



Accessories for Stand-alone inverter

SUNNY ISLAND GENMAN

Technical Description



Table of Contents

1	Notes on this manual	5
1.1	Validity	5
1.2	Target group	5
1.3	Storage of this manual	5
1.4	Symbols Used	6
2	Safety Precautions	7
2.1	Appropriate Usage	7
2.2	General Safety Instructions	8
3	Unpacking	9
3.1	Delivery Scope	9
3.2	Checking for Transport Damage	10
3.3	Type label/Firmware	10
4	Mounting	11
4.1	Selecting the Mounting Location	11
4.1.1	Dimensions	11
4.1.2	Ambient Conditions	11
4.1.3	Safety Clearances	12
4.2	Mounting the GenMan	12
5	Electrical Connection	13
5.1	Preparatory Work	14
5.2	Overview	15
5.3	Connect the Sunny Island to the Generator	15
5.4	Connecting the GenMan	16
5.4.1	Sunny Island	17
5.4.2	On the Generator	17
5.5	Gen Ready Relay	18

6	(First) Commissioning	19
6.1	Configuration	19
6.1.1	Rotary Switch S2	19
6.1.2	DIP Switch S3	20
6.2	Commissioning of GenMan	21
7	Opening and Closing	22
7.1	Opening the Device	22
7.2	Closing the Device	22
8	Operation	23
8.1	3-position Switch S1	23
8.2	LED Displays	25
8.3	Display	26
9	Decommissioning	27
9.1	Disassembly	27
9.2	Packaging	27
9.3	Storage	27
9.4	Disposal	27
10	Troubleshooting and Problem Solving	28
10.1	Error Message: the red LED is flashing	28
10.2	Frequently Asked Questions	29
11	Technical Data	30
12	Contact	31

1 Notes on this manual

These technical specifications explain the operating principles as well as the mounting, installation, and operation of the generator management box hereinafter named GenMan.

1.1 Validity

These technical specifications are valid for the GenMan starting from firmware version 1.00.012.

1.2 Target group





These technical specifications apply to both the installer and the operator of GenMan.

1.3 Storage of this manual

Store GenMan manual in the direct vicinity of the system so that it is accessible at all times.

1.4 Symbols Used

The following types of safety precautions as well as general information are used in this manual:

	DANGER!
<p>"DANGER" indicates a hazardous situation which, if not avoided, will result in death or serious injury.</p>	
	WARNING!
<p>"WARNING" indicates a hazardous situation which, if not avoided, could result in death or serious injury.</p>	
	CAUTION!
<p>"CAUTION" indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.</p>	
NOTICE!	
<p>"NOTICE" indicates a situation that can result in property damage if not avoided.</p>	
	Information
<p>Information provides tips that are valuable for the optimal installation and operation of your product.</p>	

2 Safety Precautions

2.1 Appropriate Usage

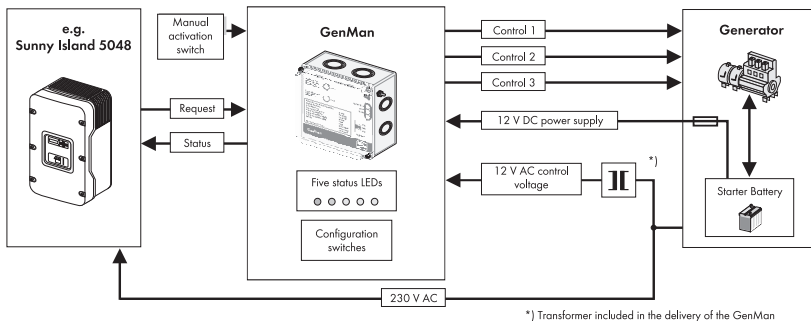
GenMan controls the various functions of your generator in the stand-alone grid system. It thereby controls generators that require more than a start/stop signal. You can designate the number of start attempts that schedule warm-up and cool-down phases and that stop the generator.

