

Solar Frontier Europe GmbH

## **Installation and Operating Manual**

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PowerSets with single-phase inverter

2.0-170-1p / 2.4-170-1p / 3.0-165-1p / 3.1-170-1p / 3.6-170-1p /  
4.1-170-1p / 4.8-170-1p / 5.1-170-1p / 5.9-165-1p / 6.1-170-1p /  
7.1-170-1p / 8.2-170-1p

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PowerSets with three-phase inverter

3.1-170-3p / 4.1-170-3p / 5.1-170-3p / 6.0-170-3p

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# 1. Preface

Thank you for choosing a PowerSet with CIS photovoltaic modules from Solar Frontier. Solar Frontier (SF) offers the highest standards in creating electrical power from solar energy, and in customer service.

This manual contains important information with regards to the installation, operation, maintenance, cabling and use of the PowerSet, and the safety instructions involved. To ensure a proper and safe use of the PowerSet, all tips and warnings in this document, as well as the advice of the manufacturers of the system components should be carefully read, understood and applied. Please make sure that the installer and operator of the plant obtain a copy of this manual. Please save this document for future use. All applicable local and national laws and norms should be obeyed during installation, cabling, operation and maintenance of the PowerSet. In case of further questions please get in touch with your dealer or with Solar Frontier directly.

# 2. Identification

## Type plate of the Solar Frontier inverter

### SF-WR for PowerSets

2.0-170-1p / 2.4-170-1p / 3.0-165-1p / 3.1-170-1p /  
3.6-170-1p / 4.1-170-1p / 4.8-170-1p / 5.1-170-1p /  
5.9-165-1p / 6.1-170-1p / 7.1-170-1p / 8.2-170-1p

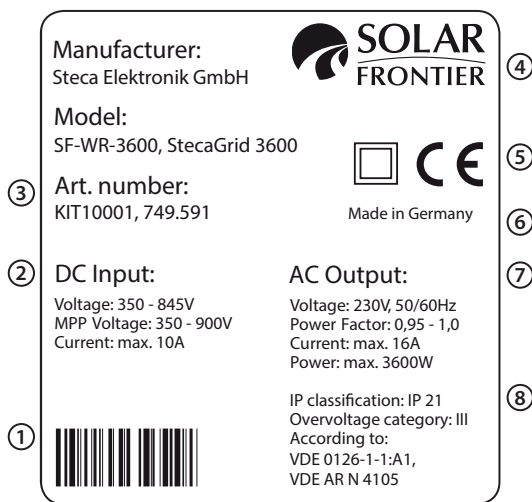


Figure 1

- ① Barcode for internal purposes
- ② Technical Data DC-input
- ③ Article number and product designation
- ④ Manufacturer
- ⑤ **Protection Class II** and CE symbols
- ⑥ Country of manufacture
- ⑦ Technical Data AC-output
- ⑧ Protection classification and grid-monitoring standard
- ⑨ Serial number (and barcoded serial number)

## Type plate of the Solar Frontier inverter

### SF-WR for PowerSets

3.1-170-3p / 4.1-170-3p / 5.1-170-3p / 6.0-170-3p

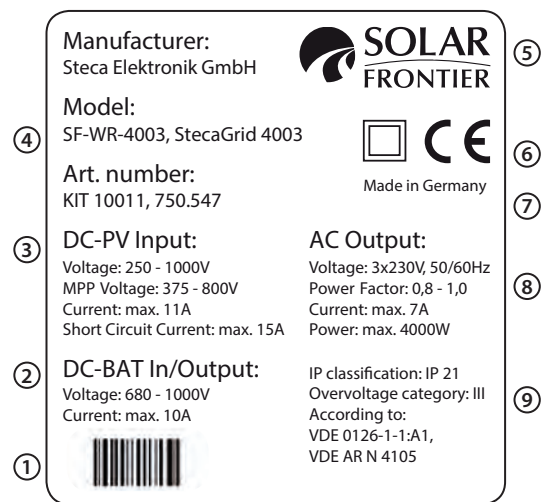


Figure 2

- ① Barcode for internal purposes
- ② Technical Data DC-Bat-input
- ③ Technical Data DC-PV-input
- ④ Article number and product designation
- ⑤ Manufacturer
- ⑥ **Protection Class II** and CE symbols
- ⑦ Country of manufacture
- ⑧ Technical Data AC-output
- ⑨ Protection classification and grid-monitoring standard

## Type plate of the SF PowerModules

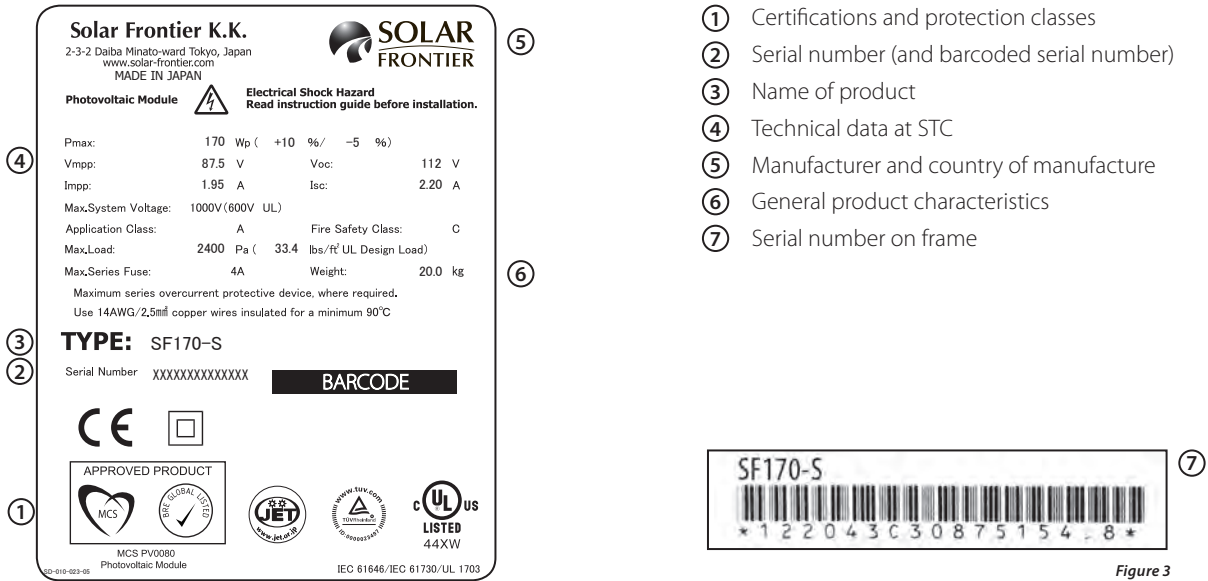


Figure 3

## 3. General Safety Advice

Please ensure all necessary measures are taken to prevent accidents. The use of PowerSets in applications that may endanger human lives is prohibited, including in air and road transport systems. PowerSets must not be used for anything other than their expressed purpose.

Solar Frontier strongly advises you to follow the instructions below in order to avoid bodily injury, damage to property and/or death.

**PowerSets sold by Solar Frontier GmbH may only be installed by authorized professionals (see 6.2). As soon as it becomes evident that safe operation is no longer possible (e.g. visible damage), remove the PowerSet immediately from the grid.**

### 3.1 Safety advice for photovoltaic modules of type Solar Frontier SF170-S

- Installation, wiring, and maintenance of SF modules must only be carried out by licensed and trained persons.
- Ensure that all instructions and information related to SF modules and other balance of system components are fully understood prior to handling and installing a PV solar system.
- The front surface of SF modules should be covered with an opaque material during installation to decrease the potential of electrical shock.
- SF modules only generate direct current (DC) electricity.
- SF modules do not have the ability to store electricity.
- SF modules will experience higher voltage when connected in series and higher electrical current when connected in parallel.
- Only interconnect SF modules with similar electrical characteristics in series or in parallel to prevent system imbalance conditions and module damage.
- The PV array open-circuit voltage must never exceed the maximum system voltage (including in low temperature conditions).
- Leakage currents could create a shock hazard or fire.
- Do not disconnect operational modules or electrical arcing may occur. This may result in serious bodily harm or death.
- Do not use SF modules for purposes other than terrestrial power generation to prevent electrical shock, fire or other accidents.
- Do not artificially concentrate sunlight on modules using lenses or mirrors.

- Do not use light sources other than natural sunlight and general illumination for power generation.
- Do not use SF modules in water or liquid. There is a serious risk of electric shock, an electric leak or an accident.
- The level of leakage current must be limited in accordance with local regulations for safety reasons.
- Carefully check the polarity of the wiring before installing. Incorrect wiring may damage SF modules or appliances.
- Only use equipment, connectors, wiring and support frames suitable for solar electric systems.
- Wear appropriate protection and take all necessary precautions to prevent electric shock, especially when DC voltage exceeds 30V.

### 3.2 Safety advice for the inverter SF-WR

- Install and use the device only after reading and understanding this document.
- Always perform the measures described in this document in the sequence specified.
- Keep this document in a safe place for the entire service life of the device. Pass the document on to subsequent owners and operators of the device.
- Improper operation can reduce the yields of the photovoltaic system.
- The device must not be connected to the DC or AC cables if it has a damaged casing.
- If one of the following components is damaged, immediately take the device out of operation and disconnect it from the mains grid and solar modules.
  - Device (not functioning, visible damage, smoke, etc.)
  - Cables
  - Solar modules
- The system must not be switched on again until:
  - The device has been repaired by a dealer or the manufacturer.
  - Damaged cables or solar modules have been repaired by a technical specialist.
- Never cover the cooling fins.
- Do not open the casing. This will void the warranty and could result in serious bodily harm or death.
- Factory labels and markings must never be altered, removed or rendered unreadable.
- Observe the respective manufacturer's manual when connecting an external device that is not described in this document (e.g. external data logger). Incorrectly connected devices can damage the inverter.
- In addition, all necessary security measures have to be taken in order to avoid electrical shocks.

#### Safety advice on the inverter

For PowerSets 2.0-170-1p / 2.4-170-1p / 3.0-165-1p / 3.1-170-1p / 3.6-170-1p / 4.1-170-1p / 4.8-170-1p / 5.1-170-1p / 5.9-165-1p / 6.1-170-1p / 7.1-170-1p / 8.2-170-1p



- ① Dangerous voltages can remain present on the components up to 10 minutes after switching off the DC circuitbreaker **and** the line circuit breaker.
- ② Warning. There are 2 voltage sources present: powergrid, solar modules.
- ③ Disconnect both voltage sources from the device before working on the device:  
The solar modules via the DC circuit breaker **and** the power grid via the line circuit breaker.
- ④ Read and follow the instructions!

Figure 4

Für PowerSets 3.1-170-3p / 4.1-170-3p / 5.1-170-3p / 6.0-170-3p



- ① Serial number (and barcoded serial number)
- ② Read manual!
- ③ Caution of hot surface of the cover!

Figure 5

## 4. Proper Usage

The PowerSet may only be used in grid-connected photovoltaic systems. The modules, inverter, cables, and connectors have been mutually calibrated for best performance. The connections may not be grounded.

### Potential curves of the photovoltaic voltage $U_{pv}$ at 350 V (left) and 550 V (right)

$U_{pv}$  = Potential between plus and minus poles at the DC input

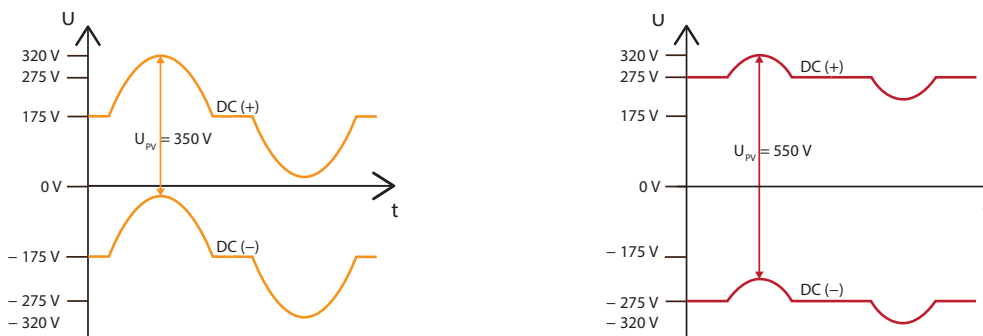


Figure 6

## 5. Scope of Delivery

The Solar Frontier PowerSet comprises the following components. The number of components required can be determined using the list below based on the type of PowerSet you have:



- ① Photovoltaic module Solar Frontier SF170-S
- ② Solar Frontier inverter SF-WR incl. Inverter, Mounting plate, AC plug, 1 pair of SunClix contact (PowerSets 3.1-170-3p, 4.1-170-3p, 5.1-170-3p und 6.0-170-3p: 2 pairs)
- ③ Connecting cable (Versions for + and -, with either 2, 3 or 4 outputs)
- ④ DC cable (in 50m or 100m)
- ⑤ DC plugs und DC sockets (5 of each in each package unit)
- ⑥ Unlocking tool
- ⑦ Installation Manual



PowerSet	PowerSets with single-phase inverter												PowerSets with three-phase inverter			
	2.0-170-1p	2.4-170-1p	3.0-165-1p	3.1-170-1p	3.6-170-1p	4.1-170-1p	4.8-170-1p	5.1-170-1p	5.9-165-1p	6.1-170-1p	7.1-170-1p	8.2-170-1p	3.1-170-3p	4.1-170-3p	5.1-170-3p	6.0-170-3p
① SF170-S	12	14	18	18	21	24	28	30	36	36	42	48	18	24	30	35
② SF-WR-3000	1	1		1	1	-	-	2	2	2	2	-	-	-	-	-
② SF-WR-3600	-	-		-	-	1	-	-	-	-	-	2	-	-	-	-
② SF-WR-4200	-	-		-	-	-	1	-	-	-	-	-	-	-	-	-
② SF-WR-3203	-	-		-	-	-	-	-	-	-	-	-	1	-	-	-
② SF-WR-4003	-	-		-	-	-	-	-	-	-	-	-	-	1	-	-
② SF-WR-4803	-	-		-	-	-	-	-	-	-	-	-	-	-	1	-
② SF-WR-5503	-	-		-	-	-	-	-	-	-	-	-	-	-	-	1
③ Connecting cable	2	2	2	2	2	2	2	4	4	4	4	4	2	2	2	2
④ DC cable [m]	50	50	50	50	50	50	50	100	100	100	100	100	50	50	50	50
⑤ Plugs & sockets	5+5	5+5	5+5	5+5	5+5	5+5	5+5	10+10	10+10	10+10	10+10	10+10	5+5	5+5	5+5	5+5
⑥ Unlocking tool	1	1	1	1	1	1	1	2	2	2	2	2	1	1	1	1
Regions	■ ■	■ ■	■	■	■ ■	■ ■	■ ■	■ ■	■ ■	■	■	■	■	■	■	■
	■ Suitable for installations in region North ■ Suitable for installations in region South Region North comprises all countries located in the North of the Alps whilst region South comprises all countries in the South thereof.															

Not scope of the delivery are:

- Installation scaffolding and installation materials
- Tools for installation and confectioning of the cables

## 6. About this Manual

### 6.1 Contents

These instructions contain all information required by a technical professional for setting up and operating the inverters. Follow the instructions of the respective manufacturers when installing other components (e.g. AC cable, substructures).

### 6.2 Target audience





Unless otherwise indicated, the target audiences of this manual are technical professionals and system operators.

Technical professionals are, for example:

- Persons who have the knowledge of terminology and the skills necessary for setting up and operating photovoltaic systems.
- Persons who have the necessary training, knowledge and experience, and knowledge of the applicable regulations in order to evaluate and recognise the dangers inherent in the following work:
  - Installation of electrical equipment
  - Production and connection of data communication cables
  - Production and connection of mains grid power supply cables

### 6.3 Markings

#### 6.3.1 Symbols

Symbol	Description	Location
	general danger warning	manual
	danger from electricity	manual device
	Read manual before using the product.	device
	caution of hot surface (for PowerSets 3.1-170-3p / 4.1-170-3p / 5.1-170-3p / 6.0-170-3p only)	manual device

### 6.3.2 Keywords

Keywords used in conjunction with the symbols described above:

Keyword	Description
<b>Danger</b>	Immediate danger of death or serious bodily injury
<b>Warning</b>	Possible danger of death or serious bodily injury
<b>Caution</b>	Possible danger of light or medium bodily injury
<b>Attention</b>	Possible damage to property
<b>Note</b>	Tips on operation or usage of the manual

### 6.3.3 Markings used in the text

Marking	Description
√	Condition for action
▶	Single step
1., 2., 3., ...	Several steps in series
<i>cursive</i>	light emphasis
<b>bold</b>	strong emphasis
Courier	Designation of product elements such as buttons, displays, operating state

### 6.3.4 Abbreviations

Abbreviation	Description
A	Current in Amperes
AC	Alternating current
ca.	circa
DC	Direct current
Derating	Power reduction
DHCP	The use of DHCP allows automatic integration of the device into an existing network (Dynamic Host Configuration Protocol)
e.g.	for example
et al	and others
etc.	and so on
F	Fahrenheit
ft	foot
I	Current
$I_k$	Short circuit current
$I_{mpp}$	MPP circuit current
lbs	Pound
i.e.	that is
in / in <sup>2</sup>	Inch / Square inch
incl.	inclusive
kVA	Kilovoltampere
kW	Kilowatt
kWh	Kilowatthour(s)
m / m <sup>2</sup>	Meter / Square meter
mm / mm <sup>2</sup>	Millimeter / Square millimeter
MPP	maximum power point

<b>MPP tracker</b>	Controls the power of the connected module strings to match the MPP
<b>MSD</b>	Internal grid monitoring of the inverter (Mains monitoring with allocated Switching Devices).
<b>Nm</b>	Newtonmeter
<b>P</b>	Electrical power
<b>Pa</b>	Pascal
<b>PV</b>	Photovoltaic
<b>SELV, TBTS, MBTS</b>	Schutzkleinspannung (EN: Safety Extra Low Voltage; FR: Très Basse Tension de Sécurité; ES: Muy Baja Tensión de Seguridad)
<b>SF</b>	Solar Frontier
<b>STC</b>	Standard Test Conditions
<b>tot.</b>	total
<b>U</b>	Voltage
<b>U<sub>L</sub></b>	Open circuit voltage
<b>U<sub>mpp</sub></b>	Voltage im Maximum Power Point
<b>U<sub>PV</sub></b>	The generator voltage present at the DC connection (photovoltaic voltage)
<b>V</b>	Volt
<b>W/m<sup>2</sup></b>	Watt per square meter
<b>η</b>	Efficiency

## 7. Composition of the Solar Frontier PowerSet

Solar Frontier currently offers 14 different PowerSets with nominal power outputs from 2.0 kW to 8.2 kW. The PowerSets consist of Solar Frontier modules, Solar Frontier inverter(s), the necessary connecting cables, DC cable and plugs and sockets.

Table shows the exact composition of each PowerSet, including the electrical structure:

### PowerSets with single-phase inverter

Area	PowerSet Description	Capacity	Number of modules	Number & type of inverter	Connecting cable	DC cable	Plugs & Sockets	Modules in series	Unlocking tool	Region
15.6 m <sup>2</sup>	PowerSet 2.0 -170-1p	2.04 kWp	12 x SF170-S	1 x SF-WR-3000	1 x 2(+) & 1 x 2(-)	50 m	5 + 5	6	1	■ ■
18.2 m <sup>2</sup>	PowerSet 2.4 -170-1p	2.38 kWp	14 x SF170-S	1 x SF-WR-3000	1 x 2(+) & 1 x 2(-)	50 m	5 + 5	7	1	■ ■
23.4 m <sup>2</sup>	PowerSet 3.0 -165-1p	2.97 kWp	18 x SF165-S	1 x SF-WR-3000	1 x 3(+) & 1 x 3(-)	50 m	5 + 5	6	1	■
23.4 m <sup>2</sup>	PowerSet 3.1 -170-1p	3.06 kWp	18 x SF170-S	1 x SF-WR-3000	1 x 3(+) & 1 x 3(-)	50 m	5 + 5	6	1	■
27.3 m <sup>2</sup>	PowerSet 3.6 -170-1p	3.57 kWp	21 x SF170-S	1 x SF-WR-3000	1 x 3(+) & 1 x 3(-)	50 m	5 + 5	7	1	■ ■
31.2 m <sup>2</sup>	PowerSet 4.1 -170-1p	4.08 kWp	24 x SF170-S	1 x SF-WR-3600	1 x 4(+) & 1 x 4(-)	50 m	5 + 5	6	1	■ ■
36.4 m <sup>2</sup>	PowerSet 4.8 -170-1p	4.76 kWp	28 x SF170-S	1 x SF-WR-4200	1 x 4(+) & 1 x 4(-)	50 m	5 + 5	7	1	■ ■
39.0 m <sup>2</sup>	PowerSet 5.1 -170-1p	5.10 kWp	30 x SF170-S	2 x SF-WR-3000	1 x 2(+) & 1 x 2(-) 1 x 3(+) & 1 x 3(-)	100 m	10 + 10	6	1	■ ■
46.8 m <sup>2</sup>	PowerSet 5.9 -165-1p	5.94 kWp	36 x SF165-S	2 x SF-WR-3000	2 x 3(+) & 2 x 3(-)	100 m	10 + 10	6	1	■
46.8 m <sup>2</sup>	PowerSet 6.1 -170-1p	6.12 kWp	36 x SF170-S	2 x SF-WR-3000	2 x 3(+) & 2 x 3(-)	100 m	10 + 10	6	1	■
54.6 m <sup>2</sup>	PowerSet 7.1 -170-1p	7.14 kWp	42 x SF170-S	2 x SF-WR-3000	2 x 3(+) & 2 x 3(-)	100 m	10 + 10	7	1	■
62.4 m <sup>2</sup>	PowerSet 8.2 -170-1p	8.16 kWp	48 x SF170-S	2 x SF-WR-3600	2 x 4(+) & 2 x 4(-)	100 m	10 + 10	6	1	■

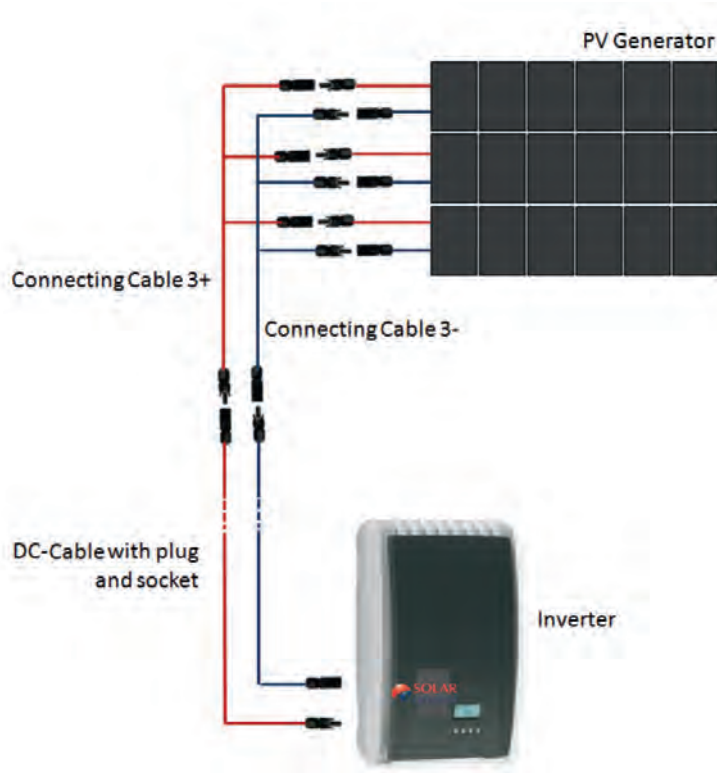
### PowerSets mit three-phase inverter

Area	PowerSet Description	Capacity	Number of modules	Number & type of inverter	Connecting cable	DC cable	Plugs & Sockets	Modules in series	Unlocking tool	Region
23.4 m <sup>2</sup>	PowerSet 3.1 -170-3p	3.06 kWp	18 x SF170-S	1 x SF-WR-3203	1 x 3(+) & 1 x 3(-)	50 m	5 + 5	6	1	■
31.2 m <sup>2</sup>	PowerSet 4.1 -170-3p	4.08 kWp	24 x SF170-S	1 x SF-WR-4003	1 x 4(+) & 1 x 4(-)	50 m	5 + 5	6	1	■
39.0 m <sup>2</sup>	PowerSet 5.1 -170-3p	5.10 kWp	30 x SF170-S	1 x SF-WR-4803	1 x 5(+) & 1 x 5(-)	50 m	5 + 5	6	1	■
45.5 m <sup>2</sup>	PowerSet 6.0 -170-3p	5.95 kWp	35 x SF170-S	1 x SF-WR-5503	1 x 5(+) & 1 x 5(-)	50 m	5 + 5	7	1	■

■ Suitable for installations in region North ■ Suitable for installations in region South  
Region North comprises all countries located in the North of the Alps whilst region South comprises all countries in the South thereof.

## Schematic structure based on PowerSet 3.1

Figure 5 shows the schematic structure of the PowerSet. The modules are connected serially to strings. The outputs of each single string are drawn together using the appropriate connecting cable. The connecting cables have to be assembled on the spot, and serve to extend the connection to the inverter.



The connecting cables have two, three or four outputs depending on the plant size. Cables are provided for each polarity (plus and minus).

Figure 7

## 8. Installation

**For a safe installation, all relevant national and local laws, regulations and directives, especially for accident avoidance, as well as all relevant technical standards are to be adhered to.**

### 8.1 Mounting system/ substructure

The PowerSets are delivered without mounting systems. In general, all mounting systems commercially available, are suitable (e.g. No-votegra (MHH), HatiCon, K2 Mounting Systems, Easy Roof (IRFTS), Schletter, Tritec) provided that the installation is in accordance with the requirements indicated in 8.2.3. Your installer will be able to suggest a suitable solution.

### 8.2 Mechanical installation of Solar Frontier SF170-S photovoltaic modules

#### 8.2.1 Site location

- Ensure that the maximum wind and snow loads in local conditions do not exceed the SF module maximum load ratings.
- Avoid installing SF modules in areas where they are exposed to oil vapour and /or corrosive gas.
- Avoid accumulation of grit or dust on the SF modules as it may influence the output yield.
- Do not expose SF modules to sulphurous atmospheres.
- Do not install SF modules in locations where flammable gases accumulate or flow as there is a risk of sparks from SF PV modules.
- Do not install SF modules near fire.

- Avoid installing SF modules in locations where they may be covered by permanent shadows. This may adversely affect their performance.
- Do not install SF modules in locations where temperatures exceed the temperature range indicated in the module's technical specifications

## 8.2.2 Module handling instructions

- Do not disassemble or modify SF modules. This may result in an electric shock, fire or other accidents. Solar Frontier cannot be held responsible for any loss or damage caused by unauthorized disassembling, modification or misuse of SF modules.
- Do not drill additional mounting holes into the aluminum frame. Only pre-drilled holes should be used.
- Avoid placing any stress onto the SF modules, cables or connectors.  
(Minimum bending radius of 39 mm (1.54 in) for module cables is recommended)
- Do not stand or step on SF modules. This may result in damage to the module and/ or bodily harm by falling.
- Do not drop SF modules or drop objects onto them. Both sides of the module (the glass surface and the back sheet) are fragile.
- Do not strike the terminal box or pull the cables. The terminal box can crack and break, while the output cable may unplug and cause electricity leakage or an electric shock.
- Do not scratch the back sheet or cables of the SF modules. Rubbing or scratching may result in an electric shock, electric leakage or an accident.
- Do not scratch the insulation coating of the frame (except for the grounding connection). This may weaken the strength of the frame or cause corrosion.
- Do not cover the water drain holes of the frame. Doing so may cause frost damage.
- Do not use glue when closing the cover of the junction box. Similarly, do not use a sealant to bond the junction box lid to its base.

## 8.2.3 Module mounting instructions

### Mounting structures cautions

- Pay attention to the electrochemical series when selecting support structure material to avoid galvanic corrosion.
- Fasten and lock bolts completely. Inadequate mounting may result in SF modules falling or other accidents.
- Ensure that the SF modules are securely fastened to the mounting support structure that is durable, made of UV and corrosion resistant material, and follow the applicable local and civil codes.
- Ensure that your mounting support structure is designed to withstand the SF module design snow and wind loads applicable for the chosen site. Solar Frontier will not be responsible if the SF modules are damaged due to the durability of the mounting support structure. Please consult your mounting structure manufacturer.

### Mounting the solar modules

- PV modules should typically face South in the Northern Hemisphere and North in the Southern Hemisphere for optimal power production.
- Modules can be installed horizontally (landscape) or vertically (portrait).
- Maintain a space between SF modules and the roof. This will allow air to circulate, cooling the module, and allowing condensation to dissipate. Solar Frontier recommends a distance of at least 100 mm (3.94 in).

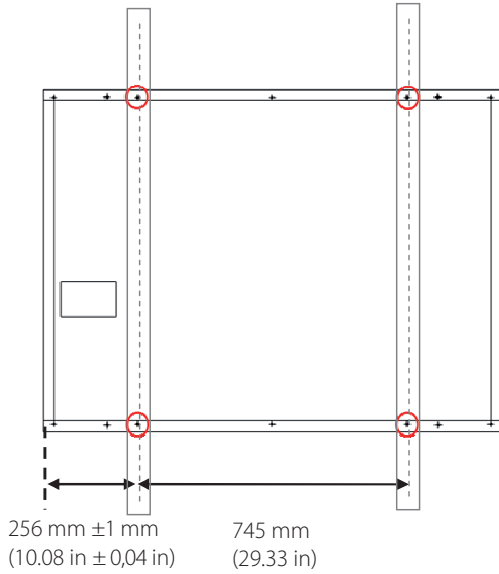
## Mounting with Screws

SF modules should be fastened to the support structure using the mounting holes on the frame. The support structure should be securely fastened to a non-corrosive roof.

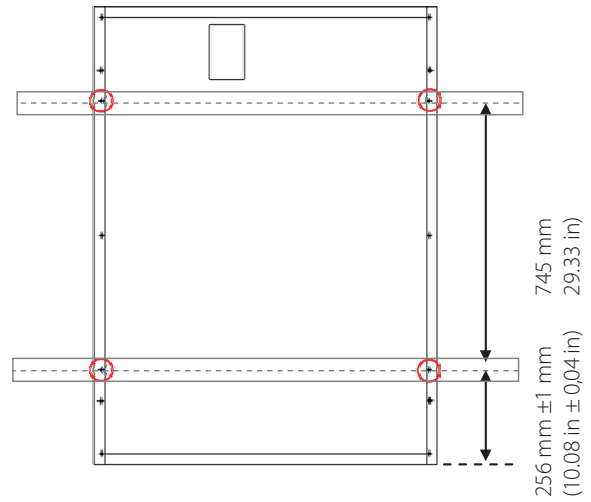
### Mounting with Inner Holes

Each module will require four M6 (or 1/4 in) bolts with washers, lock washers and nuts. Tighten the screws with an adequate torque value.

**UL:** Recommended tightening torque is 8 Nm (70.8 lb in) minimum.



**Landscape (horizontal)**



**Portrait (vertical)**

Figure 8

**TUV: 2,400 Pa (50 lbs/ft<sup>2</sup>) to the front and back of the module**

**UL: 1,600 Pa (33.4 lbs/ft<sup>2</sup>) to the front and back of the module**

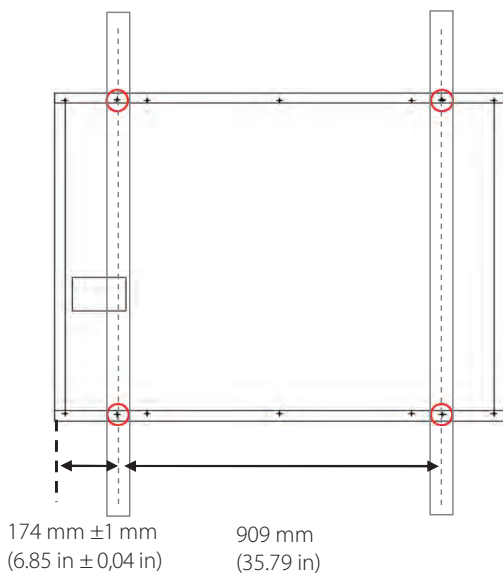
1.5 times the design load is applied to the module during UL testing. 2,400 Pa (50 lbs/ft<sup>2</sup>) is applied to test 1,600 Pa (33.4 lbs/ft<sup>2</sup>) UL design load.

### Mounting with Outer Holes

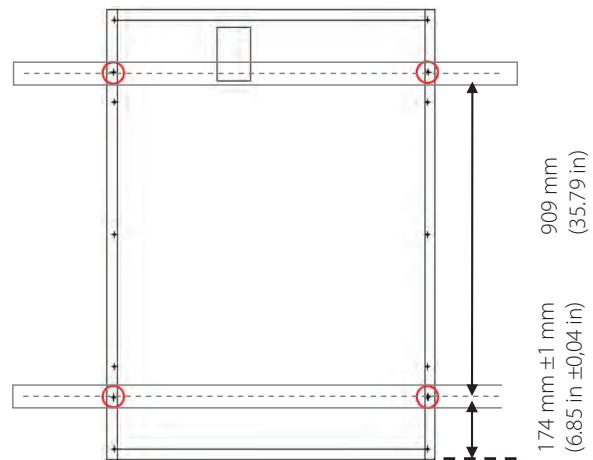
Each module will require four M8 (or 5/16 in) bolts with washers, lock washers and nuts. Tighten the screws with an adequate torque value.

**UL:** Recommended tightening torque is 15 Nm (132.8 lb in) minimum.

**TUV: 2,400 Pa (50 lbs/ft<sup>2</sup>) to the front and back of the module**  
**UL: 1,600 Pa (33.4 lbs/ft<sup>2</sup>) to the front and back of the module**



**Landscape (horizontal)**



**Portrait (vertical)**

Figure 9

1.5 times the design load is applied to the module during UL testing. 2,400 Pa (50 lbs/ft<sup>2</sup>) is applied to test 1,600 Pa (33.4 lbs/ft<sup>2</sup>) UL design load.

Please refer to further instructions and adequate torque value provided by the screw manufacturer.

## Mounting with clamps

Four or more corrosion-proof aluminum clamps should be used to fasten SF modules to the support structure. Center-line of the clamps shall be secured within the indicated clamping zone (256 mm +/- 75 mm, 10.08 in +/- 2.95 in) from the corners of the longer side of the module frame using stainless-steel M8 bolts with a minimum length of 20 mm (0.79 in). Tighten the clamps with an adequate torque value.\*1

All selected module clamps must be at least 50 mm (1.97 in) long, 3 mm (0.12 in) thick, and overlap the module frame by 8 mm (0.31 in) or more.

Clamps must not create shadow nor cover the front glass, and shall not deform the module frames during installation. Please refer to the instructions provided by the clamp manufacturer for further instructions.

\*1 UL: Recommended tightening torque is 15 Nm (132.8 lb in) minimum.

**TUV: 2,400 Pa (50 lbs/ft<sup>2</sup>) to the front and back of the module**

**UL: 1,600 Pa (33.4 lbs/ft<sup>2</sup>) to the front and back of the module**

1.5 times the design load is applied to the module during UL testing. 2,400 Pa (50 lbs/ft<sup>2</sup>) is applied to test 1,600 Pa (33.4 lbs/ft<sup>2</sup>) UL design load.

