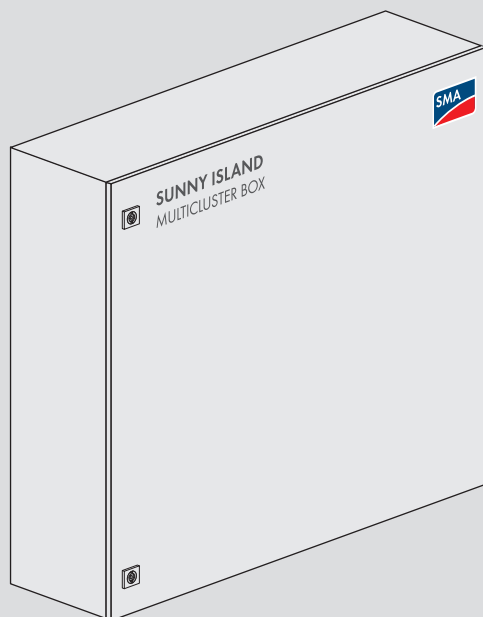


Operating manual
MULTICLUSTER-BOX 6



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1 Information on this Document

1.1 Validity

This document is valid for:

- MC-BOX-6.3-11 (Multicluster-Box 6)


1.2 Target Group

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

- Training in how to deal with the dangers and risks associated with installing, repairing and using electrical devices, batteries and installations
- Training in the installation and commissioning of electrical devices and installations
- Knowledge of all applicable laws, standards and directives
- Knowledge of and compliance with this document and all safety information

1.3 Levels of warning messages

1.4 Symbols in the Document

Icon	Explanation
<input type="checkbox"/>	Indicates a requirement for meeting a specific goal
<input checked="" type="checkbox"/>	Desired result
✘	A problem that might occur.
	Example

1.5 Typographical Elements in the Document

Typographical element	Use	Example
bold	<ul style="list-style-type: none"> • Messages • Terminals • Elements on a user interface • Elements to be selected • Elements to be entered 	<ul style="list-style-type: none"> • Connect the insulated conductors to the terminals X703:1 to X703:6. • Enter 10 in the field Minutes.
>	<ul style="list-style-type: none"> • Connects several elements to be selected 	<ul style="list-style-type: none"> • Go to Settings > Date.

Typographical element	Use	Example
[Button] [Key]	<ul style="list-style-type: none"> Button or key to be clicked on or pressed down 	<ul style="list-style-type: none"> Select [Enter].
#	<ul style="list-style-type: none"> Placeholder for variable components (e.g., parameter names) 	<ul style="list-style-type: none"> Parameter WCtHz.Hz#

1.6 Designations in the Document

Complete designation	Designation in this document
Multicluster-Box 6.3	Multicluster-Box
Sunny Island 6.0H / 8.0H	Sunny Island, battery inverter

1.7 Additional Information

For more information, please go to www.SMA-Solar.com.

Title and information content	Type of information
SUNNY ISLAND 4.0M / 6.0H / 8.0H	Operating manual

2 Safety

2.1 Intended Use

The Multicluster-Box is the main AC distribution board in a multicluster system. The multicluster system forms an AC grid and is made up of a maximum of 2 clusters (each three-phase).

Do not exceed the maximum AC connection power of the Multicluster-Box. Cables with copper conductors must be used for the installation.

The Multicluster-Box is designed for connection to TN-S systems.

The Multicluster-Box must only be operated in conjunction with Sunny Island 6.0H (SI6.0H-13 / SI6.0H-12) or Sunny Island 8.0H (SI8.0H-13 / SI8.0H-12). Always take the maximum AC connection power and the permitted inverter combinations into account.

In terms of interference immunity, the product is suitable for EMC environment A, and in terms of EMC emissions, it is suitable for EMC environment B (as per IEC 61439-1:2011).

The product is designed for indoor use only.

Only operate the product at temperatures between -25°C and $+60^{\circ}\text{C}$.

The Multicluster-Box is designed for use at altitudes of up to 2000 m above Mean Sea Level. If you would like to use the Multicluster-Box at altitudes above 2000 m, contact Service (see Section 15, page 37).

Use SMA products only in accordance with the information provided in the enclosed documentation and with the locally applicable laws, regulations, standards and directives. Any other application may cause personal injury or property damage.

Alterations to the SMA products, e.g., changes or modifications, are only permitted with the express written permission of SMA Solar Technology AG. Unauthorized alterations will void guarantee and warranty claims and in most cases terminate the operating license. SMA Solar Technology AG shall not be held liable for any damage caused by such changes.

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

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

The type label must remain permanently attached to the product.

2.2 IMPORTANT SAFETY INSTRUCTIONS

Keep the manual for future reference.

This section contains safety information that must be observed at all times when working.

The product has been designed and tested in accordance with international safety requirements. As with all electrical or electronical devices, there are residual risks despite careful construction. To prevent personal injury and property damage and to ensure long-term operation of the product, read this section carefully and observe all safety information at all times.

DANGER

Danger to life due to electric shock when live components or cables are touched

High voltages are present in the conductive components or cables of the product. Touching live parts and cables results in death or lethal injuries due to electric shock.

- Do not touch non-insulated parts or cables.
- Disconnect the product from voltage sources and ensure it cannot be reconnected before working on the device.
- Wear suitable personal protective equipment for all work on the product.

CAUTION

Risk of burns due to hot components

Some components and terminals inside the product can become hot during operation. Touching hot components or terminals can result in burn injuries.

- Wear suitable personal protective equipment for all work on the product.
- After opening the product, wait until the components have cooled down.

NOTICE

Damage to the product due to sand, dust and moisture ingress

Sand, dust and moisture penetration can damage the product and impair its functionality.

