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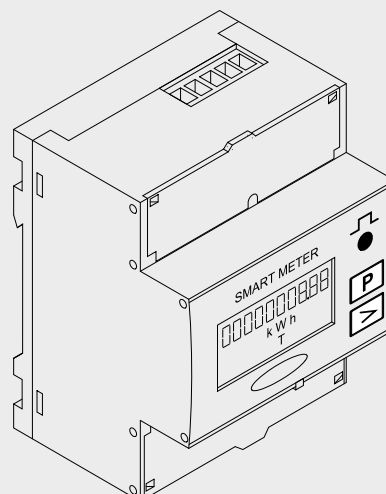
[www.youtube.com/FroniusSolar](http://www.youtube.com/FroniusSolar)

## Fronius Smart Meter 50kA-3

EN

Operating instructions

PV system monitoring



42,0426,0280,EN 006-19082020



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# Safety rules

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## General

The device has been manufactured in line with the state of the art and according to recognized safety standards. If used incorrectly or misused, however, it can cause:

- Injury or death to the operator or a third party
  - Damage to the device and other material assets belonging to the operating company.
- 

All personnel involved in commissioning, maintenance, and servicing of the device must:

- Be suitably qualified
  - Have knowledge of and experience in dealing with electrical installations and
  - Have fully read and precisely followed these Operating Instructions
- 

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.

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All safety and danger notices on the device:

- Must be kept 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 danger of:

- Injury or death to the operator or a third party
  - Damage to the device and other material assets belonging to the operating company
- 

Any safety devices that are not fully functional must be repaired by an authorised specialist before the device is switched on.

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Never bypass or disable protection devices.

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For the location of the safety and danger notices on the device, refer to the section headed "General remarks" in the Operating Instructions for the device.

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

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**This is for your personal safety!**

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## 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 accepts no liability for any damage resulting from improper use.

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## Qualified personnel

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

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

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

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

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

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

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**Copyright**

Copyright of these operating instructions remains with the manufacturer.

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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.

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**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.

# General

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## Explanation of safety notices

### **DANGER!**

Indicates **immediate danger**.

- ▶ If not avoided, death or serious injury will result.
- 

### **WARNING!**

Indicates a **potentially hazardous situation**.

- ▶ If not avoided, death or serious injury may result.
- 

### **CAUTION!**

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

- ▶ If not avoided, minor injury and/or damage to property may result.
- 

### **NOTE!**

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

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## Description of the device

The Fronius Smart Meter is a bidirectional electricity meter for optimising your own consumption and recording the load curve of the household. Together with the Fronius Datamanager, the Fronius Smart Meter provides a clear overview of your own electricity consumption.

The meter measures the power flow to the loads or the grid and forwards the information to the Fronius Datamanager via ModBus RTU/RS485 interface.

### **CAUTION!**

**Observe and follow the safety instructions!**

Non-observance of the safety instructions will result in damage to persons and equipment.

- ▶ Switch off the power supply before making a grid connection.
  - ▶ Observe the safety instructions.
- 

## Symbols on the device

Technical data, markings and safety symbols are located on the Fronius Smart Meter. These must not be removed nor painted over. The notices and symbols warn of incorrect operation that could result in serious injury and damage to property.

### **Symbols on the rating plate:**



#### **CE mark**

The devices conform to 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.



**Regulatory Compliance Mark (RCM)**

Complies with all applicable regulatory requirements in Australia and New Zealand regarding safety and electromagnetic compatibility, as well as specific requirements for radio equipment.



**WEEE mark**

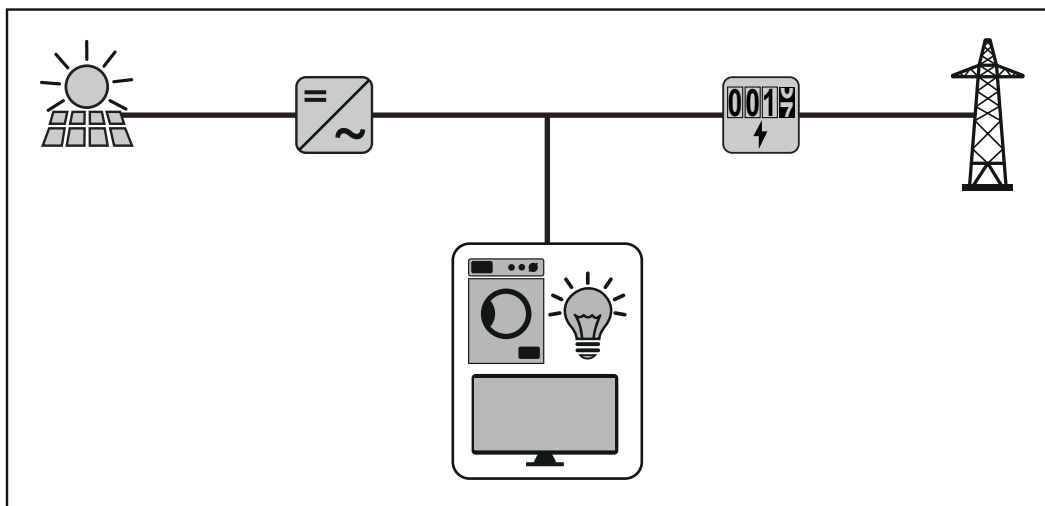
In accordance with European Directive 2012/19/EU on waste electrical and electronic equipment and its implementation in national law, used electrical devices must be collected separately and recycled in an environmentally responsible manner. Ensure that you return your used device to your dealer or obtain information regarding a local, authorised collection and disposal system. Failure to comply with this EU Directive may result in a negative impact on the environment and your health!

**Positioning**

The Fronius Smart Meter can be installed at two possible locations in the system: at the feed-in point and at the consumption point.

