



Installation and operation manual

RPI M50A_12s Solar Inverter



United Kingdom



Europe general



This manual applies to the following inverter models:

- **RPI M50A_12s (Delta part number: RPI503M221000)**

with firmware versions:

DSP: 1.50 / RED: 1.24 / COM: 1.34

The Delta part number can be found on the type plate of the inverter. The firmware versions are listed on the display in the **Inverter Info.** menu.

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This manual is intended for installers.

The information in this manual is to be treated as confidential and no part of this manual may be reproduced without prior written permission from Delta Energy Systems. The information in this manual may not be used for any purpose not directly connected to use of the inverter.

All information and specifications can be modified without prior notice.

If you notice discrepancies between the descriptions in this quick installation guide and the information on the inverter display, go to www.solar-inverter.com and download the version of the quick installation guide that matches the model number and the firmware version of your inverter.

On the website, you will also find the installation and operation manual with detailed information about the inverter.

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1. About This Manual

1.1 Purpose of This Manual

This manual is part of the inverter and supports the installation, commissioning and operation of the inverter.

Read this manual **before** working on the inverter.

Always follow the safety instructions and work instructions in this manual. This will ensure that the inverter can be safely installed, commissioned and operated.

Store this manual in a safe place in the vicinity of the inverter so that it is always quickly available when working on the inverter.

Delta Energy Systems is not responsible for damage resulting from failure to follow the safety and operating instructions set out in this manual.

1.2 Target audience of this manual

This manual is intended for installers who are trained and approved for the installation, commissioning and operation of solar inverters in grid-connected solar systems.

1.3 Warning notices and warning symbols

This manual uses the following warning notices and symbols for describing potential dangers and the measures necessary for reducing these dangers.

Always follow the instructions in the warning notices.

Warning levels



DANGER

Indicates a dangerous situation that will **always** lead to death or severe injuries if not avoided.



WARNING

Indicates a dangerous situation that **can lead** to death or severe injuries if not avoided.



CAUTION

Indicates a dangerous situation that **can lead** to light or medium injuries if not avoided.

ATTENTION

Indicates possible **material damage** that can be caused to other objects by the inverter.



A notice provides information on efficient use of the inverter.

If necessary, the warning notices are also marked with warning symbols indicating the source of the danger.



High electrical voltages or currents



Hot surfaces



Heavy weight



General danger

1 About This Manual

1.4 Writing and labeling conventions

Some sections in this manual are specially labeled.

Labeling of work instructions

Work instructions that must be performed in a specific sequence are numbered accordingly. Numbered sequences of work steps must **always** be performed in the specified sequence.

- 1. First step
 - Where necessary, the result of the work step is described here. This is used for checking that the work step has been completed correctly.
- 2. Second step
- 3. Third step
- ☒ Work step is now finished.

If the work instructions consist of only a single step or the work steps can be performed in any desired sequence then the work steps are labeled as follows:

- Step
- Step

Labeling of inverter components

Buttons



Text on the inverter display

Inverter info.

LEDs

ALARM LED

LED	Meaning
	LED stays on.
	LED flashes.
	LED is off.

2. Basic safety instructions

DANGER



Electrical shock

Potentially fatal voltage is applied to the inverter during operation. When the inverter is disconnected from all power sources, this voltage remains in the inverter for up to 10 seconds. Therefore, always carry out the following steps before working on the inverter:

1. Turn the AC/DC disconnect to the **OFF** position.
2. Disconnect the inverter from all AC and DC voltage sources and make sure that none of the connections can be accidentally restored.
3. Wait for at least 10 seconds until the internal capacitors have discharged.

DANGER



Electrical shock

Potentially fatal voltage is present at the inverter's DC connections. When light falls on the solar modules, they immediately start to generate electricity. This also happens when light does not fall directly on the solar modules.

- ▶ Never disconnect the inverter from the solar modules when it is under load.
- ▶ Turn the AC/DC disconnect to the **OFF** position.
- ▶ Disconnect the connection to the grid so that the inverter cannot supply energy to the grid.
- ▶ Disconnect the inverter from all AC and DC voltage sources. Ensure that none of the connections can be restored accidentally.
- ▶ Ensure that the DC cables cannot be touched accidentally.

WARNING



Electrical shock

When the cover is removed from the fuse box, this exposes live parts and protection conforming to IP65 is no longer guaranteed.

- ▶ Remove the cover only when it is absolutely necessary.
- ▶ Do not remove the cover if water might enter the inverter.
- ▶ After work is completed, ensure that the cover is properly replaced and screwed in. Check that the cover is properly sealed.

WARNING



Heavy weight

The inverter is very heavy.

- ▶ The inverter must be lifted and carried by at least 3 people or using appropriate lifting gear.

- To comply with the IEC 62109-5.3.3 safety requirements and avoid injury or material damage, the inverter must be installed and operated in accordance with the safety and operating instructions set out in this manual. Delta Energy Systems is not responsible for damage resulting from failure to follow the safety and operating instructions set out in this manual.
- The inverter may only be installed and commissioned by installers who have been trained and certified for the installation and operation of grid-based solar inverters.
- All repair work on the inverter must be carried out by Delta Energy Systems. Otherwise, the warranty will be void.
- Warning instructions and warning symbols attached to the inverter by Delta Energy Systems must not be removed.
- The inverter has a high leakage current value. The grounding cable **must** be connected before commencing operation.
- Do not disconnect any cables while the inverter is under load due to risk of a fault arc.
- To prevent damage due to lightning strikes, follow the provisions that apply in your country.
- The surface of the inverter can get very hot during operation. Only touch the inverter (outside of the display) with safety gloves.
- Only equipment in accordance with SELV (EN 60950) may be connected to the RS485 interfaces.
- All connections must be sufficiently insulated in order to ensure the IP65 protection degree. Unused connections must be closed using cover caps.

3 Intended purpose

3. Intended purpose

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

The intended purpose of the inverter is defined as follows:

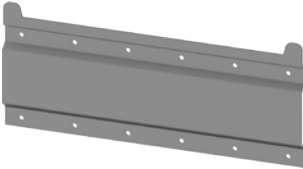
- Use in stationary solar systems connected to the public grid, for converting DC voltage generated by the solar modules in the solar system into AC voltage that is fed into the public grid.
- Use in conformance with the power specifications and environmental conditions specified by the manufacturer.

The following uses are regarded as **not the intended purposes**:

- Use in stand-alone mode, i.e. without a connection to the public grid. The inverter has functions for preventing operating in stand-alone mode.
- Use in mobile solar systems

4. Product overview

4.1 Scope of delivery

Part	Quantity	Description	Part	Quantity	Description
Inverter	1		AC plug	1	China Aviation Optical-Electrical Technology Co. PVE5T125KE36 
Mounting plate	1		Sealing rings for AC plug	1	1 set with 3 sealing rings 
	12	Multi-Contact MC4-plug for DC + (32.0017P0001-UR for 4/6 mm²) 	Grounding screw	1	To ground the inverter housing; with spring washer, washer and lock washer; mounted on the inverter
DC plug	12	Multi-Contact MC4-plug for DC- (32.0016P0001-UR for 4/6 mm²) 	Quick installation guide and basic safety instructions	1	 Installations- und Betriebshandbuch RPI M50A_12s 



Check the delivery for completeness and all components for damage before starting installation work.
Do not use any damaged components.



Keep the packaging.

4 Product overview

4.2 Overview of components and connections



Fig. 4.1: Overview of components and connections

1	Display, buttons, and LED	See “4.3 Display, buttons, status LEDs”, page 13
2	Fuse box with string fuses and overvoltage conductors	See “4.4 String fuses”, page 14 and “4.5 Surge protection devices”, page 15
3	Air inlets	See “4.6 Air inlets, air outlets and fans”, page 15
4	Electrical connections	See “4.7 Electrical connections”, page 16
5	Fans	See “4.6 Air inlets, air outlets and fans”, page 15
6	Type plate	See “4.8 Information on the Type Plate”, page 20

4.3 Display, buttons, status LEDs



Fig. 4.2: Overview of display, buttons, and LEDs

Label	Designation	Use
LEDs		
GRID	Grid	Green LED; lights up when the inverter is supplying power to the grid.
ALARM	Alarm	Red LED; displays a warning, an error or a fault.
Buttons		
	Exit	Exit the current menu. Cancel the setting of a parameter. Changes are not adopted.
	Down	Move downwards in the menu. Reduce the value of a configurable parameter.
	Up	Move upwards in the menu. Increase the value of a configurable parameter.
	Enter	Select menu item. Open a configurable parameter for editing. Accept the setting of a parameter. Changes are adopted.

4 Product overview

4.4 String fuses



Fig. 4.3: Position of the string fuses on the inverter

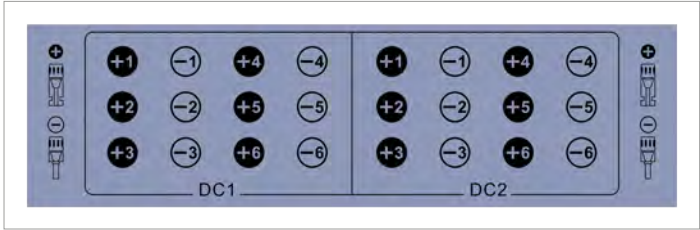
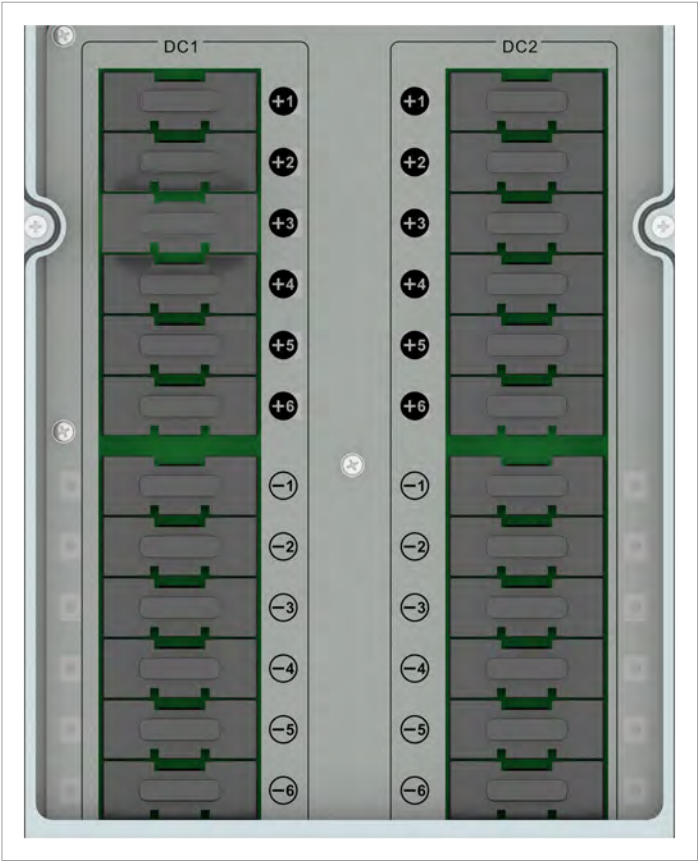


Fig. 4.4: Assignment of the string fuses to the DC inputs

The inverter has string fuses on the DC side.



Fig. 4.5: The inverter uses Littelfuse string fuses

Type

Manufacturer	Littelfuse
Part number	0SPF015.T
Nominal current	15 A
Nominal voltage	1000 V

or

Manufacturer	Hollyland
Part number	10GPV15UO
Nominal current	15 A
Nominal voltage	1000 V

4.5 Surge protection devices



Fig. 4.6: Position of the surge protection devices on the inverter

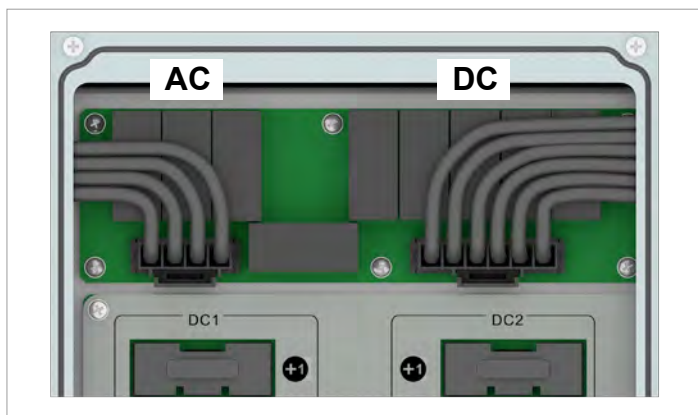


Fig. 4.7: Assignment of the surge protection devices (AC and DC)

The inverter has replaceable type 2 surge protection devices on the AC side and the DC side. The surge protection devices protect the inverter from excessively high voltages.

The surge protection devices are located behind the fuse box cover.

Type for the AC side

Type 2 OCM as per EN 61643-11	
Nominal current I_n	10 kA (8/20)
Maximum current I_{max}	20 kA (8/20)
Voltage U_p	1.8 kV

Type for the DC side

Type 2 OCM as per EN 50539-11	
Current I_n	20 kA (8/20)
Current I_{max}	40 kA (8/20)
Voltage U_p	≤3.9 kV

4.6 Air inlets, air outlets and fans



Fig. 4.8: Air inlets are located at the top of the left and right sides



Fig. 4.9: Position of the fans and air outlet on the inverter

Ambient air is sucked into the air inlets by the fans, passed through the inverter for cooling and the heated air is then expelled to the environment via the air outlet.

4 Product overview

4.7 Electrical connections

4.7.1 Overview

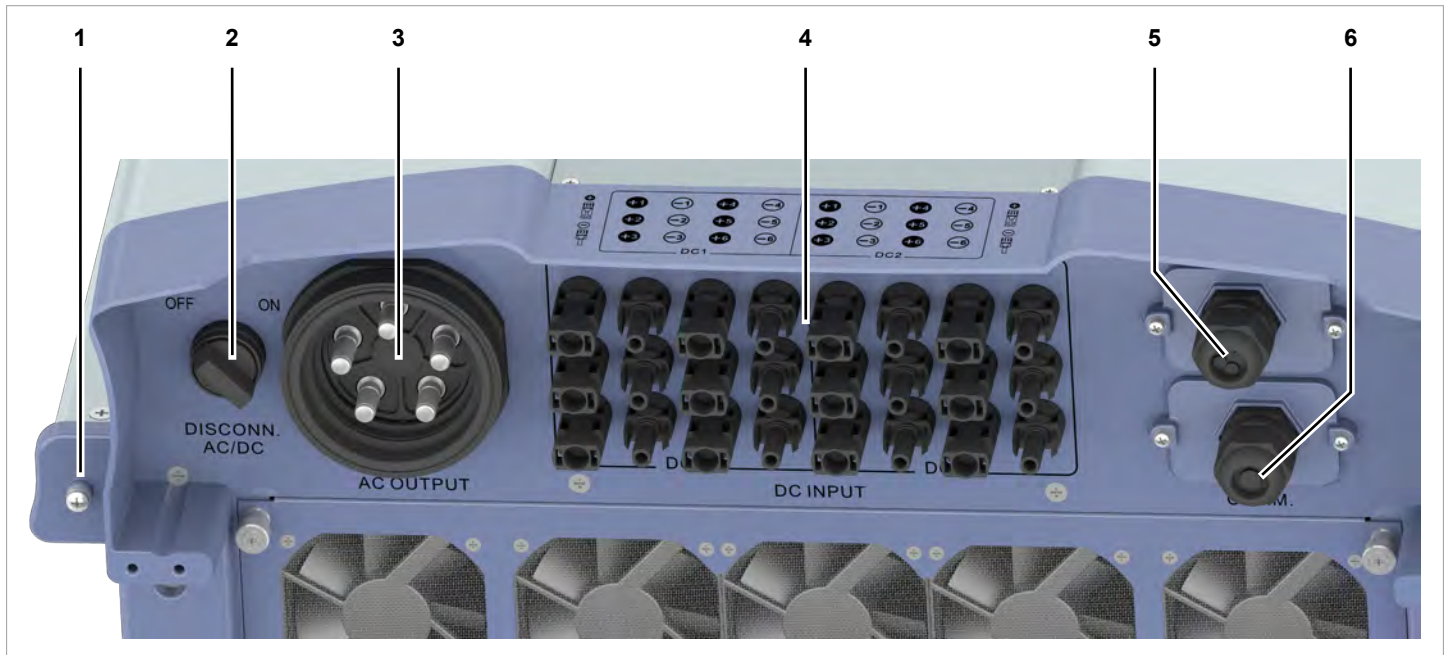


Fig. 4.10: Overview of electrical connections

Component/Connection		Label on the inverter	Description
1	Grounding connection	-	Further information is provided in “4.7.2 Grounding connection”, page 17
2	AC/DC disconnect	DISCONN. AC/DC	Further information is provided in “4.7.3 AC/DC disconnect”, page 17
3	AC connection	AC OUTPUT	Further information is provided in “4.7.4 AC connection (AC OUTPUT)”, page 18
4	DC connections	DC INPUT	Further information is provided in “4.7.5 DC connection (DC INPUT)”, page 18
5	Communication port 1	COMM.	Further information is provided in “4.7.6 Communication port 1”, page 19
6	Communication port 2	COMM.	Further information is provided in “4.7.7 Communication port 2”, page 19

4.7.2 Grounding connection



Fig. 4.11: Position of the grounding connection on the inverter

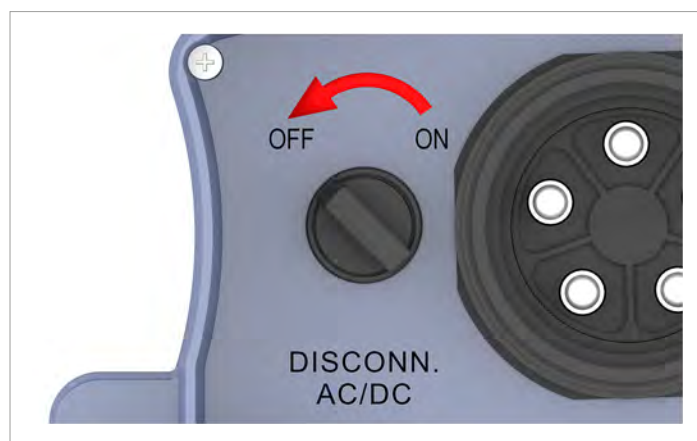
The inverter housing can be grounded via the grounding connection.

M6 screw, spring washer, washer, and toothed lock washer are already mounted on the inverter.

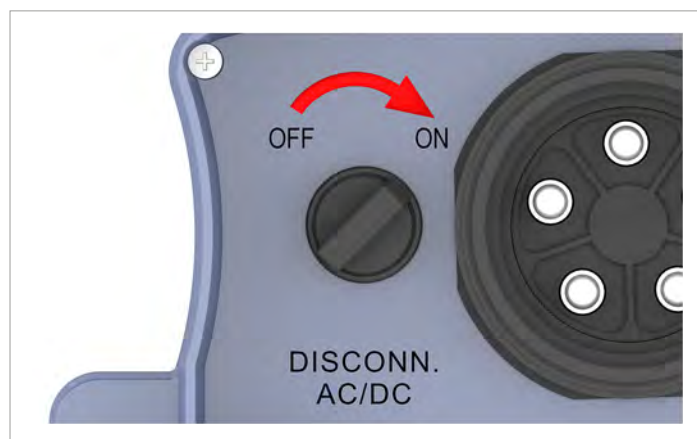
4.7.3 AC/DC disconnect



Fig. 4.12: Position of the AC/DC disconnect on the inverter



The inverter is **disconnected** from the grid and the solar modules when the AC/DC disconnect is in the **OFF** position.



The inverter is **connected** to the grid and the solar modules when the AC/DC disconnect is in the **ON** position.

4 Product overview

4.7.4 AC connection (AC OUTPUT)



Fig. 4.13: Position of the **AC connection** on the inverter

The inverter is connected to the public grid via the AC connection.

Purpose:

- Feeding AC power into the public grid.
- Providing power for the display when power is not available from the solar modules.

Grid types that can be used:

- Grids with 3 phases and a neutral conductor: 3P4W (L1, L2, L3, N, PE)
- Mains grids with 3 phases and without a neutral conductor: 3P3W (L1, L2, L3, PE).

Plug type required:

China Aviation Optical-Electrical Technology Co. PVE5T125KE36

The AC plug is included in the scope of delivery.

4.7.5 DC connection (DC INPUT)

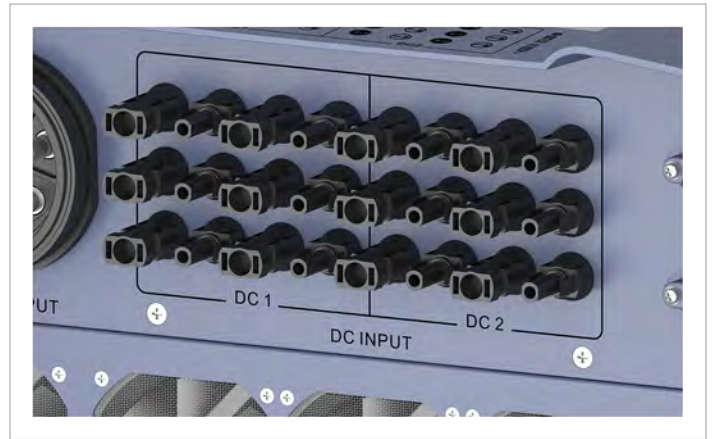


Fig. 4.14: Position of the **DC connections** on the inverter

The solar modules are connected to the DC connections.

Plug type required:

- Multi-contact MC4 32.0017P0001-UR for DC+
- Multi-contact MC4 32.0016P0001-UR for DC–

12 pairs of DC plugs are supplied in the scope of delivery.

4.7.6 Communication port 1



Fig. 4.15: Position of communication connection 1 on the inverter

4.7.7 Communication port 2



Fig. 4.16: Position of communication connection 2 on the inverter

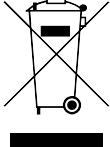
Available connections:

Connection	Connection type
2x RS485 (DATA+ and DATA–)	Terminal block
1x VCC (12 V, 0,5 A)	Terminal block
6x digital inputs	Terminal block
2x dry contacts	Terminal block
1x external power-off (EPO)	Terminal block

Communication connection 2 is not used on this inverter.

4 Product overview

4.8 Information on the Type Plate

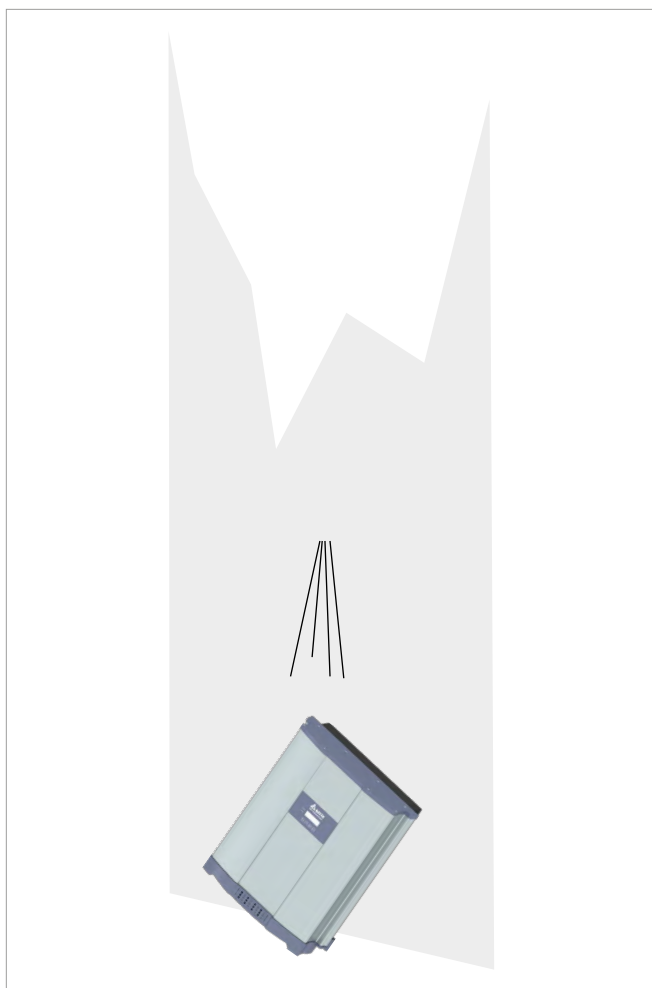
Information on the Type Plate	Description
 10 seconds	Danger to life through electric shock Potentially fatal voltage is present inside the inverter during operation and this voltage is still present 10 seconds after disconnection of the power supply. Only the fuse box may be opened. All other device parts may not be opened.
	Before working on the solar inverter, you must read the supplied manual and follow the instructions contained therein.
	This inverter is not separated from the grid by a transformer.
	The housing of the inverter must be grounded if this is required by local regulations.
	WEEE marking The inverter must not be disposed of as standard household waste, but in accordance with the applicable electronic waste disposal regulations of your country or region.
DC input	
200~1000 V DC	DC input voltage range
MPPT 520-800 V DC	MPP input voltage range at full power (with symmetrically configured DC inputs)
1000 V DC	Maximum DC input voltage
50 A*2 max.	Maximum DC input current (50 A at DC1 and DC2 respectively)
Isc: 60 A*2 max.	DC short-circuit current
AC output	
220/380, 230/400 Vac	AC nominal voltage
3P3W or 3P4W	The inverter can be connected to 3-phase grids without neutral conductors (3P3W, 3 phases + PE) and 3-phase grids with neutral conductors (3P4W, 3 phases + N + PE).
50 / 60 Hz	AC nominal frequency
50 kW nom.	Nominal active power
55 kW/55 kVA	Maximum active power/reactive power
Max. 80 A	Maximum AC current
cos φ 0,8 ind. ~ 0.8 cap.	Setting range of the displacement factor cos φ
IP code: IP65 (Electronics)	
Degree of protection for the electronics as per EN 60529	
Protective Class: I	Safety class as per EN 61140
AC Overvoltage Category: III	AC overvoltage category as per IEC 62109-1
Assembled in China	Assembled in China

5. Planning installation

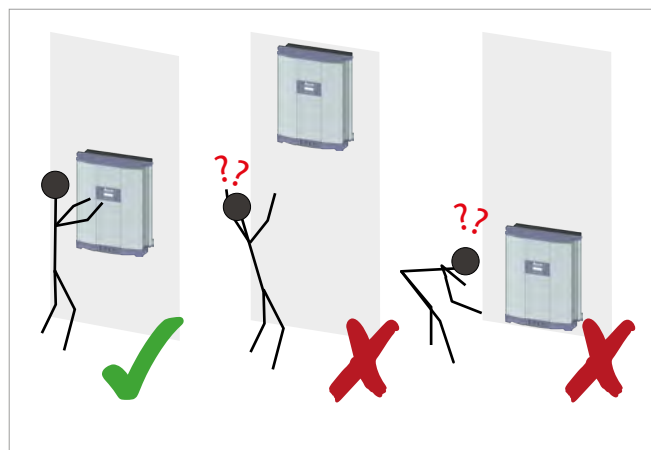


This chapter only describes **planning** of the installation work. The **execution** of the installation work and the associated dangers are described in chapter "6. Installation", page 45.

5.1 Installation location



- ▶ The inverter is very heavy. The wall or mounting system must be able to bear the heavy weight of the inverter.
- ▶ Always use the mounting plate supplied with the inverter.
- ▶ Use mounting materials (dowels, screws etc.) that are suitable for the wall or the mounting system, as well as the heavy weight of the inverter.
- ▶ Mount the inverter on a vibration-free wall to avoid malfunctions.
- ▶ When using the inverter in residential areas or in buildings with animals, possible noise emissions can be disturbing. Therefore, choose the place of installation carefully.
- ▶ Mount the inverter on a fireproof wall.



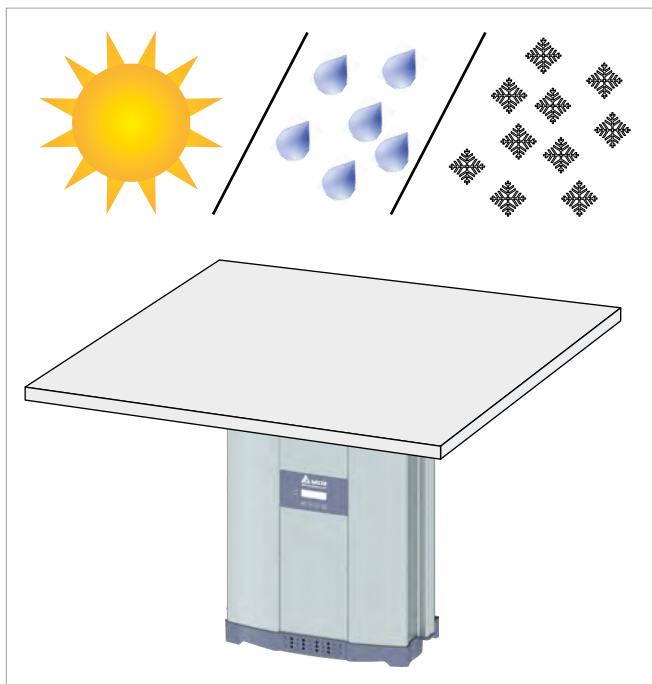
- ▶ Attach the inverter so that the information on the display can be read and the buttons can be operated without any problems.



- ▶ Mount the inverter vertically.

5 Planning installation

5.2 Outdoor installations



- The inverter has a protection degree of IP65 and can be installed indoors and outdoors. Despite this, the inverter should be protected by a roof against direct solar irradiation, rain and snow.

For example, the power of the inverter will be reduced if it is too heavily heated by solar irradiation. This is normal operating behavior for the inverter and is necessary to protect the internal electronics.

- In areas with many trees or fields, pollen and other plant material can clog the air inlets or fans.

One solution is to cover the air inlets. This must not hinder the flow of air through the inverter. Regularly clean and test the cooling system, see [“11.4 Cleaning the air inlets”](#), [page 144](#).

5.3 Installation clearances and air circulation

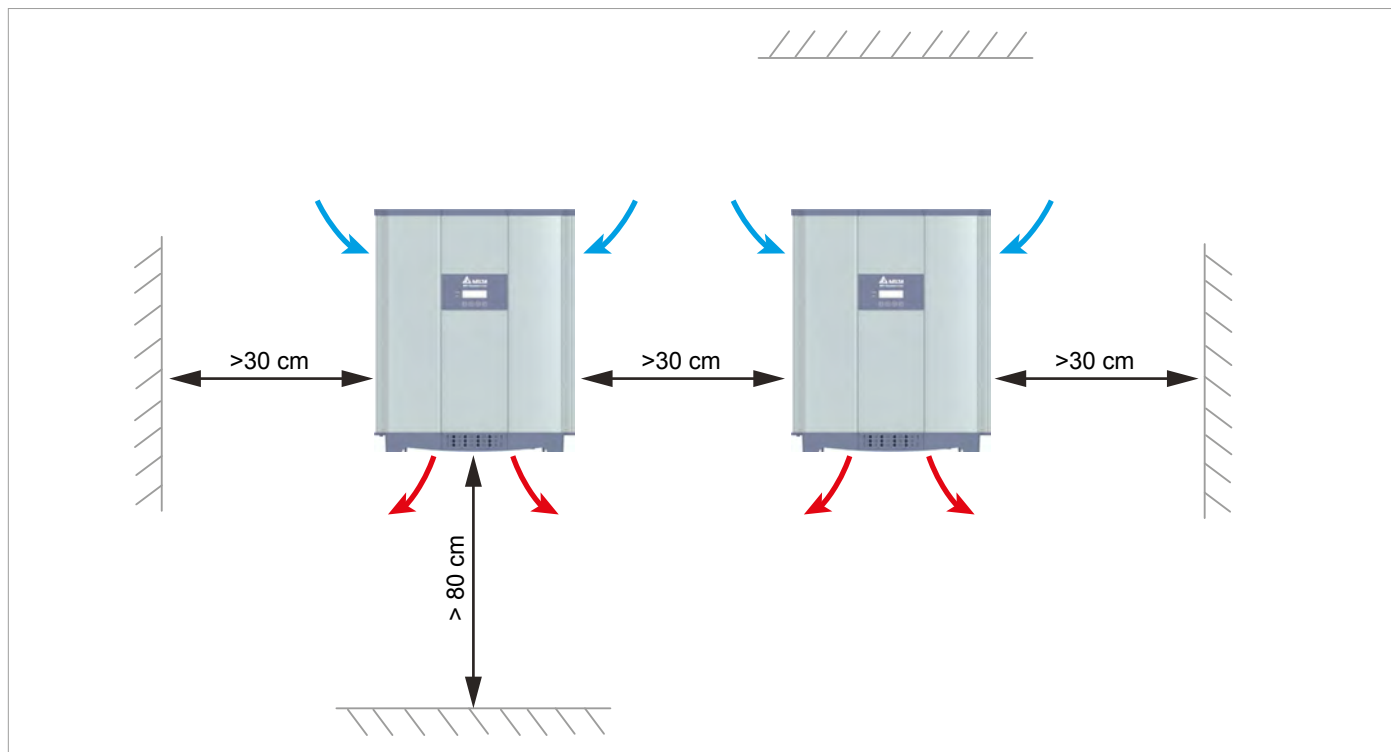


Fig. 5.1.: Installation clearances and air circulation I

- Ensure sufficient air circulation. Warm air must be able to escape from below.
- Leave enough space around each inverter.
- Do not install inverters above one another so that they do not heat each other.
- Note the *Operating temperature range without derating* and the *Operating temperature range*.

When the *Operating temperature range without derating* is exceeded the inverter reduces the AC power fed into the grid.

When the *Operating temperature range* is exceeded the inverter stops feeding AC power into the grid.

This is normal operating behavior for the inverter and is necessary to protect the internal electronics.

