the App Store

Available now on Windows Phone Store

When starting Fronius Datamanager 2.0 for the first time,

- the Fronius Datamanager 2.0 plug-in card must be installed in the inverter,
  or
- there must be a Fronius Datamanager Box 2.0 in the Fronius Solar Net ring.

IMPORTANT! In order to establish a connection to Fronius Datamanager 2.0, the end device in question (e.g. laptop, tablet, etc.) must be set up as follows:

- “Obtain IP address automatically (DHCP)” must be activated.

NOTE! If the photovoltaic system has only one inverter, steps 1 and 2 below can be skipped. In this case, starting for the first time will commence with step 3.

1 Connect inverter with Fronius Datamanager 2.0 or Fronius Datamanager Box 2.0 to the Fronius Solar Net

2 When networking several inverters together in Fronius Solar Net:
Set the Fronius Solar Net master / slave switch on the Fronius Datamanager 2.0 plug-in card correctly
- One inverter with Fronius Datamanager 2.0 = master
- All other inverters with Fronius Datamanager 2.0 = slave (the LEDs on the Fronius Datamanager 2.0 plug-in cards are not illuminated)

3 Switch the device to Service mode.
- Activate the WiFi Access Point via the Setup menu on the inverter.

The inverter establishes the WLAN access point. The WLAN access point remains open for 1 hour.

Installation using the Solar.web App

4 Download the Fronius Solar.web App.

5 Run the Fronius Solar.web App.

Installation using a web browser

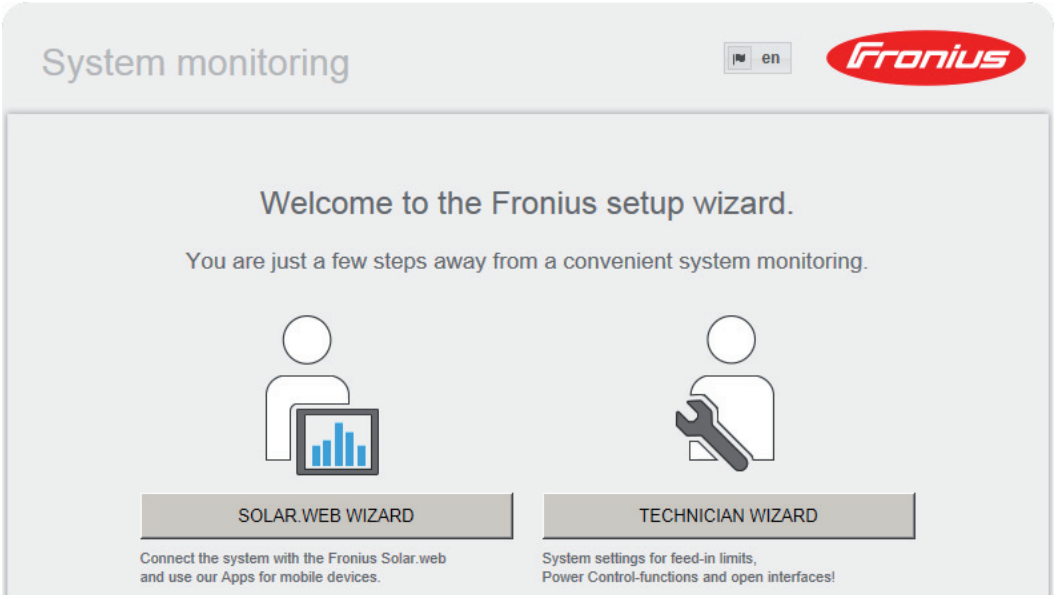
4 Connect the end device to the WLAN access point

SSID = Fronius_240.xxxxx (5-8 digits)
- Search for a network with the name "Fronius_240.xxxxx"
- Establish a connection to this network.
- Enter the password 12345678.

(Alternatively, connect the end device and inverter using an Ethernet cable.)

5 Enter the following in the browser:
http://datamanager
or
192.168.250.181 (IP address for WLAN connection)
or
169.254.0.180 (IP address for LAN connection).

The Setup wizard start page is displayed.



The technician wizard is intended for the installer and contains standard-specific settings.
Running the technician wizard is optional.
If the technician wizard is run, it is vital to note the service password that is issued. This service password is necessary for setting the EVU Editor menu item.
If the technician wizard is not run, no specifications regarding power reduction are set.

Running the Solar Web wizard is mandatory.

6 Run the Solar Web wizard and follow the instructions.

The Fronius Solar.web homepage is displayed,
or
the Fronius Datamanager 2.0 web page is displayed.

7 Where necessary, run the technician wizard and follow the instructions

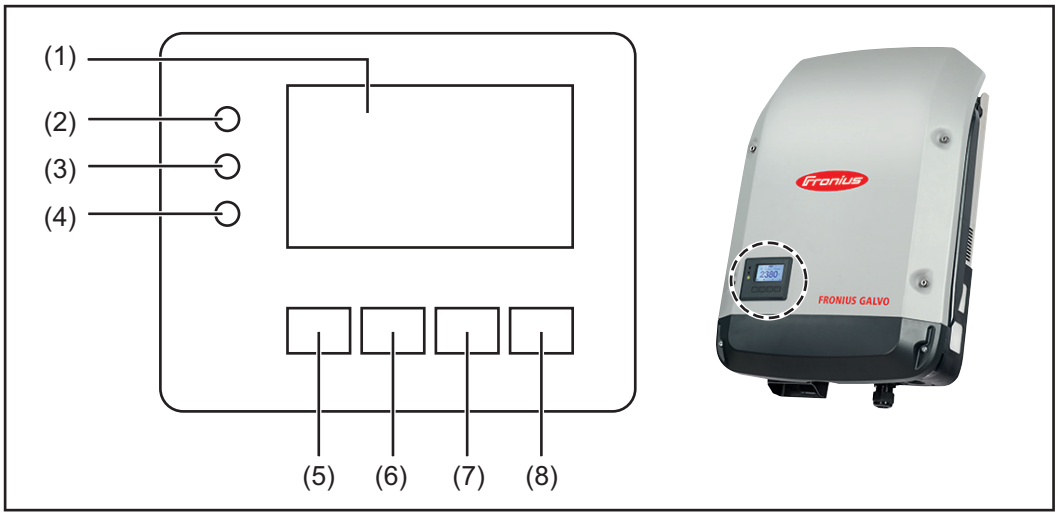
Further information on Fronius Datamanager 2.0

Further information on the Fronius Datamanager 2.0 and other start-up options can be found at:

→ http://www.fronius.com/QR-link/4204260191EA

Controls and indicators

Controls and indicators



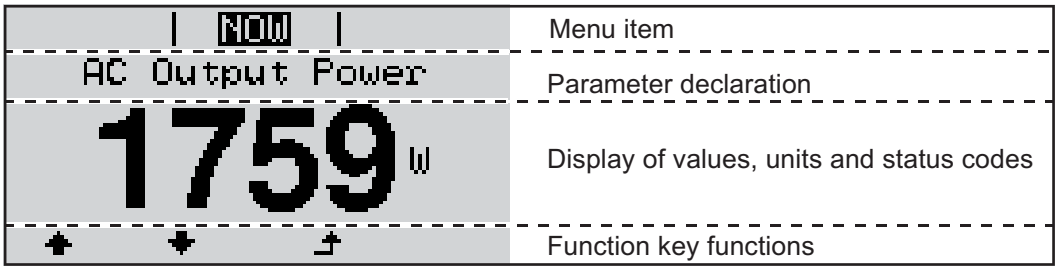
Item	Description
(1)	Display showing values, settings and menus
	Monitoring and status LEDs
(2)	General status LED (red) on steady, - if a status message is being displayed on the monitor - if the process of feeding energy into the grid is interrupted - while error handling (the inverter waits for an acknowledgement or for an error to be rectified)
(3)	Startup LED (orange) on steady if - the inverter is in its automatic startup or self-test phase (as soon after sunrise as the solar modules are delivering sufficient power) - the inverter has been switched to standby mode in the setup menu (= feeding energy into the grid switched off manually) - the inverter software is being updated
(4)	Operating status LED (green) on steady, - if the PV system is working correctly after the inverter's automatic startup phase - all the time while energy is being fed into the grid
	Function keys - allocated different functions depending on the selection:
(5)	'Left/up' key for navigating to the left and up
(6)	'Down/right' key for navigating down and to the right
(7)	'Menu/Esc' key for switching to the menu level for quitting the Setup menu
(8)	'Enter' key for confirming a selection

The keys are capacitive, and any exposure to water can impair their function. Wipe the keys dry with a cloth if necessary to ensure optimum functionality.

