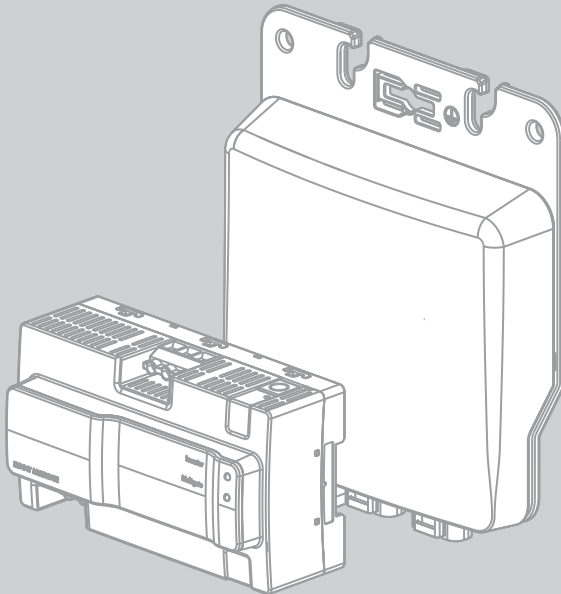Installation Manual
SUNNY BOY 240
SUNNY MULTIGATE

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SMA Solar Technology AG
Sonnenallee 1
34266 Niestetal
Germany
Tel. +49 561 9522-0
Fax +49 561 9522-100
www.SMA.de
E-mail: info@SMA.de

Table of Contents

1 Information on this Document

Validity

This document is valid for the following device types:

- SB 240-10 (Sunny Boy 240)
- Multigate-10 (Sunny Multigate)

Target Group

This document is intended for qualified persons. Only qualified persons are allowed to perform the tasks described in this manual (see Section 2.2 "Skills of Qualified Persons", page 10).

Additional Information

Links to additional information can be found at www.SMA-Solar.com:

Document Title	Document Type
Micro Inverters in Sunny Portal	User Manual
Sunny Explorer	User Manual
Circuit Breaker	Technical Information
Measured Values and Parameters	Technical Information
Criteria for Selecting a Residual-Current Device	Technical Information
Application for SMA Grid Guard Code	Certificate

Symbols

Symbol	Explanation
⚠ **DANGER**	Indicates a hazardous situation which, if not avoided, will result in death or serious injury
⚠ WARNING	Indicates a hazardous situation which, if not avoided, can result in death or serious injury
⚠ CAUTION	Indicates a hazardous situation which, if not avoided, can result in minor or moderate injury
NOTICE	Indicates a situation which, if not avoided, can result in property damage
i	Information that is important for a specific topic or goal, but is not safety-relevant
☐	Indicates a requirement for meeting a specific goal
☑	Desired result
✖	A problem that could occur

Nomenclature

Complete designation	Designation in this document
Sunny Boy	Inverter, micro inverter, product
Sunny Multigate	Product
SMA Speedwire	Speedwire
Torque	Torque
Inverter which is located at the beginning of the PV system and directly connected to the Sunny Multigate via the AC cable and the AC field plug	First inverter
Inverter which is located at the end of the PV system and not directly connected to the Sunny Multigate	Last inverter
Industrial enclosure, sub-distribution, switch cabinet or meter box	Distribution box

2 Safety

2.1 Intended Use

Sunny Boy 240

The Sunny Boy is a micro inverter for PV systems that converts the direct current from a PV module into grid-compliant alternating current. The alternating current generated is fed into the utility grid via the Sunny Multigate.

The product is suitable for indoor and outdoor use.

The Sunny Boy must only be connected to one PV module. The PV module used must comply with protection class II as per IEC 61730, application class A and must be compatible for use with the Sunny Boy. The Sunny Boy must be operated with the Sunny Multigate.

All components must remain within their permitted operating ranges at all times.

The product must only be used in countries for which it is approved or released by SMA Solar Technology AG and the grid operator.

Use this product only in accordance with the enclosed documentation and with the local standards and directives. Any other application may cause injury to persons or lead to property damage.

For safety reasons, it is forbidden to modify the product or install components that are not explicitly recommended or distributed by SMA Solar Technology AG for this product. Unauthorized modifications and installations will void all warranty claims.

Any use of the product other than that described in the Intended Use section does not qualify as appropriate.

The enclosed documentation is an integral part of this product. Keep the documentation in a convenient place for future reference and observe the instructions.

The type label must be permanently attached to the product.

- Do not connect any loads between the Sunny Boy and the Sunny Multigate.
- Do not connect any loads between the individual Sunny Boy inverters.
- Do not open the lid of the Sunny Boy.
- Only mount the Sunny Boy on the framework mounted on the roof directly under the PV modules or on the wall.
- Do not mount the Sunny Boy directly on the module frame.
- Do not mount the Sunny Boy on flammable construction materials.
- Do not mount the Sunny Boy in areas containing highly flammable materials.
- Do not mount the Sunny Boy in potentially explosive atmospheres.

Sunny Multigate

The Sunny Multigate is a communication unit and forms the electrical connection point of the PV system with a maximum of twelve micro inverters to the utility grid. The Sunny Multigate is equipped with an integrated disconnection point for grid monitoring. The Sunny Multigate is connected between the micro inverters and the utility grid to feed the alternating current of the micro inverters collectively into the utility grid.

The product is designed for indoor use only.

The Sunny Multigate must be installed and operated in a distribution box.

All components must remain within their permitted operating ranges at all times.

The product must only be used in countries for which it is approved or released by SMA Solar Technology AG and the grid operator.

Use this product only in accordance with the enclosed documentation and with the local standards and directives. Any other application may cause injury to persons or lead to property damage.

For safety reasons, it is forbidden to modify the product or install components that are not explicitly recommended or distributed by SMA Solar Technology AG for this product. Unauthorized modifications and installations will void all warranty claims.

Any use of the product other than that described in the Intended Use section does not qualify as appropriate.

The enclosed documentation is an integral part of this product. Keep the documentation in a convenient place for future reference and observe the instructions.

The type label must be permanently attached to the product.

- A maximum of twelve micro inverters can be connected to the Sunny Multigate.
- No loads must be connected between the Sunny Boy and the Sunny Multigate.
- No loads must be connected between the Sunny Multigate and the circuit breaker.
- The grounding conductor of the AC cable from the inverter must be connected to the Sunny Multigate.
- The grounding conductor of the Sunny Multigate must be connected to the equipotential bonding of the AC distribution board.
- The Sunny Multigate must not be opened.

2.2 Skills of Qualified Persons

The tasks described in this document may only be performed by qualified persons. Qualified persons must have the following skills:

- Knowledge of how an inverter works and is operated
- Training in how to deal with the dangers and risks associated with installing and using electrical devices and systems
- Training in the installation and commissioning of electrical devices and systems
- Knowledge of the applicable standards and directives
- Knowledge of and adherence to this document and all safety precautions

2.3 Safety Precautions

This section contains safety precautions that must be observed at all times when working on or with the product.

To prevent personal injury or property damage and to ensure long-term operation of the product, read this section carefully and follow all safety precautions at all times.

⚠ DANGER

Risk of electric shock due to ground fault

If a ground fault occurs, parts of the system may still be live. Touching live components can lead to lethal electric shocks.

- Prior to touching any components, always disconnect the inverter from any voltage sources as described in this document (see Section 9, page 49).
- Prior to touching any components, always disconnect the Sunny Multigate from any voltage sources as described in this document (see Section 10, page 51).

⚠ DANGER

Risk of electric shock due to damaged devices

Operating a damaged inverter or Sunny Multigate can lead to hazardous situations that result in lethal electric shocks.

- Only operate the inverter and the Sunny Multigate provided that they are in safe and full working order.
- Regularly check for visible damage.

⚠ WARNING

Risk of burns from hot surfaces

The surfaces of the inverter and the Sunny Multigate can get very hot. Touching the surface can result in burns.

- Mount the inverter in such a way that it cannot be touched inadvertently.
- Do not touch hot surfaces.
- Wait ten minutes for the surface to cool sufficiently before performing any work on the inverter.
- Observe the safety messages on the inverter and the Sunny Multigate.

NOTICE

Damage to the inverter due to moisture and dust intrusion

Dust or moisture intrusion can damage the inverter and impair its functionality.

- Seal all inverter pin connectors with the appropriate plugs or protective caps.

NOTICE

Damage to the Sunny Multigate type label due to the use of cleaning agents

- If the Sunny Multigate is dirty or dusty, you can clean the enclosure, the ventilation slots, the type label, and the LEDs. Prior to cleaning it, disconnect the Sunny Multigate from voltage sources (see Section 10, page 51). Then you can clean the Sunny Multigate with a dry brush.

NOTICE

Damage to the inverter type label due to the use of cleaning agents

- If the inverter is dirty, you can clean the enclosure, the enclosure lid, and the type label using only water and a cloth.

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3 Scope of Delivery

Check the scope of delivery for completeness and any visible damage. Contact your distributor if the delivery is incomplete or damaged.

Sunny Boy
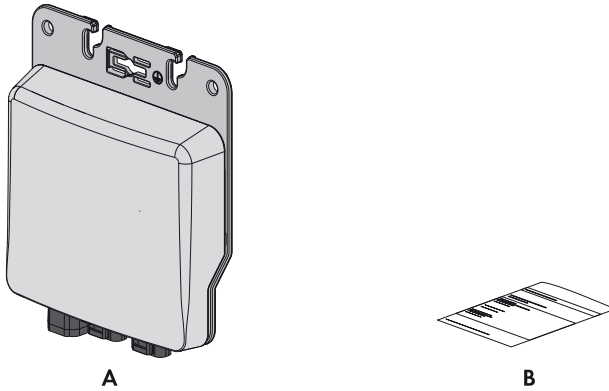
Figure 1:   Components included in the scope of delivery of the inverter

Item	Quantity	Designation
A	1	Inverter
B	1	Supplementary sheet for Sunny Boy

Sunny Multigate
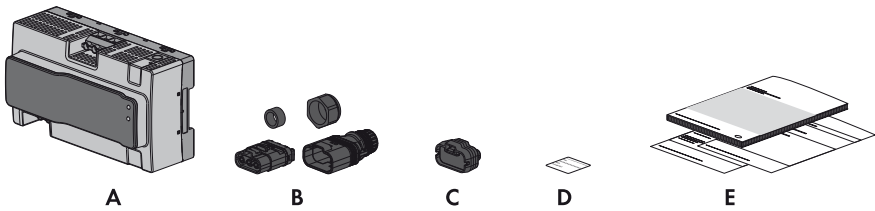
Figure 2:   Elements included in the scope of delivery of the Sunny Multigate

Item	Quantity	Designation
A	1	Sunny Multigate
B	1	AC field plug: insulator, plug enclosure, seal, screw connection
C	1	Protective cap for unused AC pin connector on the last inverter*
D	1	Label with registration ID (RID) and identification key (PIC) for registration in Sunny Portal**
E	1	Installation manual for Sunny Boy and Sunny Multigate, mounting overview, supplementary sheet with default settings

* Last inverter: The inverter that is located at the end of the PV system and not directly connected to the Sunny Multigate but only to one other inverter, is called the "last inverter" in this document. An AC pin connector remains unused on the last inverter and must be closed with a protective cap.

** Keep this label with your access data for registration in Sunny Portal. The access data can be found on the Sunny Multigate type label.

AC Cable and DC Plug

| A | B |

Figure 3:   Components included in the scope of delivery of the AC cable and the DC plug

Item	Quantity	Designation
A	1	AC cable with two connectors for connecting two inverters or for connecting the first inverter* with the AC field plug
B	1	DC plug with two DC connectors**

* First inverter: The inverter that is located at the beginning of the PV system and is directly connected to the Sunny Multigate via the AC cable is called "first inverter" in this document.

** The DC connectors illustrated may deviate from your order.

4 Product Description

4.1 Sunny Boy

The Sunny Boy is a micro inverter for PV systems that converts the direct current from a PV module into grid-compliant alternating current. The alternating current generated is fed into the utility grid via the Sunny Multigate.

The DC plug has the function of a DC load-break switch.

Symbols on the Inverter and the DC Plug

Symbol	Explanation
⏚	Grounding conductor
	This symbol indicates the position for the grounding conductor connection.
—⌀—	DC load-break switch
	The DC plug has the function of a DC load-break switch.

