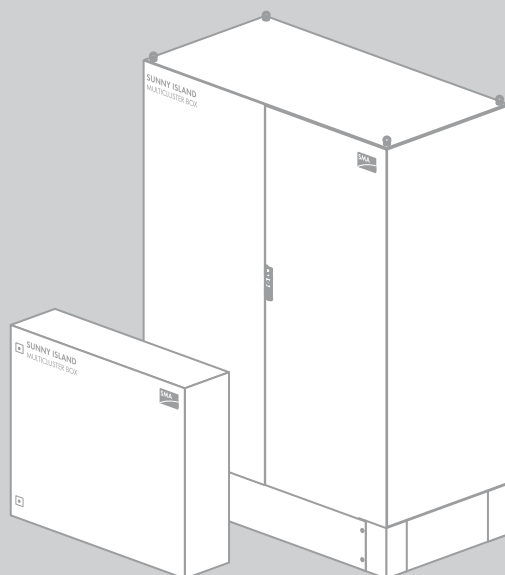


Operating Manual

Multiclusterc Box 6.3 / 12.3



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SMA Warranty

The current warranty conditions come enclosed with your device. These are also available online at www.SMA-Solar.com and can be downloaded and are available on paper from the usual sales channels if required.

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1 Information on this Document

Validity

This document is valid for the following device types:

- MC-Box-6.3-11
- MC-Box-12.3

Target Group

This document is intended for qualified persons. Only persons with the appropriate skills are allowed to perform the tasks described in this document (see Section 2.2 "Skills of Qualified Persons", page 8).

Symbols

Symbol	Explanation
	Indicates a hazardous situation which, if not avoided, will result in death or serious injury
	Indicates a hazardous situation which, if not avoided, can result in death or serious injury
	Indicates a hazardous situation which, if not avoided, can result in minor or moderate injury
	Indicates a situation which, if not avoided, can result in property damage
	Indicates that the following section contains tasks that must only be performed by qualified persons
	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 might occur

Nomenclature

Complete designation	Designation in this document
Multiclustar Box 6.3-11 / 12.3	Multiclustar Box
Sunny Island multiclustar system	Multiclustar system

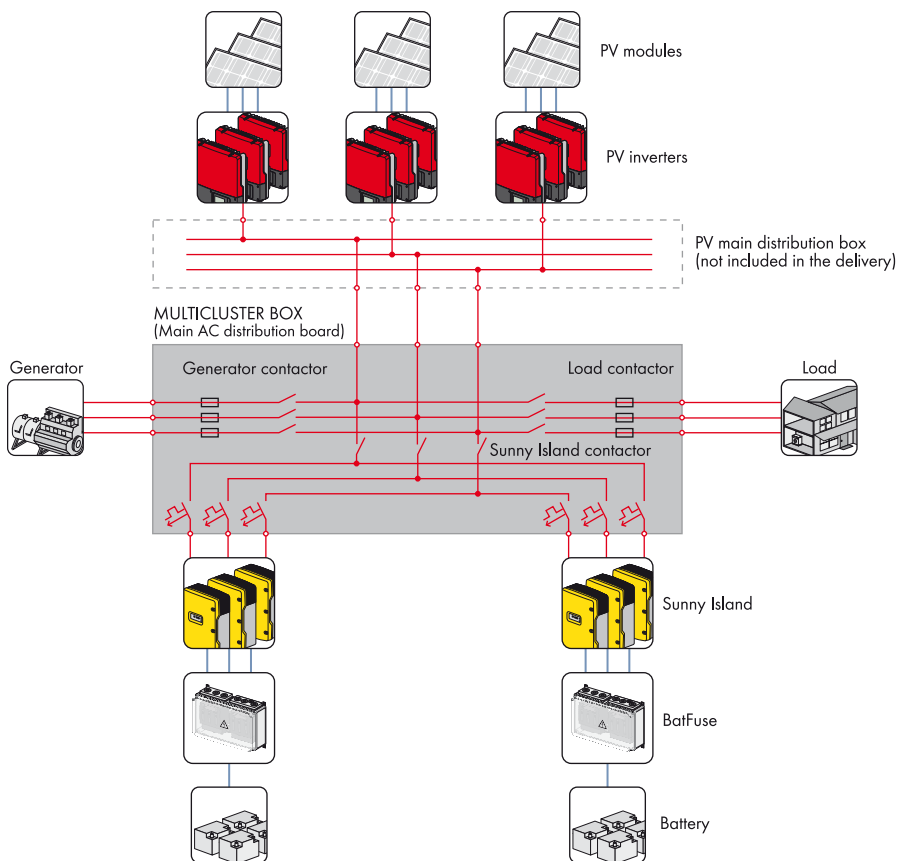
Abbreviations

Abbreviation	Designation	Explanation
AC	Alternating Current	-
DC	Direct Current	-
PV	Photovoltaics	-

2 Safety

2.1 Intended Use

The Multicluster Box is a device of a multicluster system. It is used to establish stand-alone grids with several Sunny Island inverters. The Multicluster Box is a stationary switching device combination (AC main distributor) to which you can connect the Sunny Island inverters, the loads, the generator and another power generation system such as a PV system.



Connection only to TN system

The Multicluster Box is only suitable for the connection to a TN system.

Only commission the Multiclusterc Box in conjunction with Sunny Island inverters of device type SI 6.0H/8.0H/5048.

The maximum connection power of the individual outputs must not be exceeded, e.g. the maximum connectable PV power of 55 kW for the Multiclusterc Box 6.3.

The conductors of all connection cables must be made of copper.

The Multiclusterc Box is designed for use at altitudes of up to 2,000 m above mean sea level. If you wish to use the Multiclusterc Box at altitudes above 2,000 m, contact SMA Solar Technology AG.

The Multiclusterc Box is designed for indoor use only.

The product is designed for EMC environment A* . In EMC environment B* , the product can cause undesired electromagnetic interference. If the product is operated in EMC environment B, take protective measures against electromagnetic interference in accordance with the locally applicable standards and directives.

Only use this product in accordance with the enclosed documentation and with the local standards and directives. Any other application may cause personal injury or property damage.

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

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

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

The type label must remain permanently attached to the product.

2.2 Skills of Qualified Persons

Qualified persons must have the following skills:

- Training in off-grid systems from SMA Solar Technology AG
- Training in how to deal with the dangers and risks associated with installing and operating electrical devices and batteries
- Training in the installation and commissioning of electrical devices
- Knowledge of and adherence to the local standards and directives
- Knowledge of and adherence to this document and all safety precautions

* in accordance with IEC 61439-1:2011

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

WARNING

Danger to life due to electric shock

High voltages are present in the Multiclustert Box. Touching live components can result in death or serious injury due to electric shock.

- Disconnect the multiclustert system from all voltage sources before carrying out any work on the Multiclustert Box (see Section 8, page 35).



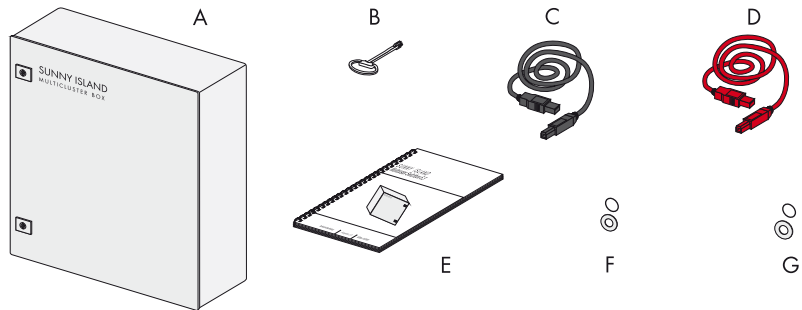
Problems occurring while performing the described activities

Should you encounter problems while performing the activities described in this document, contact SMA Solar Technology AG (see Section 13 "Contact", page 44).

3 Scope of Delivery

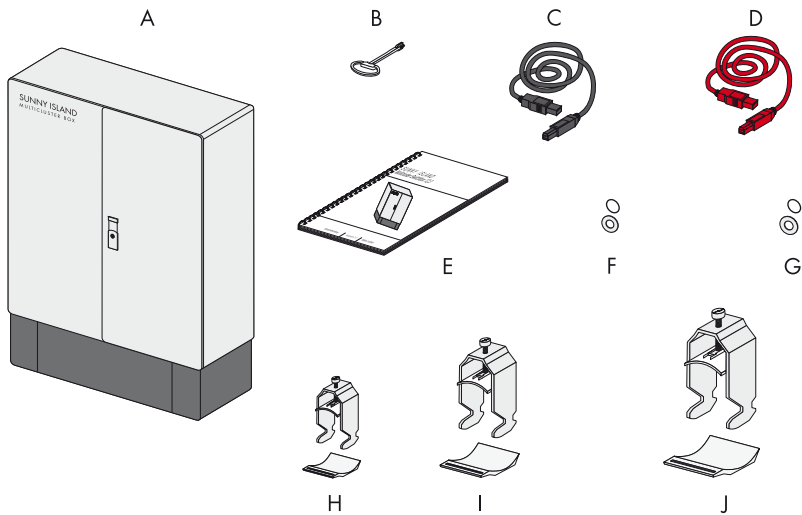
Check the scope of delivery for completeness and any externally visible damage. Contact your distributor if the scope of delivery is incomplete or damaged.