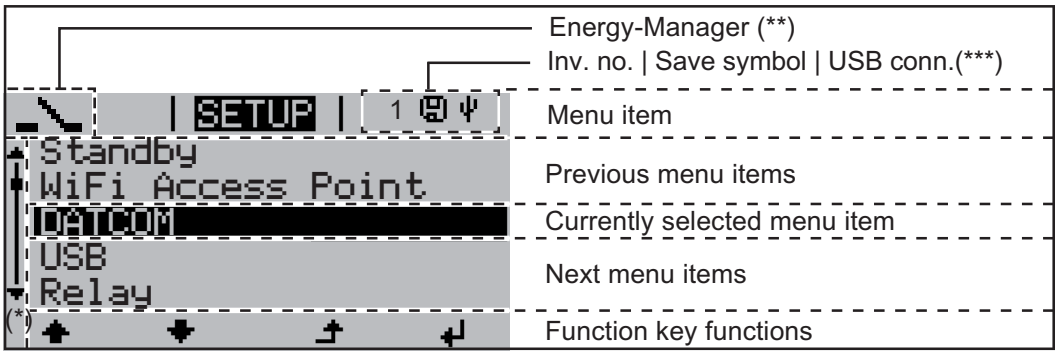
Display

Power for the display comes from the mains voltage. Depending on the setting selected in the Setup menu, the display can be kept on all day.

IMPORTANT! The display on the inverter is not a calibrated measuring device. A slight inaccuracy in comparison with the energy meter used by the power supply company is intrinsic to the system. A calibrated meter will be needed to calculate the bills for the power supply company.



Display areas in Display mode



Display areas in Setup mode

(*) Scroll bar

(**) The Energy Manager symbol is displayed when the Energy Manager function is activated

(***) Inv. no. = Inverter DATCOM number,
Save symbol - appears briefly while set values are being saved,
USB connection - appears if a USB flash drive has been connected

The menu level

Activate display backlighting

1 Press any key

The display backlighting is activated.

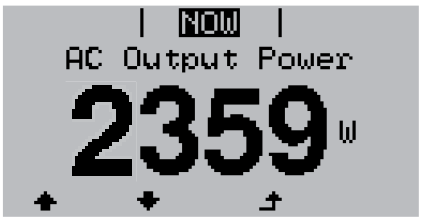
There is an option under 'Display Settings' in the SETUP menu to set the display backlighting so that it is on all the time or off all the time.

Automatic deactivation of display backlighting / choose 'NOW' menu item

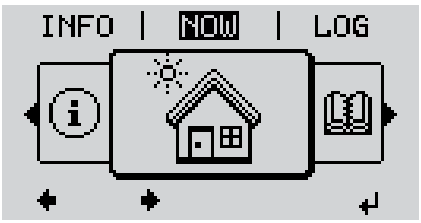
If no key is pressed for 2 minutes,

- the display backlighting switches off automatically and the inverter goes to the 'NOW' menu item (assuming the display backlighting is set to automatic).
- The selection of the 'NOW' menu item can happen from any position on the menu level with the exception of the item 'Standby' on the Setup menu.
- The amount of energy currently fed in is displayed.

Open menu level



1 Press the 'Menu' key



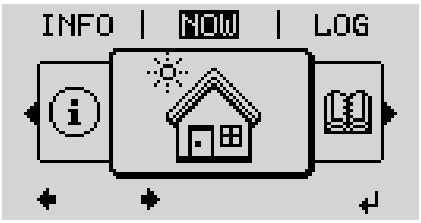
The display switches to the menu level

2 Use the 'Left' or 'Right' keys to select the desired menu item

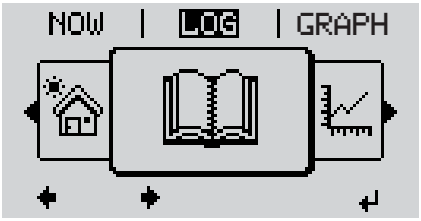
3 Press the 'Enter' key to select the desired menu item

The NOW, LOG and GRAPH menu items

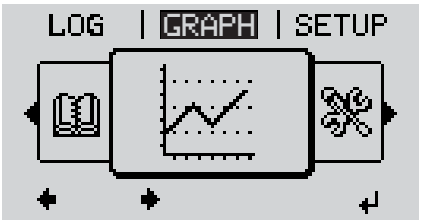
NOW
LOG
GRAPH



NOW
(Displays real-time values)



LOG
(Data recorded today, during the current calendar year and since the inverter was first commissioned)



GRAPH
Day characteristic
displays a plot showing the power output during the day. The time axis is scaled automatically.

Press the 'Back' key to remove the display

Values displayed in the NOW and LOG menu items

Values displayed in the NOW menu item:

AC Output power (W)
AC Reactive power (V Ar)
AC Voltage (V)
AC Output current (A)
AC Frequency (Hz)
PV Array Voltage (V)
PV Array Current (A)
Time / date Time and date on the inverter or in the Fronius Solar Net ring

Values displayed in the LOG menu item:
(for today, during the current calendar year and since the inverter was started for the first time)

AC Energy Yield (kWh / MWh)
Energy fed into the grid during the period in question

There may be discrepancies with values displayed on other measuring instruments because of differences in measuring methods. As far as the billing of the energy fed in is concerned, the only binding display values are those produced by the calibrated measuring device provided by the electricity supply company.

AC Max. Output Power (W)
Largest amount of power fed into the grid during the period in question

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

Like the energy supplied figure, the yield figure may also exhibit discrepancies with other measured values.

The 'Setup Menu' section explains how to select a currency and charge rate.
The factory setting depends on the respective country setup.

CO2 savings (g / kg)
CO_2 emissions saved during the period in question

The value for CO_2 savings depends on the power station facilities and corresponds to the CO_2 emissions that would be released when generating the same amount of energy. The factory setting is 0.53 kg / kWh (source: DGS – Deutsche Gesellschaft für Sonnenenergie e.V. (German Society for Solar Energy).

AC Max. Voltage L-N (V)
Highest voltage measured between the conductor and neutral conductor during the period in question

PV Array Max. Voltage (V)
Highest solar module voltage measured during the period in question

Operating Hours
Length of time the inverter has been working (HH:MM).

IMPORTANT! A prerequisite for the correct display of day and year values is that the time is set correctly.

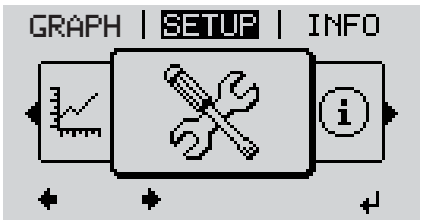
SETUP menu item

Initial setting

The inverter is pre-configured and ready to use. There is no need to enter any initial settings before using it to feed energy into the grid, as this is a fully-automated process.

The SETUP menu item allows the initial settings of the inverter to be changed easily to bring it in line, as closely as possible, with the preferences and requirements of the user.

SETUP

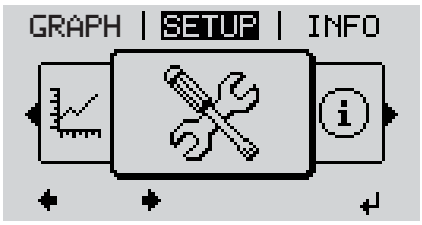


SETUP
(Setup menu)

NOTE! As a result of software updates, you may find that your device has certain functions that are not described in these operating instructions, or vice versa. Certain illustrations may also differ slightly from the actual controls on your device. but these controls function in exactly the same way.

