



Off-Grid Power Supply



AC Power Supply Products for Rural Electrification

ISLAND INVERTERS





SMA Island Inverters: System Managing for all Types of Energy Producers

Secure power supply for off-grid systems: the Sunny Island battery inverter forms a standard AC voltage grid into which all users and generators can be easily integrated. With this AC coupling and the Sunny Island as the system manager, SMA delivers an innovative solution for supplying electricity to remote locations and for creating an emergency supply for areas with unstable grids.

Functional principle

The Sunny Island is a battery inverter and is charged with setting up a stable stand-alone grid. In so doing, it constantly holds the voltage and frequency of the AC grid within the allowable limits. Both users and generators are connected directly to this grid. If there is an energy surplus, the Sunny Island charges the batteries; if there is a shortage, it supplies the grid with electricity from the batteries. Thanks to its highly developed battery management system, it can recognize the charge levels

at any given moment and, through its function as system manager, it makes further decisions as well: if batteries are discharged or if there is a great demand for electricity, the Sunny Island can start a diesel generator or it can disconnect loads as needed. If the batteries are fully charged and there is little demand, it can reduce the solar plant's electricity production. It also determines the optimal strategy for charging the batteries, and in so doing, increases their lifespan.

Flexible grid layout

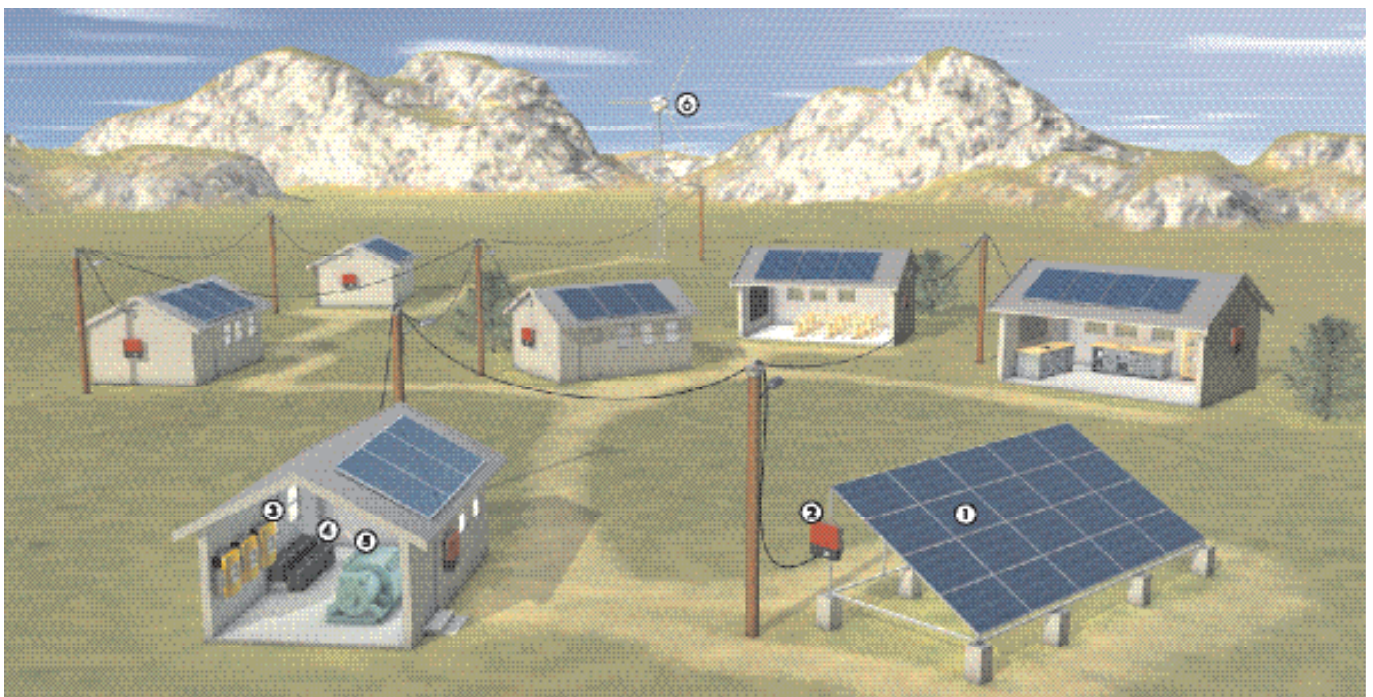
In addition to solar and wind power plants, diesel generators and other electricity generators, as well as all 230-volt loads, can be connected to the AC stand-alone grid. This avoids costly DC cabling and provides great flexibility. For smaller systems, SMA offers the Sunny Island Charger, an MPP charge regulator for a highly efficient DC connection of the PV plant and batteries. This makes SMA the only company in

the world to offer coordinated solutions for both AC and DC connections. The special advantage: SMA stand-alone grids can be set up quickly and can be adapted to increasing demand without much expense.

Expandable up to 100 kW

Stand-alone grids using the Sunny Island 2012, 2224 or 5048 can be expanded without difficulty through the parallel connection of several devices – single-phase as well as three-phase. For systems with more than 15 kW, three Sunny Island and a battery are combined in a cluster. To reach the total power desired, several of these clusters can be connected in parallel. The advantage: even if a battery fails, only one portion of the system is affected, i.e., the stand-alone grid supply is markedly secure.

To find out more about the “Off-Grid” topic, read the “Know-how” section on page 186.



Components: 1. Solar generator, 2. SUNNY BOY, 3. SUNNY ISLAND, 4. Batteries, 5. Diesel generator, 6. Wind power plant



Flexible

- For systems from 3 to 100 kW
- 1- and 3-phase operation, connectable in parallel and modularly extendable
- AC and DC coupling

Simple

- Easy commissioning with the "Quick Configuration Guide"
- Complete off-grid management

Efficient

- High efficiency
- Intelligent battery management for maximum battery life-span
- State of charge calculation

Robust

- Extreme overload capability
- OptiCool
- 5-year SMA Warranty

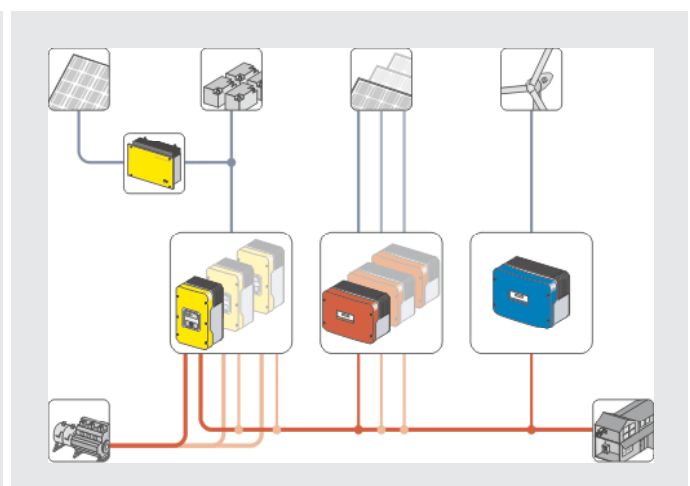
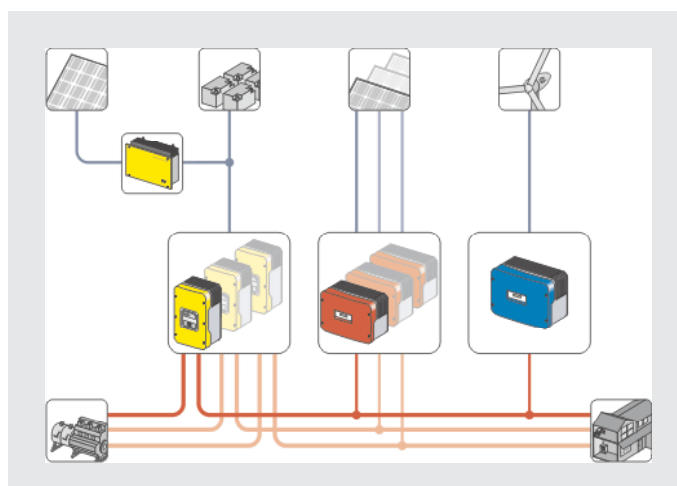
SUNNY ISLAND 5048 / 5048U

The island manager

Commissioning within minutes: the Sunny Island 5048 makes it possible. All required operational settings can be made quickly and easily. The Sunny Island 5048 is flexible in its application, extendable and takes on all control processes. Its first-class battery management ensures maximum battery life. In addition, the device's features are impressive, with its high efficiency, ergonomic die-cast aluminum housing and OptiCool active cooling system. The Sunny Island is also available in a UL-compliant 5048U version with an output rating of 120 V and 60 Hz.