5 Planning installation

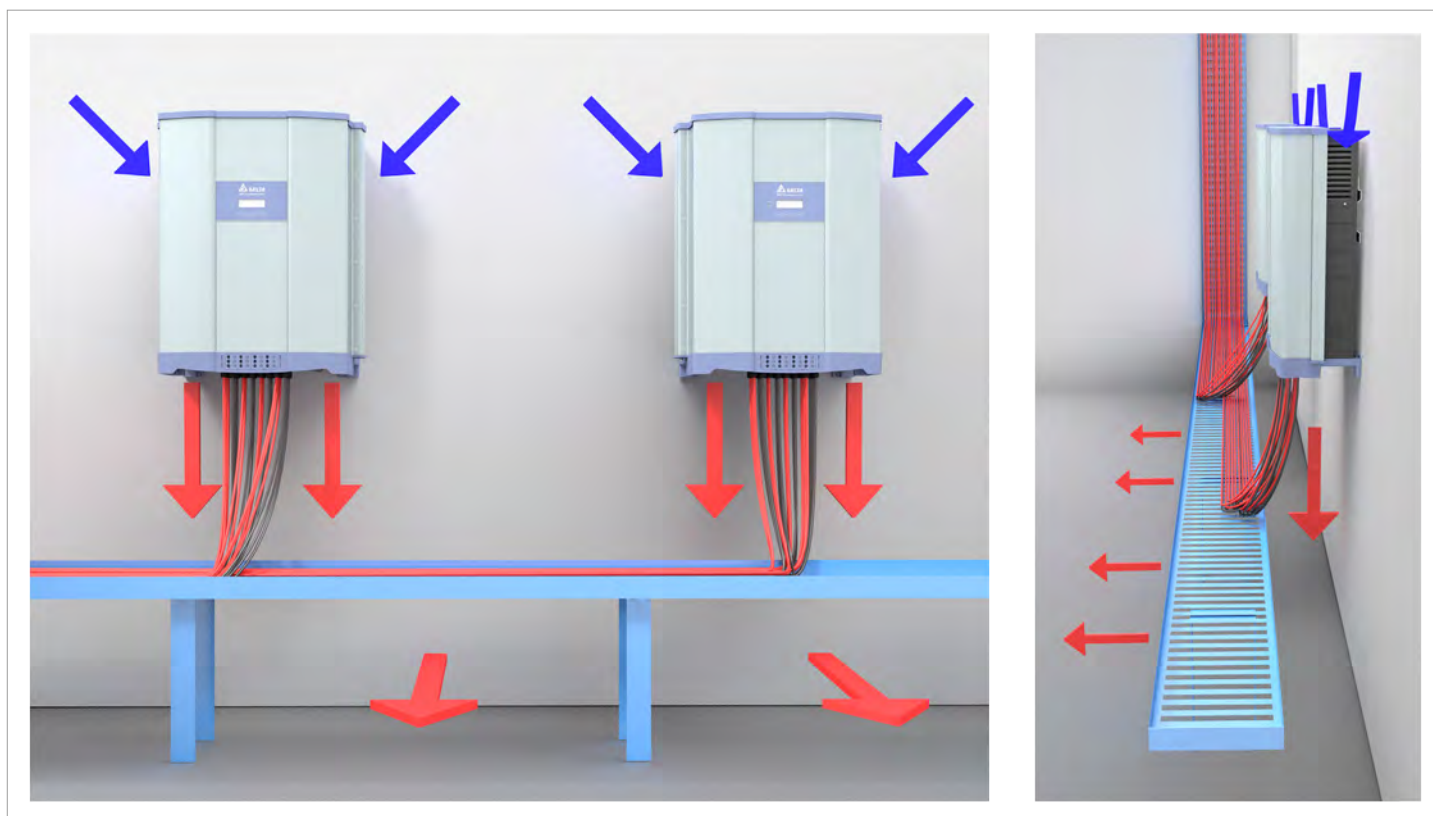


Fig. 5.1: Air flow around solar inverters

5.4 Characteristic curves

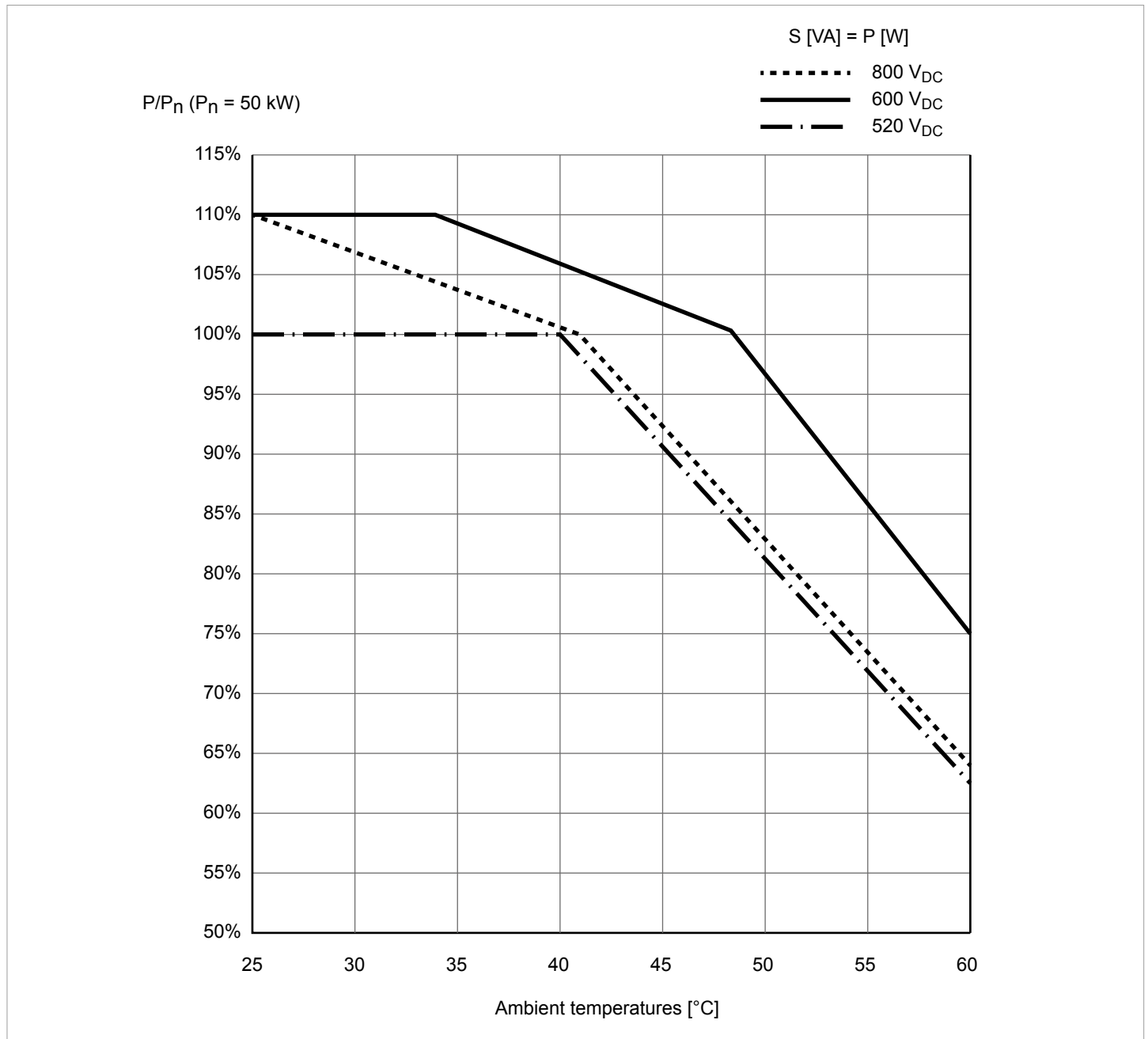


Fig. 5.2: Characteristic curve "Power reduction depending on the ambient temperature, $\cos \varphi = 1.0$ " (derating)

5 Planning installation

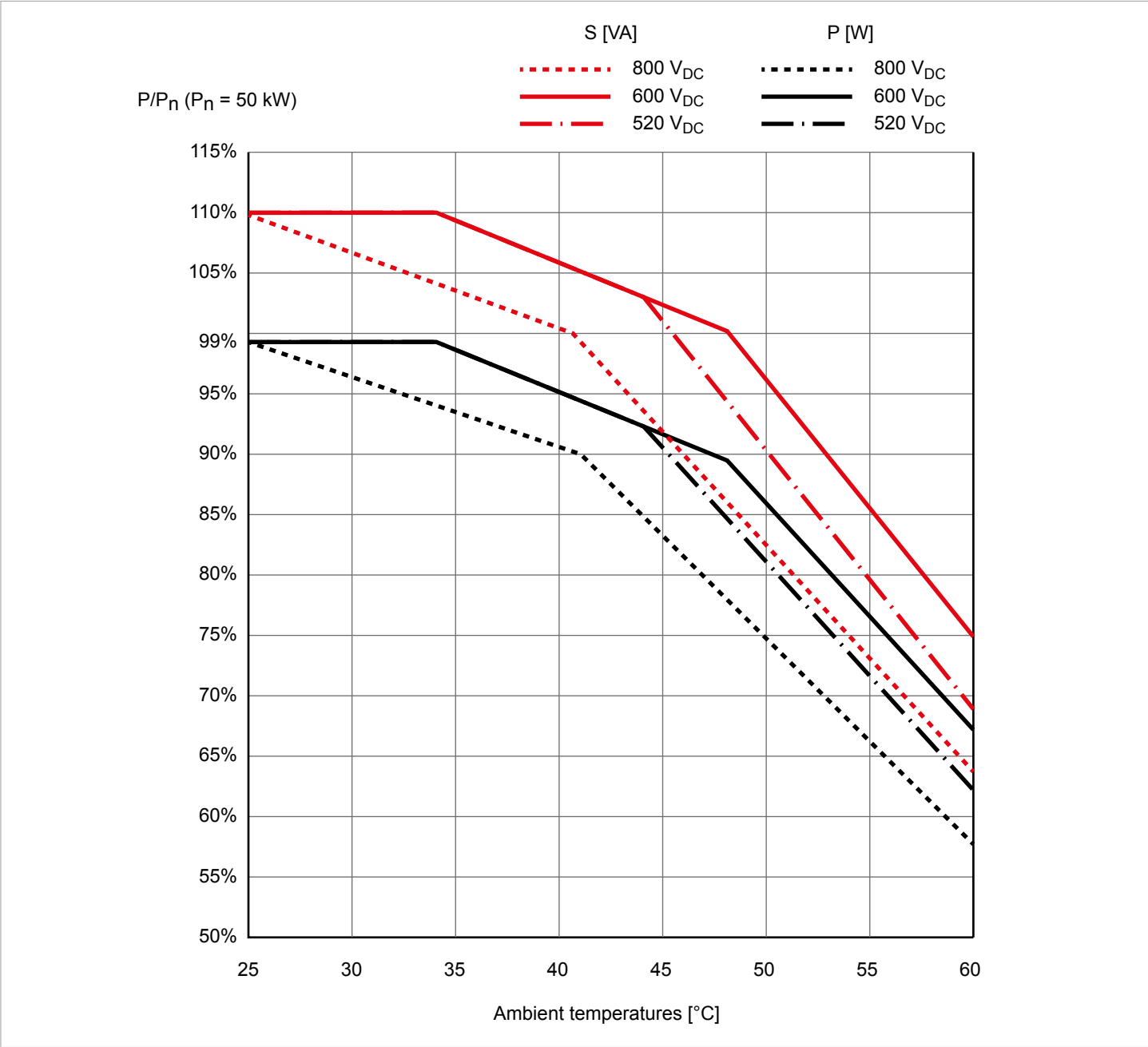


Fig. 5.3: Characteristic curve "Power reduction depending on the ambient temperature, $\cos \varphi = 0.95$ " (derating)

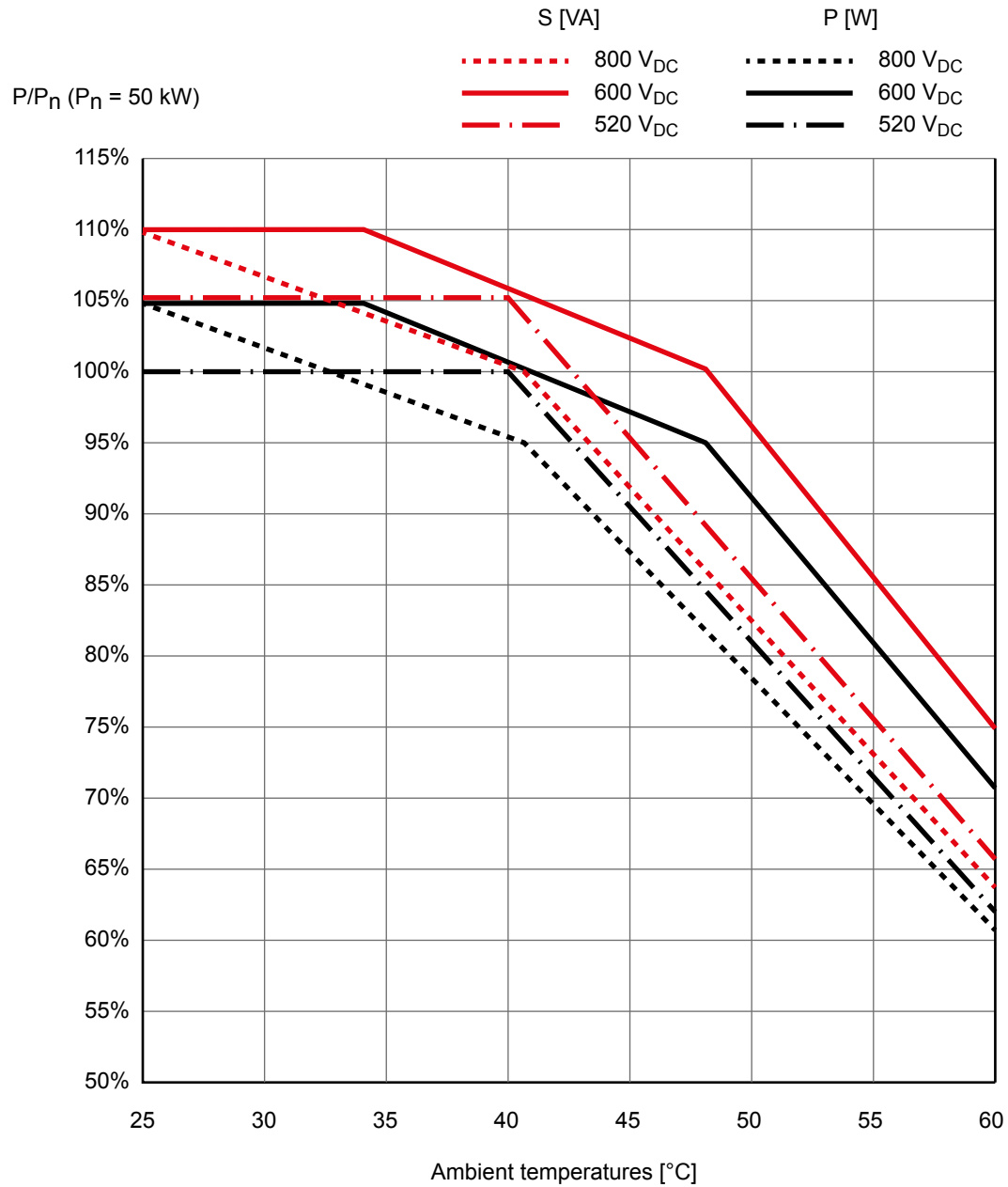


Fig. 5.4: Characteristic curve "Power reduction depending on the ambient temperature, $\cos \varphi = 0.90$ " (derating)

5 Planning installation

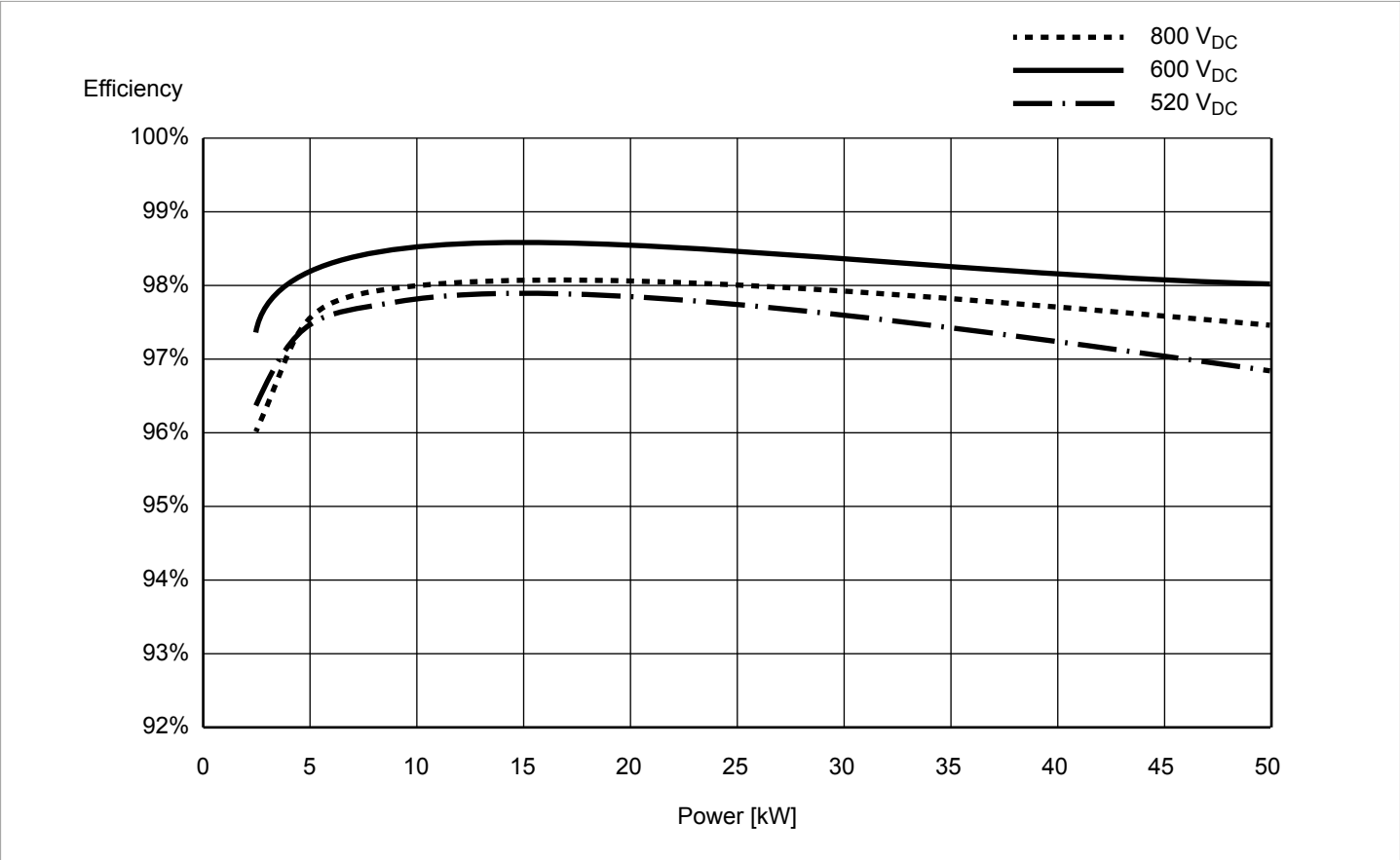


Fig. 5.5: Efficiency curve

5.5 Dimensions

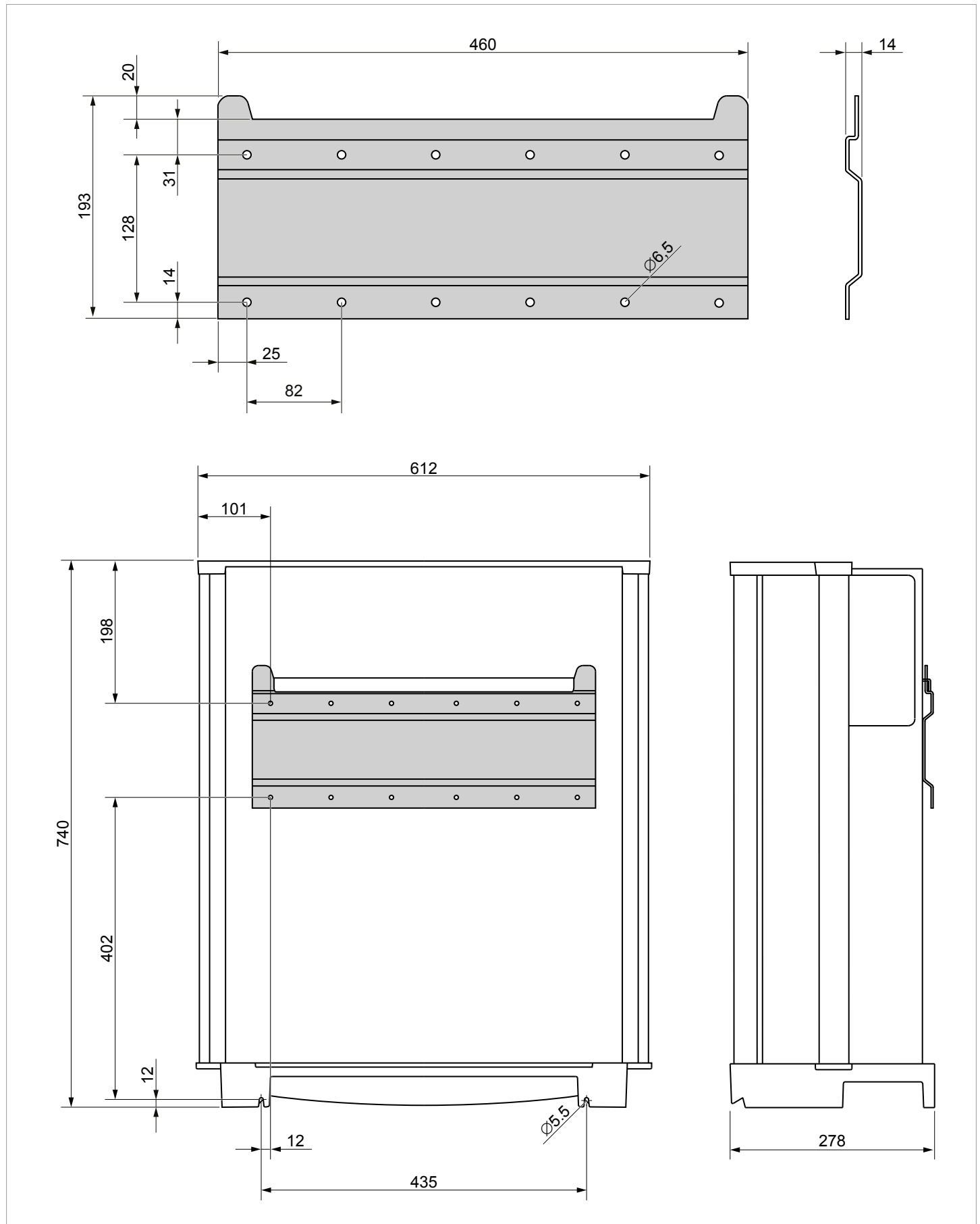


Fig. 5.6: Dimensions

5 Planning installation

5.6 AC connection (grid)

NOTICE



Ingress of moisture

If the fuse box cover is removed, the protection class is no longer IP65.

- ▶ Only remove the cover when the inverter is in a dry environment.

5.6.1 Important safety instructions

- ▶ Always follow the specific regulations of your country or region.
- ▶ Always follow the specific regulations of your energy provider.
- ▶ Install all stipulated safety and protective devices (e.g. automatic circuit breakers and/or surge arresters).
- ▶ Protect the inverter with a suitable upstream circuit breaker:

Circuit breaker	100 A
-----------------	-------

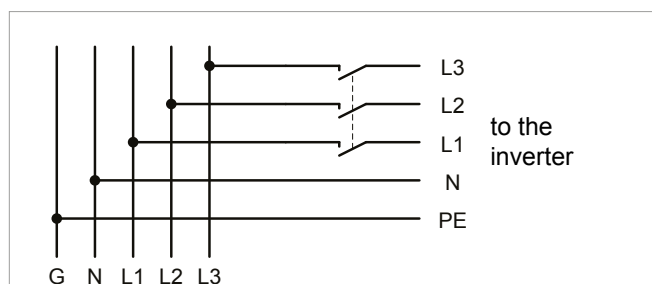


Fig. 5.7.: Position of the upstream circuit breaker

1.1.1 Residual current circuit breaker

Due to its design, the inverter cannot supply the grid with DC residual current. This means that the inverter meets the requirements of DIN VDE 0100-712.

Possible error events were assessed by Delta in accordance with the current installation standards. The assessments showed that no hazards arise from operating the inverter in combination with an upstream, type A residual current circuit breaker (FI circuit breaker, RCD). There is no need to use a type B residual current circuit breaker.

Minimum tripping current of the type A residual current circuit breaker	≥300 mA
---	---------



The required tripping current of the residual current circuit breaker depends first and foremost on the quality of the solar modules, the size of the PV system, and the ambient conditions (e.g. humidity). The tripping current must not, however, be less than the specified minimum tripping current.

5.6.2 Integrated residual current monitoring unit

The integrated, universal current-sensitive residual current monitoring unit (RCMU) is certified in accordance with VDE 0126 1-1/A1:2012-02 §6.6.2.

5.6.3 Integrated string fuses and surge protection devices

- ▶ Replace damaged string fuses and surge protection devices with devices of the same type and from the same manufacturer.
- ▶ Surge protection devices are available from Delta.

5.6.4 Cable requirements

The AC plug provided with the inverter has the following technical characteristics:

AC connection	China Aviation Optical-Electrical Technology Co. PVE5T125KE36
Nominal current	100 A
Min./max. cable diameter	21,9 ... 44,7 mm
Min./max. Wire cross-section	25 ... 38 mm ²
Recommended torque for terminal screws	3 Nm

The AC plug can only be used with a flexible copper cable.

Consider the following factors when calculating the cable diameter:

- Cable material
 - Temperature conditions
 - Cable length
 - Installation type
 - Voltage drop
 - Loss of power in the cable
- ▶ Always follow the installation regulations for AC cables applicable in your country.
 - ▶ France: Follow the installation regulations of UTE 15-712-1. This standard contains the requirements for minimum cable diameters and for avoiding overheating due to high currents.
 - ▶ Germany: Follow the installation regulations of VDE 0100-712. This standard contains the requirements for minimum cable diameters and for avoiding overheating due to high currents.
 - ▶ Australia/New Zealand: Follow the installation regulations of AS/NZS 5033:2005. This standard contains the requirements for minimum cable diameters and for avoiding overheating due to high currents.

5.6.5 Grounding the inverter

The inverter must be grounded via the PE conductor. To do this, connect the PE conductor of the AC cable to the AC plug pin provided for that purpose.

5.6.6 Permissible grounding systems

Grounding system	TN-S	TN-C	TN-C-S	TT	IT
Allowed	Yes	Yes	Yes	Yes	No

5.6.7 Requirements for the grid voltage

3P3W	Voltage range	3P4W	Voltage range
L1-L2	$400 V_{AC} \pm 20\%$	L1-N	$230 V_{AC} \pm 20\%$
L1-L3	$400 V_{AC} \pm 20\%$	L2-N	$230 V_{AC} \pm 20\%$
L2-L3	$400 V_{AC} \pm 20\%$	L3-N	$230 V_{AC} \pm 20\%$

5.7 DC connection (solar modules)

NOTICE



Incorrectly dimensioned solar system.

An solar system of the wrong size may cause damage to the inverter.

- Always pay attention to the technical specifications of the inverter (input voltage range, maximum current and maximum input power) when calculating the number of solar modules.

NOTICE



Overheating of the DC connections.

Exceeding the maximum current can cause overheating of the DC connections and result in a fire.

- Always take the maximum current of the DC connections into account when planning the installation.

5 Planning installation

5.7.1 Symmetric and asymmetric configuration of the DC inputs

The inverter has a separate MPP tracker for each DC input (DC1 and DC2).

The two MPP trackers work independently, i.e. the optimum working point is set separately for DC1 and DC2. This allows the module strings connected to DC1 and DC2 to be differently aligned and differently dimensioned. A typical application example is a building with a gable roof where the roof halves are oriented to the east and west.

Variant 1: Symmetrical design of the DC inputs

The total input power is evenly divided (50%/50%) between DC1 and DC2.

Variant 2: Asymmetrical design of the DC inputs

The maximum permissible total input power is divided between DC 1 and DC 2 within a range of 60%/40% to 40%/60%. A distribution of 55%/45% or 45%/55% is also possible, for example.

The percentages relate to the instantaneous input power. With an east-west roof-mounted system, this allows installing 60% of the maximum input power on both roofs. This utilizes the effect that the solar modules on both roofs provide maximum power at different times of the day.

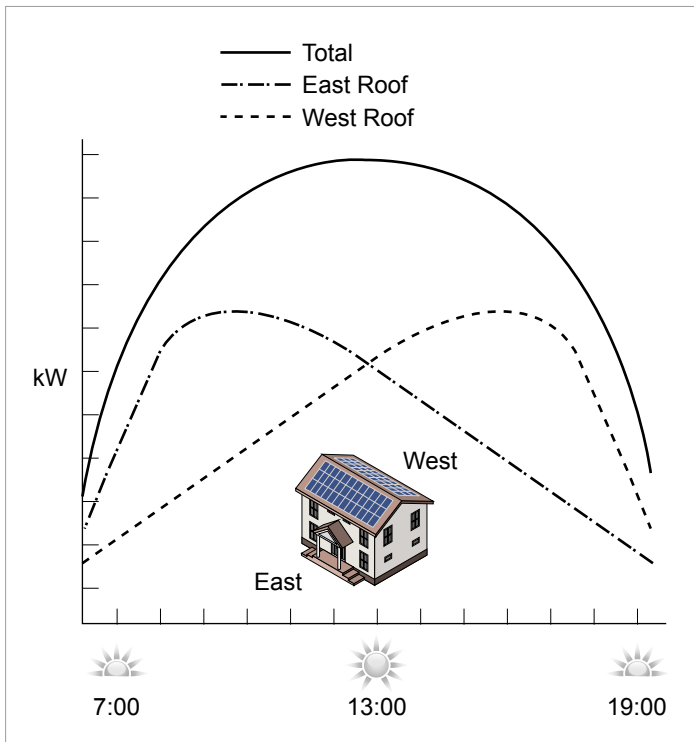
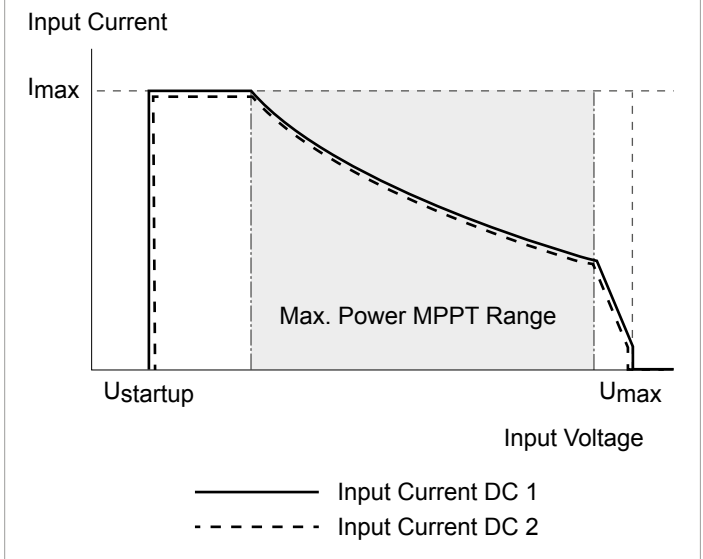


Fig. 5.8: Concept for a system with 2 MPP trackers and asymmetric configuration of the DC inputs

Symmetrical design



Asymmetrical design

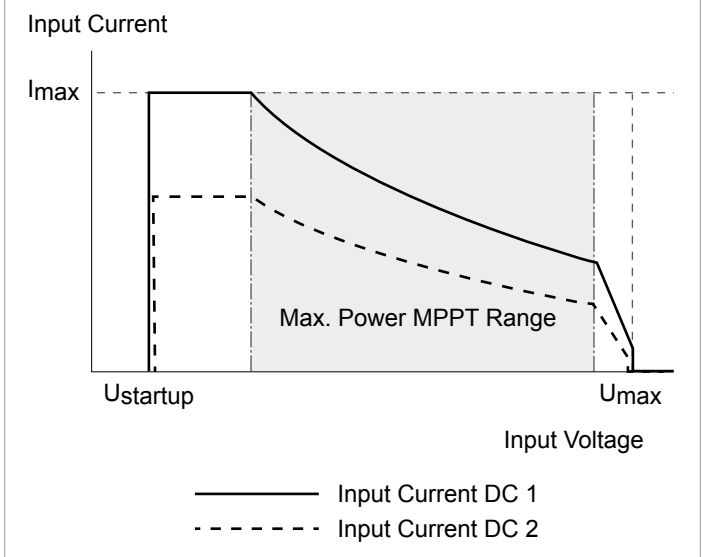


Fig. 5.9: I-U characteristic curves for symmetric and asymmetric configuration of the DC inputs (illustration of principle)



See "13. Technical data", page 164 for currents and voltages.

5.7.2 Separately connected and parallel-connected DC inputs

The inverter can be operated with separately connected and parallel-connected DC inputs.

Separately connected DC inputs

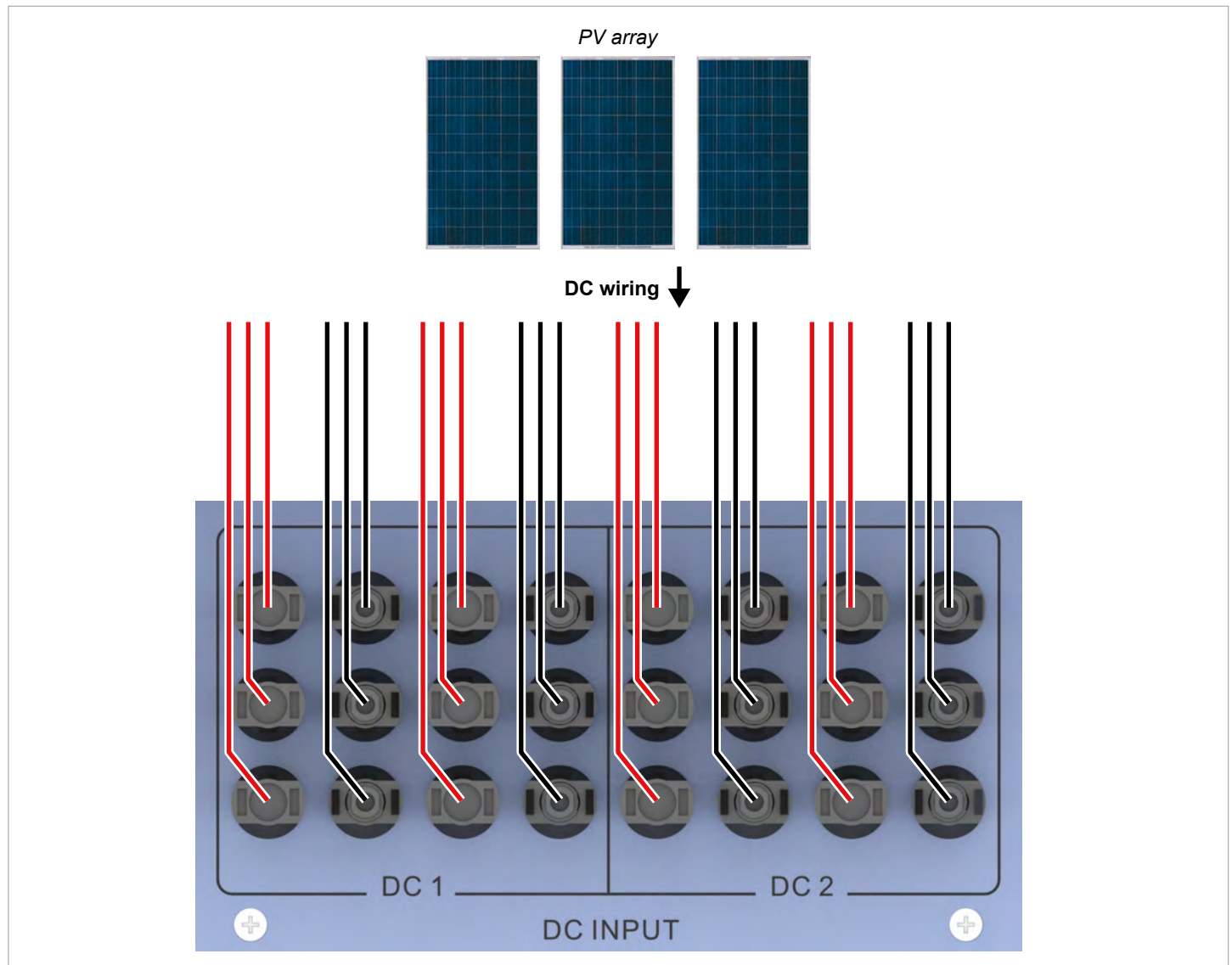


Fig. 5.10: Separately connected DC inputs

The module strings for DC1 and DC2 are connected separately. MPP tracker 1 regulates the module strings at DC1, MPP tracker 2 regulates the module strings at DC2.

This allows implementation of symmetric and asymmetric configurations at the DC inputs.

This DC cabling variant **cannot** be used with grounded solar modules.

5 Planning installation

5.7.3 Parallel-connected DC inputs

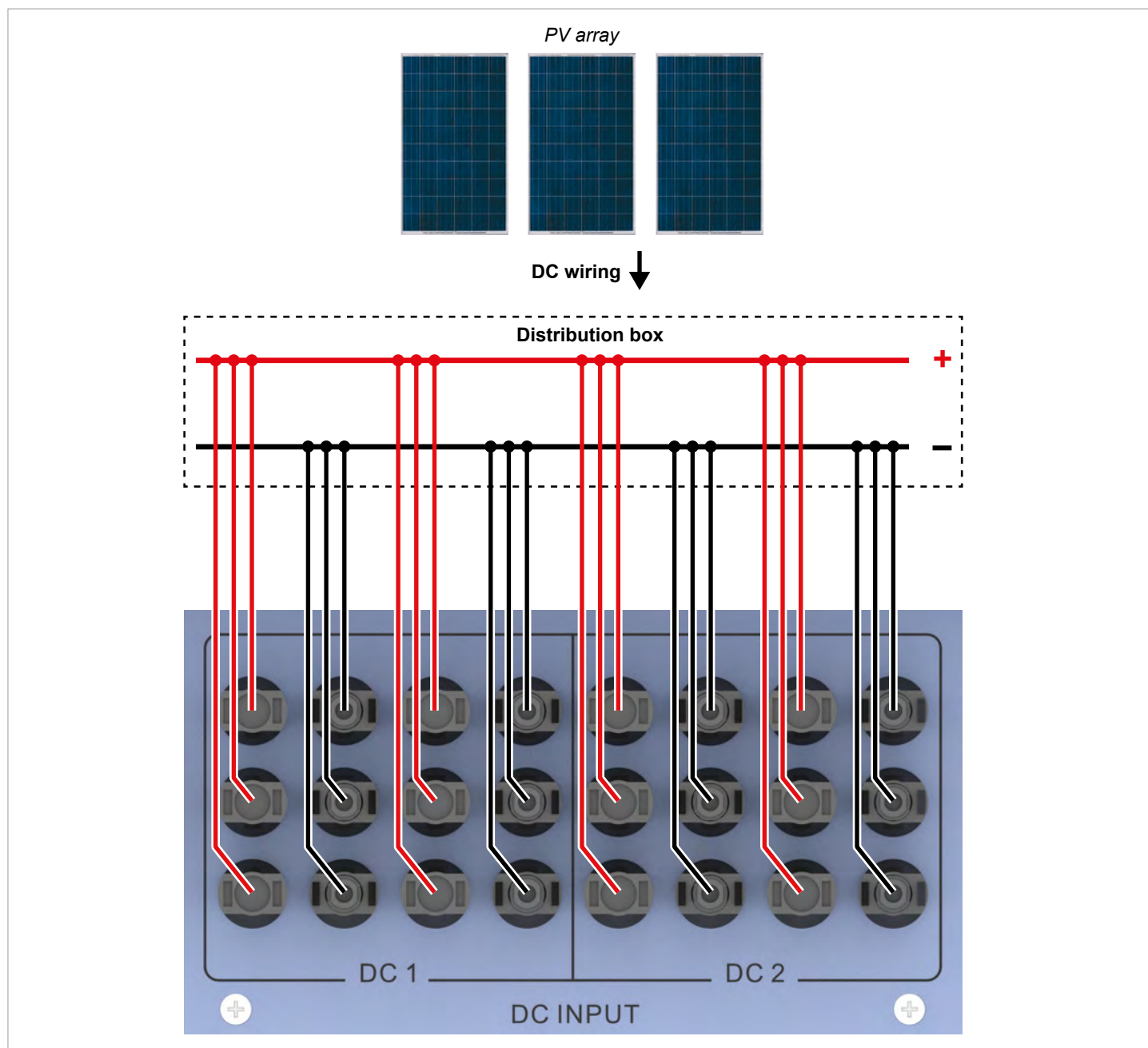


Fig. 5.11: Parallel-connected DC inputs

The module strings are combined at a distribution box and the DC cable is then connected to DC1 and DC2. MPP tracker 1 regulates all module strings, MPP tracker 2 is not used.

This allows implementation of symmetric configurations only at the DC inputs.

This DC cabling variant **is mandatory by law** for use with grounded solar modules.

5.7.4 Connecting solar modules that are not grounded

The DC inputs can be connected to the DC inputs separately or in parallel when using non-grounded solar modules.

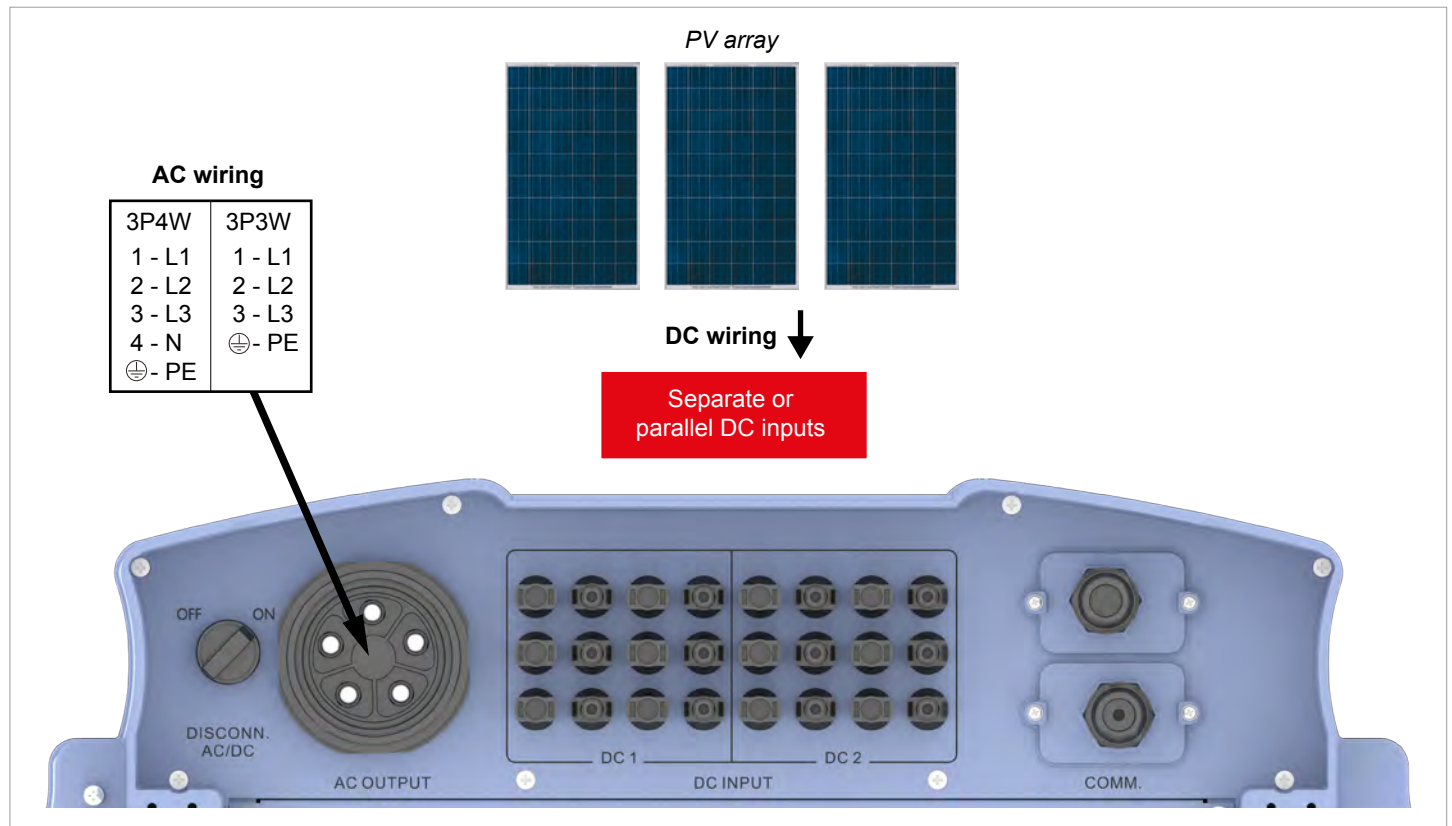


Fig. 5.12: System design when using non-grounded solar modules

5 Planning installation

5.7.5 Connecting grounded solar modules

The DC inputs must be connected in parallel when using grounded solar modules.

