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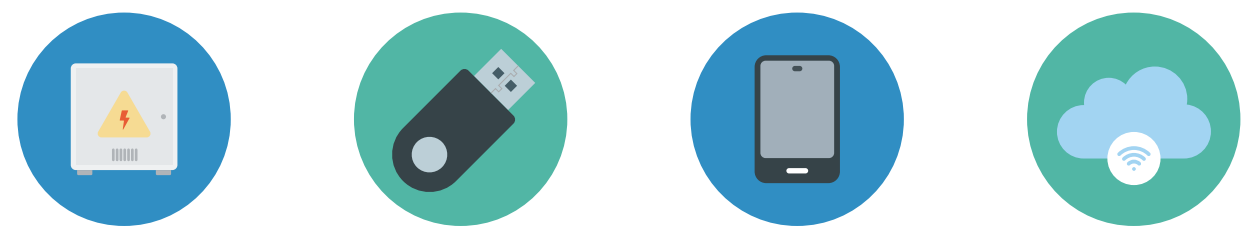
**Monitor and manage your smart energy
for a better world**

INTRODUCTION

IGEN Tech Co., Ltd., founded in 2009, a high-tech enterprise, is professional in innovative applications based on technologies of IoTs, cloud computing and big data. Being focus on energy field for 16 years, the company is committed to constructing sustainable solutions and services into energy system, and has developed a complete solution including hardware, software and data analysis to offer smart energy for global customers.

Adhering to green vision and better future, IGEN Tech will keep close to customer needs in energy field of the globe.

SOLARMAN is a brand of IGEN Tech, specialized in intelligent PV solutions. SOLARMAN product has been a global leading PV monitoring and management platform, which covers the whole life cycle of PV station and provides differentiated solutions for distinct users.



Products and Services

- Different types of external data loggers

Embedded monitoring module for inverters

Smart meters and sockets

Weather stations
- Web-based monitoring portal

Monitoring app and dashboard

Customerized software platform

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SOLARMAN Smart Energy Management System around the world