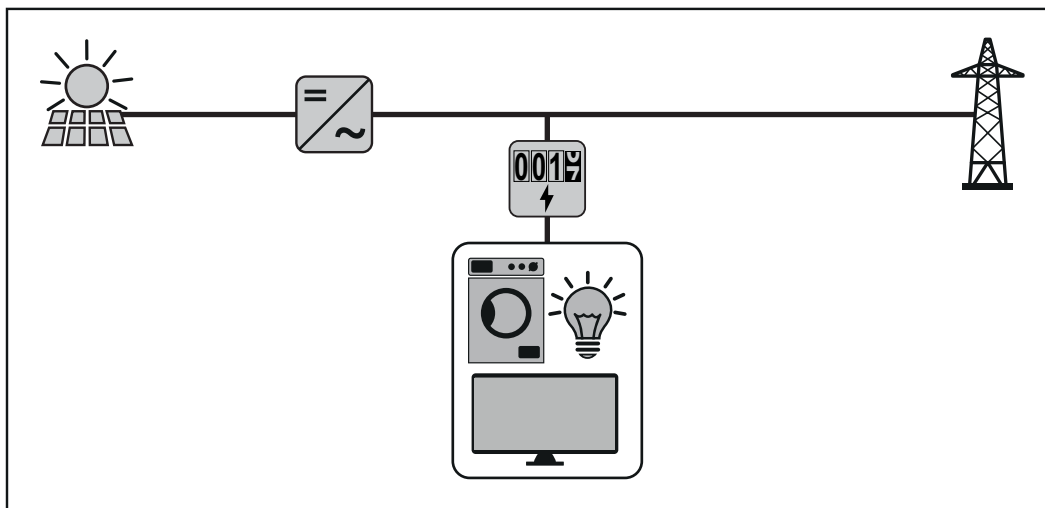
**Placement at the feed-in point**

Fronius Smart Meter located at the feed-in point.



**Placement at the consumption point**

Fronius Smart Meter located at the consumption load.



# Installation

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## Checklist for installation

For information about installation, please refer to the following sections:

- 1 Switch off the power supply before establishing a mains connection
- 2 Mount the Fronius Smart Meter (see [Installation](#) on page 8)
- 3 Connect automatic circuit breakers or automatic circuit breakers and disconnectors (see [Protective circuit](#) on page 8)
- 4 Connect the mains cable to the Fronius Smart Meter (see [Cabling](#) on page 9)
- 5 Mount the current transformers on the conductors. Make sure that the current transformers are pointing in the correct direction. An arrow either points to the load or the source (public grid) (see [Connecting the current transformers](#) on page 12)
- 6 Connect the current transformer and Fronius Smart Meter (see [Connecting the current transformers](#) on page 12)
- 7 Make sure that the current transformer phases match the mains voltage phases (see [Connecting the current transformers](#) on page 12)
- 8 Note down the nominal current of the current transformer for each meter. These values will be required during setup.
- 9 Connect the output terminals of the Fronius Smart Meter to the Fronius system monitoring (see [Connecting the data communication cable to the inverter](#) on page 12)
- 10 If necessary, set terminating resistors (see [Terminating resistors](#) on page 13)
- 11 Tug on each wire and plug to make sure that they are securely connected to the terminal blocks.
- 12 Switch on the power supply to the Fronius Smart Meter
- 13 Check the firmware version of the Fronius system monitoring. To ensure compatibility between the inverter and the Fronius Smart Meter, the software must always be kept up to date. The update can be started via the inverter web page or using Solar.web.
- 14 Set the transformation ratio of the current and voltage transformers (see [Setting the transformation ratio of the current and voltage transformers on the Smart Meter](#) on page 14)
- 15 If several Fronius Smart Meters are installed in the system, set the address (see "Setting the address" under [Setting the address of the Fronius Smart Meter](#) on page 17)
- 16 Set meter location via the Fronius system monitoring web interface under "Settings - Meter - Settings" (see [Configuring the web interface](#) on page 18)

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## Installation

The Fronius Smart Meter can be mounted on a 35 mm DIN rail. The housing comprises 4 DUs (division units, max. 72 mm).

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## Protective circuit

The Fronius Smart Meter is a hard-wired device and requires a disconnecting device (circuit breaker, switch or disconnector) and overcurrent protection (automatic circuit breaker).

The Fronius Smart Meter consumes 10 - 30 mA. The nominal capacity of the disconnecting devices and the overcurrent protection is determined by the wire thickness, the mains voltage and the required breaking capacity.



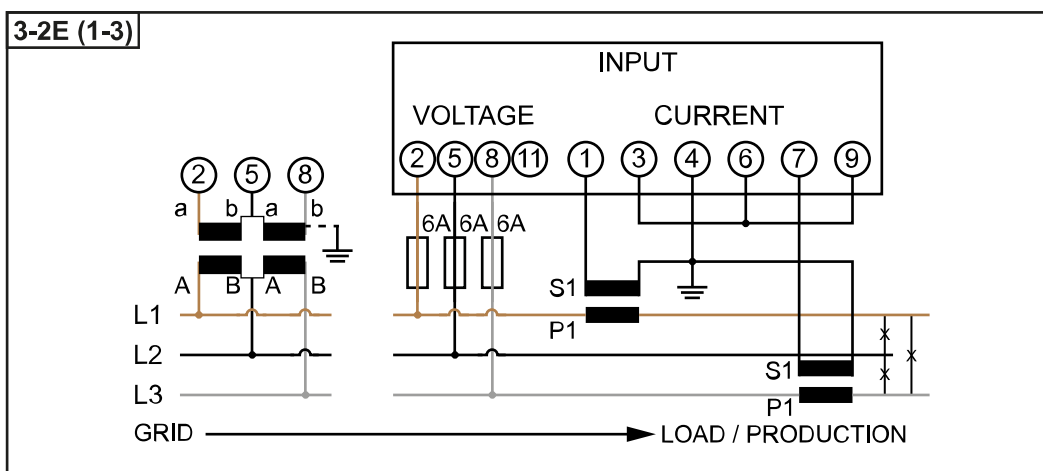
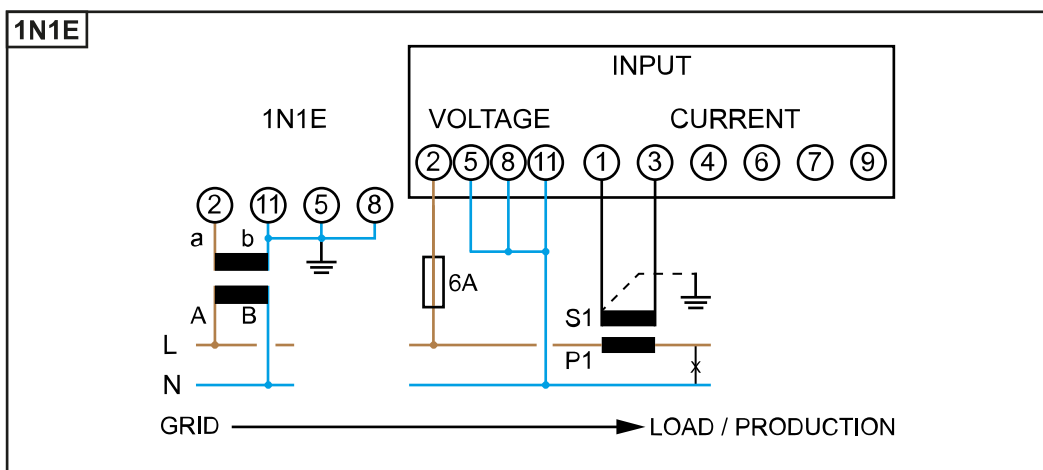
- Disconnecting devices must be mounted within sight and as close as possible to the Fronius Smart Meter; they must also be easy to use.
- The disconnecting devices must satisfy the requirements of IEC 60947-1 and IEC 60947-3, as well as all national and local regulations for electrical systems.
- Use overcurrent protection rated for max. 63 A.
- To monitor more than one mains voltage, use connected automatic circuit breakers.
- The overcurrent protection must protect the mains terminals marked L1, L2 and L3. In rare cases, the neutral conductor has an overcurrent protection which must simultaneously interrupt neutral and unearthed lines.

