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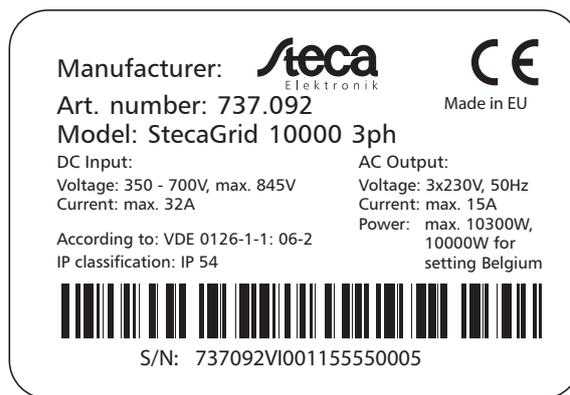
Identification

General information

Feature	Description
Type	StecaGrid 8000 3ph / 10000 3ph
Part numbers	738.974 (StecaGrid 8000 3ph) / 737.092 (StecaGrid 10000 3ph) Version: 03/02/2011
Issue version of the manual	Z02
Manufacturer address	See chapter 9 <i>Contact Steca</i>
Certificates	See chapter <i>Certificates</i>
Optional accessories	StecaGrid Vision

Type plate

The above specifications and more can be found on the type plate; see the illustrated example. The type plate is located on the lower right side of the inverter.



Safety



Danger

Risk of death by electrocution!

- The unit may only be connected to the grid by qualified personnel in accordance with the regulations of the local power supply company.

Introduction

A significant contribution to environmental protection can be made by using renewable energy sources as less carbon dioxide (CO₂) is released into the Earth's atmosphere, as well as other harmful gases, following the burning of fossil fuels. One such renewable energy source is the sun.

Solar energy is converted into electricity by means of a PV system (photovoltaic system). A PV system contains, amongst other things, an inverter. The inverter converts the direct current produced by the solar modules into alternating current which can be fed directly into the public power grid.

The inverter was designed for so-called "grid-connected systems". With these systems, the inverter is connected parallel to the public power grid.

The latest technology is used in the inverter. Very high efficiency is achieved as a result. The advantage of three-phase feeding is that the produced solar capacity is always symmetrically distributed on all three power conductors to the public power grid. This is the case across the whole output range of the inverter. When designing a system, the laborious work involved in avoiding asymmetry of more than 4.6 kW (or 5 kW / 6 kW – depending on the country) through the correct selection of separate inverters is thus dispensed with.

The solar power system feeds the alternating current via an additional feed-in meter (used for feed-in tariff) directly to the grid system of the grid system operator and is then available to all consumers connected to the grid. The energy used by the electricity consumers is then billed as normal using the existing consumption meter.

Among other components, the inverter contains a central control unit and an internal data logger. The inverter can be optionally extended with a StecaGrid Vision display unit. See www.stecasolar.com for further information about accessories. Your installer can, of course, also give you more information about the options and accessories that are available.

In the following technical documentation, the installer and user are given a description of the technical features that are necessary for the installation, function, operation and use of the inverter.

1 About this manual

1.1 Applicability

This manual describes the installation, commissioning, function, operation, maintenance and deinstallation of the inverter for grid-connected photovoltaic systems. When installing the remaining components, e.g. the photovoltaic modules, the DC or AC wiring and other accessories, be sure to observe the appropriate installation instructions provided by each manufacturer.

1.2 Users of this manual

Installation, commissioning, operation, maintenance and deinstallation of the inverter may only be done by qualified electricians in accordance with the applicable on-site installation regulations. The qualified electricians must be familiar with this operating manual and follow the instructions it contains.

Qualified electricians are persons professionally qualified, certified and authorised to perform the following work:

- Installation of electrical equipment
- Production and connection of data communication lines
- Production and connection of mains grid power supply lines

The end user may only perform operating functions.

1.3 Description of symbols

1.3.1 Symbols used in this manual and on the device

Symbol	Description	Location
	General danger symbol	Manual
	Electrical voltage	Manual, device
	Hot surface	Manual, device
	Note	Manual
	Read the manual before using the product.	Device

1.3.2 Structure of the warning notices



SIGNAL WORD

Type, source and consequences of the danger!

- ▶ Measures for avoiding danger

1.3.3 Danger levels in warning notices

Danger level	Likelihood of occurrence	Consequences of non-compliance
 Danger	Imminent threat of danger	Death, serious bodily injury
 Warning	Possible threat of danger	Death, serious bodily injury
 Caution	Possible threat of danger	Minor bodily injury
Caution	Possible threat of danger	Property damage

1.3.4 The structure of notes



Note

Note on easier and safer working habits.

- ▶ Measures for easier and safer working habits

1.3.5 Other symbols and markings

Symbol	Meaning
▶	Call to action
▷	Result of action
-	Action description
•	List
1., 2., 3. ...	Work step

2 Safety

2.1 Proper usage

The inverter may only be used in grid-connected photovoltaic systems within the permitted power range and in the permitted ambient conditions. Protection functions may be impaired if the device is used improperly.

2.2 Improper usage

The inverter must not be operated in the following environments:

- in extremely warm environments with temperatures over +60 °C (output derating from +50 °C),
- in dusty environments,
- in an environment where highly flammable gas mixtures can occur (potentially explosive atmosphere).

2.3 Dangers during installation and commissioning

The following dangers exist during installation / commissioning of the inverter and during operation (in case of installation errors):

- Risk of death by electrocution (both DC and AC)
- Risk of fire due to short-circuit
- Damage to any of the constructional fire safety measures present in the building due to incorrectly installed cables
- Damage to the inverter and connected devices or components if used in ambient conditions other than those permitted, if an inappropriate power supply is used (on either the direct or alternating current sides) and if devices or components which are not permitted are connected.

2.4 Notes on installation

The following instructions must be observed during installation and operation:

- All safety regulations apply when working on the mains supply. The inverter may not be opened.
- When laying cables, ensure that no damage occurs to any of the constructional fire safety measures in the building.
- Make sure that the permissible ambient conditions at the installation site are not exceeded.
- Factory labels and markings may not be altered, removed or rendered unreadable.
- Before connecting the device, make sure that the power supply (both DC and AC) matches the specifications on the type plate.
- Make sure that all devices which are connected to the inverter conform to the technical data of the inverter.
- Secure the device against unintentional start-up.
- Installation work on the inverter may only be carried out when it is disconnected from the grid and the photovoltaic generator.
- Protect the inverter against overloading and short-circuiting.