Multiclustervox 6.3



Position	Quantity	Description
A	1	Multiclustervox
B	1	Switch cabinet key
C	1	Data cable for communication (5 m, black)
D	3	Data cable for control and measuring signals (5 m, red)
E	1	Operating manual and connection overview
F	4	Sealing ring with washer (diameter: 6 mm)
G	4	Sealing ring with washer (diameter: 8 mm)

Multiclust Box 12.3



Position	Quantity	Description
A	1	Multiclust Box
B	1	Switch cabinet key
C	1	Data cable for communication (5 m, black)
D	3	Data cable for control and measuring signals (5 m, red)
E	1	Operating manual
F	4	Sealing ring with washer (diameter: 6 mm)
G	4	Sealing ring with washer (diameter: 8 mm)
H	1	Strain relief with counter-trough (22 mm to 28 mm)
I	3	Strain relief with counter-trough (52 mm to 58 mm)
J	3	Strain relief with counter-trough (58 mm to 64 mm)

4 Type Label

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

- Address of SMA Solar Technology AG
- Device type (Type)
- Serial number (Serial No.)
- Article number (Art No.)
- Date of manufacture

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 Label

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 due to 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 documentation supplied with the product.
	WEEE designation Do not dispose of the product together with the household waste but in accordance with the locally applicable disposal regulations for electronic waste.
	CE marking The product complies with the requirements of the applicable EU directives.
	Degree of protection The product is protected against interior dust deposits and water jets from all angles.

5 Mounting and Installation

5.1 Multiclusterc Box 6.3

5.1.1 Selecting the Mounting Location

⚠ WARNING

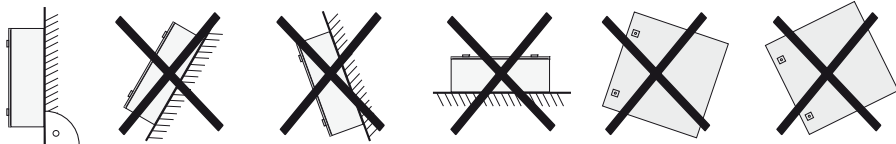
Danger to life due to fire or explosion

Despite careful construction, electronic devices can cause fires if they are not installed properly. This can result in death or serious injury.

- Do not install the Multiclusterc Box on flammable construction materials.
- Do not store any highly flammable materials or products in the vicinity of the Multiclusterc Box.
- Do not install the Multiclusterc Box in potentially explosive areas.

Requirements:

- ☐ The mounting location and method must be suitable for the weight and dimensions.
- ☐ Mount on a solid support surface.
- ☐ The mounting location must be accessible at all times.
- ☐ The ambient temperature must be between -25°C and $+50^{\circ}\text{C}$ to guarantee optimal operation.
- ☐ Vertical installation, connection area must point downwards.



Optimum mounting location

If the Multiclusterc Box and the Sunny Island inverters are operated under different ambient conditions, the circuit breakers for the Sunny Island inverters may trip more often.

- To ensure optimum operation, mount or install the Multiclusterc Box and the Sunny Island inverters at the same location.

5.1.2 Mounting the Multiclustler Box 6.3 on the Wall

⚠ WARNING

Danger of crushing or damage to the Multiclustler Box

The Multiclustler Box can fall down as a result of improper transport and cause severe crushing injuries.

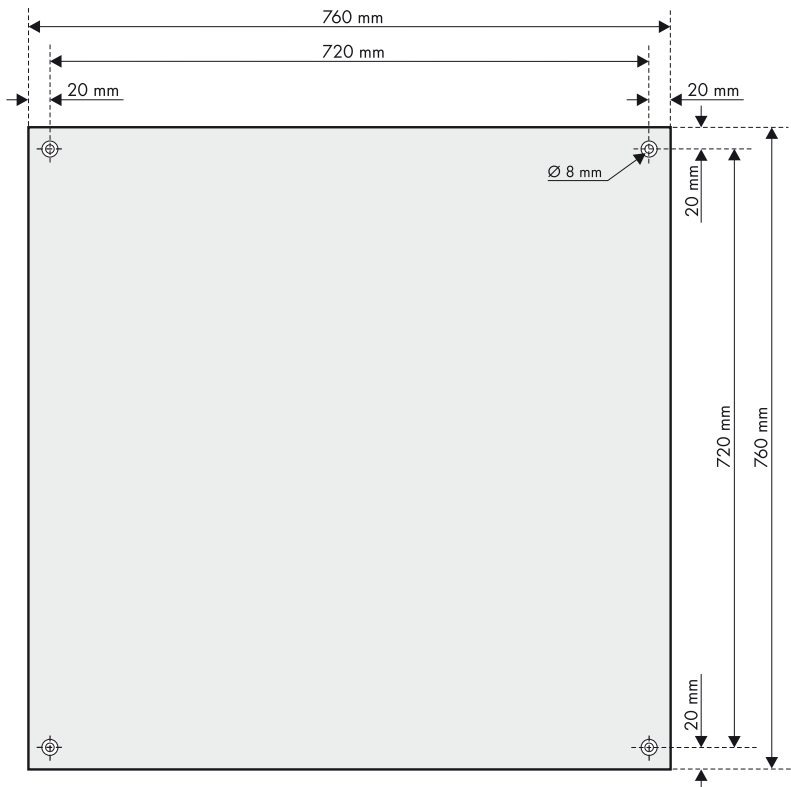
- Take the weight of the Multiclustler Box of approximately 60 kg into account.

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

- ☐ Four screws suitable for the support surface
- ☐ Four screw anchors suitable for the support surface and the screws

Procedure:

1. Mark the position of the drill holes.



2. Drill holes (recommended diameter: 6 mm) at the marked position.

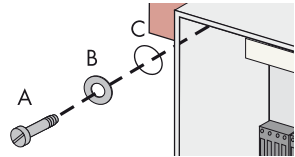
3. Open the Multiclusterc Box with the switch cabinet key included in the delivery.

4. **NOTICE**

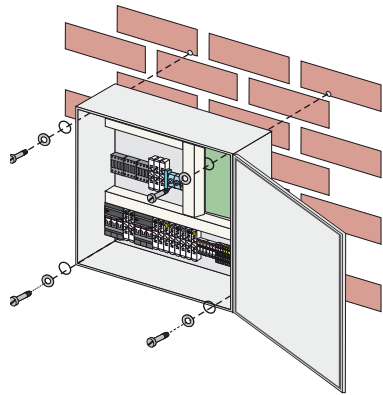
Damage to the Multiclusterc Box

Dust and moisture can penetrate the Multiclusterc Box due to missing seals.

- Position the sealing disc (C).
- Position the washer (B).
- Secure the sealing disc and the washer using a suitable screw (A).



5. Attach the Multiclusterc Box to the wall using suitable screws, washers and sealing discs.



6. Ensure that the device is securely in place.

5.2 Multiclusterc Box 12.3

5.2.1 Selecting a Mounting Location

⚠ WARNING

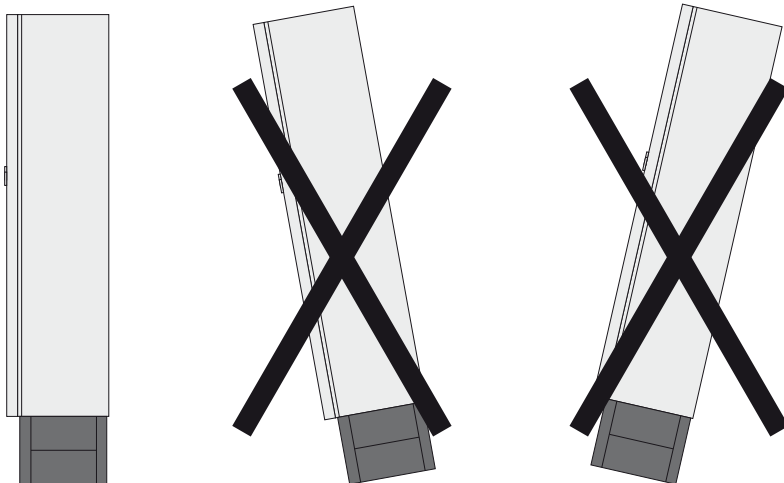
Danger to life due to fire or explosion

Despite careful construction, electronic devices can cause fires if they are not installed properly. This can result in death or serious injury.

