Sunny Family 2010/2011

The Future of Solar Technology

» SMA has the right solution for every application. Because each PV plant is unique

SUNNY BOY
1 to 5 kW

PV house system
up to 20 kW

SUNNY MINI CENTRAL
5 to 11 kW

SUNNY TRIPOWER
10 to 17 kW

Commercial System
10 kW up to the MW range

SUNNY CENTRAL
100 to 1,600 kW

Solar power station
100 kW up to the MW range

SUNNY ISLAND
2 to 5 kW

Off-grid system
up to 300 kW

SUNNY BACKUP
2 to 5 kW

Solar power – even in the event of grid failure
up to 100 kW

MONITORING SYSTEMS
Plant Monitoring

Everything under control
for every PV plant

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Expanding technological progress

... while remaining flexible. This drives our work and is our strategy for success. Our state-of-the-art production facility, which is the world's largest carbon-neutral inverter factory, began operation in 2009. This raised our annual capacity to 4 gigawatt. To meet the increasing need for solar inverters, we will again more than double our capacity in 2010. The addition of another factory in Niestetal, Germany and a new production site in Denver, Colorado will increase our total output to 11 gigawatt. Production in our new facilities will also be flexible and scalable. This allows us to easily keep pace with the dynamic market trends of the photovoltaic industry and at the same time absorb short-term fluctuations in demand for solar inverters.

We also maintain our technological advantage by continuing to strengthen our development team: with more than 500 development engineers and technicians we can introduce up to 6 new products to the market each year. The "Total Cost of Ownership", which includes issues such as energy yield, reliability, lifespan and installation costs, play an important role in this respect. In short: our innovations provide tangible customer benefits while reducing specific costs.

Once again, our catalogue introduces a number of new products and technologies, including the Sunny Central CP – a series of central inverters with a completely new design. The Sunny Central CP features a compact, weatherproof enclosure and is easier to install because it does not require a heavy concrete substation. With its intelligent power management, the device is also exceptionally efficient: at an ambient temperature of up to 25 °C, it produces 10 percent more than the specified nominal power.

The three-phase Sunny Tripower also features the latest SMA technology, including the multi-level security concept Optiprotect. With its asymmetric multi-string concept Optiflex, the device also offers unparalleled flexibility in the configuration of highly efficient PV plants. The Sunny Tripower was awarded the first prize at the 25th Photovoltaic Symposium in Staffelstein, Germany, as the most innovative product of 2010.

The Sunny Boy HF represents the new generation of galvanically isolating inverters. The Sunny Boy HF provides the highest yields for transformer inverters in the 2 to 3 kilowatt power class, and its SMA Plug-in Grounding, Quick Module and SUNCLIX DC connector system ensure simple and safe installation. Its compact design also makes it ideally suited for wooden-frame houses, which makes the UL version ideal for the US solar market.

In 2010 and 2011, we will continue to make an important contribution to the future of photovoltaics with our products. For example, many SMA inverters offer comprehensive grid management functions, some of which already exceed current statutory requirements. And we continue to look ahead to the future: for example, our development engineers are working to create effective solutions for private solar electricity consumption, and are developing new Smart Grid concepts.

We look forward to continuing to work with you in the future and to many successful projects.

Günther Cramer
Chief Executive Officer SMA Solar Technology

THE FUTURE OF SOLAR TECHNOLOGY

New technologies that make the worldwide deployment of photovoltaics increasingly economical. A tremendous rate of innovation. And a unique and diverse product range. SMA Solar Technology AG has been among the most successful companies in the field of solar technology for nearly 30 years. Our team of over 500 engineers develops state-of-the-art solar inverters and monitoring systems for photovoltaic power-plants.

The right inverter for every application.

Since every PV plant has to be individually designed, SMA has a broad product range: we are the only manufacturer to offer the appropriate inverter for every requirement, worldwide – whether for grid connection, off-grid supply or back-up operation. From kilowatt to megawatt, and for all module types – whether thin-film, crystalline or concentrator technology.

SMA inverters as intelligent system managers

The inverter is the most important component in any PV plant because it converts the direct current generated in photovoltaic cells into alternating current suitable for the grid. In addition, it functions as an intelligent system manager that is responsible for yield monitoring and grid management. SMA's solar inverters are especially efficient: the Sunny Tripower already features an efficiency of over 98 percent and thus ensures increased power production.

Worldwide customer proximity and international experience

SMA is the market and technology leader in the solar inverter sector, and is represented internationally by its own distribution and service subsidiaries. Our strategy: proximity to the customer in all major solar markets. SMA customers do not just benefit from our internationally-oriented processes, but also from our many years of experience in dealing with country-specific certification and grid compliance regulations.

SMA in figures

SMA Solar Technology AG is headquartered in Niestetal near Kassel in Germany, and is currently represented by 13 international subsidiaries on four continents. The group consists of more than 4.000 employees (including temporary staff), and has been distinguished several times in previous years with awards for its outstanding performance as an employer. The company has been listed in the Prime Standard segment of the Frankfurt Stock Exchange (S92) since June 27, 2008 and the company's stock has been listed on the TecDAX since September 22, 2008. In 2009, SMA posted revenues of 934 million Euros.

Solar Inverters from SMA: The Heart of Every Solar Power Plant

The first solar inverter was one of ours. Today, SMA solar inverters are the product of almost 30 years of experience in this technology. With currently 7.9 gigawatt installed PV power, we play a leading role in the success of photovoltaics. An important reason for this is that we invest a great deal in research and development. At our company headquarters in Niestetal, Germany, over 500 developers are working on making the devices even more user-friendly and more cost-effective.

Investment security and fast amortization

Durability and economic viability are important criteria in deciding for an inverter. With a service life of over 20 years and over 98 percent efficiency, SMA products set the standards in this sector. The key to our success: the combination of the latest technologies and modern production processes. The enhanced OptiTrac Global Peak operation control, the asymmetrical Optiflex multistring topology and the Optiprotect security concept ensure the best possible performance of the devices 24 hours a day, regardless of the weather.

Flexible plant design

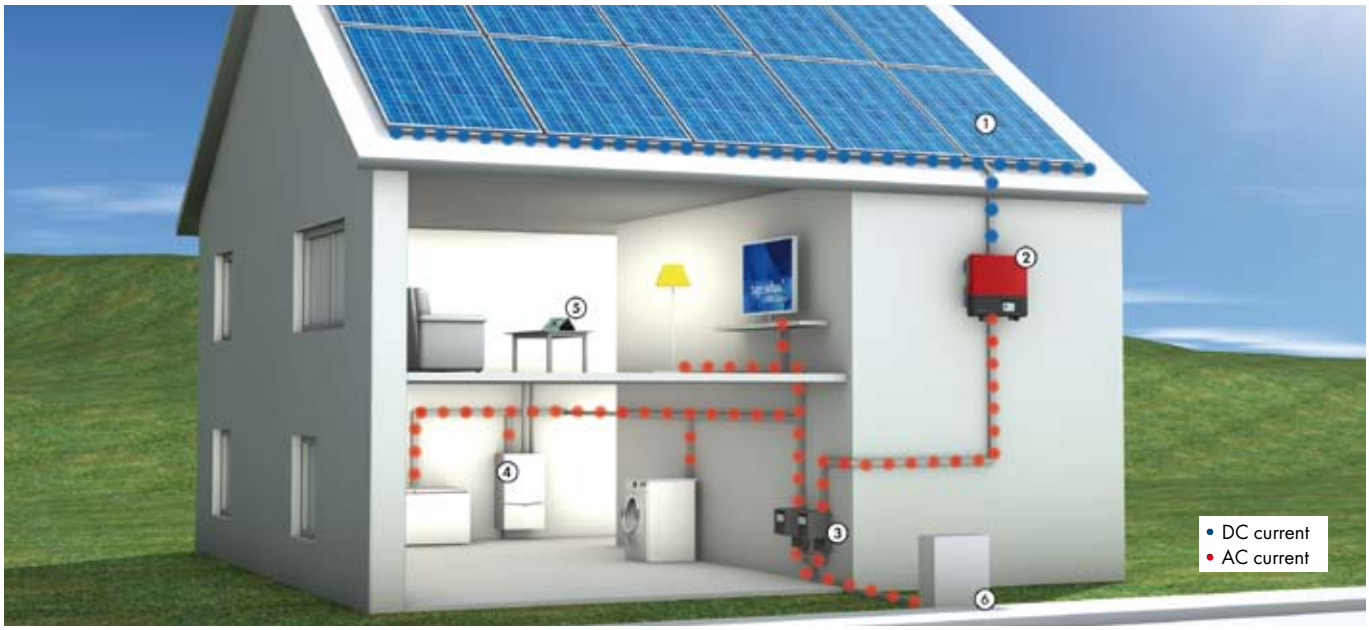
PV plants are just as individual as the buildings and surfaces on which they are installed. A broad range of products offers the right inverter for the respective PV module and ensures best energy harvest. SMA offers the right inverter for all requirements making a perfect plant design possible. Our inverters can be installed indoors as well as outdoors.

Safe installation

With the SMA Grid Guard and Electronic Solar Switch (ESS), SMA provides the most reliable safety systems on the market. For countries that require UL certification, the design of these safety facilities differs slightly. (see p. 206). The standardized DC plug system SUNCLIX, the newly developed communication unit Quick Module or the SMA Plug in Grounding kit make installation even easier and faster.

Simple control

All SMA inverters can be combined with a wide range of components for plant monitoring: Sunny Beam with *Bluetooth*, Sunny WebBox for diagnosis and maintenance via Internet and Sunny Portal, the world's largest online portal for the monitoring and administration of PV plants.



Components: 1. PV module, 2. SUNNY BOY PV inverter, 3. Feed-in meter, 4. Loads, 5. SUNNY BEAM, 6. Grid connection

Plant design

Diligence that pays off

Through the skillful selection of suitable components, a solar plant can be ideally adapted to local operating conditions. When designing the plant, the particularities of the chosen location must be taken into consideration. The designing process should therefore be conducted by an experienced specialist. The broad product range from SMA provides a multitude of attractive solutions, especially for this first important step.

Multi-string inverter

Whenever the PV generator is exposed to differing irradiation conditions, it should be divided into separate strings, e.g. in the case of varying roof pitches or some modules being in the shade. Dividing up the PV generator in this way avoids large losses in yield since the individual sub-generators have different MPPs. A multi-string inverter from SMA operates strings from PV modules with the same level of irradiation separately and each with its own MMP tracker thus ensuring maximum energy yield.

Grounding the PV generator

Some module types require a connection to ground. Choosing an inverter with galvanic isolation (with transformer) offers maximum flexibility here. With the appropriate grounding kit, the inverter can be customized to meet any imaginable recommendation of the module manufacturer, even retrospectively (see Know-how section page 202).

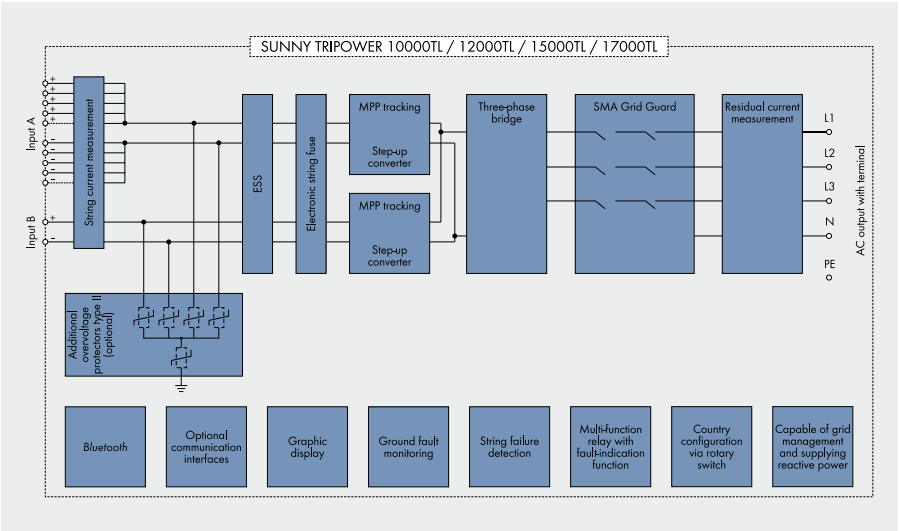
Maximum energy yield

If the energy yield is to be maximized, then a transformerless inverter is the only solution. In comparison to the galvanic isolating devices, SMA inverters with patented H5 topology (see the Know-how section, page 204) provide an approximately two percent greater energy yield without having to make cut-backs in personnel protection.

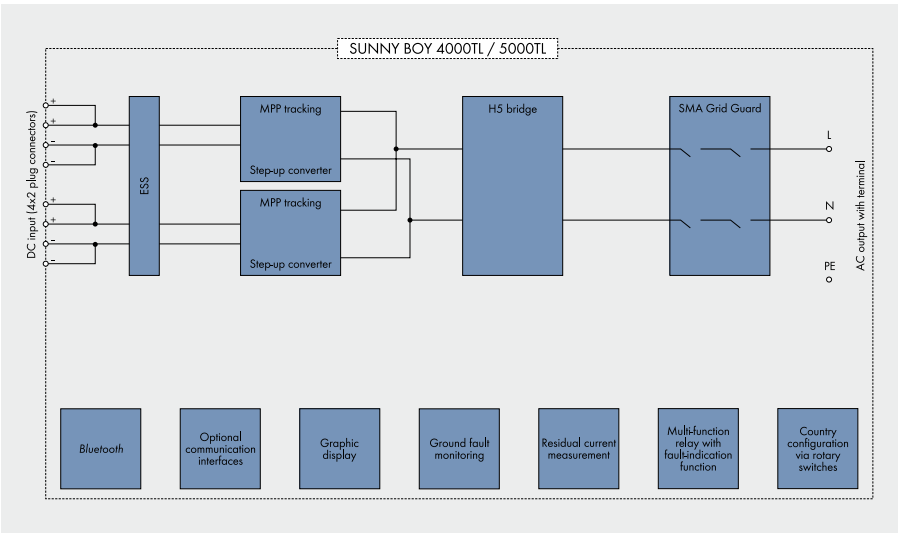
Grid feeding

Good grid compatibility means more than just grid-synchronized energy feeding. For smaller PV plants, the symmetrical distribution of the feeding power across the three phases is adequate and the responsibility of the planner. For PV plants in the upper power range, SMA inverters support the grid management of grid operators with the SMA Power Balancer, three-phase feeding, reactive power capability and other options.

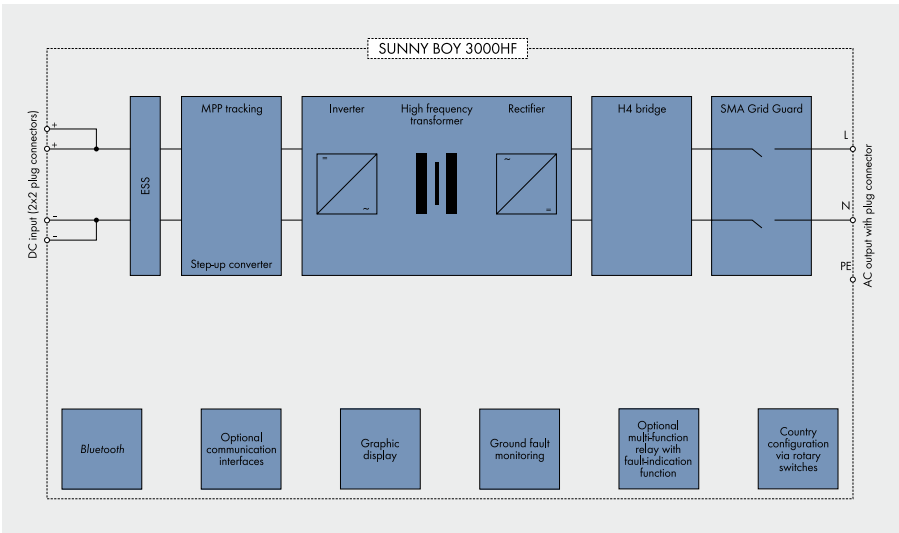
The listed examples show that diverse factors have to be taken into consideration when designing a PV plant. Therefore we recommend our free Sunny Design planning software for designing systems (see next page). It helps with optimization and makes the planner aware of critical combinations.



Block circuit diagram of a three-phase inverter of the Sunny Tripower type



Block circuit diagram of a multi-string inverter without transformer



Block circuit diagram of a galvanic isolating inverter of the Sunny Boy HF series

Simple

- Optimal design for grid-connected PV plants
- Tips aimed at plant optimization
- Free download

Comprehensive

- Database of all PV modules currently available on the market
- Use of high-resolution meteorological data
- Worldwide location support

- Automatic dimensioning of the cable lengths and cross sections
- Energy analysis over a period of one operating year

SUNNY DESIGN

Plant design made easy

With Sunny Design, designing PV plants is easier than ever. Simply enter all required details and within a few minutes you will receive the optimal plant configuration. The free software gives solar professionals and system planners a user-friendly interface, and a practical input wizard helps with any questions. The software provides data for an economic evaluation of the system along with technical checking of the various components. Thus, the end customer gains a tailor-made PV plant and the solar professionals save valuable time.

Sunny Design contains the most important data of all SMA inverters as well as all currently available PV modules. It is easy to use and guides the planner through the entire design process. This saves time and allows different configuration options to be simulated without the need for complicated calculations. Sunny Design calculates the values automatically and comes up with a comprehensive result for all design variants.

Operating states that could be critical are reliably detected and identified. This ensures that the planner is notified of any deviations from the standard design. Such a notification does not necessarily mean that the design is not permissible, but it serves to indicate that a thorough check is required to see whether this operating state (e.g. generator voltage too low) is relevant in the current plant.

Sunny Design thus enables the plant designer to fully concentrate on what plant designing is all about. The software helps to estimate the implications of the most important parameters on the yield and investment costs. In this way, the customer can be offered a tailor-made plant.

Additionally, realistic operation is evaluated over a calendar year on the basis of the integrated meteorological database. Although an accurate yield forecast cannot be expected from Sunny Design (further simulation programs with complex adjustment possibilities are necessary for this), Sunny Design can determine the yield differences between the different designs and also includes technical checking. Thus not only can the best plant design be found, it can also be evaluated how cost-effective it is.

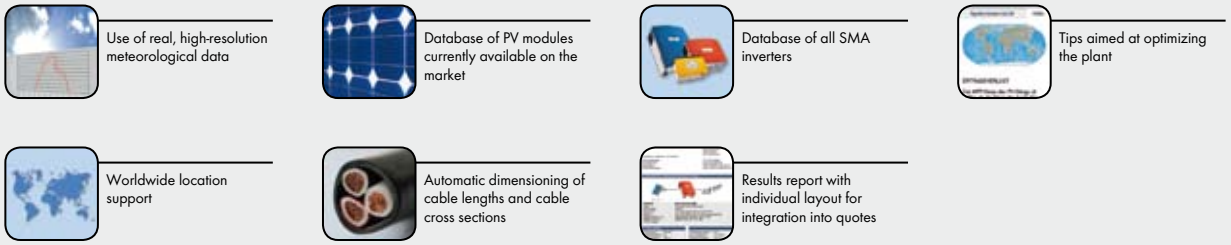
Finally, the technical assessment of the plant design is illustrated clearly in a results report that can be individually customized. As a printout or a PDF file, this summary is the ideal supplement to an offer.

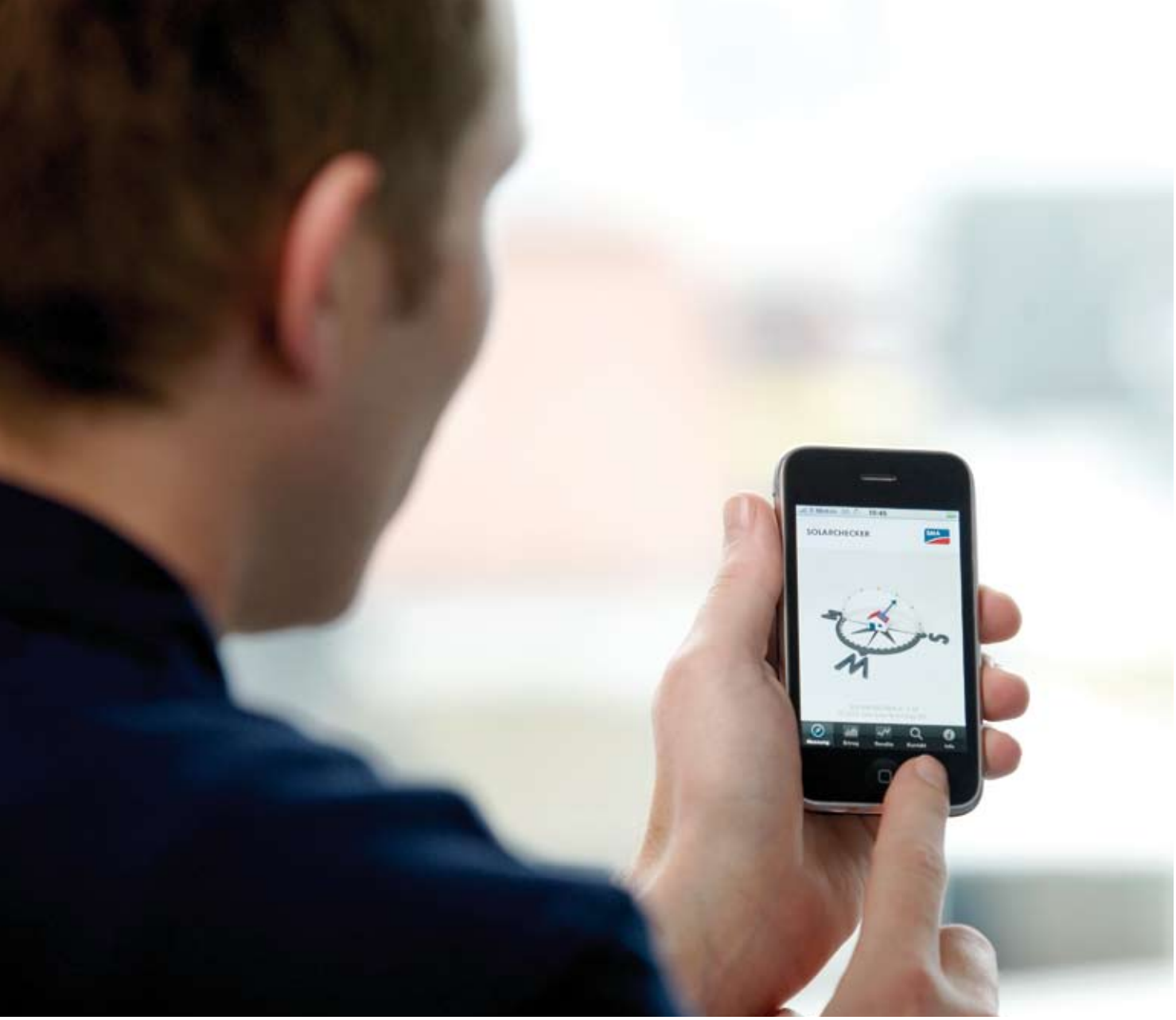
Free download at
www.SMA.de/SunnyDesign

System Requirements

Supported Operating Systems
Windows 2000
Windows XP
Windows Vista
Windows 7

Hardware (minimum requirements)
Intel Pentium 1 GHz
256 MB RAM
250 MB (free hard disk space)
1024 x 768 pixels / 256 colors





Simple

- Automatic position determination
- Determination of roof tilt and orientation
- Online meteorological data for determining the irradiation values

Fast

- Online feed-in tariffs and average system costs
- Determination of yield and expected profits
- Integrated financing calculator

Communicative

- SMA specialist search*
- Telephone or email enquires at the press of button
- Free download in Apple App Store

SMA SOLARCHECKER

iPhone-App for estimating the yield of PV plant

"Is it worth having a photovoltaic plant on my roof?" A question that many home owners are asking themselves. Specialists who own an iPhone 3GS can reply in just a few seconds – thanks to the Solarchecker from SMA. The application for the iPhone estimates the possible current yield of a PV plant in no time at all – directly on site.

Up until now, solar system engineers needed a long time before they could provide potential customers with an initial yield estimation. Now, technicians can calculate this estimate directly using an iPhone and the SMA Solarchecker. This mobile device features integrated sensors that allow it to determine the location, orientation and tilt of the roof fully automatically. The SMA Solarchecker uses this data and some individual information such as plant size and financing costs to estimate the planned power and profits. Although the estimate does not replace the final detailed planning of the system, it saves much valuable time. And it convinces customers even faster of the benefits of these cost-effective and environmentally friendly plants.

The iPhone as a solar power planner

Firstly, the SMA Solarchecker finds the current location using the iPhone's GPS tracker. Using these values, the "App" (Application) determines the solar irradiation taken from a database that would be theoretically possible at that particular GPS location. Via the magnetic compass, the iPhone then measures to what degree the roof deviates from the ideal south-facing orientation. The device determines the possible tilt of the solar generator using the tilt sensor. The SMA Solarchecker then uses these values to determine the specific yield of a PV plant, i.e. the number of kilowatt hours produced per kW of generator power.

Calculating the energy yield with the Solarchecker

To determine the energy yield, the planned power of the PV generator must be calculated first. The SMA Solarchecker offers two options for this: you can either give the power directly in kWp or give the number of square meters of the planned PV plant. In the latter case, the App converts the entered roof area automatically into power. Of course, the App takes into account the PV module type that was specified in the settings.

The SMA Solarchecker calculates the annual energy yield of the PV plant by multiplying the specific yield of the roof area with the planned peak power. Long-term estimates, e.g. over 20 years, are also possible. For degradation, the SMA Solarchecker takes on a value of 0.2 percent per year. Whoever wants to calculate more precisely can increase this value accordingly.

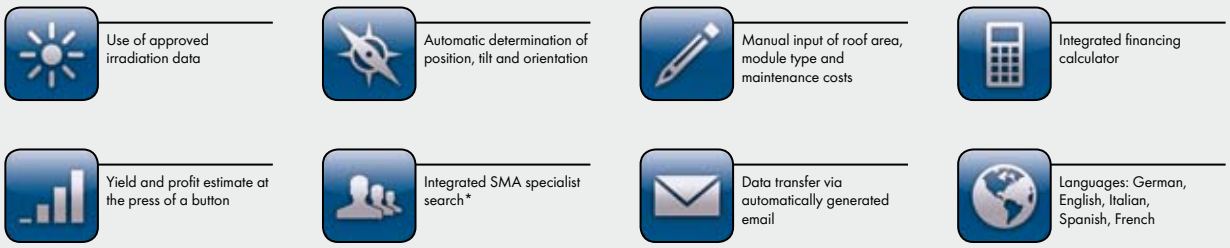
Important information:

Since the returns and profits are dependent on the estimate of the specific yearly yield, they both carry a certain degree of uncertainty. SMA is therefore not liable for lower actual yields that can also be due to other factors such as shade and soiling of the module. For more precise yield calculations, SMA recommends consulting a qualified technician or system planner.

Profit estimate at the press of a button

The App can also estimate profits that are possible with the planned PV plant. All you need to do is to type in the current feed-in tariff per kilowatt hour and the expected financing costs.

Free download of the SMA Solarchecker www.apple.com/itunes



* All members of the Sunny PRO Clubs are included in the SMA specialist search.

INVERTERS WITHOUT TRANSFORMERS

Efficient

- Maximum efficiency of 98.1 %
- OptiTrac-Global Peak for best tracking efficiency
- *Bluetooth* Communication

Safe

- Electronic string fuse and failure detection
- Integrable DC overvoltage protector (Type II)
- String current monitoring

Flexible

- DC input voltage up to 1,000 V
- Integrated grid management functions
- Tailor made plant design with Optiflex

Simple

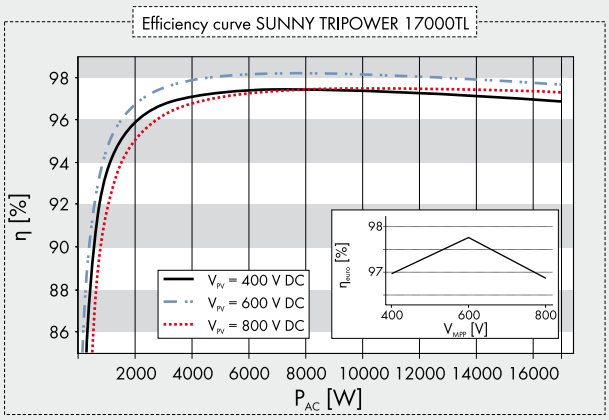
- Three-phase feed-in
- Cable connection without tools
- DC plug system SUNCLIX
- Easily accessible connection area

SUNNY TRIPOWER 10000TL / 12000TL / 15000TL / 17000TL

The three-phase inverter for easy system design

Packed full of pioneering technology: thanks to the new Optiflex technology with two MPP inputs and its very broad input voltage range, the three-phase Sunny Tripower is suited to almost any module configuration. In addition, it is highly flexible in terms of the plant design – right up to the megawatt range. The Sunny Tripower meets all the requirements for reactive power supply, utility interaction management and grid support, thus making a reliable contribution to grid management. The extensive Optiprotect safety concept, with its self-learning string failure detection, electronic string fuse and integrable DC overvoltage protector Type II, ensures maximum availability.

Technical data	Sunny Tripower 10000TL	Sunny Tripower 12000TL	Sunny Tripower 15000TL	Sunny Tripower 17000TL
Input (DC)				
Max. DC power (@ cos φ = 1)	10200 W	12250 W	15340 W	17410 W
Max. DC voltage	1000 V	1000 V	1000 V	1000 V
MPP voltage range	320 V – 800 V	380 V – 800 V	360 V – 800 V	400 V – 800 V
DC nominal voltage	600 V	600 V	600 V	600V
Min. DC voltage / start voltage	150 V / 188 V	150 V / 188 V	150 V / 188 V	150 V / 188 V
Max. input current / per string	A: 22 A, B: 11 A / 33 A	A: 22 A, B: 11 A / 33 A	A: 33 A, B: 11 A / 33 A	A: 33 A, B: 11 A / 33 A
Number of MPP trackers / strings per MPP tracker	2 / A: 4, B: 1	2 / A: 4, B: 1	2 / A: 5, B: 1	2 / A: 5, B: 1
Output (AC)				
AC nominal power (@ 230 V, 50 Hz)	10000 W	12000 W	15000 W	17000 W
Max. AC apparent power	10000 VA	12000 VA	15000 VA	17000 VA
Nominal AC voltage; range	3 / N / PE, 230 V / 400 V; 160 V – 280 V			
AC grid frequency; range	50, 60 Hz; -6 Hz, +5 Hz	50, 60 Hz; -6 Hz, +5 Hz	50, 60 Hz; -6 Hz, +5 Hz	50, 60 Hz; -6 Hz, +5 Hz
Max. output current	16 A	19.2 A	24 A	24.6 A
Power factor (cos φ)	0.8 leading ... 0.8 lagging			
Phase conductors / connection phases / power balancing	3 / 3 /–	3 / 3 /–	3 / 3 /–	3 / 3 /–
Efficiency				
Max. efficiency / Euro-eta	98.1 % / 97.7 %	98.1 % / 97.7 %	98.1 % / 97.7 %	98.1 % / 97.7 %
Protection devices				
DC reverse-polarity protection / reverse current protection	●/electronic	●/electronic	●/electronic	●/electronic
ESS switch-disconnector	●	●	●	●
AC short circuit protection	●	●	●	●
Ground fault monitoring	●	●	●	●
Grid monitoring (SMA Grid Guard)	●	●	●	●
Galvanically isolated / all-pole sensitive fault current monitoring unit	–/●	–/●	–/●	–/●
DC overvoltage protector type II	o	o	o	o
String failure detection	●	●	●	●
Protection class / overvoltage category	I / III	I / III	I / III	I / III
General data				
Dimensions (W / H / D) in mm	665 / 690 / 265	665 / 690 / 265	665 / 690 / 265	665 / 690 / 265
Weight	65 kg	65 kg	65 kg	65 kg
Operating temperature range	-25 °C ... +60 °C	-25 °C ... +60 °C	-25 °C ... +60 °C	-25 °C ... +60 °C
Noise emission (typical)	www.SMA-Solar.com	www.SMA-Solar.com	www.SMA-Solar.com	www.SMA-Solar.com
Internal consumption: (night)	1 W	1 W	1 W	1 W
Topology	transformerless	transformerless	transformerless	transformerless
Cooling concept	OptiCool	OptiCool	OptiCool	OptiCool
Electronics protection rating / connection area (as per IEC 60529)	IP65 / IP54	IP65 / IP54	IP65 / IP54	IP65 / IP54
Climatic category (per IEC 60721-3-4)	4K4H	4K4H	4K4H	4K4H
Features				
DC connection: SUNCLIX	●	●	●	●
AC connection: screw terminal / spring-type terminal	–/●	–/●	–/●	–/●
Display: text line / graphic	–/●	–/●	–/●	–/●
Interfaces: RS485 / *Bluetooth*	o/●	o/●	o/●	o/●
Warranty: 5 / 10 / 15 / 20 / 25 years	●/o/o/o/o	●/o/o/o/o	●/o/o/o/o	●/o/o/o/o
Certificates and permits (more available on request)	CE, VDE 0126-1-1, DK 5940, G83/1-1, PPC, AS4777, EN 50438*, C10/C11, IEC 61727			
** Does not apply to all national deviations of EN 50438				
● Standard features o Optional features – Not available				
Provisional data, as of March 2010 – data at nominal conditions				
Type designation	STP 10000TL-10	STP 12000TL-10	STP 15000TL-10	STP 17000TL-10



Accessories

RS485 interface
DM-485CB-10

DC overvoltage protector
(type II), input A
DCSPD KIT1-10

DC overvoltage protector
(type II), inputs A and B
DCSPD KIT2-10

Read more on the topic of the Medium-Voltage Directive in the article "The SMA Inverter as Grid Manager," on page 198.

Flexible

- Reactive power supply

High Yields

- Maximum efficiency of 97.7 %
- Transformerless, with H5 topology
- OptiCool active temperature management

Reliable

- SMA Power Balancer for three-phase grid connection
- Integrated ESS DC switch-disconnector
- Monitored string fuses

Simple

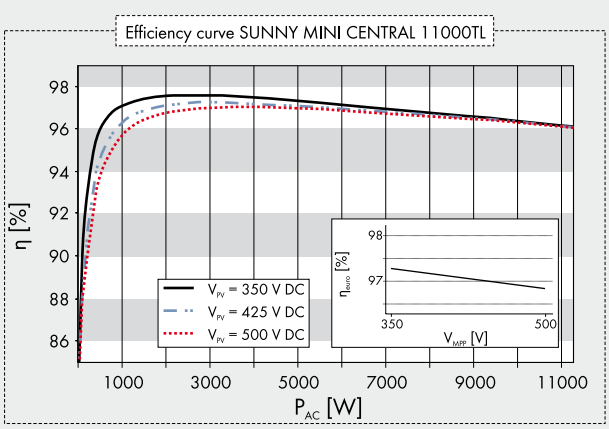
- DC plug system SUNCLIX

SUNNY MINI CENTRAL 9000TL / 10000TL / 11000TL with Reactive Power Control

Optimal grid integration with reactive power supply

Future-proof grids at a glance: the Sunny Mini Central 9000TL / 10000TL / 11000TL with Reactive Power Control are the solution when the electric power company is required to supply reactive power. The inverters can now be used to realize plant concepts which have specifications for the displacement factor cos φ and thus for the percentage of the reactive power. In this way, large-scale power systems, especially those in the megawatt range, can make optimal use of the distribution grid capacities provided. In doing so, they can significantly contribute to the success of renewable energy sources.

Technical data	Sunny Mini Central 9000TL	Sunny Mini Central 10000TL	Sunny Mini Central 11000TL
Input (DC)			
Max. DC power (@ cos φ = 1)	9300 W	10350 W	11400 W
Max. DC voltage	700 V	700 V	700 V
MPP voltage range	333 V – 500 V	333 V – 500 V	333 V – 500 V
DC nominal voltage	350 V	350 V	350 V
Min. DC voltage / start voltage	333 V / 400 V	333 V / 400 V	333 V / 400 V
Max. input current / per string	28 A / 28 A	31 A / 31 A	34 A / 34 A
Number of MPP trackers / strings per MPP tracker	1 / 5	1 / 5	1 / 5
Output (AC)			
AC nominal power (@ 230 V, 50 Hz)	9000 W	10000 W	11000 W
Max. AC apparent power	9000 VA	10000 VA	11000 VA
Nominal AC voltage; range	220, 230, 240 V; 180 V – 260 V	220, 230, 240 V; 180 V – 260 V	220, 230, 240 V; 180 V – 260 V
AC grid frequency; range	50, 60 Hz; -6 Hz, +5 Hz		
Max. output current	40 A	44 A	48 A
Power factor (cos φ)	0.8 leading ... 0.8 lagging		
Phase conductors / connection phases / power balancing	1 / 1 / ●	1 / 1 / ●	1 / 1 / ●
Efficiency			
Max. efficiency / Euro-Eta	97.7 % / 97.3 %	97.7 % / 97.2 %	97.7 % / 97.2 %
Protection devices			
DC reverse-polarity protection / reverse current protection	●/○ (Fuses)	●/○ (Fuses)	●/○ (Fuses)
ESS switch-disconnector	●	●	●
AC short circuit protection	●	●	●
Ground fault monitoring	●	●	●
Grid monitoring (SMA Grid Guard)	●	●	●
Galvanically isolated / all-pole sensitive fault current monitoring unit	–/●	–/●	–/●
DC overvoltage protector (type II), can be integrated	–	–	–
String failure detection	–	–	–
Protection class / overvoltage category	I / III	I / III	I / III
General data			
Dimensions (W / H / D) in mm	468 / 613 / 242	468 / 613 / 242	468 / 613 / 242
Weight	35 kg	35 kg	35 kg
Operating temperature range	-25 °C ... +60 °C	-25 °C ... +60 °C	-25 °C ... +60 °C
Noise emission (typical)	≤ 42 dB(A)	≤ 45 dB(A)	≤ 46 dB(A)
Internal consumption: (night)	0.25 W	0.25 W	0.25 W
Topology	transformerless	transformerless	transformerless
Cooling concept	OptiCool	OptiCool	OptiCool
Electronics protection rating / connection area (as per IEC 60529)	IP65 / IP65	IP65 / IP65	IP65 / IP65
Climatic category (per IEC 60721-3-4)	4K4H	4K4H	4K4H
Features			
DC connection: SUNCLIX	●	●	●
AC connection: screw terminal / spring-type terminal	●/–	●/–	●/–
Display: LCD / Graphic	●/–	●/–	●/–
Interfaces: RS485 / *Bluetooth*	○/○	○/○	○/○
Warranty: 5 / 10 / 15 / 20 / 25 years	●/○/○/○/○	●/○/○/○/○	●/○/○/○/○
Certificates and permits (more available on request)	CE, VDE 0126-1-1, EN 50438*, C10 / C11		
* Does not apply to all national deviations of EN 50438			
● Standard features ○ Optional features – not available			
Data at nominal conditions			
Type designation	SMC 9000TLRP-10	SMC 10000TLRP-10	SMC 11000TLRP-10



Accessories

RS485 interface of type 485PB-NR

Bluetooth Piggy Back BTBINV-NR

SMA Power Balancer Y cable PBL-YCABLE-10

Read more on the topic of the Medium-Voltage Directive in the article "The SMA Inverter as Grid Manager," on page 198.

Efficient

- Maximum efficiency of 98 %
- The best tracking efficiency with OptiTrac MPP tracking
- Transformerless, with H5 topology

- OptiCool active temperature management

Safe

- SMA Power Balancer for three-phase power supply line
- Integrated ESS DC switch-disconnector
- Monitored string fuses

Simple

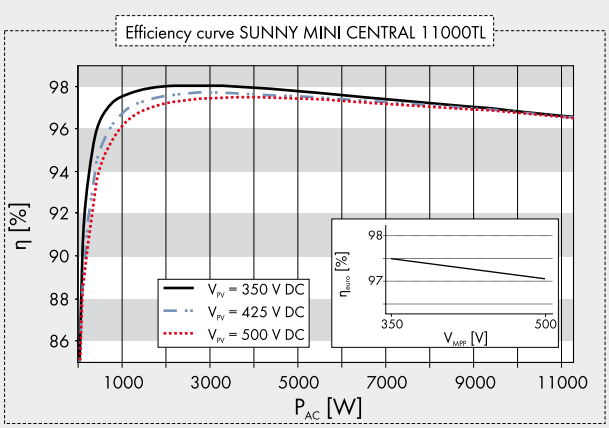
- DC plug system SUNCLIX

SUNNY MINI CENTRAL 9000TL / 10000TL / 11000TL

Precise plant design for maximum yield

Simple realization of medium and large PV plants from 27 kWp up to the megawatt range: the Sunny Mini Central inverters in the performance classes from nine to eleven kW allow almost limitless possibilities, and are easy to combine. The combination of high efficiency and low specific price ensures a short amortization time. In addition, the decentralized plant design helps to keep maintenance costs low. SMA's Sunny Mini Central: state-of-the-art technology which pays off with every sunbeam.

Technical data	Sunny Mini Central 9000TL	Sunny Mini Central 10000TL	Sunny Mini Central 11000TL
Input (DC)			
Max. DC power (@ cos φ =1)	9300 W	10350 W	11400 W
Max. DC voltage	700 V	700 V	700 V
MPP voltage range	333 V – 500 V	333 V – 500 V	333 V – 500 V
DC nominal voltage	350 V	350 V	350 V
Min. DC voltage / start voltage	333 V / 400 V	333 V / 400 V	333 V / 400 V
Max. input current / per string	28 A / 28 A	31 A / 31 A	34 A / 34 A
Number of MPP trackers / strings per MPP tracker	1 / 5	1 / 5	1 / 5
Output (AC)			
AC nominal power (@ 230 V, 50 Hz)	9000 W	10000 W	11000 W
Max. AC apparent power	9000 VA	10000 VA	11000 VA
Nominal AC voltage; range	220, 230, 240 V; 180 V – 260 V (262 V*)	220, 230, 240 V; 180 V – 260 V (262 V*)	220, 230, 240 V; 180 V – 260 V (262 V*)
AC grid frequency; range	50, 60 Hz; ± 4.5 Hz	50, 60 Hz; ± 4.5 Hz	50, 60 Hz; ± 4.5 Hz
Max. output current	40 A	44 A	48 A
Power factor (cos φ)	1	1	1
Phase conductors / connection phases / power balancing	1 / 1 / ●	1 / 1 / ●	1 / 1 / ●
Efficiency			
Max. efficiency / Euro-eta	98.0 % / 97.6 %	98.0 % / 97.5 %	98.0 % / 97.5 %
Protection devices			
DC reverse-polarity protection / reverse current protection	●/○ (Fuses)	●/○ (Fuses)	●/○ (Fuses)
ESS switch-disconnector	●	●	●
AC short circuit protection	●	●	●
Ground fault monitoring	●	●	●
Grid monitoring (SMA Grid Guard)	●	●	●
Galvanically isolated / all-pole sensitive fault current monitoring unit	–/●	–/●	–/●
DC overvoltage protector (type II), can be integrated	–	–	–
String failure detection	–	–	–
Protection class / overvoltage category	I / III	I / III	I / III
General data			
Dimensions (W / H / D) in mm	468 / 613 / 242	468 / 613 / 242	468 / 613 / 242
Weight	35 kg	35 kg	35 kg
Operating temperature range	-25 °C ... +60 °C	-25 °C ... +60 °C	-25 °C ... +60°C
Noise emission (typical)	≤ 42 dB(A)	≤ 45 dB(A)	≤ 46 dB(A)
Internal consumption: (night)	0.25 W	0.25 W	0.25 W
Topology	transformerless	transformerless	transformerless
Cooling concept	OptiCool	OptiCool	OptiCool
Electronics protection rating / connection area (as per IEC 60529)	IP65 / IP65	IP65 / IP65	IP65 / IP65
Climatic category (per IEC 60721-3-4)	4K4H	4K4H	4K4H
Features			
DC connection: SUNCLIX	●	●	●
AC connection: screw terminal / spring-type terminal	●/–	●/–	●/–
Display: text line / graphic	●/–	●/–	●/–
Interfaces: RS485 / *Bluetooth*	○/○	○/○	○/○
Warranty: 5 / 10 / 15 / 20 / 25 years	●/○/○/○/○	●/○/○/○/○	●/○/○/○/○
Certificates and permits (more available on request)	CE, VDE 0126-1-1, DK 5940*, RD 1663, PPC, AS4777, EN 50438**, C10/C11, PPDS, IEEE 929		
* Only applies to IT variants, ** Does not apply to all national deviations of EN 50438			
● Standard features ○ Optional features – not available			
Data at nominal conditions			
Type designation	SMC 9000TL-10	SMC 10000TL-10	SMC 11000TL-10



Accessories

RS485 interface of type 485PB-NR

Bluetooth Piggy Back BTBINV-NR

SMA Power Balancer Y cable PBL-YCABLE-10

High Yields

- Maximum efficiency of 98 %
- The best tracking efficiency with OptiTrac MPP tracking
- Transformerless, with H5 topology

- OptiCool active temperature management

Safe

- SMA Power Balancer for three-phase grid connection
- Integrated ESS DC switch-disconnector

Simple

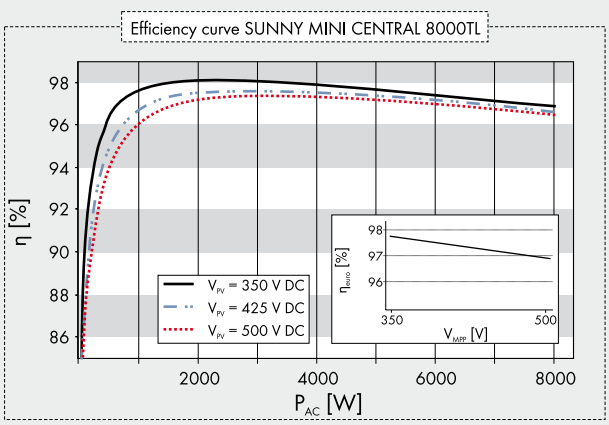
- DC plug system SUNCLIX

SUNNY MINI CENTRAL 6000TL / 7000TL / 8000TL

High yield providers for multiple possible combinations

The transformerless Sunny Mini Central 6000TL, 7000TL and 8000TL provide their owners with high yields. With the Sunny Mini Central family of transformerless inverters, it will be even easier to realize PV plants from 18 kWp to the megawatt range. The finely graduated performance classes are ideal for precise configuration of PV plants. The flexibility it provides for the layout of plants and a favorable price-performance ratio make the Sunny Mini Central the ideal inverter for mid-sized to large solar power plants.

Technical data	Sunny Mini Central 6000TL	Sunny Mini Central 7000TL	Sunny Mini Central 8000TL
Input (DC)			
Max. DC power (@ cos φ =1)	6200 W	7200 W	8250 W
Max. DC voltage	700 V	700 V	700 V
MPP voltage range	333 V – 500 V	333 V – 500 V	333 V – 500 V
DC nominal voltage	350 V	350 V	350 V
Min. DC voltage / start voltage	330 V / 400 V	330 V / 400 V	330 V / 400 V
Max. input current / per string	19 A / 19 A	22 A / 22 A	25 A / 25 A
Number of MPP trackers / strings per MPP tracker	1 / 4	1 / 4	1 / 4
Output (AC)			
AC nominal power (@ 230 V, 50 Hz)	6000 W	7000 W	8000 W
Max. AC apparent power	6000 VA	7000 VA	8000 VA
Nominal AC voltage; range	220, 230, 240 V; 180 V – 260 V (262 V*)	220, 230, 240 V; 180 V – 260 V (262 V*)	220, 230, 240 V; 180 V – 260 V (262 V*)
AC grid frequency; range	50, 60 Hz; ± 4.5 Hz	50, 60 Hz; ± 4.5 Hz	50, 60 Hz; ± 4.5 Hz
Max. output current	27 A	31 A	35 A
Power factor (cos φ)	1	1	1
Phase conductors / connection phases / power balancing	1 / 1 / ●	1 / 1 / ●	1 / 1 / ●
Efficiency			
Max. efficiency / Euro-eta	98.0 % / 97.7 %	98.0 % / 97.7 %	98.0 % / 97.7 %
Protection devices			
DC reverse-polarity protection / reverse current protection	●/–	●/–	●/–
ESS switch-disconnector	●	●	●
AC short circuit protection	●	●	●
Ground fault monitoring	●	●	●
Grid monitoring (SMA Grid Guard)	●	●	●
Galvanically isolated / all-pole sensitive fault current monitoring unit	–/●	–/●	–/●
DC overvoltage protector (type II), can be integrated	–	–	–
String failure detection	–	–	–
Protection class / overvoltage category	I / III	I / III	I / III
General data			
Dimensions (W / H / D) in mm	468 / 613 / 242	468 / 613 / 242	468 / 613 / 242
Weight	31 kg	32 kg	33 kg
Operating temperature range	-25 °C ... +60 °C	-25 °C ... +60 °C	-25 °C ... +60 °C
Noise emission (typical)	≤ 31 dB(A)	≤ 33 dB(A)	≤ 40 dB(A)
Internal consumption: (night)	0.25 W	0.25 W	0.25 W
Topology	transformerless	transformerless	transformerless
Cooling concept	OptiCool	OptiCool	OptiCool
Electronics protection rating / connection area (as per IEC 60529)	IP65 / IP65	IP65 / IP65	IP65 / IP65
Climatic category (per IEC 60721-3-4)	4K4H	4K4H	4K4H
Features			
DC connection: SUNCLIX	●	●	●
AC connection: screw terminal / spring-type terminal	●/–	●/–	●/–
Display: text line / graphic	●/–	●/–	●/–
Interfaces: RS485 / *Bluetooth*	o/o	o/o	o/o
Warranty: 5 / 10 / 15 / 20 / 25 years	●/o/o/o/o	●/o/o/o/o	●/o/o/o/o
Certificates and permits (more available on request)	CE ,VDE 0126-1-1, DK 5940*, RD 1663, PPC, AS4777, EN 50438**, C10/C11, PPDS		
* Only applies to IT variants, ** Does not apply to all national deviations of EN 50438			
● Standard features o Optional features – not available			
Data at nominal conditions			
Type designation	SMC 6000TL	SMC 7000TL	SMC 8000TL



Accessories

RS485 interface of type 485PB-NR

Bluetooth Piggy Back BTBINV-NR

SMA Power Balancer Plug connector PBL-SMC-10-NR

We ourselves could not have said it better than the PHOTON editorial office: "The test results for the Sunny Mini Central 8000TL are not only the best, by far, since the beginning of the PHOTON tests [...], they are also so exceptionally good that it is hard to imagine it possible to find a better device on the market." (PHOTON 10/2007)

High Yields

- Maximum efficiency of 97 %
- Multi-String technology*
- Transformerless, with H5 topology
- Shade management with OptiTrac Global Peak

Safe

- Integrated ESS DC switch-disconnector

Simple

- Easily accessible connection area
- Cable connection without tools
- DC plug system SUNCLIX

Communicative

- *Bluetooth* technology as standard
- Multilingual graphic display
- Multi-function relay as standard

SUNNY BOY 3000TL / 4000TL / 5000TL

Perfection Plus. Usability. The transformerless Sunny Boy generation

More communicative, easier to use and more efficient than ever: this Sunny Boy is setting new standards in inverter technology. A modern graphic display, readout of daily values even after sunset, simplified installation concept and wireless communication via *Bluetooth*: The new Sunny Boys fulfill every wish. With the new OptiTrac Global Peak shade management and an optimal efficiency of 97 %, the inverters ensure optimum solar yield. As transformerless, multi-string devices, the Sunny Boy 4000TL and 5000TL provide maximum flexibility for plant design, and are the first choice for demanding generator designs.

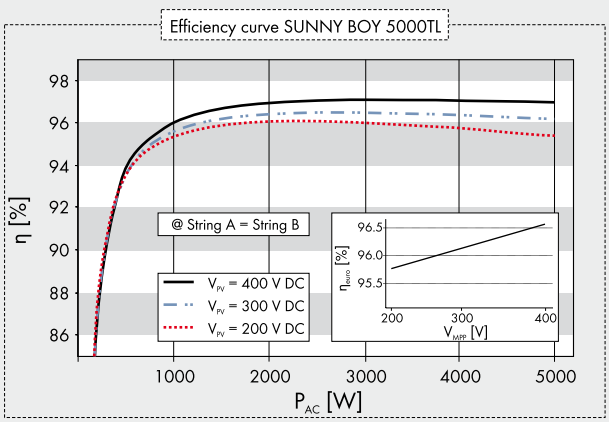
*Sunny Boy 4000TL / 5000TL

Technical data	Sunny Boy 3000TL	Sunny Boy 4000TL	Sunny Boy 5000TL
Input (DC)			
Max. DC power (@ cos φ =1)	3200 W	4200 W	5300 W
Max. DC voltage	550 V	550 V	550 V
MPP voltage range	188 V – 440 V	175 V – 440 V	175 V – 440 V
DC nominal voltage	400 V	400 V	400 V
Min. DC voltage / start voltage	125 V / 150 V	125 V / 150 V	125 V / 150 V
Max. input current / per string	17 A / 17 A	2 x 15 A / 15 A	2 x 15 A / 15 A
Number of MPP trackers / strings per MPP tracker	1 / 2	2 / A: 2, B: 2	2 / A: 2, B: 2
Output (AC)			
AC nominal power (@ 230 V, 50 Hz)	3000 W	4000 W	4600 W
Max. AC apparent power	3000 VA	4000 VA	5000 VA
Nominal AC voltage; range	220, 230, 240 V; 180 – 280 V	220, 230, 240 V; 180 – 280 V	220, 230, 240 V; 180 – 280 V
AC grid frequency; range	50, 60 Hz; ± 5 Hz	50, 60 Hz; ± 5 Hz	50, 60 Hz; ± 5 Hz
Max. output current	16 A	22 A	22 A
Power factor (cos φ)	1	1	1
Phase conductors / connection phases	1 / 1	1 / 1	1 / 1
Efficiency			
Max. efficiency / Euro-eta	97.0 % / 96.3 %	97.0 % / 96.4 %	97.0 % / 96.5 %
Protection devices			
DC reverse-polarity protection	●	●	●
ESS switch-disconnector	●	●	●
AC short circuit protection	●	●	●
Ground fault monitoring	●	●	●
Grid monitoring (SMA Grid Guard)	●	●	●
Galvanically isolated / all-pole sensitive fault current monitoring unit	–/●	–/●	–/●
Protection class / overvoltage category	I / III	I / III	I / III
General data			
Dimensions (W / H / D) in mm	470 / 445 / 180	470 / 445 / 180	470 / 445 / 180
Weight	22 kg	25 kg	25 kg
Operating temperature range	-25 °C ... +60 °C	-25 °C ... +60 °C	-25 °C ... +60 °C
Noise emission (typical)	≤ 25 dB(A)	≤ 29 dB(A)	≤ 29 dB(A)
Internal consumption: (night)	< 0.5 W	< 0.5 W	< 0.5 W
Topology	transformerless	transformerless	transformerless
Cooling concept	Convection	OptiCool	OptiCool
Electronics protection rating / connection area (as per IEC 60529)	IP65 / IP54	IP65 / IP54	IP65 / IP54
Climatic category (per IEC 60721-3-4)	4K4H	4K4H	4K4H
Features			
DC connection: SUNCLIX	●	●	●
AC connection: screw terminal / plug connector / spring-type terminal	–/–/●	–/–/●	–/–/●
Display: text line / graphic	–/●	–/●	–/●
Interfaces: RS485 / *Bluetooth*	o/●	o/●	o/●
Warranty: 5 / 10 / 15 / 20 / 25 years	●/o/o/o/o	●/o/o/o/o	●/o/o/o/o
Certificates and permits (more available on request)	CE, VDE 0126-1-1, DK 5940, RD 1663, G83/1-1, PPC, AS4777, EN 50438*, C10/C11, PPDS, KEMCO (SB 3000TL-20 only)		

* Does not apply to all national deviations of EN 50438

● Standard features o Optional features – not available

Data at nominal conditions			
Type designation	SB 3000TL-20	SB 4000TL-20	SB 5000TL-20



Accessories

RS485 interface
DM-485CB-10

Efficient

- 96 % efficiency
- Transformerless

Safe

- Integrated ESS DC switch-disconnector

Reliable

- Tried and tested technology
- Maintenance free, thanks to convection cooling

Simple

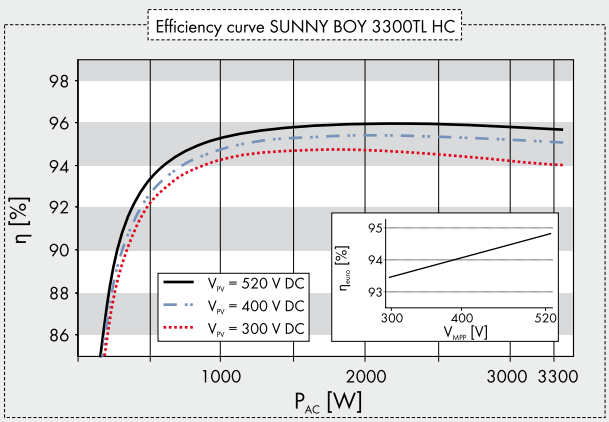
- DC plug system SUNCLIX

SUNNY BOY 2100TL / 3300TL HC

The little one with big returns

Combining a broad input voltage range and a broad input current range, the transformerless Sunny Boy 3300TL HC can be connected to nearly all standard crystalline PV modules. The proven and reliable Sunny Boy 2100TL is the starter model among the transformerless inverters; its efficiency is nevertheless top-class. Its low weight and robust enclosure allow simple installation, both indoors and outdoors. The Sunny Boy 2100TL is the ideal inverter for smaller PV plants.

