Operation and installation manual

SOLIVIA 2.5 EU G4 TR
SOLIVIA 3.0 EU G4 TR
SOLIVIA 3.3 EU G4 TR
SOLIVIA 3.6 EU G4 TR
SOLIVIA 5.0 EU G4 TR

This manual applies to solar inverters of type

- **SOLIVIA 2.5 EU G4 TR**

- **SOLIVIA 3.0 EU G4 TR**

- **SOLIVIA 3.3 EU G4 TR**

- **SOLIVIA 3.6 EU G4 TR**

- **SOLIVIA 5.0 EU G4 TR**

with the software version 0.0.38.

This manual can be amended at any time.

The latest version of this manual is available at www.solar-inverter.com.

Delta Energy Systems (Germany) GmbH

Tscheulinstraße 21

79331 Teningen

Germany

Table of contents

1. About this manual

This manual allows you to become acquainted with the product.

Observe the safety regulations applicable for each country. You can contribute to the durability and reliability of the product during its use by handling it carefully. These are basic prerequisites for optimum use of your product.

1.1 Purpose of this manual

This manual is part of the product. Store the manual in a safe place.

Read the manual carefully and thoroughly and follow the instructions contained therein. The manual contains important information on the installation, commissioning and operation of the solar power inverter.

Take note of and follow the information on safe use (see "3. General safety instructions", p. 7).

The installer and the operator must have access to this manual and must be familiar with the safety instructions.

The solar power inverter can be operated safely and normally only if it is installed and operated in accordance with this manual (see IEC 62109-5.3.3). Delta Energy Systems is not responsible for damage incurred by failure to comply with the installation and operating instructions in this manual.

1.2 Target audience of this manual

This manual is aimed at qualified electricians.

Only chapters "9. Production information", p. 37 and "12. Diagnosis and maintenance", p. 48 are relevant to the operator. All other activities may only be performed by qualified electricians.

1.3 Warnings and symbols

The following section explains the warnings and symbols used in this manual.

| ⚠ DANGER | Indicates a dangerous situation. An accident **will** lead to death or severe physical injuries. |

| ⚠ WARNING | Indicates a dangerous situation. An accident **can** lead to death or severe physical injuries. |

| ⚠ CAUTION | Indicates a dangerous situation. An accident **can** lead to medium or light physical injuries. |

| ATTENTION | Indicates a dangerous situation that can result in material damage. |

| NOTE | Contains general information on using the solar power inverter. A note **does not** indicate dangerous situations. |

This symbol warns of a danger of electric shock due to the presence of high voltages.

This symbol is a warning of general dangers.

1.4 Conventions used in this document

1.4.1 Work steps

Numbered sequences of work steps must be performed in the specified sequence.

1. Work step
   → When the solar power inverter reacts to a work step, then this reaction is marked with an arrow.
2. Work step
3. Work step

The end of a sequence of work steps is marked as follows:

☑ End of a sequence of work steps

An instruction consisting of only one work step is shown as follows:

► Work step

1.4.2 User buttons and LEDs

User buttons and LEDs are marked in this document as follows:

User buttons on the solar power inverter: [ESC] button.

LEDs on the solar power inverter: *FAILURE* LED

LED symbol	Meaning
🔆 (green)	The LED lights up continuously.
🔆 (green)	The LED flashes.
◯ (grey)	The LED is off.

1.4.3 Software elements

Software elements as menus and input fields are marked in this document as follows:

Software menu elements: **User settings** menu

You change the value of a parameter in data entry fields. All types of data entry fields on the display are shown as follows: *Cos Phi* data entry field.

2.   Intended purpose

This solar power inverter in the EU series may be used in the following countries (Status 02.07.2012):

Country	SOLIVIA				
	2.5	3.0	3.3	3.6	5.0
Belgium	x	x	x	x	
Bulgaria	x	x	x	x	
Danmark	x	x	x	x	x
France	x	x	x	x	
Germany	x	x	x		
Great Britain					
Greece	x	x	x	x	
Italy	x	x	x	x	
The Netherlands	x	x	x	x	
Portugal	x	x	x	x	
Romania	x	x	x	x	
Slovakia					
Slovenia	x	x	x	x	
Spain					

This list may change due to current approval processes. If you have any questions, please contact the Delta Support Team.

The solar power inverter connects a photovoltaic system to the public power grid. The solar power inverter converts DC electricity into AC electricity, which is then fed into the public power grid.

The solar power inverter is intended for use in photovoltaic systems connected to a power grid. The solar power inverter is not intended for mobile use.

The solar power inverter can be used indoors and in protected outdoor areas with ambient conditions according to IP65.

The solar power inverter may only be used within the specified power range and under the specified ambient conditions.

The solar power inverter contains monitoring devices, including an anti-islanding device.

The solar power inverter may only be used for the specified intended purpose.

3.   General safety instructions

<div style="background:red;color:white">⚠ **DANGER**</div>

⚡ **Danger of death from hazardous voltage**
Hazardous voltage is applied to the solar power inverter during operation. Hazardous voltage is still present 5 minutes after all power sources have been disconnected.
► Never open the solar power inverter. The solar power inverter contains no components that are to be maintained or repaired by the operator or installer. Opening the cover will void the warranty.

● Incorrect handling can lead to physical injuries and material damage!

● The installation and commissioning work may be performed only by qualified electricians.

● The solar power inverter can be operated safely and normally only if it is installed and operated in accordance with this manual (see IEC 62109-5.3.3). Delta Energy Systems is not responsible for damage incurred by failure to comply with the installation and operating instructions in this manual.

● The solar power inverter contains no components that are to be maintained or repaired by the operator or installer. All repairs must be performed by Delta.

● Observe all points in this installation and operation manual!

● Before working on the solar power inverter, you must disconnect it from the grid and the PV modules.

● Do not disconnect any cables when the solar power inverter is under load, as there is a risk of an arc fault.

● To prevent lightning strikes, follow the regulations applicable in your country.

● The surface of the solar power inverter can get very hot.

● The solar power inverter is heavy (see "15. Technical data", p. 56). The solar power inverter must always be lifted by two people.

● The solar power inverter has a high leakage current value (see "15. Technical data", p. 56). The ground wire **MUST** be connected before the start of operation.

● Only equipment in accordance with SELV (EN 60950) may be connected to the RS485 and USB interfaces.

● Do not remove any warning signs that the manufacturer has installed on the solar power inverter.

● In order for IP65 protection to be granted, all used and unused connections must be sufficiently sealed.

4.   Unpacking

> ⚠️ **WARNING**
>
> ⚡ **Danger of injury due to heavy weight**
> The solar power inverter is heavy (see "15. Technical data", S. 56). Incorrect handling can lead to injuries.
> ► The solar power inverter must always be lifted by at least two people. Or use an appropriate lifting device, e.g., a crane.
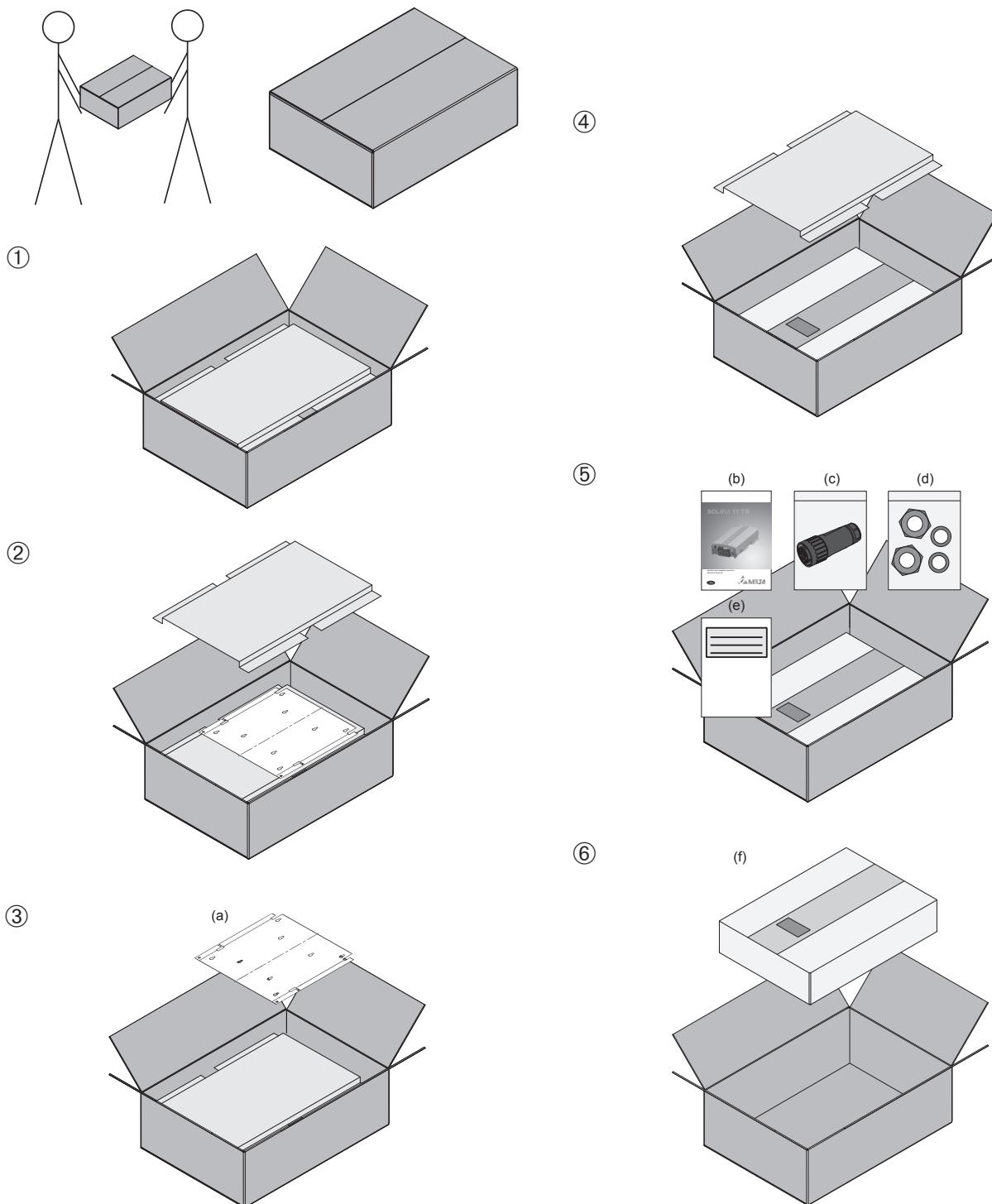
► Check the scope of delivery for completeness:

– Mounting plate (a)

– Operation and installation manual (b)

– Wieland RST25i3S AC plug (c)

– I/O interface plug

– 2 M6 nuts and 2 M6 washers (d)

– "Power limit" label (e)

– Solar power inverter (f)

► Check all parts for signs of damage!

► Store the packaging in a safe place!

① ② ③ ④ ⑤ ⑥

(a) (b) (c) (d) (e) (f)

5. System description

5.1 General overview
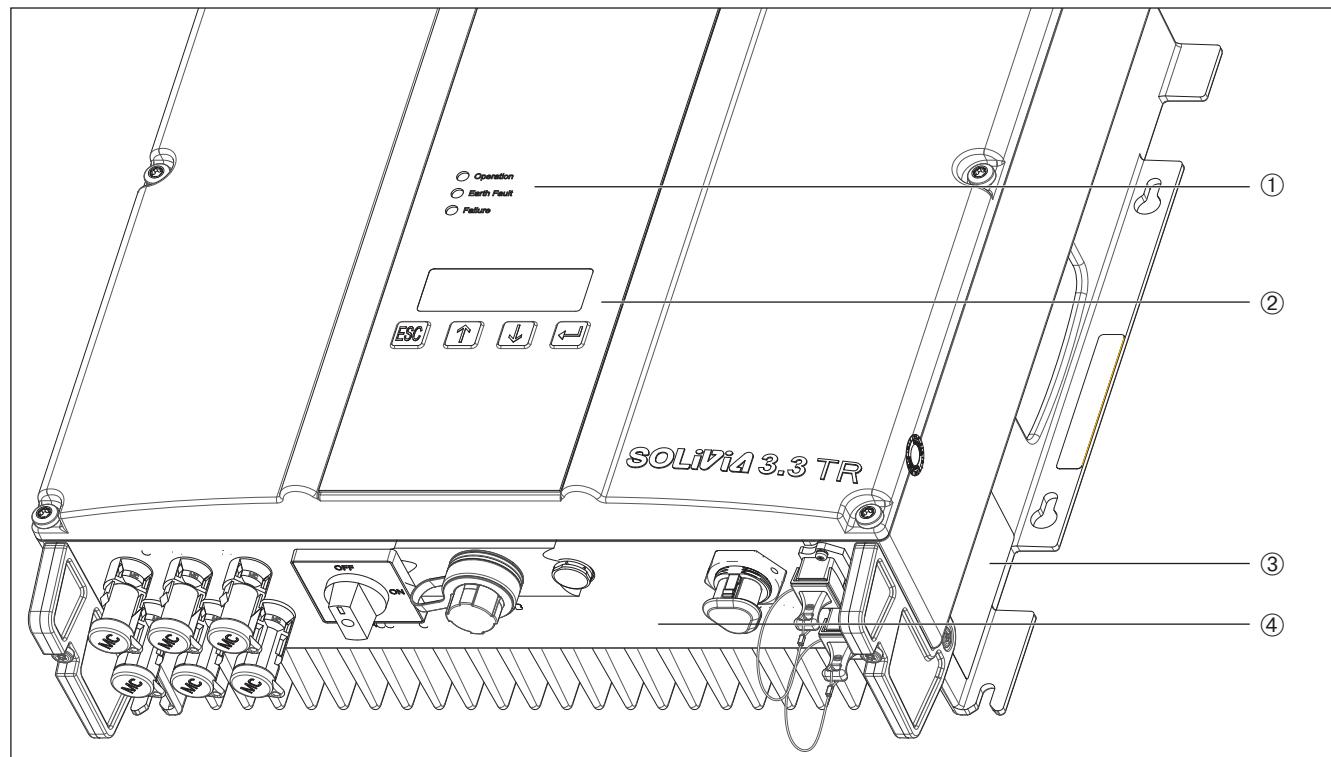
Fig. 5.1.:   Components of the solar power inverter

No.	Meaning	Description
①	Status LEDs	"5.3 Status LEDs", p. 11
②	Display and buttons	"5.4 Display and buttons", p. 11
③	Type plate	"5.2 Type plate", p. 10
④	Electrical connections	"5.5 Electrical connections", p. 15

5.2   Type plate
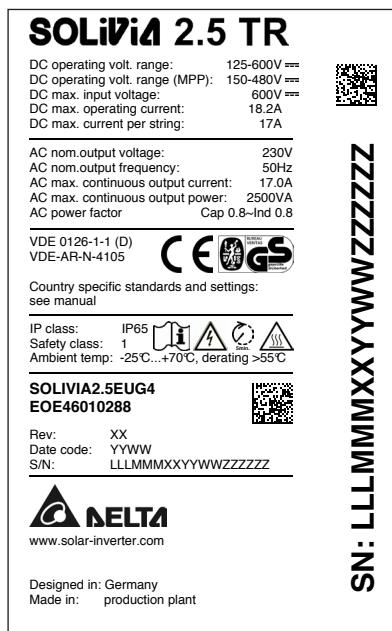
Fig. 5.2.:   Solivia 2.5 G4 TR type plate
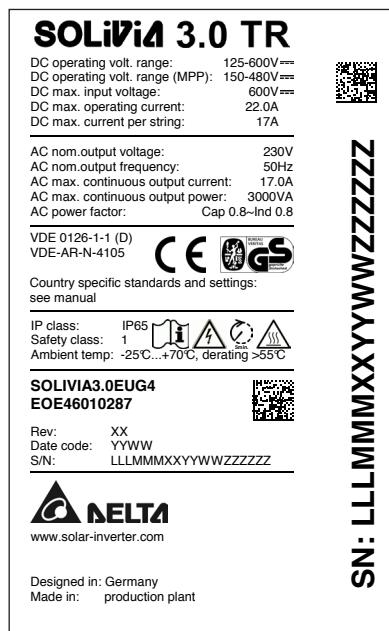
Fig. 5.3.:   Solivia 3.0 G4 TR type plate

Fig. 5.4.:   Solivia 3.3 G4 TR type plate
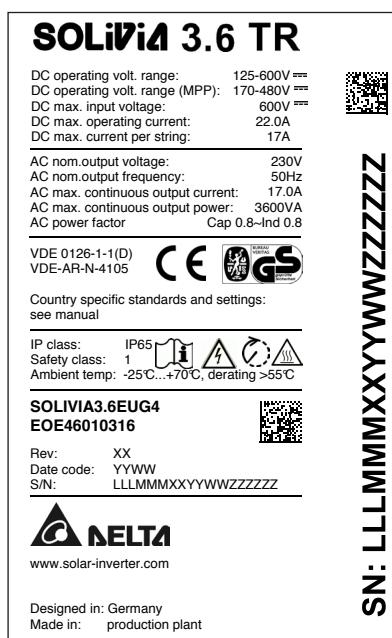
Fig. 5.5.:   Solivia 3.6 G4 TR type plate
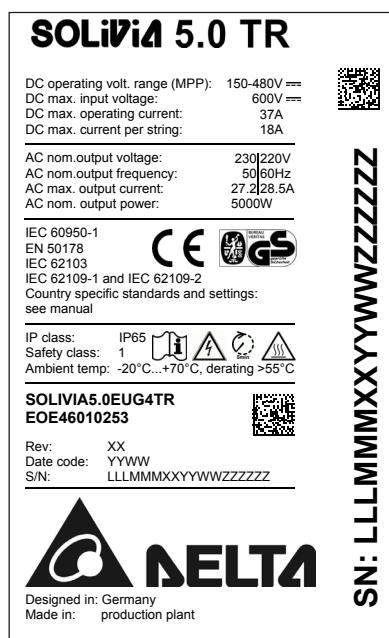
Fig. 5.6.:   Solivia 5.0 G4 TR type plate

Warning symbols on the type plate	Description
	Danger of death from hazardous voltage Hazardous voltage is applied to the solar power inverter during operation. Hazardous voltage is still present 5 minutes after all power sources have been disconnected. ► Never open the solar power inverter. The solar power inverter contains no components that are to be maintained or repaired by the operator or installer. Opening the cover will void the warranty.
	► Read the manual before working with the solar power inverter and follow the instructions contained in the manual.
	Danger from high temperatures During operation the housing of the solar inverter can get very hot. ► Do not touch the housing beside the orange middle part without safety gloves. The orange middle part and the display are protected by a special surface.

5.3 Status LEDs
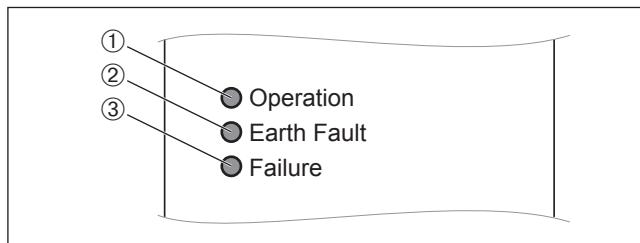
Fig. 5.7.: Status LEDs

No.	Label	Designation	Color
①	*OPERATION*	Operation	Green
②	*EARTH FAULT*	Earth fault	Red
③	*FAILURE*	Failure	Yellow

Information on the LED messages is provided in "12. Diagnosis and maintenance", p. 48.

5.4 Display and buttons

5.4.1 Components
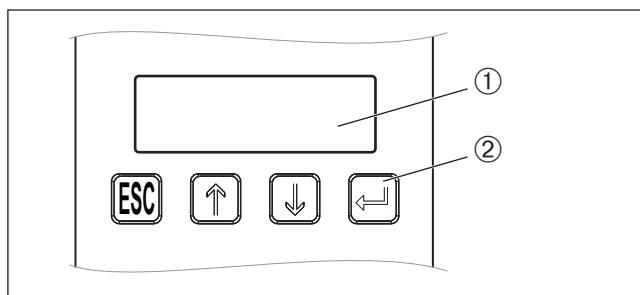
Fig. 5.8.: Display components

No.	Designation
①	Display
②	Buttons

5.4.2 Display layout
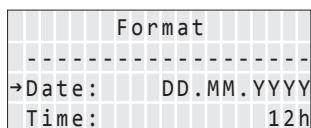
Fig. 5.9.: Display

The display has 4 rows of 20 characters each.

The first row contains the name of the currently displayed menu.

The second to fourth rows show the menu elements.

A small arrow in the third row shows the currently selected menu item.

5.4.3 Buttons

Symbol	Use
ESC	● Exit the current menu
	● Cancel the setting of a value
⇑	● Move upwards in a menu
	● Set a value (increase the value)
⇓	● Move downwards in a menu
	● Set a value (decrease the value)
↵	● Select a menu entry
	● Open a configurable value for editing
	● Finish editing (adopt the set value)

5.4.4 General menu structure

The menus have up to three levels:

[Main menu]

...

300 USB features

400 Production info

    410 Actual data

        411 Current overview

        412 Actual data AC

        ...

    420 Day statistics

    430 Week statistics

    ...

500 User settings

...

Most menu names consist of a three-digit number and a menu title.

See "16.3 Overview of menu structure", p. 61 for an overview of the complete menu structure.

5.4.5 "Go to menu" function

> **NOTE**
>
> You can use the "Go to menu" function to directly navigate to a particular menu.
>
> A list of the available menu numbers is provided in "16.3 Overview of menu structure", p. 61.

1. To open the **Go to menu** function, press and hold the [ESC] button on the solar power inverter for at least 3 seconds.

   → **Go to menu** opens.

   ```
   Go to menu

    Menu:            411
    411 Actual overview
   ```

2. Press the [↵] button to enter the menu number.

   → The first digit flashes.

3. Enter the first digit of the menu number using the [↓][↑] buttons.

   → You can only set menu numbers that actually exist. The name of the associated menu is displayed in the fourth display row.

4. Once you have set the first digit, press the [↵] button.

   → The second digit flashes.

5. Enter the second and third digit in the same manner.

6. Press the [↵] button.

   → The menu corresponding to the entered menu number is displayed.

5.4.6 Button combinations

The table lists special button combinations for the display buttons.

Buttons	Action
[ESC] [↓]	Pressing the [ESC] and [↓] buttons at the same time displays the **100 Install settings** menu where you can change the display language to be used, see "10.2.1 Display language", p. 39.
[↑] [↓]	Pressing the [↓][↑] buttons at the same time displays the **800 Standard menu** where you can select the "standard menu", see "10.6 Standard menu", p. 44.

5.4.7 Navigating in menus

You use the [↓][↑] buttons for navigating in menus.

