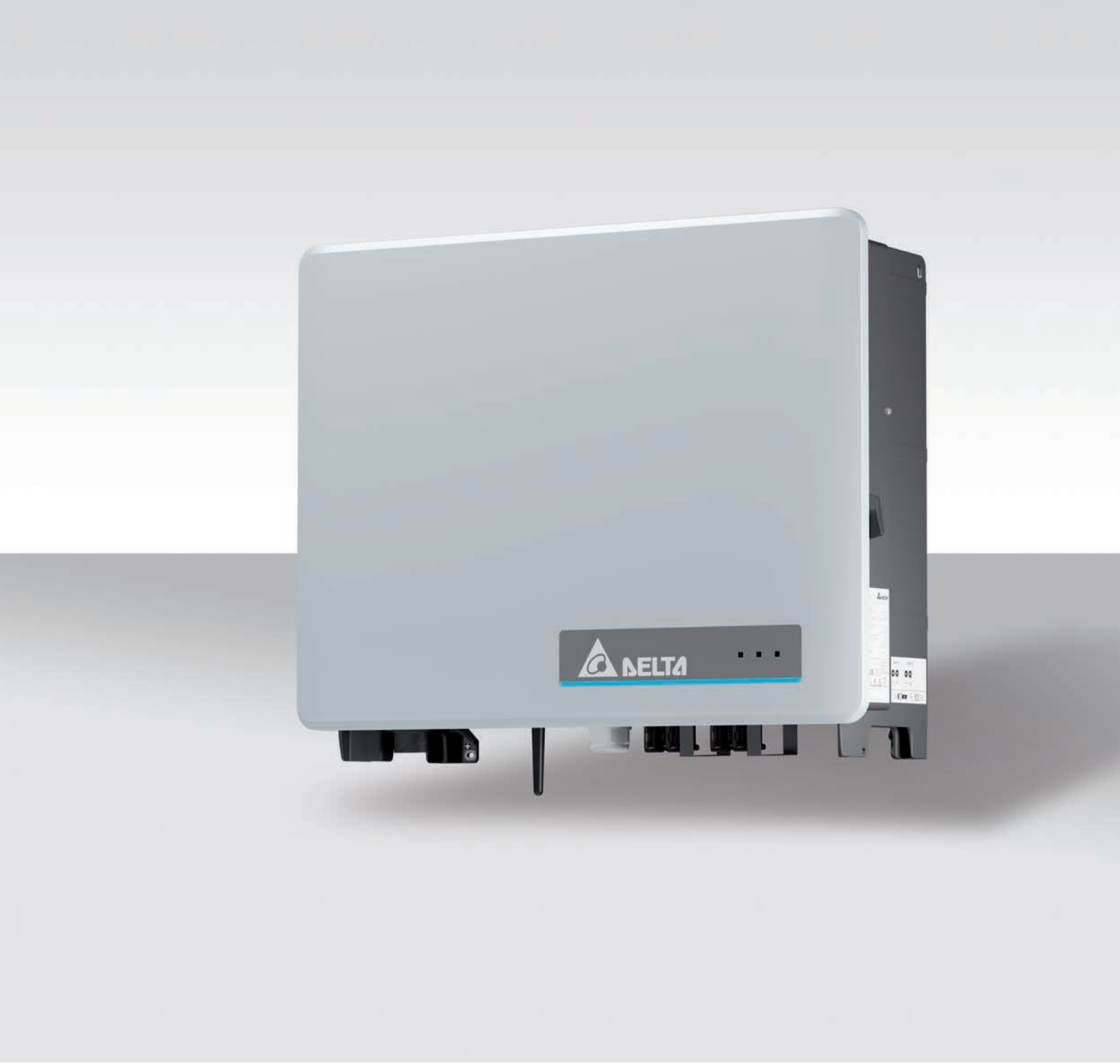


Installation guide

Solar inverter
M15A_220 / M20A_220
Product version 0

Europe

This manual applies to the inverter models:

- M15A_220 (Delta part number RPI153M220100, product version 0)
- M20A_220 (Delta part number RPI203M220100, product version 0)

and DSS software version 6.0 or higher

The Delta part number and the product version can be found on the type plate of the inverter.

Delta manuals undergo continuous revision in order to provide you with complete information regarding the installation and operation of its inverters. Therefore, before starting installation work, **always** consult solarsolutions.delta-emea.com to check whether a newer version of the Quick Installation Guide or the Installation and Operation Manual is available.

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This manual is intended for use by electrical installers who are trained and approved for installation and commissioning of grid-connected solar inverters.

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All information and specifications can be modified without prior notice.

All translations of this manual that are not authorized by Delta Electronics (Netherlands) B.V. must be marked with the words "Translation of the original operating instructions."

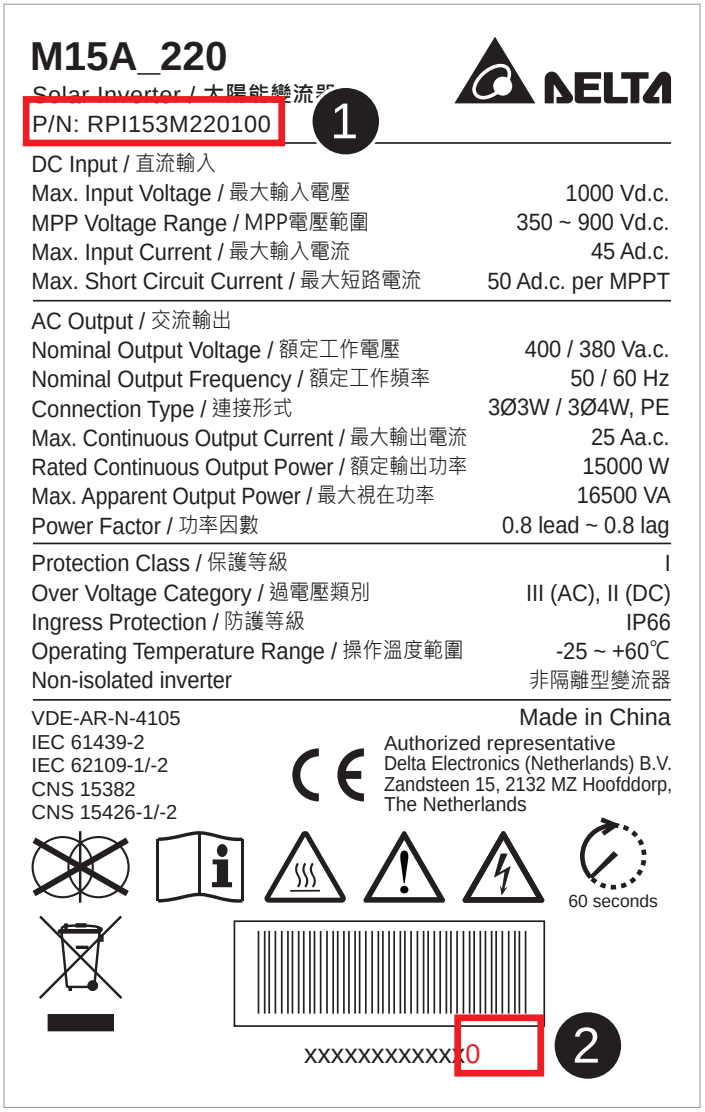
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Information about the versions of this manual

Version	Date	Changes
1.0	2021-09-29	First edition for the product version

Identification of the product and the product version



Product version		Identification of the product and the product version
0	❶	Delta part number
		Serial Number
	❷	The last letter of the serial number indicates the product version. Please have the serial number to hand if you would like to contact Delta Customer Service.

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Basic safety instructions

For a description of how to structure warning notices and of the warning symbols used, refer to section

DANGER



Electric shock

Potentially fatal voltages are present in the inverter during operation.

► If the inverter is installed in a location to which children or other persons in need of protection have access, do not store the Allen key to open the front door on or near the inverter.

DANGER



Electric shock

Potentially fatal voltages are present in the inverter during operation. When the inverter is disconnected from all power sources, this voltage remains in the inverter for up to 60 seconds.

You should therefore always carry out the following steps before working on the inverter:

► Never disconnect the inverter from the solar modules when it is under load.

1. Disconnect the connection to the grid so that the inverter cannot feed energy into the grid.
2. Turn the DC isolating switch to the ***OFF*** position.
3. Disconnect the inverter from all AC and DC voltage sources. Make sure that none of the connections can be restored accidentally.
4. Wait at least 60 seconds for the internal capacitors to discharge.
5. Ensure that the DC cables cannot be touched accidentally.

DANGER



Electric shock

Potentially fatal voltages are present at the DC connections of the inverter. 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.

1. Disconnect the connection to the grid so that the inverter cannot feed energy into the grid.
2. Turn the DC isolating switch to the ***OFF*** position.
3. Disconnect the inverter from all AC and DC voltage sources. Make sure that none of the connections can be restored accidentally.
4. Wait at least 60 seconds for the internal capacitors to discharge.
5. Ensure that the DC cables cannot be touched accidentally.

DANGER



Electric shock

The inverter has a high leakage current value.

► **Always** connect the ground cable first, then the AC and DC cables.

WARNING



Electric shock

The IP66 protection degree is no longer guaranteed when the door is open.

► Only open the door when absolutely necessary.

► Do not open the door if water or dirt might enter the inverter.

► After work is completed, ensure that the door is properly shut and tightened again. Check that the door is properly sealed.

WARNING



Heavy weight

The inverter is heavy.

► Lift and carry the inverter with at least 2 people.

WARNING



Hot surfaces
The surface of the inverter can get very hot during operation.



- Always wear safety gloves when touching the inverter.

NOTICE



Working in freezing conditions
In frosty conditions, the rubber seal of the front door can freeze to the enclosure, tear when opened and thus become leaky.

► Before opening the front door, defrost the rubber seal with some warm air.

► Open the front door slowly.

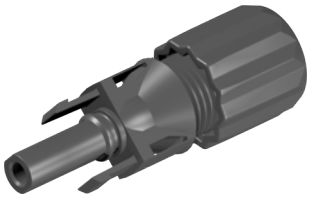
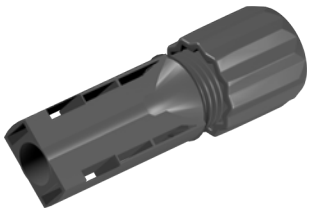
- To comply with IEC 62109-5.3.3 safety requirements and avoid injury or material damage, the inverter must be installed and operated in accordance with the safety and operating instructions set out in this manual. Delta Electronics is not responsible for damage resulting from failure to follow the safety and operating instructions set out in this manual.
- The inverter may only be installed and commissioned by installers who have been trained and approved for the installation and operation of grid-connected solar inverters.
- All repair work on the inverter must be carried out by Delta Electronics. Otherwise the warranty will be void.
- Warning notices, warning symbols and other markings attached to the inverter by Delta Electronics must not be removed.
- To avoid the risk of arcing, do not disconnect cables when the inverter is under load.
- To prevent damage due to lightning strikes, follow the applicable regulations in your country.
- All external connections must be sufficiently sealed in order to ensure an IP66 protection degree. Seal any unused connections with the cover caps supplied.
- The front door does **not** need to be removed for standard installation. All connections required for the standard installation are also accessible from outside.
- Only equipment in accordance with SELV (EN 60950) may be connected to the RS485 interfaces.