Technical Data

	Sunny Island 5048	Sunny Island 5048U
AC output (users)		
Nominal AC voltage (adjustable)	230 V (202 V - 253 V)	120 V (105 V - 132 V)
Nominal frequency (adjustable)	50 Hz / 60 Hz (45 Hz - 65 Hz)	60 Hz (55 Hz - 65 Hz)
Continuous AC power at 25 °C / 45 °C	5000 W / 4000 W	5000 W / 4000 W
AC output power at 25 °C for 30 min / 1 min / 5 s	6500 W / 8400 W / 12000 W	6500 W / 8400 W / 11000 W
Nominal AC current / Max. AC current (peak)	21.7 A / 120 A for 60 ms	41.7 A / 180 A for 60 ms
Total harmonic distortion / phase shift (cos φ)	< 3 % / -1 to +1	< 3 % / -1 to +1
AC input (generator or grid)		
Input voltage (range)	230 V (172.5 V - 264.5 V)	120 V (80 V - 150 V)
Input frequency (range)	50 Hz / 60 Hz (40 Hz - 70 Hz)	60 Hz (54 Hz - 66 Hz)
Max. input current (adjustable) / Max. input power	56 A (0 A - 56 A) / 12.8 kW	56 A (0 A - 56 A) / 6.7 kW
Battery DC input		
Battery voltage (range)	48 V (41 V - 63 V)	48 V (41 V - 63 V)
Max. battery charging current / continuous charging current at 25 °C	120 A / 100 A	120 A / 100 A
Battery type / battery capacity (range)	Lead acid, NiCd / 100 - 10,000 Ah	Lead acid, NiCd / 100 - 10,000 Ah
Charge control	IUoU process	IUoU process
Efficiency / Operating consumption		
Max. efficiency	95 %	95 %
Own consumption with no load / standby	25 W / 4 W	25 W / 4 W
Protection devices		
DC reverse polarity / DC fuse	●/●	●/●
AC short-circuit / AC overload	●/●	●/●
Overtemperature / excessive battery discharge	●/●	●/●
General Data		
Dimensions (Width / Height / Depth in mm)	467 / 612 / 235	467 / 612 / 235
Weight	63 kg	63 kg
Operating temperature range	-25 °C ... +50 °C	-25 °C ... +50 °C
Protection rating	Indoors (IP30)	Indoors (NEMA 1)
Features / Function		
Operation & display / multifunction relays	Internal / 2	Internal / 2
3-phase systems / parallel connection	●/●	●/●
Integrated bypass / multicluster operation	-/●	-/ starting Oct. 2009
State of charge calculation / Full- / Equalization charge	●/●/●	●/●/●
Integrated soft start / Generator support	●/●	●/●
Battery temperature sensor / Communication cables	●/●	●/●
Warranty (5 years / 10 years)	●/○	●/○
Certificates and permits	www.SMA.de	www.SMA.de
Accessories		
Battery cables / battery fuses	○/○	○/○
Interfaces (RS485 PB / Multicluster PB)	○/○	○/○
"GenMan" extended generator start	○	○
Load-shedding contactor / Battery current measurement	○/○	○/○
● Standard ○ Optional		
Last update: March 2009		
Type Designation	SI 5048	SI 5048U





Simple

- For systems from 2 to 5 kW
- AC and DC coupling
- Simple installation

Efficient

- High efficiency
- Excellent price-performance ratio

Robust

- Extreme overload capability
- 5-year SMA Warranty

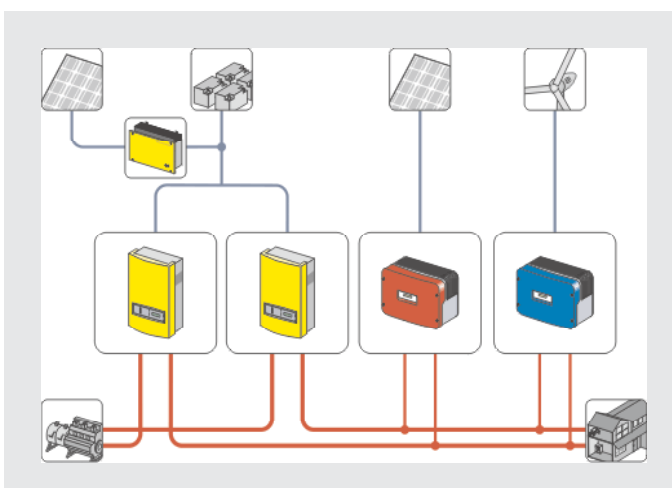
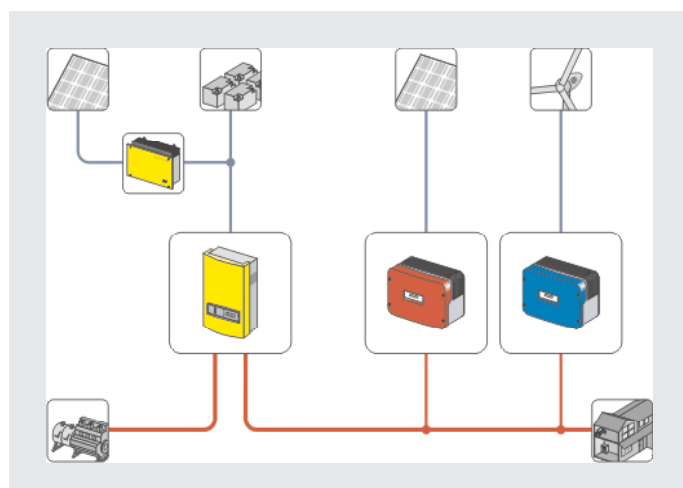
SUNNY ISLAND 3324 / 4248 / 4248U

Stand-alone grids easier than ever

Easy installation, safe operation and outstanding cost-to-benefit ratio: the Sunny Island 3324 and 4248 battery inverters are especially suitable for use in small and mid-sized stand-alone grids. The Sunny Island 4248U model is available for countries with voltage systems compatible with the U.S. standard. The devices guarantee a reliable and high-quality power supply. Due to their outstanding overload capabilities and the fact that they are designed to withstand high ambient temperatures, these devices can be used under extreme weather conditions.