## Module perpendicular to support rails

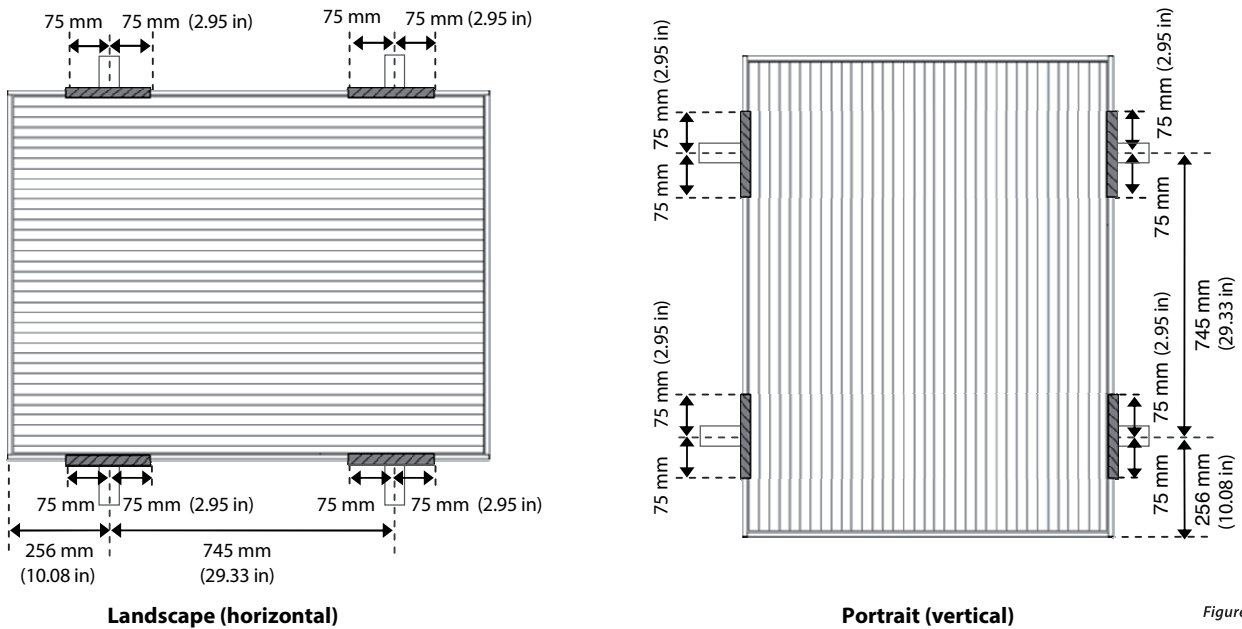


Figure 10

## Array Installation (section)

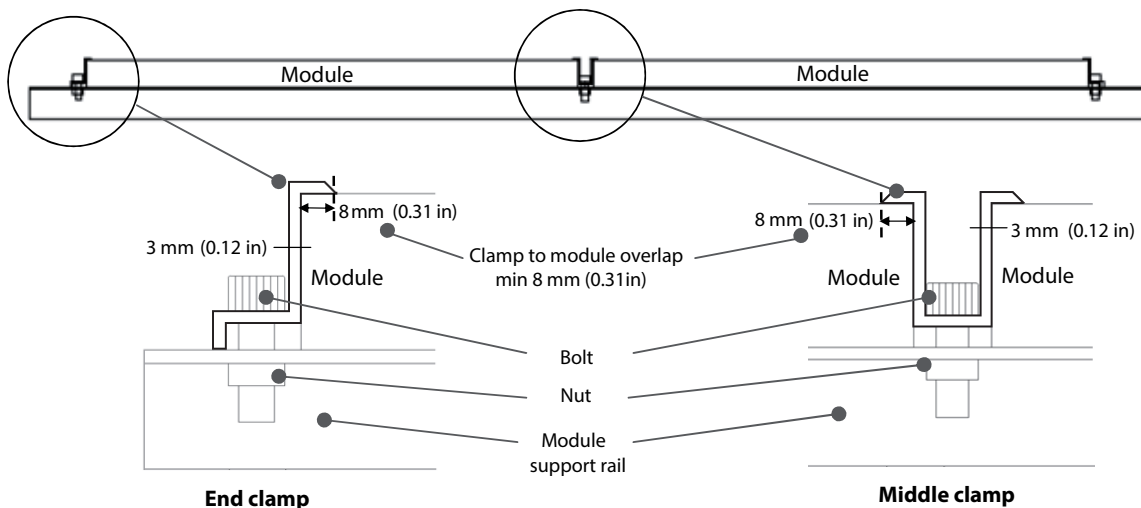


Figure 11

**Module parallel to support rails**

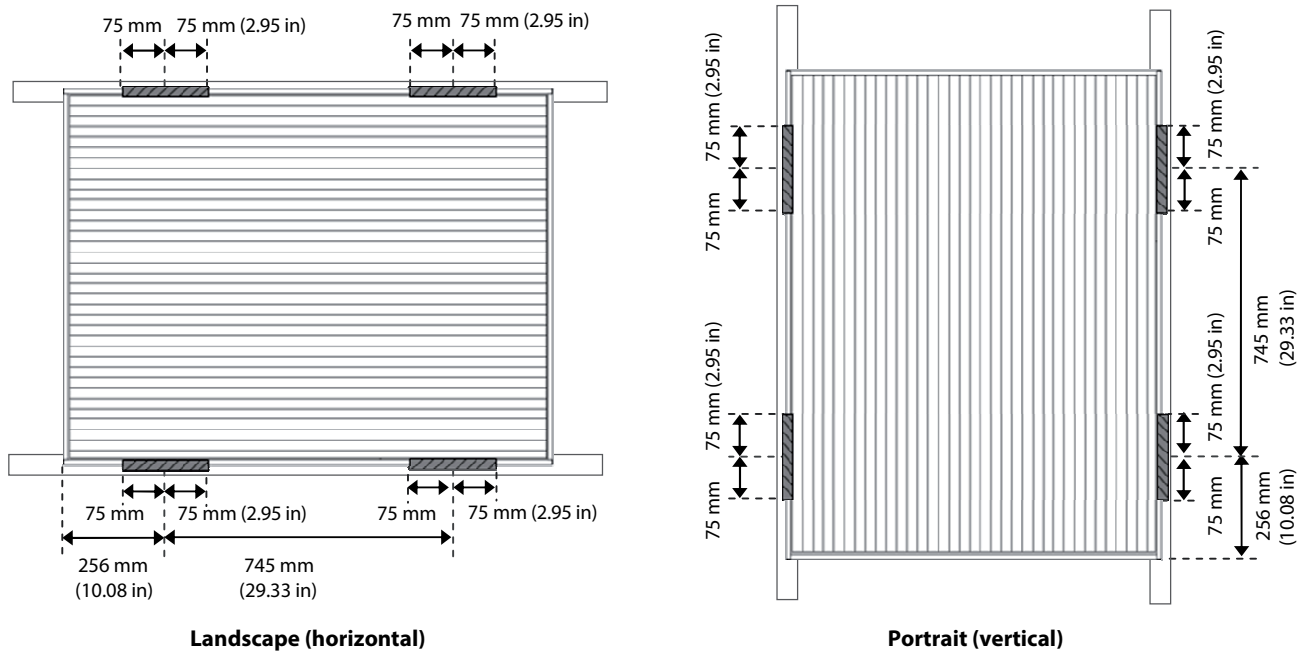


Figure 12

**Array Installation (section)**

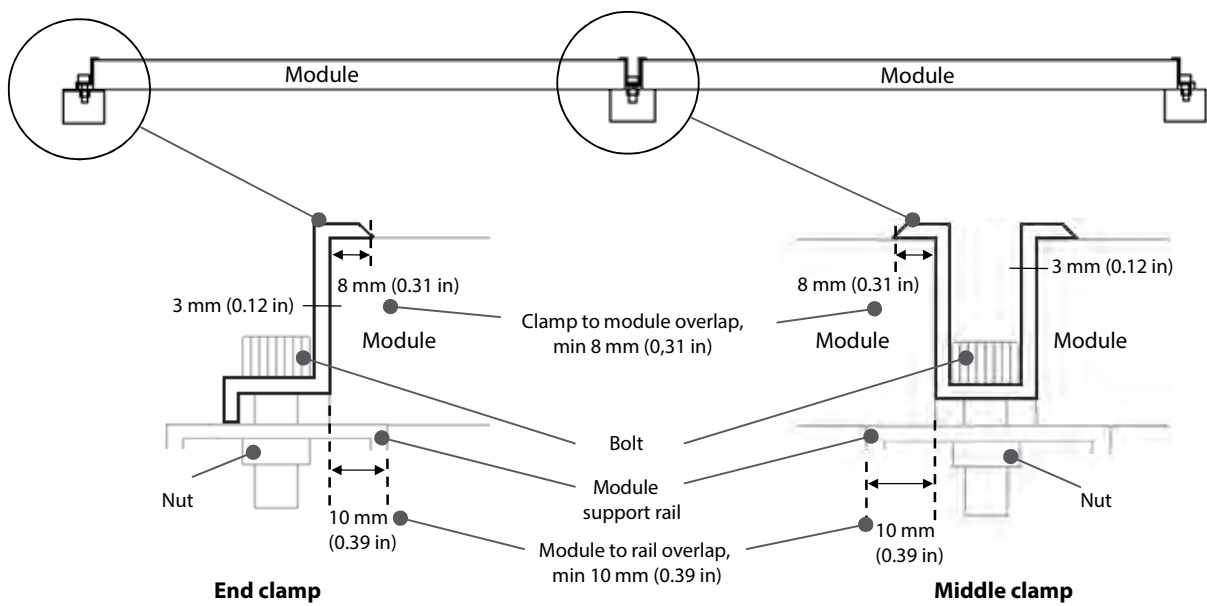


Figure 13

For alternative mounting methods, please consult Solar Frontier.



## 8.3 Electrical installation photovoltaic generator

### 8.3.1 Electrical wiring safety precautions

- The sum of Voc of modules in series must not exceed the maximum system voltage of the module under any condition. Reverse current applied to the modules must not exceed 7 A.
- Do not touch or handle the PV module, terminal box or the end of output cables with bare hands.
- Do not carry out installation when PV modules, installation tools or installation area are exposed to water.
- Ensure that the connection parts between SF modules and power receiving devices are isolated and waterproof. Using SF modules with insufficient isolation and waterproofing could result in an electric shock, an electric leak or an accident.
- Keep the wiring box (junction box) and the module connector away from any liquids until connectors are mated. Failure to do this may cause faulty wiring.
- Components interconnecting the modules must be compatible with the connectors, and must provide system operation and fault protection.
- Inverters must meet the technical requirements of SF modules.
- Do not connect the PV modules directly to loads such as motors. Variation in output power may damage the motor.
- Observe and understand the safety instructions of batteries. Their misuse can result in serious bodily harm due to high electrical current.
- Cables should be adequately protected from damage by wildlife

### 8.3.2 Cabling

Solar Frontier places great value on delivering as many components as possible pre-assembled in order to help avoid sources of error. Since roof and PV installation has its own specialities, it may be necessary to adapt certain cables on site to fit them best (e.g.: connections cables to the inverter shall be cut and assembled on site, and/or extension cable will be necessary to wire around interrupted strings on the roof if obstacles exist such as chimneys). The DC cable, sockets and plugs which are included in the PowerSet are for this purpose. A suitable crimping tool is necessary but excluded of the PowerSet.

**Please ensure a clean and proper assembly of the cables to avoid error sources and to ensure safe cabling.**

To assemble the cables the following tools are necessary:

- Mounting key (not scope of the delivery)
- Crimping tool for twisted contacts (not scope of the delivery)
- Insulation stripping pliers (not scope of the delivery)

#### **Shortening and stripping the insulation from cables**

First, the cable has to be shortened to the proper length. Then the outer insulation is removed with a suitable insulation stripping pliers to a length of 7 mm (0.28 in).

**Ensure that the wires are not damaged – a reduction of the cross-sectional area can result in electrical errors.**

See Figures 14 and 15:

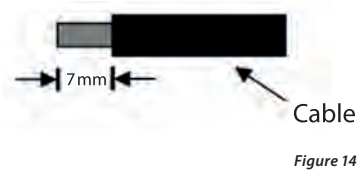
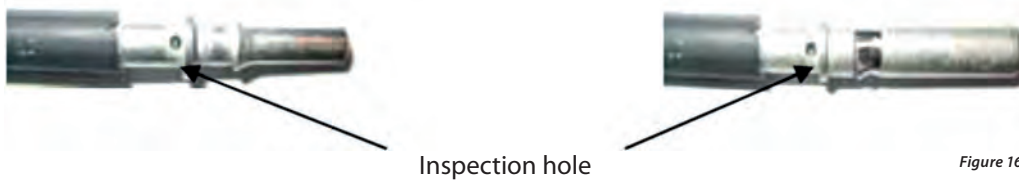


Figure 15

### Crimping the twisted contacts

Push the stripped end of the cable into the crimp sleeve as shown in Figure 16. Make sure that all wires are inside the crimp sleeve. The wires must be visible in the small opening.



To crimp the sleeves use the „hex“ or „4-ident“ crimp die. Put the crimp sleeve with the cable in the respective slot on the crimp pliers. The crimping tool must be suitable for drilled crimp contacts of the type Amphenol Helios H4. For more detailed information on using the crimp pliers please consult the operations manual of the pliers manufacturer.

See Figures 17 and 18:

### Checking the crimping results

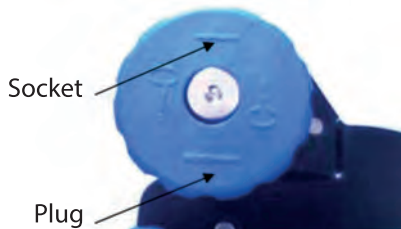


Figure 17



Figure 18

A visual check of the crimping results, and a pull test are needed to ensure a correct crimping.

Figure 19 and Figure 21 show a good result for a „hex“ crimping; Figure 20 and Figure 22 show a good result for a „4-ident“ crimping:



Figure 19



Figure 20



Figure 21



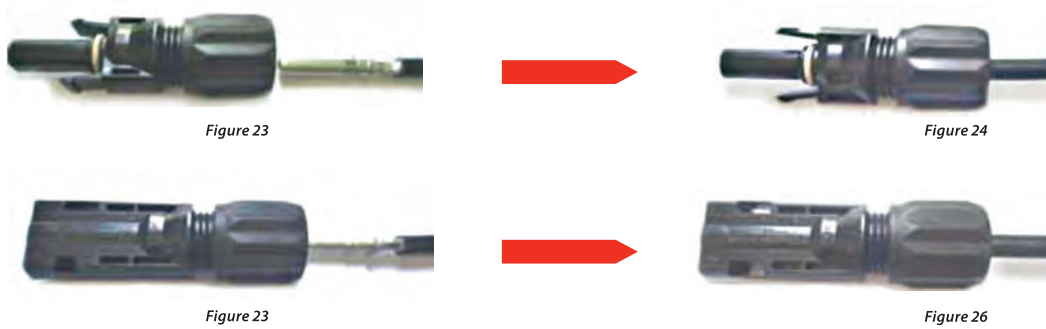
Figure 22

The pull test should be for at least 310 Newton.

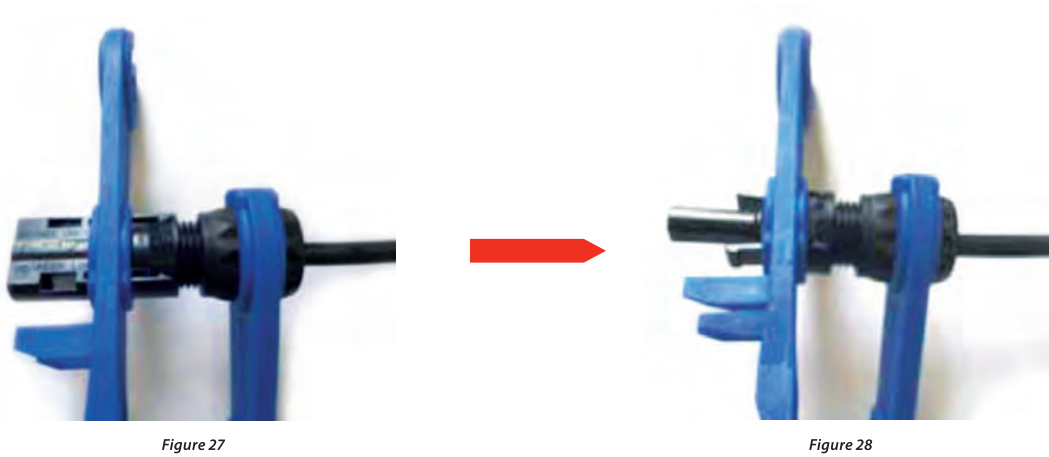
## Assembling the plugs and sockets

To assemble the plugs and socket the respective cover should be pushed over the contact until a clear click is heard or felt. The click shows that the contact is in the right position in the plug/socket. Contacts cannot be released when they have been positioned.

See Figures 23 to 26:



The covering cap is to be tightened with 2.6 to 2.9 Nm. A suitable installation spanner can be used for this purpose.



## Connecting and disconnecting the plug/socket combination

Connect the plug and socket to each other. A click shows that the connection has been successful. To open and disconnect the plug/socket combination a suitable tool is necessary. This could be a disconnecting tool as delivered or another suitable tool.

See Figure 29.

**Never disconnect plug/socket combinations when the plant is in operation in order to avoid light arcing, which can lead to serious injury or death.**



### 8.3.3 Procedures for electric cabling

The electrical cabling of Solar Frontier PowerSets has to be done as described in Chapter 7, Table 2. Take care that the exact number of modules in series are connected in accordance with Table 2, and that the respective number of parallel strings is adhered to.

#### String connection

The serial connection of modules should be done in accordance with 8.3.5, Figure 33 and 34.

#### Procedure by interrupted strings:

If it isn't possible to connect modules directly, the plugs, sockets and DC cable provided can be used to bridge gaps.

An exemplary approach is shown in 8.3.5, Figure 35 and 36. The basics on assembling an extension cable can be found in Chapter 8.3.2 Assembly. Please note that only a limited number of plugs/sockets are provided in the set, and that the cable provided is primarily for the extension from the generator to the inverter.

**If you should need extra material, please ensure that the compatibility to the PowerSet products is confirmed. If in doubt please contact Solar Frontier.**

#### Connecting the strings

The string connecting cable in the set is used to connect the strings and lead them to a mutual collection point. The number of strings can be determined in Chapter 7, Table 2.

#### DC cable

The DC cable is used to extend the connecting cables in the PV generator with the inverter. Basics on assembling the cable can be found in chapter 8.3.2

#### Connecting to the inverter

The connection of the PV generator to the inverter is described in detail in chapter 8.4. Please ensure that the instructions and procedures described there are strictly adhered to avoid possible danger sources and to ensure a safe installation.


### 8.3.4 Grounding

#### Grounding cautions

- Be aware of the necessary grounding requirements prior to installation. Your local authorities can help you further.
- Install arrestors, surge absorbers or any other appropriate lightning protection tools as needed.
- Module frames, mountings, connection boxes and metal conduits should be connected to an earth ground as lightning protection, in accordance with local, regional and national standards and regulations.
- Grounding holes ( $\phi$  4 mm, 0.16 in) on the aluminum frame of the SF modules are provided to accommodate grounding. Use a grounding wire made of copper, not smaller than 2 mm<sup>2</sup> (0.003 in<sup>2</sup>) (14AWG). Temperature rating of the conductors must be between -40 °C to 85 °C. Ensure that the crimping terminal is tightly tied to the module frame with a rolling thread screw and a lock washer to ensure electrical contact.
- Grounding devices such as module clamps with an integrated grounding pin, serrated washers, grounding clips or lugs, designed for bonding photovoltaic modules to the mounting structures may also be used for grounding as described in NEC section 250. These grounding devices shall be made in conformance with the grounding device manufacturer instructions. Consult the grounding device manufacturer to identify the appropriate grounding and bonding device for your mounting structure or design.

For alternative grounding methods please consult Solar Frontier.

**UL:** The module with exposed conductive parts is considered to be in compliance with UL 1703 only when it is electrically grounded in accordance with the instruction presented below and the requirements of the NEC.

Earth by connecting from  to earth.

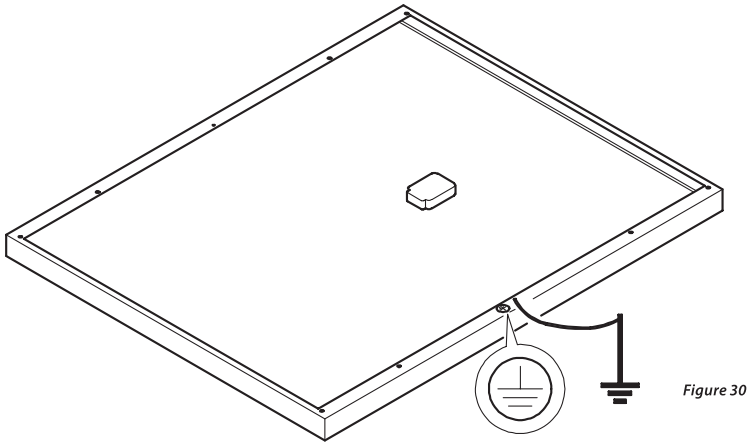
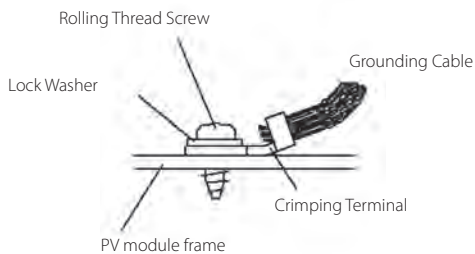


Figure 30

#### Grounding (IEC)



#### Grounding with washer (UL)

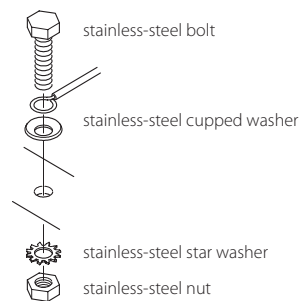


Figure 31

Use M4 bolt (torque value 1.5 Nm) or standard gauge size #6 bolt (torque value 1.0 Nm). Tighten the bolts or screw with an adequate torque value. Please refer to further instructions provided by the screw or bolt manufacturer.

**UL:** Recommended tightening torque is 1.5 Nm and 1.0 Nm minimum for M4 and standard size #6 bolt respectively.

### 8.3.5 Electrical wiring

- A set of cables with a plastic connector for each polarity is supplied with SF modules. Use these to connect modules.
- Do not open the junction box.
- Fasten the module cable to the frame or to the mounting system in order to avoid any stress to the connector.
- Cables drooping from the terminal box are hazardous and must be avoided.
- Cables should be secured so they are not exposed to direct sunlight (such as behind the module).
- The sum of  $V_{oc}$  of modules in series must not exceed the maximum system voltage rating of the module under any condition, even at low temperature.
- Reverse current applied to the modules should not exceed 7 A under any condition.
- Minimum cable diameter:  $2.5 \text{ mm}^2$  ( $0.004 \text{ in}^2$ ).

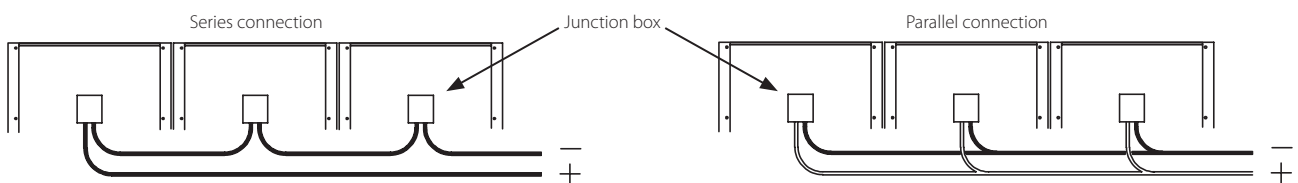


Figure 32

Carry out installation and wiring work in compliance with all relevant health, safety and environment laws and regulations.

### Schematic structure of standard module cabling

The standard module cabling is applicable for modules mounted in portrait and landscape direction. Modules connected in series make up a string. The string cabling can be done as shown in Figure 31 and Figure 32. The strings are picked up with the delivered connecting cables one on each side and led to a mutual collection point.

#### Landscape:

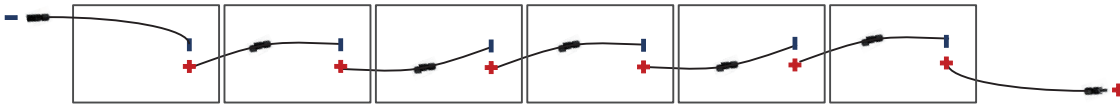


Figure 33

#### Portrait:

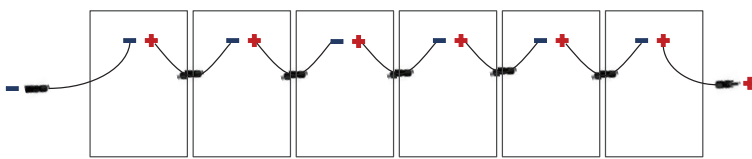


Figure 34

### Schematic structure of standard cabling with interruption

If obstacles such as windows and chimneys exist on site, it is not possible to mount the modules directly next to each other. In cases like these, DC cable, plugs and sockets, which are provided with the kit, could be used as a bridge connection. A simple example is shown in Figure 35 and Figure 36:

#### Landscape:

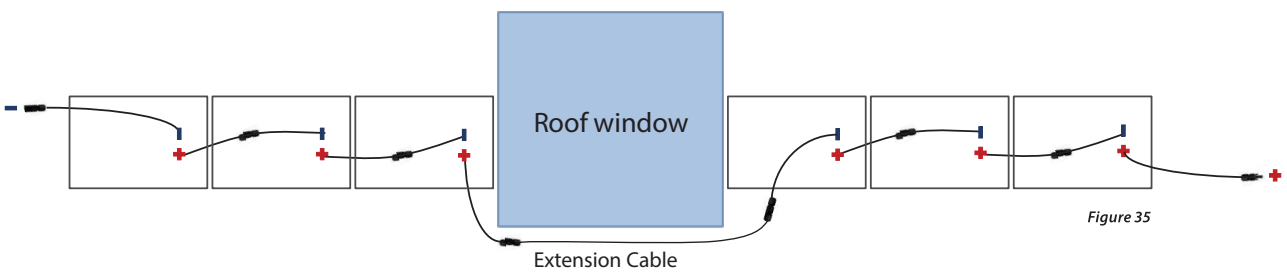


Figure 35

#### Portrait:

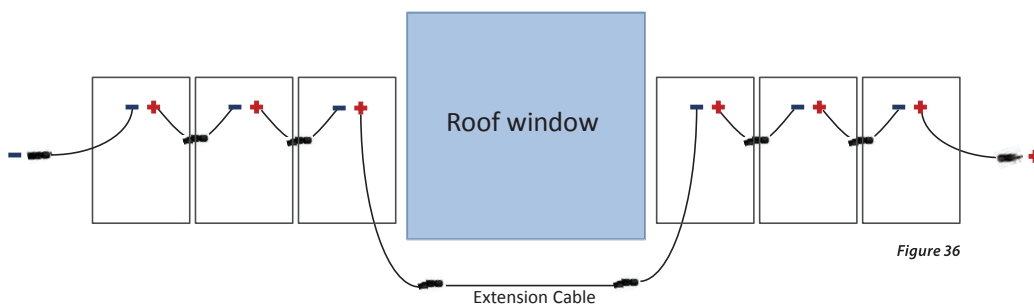


Figure 36

### Schematic structure of cross cabling

Those modules connected in series make up a string. The string cabling should be done as shown in Figure 37:

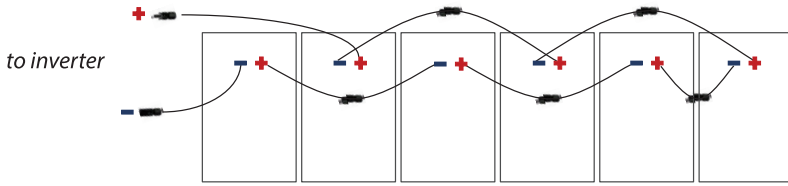


Figure 37

Cross cabling is used only for a portrait installation of the modules, whereby modules are alternately cross connected in series to optimize the use of the cable length. The serially connected modules make up a string. The wiring of one string should be effected as shown in Figure 37. The strings are picked up with the delivered connecting cable and led to a mutual collection point. The number of strings and the number of parallel strings can be found in Table 2 on page 11.

### Schematic structure of cross cabling with interruptions

If obstacles such as windows and chimneys exist on site, it is not possible to mount the modules directly next to each other. In cases like these, DC cable, plugs and sockets, which are provided with the kit, could be used as a bridge connection. A simple example is shown in Figure 38:

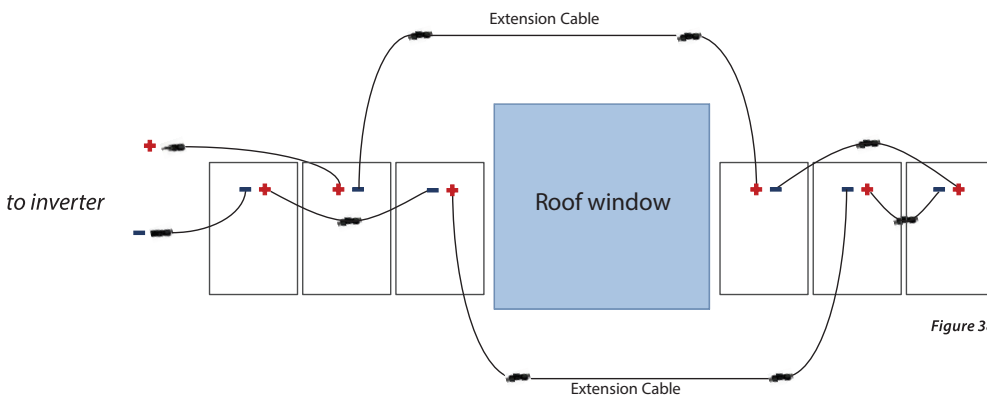


Figure 38

## 8.4 Installation Inverter SF-WR

### 8.4.1 Safety measures during installation

Observe the following safety notes when performing the work described in section *Installation*.

---

#### Danger

Risk of death by electrocution!

---

- Only technical professionals may perform the work described in section *Installation*.
- **Always** disconnect all DC and AC cables as follows before starting work on the inverter:
  1. Turn the AC circuit breaker to off. Take measures to prevent the system from being unintentionally switched on again.
  2. Set the DC circuit breaker on the inverter to position 0. Take measures to prevent the system from being unintentionally switched on again.
  3. Disconnect the plug connectors (SunClix) of the DC cables according to the manufacturer's instructions. (Overcome the safety clip by gently pressing the sides of the plug casing together and removing the plug.)  
**Warning:** DC cables carry voltage when the solar modules are subjected to sunlight.
  4. Pull out the AC plug from the inverter as described in section 8.4.9.
  5. Check that all pins of the AC plug are free of voltage. Use a suitable voltmeter for this (do not use a simple neon phase checker).
- Do not connect cables to the inverter until explicitly asked to do so in the instructions.
- Do not open the casing of the inverter.
- Connect only SELV circuits to the RJ45 sockets.
- Lay the cables such that the connection cannot come loose accidentally.
- When laying cables, ensure that no damage occurs to any of the constructional fire safety measures in the building.
- Make sure that no inflammable gases are present.
- Observe all applicable installation regulations and standards, national laws and connection values specified by the regional power supply company.

---

#### Attention

Danger of damage to the inverter or derating!

- The mounting location must satisfy the following conditions:
  - The mounting surface and immediate environment are permanently fixed, vertical, flat, non-inflammable and not subject to constant vibration.
  - The permissible ambient conditions are conformed to; see *Technical data Inverter*, 15.2.1.
  - The following free spaces must be present around the inverter:
    - Above/below: at least 200 mm (7.87 in);
    - At the sides/in front: at least 60 mm (2.36 in)
- Do not install the inverter in areas where animals are kept.
- Observe the connection ratings specified on the type plate.
- The DC cables must not be connected to an earth potential (DC inputs and AC output are not galvanically isolated).

---

#### Attention

When transmitting data over a public network:

- Transmitting data over a public network can incur additional costs.
- Data transmitted over a public network is not protected from unauthorised access by third-parties.

---

#### Note

- Avoid exposing the inverter to direct sunlight.
  - The display must be readable on the installed device.
-



## 8.4.2 Mounting the inverter

### Fastening the mounting plate

Screw the mounting plate to the mounting surface using 4 screws:

- Use screws (and dowels etc.) appropriate for the weight of the inverter.
- The mounting plate must lie flat on the mounting surface and the metal strips at the sides must point forwards (Figure 39).
- Install the mounting plate vertically with the retaining plate ① at the top (Figure 39).

#### Note

More information on determining the optimum position for the mounting plate is provided in the attached information sheet.

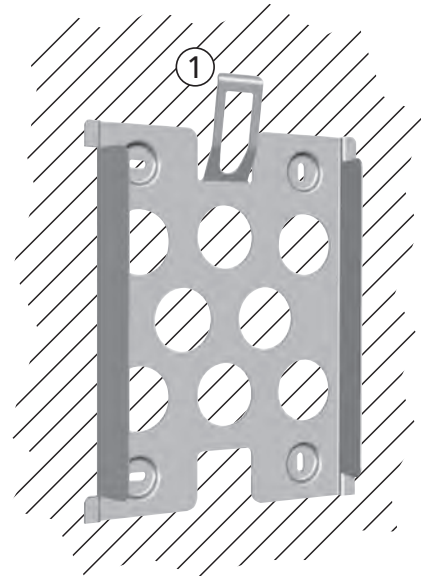


Figure 39

### For Australia only: Mask off the *Protection Class II* symbol on the type plate

#### Note

When the inverter is used in Australia, the national regulations do not permit the *Protection Class II* symbol to be displayed on the type plate. The inverter is therefore supplied with a small sticker in the same bag as the AC plug.

Completely cover the *Protection Class II* symbol using the small sticker provided, as shown in Figure 40.

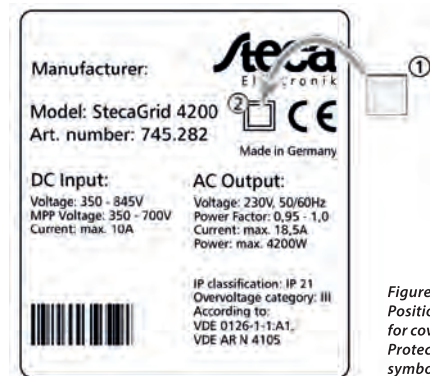


Figure 40  
Position of the sticker  
for covering the  
*Protection Class II*  
symbol

### Mounting the inverter on the mounting plate

1. Grasp the inverter by the recesses ①, position it ① in the middle of the mounting plate ② and press lightly (Figure 41).
2. Lower the inverter into place ③ until the retaining plate on the mounting plate clicks audibly into place. The hooks on the rear side of the inverter must slide over matching protrusions on the mounting plate.
3. The inverter must now sit securely on the mounting plate and can no longer be slid upwards.

#### Note

The procedure for removing the inverter from the mounting plate is described in 8.4.9

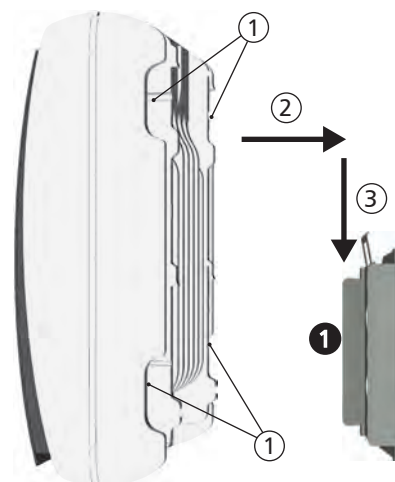


Figure 41

## 8.4.3 Preparing the AC connection

### Line circuit breaker

Information on the required line circuit breaker and the cables to be used between the inverter and the line circuit breaker is provided in chapter 15.3.

### Residual current circuit breaker

If the local installation regulations require the installation of an external residual current circuit breaker, then a Type A residual current circuit breaker as per IEC 62109-1, § 7.3.8. is sufficient.

### Wiring the AC plug

---

#### Danger

Risk of death by electrocution! Observe the warning notes in 8.4.1!

---

### Grid voltage 220 V ... 240 V

Wire the AC plug supplied as described in 19.2.

### Grid voltage 100 V ... 127 V

---

#### Danger

Risk of death by electrocution! Never connect one of the phases  $L_1$ ,  $L_2$  or  $L_3$  to PE or N on the mains grid side.

---

#### Note

With a mains grid voltage of 100 V ...127 V, the inverter can be connected between the  $L_1$ ,  $L_2$  and  $L_3$  external conductors as follows:

### 2-phase mains grids

- N and L are connected between the  $L_1 - L_2$  external conductors at the inverter side. See ② and ③ Figure 42.
- One of the two connected external conductors is connected to PE at the inverter side. This connection can be made within the AC plug or in an external junction box.
- Figure 42 shows an example of an inverter-side connection between  $L_1$  and PE:  
Above: Connection ① in the AC plug ⑤  
Below: Connection ④ in an external junction box ⑥).

### 3-phase mains grids

- N and L are connected between the  $L_1 - L_2$  or  $L_1 - L_3$  or  $L_2 - L_3$  external conductors at the inverter side.
- Connect the external conductor on the inverter side to PE: as above.
- Figure 42: as above.

The external conductor voltages are shown in Figure 43.

---

1. Wire the AC plug supplied to match the selected external conductors, as described in chapter 19.2. Do not yet close the AC plug.
2. Connect one of the two connected phases to PE at the inverter side. Make this connection inside the AC plug or use an external junction box; see Figure 42.