Navigating in the SETUP menu item

Enter the SETUP menu item



Menu level, 'SETUP' selected

◆ ◆ 1 In the menu level, use the 'Left' or 'Right' keys to select the 'SETUP' menu item

↵ 2 Press the 'Enter' key

'Standby' entry

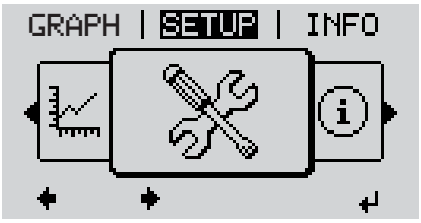
The first entry under the SETUP menu item is displayed:
'Standby'

Scrolling between the entries

Example: 'WiFi Access Point' menu item

▲ ▼ 3 Use the 'Up' and 'Down' keys to move between the available entries

Exiting an entry



4 To exit a menu entry, press the 'Back' key

The menu level appears

If no key is pressed for 2 minutes,
- The inverter switches from wherever it is on the menu level back to the 'NOW' display mode (exception: 'Standby' Setup menu entry),
- the display backlighting goes out.
- The amount of energy currently being fed in is displayed.

Setting entries on the Setup menu, general

1 Entering the SETUP menu item

2 Use the 'Up' or 'Down' keys to select the desired menu item

3 Press 'Enter'

The first digit of a value to be set flashes:

4 Use the 'Up' or 'Down' keys to select a value for the first digit

5 Press 'Enter'

The second digit of the value flashes.

6 Repeat steps 4 and 5 until ...

the whole value to be set flashes.

7 Press 'Enter'

8 Repeat steps 4 - 6 as required for units or other values that are to be set until the appropriate unit or the value flashes.

9 Press the 'Enter' key to save and apply the changes.

To discard the changes, press the 'Esc' key.

The currently selected menu item is displayed.

The available settings are displayed:

4 Use the 'Up' or 'Down' buttons to select the desired setting

5 Press the 'Enter' key to save and apply the setting.

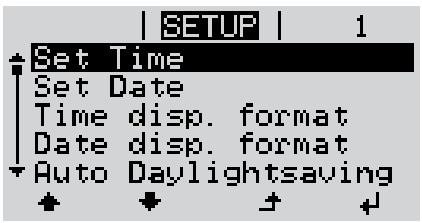
To discard the setting, press the 'Esc' key.

The currently selected menu item is displayed.

Application example: Setting the time

↑↓ 1 Select 'Time / Date' from the Setup menu

↵ 2 Press the 'Enter' key



An overview of the values that can be changed is displayed.

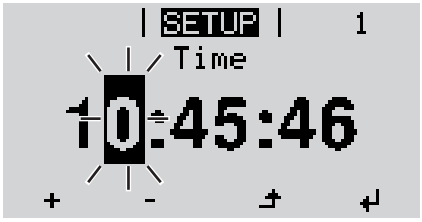
↑↓ 3 Use the 'Up' or 'Down' keys to select 'Set time'

↵ 4 Press the 'Enter' key

The current time appears. (HH:MM:SS, 24-hour clock), the 'tens' digit for the hour will flash.

+ − 5 Use the 'Up' and 'Down' keys to select a value for the 'tens' digit for the hour

↵ 6 Press the 'Enter' key

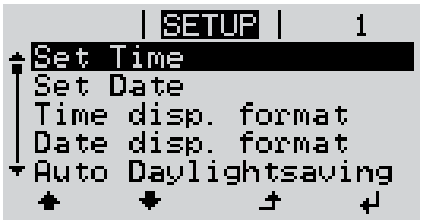


The 'units' digit for the hour will flash.

7 Repeat steps 5 and 6 for the 'units' digit for the hour, for the minutes and seconds until...

the set time starts flashing.

↵ 8 Press the 'Enter' key



The time is applied and the overview of values that can be changed is displayed.

↵ 4 Press the 'Esc' key

The 'Time / Date' item on the Setup menu appears.

The Setup menu items

Standby

Manual activation / deactivation of Standby mode

- No energy is fed into the grid.
- The Startup LED will show steady orange.
- In Standby mode, no other menu item at menu level can be accessed or adjusted.
- The automatic switchover into the 'NOW' display mode after 2 minutes of keyboard inactivity does not occur.
- Standby mode can only be terminated manually by pressing the 'Enter' key.
- Feeding energy into the grid can be resumed at any time (deactivate 'Standby').

Switching off Standby mode (manually switching off feeding energy into the grid):

1 Select the 'Standby' item

2 Press the 'Enter' key

'STANDBY' and 'ENTER' appear alternately on the display.
Standby mode is now active.
The Startup LED shows steady orange.

Resuming feeding energy into the grid:

'STANDBY' and 'ENTER' appear alternately on the display when in Standby mode.

1 Press the 'Enter' key to resume feeding energy into the grid

The 'Standby' menu item is displayed.
At the same time, the inverter enters the startup phase.
The operating state LED shows steady green when feeding energy into the grid has been resumed.

WiFi Access Point

For activating / deactivating the WLAN access point (e.g. to set up system monitoring)

Setting range	WiFi Access Point [stopped]
	Activate WiFi AP?
	↵ To activate the WLAN access point Press the 'Enter' key
	WiFi Access Point [active]
	The SS-ID (SS) and password (PW) are displayed.
	Deactivate WiFi AP?
	↵ To deactivate the WLAN access point Press the 'Enter' key

***

WiFi Access Point
[not available]

Displayed if there is no system monitoring present on the inverter.

DATCOM

Checking data communications, entering the inverter number, DATCOM night mode, protocol settings

Setting range	Status / inverter number / protocol type

Status
Indicates data communication is taking place via Fronius Solar Net or that a data communications error has occurred

Inverter number
Sets the number (= address) of the inverter in a system with several solar inverters

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

IMPORTANT! If a number of inverters are linked together in a data communications system, assign a unique address to each one.

Protocol type
Specifies the communications protocol to be used to transfer the data:

Setting range	Fronius Solar Net / Interface protocol *
Factory setting	Fronius Solar Net

* The protocol type 'interface protocol' only functions when there is no Datamanager card in the inverter. All Datamanager cards must be removed from the inverter.

USB

Specification of values in conjunction with a USB stick

Setting range	Safely remove hardware / Software update / Logging interval

Safely remove hardware
To remove a USB stick from the USB A socket on the plug-in data communications card without losing any data.
The USB stick can be removed:
- when the OK message appears
- when the 'Data transfer' LED stops flashing or comes on steady

Software Update
To update the inverter software via a USB stick.

Procedure:

1 Download the relevant update file 'froxxxxx.upd'
(e.g. from http://www.fronius.com; xxxxx stands for the version number)

NOTE! To successfully update the inverter software, the USB stick provided for the purpose must not have a hidden partition or any encryption (see chapter "Suitable USB sticks").

2 Save the update file to the highest data level of the USB stick

3 Open the data communication area

4 Plug the USB stick containing the update file into the USB socket in the data communication area

5 Select 'USB' from the Setup menu, followed by 'Update software'

6 Press the 'Enter' key

7 Wait until the version currently installed on the inverter and the new software version are displayed for comparison:
- 1st page: Recerbo software (LCD), key controller software (KEY), country setup version (Set)
- 2nd page: Power stage set software

8 Press the 'Enter' key after each page

The inverter starts copying the data.
'UPDATE' and the progress of storing the individual tests expressed in % are displayed until all the data for all the electronic modules has been copied.

Once copying is complete, the inverter updates the electronic modules as required in sequence.
'UPDATE', the affected modules and the update progress in % are displayed.

The final step is for the inverter to update the display.
The display remains dark for approx. 1 minute while the monitoring and status LEDs flash.