The [↓] button moves to the next lower menu item and the [↑] button moves to the next higher menu item.

```
    Solivia ##
 Production info
→User settings
 Diagnostic&Alarm
```

[↓]   [↑]

```
    Solivia ##
 User settings
→Diagnostic&Alarm
 Inverter info
```

[↓]   [↑]

```
    Solivia ##
 Diagnostic&Alarm
→Inverter info
 Standard
```
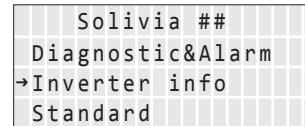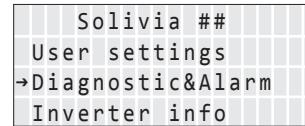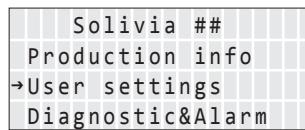
5.4.8 Selecting a sub-menu

► Press the [↵] button to open a sub-menu.

```
    Solivia ##
 USB features
→Production info
 User settings
```

[↵]

```
400 Production info
 Feed-in settings
→Actual data
 Day statistics
```
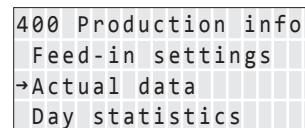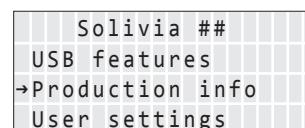
5.4.9 Exiting a menu

► Press the [ESC] button to return to the higher-level menu.

```
400 Production info
 Feed-in settings
→Actual data
 Day statistics
```

[ESC]

```
    Solivia ## G4
 User features
 Production info
 User settings
```
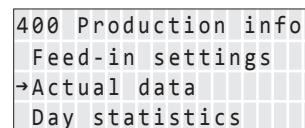
5.4.10 Setting values

You can set parameters in several menus. The [↓][↑] buttons are used to change parameter values.

The [↑] button increases the value of the parameter.

The ⬇ button decreases the value of the parameter.

The [ESC] button can be used to cancel the setting, and the original value is then displayed once more.

Pressing the ⏎ button causes the new parameter value to be adopted.

The example on the next page illustrates the procedure for changing the value of a parameter. This procedure is the same for all configurable parameters.

5. System description

Example: Setting the date

Buttons	Action	Result

⇑ ⇓	1. Press the ⇓⇑ buttons in the main menu to select the **Install settings** menu.	`    Solivia ## G4`
		 `--------------------`
		 `→Install settings`
		 ` Options`

↵	2. Press the ↵ button to open the **100 Install settings** (installation settings) menu.	`100 Install settings`
		 `--------------------`
		 `→Language:   English`
		 ` Date and time`

⇑ ⇓	3. Use the ⇓⇑ buttons to select **Date and time**.	`100 Install settings`
		 ` Language:   English`
		 `→Date and time:`
		 ` Display settings`

↵	4. Press the ↵ button to open the **110 Date and time** menu.	`110 Date and time`
		 `--------------------`
		 `→Date:    09/14/2011`
		 ` Time:    03:15:22pm`

⇑ ⇓	5. Use the ⇓⇑ buttons to select the *Date* menu item.	`110 Date and time`
		 `--------------------`
		 `→Date:    09/14/2011`
		 ` Time:    03:15:22pm`

↵	6. Press the ↵ button to begin making the setting
	 → The digits for the first value (in this case the month) flash.
		`110 Date and time`
		 ` Format`
		 `→Date:    `**`09`**`/14/2011`
		 ` Time:    03:15:22pm`

⇑ ⇓	7. Use the ⇓⇑ buttons to set the month.	`110 Date and time`
		 ` Format`
		 `→Date:    `**`11`**`/14/2011`
		 ` Time:    03:15:22pm`

↵	8. Press the ↵ button to adopt the new value.
	 → The digits for the second value (in this case the day) flash.
		`110 Date and time`
		 ` Format`
		 `→Date:    11/`**`14`**`/2011`
		 ` Time:    03:15:22pm`

⇑ ⇓	9. Use the ⇓⇑ buttons to set the day.	`110 Date and time`
		 ` Format`
		 `→Date:    11/`**`17`**`/2011`
		 ` Time:    03:15:22pm`

↵	10. Press the ↵ button to adopt the new value.
	 → The digits for the last value (in this case the year) flash.
		`110 Date and time`
		 ` Format`
		 `→Date:    11/17/`**`2011`**
		 ` Time:    03:15:22pm`

⇑ ⇓	11. Use the ⇓⇑ buttons to set the year.	`110 Date and time`
		 ` Format`
		 `→Date:    11/17/`**`2012`**
		 ` Time:    03:15:22pm`

↵	12. Press the ↵ button to adopt the new value.	

	☑ The value is adopted and the editing mode is exited.	`110 Date and time`
		 `--------------------`
		 `→Date:    11/17/2012`
		 ` Time:    03:15:22pm`

5.5 Electrical connections

5.5.1 Overview
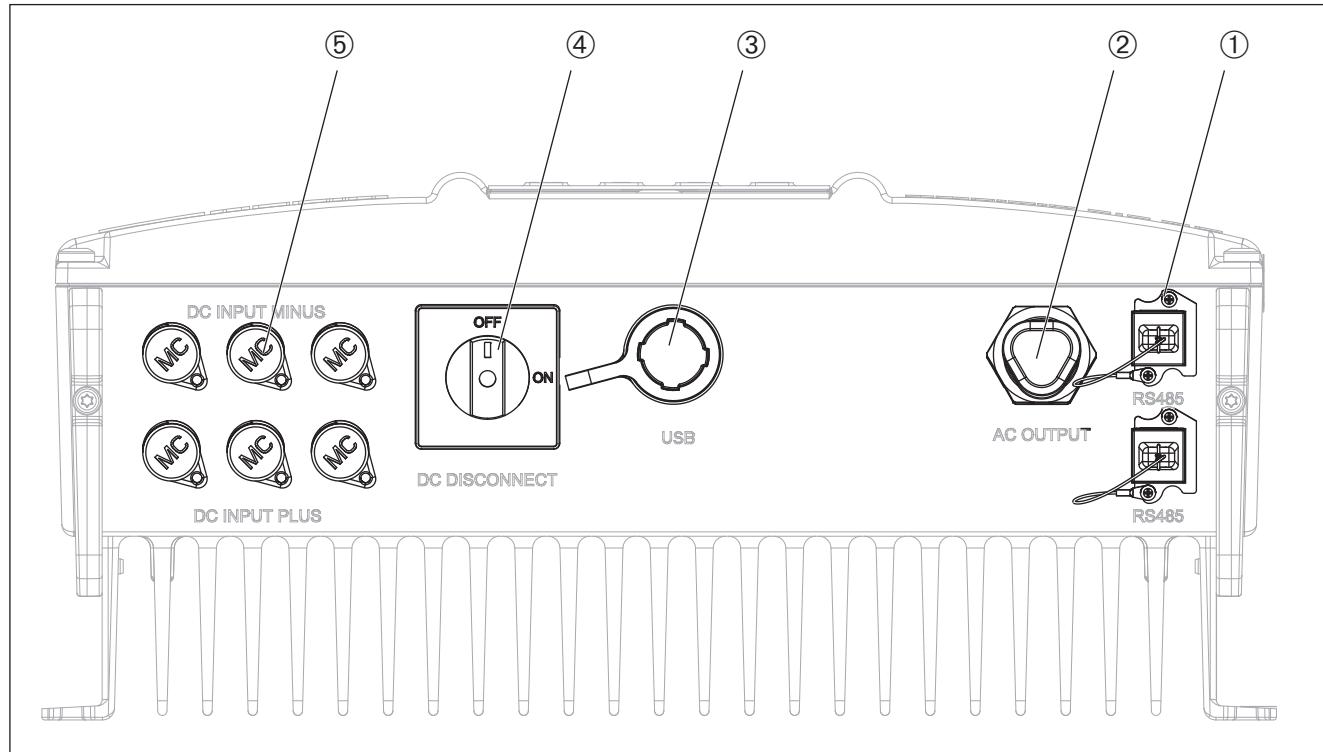
Fig. 5.10.: Electrical connections SOL
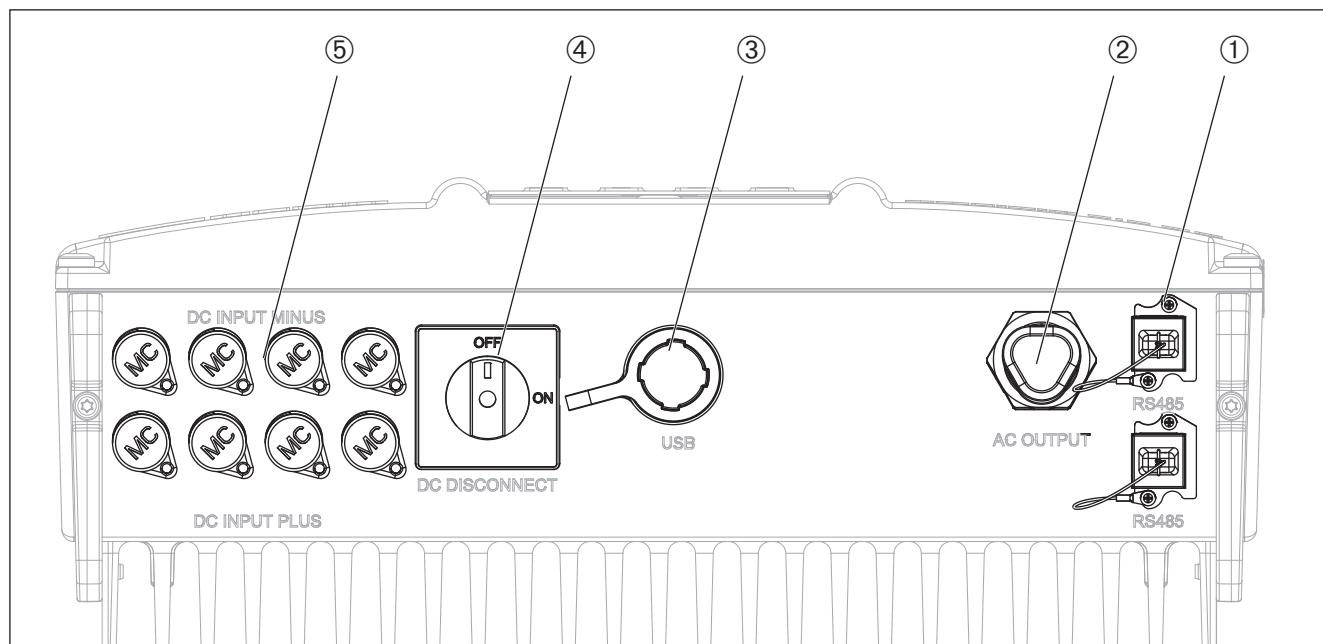
Fig. 5.11.: Elektroanschlüsse SOLIVIA 5.0

No.	Designation	Description
①	2 x RS485 interfaces	"5.5.4 RS485 interface (EIA485)", p. 16
②	AC connection	"5.5.3 AC connection", p. 16
③	USB interface	"5.5.5 USB interface", p. 16
④	DC disconnector	"5.5.2 DC connections and DC disconnector", p. 16
⑤	DC connections	"5.5.2 DC connections and DC disconnector", p. 16

5.5.2 DC connections and DC disconnector
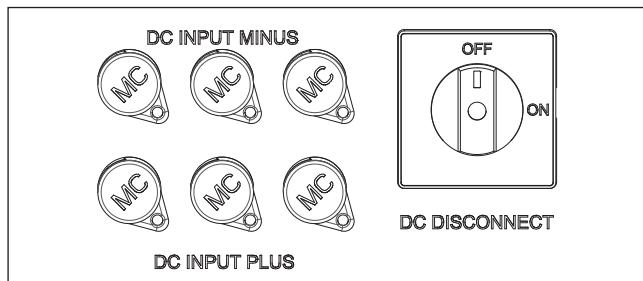
Fig. 5.12.: DC connections and DC disconnector

The DC connections are used for connecting the PV module string(s) to the solar power inverter.

The solar power inverter is equipped with an integrated DC disconnector for disconnecting the DC connections from the DC voltage of the PV modules.

The maximum permissible input current is 29 A for each DC connection.

Connection type: Tyco MultiContact MC4, pairs with plug (DC+) and socket (DC–), 3 pairs for SOLIVIA 2.5 ... 3.6, 4 pairs for SOLIVIA 5.0.

5.5.3 AC connection

The AC connection is used for connecting the solar power inverter to the grid.

The solar power inverter is connected to the grid using a 3-wire cable (L, N, PE).

Connection type: Wieland RST25i3s, plug supplied in the scope of delivery

5.5.4 RS485 interface (EIA485)

The two RS485 interfaces are used to connect one or more solar power inverters to a monitoring system.

The RS485 interfaces are internally wired 1:1. This means that both RS485 interfaces can be used as an input or an output.

Multiple solar power inverters are connected in series. Each solar power inverter must have a unique RS485 ID. A termination resistor must be connected to the last solar power inverter in the series.

The RS485 ID can be set during the commissioning (see "8. Commissioning", p. 27) or later (see "10.2.6 RS485 (EIA485)", p. 41).

Connection type: 2 x RJ45

5.5.5 USB interface

The USB interface is used for saving and loading data and reports.

Supported functions:

● Updating firmware

● Saving and loading settings

● Saving swap data

● Creating reports

● Service

See "11. Saving and loading data and settings", p. 45 for a detailed description of the functions.

Connection type: USB A

6. Operating behavior

6.1 General principle of operation

The solar power inverter converts the DC electricity from the PV modules into AC electricity. The AC electricity is then fed into the public power grid.

MPP tracker

The solar power inverter has an MPP tracker (MPP = Maximum Power Point).

The MPP tracker regularly scans a DC voltage range in the vicinity of the actual working point in order to find a point offering higher power. If a point offering higher power is found then the solar power inverter sets this as the new actual working point.

The "Shadowing" function can be used to set the MPP tracker to scan over a wider DC voltage range. This function is especially useful when small shadows regularly pass over the PV modules, e.g., from chimneys or trees.

Galvanic isolation

The AC and DC sides of the solar power inverter are galvanically isolated via a high frequency transformer. This makes it impossible for DC electricity to reach the AC side of the inverter.

Anti-islanding

The integrated anti-islanding device switches off the solar power inverter when the grid fails.

Temperature control

The convection cooling system provides optimal heat dissipation.

An internal temperature controller reduces the output power at ambient temperatures in the upper operating range. The solar power inverter is switched off when the ambient temperature exceeds the operating temperature range.

DC voltages

The DC input voltages mentioned in this section are provided in chapter "15. Technical data", p. 56.

The **maximum input voltage** must never be exceed. Measure the input voltage and use an overvoltage protection device on the DC side to prevent higher voltages from reaching the inverter. The maximum open-circuit voltage occurs at the lowest assumed temperature. More exact information on temperature dependency is provided in the PV module data sheet.

The **feed-in voltage range** of the solar power inverter defines the range of input voltages over which the solar power inverter will feed electricity into the grid.

The **MPP input voltage range at full power** of the solar power inverter defines the range of input voltages over which the MPP tracker is activated.

6.2 Functions for influencing the operating behavior

A detailed description of the functions is provided in chapter "10. Settings", p. 39.

- Active power control
- Reactive power control
- Insulation and grounding monitoring
- Extended MPP tracking in the case of partial shadowing of the PV modules

6.3 Fixed settings for reduction of active power and reactive power

The settings for reduction of active power and/or reactive power can be configured during initial commissioning. After completion of initial commissioning the values can only be changed using a PIN.

6.4 Balancing of asymmetrical grid loads

If an asymmetrical grid load above the permitted limits (e.g., > 4.6 kW for Germany) can occur in the event of a phase failure, the solar power inverter may be operated only in combination with a SOLIVIA Gateway M1 G2. The Gateway controls the feed-in so that an impermissible asymmetrical grid load cannot occur.

The asymmetrical grid load balancing can be activated during the initial commissioning.

After completion of initial commissioning, the function can only be changed using a PIN.

For a detailed description, see chapter "7.1 Planning the installation", p. 19.

6.5 Data analysis and communication

The solar power inverter is controlled by microcontrollers that also implement the interface communication, the monitoring of the values and the display messages.

The solar power inverter acquires and saves various data values that can be directly shown on the display or sent to a PC and displayed there.

Production information

Production information is available for the actual day, week, month, etc. The production information is saved each month.

Saving the configuration settings

The configuration settings of the solar power inverter can be exchanged between solar power inverters of the same type by using a USB stick.

Warning and failure messages

Every warning or failure message is stored with a timestamp in the solar power inverter. The messages are stored in the event log or in the internal log, depending on the cause of the failure.

6. Operating behavior

Reports

Reports can be read on the display and also stored on a USB stick. The reports contain information on production, events, settings and internal logs. For LVD grids, the last five failures are stored together with the settings.

6.6 Characteristic curves

Efficiency curves

SOLIVIA 2.5 EU G4 TR
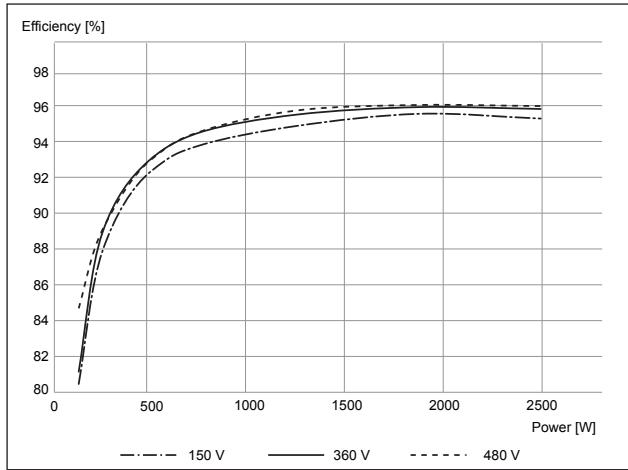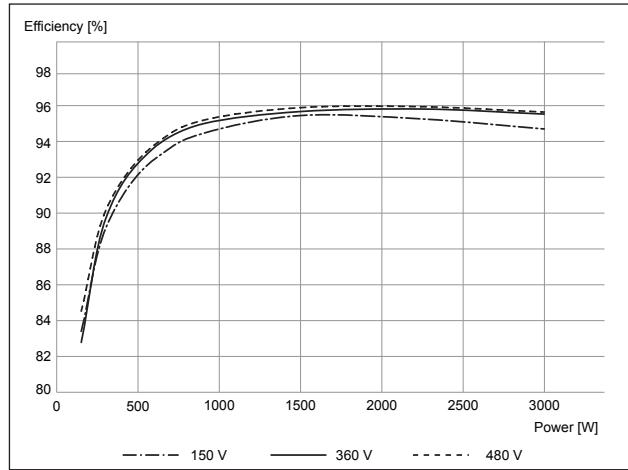
SOLIVIA 3.0 EU G4 TR
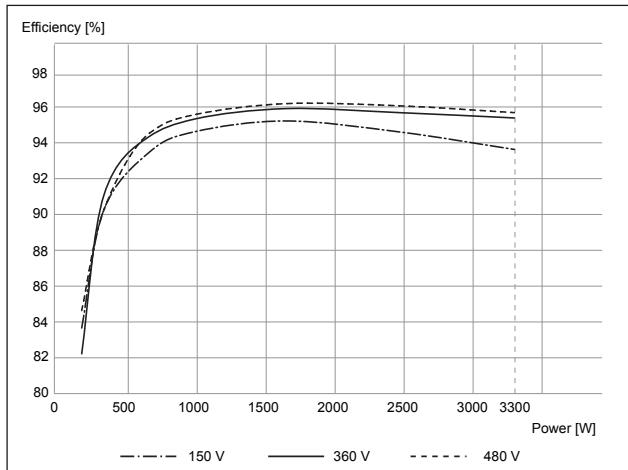
SOLIVIA 3.3 EU G4 TR

SOLIVIA 3.6 EU G4 TR
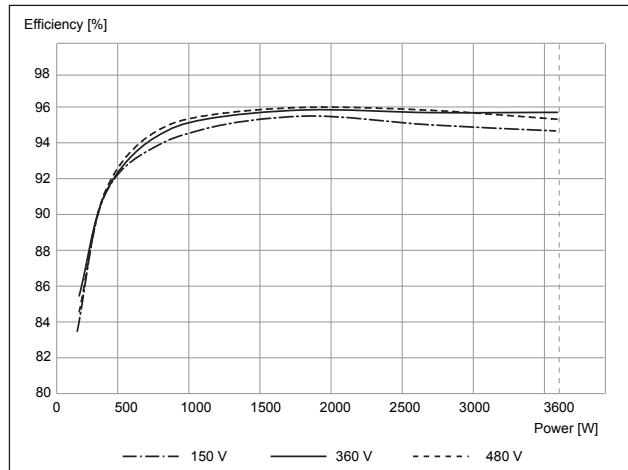
SOLIVIA 5.0 EU G4 TR
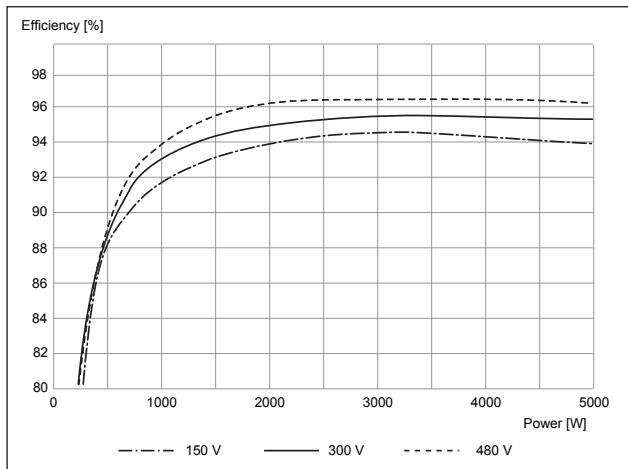
7. Installation

7.1 Planning the installation

7.1.1 General instructions

NOTE

If you want to use several of the solar power inverters described in this manual in one and the same phase

► Always use the mounting plate supplied with the solar power inverter.

► First mount the solar power inverter on the wall and then establish the electrical connections.

► Possible noise emissions can be irritating when the device is used in living areas. Avoid installing the device in living areas for this reason.

► Mount the solar power inverter so that the LEDs and display can be easily seen. Pay attention to the reading angle and installation height.

► Mount the solar power inverter on a fireproof wall.

► Mount the solar power inverter on a non-resonating wall.

► Check that the wall is capable of carrying the heavy weight of the device.

► Use dowels and screws for the installation that are suitable for the wall material and the heavy weight.

► Mount the solar power inverter vertically, see Fig. 7.1.
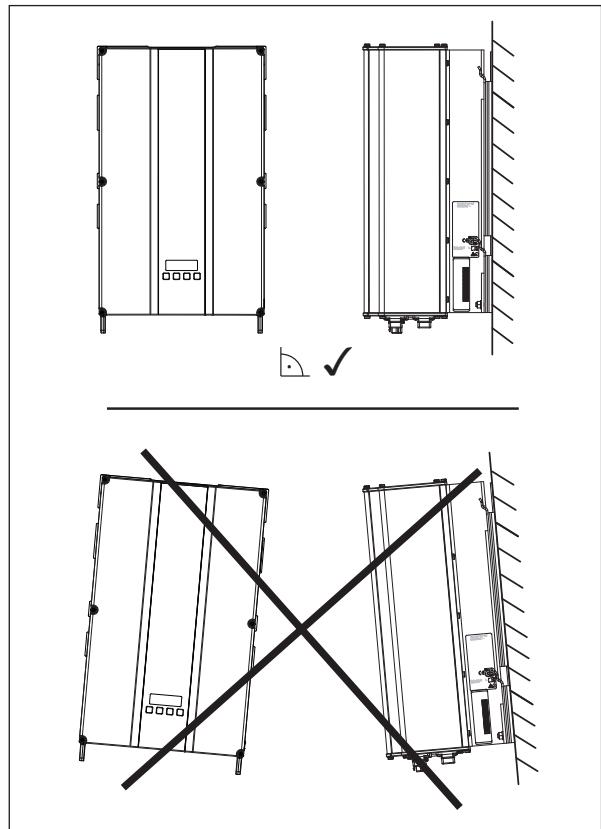
Fig. 7.1.:   Mounting alignment

7.1.2 Ambient conditions

► The solar power inverter has an IP65 degree of protection and can be installed indoors and in protected outdoor areas.