2.5 Dangers during operation



Warning
Danger, hot surface!

- ▶ The surface temperature of the casing can exceed +70 °C.

2.6 Exclusion of liability

The manufacturer can neither monitor compliance with this manual nor the conditions and methods during the installation, operation, usage and maintenance of the inverter. Improper installation of the system may result in damage to property and, as a result, to bodily injury.

Therefore, we assume no responsibility or liability for loss, damage or costs which result from, or are in any way related to, incorrect installation, improper operation, or incorrect use and maintenance.

Similarly, we assume no responsibility for patent right or other right infringements of third parties caused by usage of this inverter.

The manufacturer reserves the right to make changes to the product, technical data or installation and operating instructions without prior notice.

As soon as it becomes evident that safe operation is no longer possible (e.g. visible damage), remove the device from the grid and the photovoltaic generator immediately.

3 Construction

3.1 General

The inverter is transformerless and therefore not galvanically isolated. Positive and/or negative inputs of the device must therefore not be connected to an earth potential. The inverter was designed so that it can also be installed outdoors without problems (protection degree IP54).

The inverter is controlled by microcontrollers. The microcontrollers set the voltage of the solar modules in such a way that the solar modules provide their maximum output (maximum power point tracking). The inverter has an MPP tracker.

The input voltage range was selected in such a way that the rated voltage range of the PV modules is covered from 350 V – 700 V (open circuit voltage max. 845 V). The inverter can handle a maximum input current of 27 A (StecaGrid 8000 3ph) or 32 A (StecaGrid 10000 3ph). The inverter limits the maximum input current by itself.

At night the inverter minimises use of electronic components and electricity consumption by switching to sleep mode. The inverter is protected against stand-alone operation.

3.2 Cooling

The inverter transfers its heat via a cooling element. Due to the cooling profile and the temperature-controlled fan, the inverter can operate in ambient temperatures between $-20\text{ }^{\circ}\text{C}$ and $+60\text{ }^{\circ}\text{C}$.



Warning
Danger, hot surface!

► The surface temperature of the casing can exceed $+70\text{ }^{\circ}\text{C}$.

An integrated temperature control prevents excessive internal temperatures. When the temperature of the cooling element monitored by the inverter exceeds the derating limit, the highest value of the power consumption from the PV modules is automatically adjusted to the prevailing temperatures. This process reduces the heat generated from the inverter during operation and prevents the operating temperature from becoming too high. When the ambient temperature is above $+50\text{ }^{\circ}\text{C}$, maximum output can be limited.

3.3 Safety aspects and applicable standards

The grid and the solar modules are not galvanically isolated. The inverter is equipped with universal current sensitive residual current monitoring and isolation monitoring of the positive and negative inputs to earth potential.

The inverter complies with the requirements of all applicable standards relating to electromagnetic compatibility (EMC) and safety equipment. The inverter also conforms to the directives regarding the operation of energy-generating systems parallel to the low voltage grid of the regional power supply company. The CE symbol can be found on the type plate of the inverter.

The inverter monitors the grid quality by measuring the grid voltage and grid frequency. When there are faults in the grid, the inverter will automatically disconnect itself from the grid. The values at which the inverter disconnects itself from the grid vary from country to country. More information on this is provided in chapter 7 *Technical data/Table of countries*.

3.4 Data communication

3.4.1 Overview

In order to provide an easy overview of the system functions, voltage, current, solar generator output, grid frequency and grid voltage, among other values, are measured within the inverter. The energy yields are also stored on a daily, monthly and annual basis.

The underside of the inverter has a slot for interface cards. By default, the inverter is supplied with an RS485 card that has two RJ45 sockets for connection.

An optional display (StecaGrid Vision) can use this RS485 interface to display various measurements and the operating status of the inverter. StecaGrid Vision allows complete, integrated monitoring of the solar power system. Further information, etc. about installation and commissioning can be found in the separate operating instructions.

The data protocol used by the inverter is supported by Meteocontrol WEB'log and by Solar-Log from Solare Datensysteme. These external data loggers can read various measurements and operating states from the inverters. Steca recommends these systems for professional system monitoring.

3.4.2 Wiring

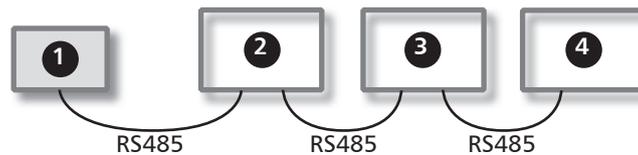


Caution

Danger of material damage caused by electrical voltage.

- ▶ The alternative data cable may only be manufactured by professional personnel.

Cable connection diagram



- ❶ StecaGrid Vision or external data logger (e.g. WEB'log, Solar-Log)
- ❷ First inverter
- ❸ Inverter
- ❹ Last inverter, terminated

Cabling using the supplied data cable

- Data cable:
 - A data cable is supplied with each inverter (1.5 m long, RJ45 plug with push-pull locking mechanism).
 - The data cables supplied can be used for connecting all the inverters to the StecaGrid Vision when the devices are mounted close enough to each other. An alternative data cable must be used for connecting a remotely mounted StecaGrid Vision or external data loggers.
- Device connections:
 - StecaGrid Vision: 1x RJ45 (additional 1x COMBICON for alternative data cable)
 - Inverter: 2x RJ45 (identical, can be used as desired)

Alternative data cable

The following table describes the properties of the alternative data cable.

Property	Description
Application	Data connection between: <ul style="list-style-type: none"> • Inverter and inverter • StecaGrid Vision and inverter • External data logger and inverter
Cable	Type Cat-5, total length \leq 200 m (from the StecaGrid Vision or external data logger to the last inverter)
Plugs	StecaGrid Vision: <ul style="list-style-type: none"> • The StecaGrid Vision is supplied with the following plugs: <ul style="list-style-type: none"> – HARTING PushPull RJ45 10G, No. 09 45 145 1560 (push-pull locking mechanism, can be wired without tools, IP65). – COMBICON 3-pole • When using a standard RJ45 plug, remove the plastic collar from the RJ45 socket on the StecaGrid Vision. External data loggers: <ul style="list-style-type: none"> • Solar-Log: standard RJ45 • Other: Use a plug according to the manufacturer's specifications.
Connector pin assignments	<ul style="list-style-type: none"> • StecaGrid Vision to inverter: <ul style="list-style-type: none"> – with RJ45: 1:1 – with COMBICON: see following table • Inverter to inverter 1:1 • Solar-Log to inverter: see following table • Other external data logger to inverter: Connector pin assignments according to the manufacturer's specifications