4.2 Sunny Multigate

The Sunny Multigate is a communication unit and forms the electrical connection point of the PV system with a maximum of twelve micro inverters to the utility grid. The Sunny Multigate is equipped with an integrated disconnection point for grid monitoring. The Sunny Multigate is connected between the micro inverters and the utility grid to feed the alternating current of the micro inverters collectively into the utility grid.
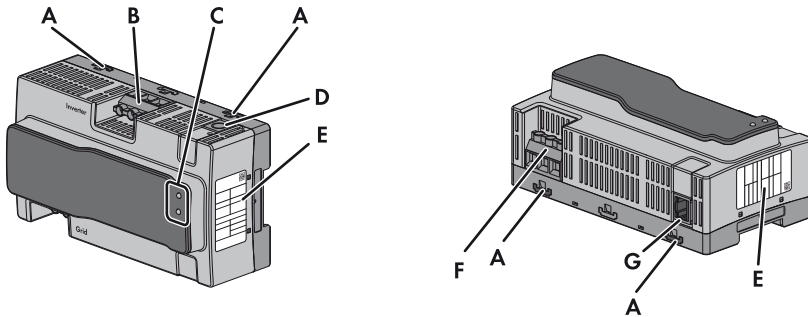
Figure 4:   Design of the Sunny Multigate

Item	Designation
A	Press-out brackets for mounting with screws
B	Screw terminal for AC input (inverter)
	Labeling: Inverter
C	LEDs
	The upper LED indicates the operating state of the inverter. The lower LED indicates the operating state of the Sunny Multigate. Depending on the operating state, the LEDs are glowing green, red or orange, or are off (see Section 11.1 "LED Signals on the Sunny Multigate", page 52).
D	Interface for optional communication
E	Type label
F	Screw terminal for AC output (utility grid)
	Labeling: Grid
G	Pin connector for connecting the network cable (RJ45)

4.3 Type Labels and Stickers

Sunny Boy

The type label uniquely identifies the inverter. The type label is located on the right-hand side of the enclosure. You will find the following information on the type label:

- Device type (Model)
- Serial number (Serial No.)
- Date of manufacture
- Device-specific characteristics

You will require the information on the type label to use the product safely and when seeking customer support from the SMA Service Line.

Label with Inverter Serial Number

A type label with the serial number of the inverter is located at the rear of the Sunny Boy. This label is detachable. To enable clear identification of the inverters of a PV system, e.g. under fault conditions, this label can be applied to the enclosed mounting overview.

Sunny Multigate

The type label provides a clear identification of the Sunny Multigate. The type label is located on the right-hand side of the enclosure. You will find the following information on the type label:

- Device type (Model)
- Serial number (Serial No.)
- Registration ID (RID) for registration in Sunny Portal
- Identification key (PIC) for registration in Sunny Portal
- Device-specific characteristics

You will require the information on the type label to use the product safely and when seeking customer support from the SMA Service Line.

Symbols on the Type Labels

Symbol	Explanation
⚠	Danger to life due to high voltages The product operates at high voltages. All work on the product must be carried out by qualified persons only.
⚠	Risk of burns from hot surfaces The product can get hot during operation. Avoid contact during operation. Allow the product to cool down sufficiently before carrying out any work. Wear personal protective equipment such as safety gloves.
📖	Observe the documentation. Observe all the documentation supplied with the product.
CE	CE marking The product complies with the requirements of the applicable EU directives.
VDE	VDE certification mark The product was tested by VDE and conforms with the current safety and health requirements.
VDE GS	Certified safety The product was tested by VDE and conforms with the current safety and health requirements.

4.4   Communication

Communication between Inverter and Sunny Multigate

The inverter is connected to the Sunny Multigate via the AC cable. The communication and data transmission between the Sunny Multigate and the inverters takes place via a Powerline interface.

Communication between Sunny Multigate and Other Communication Products
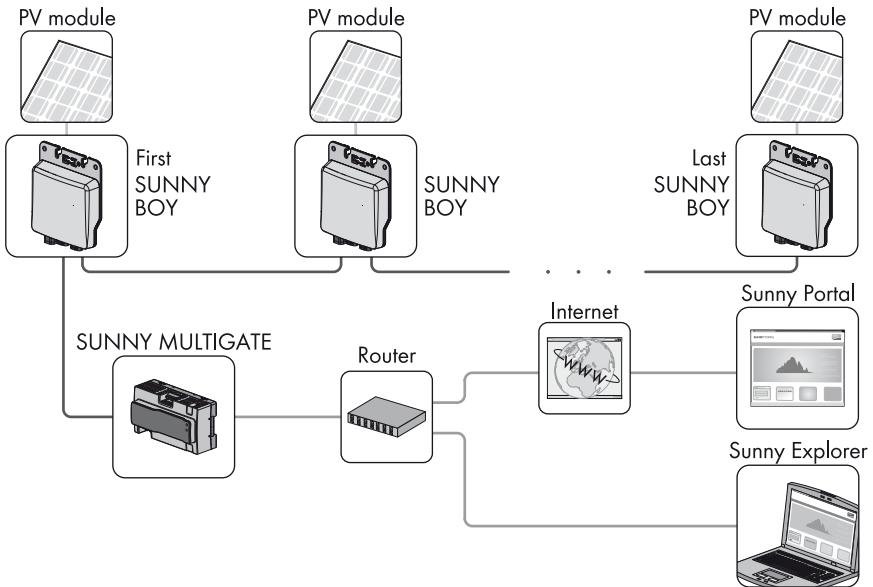
Figure 5:   Example of a PV system with micro inverters and Sunny Multigate with communication via Speedwire/Webconnect

Communication between the Sunny Multigate and other SMA communication products (e.g. Sunny Explorer, Sunny Portal) takes place via Speedwire/Webconnect. Speedwire is a type of communication based on Ethernet. You can connect the Sunny Multigate to your network via Speedwire. Webconnect enables data exchange between Sunny Multigate and Sunny Portal. In order to establish a connection to Sunny Portal, the Sunny Multigate must be connected to a router or modem with Internet connection and be integrated into the local network. To enable data exchange between Sunny Multigate and Sunny Portal, you must register the PV system in Sunny Portal (see Section 8.3, page 46). If you do not want to use the Webconnect function, you can deactivate it in Sunny Explorer (see Section 8.7, page 48).

5 Mounting

5.1 Requirements for Mounting the Inverter

Requirements for the mounting location:

⚠ WARNING

Danger to life due to fire or explosion

Despite careful construction, electrical devices can cause fire.

- Do not mount the product in areas containing highly flammable materials.
- Do not mount the product in potentially explosive atmospheres.

☐ The mounting location must be inaccessible to children.

☐ A solid support surface must be available for mounting, e.g. concrete or masonry or frame construction underneath the PV modules. In living areas, make sure that the support surface is not made of drywall or similar. When in use, the inverter makes noises which can be perceived as a nuisance.

☐ When mounting on the framework, the mounting position should preferably be in the center of the PV module. This will ensure a longer electrical endurance of the inverter.

☐ The mounting location must be suitable for the weight and dimensions of the inverter (see Section 13 "Technical Data", page 66).

☐ The mounting location should not be exposed to direct solar irradiation. Direct solar irradiation can increase the operating temperature of the inverter. As a result, the inverter reduces its power output.

☐ The ambient temperature must be between − 40°C and +65°C. This ensures optimal operation of the inverter.

Dimensions for mounting:
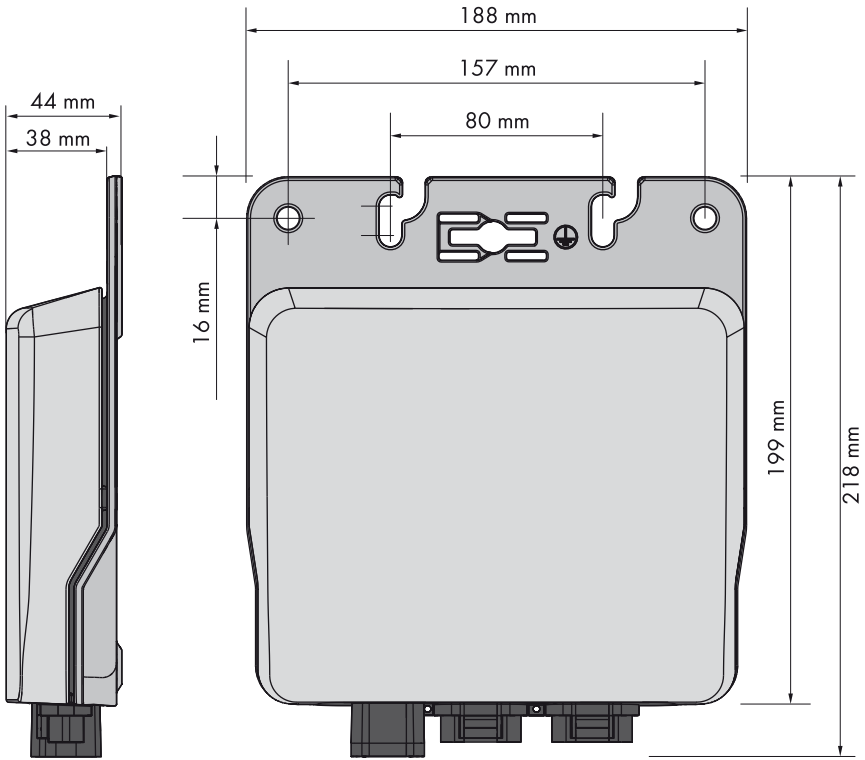
Figure 6: Dimensions of the inverter and the drill holes for mounting

Recommended clearances:

☐ When using an AC cable of 1.40 m: min. 50 mm to max. 1.10 m

☐ When using an AC cable of 2.0 m: min. 50 mm to max. 1.70 m

☐ Using the AC field plug allows for greater distances between two inverters (see Section 6.6.1 "Assembling the AC Field Plug", page 34).

☐ Observe recommended clearances to the inverters or other objects.

mind. 50 mm
max. 1,100 mm or 1,700 mm
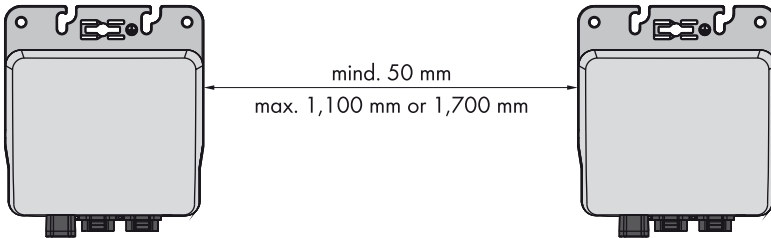
Figure 7: Recommended clearances with AC cable

Minimum Clearance between Inverter and PV Module Bottom Side:

NOTICE

Damage to the PV module due to insufficient clearance between the inverter and the PV module bottom side

If you have to ground the enclosure, allow for a minimum clearance from the inverter to the bottom side of the PV module, if necessary.

Permitted Mounting Position:

⚠ DANGER

Risk of electric shock due to ingress of moisture

During mounting, make sure that the connection area of the inverter remains dry.
As soon as the connector and protective cap are plugged in, the connection area will be protected from moisture ingress. Thus, the inverter complies with degree of protection IP65.

5.2   Mounting the Inverter

5.2.1   Mounting the Inverter on the Roof

⚠ WARNING

Risk of falling when working on the roof

There is a risk of falling or slipping when working on the rooftop. Observe the applicable accident prevention regulations for work on rooftops.

- Before stepping on the rooftop, ensure the load bearing capacity of all parts subjected to load.
- In accordance with the accident prevention regulations, a safety harness must be worn or a safety scaffold must be used.
- Use a fall protection.

When mounting the inverter on the roof underneath the PV modules, proceed as follows.

You can mount the inverter with the back panel or with the enclosure lid to the roof. SMA Solar Technology AG recommends mounting the inverter with the enclosure lid to the roof. This will allow for better heat dissipation. Observe the minimum clearance of the inverter to the PV module.

ℹ   Information on the illustrations in this section

The figures show the recommended mounting option for the inverter with the lid to the roof. The procedure for mounting the inverter with the back panel to the support surface is identical and is not depicted in the figures in this section.

ℹ   Position of the inverter

In order to ensure optimum operation and long electrical endurance of the inverter, install each inverter under the center of the respective junction box of the PV module.

Additionally required mounting material (not included in the scope of delivery):

☐   The required fastening material must be selected according to the profile rail used.

☐   The mounting material must be made of stainless steel.

☐   Diameter of the screws: max. 8 mm

NOTICE

Damage to the PV module due to screws being too long

The length of the screws must be suitable for the clearance between the inverter and the PV module bottom side.

- Make sure that the PV module is not damaged by the screws being used.

There are several options for attaching the inverter to the framework on the roof. In the following example, mounting with T-head bolts is described.

Procedure:

1. Keep the supplied mounting overview at hand for the allocation of the inverters to the PV modules.

2. In case the connection area points upwards during mounting, make sure to protect the plugs and pin connectors against ingress of moisture.

3. Remove the label with the inverter serial number from the inverter and attach it to the corresponding position in the mounting overview included in the delivery.

4. Insert the T-head bolts into the profile rail and turn by 90°. This will firmly anchor the screws in the profile rail.
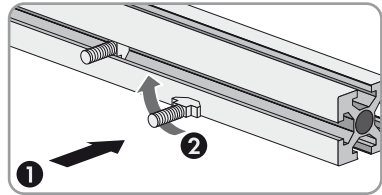
5. Position the inverter on the anchored screws. Insert the screws into the oblong holes in the enclosure as far as the required fastening point.
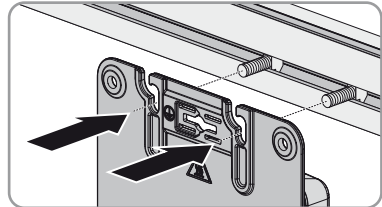
6. Attach the inverter using suitable washers and nuts.
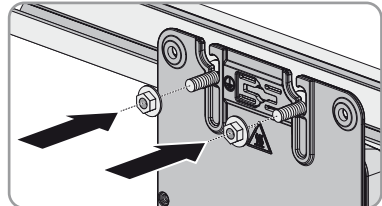
7. Ensure that the inverter is securely in place.

5.2.2   Mounting the Inverter on the Wall

To mount the inverter on the wall, proceed as follows.