Product overview

Scope of delivery

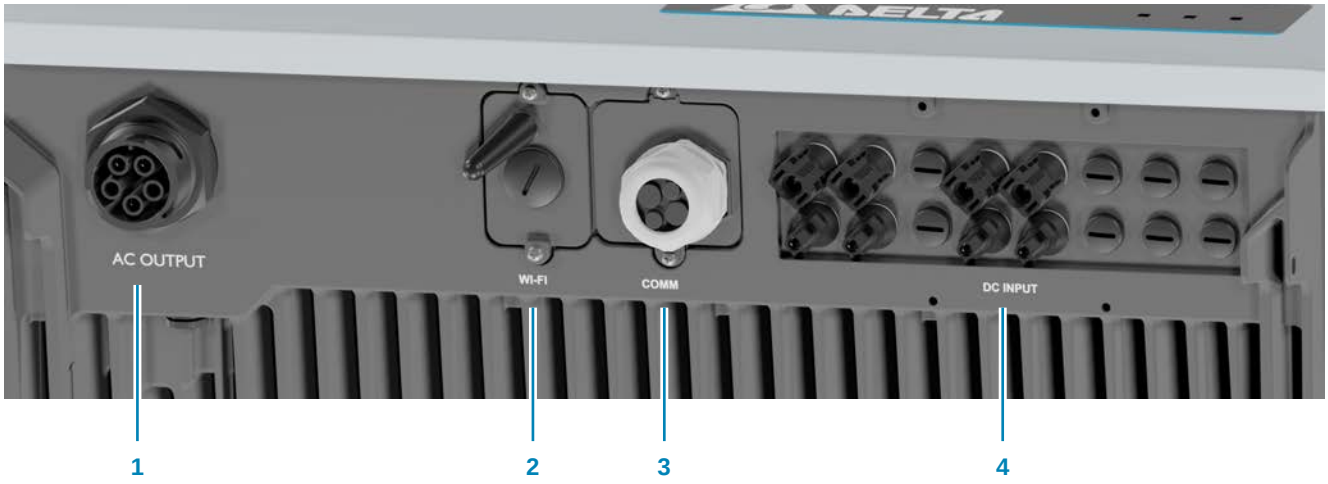
- ► Check the delivery for completeness and all components for damage before starting installation work.
- ► Do not use any damaged components.
- ► Contact Delta Customer Service if the scope of delivery does not match the description in this manual.

- ► Keep the packaging.

Part	Q'ty	Description
Inverter	1	
Mounting plate	1	For mounting the inverter on the wall 
DC plug for DC+	4	Amphenol H4 DC plug for 4/6 mm² (H4C**F** C4D●MS) 
DC plug for DC–	4	Amphenol H4 DC plug for 4/6 mm² (H4C**M** C4D●MS) 
Mounting tool for DC plug	2	For unscrewing the Amphenol H4 DC plugs from the DC connections of the inverter (manufacturer part number: H4TW0001) 

Part	Q'ty	Description
AC plug	1	For connecting the inverter to the public grid 
Wi-Fi antenna	1	The inverter can be connected to a PC, smartphone or Wi-Fi router via the Wi-Fi antenna. 
Allen key	1	For opening the front door and securing the open door from slamming shut. The Allen key is attached to the upper door seal. 
Quick Installation Guide	1	This document. 
Safety instructions	1	Safety instructions in several languages. 

Overview of components and connections



1 AC connection
2 Wi-Fi module
3 Communication connection
4 DC connection panel



1 DC surge protection devices
2 AC surge protection devices

The inverter does not need to be opened for installation.

LED indicator



GRID	Grid	LED: green
ALARM	Alarm	LED: red / yellow
COMM.	Communication	LED: green

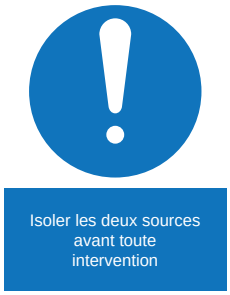
	LED is off.
1s	LED flashes at the standard rate (1 s ON, 1 s OFF).
0,25s	LED flashes rapidly (0.25 sec ON, 0.25 sec OFF).
5s	LED flashes slowly (5 s ON, 10 s OFF).
	LED stays on.

Status display: operation

GRID	ALARM		Explanation
Green	Red	Yellow	
1s			Countdown (inverter is starting up).
			The inverter is connected to the grid and is operating as expected.
			Error. Power-off via external signal.
	1s		Warning. The inverter continues to supply electricity.
	1s		Warning. The inverter is no longer supplying electricity.
			Solar panel system failure. The inverter is no longer supplying electricity.
		1s	Solar system warning. The inverter continues to supply electricity.
		5s	No DC. Also appears when both DC disconnectors are open.
1s	1s		Updating firmware.
1s		1s	Standby mode.
0,25s		0,25s	Check the PV power.
	1s	1s	System lock.

Type plate and markings

Symbols on the type plate	Meaning
	This inverter is not separated from the grid by a transformer.
	Before working on the inverter, read the supplied manual and follow the instructions provided.
	The inverter housing can become very hot during operation.
	The inverter housing must be grounded if this is required by local regulations.
 60 seconds	**Risk of death due to electric shock** Potentially fatal voltage is present inside the inverter during operation and this voltage remains present for up to 60 seconds after disconnection from the power supply.
	WEEE mark 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.

Warning notice	Description
	**For France: Warning notice according to UTE 15712-1** Attention Présence de deux sources de tension - Réseau de distribution - Panneaux photovoltaics
	**For France: Warning notice according to UTE 15712-1** Isoler les deux sources avant toute intervention

Planning the installation

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

This chapter describes the default installation conditions. If you wish to implement conditions that deviate from these, please contact Delta Customer Service.

Installation

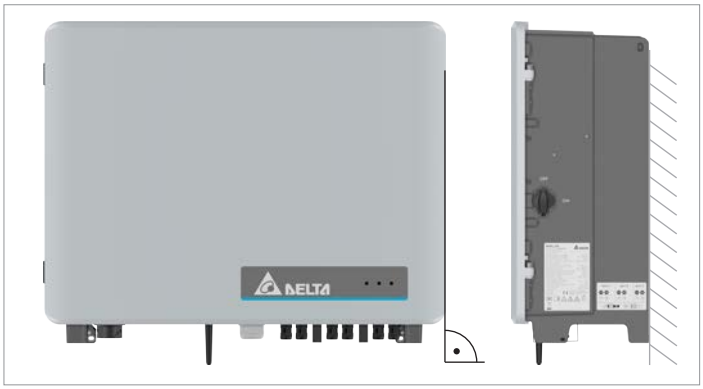
Requirements for the wall, ground and mounting system

- ► The inverter is mounted in a suspended position.
- ► The inverter is heavy. The wall, ground and 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 disruptions.
- ► When using the inverter in residential areas or in buildings with animals, possible noise emissions can be disturbing. Therefore, choose the installation location carefully.
- ► Mount the inverter on a fireproof wall.

Installation height

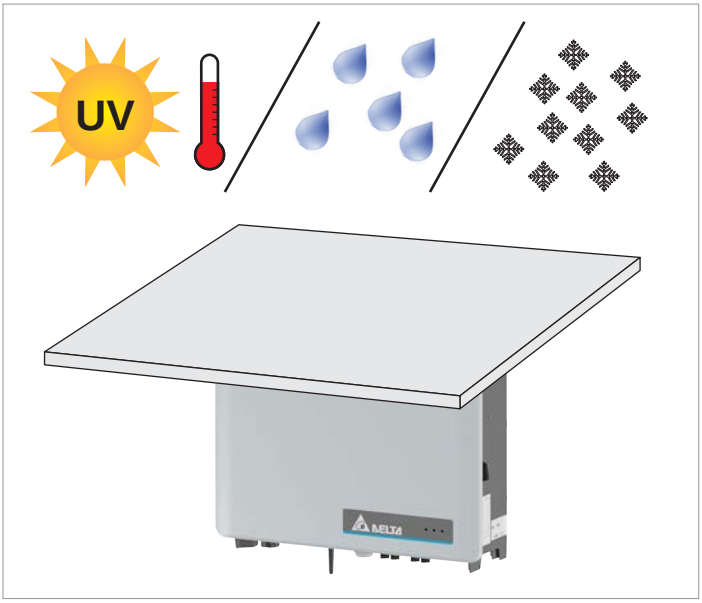
- ► Mount the inverter so that the LEDs are always visible.

Installation position



- ► Mount the inverter vertically.

Outdoor installations



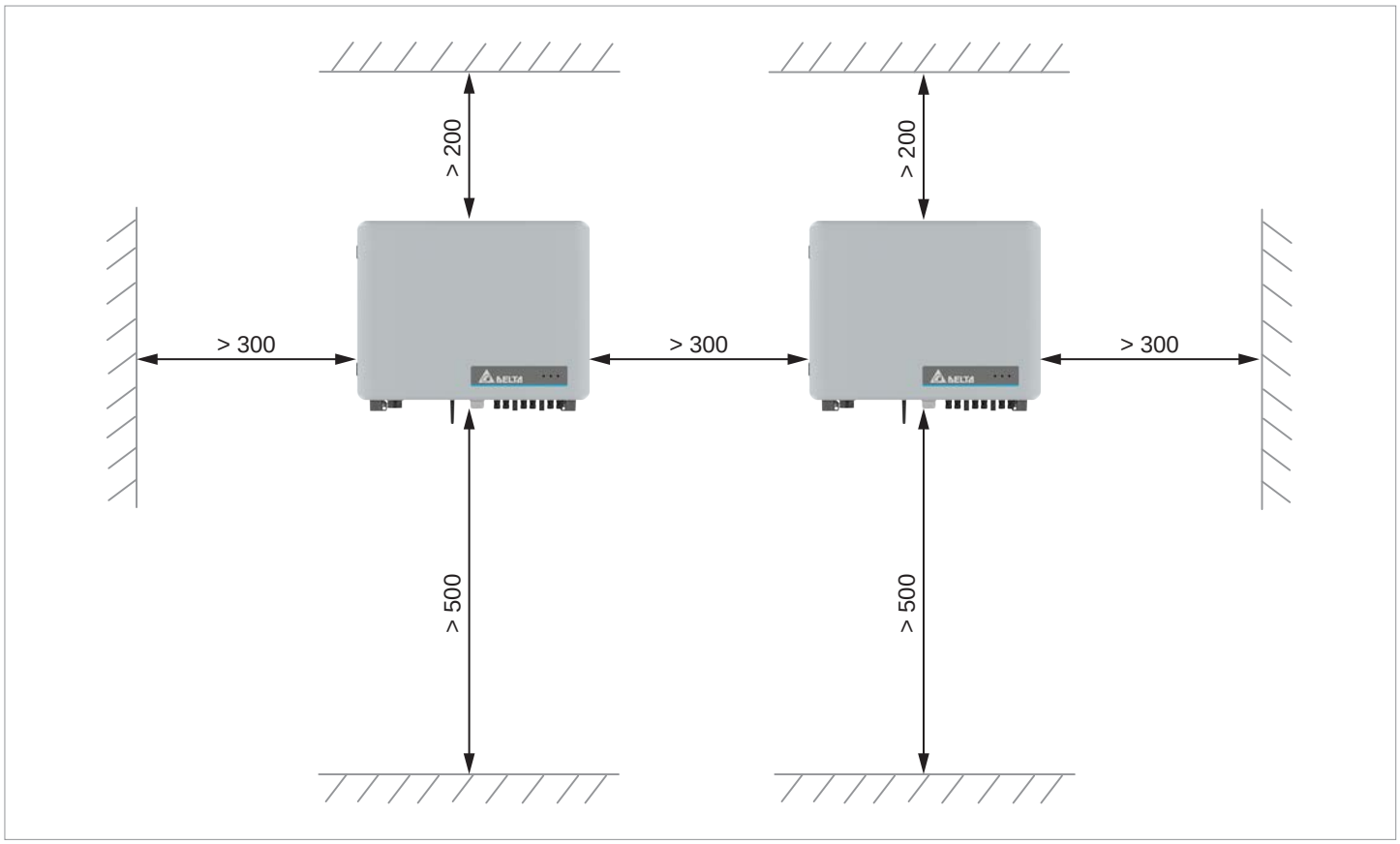
The inverter has a protection degree of IP66 and can be installed indoors and outdoors. Despite this, the inverter should be protected by a roof against direct sun, UV radiation, rain and snow.