Technical Data

	Sunny Island 3324	Sunny Island 4248	Sunny Island 4248U
AC output (users)			
Nominal AC voltage (adjustable)	230 V (202 V - 253 V)	230 V (202 V - 253 V)	120 V (105 V - 132 V)
Nominal frequency (adjustable)	50 Hz (45 Hz - 55 Hz)	50 Hz (45 Hz - 55 Hz)	60 Hz (55 Hz - 65 Hz)
Continuous AC power at 25 °C / 45 °C	3300 W / 2300 W	4200 W / 3400 W	4200 W / 3400 W
AC output power at 25 °C for 30 min / 1 min / 5 s	4200 / 5000 / 7300 W	5400 / 7000 / 11400 W	5400 / 7000 / 11900 W
Nominal AC current / Max. AC current (peak)	14.5 A / 70 A for 100 ms	18 A / 100 A for 100 ms	35 A / 140 A for 5 s
Total harmonic distortion / phase shift (cos φ)	< 3 % / -1 to +1	< 3 % / -1 to +1	< 3 % / -1 to +1
AC input (generator or grid)			
Input voltage (range)	230 V (172.5 V - 250 V)	230 V (172.5 V - 250 V)	120 V (80 V - 150 V)
Input frequency (range)	50 Hz (40 Hz - 60 Hz)	50 Hz (40 Hz - 60 Hz)	60 Hz (54 Hz - 66 Hz)
Max. input current (adjustable) / Max. input power	56 A (2 - 56 A) / 12.8 kW	56 A (2 - 56 A) / 12.8 kW	56 A (2 - 56 A) / 6.7 kW
Battery DC input			
Battery voltage (range)	24 V (21 V - 32 V)	48 V (41 V - 63 V)	48 V (41 V - 63 V)
Max. battery charging current / continuous charging current at 25 °C	140 A / 104 A	100 A / 80 A	100 A / 80 A
Battery type / battery capacity (range)	Lead acid/100-6,000 Ah	Lead acid/100-6,000 Ah	Lead acid/100-6,000 Ah
Charge control	IUoU process	IUoU process	IUoU process
Efficiency / Operating consumption			
Max. efficiency	94.5 %	95 %	95 %
Own consumption with no load / standby	22 W / 4 W	22 W / 4 W	22 W / 4 W
Protection devices			
DC reverse polarity / DC fuse	●/●	●/●	●/●
AC short-circuit / AC overload	●/●	●/●	●/●
Overtemperature / excessive battery discharge	●/●	●/●	●/●
General Data			
Dimensions (Width / Height / Depth in mm)	390 / 590 / 245	390 / 590 / 245	390 / 590 / 245
Weight	39 kg	39 kg	39 kg
Operating temperature range	-25 °C ... +50 °C	-25 °C ... +50 °C	-25 °C ... +50 °C
Protection rating	Indoors (IP30)	Indoors (IP30)	Indoors (NEMA 1)
Features / Function			
Operation & display / multifunction relays	Internal / 2	Internal / 2	Internal / 2
3-phase systems / parallel connection	-/-	-/-	-/-
Integrated bypass / multicluster operation	-/-	-/-	-/-
State of charge calculation / Full- / Equalization charge	-/●/●	-/●/●	-/●/●
Integrated soft start / Generator support	-/-	-/-	-/-
Battery temperature sensor / Communication cables	●/-	●/-	●/-
Warranty (5 years / 10 years)	●/○	●/○	●/○
Certificates and permits	www.SMA.de	www.SMA.de	www.SMA.de
Accessories			
Battery cables / battery fuses	○/○	○/○	○/○
Interfaces (RS485 PB / Multicluster PB)	○/-	○/-	○/-
"GenMan" extended generator start	○	○	○
Load-shedding contactor / Battery current measurement	○/-	○/-	○/-
● Standard ○ Optional			
Last update: March 2009			
Type Designation	SI 3324	SI 4248	SI 4248U





Flexible

- For systems from 1 to 9 kW
- 1- and 3-phase operation, connectable in parallel and modularly extendable
- AC and DC coupling

Simple

- Simple installation
- Complete off-grid management
- Easy and remote configuration and monitoring with Sunny Remote Control

Efficient

- High efficiency
- State of charge calculation
- Intelligent battery management for maximum battery life-span

Robust

- For indoor and outdoor installation
- Excellent overload characteristics
- Very wide temperature range
- 5-year SMA Warranty

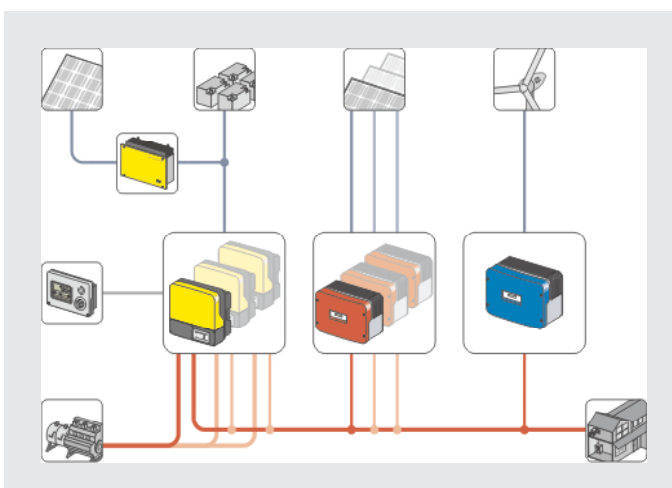
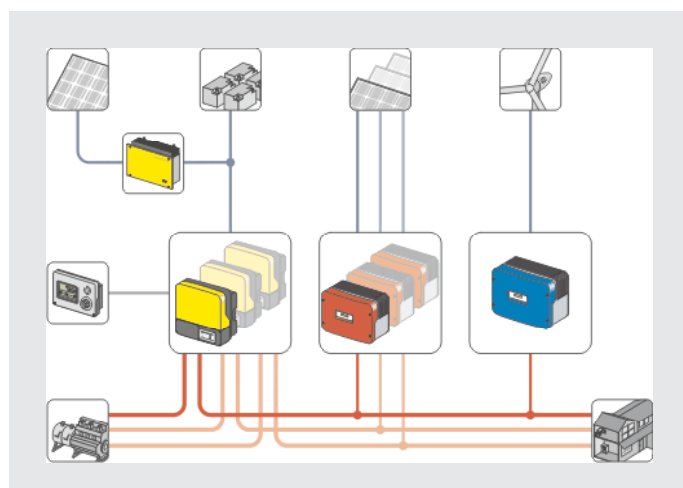
SUNNY ISLAND 2012 / 2224

Compact and powerful for small off-grid systems

New Sunny Island products: the Sunny Island 2012 and 2224 extend the product range for the lower power range. The devices not only feature all the proven product characteristics of the Sunny Island 5048, but thanks to their reduced weight and compact design, the new family members are even easier to handle and install. The high IP54 protection rating and the Sunny Remote Control (SRC-1) give you full flexibility when choosing an installation location. Easy-to-use technology at its best: the unbeatable combination for off-grid systems of up to 9 kilowatts.