Additionally required mounting material (not included in the scope of delivery):

☐ The mounting material must be made of stainless steel.

☐ Two screws suitable for the support surface

☐ Two washers suitable for the screws

☐ Two screw anchors suitable for the support surface and the screws

Procedure:

1. **⚠ WARNING**

   Risk of electric shock if electric cables and other supply lines are damaged by drilling
   • Before drilling, ensure that there are no electric cables and supply lines in the wall that could be damaged.

2. Mark the position of the drill holes using the holes in the enclosure. For this, use the two outer holes or the two oblong holes in the middle.

3. Drill the holes and insert the screw anchors.

4. Align the inverter with the drill holes and attach it using suitable screws and washers.
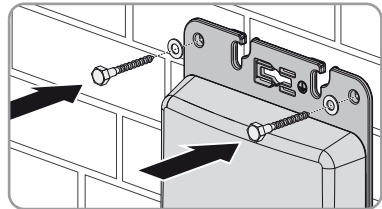
5.3   Grounding the Inverter Enclosure

If a second grounding conductor or equipotential bonding is locally required, you can also ground the inverter enclosure. This prevents touch current if the original grounding conductor fails.

You can ground each inverter separately or connect several inverters with one another.

Procedure:

- Connect the grounding conductor to the equipotential bonding of the AC distribution board.

5.4   Requirements for Mounting of the Sunny Multigate

⚠ WARNING

Danger to life due to fire or explosion

Despite careful construction, electrical devices can cause fire.

- Do not mount the product in areas containing highly flammable materials.
- Do not mount the product in potentially explosive atmospheres.

⚠ WARNING

Danger of fire due to missing external enclosure

The Sunny Multigate is only protected against fire if it is installed in a distribution box. Otherwise, the fire risk could lead to personal injury and property damage.

- Only mount the Sunny Multigate in a distribution box.

NOTICE

Damage to the Sunny Multigate from moisture and dust intrusion

Dust or moisture intrusion can damage the Sunny Multigate and impair its functionality. The Sunny Multigate complies with degree of protection IP20 and must always be installed in a distribution box. This ensures that the Sunny Multigate is protected against dust and moisture.

- Only mount the Sunny Multigate in a distribution box.

☐ The mounting location must be inaccessible to children.

☐ The mounting location must be suitable for the installation of the Sunny Multigate in a distribution box.

☐ AC cable route of the entire PV system with Sunny Multigate: maximum 30 m.
   If you are installing several Sunny Multigate devices in a PV system, the AC cable of each Sunny Multigate to the respective inverters must be laid separated from each other in order to guarantee trouble-free communication between the Sunny Multigate and the inverter.
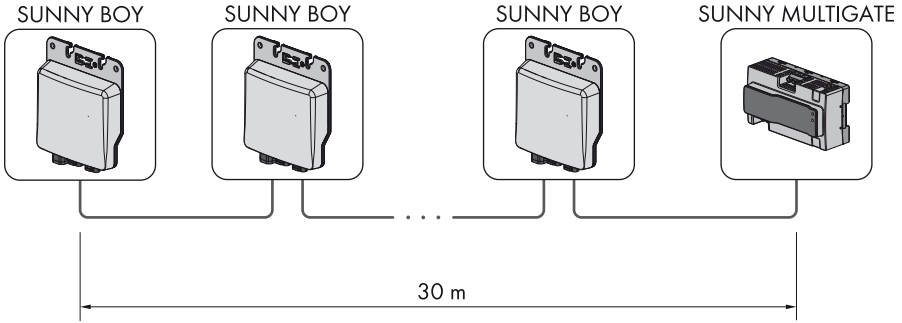
Figure 8:   Maximum AC cable route of the PV system (left: last inverter; right: first inverter connected to Sunny Multigate).

☐ A robust support surface must be available for mounting the device, e.g. concrete, walls.
    In living areas, make sure that the support surface is not made of drywall or similar.

☐ The mounting location must be suitable for the weight and dimensions of the Sunny Multigate
    (see Section 13 "Technical Data", page 66).

☐ The mounting location should be clear and safely accessible at all times without the need for
    any auxiliary equipment (such as scaffolding or lifting platforms). Non-fulfillment of these criteria
    may restrict servicing.

☐ The mounting location should not be exposed to direct solar irradiation.

☐ Climatic conditions must be met (see Section 13 "Technical Data", page 66).

☐ The ambient temperature must be between − 40°C and +45°C. This will ensure optimal
    operation of the Sunny Multigate.

Dimensions for mounting with screws:
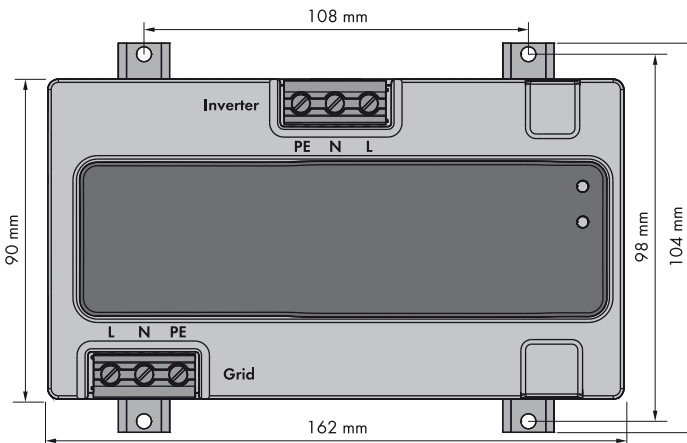
Figure 9:   Dimensions of the Sunny Multigate and the drill holes for mounting with screws

Minimum clearances when mounting in a metal distribution box:

☐ The minimum clearance inside the metal distribution box must be 12.7 mm to all walls.

Recommended clearances:

☐ Observe the recommended clearances within the distribution box.
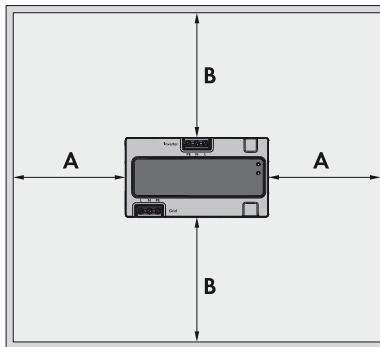
A = 98 mm   B = 150 mm

Permitted mounting positions:

☐ Only mount the Sunny Multigate horizontally on the wall or on the top-hat rail inside the distribution box.

5.5 Mounting the Sunny Multigate

Mounting Options

- Mounting on top-hat rail
- Mounting with screws at the brackets

Additionally required mounting material (not included in the scope of delivery):

☐ Distribution box complying with the installation site requirements according to degree of protection IP20

☐ For mounting on top-hat rail: top-hat rail (DIN rail) suitable for the distribution box, if necessary. Width: 35 mm, length: 235 mm

☐ When mounting with press-out brackets: four screws suitable for the size of the brackets and for the material of the distribution box. The maximum permissible height of the screw head of 6 mm must not be exceeded.

Mounting on top-hat rail

1. For mounting on a top-hat rail, attach the
   Sunny Multigate to the top-hat rail from above,
   and hook it in.
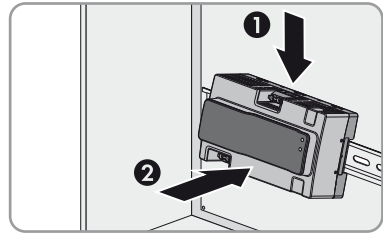
☑ The Sunny Multigate snaps audibly into place.

2. Ensure that the Sunny Multigate is securely in place.

Mounting with Screws

1. For mounting with screws, use the four brackets on the rear panel of the Sunny Multigate.

2. **⚠ WARNING**

   Danger to life due to electric shock

   If screws or conductors on the connecting terminal plate are touched, there is a risk of electric shock.

   - To avoid contact with screws or conductors, only use screws with a maximum head height 6 mm for mounting on the brackets.

3. Press the brackets out from the inside.
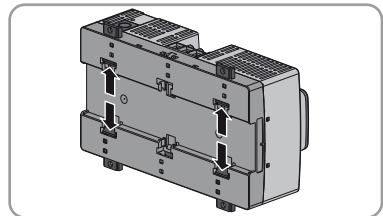
☑ The brackets snap audibly into place.

4. Mark the drill holes using the brackets as a template.

5. Drill the holes.

6. Insert screws with a maximum head height of
   6 mm through the brackets and tighten.
   Make sure not to damage the brackets.
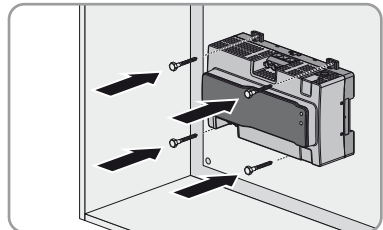
7. Ensure that the Sunny Multigate is securely in place.

6 Electrical Connection

6.1 Safety during Electrical Connection

⚠ DANGER

Risk of electric shock due to contact with live components when opening the Sunny Multigate

There are live components inside the Sunny Multigate. There is a risk of electric shock if you open the Sunny Multigate.

- **Never** open the Sunny Multigate.

NOTICE

Damage to the inverter due to moisture ingress

When the inverter is open, moisture can penetrate and cause damage to the inverter. The inverter is no longer water-tight and its function may be impaired.

- **Never** open the inverter.

6.2 Connection Areas

6.2.1 Sunny Boy

View from Below
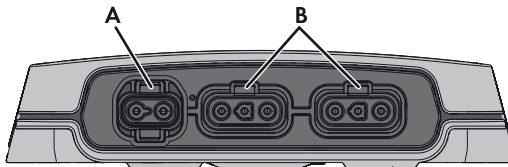
Figure 10:   Connection areas at the bottom of the inverter

Item	Designation	Explanation
A	DC pin connector	Terminal for the DC plug
B	AC pin connector	• For AC cable connection for connecting two inverters • For connecting the first inverter to the Sunny Multigate • For inserting the protective cap on the last inverter*

* The unused AC pin connector must be sealed in some countries. The protective caps must be plugged into the middle AC pin connector since it is the only one having eyelets for sealing.

6.2.2   Sunny Multigate
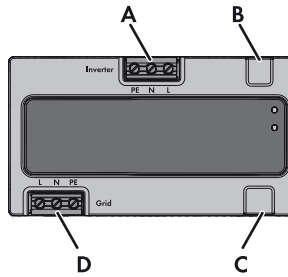
Figure 11:   Connection areas on the Sunny Multigate

Item	Designation
A	Connecting terminal plate for the connection of the AC cable of the inverter, labeling: **Inverter**
B	Pin connector for connecting the optional communication
C	Pin connector for connecting the network cable (RJ45)
D	Connecting terminal plate for the connection of the AC cable of the utility grid, labeling: **Grid**

6.3   Connecting the AC Cable to the Inverters
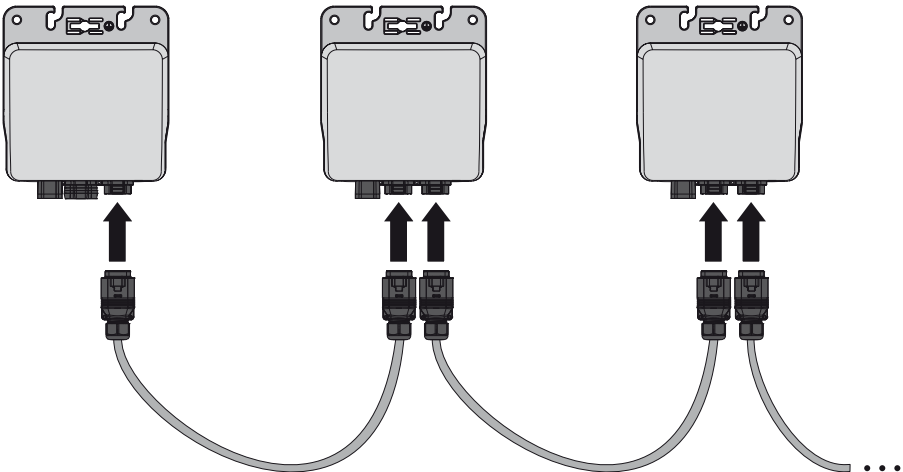
Figure 12:   AC cabling among the inverters (left = last inverter; right = first inverter)

Requirements:

☐ For fusing purposes, use at maximum a 16 A circuit breaker.

☐ No loads must be connected between the individual inverters.

☐ For the AC cable connection to the Sunny Boy, only use the AC cable recommended by SMA Solar Technology AG (see Section 14 "Accessories", page 72).

☐ If the unused AC pin connector of an inverter needs to be sealed, make sure that the AC cable of the last inverter in the PV system is plugged into the outer AC pin connector. Only the middle AC pin connector can be used for sealing since it is the only one having eyelets for sealing.

Procedure:

1.   **⚠ DANGER**

   Danger to life due to electric shock

   Do not disconnect the AC connectors under load.

   • Ensure that the circuit breaker is switched off and ensure that it cannot be reconnected.

   • Ensure that the PV modules are covered.