Once the software update is complete, the inverter enters its startup phase before going on to start feeding energy into the grid. The USB stick can be unplugged.

When the inverter software is updated, any custom settings that were configured in the Setup menu are retained.

Logging interval
Activate / deactivate the logging function and specify a logging interval

Unit	Minutes
Setting range	30 min. / 20 min./ 15 min./ 10 min./ 5 min./ No log
Factory setting	30 min.

30 min.	The logging interval is 30 minutes; every 30 minutes new logging data will be saved on the USB stick.
20 min.	
15 min.	
10 min.	
5 min.	The logging interval is 5 minutes; every 5 minutes new logging data will be saved on the USB stick.
No log	No data is saved

IMPORTANT! In order for the logging function to work correctly the time must be set correctly.

Relays

Activate relay, relay settings, relay test

Setting range	Relay mode / Relay test / Switch-on point* / Switch-off point*

* these are only shown if the 'E-Manager' function has been activated under 'Relay mode'.

Relay mode
for selecting the different functions of the floating switch contact in the data communication area:
- Alarm function
- Active output
- Energy Manager

Setting range	ALL / Permanent / OFF / ON / E-Manager
Factory setting	ALL

Alarm function:

Permanent / ALL:	Switch the floating switch contact for permanent and temporary service codes (e.g. brief interruption to energy being fed into the grid, a service code occurs a certain number of times a day - can be adjusted in the 'BASIC' menu)

Active output:

ON:	The floating NO contact is on all the time the inverter is in operation (as long as the display is not dark or is displaying something).
OFF:	The floating NO contact is off.

Energy Manager:

E-Manager:	Further details on the 'Energy Manager' function may be found in the "Energy Manager" section.

Relay test
Function test to determine whether the floating switch contact switches

Switch-on point (only if 'Energy Manager' function is activated)
for setting the effective power limit beyond which the floating switch contact is switched on

Factory setting	1000 W
Setting range	Switch-off point - max. nominal output of inverter / W / kW

Switch-off point (only if 'Energy Manager' function is activated)
for setting the effective power limit beyond which the floating switch contact is switched off

Factory setting	500
Setting range	0 - Switch-on point / W / kW

Energy-Manager (in Relay menu item)

The 'Energy-Manager' function can be used to activate the floating switch contact in such a way that it functions as an actuator.
Thus a consumer that is connected to the floating switch contact can be controlled by specifying a switch-on or switch-off point that depends on the feed-in power.

The floating switch contact is automatically switched off,
- if the inverter is not feeding any power into the grid,
- if the inverter is manually switched into standby mode,
- if the effective power is < 10% of nominal output,
- in the event of insufficient insulation.

To activate the 'Energy-Manager' function, select 'E-Manager' and press the 'Enter' key. When the 'Energy-Manager' function is running, the 'Energy-Manager' symbol will appear in the top left corner of the display:

when the floating NO contact is off (open contact)

when the floating NO contact is on (closed contact)

To deactivate the 'Energy-Manager' function, select a different function and press the 'Enter' key.

Notes on setting up the switch-on and switch-off points
If the difference between the switch-on and switch-off points is too small, or if there are fluctuations in effective power, the result may be multiple switching cycles.
To avoid switching on and off frequently, the difference between the switch-on and switch-off points should be at least 100 - 200 W.

When choosing the switch-off point the power consumption of the connected consumer should be taken into account.

When choosing the switch-on point, the weather conditions and anticipated insulation should also be taken into account.

Application example
Switch-on point = 2000 W, switch-off point = 1800 W

If the inverter is outputting 2000 W or above, then the floating switch contact on the inverter is switched on.
If the inverter output falls to below 1800 W, the floating switch contact is switched off.

Possible applications:
operating a heat pump or an air-conditioning system using as much self-generated power as possible

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Time / Date

Set the time, date and automatic changeover between summer and winter time

Setting range	Set time / Set date / Time display format / Date display format / Summer/winter time

Set time
Set the time (hh:mm:ss or hh:mm am/pm – depending on the setting for the time display format)

Set date
Set the date (dd.mm.yyyy or mm/dd/yyyy - depending on the setting for the date display format)

Time display format
For specifying the time display format

Setting range	12hrs / 24hrs
Factory setting	Depends on country setup

Date display format
for specifying the date display format

Setting range	mm/dd/yyyy / dd.mm.yy
Factory setting	Depends on country setup

Summer/winter time
Activate/deactivate automatic changeover between summer and winter time

IMPORTANT! Only use the automatic summer/winter time changeover function if the Fronius Solar Net ring does not include any LAN- or WLAN-compatible system components (e.g. Fronius Datalogger Web, Fronius Datamanager or Fronius Hybridmanager).

Setting range	on / off
Factory setting	on

IMPORTANT! The time and date must be set accurately in order for the day and year values and for the day characteristic to be displayed correctly.

Display settings

Setting range	Language / Night mode / Contrast / Illumination

Language
Set language for display

Setting range	German, English, French, Dutch, Italian, Spanish, Czech, Slovak, etc.

Night mode
DATCOM night mode; controls DATCOM and display operation during the night or when the DC voltage is insufficient

Setting range	AUTO / ON / OFF
Factory setting	OFF

AUTO: DATCOM mode is always in effect as long as there is a Datalogger connected in an active and uninterrupted Fronius Solar Net.
The display remains dark during the night, but can be activated by pressing any key.

ON: DATCOM mode is always in effect. The inverter supplies 12 V continuously to power the Fronius Solar Net. The display is always active.

IMPORTANT! If DATCOM night mode is set to ON or AUTO when there are Fronius Solar Net components connected, then the inverter's current consumption during the night will increase to around 7 W.

OFF: DATCOM will not run at night, the inverter will not need any AC current in order to supply power to the Fronius Solar Net.
The display is switched off during the night and the Fronius Datamanager is not available.

Contrast
Set the contrast on the display

Setting range	0 - 10
Factory setting	5

Since the contrast is temperature-dependent, it may be necessary to adjust the setting under the "Contrast" menu item when the environmental conditions change.

Illumination
Initial setting for display illumination

The "Illumination" menu item only relates to the display backlighting.

Setting range	AUTO / ON / OFF
Factory setting	AUTO

AUTO:	The display backlighting is activated by pressing any key. If no key is pressed for 2 minutes, the display backlighting will go off again.
ON:	The display backlighting remains permanently on when the inverter is active.
OFF:	The display backlighting is permanently switched off.

Energy yield

Setting
- of the currency
- of the feed-in tariff

Setting range	Currency / Feed-in tariff

Currency
Set the currency

Setting range	3 characters, A-Z

Feed-in tariff
Set the remuneration rate for energy fed into the grid

Setting range	2 digits, 3 decimal places
Factory setting	(depends on country setup)

Fan

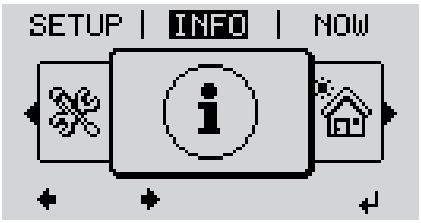
To check that the fan is working correctly

Setting range	Test fan #1 / Test fan #2 (depending on the device)

- Use the 'Up' and 'Down' keys to select the desired fan
- Testing of the selected fan is initiated by clicking 'Enter'.
- The fan will continue to run until the operator exits the menu by pressing 'Esc'.

