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Small 小型风机并网逆变电源 Wind Turbine Grid-Connected Inverter



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小型风机并网发电系统采用无蓄电池组设计，风机产生的电能经过变换后直接馈入电网。整个系统的成本仅为同功率光伏系统的 1/4 左右。而和兆瓦级大型风机系统相比，具有初期投资小，安装简便，应用灵活等优点，具有广阔的应用前景。

小型风机并网发电系统一般由小型风力发电机、整流器、卸荷负载、并网逆变器等产品组成。

本公司生产的WG系列风机并网逆变器，功率范围覆盖1.5KW至100KW。可匹配从600W至100KW，不同功率和电压等级的风机。

与之配套的WEL系列电子负载控制器，功率范围覆盖2KW至100KW。电子负载控制器内部包括了整流器、连续可调电子负载和多种保护功能模块，采用DSP单独控制。可以给并网逆变器和风机提供全面的保护，同时可最大限度地利用风能并网发电。

整个系统的拓扑结构如下：

The small scale grid connected wind power system converts the variable wind power from the wind turbine to a stable AC power and then feed the power to the grid .No battery storage is required. The cost of this system is only 25% of the same power level solar generation system cost. This kind of wind system enjoys a good prospect of application for its advantages over large scale mega-watt system. These advantages include low initial cost, easier installation and flexible applications.

The main components of a small scale grid-connected wind power system include wind turbine, rectifier, electronic dump load and grid -connected inverter.

The power level of Sungrow WG series grid-connected inverter covers a broad range of 1.5KW to 100KW, which can suitably match different power level of wind turbine from 600W to 100KW.

The supporting WEL series electronic load controller has a power range of 2KW to 100KW. The WEL electronic load controller is comprised of rectifier, continuously adjustable electronic load and multi-protection modules ,which utilizes a DSP to perform all control tasks.

The WEL E-load controller can automatically and continually adjust the put-into-use dump-load power according to the wind strength. This feature endows the wind power system with maximum wind power utilization and complete protections.

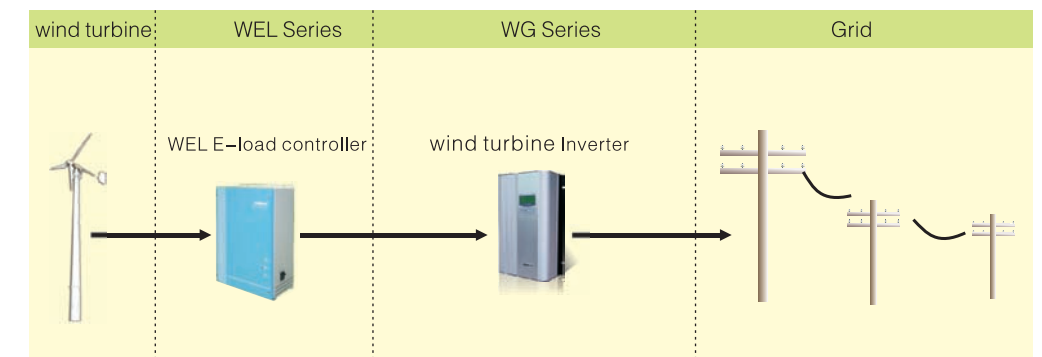
The whole system topology is illustrated below:

小型风机并网逆变电源

Small Wind Turbine Grid-Connected Inverter



系统的拓扑结构



system topology

Small Wind Turbine Grid-Connected Inverter

- ◆ 与WEL-2K配合使用, 可提供小型风力发电的完整解决方案
- ◆ 使用三菱第五代IPM模块, 大大提高系统效率
- ◆ MPPT自寻优技术, 最大限度提高系统的发电量
- ◆ 多语种液晶显示功能, 可自由设置
- ◆ 人性化界面, 可通过按键设定各种运行参数
- ◆ 多种通讯接口可以选择, 可方便的实现上位机监控
- ◆ 完善的保护功能, 系统的可靠性更高
- ◆ 宽直流输入电压范围
- ◆ 可自由设定风机的功率曲线
- ◆ 具有直插式防水端子
- ◆ CE认证

- ◆ Combined with WEL-2K to provide best wind generation solution.
- ◆ Using the fifth generation Intelligent Power Module from Mitsubishi, improve the system efficiency.
- ◆ MPPT auto-optimizing technique makes the most of the generation capacity.
- ◆ Easy-to-set Multilingual LCD display.
- ◆ Friendly LCD interface, can adjust operation parameters through keys.
- ◆ Multi communication interface can be selected.
- ◆ High reliability due to complete protection function.
- ◆ Wide DC input voltage range.
- ◆ Adjustable Power Curve.
- ◆ water-proof direct-plug terminals.
- ◆ CE Certification.