2. Plug one end of the supplied AC cable into the outer AC pin connector of the last inverter of the PV system.
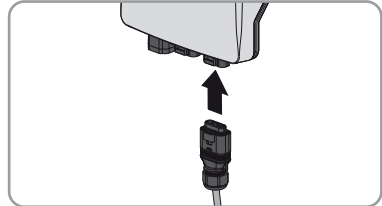
   ☑ The plug snaps audibly into place.
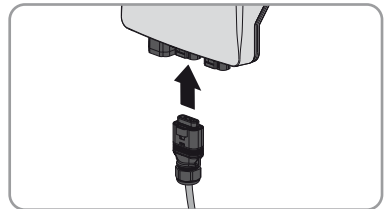
3. Plug the protective cap into the middle AC pin connector of the last inverter. Seal the protective cap, if necessary. Only the middle AC pin connector has eyelets for sealing.
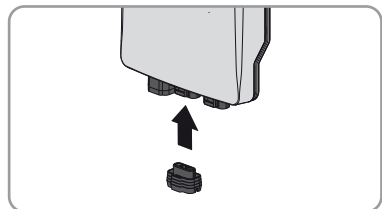
   ☑ The protective cap snaps audibly into place.

4. Plug the other end of the AC cable into the middle AC pin connector of the next inverter.

   ☑ The plug snaps audibly into place.

5. Ensure that the AC connector and the protective cap in the inverter pin connectors are securely in place.

6. Connect the free end of the AC cable of the first inverter to the AC field plug (see Section 6.6 "Option 1: AC Cabling with AC Field Plug", page 34).

7. To allow for greater distances between two inverters, use the AC field plug (see Section 6.6 "Option 1: AC Cabling with AC Field Plug", page 34).

8. Connecting the PV Module to the Inverter (see Section 6.4, page 32).

6.4   Connecting the PV Module to the Inverter

Only connect one PV module to each inverter in accordance with the following procedure.

Requirements:

☐ Each inverter must be connected to no more than one PV module.

☐ The limiting values for the input voltage and the input current of the inverter must be observed.

☐ The positive connection cable (DC+) of the PV module must be fitted with a positive DC connector suitable for the DC connector of the inverter.

☐ The negative connection cable (DC −) of the PV module must be fitted with a negative DC connector suitable for the DC connector of the inverter.

Procedure:

1.   **⚠ DANGER**

   Danger to life due to electric shock

   Do not disconnect the AC connector under load.

   • Ensure that the circuit breaker is switched off and ensure that it cannot be reconnected.

   • Ensure that the PV module is covered.

2. Check the PV module for ground faults (see Section 11.3, page 64).

3. Check the DC connectors of the PV module for correct polarity and connect to the DC connectors of the supplied DC plug. Tip: for correct assignment, the DC plug is marked with + and −.

   ☑ The DC connectors snap into place.

4. Ensure that the DC connectors are securely in place.

5. Insert the DC plug with the DC connectors into the outer pin connector on the inverter.
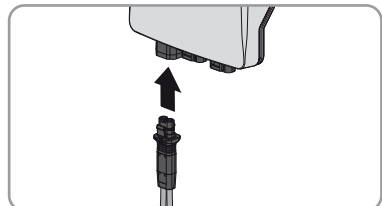
6. Connect the first inverter of the PV system to the Sunny Multigate (see Section 6.8, page 39).

6.5   AC Cabling from Inverter to Sunny Multigate

You have the option of implementing the AC cabling from the inverter to the Sunny Multigate using either the supplied AC field plug or a junction box with integrated feed-through terminal.

Option 1
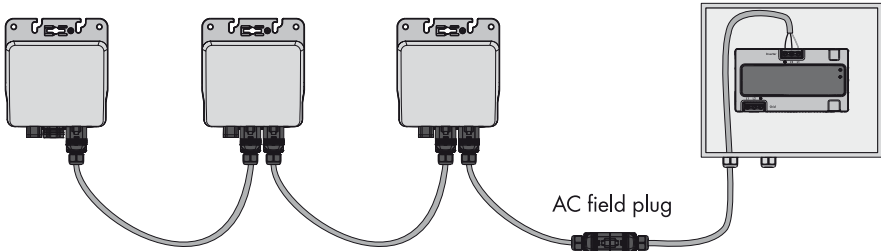
Figure 13:   AC cabling of the entire PV system with AC field plug

Option 2
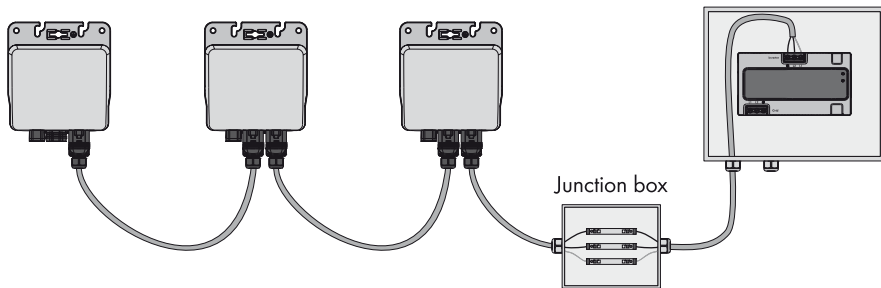
Figure 14:   AC cabling of the entire PV system with junction box (example)

6.6 Option 1: AC Cabling with AC Field Plug

6.6.1 Assembling the AC Field Plug

The AC cable with the two connectors is used to connect the inverters among each other for a distance of a maximum of 1.70 meters. To allow for greater distances between two inverters or to connect the inverter with the Sunny Multigate, you will need the enclosed AC field plug.

Overview
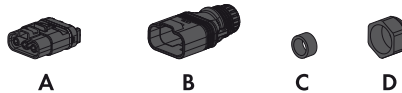
Figure 15:   Elements of the AC field plug

Item	Designation
A	Insulator
B	Plug enclosure
C	Seal
D	Screw connection

Additionally required material (not included in the scope of delivery):

☐ Three bootlace ferrules: 2.5 mm²

☐ Cable shears: 165 mm

☐ Stripping knife with straight knife blade: 8 mm to 28 mm

☐ Insulation stripping tool: up to 10 mm²

☐ Crimping tool for bootlace ferrules: up to 10 mm²

☐ Torque screwdriver: 0.3 Nm to 1.2 Nm

☐ Cross-head screwdriver Pozidriv – Bit, 1.4" or BiTorsion, 1/25mm

☐ Torque wrench, scale adjustable, 2 Nm to 20 Nm

☐ Crow-Ring wrench, AF 25

☐ Square insertion tool, outer square: 203 mm , inner square: 9x12

☐ Screwdriver: insulated, blade width: 4 mm, blade thickness 0.8 mm

Cable requirements:

☐ Cable cross-section: 2.5 mm²

☐ Cable type: PV cable, Nexans 269 Photovoltaic Energyflex PV07AC-F BW 3 G 2.5 mm² 450/750 V

☐ Temperature resistant up to +90°C

☐ External diameter of the cable sheath: 9.6 mm to 10 mm

☐ Number of stranded wires: 46

☐ Cable type: copper wire, tin-plated

☐ Wire cross-section: 0.25 mm²

⚠ DANGER

Danger to life due to electric shock

- Do not disconnect or connect the AC field plug under load.
- Only assemble the AC field plug in a dry environment.
- Observe the operating temperature range of − 40°C to +85°C.

Always assemble the AC field plug as follows in the prescribed order:

Assembling the Cable

1. Shorten the cable to the desired length using cable shears.
2. Dismantle the cable by 42 mm using the stripping knife. Take care not to damage the individual insulated conductors.
   - The grounding conductor must be 42 mm long. The grounding conductor must be approximately 7 mm longer than L and N.
   - L and N must each be 35 mm long.
3. Using the insulation stripping tool, strip the insulation of the three individual conductors each by 10 mm (tolerance: ± 1 mm). Take care not to damage the individual stranded wires.

   ☑ The cable is assembled.
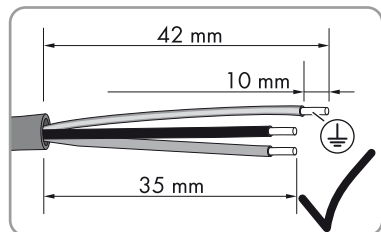
4. Push one bootlace ferrule onto each stripped insulated conductor up to the stop.
5. Crimp the bootlace ferrule tightly using a crimping tool.
6. Ensure that a crimping length of max. 2.4 mm is maintained.

Premounting the AC Field Plug

1. Slide the screw connection over the cable with the bootlace ferrules. Ensure that the thread of the screw connection is facing the bootlace ferrule.
2. Use your fingers to push the seal as far as possible into the plug enclosure.
3. Lead the plug enclosure with the seal over the cable. The thread must be facing the thread of the screw connection.

Mounting the Insulator

1. Push the stranded wires with the bootlace ferrules up to the stop in the premounted pin connectors inside the insulator. The line conductor must be plugged into pin connector **L**, the neutral conductor into pin connector **N** and the grounding conductor into the pin connector with the symbol ⏚ .

   ☑ The bootlace ferrules are no longer visible.

2. Tighten the three screws in the insulator using a screwdriver (torque: 0.8 Nm).

3. Ensure that the individual conductors are positioned securely in the correct pin connectors of the insulator.

Completing Mounting of the AC Field Plug

1. Push the plug enclosure onto the insulator.

   ☑ Both parts snap audibly together. The catch mechanism on the insulator and on the plug enclosure must be correctly aligned.

2. Tighten the screw connection of the plug enclosure using a torque wrench and then tighten it with two different torques:

   • First tighten the screw connection with a torque of 3.3 Nm. Set the value 3.0 Nm at the scale of the torque wrench specified by SMA Solar Technology AG.

   • Then tighten the screw connection with a torque of 4.4 Nm. Set the value 4.0 Nm at the scale of the torque wrench specified by SMA Solar Technology AG.

   Tip: the indicated torque only applies to the torque wrench specified by SMA Solar Technology AG. The value to be set on the torque wrench is lower than the actual value (for more information on the calculation of the torque to be set, go to www.stahlwille.com). A torque wrench consists of the following components: torque wrench (basic device), square insertion tool and crow's foot wrench.

3. Make sure that the screw connection of the plug enclosure is securely fastened.

6.6.2   Removing and Reassembling the AC Field Plug

i **Removing and reassembling the AC field plug is only possible within 72 hours**

- In total, the AC field plug may at maximum be removed three times and only within the first 72 hours after the first assembly.
- After the period of 72 hours has expired, the AC field plug must not be removed.
- The cable must be shortened again before each assembly.

Procedure:

1. **⚠ DANGER**

    Danger to life due to electric shock

    Do not disconnect the AC field plug under load.

    - Ensure that the circuit breaker is switched off and ensure that it cannot be reconnected.
    - Ensure that the PV modules are covered.

2. Disconnect the AC field plug from the AC cable of the inverter (see Section 6.6.4, page 38).

3. Loosen the screw connection of the plug enclosure.

4. Remove the seal from the opening of the thread. Make sure not to damage the fins of the plug enclosure.

5. Detach the plug enclosure from the insulator. To do this, insert a flat-blade screwdriver (blade width: 4 mm) into the small slot of the plug enclosure and unlock the fastening clamps until the insulator is detached from the plug enclosure.
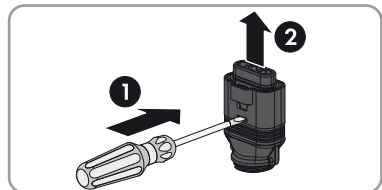
6. Loosen all three screws using a screwdriver and remove the conductors.

7. Shorten the cable and reassemble the AC field plug (see Section 6.6.1, page 34).

6.6.3   Connecting the AC Field Plug to the AC Cable of the Inverter

1. ⚠ **DANGER**

    Danger to life due to electric shock

    Do not connect the AC field plug under load.

    - Ensure that the circuit breaker is switched off and ensure that it cannot be reconnected.
    - Ensure that the PV modules are covered.

2. Plug the free end of the AC cable connected to the inverter into the pin connector of the assembled AC field plug.
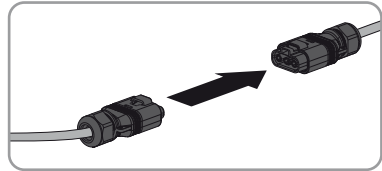
    ☑ The AC field plug snaps audibly into place. The catch mechanisms of both plugs must be correctly aligned.

6.6.4   Disconnecting the AC Field Plug from the Inverter AC Cable

1. ⚠ **DANGER**

    Danger to life due to electric shock

    Do not disconnect the AC field plug under load.

    - Ensure that the circuit breaker is switched off and ensure that it cannot be reconnected.
    - Ensure that the PV modules are covered.

2. Unlock and remove the AC field plug from the connector of the inverter AC cable. Hook a flat-blade screwdriver (blade width: 4 mm) into the wide slot at the AC field plug and lever it open. At the same time, pull out the AC connector.
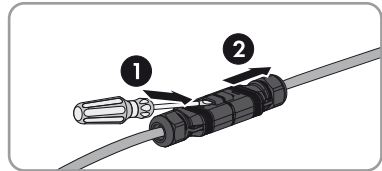
6.7   Option 2: AC Cabling with Junction Box

As an alternative to the AC field plug, you can use a junction box with feed-through terminal for the connection of the inverter AC cable to the Sunny Multigate. For the assembly and connection of the AC cable, follow the instructions of the junction box manufacturer.