- Do not open the product during a dust storm or precipitation.
- Close the product in case of interruption of work or after finishing work.
- Only operate the product when it is closed.
- Store the closed product in a dry and covered location. Observe storage conditions.

Effects of an emergency disconnection

Emergency disconnection on the battery inverter triggers the uncontrolled shutdown of the system and unsaved data is lost.

- Only trip the emergency disconnection to avoid danger or consequential damage.
- In the event of an emergency disconnection, always check whether any fuse elements in the product, such as circuit breakers, have tripped.
- If any fuse elements have tripped, reactivate these fuse elements.

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.

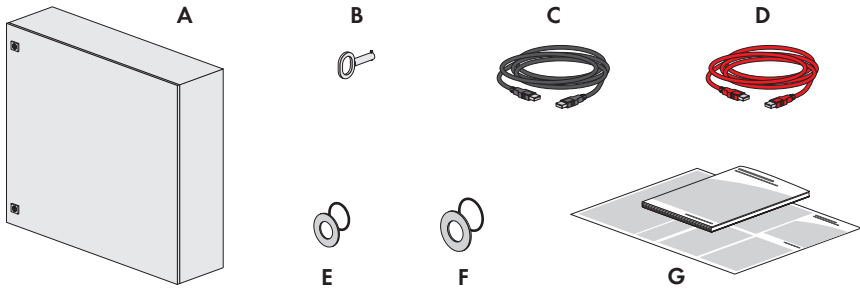


Figure 1: Components included in scope of delivery

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

4 Product Overview

4.1 Product Description

The Multicuster-Box is an SMA multicuster technology device for off-grid systems, battery-backup systems, and systems for increased self-consumption. The Multicuster-Box is a main AC distribution board to which you can connect up to 2 clusters. Each cluster is three-phase and made up of 3 DC-side, parallel-switched Sunny Island 6.0H / 8.0H inverters with firmware version 3.5 or higher.

Functions of the Multicuster-Box include:

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

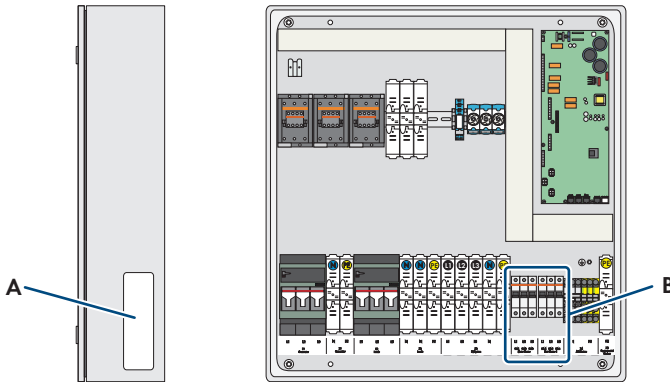











Figure 2: Multicuster-Box with cabinet door open

Position	Designation
A	<p>Type label</p> <p>The type label clearly identifies the product. The type label must remain permanently attached to the product. You will find the following information on the type label:</p> <ul style="list-style-type: none"> • Device type (Model) • Serial number (Serial No. or S/N) • Date of manufacture • Device-specific characteristics
B	<p>Circuit breaker</p> <p>Protects power cables of the connected inverters.</p>

4.2 Symbols on the Product

Icon	Explanation
	Beware of electrical voltage The product operates at high voltages.
	Beware of hot surface The product can get hot during operation.
	Observe the documentations Observe all documentations supplied with the product.
	Grounding conductor This symbol indicates the position for connecting a grounding conductor.
	WEEE designation Do not dispose of the product together with the household waste but in accordance with the disposal regulations for electronic waste applicable at the installation site.
	Degree of protection IP55 The product is protected against interior dust deposits and water that is directed as a jet against the enclosure from all directions.
	CE marking The product complies with the requirements of the applicable EU directives.
	UKCA marking The product complies with the regulations of the applicable laws of England, Wales and Scotland.
	RoHS labeling The product complies with the requirements of the applicable EU directives.

4.3 System Structure

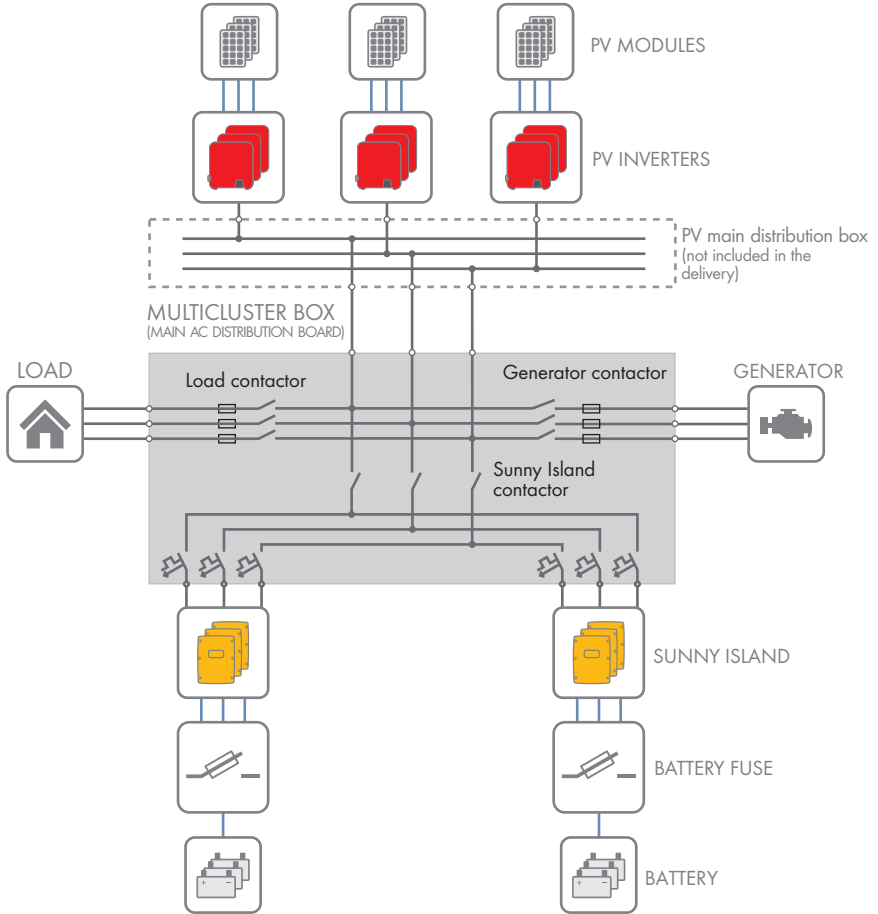


Figure 3: Circuitry principle of a multicluster system – example with Multicluster-Box