**For PowerSets 2.0-170-1p / 2.4-170-1p / 3.0-165-1p / 3.1-170-1p / 3.6-170-1p / 4.1-170-1p / 4.8-170-1p / 5.1-170-1p / 5.9-165-1p / 6.1-170-1p / 7.1-170-1p / 8.2-170-1p only:**

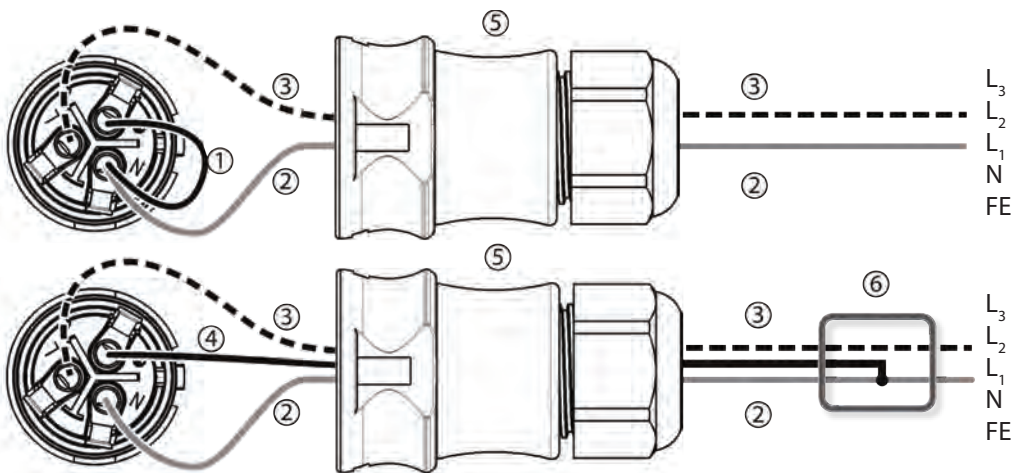


Figure 42 connecting N and PE in AC plug (above) or distribution box (below)

- ① Connection cable between N and PE with the connection point inside the AC plug
- ② External conductor  $L_1$
- ③ External conductor  $L_2$
- ④ Connection cable between N and PE with the connection point inside the junction box
- ⑤ Casing of the AC plug
- ⑥ Junction box

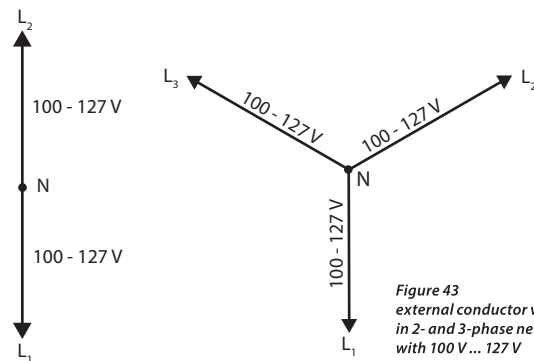


Figure 43 external conductor voltages in 2- and 3-phase nets with 100 V... 127 V

**For PowerSets 3.1-170-3p / 4.1-170-3p / 5.1-170-3p / 6.0-170-3p only:**

Wire the AC plug provided as described in the following Figure.

- ① Phase 1
- ② Phase 2
- ③ Phase 3
- ④ As the inverter is *protection class II*, the PE protective conductor has no function and need not be connected.
- ⑤ Neutral conductor

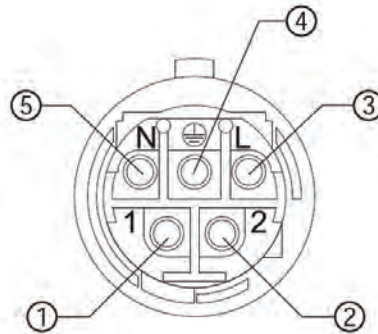


Figure 44

## 8.4.4 Preparing the DC connections

### Danger

Risk of death by electrocution!

Observe the warning notes in 8.4.1

Use the SunClix plug connectors provided to ensure that the specified degree of protection is maintained.

### Attention

Danger of damage to the inverter and the modules.

Connect the opposing connectors for the DC connections to the DC cable, observing the correct polarity.

Only Steca-approved energy storage systems may be connected to the battery connections. Connection to other systems could damage the inverter and modules.

## 8.4.5 Preparing the data connection cable

If a data connection is required, use a standard RJ45 cable (patch cable, Cat5) or construct an alternative data connection cable (see page 41).

## 8.4.6 Connecting the inverter and switching on the AC power

---

### Danger

Risk of death by electrocution! Observe the warning notes in 8.4.1.

---

### Attention

Maintain a minimum clearance of 200 mm ( 7,87 in) between the data connection cables (RS485/Ethernet) and the DC /AC cables to prevent data transmission interference.

---

1. If necessary, establish a data connection:
  - Connect the inverter and master using the data connection cable.
  - Switch on the termination (slide switch) at the last inverter.
2. Push the Amphenol Helios H4 opposing connector of the DC cable firmly into the DC connection of the inverter until it audibly clicks into place.
3. Insert the AC plug into the socket on the inverter until it audibly clicks into place.
4. Switch on the AC line circuit breaker. The start page for initial commissioning is shown on the display.
5. Perform initial commissioning and switch on the DC supply, as described in 8.4.7 and 8.4.8.

## 8.4.7 Initial commissioning of the inverter

- Before connecting the PV system to the grid, ensure that the complete system has been checked, tested and approved in accordance with the relevant laws, norms, and regulations.
- Depending on local regulations only accredited personnel may connect the PV system to the grid, and commission it.

## Function

### Conditions for starting initial commissioning

Initial commissioning starts automatically when at least the AC connector has been installed and switched on as described previously. If initial commissioning is not fully completed then it starts anew the next time the device is switched on.

### Guided initial commissioning

Initial commissioning is a guided procedure that sets the following information:


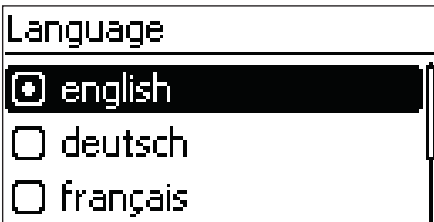
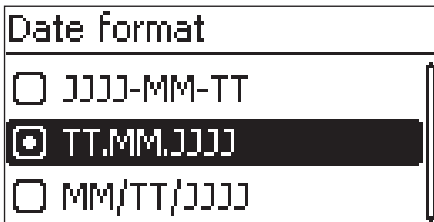
- Display language
- Date / Time
- Country
- Reactive power characteristic curve (if prescribed for the selected country)

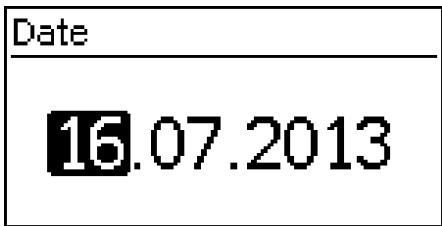
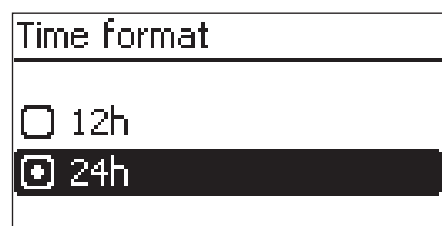
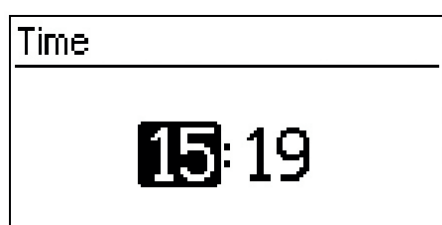

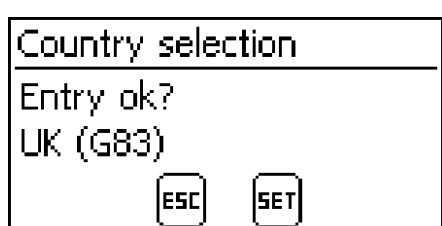
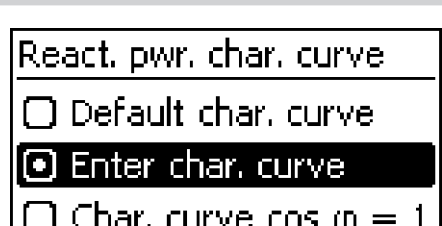
### Setting the country

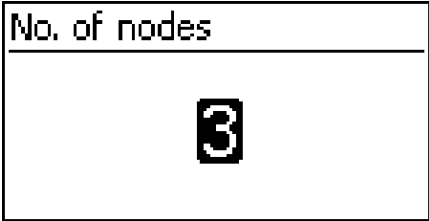
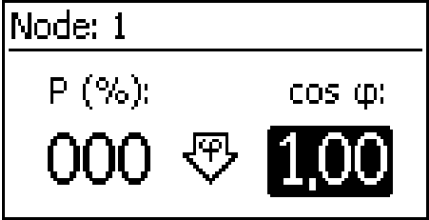
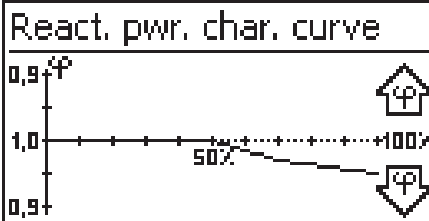

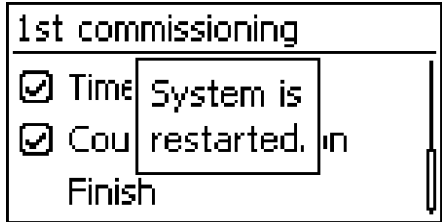
The following applies when setting the country:

- The country set must always be the same as the country where the inverter is installed. This causes the inverter to load the prescribed grid parameters for the selected country. More information on this is provided in the table of countries, chapter 15.4.
- **The country can only be set once!**
- Contact your installer if you have set the wrong country.
- Contact your installer if you cannot select the country where your inverter is installed.
- The country setting does not affect the language used on the display. The display language is set separately.

## Operation

Starting initial commissioning	
	<p>√ The check list for initial commissioning is displayed.</p> <ul style="list-style-type: none"><li>• The <b>Language</b> entry is selected.</li><li>• The check boxes are not selected.</li></ul> <p><b>Notes</b></p> <ul style="list-style-type: none"><li>• When a check list item is called up the corresponding check box is automatically selected.</li><li>• The following items are only displayed when the use of a reactive power characteristic curve is prescribed for the country currently selected in the <b>Country</b> item:<ul style="list-style-type: none"><li>– <b>Reac. pwr. ch. c.</b> (type of reactive power characteristic curve)</li><li>– <b>No. of nodes<sup>1)</sup></b></li><li>– <b>Node 1<sup>1)</sup></b></li><li>– <b>Node 2<sup>1)</sup></b></li><li>– <b>Node n<sup>1) 2)</sup></b></li><li>– <b>Display char. curve</b></li></ul></li></ul> <p><sup>1)</sup>: Is only displayed for reactive power characteristic curve type <b>Enter char. curve</b>.</p> <p><sup>2)</sup>: Is only displayed when <b>no. of nodes</b> has been set to a value &gt; 2.</p> <ul style="list-style-type: none"><li>• Initial commissioning is completed by calling up the <b>Finish</b> item.</li><li>• <b>Finish</b> can only be performed when <b>all other</b> checkboxes are selected.</li></ul> <ol style="list-style-type: none"><li>1. Press <math>\Delta\nabla</math> to select a check list item.</li><li>2. Press <b>SET</b> to call up the item. The items are described in detail below.</li></ol>
Language	
	<ol style="list-style-type: none"><li>1. Press <math>\Delta\nabla</math> to select a display language.</li><li>2. Press <b>SET</b>. The language is adopted.</li><li>3. Press <b>ESC</b>. The check list is shown.</li></ol>
Date format	
	<ol style="list-style-type: none"><li>1. Press <math>\Delta\nabla</math> to select a date format.</li><li>2. Press <b>SET</b>. The date format is adopted.</li><li>3. Press <b>ESC</b>. The check list is shown.</li></ol>

<p><b>Date</b></p> 	<ol style="list-style-type: none"> <li>1. Press <b>SET</b>. The date flashes.</li> <li>2. Press <math>\Delta\nabla</math> to change the day</li> <li>3. Press <b>SET</b>. The change is adopted.</li> <li>4. Press <math>\nabla</math>. The month is selected.</li> <li>5. Repeat steps 1 to 3 for the month.</li> <li>6. Press <math>\nabla</math>. The year is selected.</li> <li>7. Repeat steps 1 to 3 for the year.</li> <li>8. Press <b>ESC</b>. The check list is shown.</li> </ol>
<p><b>Time format</b></p> 	<ol style="list-style-type: none"> <li>1. Press <math>\Delta\nabla</math> to select a time format.</li> <li>2. Press <b>SET</b>. The time format is adopted.</li> <li>3. Press <b>ESC</b>. The check list is shown.</li> </ol>
<p><b>Time</b></p> 	<ol style="list-style-type: none"> <li>1. Press <b>SET</b>. The hour display flashes.</li> <li>2. Press <math>\Delta\nabla</math> to change the hour.</li> <li>3. Press <b>SET</b>. The change is adopted.</li> <li>4. Press <math>\nabla</math>. The minutes are selected.</li> <li>5. Repeat steps 1 to 3 for the minutes.</li> <li>6. Press <b>ESC</b>. The check list is shown.</li> </ol>
<p><b>Country selection</b></p>  	<p><b>Note</b> The country can only be set once!</p> <ol style="list-style-type: none"> <li>1. Press <math>\Delta\nabla</math> to select a country.</li> <li>2. Press <b>SET</b>.</li> <li>3. Press <b>ESC</b>. The dialogue shown at the left is displayed.</li> <li>4. Press <b>ESC</b> to select a different country by performing step 1 and step 2, or Press <b>SET</b> for a longer period of time (&gt; 1 s) to confirm the currently selected country. The check list is shown.</li> </ol>
<p><b>Reactive power characteristic curve</b></p> 	<ol style="list-style-type: none"> <li>1. Press <math>\Delta\nabla</math> to select the reactive power characteristic curve corresponding to to the local regulations.</li> <li>2. Press <b>SET</b>. The power characteristic curve type is adopted.</li> <li>3. Press <b>ESC</b>. The check list is shown.</li> </ol>

Number of nodes	
	<ol style="list-style-type: none"> <li>1. Press <b>SET</b>. The value flashes.</li> <li>2. Press <math>\Delta\nabla</math> to change the number of nodes.</li> <li>3. Press <b>SET</b>. The value is adopted.</li> <li>4. Press <b>ESC</b>. The check list is shown.</li> </ol>
Node n	
	<ol style="list-style-type: none"> <li>1. Press <math>\Delta\nabla</math> to select a parameter for the node.</li> </ol> <p>Note P % cannot be changed at the first and last nodes (000 %, 100 %).</p> <ol style="list-style-type: none"> <li>2. Press <b>SET</b>. The parameter value flashes.</li> <li>3. Press <math>\Delta\nabla</math> to change the value.</li> <li>4. Press <b>SET</b>. The change is adopted.</li> <li>5. Repeat steps 1 to 4 for the other parameters.</li> <li>6. Press <b>ESC</b>. The check list is shown.</li> </ol>
Display characteristic curve	
	<ol style="list-style-type: none"> <li>1. The previously set reactive power characteristic curve is displayed graphically (example in Fig. left).</li> <li>2. Press <b>ESC</b>. The check list is shown.</li> </ol>
Finish	
	<p>✓ <b>Finish</b> has been selected in the check list and <b>SET</b> has been pressed. One of 2 possible dialogues is displayed.</p>
	<ol style="list-style-type: none"> <li>1. Proceed as follows, depending on the respective dialogue: <ul style="list-style-type: none"> <li>• Dialogue <b>Settings are incomplete</b>: Press <b>SET</b> and work through the open items in the check list.</li> <li>• Dialogue <b>Are all settings correct?</b>: Press <b>ESC</b> to correct settings or Press and hold <b>SET</b> (&gt; 1 s) to finish initial commissioning.</li> </ul> </li> <li>2. If <b>SET</b> was pressed for a longer time then the inverter starts anew and synchronises itself with the grid (Fig. left).</li> </ol>

## 8.4.8 Switching on the DC supply

- ▶ Set the DC circuit breaker on the inverter to position I (Figure 45). After testing via the internal MSD (approx. 2 minutes), the power fed into the grid can be shown on the display (assuming that sunlight is present).

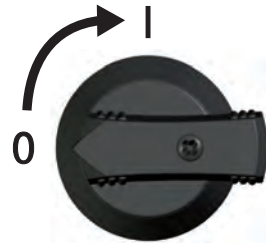


Figure 45  
DC circuit breaker  
set to position I

## 8.4.9 De-installing the inverter

### Danger

Risk of death by electrocution!

Only technical professionals may perform the work described in section *De-installing the inverter*.

Observe the warning notes in chapter 8.4.1.

### Switching off AC and DC supplies

1. Turn the AC circuit breaker to off.
2. Set the DC circuit breaker on the inverter to position 0 (Figure 46).

### Disconnecting DC connections from the inverter

- ▶ Disconnect the DC cable plug connectors according to the manufacturer's instructions.

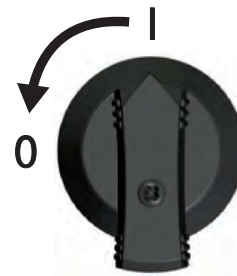


Figure 46  
DC circuit breaker  
set to position 0

### Warning

DC cables are under current if light falls on the modules.

### Disconnecting the AC plug from the inverter

1. Remove the AC plug from the socket on the inverter as described in chapter 19.2.
2. Check that all pins of the AC plug are free of voltage. Use a suitable voltmeter for this (do not use a simple neon phase checker).

### Opening the AC plug (only if required)

- ▶ Open the AC plug as described in the Appendix under Mounting > AC plugs.



### Removing the inverter from the mounting plate

1. Use one hand to press the retaining plate on the mounting plate approx. 5 mm (0,20 in) towards the mounting surface ① (Figure 47)
2. Use the other hand to push the inverter upwards, far enough so that the retaining plate no longer latches ② Release the retaining plate.
3. Lift the inverter with both hands until the hooks on the rear side of the inverter are free ③
4. Remove the inverter from the mounting surface ④

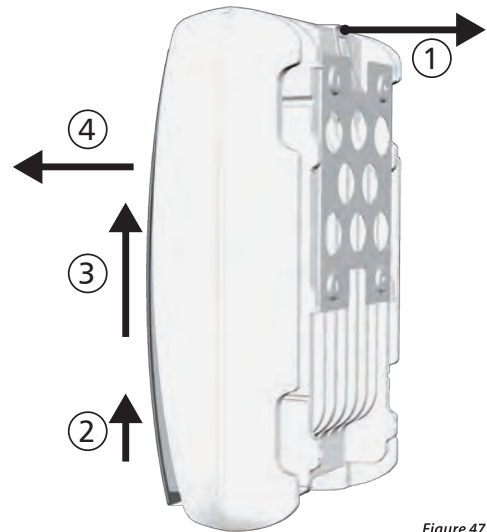


Figure 47

## 9. Structure and Function of the Inverter SF-WR

### 9.1 Casing

#### SF-WR-3000 / SF-WR-3600 / SF-WR-4200

- ① Hood
- ② Display (monochrome, 128 x 64 Pixel)
- ③ Type plate, warning notices
- ④ Operating buttons: **ESC**,  $\Delta$ ,  $\nabla$ , **SET** (from left to right)
- ⑤ 1x AC connection
- ⑥ 2x RJ45 sockets (RS485 bus)
- ⑦ 1x Minus DC connection (-) for solar modules (Phoenix Contact SunClix, contact proof)
- ⑧ 1x RJ45 socket (Ethernet)
- ⑨ 1x Plus DC connection (+) for solar modules (Phoenix Contact SunClix, contact proof)
- ⑩ DC circuit breaker (interrupts the plus and minus inputs simultaneously)

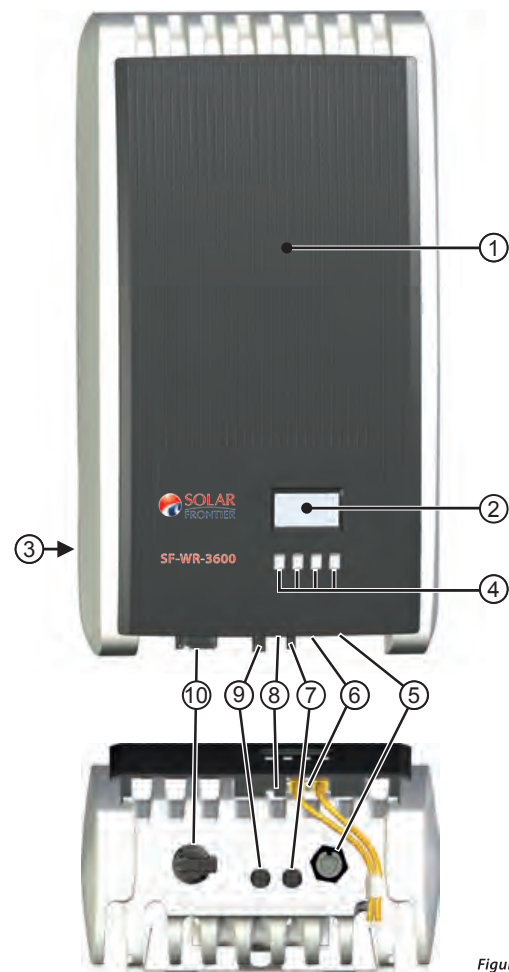


Figure 48

The casing components are described in detail below.

**SF-WR-3203 / SF-WR-4003 / SF-WR-4803 / SF-WR-5503**

- ① Hood
- ② Display (monochrome, 128 x 64 Pixel)
- ③ Type plate, warning notices
- ④ Operating buttons: **ESC**,  $\Delta$ ,  $\nabla$ , **SET** (from left to right)
- ⑤ 1x AC connection
- ⑥ 2x RJ45 sockets (RS485 bus)
- ⑦ 1x Minus DC connection (-) for optional energy storage system (Phoenix Contact SUNCLIX, contact proof)
- ⑧ 1x Minus DC connection (-) for solar modules (Phoenix Contact SUNCLIX, contact proof)
- ⑨ 1x RJ45 socket (Ethernet)
- ⑩ 1x Plus DC connection (+) for solar modules (Phoenix Contact SUNCLIX, contact proof)
- ⑪ 1x Plus DC connection (+) for optional energy storage system (Phoenix Contact SUNCLIX, contact proof)
- ⑫ DC circuit breaker (interrupts the plus and minus inputs simultaneously)

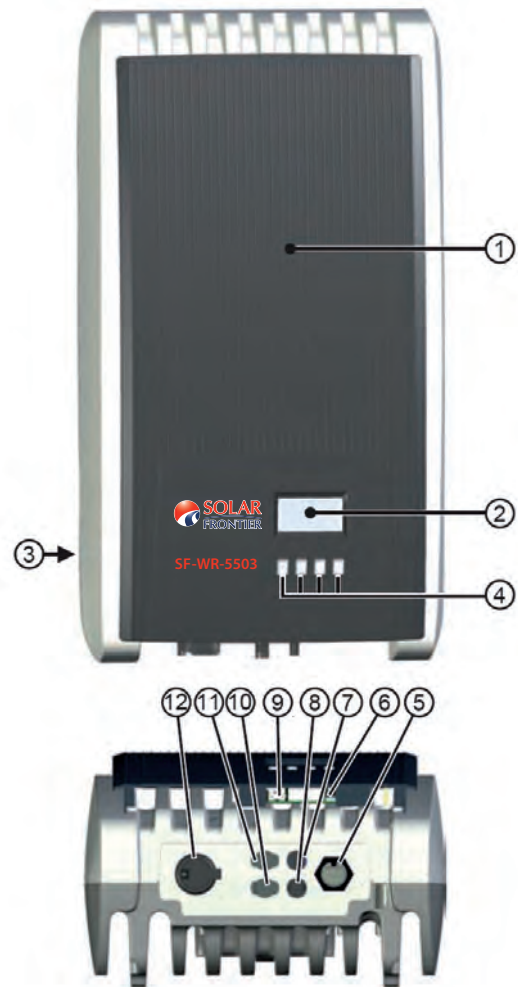


Figure 49

The casing components are described in detail below.

## 9.2 Operating buttons

The operating buttons (④ in Figure 48 und 49) have the following functions:


Button	Action	Function general	Guided configuration
ESC	Press briefly	jumps up by 1 menu level	navigates 1 step
	Press longer (≥ 1 second)	discards any changes	
	Press longer (≥ 1 second)	jumps to status display	jumps to the start of the guided configuration process
$\Delta$	Press briefly	<ul style="list-style-type: none"> <li>• moves the selection bar or the display content upwards</li> <li>• when performing numerical settings, moves the selection 1 position to the left</li> <li>• increases the setting value by 1 step</li> </ul>	
$\nabla$	Press briefly	<ul style="list-style-type: none"> <li>• moves the selection bar or the display content downwards</li> <li>• when performing numerical settings, move the selection 1 position to the right</li> <li>• decreases the setting value by 1 step</li> </ul>	
SET	Press briefly	jumps down 1 menu level	–
	Press longer (≥ 1 second)	<ul style="list-style-type: none"> <li>• a selected numerical value starts flashing and can be changed</li> <li>• accepts a change</li> <li>• changes the state for a control element (checkbox/ radio button)</li> </ul>	
	Press longer (≥ 1 second)	answers a query dialogue with yes	navigates 1 step forward

Table 3

## 9.3 Display

### 9.3.1 General information

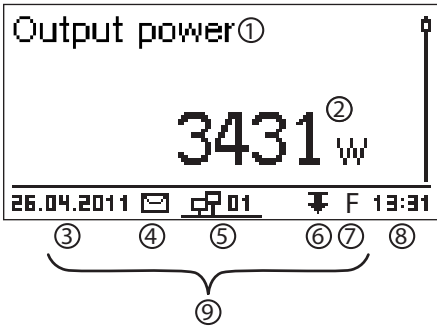



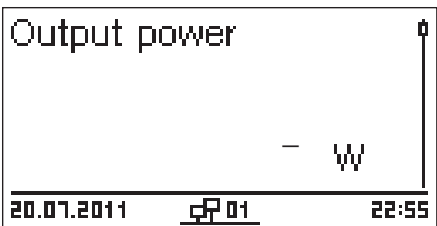

For information shown in the display (② in Figure 48 und 49) the following generally applies:

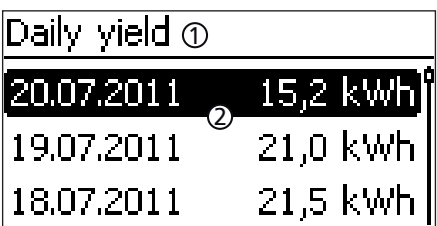
- Symbol : the inverter is processing large amounts of data and is not able to process any user input at this times. The resulting waiting time is indicated by the animated sun symbol.
- Errors are indicated by a red flashing backlighting. An event message is also displayed at the same time.

### 9.3.2 Information

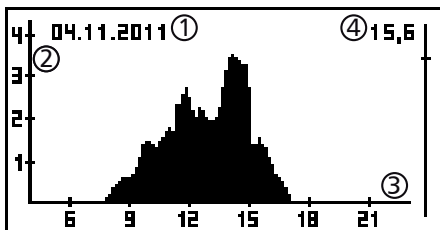
The information shown on the display is described below using illustrative examples.

The status display shows the following values:

Status display	
 <p>Output power ① 3431 ② W 26.04.2011 ③  ④  01 ⑤  F 13:31 ⑧ ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨</p>	<ul style="list-style-type: none"> <li>① Measurement name</li> <li>② Measurement with units</li> <li>③ Date</li> <li>④ Symbol <i>non-confirmed event messages</i>; more information on this is provided in 9.9.</li> <li>⑤ Animated <i>Connect</i> symbol with 2-digit inverter address; indicates data traffic on the RS485 bus.</li> <li>⑥ Symbol <i>derating</i></li> <li>⑦ Symbol <i>Fixed voltage mode</i> activated</li> <li>⑧ Time</li> <li>⑨ IP address of the device when a network connection has been established, display alternates with ③ - ⑦</li> </ul>
 <p>Output power - W 20.07.2011  01 22:55</p>	<p>The following applies to the status display:</p> <ul style="list-style-type: none"> <li>• The measurements shown in the status display are defined under <b>Settings/Measurement values</b>. Some measurements are always displayed (default setting).</li> <li>• Current values are not displayed at night (solar irradiation too low; example in Figure left).</li> <li>• The <b>CO<sub>2</sub> savings</b> shown in the staus display are calculated using the savings factor of 508g/kWh</li> </ul>

Numeric Yield (day, month, year)	
 <p>Daily yield ① 20.07.2011 ② 15,2 kWh 19.07.2011 21,0 kWh 18.07.2011 21,5 kWh</p>	<p>Daily, monthly and annual yield can be displayed numerically in a list.</p> <ul style="list-style-type: none"> <li>① Yield period (day/month/year)</li> <li>② Individual yields with period and value (1 per row)</li> </ul> <p>The yield periods contain the following numbers of individual entries:            Day yield: last 31 days <sup>1)</sup>            Monthly yield: last 13 months <sup>1)</sup>            Annual yield: last 30 years <sup>1)</sup></p> <p><sup>1)</sup> A yield value of 0 is shown when the inverter has not yet been installed at that time.</p>

### Graphical Yield (day, month, year)

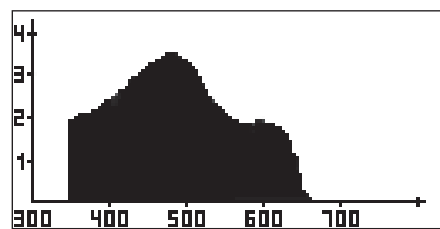
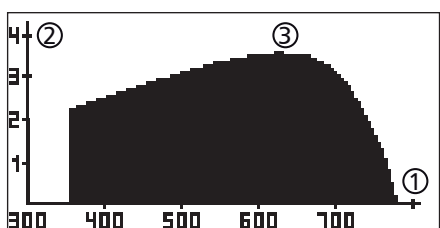


Daily, monthly, and annual yields can be graphically displayed in a chart.

- ① Period for a single yield value (here: day yield).
- ② y-axis:
  - Yield in kWh
  - With an extra M: yield in MWh
  - The scaling changes depending on the maximum value
- ③ x-axis: time in hours / days/ months/ years
- ④ Total of all individual yields shown in the graph, in kWh; The graphical representation can show annual yields for the last 20 years.

### Event messages (See section 9.9).

#### Generator characteristic curve

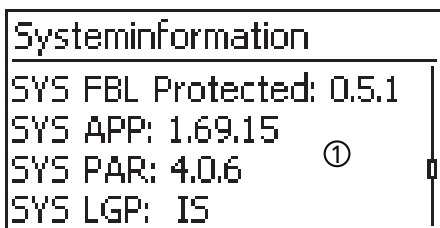


- ① x-axis: input voltage in V
- ② y-axis: power in kW
- ③ Peak = MPP

When the *Generator characteristic curve* menu item is called, the inverter records the generator characteristic curve of the generator and then displays it (see left). The following applies:

- The inverter traverses the input voltage range and records the power generated over this range. Duration: a few seconds, is displayed.
- The MPP is the peak of the generator characteristic curve.
- This peak and the generator characteristic curve change with the level of solar irradiation.
- Multiple peaks are a sign of partial shading (see example on the left).
- If the top of the curve is flat then the inverter may possibly no longer feed power into the grid.

#### Information

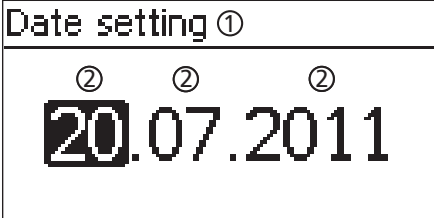
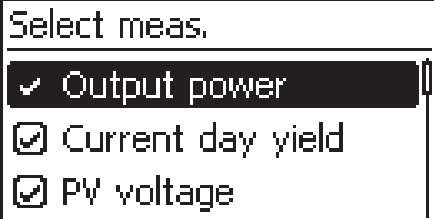


The **information** menu item contains the following submenu items:

- **Contact information**
- **Systeminformation** (see left):
  - Product designation
  - Serial number of the inverter
  - Information on the software and hardware versions of the inverter (see example ① on the left)
  - Inverter address
  - Version of the relevant operating instructions for the inverter.
- **Country setting:** currently set country and country-specific grid parameters.
- **React.pwr.char.curve:** reactive power characteristic curve graph (only when prescribed for currently set country)
- **Network:** network parameters, partially configurable under **Settings > Network**
  - **DHCP status:** DHCP on/off
  - **Link status:** Network connection state
  - **IP address:** IP address of the inverter
  - **Subnet mask:** subnet mask of the inverter
  - **Gateway:** IP address of the network gateway
  - **DNS address:** IP address of the DNS server
  - **MAC address:** hardware address of the inverter
- **Result of the last self test:** (only when the configured country is *Italy*)

### 9.3.3 Settings

The control elements shown on the display, which are used for performing settings in the inverter, are described below using illustrative examples:

Numerical settings	
	<p>① Designation of the numerical setting.            ② Value to be set; the selected value to be set is highlighted in black.</p> <p>When performing numerical settings of remuneration and dates, the following applies:</p> <p><b>Remuneration</b></p> <ul style="list-style-type: none"> <li>• Possible currencies: £ (pound), € (Euro), kr (Krone), <b>none</b>.</li> <li>• The maximum value that can be set for remuneration is limited for technical reasons. The remuneration must be set using different units as required. Example: dollars instead of cents (set a currency of <b>none</b>).</li> </ul> <p><b>Date</b></p> <p>When setting the month/year, a check is performed to ensure that the selected day is valid. If not, then the day is automatically corrected.            Example: 31.02.2011 is corrected to 28.02.2011.</p>
Selection of the measurements	
	<p>Selection of the measurements to be shown in the status display. The following measurements can be selected:</p> <ul style="list-style-type: none"> <li>• <b>Output power:</b> output power of the inverter <sup>1)</sup></li> <li>• <b>Act. day yield:</b> daily yield since 0:00</li> <li>• <b>PV Voltage:</b> voltage supplied by the solar modules</li> <li>• <b>PV Current:</b> current supplied by the solar modules</li> <li>• <b>Grid voltage</b><sup>1)</sup></li> <li>• <b>Grid current:</b> current fed into the mains grid</li> <li>• <b>Grid frequency</b></li> <li>• <b>Internal temperature:</b> internal temperature of the inverter.</li> <li>• <b>Derating:</b> cause for the derating <sup>2)</sup></li> <li>• <b>Max. daily power:</b> maximum power supplied in the current day. <sup>3)</sup></li> <li>• <b>Absolute max. power:</b> maximum power ever fed into the grid. <sup>3)</sup></li> <li>• <b>Max. daily yield:</b> max. daily yield achieved <sup>3)</sup></li> <li>• <b>Operating hours:</b> the operating hours during which the device has been connected to the grid (including nighttime hours)</li> <li>• <b>Total yield:</b> yield since commissioning</li> <li>• <b>CO<sub>2</sub> saving:</b> CO<sub>2</sub>-savings achieved since commissioning</li> </ul> <p><sup>1)</sup> Measurement is always displayed (cannot be switched off)  <sup>2)</sup> Possible causes:</p> <ul style="list-style-type: none"> <li>- internal temperature too high</li> <li>- User default Power limiter</li> <li>- frequency too high</li> <li>- controlled by grid operator (feed-in management)</li> <li>- delayed increase in power after starting</li> </ul> <p><sup>3)</sup> can be reset to 0 via: <b>Settings/Reset max. Values</b></p>

Acoustic Alarm	
<p>Acoustic alarm</p> <p><input checked="" type="checkbox"/> On</p> <p><input type="checkbox"/> Off</p>	<p>An acoustic alarm sounds (approx. 4.5 kHz) when an event message is displayed.</p> <ul style="list-style-type: none"> <li>• 2 tones: warning</li> <li>• 3 tones: error</li> </ul> <p>The acoustic alarm is switched off with the factory default settings.</p>

Backlighting	
<p>Backlight</p> <p><input type="checkbox"/> off</p> <p><input checked="" type="checkbox"/> automatic</p> <p><input type="checkbox"/> Grid feed</p>	<ul style="list-style-type: none"> <li>• <b>off</b></li> <li>• <b>automatic:</b> switches on for 30 seconds when a button is pushed.</li> <li>• <b>Grid feed:</b> <ul style="list-style-type: none"> <li>- Not feeding: switches on for 30 seconds when a button is pushed; then switches off.</li> <li>- Feeding: switches on for 30 seconds when a button is pushed; then dims.</li> </ul> </li> </ul>

**Note:**

The following section assumes that you know the parameters required for setting up the TCP/IP network connection. Consult (further) technical professionals if required.

