

WINDY BOY



Grid Connection of Small Wind Turbine Systems

Innovations

SMA has over 1200 employees, of which over 200 are engineers and technicians, working every day on innovative products and solutions.

Trendsetter

SMA is a trendsetter in system technology for PV systems and small wind turbines. Constant innovation, commitment and experience yield products of the highest quality. We have the optimum solution to suit your particular application and system size.

Service

The service offered by SMA is unique. We implement your particular requirements in using optimized maintenance and service concepts.



Market leader

SMA has been developing and producing inverters for photovoltaic systems since 1981. We are currently the market leader in grid-connected solar inverters, with a total of more than 1,5 GW_{AC} of delivered power.

Success

SMA is internationally successful. We are already active in the markets of the future, with branches in North America, Spain, Italy, Korea and China.

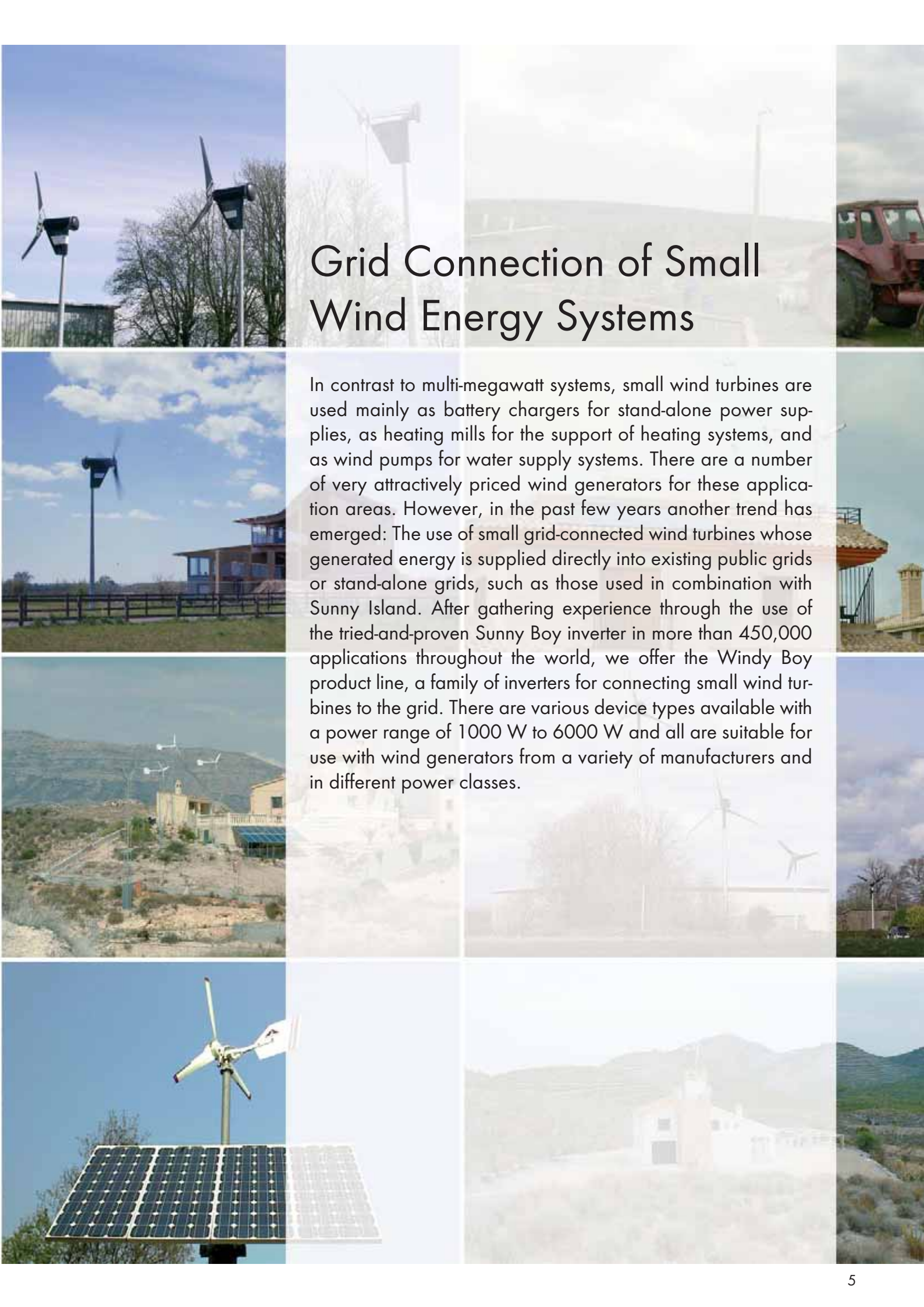
Experience

Maximum investment security and profits are guaranteed by over 20 years of experience in the development of photovoltaic inverters.



SMA Technologie AG
Ideas Become Reality





Grid Connection of Small Wind Energy Systems

In contrast to multi-megawatt systems, small wind turbines are used mainly as battery chargers for stand-alone power supplies, as heating mills for the support of heating systems, and as wind pumps for water supply systems. There are a number of very attractively priced wind generators for these application areas. However, in the past few years another trend has emerged: The use of small grid-connected wind turbines whose generated energy is supplied directly into existing public grids or stand-alone grids, such as those used in combination with Sunny Island. After gathering experience through the use of the tried-and-proven Sunny Boy inverter in more than 450,000 applications throughout the world, we offer the Windy Boy product line, a family of inverters for connecting small wind turbines to the grid. There are various device types available with a power range of 1000 W to 6000 W and all are suitable for use with wind generators from a variety of manufacturers and in different power classes.

Grid Connection Options

The transfer of direct current into alternating current is now easier than ever



Photos: Proven Energy Ltd., Braun Windtechnik, Southwest Windpower

High Yields

Achieving high yields from your wind energy system is possible only if the inverter is synchronized precisely with the output characteristics of the wind generator used. In contrast to those used in photovoltaic applications, these inverters should have the additional quality of being able to adapt to quick load changes occurring constantly. The Windy Boy inverter has a special operational mode for wind turbines which allows performance ad-

justment to the defined curves of many different manufacturers' generators. Adjustment can also be made for different wind strengths in various locations.

Universal

The system can be used almost anywhere in the world with minimum installation costs and simplified authorization procedures thanks to its transformer-based concept, the grid guard automatic disconnection device, its au-

tomatic 50 Hz / 60 Hz recognition, and a number of special country approvals.

Robust

Of particular importance in wind applications is ensured operation even under extreme climatic conditions. The Windy Boy is suitable for indoor and outdoor installation, e.g. directly on a mast, thanks to its particularly robust housing and waterproof plug connector.