WGIK5TL



■ 技术参数

输入直流电压范围	70~400 V
额定交流输出功率	1.5 KW
总电流波形畸变率	<3% (额定功率时)
功率因数	>0.99
最大效率	95%
欧洲效率	93%
允许电网电压范围 (单相)	180~260V AC (可设定)
额定输出电流	6.5 A
允许电网频率范围	47~51.5 Hz / 57~61.5 Hz (可设定)
噪音	<40 dB
防护等级	IP41
冷却	自然冷却
通讯接口	RS485/Ethernet (可选) /GPRS (可选)
使用环境温度	-20°C ~ +40°C
尺寸 (宽×高×深)	288 x 417 x 126 mm
重量	11.5 kg

T echnical Parameters

DC Input voltage range	70~400 V
Nominal AC output power	1.5 KW
THD of output current	<3% (at nominal power)
Power Factor	>0.99
Peak Efficiency	95%
European Efficiency	93%
Grid Voltage Range (single-phase)	180~260V AC (can be set)
Nominal output current	6.5 A
Grid Frequency Range	47~51.5 Hz / 57~61.5 Hz (can be set)
Noise level	<40 dB
Waterproof Class	IP41
Cooling	Natural cooling
Communication interfaces	RS485/Ethernet (optional)/GPRS (optional)
Ambient Temperature	-20°C ~ +40°C
Dimensions (W × H × D)	288 x 417 x 126 mm
Weight	11.5 kg

Small Wind Turbine Grid-Connected Inverter

- ◆ 与WEL-6K相配合使用, 可提供小型风力发电的完整解决方案
- ◆ 使用三菱第五代IPM模块, 大大提高系统效率
- ◆ MPPT自寻优技术, 最大限度提高系统的发电量
- ◆ 多语种液晶显示功能, 可自由设置
- ◆ 人性化界面, 可通过按键设定各种运行参数
- ◆ 多种通讯接口可以选择, 可方便的实现上位机监控
- ◆ 完善的保护功能, 系统的可靠性更高
- ◆ 宽直流输入电压范围
- ◆ 可自由设定风机的功率曲线
- ◆ 具有直插式防水端子
- ◆ CE认证

- ◆ Combined with WEL-6K to provide best wind generation solution.
- ◆ Using the fifth generation Intelligent Power Module from Mitsubishi, improve the system efficiency.
- ◆ MPPT auto-optimizing technique makes the most of the generation capacity.
- ◆ Easy-to-set Multilingual LCD display.
- ◆ Friendly LCD interface, can adjust operation parameters through keys.
- ◆ Multi communication interface can be selected.
- ◆ High reliability due to complete protection function.
- ◆ Wide DC input voltage range.
- ◆ Adjustable Power Curve.
- ◆ water-proof direct-plug terminals.
- ◆ CE Certification.

WG3K/5K



■ 技术参数

型号	WG3K	WG5K
输入直流电压范围	230~450 V	200~780 V
额定交流输出功率	3 KW	5 KW
总电流波形畸变率	<3% (额定功率时)	
功率因数	>0.99	
最大效率	94%	
欧洲效率	93%	
允许电网电压范围 (单相)	180~260V AC (可设定)	
额定输出电流	13 A	21.7 A
允许电网频率范围	47~51.5 Hz / 57~61.5 Hz (可设定)	
噪音	<40 dB	
防护等级	IP65	IP20
冷却	自然冷却	风冷
通讯接口	RS485/Ethernet (可选) / GPRS (可选)	
使用环境温度	-25°C ~ +60°C	-20°C ~ +40°C
尺寸 (宽×高×深)	490 x 380 x 177 mm	356 x 569 x 243 mm
重量	44 kg	53 kg

Technical Parameters

Model	WG3K	WG5K
DC Input voltage range	230~450 V	200~780 V
Nominal AC output power	3 KW	5 KW
THD of output current	<3% (at nominal power)	
Power Factor	>0.99	
Peak Efficiency	94%	
European Efficiency	93%	
Grid Voltage Range (single-phase)	180~260V AC (can be set)	
Nominal output current	13 A	21.7 A
Grid Frequency Range	47~51.5 Hz / 57~61.5 Hz (can be set)	
Noise level	<40 dB	
Waterproof Class	IP65	IP20
Cooling	Natural cooling	Fan cooling
Communication interfaces	RS485/Ethernet (optional)/GPRS (optional)	
Ambient Temperature	-25°C ~ +60°C	-20°C ~ +40°C
Dimensions (W×H×D)	490 x 380 x 177 mm	356 x 569 x 243 mm
Weight	44 kg	53 kg