DHCP is activated in the device ex-works. This allows automatic integration of the device in most networks.


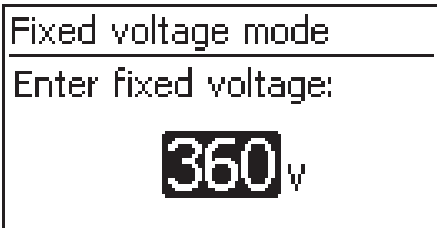
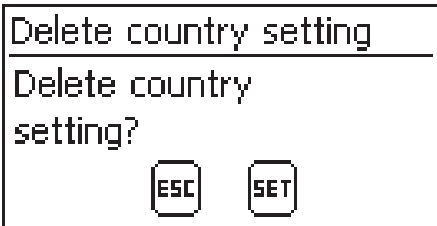
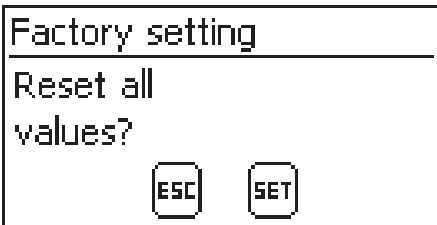
TCP/IP-Network	
<p>Network</p> <p><b>DHCP</b></p> <p>IP address</p> <p>Subnet mask</p>	<p>Network settings, required for network communication, e. g. with an Internet portal:</p> <ul style="list-style-type: none"> <li>• <b>DHCP:</b> switch DHCP on/off</li> <li>• <b>IP address:</b> IP address of the inverter</li> <li>• <b>Subnet mask:</b> subnet mask of the inverter</li> <li>• <b>Gateway:</b> IP address of the network gateway</li> <li>• <b>DNS address:</b> IP address of the DNS server</li> <li>• <b>Connection test:</b> Tests the Internet connection and then displays the result</li> </ul>

### 9.3.4 Service menu

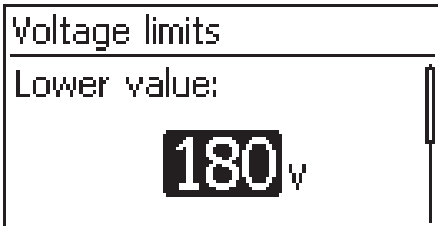
The following section describes the service menu items. Some items have password protection. You can also obtain the password from our technical support; see chapter 17.

#### Attention

Risk of reduced yields. Inverter and grid parameters can be changed in the service menu. The service menu may only be used by technical professionals who can ensure that the changes do not contravene the applicable regulations and standards.

Power limiting	
 <p>Power limiter</p> <p>3600 W</p>	<p>The inverter output power can be manually limited to a minimum of 500 W. When the power is manually limited, the <b>Derating</b> symbol is shown in the status display and the <b>Derating/Cause: User default</b> measurement is displayed.</p>
Fixed voltage	
 <p>Fixed voltage mode</p> <p>Enter fixed voltage:</p> <p>360 V</p>	<p>The device can regulate the input voltage to a manually adjustable value. This switches off the automatic setting of the MPP (MPP tracking). The input voltage can be adjusted over a range between the maximum and minimum input voltage. Example of application: fuel cell.</p>
Delete country setting	
 <p>Delete country setting</p> <p>Delete country setting?</p> <p>ESC SET</p>	<p>After the country setting has been deleted, the device starts a new and displays the guided initial commissioning menu.</p>
Factory setting	
 <p>Factory setting</p> <p>Reset all values?</p> <p>ESC SET</p>	<p>Resetting the device to the factory setting deletes the following data:</p> <ul style="list-style-type: none"><li>• Yield data</li><li>• Event messages</li><li>• Date and time</li><li>• Country setting</li><li>• Display language</li><li>• Network settings</li></ul> <p>After the factory setting has been deleted, the device starts a new and displays the guided initial commissioning menu.</p>

### Voltage limits (peak values)

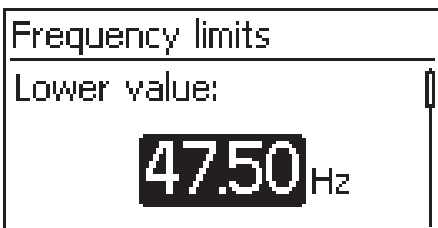


The following voltage limits can be changed:

- Upper disconnection value <sup>1)</sup>
- Lower disconnection value <sup>1)</sup> (figure left)

<sup>1)</sup> The disconnection value relates to the peak value of the voltage.

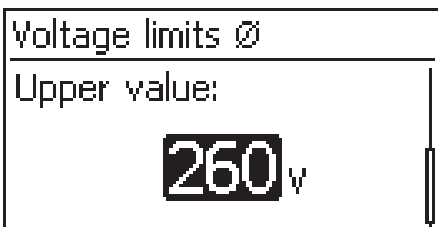
### Frequency limits



The following frequency limits can be changed:

- Upper disconnection value.
- Lower disconnection value (figure left)
- Derating switch-on threshold (because frequency is too high)
- Frequency threshold when switching on again.

### Voltage limits Ø (average value)

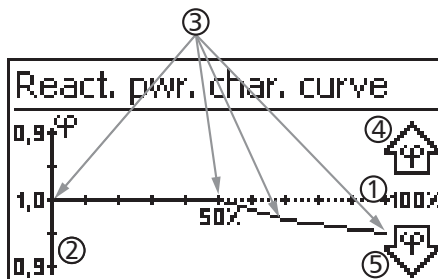
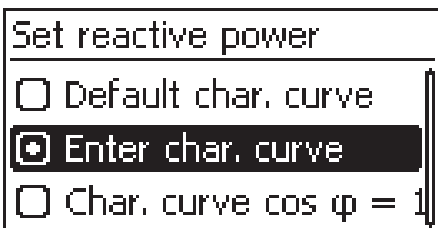


The following voltage limits can be changed:

- Upper disconnection value <sup>1)</sup> (Figure left)
- Lower disconnection value <sup>1)</sup>

<sup>1)</sup> The disconnection value relates to the average value of the voltage.

### Reactive power characteristic curve - Overview



The reactive power characteristic curve must be set during initial commissioning if this is prescribed for the previously selected country. The following applies:

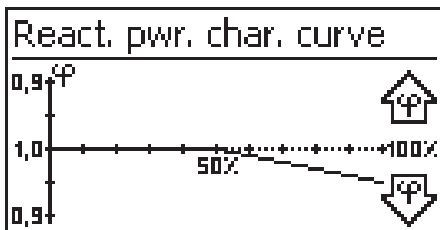
- 3 characteristic curves are available for selection (see left):
  - **Default. char. curve** (pre-defined)
  - **Enter char. curve** (manually adjustable)
  - **Char. curve cos φ = 1** (pre-defined)

• After configuration, the characteristic curve is displayed as a graph (example left).

- ① x-axis, output power P in %
- ② y-axis, phase shift cos φ
- ③ nodes (in example: 4 nodes)
- ④ arrow symbol overexcitation
- ⑤ arrow symbol underexcitation



## Technical details



- Each characteristic curve is defined by 2 to 8 nodes.
- A node is defined by the output power P of the inverter (x-axis) and the associated phase shift (y-axis).
- The phase shift can be set over a range of 0.95 (overexcitation) through 1.00 (no phase shift) to 0.95 (underexcitation)
- The type of phase shift is shown in the graph using arrow symbols defined as follows (defined from the point of view of the inverter):
  - ↑ Overexcitation - inductive
  - ↓ Underexcitation - capacitive
- The 3 characteristic curves available for selection have the following properties:
  - Default char. curve:** pre-defined according to the selected country (example left)
  - Char. curve  $\cos \varphi = 1$ :** pre-defined with  $\cos \varphi =$  constantly 1.00. this characteristic curve must be selected if no reactive power control is to be performed on the device.
  - Enter char. curve:** the number of nodes and their x/y values can be configured. Exceptions: the first node is always located at x (P%)= 0% and the last node is always located at x (P%) = 100%.

## All parameters

Service technicians can use this menu item for changing additional MSD parameters.

## 9.4 Cooling

The internal temperature control system prevents excessive operating temperatures. When the internal temperature is too high, the inverter adjusts the power consumption from the solar modules to reduce the heat dissipation and operating temperature.

The inverter is convection cooled via fins on the front and rear side. A maintenance-free fan circulates the heat within the closed casing evenly over the entire surface of the casing.

## 9.5 Grid monitoring

The inverter constantly monitors the mains grid parameters while feeding the grid. If the grid deviates from the legally prescribed specifications then the inverter automatically switches off. When the grid conforms to the legally prescribed specifications then the inverter automatically switches on again.

### 9.5.1 Data communication

The device has the following communication interfaces:

- 1x RJ45 socket (Ethernet for TCP/IP network) for communication, e. g. with a central data server
- 2x RJ45 sockets (RS485 bus) for communication with external devices, e. g. a data logger

## Data

The inverter can transmit a wide range of data to other devices. Some of this data is shown on the display and certain data is stored in the internal memory (EEPROM) as described below.

### Displayed data

- Voltage and current of the solar generator
- Power and current fed into the grid
- Voltage and frequency of the power grid
- Energy yields on a daily, monthly and annual basis
- Error conditions, notes
- Version information

### Logged data (EEPROM)

- Event messages with date
- Energy yields on a daily, monthly and annual basis (Table 4)

The storage resolution of the energy yield data is as follows:

Energy yield data	Storage resolution/Period
10-minute values	31 days
Daily values	13 months
Monthly Values	30 years
Annual values	30 years
Total yield	permanent

Table 4

### Network (TCP/IP)

The device can transfer yield data and event messages via the TCP/IP interface to the Internet portal server at <http://public.meteocontrol.com/>. The yield data can be displayed graphically in the Internet portal as illustrated below. This service is free of charge for a period of 2 years from the time of registration. The following applies:

- The user must first register at <http://www.solar-frontier.eu/en/products/powersystems/powersets/monitoring/> before the Internet portal can be used. More information on this is provided in chapter 9.7.
- The local network settings must be set at the inverter in order to establish a connection to the Internet portal server. This can be performed automatically or manually:  
**Automatically:** If IP addresses are automatically assigned in your network (DHCP), then no settings need to be made at the inverter.  
**Manually:** If IP addresses are not automatically assigned in your network, then you must manually set the inverter network settings via **Settings > Network**, see p. 37.



Figure 50

- The address of the Internet portal server is permanently stored in the inverter and cannot be changed.
- Once the network connection is established, the inverter automatically starts non-encrypted transmission of data to the server.

---

### Attention

The network cable must be disconnected in order to prevent transmission of the data.

---

## RS485 bus

The inverter communicates with other devices via an RS485 bus. The following applies:

- The inverter has two RS485 interfaces (RJ45 sockets) on the lower side of the casing.
- The beginning and end of the RS485 bus must be terminated; see P. 44.
- Standard RJ45 cables can be used as bus cables (Cat-5 patch cables, not supplied). Use an alternative data connection cable for longer connections; see P. 44.
- The inverters connected to the RS485 bus operate as bus slave units.

---

### Attention

The following inverters have compatible data interfaces and can be connected to the RS485 bus as slaves:

SF-WR-3000, -3600, -4200, -3203, -4003, -4803 und -5503.

Observe the manuals of these devices concerning the definition of addresses, termination and permissible data cables.

---

### Attention

If a country setting of Italy is set then the RS485 bus must be wired as follows in order to allow control via an external device as per CEI 0-21:

– External fast disconnection (Ital.: Teledistacco): If wires 3<sup>1)</sup> and 8<sup>1)</sup> of the RS485 bus 2) are connected, e. g. via an external relay, then the following applies:

*Relay closes:* The inverters connected to the bus disconnect themselves from the grid.

*Relay opens:* The inverters connected to the bus connect themselves from the grid (normal operation).

– Switch-over of the grid frequency disconnection thresholds (Ital.: Modalità definitiva di funzionamento del sistema di protezione di interfaccia (impiego del SPI sulla base di letture locali e di informazioni/comandi esterni)): If wires 5<sup>1)</sup> and 8<sup>1)</sup> of the RS485 bus<sup>2)</sup> are connected, e. g. via an external relay, then the following applies:

*Relay closes:* The inverters connected to the bus set the switch-off thresholds as per CEI 0-21 to 47.5 Hz and 51.5 Hz.

*Relay opens:* The inverters connected to the bus set the switch-off thresholds as per the Italy country setting; see the Technical Data section.

We recommend integrating the interconnection of wires 3, 5 and 8 into the bus termination.

<sup>1)</sup> Pin assignments of the RJ45 plug for the RS485 bus: see Fig. 51.

<sup>2)</sup> See ⑥ under 9.1, p. 33.

---



Figure 51

One (!) of the following master devices can be connected to the RS485 bus.

The devices support the transfer protocol used by the inverter.

- Energy management unit StecaGrid SEM: Interface to a ripple control receiver for EEG compliant feed-in management
- PC or notebook (with suitable software, for technical professionals only):
  - Load firmware updates
  - Read inverter information using service software
  - An optional RS485 ↔ USB adapter for connecting to the inverter is also available.
- External data loggers, recommended for professional system monitoring:
  - WEB'log (Meteocontrol)
  - Solar-Log (Solare Datensysteme)

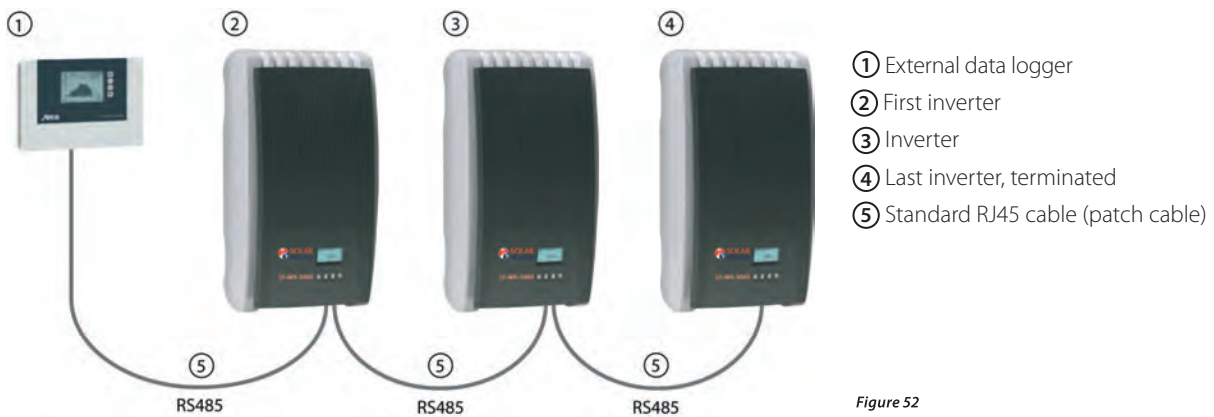
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**Note**

The correct settings must be made in external data loggers, according to the manufacturer's instructions, before connecting them to the bus.

---

The wiring diagram of the RS485 bus is shown below.



---

**Alternative data connection cable**

---

**ATTENTION!**

Material damage caused by electrical voltage! The alternative data connection cable may only be manufactured by professional personnel.

---

The alternative data connection cable is a Cat-5 cable for long data connections. The following applies to the alternative data connection cable

- The total length of the RS485 bus must not exceed 1,000 m (master/first inverter to last inverter)
- Use the pin assignment according to the table below if the alternative data connection cable is connected to the RJ45 socket of the first inverter and to the connector of the data logger.

**Pin assignments of the alternative data cable**

Device	Inverter	Solar -Log	WEB'log	Signal
Connection	RJ45	Terminal strip	RJ12	
Pin	1	1	2	Data A
	2	4	4	Data B
	3	—	—	—
	4	—	—	—
	5	—	—	—
	6	—	—	—
	7	—	—	—
	8	3	6	Ground

---

**Attention**

Danger of destroying the RS485 input of the inverter. Pin 1 of the RJ12 socket of the Web'logdata logger carries 24 V DC. Never connect the alternative data connection cable to pin 1!

---

**Termination**

To prevent data transmission errors, the start and end of the RS485 bus should be terminated:

- The external data logger (at the start of the data connection) must be terminated according to the manufacturer's specifications.
- The last inverter (at the end of the data connection) is terminated by plugging the optionally available termination plug into the free RJ45 socket (for RS485 bus).

## Addressing

Every inverter must be assigned its own unique address for communication between the bus master and the slaves. Every inverter is set with an address of 1 at the factory. This means that the addresses must be adjusted in systems having more than 1 inverter. The following applies:

- The address is changed at the inverter via the menu items **Settings > Address** .
- Only addresses ranging from 1 – 99 may be set.
- The bus master devices usually support less than 99 addresses. Consult the respective operating instructions for these devices before setting the addresses of the inverters.
- We recommend starting with address 1 for the first inverter on the bus and then incrementing the address by 1 for each subsequent inverter on the bus, in the same order as they are physically installed. This makes it easier to identify the relevant inverters when their address is displayed in messages shown on the remote display.

## Feed-in management

Depending on the country, the active power fed into the grid by a photovoltaic system must be able to be reduced by the grid operator. The following products are recommended for implementing this legally prescribed specification:

- StecaGrid SEM
- WEB'log from Meteocontrol
- Solar-Log from Solare Datensysteme

## 9.6 Operation

### 9.6.1 Overview of operating functions

For the sake of clarity, only the operating buttons  $\nabla$  and SET are illustrated.

Operating functions for PowerSets 2.0-170-1p / 2.4-170-1p / 3.0-165-1p / 3.1-170-1p / 3.6-170-1p / 4.1-170-1p / 4.8-170-1p / 5.1-170-1p / 5.9-165-1p / 6.1-170-1p / 7.1-170-1p / 8.2-170-1p

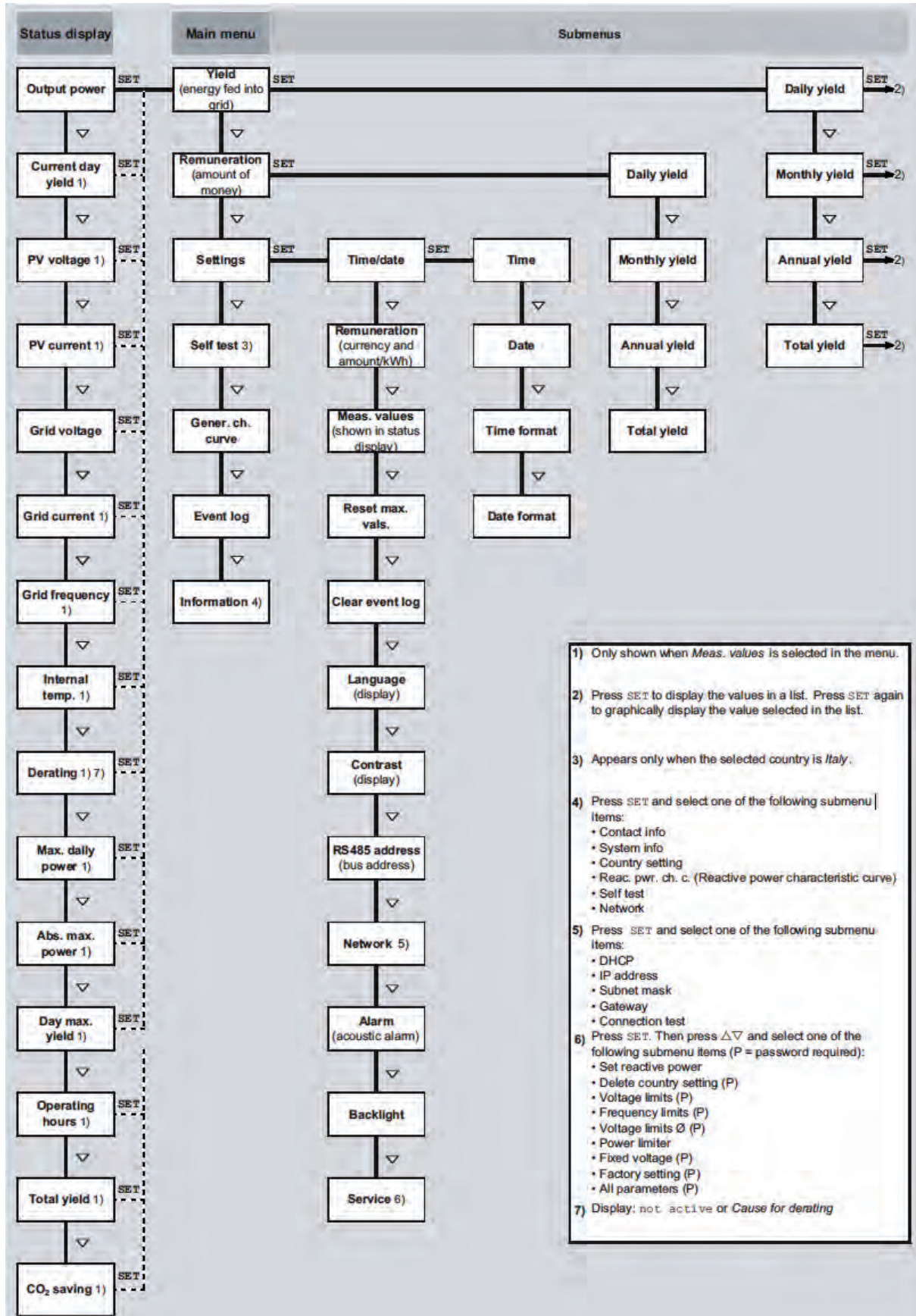


Figure 53

Operating functions for PowerSets 3.1-170-3p / 4.1-170-3p / 5.1-170-3p / 6.0-170-3p

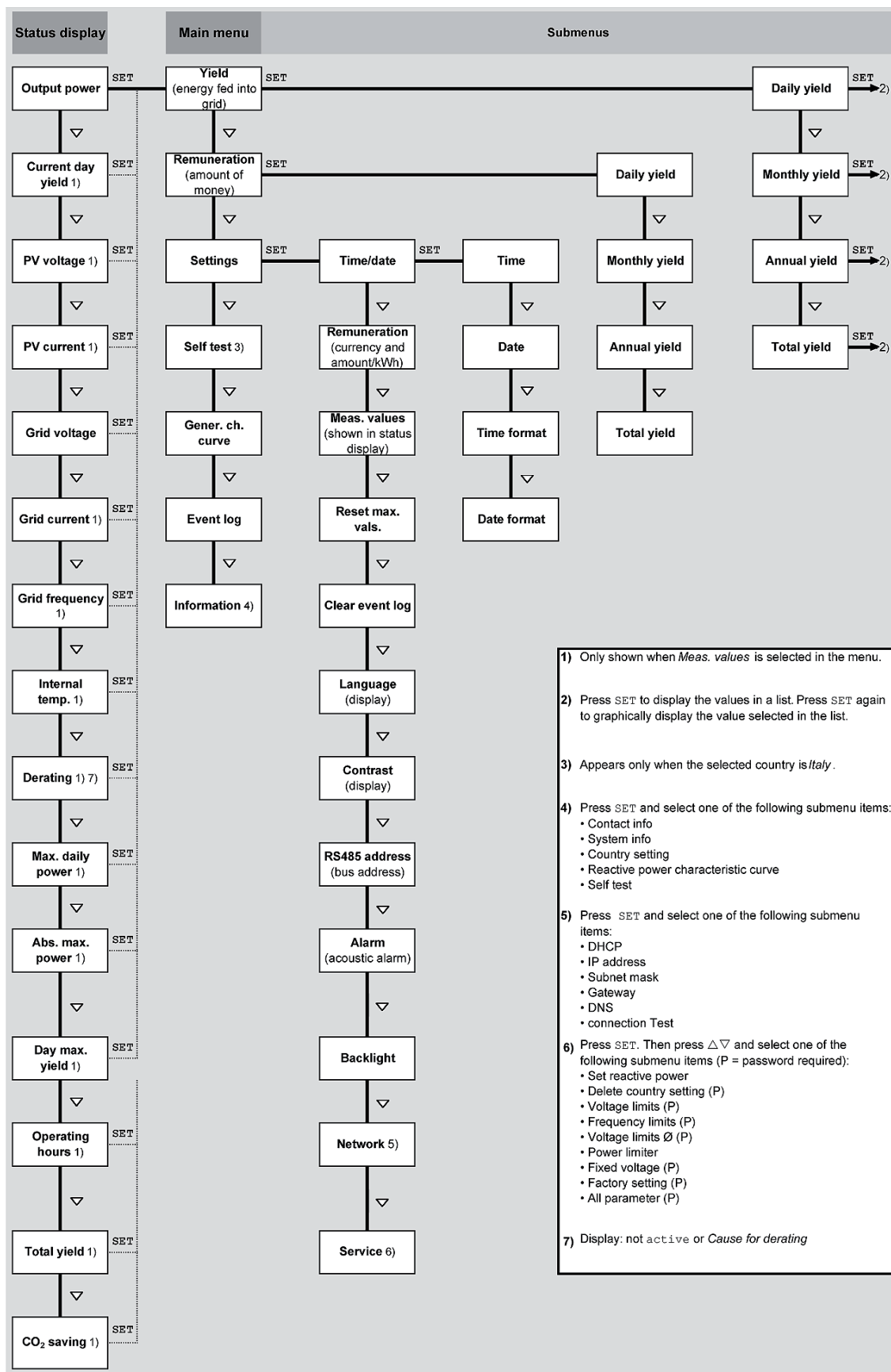


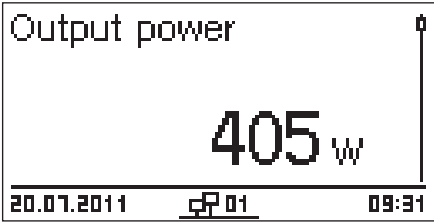

Figure 54

## 9.6.2 General operating functions

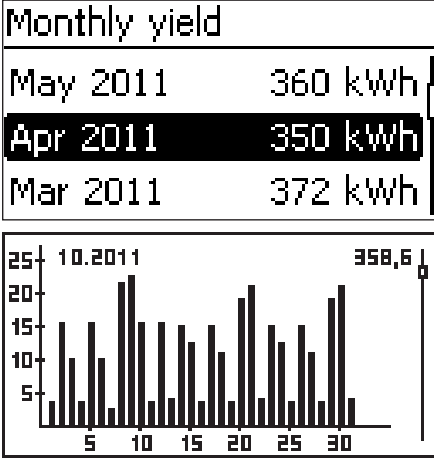
- Hidden content is shown using the  $\Delta$  and  $\nabla$  buttons.
- Repeated button presses: If  $\Delta/\nabla$  need to be pressed repeatedly, you can alternatively hold these buttons pressed for a *long* time. The rate of repetition increases the longer the button is held.
- Pressing any button switches on the display backlighting.

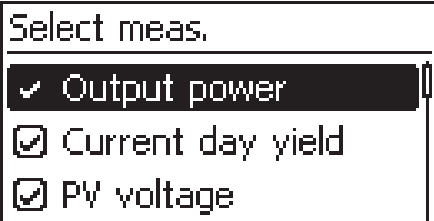
## 9.6.3 Main operating functions

The figures in this section show examples.

Status Display	
	<ol style="list-style-type: none"> <li>1. If necessary press <b>ESC</b> 1 for one second to call up the status display (fig. left).</li> <li>2. Press <math>\Delta/\nabla</math> to display a different parameter.</li> </ol>
Menu Navigation	
	<ol style="list-style-type: none"> <li>1. Press <b>ESC</b> for one second to call up the status display as required.</li> <li>2. Press <b>SET</b>. The main menu is displayed with the top item selected.</li> <li>3. Press <math>\Delta/\nabla</math> to select a menu item.</li> <li>4. Press <b>SET</b>, to call up the submenu (fig. left).</li> <li>5. Repeat steps 3 and 4 for further submenus as required.</li> </ol>

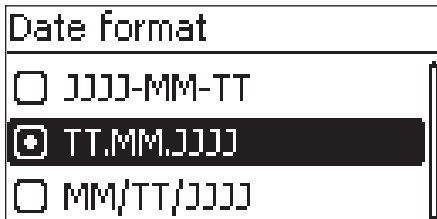
### Event messages (See section 9.9)

Displaying yields numerically (list) and graphically (chart)	
	<p>✓ The status display is shown.</p> <ol style="list-style-type: none"> <li>1. Press <b>SET</b>. The main menu is displayed with <b>Yield</b> selected.</li> <li>2. Press <b>SET</b>. The list with yield times periods is shown.</li> <li>3. Press <math>\Delta/\nabla</math> to select a yield time period.</li> <li>4. Press <b>SET</b>. The individual yields for the yield time period are shown in a list (fig. left).</li> <li>5. Press <math>\Delta/\nabla</math> to select an individual yield value.</li> <li>6. Press <b>SET</b>. The selected individual yield is shown in a chart (fig. left).</li> <li>7. Press <math>\Delta/\nabla</math> to page through the charts.</li> <li>8. Press <b>SET</b> to return to the list.</li> </ol>

Editing selection lists containing check boxes	
	<p>✓ A selection list with check boxes is displayed (fig. left).</p> <ol style="list-style-type: none"> <li>1. Press <math>\Delta/\nabla</math> to select a check box.</li> <li>2. Press <b>SET</b>. The state of the check box changes from <i>on</i> to <i>off</i> and vice-versa (preset check boxes cannot be changed).</li> <li>3. Repeat steps 1 and 2 for further check boxes as required.</li> <li>4. Press <b>ESC</b>. The changes are adopted and the next higher menu level is displayed.</li> </ol>

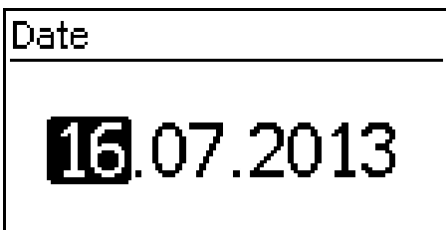


### Editing selection lists containing radio buttons



- √ A selection list with radio buttons is displayed (fig. left).
1. Press  $\Delta/\nabla$  to select a radio button that is currently switched off.
  2. Press **SET**. The selected radio button is switched on and the previously switched on radio button is switched off.
  3. Press **ESC**. The next higher menu level is displayed.

### Changing numeric settings

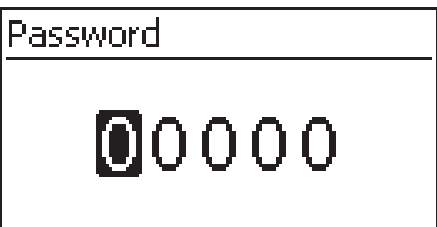
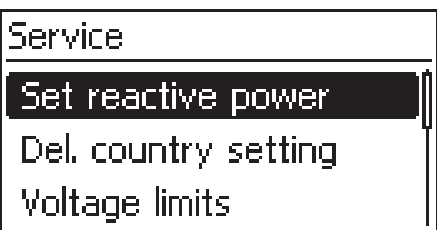
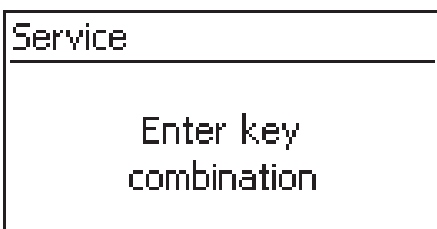


- √ A numeric setting is displayed (example Date in fig. left)
1. Press **SET**. The selected value flashes (Day in fig. left)
  2. Press  $\Delta/\nabla$  to change the value
  3. Press **SET**. The change is adopted (value no longer flashes) or press **ESC** to cancel the change (value no longer flashes).
  4. Press  $\nabla$ . The next value is selected.
  5. Repeat steps 1 to 4 for the remaining values.
  6. Press **ESC**. The next higher menu level is displayed.

### Attention

Risk of yield losses and contravention of regulations and standards. Inverter and grid parameters can be changed in the service menu. The service menu must therefore only be used by technical professionals who know the applicable regulations and standards.

### Calling up the service menu and editing the values



1. Select the **Service** menu item.
2. Press **SET**. The fig. shown at the left appears.
3. Press  $\Delta/\nabla$  simultaneously for 3 seconds. The service menu is displayed (fig. left).
4. Press  $\Delta/\nabla$  to select a menu item.
5. Press **SET** to edit the menu item. The following applies:
  - Enter the password if required (fig. left).
  - Press  $\Delta/\nabla$  within a menu item, if required, to display and edit other settings (e.g. **Voltage limits**).
  - The menu items are described in section 9.3.4.

## 9.7 Internetportal

### 9.7.1 Registration

#### Call up the Internet portal, enter the language and serial number

1. Enter the following address into the Internet browser (or click the address if you are reading this document as a PDF on a computer monitor): <https://www.solar-monitoring.net/registration/?source=0CHFT>.  
Ensure that scripting and cookies for [www.solar-monitoring.net/registration/?source=0CHFT](https://www.solar-monitoring.net/registration/?source=0CHFT) are enabled in the browser.  
→ Figure 55 appears.

The screenshot shows the registration page for the Solar Frontier Monitoring Portal. At the top left is the Solar Frontier logo. At the top right, there is a 'Change language' button with flags for German, English, French, Spanish, and Italian, marked with a circled '1'. Below the logo is the title 'Solar Frontier Monitoring Portal registration'. A 'Data logger' section contains an 'Inverter serial number(s)\*' field with a green '+' button on the left and a text input field containing '123456AB12345678912', marked with a circled '2'. Below the field is a note: '\* Please enter the serial number of the inverter here. Up to 5 inverters can be registered in this registration process.' To the right of the field is a 'Continue' button, marked with a circled '3'. Below the 'Data logger' section are 'User data' and 'System' sections. At the bottom, there is a checkbox for 'I have read the General Terms and Conditions and the Data Protection Regulations and accept them.' and a 'Submit information' button.

Figure 55

2. Select your language using the buttons ① (in Figure 55). The language is set immediately.
3. Enter the serial number of the device into the field ②.

---

#### Note

The serial number always consists of a sequence with 6 numbers – 2 letters – 12 numbers, e. g. 123456AB123456789012.

If you enter an invalid serial number, an error message is displayed and the login process is cancelled.

Press the green button „+“ (at the left next to the field ②), to enter the serial numbers of further inverters (a maximum of 5 inverters are possible).

4. After entering the last serial number, press the button ③.  
→ Figure 56 appears.

## Entering the user data

### Solar Frontier Monitoring Portal registration

The screenshot shows the 'User data' section of the registration form. It includes a 'Registration' sub-section with the following fields and annotations:

- E-mail\*:** A text input field containing 'example@example.com', annotated with a circled 1 (1).
- Password:** A password input field with masked characters, annotated with a circled 2 (2).
- Repeat password:** A second password input field with masked characters, annotated with a circled 3 (3).
- Note:** A note below the password fields reads: '\* Note: Your e-mail address is also your user name.', annotated with a circled 4 (4).
- Buttons:** A 'Back' button on the left (annotated with a circled 6 (6)) and a 'Continue' button on the right (annotated with a circled 5 (5)).

At the bottom of the form, there is a checkbox for 'I have read the General Terms and Conditions and the Data Protection Regulations and accept them.' and a 'Submit information' button.

Figure 56

### Attention

The email address can only be entered once and cannot be subsequently changed! The email address is also the user name; see also 1 in Figure 61, p. 53.

1. Enter your email address into the field 1 (Figure 56). Observe the note 4.
  2. Enter any desired password into the field 2 and repeat the entry of this password in the field 3 (safety check).
  3. Confirm via the button 5
    - or
    - use the 6 button to return to the previous page if necessary (entries in Figure 56 are discarded).
- After 5 has been pressed, Figure 57 appears.

## Entering system data

### Solar Frontier Monitoring Portal registration

The screenshot shows the 'System' section of the registration form. It includes the following fields and annotations:

- System name:** A text input field containing 'PowerSet 3.1', annotated with a circled 1 (1).
- Installed power:** A text input field containing '3.1', annotated with a circled 2 (2), followed by 'kWp' with a green checkmark.
- System description\*:** A text input field containing 'PowerSet 3.1, 1x SF-WR-3000, 18x SF170-S', annotated with a circled 3 (3). Below the field, it says '210 of 250 characters available.'
- Note:** A note below the description field reads: '\* Please enter a short description of the system here. For example, you can enter data about the number and type of solar modules, the inverter and the power of the system. This information will be shown under technical data in Solar Frontier Monitoring Portal.', annotated with a circled 4 (4).
- Site data:** A section with a 'Map' and a 'Determine position' button (annotated with a circled 5 (5)). The map shows a satellite view of a location with a 'Centre card on marker' (annotated with a circled 7 (7)).
- Longitude:** A text input field containing '11.548347000000035', annotated with a circled 8 (8).
- Latitude:** A text input field containing '48.066895', annotated with a circled 9 (9).
- Adresse (optional):** A text input field containing 'Bavariafilmplatz 8, 8203 Grünwald', annotated with a circled 10 (10).
- Buttons:** A 'Back' button on the left (annotated with a circled 10 (10)) and a 'Submit information' button on the right (annotated with a circled 11 (11)).