The GenMan possesses:

- five LEDs: they display the operating mode and possible faults.
- a 3-position switch: for manual or automatic starting and stopping.
- a rotary and a DIP switch: they serve the simple configuration of the generator.

The GenMan possesses safety functions that reset the generator command if the generator:

- fails to start
- stops
- runs too long, or
- if the output frequency or output voltage lies outside the tolerance limits during the start-up phase.



SMA Solar Technology Products

The GenMan is an accessory for the stand-alone inverter Sunny Island 2012, 2224, 3324, 4248, and 5048.

2.2 General Safety Instructions

**DANGER!**

Risk of lethal electric shock.

- All work on the GenMan, Generator, and Sunny Island must be carried out by a qualified electrician.

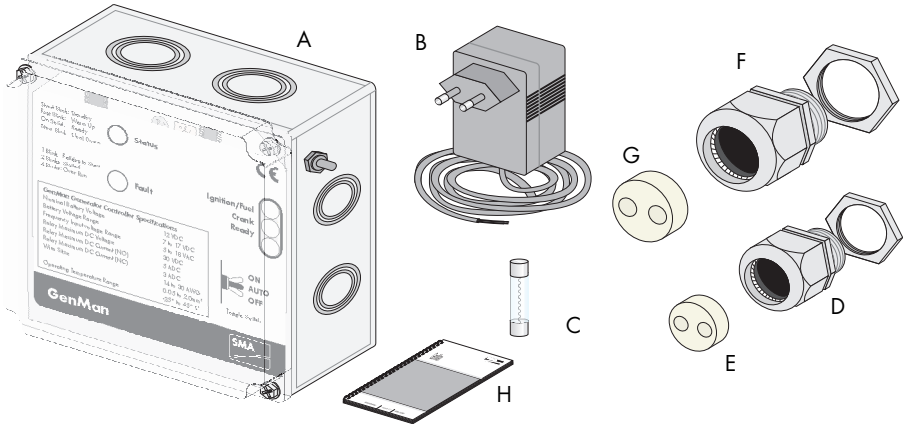
**Observe standards and guidelines**

Be sure to observe all applicable regional standards and guidelines.

3 Unpacking

3.1 Delivery Scope

The following elements are included in the delivery scope:



Object	Number	Description
A	1	GenMan
B	1	transformer 230 V / 12 V for top hat rail installation or as plug-in power supply (depending on your order)
C	3	miniature fuses (0.5 mA, fast-acting)
D	2	metric cable screw connections M20
E	2	multi-seal insert M20
F	2	metric cable screw connections M25
G	2	multi-seal insert M25
H	1	technical description

3.2 Checking for Transport Damage

Before installing, make sure that all parts are included in the delivery.

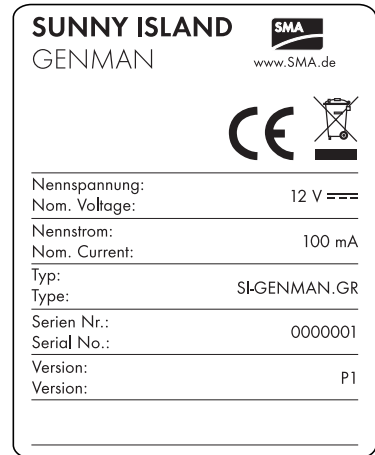
- Carefully check the packaging and the GenMan for any signs of damage.
- Ensure that all parts are included in the delivery.

If something is missing or if the GenMan was damaged during shipping, immediately call SMA Solar Technology AG. For more information, please see section 12 „Contact“ (31).

3.3 Type label/Firmware

Type label

You can identify the GenMan from the type label. The type label can be found on the left outside on the housing.



Firmware version

This technical description applies to firmware versions 1.00.012 and higher.