5 Mounting

5.1 Requirements for Mounting

Requirements for the mounting location:

WARNING

Danger to life due to fire or explosion

Despite careful construction, electrical devices can cause fires. This can result in death or serious injury.

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

Optimum mounting location

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

- To ensure optimum operation, mount and install the Multiclus-ter-Box and the battery inverters at the same location.

Requirements:

- A solid, flat support surface must be available for mounting.
- The mounting location must be suitable for the weight and dimensions of the product (see Section 12, page 30).
- The mounting location must be less than 2000 m above Mean Sea Level. If you would like to use the Multiclus-ter-Box at altitudes above 2000 m, contact Service (see Section 15, page 37).
- The mounting location must not hinder access to disconnection devices.
- All local requirements concerning minimum passage widths and escape routes must be observed.
- The mounting location should be freely and safely accessible at all times without the need for any auxiliary equipment (such as scaffolding or lifting platforms). Non-fulfillment of these criteria may restrict servicing.
- All ambient conditions must be met (see Section 12, page 30).

Permitted and prohibited mounting positions:

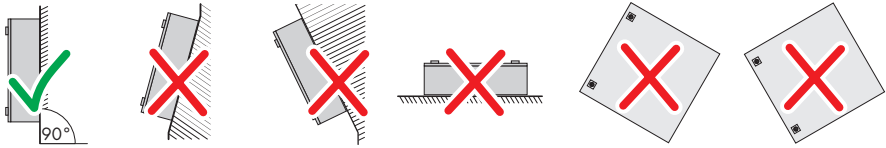


Figure 4: Permitted and prohibited mounting positions

Dimensions for mounting:

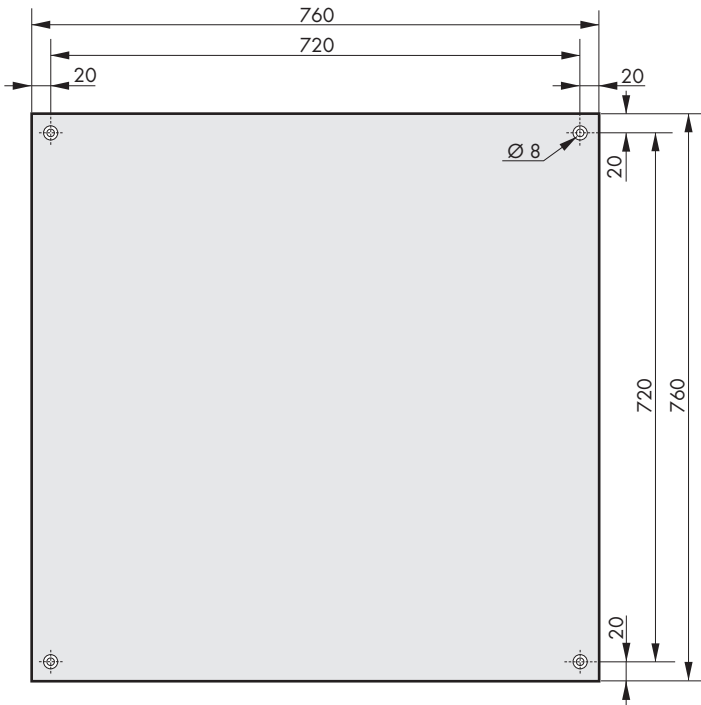


Figure 5: Position of the anchoring points(Dimensions in mm)

5.2 Mounting the product

⚠ WARNING

Danger to life if raised or suspended loads tip over, fall or sway

Vibrations or careless or hasty lifting and transportation may cause the product to tip over or fall. This can result in death or serious injury.

- All means of transport and auxiliary equipment used must be designed for the weight of the product. Weight: 55 kg.
- Always transport and lift the product upright.
- Always maintain a sufficient safety distance from the product during transport.
- Wear suitable personal protective equipment for all work on the product.

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

- Four screws, washers and fastening material suitable for the support surface

Procedure:

1. Mark the position of the 4 drill holes and drill the holes. Use the recesses for the upper wall mounting brackets and the holes for the lower wall mounting brackets.
2. If necessary, provide the 4 drill holes with suitable screw anchors.
3. Open Multicluster-Box with the switch cabinet key included in the delivery.

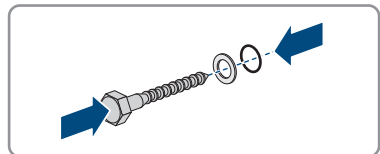
4. NOTICE

Damage to the product due to sand, dust and moisture due to missing sealing rings

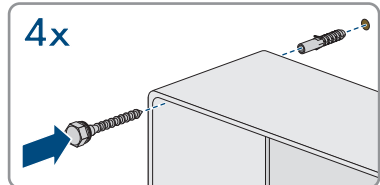
If sealing rings are missing, sand, dust and moisture can penetrate into the product and damage it.

- Install the sealing rings as follows.