- ▶ An isolation transformer must be connected between the grid and the AC connection of the inverter.
- ▶ The insulation monitoring can be set on the inverter display after commissioning, see “8.4.2 Insulation”, page 84.

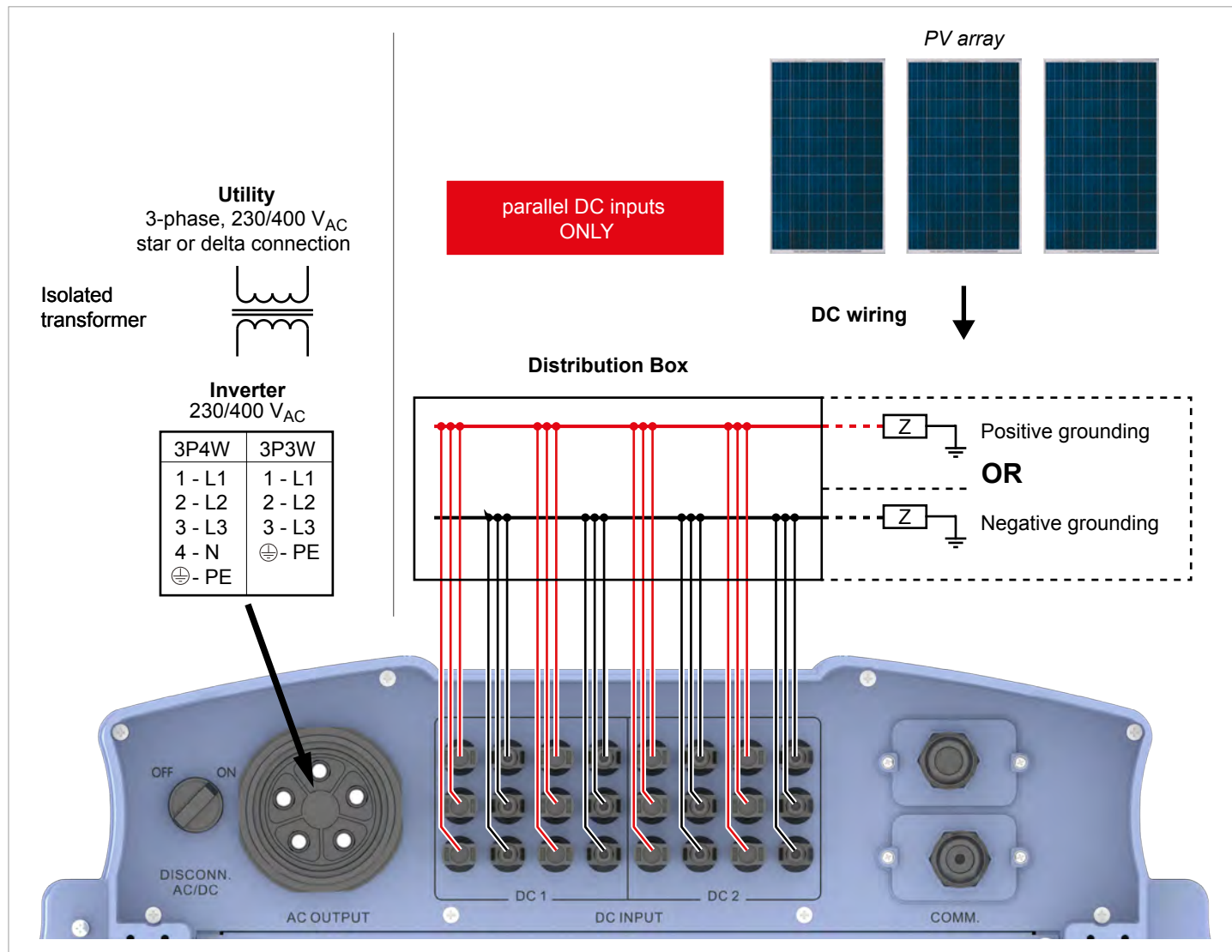


Fig. 5.13: System design when using grounded solar modules

5.7.6 Connecting the DC strings to the DC inputs

- Check the polarity of the DC voltage at the DC strings before connecting the solar modules to the inverter.
- Connect the negative pole of the solar modules to DC–, connect the positive pole to DC+.

Connecting a single DC string to a DC input

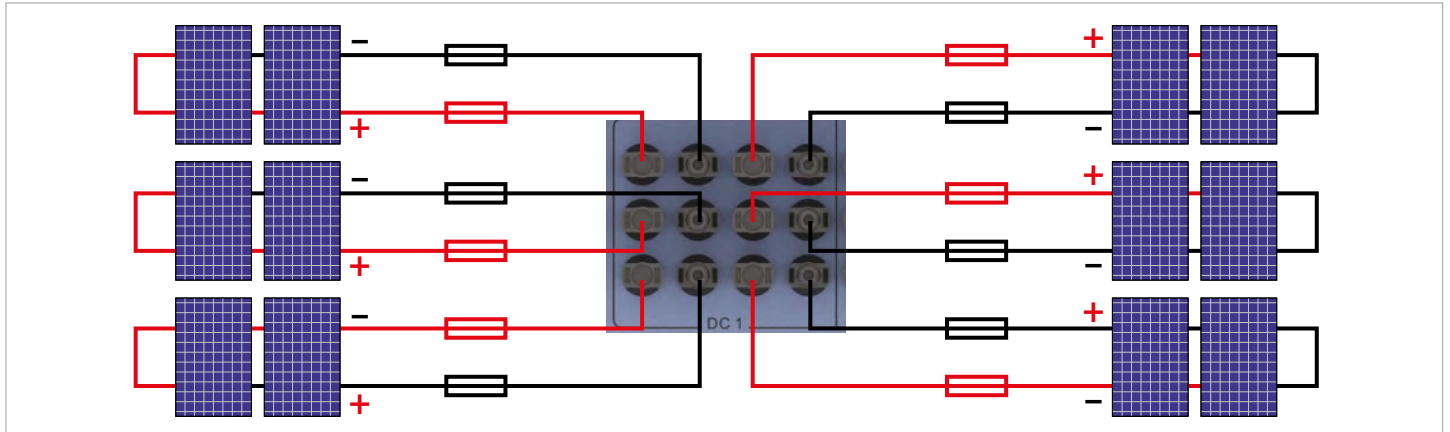


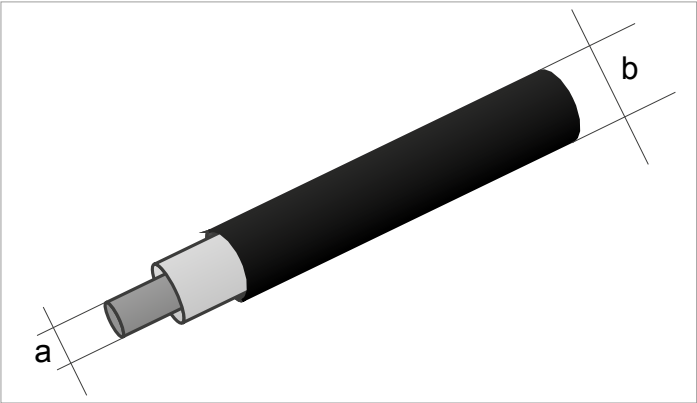
Fig. 5.14: Connecting a single DC string to a DC input

5 Planning installation

5.7.7 Cable requirements

The DC plugs for all DC connections are supplied with the inverter.

If you want to order more or need a different size, see the information in the following table.



DC connections on the inverter		DC plugs for DC cables		
		a	b	MultiContact
		mm ²	mm	
DC–		1.5/2.5	3-6	32.0010P0001-UR
			5.5-9	32.0012P0001-UR
		4/6	3-6	32.0014P0001-UR
			5.5-9	32.0016P0001-UR ¹⁾
DC+		1.5/2.5	3-6	32.0011P0001-UR
			5.5-9	32.0013P0001-UR
		4/6	3-6	32.0015P0001-UR
			5.5-9	32.0017P0001-UR ¹⁾

1) Included in delivery

5.8 Connecting a data logger

The inverter can be connected to a data logger via RS485, e.g. for monitoring the PV system or changing the inverter settings.

Multiple inverters can be connected in series to a data logger.

Note the following recommendations for ensuring a stable data connection.

Connecting a single inverter to a data logger

- ▶ Switch on the RS485 termination resistor.
- ▶ Lay the cable with a suitable clearance to the AC and DC cables to prevent interference in the data connection.

Connecting multiple inverters to a data logger

- ▶ Switch on the RS485 termination resistor at the last inverter in the chain.
- ▶ If the data logger does not have an integrated RS485 termination resistor then also switch on the RS485 termination resistor at the first inverter in the chain.
- ▶ Switch off the RS485 termination resistor at all other inverters in the chain.
- ▶ A different inverter ID must be set at each inverter. Otherwise the data logger cannot identify the individual inverters.
- ▶ Set the same RS485 baud rate at all inverters.
- ▶ Lay the cable with a suitable clearance to the AC and DC cables to prevent interference in the data connection.

Cable requirements

- Shielded twisted-pair cable (CAT5 or CAT6) with solid conductors
- Cable diameter: 5 mm
- Wire cross-section: 1 mm²

5.9 Connecting an external alarm unit

The inverter has two multifunction relays allowing connection of an acoustic or visual alarm unit to each.

An event can be assigned to the dry contacts on the inverter display after commissioning, see [“8.4.6 Dry contacts”](#), page 98.

Event	Description
Disable	The function is disabled.
On Grid	The inverter has connected to the grid.
Fan Fail	The fans are defective.
Insulation	The insulation test has failed.
Alarm	An error event message, fault message or warning has been sent.
Error	An error event message has been sent.
Fault	A fault message has been sent.
Warning	A warning message has been sent.

The default setting for both relays is **Disable**.

Cable requirements

- Shielded twisted-pair cable (CAT5 or CAT6) with solid conductors
- Cable diameter: 5 mm
- Wire cross-section: 1 mm²

5 Planning installation

5.10 Connecting a ripple control receiver

An external ripple control receiver can be connected to the digital inputs.

Pin assignments

Pin	Designation	Short circuit	Assigned action
1	V1	-	-
2	K0	V1 + K0	External power-off (EPO)
3	K1	V1 + K1	Maximum active power limited to 0%
4	K2	V1 + K2	Maximum active power limited to 30 %
5	K3	V1 + K3	Maximum active power limited to 60 %
6	K4	V1 + K4	Maximum active power limited to 100 %
7	K5	V1 + K5	Reserved
8	K6	V1 + K6	Reserved

Cable requirements

- Shielded twisted-pair cable (CAT5 or CAT6) with solid conductors
- Cable diameter: 5 mm
- Wire cross-section: 1 mm²

5.11 External power-off

The inverter has a multifunction relay allowing an external shut-down of the inverter to be triggered.

Pin assignments

Pin	Designation	Short circuit	Assigned action
1	V1	-	-
2	K0	V1 + K0	External power-off (EPO)
3	K1	V1 + K1	Maximum active power limited to 0%
4	K2	V1 + K2	Maximum active power limited to 30%
5	K3	V1 + K3	Maximum active power limited to 60%
6	K4	V1 + K4	Maximum active power limited to 100%
7	K5	V1 + K5	Reserved
8	K6	V1 + K6	Reserved

After commissioning, the relays for the external power-off (EPO) can be defined on the display as having normally closed or normally open contacts, see [“8.4.8 EPO \(External power-off\)”](#), [page 101](#).

Cable requirements

- Shielded twisted-pair cable (CAT5 or CAT6) with solid conductors
- Cable diameter: 5 mm
- Wire cross-section: 1 mm²

5.12 Using external grid and system protection

1. The German standard VDE-AR-N 4105, Section 6.1, requires external grid and system protection with a coupling switch for PV system larger than 30 kVA.
2. Alternatively, VDE-AR-N 4105, Section 6.4.1, allows the use of an inverter with an internal coupling switch when this switch disconnects the inverter from the grid in less than 100 ms.

This inverter satisfies the requirements of (2) when the following firmware versions are installed: DSP $\geq$ 1.30 / RED $\geq$ 1.20 / COMM $\geq$ 1.10. External grid and system protection is not necessary for inverters with these firmware versions.

5.13 Connecting a PC

The inverter settings can be changed using a PC. This requires the following accessories.

Accessories	Description
Standard USB/RS485 adapter	For connecting a PC to the inverter
Delta Service Software	For changing the inverter settings

The Delta Service Software can be downloaded from www.solar-inverter.com.

Cable requirements

Bell wire. Both ends open.

5 Planning installation

5.14 Tools and materials required

This section lists the necessary tools and materials not included in the scope of delivery.

5.14.1 For mounting the inverter

Part	Quantity	Description
M6 mounting screws	6 or 12	The mounting plate must be attached using 6 or 12 M6 screws. Additional mounting materials may be required depending on the installation position of the inverter (e.g. brick wall, concrete wall, metal frame etc.): Dowels, washers, lock washers, nuts etc. Always take the conditions at the installation location into account when selecting the mounting materials. Galvanic corrosion can occur when using mounting materials made of different materials

5.14.2 For connecting to the grid (AC)

Part	Quantity	Description
AC cable	-	See “5.6.4 Cable requirements”, page 30 for notes on selecting the AC cable.
Wire end-sleeves	5	Wire end-sleeves must be used at the wire ends of the AC cable to ensure adequate electrical contact between the AC plug and the AC cable. Attach the wire end-sleeves to the wires using a crimping tool. 

5.14.3 For connecting to the solar modules (DC)

Part	Quantity	Description
DC cable	-	See “5.7.7 Cable requirements”, page 38 for notes on selecting the DC cable
DC protective caps	Up to 8	The protective caps lock the DC plug so that it can only be disconnected from the DC connections using the special DC mounting tool. Available from Multi-Contact. Observe the local regulations regarding the use of DC protective caps. France: The DC protective caps must be used. 
DC mounting tool	1	Mounting tool for disconnecting the DC plug and the DC protective caps from the DC connections. Available from Multi-Contact. 

5.14.4 For grounding the inverter housing

Part	Quantity	Description
Grounding cable with cable lug	-	Typically a yellow-green copper cable with a conductor cross-section of at least 6 mm². Always observe the local regulations relating to grounding cable requirements.

5.14.5 For wiring the RS485 connections, the digital inputs and the dry contacts

Part	Quantity	Description
Cable	-	- Shielded twisted-pair cable (CAT5 or CAT6) with solid conductors - Cable diameter: 5 mm - Wire cross-section: 1 mm²
SOLIVIA Gateway M1 G2	1	For connecting to SOLIVIA Monitor, the Internet-based monitoring system from Delta. 

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5.14.6 For connecting a PC

Part	Quantity	Description
USB/RS485 adapter	1	Standard USB/RS485 adapter
2-core cable	1	Bell wire. Both ends open.
Delta Service Software	1	The Delta Service Software can be downloaded from www.solar-inverter.com .

5.14.7 Other parts

Part	Quantity	Description
Warning stickers	-	Observe the local regulations regarding the application of warning labels.
		 WARNING Dual supply  Do not work on this equipment until it is located from both mains and on site generation supplies. Isolate on-site Generation Unit(s) at _____ Isolate mains supply at _____ Warning - Only persons authorized by DNO may remove the main cut out fuse  Warning Two voltage sources present - Distribution network - PV modules  Disconnect both sources prior to any work

6. Installation



- Read chapter “5. Planning installation”, page 21 and this chapter in full before you start installation.

6.1 Safety instructions

DANGER



Electrical shock

Potentially fatal voltage is applied to the inverter during operation. When the inverter is disconnected from all power sources, this voltage remains in the inverter for up to 10 seconds. Therefore, always carry out the following steps before working on the inverter:

1. Turn the AC/DC disconnecter to the **OFF** position.
2. Disconnect the inverter from all AC and DC voltage sources and make sure that none of the connections can be accidentally restored.
3. Wait for at least 10 seconds until the internal capacitors have discharged.

DANGER



Electrical shock

Potentially fatal voltage is present at the inverter's DC connections. When light falls on the solar modules, they immediately start to generate electricity. This also happens when light does not fall directly on the solar modules.

- Never disconnect the inverter from the solar modules when it is under load.
- Turn the AC/DC disconnecter to the **OFF** position.
- Disconnect the connection to the grid so that the inverter cannot supply energy to the grid.
- Disconnect the inverter from all AC and DC voltage sources. Ensure that none of the connections can be restored accidentally.
- Ensure that the DC cables cannot be touched accidentally.

WARNING



Electrical shock

When the cover is removed from the fuse box, this exposes live parts and protection conforming to IP65 is no longer guaranteed.

- Remove the cover only when it is absolutely necessary.
- Do not remove the cover if water might enter the inverter.
- After work is completed, ensure that the cover is properly replaced and screwed in. Check that the cover is properly sealed.

WARNING



Heavy weight

The inverter is very heavy.

- The inverter must be lifted and carried by at least 3 people or using appropriate lifting gear.

NOTICE



Water penetration.

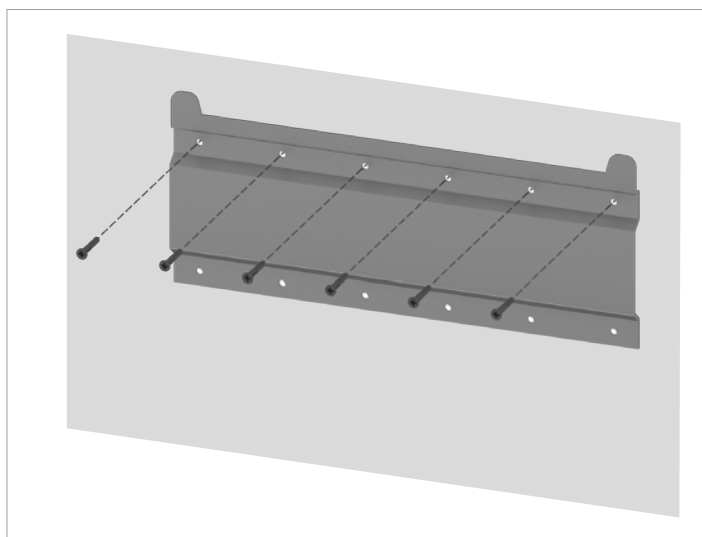
- Store all sealing caps removed during installation for later use (e.g. transport or storage).

6.2 Sequence of installation steps

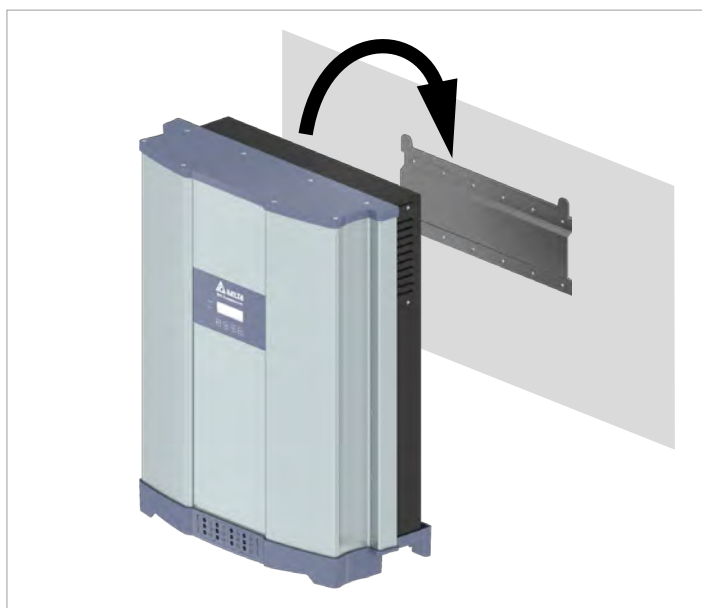
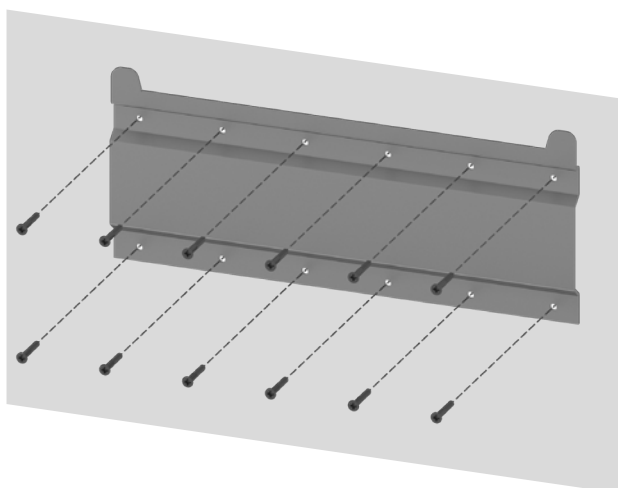
The sequence of the subsections in this chapter corresponds to the recommended sequence of the installation steps.

6 Installation

6.3 Mounting the inverter



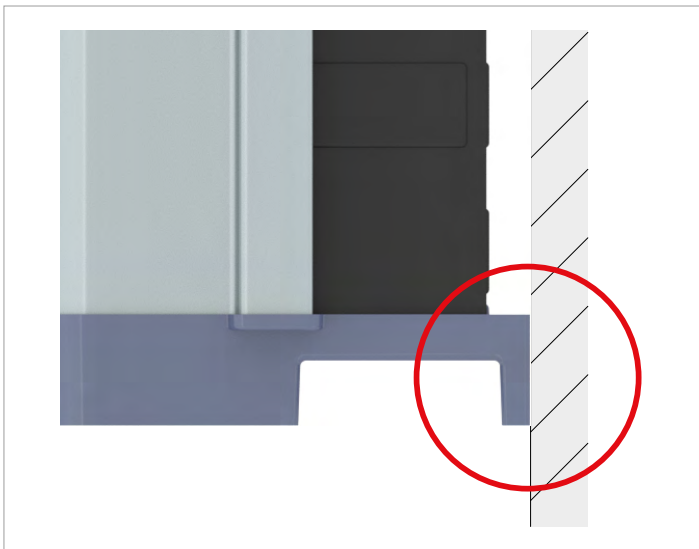
1. Attach the mounting plate to the wall / the mounting system with 6 or 12 M6 screws.



2. Mount the inverter on the mounting plate.



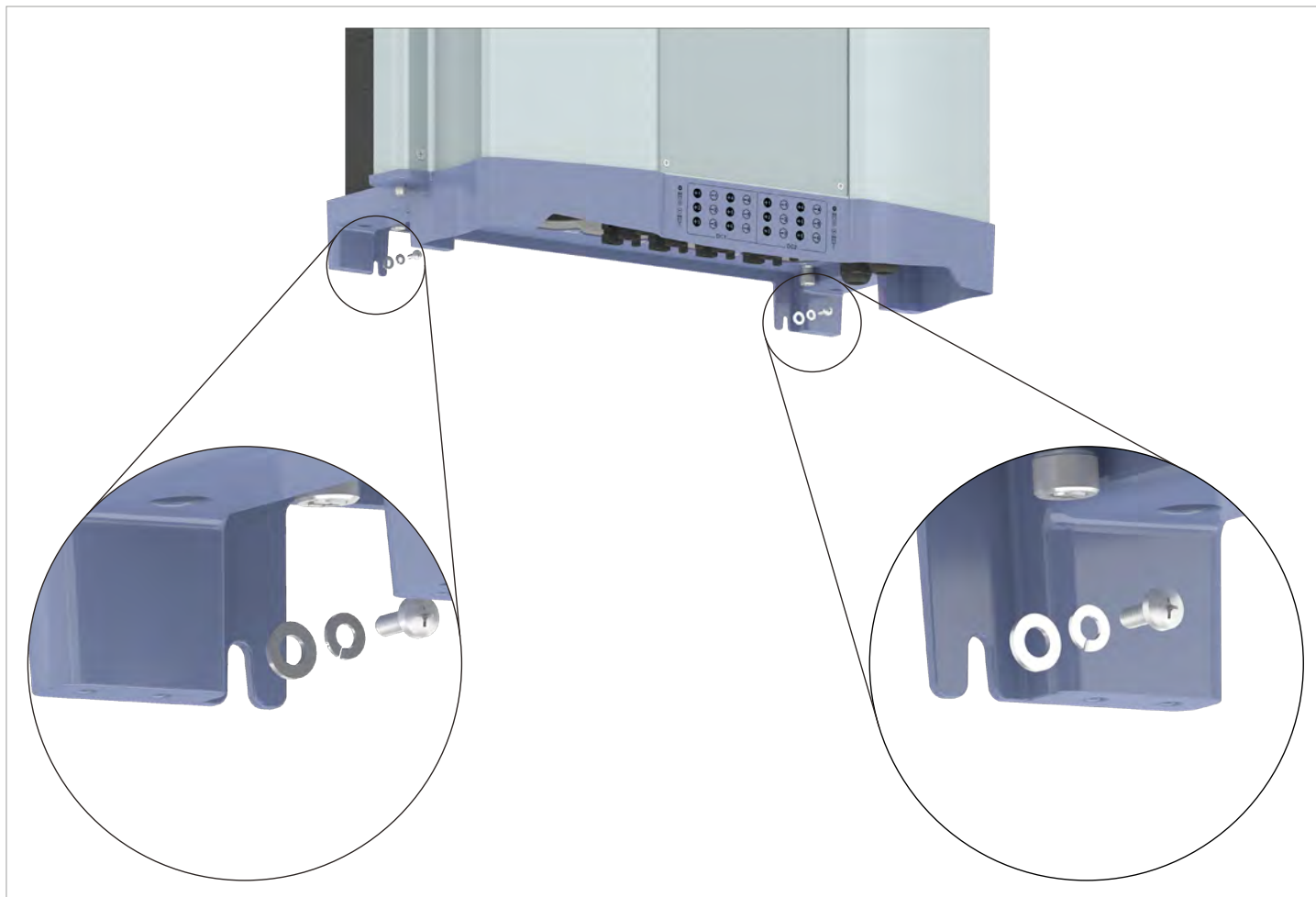
3. Check that the inverter is correctly mounted on the mounting plate.



4. Check that the lower end of the inverter is correctly positioned on the wall / mounting system.

6 Installation

5. Check that the inverter is correctly mounted on the mounting plate.



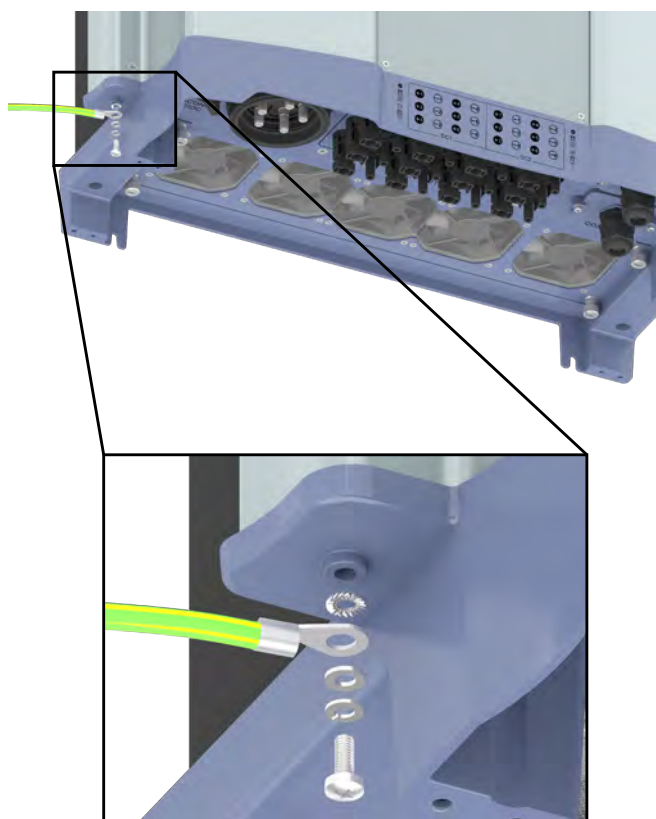
6.4 Grounding the inverter housing

DANGER



Electrical shock

- ▶ Always observe the local regulations relating to grounding cable requirements.
- ▶ To increase the safety of the system, always ground the inverter housing even when this is not required by the local regulations.
- ▶ Always ground the inverter housing **before** connecting the inverter to the grid and solar modules.



1. Screw the grounding cable onto the inverter. M4 screw, spring washer, washer, and lock washer are already mounted on the inverter.

2. Perform a continuity check of the grounding connection. If there is insufficient conductive connection, scratch away the paint from the inverter housing under the toothed lock washer to achieve a better electrical contact.

6 Installation

6.5 Connecting the communication card

NOTICE



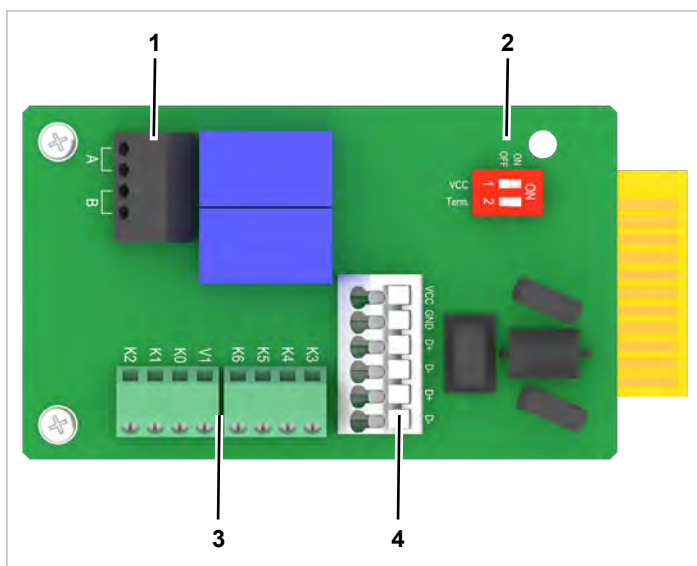
Water penetration.

- Store all sealing caps removed during installation for later use (e.g. transport or storage).



The connections for RS485, the dry contacts, the digital inputs and the external shutdown (EPO) are all on the communication card. This means that the installation work can be combined.

6.5.1 Components of the communication card

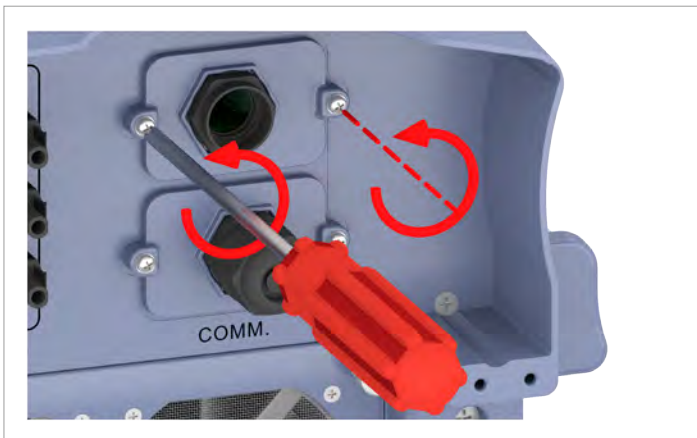


- 1 2 x dry contacts (terminal box)
- 2 DIP switch for RS485 termination resistor and VCC
- 3 Digital inputs and external power-off (terminal block)
- 4 RS485 (terminal block)
- 5 Protection against electromagnetic interference (EMI)

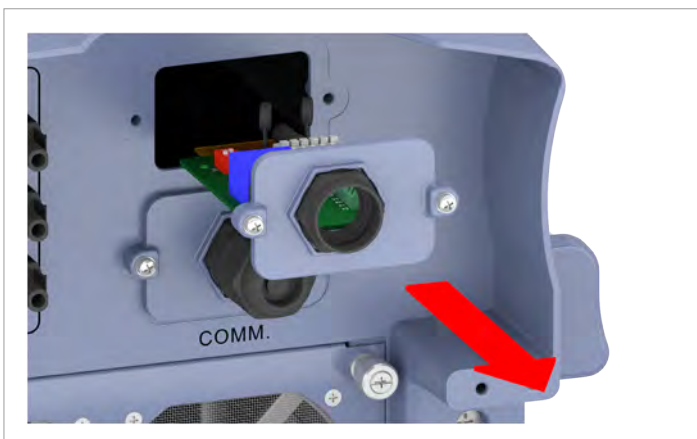
6.5.2 Initial steps



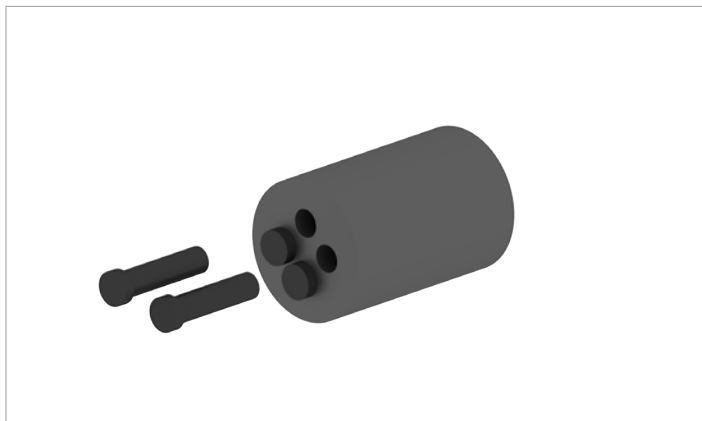
1. Unscrew the cable gland of the communication connection and remove the cable gland and seal.



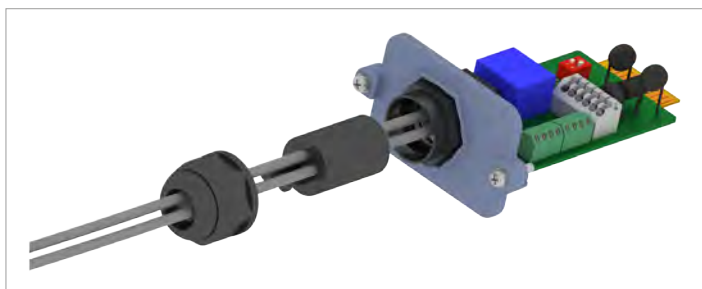
2. Unscrew and carefully pull out the cover. The communication card is screwed to the cover.



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3. Remove the same number of rubber plugs from the seal corresponding to the number of cables to be connected. Do not remove the rubber plugs from the unused seal feed-throughs.



4. Pull the cable through the cable gland and seal.

6.5.3 Connecting a data logger via RS485

Cable and wiring requirements

- Shielded twisted-pair cable with solid conductors (CAT 5 or CAT 6).
- Cable diameter: 5 mm
- Wire cross-section: 1 mm²
- Lay the cable with a suitable clearance to the AC and DC cables to prevent interference in the data connection.

NOTICE

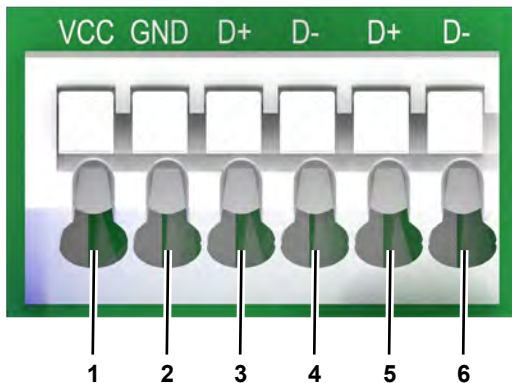


Unwanted currents.

Unwanted currents can flow when multiple inverters are connected via RS485.

- Do not use GND and VCC.
- If the cable shield is used for providing lightning protection then the housing of only one inverter in the RS485 chain should be grounded.

Terminal assignments of the RS485 terminal block



- 1 VCC (+12 V; 0.5 A)
- 2 GND
- 3 D+ (DATA+ RS485)
- 4 D- (DATA+ RS485)
- 5 D+ (DATA+ RS485)
- 6 D- (DATA+ RS485)

Terminal pairs 3/4 or 5/6 can be used. The second terminal pair is only required when connecting several inverters via RS485.

Data format

Baud rate	9600, 19200, 38400; standard: 19200
Data bits	8
Stop bit	1
Parity	Not applicable

The baud rate can be set on the inverter display after commissioning, see "8.3.3 Baud rate", page 80.

DIP switch for RS485 termination resistor and VCC



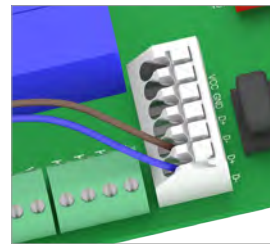
- 1 VCC (+12 V; 0.5 A)
- 2 RS485 termination resistor

Connection to a Delta SOLIVIA Gateway M1 G2

Individual wires are connected at the inverter and an RJ45 plug is used at the gateway.