Small Wind Turbine Grid-Connected Inverter

- ◆ 与WEL-30K相配合使用, 可提供小型风力发电的完整解决方案
- ◆ 使用三菱第五代IPM模块, 大大提高系统效率
- ◆ MPPT自寻优技术, 最大限度提高系统的发电量
- ◆ 多语种液晶显示功能, 可自由设置
- ◆ 人性化界面, 可通过按键设定各种运行参数
- ◆ 多种通讯接口可以选择, 可方便的实现上位机监控
- ◆ 完善的保护功能, 系统的可靠性更高
- ◆ 宽直流输入电压范围
- ◆ 可自由设定风机的功率曲线
- ◆ CE认证

- ◆ Combined with WEL-30K to provide best wind generation solution.
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- ◆ MPPT auto-optimizing technique makes the most of the generation capacity.
- ◆ Easy-to-set Multilingual LCD display.
- ◆ Friendly LCD interface, can adjust operation parameters through keys.
- ◆ Multi communication interface can be selected.
- ◆ High reliability due to complete protection function.
- ◆ Wide DC input voltage range.
- ◆ Adjustable Power Curve.
- ◆ CE Certification.

WG10K/20K/30K



■ 技术参数

型号	WG10K	WG20K	WG30K
输入直流电压范围	200~450 V	250~800 V	250~800 V
额定交流输出功率	10 KW	20 KW	30 KW
总电流波形畸变率	<3% (额定功率时)		
功率因数	>0.99		
最大效率	94.5%		
欧洲效率	93.5%		
允许电网电压范围(单相)	180~260V AC (可设定)		
额定输出电流	43.5 A	87 A	130.5 A
允许电网频率范围	47~51.5 Hz / 57~61.5 Hz (可设定)		
噪音	<60 dB		
防护等级	IP20		
冷却	风冷		
通讯接口	RS485/Ethernet (可选) / GPRS (可选)		
使用环境温度	-20°C ~ +40°C		
尺寸(宽×高×深)	530 x 900 x 460 mm	820 x 1964 x 646 mm	
重量	200 kg	400 kg	500 kg

Technical Parameters

Model	WG10K	WG20K	WG30K
DC Input voltage range	200~450 V	250~800 V	250~800 V
Nominal AC output power	10 KW	20 KW	30 KW
THD of output current	<3% (at nominal power)		
Power Factor	>0.99		
Peak Efficiency	94.5%		
European Efficiency	93.5%		
Grid Voltage Range(single-phase)	180~260V AC (can be set)		
Nominal output current	43.5 A	87 A	130.5 A
Grid Frequency Range	47~51.5 Hz / 57~61.5 Hz (can be set)		
Noise level	<60dB		
Waterproof Class	IP20		
Cooling	Fan cooling		
Communication interfaces	RS485/Ethernet (optional)/GPRS (optional)		
Ambient Temperature	-20°C ~ +40°C		
Dimensions (W×H×D)	530 x 900x 460 mm	820x1964x 646 mm	
Weight	200 kg	400 kg	500 kg

- ◆ 与WEL-30K相配合使用, 可提供小型风力发电的完整解决方案
- ◆ 使用三菱第五代IPM模块, 大大提高系统效率
- ◆ MPPT自寻优技术, 最大限度提高系统的发电量
- ◆ 多语种液晶显示功能, 可自由设置
- ◆ 人性化界面, 可通过按键设定各种运行参数
- ◆ 多种通讯接口可以选择, 可方便的实现上位机监控
- ◆ 完善的保护功能, 系统的可靠性更高
- ◆ 宽直流输入电压范围
- ◆ 可自由设定风机的功率曲线
- ◆ CE认证

Small Wind Turbine Grid-Connected Inverter

- ◆ Combined with WEL-30K to provide best wind generation solution.
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- ◆ Friendly LCD interface, can adjust operation parameters through keys.
- ◆ Multi communication interface can be selected.
- ◆ High reliability due to complete protection function.
- ◆ Wide DC input voltage range.
- ◆ Adjustable Power Curve.
- ◆ CE Certification.