5. Place the supplied sealing rings and supplied washers over suitable screws.



6. Attach Multicluster-Box to the wall with the suitable screws, washers and sealing discs.



7. Ensure that the product is securely in place.

6 Electrical Connection

6.1 Overview of the Connection Area

6.1.1 Interior View

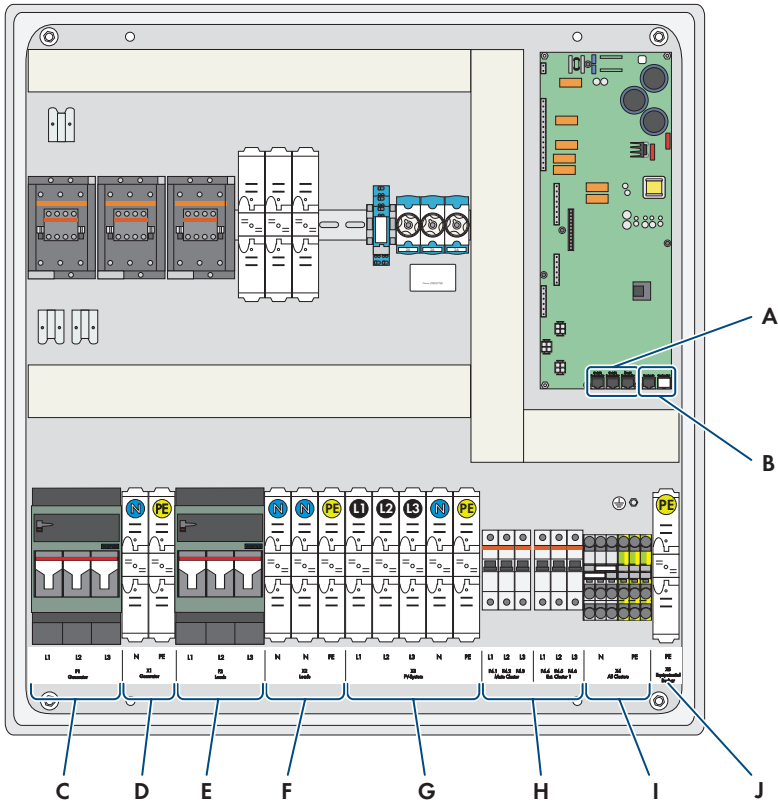
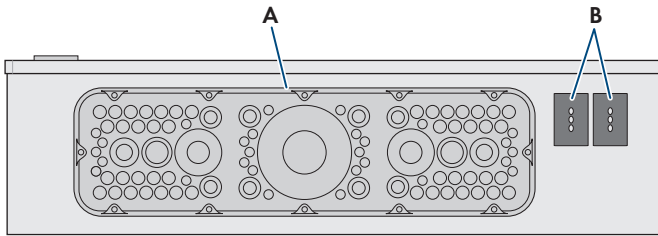


Figure 6: Components and terminals inside the Multicenter-Box

Position	Designation
A	RJ45 jacks for connecting the data cables for control and measuring signals
B	RJ45 jack for connecting the data cable for communication
C	Fuse switch-disconnectors F1 Generator for connecting the generator (L1, L2, L3)
D	Terminals X1 Generator for connecting the generator (N, grounding conductor (PE))
E	Fuse switch-disconnectors Loads for connecting the loads (L1, L2, L3)

Position	Designation
F	Terminals Loads for connecting the loads (N, grounding conductor (PE))
G	Terminals PV-System for connecting the PV system (L1, L2, L3, N, grounding conductor (PE))
H	Miniature circuit breaker for connecting the Sunny Island (L)
I	Terminals Clusters for connecting the Sunny Island (N, grounding conductor (PE))
J	Terminal X5 Equipotential Busbar for connecting the grounding conductor (for grounding the entire multicluster system)

6.1.2 View from Below



Position	Designation
A	Base plate with membranes for inserting the power cables: <ul style="list-style-type: none"> • 28 membranes for external cable diameters of 5 mm to 11 mm • 48 membranes for external cable diameters of 10 mm to 15 mm • 8 membranes for external cable diameters of 15 mm to 25 mm • 2 membranes for external cable diameters of 19 mm to 34 mm • 2 membranes for external cable diameters of 26 mm to 35 mm • 2 membranes for external cable diameters of 26 mm to 54 mm • 1 membrane for external cable diameters of 50 mm to 110 mm
B	Two-part cable feed-through for inserting the data cables

6.2 Connecting the Generator

You can connect a three-phase generator to the Multicluster-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 Multicluster-Box. Fuse links with a nominal current of 80 A are factory-installed.

Utility grid connection:

- The VDE-AR-N 4105 rule must not apply to the utility grid.
- Connecting the utility grid to the Multicluster-Box must be permitted in accordance with the local standards and directives and agreed with the grid operator.
- If the utility grid is directly connected to the Multicluster-Box, do not install a generator in the multicluster system.

i **Generator output fuse influences dimensioning of the PV system power cables**

Remember that the size of the generator output fuse affects the dimensions of the PV system's power cable (see Section 6.4, page 19).

Cable dimensioning:

If the generator does not have an output fuse, the power cable to the Multicluster-Box must be protected against ground faults and short circuits. As an alternative, you can install an additional distribution board close to the generator, especially if the cable routes are long.

Cable requirement:

- Conductor type: copper wire
- Maximum connectable conductor cross-section: 35 mm²

Procedure:

1. Insert the power cables into the Multicluster-Box (see Section 9.1, page 24).
2. Connect the grounding conductor and the neutral conductor to the terminal **X1 Generator** as labeled.
3. Connect the line conductor 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 into the fuse switch-disconnector.