Technical Data

	Sunny Island 2012	Sunny Island 2224
AC output (users)		
Nominal AC voltage (adjustable)	230 V (202 V - 253 V)	230 V (202 V - 253 V)
Nominal frequency (adjustable)	50 Hz / 60 Hz (45 Hz - 65 Hz)	50 Hz / 60 Hz (45 Hz - 65 Hz)
Continuous AC power at 25 °C / 45 °C	2000 W / 1400 W	2200 W / 1600 W
AC output power at 25 °C for 30 min / 1 min / 5 s	2500 W / 3800 W / 3900 W	2900 W / 3800 W / 3900 W
Nominal AC current / Max. AC current (peak)	8.7 A / 25 A for approx. 500 ms	9.6 A / 25 A for approx. 500 ms
Total harmonic distortion / phase shift (cos φ)	< 4 % / -1 to +1	< 4 % / -1 to +1
AC input (generator or grid)		
Input voltage (range)	230 V (172.5 V - 264.5 V)	230 V (172.5 V - 264.5 V)
Input frequency (range)	50 Hz / 60 Hz (40 Hz - 70 Hz)	50 Hz / 60 Hz (40 Hz - 70 Hz)
Max. input current (adjustable) / Max. input power	25 A (0 A - 25 A) / 5.75 kW	25 A (0 A - 25 A) / 5.75 kW
Battery DC input		
Battery voltage (range)	12 V (8.4 V - 15.6 V)	24 V (16.8 V - 31.5 V)
Max. battery charging current / continuous charging current at 25 °C	180 A / 160 A	90 A / 80 A
Battery type / battery capacity (range)	Lead acid, NiCd / 100 - 10,000 Ah	Lead acid, NiCd / 100 - 10,000 Ah
Charge control	IUoU process	IUoU process
Efficiency / Operating consumption		
Max. efficiency	93 %	93.6 %
Own consumption with no load / standby	21 W / 6 W	21 W / 6 W
Protection devices		
DC reverse polarity / DC fuse	-/-	-/-
AC short-circuit / AC overload	●/●	●/●
Overtemperature / excessive battery discharge	●/●	●/●
General Data		
Dimensions (Width / Height / Depth in mm)	470 / 445 / 185	470 / 445 / 185
Weight	19 kg	19 kg
Operating temperature range	-25 °C ... +60 °C	-25 °C ... +60 °C
Protection rating	Outdoor installation (IP54)	Outdoor installation (IP54)
Features / Function		
Operation & display / multifunction relays	External via SRC-1 / 2	External via SRC-1 / 2
3-phase systems / parallel connection	●/●	●/●
Integrated bypass / multicuster operation	●/-	●/-
State of charge level calculation / Full- / Equalization charge	●/●/●	●/●/●
Integrated soft start / Generator support	●/●	●/●
Battery temperature sensor / Communication cables	●/●	●/●
Warranty (5 years / 10 years)	●/○	●/○
Certificates and permits	www.SMA.de	www.SMA.de
Accessories		
Battery cables / battery fuses	○/○	○/○
Interfaces (RS485 PB / Multicuster PB)	○/-	○/-
"GenMan" extended generator start	○	○
Load-shedding contactor / Battery current measurement	○/○	○/○
● Standard ○ Optional		
Last update: March 2009		
Type Designation	SI 2012	SI 2224





Flexible

- For 12 / 24 / 48 V
- Up to four devices can be connected in parallel
- Modular and extendable

Simple

- Easy installation and commissioning
- Automatic control and single point of operation by the Sunny Island

Efficient

- Active MPP tracking
- Efficiency > 98 %

Robust

- Indoor and outdoor through IP65
- Fanless
- Nominal power up to 40 °C
- 5-year SMA Warranty

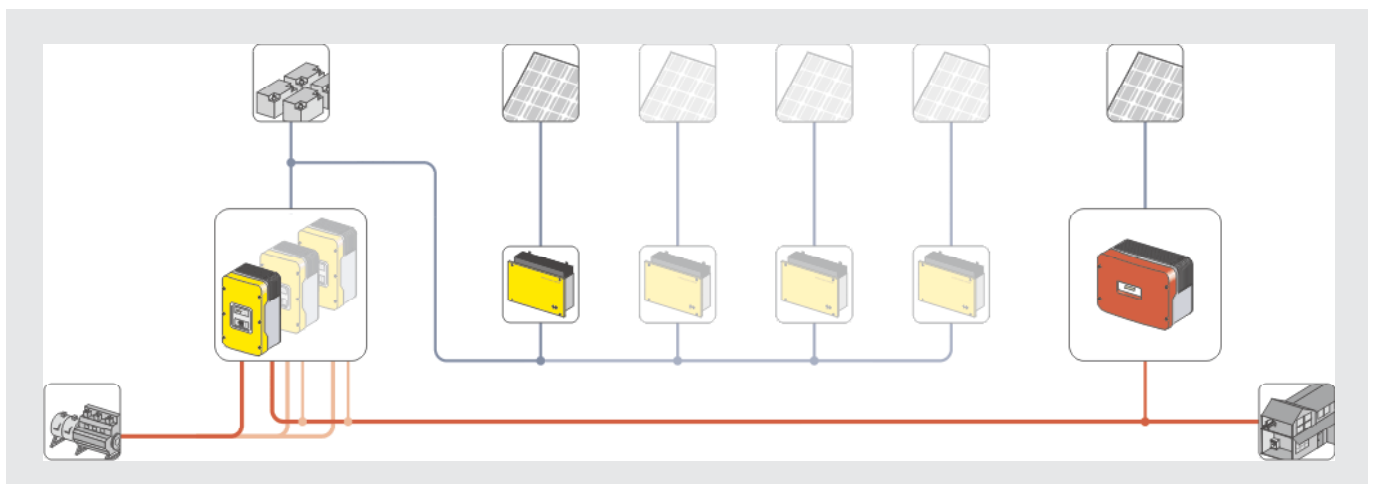
SUNNY ISLAND CHARGER 40

SMA DC coupling: maximum efficiency and applicable everywhere

AC and DC coupling optimally aligned and for the first time by one manufacturer: SMA's universally applicable Sunny Island Charger 40. Its wide DC input voltage range results in a perfect configuration for nearly all PV modules. Thanks to the integrated MPP tracking, the charger guarantees an energy yield that is 15 % - 30 % higher than that of conventional shunt and serial charge controllers. What makes charge controllers in this power range unique are the high protection rating, the fanless operation, and the broad temperature range that allow for its use even under harsh ambient conditions. The easy installation and automatic adjustment of the controller settings by the Sunny Island make for a foolproof startup.

Technical Data

	Sunny Island Charger 40 MPT		
	12 V	24 V	48 V
Input (PV generator)			
Max. PV power	630 W	1250 W	2100 W
Max. DC voltage	140 V DC	140 V DC	140 V DC
Optimal MPPT voltage range	25 V - 60 V	25 V - 60 V	25 V - 60 V
Number of MPP trackers	1	1	1
Max. PV current	40 A	40 A	30 A
Output (battery)			
Nominal DC power up to 40 °C	600 W	1200 W	2000 W
Nominal battery voltage	12 V	24 V	48 V
Battery voltage range	8 - 15.6 V	16 - 31.5 V	36 - 63 V
Battery type	Closed and sealed lead acid batteries	Closed and sealed lead acid batteries	Closed and sealed lead acid batteries
Max. charging current / continuous charging current	50 A / 50 A	50 A / 50 A	40 A / 40 A
Charge control	IUoU	IUoU	IUoU
Efficiency / Power consumption			
Max. efficiency	98.0 %	98.0 %	98.0 %
Euro ETA	97.3 %	97.3 %	97.3 %
Daytime operating consumption	< 5 W	< 5 W	< 5 W
Nighttime operating consumption	< 3 W	< 3 W	< 3 W
General			
Dimensions (Width / Height / Depth) in mm	421 x 310 x 143	421 x 310 x 143	421 x 310 x 143
Protection rating in accordance with DIN EN 60529	IP65	IP65	IP65
Weight	10 kg	10 kg	10 kg
Device protection	Short circuit / reverse polarity / overload / overvoltage and undervoltage / overtemperature and undertemperature	Short circuit / reverse polarity / overload / overvoltage and undervoltage / overtemperature and undertemperature	Short circuit / reverse polarity / overload / overvoltage and undervoltage / overtemperature and undertemperature
Certificates and permits	CE	CE	CE
Display	1 x multicolored LED	1 x multicolored LED	1 x multicolored LED
Setting parameters	Plug and play in combination with SI 5048, SI 2224, SI 2012 (SIC-PB required), DIL switch with stand-alone applications	Plug and play in combination with SI 5048, SI 2224, SI 2012 (SIC-PB required), DIL switch with stand-alone applications	Plug and play in combination with SI 5048, SI 2224, SI 2012 (SIC-PB required), DIL switch with stand-alone applications
Parallel operation	up to 4 devices over the Sync-Bus	up to 4 devices over the Sync-Bus	up to 4 devices over the Sync-Bus
Interface for Sunny Island Sync-Bus	optional (SIC-PB)	optional (SIC-PB)	optional (SIC-PB)
External temperature sensor	optional (KTY type)	optional (KTY type)	optional (KTY type)
Warranty	5 years	5 years	5 years
Ambient conditions			
Permissible ambient temperature during operation	-25 °C ... +60 °C	-25 °C ... +60 °C	-25 °C ... +60 °C
Air humidity	0 % - 100 %	0 % - 100 %	0 % - 100 %
Type Designation	SIC40-MPT	SIC40-MPT	SIC40-MPT