Monitoring

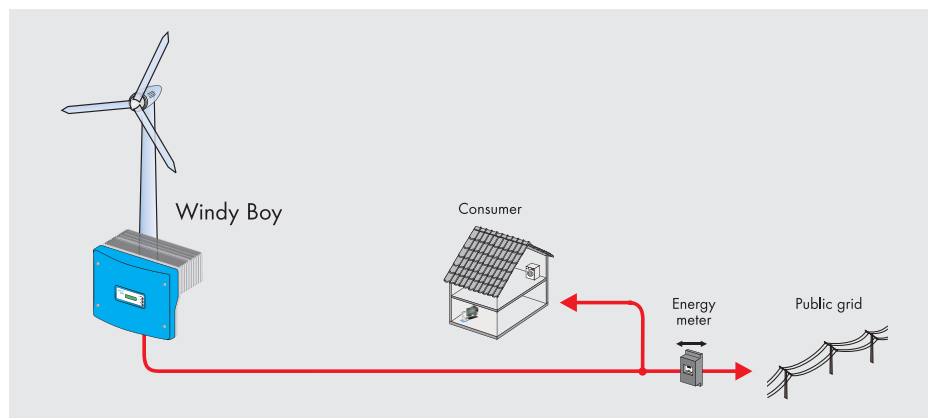
As well as a standard display, there are various options for diagnosis, data visualization, data storage and remote maintenance of your wind turbine

system via optional interfaces (RS232 and RS485), SMA Powerline or wireless data transmission. The compatibility with all SMA communication

products offers you a wide range of applications, including system monitoring via the Internet.

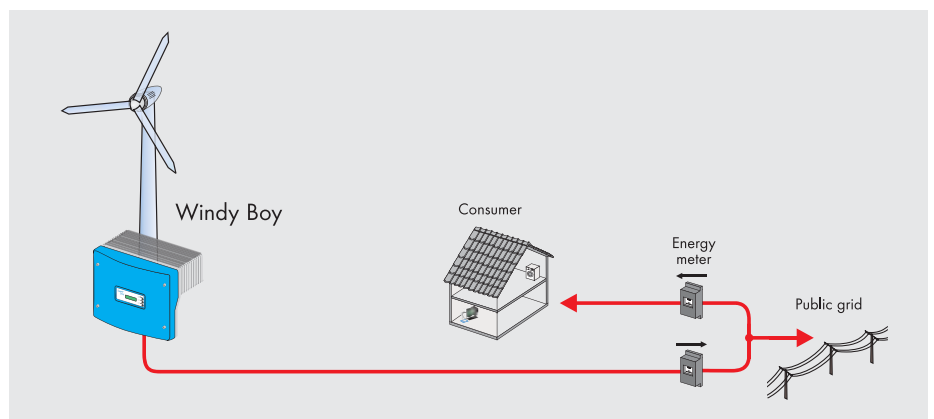
Flexible

Maximum flexibility ensures indirect supply: The energy generated can either be consumed or supplied as excess energy to the public grid without the need for interim storage in a battery. The resulting savings potentials are immense as there is no longer any need for expensive and high-maintenance batteries.



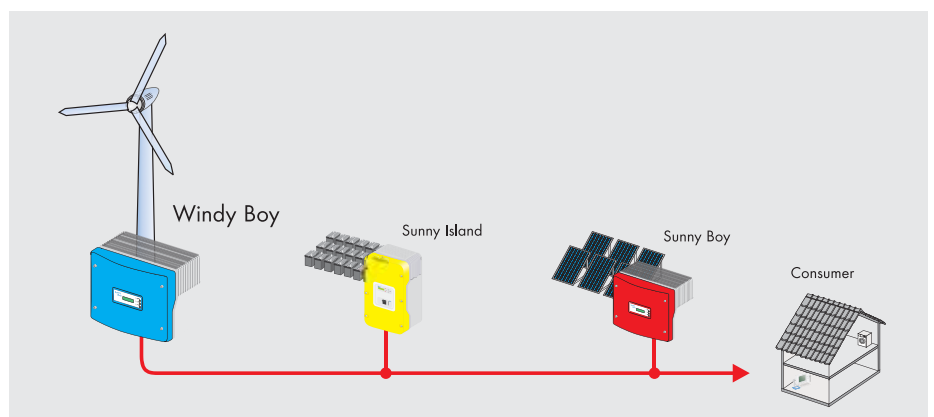
Indirect supply (surplus feed-in)

During direct feeding, the generated energy is fed into the public grid via a separate feed-in meter. The best possible feed-in method can be selected depending on the remunerations or regulations in the countries of use.



Direct supply

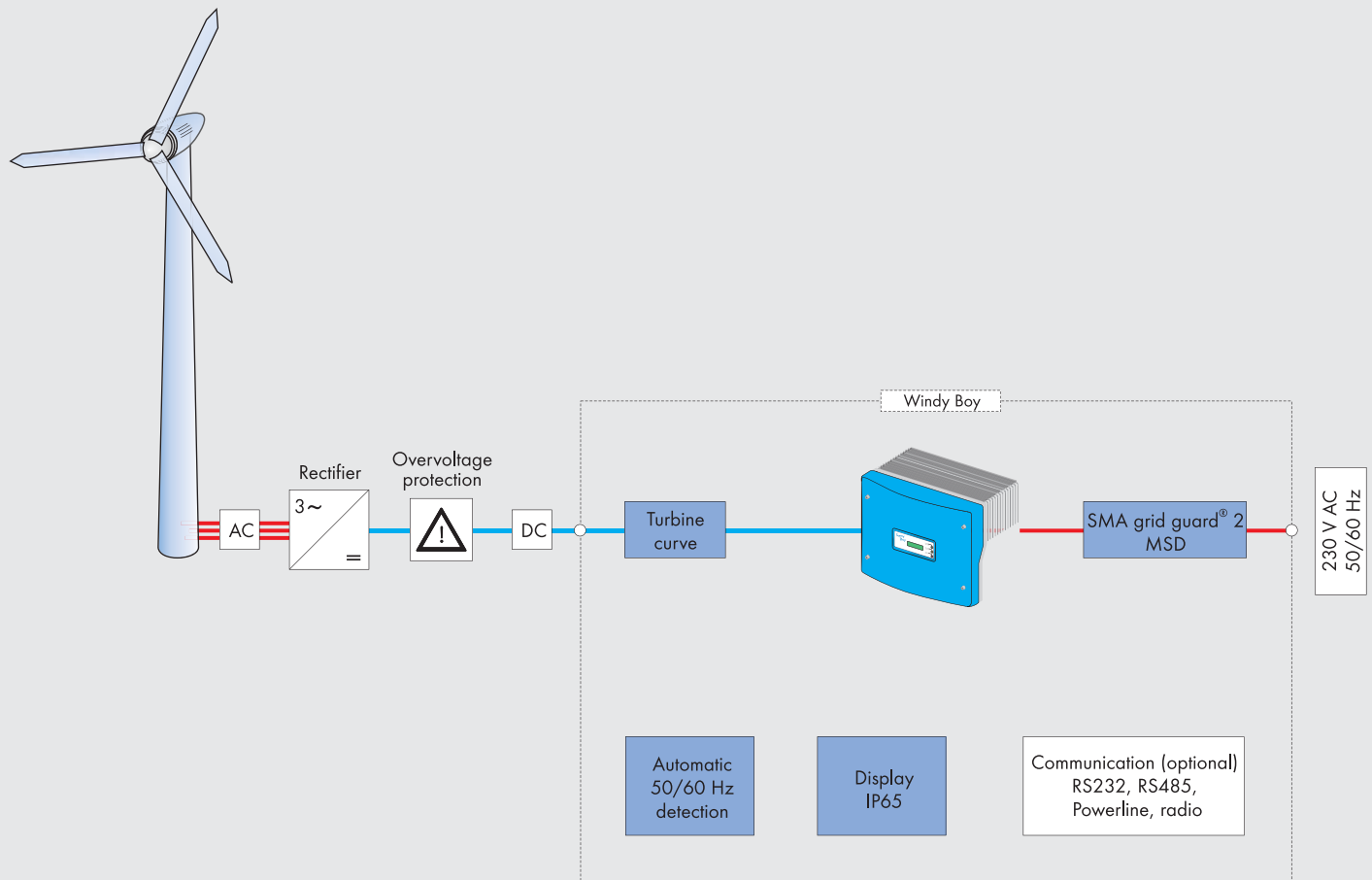
The Sunny Island battery inverter forms the basis of your power supply in the stand-alone system. The Sunny Island connects all your system components to the AC side and forms the grid.