6.3 Connecting the Loads

The line conductors L1, L2, and L3 are routed via a fuse switch-disconnector in the Multicluster-Box. Fuse links with a nominal current of 80 A are factory-installed. The fuse switch-disconnectors are required to protect the outgoing power cables from overload in stand-alone mode. Note that the electric currents of the Sunny Island, the PV system, and the generator can add up.

Cable requirement:

- Conductor type: copper wire
- Maximum connectable conductor cross-section: 35 mm²

Procedure:

1. Insert the power cables into the Multicluster-Box (see Section 9.1, page 24).
2. Connect the grounding conductor and the neutral conductor to the terminal **X2 Loads** as labeled. When doing this, do not connect the 2nd terminal **N**.

3. Connect the line conductor 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 into the fuse switch-disconnector.

6.4 Connecting the PV System

i Cable protection

The Multicluster-Box does not take the place of the distribution board of the PV system (PV main distribution board).

- Install a circuit breaker and, if necessary, a residual-current device between the Multicluster-Box and the PV system for protection and disconnection purposes.
- Adhere to all standards and directives for the installation of electrical devices and systems applicable at the installation location.

i Connection of other energy sources

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

Cable dimensioning:

In the event of a short circuit, short-circuit currents caused by the generator will flow through the unprotected power cable between Multicluster-Box and PV main distribution. If the generator fuse is larger than the fuse in the PV main distribution board, the power cables must be dimensioned to match the generator fuse.

The PV inverters and Sunny Island do not need to be considered when planning line protection in case of a short circuit, as they are designed to not to pose any danger to power cables during a short circuit. Overload protection is guaranteed if the power cables to the PV system are at least dimensioned for the feed-in power of the PV system.

Cable requirement:

- Conductor type: copper wire
- Maximum connectable conductor cross-section: 35 mm²

Procedure:

1. Insert the power cables into the Multicluster-Box (see Section 9.1, page 24).
2. Connect the grounding conductor and the neutral conductor to the terminal **X3 PV-System** as labeled.
3. Connect the line conductor to the fuse switch-disconnector **X3 PV-System** as labeled.

6.5 Connecting the Sunny Island

i Fusing of the Sunny Island inverters

The power cables of each Sunny Island inverter are fused with a 40 A circuit breaker inside the Multicluster-Box.

Cable requirement:

- Conductor type: copper wire
- Maximum connectable conductor cross-section for a rigid cable: 25 mm²
- Maximum connectable conductor cross-section for a fine-stranded cable: 16 mm²

Procedure:

1. Insert the power cables into the Multicluster-Box (see Section 9.1, page 24).
2. Connect the grounding conductor and the neutral conductor to the terminal **X4 All Clusters** as labeled.
3. Connect the inverters of the main cluster as described in the following three steps:
4. Connect the line conductor of the master to L1 of the miniature circuit breaker **F4.1 Main Cluster**.
5. Connect the line conductor of slave 1 to L2 of the miniature circuit breaker **F4.2 Main Cluster**.
6. Connect the line conductor of slave 2 to L3 of the miniature circuit breaker **F4.3 Main Cluster**.
 - The inverters of the main cluster are connected.
7. Connect the inverters of the extension cluster as described in the following three steps:
8. Connect the line conductor of the master to L1 of the miniature circuit breaker **F4.4 Main Cluster**.
9. Connect the line conductor of slave 1 to L2 of the miniature circuit breaker **F4.5 Main Cluster**.
10. Connect the line conductor of slave 2 to L3 of the miniature circuit breaker **F4.6 Main Cluster**.
 - The inverters of the extension cluster are connected.

6.6 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 requirement:

- Conductor type: copper wire
- Connectable conductor cross-section: 16 mm² bis 120 mm²

Procedure:

1. Insert the power cables into the Multicluster-Box (see Section 9.1, page 24).
2. Connect the grounding conductor to the grounding terminal **X5 Equipotential Busbar** and connect it to the grounding busbar.
3. Ground the multicluster system outside the Multicluster-Box on either the generator side or the load side. To do this, connect the neutral conductor to the grounding conductor, observing all standards and directives applicable at the installation site.

6.7 Connecting the Data Cable

Connecting the Data Cables for Control and Measuring Signals

1. Insert the data cables (see Section 9.2, page 25).
2. Plug the data cable for control and measuring signals (red) for the master of the main cluster in the jack **Mstr/L1**.
3. Plug the data cable for control and measuring signals for slave 1 of the main cluster in the jack **Slv1/L2**.
4. Plug the data cable for control and measuring signals for slave 2 of the main cluster in the jack **Slv2/L3**.

Connecting the Data Cables for Communication

1. Insert the data cables (see Section 9.2, page 25).
2. Plug the black data cable for the communication between Sunny Island and Multicluster-Box in the jack **ComSyncln**.
3. Leave the terminator plugged into the jack **ComSyncOut**.
4. Plug the end of the data cable in the jack **ComSyncln** of a Sunny Island in the main cluster.
Since all Sunny Islands (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 Preparing for Commissioning

i Load shedding in the first two operating hours

The state of charge (SOC) recorded by battery management and the available battery capacity (SOH) of the battery will deviate strongly in a newly connected battery from the actual SOC and SOH values. 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 messages. These messages will be displayed on the Sunny Island user interface.

Requirements:

- The Multiclus-ter-Box must be correctly mounted (see Section 5, page 13).
- All cables must be correctly connected (see Section 6, page 16).
- All cables must be tightly enclosed by a membrane or cable entry of the Multiclus-ter-Box.
- All power cables must be secured inside or outside the Multiclus-ter-Box.
- The multiclus-ter system must be grounded outside the Multiclus-ter-Box on either the generator side or the load side (see Section 6.6, page 20).
- The neutral conductor must be connected to the grounding conductor.