WG10K3/20K3

■ 技术参数

型号	WG10K3	WG20K3
输入直流电压范围	200~450 V	250~800 V
额定交流输出功率	10 KW	20 KW
总电流波形畸变率	<3% (额定功率时)	
功率因数	>0.99	
最大效率	94.5%	
欧洲效率	93.5%	
允许电网电压范围 (三相)	330~450V AC (可设定)	
额定输出电流	14.5 A	28.8 A
允许电网频率范围	47~51.5 Hz / 57~61.5 Hz (可设定)	
噪音	<60 dB	
防护等级	IP20	
冷却	风冷	
通讯接口	RS485/Ethernet (可选) / GPRS (可选)	
使用环境温度	-20°C ~ +40°C	
尺寸 (宽×高×深)	530 x 900 x 460 mm	820 x 1964 x 646 mm
重量	200 kg	400 kg

Technical Parameters

Model	WG10K3	WG20K3
DC Input voltage range	200~450 V	250~800 V
Nominal AC output power	10 KW	20 KW
THD of output current	<3% (at nominal power)	
Power Factor	>0.99	
Peak Efficiency	94.5%	
European Efficiency	93.5%	
Grid Voltage Range (3-phase)	330 V~450V AC (can be set)	
Nominal output current	14.5 A	28.8 A
Grid Frequency Range	47~51.5 Hz / 57~61.5 Hz (can be set)	
Noise level	<60 dB	
Waterproof Class	IP20	
Cooling	Fan cooling	
Communication interfaces	RS485/Ethernet (optional)/GPRS (optional)	
Ambient Temperature	-20°C ~ +40°C	
Dimensions (W × H × D)	530 x 900 x 460 mm	820 x 1964 x 646 mm
Weight	200 kg	400 kg

Small Wind Turbine Grid-Connected Inverter

- ◆ 使用三菱第五代IPM模块,大大提高系统效率
- ◆ MPPT自寻优技术,最大限度提高系统的发电量
- ◆ 多语种液晶显示功能,可自由设置
- ◆ 人性化界面, 可通过按键设定各种运行参数
- ◆ 多种通讯接口可以选择,可方便的实现上位机监控
- ◆ 完善的保护功能,系统的可靠性更高
- ◆ 宽直流输入电压范围
- ◆ 可自由设定风机的功率曲线
- ◆ CE认证

- ◆ Using the fifth generation Intelligent Power Module from Mitsubishi, improve the system efficiency.
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- ◆ Friendly LCD interface, can adjust operation parameters through keys.
- ◆ Multi communication interface can be selected.
- ◆ High reliability due to complete protection function.
- ◆ Wide DC input voltage range.
- ◆ Adjustable Power Curve.
- ◆ CE Certification.



WG30K3/50K3

■ 技术参数

型号	WG30K3	WG50K3
输入直流电压范围	250~800 V	400~850 V
额定交流输出功率	30 KW	50 KW
总电流波形畸变率	<3 % (额定功率时)	
功率因数	>0.99	
最大效率	94.5 %	95 %
欧洲效率	93.5 %	94 %
允许电网电压范围 (三相)	330 V~450V AC (可设定)	
额定输出电流	43.3 A	72.2 A
允许电网频率范围	47~51.5 Hz /57~61.5 Hz (可设定)	
噪音	<60 dB	
防护等级	IP20	
冷却	风冷	
通讯接口	RS485/Ethernet (可选) /GPRS (可选)	
使用环境温度	- 20°C ~ + 40°C	
尺寸 (宽 × 高 × 深)	820 x 1964 x 646 mm	
重量	500 kg	700 kg

Technical Parameters

Model	WG30K3	WG50K3
DC Input voltage range	250~800 V	400~850 V
Nominal AC output power	30 KW	50 KW
THD of output current	<3 % (at nominal power)	
Power Factor	>0.99	
Peak Efficiency	94.5 %	95 %
European Efficiency	93.5 %	94 %
Grid Voltage Range(3-phase)	330 V~450V AC(can be set)	
Nominal output current	43.3 A	72.2 A
Grid Frequency Range	47~51.5 Hz /57~61.5 Hz(can be set)	
Noise level	<60 dB	
Waterproof Class	IP20	
Cooling	Fan cooling	
Communication interfaces	RS485/Ethernet (optional)/GPRS (optional)	
Ambient Temperature	- 20°C ~ + 40°C	
Dimensions (W × H × D)	820x1964x 646 mm	
Weight	500 kg	700 kg