## Cabling

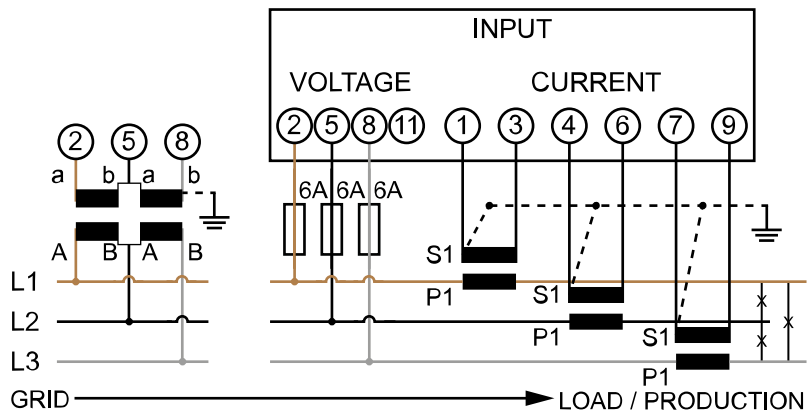
- Always switch off the power supply before connecting the mains voltage inputs to the Fronius Smart Meter.
- Connection cross-section:
  - Wire (rigid): min. 0.05 mm<sup>2</sup> / max. 4 mm<sup>2</sup>
  - Wire (flexible): min. 0.05 mm<sup>2</sup> / max. 2.5 mm<sup>2</sup>
  - Recommended torque: 0.5 Nm / max. 0.8 Nm
- Do not lay more than one cable per screw terminal. Use terminal blocks if necessary.

The measuring inputs of the current transformers must be earthed on one side as shown in the circuit diagram.

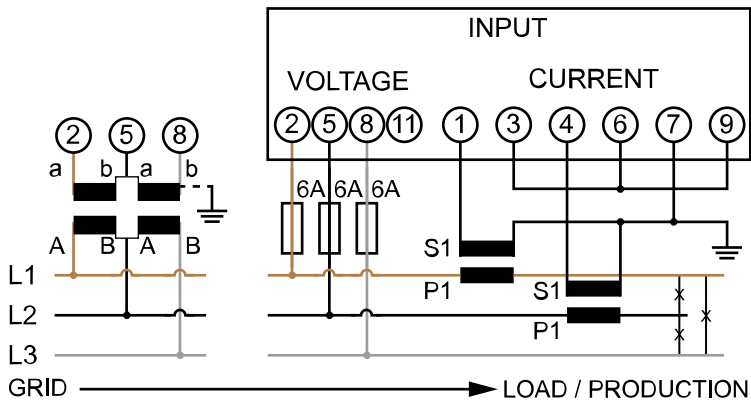
Connect each voltage line to the terminal strip as shown in the graphics below.



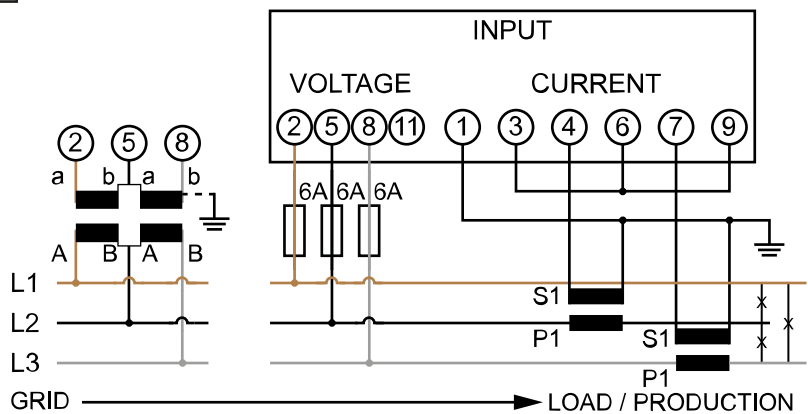
3-3E

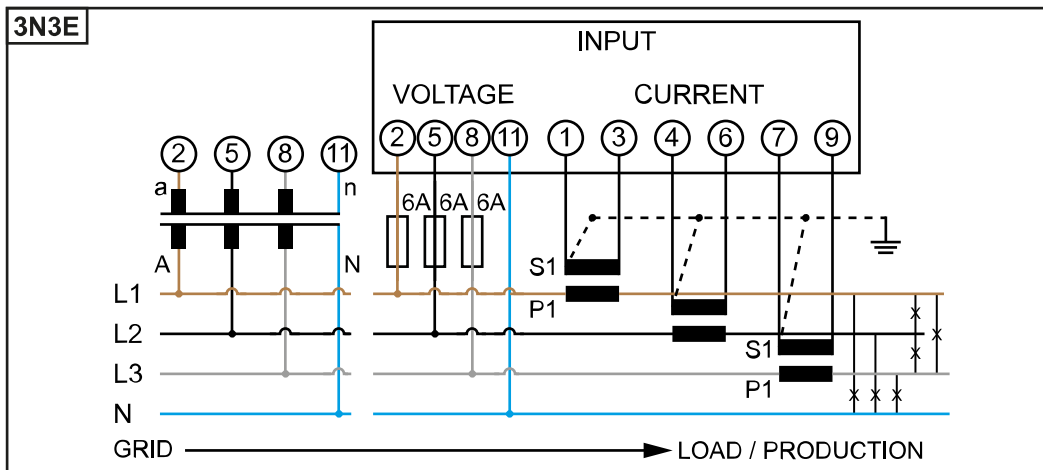


3-2E (1-2)



3-2E (2-3)





**Selection criteria for current transformer**

**General**

Do not use current transformers with a voltage output. Current transformers are directional. If they are mounted backwards or with reversed wires, the measured power will be negative.