Stand-alone system with Sunny Island and Sunny Boy

Operating Principles

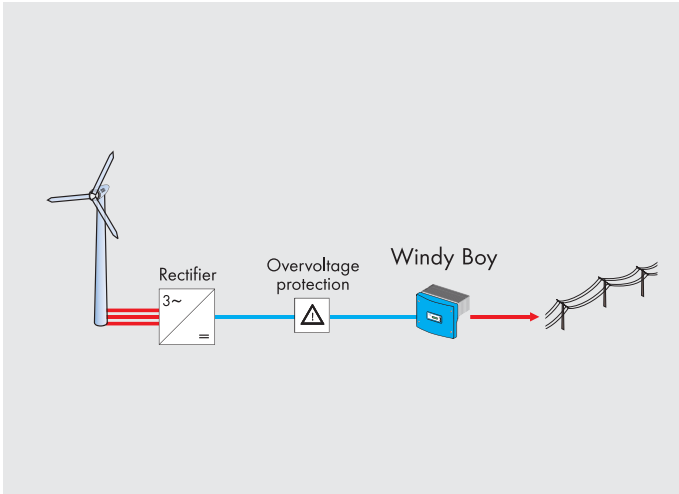
WINDY BOY, the Heart of Your Wind Energy System



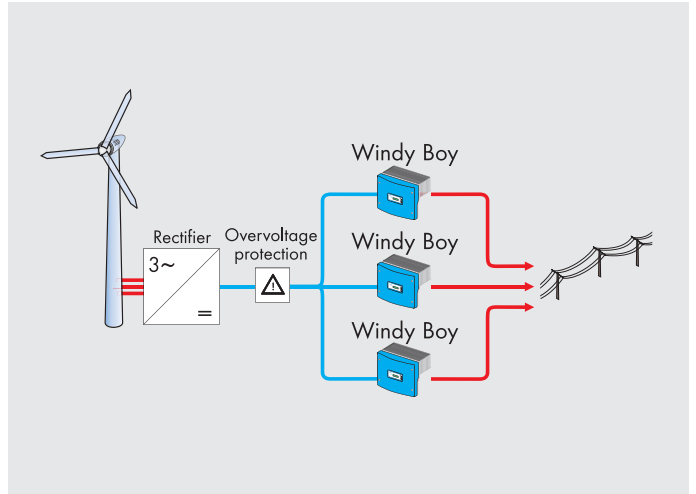
Principle

With the Windy Boy inverter it is now possible to operate small, grid-connected wind energy systems with permanent magnet generators and down-stream 3-phase rectifiers. The Windy Boy converts the rectified DC voltage from a wind turbine, which varies with speed, into grid-compliant

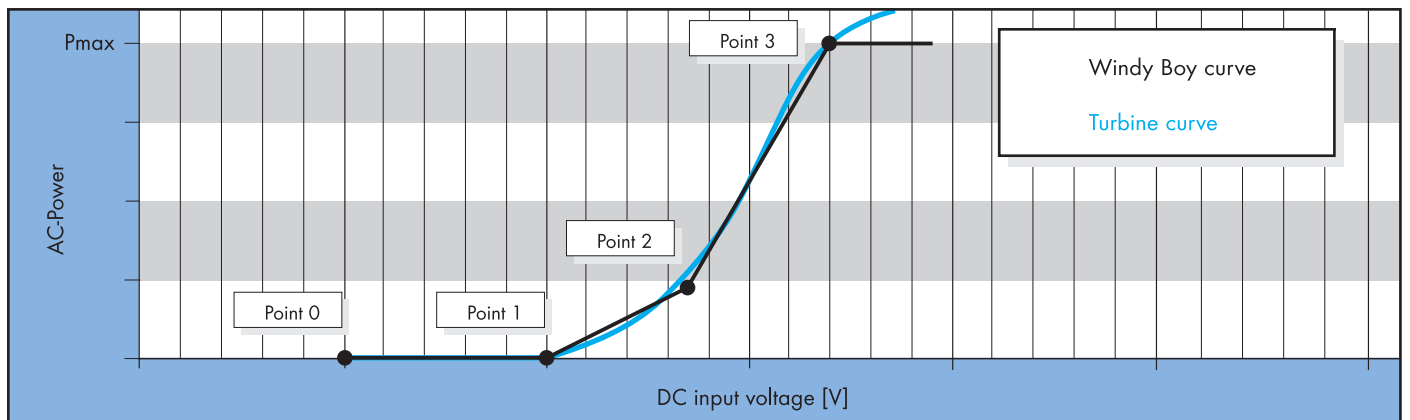
AC voltage. In order to protect the inverter from excessive input voltage, the system should also be equipped with overvoltage protection, available from many wind turbine manufacturers.



1-phase application



3-phase application



Performance adjustment through the programmable turbine curve

Turbine curve

The turbine curve, which can be programmed using software parameters, constitutes a central component of the Windy Boy. By setting a start value along with 3 curve points, the user can adjust the inverter to the wind turbine system being used. As a result, an optimum startup behavior, a high reaction speed and an ideal system yield are achieved.

The Windy Boy also has a smooth startup parameter which, when activated, protects the mechanical components of your wind turbine system,

and thus contributes to a long service life for your system.

Additional adjustments are possible by optimizing the Windy Boy's maximum output according to the turbine used and by adjusting the control speed.

Increasing Power Output through Parallel Operation

Windy Boys with the identical max. input voltage data can be connected in parallel. This allows system outputs well beyond 6 kW to be attained. Another advantage is the possibility

of implementing multi-phase systems. Establishing multi-phase systems may require observing the statutory regulations or may be achieved by simply supplying distributed loads of a domestic grid using several phases.

WINDY BOY 1100, 1100LV, 1700, 2500, 3000

The Tailor-made Solution for any System Size



- Display
- SMA grid guard
- Outdoor installation
- 5 year warranty

WB 1100, 1700, 2500, 3000

The WB 1100 through WB 3000 inverters of the Windy Boy family vary according to input voltage and power ranges. Therefore, they can be combined precisely with wind turbines of various power classes. In each case, an ideal watt-specific price is attained. The robust housing design and high protection degree (IP65) ensure secure operation even in extreme climatic conditions, both indoors and outdoors.

WB 1100LV

The WB 1100LV is ideal for special applications with very low input voltages. The WB 1100LV is designed for DC input voltages of 21 to 60 V, and accepts currents of up to 62 A. Therefore, very small wind turbines with low output voltages can be connected easily to the grid, or integrated into a stand-alone grid with Sunny Island.