Small Wind Turbine Grid-Connected Inverter

- ◆ 使用三菱第五代IPM模块,大大提高系统效率
- ◆ MPPT自寻优技术,最大限度提高系统的发电量
- ◆ 多语种液晶显示功能,可自由设置
- ◆ 人性化界面, 可通过按键设定各种运行参数
- ◆ 多种通讯接口可以选择,可方便的实现上位机监控
- ◆ 完善的保护功能,系统的可靠性更高
- ◆ 宽直流输入电压范围
- ◆ 可自由设定风机的功率曲线
- ◆ CE认证

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- ◆ Friendly LCD interface, can adjust operation parameters through keys.
- ◆ Multi communication interface can be selected.
- ◆ High reliability due to complete protection function.
- ◆ Wide DC input voltage range.
- ◆ Adjustable Power Curve.
- ◆ CE Certification.



WG100K3

■ 技术参数

输入直流电压范围	480~880 V
额定交流输出功率	100 KW
总电流波形畸变率	<3 % (额定功率时)
功率因数	>0.99
最大效率	96.2 %
欧洲效率	95.2 %
允许电网电压范围 (三相)	330~450V AC (可设定)
额定输出电流	145 A
允许电网频率范围	47~51.5 Hz /57~61.5 Hz (可设定)
噪音	<60 dB
防护等级	IP20
冷却	风冷
通讯接口	RS485/Ethernet (可选) /GPRS (可选)
使用环境温度	- 20°C ~ + 40°C
尺寸 (宽 × 高 × 深)	1020 x1964 x770 mm
重量	800 kg

Technical Parameters

DC Input voltage range	480~880 V
Nominal AC output power	100 KW
THD of output current	<3 % (at nominal power)
Power Factor	>0.99
Peak Efficiency	96.2 %
European Efficiency	95.2 %
Grid Voltage Range (3-phases)	330~450V AC(can be set)
Nominal output current	145 A
Grid Frequency Range	47~51.5 Hz /57~61.5 Hz(can be set)
Noise level	<60 dB
Waterproof Class	IP20
Cooling	Fan cooling
Communication interfaces	Rs485/Ethernet (optional)/GPRS (optional)
Ambient Temperature	- 20°C ~ + 40°C
Dimensions (W × H × D)	1020 x1964 x770 mm
Weight	800 kg

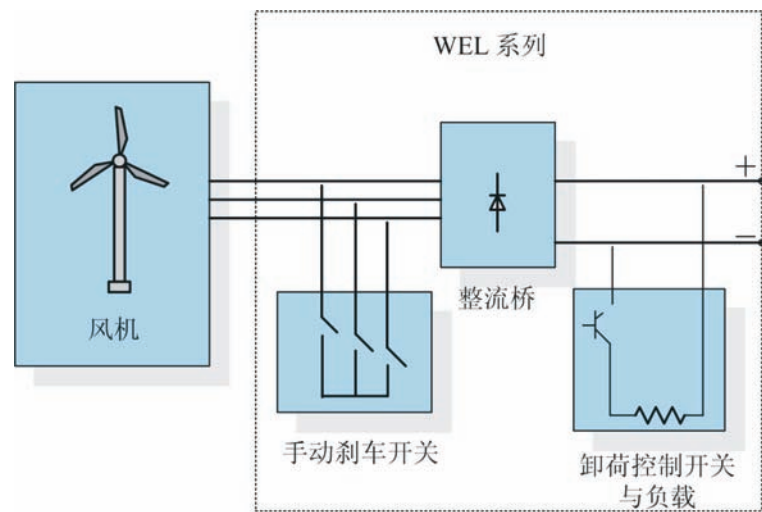
可选配件

WEL系列电子负载控制器 >>>

WEL系列电子负载控制器功率范围覆盖2KW至100KW。内部包括了整流器、连续可调电子负载和多种保护功能模块，采用DSP芯片单独控制。可以给并网逆变器和风机提供全面的保护。具有以下优点：

- ◆ 可匹配不同种类和不同电压等级的风机；
- ◆ 单独设计，可独立运行；
- ◆ 同时适合应用于风机并网和独立系统中；
- ◆ 卸荷负载功率连续可调；
- ◆ 在大风时，通过连续控制卸荷负载功率，保证风能最大限度地并网发电，从而提高风能的利用效率，提高发电量；
- ◆ 从风机输入直接取电，保证在电网断电时，对风机进行安全保护；
- ◆ 提供手动刹车开关；
- ◆ 可在维修或紧急状态下，停止风机运行。