At the bottom of the form, there is a checkbox for 'I have read the General Terms and Conditions and the Data Protection Regulations and accept them.'

Figure 57

1. Enter any desired name<sup>A)</sup> for your solar system into the field ① in Figure 57.
2. Enter the installed power<sup>A)</sup> of the system into the field ②.
3. Enter a description<sup>A)</sup> of the system into the field ③. Observe the note ④.
4. Use the Google Maps buttons ⑤ to ⑦ to navigate to the location of the system.
  - The location data is displayed in the fields ⑧.
5. Enter an optional address of the system into the field ⑨.
6. Select the check box ⑩ and confirm via the button ⑪.
  - Figure 58 appears; an email with the activation code, as shown in Figure 58, is sent to the email address ① in Figure 55.

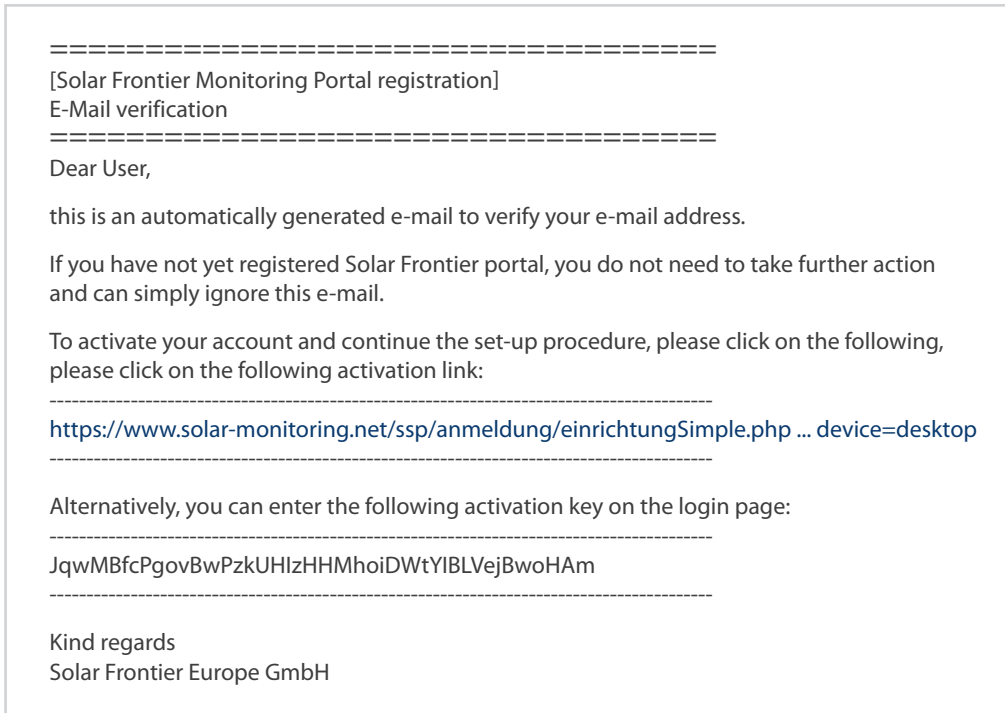


Figure 58

<sup>A)</sup> Data can be subsequently changed.

## Completing registration

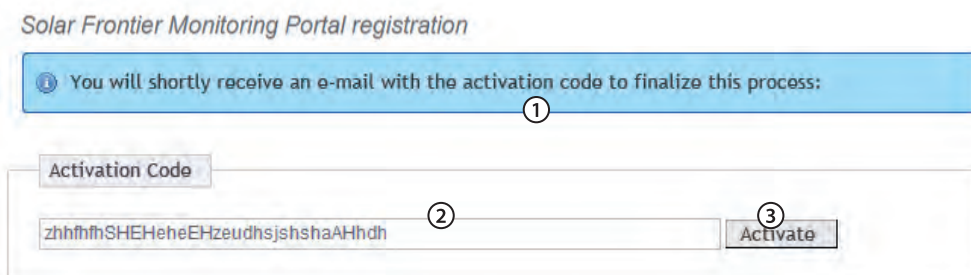


Figure 59

1. Enter the activation code that you received in the email as per Figure 58 into the field ② (Figure 59).
2. Confirm via the button ③.
  - If the registration was successful then Figure 60 appears and you will receive an additional confirmation email (Figure 61). This email contains a direct link to Figure 63, p. 54.

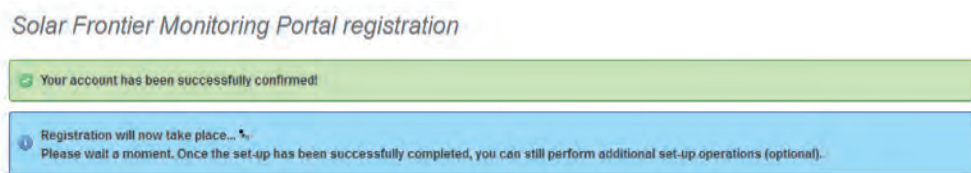


Figure 60

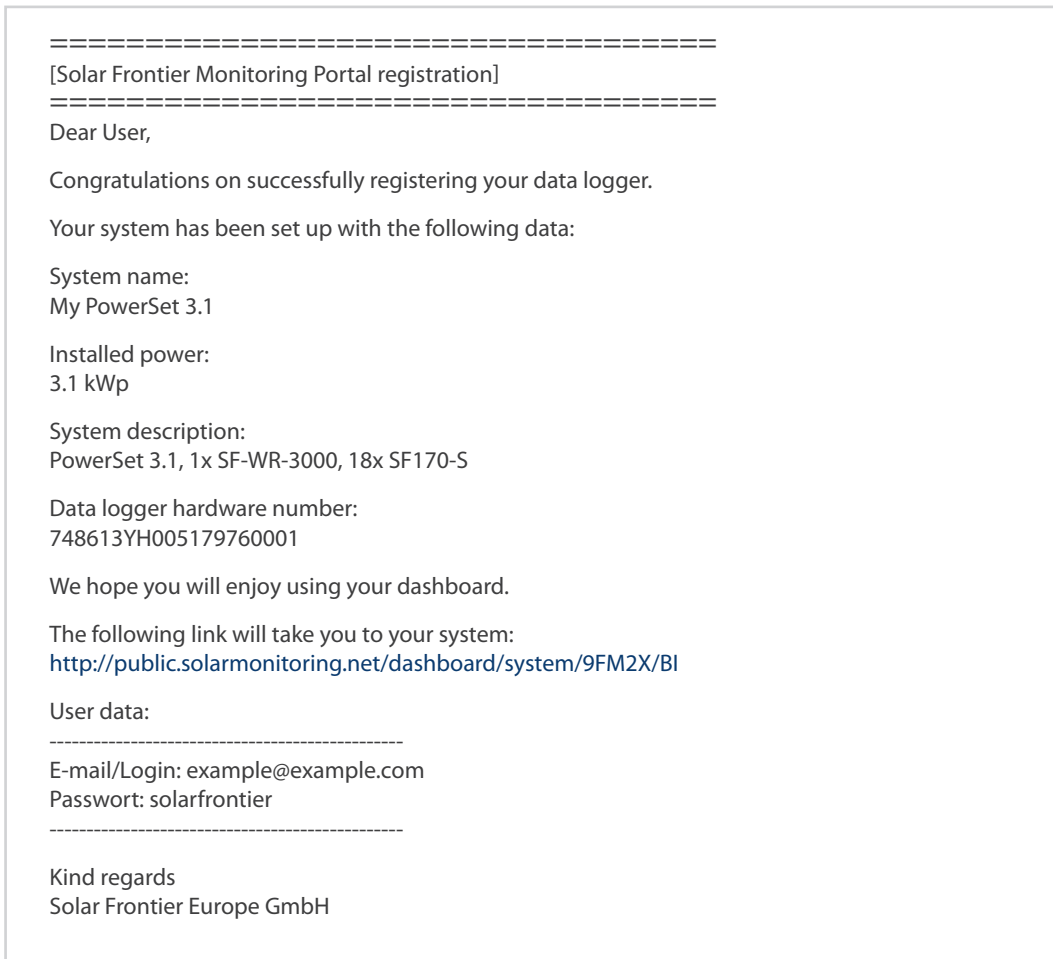
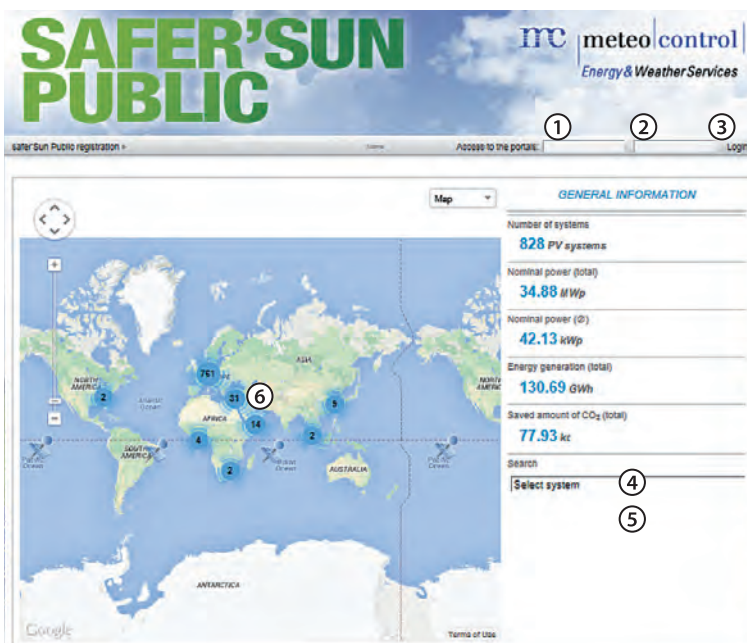


Figure 61

## 9.7.2 Login – Displaying yield data – Changing settings

1. Enter the following address into the browser: <http://public.meteocontrol.com/>. Ensure that scripting and cookies are enabled in the browser.  
→ The home page of the Internet portal as shown in Figure 62 is displayed.
2. The functions as per the legend shown in Figure 57 are available on the home page of the Internet portal.



- ① Username data entry field (= email address)
- ② Password data entry field
- ③ Button for logging in after ① and ② have been entered. After logging in, the functions as per the legend shown in Fig. 58 are available.
- ④ Data entry field for the postal address of the system that is to be displayed.
- ⑤ Data entry field for the name of the system that is to be displayed.
- ⑥ Map for searching for systems.

Figure 62



- ① System data display
- ② Performance data display
- ③ Environmentally related data display
- ④ Buttons for changing the display
- ⑤ Yield charts display
- ⑥ Buttons for setting the period shown in ⑤
- ⑦ Button for changing the *system data*, as described on p. 51.
- ⑧ Button for selecting the language

Figure 63

## 9.8 Self test

The self test is mandatory for operation of inverters in Italy.

### Function

The prerequisites for performing the self test are as follows:

- The country *Italy* was selected during initial commissioning.
- The level of solar irradiation is high enough to ensure that the inverter can feed the grid.

During the self test, the inverter checks its switch-off behaviour with regard to too high / too low grid voltage and frequency (6 test phases, duration of approx. 40 minutes). The following applies:

- In each phase of the self test, the inverter changes its switch-off threshold, step-by-step upwards/downwards from the set lower/upper limit values.
- When the switch-off threshold reaches the actual grid voltage/frequency then the inverter stores this information.
- The data is shown on the display as follows:
  - The current values of the *first* test phase are displayed first; see the following illustration p. 53.
  - The values of the subsequent test phases are added below (initially hidden)
  - If the self test succeeded then the message **Self test passed** is added below. The message must be displayed and confirmed.
- If the self test conditions are not satisfied, one of the messages listed in Table 5 is displayed.
- If a measurement lies outside the required tolerance during the self test then the self test is cancelled and the inverter displays the message **Self test failed**. The inverter remains disconnected from the grid (relay open, no feeding) until the self test is passed successfully.

Selftest	
①	Lower / upper limit value according to the country setting
②	Measured actual grid voltage / frequency
③	Switch-off threshold (changed in steps)
④	Switch-off time = time between the following events: - Switch-off threshold reaches the actual grid voltage/frequency - The inverter disconnects itself from the grid

Operation	
√	<i>Italy</i> is set in the inverter to be tested.
1.	Check the country setting via <b>Information/ System information</b> the main menu as required
2.	Select <b>Self test</b> in the main menu. The dialogue shown at the left is displayed
3.	Press <b>SET</b> for 1 second. The self test starts.
4.	The values for the first test phase are displayed (fig. left).
5.	Press <b>▽</b> to display the values for the subsequent test phases (if available).
6.	Only when <b>Self test failed</b> is displayed: <b>SET</b> to confirm the message. The status display appears.

Operation	
<b>Attention</b>	If <b>Self test failed</b> is displayed then repeat the self test as soon as possible so that the inverter can resume feeding. When the test has finished, proceed as follows:
7.	Press <b>▽</b> several times until the message <b>Self test passed</b> is displayed (fig. left).
8.	Press <b>SET</b> to confirm the result of the self test. The status display appears.

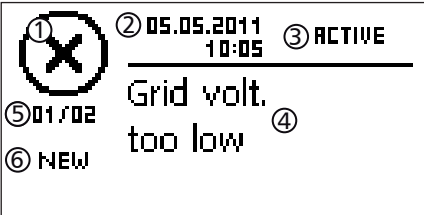
Messages about errors that prevent the self test from running:

Message	Description	Remedy
An error was detected	An internal error prevented the self test from starting.	Contact your installer if this error occurs <b>frequently</b> .
Not enough sunlight	The self test was not started or was cancelled due to insufficient sunlight, especially in the evening/ at night.	Repeat the self test during the day when the inverter is feeding the grid.
Invalid grid conditions	The self test was cancelled due to invalid grid conditions, e.g. due to insufficient AC voltage.	Repeat the self test later.
MSD not ready	The self test was not started because the inverter was not ready for operation.	Repeat the self test a few minutes later when the inverter is ready for operation and is feeding.

Table 5

## 9.9 Troubleshooting

Faults are indicated by event messages as described below. The display flashes red. Table 6 „List of event messages“ contains information on troubleshooting and fault correction.

Structure	
	Event messages have the following information: ① Symbol for the type of event message ② <b>Date/Time</b> when the event occurred ③ <b>ACTIVE</b> : The cause of the event message is still present or date/time when the cause of the event message was corrected. ④ Cause of the event message. ⑤ Counter: <i>No. of the displayed event messages / Total number of event messages</i> ; max. number of all <i>event messages</i> = 30 ⑥ <b>NEW</b> is displayed until the event message has been manually confirmed via the <b>ESC</b> or $\Delta \nabla$ button

### Function

Event message types

- Type **Information** (Symbol  $\square$ )  
The inverter has detected an error that does not affect the feed-in process. The user does not need to intervene.
- Type **Warning** (Symbol  $\triangle$ )  
The inverter has detected an error that may result in reduced yields. It is highly recommended that you correct the cause of the error.
- Type **Error** (Symbol  $\otimes$ )  
The inverter has detected a serious error. The inverter will not feed into the grid while this error is present. Please contact your installer. More information is provided in table 6 „List of event messages“.

### Display behaviour

New event messages are displayed immediately. The messages disappear after they have been confirmed or their cause(s) have been corrected.

### Note

When an event message is confirmed, the user thereby simply confirms that he/she has seen the message. This does not correct the error that caused the event message to be shown!

If messages exist whose cause has been corrected but have not been confirmed then  $\otimes$  is shown in the status display. If an already confirmed error recurs then it is displayed again.

## Operation

### Confirming event messages

- ✓ An event message with the comment **NEW** is displayed.
- ▶ Press **ESC**/ $\Delta \nabla$ . The event message is confirmed.

### Displaying event messages

1. Select **Event log** in the main menu.
2. Press **SET**. The event messages are displayed in chronological order (latest message first).
3. Press  $\Delta \nabla$  to page through the **Event Messages**.



Event Message	Description	Type
Grid Frequency too low	The grid frequency at the inverter is less than the minimum permissible value. Due to legal requirements, the inverter switches automatically off while the error state is present. ▶ Contact your installer if this error occurs frequently.	⊗
Grid Frequency too high	The grid frequency at the inverter is greater than the maximum permissible value. Due to legal requirements, the inverter switches automatically off while the error state is present. ▶ Contact your installer if this error occurs frequently.	⊗
Grid voltage too low	The grid voltage at the inverter is less than the minimum permissible value. Due to legal requirements, the inverter switches automatically off while the error state is present. ▶ Contact your installer if this error occurs frequently.	⊗
Grid voltage too high	The grid voltage at the inverter is greater than the maximum permissible value. Due to legal requirements, the inverter switches automatically off while the error state is present. ▶ Contact your installer if this error occurs frequently.	⊗
Grid voltage too high for reactivation	After switching off, the inverter cannot resume feeding because the grid voltage exceeds the legally prescribed switch-on value. ▶ Contact your installer if this error occurs frequently.	⊗
Grid voltage Ø too low	The output voltage averaged over the legally prescribed period of time exceeds the permissible tolerance range. The inverter switches automatically off while the error state is present. ▶ Contact your installer if this error occurs frequently.	⊗
Grid voltage Ø too high	The output voltage averaged over the legally prescribed period of time exceeds the permissible tolerance range. The inverter switches automatically off while the error state is present. ▶ Contact your installer if this error occurs frequently.	⊗
Grid current DC offset too high	The DC current portion fed into the grid by the inverter exceeds the maximum permissible value. Due to legal requirements, the inverter switches automatically off while the error state is present. ▶ Contact your installer.	⊗
Resid. Current too high	The residual current flowing from the plus or minus inputs to earth via the photovoltaic modules exceeds the maximum permissible value. Due to legal requirements, the inverter switches automatically off while the error state is present. ▶ Contact your installer.	⊗
L und N swapped	The live and neutral conductors are wrongly connected. For safety reasons, the inverter must not feed into the grid. ▶ Contact your installer.	⊗
PE not connected	The protective earth is not connected. For safety reasons, the inverter must not feed into the grid. ▶ Contact your installer.	⊗
Insulation error	The insulation resistance between the plus or minus inputs and earth is less than the permissible value. For safety reasons, the inverter must not feed into the grid. ▶ Contact your installer.	⊗
Fan faulty	The internal fan of the inverter is faulty. In certain situations the inverter will feed less power into the grid. ▶ Contact your installer.	⚠
Device overheated	Despite derating, the maximum permissible temperature has been exceeded. The inverter feeds no power into the grid until the maximum permissible temperature is no longer exceeded. ▶ 1. Check that the installation conditions are satisfied. ▶ 2. Contact your installer.	⊗

<b>PV voltage too high</b>	The input voltage at the inverter is greater than the maximum permissible value. ▶ Switch off the DC circuit breaker at the inverter and contact your installer.	⊗
<b>PV current too high</b>	The input current at the inverter exceeds the permissible value. The inverter limits the current to the permissible value. ▶ Contact your installer if this message occurs frequently.	⚠
<b>Grid islanding detected</b>	There is no grid voltage present (inverter running independently). For safety reasons, the inverter must not feed into the grid and switches off while the error is present (dark display). ▶ Contact your installer if this message occurs frequently.	⊗
<b>Time / Date lost</b>	The inverter has lost the time settings because it was disconnected from the grid for too long. Yields cannot be stored and event messages will have the wrong date. ▶ Correct the time under <b>Settings/Time/Date</b> .	⚠
<b>Internal Info</b>	▶ Contact your installer if this information occurs frequently.	i
<b>Internal Warning</b>	▶ Contact your installer if this warning occurs frequently.	⚠
<b>Internal Error</b>	▶ Contact your installer if this error occurs frequently.	⊗
<b>Self test failed</b>	An error occurred during the self test and the self test was cancelled. ▶ Contact your installer when – the self test is cancelled due to an error several times at different times of the day and – it is certain that the grid voltage and frequency were within the limit values defined by the country setting; see section 15.4.	⊗
<b>Faulty country setting</b>	An inconsistency exists between the selected country settings and those stored in memory. ▶ Contact your installer.	⊗
<b>BCONV over-temperature</b>	The maximum permissible boost converter temperature has been exceeded. The inverter feeds no power into the grid until the maximum permissible temperature is no longer exceeded. ▶ 1. Check that the installation conditions are satisfied. ▶ 2. Contact your installer if this message occurs frequently.	⊗
<b>Boost converter defective</b>	The boost converter is defective, the inverter is not feeding into the grid or is feeding at reduced power. ▶ Contact your installer.	⊗
<b>Boost converter not detected</b>	▶ Contact your installer.	⊗

Table 6

## 10. Registration and warranty

The standard product- and output warranty for this photovoltaic system (system warranty) runs for five years. It is possible to extend the system warranty to ten years, by registering the PowerSet with Solar Frontier at [www.solar-frontier.eu](http://www.solar-frontier.eu). Full warranty conditions are available on the websites.

## 11. Maintenance

### 11.1 Maintenance Solar Frontier SF170-S photovoltaic module

A monthly visual check is highly recommended in order to maintain the efficiency of SF modules and the security of the mounting.

- Remove any dirt, fallen leaves or bird droppings from the surface, and check that there is no damage to the surface. Do not use detergent or chemicals for cleaning dirt off SF modules as it may damage the modules and result in degradation of insulation.
- Do not use hard brushes or any other hard materials; use only soft cloths or sponges for removing dirt from the SF modules surface.
- When replacement parts are required, be sure the installer/servicer uses parts specified by the manufacturer with the same characteristics as the original parts. Unauthorized substitutions may result in fire, electric shock, or other hazard.
- Stop using SF modules when any damage or unusual phenomena are observed. Have them immediately replaced or removed by a qualified technician.

### 11.2 Maintenance DC system

The DC system is maintenance-free. It is still recommended that cables and connectors are regularly checked for signs of damage.

### 11.3 Maintenance inverter SF-WR

The inverter is basically maintenance-free. Despite this, it is a good idea to regularly check that the cooling fins on the front and rear sides of the device are free of dust. Clean the inverter when necessary as described below.

---

#### Attention

Danger of destruction of components in devices.

- Do not allow cleaning agents and devices to penetrate between the cooling fins at the front of the inverter (under the grey hood).
- Do not use especially the following cleaning agents:
  - Solvent-based cleaning agents
  - Disinfection agents
  - Coarse or sharp-edged cleaning agents

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#### Removing dust

- ▶ Dust should be removed using compressed air (max. 2 bar).

#### Removing heavy soiling

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##### Danger

Risk of death by electrocution. Use cleaning agents only with a slightly damp cloth.

1. Remove heavy soiling with a slightly damp cloth (use clear water). If necessary, use a 2 % hard soap solution instead of water.
2. After cleaning, remove any soap residue using a slightly damp cloth.

## 12. Accessories

Accessories such as data loggers, data interfaces to laptops are not available at the moment. Should you have questions, or want recommendations, please get in touch with our technical support.

## 13. Transport and Storage

Pay attention to all advice on the packaging, if you store or transport SF PowerSets. A dry room should be chosen for storage. The packaging is not waterproof. All electronic components should be kept away from liquids during transport and storage. The SF PowerSets must remain in the original packaging until the installation.

Small amounts of white powder from packaging material may adhere to the modules. This may safely be ignored and has no effect on performance.

## 14. Disposal

### 14.1 Disposal of Solar Frontier SF170-S photovoltaic modules

SF modules must be disposed of in a responsible manner. Please contact your local supplier or disposal company for further information. For health and safety reasons, SF modules should not be disposed of with household garbage, and must be dealt with in accordance with local codes and regulations.

Solar Frontier is a member of PV Cycle, marking its commitment to the environment and public safety. PV Cycle's initiatives can be found at: [www.pvcycle.org](http://www.pvcycle.org)

### 14.2 Disposal of inverter SF-WR

Do not dispose of the device in household garbage. Please send the device to Steca customer service at end of operative life with the remark **"For disposal"**. The packaging is recyclable. (Please see section 17 for this)

### 14.3 Disposal of DC cabling

The DC cables can be disposed of in municipal collection points as electric waste.

## 15. Technical Data, Data Sheets and Certificates

Below you find a summary of product data sheets and certificates of the single components.

### 15.1 Solar Frontier SF170-S photovoltaic module

Solar Frontier's CIS modules generate an electrical direct current when exposed to sunlight. They are designed for terrestrial use. The nominal power of SF modules indicates the power generated under Standard Test Conditions (module temperature: 25 °C, air mass 1.5, solar irradiance 1,000 W/m<sup>2</sup>). SF module power output in actual operating conditions may vary. The amount of electrical direct current generated by SF modules is proportional to irradiance intensity, while the voltage is affected by temperature.

#### 15.1.1 Technical data

##### Electrical characteristics

Information required by UL is marked accordingly and is only relevant to US installers.

##### Electrical Performance at Standard Test Conditions (STC)\*1

Nominal power	P <sub>max</sub>	170 W
Power tolerance		+5 W / 0 W
Open circuit voltage	V <sub>oc</sub>	112 V
Short circuit current	I <sub>sc</sub>	2.20 A
Voltage at nominal power	V <sub>mpp</sub>	87.5 V
Current at nominal power	I <sub>mpp</sub>	1.95 A

Photovoltaic modules may produce more current and/or voltage under actual operating conditions than in Standard Test Conditions. The electrical characteristics are within 10 % of the indicated I<sub>sc</sub> and V<sub>oc</sub> values under STC. The power output stated on the label is measured at the plant after module preconditioning. The values of I<sub>sc</sub> and V<sub>oc</sub> marked on modules should be multiplied by a factor of 1.25 to determine component voltage ratings, conductor ampacities, overcurrent device ratings and size of controls connected to the module output.

**UL:** Refer to section 690.8 of the National Electrical Code for an additional multiplying factor of 125 % (80 % derating). Installation must be completed in accordance with CSA C22.1, Safety Standard for Electrical Installations, Canadian Electrical Code, Part 1.

##### Electrical Performance at Nominal Operating Cell Temperature (NOCT) Conditions\*2

Nominal power	P <sub>max</sub>	126 W
Open circuit voltage	V <sub>oc</sub>	102 V
Short circuit current	I <sub>sc</sub>	1.76 A
Voltage at nominal power	V <sub>mpp</sub>	82.1 V
Current at nominal power	I <sub>mpp</sub>	1.55 A

\*1 Standard Test Conditions (STC): 1,000 W/m<sup>2</sup> irradiance, module temperature 25 °C, air mass 1.5. I<sub>sc</sub> and V<sub>oc</sub> are ±10 % tolerance of STC rated values. Module output may rise due to the Light Soaking Effect. Subject to simulator measurement uncertainty (using best-in-class AAA solar simulator and applying Solar Frontier preconditioning requirements): +10 % / -5 %.

\*2 Nominal Operating Cell Temperature Conditions: Module operating temperature at 800 W/m<sup>2</sup> irradiance, air temperature 20 °C, wind speed 1 m/s and open circuit condition.

## Module performance at low irradiance

Efficiency reduction of maximum output from an irradiance of 1,000 W/m<sup>2</sup> to 200 W/m<sup>2</sup> at 25 °C is typically 2.0 %.  
The standard deviation for the reduction in efficiency is 1.9 %.

## Thermal characteristics

NOCT		47 °C
Temperature-coefficient I <sub>sc</sub>	α	+0.01 %/K
Temperature-coefficient V <sub>oc</sub>	β	-0.30 %/K
Temperature-coefficient P <sub>max</sub>	δ	-0.31 %/K

## Characteristics for system design

Maximum system voltage	V <sub>sys</sub>	1,000 V DC (UL 600 V DC)
Limiting reverse current	I <sub>r</sub>	7 A
Maximum series fuse rating	I <sub>sf</sub>	4 A

- The sum of V<sub>oc</sub> for modules in series must not exceed the maximum system voltage of the module under any condition. This includes also low temperature conditions.
- Reverse current applied to the modules should not exceed 7 A under any circumstances.

**UL:** Modules installed in parallel will be provided with the listed maximum series fuses, as specified.

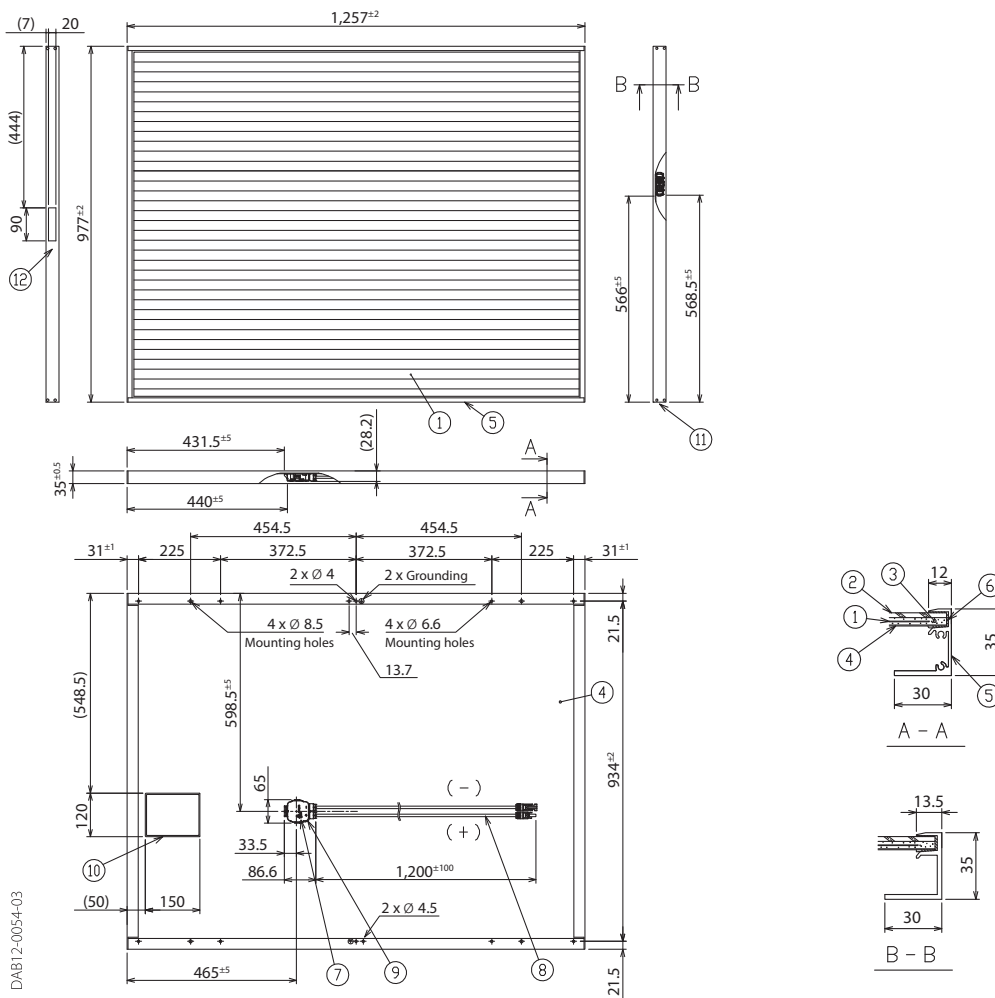
## Mechanical Data

Dimensions (L x W x H)	1,257 x 977 x 35 mm (49.5 x 38.5 x 1.4 in)
Weight	20.0 kg (44.1 lbs) / 16.3 kg/m <sup>2</sup> (3.3 lbs/ft <sup>2</sup> )
Module operating temperature	-40 °C to 85 °C
Application class according to IEC 61730 d	Class A
Fire safety class according to IEC 61730	Class C
Cable	2.5 mm <sup>2</sup> (0.004 in <sup>2</sup> )/ AWG14 (halogen free)
Snow load (to the front of the module)	2,400 Pa (IEC61646) / 1,600 Pa design load (UL1703)
Wind load (to the back of the module)	2,400 Pa (IEC61646) / 1,600 Pa design load (UL1703)

\*1 UL: The fire rating of this module is valid only when mounted in the manner specified in the mechanical mounting instructions.

\*2 UL: The load applied to a module under UL testing conditions is 1.5 times greater than the module's design load. Accordingly, 2,400 Pa (50 lbs/ft<sup>2</sup>) is loaded to test the 1,600 Pa (33.4 lbs/ft<sup>2</sup>) UL design load.

## Module drawing



The measures in this drawing are given in mm

No.	Item	Qty.	Description
1	Cell	1	CIS (Substrate glass)
2	Cover glass	1	Clear tempered glass
3	Encapsulant		EVA
4	Back sheet		Weatherproof plastic film / Colour: black and silver
5	Frame	1 Set	Anodized aluminium alloy / Colour: black
6	Edge sealant		Butyl rubber
7	Junction box	1	With bypass diode
8	Cable		2.5 mm <sup>2</sup> (0.004 in <sup>2</sup> ) / AWG14 (with waterproof and locking connector MC4-compatible)
9	Adhesive		Silicon
10	Label	1	Product label
11	Screw	8	Stainless tapping (SUS304J3)
12	Bar code label	1	Serial number

## 15.1.2 Certificates for Solar Frontier SF170-S

Solar Frontier's CIS modules are not only tested under extreme conditions, such as heat, cold and high stress tests, in our own research center, the Atsugi Research Center (ARC). Independent institutions, such as TÜV or Atlas 25+, confirm the long-term yield capabilities of our modules on the basis of accelerated aging tests.

Regional certifications are limited to the respective business locations of Solar Frontier. These include the dependencies in Japan, Europe, North America and Saudi Arabia, our three production sites and the Atsugi Research Center in Japan.