Technical data	Sunny Boy 2100TL	Sunny Boy 3300TL HC
Input (DC)		
Max. DC power (@ cos φ =1)	2200 W	3440 W
Max. DC voltage	600 V	750 V
MPP voltage range	200 V – 480 V	313 V – 600 V
DC nominal voltage	400 V	520 V
Min. DC voltage / start voltage	125 V / 150 V	125 V / 150 V
Max. input current / per string	11 A / 11 A	11 A / 11 A
Number of MPP trackers / strings per MPP tracker	1 / 2	1 / 2
Output (AC)		
AC nominal power (@ 230 V, 50 Hz)	1950 W	3000 W
Max. AC apparent power	2100 VA	3300 VA
Nominal AC voltage; range	220, 230, 240 V; 180 V – 260 V	220, 230, 240 V; 180 V – 260 V
AC grid frequency; range	50 Hz; –4.5 Hz, +2.5 Hz	50 Hz; –4.5 Hz, +2.5 Hz
Max. output current	11 A	16 A
Power factor (cos φ)	1	1
Phase conductors / connection phases	1 / 1	1 / 1
Efficiency		
Max. efficiency / Euro-eta	96.0 % / 95.2 %	96.0 % / 94.6 %
Protection devices		
DC reverse-polarity protection	●	●
ESS switch-disconnector	●	●
AC short circuit protection	●	●
Ground fault monitoring	●	●
Grid monitoring (SMA Grid Guard)	●	●
Galvanically isolated / all-pole sensitive fault current monitoring unit	–/●	–/●
Protection class / overvoltage category	I / III	I / III
General data		
Dimensions (W / H / D) in mm	440 / 339 / 214	470 / 490 / 225
Weight	16 kg	28 kg
Operating temperature range	–25 °C ... +60 °C	–25 °C ... +60 °C
Noise emission (typical)	≤ 33 dB(A)	≤ 29 dB(A)
Internal consumption: (night)	< 0.1 W	< 0.25 W
Topology	transformerless	transformerless
Cooling concept	Convection	Convection
Electronics protection rating / connection area (as per IEC 60529)	IP65 / IP65	IP65 / IP65
Climatic category (per IEC 60721-3-4)	4K4H	4K4H
Features		
DC connection: SUNCLIX	●	●
AC connection: screw terminal / plug connector / spring-type terminal	–/●/–	●/–/–
Display: text line / graphic	●/–	●/–
Interfaces: RS485 / *Bluetooth*	o/o	o/o
Warranty: 5 / 10 / 15 / 20 / 25 years	●/o/o/o/o	●/o/o/o/o
Certificates and permits (more available on request)	CE, VDE 0126-1-1, RD 1663 , EN 50438**, C10/C11, PPDS	CE, VDE 0126-1-1, DK 5940*, RD 1663, PPC, EN 50438**, C10/C11, PPDS
* Only applies to IT variants, ** Does not apply to all national deviations of EN 50438		
● Standard features o Optional features – not available		
Data at nominal conditions		
Type designation	SB 2100TL	SB 3300TL HC



Accessories

RS485 interface of type 485PB-NR

Bluetooth Piggy Back BTBINV-NR

Innovative

- First transformerless SMA inverter for the North American market
- Certified in accordance with UL 1741 with safety standards from IEC 62109

Efficient

- Maximum efficiency of 98 %
- The best tracking efficiency with OptiTrac MPP tracking
- Transformerless, with H5 topology

- OptiCool active temperature management

Safe

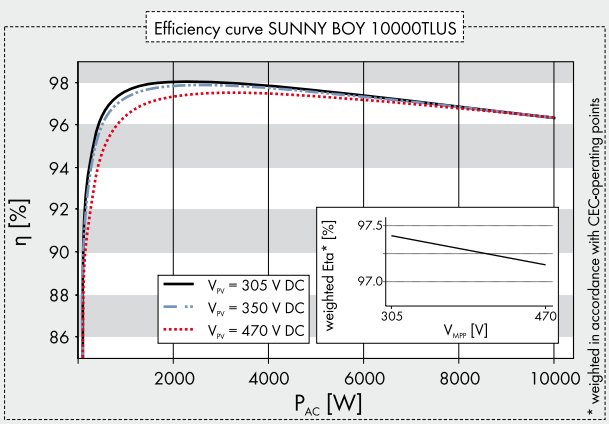
- Integrated DC switch-disconnector
- SMA Power Balancer for three-phase grid connection

SUNNY BOY 8000TL-US / 9000TL-US / 10000TL-US

High yield providers with UL certification

With optimum efficiencies of 98 %, the transformerless Sunny Boy 8000TL-US, 9000TL-US and 10000TL-US provide their owners with high yields. The finely graduated performance classes are ideal for precise configuration of PV power plants. The flexibility it provides for the design of plants and its low weight make the Sunny Boy the ideal inverter for mid-sized to large PV plants.

Technical data	Sunny Boy 8000TL-US	Sunny Boy 9000TL-US	Sunny Boy 10000TL-US
	208 V AC	208 V AC	208 V AC
Input (DC)			
Max. recommended PV power (@ module STC)	10000 W	11250 W	12500 W
Max. DC power (@ cos φ =1)	8400 W	9400 W	10500 W
Max. DC voltage	600 V	600 V	600 V
DC nominal voltage	345 V	345 V	345 V
MPP voltage range	300 V – 480 V	300 V – 480 V	300 V – 480 V
Min. DC voltage / start voltage	300 V / 360 V	300V / 360 V	300 V / 360 V
Max. input current / per string (at DC disconnector)	28 A / 28 A	31 A / 31 A	35 A / 35 A
Number of MPP trackers / fuse-protected strings per MPP tracker	1 / 6 (@ Combiner Box)	1 / 6 (@ Combiner Box)	1 / 6 (@ Combiner Box)
Output (AC)			
AC nominal power	8000 W	9000 W	10000 W
Max. AC apparent power	8000 VA	9000 VA	10000 VA
Nominal AC voltage / adjustable	208 V / –	208 V / –	208 V / –
AC voltage range	183 V – 229 V	183 V – 229 V	183 V – 229 V
AC grid frequency; range	60 Hz; 59.3 – 60.5 Hz	60 Hz; 59.3 – 60.5 Hz	60 Hz; 59.3 – 60.5 Hz
Max. output current	44 A	49 A	49 A
Power factor (cos φ)	1	1	1
Phase conductors / connection phases	1 / 2	1 / 2	1 / 2
Harmonics	< 4 %	< 4 %	< 4 %
Efficiency			
Max. efficiency	98.0 %	98.0 %	98.0 %
CEC efficiency	www.SMA-Solar.com	www.SMA-Solar.com	www.SMA-Solar.com
Protection devices			
DC reverse-polarity protection	●	●	●
AC short circuit protection	●	●	●
Galvanically isolated / all-pole sensitive monitoring unit	–/●	–/●	–/●
Protection class / overvoltage category	I / IV	I / IV	I / IV
General data			
Dimensions (W / H / D) in mm (in)	470 / 615 / 240 (18.4 / 24.1 / 9.5)		
DC Disconnect dimensions (W / H/ D) in mm (in)	187 / 297 / 190 (7.28 / 11.7 / 7)		
Packing dimensions (W / H / D) in mm (in)	390 / 580 / 800 (31 / 15 / 23)		
DC Disconnect packing dimensions (W / H / D) in mm (in)	580 / 400 / 270 (23 / 16 / 11)		
Weight / DC Disconnect weight	approx. 35 kg (78 lb) / 3.5 kg (8 lb)		
Packing weight / DC Disconnect packing weight	approx. 40 kg (90 lb) / 4 kg (9 lb)		
Operating temperature range (full power)	–25 °C ... +45 °C / –13 °F ... +113 °F		
Noise emission (typical)	www.SMA-Solar.com	www.SMA-Solar.com	www.SMA-Solar.com
Internal consumption: (night))	≤ 0.25 W	≤ 0.25 W	≤ 0.25 W
Topology	Transformerless H5	Transformerless H5	Transformerless H5
Cooling concept	OptiCool	OptiCool	OptiCool
Electronics protection rating / connection area	NEMA 3R / NEMA 3R	NEMA 3R / NEMA 3R	NEMA 3R / NEMA 3R
Features			
Display: text line / graphic	●/–	●/–	●/–
Interfaces: RS485 / *Bluetooth*	o/o	o/o	o/o
Warranty: 10 / 15 / 20 years	●/o/o	●/o/o	●/o/o
Certificates and permits (more available on request)	UL1741, UL1998, IEEE 1547, FCC Part 15 (Class A & B)		
● Standard features o Optional features – not available			
Provisional data, as of March 2010 – data at nominal conditions			
Type designation	SB 8000TLUS-10	SB 9000TLUS-10	SB 10000TLUS-10



Accessories

Sunny Boy Combiner Box
SBCBTL6-10

Bluetooth Piggy Back
BTPBINV-NR

RS485 interface of type
485PB-NR

SMA Power Balancer
PBL-SBUS-10-NR

INVERTERS WITH TRANSFORMERS

Efficient

- OptiCool active temperature management
- The best tracking efficiency with OptiTrac MPP tracking

Safe

- Galvanic isolation
- Integrated ESS DC switch-disconnector
- SMA Power Balancer for three-phase grid connection

Flexible

- Integrated reactive power capability and grid management functions
- Input voltage range of up to 800 V
- Suitable for generator grounding*

Simple

- DC plug system SUNCLIX

SUNNY MINI CENTRAL 7000HV

The champion for thin-film projects

Reduced installation costs thanks to greater input voltage range: with the Sunny Mini Central 7000HV, more modules can be connected in series than with common inverters. This reduces cabling costs on the DC side and simplifies the installation. Due to its galvanic isolation, the Sunny Mini Central 7000HV can be used both with crystalline cells and thin film modules. Its performance range permits the installation of large PV plants made up of smaller units, which allows for more detailed system monitoring. Its new reactive power and grid management functions mean it is also suitable for international use.

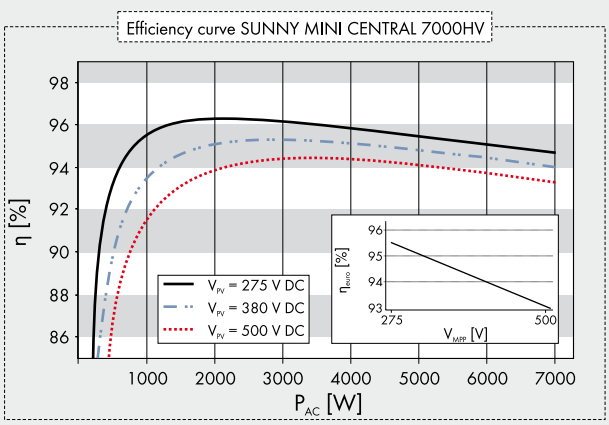
Technical data	Sunny Mini Central 7000HV
Input (DC)	
Max. DC power (@ cos φ =1)	7500 W
Max. DC voltage	800V
MPP voltage range	335 V – 560 V
DC nominal voltage	340 V
Min. DC voltage / start voltage	290 V / 400 V
Max. input current / per string	23 A / 23 A
Number of MPP trackers / strings per MPP tracker	1 / 4
Output (AC)	
AC nominal power (@ 230 V, 50 Hz)	6650 W
Max. AC apparent power	7000 VA
Nominal AC voltage; range	220, 230, 240 V; 180 V – 260 V (262 V**)
AC grid frequency; range	50, 60 Hz; -6 +5 Hz
Max. output current	31 A
Power factor (cos φ)	0.8 leading ... 0.8 lagging
Phase conductors / connection phases / power balancing	1 / 1 / ●
Efficiency	
Max. efficiency / Euro-eta	96.2 % / 95.5 %
Protection devices	
DC reverse-polarity protection / reverse current protection	●/–
ESS switch-disconnector	●
AC short circuit protection	●
Ground fault monitoring	●
Grid monitoring (SMA Grid Guard)	●
Galvanically isolated / all-pole sensitive fault current monitoring unit	●/–
DC overvoltage protector (type II), can be integrated	–
String failure detection	–
Protection class / overvoltage category	I / III
General data	
Dimensions (W / H / D) in mm	468 / 613 / 242
Weight	65 kg
Operating temperature range	-25 °C ... +60 °C
Noise emission (typical)	≤ 41 dB(A)
Internal consumption: (night)	0.25 W
Topology	LF transformer
Cooling concept	OptiCool
Electronics protection rating / connection area (as per IEC 60529)	IP65 / IP65
Climatic category (per IEC 60721-3-4)	4K4H
Features	
DC connection: SUNCLIX	●
AC connection: screw terminal / spring-type terminal	●/–
Display: text line / graphic	●/–
Interfaces: RS485 / *Bluetooth*	o/o
Warranty: 5 / 10 / 15 / 20 / 25 years	●/o/o/o/o
Certificates and permits (more available on request)	CE, VDE 0126-1-1, DK 5940**, RD 1663, C10/C11, PPDS, EN 50438***, AS 4777, IEC 61727, PPC

* Variants for France under preparation **Only applies to IT variants, *** Does not apply to all national deviations of EN 50438

● Standard features o Optional features – not available

Data at nominal conditions

Type designation SMC 7000HV-11



Accessories

RS485 interface of type 485PB-NR

Bluetooth Piggy Back BTPBINV-NR

SMA Power Balancer Plug connector PBL-SMC-10-NR

Grounding set "Positive" ESHV-P-NR*

Grounding set "Negative" ESHV-P-NR*

Powerful

- OptiCool active temperature management
- The best tracking efficiency with OptiTrac MPP tracking

Safe

- Galvanic isolation
- Integrated ESS DC switch-disconnector
- SMA Power Balancer for three-phase grid connection

Flexible

- Suitable for generator grounding*

Simple

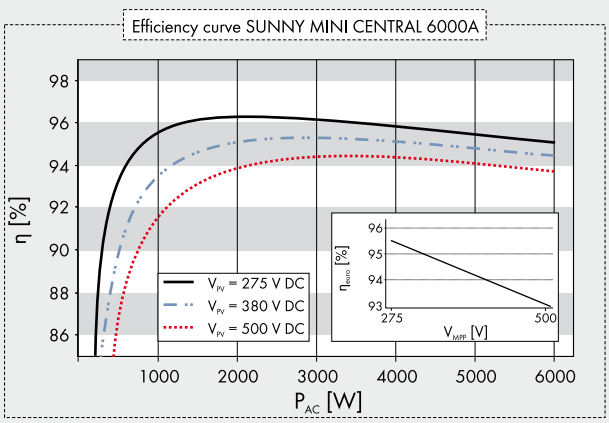
- DC plug system SUNCLIX

SUNNY MINI CENTRAL 4600A / 5000A / 6000A

Proven technology for flexible applications

The Sunny Mini Central 4600A, 5000A und 6000A are installed in locations where galvanic isolation is required. This means they can be used around the world for many different types of connections. In this way, the Sunny Mini Centrals can be used with crystalline cells as well as thin-film modules. Thanks to their graduated performance classes, they offer the highest degree of flexibility in plant design. The Sunny Mini Centrals 5000A and 6000A are ideal for three-phase systems, while the Sunny Mini Central 4600A is designed for single-phase PV plants.

Technical data	Sunny Mini Central 4600A	Sunny Mini Central 5000A	Sunny Mini Central 6000A
Input (DC)			
Max. DC power (@ cos φ =1)	5250 W	5750 W	6300 W
Max. DC voltage	600V	600V	600 V
MPP voltage range	211 V – 480 V	246 V – 480 V	246 V – 480 V
DC nominal voltage	270 V	270 V	270 V
Min. DC voltage / start voltage	211 V / 300 V	211 V / 300 V	211 V / 300 V
Max. input current / per string	26 A / 26 A	26 A / 26 A	26 A / 26 A
Number of MPP trackers / strings per MPP tracker	1 / 4	1 / 4	1 / 4
Output (AC)			
AC nominal power (@ 230 V, 50 Hz)	4600 W	5000 W	6000 W
Max. AC apparent power	5000 VA	5500 VA	6000 VA
Nominal AC voltage; range	220, 230, 240 V; 180 V – 260 V	220, 230, 240 V; 180 V – 260 V (262 V**)	220, 230, 240 V; 180 V – 260 V (262 V**)
AC grid frequency; range	50, 60 Hz; ± 4.5 Hz	50, 60 Hz; ± 4.5 Hz	50, 60 Hz; ± 4.5 Hz
Max. output current	26 A	26 A	26 A
Power factor (cos φ)	1	1	1
Phase conductors / connection phases / power balancing	1 / 1 / ●	1 / 1 / ●	1 / 1 / ●
Efficiency			
Max. efficiency / Euro-eta	96.1 % / 95.3 %	96.1 % / 95.3 %	96.1 % / 95.3 %
Protection devices			
DC reverse-polarity protection / reverse current protection	●/–	●/–	●/–
ESS switch-disconnector	●	●	●
AC short circuit protection	●	●	●
Ground fault monitoring	●	●	●
Grid monitoring (SMA Grid Guard)	●	●	●
Galvanically isolated / all-pole sensitive fault current monitoring unit	●/–	●/–	●/–
DC overvoltage protector (type II), can be integrated	–	–	–
String failure detection	–	–	–
Protection class / overvoltage category	I / III	I / III	I / III
General data			
Dimensions (W / H / D) in mm	468 / 613 / 242	468 / 613 / 242	468 / 613 / 242
Weight	62 kg	62 kg	63 kg
Operating temperature range	-25 °C ... +60 °C	-25 °C ... +60 °C	-25 °C ... +60 °C
Noise emission (typical)	≤ 42 dB(A)	≤ 42 dB(A)	≤ 42 dB(A)
Internal consumption: (night)	0.25 W	0.25 W	0.25 W
Topology	LF transformer	LF transformer	LF transformer
Cooling concept	OptiCool	OptiCool	OptiCool
Electronics protection rating / connection area (as per IEC 60529)	IP65 / IP65	IP65 / IP65	IP65 / IP65
Climatic category (per IEC 60721-3-4)	4K4H	4K4H	4K4H
Features			
DC connection: SUNCLIX	●	●	●
AC connection: screw terminal / spring-type terminal	●/–	●/–	●/–
Display: text line / graphic	●/–	●/–	●/–
Interfaces: RS485 / *Bluetooth*	o/o	o/o	o/o
Warranty: 5 / 10 / 15 / 20 / 25 years	●/o/o/o/o	●/o/o/o/o	●/o/o/o/o
Certificates and permits (more available on request)	CE, VDE 0126-1-1, G83/1-1, PPC, EN 50438***, C10/C11, PPDS, IEEE 929	CE, VDE 0126-1-1, DK 5940**, RD 1663, G83/1-1, CER/06/190, PPC, AS4777, EN 50438***, C10/C11, PPDS, IEEE 929	
● Standard features o Optional features – not available			
* Variants for France under preparation **Only applies to IT variants, *** Does not apply to all national deviations of EN 50438			
Data at nominal conditions			
Type designation	SMC 4600A	SMC 5000A	SMC 6000A



Accessories


RS485 interface of type 485PB-NR


Bluetooth Piggy Back BTPBINV-NR


SMA Power Balancer Plug connector PBL-SMC-10-NR


Grounding set "Positive" ESHV-P-NR*


Grounding set "Negative" ESHV-P-NR*

Powerful

- Efficiency of up to 95.6 %
- OptiCool active temperature management
- The best tracking efficiency with OptiTrac MPP tracking

Safe

- Galvanic isolation
- Integrated ESS DC switch-disconnector

Flexible

- For indoor and outdoor installation
- Suitable for generator grounding*

Simple

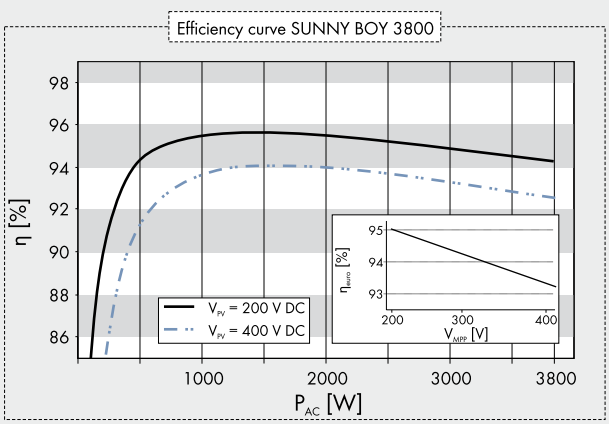
- DC plug system SUNCLIX

SUNNY BOY 3300 / 3800

The generalist

It is robust, easy-to-handle, and, thanks to its galvanic isolation, can be used in all kinds of AC grids: the Sunny Boy 3300 / 3800. Due to its suitability for generator grounding, it can be combined with all module types. The die-cast aluminum enclosure, with the OptiCool active cooling system, guarantees the highest yields and a long service life, even under extreme conditions.

Technical data	Sunny Boy 3300	Sunny Boy 3800
Input (DC)		
Max. DC power (@ cos φ =1)	3820 W	4040 W
Max. DC voltage	500 V	500 V
MPP voltage range	200 V – 400 V	200 V – 400 V
DC nominal voltage	200 V	200 V
Min. DC voltage / start voltage	200 V / 250 V	200 V / 250 V
Max. input current / per string	20 A / 16 A	20 A / 16 A
Number of MPP trackers / strings per MPP tracker	1 / 3	1 / 3
Output (AC)		
AC nominal power (@ 230 V, 50 Hz)	3300 W	3800 W
Max. AC apparent power	3600 VA	3800 VA
Nominal AC voltage; range	220, 230, 240 V; 180 V – 260 V	220, 230, 240 V; 180 V – 260 V
AC grid frequency; range	50, 60 Hz; ± 4.5 Hz	50, 60 Hz; ± 4.5 Hz
Max. output current	18 A	18 A
Power factor (cos φ)	1	1
Phase conductors / connection phases	1 / 1	1 / 1
Efficiency		
Max. efficiency / Euro-eta	95.2 % / 94.4 %	95.6 % / 94.7 %
Protection devices		
DC reverse-polarity protection	●	●
ESS switch-disconnector	●	●
AC short circuit protection	●	●
Ground fault monitoring	●	●
Grid monitoring (SMA Grid Guard)	●	●
Galvanically isolated / all-pole sensitive fault current monitoring unit	●/–	●/–
Protection class / overvoltage category	I / III	I / III
General data		
Dimensions (W / H / D) in mm	450 / 352 / 236	450 / 352 / 236
Weight	38 kg	38 kg
Operating temperature range	-25 °C ... +60 °C	-25 °C ... +60 °C
Noise emission (typical)	≤ 40 dB(A)	≤ 42 dB(A)
Internal consumption: (night)	< 0.1 W	< 0.1 W
Topology	LF transformer	LF transformer
Cooling concept	OptiCool	OptiCool
Electronics protection rating / connection area (as per IEC 60529)	IP65 / IP65	IP65 / IP65
Climatic category (per IEC 60721-3-4)	4K4H	4K4H
Features		
DC connection: SUNCLIX	●	●
AC connection: screw terminal / plug connector / spring-type terminal	–/●/–	–/●/–
Display: text line / graphic	●/–	●/–
Interfaces: RS485 / *Bluetooth*	o/o	o/o
Warranty: 5 / 10 / 15 / 20 / 25 years	●/o/o/o/o	●/o/o/o/o
Certificates and permits (more available on request)	CE, VDE 0126-1-1, DK 5940**, RD 1663 , G83/1-1, CER/06/190, PPC, AS4777, EN 50438***, C10/C11, PPDS	
* Variants for France under preparation		
** Only applies to IT variants		
*** Does not apply to all national deviations of EN 50438		
● Standard features o Optional features – not available, data at nominal conditions		
Type designation	SB 3300	SB 3800



Accessories

RS485 interface of type 485PB-NR

Bluetooth Piggy Back BTPBINV-NR

Grounding set "Positive" ESHV-P-NR*

Grounding set "Negative" ESHV-P-NR*

High Yields

- Maximum efficiency 96.3 %
- The best tracking efficiency with OptiTrac MPP tracking
- Shade management with OptiTrac Global Peak

Safe

- Galvanic isolation
- Integrated ESS DC switch-disconnector
- Theft protection

Simple

- Quick and easy configuration thanks to Quick Module
- DC plug system SUNCLIX
- Suitable for generator grounding*

Communicative

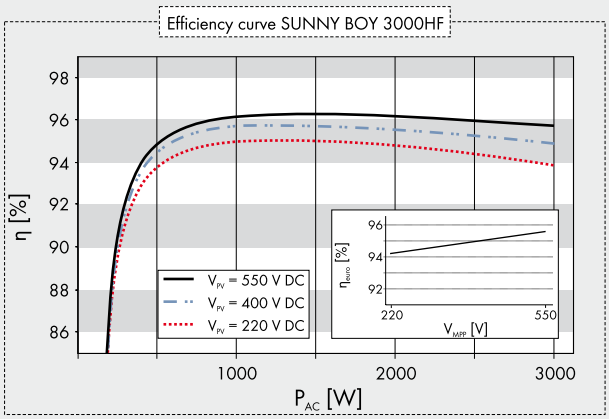
- Graphic display
- *Bluetooth* technology as standard

SUNNY BOY 2000HF / 2500HF / 3000HF

Simply high yields

This is the new generation of galvanically isolated inverters – packed full of the latest SMA technology, the Sunny Boy HF series provides the highest yields for transformer inverters of this performance class. Installation is now easier than ever thanks to the DC connector system SUNCLIX, the plug-in generator grounding (optional), and an easily accessible configuration area – including easier mounting due to the reduced weight. The wide input voltage range from 175 to 700 s gives you extraordinary flexibility for your plant design, and the modern graphic display and wireless *Bluetooth* communication system make the devices highly user-friendly.

Technical data	Sunny Boy 2000HF	Sunny Boy 2500HF	Sunny Boy 3000HF
Input (DC)			
Max. DC power (@ cos φ = 1)	2100 W	2600 W	3150 W
Max. DC voltage	700 V	700 V	700 V
MPP voltage range	175 V – 560 V	175 V – 560 V	210 V – 560 V
DC nominal voltage	530 V	530 V	530 V
Min. DC voltage / start voltage	175 V / 220 V	175 V / 220 V	175 V / 220 V
Max. input current / per string	12 A / 12 A	15 A / 15 A	15 A / 15 A
Number of MPP trackers / strings per MPP tracker	1 / 2	1 / 2	1 / 2
Output (AC)			
AC nominal power (@ 230 V, 50 Hz)	2000 W	2500 W	3000 W
Max. AC apparent power	2000 VA	2500 VA	3000 VA
Nominal AC voltage; range	220, 230, 240 V; 180 – 280 V	220, 230, 240 V; 180 – 280 V	220, 230, 240 V; 180 – 280 V
AC grid frequency; range	50, 60 Hz; ± 4.5 Hz	50, 60 Hz; ± 4.5 Hz	50, 60 Hz; ± 4.5 Hz
Max. output current	11.4 A	14.2 A	16 A
Power factor (cos φ)	1	1	1
Phase conductors / connection phases	1 / 1	1 / 1	1 / 1
Efficiency			
Max. efficiency / Euro-eta	96.3 % / 95.0 %	96, 3 % / 95.4 %	96.3 % / 95.5 %
Protection devices			
DC reverse-polarity protection	●	●	●
ESS switch-disconnector	●	●	●
AC short circuit protection	●	●	●
Ground fault monitoring	●	●	●
Grid monitoring (SMA Grid Guard)	●	●	●
Galvanically isolated / all-pole sensitive fault current monitoring unit	●/–	●/–	●/–
Protection class / overvoltage category	I / III	I / III	I / III
General data			
Dimensions (W / H / D) in mm	348 / 580 / 145	348 / 580 / 145	348 / 580 / 145
Weight	< 18 kg	< 18 kg	< 18 kg
Operating temperature range	-25 °C ... +60 °C	-25 °C ... +60 °C	-25 °C ... +60 °C
Noise emission (typical)	www.SMA-Solar.com	www.SMA-Solar.com	www.SMA-Solar.com
Internal consumption: (night)	0.8 W	0.8 W	0.8 W
Topology	HF transformer	HF transformer	HF transformer
Cooling concept	OptiCool	OptiCool	OptiCool
Electronics protection rating / connection area (as per IEC 60529)	IP65 / IP54	IP65 / IP54	IP65 / IP54
Climatic category (per IEC 60721-3-4)	4K4H	4K4H	4K4H
Features			
DC connection: SUNCLIX	●	●	●
AC connection: screw terminal / plug connector / spring-type terminal	–/●/–	–/●/–	–/●/–
Display: text line / graphic	–/●	–/●	–/●
Interfaces: RS485 / *Bluetooth*	o/●	o/●	o/●
Warranty: 5 / 10 / 15 / 20 / 25 years	●/o/o/o/o	●/o/o/o/o	●/o/o/o/o
Certificates and permits (more available on request)	CE, VDE 0126-1-1, DK 5940, RD 1663, G83/1-1, PPC, AS4777, EN 50438**, C10/C11, PPDS		
* Variants for France under preparation			
** Does not apply to all national deviations of EN 50438			
● Standard features o Optional features – not available			
Provisional data, as of March 2010 – data at nominal conditions			
Type designation	SB 2000HF-30	SB 2500HF-30	SB 3000HF-30



Accessories

SMA Plug-in Grounding
PLUGIN-GRD-10-NR*

Quick Module RS485
+ multi-function relay
485QM-10-NR

Safe

- Integrated ESS DC switch-disconnector
- Galvanic isolation

All purpose

- For indoor and outdoor installation
- Suitable for generator grounding*

Reliable

- Tried and tested technology
- Maintenance free, thanks to convection cooling

Simple

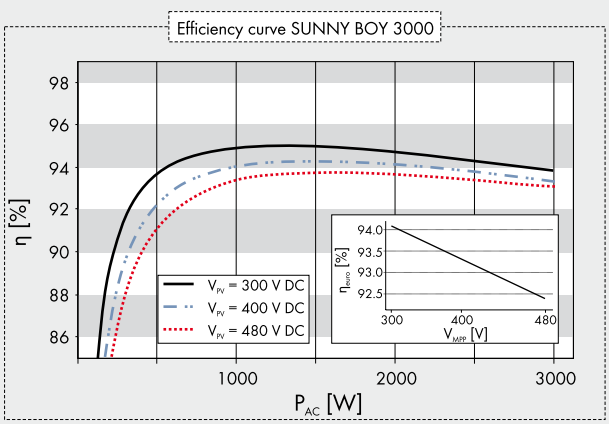
- DC plug system SUNCLIX

SUNNY BOY 1200 / 1700 / 2500 / 3000

Proven technology for secure investments

Universally applicable: the Sunny Boy inverters 1200, 1700, 2500 and 3000 are used in the most diverse AC grids thanks to their galvanic isolation. In addition, the devices are suitable for simple grounding of the generator. Their integrated ESS DC switch-disconnector makes installation simpler while also reducing assembly costs. Equipped with the OptiTrac MPP-tracking process, it will always find the best working point, even under dynamic weather conditions. In this way, it reliably converts solar energy into solar yield.

Technical data	Sunny Boy 1200	Sunny Boy 1700	Sunny Boy 2500	Sunny Boy 3000
Input (DC)				
Max. DC power (@ cos φ = 1)	1320 W	1850 W	2700 W	3200 W
Max. DC voltage	400 V	400 V	600 V	600 V
MPP voltage range	100 V – 320 V	147 V – 320 V	224 V – 480 V	268 V – 480 V
DC nominal voltage	120 V	180 V	300 V	350 V
Min. DC voltage / start voltage	100 V / 120 V	139 V / 180 V	224 V / 300 V	268 V / 330 V
Max. input current / per string	12.6 A / 12.6 A	12.6 A / 12.6 A	12 A / 12 A	12 A / 12 A
Number of MPP trackers / strings per MPP tracker	1 / 2	1 / 2	1 / 3	1 / 3
Output (AC)				
AC nominal power (@ 230 V, 50 Hz)	1200 W	1550 W	2300 W	2750 W
Max. AC apparent power	1200 VA	1700 VA	2500 VA	3000 VA
Nominal AC voltage; range	220, 230, 240 V; 180 V – 260 V	220, 230, 240 V; 180 V – 260 V	220, 230, 240 V; 180 V – 260 V	220, 230, 240 V; 180 V – 260 V
AC grid frequency; range	50, 60 Hz; ± 4.5 Hz	50, 60 Hz; ± 4.5 Hz	50, 60 Hz; ± 4.5 Hz	50, 60 Hz; ± 4.5 Hz
Max. output current	6.1 A	8.6 A	12.5 A	15 A
Power factor (cos φ)	1	1	1	1
Phase conductors / connection phases	1 / 1	1 / 1	1 / 1	1 / 1
Efficiency				
Max. efficiency / Euro-eta	92.1 % / 90.9 %	93.5 % / 91.8 %	94.1 % / 93.2 %	95.0 % / 93.6 %
Protection devices				
DC reverse-polarity protection	●	●	●	●
ESS switch-disconnector	●	●	●	●
AC short circuit protection	●	●	●	●
Ground fault monitoring	●	●	●	●
Grid monitoring (SMA Grid Guard)	●	●	●	●
Galvanically isolated / all-pole sensitive fault current monitoring unit	●/–	●/–	●/–	●/–
Protection class / overvoltage category	I / III	I / III	I / III	I / III
General data				
Dimensions (W / H / D) in mm	440 / 339 / 214	440 / 339 / 214	440 / 339 / 214	440 / 339 / 214
Weight	23 kg	25 kg	28 kg	32 kg
Operating temperature range	–25 °C ... +60 °C	–25 °C ... +60 °C	–25 °C ... +60 °C	–25 °C ... +60 °C
Noise emission (typical)	≤ 41 dB(A)	≤ 46 dB(A)	≤ 33 dB(A)	≤ 30 dB(A)
Internal consumption: (night)	< 0.1 W	< 0.1 W	< 0.25 W	< 0.25 W
Topology	LF transformer	LF transformer	LF transformer	LF transformer
Cooling concept	Convection	Convection	Convection	Convection
Electronics protection rating / connection area (as per IEC 60529)	IP65 / IP65	IP65 / IP65	IP65 / IP65	IP65 / IP65
Climatic category (per IEC 60721-3-4)	4K4H	4K4H	4K4H	4K4H
Features				
DC connection: SUNCLIX	●	●	●	●
AC connection: screw terminal / plug connector / spring-type terminal	–/●/–	–/●/–	–/●/–	–/●/–
Display: text line / graphic	●/–	●/–	●/–	●/–
Interfaces: RS485 / *Bluetooth*	o/o	o/o	o/o	o/o
Warranty: 5 / 10 / 15 / 20 / 25 years	●/o/o/o/o	●/o/o/o/o	●/o/o/o/o	●/o/o/o/o
Certificates and permits (more available on request)	CE, VDE 0126-1-1, DK 5940**, RD 1663 , G83/1-1, CER/06/190 (only SB 1700), PPC, AS4777, EN 50438***, C10/C11, PPDS, IEEE 929		CE, VDE 0126-1-1, DK 5940**, RD 1663 , G83/1-1, CER/06/190, PPC, AS4777, EN 50438***, C10/C11, PPDS	
* Variants for France under preparation **Only applies to IT variants, *** Does not apply to all national deviations of EN 50438				
● Standard features o Optional features – not available				
Data at nominal conditions				
Type designation	SB 1200	SB 1700	SB 2500	SB 3000



Accessories

RS485 interface of type 485PB-NR

Bluetooth Piggy Back BTPBINV-NR

Grounding set "Positive" ESHV-P-NR*

Grounding set "Negative" ESHV-P-NR*

UL certified

- For countries that require UL certification (UL 1741/IEEE 1547)

Efficient

- 97 % peak efficiency
- OptiCool active temperature management

Safe

- Galvanic isolation

Simple

- Patented automatic grid voltage detection*
- Integrated DC switch-disconnector

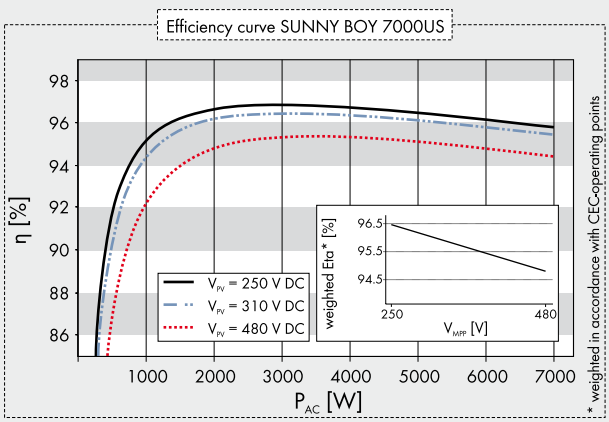
SUNNY BOY 5000-US / 6000-US / 7000-US / 8000-US

Profitable units with UL certification

Maximal energy yields for a continuously expanding solar market: the Sunny Boys with US certification are impressive due to their excellent efficiency. Additionally, they offer the highest degree of flexibility in plant design due to their graduated performance classes. The automatic grid voltage detection* allows easy and safe installation. Furthermore, the galvanic isolation provides flexible connection possibilities. This way, the Sunny Boy inverters can be used with crystalline cells, as well as with thin-film modules.

* US Patent US7352549B1

Technical data	Sunny Boy 5000-US			Sunny Boy 6000-US			Sunny Boy 7000-US			Sunny Boy 8000-US	
	208 V AC	240 V AC	277 V AC	208 V AC	240 V AC	277 V AC	208 V AC	240 V AC	277 V AC	240 V AC	277 V AC
Input (DC)											
Max.recommended PV power (@ module STC)	6250 W			7500 W			8750 W			10000 W	
Max. DC power (@ cos φ = 1)	5300 W			6350 W			7400 W			8600 W	
Max. DC voltage	600 V			600 V			600 V			600 V	
DC nominal voltage	310 V			310 V			310 V			345 V	
MPP voltage range	250 V – 480 V			250 V – 480 V			250 V – 480 V			300 V – 480 V	
Min. DC voltage / start voltage	250 V / 300 V			250 V / 300 V			250 V / 300 V			300 V / 365 V	
Max. input current / per string (at DC disconnector)	21 A / 20 A; 36 A @ combined terminal			25 A / 20 A; 36 A @ combined terminal			30 A / 20 A; 36 A @ combined terminal			30 A / 20 A; 36 A @ combined terminal	
Number of MPP trackers / fuse-protected strings per MPP tracker	1 / 4 (DC disconnector)										
Output (AC)											
AC nominal power	5000 W			6000 W			7000 W			7680 W	8000 W
Max. AC apparent power	5000 VA			6000 VA			7000 VA			8000 VA	
Nominal AC voltage / adjustable	208 V / ●	240 V / ●	277 V / ●	208 V / ●	240 V / ●	277 V / ●	208 V / ●	240 V / ●	277 V / ●	240 V / ●	277 V / ●
AC voltage range	183 – 229 V	211 – 264 V	244 – 305 V	183 – 229 V	211 – 264 V	244 – 305 V	183 – 229 V	211 – 264 V	244 – 305 V	211 – 264 V	244 – 305 V
AC grid frequency; range	60 Hz; 59.3 – 60.5 Hz			60 Hz; 59.3 – 60.5 Hz			60 Hz; 59.3 – 60.5 Hz			60 Hz; 59.3 – 60.5 Hz	
Max. output current	24 A	21 A	18 A	29 A	25 A	22 A	34 A	29 A	25 A	32 A	
Power factor (cos φ)	1			1			1			1	
Phase conductors / connection phases	1 / 2	1 / 2	1 / 1	1 / 2	1 / 2	1 / 1	1 / 2	1 / 2	1 / 1	1 / 2	1 / 1
Harmonics	< 4 %			< 4 %			< 4 %			< 4 %	
Efficiency											
Max. efficiency	96.7 %	96.8 %	96.8 %	96.9 %	96.8 %	97.0 %	97.1%	96.9 %	97.0 %	96.3 %	96.5 %
CEC efficiency	95.5 %	95.5 %	95.5 %	95.5 %	95.5 %	96.0 %	95.5 %	96.0 %	96.0 %	96.0 %	96.0 %
Protection devices											
DC reverse-polarity protection	●			●			●			●	
AC short circuit protection	●			●			●			●	
Galvanically isolated / all-pole sensitive monitoring unit	●/–			●/–			●/–			●/–	
Protection class / overvoltage category	I / III			I / III			I / III			I / III	
General data											
Dimensions (W / H / D) in mm (in)	470 / 615 / 240 (18.4 / 24.1 / 9.5)										
DC Disconnect dimensions (W / H / D) in mm (in)	187 / 297 / 190 (7.3 / 11.7 / 7)										
Packing dimensions (W / H / D) in mm (in)	390 / 580 / 800 (31 / 15 / 23)										
DC Disconnect packing dimensions (W / H / D) in mm (in)	580 / 400 / 270 (23 / 16 / 11)										
Weight / DC Disconnect weight	64 kg (143 lb) / 3.5 kg (8 lb)									66 kg (148 lb) / 3.5 kg (8 lb)	
Packing weight / DC Disconnect packing weight	67 kg (148 lb) / 4 kg (9 lb)									69 kg (152 lb) / 4 kg (9 lb)	
Operating temperature range (full power)	–25 °C ... +45 °C / –13 °F ... +113 °F										
Noise emission (typical)	44 dB(A)			45 dB(A)			46 dB(A)			49 dB(A)	
Internal consumption: (night)	0.1 W			0.1 W			0.1 W			0.1 W	
Topology	LF transformer			LF transformer			LF transformer			LF transformer	
Cooling concept	OptiCool			OptiCool			OptiCool			OptiCool	
Electronics protection rating / connection area	NEMA 3R / NEMA 3R			NEMA 3R / NEMA 3R			NEMA 3R / NEMA 3R			NEMA 3R / NEMA 3R	
Features											
Display: text line / graphic	●/–			●/–			●/–			●/–	
Interfaces: RS485 / *Bluetooth*	o/o			o/o			o/o			o/o	
Warranty: 10 / 15 / 20 years	●/o/o			●/o/o			●/o/o			●/o/o	
Certificates and permits (more available on request)	UL1741, UL1998, IEEE 1547, FCC Part 15 (Class A & B)										
● Standard features o Optional features – not available											
Data at nominal conditions											
Type designation	SB 5000US			SB 6000US			SB 7000US			SB 8000US	



Accessories

RS485 interface of type 485USPB-SMC-NR

Bluetooth Piggy Back BTPBINV-NR

UL certified

- For countries that require UL certification (UL 1741/IEEE 1547)

Efficient

- 96.8 % peak efficiency
- OptiCool active temperature management

Safe

- Galvanic isolation

Simple

- Patented automatic grid voltage detection*
- Integrated DC switch-disconnector

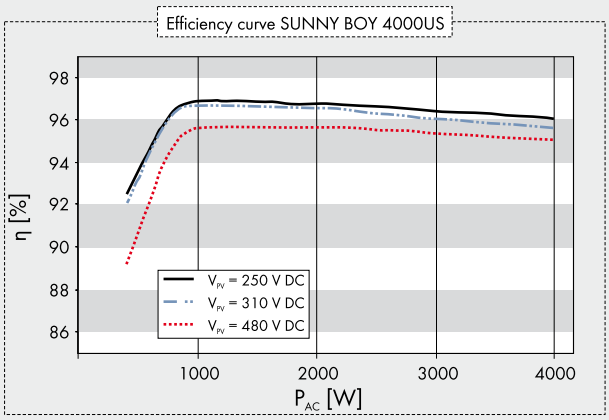
SUNNY BOY 3000-US / 3800-US / 4000-US

Reliable system managers with UL certification

The Sunny Boy 3000-US, 3800-US and 4000-US inverters are specially designed for countries that require UL certification. The automatic grid voltage detection* allows easy and safe installation. The integrated DC switch-disconnector simplifies installation and saves costs. Since the devices are suitable for generator grounding, they can be combined with all types of modules. The die-cast aluminum enclosure, with the OptiCool active cooling system, guarantees the highest yields and a long service life, even under extreme conditions. The Sunny Boy 3800-US is tailor-made for installations requiring a current limit of 16 A.

* US Patent US7352549B1

Technical data	Sunny Boy 3000-US		Sunny Boy 3800-US	Sunny Boy 4000-US	
	208 V AC	240 V AC	240 V AC	208 V AC	240 V AC
Input (DC)					
Max.recommended PV power (@ module STC)	3750 W		4750 W	4375 W	5000 W
Max. DC power (@ cos φ = 1)	3200 W		n. s.	4200 W	
Max. DC voltage	500 V		600 V	600 V	
DC nominal voltage	250 V		310 V	310 V	
MPP voltage range	175 – 400 V	200 – 400 V	250 – 480 V	220 – 480 V	250 – 480 V
Min. DC voltage / start voltage	175 / 228 V	200 / 228 V	250 / 285 V	220 / 285 V	250 / 285 V
Max. input current / per string (at DC disconnector)	17 A / 17 A; 36 A @ combined terminal		18 A / 18 A; 36 A @ combined terminal	18 A / 18 A; 36 A @ combined terminal	
Number of MPP trackers / fused strings per MPP tracker	1 / 4 (DC disconnector)				
Output (AC)					
AC nominal power	3000 W		3800 W	3500 W	4000 W
Max. AC apparent power	3000 VA		3800 VA	3500 VA	4000 VA
Nominal AC voltage / adjustable	208 V / ●	240 V / ●	240 V / –	208 V / ●	240 V / ●
AC voltage range	183 – 229 V	211 – 264 V	211 – 264 V	183 – 229 V	211 – 264 V
AC grid frequency; range	60 Hz; 59.3 – 60.5 Hz		60 Hz; 59.3 – 60.5 Hz	60 Hz; 59.3 – 60.5 Hz	
Max. output current	15 A	13 A	16 A	17 A	
Power factor (cos φ)	1		1	1	
Phase conductors / connection phases	1 / 2		1 / 2	1 / 2	
Harmonics	< 4 %		< 4 %	< 4 %	
Efficiency					
Max. efficiency	96.0 %	96.5 %	n. s.	96.5 %	96.8 %
CEC efficiency	95.0 %	95.5 %	n. s.	95.5 %	96.0 %
Protection devices					
DC reverse-polarity protection	●		●	●	
AC short circuit protection	●		●	●	
Galvanically isolated / all-pole sensitive monitoring unit	●/–		●/–	●/–	
Protection class / overvoltage category	I / III		I / III	I / III	
General data					
Dimensions (W / H / D) in mm (in)	450 / 350 / 235 (17.8 / 13.8 / 9.3)				
DC Disconnect dimensions (W / H / D) in mm (in)	187 / 297 / 190 (7.3 / 11.7 / 7)				
Packing dimensions (W / H / D) in mm (in)	390 / 580 / 470 (15 / 23 / 19)				
DC Disconnect packing dimensions (W / H / D) in mm (in)	580 / 400 / 270 (23 x 16 x 11)				
Weight / DC Disconnect weight	38 kg (84 lb) / 3.5 kg (8 lb)				
Packing weight / DC Disconnect packing weight	44 kg (97 lb) / 4 kg (9 lb)				
Operating temperature range (full power)	–25 °C ... +45 °C / –13 °F ... +113 °F				
Noise emission (typical)	40 dB(A)		www.SMA-Solar.com	37 dB(A)	
Internal consumption: (night)	0.1 W		www.SMA-Solar.com	0.1 W	
Topology	LF transformer		LF transformer	LF transformer	
Cooling concept	OptiCool		OptiCool	OptiCool	
Electronics protection rating / connection area	NEMA 3R / NEMA 3R		NEMA 3R / NEMA 3R	NEMA 3R / NEMA 3R	
Features					
Display: text line / graphic	●/–		●/–	●/–	
Interfaces: RS485 / *Bluetooth*	o/o		o/o	o/o	
Warranty: 10 / 15 / 20 years	●/o/o		●/o/o	●/o/o	
Certificates and permits (more available on request)	UL1741, UL1998, IEEE 1547, FCC Part 15 (Class A & B)				
● Standard features o Optional features – not available					
Data at nominal conditions					
Type designation	SB 3000US		SB 3800-US-10	SB 4000US	



Accessories

RS485 interface of type 485USPB-SMC-NR

Bluetooth Piggy Back BTPBINV-NR

High Yields

- Maximum efficiency 96 %
- The best tracking efficiency with OptiTrac MPP tracking
- OptiCool active temperature management

Safe

- Galvanic isolation
- Integrated DC switch-disconnector

User-friendly

- Perfect-fit integration in walls of wooden-frame houses
- Plug-in ground with GFDI
- Reduced weight
- Quick and easy configuration thanks to Quick module

Communicative

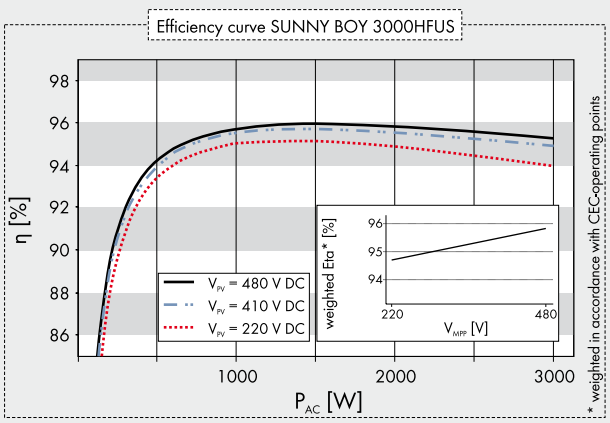
- Graphic display
- *Bluetooth*® technology as standard

SUNNY BOY 2000HF-US / 2500HF-US / 3000HF-US

Perfect yields

This is the new generation of inverters designed for the countries with UL certification: packed full of the latest SMA technology, these devices provide the highest yields for transformer inverters of this performance class. The slim enclosure allows for perfect fitting of the Sunny Boy HF in walls of wooden-frame houses. At the same time, installation is made even simpler due to automatic grid type detection*, plug-in generator grounding with GFDI and reduced weight. The wide input voltage range from 175 to 600 volt gives you extraordinary flexibility for your plant design, and the modern graphic display and wireless *Bluetooth* communication system make the devices highly user-friendly.

Technical data	Sunny Boy 2000HF-US		Sunny Boy 2500HF-US		Sunny Boy 3000HF-US	
	208 V AC	240 V AC	208 V AC	240 V AC	208 V AC	240 V AC
Input (DC)						
Max. recommended PV power (@ module STC)	2500 W		3125 W		3750 W	
Max. DC power (@ cos φ = 1)	2100 W		2600 W		3150 W	
Max. DC voltage	600 V		600 V		600 V	
DC nominal voltage	480V		480V		480V	
MPP voltage range	175 – 480V	175 – 480V	175 – 480V	175 – 480V	220 – 480V	220 – 480 V
Min. DC voltage / start voltage	175 V / 220V		175 V / 220V		220 V / 220V	
Max. input current / per string	12.2 A / 12.2 A		12.4 A / 12.4 A		14.8 A / 14.8 A	
Number of MPP trackers / fuse-protected strings per MPP tracker	1/ 3 optional					
Output (AC)						
AC nominal power	2000 W		2500 W		3000 W	
Max. AC apparent power	2000 VA		2500 VA		3000 VA	
Nominal AC voltage / adjustable	208 V / ●	240 V / ●	208 V / ●	240 V / ●	208 V / ●	240 V / ●
AC voltage range	183 – 229 V	211 – 264 V	183 – 229 V	211 – 264 V	183 – 229 V	211 – 264 V
AC grid frequency; range	60 Hz; 59.3 – 60.5 Hz		60 Hz; 59.3 – 60.5 Hz		60 Hz; 59.3 – 60.5 Hz	
Max. output current	10.0 A	8.5 A	12.0 A	10.4 A	14.4 A	12.5 A
Power factor (cos φ)	1		1		1	
Phase conductors / connection phases	1 / 2		1 / 2		1 / 2	
Harmonics	< 4 %		< 4 %		< 4 %	
Efficiency						
Max. efficiency	96.0 %		96.0 %		96.0 %	
CEC efficiency	95.0 %	95.0 %	95.0 %	95.0 %	95.0 %	95.0 %
Protection devices						
DC reverse-polarity protection	●		●		●	
AC short circuit protection	●		●		●	
Galvanically isolated / all-pole sensitive monitoring unit	●/–		●/–		●/–	
Protection class / overvoltage category	I / III		I / III		I / III	
General data						
Dimensions (W / H / D) in mm (in)	348 / 727 / 183 (14 / 29 / 7) incl. DC Disconnect					
DC Disconnect dimensions (W / H / D) in mm (in)	–					
Packing dimensions (W / H / D) in mm (in)	450 / 600 / 400 (18 / 24 / 16) incl. DC Disconnect					
DC Disconnect packing dimensions (W / H / D) in mm (in)	–					
Weight / DC Disconnect weight	approx. 23 kg (approx. 51 lb) incl. DC Disconnect					
Packing weight / DC Disconnect packing weight	n.s. / n.s.					
Operating temperature range (full power)	–25 °C ... +45 °C / –13 °F ... +113 °F					
Noise emission (typical)	www.SMA-Solar.com		www.SMA-Solar.com		www.SMA-Solar.com	
Internal consumption: (night)	0.8 W		0.8 W		0.8 W	
Topology	HF transformer		HF transformer		HF transformer	
Cooling concept	OptiCool		OptiCool		OptiCool	
Electronics protection rating / connection area	NEMA 3R / NEMA 3R		NEMA 3R / NEMA 3R		NEMA 3R / NEMA 3R	
Features						
Display: text line / graphic	–/●		–/●		–/●	
Interfaces: RS485 / *Bluetooth*	o/●		o/●		o/●	
Warranty: 10 / 15 / 20 years	●/o/o		●/o/o		●/o/o	
Certificates and permits (more available on request)	UL1741, UL1998, IEEE 1547, FCC Part 15 (Class A & B)					
● Standard features o Optional features – not available						
Provisional data, as of March 2010 – data at nominal conditions						
Type designation	SB 2000HFUS-30		SB 2500HFUS-30		SB 3000HFUS-30	



Accessories

Wooden-framed installation pit Flush-Mount Kit Mount Kit-10-NR

Quick Module RS485 + multi-function relay 485QMUS-10-NR

UL certified

- For countries with UL certification (UL 1741/IEEE 1547)

Safe

- Galvanic isolation

Simple

- Simple installation thanks to three-point mounting assembly

Flexible

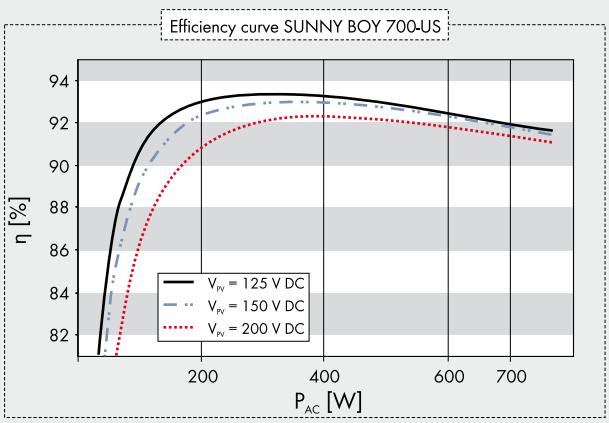
- Three different input voltage ranges
- Modular addition for all applications

SUNNY BOY 700-US

Flexible for modular plant concepts

Implementing modular PV plants with ease is not a problem with the UL certified Sunny Boy 700-US. It is optimally suited for expanding new or already-existing plants in small increments. With its configurable input voltage range, it can be adjusted to individual plant requirements in just a few simple steps. Three different input voltage ranges are available. In addition, thanks to its protection rating in accordance with NEMA 3X, it is extremely robust, and the practical three-point mounting assembly makes installation especially straightforward.