4 Mounting

4.1 Selecting the Mounting Location

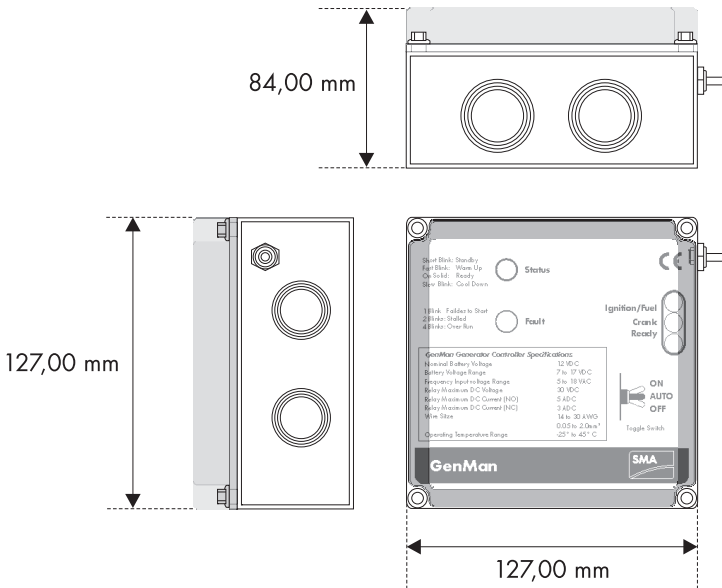
DANGER!
Danger to life due to fire or explosion.

Despite careful construction, a fire can occur with electrical devices.

Do not install the GenMan

- on flammable construction materials,
- in areas where highly flammable materials are stored,
- in potentially explosive areas!

4.1.1 Dimensions

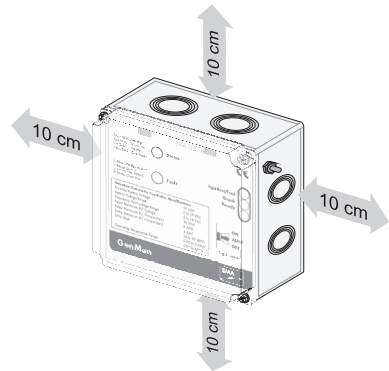


4.1.2 Ambient Conditions

- The mounting location must be accessible at all times.
- An ambient temperature between -25 °C and 50 °C ensures optimum operation.
- Direct sunlight is to be avoided.

4.1.3 Safety Clearances

Observe the following safety clearances to walls, other devices, or other objects.

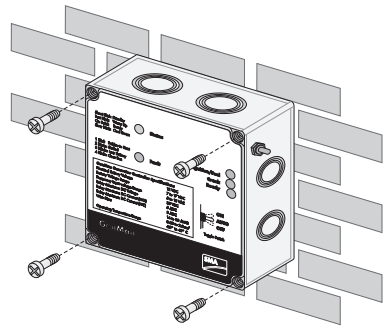


4.2 Mounting the GenMan

Wall mounting

The GenMan is mounted directly on the wall. Proceed as follows:

1. Remove the cover.
2. Mark the drill holes.
3. Drill the holes.
4. Fasten GenMan to the wall.



5 Electrical Connection

**DANGER!**

Risk of lethal electric shock.

- All work on the GenMan must only be carried out by a qualified electrician.

NOTICE!

Short-circuit due to overheating.

- Protect the battery cable from the generator to the GenMan with a 4 A fuse.

NOTICE!

Short-circuit due to faulty connection.

- Ensure that all connections are connected correctly. Only after that should the positive pole of the battery backup be connected to the generator.

**Observe cable length**

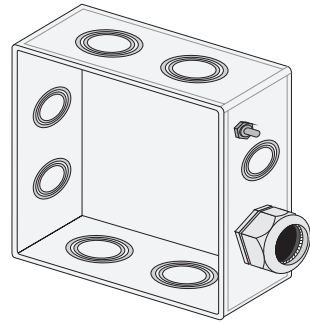
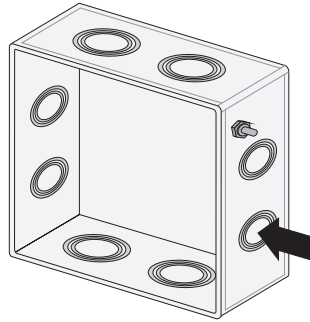
The cable between the starter battery and the GenMan cannot be longer than 10 m.