- Do not install the Multiclusterc Box on flammable construction materials.
- Do not store any highly flammable materials or products in the vicinity of the Multiclusterc Box.
- Do not install the Multiclusterc Box in potentially explosive areas.

Observe the following conditions during mounting:

- Mount the product on a solid support surface, e.g. a concrete foundation.
- The mounting location must be accessible at all times.
- Observe the corresponding minimum passage widths and escape routes.
- Vertical installation:



Properties of the support surface:

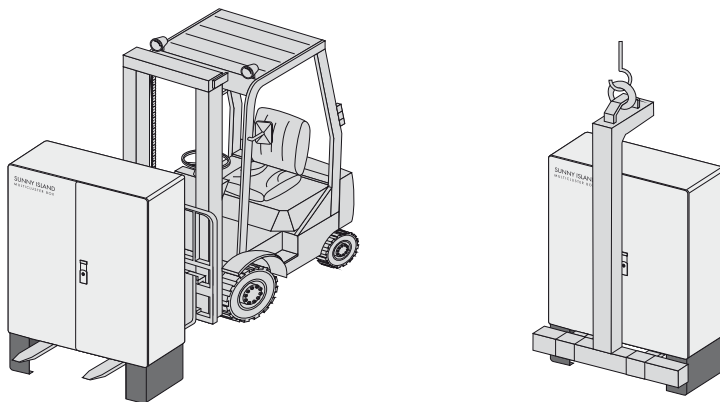
The support surface must guarantee solid and safe positioning of the Multiclusterc Box. When selecting the support surface, take the weight of the Multiclusterc Box of 110 kg into account. The Multiclusterc Box must be installed on a level surface. Correct any existing unevenness or depression in the support surface.

5.2.2 Transporting the Multiclusterc Box 12.3

Transport options:

The Multiclusterc Box is delivered on a Euro pallet. You can use the following means of transport to lift the Multiclusterc Box from the Euro pallet:

- Forklift truck or pallet truck
- Crane with suitable fork



WARNING

Danger of crushing or damage to the Multiclusterc Box

The Multiclusterc Box can fall down as a result of improper transport and cause severe crushing injuries.

- The means of transport must be suitable for the weight of the Multiclusterc Box.
- The Multiclusterc Box must only be transported in an upright position.
- Pay attention to the center of gravity of the Multiclusterc Box. The center of gravity is located in the top third of the Multiclusterc Box.

NOTICE

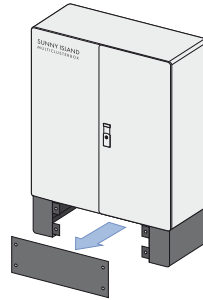
Damage to the Multiclusterc Box due to inappropriate transport

If the Multiclusterc Box is set down on uneven surfaces, it may cause buckling so that the doors will no longer close properly. This can lead to moisture and dust penetrating the Multiclusterc Box.

- Never place the Multiclusterc Box on an unpaved, uneven surface.
- Never transport the Multiclusterc Box with mounted kick plates.

Procedure:

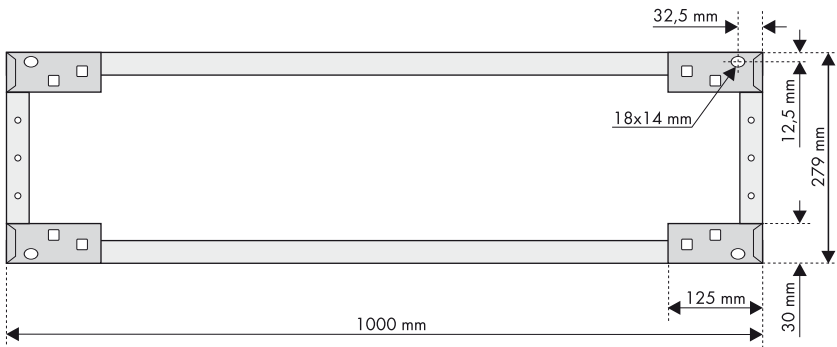
1. Remove all fastening screws from the kick plates at the front and rear.
2. Set the screws aside. These screws will be needed later to reattach the kick plates.
3. Remove the kick plates and set them aside.



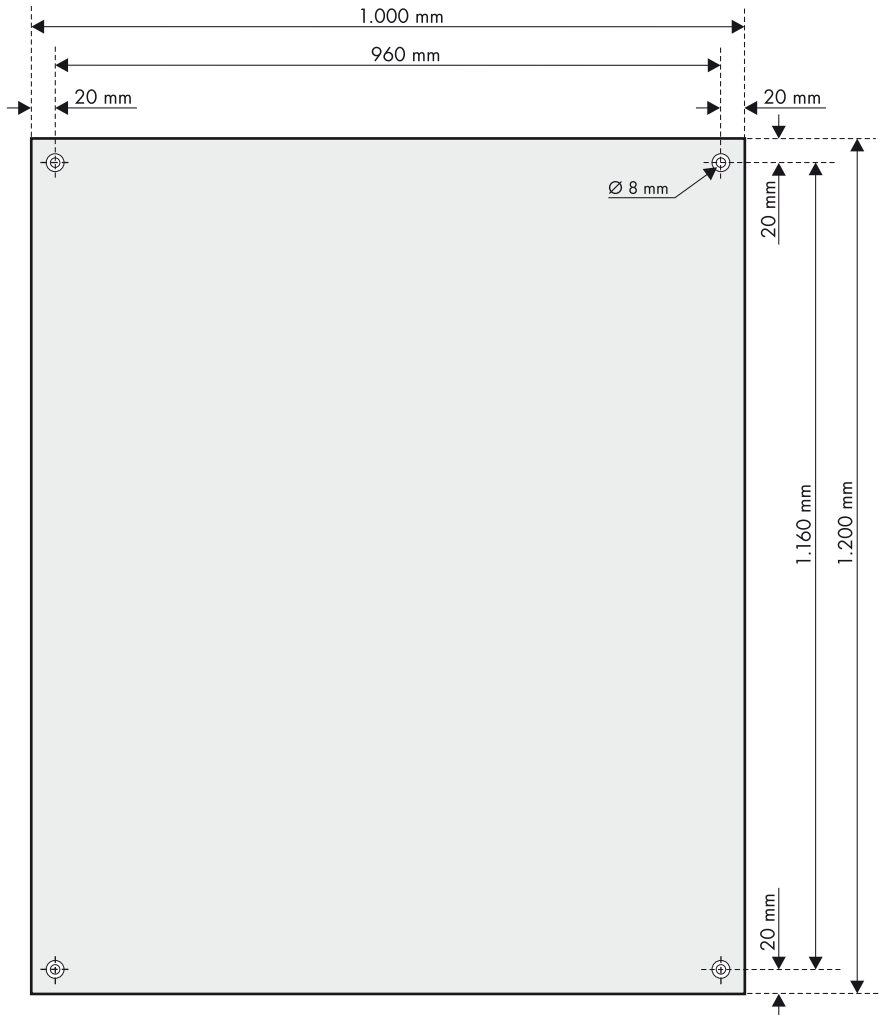
4. Slide the fork of the lift, pallet truck or crane underneath the Multiclustervox and transport the Multiclustervox to the mounting location.

5.2.3 Installing the Multiclustervox 12.3

1. Mark the positions of the drill holes for attaching the base.



2. Only attach the Multiclustler Box to the wall, if you want to secure it additionally.
 - Mark the positions of the drill holes for attaching the rear panel.