Flexible

- 3 different sizes from 30 to 110 kW
- Different generator, PV and load sizes

Simple

- Integrated AC distribution for Sunny Island, generator, PV
- Integrated load shedding contactor

Safe

- Active Anti-Islanding
- Reverse current monitoring
- Automatic bypass for the generator

Robust

- Due to IP65 high protection rating
- 5-year SMA Warranty

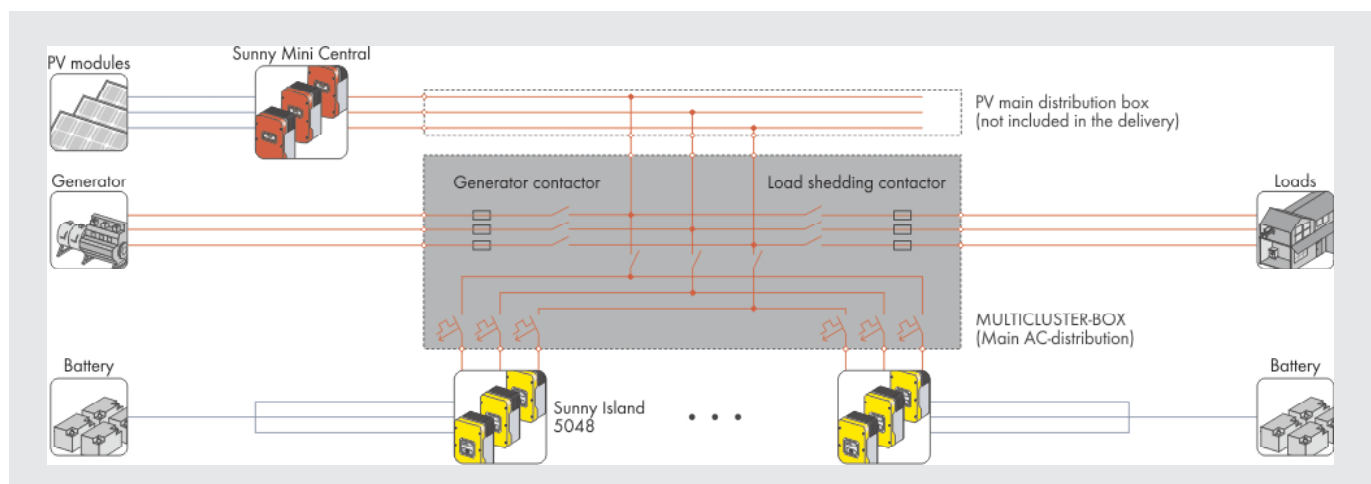
Multicluster Boxes for SUNNY ISLAND 5048

Simple setup of stand-alone and hybrid systems

Large off-grid systems with only a little effort: the new Multicluster Boxes for the Sunny Island 5048 are the ideal solution for the easy installation of stand-alone and hybrid systems from 30 to 100 kW. For this, two to four 3-phase clusters, each consisting of 3 Sunny Islands, are connected in parallel. Multicluster Boxes were specially developed for these systems as the AC main distribution unit with integrated generator and load contactors. To simplify installation, all Multicluster Boxes are completely wired and fitted at the factory with a main connector for PV or wind generators. All communication cables necessary for the installation are included with standard delivery.

Technical Data

	Multicluster Box 6	Multicluster Box 9	Multicluster Box 12
General			
Number of phases	3-phase	3-phase	3-phase
Nominal voltage	3 x 230 V / 400 V	3 x 230 V / 400 V	3 x 230 V / 400 V
Voltage range	172.5 - 265 V / 300 - 460 V	172.5 - 265 V / 300 - 460 V	172.5 - 265 V / 300 - 460 V
Nominal frequency (range)	50 Hz (40 - 70 Hz)	50 Hz (40 - 70 Hz)	50 Hz (40 - 70 Hz)
Dimensions (Width x Height x Depth) in mm	760 x 760 x 210 mm	1000 x 1200 x 300 mm	1000 x 1400 x 300 mm
Mounting type	suspended	standing on a base	standing on a base
Weight	approx. 55 kg	approx. 90 kg	approx. 110 kg
Connections for Sunny Island			
Number	6	9	12
Continuous AC output at 25 °C	30 kW	45 kW	60 kW
AC output for 30 min. / 1 min.	40 kW / 50 kW	60 kW / 75 kW	80 kW / 100 kW
Nominal AC current at 25 °C	3 x 44 A	3 x 65 A	3 x 87 A
Connection for PV system			
Number	1 x 3-phase	1 x 3-phase	1 x 3-phase
Nominal AC power / AC current	55 kW / 3 x 80 A	86 kW / 3 x 125 A	110 kW / 3 x 160 A
Load Connection			
Number	1 x 3-phase	1 x 3-phase	1 x 3-phase
Nominal power / current	55 kW / 3 x 80 A	86 kW / 3 x 125 A	110 kW / 3 x 160 A
Generator connection			
Number	1 x 3-phase	1 x 3-phase	1 x 3-phase
Nominal power / current	55 kW / 3 x 80 A	86 kW / 3 x 125 A	110 kW / 3 x 160 A
Ambient conditions			
Ambient temperature	-25 °C ... +50 °C	-25 °C ... +50 °C	-25 °C ... +50 °C
Protection rating in accordance with DIN EN 60529	IP65	IP65	IP65
Accessories			
Communication cable	4 x 5 m FTP Cat 5e	4 x 5 m FTP Cat 5e	4 x 5 m FTP Cat 5e
Multicluster Piggy-Back	optional	optional	optional
Last update: March 2009			
Type Designation	MC-Box-6.3	MC-Box-9.3	MC-Box-12.3





Flexible

- For use from 45 to 65 Hz
- Can be connected in parallel
- Suitable for 1- and 3-phase operation

Simple

- Ideal complement for energy sources without active power control
- Easy installation and commissioning

Safe

- Minimized AC interference emission thanks to phase shift control
- Integrated power and frequency control

Robust

- IP65 high protection rating
- 5-year SMA Warranty

Smart Load for SUNNY ISLAND

Intelligent dumpload for stand-alone grids

The Smart Load forms the perfect complement to unregulated energy generators in stand-alone grids, e.g., small, directly-connected wind generators with passive stall power control. If there is an electricity surplus, the Smart Load feeds it into special loads, for example, heating cartridges in a hot water tank. The necessary arrangement is completely automatic, fast and free of retroactive effects for other loads. This continuous and quick energy consumption allows for ideal protection of system components and guarantees increased reliability.



BACKUP SYSTEMS





Sunny Backup System: Solar Power – Even in the Event of Grid Failure

A power outage means: grid disconnection of the PV system

No light, no heating, no computer: today, it is very difficult to do anything without electricity. But how many solar power system operators are really aware that in the event of a power outage, the PV system is disconnected from the grid for reasons of safety? From that moment on, it ceases to provide solar power, neither for grid feeding nor for the internal power supply. And this is all the more irritating because, as the experts agree, throughout Europe, lengthy blackouts and temporary power outages are set to increase.

It is precisely this supply gap, which we are closing with the Sunny Backup system from SMA. As of now, this can be used by any PV system owner to power important loads in a reliable and environmentally friendly way, even in the event of grid failure.

Stand-alone power supply

Over 25 years of SMA experience in system technology for PV systems as well as off-grid solutions form the basis for the system that was awarded the "Innovationspreis 2007" (Innovation Award). The Sunny Backup system is a mixture of grid-connected operation and off-grid technology which guarantees you a very high degree of user reliability, as well as easy installation. The Sunny Backup system is not only equipped with the first backup inverter to be certified in accordance with the German standard DIN VDE 0126-1-1*, but it is also available as a completely pre-configured kit solution for different power classes up to 100 kW.