Cable requirements:

☐ Cable cross-section: 2.5 mm²

☐ Cable type: PV cable, Nexans 269 Photovoltaic Energyflex PV07AC-F BW 3 G 2.5 mm² 450/750 V

☐ Temperature resistant up to +90°C

☐ External diameter of the cable sheath: 9.6 mm to 10 mm

☐ Number of stranded wires: 46

☐ Cable type: copper wire, tin-plated

☐ Wire cross-section: 0.25 mm²

6.8   Connecting the Inverter to the Sunny Multigate

Connect the free end of the AC cable coming from the AC field plug to the connecting terminal plate of the Sunny Multigate. The connecting terminal plate assigned for this is labeled **Inverter**.

Requirement:

☐ The Sunny Multigate must be correctly installed in the distribution box.

Cable requirements:

☐ Do not use shielded cables.

☐ Only use copper cables.

☐ Temperature resistant up to +90°C

☐ Only use cables with stranded wires: 1.5 mm² to 6.0 mm²

ℹ️ **Installation of several Sunny Multigate devices**

When installing several Sunny Multigate devices in a PV system, a three-wire cable with a grounding conductor each must be used per Sunny Multigate in order to guarantee trouble-free communication between the Sunny Multigate and the inverter.

Procedure:

1. **⚠ DANGER**

    Danger to life due to electric shock
    • Ensure that the circuit breaker is switched off and ensure that it cannot be reconnected.
    • Ensure that the PV modules are covered.

2. Route the AC cable of the first inverter to the terminal **Inverter** of the Sunny Multigate.

3. Dismantle the AC cable to the desired length.

4. Strip the insulation of the three AC cable conductors by 8 mm each.

5.
┌──────────────────┐
│   *NOTICE*   │
└──────────────────┘

Damage to the Sunny Multigate due to incorrectly connected conductors

If **PE** and **L** or **N** are swapped, the Sunny Multigate could be damaged during commissioning.

- Be sure to observe the terminal labels on the Sunny Multigate.
- Connect all conductors in accordance with the terminal labels:
  - Connect the grounding conductor of the AC cable to the terminal **PE** of the Sunny Multigate. Make sure that the conductor is inserted into the terminal right up to the stop.
  - Connect the line conductor of the AC cable to the terminal **L** of the Sunny Multigate. Make sure that the conductor is inserted into the terminal right up to the stop.
  - Connect the neutral conductor of the AC cable to the terminal **N** of the Sunny Multigate. Make sure that the conductor is inserted into the terminal right up to the stop.

6. Tighten all three screws of the connecting terminal plate using a flat-blade screwdriver (torque: 0.6 Nm).

7. Ensure that all terminals are correctly allocated.

8. Ensure that all conductors are securely in place.

9. In order to allow for greater distances between the inverter and the Sunny Multigate, use an AC field plug as well (see Section 6.6 "Option 1: AC Cabling with AC Field Plug", page 34).

6.9   Connecting the Sunny Multigate to the Utility Grid

Connect the AC cable of the utility grid to the connecting terminal plate of the Sunny Multigate labeled **Grid** according to the following procedure:

Cable requirements:

☐ Only use copper cables.

☐ Use only cables made of solid wire or stranded wires.

☐ Temperature resistant up to +90°C

☐ Conductor cross-section: 1.5 mm² to 6.0 mm²

Requirement:

☐ The Sunny Multigate must be correctly installed in the distribution box.

☐ If an external residual-current device is required, install a type A residual-current device, which trips at a residual current of 100 mA or higher (for details on selecting a residual-current device, see Technical Information "Criteria for Selecting a Residual-Current Device" at www.SMA-Solar.com).

Overvoltage category

The Sunny Multigate can be deployed in utility grids of installation category III or lower, as defined in IEC 60664-1. This means that the Sunny Multigate can be permanently connected to the origin of an utility grid in a building. In installations involving long outdoor cable routes, additional measures for overvoltage suppression must be taken so that the overvoltage category is reduced from IV to III.

Procedure:

1.   **⚠ DANGER**

     Danger to life due to electric shock
     • Ensure that the circuit breaker is switched off and ensure that it cannot be reconnected.

2.   Route the AC cable of the utility grid through one opening at the bottom of the distribution box to the terminal **Grid** of the Sunny Multigate.

3.   Dismantle the AC cable to the desired length.

4.   Strip 8 mm insulation off each of the three conductors of the AC cable of the utility grid.

5.

NOTICE

Damage to the Sunny Multigate due to incorrectly connected conductors

If **PE** and **L** or **N** are swapped, the Sunny Multigate could be damaged during commissioning.

- Be sure to observe the terminal labels on the Sunny Multigate.
- Connect all conductors in accordance with the terminal labels:
  - Connect the grounding conductor of the AC cable to the terminal **PE** of the Sunny Multigate. Make sure that the conductor is inserted into the terminal right up to the stop.
  - Connect the line conductor of the AC cable to the terminal **L** of the Sunny Multigate. Make sure that the conductor is inserted into the terminal right up to the stop.
  - Connect the neutral conductor of the AC cable to the terminal **N** of the Sunny Multigate. Make sure that the conductor is inserted into the terminal right up to the stop.

6. Tighten all three screws of the connecting terminal plate using a flat-blade screwdriver (torque: 0.6 Nm).

7. Ensure that all terminals are correctly allocated.

8. Ensure that all conductors are securely in place.

9. Connect the grounding conductor of the Sunny Multigate to the equipotential bonding of the AC distribution board.

7 Commissioning

Requirements:

☐ All inverters must be correctly mounted.

☐ The AC connector must be firmly plugged in.

☐ The DC plug and the connectors must be firmly plugged in.

☐ The connection areas of all inverters must be dry and sealed rain-tight by means of connectors and, where applicable, a protective cap.

☐ The PV modules must be correctly mounted.

☐ The circuit breaker must be correctly rated.

☐ The country data set must be configured according to the country or purpose. You can find the configured country data set on the enclosed supplementary sheet with the default settings.

☐ The Sunny Multigate must be correctly installed in the distribution box.

☐ The unused AC pin connector on the last inverter of the PV system must be sealed with a protective cap.

☐ The first inverter of the PV system must be correctly connected to the Sunny Multigate via the AC cable. All conductors must be connected in accordance with the terminal labels. No conductors must be swapped.

☐ The AC cable of the utility grid must be correctly connected to the Sunny Multigate.
All conductors must be connected in accordance with the terminal labels. No conductors must be swapped.

NOTICE

Damage to the Sunny Multigate due to incorrectly connected conductors

If **PE** and **L** or **N** are swapped, the Sunny Multigate could be damaged during commissioning.

- Be sure to observe the terminal labels on the Sunny Multigate.
- All conductors must be connected in accordance with the terminal labels.
- Ensure that all terminals are correctly allocated.

Procedure:

- Switch on the circuit breaker.

  ☑ Both LEDs on the Sunny Multigate are glowing green. Feed-in operation begins.

  ✖ The LED **Inverter** is off?

  There is a disturbance in the PV system.

  - You will find the detailed error message in Sunny Portal or Sunny Explorer. You can find the cause and its corrective measure in this document (see Section 11.1 "Events: Information, Warnings and Errors", page 52).

  ✖ The LED **Inverter** on the Sunny Multigate is glowing orange or red?

  There is a disturbance in at least one of the connected inverters.

  - You will find the detailed error message in Sunny Portal or Sunny Explorer. You can find the cause and its corrective measure in this document (see Section 11.1 "Events: Information, Warnings and Errors", page 52).

  ✖ The LED **Multigate** on the Sunny Multigate is glowing orange or red?

  There is a disturbance in the Sunny Multigate.

  - Identify and eliminate the disturbance (see Section 11.1 "LED Signals on the Sunny Multigate", page 52).

8 Configuration

8.1 Procedure

Once you have commissioned the PV system, you may have to adjust various settings via a communication product. This section describes the procedure for configuration and gives an overview of the steps you must perform in the prescribed order.

Procedure		Refer to
1.	If you want to integrate the PV system into a Speedwire network, connect the Sunny Multigate to the network.	Section 8.2, page 45
2.	Register the Sunny Multigate in a communication product in order to manage the PV system data or to set the operating parameters.	Section 8.3, page 46 and Section 8.4, page 47
3.	Change the PV system time and PV system password.	Manual of the communication product at www.SMA-Solar.com
4.	Check which country data set the Sunny Multigate is set to.	Supplementary sheet with default settings
5.	If the country data set is not set correctly for your country or your purpose, adjust to the required country data set.	Section 8.6, page 48

8.2 Connecting the Sunny Multigate to the Network

You can configure the Sunny Multigate and the inverters using an SMA communication product (e.g. Sunny Portal, Sunny Explorer).

In order to register your PV system in Sunny Portal, you must connect the Sunny Multigate to the local network.

Required material (not included in the scope of delivery):

☐ One network cable

Cable requirements:

The cable length and quality have an effect on the signal quality. Observe the following cable requirements.

☐ Cable type: 100BaseTx
SMA Solar Technology AG recommends cable type "SMA COMCAB-OUTxxx" for outdoor use and cable type "SMA COMCAB-INxxx" for indoor use in the lengths xxx = 100 m, 200 m, 500 m, 1,000 m.

☐ Shielding: S-FTP or S-STP

☐ Plug type: RJ45 of Cat5, Cat5e, Cat6, Cat6a

☐ Number of insulated conductor pairs and conductor cross-section: at least 2 x 2 x 0.22 mm² or at least 2 x 2 x 24 AWG

☐ Maximum cable length between two nodes with patch cable: 50 m

☐ Maximum cable length between two nodes with installation cable: 100 m

☐ UV-resistant for outdoor use

Requirements:

☐ The PV system must be commissioned (see Section 7 "Commissioning", page 43).

☐ A computer with an Ethernet interface must be available.

Procedure:

1. Connect one end of the network cable to the router or directly to the computer.

2. Plug the other end of the network cable into the pin connector at the bottom of the Sunny Multigate.
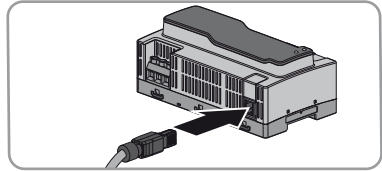
☑ The green LED in the pin connector is glowing or flashing. The Sunny Multigate is connected to the router or the computer.

☑ The green LED in the pin connector is glowing or flashing and the yellow LED is glowing: A 100 Mbit connection to the router or the computer is established.

✖ All LEDs in the pin connector are off.

Possible failure cause: the other end of the network cable is not correctly attached or there is no voltage supply.

- Ensure that the router or computer is supplied with voltage.
- Ensure that the network cable is correctly attached.
- If the network cable is correctly attached and the problem persists, contact the SMA Service Line (see Section 15 "Contact", page 74).

8.3   Registering the Sunny Multigate in Sunny Portal

If you want to use the Webconnect function and monitor your PV system in Sunny Portal, you must register the Sunny Multigate in Sunny Portal.

Requirements:

☐ The PV system must be commissioned (see Section 7 "Commissioning", page 43).

☐ The Sunny Multigate must be connected to a router or modem with Internet access and must be integrated in the local network. If the router or the modem does not support DHCP, or if DHCP is deactivated, you can use the SMA Connection Assist to integrate the Sunny Multigate into your network (see www.SMA-Solar.com).

☐ All UDP ports > 1024 on the router or modem must be open for outgoing connections. If there is a firewall installed on the router or modem, you might have to adjust the firewall rules.

☐ It must be possible for the outgoing router or modem connections to reach all Internet destinations (target IP, target port). If there is a firewall installed on the router or modem, you might have to adjust the firewall rules.

☐ On a router or modem with NAT (Network Address Translation) there must not be any port forwarding. Potential communication problems can thus be prevented.

☐ There must be no packet filtering or manipulation for SIP packets on the router or modem.

☐ The registration ID (RID) and identification key (PIC) for registration in Sunny Portal must be available (see type label on the Sunny Multigate or enclosed label).

Procedure:

• Register the Sunny Multigate in Sunny Portal (see User Manual "Micro Inverters in Sunny Portal" at www.SunnyPortal.com). Useful hint: The Plant Setup Assistant guides you through user registration and the registration of your PV system in Sunny Portal.

8.4 Connecting the Sunny Multigate to Sunny Explorer

Requirements:

☐ The PV system must be commissioned (see Section 7 "Commissioning", page 43).

☐ A computer with an Ethernet interface must be available.

☐ The Sunny Multigate must be connected to the network.

☐ Sunny Explorer from software version 1.06 must be installed on the computer.

Procedure:

• Start Sunny Explorer and create a PV system (see Sunny Explorer user manual at www.SMA-Solar.com).

8.5 Changing Operating Parameters

This section describes the basic procedure for changing operating parameters. Always change operating parameters as described in this section.

The operating parameters of the Sunny Multigate are set to certain values by default. You can change the operating parameters after commissioning using Sunny Explorer to optimize the operation of the inverter.

Requirements:

☐ The PV system must be commissioned (see Section 7 "Commissioning", page 43).

☐ A computer with an Ethernet interface must be available.

☐ Sunny Explorer from software version 1.06 must be installed on the computer.

☐ The system must be registered in Sunny Explorer.

☐ The changes to the grid-relevant operating parameters must be approved by the responsible grid operator.

☐ When changing grid-relevant parameters, the SMA Grid Guard code must be available (see Certificate "Application for SMA Grid Guard Code" at www.SMA-Solar.com).