► Note the **Operating temperature range at full power without derating** and the **maximum operating temperature range**.

When the first operating temperature range is exceeded, the solar power inverter reduces the amount of power generated. When the maximum operating temperature range is exceeded, the solar power inverter switches off.

– Be sure to adhere to the specified minimum clearances to walls and other solar power inverters when installing the device (see Fig. 7.2.).

– Install multiple solar power inverters next to each other.

– Avoid direct sunlight.

– Ensure an adequate circulation of air. .
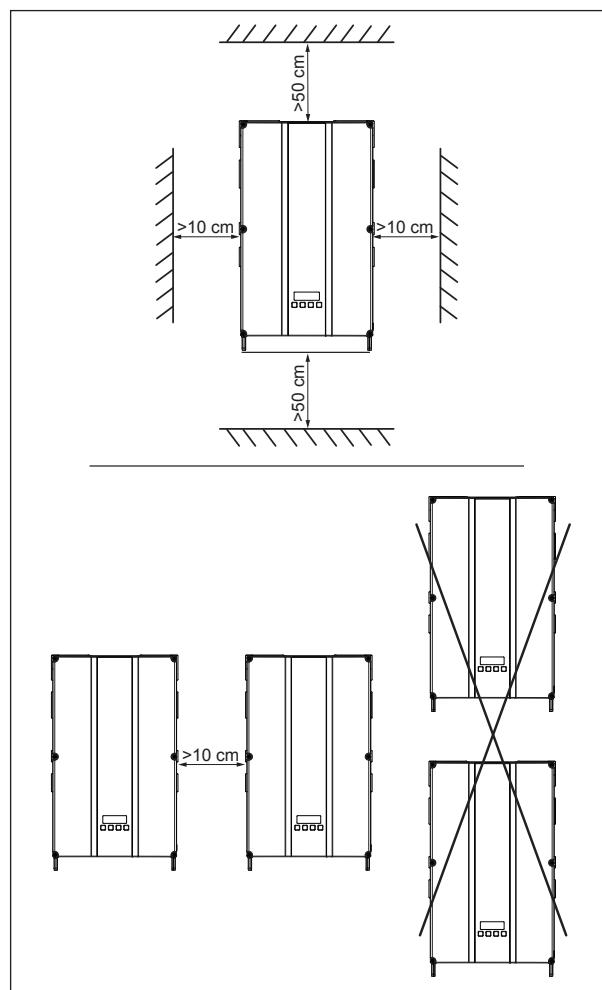
Fig. 7.2.:   Mounting clearances for correct convection

► Avoid heavy soiling. Dust can impair the performance of the device.

► Protect the solar power inverter from heavy rain and snow deposits.

7.1.3   Consideration of the asymmetrical grid load

The use of a SOLIVIA Gateway M1 G2 is mandatory for some installation types.

For example, this applies to installations in which several single-phase solar power inverters feed into one and the same phase and an impermissible asymmetrical grid load can occur if a phase fails.

Fig. 7.3 shows an example of such an installation for Germany. In Germany, the asymmetrical grid load must not exceed 4.6 kW.

The three-phase solar power inverter SOLIVIA 11 is unproblematic, because it controls the feed-in internally and always distributes the fed-in power evenly among all three phases.

The situation is different for the single-phase solar power inverters. If the phase fails, an asymmetrical grid load greater than 4.6 kW can occur.

In this case, the Gateway controls the feed-in via the RS485 interface and ensures that an impermissible asymmetrical grid load cannot occur.

If a Gateway is used to balance asymmetrical grid loads, you must activate the "asymmetrical grid load balancing" function on each single-phase solar power inverter during the initial commissioning.

If the RS485 connection between the Gateway and a single-phase solar power inverter is interrupted, the function switches off the solar power inverter after a specified time for safety.
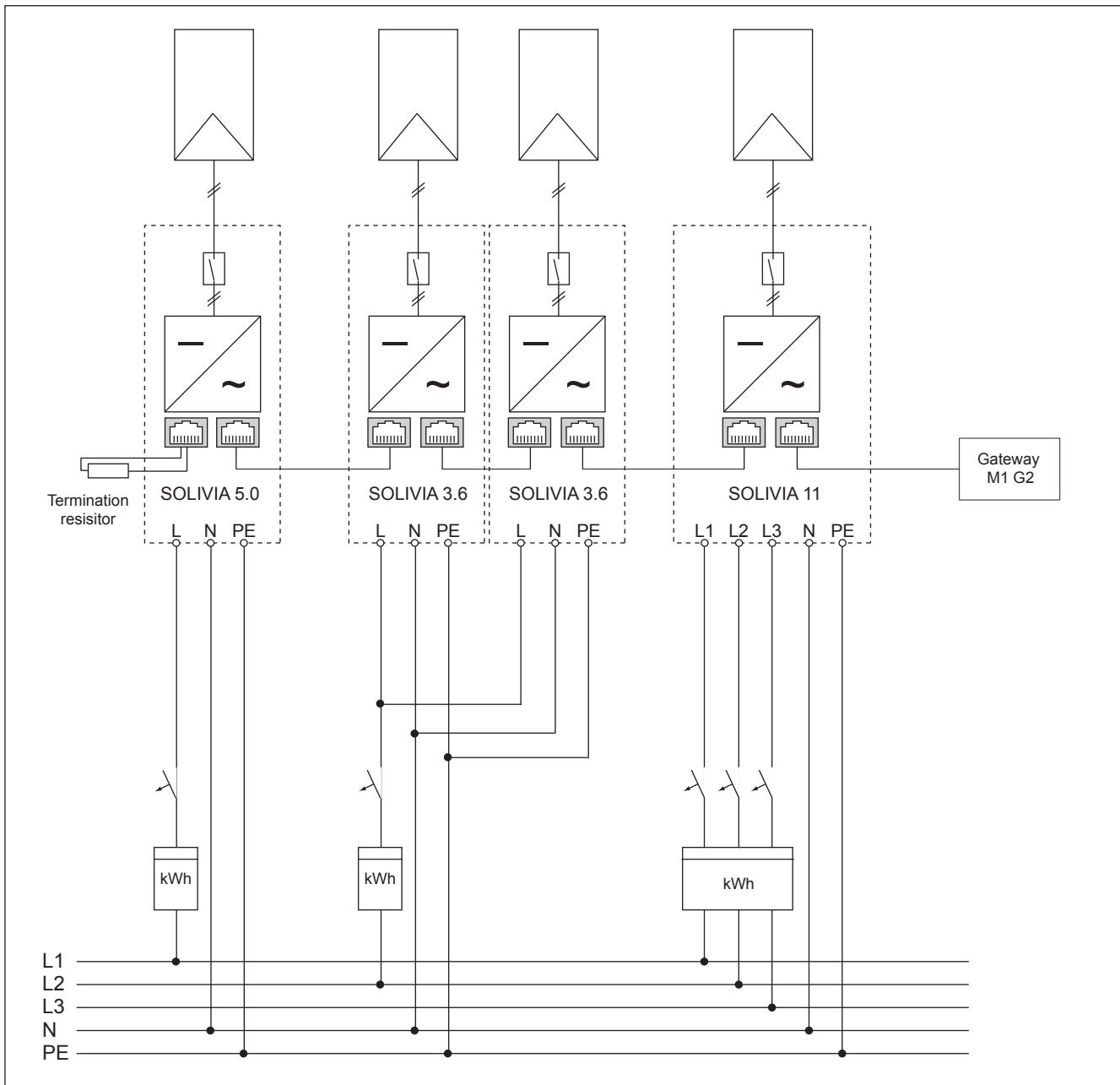
Fig. 7.3.:   Example of multiple solar power inverters connected in one phase

7.2 Mechanical installation

7.2.1 Mounting plate

> ⚠ **WARNING**
>
> **Danger of injury due to heavy weight**
> The solar power inverter is heavy (see "15. Technical data", p. 56). Incorrect handling can lead to injuries.
> ► The solar power inverter must always be lifted by at least two people. Or use an appropriate lifting device, e.g., a crane.

Materials and tools required

Supplied in the scope of delivery:

▪ Mounting plate

▪ 2 mounting nuts and washers for fastening the solar power inverter to the mounting plate

The following items are also required:

▪ Screws (∅ 6 mm) + dowels for fastening the mounting plate to the wall. At least 4 screws are required.

▪ Drill and drill bits suitable for the wall material and size of the dowels.

▪ Screwdriver or open-ended wrench matching the screws.
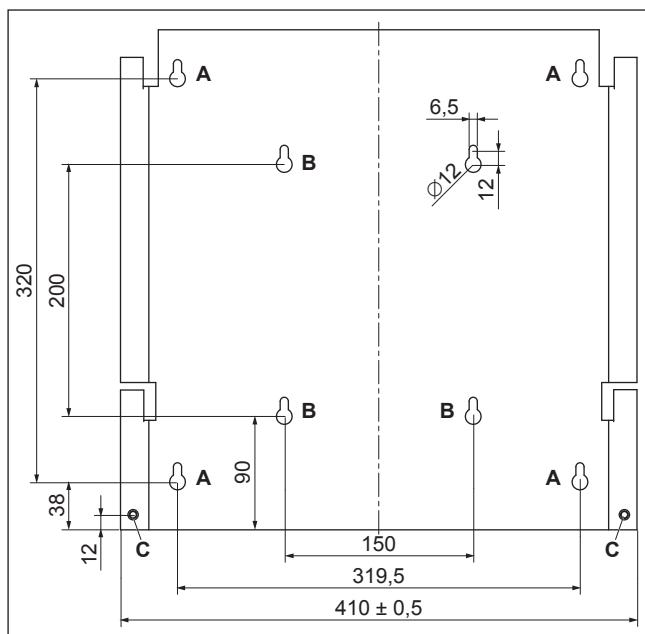
Fig. 7.4.:   Dimensioned drawing of the mounting plate

1. Fasten the mounting plate to the wall using at least 4 screws (∅ 6 mm) and appropriate dowels. Use the 4 holes **A** or the 4 holes **B** for the 4 screws (see Fig. 7.4). You can use the mounting plate as a template for marking the positions of the holes to be drilled.

2. Screw the screws tightly into the wall.

3. Hang the solar power inverter on the mounting plate, see Fig. 7.5.
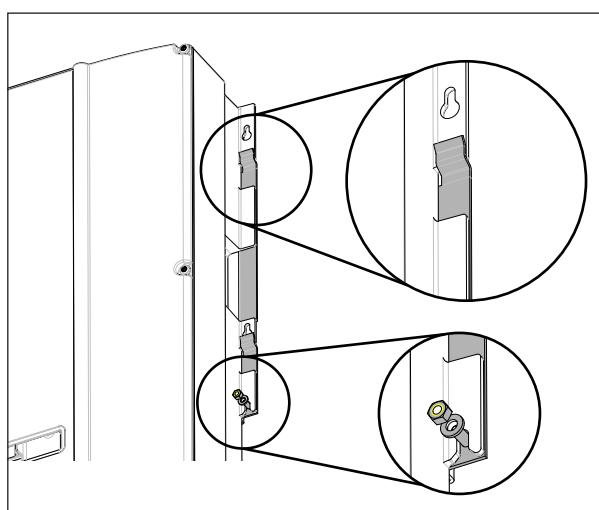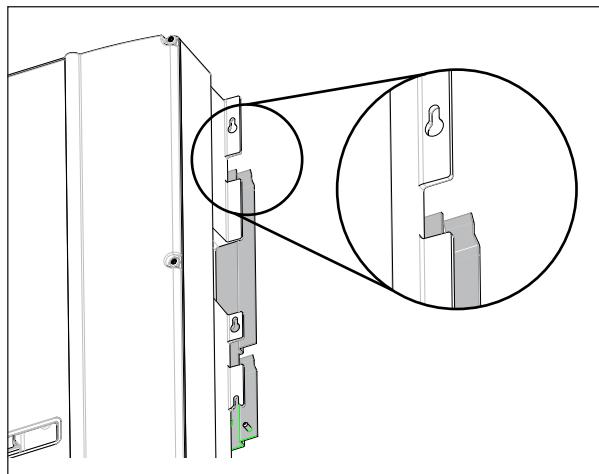
Fig. 7.5.:   Hanging the solar power inverter on the mounting plate

4. Secure the solar power inverter to the mounting plate by fitting the washers and mounting nuts on the stud bolts and then tightening (see Fig. 7.4, item C). (The stud bolts are also used for connecting the grounding cable to the solar power inverter.)

5. Check the mechanical installation.

☑ Mechanical installation of the solar power inverter is now finished.

7.3 Electrical installation

> ### ⚠ DANGER
>
> **Danger of death or severe injuries from dangerous voltage**
> ► Switch off the AC cable to be free of voltage before removing or inserting the AC connector.

7.3.1 Connecting the grid

General instructions

The solar power inverter is connected to the grid using the AC plug. The AC plug has a locking mechanism to prevent it from being unintentionally disconnected. The locking mechanism can be released on the AC plug using a screwdriver.

Use a flexible 3-wire cable (L, N, PE) with a conductor cross-section from 2.5 to 4.0 mm² (coefficient k=1).

Observe the required grid impedance at the grid connection point (cable length, conductor cross-section).

Select the cable length and conductor cross-section so that the conductor temperature and cable losses are as small as possible. In some countries (e.g., France and Germany) specific requirements for the system installation must be satisfied (UTE C15-712-1, VDE 0100 712). These requirements specify the minimum cable cross-section and the protective measures required to prevent overheating due to high voltages. Always adhere to the specific requirements of your country.

The energy meter must be installed between the solar power inverter and the grid feed-in point. Observe the directives of your local electricity supplier when doing this.

The following table shows the maximum permissible trigger current for the automatic circuit breaker (type B).

Solar power inverter	Max. permissible trigger current
2.5 EU G4 TR	20.0 A
3.0 EU G4 TR	
3.3 EU G4 TR	
3.6 EU G4 TR	25.0 A

The AC and DC sides of the solar power inverter are galvanically isolated. This makes it impossible for DC electricity to reach the AC side of the inverter, i.e., a type A residual current device is sufficient. We recommend using a 20 A residual current device. However, be sure to always adhere to the specific regulations applicable in your country.

The typical leakage current is less than 3.5 mA.

> ### ℹ NOTE
>
> The rated value of the secondary short-circuit current at the grid connection point to the public power grid increases due to the rated current of the connected solar power inverter.

To protect the user and the system, install the required safety and protection devices (e.g., automatic circuit breaker and/or overvoltage protection devices).

A special kit for France is available from Delta. This kit contains all components required for satisfying the requirements specified in UTE C15-712-1. ().

Materials and tools required

Supplied in the scope of delivery:

- Round plug, type Wieland RST25i3s

Not supplied in the scope of delivery:

- Flexible 3-wire cable (L, N, PE) with a conductor cross-section from 2.5 mm² to 4 mm².

- Cable strain-relief

- An additional securing washer is required to connect the ground cable to the solar power inverter (see Fig. 7.4, item **C**).

Connecting the cable and the AC plug

1. Remove the cable sheath as shown and remove 10 mm of insulation from each conductor.

> **NOTE**
>
> ! Observe the correct polarity of the round plug. An incorrect arrangement can destroy the solar power inverter.
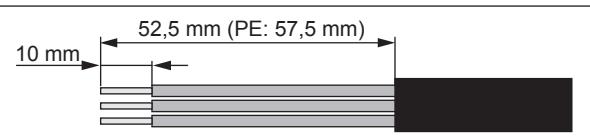
2. Put a ferrule on the end of each conductor.
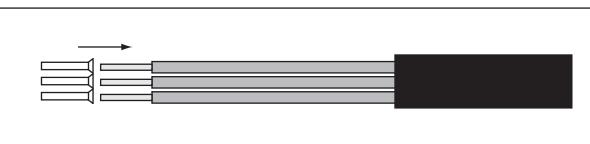
3. Connect the cable to the AC plug as described below.

► Unscrew the nut ① from the cable housing ② and then remove the cable housing from the socket insert ③.
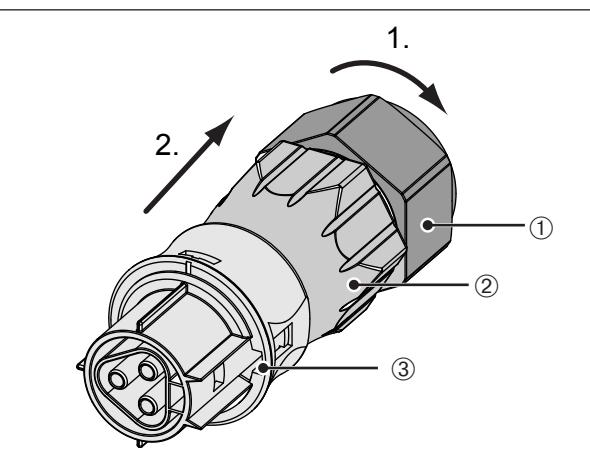
► Slide the nut ① and cable housing ② onto the cable.
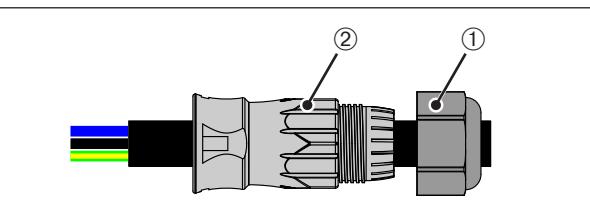
► Slide the cable conductors into the connections in the pin insert and screw tight. Observe the correct phase sequence when doing this.
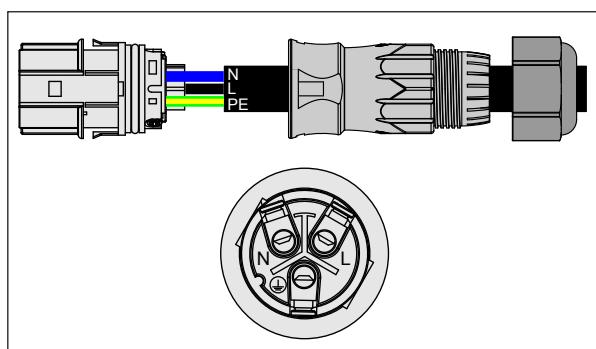
► Screw the cable housing ② onto the socket insert ③ and then screw the nut ① onto the cable housing.
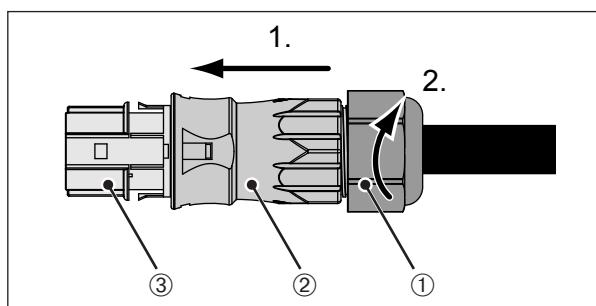
► Insert the AC plug into the AC socket ① on the solar power inverter until the AC plug locks into place.
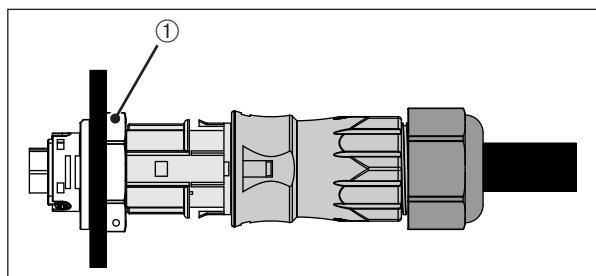
4. Ground the mounting plate.
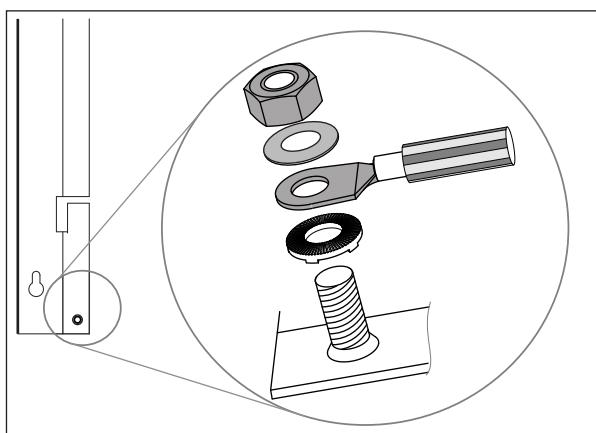
7.3.2 Connecting PV modules

<div style="border:1px solid red">

⚠ DANGER

Danger of death or severe injuries from dangerous voltage

Dangerous voltages can be present at the DC connections of the solar power inverter.

► Never disconnect the PV modules when the solar power inverter is under load. First switch off the grid connection so that the solar power inverter cannot feed energy into the grid. Then open the DC disconnector.

► Secure the DC connections against being touched.

</div>

NOTE

To ensure protection conforming to IP65 all unused connections and interfaces must be closed using the covers on the solar power inverter.

General instructions

Check the polarity of the DC voltage at the DC connections before connecting the photovoltaic system.

The PV module strings are connected to the DC connections, with the negative DC pole connected to DC MINUS and the positive DC pole connected to DC PLUS. The connections are coded to prevent incorrect polarity.

The maximum input voltage of the solar power inverter is 600 V when feeding the grid. The maximum current load at each DC connection is 29 A.

The solar power inverter can be grounded at either the DC plus side or the DC minus side. The DC side of the solar power inverter has an insulation and grounding monitor. The monitoring can be configured in the **230 Grounding** menu, see "10.5.2 Insulation and grounding monitoring", p. 44.

The solar power inverter has an integrated DC disconnector.

Tools and devices required

Not supplied in the scope of delivery:

- Single-wire cable for DC connection.

The ground connection must be installed in the immediate vicinity of the solar power inverter. We recommend using the "Grounding Set A Solar" grounding kit from Delta.

Grounding kit	Delta part number
Grounding Set A Solar	EOE990000275

- Cable coupling types for the DC connections to the inverter.

The DC+ connection of the solar power inverter is a plug, the DC– connection is a socket.

DC connection	Cable coupling type	Conductor cross-section mm²	AWG	Diameter range for cable sheath mm	Order number
DC+	Socket	1,5 / 2,5	14	3-6	32.0010P0001-UR
				5,5-9	32.0012P0001-UR
		4 / 6	10	3–6	32.0014P0001-UR
				5,5-9	32.0016P0001-UR
DC–	Plug	1,5 / 2,5	14	3-6	32.0011P0001-UR
				5,5-9	32.0013P0001-UR
		4 / 6	10	3-6	32.0015P0001-UR
				5,5-9	32.0017P0001-UR

- UTE kit according to the current French standard UTE C 15-712-1

The Multi-Contact UTE Kit is designed to conform to the latest French standard UTE C 15-712-1. It contains 8 DC measuring elements, a mounting tool and an additional signal-flash drive. This kit allow you to conform to the DC protection and signal requirements specified in UTE C 15-712-1.

Multi-contact UTE kit	Delta part number
Multi-contact UTE kit for SOLIVIA EU Solar Inverter	EOE90000341

7.3.3 RS485 interface (EIA485)

NOTE

To ensure protection conforming to IP65 all unused connections and interfaces must be closed using the covers on the solar power inverter.
Only the cables described below may be used. Standard cables are not permitted.

One or more solar power inverters can be connected to a monitoring system via the RS485 interfaces. The two RS485 interfaces are internally wired 1:1. Each RS485 interface can be used as an input or output.