The connection terminals on the GenMan are suitable for cable cross-sections of 0.05 – 2.0 mm².
The recommended cable cross-section is 0.75 mm².

5.1 Preparatory Work

Put in the cable screw connections:

1. With a suitable object, remove the identified areas for the required cable screw connections.
2. Put in and screw in the cable screw connections.



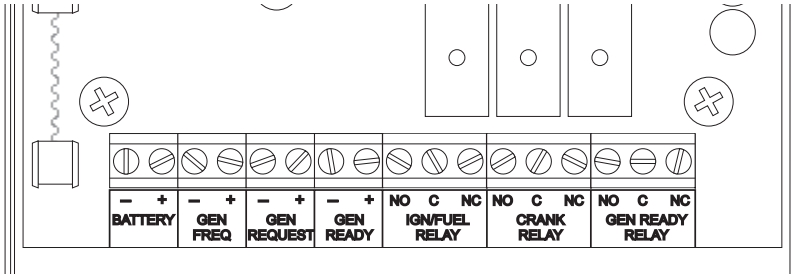
Guide the cables into the housing:

Pass all cables only over the cable screw connections with a metric thread into the GenMan. The cable screw connections provide for IP protection class 65 (protection against dust and water). Furthermore, they serve as strain relief.

How to proceed:

1. Cut to length and strip the cables.
2. Loosen the lock nut from the cable screw connection and slide it over the cable.
3. Pass the cable through the multi-seal insert.
4. Press the multi-seal insert firmly into the cable screw connection.
5. Tighten the lock nut.

5.2 Overview



Meaning of the connections

Connection terminal	Description
BATTERY	The generator battery supplies the GenMan via the BATTERY connection.
GEN FREQ	Connecting contact of the transformer. The GenMan continually measures the voltage and frequency of the generator output.
GEN REQUEST	The Sunny Island makes requests to the generator via the GEN REQUEST contact.
GEN READY	Feedback contact. Generator is "ready."
IGN/FUEL RELAY	Initiates the start (ignition on).
CRANK RELAY	Switches the generator starter on or off.
GEN READY RELAY	Additional contact. Can be variably reserved, see section 5.5 „Gen Ready Relay“ (18).