**Primary current**

Maximum current per phase. A current transformer is to be selected whose primary current is higher than the maximum expected current per phase. The closer the expected current is to this value, the more accurate the measurement.

**Secondary current**

The current transformer must supply 1 or 5 amps alternating current at nominal current. The nominal data of the current transformer is stated in the current transformer data sheet.

**Power**

The Fronius Smart Meter requires 0.3 VA to perform the measurement. In addition, there are losses on the outgoing and return leads. The power of the current transformer must be greater than the sum of the power of the Fronius Smart Meter and the leads. The higher the power, the better.

Line resistances at different cross-sections (copper wires)						
Secondary current [A]	Cross-section [mm <sup>2</sup> ]	Line resistances at different lead lengths (outgoing and return lead)				
		0.5 m	1.0 m	2.5 m	5 m	10 m
5	1.5	0.3 VA	0.6 VA	1.5 VA	2.9 VA	5.8 VA
5	2.5	0.2 VA	0.4 VA	0.9 VA	1.8 VA	3.6 VA
5	4	-	-	0.6 VA	1.1 VA	2.2 VA

**Example**

The length of the outgoing and return lead (0.5 m each) between the Fronius Smart Meter and current transformer is 1 m in total and has a copper cable cross-section of 1.5 mm<sup>2</sup>, so the line resistance is 0.6 VA according to the table above. The Fronius Smart Meter's internal consumption is 0.3 VA.

Line resistance 0.6 VA + internal consumption 0.3 VA = 0.9 VA

→ A current transformer with an output of 1 VA, 1.5 VA, 5 VA or higher is suitable here.

**Use accuracy class**

1 or better (Cl. 0.5, Cl. 0.2, etc.). Class 1 corresponds to a deviation of ± 1% of the secondary current at maximum power.

## Mounting

Rigid or hinged.

Rigid is usually less expensive and often has better performance and accuracy values. Hinged current transformers can be opened for mounting on the conductor. To prevent unintentional opening, a plastic cable tie can be attached to the current transformer.

Hinged current transformers can be installed in a system without interrupting the voltage.

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## Connecting the current transformers

- Make sure that the current transformers match the voltage phases. Make sure that current transformer L1 measures the current on the same phase that is monitored by voltage input L1. The same applies for phases L2 and L3.
- Make sure that the current transformers are pointing in the correct direction. Observe the data sheet for the current transformer.

Attach the current transformers to the conductor to be measured and connect the current transformer cables to the Fronius Smart Meter. Always switch off the power supply before disconnecting live conductors.

The current transformers are connected to connections 1 and 3; 4 and 6; 7 and 9. If necessary, excessively long cables can be shortened accordingly. Observe the sequence in which the phases are connected. Accurate power measurement is only ensured if the mains voltage phases match the current phases.

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## Suitable voltage transformers

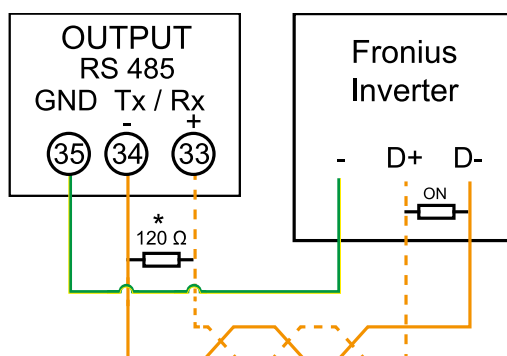
Suitable voltage transformers: Only voltage transformers with a voltage range of 210 to 440 V (phase-to-phase) may be used. The voltage transformers must be connected to terminals 2, 5, 8 and 11 at the point of direct voltage measurement.

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## Connecting the data communication cable to the inverter

Connect the data communication connections of the Fronius Smart Meter to the Fronius system monitoring in the inverter.

- Connect 35 (Fronius Smart Meter) to - (Fronius inverter)
- Connect 34 (Fronius Smart Meter) to D- (Fronius inverter)
- Connect 33 (Fronius Smart Meter TS) to D+ (Fronius inverter)
- Several Smart Meters can be installed in the system, see chapter [Multi-meter system](#) on page 16



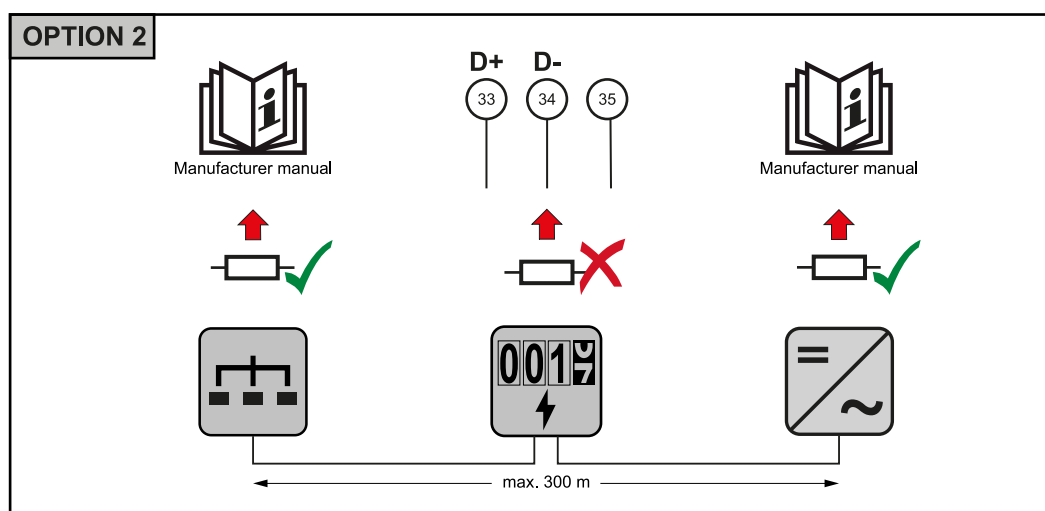
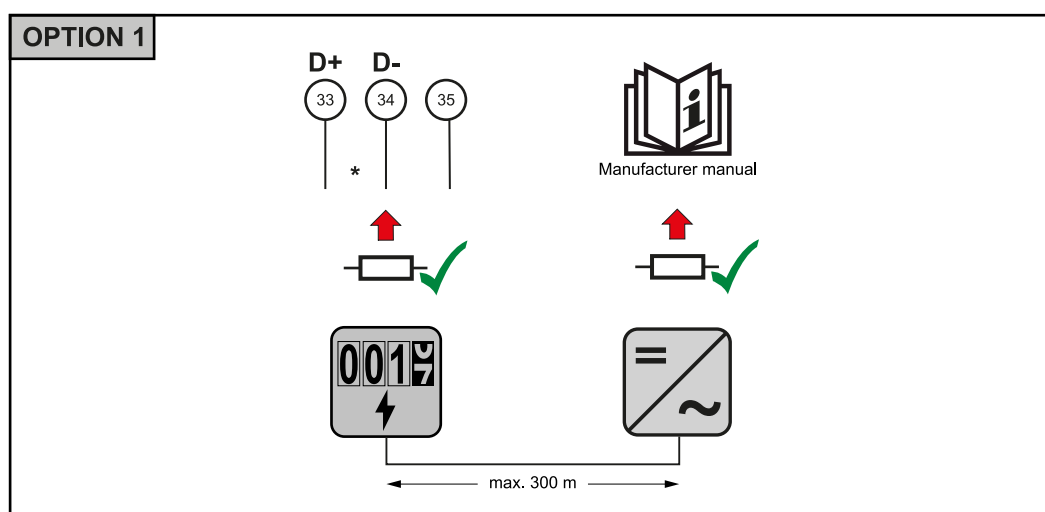
**ATTENTION! ?****More information on successful commissioning.**