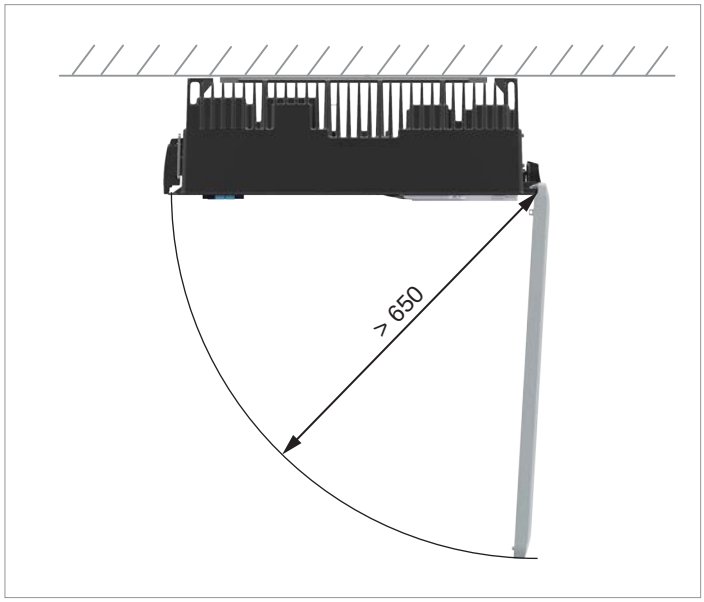
For example, the power of the inverter will be reduced if it is too heavily heated by solar radiation. This is normal operating behavior for the inverter and is necessary to protect the internal electronics.

Lifting and transporting the inverter

- ► Lift and move the inverter with at least 2 people or a suitable lifting device.

Installation clearances and air circulation





- ► Ensure sufficient air circulation. There must not be heat buildup around the inverter.
- ► Observe *Operating temperature range without derating* and the *Total operating temperature range* (see "Technical Data").

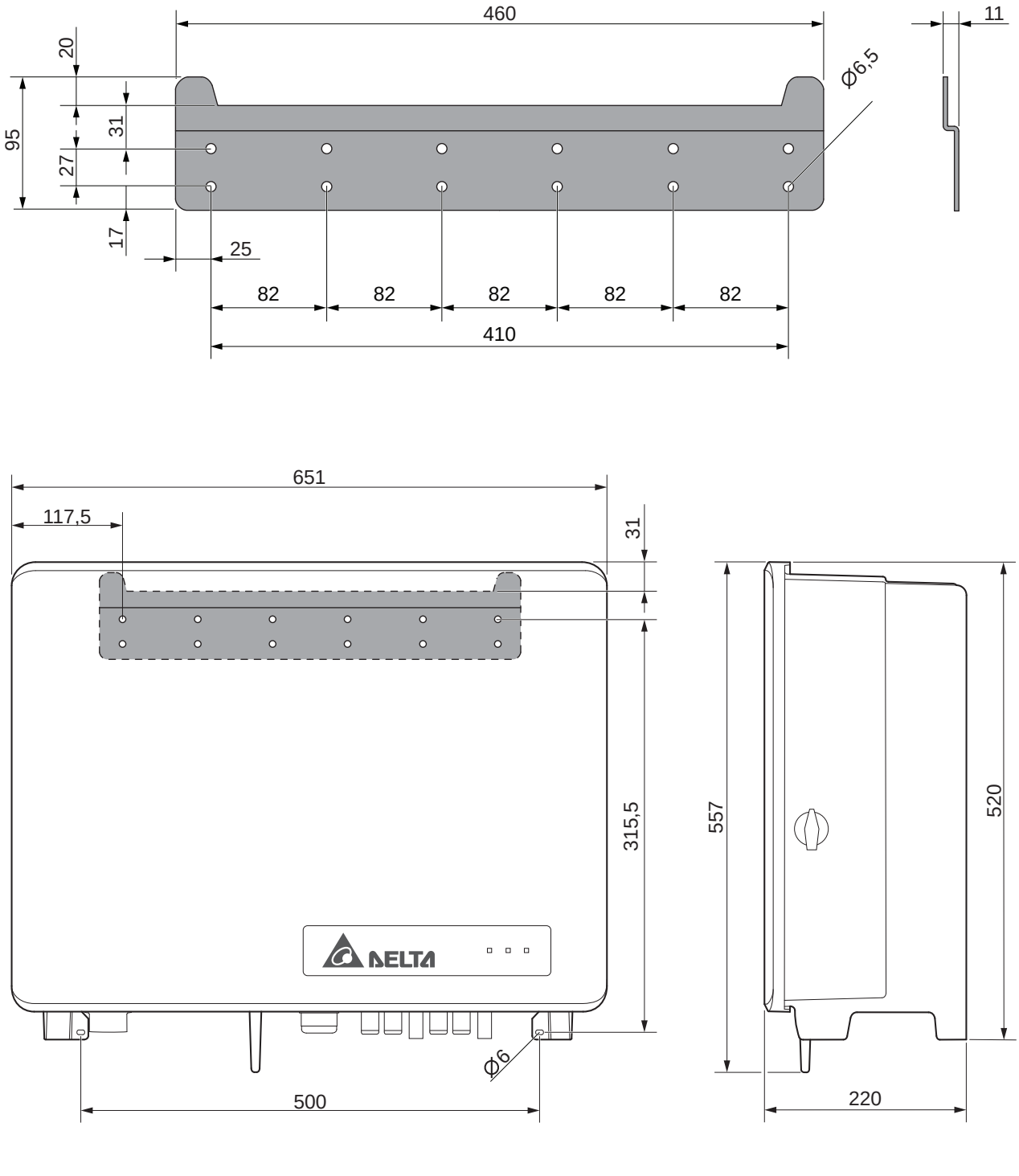
  When the *operating temperature range without derating* is exceeded, the inverter reduces the AC power fed into the grid.

  When the *Total 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.
- ► Position multiple inverters so that they do not heat each other up.
- ► Observe the minimum bend radius of the cables used (especially the AC cable)!
- ► Allow space to the front to open the door.

  If there is a loss of performance during operation, this may be due to overheating of the inverter.

Dimensions

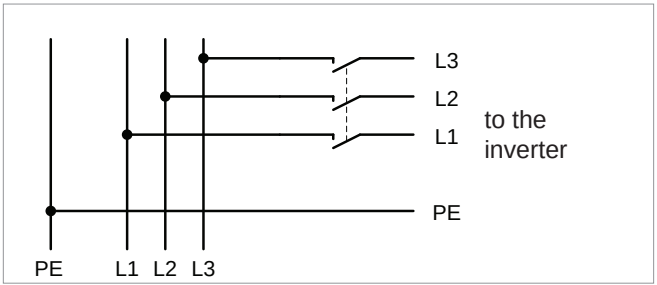

460
11
20
95
31
27
17
25
ϕ6,5
82
82
82
82
82
410
651
117,5
31
315,5
ϕ6
500
557
520
220

Mains connection (AC)

Important safety instructions

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

Upstream circuit breaker	63 A recommended



- ► Selection of the protective devices for the grid cables to the transformer of the grid feed-in point: Always take into account the impedance between the PE of the inverter and the system and/or operational ground of the distribution network. This applies in particular for IT networks.

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 (for example, humidity). The tripping current must not, however, be less than the specified minimum tripping current.

Integrated residual current monitoring unit

The integrated universal current-sensitive residual current monitoring unit (RCMU) is certified in accordance with VDE 0126 1-1:2013-08 §6.6.2.

AC surge protection devices

The inverter is equipped with type-2 AC surge protection devices. Replacements can be ordered from Delta Electronics.

Permissible grounding systems

DANGER

Electric shock

In IT grids, a twofold insulation fault can lead to high residual currents on the inverter housing.

- ► Ground the housing of the inverter via the grounding connection.
- ► Set up a permanent insulation monitoring system.
- ► The first time an insulation fault occurs, this insulation fault must be rectified **immediately**!

Grounding system	TN-S	TN-C	TN-C-S	TT	IT
Allowed	Yes	Yes	Yes	Yes	Yes

Grounding the inverter

WARNING

High current

- ► Always observe the local regulations relating to grounding cable requirements.
- ► To increase the safety of the system, always use the grounding screw to 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.
- ► The grounding cable cross-section must be at least 6 mm^2.

A cable lug, M6 screw, spring washer and washer are required for connecting the grounding cable. A toothed washer is not required. The ground connection has an M6 thread.

Permissible grid voltages

The inverter is suitable for grid systems with 3 phases + PE (delta connection) or 3 phases + N * PE (star connection).

3P3W	Voltage range	3P4W	Voltage range
L1-L2	400 V_{AC} -20%/+30%	L1-N	230 V_{AC} -20%/+30%
L1-L3	400 V_{AC} -20%/+30%	L2-N	230 V_{AC} -20%/+30%
L2-L3	400 V_{AC} -20%/+30%	L3-N	230 V_{AC} -20%/+30%

Technical specification for the AC plug

An AC plug is included in the scope of delivery

Connection type	5-pin AC plug
Rated currents I_N	
• 4 mm²	30 A
• 6 mm²	40 A
• 10 mm²	50 A
• 16 mm²	65 A
• 25 mm²	75 A
Rated voltage U_N	600 V
Operating temperature range	-40 to +85°C

Notes on calculating the cable cross-section

► Consider the following factors when calculating the cable cross-section:
  – Cable material
  – Temperature conditions
  – Cable length
  – Installation type
  – Voltage drop
  – Loss of power in the cable
  – Bundling factor (for example, if several cables are routed together in a single cable duct.)

► Always follow the IEC 60364-5-52 requirements and your country-specific installation instructions.

► France: Follow the installation instructions 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 instructions of VDE 0100-712. This standard contains the requirements for minimum cable diameters and for avoiding overheating due to high currents.

