

Operating Manual

MULTICLUSTER BOX 36



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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

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1 Information on this Document

Validity

This document is valid for the device type MC-BOX-36.3-11 (Multiclusterc Box 36).

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).

Additional Information

You can find more information on the SMA multiclusterc technology and the configurable parameters of the Sunny Island in the documentation of the Sunny Island 5048 / 6.0H / 8.0H.

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
	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
x	A problem that might occur

Nomenclature

Complete designation	Designation in this document
Multiclusterc Box 36	Multiclusterc Box
Sunny Island multiclusterc system	Multiclusterc system

Abbreviations

Abbreviation	Designation	Explanation
AC	Alternating Current	-
DC	Direct Current	-
EMC	Electromagnetic Compatibility	-
MSL	Mean Sea Level	-
PV	Photovoltaics	-
SOC	State of Charge	State of charge of the battery
SOH	State of Health	Battery capacity available for consumption

2 Safety

2.1 Intended Use

The Multicluster Box is a component of the SMA multicluster technology for off-grid systems. The Multicluster Box is a main AC distribution board to which you can connect up to twelve three-phase clusters. Each cluster consists of three Sunny Island inverters of the same device type with parallel DC-side connection.

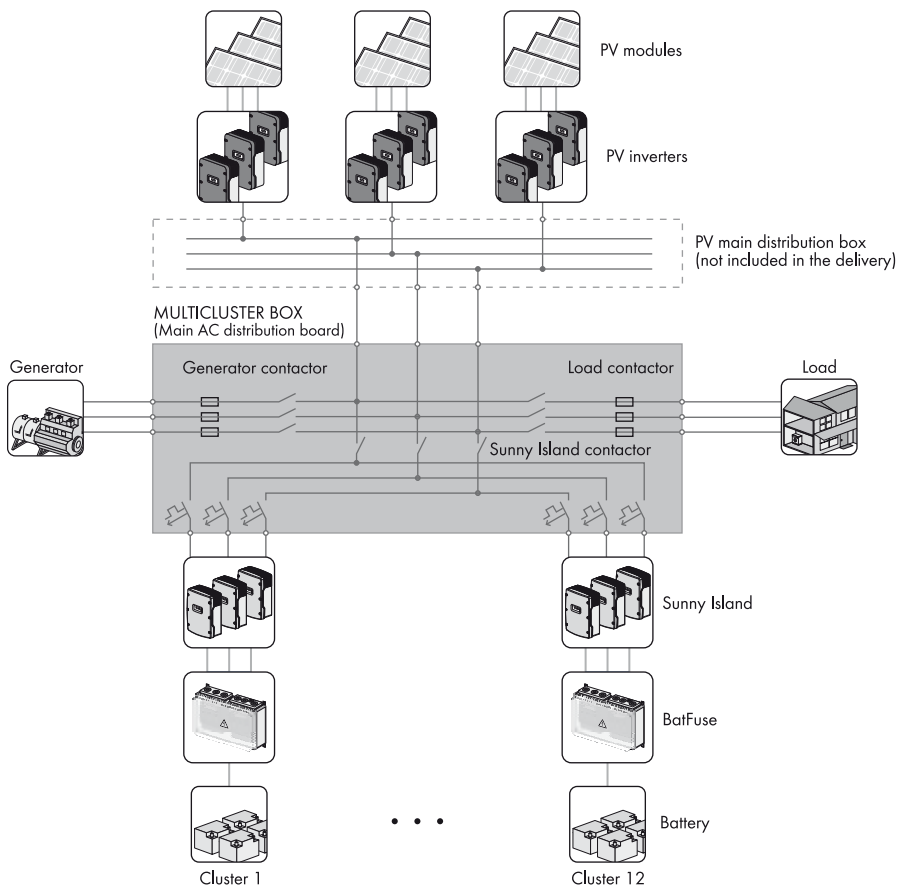


Figure 1: Circuitry principle



Connection requirements

The Multicluster Box is designed for connection to TN systems. The Multicluster Box must be grounded prior to commissioning (see Section 7.9, page 33).

Do not exceed the maximum AC connection power of the Multicluster Box.

Only operate the Multicluster Box in conjunction with Sunny Island inverters of type Sunny Island 5048 / 6.0H / 8.0H. Always take the maximum AC connection power and the permitted Sunny Island combinations into account.

Permitted Sunny Island combinations

- Only Sunny Island inverters of the same device type are permitted to operate in one cluster.
- Different clusters may be equipped with different device types.

The Multicluster Box is designed for use at altitudes of up to 2,000 m above mean sea level. If you wish to use the Multicluster Box at altitudes above 2,000 m, contact SMA Solar Technology AG (see Section 13 "Contact", page 44).

The product 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.

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 this product.

The type label must be permanently attached to the product.

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

The enclosed documentation is an integral part of this product.

- Read and observe the documentation.
- Keep the documentation in a convenient place for future reference.

2.2 Skills of Qualified Persons

The tasks described in this document must be performed by qualified persons only. 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 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

Danger to life due to electric shock

High voltages are present in the Multiclustervox. Touching live components results in death or serious injury due to electric shock.

- Disconnect the Multiclustervox from all voltage sources before carrying out any work.
 - Switch off all loads.
 - Switch off the master of the main cluster.
 - Disconnect all Sunny Island inverters in the Multiclustervox and secure against reconnection.
 - Disconnect the PV main distribution board and secure against reconnection.
 - Shut down the generator and secure against unintentional reconnection.

3 Scope of Delivery

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

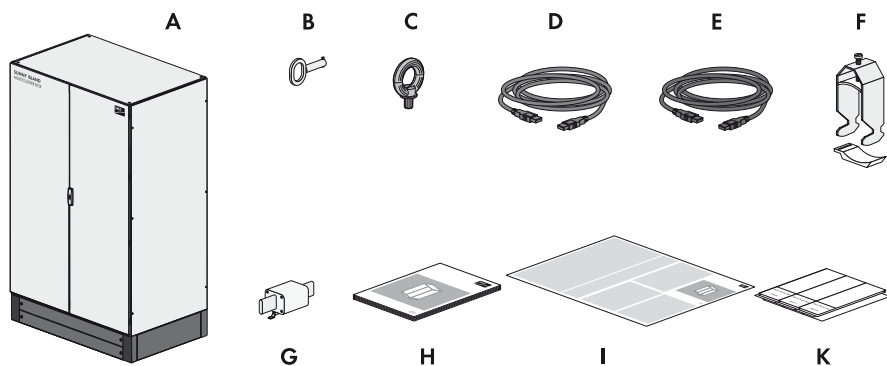


Figure 2: Components included in the scope of delivery

Object	Number	Description
A	1	Multicenter Box
B	1	Switch cabinet key
C	4	Lifting lug
D	1	Data cable: 10 m, black
E	3	Control and measuring cable: 10 m, red
F	15	Cable clamp with counter sleeve (26 mm to 30 mm)
G	3	LV/HRC fuse link 500 A
H	1	Operating manual
I	1	Document "Installation - Circuitry Overview"
K	2	Set with adhesive web for marking the cables