WINDY BOY 3300/3800, 5000A/6000A

The Power-packers



- Display
- SMA grid guard
- OptiCool
- Outdoor installation
- 5 year warranty

WB 5000A, WB 6000A

With an efficiency level of 96 %, the Windy Boy 5000A/6000A is a transformer-equipped inverter which is unique, worldwide. OptiCool, the new active cooling concept, ensures safe system operation even in high ambient temperatures. It also provides optimum protection for the electronic components within its housing, a level of protection of IP65. This makes the Windy Boy 5000A/6000A ideal for applications both indoors and outdoors.

WB 3300, WB 3800

Both the Windy Boys 3300/3800 and Windy Boys 5000A/6000A are equipped with the innovative cooling concept of OptiCool. This is the latest development in inverters to come from SMA and offers easy handling, simplified installation, and has a level of efficiency unique to inverters of this power class.

WINDY BOY

Inverter for Small Wind Energy Systems

Legend:

- ✓ = standard
- = feature not available
- = optional



WINDY BOY 1100



WINDY BOY 1700



WINDY BOY 2500

		WINDY BOY 1100	WINDY BOY 1700	WINDY BOY 2500
Input data	max. DC input voltage	400 V	400 V	600 V
	"Turbine Mode" operating range	139 ... 400 V	139 ... 400 V	224 ... 600 V
	min. open circuit input voltage for activating "Turbine Mode"	150 V	150 V	250 V
	nominal DC operating voltage	180 V	180 V	300 V
	recommended generator power at 2500 full-load hours per year	900 W	1395 W	2070 W
	recommended generator power at 5000 full-load hours per year	800 W	1240 W	1840 W
	max. input current (I _{max})	10.0 A	12.6 A	12.0 A
	operating consumption	< 4 W	< 5 W	< 7 W
	DC voltage ripple (U _{pp})	< 10 %	< 10 %	< 10 %
	DC isolator	DC plug connector	DC plug connector	DC plug connector
	ground fault monitoring	✓	✓	✓
	reverse polarity protection	✓	✓	✓
	grid connection	AC plug connector	AC plug connector	AC plug connector
Output data	max. AC output	1100 W	1700 W	2500 W
	nominal AC power output	1000 W	1550 W	2300 W
	operating consumption when in standby	0.1 W	0.1 W	0.25 W
	automatic 50/60 Hz detection	✓	✓	✓
Efficiency	max. efficiency / Euro ETA	93.0 % / 91.6 %	93.5 % / 91.8 %	94.1 % / 93.2 %
Grid monitoring	SMA grid guard DIN VDE 0126-1-1	✓	✓	✓
Ambient conditions	permissible ambient temperatures	-25 °C to +60 °C	-25 °C to +60 °C	-25 °C to +60 °C
	allowable relative humidity	0 ... 100 %, 4K4H	0 ... 100 %, 4K4H	0 ... 100 %, 4K4H
Miscellaneous	installation site	indoor/outdoor	indoor/outdoor	indoor/outdoor
	cooling type	convection	convection	convection
	dimensions (w x h x d) mm	434 x 295 x 214	434 x 295 x 214	434 x 295 x 214
	weight	22 kg	25 kg	30 kg
Special features	display	✓	✓	✓
	suitable for Sunny Island systems	✓	✓	✓
Accessories	RS232, RS485, radio	•	•	•
	Powerline communication	•	•	•
	Sunny Beam, Sunny Boy Control, Sunny WebBox, Sunny Portal	•	•	•



WINDY BOY 2800i

WINDY BOY 3000

WINDY BOY 3300

WINDY BOY 3800

WINDY BOY 5000A

WINDY BOY 6000A

WINDY BOY 1100LV

600 V	600 V	500 V	500 V	600 V	600 V	60 V
224 ... 600 V	268 ... 600 V	200 ... 500 V	200 ... 500 V	246 ... 600 V	246 ... 600 V	20 ... 60 V
250 V	290 V	200 V	200 V	250 V	250 V	20 V
300 V	350 V	200 V	200 V	270 V	270 V	25 V
2340 W	2475 W	2970 W	3420 W	4500 W	5400 W	900 W
2080 W	2200 W	2640 W	3040 W	4000 W	4800 W	800 W
13.5 A	12.0 A	20 A	20 A	26 A	26 A	62 A
< 7 W	< 7 W	< 7 W	< 7 W	< 7 W	< 7 W	< 5 W
< 10 %	< 10 %	< 10 %	< 10 %	< 10 %	< 10 %	< 10 %
DC plug connector	DC plug connector	DC plug connector	DC plug connector	DC plug connector	DC plug connector	screw terminal
✓	✓	✓	✓	✓	✓	✓
✓	✓	✓	✓	✓	✓	✓
AC plug connector	AC plug connector	AC plug connector	AC plug connector	screw terminal	screw terminal	AC plug connector
2800 W	3000 W	3600 W	3800 W	5500 W	6000 W	1100 W
2600 W	2750 W	3300 W	3800 W	5000 W	6000 W	1000 W
0.25 W	0.25 W	0.1 W	0.1 W	0.25 W	0.25 W	0.1 W
✓	✓	✓	✓	✓	✓	✓
94.0 % / 93.0 %	95.0 % / 93.6 %	95.2 % / 94.4 %	95.6 % / 94.7 %	96.1 % / 95.2 %	96.1 % / 95.2 %	92.0 % / 90.4 %
✓	✓	✓	✓	✓	✓	✓
-25 °C to +60 °C	-25 °C to +60 °C	-25 °C to +60 °C	-25 °C to +60 °C	-25 °C to +60 °C	-25 °C to +60 °C	-25 °C to +60 °C
0 ... 95 %, 3K3	0 ... 100 %, 4K4H	0 ... 100 %, 4K4H	0 ... 100 %, 4K4H	0 ... 100 %, 4K4H	0 ... 100 %, 4K4H	0 ... 100 %, 4K4H
indoor (IP 21)	indoor/outdoor	indoor/outdoor	indoor/outdoor	indoor/outdoor	indoor/outdoor	indoor/outdoor
active	convection	OptiCool	OptiCool	OptiCool	OptiCool	convection
440 x 305 x 226	434 x 295 x 214	450 x 352 x 236	450 x 352 x 236	468 x 613 x 242	468 x 613 x 242	434 x 295 x 236
31 kg	32 kg	41 kg	41 kg	62 kg	63 kg	28 kg
✓	✓	✓	✓	✓	✓	✓
✓	✓	✓	✓	✓	✓	✓
•	•	•	•	•	•	•
•	•	•	•	—	—	•
•	•	•	•	•	•	•



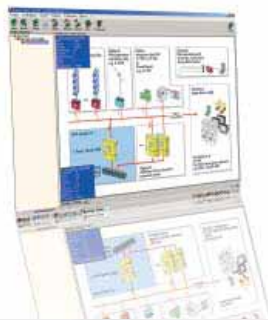
SUNNY ISLAND



SUNNY BOY CONTROL



SUNNY DATA CONTROL



SUNNY SENSORBOX



SUNNY WEBBOX



ACCESSORIES



Additional Products

Windy Boy's compatibility with Sunny Boy and Sunny Mini Central, photovoltaic inverters from SMA Technologie AG, the market leader, provide a wide range of possibilities for diagnosis, data visualization, data archiving, and the remote maintenance of your wind turbine system. In addition, Sunny Island enables seamless integration into stand-alone systems.