AC cable specifications

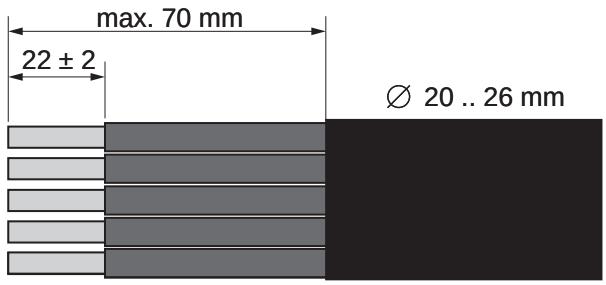
NOTICE



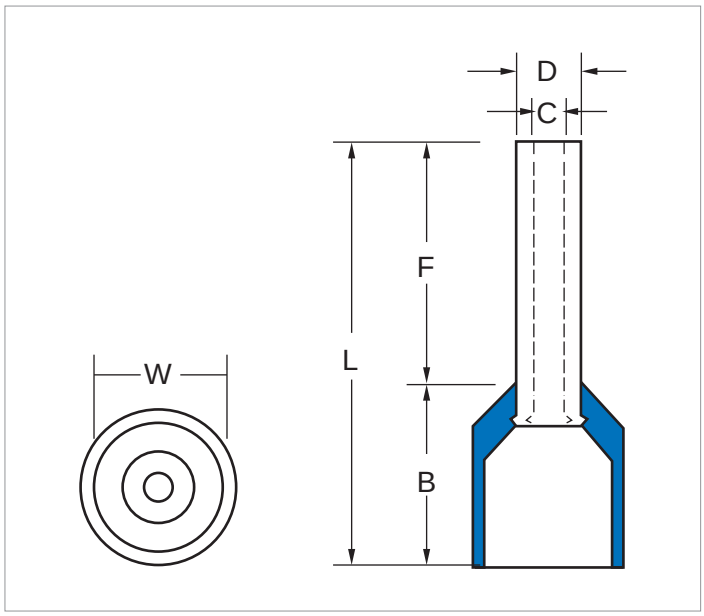
The AC plug is only approved for copper cables. Aluminum cables must not be used.

Cable diameter	20 to 26 mm
Min./max. Wire cross section	
Without wire end sleeve	
• Rigid cable	4 to 25 mm²
• Multi-wire cable	4 to 25 mm²
With wire end sleeve	
• Fine-wire cable	2.5 to 16 mm²
Cables	Copper (rigid, multi-wire, fine-wire)

Stripping length



Wire end-sleeves



Wire cross section	16 mm²
L	28 mm
F	18 mm
B	10 mm
ØC	5.8 mm
ØD	6.2 mm
ØW	8.7 mm

Connecting the solar modules (DC)

NOTICE

Incorrectly dimensioned solar system
If the solar system is dimensioned incorrectly, this may damage the inverter.

► When calculating the module string, always pay attention to technical specifications of the inverter (*input voltage range*, *maximum input current* and *maximum input power*, see "Technical Data").

NOTICE

Overheating of the DC connections
Exceeding the *maximum input current* can cause the DC connections to overheat and result in a fire.

► When dimensioning the module strings, always take into account the *maximum input current* of the DC connections (see "Technical Data").

NOTICE

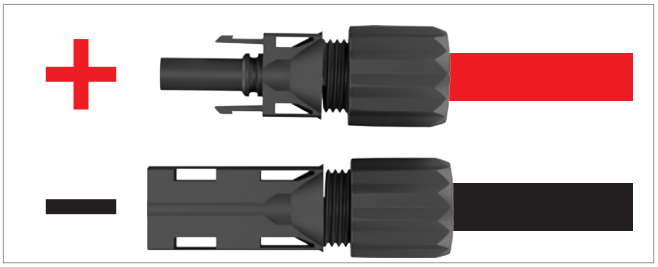
Ingress of moisture
Moisture can enter via open DC connectors.

► To ensure protection degree IP66, close unused DC connectors with the rubber plugs that are attached to the DC connectors.

When selecting protective devices (such as string fuses), always cater for the *maximum current rating* of the solar modules.

Polarity of the DC voltage

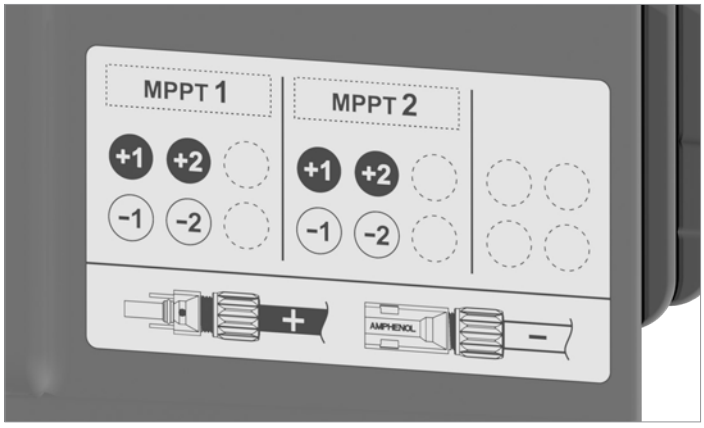
► Check the polarity of the module strings before connecting the solar modules.

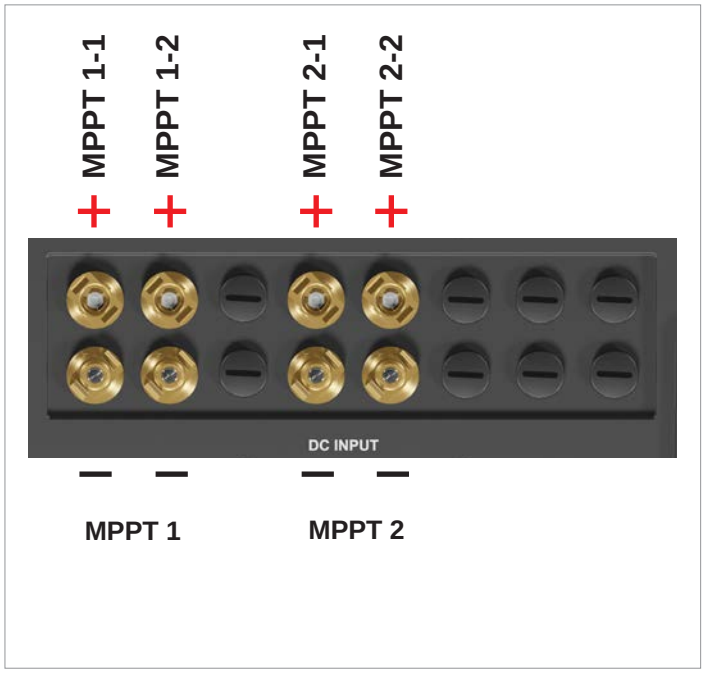


The inverter has an integrated function for detecting reverse polarity on the DC connections. If such reverse polarity is detected, the inverter triggers an error message. This error message is indicated by the ***ALARM*** LED as soon as the inverter is switched on.

Arrangement of the DC inputs on the DC connection panel

The inverter has 3 MPP trackers (MPPT1 to MPPT3) with 2 pairs of DC connectors each. Up to 18 module strings can be directly connected to the inverter.





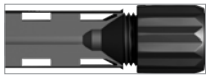
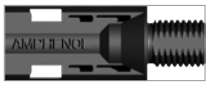
Specification for the DC cables

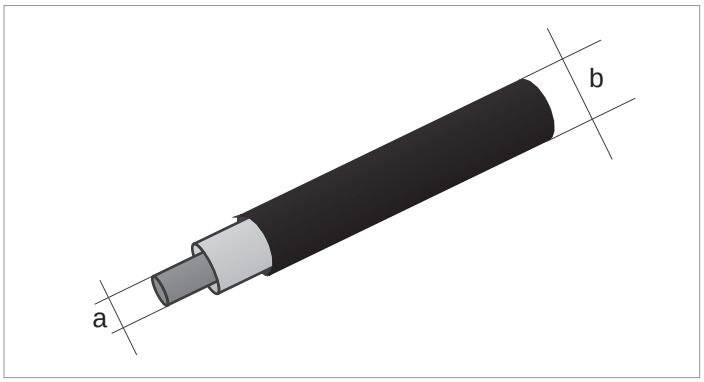
The DC plugs for all DC connectors are supplied with the inverter.

The DC plugs are only suitable for copper wire.

You can download the assembly instructions for the DC plugs from Amphenol at: www.amphenol-solar.com.

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

	DC plugs for DC cables	DC connections on the inverter
DC–		
DC+		

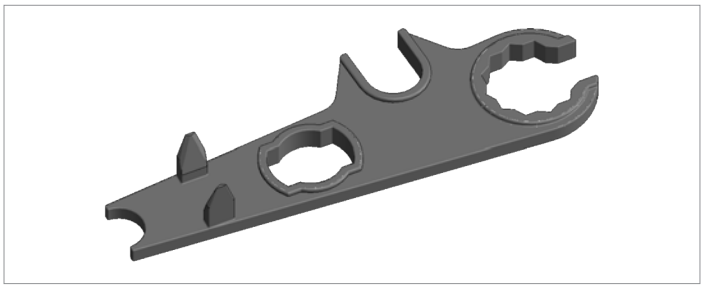


	a	b	Amphenol DC plug [1]
	mm²	mm	
DC+	4/6	5.3 ... 7.65	H4C**F**C4D●MS
DC–	4/6	5.3 ... 7.65	H4C**M**C4D●MS

[1] Included in scope of delivery

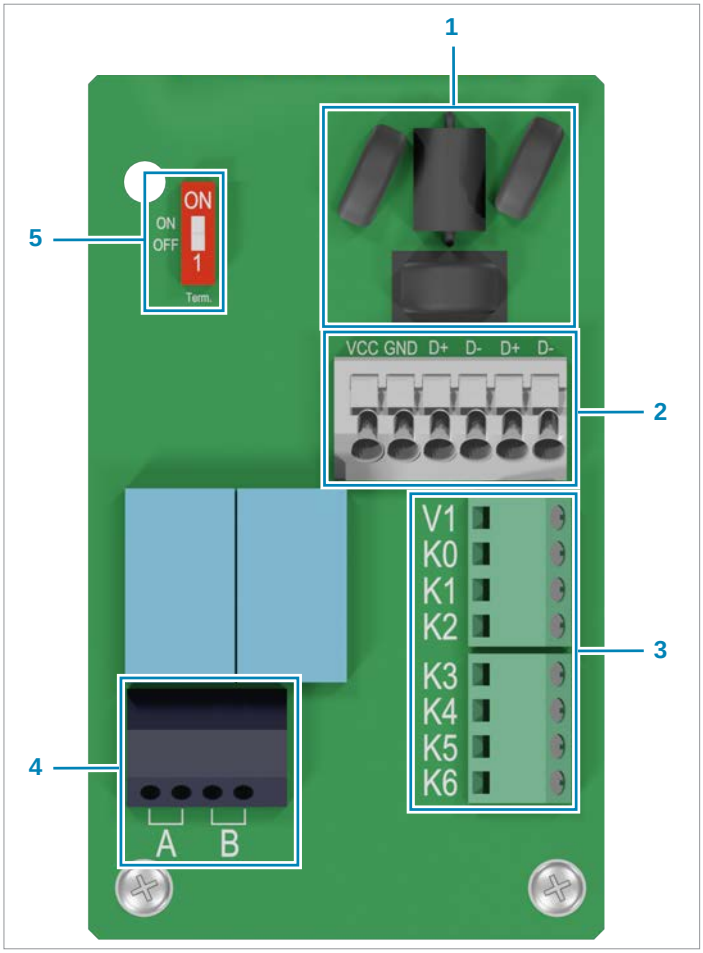
Special tools required

Always use the supplied Amphenol mounting tools to unscrew the DC connectors.



Device communication and system monitoring

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



1 Surge protection type 3
2 RS485 (terminal block) + VCC + GND
3 Digital inputs and external power-off (terminal block)
4 2 x dry contacts (terminal block)
5 DIP switch for the RS485 termination resistor

Connection	Connector type
2 x RS485 (DATA+ and DATA–)	Terminal block
1 x VCC (12 V, 0.5 A)	Terminal block
6 x digital inputs	Terminal block
2 x dry contacts	Terminal block
1 x external power-off (EPO)	Terminal block

Cable type	Shielded and twisted pair cable (CAT5 or CAT6)
Cable diameter	7.2 to 10 mm
Wire cross section	0.25 ... 1.5 mm²

Cable gland for the communication connection



The inverter has one cable gland for up to four communication cables.