5.3 Connect the Sunny Island to the Generator



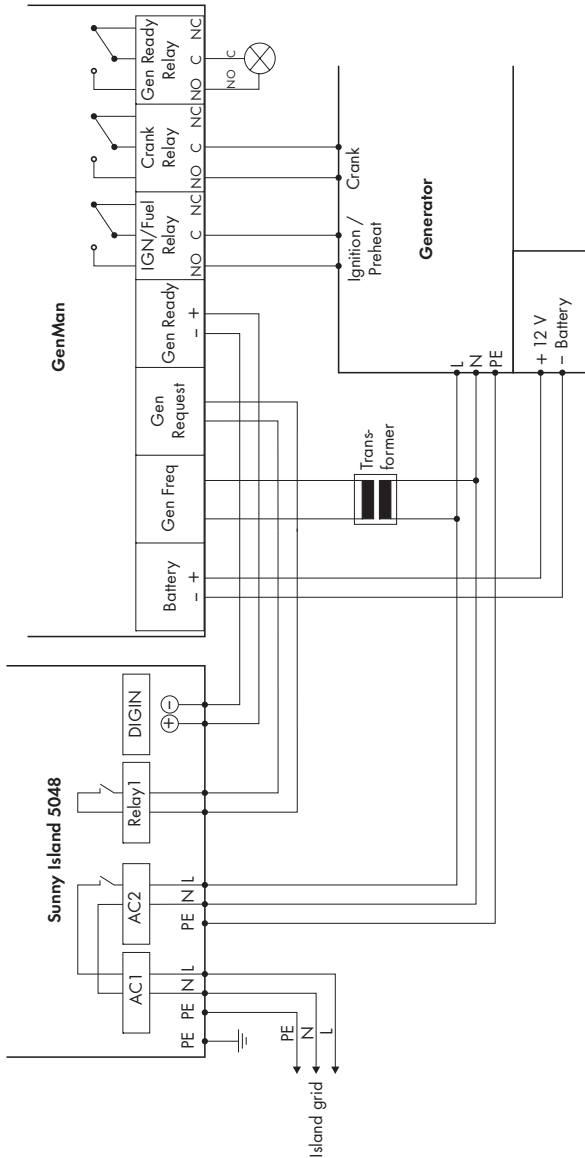
Cable cross-section

Observe the instructions for the recommended cable cross-section in the generator documentation.

1. Connect phase conductor (L) of the generator with AC2 (L).
2. Connect neutral conductor (N) of the generator with AC2 (N).
3. Connect protective earth (PE) of the generator with AC2 (PE).

5.4 Connecting the GenMan

Wiring example for the Sunny Island 2012/2224/5048:



5.4.1 Sunny Island

The terminals of the Sunny Island 3324/4248 which are identified with an * are named differently from the Sunny Island 2012/2224/5048. The respective terminals can be taken from the following table:

Sunny Island 2012/2224/5048	Sunny Island 3324/4248
AC1	AC output
AC2	AC input
Relay1	G_Req
DIGIN	G_Run

Proceed as follows:

1. Connect the change-over contact (C) of the Relay1 of the Sunny Island to the Gen Request of the GenMan.
2. Connect the operating contact (NO) of the Relay1 to the Gen Request.
3. Connect the "DIGIN -" of the Sunny Island with "Gen Ready -" of the GenMan.
4. Connect the "DIGIN +" with the "Gen Ready +".

5.4.2 On the Generator

1. Connect the transformer frequency input to the 230 V output of the generator.
2. Connect the positive transformer output (12 V) to "GenFreq +" of the GenMan.
3. Connect the negative transformer output (12 V) to "GenFreq -".
4. Connect the ignition/pre-heating contact 1 of the generator to the change-over contact (C) of the IGN/FUEL relay of the GenMan.
5. Connect the ignition/glowing up contact 2 of the generator to the operating contact (NO) of the IGN/FUEL relay.
6. Connect the starter contact 1 of the generator to the change-over contact (C) of the crank relay of the GenMan.
7. Connect the generator starter contact 2 to the operating contact (NO) of the crank relay.
8. Connect the negative pole of the generator battery to "battery -" of the GenMan.
9. Connect the positive pole of the generator battery to "battery +" of the GenMan.

Attach this cable with a 4 A fuse.

5.5 Gen Ready Relay

The Gen Ready relay can be used optionally and is activated via the Gen Ready signal. Major loads that have to be supplied by the generator can be activated via the Gen Ready relay. Or they can connect a signal lamp that displays the status of the generator.

NOTICE!**Destruction of the GenMan by high voltages and currents.**

Observe the maximum voltage and current of the Gen Ready relay:

- $V_{DC \max} = 30 \text{ V}$
- $I_{DC \max} = 5 \text{ A}$ (NO, operating contact)
- $I_{DC \max} = 3 \text{ A}$ (NC, rest contact)

6 (First) Commissioning

6.1 Configuration

Via the rotary switch S2 and the DIP S3 switch, you can

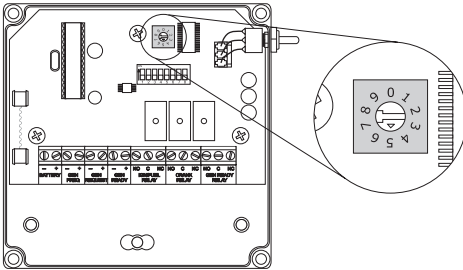
- adjust the number of start attempts
- schedule the warm-up and cool-down phases
- designate the start and pause times

The various settings are dependent upon the generator type.