SUNNY ISLAND

The Heart of Every Stand-alone Power Supply

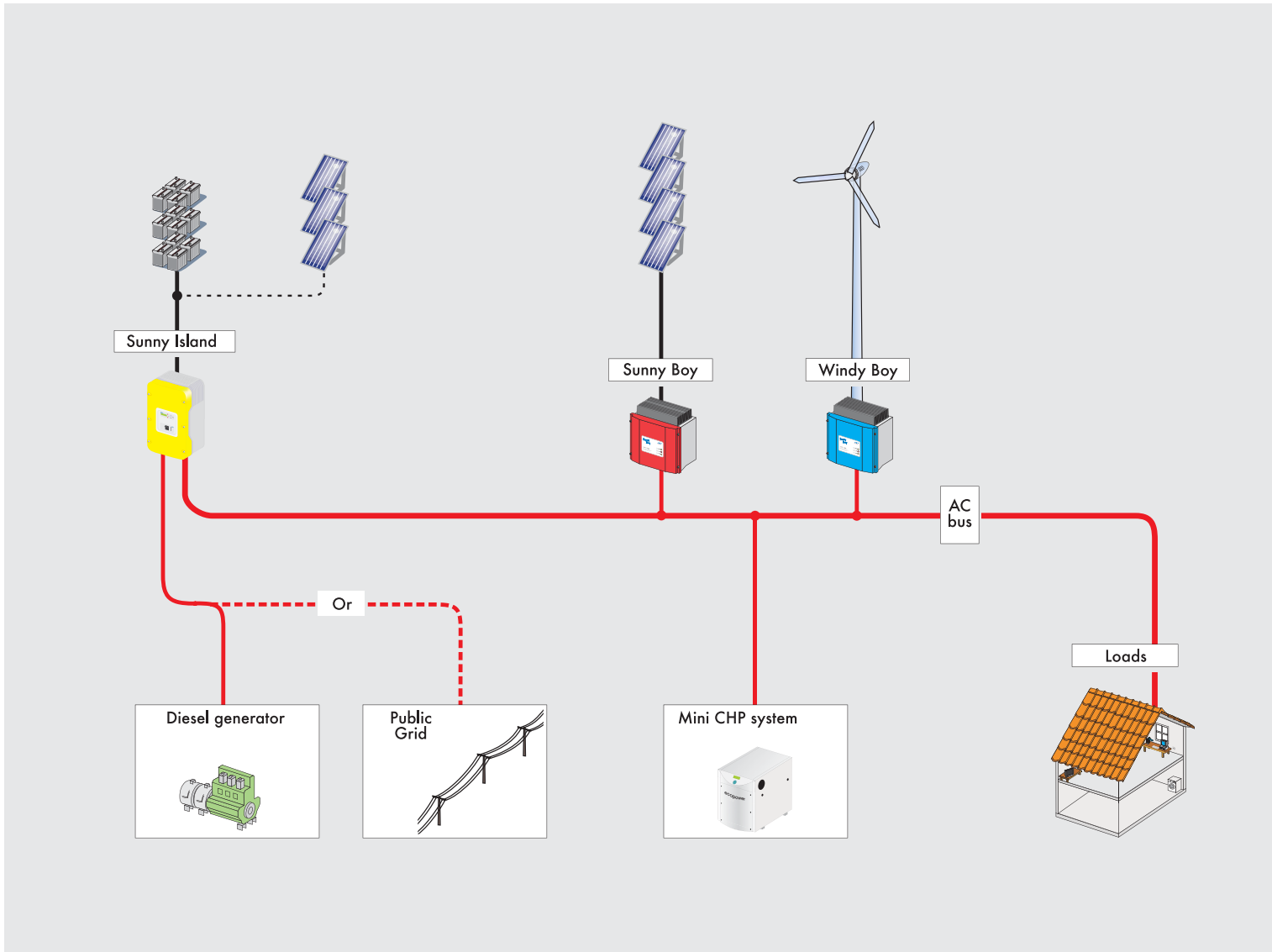


- **Flexible stand-alone grids by means of modular coupling of all generators on the AC side**
- **Optimum battery service life due to the intelligent energy management system**
- **Secure power supply at grid quality**

The Sunny Island battery inverters developed by SMA offer excellent possibilities when setting up a stand-alone grid, due to their high flexibility. Fed from renewable energy sources, which are available in all locations around the world, and connected to a small battery unit, they form a stand-alone AC grid. This power grid meets the highest quality standards, so that even the most sensitive AC devices can be connected.

This technology makes it possible to provide electricity to a large proportion of the 2 billion people who go without it today.

Stand-alone grids also constitute a practical extension to our central power supply, and are also ideal for emergency power supply in unstable grids.



The Idea

Together with the batteries, the Sunny Island creates an AC grid in which power generators as well as energy loads can be connected everywhere, depending on the requirements. In doing so, the Sunny Island performs all control processes, such as the grid voltage and frequency. In addition, it channels surplus energy directly to the batteries to store it there. Conversely, in the event of an energy shortage – if consumption exceeds energy production – it supplies the AC grid with the energy stored in the batteries.

Flexible

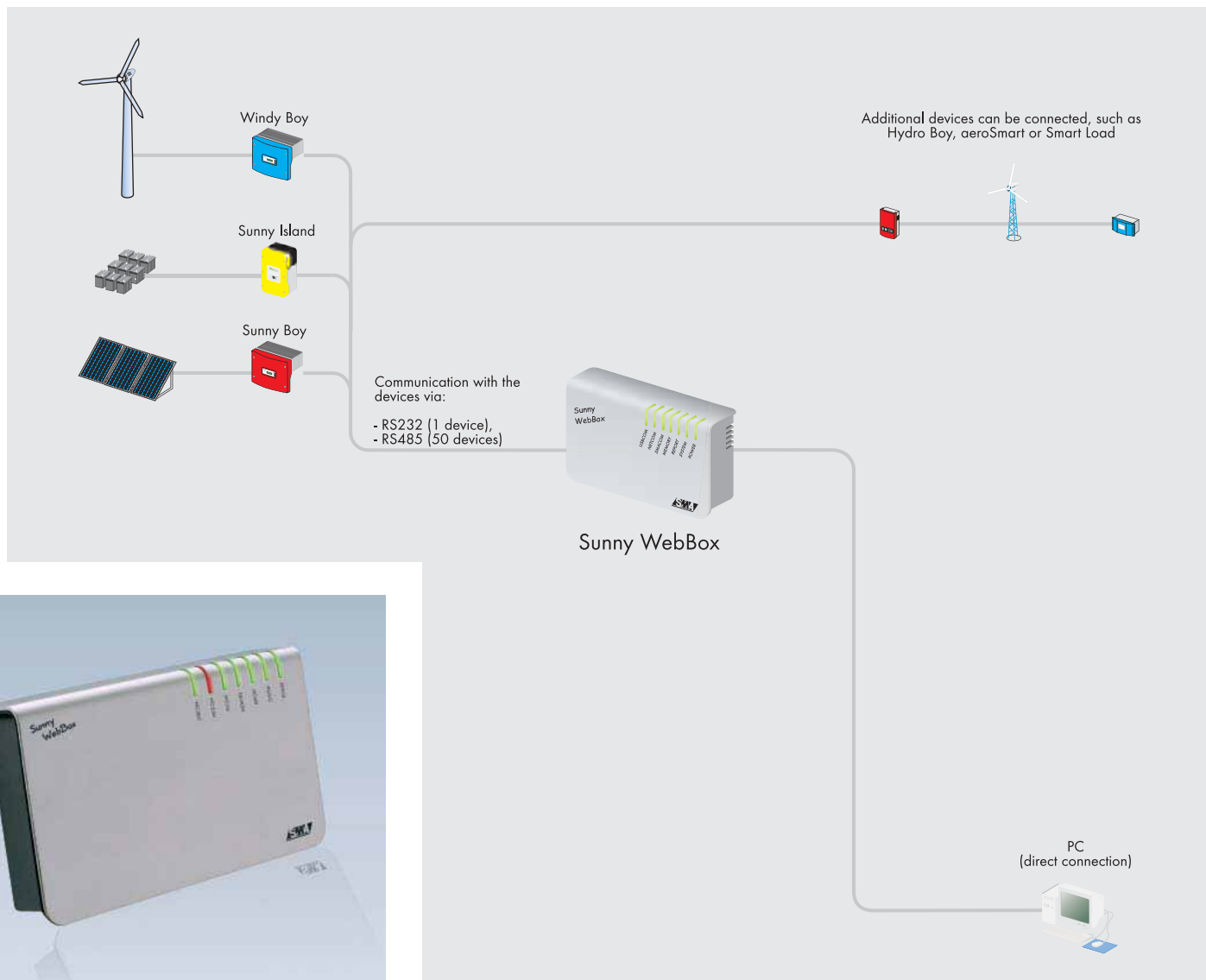
Any kind of power generator can be integrated into the Sunny Island stand-alone grid: Photovoltaic systems with Sunny Boy inverters, wind energy systems with Windy Boy inverters, water turbines and diesel generators which start automatically as soon as there are insufficient renewable energy sources available or if the charge level of the batteries require it.