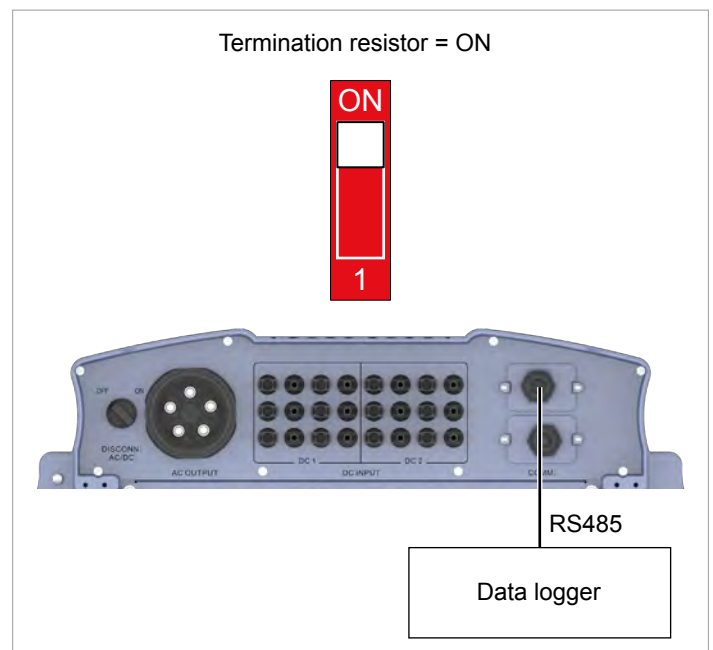
Inverter

SOLIVIA Gateway M1 G2



DATA+	Terminal 3 or 5	Pin 7
DATA-	Terminal 4 or 6	Pin 6 or 8

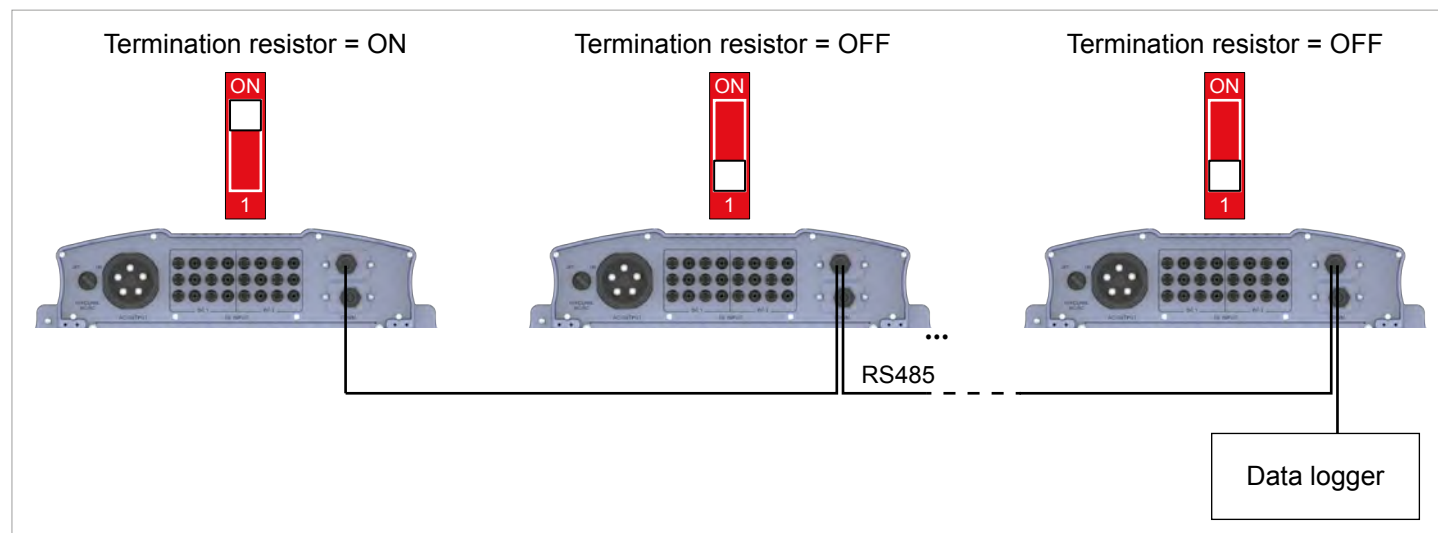
Wiring diagram for a single inverter



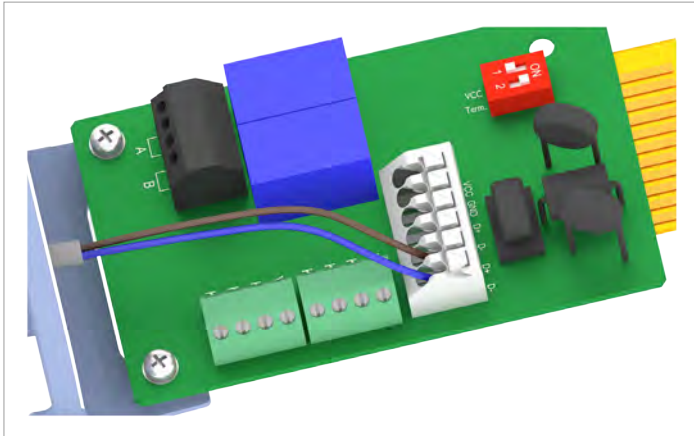
6 Installation

Wiring diagram for multiple inverters

- If the data logger does not have an integrated RS485 termination resistor, switch on the RS485 termination resistor on the first inverter.
- Set a different inverter ID at each inverter during commissioning of the inverters.



6.5.3.1 Wiring for a single inverter



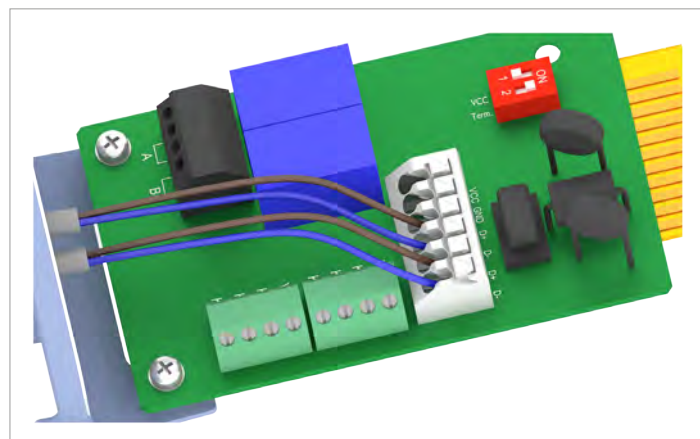
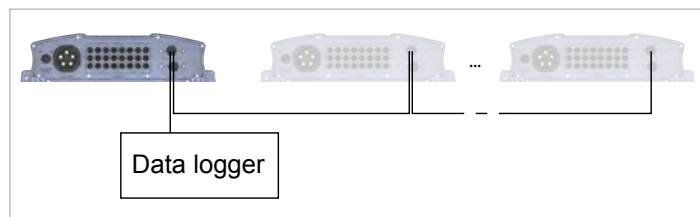
1. Connect the DATA+ wire to terminal 5 and the DATA– wire to terminal 6.



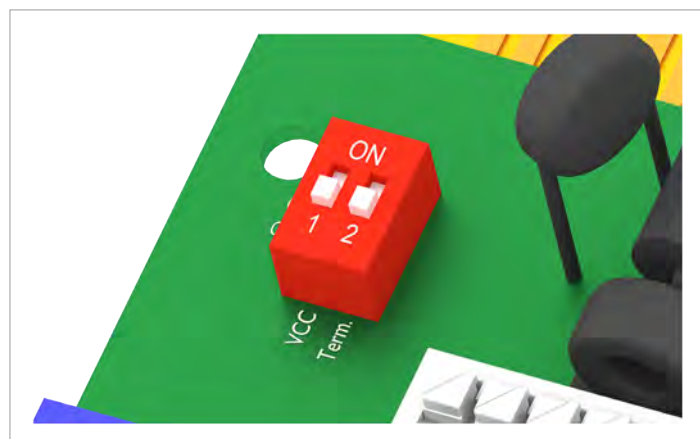
2. Put the DIP switch for the RS485 termination resistor (DIP 2) in the **ON** position.

6 Installation

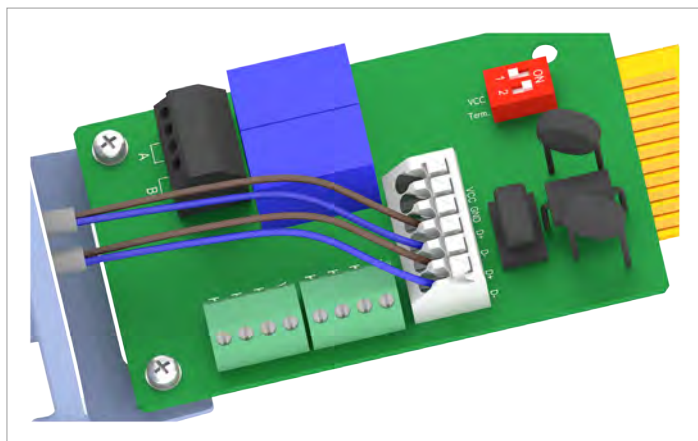
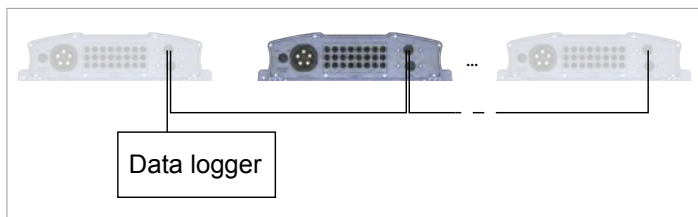
6.5.3.2 Wiring for multiple inverters



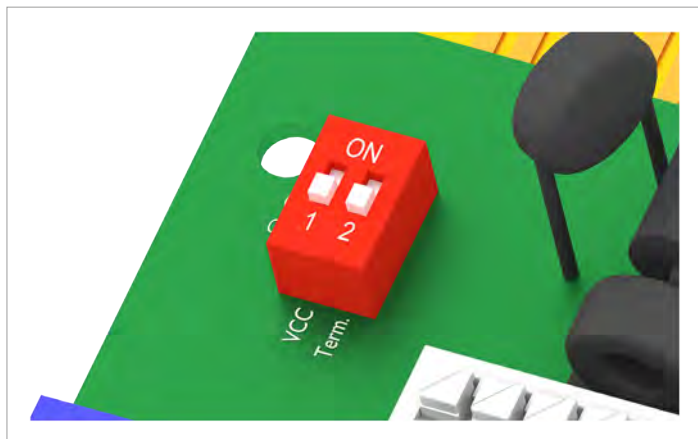
1. On the cable coming from the data logger: Connect the DATA+ wire to terminal 5 and the DATA– wire to terminal 6. On the cable going to the second inverter: Connect the DATA+ wire to terminal 3 and the DATA– wire to terminal 4.



2. Put the DIP switch for the RS485 termination resistor (DIP 2) in the **OFF** position.

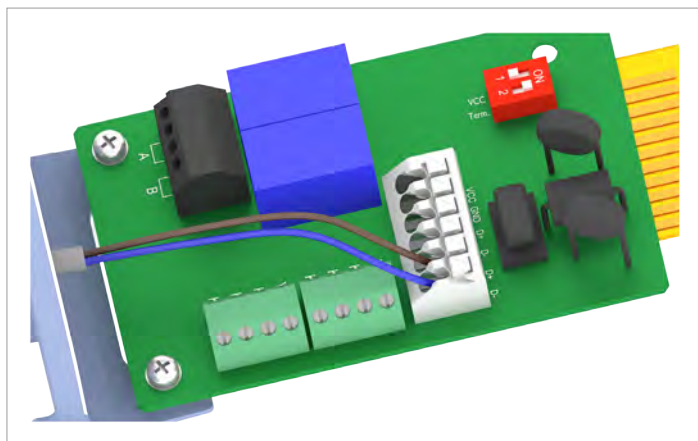
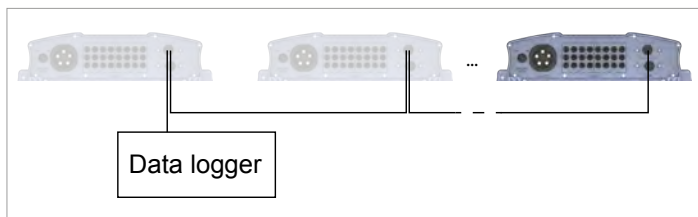


1. On the cable coming from the previous inverter: Connect the DATA+ wire to terminal 5 and the DATA– wire to terminal 6.
On the cable going to the next inverter: Connect the DATA+ wire to terminal 3 and the DATA– wire to terminal 4.



2. Put the DIP switch for the RS485 termination resistor (DIP 2) in the **OFF** position.

6 Installation



1. Connect the DATA+ wire to terminal 5 and the DATA– wire to terminal 6



2. Put the DIP switch for the RS485 termination resistor (DIP 2) in the **ON** position.

6.5.4 Connecting an external alarm unit

Cable and wiring requirements

- Shielded twisted-pair cable with solid conductors (CAT 5 or CAT 6).
- Cable diameter: 5 mm
- Wire cross-section: 1 mm²
- Lay the cable with a suitable clearance to the AC and DC cables to prevent interference in the data connection.

6.5.4.1 Wiring for an external alarm unit with an external 12 V_{DC} power supply

The external alarm unit must be connected to an external power supply if the internal 12V_{DC} power supply is not used.

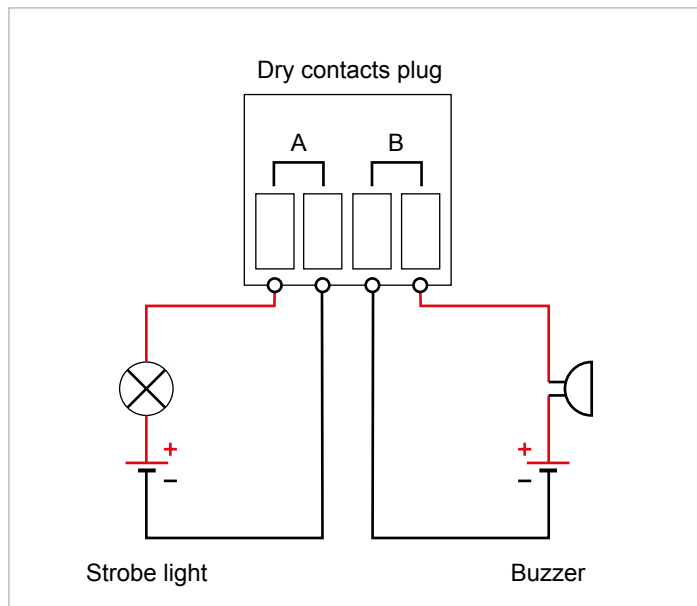
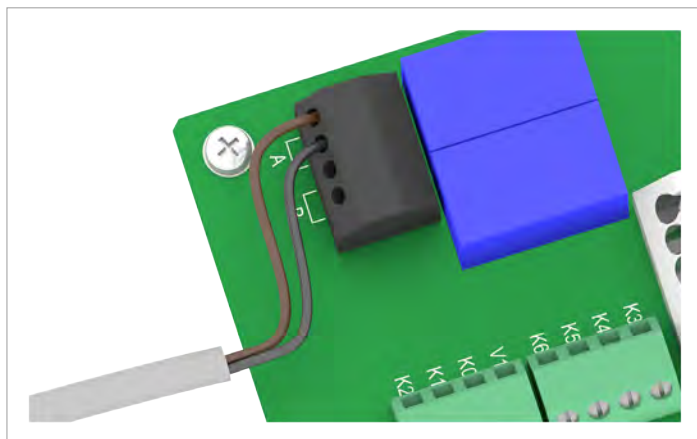


Fig. 6.15: Connection example: Dry contacts with an external power supply



1. Connect two wires of the cable to one of the two dry contacts.
2. After commissioning, use the inverter display to assign an event for triggering the alarm unit (see [“8.4.6 Dry contacts”](#), page 98).

6 Installation

6.5.4.2 Wiring for a single alarm unit with an internal 12 V_{DC} power supply

Connection examples

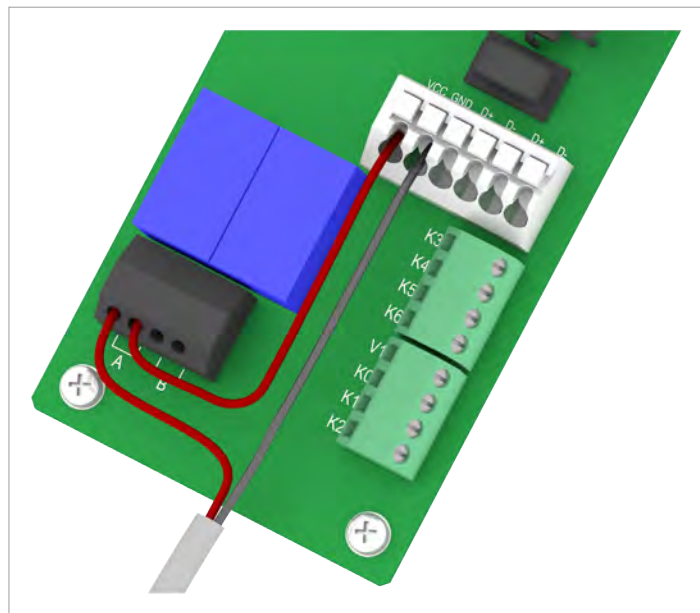
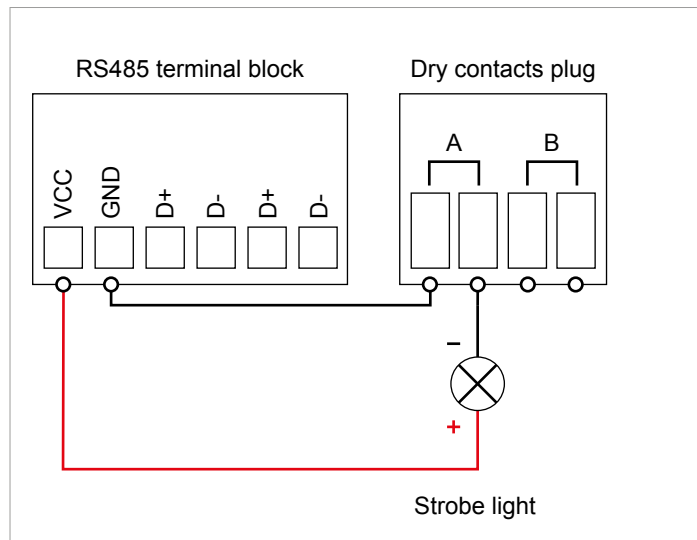
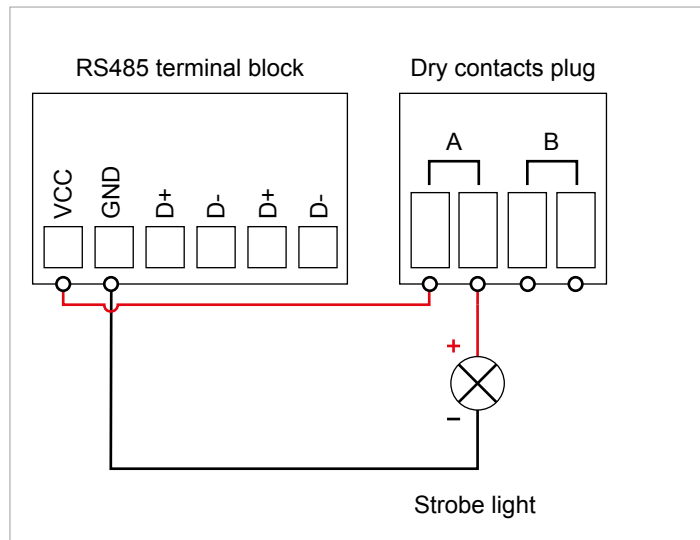


Fig. 6.16: Connection example 1: 1 dry contact with an internal 12 VDC power supply for an external alarm unit, variant 1

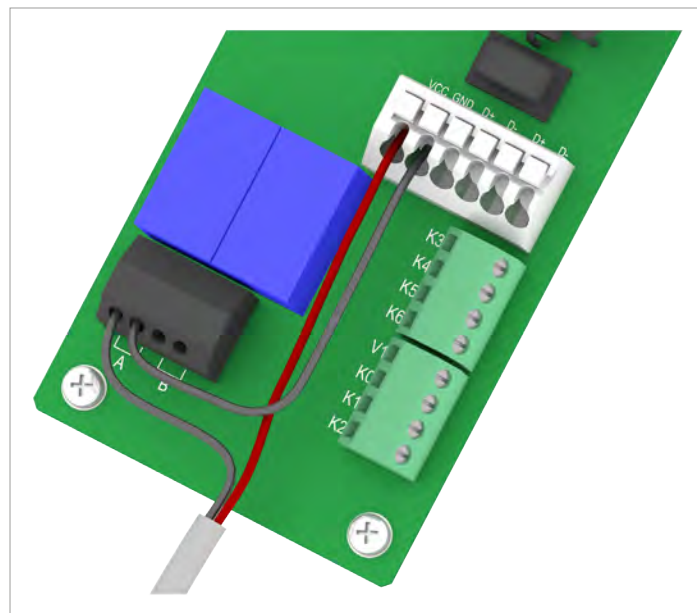


Fig. 6.17: Connection example 2: 1 dry contact with an internal 12 VDC power supply for an external alarm unit, variant 2

1. Connect the wires according to the desired connection diagram, see [“Connection examples”, page 60](#).
2. After commissioning, an event can be assigned to the dry contacts on the display, (see [“8.4.6 Dry contacts”, page 98](#)).

6.5.4.3 Wiring for two alarm units with an internal 12 V_{DC} power supply

Connection examples

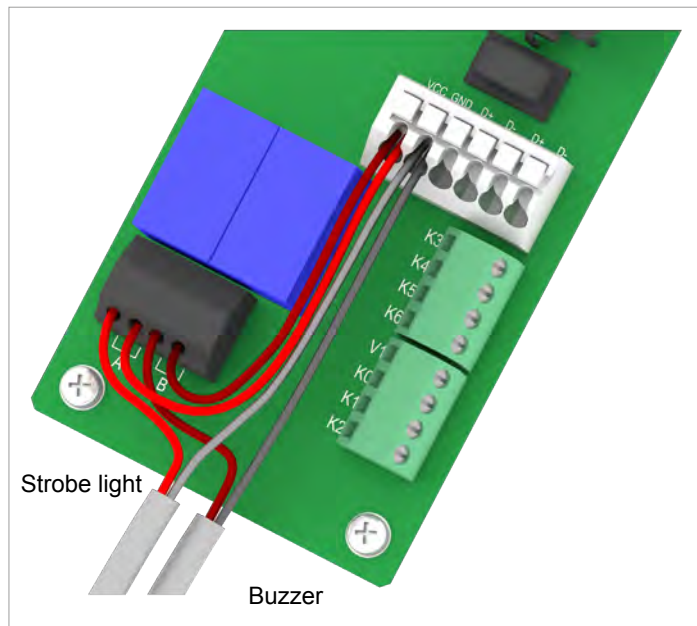
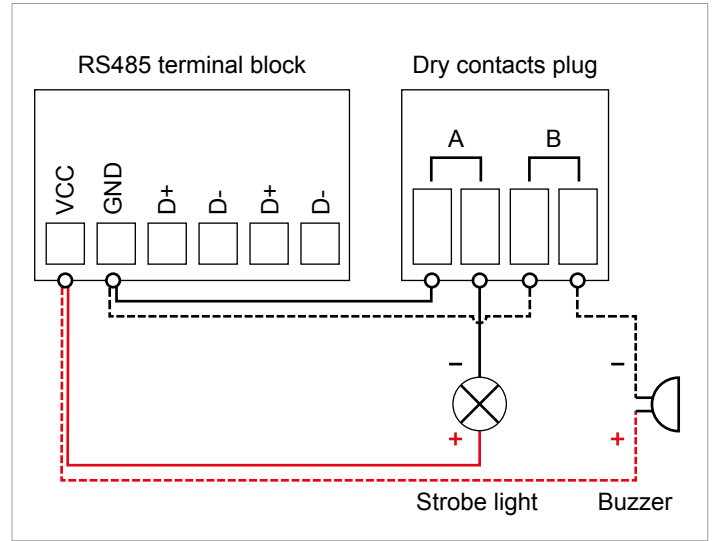
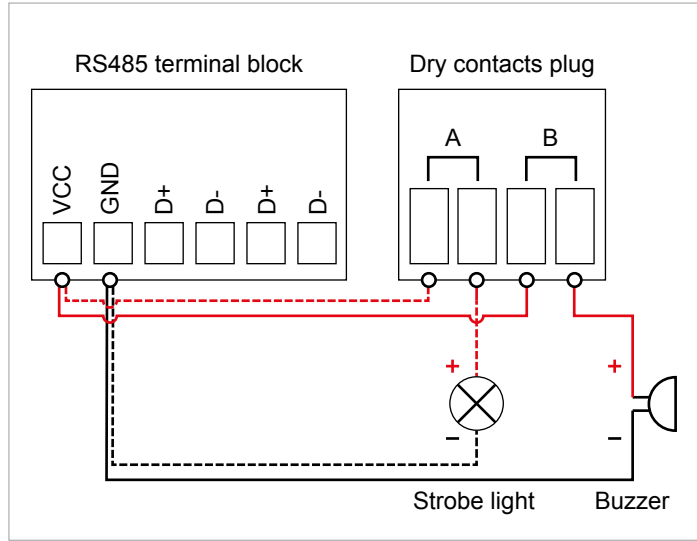


Fig. 6.18: Connection example 3: 2 dry contacts with an internal 12 VDC power supply for 2 external alarm units, variant 1

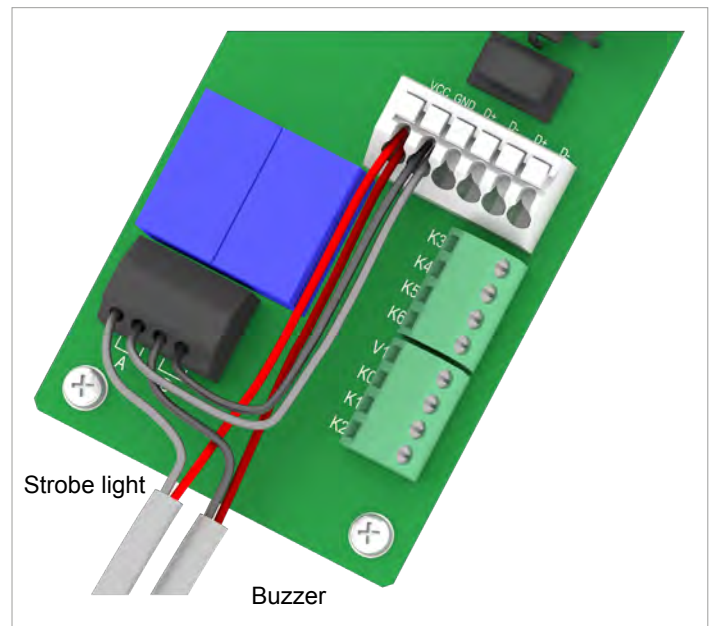


Fig. 6.19: Connection example 4: 2 dry contacts with an internal 12 VDC power supply for 2 external alarm units, variant 2

1. Connect the wires according to the desired connection diagram, see "Connection examples", page 60.
2. After commissioning, an event can be assigned to the dry contacts on the display, (see "8.4.6 Dry contacts", page 98).

6 Installation

6.5.5 Connecting digital inputs and external power-off (EPO)

Pin assignments

Pin	Designation	Sort-circuit	Assigned action
1	V1	–	–
2	K0	V1 + K0	External power-off (EPO)
3	K1	V1 + K1	Set maximum active power to 0%
4	K2	V1 + K2	Set maximum active power to 30%
5	K3	V1 + K3	Set maximum active power to 60%
6	K4	V1 + K4	Set maximum active power to 100%
7	K5	V1 + K5	Reserved
8	K6	V1 + K6	Reserved

After commissioning, the relays can be defined as make-contact or break-contact for the external shutdown on the display “8.4.8 EPO (External power-off)”, page 101.

Wiring examples

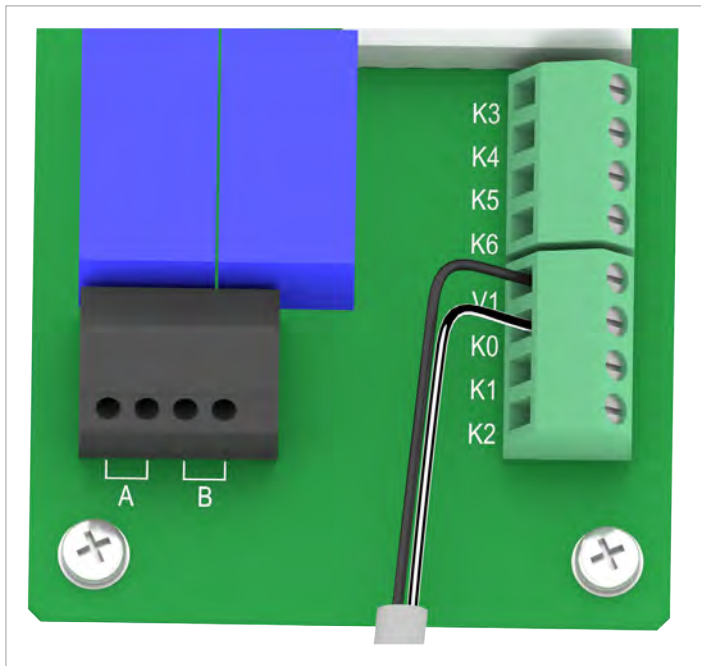


Fig. 6.20: Connection example 7: Connecting an external power-off

Connecting a ripple control receiver

Power limiting to:	Short circuit
0%	Terminals V1 and K1
30%	Terminals V1 and K2
60%	Terminals V1 and K3
100%	Terminals V1 and K4

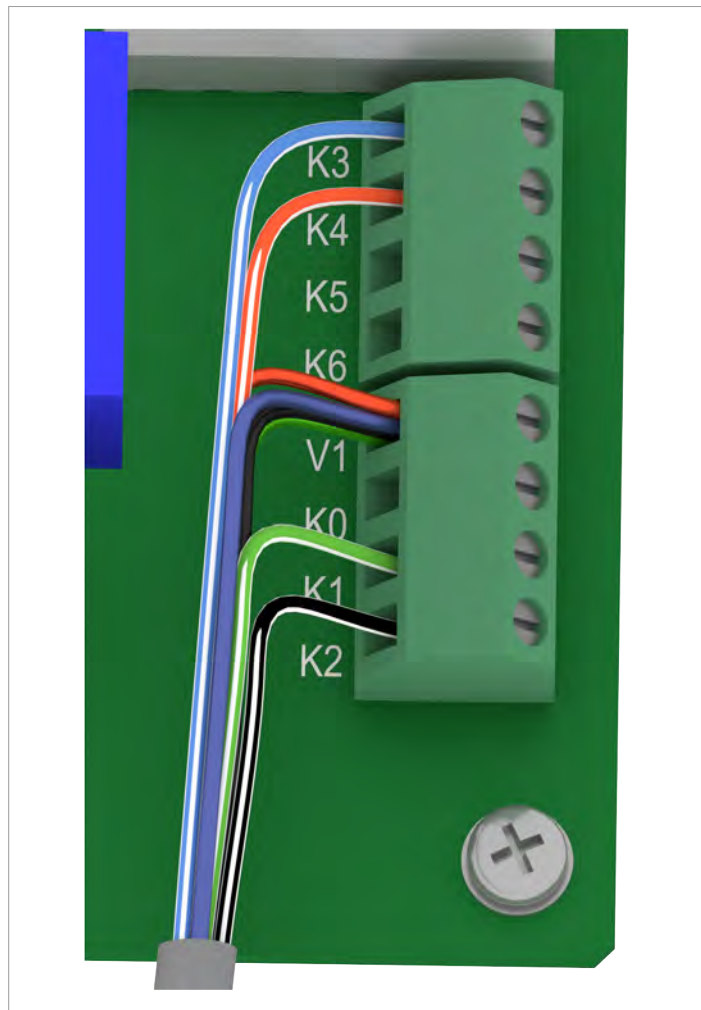
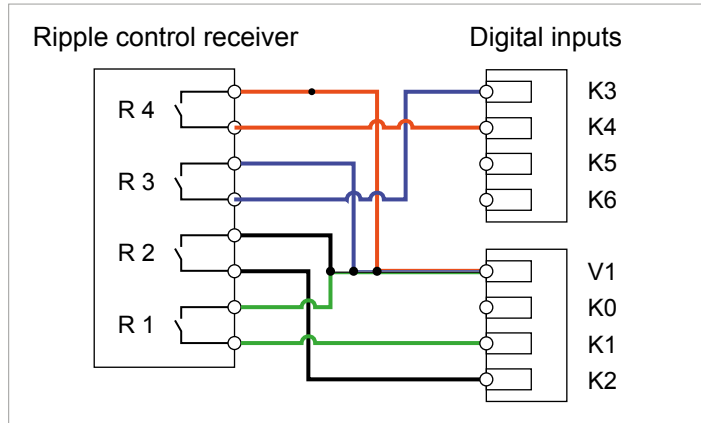


Fig. 6.21: Connection example 8: Connecting a ripple control receiver

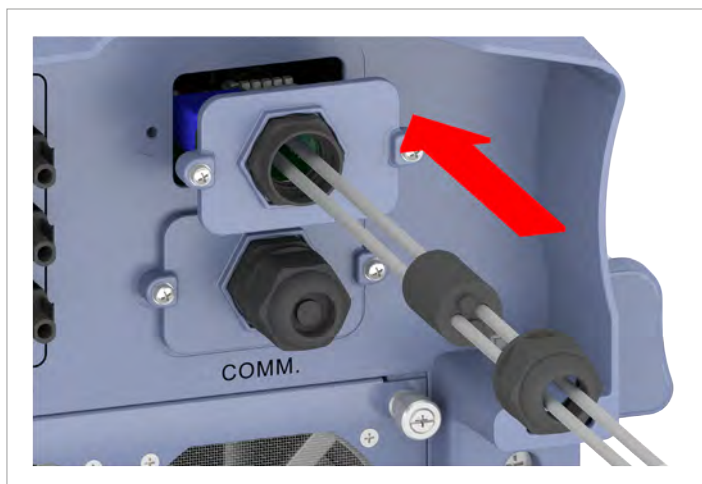


The colors of the wires in the connection example correspond to a standard CAT5 cable and may differ in other cables. The wire colors have no effect on the function of the wiring.

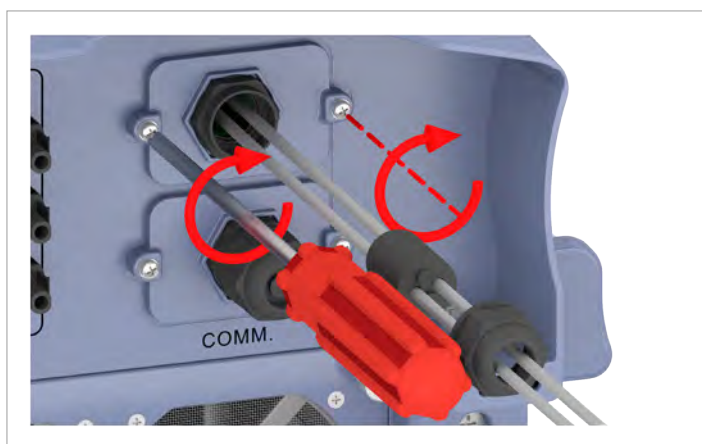
1. Connect the wires according to the desired connection diagram.
2. After commissioning, the relays can be defined as make-contact or break-contact for the external shutdown on the display (see [“8.4.8 EPO \(External power-off\)”](#), page 101).

6 Installation

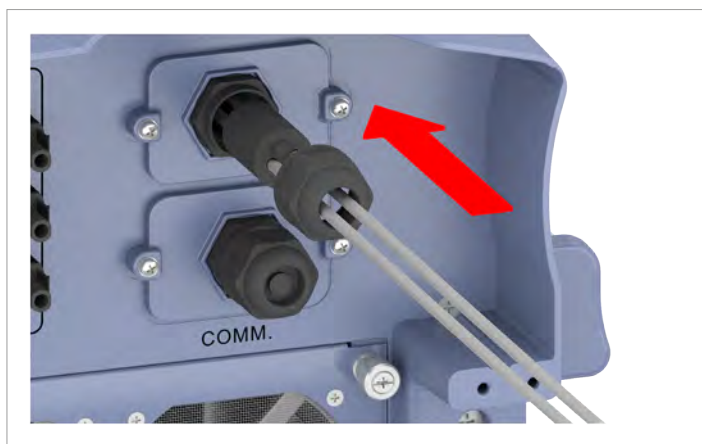
6.5.6 Final work



1. Fit the communication card cover and screw in place.



2. Fit the seal and cable gland and screw the cable gland tight.



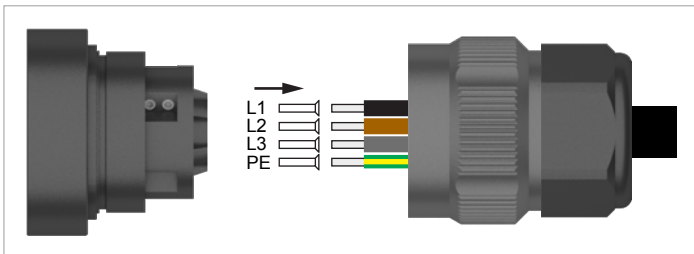
6.6 Connecting to the grid (AC)

The inverter can be connected to 3-phase grids without neutral conductors (3P3W, 3 phases + PE) and 3-phase grids with neutral conductors (3P4W, 3 phases + N + PE).

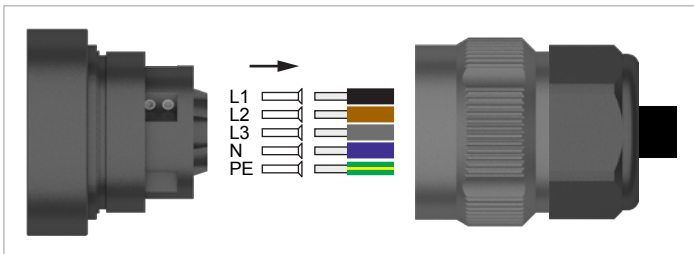


- ▶ If makes no difference which individual wire of the AC cable is connected to which contact.
- ▶ If the inverter is connected to a grid without a neutral conductor, the AC connection must be changed via the display to 3P3W after commissioning, see [“8.4.9 AC connection”](#), [page 102](#).