Pin assignments
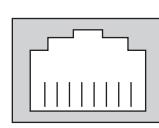
Pin	Assignment
1	Reserved
2	Reserved
3	Reserved
4	GND
5	Reserved
6	Reserved
7	TX_A
8	RX_B

EN

Connection of a single solar power inverter
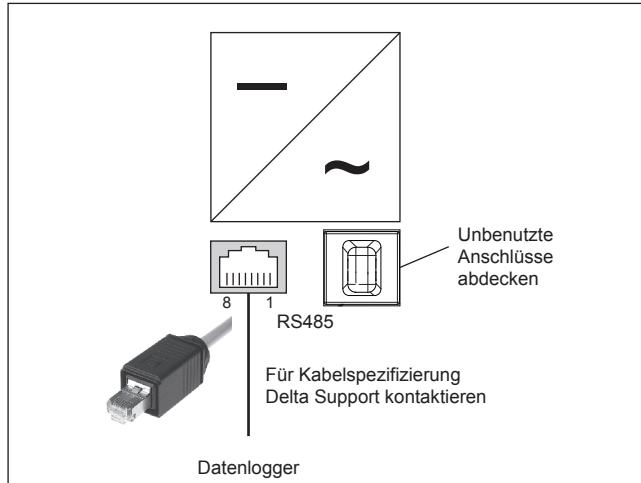
Fig. 7.6.:   Connection of a single solar power inverter to a data logger via RS485

The RS485 ID can be set during the commissioning (see Fig. 7.1) or later (see "10.2.6 RS485 (EIA485)", p. 41).

Connection of multiple solar power inverters
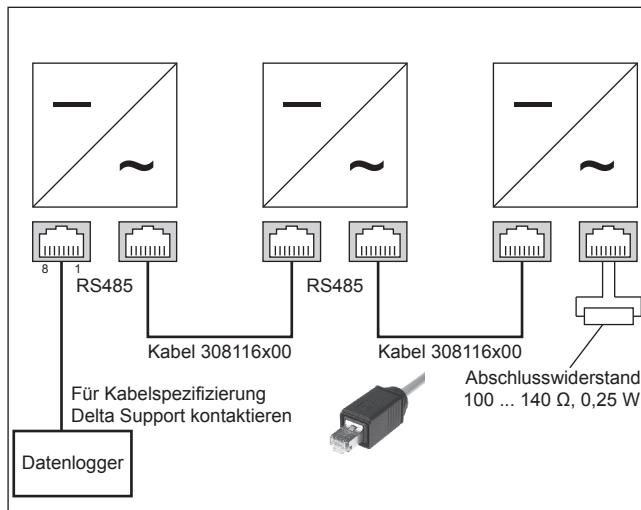
Fig. 7.7.:   Connection of multiple solar power inverters to a data logger via RS485

When multiple solar power inverters are connected to a monitoring system via RS485, a termination resistor must be connected to the last solar power inverter of the bus, see Fig. 7.7.

The termination resistor must be connected to pin 7 (TX_A) and pin 8 (RX_B).

RS485 connection cable	Delta part number
Cable for connecting solar power inverters	
Push/Pull cable from Harting, IP67, one side with a blue cable manager, the other side with a white cable manager	
1.5 m	3081186300
3.0 m	3081186500
5.0 m	3081186600
10.0 m	3081186200
20.0 m	3081186400
Connecting cable from the solar power inverter to the monitoring gateway device	
e.g., Solivia Basic Gateway, Solarlog or Meteocontrol WEB'logger	
Outdoor cable, IP65, with Harting RJ45 PushPull and RJ12 plugs	Contact Delta support

If you wish to make the cables yourself, then you must use cable managers from Harting (IP67-Push/Pull system cable RJ45).

We recommend using a blue cable manager on one side and a white cable manager on the other side.

Cable manager	Harting part number
RJI IP67 data plug PushPull 8-pin white	09 45 145 1500
RJI IP67 data plug PushPull 8-pin blue	09 45 145 1510

HARTING Deutschland GmbH & Co. KG (PF 2451, D-32381 Minden, www.harting.com)

EN

8. Commissioning

8.1 Before you start

The solar power inverter must be correctly installed, see "7. Installation", p. 19.

Information on operating the display is provided in "5.4 Display and buttons", p. 11.

After the device has been started for the first time and the automatic self-test has been completed, you are guided step-by-step through the initial commissioning procedure.

8.2 Selection of the correct initial commissioning procedure

The initial commissioning procedure depends on the following criteria:

● Is the solar power inverter to be newly set up from the very beginning? In this case the decisive factor is the type of grid to which the solar power inverter is connected.

● Should the solar power inverter be set up with the same settings as another identical solar power inverter?

● Is the solar power inverter a replacement device for another identical solar power inverter?

The following table should make the selection of the correct initial commissioning procedure easier.

Task	Relevant initial commissioning procedure
The solar power inverter is to be set up from the very beginning and the grid to which the solar power inverter is connected is shown in the following list:	"8.3 Standard initial commissioning", p. 28
BE Belgium	
BUL Bulgaria	
CZ Czech Republic	
DE VDE Germany as per VDE 0126	
ES 51/48Hz Spain 51/48 Hz	
ES 51/49Hz Spain 51/49 Hz	
FR France	
FR ISL. 60Hz French Islands with 60 Hz	
GR CONTINENT Greece / Continent (49.5/50.5 Hz)	
GR ISLAND Greece / Islands (47.5/51 Hz)	
IT 50/49Hz Italy 50/49 Hz	
IT 51/49Hz Italy 51/49 Hz	
NL Netherlands	
PT Portugal	
ROM Rumania	
SLK Slovakia	
SLN Slovenia	
UK G59 United Kingdom	
The solar power inverter is to be set up from the very beginning and is connected to an LVD grid.	"8.4 Standard commissioning for LVD grids", p. 30
DE LVD Germany as per VDE AR N 4105	
DK LVD Denmark as per VDE AR N 4105	
The solar power inverter is to be set up with the same settings as another identical solar power inverter.	"8.5 Commissioning by loading the settings from another solar power inverter", p. 33
The solar power inverter is a replacement device for another identical solar power inverter.	"8.6 Commissioning after replacing a solar power inverter", p. 35
The solar power inverter is to be set up from the very beginning and the grid to which the solar power inverter is connected is **not** shown in the list above.	You can set up a specific grid. Please contact Delta Support by telephone.

8.3 Standard initial commissioning

8.3.1 Brief overview of the commissioning steps

► Set the display language

► Select the grid

► Set the MPP tracking

► Set the power limitation (optional)

► Set the asymmetrical grid load balancing (optional)

► Set the date and time formats

► Set the date and time

► Set up the RS485 communication

8.3.2 Detailed description of the commissioning steps

1. Check all connections and cables for damage and correct seating. Correct the installation if necessary.

2. Switch on the DC disconnector.

   → The startup process of the solar power inverter begins.

   After the startup process and the automatic self-test, the initial commissioning procedure of the solar power inverter starts and the **Installation** menu is displayed.

3. Select a language for the display.

```
    Installation
--------------------
→Language:      German
 continue
```

Configurable parameters		
Display text	**Designation**	**Description**
Language	Language	The display language.
		Czech	Danish	Dutch	English	French	German	Italian	Portuguese	Romanian	Slovak	Slovenian	Spanish

4. Select *Continue* and press the ⏎.

```
    Installation
 Language:      German
→continue
--------------------
```

   → The **Load USB data** menu is displayed.

5. In the **Load USB data** menu, select the option *No* to perform manual commissioning.

```
   Load USB data
 Yes
→No
--------------------
```

   → The **Grid selection** menu is displayed.

6. Select a grid.

```
    Grid selection
--------------------
→Grid:          DE VDE
 continue
```

Grids available for standard commissioning	
Display text	**Description**
BE	Belgium
BUL	Bulgaria
CZ	Czech Republic
DE VDE	Germany as per VDE 0126
ES 51/48Hz	Spain 51/48 Hz
ES 51/49Hz	Spain 51/49 Hz
FR	France
FR ISL. 60Hz	French Islands with 60 Hz
GR CONTINENT	Greece / Continent (49.5/50.5 Hz)
GR ISLAND	Greece / Islands (47.5/51 Hz)
IT 50/49Hz	Italy 50/49 Hz
IT 51/49Hz	Italy 51/49 Hz
NL	Netherlands
PT	Portugal
ROM	Rumania
SLK	Slovakia
SLN	Slovenia
UK G59	United Kingdom

NOTE

► If you set the grid as "IT 50/49Hz" or "IT 50/49Hz", then you must perform an autotest after commissioning, see "12.7 Autotest for Italy", p. 52.

7. Select *Continue* and press the ⏎ button.

```
Grid selection
 Grid:          DE VDE
→continue
--------------------
```

   → The **DC settings** menu is displayed. This setting cannot be changed, because this solar power inverter only has a single MPP tracker.

8. Select *Continue* and press the ⏎ button.

```
   DC settings
 MPPT:             PV1
→continue
--------------------
```

   → The **Locked power limit** menu is displayed.

9. If necessary, set power limits for active power and reactive power.

```
 Locked power limit
--------------------
→Pmax:         ----kW
 Smax:        ----kVA
```

Configurable parameters

Display text	Designation	Description
Pmax	Maximum active power	The maximum active power that can be fed into the grid. The value is set in kW.
Smax	Maximum apparent power	The maximum apparent power that can be fed into the grid. The value is set in kVA.

NOTE

► If you set a power limit then you must also fill out the label stating "The power of the product has been reduced ..." and apply this label to the front of the solar power inverter. Use a waterproof pen for filling out this information.

NOTE

After commissioning, the set power limitation is displayed in menu **131 View grid setup** (value *MaxPower*).

NOTE

After finishing the commissioning process, the power limitation is locked.
► To change the power limitation after commissioning, a PIN is needed.

10. Select *Continue* and press the ⏎ button.

```
  Locked power limit
 Smax:          ----kVA
→continue
 --------------------
```

→ The **Power balancing** menu is displayed.

11. If you need asymmetrical grid load balancing, set the **Balancing** option to *On*.

NOTE

► The G2 Gateway from Delta is required for the balancing of asymmetrical grid loads. If a G2 Gateway is not connected to the RS485 interface, set the **Balancing** option to *Off*!

```
   Power balancing
 --------------------
→Balancing:        Off
 continue
```

Configurable parameters

Display text	Designation	Description
Balancing	Balance asymmetrical grid load	Off | On

12. Select *Continue* and press the ⏎ button.

```
   Power balancing
 Balancing:        Off
→continue
 --------------------
```

→ The **Format** menu is displayed.

13. Define the date and time formats.

```
      Format
 --------------------
→Date:      DD.MM.YYYY
 Time:             12h
```

Configurable parameters

Display text	Designation	Description
Date	Date format	DD.MM.YYYY DD/MM/YYYY DD-MM-YYYY MM.DD.YYYY MM/DD/YYYY MM-DD-YYYY YYYY.MM.DD YYYY/MM/DD YYYY-MM-DD
Time	Time format	12h | 24h

14. Select *Continue* and press the ⏎ button.

```
      Format
 Time:             24h
→continue
 --------------------
```

→ The **Date and time** menu is displayed.

15. Set the date and time.

```
   Date and time
 --------------------
→Date:      12.03.2012
 Time:        10:14:23
```

16. Select *Continue* and press the ⏎ button.

```
   Date and time
 Time:        10:14:23
→continue
 --------------------
```

→ The **RS485** menu is displayed.

17. Set the RS485 ID and the baud rate.

```
      RS485
 --------------------
→ID:                1
 Baud rate:      19200
```

Configurable parameters

Display text	Designation	Description
ID	RS485 ID	1 .. 255
Baud rate	Baud rate	2400 | 4800 | 9600 | 19200 | 38400, the standard is 19200

NOTE

Connecting multiple solar power inverters via RS485
► If multiple solar power inverters are to be connected via RS485, select a different ID for each inverter. This ID will also be used later to identify each solar power inverter when loading settings or transferring data.

18. Select *Continue* and press the ⏎ button.

```
          RS485
 Baud rate:      19200
→continue
 -------------------
```

→ The last menu is displayed.

19. Press the ⏎ button to finish commissioning.

```
ENTER
   to confirm
ESC
   for reselection
```

→ The solar power inverter is restarted.

☑ Commissioning is now finished.

8.4 Standard commissioning for LVD grids

8.4.1 Brief overview of the commissioning steps

► Set the display language

► Select the grid

► Set up the grid and system protection (NA protection)

► Set the MPP tracking

► Set the power limitation (optional)

► Set the asymmetrical grid load balancing (optional)

► Set the date and time formats

► Set the date and time

► Set up the RS485 communication

8.4.2 Detailed description of the commissioning steps

1. Check all connections and cables for damage and correct seating. Correct the installation if necessary.

2. Switch on the DC disconnector.

   → The startup process of the solar power inverter begins.

   After the startup process and the automatic self-test, the initial commissioning procedure of the inverter starts and the **Installation** menu is displayed.

3. Select a language for the display.

```
     Installation
 -------------------
→Language:     German
 continue
```

Configurable parameters		
Display text	**Designation**	**Description**
Language	Language	The display language.
		Czech | Danish | Dutch | English | French | German | Italian | Portuguese | Romanian | Slovak | Slovenian | Spanish

4. Select *Continue* and press the ⏎ button.

```
     Installation
 Language:     German
→continue
 -------------------
```

   → The **Load USB data** menu is displayed.

5. In the **Load USB data** menu, select the option *No* to perform manual commissioning.

```
     Load USB data
 Yes
→No
 -------------------
```

   → The **Grid selection** menu is displayed.

6. Select an LVD grid.

```
     Grid  selection
 --------------------
→Grid:          DE VDE
 continue
```

LVD grids available for commissioning	
DE LVD	Germany as per VDE AR N 4105
DK LVD	Denmark as per VDE AR N 4105

7. Select *Continue* and press the ⏎ button.

```
 Grid  selection
  Grid:          DE LVD
→continue
 --------------------
```

→ The **PDD settings** menu (grid and system protection, NA protection) is displayed.

8. Select a **PDD** option.

```
   PDD  settings
 --------------------
→PDD:         Standard
 continue
```

The **PDD settings** menu offers three options:

Option	Description
Standard	Loads the settings specified by the relevant standards.
OFF	The NA protection is switched off.
USER	The parameters can be manually set within the limits defined in the relevant standards.

"USER" option

You can set the following parameters:

Configurable parameters		
Display text	Designation	Description
Umax	Voltage increase protection U>	253 ... 264 V (corresponds to 110 ... 115%)

As defined in the standard VDE AR N 4105, only the voltage increase protection U> can be set. U> is conceived as a 10-minute mean value protection, to avoid exceeding the limit value defined in the standard DIN EN 50160 (power monitoring).

9. Select *Continue* and press the ⏎ button.

```
   PDD  settings
  U>:             253V
→continue
 --------------------
```

→ The **DC settings** menu is displayed. This setting cannot be changed, because this solar power inverter only has a single MPP tracker.

10. Select *Continue* and press the ⏎ button.

```
   DC  settings
  MPPT:           PV1
→continue
 --------------------
```

→ The **Locked power limit** menu is displayed.

11. If necessary, set power limits for active power and reactive power.

```
 Locked  power  limit
 --------------------
→Pmax:        ----kW
 Smax:        ----kVA
```

Configurable parameters		
Display text	Designation	Description
Pmax	Maximum active power	The maximum active power that can be fed into the grid. The value is set in kW.
Smax	Maximum apparent power	The maximum apparent power that can be fed into the grid. The value is set in kVA.

NOTE

► If you set a power limit then you must also fill out the label stating "The power of the product has been reduced ..." and apply this label to the front of the solar power inverter. Use a waterproof pen for filling out this information.

NOTE

After commissioning, the set power limitation is displayed in menu **131 View grid setup** (value *MaxPower*).

NOTE

After finishing the commissioning process, the power limitation is locked.
► To change the power limitation after commissioning, a PIN is needed.

12. Select *Continue* and press the ⏎ button.

→ The **Power balancing** menu is displayed.

13. If you need asymmetrical grid load balancing, set the **Balancing** option to *On*.

```
   Power  balancing
 --------------------
→Balancing:       Off
 continue
```

Configurable parameters		
Display text	Designation	Description
Balancing	Balance asymmetrical grid load	Off	On.

NOTE

► See chapter "7.1 Planning the installation", p. 19 for a description of the "asymmetrical grid load balancing" function.

14. Select *Continue* and press the ⏎ button.

```
    Power balancing
 Balancing:        Off
→continue
 -------------------
```

→   The **Format** menu is displayed.

15. Define the date and time formats.

```
        Format
 -------------------
→Date:      DD.MM.YYYY
 Time:            12h
```

Configurable parameters

Display text	Designation	Description
Date	Date format	DD.MM.YYYY DD/MM/YYYY DD-MM-YYYY MM.DD.YYYY MM/DD/YYYY MM-DD-YYYY YYYY.MM.DD YYYY/MM/DD YYYY-MM-DD
Time	Time format	12h | 24h

16. Select *Continue* and press the ⏎ button.

```
        Format
 Time:            24h
→continue
 -------------------
```

→   The **Date and time** menu is displayed.

17. Set the date and time.

```
     Date and time
 -------------------
→Date:     12.03.2012
 Time:       10:14:23
```

18. Select *Continue* and press the ⏎ button.

```
     Date and time
 Time:       10:14:23
→continue
 -------------------
```

→   The **RS485** menu is displayed.

19. Set the RS485 ID and the baud rate. Switch on the termination resistor if required.

```
        RS485
 -------------------
 ID:               1
 Baud rate:    19200
```

Configurable parameters

Display text	Designation	Description
ID	RS485 ID	1 .. 255
Baud rate	Baud rate	2400 | 4800 | 9600 | 19200 | 38400, the standard is 19200

NOTE

Connecting multiple solar power inverters via RS485
► If multiple solar power inverters are to be connected via RS485, select a different ID for each inverter. This ID will also be used later to identify each solar power inverter when loading settings or transferring data.

20. Select *Continue* and press the ⏎ button.

```
        RS485
 Baud rate:    19200
→continue
 -------------------
```

→   The last menu is displayed.

21. Press the ⏎ button to finish commissioning.

```
ENTER
  to confirm
ESC
  for reselection
```

→   The solar power inverter is restarted.

☑   Commissioning is now finished.

8.5 Commissioning by loading the settings from another solar power inverter

ATTENTION

The data is loaded via the USB interface. Using a USB stick reduces the degree of protection.

NOTE

The STUP_###.CFG file must be in the main directory of the USB stick. The ### characters represent the RS485 ID of the solar power inverter from which the data is to be loaded, for example "001".

8.5.1 Brief overview of the commissioning steps

► Set the display language

► Load the data from a USB stick

After loading you can decide whether or not to edit the data. In this case, the commissioning steps are the same as those for the standard commissioning (depending on the grid).

The commissioning process is shorter if you adopt the data without making changes:

► Set the date and time

► Set up the RS485 communication

8.5.2 Detailed description of the commissioning steps

1. Save the settings from the other solar power inverter if you have not already done this, see "11.4 Saving settings", p. 46.

2. Check all connections and cables for damage and correct seating. Correct the installation if necessary.

3. Switch on the DC disconnector.

   → The startup process of the solar power inverter begins.

   After the startup process and the automatic self-test, the initial commissioning procedure of the solar power inverter starts and the **Installation** menu is displayed.

4. Select a language for the display.

```
   Installation
--------------------
→Language:     German
 continue
```

Configurable parameters		
Display text	**Designation**	**Description**
Language	Language	The display language.
		Czech | Danish | Dutch | English | French | German | Italian | Portuguese | Romanian | Slovak | Slovenian | Spanish

5. Select *Continue* and press the ⏎ button.

```
   Installation
 Language:     German
→continue
--------------------
```

→ The **Load USB data** menu is displayed.

6. In the **Load USB data** menu, select the option *Yes* to load data from the USB stick.

```
   Load USB data
--------------------
→Yes
 No
```

→ The next **Load USB data** menu is displayed.

7. In the **Load USB data** menu, select the *Load settings* option.

```
   Load USB data
--------------------
→Load settings
 Load swap data
```

→ The next **Load USB data** menu is displayed.

8. Insert the USB stick into the USB socket underneath the solar power inverter and press the ⏎ button.

```
   Load USB data

Insert USB Pendrive
and press Enter
```

→ The **Select RS485 ID** menu is displayed.

9. Select the RS485 ID of the solar power inverter from which the data is to be loaded.

```
  Select RS485 ID

→ID:              ___
 continue
```

10. Press the ⏎ button.

   → Loading of the data begins.

   A message is displayed when the loading process is successful.

```
     Load data

     Successful
   Press ENTER
```

EN

11. Press the ⏎ button.

NOTE

If a power limit was set at the solar power inverter from which the data was loaded, the following message appears:

```
The power of the
  inverter is
  limited to:
          ____W
```

► If you set a power limit, then you must also fill out the label stating "The power of the product has been reduced ..." and apply this label to the front of the solar power inverter. Use a waterproof pen for filling out this information.

NOTE

If the asymmetrical grid load balancing was activated on the solar power inverter from which the data was loaded, the following message appears:

```
Power balancing

  is activated
```

→ The **Edit Loaded Data** menu is displayed.

12. Select **No** and press the ⏎ button.

```
Edit Loaded Data

→No
 Yes
```

→ The **Date and time** menu is displayed.

NOTE

Select **Yes** if you wish to edit the loaded data. Commissioning then proceeds in the same manner as the standard commissioning procedure (depending on the selected grid). The loaded data is then shown in the individual menus and not the default values.

13. Set the date and time.

```
    Date and time
--------------------
→Date:     12.03.2012
 Time:       10:14:23
```

14. Select **Continue** and press the ⏎ button.

```
    Date and time
 Time:       10:14:23
→continue
--------------------
```

→ The **RS485** menu is displayed.

15. Set the RS485 ID and the baud rate. Switch on the termination resistor if required.

```
      RS485
--------------------
 ID:               1
 Baud rate:    19200
```

Configurable parameters		
Display text	**Designation**	**Description**
ID	RS485 ID	1 .. 255
Baud rate	Baud rate	2400 | 4800 | 9600 | 19200 | 38400, the standard is 19200

NOTE

Connecting multiple solar inverters via RS485
► If multiple solar power inverters are to be connected via RS485, select a different ID for each inverter. This ID will also be used later to identify each solar power inverter when loading settings or transferring data.

16. Select **Continue** and press the ⏎ button.

```
      RS485
 Baud rate:    19200
→continue
--------------------
```

→ The last menu is displayed.

17. Press the ⏎ button to finish commissioning.

```
ENTER
  to confirm
ESC
  for reselection
```

→ The solar power inverter is restarted.

☑ Commissioning is now finished.

8.6 Commissioning after replacing a solar power inverter

ATTENTION

In this chapter, the term "swap" means the replacement of a damaged solar power inverter with a new device of the same type.

The replacement may only be performed after consulting Delta Solar Support. The support team will discuss the correct procedure with you.

ATTENTION

The data is loaded via the USB interface. Using a USB stick reduces the degree of protection.

NOTE

The STUP_###.CFG file must be in the main directory of the USB stick. The ### characters represent the RS485 ID of the solar power inverter from which the data is to be loaded, for example "001".

8.6.1 Brief overview of the commissioning steps

► Set the display language

► Load the data from a USB stick

After loading you can decide whether or not to edit the data. In this case, the commissioning steps are the same as those for the standard commissioning (depending on the grid).

The commissioning process is shorter if you adopt the data without making changes:

► Set the date and time

► Set up the RS485 communication

8.6.2 Detailed description of the commissioning steps

1. Save the swap data from the other solar power inverter if you have not already done this, see

2. Check all connections and cables for damage and correct seating. Correct the installation if necessary.

3. Switch on the DC disconnector.

   → The startup process of the solar power inverter begins.