4 Additionally Required Materials

Material	Number of units	Explanation
Screws and screw anchors	4	For securing the base of the Multicluster Box
Terminal lugs M12	12	For connecting the generator, PV plant and loads
Connection cables, installation and cable-laying material	–	For connecting the generator, PV plant and loads
Distribution board with protection units	2	One distribution board each for the PV plant and the loads
LV/HRC fuse link, as required	6	The fuse links for the generator and the loads must be dimensioned to match the system. 500 A LV/HRC size 3 fuse links are installed in the fuse switch by default.
Cable tie	–	To retain the Sunny Island connection cables
Agent to counteract freeze damage to seals (e.g., talcum, petroleum jelly or wax)	–	To protect door seals from freezing

5 Product Description

5.1 Multicluster Box 36

The Multicluster Box is a component of the SMA multicluster technology for off-grid systems. The Multicluster Box is a main AC distribution board to which you can connect up to twelve three-phase clusters. Each cluster consists of three Sunny Island inverters of the same device type with parallel DC-side connection.

Functions of the Multicluster Box:

- Main AC distribution board for the Sunny Island inverters, one generator and one PV plant
- Load shedding
- Automatic bypass for the generator
- Active anti-islanding
- Reverse current monitoring

5.2 Type Label

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

- Address of SMA Solar Technology AG
- Date of manufacture (Date)
- Standards underlying the CE marking
- Device type (Type)
- Serial number of the Multicluster Box (Serial No.)
- Article number (Art No.)
- 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 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 that is supplied with the product.
	CE marking The product complies with the requirements of the applicable EU directives.
	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.
 IP54	Degree of protection The product is protected against interior dust deposits and splash water from all angles.

6 Installation

6.1 Choosing a Mounting Location

Requirements for 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 may result in death or serious injury.

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



Optimum mounting location

The ambient temperature of the Multiclusster Box influences the tripping threshold of the circuit breakers for the Sunny Island inverters. The higher the temperature, the earlier the circuit breakers will trip. At high ambient temperatures, the derating function of the Sunny Island inverters inhibits premature tripping of the circuit breakers.

- To ensure optimum operation, mount and install the Multiclusster Box and the Sunny Island inverters at the same location.
- ☐ A firm, even foundation, e.g., a concrete surface, must be available for mounting.
 - ☐ The mounting location must be suitable for the weight and dimensions of the Multiclusster Box (see Section 12 "Technical Data", page 41).
 - ☐ The mounting location must be clear and safely accessible at all times without any need for auxiliary equipment.
 - ☐ The mounting location must not hinder access to disconnection devices.
 - ☐ All local requirements concerning minimum passage widths and escape routes must be observed.
 - ☐ Climatic conditions must be met (see Section 12 "Technical Data", page 41).
 - ☐ The mounting location must be below 2,000 m above MSL. For altitudes over 2,000 m above MSL, contact the SMA Service Line.

Observe minimum clearances:

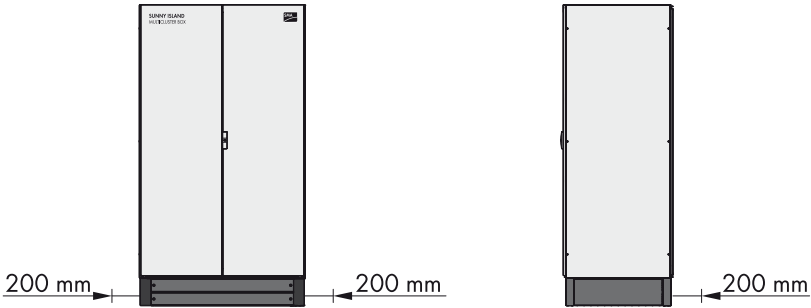


Figure 3: Minimum clearances

Observe the permitted mounting position:

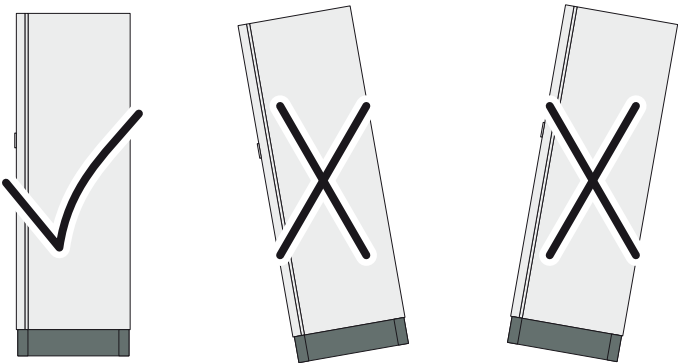


Figure 4: Permitted and prohibited mounting positions

6.3 Transport

6.3.1 Transport Options

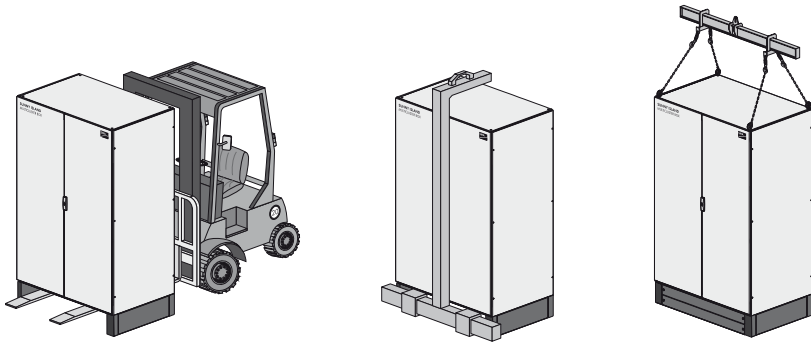


Figure 6: Transport options

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

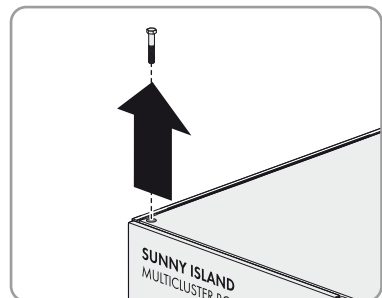
- Forklift truck or pallet truck
- Crane with suitable fork
- Crane with suitable hoist

6.3.2 Attaching the Lifting Lugs

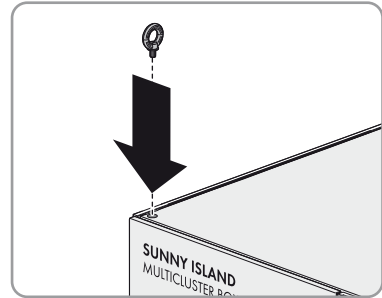
To transport the Multicluster Box using a crane with hoist, attach the supplied lifting lugs to the Multicluster Box.