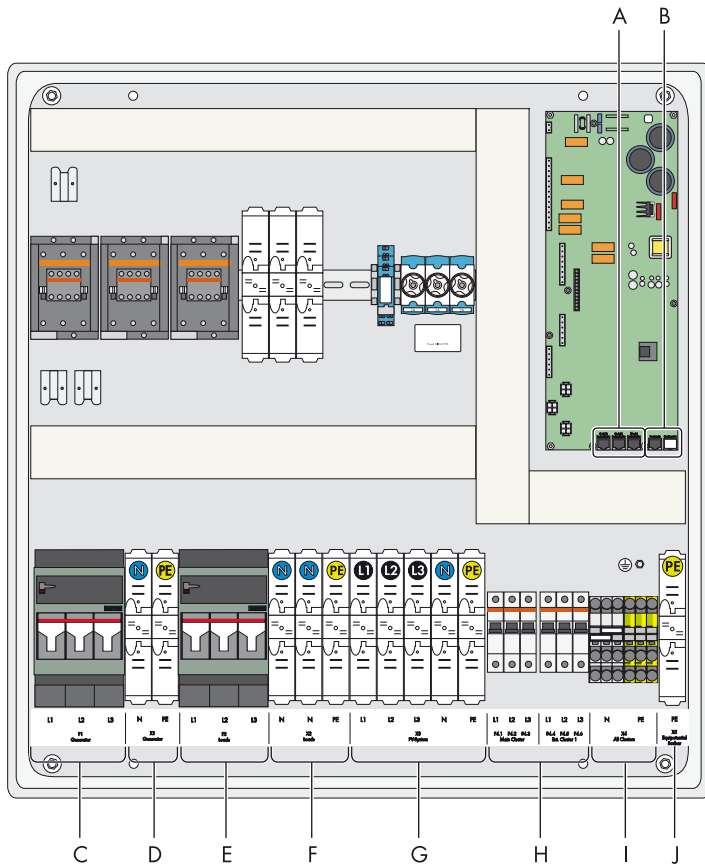


- Drill holes at the marked positions.
 - Insert the screw anchors.
3. Position the Multiclustler Box on the support surface against the wall.
 4. Use four suitable screws to attach the Multiclustler Box to the wall.
 5. Attach the Multiclustler Box to the support surface using four suitable screws.

6 Electrical Connection

6.1 Overview of the Connection Area

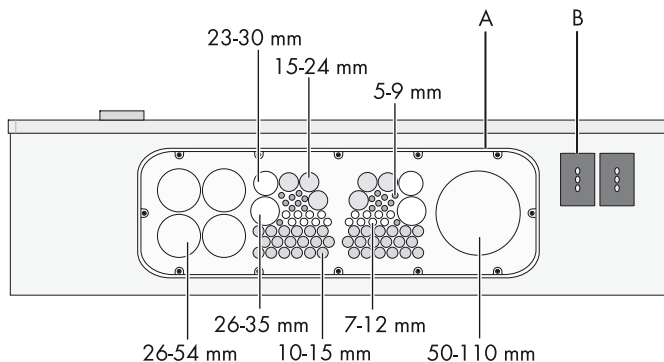
6.1.1 Interior View of the Multiclust Box 6.3



Object	Description
A	RJ45 pin connectors for connecting the data cables for control and measuring signals
B	RJ45 pin connector for connecting the data cable for communication
C	Fuse switch-disconnector F1 Generator for connecting the generator (L1, L2, L3)
D	Terminals X1 Generator for connecting the generator (N, grounding conductor)
E	Fuse switch-disconnector F2 Loads for connecting the loads (L1, L2, L3)

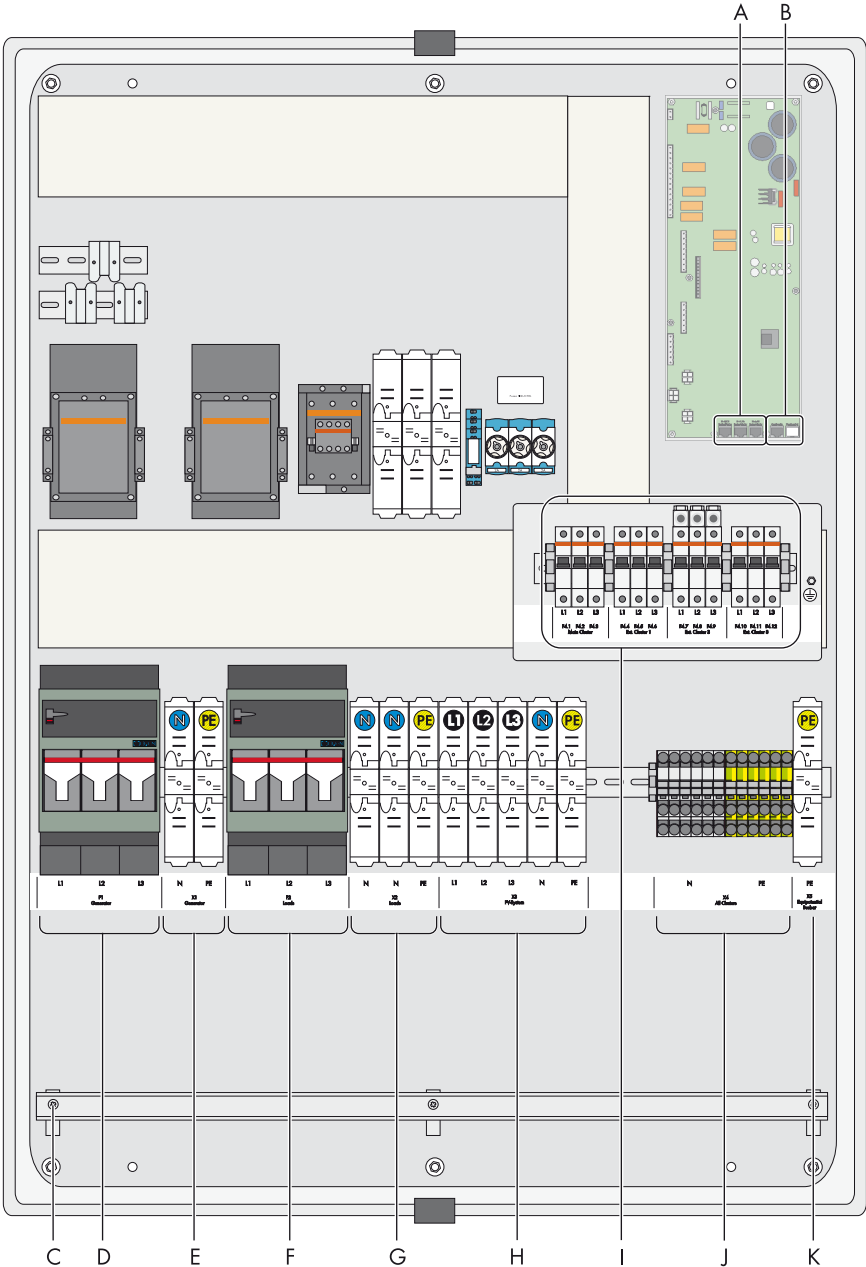
Object	Description
F	Terminals X2 Loads for connecting the loads (N, grounding conductor)
G	Terminals X3 PV-System for connecting the PV system (L1, L2, L3, N, grounding conductor)
H	Circuit breaker for connecting the Sunny Island inverters (L)
I	Terminals X4 All Clusters for connecting the Sunny Island inverters (N, grounding conductor)
J	Terminal X5 Equipotential Busbar for connecting the grounding conductor (for grounding the entire multicluster system)

6.1.2 Bottom View of the Multicluster Box 6.3



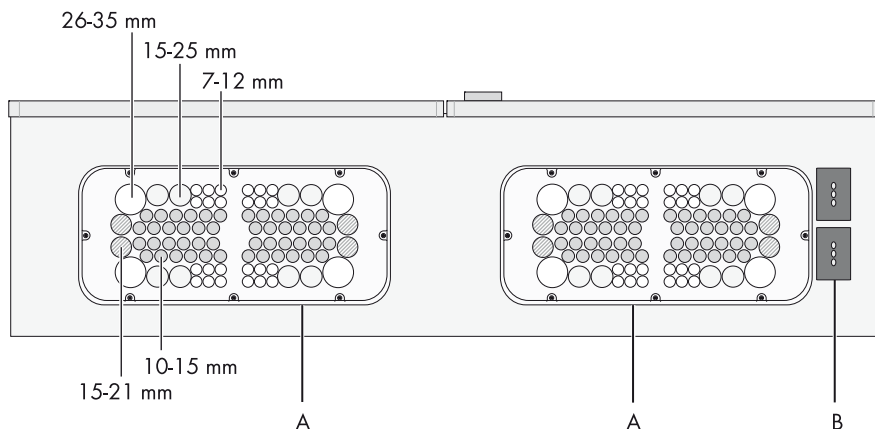
Object	Description
A	Flange plate with membranes for inserting the connection cables
B	Two-part cable feed-through for inserting the data cables

6.1.3 Interior View of the Multiclust Box 12.3



Object	Description
A	RJ45 pin connectors for connecting the data cables for control and measuring signals
B	RJ45 pin connector for connecting the data cable for communication
C	Cable support rail for strain relief of the cables
D	Fuse switch-disconnector F1 Generator for connecting the generator (L1, L2, L3)
E	Terminals X1 Generator for connecting the generator (N, grounding conductor)
F	Fuse switch-disconnector F2 Loads for connecting the loads (L1, L2, L3)
G	Terminals X2 Loads for connecting the loads (N, grounding conductor)
H	Terminals X3 PV-System for connecting the PV system (L1, L2, L3, N, grounding conductor)
I	Circuit breaker for connecting the Sunny Island inverters (L)
J	Terminals X4 All Clusters for connecting the Sunny Island inverters (N, grounding conductor)
K	Terminal X5 Equipotential Busbar for connecting the grounding conductor (for grounding the entire multicluster system)

6.1.4 Bottom View of the Multicluster Box 12.3 (without Base)



Object	Description
A	Flange plate with membranes for inserting the connection cables
B	Two-part cable feed-through for inserting the data cables

6.2 Preparing the Cables

NOTICE

Damage to the Multiclustler Box due to moisture penetration

Dust and moisture can penetrate the Multiclustler Box due to overstretched rubber membranes.