Connecting to a 3-phase grid with a neutral conductor (3P3W)



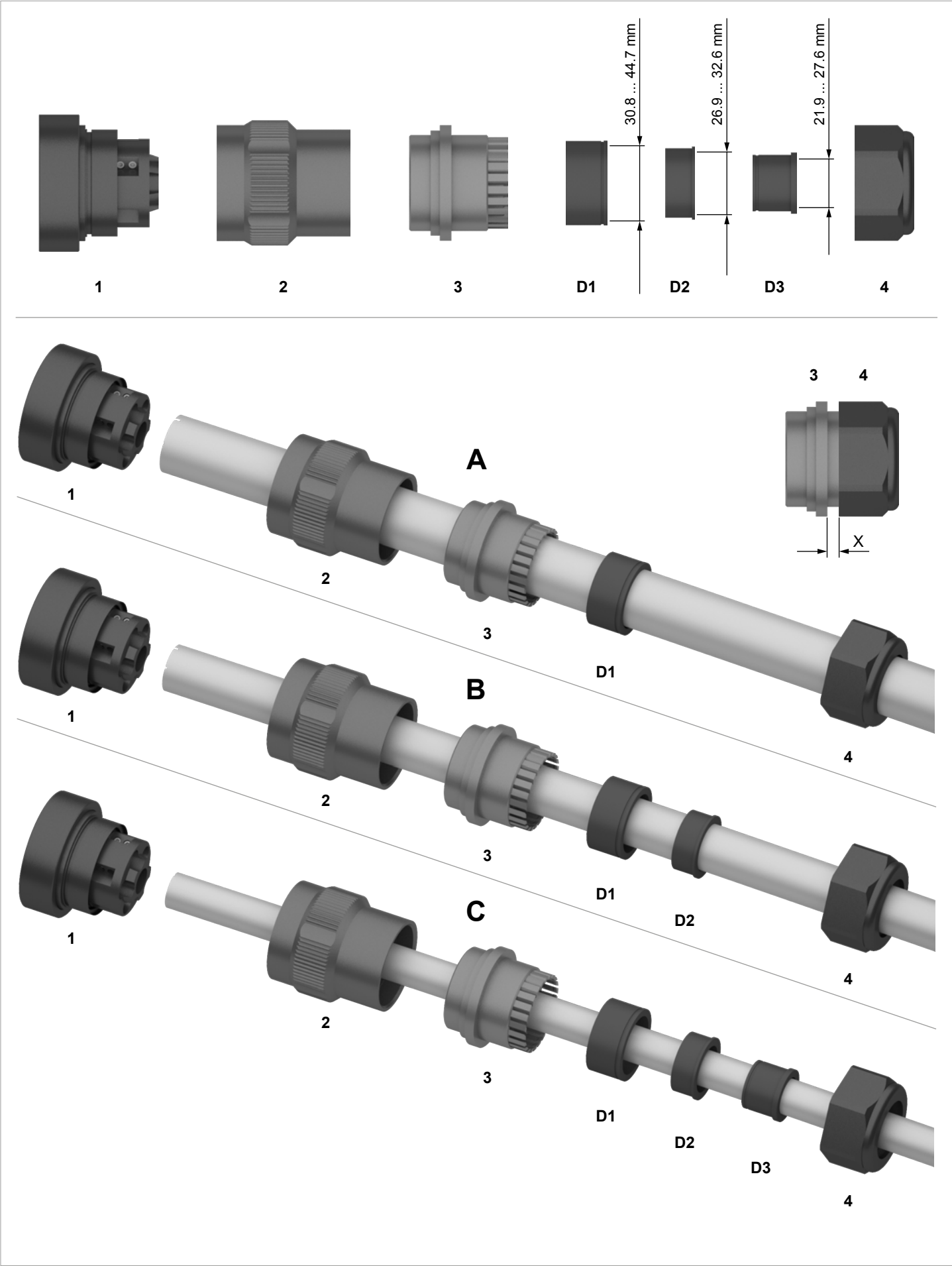
Connecting to a 3-phase grid without a neutral conductor (3P4W)

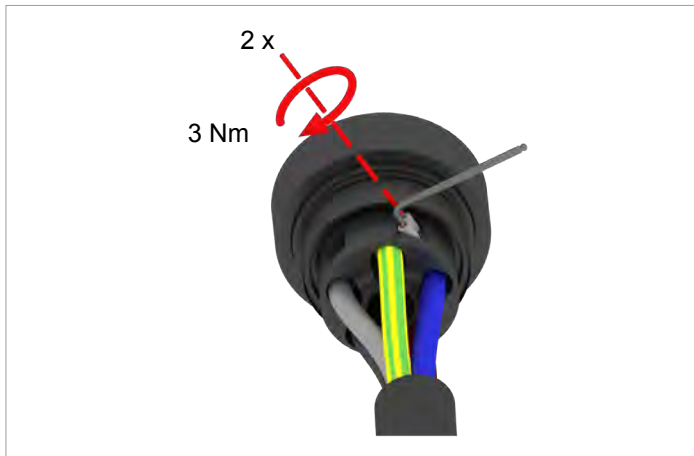
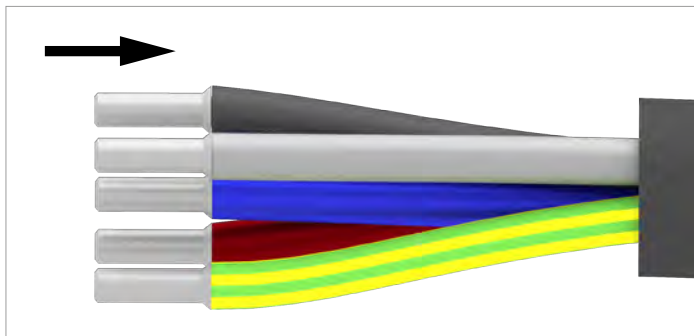
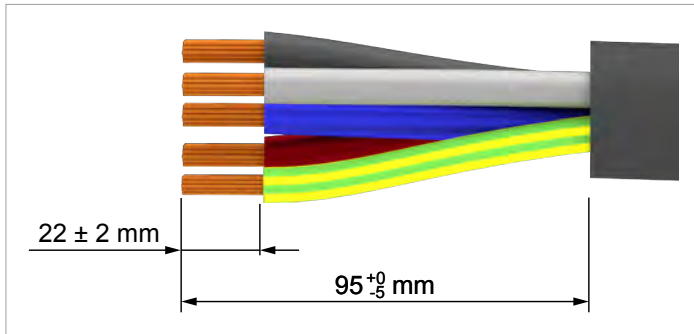


1. Pull all necessary parts of the AC plug over the cable. The parts required depend on the cable diameter, see figure on the following page.

Variant	Cable diameter	Seal	Torque (nut, 4)	Gap X
A	30.8 ... 44.7 mm	D1	6.5 ... 20.0 Nm	1 ... 7.5 mm
B	26.8 ... 35.4 mm	D1 + D2	11.0 ... 17.0 Nm	1 ... 6 mm
C	21.9 ... 27.6 mm	D1 + D2 + D3	13.0 ... 14.0 Nm	1 ... 3.5 mm
	(with 38 mm ² wire cross-section)	D1 + D2 + D3	12 Nm	3.5 mm

6 Installation





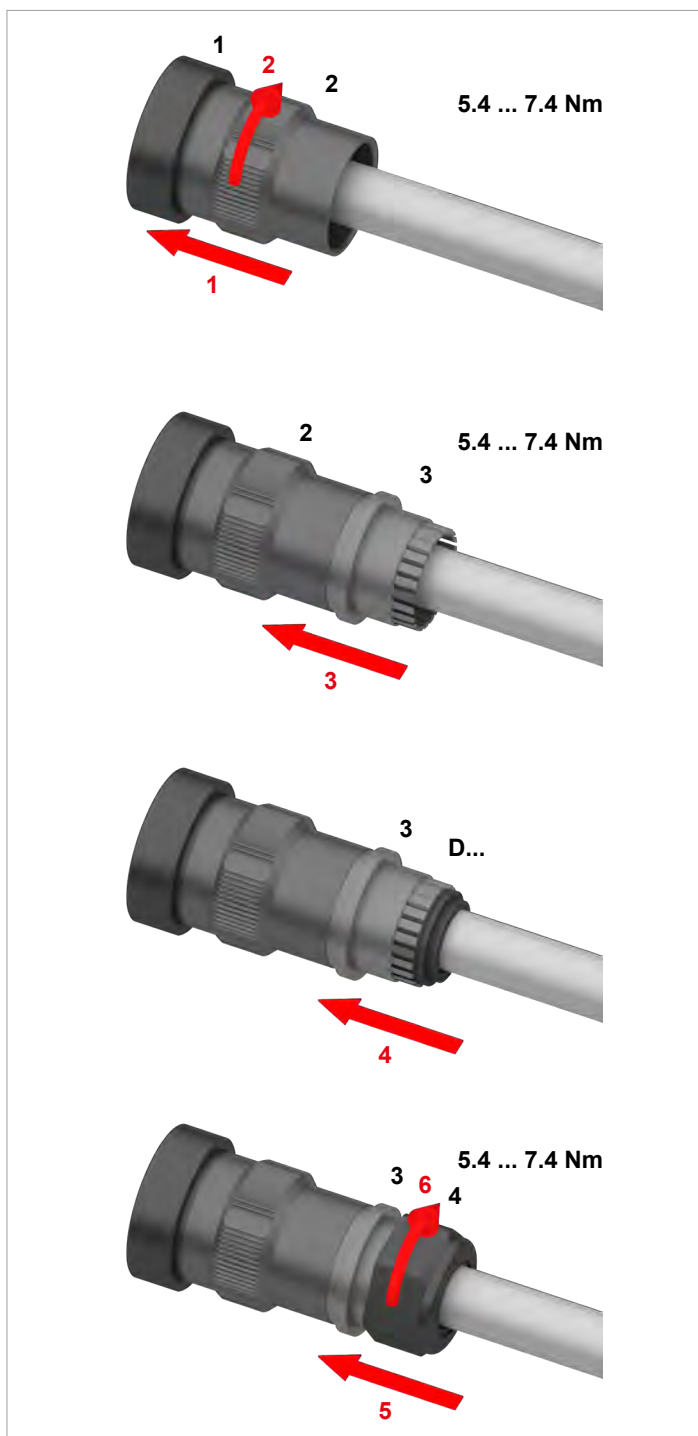
2. Remove the insulation from the cable and wires. Do not twist the wire ends because this reduces the contact surface area with the wire end sleeves.

3. Wire end sleeves must be used with some wire cross-sections, see the following table.

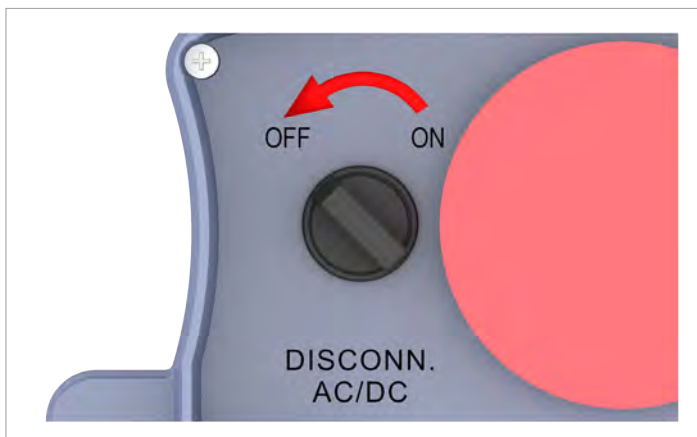
Conductor cross-section	Use wire end-sleeves?
25 mm ²	Yes
> 25 mm ²	No

4. There are two connecting screws per conductor. **Always** fasten all wires with both connecting screws.

6 Installation



5. Assemble the AC plug.



6. Turn the AC/DC disconnect to the **OFF** position.



7. Remove the sealing cap from the AC connection and store in a safe place.



8. Plug the AC plug into the AC connection on the inverter and twist tight.

9. Fasten the AC cable with a strain relief element.

10. If the inverter is connected to a grid without a neutral conductor, the AC connection must be changed using the display to 3P3W after commissioning, see [“8.4.9 AC connection”, page 102](#).

6 Installation

6.7 Connecting solar modules (DC)

DANGER



Electrical shock

Potentially fatal voltage is present at the inverter's DC connections. When light falls on the solar modules, they immediately start to generate electricity. This also happens when light does not fall directly on the solar modules.

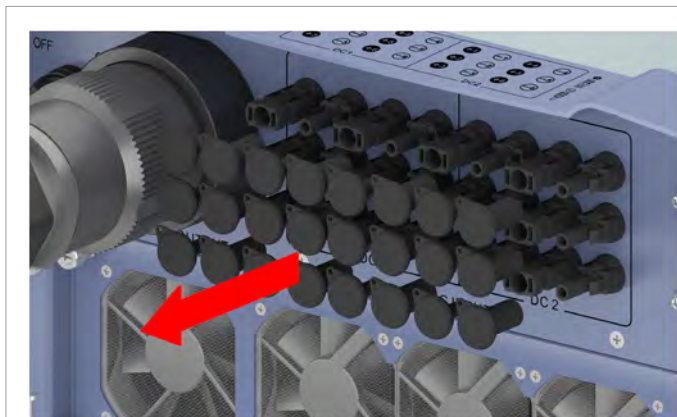
- ▶ Never disconnect the inverter from the solar modules when it is under load.
- ▶ Turn the AC/DC disconnector to the **OFF** position.
- ▶ Disconnect the connection to the grid so that the inverter cannot supply energy to the grid.
- ▶ Disconnect the inverter from all AC and DC voltage sources. Ensure that none of the connections can be restored accidentally.
- ▶ Ensure that the DC cables cannot be touched accidentally.



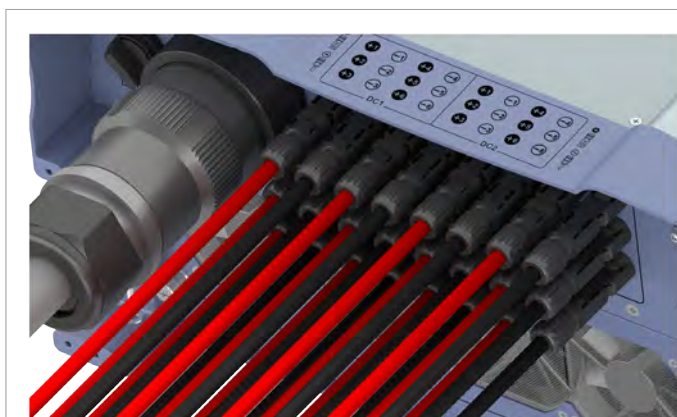
1. Use a red cable for DC+ and a black cable for DC-. Use a voltmeter to check the polarity.



2. Turn the AC/DC disconnector to the OFF position.



3. Remove the sealing caps from the DC connections and store in a safe place.
Do not remove the sealing caps from the unused DC connections.



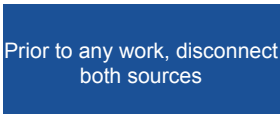
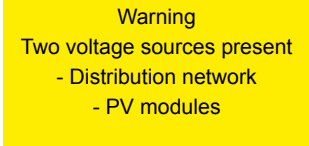
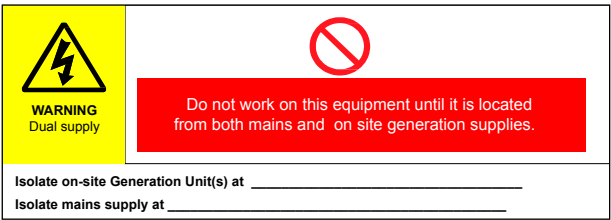
4. Plug the DC plugs with the DC cables into the DC connections on the inverter.

6 Installation

6.8 Attaching warning labels to the inverter

- Attach all necessary warning labels to the inverter. Always follow the local regulations.

Some examples of warning labels are listed below.



6.9 Connecting a PC via RS485

Inverter	USB/RS485 adapter
DATA+ Terminal 3 or 5	D+
DATA- Terminal 4 or 6	D-

7. Commissioning



To perform the commissioning steps described in this section the inverter must be supplied with either AC power (grid) or DC power at both DC inputs (solar modules).



1. Turn the AC/DC disconnect to the **ON** position.

```
Select language
English
►Deutsch
Français
```

2. Use the ▼ and ▲ buttons to select the **English** language and then press the ENT button.

```
►UK G59-3 230
FRA-Is 50HZ
FRA-Is 60HZ
FRANCE MV
```

3. Use the ▼ and ▲ buttons to select your country or grid type and then press the ENT button.

Country	Available grids	Description
Belgium	BELGIUM	Synergrid C10/11 (July 2012)
Germany	GERMANY LV	Germany VDE-AR-N 4105
	GERMANY MV	Germany BDEW
Austria	AUSTRIA	ÖNORM E8001-4-712 + A1: 04/2014
Switzerland	SWITZERLAND	Germany VDE-AR-N 4105

```
Are you sure to
set country:
UK G59-3 230
►Yes / No
```

4. Check that the correct country or grid type is selected.

If the correct country is selected, use the ▼ and ▲ buttons to select the **Yes** entry and then press the ENT button.

To change the selection, press the EXIT button.

→ The inverter starts a self-test lasting approx. 2 minutes. The remaining time is shown on the display.

NOTICE

If multiple inverters are connected to the PV system then a different inverter ID must be set for each inverter. For example, the inverter ID is used by monitoring systems to uniquely identify each inverter.

```
Setting ID:
ID=001
```

5. Use the ▼ and ▲ buttons to set the individual digits, choose **English** and then press the ENT button.

7 Commissioning

Are you sure to set
ID: 1
►Yes / No

12.Jun 2016 15:32
Status: On Grid
Power: 0W
E-Today: 0kWh

- 6.** Check that the correct inverter ID is set.

If the correct inverter ID is selected, use the ▼ and ▲ buttons to select the **Yes** entry and then press the **ENT** button.

Press the **EXIT** button to change the selection

- ☒ The basic settings are now complete. The standard menu is displayed.



- Use the chapter “8. Settings”, page 75 to check whether you need to make additional settings.
-

8. Settings

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8 Settings

8.2 "Inverter info." menu area (current settings)

Overview

This function allows you to display the current inverter settings.

Setting options

None.

Menu item path

Main menu > Inverter Info.

Displaying the inverter information

10.Sep 2014 15:32
Status: On Grid
Power: 0W
E-Today: 0kWh

Meter
Energy Log
Event Log
►Inverter Info.

1. If the default information is displayed, press any button to open the main menu. Otherwise, press the **EXIT** button repeatedly until the main menu is displayed.

2. Use the **▼** and **▲** buttons to select the **Inverter Info.** entry and then press the **ENT** button.

3. Use the **▼** and **▲** buttons to page through the list.

Notice: Some list items contain sub-items with additional information.

4. Press the **EXIT** button to exit the menu.

Overview of displayed information

Displayed information	Description	How can I change this setting
S/N:xxxxxxxxxxxxxx	S/N: xxxxxxxxxxxxxxxx	This setting cannot be changed.
Install:	The 13-character serial number of the inverter.	
DSP 1.44 Red. 1.24	The serial number is also located on the type plate of the inverter.	
COMM 1.29 ID: 1	Install:	This setting cannot be changed.
	The installation date of the inverter	
	DSP 1.44, RED. 1.24, COMM 1.29	This setting cannot be changed.
	The version numbers of the installed firmware.	
	This manual relates to the three firmware versions listed here.	
	ID: 1	See "8.4 "Installation settings" menu area", page 83 for a detailed description and how to change the settings
	The inverter ID. This is required in order to uniquely identify an inverter when several inverters are installed in a system.	
	Country: GERMANY LV	See "8.4.3 Country", page 86 for how to change the settings
	The configured country or grid type.	
	Insulation: 250k	See "8.4.2 Insulation", page 84 for a detailed description and how to change the settings
	The insulation resistance.	
	Baud rate: 19200bps	See "8.3.3 Baud rate", page 80 for a detailed description and how to change the settings
	The RS485 baud rate.	

Displayed information	Description	How can I change this setting
AC connection: 3P4W Max. Power: 55000W Dry Cont.A: Disabled Dry Cont.B: Disabled	AC connection: 3P4W The grid type (with or without a neutral conductor). Max. power: 55000W The maximum active power limit of the inverter. Dry Cont. A: Disable Dry Cont. B: Disable The event during which the relays trigger the dry contacts. EPO: Normal Open	See "8.4.9 AC connection", page 102 for a detailed description and how to change the settings See "8.4.10 Anti-islanding", page 103 for a detailed description and how to change the settings See "5.9 Connecting an external alarm unit", page 39 for a detailed description and see "8.4.6 Dry contacts", page 98 for how to change the settings "8.4.5 DC Injection", page 96
EPO: Normal close ►Grid Settings Active Pwr Settings React Pwr Settings	EPO: Normal Open The setting for the external power off relay. Grid Settings Sub-item with the settings for grid voltage, grid frequency and reconnection time after a grid error. Active Pwr Settings Sub-item with the settings for the functions controlling active power. React Pwr Settings Sub-item with the settings for the functions controlling reactive power.	See "8.4.3 Country", page 86 for a detailed description and how to change the settings See below for a description. See below for a description.
►FRT Settings	FRT Settings Function for setting the operating behavior in the case of a grid voltage fail.	See "8.6 FRT (Fault Ride Through)", page 122 for a detailed description and how to change the settings
Sub-item "Active Pwr Settings"	Power limit Function for power limiting Power vs. Frequency Function for regulating the active power depending on the grid frequency. P(V) Function for regulating the active power depending on the grid voltage.	See "8.5.1 Power limit", page 106 for a detailed description and how to change the settings See "8.5.2 Regulating the active power via the grid frequency", page 108 for a detailed description and how to change the settings See "8.5.3 P (V) (regulating the active power via the grid voltage)", page 111 for a detailed description and how to change the settings
Sub-item "React Pwr Settings"	Constant cos phi Function for setting a constant cos phi (power factor). Cos phi (P) Function for regulating the cos phi (power factor) depending on the active power. Constant Q Function for setting a constant reactive power Q(V) Function for regulating the reactive power depending on the grid voltage.	See "8.5.3 P (V) (regulating the active power via the grid voltage)", page 111 for a detailed description and how to change the settings See "8.5.5 Cos phi (P) (regulate cos phi via active power)", page 115 for a detailed description and how to change the settings See "8.5.6 Constant Q (constant reactive power)", page 117 for a detailed description and how to change the settings See "8.5.7 Q (V) – Regulating reactive power via voltage", page 119 for a detailed description and how to change the settings

8 Settings

8.3 "General settings" menu area

8.3.1 Language

Overview

This function allows you to set the display language.

Setting options

Parameter	Description	Setting range
Language	The display language.	German English Spanish French Italian Dutch

Menu item path

Main menu > General settings > Language

Set the display language

10.Sep 2014 15:32
Status: On Grid
Power: 0W
E-Today: 0kWh

►General Settings
Install Settings
Active/Reactive Pwr
FRT

►Language
Date & Time
Baud rate
Protocoll

►English
Deutsch
Français
Italiano

1. If the default information is displayed, press any button to open the main menu.
Otherwise, press the  button repeatedly until the main menu is displayed.
2. Use the  and  buttons to select the **General Settings** entry and then press the  button.
3. Use the  and  buttons to select the **Language** entry and then press the  button.
4. Use the  and  buttons to select a language and then press the  button.

8.3.2 Date and Time

Overview

This function allows you to set the date and time.



The date and time must be set correctly for exact calculations of the statistics in the inverter or in a monitoring system.

Setting options

Parameter	Description	Setting range
-	Date and Time	-

Menu item path

Main menu > General settings > Date and time

Setting the date and time

```

10.Sep 2014 15:32
Status:      On Grid
Power:       0W
E-Today:     0kWh

```

```

►General Settings
  Install Settings
  Active/Reactive Pwr
  FRT

```

```

  Language
  ►Date & Time
    Baud rate
    Protocoll

```

```

10.Sep 2014 14:55

```

1. If the default information is displayed, press any button to open the main menu. Otherwise, press the **EXIT** button repeatedly until the main menu is displayed.
2. Use the **▼** and **▲** buttons to select the **General Settings** entry and then press the **ENT** button.
3. Press the **▼** and **▲** buttons to select the entry **Date and Time** and then press the **ENT** button.
4. Use the **▼** and **▲** buttons to change the currently selected (underlined) value and then press the **ENT** button.
→ The selection jumps to the next value.

8 Settings

8.3.3 Baud rate

Overview

This function allows you to set the RS485 baud rate.



If multiple inverters are connected via RS485 then the same baud rate must be set at every inverter.

Setting options

Parameter	Description	Setting range
Baud rate	Baud rate for RS485	9600 19200 38400

Menu item path

Main menu > General settings > Baud rate

Setting the Baud rate for RS485

```
10.Sep 2014 15:32
Status:      On Grid
Power:       0W
E-Today:     0kWh
```

```
►General Settings
Install Settings
Active/Reactive Pwr
FRT
```

```
Language
Date & Time
►Baud rate
Protocoll
```

```
►9600
19200
38400
```

1. If the default information is displayed, press any button to open the main menu. Otherwise, press the **EXIT** button repeatedly until the main menu is displayed.
2. Use the **▼** and **▲** buttons to select the **General Settings** entry and then press the **ENT** button.
3. Use the buttons **▼** and **▲** to select the entry **Baud Rate** and then press the **ENT** button.
4. Use the **▼** and **▲** buttons to configure the value and then press the **ENT** button.

8.3.4 Protocol

Overview

This function allows you to set the RS485 protocol type.

Setting options

Parameter	Description	Setting range
-	Type of RS485 protocol used for RS485 communication.	Prot. Delta/Solivia Prot. Sunspec

Menu item path

Main Menu > General settings > Protocol

Setting the RS485 protocol

```

10.Sep 2014 15:32
Status:      On Grid
Power:       0W
E-Today:     0kWh

```

```

►General Settings
Install Settings
Active/Reactive Pwr
FRT

```

```

Language
Date & Time
Baud rate
►Protocol1

```

```

►Prot. Delta/Solivia
Prot. Sunspec

```

1. If the default information is displayed, press any button to open the main menu. Otherwise, press the  button repeatedly until the main menu is displayed.
2. Use the  and  buttons to select the **General Settings** entry and then press the  button.
3. Use the  and  buttons to select the **Protocol** entry and then press the  button.
4. Use the  and  buttons to select an RS485 protocol option and then press the  button.

8 Settings

8.3.5 Test menu

See "[11.2 Checking the fans](#)", page 136 for a description

8.4 "Installation settings" menu area



This menu area is password-protected because the settings in this menu area affect the energy production of the inverter.

- Exercise extra care with all settings in this menu area.

8.4.1 Inverter ID

Overview

This function allows you to set the inverter ID.



If multiple inverters are connected to the PV system then a different inverter ID must be set for each inverter. For example, the inverter ID is used by monitoring systems to uniquely identify each inverter.

Setting options

Parameter	Description	Setting range
Set ID	Inverter ID	001 .. 254

Menu item path

Main Menu > Install Settings > Inverter ID

Setting the inverter ID

```

10.Sep 2014 15:32
Status:      On Grid
Power:       0W
E-Today:     0kWh

```

```

General Settings
►Install Settings
Active/Reactive Pwr
FRT

```

```

Warning:
Adj. would affect
energy production.
Password  0 * * *

```

```

►Inverter ID:  001
Insulation
Country
Grid Settings

```

```

► Setting ID:
ID=001

```

1. If the default information is displayed, press any button to open the main menu. Otherwise, press the **EXIT** button repeatedly until the main menu is displayed.
2. Use the **▼** and **▲** buttons to select the **Install Settings** entry and then press the **ENT** button.
3. This function is protected with password 5555. Use the **▼** and **▲** buttons to set the individual numerals. Press the **ENT** button to confirm a number.
4. Use the **▼** and **▲** buttons to select the **Inverter ID** entry and then press the **ENT** button. The current inverter ID is displayed after the entry.
5. Use the **▼** and **▲** buttons to set the inverter ID and then press the **ENT** button.

8 Settings

8.4.2 Insulation



These parameters are set according to the requirements of the selected country. Changing these parameter settings can invalidate the type approval of the unit. Change this setting only after consultation with Delta customer service.

Overview

This function allows you to set the insulation mode and insulation resistance.

Setting options

Parameter	Description	Setting range
Mode	The insulation mode.	ON
		Plus grounding
		Minus grounding
		OFF
Resistance	Insulation resistance	150 kΩ 250 kΩ 1100 kΩ

Menu item path

Main Menu > Install Settings > Insulation

Calling up the menu

```
10.Sep 2014 15:32
Status:      On Grid
Power:       0W
E-Today:     0kWh
```

```
General Settings
►Install Settings
Active/Reactive Pwr
FRT
```

```
Warning:
Adj. would affect
energy production.
Password    0 * * *
```

```
Inverter ID:    001
►Insulation
Country
Grid Settings
```

```
►Mode: ON
Resistance: 1100 kΩ
```

```
►ON
Plus grounded
Minus grounded
OFF
```

1. If the default information is displayed, press any button to open the main menu.
Otherwise, press the **EXIT** button repeatedly until the main menu is displayed.
2. Use the **▼** and **▲** buttons to select the **Install Settings** entry. and then press the **ENT** button.
3. This function is protected with password 5555.
Use the **▼** and **▲** buttons to set the individual numerals.
Press the **ENT** button to confirm a number.
4. Use the **▼** and **▲** buttons to select the **Insulation** entry and then press the **ENT** button.
5. Use the **▼** and **▲** buttons to select the **Mode** entry and then press the **ENT** button.
The currently set value is displayed after the entry.
6. Use the **▼** and **▲** buttons to select a mode and then press the **ENT** button.

Mode: ON
►Resistance: 1100 kΩ

150kΩ
►250kΩ
1100kΩ

7. Use the ▼ and ▲ buttons to select the **Resistance** entry and then press the ENT button. The currently set value is displayed after the entry.

8. Use the ▼ and ▲ buttons to select a value and then press the ENT button.

8 Settings

8.4.3 Country



Change this setting only after consultation with Delta customer service.

Overview



To change this setting, you need a special password provided by Delta customer service. You can find the contact information on the back of this document.

This function allows you to set the country.

Setting options

Parameter	Description	Setting range
Country	Reset the inverter to the factory settings.	None

Menu item path

Main Menu > Install Settings > Country

Loading the factory settings

```
10.Sep 2014 15:32
Status:      On Grid
Power:       0W
E-Today:     0kWh
```

```
General Settings
►Install Settings
Active/Reactive Pwr
FRT
```

```
Warning:
Adj. would affect
energy production.
Password  0 * * *
```

```
Inverter ID:  001
Insulation
►Country
Grid Settings
```

```
►UK G59-3 230
FRA-Is 50HZ
FRA-Is 60HZ
FRANCE MV
```

1. If the default information is displayed, press any button to open the main menu.
Otherwise, press the **EXIT** button repeatedly until the main menu is displayed.
2. Use the **▼** and **▲** buttons to select the **Install Settings** entry and then press the **ENT** button.
3. Enter the password provided by Delta customer service.
Use the **▼** and **▲** buttons to set the individual numerals.
Press the **ENT** button to confirm a number.
4. Use the **▼** and **▲** buttons to select the **Country** entry and then press the **ENT** button.
5. Use the **▼** and **▲** buttons to select your country or grid type and then press the **ENT** button.

8.4.4 Grid settings



These parameters are set according to the requirements of the selected country. Changing these parameter settings can invalidate the type approval of the unit. Change this setting only after consultation with Delta customer service.

8.4.4.1 Overview



To change this setting, you need a special password provided by Delta customer service. You can find the contact information on the back of this document.

This menu area is used to define the behavior of the inverter in the case of faults in the public grid.

The **Grid Settings** menu area has the following sub-areas:

Voltage protection	The behavior of the inverter in the case of grid overvoltage or undervoltage.
Frequency protection	The behavior of the inverter in the case of grid overfrequency or underfrequency.
Reconnection time	The time waited by the inverter before reconnecting to the grid after a grid fault.
P ramp up	The grid feed behavior of the inverter when reconnecting to the grid after a grid fault.

8 Settings

8.4.4.2 Voltage protection



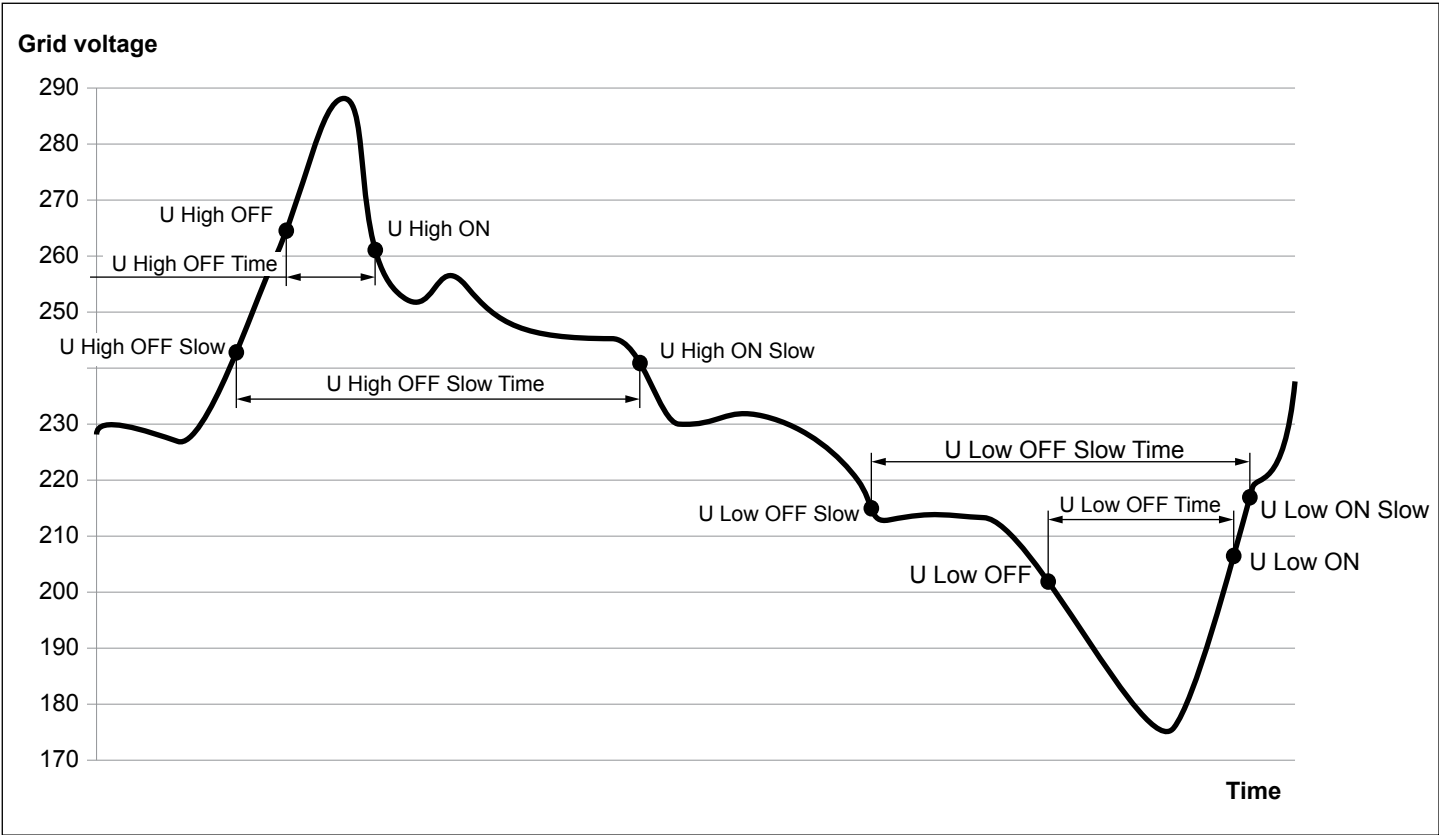
These parameters are set according to the requirements of the selected country. Changing these parameter settings can invalidate the type approval of the unit. Change this setting only after consultation with Delta customer service.

Overview



To change this setting, you need a special password provided by Delta customer service. You can find the contact information on the back of this document.

This function allows you to defined the behavior of the inverter in the case of grid overvoltage or undervoltage.



Setting options

Parameter	Description	Setting range
High Off	Voltage high off	184.0 .. 276.0 V
High On	Voltage high on	184.0 .. 276.0 V
High Off T	Disconnection time for voltage high off	0.0 .. 5.0 s
Low Off	Voltage low off	184.0 .. 276.0 V
Low On	Voltage low on	184.0 .. 276.0 V
Low Off T	Disconnection time for voltage low off	0 .. 5.0 s
Hi Off Slow	Voltage high off slowly	184.0 .. 276.0 V
Lo On Slow	Voltage low on slowly	184.0 .. 276.0 V
Hi Off Sl T	Disconnection time for voltage high off slowly	0 .. 600 s
Lo Off Slow	Voltage low off slowly	184.0 .. 276.0 V
Lo On Slow	Voltage low on slowly	184.0 .. 276.0 V
Lo Off Sl T	Disconnection time for voltage low off slowly	0 .. 600 s

Menu item path

Main Menu > Install Settings > Grid Settings > Voltage Protection

Changing the settings



This procedure is the same for all parameters.

```

10.Sep 2014 15:32
Status:      On Grid
Power:       0W
E-Today:    0kWh

```

```

General Settings
►Install Settings
Active/Reactive Pwr
FRT

```

```

Warning:
Adj. would affect
energy production.
Password  0 * * *

```

```

Inverter ID:  001
Insulation
Country
►Grid Settings

```

1. If the default information is displayed, press any button to open the main menu. Otherwise, press the **EXIT** button repeatedly until the main menu is displayed.
2. Use the **▼** and **▲** buttons to select the **Install Settings** entry and then press the **ENT** button.
3. Enter the password provided by Delta customer service. Use the **▼** and **▲** buttons to set the individual numerals. Press the **ENT** button to confirm a number.
4. Use the **▼** and **▲** buttons to select the **Grid Settings** entry and then press the **ENT** button.

8 Settings

►Voltage Protection	
Freq. Protection	
Reconnect T:	600s
P Ramp up:	6000%/m

►High Off:	276.0V
High On:	259.0V
High Off T:	0.3s
Low Off:	104.0V

5. Use the  and  buttons to select the **Voltage Protection** entry and then press the  button.

6. Use the  and  buttons to select a parameter and then press the  button.
→ The shape of the arrow changes , the value can be changed.
The currently set value is displayed after the entry.

7. Use the  and  buttons to configure the value and then press the  button.

8.4.4.3 Frequency protection



These parameters are set according to the requirements of the selected country. Changing these parameter settings can invalidate the type approval of the unit. Change this setting only after consultation with Delta customer service.

Overview



To change this setting, you need a special password provided by Delta customer service. You can find the contact information on the back of this document.

This function allows you to defined the behavior of the inverter in the case of grid overfrequency or underfrequency.

Setting options

Parameter	Description	Setting range
High Off	Frequency high off	45 .. 65 Hz
High On	Frequency high on	45 .. 65 Hz
High Off T	Disconnection time for frequency high off	0.0 .. 5.0 s
Low Off	Frequency low off	45 .. 65 Hz
Low On	Frequency low on	45 .. 65 Hz
Low Off T	Disconnection time for frequency low off	0 .. 5.0 s
Hi Off Slow	Frequency high off slowly	45 .. 65 Hz
Lo On Slow	Frequency low on slowly	45 .. 65 Hz
Hi Off Sl T	Disconnection time for frequency high off slowly	0 .. 600 s
Lo Off Slow	Frequency low off slowly	45 .. 65 Hz
Lo On Slow	Frequency low on slowly	45 .. 65 Hz
Lo Off Sl T	Disconnection time for voltage low off slowly	0 .. 600 s

Menu item path

Main Menu > Install Settings > Grid Settings > Freq. Protection

8 Settings

Changing the settings



This procedure is the same for all parameters.