Connection of a data logger via RS485

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

The SUNSPEC protocol with Modbus RTU is used for data transmission.

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

Take into account the notes for ensuring a stable data connection.

Connecting a single inverter to a data logger

► Switch on the RS485 termination resistor.
► Lay the communication 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

Consideration of the position of the data logger in the RS485 bus:

► The data logger is located at one of the two ends of the RS485 bus:
  – Switch the RS485 termination resistor of the data logger *on*.
  – Switch the RS485 termination resistor of the inverter at the other end of the RS485 bus *on*.
► The data logger is *not* at either end of the RS485 bus:
  – Switch the RS485 termination resistor of the data logger *off*.
  – Switch the RS485 termination resistor of the two inverters at the ends of the RS485 bus *on*.

► Switch the RS485 termination resistor on all other inverters *off* (default setting from the factory).

Further notes:

► Set a different inverter ID for each inverter using the Delta Service Software (DSS) Auto ID function. Otherwise the data logger cannot identify the individual inverters.

► Set the same RS485 baud rate at each inverter (factory setting: 19200).

► Lay the RS485 cable with a suitable clearance to the AC and DC cables to prevent interference in the data connection.

► Do not connect VCC and GND when using RS485.

Connection of a DC1 data collector from Delta

The inverter can be connected to the DC1 via RS485.

In order to access the DC1 and the inverter through it, you also need a mobile device (smartphone, tablet) with the DeltaSolar app.

The DeltaSolar app is available for iOS and Android.

Connecting an external alarm unit

The inverter has two relays for triggering external alarm devices. The communication card contains 2 pairs of dry contacts, each of which can be connected to an external acoustic or optical alarm device.

The communication card also has a 12 V_{DC} power supply.

Both relays are designed as normally open contacts.

After commissioning, each relay can be assigned an event at which the relay switches. By default, the relays are disabled.

To set an event for the relays, you need:

- A mobile device (smartphone, tablet) with the DeltaSolar app

or

- A Windows PC running the Delta Service Software (DSS)

The DeltaSolar app is available for iOS and Android.

The DSS be downloaded from https://solarsolutions.delta-emea.com/en/Solar-Inverter-Support-171.htm.

The default setting for both relays is **`Disabled`**.

Connecting a ripple control receiver

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

The digital inputs are located on the communication card.

External power-off

To disconnect the inverter AC-side from the grid connection point, a switching signal can be sent via an external monitoring unit using the digital input K0.

The relay is designed at the factory as a normally open contact. The relay can also be set as an normally closed contact in the inverter settings.

The connection for external disconnection is located on the terminal block with the digital inputs of the communication card.

Connecting a PC

You can use the PC to commission the inverter and change all settings and parameters.

The Delta Service Software (DSS) is available for this purpose.

Download link: https://solarsolutions.delta-emea.com/en/Solar-Inverter-Support-171.htm

Options for connecting the PC to the inverter:

- Via the RS485 terminal block on the communication card of the inverter
- Via Wi-Fi

To connect the PC via RS485, you will need: A **USB/RS485 adapter**.

Grid and system protection

1. The German standard VDE-AR-N 4105 requires external grid and system protection with a coupling switch for PV systems larger than 30 kVA.
2. Alternatively, VDE-AR-N 4105 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 meets the requirement in (2). An external coupling switch is not required. This statement also applies to medium-voltage systems.

Installation

NOTICE

Water ingress.
► All sealing caps removed during installation should be stored for later use (for example, transportation or storage).

NOTICE

Working in freezing conditions
In frosty conditions, the rubber seal of the front door can freeze to the enclosure, tear when opened and thus become leaky.
► Before opening the front door, defrost the rubber seal with some warm air.
► Open the front door slowly.

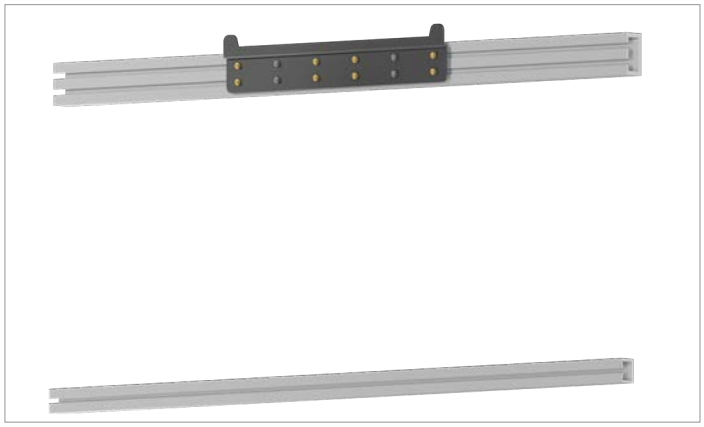
Use insulated tools.

Mounting the inverter

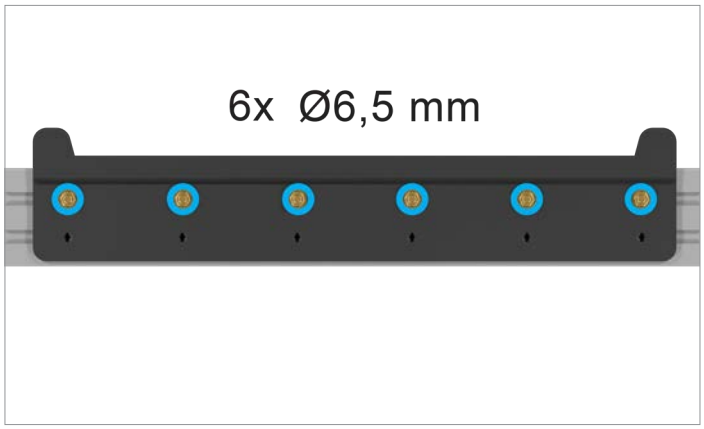
WARNING

Heavy weight
The inverter is heavy.
► Lift and carry the inverter with at least 2 people.

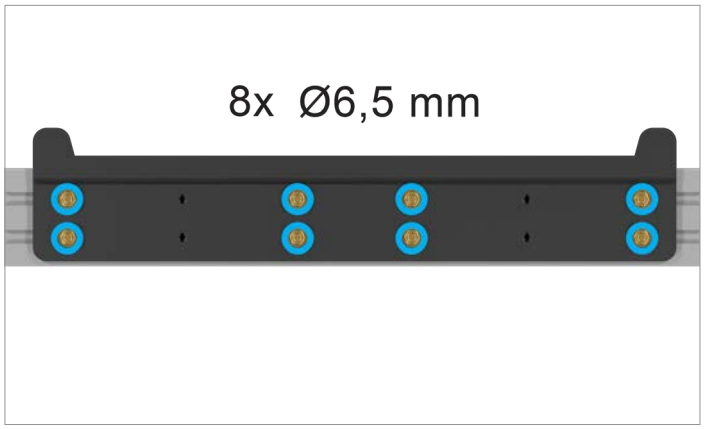
Always check with Delta Customer Service **first** if you want to deviate from the work instructions given in this section.



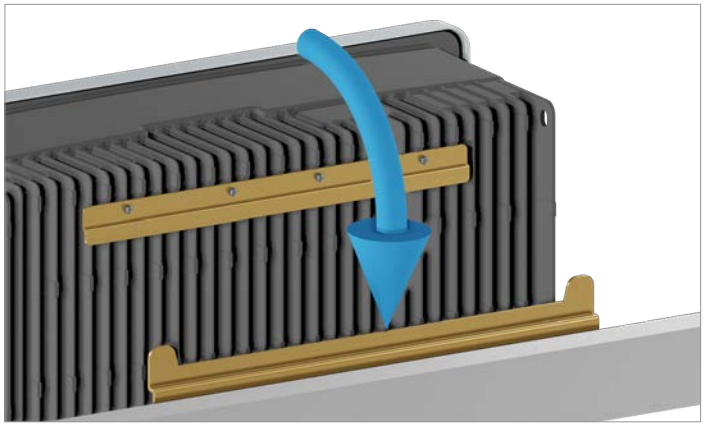
1. Attach the mounting plate to the wall/mounting system using one of the options shown below.



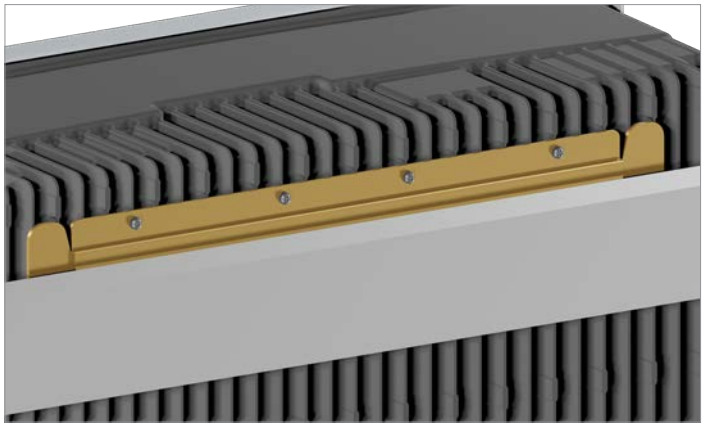
Option 1: Attach with at least **6** screws



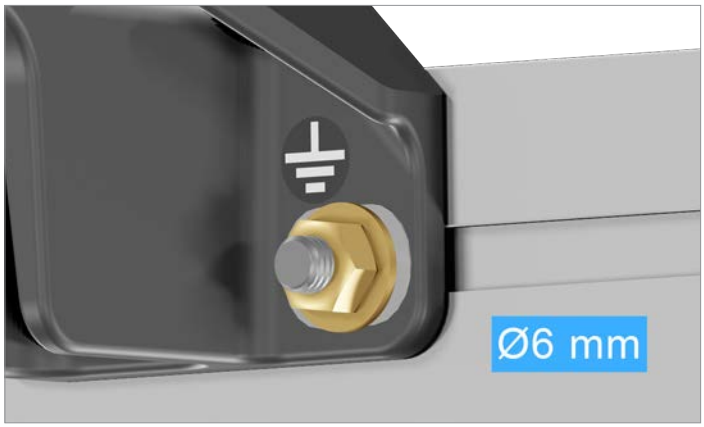
Option 2: Attach with at least **8** screws

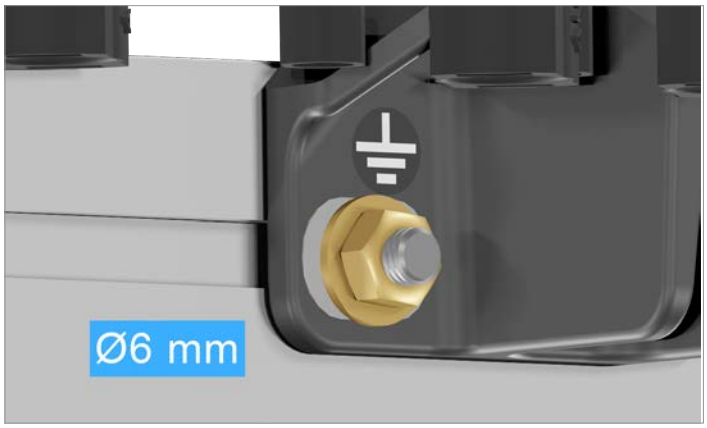


2. Mount the inverter on the mounting plate.



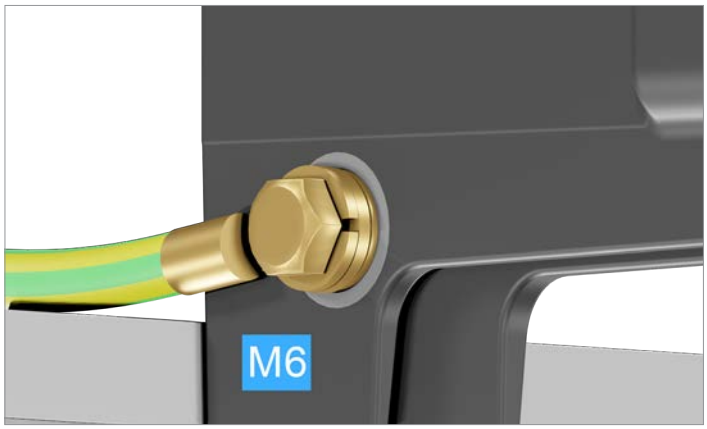
3. Check that the inverter is correctly mounted on the mounting plate.