Procedure:

1. Ensure that the power cables are secured with a strain relief.
2. Close Multiclus-ter-Box.
3. Commission the multiclus-ter system (see documentation of the Sunny Island).
4. In order to receive service assignments for the multiclus-ter system, all system data must be recorded in the information sheet for Sunny Island systems and made available to Service. To do this, access the information sheet at www.SMA-Solar.com.

8 Disconnect from voltage sources

CAUTION

Risk of burns due to hot components

Some components and terminals inside the product can become hot during operation. Touching hot components or terminals can result in burn injuries.

- Wear suitable personal protective equipment for all work on the product.
- After opening the product, wait until the components have cooled down.

Procedure:

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

9 Periodic Actions

9.1 Inserting Power Cables

NOTICE

Damage to the product due to sand, dust and moisture because of leaky membranes

By piercing unnecessary or oversized holes, the membranes in the cable feed-through plate become leaky. Sand, dust and moisture penetration can damage the product and impair its functionality.

- Select membranes that match the cable diameter.
- Only pierce as many holes in the membranes of the cable feed-through plate as you need for the cables.
- The hole in each membrane must be smaller than the diameter of the cable to be led through.
- Only insert one cable in each membrane.

NOTICE

Damage to the product due to sand, dust and moisture because of leaky membranes caused by town cables

Excessive mechanical stress can cause the cables to break off and damage the membranes in the cable entry plate. If membranes are damaged, sand, dust and moisture can penetrate into the product and damage it.

- Secure the cables outside the product, e.g., with a cable support rail.

Cable requirement:

- Conductor type: copper wire

Procedure:

1. Select a suitable membrane for inserting the individual cable.
2. Pierce the selected membrane with a pointed object.
3. Insert the cable through the membrane into the Multicenter-Box. The cable must be tightly enclosed by the membrane after it is inserted.
4. Prepare the cables for connecting the generator, loads and PV system and for grounding the multicenter system. To do this, strip the insulation off each cable to match the tube terminal lug used and fit the stripped insulated conductor with a suitable tube terminal lug.
5. Insulate the cables for connection to Sunny Island.

9.2 Inserting Data Cables

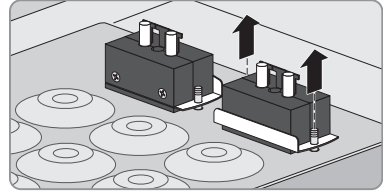
i Separate wiring of data and power cables

If data cables are wired near power cables, coupling interference signals can occur under unfavorable conditions.

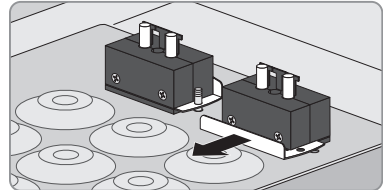
- Make sure that the data cables are always routed separately from the power cables.

Procedure:

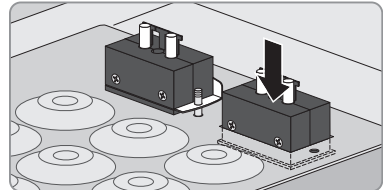
1. Loosen the screws of the mounting plate of the two-part cable feed-through inside the Multicluster-Box.



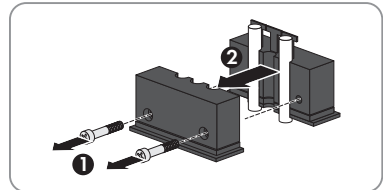
2. Remove the mounting plate and set it aside.



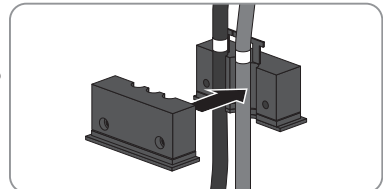
3. Remove the cable feed-through from the enclosure.



4. Loosen the screws of the two-part cable feed-through and remove the half without the T-shaped fastening pieces.

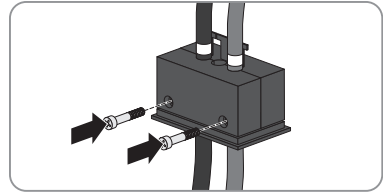


5. Lay the data cables into the half with the T-shaped fastening pieces, and secure with cable ties. Ensure sufficient cable length from the cable feed-through to the desired connection point.

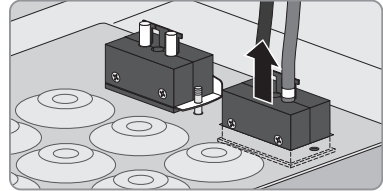


6. Screw the two halves back together. Fasten screws hand-tight.

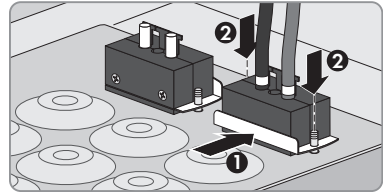
The data cables and placeholders (plastic inserts) must be firmly clamped between both sides of the two-part cable feed-through. This ensures tightness of the enclosure seal.



7. Position the cable feed-through including cable on the outside of the enclosure.



8. Attach the mounting plate of the two-part cable feed-through and fasten the fastening screws hand-tight.



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

10 General Maintenance Work

DANGER

Danger to life due to electric shock when live components or cables are touched

High voltages are present in the conductive components or cables of the product. Touching live parts and cables results in death or lethal injuries due to electric shock.

- Do not touch non-insulated parts or cables.
- Disconnect the product from voltage sources and ensure it cannot be reconnected before working on the device.
- Wear suitable personal protective equipment for all work on the product.

The general maintenance work must be performed every 12 months.

Adverse ambient conditions reduce maintenance intervals

Location and ambient conditions influence the maintenance intervals. Note that cleaning and corrosion protection may be required more frequently depending on the conditions at the installation site.

- If the product is subject to adverse ambient conditions, a reduction of the maintenance intervals is recommended. Above all, the intervals between cleaning work and corrosion protection should be reduced.
- SMA recommends a monthly optical inspection to determine the maintenance requirement.