10.Sep 2014 15:32
Status: On Grid
Power: 0W
E-Today: 0kWh

General Settings
►Install Settings
Active/Reactive Pwr
FRT

Warning:
Adj. would affect
energy production.
Password 0 * * *

Inverter ID: 001
Insulation
Country
►Grid Settings

Voltage Protection
►Freq. Protection
Reconnect T: 600s
P Ramp up: 6000%/m

►High Off: 51.50Hz
High On: 50.05Hz
High Off T: 0.1s
Low Off: 47.50Hz

1. If the default information is displayed, press any button to open the main menu.
Otherwise, press the **EXIT** button repeatedly until the main menu is displayed.
2. Use the **▼** and **▲** buttons to select the **Install Settings** entry and then press the **ENT** button.
3. Enter the password provided by Delta customer service.
Use the **▼** and **▲** buttons to set the individual numerals.
Press the **ENT** button to confirm a number.
4. Use the **▼** and **▲** buttons to select the **Grid Settings** entry and then press the **ENT** button.
5. Use the **▼** and **▲** buttons to select the **Freq. Protection** entry and then press the **ENT** button.
6. Use the **▼** and **▲** buttons to select a parameter and then press the **ENT** button.
→ The shape of the arrow changes **→|**, the value can be changed.
The currently set value is displayed after the entry.
7. Use the **▼** and **▲** buttons to configure the value and then press the **ENT** button.

8.4.4.4 Reconnection time



These parameters are set according to the requirements of the selected country. Changing these parameter settings can invalidate the type approval of the unit. Change this setting only after consultation with Delta customer service.

Overview



To change this setting, you need a special password provided by Delta customer service. You can find the contact information on the back of this document.

This function allows you to specify a reconnection time for cases where the inverter disconnects from the grid due to a voltage fault or frequency fault.

Once the fault has disappeared, the inverter waits for the specified reconnection time before reconnecting to the grid.

Setting options

Parameter	Description	Setting range
Reconnect T	Reconnection time	0 .. 600 s

Menu item path

Main Menu > Install Settings > Grid Settings > Reconnect T

Setting the reconnection time

```

10.Sep 2014 15:32
Status:      On Grid
Power:       0W
E-Today:     0kWh

```

1. If the default information is displayed, press any button to open the main menu. Otherwise, press the **EXIT** button repeatedly until the main menu is displayed.

```

General Settings
►Install Settings
Active/Reactive Pwr
FRT

```

2. Use the **▼** and **▲** buttons to select the **Install Settings** entry and then press the **ENT** button.

```

Warning:
Adj. would affect
energy production.
Password  0 * * *

```

3. Enter the password provided by Delta customer service. Use the **▼** and **▲** buttons to set the individual numerals. Press the **ENT** button to confirm a number.

```

Inverter ID:  001
Insulation
Country
►Grid Settings

```

4. Use the **▼** and **▲** buttons to select the **Grid Settings** entry and then press the **ENT** button.

```

Voltage Protection
Freq. Protection
►Reconnect T:  600s
P Ramp up:    6000%/m

```

5. Use the **▼** and **▲** buttons to select the **Reconnect T** entry and then press the **ENT** button.

→ The shape of the arrow changes **→|**, the value can be changed.

The currently set value is displayed after the entry.

8 Settings

6. Use the  and  buttons to configure the value and then press the  button.

8.4.4.5 P Ramp Up



These parameters are set according to the requirements of the selected country. Changing these parameter settings can invalidate the type approval of the unit. Change this setting only after consultation with Delta customer service.

Overview

This function allows you to specify the active power increase ramp for cases where the inverter disconnects from the grid due to a voltage fault or frequency fault.

Once the fault has disappeared, the inverter continuously increases the active power according to the specified ramp.

Setting options

Parameter	Description	Setting range
P Ramp Up	Increase of the fed active power in percent per minute.	0 .. 6000 %/min

Menu item path

Main Menu > Install Settings > Grid Settings > P Ramp Up

Setting the active power increase ramp

```

10.Sep 2014 15:32
Status:      On Grid
Power:       0W
E-Today:     0kWh

```

```

General Settings
►Install Settings
Active/Reactive Pwr
FRT

```

```

Warning:
Adj. would affect
energy production.
Password      0 * * *

```

```

Inverter ID:   001
Insulation
Country
►Grid Settings

```

```

Voltage Protection
Freq. Protection
Reconnect T:   600s
►P Ramp up:    6000%/m

```

```

Voltage Protection
Freq. Protection
Reconnect T:   600s
→P Ramp up:   6000%/m

```

1. If the default information is displayed, press any button to open the main menu. Otherwise, press the **EXIT** button repeatedly until the main menu is displayed.
2. Use the **▼** and **▲** buttons to select the **Install Settings** entry and then press the **ENT** button.
3. Enter the password provided by Delta customer service. Use the **▼** and **▲** buttons to set the individual numerals. Press the **ENT** button to confirm a number.
4. Use the **▼** and **▲** buttons to select the **Grid Settings** entry and then press the **ENT** button.
5. Use the **▼** and **▲** buttons to select the **P Ramp Up** entry and then press the **ENT** button.
→ The shape of the arrow changes **→|**, the value can be changed.
The currently set value is displayed after the entry.
6. Use the **▼** and **▲** buttons to configure the value and then press the **ENT** button.

8 Settings

8.4.5 DC Injection



Change this setting only after consultation with Delta customer service.

Overview



To change this setting, you need a special password provided by Delta customer service. You can find the contact information on the back of this document.

This function allows you to specify the behavior of the inverter when a DC portion occurs when feeding the grid.

Setting options

Parameter	Description	Setting range
Mode	Switch the function on and off.	ON OFF
Trip Value	The amount of DC current at which the inverter stops feeding into the grid.	0.01 .. 1.00 A
Trip Time	When the switch-off value is exceeded, the inverter waits for the specified time to see if the DC current drops below the switch-off value again. When this time has expired, the inverter switches off.	0.0 .. 5.0 s

Menu item path

Main Menu > Install Settings > DC Injection

Calling up the menu item

10.Sep 2014 15:32
Status: On Grid
Power: 0W
E-Today: 0kWh
General Settings
►Install Settings
Active/Reactive Pwr
FRT
Warning:
Adj. would affect
energy production.
Password 0 * * *
Inverter ID: 001
►Insulation
Country
Grid Settings

1. If the default information is displayed, press any button to open the main menu.
Otherwise, press the **EXIT** button repeatedly until the main menu is displayed.
2. Use the **▼** and **▲** buttons to select the **Install Settings** entry and then press the **ENT** button.
3. Enter the password provided by Delta customer service.
Use the **▼** and **▲** buttons to set the individual numerals.
Press the **ENT** button to confirm a number.
4. Use the **▼** and **▲** buttons to select the **Insulation** entry and then press the **ENT** button.

Setting the mode

►Mode:	ON
Trip Value:	1.00A
Trip Time:	0.2s

- Use the  and  buttons to select the **Mode** entry and then press the  button.
→ The shape of the arrow changes , the value can be changed.
The currently set mode is displayed after the entry.

- Use the  and  buttons to select a mode and then press the  button.

Changing the settings



This procedure is the same for all parameters.

Mode:	ON
►Trip Value:	1.00A
Trip Time:	0.2s

- Use the  and  buttons to select a parameter and then press the  button.
→ The shape of the arrow changes , the value can be changed.
The currently set value is displayed after the entry.

- Use the  and  buttons to configure the value and then press the  button.

8 Settings

8.4.6 Dry contacts

Overview

If you have connected an external alarm unit to the dry contacts you can use this function to specify the events that trigger the external alarm unit.

You can specify a different event for each dry contact.

Setting options

Parameter	Description	Setting range
Dry contact A	The event for dry contact A.	Disabled On Grid Fan Fail Insulation Alarm Error Fault Warning
Dry contact B	The event for dry contact B.	

Event	Description
Disable	The function of the dry contacts is disabled.
On Grid	The inverter is connected to the grid.
Fan Fail	The fans are defective.
Insulation	The insulation test has failed.
Alarm	An error event message, fault message or warning has been sent.
Error	An error event message has been sent.
Fault	A fault message has been sent.
Warning	A warning message has been sent.

Menu item path

Main Menu > Install Settings > Dry Cont

Assigning events to the dry contacts

10.Sep 2014 15:32
Status: On Grid
Power: 0W
E-Today: 0kWh

General Settings
►Install Settings
Active/Reactive Pwr
FRT

Warning:
Adj. would affect
energy production.
Password 0 * * *

DC Injection
►Dry Contact
RCMU: ON
EPO: Normal Close

1. If the default information is displayed, press any button to open the main menu. Otherwise, press the **EXIT** button repeatedly until the main menu is displayed.
2. Use the **▼** and **▲** buttons to select the **Install Settings** entry and then press the **ENT** button.
3. Enter the password provided by Delta customer service. Use the **▼** and **▲** buttons to set the individual numerals. Press the **ENT** button to confirm a number.
4. Use the buttons **▼** and **▲** to select the **Dry Cont** button and then press the **ENT** button.

►Dry	Cont.A	Disable
Dry	Cont.B	Disable

- Disable
- On Grid
- Fan Fail
- Insulation

5. Use the buttons  and  to select a dry contact and then press the  button.
6. Use the  and  buttons to select an event and then press the  button.

8 Settings

8.4.7 RCMU (Integrated residual current monitoring unit)



Change this setting only after consultation with Delta customer service.

Overview



To change this setting, you need a special password provided by Delta customer service. You can find the contact information on the back of this document.

This function allows you to switch the integrated residual current monitoring unit on and off.

Setting options

Parameter	Description	Setting range
RCMU	Switch the function on and off.	ON OFF

Menu item path

Main Menu > Install Settings > RCMU

Setting the integrated residual current monitoring unit

```
10.Sep 2014 15:32
Status:      On Grid
Power:       0W
E-Today:    0kWh
```

```
General Settings
►Install Settings
Active/Reactive Pwr
FRT
```

```
Warning:
Adj. would affect
energy production.
Password  0 * * *
```

```
DC Injection
Dry Contact
►RCMU:      ON
EPO:       Normal Close
```

1. If the default information is displayed, press any button to open the main menu. Otherwise, press the **EXIT** button repeatedly until the main menu is displayed.
2. Use the **▼** and **▲** buttons to select the **Install Settings** entry and then press the **ENT** button.
3. Enter the password provided by Delta customer service. Use the **▼** and **▲** buttons to set the individual numerals. Press the **ENT** button to confirm a number.
4. Use the **▼** and **▲** buttons to select the **RCMU** entry and then press the **ENT** button.
5. Use the **▼** and **▲** buttons to select a mode and then press the **ENT** button.

8.4.8 EPO (External power-off)

Overview

This function allows you to define the relay contacts for the external power-off (EPO) as being normally closed or normally open contacts.

Setting options

Parameter	Description	Setting range
EPO	Defines how the relay functions for the external power-off (EPO).	Normal Open Normal Closed

Menu item path

Main Menu > Install Settings > EPO

Setting the external power-off

```

10.Sep 2014 15:32
Status:      On Grid
Power:       0W
E-Today:     0kWh

```

1. If the default information is displayed, press any button to open the main menu. Otherwise, press the **EXIT** button repeatedly until the main menu is displayed.

```

General Settings
►Install Settings
Active/Reactive Pwr
FRT

```

2. Use the **▼** and **▲** buttons to select the **Install Settings** entry and then press the **ENT** button.

```

Warning:
Adj. would affect
energy production.
Password  0 * * *

```

3. This function is protected with password 5555. Use the **▼** and **▲** buttons to set the individual numerals. Press the **ENT** button to confirm a number.

```

DC Injection
Dry Contact
RCMU:      ON
►EPO:      Normal Close

```

4. Use the buttons **▼** and **▲** to select the entry **EPO** and press the **ENT** button.
→ The shape of the arrow changes **→|**, the value can be changed.
The currently set value is displayed after the entry.

```

DC Injection
Dry Contact
RCMU:      ON
→EPO:      Normal Close

```

5. Use the **▼** and **▲** buttons to configure the value and then press the **ENT** button.

8 Settings

8.4.9 AC connection

Overview

The inverter is configured by default for an AC connection with 3-phases and a neutral conductor (**3P4W**). If you wish to connect the inverter without a neutral conductor then you must set the AC connection type to **3P3W** after commissioning.

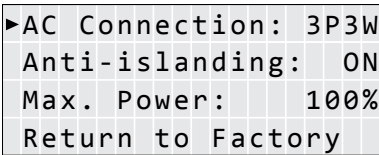
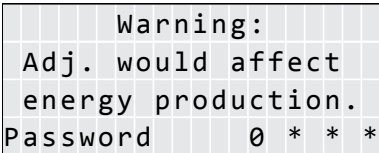
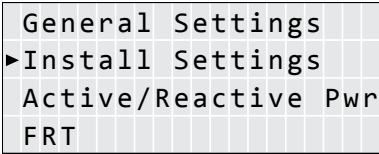
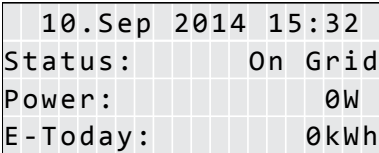
Setting options

Parameter	Description	Setting range
	Set the AC connection type.	
AC connection	3P3W: 3-phase system without a neutral conductor (L1, L2, L3, PE) 3P4W: 3-phase system with a neutral conductor (L1, L2, L3, N, PE)	3P3W 3P4W

Menu item path

Main Menu > Install Settings > AC connection

Setting the AC connection type



1. If the default information is displayed, press any button to open the main menu.
Otherwise, press the  button repeatedly until the main menu is displayed.
2. Use the  and  buttons to select the **Install Settings** entry and then press the  button.
3. This function is protected with password 5555.
Use the  and  buttons to set the individual numerals.
Press the  button to confirm a number.
4. Use the buttons  and  to select the entry **AC connection** and press the  button.
→ The shape of the arrow changes , the value can be changed.
The currently set value is displayed after the entry.
5. Use the  and  buttons to configure the value and then press the  button.

8.4.10 Anti-islanding



Change this setting only after consultation with Delta customer service.

Overview



To change this setting, you need a special password provided by Delta customer service. You can find the contact information on the back of this document.

This function allows you to switch the anti-islanding protection on and off.

Setting options

Parameter	Description	Setting range
Anti-islanding	Switch the anti-islanding protection on and off.	ON OFF

Menu item path

Main Menu > Install Settings > Anti-islanding

Setting the anti-islanding

```

10.Sep 2014 15:32
Status:      On Grid
Power:       0W
E-Today:    0kWh

```

```

General Settings
►Install Settings
Active/Reactive Pwr
FRT

```

```

Warning:
Adj. would affect
energy production.
Password  0 * * *

```

```

AC Connection: 3P3W
►Anti-islanding: ON
Max. Power:   100%
Return to Factory

```

1. If the default information is displayed, press any button to open the main menu. Otherwise, press the **EXIT** button repeatedly until the main menu is displayed.
2. Use the **▼** and **▲** buttons to select the **Install Settings** entry and then press the **ENT** button.
3. Enter the password provided by Delta customer service. Use the **▼** and **▲** buttons to set the individual numerals. Press the **ENT** button to confirm a number.
4. Use the **▼** and **▲** buttons to select the **Anti-islanding** entry and then press the **ENT** button.
5. Use the **▼** and **▲** buttons to select a mode and then press the **ENT** button.

8 Settings

8.4.11 Max. power (maximum active power)



These parameters are set according to the requirements of the selected country. Changing these parameter settings can invalidate the type approval of the unit. Change this setting only after consultation with Delta customer service.

Overview

This function allows you to set the maximum active power fed into the grid.

Setting options

Parameter	Description	Setting range
Max. Power	Limits the maximum power that can be fed into the grid.	0 .. 55000 W

Menu item path

Main Menu > Install Settings > Max. Power

Setting the maximum active power

10.Sep 2014 15:32
Status: On Grid
Power: 0W
E-Today: 0kWh

General Settings
►Install Settings
Active/Reactive Pwr
FRT

Warning:
Adj. would affect
energy production.
Password 0 * * *

AC Connection: 3P3W
Anti-islanding: ON
►Max. Power: 100%
Return to Factory

1. If the default information is displayed, press any button to open the main menu. Otherwise, press the  button repeatedly until the main menu is displayed.
2. Use the  and  buttons to select the **Install Settings** entry and then press the  button.
3. This function is protected with password 5555.
Use the  and  buttons to set the individual numerals.
Press the  button to confirm a number.
4. Use the buttons  and  to select the entry **Max. Power** and press the  button.
→ The shape of the arrow changes , the value can be changed.
The currently set value is displayed after the entry.
5. Use the  and  buttons to configure the value and then press the  button.

8.4.12 Loading the factory settings



Change this setting only after consultation with Delta customer service.

Overview



To change this setting, you need a special password provided by Delta customer service. You can find the contact information on the back of this document.

This function allows you to reset the inverter to the factory settings.

Setting options

Parameter	Description	Setting range
Return to Factory	Reset the inverter to the factory settings.	None

Menu item path

Main Menu > Install Settings > Return to Factory

Loading the factory settings

```

10.Sep 2014 15:32
Status:      On Grid
Power:       0W
E-Today:    0kWh

```

```

General Settings
►Install Settings
Active/Reactive Pwr
FRT

```

```

Warning:
Adj. would affect
energy production.
Password  0 * * *

```

```

AC Connection: 3P3W
Anti-islanding: ON
Max. Power:   100%
►Return to Factory

```

```

Return to factory?
►Yes / No

```

1. If the default information is displayed, press any button to open the main menu. Otherwise, press the **EXIT** button repeatedly until the main menu is displayed.
2. Use the **▼** and **▲** buttons to select the **Install Settings** entry and then press the **ENT** button.
3. Enter the password provided by Delta customer service. Use the **▼** and **▲** buttons to set the individual numerals. Press the **ENT** button to confirm a number.
4. Use the **▼** and **▲** buttons to select the **Return to Factory** entry and then press the **ENT** button.
5. Use the **▼** and **▲** buttons to select the **Yes** entry and then press the **ENT** button.

8 Settings

8.5 "Active/reactive power" menu area



This menu area is password-protected because the settings in this menu area affect the energy production of the inverter.

- Exercise extra care with all settings in this menu area.

8.5.1 Power limit



These parameters are set according to the requirements of the selected country. Changing these parameter settings can invalidate the type approval of the unit. Change this setting only after consultation with Delta customer service.

Overview

This function allows you to additionally limit the active power. The active power is specified as a percentage of the value set in the **Max. power** parameter (see "8.4.10 Anti-islanding", page 103).

Example

Maximum power = 45,000 W

Power limit = 90%

Maximum active power = max. power x power limit

Maximum active power = 45,000 W x 90% = 40,500 W

Setting options

Parameter	Description	Setting range
Mode	Switch the function on and off.	ON OFF
Define point	Additional active power limitation	0 .. 100%

Menu item path

Main Menu > Active/Reactive Pwr > Active Power Ctrl >
Power Limit

Calling up the menu item

```
10.Sep 2014 15:32
Status:      On Grid
Power:       0W
E-Today:     0kWh
```

```
General Settings
Install Settings
►Active/Reactive Pwr
FRT
```

```
Warning:
Adj. would affect
energy production.
Password 0 * * *
```

1. If the default information is displayed, press any button to open the main menu. Otherwise, press the **EXIT** button repeatedly until the main menu is displayed.

2. Use the **▼** and **▲** buttons to select the **Active/Reactive Pwr** entry and then press the **ENT** button.

3. This function is protected with password 5555. Use the **▼** and **▲** buttons to set the individual numerals. Press the **ENT** button to confirm a number.

►Active Power Ctrl
Reactive Power Ctrl

►Power Limit	
Power vs. Frequency	
P(V)	

- Use the  and  buttons to select the **Active Power Ctrl** entry and then press the  button.
- Use the  and  buttons to select the **Power Limit** entry and then press the  button.

Setting the mode

```
►Mode: ON
Set Point: 100%
```

- 6.** Use the  and  buttons to select the **Mode** entry and then press the  button.
- The shape of the arrow changes , the value can be changed.
- The currently set mode is displayed after the entry.

7. Use the  and  buttons to select a mode and then press the  button.

Changing the settings

```

Mode: ON
►Set Point: 100%

```

- 8.** Use the  and  buttons to select a parameter and then press the  button.
→ The shape of the arrow changes , the parameter can be changed.
The currently set value is displayed after the entry.
- 9.** Use the  and  buttons to configure the value and then press the  button.

8 Settings

8.5.2 Regulating the active power via the grid frequency

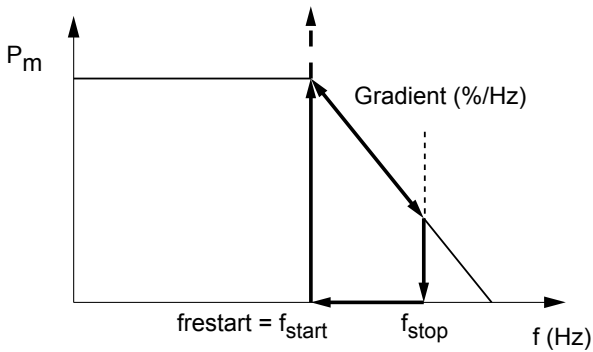


These parameters are set according to the requirements of the selected country. Changing these parameter settings can invalidate the type approval of the unit. Change this setting only after consultation with Delta customer service.

Overview

This function allows you to regulate the active power fed into the grid via the grid frequency.

Standard behavior of low-voltage power grids in Germany (VDE-AR-N 4105)



When the grid frequency exceeds f_{start} the instantaneous value of the active power is stored and the fed active power is reduced according to the gradient.

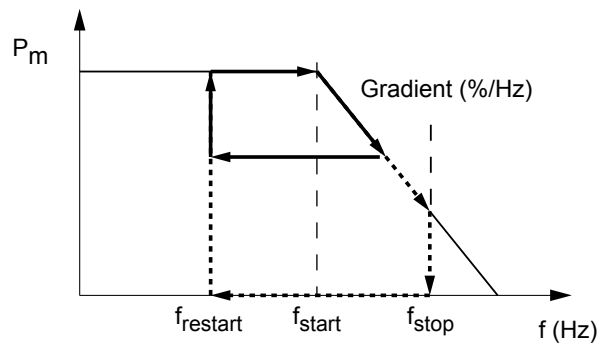
The active power is regulated according to the gradient as long as the grid frequency lies between f_{start} and f_{stop} .

The active power feed is stopped when the grid frequency exceeds f_{stop} .

Feeding remains stopped until the grid frequency falls below f_{start} again.

Feeding is resumed at the stored instantaneous value when the grid frequency falls below f_{start} again.

Standard behavior of medium-voltage power grids in Germany (BDEW)



When the grid frequency exceeds f_{start} the instantaneous value of the active power is stored and the fed active power is reduced according to the gradient.

The subsequent grid feed behavior depends on changes in the grid frequency.

a)

When the grid frequency falls again, the fed active power stored at this time is maintained before reaching f_{stop} .

Feeding is resumed at the stored instantaneous value when the grid frequency falls below $f_{restart}$.

b)

The active power feed is stopped when the grid frequency exceeds f_{stop} .

Feeding remains stopped until the grid frequency falls below $f_{restart}$.

Feeding resumes at the stored instantaneous value when the grid frequency falls below $f_{restart}$ again.

f_{stop} is automatically calculated using the following formula:

$$f_{stop} = f_{start} + (1 / \text{gradient})$$

Setting options

Parameter	Description	Setting range
Mode	Switch the function on and off.	ON OFF
F Start	The grid frequency above which the active power being fed is reduced.	50.00 .. 55.00 Hz
F Restart	The grid frequency below which the active power being fed is reduced.	50.00 .. 55.00 Hz
Gradient	When the grid frequency exceeds F Start the active power being fed is continuously reduced by the value specified here.	0 .. 100%
T Restart	When the grid frequency falls below F Restart again, the inverter waits for the time specified here before removing the previously imposed reduction of fed active power.	0 .. 600 s

Menu item path

Main Menu > Active/Reactive Pwr > Active Power Ctrl >
Power vs. Frequency

Calling up the menu item

```

10.Sep 2014 15:32
Status:      On Grid
Power:       0W
E-Today:     0kWh

```

```

General Settings
Install Settings
►Active/Reactive Pwr
FRT

```

```

Warning:
Adj. would affect
energy production.
Password  0 * * *

```

```

►Active Power Ctrl
Reactive Power Ctrl

```

```

Power Limit
►Power vs. Frequency
P(V)

```

1. If the default information is displayed, press any button to open the main menu. Otherwise, press the **EXIT** button repeatedly until the main menu is displayed.
2. Use the **▼** and **▲** buttons to select the **Active/Reactive Pwr** entry and then press the **ENT** button.
3. This function is protected with password 5555.
Use the **▼** and **▲** buttons to set the individual numerals.
Press the **ENT** button to confirm a number.
4. Use the **▼** and **▲** buttons to select the **Active Power Ctrl** entry and then press the **ENT** button.
5. Use the **▼** and **▲** buttons to select the **Power vs. Frequency** entry and then press the **ENT** button.

8 Settings

Setting the mode

►Mode:					ON
F Start:				50.20Hz	
F Recovery:				50.20Hz	
Gradient:				100%	

6. Use the  and  buttons to select the **Mode** entry and then press the  button.
→ The shape of the arrow changes , the value can be changed.
The currently set mode is displayed after the entry.

7. Use the  and  buttons to select a mode and presse the  button.

Changing the settings

Mode:					ON
►F Start:				50.20Hz	
F Recovery:				50.20Hz	
Gradient:				100%	

8. Use the  and  buttons to select a parameter and then press the  button.
→ The shape of the arrow changes , the parameter can be changed.
The currently set value is displayed after the entry.
9. Use the  and  buttons to set the value and press the  button.

8.5.3 P (V) (regulating the active power via the grid voltage)



These parameters are set according to the requirements of the selected country. Changing these parameter settings can invalidate the type approval of the unit. Change this setting only after consultation with Delta customer service.

Overview

This function allows you to regulate the active power fed into the grid via the grid voltage.

Setting options

Parameter	Description	Setting range
Mode	Switch the function on and off.	ON OFF
P lock-in		10 .. 100%
P lock-out		0 .. 50%
V lock-in		230.0 .. 292.0 V
V lock-out		207.0 .. 292.0 V
T Restart		10 .. 900 s

Menu item path

Main Menu > Active/Reactive Pwr > Active Power Ctrl > P(V)

Calling up the menu item

```

10.Sep 2014 15:32
Status:      On Grid
Power:       0W
E-Today:    0kWh

```

```

General Settings
Install Settings
►Active/Reactive Pwr
FRT

```

```

Warning:
Adj. would affect
energy production.
Password  0 * * *

```

```

►Active Power Ctrl
Reactive Power Ctrl

```

```

Power Limit
Power vs. Frequency
►P(V)

```

1. If the default information is displayed, press any button to open the main menu. Otherwise, press the **EXIT** button repeatedly until the main menu is displayed.
2. Use the **▼** and **▲** buttons to select the **Active/Reactive Pwr** entry and then press the **ENT** button.
3. This function is protected with password 5555. Use the **▼** and **▲** buttons to set the individual numerals. Press the **ENT** button to confirm a number.
4. Use the **▼** and **▲** buttons to select the **Active Power Ctrl** entry and then press the **ENT** button.
5. Use the **▼** and **▲** buttons to select the **P(V)** entry and then press the **ENT** button.

8 Settings

Setting the mode

►Modus:				EIN
P lock-in:				20%
P lock-out:				5%
V lock-in:			253.0V	

6. Use the  and  buttons to select the **Mode** entry and then press the  button.
→ The shape of the arrow changes , the value can be changed.
The currently set mode is displayed after the entry.

7. Use the  and  buttons to select a mode and then press the  button.

Changing the settings

►Modus:				EIN
P lock-in:				20%
P lock-out:				5%
V lock-in:			253.0V	

8. Use the  and  buttons to select a parameter and then press the  button.
→ The shape of the arrow changes , the parameter can be changed.
The currently set value is displayed after the entry.

9. Use the  and  buttons to configure the value and then press the  button.

8.5.4 Constant cos phi (cos ϕ)



These parameters are set according to the requirements of the selected country. Changing these parameter settings can invalidate the type approval of the unit. Change this setting only after consultation with Delta customer service.

Overview

This function allows you to set a constant cos ϕ .

Setting options

Parameter	Description	Setting range
Mode	Switch the function on and off.	ON OFF
Cos Phi	Constant cos phi (cos ϕ), capacitive or inductive	0.80 .. 0.99 cap 1 0.80 .. 0.99 ind

Menu item path

Main Menu > Active/Reactive Pwr > Reactive Power Ctrl >
Constant cosphi

Calling up the menu item

```

10.Sep 2014 15:32
Status:      On Grid
Power:       0W
E-Today:     0kWh

```

```

General Settings
Install Settings
►Active/Reactive Pwr
FRT

```

```

Warning:
Adj. would affect
energy production.
Password  0 * * *

```

```

Active Power Ctrl
►Reactive Power Ctrl

```

```

►Constant cos phi
Cos phi (P)
Constant Q
Q(V)

```

1. If the default information is displayed, press any button to open the main menu. Otherwise, press the **EXIT** button repeatedly until the main menu is displayed.
2. Use the **▼** and **▲** buttons to select the **Active/Reactive Pwr** entry and then press the **ENT** button.
3. This function is protected with password 5555. Use the **▼** and **▲** buttons to set the individual numerals. Press the **ENT** button to confirm a number.
4. Use the **▼** and **▲** buttons to select the **Reactive Power Ctrl** entry and then press the **ENT** button.
5. Use the **▼** and **▲** buttons to select the **Constant cos phi** entry and then press the **ENT** button.

8 Settings

Setting the mode

►Mode:				ON
Cos phi:		Ind	1.00	

6. Use the  and  buttons to select the **Mode** entry and then press the  button.
→ The shape of the arrow changes , the value can be changed.
The currently set mode is displayed after the entry.

7. Use the  and  buttons to select a mode and then press the  button.

Changing the settings

Mode:				ON
►Cos phi:		Ind	1.00	

8. Use the  and  buttons to select a parameter and then press the  button.
→ The shape of the arrow changes , the parameter can be changed.
The currently set value is displayed after the entry.

9. Use the  and  buttons to configure the value and then press the  button.

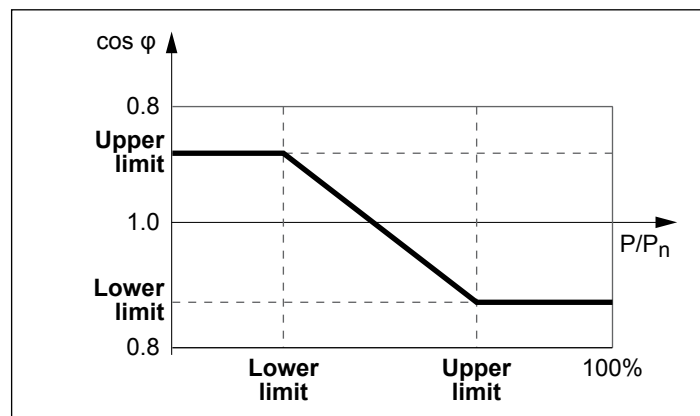
8.5.5 Cos phi (P) (regulate cos phi via active power)



These parameters are set according to the requirements of the selected country. Changing these parameter settings can invalidate the type approval of the unit. Change this setting only after consultation with Delta customer service.

Overview

This function allows you to regulate cos phi ($\cos \phi$) via the active power.



Setting options

Parameter	Description	Setting range
Mode	Switch the function on and off.	ON OFF
Q upper	The upper limit of cos phi ($\cos \phi$).	0.80 .. 0.99 cap 1 0.80 .. 0.99 ind
P lower	The lower limit of the active power.	0 .. 100%
Q lower	The lower limit of cos phi ($\cos \phi$).	0.80 .. 0.99 cap 1 0.80 .. 0.99 ind
P upper	The upper limit of the active power.	0 .. 100%
V lock-in		230.0 .. 253.0 V
V lock-out		207.0 .. 230.0 V

Menu item path

Main Menu > Active/Reactive Pwr > Reactive Power Ctrl
> Cos phi (P)

Calling up the menu item

10.Sep 2014 15:32
Status: On Grid
Power: 0W
E-Today: 0kWh

1. If the default information is displayed, press any button to open the main menu. Otherwise, press the **EXIT** button repeatedly until the main menu is displayed.

8 Settings

General Settings
Install Settings
►Active/Reactive Pwr
FRT

Warning:	
Adj. would affect	
energy production.	
Password	0 * * *

Active Power Ctrl
►Reactive Power Ctrl

Constant cos phi
►Cos phi (P)
Constant Q
Q(V)

2. Use the  and  buttons to select the **Active/Reactive Pwr** entry and then press the  button.

3. This function is protected with password 5555.

Use the  and  buttons to set the individual numerals.
Press the  button to confirm a number.

4. Use the  and  buttons to select the **Reactive Power Ctrl** entry and then press the  button.

5. Use the  and  buttons to select the **Cos phi (P)** entry and then press the  button.

Setting the mode

►Mode:	ON
Q upper:	Ind 1.00
P lower:	45%
Q lower:	Ind 1.00

6. Use the  and  buttons to select the **Mode** entry and then press the  button.

→ The shape of the arrow changes , the value can be changed.

The currently set mode is displayed after the entry.

7. Use the  and  buttons to select a mode and then press the  button.

Changing the settings

Mode:	ON
►Q upper:	Ind 1.00
P lower:	45%
Q lower:	Ind 1.00

8. Use the  and  buttons to select a parameter and then press the  button.

→ The shape of the arrow changes , the parameter can be changed.

The currently set value is displayed after the entry.

9. Use the  and  buttons to configure the value and then press the  button.

8.5.6 Constant Q (constant reactive power)



These parameters are set according to the requirements of the selected country. Changing these parameter settings can invalidate the type approval of the unit. Change this setting only after consultation with Delta customer service.

Overview

This function allows you to set constant reactive power.

Setting options

Parameter	Description	Setting range
Mode	Switch the function on and off.	ON OFF
Fixed Q	The constant reactive power as a percentage of the nominal apparent power.	0 .. 100% cap 0% 0 .. 100% ind

Menu item path

Main Menu > Active/Reactive Pwr > Reactive Power Ctrl
> Constant Q

Calling up the menu item

```

10.Sep 2014 15:32
Status:      On Grid
Power:       0W
E-Today:    0kWh

```

```

General Settings
Install Settings
►Active/Reactive Pwr
FRT

```

```

Warning:
Adj. would affect
energy production.
Password  0 * * *

```

```

Active Power Ctrl
►Reactive Power Ctrl

```

```

Constant cos phi
Cos phi (P)
►Constant Q
Q(V)

```

1. If the default information is displayed, press any button to open the main menu. Otherwise, press the **EXIT** button repeatedly until the main menu is displayed.
2. Use the **▼** and **▲** buttons to select the **Active/Reactive Pwr** entry and then press the **ENT** button.
3. This function is protected with password 5555. Use the **▼** and **▲** buttons to set the individual numerals. Press the **ENT** button to confirm a number.
4. Use the **▼** and **▲** buttons to select the **Reactive Power Ctrl** entry and then press the **ENT** button.
5. Use the **▼** and **▲** buttons to select the **Constant Q** entry and then press the **ENT** button.

8 Settings

Setting the mode

►Mode:				ON
Fix Q:		Ind	90%	

6. Use the  and  buttons to select the **Mode** entry and then press the  button.
→ The shape of the arrow changes , the value can be changed.
The currently set mode is displayed after the entry.

7. Use the  and  buttons to select a mode and then press the  button.

Changing the settings

Mode:				ON
►Fix Q:		Ind	90%	

8. Use the  and  buttons to select a parameter and then press the  button.
→ The shape of the arrow changes , the parameter can be changed.
The currently set value is displayed after the entry.

9. Use the  and  buttons to configure the value and then press the  button.

8.5.7 Q (V) – Regulating reactive power via voltage

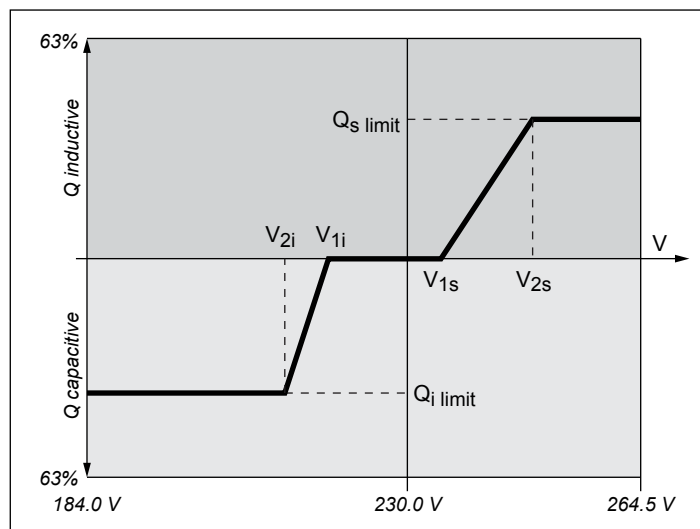


These parameters are set according to the requirements of the selected country. Changing these parameter settings can invalidate the type approval of the unit. Change this setting only after consultation with Delta customer service.

Overview

This function allows you to regulate the reactive power via the voltage.

This function is only available for medium-voltage grids.



Case 1: Grid voltage > nominal voltage

When the grid voltage drops below the lower voltage limit **V1s** the inverter begins feeding inductive reactive power.

If the **Delay time** is greater than 0 (zero), the inverter waits for the time specified here to see if the grid voltage falls below **V1s** again, before feeding capacitive reactive power.

When the grid voltage increases again, the inductive reactive power is increased according to the ramp specified by the characteristic curve.

When the grid voltage exceeds the upper voltage limit **V2s** the inductive reactive power remains at the level specified in **Qs Limit**.

Case 2: Grid voltage < nominal voltage

When the grid voltage drops below the upper voltage limit **V1i** the inverter begins feeding capacitive reactive power.

If the **Delay time** is greater than 0 (zero), the inverter waits for the time specified here to see if the grid voltage rises above **V1i** again, before feeding capacitive reactive power.

When the grid voltage increases again, the capacitive reactive power is increased according to the ramp specified by the characteristic curve.

When the grid voltage drops below the lower voltage limit **V2i** the capacitive reactive power remains at the level specified in **Qi Limit**.