Procedure:

1. Remove the four screws from the corners of the Multicluster Box (AF 19). Retain the sealing discs for the lifting lugs.



2. In each corner, attach one lifting lug with one sealing disc (torque: 10 Nm to 35 Nm).



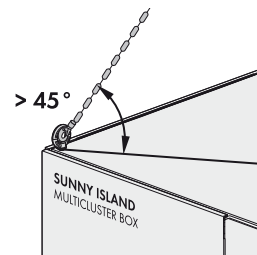
6.3.3 Transporting and Mounting the Multiclusterc Box

⚠ WARNING

Danger of crushing if the raised Multiclusterc Box tips over, falls, or sways during lifting

The Multiclusterc Box can topple or fall if it is lifted and transported carelessly or hastily. This may result in death or serious injury.

- When transporting the Multiclusterc Box, always keep it as close to the ground as possible.
- Use means of transportation which are adequate for the weight of the Multiclusterc Box (max. 400 kg).
- Transport the Multiclusterc Box in an upright position.
- Keep a safe distance from the Multiclusterc Box at all times during transport.
- Observe the center of gravity of the Multiclusterc Box. The center of gravity of the Multiclusterc Box is located approximately in the center of the cabinet and is marked on the enclosure with the center of gravity symbol.
- When using lifting lugs, remember to maintain a minimum angle of 45° between the cable pull and the Multiclusterc Box.



NOTICE**Damage to the Multiclustler Box due to inappropriate transport**

If the Multiclustler 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 Multiclustler Box.

- Never place the Multiclustler Box on a non-reinforced, uneven surface.
- Never transport the Multiclustler Box with mounted kick plates.

Requirement:

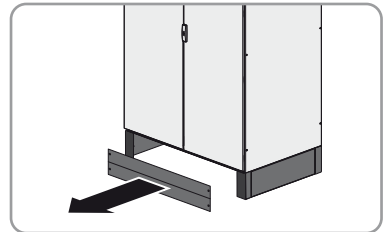
- ☐ When using a crane with hoist, the four lifting lugs must be attached (see Section 6.3.2, page 17).

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

- ☐ Four suitable screws to attach the Multiclustler Box

Procedure:

1. Remove all fastening screws from the kick plates at the front and rear. Use a wrench with a TX 30 attachment.
2. Remove the kick plates and set them aside.



3. Retain the kick plates and the fastening screws for later use.
4. When using a forklift truck or pallet truck, slide the fork underneath the Multiclustler Box and transport the Multiclustler Box to the mounting location.
5. When using a crane with fork, slide the crane fork underneath the Multiclustler Box and transport the Multiclustler Box to the mounting location.
6. When using a crane with hoist, proceed as follows to transport the Multiclustler Box:
 - Attach the hoist to all four lifting lugs on the Multiclustler Box.
 - Raise the crane hook slowly until the hoist is taut.
 - Ensure that the hoist is attached correctly.
 - Raise the Multiclustler Box and transport to the mounting location.
7. Attach the Multiclustler Box to the foundation using four suitable screws.

7 Electrical Connection

7.1 Overview of the Connection Area

7.1.1 Terminals

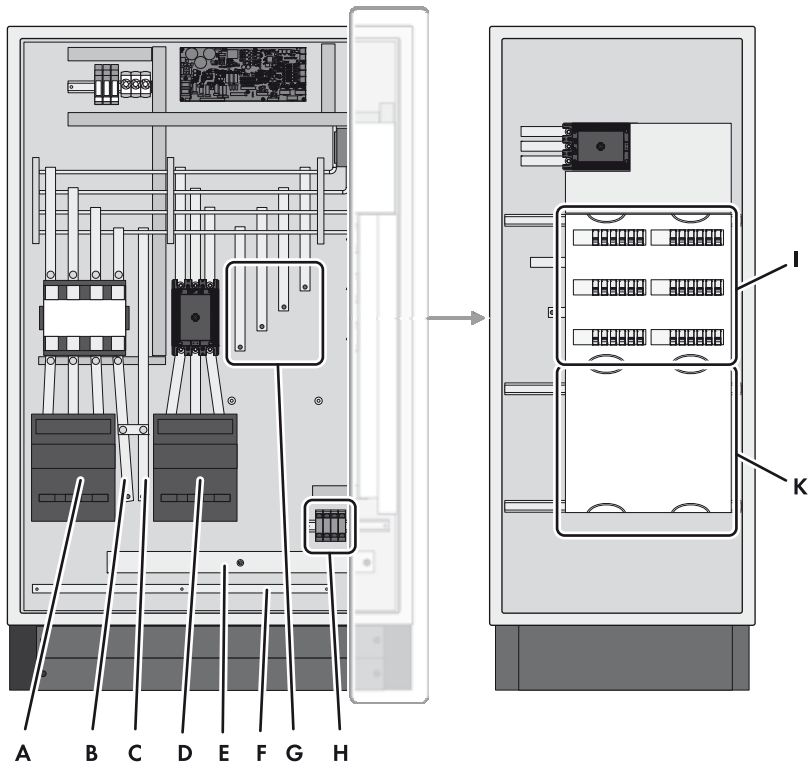


Figure 7: Position of the terminals

Object	Description
A	Fuse switch = MC-F1 Generator for connecting the line conductors of the generator
B	Busbar = MC-X1 for connecting the neutral conductor of the generator
C	Busbar = MC-X2 for connecting the neutral conductor of the loads
D	Fuse switch = MC-F2 Generator for connecting the line conductors of the loads
E	Grounding busbar for connecting the grounding conductors of the generator, the loads and the PV plant
F	Cable support rail

Object	Description
G	Busbars = MC-X3 PV-System for connecting the line conductors and the neutral conductor of the PV plant
H	RJ45 pin connectors for connecting the control and measuring cables and the data cable
I	Circuit breakers for the Sunny Island inverters
K	Connection area for connecting the Sunny Island power cables

7.1.2 Cable Entries in the Floor

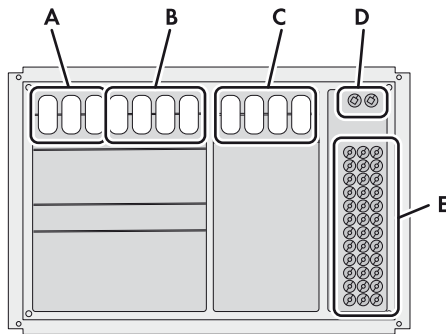


Figure 8: Cable entries

Object	Description
A	Double-membrane seal for the connection cables of the generator
B	Double-membrane seal for the connection cables of the loads
C	Double-membrane seal for the connection cables of the PV plant
D	Cable support sleeve for the three control and measuring cables and the data cable
E	Double-membrane seal for the Sunny Island power cables