The INFO menu item

INFO



INFO
(Information about the device and the software)

Measured values
PSS status
Grid status

Measured values	Display range:	PV ins. / Ext. lim. / U PV1 / GVDPR / Fan #1
	PV Iso. Insulation resistance of the PV system (with ungrounded solar modules and solar modules with negative pole grounding) **Ext. lim.** External power reduction in percent e.g. specified by grid operator **U PV1** Current DC voltage on the terminals, even if the inverter is not feeding any power into the grid whatsoever (from the 1st MPP tracker) **GVDPR** Grid voltage-dependent power reduction **Fan #1** Percentage of target output for fan	
PSS status	The status of the most recent inverter fault can be displayed. **IMPORTANT!** Due to the low level of insolation early in the morning and in the evening, the status codes 306 (Power low) and 307 (DC low) are displayed routinely at these times of day. These status codes do not indicate any kind of fault. - Press the 'Enter' key to see the status of the power stage set and the most recent fault - Use the 'Up' and 'Down' keys to scroll through the list - Press the 'Back' key to close the status and fault list	
Grid status	The five most recent grid faults can be displayed: - Press the 'Enter' key to see the five most recent grid faults - Use the 'Up' and 'Down' keys to scroll through the list - Press the 'Back' key to close the grid fault display	

Device information

For displaying the settings that will be of relevance to an energy supply company. The values shown will depend on the country setup or the device-specific settings of the inverter.

Display range	General / Country-specific setting / MPP tracker / Grid monitoring / Grid voltage limits / Grid frequency limits / Q-mode / AC power limit / AC voltage derating / Fault Ride Through
General:	Device type Fam.
Country-specific setting:	Setup Specified country setup Version Version of country setup Group Group for updating the inverter software
MPP Tracker:	Tracker 1
Monitoring the grid:	GMTi Startup time of inverter in s GMTr Reconnection time in s following a grid fault ULL Mean grid voltage over 10 minutes in V. LLTrip Trip time for long-term voltage monitoring
Grid voltage limits:	UILmax Upper inner grid voltage in V UILmin Lower inner grid voltage in V
Grid frequency limits:	FILmax Upper inner grid frequency in Hz FILmin Lower inner grid frequency in Hz
Q-mode:	current power factor setting cos phi (e.g. Constant Cos(phi) / Constant Q / Q(U)-characteristic / etc.)
AC power limit:	Max. P AC manual power reduction

AC voltage derating:	Status ON / OFF voltage-dependent power reduction GVDPRe Threshold from which the voltage-dependent power reduction begins GVDPRv Reduction gradient used to reduce the power, e.g.: 10% per volt above the GVDPRe threshold. Message Activates the dispatch of an info message via Fronius Solar Net
Fault Ride Through:	Status - default setting: OFF If the function is activated, the inverter does not switch off immediately in the event of a short-term AC voltage interruption (outside of the limits specified by the grid supplier), but instead continues to feed in power for a defined period. DB min - default setting: 90% "Dead Band Minimum" setting in percent DB max - default setting: 120% "Dead Band Maximum" setting in percent k-Fac. - default setting: 0

Version

Displays the version and serial numbers of the PC boards in the inverter (e.g. for service purposes)

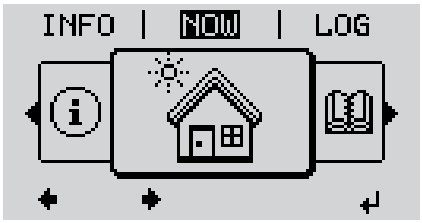
Display area	Display / Display Software / Integrity Checksum / Memory Card / Memory Card #1 / Power Stage / Power Stage Software / EMI Filter / Power Stage #3 / Power Stage #4

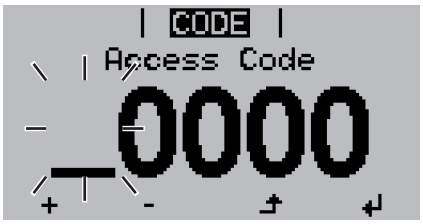
Switching the key lock on and off

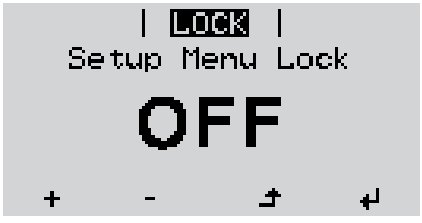
General

The inverter has a key lock function.
When the key lock is active, the Setup menu is not accessible, i.e. the setup data cannot be changed accidentally (or maliciously).
The code 12321 has to be entered in order to activate / deactivate the key lock.

Switching the key lock on and off



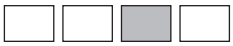




1 Press the 'Menu' key

The menu level appears.

2 Press the unassigned 'Menu / Esc' key
5 times



"Access Code" is displayed in the "CODE" menu; the first digit starts flashing.

3 Enter the code 12321: use the 'Up' and 'Down' keys to select a value for the first digit of the code.

4 Press the 'Enter' key

The second digit starts flashing.

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

the selected code starts flashing.

6 Press the 'Enter' key

'Key Lock' is displayed in the 'LOCK' menu.

7 Use the 'Up' and 'Down' keys to turn the key lock on or off:

ON = key lock is on (the Setup menu is not accessible)

OFF = key lock is off (the Setup menu is accessible)

8 Press the 'Enter' key

USB Stick as a Data Logger and for Updating Inverter Software

USB stick as a datalogger

If a USB stick is connected to the USB A socket it can function as a datalogger for an inverter.

At any time, the logging data stored on the USB stick can be
- imported into the Fronius Solar.access software using the FLD file that was logged at the same time,
- viewed directly in third-party programs (e.g. Microsoft® Excel) using the CSV file logged at the same time.

Older versions (before Excel 2007) are limited to a maximum of 65,536 rows.

Further information on "Data on a USB stick", "Data volume and storage capacity" as well as "Buffer memory" can be found at:

→ http://www.fronius.com/QR-link/4204260171EN

Suitable USB flash drives

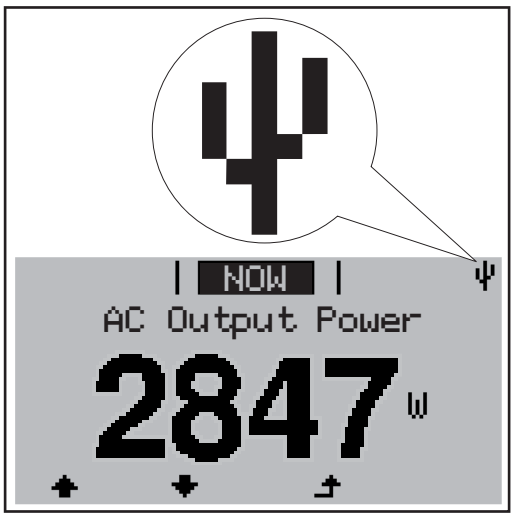
Due to the variety of USB flash drives available on the market, it cannot be guaranteed that every USB flash drive will be detected by the inverter.

Fronius recommends that only certified USB flash drives suitable for building sites are used (look out for the USB-IF logo).

The inverter supports USB flash drives with the following file systems:
- FAT12
- FAT16
- FAT32

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

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



If the inverter detects a USB flash drive, the USB symbol will appear in the top right corner of the display.

When inserting a USB flash drive, check whether the USB symbol is displayed (it may also flash).

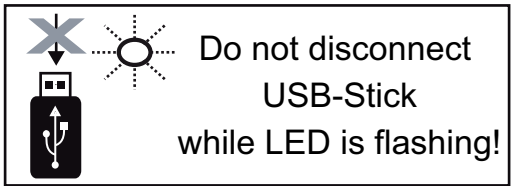
NOTE! Please note for outdoor applications that conventional USB flash drives are often only guaranteed to work within a restricted temperature range. For outdoor applications ensure that the USB flash drive also functions, for example, at low temperatures.

USB stick for updating the inverter software

With the help of the USB stick, end customers can also update the inverter software via the USB item on the SETUP menu: the update file is first saved to the USB stick, from where it is then transferred to the inverter. The update file must be saved in the root directory on the USB stick.

Remove USB stick

Security note concerning the removal of a USB stick:



IMPORTANT! To avoid any loss of data, a USB stick may only be removed if the following conditions are met:

- only remove a USB stick via the 'Safely remove USB / HW' item on the SETUP menu
- the 'Data transmission' LED has stopped flashing or comes on steady.