6.1.1 Rotary Switch S2

The number of start attempts as well as the start and pause times are set on the rotary switch S2.

You can change the various positions with a screw driver.



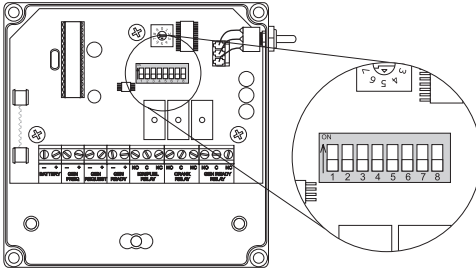
Rotary switch position	Number of start attempts	Start time ^{a)}	Pause time ^{b)}
0	4	10 s	5 s
1	2	3 s	3 s
2	2	5 s	5 s
3	2	3 s	10 s
4	3	3 s	3 s
5	3	3 s	5 s
6	3	3 s	10 s
7	4	3 s	5 s
8	4	5 s	10 s

^{a)} Duration of the starting procedure. The starter is only active at the beginning of the the starting procedure.

^{b)} Time between the automatic starting attempts.

6.1.2 DIP Switch S3

The warm-up and cool-down phases are set on DIP switch S3. It has two switch positions. Push the switch up to carry out the desired setting.



Switch	Off (down)	On (up)
1	no warm-up/cool-down phase	5 min. warm-up/cool-down phase
2	time between ignition and start-up: 2 seconds	time between ignition and start-up: 30 seconds
3	not used	not used
4	not used	not used
5	not used	not used
6	not used	not used
7	for all other generators	diesel Gen Ready relay is used for preheating (duration: 8 seconds)
8	for all other generators	Onan generator ^{a1)}

^{a1)} For generators of the manufacturer Onan. They only stop if the ignition is temporarily shut down. This setting enables a secure stoppage of the generator.

6.2 Commissioning of GenMan

1. Set 3-position switch to "OFF". The 3-position switch S1 is described in section 8.1 „3-position Switch S1“ (23).

2. 4 Screw the A fuse in the battery connection bracket.

The green LED begins blinking.

3. Set 3-position switch to "On".

The generator starts after a few seconds. If it does not start, set the 3-position switch to "Off" (also see section 10 „Troubleshooting and Problem Solving“ (28)).

4. Set 3-position switch to "Off".

The generator stops. If it does not stop, follow the steps recommended by SMA Solar Technology to stop the generator (also see section 10 „Troubleshooting and Problem Solving“ (28)).

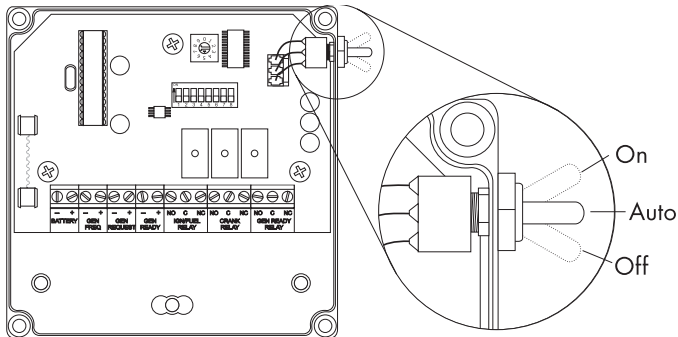
5. Set 3-position switch to "Auto".

6. The Sunny Island starts and stops the generator.

If the generator does not start or stop automatically, set the 3-position switch to "Off" (also see section 10 „Troubleshooting and Problem Solving“ (28)).

7. Set the 3-position switch to the desired position.

The (first) commissioning is complete.