4. Screw the lower left and right sides of the inverter onto the wall or mounting system using one screw, spring washer and washer on each side.

Grounding the inverter housing



1. Screw the ground cable to the lower left side or lower right side of the ground connection (torque: 3.9 Nm). This requires an M6 screw, spring washer and washer. A toothed washer is **not** required.

2. Perform a continuity check of the grounding connection.
   → If there is not a sufficiently conductive connection, clean the contact surface on the grounding screw or use a toothed washer if necessary.

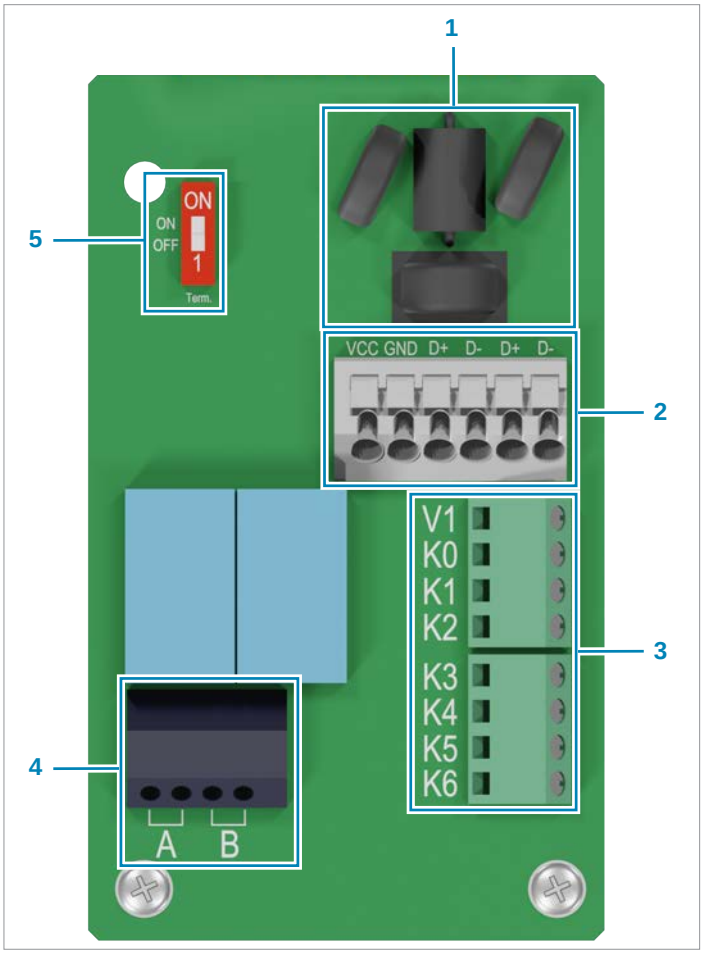
Connecting the communication card

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

NOTICE

Water ingress.
► All sealing caps removed during installation should be stored for later use (for example, transportation or storage).

Connections on the communication card



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

Connection	Connector type
2 x RS485 (DATA+ and DATA–)	Terminal block
1 x VCC (12 V, 0.5 A)	Terminal block
6 x digital inputs	Terminal block
2 x dry contacts	Terminal block
1 x external power-off (EPO)	Terminal block

Cable type	Shielded and twisted pair cable (CAT5 or CAT6)
Cable diameter	7.2 to 10 mm
Wire cross section	0.25 ... 1.5 mm²

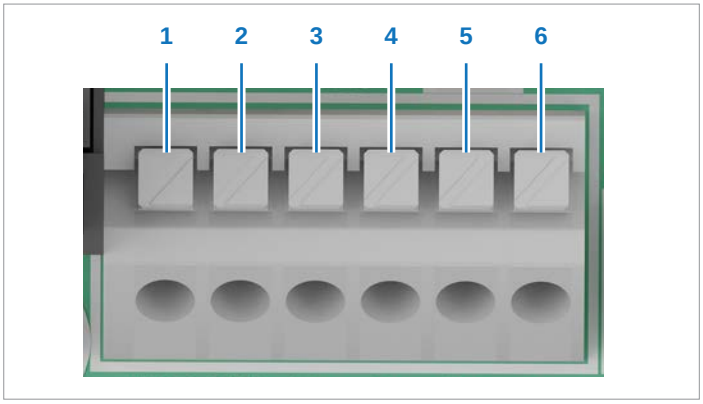
Lay the communication cable with a suitable clearance to the AC and DC cables to prevent interference in the data connection.

Connecting a data logger via RS485

NOTICE

Unwanted currents.
In some installation variants, unwanted currents can flow when multiple inverters are connected via RS485.
► Do not use GND and VCC.

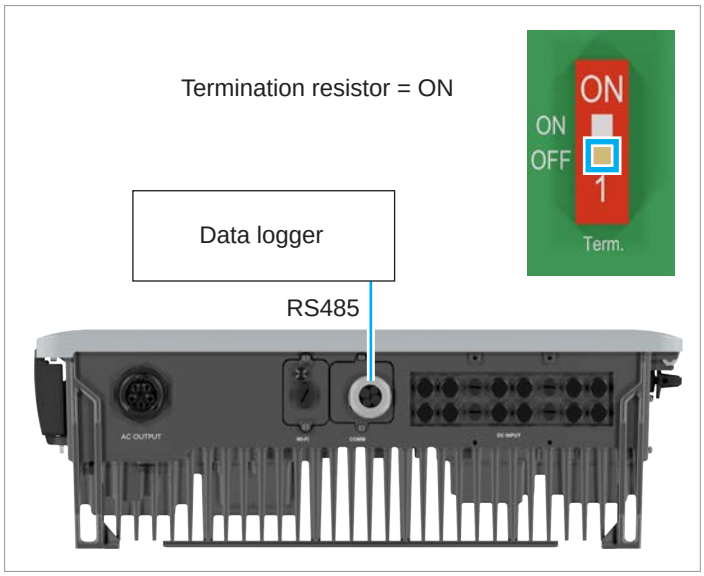
Terminal assignment of the RS485 terminal block



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

Terminal pair 3/4 or 5/6 can be used to connect a data logger.

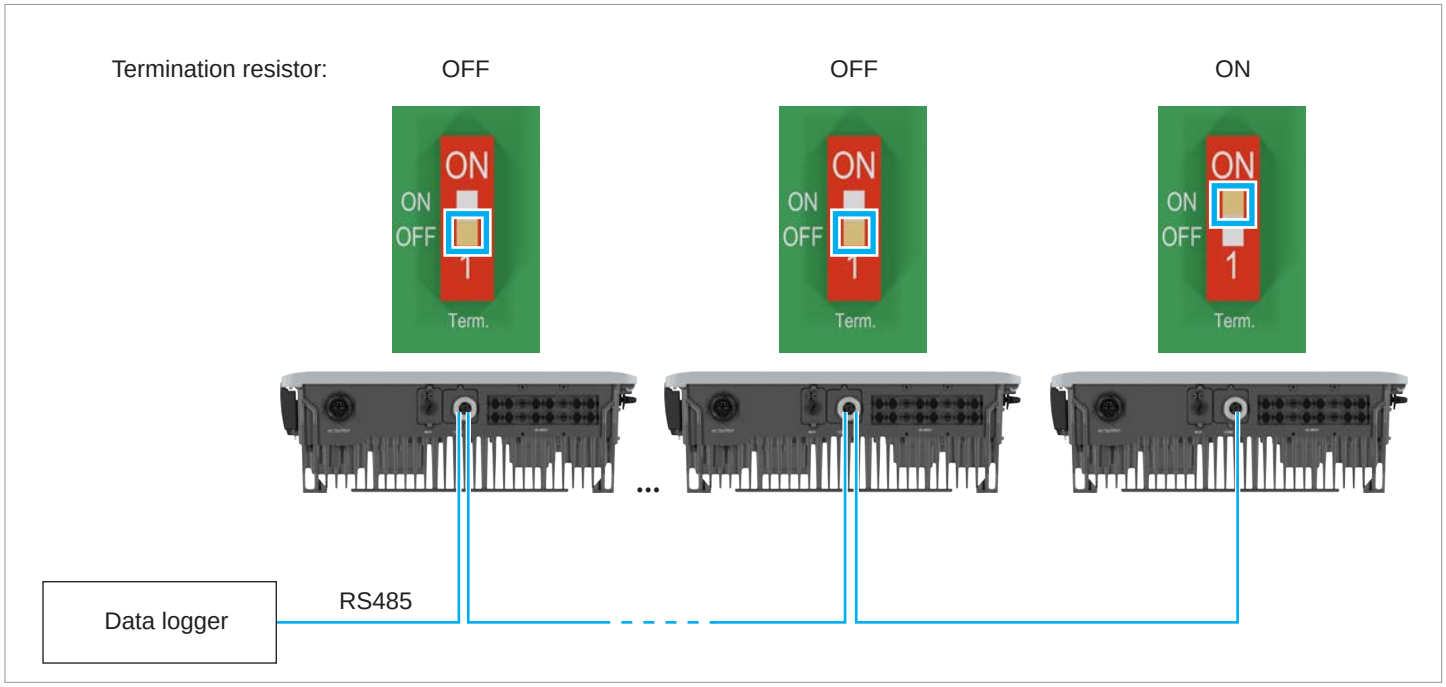
RS485 connection diagram for a single inverter