Extendibility

Stand-alone grids using Sunny Island can be expanded from a single-phase supply to a 3-phase grid with several Sunny Islands. This can be done in steps, according to the increasing energy demands. For further information on Sunny Island, order our comprehensive brochure material.

SUNNY WEBBOX

The Communication Center for your Wind Turbine System



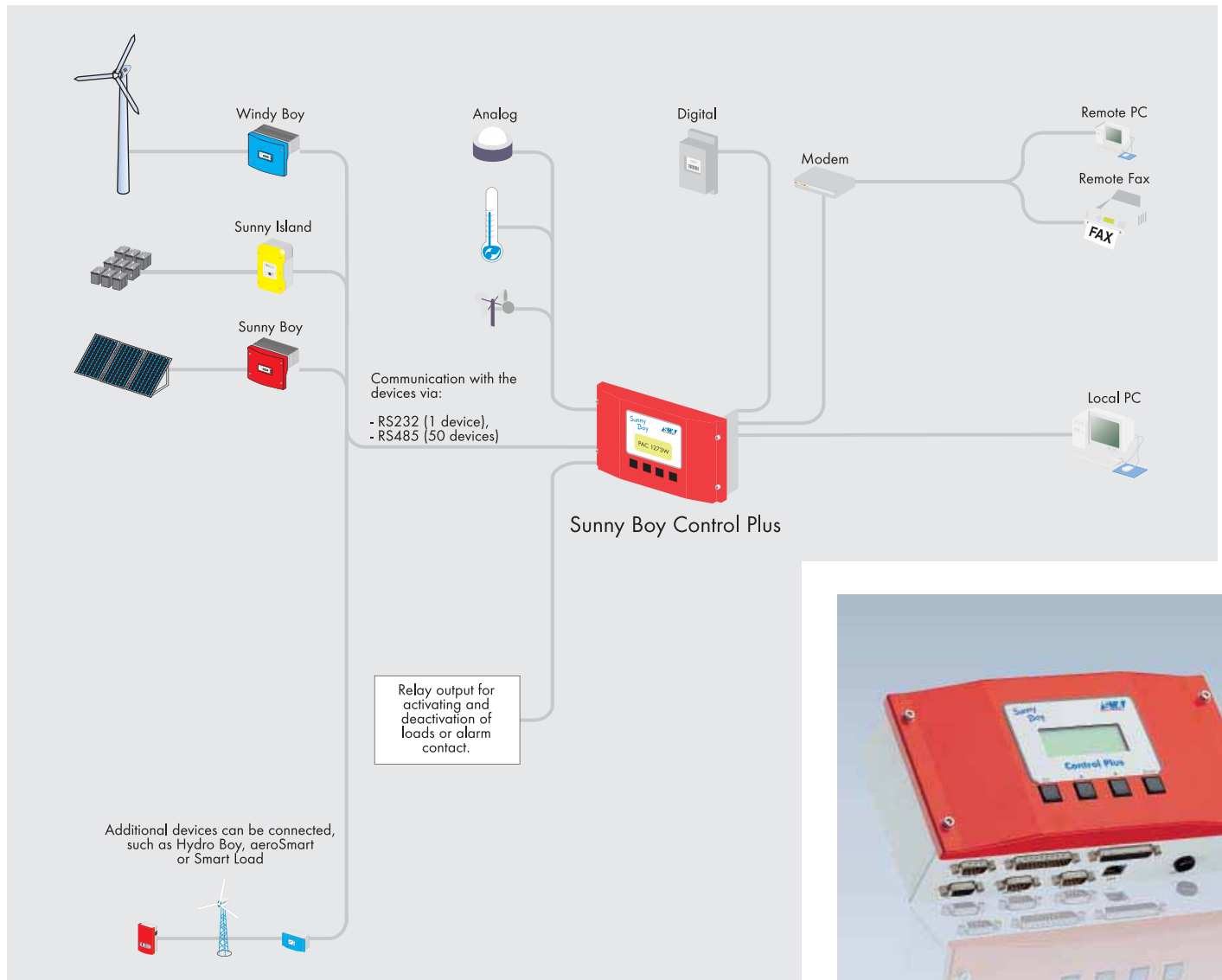
- **Continuous and simple monitoring**
- **Daily, monthly and annual measurement of the energy yield**
- **Early fault detection**
- **Diagnosis and system configuration using a PC**
- **Low energy consumption**

The Sunny WebBox allows you to connect directly to your Windy Boy at any time. A PC or laptop with an Internet browser are enough to stay informed of the status of your wind turbine system by simply accessing the Sunny WebBox – regardless of whether you are at the system site, in your study, office or on vacation. Not only do you receive information on the energy yield, but you also receive a direct view of high-resolution measuring channels of all system components.

The WebBox not only collects all relevant data, but saves it as well. If desired, this data is directly forwarded to your PC or the free SMA Sunny Portal Internet portal. Here, using a password-protected access, you can save an unlimited quantity of data and create a graph for the data using comprehensive tools.

SUNNY BOY CONTROL PLUS

Comprehensive System Monitoring with Long-term Storage



- **Recording operating data**
- **Connections for external sensors**
- **Digital inputs and outputs**
- **System monitoring and remote diagnosis**
- **Low energy consumption**
- **Compatible with the Sunny Data Control software**

Its low energy consumption and the possibility of recording the operating data of your wind turbine system make the Sunny Boy Control Plus ideally suited for recording data over the long term. Another advantage is the possibility of connecting external sensors directly, e.g. anemometers or temperature sensors, or of using digital inputs and outputs for integrating signal sensors or fault detectors.