Module certificates from Solar Frontier can be downloaded at:


[www.solar-frontier.eu](http://www.solar-frontier.eu)



## 15.2 Inverter SF-WR

### 15.2.1 Technical data inverter for PowerSets

2.0-170-1p / 2.4-170-1p / 3.0-165-1p / 3.1-170-1p / 3.6-170-1p / 4.1-170-1p / 4.8-170-1p / 5.1-170-1p / 5.9-165-1p / 6.1-170-1p / 7.1-170-1p / 8.2-170-1p

	SF-WR-3000	SF-WR-3600	SF-WR-4200
<b>DC input side (PV generator connection)</b>			
Number of DC inputs	1	1	1
Maximum start voltage	900 V	900 V	900 V
Maximum input voltage	900 V	900 V	900 V
Minimum input voltage for grid-feeding	350 V	350 V	350 V
Startup input voltage	350 V	350 V	350 V
Rated input voltage	380 V	455 V	540 V
Minimum input voltage for rated output	350 V	350 V	360 V
MPP voltage	350 V ... 700 V	350 V ... 700 V	360 V ... 700 V
Maximum input current	12 A	12 A	12 A
Rated input current	8 A	8 A	8 A
Maximum input power at maximum active output power	3060 W	3690 W	4310 W
Rated input power ( $\cos \varphi = 1$ )	3060 W	3690 W (Portugal: 3450 W)	4310 W (Portugal: 3680 W)
Recommended maximum PV output	3800 Wp	4500 Wp	5200 Wp
Derating / power limiting	Occurs automatically when: <ul style="list-style-type: none"> <li>input power &gt; max. recommended PV power</li> <li>cooling is inadequate</li> <li>input current too high</li> <li>grid current too high</li> <li>internal or external derating</li> <li>grid frequency too high (according to country settings)</li> <li>limiting signal received via an external interface</li> <li>output power is limited (set at the inverter)</li> </ul>		
<b>AC output side (mains grid connection)</b>			
Output voltage	185 V ... 276 V (depending on the country settings)		
Rated output voltage	230 V	230 V	230 V
Maximum output current	16 A	16 A	18,5 A
Rated output current	13 A	15,6 A	18,3 A
Maximum active power ( $\cos \varphi = 1$ )	3000 W	3600 W (Belgium: 3330 W)	4200 W (Belgium: 3330 W)
Maximum active power ( $\cos \varphi = 0,95$ )	3000 W	3530 W	3990 W
Maximum apparent power ( $\cos \varphi = 0,95$ )	3130 VA	3680 VA	4200 VA
Rated output	3000 W	3600 W (Portugal 3450 W)	4200 W (Portugal 3680 W)
Rated frequency	50 Hz and 60 Hz		
Grid type	L / N / PE (Protective Earth  )		
Grid frequency	45 Hz ... 65 Hz (depending on the country settings)		
Power losses in nighttime operation	< 0,7 W		
Feeding phases	single-phase		
Distortion factor ( $\cos \varphi = 1$ )	< 2 %		
Power factor $\cos \varphi$	0,95 capacitive ... 0,95 inductive		
<b>Characterisation of the operating behaviour</b>			
Maximum efficiency	98,6 %	98,6 %	98,6 %
European efficiency	98,3 %	98,3 %	98,2 %
CEC Efficiency	98,4 %	98,3 %	98,2 %
MPP efficiency	> 99,7 % (static), > 99 % (dynamic)		
Efficiency values (at 5 %, 10 %, 20 %, 25 %, 30 %, 50 %, 75 %, 100 % of the rated power) at rated voltage	95,4 %, 97,3 %, 98,2 %, 98,4 %, 98,5 %, 98,5 %, 98,3 %, 98,0 %	95,8 %, 97,4 %, 98,2 %, 98,3 %, 98,4 %, 98,4 %, 98,1 %, 97,7 %	96,2 %, 97,6 %, 98,3 %, 98,3 %, 98,3 %, 98,2 %, 97,9 %, 97,4 %

	SF-WR-3000	SF-WR-3600	SF-WR-4200
Efficiency values (at 5 %, 10 %, 20 %, 25 %, 30 %, 50 %, 75 %, 100 % of the rated power) at minimum MPP voltage	95.7 %, 97.5 %, 98.4 %, 98.5 %, 98.6 %, 98.6 %, 98.4 %, 98.1 %	96.3 %, 97.7 %, 98.5 %, 98.6 %, 98.6 %, 98.5 %, 98.3 %, 97.7 %	96.7 %, 98.0 %, 98.5 %, 98.6 %, 98.6 %, 98.4 %, 98.1 %, 97.6 %
Efficiency values (at 5 %, 10 %, 20 %, 25 %, 30 %, 50 %, 75 %, 100 % of the rated power) at maximum MPP voltage	94.6 %, 96.7 %, 97.7 %, 97.9 %, 98.0 %, 98.2 %, 97.9 %, 97.6 %	95.2 %, 97.0 %, 97.8 %, 98.0 %, 98.1 %, 98.0 %, 97.8 %, 97.5 %	95.7 %, 97.0 %, 98.0 %, 98.1 %, 98.2 %, 97.9 %, 97.6 %, 97.2 %
Efficiency reduction in case of a rise in ambient temperature (at temperatures > 40 °C)	0.005 %/°C		
Efficiency change in the case of deviation from the DC rated voltage	0.002 %/V		
Own consumption	< 4 W		
Derating at full power	from 50 °C (T <sub>amb</sub> )	from 50 °C (T <sub>amb</sub> )	from 45 °C (T <sub>amb</sub> )
Switch-on power	10 W		
Switch-off power	5 W		
Standby power	6 W		
<b>Safety</b>			
Protection class	II		
Isolation principle	No galvanic isolation; transformerless		
Grid monitoring	Yes, integrated		
Insulation monitoring	Yes, integrated		
Residual current monitoring	Yes, integrated <sup>1)</sup>		
Overvoltage protection version	Varistors		
Reverse polarity protection	Yes		
<b>Application conditions</b>			
Area of application	Indoor rooms, with or without air conditioning		
Ambient temperature range (T <sub>amb</sub> )	-15 °C ... +60 °C		
Storage Temperature	-30 °C ... +80 °C		
Relative humidity	0 % ... 95 %, non-condensing		
Installation elevation	≤ 2000 m (6561 ft) above sea level		
Degree of pollution	PD3		
Noise emission (typical)	26 dBA	29 dBA	31 dBA
Impermissible ambient gases	Ammonia, solvents		
<b>Equipment and design</b>			
Degree of protection	IP21 (Casing: IP51; Display: IP21)		
Overvoltage category	III (AC), II (DC)		
DC connection	Phoenix Contact SunClix (1 pair, PowerSets 3.1-170-3p, 4.1-170-3p, 5.1-170-3p and 6.0-170-3p: 2 pairs)		
<b>AC connection</b>			
Type	Wieland RST25i3 plug		
Connection conductor cross-section	Cable diameter 10 ... 14 mm (0.55 in) conductor cross-section ≤ 4 mm <sup>2</sup> (0.006 in <sup>2</sup> )		
Opposing connector	Included in delivery		
Dimensions (X x Y x Z)	340 x 608 x 222 mm (13.39 x 23.94 x 8.74 in)		
Weight	9 kg (19.84 lbs)		
Display	Grafical display 128 x 64 Pixel		
Communication interface	3 x RJ45 socket (2 x RS485 for connection to Meteocontrol WEB'log or Solar-Log; 1 x Ethernet)		
Feed-in management as per EEG 2012	EinsMan-ready, via RS485 interface		
Integrated DC circuit breaker	Yes, VDE 0100-712 compliant		
Cooling principle	Temperature-controlled fan, variable speed, internal (dust protected)		
Test certificate	CE-Zeichen, VDE AR N 4105, G83, UTE, C 15-712-1, AS4777, CEI 0-21	CE-Zeichen, VDE AR N 4105, G83, UTE, C 15-712-1, AS4777, CEI 0-21	CE-Zeichen, VDE, AR N 4105, G83, CEI 0-21

Technical data at 25 °C/ 77 °F.

<sup>1)</sup> The design of the inverter prevents it from causing DC leakage current.

## 15.2.2 Technical data inverter for PowerSets 3.1-170-3p / 4.1-170-3p / 5.1-170-3p / 6.0-170-3p

	SF-WR-3203	SF-WR-4003	SF-WR-4803	SF-WR-5503
<b>DC input side (PV generator connection)</b>				
Number of DC inputs	1	1	1	1
Maximum start voltage	1000 V	1000 V	1000 V	1000 V
Maximum input voltage	1000 V	1000 V	1000 V	1000 V
Minimum input voltage for grid-feeding	250 V	250 V	250 V	250 V
Startup input voltage	250 V	250 V	250 V	250 V
Rated input voltage	410 V	510 V	615 V	700 V
Minimum input voltage for rated output	300 V	375 V	450 V	510 V
MPP voltage	300 V ... 800 V	375 V ... 800 V	450 V ... 800 V	510 V ... 800 V
Maximum input current	11 A	11 A	11 A	11 A
Rated input current	15 A	15 A	15 A	15 A
Maximum input power at maximum active output power	8 A	8 A	8 A	8 A
Rated input power ( $\cos \varphi = 1$ )	3300 W	4100 W	4920 W	5620 W
Recommended maximum PV output	3300 W	4100 W	4920 W	5620 W
Derating / power limiting	4000 Wp	4900 Wp	5900 Wp	6700 Wp
	Occurs automatically when: <ul style="list-style-type: none"> <li>• input power &gt; max. recommended PV power</li> <li>• cooling is inadequate</li> <li>• input current too high</li> <li>• grid current too high</li> <li>• internal or external derating</li> <li>• grid frequency too high (according to country settings)</li> <li>• limiting signal received via an external interface</li> <li>• output power is limited (set at the inverter)</li> </ul>			
<b>DC side (Speicherschluss)<sup>1)</sup></b>				
Voltage	680 V to 1000 V			
max. current	10 A			
<b>AC output side (mains grid connection)</b>				
Output voltage	320 V bis 480 V (depending on the country settings)			
Rated output voltage	400 V	400 V	400 V	400 V
Maximum output current	7 A	7 A	10 A	10 A
Maximum Inrush-Current	16 A (for 10 ms)			
RMS short-circuit current	3.82 A <sub>RMS</sub> (for 60 ms)			
Rated output current	2.7 A	3.3 A	4 A	4.6 A
Maximum active power ( $\cos \varphi = 1$ )	3200 W	4000 W	4800 W	5500 W
Maximum active power ( $\cos \varphi = 0.95$ )	3040 W	3800 W	4560 W	5225 W
Maximum active power ( $\cos \varphi = 0.90$ )	2880 W	3600 W	4320 W	4950 W
Maximum apparent power ( $\cos \varphi = 0.95$ )	3200 W	4000 W	4800 W	5500 W
Maximum apparent power ( $\cos \varphi = 0.90$ )	3200 W	4000 W	4800 W	5500 W
Rated output	3200 W	4000 W	4200 W	5500 W
Rated frequency	50 Hz und 60 Hz			
Grid type	L <sub>1</sub> / L <sub>2</sub> / L <sub>3</sub> / N / FE			
Grid frequency	45 Hz ... 65 Hz (depending on the country settings)			
Power losses in nighttime operation	< 3 W			
Feeding phases	three-phase			
Distortion factor ( $\cos \varphi = 1$ )	< 1 %			
Power factor $\cos \varphi$	0.80 capacitive ... 0.80 inductive			
<b>Characterisation of the operating behaviour</b>				
Maximum efficiency	98.6 %	98.6 %	98,6 %	98,6 %
European efficiency	97.5 %	97.8 %	98,0 %	98,1 %
CEC Efficiency	98.2 %	98.3 %	98.3 %	98.3 %
MPP efficiency	> 99.7 % (static). > 99 % (dynamic)			

	SF-WR-3203	SF-WR-4003	SF-WR-4803	SF-WR-5503
Efficiency values (at 5 %, 10 %, 20 %, 25 %, 30 %, 50 %, 75 %, 100 % of the rated power) at rated voltage	90.4 % 95.1 % 97.2 % 97.7 % 97.9 % 98.2 % 98.4 % 98.6 %	91.0 % 95.5 % 97.5 % 97.9 % 98.1 % 98.4 % 98.6 % 98.3 %	91.5 % 95.8 % 97.7 % 98.0 % 98.2 % 98.6 % 98.5 % 98.2 %	92.3 % 96.2 % 98.0 % 98.2 % 98.4 % 98.6 % 98.4 % 98.1 %
Efficiency reduction in case of a rise in ambient temperature (at temperatures > 40 °C)	0.005 %/°C			
Efficiency change in the case of deviation from the DC rated voltage	0.002 %/V			
Own consumption	< 8 W			
Derating at full power	from 50 °C (T <sub>amb</sub> )	from 50 °C (T <sub>amb</sub> )	from 50 °C (T <sub>amb</sub> )	from 45 °C (T <sub>amb</sub> )
Switch-on power	10 W			
Switch-off power	8 W			
<b>Safety</b>				
Protection class	II			
Isolation principle	No galvanic isolation; transformerless			
Grid monitoring	Yes, integrated			
Insulation monitoring	Yes, integrated			
Residual current monitoring	Yes, integrated <sup>2)</sup>			
Overvoltage protection version	Varistors			
Reverse polarity protection	Yes			
<b>Application conditions</b>				
Area of application	Indoor rooms, with or without air conditioning			
Ambient temperature range (T <sub>amb</sub> )	-15 °C ... +60 °C			
Storage Temperature	-30 °C ... +70 °C			
Relative humidity	0 % ... 95 %			
Installation elevation	≤ 2000 m (6561 ft) above NN			
Degree of pollution	PD3			
Noise emission (typical)	29 dBA			
Impermissible ambient gases	Ammonia, solvents			
<b>Equipment and design</b>				
Degree of protection	IP21 (Casing: IP51; Display: IP21)			
Overvoltage category	III (AC), II (DC)			
DC connection	Phoenix Contact SUNCLIX (2 pairs)			
<b>AC-connection</b>				
Type	Wieland RST25i5 plug			
Connection conductor cross-section	Cable diameter 10 ... 14 mm <sup>2</sup> (0.02 in <sup>2</sup> ) conductor cross-section ≤ 4 mm <sup>2</sup> (0.006 in <sup>2</sup> )			
Opposing connector	Included in delivery			
Dimensions (X x Y x Z)	340 x 608 x 222 mm (13.39 x 23.94 x 8.74 in)			
Weight	10 kg (22.05 lbs)			
Communication interface	1x RJ45 socket (RS485), 2x RJ45 socket (Meteocontrol WEB'log or Solar-Log; 1x Ethernet)			
Feed-in management as per EEG 2012	EinsMan-ready, via RS485-interface			
Integrated DC circuit breaker	yes, VDE 0100-712 compliant			
Cooling principle	Temperature-controlled fan, variable speed, internal (dust protected)			
Test certificate	CE-Zeichen, VDE AR N 4105; more in preparation			

Table 8

Technical data at 25 °C/ 77 °F.

<sup>1)</sup> Only connect Steca storage-ready devices to the storage connections. Direct battery connection is not possible.

<sup>2)</sup> The design of the inverter prevents it from causing DC leakage current..

## 15.3 Technical data AC cable and line circuit breakers

Inverter	AC cable conductor cross-section	Power loss <sup>1)</sup>	Line circuit breaker
SF-WR-3000	2.5 mm <sup>2</sup> (0.0038 in <sup>2</sup> )	25 W	B16 or B25
	4.0 mm <sup>2</sup> (0.006 in <sup>2</sup> )	15 W	B16 or B25
SF-WR-3600	2.5 mm <sup>2</sup> (0.0038 in <sup>2</sup> )	35 W	B25
	4.0 mm <sup>2</sup> (0.006 in <sup>2</sup> )	22 W	B25
SF-WR-4200	2.5 mm <sup>2</sup> (0.0038 in <sup>2</sup> )	48 W	B25
	4.0 mm <sup>2</sup> (0.006 in <sup>2</sup> )	30 W	B25
SF-WR-3203	2.5 mm <sup>2</sup> (0.0038 in <sup>2</sup> )	4 W	B16
	4.0 mm <sup>2</sup> (0.006 in <sup>2</sup> )	3 W	B16
SF-WR-4003	2.5 mm <sup>2</sup> (0.0038 in <sup>2</sup> )	7 W	B16
	4.0 mm <sup>2</sup> (0.006 in <sup>2</sup> )	4 W	B16
SF-WR-4803	2.5 mm <sup>2</sup> (0.0038 in <sup>2</sup> )	10 W	B16
	4.0 mm <sup>2</sup> (0.006 in <sup>2</sup> )	7 W	B16
SF-WR-5503	2.5 mm <sup>2</sup> (0.0038 in <sup>2</sup> )	13 W	B16
	4.0 mm <sup>2</sup> (0.006 in <sup>2</sup> )	8 W	B16

Table 9

<sup>1)</sup> Power loss of the AC cables at the rated power of the inverter and a cable length of 10 m.

## 15.4 Table of countries

Details on setting the country are provided in section 8.4.6.

### Note

The requirements for the country-specific grid parameters may change at short notice. Contact the technical support of Solar Frontier if the parameters specified in the table no longer correspond to the legally prescribed requirements in your country. See section 17.

**Table of countries for PowerSets 2.0-170-1p / 2.4-170-1p / 3.0-165-1p / 3.1-170-1p / 3.6-170-1p / 4.1-170-1p / 4.8-170-1p / 5.1-170-1p / 5.9-165-1p / 6.1-170-1p / 7.1-170-1p / 8.2-170-1p**

Country		Reconnection time	Voltage disconnection values (peak values) <sup>2)</sup>					Voltage disconnection value Ø (average value) <sup>3)</sup>				Frequency disconnection values <sup>4)</sup>			
			upper		lower			upper		lower		upper		lower	
Name	Display <sup>1)</sup>	s	%	s	%	s	%	s	%	s	Hz	s	Hz	s	
Germany	4900 Deutschland	60	15	0.2	-20	0.2	10	600	-	-	1,5	0.2	-2.5	0.2	
Sweden	4600 Sverige	30	15	0.2	-15	0.2	11	60	-10	60	1	0.5	-3.0	0.5	
France	3300 France	30	15	0.2	-15	0.2	10	600	-	-	0.4	0.2	-2.5	0.2	
Portugal	35100 Portugal	20	15	0.2	-15	1.5	10	600	-	-	1	0.5	-3.0	0.5	
Spain 1699	3400 España	180	15	0.2	-15	1.5	10	1.5	-	-	1	0.5	-2.0	3	
Netherlands	3100 Nederland	30	10	2	-20	2	-	-	-	-	1	2	-2.0	2	
Belgium 2	3202 Belgique 2 <sup>5)</sup>	30	15	0.2	-20	0.2	10	600	-	-	1.5	0.2	-2.5	0.2	
Belgium 2 unlimited	3203 Belgique 2 unl <sup>5)</sup>	30	15	0.2	-20	0.2	10	600	-	-	1.5	0.2	-2.5	0.2	
Austria	4300 Österreich	30	15	0.2	-20	0.2	12	600	-	-	1	0.2	-3.0	0.2	
Italy 3	3902 Italia 3	30	22	0.1	-25	0.2	-	-	-	-	5	0.2	-5.0	0.2	
Italy 8	3907 Italia 8 <sup>9)</sup>	300	15	0.2	-60	0.2	10	600	-15	0.4	0.5	0.1	-0.5	0.1	
Italy 9	3908 Italia 9 <sup>10)</sup>	300	15	0.2	-60	0.2	10	600	-15	0.4	0,5	0.1	-0.5	0.1	
Slovenia	38600 Slovenija	30	15	0.2	-30	0.2	10	1.5	-15	1.5	1	0.2	-3.0	0.2	
Czech Republic	42000 Česko	30	15	0.2	-15	0.2	10	600	-	-	0.5	0.2	-0.5	0.2	
Greek Islands	3001 Greece islands	180	15	0.5	-20	0.5	10	600	-	-	1	0.5	-2.5	0.5	

Country			Reconnection time	Voltage disconnection values (peak values) <sup>2)</sup>				Voltage disconnection value $\bar{\varnothing}$ (average value) <sup>3)</sup>				Frequency disconnection values <sup>4)</sup>			
				upper		lower		upper		lower		upper		lower	
Name	Display <sup>1)</sup>		s	%	s	%	s	%	s	%	s	Hz	s	Hz	s
Greek Mainland	3000	Greece continent	180	15	0.5	-20	0.5	10	600	-	-	0.5	0.5	-0.5	0.5
Australia	6100	Australia	60	17	2	-13	2	-	-	-	-	5	2	-5.0	2
Israel	9720	Israel	300	35	0.05	-50	0.1	10	2	-15	2	5	2	-5.0	2
Turkey	9000	Türkiye	30	15	0.2	-20	0.2	10	600	-	-	0.2	0.2	-2.5	0.2
Ireland	35300	Éire	30	10	0.5	-10	0.5	-	-	-	-	0.5	0.5	-2.0	0.5
United Kingdom G83	4400	United Kingdom G83 <sup>6)</sup>	20	19	0.5	-20	0.5	14	1	-13	2.5	2	0.5	-3.0	0.5
United Kingdom G59	4401	United Kingdom G59 <sup>6)</sup>	180	15	0.5	-20	0.5	10	1	-13	2.5	1.5	0.5	-2.5	0.5
Switzerland	4100	Suisse	30	15	0.2	-20	0.2	10	600	-	-	0.2	0.2	-2.5	0.2
Hungary	3600	Magyarország	30	35	0.05	-50	0.1	10	2	-15	2	1	0.2	-1.0	0.2
Denmark unlimited	4500	Danmark unl.	60	15	0.2	-20	0.2	10	600	-	-	1.5	0.2	-2.5	0.2
Denmark	4501	Danmark <sup>7)</sup>	60	15	0.2	-20	0.2	10	600	-	-	1.5	0.2	-2.5	0.2
Cyprus	35700	Cyprus	30	10	0.5	-10	0.5	-	-	-	-	2	0.5	-3.0	0.5
Finland	35800	Suomi	30	10	0.2	-15	0.2					1	0.2	-2.0	0.2
Poland	4800	Polska	20	15	0.2	-15	1.5	10	600	-	-	1	0.5	-3.0	0.5
EN 50438	50438	EN 50438	20	15	0.2	-15	1.5	-	-	-	-	1	0.5	-3.0	0.5
Costa Rica	5060	Latinoamérica 60Hz <sup>6)</sup>	20	10	0.2	-20	0.2	-	-	-	-	0.6	0.2	-0.6	0.2
Tahiti	6890	Tahiti 60Hz	30	15	0.2	-20	0.2	10	600	-	-	2.5	0.2	-5.0	0.2
Bulgaria	3590	Bългария	30	15	0.2	-20	0.2	10	600	-	-	0.2	0.2	-2.5	0.2
Mauritius	23000	Mauritius	180	10	0.2	-6	1.5	6	1.5	-	-	1	0.5	-3.0	0.5
Brazil 220	5500	Brasil 220V 60Hz	300	10	0.2	-20	0.4					2	0.2	-2.5	0.2
Brazil 230	5501	Brasil 230V 60Hz	300	10	0.2	-20	0.4					2	0.2	-2.5	0.2
Thailand PEA	6600	Thailand	300	40	0.05	-50	0.1	9	2	-9	2	0.5	0.1	-0.5	0.1
Estonia	3720	Estland	30	15	0.2	-15	1.5					1	0.5	-3	0.5
Malaysia	6000	Malaysia	60	17.4	2	-13	2					5	2	-5	2
India	9100	India	300	35	0.05	-50	0.1	10	2	-15	2	1	2	-1	2
South Africa	2700	South Africa	60	20	0.16	-50	0.2	10	2	-15	2	2	0.5	-2.5	5
Droop-Mode	0007	Droop-Mode <sup>9)</sup>	60	20	0.5	-20	0.5	-	-	-	-	5	0.5	-3.5	0.5
Droop-Mode 60 Hz	0008	Droop-Mode 60 Hz <sup>9)</sup>	60	20	0.5	-20	0.5	-	-	-	-	5	0.5	-3.5	0.5

Table 10

### Country table

<sup>1)</sup> Country code and name as shown on the display.

<sup>2)</sup> Disconnection values are upper and lower deviations from the peak values of the rated voltage (in %) and the associated switch-off time (in s).

<sup>3)</sup> Disconnection values are upper and lower deviations from the average values of the rated voltage (in %) and the associated switch-off time (in s).

<sup>4)</sup> Disconnection values are upper and lower deviations from the rated frequency (in Hz) and the associated switch-off time (in s).

<sup>5)</sup> SF-WR 3600 and 4200 only:

Maximum output power Belgium 1 / Belgium 2: 3330 W

Maximum output power Belgium 1 unlimited / Belgium 2 unlimited: 3600 W

<sup>6)</sup> The rated voltage is 240 V (instead of 230 V).

<sup>7)</sup> Maximum output power: 2000 W.

<sup>8)</sup> The rated voltage is 220 V (instead of 230 V).

## Attention

Danger of yield losses. Activation of the *Droop Mode* is not permitted in systems connected to the public electricity grid.

Activation of the *Droop Mode* is recommended when the inverter is operated in conjunction with a stand-alone inverter in a system that is not connected to the public electricity grid. *Droop mode 50 Hz*: 50 Hz; *Droop mode 60 Hz*: 60 Hz.

<sup>9)</sup> *Italy 8*: Systems smaller than 3 kW maximum output power; <sup>10)</sup> *Italy 9*: Systems greater than 3 kW maximum output power.

## Table of countries for PowerSets 3.1-170-3p / 4.1-170-3p / 5.1-170-3p / 6.0-170-3p

### Note

The requirements for the country-specific grid parameters may change at short notice. Contact the technical Support of Solar Frontier if the parameters specified in the table below no longer correspond to the legally prescribed requirements in your country.

Country		Reconnection time	Voltage disconnection values (peak values) <sup>2)</sup>				Voltage disconnection value Ø (average value) <sup>3)</sup>				Frequency disconnection values <sup>4)</sup>			
			upper		lower		upper		lower		upper		lower	
Name	Display <sup>1)</sup>	s	%	s	%	s	%	s	%	s	Hz	s	Hz	s
Germany	4900 Deutschland	60	15	0.2	-20	0.2	10	600	-	-	1.5	0.2	-2.5	0.2
Sweden	4600 Sverige	30	15	0.2	-15	0.2	11	60	-10	60	1	0.5	-3.0	0.5
Spain 1699	3400 España	180	15	0.2	-15	1.5	10	1.5	-	-	1	0.5	-2.0	3
Netherlands	3100 Nederland	30	10	2	-20	2	-	-	-	-	1	2	-2.0	2
Belgium 2 unlimited	3203 Belgique 2 unl	30	15	0.2	-20	0.2	10	600	-	-	1.5	0.2	-2.5	0.2
Austria	4300 Österreich	30	15	0.2	-20	0.2	12	600	-	-	1	0.2	-3.0	0.2
Italy 3	3902 Italia 3	30	22	0.1	-25	0.2	-	-	-	-	5	0.2	-5.0	0.2
Slovenia	38600 Slovenija	30	15	0.2	-30	0.2	10	1.5	-15	1.5	1	0.2	-3.0	0.2
Czech Republic	42000 Česko	30	15	0.2	-15	0.2	10	600	-	-	0.5	0.2	-0.5	0.2
Greek Islands	3001 Greece islands	180	15	0.5	-20	0.5	10	600	-	-	1	0.5	-2.5	0.5
Greek Mainland	3000 Greece continent	180	15	0.5	-20	0.5	10	600	-	-	0.5	0.5	-0.5	0.5
Turkey	9000 Türkiye	30	15	0.2	-20	0.2	10	600	-	-	0.2	0.2	-2.5	0.2
Ireland	35300 Éire	30	10	0.5	-10	0.5	-	-	-	-	0.5	0.5	-2.0	0.5
Switzerland	4100 Suisse	30	15	0.2	-20	0.2	10	600	-	-	0.2	0.2	-2.5	0.2
Denmark unlimited	4500 Danmark unl.	60	15	0.2	-20	0.2	10	600	-	-	1.5	0.2	-2.5	0.2
Cyprus	35700 Cyprus	30	10	0.5	-10	0.5	-	-	-	-	2	0.5	-3.0	0.5
Finland	35800 Suomi	30	10	0.2	-15	0.2					1	0.2	-2.0	0.2
Poland	4800 Polska	20	15	0.2	-15	1.5	10	600	-	-	1	0.5	-3.0	0.5
EN 50438	50438 EN 50438	20	15	0.2	-15	1.5	-	-	-	-	1	0.5	-3.0	0.5
Bulgaria	3590 Bălgarija	30	15	0.2	-20	0.2	10	600	-	-	0.2	0.2	-2.5	0.2
Mauritius	23000 Mauritius	180	10	0.2	-6	1.5	6	1.5	-	-	1	0.5	-3.0	0.5
Brasil 220	5500 Brasil 220V 60Hz <sup>5)</sup>	300	10	0.2	-20	0.4	-	-	-	-	2	0.2	-2.5	0.2
Brasil 230	5501 Brasil 230V 60Hz	300	10	0.2	-20	0.4	-	-	-	-	2	0.2	-2.5	0.2
Estonia	3720 Estland	30	15	0.2	-15	1.5	-	-	-	-	1	0.5	-3	0.5
Malaysia	6000 Malaysia	60	17.4	2	-13	2	-	-	-	-	5	2	-5	2
India	9100 India	300	35	0.05	-50	0.1	10	2	-15	2	1	2	-1	2
Droop-Mode	0007 Droop-Mode <sup>6)</sup>	60	20	0.5	-20	0.5	-	-	-	-	5	0.5	-3.5	0.5

Table 11

## Country table

- <sup>1)</sup> Country code and name as shown on the display.
- <sup>2)</sup> Disconnection values are upper and lower deviations from the peak values of the rated voltage (in %) and the associated switch-off time (in s).
- <sup>3)</sup> Disconnection values are upper and lower deviations from the average values of the rated voltage (in %) and the associated switch-off time (in s).
- <sup>4)</sup> Disconnection values are upper and lower deviations from the rated frequency (in Hz) and the associated switch-off time (in s).
- <sup>5)</sup> The rated voltage is 240 V (instead of 230 V).

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### Attention

Danger of yield losses. Activation of the *Droop Mode* is not permitted in systems connected to the public electricity grid.

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Activation of the *Droop Mode* is recommended when the inverter is operated in conjunction with a stand-alone inverter in a system that is not connected to the public electricity grid. *Droop mode 50 Hz*; *Droop mode 60 Hz*: 60 Hz.



## 15.5 EU – Declaration of conformity inverter SF-WR

Declaration of conformity for inverter SF-WR-3000 / SF-WR-3600 / SF-WR-4200



EU – KONFORMITÄTSERKLÄRUNG  
EC – DECLARATION OF CONFIRMITY  
DECLARATION DE CONFORMITE DE LA CE

Zertifikat/ Certificat/ Certificat Nr.

006-0313

Die Firma  
The company  
La société

Steca Elektronik GmbH  
Mammostraße 1  
87700 Memmingen  
Germany  
www.steca.com

erklärt in alleiniger Verantwortung, dass folgendes Produkt  
hereby certifies on its responsibility that the following product  
se déclare seule responsable du fait que le produit suivant

Netzwechselrichter

StecaGrid 1800, StecaGrid 1800x  
StecaGrid 2300, StecaGrid 2300x  
StecaGrid 3010, StecaGrid 3010x  
StecaGrid 3000, StecaGrid 3000x  
StecaGrid 3600, StecaGrid 3600x  
StecaGrid 4200, StecaGrid 4200x

auf das sich diese Erklärung bezieht, mit folgenden Richtlinien bzw. Normen übereinstimmt.  
which is explicitly referred to by this Declaration meet the following directives and standard(s).  
qui est l'objet de la présente déclaration correspondent aux directives et normes suivantes.

Elektromagnetische Verträglichkeit – Richtlinie  
Electromagnetic Compability – Directive  
Compatibilité électromagnétique – Directive

2004/108/EG

Niederspannungsrichtlinie  
Low Voltage Directive  
Directive de basse tension

2006/95/EG

Europäische Normen <sup>1) (2/2)</sup>  
European Standard  
Norme européenne

EN 55 014-1

EN 55 014-2

EN 61 000-6-2

EN 61 000-6-3

EN 62 109-1

EN 62 109-2

Die oben genannte Firma hält Dokumentationen als Nachweis der Erfüllung der Sicherheitsziele und die wesentlichen Schutzanforderungen zur Einsicht bereit.

Documentation evidencing conformity with the requirements of the Directives is kept available for inspection at the above company.

En tant que preuve de la satisfaction des demandes de sécurité la documentation peut être consultée chez la société sousmentionnée.

Memmingen, 27.03.2013

Ralf Brielentrog, Entwicklungsleiter



EU – KONFORMITÄTSERKLÄRUNG  
EC – DECLARATION OF CONFIRMITY  
DECLARATION DE CONFORMITE DE LA CE

**Netzwechselrichter**

**StecaGrid 4200**

**BG**

**Декларация за съответствие на европейските норми**

С настоящото декларираме, че посочените на страница 1 продукти, отговарят на следните норми и директиви:

Електромагнитна устойчивост 2004/108/EG, директива за ниско напрежение – 2006/95/EG.

Приложими съгласувани стандарти и норми в частност:<sup>1)</sup>

**EE**

**EL vastavusavaldus**

Käesolevaga avaldame, et nimetatud toode on kooskõlas järgmiste direktiivide ja standarditega:

Elektromagnetilise ühilduvuse direktiiv 2004/108/EG, Madalpingedirektiiv 2006/95/EG

Kohaldatud Euroopa standardid, eeskõige:<sup>1)</sup>

**GR**

**Δήλωση προσαρμογής στις προδιαφές της Ε.Ε. (Ευρωπαϊκής Ένωσης)**

Δηλώνουμε ότι το προϊόν αυτό ο' αυτή την κατάσταση παράδοσης ικανοποιεί τις ακόλουθες διατάξεις:

Ηλεκτρομαγνητική συμβατότητα 2004/108/EG, Οδηγία χαμηλής τάσης 2006/95/EG.

Εναρμονισμένα χρησιμοποιούμενα πρότυπα, ιδιαίτερα:<sup>1)</sup>

**LT**

**Atitikties pareiškimas su Europos Sąjungoje galiojančiomis normomis**

Šiuo mes pareiškiamė, kad nurodytas gaminys atitinka sekancias direktyvas bei normas:

Elektromagnetinio suderinamumo direktyva 2004/108/EG,

Žemosios įtampos direktyva 2006/95/EG

Naudojamas Europoje normos, ypač:<sup>1)</sup>

**NO**

**EU-Overensstemmelseserklæring**

Vi erklærer hermed at denne enheten i utførelse som levert er i overensstemmelse med følgende relevante bestemmelser:

EG-EMV-Elektromagnetisk kompatibilitet 2004/108/EG, EG-Lavspenningsdirektiv 2006/95/EG

Anvendte harmoniserte standarder, særligt:<sup>1)</sup>

**RO**

**Declarație de conformitate UE**

Prin prezenta se declară că produsul mai sus menționat este în conformitate cu următoarele directive, respectiv norme:

Compatibilitate electromagnetică 2004/108/EG, Directiva CE referitoare la tensiunile joase 2006/95/EG

Norme europene utilizate, în special:<sup>1)</sup>

**SI**

**EU-izjava o skladnosti**

Izjavljamo, da je navedeni izdelek skladen z naslednjimi direktivami oz. standardi:

Direktiva o elektromagnetni združljivost 2004/108/EG, Direktiva o nizkonapetostni opremi 2006/95/EG.

Uporabljene evropski standardi, še posebej:<sup>1)</sup>

**StecaGrid 3000**

**CZ**

**Prohlášení o shodě EU**

Prohlášíme tímto, že tento agregát v dodaném provedení odpovídá následujícím příslušným ustanovením:

Směrnici EU-EMV 2004/108/EG,

Směrnici EU-nízké napětí 2006/95/EG.

Použití harmonizační normy, zejména:<sup>1)</sup>

**ES**

**Declaración de conformidad CE**

Por la presente declaramos la conformidad del producto en su estado de suministro con las disposiciones pertinentes siguientes:

Compatibilidad electromagnética 2004/108/EG,

Directiva sobre equipos de baja tensión 2006/95/EG.

Normas armonizadas adoptadas, especialmente:<sup>1)</sup>

**HU**

**EK. Azonossági nyilatkozat**

Ezennel kijelentjük, hogy az berendezés az alábbiaknak megfelel:

Elektromágneses zavarás/űrés: 2004/108/EG,

Kisfeszültségű berendezések irány-Élve: 2006/95/EG

Felhasznált harmonizált szabványok, különösen:<sup>1)</sup>

**LV**

**ES Atbilstības deklarācija**

Paziņojam, ka minētāis izstrādājums atbilst sekojošām direktīvām jeb normām:

2004/108/EG Par elektromagnētisko panesamību,

2006/95/EG Direktīvai par zemspriegumu.

Izmantotās Eiropas normas, īpaši:<sup>1)</sup>

**PL**

**Deklaracja Zgodności CE**

Niniejszym deklarujemy z pełną odpowiedzialnością że dostarczony wyrób jest zgodny z następującymi dokumentami:

Odpowiedniści elektromagnetyczna

2004/108/EG,

Normie niskich napięć 2006/95/EG,

Wyroby są zgodne ze szczegółowymi normami zharmonizowanymi:<sup>1)</sup>

**RU**

**Декларация о соответствии Европейским нормам**

Настоящим документом заявляю, что данный агрегат в его объеме поставки соответствует следующим нормативным документам:

Электромагнитная устойчивость 2004/108/EG, Директивы по низковольтному напряжению 2006/95/EG

Используемые согласованные стандарты и нормы в частности:<sup>1)</sup>

**SK**

**Prehlásenie o zhode ES**

Týmto prehlasujeme, že sa uvedený produkt zhoduje s nasledovnými smernicami príp. normami:

Elektromagnetická zlučiteľnosť 2004/108/EG,

Smernica o nízkom napätí 2006/95/EG.

Použitá európske normy, predovšetkým:<sup>1)</sup>

**StecaGrid 3600**

**DK**

**EF-overensstemmelseserklæring**

Vi erklærer hermed, at denne enhed ved levering overholder følgende relevante bestemmelser:

Elektromagnetisk kompatibilitet: 2004/108/EG,

Lavvolts-direktiv 2006/95/EG.

Anvendte harmoniserede standarder, særligt:<sup>1)</sup>

**FI**

**CE-standardinmukaisuuslauselesto**

Ilmoitamme läten, että tämä laite vastaa seuraavia asiaankuuluvia määräyksiä:

Sähkömagneettinen soveltuvuus 2004/108/EG,

Metallajännite direktiiv: 2006/95/EG

Käytetyt yhteensovitetut standardit, erityisesti:<sup>1)</sup>

**IT**

**Dichiarazione di conformità CE**

Con la presente si dichiara che i presenti prodotti sono conformi alle seguenti disposizioni e direttive rilevanti:

Compatibilità elettromagnetica 2004/108/EG,

Direttiva bassa tensione 2006/95/EG.

Norme armonizzate applicate, in particolare:<sup>1)</sup>

**NL**

**EU-verklaring van overeenstemming**

Hiermed verklaren wij dat dit aggregaat in die geleverde uitvoering voldoet aan de volgende bepalingen:

Elektromagnetische compatibiliteit 2004/108/EG,

EG-laagspanningsrichtlijn 2006/95/EG.

Gebruikte geharmoniseerde normen, in het bijzonder:<sup>1)</sup>

**PT**

**Declaração de Conformidade CE**

Pela presente, declaramos que esta unidade no seu estado original, está conforme os seguintes requisitos:

Compatibilidade electromagnética 2004/108/EG,

Directiva de baixa voltagem 2006/95/EG.

Normas harmonizadas aplicadas, especialmente:<sup>1)</sup>

**SE**

**CE-försäkran**

Härmed förklarar via tt denna maskin i levererat utförande motsvarar följande tillämpliga bestämmelser:

EG-Elektromagnetisk kompatibilitet 2004/108/EG,

EG-Lågspanningsdirektive 2006/95/EG.