Technical data	SB700-US 150 V DC	SB700-US 200 V DC	SB700-US 250 V DC
Input (DC)			
Max. recommended PV power (@ module STC)	575 W	750 W	875 W
Max. DC power (@ cos φ = 1)	510 W	670 W	780 W
Max. DC voltage	150 V	200 V	250 V
DC nominal voltage	95 V	125 V	150 V
MPP voltage range	77 V – 120 V	100 V – 160 V	125 V – 200 V
Min. DC voltage / start voltage	75 V / 95 V	100 V / 125 V	125 V / 150 V
Max. input current / per string		7 A / 7 A	
Number of MPP trackers / strings per MPP tracker		1 / 2	
Output (AC)			
AC nominal power	460 W	600 W	700 W
Max. AC apparent power	460 VA	600 VA	700 VA
Nominal AC voltage / adjustable		120 V / –	
AC voltage range		106 V – 132 V	
AC grid frequency; range		60 Hz; 59.3 – 60.5 Hz	
Max. output current	4.4 A	5.7 A	6.6 A
Power factor (cos φ)	1	1	1
Phase conductors / connection phases	1 / 2	1 / 2	1 / 2
Harmonics	< 3 %	< 3 %	< 3 %
Efficiency			
Max. efficiency	92.4 %	93.3 %	93.6 %
CEC efficiency	91.5 %	91.5 %	91.5 %
Protection devices			
DC reverse-polarity protection	●	●	●
AC short circuit protection	●	●	●
Galvanically isolated / all-pole sensitive monitoring unit	●/–	●/–	●/–
Protection class / overvoltage category	I / III	I / III	I / III
General data			
Dimensions (W / H / D) in mm (in)	322 / 290 / 180 (12.7 / 12.6 / 7.1)		
DC Disconnect dimensions (W / H / D) in mm (in)	–		
Packing dimensions (W / H / D) in mm (in)	390 / 390 / 230 (15 / 15 / 9)		
DC Disconnect packing dimensions (W / H / D) in mm (in)	–		
Weight / DC Disconnect weight	23 kg (51 lb) / –		
Packing weight / DC Disconnect packing weight	26 kg (57 lb) / –		
Operating temperature range (full power)	-25 °C ... +45 °C / -13 °F ... +113 °F		
Noise emission (typical)	–	–	–
Internal consumption: (night)	0.1 W	0.1 W	0.1 W
Topology	LF transformer	LF transformer	LF transformer
Cooling concept	convection	convection	convection
Electronics protection rating / connection area	NEMA 3X / NEMA 3X	NEMA 3X / NEMA 3X	NEMA 3X / NEMA 3X
Features			
Display: text line / graphic	●/–	●/–	●/–
Interfaces: RS485 / *Bluetooth*	O/–	O/–	O/–
Warranty: 10 / 15 / 20 years	●/O/O	●/O/O	●/O/O
Certificates and permits (more available on request)	UL1741, UL1998, IEEE 1547, FCC Part 15 (Class A & B)		
● Standard features O Optional features – not available			
Data at nominal conditions			
Type designation	SB 700U 150 VDC	SB 700U 200 VDC	SB 700U 250 VDC



Accessories

RS485 interface of type 485USPB-SMC-NR

SUNNY TOWER

Efficient

- Efficiency of up to 98 %
- Low specific price
- Greater yield with multiple MPP trackers

Safe

- Integrated ESS DC load disconnection switch

Flexible

- Modular design
- Sunny Mini Central and Sunny Boy inverters can be combined
- Suitable for outdoors

Convenient

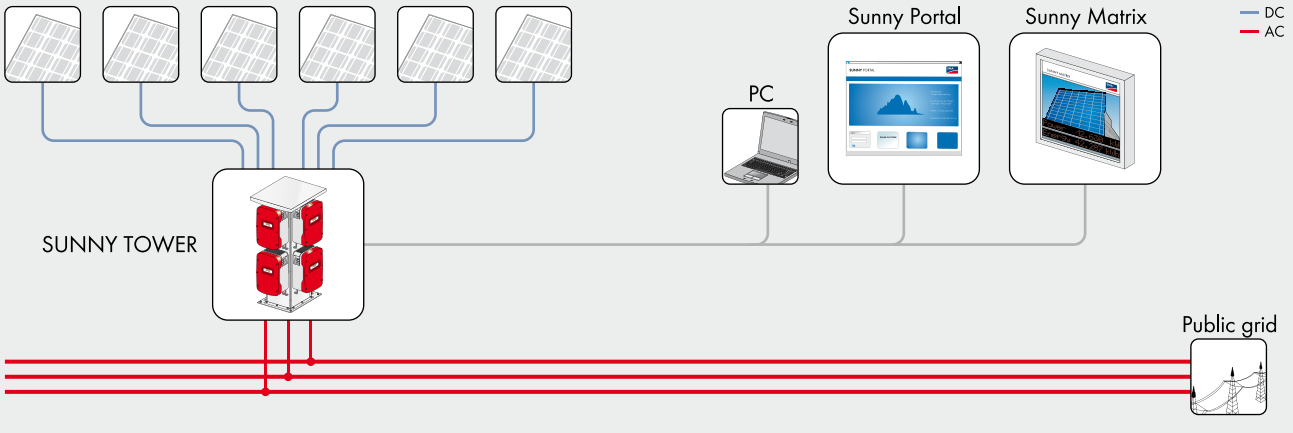
- Delivered as a turn-key solution
- Easy installation
- Integrated data acquisition with Sunny WebBox (optional)

SUNNY TOWER

Easy Installation – maximum yield

The Sunny Tower: As easy to install as a central inverter, as profitable as a Sunny Mini Central. Its exceptional efficiency of up to 98 % and easy installation ensure maximum power yield. The intelligent OptiCool temperature management system makes the Sunny Tower suitable for use at high ambient temperatures. In addition to this, the modular design makes it possible to combine Sunny Mini Central and Sunny Boy inverters, thus guaranteeing maximum flexibility in plant design and extension.

Technical data	Sunny Tower with 6 Sunny Mini Central 8000TL	Sunny Tower with 6 Sunny Mini Central 11000TL
Input (DC)		
Max. DC power	49.6 kW	68.4 kW
PV voltage range	333 V – 500 V	333 V – 500 V
Max. DC voltage	700 V	700 V
Max. input current	6 x 25 A	6 x 34 A
DC voltage ripple	< 10 %	< 10 %
Max. number of strings (parallel)	6 x 4	6 x 5
Reverse polarity protection	short-circuit diode	short-circuit diode
Output (AC)		
Continuous AC power	48 kW at 40 °C	66 kW at 40 °C
Nominal AC power	48 kW	66 kW
Max. output current	3 x 70 A	3 x 96 A
THD of grid current	< 4 %	< 4 %
Nominal AC voltage	220 V – 240 V	220 V – 240 V
Nominal AC frequency	50 Hz / 60 Hz	50 Hz / 60 Hz
Power factor (cos φ)	1	1
Grid connection	bolt clamp, max. 5 x 95 mm²	bolt clamp, max. 5 x 95 mm²
Efficiency		
Max. efficiency / Euro-Eta	98.0 % / 97.7 %	98.0 % / 97.5 %
Protection devices		
Thermally monitored varistors	●	●
Ground fault monitoring	●	●
ESS DC load disconnection switch	●	●
Grid monitoring (SMA Grid Guard)	●	●
Short-circuit tolerance (current control)	●	●
Line circuit breaker	6 x B50	6 x B63
General data		
Inverter/Sunny Tower protection rating (acc. to IEC 60529)	IP65 / IP44	IP65 / IP44
Cooling concept	OptiCool	OptiCool
Operating temperature range	-25 °C ... +60 °C	-25 °C ... +60 °C
Topology	transformerless	Transformerless
Number phase conductors	3	3
Weight	320 kg	320 kg
Dimensions (W / H / D) in mm	1100 / 1810 / 990	1100 / 1810 / 990
Features		
Warranty: 5 years/10 years	●/○	●/○
Plant monitoring (pre-wired): RS485 / Sunny WebBox / SMA Power Balancer	○/○/○	○/○/○
● Standard features ❍ Optional features		
Data at nominal conditions		
Type designation	ST6	ST6



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 PV plant operators are really aware that in the event of a power outage, the PV plant 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 internal power supply. And this is all the more irritating because, as the experts agree, throughout Europe, lengthy blackouts and temporary outages are set to increase.

The SMA Sunny Backup-System closes this supply gap. Now all owners of a personal PV plant can continue to obtain reliable and environmentally-friendly power for important loads even in the event of a grid failure.

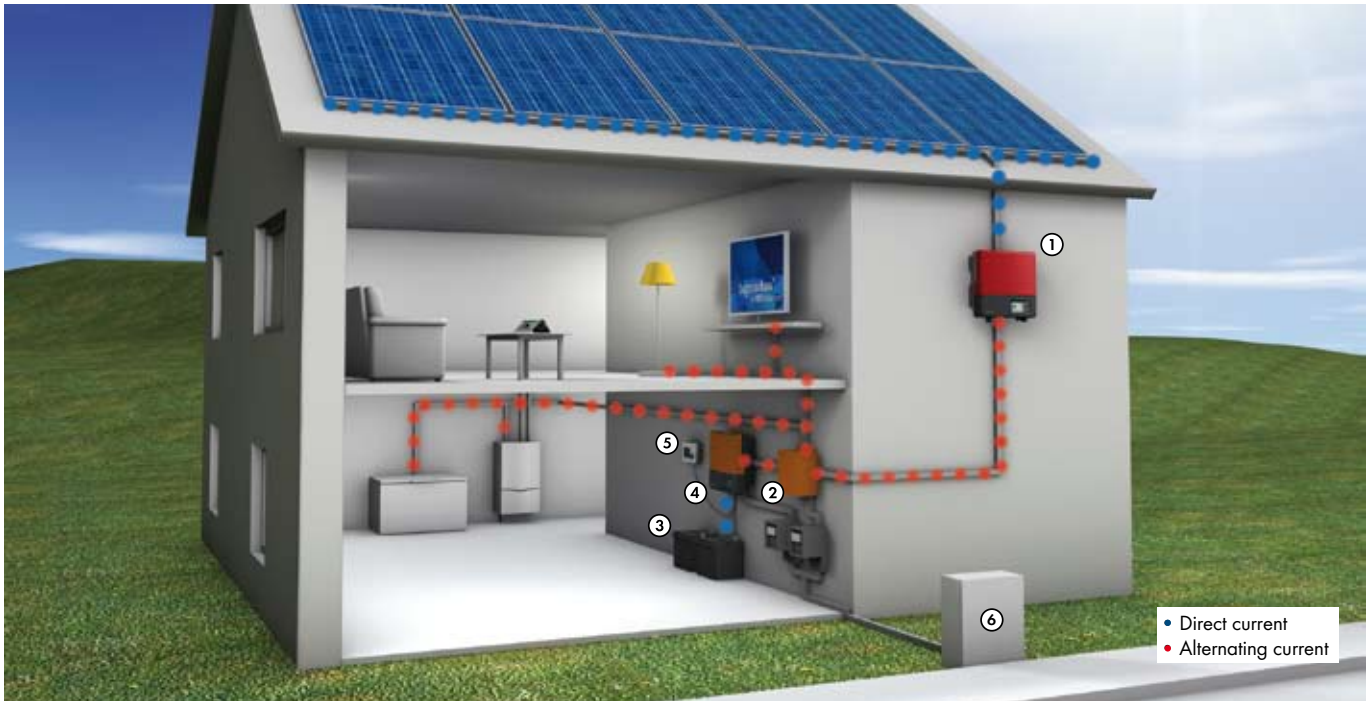
Stand-alone power supply

The Sunny Backup System is the result of nearly 30 years' experience in photovoltaic system technology – both for grid-connected PV plants and for stand-alone systems. The Sunny Backup-System is a synthesis between grid-connected operation and off-grid technology that ensures optimum user safety as well as ease of installation. The system is equipped with a Sunny Backup Inverter and is also available as a fully pre-configured set solution for all performance categories up to 100 kW.

The optimum electricity insurance

Power outages can have very serious economic consequences, especially for businesses – unless the PV plant has been equipped with a Sunny Backup-System. With a Sunny Backup System, barn ventilation and heating lamps will continue to function in agricultural enterprises. Cold-storage units, hotels, supermarkets and restaurants can remain in operation with no loss of image or expensive disruptions to the cooling chain. And heating, cookers, computers and lights will continue to function with no interruption in family homes, while maintaining the same supply quality as during normal operation.

Furthermore: all PV plants with Sunny Boy inverters can be easily upgraded.



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

Simple

- Can be integrated into existing and new PV plants
- Pre-configured sets for various performance classes

Flexible

- Single and three-phase systems are possible
- Modularly extendable
- Capacities from 5 kW to 100 kW available

Efficient

- Small battery through integration into the PV plant
- Power supply and battery charging over the grid
- Continuously high PV efficiency

Reliable

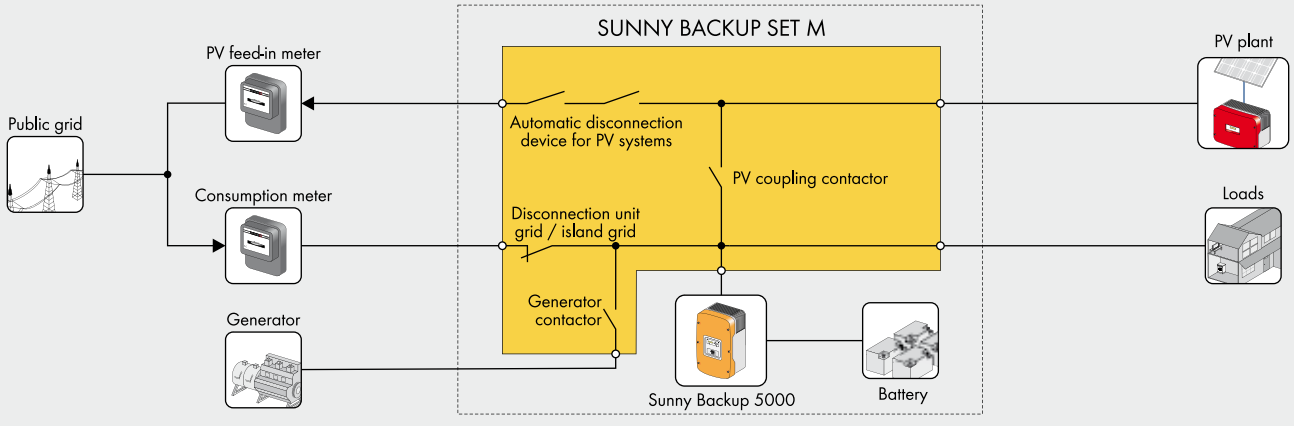
- Automatic switching to backup in only approx. 20 milliseconds
- Automatic disconnection per DIN VDE 0126-1-1 and AS 4777

SUNNY BACKUP Set M / L / XL

Solar power – even in the event of grid failure

Greatest performance and user benefits along with the lowest investment and operating costs: in comparison with conventional emergency power systems, the Sunny Backup System scores well. As an ad-on to the PV plant the Sunny Backup automatically switches to stand-alone power supply within approximately 20 milliseconds of a grid failure. Both new and existing PV plants can be equipped with a Sunny Backup System – with no effect on PV efficiency. And the best part: due to the integration of the PV plant, 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 (duration / 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 (187 – 253 V)	230 V (187 – 253 V)	230 V (187 – 253 V)
Frequency (range)	50 Hz (45 to 55 Hz)	50 Hz (45 to 55 Hz)	50 Hz (45 to 55 Hz)
Permissible grid structure	TN / TT	TN / TT	TN / TT
Typical interruption time in the event of power outage	20 ms	20 ms	20 ms
Input PV plant			
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 / internal 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
Protection devices			
DC reverse polarity protection / total discharge protection	●/●	●/●	●/●
AC short-circuit / AC overload	●/●	●/●	●/●
Grid monitoring (SMA Grid Guard) / galvanic isolation	●/●	●/●	●/●
General data			
Dimensions SBU (W / H / D) in mm	467 / 612 / 235	467 / 612 / 235	467 / 612 / 235
Dimensions AS-Box (W / H / D) in mm	600 / 600 / 210	600 / 760 / 210	1000 / 1600 / 300
Dimensions battery per block (W / H / D) 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 in the event of 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-Solar.com	www.SMA-Solar.com	www.SMA-Solar.com
Accessories			
Battery cables / DC distributor / 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 features ○ Optional – Not available			
Last updated: March 2009			
Type designation	SBU-Set-M	SBU-Set-L	SBU-Set-XL



Simple

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

Efficient

- Energy supply and battery charging over the grid
- Same high PV efficiency

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

Reliable

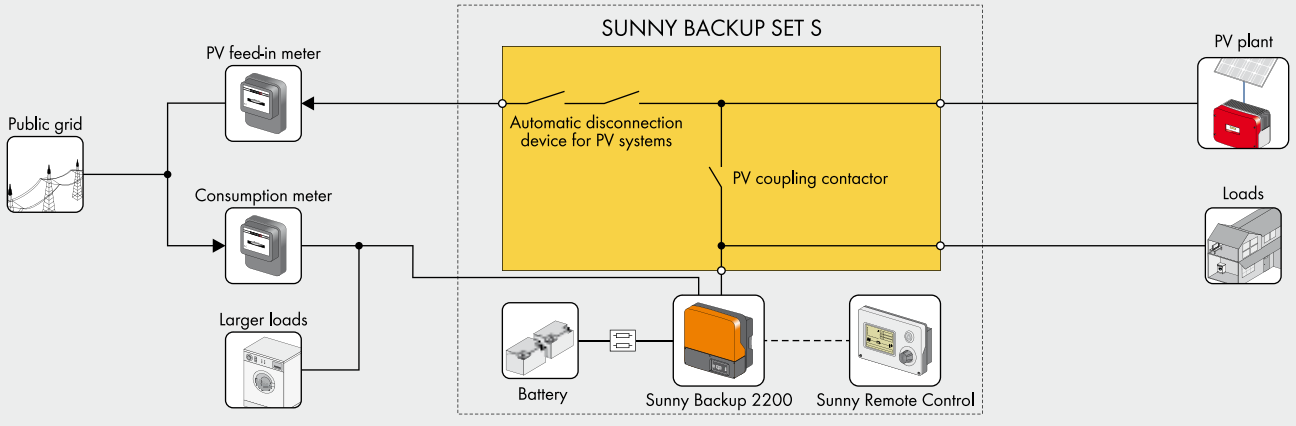
- Automatic switching to backup supply in approx. 50 milliseconds
- Automatic disconnection per DIN VDE 0126-1-1 and AS 4777

SUNNY BACKUP Set S

Reliable back-up electricity supply for family homes

Innovative power backup for private homes: as an add-on to a PV plant, the Sunny Backup Set S switches automatically to off-grid mode within 50 milliseconds in the event of grid failure. Whether in summer or winter: owners of small to mid-sized SMA PV plants and inverters can supply their most important consumer loads themselves in case of a blackout. Our affordable complete solution is suitable for both new solar electricity systems as well as existing PV systems, which can be easily retrofitted with our certified Sunny Backup Set S.

Technical data	SUNNY BACKUP Set S	
Output (loads)		
Nominal power / current during grid operation	5.7 kW / 25 A	
Backup power (duration / 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 plant		
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 / internal consumption		
Max. efficiency backup operation	93.6 %	
Internal consumption day / night (Silent Mode)	40 W / 6 W	
Protection devices		
DC reverse polarity protection / total discharge protection	–/●	
AC short-circuit / AC overload	●/●	
Grid monitoring (SMA Grid Guard) / galvanic isolation	●/●	
General data		
Dimensions SBU (W / H / D) in mm	470 / 445 / 180	
Dimensions AS-Box (W / H / D) in mm	200 / 300 / 120	
Dimensions battery per block (W / H / D) 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 in the event of faults / test operation	●/●	
State of charge calculation / generator input	●/–	
Warranty SBU 2200 (5 years / 10 years)	●/o	
Battery warranty (2 years), AS-Box warranty (5 years)	●	
Certificates and permits	www.SMA-Solar.com	
Accessories		
Battery cables / DC distributor / communication cables	4 m / – / 5 m	
Battery fuses "BATFUSE"	●	
Interfaces (RS485 / Multicluster PB)	o/–	
Additional battery parallel / other battery	o/o	
External user interface "SRC-1"	●	
* SB 2500, SB 2800, SB 3000, models from May 2005 and later		
● Standard features o Optional – Not available		
Last updated: March 2009		
Type designation	SBU-Set-S.1	



CENTRAL INVERTERS


EMERGENCY
STOP

Central Inverters from SMA: High Technology for solar power stations

Larger, more powerful, more efficient. The success of photovoltaics has led to constantly growing plant sizes in recent years. With the Sunny Central product line, SMA offers central inverters intended specifically for high performance class installations. Thanks to their special properties such as highest efficiency, string monitoring, direct medium-voltage feed-in, grid management and the possibility of outdoor installation, the devices are optimally suited for use in solar power stations with homogenous structures.

An investment that pays off

From 100 kW Sunny Centrals up to series-produced megawatt stations – the Sunny Central inverters from SMA are particularly economical. Whether the Sunny Central HE series or the new devices of the CP series for outdoor use: SMA devices with efficiencies of over 98 percent are the most efficient in their segment. Furthermore, the HE and CP series offer comprehensive grid management functions (more on page 198).

Central inverters with their own weatherproof enclosures allow for installation outdoors – greatly simplifying transport and installation as a result.

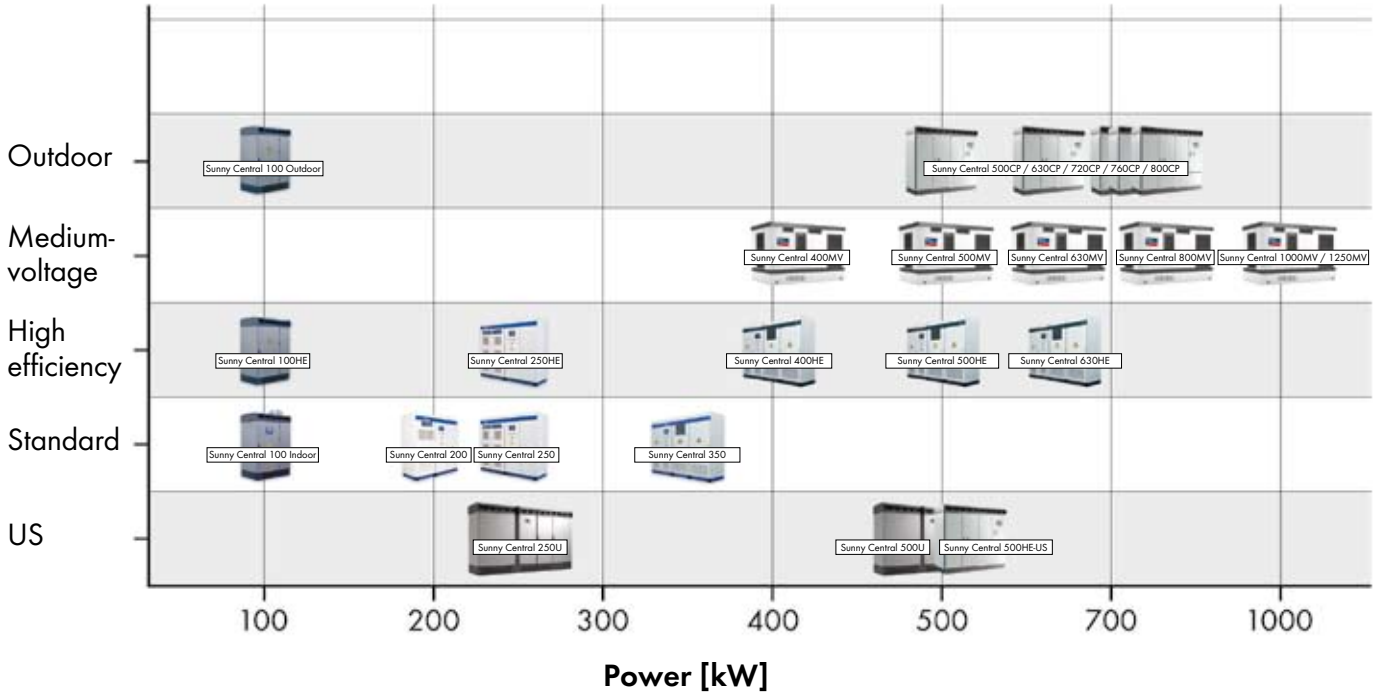
Guarantee of reliability and durability

SMA central inverters have been developed for a minimum lifespan of 20 years. This is because maximum investment security is only ensured when inverters operate reliably and flawlessly over a long period of time. The SMA plant monitoring assures additional safety: thanks to numerous communications interfaces, operators can monitor their plant from any PC around the world via the Internet. Yield variations can therefore be recognized and resolved in good time.

» **Comprehensive Service Worldwide**

SMA not only has many years of experience in the implementation of large solar power plants, but it also offers the appropriate service to match for every application. For the highest availability and secure investment.

Read more about the Sunny Central Service on page 182



Economic

- Direct deployment in the field due to outdoor enclosure
- Simplified shipping without concrete substation

Efficient

- Full nominal power at ambient temperatures up to 50 °C
- 10 % additional power for constant operation at ambient temperatures up to 25 °C

Flexible

- Powerful grid management functions (including LVRT)
- DC voltage range configurable

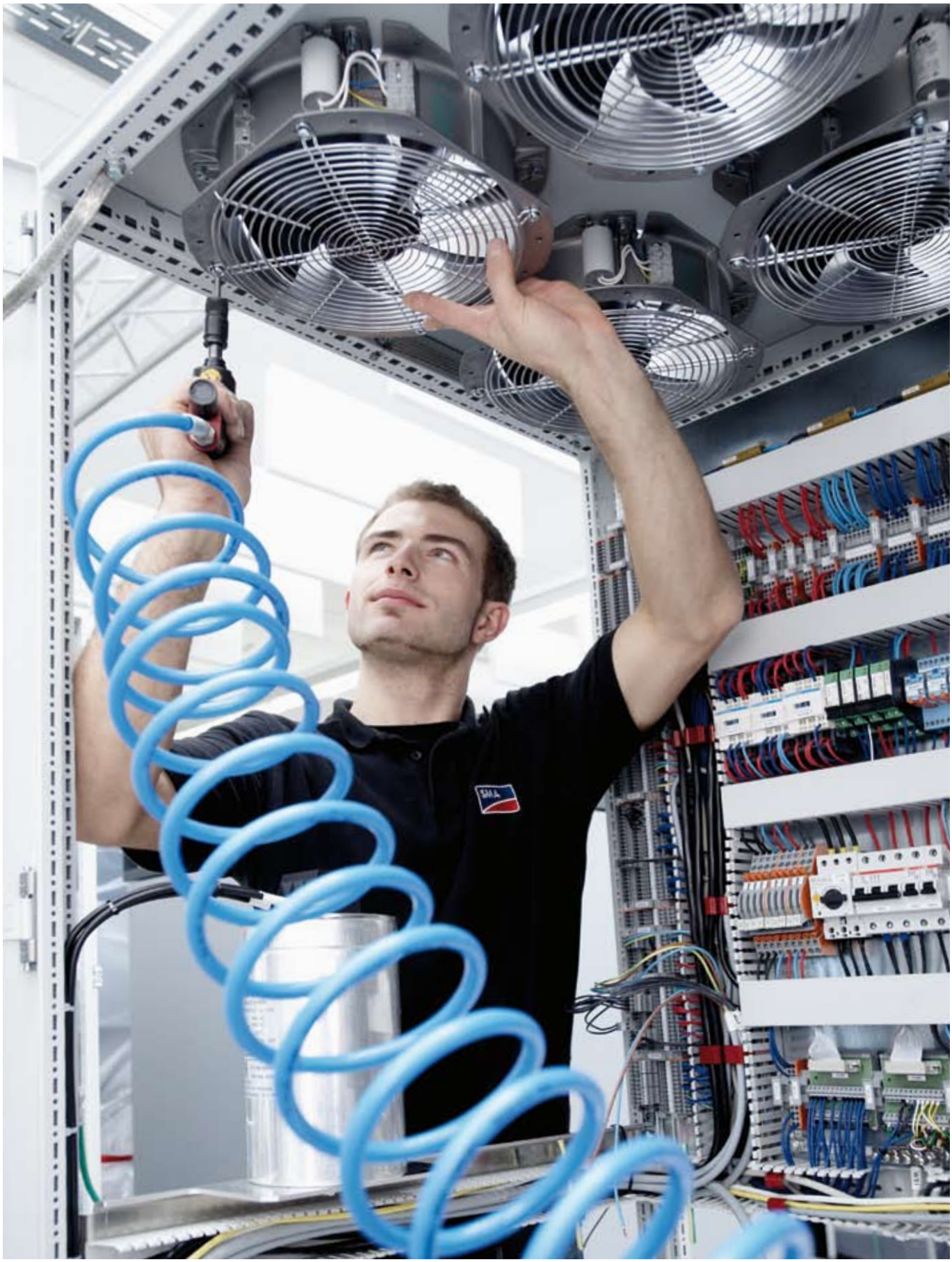
Reliable

- Easy and safe installation due to a separate connection area
- Optional: extended input voltage range up to 1,100 V

SUNNY CENTRAL 500CP / 630CP / 720CP / 760CP / 800CP

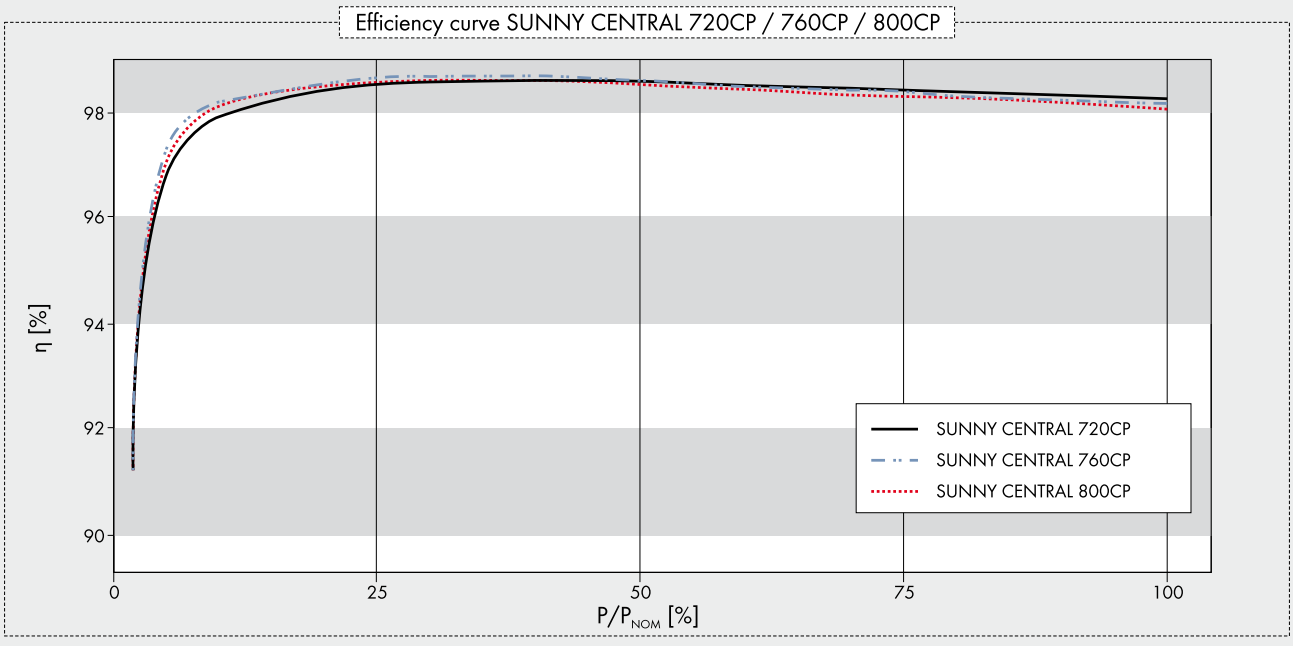
High performance as standard

The completely new design of the Sunny Central CP series saves you real money. The compact and weatherproof enclosure is easy to load and transport and can be installed almost anywhere – there is no need for heavy protective concrete substations any longer. The innovative cooling concept OptiCool allows it to operate at full nominal power with ambient temperatures up to 50 °C. With the powerful grid management functions you are perfectly prepared for today's utility requirements as well as those still to come. The intelligent power management is the most important feature: in continuous operation, the Sunny Central 800CP can feed 880 kVA to the grid at ambient temperatures of up to 25 °C – that's 10 % more than the rated nominal power.



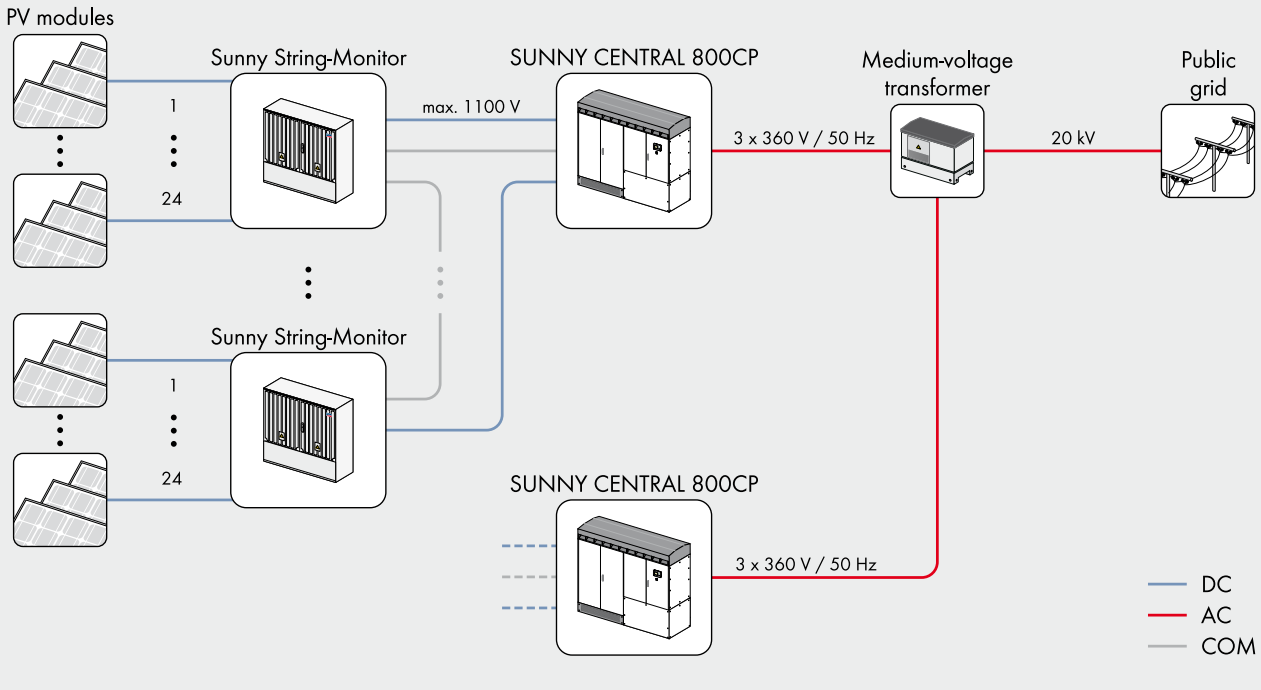
SUNNY CENTRAL 720CP / 760CP / 800CP

Technical data	Sunny Central 720CP	Sunny Central 760CP	Sunny Central 800CP
Input Data			
MPP voltage range	515 V – 820 V [3] [5]	545 V – 820 V [3] [5]	570 V – 820 V [3] [5]
Max. DC voltage		1000 V / 1100 V [1] Optional	
Max. DC current	1400 A	1400 A	1400 A
Number of DC inputs		9 fused inputs	
Output Values			
Nominal AC output @ 50 °C	720 kVA	760 kVA	800 kVA
Continuous AC power @ 25 °C	792 kVA	836 kVA	880 kVA
Max. AC current	1411 A	1411 A	1411 A
Nominal AC-current	1283 A	1283 A	1283 A
Nominal AC-voltage ±10 %	324 V	342 V	360 V
AC grid frequency 50 Hz	●	●	●
AC grid frequency 60 Hz	●	●	●
Power factor (cos φ)		0.9 leading ... 0.9 lagging	
Max. THD	< 3 %	< 3 %	< 3 %
Power consumption			
Internal consumption in operation	< 1500 W [4]	< 1500 W [4]	< 1500 W [4]
Standby consumption	< 100 W	< 100 W	< 100 W
External auxiliary voltage	3 x 230 V, 50 / 60 Hz	3 x 230 V, 50 / 60 Hz	3 x 230 V, 50 / 60 Hz
Dimensions and Weight			
Dimensions (W / H / D) in mm	2562 / 2279 / 956	2562 / 2279 / 956	2562 / 2279 / 956
Weight	1800 kg	1800 kg	1800 kg
Efficiency [2]			
Max. efficiency	98.6 %	98.6 %	98.6 %
Euro ETA	98.4 %	98.4 %	98.4 %
CEC-eta	98.4 %	98.4 %	98.4 %
Protection Rating and Ambient Conditions			
Protection rating (as per EN 60529)	IP54	IP54	IP54
Protection rating (as per IEC 60721-3-3) Ambient conditions: fixed location, with protection against wind and weather	• Classification of chemically active substances: 3C2 • Classification of mechanically active substances: 3S2		
Operation temperature range	–20 °C ... +50 °C	–20 °C ... +50 °C	–20 °C ... +50 °C
Rel. humidity	15 % ... 95 %	15 % ... 95 %	15 % ... 95 %
Fresh air consumption	3000 m³/h	3000 m³/h	3000 m³/h
Max. altitude above sea level	2000 m	2000 m	2000 m



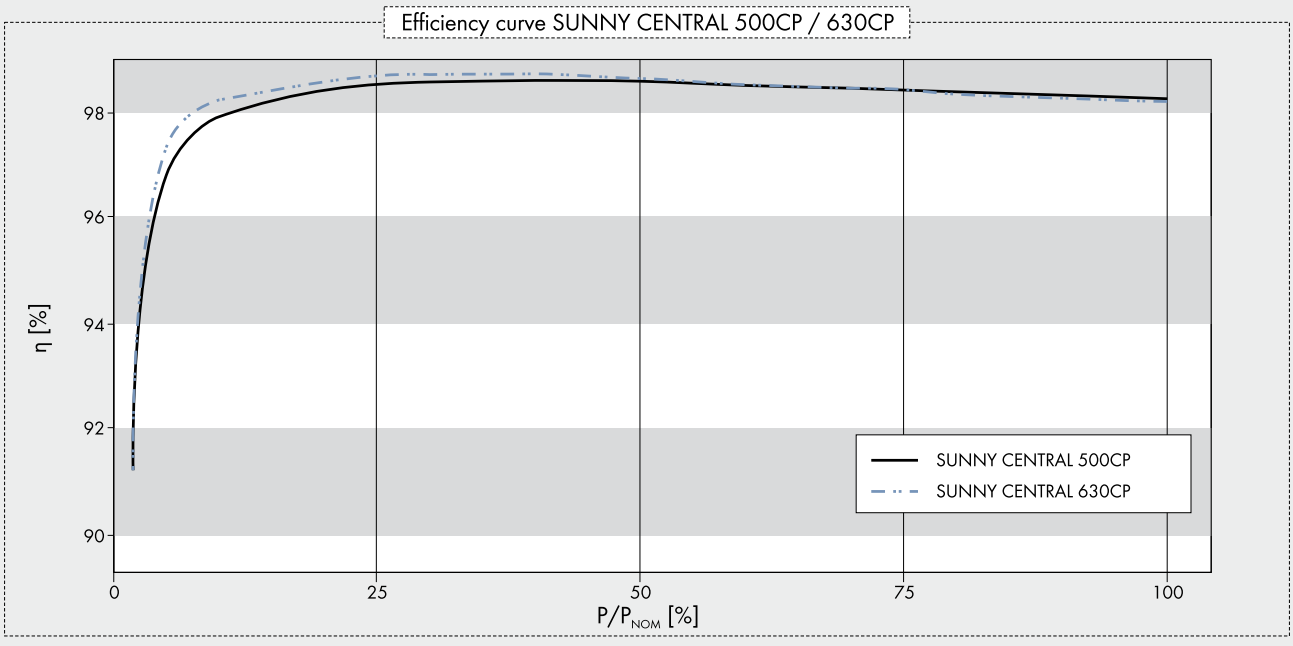
	Sunny Central 720CP	Sunny Central 760CP	Sunny Central 800CP
Features			
Sunny WebBox	●	●	●
Communication	Ethernet (optical fiber optional)	Ethernet (optical fiber optional)	Ethernet (optical fiber optional)
Communication with Sunny String-Monitor	RS485	RS485	RS485
LCD graphic display	●	●	●
Enclosure color	RAL 9016	RAL 9016	RAL 9016
Color of base	RAL 7005	RAL 7005	RAL 7005
Color of roof	RAL 7004	RAL 7004	RAL 7004
Ground fault monitoring / insulation monitoring	●	●	●
Circuit breaker AC side	●	●	●
Motor driven load disconnection switch on DC side	●	●	●
AC overvoltage protector	●	●	●
DC overvoltage protector	●	●	●
Overvoltage protectors for auxiliary supply	●	●	●
Certificates / Listings			
EMC	EN 61000-6-2 EN 61000-6-4		
CE conformity	●	●	●
BDEW-MSRL / FGW / TR8 [6]	●	●	●
RD 1633 / 2000	●	●	●
Report dated 23 / 04 / 08	●	●	●
● Standard features ❍ Optional features – Not available			
Type name	SC 720CP-10	SC 760CP-10	SC 800CP-10

1) Startup at DC voltage < 1000 V
2) Efficiency measured without internal power supply
3) Further AC voltages, DC voltages and power classes can be configured
4) Internal consumption at nominal power
5) At 1.05 $U_{AC,nom}$ and cos φ= 1
6) With complete dynamic grid support



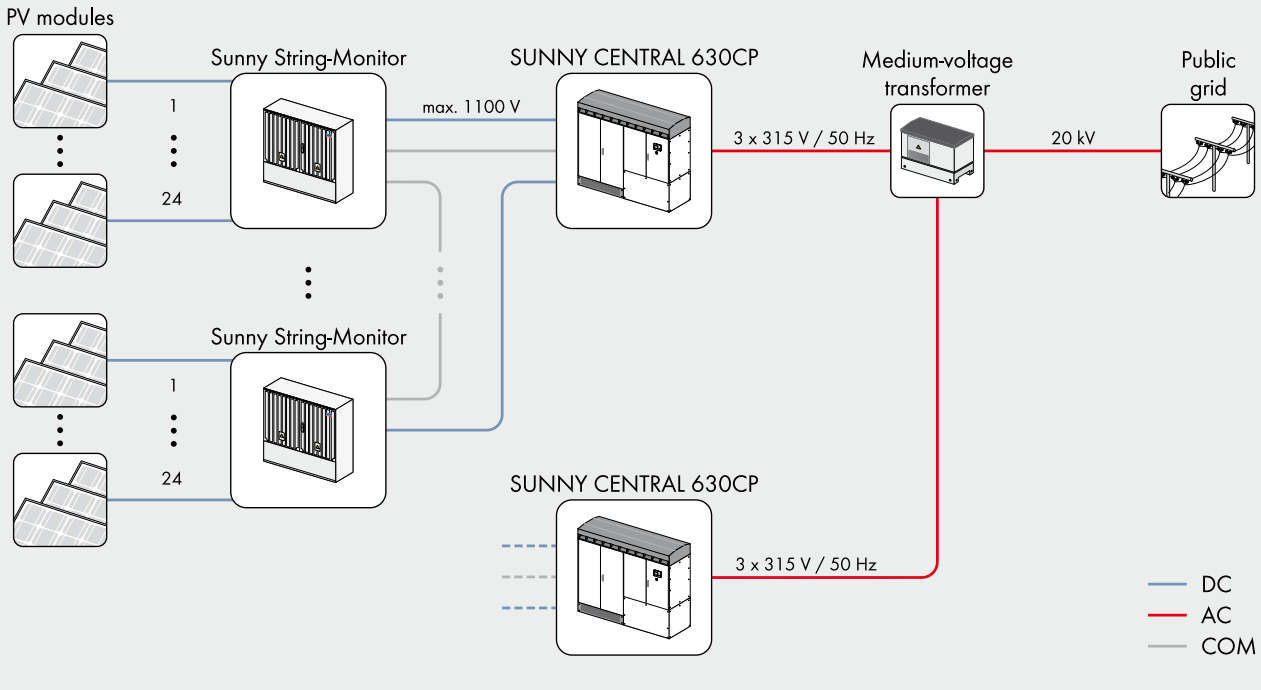
SUNNY CENTRAL 500CP / 630CP

Technical data	Sunny Central 500CP	Sunny Central 630CP
Input Data		
MPP voltage range	430 V – 820 V [5]	500 V – 820 V [5]
Max. DC voltage	1000 V / 1100 V [1] Optional	
Max. DC current	1250 A	1350 A
Number of DC inputs	9 fused inputs	
Output Values		
Nominal AC output @ 50 °C	500 kVA	630 kVA
Continuous AC power @ 25 °C	550 kVA	700 kVA
Max. AC current	1167 A	1271 A
Nominal AC-current	1069 A	1155 A
Nominal AC-voltage ±10 %	270 V	315 V
AC grid frequency 50 Hz	●	●
AC grid frequency 60 Hz	●	●
Power factor (cos φ)	0.9 leading ... 0.9 lagging	
Max. THD	< 3 %	< 3 %
Power consumption		
Internal consumption in operation	< 1500 W [4]	< 1500 W [4]
Standby consumption	< 100 W	< 100 W
External auxiliary voltage	3 x 230 V, 50 / 60 Hz	3 x 230 V, 50 / 60 Hz
Dimensions and Weight		
Dimensions (W / H / D) in mm	2562 / 2279 / 956	2562 / 2279 / 956
Weight	1800 kg	1800 kg
Efficiency [2]		
Max. efficiency	98.6 %	98.7 %
Euro ETA	98.4 %	98.5 %
CEC-eta	98.5 %	98.5 %
Protection Rating and Ambient Conditions		
Protection rating (as per EN 60529)	IP54	IP54
Protection rating (as per IEC 60721-3-3) Ambient conditions: fixed location, with protection against wind and weather	• Classification of chemically active substances: 3C2 • Classification of mechanically active substances: 3S2	
Operation temperature range	–20 °C ... +50 °C	–20 °C ... +50 °C
Rel. humidity	15 % ... 95 %	15 % ... 95 %
Fresh air consumption	3000 m³/h	3000 m³/h
Max. altitude above sea level	2000 m	2000 m



	Sunny Central 500CP	Sunny Central 630CP
Features		
Sunny WebBox	●	●
Communication	Ethernet (optical fiber optional)	Ethernet (optical fiber optional)
Communication with Sunny String-Monitor	RS485	RS485
LCD graphic display	●	●
Enclosure color	RAL 9016	RAL 9016
Color of base	RAL 7005	RAL 7005
Color of roof	RAL 7004	RAL 7004
Ground fault monitoring / insulation monitoring	●	●
Circuit breaker AC side	●	●
Motor driven load disconnection switch on DC side	●	●
AC overvoltage protector	●	●
DC overvoltage protector	●	●
Overvoltage protectors for auxiliary supply	●	●
Certificates / Listings		
EMC	EN 61000-6-2 EN 61000-6-4	
CE conformity	●	●
BDEW-MSRL / FGW / TR8 [6]	●	●
RD 1633 / 2000	●	●
Report dated 23 / 04 / 08	●	●
● Standard features ❍ Optional features – Not available		
Type name	SC 500CP-10	SC 630CP-10

1) Startup at DC voltage < 1000 V
2) Efficiency measured without internal power supply
3) Further AC voltages, DC voltages and power classes can be configured
4) Internal consumption at nominal power
5) At 1.05 $U_{AC,nom}$ and cos φ= 1
6) With complete dynamic grid support



Efficient

- Without low-voltage transformers: greater plant efficiency due to direct connection to the medium-voltage grid

Turnkey Delivery

- With medium-voltage transformer and concrete substation for outdoor installation

Optional

- Medium-voltage switchgear systems for a flexible structure of large solar parks
- AC transfer station with measurement
- Medium-voltage transformers for other grid voltages (deviating from 20 kV)

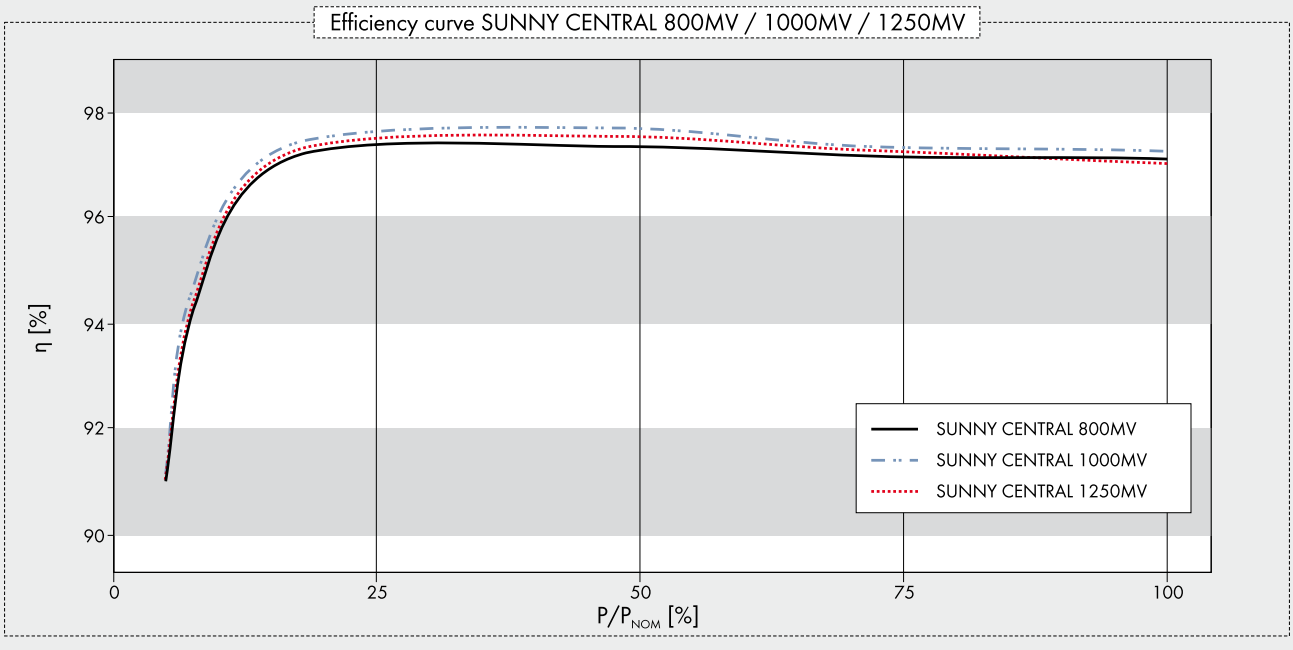
SUNNY CENTRAL for Direct medium-voltage feed-in 800MV / 1000MV / 1250MV

High-performance medium-voltage station

For even more power: Two powerful Sunny Central HE inverters are components of a medium-voltage station (MV) which feeds directly into a shared medium-voltage transformer. In this way, for example, two Sunny Central 630HE inverters are combined into a powerful Sunny Central 1250MV station. The advantage: By removing the need for low-voltage transformers, the efficiency is increased and at the same time the inverter costs are lower. The Sunny Central MV also offers the best possible forecast for the future: It is the first central inverter to fulfil the requirements of the medium voltage directive. An investment that also pays off in the future.