RS485 connection diagram for multiple inverters

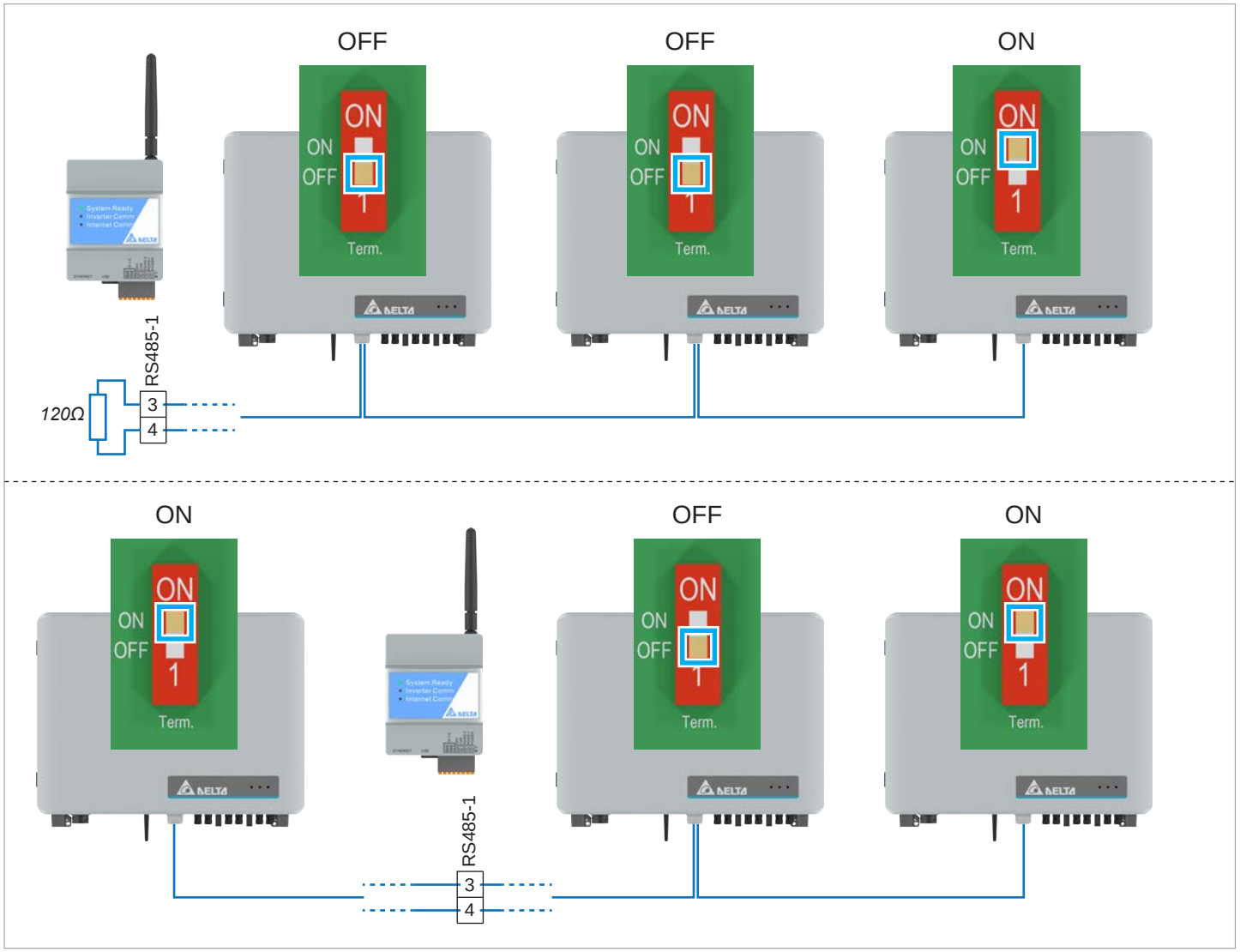
If you are using a DC1 data collector from Delta, also refer to the notes in the next section.

- ► On the last inverter in the RS485 bus, set the DIP switch of the RS485 termination resistor to ***ON***.
- ► If the data logger is located at one end of the RS485 chain, then also switch on the RS485 termination resistor of the data logger. If the data logger does not have an integrated RS485 termination resistor, then also switch on the DIP switch of the first inverter in the RS485 series, i.e. the one that is directly connected to the data logger.
- ► Set a different inverter ID at each inverter during commissioning of the inverters.



Connection of a DC1 data collector via RS485

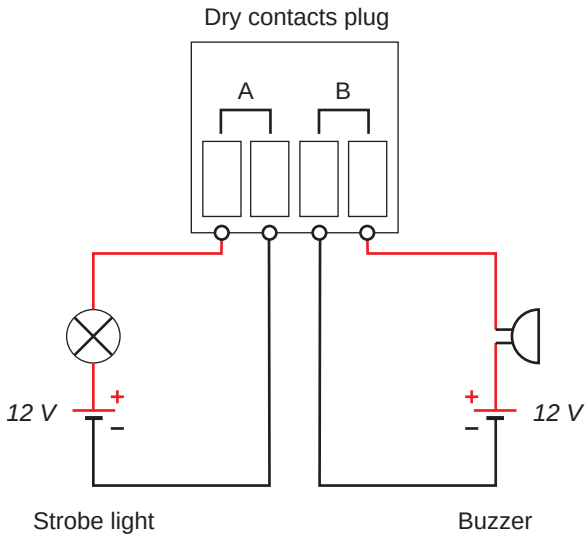
The DC1 data collector from Delta does not have an integrated RS485 termination resistor. Depending on where the DC1 is located in the RS485 bus, an external RS485 termination resistor may need to be connected, see the image below.



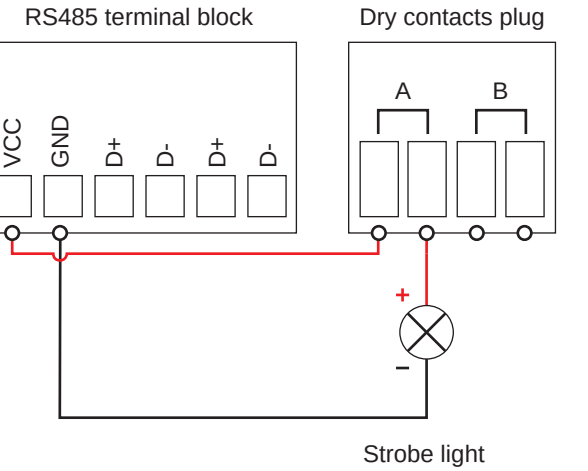
Connecting an external alarm unit

The external alarm unit is connected to the dry contacts.

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



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



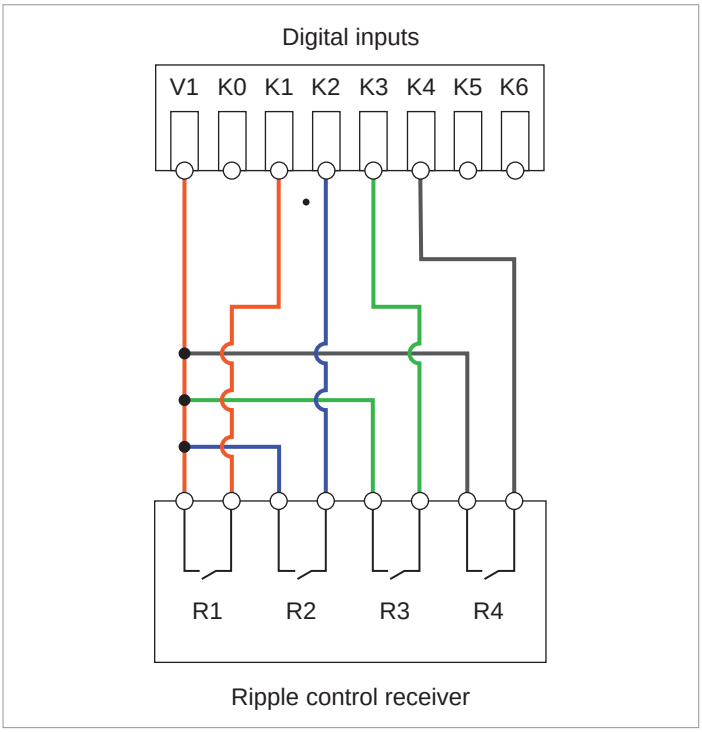
An event can be assigned to the dry contacts with Delta Service Software or the DeltaSolar app after commissioning.

Connecting a ripple control receiver

Pin	Naming	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

Connection schema

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



Connecting the external power-off (EPO)

Pin assignments

Pin	Naming	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

1. Connect the wires to the terminals V1 and K0.
2. After commissioning, the relay for the external power-off can be defined with Delta Service Software as a normally closed or normally open contact.

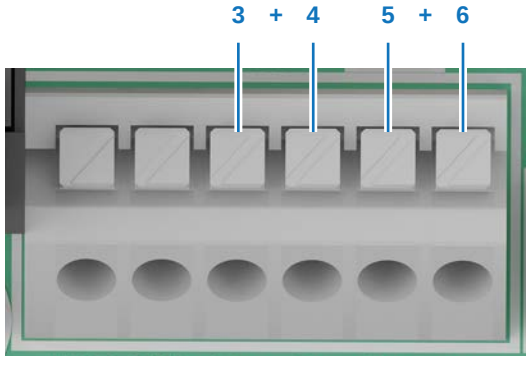
Connecting a PC via RS485 (optional)

Please note that after commissioning, you must reset the protocol to SUNSPEC and disconnect the PC from the inverter again!

Alternatively, you can connect the PC to the inverter via Wi-Fi:

Accessories	Description
Standard USB/RS485 adapter	For connecting the PC to the inverter.
Delta Service Software (DSS)	For changing the inverter settings.

You can download the DSS at https://solarsolutions.delta-emea.com.



You can use terminal pairs 3+4 or 5+6 to connect the PC.

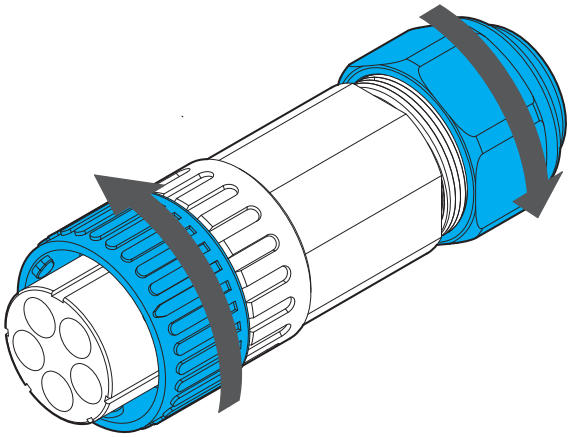
DATA+	Terminal 3 or 5
DATA–	Terminal 4 or 6

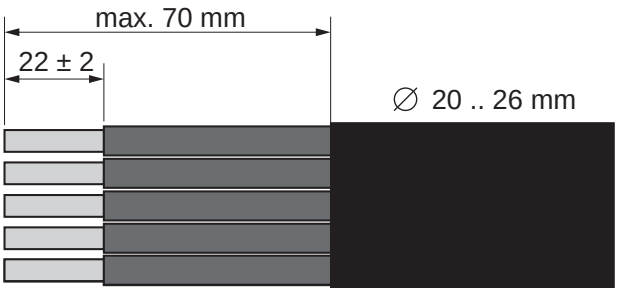
Cable requirements

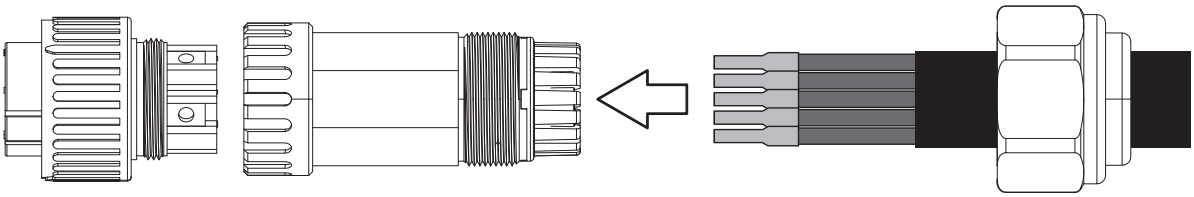
Bell wire. Both ends open.