8 Settings

Setting options

Parameter	Description	Setting range
Mode	Switch the function on and off.	ON OFF
V1s	The lower voltage limit for feeding inductive reactive power.	220.0 .. 292.0 V
V2s	The upper voltage limit for feeding inductive reactive power.	220.0 .. 292.0 V
Qs limit	The limit value for inductive reactive power. The value is set as a percentage of the nominal apparent power S_n . This value is connected to the parameter V2s.	ind 63% .. 1% 0%
V1i	The upper voltage limit for feeding capacitive reactive power.	184.0 .. 254.0 V
V2i	The lower voltage limit for feeding capacitive reactive power.	184.0 .. 254.0 V
Qi limit	The limit value for capacitive reactive power. The value is set as a percentage of the nominal apparent power S_n . This value is connected to the parameter V2i.	cap 63% .. 1% 0%
T Delay	Delay time before feeding reactive power.	0 .. 120 s
Lock-in power	The upper limit of the active power range in which the function is active. The value is set as a percentage of the nominal active power.	Cannot be changed
Lock-out power	The lower limit of the active power range in which the function is active. The value is set as a percentage of the nominal active power.	Cannot be changed

Menu item path

Main Menu > Active/Reactive Pwr > Reactive Power Ctrl
> Q(V)

Calling up the menu item

```

10.Sep 2014 15:32
Status:      On Grid
Power:       0W
E-Today:    0kWh

```

```

General Settings
Install Settings
►Active/Reactive Pwr
FRT

```

```

Warning:
Adj. would affect
energy production.
Password  0 * * *

```

```

Active Power Ctrl
►Reactive Power Ctrl

```

```

Constant cos phi
Cos phi (P)
Constant Q
►Q(V)

```

1. If the default information is displayed, press any button to open the main menu. Otherwise, press the **EXIT** button repeatedly until the main menu is displayed.
2. Use the **▼** and **▲** buttons to select the **Active/Reactive Pwr** entry and then press the **ENT** button.
3. This function is protected with password 5555.
Use the **▼** and **▲** buttons to set the individual numerals.
Press the **ENT** button to confirm a number.
4. Use the **▼** and **▲** buttons to select the **Reactive Power Ctrl** entry and then press the **ENT** button.
5. Use the **▼** and **▲** buttons to select the **Q(V)** entry and then press the **ENT** button.

Setting the mode

►Mode:					OFF
V1s:					248.4V
V2s:					253.0V
Qs limit:			Ind		44%

6. Use the  and  buttons to select the **Mode** entry and then press the  button.
→ The shape of the arrow changes , the value can be changed.
The currently set mode is displayed after the entry.

7. Use the  and  buttons to select a mode and then press the  button.

Changing the settings

Mode:					OFF
►V1s:					248.4V
V2s:					253.0V
Qs limit:			Ind		44%

8. Use the  and  buttons to select a parameter and then press the  button.
→ The shape of the arrow changes , the parameter can be changed.
The currently set value is displayed after the entry.

9. Use the  and  buttons to configure the value and then press the  button.

8 Settings

8.6 FRT (Fault Ride Through)



These parameters are set according to the requirements of the selected country. Changing these parameter settings can invalidate the type approval of the unit. Change this setting only after consultation with Delta customer service.

Overview



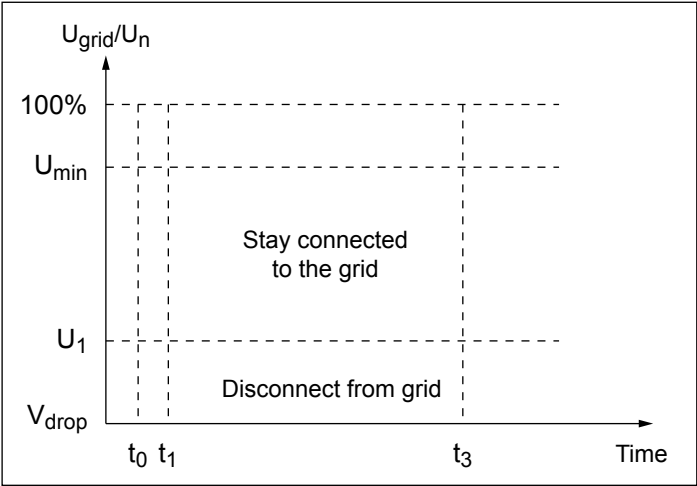
To change this setting, you need a special password provided by Delta customer service. You can find the contact information on the back of this document.

This function allows you to defined the behavior of the inverter in the case of short-term grid voltage dropouts.

Menu item path

Main menu > Settings > FRT

Setting options



t_0 : The time at which a voltage collapse begins.

Parameter	Description	Setting range
Mode	Switch the function on and off.	ON OFF
Dead Band	The upper voltage limit of the voltage range in which this function is not active. The percentage value relates to the nominal voltage.	-20 .. 0%
Vdrop	Voltage drop	0 .. 90%
t1	Time t1	0.0 .. 5.0 s
U1	Voltage U1	20 .. 90%
t3	Time t3	0.0 .. 5.0 s
K factor	Switching current factor	0.0 .. 10.0

Calling up the menu item

10.Sep 2014 15:32
Status: On Grid
Power: 0W
E-Today: 0kWh

General Settings
Install Settings
Active/Reactive Pwr
►FRT

Warning:
Adj. would affect
energy production.
Password 0 * * *

1. If the default information is displayed, press any button to open the main menu.
Otherwise, press the **EXIT** button repeatedly until the main menu is displayed.
2. Use the **▼** and **▲** buttons to select the **Active/Reactive Pwr** entry and then press the **ENT** button.
3. This function is protected with password 5555.
Use the **▼** and **▲** buttons to set the individual numerals.
Press the **ENT** button to confirm a number.

Setting the mode

►Mode: ON
Dead band: -10%
Vdrop: 0%
t1: 0.30s

4. Use the **▼** and **▲** buttons to select the **Mode** entry and then press the **ENT** button.
→ The shape of the arrow changes **→**, the value can be changed.
The currently set mode is displayed after the entry.

5. Use the **▼** and **▲** buttons to select a mode and then press the **ENT** button.

Changing the settings

Mode: ON
►Dead band: -10%
Vdrop: 0%
t1: 0.30s

6. Use the **▼** and **▲** buttons to select a parameter and then press the **ENT** button.
→ The shape of the arrow changes **→**, the parameter can be changed.
The currently set value is displayed after the entry.
7. Use the **▼** and **▲** buttons to configure the value and then press the **ENT** button.

9 Measurements and statistics

9. Measurements and statistics

The following information is available:

Type of information	Description
Measurements	Current data for various parameters
Energy log	Information on the energy generated over the entire usage period of the inverter
Event log	A list of major events, e.g. warning messages, faults, parameter changes etc., with date and time.
Inverter information	Information on general settings, grid settings, active power and reactive power monitoring, firmware versions etc. (see “8.2 “Inverter info.” menu area (current settings)” , page 76)

9.1 Measurements

Overview

This menu displays the current data for various parameters in real time.

Setting options

The displayed information cannot be edited.

Menu item path

Main menu > Meter

Displaying measurements

10.Sep 2014 15:32
Status: On Grid
Power: 0W
E-Today: 0kWh

►Meter
Energy Log
Event Log
Inverter Info.

1. If the default information is displayed, press any button to open the main menu.

Otherwise, press the **EXIT** button repeatedly until the main menu is displayed.

2. Use the **▼** and **▲** buttons to select the **Meter** entry and then press the **ENT** button.

3. Use the **▼** and **▲** buttons to page through the menu.

Press the **EXIT** button to cancel.

AC	L1	L2	L3
V	0	0	0 V
I	0	0	0 A
P	0	0	0 W

AC side

The instantaneous values for phases L1, L2 and L3 are shown.

V: AC voltage in V

I: AC current in A

P: AC active power in W

PF:	cap 0.95
Power:	0 W
Frequency:	0 Hz
E-Today:	0 kWh

AC side

cos phi: Active power factor cos phi

Power: Instantaneous active power being fed in kW

Frequency: Current grid frequency in Hz

E-Today: Amount of energy generated today up to now

DC	DC1	DC2
V	0	0 V
I	0	0 A
►P	0	0 W

DC side

The instantaneous values for DC inputs DC1 and DC2 are shown.

V: DC voltage in V

I: DC current in A

P: DC active power in W

9.2 Energy log

Overview

This menu shows the energy yields for various time periods.

Setting options

The displayed information cannot be edited.

Menu item path

Main menu > Energy log

Displaying the energy log

10.Sep 2014 15:32
Status: On Grid
Power: 0W
E-Today: 0kWh

Meter
►Energy Log
Event Log
Inverter Info.

►Life Energy
Day Energy
Month Energy

1. If the default information is displayed, press any button to open the main menu.

Otherwise, press the **EXIT** button repeatedly until the main menu is displayed.

2. Use the **▼** and **▲** buttons to select the **Energy Log** entry and then press the **ENT** button.

3. Use the **▼** and **▲** buttons to page through the menu.

Press the **ENT** button to open a submenu.

Press the **EXIT** button to cancel.

Life Energy

Life Energy
E-total: 0kWh
Runtime: 0hrs

E-Total: The energy generated over the runtime period.

Runtime: Total running time of the inverter.

Day Energy

Day Energy
2016.05.19 0kWh
2016.05.18 0kWh
2016.05.17 0kWh

Amount of energy generated per day.

Month Energy

Day Energy
2016.05.19 0kWh
2016.05.18 0kWh
2016.05.17 0kWh

Amount of energy generated per month.

9 Measurements and statistics

9.3 Event log

The event log contains error event messages and a grid report.

9.3.1 Error events

Overview

This menu shows a list with the last 30 error events.

Setting options

The list can be deleted.

Menu item path

Main Menu > Event Log > Error Events

Displaying error events

```
10.Sep 2014 15:32
Status:      On Grid
Power:       0W
E-Today:     0kWh
```

```
Meter
Energy Log
►Event Log
Inverter Info.
```

```
►Error Events
Grid Report
```

```
1. 23/02/2016 17:20
   AC Freq High
2. 22/02/2016 08:20
   AC Volt Low
```

1. If the default information is displayed, press any button to open the main menu.
Otherwise, press the **EXIT** button repeatedly until the main menu is displayed.

2. Use the **▼** and **▲** buttons to select the **Event Log** entry and then press the **ENT** button.

3. Use the **▼** and **▲** buttons to select the **Error Events** entry and then press the **ENT** button.

4. Use the **▼** and **▲** buttons to page through the menu.
Press the **EXIT** button to cancel.

Deleting error events



The grid report is also deleted together with the error events!

```
10.Sep 2014 15:32
Status:      On Grid
Power:       0W
E-Today:     0kWh
```

```
Meter
Energy Log
►Event Log
Inverter Info.
```

```
►Error Events
Grid Report
```

1. If the default information is displayed, press any button to open the main menu.
Otherwise, press the **EXIT** button repeatedly until the main menu is displayed.

2. Use the **▼** and **▲** buttons to select the **Event Log** entry and then press the **ENT** button.

3. Use the **▼** and **▲** buttons to select the **Error Events** entry and then press the **ENT** button.

→ The list of error events is displayed.

1.	23/02/2016 17:20
	AC Freq High
2.	22/02/2016 08:20
	AC Volt Low

Clear Event Logs?
►Yes / No

Empty

- Press and hold the ,  and  buttons simultaneously for at least 5 seconds.
→ A confirmation prompt is displayed.

- Use the  and  buttons to select the **Yes** entry and then press the  button.

- ☒ The event log has now been deleted.

9.3.2 Grid report

Overview

This menu shows a list with the last 5 error events.

Setting options

The list can be deleted.

Menu item path

Main Menu > Event Log > Grid Report

Displaying the grid report

10.Sep 2014 15:32
Status: On Grid
Power: 0W
E-Today: 0kWh

Meter
Energy Log
►Event Log
Inverter Info.

Error Events
►Grid Report

1.	23/02/2016 17:20
	AC Freq High
2.	22/02/2016 08:20
	AC Volt Low

- If the default information is displayed, press any button to open the main menu.
Otherwise, press the  button repeatedly until the main menu is displayed.

- Use the  and  buttons to select the **Event Log** entry and then press the  button.

- Use the  and  buttons to select the **Grid Report** entry and then press the  button.

- Use the  and  buttons to page through the menu.
Press the  button to cancel.

Deleting the grid report



The error events are also deleted together with the grid report!

9 Measurements and statistics

10.Sep 2014 15:32
Status: On Grid
Power: 0W
E-Today: 0kWh

Meter
Energy Log
►Event Log
Inverter Info.

Error Events
►Grid Report

1. 23/02/2016 17:20
AC Freq High
2. 22/02/2016 08:20
AC Volt Low

Clear Event Logs?
►Yes / No

Empty

1. If the default information is displayed, press any button to open the main menu.

Otherwise, press the  button repeatedly until the main menu is displayed.

2. Use the  and  buttons to select the **Event Log** entry and then press the  button.

3. Use the  and  buttons to select the **Grid Report** entry and then press the  button.

→ The list of error events is displayed.

4. Press and hold the ,  and  buttons simultaneously for at least 5 seconds.

→ A confirmation prompt is displayed.

5. Use the  and  buttons to select the **Yes** entry and then press the  button.

☒ The event log has now been deleted.

10. Error events and troubleshooting

DANGER



Electrical shock

Potentially fatal voltage is applied to the inverter during operation. When the inverter is disconnected from all power sources, this voltage remains in the inverter for up to 10 seconds. Therefore, always carry out the following steps before working on the inverter:

1. Turn the AC/DC disconnect to the **OFF** position.
2. Disconnect the inverter from all AC and DC voltage sources and make sure that none of the connections can be accidentally restored.
3. Wait for at least 10 seconds until the internal capacitors have discharged.

DANGER



Electrical shock

Potentially fatal voltage is present at the inverter's DC connections. When light falls on the solar modules, they immediately start to generate electricity. This also happens when light does not fall directly on the solar modules.

- ▶ Never disconnect the inverter from the solar modules when it is under load.
- ▶ Turn the AC/DC disconnect to the **OFF** position.
- ▶ Disconnect the connection to the grid so that the inverter cannot supply energy to the grid.
- ▶ Disconnect the inverter from all AC and DC voltage sources. Ensure that none of the connections can be restored accidentally.
- ▶ Ensure that the DC cables cannot be touched accidentally.

WARNING



Heavy weight

The inverter is very heavy.

- ▶ The inverter must be lifted and carried by at least 3 people or using appropriate lifting gear.



Only Delta Customer Service is permitted to perform repair work and replace inverter components.

Exceptions:

- ▶ Replacing the fans.
- ▶ Cleaning the air inlets/outlets.

Failure to adhere to this requirement will invalidate the warranty.

The Delta Customer Service contact information for your country is provided on the last page of this document.

10 Error events and troubleshooting

10.1 Error

Number	Message	Possible cause	Correction suggestions
E01	AC Freq High (AC Freq High)	Mains grid frequency lies above the OFR setting (overfrequency detection).	Check the grid frequency on the inverter display.
		Incorrect country setting.	Check the country setting on the inverter display.
E02	AC Freq Low (AC Freq Low)	Mains grid frequency lies below the UFR setting (underfrequency detection).	Check the grid frequency on the inverter display.
		Incorrect country or grid type setting.	Check the country and grid type settings.
E11, E13, E16, E18, E21, E23	AC Volt High (AC Volt High)	Mains grid voltage lies above the OVR setting (overvoltage detection).	Check the grid voltage on the inverter display.
		Supply voltage is greater than the OVR Langs. setting during operation.	Check the grid voltage on the inverter display.
		Incorrect country or grid type setting.	Check the country and grid type settings.
E10, E15, E20	AC Volt Low (AC Volt Low)	Mains grid voltage lies below the UVR setting (undervoltage detection).	Check the grid voltage connection at the inverter terminals.
		Incorrect country or grid type setting.	Check the country and grid type settings.
		Incorrectly wired AC plug.	Check the wiring of the AC plug.
E07	Grid Quality (Grid Quality)	Non-linear load in the grid and in the vicinity of the inverter.	If necessary, the grid connection must be far away from a non-linear load.
E08	HW Connect Fail (HW Connect Fail)	Incorrectly wired AC plug.	Check the wiring of the AC plug.
E34	Insulation (Insulation)	Insulation fault in the PV system.	Check the insulation of the DC inputs.
		Large PV system capacitance between Plus and Ground or Minus and Ground or both.	Check the capacitance and dry the PV modules if necessary.
E09	No Grid (No Grid)	The AC/DC disconnect is in the OFF position.	Turn the AC/DC disconnect to the ON position.
		AC plug is not correctly connected.	Check the connection in the AC plug and its connection to the inverter.
		Incorrectly wired AC plug.	Check the wiring of the AC plug.
E30	Solar1 High (Solar1 High)	The DC input voltage at DC1 is greater than the maximum permissible DC input voltage.	Change the solar system setting so that the DC input voltage at DC1 lies below the maximum permissible DC input voltage.
E31	Solar2 High (Solar2 High)	The DC input voltage at DC2 is greater than the maximum permissible DC input voltage.	Change the solar system setting so that the DC input voltage at DC1 lies below the maximum permissible DC input voltage.

10.2 Warnings

Number	Message	Possible cause	Correction suggestions
W01	Solar1 Low (Solar1 Low)	The DC input voltage at DC1 is less than the minimum permissible DC input voltage.	Check the DC input voltage at DC1 on the inverter display.
			There may be insufficient solar irradiation.
W02	Solar2 Low (Solar2 Low)	The DC input voltage at DC2 is less than the minimum permissible DC input voltage.	Check the DC input voltage at DC2 on the inverter display.
			There may be insufficient solar irradiation.
W11	HW Fan (HW Fan)	One or more fans are blocked.	Remove all objects that might be blocking the fans.
		One or more fans are defective.	Replace the fans.
		One or more fans are disconnected.	Check the connections for all fans.
	SPD Fail (SPD Fail)	The inverter has been hit by lightning.	Check the inverter status.
		One or more surge protection devices are defective.	Replace the defective surge protection devices.
		One or more surge protection devices are incorrectly fitted.	Check all surge protection devices.

10 Error events and troubleshooting

10.3 Faults

Number	Message	Possible cause	Correction suggestions
F36, F37, F38, F39, F40, F41	AC Current High (AC Current High)	Overvoltage during operation.	Contact Delta Customer Service.
		Internal error.	Contact Delta Customer Service.
F30	Bus Unbalance (Bus Unbalance)	Incomplete independent or parallel configuration between the inputs.	Check the input connections.
		Grounding of the PV system.	Check the insulation of the PV system.
		Internal error.	Contact Delta Customer Service.
F60, F61, F70, F71	DC Current High (DC Current High)	Internal error.	Contact Delta Customer Service.
F24	Ground Current (Ground Current)	Insulation fault in the PV system.	Check the insulation of the DC inputs.
		Large PV system capacitance between Plus and Ground or Minus and Ground.	Check the capacitance, it must be < 2.5 µF. Install an external transformer if necessary.
		Internal error.	Contact Delta Customer Service.
F45	HW AC OCR (HW AC OCR)	Large grid harmonics.	Check the grid waveform. The grid connection must be far away from non-linear loads; if necessary, move further away.
		Internal error.	Contact Delta Customer Service.
F31, F33, F35	HW Bus OVR (HW Bus OVR)	The DC input voltage is greater than the maximum permissible DC input voltage.	Change the solar system setting so that the DC input voltage at DC1 lies below the maximum permissible DC input voltage.
		Overvoltage during operation.	Contact Delta Customer Service.
		Internal error.	Contact Delta Customer Service.
F23	HW COMM1 (HW COMM1)	Internal error.	Contact Delta Customer Service.
F22	HW COMM2 (HW COMM2)	Internal error.	Contact Delta Customer Service.
F26	HW Connect Fail (HW Connect Fail)	Internal error.	Contact Delta Customer Service.
F42	HW CT A Fail (HW CT A Fail)	Internal error.	Contact Delta Customer Service.
F43	HW CT B Fail (HW CT B Fail)	Internal error.	Contact Delta Customer Service.
F44	HW CT C Fail (HW CT C Fail)	Internal error.	Contact Delta Customer Service.
F01, F02, F03	HW DC Injection (HW DC Injection)	The grid waveform is abnormal.	Check the grid waveform. The grid connection must be far away from non-linear loads; if necessary, move further away.
		Internal error.	Contact Delta Customer Service.
F15, F16, F17	HW DSP ADC1, HW DSP ADC2, HW DSP ADC3	The DC input voltage is less than the minimum required DC voltage.	Check the DC input voltage on the inverter display. There may be insufficient solar irradiation.
		Internal error.	Contact Delta Customer Service.
F20	HW Efficiency (HW Efficiency)	Incorrect calibration.	Check the accuracy of the voltage and power.
		Internal error.	Contact Delta Customer Service.

10 Error events and troubleshooting

Number	Message	Possible cause	Correction suggestions
F06, F08, F09, F10	HW NTC1 Fail, HW NTC2 Fail, HW NTC3 Fail, HW NTC4 Fail (HW NTCx Fail)	Ambient temperature is > 90 °C or < -30 °C.	Check the system environment.
		Fault in the detection circuit.	Check the detection circuit in the Inverter .
F18, F19	HW Red ADC1, HW Red ADC2	The DC input voltage is less than the minimum required DC voltage.	Check the DC input voltage on the inverter display. There may be insufficient solar irradiation.
		Internal error.	Contact Delta Customer Service.
F50	HW ZC Fail (HW ZC Fail)	Internal error.	Contact Delta Customer Service.
F27	RCMU Fail (RCMU Fail)	Internal error.	Contact Delta Customer Service.
F13, F29	Relay Open (Relay Open)	Internal error.	Contact Delta Customer Service.
F28	Relay Short (Relay Short)	Internal error.	Contact Delta Customer Service.
		Fault in the relay driver circuit.	Check the driver circuit in the Inverter .
F05	Temperature High (Temperature High)	The ambient temperature is > 60 °C.	Check the system environment.
F07	Temperature Low (Temperature Low)	The ambient temperature is < -30 °C.	Check the system environment.
		Internal error.	Contact Delta Customer Service.

11 Maintenance

11. Maintenance

DANGER



Electrical shock

Potentially fatal voltage is applied to the inverter during operation. When the inverter is disconnected from all power sources, this voltage remains in the inverter for up to 10 seconds.

Therefore, always carry out the following steps before working on the inverter:

1. Turn the AC/DC disconnect to the **OFF** position.
2. Disconnect the inverter from all AC and DC voltage sources and make sure that none of the connections can be accidentally restored.
3. Wait for at least 10 seconds until the internal capacitors have discharged.

DANGER



Electrical shock

Potentially fatal voltage is present at the inverter's DC connections. When light falls on the solar modules, they immediately start to generate electricity. This also happens when light does not fall directly on the solar modules.

- ▶ Never disconnect the inverter from the solar modules when it is under load.
- ▶ Turn the AC/DC disconnect to the **OFF** position.
- ▶ Disconnect the connection to the grid so that the inverter cannot supply energy to the grid.
- ▶ Disconnect the inverter from all AC and DC voltage sources. Ensure that none of the connections can be restored accidentally.
- ▶ Ensure that the DC cables cannot be touched accidentally.

WARNING



Electrical shock

When the cover is removed from the fuse box, this exposes live parts and protection conforming to IP65 is no longer guaranteed.

- ▶ Remove the cover only when it is absolutely necessary.
- ▶ Do not remove the cover if water might enter the inverter.
- ▶ After work is completed, ensure that the cover is properly replaced and screwed in. Check that the cover is properly sealed.

WARNING



Heavy weight

The inverter is very heavy.

- ▶ The inverter must be lifted and carried by at least 3 people or using appropriate lifting gear.

11.1 Periodic maintenance

Perform the following checks every 6 months.

- Check the string fuses. Measure the current using a current transformer.
- Check the fans for soiling and clean if necessary.
- Test the fans, see [“11.2 Checking the fans”, page 136](#).
- Check the air inlets for soiling and clean if necessary.

11 Maintenance

11.2 Checking the fans

The inverter must be supplied with DC voltage in order to be able to perform the fan test.

Menu item path

Main menu > General settings > Test Menu

Performing the fan test

```
10.Sep 2014 15:32
Status:      On Grid
Power:       0W
E-Today:     0kWh
```

```
►General Settings
Install Settings
Active/Reactive Pwr
FRT
```

```
►Test menu
```

```
►Fan Test
```

```
►Fan Test      OFF
Fan Test Result
```

```
►Fan Test      ON
Fan Test Result
```

```
►Fan Test      OFF
Fan Test Result
```

```
Fan Test      OFF
►Fan Test Result
```

1. If the default information is displayed, press any button to open the main menu. Otherwise, press the **EXIT** button repeatedly until the main menu is displayed.
2. Use the **▼** and **▲** buttons to select the **General Settings** entry and then press the **ENT** button.
3. Use the **▼** and **▲** buttons to select the **Test Menu** entry and then press the **ENT** button.
4. Use the **▼** and **▲** buttons to select the **Fan Test** entry and then press the **ENT** button.
5. Use the **▼** and **▲** buttons to select the **Fan Test** entry again and then press the **ENT** button.
6. To start the fan test, use the **▼** and **▲** buttons to set the **Fan Test** entry to **ON** and then press the **ENT** button.
 - The fan test starts after approx. 5 seconds.
 - The fans audibly accelerate to maximum speed. The fans have reached maximum speed when the fan noise remains constant.
7. Allow the fans to run at a maximum speed for approximately 20 seconds.
 - The **ALARM** LED starts flashing after about 10 seconds if a fan is not functioning correctly.
 - If all fans are functioning correctly the **ALARM** LED remains off.
8. To end the fan test, use the **▼** and **▲** buttons to set the **Fan Test** entry to **OFF** and then press the **ENT** button.
 - The fan speed drops and the fans come to a standstill.
9. To see the results of the fan test, use the **▼** and **▲** buttons to select the **Fan Test Results** entry and then press the **ENT** button.

The list shows the fans that are defective.

Result when no fans are defective.

```
Failed Fan:
Empty
```

Result when one fan is defective.

```
Failed Fan:
Ext Fan 1
```

11 Maintenance

11.3 Replacing/cleaning the fans

DANGER



Electrical shock

Potentially lethal voltage is still present on the inner electrical components of the inverter after the AC/DC disconnect has been opened.

1. Turn the AC/DC disconnect to the **OFF** position.
2. Disconnect the inverter from all AC and DC voltage sources and make sure that none of the connections can be accidentally restored.
3. Wait for at least 10 seconds until the internal capacitors have discharged.

NOTICE



After unscrewing the fan block, the entire weight of the fan block hangs on the fan power supply cables.

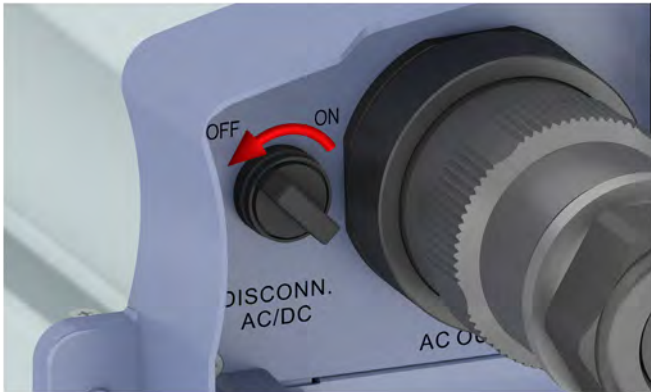
- You should therefore hold the fan block with one hand when unscrewing.

NOTICE



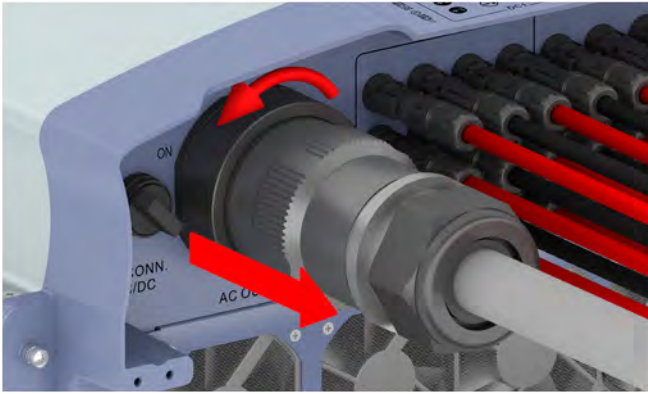
Do not use any sharp, pointed or hard objects for cleaning.

Do not use liquids for cleaning.



1. Turn the AC/DC disconnect to the **OFF** position.

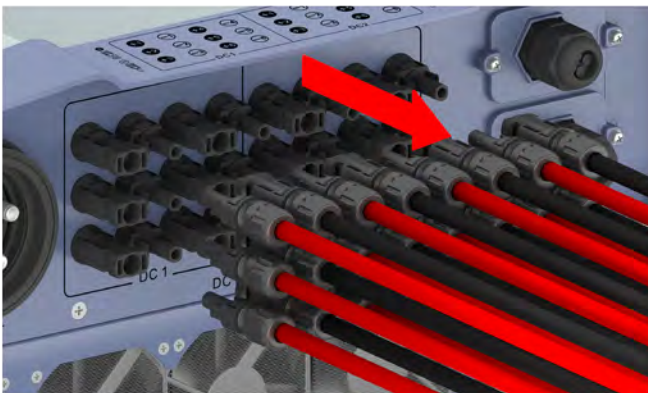
2. Disconnect the connection between the inverter and the solar modules (DC).
3. Disconnect the connection between the inverter and the grid (AC).
4. Use a voltmeter to check that the AC and DC connections are free of voltage.



5. Unscrew and unplug the AC plug.



6. Use the mounting tool to release the DC plugs and then pull them out.

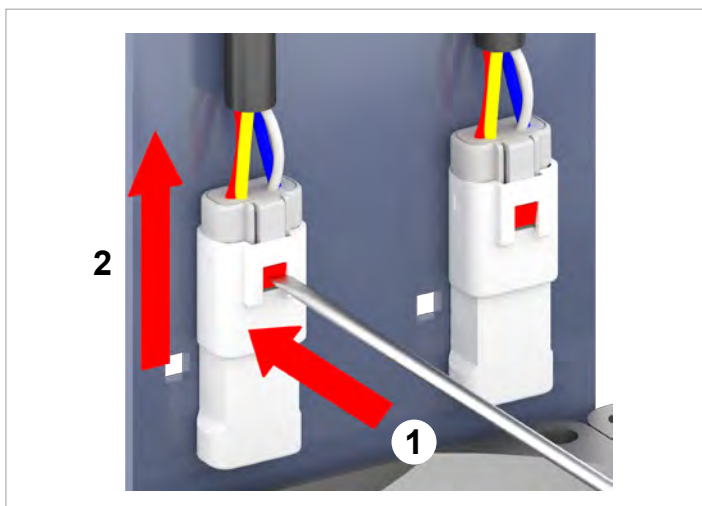
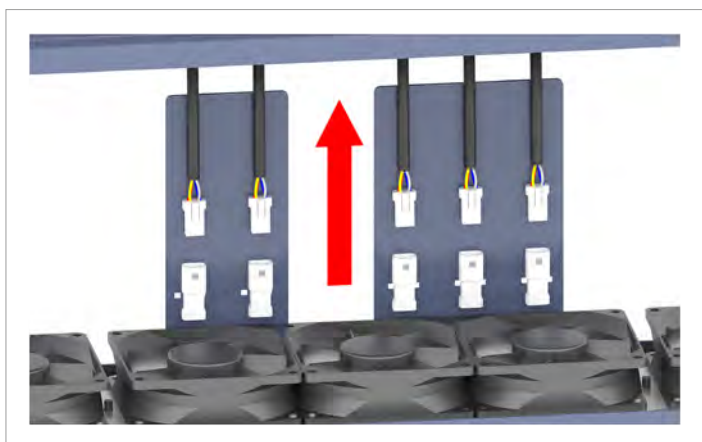
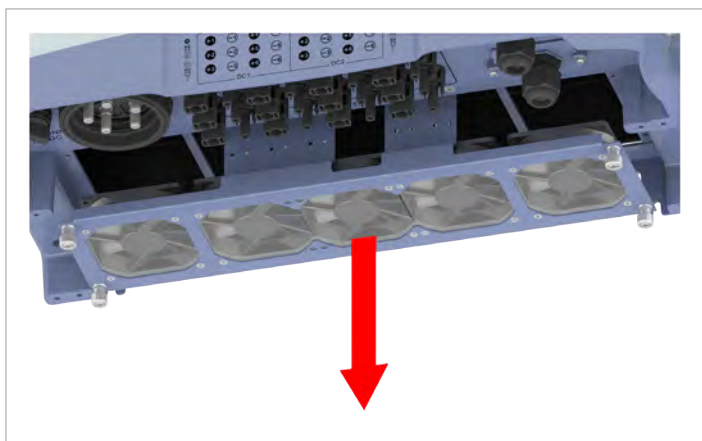
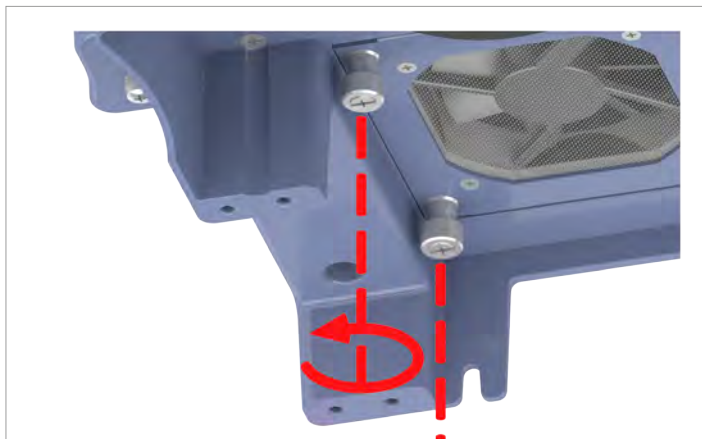


7. Wait for at least 10 seconds until the internal capacitors have discharged.

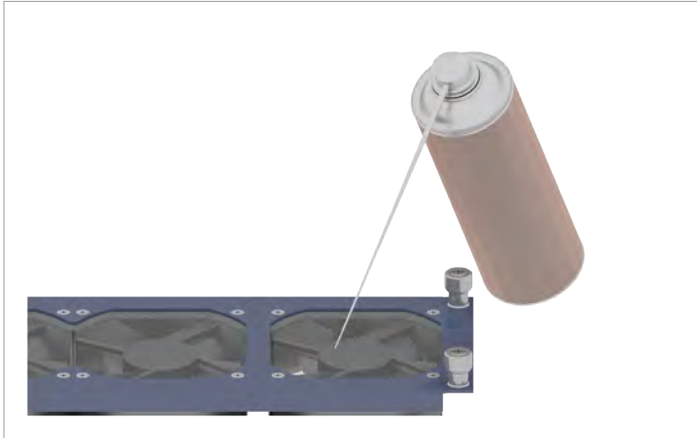


8. Unscrew and carefully pull out the fan block.

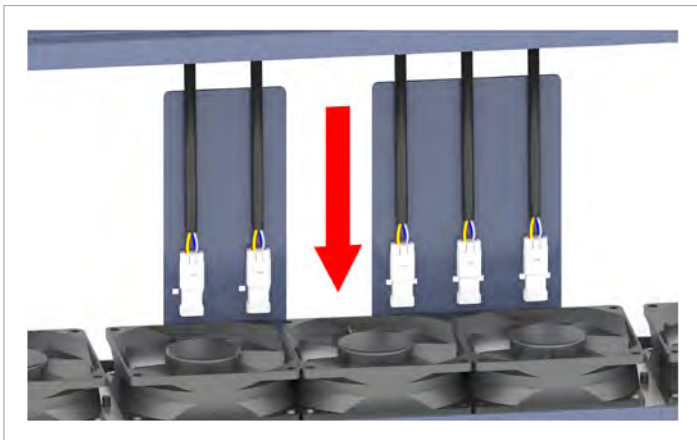
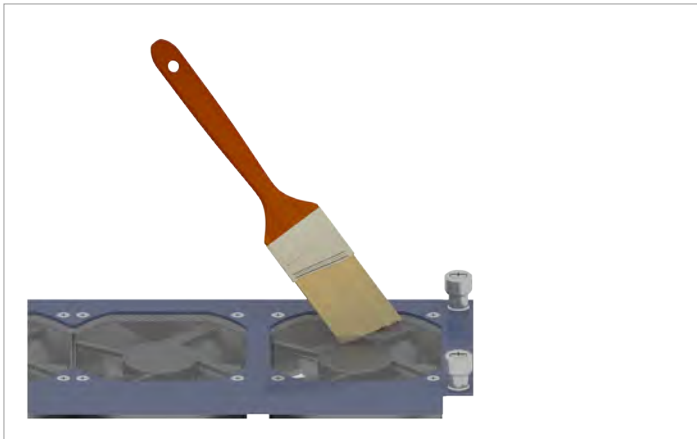
11 Maintenance



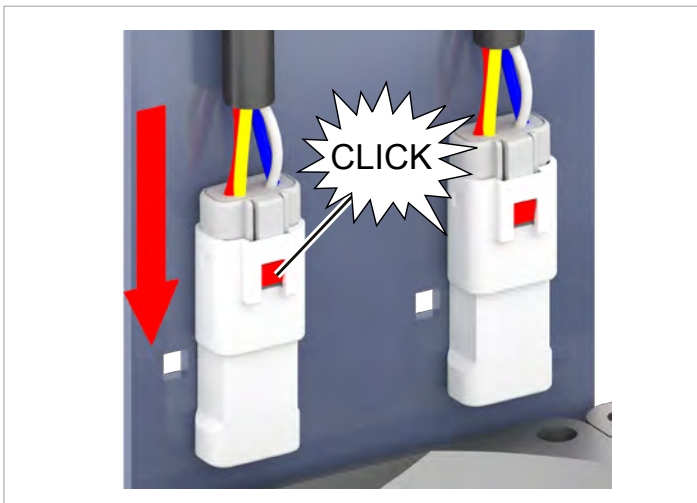
9. Pull the plugs of the power supply cable out of the fan connectors.



10. Clean the fans with a compressed air cleaner or a stiff paintbrush.



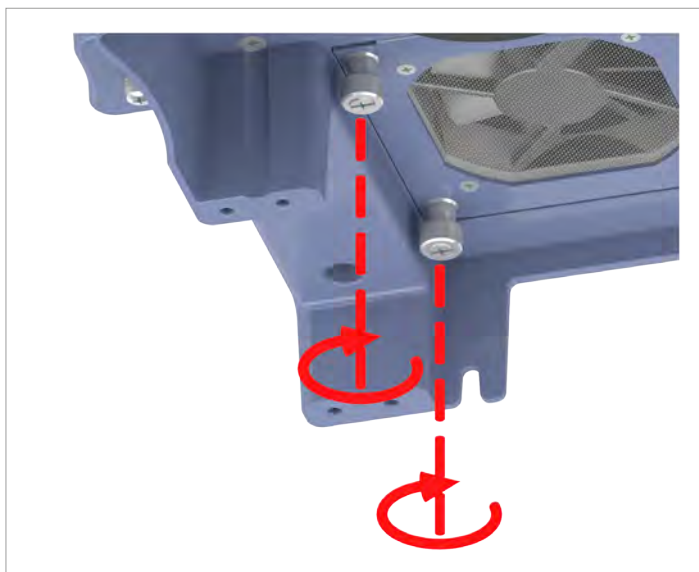
11. Insert the plugs of the power supply cable into the fan connectors.