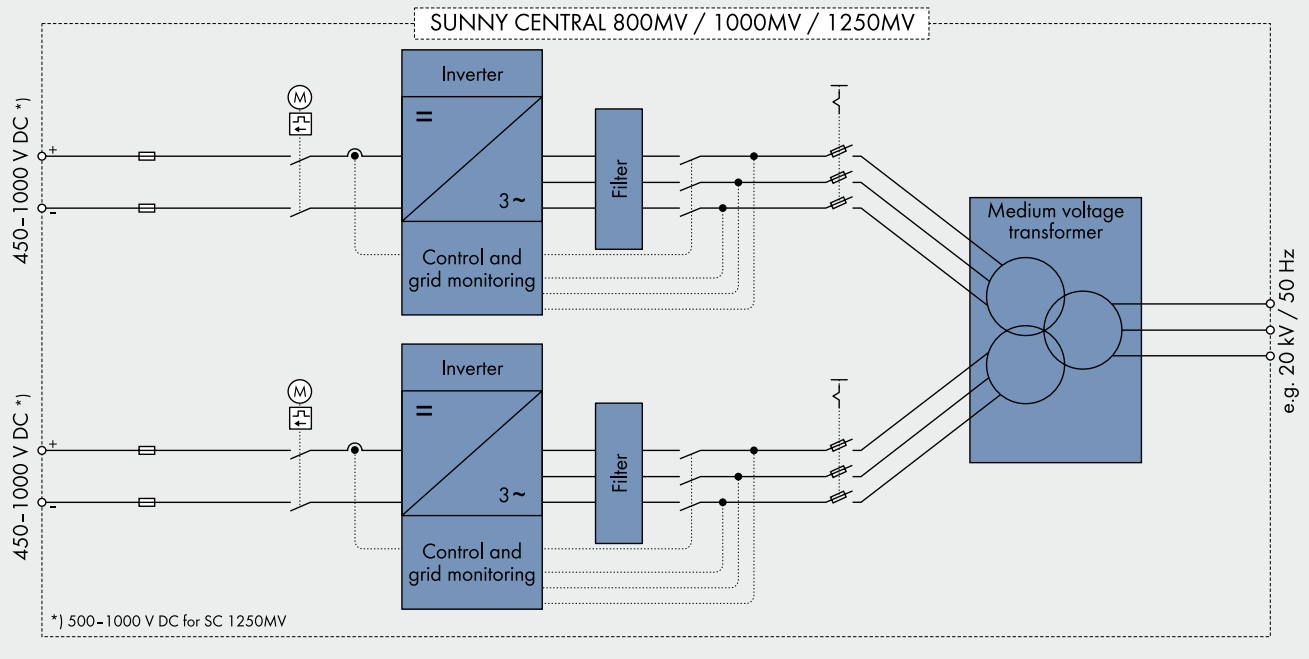
SUNNY CENTRAL 800MV / 1000MV / 1250MV

Technical data	Sunny Central 800MV	Sunny Central 1000MV	Sunny Central 1250MV
Input data			
Nominal DC power	816 kW	1018 kW	1284 kW
Max. DC power	900 kWp	1120 kWp	1410 kWp
MPP voltage range	450 V – 820 V [4]	450 V – 820 V [4]	500 V – 820 V [4]
Max. DC voltage	1000 V	1000 V	1000 V
Max. DC current	1986 A	2484 A	2844 A
Number of DC inputs	(16 + 16) + 4 DCHV	(16 + 16) + 4 DCHV	(16 + 16) + 4 DCHV
Output data			
Nominal AC power @ 45 °C	800 kVA	1000 kVA	1250 kVA
Continuous AC power @ 25 °C	880 kVA	1100 kVA	1400 kVA
Nominal AC voltage	20000 V	20000 V	20000 V
Nominal AC current	23.2 A	28.8 A	36.1 A
AC grid frequency 50 Hz	●	●	●
AC grid frequency 60 Hz	●	●	●
Power factor (cos φ)		0.9 leading ... 0.9 lagging	
Max. THD	< 3 %	< 3 %	< 3 %
Power consumption			
Internal consumption in operation	< 3000 W [3]	< 3000 W [3]	< 3000 W [3]
Standby consumption	< 180 W + 1100 W	< 180 W + 1100 W	< 180 W + 1350 W
External auxiliary supply voltage	3 x 230 V, 50/60 Hz	3 x 230 V, 50/60 Hz	3 x 230 V, 50/60 Hz
External back-up fuse for auxiliary supply	B 20 A, 3-pole	B 20 A, 3-pole	B 20 A, 3-pole
Dimensions and weight			
Height	3620 mm	3620 mm	3620 mm
Width	5400 mm	5400 mm	5400 mm
Depth	3000 mm	3000 mm	3000 mm
Weight	35000 kg	35000 kg	35000 kg
Efficiency [1]			
Max. efficiency	97.7 %	97.9 %	97.8 %
Euro-eta	97.3 %	97.5 %	97.4 %
Protection rating and ambient conditions			
Protection rating (as per EN 60529)	IP54	IP54	IP54
Operating temperature range	–20 °C ... +45 °C	–20 °C ... +45 °C	–20 °C ... +45 °C
Rel. humidity	15 % ... 95 %	15 % ... 95 %	15 % ... 95 %
Fresh air consumption	12400 m³/h	12400 m³/h	12400 m³/h
Max. altitude (above sea level)	1000 m	1000 m	1000 m



	Sunny Central 800MV	Sunny Central 1000MV	Sunny Central 1250MV
Features			
Display: text line / graphic	●/–	●/–	●/–
Ground fault monitoring	●	●	●
Heating	●	●	●
Emergency stop	●	●	●
Circuit breaker AC side	SI load disconnection switch	SI load disconnection switch	SI load disconnection switch
Circuit breaker DC side	Switch-disconnector with motor	Switch-disconnector with motor	Switch-disconnector with motor
Monitored overvoltage protectors AC / DC	● / ●	● / ●	● / ●
Monitored overvoltage protectors for auxiliary supply	●	●	●
SCC (Sunny Central Control) interfaces			
Communication (NET Piggy-Back, optional)	analog, ISDN, Ethernet	analog, ISDN, Ethernet	analog, ISDN, Ethernet
Analog inputs	10 x A_{in} 2)	10 x A_{in} 2)	10 x A_{in} 2)
Overvoltage protection for analog inputs	o	o	o
Sunny String-Monitor connection (COM1)	RS485	RS485	RS485
PC connection (COM3)	RS232	RS232	RS232
Electrically separated relay (ext. alert signal)	2	2	2
Certificates / listings			
EMC	EN 61000-6-2 EN 61000-6-4		
CE conformity	●	●	●
BDEW-MSRL / FGW/TR8 5)	●	●	●
RD 1633/2000	●	●	●
Arrêté 23/04/08	●	●	●
● standard features o optional features – not available			
Type designation	SC 800MV-11	SC 1000MV-11	SC 1250MV-11

HE: High Efficiency, inverter without galvanic isolation for connection to a medium-voltage transformer (taking into account the SMA specification for the transformer)
1) Efficiency measured without an internal power supply at U_{DC} = 500 V
2) 2x inputs for the external nominal value specification for active power and reactive power, 1x external alarm input, 1x irradiation sensor, 1x pyranometer
3) Internal consumption at nominal power
4) At 1.05 $U_{AC, nom}$ and cos φ = 1
5) With limited dynamic grid support
Please note: in certain countries the substations may differ from the substations shown in the images



Efficient

- Without low-voltage transformers: greater plant efficiency due to direct connection to the medium-voltage grid

Turnkey Delivery

- Complete with medium-voltage transformer and concrete substation for outdoor installation

Optional

- Medium-voltage switchgear systems for a flexible structure of large solar parks
- AC transfer station with measurement
- Medium-voltage transformers for other grid voltages (deviating from 20 kV)

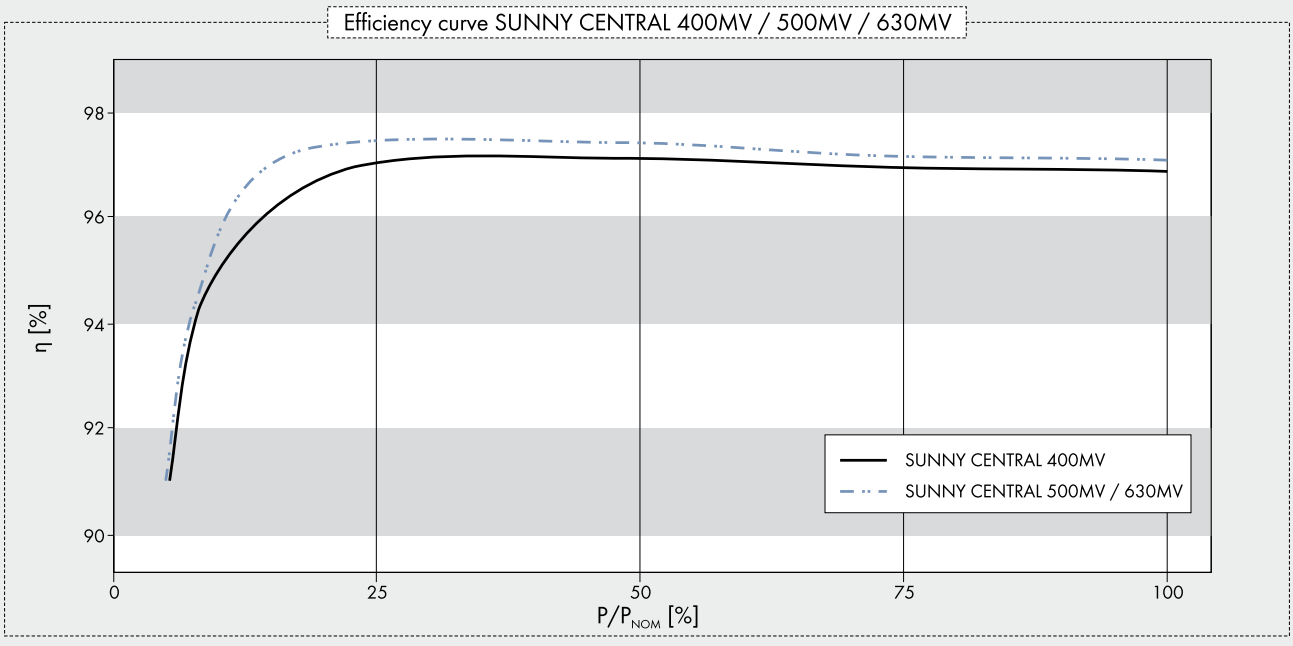
SUNNY CENTRAL for direct medium-voltage feed-in 400MV / 500MV / 630MV

The compact station for safe grid management

The station has got it: Equipped with an SMA central inverter of the new HE family and a medium-voltage transformer, the Sunny Central MV feeds directly into the medium-voltage grid. The advantage: By removing the need for the low-voltage transformer, the plant operator realizes greater yields and at the same time lower inverter costs. The Sunny Central MV is delivered as a "turnkey" concrete substation for outside installation. On top of that, the Sunny Central MV actively participates in grid management, and thereby fulfils all requirements of the Medium-Voltage Directive valid as of July 2010.

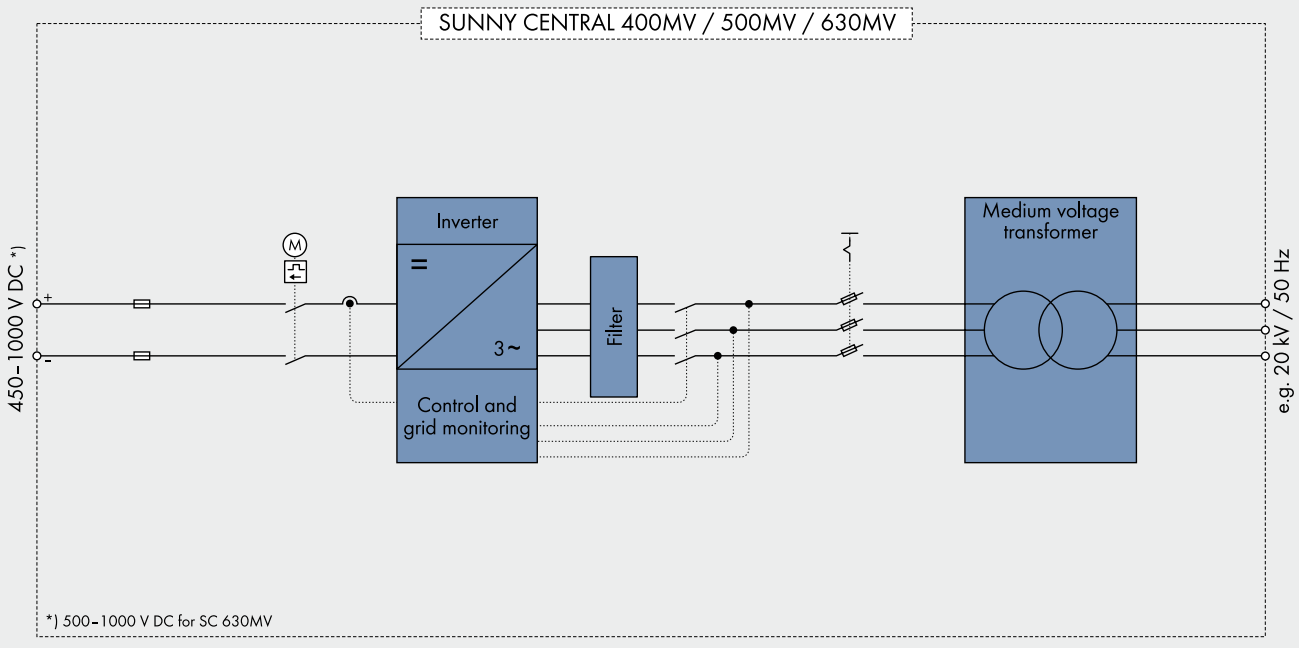
SUNNY CENTRAL 400MV / 500MV / 630MV

Technical data	Sunny Central 400MV	Sunny Central 500MV	Sunny Central 630MV
Input data			
Nominal DC power	408 kW	509 kW	642 kW
Max. DC power	450 kWp [1]	560 kWp [1]	705 kWp [1]
MPP voltage range	450 V – 820 V [5]	450 V – 820 V [5]	500 V – 820 V [5]
Max. DC voltage	1000 V	1000 V	1000 V
Max. DC current	993 A	1242 A	1422 A
Number of DC inputs	(8 + 8) + 2 DCHV	(8 + 8) + 2 DCHV	(8 + 8) + 2 DCHV
Output data			
Nominal AC power @ 45 °C	400 kVA	500 kVA	630 kVA
Continuous AC power @ 25 °C	440 kVA	550 kVA	700 kVA
Nominal AC voltage	20000 V	20000 V	20000 V
Nominal AC current	11.55 A	14.4 A	18.18 A
AC grid frequency 50 Hz	●	●	●
AC grid frequency 60 Hz	●	●	●
Power factor (cos φ)		0.9 leading ... 0.9 lagging	
Max. THD	< 3 %	< 3 %	< 3 %
Power consumption			
Internal consumption in operation	< 1500 W [4]	< 1500 W [4]	< 1500 W [4]
Standby consumption	< 100 W + 720W	< 100 W + 720 W	< 100 W + 860 W
External auxiliary supply voltage	3 x 230 V, 50/60 Hz	3 x 230 V, 50/60 Hz	3 x 230 V, 50/60 Hz
External back-up fuse for auxiliary supply	B 20 A, 3-pole	B 20 A, 3-pole	B 20 A, 3-pole
Dimensions and weight			
Height	3600 mm	3600 mm	3600 mm
Width	5300 mm	5300 mm	5300 mm
Depth	2500 mm	2500 mm	2500 mm
Weight	30000 kg	30000 kg	30000 kg
Efficiency [2]			
Max. efficiency	97.5 %	97.7 %	97.8 %
Euro-eta	97.1 %	97.3 %	97.4 %
Protection rating and ambient conditions			
Protection rating (as per EN 60529)	IP54	IP54	IP54
Operating temperature range	–20 °C ... +45 °C	–20 °C ... +45 °C	–20 °C ... +45 °C
Rel. humidity	15 % ... 95 %	15 % ... 95 %	15 % ... 95 %
Fresh air consumption	6200 m³/h	6200 m³/h	6200 m³/h
Max. altitude (above sea level)	1000 m	1000 m	1000 m



	Sunny Central 400MV	Sunny Central 500MV	Sunny Central 630MV
Features			
Display: text line / graphic	●/–	●/–	●/–
Ground fault monitoring	●	●	●
Heating	●	●	●
Emergency stop	●	●	●
Circuit breaker AC side	SI load disconnection switch	SI load disconnection switch	SI load disconnection switch
Circuit breaker DC side	Switch-disconnector with motor	Switch-disconnector with motor	Switch-disconnector with motor
Monitored overvoltage protectors AC / DC	●/●	●/●	●/●
Monitored overvoltage protectors for auxiliary supply	●	●	●
SCC (Sunny Central Control) interfaces			
Communication (NET Piggy-Back, optional)	analog, ISDN, Ethernet	analog, ISDN, Ethernet	analog, ISDN, Ethernet
Analog inputs	5 x A_{in} 3)	5 x A_{in} 3)	5 x A_{in} 3)
Overvoltage protection for analog inputs	O	O	O
Sunny String-Monitor connection (COM1)	RS485	RS485	RS485
PC connection (COM3)	RS232	RS232	RS232
Electrically separated relay (ext. alert signal)	1	1	1
Certificates / listings			
EMC	EN 61000-6-2 EN 61000-6-4		
CE conformity	●	●	●
BDEW-MSRL / FGW / TR8 6)	●	●	●
RD 1633 / 2000	●	●	●
Arrêté 23 / 04 / 08	●	●	●
● standard features O optional features – not available			
Type designation	SC 400MV-11	SC 500MV-11	SC 630MV-11

HE: High Efficiency, inverter without galvanic isolation for connection to a medium-voltage transformer (taking into account the SMA specification for the transformer)
1) Specifications apply to irradiation values below STC
2) Efficiency measured without an internal power supply at U_{DC} = 500 V
3) 2x inputs for the external nominal value specification for active power and reactive power, 1x external alarm input, 1x irradiation sensor, 1x pyranometer
4) Internal consumption at nominal power
5) At 1.05 $U_{AC, nom}$ and cos φ = 1
6) With limited dynamic grid support
Please note: in certain countries the substations may differ from the substations shown in the images



High yields

- Excellent specific price
- Full nominal power up to 50 °C
- 10 % additional power in continuous operation at ambient temperatures up to 25 °C
- Efficiency of more than 98 percent

Flexible

- Integrated DC main distribution for direct connection of the String-Monitors
- Flexible plant design due to input voltage up to 1000 V

- Connection of up to two external DC main distributors for diverse system configuration

Reliable

- Comprehensive grid management functions
- Perfect monitoring of all PV strings in the field

SUNNY CENTRAL 400HE / 500HE / 630HE

Proven high performance

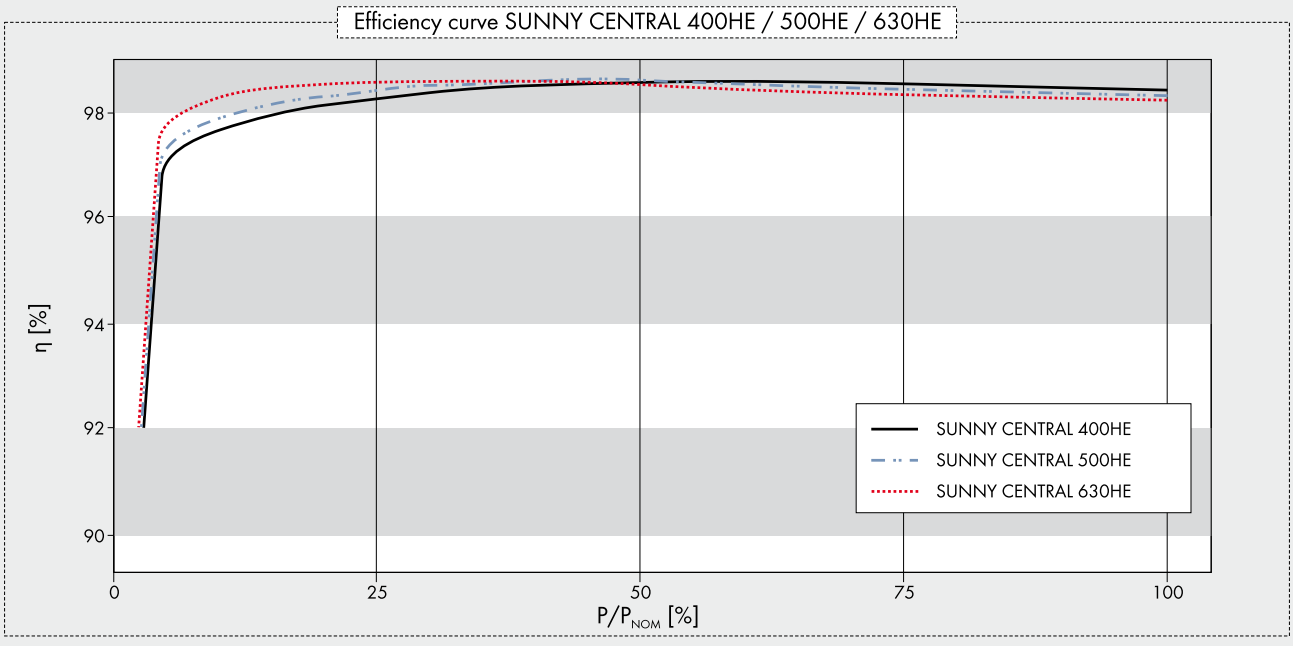
High flexibility in plant design and minimal systems costs with even more power: the proven High Efficiency series for direct connection to the medium-voltage transformer has once again been improved and is already equipped with the intelligent power management of the succeeding generation. This means that maximum power in continuous operation has been increased by ten percent compared to the nominal power for as long as the ambient temperature does not exceed 25 °C. At the same time, the devices offers comprehensive grid management functions – including immediate reconnection after a grid voltage drop.


SUNNY CENTRAL 630HE

SUNNY CENTRAL 400HE / 500HE / 630HE

Technical data	Sunny Central 400HE	Sunny Central 500HE	Sunny Central 630HE
Input data			
Nominal DC power	408 kW	509 kW	642 kW
Max. DC power	450 kWp [1]	560 kWp [1]	705 kWp [1]
MPP voltage range	450 V – 820 V [5]	450 V – 820 V [5]	500 V – 820 V [5]
Max. DC voltage	1000 V	1000 V	1000 V
Max. DC current	993 A	1242 A	1422 A
Number of DC inputs	(8 + 8) + 2 DCHV	(8 + 8) + 2 DCHV	(8 + 8) + 2 DCHV
Output data			
Nominal AC power @ 50 °C	400 kVA	500 kVA	630 kVA
Continuous AC power @ 25 °C	440 kVA	550 kVA	700 kVA
Nominal AC voltage ± 10 %	270 V	270 V	315 V
Nominal AC current	855 A	1070 A	1155 A
AC grid frequency 50 Hz	●	●	●
AC grid frequency 60 Hz	●	●	●
Power factor (cos φ)		0.9 leading ... 0.9 lagging	
Max. THD	< 3 %	< 3 %	< 3 %
Power consumption			
Internal consumption in operation	< 1500 W [4]	< 1500 W [4]	< 1500 W [4]
Standby consumption	< 100 W	< 100 W	< 100 W
External auxiliary supply voltage	3 x 230 V, 50/60 Hz	3 x 230 V, 50/60 Hz	3 x 230 V, 50/60 Hz
External back-up fuse for auxiliary supply	B 20 A, 3-pole	B 20 A, 3-pole	B 20 A, 3-pole
Dimensions and weight			
Height	2120 mm	2120 mm	2120 mm
Width	2800 mm	2800 mm	2800 mm
Depth	850 mm	850 mm	850 mm
Weight	1900 kg	1900 kg	1900 kg
Efficiency [2]			
Max. efficiency	98.6 %	98.6 %	98.6 %
Euro-eta	98.4 %	98.4 %	98.4 %
Protection rating and ambient conditions			
Protection rating (as per EN 60529)	IP20	IP20	IP20
Operating temperature range	–20 °C ... +50 °C	–20 °C ... +50 °C	–20 °C ... +50 °C
Rel. humidity	15 % ... 95 %	15 % ... 95 %	15 % ... 95 %
Fresh air consumption	6200 m³/h	6200 m³/h	6200 m³/h
Max. altitude (above sea level)	1000 m	1000 m	1000 m

Efficiency curve SUNNY CENTRAL 400HE / 500HE / 630HE

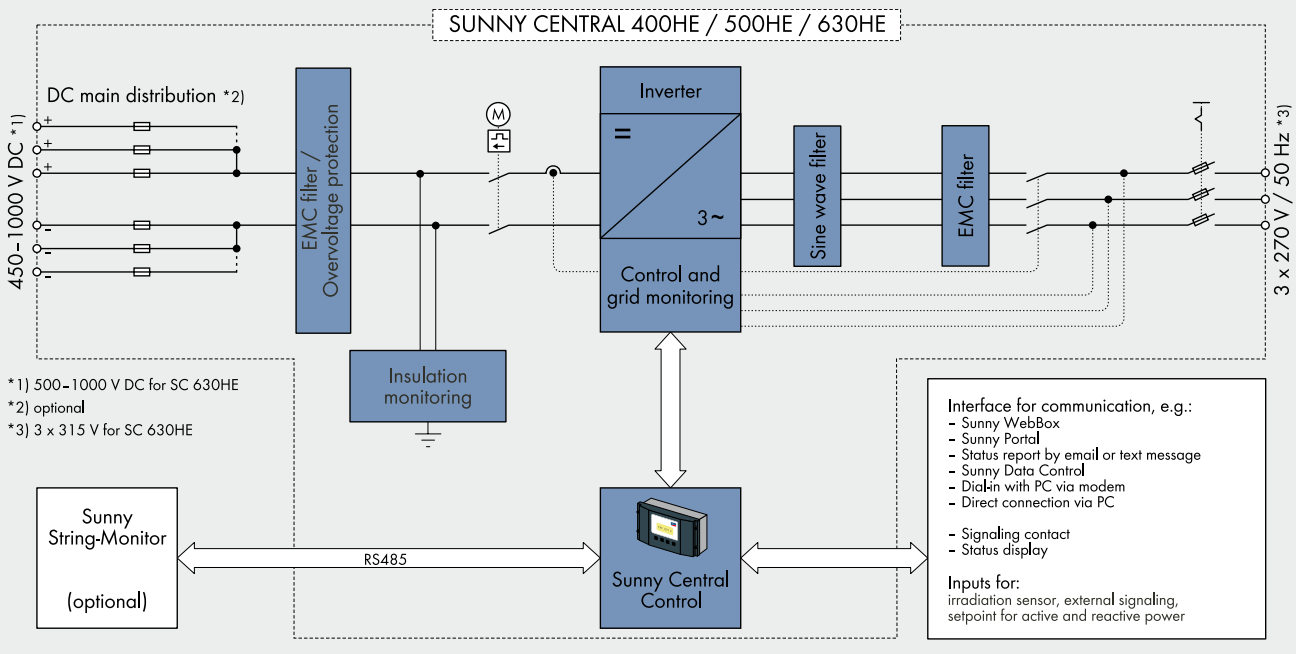


	Sunny Central 400HE	Sunny Central 500HE	Sunny Central 630HE
Features			
Display: text line / graphic	●/–	●/–	●/–
Ground fault monitoring	●	●	●
Heating	●	●	●
Emergency stop	●	●	●
Circuit breaker AC side	SI load disconnection switch	SI load disconnection switch	SI load disconnection switch
Circuit breaker DC side	switch-disconnector with motor	switch-disconnector with motor	switch-disconnector with motor
Monitored overvoltage protectors AC / DC	● / ●	● / ●	● / ●
Monitored overvoltage protectors for auxiliary supply	●	●	●
SCC (Sunny Central Control) interfaces			
Communication (NET Piggy-Back, optional)	analog, ISDN, Ethernet	analog, ISDN, Ethernet	analog, ISDN, Ethernet
Analog inputs	5 x A_{in} 3)	5 x A_{in} 3)	5 x A_{in} 3)
Overvoltage protection for analog inputs	O	O	O
Sunny String-Monitor connection (COM1)	RS485	RS485	RS485
PC connection (COM3)	RS232	RS232	RS232
Electrically separated relay (ext. alert signal)	1	1	1
Certificates / listings			
EMC	EN 61000-6-2 EN 61000-6-4		
CE conformity	●	●	●
BDEW-MSRL / FGW / TR8 6)	●	●	●
RD 1633 / 2000	●	●	●
Arrêté 23 / 04 / 08	●	●	●
● standard features O optional features – not available			
Type designation	SC 400HE-11	SC 500HE-11	SC 630HE-11

HE: High Efficiency, inverter without galvanic isolation for connection to a medium-voltage transformer (taking into account the SMA specification for the transformer)

1) Specifications apply to irradiation values below STC
2) Efficiency measured without an internal power supply at U_{DC} = 500 V
3) 2x inputs for the external nominal value specification for active power and reactive power, 1x external alarm input, 1x irradiation sensor, 1x pyranometer
4) Internal consumption at nominal power
5) $U_{DC\,min}$ at $U_{AC,\,nom}$ ±5 % and cos φ = 1
6) With limited dynamic grid support

Please also read: Transport instructions for Sunny Central and the Sunny Central Installation Guide



Reliable

- Motorized disconnector on the DC side
- Overvoltage protection on DC and AC sides

Communicative

- Easy remote querying using remote access
- Status messages can be sent via e-mail or SMS

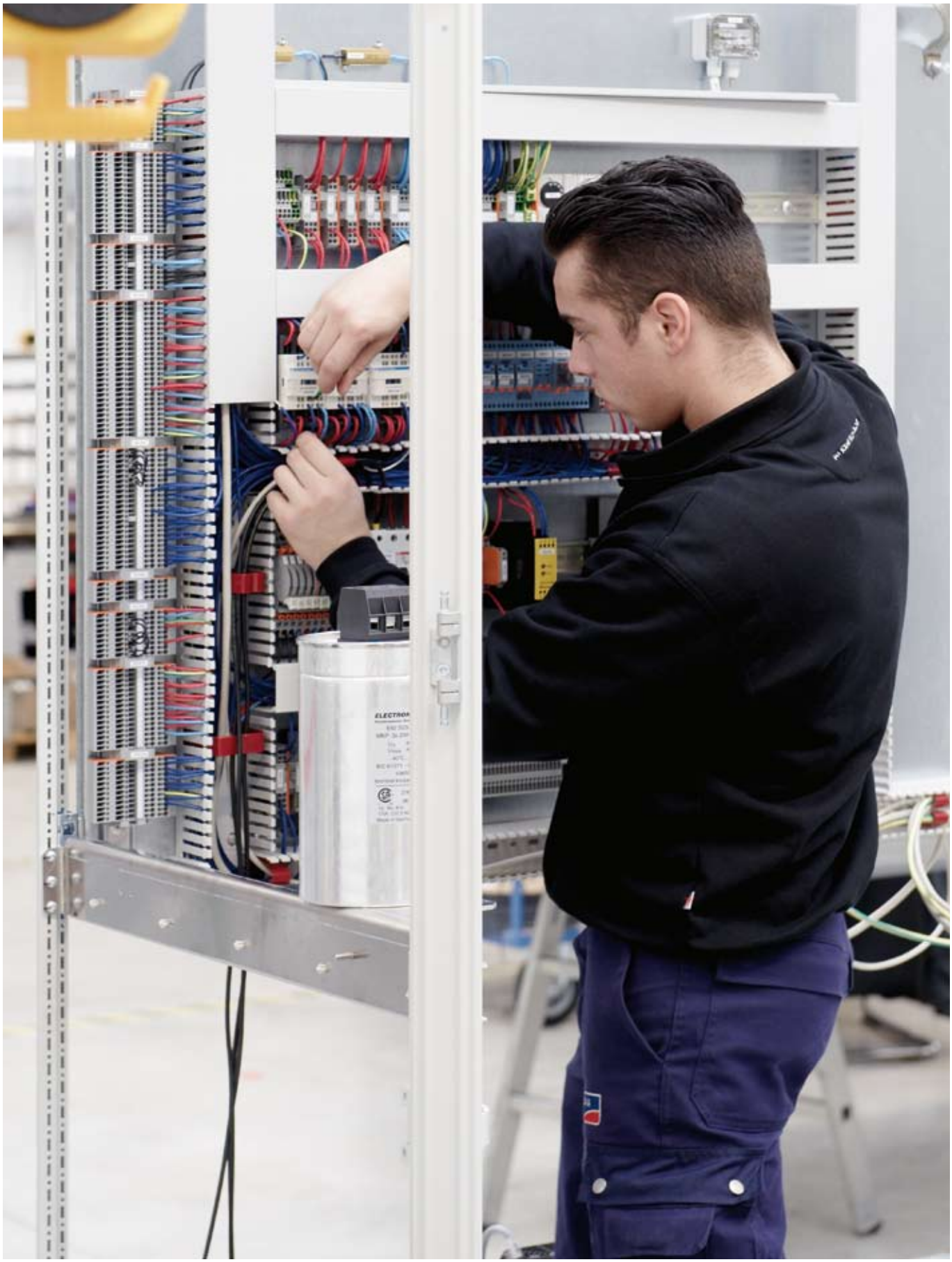
Optional

- String current monitoring
- Extended DC input voltage range up to 1000 V

SUNNY CENTRAL 200 / 250 / 250HE / 350

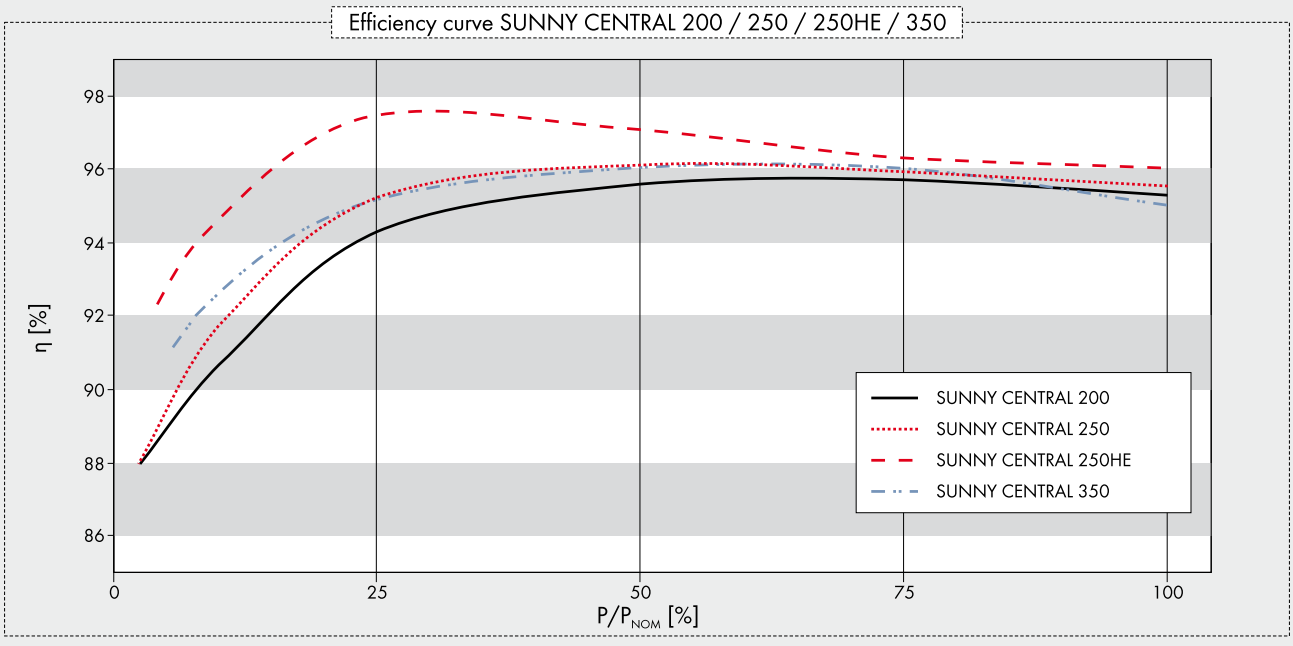
Direct line to the low-voltage grid

First choice for usage in medium-sized and large-scale PV power plants: with the proven Sunny Centrals 200, 250 and 350, plant operators can realize very good solar yields, especially in ground-mounted systems or roof systems with homogeneous structure. The central inverters have five, eight or twelve fused inputs respectively for the DC distributor box. Several devices can be connected together on the AC side. This makes generator powers in the megawatt range possible. Whereas the Sunny Central 200, 250 and 350 feed directly into the low voltage range, the Sunny Central 250HE can be connected directly to a medium-voltage transformer.



SUNNY CENTRAL 200 / 250 / 250HE / 350

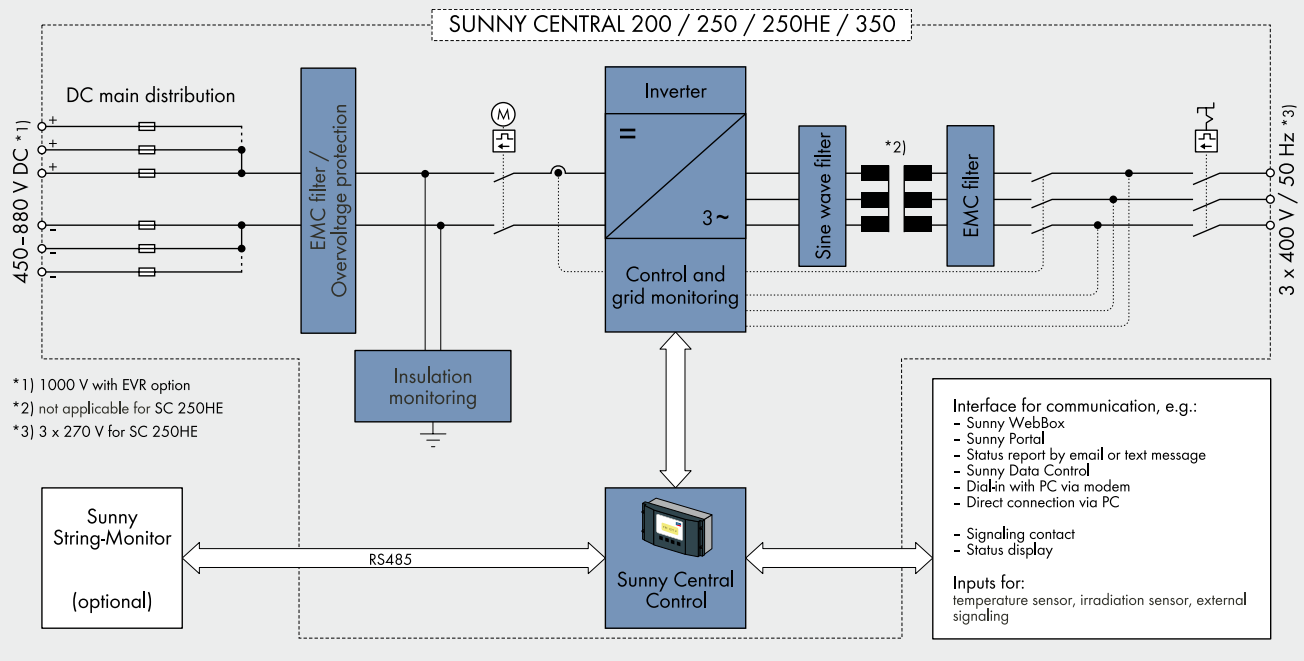
Technical data	Sunny Central 200	Sunny Central 250	Sunny Central 250HE	Sunny Central 350
Input data				
Nominal DC power	210 kW	262 kW	261 kW	369 kW
Max. DC power	230 kWp [1]	290 kWp [1]	285 kWp [1]	405 kWp [1]
MPP voltage range	450 V – 820 V [5]	450 V – 820 V [5]	450 V – 820 V [5]	450 V – 820 V [5]
Max. DC voltage	880 V	880 V	880 V	880 V
Max. DC current	472 A	591 A	591 A	800 A
Number of DC inputs	5	8	8	12
Output data				
Nominal AC power	200 kW	250 kW	250 kW	350 kW
Nominal AC voltage	400 V	400 V	270 V	400 V
Nominal AC current	289 A	361 A	535 A	505 A
AC grid frequency 50 Hz	●	●	●	●
AC grid frequency 60 Hz	●	●	●	●
Max. cos φ	> 0.98	> 0.98	> 0.98	> 0.98
Max. THD	< 3 %	< 3 %	< 3 %	< 3 %
Power consumption				
Internal consumption in operation	< 1000 W	< 1500 W	< 1500 W	< 2500 W
Standby consumption	< 70 W	< 80 W	< 80 W	< 70 W
External auxiliary supply voltage	230 V, 50/60Hz	400 V, 50/60 Hz	400 V, 50/60 Hz	400 V, 50/60 Hz
External back-up fuse for auxiliary supply	B 16 A, 1-pole	B 16 A, 3-pole	B 16 A, 3-pole	B 16 A, 3-pole
Dimensions and weight				
Height	2120 mm [4]	2120 mm [4]	2120 mm [4]	2120 mm [4]
Width	2000 mm	2400 mm	2400 mm	2800 mm
Depth	850 mm	850 mm	850 mm	850 mm
Weight	1600 kg	2070 kg	1170 kg	2800 kg
Efficiency [2]				
Max. efficiency	95.7 %	96.1 %	97.5 %	96.0 %
Euro-eta	94.5 %	95.2 %	96.7 %	95.2 %
Protection rating and ambient conditions				
Protection rating (as per EN 60529)	IP20	IP20	IP20	IP20
Operating temperature range	–20 °C ... +40 °C	–20 °C ... +40 °C	–20 °C ... +40 °C	–20 °C ... +40 °C
Rel. humidity	15 % ... 95 %	15 % ... 95 %	15 % ... 95 %	15 % ... 95 %
Fresh air consumption	3300 m³/h	4200 m³/h	3500 m³/h	6500 m³/h
Max. altitude (above sea level)	1000 m	1000 m	1000 m	1000 m



	Sunny Central 200	Sunny Central 250	Sunny Central 250HE	Sunny Central 350
Features				
Display: text line / graphic	●/–	●/–	●/–	●/–
Ground fault monitoring	●	●	●	●
Heating	●	●	●	●
Emergency stop	●	●	●	●
Circuit breaker AC side	●	●	Fuse-switch-disconnector	●
Circuit breaker DC side	motor-driven	motor-driven	motor-driven	motor-driven
Monitored overvoltage protectors AC	● (not with TT grid)	● (not with TT grid)	●	● (not with TT grid)
Monitored overvoltage protectors DC	●	●	●	●
Monitored overvoltage protectors for auxiliary supply	● (not with TT grid)	● (not with TT grid)	●	● (not with TT grid)
SCC (Sunny Central Control) interfaces				
Communication (NET Piggy-Back, optional)	analog, ISDN, Ethernet	analog, ISDN, Ethernet	analog, ISDN, Ethernet	analog, ISDN, Ethernet
Analog inputs	1 x PT 100, 2 x A_{in} 3)	1 x PT 100, 2 x A_{in} 3)	1 x PT 100, 2 x A_{in} 3)	1 x PT 100, 2 x A_{in} 3)
Overvoltage protection for analog inputs	O	O	O	O
Sunny String-Monitor connection (COM1)	RS485	RS485	RS485	RS485
PC connection (COM3)	RS232	RS232	RS232	RS232
Electrically separated relay (ext. signal)	1	1	1	1
Certificates / listings				
EMC	EN 61000-6-2 EN 61000-6-4			
CE conformity	●	●	●	●
EEG conformity 6)	●	●	●	●
RD 1633 / 2000	●	●	●	●
● standard features O optional features – not available				
Type designation	SC 200	SC 250	SC 250HE	SC 350

1) Specifications apply to irradiation values = 1000 (kWh/(kWp x year))
2) Efficiency measured without an internal power supply at U_{DC} = 500 V
3) Terminal for an analog sensor provided by the customer in two-wire and four-wire version
4) The switch cabinet is raised by 210 mm for the EVR option
5) $U_{DC\,min}$ at $U_{AC,\,nom}$ ±5 % and cos φ = 1
6) Grid stability management and static voltage support

Please also read: Transport instructions for Sunny Central and the Sunny Central Installation Guide



Flexible

- For indoor and outdoor installation
- Extended temperature range from –20 °C to +50 °C
- Compact dimensions, easier installation

Efficiency

- 97.6 % leading edge efficiency

Reliable

- System monitoring via integrated data logger
- Easy remote querying using remote access

Optional

- String monitoring
- DC input voltage range up to 1000 V
- Operation with a grounded PV generator

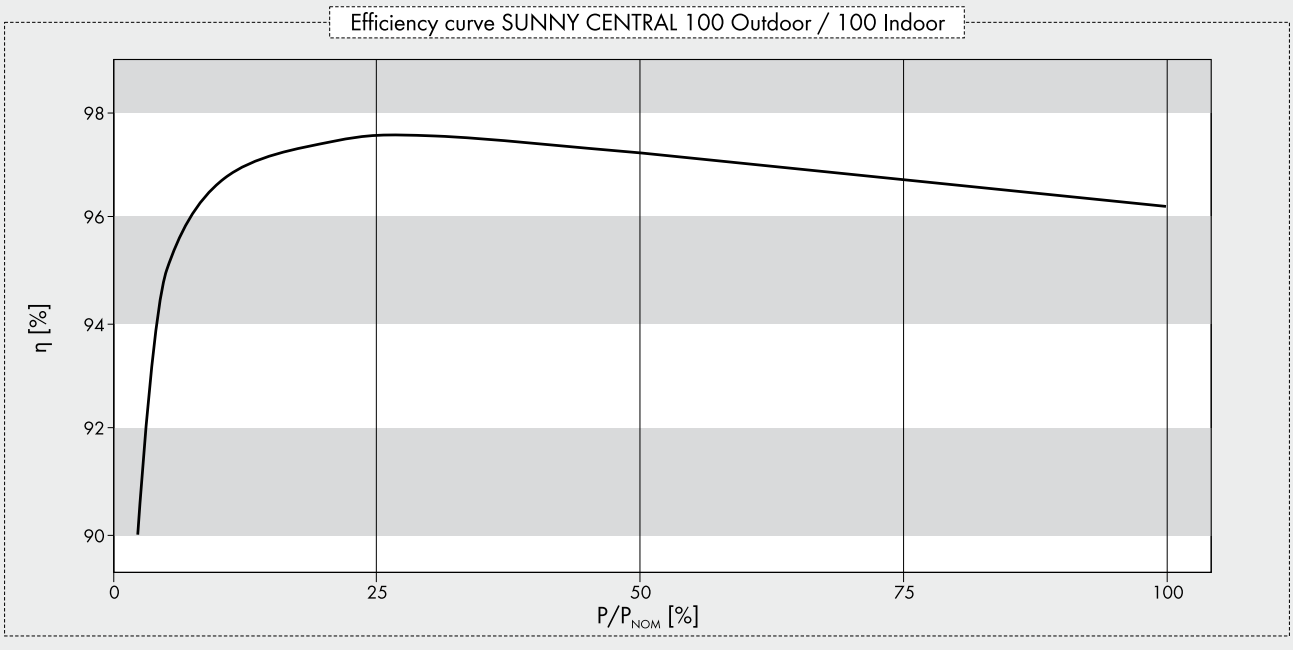
SUNNY CENTRAL 100 Outdoor / 100 Indoor

Concentrated power at an attractive price

Powerful and efficient: The Sunny Central 100 Outdoor is perfectly suited for implementing large-scale solar power plants in open spaces. With a weatherproof enclosure and extended temperature range, it is the first choice for reliable outdoor operation – even under harsh climatic conditions. Plant operators benefit twice: the compact design greatly reduces installation work, and thanks to innovative transformer technology, the leading edge efficiency has again been improved. As a result, it is the most efficient inverter in its class. The indoor version is equipped with a special ventilation concept for utilization indoors.

SUNNY CENTRAL 100 Outdoor / 100 Indoor

Technical data	Sunny Central 100 Indoor	Sunny Central 100 Outdoor	Sunny Central 100 Indoor / Outdoor HE
Input data			
Nominal DC power	105 kW	105 kW	103 kW
Max. DC power	115 kWp [1]	115 kWp [1]	115 kWp [1]
MPP voltage range	450 V – 820 V [5]	450 V – 820 V [5]	450 V – 820 V [5]
Max. DC voltage	1000 V	1000 V	1000 V
Max. DC current	235 A	235 A	235 A
Number of DC inputs	3	3	3
Output data			
Nominal AC power	100 kW	100 kW	100 kW
Nominal AC voltage	400 V	400 V	300 V
Nominal AC current	145 A	145 A	193 A
AC grid frequency 50 Hz	●	●	●
AC grid frequency 60 Hz	●	●	●
Max. cos φ	> 0.99	> 0.99	> 0.99
Max. THD	< 3 %	< 3 %	< 3 %
Power consumption			
Internal consumption in operation	< 1000 W	< 1000 W	< 1000 W
Standby consumption	< 50 W	< 50 W	< 50 W
External auxiliary supply voltage	230 V, 50/60 Hz	230 V, 50/60 Hz	230 V, 50/60 Hz
External back-up fuse for auxiliary supply	B 16 A, 1-pole	B 16 A, 1-pole	B 16 A, 1-pole
Dimensions and weight			
Height	1835 mm	1835 mm	1835 mm
Width	1280 mm	1280 mm	1280 mm
Depth	830 mm	830 mm	830 mm
Weight	925 kg	925 kg	505 kg
Efficiency [2]			
Max. efficiency	97.6 %	97.6 %	98.5 %
Euro-eta	97.0 %	97.0 %	98.3 %
Protection rating and ambient conditions			
Protection rating (as per EN 60529)	IP20	IP44, IP54	IP44, IP54
Operating temperature range	–20 °C ... +50 °C [4]	–20 °C ... +50 °C [4]	–20 °C ... +50 °C [4]
Rel. humidity	15 % ... 95 %	15 % ... 95 %	15 % ... 95 %
Fresh air consumption	2300 m³/h	2300 m³/h	2300 m³/h
Max. altitude (above sea level)	1000 m	1000 m	1000 m

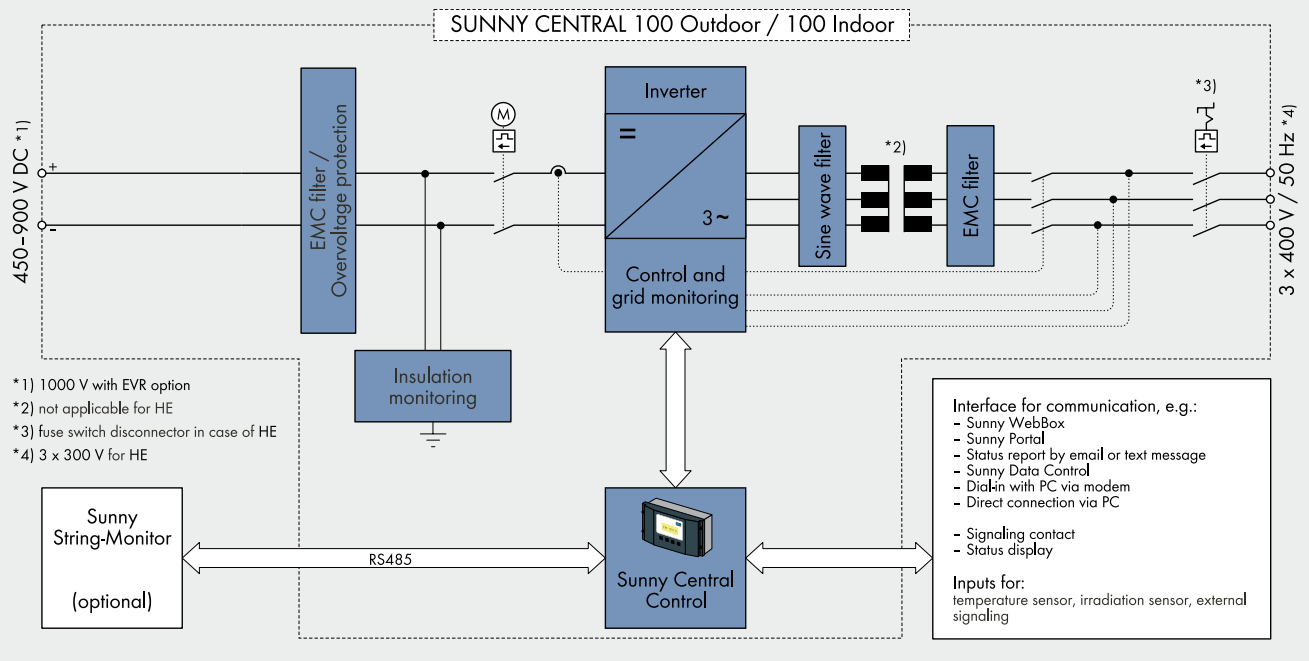


	Sunny Central 100 Indoor	Sunny Central 100 Outdoor	Sunny Central 100 Indoor / Outdoor HE*
Features			
Display: text line / graphic	●/–	●/–	●/–
Ground fault monitoring	● (optionally adjustable)	● (optionally adjustable)	● (optionally adjustable)
Heating	●	●	●
Emergency stop	●	–	● / –
Circuit breaker AC side	o	o	fuse-switch-disconnector*
Circuit breaker DC side	motor-driven	motor-driven	motor-driven
Monitored overvoltage protectors AC / DC	o	o	●
Monitored overvoltage protectors for auxiliary supply	o	o	o
SCC (Sunny Central Control) interfaces			
Communication (NET Piggy-Back, optional)	analog, ISDN, Ethernet	analog, ISDN, Ethernet	analog, ISDN, Ethernet
Analog inputs		optional 1 x PT 100, 2 x A_{in} 3)	
Overvoltage protection for analog inputs	o	o	o
Sunny String-Monitor connection (COM1)	RS485	RS485	RS485
PC connection (COM3)	RS232	RS232	RS232
Electrically separated relay (ext. alert signal)	1	1	1
Certificates / listings			
EMC		EN 61000-6-2 EN 61000-6-4	
CE conformity	●	●	●
RD 1633 / 2000	●	●	●
● standard features o optional features – not available			
Type designation	SC 100	SC 100	SC 100

*HE: High Efficiency, inverter without galvanic isolation for connection to a medium-voltage transformer

1) Specifications apply to irradiation values = 1000 (kWh/(kWp x year))
2) Efficiency measured without an internal power supply at U_{DC} = 500 V
3) Terminal for an analog sensor provided by the customer in two-wire and four-wire version
4) Complies with nominal values up to an ambient temperature of +40 °C, at an ambient temperature of +50 °C the nominal values are held for two hours.
5) $U_{DC\ min}$ at $U_{AC,\ nom}$ ±5 % and cos φ = 1

Note: Transport instructions for Sunny Central, the Sunny Central Installation Guide, a suitable foundation, sufficient ventilation and appropriate sun shading systems are necessary.



High Yields

- 98.6 % leading edge efficiency
- Suitable for ambient temperatures of up to 140°F / 60°C
- Intelligent temperature management OptiCool

Low system costs

- Direct deployment outdoors due to outdoor enclosure
- Easy installation through separate connection area
- Simple connection with all grids

Strong peripherals

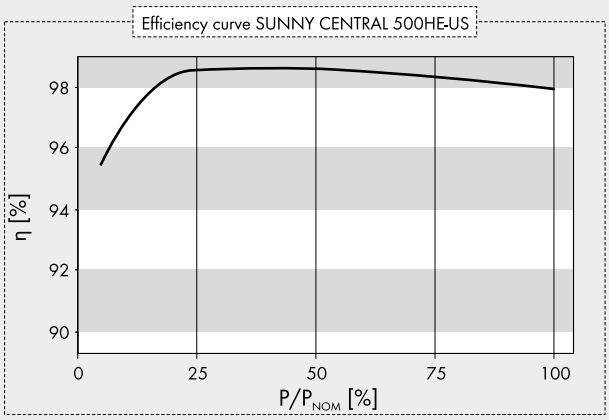
- AC/DC disconnect unit
- Circuit combiner boxes
- Sunny Central String-Monitor US
- Available as integrated complete solution

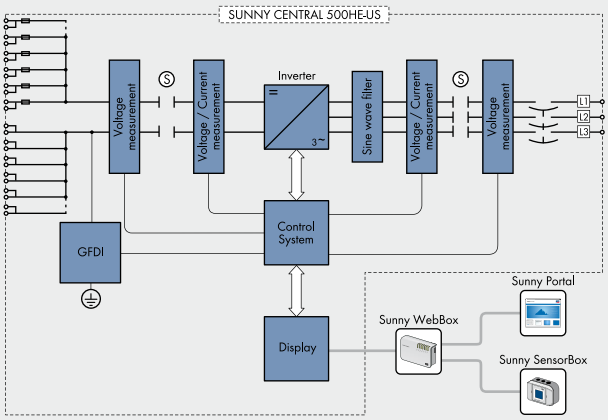
SUNNY CENTRAL 500HE-US

The solution for solar power plants in North America

The Sunny Central 500HE-US is the right product for industrial standard solar power stations: In combination with an external transformer, it can be connected with any imaginable grid. The outdoor enclosure with OptiCool cooling concept, the separate connection area and the integrated AC disconnector ensure simple installation and low system costs. With its leading edge efficiency of 98.6 %, it outdoes all other devices in its performance class. Flexible plant monitoring is available via various communications solutions such as Ethernet, Modbus, RS485 and OPC. SMA also supplies complete megawatt stations with two inverters, suitable AC / DC disconnectors and transformers upon request.