- When inserting the connection cables, take the maximum diameter of the rubber membranes into account (see Section 6.1.2, page 21 and Section 6.1.4, page 23).

NOTICE

Damage to the Multiclustler Box due to rupture of the grounding cables

If the mechanical stress on the connection cables is too high, the connection cables get loose and damage the Multiclustler Box.

- Secure the connection cables of the Multiclustler Box 6.3 externally, e.g. by means of cable support rails.
- Secure the connection cables in the Multiclustler Box 12.3 in the provided cable support rail. Use the strain reliefs and counter-troughs provided for that purpose.

Cable requirement:

- ☐ Conductor material: copper

Procedure:

1. Select a suitable membrane for inserting the individual connection cable.
2. Pierce the selected membrane with a pointed object. The opening must not be too large.
3. Insert the connection cable through the membrane in the Multiclustler Box. The connection cable must be tightly enclosed by the membrane after it is inserted.
4. Strip the insulation off the connection cable in accordance with the tube terminal lug used.
5. Fit the stripped insulated conductor with a suitable tube terminal lug. This does not apply to the connection cables of the Sunny Island inverters.
6. Connect each connection cable as described in the following sections.

6.3 Cable Connection



Overview of the connection area

The following sections show an example of the connection area of the Multiclustler Box 12.3. The connection procedure for both Multiclustler Boxes is identical, only the environment is different.

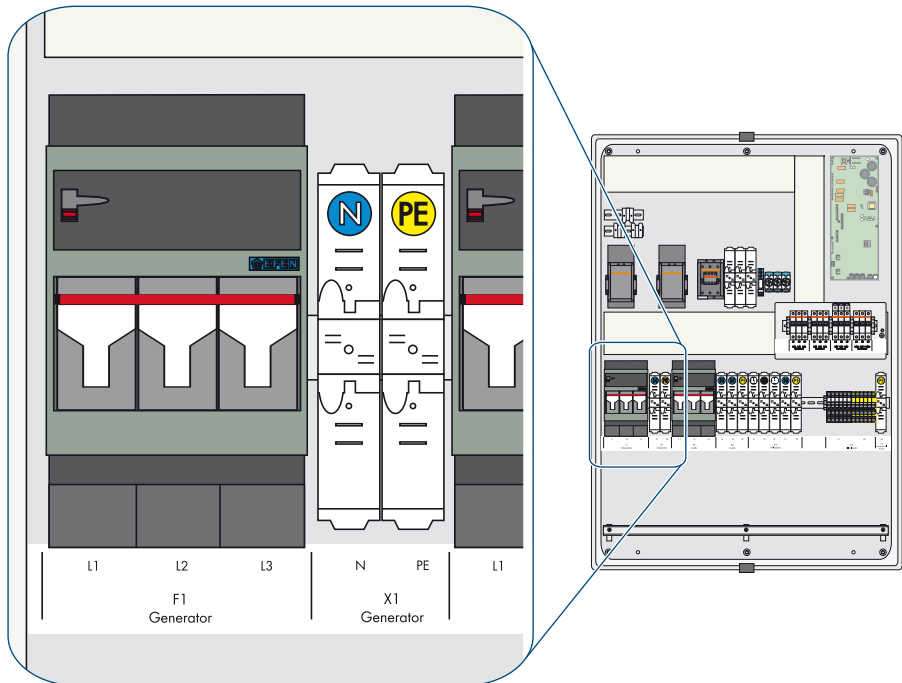


Torque of the terminals

When connecting the cables, it is essential to observe the torques of the individual terminals (see Section 11, page 38 or Section 12, page 42).

6.3.1 Connecting the Generator

You can connect a three-phase generator to the Multiclusterc Box, e.g. a diesel generator or another grid-forming power generator. However, you also have the option of connecting it to the utility grid. The line conductors L1, L2 and L3 are routed via a fuse switch-disconnector in the Multiclusterc Box. Fuse links with a nominal current of 80 A (Multiclusterc Box 6.3) or 160 A (Multiclusterc Box 12.3) are installed ex works.



Cable dimensioning:

If the generator does not have an output fuse, the connection cables to the Multiclusterc Box must be short-circuit and ground-fault protected. As an alternative, you can install an additional fuse box close to the generator, especially in case of longer cable routes.

Cable requirement:

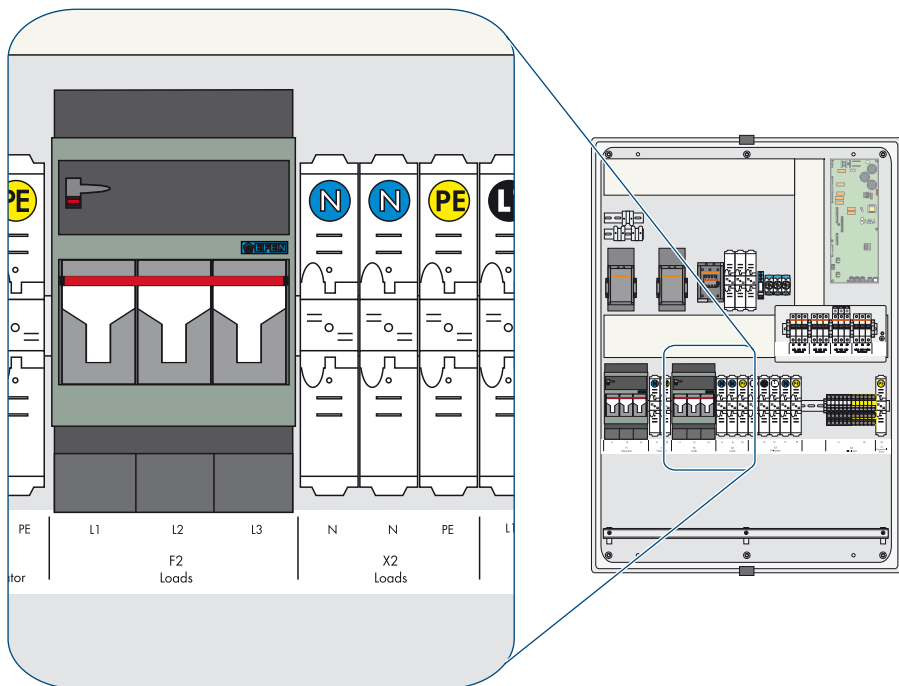
- ☐ Conductor material: copper

Procedure:

1. Prepare the connection cables (see Section 6.2 "Preparing the Cables", page 24).
2. Connect the grounding conductor and N to the terminal **X1 Generator** as labeled.
3. Connect L1, L2 and L3 to the fuse switch-disconnector **F1 Generator** as labeled.
4. According to the type of cable routing and the installation conditions, determine the required fuse link for the fuse switch-disconnector and insert it in the fuse holder.

6.3.2 Connecting the Loads

The line conductors L1, L2 and L3 are routed via a fuse switch-disconnector in the Multiclusster Box. Fuse links with a nominal current of 80 A (Multiclusster Box 6.3) or 160 A (Multiclusster Box 12.3) are installed ex works. The fuse switch-disconnectors are required to protect the output cables from overload in stand-alone grid operation. Note that the currents of the Sunny Island inverters, the PV system and the generator can add up.



Cable requirement:

- ☐ Conductor material: copper

Procedure:

1. Prepare the connection cables (see Section 6.2 "Preparing the Cables", page 24).
2. Connect the grounding conductor and N to the terminal **X2 Loads** as labeled. The second terminal **N** is not used.
3. Connect L1, L2 and L3 to the fuse switch-disconnector **F2 Loads** as labeled.
4. According to the type of cable routing and the installation conditions, determine the required fuse link for the fuse switch-disconnector and insert it in the fuse holder.