Tillämpada harmoniserade normer, i synnerhet:<sup>1)</sup>

**TR**

**EC Uygunluk Teyid Belgesi**

Bu cihazın teslim edildiği şekilde aşağıdaki standartlara uygun olduğunu teyid ederiz:

Elektromanyetik Uyumluluk 2004/108/EG,

Alçak gerilim direktifi 2006/95/EG.

Kısmen kullanılan standartlar:<sup>1)</sup>



EU – KONFORMITÄTSERKLÄRUNG  
EC – DECLARATION OF CONFIRMITY  
DECLARATION DE CONFORMITE DE LA CE

Zertifikat/ Certificat/ Certificat Nr.

001-0114

Die Firma  
The company  
La société



Steca Elektronik GmbH  
Mammostraße 1  
87700 Memmingen  
Germany  
www.steca.com

erklärt in alleiniger Verantwortung, dass folgendes Produkt  
hereby certifies on its responsibility that the following product  
se déclare seule responsable du fait que le produit suivant

Netzwechselrichter  
StecaGrid 3203, StecaGrid 3203x  
StecaGrid 4003, StecaGrid 4003x  
StecaGrid 4803, StecaGrid 4803x  
StecaGrid 5503, StecaGrid 5503x

auf das sich diese Erklärung bezieht, mit folgenden Richtlinien bzw. Normen übereinstimmt.  
which is explicitly referred to by this Declaration meet the following directives and standard(s).  
qui est l'objet de la présente déclaration correspondent aux directives et normes suivantes.

Elektromagnetische Verträglichkeit – Richtlinie 2004/108/EG  
Electromagnetic Compability – Directive  
Compatibilité électromagnétique – Directive

Niederspannungsrichtlinie 2006/95/EG  
Low Voltage Directive  
Directive de basse tension

Europäische Normen <sup>1) (2/3)</sup>  
European Standard  
Norme européenne

EN 62 109-1	EN 62 109-2	
EN 61 000-6-2	EN 61 000-6-3	EN 61 000-3-2
EN 61 000-3-3	EN 55 014-1	EN 55 014-2

Die oben genannte Firma hält Dokumentationen als Nachweis der Erfüllung der Sicherheitsziele und die wesentlichen Schutzanforderungen zur Einsicht bereit.

Documentation evidencing conformity with the requirements of the Directives is kept available for inspection at the above company.

En tant que preuve de la satisfaction des demandes de sécurité la documentation peut être consultée chez la société sousmentionnée.

Memmingen, 22.01.2014

  
Ralf Griesentrog, Entwicklungsleiter



EU – KONFORMITÄTSEKTLÄRUNG  
EC – DECLARATION OF CONFIRMITY  
DECLARATION DE CONFORMITE DE LA CE

**Netzwechselrichter**  
StecaGrid 4003  
StecaGrid 4803x

**BG**  
**Декларация за съответствие на европейските норми**  
С настоящето декларираме, че посочените на страница 1 продукти, отговарят на следните норми и директиви:  
Електромагнитна устойчивост 2004/108/EG,  
директива за ниско напрежение – 2006/95/EG.  
Приложими съгласувани стандарти и норми в частност:<sup>1)</sup>

**EE**  
**EL vastavusavaldus**  
Käesolevaga avaldame, et nimetatud toode on kooskõlas järgmistele direktiivide ja standarditega:  
Elektromagnetilise ühilduvuse direktiiv 2004/108/EG,  
Madalpingedirektiiv 2006/95/EG  
Kohaldatud Euroopa standardid, eelkõige:<sup>1)</sup>

**GR**  
**Δήλωση προσαρμογής στις προδιαφές της Ε.Ε. (Ευρωπαϊκής Ένωσης)**  
Δηλώνουμε ότι το προϊόν αυτό σ' αυτή την κατάσταση παράδοσης ικανοποιεί τις ακόλουθες διατάξεις:  
Ηλεκτρομαγνητική συμβατότητα 2004/108/EG,  
Οδηγία χαμηλής τάσης 2006/95/EG.  
Εναρμονισμένα χρησιμοποιούμενα πρότυπα, ιδίαιτερα:<sup>1)</sup>

**LT**  
**Atitikties pareišikimas su Europos Sąjungoje galiojančiomis normomis**  
Šiuo mes pareišikiame, kad nurodytas gaminyas atitinka sekancias direktyvas bei normas:  
Elektromagnetinio suderinamumo direktyvą 2004/108/EG,  
Žemiosios įtampos direktyvą 2006/95/EG.  
Naudojamas Europoje normas, ypač:<sup>1)</sup>

**NO**  
**EU-Overensstemmelseserklæring**  
Vi erklærer hermed at denne enheden i utførelse som levert er i overensstemmelse med følgende relevante bestemmelser:  
EG-EMV-Elektromagnetisk kompatibilitet 2004/108/EG,  
EG-Lavspenningsdirektiv 2006/95/EG.  
Anvendte harmoniserte standarder, særlig:<sup>1)</sup>

**RO**  
**Declarație de conformitate UE**  
Prin prezenta se declară că produsul mai sus menționat este în conformitate cu următoarele directive, respectiv norme:  
Compatibilitate electromagnetică 2004/108/EG,  
Directiva CE referitoare la tensiunile joase 2006/95/EG.  
Norme europene utilizate, în special:<sup>1)</sup>

**SI**  
**EU-izjava o skladnosti**  
EU-izjava, da je navedeni izdelek skladen z naslednjimi direktivami oz. standardi:  
Direktiva o elektromagnetni združljivosti 2004/108/EG,  
Direktiva o nizkonapetostni opremi 2006/95/EG.  
Uporabljene evropski standardi, še posebej:<sup>1)</sup>

StecaGrid 3203  
StecaGrid 4003x  
StecaGrid 5503

**CZ**  
**Prohlášení o shodě EU**  
Prohlašujeme tímto, že tento agregát v dodaném provedení odpovídá následujícím příslušným ustanovením:  
Směrnici EU-EMV 2004/108/EG,  
Směrnici EU-nizké napětí 2006/95/EG.  
Použité harmonizační normy, zejména:<sup>1)</sup>

**ES**  
**Declaración de conformidad CE**  
Por la presente declaramos la conformidad del producto en su estado de suministra con las disposiciones pertinentes siguientes:  
Compatibilidad electromagnética 2004/108/EG,  
Directiva sobre equipos de baja tensión 2006/95/EG.  
Normas armonizadas adoptadas, especialmente:<sup>1)</sup>

**HU**  
**EK. Azonossági nyilatkozat**  
Ezennel kijelentjük, hogy az berendezés az alábbiaknak megfelel:  
Elektromágnessé zavarás/űrés: 2004/108/EG,  
Kisfeszültségű berendezések irány-Elve: 2006/95/EG.  
Felhasznált harmonizált szabványok, különösen:<sup>1)</sup>

**LV**  
**ES Atbilstības deklarācija**  
Paziņojam, ka minētais izstrādājums atbilst sekojošām direktīvām jeb normām:  
2004/108/EG Par elektromagnētisko panesamību,  
2006/95/EG Direktīvai par zemspriegumu.  
Izmantotās Eiropas normas, īpaši:<sup>1)</sup>

**PL**  
**Deklaracja Zgodności CE**  
Niniejszym deklarujemy z pełną odpowiedzialnością że dostarczony wyrób jest zgodny z następującymi dokumentami:  
Odpowiedniość elektromagnetyczna 2004/108/EG,  
Normie niskich napięć 2006/95/EG.  
Wyroby są zgodne ze szczegółowymi normami zharmonizowanymi:<sup>1)</sup>

**RU**  
**Декларация о соответствии Европейским нормам**  
Настоящим документом заявляем, что данный агрегат в его объеме поставки соответствует следующим нормативным документам:  
Электромагнитная устойчивость 2004/108/EG,  
Директивы по низковольтному напряжению 2006/95/EG.  
Используемые согласованные стандарты и нормы в частности:<sup>1)</sup>

**SK**  
**Prehlásenie o zhode ES**  
Týmto prehlasujeme, že sa uvedený produkt zhoduje s nasledovnými smernicami príp. normami:  
Elektromagnetická zlučiteľnosť 2004/108/EG,  
Smernica o nízkom napätí 2006/95/EG.  
Použitie európske normy, predovšetkým:<sup>1)</sup>

StecaGrid 3203x  
StecaGrid 4803  
StecaGrid 5503x

**DK**  
**EF-overensstemmelseserklæring**  
Vi erklærer hermed, at denne enhed ved levering overholder følgende relevante bestemmelser:  
Elektromagnetisk kompatibilitet: 2004/108/EG,  
Lavvolts-direktiv 2006/95/EG.  
Anvendte harmoniserede standarder, særligt:<sup>1)</sup>

**FI**  
**CE-standardinmukaisuuslause**  
Ilmoitamme täten, että tämä laite vastaa seuraavia asiaankuuluvia määräyksiä:  
Sähkömagneettinen soveltuvuus 2004/108/EG,  
Matalajännite direktiivi: 2006/95/EG  
Käytetyt yhteensovitettut standardit, erityisesti:<sup>1)</sup>

**IT**  
**Dichiarazione di conformità CE**  
Con la presente si dichiara che i presenti prodotti sono conformi alle seguenti disposizioni e direttive rilevanti:  
Compatibilità elettromagnetica 2004/108/EG,  
Direttiva bassa tensione 2006/95/EG.  
Norme armonizzate applicate, in particolare:<sup>1)</sup>

**NL**  
**EU-verklaring van overeenstemming**  
Hiermede verklaren wij dat dit aggregaat in die geleverde uitvoering voldoet aan de volgende bepalingen:  
Elektromagnetische compatibiliteit 2004/108/EG,  
EG-laagspanningsrichtlijn 2006/95/EG.  
Gebruikte geharmoniseerde normen, in het bijzonder:<sup>1)</sup>

**PT**  
**Declaração de Conformidade CE**  
Pela presente, declaramos que esta unidade no seu estado original, está conforme os seguintes requisitos:  
Compatibilidade electromagnética 2004/108/EG,  
Directiva de baixa voltagem 2006/95/EG.  
Normas harmonizadas aplicadas, especialmente:<sup>1)</sup>

**SE**  
**CE-försäkran**  
Härmed förklarar via tt denna maskin i levererat utförande motsvarar följande tillämpliga bestämmelser:  
EG-Elektromagnetisk kompatibilitet 2004/108/EG,  
EG-Lågspänningsdirektive 2006/95/EG.  
Tillämpada harmoniserade normer, i synnerhet:<sup>1)</sup>





**TR**  
**EC Uygunluk Teyid Belgesi**  
Bu cihazın teslim edildiği şekliyle aşağıdaki standartlara uygun olduğunu teyid ederiz:  
Elektromanyetik Uyumluluk 2004/108/EG,  
Alçak gerilim direktifi 2006/95/EG.  
Kısmen kullanılan standartlar:<sup>1)</sup>

## 15.6 Plugs and Sockets

### 15.6.1 Product information plugs and sockets

Features	
 <p>Producer: Amphenol Product: Helios H4</p> 	<ul style="list-style-type: none"> <li>• UL, TÜV and CSA approved</li> <li>• Fully intermateable with industry standard</li> <li>• Meets all new NEC 2008 requirements</li> <li>• Quick and easy secure snap lock mating</li> <li>• Simple unlocking tool meets NEC requirements</li> <li>• Long-term UV and Ozone resistance</li> <li>• Highest current rating in industry</li> <li>• RoHS compliant</li> <li>• Complete Cable Assemblies available</li> <li>• Low contact resistance means low loss</li> <li>• Ready for field assembly</li> </ul>

Technical Data	
<b>Rated current</b>	32A (2,5 mm (0.09 in), AWG14), 40A (4,0 mm (0.016 in), AWG 12), 44A (6,0 mm (0.24 in), AWG10), 65A (10,0 mm (0.39 in), AWG 8)
<b>Rated voltage</b>	1000 V (IEC), 1000 V (UL)
<b>Test voltage</b>	6 KV for 1 minute, 10 kV impulse (1,2/50µS) (IEC)
<b>Typical contact resistance</b>	0,25m Ω
<b>Contact material</b>	Copper, tin plated
<b>Contact system</b>	Machined/Cold Formed or Stamped & Formed with RADSOK® insert
<b>Insulation material</b>	PC
<b>Locking mechanism</b>	Snap-lock, special unlock tool required to un-mate as required by NEC 2008
<b>Cable strain relief</b>	Compression gland with ratcheting gland nut
<b>Degree of protection</b>	IP68
<b>Safety class</b>	II (IEC61140)
<b>Pollution degree</b>	2 (IEC60664)
<b>Overvoltage category</b>	III (IEC60664)
<b>Flame class</b>	UL94-VO
<b>Ambient temperature range</b>	-40 °C to 85 °C

Tools	
 <p><b>Crimp Tool</b></p>	 <p><b>Strip Tool</b></p>
 <p><b>Wrench Tool</b></p>	 <p><b>Universal Unlocking Tool</b></p>

For the purchase of the special tool, please contact directly the manufacturer Amphenol.

15.6.2 TÜV certificate plugs and sockets

**Zertifikat**

**Certificate**



Zertifikat Nr. *Certificate No.* Blatt *Page*  
 R 50157783 0002

Ihr Zeichen *Client Reference* Unser Zeichen *Our Reference* Ausstellungsdatum *Date of Issue*  
 J.L. 02-CHENAND- 17011847 002 26.10.2009 (day/month/yr)

**Genehmigungsinhaber *License Holder***  
 Amphenol Industrial Operations  
 40-60 Delaware Avenue, Sidney  
 New York State 13838-1395  
 USA

**Fertigungsstätte *Manufacturing Plant***  
 Amphenol Technology (Shenzhen)  
 Co., Ltd.  
 Blk5, FuAn 2nd Industrial Park  
 Dayang Rd., Fuyong Town, Baoan  
 Shenzhen, Guangdong 518103  
 P.R. China

**Prüfzeichen *Test Mark***

Geprüft nach *Tested acc. to*  
 EN 50521:2008



**Zertifiziertes Produkt *(Geräteidentifikation)***  
***Certified Product (Product Identification)***

**Lizenzentgelte - Einheit**  
***License Fee - Unit***

Connector (Connector for Photovoltaic System)

as page 0001  
 Change  
 Addition

Test Requirement : See above  
 Type Designation : Helios H4 2.5mm<sup>2</sup> (for cable)  
                           Helios H4 4mm<sup>2</sup> (for cable)  
                           Helios H4 6mm<sup>2</sup> (for cable)  
                           Helios H4 2.5mm<sup>2</sup> bulkhead (for panel)  
                           Helios H4 4mm<sup>2</sup> bulkhead (for panel)  
                           Helios H4 6mm<sup>2</sup> bulkhead (for panel)  
 Rated Current : 32A/ta=90°C, 40A/ta=85°C for 2.5mm<sup>2</sup>  
                           40A/ta=90°C, 48A/ta=85°C for 4.0mm<sup>2</sup>  
                           44A/ta=90°C, 56A/ta=85°C for 6.0mm<sup>2</sup>  
 Ambient Temperature (ta) : 90°C  
 Upper Limiting Temperature: 120°C  
 The labelling requirements acc. to EU Directive 2001/95  
 have to be observed for distribution within the EEA.

6

**ANLAGE (Appendix): 1.1**

Dem Zertifikat liegt unsere Prüf- und Zertifizierungsordnung zugrunde und es bestätigt die Konformität des Produktes mit den oben genannten Standards und Prüfgrundlagen. Zusätzliche Anforderungen in Ländern, in denen das Produkt in Verkehr gebracht werden soll, müssen zusätzlich betrachtet werden. Die Herstellung des zertifizierten Produktes wird überwacht.  
 This certificate is based on our Testing and Certification Regulation and states the conformity of the product with the standards and testing requirements as indicated above. Any additional requirements in countries where the product is going to be marketed have to be considered additionally. The manufacturing of the certified product is subject to surveillance.

**TÜV Rheinland Product Safety GmbH, Am Grauen Stein, D-51105 Köln**  
 Tel.: (+49/221)8 06 - 13 71 e-mail: cert-validity@de.tuv.com  
 Fax: (+49/221)8 06 - 39 35 http://www.tuv.com/safety



Dipl.-Ing. S. O. Steinke

## DC Cable

### 15.6.3 Product information DC cable

Features	
	<ul style="list-style-type: none"> <li>• UV-, ozone-, acid-, alkali- and weather-resistance</li> <li>• Flame-retardant, halogen-free</li> <li>• Good abrasion resistance, robust</li> <li>• Short-circuit-proof up to 200°C/5s, thanks to double insulation</li> <li>• Highly flexible for high mechanical stress</li> <li>• RoHS and REACH-conformant</li> <li>• Sheath colours: black</li> <li>• 25-year factory warranty from date of delivery. The warranty conditions for HIRKA® PRO apply for intended use, installation and operating conditions.</li> </ul>
<p>Hersteller: HIS Produkt: HIRKA® S</p>	

Technical Data	
<b>Approvals</b>	DKE (PV1-F), TÜV 2 PFG. 1169/08.07 (R 60033853)
<b>Working temperature flexible</b>	-25° C bis +125° C
<b>Working temperature fixed</b>	-50° C bis +150° C
<b>Minimum bending radius flexible</b>	10 x cable dia
<b>Minimum bending radius fixed</b>	5 x cable dia
<b>Nominal voltage [U0/U]</b>	AC 600 / 1,000 V   DC 900 / 1,500 V
Voltages up to 1,8 kV are possible (conductor / conductor, not grounded system, unloaded circuit)	
<b>Test voltage</b>	AC 6,500 V
<b>Rated voltage</b>	Maximum permissible voltage up to 1.8 kV DC (conductor/conductor, non grounded system, unstressed circuit)
General Construction	
<b>Number x section in mm<sup>2</sup></b>	1 x 4.0 (1x 0.16 in <sup>2</sup> )
<b>Conductor construction n x max-Ø (mm)</b>	56 x 0.30 (56 x 0.012 in)
<b>External diameter approx. (± 0,2 mm)</b>	5.2 (0.2 in ± 0.008 in)
<b>Weight ca. kg/km</b>	59 (12.08 lbs/ft <sup>2</sup> )
Construction	
Tin-plated copper strand, fine wire as per IEC EN 60228 class 5	
Polyolefin	
Double isolated	
Insulation / Chemically cross-linked special compound	

## 15.6.4 EU declaration of conformity DC cable

### **EC Declaration of Conformity**

Issuer's name and address:

HI-Kabelkonfektionierungs GmbH  
Siemensstr. 4  
64743 Beerfelden

Product:

Cables for photovoltaic systems

Type designation:

HIKRA Solar PV1-F

The designated product is in conformity with the European Directive:

**2006/95/EC**

**"Council Directive on the harmonization of the laws of the Member States relating to electrical equipment designed for use within certain voltage limits".**

Full compliance with the standards listed below proves the conformity of the designated product with the provisions of the above-mentioned EC Directive:

Anforderungsprofil Leitungen für

PV-Systeme/requirements for cables for PV systems 2008-02-12

(in Anlehnung an/with reference to) und nach Werksspezifikation/and according to manufacturer's specification

The VDE Testing and Certification Institute GmbH (EU Identification No.0366), Merianstr. 28, D-63069 Offenbach, has tested and certified the product granting the VDE Approval for the mark(s) as displayed.



REG.-Nr. 8322 oder/or



oder/or VDE-REG.-Nr. 8322

REG.-Nr. 8322

Certificate No.  
File Reference

40026479  
5003369-5920-0070 / 112511 FG41 / LR

Beerfelden 12-8-10  
(Place, Date)

[Signature]  
(Legally binding signature of the issuer)



15.6.5 TÜV certificate DC cable

**Zertifikat**

**Certificate**



Zertifikat Nr. *Certificate No.*  
R 60033853      Blatt *Page*  
0001

<b>Ihr Zeichen</b> <i>Client Reference</i>	<b>Unser Zeichen</b> <i>Our Reference</i>	<b>Ausstellungsdatum</b>	<b>Date of Issue</b> (day/mo/yr)
	0010-- 21148677 007	10.09.2010	

<b>Genehmigungsinhaber</b> <i>License Holder</i>	<b>Fertigungsstätte</b> <i>Manufacturing Plant</i>
HIS Solarsysteme GmbH Siemensstr. 4 64743 Beerfelden Deutschland	0010--21148677 002

**Prüfzeichen** *Test Mark*      Geprüft nach *Tested acc. to*  
2 PFG 1169/08.07



<b>Zertifiziertes Produkt</b> (Geräteidentifikation) <i>Certified Product (Product Identification)</i>	<b>Lizenzentgelte - Einheit</b> <i>License Fee - Unit</i>
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PV-Leitungen

Bezeichnung	: HIKRA Solar	11
Bauartkurzzeichen	: PV1-F	
Bemessungsquerschnitt:	2,5 mm <sup>2</sup> ; 4,0 mm <sup>2</sup> ; 6,0 mm <sup>2</sup> ; 10,0 mm <sup>2</sup> 16,0 mm <sup>2</sup> und 35,0 mm <sup>2</sup>	5
Bemessungsspannung	: AC U <sub>o</sub> /U 0,6/1kV; DC 1,8kV (Leiter-Leiter, nicht geerdetes System, unbelasteter Stromkreis)	
Temperaturbereich	: - 40°C bis + 90°C	
max. Temp. am Leiter	: 120°C (für 20.000h)	
Material Isolation	: XLPE schwarz	
Material Mantel	: XLPE	
Mantelfarbe für: 2,5 mm <sup>2</sup> ; 4,0 mm <sup>2</sup> ; 6,0 mm <sup>2</sup> ; 10,0 mm <sup>2</sup> :	schwarz, rot oder blau	
Mantelfarbe für: 16,0 mm <sup>2</sup> und 35,0 mm <sup>2</sup> :	schwarz	

*Dem Zertifikat liegt unsere Prüf- und Zertifizierungsordnung zugrunde und es bestätigt die Konformität des Produktes mit den oben genannten Standards und Prüfgrundlagen. Zusätzliche Anforderungen in Ländern, in denen das Produkt in Verkehr gebracht werden soll, müssen zusätzlich betrachtet werden. Die Herstellung des zertifizierten Produktes wird überwacht.*  
*This certificate is based on our Testing and Certification Regulation and states the conformity of the product with the standards and testing requirements as indicated above. Any additional requirements in countries where the product is going to be marketed have to be considered additionally. The manufacturing of the certified product is subject to surveillance.*

**TÜV Rheinland LGA Products GmbH, Tillystraße 2, 90431 Nürnberg**  
Tel.: +49 221 806-1371 e-mail: cert-validity@de.tuv.com  
Fax: +49 221 806-3935 http://www.tuv.com/safety



## 16. Exclusion of Liability

This manual is the proprietary information of Solar Frontier Europe GmbH (SF). Solar Frontier's limited warranty will be voided if the instructions here within are not strictly observed. Solar Frontier will not assume any liability for personal injuries and damage to property arising from improper use, wrong assembly, operation and maintenance of PowerSets. Solar Frontier reserves the right to make amendments to the contents of this document without prior notice. This manual is valid from June 2014.

The information provided with this installation and operation manual represent the latest information of the manufacturer of the single components at the time of printing. Subject to changes and modifications.

## 17. Contact

In case of complaints or faults, please contact the dealer from whom you purchased the product. They will help you with any issues you may have.

After Sales Service	Phone: <b>00800 333 111 333</b>
	Internet: <b><a href="http://www.solar-frontier.eu">www.solar-frontier.eu</a></b>
	E-Mail: <b><a href="mailto:powersets.aftersaleservice@solar-frontier.eu">powersets.aftersaleservice@solar-frontier.eu</a></b>

## 18. Notes

### Inverter

Type \_\_\_\_\_  
\_\_\_\_\_

Serial number \_\_\_\_\_  
\_\_\_\_\_

Installation company \_\_\_\_\_  
\_\_\_\_\_

Company \_\_\_\_\_  
\_\_\_\_\_

Contact \_\_\_\_\_  
\_\_\_\_\_

Street \_\_\_\_\_  
\_\_\_\_\_

ZIP \_\_\_\_\_  
\_\_\_\_\_

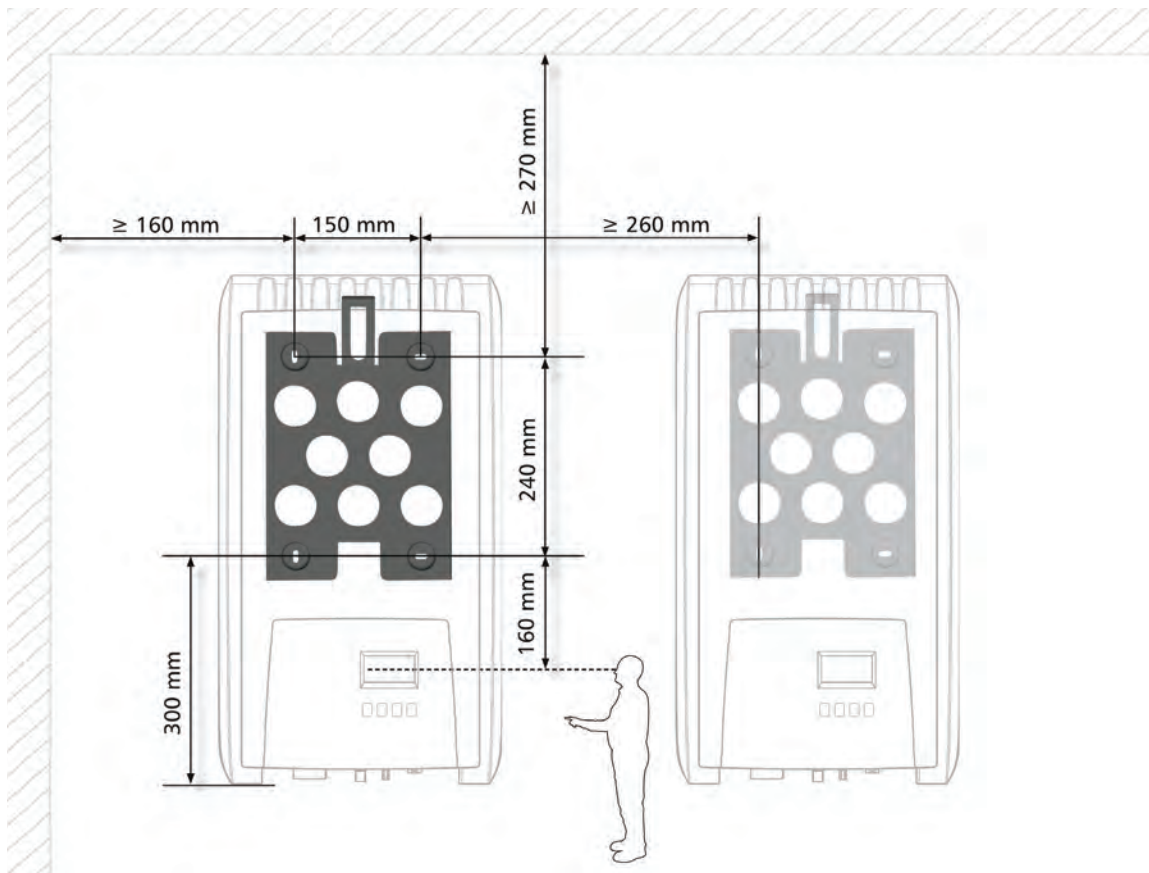
City \_\_\_\_\_  
\_\_\_\_\_

Telephone number \_\_\_\_\_  
\_\_\_\_\_

E-Mail \_\_\_\_\_

## 19. Appendices

### 19.1 Installation SF-WR



## 19.2 AC plug SF-WR

### Wichtige Information - bitte aufmerksam lesen

Dieses Beiblatt beschreibt die Montage der zwei- und dreipoligen **gesis** RST-Steckverbinder. Bitte beachten Sie, daß elektrische Anschlüsse und Installationen ausschließlich von hierfür ausgebildeten Fachkräften vorgenommen werden dürfen.

### Important information - please read carefully

This leaflet is intended for use by trained electricians only. It describes the mounting of the two and three pole gesis RST connectors. Please observe the warnings and notes.

### Einsatzbereich und Zündschutzart

#### Operating conditions and type of protection

- II 3 G Ex nA II, 80°C (T6)
- II 3 D Ex tD A22 T85°C (H05VV-F...: T70°C; H07RN-F...: T60°C)

Zertifikat Nr./Certificate No. SEV 07 ATEX 0110 X

Erweiterter Einsatzbereich für nachfolgende Geräte- und Erstanstschlüsse in Schraubtechnik:  
Extended range of application for following screw-type appliance and power connectors:

- RST20I3S(D)S1 ZR.. / ..S(D)B1 ZR..
- RST20I3S(D)S1 M.. / ..S(D)B1 M..

Siehe auch „Besondere Bedingungen X“  
See also „Special conditions X“

### Kabeltypen

#### Cable types

- H05VV-F... 1,5mm<sup>2</sup> und 2,5mm<sup>2</sup>
- H07RN-F... 1,5mm<sup>2</sup> und 2,5mm<sup>2</sup>

### Technische Spezifikationen

#### Technical specifications

Bemessungsspannung Rated voltage	50V, 250V, 250/400V
Bemessungsquerschnitt Rated diameter	2,5mm <sup>2</sup>
Schutzart Type of protection	IP 66/68

#### Bemessungsstrom/ Rated current

Geräte- und Erstanstschlüsse, Schraub und Federkraftanschluss Device and mains connections, screw and spring clamp terminals		
1,5mm <sup>2</sup>	16A	
2,5mm <sup>2</sup>	20A	
Konfektionierte Leitungen, Crimpanschluss Assembled cables, crimp connection		
Kabeltyp / Cable type	H05VV-F	H07RN-F
1,5mm <sup>2</sup>	16A	14,5A
2,5mm <sup>2</sup>	20A	17,5A

#### Anschließbare Querschnitte (mm<sup>2</sup>) / Connectable cross sections (mm<sup>2</sup>)

	min.	max.
Schraubtechnik / Screw technique	1,5	4,0
Federkrafttechnik / Spring force technique	1,5	2,5

Ein- und feindrähtige Leiter mit 0,75mm<sup>2</sup> und 1,0mm<sup>2</sup> sind auch klemmbar  
Single-wire and fine-strand conductors with 0.75mm<sup>2</sup> and 1.0mm<sup>2</sup> can also be connected

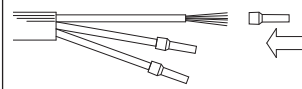
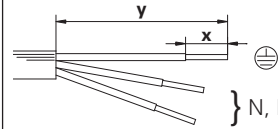
#### Anschließbare Leiterarten / Type of conductors which can be connected

		Leiterquerschnitt (mm <sup>2</sup> ) / conductor cross section (mm <sup>2</sup> )
Schraubklemmstelle / Screw terminal	ein-/feindrähtig single-wire/fine strand	1,5...2,5
- zusätzlich / additionally	feindrähtig fine-strand	4,0
- zusätzlich / additionally	flexibel mit Aderendhülse flexible with core end sleeve	1,5...2,5
Schraubenlose Klemmstelle / Screwless terminal	eindrähtig single wire	1,5...2,5
- zusätzlich / additionally	flexibel mit ultraschallverdichteten Leiterenden flexible with ultrasonically densified lead ends	1,5; 2,5
- zusätzlich / additionally	flexibel mit Aderendhülse flexible with core end sleeve	1,5
Crimpanschluss / Crimp connection	flexibel mit ultraschallverdichteten Leiterenden flexible with ultrasonically densified lead ends	1,5; 2,5

Anzahl der Kabel pro Klemmstelle: 1 bzw. 2  
Number of cables per terminal point: 1 or 2 respectively

### Abmantellängen und Abisolierlängen (mm)

#### Dismantling and insulation strip lengths (mm)



Preßzange für Aderendhülsen: Art-Nr. **95.101.1300.0**  
Crimping tool for ferrules  
Wieland order ref.-no. **95.101.1300.0**

#### Federkraft-Anschlüsse / Spring clamp connections

Leiter / conductor	PE	N,L	PE	N,L
	Einfach-Anschluß Single connector		Doppel-Anschluß Dual connector	
Abmantellänge y (mm) / Dismantling length y (mm)	<b>40</b>	<b>35</b>	<b>55</b>	<b>50</b>

	Abisolierlänge x (mm) / Insulation strip length x (mm)	
Leiterquerschnitt (mm <sup>2</sup> ) / Conductor cross section (mm <sup>2</sup> )	1,5	2,5
eindrähtig / solid	<b>14,5+1</b>	<b>14,5+1</b>
feindrähtig (nur mit Aderendhülse) / fine stranded (ferrules required)	<b>13+1</b>	
Aderendhülse entspr. DIN 46228-E-... Ferrules acc. to DIN 46228-E-...	<b>12</b>	
Aderendhülse entspr. DIN 46228-E-... Ferrules acc. to DIN 46228-E-...	<b>12</b>	
Ultraschallverdichtet / ultrasonically compressed	<b>14,5+1</b>	<b>14,5+1</b>

#### Schraubanschlüsse / Screw connections

Zugentlastung / strain relief	Ø 10...14		Ø 13...18	
Leiter / conductor	PE	N,L	PE	N,L
	Einfach-Anschluß Single connector			
Abmantellänge y (mm) / Dismantling length y (mm)	<b>30</b>	<b>25</b>	<b>42</b>	<b>37</b>
	<b>45</b> <b>40</b>			
	Doppel-Anschluß Dual connector			

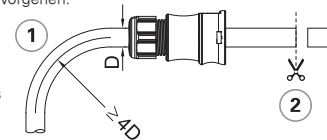
Abisolierlänge x (mm) / Insulation strip length x (mm)	<b>8</b> (Leiterquerschnitt 1,5...4mm <sup>2</sup> ) (conductor cross section 1,5...4mm <sup>2</sup> )
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### Biegeradien

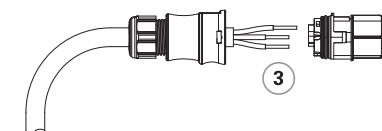
Beachten Sie den minimalen Biegeradius der Leiter. Vermeiden Sie Zugkräfte auf die Kontaktstellen, indem Sie wie folgt vorgehen:

#### Bending radius

Note the minimum bending radius for conductors. Avoid pull forces on the contact points by proceeding as follows:



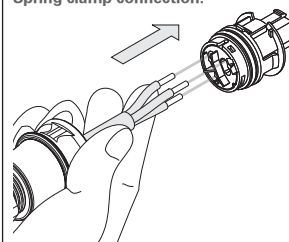
1. Leitung wie benötigt biegen  
Bend the wire as required
2. Leitung ablängen  
Cut the wire to length
3. Abmanteln, abisolieren.  
Strip the cable and wires.



### Leitermontage

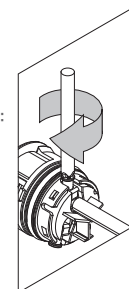
#### Wire connection

##### Federkraft-Anschluß: Spring clamp connection:



**Schraubanschluß:**  
Antrieb PZ1,  
Anzugsmoment  
typ. 0,8...1 Nm

**Screw connection:**  
Drive PZ1,  
Tightening torque  
typ. 0.8...1 Nm

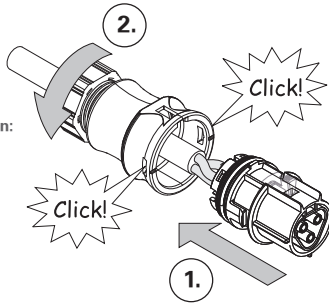


## Verschließen

### Closing

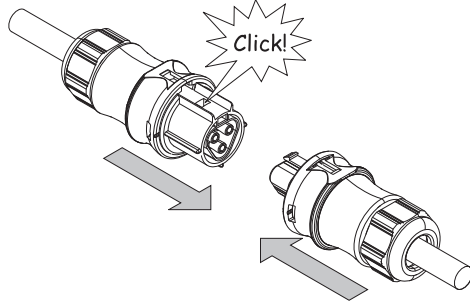
**Verschraubung:**  
Anzugsmoment  
typ. 4+1 Nm

**Screw connection:**  
Tightening torque  
typ. 4+1 Nm



## Stecken und verriegeln

### Plugging and locking

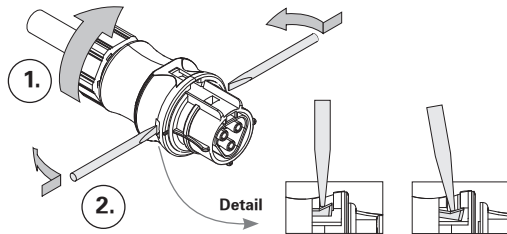


### ACHTUNG / CAUTION

- Die Steckverbinder sind nicht zur Stromunterbrechung geeignet. Trennen oder stecken Sie die Verbindung niemals unter Last!  
The connectors are not for current interrupting. Never connect or disconnect under load!
- Um die Einhaltung der IP-Schutzart gewährleisten zu können, müssen an allen nicht belegten Stecker- oder Buchsentteilen Schutzkappen (Zubehör) montiert werden!  
To maintain IP 65 type of enclosure, protective caps (accessory) must be mounted on all unoccupied connectors!