Technical data	Sunny Central 500HE-US	
Input data		
Max. DC power	565 kWp [1]	
MPP voltage range	330 V – 600 V	
Max. DC voltage	600 V	
Feed starting at [U] / [P]	380 V / 5000 W	
Max. DC current	1600 A	
Number of DC inputs	6 – 9	
Output data		
Nominal AC power	500 kVA @ 45 °C	
Max. AC current	1470 A @ 200 V	
AC grid frequency	60 Hz	
AC voltage range	180 V – 220 V	
AC voltage range, full active power	196 V – 210 V	
power factor (cos φ)	> 0.99	
Max. THD	< 5 %	
Efficiency [2]		
Max. efficiency	98.6 %	
CEC efficiency	98.0 %	
Euro-eta	97.9 %	
Ambient conditions		
Operating temperature range	–25 °C ... +60 °C / –13 °F ... +140 °F	
Max. temperature for nominal conditions	+45 °C / +113 °F	
Protection rating	NEMA 3R	
Installation indoors / outdoors	●/●	
Rel. humidity	15 % ... 95 %	
Fresh air consumption	3000 m³/h	
Internal consumption at nominal power	< 1600 W	
Standby consumption (P_{night})	< 110 W	
Dimensions and weight		
Height	2277 mm (90 in)	
Width	2562 mm (101 in)	
Depth	956 mm (38 in)	
Weight	< 1800 kg / 3970 lb	
Certificates / listings		
Certificates	UL 1741, UL 1998, IEEE 1547	
EMC conformity	FCC, Part 15, Class A	
Interfaces		
RS485 / Ethernet / analog	o/o/o	
Display: text line / graphic	–/●	
Communication protocols	Modbus / TCP	
SSM-US connection	RS485	
Plant monitoring	Sunny Portal	
1) Specifications apply to irradiation values below STC 2) Measured without an internal power supply at U_{DC} = 330 V		
● standard features o optional features – not available		
Type designation	SC 500HE-US	





Efficiency

- 97.5 % leading edge efficiency
- Direct connection to the 480 V grid
- Suitable for ambient temperatures of up to 140 °F / 60 °C

Reliable

- Galvanic isolation
- Weatherproof enclosure
- Integrated data logger
- Simple remote query and maintenance per remote access

Strong peripherals

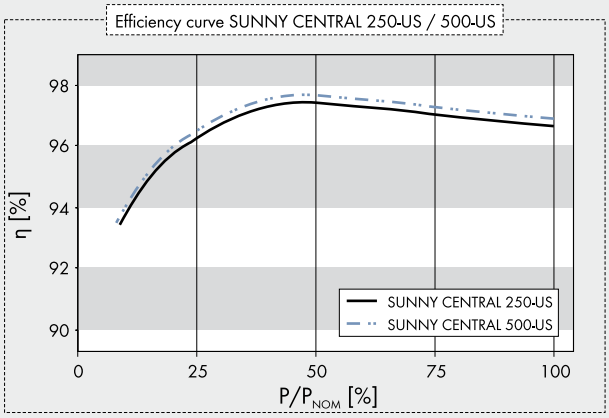
- AC/DC disconnect unit
- Circuit combiner boxes for sting collection
- Sunny Central String-Monitor-US

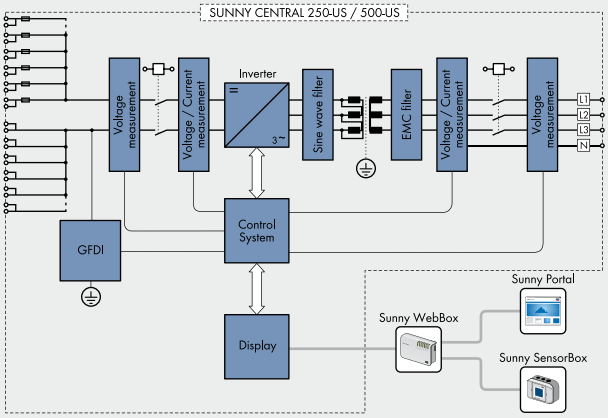
SUNNY CENTRAL 250-US / 500-US

Perfect for commercial systems in North America

The two proven central inverters are ideally suitable for commercial plants in North America: The integrated transformer makes possible direct connection with the low-voltage grid and, thanks to the outdoor enclosure with the OptiCool cooling concept, the devices can be installed practically anywhere. The leading edge efficiency of 97.5 %, which is remarkable for transformer devices, is just as convincing as the simple monitoring and remote maintenance via the integrated data logger – optionally with RS485, Ethernet or OPC interface. Special highlight: when others switch off, the two Sunny Central inverters continue to feed at a lower output. This means that in the temperature range of 122 to 140 °F (50 to 60 °C), up to 75 % of the nominal output is still available.

Technical data	Sunny Central 250-US	Sunny Central 500-US
Input data		
Max. DC power	285 kWp [1]	570 kWp [1]
MPP voltage range	330 V – 600 V	330 V – 600 V
Max. DC voltage	600 V	600 V
Feed starting at [U]/[P]	380 V / 5000 W	380 V / 5000 W
Max. DC current	800 A	1600 A
Number of DC inputs	4 – 6	6 – 9
Output data		
Nominal AC power	250 kVA @ 45 °C	500 kVA @ 45 °C
Max. AC current	300 A @ 480 V	600 A @ 480 V
AC grid frequency	60 Hz	60 Hz
AC voltage range	422 V – 528 V	422 V – 528 V
AC voltage range, full active power	480 V – 514 V	480 V – 514 V
Power factor (cos φ)	> 0.99	> 0.99
Max. THD	< 3 %	< 3 %
Efficiency [2]		
Max. efficiency	97.50 %	97.40 %
CEC efficiency	97.00 %	97.00 %
Euro-eta	96.60 %	96.90 %
Ambient conditions		
Operating temperature range	–25 °C ... +50 °C / –13 °F ... +122 °F	–25 °C ... +50 °C / –13 °F ... +122 °F
Max. temperature for nominal conditions	+45 °C / +113 °F	+45 °C / +113 °F
Protection rating	NEMA 3R	NEMA 3R
Installation indoors / outdoors	●/●	●/●
Rel. humidity	15 % ... 95 %	15 % ... 95 %
Fresh air consumption	4000 m³/h	6000 m³/h
Internal consumption at nominal power	< 800 W	< 1500 W
Standby consumption (P_{night})	< 69 W	< 80 W
Dimensions and weight		
Height	2027 mm (80 in)	2027 mm (80 in)
Width	2786 mm (110 in)	3536 mm (140 in)
Depth	830 mm (33 in)	930 mm (37 in)
Weight	< 1900 kg / 4189 lb	< 3250 kg / 7165 lb
Certificates / listings		
Certificates	UL 1741, UL 1998, IEEE 1547	UL 1741, UL 1998, IEEE 1547
EMC conformity	FCC, Part 15, Class A	FCC, Part 15, Class A
Interfaces		
RS485 / Ethernet / Analog	o/o/o	o/o/o
Display: text line / graphic	●/–	●/–
Communication protocols	Modbus / TCP	Modbus / TCP
SSM-US connection	RS485	RS485
Plant monitoring	Sunny Portal	Sunny Portal
1) Specifications apply to irradiation values below STC 2) Measured without an internal power supply at U_{DC} = 325 V (SC 250U) or 330 V (SC 500U)		
● standard features o optional features – not available		
Type designation	SC 250U	SC 500U





Precise

- Perfect monitoring of all PV strings in the field

Flexible

- Sunny String-Monitor is available with various connection possibilities for the string connections
- For grounded or non-grounded PV generators upon request

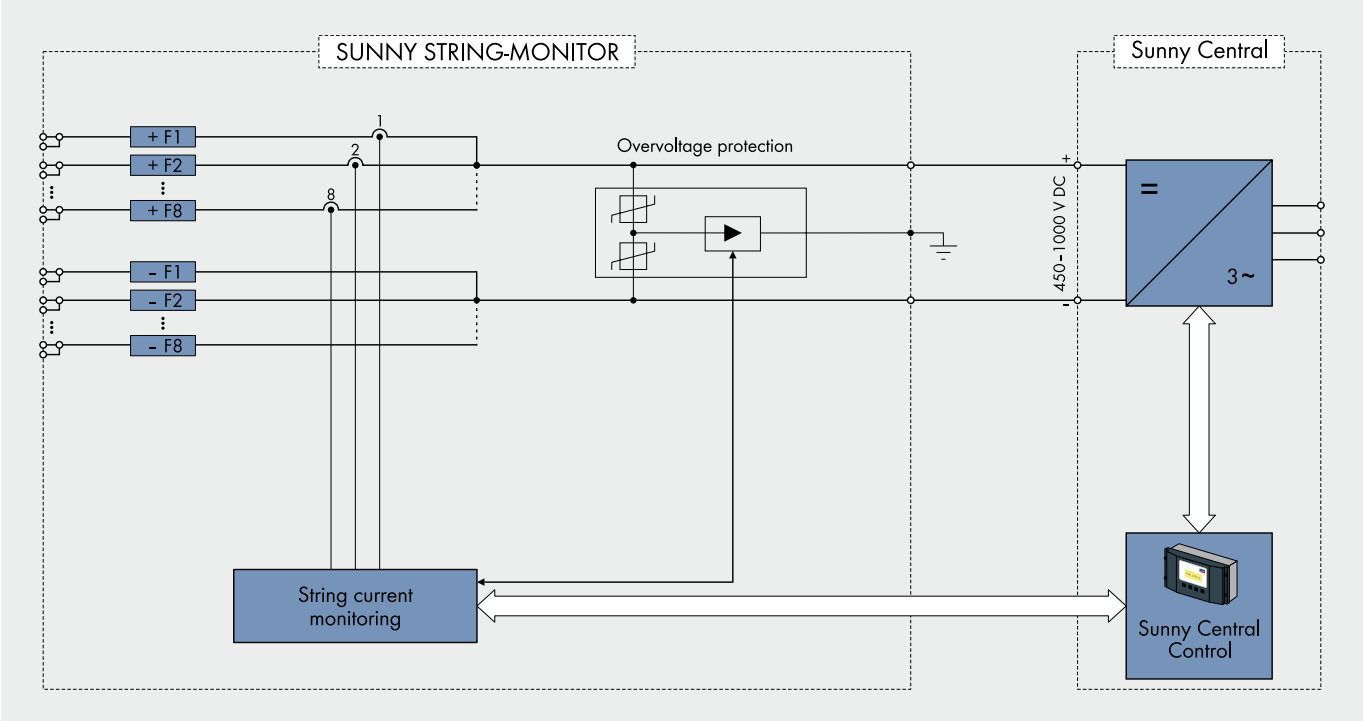
- String monitoring with 8, 16 or 24 measurement channels
- Available upon request with remote-controlled DC switch

SUNNY STRING-MONITOR

The insurance for solar yields

With the Sunny String-Monitor, SMA offers a high resolution monitoring of the PV generator. By measuring and comparing the individual string currents, power deviations in the solar generator are detected reliably and are analyzed directly in the inverter. According to preference, the Sunny Central String-Monitor can be delivered either in an enclosure for wall mounting or as a standalone box. Alongside the measurement of string currents, the device features a string fuse protection as well as an overvoltage protection device.

Technical data	Sunny String-Monitor	Sunny String-Monitor 16	Sunny String-Monitor 24
Input data			
Max. permissible DC voltage	1000 V / 950 V*	1000 V / 950 V*	1000 V
Max. permissible DC current	130 A	280 A	320 A
Number of measuring channels	8	16	24
Max. string current per measuring channel	16.25 A	17.5 A	13.30 A
Nominal current string fuse	10 A, 12 A, 16 A, 20 A, 25 A*	10 A, 12 A, 16 A, 20 A, 25 A*	10 A, 12 A, 16 A, 20 A
General data			
Protection rating (as per EN 60529)	IP65	IP54	IP54
Dimensions (W / H / D) in mm	795 / 400 / 230	1060 / 820 / 245	1060 / 1085 / 245
Weight	13 kg	70 kg	80 kg
Operating temperature range	–25 °C ... +40 °C	–25 °C ... +40 °C	–25 °C ... +40 °C
Rel. humidity	15 % ... 95 %	15 % ... 95 %	15 % ... 95 %
Interfaces: RS485	●	●	●
Features			
DC switch	o	●	●
DC switch with remote trigger	o	o	o
Plinth for free-standing installation	–	o	o
Interfaces: RS485	●	●	●
* When the 25 A fuse is used, the permissible DC input voltage is reduced to 950 V			
● standard features o optional features – not available			
Type designation	SSM	SSM16-11	SSM24-11



Economical

- Optimal failure detection for high yields
- A maximum of nine devices necessary for monitoring the entire generator

Precise

- Failure detection through string current monitoring
- DC distributor box in Nema 3R with integrated current measurement

Flexible

- Three different versions for the best possible plant design
- Optionally suitable for installation near the coast

User-friendly

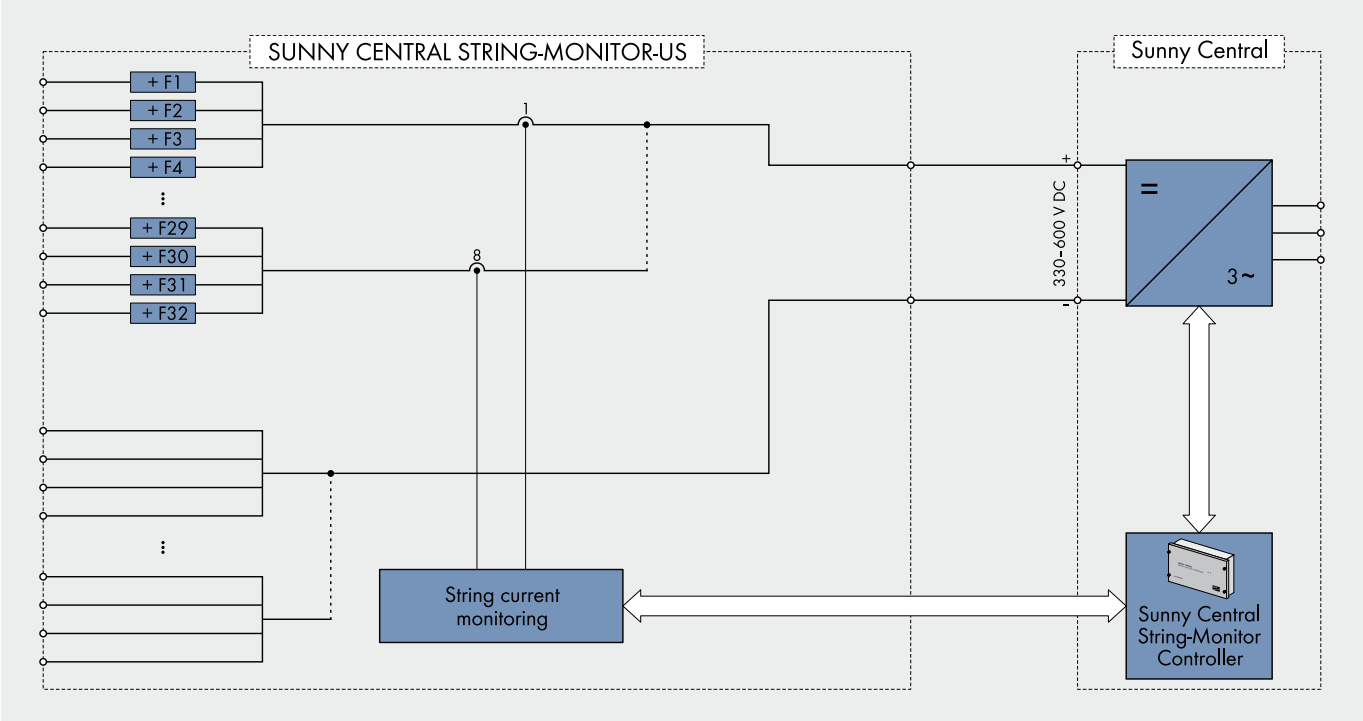
- Comfortable installation preparation due to detachable side and base plates
- Uncomplicated configuration of the string current monitoring

SUNNY CENTRAL STRING-MONITOR-US

The insurance for solar yields in North America

Detailed monitoring of the PV generator for the North American market: the Sunny Central String-Monitor-US. By measuring and comparing the individual string currents, power deviations in the solar generator are detected reliably and are analyzed directly in the Sunny Central. According to preference, the Sunny Central String-Monitor-US is delivered either in an enclosure for wall or pole mounting (protection rating Nema 3R). For the measurement of the string currents, there are three variants of string fuse protection, which comply all with the NEC standard. Thus the Sunny Central String-Monitor-US is ultimately suitable for use in the North American solar market.

Technical data	Sunny Central String-Monitor-US Version 24	Sunny Central String-Monitor-US Version 32	Sunny Central String-Monitor-US Version 64
PV generator connection			
Input voltage range	0 ... 600 V DC	0 ... 600 V DC	0 ... 600 V DC
Max. PV short-circuit current per string	12.8 A [2]	9.6 A [2]	5.1 A [2]
Max. fuse size (10 x 38 class CC fuses)	20 A, 600 V DC [1]	15 A, 600 V DC [1]	8 A, 600 V DC [1]
Max. number of strings	24	32	64
Fused inputs per measuring channel	3	4	8
PV array configuration	neg. or pos. grounded	neg. or pos. grounded	neg. or pos. grounded
Number of measuring channels	8	8	8
Sunny Central Connection			
DC short-circuit current	480 A	480 A	512 A
Max. continuous DC current	308 A	308 A	328 A
Max. number of cables per output	2	2	2
Mechanical data			
Dimensions (H x W x D) in mm	800 / 800 / 250	800 / 800 / 250	800 / 1200 / 300
Weight	65 kg	65 kg	88 kg
protection rating	NEMA 3R	NEMA 3R	NEMA 3R
Enclosure materials	steel or stainless steel	steel or stainless steel	Steel or stainless steel
Ambient conditions			
Operating temperature range	–25 °C ... +45 °C	–25 °C ... +45 °C	–25 °C ... +45 °C
Rel. air humidity	up to 95 %, condensation possible	up to 95 %, condensation possible	up to 95 %, condensation possible
Communication			
SSM-U connection	RS485	RS485	RS485
1) Input current without impedance factor as per NEC 690.8 (A) (1) and 690.8 (8) (1)			
2) Input current with impedance factor as per NEC 690.8 (A) (1) and 690.8 (8) (1)			
Type designation	SSM-US	SSM-US	SSM-US



MONITORING SYSTEMS


25.05.09
16:58
Power today
kW
5.0
4.0
3.0
2.0
1.0
0
8
11
14
17
20
Power 2.250 kW
24.063
E-Today
kWh
1178.23
E-total
kWh
SUNNY BEAM

Monitoring, Informing, Presenting
Yield Maintenance for Solar Power Systems

Sunday afternoon at the garden fence. The sun is shining. Two neighbors are talking. One neighbor points to the PV system on the other's roof. "So, how much is it generating right now?". The system operator takes a quick look at the Sunny Beam. The neighbor is impressed with the answer. It's a good feeling: your solar power system is doing what it should – feeding solar power into the public grid and securing you valuable yields. And best of all, the system (practically) takes care of itself. Thanks to the intelligent monitoring solutions from SMA.

Everything under control

Comprehensive management is key to profits for both small solar energy systems and giant solar parks. By choosing a solar power system, operators are counting on environmentally friendly technology as well as long-term profits. This means that the system must run smoothly at all times. If output reductions in a system due to factors such as shade on the solar module or faults in the public electric grid go unnoticed over longer periods, this can result in substantial loss of profits. Continuous system monitoring does not only entail staying up to date on the amount of solar power being produced, but being able to react quickly to changes and problems.

Simple maintenance and parameterization

SMA plant monitoring also provides many benefits to installers. In the event of a problem, installers have quick – and, with Sunny Portal *mobile* – also remote access to all plant data. This data allows contractors to draw conclusions about a specific event and, for example, call the operator to check if a fuse has blown. This can sometimes save on the need for long distance service visits. SMA products are also useful for plant maintenance and configuration. With Sunny Explorer, for example, you can access an inverter with a laptop equipped with a *Bluetooth* interface.

Reliable and simple – everywhere in the world

Modern system monitoring is much more than simple control. It provides information regarding plant operation in an easy to read manner and, thanks to the Internet, to any location in the world – for example, via E-mail. Additionally the system data is presented simply, cleary and professionally: in order to have the system performance continuously in sight. Or for larger systems, in order to present the ecological commitment for the benefit of the public.

Plant monitoring offers a variety of options: wireless or cable, compact or complex, short or extensive. It makes no difference whether the yield to be monitored is a single-family home rooftop system or an open-air solar power plant. And as a result of industry quality manufacturing devices for system monitoring such as our inverters are designed for a lifespan of at least 20 years.

PRIVATE HOME ROOFTOP SYSTEM

COMMERCIAL SOLAR POWER SYSTEM

SOLAR POWER PLANT

Threefold simple and reliable
The right solution for every solar plant

Your PV system is unique and the system monitoring can be put together just the way you need it. Three different basic scenarios are available for our customers to select from.

Simple monitoring and control for home rooftop systems.

For solar power systems on single-family homes, for example, we recommend Sunny Beam or Sunny Explorer software. With our user-friendly and compact products, the operators can easily keep an eye on yields, around the clock.

Modular system monitoring for commercial solar power systems

For larger solar plants, a variety of components can be assembled to create a customized monitoring solution. In combination with SMA solar inverters, operators and installers benefit from a perfectly-coordinated system. The product spectrum of plant monitoring products includes Sunny WebBox, Sunny Portal, Sunny SensorBox, Sunny Matrix and Flashview.

Reliable monitoring for solar power stations

The larger the PV plant, the faster small reductions in power negatively affect yield – if they remain undiscovered. With our solutions especially for solar parks, including Sunny WebBox, the Power Reducer Box, and the SMA OPC server, megawatt plants can be monitored comprehensively and safely.

Easy to Use

- PC software free of charge for wireless monitoring of the PV plant via *Bluetooth*
- Quick overview of yields and status

User-friendly

- Intuitive operation
- Graphic display of key PV system data

Reliable

- Long-term archiving via data export in CSV format
- Rapid diagnosis via access to measured values and event memory

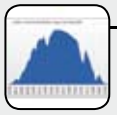
SUNNY EXPLORER

The free PC software solution

Switch on your laptop or PC, activate the *Bluetooth* interface, and start Sunny Explorer – that's all that's needed to give operators and installers an overview of their PV plant. The free PC software is thus the optimum addition to the new generation of inverters with integrated *Bluetooth*. The key plant data can be visualized on the PC or laptop – quickly and wirelessly with *Bluetooth*. Energy values and events can be archived long-term by means of data export in CSV format, and processed and visualized in Excel. Sunny Explorer also provides support during inverter parameterization: because no complicated cabling is needed, PV plant maintenance is convenient and fast.

Technical data	Sunny Explorer
Languages	
Available languages	German, English, Spanish, Italian, French, Czech, Greek, Korean, Portuguese, Dutch
System requirements	
Supported operating systems	Windows XP (Service Pack 2), Windows Vista (32 Bit), Windows 7
Supported *Bluetooth* stacks	Microsoft, Toshiba, BlueSoleil, Broadcom
Hardware (minimum requirements)	
Processor	PIII 800 MHz (XP) / P4 1 GHz (Vista)
Main Memory	512MB (XP) / 1 GB (Vista)
Free hard disk space	265 MB (240 MB .Net / 25 MB application)
Resolution	1024 x 768 pixels
Communication	
Inverter communication	*Bluetooth*
Max. number of devices	1 Master: 50 / 2 Masters: 25
System information	
Plant overview	Ideally suited for an overview over the entire PV plant by presentation of the most important data
System settings	Simple parameter setting for an entire device class
Current system values	Summary of current device data. The display of minimum and maximum values, sums and averages (depicted for every device category) provides the operator with detailed information about the current status of their PV plant
Device information	
Device overview	The most important device information at a single glance
Device settings	Individual parameter adjustment for each device
Current device values	Detailed information on the current values of the selected device
Events	Rapid event analysis with use of the device analysis functions and direct viewing of recorded events
Data export	
Daily data	Easy overview of the PV plant performance data stored every 5 minutes, with daily storage of a file containing the values for all inverters
Monthly files	Long-term overview of the PV plant daily yields, with monthly storage of a file containing the values for all inverters
Events	Rapid overview of all events that were written to a file for a selected time frame

Quick overview of PV plant status



Display of essential plant data

Configuration of individual devices or an entire device category

Communication with the inverters via *Bluetooth*

Easy diagnostics due to event log display

Safe data transfer through new password system

Long-term archiving via data export in CSV format

User-friendly

- Wireless table device with large, easily readable display
- USB interface for data transfer to PC

Innovative

- Automatic monitoring of up to twelve inverters via *Bluetooth*
- Power supply via integrated solar cell

Easy to use

- Intuitive operation via rotary push button
- Easy to understand display of all key plant data

Reliable

- Audio alarm in the event of faults
- Data archiving for at least 90 days in daily files and up to 12 monthly files in CSV format

SUNNY BEAM with *Bluetooth*® Wireless Technology

The all-in-one service package for the home

Informative, compact, and easy to operate: Sunny Beam with *Bluetooth* doesn't just look good, it's an innovative monitoring solution. The key data is visible on its large graphic display: daily profile, current output, as well as daily and total energy yield. The performance of up to 12 inverters, the monthly overview, the energy yield in euros, and the CO_2 savings can all be accessed with one hand. Data for a minimum of 90 days is stored in the device and can be transmitted to a PC via a USB cable – without an additional program. And in the event of errors, the Sunny Beam can also be set up to emit an acoustic signal.

Technical data	Sunny Beam with *Bluetooth*®	
Communication		
Inverter communication	*Bluetooth*	
PC-communication	USB 2.0	
Max. number of SMA devices	12	
Max. communication range		
Bluetooth in the open air	up to 100 m	
Power supply		
Power supply	Integrated solar cell, USB cable	
Number of batteries	2	
Type of battery	ENEKEEP (Mignon AA), NiMH (1.2 Vdc)	
Environmental conditions in operation		
Ambient temperature	0 °C ... +40 °C	
Protection rating (as per EN 60529)	IP20	
General data		
Dimensions (W / H / D) in mm	127 / 75 / 195 (as desk-top device)	
Weight	approx. 350 g (with batteries)	
Mounting location	Indoors	
Status display	LCD	
Software language	German, English, French, Greek, Italian, Dutch, Portuguese, Spanish, Czech	
Language versions – manual	German, English, French, Greek, Italian, Dutch, Portuguese, Spanish, Czech	
Features		
Display	LCD	
Operation	Rotary push button	
Warranty	5 years	
Certificates and approvals	www.SMA-Solar.com	
Information displayed		
General information	Time, date	
System data	Current output, daily yield, total yield, specific annual yield, CO_2 savings, remuneration	
Accessories		
USB cable	●	
USB plug-in power supply	o	
Replacement batteries	o	
SMA *Bluetooth*® Repeater	o	

● Standard Features o Optional features – Not available

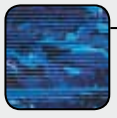
Wireless **communication** with the inverters via *Bluetooth*

Large, easy to read **LC display**

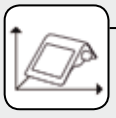
Acoustic **alarm system**

USB interface for data transmission to PC and charging of the batteries

Simple and intuitive operation via the **rotary push button**



Power supply via **solar cell** and battery



Compact and lightweight
Dimensions:
127 x 75 x 195 mm
Weight:
approx. 350 g

Reliable

- Remote monitoring, diagnosis and configuration of the solar plant from anywhere in the world
- Data logger for all key plant data

- Rapid detection of operation failures
- Alarm via E-mail or text message for "Error" events

User-friendly

- Easy remote access via the web browser
- Including free standard access for Sunny Portal for the entire service life of the plant

- Flexible display, evaluation, yield and event reports via Sunny Portal

SUNNY WEBBOX

Remote monitoring and remote maintenance of large solar power plants

The monitoring solution for large solar plants: Sunny WebBox receives and stores all current measurement values and data – via *Bluetooth* or RS485, keeping you up to date on your plant operation, 24 hours a day. In the event of a problem, you can react quickly and secure your yields. The parameters can be changed and a variety of measured values can be depicted, analyzed and downloaded via the Web browser – from anywhere in the world as long as you have the necessary Internet connection. All data of the connected devices are stored and, if desired, automatically transmitted to Sunny Portal. And with the optional GSM modem, measurement data can be transmitted to the Sunny Portal even from remote locations.

*optional with existing GSM modem

Technical data	Sunny WebBox	Sunny WebBox with *Bluetooth*® (Available from July 2010)
Communication		
Inverter communication	RS485, 10/100 Mbit Ethernet (only for Sunny Central)	*Bluetooth*
PC-communication	10/100 Mbit Ethernet	10/100 Mbit Ethernet
Modem	Analog (optional), GSM (optional)	Analog* (optional), GSM (optional)*
Connections		
Inverter	1x SMACOM	See inverter communication
Ethernet	10/100 Mbit, RJ45	10/100 Mbit, RJ45
Max. number of SMA devices		
RS485 / Ethernet	50 / 50	–/–
Bluetooth	–	1 Master: 50 / 2 Masters: 25
Max. communication range		
RS485 / Ethernet	1,200 m / 100 m	–/–
Bluetooth in the open air	–	Up to 100 m (can be extended with an SMA *Bluetooth*® Repeater)
Power supply		
Power supply	External plug-in power supply	External plug-in power supply
Input voltage	100 V – 240 V AC, 50 / 60 Hz	100 V – 240 V AC, 50 / 60 Hz
Power consumption	Typ. 4 W/ max. 12 W	Typ. 4 W/ max. 12 W
Environmental conditions in operation		
Ambient temperature	–20 °C ... +65 °C	–20 °C ... +65 °C
Relative air humidity	5 % ... 95 %, non-condensing	5 % ... 95 %, non-condensing
Memory		
Internal	8 MB in a ring memory configuration	12.5 MB in a ring memory configuration
External	SD card 128 MB/512 MB/1 GB/2 GB (optional)	SD card 128 MB/512 MB/1 GB/2 GB (optional)
General data		
Dimensions (W / H / D) in mm	255 / 130 / 57	255 / 130 / 57
Weight	750 g	750 g
Mounting location	Indoors	Indoors
Installation options	DIN rail installation, wall mounting, tabletop device	DIN rail installation, wall mounting, tabletop device
Status display	LEDs	LEDs
Language versions – software / manual	German, English, French, Greek, Italian, Korean, Dutch, Portuguese, Spanish, Czech	
Features		
Operation	Integrated Web server (Internet browser)	Integrated Web server (Internet browser)
Warranty	5 years	5 years
Certificates and approvals	www.SMA-Solar.com	www.SMA-Solar.com
Accessories		
Sunny SensorBox	Connection via RS485 Power Injector	Connection via SMA Power Injector with Bluetooth®
SMA *Bluetooth*® Repeater	–	For extending the maximum *Bluetooth*® communication range
Sunny Matrix	o	o
SD card 128 MB/512 MB/1 GB/2 GB (optional)	o	o
Outdoor GSM antenna	o	o*
GSM data card	o	o*
RS485 communication cables	o	–

● Standard features o Optional features – Not available

* Analog and GSM modem as well as corresponding accessories not available for first version of Sunny WebBox with *Bluetooth*

Communication with the inverters via RS485 or *Bluetooth*

Presentation of plant data with Sunny Matrix or Flashview

Free, automatic **visualization** of the measurement data in Sunny Portal

SD card slot for optional **memory expansion** and data transfer to a PC

Integrated web server enables **online remote data access** from any web-enabled PC in the world

Integrated FTP server for data transfer and storage on a PC

Individual processing of the measuring data on the PC

Flexible data transfer to an selectable FTP server parallel to Sunny Portal possible

User-friendly

- Central administration of all customer and plant data
- Easy to understand reporting

- World-wide access via the Internet – via PC and mobile phones

Personalization

- Individual configuration of pages and diagrams
- Individual yield and event reports sent via E-mail

Informative

- Fully automatic yield comparison of devices in a plant
- Professional integration in personal Web site

SUNNY PORTAL

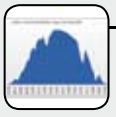
Professional management, monitoring and presentation of PV systems

Whether for a small home system or a large solar park – central administration and monitoring of several PV plants saves time and money. Plant operators, installers and SMA service technicians have access to key data at any time, from any location. Pre-configured standard pages can be easily customized or supplemented with individually designed pages. Whether as a data table or as a highly configurable diagram: SMA solutions allow almost infinite options for analyzing measured data or visualizing yields. The yields of all inverters in a plant are compared fully automatically, permitting detection of even the smallest deviations. And the powerful reporting functions provide regular updates via E-mail to help insure yields.

Technical data	Sunny Portal
Languages	
Available languages	German, English, Spanish, Italian, French, Chinese, Greek, Korean, Portuguese, Czech
System requirements	
Supported operating systems	All / optimized access for mobile end devices
Software	
Recommended browsers	Firefox, Internet Explorer Version 7 and up, Safari
Other	JavaScript and cookies enabled
Supported data logger	Sunny WebBox
Plant management	
Sunny Portal Account	One password for all plants in Sunny Portal
Plant information	
Plant description	Overview of the key properties of the PV system
Annual comparison	Quick yield overview of the entire operating period
Plant log book	Access to messages regarding plant events
Device overview	Properties and parameters of the devices in the PV system
Page design	
Standard pages	Automatic standard pages for the most common plant monitoring and presentation needs
Personalized pages	A variety of templates for page construction
Page modules	Tables, diagrams, own images, free text, plant overview (CO_2, remuneration, energy)
Visualization of yield and measured values	
Diagram types	Selection of six diagram types for optimal presentation of yield & measurement values, bar graphs, area charts, and line charts (with, without, or only tags), as well as XY diagrams
Tables	Individual configuration of charts for all yield and measured values
Time periods	From 5 minutes to 1 year, various time intervals selectable
Monitoring	
Inverter comparison	Fully automatic and ongoing inverter yield comparison and E-mail alarms
Communication monitoring	Ongoing monitoring and, when necessary, alarms for the connection between Sunny Portal and Sunny WebBox
Status reports	
Information reports	Daily or monthly reports on energy yield, maximum output, remuneration, CO_2 reduction, via E-mail, and a self-defined page can also be sent from Sunny Portal
Event reports	Hourly or daily reports on events, warnings, faults and errors, with personalized content and recipients
Report format	Text, PDF, HTML
Individual access	
Publication of specific pages	Access via the public area on Sunny Portal by all Internet users ideal for personalized presentations on personal Web sites
User roles	By assigning the roles of "guest", "standard user", "installer" and "plant administrator", you can easily determine who has which viewing and configuration rights

Management of several PV systems from one central location

Monitoring without having to be on site



Quick overview of measured and yield values of the solar plant

Easy diagnostics through display of measured values and event log

You can rely on high-performance reporting to help safeguard yield

Personalized access to screen options and functions

Flexible page design for individual presentation of your solar plant

Standard pages for the most common views

Reliable

- Rapid error detection via continuous target-actual comparison of plant performance

Informative

- Precise acquisition of irradiation intesity, module temperature, ambient temperature and wind speed values

Easy to install

- Easy installation on the solar generator
- Simple integration into existing PV plants via RS485

- Data analysis on any PC or in the Sunny Portal

SUNNY SENSORBOX

The weather station for PV plants

The Sunny SensorBox is installed directly onto the modules and measures the sun radiation and temperature. In combination with Sunny WebBox and Sunny Portal, it provides a continuous target-actual comparison of plant performance. This makes it possible to detect shade, dirt, and gradually declining performance in a generator and thus maximizes yield security. Additional sensor for optional measurement of ambient temperature or wind speed permit more precise calculations.

Technical data	Sunny SensorBox	
Communication		
Data logger communication	RS485 to Sunny WebBox, RS485 to Sunny Boy Control	
Interfaces		
Sunny WebBox and Power Injector	1x SMACOM / spring terminals	
Max. communication range		
RS485	1.200 m	
Power supply		
Power supply	RS485 Power Injector	
Input voltage	100 V – 240 V AC, 50 / 60 Hz	
Power consumption	< 1 W	
Environmental conditions in operation		
Ambient temperature	–25 °C ... +70 °C	
Protection rating (as per EN 60529)	IP65	
General data		
Dimensions (W / H / D) in mm	120 / 50 / 90	
Weight	500 g	
Mounting location	Outdoor	
Deployment options	Mounting plate, roof bracket	
Language versions – manual	German, English, French, Italian, Spanish, Dutch, Czech, Portuguese, Greek	
Features		
Operation	via the Sunny WebBox interface	
Warranty	5 years	
Certificates and approvals	www.SMA-Solar.com	
Accessories		
Mounting plate	o	
Roof bracket	o	
Wind sensor	o	
Wall mounting bracket for wind sensor	o	
PT100 ambient temperature sensor	o	
PT100 module temperature sensor	●	
RS485 Power Injector	●	
SMA Power-Injector with *Bluetooth*®	o	

● Standard features o Optional features – Not available

Communication with the Sunny WebBox via RS485

Continuous **monitoring** of generator performance in Sunny Portal

Measurement of radiation and module temperature (plus optional measurement of ambient temperature and wind speed)

Easy installation data transmission and energy supply via a common cable

Durable

- Large, weather-proof display for effective plant presentation

Flexible

- Different sized for any application
- Customizable front panel label

- Flexible display
- Integration of own texts and content

User-friendly

- Easy set-up and operation via the Web browser
- Automatic brightness control

SUNNY MATRIX

Attractive large-scale display

All representative plant data a glance: the robust large-format display Sunny Matrix visualizes yield, performance and CO_2 reduction of PV systems in large, luminous figures. Sunny Matrix derives the display data from the Sunny WebBox via the Ethernet interface: either through the local network or via the Internet – from any location in the world. If the solar power system is fitted with a Sunny SensorBox, the local recorded weather data will also be available for display. Various formats, no restriction on layout of text modules, and variable numbers of lines and characters are features which make the Sunny Matrix the ideal information board for solar power systems.

Technical data	Sunny Matrix
Communication	
Data logger communication	Ethernet
Interfaces	
Ethernet	10/100 Mbit, RJ45
Max. number of devices	
Ethernet (Sunny WebBox)	50
Max. communication range	
Ethernet	100 m
System requirements	
Required SMA devices	Sunny WebBox
Power supply	
Input voltage	100 V – 240 V AC, 50 / 60 Hz
Power consumption	Normally 20 W + 5 W per 4-character display module
Max. current input	1.3 A
Environmental conditions in operation	
Ambient temperature	–25 °C ... +60 °C
Protection rating (as per EN 60529)	IP54
General data	
Dimensions (W / H / D) in mm	800 / 400 / 120, 800 / 800 / 120, 800 / 1000 / 120
Weight	15 kg, 20 kg, 25 kg
Mounting location	Outdoor
Deployment options	Wall mounting
Character height	51 mm
Length of lines	4, 8, 12 or 16 characters
Number of lines	max. 2 lines (400 mm model), up to 4 lines (800/1000 mm model)
Line layout	Positioning to customer specification
Font panel design	According to customer specification
Software language	German, English, Italian, Spanish, French, Dutch, Portuguese
Language versions – manual	German, English, Italian, Spanish, French, Dutch, Portuguese
Features	
Operation	Integrated Web server (Internet browser)
Warranty	5 years
Certificates and approvals	www.SMA-Solar.com
Information displayed	
General information	Time, date, personal text, personal web text
System data	Current output, daily yield, total yield, CO_2 saving
Sunny SensorBox data	Ambient temperature, module temperature, internal solar radiation, wind speed
Sunny Island data	Battery charge level
Accessories	
Optional software	Sunny Matrix Admin Tool

Presentation of system performance with high public appeal for indoor or outdoor application

Automatic data synchronization with Sunny WebBox

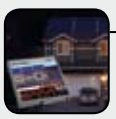
Practically unlimited choice of position and length of **text modules**

Integrated web server for set-up, operation and remote maintenance from any web-enabled PC in the world

Three different **enclosure sizes**

Display of wind, temperature and radiation data in combination with the Sunny SensorBox

Individual design of front panel label according to your specifications



Changing displays, freely editable and ticker text, automatic night switching

Informative

- Attractive presentation on standard displays
- Continuous, current display of the most important system data

- Display of output, yield, environmental and local data

Easy to Use

- Incorporation of own images and logos
- Easy set-up and operation
- Free download

FLASHVIEW

Professional plant presentation free of charge

Yields, current output, environmental and ambient data: Flashview presents solar plants on an ordinary display attached to a PC. Different display views either switch automatically or can be manually selected by the viewer. Flashview queries the plant data from Sunny WebBox via an existing network connection – optionally via the Internet from any location in the world. And you can integrate images of your own plant as well as external RSS feeds.

Technical data	Flashview
Languages	
Available languages	German, English, Spanish, Italian, French, Chinese, Greek, Korean, Portuguese, Dutch, Czech
System requirements	
Supported operating systems	Windows XP (Service Pack 2) Windows Vista Apple Macintosh OS X
Required SMA devices	Sunny WebBox
Communication	
Data logger communication	Ethernet
Type	IP address, URL (e.g., DynDns)
Max. number of devices	
Ethernet	10
Max. communication range	
Ethernet	100 m
Software	
Other	WinZip
Hardware (minimum requirements)	
Processor	1 GHz
Main Memory	256 MB
Free hard disk space	12 MB
Resolution	1280 x 1024 pixels
Color depth	256 colors
Information displayed	
General information	Time
System Data	Current output, daily yield, total yield, CO_2 saving
Sunny SensorBox data	Ambient temperature, module temperature, internal solar radiation, wind speed
Other information	Kilometers driven, remuneration
Additional pages	Partner page for personal advertising campaigns, RSS feed news ticker
Individual set-up options	
Values	CO_2 factor, number format, length unit weight unit, temperature unit
Other	Name of plant, personal wallpaper
Features	
Operation	PC keyboard, automatic switching of slide show after 5, 10, 20 or 30 seconds

Easy to operate

Automatic data synchronization with Sunny WebBox

Flexible set-up options

Free download

Display of key **performance parameters**

News ticker with **RSS feed**

Individual design with personal wallpaper

Attractive **visual presentation**

Reliable

- Complies with the directives of the German EEG* amendment on feed-in management
- Logging of all events and change of status

- Meets the requirements of the German BDEW Medium-Voltage Directive (BDEW)** for grid safety management

Flexible

- Active power limitation and reactive power setpoint
- Reliably controls up to 2,500 inverters

Easy to use

- Straightforward integration into existing systems
- Easy Installation
- Free support from the SMA Service Line
- Integrated web server

POWER REDUCER BOX

Feed-in management for large-scale PV plants

With the Power Reducer Box, SMA delivers a solution for large PV plants that must take part in feed-in management: it allows the grid operator to control the plant performance remotely. It achieves this by translating the setpoint values transmitted via radio ripple control receiver into control commands for the Sunny WebBox, which forwards them to the inverters. During this process, each change of status is logged twice: once in the Power Reducer Box and once in the Sunny WebBox.The Power Reducer Box automatically transmits the data to the Sunny Portal if desired – informing the operator immediately of the utility operator's requirements.

* German Renewable Energies Act
** Guideline established by the German Federal Association for Energy and Water

Technical data	Power Reducer Box	
Communication		
Communication with Sunny WebBox	Ethernet	
PC communication	Ethernet	
Interfaces		
Radio ripple control receiver (AUX COM)	4 digital inputs	
Ethernet	10/100 Mbit, RJ45	
Max. number of SMA devices		
Sunny WebBox	50	
Max. communication range		
Ethernet	100 m	
Power supply		
Power supply	Plug-in power supply	
Input voltage	100 V – 240 V AC, 50 / 60 Hz	
Power consumption	Type 4 W / max. 12 W	
Environmental conditions in operation		
Ambient temperature	–20 °C ... +60 °C	
Relative air humidity	5 % ... 95 %, non-condensing	
Memory		
Internal	16 MB in a ring memory configuration	
External	SD card 128 MB / 512 MB / 1 GB / 2 GB	
General data		
Dimensions (W / H / D) in mm	255 / 130 / 57	
Weight	750 g	
Mounting location	Indoors	
Deployment options	DIN rail mounting, wall mounting	
Status display	LEDs	
Software language	German, English	
Language versions – manual	German, English	
Features		
Operation	Integrated Web server (Internet browser)	
Warranty	5 years	
Certificates and approvals	www.SMA-Solar.com	
Accessories		
Plug-in power supply with adaptors	●	
Red Ethernet cable (patch cable)	●	
Blue Ethernet cable (crossover cable)	●	
Screwdriver	●	
Plug for AUXCOM (plug, connector shell, cable tie) with 2.5 meter cable	●	
Screws and anchors	●	
Technical Description with drilling template	●	
SD Card, 2GB	o	

● Standard features o Optional features – Not available

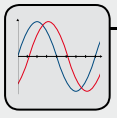
Suitable for large-scale plants with up to 2,500 inverters

Compliance with legislation **(§6 EEG 2009)**

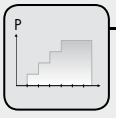
Rapid and simple commissioning

Double logging of all switching operations

Operating history can be recalled at any time **online via Sunny Portal.**



Default setting **of reactive power or cos φ**



Gentle gradual reconnection of plant in compliance with the Medium-Voltage Directive**

Integrated web server for **remote online access** from any PC

Professional

- Visualization, control and monitoring of large-scale plants
- Integration of SMA devices into existing control-room technology such as GLT and SCADA systems

Flexible

- Data interface in accordance with the communication standard OPC-DA / OPC-XML-DA
- Simple and fast installation, high reliability

- Compatible with WinCC, InTouch, LabView, etc.

SMA OPC SERVER

The standardized data interface for large-scale systems

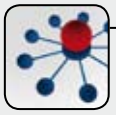
Particularly for large-scale plants and PV power stations, customized monitoring solutions are needed to link systems and components supplied by different manufacturers into one joint control system. OPC, the international communication standard in the field of automation technology, plays an important role in this: it enables simple and reliable data exchange between products and applications supplied by different vendors. With the SMA OPC Server, SMA devices can be very easily integrated into OPC-compatible systems.

Technical data	SMA OPC server	
Languages		
Available languages	German, English, French	
System requirements		
Supported operating systems	Windows XP Professional (Service Pack 2) Windows Server 2003 (recommended)	
Required SMA devices	Sunny WebBox	
Hardware (minimum requirements)		
Processor	2 GHz	
Main memory	2 GB	
Free hard disk space	2 MB	
Resolution	1024 x 768 pixels	
Drives	CD-ROM	
Software		
	Microsoft .NET Framework 2.0 OPC core components	
Communication		
Sunny WebBox communication	Ethernet	
OPC communication	OPC-DA and OPC-XML-DA	
Max. number of devices		
Ethernet	50 Sunny WebBox devices	
Supports the following systems		
OPC clients	Wonderware InTouch LabView Siemens WinCC National Instruments LabVIEW	
Packing List		
	CD-ROM, documentation	
Functionality		
Data update	Up to 10 seconds	
Unidirectional data exchange	Inverter measured values	
Two-way data exchange	Inverter parameters	
Other		
Legal notice	Operation with valid license contract only	

Visualize PV power stations professionally

International **OPC standard**

Simple installation and intuitive configuration

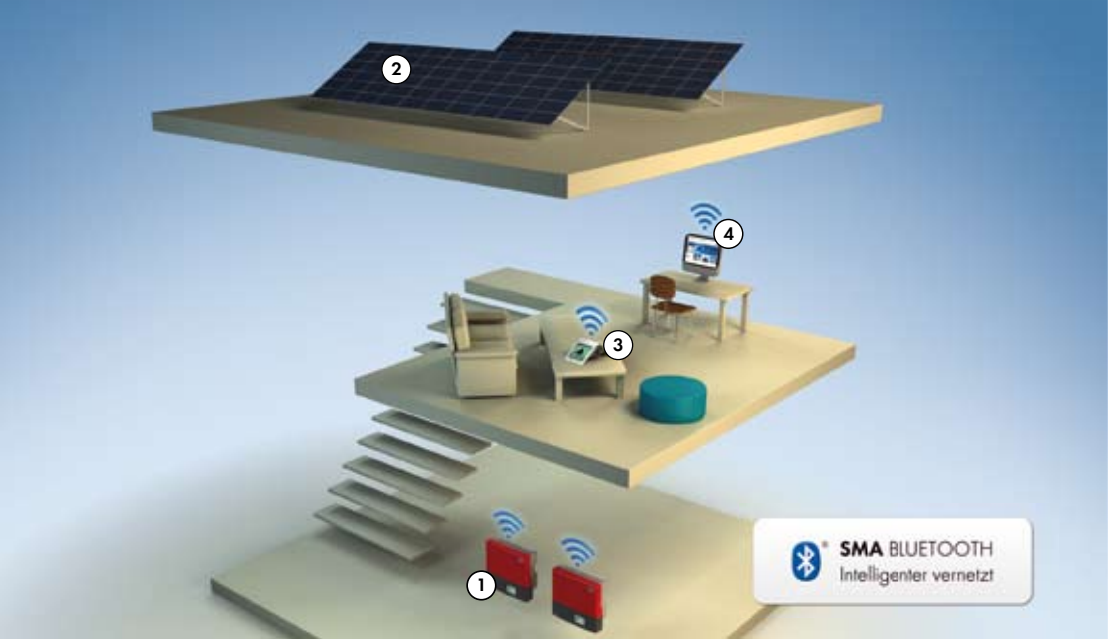


Standardized **interfaces** to the PV system

Simple integration of the PV plant into existing visualization systems

Real-time plant data for monitoring and controlling the PV plant

Monitoring of multiple plants from a central point



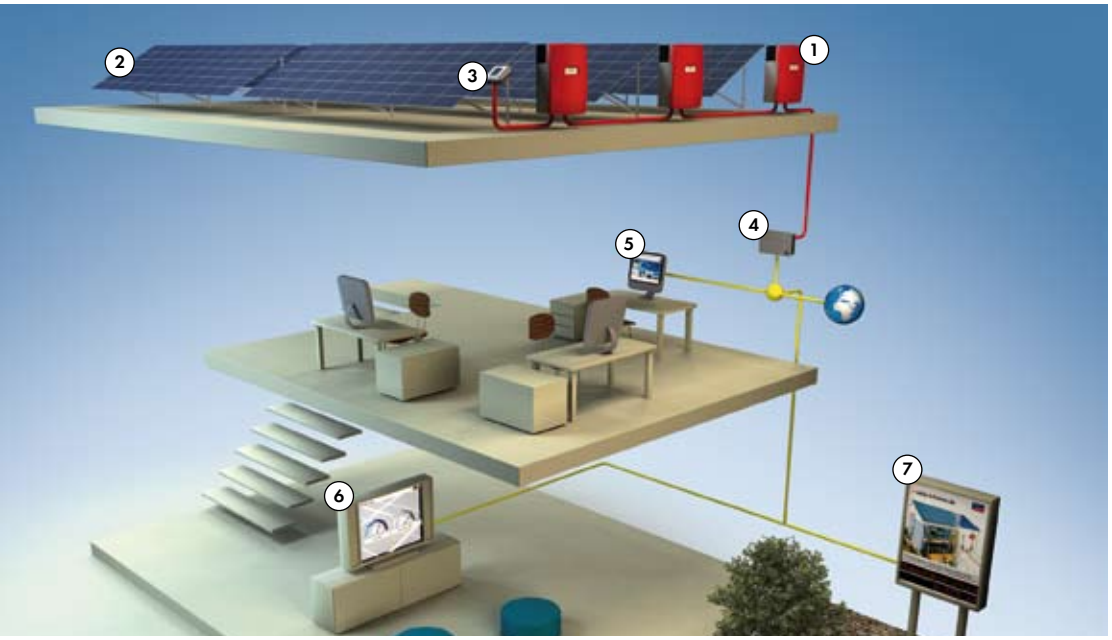
Typical system design – wireless transmission

Electricity generation

(1) SUNNY BOY
(2) PV generator

Plant monitoring

(3) SUNNY BEAM
(4) SUNNY EXPLORER



Typical system design – cable transmission

Electricity generation

(1) SUNNY MINI CENTRAL
(2) PV generator

Plant monitoring

(3) SUNNY SENSORBOX
(4) SUNNY WEBBOX
(5) SUNNY PORTAL
(6) FLASHVIEW
(7) SUNNY MATRIX

RS485
Local network / Internet

Bluetooth

- Automatic networking of up to 50 devices
- Range of up to 100 m in the open air
- Compatible with standard *Bluetooth* devices

RS485

- Greatest reliability via symmetrical signal transmission
- Various accessories available (radio links, fiber optic converters)

Wireless or cable

Secure connection with and without cable

To monitor solar power systems, data has to be transmitted. This can be power values or energy yields. For the communication between the solar inverter and monitoring devices, SMA provides two basic choices: wireless and wired variants. Both have advantages and are used with different sized systems. Here you can obtain more information to decide which method of communication best suits your PV plant.

	Bluetooth (radio connection)	RS485 wiring
Typical application	Especially for small and mid-sized solar power plants	For mid-sized and large solar power plants
Advantages	Reduced costs and effort	High speed and reliability
Number of participants (system monitoring and inverters)	Up to 50 per *Bluetooth* network	Up to 50 per RS485 bus
Range	Up to 100 meters in the open air between individual devices	1,200 meters per RS485 bus
Number of data retrieval devices (for example, Sunny Beam or Sunny WebBox)	Up to four per network	One per RS485 bus

Wireless Success – Intelligently Networked with SMA *Bluetooth*

With SMA *Bluetooth*, wireless networks can be created simply and quickly – without the additional effort of having to lay cables in walls, re-plastering or painting – so it's perfectly suited to your private home rooftop system.

Bluetooth, the international wireless standard, makes your monitoring flexible and extendable. Installers and plant operators save time and installation costs. Thanks to *Bluetooth* all new inverters are recognized in a flash and automatically integrated into the system. With the intelligent networking concept, up to 50 devices can be integrated in a network. *Bluetooth* Class 1 is the used standard, which enables communication over longer distances. And if that's not enough, for example because walls or ceilings are in the way, you can also use the SMA *Bluetooth* Repeater.

Bluetooth also stands up in terms of reliability. Thanks to constant frequency changes and the transmission of data packets in small units, the radio connection is extremely stable. And the broadcast power is always adapted to the requirements at hand. By the way: the password protection built in to all devices secures your data against unauthorized access.

Robust and Secure: powerful across long distances with proven RS485 wiring

The RS485 fieldbus is a veteran in the area of cable-connected communication technology. It has been used by SMA for many years and has proven itself in a nearly endless number of systems. All devices are connected to each other in a chain (a so-called data bus). At the end of this chain, the Sunny WebBox collects all the data and reliably informs you of the status of the PV plant. The advantage of RS485 wiring: functional lengths of up to 1,200 meters and reliable data transmission even in interference-prone areas. Especially for larger solar power systems, operators require maximum security and reliability.

OFF-GRID INVERTERS

Off-Grid Inverters by SMA: System manager for all types of energy generators

Secure power supply for stand-alone 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 a 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 in charge of setting up a stable stand-alone grid. In doing this, it holds the voltage and frequency of the AC grid constant within the specified 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 energy 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 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.