Procedure:

1. Access the Sunny Explorer user interface.

2. Select and set the desired parameter.

3. Save settings.

8.6   Changing the Country Data Set

> **i** **The country data set must be set correctly**
>
> If you select a country data set which is not valid for your country and purpose, it can cause a disturbance in the PV system and lead to problems with the grid operator. When selecting the country data set, you must always observe the locally applicable standards and directives as well as the properties of the PV system (e.g. PV system size, grid-connection point).
>
> • If you are not sure which country data set is valid for your country or purpose, contact your grid operator and ask which country data set is to be configured.

> **i** **Basic procedure for changing operating parameters**
>
> The basic procedure for changing operating parameters is explained in a separate section Changing Operating Parameters.

Procedure:

• Select the **Set country standard** parameter and set the required country data set.

8.7   Deactivating the Webconnect Function

Requirements:

☐ The PV system must be commissioned (see Section 7 "Commissioning", page 43).

☐ A computer with an Ethernet interface must be available.

☐ Sunny Explorer from software version 1.06 must be installed on the computer.

Procedure:

1. Access the Sunny Explorer user interface.

2. Under **Settings > External Communication**, select the parameter **Webconnect functionality switched on** and set to **No**.

3. Save settings.

9   Disconnecting the Inverter from Voltage Sources

NOTICE

Damage to the inverter due to moisture ingress

When the inverter is open, moisture can penetrate and cause damage to the inverter.
The inverter is no longer water-tight and its function may be impaired.

- **Never** open the inverter.

NOTICE

Destruction of the measuring device due to overvoltage

- Only use measuring devices with a DC input voltage range up to at least 600 V.

Prior to performing any work on the inverter always disconnect it from all voltage sources as described in this section. Observe the given sequence. If you want to disconnect several inverters from voltage sources, you must repeat the following procedure for each inverter.

Procedure:

1.   **⚠ DANGER**

     Danger to life due to electric shock

     Do not disconnect the AC connectors under load.

     - Disconnect the circuit breaker and secure against reconnection.
     - Cover the PV modules.

2.   Release and remove all connected AC connectors from the inverter. Hook a flat-blade screwdriver (blade width: 4 mm) into the wide slot on the plug and lever it open. At the same time, pull out the AC connector without pulling the cable.
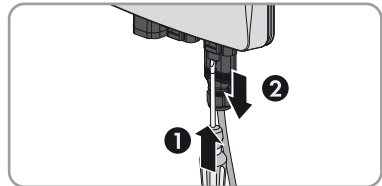
3.   Remove the DC plug from the inverter. Do **not** pull on the DC cables.
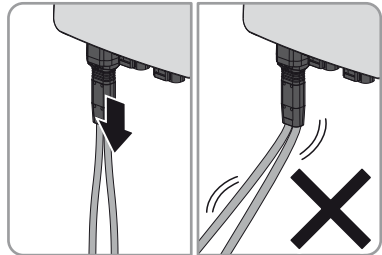
4. To loosen the protective cap, remove the sealing, if necessary, and hook a flat-blade screwdriver (blade width: 4 mm) into the wide slot and and lever it open. At the same time, pull out the protective cap.
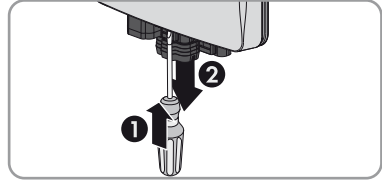
5. ⚠ **DANGER**

   Risk of electric shock due to high voltages
   - Before carrying out any of the following work, wait five minutes for the capacitors to discharge.

10 Disconnecting the Sunny Multigate from Voltage Sources

⚠ DANGER

Risk of electric shock due to contact with live components when opening the Sunny Multigate

There are live components inside the Sunny Multigate. There is a risk of electric shock if you open the Sunny Multigate.

- **Never** open the Sunny Multigate.

Before working on the Sunny Multigate, always disconnect it from any voltage sources as described in this section.

Procedure:

1. **⚠ DANGER**

    Danger to life due to electric shock
    - Disconnect the circuit breaker and secure against reconnection.

2. Ensure that no voltage is present between conductors L and N at the AC terminal **Grid** using a suitable measuring device.

3. Ensure that no voltage is present between conductors L and PE at the AC terminal **Grid** using a suitable measuring device.

4. Ensure that no voltage is present between conductors L and N at the AC terminal **Inverter** using a suitable measuring device.

5. Ensure that no voltage is present between conductors L and PE at the AC terminal **Inverter** using a suitable measuring device.

11 Troubleshooting

11.1   LED Signals on the Sunny Multigate

The LEDs on the Sunny Multigate indicate the operating state of the PV system.
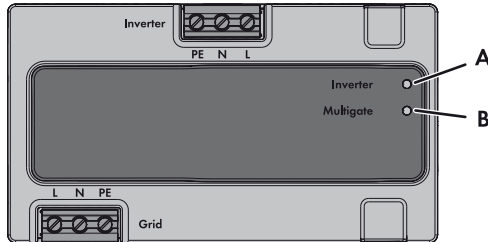
Figure 16:   Position of the LEDs on the Sunny Multigate

The upper LED is labeled with **Inverter** and indicates the operating state of the inverters.

The lower LED is labeled with **Multigate** and indicates the operating state of the Sunny Multigate.

LED	Status	Explanation
A: LED **Inverter**	off	The communication with the inverters is not active.
	glowing green	The inverters are in operation.
	glowing orange	At least one of the connected inverters is in **Warning** mode. You will find the detailed error message in Sunny Portal or Sunny Explorer. If communication is still possible, determine the respective error message in Sunny Portal or Sunny Explorer.
	glowing red	At least one of the connected inverters is in **Fault** mode. You will find the detailed error message in Sunny Portal or Sunny Explorer. You can find the cause and its corrective measure in this document Events: Information, Warnings and Errors.

LED	Status	Explanation
B: LED **Multigate**	off	Either there is no AC voltage present or the Sunny Multigate is defective.
	glowing green	The Sunny Multigate is in normal operating state.
	glowing orange	The Sunny Multigate is in **Warning** mode. 1. If communication is still possible, determine the respective error message in Sunny Portal or Sunny Explorer. You can find the cause and its corrective measure in this document Events: Information, Warnings and Errors. 2. If no communication is possible, disconnect the network cable from the Sunny Multigate and reconnect the Sunny Multigate to the network (see Section 8.2, page 45). 3. If the error persists, disconnect the Sunny Multigate from any voltage source (see Section 10, page 51) and reconnect it (see Section 6.9, page 41). 4. If the error persists, contact the SMA Service Line.
	glowing red	The Sunny Multigate is in **Fault** mode. 1. If communication is still possible, determine the respective error message in Sunny Portal or Sunny Explorer. You can find the cause and its corrective measure in this document Events: Information, Warnings and Errors. 2. If no communication is possible, disconnect the network cable from the Sunny Multigate and reconnect the Sunny Multigate to the network (see Section 8.2, page 45). 3. If the error persists, disconnect the Sunny Multigate from any voltage source (see Section 10, page 51) and reconnect it (see Section 6.9, page 41). 4. If the error persists, contact the SMA Service Line.

11.2   Events: Information, Warnings and Errors

During operation of the PV system, events may occur which can refer to one or several inverters or the Sunny Multigate. Events can be information, warnings or errors. All events are displayed in the communication product you are using (e.g. Sunny Portal, Sunny Explorer). Sunny Explorer additionally displays the corresponding event number for each event.

Inverter

Event number	Event, cause and corrective measures
101	**System incident / Grid monitoring spot value (101)** The line voltage or grid impedance at the connection point is too high. The inverter has disconnected from the utility grid. **Corrective measures:** • Check whether the line voltage at the connection point is permanently in the permissible range. If the line voltage is outside the permissible range due to local grid conditions, contact the grid operator. The grid operator must approve changes to the operating parameters of the inverter. If the line voltage is permanently within the permissible range and this message is still displayed, contact the SMA Service Line.
102	**Grid fault / Grid overvoltage fast (102)** The line voltage or grid impedance at the connection point of the inverter is too high. The inverter has disconnected from the utility grid. **Corrective measures:** • Check whether the line voltage at the connection point of the inverter is permanently in the permissible range. If the line voltage is outside the permissible range due to local grid conditions, contact the grid operator. The grid operator must approve changes to the operating parameters of the inverter. If the line voltage is permanently within the permissible range and this message is still displayed, contact the SMA Service Line.

Event number	Event, cause and corrective measures
202	**Grid fault / Grid undervoltage fast (202)**
	The utility grid has been disconnected, the AC cable is damaged or the line voltage at the connection point of the inverter is too low. The inverter has disconnected from the utility grid.
	Corrective measures:
	1. Ensure that the circuit breaker is switched on.
	2. Ensure that the AC cable is not damaged.
	3. Ensure that the AC cable is correctly connected.
	4. Check whether the line voltage at the connection point of the inverter is permanently in the permissible range.
	If the line voltage is outside the permissible range due to local grid conditions, contact the grid operator. The grid operator must approve changes to the operating parameters of the inverter.
	If the line voltage is permanently within the permissible range and this message is still displayed, contact the SMA Service Line.
301	**Grid fault / Voltage increase protection (301)**
	The line voltage or grid impedance at the connection point is too high. The inverter has disconnected from the utility grid to comply with the power quality.
	Corrective measures:
	• Check whether the line voltage at the connection point of the inverter is permanently in the permissible range.
	If the line voltage is outside the permissible range due to local grid conditions, contact the grid operator. The grid operator must approve changes to the operating parameters of the inverter.
	If the line voltage is permanently within the permissible range and this message is still displayed, contact the SMA Service Line.
401	**Grid fault / Island grid (401)**
	The inverter is no longer in grid parallel operation and has stopped feed-in operation for safety reasons.
	Corrective measures:
	• Check the grid connection for significant, short-term frequency fluctuations.

Event number	Event, cause and corrective measures
501	**Grid fault / Grid frequency disturbance (501)** The power frequency is not within the permissible range. The inverter has disconnected from the utility grid. **Corrective measures:** • If possible, check the power frequency and observe how often major fluctuations occur. If fluctuations occur frequently and this message is displayed often, contact the grid operator. The grid operator must approve changes to the operating parameters of the inverter. If the grid operator gives his approval, discuss any changes to the operating parameters with the SMA Service Line.
1001	**Installation failure grid connection / L/N swapped (1001)** The conductors **L** and **N** are swapped or **PE** is not connected. **Corrective measures:** • Check whether the inverter is correctly connected at the connecting terminal plate **Inverter** of the Sunny Multigate. If the inverter is not correctly connected, disconnect it from voltage sources (see Section 9, page 49), disconnect the Sunny Multigate from voltage sources (see Section 10, page 51) and connect the conductors **L**, **N** and **PE** correctly. • Check whether the AC field plugs between the inverters were correctly assembled. Disconnect the inverter from voltage sources (see Section 9, page 49), disassemble the AC field plug and assemble it correctly (see Section 6.6.2, page 37). If the inverter is connected correctly, the AC field plug assembled correctly and this message is still displayed, contact the SMA Service Line.
3401	**DC overvoltage / Overvoltage input A (SW) (3401)** The DC input voltage connected to the inverter is too high. This can destroy the inverter. **Corrective measures:** 1. Immediately disconnect the PV module from the inverter. 2. Check whether the DC voltage is below the maximum input voltage of the inverter. If the DC voltage is below the maximum input voltage of the inverter, reconnect the DC connectors to the inverter. If the DC voltage is above the maximum input voltage of the inverter, ensure that the PV module has been correctly rated or contact the installer of the PV module. If this message is repeated frequently, contact the SMA Service Line.

Event number	Event, cause and corrective measures
3501	**Insulation resistance / Insulation failure (3501)** The inverter has detected a ground fault in the PV array. As long as the fault exists, the inverter will not feed in. **Corrective measures:** • Check the PV system for ground faults (see Section 11.3, page 64).
3902	**Waiting for DC start conditions / Generator voltage too low / Start conditions not met (3902)** The generator voltage is too low. **Corrective measures:** 1. Wait for higher irradiation. 2. If necessary, remove snow or dirt from the PV modules.
3903	**Waiting for DC start conditions / Generator voltage too high / Start conditions not met (3903)** The generator voltage is too high. **Corrective measures:** • Wait until the DC start conditions are met.
6002 to 6006	**Self diagnosis / Interference device (6002, 6005, 6006)** The cause must be determined by the SMA Service Line. **Corrective measures:** • Contact the SMA Service Line.
6305	**Self diagnosis / Interference device (6305)** The cause must be determined by the SMA Service Line. **Corrective measures:** • Contact the SMA Service Line.
6402	**Self diagnosis / Overtemperature (6402)** The cause must be determined by the SMA Service Line. **Corrective measures:** • Contact the SMA Service Line.