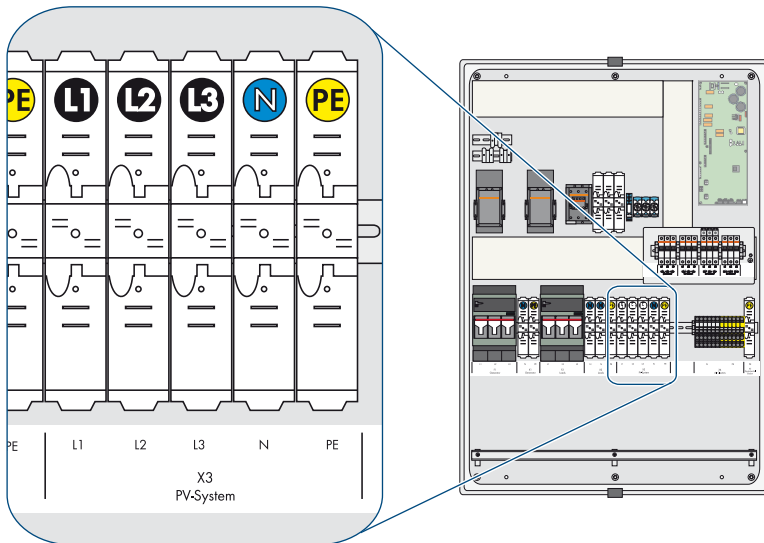
6.3.3 Connecting the PV System

Cable protection

The Multiclusterc Box does **not** replace the distribution board of the PV system (PV main distribution board). Install a circuit breaker and if necessary a residual-current device between the Multiclusterc Box and the PV system for protection and disconnection purposes. Make sure to observe all standards and directives applicable at the installation site.

Connecting other energy sources

Instead of a PV system, you can connect other energy sources (e.g. small wind turbine systems) to the Multiclusterc Box.



Cable dimensioning:

In the event of a short circuit, short-circuit currents occurring in the generator will flow via the unprotected cable between the Multiclusterc Box and PV main distribution. If the generator fuse is larger than the fuse in the PV main distribution board, the cables must be dimensioned for the generator fuse.

When planning the short-circuit protection of cables, the PV inverters and Sunny Island inverters may be disregarded, as their construction precludes any danger to cables in case of short circuits. Overload protection is guaranteed if the connection cables to the PV system are at least dimensioned for the feed-in power of the PV system.

Cable requirement:

- ☐ Conductor material: copper

Procedure:

1. Prepare the connection cables (see Section 6.2 "Preparing the Cables", page 24).
2. Connect the grounding conductor and N to the terminal **X3 PV-System** as labeled.
3. Connect L1, L2 and L3 to the terminal X3 **PV-System** as labeled.

6.3.4 Connecting the Sunny Island

**Fuse of the Sunny Island inverters**

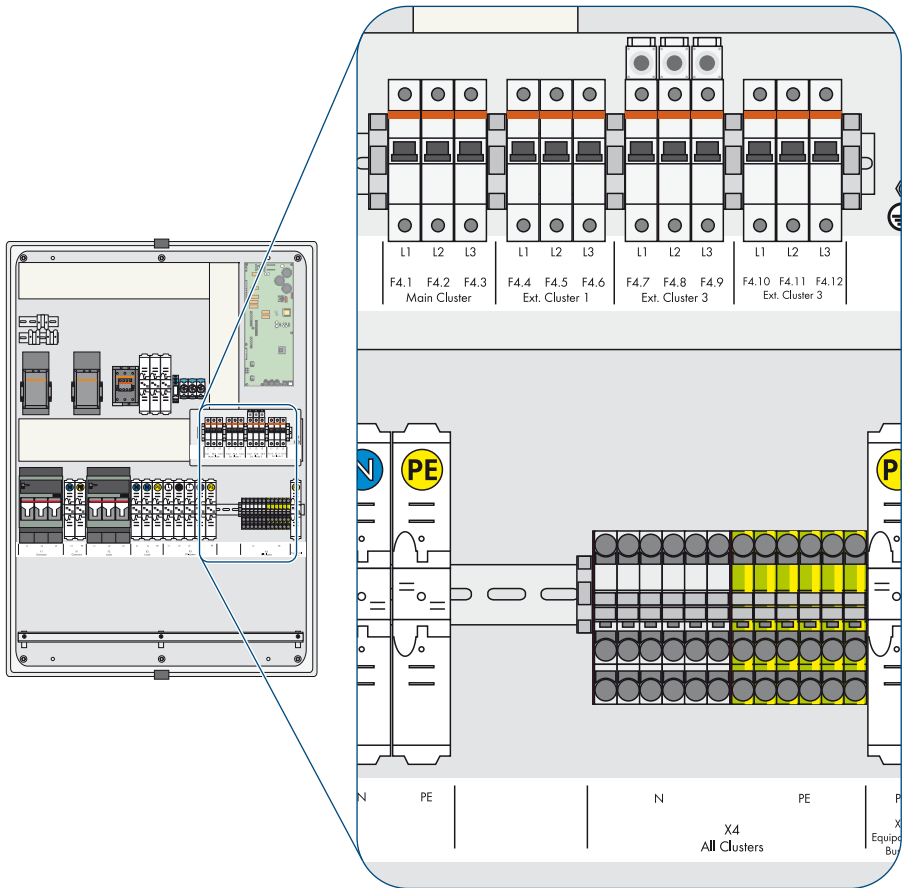
Each Sunny Island is fused by a circuit breaker inside the Multicluseter Box.

- Multicluseter Box 6.3-11: 40 A
- Multicluseter Box 12.3: 32 A

**Optimum mounting location**

If the Multicluseter Box and the Sunny Island inverters are operated under different ambient conditions, the circuit breakers for the Sunny Island inverters may trip more often.

- To ensure optimum operation, mount and install the Multicluseter Box and the Sunny Island inverters at the same location.



Cable requirement:

- ☐ Conductor material: copper

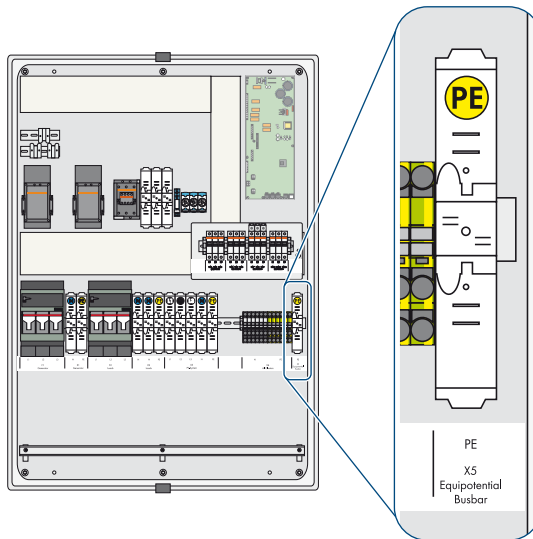
Procedure:

1. Prepare the connection cables (see Section 6.2 "Preparing the Cables", page 24).
2. Connect the grounding conductor and N of all Sunny Island inverters to the terminal **X4 All Clusters** as labeled.
3. Connecting the main cluster:
 - Connect L of the master to L1 of the circuit breaker **F4.1 Main Cluster**.
 - Connect L of Slave 1 to L2 of the circuit breaker **F4.2 Main Cluster**.
 - Connect L of Slave 2 to L3 of the circuit breaker **F4.3 Main Cluster**.

4. Connect Extension Cluster 1 to the circuit breakers **F4.4 – F4.6 Ext. Cluster 1**.
For the connection of Extension Cluster 1, proceed as described under point 3.
5. Connect Extension Cluster 2 to the circuit breakers **F4.7 – F4.9 Ext. Cluster 2**.
For the connection of Extension Cluster 2, proceed as described under point 3.
6. Connect Extension Cluster 3 to the circuit breakers **F4.10 – F4.12 Ext. Cluster 3**.
For the connection of Extension Cluster 3, proceed as described under point 3.

6.3.5 Grounding the Multicuster System

The neutral conductors inside the Multicuster Box are not connected to the grounding conductor by default. To ensure safe operation of the multicuster system, the following measures must be taken prior to commissioning:



Cable requirement:

- ☐ Conductor material: copper

Procedure:

1. Prepare the connection cables (see Section 6.2 "Preparing the Cables", page 24).
2. Connect the grounding conductor to the grounding terminal **X5 Equipotential Busbar** and connect it to the grounding busbar.
3. Ground the multicuster system outside the Multicuster Box on either the generator side or the load side. Connect the neutral conductor to the grounding conductor, observing all standards and directives applicable at the installation site.

6.4 Data Cable Connection

The Multicluster Box transfers voltage and current measuring signals to the Sunny Island inverters. These signals are transferred via the supplied data cables for control and measuring signals (red). The Multicluster Box is controlled by the master in the main cluster via a CAN interface.

Before connecting the data cables in the Multicluster Box, you must insert the cables into the Multicluster Box through the two-part cable feed-throughs (see Section 6.4.1 "Inserting the Data Cables into the Multicluster Box", page 31). Afterwards, connect the cables (see Section 6.4.2, page 33 and Section 6.4.3, page 33).