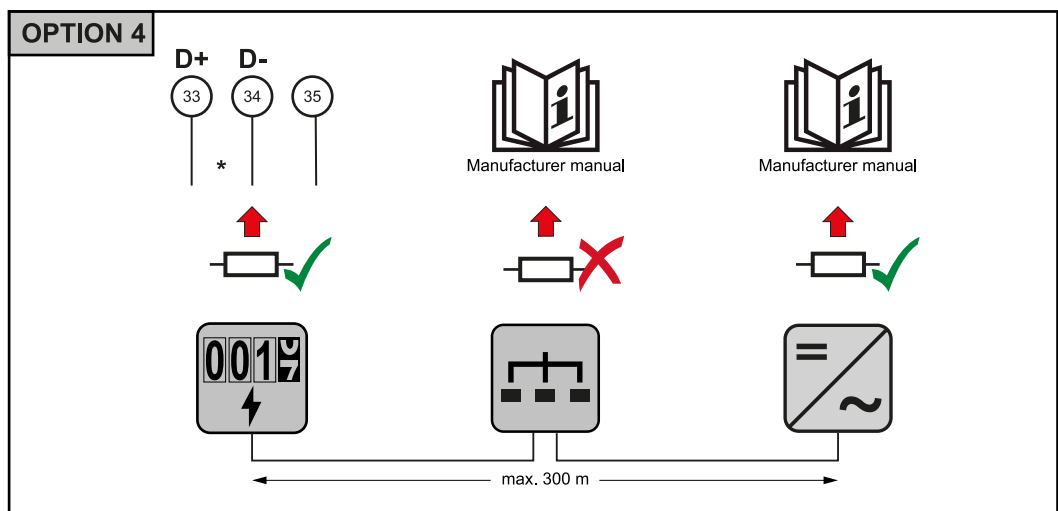
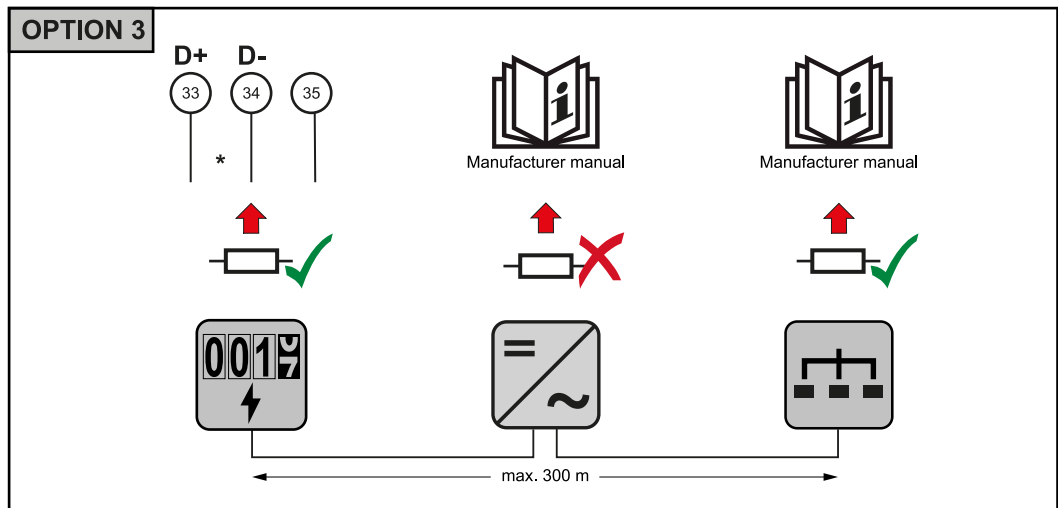
Note the following information about connecting the data communication cable to the inverter.

- ▶ Use cables of type CAT5 or higher.
- ▶ Use a mutual twisted cable pair for data lines that belong together (D+ and D-).
- ▶ If the output cables are close to the mains cabling, use wires or cables that are designed for 300 to 600 V (never less than the operating voltage).
- ▶ Use double-insulated or sheathed output cables when they are close to bare conductors.
- ▶ Use shielded twisted pair cables to avoid faults.
- ▶ The outputs of the Fronius Smart Meter are electrically isolated from hazardous voltages.

**Terminating resistors**

Due to interference, it is recommended that terminating resistors are used as illustrated below to ensure proper functioning.





\* The terminating resistor on Fronius Smart Meters is installed between **33** and **34**. The terminating resistor R 120 Ohm is included with the Fronius Smart Meter.