Event number	Event, cause and corrective measures
6406	**DC overcurrent / Overcurrent input A (HW) (6406)** The current at the module input of the inverter is too high. The inverter has interrupted the feed-in operation. **Corrective measures:** • Check whether the line voltage at the connection point of the inverter is permanently in the permissible range and/or whether voltage jumps occur (e.g. by switching on and off large loads). If voltage jumps occur or the line voltage is outside the permissible range due to local grid conditions, contact the grid operator. The grid operator must approve changes to the operating parameters of the inverter. If the line voltage is permanently within the permissible range and this message is still displayed, contact the SMA Service Line.
6415	**Self diagnosis / Interference device (6305)** The cause must be determined by the SMA Service Line. **Corrective measures:** • Contact the SMA Service Line.
6450	**Self diagnosis / Energy transfer not possible / Interference device (6450)** The inverter cannot feed into the utility grid. Possible causes: line voltage is too high; a PV module is defective, soiled or shaded; a cloudy or foggy day. **Corrective measures:** 1. Check whether the line voltage at the connection point of the inverter is permanently in the permissible range. If the line voltage is outside the permissible range due to local grid conditions, contact the grid operator. The grid operator must approve changes to the operating parameters of the inverter. 2. Check whether the DC voltage is stable in a realistic range in accordance with the datasheet of the PV module and the assessment of the weather situation. Therefore, determine the voltage during inverter operation using a communication product. 3. Check whether the respective PV module is heavily soiled or shaded. Clean the PV module if soiled. 4. During a very cloudy or foggy day, wait for higher irradiation. 5. If none of the described causes is applicable and the message is still displayed, contact the SMA Service Line.

Event number	Event, cause and corrective measures
10265	**PLC communication impaired (10265)** The cause must be determined by the SMA Service Line. **Corrective measures:** 1. If several Sunny Multigate devices are installed in a PV system, check whether the AC cabling of the inverters to the Sunny Multigate is laid separated from each other. If the AC cables are not laid separately from each other, do lay the AC cables from the inverter to the Sunny Multigate in separate locations. 2. If the problem persists, contact the SMA Service Line.

Sunny Multigate

Event number	Event, cause and corrective measures
101	**System incident / Grid monitoring spot value (101)** The line voltage or grid impedance at the connection point is too high. The inverter has disconnected from the utility grid. **Corrective measures:** • Check whether the line voltage at the connection point is permanently in the permissible range. If the line voltage is outside the permissible range due to local grid conditions, contact the grid operator. The grid operator must approve changes to the operating parameters of the inverter. If the line voltage is permanently within the permissible range and this message is still displayed, contact the SMA Service Line.
102	**Grid fault / Grid overvoltage fast (102)** The line voltage or grid impedance at the connection point of the inverter is too high. The inverter has disconnected from the utility grid. **Corrective measures:** • Check whether the line voltage at the connection point of the inverter is permanently in the permissible range. If the line voltage is outside the permissible range due to local grid conditions, contact the grid operator. The grid operator must approve changes to the operating parameters of the inverter. If the line voltage is permanently within the permissible range and this message is still displayed, contact the SMA Service Line.

Event number	Event, cause and corrective measures
202	**Grid fault / Grid undervoltage fast (202)** The utility grid has been disconnected, the AC cable is damaged or the line voltage at the connection point of the inverter is too low. The inverter has disconnected from the utility grid. **Corrective measures:** 1. Ensure that the circuit breaker is switched on. 2. Ensure that the AC cable is not damaged. 3. Ensure that the AC cable is correctly connected. 4. Check whether the line voltage at the connection point of the inverter is permanently in the permissible range. If the line voltage is outside the permissible range due to local grid conditions, contact the grid operator. The grid operator must approve changes to the operating parameters of the inverter. If the line voltage is permanently within the permissible range and this message is still displayed, contact the SMA Service Line.
301	**Grid fault / Voltage increase protection (301)** The line voltage or grid impedance at the connection point of the inverter is too high. The inverter has disconnected from the utility grid to comply with the power quality. **Corrective measures:** • Check whether the line voltage at the connection point of the inverter is permanently in the permissible range. If the line voltage is outside the permissible range due to local grid conditions, contact the grid operator. The grid operator must approve changes to the operating parameters of the inverter. If the line voltage is permanently within the permissible range and this message is still displayed, contact the SMA Service Line.
401	**Grid fault / Island grid (401)** The inverter is no longer in grid parallel operation and has stopped feed-in operation for safety reasons. **Corrective measures:** • Check the grid connection for significant, short-term frequency fluctuations.

Event number	Event, cause and corrective measures
501	**Grid fault / Grid frequency disturbance (501)** The power frequency is not within the permissible range. The inverter has disconnected from the utility grid. **Corrective measures:** • If possible, check the power frequency and observe how often major fluctuations occur. If fluctuations occur frequently and this message is displayed often, contact the grid operator. The grid operator must approve changes to the operating parameters of the inverter. If the grid operator gives his approval, discuss any changes to the operating parameters with the SMA Service Line.
1001	**Installation failure grid connection / L/N swapped (1001)** The conductors **L** and **N** are swapped or **PE** is not connected. **Corrective measures:** • Check whether the connecting terminal plates **Grid** and **Inverter** of the Sunny Multigate are correctly assigned. If the connecting terminal plates **Grid** and **Inverter** are not correctly assigned, disconnect the Sunny Multigate from voltage sources (see Section 10, page 51) and connect the conductors **L**, **N** and **PE** correctly. If the connecting terminal plates **Grid** and **Inverter** of the Sunny Multigate are correctly assigned and the message is still displayed, contact the SMA Service Line. • Check whether the AC field plugs between the inverters were correctly assembled. Disconnect the inverter from voltage sources (see Section 9, page 49), disassemble the AC field plug and assemble it correctly (see Section 6.6.2, page 37). If the inverter is connected correctly, the AC field plug assembled correctly and this message is still displayed, contact the SMA Service Line.
6002	**Self diagnosis / Interference device (6002)** The system data is defective. **Corrective measures:** • Download firmware update from www.SMA-Solar.com and install with Sunny Explorer. • If this message is still displayed, contact the SMA Service Line.

Event number	Event, cause and corrective measures
6415	**Self diagnosis / Interference device (6415)** The reference voltage test failed. **Corrective measures:** • Disconnect the Sunny Multigate from voltage sources (see Section 10, page 51) and re-commission it (see Section 7, page 43). • If this message is still displayed, contact the SMA Service Line.
6702	**Interference device (6702)** The cause must be determined by the SMA Service Line. **Corrective measures:** • Contact the SMA Service Line.
7001	**Fault sensor interior temperature (7001)** The temperature sensor for the indoor temperature of the Sunny Multigate is defective. Feed-in operation will be interrupted. **Corrective measures:** • Contact the SMA Service Line.
7702	**Self diagnosis / Interference device (7702)** An relay error has occurred. **Corrective measures:** • Disconnect the Sunny Multigate from voltage sources (see Section 10, page 51) and re-commission it (see Section 7, page 43). • If this message is still displayed, contact the SMA Service Line.
8101 to 8102	**Communication disturbed (8101, 8102)** An error has occurred in the internal communication. This can be caused by one of the following: Feed-in operation continues. **Corrective measures:** 1. If several Sunny Multigate devices are installed in a PV system, check whether the AC cabling of the inverters to the Sunny Multigate is laid separated from each other. If the AC cables are not laid separately from each other, do lay the AC cables from the inverter to the Sunny Multigate in separate locations. 2. If the problem persists, contact the SMA Service Line.
8104	**Interference device (8104)** The cause must be determined by the SMA Service Line. **Corrective measures:** • Contact the SMA Service Line.

Event number	Event, cause and corrective measures
9014	**Invalid device combination (9014)** The Sunny Multigate and the inverters cannot be operated in this combination. **Corrective measures:** 1. Contact the SMA Service Line and request the latest firmware update, if necessary.
9015	**Max. permitted number of inverters exceeded (9015)** The number of inverters connected exceeds the number specified in the currently set standard. **Corrective measures:** • Reduce the number of inverters in the PV system until the maximum permissible number is reached (see user manual of the communication product).
10221	**New device cannot be administered (10221)** The cause must be determined by the SMA Service Line. **Corrective measures:** • Contact the SMA Service Line.
10259	**Inconsistent communication version (10259)** The communication version of an inverter is not supported or the device combination is invalid. **Corrective measures:** 1. Contact the SMA Service Line and request the latest firmware update, if necessary.
10265	**The device with serial number X has not been available for X day(s) (10265)** Communication with one or several inverters is no longer possible. **Corrective measures:** 1. Check cables and inverters for loose connectors or damage. 2. Check PV modules for soiling or damage. 3. If the problem persists, contact the SMA Service Line.
10267	**Loss of communication to one or several devices (10267)** Communication with one or several inverters is no longer possible. **Corrective measures:** 1. Check cables and inverters for loose connectors or damage. 2. Check PV modules for soiling or damage. 3. If the problem persists, contact the SMA Service Line.

11.3   Checking the PV System for Ground Faults

If the LED **Inverter** on the Sunny Multigate is glowing red, this may indicate a ground fault in the PV system. The electrical insulation between the PV system and ground is defective.

⚠ WARNING

Danger to life due to electric shock

In the event of a ground fault, high voltages can be present.

- **No** terminal of the PV module must be grounded.
- Only touch the cables of the PV modules on their insulation.
- Do not touch any parts of the framework or supports of the PV modules.
- Do not connect any PV module with a ground fault to the inverter.

NOTICE

Destruction of the measuring device due to overvoltage

- Only use measuring devices with a DC input voltage range up to at least 600 V.

If the Sunny Multigate indicates a ground fault in the PV array, proceed as follows:

Procedure:

1. Ensure that **no** terminal of the PV module is grounded.
2. Use Sunny Portal or Sunny Explorer to determine which of the connected inverters has a ground fault (see user manual of the communication product at www.SMA-Solar.com).
3. **⚠ DANGER**

   Risk of electric shock due to high voltages
     - Disconnect the affected inverter from any voltage source (see Section 9, page 49).

4. Measure voltages with a suitable measuring device.
   - Measure the voltages between the positive terminal and the ground potential.
   - Measure the voltages between the negative terminal and the ground potential.
   - Measure the voltages between the positive and negative terminals.
     If the following results are present at the same time, there is a ground fault in the PV system.
     – All measured voltages are stable.
     – The sum of the two voltages to ground potential is approximately equal to the voltage between the positive and negative terminals.
   - Eliminate the ground fault.
     If there is no ground fault and the problem persists, contact the SMA Service Line.
5. Commission the PV system (see Section 7 "Commissioning", page 43).

12 Decommissioning

12.1   Decommissioning the Inverter

1.   **⚠ DANGER**

     Danger to life due to electric shock

     Do not disconnect the AC connectors under load.

     • Disconnect the inverter from all voltage sources (see Section 9, page 49).

2.   Release and remove all cables from the inverter.

3.   Loosen all screws in the drill holes.

4.   Remove the inverter from the wall or profile rail.

5.   If the inverter is to be stored or shipped in packaging, pack the inverter, the DC connectors, and the AC connector. Use the original packaging or packaging that is suitable for the weight and dimensions of the inverter (see Section 13 "Technical Data", page 66).

6.   Dispose of the inverter in accordance with the locally applicable disposal regulations for electronic waste.

12.2   Decommissioning the Sunny Multigate

1.   **⚠ DANGER**

     Danger to life due to electric shock

     • Disconnect the Sunny Multigate from voltage sources (see Section 10, page 51).

2.   Release the screw terminals on the Sunny Multigate using a flat-blade screwdriver (blade width: 3.5 mm).

3.   Remove the conductors L and N from both connecting terminal plates.

4.   If a network cable is connected, pull the network cable out of the pin connector.

5.   Pull the grounding conductor out of both connecting terminal plates.

6.   Disassemble the Sunny Multigate:

     • If mounted on a top-hat rail, detach the Sunny Multigate from the top-hat rail. To do this, tilt the lower edge of the Sunny Multigate forwards and lift it up and off the top-hat rail.

     • If mounted on the brackets, release the screws with a flat-blade screwdriver (blade width: 3.5 mm) and remove the Sunny Multigate.

7.   If the Sunny Multigate is to be stored or shipped, pack the Sunny Multigate and the AC connector. Use the original packaging or packaging suitable for the weight and size of the Sunny Multigate (see Section 13 "Technical Data", page 66).

8.   If the Sunny Multigate is to be disposed of, dispose of the Sunny Multigate in accordance with the locally applicable disposal regulations for electronic waste.