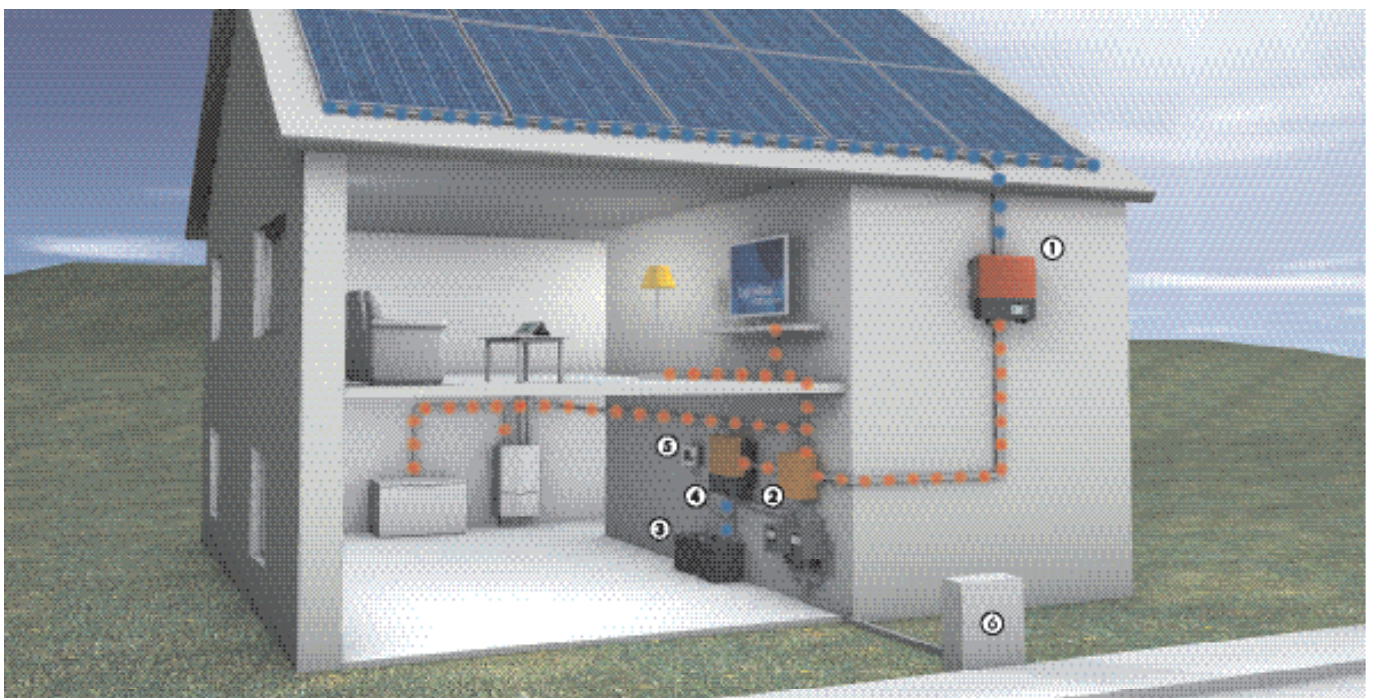
The optimal electricity insurance

Power outages can have terrible financial consequences, especially for companies – unless you have extended

the PV system with the Sunny Backup system. In agricultural enterprises, stall ventilation and heat lamps will continue to be powered reliably. In refrigeration rooms, hotels, supermarkets and guest-houses, operations continue without any harm to reputation and without expensive interruptions in the cold chain. And in single-family homes, the heating, oven, PC and lighting all function without interruption, with the same quality of supply as during normal operation.

Furthermore: all PV systems with Sunny Boy inverters can be upgraded without any trouble.

* and for Australia in accordance with AS4777



Components: 1. SUNNY BOY solar inverter, 2. SUNNY BACKUP automatic switching device, 3. SUNNY BACKUP battery set, 4. SUNNY BACKUP 2200, 5. SUNNY REMOTE CONTROL, 6. grid connection



Straightforward

- Can be integrated into existing systems and new PV systems
- Pre-configured sets for different power classes

Flexible

- 1- and 3-phase systems can be realized
- Modularly extendable
- Capacities from 5 kW to approx. 100 kW available

Efficient

- Smaller battery capacity
- Power Supply and battery charging via the grid
- Continuously high PV efficiency

Reliable

- Automatic switching to backup power in approx. 20 milliseconds
- Independent disconnection device in accordance with DIN VDE 0126-1-1

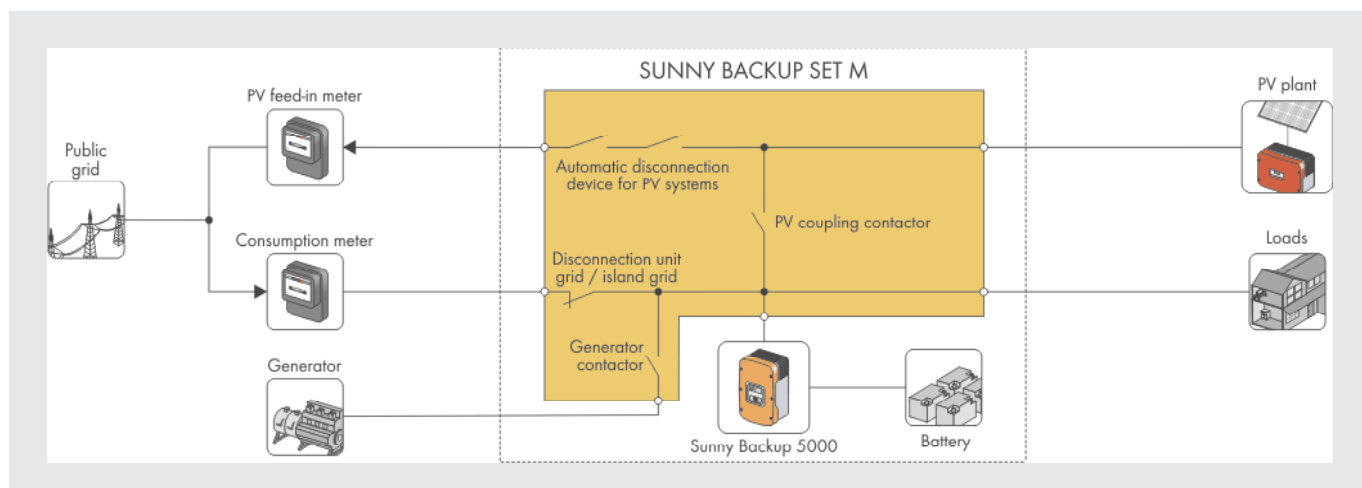
SUNNY BACKUP Set M / L / XL

Solar power – even in the event of grid failure

Best performance, greatest user benefits and lowest investment and operating costs: in comparison with conventional emergency power systems, the Sunny Backup System scores well. As an add-on to the PV system, the Sunny Backup automatically switches to off-grid supply within approx. 20 milliseconds in the event of a grid failure. New and existing PV-plants can be equipped with the Sunny Backup – without affecting system efficiency. And the best part: due to the integration of the PV system, a small and therefore low-cost battery can be implemented as it is usually only needed to bridge the night hours.