   After the startup process and the automatic self-test, the initial commissioning procedure of the solar power inverter starts and the **Installation** menu is displayed.

4. Select a language for the display.

```
     Installation
--------------------
 Language:      German
 continue
```

Configurable parameters		
Display text	**Designation**	**Description**
Language	Language	The display language.
		Czech | Danish | Dutch | English | French | German | Italian | Portuguese | Romanian | Slovak | Slovenian | Spanish

5. Select **Continue** and press the ⏎ button.

```
     Installation
 - - - -
→continue
 Language:      German
```

   → The **Load USB data** menu is displayed.

6. In the **Load USB data** menu, select the option **Yes** to load data from the USB stick.

```
     Load USB data

→Yes
 No
```

   → The next **Load USB data** menu is displayed.

7. In the **Load USB data** menu, select the **Load swap data** option.

```
     Load USB data

→Load swap data
 Load settings
```

   → The next **Load USB data** menu is displayed.

8. Insert the USB stick into the USB socket underneath the solar power inverter and press the ⏎ button.

```
     Load USB data

Insert USB Pendrive
and press Enter
```

   → In the subsequently displayed menu, select the RS485 ID of the solar power inverter from which the data is to be loaded.

9. Select the RS485 ID of the solar power inverter from which the data is to be loaded.

```
   Select RS485 ID

→ID:              ___
 continue
```

10. Select **Continue** and press the ⏎ button.

   → Loading of the data begins.

   A message is displayed when the loading process is successful.

```
     Load data

    Successful
   Press ENTER
```

EN

11. Press the ⏎ button.

NOTE

If a power limit was set at the solar power inverter from which the data was loaded, the following message appears:

```
   The power of the
     inverter is
     limited to:
            ____W
```

► If you set a power limit, then you must also fill out the label stating "The power of the product has been reduced ..." and apply this label to the front of the solar power inverter. Use a waterproof pen for filling out this information.

NOTE

If the asymmetrical grid load balancing was activated on the solar power inverter from which the data was loaded, the following message appears:

```
   Power balancing

      is activated
```

→ The **Edit Loaded Data** menu is displayed.

12. Select *No* and press the ⏎ button.

```
Edit Loaded Data

→No
  Yes
```

→ The **Date and time** menu is displayed.

13. Set the date and time.

```
    Date and time
--------------------
 Date:     12.03.2012
 Time:       10:14:23
```

14. Select *Continue* and press the ⏎ button.

```
    Date and time
 Time:       10:14:23
→continue
--------------------
```

→ The **RS485** menu is displayed.

15. Set the RS485 ID and the baud rate.

NOTE

Since this is a replacement unit, you do not usually need to change the RS485 settings at this point.

```
        RS485
 Baud rate:     19200
→continue

--------------------
```

Configurable parameters

Display text	Designation	Description
ID	RS485 ID	1 .. 255
Baud rate	Baud rate	2400 | 4800 | 9600 | 19200 | 38400, the standard is 19200

16. Select *Continue* and press the ⏎ button.

```
        RS485
 Baud rate:     19200
 continue
--------------------
```

→ The last menu is displayed.

17. Press the ⏎ button to finish commissioning.

```
ENTER
  to confirm
ESC
  for reselection
```

→ The solar power inverter is restarted.

☑ Commissioning is now finished.

8.7 Next steps

► If the solar power inverter is connected to an LVD grid, the active and reactive power control settings can be configured, see "10.4 Active and reactive power control", p. 41.

► The solar power inverter offers a number of optional functions, see "10.5 Options settings", p. 43.

NOTE

On completion of commissioning, save the settings (see "11.4 Saving settings", p. 46) and the swap data (see "11.6 Saving swap data", p. 46) on a USB stick so that you can use this information later.

9. Production information

NOTE	
(!)	All production information is provided for orientation purposes only. The measuring devices and meters provided by the electricity supply company are the authoritative source of information for invoicing.

9.1 Overview

The **400 Production info** menu contains current data and statistics. The information is write-protected and cannot be edited.

► Select the **Production info** menu item in the main menu.

→ The **400 Production info** menu is displayed.

```
400 Production info
--------------------
→Current data
 Day statistics
```
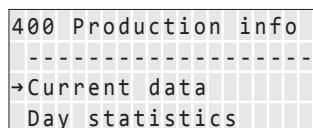
Structure of the 400 Production info menu

Sub-menu	Contents	Description
410 Current data	Current data for power, AC, PV, insulation	"9.2 Actual data", p. 37
420 Day statistics	Statistics for AC, PV and ISO	"9.3 Other statistics", p. 38
430 Week statistics		
440 Month statistics		
450 Year statistics		
460 Total statistics		
470 Feed-in settings	Settings for currency and revenue per kWh	"10.3 Grid freed-in settings", p. 41
480 Event journal	List of operating state messages	"12. Diagnosis and maintenance", p. 48
490 7-day statistics	Statistics for the last seven days in which the solar power inverter was in operation.	"9.3 Other statistics", p. 38

9.2 Current data

Relevant menu

The actual production data is provided in the menu **410 Current data**.

Access

► You access the menu by navigating to **Main menu > Production info > Current data**.

→ The **410 Current data** menu is displayed.

```
410 Current data
--------------------
→Current overview
 Current data AC
```
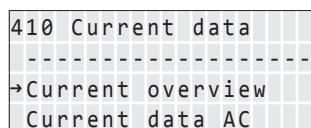
Structure

Sub-menu	Contents and example display
411 Actual overview	Current power and energy generation for the current day.
	Actual operating state (see "12. Diagnosis and maintenance", p. 48)
	``` 411 Actual overview Now: _W Day: _Wh Normal operation ```
	If there are messages, the list of messages can be opened by pressing the ↵ button. For a detailed description, see chapter "12. Diagnosis and maintenance", p. 48.
412 Actual data AC	Displays for: voltage, frequency, current, active power P, reactive power Q, DC feed-in
	``` 412 Actual data AC L1 voltage: _V L2 voltage: _V L3 voltage: _V ```
416 Current data PV	Data for: voltage, current
	``` 416 Current data PV PV1 Voltage: ---V PV1 Current: -.--A ```
41A Date and time	Shows the actual date and time.
	Use the **110 Date and time** menu to set the values, see "10.2.2 Date and time", p. 39.
	``` 41A Date and time Date: 09/14/2011 Time: 13:15:22 ```
41B Actual isolation	Data for: maximum and minimum insulation resistances
	``` 41B Actual isolation R ISO max: _kΩ R ISO min: _kΩ ```

9.3 Other statistics

Menu
420 Day statistics
430 Week statistics
440 Month statistics
450 Year statistics
460 Total statistics
490 7-day statistics

Example display

```
420 Day statistics
 Day stat. AC
→Day stat. PV
 Day stat. ISO
```

The statistics for day, week, month, year and total production time all offer the same type of data.

The **490 7-day statistics** menu shows the statistics for the last seven days over which the solar power inverter was in operation.

```
490 7-day statistics
 Day:      16.04.2012
→Day:      15.04.2012
 Day:      13.04.2012
```

Structure

Sub-menu	Contents

421 Day stat. AC
431 Week stat. AC
441 Month stat. AC
451 Year stat. AC
461 Total stat. AC
	Statistics for: energy, runtime, revenue
	
	Information on configuring the revenue settings is provided in "10.3 Grid freed-in settings", p. 41.
	
	`421 Day stat. AC`
	`Energy:        ----Wh`
	`Runtime:        -:--h`
	`Revenue:     --.--EUR`
	
	Displays for:
	
	Δf Minimum/maximum frequency
	Imax Maximum current
	ΔU Minimum/maximum voltage
	Pmax Maximum active power
	Qmax Maximum reactive power
	Qmin Minimum reactive power
	
	`421 Day stat. AC`
	`L1 Δf: --.--/--.--Hz`
	`L1 Imax:      --.--A`
	`L1 ΔU:       ---/---V`

422 Day stat. DC
432 Week stat. DC
442 Month stat. DC
452 Year stat. DC
462 Total stat. DC
	Displays for:
	
	Pmax Maximum power
	Imax Maximum current
	Umax Maximum voltage
	
	`422 Day stat. DC`
	`PV1 Imax:        _._A`
	`PV1 Umax:         _V`
	`PV1 Pmax:         _W`

Sub-menu	Contents

423 Day stat. ISO
433 Week stat. ISO
443 Month stat. ISO
453 Year stat. ISO
463 Total stat. ISO
	Statistics for: maximum/minimum insulation resistances
	
	Pmax Maximum power
	Imax Maximum current
	
	`423 Day stat. ISO`
	
	`R ISO max:    ----kΩ`
	`R ISO min:    ----kΩ`

491 ... 497 Day ...	Statistics for the last 7 days in which the solar power inverter was in operation.
	
	The statistics contain the same information as the menus **421**, **422** and **423**.
	
	`491 Day    16.04.2012`
	`Energy:        ----Wh`
	`Runtime:        -:--h`
	`Revenue:     --.--EUR`

9.4 Deleting statistics

Description

All statistics can be deleted (except for **410 Actual data**). The procedure is always the same.

1. Navigate to **Production info > Feed-in settings > Delete statistics**.

   → The **472 Delete statistics** menu is displayed.

   ```
   472 Delete stats.
   --------------------
   →Delete day stat.
    Delete week stat.
   ```

2. Use the ⬇⬆ buttons to select the statistic you wish to delete (e.g., **Delete day stat.**) and press the ⏎ button.

   → A confirmation query is displayed.

3. Select the option *Yes* and press the ⏎ button to delete the statistic.

   ```
    Delete day stat.
    No
   →Yes
    ------------------
   ```

   → A confirmation message is displayed.

   ```
    Delete day stat.
    No
      Successful
    Press ENTER
   ```

☑ The statistic is deleted.

10. Settings

10.1 Overview

This chapter describes how to edit the configurable settings.

● Installation settings ("10.2 Installation settings", p. 39)

● Grid freed-in settings ("10.3 Grid freed-in settings", p. 41)

● User settings (only for LVD grids) ("10.4 Active and reactive power control", p. 41)

● Options settings ("10.5 Options settings", p. 43)

● Standard menu ("10.6 Standard menu", p. 44)

Information on operating the display is provided in "5.4 Display and buttons", p. 11.

10.2 Installation settings

Configurable settings

● Display language

● Date, time

● Date format, time format

● Backlighting, contrast

● Grid selection

● RS485 settings

10.2.1 Display language

Description

Menu:	100 Install settings
Menu access:	**Main menu > Install settings**
	- or -
	Press the [ESC] and [↓] buttons at the same time.
| Example display | ```
100 Install settings
 RS485
→Language:    English
 Date and time
``` |

Configurable parameters

Display text	Designation	Description
Language	Language	The display language.
		Czech | Danish | Dutch | English | French | German | Italian | Portuguese | Romanian | Slovak | Slovenian | Spanish

10.2.2 Date and time

Description

Menu:	110 Date and time
Menu access:	**Main menu > Install settings > Date and time**
| Example display: | ```
110 Date and time
 Format
→Date:    11/17/2012
 Time:    03:15:22pm
``` |

Configurable parameters

Display text	Designation	Description
Date	Date	Freely configurable according to the selected date format
Time	Time	Freely configurable according to the selected time format

10.2.3 Date and time formats

Description

Menu:	111 Format
Menu access:	**Main menu > Install settings > Date and time > Format**
| Example display: | ```
111 Format


→Date:    MM/DD/YYYY
 Time:    03:03:25pm
``` |

Configurable parameters

Display text	Designation	Description
Date	Date format	DD.MM.YYYY DD/MM/YYYY DD-MM-YYYY MM.DD.YYYY MM/DD/YYYY MM-DD-YYYY YYYY.MM.DD YYYY/MM/DD YYYY-MM-DD
Time	Time format	12h | 24h

10.2.4 Backlighting, contrast

Description

Menu:	120 Display settings
Menu access:	**Main menu > Install settings > Display settings**

Example display:	`120 Display settings`
	`--------------------`
	`→Backlight:      Auto`
	` Contrast:        10`

Configurable parameters

Display text	Designation	Description
Backlight	Display backlightingAuto | On	
		Auto = The backlighting switches on when a display button is pressed.
		On = The backlighting is always switched on.
Contrast	Display contrast	5 .. 10

10.2.5 Grid change

⚠ ATTENTION

If the selected grid is changed, a completely new commissioning process is started, see "8. Commissioning", p. 27.

► Always first contact the Delta Support Team **before** changing the selected grid!

NOTE

You always require a PIN in order to enter the grid selection mode. You require a new PIN each time you wish to select a new grid. You obtain a PIN from the Delta Support Team on request.

You must provide a key in order to receive a PIN. You will find the key in the menu **132 Grid change**.

1. To display the key, navigate to **Main menu > Install settings > Grid selection> Grid change**.

```
132 Grid change
Grid:         DE VDE
Key:     ###########
PIN: ____   Confirm
```

The key consists of 11 numbers and letters.

2. The Delta Support Team will provide you with the four-digit PIN.

3. When you have received the PIN, navigate to the menu **132 Grid change** and press the ⏎ button.

→ The first digit of the PIN flashes.

4. Use the ⬇⬆ buttons to set the first digit and press the ⏎ button to proceed to the next digit.

→ After entering the full PIN, the word **Confirm** flashes.

```
132 Grid change
Grid:         DE VDE
Key:     ###########
PIN: 1234  Confirm
```

5. Press the ⏎ button to confirm the entered PIN.

→ The **Installation** menu is displayed.

```
   Installation
--------------------
→Language:   English
 continue
```

6. Start the commissioning of the solar power inverter, see "8. Commissioning", p. 27.

10.2.6 RS485 (EIA485)

Description

Menu:	140 RS485
Menu access:	**Main menu > Install settings > RS485**
| Example display: | ```
140 RS485
--------------------
→ID:                1
  Baud rate:    19200
``` |

Configurable parameters

Display text	Designation	Description
ID	RS485 ID	1 .. 255
Baud rate	Baud rate	2400 | 4800 | 9600 | 19200 | 38400, the standard is 19200

NOTE

Connecting multiple solar inverters via RS485
► Select a different ID for each solar power inverter.
► A termination resistor must be connected to the last solar power inverter in the series (see "10.2.6 RS485 (EIA485)", p. 41).

10.3   Grid freed-in settings

Description

Menu:	470 Feed-in settings
Menu access:	**Main menu > Production info> Feed-in settings**
| Example display: | ```
470 Feed-in settings

→Currency:          EUR
  EUR / kWh:       0,28
``` |

Configurable parameters

Display text	Designation	Description
Currency	Currency	No pre-defined values.
EUR / kWh	EUR/kWh	No pre-defined values. The amount (EUR) per kWh is required for the revenue calculation.

10.4   Active and reactive power control

NOTE

This chapter applies only to LVD grids. The **500 User settings** menu is not displayed for all other grids.

10.4.1 Overview

The **500 User settings** menu provides various functions for configuring the active and reactive power control.

Function/Mode	Description
Active power control	
Power reduction	For setting the maximum generated active power
Power/Frequency	For setting the power gradient with respect to the frequency
Reactive power control	
Constant cos φ	For setting a fixed value for cos φ (inductive or capacitive)
cos φ (P)	For setting a value of cos φ (inductive or capacitive) depending on the active power ratio P/P_n

10.4.2 Active power control

10.4.2.1 Overview

Mode	Description
Power reduction	For reducing the maximum power generated
Power/Frequency	For setting the power gradient with respect to the frequency

10.4.2.2 Power reduction

Description

This mode is available for LVD grids.

The maximum permissible active power can be set as a percentage of the maximum power of the solar power inverter.

NOTE

If a power limit was set during commissioning, the percent value relates to the maximum active power that was set.

Menu:	511 Power reduction
Menu access:	**Main menu > User settings > Active PwCtrl > Power reduction**
| Example display: | ```
511 Power reduction

→Max power:        100%
``` |

Configurable parameters

Display text	Designation	Description
Max power	Maximum active power	Limits the active power to the set value.

10.4.2.3 Power/Frequency

Description

This function is available for LVD grids.

The power can be set to be a function of the frequency.

The operating behavior of the solar power inverter differs depending on whether it is connected to an LVD grid (according to German regulations).

Operating behavior in LVD grids

Variant 1 (black arrow): The actual frequency lies between f_{Start} and f_{Stop}

When the actual frequency is greater than f_{Start}, the value of the actual power P_m is automatically saved and power reduction starts.

The power reduction is adjusted according to the gradient (black arrow) as long as the actual frequency remains above f_{Start} and below f_{Stop}.

Variant 2 (orange arrow): Actual frequency lies above f_{Stop}

The power reduction is switched off when the actual frequency lies above f_{Stop}. It remains switched off until the actual frequency drops below f_{Start}. When the actual frequency drops below f_{Start}, the power reduction is started again but is limited to the stored value P_m. When the actual power reduction increases above P_m, the rate of increase is automatically limited to 10% of P_m per minute.

Menu:	512 Power vs freq
Menu access:	**Main menu > User settings > Active PwCtrl > Power vs freq**
| Example display: | ```
512 Power vs freq
 Gradient:      40%
→Start freq: --.--Hz
 Stop freq:  --.--Hz
``` |

Configurable parameters

Display text	Designation	Description
Start freq	Start frequency	Frequency at which the power reduction starts.
		Value range: 50.00 .. 55.00 Hz
		Standard: 50.20 Hz

Display text	Designation	Description
Stop freq	Stop frequency	Frequency at which the power reduction is switched off.
		Value range: 50.00 .. 55.00 Hz
		Standard: 51.50 Hz
Gradient	Gradient	Adjustment of the produced active power in percent per Hz.
		Value range: 0 .. 150%
		Standard: 40%

10.4.3 Reactive power control

10.4.3.1 Overview

Mode	Description
Cos φ constant	For setting a fixed value for cos φ (inductive or capacitive)
Cos phi(P)	For setting a value of cos φ (inductive or capacitive) depending on the active power ratio P/P_n

All functions are provided in the menu **520 Reactive PwCtrl**

Only one of the modes can be activated.

Access and activation

► You access the menu by navigating to **Main menu > User settings > Reactive PwCtrl**.

► Use the *Mode* parameter to select the mode to be used for reactive power control or select "disabled" if you do not wish to use reactive power control.

→ The parameters available in the menu are set according to the selected mode.

10.4.3.2 Constant cos φ

Description

This mode is available for LVD grids.

This mode allows selection of a constant cos φ.

Menu:	520 Reactive PwCtrl
Mode:	**Fix. cosPhi**
Example display:	``` 520 Reactive PwCtrl -------------------- →Mode: Fix. cosPhi Cos phi: ind 0.90 ```

Configurable parameters

Display text	Designation	Description
Cos phi	cos φ	Defines cos φ to be the set value.
		inductive | capacitive
		1 ... 0.8

10.4.3.3 cos φ(P)

Description

This mode is available for LVD grids.

This mode allows cos φ to be assigned a power ratio (LV) P/P_n.

Four combinations of the power ratio value and cos φ can be defined. The values of the power ratio value and cos φ are arranged in pairs: cos φ "B" belongs to power ratio "B", cos φ "C" belongs to power ratio "C".

The following curve is a configuration example for the values and the operating behavior resulting from these:

Fig. 11.8.:   Example cos φ (P) curve

Menu:	520 Reactive PwCtrl
Mode:	**Cos phi(P)**
Example display:	``` 520 Reactive PwCtrl D Cos Phi: cap 1.00 →Mode: Cos phi(P) A Cos Phi: cap 1.00 ```

Configurable parameters

Display text	Designation	Description
A cos phi: ind 1.00	cos φ A	inductive | capacitive; 1 ... 0.8
B cos phi: ind 1.00	cos φ B	inductive | capacitive; 1 ... 0.8
B Power ratio	Power ratio B	1 ... 49%
C cos phi: ind 1.00	cos φ C	inductive | capacitive; 1 ... 0.8
C Power ratio	C power ratio	50 ... 99%
D cos phi: ind 1.00	cos φ D	inductive | capacitive; 1 ... 0.8

The power ratios A and D are fixed at values of 0% and 100% and cannot be changed. These two values are therefore not displayed.

10.5 Options settings

Configurable settings

● Shadowing

● Insulation and grounding monitoring

10.5.1 Shadowing

Description

The "Shadowing" option is an extended MPP tracker. When the option is switched on, the MPP tracker performs an additional search at regular intervals.

The MPP tracker then searches for the maximum power over a wider voltage range.

This option should be switched on if shadows regularly pass slowly over the PV modules in the course of a day. These types of moving shadows can be caused by chimneys or trees, for example. This option has a relatively small effect in the case of fast-moving shadows, e.g., from passing clouds.

The option is set depending on the size of the shadowing.

Menu:	210 Shadowing
Menu access:	**Main menu > Options > Shadowing**
Example display:	``` 210 Shadowing -------------------- →Mode: Deactivated -------------------- ```

Configurable parameters

Display text	Designation	Description
Mode:	Mode	Deactivated
		Extended MPP tracking is deactivated
		High
		High shadowing, time cycle: 0.5 hours
		Medium
		Medium shadowing, time cycle: 2 hours
		Low
		Low shadowing, time cycle: 4.5 hours

10.5.2 Insulation and grounding monitoring

Description

The DC side of the solar power inverter has an insulation and grounding monitor.

The insulation monitoring offers two modes:

- ISO Error
- ISO Warning

If the positive or negative pole of the PV modules must be grounded to satisfy the requirements of the module manufacturer, then this grounding can be monitored. The grounding monitoring has four modes:

- – GND Failure
- – GND Warning
- + GND Failure
- + GND Warning

Before delivery, the solar power inverter is set at the factory to the **ISO Warning** (Insulation warning) mode.

Description of the monitoring modes:

Monitoring mode	Description
ISO/GND off	Monitoring is deactivated.
xxx Failure	If an insulation failure occurs, the solar power inverter is disconnected from the grid.
xxx Warning	If an insulation failure occurs, the solar power inverter logs and displays the failure but is not disconnected from the grid.

Menu:	230 Grounding
Menu access:	**Main menu > Options > Grounding**
Example display:	230 Grounding - →PV: ISO Warning -

Configurable parameters

Display text	Designation	Description
PV	PV monitoring	ISO Failure ISO Warning – GND Failure – GND Warning + GND Failure + GND Warning ISO/GND off

10.6 Standard menu

Description

A standard menu can be defined, which is automatically displayed when the display buttons are not used for a certain period of time. When the standard menu is displayed, pressing the [ESC] button displays the main menu.

The standard menu is set to **411 Actual data** at the factory. This menu shows the actual data and actual operating messages.

The number must be a valid menu number.

1. Press the [↵] button to enter the menu number.
   → The first digit flashes.
2. Enter the first digit of the menu number using the [↓][↑] buttons.
   → You can only set menu numbers that actually exist. The name of the associated menu is displayed in the fourth display row.
3. Once you have set the first digit, press the [↵] button.
   → The second digit flashes.
4. Enter the second and third digit in the same manner.
5. Press the [↵] button.
   → The menu corresponding to the entered menu number is displayed.

Menu:	800 Standard
Menu access:	**Main menu > Standard**
Example display:	800 Standard menu - →Menu number: 411 411 Actual overview

Configurable parameters

Display text	Designation	Description
Menu number	Menu number	Any valid menu number.

11. Saving and loading data and settings

11.1 Before you start

Data and settings can be saved and loaded via the USB interface of the solar power inverter.

NOTE

The swap data can be loaded only during the installation process.

Information on operating the display is provided in "5.4 Display and buttons", p. 11.