Connector pin assignments for inverter to StecaGrid Vision / Solar-Log

Inverter RJ45	Signal	StecaGrid Vision COMBICON	Solar-Log RJ45
Contact		Contact	Contact
1	Data A	1	1
2	Data B	2	4
3	–	–	2
4	–	–	8
5	–	–	5
6	–	–	6
7	–	–	7
8	Ground	3	3

3.4.3 Termination

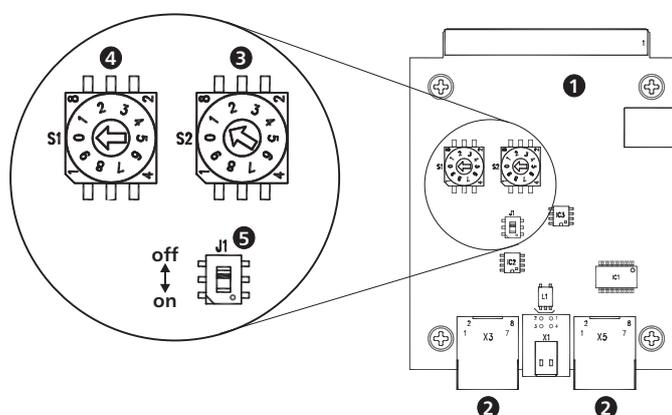
To avoid data transmission errors the start and end of the data connection between the inverters and the StecaGrid Vision / data logger must be terminated with a termination resistor as described below:

- The StecaGrid Vision at the start of the data connection is permanently terminated internally.
- The external data logger must be terminated according to the manufacturer's specifications.
- The last inverter (at the end of the data connection) must be terminated at the interface card. The termination can be switched on and off via a DIP switch; see the figure in chapter *Addressing*.

3.4.4 Addressing

Every inverter must be assigned its own unique address for the communication between the inverters and the StecaGrid Vision to function correctly. The factory setting for the address is 1. This must be changed if the system has more than one inverter. The following applies:

- The address is set via two rotary switches on the inverter interface card (see figure below):
 - Left rotary switch: tens
 - Right rotary switch: units (see also the labels next to the rotary switches on the circuit board)
- Only the following addresses may be set:
 - StecaGrid Vision: addresses 1 – 20
 - Solar-Log: addresses 1 – 99 (maximum, depending on device type)
 - WEB'log: addresses 1 – 31
- We recommend assigning addresses using an incrementing sequence from the first to the last inverter. This makes the relevant inverter easy to identify when reading messages from the StecaGrid Vision that contain address numbers.
- The inverter addresses are entered into the StecaGrid Vision the first time it is switched on; see the StecaGrid Vision manual.



- ❶ Interface card
- ❷ RJ45 sockets (with black collars)
- ❸ Rotary switch for the units digit of the address
- ❹ Rotary switch for the tens digit of the address
- ❺ DIP switch for termination

4 Installation



Danger

Risk of death by electrocution!

- ▶ The StecaGrid inverter may only be connected to the grid by qualified personnel in accordance with the regulations of IEC standard 60364 and the regulations of the local power supply company.
- ▶ When working on the solar power system, disconnect the inverter from the power supply.
- ▶ Make sure that the power supply cannot be unintentionally switched back on.

Danger of burns from arcing!

- ▶ Do not interrupt the DC connection between the solar modules and between the solar modules and the inverter while current is flowing. If the DC connection has to be interrupted, the integrated DC circuit breaker must be switched off.
- ▶ Press the MC connection of the DC connections together until it audibly snaps into place.



Note

The illustrations in this chapter show the StecaGrid 10000 3ph.

4.1 General requirements for installation

The inverter feeds the grid symmetrically in 3 phases. This means that phase imbalances cannot occur. For proper operation, the neutral conductor and the PE must be connected in addition to the 3 phases.

Every inverter must be connected to the electrical system via a line circuit breaker on all three phases. This must be situated close to the inverter.

A DC circuit breaker is required in all CENELEC countries (The Netherlands, Germany, Spain, Italy, etc.)* This is already integrated into the inverter.

The installer must ensure that all applicable installation regulations, national laws, installation standards and connection load values of the regional power supply company are adhered to.

*) See IEC standard IEC60364-7-712 for further information.

Cable cross-section and fuse:

Type	P _{rated}	Cross-section	Line circuit breaker
StecaGrid 8000 3ph	8.0 kW	5 x 2.5 mm ² fine-stranded	3 x B20
		5 x 4 mm ² single-stranded	3 x B25
StecaGrid 10000 3ph	9.5 kW	5 x 2.5 mm ² fine-stranded	3 x B20
		5 x 4 mm ² single-stranded	3 x B25

4.2 Notes on installation



Caution

Danger of damage to the inverter!

- ▶ Do not install the inverter:
 - in extremely warm environments with temperatures over +60 °C (output derating from +50 °C),
 - in dusty environments,
 - in an environment where highly flammable gas mixtures can occur (potentially explosive atmosphere).
- ▶ Keep the cables of the solar modules as short as possible.
- ▶ Do not install the inverter in locations where it will be subjected to vibrations.
- ▶ The inverter must not be installed in a closed switching cabinet.
- ▶ Do not block the air flow which cools the inverter. A space of at least 20 cm must be left above and below the device to allow air to circulate around the device.

Due to its protection degree (IP54), the StecaGrid inverter can be installed in numerous locations. However, a number of points must be observed during installa-

tion, which are listed in the following.

- The device should not be installed in living areas because it can make a humming/whirring noise (< 60 dBA).
- The inverter must not be installed in areas where animals are kept. (Risk to animals and/or risk to the electrical system due to animals and because of increased dust formation, damage to cables from ammonia, etc.)
- The LED must be visible.
- The ambient temperature must remain in the range of $-20\text{ }^{\circ}\text{C}$ to $+60\text{ }^{\circ}\text{C}$ ($+50\text{ }^{\circ}\text{C}$ is better).
- Direct exposure to sunlight should be avoided. If necessary, the equipment must be protected against direct sunlight by placing a special shield in front of and above the equipment.
- There must be sufficient ventilation.
- The inverters should not be mounted above one another, so as to avoid output losses.
- The installation position of the inverter will be described in the next section. This installation position must be adhered to.

The last 5 points are important in order to minimise the probability of derating occurring. If these points are not taken into consideration this may result in reduced yield.