控制器内部拓扑结构如下：



WEL结构框图



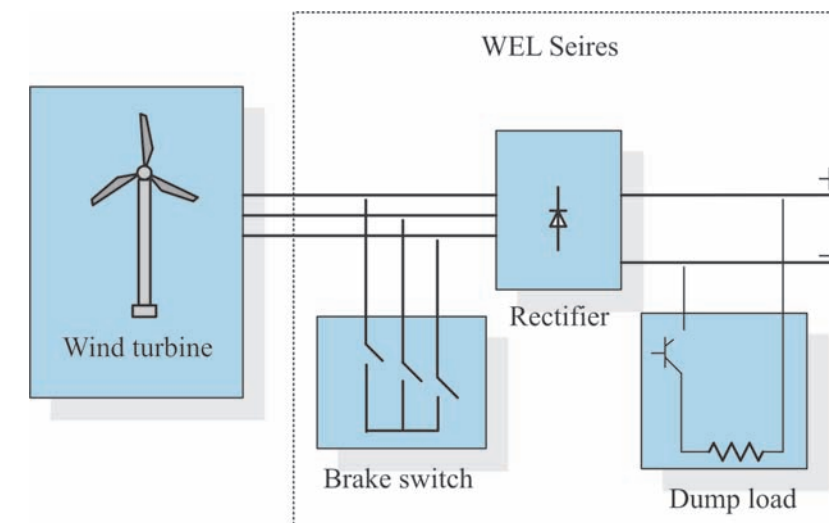
Optional parts

WEL E-load controller >>>

The WEL series electronic load controller has a power range of 2KW to 100KW. The WEL electronic load controller is comprised of rectifier, continuously adjustable electronic load and multi-protection modules, which utilizes a DSP to perform all control tasks. The WEL series will endow the wind power system with maximum wind power utilization and complete protections. Some advantages of WEL series are list below:

- ◆ Match different wind turbine types and power levels.
- ◆ Independent design and operation, suitable for both grid connection system and stand alone system.
- ◆ The power consumption of internal power supply is drawn from the wind turbine.
- ◆ This feature provides the wind turbine reliable protections when the grid is unavailable.
- ◆ Automatically and continually adjust the put-into-use dump-load power according to the wind strength.
- ◆ This feature endows the system with maximum wind power utilization.
- ◆ Manually brake switch is equipped to halt the wind turbine in case of maintenance or emergency.

The internal controller topology is illustrated below:



Circuit topology of WEL



可选配件

监控软件 >>>

Super sun software是针对太阳能风力发电系统开发的软件平台，配合我公司的多功能并网逆变器，对系统进行监视记录和控制、应用范围广。



运行界面显示 >>>

- ◆ 当前发电功率、日发电量累计、月发电量累计、年发电量累计、总发电量累计、累计CO₂减排
- ◆ 系统详细运行参数
- ◆ 故障记录及报警

具有电量累计功能，系统分析功能，历史记录功能，大量的参数设置功能。

环境检测仪 >>>

适用于气象、军事、船空、海港、环保、工业、农业、交通等部门测量水平风参量及太阳辐射能量的测量。系统包括：

- ◆ 风速传感器；
- ◆ 风向传感器；
- ◆ 日照辐射表；
- ◆ 测温探头；
- ◆ 控制盒及支架。



其它配件 >>>

- ① RS485-232转换器
- ② GPRS 模块
- ③ 串口以太网接口
- ④ 数据采集器



Optional Parts

Monitoring software >>>

The Super Sun Software is a platform for the development of the solar/ wind power generation system, it has broad application scope to supervise, records and controls the system coordinating with our multi-purpose grid - connected inverter etc.



Running interface >>>

- ◆ Current electricity generation power, everyday's power rate accumulation, per month's power rate accumulation, annual power rate accumulate, the total output of electrical energy accumulation, CO₂ discharge reduce accumulation.
- ◆ Detailed movement system parameter.
- ◆ The breakdown event records and alarm.

It has the electric power accumulation function, System analysis function, Event record function, Massive parameters set up function.

Environment data monitor >>>

Applicable for measuring horizontal wind parameters and solar radiation energy in meteorology, military, aviation, port, conservation, industry, agriculture, transportation departments.
The system consists of :

- ◆ speed sensor;
- ◆ wind direction sensor
- ◆ solar radiation table
- ◆ temperature detector
- ◆ controlling box and holder



Other optional Parts >>>

- ① RS485-232 adapter
- ② GPRS module
- ③ Ethernet adapter
- ④ Data logger