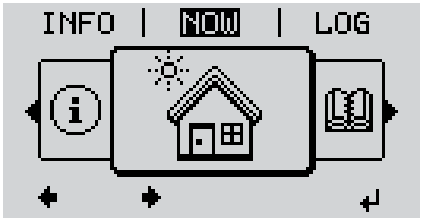
The Basic menu

General

The Basic menu is used to set the following parameters, which are important for installing and operating the inverter:

- DC operating mode
- Fixed voltage
- MPPT1 initial voltage
- USB logbook
- Insulation settings
- TOTAL reset
- Event counter

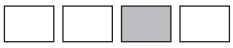
Access the Basic menu



1 Press the 'Menu' key

The menu level appears.

2 Press the unassigned 'Menu / Esc' key
5 times



"Access Code" is displayed in the "CODE" menu; the first digit starts flashing.

3 Enter the code 22742: Use the 'Up' and 'Down' keys to select a value for the first digit of the code

4 Press the 'Enter' key

The second digit starts flashing.

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

the selected code starts flashing.

6 Press the 'Enter' key

The Basic menu appears.

7 Use the 'Up' or 'Down' keys to select the desired menu item

8 Press the 'Enter' key to open the desired menu item

9 Press the 'Esc' key to exit the Basic menu

Items on the Basic menu

The Basic menu contains the following items:

MPP Tracker 1

- DC operating mode:
  MPP AUTO
  FIX
  MPP USER

- Fixed voltage:
  for inputting a fixed voltage, 120 - 440 V

- MPPT1 initial voltage:
  for inputting the MPPT1 initial voltage, 120 - 440 V

USB log book

Activates or deactivates the function for saving all error messages to a USB flash drive
AUTO / OFF / ON

Input signal

- How it works:
  Ext Sig. / S0 meter / OFF

- Triggering method (with "Ext. Sig." mode of operation):
  Warning / Ext. Stop

- Connection type (with "Ext. Sig." mode of operation):
  N/C / N/O

SMS / relay

- Event delay
  for inputting the time delay after which an SMS is sent or the relay is to switch
  900 - 86,400 seconds

- Event counter:
  for entering the number of errors after which an SMS is sent or the relay is to switch:
  10 - 255

Grounding setting

- Grounding mode:
  Off / Positive / Negative

- Ground monitoring:
  Off / Warn Err / Error / Warning

Insulation mode

- Insulation warning:
  for activating and deactivating insulation monitoring, with display of a warning without interruption of feed-in if there is an insulation fault
  ON / OFF (depends on the country setup)

- Threshold warning:
  for setting an insulation threshold at which the inverter produces a warning (without interruption of feed-in)
  0 - 1000 kOhm (depends on the country setup)

- Insulation fault:
  for activating and deactivating insulation monitoring, with error message and immediate shutdown of the inverter if there is an insulation fault
  ON / OFF (depends on the country setup)

- Threshold error:
  for setting an insulation threshold at which the inverter produces an error message and interrupts the feeding of energy into the grid
  0 - 1000 kOhm (depends on the country setup)

Temperature warning
for activating / deactivating the overtemperature warning for each event;
the overtemperature warning is sent and displayed on the monitor.
ON / OFF

TOTAL Reset
in the LOG menu item, resets the max. and min. voltage values and the max. power of feeding in to zero.
Once values have been reset, this action cannot be undone.

To reset the values to zero, press the 'Enter' key.
"CONFIRM" is displayed.
Press 'Enter' again.
The values are reset and the menu is displayed

Status diagnostics and troubleshooting

Displaying status codes

The inverter performs a system self diagnosis that automatically detects many faults that may occur and shows them on the display. This means you are promptly made aware of malfunctions in the inverter and the photovoltaic system, or of any installation or operating faults.

If the system self diagnosis has detected a specific fault, the associated status code will be shown on the display.

IMPORTANT! Status codes may sometimes appear briefly as a result of the inverter's control response. If the inverter then continues working with no sign of any problem, this means that there was no fault.

Total failure of the display

If the display fails to come on some time after sunrise:

- Check the AC voltage ON the inverter connections: the AC voltage must be 230 V (+ 10 % / - 5 %)*.

* The mains voltage tolerance depends on the country setup

Class 1 status codes

Class 1 status codes generally only arise momentarily and are caused by the public grid.

The initial response of the inverter in this case is to disconnect itself from the grid. The grid is subsequently checked for the stipulated monitoring period. If no further problem has been detected by the end of this period, then the inverter will resume feeding energy into the grid.

The GPIS SoftStart function is activated according to the country setup:
after cutting out due to an AC error, the output power of the inverter is continuously increased by 10% every minute in line with the VDE-AR-N 4105 guideline.

Code	Description	Behaviour	Remedy
102	AC voltage too high	Following careful testing and when the grid conditions are within the permissible range again, the inverter will resume feeding energy into the grid.	Check grid connections: If this status code keeps recurring, contact your system engineer
103	AC voltage too low		
105	AC frequency too high		
106	AC frequency too low		
107	AC grid outside the permissible limits		
108	Stand alone operation detected		

Class 3 status codes

Class 3 includes status codes that may occur while feeding energy into the grid, but generally do not cause the process to be interrupted for any length of time.

The inverter disconnects automatically from the grid, the grid is then monitored as specified and the inverter attempts to resume feeding energy into the grid.

Code	Description	Behaviour	Remedy
301	Overcurrent (AC)	Short-term interruption while feeding energy into the grid due to overcurrent in the inverter The inverter resumes with its startup routine.	Fault is rectified automatically; if this status code is displayed all the time: notify a Fronius-trained service engineer.
302	Overcurrent (DC)		
303	Power stage set overtemperature	Short-term interruption while feeding energy into the grid due to overtemperature The inverter resumes with its startup routine.	Purge openings for cooling air and heat sink if necessary; fault is rectified automatically; if this status code keeps recurring, contact your system engineer
304	Internal temperature too high		
306	LOW PV OUTPUT Intermediate circuit voltage too low for feeding energy into the grid	Short-term interruption while feeding energy into the grid The inverter resumes with its startup routine.	Fault is rectified automatically; if this status code occurs when there is sufficient insolation, contact your system engineer
307	LOW PV VOLTAGE DC input voltage too low for feeding energy into the grid		

IMPORTANT! Due to the low level of insolation early in the morning and in the evening, the status codes 306 (LOW PV OUTPUT) and 307 (LOW PV VOLTAGE) are displayed routinely at these times of day. These status codes do not indicate any kind of fault.

308	Intermediate circuit overvoltage	Short-term interruption while feeding energy into the grid The inverter resumes with its startup routine.	Fault is rectified automatically; if this status code is displayed all the time: notify a Fronius-trained service engineer.
309	DC input voltage too high		

Class 4 status codes

Some of the class 4 status codes necessitate intervention by a Fronius-trained service engineer.