4.3 Installation

The inverter has been designed to stand vertically. Because of the risk of faults occurring to the cooling system, deviation from the vertical must not be more than $\pm 15^\circ$. The device must not be installed in the horizontal position.

The mounting rail is supplied with the inverter.



Warning

Danger of personal injury. The inverter weighs 42 kg.

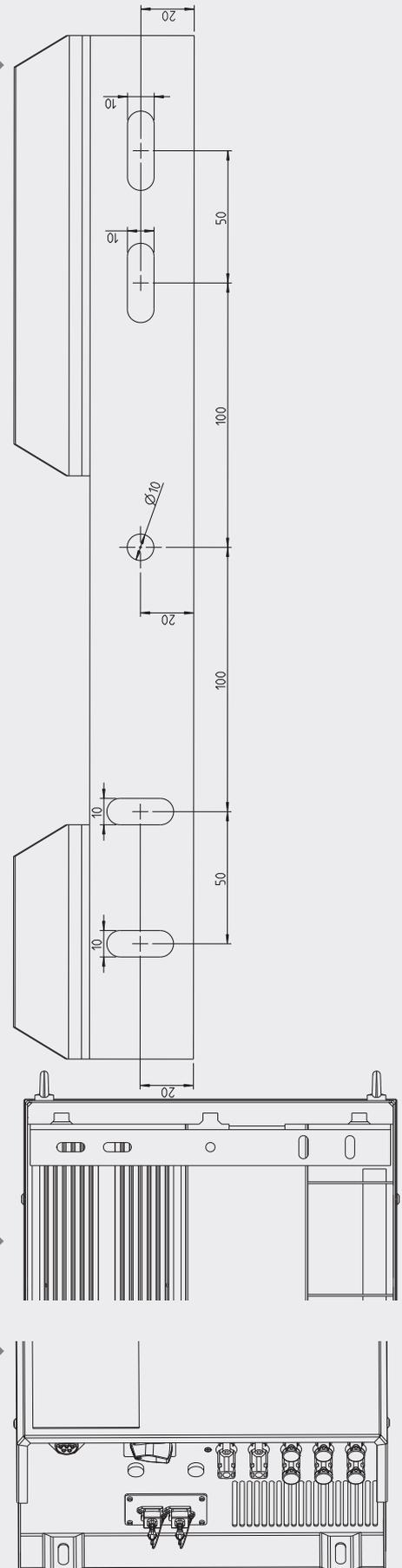
- ▶ Always install the inverter using at least two people.
- ▶ Use the handles on the inverter to carry the device.

When installing the inverter, choose a flat background which is not easily flammable, e.g. a concrete or stone wall.

You install the inverter as follows:

- 1 Use the supplied drilling template for drilling the holes.
If there are already inverters installed under the area to be drilled, please cover the ventilation duct at the top. This is to prevent drilling dust entering into the ventilation duct.
- 2 First fasten the mounting rail in horizontal position using 4 screws (\varnothing 8 mm, not supplied). Please use stainless-steel screws. Take the weight of the inverter (42 kg) into account when selecting the fastening material.
- 3 Hang the inverter into the mounting rail from above.
Place the inverter as far up as possible and let it slide onto the mounting rail from above.
The side and top flanges serve to guide the inverter.
- 4 Use screws to fasten the device at the bottom.

If further inverters are installed, a minimum distance of 15 cm must be maintained between the inverters.



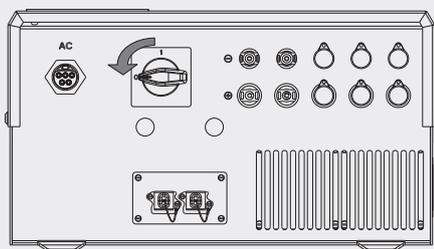
4.4 Connecting (AC) the inverter



Danger

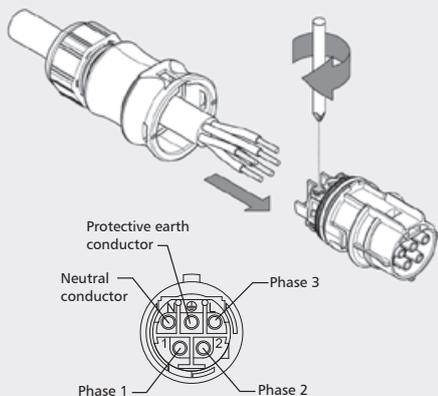
Risk of death by electrocution!

- ▶ When working on the solar power system, disconnect the inverter from the AC power supply.
- ▶ Turn the DC switch to off.
- ▶ Make sure that the power supply cannot be unintentionally switched back on.



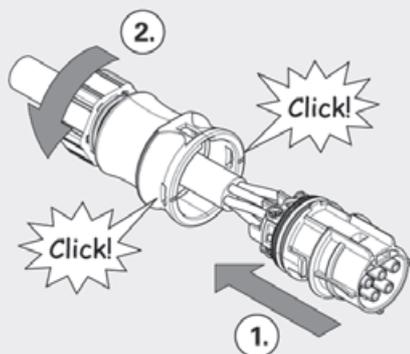
4.4.1 Connecting the inverter to the AC cable

- 1 Turn the DC switch to off.



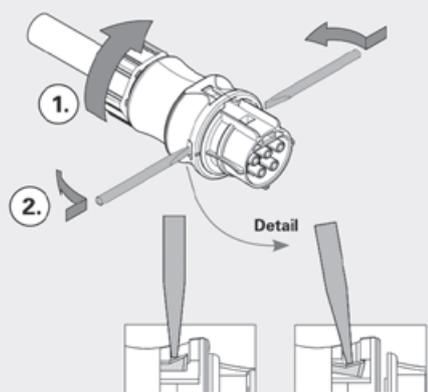
- 2 Wire the AC connector:

- ▶ The connector layout is imprinted next to the contacts or can be found in the adjacent drawing.



- 3 Close the connector:

- ▶ Push the connector into the housing until it clicks into place.
- ▶ Tighten the screw connection by hand.

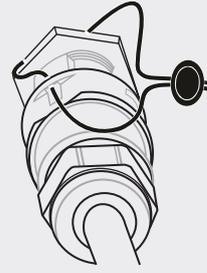


- 4 To open the connector again, if necessary:

- ▶ Loosen the screw connection.
- ▶ Use a screwdriver to press the locking mechanism together at the point shown and
- ▶ push the connector out of the housing.