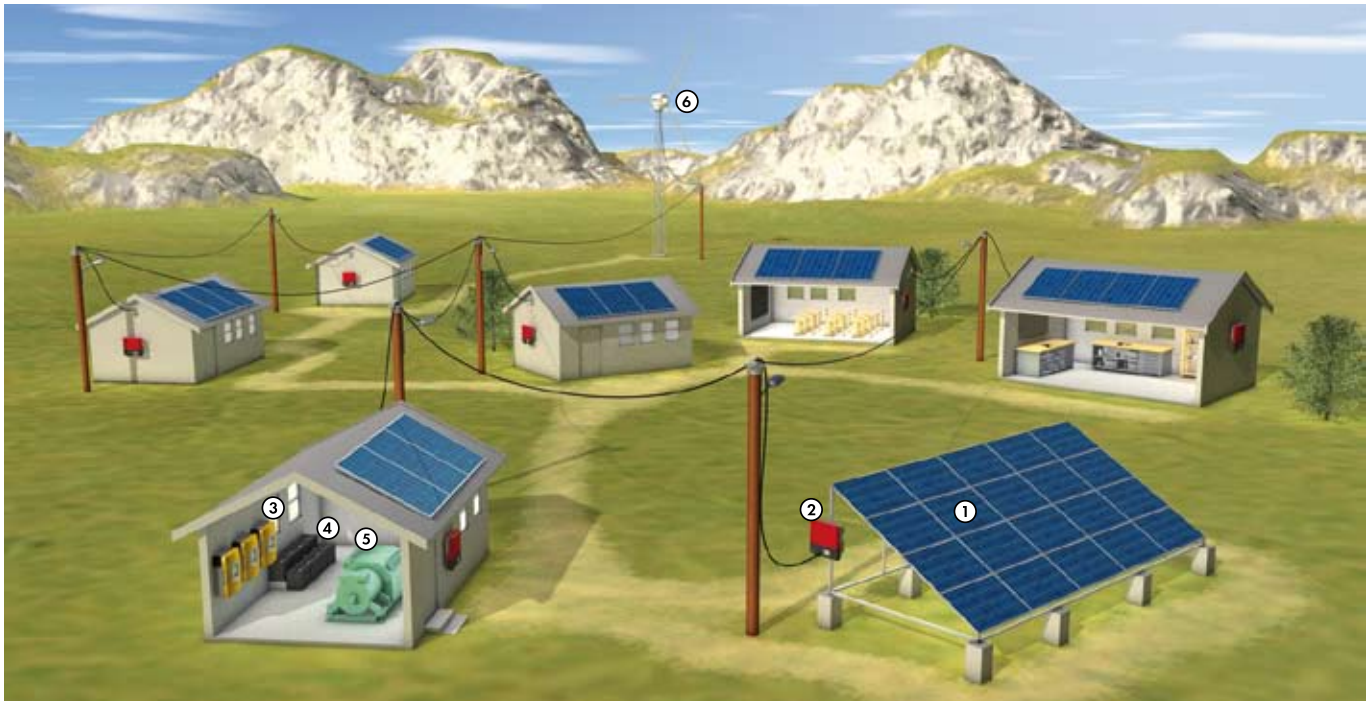
Flexible grid layout

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 does away with costly DC cabling. For smaller systems, SMA offers the Sunny Island Charger, an MPP charge regulator for a 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 cost-effectively adapted to increasing electricity demands.

Expandable up to 300 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 Islands 5048s 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, which ensures a secure stand-alone grid supply.

To find out more, see page 208.



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 300 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
- Charge level calculation

Robust

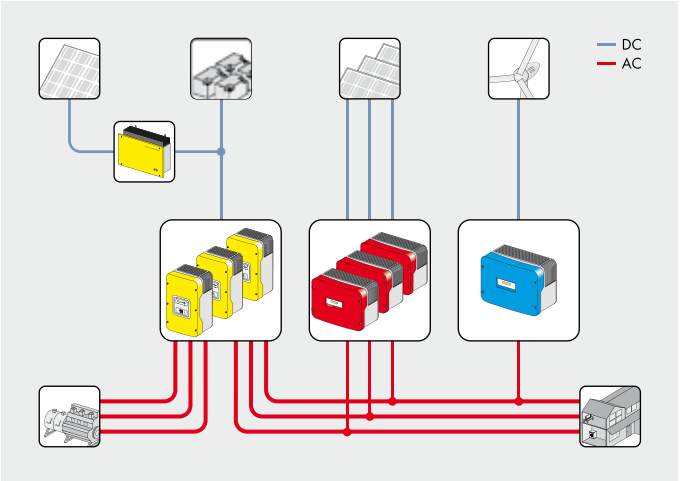
- Extreme overload capability
- OptiCool
- 5-year SMA warranty

SUNNY ISLAND 5048 / 5048-US

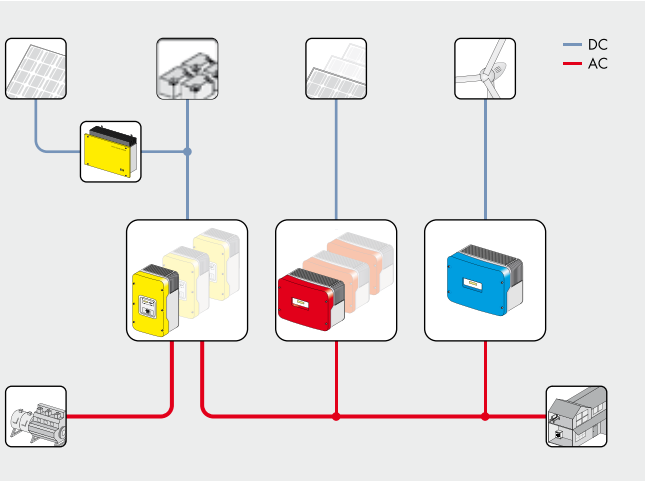
The Island Manager

Commissioning within minutes: the Sunny Island 5048 makes it possible. All required operational settings can be made quickly and easily in just a few steps. 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 features an impressive high-efficiency, ergonomic die-cast aluminum enclosure and an OptiCool active cooling system. The Sunny Island is also available in a UL-compliant 5048-US version with an output rating of 120 V and 60 Hz for the North American market.

Technical data	Sunny Island 5048	Sunny Island 5048-US
AC output (loads)		
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 / 3 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
THD output voltage / power factor (cos φ)	< 3 % / –1 to +1	< 3 % / –1 to +1
AC input (generator or grid)		
AC input voltage (range)	230 V (172.5 V – 264.5 V)	120 V (80 V – 150 V)
AC 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, NiCd / 100 – 10,000 Ah	lead, 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 protection / DC fuse	●/●	●/●
AC short-circuit / AC overload	●/●	●/●
Overtemperature / excessive battery discharge	●/●	●/●
General data		
Dimensions (W / H / D) 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 (as per IEC 60529)	indoors (IP30)	indoors (NEMA 1)
Features / function		
Operation & display / multifunction relays	internal / 2	internal / 2
3-phase systems / parallel connection	●/●	●/●
Integrated bypass / multicluster operation	–/●	–/ ●
Charge level calculation / full- / equalization charge	●/●/●	●/●/●
Integrated soft start / generator support	●/●	●/●
Battery temperature sensor / communication cables	●/●	●/●
Warranty: (5 / 10 / 15 / 20 / 25 years)	●/O/O/O/O	●/O/O/O/O
Certificates and permits	www.SMA-Solar.com	www.SMA-Solar.com
Accessories		
Battery cables / battery fuses	O/O	O/O
Interfaces (RS485 / Multicluster PB)	O/O	O/O
"GenMan" extended generator start	O	O
Load-shedding contactor / battery current measurement	O/O	O/O
● Standard features O Optional features – not available		
Last revision: May 2010		
Type designation	SI 5048	SI 5048U



Three-phase system



Single-phase system

Simple

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

Efficient

- High efficiency
- Excellent price-performance ratio

Durable

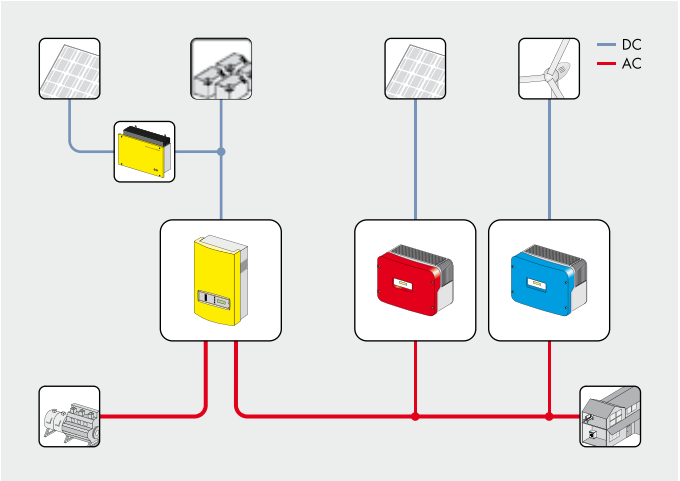
- Extreme overload capability
- 5-year SMA Warranty

SUNNY ISLAND 3324 / 4248 / 4248-US

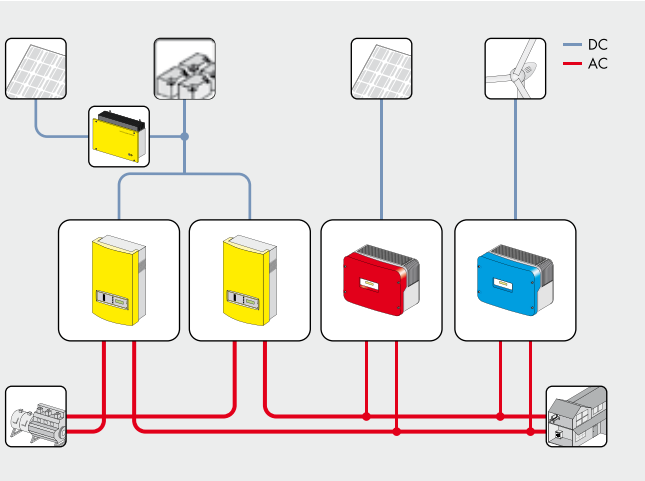
Stand-alone grids easier than ever

Easy installation, safe operation and outstanding price-performance 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 4248-US 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 4248-US
AC output (loads)			
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 / 3 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
THD output voltage / power factor (cos φ)	< 3 % / –1 to +1	< 3 % / –1 to +1	< 3 % / –1 to +1
AC input (generator or grid)			
AC input voltage (range)	230 V (172.5 V – 264.5 V)		120 V (80 V – 150 V)
AC 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 / 100 – 6,000 Ah	lead / 100 – 6,000 Ah	lead / 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 protection / DC fuse	●/●	●/●	●/●
AC short-circuit / AC overload	●/●	●/●	●/●
Overtemperature / excessive battery discharge	●/●	●/●	●/●
General data			
Dimensions (W / H / D) 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 (according to IEC 60529)	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	–/–	–/–	–/–
Charge level calculation / full- / equalization charge	–/●/●	–/●/●	–/●/●
Integrated soft start / generator support	●/–	●/–	●/–
Battery temperature sensor / communication cables	●/–	●/–	●/–
Warranty: (5 / 10 / 15 / 20 / 25 years)	●/O/O/O/O	●/O/O/O/O	●/O/O/O/O
Certificates and permits	www.SMA-Solar.com	www.SMA-Solar.com	www.SMA-Solar.com
Accessories			
Battery cables / battery fuses	O/O	O/O	O/O
Interfaces (RS485 / Multicluster PB)	O/–	O/–	O/–
"GenMan" extended generator start	O	O	O
Load-shedding contactor / battery current measurement	O/–	O/–	O/–
● Standard features O Optional features – not available			
Last revision: May 2010			
Type designation	SI 3324	SI 4248	SI 4248U



Single-phase system



Split-phase system (only with Sunny Island 4248-US)

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
- Charge level calculation
- Intelligent battery management for maximum battery life-span

Durable

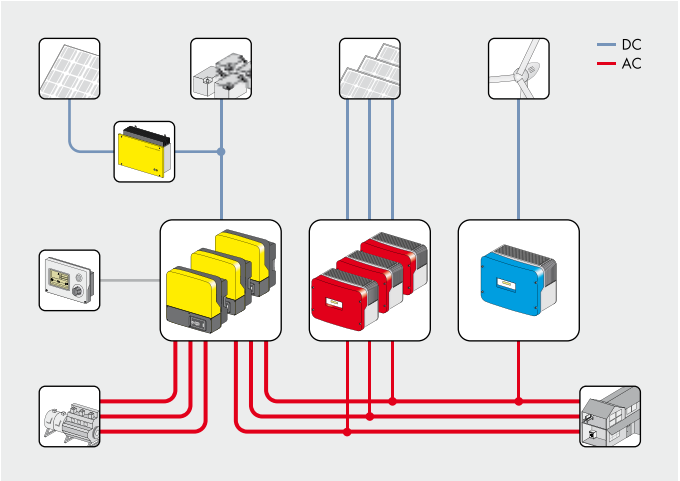
- For indoor and outdoor installation
- Excellent overload characteristics
- Very wide temperature range
- 5-year SMA Warranty

SUNNY ISLAND 2012 / 2224

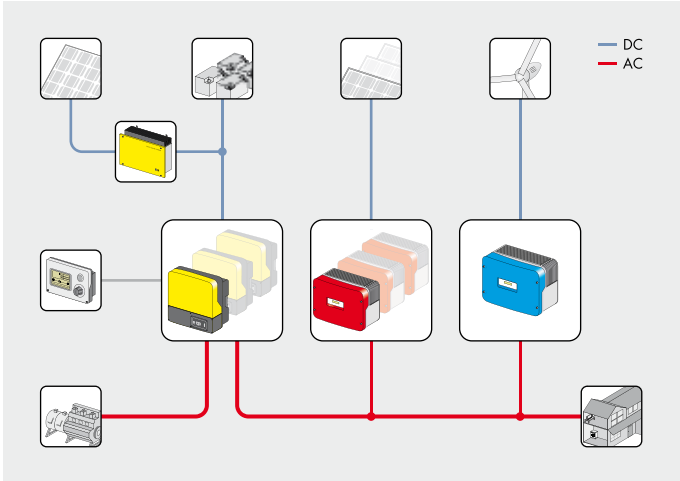
Compact and powerful for small stand-alone systems

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 "big brother" Sunny Island 5048 – thanks to their reduced weight and compact design, the new family members are even easier to handle and install. The high IP54 protection class 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 (loads)		
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 / 3 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 ca. 500 ms	9.6 A / 25 A for ca. 500 ms
THD output voltage / power factor (cos φ)	< 4 % / –1 to +1	< 4 % / –1 to +1
AC input (generator or grid)		
AC input voltage (range)	230 V (172.5 V – 264.5 V)	230 V (172.5 V – 264.5 V)
AC 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, NiCd / 100 – 10,000 Ah	lead, 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 protection / DC fuse	–/–	–/–
AC short-circuit / AC overload	●/●	●/●
Overtemperature / excessive battery discharge	●/●	●/●
General data		
Dimensions (W / H / D) 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 (according to IEC 60529)	outdoor installation (IP54)	outdoor installation (IP54)
Features / function		
Operation & display / multifunction relays / search mode	external via SRC-1 / 2 / ●	external via SRC-1 / 2 / ●
3-phase systems / parallel connection	●/●	●/●
Integrated bypass / multicluster operation	●/–	●/–
Charge level calculation / full- / equalization charge	●/●/●	●/●/●
Integrated soft start / generator support	●/●	●/●
Battery temperature sensor / communication cables	●/●	●/●
Warranty: (5 / 10 / 15 / 20 / 25 years)	●/o/o/o/o	●/o/o/o/o
Certificates and permits	www.SMA-Solar.com	www.SMA-Solar.com
Accessories		
Battery cables / battery fuses	o/o	o/o
Interfaces (RS485 / Multicluster PB)	o/–	o/–
"GenMan" extended generator start	o	o
Load-shedding contactor / battery current measurement	o/o	o/o
● Standard features o Optional features – not available		
Last revision: May 2010		
Type designation	SI 2012	SI 2224



Three-phase system



Single-phase system

Flexible

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

Simple

- Easy installation and commissioning
- Operation and configuration via Sunny Island (Single Point of Operation)

Efficient

- Active MPP tracking
- Efficiency > 98 %

Durable

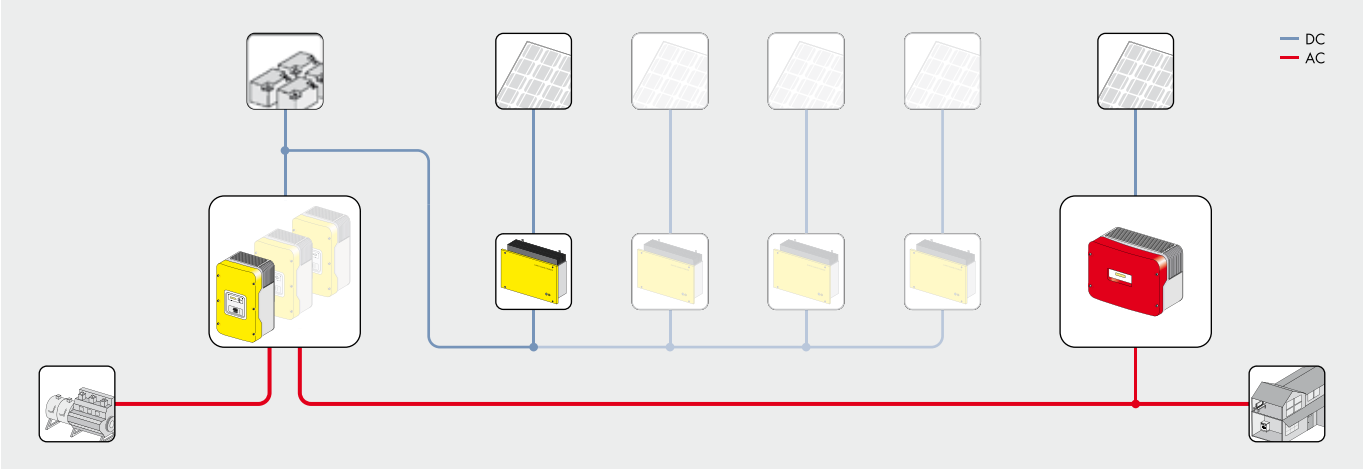
- Outdoor installation possible due to IP65
- Fanless
- Nominal power up to 40 °C
- 5-year SMA Warranty

SUNNY ISLAND CHARGER 40

SMA DC coupling: maximum efficiency and applicable everywhere

AC and DC coupling optimally coordinated and, for the first time, from a single manufacturer: the all-purpose Sunny Island Charger 40 by SMA. Its broad DC input voltage range makes sensible system configuration possible for almost all PV modules. Thanks to the integrated MPP tracking system, the charger guarantees an energy yield that is between 15 to 30 percent higher than that of conventional shunt and serial charge controllers. Its unique features for charge controllers of this power range include the high protection rating, fanless operation and the broad temperature range that makes worldwide use possible even in difficult ambient conditions. The easy installation and completely automatic customization of the key controller settings by the Sunny Island make its startup foolproof.

Technical data	Sunny Island Charger 40		
	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	40 V – 80 V	70 V – 100 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
Nominal voltage range	8 V – 15.6 V	16 V – 31.5 V	36 V – 65 V
Battery type	flooded 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			
Max. efficiency	98 %	98 %	98 %
Euro ETA	97.3 %	97.3 %	97.3 %
Device protection			
DC reverse polarity	●	●	●
Short-circuit proof	●	●	●
Overload protection	●	●	●
Over- and undervoltage protection	●	●	●
Over- and undertemperture protection	●	●	●
General data			
Dimensions (W / H / D) in mm	421 / 310 / 143	421 / 310 / 143	421 / 310 / 143
Weight	10 kg	10 kg	10 kg
Protection class (according IEC 60529)	IP65	IP65	IP65
Operating temperature range	-25 °C ... +60 °C	-25 °C ... +60 °C	-25 °C ... +60 °C
Air humidity	0 % – 100 %	0 % – 100 %	0 % – 100 %
Daytime operating consumption	< 5 W	< 5 W	< 5 W
Internal consumption at night	< 3 W	< 3 W	< 3 W
Features and functions			
Display	multicolored LED	multicolored LED	multicolored LED
Setting parameters	plug and play in combination with SI 5048, SI2224, SI2012 (Sync Bus Piggy Back required) DIL switch with stand-alone applications		
Parallel operation	Up to 4 devices	Up to 4 devices	Up to 4 devices
Interface: Sync Bus Piggy-Back	o	o	o
External temperature sensor (KTY type)	o	o	o
Warranty: 5 / 10 / 15 / 20 / 25 years	●/o/o/o/o	●/o/o/o/o	●/o/o/o/o
Certificates and permits	CE	CE	CE
● Standard features o Optional features – not available			
Last revision: May 2010			
Type designation	SIC40-MPT	SIC40-MPT	SIC40-MPT



Similar to figure

Flexible

- 3 different sizes from 30 to 300 kW
- Different generator, PV and load sizes

Simple

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

Reliability

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

Durable

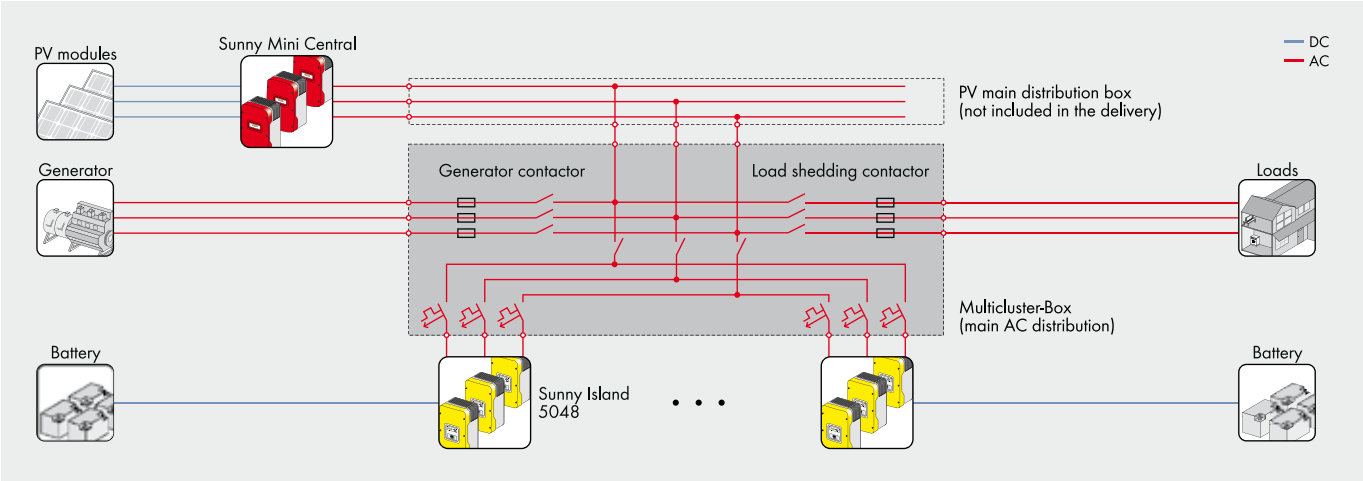
- IP65 high protection class
- 5-year SMA Warranty

Multicluster Boxes for SUNNY ISLAND 5048

For easy set-up of stand-alone and hybrid systems

Large off-grid systems with minimum effort: the new Multicluster-Boxes for the Sunny Island 5048 are the ideal solution for the easy installation of island and hybrid systems from 30 up to 300 kW. For this, 2 to 12 three-phase clusters, each consisting of 3 Sunny Island inverters, are connected in parallel. We designed the Multicluster Box as an AC distribution center for connecting generators and to supply loads up to 300 kW especially for these systems. 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 required for the installation are included in the delivery.

Technical data	Multicluster-Box 6	Multicluster-Box 12	Multicluster-Box 36
General			
Number of phases	3-phase	3-phase	3-phase
Nominal AC voltage	230 V (L,N), 400 V (L1, L2)	230 V (L,N), 400 V (L1, L2)	230 V (L,N), 400 V (L1, L2)
AC voltage range	172.5 V – 265 V, 300 V – 433 V	172.5 V – 265 V, 300 V – 433 V	172.5 V – 250 V, 300 V – 433 V
Nominal AC frequency (range)	50 Hz (40 Hz – 70 Hz)	50 Hz (40 Hz – 70 Hz)	50 Hz (40 Hz – 70 Hz)
Permitted grid structure	TN	TN	TN
Dimensions (W / H / D) in mm	760 / 760 / 210	1000 / 1400 / 300	1200 / 2000 / 850
Mounting type	suspended	standing on a plinth	standing on a plinth
Weight	60 kg	140 kg	300 kg
Connections for Sunny Island			
Number of devices	6	12	36
Continuous AC power / AC current at 25 °C	30 kW / 3 x 44 A	60 kW / 3 x 87 A	180 kW / 3 x 260 A
Continuous AC power / AC current at 45 °C	24 kW / 3 x 35 A	48 kW / 3 x 70 A	144 kW / 3 x 209 A
AC power / AC current for 30 min.	40 kW	80 kW	234 kW / 3 x 340 A
AC power / AC current for 1 min.	50 kW	100 kW	300 kW / 3 x 440 A
Fuses	circuit breaker C32A	circuit breaker C32A	circuit breaker C32A
PV system connection			
Quantity	1 (three-phase)	1 (three-phase)	1 (three-phase)
Continuous AC power PV / continuous AC current PV at 25 °C	55 kW / 3 x 80A	110 kW / 3 x 160 A	300 kW / 3 x 435 A (AC1)
Fuses	–	–	–
Load connection			
Quantity	1 (three-phase)	1 (three-phase)	1 (three-phase)
Nominal power / current at 25 °C	55 kW / 3 x 80A	110 kW / 3 x 160 A	300 kW / 3 x 435 A (AC1)
Fuses	NH00	NH00	NH03
Generator connection			
Quantity	1 (three-phase)	1 (three-phase)	1 (three-phase)
Nominal generator power / current at 25 °C	55 kW / 3 x 80A	110 kW / 3 x 160 A	300 kW / 3 x 435 A (AC1)
Fuses	NH00	NH00	NH03
Features / function			
Warranty: (5 / 10 / 15 / 20 / 25 years)	●/○/○/○/○	●/○/○/○/○	●/○/○/○/○
Certificates and permits	CE	CE	CE
Ambient Conditions			
Ambient temperature (SBU, AS-box)	-25 °C ... +50 °C	-25 °C ... +50 °C	-25 °C ... +60 °C
Protection class (according IEC 60529)	IP65	IP65	IP55
Air humidity	0 % ... 100 %	0 % ... 100 %	0 % ... 100 %
Accessories			
Communication cables	●	●	●
Multicluster Piggy-Back	○	○	○
● Standard features ○ Optional features – not available			
Dated May 2010			
Type designation	MC-BOX-6.3	MC-BOX-12.3	MC-Box-36.3



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 power factor adjustment
- Integrated load frequency statistics

Robust

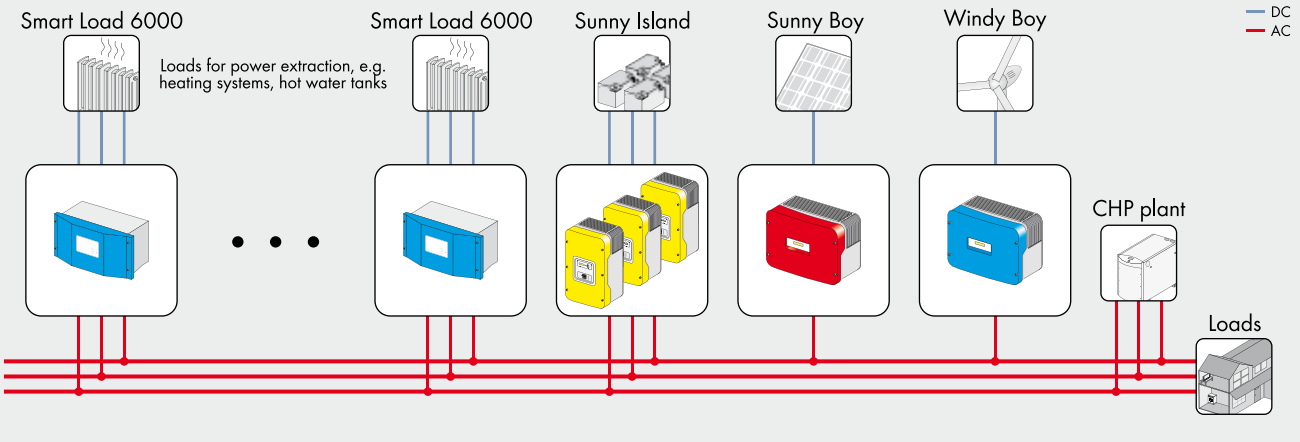
- IP65 high protection class
- 5-year SMA Warranty

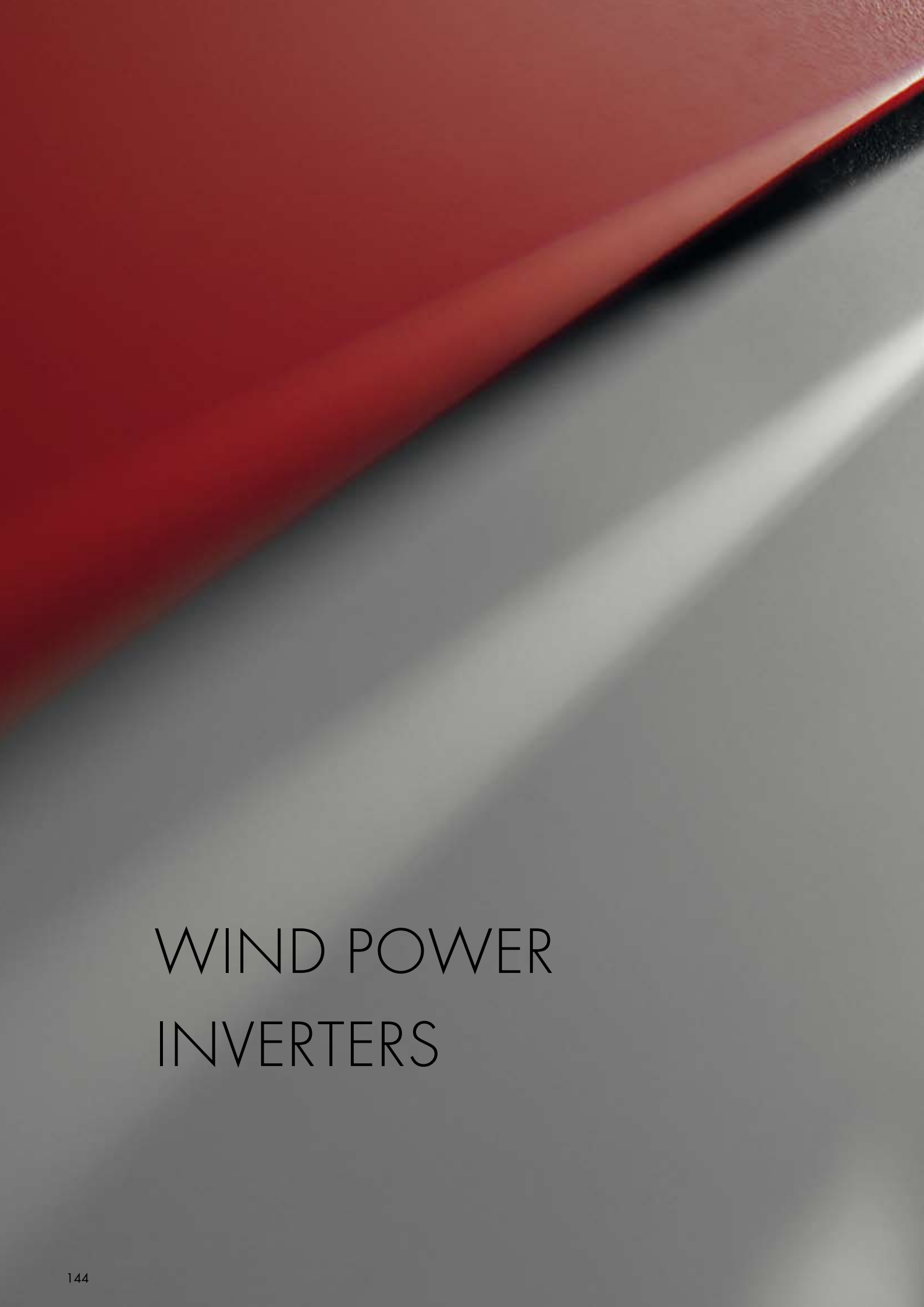
Smart Load for SUNNY ISLAND

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 control system is completely automatic, lightning 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.

Technical data	Smart Load 6000	
Input Data		
Nominal input voltage	230 V (single-phase) / 3 x 400 V / 230 V with a load-withstanding neutral conductor	
System frequency	45 – 55 Hz, 55 – 65 Hz	
Input voltage range	3 x 180 – 270 V	
Output Values		
Output voltage	3 x 0 – 230 V	
Output power per phase (3-phase / 1-phase)	3 x 2 kW / 6 kW	
Connections for	3 individual resistors at 2 kW, 1 individual resistor at 6 kW	
Protection devices		
DC short circuit	●	
DC open circuit	●	
AC short circuit	●	
Overload	●	
General data		
Dimensions (W / H / D) in mm	435 / 325 / 215	
Weight	14 kg	
Operating temperature range	–25 °C ... +50 °C	
Degree of protection	IP65	
Features		
Warranty: (5 / 10 / 15 / 20 / 25 years)	●/○/○/○/○	
Certificates and permits	CE	
● Standard features ○ Optional features – not available		
Last revision: May 2010		
Type designation	SL-6000	





WIND POWER INVERTERS

WINDY BOY
Grid connection of small wind turbine systems

Versatile

Drawing on our experience of over six gigawatts of installed inverter output across the world, we developed the Windy Boy series as an inverter family for grid connection of small wind energy plants. The series includes a variety of device types for the 1 to 21 KW performance range that are suited for use with wind generators of a number of different manufacturers and performance classes.

High Yields

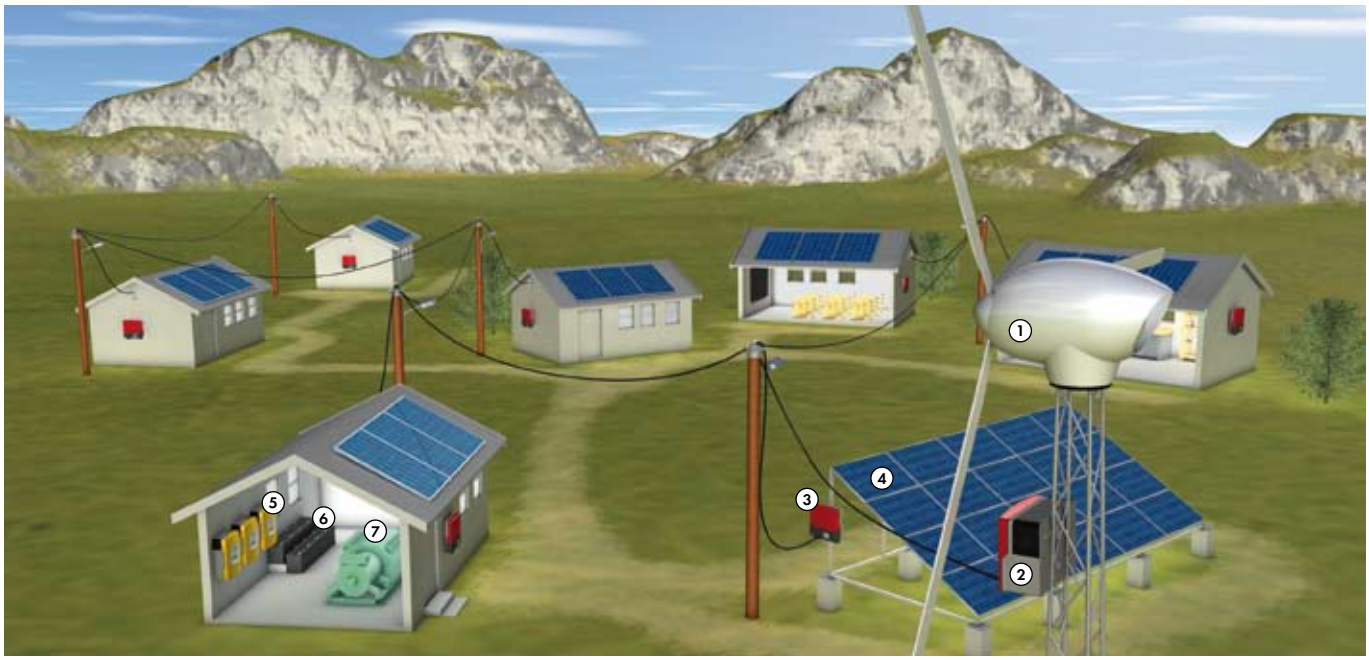
A wind plant can only achieve high yields when the inverter is ideally suited to the wind generator's performance characteristics. This is the advantage of SMA's programmable polynomial curve: because the performance curve of wind turbines of all sorts can be depicted with a polynomial, the turbine and the inverter can be optimally adjusted to one another. This improves yields, especially when the wind speed is low. The constantly changing slope of the polynomial curve also minimizes mechanical strain on the turbine by gently and gradually shifting the load, even during significant speed fluctuations.

All-Purpose

Its transformer-based concept, the independent Grid Guard disconnection device, the automatic 50 / 60 Hz detection, as well as certification for the most important countries of installation permit installation nearly anywhere in the world, while ensuring low installation costs and simplified commissioning procedures.

Reliable

Converting the wind energy plant's speed dependant voltage to grid-compliant alternating current is easier than ever: the Windy Boy Protection Box and the Windy Boy make it possible to use permanent magnet generators to connect small wind energy plants to the grid for safe and reliable operation. The Windy Boy Protection Box converts the wind generator's speed dependant AC voltage to DC voltage, and protects the Windy Boy from high input voltages. The input voltage is fed to an external load resistance. The Windy Boy thus converts the generated direct current to alternating current suitable for the grid.



Components: 1. Wind turbine system, 2. WINDY BOY, 3. SUNNY BOY, 4. Solar generator, 5. SUNNY ISLAND, 6. Batteries, 7. Diesel generator

Efficiency

- Up to 96.1 % efficiency
- Can be combined to form three-phase units with up to 21 kW output
- Integrated SMA Power Balancer
- OptiCool: Continuous operation even at high temperatures

Easy to use

- Free choice of installation site
- Programmable polynomial curve enables free selection of turbines
- Certified for the most countries (SMA Grid Guard)

Safe

- Galvanic Isolation
- Compatible with Windy Boy Protection Box 600

Reliable

- Worldwide SMA Service including Serviceline
- Comprehensive SMA warranty program

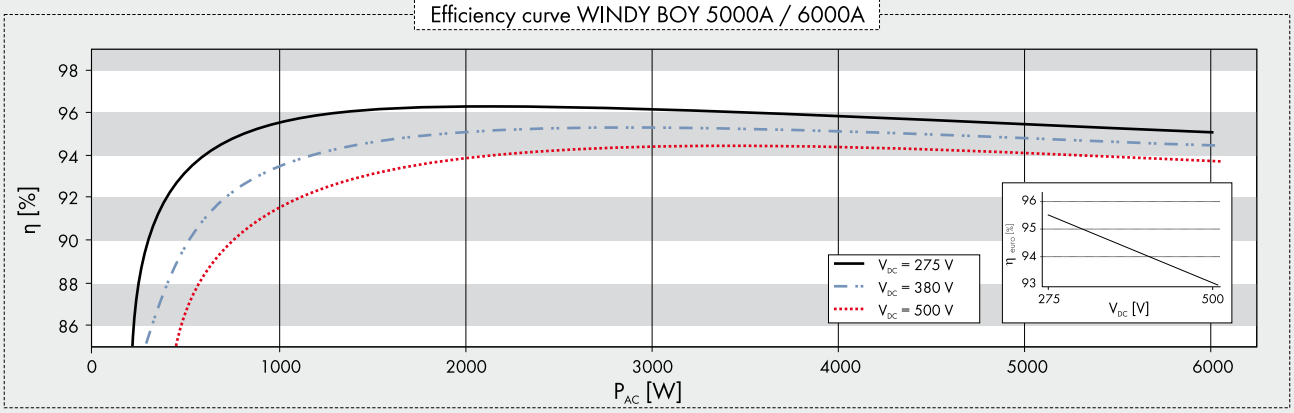
WINDY BOY 5000A / 6000A / 7000HV

The performance class up to 21 kW

The Windy Boy 5000A, 6000A and 7000 HV not only feature a maximum efficiency of 96.1 percent, but are also suited for the development of three-phase grid-feeding wind energy plants. The integrated SMA Power Balancer prevents undue load unbalance, and the plant is also able to feed-in even if individual phases fail. The weather-proof enclosure and the wide temperature range allow for installation at almost any location. Thanks to the OptiCool ventilation system, the equipment works at outdoor temperatures of up to 45 °C with maximum output. And in case of a problem: the worldwide SMA Service and comprehensive warranty program provide maximum security.

Technical data	Windy Boy 5000A	Windy Boy 6000A	Windy Boy 7000HV
Input (DC)			
Max. DC power	5750 W	6300 W	7500 W
Recommended generator power at 2500 / 5000 full-load hours per year	4600 W / 4200 W	5500 W / 5100 W	6500 W / 6000 W
Max. DC voltage	600 V	600 V	800 V
DC nominal voltage	270 V	270 V	340 V
Min. open circuit voltage for activating "Turbine Mode"	300 V	300 V	400 V
Operating range "Turbine Mode"	250 V – 600 V	250 V – 600 V	335 V – 800 V
Max. input current	26.0 A	26.0 A	23.0 A
Output (AC)			
AC nominal power	5000 W	6000 W	6650 W
Max. AC power	5500 W	6000 W	7000 W
Max. output current	26.0 A	26.0 A	31.0 A
Nominal AC voltage / AC operating range	220 V, 230 V , 240 V / 180 V – 260 V		
AC grid frequency / range	50 Hz, 60 Hz / ± 4.5 Hz	50 Hz, 60 Hz / ± 4.5 Hz	50 Hz, 60 Hz / ± 4.5 Hz
Power factor (cos φ)	1	1	1
Phase conductors / connection phases	1 / 1	1 / 1	1 / 1
Efficiency			
Max. efficiency / Euro-Eta	96.1 % / 95.3 %	96.1 % / 95.3 %	96.2 % / 95.5 %
Protective devices			
DC reverse-polarity protection	●	●	●
AC short-circuit protection	●	●	●
Ground fault monitoring	●	●	●
Grid monitoring (SMA Grid Guard)	●	●	●
Galvanically isolated	●	●	●
Protection class / overvoltage category	I / III	I / III	I / III
General data			
Dimensions (W / H / D) in mm	468 / 613 / 242	468 / 613 / 242	468 / 613 / 242
Weight	62 kg	63 kg	65 kg
Operating temperature range	-25 °C ... +60 °C	-25 °C ... +60 °C	-25 °C ... +60 °C
Noise emission (typical)	≤ 42 dB(A)	≤ 42 dB(A)	≤ 41 dB(A)
Internal consumption: operation / standby	< 7 W / 0.25 W	< 7 W / 0.25 W	< 7 W / 0.25 W
Topology	LF transformer	LF transformer	LF transformer
Cooling concept	OptiCool	OptiCool	OptiCool
Electronics protection rating / connection area (per IEC 60529)	IP65 / IP65	IP65 / IP65	IP65 / IP65
Climatic category (per IEC 60721)	4K4H	4K4H	4K4H
Features			
DC connection: SUNCLIX	●	●	●
AC connection: screw terminal	●	●	●
Display: text line / graphic	●/–	●/–	●/–
Interfaces: RS485 / *Bluetooth*	o/o	o/o	o/o
Warranty: 5 years / 10 years	●/o	●/o	●/o
Certificates and permits	CE, VDE0126-1-1, G83/1, CER/06/190, DK 5940 ED2.2*, RD 1663, AS4777, EN 50438		
* applies only to IT variant			
● Standard features o Optional features – Not available / Data at nominal conditions			
Type name	WB 5000A	WB 6000A	WB 7000HV-11

Efficiency curve WINDY BOY 5000A / 6000A



High Yields

- Maximum efficiency of 97 %
- Transformerless, with H5 topology
- OptiCool: Continuous operation even at high temperatures

Flexible

- Broad input voltage range
- Cable connection without tools
- Programmable polynomial curve enables free selection of turbines

Easy to use

- Easily accessible connection-area
- Low specific weight

Communicative

- *Bluetooth* technology
- Multilingual graphic display

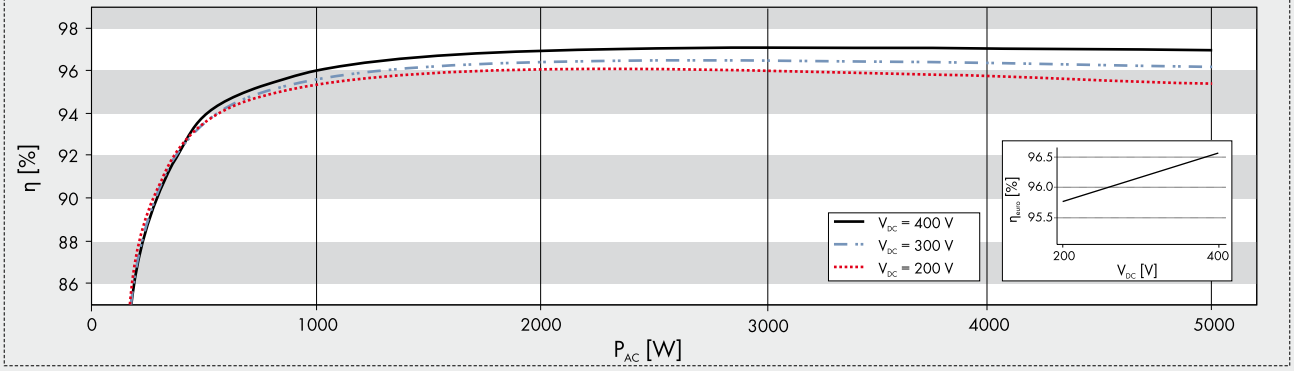
WINDY BOY 3600TL / 5000TL

Technology meets simplicity

With even better communication, usability and efficiency, the Windy Boy 3600TL and 5000 TL inverters set a new standard for inverter technology. With modern graphic displays, a simplified assembly concept, and cable-free plant communication using the *Bluetooth* global standard: the new generation of devices are ideally suited to almost every need. The transformer-free Windy Boy 3600TL and 5000TL feature a peak efficiency of 97 percent for optimal yields from small wind energy plants. The polynomial curve and broad input voltage range provide maximum plant design flexibility. The new generation Windy Boy: an inverter for all turbine types.

Technical data	Windy Boy 3600TL	Windy Boy 5000TL
Input (DC)		
Max. DC power	3800 W	5300 W
Max. DC voltage	550 V	550 V
DC nominal voltage	400 V	400 V
Min. open circuit voltage for activating "Turbine Mode"	125 V	125 V
Operating range "Turbine Mode"	80 V – 550 V	80 V – 550 V
Max. input current	30.0 A	30.0 A
Output (AC)		
AC nominal power	3600 W	4600 W
Max. AC power	3600 W	5000 W
Max. output current	22.0 A	22.0 A
Nominal AC voltage / AC operating range	220 V – 240 V / 180 V – 280 V	
AC grid frequency / range	50 Hz, 60 Hz / ± 5 Hz	50 Hz, 60 Hz / ± 5 Hz
Power factor (cos φ)	1	1
Phase conductors / connection phases	1 / 1	1 / 1
Efficiency		
Max. efficiency / Euro-Eta	> 97.0 % / 96.4 %	97.0 % / 96.5 %
Protection devices		
DC reverse-polarity protection	●	●
AC short-circuit protection	●	●
Ground fault monitoring	●	●
Grid monitoring (SMA Grid Guard)	●	●
Protection class / overvoltage category	I / III	I / III
General data		
Dimensions (W / H / D) in mm	470 / 445 / 180	470 / 445 / 180
Weight	25 kg	25 kg
Operation temperature range	-25 °C ... +60 °C	-25 °C ... +60 °C
Noise emission (typical)	≤ 29 dB(A)	≤ 29 dB(A)
Internal consumption: operation / standby	< 10 W / < 0.5 W	< 10 W / < 0.5 W
Topology	Transformerless	Transformerless
Cooling concept	Convection	OptiCool
Electronics protection rating / connection area (per IEC 60529)	IP65 / IP65	IP65 / IP65
Climatic category (per IEC 60721)	4K4H	4K4H
Features		
DC connection: SUNCLIX	●	●
AC-connection: terminals	●	●
Display: text line / graphic	– / ●	– / ●
Interfaces: RS485 / *Bluetooth*	O/●	O/●
Warranty: 5 years / 10 years	●/O	●/O
Certificates and permits	CE, VDE0126-1-1, G83/1, DK 5940 ED2.2*, RD 1663/200, EN 50438	
* applies only to IT variant		
● Standard features O Optional features – Not available / Data at nominal conditions		
Type name	WB 3600TL-20	WB 5000TL-20

Efficiency curve WINDY BOY 3600TL / 5000TL



Efficiency

- Up to 95.6 % efficiency
- OptiCool: Continuous operation even at high temperatures

Easy to use

- Free choice of installation site
- Programmable polynomial curve enables free selection of turbines
- Certified for the most countries (SMA Grid Guard)

Safe

- Galvanic Isolation
- Compatible with Windy Boy Protection Box 500

Reliable

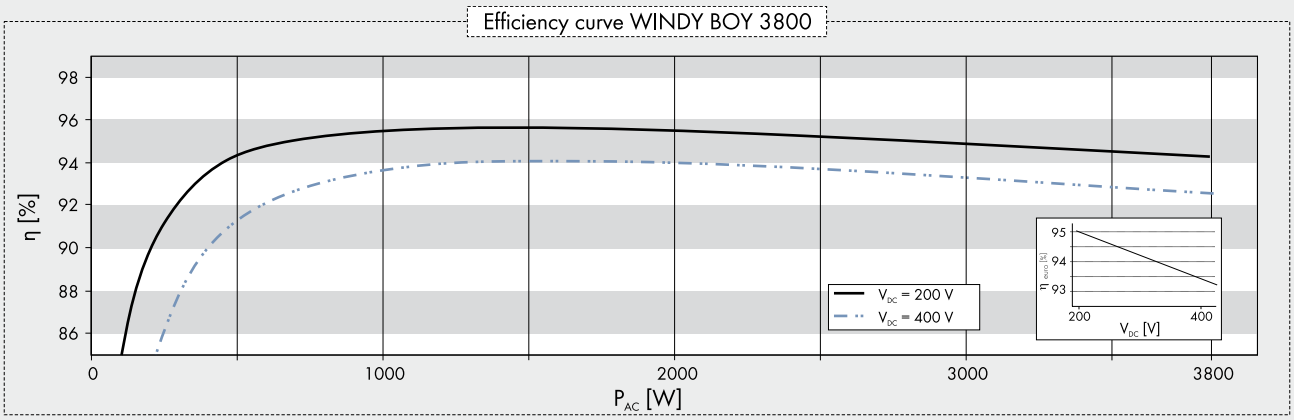
- Worldwide SMA Service including Serviceline
- Comprehensive SMA warranty program

WINDY BOY 3300 / 3800

Highest yield in any climate

With a maximum efficiency of 95.6 percent, the Windy Boy 3300 and 3800 inverters are among the most cost-effective inverters for small wind energy plants. The weather-proof enclosure and broad temperature range permit installation at nearly any location, and thanks to the OptiCool cooling system, the inverters operate at outdoor temperatures of up to 45 °C with maximum output. The programmable polynomial curve enables optimal adaptation to the turbine curve, which increases yield. And in case of a problem: the worldwide SMA Service and comprehensive warranty program provide maximum security.

Technical data	Windy Boy 3300	Windy Boy 3800
Input (DC)		
Max. DC power	3820 W	4040 W
Recommended generator power at 2500 / 5000 full-load hours per year	3100 W / 2800 W	3600 W / 3300 W
Max. DC voltage	500 V	500 V
DC nominal voltage	200 V	200 V
Min. open circuit voltage for activating "Turbine Mode"	250 V	250 V
Operating range "Turbine Mode"	200 V – 500 V	200 V – 500 V
Max. input current	20.0 A	20.0 A
Output (AC)		
AC nominal power	3300 W	3800 W
Max. AC power	3600 W	3800 W
Max. output current	18.0 A	18.0 A
Nominal AC voltage / AC operating range	220 V, 230 V , 240 V / 180 V – 260 V	220 V, 230 V , 240 V / 180 V – 260 V
AC grid frequency / range	50 Hz, 60 Hz / ± 4.5 Hz	50 Hz, 60 Hz / ± 4.5 Hz
Power factor (cos φ)	1	1
Phase conductors / connection phases	1 / 1	1 / 1
Efficiency		
Max. efficiency / Euro-Eta	95.2 % / 94.4 %	95.6 % / 94.7 %
Protective devices		
DC reverse-polarity protection	●	●
AC short-circuit protection	●	●
Ground fault monitoring	●	●
Grid monitoring (SMA Grid Guard)	●	●
Galvanically isolated	●	●
Protection class / overvoltage category	I / III	I / III
General data		
Dimensions (W / H / D) in mm	450 / 352 / 236	450 / 352 / 236
Weight	38 kg	38 kg
Operation temperature range	–25 °C ... +60 °C	–25 °C ... +60 °C
Noise emission (typical)	≤ 40 dB(A)	≤ 42 dB(A)
Internal consumption: Operation / standby	< 7 W / 0.1 W	< 7 W / 0.1 W
Topology	LF transformer	LF transformer
Cooling concept	OptiCool	OptiCool
Electronics protection rating / connection area (per IEC 60529)	IP65 / IP65	IP65 / IP65
Climatic category (per IEC 60721)	4K4H	4K4H
Features		
DC connection: SUNCLIX	●	●
AC connection: plug connector	●	●
Display: text line / graphic	●/–	●/–
Interfaces: RS485 / *Bluetooth*	o/o	o/o
Warranty: 5 years / 10 years	●/o	●/o
Certificates and permits	CE, VDE0126-1-1, G83/1, CER/06/190, DK 5940 ED2.2*, RD 1663, AS4777, EN 50438	
* applies only to IT variant		
● Standard features o Optional features – Not available / Data at nominal conditions		
Type name	WB 3300	WB 3800



High Yields

- Maximum efficiency over 96 %
- OptiCool: Continuous operation even at high temperatures

Flexible

- Programmable polynomial curve enables free selection of turbines
- Broader input voltage range

Easy to use

- Fast and simple connection

Communicative

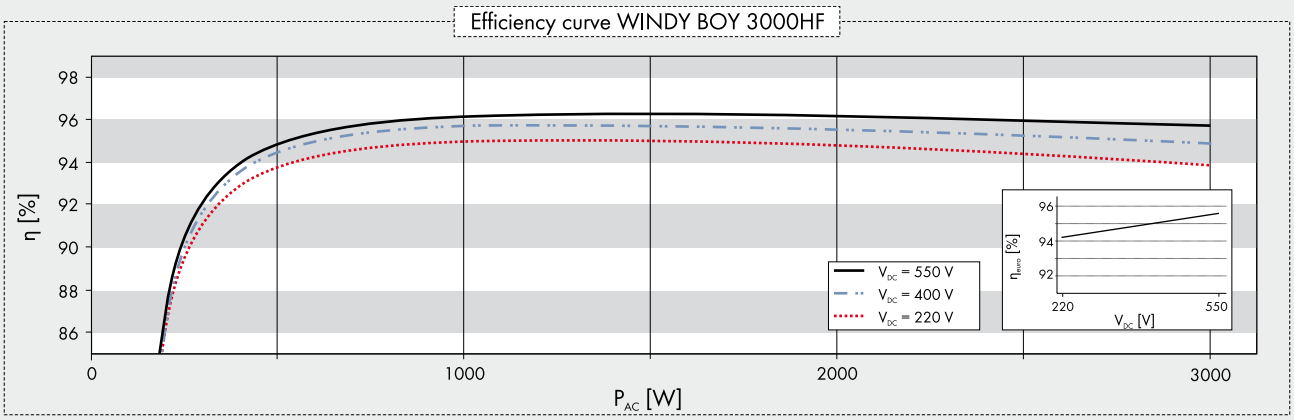
- *Bluetooth*® technology
- Multi-language graphic display

WINDY BOY 2000HF / 2500HF / 3000HF

Narrow and compact for high yields

Packed full of the latest SMA technology, the Windy Boy HF series provides the highest yields for transformer inverters of this performance class. Installation is now easier than ever thanks to the new DC connector system SUNCLIX and an easily accessible configuration area – including easier mounting due to the reduced weight. The programmable polynomial curve and the broad input voltage range also offer great freedom in wind turbine selection and enable grid-feeding even at low wind speeds. And the modern graphic display and wireless *Bluetooth*® communication system make the devices highly user-friendly.