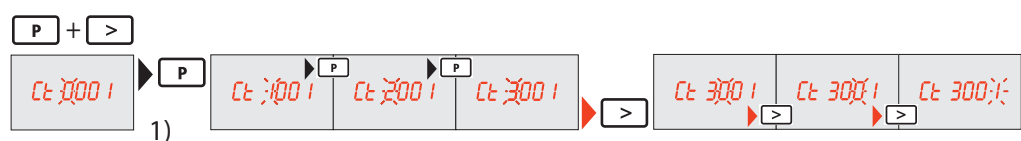
### Setting the transformation ratio of the current and voltage transformers on the Smart Meter

Only the transformation ratio of the current and voltage transformers must be set. All other parameters have already been set in advance.

Password (0001):



Transformation ratio of the current transformers<sup>1)</sup> (0001 - 9999<sup>2)</sup>):



Transformation ratio of the voltage transformers<sup>1), 3)</sup> (001.0 - 500.0<sup>2)</sup>):

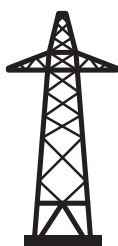


Change **(and remember!)** password:



- 1) **Important!** Changing the transformation ratios will reset the counters in the Fronius Smart Meter to 0.
- 2) Transformation ratio in the current transformer x Transformation ratio of the voltage transformers = max. 1,000,000
- 3) Changeover only when using voltage transformers (direct voltage measurement Vt = 1)

**Multi-meter system - Explanation of symbols**



**Grid**  
supplies the loads in the system if insufficient power is being generated by the solar modules or supplied by the battery.



**Inverter in the system**  
e. g. Fronius Primo, Fronius Symo, etc.



**Utility meter**  
Measures the measurement data relevant for billing amounts of energy (in particular kilowatt hours of energy sourced from the grid and energy fed into the grid). Based on the relevant billing data, the electricity retailer will invoice the energy sourced from the grid and the purchaser of the surplus energy will reimburse the energy fed into the grid.



**Primary meter**  
Records the system's load curve and provides measurement data for energy profiling in Fronius Solar.web. The primary meter also controls the dynamic feed-in control.



**Secondary meter**  
Records the load curve of individual loads (e.g. washing machine, lamps, TV, heat pump, etc.) in the consumption branch and provides measurement data for energy profiling in Fronius Solar.web.



**Producer meter**  
Records the load curve of individual producers (e.g. wind power plant) in the consumption branch and provides measurement data for energy profiling in Fronius Solar.web.



### Loads in the system

e. g. washing machine, lamps, TV, etc.



### Additional loads in the system

e. g. heat pump



### Additional producers in the system

e. g. wind power plant

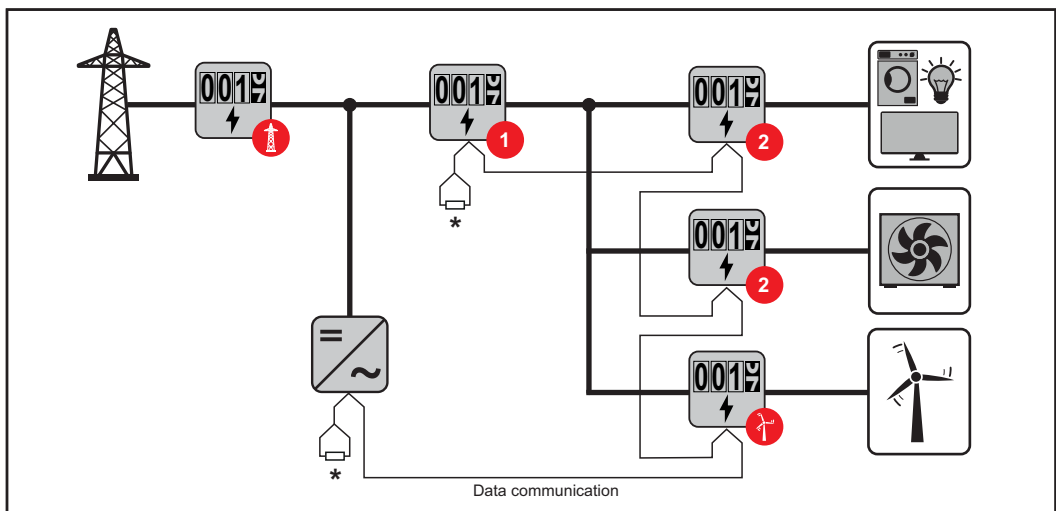


### Terminating resistor

R 120 Ohm

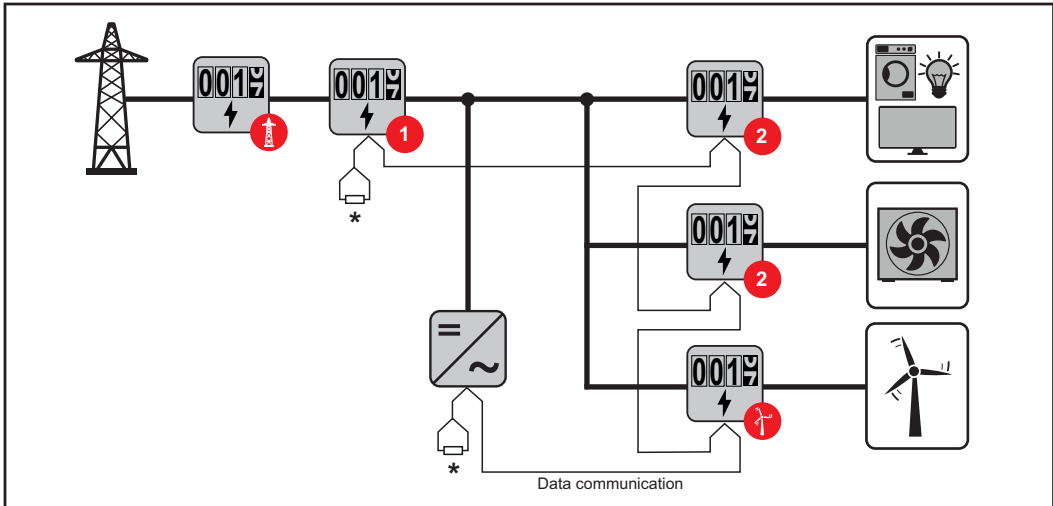
## Multi-meter system

If several Fronius Smart Meters are being installed, a separate address (see [Setting the address of the Fronius Smart Meter](#) page 17) must be set for each one. The primary meter always has address 1, all other meters are numbered in the address range from 2 to 14. Different types of Fronius Smart Meter can be used together.