4.4.2 Sealing the AC connection

A tamper seal can be applied to the AC connection. The tamper seal wire is fed through the counternut of the AC socket on the inverter and through an opening in the opposing plug. The counternut has a hole for this purpose. See the illustration on the right.



4.4.3 Connecting the isolation transformer

If an isolation transformer is required then it must be wired as shown below. If connection ❶ is missing, the LED illuminates red.

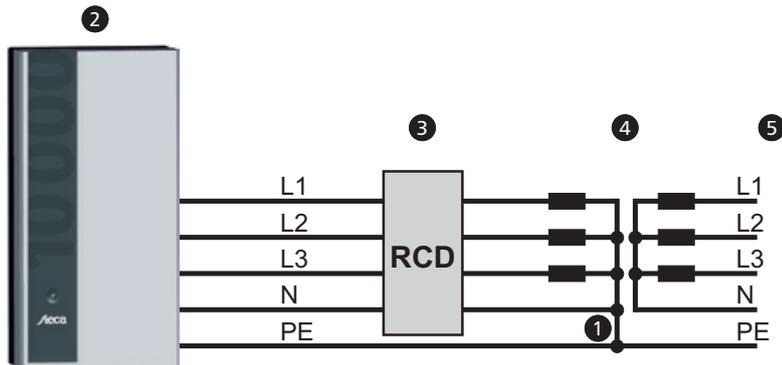
Reason: The inverter is not feeding the grid because it cannot monitor the isolation.



Danger

Risk of death by electrocution!

- In the illustrated wiring example the primary and secondary sides of the isolation transformer are **not galvanically isolated**.



- ❶ N-PE connection ❷ Inverter ❸ Residual current protection device (RCD) ❹ Isolation transformer ❺ Mains grid

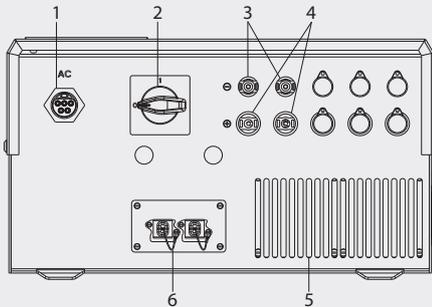
4.5 Connecting the strings (DC)



Danger

Risk of death by electrocution!

- ▶ When working on the solar power system, disconnect the inverter from the AC power supply.
- ▶ The AC connector should not be used to disconnect the power supply.
- ▶ Turn the DC switch to off.
- ▶ Make sure that the power supply cannot be unintentionally switched on.



- 1 AC socket
- 2 DC circuit breaker
- 3 Negative inputs
(StecaGrid 8000 3ph / 10000 3ph: 3x / 5x)
- 4 Positive inputs
(StecaGrid 8000 3ph / 10000 3ph: 3x / 5x)
- 5 Air inlet
- 6 Slot for interface card

- All socket inputs in the casing of the inverter which do not have a cable connection must be closed off with the covers supplied. This ensures that the inverter complies with protection degree IP54.
- The DC connector can be connected in any sequence because all inputs are interlinked internally.
- The input voltage must never exceed 845 V DC. Higher input voltages will damage the inverter. Here, please note the temperature dependence of the open circuit voltage of the solar modules.
- It is not necessary and also not permitted to open the inverter casing! Opening the casing will invalidate the guarantee.

Each inverter has 3 positive and 3 negative sockets (StecaGrid 8000 3ph) or 5 positive and 5 negative sockets (StecaGrid 10000 3ph) for connecting the modules. All inputs are internally interlinked to one MPP tracker.

String fuses cannot be installed into the inverter. If string fuses are required because otherwise the parallel connection would cause the return current flow resistance to be exceeded, they must be installed externally.

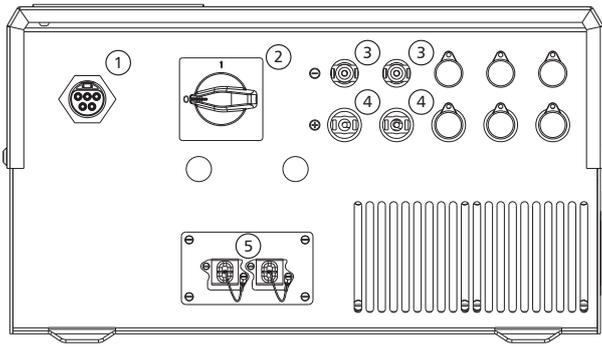
4.6 Connecting optional accessories

4.6.1 Connecting the data cables

1. Connect all the inverters in the system using the data cables provided. The following applies:
 - The cable plugs must latch into place.
 - One RJ45 socket remains free at the first and last inverters in the chain.
 - One data cable is left over.
2. Switch on the termination at the interface card of the **last** inverter; see chapter *Settings on the inverter interface card*.
3. Plug the remaining RJ45 cable into the StecaGrid Vision and the free RJ45 socket of the **first** inverter
 or plug the alternative data cable into the COMBICON socket of the StecaGrid Vision and a free RJ45 socket on the **first** inverter
 or connect an external data logger to a free RJ45 socket of the **first** inverter using a cable conforming to the manufacturer's specifications.

4.6.2 Settings on the inverter interface card

The address and termination of the inverter are set on the interface card. The interface card must be removed to make these settings.



- ① AC socket
- ② DC circuit breaker
- ③ Negative inputs
- ④ Positive inputs
- ⑤ Interface card

Removing the interface card



Danger

Risk of death by electrocution!

- ▶ All work must be performed with the inverter removed from all power sources. Always perform the following steps in the sequence described.

1. Set the DC switch to 0.
2. Remove the AC cable by releasing the locking device on the AC plug.
3. Make sure that the DC switch and AC cable cannot be unintentionally switched on / plugged in.
4. Remove the data cable. Grasp the cable by the plug to open the push-pull locking mechanism.
5. Remove the four Phillips screws holding the interface card.
6. Pull the interface card out of the slot. Grasp the card by the protruding black collars of the RJ45 sockets. Place the seal to one side.

Setting the inverter address

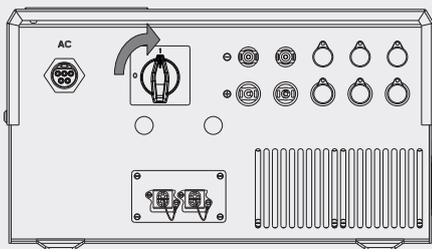
1. Use a screwdriver to set the rotary switches to the desired address.
2. Write down the address to make error-finding easier in the case of address conflicts.