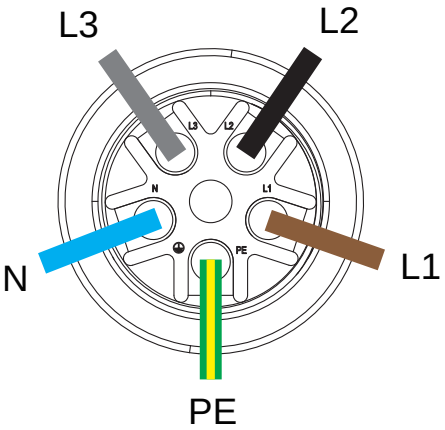
Connecting the grid (AC)

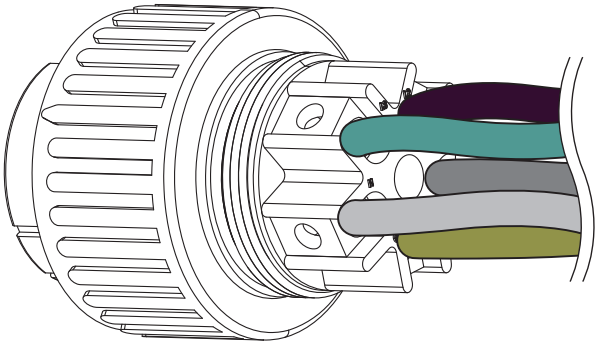
Wire the AC plug

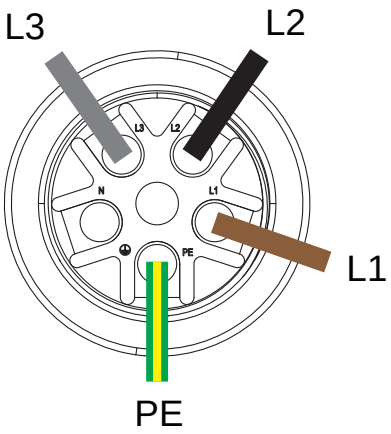


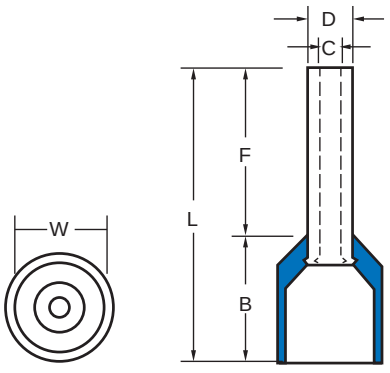












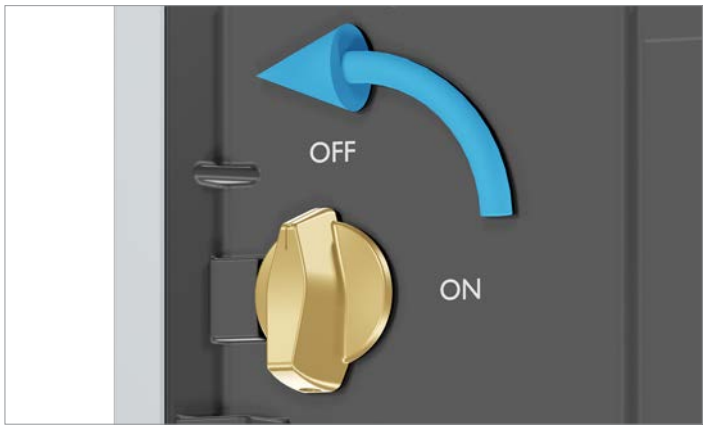
Cu 16 mm²	
L	28 mm
F	18 mm
B	10 mm
ØC	5,8 mm
ØD	6,2 mm
ØW	8,7 mm

Connecting the AC cables

There is normally an isolating switch (for example in an equipment wiring box) between the inverter and the grid connection box and between the inverter and the solar modules. This isolates the inverter from all the AC and DC voltage sources and renders it de-energized.

1. To ensure that no voltage can be applied to the inverter during installation work, open the isolating switches between the inverter and the grid connection point and between the inverter and the solar modules.

   Secure all the isolating switches to prevent them from being switched back on accidentally.



2. Turn the DC isolating switch to the ***OFF*** position.



3. Screw on the AC plug.

Connecting the solar modules (DC)

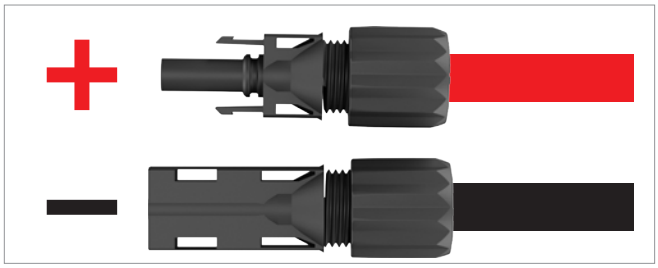
Always use the supplied mounting tools to open the DC connectors.

When disconnecting the DC cables, take care not to damage the connectors.

Do not use force.

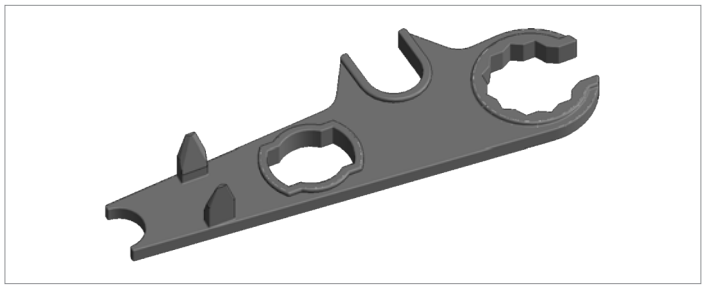
Pull out at the DC connector, **not** at the DC cable.

► Check the polarity of the DC voltage of the DC strings before connecting the solar modules.

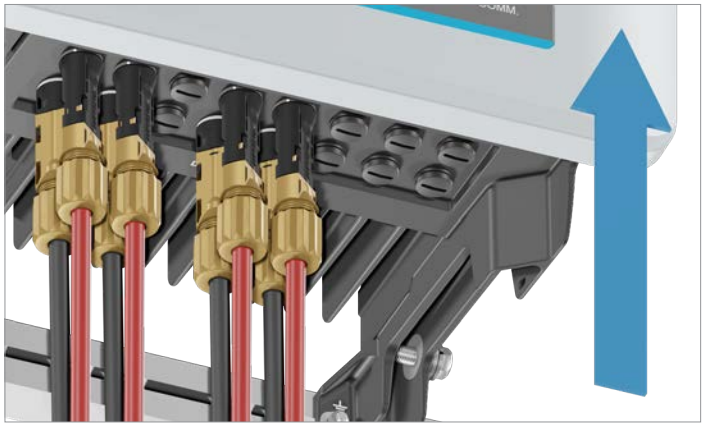


The inverter has an integrated function for detecting reverse polarity on the DC side. If such reverse polarity is detected, the inverter triggers an error message. This error message is indicated by the ***ALARM*** LED as soon as the inverter is switched on.

Special tools required



Mounting tools for DC connectors (included in delivery)



► Plug in the DC cables.

Technical Data

Input (DC)	M15A	M20A
Maximum input power (per MPP Tracker/total)	9,85 kW / 16,5 kW	13,5 kW / 22 kW
Rated power	15 kW	20 kW
Input voltage range for operation	200 to 1000 V_{DC}	
Max. input voltage	1100 V_{DC} [1)]	
Rated voltage	600 V_{DC}	
Switch-on voltage	250 V	
Switch-on power	??? W	
Number of MPP trackers	Parallel inputs: 1; separate inputs: 2	
Number of DC connections (per MPP tracker/total)	2/4	
MPP input voltage range total	200 to 1000 V_{DC}	
MPP input voltage range with full power	325 to 900 V_{DC}	460 to 900 V_{DC}
Maximum asymmetrical design	90%/10%; 10%/90%	67.5%/32.5%; 32.5%/67.5%
Maximum input current (per MPP Tracker/total)	26 A/48 A	
Maximum DC short-circuit current I_{SC}	50 A per MPP tracker	
DC connection panel		
Connector type	Amphenol H4 connector	
Number of DC connections	4 pairs	
DC cable specifications	4/6 mm^2	
Use of external string fuses	1 or 2 strings per MPPT: no external string fuses required	
Overvoltage category [2)]	II	
Surge protection devices	Type 2 (EN 50539-11), replaceable	
Galvanic isolation	No	

Output (AC)	M15A	M20A
Maximum apparent power [3)]	15 kVA at 40°C; 16.5 kVA at 35°C	20 kVA at 40°C; 22 kVA at 35°C
Maximum active power	15 kW at 40°C; 16.5 kW at 35°C	20 kW at 40°C; 22 kW at 35°C
Nominal active power	15 kW	20 kW
Nominal apparent power	15kVA	20KVA
Rated voltage [4)]	230/400 V -20%/+30%, 3 phases + PE, 3 phases + N + PE	
Nominal current	??? A	??? A
Maximum output current	25 A	32 A
Switch-on current	110 A/50 µs	
Maximum current in case of fault	40 A_{rms}	
Maximum surge protection	77 A	
Frequency range [4)]	50/60 Hz ± 5 Hz	
Power factor adjustment range	0.8 cap to 0.8 ind	
Total harmonic distortion	<3% at rated apparent power	
Power consumption in night mode	<2 W [5)]	
AC connection		
Connector type	AC connector (included with delivery)	
Copper cable specifications		
Cable diameter	20 to 26 mm	
Conductor type	Single-wire; multi-wire; fine-wire with end sleeve	
Wire cross section	2.5 to 16 mm^2 with end sleeve	
Aluminum cable specifications	not permitted	
Overvoltage category [2)]	III	
Surge protection devices	Type 2 (EN 61463-11), replaceable	

Mechanical details	M15A	M20A
Dimensions (W x H x D)	650 × 520 × 220 mm	
Weight	40.5 kg	
Cooling	Natural convection	
Installation options	suspended (mounting plate included in the scope of delivery)	
Disconnectors	1x mechanical DC disconnector	

Communication and data visualization	M15A	M20A
Communication interfaces	2x RS485, 2x dry contacts, 1x EPO, 1x 12 V_{DC} power supply, 6x digital inputs	
Communication	RS485, Wi-Fi, Sub-1G (optional)	
Communication protocols	Modbus RTU	

General specifications	M15A	M20A
Delta model name	M15A_220	M20A_220
Delta part number	RPI153M220100	RPI203M220100
Overall operating temperature range	-25 to +60°C	
Storage temperature range	-25 to +60°C	
Relative humidity	0 to 100%, non-condensing	
Max. operating height	4000 m above sea level	
Noise level	≤31.6 dB(A)	

Standards and guidelines	M15A	M20A
Protection class	IP66	
Safety class	I	
Pollution degree	II	
Configurable trip parameters	Yes	
Insulation monitoring	Yes	
Overload behavior	Current limit, power limit	
Safety	IEC 62109-1/-2, CE compliance	
EMC	EN 61000-6-2/-6-3/-3-11/-3-12	
Noise immunity	IEC 61000-4-2/-3/-4/-5/-6/-8	
Distortion factor	EN 61000-3-2	
Voltage fluctuations and flicker	EN 61000-3-3	
Islanding protection/grid connection guidelines	You will find the current list at solarsolutions.delta-emea.com	

1) The maximum withstand voltage is 1100 V_{DC}. The inverter starts to work if the input voltage falls below 1000 V_{DC}.
2) IEC 60664-1, IEC 62109-1
3) For cos phi = 1 (VA = W)
4) Rated voltage and frequency range will be programmed according to the specific country requirements.
5) Power consumption with standby communication

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