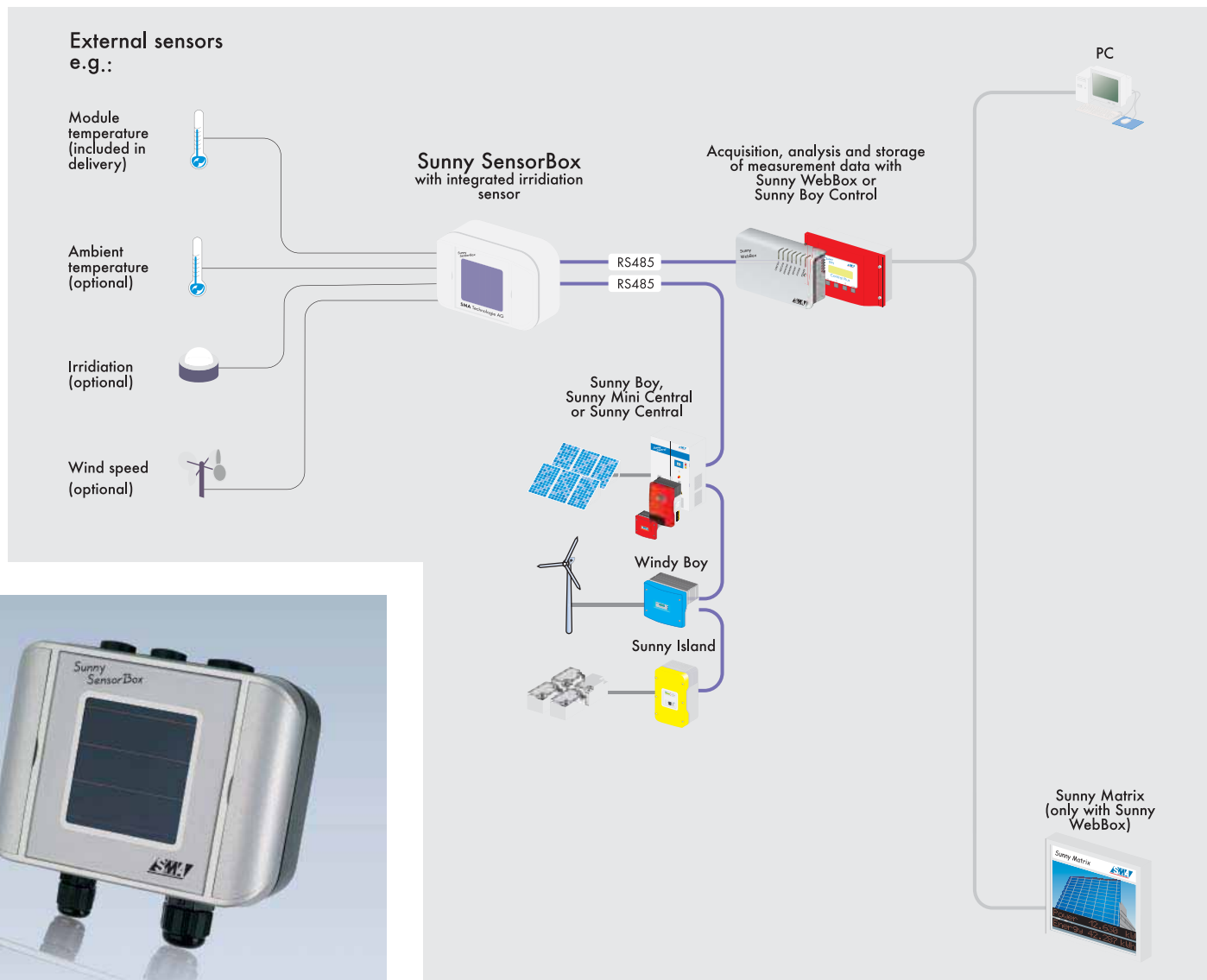
The Sunny Boy Control Plus can be connected directly to a PC so as to

analyze the operating performance. In order to detect any potential faults quickly, you can request a daily/hourly system report using an external modem or via GSM. In addition, the Sunny Data Control software also allows the Sunny Boy Control Plus to be used for system monitoring.

Communication with the inverters is performed via RS485. In the process, the Sunny Boy Control Plus can monitor and control up to 50 SMA devices of different power classes.

SUNNY SENSORBOX

Performance Monitoring of Wind Turbine and PV Systems



- **Logging of wind speed, irradiation, module and ambient temperature**
- **Easy installation**
- **Integration in existing systems via RS485**
- **Compatible with Sunny WebBox**
- **Data analysis on a PC or in Sunny Portal**

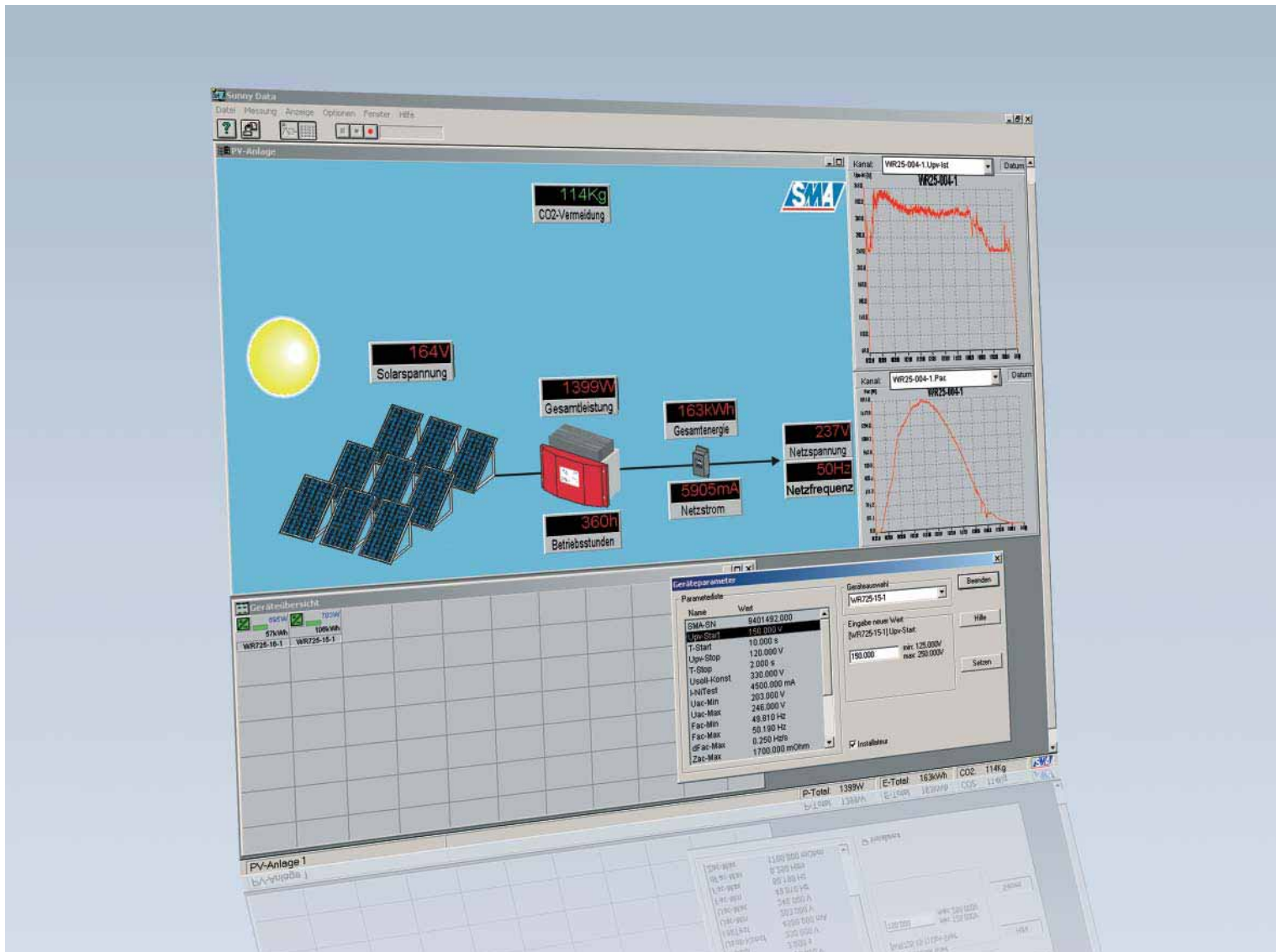
The Sunny SensorBox monitors your wind turbine and PV system by also recording environmental data. The Sunny SensorBox can be installed outdoors and records the wind speed and the ambient temperature using optional sensors and the solar irradiation using an integrated solar cell. From the recorded data, it is then possible to calculate the expected output, and to compare it with the actual measured output of the inverter. In case of deviations, operational faults in the system can be detected at an early stage.