Switching on the termination

- ▶ Slide the DIP switch towards the RS485 connectors. Use a pointed implement if necessary, e.g. a ballpoint pen.

Installing the interface card and making connections

1. Mount the seal on the interface card.
2. Insert the interface card into the side rails and slide it into place until it latches in place.
3. Fasten the interface card with the four Phillips screws.
4. Plug in the data cable.
5. Plug in the AC cable.



4.7 Turning on the DC switch

Turn the DC switch 90° to the on position (position I).

4.8 Switching the grid voltage on for the first time

The inverter constantly monitors the quality of the mains grid. If the grid quality is poor the inverter will automatically disconnect itself. The following applies to the grid parameters used by the inverter for deciding to disconnect:

- Each country has its own legally defined mains grid parameters.
- The countries that are available for selection at the inverter, and their mains grid parameters are described in *Technical data/Table of countries*.
- In order to select a particular country, one of the following devices must be connected to one of the RJ45 sockets (RS485):
 - Optional *StecaGrid Vision* remote display
 - PC/Notebook with an RS485 interface and the *StecaGrid Service* service software. An optional USB/RJ45 adapter cable is available.

More information is provided in the *StecaGrid Vision* and *StecaGrid Service* operating manuals.

► The electrical connections must be made in the correct order:

- 1 Connect the device to the grid.
- 2 Connect the PV generator.
- 3 Turn the DC switch to on.
- 4 Switch on the grid line circuit breaker (automatic cutout). After switching on the grid voltage the inverter automatically synchronises itself with the grid.

4.9 Deinstallation



Danger

Risk of death by electrocution!

- When working on the solar power system, disconnect the inverter from the AC power supply.
- Turn the DC switch to off.
- Make sure that the power supply cannot be unintentionally switched back on.



Warning

Danger of burns from arcing!

- Do not interrupt the DC connection between the solar modules and between the solar modules and the inverter while current is flowing.



Warning

Danger of personal injury. The inverter weighs 42 kg.

- Always install the inverter using at least two people.
- Use the handles on the inverter to carry the device.

To deinstall the device, follow the installation instructions in the reverse order. Proceed as follows:

- 1 Turn the DC switch to off.
- 2 Turn the AC circuit breaker to off.
- 3 Disconnect all DC connectors.
- 4 Disconnect all AC connectors.
- 5 Loosen the lower fastening screws of the inverter.
- 6 Lift the inverter up and pull it forward to remove it from the support.

5 Operating and fault display

After the device is switched on, the system starts with a series of test procedures which take a few seconds. When the output of the solar modules is high enough, the inverter will switch to 'active mode'. When there is little irradiation it may be that the solar modules do not produce enough power to feed the power grid. The device then enters the standby mode.

The front of the control unit is equipped with a two-colour LED which shows the operating status of the inverter. The LED shows the following operating states:

LED status	System status	Explanation, cross-references
Green	Active mode – normal operation	The system is running in normal operating mode and feeds the grid.
Green flashing	Standby mode	The irradiation is not sufficient for feeding the grid.
Red-green flashing	Information	A fault is present but the inverter is still capable of full performance.
Red flashing	Warning: Limited mode – partial fault No country set	The inverter may no longer be capable of full performance. Contact your installer. Select a country at the optional StecaGrid Vision remote display or contact your installer.
Red	Modules covered DC switch is off Error	No energy is being supplied because the modules are covered, e.g. by snow. If the snow cannot be removed then you must wait until it has sufficiently melted. Turn the DC switch to on. The inverter has a fault. No energy is being supplied. Contact your installer.
Off	Off	There is no input voltage (nighttime operation) or no mains voltage.

6 Troubleshooting

6.1 Fault messages

In addition to indicating the operating status the LEDs are also used to indicate faults.

In the case of a fault (red LED display either constant or flashing) please notify your installer immediately.

If a StecaGrid Vision display unit is used with the system then it can be used for displaying error messages. Details on the error messages are provided in the StecaGrid Vision manual.

6.2 Errors

Error message	Explanation / Action	LED display
Mains voltage too high	The grid voltage of one or more phases present at the inverter exceeds the permissible value according to the national standards of the country selected. The inverter must not feed into the grid. Contact your installer.	Red
Mains voltage too low	The grid voltage of one or more phases present at the inverter is lower than the permissible value according to the national standards of the country selected. The inverter must not feed into the grid. Contact your installer.	Red
Mains frequency too high	The mains frequency at the inverter exceeds the maximum permissible value for the selected country. The inverter must not feed into the grid. Contact your installer.	Red
Mains frequency too low	The mains frequency at the inverter is less than the minimum permissible value for the selected country. The inverter must not feed into the grid. Contact your installer.	Red
Residual current too high	The residual current flowing from the positive or negative inputs to earth via the photovoltaic modules exceeds the maximum permissible value. The inverter must not feed into the grid. Contact your installer.	Red
Mains DC current too high	The DC current portion fed into the grid by the inverter exceeds the maximum permissible value for the selected country. The inverter must not feed into the grid. Contact your installer.	Red
Isolation error	The isolation resistance between the positive or negative input and earth is less than the permissible value. The inverter must not switch onto the grid. Contact your installer.	Red
Invalid country settings	One or more inverters have an invalid country code. Either no country was selected during commissioning or differing countries are selected for multiple inverters in the same system. The inverter(s) do(es) not feed into the grid. Set a valid country code in the inverter.	Red
DC input voltage too high	The input voltage at the inverter exceeds the permissible value. The inverter does not feed into the grid. Switch off the DC switch and contact your installer.	Red
DC input voltage too low	The input voltage at the inverter is less than the permissible value. The inverter cannot feed into the grid. Contact your installer.	Red flashing
Internal error	Contact your installer.	Red
Internal warning	Contact your installer.	Red flashing
Internal information	Contact your installer.	Red-green flashing
Derating temperature	The inverter cannot feed the grid at full power because the maximum permissible internal temperature has been reached. Contact your installer if this warning occurs frequently.	Red flashing
Derating 10 minutes average value	The inverter cannot or may not feed the grid at full power because the average output voltage over a period of 10 minutes lies outside the permissible tolerance range. Contact your installer if this warning occurs frequently.	Red flashing
Derating external (e.g. power supply company)	The inverter has received an external signal via the communications interface and is currently feeding the grid at reduced power.	Red flashing
Derating temperature > 30 min	The inverter cannot feed the grid at full power because the maximum permissible internal temperature has been reached. This state has now existed for more than 30 minutes. Contact your installer.	Red flashing
Derating 10 minutes average value > 30 min	The inverter cannot or may not feed the grid at full power because the average output voltage over a period of 10 minutes has been outside the permissible tolerance range for over 30 minutes. Contact your installer if this warning occurs frequently.	Red flashing
Derating external (e.g. power supply company) > 30 min	The inverter has received an external signal via the communications interface and is currently feeding the grid at reduced power. This state has now existed for more than 30 minutes.	Red flashing
Date/time not set	The time and/or date have not been correctly set at the inverter. The inverter operates without restrictions but the measurements are not correctly stored in the internal data logger. Set the time and date at the inverter (see the <i>StecaGrid Vision</i> manual).	Red-green flashing
Option card error	The communications card inserted into the inverter has signalled an error. The communication to the outside world is possibly interrupted but the inverter is otherwise operating without restrictions. Check the communications and/or contact your installer.	Red-green flashing
24h no energy injection	The inverter has fed no power into the grid for at least 24 hours. Check if the DC switch is switched off or if snow is lying on the modules. If neither is the case then contact your installer.	Red
Grid error (grid islanding detected)	The output voltage between two or more phases of the inverter lies outside the permissible tolerance range. The inverter switches off for safety reasons.	Red