The USB interface is disabled by default. It must be enabled before use and disabled again after use, see "11.2 Enabling/disabling the USB interface", p. 45.

⚠ ATTENTION

The IP 65 degree of protection is no longer guaranteed when the USB interface protective cover is removed.

► Only remove the protective cover when necessary.
► Always use the Micro-USB stick provided. The protective cover is designed to fit over the Micro-USB stick.

11.2 Enabling/disabling the USB interface

The USB interface must be enabled before use.

The USB interface must be disabled again after use.

11.2.1 Enabling the USB interface

1. Navigate to **Main menu > USB features > State**.

```
300 USB features
--------------------
→State:      disabled
 Firmware update
```

2. Press the ⏎ button.

   → The value *disabled* flashes.

3. Use the ⏬⏫ buttons to change the state to *enabled*.

```
300 USB features
--------------------
→State:       enabled
 Firmware update
```

4. Press the ⏎ button to accept the new value.

☑ The USB interface is now enabled.

11.2.2 Disabling the USB interface

1. Navigate to **Main menu > USB features > State**.

```
300 USB features
--------------------
→State:       enabled
 Firmware update
```

2. Press the ⏎ button. The value *enabled* flashes.

3. Use the ⏬⏫w buttons to change the state to *disabled*.

```
300 USB features
--------------------
 State:      disabled
 Firmware update
```

4. Press the ⏎ button to accept the new value.

☑ The USB interface is now disabled.

11.3 Firmware update

The firmware can be updated via the USB interface:

NOTE

The file containing the firmware data must have the name "Image.hex" and must be located in the main directory of the USB stick.

Rename the file correctly if necessary! You will need a PC for this!

1. First enable the USB interface (see "11.2.1 Enabling the USB interface", p. 45).

2. Insert the USB stick into the USB interface socket.

3. Navigate to **Main menu > USB features > Firmware update**.

```
300 USB features
 State:      disabled
→Firmware update
 Save settings
```

4. Press the ⏎ button.

   → The firmware update starts. A message is displayed after a successful download (100%).

5. Press the ␛ button to confirm.

6. Remove the USB stick.

7. Disable the USB interface (see "11.2.2 Disabling the USB interface", p. 45).

8. Restart the solar power inverter.

☑ The firmware update is automatically enabled after the restart.

11.4 Saving settings

The solar power inverter settings can be saved to allow them to be loaded into another solar power inverter of the same type that is to be used with the same settings.

The saved settings are:

- Grid settings
- User settings
- Display settings
- Production settings

Save the settings as follows:

1. First enable the USB interface (see "11.2.1 Enabling the USB interface", p. 45).

2. Insert the USB stick into the USB interface socket.

3. Navigate to **Main menu > USB features > Save settings**.

```
300 USB features
 Firmware update
 Save settings
 Save swap data
```

4. Press the ⏎ button.

    → The save process begins. A message is displayed after saving succeeds (100%).

5. Press the ESC button to confirm.

6. Remove the USB stick.

7. Disable the USB interface (see "11.2.2 Disabling the USB interface", p. 45).

11.5 Loading settings

To simplify the setup procedure, the settings from another solar power inverter of the same type can be loaded and used in another solar power inverter that is to use the same settings. Information on saving the settings is provided in "11.4 Saving settings", p. 46.

Load the settings as follows:

1. First enable the USB interface (see "11.2.1 Enabling the USB interface", p. 45).

2. Insert the USB stick into the USB interface socket.

3. Navigate to **Main menu > USB features > Load settings**.

```
300 USB features
 Create Reports
→Load settings
 Service
```

4. Press the ⏎ button.

    → The loading process begins. A message is displayed after loading succeeds (100%).

5. Press the ESC button to confirm.

6. Remove the USB stick.

7. Disable the USB interface (see "11.2.2 Disabling the USB interface", p. 45).

11.6 Saving swap data

NOTE

In this chapter, the term "swapping" means the replacement of a solar power inverter with a new device of the same type, without changing the installation parameters, e.g., those of the PV modules.

The replacement may only be performed after consulting Delta Solar Support. The support team will discuss the correct procedure with you.

The following data is saved:

- Grid settings
- User settings
- Display settings
- Production settings
- RS485 ID
- Statistics
- Date of first installation

Save the swap data as follows:

1. First enable the USB interface (see "11.2.1 Enabling the USB interface", p. 45).

2. Insert the USB stick into the USB interface socket.

3. Navigate to **Main menu > USB features > Save swap data**.

```
300 USB features
 Save settings
→Save swap data
 Create Reports
```

4. Press the ⏎ button.

    → The save process begins. A message is displayed after saving succeeds (100%).

5. Press the ESC button to confirm.

6. Remove the USB stick.

7. Disable the USB interface (see "11.2.2 Disabling the USB interface", p. 45).

11.7   Creating reports

The reports contain the following information:

- Firmware/Serial number of the model

- Statistics, events, comparison statistics/events

- Internal logs

- AT reports

- MVD/LVD reports

Save the reports as follows:

1. First enable the USB interface (see).

2. Insert the USB stick into the USB interface socket.

3. Navigate to **Main menu > USB features > Create Reports**.

```
300 USB features
 Save swap data
→Create Reports
 Load settings
```

4. Press the ⏎ button.

   → The save process begins. A message is displayed after saving succeeds (100%).

5. Press the ESC button to confirm.

6. Remove the USB stick.

7. Disable the USB interface (see).

11.8   Service

This function is used for servicing purposes. You will be notified by Delta Support when this function must be used.

12. Diagnosis and maintenance

12.1 Operating state

12.1.1 Types of operating states

Operating state	Associated influencing factors	Grid feed-in
Normal operation	No factors are present that influence the production results.	Yes
Limited operation	Non-critical factors that can affect the production results but which are not failures (e.g., self-test).	Different
Warning	External events or internal failures are present that affect the production results.	Yes
Failure		No
Insulation or grounding warning.	Problems exist with the insulation or grounding	Yes
Insulation or grounding failure.		No

Table 12.1.: Operating states of the solar power inverter

See chapter „12.1.2 Factors influencing the operating state", p. 48 for a description of the influencing factors.

Grid feed-in is always stopped when the solar power inverter enters the "Failure" operating state.

12.1.2 Factors influencing the operating state

Different influencing factors are assigned to the individual operating states. These influencing factors are divided into the following categories.

Non-critical factors

Non-critical factors are (for example) the self-test or a DC voltage that is too low due to bad weather. Non-critical factors are therefore not failures.

Events

Events are usually caused outside the solar power inverter.

Events are divided into **external events** (e.g., voltage or frequency errors) and **parameter changes** occurring via the buttons or the RS485 interface.

Internal failures

Internal failures are caused from within the solar power inverter and must be corrected with help of the Delta Support Team.

Insulation and grounding failures

Insulation and grounding failures are logged and displayed when the insulation and grounding monitoring is enabled (see chapter „5.5.4 RS485 interface (EIA485)", p. 16).

12.1.3 Display of the actual operating state

The actual operating state is indicated via LEDs.

A short message is also shown in the fourth line of the **411 Actual overview** menu.

```
411 Actual overview
Now:              _W
Day:             _Wh
Normal operation
```

The **411 Actual overview** menu is automatically displayed when a new message arrives.

Message category	LED status	Display text in menu 411
Normal operation	Operation (green) / Earth Fault / Failure	`Normal operation`
Limited operation	Operation (green) / Earth Fault / Failure	`e.g. Self-test`
General warning messages	Operation (green) / Earth Fault / Failure (yellow)	For external events: `External events` For internal failures: `Warning ###` (3-digit number)
General failure messages	Operation / Earth Fault / Failure (yellow)	For external events: `External events` For internal failures: `Failure ###` (3-digit number)
Insulation or grounding warning	Operation (green) / Earth Fault (red) / Failure	`Insulation`
Insulation or grounding failure	Operation / Earth Fault (red) / Failure	`Insulation`

Table 12.2.: Message categories indicated by the LEDs

The software defines which events trigger a warning and which events trigger a failure.

For problems with the insulation or grounding, you can use the **230 Grounding** menu to define whether a warning or failure is triggered (see chapter „10.5.2 Insulation and grounding monitoring", p. 44).

12.2 Event journal

12.2.1 Overview

Menu:	480 Event journal

Menu access:	**Main menu > Production info> Event journal**
Example display:	480 Event journal All events →Change events External events

The event journal contains the messages relating to the following events:

● Parameter changes

 Changes to all parameters influencing the energy production and thus also the revenue.

● External events
● Problems with the insulation and grounding

Sub-menu	Description
481 All events	A list of all parameter changes and external events
482 Change events	A list of parameter changes made via the display or via RS485.
483 External events	A list of all external events.

12.2.2 Change events menu

Description

The **482 Change events** menu contains a chronological list of all changes to parameters influencing the energy production and thus also the revenue.

Menu:	**482 Change events**
Menu access:	**Main menu > Production info> Event journal > Change events**
Example display:	482 Change events 16.04.12 17:25:36 D Max. power: 100% Max. power: 90%

The parameter change entry has the following structure:

2nd line	Date and time when the external event occurred. Source of the change: D: Display E: External (RS485) U: USB interface S: System
3rd line	Name of the changed parameter + previous value
4th line	Name of the changed parameter + new value

12.2.3 External events menu

Description

Menu:	**483 Event journal**
Menu access:	**Main menu > Production info> Event journal > External events**
Example display:	483 External events 16.04.2012 17:25:36 L1 Islanding Begin

The external event message has the following structure:

2nd line	Date and time when the external event occurred.
3rd line	Short description of the failure (see chapter „12.3 Fault-finding and correction", p. 49)
4th line	Additional information, e.g., "Begin" for the occurrence of an event or "End" for the disappearance of an event.

12.3 Fault-finding and correction

12.3.1 External events / Insulation and grounding failures

The **411 Actual overview** menu shows one of the following messages:

411 Actual data
L1   _W
Day: _Wh
External events

411 Actual data
L1   _W
Day: _Wh
Insulation

1. To receive a more exact description of the problem, press the ⏎ button in the **411 Actual overview** menu.

 → The **External events** menu is displayed.

    External events
PV1+ Grounding warn
PV1 ISO running warn
PV1 ISO startup warn

 The menu contains a list of all active messages relating to external events and insulation/grounding.

2. Press the ⏎ button again.

 → The **480 Event journal** menu containing the detailed message text is displayed (see „12.2 Event journal", p. 48).

    480 Event journal

→All events
 Change events

3. Select the entry *External events* and press the ⏎ button.

```
480 Event journal
 Change events
 External events
 --------------------
```

→   The **483 External events** menu is displayed.

```
483 External events
16.04.2012 17:25:36
L1 Islanding
Begin
```

Alternatively, you can also directly open the **483 External events** menu via the "Go to menu" function, see chapter „5.4.5 "Go to menu" function", p. 12.

The following table shows the failure messages that can appear in the **483 External events** menu and provides fault-finding and correction suggestions.

LEDs	Display message	Message description / Fault correction
	Warning ###	Internal failure ("Warning" + three-digit number) ► Please contact Delta Support.
	Failure ###	Internal failure ("Failure" + three-digit number) ► Please contact Delta Support.
	L1 Voltage failure	AC overvoltage or undervoltage on phase L. ► Check the grid voltage shown on the display (menu **412 Actual data AC**). ► If no voltage is present, check the circuit breaker.
	L1 Frequency error	AC high frequency or low frequency on phase L. ► Check the grid frequency shown on the display (menu **412 Actual data AC**). ► If no voltage is present, check the automatic circuit breaker.
	DC Inj. failure	DC feed-in failure. ► Restart the solar power inverter. Contain your maintenance technician if the failure persists.

LEDs	Display message	Message description / Fault correction
	L1 Islanding	Frequency shift failure on phase L. ► Ask your electricity supply company about the actual state of the grid. ► Check the installation. ► Restart the solar power inverter. Contain your maintenance technician if the failure persists.
	PV Power too low	The solar power is too low. Insufficient solar irradiation (dawn/dusk). ► Check the PV cell voltage shown on the display (menu **416 Current data PV**).
	Auto test failure	Failure during Italian autotest. For Italy only. ► Repeat the autotest.
	PV1 ISO startup warn	The startup insulation is too low. ► Check the insulation resistance at the DC side of the PV modules.
	PV1 ISO running warn	Operating insulation <150 kΩ. ► Check the insulation resistance at the DC side of the PV modules.
	PV1+ Grounding warn PV1- Grounding warn	DC+/DC- not correctly grounded. ► Check the GND connection. ► Check the GND connection fuses. ► Replace the fuse(s) if necessary.
	PV1 ISO startup fail	The startup insulation is too low. ► Check the insulation resistance at the DC side of the PV modules.
	PV1 ISO running fail	Operating insulation <150 kΩ. ► Check the insulation resistance at the DC side of the PV modules.
	PV1+ Grounding fail PV1- Grounding fail	PV1+/PV- not correctly grounded. ► Check the GND connection.

12.3.2 Internal failures

In the case of an internal failure, the message "Warning XXX" or "Failure XXX" is displayed in the **411 Actual overview** menu. XXX stands for a 3-digit failure number.

```
411 Actual data
L1                  _W
Day:                _Wh
Warning 123
```

```
411 Actual data
L1                  _W
Day:                _Wh
Failure 351
```

In the case of internal failures, always contact the Delta Support Team (see address list on the rear cover of this manual).

12.3.3 Other LED and display messages

LEDs	Display message	Message description
		Fault correction
	PV1 Voltage too low	The PV1 voltage is too low.
		There is insufficient solar irradiation.
		► Check the PV cell voltage shown on the display (menu **416 Current data PV**).
	L1 Power reduction	Power reduction active for L1.
	PV1 PW limit to Pn	Power limiting active for PV1.
	PV1 Temp derating	Temperature derating active for PV1. Reduced electricity production.
		The internal temperature of the solar power inverter lies between +55 and +70 °C.
		► Check the ventilation of the solar power inverter.
		► Prevent direct sunlight from reaching the solar power inverter.

12.4 Displaying grid settings

Description

The actual grid settings can be displayed using the **131 View grid setup** menu. The contents of this menu are write-protected.

Menu:	131 View grid setup
Menu access:	**Main menu > Install settings > View grid setup**
| Example display: | ```
131 View grid setup

→Grid:          UK 59G
 Fnom:        --.--Hz
``` |

If a power limit was set when the solar power inverter was commissioned, then the following message is displayed before the menu opens:

```
 The maximum power
 of that inverter
has been limited to
      ##.##kW
```

12.5 Internal log

Description

The internal log contains information on the internal failures that have occurred.

Menu:	620 Internal log
Menu access:	**Main menu > Diagnostic&Alarm > Internal log**
| Example display: | ```
620 Internal log

12.04.12   7:39:25
 126 127
``` |

Parameter change entries have the following structure:

3rd line	Date and time when the external event occurred.
4th line	Number(s) of the internal failure(s)

12.6 LVD report

> **NOTE**
>
> The "Report LVD" is only available when an LVD grid is set.

Description

In accordance with the VDE AR N 4105 specifications, the menu **640 Report LVD** shows the last five failures. You can navigate through the list of failures using the ⬇⬆ buttons.

Menu:	640 Report LVD
Menu access:	**Main menu > Diagnostic&Alarm > Report LVD**
| Example display: | ```
640 Report LVD
▼▼▼▼▼ Error 5 ▼▼▼▼▼
11.04.2012 18:54:12
- Critical OverVolt
``` |

12.7 Autotest for Italy

> **NOTE**
>
> "IT Autotest" is only available when the grid has been set to **IT 50/49Hz** or **IT 51/49Hz**.

Description

Menu:	610 IT Autotest
Menu access:	**Main menu > Diagnostic&Alarm > IT Autotest**
| Example display: | ```
610 IT Autotest
--------------------
→Perform autotest
 AT Report # 1
``` |

The solar power inverter is equipped with an autotest function that can be used to check that the interface protection is working correctly.

The solar power inverter may be connected to the grid only if the final result of the latest autotest is **Pass**.

During the autotest, the following tests are performed on the AC side of the solar power inverter:

● Overvoltage test (OVT)
● Undervoltage test (UVT)
● High frequency test (HFT)
● Low frequency test (LFT)

The final results of the test are displayed on completion of the autotest.

You can navigate through the list of test results using the ⬇ ⬆ buttons.

The autotest is cancelled when a general failure occurs or the operator presses the ⎋ button. The final result of the test is then "Fail". A test result of "0" is then shown for the individual tests, and "Fail" is shown as the final test result.

Perform autotest

1. Open the menu **610 IT Autotest**.

2. Use the ⬇⬆ buttons to select the *Perform autotest* entry.

```
610 IT Autotest
--------------------
→Perform autotest
 AT Report # 1
```

3. Press the ⏎ button.

→ The autotest starts.

Autotest reports

On completion of the autotest, the results are shown in a report. The reports for the last five autotests are saved.

> **NOTE**
>
> The following displays are examples only. The actual autotest results may be different.

```
611 AT Report 1
Result:        FAIL
12.10.2011 09:23:35
IT FW
```

```
611 AT Report 1
L1 OVT:        PASS
Set:   262 V<0.10 s
Test:  220 V<0.08 s
```

```
611 AT Report 1
L1 UVT:        FAIL
Set:   186 V<0.20 s
Test:  220 V<0.18 s
```

```
611 AT Report 1
L1 HFT:        PASS
Set: 50.30Hz<0.10s
Test: 50.01Hz<0.08s
```

```
611 AT Report 1
L1 LFT:        PASS
Set: 49.70Hz<0.10s
Test: 50.01Hz<0.08s
```

EN

12.8   Maintenance

⚠ **DANGER**

Danger of death from hazardous voltage
Hazardous voltage is applied to the solar power inverter during operation. Hazardous voltage is still present 5 minutes after all power sources have been disconnected.

► Never open the solar power inverter. The solar power inverter contains no components that are to be maintained or repaired by the operator or installer. Opening the cover will void the warranty.

Ensure that the solar power inverter is not covered during operation.

Regularly clean the solar power inverter to prevent soiling of the housing.

13.   Repair

⚠ DANGER

Danger of death from hazardous voltage
Hazardous voltage is applied to the solar power inverter during operation. Hazardous voltage is still present 5 minutes after all power sources have been disconnected.

► Never open the solar power inverter. The solar power inverter contains no components that are to be maintained or repaired by the operator or installer. Opening the cover will void the warranty.

NOTE

The solar power inverter contains no components that are to be maintained by the operator or installer.

---

14. Decommissioning, transport, storage, disposal

<div class="danger">

⚠ DANGER

Danger of death or severe injuries from dangerous voltage
► Disconnect the solar inverter from the grid before removing or inserting the AC connector.

</div>

<div class="danger">

⚠ DANGER

Danger of death or severe injuries from dangerous voltage
Dangerous voltages can be present at the DC connections of the solar power inverter.
► Never disconnect the PV modules when the solar power inverter is under load. First switch off the grid connection so that the solar power inverter cannot feed energy into the grid. Then open the DC disconnector.
► Secure the DC connections against being touched.

</div>

<div class="warning">

⚠ WARNING

Danger of injury due to heavy weight
The solar power inverter is heavy (see "15. Technical data", p. 56). Incorrect handling can lead to injuries.
► The solar power inverter must be lifted and carried by two people.

</div>

14.1 Decommissioning

1. Switch off the AC cable to be free of voltage.
2. Open the DC disconnector.
3. Remove all cables from the solar power inverter.
4. Unscrew the solar power inverter from the wall bracket.
5. Lift the solar power inverter from the wall bracket.

14.2 Packaging

Use the original packaging or packaging of the same quality.

14.3 Transport

Always transport the solar power inverter in the original packaging or packaging of the same quality.

14.4 Storage

Always store the solar power inverter in the original packaging or packaging of the same quality. Observe the specifications relating to storage conditions described in chapter "15. Technical data", p. 56.

14.5 Disposal

Dispose of the solar power inverter in a technically appropriate manner according to the legal requirements of your country.

EN

15. Technical data

Input (DC)	SOLIVIA 2.5	SOLIVIA 3.0	SOLIVIA 3.3	SOLIVIA 3.6	SOLIVIA 5.0
Maximum recommended PV power	3030 W_P	3700 W_P	4000 W_P	4300 W_P	6000 W_P (5320 W_P DE / 5250 W_P BE)
Rated power	2750 W	3300 W	3600 W	3850 W	5500 W (4850 W_P DE / BE)
Maximum input voltage	125 ... 600 V				
MPP working range	150 ... 480 V			170 ... 480 V	150 ... 480 V
Rated current	7.2 A @ 360 V	9.2 A @ 360 V	10.0 A @ 360 V	10.7 A @ 360 V	15,7 A @ 350 V
Maximum operating current	18.2 A	22.0 A	24.0 A	22.0 A	22,0 A
Overvoltage category	II				

Output (AC)	SOLIVIA 2.5	SOLIVIA 3.0	SOLIVIA 3.3	SOLIVIA 3.6	SOLIVIA 5.0
Rated apparent power [1]	2500 VA	3000 VA	3300 VA	3600 VA	5000 VA
Rated voltage range [2]	184 ... 264 V				
Rated current	10.9 A	13.1 A	14.4 A	15.7 A	22,0 A
Maximum current	17.0 A	17.0 A	17.0 A	17.0 A	34,0 A
Rated frequency	50 Hz				
Frequency range [2]	45 ... 65 Hz				
Power factor (cos φ) [3]	> 0.99 at rated apparent power				
Total harmonic distortion (THD)	< 3% at rated apparent power				
Nighttime consumption	< 2.0 W				
Typical leakage current	< 3.5 mA				
Overvoltage category	III				

[1]   At cos φ = 1 (VA = W)
[2]   Rated voltage range and frequency range are set according to the particular country requirements.
[3]   Cos φ = 0.8 capacitive ... 0.8 inductive

Safety and standards	
Degree of protection	IP65
Protection class	1
Soiling category	III
Configurable switch-off parameters	Yes
Insulation monitoring	Yes
Overload behavior	Current limiting, power limiting
ENS / Grid connection guidelines	DIN VDE 0126-1-1; VDE AR N 4105 (LVD)
EMC	EN61000-6-2; EN61000-6-3; EN61000-3-2; EN61000-3-3
Safety	IEC62109-1 / -2

Mechanical data	SOLIVIA 2.5	SOLIVIA 3.0	SOLIVIA 3.3	SOLIVIA 3.6	SOLIVIA 5.0
Dimensions (L x W x D)	418 x 410 x 182 mm				418 x 410 x 182 mm
Weight	21 kg				25 kg
Cooling	Convection				
AC connection	Wieland RST25i3S				
DC connection	3 pairs of multi-contact MC4				4 Pair Multi-Contact MC4
Communication interfaces	2 x RJ45 / RS485 + 1 x USB A				
DC disconnector	Integrated				
Display	3 LEDs, 4-line LCD				

General specification	SOLIVIA 2.5	SOLIVIA 3.0	SOLIVIA 3.3	SOLIVIA 3.6
Model name	SOLIVIA 2.5 EU G4 TR	SOLIVIA 3.0 EU G4 TR	SOLIVIA 3.3 EU G4 TR	SOLIVIA 3.6 EU G4 TR
Delta part number	EOE45010288	EOE46010287	EOE46010252	EOE46010316
Max. efficiency	96.1%	96.1%	96.0%	96.0%
EU efficiency	94.3%	94.6%	94.7%	94.6%
Maximum operating temperature range	-25 ... +70 °C			
Operating temperature range at full power without derating	-25 ... +55 □			
Storage temperature range	-25 ... +80 □			
Humidity	0 ... 95%			
Maximum operating altitude	2000 m above sea level			

16.   Appendix

16.1   Overview of setting options

The following table contains an overview of all settings that can be made in the solar power inverter.