Technical Data

	Sunny Backup Set M	Sunny Backup Set L	Sunny Backup Set XL
Output (loads)			
Nominal power / current during grid operation	8 kW / 35 A	44 kW / 3 x 63 A	110 kW / 3 x 160 A
Backup power (continuous / 30 min / 1 min)	5 kW / 6.5 kW / 8.4 kW	15 kW / 19.5 kW / 25.2 kW	up to 60 kW / 78 kW / 100 kW
Number of phases (grid operation / backup operation)	3 / 1	3 / 3	3 / 3
Voltage (range)	230 V (172.5 - 264.5 V)	230 V (172.5 - 264.5 V)	230 V (172.5 - 264.5 V)
Frequency (range)	50 Hz (45 to 65 Hz)	50 Hz (45 to 65 Hz)	50 Hz (45 to 65 Hz)
Permitted grid structure (grid side / load side)	TN-C / TN-S	TN-C / TN-S	TN-C / TN-S
Typical interruption time in the event of power outage	20 ms	20 ms	20 ms
Input PV system			
Nominal AC PV output / current	5.7 kW / 25 A	30 kW / 3 x 44 A	110 kW / 3 x 160 A
Compatible PV inverters	all SB and SMC 4600A	all SB and SMC	all SB and SMC
Input battery			
Nominal voltage / number of blocks	48 V / 4 x 12 V	48 V / 8 x 12 V	48 V / 32 x 12 V
Type / energy / capacity per block	AGM/6.8 kWh/142 Ah	AGM/13.6 kWh/142 Ah	AGM/54.4 kWh/142 Ah
Service life (according to Eurobat)	> 12 years	> 12 years	> 12 years
Efficiency / operating consumption			
Max. efficiency backup operation	95 %	95 %	95 %
Internal consumption day / night (Silent Mode)	48 W / 32 W	114 W / 69 W	360 W / 230 W
Protective devices			
DC reverse polarity / excessive battery discharge	●/●	●/●	●/●
AC short-circuit / AC overload	●/●	●/●	●/●
Grid monitoring (SMA Grid Guard) / galvanic isolation	●/●	●/●	●/●
General Data			
Dimensions SBU (width / height / depth in mm)	467 / 612 / 235	467 / 612 / 235	467 / 612 / 235
Dimensions AS-Box (width / height / depth in mm)	600 / 600 / 210	600 / 760 / 210	1000 / 1600 / 300
Dimensions battery per block (width / height / depth in mm)	498 / 230 / 177	498 / 230 / 177	498 / 230 / 177
Weight per (SBU / AS-Box / battery block)	63 kg / 29 kg / 54.5 kg	63 kg / 41 kg / 54.5 kg	63 kg / 180 kg / 54.5 kg
Operating temperature range	-25 °C ... +50 °C	-25 °C ... +50 °C	-25 °C ... +50 °C
Protection rating (SBU, AS-Box)	IP30 / IP65	IP30 / IP65	IP30 / IP65
Features / function			
Integrated bypass for faults / test operation	●/●	●/●	●/●
State of charge calculation / generator input	●/○	●/○	●/○
Warranty SBU 5000 (5 years / 10 years)	●/○	●/○	●/○
Battery warranty (2 years), AS-Box warranty (5 years)	●	●	●
Certificates and permits	www.SMA.de	www.SMA.de	www.SMA.de
Accessories			
Battery cables / DC splitter / communication cables	3 m / ○ / 5 m	6 m / ● / 5 m	6 m / ● / 5 m
Battery fuses "BATFUSE"	○	○	○
Interfaces (RS485 PB / Multicluster PB)	○/○	○/○	●/●
Additional battery parallel / other battery	○/○	○/○	○/○
● Standard ○ Optional			
Last updated: March 2009			
Type designation	SBU-Set-M	SBU-Set-L	SBU-Set-XL





Simple

- Can be integrated into existing systems and new PV systems
- Pre-configured set

Affordable

- Compact and affordable switching device
- Smaller battery size required due to utilization of the PV energy

Efficient

- Power supply and battery charging via the grid
- Unchanged high efficiency

Reliable

- Automatic switching to backup power supply in approx. 50 milliseconds
- Independent disconnection device in accordance with DIN VDE 0126-1-1

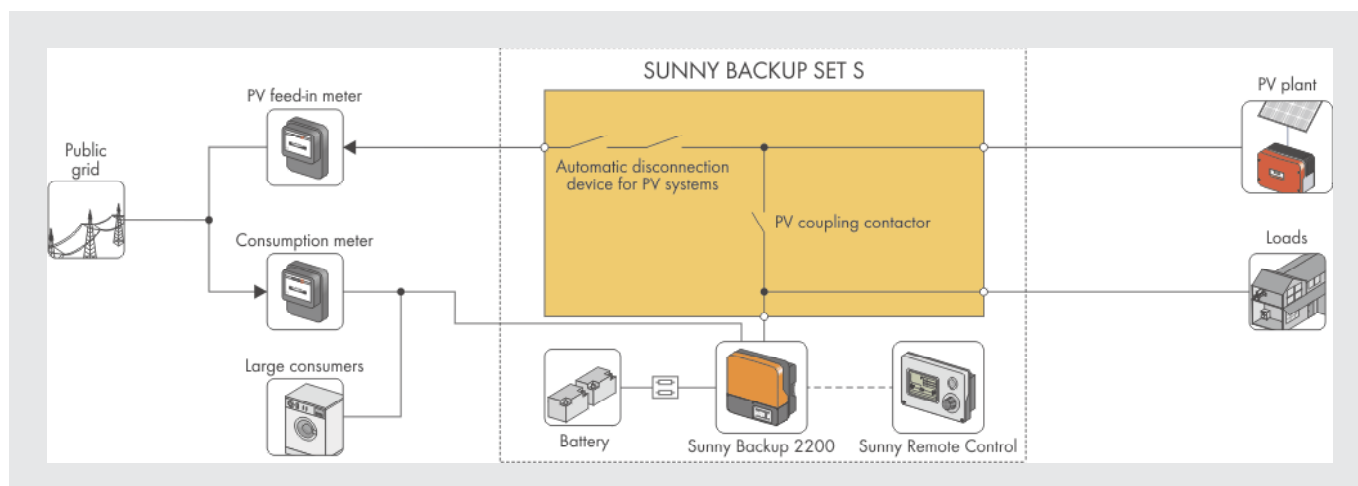
SUNNY BACKUP Set S

Reliable back-up electricity supply for single-family homes

Innovative electricity supply for home owners: as an add-on to the PV system, the Sunny Backup Set Small switches to off-grid mode within 50 milliseconds. For winter or summer: owners of small or medium-sized PV systems with inverters from SMA can supply the important loads self-sufficiently in the event of a power failure. The affordable complete solution is not only suitable for new solar power systems; existing PV systems can also be retrofitted with the certified Sunny Backup System without difficulty.

Technical Data

	Sunny Backup Set S	
Output (loads)		
Nominal power / current during grid operation	5.7 kW / 25 A	
Backup power (continuous / 30 min / 1 min)	2.2 kW / 2.9 kW / 3.8 kW	
Number of phases (grid operation / backup operation)	1 / 1	
Voltage (range)	230 V (172.5 - 264.5 V)	
Frequency (range)	50 Hz (45 to 65 Hz)	
Permitted grid structure (grid side / load side)	TN-C / TN-S	
Typical interruption time in the event of power outage	50 ms	
Input PV system		
Nominal AC PV output / current	4.6 kW / 20 A	
Compatible PV inverters	All Sunny Boy inverters *	
Input battery		
Nominal voltage / number of blocks	24 V / 2 x 12 V	
Type / energy / capacity per block	AGM / 3.4 kWh / 142 Ah	
Service life (according to Eurobat)	> 12 years	
Efficiency / operating consumption		
Max. efficiency backup operation	93.6 %	
Internal consumption day / night (Silent Mode)	40 W / 6 W	
Protective devices		
DC reverse polarity / excessive battery discharge	-/●	
AC short-circuit / AC overload	●/●	
Grid monitoring (SMA Grid Guard) / galvanic isolation	●/●	
General Data		
Dimensions SBU (width / height / depth in mm)	470 / 445 / 180	
Dimensions AS-Box (width / height / depth in mm)	200 / 300 / 120	
Dimensions battery per block (width / height / depth in mm)	498 / 230 / 177	
Weight per (SBU / AS-Box / battery block)	19 kg / 4.5 kg / 54.5 kg	
Operating temperature range	-25 °C ... +60 °C	
Protection rating (SBU, AS-Box)	IP54 / IP65	
Features / function		
Integrated bypass for faults / test operation	●/●	
State of charge calculation / generator input	●/-	
Warranty SBU 2200 (5 years / 10 years)	●/○	
Battery warranty (2 years), AS-Box warranty (5 years)	●	
Certificates and permits	www.SMA.de	
Accessories		
Battery cables / DC splitter / communication cables	4 m / - / 5 m	
Battery fuses "BATFUSE"	●	
Interfaces (RS485 PB / Multicluster PB)	○/-	
Additional battery parallel / other battery	○/○	
External user interface "SRC-1"	●	
* SB 2500, SB 2800, SB 3000, models from May 2005 and later		
● Standard ○ Optional		
Last updated: March 2009		
Type designation	SBU-Set-S.1	