6.3 Maintenance

Due to its design, the inverter is maintenance-free.

The cooling system is dimensioned in such a way that the inverter is optimally protected from overheating over its entire lifetime. The fans are temperature-controlled, running only when the system output is raised. The fan speed thus depends on output.

If an inverter is installed in a dusty environment, the inverter will quickly become dirty as a result of the air flow through the cooling fins.

If the cooling element becomes dirty, heat dissipation will be impaired causing the output restriction at lower ambient temperatures than the stated +50 °C to be reached more quickly and thus unnecessarily decrease the amount of electricity generated.

It is recommended that the amount of dirt on the cooling element be checked regularly and that the ventilation grills and the ventilation duct be cleaned as needed. Make sure that no objects cover the ventilation paths. If faults occur and you must exchange the fans, please contact your installer.

The inverter casing can be cleaned with a damp cloth. Do not use any cleaning agents that can damage the lacquered metal casing.

7 Technical data

Parameter	Value	
	StecaGrid 8000 3ph	StecaGrid 10000 3ph
DC input side (PV generator connection)		
Number of DC inputs	3	5
Maximum start voltage	845 V	
Maximum input voltage (V_{dcmax})	845 V	
Minimum input voltage (V_{dcmin})	350 V	
Rated input voltage ($V_{dc,r}$)	600 V	
Minimum input voltage for rated output	350 V	
MPP voltage ($V_{mppmin} \dots V_{mppmax}$)	350 V ... 700 V	
Maximum input current (I_{dcmax})	27 A	32 A
Rated input current	14 A	16.7 A
Maximum input power	9,250 W	10,800 W
Rated input power	8,400 W	10,000 W
Recommended maximum PV output	10,500 Wp	12,500 Wp
Derating / restriction	automatic when: <ul style="list-style-type: none"> input power is higher the device is not cooled sufficiently input currents > 27 A Higher currents are restricted by the inverter and therefore will not damage it.	automatic when: <ul style="list-style-type: none"> input power is higher the device is not cooled sufficiently input currents > 32 A
AC output side (mains grid connection)		
Output voltage ($V_{acmin} \dots V_{acmax}$)	320 V ... 480 V [depending on the regional settings]	
Rated output voltage ($V_{ac,r}$)	400 V	
Maximum output current (I_{acmax})	15 A	
Rated output current	11.6 A	13.7 A
Maximum output power	8,800 W	10,300 W 10,000 W (Belgium only; see table of countries)
Rated output ($P_{ac,r}$)	8,000 W	9,500 W
Rated frequency (f_r)	50 Hz	
Grid frequency ($f_{min} \dots f_{max}$)	47.5 Hz ... 52 Hz [depending on the regional settings]	
Power losses in nighttime operation	< 1.6 W	
Feeding phases	three-phase	
Distortion factor	< 4% (max. output)	
Characterisation of the operating behaviour		
Maximum efficiency	96.3%	
European efficiency (η_{EU})	95.2%	95.4%
MPP efficiency	> 99%	
Operating efficiency (at 5 %, 10 %, 20 %, 25 %, 30 %, 50 %, 75 %, 100 % of rated power) at minimum MPP voltage	84.4 %, 91.8 %, 94.5 %, 95 %, 95.1 %, 95.6 %, 94.7 %, 94.3 %	88.3 %, 93.2 %, 95 %, 95.2 %, 95.3 %, 95.6 %, 94.8 %, 94.3 %
Operating efficiency (at 5 %, 10 %, 20 %, 25 %, 30 %, 50 %, 75 %, 100 % of rated power) at maximum MPP voltage	74.1 %, 92.7 %, 94.8 %, 95.5 %, 95.7 %, 96.2 %, 95.8 %, 95.3 %	77.2 %, 94.1 %, 95.3 %, 95.7 %, 95.9 %, 96.2 %, 95.9 %, 95.3 %
Efficiency reduction in the case of deviation from the DC rated voltage	-0.0025% / V	
Power derating at full power	from +50 °C (T_{amb})	
Switch-on power	20 W	
Switch-off power	40 W	
Standby power	9 W	

Parameter	Value	
	StecaGrid 8000 3ph	StecaGrid 10000 3ph
Safety		
Protection degree	I	
Isolation principle	no galvanic isolation, transformerless	
Grid monitoring	MSD, compliant with DIN VDE 0126-1-1	
Isolation monitoring	yes, integrated	
Residual current monitoring	Yes, integrated; in addition, the plant must be equipped with an AC/DC sensitive residual current protection switch type B in accordance with DIN VDE 0100-410.	
Application conditions		
Area of application	indoor rooms with or without air conditioning, outdoors with protection	
Corrosion categories	C3 (urban and industrial atmosphere, coastal areas with low salt concentration)	
Ambient temperature	-20 °C ... +60 °C	
Relative humidity	0% ... 95%	
Noise emission	< 60 dBA	
Equipment and design		
Degree of protection	IP54	
DC connection	MultiContact MC4 (3 pairs), rated current of 22 A per input	MultiContact MC4 (5 pairs), rated current of 22 A per input
AC connection	Wieland RST25i5 plug for cable cross-sections $\leq 4 \text{ mm}^2$, counterpart socket provided	
Dimensions (X x Y x Z)	400 x 847 x 225 mm	
Weight	42 kg	
Communication interface	RS485 plug-in card (included in delivery), 2 x RJ45 sockets, can be connected to StecaGrid Vision, Meteocontrol WEB'log or Solar-Log	
Integrated DC circuit breaker	yes, compliant with VDE 0100-712	
Cooling principle	temperature-controlled fan (variable speed)	
Test certificate	CE mark, G83 projected: clearance certificate, DK5940	clearance certificate, CE mark, G83, DK5940, AS4777

Table of countries



Note

After being switched on for the first time the inverter operates using default values until a country has been selected.