Technical data	Windy Boy 2000HF	Windy Boy 2500HF	Windy Boy 3000HF
Input (DC)			
Max. DC power	2100 W	2650 W	3150 W
Max. DC voltage	700 V	700 V	700 V
DC nominal voltage	530 V	530 V	530 V
Min. open circuit voltage for activating "Turbine Mode"	220 V	220V	220V
Operating range "Turbine Mode"	175 V – 560 V	175 V – 560 V	210 V – 560 V
Max. input current	12.0 A	15.0 A	15.0 A
Output (AC)			
AC nominal power	2000 W	2500 W	3000 W
Max. AC power	2000 W	2500 W	3000 W
Max. output current	11.4 A	14.2 A	16.0 A
Nominal AC voltage / AC operating range	220 V – 240 V / 180 V – 260 V		
AC grid frequency / range	50 Hz, 60 Hz / ± 4.5 Hz		
Power factor (cos φ)	1	1	1
Phase conductors / connection phases	1 / 1	1 / 1	1 / 1
Efficiency			
Max. efficiency / Euro-Eta	96.4 % / 95.4 %	96.4 % / 95.6 %	96.4 % / 95.6 %
Protective devices			
DC reverse-polarity protection	●	●	●
AC short-circuit protection	●	●	●
Ground fault monitoring	●	●	●
Grid monitoring (SMA Grid Guard)	●	●	●
Galvanically isolated	●	●	●
Protection class / overvoltage category	I / III	I / III	I / III
General data			
Dimensions (W / H / D) in mm	348 / 580 / 145	348 / 580 / 145	348 / 580 / 145
Weight	< 17 kg	< 17 kg	< 17 kg
Operation temperature range	-25 °C ... +60 °C	-25 °C ... +60 °C	-25 °C ... +60 °C
Noise emission (typical)	n. s.	n. s.	n. s.
Topology	HF transformer	HF transformer	HF transformer
Cooling concept	OptiCool	OptiCool	OptiCool
Electronics protection rating / connection area (per IEC 60529)	IP65 / IP65	IP65 / IP65	IP65 / IP65
Climatic category (per IEC 60721)	4K4H	4K4H	4K4H
Features			
DC connection: SUNCLIX	●	●	●
AC connection: connector	●	●	●
Display: text line / graphic	–/●	–/●	–/●
Interfaces: RS485 / *Bluetooth*	o/●	o/●	o/●
Warranty: 5 years / 10 years	●/o	●/o	●/o
Certificates and permits	CE, VDE0126-1-1, G83/1-1, DK 5940, RD 1663, AS4777, EN 50438		
● Standard features o Optional features – not available			
Provisional data, as of March 2010 – data at nominal conditions			
Type designation	WB 2000HF	WB 2500HF	WB 3000HF



Efficiency

- Efficiency up to 95 %
- Improved yields via polynomial curves

Easy to use

- Free choice of installation site
- Certified for the most countries (SMA Grid Guard)

Reliability

- Galvanic Isolation
- Compatible with Windy Boy Protection Box 600

Reliable

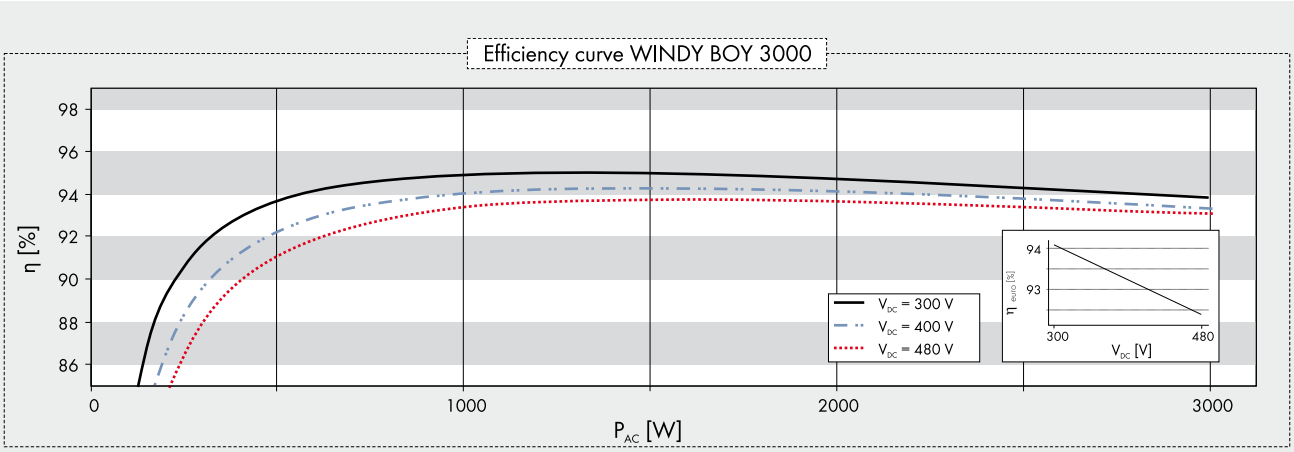
- Worldwide SMA Service including Serviceline
- Comprehensive SMA warranty program

WINDY BOY 2500 / 3000

Worldwide proven technology

Windy Boy 2500 and 3000 inverters are ideally suited to small wind energy plants, and feature a maximum efficiency of 95 percent. The programmable polynomial curve enables optimal adaptation to the turbine curve, which is also protected with a special smooth start device. This Windy Boy also features the SMA Grid Guard interface, which can be used anywhere in the world. It ensures maximum wind energy plant reliability and allows for the feeding-in to almost any public grid.

Technical data	Windy Boy 2500	Windy Boy 3000
Input (DC)		
Max. DC power	2700 W	3200 W
Recommended generator power at 2500 / 5000 full-load hours per year	2100 W / 1900 W	2500 W / 2200 W
Max. DC voltage	600 V	600 V
DC nominal voltage	300 V	350 V
Min. open circuit voltage for activating "Turbine Mode"	300 V	330 V
Operating range "Turbine Mode"	250 V – 600 V	290 V – 600 V
Max. input current	12.0 A	12.0 A
Output (AC)		
AC nominal power	2300 W	2750 W
Max. AC power	2500 W	3000 W
Max. output current	12.5 A	15.0 A
Nominal AC voltage / AC operating range	230 V / 180 V – 260 V	230 V / 180 V – 260 V
AC grid frequency / range	50 Hz, 60 Hz / ± 4.5 Hz	50 Hz, 60 Hz / ± 4.5 Hz
Power factor (cos φ)	1	1
Phase conductors / connection phases	1 / 1	1 / 1
Efficiency		
Max. efficiency / Euro-Eta	94.1 % / 93.2 %	95.0 % / 93.6 %
Protective devices		
DC reverse-polarity protection	●	●
AC short-circuit protection	●	●
Ground fault monitoring	●	●
Grid monitoring (SMA Grid Guard)	●	●
Protection class / overvoltage category	I / III	I / III
General data		
Dimensions (W / H / D) in mm	440 / 339 / 214	440 / 339 / 214
Weight	28 kg	32 kg
Operation temperature range	-25 °C ... +60 °C	-25 °C ... +60 °C
Noise emission (typical)	≤ 33 dB(A)	≤ 30 dB(A)
Internal consumption: Operation / standby	< 7 W / 0.25 W	< 7 W / 0.25 W
Topology	LF transformer	LF transformer
Cooling concept	Convection	Convection
Electronics protection rating / connection area (per IEC 60529)	IP65 / IP65	IP65 / IP65
Climatic category (per IEC 60721)	4K4H	4K4H
Features		
DC connection: SUNCLIX	●	●
AC connection: plug connector	●	●
Display: text line / graphic	●/–	●/–
Interfaces: RS485 / *Bluetooth*	o/o	o/o
Warranty: 5 years / 10 years	●/o	●/o
Certificates and permits	CE, VDE0126-1-1, G83/1, CER/06/190, DK 5940 ED2.2*, RD 1663, AS4777, EN 50438	
* applies only to IT variant		
● Standard features o Optional features – Not available / Data at nominal conditions		
Type name	WB 2500	WB 3000



Efficiency

- Specially designed for small wind energy plants
- Improved yields via polynomial curves

Easy to use

- Free choice of installation site
- Certified for the most countries (SMA Grid Guard)

Reliability

- Galvanic Isolation
- Compatible with Windy Boy Protection Box 400

Flexibility

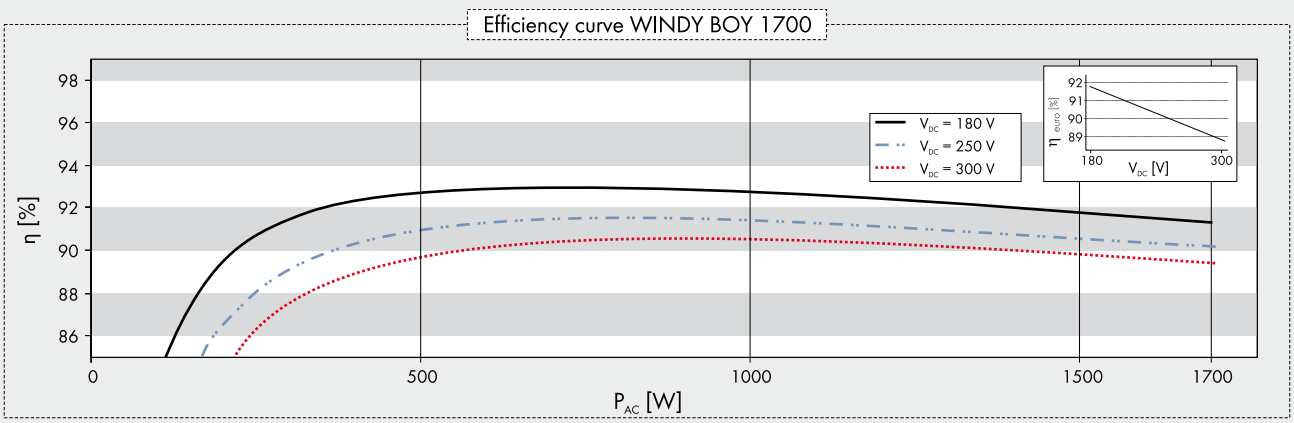
- Broad input voltage-range for Windy Boy 1200

WINDY BOY 1200 / 1700

The powerful compact devices.

The Windy Boy 1200 and 1700 are ideally suited for small wind energy plants. The programmable polynomial curve enables optimal adaptation to the turbine curve, which increases yield. The weather-proof enclosure and the wide temperature range allow for installation at almost any location. The devices are optimally adjusted to fast and frequent load changes and, with the optimal Windy Boy Protection Box, provide the perfect interface for any turbine. Using the integrated display and different communication interfaces you can monitor all plant values at any time. And in case of a problem: the worldwide SMA Service and comprehensive warranty program provide maximum security.

Technical data	Windy Boy 1200	Windy Boy 1700
Input (DC)		
Max. DC power	1320 W	1850 W
Recommended generator power at 2500 / 5000 full-load hours per year	1050 W / 1000 W	1400 W / 1300 W
Max. DC voltage	400 V	400 V
DC nominal voltage	120 V	180 V
Min. open circuit voltage for activating "Turbine Mode"	120 V	150 V
Operating range "Turbine Mode"	100 V – 400 V	139 V – 400 V
Max. input current / per input B	12.6 A / 12.6 A	12.6 A / 12.6 A
Output (AC)		
AC nominal power	1200 W	1550 W
Max. AC power	1200 W	1700 W
Max. output current	6.1 A	8.6 A
Nominal AC voltage / AC operating range	220 V, 230 V , 240 V / 180 V – 260 V	220 V, 230 V , 240 V / 180 V – 260 V
AC grid frequency / range	50 Hz, 60 Hz / ± 4.5 Hz	50 Hz, 60 Hz / ± 4.5 Hz
Power factor (cos φ)	1	1
Phase conductors / connection phases	1 / 1	1 / 1
Efficiency		
Max. efficiency / Euro-Eta	92.1 % / 90.9 %	93.5 % / 91.8 %
Protective devices		
DC reverse-polarity protection	●	●
AC short-circuit protection	●	●
Ground fault monitoring	●	●
Grid monitoring (SMA Grid Guard)	●	●
Galvanically isolated	●	●
Protection class / overvoltage category	I / III	I / III
General data		
Dimensions (W / H / D) in mm	440 / 339 / 214	440 / 339 / 214
Weight	25 kg	25 kg
Operation temperature range	–25 °C ... +60 °C	–25 °C ... +60 °C
Noise emission (typical)	≤ 41 dB(A)	≤ 46 dB(A)
Internal consumption: Operation / standby	< 5 W / 0.1 W	< 5 W / 0.1 W
Topology	LF transformer	LF transformer
Cooling concept	Convection	Convection
Electronics protection rating / connection area (per IEC 60529)	IP65 / IP65	IP65 / IP65
Climatic category (per IEC 60721)	4K4H	4K4H
Features		
DC connection: SUNCLIX	●	●
AC connection: plug connector	●	●
Display: text line / graphic	●/–	●/–
Interfaces: RS485 / *Bluetooth*	o/o	o/o
Warranty	●/o	●/o
Certificates and permits	CE, VDE0126-1-1, G83/1, CER/06/190, DK 5940 ED2.2*, RD 1663, AS4777, EN 50438	
* applies only to IT variant		
● Standard features o Optional features – Not available / Data at nominal conditions		
Type name	WB 1200	WB 1700



Efficiency

- Specially designed for small wind energy plants
- Outstanding performance at low wind speeds

Easy to use

- Programmable polynomial curve enables free selection of turbines
- Free choice of installation site

Reliability

- Galvanic Isolation
- In accordance with almost all European power supply line guidelines

Reliable

- Worldwide SMA Service including Serviceline
- Comprehensive SMA warranty program

WINDY BOY 1100LV

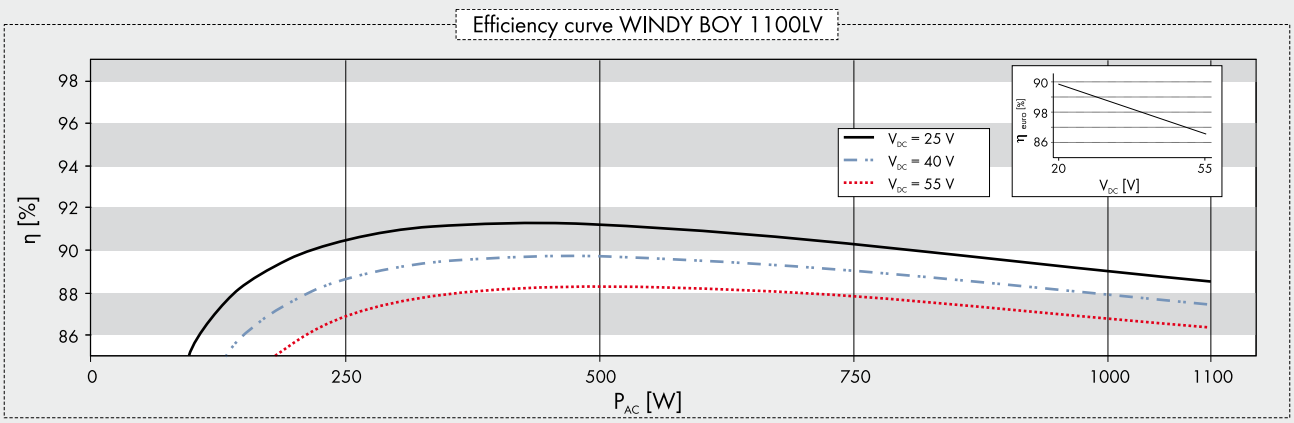
The solution for low generator voltage

The Windy Boy 1100LV is the perfect solution for the smallest wind energy systems with low generator voltage: turbines with a nominal voltage of 24 or 48 V can be connected without an additional voltage converter. The programmable polynomial curve gives you full flexibility for choosing the turbine, while its weatherproof enclosure and the wide temperature range allow for installation at nearly any location. As an inverter for wind energy systems, the Windy Boy is optimally adjusted to fast and frequent load changes. Its minimum internal consumption during a calm also increases the yield, which you can monitor at any time using the display and different communication interfaces.

Technical data	Windy Boy 1100LV	
Input (DC)		
Max. DC power	1210 W	
Recommended generator power at 2500 / 5000 full-load hours per year	1000 W / 900 W	
Max. DC voltage	60 V	
Min. open circuit voltage for activating "Turbine Mode"	25 V	
Operating range "Turbine Mode"	21 V – 60 V	
Max. input current	62 A	
Output (AC)		
AC nominal power	1000 W	
Max. AC power	1100 W	
Max. output current	5 A	
Nominal AC voltage / AC operating range	220 V, 230 V, 240 V / 180 V – 260 V	
AC grid frequency / range	50 Hz, 60 Hz / ± 4.5 Hz	
Power factor (cos φ)	1	
Phase conductors / connection phases	1 / 1	
Efficiency		
Max. efficiency / Euro-Eta	92.0 % / 90.4 %	
Protective devices		
DC reverse-polarity protection	●	
AC short-circuit protection	●	
Ground fault monitoring	●	
Grid monitoring (SMA Grid Guard)	●	
Galvanically isolated	●	
General data		
Dimensions (W / H / D) in mm	434 / 295 / 214	
Weight	29 kg	
Operation temperature range	–25 °C ... +60 °C	
Internal consumption: Operation / standby	< 5 W / 0.1 W	
Topology	LF transformer	
Cooling concept	Convection	
Electronics protection rating / connection area (per IEC 60529)	IP65 / IP65	
Climatic category (per IEC 60721)	4K4H	
Features		
DC connection: screw terminal	●	
AC connection: plug connector	●	
Display: text line / graphic	●/–	
Interfaces: RS485 / *Bluetooth*	o/o	
Warranty: 5 years / 10 years	●/o	
Certificates and permits	CE, VDE0126-1-1, G83/1, CER/06/190, DK 5940, RD 1663, AS4777, EN 50438	

● Standard features o Optional features – Not available / Data at nominal conditions

Type name	WB 1100LV	



UL certified

- For the North American small wind market (UL 1741/IEEE-1547)

High Yields

- 97 % peak efficiency
- OptiCool active temperature management

Easy to use

- Free choice of installation site
- Programmable polynomial curve enables free selection of turbines

Reliability

- Galvanic isolation due to integrated transformer
- Compatible with Windy Boy Protection Box 600

WINDY BOY 5000-US / 6000-US / 7000-US / 8000-US

A cost-effective option with UL certification

Maximum energy yields for a growing market: the Windy Boy inverters for countries with UL certification feature premium efficiency. They are easy to combine, and more than one device can be operated on a single wind power plant, which makes it possible to easily connect plants with higher power to the grid. The automatic grid voltage detection* allows for a straightforward and secure installation. The galvanic isolation also ensures safety as well as flexible connection options. The weather-proof enclosure and the wide temperature range allow for installation at almost any location. Four devices, a single technology: the best choice for small wind plants over 5 kW.

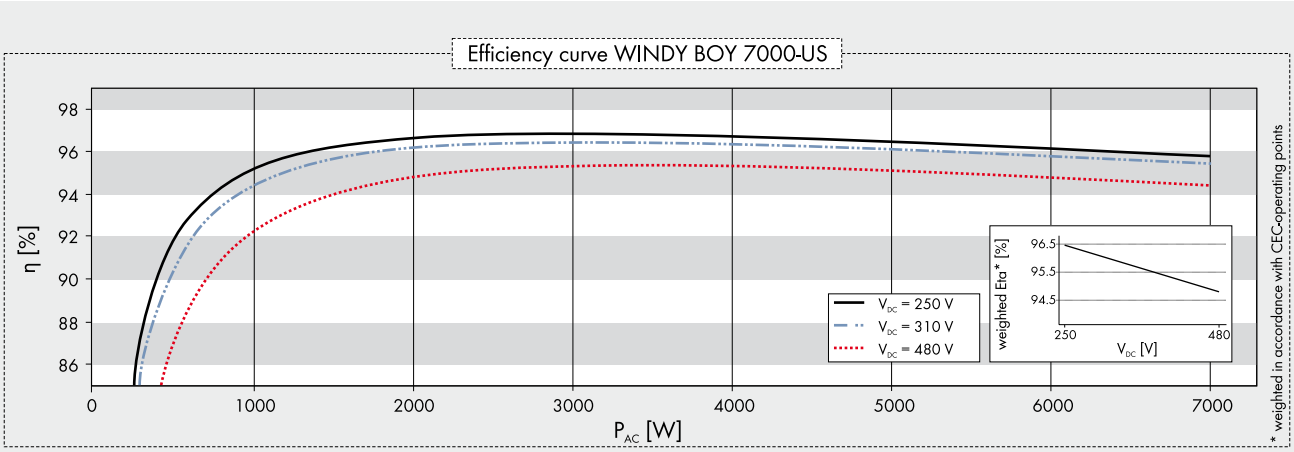
* US-Patent US7352549B1

Technical data	Windy Boy 5000-US			Windy Boy 6000-US			Windy Boy 7000-US			Windy Boy 8000-US	
	208 V	240 V	277 V	208 V	240 V	277 V	208 V	240 V	277 V	240 V	277 V
Input (DC)											
Max. DC power	5300 W			6380 W			7450 W			8600 W	
Max. DC voltage	600 V			600 V			600 V			600 V	
DC nominal voltage	310 V			310 V			310 V			345 V	
Min. open circuit voltage for activating "Turbine Mode"	300 V			300 V			300 V			300 V	
Operating range "Turbine Mode"	250 V – 600 V			250 – 600 V			250 – 600 V			300 – 600 V	
Max. input current	21 A			25 A			30 A			30 A	
Output (AC)											
AC nominal power	5000 W			6000 W			7000 W			7680 W	8000 W
Max. AC power	5100 W			6100 W			7100 W			7680 W	8100 W
Max. output current	27.9 A	24.1 A	20.9 A	33.3 A	28.9 A	25.0 A	34 A	34 A	32 A	32 A	32 A
Nominal AC voltage	183-229 V	211-264 V	244-305 V	183-229 V	211-264 V	244-305 V	183-229 V	211-264 V	244-305 V	211-264 V	244-305 V
AC grid frequency / range	60 Hz / 59.3 – 60.5 Hz			60 Hz / 59.3 – 60.5 Hz			60 Hz / 59.3 – 60.5 Hz			60 Hz / 59.3 – 60.5 Hz	
Power factor (cos φ)	1			1			1			1	
Phase conductors / connection phases	1 / 1			1 / 1			1 / 1			1 / 1	
Efficiency											
Max. efficiency	96.8 %			97 %			97.1 %			96.5 %	
CEC	95.5%	95.5 %	95.5 %	95.5 %	95.5 %	95 %	95.5 %	96 %	96 %	96 %	96 %
Protective devices											
DC reverse-polarity protection	●			●			●			●	
AC short-circuit protection	●			●			●			●	
Galvanically isolated	●			●			●			●	
Protection class / overvoltage category	I / III			I / III			I / III			I / III	
General data											
Dimensions (W / H / D) in mm	468 / 613 / 242			468 / 613 / 242			468 / 613 / 242			468 / 613 / 242	
Weight	65 kg			65 kg			65 kg			69 kg	
Operation temperature range	-25 °C ... +45 °C			-25 °C ... +45 °C			-25 °C ... +45 °C			-25 °C ... +45 °C	
Noise emission (typical)	≤ 44 dB			≤ 45 dB			≤ 46 dB			n. s.	
Internal consumption in standby	0.1 W			0.1 W			0.1 W			0.1 W	
Topology	LF transformer			LF transformer			LF transformer			LF transformer	
Cooling concept	OptiCool			OptiCool			OptiCool			OptiCool	
Mounting location: indoor / outdoor (NEMA 3R)	●/●			●/●			●/●			●/●	
Features											
Display: text line / graphic	●/–			●/–			●/–			●/–	
Communication: RS485 / *Bluetooth*	o/o			o/o			o/o			o/o	
Warranty: 10 years	●			●			●			●	
Certificates and permits	FCC, Part 15, Class A & B, UL 1741, IEEE-1741										

● Standard features o Optional features – not available

Provisional data, last updated: October 2009

Type name:	WB 5000US	WB 6000US	WB 7000US	WB 8000US



Flexible

- Broad input voltage range
- Reduced weight

Reliability

- Galvanic Isolation
- Anti-theft protection

Easy to use

- Fast and simple connection
- Plug-in grounding with GFDI
- Simple country configuration

Communicative

- *Bluetooth*® technology
- Graphic display

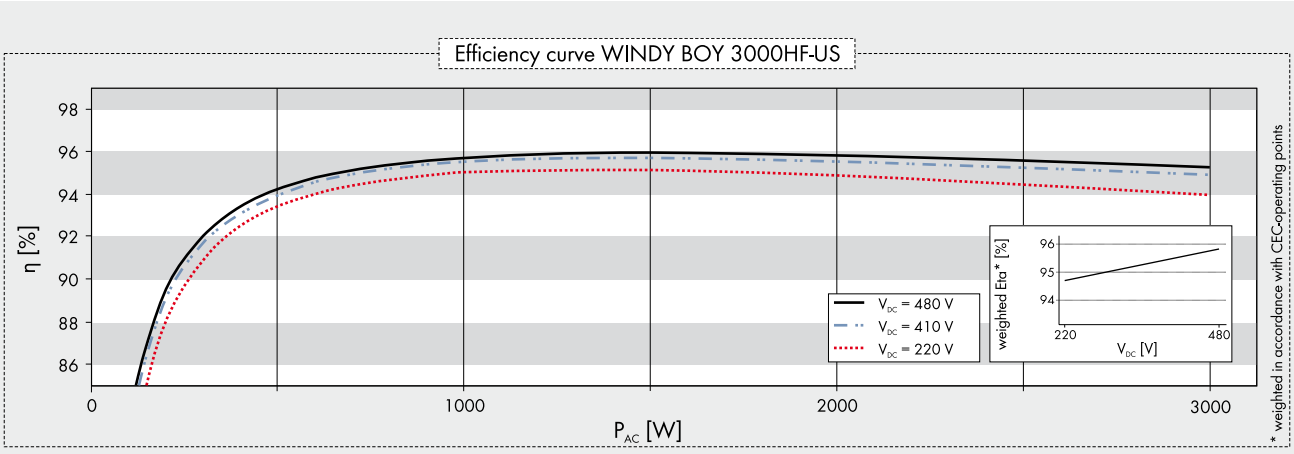
WINDY BOY 2000HF-US / 2500HF-US / 3000HF-US

The flexible solution for the lower performance range

This is the new generation of inverters designed for the countries with UL certification – packed full of the latest SMA technology, these devices provide the highest yields for transformer inverters of this performance class. Installation is made even simpler due to automatic grid detection*, plug-in generator grounding (with GFDI) and reduced weight. The broad input voltage range also offers great freedom in wind turbine selection and enables grid-feeding even at low wind speeds. And the modern graphic display and wireless *Bluetooth*® communication system make the devices highly user-friendly. The Windy Boy HF: the optimal solution for small wind plants in the USA.

* US-Patent US7352549B1

Technical data	Windy Boy 2000HF-US		Windy Boy 2500HF-US		Windy Boy 3000HF-US	
	208 V	240 V	208 V	240 V	208 V	240 V
Input (DC)						
Max. DC power	2500 W		3125 W		3750 W	
Max. DC voltage	600 V		600 V		600 V	
DC nominal voltage	n. s.		n. s.		n. s.	
Min. open circuit voltage for activating "Turbine Mode"	220 V		220 V		220 V	
Operating range "Turbine Mode"	175 V – 480 V		215 V – 480 V		215 V – 480 V	
Max. input current	12.2 A		12.4 A		14.8 A	
Output (AC)						
Nominal AC power / max. AC power	2000 W / 2000 W		2500 W / 2500 W		3000 W / 3000 W	
Max. output current	10.0 A	8.5 A	12.0 A	10.4 A	14.4 A	12.5 A
Nominal AC voltage range	183 V – 229 V	211 V – 264 V	183 V – 229 V	211 V – 264 V	183 V – 229 V	211 V – 264 V
AC grid frequency / range	60 Hz / 59.3 Hz – 60.5 Hz					
Power factor (cos φ)	0.99 at nominal power					
Phase conductors / connection phases	1/1		1/1		1/1	
Efficiency						
Max. efficiency / Euro-Eta	95.5 % / 95 %		95.5 % / 95 %		95.5 % / 95 %	
Protective devices						
DC reverse-polarity protection	●		●		●	
AC short-circuit protection	●		●		●	
Ground fault monitoring	●		●		●	
Galvanically isolated	●		●		●	
Protection class / overvoltage category	I / III		I / III		I / III	
General data						
Dimensions (W / H / D) in mm	348 / 727 / 183		348 / 727 / 183		348 / 727 / 183	
Weight	< 23 kg		< 23 kg		< 23 kg	
Operation temperature range	-25 °C ... +45 °C		-25 °C ... +45 °C		-25 °C ... +45 °C	
Internal consumption in standby	≤ 0.25 W		≤ 0.25 W		≤ 0.25 W	
Topology	HF transformer		HF transformer		HF transformer	
Cooling concept	OptiCool		OptiCool		OptiCool	
Climatic category (per IEC 60721)	4K4H		4K4H		4K4H	
Mounting location: indoor / outdoor (NEMA 3R)	●/●		●/●		●/●	
Features						
Display: text line / graphic	–/●		–/●		–/●	
Interfaces: RS485 / *Bluetooth*	○/●		○/●		○/●	
Warranty: 10 years	●		●		●	
Certificates and permits	FCC, Part 15, Class A & B, UL 1741, UL 1998, IEEE 1547					
● Standard features ○ Optional features – not available						
Data at nominal conditions						
Type designation	WB 2000HFUS		WB 2500HFUS		WB 3000HFUS	



UL certified

- For the North American small wind market (UL 1741/IEEE-1547)

Efficiency

- Peak efficiency of 96.5 %
- OptiCool active temperature management

Easy to use

- Free choice of installation site
- Programmable polynomial curve enables free selection of turbines

Reliability

- Galvanic isolation due to integrated transformer

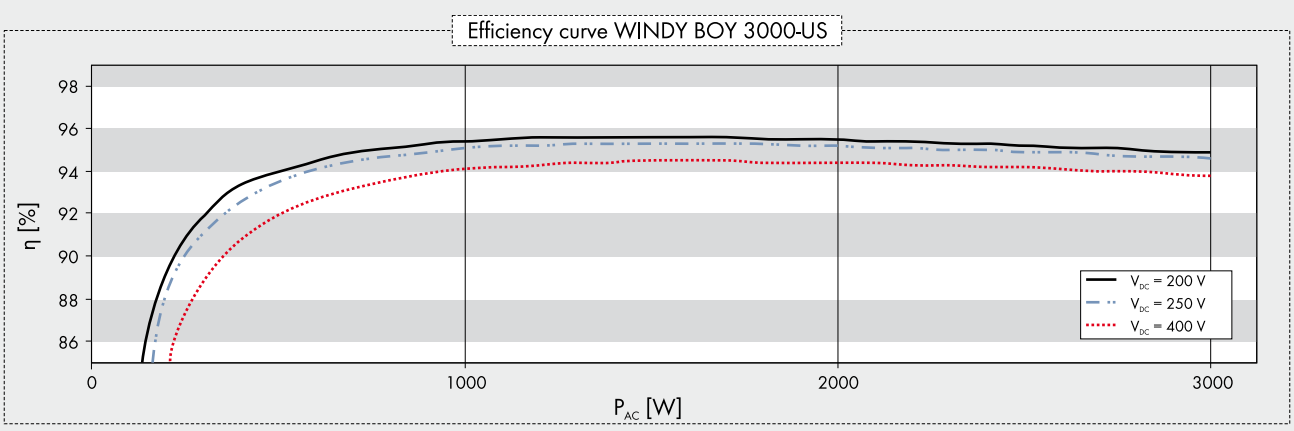
WINDY BOY 3000-US

A reliable option with UL certification

User-friendly, safe and reliable: the Windy Boy 3000-US is specially certified for the US market. The automatic grid voltage detection* allows for a straightforward and secure installation. The aluminum die-cast enclosure and the OptiCool active cooling system ensure optimal yield as well as a long lifespan, even under adverse operating conditions.

* US-Patent US7352549B1

Technical data	Windy Boy 3000-US	
	208 V	244 V
Input (DC)		
Max. DC power	3200 W	
Max. DC voltage	500 V	
DC nominal voltage	250 V	
Min. open circuit voltage for activating "Turbine Mode"	228 V	
Operating range "Turbine Mode"	180 – 500 V	200 – 500 V
Max. input current	17 A	
Output (AC)		
AC nominal power	3000 W	
Max. AC power	3050 W	
Max. output current	15 A	
Nominal AC voltage / AC operating range	183 – 229 V / –	211 – 264 V / –
AC grid frequency / range	60 Hz / 59.3 – 60.5 Hz	
Power factor (cos φ)	1	
Phase conductors / connection phases	1 / 1	
Efficiency		
Max. efficiency	96.6 %	
CEC	95.0 %	95.5 %
Protective devices		
DC reverse-polarity protection	●	
AC short-circuit protection	●	
Galvanically isolated	●	
Protection class / overvoltage category	I / III	
General data		
Dimensions (W / H / D) in mm	450 / 352 / 236	
Weight	40 kg	
Operation temperature range	-25 °C ... +45 °C	
Noise emission (typical)	≤ 40 dB	
Internal consumption in standby	0.1 W	
Topology	LF transformer	
Cooling concept	OptiCool	
Climatic category (per IEC 60721)	4K4H	
Mounting location: indoor / outdoor (NEMA 3R)	● / ●	
Features		
Display: text line / graphic	●/–	
Communication: RS485 / *Bluetooth*	o/o	
Warranty: 10-year	●	
Certificates and permits	FCC, Part 15, Class A & B, UL 1741, IEEE-1741	
● Standard features o Optional features – Not available		
Data at nominal conditions		
Type name	WB 3000US	



Reliability

- Highly dynamic overvoltage protection
- Optimal start-up performance of the wind turbine

High Yields

- High efficiency of the integrated inverter
- Feeding-in even at excessive generator voltage

Easy to Use

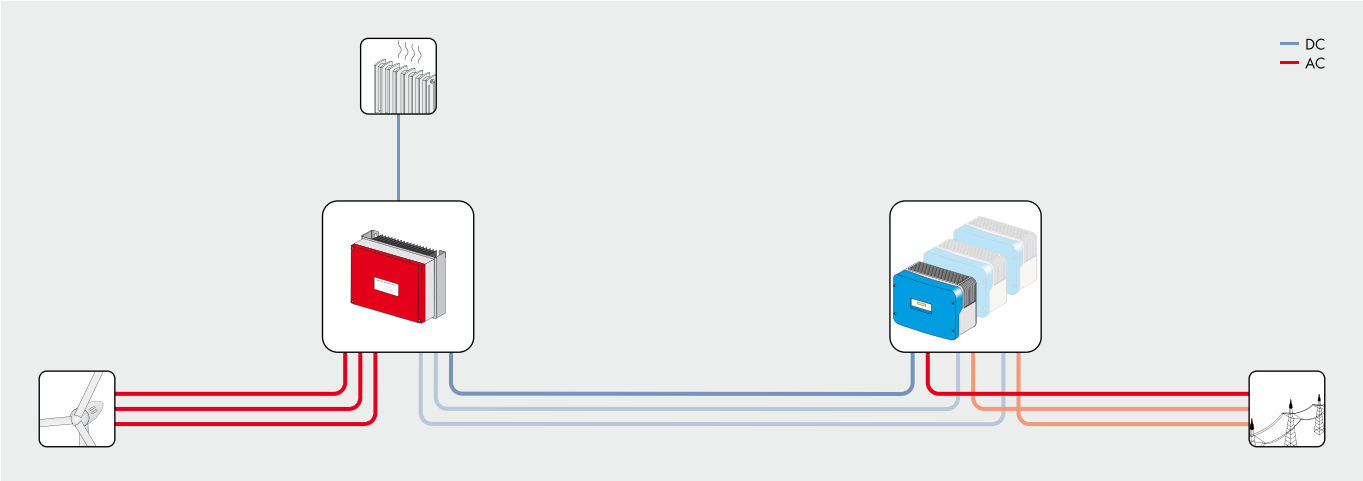
- Easy installation
- 3-phase generator connection
- Available in three voltage classes: 400 V, 500 V and 600 V

WINDY BOY PROTECTION BOX

Optimal protection for small wind power plants

A rectifier and overvoltage protection in one – SMA's Windy Boy Protection Box can do it all: it protects the inverter from excess generator voltage by feeding excess generator voltage to a load resistor, which slows down the turbine. In addition, the Windy Boy Protection Box features a three-phase rectifier. It is delivered as turnkey unit and can be used with nearly all types of generators made by different manufacturers in various performance classes. The box is thus suited for use with wind plants as well as for other permanent magnet generators such as small water power plants and CHP systems.

Technical data	Windy Boy Protection Box 400	Windy Boy Protection Box 500	Windy Boy Protection Box 600
General			
Suitable for	WB 1100, WB1200, WB 1700	WB 3300, WB 3800	WB 2500, WB 3000, WB 5000A, WB 6000A
Rectifier	Integrated	Integrated	Integrated
Size (W / H / D) in mm	280 / 220 / 130	280 / 220 / 130	280 / 220 / 130
Weight	5 kg	5 kg	5 kg
Generator connection			
Quantity	1 x 3-phase	1 x 3-phase	1 x 3-phase
AC voltage	3 x 0 V – 500 V	3 x 0 – 500 V	3 x 0 – 500 V
AC current	3 x 0 A – 11.5 A	3 x 0 – 11.5 A	3 x 0 – 11.5 A
Generator frequency	0 Hz – 400 Hz	0 Hz – 400 Hz	0 Hz – 400 Hz
Nominal power	1 kW – 2 kW	3 kW – 4 kW	2 kW – 6 kW
Windy Boy connection			
Quantity	3	3	3
Voltage limitation (DC)	400 V	500 V	600 V
Total power	3 kW	4 kW	6 kW
Load resistance connection			
Quantity	1	1	1
Nominal voltage (DC)	400 V	500 V	600 V
Continuous power	3 kW	4.5 kW	6 kW
Efficiency			
Max. efficiency	> 99.95 %	> 99.95 %	> 99.95 %
Conduction losses at continuous power	15 W	20 W	30 W
Ambient conditions			
Ambient temperature	–25 °C ... +60 °C	–25 °C ... +60 °C	–25 °C ... +60 °C
Protection class (according IEC 60529)	IP54	IP54	IP54
Accessories			
Load resistance	Optional	Optional	Optional



Grid feeding with a three-phase system construction

FUEL CELL INVERTERS

Hydro Boy Inverter for Fuel Cells
The clean alternative to diesel generators

Trendsetting and efficient: the Hydro Boy inverters are ideal for an environmentally-friendly expansion of off-grid systems with SMA products. Whether for the energy supply of remote regions far from the grid or to provide electricity in case of emergency in unstable grids, the development of self-sufficient off-grid systems is an important future market. The SMA inverters will become increasingly popular for fuel cells as diesel and heating oil prices continue to increase.

Trend setting technology

How it works: the Hydro Boy efficiently transforms the direct current generated by the fuel cell into alternating current. To do so, it must operate with low voltages and high currents. The SMA Hydro Boy meets these special requirements and is a proven device that benefits from nearly 30 years' experience with innovative power supply systems.

Supplement to off-grid systems

SMA is the only manufacturer in the world to offer AC coupled PV plants for self-sufficient energy supply systems ranging from one to 300 kW. Along with off-grid and solar inverters from SMA, the Hydro Boy is an important component in a reliable standard AC voltage grid. The H_2 Island Extension complements the necessary batteries in a stand-alone grid with a fuel cell featuring a hydrogen accumulator.

Advantages of fuel cells

In comparison to diesel generators fuel cells are more efficient. They are quiet and do not generate CO_2, and are thus especially environmentally friendly. Since fuel cells generate heat, the H_2-Island Extension can also be linked to a heating system which allows waste heat to be used as heating energy. SMA cooperates with the leading heating system manufacturers and their research and development departments.

Everything from a single source

From the reliable Sunny Island island manager to the Sunny Boy solar inverter and Sunny Mini Central, from the Windy Boy inverter for wind energy, to the Hydro Boy: SMA supplies optimally coordinated components for an AC-coupled stand-alone grid. Thus installing and expanding stand-alone grids is easier than ever.

Source: Viessmann Unternehmensgruppe

Tailor-made

- Low input voltage range is ideal for fuel cells
- High input current of up to 56 A

Reliable

- Certified for the most countries (SMA Grid Guard)
- Galvanic isolation

Flexible

- Grid-parallel operation
- For use in stand-alone grids with Sunny Island
- Optional auto-start function

HYDRO BOY 1124 / 1324

The powerful compact devices.

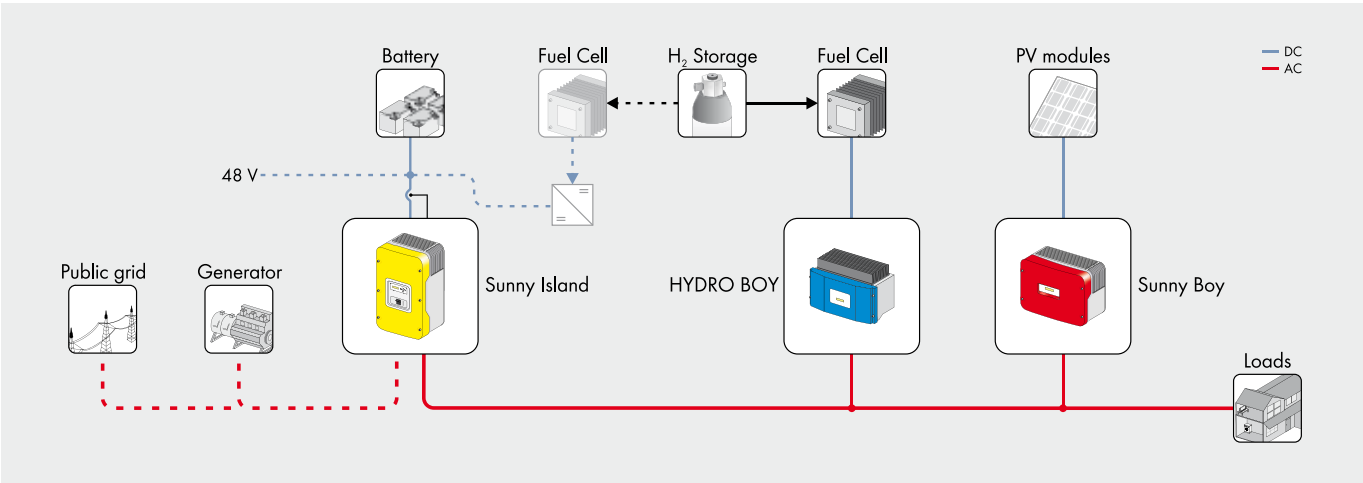
Long operating times and many system applications: the Hydro Boy 1124 / 1324 is the time-tested SMA inverter for standard fuel cell systems. The devices have a transformer on the grid feed-in side, which qualifies them for direct grid feed-in anywhere in the world. For AC power scaling, the devices can simply be connected in parallel. And as supplemental power sources in stand-alone grids, they are the ideal addition to SMA solar and off-grid inverters.

Technical data	Hydro Boy 1124	Hydro Boy 1324
Input (DC)		
DC nominal power	1200 W	1300 W
Max. DC voltage	60 V	60 V
DC nominal power / DC voltage range	24 V / 20 V – 55 V	24 V / 20 V – 55 V
Max. input current	56 A	56 A
Output (AC)		
Continuous AC output (at 25 °C)	1100 W	1200 W
Max. AC power	1200 W	1200 W
Nominal output current	4.8 A	5.2 A
Nominal AC voltage / range	220 V – 240 V / 180 V – 260 V	220 V – 240 V / 180 V – 260 V
AC grid frequency / range	50 Hz, 60 Hz / ±4.5 Hz	50 Hz, 60 Hz / ±4.5 Hz
Power factor (cos φ)	1	1
AC connection:	single-phase	single-phase
Efficiency		
Max. efficiency	91 %	91 %
Protection devices		
DC reverse-polarity protection	●	●
AC short circuit monitoring	●	●
Ground fault monitoring	●	●
Grid monitoring (SMA Grid Guard)	●	●
General data		
Dimensions (W / H / D) in mm	434 / 295 / 214	434 / 345 / 214
Protection rating (as per IEC 60529)	IP42	IP22
Weight	approx. 29 kg	approx. 29 kg
Operating temperature range	-25 °C ... +60 °C	-25 °C ... +60 °C
Internal consumption: operation (standby) / off	< 5 W / < 0.1 W	< 5 W / < 0.1 W
Topology	LF transformer	LF transformer
Cooling concept	convection	forced air cooling, temperature controlled
Features		
DC connection: screw terminal	●	●
AC connection: plug connector	●	●
Display: text line / graphic	●/–	●/–
Interfaces: CAN / RS485 / RS232	●/○/○	●/○/○
Warranty: 2 years	●	●
Certificates and permits	www.SMA-Solar.com	www.SMA-Solar.com

● Standard features ○ Optional – Not available

Data at nominal conditions

Type designation	HB 1124	HB 1324



Customer-tailored design BAXI INNOTECH

Efficient

- High efficiency
- Optimized for heating systems

Compact

- Reduced weight
- Suitable for 19" rack mount

Reliable

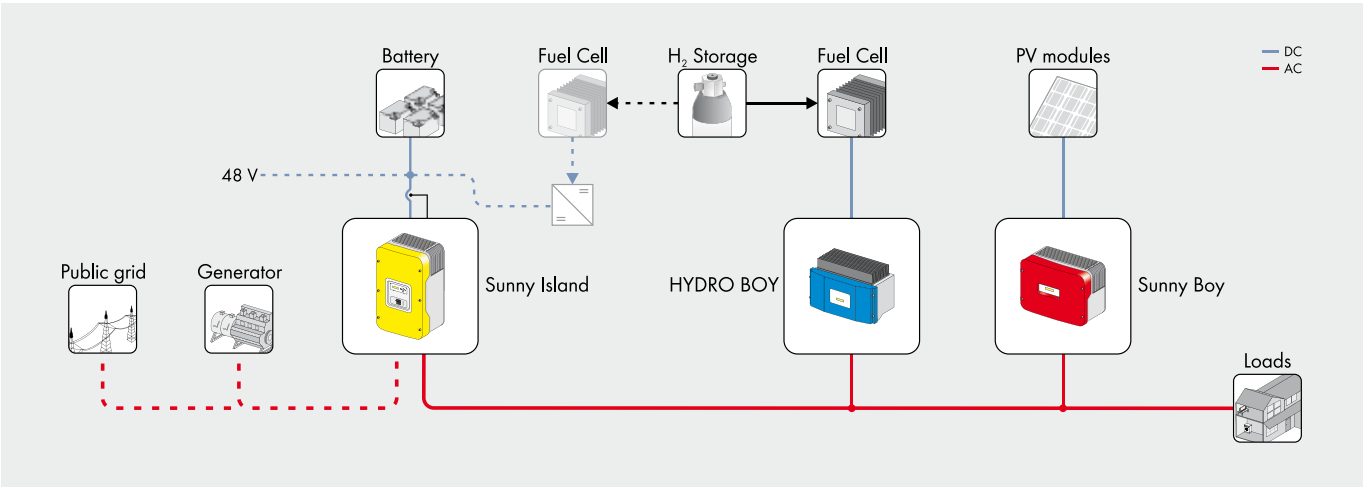
- Galvanic isolation

HYDRO BOY 1524HF / 2524HF

High yield devices in lightweight enclosure

The new generation Hydro Boy: the 1524HF and 2524HF devices are equipped with state-of-the-art high-frequency technology which ensures optimal efficiency. By reducing the weight and volume of coils, these inverters are especially light and easy to handle. They combine state-of-the-art SMA technology and optimal efficiency in a light-weight construction.

Technical data	Hydro Boy 1524HF	Hydro Boy 2524HF
Input (DC)		
DC nominal power	1500 W	2500 W
Max. DC voltage	70 V	70 V
DC nominal power / DC voltage range	33 V / 25 V – 70 V	33 V / 25 V – 70 V
Max. input current	60 A	100 A
Output (AC)		
Continuous AC output (at 25 °C)	1150 W	2300 W
Max. AC power	1150 W	2300 W
Nominal output current	5 A	10 A
Nominal AC voltage / range	220 V – 240 V / 184 V – 264 V	220 V – 240 V / 184 V – 264 V
AC grid frequency / range	50 Hz, 60 Hz / ± 5 Hz	50 Hz, 60 Hz / ± 5 Hz
Power factor (cos φ)	1	1
AC connection	single-phase	single-phase
Efficiency		
Max. efficiency	> 92 %	> 93 %
Protective devices		
DC reverse-polarity protection	●	●
AC short circuit monitoring	●	●
Grid monitoring	●	●
General data		
Dimensions (W / H / D) in mm	444 / 160 / 454	444 / 130 / 454
Protection rating (as per IEC 60529)	IP20	IP20
Weight	approx. 15 kg	approx. 17 kg
Operating temperature range	0 °C ... +70 °C	0 °C ... +70 °C
Internal consumption: operation (standby) / off	< 12 W / < 1 W	< 12 W / < 1 W
Topology	HF transformer	HF transformer
Cooling concept	forced air cooling, temperature controlled	forced air cooling, temperature controlled
Features		
DC connection: screw terminal	●	●
AC connection: plug connector	●	●
Display: text line / graphic	–/–	–/–
Interfaces: CAN / RS485	●/○	●/○
Internal backup operation	●	●
Control for external load resistance	○	○
Warranty: 2 years	●	●
Certificates and permits	www.SMA-Solar.com	www.SMA-Solar.com
● Standard features ○ Optional – Not available		
Data at nominal conditions		
Type designation	HB 1524HF	HB 2524HF



SERVICE

Customer-oriented

- Professional commissioning, maintenance and repair
- Telephone support through our Serviceline

Optimum availability

- Fast and simple device replacement
- One year full warranty on every replacement device

Assured returns

- Five-year warranty on Sunny Boy, Sunny Mini Central, Sunny Tripower and Sunny Island inverters

Flexible

- Warranty extensions to 10, 15 or 20 years

SMA Service for decentralized inverter solutions

Comprehensive service for all customer requirements

All those who opt for a PV plant are banking on earnings over the long term. To achieve these benefits, the solar inverter must not only be durable and highly efficient, the service partner must also provide reliable, flexible and competent support. SMA provides the highest level technology and expert service from a single source. Whether the SMA Serviceline, on-site service, or our replacement service: our flexible services are individually-tailored to the needs of solar professionals – worldwide.

Expert advice over the telephone via the SMA Serviceline

The experts on our Serviceline support solar professionals during the installation and commissioning of PV plants, advise on technical issues, and provide tips on system monitoring. The specially-trained expert teams are available at various telephone numbers for all inquiries regarding inverters, communication products, and Sunny Island products.

SMA service on-site

Solar professionals can rely on our support: we have a well-developed international service network with numerous access points, currently in 13 countries. In the event of a service requirement, SMA can be on-site quickly. Thus, we are ready to support our customers around the world, from on-site diagnosis to device replacement.

Device replacement for highest security of return

Should a failure occur, we will keep down times as short as possible by replacing your device. After a call is received, the replacement inverter is generally shipped on the same day. To replace the defective inverter, the customer will receive a comparable device with state-of-the-art technology, including all updates and alterations. If a device is exchanged within the warranty period, the remaining warranty period is transferred to the replacement device. In any event, we provide one year full warranty on all replacement parts both within and outside the warranty period. And that's not all: our service technicians can take care of the installation of the replacement device upon request.

More security with long-term warranties

SMA products meet the highest quality standards and come with a standard five-year warranty. Additionally, we offer an extended warranty for an additional five, ten, fifteen or twenty years, with which operators can assure themselves of the right to free repair or a replacement device.

Interested?

Whether for commissioning, service work or tips on plant monitoring: operators and solar professionals are in good hands with the SMA service concept. Additional information on our services is available on the corresponding SMA website, where you may also download or order a free copy of our service data sheet.

SERVICELINES

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> COMMUNICATION +49 561 9522 2499
> SMS CALL-BACK +49 176 888 222 44
SUNNY ISLAND +49 561 9522 399

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Tel. 1800 SMA AUS (1800 762 287)

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SMA France S.A.S.
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Surveillance et Communication
Tel. +33 472 09 04 41
Sunny Island Tel. +33 472 09 04 42

SMA Hellas AE
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SMA Middle East LLC
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Masdar City, Abu Dhabi (AE)

SMA SOLAR TECHNOLOGY AG www.SMA-Solar.com

Customer-oriented

- Professional installation, commissioning and repair on site
- Telephone support by teams of experts through our Serviceline

Assured returns

- Technical availability up to 97, 98 or 99 percent
- Five-year warranty on all Sunny Central inverters

Flexible

- Service and maintenance contracts up to 20 years

SMA Service for central inverter solutions

Tailored services worldwide for optimum system availability

Solar power stations are profitable and secure investment opportunities. In combination with the high-yield SMA central inverters, our services ensure optimum system availability. From telephone support through the SMA Serviceline, to on-site service, to our five-year standard warranty, to maintenance contracts with technical availability of up to 99 percent: our SMA Sunny Central Service is a secure investment for the future.

Partnership and experience: from planning to commissioning

From the start, SMA offers large-scale plant operators support in project planning and components selection. Whether choosing the best inverter for your needs or generating a monitoring concept with SMA project solutions tailor-made to your plant, our experts can help assemble the best components to meet any need. In addition to supplying, fitting and installing the inverters, you can depend on us to assist with your large turnkey projects right through to inspection and approval by the utility company.

A direct link to the experts: our Serviceline

One telephone number, one contact person, one solution: through the Serviceline, our Sunny Central team provides fast and efficient telephone support to contractors, solar professionals and plant operators. With SMA monitoring devices such as the Sunny WebBox, our support staff can also undertake quick and direct remote diagnosis.

In Germany and worldwide: Sunny Central Service on-site

Support you can count on: we can be on-site quickly if service is required. Moreover, we have a well-established international service infrastructure, currently in 13 countries. From on-site diagnosis to repairs and maintenance in the field, we work for our customers worldwide.

Interested?

From commissioning to service calls to tips on plant monitoring: customers and solar professionals are in good hands with the SMA service concept. All information is available on the respective SMA website, where plant operators and installers can also download or order a service data sheet free of charge.