Your Own Electrical Grid

AC and DC solutions for stand-alone systems

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Electrical current, anytime, anywhere – something we all take for granted. More than two billion people, however, live in another reality: in so called remote areas, far away from power plants and electrical grids. And for this reason, they simply must live without many of the conveniences of our civilization.

Photovoltaic offers solutions like no other technology: PV systems are robust, durable, easy to install and maintain. For years SMA has been motivated by the concept of a self-contained energy supply system based on solar power. As the only manufacturer in the world, SMA has followed not only the concept of DC coupling, but the AC coupling as well, which distinguishes itself with a host of advantages. With AC coupling, all consumers and generators are connected using an AC voltage bus, whereas with DC coupling, the interconnection takes place in a DC voltage grid. For residential as well as industrial power generation, AC coupling has been used throughout the world, while

DC coupling systems have been employed mostly in small applications of up to 100 watts as well as for telecommunications purposes.

Different types of coupling

For the assembly of energy supply systems, which save the generated energy in batteries, there are three different concepts: pure DC coupling, mixed systems, and pure AC coupling. In the beginning, the first offerings were of a pure DC coupling variation: both the solar modules and the batteries were DC voltage sources, so that a conversion of the power with the, still expensive, inverter technology could be surrendered. With some 100 watts of power, the performance of this system was quite low and many of the appliances consuming the energy, such as lamps, radios or televisions, were also available in a DC voltage version.

Variants of the DC coupling

Powerful systems pose a difficult problem for pure DC coupling: since the voltage is generally limited to 48 volts for reasons of personal safety, there is a huge amperage. Sockets, cables and fuses with around 80 amps must be resilient in order to carry the around 3,700 watts of power put out by a common household socket. The costs for a setup of this type are noticeably higher. Moreover, there are very few 48 volt DC compatible appliances in the world.

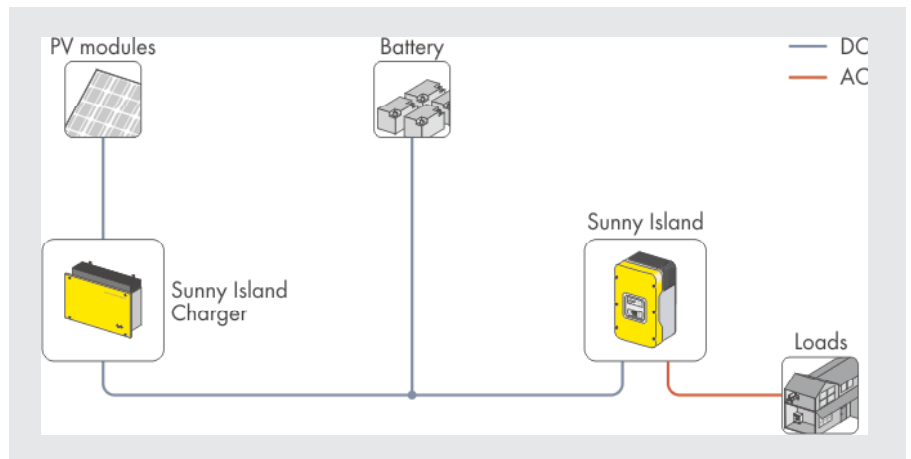
For this reason, mixed systems are used, at least with regard to larger solar energy supply systems: inverters convert the lower DC voltage of the batteries into grid conforming AC voltage of 230 volts. Only the consumers were connected to this AC voltage, while the PV modules and batteries were still connected with DC cables. For small distances you can make up for it with a charge controller, which prevents battery overload.

The SMA solution for DC coupling

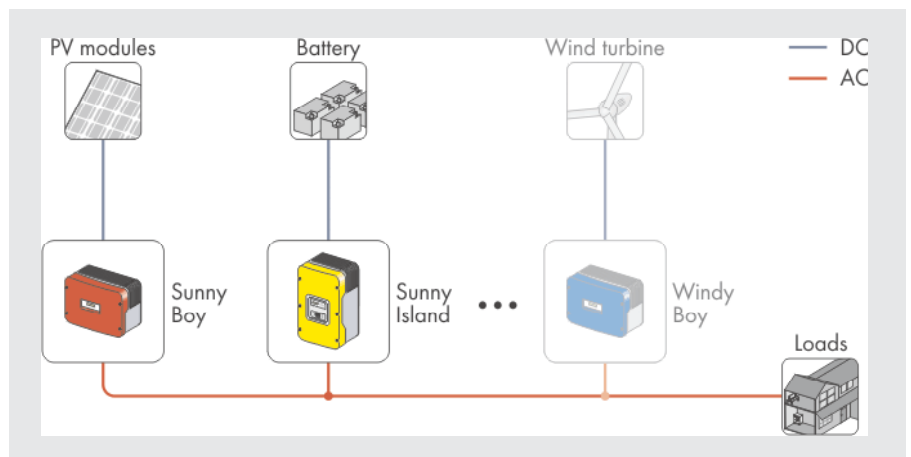
Since the PV modular voltage varies with the battery voltage, the solar modules in such systems almost never reach their optimal operating point. In this way, as much as 30 percent of the valuable solar energy is lost. In order to avoid this, you need an MPP charge controller like the Sunny Island Charger. It increases or decreases the voltage coming from the battery to the current MPP voltage of the solar module. The somewhat higher costs can be recovered very quickly. The solar yield increases by 20 to 30 percent. The solar system can be built relatively smaller, which more than makes up for the additional costs of the charge controller.

Flexibility with AC coupling

Should the solar system and the batteries lie some distance apart, the optimal solution can be found in a complete AC coupling: instead of building a costly DC grid on the producer side, a solar inverter converts the solar power into AC current and feeds it into the preexisting AC island grid. This can create a number of advantages:



DC coupling: better with the Sunny Island Charger



AC coupling: the basis for a highly flexible off-grid electricity supply

- Lower installation costs due to the lower amperage and the AC voltage technology.
- Simpler and more flexible planning, as the distance between solar generator and battery is unproblematic. Feeding energy into any point of the AC grid is now a de facto possibility.
- Better usage of solar power especially during high-use periods of the day.
- Utilization of technological benefits from the utility link-up, such as optimized MPP tracking processes, high efficiency, Opti-Cool, etc.
- Lower total costs for solar systems with more than four kilowatts of power

AC and DC solutions for stand-alone systems

SMA is the only manufacturer in the world to offer matched, AC coupled PV systems for self-sufficient energy supply systems ranging from one to 100 kW. Both the multiple award winning Sunny Boy and the Sunny Mini Central solar inverters are put into use. Smaller systems can also be built as DC coupled solar systems with the Sunny Island Charger. No compromising in terms of design, cost or installation: SMA offers optimal solutions for all off-grid systems ranging from one to 100 kW.



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