Country	Grid voltage	Grid frequency	Reconnection time
Default values	±10 % of the rated voltage (0.10 s)	-0.3 Hz / +0.2 Hz of the rated frequency (0.10 s)	180 s
Greece (Mainland)	-20 % / +15 % of the rated voltage (0.50 s)	± 0.5 Hz of the rated frequency (0.50 s)	180 s
Greece (Islands)	-20 % / +15 % of the rated voltage (0.50 s)	-2.5 Hz / +1.0 Hz of the rated frequency (0.50 s)	180 s
Netherlands	-20 % / +10 % of the rated voltage (2.00 s)	-2.0 Hz / +1.0 Hz of the rated frequency (2.00 s)	30 s
Belgium ¹⁾	-15 % / +10 % of the rated voltage (0.12 s)	-2.5 Hz / +0.5 Hz of the rated frequency (0.12 s)	30 s
Belgium unlimited ²⁾	-15 % / +10 % of the rated voltage (0.12 s)	-2.5 Hz / +0.5 Hz of the rated frequency (0.12 s)	30 s
France	±15 % of the rated voltage (0.20 s)	± 0.5 Hz of the rated frequency (0.20 s)	30 s
Spain	-15 % / +10 % of the rated voltage (0.20 s)	± 1.0 Hz of the rated frequency (0.20 s)	180 s
Portugal	±15 % of the rated voltage (0.20 s)	-3.0 Hz / +1.0 Hz of the rated frequency (0.50 s)	20 s
Ireland	±10 % of the rated voltage (0.50 s)	-2.0 Hz / +0.5 Hz of the rated frequency (0.50 s)	30 s
Slovenia	±15 % of the rated voltage (0.20 s)	-3.0 Hz / +1.0 Hz of the rated frequency (0.20 s)	30 s
Italy 1	±20 % of the rated voltage (0.10 s)	± 0.3 Hz of the rated frequency (0.10 s)	30 s
Italy 2	±20 % of the rated voltage (0.10 s)	± 1.0 Hz of the rated frequency (0.10 s)	30 s
Czech Republic	±15 % of the rated voltage (0.20 s)	± 0.5 Hz of the rated frequency (0.20 s)	30 s
Austria	-20 % / +15 % of the rated voltage (0.20 s)	-3.0 Hz / +1.0 Hz of the rated frequency (0.20 s)	30 s
Great Britain	-10 % / +15 % of the rated voltage (1.50 s)	-3.0 Hz / +0.5 Hz of the rated frequency (0.50 s)	180 s
Sweden	±15 % of the rated voltage (0.20 s)	-3.0 Hz / +1.0 Hz of the rated frequency (0.50 s)	30 s
Germany / Switzerland	-20 % / +15 % of the rated voltage (0.20 s)	-2.5 Hz / +0.2 Hz of the rated frequency (0.20 s)	30 s
Australia	-13 % / +17 % of the rated voltage (2.00 s)	-3.5 Hz / +5.0 Hz of the rated frequency (2.00 s)	60 s
Turkey	-20 % / +15 % of the rated voltage (0.20 s)	-2.5 Hz / +0.2 Hz of the rated frequency (0.20 s)	30 s
Israel	-13 % / +17 % of the rated voltage (2.00 s)	-3.5 Hz / +5.0 Hz of the rated frequency (2.00 s)	300 s

¹⁾ maximum output power of 10,000 W (StecaGrid 10000 3ph only)

²⁾ maximum output power of 10,300 W (StecaGrid 10000 3ph only)

8 Commercial and legal guarantee conditions

Guarantee conditions for products from Steca Elektronik GmbH

1 Defects in materials and workmanship

The guarantee only applies to defects in materials and workmanship, insofar as these can be attributed to inadequate professional ability on the part of Steca.

Steca reserves the right at its own discretion to repair, adapt or replace the faulty products.

2 General information

In accordance with statutory regulations, there is a 2-year legal guarantee on all products for the customer.

For this Steca product, we provide a voluntary 5-year commercial guarantee to the specialist dealer from the date of invoice or receipt. This voluntary guarantee applies only to products sold within an EU country.

The legal guarantee entitlements are not restricted by the voluntary guarantee.

To be able to make a claim under the guarantee the customer must provide proof of purchase (payment receipt).

If a problem arises, the customer must contact his or her installer or Steca Elektronik GmbH.

3 Guarantee exclusion clause

The guarantees on products from Steca Elektronik GmbH described under point 1 are not valid in the event that the fault is attributable to: (1) specifications, designs, accessories, or components added to the product by the customer or at the wish of the customer, or special instructions from the customer relating to the production of the product, the connection (of parts) of Steca products with other products that are not explicitly approved by Steca Elektronik GmbH; (2) modifications or adjustments to the product by the customer, or other causes due to the customer; (3) incorrect arrangement or installation, incorrect or careless handling, accident, transport, overvoltage, storage or damage caused by the customer or other third party; (4) unavoidable accident, fire, explosion, construction or new construction of any kind in the environment where the product is located, due to natural phenomena such as earthquakes, flooding, or storms, or any other cause outside the control of Steca Elektronik GmbH; (5) any other cause that could not be foreseen or avoided with the technology used in manufacturing the product; (6) if the serial number and/or the type number has been manipulated or rendered unreadable; (7) the use of the solar products in a movable object, for example ships, mobile homes, or others.

The guarantee stated in this operating manual only applies to consumers who are customers of Steca Elektronik GmbH or of resellers authorised by Steca Elektronik GmbH. The guarantee mentioned here is not transferable to a third party. The customer shall not transfer his rights or responsibilities resulting from this in any way, without the prior written approval of Steca Elektronik GmbH. Furthermore, Steca Elektronik GmbH shall in no case be liable for indirect damage or loss of profit. Unless otherwise specified by any applicable compulsory legislative regulations, Steca Elektronik GmbH shall also not be liable for any other damages other than those for which Steca Elektronik GmbH has hereby explicitly accepted liability.