Function/Characteristic	Short description	Menu
		Manual chapter
Settings for MVD/LVD grids	Functions for setting production parameters	**500 User settings**
		"10.4 Active and reactive power control", p. 41
Active power control	For setting the active power control for LVD and MVD grids	**510 Active PwCtrl**
		"10.4.2 Active power control", p. 41
● Power reduction	For reducing the maximum power	**511 Power reduction**
		"10.4.2.2 Power reduction", p. 41
● Power/Frequency	For setting the power gradient with respect to the frequency	**512 Power vs freq**
		"10.4.2.3 Power/Frequency", p. 42
Reactive power control	For setting the active power control for LVD and MVD grids	**520 Reactive PwCtrl**
		"10.4.3 Reactive power control", p. 42
● Cos φ constant	For setting a fixed value for cos φ (inductive or capacitive)	**520 Reactive PwCtrl**
		"10.4.3.2 Constant cos φ", p. 43
● Cos phi(P)	For setting a value of cos φ (inductive or capacitive) depending on the active power ratio P/P_n	**520 Reactive PwCtrl**
		"10.4.3.3 cos φ(P)", p. 43
Options		**200 Options**
		"10.5 Options settings", p. 43
Shadowing	For setting up the extended MPP tracking	**210 Shadowing**
		"10.5.1 Shadowing", p. 43
Insulation and grounding monitoring	For selecting an insulation and grounding monitoring mode	**230 Grounding**
		"10.5.2 Insulation and grounding monitoring", p. 44
Reports		
Storing reports on a USB stick	For storing all available reports on USB sticks	**300 USB features**
		"11.7 Creating reports", p. 47
Showing reports on the display		
Italian autotest report		**600 Diagnostic&Alarm**
		"12.7 Autotest for Italy", p. 52
Display settings		
Language	For setting the display language	**100 Install settings**
		"10.2.1 Display language", p. 39
Date and time	For setting the date and time	**110 Date and time**
		"10.2.2 Date and time", p. 39
Date and time formats	For setting the date and time formats	**111 Format**
		"10.2.3 Date and time formats", p. 39
Backlighting and contrast	For setting the backlighting and contrast	**120 Display settings**
		"10.2.4 Backlighting, contrast", p. 40
Standard menu	For selecting the display to be shown when no button has been pressed for a certain period of time.	**800 Standard**
		"10.6 Standard menu", p. 44
Monitoring		
RS485 (EIA 485) settings	For setting the RS485 ID and the baud rate and for switching the termination resistor on and off	**150 RS485**
		"10.2.6 RS485 (EIA485)", p. 41
Insulation and grounding monitoring	-	**230 Grounding**
		"10.5.2 Insulation and grounding monitoring", p. 44
Showing statistics		
Showing statistics on the display	-	**400 Production info**
		"9. Production information", p. 37

Function/Characteristic	Short description	Menu
		Manual chapter
Saving and loading data		
Storing reports on a USB stick	-	**300 USB features**
		"11.7 Creating reports", p. 47
Storing settings on a USB stick		**300 USB features**
		"11.4 Saving settings", p. 46
Loading settings from a USB stick		**300 USB features**
		"11.5 Loading settings", p. 46
Saving swap data on a USB stick	For saving the data required when replacing a solar power inverter	**300 USB features**
		"11.6 Saving swap data", p. 46
Feed-in settings		
Currency, revenue per kWh	For setting the currency and the revenue per kWh	**471 Feed-in settings**
		"10.3 Grid freed-in settings", p. 41

16.2   Order numbers

Grounding kit

The ground connection must be installed in the immediate vicinity of the solar power inverter. We recommend using the "Grounding Set A Solar" grounding kit from Delta.

Grounding kit	Delta part number
Grounding Set A Solar	EOE990000275

Cable couplings

Cable coupling types for the DC connections to the inverter. The DC+ connection of the solar power inverter is a plug, the DC– connection is a socket.

DC connection	Cable coupling type	Conductor cross-section mm²	AWG	Cable sheath diameter mm	Order number
DC+ (Plug)	Socket	1,5 / 2,5	14	3–6	32.0010P0001-UR
				5,5–9	32.0012P0001-UR
		4 / 6	10	3–6	32.0014P0001-UR
				5,5–9	32.0016P0001-UR
DC– (Socket)	Plug	1,5 / 2,5	14	3–6	32.0011P0001-UR
				5,5–9	32.0013P0001-UR
		4 / 6	10	3–6	32.0015P0001-UR
				5,5–9	32.0017P0001-UR

MultiContact UTE kit

The Multi-Contact UTE Kit is designed to conform to the latest French standard UTE C 15-712-1. The UTE kit contains 8 DC measuring elements, a mounting tool and an additional signaling sticker. The UTE kit allows you to conform to the DC protection and signal requirements specified in UTE C 15-712-1.

Multi-contact UTE kit	Delta part number
Multi-contact UTE kit for SOLIVIA EU Solar Inverter	EOE90000341

RS485 cable

RS485 connection cable	Delta part number
Cable for connecting solar power inverters	
Push/Pull cable from Harting, IP67, one side with a blue cable manager, the other side with a white cable manager	
1.5 m	3081186300
3.0 m	3081186500
5.0 m	3081186600
10.0 m	3081186200
20.0 m	3081186400
Connecting cable from the last solar power inverter to a monitoring gateway device, e.g., Solivia Basic Gateway, Solarlog or Meteocontrol WEB'logger	
Outdoor cable, IP65, with Harting RJ45 PushPull and RJ12 plugs	Contact Delta support

If you wish to assemble cables yourself in order to connect inverters to each other, then you must use cable managers from Harting (IP67 PushPull system cable RJ45).

We recommend using a blue cable manager on one side and a white cable manager on the other side.

Cable manager	Harting part number
RJI IP67 data plug Push Pull 8-pin white	09 45 145 1500
RJI IP67 data plug Push Pull 8-pin blue	09 45 145 1510

HARTING Deutschland GmbH & Co. KG (PF 2451, D-32381 Minden, www.harting.com)

16.3 Overview of menu structure

16.3.1 "Go to menu" function

NOTE	
ⓘ	You can use the "Go to menu" function to directly navigate to a particular menu.

1. To open the **Go to menu** function, press and hold the [ESC] button on the solar power inverter for at least 3 seconds.

    → **Go to menu** opens.

    ```
    Go to menu
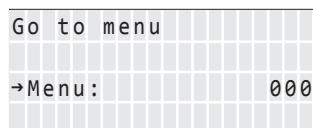
    →Menu:           000
    ```

2. Press the [↵] button to enter the menu number.

    → The first digit flashes.

3. Enter the first digit of the menu number using the [↓] [↑] buttons. Press the [↵] button when you are finished.

    → The second digit flashes.

4. Enter the second and third digit in the same manner.

5. Press the [↵] button.

    → The menu corresponding to the entered menu number is displayed.

16.3.2 Installation settings (100)

100 Installation	Explanation
Language: German	Display language
110 Date and time	Set the date and time
120 Display settings	Backlighting and contrast
130 Grid selection	Display the grid settings, change the grid
MPPT: PV1	Cannot be changed
140 RS485	Change RS485 settings

110 Date and time	Explanation
Date: 2012/01/07	Date
Time: 15:12:23	Time
111 Format	Date and time formats

111 Format	Explanation
Date: YYYY/MM/DD	Date format
Time: 24h	Time format (12h or 24h)

120 Display settings	Explanation
Backlight: Auto	Backlighting (Auto/On)
Contrast: 10	Contrast (1 ... 10)

130 Grid selection	Explanation
131 Display grid settings	Actual grid settings

130 Grid selection	Explanation
132 Grid change	Set a different grid
133 Custom. country	Set a customer-specific grid

140 RS485	Explanation
ID: ---	If multiple solar power inverters are connected via RS485, then each inverter must have a different ID. (1 ... 254)
Baud rate	Baud rate (2400 / 4800 / 9600 / 19200 / 38400)
Termination: On	If multiple solar power inverters are connected via RS485, then the termination resistor in the last inverter must be switched on. (On / Off)

16.3.3 Shadowing (210)

Mode	Explanation
Disabled	Monitoring is deactivated.
High	High shadowing, time cycle: 0.5 hours
Medium	Medium shadowing, time cycle: 2 hours
Low	Low shadowing, time cycle: 4.5 hours

210 Shadowing	Explanation
Mode: Disabled	Disabled / High / Medium / Low

16.3.4 Insulation and grounding settings (230)

The DC side of the solar power inverter has an insulation and grounding monitor.

The grounding can be monitored if you are compelled by the PV module manufacturer to ground the positive or negative pole of the PV system.

A detailed description of this function is provided in chapter "10.5.2 Insulation and grounding monitoring", p. 44.

Mode	Explanation
ISO/GND off	Monitoring is deactivated.
xxx Failure	If an insulation failure occurs, the solar power inverter is disconnected from the grid.
xxx Warning	If an insulation failure occurs, the solar power inverter logs and displays the failure but is not disconnected from the grid.

230 Grounding	Explanation
PV1: ISO Warning	ISO/GND off ISO error/warning – GND error/warning + GND error/warning

16.3.5 Save and load (300)

The USB interface must be activated before it can be used!

Deactivate the USB interface again after use!

A detailed description of the functions is provided in the "Saving and loading data and settings" chapter of the manual.

300 USB features	Explanation
State: disabled	Activate/Deactivate the USB interface
Firmware update	Firmware update
Save settings	The settings should always be saved to be on the safe side.
Save swap data	Save data for replacing the device. The data can only be loaded during initial commissioning.
Create Reports	Create various reports
Load settings	The settings can also be loaded during initial commissioning.
Service	Start the service monitoring

16.3.6 Production information (400)

400 Production info	Explanation
410 Actual data	Actual power and energy values. Messages on the actual operating status.
420 Day statistics	Statistics for the current day
430 Week statistics	Statistics for the current calendar week
440 Month statistics	Statistics for the current calendar month
450 Year statistics	Statistics for the current calendar year
460 Total statistics	Statistics for the entire operating period
470 Feed-in settings	Settings for currency and revenue per kWh

410 Actual data	Explanation
411 Current overview	Actual status
412 Actual data AC	AC = AC side
417 Actual data PV	PV = module side
41A Date and time	Date and time
41B Actual insulation	Insulation resistance value

411 Current overview	Explanation
Now: 200W	Actual active power
Day: 2000Wh	Energy production actual day
Normal operation	Current status messages

412 Actual data AC	Explanation
L1 voltage: ---V	Voltage
L1 Freq.: --.--Hz	Frequency
L1 Current: -.--A	Phase current
L1 P: ---W	Active power

412 Actual data AC	Explanation
L1 Q: ---Var	Apparent power
L1 DC inj.: ---mA	Feed-in current

416 Actual data PV	Explanation
PV1 Voltage: ---V	Voltage on the PV side
PV1 Current: -.--A	Current on the PV side

41A Date and time	Explanation
Date: 07.01.2012	Current date
Time: 15:05:19	Current time

41B Actual insulation	Explanation
R iso+: ----kΩ	Insulation resistance at DC+
R iso-: ----kΩ	Insulation resistance at DC--

420 Day statistics	Explanation
421 Day statistics AC	AC = AC side
422 Day statistics PV	PV = Module side
423 Day statistics ISO	ISO = Insulation
430 Week statistics	
440 Month statistics	
450 Year statistics	
460 Total statistics	
470 7-day statistics	
480 Event journal	

421 Day statistics AC	Explanation
Energy: ---Wh	Energy
Runtime: -:--h	Runtime
Revenue: -:--h	Revenue
L1 Δf: --.--/--.--Hz	Min./Max. frequency
L1 Imax: -.--A	Maximum current
L1 ΔU: ---/---V	Min./Max. voltage
L1 Pmax: ---W	Maximum active power
L1 Qmax: ---Var	Maximum apparent power
L1 Qmin: ---Var	Minimum apparent power
431 Week statistics AC	
441 Month statistics AC	
451 Year statistics AC	
461 Total statistics AC	

422 Day statistics PV	Explanation
PV1 Imax: ---A	Max. current
PV1 Umax: ---V	Max. voltage
PV1 Pmax: ---W	Max. power
432 Week statistics PV	
442 Month statistics PV	
452 Year statistics PV	
462 Total statistics PV	

423 Day statistics ISO	Explanation
R ISO max: ---kΩ	Max. insulation resistance
R ISO min: ---kΩ	Min. insulation resistance
433 Week statistics ISO	
443 Month statistics ISO	
453 Year statistics ISO	
463 Total stat. ISO	

470 Feed-in settings	Explanation
Currency: EUR	Define the currency
EUR / kWh: #.##	Define the revenue pro kWh

480 Event journal	Explanation
481 All events	Complete overview
482 Change events	Overview of all parameter changes
483 External events	Overview of all external events and insulation/grounding problems

16.3.7 Active power control (510)

The active power control is available for:

● LVD grids (VDE AR N 4105)

A detailed description of the modes is provided in chapter

510 Active PwCtrl	Explanation
511 Power reduction	Reduction of the active power
512 Power/Frequency	Setting of the active power dependent on the grid frequency

511 Power reduction	Explanation
Max P: ----W	Maximum active power in watts

512 Power/Frequency	Explanation
Start freq: --.--Hz	Start frequency at which the reduction of active power is switched on. (50.00 ... 55.00 Hz)
Stop freq: --.--Hz	Stop frequency at which the feeding of active power is stopped. (50.00 ... 55.00 Hz)
Gradient: --.--%	Gradient for the reduction of active power (0 ... 150%/Hz)

16.3.8 Reactive power control (520)

The reactive power control is available for:

● LVD grids (VDE AR N 4105)

The table shows the reactive power control modes available for LVD grids.

The number and type of configurable parameters change, depending on the mode selected.

A detailed description of the modes is provided in chapter

Mode	
Display messages	Explanation
Disabled	Reactive power control is deactivated
Fix. cosPhi	Setting of a constant cos φ
Cos phi(P)	Cos φ depending on the active power

520 Reactive power control	Explanation
Mode: disabled	Reactive power control deactivated.

520 Reactive power control	Explanation
Mode: Fix. cosPhi	
Cos phi: ind 1.00	inductive / capacitive ǁ 1.00 ... 0.8

520 Reactive power control	Explanation
Mode: Cos phi(P)	
A Cos Phi: ind 1.00	inductive / capacitive ǁ 1.00 ... 0.8
B Power ratio: ---%	1 ... 49 %
B Cos Phi: ind 1.00	inductive / capacitive ǁ 1.00 ... 0.8
C Power ratio: ---%	50 ... 99 %
C Cos Phi: ind 1.00	inductive / capacitive ǁ 1.00 ... 0.8
D Cos Phi: ind 1.00	inductive / capacitive ǁ 1.00 ... 0.8

16.3.9 Diagnostic and Alarm (600)

The reports that are displayed depend on the grid that has been set:

● Internal log (is always displayed)

● LVD report (only shown for LVD grids)

● Italian Autotest (only shown for Italian grids)

600 Diagnostic&Alarm	Explanation
610 IT Autotest	Autotest for Italian grids. Contains the last five reports.
620 Internal log	Firmware update
640 LVD Reports	Report as per VDE AR N 4105. Contains the last five failure messages.

16.3.10 Software version/inverter data (700)

700 Inverter info	Explanation
710 Software vers.	Version of the installed software
720 Inverter data	Production date and serial number

16.3.11 Standard menu (800)

800 Standard menu	Explanation
Menu number:	Number of the menu that is to be displayed as the standard menu.

17. Certificates

BUREAU VERITAS

Bureau Veritas
Consumer Product Services Germany GmbH
Businesspark A96
86842 Türkheim
Deutschland
+ 49 (0) 40 740 41-0
cps-tuerkheim@de.bureauveritas.com
akkreditiert nach ISO 17025 durch ZLS
und DAkkS

Prüfbescheinigung
Certificate

Antragsteller:
Applicant:
Delta Energy Systems (Germany) GmbH
Tscheulinstraße 21
79331 Teningen, Germany.

Produkt Typ:
Product type:
Wechselrichter
Solar inverter

Modell:
Model:
SOLIVIA5.0EUG4TR EOE46010253
SOLIVIA2.5EUG4TR EOE45010288
SOLIVIA3.0EUG4TR EOE46010287
SOLIVIA3.3EUG4TR EOE46010252
SOLIVIA3.6EUG4TR EOE46010316

Schutzarten:
IP-Code:
IP65

Ein repräsentatives Testmuster des o.g. Models bestand die Prüfung nach
A representative test sample of above stated model passed the tests according to

Norm:
Standard:
IEC 60529:1989 + A1:1999 / EN 60529:1991 + A1:2000

Bericht Nr:
Report No.:
11TH0375-IEC60529_0

Zertifikat Nr.:
Certificate No.:
11-213

Datum:
Issued:
14.10.2011

Zertifizierungsstelle
Certification department

Achim Hänchen

BUREAU VERITAS

Bureau Veritas
Consumer Products Services Germany
GmbH
Businesspark A96
86842 Türkheim
Deutschland
+ 49 (0)40 7 40 41-0
cps-tuerkheim@de.bureauveritas.com
Accredited according to ISO 17025 and
Guide 65

Zertifikat
Certificate

Zertifikatsinhaber:
Holder of certificate:
Delta Energy Systems (Germany) GmbH
Tscheulinstraße 21
79331 Teningen
Germany

Fertigungsstätte:
Factory:
Delta Electronics (Slovakia), s.r.o.
Priemyselná ulica 4600/1
01841 Dubnica nad Váhom
Slovakia

Produkt-Typ:
Product type:
netzgebundener Photovoltaikwechselrichter
grid connected photovoltaic inverte

Modell:
Model:
Solivia2.5EUG4TR EOE45010288, Solivia3.0EUG4TR EOE46010287,
Solivia3.3EUG4TR EOE46010252, Solivia3.6EUG4TR EOE46010316

Leistung:
Ratings:
siehe Anhang
see anex

Zulassungszeichen:
Certification mark:

Repräsentative Testmuster des/der o. g. Models/Modelle bestanden die Prüfungen nach
Representative test samples of above stated model(s) passed the tests according to

Norm:
Standard:
IEC 62109-1:2010 (1st Edition), EN 62109-1:2010, IEC 62109-2:2011,
EN 62109-2:2012, EN 61000-6-2:2005, EN 61000-6-3:2007 + A1:2011
und entsprechen den Anforderungen für Sicherheit und Gesundheit gemäß Produktsicherheitsgesetz
and comply with the requirements of safety and health of the GS-Act Produktsicherheitsgesetz

Bericht Nr:
Report no.:
11TH0316

Zertifikat Nr.:
Certificate no.:
12-107

Datum:
Issued:
2012-05-14

Gültig bis:
Valid until:
2017-05-13

Der Zertifikatsinhaber hat die Voraussetzungen zu schaffen, die für eine vorschriftsmäßige Fertigung erforderlich sind sowie die damit verbundenen Kontrollmaßnahmen zu dulden (§22 ProdSG). Der Zertifikatsinhaber ist berechtigt, o. g. Produkt mit dem GS-Zeichen in der abgebildeten Form zu versehen. Grundlage für die Ausstellung des Zertifikates sind die im GS-Vertrag geregelten Verfahren, welche auch den Entzug von GS-Zertifikaten regeln. *The Holder of certificate has to ensure requirements of good technical practice and has accepted actions of surveillance by certification body (§22 ProdSG). The holder of this certificate is authorized to apply the GS-mark as shown on above stated product. Issuance of GS-certificates is based on the regulations of the GS-contract, which amongst others describe the rules of withdrawal of certificates.*

Zertifizierungsstelle
Certification Department

Achim Hänchen

BUREAU VERITAS

Bureau Veritas Consumer
Products Services
Germany GmbH
Businesspark A96
86842 Türkheim
Duitsland
+ 49 (0) 40 740 41 - 0
cps-tuerkheim@de.bureauveritas.com

Potvrzení o nezávadnosti

Žadatel:
Delta Energy Systems (Germany) GmbH
Tscheulinstraße 21
79331 Teningen
Německo

Výrobek:
Samostatná spínací stanice mezi síťově paralelním
vlastním výrobním zařízením a veřejnou sítí nízkého
napětí.

Model:
Solivia2.5EUG4TR EOE45010288, Solivia3.0EUG4TR
EOE46010287, Solivia3.3EUG4TR EOE46010252,
Solivia3.6EUG4TR EOE46010316

Používání podle určení:
Samostatná spínací stanice s jednofázovou kontrolou sítě dle DIN V VDE V 0126-1-1:2006-02 (s ČR odchylkami podle EN 50438:2007, Annex A*) pro fotovoltaická zařízení s jednofázovým paralelním napájením pomocí měniče do sítě veřejného napájení. Samostatná spínací stanice je integrační součástí výše uvedených měničů s oddělovacím transformátorem. Tato slouží jako náhrada za spínací stanici s dělicí funkcí, která je kdykoli přístupná provozovateli rozvodné sítě (VNB).
* 85%<V<115%
  49,5Hz<f<50,5Hz

Zkušební podklady:
EN 50438:2007, DIN V VDE V 0126-1-1 (VDE V 0126-1-1):2006-02, a „Vlastní výrobní zařízení u sítě nízkého napětí, 4. vydání 2001, směrnice pro připojení a paralelní provoz vlastních výrobních zařízení u sítě nízkého napětí" s doplňky VDN, stav 2005, od elektrárenského svazu (VDEW) a od svazu provozovatelů sítě (VDN).

Reprezentativní zkušební vzorek výše jmenovaného výrobku odpovídá bezpečnostně technickým požadavkům platným v okamžiku vydání tohoto certifikátu, uvedených zkušebních podkladů pro používání podle určení.

Číslo zprávy: 11TH0316-EN50438_CZE
Číslo certifikátu: U12-0356
Datum: 2012-04-25 **Platnost do:** 2015-04-24

Achim Hänchen

BUREAU VERITAS

Bureau Veritas Consumer
Products Services
Germany GmbH
Businesspark A96
86842 Türkheim
Duitsland
+ 49 (0) 40 740 41 - 0
cps-tuerkheim@de.bureauveritas.com

Potvrzení o nezávadnosti

Žadatel:
Delta Energy Systems (Germany) GmbH
Tscheulinstraße 21
79331 Teningen
Německo

Výrobek:
Samostatná spínací stanice mezi síťově paralelním
vlastním výrobním zařízením a veřejnou sítí nízkého
napětí.

Model:
Solivia2.5EUG4TR EOE45010288, Solivia3.0EUG4TR
EOE46010287, Solivia3.3EUG4TR EOE46010252,
Solivia3.6EUG4TR EOE46010316

Používání podle určení:
Samostatná spínací stanice s jednofázovou kontrolou sítě dle DIN V VDE V 0126-1-1:2006-02 (s ČR odchylkami podle EN 50438:2007, Annex A*) pro fotovoltaická zařízení s jednofázovým paralelním napájením pomocí měniče do sítě veřejného napájení. Samostatná spínací stanice je integrační součástí výše uvedených měničů s oddělovacím transformátorem. Tato slouží jako náhrada za spínací stanici s dělicí funkcí, která je kdykoli přístupná provozovateli rozvodné sítě (VNB).
* 85%<V<115%
  49,5Hz<f<50,5Hz

Zkušební podklady:
EN 50438:2007, DIN V VDE V 0126-1-1 (VDE V 0126-1-1):2006-02, a „Vlastní výrobní zařízení u sítě nízkého napětí, 4. vydání 2001, směrnice pro připojení a paralelní provoz vlastních výrobních zařízení u sítě nízkého napětí" s doplňky VDN, stav 2005, od elektrárenského svazu (VDEW) a od svazu provozovatelů sítě (VDN).