7.1.3 Grounding Busbar

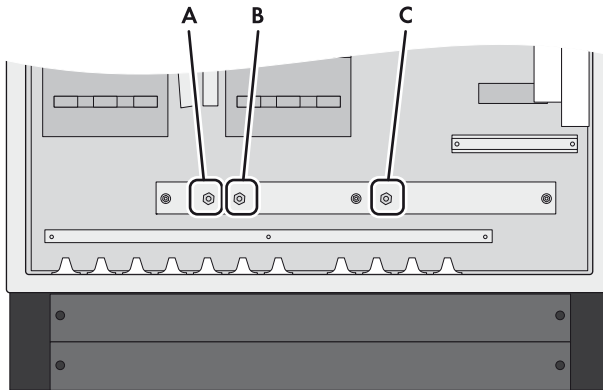


Figure 9: Busbar for connecting the grounding conductors

Object	Description
A	Grounding connection generator
B	Grounding connection loads
C	Grounding connection PV plant

7.2 Opening the Multicluster Box

1. Unlock the Multicluster Box with the switch cabinet key supplied.
2. Open the right-hand door until the door stopper clicks into place.
3. Release the left-hand door with the turning lever and open it until the door stopper clicks into place.

7.3 Removing Protection against Contact

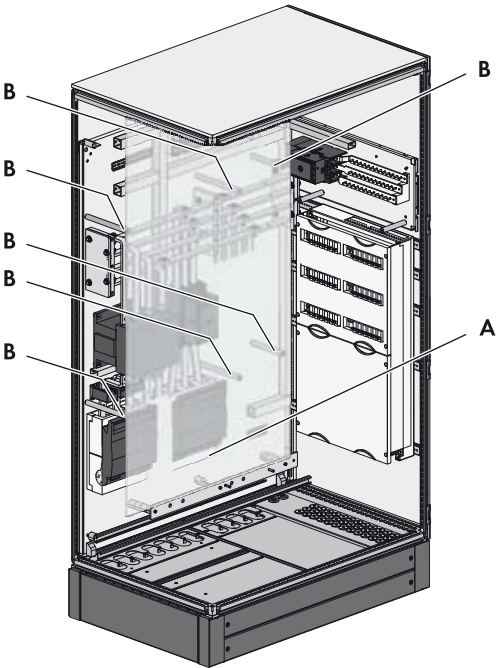


Figure 10: Positions of the attachment points of the contact hazard protection cover

Position	Number	Description
A	1	Contact hazard protection cover of the Multicenter Box
B	6	Positions of the attachment points

NOTICE

Electrostatic discharge can cause irreparable damage to the Multicenter Box

- Ground yourself before touching any component.

Procedure:

1. Remove all pan head screws with washers from the contact hazard protection cover, and remove the cover. Use a TX 30 screwdriver.
2. Set the contact hazard protection cover, pan head screws and washers aside for later use.

7.4 Inserting and Preparing the Connection Cables

Always proceed as follows to insert the connection cables of the generator, the loads, the PV plant and the Sunny Island inverters into the Multicluster Box. Insert the control, measurement and data cables as described in Section 7.10, page 34.

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

- ☐ Terminal lugs M12 for connecting the generator, loads and PV plant

Procedure:

1. Remove the front and center sliding panels at the bottom of the Multicluster Box.
2. Select an appropriate double-membrane seal for inserting the connection cable and remove it from the base plate.
3. Pierce the double-membrane seal with a sharp object. The opening must firmly encircle the cable.
4. Insert the connection cable into the Multicluster Box.
5. Slide the double-membrane seal over the connection cable.
6. For connection cables of the generator, the PV plant, or the loads: press an M12 terminal lug onto the cable.
7. Label each Sunny Island connection cable using the adhesive web included in the delivery.
8. Reinsert the double-membrane seal in the base plate.

7.5 Connecting the Generator

You can connect a three-phase generator to the Multicluster Box.

The line conductors are routed via fuse switches in the Multicluster Box. 500 A LV/HRCsize 3 fuse links are installed in the fuse switch by default.



The generator output fuse influences dimensioning of the PV plant connection cables

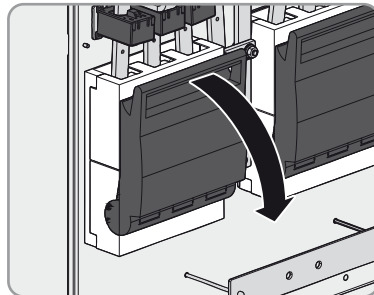
Remember that the size of the generator output fuse affects dimensioning of the PV plant cable (see Section 7.7 "Connecting the PV Plant", page 29).

Cable requirements:

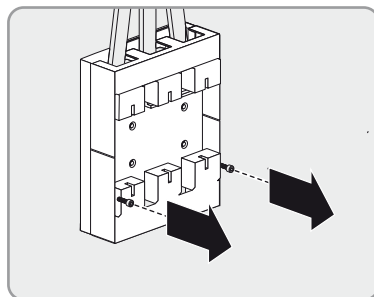
- ☐ Conductor material: copper
- ☐ The conductor cross-section must be selected based on the nominal power of the generator and must not exceed 300 mm².
- ☐ If the generator does not have an output fuse, the connection cable must be short-circuit and ground-fault protected.
- ☐ In case of long cable routes, an additional fuse box must be installed in proximity to the generator.
- ☐ Line conductors, neutral conductors and grounding conductors must have the same cross-section.

Procedure:

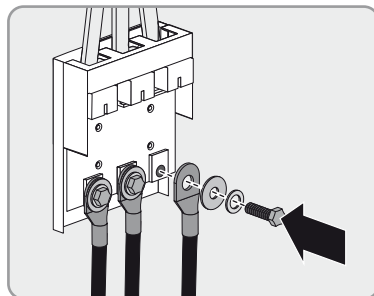
1. According to the type of cable routing and the installation conditions, determine the required fuse link for the fuse switch. Remember that the permitted fuse rating is 100 A to 500 A.
2. Remove the contact hazard protection cover (see Section 7.3, page 23).
3. Insert the generator connection cable into the Multiclusster Box and prepare (see Section 7.4, page 24).
4. Turn the handle of the fuse holder down.



5. With both hands, lift the fuse holder up and out of the anchorage.
6. Release the screws on the cover of the terminals and remove the cover. Use a PH 2 screwdriver.