Required maintenance materials and tools:

Only those consumables and maintenance materials not normally included in the standard equipment of an electrically qualified person are listed. It is taken for granted that standard tools and materials such as torque wrenches, one-contact voltage testers and wrenches will be available for all maintenance operations.

- To repair corrosion damage: touch-up sticks or, alternatively, 2K-PUR acrylic paint (RAL color: 7035)
- Abrasive cloth
- Degreaser
- For maintaining the seals: talcum, petroleum jelly or wax

Procedure:

1. Disconnect the product from voltage sources (see Section 8, page 23).
2. Check whether the inside of the product is soiled or moist.
3. If the interior of the product is dirty, clean the product.
4. If the interior of the product is moist or water has accumulated, dry the product out.
5. Check whether all connections have been tightened with the correct torque (see Section 12, page 30)

6. If any connections are not tightened with the correct torque, tighten with a suitable torque wrench.
7. Check all power cables on the product for discoloration or changes in the appearance of the insulation.
8. If any power cables are discolored or the appearance of the insulation has changed, replace these power cables.
9. Check all insulated conductors, terminals and components in the product for discoloration or changes in the appearance of the insulation.
10. If any insulated conductors, terminals or components in the product are discolored or have changed in appearance, contact Service .
11. Check whether the product is free of corrosion damage.
12. If the product shows corrosion damage, sand the affected area, clean with degreaser and paint.
13. Check whether all seals on the cabinet door are undamaged.
14. If a seal is damaged, contact Service.
15. Apply talcum, petroleum jelly or wax to seals. This will prevent frost damage.

11 Decommissioning the Product

DANGER

Danger to life due to electric shock when live components or cables are touched

High voltages are present in the conductive components or cables of the product. Touching live parts and cables results in death or lethal injuries due to electric shock.

- Do not touch non-insulated parts or cables.
- Disconnect the product from voltage sources and ensure it cannot be reconnected before working on the device.
- Wear suitable personal protective equipment for all work on the product.

WARNING

Danger to life if raised or suspended loads tip over, fall or sway

Vibrations or careless or hasty lifting and transportation may cause the product to tip over or fall. This can result in death or serious injury.

- All means of transport and auxiliary equipment used must be designed for the weight of the product. Weight: 55 kg.
- Always transport and lift the product upright.
- Always maintain a sufficient safety distance from the product during transport.
- Wear suitable personal protective equipment for all work on the product.

Procedure:

1. Make sure that the product and entire multicluster system have been disconnected from all voltage sources.
2. Open the product using the provided switch cabinet key.
3. Remove all cables from the product.
4. Release and remove the fastening screws on the bottom of the product.
5. Remove the product from the wall.
6. Lock the product using the switch cabinet key.
7. Dispose of the product in accordance with the locally applicable disposal regulations for electronic waste.

12 Technical Data

Connection of loads

Number of terminals	1 x three-phase
Rated power	55 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 265 V
AC voltage range between L1 and L2	300 V to 433 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 (PE)	6 mm
Diameter of screws at the fuse switch-disconnector for connecting L1, L2, L3	8 mm
Maximum torque of the stud terminal	6 Nm
Maximum torque of the fuse switch-disconnector	14 Nm
Maximum connectable conductor cross-section	35 mm ²
Fuse	LV/HRC 00
Maximum permitted fuse rating	80 A

Sunny Island Connection

Maximum number of Sunny Island inverters	6
Rated power of the Sunny Island inverters	36 kW
Rated operating voltage between L and N	230 W
Rated operating voltage between L1 and L2	400 W
Current at Sunny Island ratings	3 x 52.2 A
Unaffected short-circuit current / relative rated short-circuit current at the feed-in terminal	≤ 17 kA
Maximum connectable conductor cross-section for a rigid cable	25 mm ²
Maximum connectable conductor cross-section for a fine-stranded cable	16 mm ²
Fuses	6 x miniature circuit breaker C40 A

Generator connection

Number of terminals	1 x three-phase
Rated grid 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
Unaffected short-circuit current / relative rated 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 (PE)	6 mm
Diameter of screws at the fuse switch-disconnector for connecting L1, L2, L3	8 mm
Maximum torque of the stud terminal	6 Nm
Maximum torque of the fuse switch-disconnector	14 Nm
Maximum connectable conductor cross-section	35 mm ²
Fuse	LV/HRC 00
Maximum permitted fuse rating	80 A

Connection of PV system

Number of terminals	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
Rated current / AC input current	3 x 80 A
Unaffected short-circuit current / relative rated short-circuit current at the feed-in terminal	≤ 17 kA
Maximum permitted rated current of the back-up fuse	80 A
Short-circuit current breaking capacity of the back-up fuse	≥ 25 kA
Forward current of the back-up fuse	≤ 17 kA
Diameter of the stud terminal	6 mm
Maximum torque of the stud terminal	6 Nm
Maximum connectable conductor cross-section	35 mm ²
Fuse	not available

Connection of grounding

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

Auxiliary electric circuits

Fuse	D01
Maximum permitted fuse rating	2 A

General Data

Number of line conductors	3
Permitted grid configuration	TN-S
Rated frequency	50 Hz
Frequency range 50 Hz (see order options)	45 Hz to 52 Hz
Frequency range 60 Hz (see order options)	45 Hz to 65 Hz
Width x height x depth (with base)	760 mm x 760 mm x 210 mm
Weight	55 kg
Maximum operating altitude above mean sea level	2000 m
Inner subdivision	Form 1 (no subdivision)
Exterior design	closed type
Installation	only fixed interior installation permitted
Construction type	fixed components
Degree of protection of enclosure	IP55
Degree of protection with enclosure door open	IP00
Pollution degree at the mounting location (as per IEC 61439-1 and IEC 61439-2)	3
Pollution degree in the enclosure (micro-environment as per IEC 61439-1 and IEC 61439-2)	2
Protection class (as per IEC 417)	1
Overvoltage category (as per IEC 60664)	Overvoltage category 3
Rated impulse withstand voltage at 2000 m above Mean Sea Level	4 kV