Globally presented and trusted
by renewable energy customers

 **220+ GW** Active Energy Assets

 **190+** Countries&Regions

 **2,600,000+** Active PV Plants

 **12,000,000+** Devices


Germany
R&D Innovation Center




China

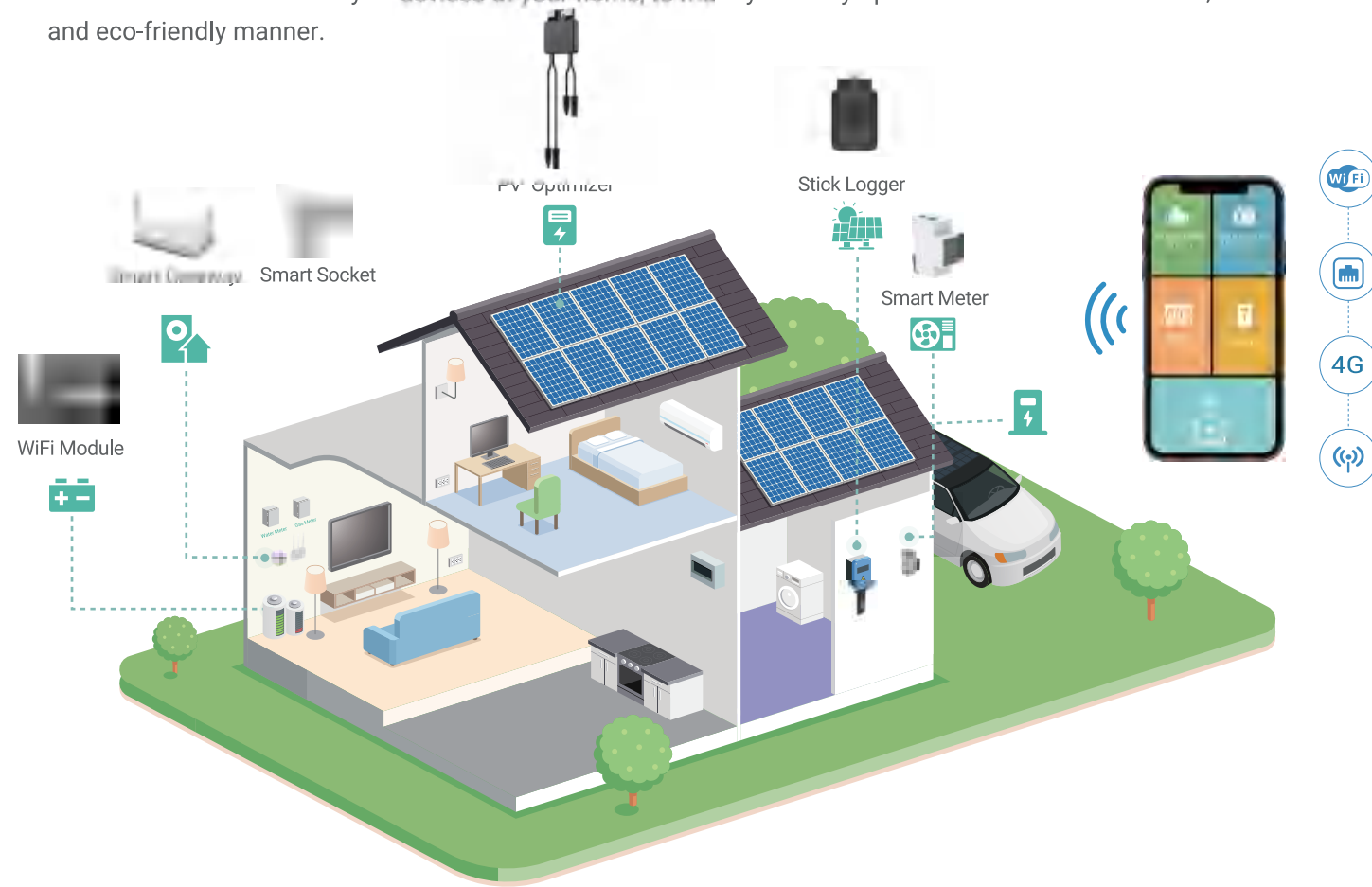


- **Shanghai Office**
Big Data Lab&Operation Support Center
- **Headquarter, Wuxi**
R&D, Sales&Production Center
- **Shenzhen Office**

Residential Solution - Home Energy Management

Wisely managing energy use has been the 1st priority when households decide to pursue a smart life with sustainable energy, improved efficiency and reduced bills.

By applying advanced technologies of IoTs (Internet of Things) and wireless communication, etc., SOLARMAN products are able to connect a variety of devices at your home, to make your daily operation in a more convenient, comfortable and eco-friendly manner.