Reprezentativní zkušební vzorek výše jmenovaného výrobku odpovídá bezpečnostně technickým požadavkům platným v okamžiku vydání tohoto certifikátu, uvedených zkušebních podkladů pro používání podle určení.

Číslo zprávy: 11TH0316-EN50438_CZE
Číslo certifikátu: U12-0356
Datum: 2012-04-25 **Platnost do:** 2015-04-24

Achim Hänchen

Certificate 1 (Italian)

Bureau Veritas Consumer Products Services Germany GmbH
Businesspark A96
86842 Türkheim
Germania
+ 49 (0) 40 740 41 – 0
cps-tuerkheim@de.bureauveritas.com

Dichiarazione di conformità

NOME ORGANISMO CERTIFICATORE:	Bureau Veritas Consumer Products Services Germany GmbH ACCREDITAMENTO n° ZLS II6/0076. 421-1/2 Rif. DIN EN 45011 Data validità: 31-Marzo-2016
OGGETTO:	GUIDA PER LE CONNESSIONI ALLA RETE ELETTRICA DI ENEL DISTRIBUZIONE, Ed. 2.2, Dicembre 2011 REGOLE TECNICHE DI CONNESSIONE DI CLIENTI PRODUTTORI ALLE RETI ENEL IN BASSA TENSIONE

TIPOLOGIA APPARATO A CUI SI RIFERISCE LA DICHIARAZIONE:

DISPOSITIVO DI INTERFACCIA	PROTEZIONE DI INTERFACCIA	DISPOSITIVO DI CONVERSIONE STATICA	DISPOSITIVO DI GENERAZIONE ROTANTE
x	x	x	

COSTRUTTORE:	Delta Energy Systems (Germany) GmbH Tscheulinstraße 21 79331 Teningen Germania

MODELLO:	Solivia2.5 EUG4TR EOE45010288	Solivia3.0 EUG4TR EOE46010287	Solivia3.3 EUG4TR EOE46010252	Solivia3.6 EUG4TR EOE46010316
POTENZA NOMINALE:	2,5 kW	3,0 kW	3,3 kW	3,6 kW

VERSIONE FIRMWARE:	IT FW 00.01.00
NUMERO DI FASI:	monofase
RIFERIMENTO:	Il dispositivo non è equipaggiato con trasformatore di isolamento a bassa frequenza.

RIFERIMENTI DEI LABORATORI CHE HANNO ESEGUITO LE PROVE:

Bureau Veritas Consumer Products Services Germany GmbH
ACCREDITAMENTO n° ZLS II6/0076. 421-1/2
Rif. DIN EN ISO/IEC 17025
Data validità: 31-Marzo-2016

Esaminati i Fascicoli Prove n°11TH0316-ENELguide, emessi dal laboratorio Bureau Veritas Consumer Products Services Germany GmbH

Si dichiara che il prodotto indicato è conforme alle prescrizioni ENEL

Numero di certificato:	U12-0338
Data di emissione:	2012-04-24

Achim Hänchen
FIRMA RESPONSABILE

Certificate 2 (Slovak)

Bureau Veritas Consumer Products Services Germany GmbH
Businesspark A96
86842 Türkheim
Germany
+ 49 (0) 40 740 41 – 0
cps-tuerkheim@de.bureauveritas.com

Certifikát o zhode

Žiadateľ:	**Delta Energy Systems (Germany) GmbH** **Tscheulinstraße 21** **79331 Teningen** **Nemecko**
Produkt:	**Zariadenie na automatické odpojenie medzi generátorom a verejnou elektrickou sieťou s nízkym napätím**
Model:	**Solivia2.5EUG4TR EOE45010288, Solivia3.0EUG4TR EOE46010287, Solivia3.3EUG4TR EOE46010252, Solivia3.6EUG4TR EOE46010316**

Použitie v súlade s predpismi:

Zariadenie na automatické odpojenie s dohľadom nad jednofázovým napájaním v súlade s normou DIN V VDE V 0126-1-1:2006-02 pre fotonapäťové systémy s jednofázovým paralelným spojením prostredníctvom prevodníka v rámci napájania z verejnej elektrickej siete. Zariadenie na automatické odpojenie je neoddeliteľnou súčasťou uvedeného prevodníka.

Použité pravidlá a štandardy:

Norma DIN V VDE V 0126-1-1 (VDE V 0126-1-1):2006-02 a predpis „Generator at the public low-voltage grid, 4th edition 2001, guideline for connection and parallel operation of generators in the public low-voltage grid" (Generátor vo verejnej elektrickej sieti s nízkym napätím, 4. vydanie, 2001, predpis na pripojenie a paralelnú prevádzku generátorov vo verejnej elektrickej sieti s nízkym napätím) s dodatkami asociácie VDN (2005) od nemeckej asociácie pre elektrinu (VDEW) asociácie sieťových operátorov (VDN).

Koncepcia bezpečnosti uvedeného reprezentatívneho produktu zodpovedá v čase vystavenia tohto certifikátu platným bezpečnostným požiadavkám na určený spôsob použitia v súlade s predpismi.

Číslo správy:	10TH0316-VDE0126
Číslo certifikátu:	U12-0399
Dátum vystavenia:	2012-05-04 **Platnosť do:** 2015-04-22

Achim Hänchen

Certificate 3 (English)

Bureau Veritas Consumer Product Services Germany GmbH
Businesspark A96
86842 Türkheim
Germany
+ 49 (0) 40 740 41 – 0
cps-tuerkheim@de.bureauveritas.com

Certificate of compliance

Applicant:	**Delta Energy Systems (Germany) GmbH** **Tscheulinstraße 21** **79331 Teningen** **Germany**
Product:	**Automatic disconnection device between a generator and the public low-voltage grid**
Model:	**Solivia2.5EUG4TR EOE45010288, Solivia3.0EUG4TR EOE46010287, Solivia3.3EUG4TR EOE46010252, Solivia3.6EUG4TR EOE46010316**

Use in accordance with regulations:

Automatic disconnection device with single-phase mains surveillance in accordance with DIN V VDE V 0126-1-1:2006-02 for photovoltaic systems with a single-phase parallel coupling via an inverter in the public mains supply. The automatic disconnection device is an integral part of the aforementioned inverter. This serves as a replacement for the disconnection device with insulating function which the distribution network provider can access at any time.

Applied rules and standards:

DIN V VDE V 0126-1-1 (VDE V 0126-1-1):2006-02 and „Generator at the public low-voltage grid, 4th edition 2001, guideline for connection and parallel operation of generators in the public low-voltage grid" with VDN additions (2005) from the German Electricity Association (VDEW) and association of network operator (VDN).

At the time of issue of this certificate the safety concept of an aforementioned representative product corresponds to the valid safety specifications for the specified use in accordance with regulations.

Report number:	11TH0316-VDE0126
Certificate number:	U12-0400
Date of issue:	2012-05-04 **Valid until:** 2015-04-22

Achim Hänchen

Certificate 4 (French)

Bureau Veritas Consumer Product Services GmbH
Businesspark A96
86842 Türkheim
Allemagne
+ 49 (0) 40 74 041-0
cps-tuerkheim@de.bureauveritas.com

Certificat de conformité

Demandeur:	**Delta Energy Systems (Germany) GmbH** **Tscheulinstraße 21** **79331 Teningen** **Allemagne**
Produit:	**Dispositif de déconnexion automatique entre un générateur et le réseau public à basse tension**
Modèle:	**Solivia2.5EUG4TR EOE45010288, Solivia3.0EUG4TR EOE46010287, Solivia3.3EUG4TR EOE46010252, Solivia3.6EUG4TR EOE46010316**

À utiliser conformément aux réglementations:

Dispositif de coupure automatique avec une surveillance du réseau monophasé, conformément à DIN V VDE V 0126-1-1:2006-02 pour des systèmes photovoltaïques avec un couplage parallèle monophasé via un convertisseur à alimentation électrique publique. Le dispositif de coupure automatique fait partie intégrante de ce convertisseur. Il remplace l'appareil de déconnexion avec une fonction isolante, auquel le fournisseur du réseau de distribution peut accéder à tout moment.

Réglementations et normes appliquées:

DIN V VDE V 0126-1-1:2006-02 et «générateur au réseau électrique basse tension public, quatrième édition 2001, le guide de connexion et d'utilisation parallèle des générateurs dans le réseau électrique basse tension » avec les additions de VDN (2005), provenant de l'Association allemande du service public de l'énergie «VDEW» et l'Association d'opérateur d'un réseau «VDN».

Un échantillon représentatif des produits mentionnés ci-dessus correspond aux exigences de sécurité technique en vigueur à la date d'émission de ce certificat pour l'usage spécifié et conformément à la réglementation.

Numéro de rapport:	11TH0316-VDE0126
Numéro de certificat:	U12-0401
Délivré le:	2012-05-04 **Valide jusqu'au :** 2015-04-22

Achim Hänchen
CERTIFICATION

Certificate 1 (German)

Bureau Veritas Consumer Products Services Germany GmbH
Businesspark A96
86842 Türkheim
Deutschland
+ 49 (0) 40 740 41 - 0
cps-tuerkheim@de.bureauveritas.com

Unbedenklichkeitsbescheinigung

Antragsteller: Delta Energy Systems (Germany) GmbH
Tscheulinstraße 21
79331 Teningen
Deutschland

Erzeugnis: Selbsttätige Schaltstelle zwischen einer netzparallelen Eigenerzeugungsanlage und dem öffentlichen Niederspannungsnetz

Modell: Solivia2.5EUG4TR EOE45010288, Solivia3.0EUG4TR EOE46010287, Solivia3.3EUG4TR EOE46010252, Solivia3.6EUG4TR EOE46010316

Bestimmungsgemäße Verwendung:
Selbsttätige Schaltstelle mit einphasiger Netzüberwachung gemäß DIN V VDE V 0126-1-1:2006-02 für Photovoltaikanlagen mit einer einphasigen Paralleleinspeisung über Wechselrichter in das Netz der öffentlichen Versorgung. Die selbsttätige Schaltstelle ist integraler Bestandteil des oben angeführten Wechselrichter mit Trenntrafo. Diese dient als Ersatz für eine jederzeit dem Verteilungsnetzbetreiber (VNB) zugängliche Schaltstelle mit Trennfunktion.

Prüfgrundlagen:
DIN V VDE V 0126-1-1 (VDE V 0126-1-1):2006-02 und „Eigenerzeugungsanlagen am Niederspannungsnetz, 4. Ausgabe 2001, Richtlinie für Anschluss und Parallelbetrieb von Eigenerzeugungsanlagen am Niederspannungsnetz" mit VDN Ergänzungen, Stand 2005 vom Verband der Elektrizitätswirtschaft (VDEW) und vom Verband der Netzbetreiber (VDN).

Ein repräsentatives Testmuster der oben genannten Erzeugnisse entspricht den zum Zeitpunkt der Ausstellung dieser Bescheinigung geltenden sicherheitstechnischen Anforderungen der aufgeführten Prüfgrundlagen für die bestimmungsgemäße Verwendung.

Bericht Nummer: 11TH0316-VDE0126
Zertifikat Nummer: U12-0334
Datum: 2012-04-23   **Gültig bis:** 2015-04-22

Achim Hänchen

Certificate 2 (Greek)

Bureau Veritas Consumer Products Services Germany GmbH
Businesspark A96
86842 Türkheim
Germany
+ 49 (0) 40 740 41 - 0
cps-tuerkheim@de.bureauveritas.com

Πιστοποιητικό συμμόρφωσης

Αιτών: Delta Energy Systems (Germany) GmbH
Tscheulinstraße 21
79331 Teningen
Γερμανία

Προϊόν: Συσκευή αυτόματης αποσύνδεσης μεταξύ μιας γεννήτριας και του δημόσιου δικτύου χαμηλής τάσης

Μοντέλο: Solivia2.5EUG4TR EOE45010288, Solivia3.0EUG4TR EOE46010287, Solivia3.3EUG4TR EOE46010252, Solivia3.6EUG4TR EOE46010316

Προβλεπόμενη χρήση σύμφωνα με τους κανονισμούς:
Συσκευή αυτόματης αποσύνδεσης με επίτηρηση μονοφασικού δικτύου σύμφωνα με το πρότυπο DIN V VDE V 0126-1-1:2006-02* για φωτοβολταϊκές εγκαταστάσεις με μονοφασική παράλληλη ζεύξη μέσω αναστροφέα στο δημόσιο δίκτυο παροχής. Η συσκευή αυτόματης αποσύνδεσης αποτελεί αναπόσπαστο τμήμα του εν λόγω αναστροφέα. Αντικαθιστά τη συσκευή αποσύνδεσης με λειτουργία απομόνωσης στην οποία ο πάροχος δικτύου διανομής μπορεί να έχει πρόσβαση ανά πάσα στιγμή.
* με dc-injection <0,5% του I_ACnom (αναμασικό εναλλασσόμενο ρεύμα)
49,5 Hz<f<50,5 Hz (ημεριμνικές παροχές)
47,5 Hz<f<51 Hz (νησιωτικές παροχές)
Χρόνος αποσύνδεσης <500 ms
Χρόνος επανασύνδεσης >180 s

Εφαρμοζόμενοι κανονισμοί και πρότυπα:
DIN V VDE V 0126-1-1 (VDE V 0126-1-1):2006-02 και «Γεννήτρια στο δημόσιο δίκτυο χαμηλής τάσης, 4η έκδοση 2001, οδηγία για τη σύνδεση και παράλληλη λειτουργία γεννητριών στο δημόσιο δίκτυο χαμηλής τάσης» με προσθήκες VDN (2005) από τη γερμανική Ένωση ηλεκτρολογικών έργων (VDEW) και την Ένωση χειριστών δικτύων (VDN).

Αντιπροσωπευτικό δείγμα των προϊόντων που αναφέρονται πιο πάνω ανταποκρίνεται στις προδιαγραφές ασφάλειας που ισχύουν τη στιγμή έκδοσης του παρόντος πιστοποιητικού για την καθορισμένη χρήση σύμφωνα με τους κανονισμούς.

Αριθμός αναφοράς: 11TH0316-VDE0126_GRE
Αριθμός πιστοποιητικού: U12-0385
Ημερομηνία έκδοσης: 2012-04-30   **Ισχύει έως:** 2015-04-29

Achim Hänchen

Certificate 3 (Dutch)

Bureau Veritas Consumer Products Services Germany GmbH
Businesspark A96
86842 Türkheim
Duitsland
+ 49 (0) 40 740 41 - 0
cps-tuerkheim@de.bureauveritas.com

Verklaring van geen bezwaar

Aanvrager: Delta Energy Systems (Germany) GmbH
Tscheulinstraße 21
79331 Teningen
Duitsland

Product: Automatisch schakelstation tussen een netparallelle zelfopwekinstallatie en het openbare laagspanningsnet

Model: Solivia2.5EUG4TR / EOE45010288, Solivia3.0EUG4TR / EOE46010287, Solivia3.3EUG4TR / EOE46010252, Solivia3.6EUG4TR / EOE46010316

Reglementair voorgeschreven gebruik:
Automatisch schakelstation met enkelfasige netwerkbewaking conform C10/11 – 06.2012 , Bijlage 3 voor fotovoltaïsche installaties met een enkelfasige parallelvoeding door middel van gelijkstroom-wisselstroommutator in het net van de openbare voorziening. Het automatische schakelstation vormt een integraal bestanddeel van de hoger vermelde gelijkstroom-wisselstroommutators.

Controlebasis:
C10/11 – 06.2012 *
DIN V VDE V 0126-1-1:2006-02

*F.A.Q. Concernant l'application de la prescription C10/11 – 06.2012
Onmiddellijke scheiding bij een maximale spanning van 264,5V.
Scheiding van een gemiddelde spanning van 253,0V, binnen 10 minuten volgens de EN50160.

Een representatief testpatroon van het hoger vermelde product voldoet aan de op het moment van de uitreiking van dit attest geldende veiligheidstechnische eisen van de vermelde controlegrondbeginselen voor een reglementair voorgeschreven gebruik.

Rapportnummer: 11TH0316-C10-11
Certificaatnummer: U12-0567
Datum: 2012-06-19   **Geldig tot:** 2015-06-18

Achim Hänchen

Certificate 4 (French)

Bureau Veritas Consumer Products Services Germany GmbH
Businesspark A96
86842 Türkheim
Allemagne
+ 49 (0) 40 740 41 - 0
cps-tuerkheim@de.bureauveritas.com

Certificat de conformité

Demandeur: Delta Energy Systems (Germany) GmbH
Tscheulinstraße 21
79331 Teningen
Allemagne

Produit: Dispositif de déconnexion automatique entre un générateur et le réseau public à basse tension

Modèle: Solivia2.5EUG4TR / EOE45010288, Solivia3.0EUG4TR / EOE46010287, Solivia3.3EUG4TR / EOE46010252, Solivia3.6EUG4TR / EOE46010316

À utiliser conformément aux réglementations:
Dispositif de coupure automatique avec une surveillance du réseau monophasé, conformément à C10/11 – 06.2012 , appendice 3, pour des systèmes photovoltaïques avec un couplage parallèle monophasé, via un convertisseur dans l'alimentation électrique publique. Le dispositif de coupure automatique fait partie intégrante de ce convertisseur. Il remplace le appareil de déconnexion avec une fonction isolante, auquel le fournisseur du réseau de distribution peut accéder à tout moment.

Réglementations et normes appliquées:
C10/11 – 06.2012*
DIN V VDE V 0126-1-1:2006-02

*F.A.Q. Concernant l'application de la prescription C10/11 – 06.2012
Séparation immédiate à une tension maximale de 264,5V.
La séparation d'avec une tension moyenne de 253,0V à 10 minutes selon la EN50160.

Un echantillon représentatif des produits mentionnés ci-dessus correspond à la date de la delivrance de ce certificat en vigueur des exigences de sécurité technique et pour l'utilisation conformément à sa destination.

Numéro de rapport: 11TH0316-C10-11
Numéro de certificat: U12-0568
Délivré le: 2012-06-19   **Valide jusque le:** 2015-06-18

Achim Hänchen

EN

Bureau Veritas Consumer Products Services Germany GmbH
Businesspark A96
86842 Türkheim
Германия
+ 49 (0) 40 740 41 - 0
cps-tuerkheim@de.bureauveritas.com

Сертификат за съответствие

Заявител:	**Delta Energy Systems (Germany) GmbH** **Tscheulinstraße 21** **79331 Teningen** **Германия**
Продукт:	**Автоматичен изключвател между генератор и обществената електроразпределителна мрежа за ниско напрежение**
Модел:	**Solivia2.5EUG4TR EOE45010288, Solivia3.0EUG4TR EOE46010287, Solivia3.3EUG4TR EOE46010252, Solivia3.6EUG4TR EOE46010316**

Експлоатация в съответствие с нормативните актове:

Автоматичен изключвател с наблюдение на еднофазна мрежа в съответствие с DIN V VDE V 0126-1-1:2006-02 за фотоволтаични системи с еднофазна паралелно свързване посредством инвертор в обществената електроразпределителна мрежа. Автоматичният изключвател е неразделна част от гореупоменатия инвертор. Също така служи за заместител на изключвателя с изолираща функция, до което операторът на електроразпределителната мрежа може да има достъп по всяко време.

Приложими правила и стандарти:

DIN V VDE V 0126-1-1 (VDE V 0126-1-1):2006-02 и „Генератор в обществената електроразпределителна мрежа за ниско напрежение, 4 издание, 2001 г., инструкция за свързване и паралелна експлоатация на генераторите в обществената електроразпределителна мрежа за ниско напрежение" с VDN допълненията (2005) на Германската асоциация на производителите на електроенергия [German Electricity Association (VDEW)] и Асоциацията на мрежовите оператори [Association of network operator (VDN)].

Концепцията за безопасност на гореупоменатия представителен продукт отговаря, към момента на издаване на този сертификат, на валидните показатели за безопасност за посоченото приложение в съответствие с нормативните актове.

Номер на протокола:	**11TH0316-VDE0126**
Номер на сертификата:	**U12-0603**
Дата на издаване:	**2012-06-28** **Валиден до:** **2015-06-27**

Achim Hänchen

Bureau Veritas Consumer Products Services Germany GmbH
Businesspark A96
86842 Türkheim
Germania
+ 49 (0) 40 740 41 - 0
cps-tuerkheim@de.bureauveritas.com

Certificat de conformitate

Solicitant:	**Delta Energy Systems (Germany) GmbH** **Tscheulinstraße 21** **79331 Teningen** **Germania**
Produs:	**Dispozitiv de deconectare automată între generator și rețelele de distribuție publică de joasă tensiune**
Model:	**Solivia2.5EUG4TR EOE45010288, Solivia3.0EUG4TR EOE46010287, Solivia3.3EUG4TR EOE46010252, Solivia3.6EUG4TR EOE46010316**

A se utiliza în conformitate cu reglementările de mai jos:

Dispozitiv de deconectare automată a sistemului de supraveghere a curentului monofazic în conformitate cu DIN V VDE V 0126-1-1:2006-02 pentru sistemele fotovoltaice cu o branșare monofazică paralelă prin intermediul unui invertor din cadrul rețelei publice de alimentare cu energie electrică. Dispozitivul de deconectare automată este parte integrantă a invertorului menționat anterior. Acesta serveşte drept înlocuitor al dispozitivului de deconectare cu funcția de izolare, pe care furnizorul rețelei de distribuţie îl poate oricând accesa.

Reguli și standarde aplicabile:

DIN V VDE V 0126-1-1 (VDE V 0126-1-1):2006-02 și „Generator în rețeaua de distribuție publică de joasă tensiune, ediția a patra, 2001, norme privind racordarea și funcționarea în paralel a generatoarelor din rețeaua de distribuție de joasă tensiune" cu adăugirile VDN (2005) din partea Asociației Germane de Electricitate (VDEW) și a Asociației Operatorilor de Rețea (VDN).

Conceptul de siguranță al produsului reprezentativ susmenționat corespunde, la momentul emiterii prezentului certificat, specificațiilor valide privind siguranța pentru utilizarea specificată în conformitate cu normele.

Număr raport:	**11TH0316-VDE0126**
Număr certificat:	**U12-0604**
Data emiterii:	**2012-06-28** **Valabil până la:** **2015-06-27**

Achim Hänchen

Delta Energy Systems (Germany) GmbH
Tscheulinstraße 21
79331 Teningen
GERMANY
Sales email: sales@solar-inverter.com
Support email: support@solar-inverter.com
Sales hotline: +49 180 10 SOLAR (76527)
Support hotline: +49 180 16 SOLAR (76527)
Monday to Friday, 8 AM to 5 PM (CET, except for public holidays) (3.9 c/min)

Delta Energy Systems (Italy) Srl
Via I Maggio 6
40011 Anzola dell'Emilia (BO)
ITALY
Phone: +39 051 733045
Fax: +39 051 731838
Email: support.italy@solar-inverter.com

Delta Energy Systems (Spain) S.L.
Calle Luis I, nº 60, Nave 1A. P.I. de Vallecas
28031 Madrid
SPAIN
Phone: +34 91 223 74 27
Fax: +34 91 332 90 38
Email: support.spain@solar-inverter.com

Delta Electronics (Slovakia) s.r.o.
Priemyselná ulica 4600/1
018 41 Dubnica nad Váhom
SLOVAKIA
Phone: +421 42 4661 230
Fax: +421 42 4661 131
Email: support.slovakia@solar-inverter.com

www.solar-inverter.com