Communication Included

The Sunny SensorBox, together with the inverters, is easily connected to a Sunny WebBox via the serial RS485 data link. From there, the data can be transferred to a PC for further processing, or to the Sunny Portal for visualization purposes and further preparation.

SUNNY DATA

Easy Monitoring, Diagnosis and Parameterization Using the PC



- Easy parameterization of the Windy Boy
- Online display of the measured values
- Recording of measurement data
- Graphic analysis
- Data export

With the Sunny Data software package, you can continuously record the operating data of all connected Windy Boys. Sunny Data is used if the Windy Boys are directly connected to the PC (e.g. without Sunny Boy Control or Sunny WebBox).

Making changes to parameters in order to adapt optimally the Windy Boys to your wind turbine system, is of course just as straightforward as the display and analysis of the stored measurement data. The Windy Boy can be connected to a PC via RS232, RS485, Powerline communication or the USB service interface. For a selection of accessories, please see page 22.

Accessories

Additional Components for Safe System Operation

DC Adapter Sets

Our pre-assembled adapter sets provide a reliable connection of the DC output of your wind turbine to the DC inputs of the Windy Boy. The adapter sets each consist of one cable with a positive and negative adapter and a sealing cap. The adapter set is available for Multi-Contact (3 mm or 4 mm) and Tyco plug connectors.



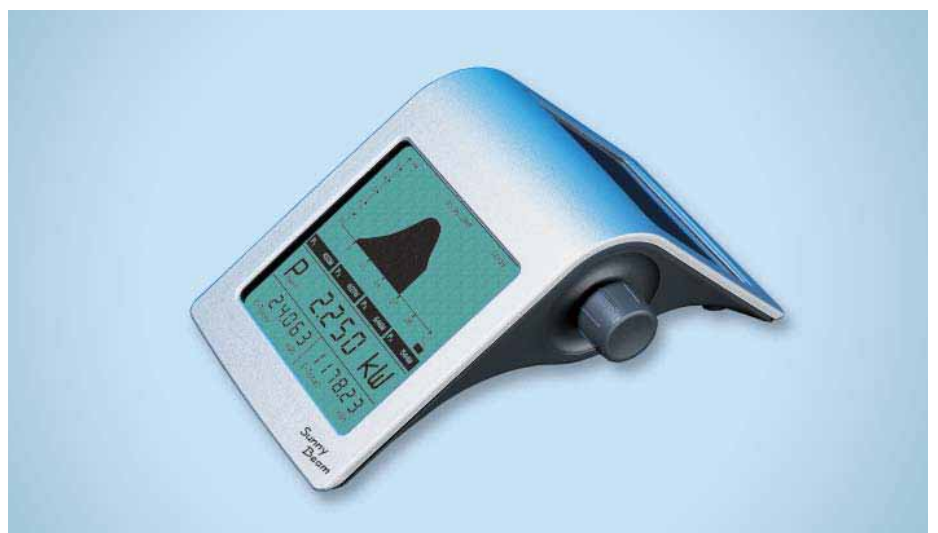
USB Service Interface

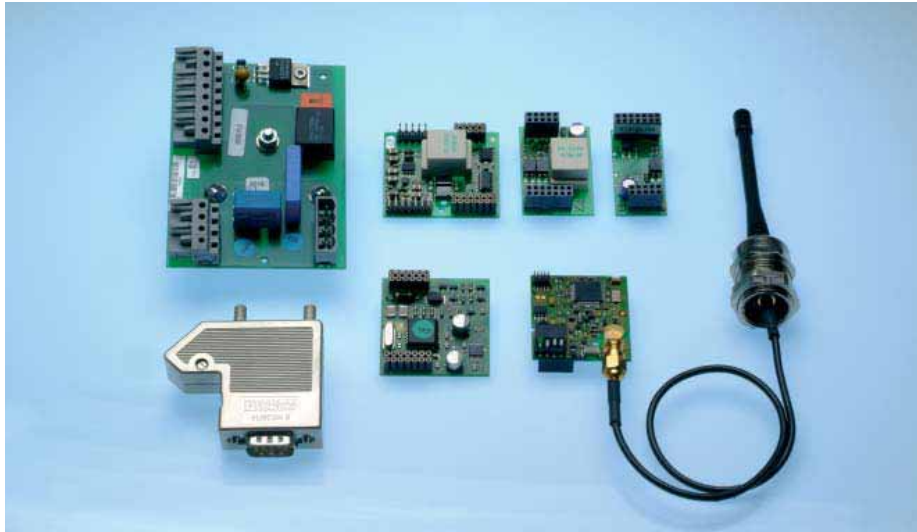
The USB service interface allows you to set the parameters of your Windy Boy easily by using the USB interface of your PC or notebook.



SUNNY BEAM

Complete system control with no cables. Convenient and practical, Sunny Beam lets you check on the status and yield of your wind turbine system at a glance, and at any time. The Sunny Beam can monitor up to four inverters via wireless interfaces.





Piggy-Backs for System Communication

You would like to record data, visualize data, optimize system parameters or perform remote system maintenance? SMA offers a comprehensive communication system for these tasks. By using pluggable interfaces, e.g. RS232, RS485, Powerline communication or radio, the user has a wide variety of monitoring options.



Plug Modem

If you decide on using Powerline communication for communicating with the Windy Boy, you require a plug modem to transfer data directly from the power cable to a PC. The plug modem is available in a USB or RS232 version.



For additional detailed information,

please see our

- Off-Grid Power Supply brochure
- Sunny Family catalog

or visit us at: www.SMA.de

SMA Technologie AG

www.SMA.de

Hannoversche Strasse 1-5
34266 Niestetal, Germany

Tel.: +49 561 9522 4000

Fax: +49 561 9522 4040

E-mail: sales@SMA.de

Freecall: +800 SUNNYBOY

Freecall: +800 78669269