EMC environment, emission (as per IEC 61439-1:2011)	Electromagnetic interference, environment B (EMC directive, Article 5 – Annex I.1.b)
EMC environment, interference immunity (as per IEC 61439-1:2011)	Interference immunity, environment A (EMC Directive Article 5 – Annex I.1.b)
EU Declaration of Conformity	Yes
UK Declaration of Conformity	Yes
Operating temperature range At operating temperatures above 40°C, the Sunny Island inverters reduce their output power (derating).	-25°C ... +50°C
Humidity (non-condensing)	0% to 100%
Rated voltage / rated insulation voltage	
Switch cabinet wiring L to N	250 V AC
Switch cabinet wiring L1 to L2	433 V AC
Auxiliary AC circuits	250 V AC
Auxiliary DC circuits	70 V DC

13 Multicluster Technology Terms

Stand-alone grid

A stand-alone grid is a utility grid which is independent of the public energy supply. A stand-alone grid with Sunny Island is designed as a single-phase or three-phase AC grid which integrates various kinds of power generators (e.g., PV systems, small wind turbine systems and diesel generators).

Batteries for energy storage are also an integral part of stand-alone grids. The Sunny Island battery inverter forms a stand-alone grid and maintains a stable energy supply by regulating all processes.

Cluster

A cluster is made up of three Sunny Island inverters and one battery. One Sunny Island inverter per line conductor, i.e., three Sunny Island inverters in total, are connected to form a three-phase stand-alone grid. Within the cluster, one Sunny Island is the master, while the other two are slaves.

Multicluster system

A multicluster system is made up of several clusters connected in parallel. The power of the multicluster system increases with the number of clusters. The individual clusters must be connected to a Multicluster-Box. The size of the Multicluster-Box is determined when the system is designed depending on the power requirement.

Multicluster-Box

The Multicluster-Box is the AC main distributor in a multicluster system. The Multicluster-Box connects the Sunny Island clusters with the loads and the power generators within a stand-alone grid.

Master

The master is the control and communication center in a cluster. It carries out the following tasks:

- Switching slaves on and off
- Controlling and monitoring the slaves, e.g., regulating frequency and voltage
- Controlling battery charge and discharge
- Monitoring battery capacity and state of charge
- Storing cluster and battery data on SD memory card
- Requesting diesel generator
- Exchanging data with the masters of other clusters
- Updating both slaves after firmware updates
- Displaying system values and system states
- Central capture of user entries

Slave

A slave is a functional unit subordinated to the master. A slave receives its configuration settings, current firmware updates, and start/stop commands from the master. It transmits its operating data to the master and executes commands issued by the master.

Main cluster

The main cluster is the leading cluster in the multicluster system. The master of the main cluster is the central user interface for the main cluster and all extension clusters of a stand-alone grid. The master of the main cluster is superior to the masters of the extension clusters. The tasks performed by the master of the main cluster include the following:

- Starting and stopping the multicluster system
- Controlling and monitoring the masters of the extension cluster
- Communicating with the Multicluster-Box

If the master of the main cluster stops operation, the entire multicluster system shuts down. If a diesel generator is integrated in the stand-alone grid, it will take over the power supply to the loads in this case.

Extension cluster

Each extension cluster is subordinate to the main cluster.

The master of the extension cluster follows the instructions issued by the master of the main cluster, and sends the operating data of its cluster to the master of the main cluster. If the master of an extension cluster stops operation, then only this cluster shuts down. In this case, the multicluster system continues to operate with reduced power.

14 Declarations of Conformity

14.1 EU Declaration of Conformity

within the scope of the EU directives

- Electromagnetic compatibility 2014/30/EU (29.3.2014 L 96/79-106) (EMC)
- Low Voltage Directive 2014/35/EU (29.3.2014 L 96/357-374) (LVD)
- Restriction of the use of certain hazardous substances 2011/65/EU (L 174/88, June 8, 2011) and 2015/863/EU (L 137/10, March 31, 2015) (RoHS)



SMA Solar Technology AG confirms herewith that the products described in this document are in compliance with the fundamental requirements and other relevant provisions of the above-mentioned directives. The entire EU Declaration of Conformity can be found at www.SMA-Solar.com.

14.2 UK Declaration of Conformity

according to the regulations of England, Wales and Scotland

- Electromagnetic Compatibility Regulations 2016 (SI 2016/1091)
- Electrical Equipment (Safety) Regulations 2016 (SI 2016/1101)
- Radio Equipment Regulations 2017 (SI 2017/1206)
- The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012 (SI 2012/3032)



SMA Solar Technology AG confirms herewith that the products described in this document are in compliance with the fundamental requirements and other relevant provisions of the above-mentioned regulations. The entire UK Declaration of Conformity can be found at www.SMA-Solar.com.

SMA Solar UK Ltd.

Countrywide House
23 West Bar, Banbury
Oxfordshire, OX16 9SA
United Kingdom

15 Contact

If you have technical problems with our products, please contact the SMA Service Line. The following data is required in order to provide you with the necessary assistance:

- Box:
 - Device type
 - Serial number
- Battery inverter:
 - Device type
 - Quantity
- PV inverter:
 - Device type
 - Quantity
- Electrical loads:
 - Device type
 - Quantity
- Type, power and maximum current for the generator (if present)
- Batteries:
 - Type
 - Nominal capacity and nominal voltage (with lead-acid batteries)

You can find your country's contact information at:



<https://go.sma.de/service>