Code	Description	Behaviour	Remedy
401	No communication with power stage set possible	The inverter will automatically attempt to connect again and, if possible, will resume feeding energy into the grid	If the status code is displayed all the time: notify a Fronius-trained service engineer
406	Power stage set temperature sensor faulty		
407	Internal temperature sensor faulty		
408	DC feeding into the grid detected		

Code	Description	Behaviour	Remedy
412	Fixed voltage mode has been selected instead of MPP voltage mode and the fixed voltage has been set to too low or too high a value.	-	If this status code keeps recurring, contact your system engineer
415	Safety cut-out via option card or RECERBO has triggered	The inverter is not feeding any energy into the grid.	If the status code is displayed all the time: notify a Fronius-trained service engineer
416	No communication possible between power stage set and control system.	The inverter will automatically attempt to connect again and, if possible, will resume feeding energy into the grid	
425	No communication possible with the power stage set		
445	Invalid limit value settings	The inverter is not feeding any energy into the grid for safety reasons.	Update the inverter firmware; If the status code is displayed all the time: notify a Fronius-trained service engineer
452	Communication error between the processors	The inverter will automatically attempt to connect again and, if possible, will resume feeding energy into the grid	If the status code is displayed all the time: notify a Fronius-trained service engineer
453	Short-term grid voltage error		
454	Short-term grid frequency error		
457	Grid relay sticking	The inverter is not feeding any energy into the grid.	notify a Fronius-trained service engineer
459	Error when recording the measuring signal for the insulation test		
460	Reference voltage source for the digital signal processor (DSP) is working out of tolerance		
472	Fuse for solar module ground is faulty	The inverter is not feeding any energy into the grid.	Replace fuse for solar module ground; if this status code keeps recurring, contact your system engineer
475	Solar module ground, insulation fault (connection between solar module and ground)	The inverter is not feeding any energy into the grid.	If this status code keeps recurring, contact your system engineer
482	Start-up incomplete	The inverter is not feeding any energy into the grid.	Perform AC reset (turn automatic circuit breaker off and on), complete start-up

Class 5 status codes

Class 5 status codes do not generally prevent the feeding of energy into the grid, but can restrict it. These status code are displayed until they are acknowledged by pressing a key (the inverter, however, continues to operate normally in the background).

Code	Description	Behaviour	Remedy
502	Insulation error on the solar modules	Warning message is shown on the display	If this status code keeps recurring, contact your system engineer
509	No energy fed into the grid in the past 24 hours	Warning message is shown on the display	Acknowledge status code; Check whether all the conditions for the problem-free feeding of energy into the grid have been met (e.g. are the solar modules covered with snow?) If the status code is displayed all the time: look out for further status codes
517	Derating caused by too high a temperature	When power derating occurs, a warning message is shown on the display	Purge cooling air openings and heat sink if necessary; fault is rectified automatically; if this status code keeps recurring, contact your system engineer
551	Fuse for solar module ground is faulty	Warning is shown on the display	Replace fuse for solar module ground; if this status code keeps recurring, contact your system engineer
558	Functional incompatibility (one or more PC boards in the inverter are not compatible with each other, e.g. after a PC board has been replaced)	Possible error displays or malfunctions on the inverter	If this status code keeps recurring, contact your system engineer
560	Derating caused by overfrequency	This status code is displayed when the grid frequency becomes excessively high. The inverter will then reduce its output. The status indicator will continue to be displayed until the inverter has returned to normal operation.	As soon as the grid frequency is back within the permissible range and the inverter has returned to normal operation, the fault is rectified automatically. If this status code keeps recurring, contact your system engineer.
568	Incorrect input signal on the multifunction current interface	The status code is displayed in the case of an incorrect input signal on the multifunction current interface and with the following setting: Basic menu / Input signal / Mode of operation = Ext. Signal, triggering method = Warning	Acknowledge status code; check the devices connected to the multifunction current interface; if this status code keeps recurring, contact your system engineer.

Class 6 status codes

Some of the class 6 status codes necessitate intervention by a Fronius-trained service engineer.

Code	Description	Behaviour	Remedy
668	Incorrect input signal on the multifunction current interface	The inverter is not feeding any energy into the grid. The status code is displayed in the case of an incorrect input signal at the multifunction current interface and with the following setting: Basic menu / Input signal / Mode of operation = Ext. Signal, triggering method = Ext. Stop	Check the devices connected to the multifunction current interface; if this status code keeps recurring: notify a Fronius-trained service engineer.

Class 7 status codes

Class 7 status codes relate to the control system, the configuration and inverter data recording, and may directly or indirectly affect the process of feeding energy into the grid.

Code	Description	Behaviour	Remedy
705	Conflict when setting the inverter number (e.g. number already assigned)	-	Correct the inverter number via the Setup menu
721	EEPROM has been reinitialised or EEPROM is faulty	Warning message is shown on the display	Acknowledge status code; If the status code is displayed all the time: notify a Fronius-trained service engineer
731	Initialisation error - USB stick is not supported	Warning message is shown on the display	Check or replace USB stick Check the file system on the USB stick If the status code is displayed all the time: notify a Fronius-trained service engineer
732	Overcurrent on USB stick		
733	No USB stick connected	Warning message is shown on the display.	Connect or check USB stick If the status code is displayed all the time: notify a Fronius-trained service engineer
734	Update file not recognised or not present	Warning message is shown on the display	Check update file (e.g. for correct file name) If the status code is displayed all the time: notify a Fronius-trained service engineer
735	Update file does not match the device, update file too old	Warning message appears on the display, update process is interrupted	Check update file and if necessary organise an update file to match the device (e.g. at http://www.fronius.com) If the status code is displayed all the time: notify a Fronius-trained service engineer

Code	Description	Behaviour	Remedy
736	Write or read error occurred	Warning message is shown on the display	Check USB stick and the data contained on it or replace USB stick Never unplug a USB stick if the 'Data Transmission' LED is still flashing or lit. If the status code is displayed all the time: notify a Fronius-trained service engineer
738	Log file cannot be saved (e.g. USB stick is write-protected or full)	Warning message is shown on the display	Create storage space, remove write protection, check or replace USB stick if necessary If the status code is displayed all the time: notify a Fronius-trained service engineer
743	Error occurred during update process	Warning message is shown on the display	Repeat the update process, check USB stick If the status code is displayed all the time: notify a Fronius-trained service engineer
745	Update file corrupt	Warning message appears on the display, update process is interrupted	Re-download update file If the status code is displayed all the time: notify a Fronius-trained service engineer
751	Time lost	Warning message is shown on the display	Reset the time and date on the inverter If the status code is displayed all the time: notify a Fronius-trained service engineer
752	Real Time Clock module communication error		
757	Hardware error in the Real Time Clock module	Error message is shown on the display; the inverter is not feeding any energy into the grid	If the status code is displayed all the time: notify a Fronius-trained service engineer
758	Internal error: Real Time Clock module is in emergency mode	Time may be inaccurate or lost (feeding energy into the grid normal)	
766	Emergency power derating has been activated (max. 750 W)	Error message is shown on the display	

Customer service

IMPORTANT! Contact your Fronius dealer or a Fronius-trained service technician if
- an error appears frequently or all the time
- an error appears that is not listed in the tables

Operation in dusty environments

When operating the inverter in extremely dusty environments:
when necessary, clean the cooling elements and fan on the back of the inverter as well as the air intakes at the wall bracket using clean compressed air.

Technical data

Fronius Galvo 1.5-1

Input data

MPP voltage range	120 - 335 V DC
Max. input voltage (at 1000 W/m²/ -10 °C in an open circuit)	420 V DC
Max. input current	13.3 A
Max. short circuit current of the solar modules	20.0 A
Max. feedback current[4)]	8.9 A

Output data

Nominal output power (P_{nom})	1500 W
Max. output power	1500 W
Nominal grid voltage	1 ~ NPE 230 V
Min. grid voltage	180 V [1)]
Max. grid voltage	270 V [1)]
Max. output current	7.2 A
Nominal frequency	50 - 60 Hz [1)]
Total harmonic distortion	< 4 %
Power factor cos phi	1 0.85 - 1 ind./cap.[2)]
Max. permitted grid impedance Z_{max} at PCC[3)]	none
Power-up current pulse[6)] and duration	36.0 A / 9.4 ms
Max. output fault current per period	43.0 A / 1.24 ms

General data

Maximum efficiency	95.9 %
Europ. efficiency	94.5 %
Overnight self-consumption	0.47 W
Cooling	Controlled forced-air ventilation
Degree of protection	IP 65
Dimensions h x w x d	645 x 431 x 204 mm
Weight	16.35 kg
Permissible ambient temperature	- 25 °C - +50 °C
Permitted humidity	0 - 100 %
EMC emission class	B
Overvoltage category DC / AC	2 / 3

Protection devices

DC insulation measurement	Warning/shutdown [7)] at R_{ISO} < 600 kOhm
Response to DC overload	Operating point shift, power limitation
DC disconnector	Integrated