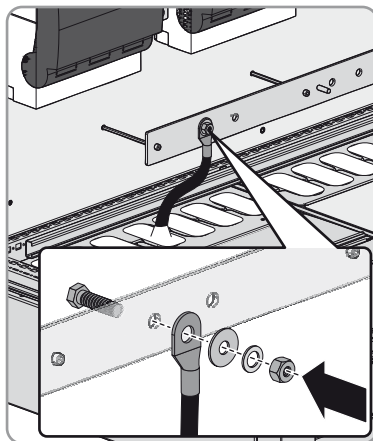


7. Connect the line conductors L1, L2 and L3 to the fuse switch **MC-F1 Generator** according to the labels (AF 19, torque: 25 Nm). Make sure to adhere to the following screw assembly: screw head / spring washer/ fender washer/ terminal lug / fuse switch terminal.

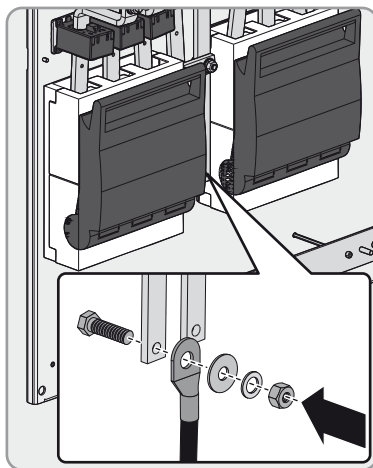


8. Ensure that there is a right-hand rotating magnetic field at the generator connection point.
9. Insert the terminal cover and tighten the screws (PH 2 screwdriver, torque: 4 Nm).
10. Insert the fuse holder in its anchorage. Press the fuse holder down slightly.
11. Insert the LV/HRC size 3 fuse links into the fuse holder.

12. Turn the handle of the fuse holder up.
13. Connect the grounding conductor to the grounding busbar (AF 19, torque: 25 Nm). Make sure to adhere to the following screw assembly: screw head / grounding busbar / terminal lug / fender washer / spring washer / nut.



14. Connect the neutral conductor to the busbar **MC-X1** (AF 19, torque: 25 Nm). Make sure to adhere to the following screw assembly: screw head / busbar / terminal lug / fender washer / spring washer / nut.



15. Attach the connection cable to the designated cable support rail. Use the cable clamps and counter sleeves supplied.

Securing the cable in the support rail relieves the strain on the cable at the connection point.

7.6 Connecting the Loads

The line conductors of the loads are routed via the fuse switch in the Multiclusterc Box. The fuses are necessary to protect the output cable from overloads. 500 A LV/HRC size 3 fuse links are installed in the fuse switch by default.



Cable protection

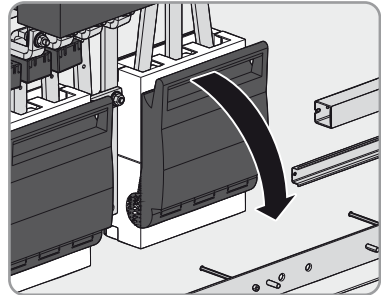
The Multiclusterc Box does not replace the distribution board for the loads. Between the Multiclusterc Box and the loads, you must install a distribution board with circuit breakers to protect and isolate the loads, as well as a residual-current device. Make sure to observe all standards and directives applicable at the installation site.

Cable requirements:

- ☐ Conductor material: copper
- ☐ Maximum conductor cross-section: 300 mm²
- ☐ Line conductors, neutral conductors and grounding conductors must have the same cross-section.

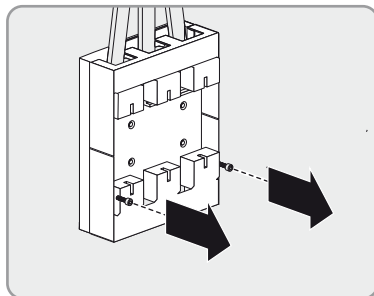
Procedure:

1. According to the type of cable routing and the installation conditions, determine the required fuse link for the fuse switch. Observe the following requirements:
 - Permitted fuse rating: 100 A to 500 A
 - The currents of the Sunny Island, the PV plant and the generator can add up.
2. Insert the connection cables in the Multiclusterc Box and prepare (see Section 7.4, page 24).
3. Throw the handle on the fuse holder down.

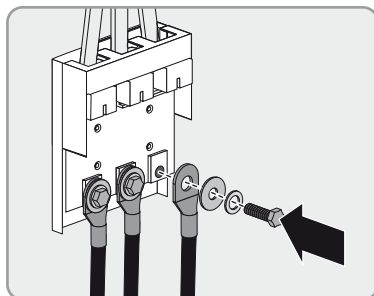


4. With both hands, lift the fuse holder up and out of the anchorage.

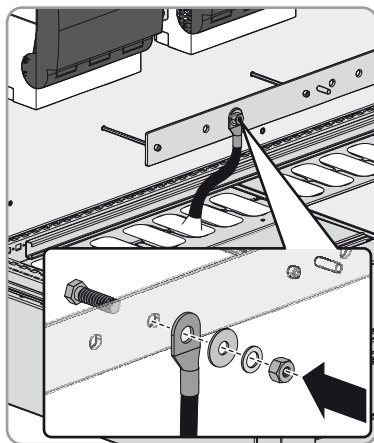
5. Release the screws on the cover of the terminals and remove the cover. Use a PH 2 screwdriver.



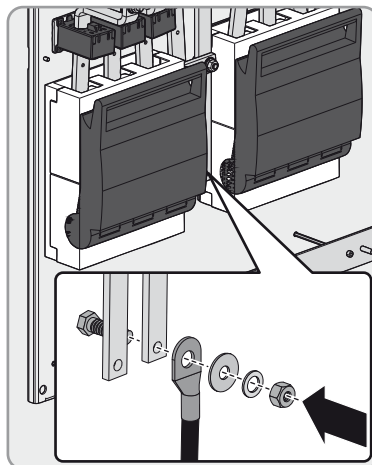
6. Connect the line conductors to the fuse switch **MC-F2 Loads** according to the labels (AF 19, torque: 25 Nm). Make sure to adhere to the following screw assembly: screw head / spring washer / fender washer / fuse switch terminal.



7. Ensure that there is a right-hand rotating magnetic field at the load connection point.
8. Insert the terminal cover and tighten the screws (PH 2 screwdriver, torque: 4 Nm).
9. Insert the fuse holder in its anchorage. Press the fuse holder down slightly.
10. Insert the LV/HRC size 3 fuse links into the fuse holder.
11. Turn the handle of the fuse holder up.
12. Connect the grounding conductor to the grounding busbar (AF 19, torque: 25 Nm). Make sure to adhere to the following screw assembly: screw head / terminal of neutral conductor / terminal lug / fender washer / spring washer / nut.