7 Opening and Closing

The housing of the GenMan has a removable cover. Only remove the housing cover during mounting or during incidental maintenance or repair work.

7.1 Opening the Device

1. Loosen the screws on the housing cover.
2. Pull the housing cover forward smoothly.
3. Remove the housing cover and store it in a safe location during mounting or during maintenance or repair work.

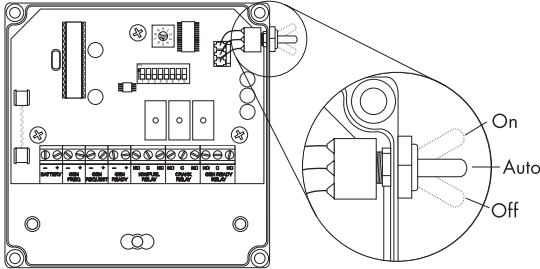
7.2 Closing the Device

1. Check whether all cables are safely installed and that all tools were removed from the inside of the GenMan.
2. Put the housing cover on the housing.
3. Tighten the screws of the housing cover.

8 Operation

8.1 3-position Switch S1

The 3-position switch enables manual or automatic starting and stopping of the generator.



Switch position	Function
On	The generator starts and continues to operate, regardless of signals from the Sunny Island.
Auto	Normal operation. The generator starts and stops according to the signals of the Sunny Island.
Off	The generator is not activated, regardless of signals from the Sunny Island.



Only start the generator via the GenMan or Sunny Island

The battery of the Sunny Island is not charged if the generator was not started by means of the GenMan or Sunny Island.

If a GenMan is used, the generator may only be:

- started by the Sunny Island (automatically)
- started by the user via the Sunny Island control panel (manually)
 - parameter "GenOperation" with the Sunny Island 3324/4248
 - parameter "GnStrMod" with the Sunny Island 2012/2224/5048
- started via the 3-position switch S1 on the GenMan

NOTICE!

Damage to the system through voltage drops and interruptions.

Grid-connected loads may be impacted by voltage drops and interruptions.

- Do not switch the 3-position switch from "On" to "Off" directly.

In the "Off" switch position, all relay contacts will be separated simultaneously. The Sunny Island does not disconnect and voltage drops and interruptions can occur.

Voltage drops and interruptions can thus be avoided:

- Switch the 3-position switch from "On" to "Auto".

The generator continues to run as long as the Sunny Island requests it. Subsequently, the GenMan switches the generator off after a cool-down phase.

- Switch off the generator manually in the Sunny Island menu.
 - parameter "GenOperation" with the Sunny Island 3324/4248
 - parameter "GnStrMod" with the Sunny Island 2012/2224/5048

The GenMan switches the generator off after a cool-down phase.

- Switch the 3-position switch from "Auto" to "Off".

8.3 Display

Short Blink: Standby
Fast Blink: Warm Up
On Solid: Ready
Slow Blink: Cool Down

Status E

1 Blink: Faildes to Start
2 Blinks: Stalled
4 Blinks: Over Run

Fault K

Ignition/Fuel
Crank
Ready

GenMan Generator Controller Specifications	
Nominal Battery Voltage	12 VDC
Battery Voltage Range	7 to 17 VDC
Frequency Input voltage Range	5 to 18 VAC
Relay Maximum DC Voltage	30 VDC
Relay Maximum DC Current (NO)	5 ADC
Relay Maximum DC Current (NC)	3 ADC
Wire Sitze	14 to 30 AWG
	0.05 to 2.0mm ²
Operating Temperature Range	-25° to 45° C

ON
AUTO
OFF

Taggle Switch

GenMan

SMA

9 Decommissioning

9.1 Disassembly

1. Open the GenMan as described in section 7.1 „Opening the Device“ (22).
2. Remove all cables from the GenMan.
3. Loosen the screws between the housing and wall.
4. Take the housing from the wall and close it with the cover.

9.2 Packaging

Package the GenMan in the original packaging. If this is no longer available, you can also use an equivalent box that is fully closable.