SERVICELINES

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SMA SOLAR TECHNOLOGY AG www.SMA-Solar.com

SUNNY PRO | Club

Making Strong Partners Stronger


SMA
NY PRO | Club
g Strong Partners Stronger
Sunlab
10587 Berlin
Peter Mertens
Membership Number SPC1236547

Profitable

- Active sales support with a wide range of professional and affordable marketing measures

- Joint web profile for SMA solar professional partners with the market leader

- Acquire new customers by having your solar professional company listed on the end customer website "Solar is Future" and on the SMA website

Time-saving

- Direct access to the latest product information
- Valuable time and costs savings for solar professionals

The Sunny PRO Club

Professional marketing for solar professionals

PV plants do not just need planning and installing – they also need to be sold. The SMA partner program for solar professionals offers its members active marketing support to tap into their regional solar markets. This not only saves time, but also attracts new customers.

Professional marketing support

All promotional measures are specially tailored to meet the individual requirements of the solar trade. Whether with sample devices, personalized brochures or display examples, members receive practical support for all their marketing needs. A particularly attractive advantage is the opportunity to have your company named in the "Solar is Future" end user portal and on your local SMA website: club members can use the solar professional search to increase awareness of their company in the region and acquire new customers.

Advantage through knowledge

It's the same for all state-of-the-art information technology: personal contact and passing on expertise are still the most important sources of knowledge. If you have any questions or comments, our Club Hotline staff will be happy to help. You can also visit a wide range of events. Sunny PRO Club members also benefit from exclusive technology and sales seminars as part of the SMA Solar Academy.

Partnership that pays off

The concept of the Sunny PRO Club is based on a principle of give and take: SMA's solar professional partners do not just receive professional marketing solutions with attractive conditions. As the world's largest manufacturer of solar inverters, SMA is also a strong and reliable partner for all Sunny PRO Club members. Just as solar professionals can use the marketing power of the SMA brand to improve their image, in turn they also help to further increase awareness of the brand.

Interested?

Becoming a member of the Sunny PRO Club is easy! For a low annual fee, each member receives a starting package and a selection of attractive marketing measures, and is also entered into the online solar professional search. Simply visit our Sunny PRO Club online. There you will find all you need to register and further details on the services we provide.

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Sunny PRO Club France
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www.SunnyPROClub.fr

SMA SOLAR ACADEMY


236 kW

Comprehensive

- Expertise on SMA inverter technology and photovoltaics
- Several hundred seminars annually worldwide for newcomers and experienced users

Targeted Training

- Training courses tailored specifically for contractors, sales staff, plant designers and solar installers
- Seminars on products or specific subject areas

Hands-on

- Specially trained instruction team
- Exchange with SMA developers and seminar participants
- Opportunity to practice with products

Cooperative

- Comprehensive seminar documentation
- Networking over lunch

SMA Solar Academy

Sharing knowledge. Creating a competitive edge.

Greater success through added know-how: the SMA Solar Academy provides expertise and targeted training in the area of photovoltaics, and takes into consideration the latest trends, developments and issues in the field. Competent and hands-on. We have extended our selection of seminars for 2010, and so interested parties can now choose from hundreds of seminars across the world.

Targeted seminar offers

All product seminars are structured thematically and take into account participants' prior level of knowledge. We offer modular courses for novices (basic seminars), advanced users (intensive seminars) and experts (expert seminars). Our compact seminars on specific topics are designed for special target groups such as architects.

Modular technical training courses*

(All seminars are one-day and can be booked separately)

» **Basic & Intensive Seminars "Inverters"**
The seminars provide up-to-date information on photovoltaics, inverter technology, plant design, installation and protection, and lightning protection.

» **Basic Seminar "Plant Communication"**
How does communication via *Bluetooth* work? Experts on plant communication explain the advantages of the new SMA radio standards and direct communication between PC and inverters.

» **Basic Seminar "Plant Monitoring"**
The seminar introduces the SMA products Sunny Beam and Sunny WebBox and shows how they are used. How do you establish a communication connection? What do you need to keep in mind when configuring the WebBox? How do you read out data with a PC? These questions and more are answered with hands-on small group exercises on training devices.

» **Basic & Intensive Seminars "Large-scale PV Plants with Sunny Central"**
High-tech for solar power plants: the seminars focus on how central inverters such as Sunny Central function. Further topics include: installation of large-scale plants, the requirements of the "Medium-Voltage Directive", comparison of a central vs. a decentralized plant design, and plant communication.

» **Intensive Seminar "Plant Monitoring"**
Advanced knowledge for all participants who have already completed the "Plant Monitoring" Basic Seminar. In addition to expanded configuration of the Sunny WebBox and Sunny Portal and basics on network technology, seminar participants will use SMA communication devices to learn how, for example, to generate complex web pages in Sunny Portal for comprehensive plant monitoring.

» **Basic , Intensive & Expert Seminars "Island Grid Supply with SUNNY ISLAND"**
In-depth training for the various off-grid Sunny Island inverters, their installation, flexibility of use, single-phase/three-phase island grid, battery, load and system management, and plant configuration.

» **Basic Seminar "Small Energy Systems with WINDY BOY"**
From functionality to technology to the variety of SMA inverter products – this seminar explains what you need to know about small wind energy systems.

Compact seminars on specific subject areas or products*

» **"Plant Planning and Design" (one-day seminar)**
Plant design made easy: the seminar explains how planners can use Sunny Design to instantly determine the optimum plant configuration.

» **"User Forum" (one-day seminar)**
Networking between "professionals" and "newcomers to PV": existing and aspiring plant operators find out all they need to know about solar power and SMA products.

» **"Communication with Sunny Boy Control" (one-day seminar)**
Continuous plant monitoring: our instructors explain the functions of Sunny Boy Control (Plus), how to connect temperature and irradiation sensors, and how to evaluate the measurement data using SMA software.

» **"Back-up Electricity Supply with Sunny Backup" (one-day seminar)**
Solar power during a blackout: the course presents the SMA back-up systems. Further topics include the integration of various additional energy sources (PV, generator) and plant configuration.

» **"Marketing PV Plants" (two-day seminar)**
How should customers decide when to install a Sunny Boy or a Sunny Mini Central? The most important (selling) points and information on all products or groups of products in one compact seminar.

» **Are you interested in the seminars offered by SMA Solar Academy?**
Simply choose your desired seminar on the SMA website and register via telephone or e-mail. We look forward to your participation!

Seminar names and contents may vary by country.

*You will find specific information on available seminars of all SMA branches, the exact training dates, as well as contact information on the respective SMA web site.

KNOW-HOW

Centralized or Decentralized?

SMA has the right inverter concept for any PV plant

From kilowatt to megawatt, SMA is the single source manufacturer for the right solar inverter of every size and for every site. Thereby, the customer can choose among various plant concepts. While a central inverter concept may clearly be the best solution for one PV plant, conditions in another system, even a system similar in size, may require a decentralized concept.

You must always consider installation and plant operating costs in particular when deciding whether to opt for a centralized or decentralized plant structure. Under certain conditions, decentralized plant design has been shown to offer a range of advantages over centralized design. A few of the important aspects typical of the power class above 100 kWp are noted in the following examples.

Decentralized plant design: precise and effective

If a PV plant is oversized or undersized, this can have just as much of an effect on the plant's energy yield as the inverter efficiency. Specific system performance can be set precisely using small inverter units. Together with a high degree of efficiency, several smaller devices can present a better alternative than one large centralized unit.

Advantageous in mixed plant structures

A centralized inverter such as the Sunny Central works most effectively with a homogenous solar generator. Decentralized concepts, such as those using Sunny Mini Central inverters, are a better choice when generator units differ and should thus be operated separately. This can be caused by using mismatched PV modules or modules with a higher manufacturing tolerance, sub-generators that are oriented differently, or tracking sub-generators.

Maintenance-friendly operation under all conditions

Maintenance work on decentralized systems is much less complicated and economical compared to centralized systems, as the individual inverters can be replaced if necessary. Installing smaller and lighter devices can be less expensive than a large heavy concrete substation if ground load capacity or site accessibility is limited.

However, monitoring of a plant with a centralized inverter is easy to set up and covered by the standard hardware. Even the required participation in grid management for large scale plants can be implemented particularly easily. And above a certain plant size, decentralized concepts are simply no longer practical.

Comprehensive analysis is important

These examples show that you really must account for all costs (TCO: Total Cost of Ownership) when choosing the most economical solution and evaluate them when planning the specifics of your solution. Different condidtions may result in the fact that a system generates profit on one site or struggles with amortization on the other. It is therefore wise to take advantage of the technical advice and experience of the SMA team when determining the optimum plant structure and components for your project.

Design of PV plants

Three Steps to Success

The possibilities for plant design are vast. There are many different module types, various inverters, roof pitches, locations and many more. The right design of a solar plant is crucial for the anticipated yield. The most important design decisions can be summarized in the following three steps. They take the fundamental technical context as well as guidelines and rules of thumb for the design of a standard PV plant in parallel grid operation into account. If deviations from the required standard conditions occur, the specified guidelines must be modified accordingly.

1. Incorporate the inverter's electrical thresholds

First of all, the voltage of the generator must match the inverter. The limits are defined by the MPP voltage at the highest cell temperature (standard: 70 °C) and the open circuit voltage at the lowest cell temperature (standard -10 °C). The maximum plant voltage of the PV modules can also limit the open circuit voltage of the generator.

2. Choose between optimizing the economy or optimizing the yield

The performance ratio (relationship between the maximum input power of the inverter compared with the peak power of the PV generator) provides information concerning oversizing or undersizing of the inverter. To utilize the full power of the PV generator at all times, the inverter must be slightly oversized (power ratio 110 %) However, the economically optimal system is slightly undersized. Therefore, the following decision must be made during the designing process: Do you want to "squeeze" every last drop of energy from the solar generator at all times (optimize the energy yield) or select a slightly lower inverter performance, accepting minimal yield losses at higher irradiation levels (optimize economy)? Of course, the answer to this question depends largely on the economic conditions at the plant location.

3. Use the maximum efficiency of the inverter

Every inverter has an input voltage at which its conversion efficiency is maximized. Whether this voltage lies in the upper or lower area of the operational range is, depends on the internal design and is listed in the respective data sheet. If possible, the MPP voltage of the PV modules at NOCT (Normal Operation Cell Temperature) should be close to this voltage.

Though professional design of a PV plant includes many more steps, the three basic decision steps above largely determine the future yield. For this purpose, SMA offers the free software SUNNY DESIGN, which incorporates all the aspects of plant design (more on page 12).

Inverters as grid managers

Overview of the grid management functions of SMA inverters

It started in Germany in January 2009, following France in 2008: Since then, large-scale PV plants have had to participate in grid management, and provide grid services to an increasing extent. Experts unanimously agree that such measures are essential. The installed PV power increases continuously, and individual projects are growing larger and larger. Increasing size and power also mean greater responsibility for the electricity grid, as only a stable grid permits unrestricted expansion of renewable energies. This was enough reason for SMA to commit fully to participation from the outset. SMA, technology leader in the field of solar inverters, is now also a pioneer in grid management.

Powerful grid management functions

For example, the SMA Power Reducer Box was the first market ready solution for utility interaction management as defined in Art. 6 of the German Renewable Energies Act (EEG)* – and is also compatible with virtually all SMA inverters. Inverters with an automatic power reduction feature in case of increased frequencies make a valuable contribution to stabilizing the grid frequency if more energy is generated than can be consumed. Reactive-power compatible inverters help keep the grid voltage constant, but can also be used to compensate for undesirable phase shifts. And the dynamic grid support features support the grid in the event of faults, and can also prevent, or at least restrict, the fault from spreading further.

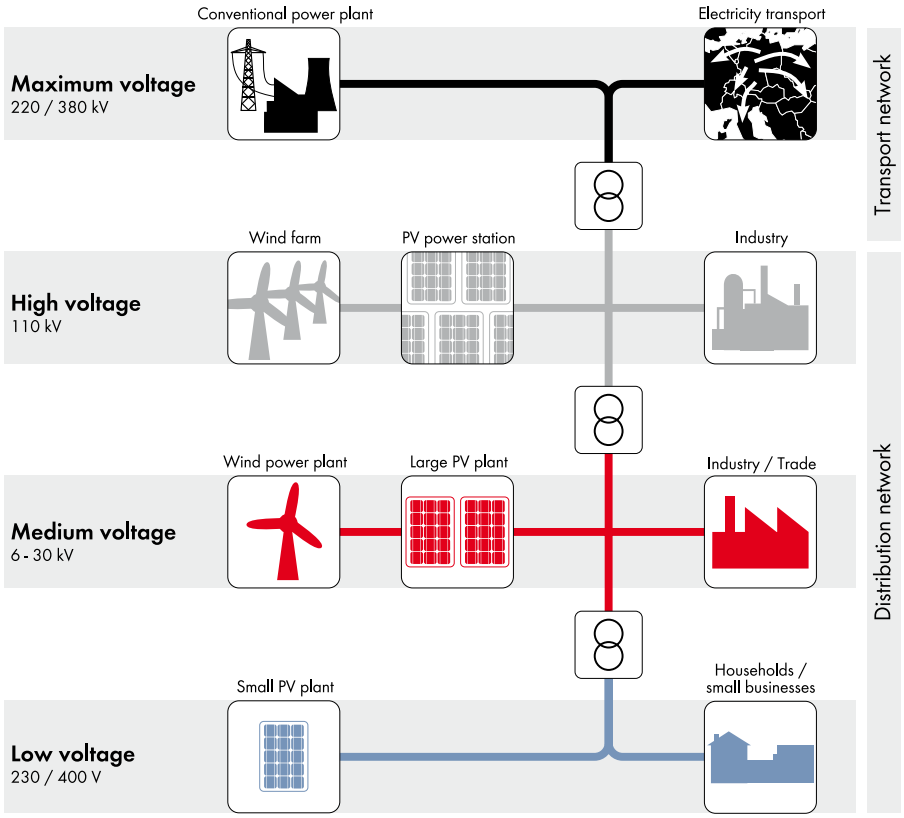
* Renewable Energies Act (EEG)

1 Generation and grid stability management

Sixty seconds: Inverters in Germany have just one minute to implement possible specifications of the utility operator. If a section of the grid is overloaded temporarily, the utility operator can and must limit the power from decentralized generating systems The plants make a major contribution to the stability of the grid, which can hardly keep pace with the rapid expansion of power from renewable energies in some cases. The SMA Power Reducer Box von SMA translates the incoming setpoint specifications of the utility operator into control commands for the Sunny WebBox. This in turn forwards the commands to the connected inverters via fieldbus, and logs the external setpoint specification – which is important for legally compulsory compensation for possible resulting yield shortfalls.

2 Automatic active power frequency control

The frequency in alternating current grids is kept constant within strict limits – typically at exactly 50 Hz or 60 Hz. The frequency drops if more energy is consumed than the generators feed-in. The opposite occurs if there is an energy surplus – the grid frequency increases. SMA inverters can react to this with an automatic active power reduction: The higher the frequency is above the setpoint, the more they derate the active power output. This stabilizes the grid and prevents mass deactivation of systems due to excessive grid frequency.



The grid levels in the AC power distribution grid

3 Static voltage support based on reactive power

In order to protect the connected loads, the voltage must be kept within defined limits – that applies to the distribution grid in particular. With their ability to provided controlled inductive or capacitive reactive power, PV inverters can help guarantee the voltage quality required in EN 50160.

Reason: the increasing feed-in at low and medium-voltage levels can result in voltage increases which caused problems for the previous grid operation method (flow of energy from central generator to decentralized loads). Using reactive power, PV inverters can now reduce undesirable voltage increases significantly. Reactive power-compatible inverters can also be used to compensate for existing phase shift. As even reactive power reduces efficiency, this reduces the load on the grid infrastructure, whose capacity limits may already have been reached. Typical causes of phase shifts include transformers, large motors or even simply long cable sections.

There are several options for adjusting the percentage of reactive power: Plant operators can use set points specified by utility operator, or various reactive power values can be set via an agreed schedule or remotely programmed via the SMA Power Reducer Box. The third option is regulation of the percentage of reactive power via a characteristic curve depending on the grid voltage measured at the connection point or the active power output of the inverter.

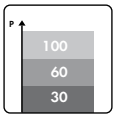
4 Dynamic grid support

Until now, PV plants had to disconnect from the grid immediately, even during temporary drops in grid voltage. This meant that many plants were deactivated in the event of grid failure, unbalancing the grid even further. Inverters with dynamic grid support functions act within milliseconds in such events, preventing the grid failure spreading further. The so-called restricted dynamic grid support ensures that the inverter is ready to feed energy into the grid immediately after a drop in the grid voltage. Devices with full LVRT or FRT behavior (Low-Voltage or Fault Ride Through) can also feed reactive power into the grid during grid voltage drops. LVRT is already supported by the new Sunny Central CP series.

Equipped for the future with SMA know-how

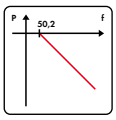
Providers of decentralized grid services and an intelligent interface to the supply grid: That describes the solar inverter of the future. The utility operators have also recognized that inverters are particularly predestined for the pending grid management responsibilities – and demand these system services to an ever greater extent. SMA makes an important contribution to this with its products.

SMA inverter grid management functions



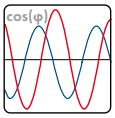
Remote-controlled power reduction in case of grid overload

In order to avoid short-term grid overload, the grid operator presets a nominal active power value which the inverter will match within 60 seconds. The nominal value is transmitted to the inverters via a ripple control receiver in combination with the SMA Power Reducer Box. Typical thresholds are 100, 60, 30 or 0 per cent of the nominal power.



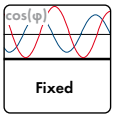
Frequency-dependent control of active power

As of a grid frequency of 50.2 Hz, the inverter automatically reduces the active power output according to a definable characteristic curve, helping to stabilize the grid frequency.



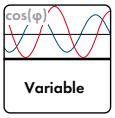
Static voltage support based on reactive power

SMA inverters feed capacitive or inductive reactive power to the grid in order to stabilize the grid voltage. Three different modes are available:



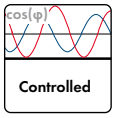
a) Fixed specification of the reactive power by the utility operator

The utility operator defines a fixed reactive power value or a fixed displacement factor between $\cos(\varphi)_{leading} = 0.90$ and $\cos(\varphi)_{lagging} = 0.90$.



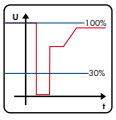
a) Dynamic specification of the reactive power by the utility operator

The utility operator defines a dynamic displacement factor – any value between $\cos(\varphi)_{leading} = 0.90$ und $\cos(\varphi)_{lagging} = 0.90$. It is transmitted via a communication unit. The SMA Power Reducer Box performs the evaluation.



c) Control of the reactive power via a characteristic curve

The reactive power or the displacement factor is controlled by a pre-defined characteristic curve – depending on the active power fed into the grid or the grid voltage.



Limited dynamic grid support

The inverter feeds into the grid again immediately after short-term voltage drops – as long as the grid voltage is within a defined voltage range.

Dynamic grid support

LVRT (Low-Voltage Ride Through): The inverter stays connected to the grid during voltage drops and supports the grid by feeding reactive power.

The right solar inverter

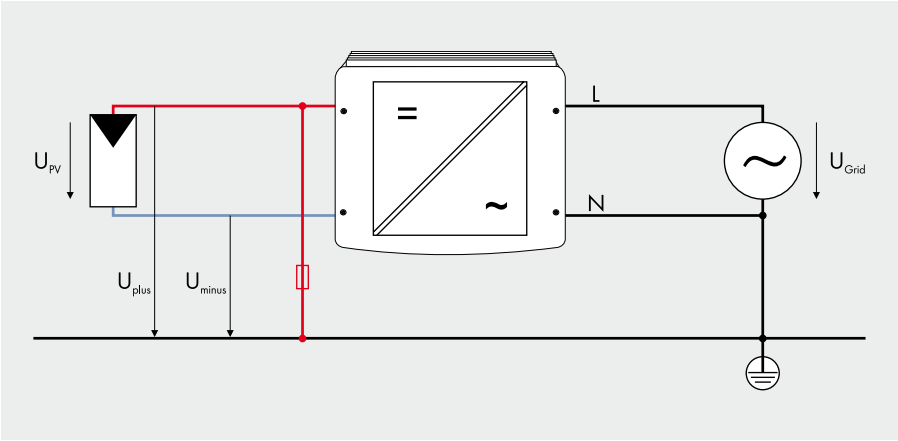
for every module technology

Besides conventional PV modules, new cell technologies and other advancements have been appearing on the market for quite some time. Of these, some can only be operated under certain conditions. For this reason, the manufacturer's application instructions must be observed when using PV modules.

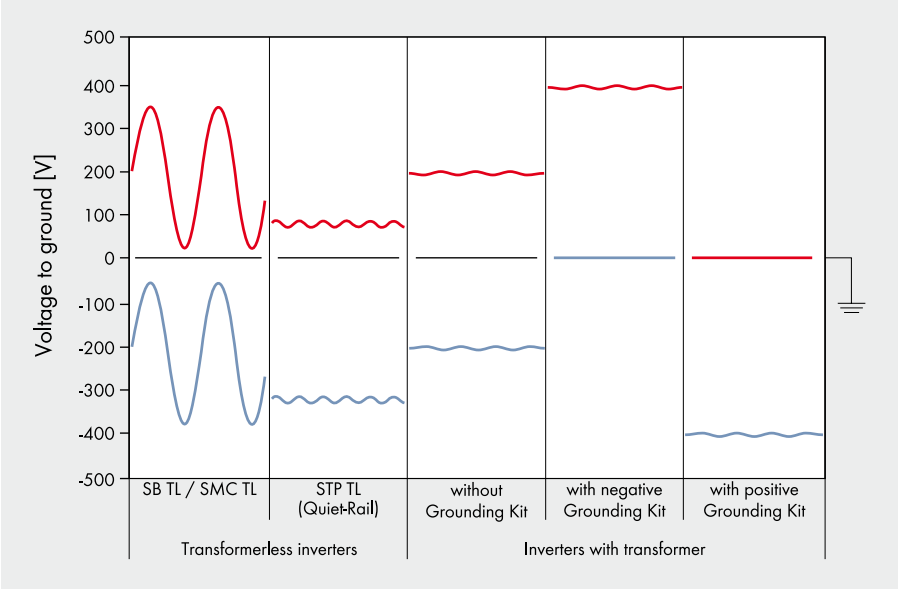
The versatile range of different topologies allows a flexible application of SMA's inverters – combined with the suitable grounding set – providing the ideal device for any module technology. Moreover, SMA is in close contact with the module manufacturers, which means that current installation recommendations can be effortlessly observed.

When selecting an inverter that meets the special PV module requirements, the generator potential in operation of various inverter topologies must be taken into account. The adjacent diagram shows a chronological map of potential courses of the generator connections during operation using several different inverters.

To help you select the right inverter for each module type, we have compiled the most important current recommendations for you. They are covered in the technical information package "Module Technology" and are explained in detail there.



Block circuit diagram: PV plant with positive generator grounding



Generation potential in different inverter topologies and grounding variations

1. Recommendation of the manufacturer

Check whether the manufacturer of the PV modules issues recommendations on the grounding of the generator or the topology of the inverter to be used.

Example: A manufacturer recommends grounding the positive generator connection for a specific module type. The right choice: Sunny Boy with transformer and a positive grounding set.

2. Selection based on module characteristics

If the manufacturer of the PV module does not define any specifications for the use of its products, we recommend choosing an inverter based on the characteristics of the PV module.

Example: Thin-film modules with CdTe or amorphous silicone cells often use a TCO-coated pane of glass as a substrate for cell construction. The right choice: Sunny Boy with transformer and a negative grounding set.

Example: In case of flexible thin-film cells, a stainless steel foil is often used as a substrate mount. Use an inverter topology in which the PV generator only features a small amount of AC voltage to the ground. The right choice: Sunny Boy with a transformer or a device with no transformer with Quiet Rail Technology (e.g. Sunny Tripower). It prevents reverse effects of the grid voltage on the generator potential via special wiring.

The table below shows favorable combinations for many different cell technologies.

For further information, see the download area of our homepage.

Cell technologies / Module design	Transformerless inverters		Inverters with transformer		
	SB xxxxxTL SMC xxxxTL	STP xxxxTL (Quiet-Rail)	Series device SB xxx, SMC xxxx	with negative grounding kit	with positive grounding kit
monocrystalline Si	●	●	●	❍	❍
polycrystalline Si	●	●	●	❍	❍
CdTe	–	–	–	●	–
amorphous Si (superstrate)	–	–	–	●	–
amorphous Si (substrate)	●	●	●	❍	❍
CIS / CIGS	●	●	●	❍	❍
monocrystalline Si (A-300)	–	–	–	–	●
Metal foil as substrate or in module design	–	●	●	●	●

Key: ● recommended, ❍ not necessary, – not recommended

Recommended combinations of inverters and cell technologies

Maximizing the yields

with High-Tech by SMA

The technical details of SMA inverters benefit in particular from the expertise of our developers and their decades of experience. Many innovative SMA technologies either directly or indirectly increase the system yield immediately.

H5 Topology – patented inverter circuits for maximum efficiency

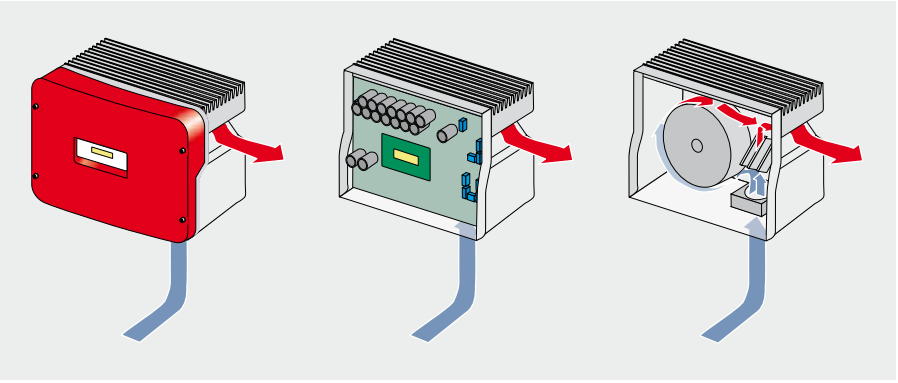
A modern inverter "consumes" between three and six percent of the energy collected by the solar modules for conversion of the direct current into alternating current, which corresponds to an efficiency of between 94 and 97 percent. SMA's patented H5 topology, an advanced circuit for the inverter bridge, optimizes the current flow in the inverter and thereby reduces the loss during conversion. Basically the sinusoidal grid current is produced using the high frequency chopping and buffering of the DC current in the inverter bridge circuits. This leads to a costly oscillation of buffered energy. A special synchronization of the inverter bridges as well as the integration of a fifth semiconductor switch prevents this oscillation and reduces the conversion loss to less than two percent. This is how the inverters based on this technology reach new levels of performance with efficiency rates above 98 percent.

OptiCool –
Intelligent temperature management

The trend is clear: PV plants and inverters are becoming ever more powerful while installation conditions remain the same. The effective heat dissipation from the enclosure is thus increasingly important. This is because increasing temperatures in the enclosure reduce the performance and lifespan of electronic components. With the patented two chamber cooling system OptiCool, SMA inverters offer an ideal combination of passive and active cooling which is worthy of the name "intelligent

temperature management." To maximize the cooling effect, the entire inverter enclosure is a part of the cooling system. It is divided into two separate chambers: the front is sealed tight and thus offers the electronics solid protection against penetration of water, dust and dirt. By contrast, all components with a functionally higher temperature, such as chokes and transformers, can be found at the back of the enclosure. A temperature-controlled fan dissipates the heat from this area though a special flow tunnel to the outside. All in all, OptiCool produces a lower component temperature and assures maximum reliability and outstanding overload characteristics.

How OptiCool functions in the Sunny Boy 3800



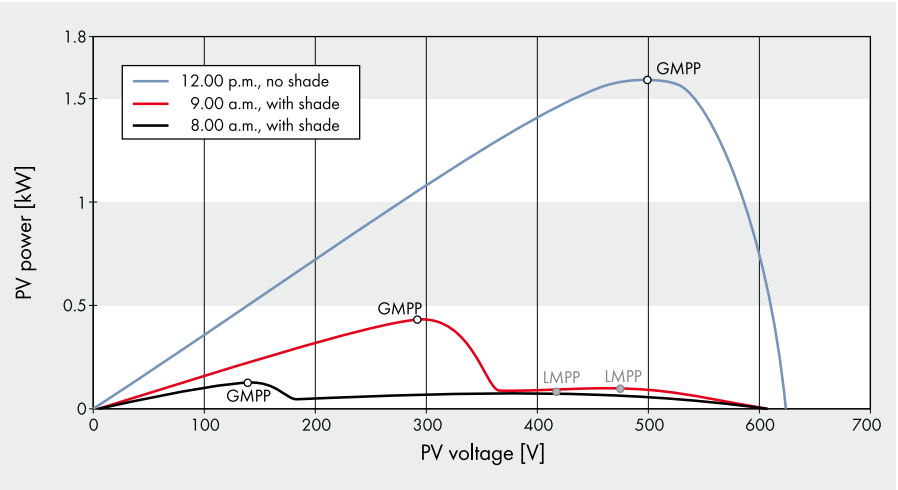
OptiTrac – Highly efficient MPP tracking

Every solar inverter has at least one: the MPP-Tracker ensures that the solar module always operates at its maximum power (MPP). Since the MPP depends on the temperature and the strength of the irradiation, it must be recalculated again and again. It is essential that this process take place as quickly and safely as possible. Irradiation conditions can change quickly and often – on sunny days, a passing patch of clouds can make this happen in just a few seconds. OptiTrac is SMA's solution for just this problem: sophisticated experiments at the SMA Solar Test Center have resulted in the refining of MPP tracking and the further increase of its efficiency. It does not matter if crystalline or thin-film modules are used. Extensive tests and field trials confirm that OptiTrac increases the energy yield of a PV plant by up to 1.5 percent per year on average – money for the plant operator.

OptiTrac Global Peak – Good yield in spite of partial shading

In order to always find the optimum operating point even in partially shaded PV plant, an additional function, "Global Peak", was added to the proven MPP tracking system. It enables the inverter to almost fully use the energy supply of the solar modules under all conditions. Reason: If the individual modules in a string are shaded, the string's power curve can suddenly show several maximum points. In general, there is only one operating point with the actual maximum power: The global maximum power, which results in significantly higher power compared with the other local maximums. This is where the new OptiTrac Global Peak gets interesting: as it reliably finds the global maximum power, the available energy of a partially shaded string can be used almost fully.

The SMA inverters Sunny Boy 3000TL, 4000TL and 5000TL will be equipped with OptiTrac Global Peak as standard from the second quarter of 2010. Older devices of these types can be upgraded via a software update. In the medium term, OptiTrac Global Peak will also be available for the Sunny Tripower.



A Sure Thing

SMA protection concepts for installation and maintenance

Safety first – This is especially important for the area of energy technology A whole series of regulations and standards are there to protect operators, maintenance personnel, and the everyday user against accidents with electricity. SMA sets the benchmark by equipping all products with exemplary safety facilities.

SMA Grid Guard -
Utility interface for use worldwide.

Most PV plants feed the solar energy directly into the power distribution grid using an inverter. The regional utility operator is responsible for this grid: They ensure that the prescribed thresholds for voltage and frequency are complied with, that the electricity grid is used effectively and is easy to maintain in the event of a fault. Of course, this only works if those feeding into the grid comply with certain rules and can be selectively disconnected from the grid. The automatic grid disconnection device SMA Grid Guard prevents unintentional feeding when the supply grid is turned off (islanding) as well as when the upper and lower limits of the standards are exceeded. In this way, it offers maximum protection for both maintenance personnel and consumer alike against excessive voltage and frequency.

Recognized safety standard

SMA was one of the first manufacturers to incorporate the requirements of the utility operators in the functions of their solar inverters. The maintenance-free automatic grid disconnection function has been a standard feature on the Sunny Boy inverters since 1995. The ongoing development of the "SMA Grid Guard" represents a recognized standard for safety: in this kind of active grid monitoring, the quality of the connected grid is constantly monitored – by monitoring voltage, frequency and impedance. Here, fail-safe operation must be guaranteed so that periodic functional test-

ing by the utility operator is not necessary. The first requirements for this safety concept were described in the German standard VDE 0126-1-1. They now include the vast experience we have attained over the course of more than a decade of safe feeding operations. Today utility operators in other countries refer to these requirements, and they modify them to suit the local grid conditions or extend the requirements with additional regulations. As the most modern type of automatic disconnection device, the SMA Grid Guard grid monitor can be used easily throughout the world.

Grid monitoring increases availability

The continuous monitoring of the grid parameters guarantees a very high availability of the inverters on the grid. The software can also adapt to difficult grid conditions via an automatic learning process: It can distinguish recurring events from faults and therefore safely avoid unnecessary grid disconnections.

Country variants

The equipment described here complies with the safety philosophy of the SMA inverters which is recognized in most countries around the world. Moreover, SMA also offers products which are tailored for the special requirements of specific countries. While these inverters contain all safety devices, they may not always be in the design described here. For example, UL-listed inverters are equipped with a special grid monitor, a mechanical DC circuit-breaker and automatic ground monitoring (GFDI) to comply with the currently valid UL regulations.

Electronic Solar Switch –
The first internal DC load disconnection unit for solar inverters

Working on an electrical device generally requires the power supply to be disconnected. A DC load disconnection unit that acts as a circuit-breaker under load between solar generator and inverter is therefore a strict requirement in most countries. The goal of the developers at SMA was to design a disconnector which did not entail additional installation costs, was simple and safe to handle, and had no effect on the efficiency of the PV plant.

The patented Electric Solar Switch (ESS) is composed of a grip handle, which covers all socket outlets and plugs completely, which prevents disconnection under load. To disconnect the generator from the inverter, the complete grip handle must first be pulled off. At the same time, an electrical circuit is activated which prevents the occurrence of an electric arc, thus guaranteeing maximum protection even if the DC lines are disconnected incorrectly. There is no more current present at the DC plug connection

which are now revealed – only the voltage of the solar generator is still present.

The ESS works passively during normal grid feeding, incurring absolutely no losses, and thus has no influence on the efficiency of the inverter. The ESS is also the only DC disconnector which guarantees continued further use of the reliable PV plug connectors and the high standard of protection against accidental contact in generator cabling in accordance with protection class II. This electronic switch, developed and patented by SMA, thus brings added safety to all work carried out on the PV plant, which exceeds the standard requirements.

Your own power grid

AC and DC solutions for stand-alone systems

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 must do without many of the conveniences of our civilization.

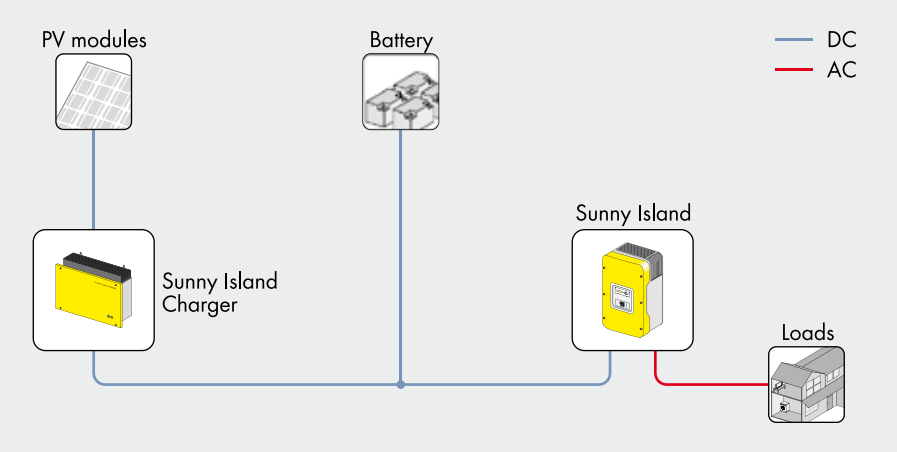
Photovoltaic energy offers solutions like no other technology: PV plants are robust, durable, easy to install and maintain. For years SMA has been motivated to develop a self-contained energy supply system based on solar power. SMA is the only manufacturer in the world to pursue not only the concept of DC coupling, but also AC coupling, which has a range of advantages. With AC coupling, all loads 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

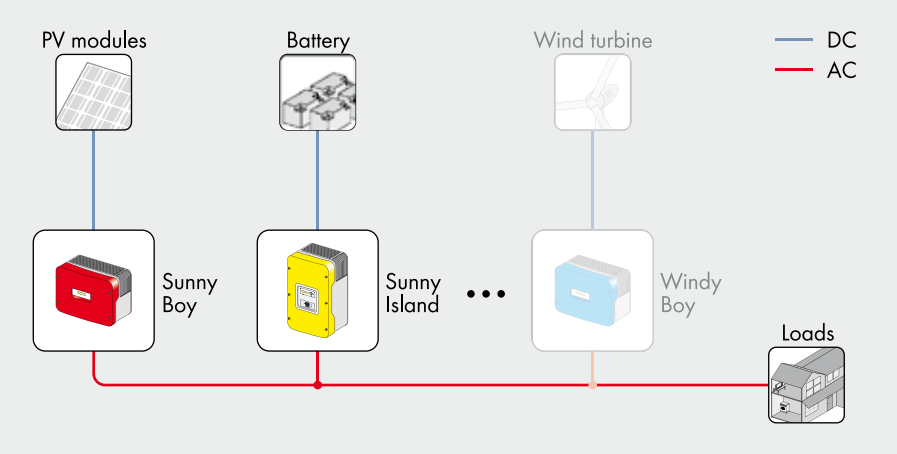
There are three different concepts for establishing energy supply systems, which save the generated energy in batteries: pure DC coupling, mixed systems, and pure AC coupling. In the beginning, the first developments relied on pure DC coupling: both the solar modules and the batteries were DC voltage sources, so that a conversion of the power with the then still expensive inverter technology could be avoided. With a few hundred 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 DC voltage versions.

Variants of DC coupling

Powerful systems pose a difficult problem for pure DC coupling: since the voltage is generally limited to 48 volts for health and safety reasons, the current is very high. Sockets, cables and fuses rated to approximately 80 amps were required in order to carry the around 3,700 watts of power output 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 installations are used, at least for larger solar energy supply systems: Inverters convert the lower DC voltage of the batteries into grid conforming AC voltage of 230 volts. Only the loads were connected to this AC voltage, while the PV modules and batteries were still connected to DC cables. This is acceptable if the distance is limited – only a charge controller is required to prevent the battery overloading.



DC coupling: better with the Sunny Island Charger



AC coupling: the basis for a highly flexible stand-alone electricity supply

The SMA Solution for DC Coupling

Since the PV module voltage varies with the battery voltage, the solar modules in such systems very rarely reach their optimal operating point (MPP). In this way, as much as 30 percent of the valuable solar energy is lost. In order to avoid this, one needs an MPP charge controller like the Sunny Island Charger. It controls the power provided by the PV generator (current and voltage) to maximize the charge current. The somewhat higher costs can be recovered very quickly. the solar yield increases by 20 to 30 percent. The size of the PV plant can be reduced accordingly, which more than makes up for the additional costs of the charge controller.

Flexibility with AC coupling

If the PV plant and the batteries are not immediately adjacent to one another, the optimal solution is a complete AC coupling: instead of building an expensive DC grid on the generator side, a solar inverter converts the solar power into AC current and feeds it into the existing stand-alone AC grid. This can create a number of advantages:

- 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-in 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 grid connection, such as optimized MPP, high efficiency, OptiCool, etc.
- Lower total costs for solar systems with more than four kilowatts of power

Solutions for all stand-alone systems

SMA is the only manufacturer in the world to offer maximum utilization of AC coupling for stand-alone power supply systems. Both the multiple award winning Sunny Boy and the Sunny Boy Central solar inverters are used for this. Smaller systems can also be built as DC-coupled PV plant with the Sunny Island Charger. No compromising in terms of design, cost or installation: SMA offers optimum solutions for all off-grid systems ranging from two to 300 kW.

SMA – Partner for successful large-scale projects

Inverters and system solutions for every system design

SMA not only offers first class products and global service, but also comprehensive system solutions for PV power stations. Relying on our technological expertise and years of experience in project development, we ably support and advise our customers on their large-scale projects. The advantage: planning support, consulting, inverter technology and service all stem from a single source.

Complete product range for successful PV power stations

Whether centralized or decentralized, SMA provides the right inverter for all large-scale plants accommodating all requirements, ranges of performance and module types. Be it a decentralized variant with Sunny Mini Central or centralized variant with Sunny Central inverters, SMA products are equipped with the most modern system technology. This makes them especially efficient and reliable. In combination with steadily decreasing system costs, we offer the best specific price on the market. In addition, SMA inverters for large-scale plants are the first which meet all the requirements specified in the German Medium-Voltage Directive.

Everything under control with SMA system monitoring

Operators can keep a close eye on their large-scale plants with our system monitoring products. As a communications center, the Sunny WebBox serves as the foundation for every large-scale plant. Using RS485, *Bluetooth* or Ethernet, it receives and saves all measured values and data. The SMA OPC Server integrates SMA devices into power plant control stations. And with the Power Reducer Box, SMA is the first manufacturer to offer a communication product suitable for the required active participation of PV power stations in grid stability management.

First class service for highly reliable plants

PV power stations are profitable investment opportunities. Our services guarantee particularly reliable devices. Among these are service and maintenance agreements for Sunny Central inverters with a reliability rating of 99 %, replacement service for Sunny Mini Central devices and extended warrantees valid for up to 20 years. With an international service network spanning four continents, we are globally available to our customers, making us a fast and dependable service provider. To ensure the profitability of investments into the future.

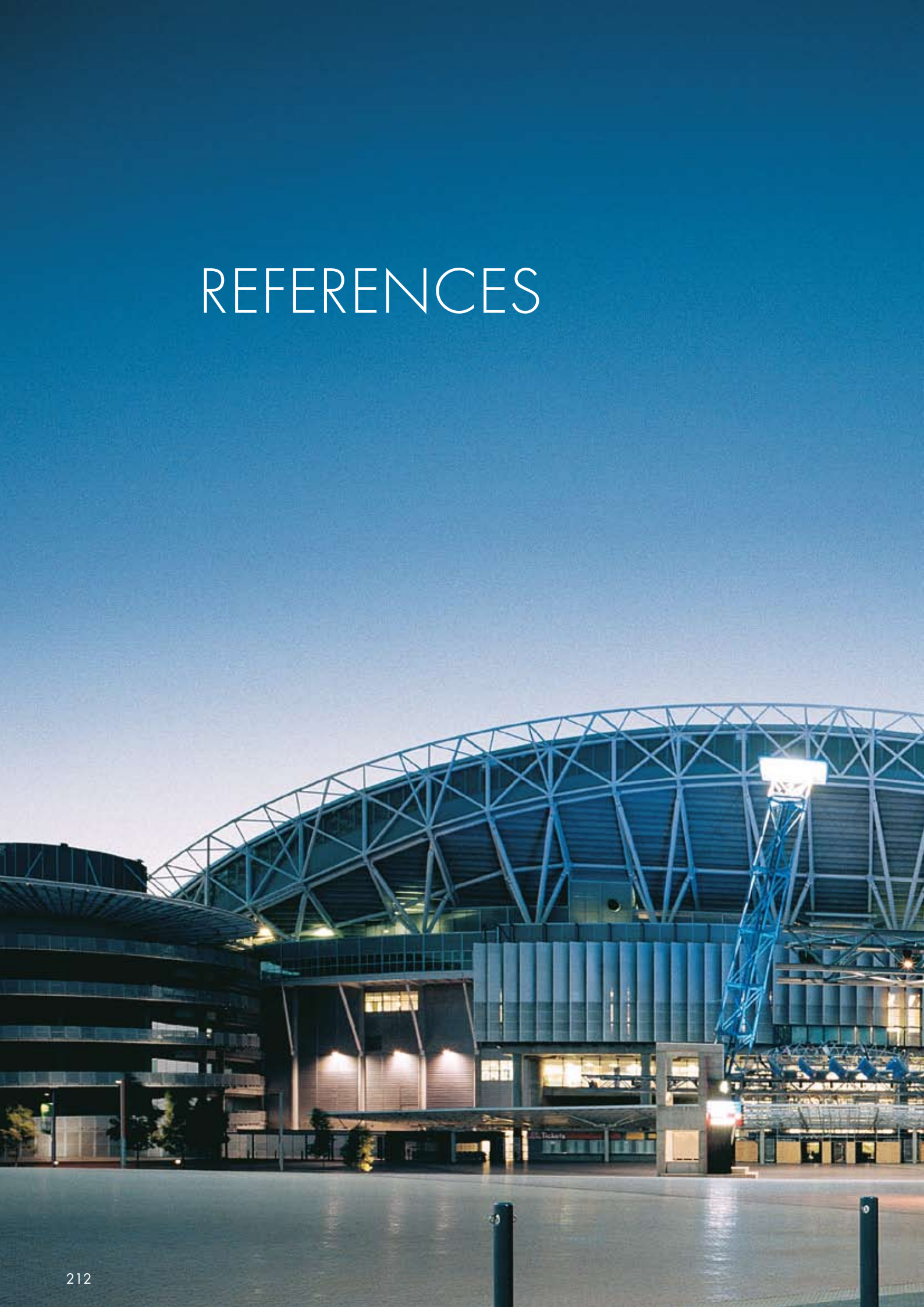
Extensive project support with experience and expertise.

From modular plugs to power supply lines: our experts advise during every phase of a project. Whether it's planning and design of a PV power station, development and installation of monitoring solutions or DC and AC cabling concepts: SMA assembles all the components for PV plants individually and supports the customer during the approval procedure for the power supply line.

A strong partner with superior technology

Never stopping for a break, we manage to create up to six new innovations every year. We do this by working every single day to make our products more efficient and economical. In particular in large PV power station, increased efficiency or simplified installation conditions have a huge impact. Our highly flexible manufacturing processes and experience in all the relevant target markets make an important contribution to our position as the leading provider of solar inverters and a strong partner for large-scale projects throughout the world.

REFERENCES



Solar Power Systems

The appropriate inverter for every application

The future belongs to renewable energy. Fossil fuels such as oil and coal are finite resources, and damage the climate and the environment. Photovoltaic plants, on the other hand – with their low wear, good scalability and generation which matches consumption – are among the most effective measures for a reliable and sustainable supply of energy, not least because the solar energy in question can cover our global consumption more than a thousand times over.

On the following pages, we show several examples which demonstrate that the integration of solar power systems into the visual appearance of our cities and countryside is highly successful. These systems are not unsightly and often add to the aesthetic value of many buildings. This is especially true of open spaces, which, as waste land with no previous use, gain a new practical social function by means of the construction of powerful solar power stations.

Photovoltaic systems are now used as the basis of solar island grid systems in many corners of the world in order to set up energy supplies in remote off-grid regions, which would otherwise be unthinkable.

Top:
Solar Park
Italy
24 MWp
with Sunny Central 630HE

Bottom left:
Galli Real Estate
Guadeloupe
167.1 kWp
with Sunny Mini Central 7000HV

Bottom right:
Central Railway Station
Berlin
190 kWp
with Sunny Boy 2000

Top:
Alpine Hut
Italy
2 kWp
Sunny Boy 1700
and Sunny Island 4500

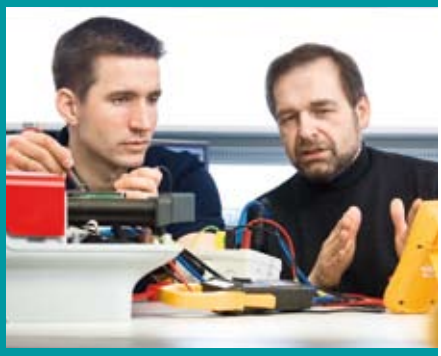
Bottom left:
Bush energy supply
Australia
4 kWp
Sunny Boy 3800
and Sunny Island 5048

Bottom right:
The White House
USA
10 kWp
with Sunny Boy 2500-US

Top left:
Salem
USA
8,4 kWp
with Sunny Boy 2500-US

Top right:
Bozen Conference Hall
Italy
300 kWp
with Sunny Central 250
and Sunny Mini Central 6000A

Bottom:
Papal Audience Hall,
Paul VI, Vatican City
220 kWp
with Sunny Boy 5000TL HC
Sunny Mini Central 7000TL, 11000TL



Glossary

Explanations Regarding Solar Technology

Central Inverter
Centralized inverters are particularly well suited for use in PV plants with a homogenous structure (modules of the same kind with identical orientation and tilt). They are used for plants starting at 100 kW and, in most cases, are designed for outdoor installation.

Dumpload
Here: load which can be spontaneously activated in the event of an energy surplus; can also be used to balance out strong load fluctuations. Consumers with storage capability (pumps, cooling units, boilers) are the most energy sensible. However, for the actual technical function, appropriately cooled resistors suffice.

ESS (Electronic Solar Switch)
The ESS is a DC disconnection unit integrated into the inverter to safely disconnect a solar generator from the inverter. The ESS has a grip handle for ease of operation. After pulling down the grip handle, the DC plugs can be accessed and disconnected with no risk of arcing. Disconnecting the plug means that the disconnection from the live generator is immediately apparent.

H5 – Topology
The inverter bridge with H5 topology features a fifth semiconductor switch, which ensures optimal efficiency during conversion at an efficiency rate of 98 percent.

HF
HF stands for "High Frequency" and also designates the new Sunny Boy series with high frequency transformers. The compact, galvanically isolating inverters provide very high efficiency for devices with transformers.

Low-Voltage Ride Through (LVRT)
Network management function from the field of dynamic grid support: when there is a short disruption in grid voltage, the inverter does not switch off, as has been required until now, but supports the grid with reactive power. After the disturbance, it immediately resumes feeding. In Germany, for example, LVRT is required as of January 2011 for plants at the medium-voltage level.

Maximum Power Point "MPP"
The operational point (current / voltage) of the PV generator under which the highest possible power under the prevailing conditions is harvested. The actual MPP changes constantly depending, for example, on the level of irradiation and the temperature.

MPP Tracker
A device that adjusts the voltage and current of a PV generator so that it operates at its "Maximum Power Point".

MSD
Part of an "Mains monitoring with allocated Switching Devices". This is a mandatory safety device which prevents power from a solar energy system from being fed into an external power grid when the public supply grid is not functioning. This function is taken over by the Sunny Boy and Sunny Mini Central using SMA Grid Guard, thus making a regular test unnecessary due to their single fault characteristics.

Multistring Inverter
An inverter which, to a great extent, combines the advantages of several string inverters (separate MPP tracking of individual strings) and a central inverter (low specific costs).

OptiCool
A patented enclosure concept by SMA, in which the interior of the enclosure is divided into two compartments. The chamber with the sensitive electronics is dustproof and waterproof. The second chamber contains transformers and chokes as well as other unsusceptible components, and can be actively cooled when necessary.

Optiflex
An innovative and highly-flexible design of the Sunny Tripower: the Sunny Tripower features an asymmetric multi-string input with two MPP trackers for custom-fit installation with nearly unlimited numbers of modules and maximum system efficiency.

Optiprotect
The Sunny Tripower features a completely new and comprehensive safety concept: its electronic string fuses, automatic string failure detection and overvoltage protection that can be integrated into the enclosure all work to monitor the PV plant, ensure safe operation, and optimally secure your energy yield.

OptiTrac Global Peak
Another advance in our time-tested OptiTrac MPP tracker for operation in partially-shaded PV plants. This specialized operation management system ensures that the modules are constantly operated at the point of maximum power even when there are multiple maximum power points, without causing measurable yield loss (loss < 0.2 percent).

Power Balancer
The Power Balancer is a Sunny Mini Central inverter standard function that prevents the formation of an unbalanced load during three-phase grid feeding. This is accomplished by connecting three inverters to a three-phase feeding unit via a control line.

Quick Module
A removable communication and configuration module for the new Sunny Boy HF series. The Quick Module contains the rotary switch for country-specific configuration and the *Bluetooth*® NetID, as well as the SD card slot. The optional Quick Module RS485 also features an RS485 interface and a multifunction relay.

SMA Grid Guard
The SMA Grid Guard concept monitors, for instance, the voltage and frequency of the connected AC grid according to predefined parameters. This serves to prevent the formation of islanding in the event of grid disconnection (see also "MSD"). Grid guard enables simple and reliable operation of SMA inverters on nearly all electrical power grids worldwide.

SMA Plug-in Grounding
A grounding set for the new Sunny Boy HF series. Grounding is quick and simple – an easy plug-in without opening the enclosure. The polarity is defined by the orientation in which the grounding is attached.

String Inverter
In string technology, the photovoltaic generator is divided into separate module surfaces and each of these "strings" is assigned to a separate string inverter. This technology reduces system costs while at the same time substantially simplifying installation and increasing the energy yield and plant availability.

SUNCLIX
A DC plug system for all SMA inverters, developed in cooperation with Phoenix Contact. The field plugs can be connected to almost any cable without tools, and are included with inverters free of charge.

» SMA Innovations

2010

Sunny Central 800CP
High performance as standard

Compact, weather-proof enclosure and intelligent power management: the new Sunny Central series does not need a heavy concrete substation and thus decreases system costs

2010

Sunny Boy 3000HF
Simply high yields.

The new generation of galvanically isolating inverters: highest yields in its performance class
and easiest installation thanks to the SMA Plug-in Grounding, SUNCLIX and Quick Module

2010

Sunny Tripower 17000TL
The three-phase inverter
for easy plant design

Packed full of pioneering technology: with Optiprotect multi-level security concept and Optiflex for flexible plant configuration

2009

Sunny Central 630HE
Grid management included

The best future prospects: more power, lower specific system costs, high flexibility for plant design and compliance with the "Medium-Voltage Directive"

2009

Sunny Island 2012
Compact, powerful and
with excellent efficiency

Bidirectional HF inverter, galvanic isolation, reduced weight, excellent efficiency

2008

Sunny Boy 5000TL
Perfection Plus. Usability.
The new Sunny Boy generation.

Bluetooth technology, graphic display, suitable for worldwide use and easy to install: leading-edge technology meets user convenience

2007

Sunny Backup System
Solar power – even in the event of grid failure

Awarded the 2007 innovation prize for the most innovative solar product

2006

ESS
Electronic Solar Switch

Our first device-integrated DC switch-disconnector for safely disconnecting the PV generator from the inverter

2006

Sunny Mini Central 8000TL
The world amortization champion

H5 topology, record efficiency of 98 %, low specific price: no other pays off faster

2005

Sunny Boy 3300
The test champion

Powerful Sunny Boy with OptiCool, galvanic isolation and maximum efficiency, for the first time in a die-cast aluminum enclosure

2005

Sunny Portal
Internet portal for the presentation
of plant data

Customized plant monitoring and individual visualization at www.SunnyPortal.com

2004

Sunny WebBox
Data logger
of the new generation

Innovative monitoring and communication with the PV plant via Internet (Sunny Portal)

2003

Sunny Beam
Easy wireless PV plant monitoring

Attractive design for the living area, power supply via integrated solar cell

2002

Sunny Central
Central inverter for large
PV power stations

With string monitoring, Sunny Central Team and an optimum service, Sunny Central is the large-scale solution

2002

Sunny Boy 5000TL
Our first multi-string inverter with three independent MPP controllers

Combines the advantages of string technology with cost reductions for larger inverters

2001

Sunny Island
The system solution for
stand-alone power supply

User-friendly connection for all components on the AC side, easy installation and extension of the plant

1995

Sunny Boy 700
First string inverter

Cost reductions thanks to minimized DC wiring, easier installation and increased efficiency

1991

PV-WR
First PV inverter designed for serial production

User display, communication and visualization with PC

Publication Information

Publisher
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