13 Technical Data

13.1   Sunny Boy 240

DC Input

Maximum number of connected PV modules per inverter	1
Maximum DC power at cos φ = 1	245 W
Maximum input voltage	45 V
MPP voltage range at 230 V	23.0 V to 32.0 V
Operating range at 230 V	23.0 V to 40.0 V
Rated input voltage	29.0 V
Minimum input voltage	23.0 V
Minimum initial input voltage	23.0 V
Maximum initial input voltage	40 V
Maximum input current	8.5 A
Maximum input current per string	8.5 A
Maximum short-circuit current per module	1 A
Number of independent MPP inputs	1
Strings per MPP input	1

AC Output

Rated power at 230 V, 50 Hz	230 W
Maximum apparent AC power	230 VA
Rated grid voltage	230 V
Nominal AC voltage	220 V / 230 V / 240 V
AC voltage range	184 V to 270 V
Nominal AC current at 220 V	1 A
Nominal AC current at 230 V	1 A
Nominal AC current at 240 V	0.96 A
Maximum output current	1 A

Total harmonic distortion of the output current with total harmonic distortion of the AC voltage < 2%, and AC power > 50% of the rated power	≤ 3%
Maximum residual output current	241 A
Rated power frequency	50 Hz
AC power frequency	50 Hz / 60 Hz
Operating range at AC power frequency 50 Hz	45.5 Hz to 63 Hz
Operating range at AC power frequency 60 Hz	45.5 Hz to 63 Hz
Power factor at rated power	1
Feed-in phases	1
Connection phases	1
Overvoltage category with Sunny Multigate as per IEC 60664-1	III

Protective Devices

DC reverse polarity protection	Short-circuit diode
Grid monitoring	SMA Grid Guard 5
AC short-circuit current capability	Available
Ground-fault monitoring	Insulation monitoring
Galvanic isolation	Available

General Data

Width x height x depth, without connection area	188 mm x 199 mm x 43 mm
Width x height x depth, with connection area	188 mm x 218 mm x 43 mm
Weight	1.3 kg
Operating temperature range	− 40°C to +65°C
Maximum permissible value for relative humidity, non-condensing	100%
Maximum operating altitude above MSL	3,000 m
Noise emission, typical	≤ 38 dB(A)
Power loss in night mode	< 0.03 W
Topology	HF transformer

Cooling concept	Convection
Degree of protection	IP65
Protection class	I
Grid configurations	TN-C grid configuration TN-S grid configuration TN-C-S grid configuration
Approvals and national standards, as per 09/2013	VDE0126-1-1 VDE-AR-N-4105

Climatic Conditions

As per IEC 60721-3-4, installation type C, class 4K4H

Extended temperature range	− 40°C to +65°C
Extended humidity range	0% to 100%
Extended air pressure range	79.5 kPa to 106 kPa

As per IEC 60721-3-4, transport type E, class 2K3

Temperature range	− 25°C to +70°C

Features

DC connection	DC plug with DC connector[*] : DC plug, assembled, MC4 DC plug, assembled, Tyco
AC connection	AC cable with two connectors[**]
Powerline interface	As standard

[*] The DC connectors supplied depend on the order (for SMA order numbers of the DC connectors (see Section 14 "Accessories", page 72)).

[**] The length of the AC cable depends on the order and is either 1.40 m or 2.0 m.

Efficiency

Maximum efficiency, η_{max}	95.8%
European efficiency, η_{EU}	95.3%

13.2   Sunny Multigate

AC Input

Maximum number of connected micro inverters	12
Minimum number of connected micro inverters	1
Maximum input current	12 A

AC Output

Rated power at 230 V, 50 Hz	2,760 W
Rated grid voltage	230 V
Nominal AC voltage	220 V / 230 V / 240 V
AC voltage range	184 V to 270 V
Nominal AC current at 220 V	12 A
Nominal AC current at 230 V	12 A
Nominal AC current at 240 V	11.5 A
Maximum output current	12 A
Total harmonic distortion of the output current with total harmonic distortion of the AC voltage < 2%, and AC power > 50% of the rated power	≤ 3%
Rated power frequency	50 Hz
AC power frequency	50 Hz / 60 Hz
Operating range at AC power frequency 50 Hz	45.5 Hz to 63 Hz
Operating range at AC power frequency 60 Hz	45.5 Hz to 63 Hz
Power factor at rated power	1
Feed-in phases	1
Connection phases	1
Overvoltage category as per IEC 60664-1	III

Protective Devices

Overvoltage protection	Varistors
Maximum permissible fuse protection	16 A

General Data

Width x height x depth, without connection area	162 mm x 90 mm x 68 mm
Weight	0.75 kg
Operating temperature range	− 40°C to +45°C
Maximum permissible value for relative humidity, non-condensing	100%
Maximum operating altitude above MSL	3,000 m
Cooling concept	Convection
Degree of protection	IP20
Protection class	I
Pollution degree	3
Approvals and national standards, as per 09/2013	VDE0126-1-1 VDE-AR-N-4105

Climatic Conditions

As per IEC 60721-3-4, installation type C, class 4K4H

Extended temperature range	− 40°C to +45°C
Extended humidity range	0% to 100%
Extended air pressure range	79.5 kPa to 106 kPa

As per IEC 60721-3-4, transport type E, class 2K3

Temperature range	− 25°C to +70°C

Features

Power-line communication to inverters	As standard
Speedwire/Webconnect communication to SMA communication products, RJ45	As standard
Display of the PV system and communication status	2 LEDs

Torques

Screw terminals	0.6 Nm

Data Storage Capacity

Energy yield over the day per inverter	At least 63 days
Daily yields per inverter	At least 30 years
Event messages of the Sunny Multigate for users	At least 1,024 events
Event messages of the Sunny Multigate for installers	At least 1,024 events
Event messages per inverter for users	At least 256 events
Event messages per inverter for installers	At least 256 events

13.3   Torques of AC Field Plugs

Screw in insulator	0.8 Nm
Screw connection of the AC plug enclosure, initial torque	3.3 Nm
Screw connection of the AC plug enclosure, end torque	4.4 Nm

14 Accessories

You will find the corresponding accessories and spare parts for your product in the following overview. If required, these can be ordered from SMA Solar Technology AG or your distributor.

Designation	Brief description	SMA order number
DC plug, assembled, MC4	24 DC plugs, assembled, Multi-Contact KST4	MI-DCMC4-10
DC plug, assembled, Tyco	24 DC plugs assembled with Tyco Solarlock	MI-DCTYCO-10
AC field plug	20 AC field plugs	MI-ACCON-10
AC protective cap	200 AC protective caps	MI-ACCAP-10
AC cable 1.40 m	24 AC cables with counterplugs for connecting the inverters among each other	MI-ACCAB14-10
AC cable 2.0 m	24 AC cables with counterplugs for connecting the inverters among each other	MI-ACCAB20-10
Bootlace ferrules 2.5 mm²	Manufacturer: Miromar LLC	Distributor: Ferrules Direct Order no. N25010
Cable shears	Insulated handles, 165 mm Manufacturer: KNIPEX	via distributor Art. no. 95 16 165
Stripping knife with straight knife blade	TiN 8 mm to 28 mm Manufacturer: JOKARI	via distributor Art. no. 728000
Insulation stripping tool	Stripping diameter up to 10 mm², insulation stripping length up to 25 mm Manufacturer: WEIDMÜLLER	via distributor Order no. 9005000000
Crimping tool	Square crimping tool for bootlace ferrules up to 10 mm² Manufacturer: RENNSTEIG	via distributor Art. no. 610 084 3
Torque screwdriver	1.4" hexagon socket, 0.3 Nm to 1.2 Nm Manufacturer: WERA	via distributor Art. no. 05074700001
Screwdriver bit	1.4" hexagon, length: 25 mm Application: cross-head screws Manufacturer: WERA	via distributor Art. no. 05056422001
Torque wrench	Adjustable by scale, torque range: 2 Nm to 20 Nm Manufacturer: STAHLWILLE	via distributor Art. no. 50181002

Designation	Brief description	SMA order number
Crow-Ring wrench, AF 25	Manufacturer: STAHLWILLE	via distributor Art. no. 02190025
Square insertion tool	Outer square: 203 mm Inner square: 9x12 Manufacturer: STAHLWILLE	via distributor Art. no. 58240005 (734/5)
Screwdriver	Insulated, Blade width: 4 mm Blade thickness: 0.8 mm Manufacturer: WERA	via distributor Art. no. 05006115006

15 Contact

If you have technical problems concerning our products, contact the SMA Service Line. We need the following information in order to provide you with the necessary assistance:

- Inverter device type
- Device type of the Sunny Multigate
- Type and number of PV modules connected
- Type of communication
- Warning or error

Australia	SMA Australia Pty Ltd. Sydney	Toll free for Australia: 1800 SMA AUS (1800 762 287) International: +61 2 9491 4200
Belgien/ Belgique/ België	SMA Benelux BVBA/SPRL Mecheln	+32 15 286 730
Brasil	Vide España (Espanha)	
Česko	SMA Central & Eastern Europe s.r.o. Praha	+420 235 010 417
Chile	Ver España	
Danmark	Se Deutschland (Tyskland)	
Deutschland	SMA Solar Technology AG Niestetal	Medium Power Solutions Wechselrichter: +49 561 9522-1499 Kommunikation: +49 561 9522-2499 SMS mit „Rückruf": +49 176 888 222 44
		Hybrid Energy Solutions Sunny Island: +49 561 9522-399
		Power Plant Solutions Sunny Central: +49 561 9522-299
España	SMA Ibérica Tecnología Solar, S.L.U. Barcelona	Llamada gratuita en España: 900 14 22 22 Internacional: +34 902 14 24 24

France	SMA France S.A.S. Lyon	Medium Power Solutions Onduleurs : +33 472 09 04 40 Communication : +33 472 09 04 41
		Hybrid Energy Solutions Sunny Island : +33 472 09 04 42
		Power Plant Solutions Sunny Central : +33 472 09 04 43
India	SMA Solar India Pvt. Ltd. Mumbai	+91 22 61713888
Italia	SMA Italia S.r.l. Milano	+39 02 8934-7299
Κύπρος/Kıbrıs	Βλέπε Ελλάδα/ Bkz. Ελλάδα (Yunanistan)	
Luxemburg/ Luxembourg	Siehe Belgien Voir Belgique	
Magyarország	lásd Česko (Csehország)	
Nederland	zie Belgien (België)	
Österreich	Siehe Deutschland	
Perú	Ver España	
Polska	Patrz Česko (Czechy)	
Portugal	SMA Solar Technology Portugal, Unipessoal Lda Lisboa	Isento de taxas em Portugal: 800 20 89 87 Internacional: +351 212377860
România	Vezi Česko (Cehia)	
Schweiz	Siehe Deutschland	
Slovensko	pozri Česko (Česká republika)	
South Africa	SMA Solar Technology South Africa Pty Ltd. Centurion (Pretoria)	08600 SUNNY (08600 78669) International: +27 (12) 643 1785
United Kingdom	SMA Solar UK Ltd. Milton Keynes	+44 1908 304899
Ελλάδ	SMA Hellas AE Αθήνα	801 222 9 222 International: +30 212 222 9 222
България	Вижте Ελλάδα (Гърция)	

ไทย	SMA Solar (Thailand) Co., Ltd. กรุงเทพฯ	+66 2 670 6999
대한민국	SMA Technology Korea Co., Ltd. 서울	+82 2 508-8599
中国	SMA Beijing Commercial Company Ltd. 北京	+86 10 5670 1350

+971 2 698-5080	SMA Middle East LLC أبو ظبي	الإمارات العربية المتحدة

Other countries	International SMA Service Line Niestetal	Toll free worldwide: 00800 SMA SERVICE (+800 762 7378423)

SMA

EC Declaration of Conformity
with the Guidelines of the European Community

- Electromagnetic compatibility 2004/108/EC (EMC)
- Low-voltage directive 2006/95/EC (LVD)

The product stated below has been developed, constructed and manufactured in accordance with the above mentioned EC directives. The applied harmonized standards are shown in the following table.

	Sunny Boy
	SB 240-10, Multigate-10
Electromagnetic Interference (EMC directive, Article 5 – Annex I.1.a)	
EN 61000-6-3:2007 + A1:2011	✓
EN 61000-6-4:2007 + A1:2011	✓
Electromagnetic interference emissions (EMC Directive Article 5 – Annex I.1.a)	
EN 61000-3-3:2008	✓
EN 61000-3-2:2006 + A1:2009 + A2:2009	✓
EN 61000-3-11:2000	✗
EN 61000-3-12:2005	✗
Immunity to interference (EMC Directive Article 5 – Annex I.1.b)	
EN 61000-6-1:2007	✓
EN 61000-6-2:2005	✓
Device safety (LVD Article 2 – Annex I)	
EN 62109-1:2010	✓
	C E

✓ Standard applicable
✗ Standard not applicable

Information:
Without an explicit written confirmation by SMA, this declaration of conformity is no longer valid if:
- the product is modified, supplemented or changed in any other way,
- components which are not part of the SMA accessories kit, are integrated in the product, as well as if the product is used or installed improperly.

Niestetal, 2013-11-06
SMA Solar Technology AG

ppa. Frank Greizer

ppa. Frank Greizer
(Vice President MPTDV)

Declaration of Conformity

with German, European and International (Non-European) standards used for SUNNY BOY 240-10 with Multigate

German Standard DIN EN		European Standard EN		International Standard IEC (IEC/CISPR)
DIN EN 61000-6-1:2007-10	based on	EN 61000-6-1:2007	based on	IEC 61000-6-1:2005
DIN EN 61000-6-2:2006-03	based on	EN 61000-6-2:2005	based on	IEC 61000-6-2:2005
DIN EN 61000-6-3:2011-09	based on	EN 61000-6-3:2007 + A1:2011	based on	IEC 61000-6-3:2006 + A1:2010
DIN EN 61000-6-4:2011-09	based on	EN 61000-6-4:2007 + A1:2011	based on	IEC 61000-6-4:2006 + A1:2010
DIN EN 61000-3-2:2010-03	based on	EN 61000-3-2:2006 + A1:2009 + A2:2009	based on	IEC 61000-3-2:2005 + A1:2008 + A2: 2009
DIN EN 61000-3-3:2009-06	based on	EN 61000-3-3:2008	based on	IEC 61000-3-3:2008
DIN EN 61000-3-11:2001-04	based on	EN 61000-3-11:2000	based on	IEC 61000-3-11:2000
DIN EN 61000-3-12:2005-09	based on	EN 61000-3-12:2005	based on	IEC 61000-3-12:2004
DIN EN 62109-1:2011	based on	EN 62109-1:2010	based on	IEC 62109-1:2010

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