9.3 Storage

Store the GenMan in a dry place where ambient temperatures are always between -25 °C and $+50\text{ °C}$.

9.4 Disposal

Dispose of the GenMan at the end of its service life in accordance with current disposal regulations for electronic waste that apply at the installation site. Alternatively, send it back to SMA Solar Technology with shipping paid by sender and labeled "FOR DISPOSAL."

10 Troubleshooting and Problem Solving

NOTICE!

Damage to the generator by manual switch-on in an error state.

The generator starter can be ruined.

- Do not manually activate the generator if the GenMan is in an error state.

10.1 Error Message: the red LED is flashing

One time: the generator does not start (failed start attempt)

The GenMan attempts to start the generator: the frequency is outside of the default limits during start-up or the battery voltage is too low.

- Check the generator and battery.

If the generator starts again, check the transformer for frequency input.

Two times: The generator stops

The generator works but stops during operation: the frequency is outside of the default limits due to insufficient fuel or mechanical problems.

- Check the generator.

If the generator operates correctly again, check the transformer for frequency input.

Four times: The generator has been in operation too long

The generator has been running for more than six hours.

- Check the charge state of the battery.

Separate large loads from the grid.

10.2 Frequently Asked Questions

The inverter does switch to the state of charge even though the generator runs.

Possible causes:

- The fuse on the generator may have been triggered.
Check the generator fuses and replace it if necessary.
- The generator has been started manually without GenMan or Sunny Island.
Set the 3-position switch of the GenMan to "On" if the generator is meant to start immediately.
Set the 3-position switch of the GenMan to "Auto" if the Sunny Island is meant to request the generator.
- The current in the stand-alone grid (I_{AC}) exceeds the maximum allowed total current. The Sunny Island does not switch itself on in order to prevent a generator overload.
Disconnect the loads from the grid: the Sunny Island will then switch itself on automatically.

11 Technical Data

Electrical data		
Nominal input voltage	V DC, nominal	12 V
Input voltage range	V DC	7 V to 17 V
Maximum input current consumption	IDC, max	< 200 mA
Input current consumption in standby mode	IDC	5 mA
Input fuse: nominal voltage	V DC	30 V
Input fuse: nominal current	IDC	0.5 A
Maximum relay contact voltage	VDC, max. relay	30 V
Maximum relay current	IDC, max. relay	5 A (NO) 3 A (NC)
"Gen Frequency Input" voltage range	VAC, gen	5 V to 18 V
"Gen Frequency Input" current	IAC, gen	< 1 mA
"Gen Frequency" range	FAC, gen	0 Hz to 100 Hz
"Gen Run Frequency" range	FAC, gen run	31 Hz to 89 Hz
Interfaces		
(1) Green LED		operating mode
(1) Red LED		error state
(3) Yellow LEDs		contact state
(1) DIP switch		8 switch positions
(1) Rotary switch (rotary coded switch)		10 rotary settings
Mechanical data		
Width x height x depth		(127 x 127 x 84) mm
Weight		approx. 400 g
Ambient conditions		
Environmental temperature range		-25 °C to 50 °C
Humidity		100 % (no condensation)
General data		
Protection rating		IP 65, material: polycarbonate
EC Declaration of Conformity		enclosed, download area www.SMA.de

12 Contact

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

- type of the Sunny Island
- firmware version of the GenMan and the Sunny Island
- displayed error message of the Sunny Island
- battery size and battery type of the Sunny Island
- type and size of the additional energy sources (generators, PV systems, PV inverters)

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- Operating the product in an unintended environment
- Operating the product whilst ignoring relevant, statutory safety regulations in the deployment location
- Ignoring safety warnings and instructions contained in all documents relevant to the product
- Operating the product under incorrect safety or protection conditions
- Altering the product or supplied software without authority
- The product malfunctions due to operating attached or neighboring devices beyond statutory limit values
- In case of unforeseen calamity or force majeure

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