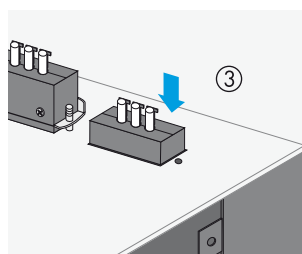
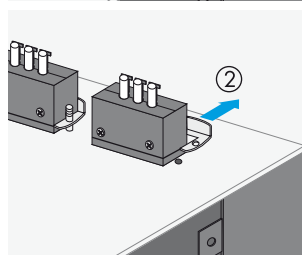
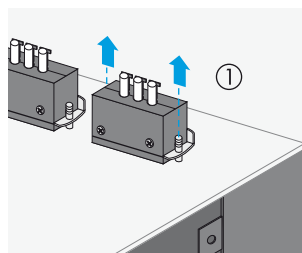
6.4.1 Inserting the Data Cables into the Multicluster Box

Illustration of the enclosure openings

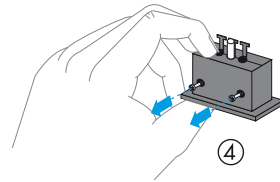
In the following instructions, the enclosure openings of the Multicluster Box 12.3 are illustrated as an example. The enclosure openings and the procedure for inserting the data cables are identical for both Multicluster Boxes, only the position of the enclosure openings is different.

Procedure:

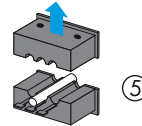
1. Loosen the screws of the mounting plate of the two-part cable feed-through inside the Multicluster Box.
2. Remove the mounting plate and set it aside.
3. Remove the cable feed-through from the enclosure.



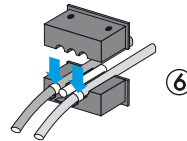
4. Loosen the screws of the two-part cable feed-through.



5. Remove the half without the T-shaped fastening pieces.

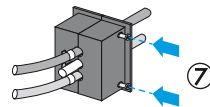


6. Lay the data cable for communication and the data cable for control and measuring signals of sufficient length from the cable feed-through with the T-shaped mounting tab to the desired connection point and secure it with cable ties.

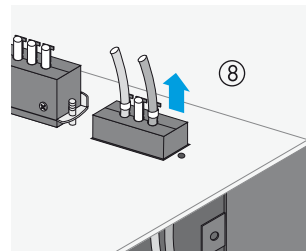


7. Bolt the halves back together. Fasten the screws hand-tight.

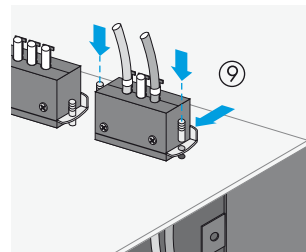
The data cables and placeholders (plastic stick) must be firmly pressed between both sides of the two-part cable feed-through. This ensures tightness of the enclosure.



8. Position the cable feed-through including the cable from the outside in the enclosure.

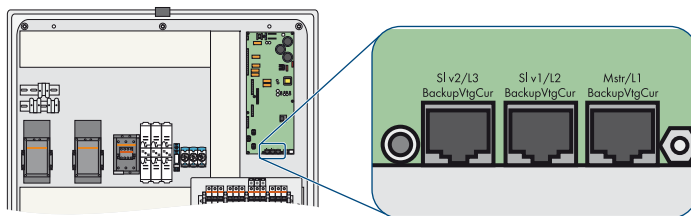


9. Position the mounting plate of the two-part cable feed-through and fasten it hand-tight.



10. Repeat steps 1 to 9 for the remaining data cables. Use the second two-part cable feed-through.

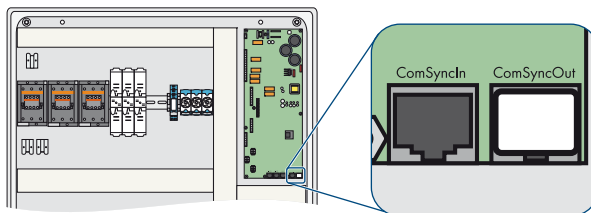
6.4.2 Connecting the Data Cables for Control and Measuring Signals



Procedure:

1. Plug the data cable for control and measuring signals (red) for the master of the main cluster in the pin connector **Mstr/L1**.
2. Plug the data cable for control and measuring signals for Slave 1 of the main cluster in the pin connector **SIv1/L2**.
3. Plug the data cable for control and measuring signals for Slave 2 of the main cluster in the pin connector **SIv2/L3**.

6.4.3 Connecting the Data Cables for Communication



Procedure:

1. Plug the black data cable for the communication between Sunny Island and Multicluster Box in the pin connector **ComSyncIn**. Leave the terminator plugged into the pin connector **ComSyncOut**.
2. Plug the end of the data cable in the pin connector **ComSyncIn** of a Sunny Island inverter in the main cluster. Since all Sunny Island inverters (master and slaves) of the main cluster are connected via a communication bus, the Multicluster Box can be connected to a slave or the master of the main cluster.

7 Commissioning the Multicluster Box

Requirements:

- ☐ The Multicluster Box must be properly mounted or installed.
- ☐ The multicluster system must be grounded outside the Multicluster Box on either the generator side or the load side.
- ☐ The neutral conductor must be connected to the grounding conductor.
- ☐ All connection cables must be correctly connected.
- ☐ All cables must be tightly enclosed by the membrane on the bottom side of the Multicluster Box.
- ☐ All connection cables for generator, loads, PV system and Sunny Island inverters must be secured inside or outside the Multicluster Box.

Procedure:

- Commission the multicluster system (see documentation of the Sunny Island inverters).



Load shedding in the first two operating hours

The state of charge (SOC) recorded by battery management and the available battery capacity (SOH) will deviate strongly from the actual SOC and SOH values for a newly connected battery. During operation, the values recorded by battery management will gradually approach the real values. In the first two operating hours with the new battery, these deviations can lead to load shedding and corresponding entries in the log file.

8 Disconnecting the Multiclustler System from Voltage Sources

1. Switch off all loads.
2. Stop the multiclustler system at the master of the main cluster (see documentation of the Sunny Island).
3. Switch off all Sunny Island inverters (see documentation of the Sunny Island).
4. Disconnect the PV main distribution board and secure against reconnection.
5. Shut down the generator and secure against reconnection.
6. Open the Multiclustler Box with the switch cabinet key.
7. In the Multiclustler Box, open all circuit breakers of the Sunny Island inverters.
8. Ensure that no voltage is present in the Multiclustler Box.
9. Ground the PV main distribution board outside the Multiclustler Box and short-circuit.
10. Ground the generator outside the Multiclustler Box and short-circuit.
11. Cover and isolate any adjacent live components.

9 Maintenance

WARNING

Danger to life due to electric shock

High voltages are present in the Multiclusster Box. Touching live components can result in death or serious injury due to electric shock.

- Disconnect the multiclusster system from all voltage sources before carrying out any work on the Multiclusster Box (see Section 8, page 35).

The Multiclusster Box must be serviced at regular intervals. Note that the maintenance interval is influenced by the mounting location and the ambient conditions. The Multiclusster Box must be serviced more frequently if it is installed in environments with severe dust pollution.

Maintenance work	Recommended maintenance interval
Check the inside of the Multiclusster Box for dirt, moisture and water ingress. • If necessary, clean the Multiclusster Box and take appropriate measures.	Twelve months
Check stability of all connections. Disconnect the Multiclusster Box from all voltage sources (see Section 8, page 35). • Tighten connections if necessary (for torques: see Section 11, page 38 or Section 12, page 42).	Twelve months
Check insulation, terminals and fuse elements for any discoloration or visible changes. • If a customer-supplied cable, such as the load cable of the Multiclusster Box, shows discoloration or visible changes, replace it. Disconnect the Multiclusster Box from all voltage sources (see Section 8, page 35). • If any internal wiring or a fuse element is discolored or shows visible changes, inform the SMA Service Line.	Twelve months
Check the Multiclusster Box for corrosion. • Use touch-up sticks, paint brushes, spray paint or, alternatively, 2K-PUR acrylic paint to repair minor surface damage. Observe the relevant instructions of the paint manufacturer. • Use touch-up paint or alternatively 2K-PUR acrylic paint to repair extensive surface damage. Observe the relevant instructions of the paint manufacturer.	Twelve months
Check door seals for damage. • Replace damaged door seals.	Twelve months
To protect the door seals from damage due to freezing, treat the seals with a protective agent (e.g. talcum, petroleum jelly or wax).	Twelve months

10 Decommissioning

10.1 Disassembling the Multiclusterc Box 6.3

WARNING

Danger of crushing limbs and damage to the Multiclusterc Box

The Multiclusterc Box can fall down as a result of improper transport and cause severe crushing injuries.