13. Connect the neutral conductor to the busbar **MC-X2** (AF 19, torque: 25 Nm). Make sure to adhere to the following screw assembly: screw head / terminal of neutral conductor / terminal lug / fender washer / spring washer / nut.



14. Attach the connection cable to the designated cable support rail. Use the cable clamps and counter sleeves supplied.

Securing the cable in the support rail relieves the strain on the cable at the connection point.

7.7 Connecting the PV Plant



Cable protection

The Multicluster Box does not replace the PV main distribution board. Within the PV main distribution board, you must install circuit breakers to protect and isolate the PV inverters, and, if necessary, a residual-current device between the Multicluster Box and the PV plant. Make sure to observe all standards and directives applicable at the installation site.



Connecting other energy generators

Instead of the PV plant, you can also connect other energy generators (e.g. small wind turbine systems) to the Multicluster Box.

Cable Dimensioning

Dimension the connection cables adequately for the continuous power of the PV plant and the short-circuit current of the generator.

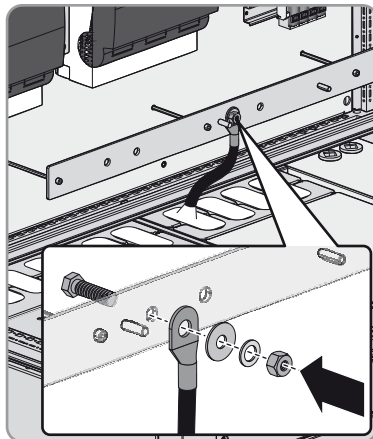
In the event of a short circuit, the short-circuit currents released from the generator will flow via the unprotected connection cable between the Multicluster Box and PV main distribution board. When planning the short-circuit protection of cables, the PV inverter and Sunny Island inverters may be disregarded, as their construction precludes any danger to cables in case of short circuits.

Cable requirements:

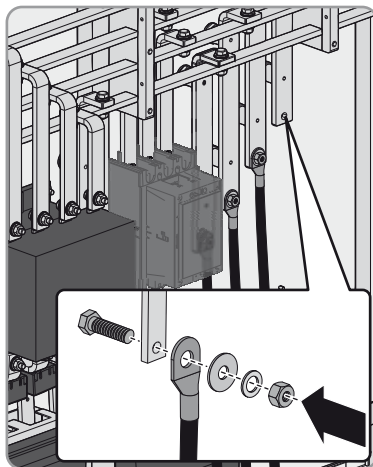
- ☐ Conductor material: copper
- ☐ Maximum conductor cross-section: 300 mm²
- ☐ Line conductors, neutral conductors and grounding conductors must have the same cross-section.

Procedure:

1. Insert the connection cables in the Multicluster Box and prepare (see Section 7.4, page 24).
2. Connect the grounding conductor to the grounding busbar (AF 19, torque: 25 Nm). Make sure to adhere to the following screw assembly: screw head / terminal of neutral conductor / terminal lug / fender washer / spring washer / nut.



3. Connect the neutral conductor and the line conductors to the busbars **MC-X3 PV-System** according to the labels (AF 19, torque: 25 Nm). Make sure to adhere to the following screw assembly: screw head / busbar / terminal lug / fender washer / spring washer / nut.



4. Attach the connection cable to the designated cable support rail. Use the cable clamps and counter sleeves supplied.

Securing the cable in the support rail relieves the strain on the cable at the connection point.

7.8 Connecting the Sunny Island Inverters



Cable protection

Each Sunny Island connection cable is fused with a C40 A circuit breaker.



Optimum mounting location

The ambient temperature of the Multiclusster Box influences the tripping threshold of the circuit breakers for the Sunny Island inverters. The higher the temperature, the earlier the circuit breakers will trip. At high ambient temperatures, the derating function of the Sunny Island inverters inhibits premature tripping of the circuit breakers.

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

Assignment of the Terminals

The following table describes how the terminals are assigned and labeled.

Top-hat rail for Sunny Island	Main cluster	Extension cluster 1	...	Extension cluster 11
Upper top-hat rail for master	1 :L	10:L	...	100:L
	2 :N	11:N		101:N
	3 :PE	12:PE		102:PE
Middle top-hat rail for slave 1	4 :L	13:L	...	103:L
	5 :N	14:N		104:N
	6 :PE	15:PE		105:PE
Lower top-hat rail for slave 2	7 :L	16:L	...	106:L
	8 :N	17:N		107:N
	9 :PE	18:PE		108:PE



Sunny Island layout in a stand-alone grid

- All masters are assigned to line conductor L1.
- All slaves 1 are assigned to line conductor L2.
- All slaves 2 are assigned to line conductor L3.

This creates a right-hand rotating magnetic field in the stand-alone grid.

Cable requirements:

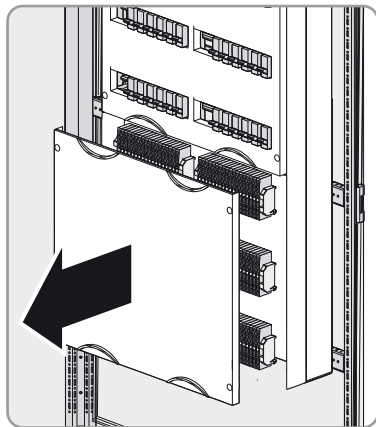
- ☐ Conductor material: copper
- ☐ Conductor cross-section: 6 mm² to 10 mm²

Procedure:

1. Insert the connection cables into the Multiclusster Box (see Section 7.4, page 24).
Label the cables using the adhesive web included in the delivery.
2. Release the four screws on the cover of the Sunny Island connection area.

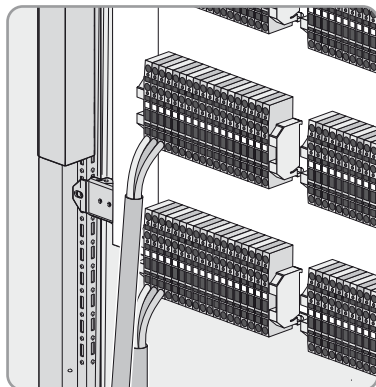
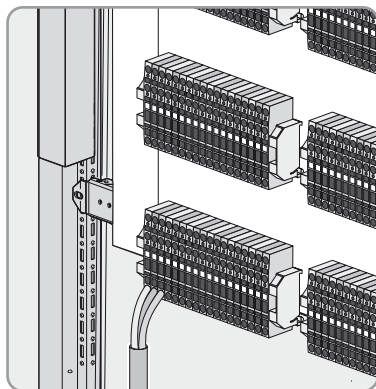
3. Remove the cover of the Sunny Island connection area.

Retain cover and screws for later use.