Position of the primary meter in the consumption branch. \*Terminating resistor R 120 Ohm





Position of the primary meter at the feed-in point. \*Terminating resistor R 120 Ohm

**The following must be observed in a multi-meter system:**

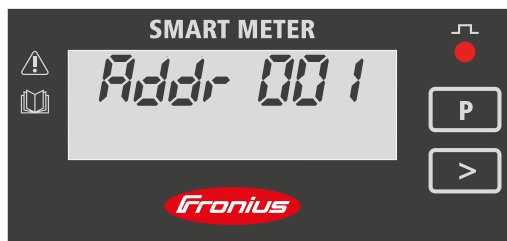
- Each Modbus address must only be assigned once.
- Terminating resistors must be positioned individually for each channel.
- The primary meter and the battery must be on different channels.
- The remaining Modbus nodes must be distributed equally.

**Setting the address of the Fronius Smart Meter**

Symbol	Name	Event	Function
	Prog	1 x	Increases the set value
	Page	1 x	Moves the cursor
	Enter	1 x	confirms the entry



- 1 Press "Prog" and "Page" at the same time to enter the code.
- 2 Enter password "2633". Increase the value with "Prog" and change to the next digit with "Page".



- 3 Press "Prog" and "Page" at the same time again to switch to the menu item "Addr" (address).
- 4 Set the relevant address.
  - Permissible values: 1 - 14

**How to configure the address of the Fronius Smart Meter in the Fronius Dataman-ager:**

- 1 Go to the Fronius Datamanager website.
    - Open the web browser.
    - In the address field, enter the IP address (IP address for WLAN: 192.168.250.181, IP address for LAN: 169.254.0.180) or the host and domain name of the Fronius Datamanager.
    - The Fronius Datamanager website will be displayed.
  - 2 Click on "Settings".
  - 3 Select the secondary meter from the drop-down list.  
  
Click "Add".
  - 4 Enter the name of the secondary meter under "Name".  
  
Enter the previously assigned address under "Modbus address".
  - 5 Add meter description.
  - 6 Repeat the process for additional meters, if necessary.
- 

## Configuring the web interface

### Connect to the Fronius Datamanager via access point

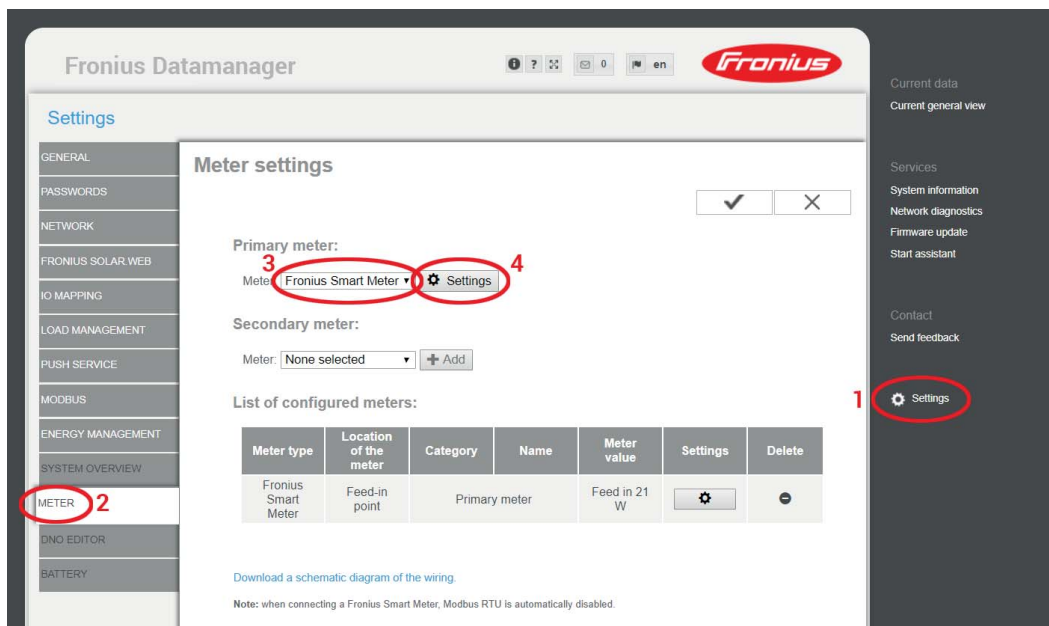
- 1 Activate the access point on the Datamanager.
- 2 Connect to the **Fronius\_240.XXXXXXX** network.
- 3 Go to the Fronius Datamanager website.
  - Open IP address <http://192.168.250.181>.

### Connect to the Fronius Datamanager via LAN

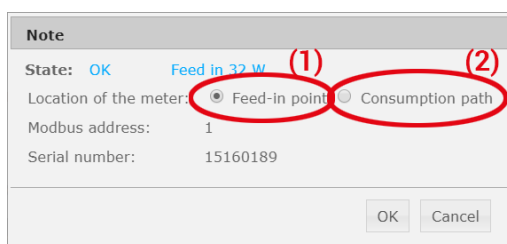
- 1 Connect the Datamanager and computer to a LAN cable.
- 2 Place the Datamanager IP switch in the 'A' position.
- 3 Go to the Fronius Datamanager website.
  - Open IP address <http://169.254.0.180>.

### Configure the address of the Fronius Smart Meter in the Fronius Datamanager

- 1 Go to the Fronius Datamanager website.
- 2 Click on "Settings" (1).
- 3 Set a service password under "Password".
- 4 Click on "Meter" (2) in the menu (username: service, password see step 3).
- 5 Select the meter from the drop-down list (3).
- 6 Click on "Settings" (4) under primary meter.



**7** Set the position of the meter – feed-in point (1) or consumption point (2) – in the pop-up window. For more information on the position of the Fronius Smart Meter, see [Positioning](#) on page 7.



**8** Click "OK" when the status *OK* is displayed. If the *Timeout* status is displayed, repeat the procedure.

**9** Click on the checkmark in the upper right corner to save the settings.

**10** The Fronius Smart Meter is fully configured and ready for use.

The "Current general view" menu item displays the power of the PV modules, self-consumption, the energy fed into the grid and the battery charge (if available).

# Operation

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**Menu structure** A graphic view of the menu structure can be found in the User Information that is supplied as standard.