- Take the weight of the Multiclusterc Box of approximately 60 kg into account.

Procedure:

1. Open the Multiclusterc Box with the switch cabinet key.
2. Remove all cables from the Multiclusterc Box.
3. Loosen the fastening screws of the Multiclusterc Box.
4. Take the Multiclusterc Box down.
5. Lock the Multiclusterc Box with the switch cabinet key.

10.2 Disassembling the Multiclusterc Box 12.3

1. Open the Multiclusterc Box with the switch cabinet key.
2. Remove all fastening screws from the kick plates at the front and rear.
3. Set the screws aside. They will be needed later to reattach the kick plates.
4. Remove all cables from the Multiclusterc Box.
5. Loosen and remove the fastening screws of the Multiclusterc Box.
6. Close the enclosure of the Multiclusterc Box with the switch cabinet key.

7. **WARNING**

Danger of crushing limbs and damage to the Multiclusterc Box

- Transport the Multiclusterc Box with a forklift truck, pallet truck, or crane (see Section 5.2.2 "Transporting the Multiclusterc Box 12.3", page 17).
8. Remount the kick plates on the Multiclusterc Box.

10.3 Storing the Product

Store the Multiclusterc Box in a dry place where the ambient temperature is between -25°C and $+50^{\circ}\text{C}$ at all times.

10.4 Disposal

Dispose of the Multiclusterc Box at the end of its service life in accordance with the disposal regulations for electronic waste applicable at the installation site at that time.

11 Technical Data of the Multiclustar Box 6.3

Load Connection

Quantity	1 x three-phase
Rated power	55 kW
Rated operating voltage between L and N	230 V
Rated operating voltage between L1 and L2	400 V
Current at rated values	3 x 80 A
Diameter of stud terminal for connecting N	6 mm
Diameter of stud terminal for connecting the grounding conductor	6 mm
Diameter of the screws at the fuse switch-disconnector for connecting L1, L2, L3	8 mm
Maximum torque of stud terminal	6 Nm
Maximum torque of the fuse switch-disconnector	14 Nm
Maximum connectable conductor cross-section	35 mm ²
Fuse	LV/HRC size 00
Maximum allowed fuse rating	80 A

Sunny Island Connection

Maximum number of Sunny Island inverters	6
Rated power of the Sunny Island	36 kW
Rated operating voltage between L and N	230 V
Rated operating voltage between L1 and L2	400 V
Current at Sunny Island ratings	3 x 52.2 A
Maximum unaffected short-circuit current at the feed-in terminal	≤ 17 kA
Maximum connectable conductor cross-section	Rigid cable: 25 mm ² Fine-stranded cable: 16 mm ²
Fuses	6 x circuit breaker C 40 A

Generator Connection

Quantity	1 x three-phase
Rated input power	55 kW
Rated operating voltage between L and N	230 V
Rated operating voltage between L1 and L2	400 V

AC input current	3 x 80 A
Maximum relative short-circuit current at the feed-in terminal	≤ 25 kA
Diameter of stud terminal for connecting N	6 mm
Diameter of stud terminal for connecting the grounding conductor	6 mm
Diameter of the screws at the fuse switch-disconnector for connecting L1, L2, L3	8 mm
Maximum torque of stud terminal	6 Nm
Maximum torque of the fuse switch-disconnector	14 Nm
Maximum connectable conductor cross-section	35 mm ²
Fuse	LV/HRC size 00
Maximum allowed fuse rating	80 A

PV System Connection

Quantity	1 x three-phase
Rated power of the PV system	55 kW
Rated operating voltage between L and N	230 V
Rated operating voltage between L1 and L2	400 V
AC current at rated values	3 x 80 A
Maximum relative short-circuit current at the feed-in terminal	≤ 17 kA
Maximum nominal current of the pre-fuse	80 A
Breaking capacity of the pre-fuse in case of short-circuit current	≥ 25 kA
Cut-off current of the fuse	≤ 17 kA
Diameter of stud terminal	6 mm
Maximum torque of stud terminal	6 Nm
Maximum connectable conductor cross-section	35 mm ²
Fuse	Not available

Grounding Connection

Diameter of the screws on the fuse element for connecting the grounding conductor	6 mm
Maximum torque	6 Nm
Maximum connectable conductor cross-section	35 mm ²

Auxiliary Electric Circuits (Fuses F5, F6, F7)

Fuse	D01
Maximum allowed fuse rating	2 A

General Data

Number of line conductors	3
Permitted grid configuration	TN-S
AC voltage range between L1 and N	172.5 V to 250.0 V
AC voltage range between L1 and L2	300 V to 433 V
Rated frequency	50 Hz
Frequency range	40 Hz to 70 Hz
Width x height x depth	760 mm x 760 mm x 210 mm
Weight	55 kg
Maximum installation height above MSL	2,000 m
Inner subdivision*	Form 1, no subdivision
Exterior structure	Closed type
Construction type	Integral parts
Degree of protection of enclosure	IP65
Degree of protection with open enclosure door	IP00
Pollution degree at the mounting location*	3
Pollution degree in the enclosure (microenvironment)*	2
Protection class**	I
Overvoltage category***	Overvoltage category 3
Rated impulse withstand voltage at 2,000 m above mean sea level	4 kV
EMC environment*	A
EC declaration of conformity	Yes
Operating temperature range	– 25°C to +50°C
Humidity	0% to 100%

* in accordance with IEC 61439-1 and IEC 61439-2

** in accordance with IEC 417

*** in accordance with EN 60664

Rated Voltage / Rated Insulation Voltage

Switch cabinet wiring L to N	250 V AC
Switch cabinet wiring L1 to L2	433 V AC
230 V auxiliary electric circuits	250 V AC
24 V auxiliary electric circuits	70 V DC

12 Technical Data of the Multiclust Box 12.3

General Data

Number of line conductors	Three-phase
Nominal voltage (range)	230 V / 400 V (172,5 V to 250 V / 300 V to 433 V)
Nominal frequency (range)	50 Hz (40 Hz to 70 Hz)
Permitted grid configuration	TN
Mounting type / Installation type	Upright on a base

Sunny Island Connection

Quantity	12
Rated current	3 x 104.3 A
Rated power	72 kW
Maximum connectable conductor cross-section	16 mm ²
Fuses	12 x circuit breaker C32A

PV System Connection

Quantity	1 (three-phase)
Rated current	3 x 160 A
Rated power	110 kW
Diameter of stud terminals	10 mm
Maximum torque of stud terminal	10 Nm to 20 Nm
Maximum connectable conductor cross-section	120 mm ²
Fuses	None

Load Connection

Quantity	1 (three-phase)
Rated current	3 x 160 A
Rated power	110 kW
Diameter of stud terminal for connecting N and grounding conductor	10 mm
Diameter of the screws at the fuse switch-disconnector for connecting L1, L2 and L3	8 mm

Maximum torque of stud terminal	10 Nm to 20 Nm
Maximum torque of the fuse switch-disconnector	14 Nm
Maximum connectable conductor cross-section	120 mm ²
Maximum fuse link	160 A
Fuses	LV/HRC size 00

Generator Connection

Quantity	1 (three-phase)
AC input current	3 x 160 A
Rated grid input power	110 kW
Diameter of stud terminal for connecting N and grounding conductor	10 mm
Diameter of the screws at the fuse switch-disconnector for connecting L1, L2 and L3	8 mm
Maximum torque of stud terminal	10 Nm to 20 Nm
Maximum torque of the fuse switch-disconnector	14 Nm
Maximum connectable conductor cross-section	120 mm ²
Maximum fuse link	160 A
Fuses	LV/HRC size 00

Grounding Connection

Stud terminal diameter	10 mm
Maximum torque	10 Nm to 20 Nm
Maximum connectable conductor cross-section	120 mm ²

Mechanical Data

Width x height x depth	1,000 mm x 1,400 mm x 300 mm
Weight	110 kg

Ambient Conditions

Ambient temperature	-25 °C to +50 °C
Humidity	0% to 100%

Protection Rating

Protection class (in accordance with DIN EN 60529)	IP55
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13 Contact

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

- Type of Multiclusster Box
- Serial number of Multiclusster Box
- Type and number of connected Sunny Island inverters
- Type and number of connected PV inverters
- Description of connected loads
- If a generator is connected:
 - Generator type
 - Power
 - Maximum current

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 Mechelen	+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
		SMA Online Service Center: www.SMA.de/Service	
		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 2 12 37 78 60
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	

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		International:	+30 212 222 9 222
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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	
日本	SMA Japan K.K. 東京	+81 3 3451 9530	
+971 2 698-5080	SMA Middle East LLC أبو ظبي		الإمارات العربية المتحدة
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