PV Monitoring System



Battery Storage Management



Power Consumption Monitoring System



PV Optimizer



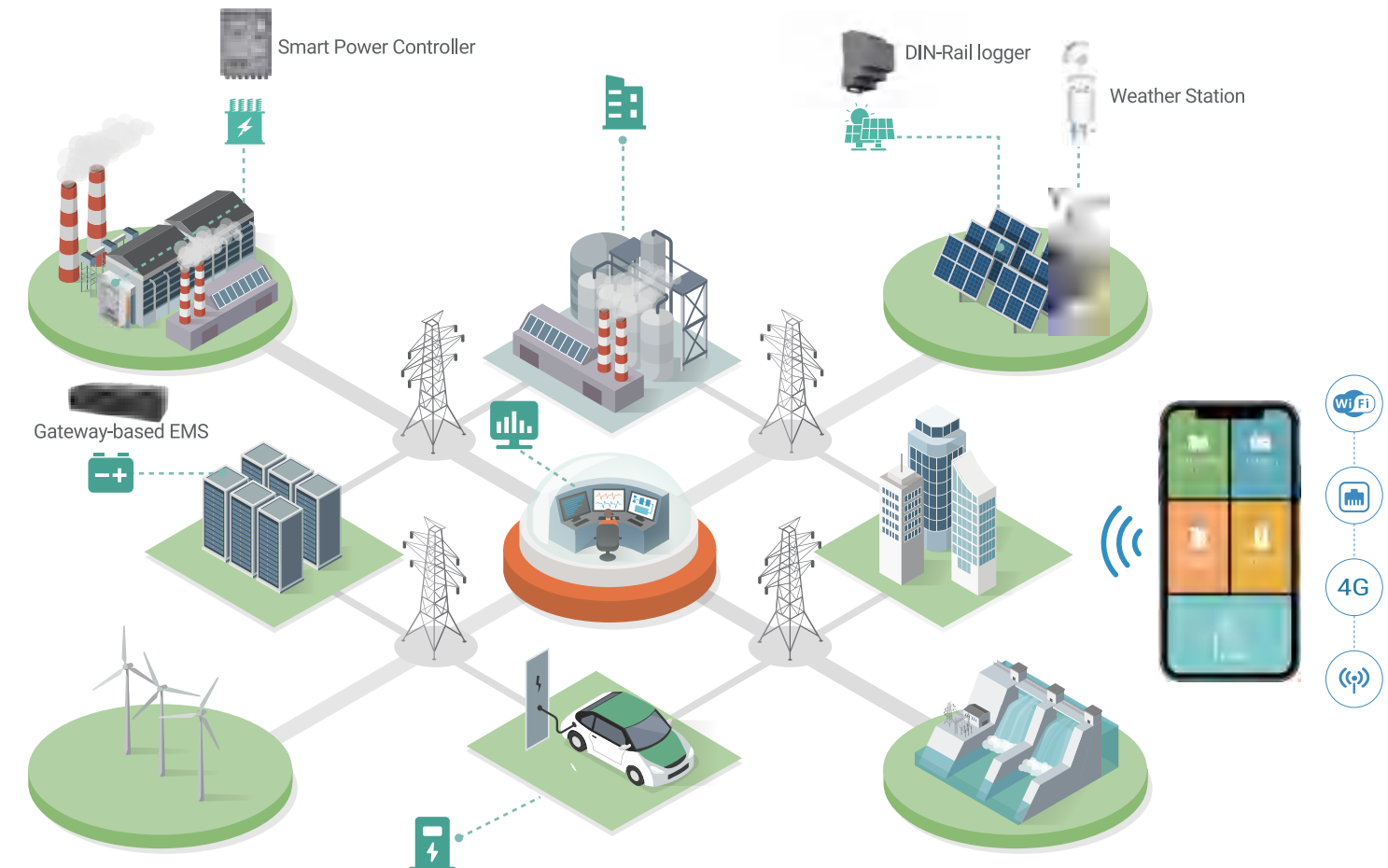
Smart Energy Management



Charging Pile Monitoring System

Commercial&Industrial Solution - Plant Energy Management

More and more corporates are going green by utilizing carbon neutral energy-especially solar power generated from their plants' and buildings' rooftops, and at the same time, battery storage is ready to leverage renewable energy to the upmost efficiency. SOLARMAN helps the companies to get insights on power transaction and hence make smart decisions.



PV Monitoring System



C&I Energy Storage Management



Feed-In Management



Backup Power



Power Consumption Monitoring System



Charging Pile Monitoring System

Overview of SOLARMAN Software

With the most reliable hardware devices, functional software and outstanding service, SOLARMAN is the right choice for everyone. It meets requirements of device manufacturer, investor, project developer, EPC and plant owner, etc. Moreover, the tailor-made needs can be easily covered under SOLARMAN modular design.

SOLARMAN software consists of two different products—SOLARMAN Business and SOLARMAN Smart. Both products are available in web-based portal and APPs.



SOLARMAN Business is developed to support professional service providers, covering the full life-cycle of PV plants:



Project Evaluation - PV resource analysis, plant simulation, production/yield forecast, etc.



Plant O&M - Data monitoring and visualizing, fault detecting and troubleshooting, performance rating, etc.