# Technical data

**Technical data**

**Modbus transmission speed:** 9600 baud

**Parity bit:** None

**Software version:** Datamanager 3.7.2 / Energypackage 1.3.3

Input	
Three-phase nominal voltage Operating range	400 - 415 V 363 to 457 V
Single-phase nominal voltage Operating range	230 - 240 V 210 to 264 V
<b>Voltage transformer ratio (kVT)</b>	1...1500.0 e.g. VT 20000/400V kVT = 50 For direct connection: kVT = 1
Self-consumption - voltage path (max. voltage)	4.5 VA (1.85 W) for 440 V
Nominal frequency Tolerance	50 - 60 Hz 47 to 63 Hz
Nominal current, I <sub>b</sub>	1 A + 5 A
Maximum current, I <sub>max</sub>	6 A
Starting current	20 mA
<b>Current transformer ratio (kCT)</b>	1...9,999 e.g. TC 800/5A kCT = 160 For direct connection: kCT = 1
Short-time overload (EN/IEC 62053-21, EN/IEC 62053-23)	20 I <sub>max</sub> / 0.5 s
Self-consumption - current path (max. current)	0.3 W for phase
<b>Maximum value kVT x kCT</b>	5,000,000 (CT/1A) or 1,000,000 (CT/5A)
Current distortion factor	In acc. with EN/IEC 62053-21
Power factor Operating range (EN/IEC 62053-21, EN/IEC 62053-23)	Active cosφ 0.5 ind to 0.8 cap, Reactive sinφ 0.5 ind to 0.5 cap

Energy	
Max. display	As per table
Resolution	As per table
LED indicator	1 pulse / 0.1 Wh
Active energy accuracy (EN/IEC 62053-21)	Class 1
Reactive energy accuracy (EN/IEC 62053-23)	Class 2
Response time after switch-on (EN/IEC 62053-21, EN/IEC 62053-23)	< 5 s

<b>kCT x kVT</b>	<b>Maximum display</b>		<b>Resolution</b>
1 to 9.9	9 9 9 9 9 9 . 9 9	kWh / kvarh	10 Wh / varh
10 to 99.9	9 9 9 9 9 9 9 . 9	kWh / kvarh	100 Wh / varh
100 to 999.9	9 9 9 9 9 9 9 9	kWh / kvarh	1 kWh / varh
1000 to 9999.9	9 9 9 9 9 9 . 9 9	MWh / kvarh	10 kWh / varh
≥ 10000	9 9 9 9 9 9 9 . 9	MWh / kvarh	100 kWh / varh

<b>Average power</b>	
Measured variable	Effective power
Calculation	Average value over set period of time
<b>Integration time</b>	5 / 8 / 10 / 15 / 20 / 30 / 60 minutes

<b>Operating hours counter</b>	
Operating hours counter	Hours and minutes
Resolution	7-digit (5 hours + 2 minutes)
Max. display	99,999 h 59 min
<b>Counting start</b>	3-phase effective power
<b>Programmable values</b>	0.10 to 50% Pn
3-phase effective power	In acc. with 400 V 5 A - 3464 W
<b>Operating hours counter reset</b>	Accessible via keypad or locked

<b>Output</b>	
<b>Energy pulse</b>	
Pulse output compatible with S0 EN/IEC 62053-31	
Optical relay with NO contact SPST-NO, floating	
Contact load	110 V DC/AC - 50 mA
<b>Assignable energy</b>	Active or reactive energy
<b>Pulse value</b>	10 Wh (Varh) - 100 Wh (Varh) - 1 kWh (kVarh) - 10 kWh (kVarh) - 100 kWh (kVarh) - 1000 kWh (kVarh)
<b>Pulse duration</b>	50 - 100 - 150 - 200 - 300 - 400 - 500 ms
<b>RS485 communication</b>	
Electrically isolated from input and auxiliary voltage	
Standard	RS485 - 3 conductors
Transmission	Serial, asynchronous
Protocol	Modbus RTU
<b>Addresses</b>	1 to 255
Number of bits	8
Stop bit	1
<b>Parity bit</b>	None - even - odd
<b>Baud rate</b>	4800 - 9600 - 19200 bit/s
Response time	≤ 200 ms

<b>Insulation (EN/IEC 62052-11, 62053-21)</b>	
Installation category	III
Pollution level	2
Insulation voltage	300 V phase-neutral
Impulse withstand voltage Test circuit	5 kV 1.2/60 $\mu$ s Voltage input, current input, pulse output, communication
Test voltage Test circuit	2.75 kV r.m.s. 50 Hz / 1 min Voltage input, current input, pulse output, communication
Test voltage Test circuit	4 kV r.m.s. 50 Hz / 1 min All circuits and earth

<b>Electromagnetic compatibility</b>	
Test in acc. with EN/IEC 62052-11	

<b>Operating conditions</b>	
Reference temperature	23 °C ( $\pm$ 2 °C)
Operating range	-5 to 55 °C
Temperature limit for storage and transport	-25 to 70 °C
Tropical model	
Max. power loss (for thermal dimensioning of the switch cabinet)	$\leq$ 2.8 W

<b>Housing</b>	
Housing	4 modules according to DIN 43880
Sealable front and terminal cover	
Connection	Screw connection
Mounting	Can be snapped onto 35 mm DIN rail
Housing material	Polycarbonate, self-extinguishing
Degree of protection (EN 60529)	IP54 front, IP20 connections
Weight	260 grams

<b>Screw terminals</b>	
<b>Measuring input</b>	
Wire (rigid)	Min. 0.05 mm <sup>2</sup> / max. 4 mm <sup>2</sup>
Wire (flexible)	Min. 0.05 mm <sup>2</sup> / max. 2.5 mm <sup>2</sup>
Recommended torque	0.5 Nm / max. 0.8 Nm
<b>Output</b>	
Wire (rigid)	Min. 0.05 mm <sup>2</sup> / max. 4 mm <sup>2</sup>
Wire (flexible)	Min. 0.05 mm <sup>2</sup> / max. 2.5 mm <sup>2</sup>
Recommended torque	0.5 Nm / max. 0.8 Nm

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**Fronius manufacturer's warranty**

Detailed, country-specific warranty terms are available on the internet:  
[www.fronius.com/solar/warranty](http://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](http://www.solarweb.com).









**FRONIUS INTERNATIONAL GMBH**

Froniusstraße 1  
A-4643 Pettenbach  
AUSTRIA  
contact@fronius.com  
**www.fronius.com**

Under **www.fronius.com/contact** you will find the addresses  
of all Fronius Sales & Service Partners and locations.



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