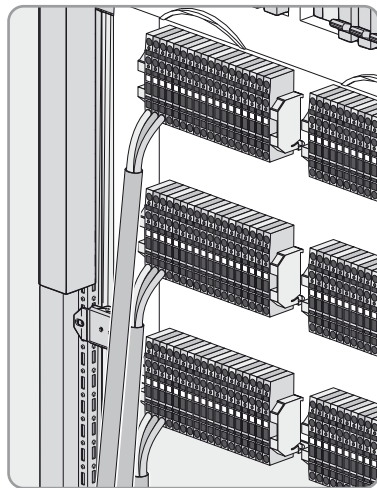


4. To connect the Sunny Island inverters of the main cluster:

- Connect slave 2 to the terminals **Main Cluster Slave 2** as follows:
 - Connect the line conductor to the terminal **7 :L1**.
 - Connect the neutral conductor to the terminal **8 :N**.
 - Connect the grounding conductor to the terminal **9 :PE**.
- Connect slave 1 to the terminals **Main Cluster Slave 1** as follows:
 - Connect the line conductor to the terminal **4 :L1**.
 - Connect the neutral conductor to the terminal **5 :N**.
 - Connect the grounding conductor to the terminal **6 :PE**.



- Connect the master to the terminals **Main Cluster Master** as follows:
 - Connect the line conductor to the terminal **1 :L1**.
 - Connect the neutral conductor to the terminal **2 :N**.
 - Connect the grounding conductor to the terminal **3 :PE**.



5. Connect the Sunny Island inverters of the extension cluster as described under point 4. Begin with slave 2 of extension cluster 1 and observe the labels on the terminals.
6. Bundle the connection cables with cable ties above the double-membrane seal. This helps relieve tension at the terminals.
7. Reinsert the cover of the Sunny Island connection area.
8. Insert the four screws into the cover of the Sunny Island connection area and fasten them hand-tight.

7.9 Grounding the Multicluster System

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

Cable requirements:

- ☐ Conductor material: copper
- ☐ Maximum conductor cross-section: 300 mm²

Procedure:

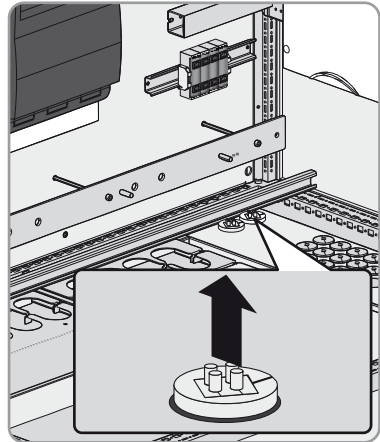
- Ground the multicluster system outside the Multicluster Box on either the generator side or the load side. Connect the neutral conductor to the grounding conductor, observing all standards and directives applicable at the installation site.

7.10 Connecting the Control, Measuring and Data Cables

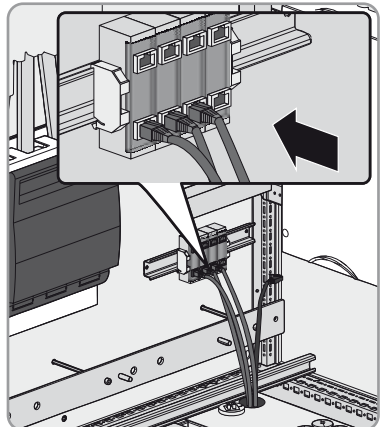
The Multiclusterc Box transfers voltage and current measurement signals to the Sunny Island inverters of the main cluster. These signals are transferred via the red control and measuring cables supplied. The master in the main cluster controls the Multiclusterc Box via a black data cable.

Procedure:

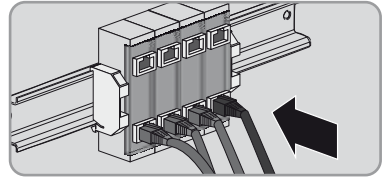
1. Remove one cable support sleeve from the cable entry in the bottom of the Multiclusterc Box.



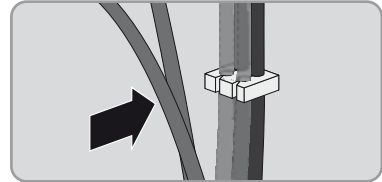
2. Insert the three red control and measuring cables and the black data cable through the enclosure opening into the Multiclusterc Box.
3. Connect the red control and measuring cables:
 - Plug the control and measuring cable for the master of the main cluster into the pin connector **Mstr./L1**.
 - Plug the control and measuring cable for slave 1 of the main cluster into the pin connector **Slv1./L2**.
 - Plug the control and measuring cable for slave 2 of the main cluster into the pin connector **Slv2./L3**.



4. Plug the black data cable into the pin connector **ComSync IN**.



5. Lay the control and measuring cables and the data cable in the four circular recesses of the cable support sleeve .



6. Press the cable support sleeve into the cable entry in the bottom of the Multiclusterc Box.
7. Reinsert the sliding panels at the bottom of the Multiclusterc Box and attach with screws. Make sure that the seals are fitted correctly.

7.11 Mounting the Contact Hazard Protection Cover

1. Position the contact hazard protection cover in front of the rear panel of the Multiclusterc Box.
2. Ensure that the attachment points on the contact hazard protection cover are correctly aligned.
3. Attach the contact hazard protection cover using six pan head screws and six washers (torque: 4 Nm). Use a torque wrench with a TX 30 attachment.

7.12 Protecting the Door Seals from Freezing

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

- ☐ Agent to counteract freeze damage to seals (e.g., talcum, petroleum jelly or wax)

Procedure:

- To protect the door seals from damage due to freezing, treat the seals with a protective agent.

7.13 Mounting the Kick Plates

- Attach the kick plates with the fastening screws (torque: 12 Nm). Use a torque wrench with a TX 30 attachment.

8 Commissioning the Multicluster Box

Requirements:

- ☐ The Multicluster Box must be properly mounted.
- ☐ 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 connection cables must be firmly enclosed by a double-membrane seal or a cable support sleeve in the base of the Multicluster Box.
- ☐ All connection cables for generator, loads, PV plant and Sunny Island inverters must be secured inside the Multicluster Box.
- ☐ The base of the Multicluster Box must be closed by means of the sliding panels. All seals must be correctly fitted.
- ☐ Protection against contact must be installed.
- ☐ The kick plates on the base of the Multicluster Box must be attached.

Procedure:

1. Close the Multicluster Box.
 - Slightly raise the door stopper of the left-hand door with your foot and close the door.
 - Lock the left-hand door using the turning lever.
 - Slightly raise the door stopper of the right-hand door with your foot and close the door.
 - Lock the Multicluster Box with the switch cabinet key.
2. Switch on and start the multicluster system in accordance with the Sunny Island documentation.



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 menu **400# Failure/Event** for the Sunny Island inverters.