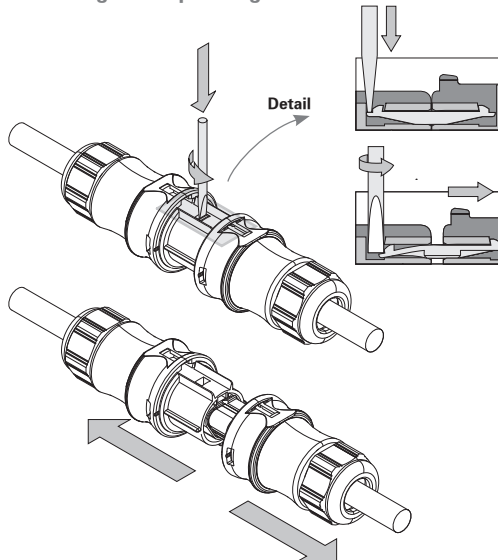
## Öffnen des Steckverbinders

### Opening the connector



## Entriegeln und Trennen

### Unlocking and separating



### ACHTUNG / CAUTION

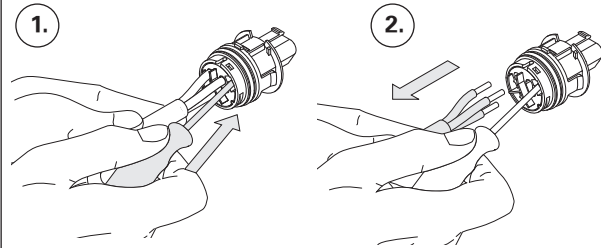
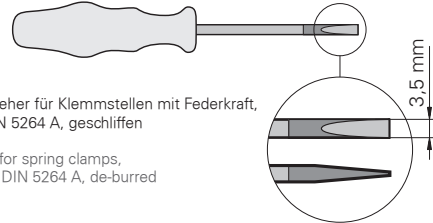


Die Steckverbinder sind nicht zur Stromunterbrechung geeignet. Trennen oder stecken Sie die Verbindung niemals unter Last!

The connectors are not for current interrupting. Never connect or disconnect under load!

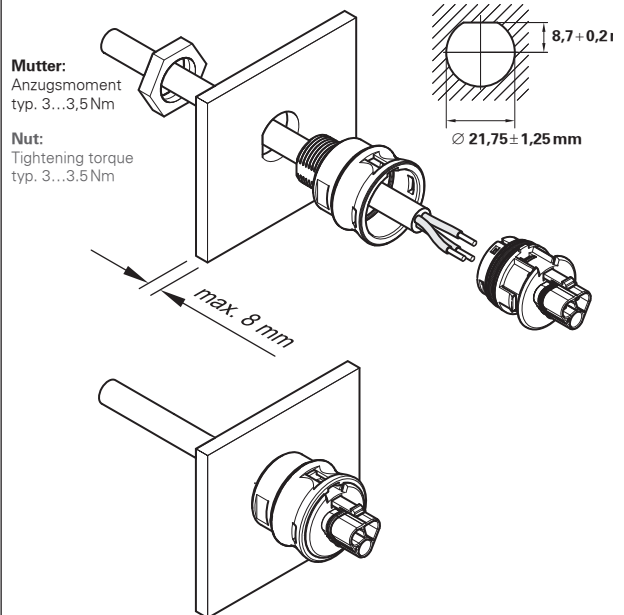
## Leiterdemontage

### Unlocking



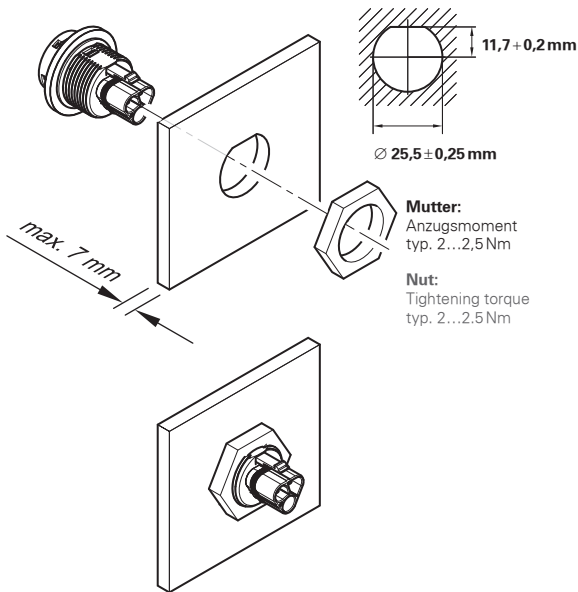
## Gehäuseeinbau mit M20-Durchführung

### Housing installation with M20 feedthrough



## Gehäuseeinbau mit M25-Durchführung

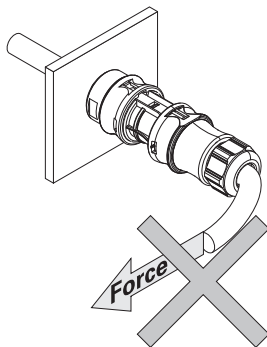
### Housing installation with M25 feedthrough



#### ACHTUNG / CAUTION

Damit die Schutzart IP68 eingehalten wird, stellen Sie durch geeignete Maßnahmen sicher, daß die Steckverbinder vor Biegekräften geschützt sind (z.B. keine Lasten an Kabel hängen; Kabelaufwicklungen nicht freihängend etc.).

To ensure protection category IP68, do not expose the connection to bending forces (e.g. do not attach loads to the cable, no free-dangling cable windings etc.).



#### HINWEISE / NOTES

- DE** Die Installationssteckverbinder RST 20i2...-i3... sind nach RL 94/9/EG (ATEX 95) Anhang I Geräte der Gerätegruppe II Kategorie 3G die nach RL 99/92/EG (ATEX 137) in der Zone 2 sowie den Gasgruppen IIA, IIB und IIC, die durch brennbare Stoffe im Bereich der Temperaturklassen T1 bis T6 explosionsgefährdet sind, eingesetzt werden dürfen.  
Bei der Verwendung/Installation sind die Anforderungen nach EN 60079-14 einzuhalten.  
**EN** The installation plug connectors RST 20i2...-i3... are, according to RL 94/9/EG (ATEX 95) Appendix I, appliances of Appliance Group II, Category 3G, which, according to RL 99/92/EG (ATEX 137), may be used in Zone 2, as well as in the gas groups IIA, IIB, and IIC, which are subject to the risk of explosion due to combustible materials in the range of temperature classes T1 to T6.  
During use/installation, the requirements according to EN 60079-14 are to be respected.
- DE** Die Installationssteckverbinder RST 20i2...-i3... sind nach RL 94/9/EG (ATEX 95) Anhang I auch Geräte der Gerätegruppe II Kategorie 3D die nach RL 99/92/EG (ATEX 137) in der Zone 22 von brennbaren Stäuben eingesetzt werden dürfen.  
Bei der Verwendung/Installation sind die Anforderungen nach EN 61 241-14 einzuhalten.  
**EN** The installation plug connectors RST 20i2...-i3... are, according to RL 94/9/EG (ATEX 95) Appendix I, appliances of Appliance Group II, Category 3D, which, according to RL 99/92/EG (ATEX 137), may be used in Zone 22 of combustible dusts.  
During use/installation, the requirements according to EN 61 241-14 are to be respected.
- DE** Der zulässige Umgebungstemperaturbereich beträgt -20°C bis +40°C.  
**EN** The permissible ambient temperature range is -20 °C to + 40 °C.

#### BESONDERE BEDINGUNGEN X / SPECIAL CONDITIONS X

- DE** Die Installationssteckverbinder RST 20i2...-i3... dürfen nur dort eingebaut werden, wo diese vor Einwirkung mechanischer Gefahr geschützt sind.  
**EN** The installation plug connectors RST 20i2...-i3... may only be installed at locations at which they are protected from the effects of mechanical dangers.
- DE** Nicht benötigte Stecker- und Buchsenteile müssen mit dem jeweils zugehörigen Verschlussstück verschlossen werden.  
**EN** Unnecessary plug and socket parts must be closed off with the pertinent closure element which relates to them.
- DE** Die am Installationssteckverbinder RST 20i2...-i3... angeschlossenen Kabel und Leitungen sind vor Einwirkung mechanischen Gefahr zu schützen. Zusätzlich muss der Installateur/Betreiber eine entsprechende Zugentlastung der angeschlossenen Kabel und Leitungen gewährleisten.  
**EN** The cables and leads connected to installation plug connectors RST 20i2...-i3... are to be protected from the effect of mechanical danger. In addition to this, the installer/operator must guarantee an appropriate strain relief for the connected cables and leads.
- DE** Bei Verwendung eines Leiterquerschnittes  $\geq 2,5\text{mm}^2$  und bei einer Umgebungstemperatur bis max. 70°C dürfen die Installationssteckverbinder RST20i3 als Geräte- und Erstanstschlüsse in Schraubtechnik mit einem maximalen Belastungsstrom von 9,4 A eingesetzt werden.  
**EN** The screw-type appliance and power connectors RST20i3 may be operated with 9.4 A if conductor cross section is equal or greater than 2.5mm<sup>2</sup> and ambient temperature does not exceed 70 °C.
- DE** Wartungs- und Reinigungsarbeiten dürfen nur durchgeführt werden, wenn keine explosive Atmosphäre vorhanden ist.  
Elektrostatische Aufladung der Installationsverbinder RST20i2...-i3..., z.B. durch Staubabwischen, muss vermieden werden.  
**EN** Maintenance and cleaning may only be performed in a non-explosive atmosphere.  
Electrostatic charging of installation connectors RST20i2...-i3..., e.g. by dusting, must be avoided.

### Wichtige Information - bitte aufmerksam lesen

Dieses Beiblatt beschreibt die Montage der vier- und fünfpoligen **gesis RST**-Steckverbinder. Bitte beachten Sie, daß elektrische Anschlüsse und Installationen ausschließlich von hierfür ausgebildeten Fachkräften vorgenommen werden dürfen.

### Important information - please read carefully

This leaflet is intended for use by trained electricians only. It describes the mounting of the four and five pole **gesis RST** connectors. Please observe the warnings and notes.

### Zugelassene Kabeltypen

#### Approved cable types

H05 VV; H07 RN-F; NYM; Ölflex-Classic 100.

Die folgende Tabelle listet die UL-zugelassen Typen auf:

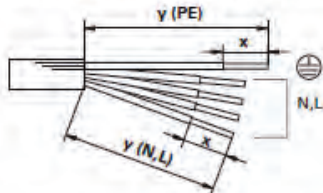
The following table denotes UL approved types:

Cord	Small bushing	Middle bushing	Large bushing
R/C (AVLV2/8)			
AWM Cord OD range	8-10 mm	10-12 mm	12-14 mm
PVC jacket, Style 21098	9.81 mm	10.85 mm	12.03 mm

Cord Style 21098 for use with female and male cable fittings, size No. 18-12 AWG, five conductors, and overall cord diameter; conductor Style 1015 for use with male and female panel-mounted inlets and outlets, size No. 18-12, five conductors.

### Abmantellängen und Abisolierlängen (mm)

#### Dismantling and insulation strip lengths (mm)



Zugentlastung / strain relief	Ø 6...10 / 10...14	Ø 13...18
Leiter / conductor	PE N,L	PE N,L
<b>Schraubanschluß / screw connection</b>		
Abmantellänge y (mm) / Dismantling length y (mm)	30	25
Abmantellänge y (Doppelanschluß) / Dismantling length y (splitter connector)	45	40
Abisolierlänge x (mm) / insulation strip length x (mm)	8 (Leiterquerschnitt/conductor cross section 1,5...4 mm <sup>2</sup> )	
<b>Crimpanschluß / crimp connection</b>		
Abmantellänge y / Dismantling length y	42	37
Abisolierlänge x / insulation strip length x	7,0+1 (Leiterquerschnitt/conductor cross section 0,75...4 mm <sup>2</sup> )	
<b>Crimp-Werkzeug (für alle Querschnitte) / Crimping tool (for all cross-sections)</b>		
Grundzange / Crimping tool	Bestell-Nr. / part no.	95.101.0800.0
Crimpbacken / Crimp insert	Bestell-Nr. / part no.	05.502.2100.0

### Biegeradien

Beachten Sie den minimalen Biegeradius der Leiter. Vermeiden Sie Zugkräfte auf die Kontaktstellen, indem Sie wie folgt vorgehen:

#### Bending radius

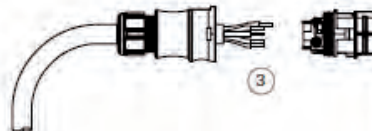
Note the minimum bending radius for conductors. Avoid pull forces on the contact points by proceeding as follows:

1. Leitung wie benötigt biegen



Bend the wire as required

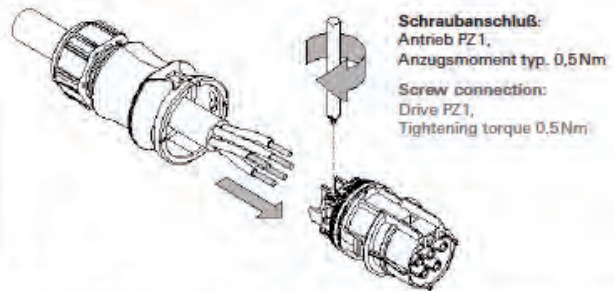
2. Leitung ablängen  
Cut the wire to length



3. Abmanteln, abisolieren.  
Strip the cable and wires.

### Leitermontage

#### Wire connection

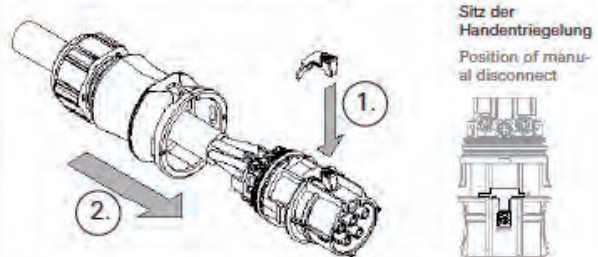


### Einsetzen der Handentriegelung (optional)

Die Handentriegelung ermöglicht das Trennen der Steckverbindung ohne Werkzeug.

### Inserting the manual disconnect (optional)

The manual disconnect enables disconnecting without a tool.



### ACHTUNG / CAUTION

Bei Verwendung der Handentriegelung erlischt die Zulassung nach VDE 0606, da die Steckverbindung dann ohne Werkzeug zu öffnen ist. Die Vorschrift VDE 0627 bleibt hiervon unberührt und wird im vollen Umfang eingehalten.

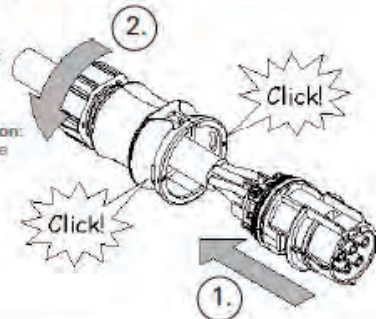
Connectors with manual disconnect are not approved according to VDE 0606 since the connection can be separated without tools. Nevertheless, the direction VDE 0627 is obeyed to its full extent.

### Verschließen

#### Closing

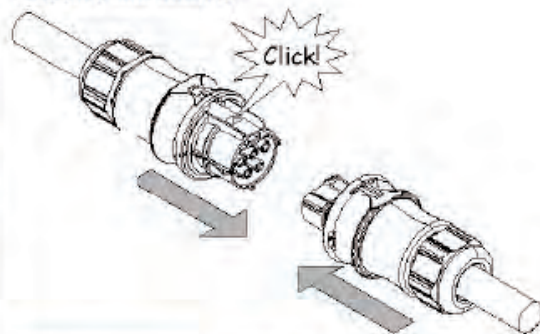
Verschraubung:  
Anzugsmoment  
typ. 4+1 Nm

Screw connection:  
Tightening torque  
typ. 4+1 Nm



### Stecken und verriegeln

#### Plugging and locking



### ACHTUNG / CAUTION

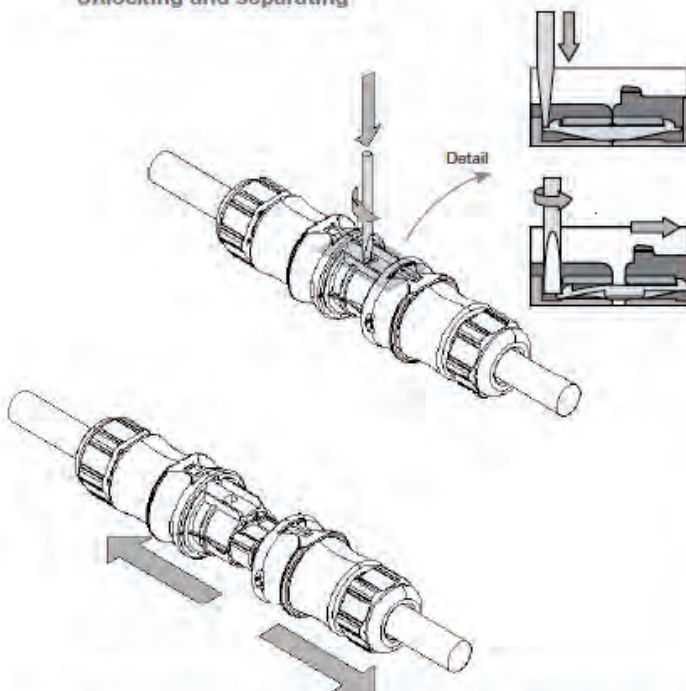
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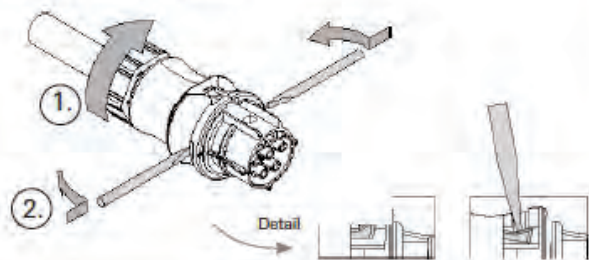
**ACHTUNG / CAUTION**  
 Um die Einhaltung der IP-Schutzart gewährleisten zu können, müssen an allen nicht belegten Stecker- oder Buchsenteilen Schutzkappen (Zubehör) montiert werden!  
 To maintain IP 65 type of enclosure, protective caps (accessory) must be mounted on all unoccupied connectors!

**Entriegeln und Trennen**  
 Unlocking and separating



**ACHTUNG / CAUTION**  
 Die Steckverbinder sind nicht zur Stromunterbrechung geeignet. Trennen oder stecken Sie die Verbindung niemals unter Last!  
 The connectors are not for current interrupting. Never connect or disconnect under load!

**Öffnen des Steckverbinders**  
 Opening the connector



**Gehäuseeinbau mit M16- und M20-Durchführung**  
 Housing installation with M16 and M20 feedthrough

	r (mm)	D (mm)
<b>M16</b>	6,8-0,2	17 ± 0,15
<b>M20</b>	8,7-0,2	21 ± 0,15

**Mutter:**  
Anzugsmoment typ. 2,5...3Nm

**Nut:**  
Tightening torque typ. 2,5...3Nm

max. 8 mm

**Gehäuseeinbau mit M25-Durchführung**  
 Housing installation with M25 feedthrough

11.7-0.2mm

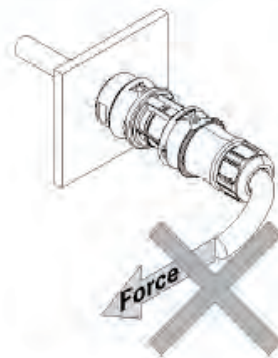
max. 8 mm

Ø 25,5 ± 0,15 mm

**Mutter:**  
Anzugsmoment typ. 2,5...3Nm

**Nut:**  
Tightening torque typ. 2,5...3Nm

**ACHTUNG / CAUTION**  
 Damit die Schutzart IP68 eingehalten wird, stellen Sie durch geeignete Maßnahmen sicher, daß die Steckverbinder vor Biegekräften geschützt sind (z.B. keine Lasten an Kabel hängen; Kabelaufwicklungen nicht freihängend etc.).  
 To ensure protection category IP68, do not expose the connection to bending forces (e.g. do not attach leads to the cable, no free-dangling cable windings etc.)



Phoenix Contact SUNCLIX (Connettore CC – Conector CC – Щепсел за постоянен ток)

**PHOENIX CONTACT**  
www.phoenixcontact.com

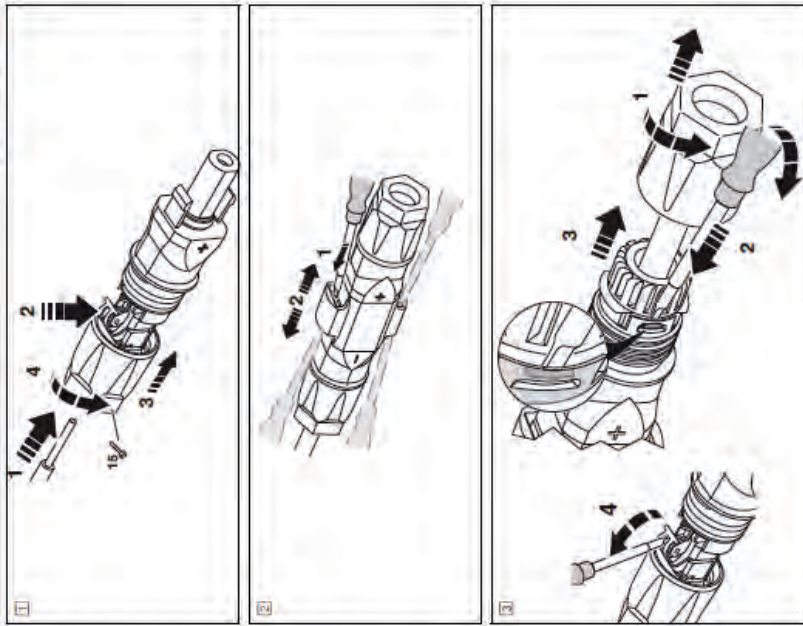
PHOENIX CONTACT GmbH & Co. KG  
32823 Bommberg, Germany  
Phone +49-(0)5235-3-00

MNR 0140692-03  
Instrucciones de instalación  
Microprogruon no y cronohe  
Montaj talimatlı  
安裝說明  
組立説明

EN Einbauanweisung  
FR Instructions d'installation  
ES Instrucciones de montaje

PV-CF-S 2,5-6 (+) 1774674  
PV-CM-S 2,5-6 (-) 1774687

2013-04-18



Conforms to  
UL Outline of Investigation  
SUBJECT 6703  
Connectors for use in  
Photovoltaic Systems

RECOGNIZED COMPONENT  
ETL  
4007180

EN 50521  
-40 °C...+85 °C  
600 V DC  
AWG 14 - 18 A, AWG 12 - 20 A, AWG 10 - 30 A  
2,5 mm<sup>2</sup> - 27 A, 4 mm<sup>2</sup> - 40 A, 6 mm<sup>2</sup> - 40 A  
5 ... 9 mm

UL SUBJECT 6703  
-40 °C...+70 °C  
1000 V DC  
AWG 14 - 18 A, AWG 12 - 20 A, AWG 10 - 30 A  
5 ... 9 mm

MNR 0140692 - 03 10520503

**Deutsch**

SUNCLIX Photovoltaik-Steckverbinder zum Einsatz in Photovoltaik-Anlagen für 2,5-6 mm<sup>2</sup> Solar Kabel vom Typ PV1-F oder für UL-zertifizierte Solar Kabel (ZKLA), AWG 10-14

**1 Sicherheitshinweise**

**⚠️** **WARNUNG:** Die SUNCLIX-Steckverbinder dürfen ausschließlich durch elektrisch-technisch ungeschulte Personen angeschlossen werden.

**⚠️** **WARNUNG:** Steckverbinder können Sie die SUNCLIX-Steckverbinder niemals unter Last!

**ⓘ** **ACHTUNG:** Verwenden Sie diese Steckverbinder nur mit anderen SUNCLIX-Steckverbinder, deren Typ PV1-F oder UL-zertifiziertem Solar Kabel (ZKLA) oder UL-zertifiziertem Solar Kabel (ZKLA) Kriptenize, AWG 10 - 14). Nur mit diesem Kabel ist der sichere elektrische Anschluss gewährleistet. Weitere Kabeltypen sind auf Anfrage möglich. Beachten Sie beim Verlegen des Kabels die Biege radien, die der Hersteller vorgibt.

**ⓘ** **ACHTUNG:** Verbinden Sie diese Steckverbinder nur mit anderen SUNCLIX-Steckverbinder, deren Typ PV1-F oder UL-zertifiziertem Solar Kabel (ZKLA) oder UL-zertifiziertem Solar Kabel (ZKLA) Kriptenize, AWG 10 - 14). Nur mit diesem Kabel ist der sichere elektrische Anschluss gewährleistet. Weitere Kabeltypen sind auf Anfrage möglich. Beachten Sie beim Verlegen des Kabels die Biege radien, die der Hersteller vorgibt.

**ⓘ** **ACHTUNG:** Schützen Sie die Steckverbinder vor Feuchtigkeit und Schmutz.

**ⓘ** Tauchen Sie die Steckverbinder nicht unter Wasser.

**ⓘ** Verlegen Sie den Stecker nicht direkt auf der Dachhaut.

**ⓘ** Versehen Sie die Steckverbinder, die nicht gesteckt sind, mit einer Schutzkappe (z. B. PV-C PROTECTION CAP, 1785430).

**2 Steckverbinder anschließen**

**2.1 Kabel anschließen (Bild 1)**

Isolieren Sie das Kabel mit einem geeigneten Werkzeug um 15 mm ab. Achten Sie darauf, dabei keine Einzeladrlitze abzuschneiden.

1 Führen Sie die abisolierte Adre mit verdrehten Litzen vorsichtig in die Feder ein. Die Litzenenden müssen in der Feder sichtbar sein.

2 Schließen Sie die Feder, stellen Sie sicher, dass die Feder einrastet.

3 Schieben Sie den Einsatz in die Hülse.

4 Ziehen Sie die Kabelverschraubung mit 2 Nm an.

**2.2 Steckverbinder zusammen fügen**

1 Prüfen Sie Stecker und Buchse zusammen.

2 Dabei rasten die Verbindung ein.

3 Ziehen Sie an der Kuppung, um die korrekte Verbindung zu prüfen.

**3 Steckverbinder trennen (Bild 2)**

Sie benötigen einen Schraubendreher mit 3-mm-breiter Klinge (z. B. SZF 1-0,6X3,5, 1204517).

1 Führen Sie den Schraubendreher ein, wie in Bild 2 gezeigt.

2 Lassen Sie den Schraubendreher stecken und trennen Sie Buchse und Stecker voneinander.

**3.1 Kabel lösen (Bild 3)**

1 Drehen Sie die Kabelverschraubung auf.

2 Führen Sie den Schraubendreher ein, wie in Bild 3 gezeigt.

3 Hebeln Sie die Verbindung auf und ziehen Sie Hülse und Einsatz auseinander.

4 Öffnen Sie die Feder mit dem Schraubendreher. Entfernen Sie das Kabel.

**English**

SUNCLIX photovoltaic I/O connector for installation in photovoltaic systems for 2,5-6 mm<sup>2</sup> solar cables, type PV1-F or for solar cables with UL certification (ZKLA), AWG 10-14

**1 Safety notes**

**⚠️** **WARNING:** The SUNCLIX plug-in connectors may be connected only by trained electricians.

**⚠️** **WARNING:** Never plug in or disconnect SUNCLIX plug-in connectors under load!

**ⓘ** **NOTE:** Use these plug-in connectors only together with 2,5-6 mm<sup>2</sup> PV1-F type solar cables or a certified solar cable (ZKLA) with a cross section of 10-14 AWG(A). A safe electrical connection is only possible with this cable. Other cable types are available on request.

When laying out the cable, observe the bending radiuses that the manufacturer specifies.

**ⓘ** **NOTE:** Connect this plug-in connector only with other SUNCLIX plug-in connectors. When making the connections, be sure to observe the specifications on nominal voltage and nominal current. The smallest common value is permissible.

**ⓘ** **NOTE:** Protect the plug-in connectors from humidity and dirt.

**ⓘ** Do not immerse the plug-in connector in water.

**ⓘ** Never lay out the plug directly on the roof.

**ⓘ** Always protect the plug-in connector with a PV-C PROTECTION CAP, order number 1785430, in plug-in connectors that are not plugged in.

**2 Connecting connectors**

**2.1 Connecting the cable (Fig. 1)**

1 Strip the cable with a suitable tool by 15 mm. Make sure that no individual wires are cut off.

1 Carefully insert the stripped wires with twisted litz wires all the way in. The litz wire ends have to be visible in the spring.

2 Close the spring. Make sure that the spring is snapped in.

3 Push the insert into the sleeve.

4 Tighten the cable gland to 2 Nm.

**2.2 Assemble the connector**

1 Bring the plug and the socket together. The connection snaps close the by.

2 Pull on the coupling to check the proper connection.

**3 Separating the connector (Fig. 2)**

You need a slot screwdriver with a 3 mm wide blade (e.g. SZF 1-0,6X3,5; item no. 1204517).

1 Insert the screwdriver as shown in Fig. 2.

2 Leave screwdriver inserted and disconnect the plug and the socket from each other.

**3.1 Loosen the cable (Fig. 3)**

1 Screw open the cable gland.

2 Insert the screwdriver as shown in Fig. 3 and the insert apart.

3 Pry the connection open and pull the sleeve and the insert apart.

4 Open the spring with the screwdriver. Remove the cable.

**Français**

Connecteur photovoltaïque SUNCLIX destiné aux câbles pour systèmes à énergie solaire de 2,5-6 mm<sup>2</sup>, type PV1-F ou homologués UL (ZKLA), AWG 10 - 14

**1 Consignes de sécurité**

**⚠️** **AVERTISSEMENT:** Seuls des personnes dûment formées en électrotechnique sont autorisées à installer les connecteurs SUNCLIX.

**⚠️** **AVERTISSEMENT:** Les connecteurs SUNCLIX ne doivent jamais être déconnectés en charge.

**ⓘ** **IMPORTANT:** Utilisez ces connecteurs uniquement avec des câbles solaires de 2,5-6 mm<sup>2</sup> de type PV1-F ou un câble homologué UL (il s'agit d'un câble ZKLA, AWG 10 - 14). Seul ce type de câble assure une connexion électrique sûre.

À l'installation, respectez les rayons de courbure prescrits par le fabricant.

**ⓘ** **IMPORTANT:** Raccordez ces connecteurs uniquement avec d'autres connecteurs SUNCLIX. Lors du raccordement, vérifiez les spécifications relatives à la tension nominale et au courant nominal. La plus petite valeur commune est autorisée.

**ⓘ** **IMPORTANT:** Protégez les connecteurs mâles de l'humidité et de la saleté. Ne jamais plonger les connecteurs mâles dans l'eau.

**ⓘ** Ne jamais poser directement le connecteur sur le toit.

**ⓘ** Équipez les connecteurs mâles non enfichés d'un capot de protection (par ex. PV-C PROTECTION CAP, 1785430).

**2 Raccordement du connecteur**

**2.1 Raccordement du câble (Fig. 1)**

1 Dévidez le câble sur 15 mm avec un outil approprié. Veillez à ne sectionner aucun fil du câble.

1 Introduire avec précaution les 8 dévidés sur les ressorts jusqu'en butée. Les extrémités des conducteurs doivent apparaître dans le « trou » à ressort.

2 Refermer le « trou » à ressort. Vérifier qu'il est bien encliqueté.

3 Enfiler le raccord dans le manchon.

4 Serer le presse-étoupe à 2 Nm.

**2.2 Assemblage du connecteur mâle**

1 Amener le connecteur et le connecteur femelle. Veiller à ce que la connexion s'encliquète.

2 Exercer une traction des deux côtés du raccordement pour en vérifier la solidité.

**3 Déconnexion du connecteur mâle**

Un tournevis à fente à lame large de 3 mm est requis (par ex. SZF 1-0,6X3,5 ; référence 1204517) (Fig. 2).

1 Introduire un tournevis comm. indiqué à la Fig. 2.

2 Laisser le tournevis en place et séparer les connecteurs mâle et femelle l'un de l'autre.

**3.1 Séparation du câble (Fig. 3)**

1 Dévisser le raccord vissé du câble.

2 Introduire un tournevis comm. indiqué à la Fig. 3.

3 Soulever la liaison puis séparer le manchon du raccord.

4 Ouvrir le « trou » à ressort avec le tournevis. Extraire le câble du connecteur.

**Italiano**

Connettore fotovoltaico SUNCLIX per l'installazione in impianti fotovoltaici per cavo solare da 2,5-6 mm<sup>2</sup> del tipo PV1-F o cavo solare certificato UL (ZKLA), AWG 10 - 14

**1 Avvertenze di sicurezza**

**⚠️** **AVVERTENZA:** I connettori SUNCLIX devono essere collegati solo da persone che abbiano ricevuto la supervisione di elettricisti specializzati.

**⚠️** **AVVERTENZA:** Collegare o scollegare i connettori SUNCLIX soltanto in assenza di tensione.

**ⓘ** **IMPORTANTE:** Utilizzare questi connettori solo con altri connettori SUNCLIX, di tipo PV1-F o cavo solare certificato UL (il si tratta di un cavo ZKLA, AWG 10 - 14). Solo con questo cavo si garantisce il collegamento elettrico sicuro.

Altri tipi di cavo sono possibili su richiesta. Per la posa del cavo rispettare i raggi di curvatura prescritti dal produttore.

**ⓘ** **IMPORTANTE:** Collegare questi connettori soltanto con altri connettori SUNCLIX. Per il collegamento rispettare assolutamente le indicazioni sulla tensione nominale e sulla corrente nominale. È permesso il più piccolo valore comune.

**ⓘ** **IMPORTANTE:** Proteggere dalla polvere e dall'umidità i connettori. Non immergere in acqua i connettori. Non immergere i connettori direttamente sul manico di coperture del tetto.

**ⓘ** Applicare un approccio di sicurezza (ad es. PV-C PROTECTION CAP, codice 1785430) ai connettori non collegati.

**2 Collegamento del connettore**

**2.1 Collegamento del cavo (figura 1)**

1 Spletare il cavo di 15 mm con un utensile adatto. Assicurarsi che non vengano tagliati i conduttori e non tagliare un singolo filo.

1 Inserire con cura il conduttore spletato con i cavi intrecciati fino a butta. Le estremità dei cavi devono essere visibili nel filetto di chiusura.

2 Chiudere l'elemento di bloccaggio a molla. Verificare che scatti.

3 Inserire il cavo nel connettore.

4 Serare la connessione a vite per cavo con una coppia di 2 Nm.

**2.2 Unione dei connettori**

1 Congiungere assieme connettore maschio e connettore femmina. Il collegamento viene così inserito.

2 Tirare il giunto per verificare che il collegamento si sia corretto.

**3 Separazione del connettore (Fig. 2)**

È necessario un cacciavite per viti a taglio con punta larga 3 mm (ad es. SZF 1-0,6X3,5, 1204517).

1 Inserire il cacciavite come indicato in figura 2.

2 Lasciare in merito il cacciavite e scollegare il connettore femmina dal connettore maschio.

**3.1 Scollegamento del cavo (Fig. 3)**

1 Svitare la connessione a vite per cavo.

2 Inserire il cacciavite come indicato in figura 3.

3 Fare leva con forza sul collegamento e staccare il connettore femmina dall'inserto.

4 Aprire l'elemento di bloccaggio a molla con il cacciavite. Rimuovere il cavo.

**English**

Technical data according to the standard

Ambient temperature  
Nominal voltage, max.  
Nominal current, max.  
Cable diameter

**Deutsch**

Technische Daten nach Norm

Umgebungstemperatur  
Nennspannung, max.  
Nennstrom, max.  
Kabeldurchmesser

**Français**

Caractéristiques techniques selon la norme

Température ambiante  
Tension nominale, max.  
Courant nominal, max.  
Diamètre de câble

**Italiano**

Dati tecnici a norma

Temperatura ambiente  
Tensione nominale, max.  
Corrente nominale, max.  
Diametro cavo



<b>Europe</b>	<b>Italy</b>	<b>Asia (HQ)</b>	<b>Middle East</b>	<b>Americas</b>
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