Fronius Galvo 2.0-1

Input data

MPP voltage range	120 - 335 V DC
Max. input voltage (at 1000 W/m²/ -10 °C in an open circuit)	420 V DC
Max. input current	17.8 A
Max. short circuit current of the solar modules	26.8 A
Max. feedback current[4)]	11.9 A

Output data

Nominal output power (P_{nom})	2000 W
Max. output power	2000 W
Nominal grid voltage	1 ~ NPE 230 V
Min. grid voltage	180 V [1)]
Max. grid voltage	270 V [1)]
Max. output current	9.7 A
Nominal frequency	50 - 60 Hz [1)]
Total harmonic distortion	< 4 %
Power factor cos phi	1 0.85 - 1 ind./cap.[2)]
Max. permitted grid impedance Z_{max} at PCC[3)]	none
Power-up current pulse[6)] and duration	36.0 A / 9.4 ms
Max. output fault current per period	43.0 A / 1.24 ms

General data

Maximum efficiency	96.0 %
Europ. efficiency	94.9 %
Overnight self-consumption	0.47 W
Cooling	Controlled forced-air ventilation
Degree of protection	IP 65
Dimensions h x w x d	645 x 431 x 204 mm
Weight	16.35 kg
Permissible ambient temperature	- 25 °C - +50 °C
Permitted humidity	0 - 100 %
EMC emission class	B
Overvoltage category DC / AC	2 / 3

Protection devices

DC insulation measurement	Warning/shutdown [7)] at R_{ISO} < 600 kOhm
Response to DC overload	Operating point shift power limitation
DC disconnector	Integrated

Fronius Galvo 2.5-1

Input data

MPP voltage range	165 - 440 V DC
Max. input voltage (at 1000 W/m²/ -10 °C in an open circuit)	550 V DC
Max. input current	16.6 A
Max. short circuit current of the solar modules	24.8 A
Max. feedback current[4)]	11 A

Output data

Nominal output power (P_{nom})	2500 W
Max. output power	2500 W
Nominal grid voltage	1 ~ NPE 230 V
Min. grid voltage	180 V [1)]
Max. grid voltage	270 V [1)]
Max. output current	12.1 A
Nominal frequency	50 - 60 Hz [1)]
Total harmonic distortion	< 4 %
Power factor cos phi	1 0.85 - 1 ind./cap.[2)]
Max. permitted grid impedance Z_{max} at PCC[3)]	none
Power-up current pulse[6)] and duration	36.0 A / 9.4 ms
Max. output fault current per period	43.0 A / 1.24 ms

General data

Maximum efficiency	96.1 %
Europ. efficiency	95.2 %
Overnight self-consumption	0.47 W
Cooling	Controlled forced-air ventilation
Degree of protection	IP 65
Dimensions h x w x d	645 x 431 x 204 mm
Weight	16.75 kg
Permissible ambient temperature	- 25 °C - +50 °C
Permitted humidity	0 - 100 %
EMC emission class	B
Overvoltage category DC / AC	2 / 3

Protection devices

DC insulation measurement	Warning/shutdown [7)] at R_{ISO} < 600 kOhm
Response to DC overload	Operating point shift power limitation
DC disconnector	Integrated

Fronius Galvo 3.0-1

Input data

MPP voltage range	165 - 440 V DC
Max. input voltage (at 1000 W/m²/ -10 °C in an open circuit)	550 V DC
Max. input current	19.8 A
Max. short circuit current of the solar modules	29.6 A
Max. feedback current[4)]	13.2 A

Output data

Nominal output power (P_{nom})	3000 W
Max. output power	3000 W
Nominal grid voltage	1 ~ NPE 230 V
Min. grid voltage	180 V [1)]
Max. grid voltage	270 V [1)]
Max. output current	14.5 A
Nominal frequency	50 - 60 Hz [1)]
Total harmonic distortion	< 4 %
Power factor cos phi	1 0.85 - 1 ind./cap.[2)]
Max. permitted grid impedance Z_{max} at PCC[3)]	none
Power-up current pulse[6)] and duration	36.0 A / 9.4 ms
Max. output fault current per period	43.0 A / 1.24 ms

General data

Maximum efficiency	96.1 %
Europ. efficiency	95.4 %
Overnight self-consumption	0.47 W
Cooling	Controlled forced-air ventilation
Degree of protection	IP 65
Dimensions h x w x d	645 x 431 x 204 mm
Weight	16.75 kg
Permissible ambient temperature	- 25 °C - +50 °C
Permitted humidity	0 - 100 %
EMC emission class	B
Overvoltage category DC / AC	2 / 3

Protection devices

DC insulation measurement	Warning/shutdown [7)] at R_{ISO} < 600 kOhm
Response to DC overload	Operating point shift power limitation
DC disconnector	Integrated

Fronius Galvo 3.1-1

Input data

MPP voltage range	165 - 440 V DC
Max. input voltage (at 1000 W/m²/ -10 °C in an open circuit)	550 V DC
Max. input current	20.7 A
Max. short circuit current of the solar modules	31.0 A
Max. feedback current[4)]	13.8 A

Output data

Nominal output power (P_{nom})	3100 W
Max. output power	3100 W
Nominal grid voltage	1 ~ NPE 230 V
Min. grid voltage	180 V [1)]
Max. grid voltage	270 V [1)]
Max. output current	15.0 A
Nominal frequency	50 - 60 Hz [1)]
Total harmonic distortion	< 4 %
Power factor cos phi	1 0.85 - 1 ind./cap.[2)]
Max. permitted grid impedance Z_{max} at PCC[3)]	none
Power-up current pulse[6)] and duration	36.0 A / 9.4 ms
Max. output fault current per period	43.0 A / 1.24 ms

General data

Maximum efficiency	96.1 %
Europ. efficiency	95.4 %
Overnight self-consumption	0.47 W
Cooling	Controlled forced-air ventilation
Degree of protection	IP 65
Dimensions h x w x d	645 x 431 x 204 mm
Weight	16.75 kg
Permissible ambient temperature	- 25 °C - +50 °C
Permitted humidity	0 - 100 %
EMC emission class	B
Overvoltage category DC / AC	2 / 3

Protection devices

DC insulation measurement	Warning/shutdown [7)] at R_{ISO} < 600 kOhm
Response to DC overload	Operating point shift power limitation
DC disconnector	Integrated

Fronius Galvo Dummy

Nominal grid voltage	1 ~ NPE 230 V
Grid voltage tolerance	+10 / -5 % 1)
Nominal frequency	50 - 60 Hz 1)
Degree of protection	IP 65
Dimensions h x w x d	645 x 431 x 204 mm
Weight	16.75 kg

Explanation of footnotes

1) The values quoted are default values; the inverter is configured specifically to meet the needs of the country in question.
2) Depending on the country setup or device-specific settings (ind. = inductive; cap. = capacitive)
3) PCC = interface to the public grid
4) Maximum current from the inverter to the solar module when an error occurs in the inverter or when the insulation between the AC and DC side is defective
5) Guaranteed by the electrical configuration of the inverter
6) Current peak when switching on the inverter
7) Depending on the country setup

Applicable standards and guidelines

CE mark
The devices comply with all the requisite and relevant standards and guidelines that form part of the relevant EU Directive, and are therefore permitted to display the CE mark.

Circuit to prevent stand-alone operation
The inverter has an approved circuit to prevent stand-alone operation.

Grid failure
The standard measurement and safety procedures integrated into the inverter ensure that in the event of a grid failure, the feed-in of energy is immediately interrupted (e.g. switch-off by the energy supplier or damage to lines).

Warranty terms and conditions, and disposal

Fronius manufacturer's warranty

Detailed, country-specific warranty terms are available on the internet: www.fronius.com/solar/warranty

To obtain the full warranty period for your newly installed Fronius inverter or storage system, please register at: www.solarweb.com.

Disposal

If you decide in the future to replace your inverter, Fronius will take back the old device and arrange for it to be recycled in an appropriate manner.