9 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 Sunny Island documentation).
3. Switch all Sunny Island inverters off (see Sunny Island documentation).
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.
7. In the Multiclustler Box open all Sunny Island circuit breakers.
8.  **CAUTION**

Risk of burns

Busbars and terminals in the Multiclustler Box can get hot during operation.

- Do not touch busbars or terminals.
9. Remove the contact hazard protection cover (see Section 7.3, page 23).
 10. Ensure that no voltage is present in the Multiclustler Box.
 11. Ground the PV main distribution board outside the Multiclustler Box, and short-circuit.
 12. Ground the generator outside the Multiclustler Box, and short-circuit.
 13. Cover and isolate any adjacent live components.

10 Maintenance

⚠ DANGER

Danger to life due to electric shock

High voltages are present in the Multicluster Box and the multicluster system. Touching live components results in death or serious injury due to electric shock.

- Disconnect the multicluster system from all voltage sources before carrying out any work on the Multicluster Box (see Section 9, page 37).

⚠ CAUTION

Risk of burns

Busbars and terminals in the Multicluster Box can get hot during operation.

- Do not touch busbars or terminals.

The Multicluster Box must be serviced at regular intervals. Note that the maintenance interval is influenced by the mounting location and the ambient conditions. The Multicluster 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 Multicluster Box for dirt, moisture and water ingress. • If necessary, clean the Multicluster Box and take appropriate actions.	12 months
Check stability of all connections. Disconnect the Multicluster Box from all voltage sources (see Section 9, page 37). • Tighten connections if necessary (for torques: see Section 12, page 41).	12 months
Check insulation, terminals and fuse elements for any discoloration or visible changes. • If a customer-supplied cable, such as the load cable to the Multicluster Box, shows discoloration or visible changes, replace it. Disconnect the Multicluster Box from all voltage sources (see Section 9, page 37). • If any internal wiring or a fuse element is discolored or shows visible changes, inform the SMA Service Line.	12 months

Maintenance work	Recommended maintenance interval
Check the Multiclustor 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.	12 months
Check doors seals for damage. • Replace damaged door seals.	12 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).	12 months

11 Decommissioning

11.1 Disassembling the Multiclusterc Box

1. **DANGER**

Danger to life due to electric shock

High voltages are present in the Multiclusterc Box and the multiclusterc system. Touching live components results in death or serious injury due to electric shock.

- Disconnect the multiclusterc system from voltage sources (see Section 8, page 35).
2. Remove all fastening screws from the kick plates at the front and rear. Set the screws aside. These screws will be needed later to reattach the kick plates.
 3. Remove all sliding panels from the Multiclusterc Box.
 4. Remove all connection cables from the Multiclusterc Box.
 5. Unscrew and remove the fastening screws of the Multiclusterc Box.
 6. Mount the contact hazard protection cover (see Section 7.1.1, page 35).
 7. Close the doors of the Multiclusterc Box.

8. **WARNING**

Danger of crushing if the raised MV Power Platform topples, falls, or sways

- Transport the Multiclusterc Box with a forklift truck, pallet truck, or crane (see Section 6.3.3, page 18).
9. Reattach the kick plates to the Multiclusterc Box.

11.2 Storing the Multiclusterc Box

- Store the Multiclusterc Box in a dry place where the ambient temperature is between -25°C and $+60^{\circ}\text{C}$.

11.3 Disposing of the Multiclusterc Box

- Dispose of the Multiclusterc Box in accordance with the locally applicable disposal regulations for electronic waste.

12 Technical Data

Load Connection

Number	1 x three-phase
Rated power	300 kW
Rated grid voltage between L and N	230 V
Rated grid voltage between L1 and L2	400 V
AC voltage range between L1 and N	172.5 V to 250 V
AC voltage range between L1 and L2	300 V to 433 V
Rated frequency	50 Hz
Frequency range	40 Hz to 70 Hz
Current at rated values	3 x 435 A
Diameter of the screws for cable connection	12 mm
Torque	25 Nm
Maximum connectable conductor cross-section	300 mm ²
Fuse	LV/HRC size 3
Permissible fuse rating	100 A to 500 A

Sunny Island Connection

Maximum number of Sunny Island inverters	36
Rated power Sunny Island	216 kW
Current at Sunny Island ratings	3 x 313 A
Sunny Island power at 45 °C	195 kW
Sunny Island current at 45 °C	3 x 283 A
Sunny Island power over 30 minutes at 25 °C	288 kW
Sunny Island current over 30 minutes at 25 °C	3 x 417 A
Conductor cross-section	6 mm ² to 16 mm ²
Fuses	36 x circuit breaker C40 A

Generator Connection

Number	1 x three-phase
Rated grid input power	300 kW
AC input current	3 x 435 A
Maximum relative short-circuit current	10 kA
Diameter of the screws for cable connection	12 mm
Torque	25 Nm
Maximum connectable conductor cross-section	300 mm ²
Fuse	LV/HRC size 3
Permissible fuse rating	100 A to 500 A

PV Plant Connection

Number	1 x three-phase
PV rated power	360 kW
AC current at rated values	3 x 522 A
Maximum relative short-circuit current	10 kA
Diameter of the screws for cable connection	12 mm
Torque	25 Nm
Maximum connectable conductor cross-section	300 mm ²
Fuses	None

Ground Connection

Diameter of screws on grounding busbar	12 mm
Maximum torque	25 Nm
Maximum connectable conductor cross-section	300 mm ²

General Data

Number of line conductors	3
Permitted grid configuration	TN
Width x height x depth	1,200 mm x 2,000 mm x 800 mm
Weight	400 kg
Exterior structure	Cabinet
Rated voltage of auxiliary circuits	24 V DC
Maximum installation height above MSL	2,000 m
Degree of protection of enclosure	IP54
Degree of protection of inner protective cover*	IP20
Protection class**	II
Overvoltage category***	Overvoltage category 3
Rated impulse withstand voltage at 2,000 m above MSL	4.8 kV
Rated insulation voltage of switch cabinet wiring	2.5 kV AC
Rated short-time withstand current	10 kA
Relative rated short-circuit current of switching device combination	10 kA
Rated load factor	0.8
EMC environment****	A
EC declaration of conformity	Yes
Operating temperature range	– 25°C to +60°C
Humidity	0% to 100%
Pollution degree at the mounting location****	3

* in accordance with IEC 60529

** in accordance with IEC 417

*** in accordance with EN 60664

**** in accordance with IEC 61439-1:2011

13 Contact

If you have technical problems concerning our products, contact the SMA Service Line. We need the following data 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
- Type and number of connected loads
- If a generator is connected:
 - 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
		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	
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		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)		
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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	
Ελλάδα	SMA Hellas AE Αθήνα	801 222 9 222	
		International:	+30 212 222 9 222
България	Вижте Ελλάδα (Γърция)		

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

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