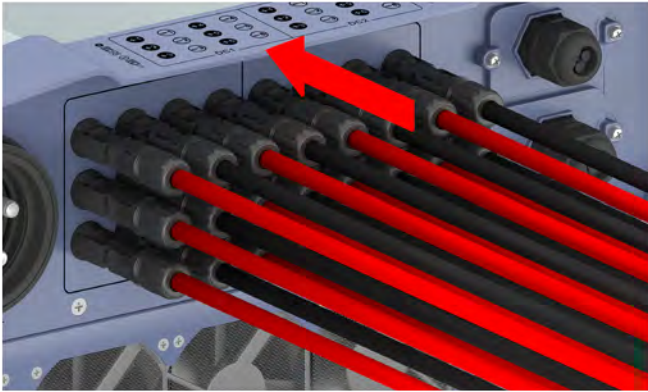


11 Maintenance

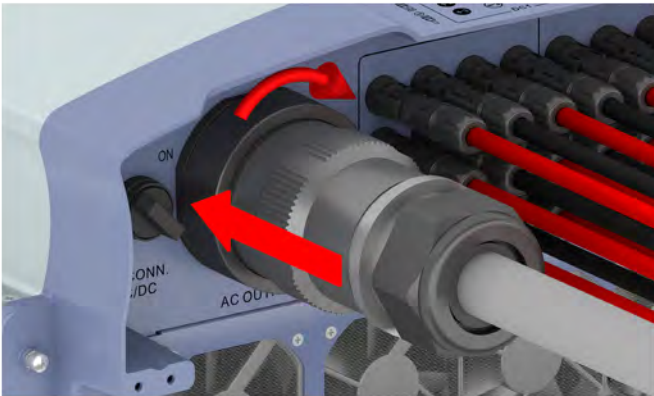


12. Insert the fan block and screw in place.





13. Plug in the DC plugs.



14. Plug in the AC plug and screw tight.



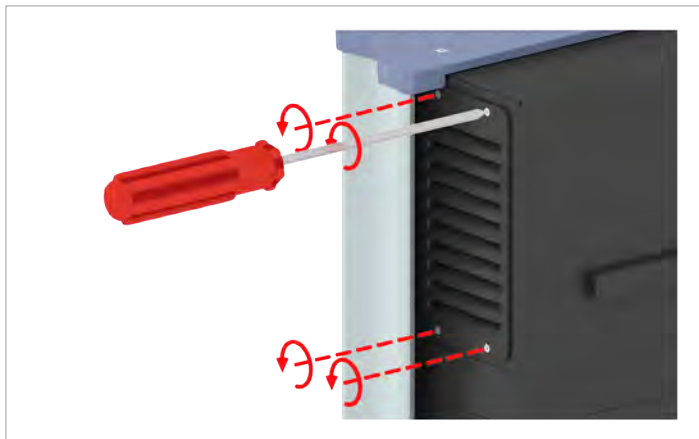
15. Turn the AC/DC disconnecter to the **ON** position.

11 Maintenance

11.4 Cleaning the air inlets



The screws on the filter housing are very small and can easily fall down. You should therefore use a magnetic screwdriver.

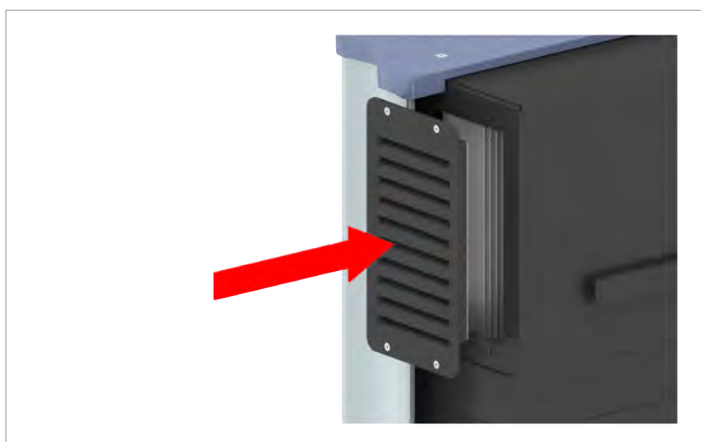
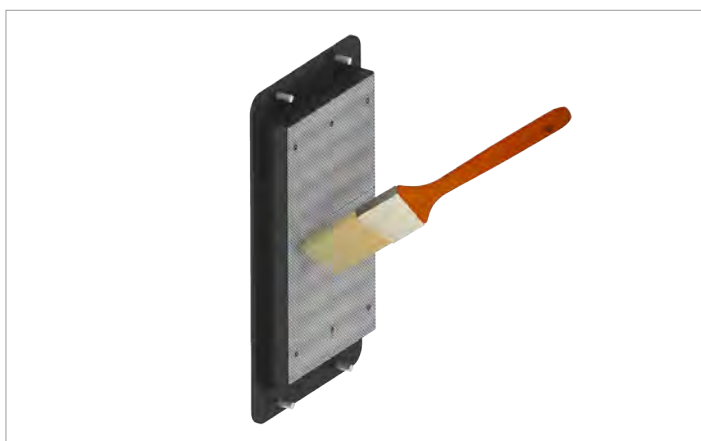


1. Unscrew and remove the air inlet covers.

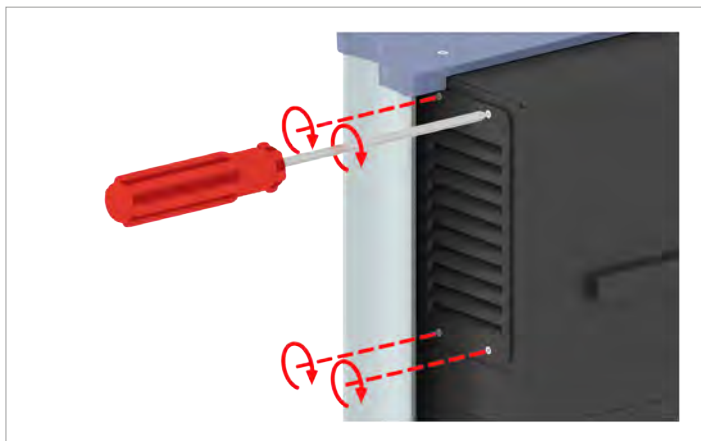




2. Clean the filters with a compressed air cleaner or a stiff paintbrush.



3. Fit the air inlet covers and screw in place.



11 Maintenance

11.5 Replacing the surge protection devices

DANGER



Electrical shock

Potentially lethal voltage is still present on the inner electrical components of the inverter after the AC/DC disconnect has been opened.

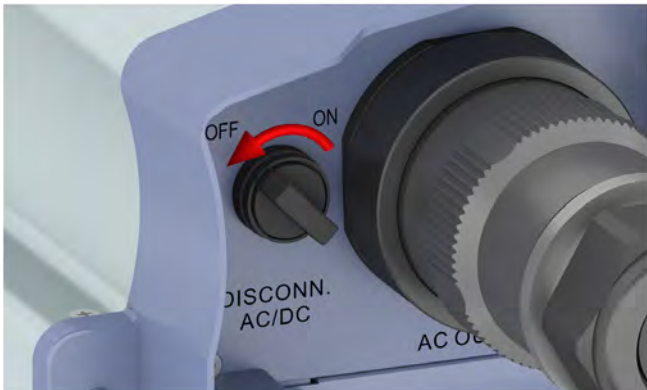
1. Turn the AC/DC disconnect to the **OFF** position.
2. Disconnect the inverter from all AC and DC voltage sources and make sure that none of the connections can be accidentally restored.
3. Wait for at least 10 seconds until the internal capacitors have discharged.



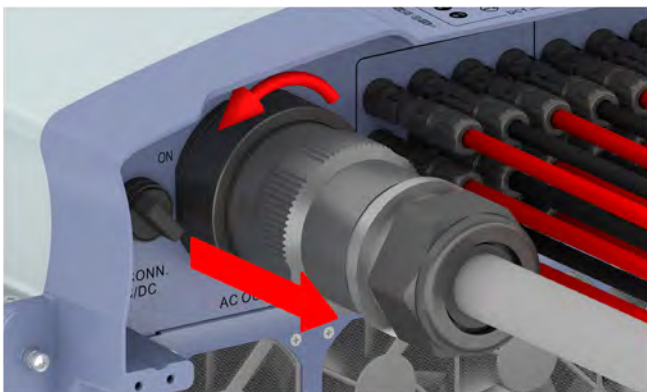
The surge protection devices are replaced as a block. You can obtain spare parts from Delta Customer Service. The contact information is provided on the last page of this document



You should use a magnetic screwdriver to prevent the screws from falling into the inverter.



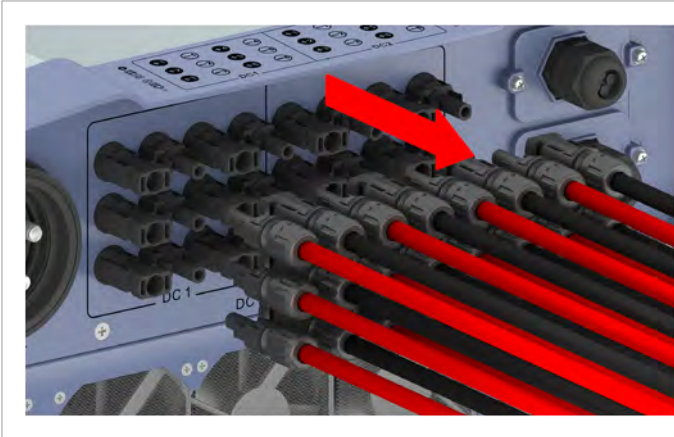
1. Turn the AC/DC disconnect to the **OFF** position.



2. Unscrew and unplug the AC plug.



3. Use the mounting tool to release the DC plugs and then pull them out.



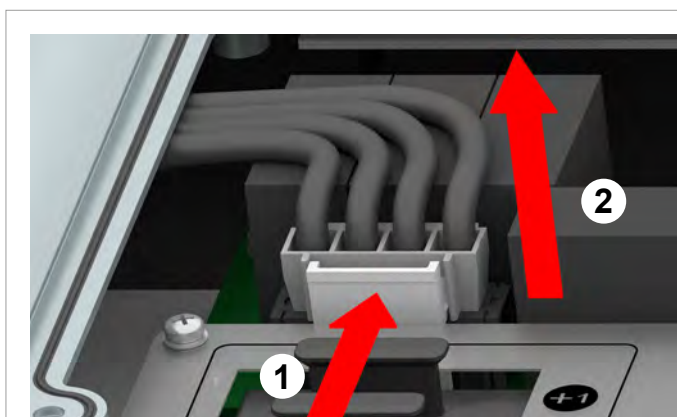
4. Unscrew and remove the fuse box cover.



11 Maintenance



5. Pull out both power cable plugs.

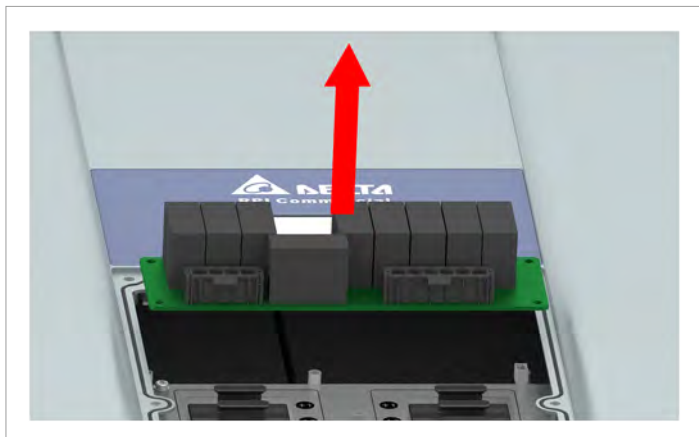


6. Pull out the communication cable plug.



7. Unscrew the 6 screws and lift out the block with the defective surge protection devices.

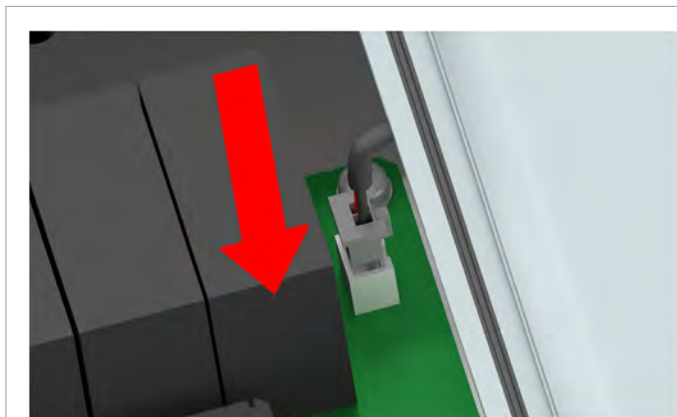




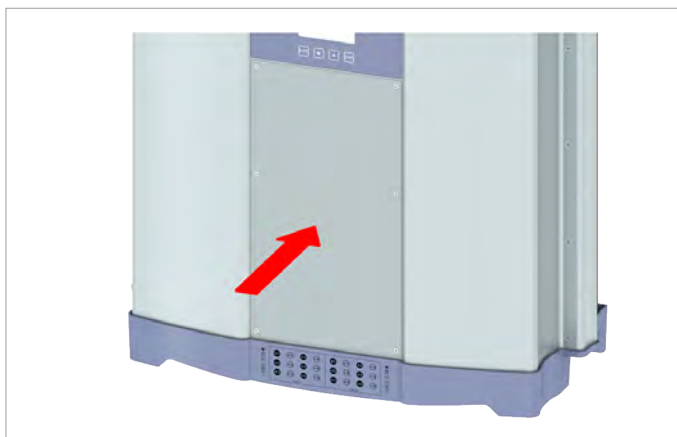
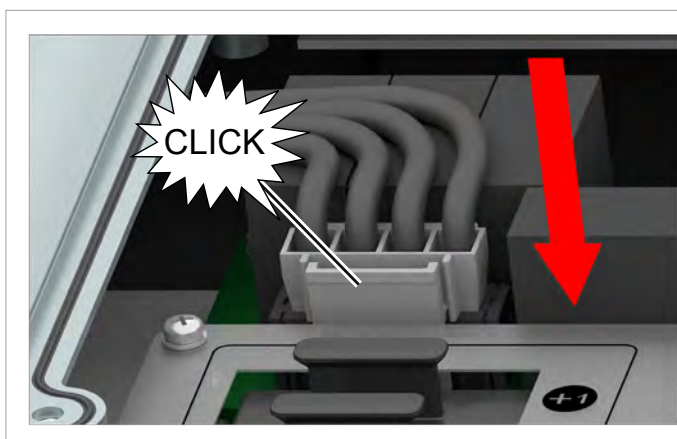
8. Fit the new block with the surge protection devices and screw in place using the 6 screws.

9. Plug in the communication cable plug.

11 Maintenance



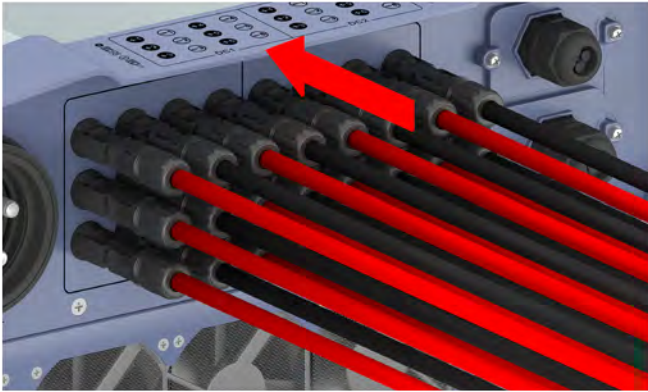
10. Plug in both power cable plugs.



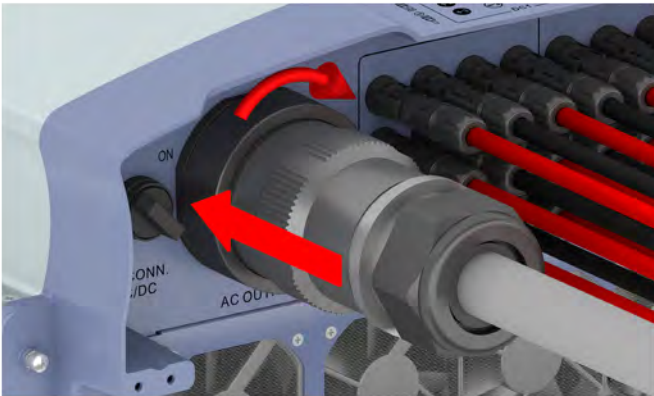
The fuse box cover must sit correctly and properly seal the fuse box in order to ensure an IP65 degree of protection.

11. Fit the fuse box cover and screw in place.





12. Plug in the DC plugs.



13. Plug in the AC plug and screw tight.



14. Turn the AC/DC disconnecter to the **ON** position.

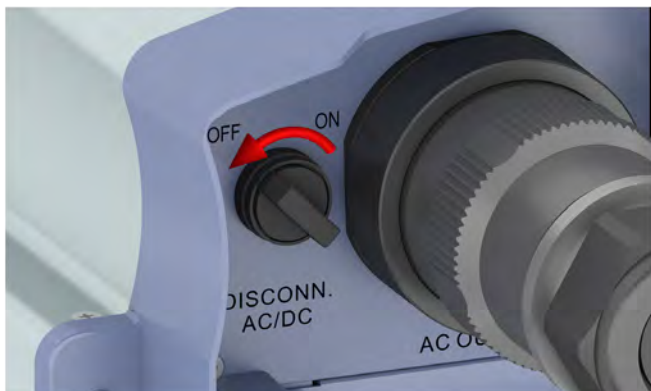
11 Maintenance

11.6 Replacing string fuses

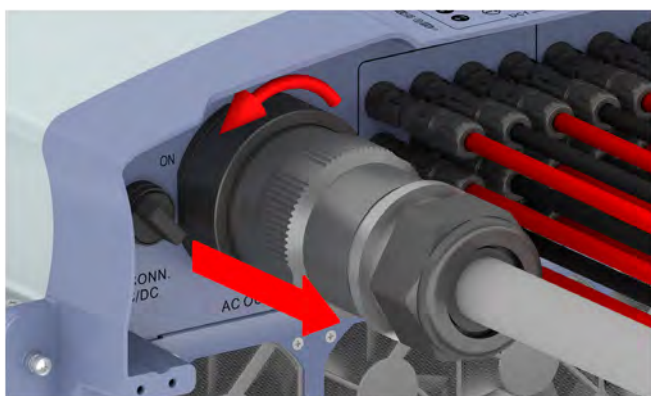


Replace only with the string fuses specified in the table!

Delta reserves the right to invalidate all warranty claims if other string fuses are used and this results in problems with the inverter or the installation.



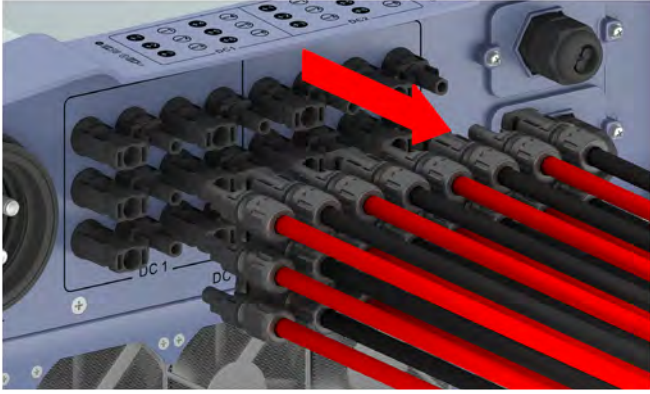
1. Turn the AC/DC disconnecter to the **OFF** position.



2. Unscrew and unplug the AC plug.



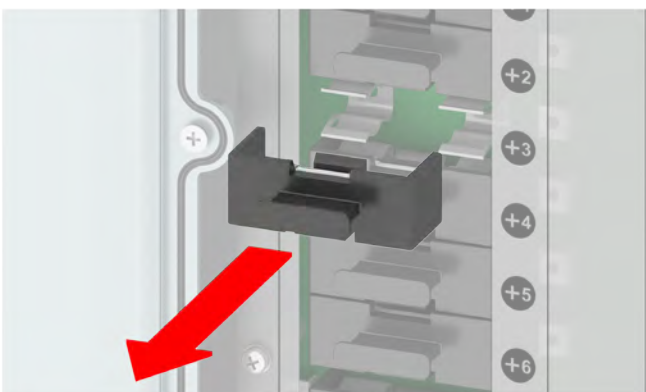
3. Use the mounting tool to release the DC plugs and then pull them out.



4. Unscrew and remove the fuse box cover.

5. Localize the defective string fuse using a current transformer.

6. Pull out the fuse holder of the defective string fuse using your fingers.



11 Maintenance



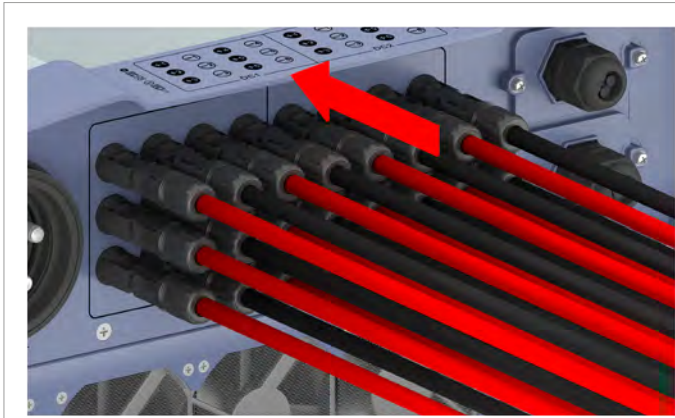
7. Replace the defective string fuse with a new string fuse.

8. Insert the fuse holder of the new string fuse using your fingers.



The fuse box cover must sit correctly and properly seal the fuse box in order to ensure an IP65 degree of protection.

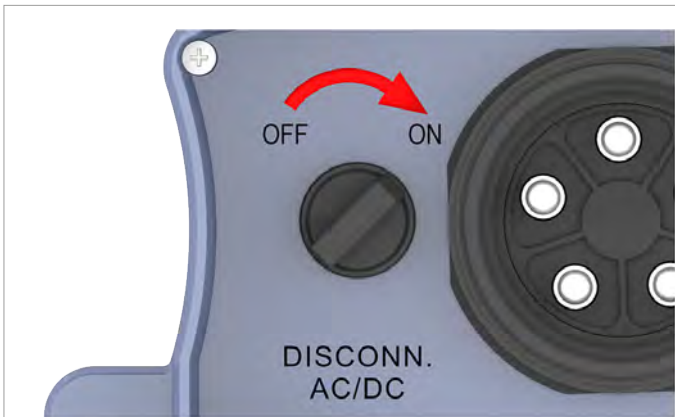
9. Fit the fuse box cover and screw in place.



10. Plug in the DC plugs.



11. Plug in the AC plug and screw tight.



12. Turn the AC/DC disconnect to the **ON** position.

12 Decommissioning

12. Decommissioning

DANGER



Electrical shock

Potentially fatal voltage is applied to the inverter during operation. When the inverter is disconnected from all power sources, this voltage remains in the inverter for up to 10 seconds.

Therefore, always carry out the following steps before working on the inverter:

1. Turn the AC/DC disconnect to the **OFF** position.
2. Disconnect the inverter from all AC and DC voltage sources and make sure that none of the connections can be accidentally restored.
3. Wait for at least 10 seconds until the internal capacitors have discharged.

DANGER



Electrical shock

Potentially fatal voltage is present at the inverter's DC connections. When light falls on the solar modules, they immediately start to generate electricity. This also happens when light does not fall directly on the solar modules.

- ▶ Never disconnect the inverter from the solar modules when it is under load.
- ▶ Turn the AC/DC disconnect to the **OFF** position.
- ▶ Disconnect the connection to the grid so that the inverter cannot supply energy to the grid.
- ▶ Disconnect the inverter from all AC and DC voltage sources. Ensure that none of the connections can be restored accidentally.
- ▶ Ensure that the DC cables cannot be touched accidentally.

WARNING

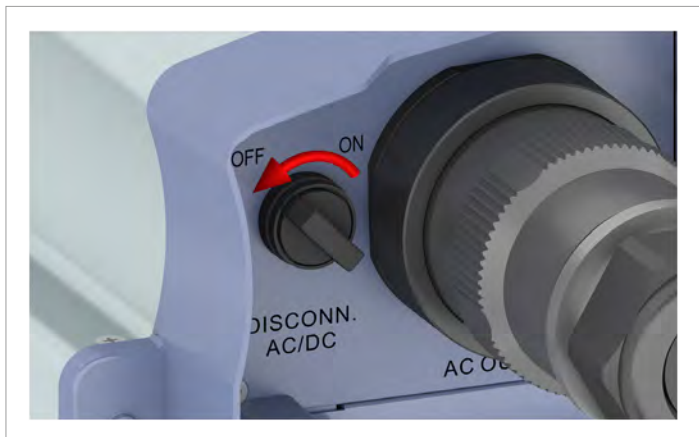


Heavy weight

The inverter is very heavy.

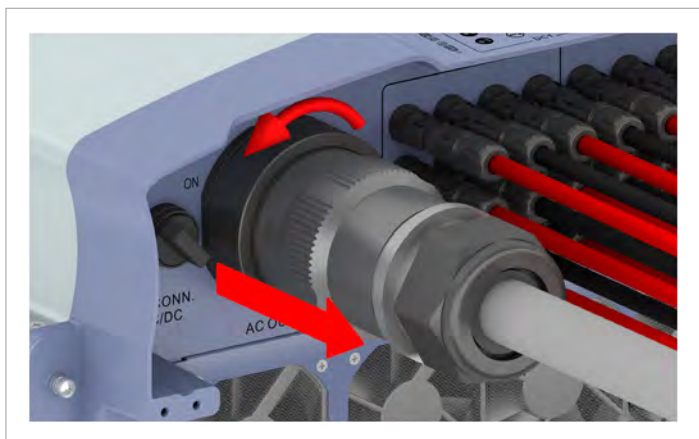
- ▶ The inverter must be lifted and carried by at least 3 people or using appropriate lifting gear.

12 Decommissioning

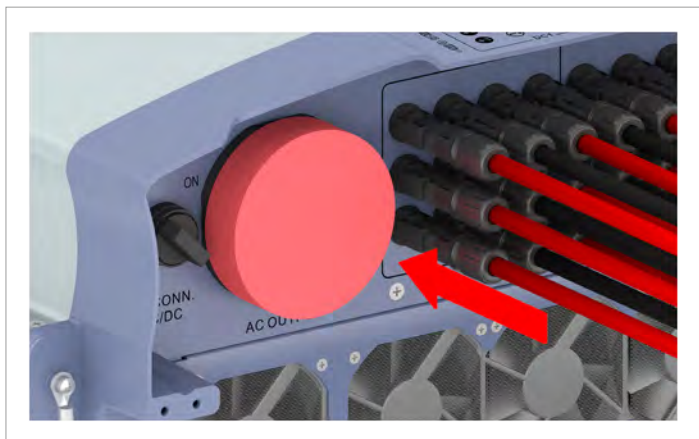


1. Turn the AC/DC disconnecter to the **OFF** position.

2. Disconnect the connection between the inverter and the solar modules (DC).
3. Disconnect the connection between the inverter and the grid (AC).
4. Use a voltmeter to check that the AC and DC connections are free of voltage.
5. Fit the sealing cap on the AC connection.



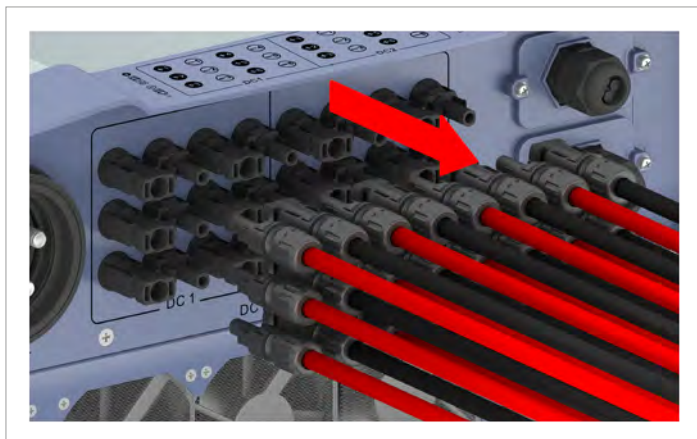
6. Unscrew and unplug the AC plug.



12 Decommissioning



7. Use the mounting tool to release the DC plugs and then pull them out.

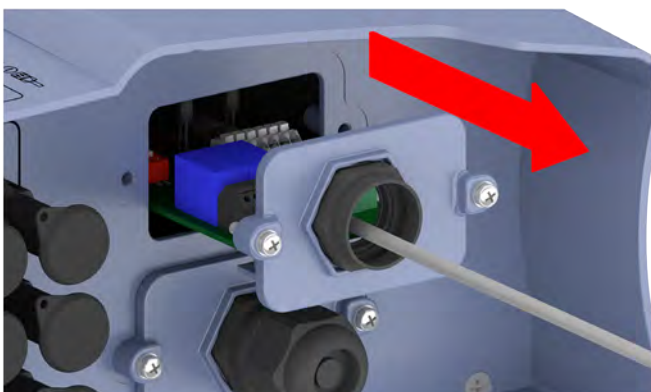


8. Seal the DC connections using the sealing caps

9. Unscrew the cable gland of the communication connection and remove the cable gland and seal



10. Unscrew and carefully pull out the cover. The communication card is screwed to the cover.



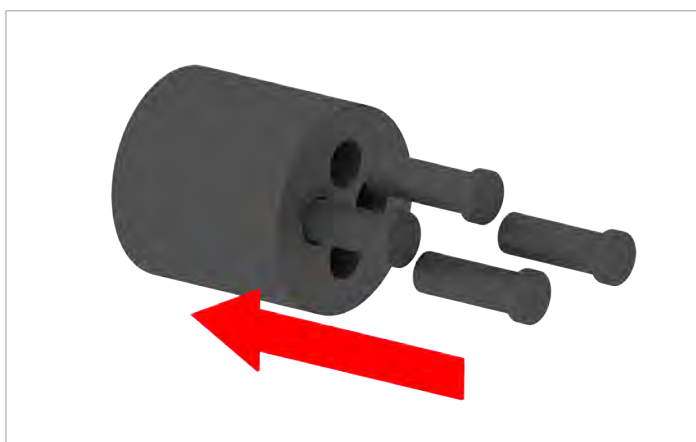
12 Decommissioning



11. Remove the cable and re-insert the cover with the communications card and screw tight.



12. Insert the rubber plug in the seal.



12 Decommissioning



13. Fit the seal and cable gland and screw the cable gland tight.

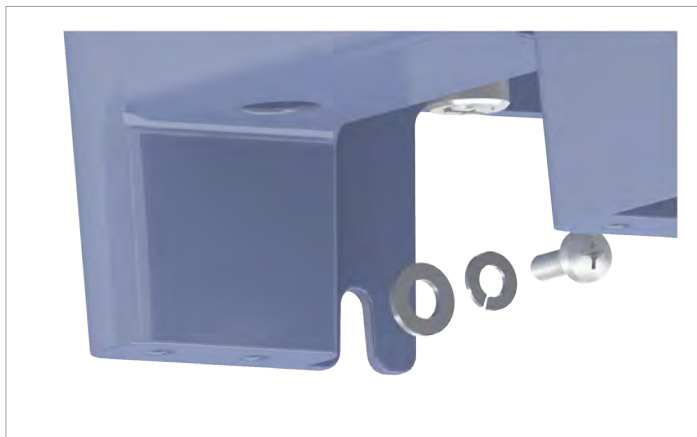


14. Unscrew the grounding cable.



15. Refit the grounding screw, spring washer, washer and lock washer.

12 Decommissioning

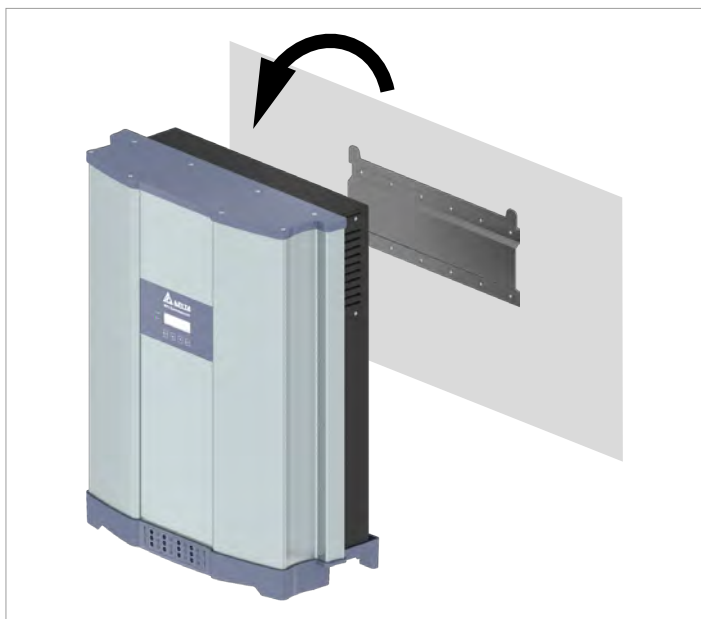


16. Unscrew the inverter from the wall or mounting system at both sides.



17. Lift the inverter off the mounting plate.





18. Place the inverter in the original box.



The following steps are only necessary when you wish to completely decommission and store the inverter.

19. Pack all parts originally included in delivery (see [“4.1 Scope of delivery”, page 11](#)) in the original box for storing the inverter.
20. Adhere to the specified environmental conditions when storing the inverter, see [“13. Technical data”, page 164](#).

13 Technical data

13. Technical data

Input (DC)	RPI M50A_12s
Maximum recommended PV power	
Symmetrical load	63 kW _p
Asymmetrical load	70 kW _p
Maximum input power (total / per input)	58 kW / 34.8 kW ¹⁾
Rated power	52 kW
Input voltage range	200 ... 1100 V _{DC} ²⁾
Nominal voltage	600 V _{DC}
Cut-in voltage	250 V _{DC}
Cut-in power	40 W
MPP input voltage range	200 ... 1000 V _{DC}
MPP input voltage range with full power	
Symmetrical load	520 ... 800 V _{DC}
Asymmetrical load	620 ... 800 V _{DC}
Asymmetrical load	60/40%; 40/60%
Maximum input power, total (DC1/DC2)	100 A (50 A / 50 A)
Maximum short circuit power upon fault	72 A (12 A per string)
Number of MPP trackers	Parallel inputs: 1 MPP tracker; separate inputs: 2 MPP tracker
Number of DC inputs, total (DC1/DC2)	12 (6 / 6)
Electrical isolation	No
Overvoltage category ³⁾	III
String fuses	15 A ⁴⁾
Surge protection devices	Type 2, replaceable
Output (AC)	RPI M50A_12s
Maximum apparent power ⁵⁾	55 kVA ⁶⁾
Rated apparent power ⁵⁾	50 kVA
Nominal voltage ⁷⁾	230 ±20 %/400 V _{AC} ±20 %, 3 phases + PE or 3 phases + N + PE
Nominal current	73 A
Max. current	80 A
Switch-on current	200 A / 100 µs
Nominal frequency	50 / 60 Hz
Frequency range ⁷⁾	45 ... 65 Hz
Configurable power factor	0.8 cap ... 0.8 ind
Total harmonic distortion	<3%
DC infeed	<0.5% at nominal current
Power loss in night mode	<2.5 W
Overvoltage category ³⁾	II
Surge protection devices	Type 2, replaceable

Mechanical details	RPI M50A_12s
Dimensions (W x H x D)	612 x 740 x 278 mm
Weight	74 kg
Cooling	5 fans
AC connection type	China Aviation Optical-Electrical Technology Co. PVE5T125KE36
DC connection type	12 x multi-contact MC4
Communication interfaces	2 x RS485, 2 x dry contacts, 1 x external power-off, 6 x digital inputs
General specifications	RPI M50A_12s
Delta model name	RPI M50A_12s
Delta part number	RPI503M221000
Maximum efficiency	98.6%
EU efficiency	98.4%
Operating temperature range	-25 ... +60 °C
Operating temperature range without derating	-25 ... +48 °C
Storage temperature range	-30 ... +60 °C
Relative humidity	0 ... 100%, non-condensing
Max. operating height	2000 m above sea level
Standards and guidelines	RPI M50A_12s
Safety class as per IEC 60529	IP65
Safety class as per IEC 61140	I
Soiling class as per IEC 60664-1	II
Overload behavior	Current limiting, power limiting
Safety	IEC 62109-1 / -2, CE-compliance
EMC	EN 61000-6-2, EN 61000-6-3
Fault-free operation	IEC 61000-4-2 / -3 / -4 / -5 / -6 / -8
Harmonic distortion	EN 61000-3-2
Fluctuations and fibrillations	EN 61000-3-3
Grid connection guidelines	You will find the current list at www.solar-inverter.com .

¹⁾ Maximum 34.8 kW per DC input with asymmetrical load (60/40 %)

²⁾ 1000 V for inverter with firmware version less than DPS 1.32

³⁾ IEC 60664-1, IEC 62109-1

⁴⁾ The specified value applies for a temperature of 25 °C in the interior of the inverter. At higher temperatures, the value can drop by to 10 A.

⁵⁾ For cos phi = 1 (VA = W)

⁶⁾ Possible under the following conditions: DC input voltage > 580 V; symmetrical load; ambient temperature < 25 °C.

⁷⁾ AC voltage and frequency range are programmed using the corresponding country specifications.

Service - Europe

Austria	service.oesterreich@solar-inverter.com	0800 291 512 (toll free)
Belgium	support.belgium@solar-inverter.com	0800 711 35 (toll free)
Bulgaria	support.bulgaria@solar-inverter.com	+421 42 4661 333
Czech Republic	podpora.czechia@solar-inverter.com	800 143 047 (toll free)
Denmark	support.danmark@solar-inverter.com	8025 0986 (toll free)
France	support.france@solar-inverter.com	0800 919 816 (toll free)
Germany	service.deutschland@solar-inverter.com	0800 800 9323 (toll free)
Greece	support.greece@solar-inverter.com	+49 7641 455 549
Great Britain	support.uk@solar-inverter.com	0800 051 4281 (toll free)
Israel	supporto.israel@solar-inverter.com	800 787 920 (toll free)
Italy	supporto.italia@solar-inverter.com	800 787 920 (toll free)
Netherlands	ondersteuning.nederland@solar-inverter.com	0800 022 1104 (toll free)
Poland	serwis.polska@solar-inverter.com	+48 22 335 26 00
Portugal	suporte.portugal@solar-inverter.com	+49 7641 455 549
Slovakia/Poland	podpora.slovensko@solar-inverter.com	0800 005 193 (toll free)
Slovenia	podpora.slovenija@solar-inverter.com	+421 42 4661 333
Spain	soporto.espana@solar-inverter.com	900 958 300 (toll free)
Switzerland	support.switzerland@solar-inverter.com	0800 838 173 (toll free)
Turkey	support.turkey@solar-inverter.com	+421 42 4661 333
Other European countries	support.europe@solar-inverter.com	+49 7641 455 549