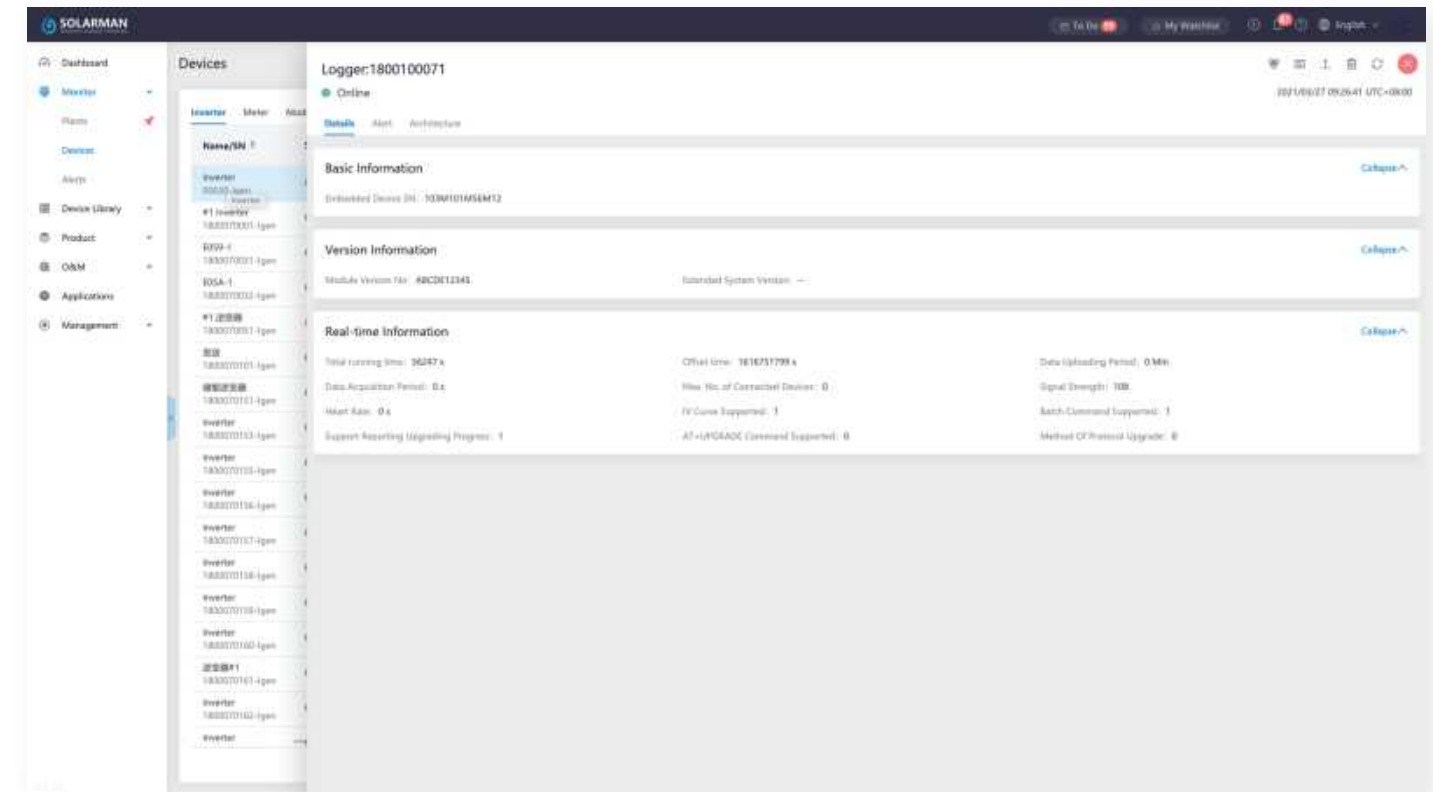


Asset Trade - Financial evaluation, cash flow forecast, ROI analysis, etc.

SOLARMAN Smart offers excellent experience to individual users, who can get all important data/information at a glance. The product is designed in simple style, ease of use, perfect for end-users.

SOLARMAN Business - Device Access, Control and Data Processing

SOLARMAN solution is compatible with the inverter models from all major manufacturers and with numerous components, i.e. energy meter, gas meter, weather station, heat pump and smart plug, etc.



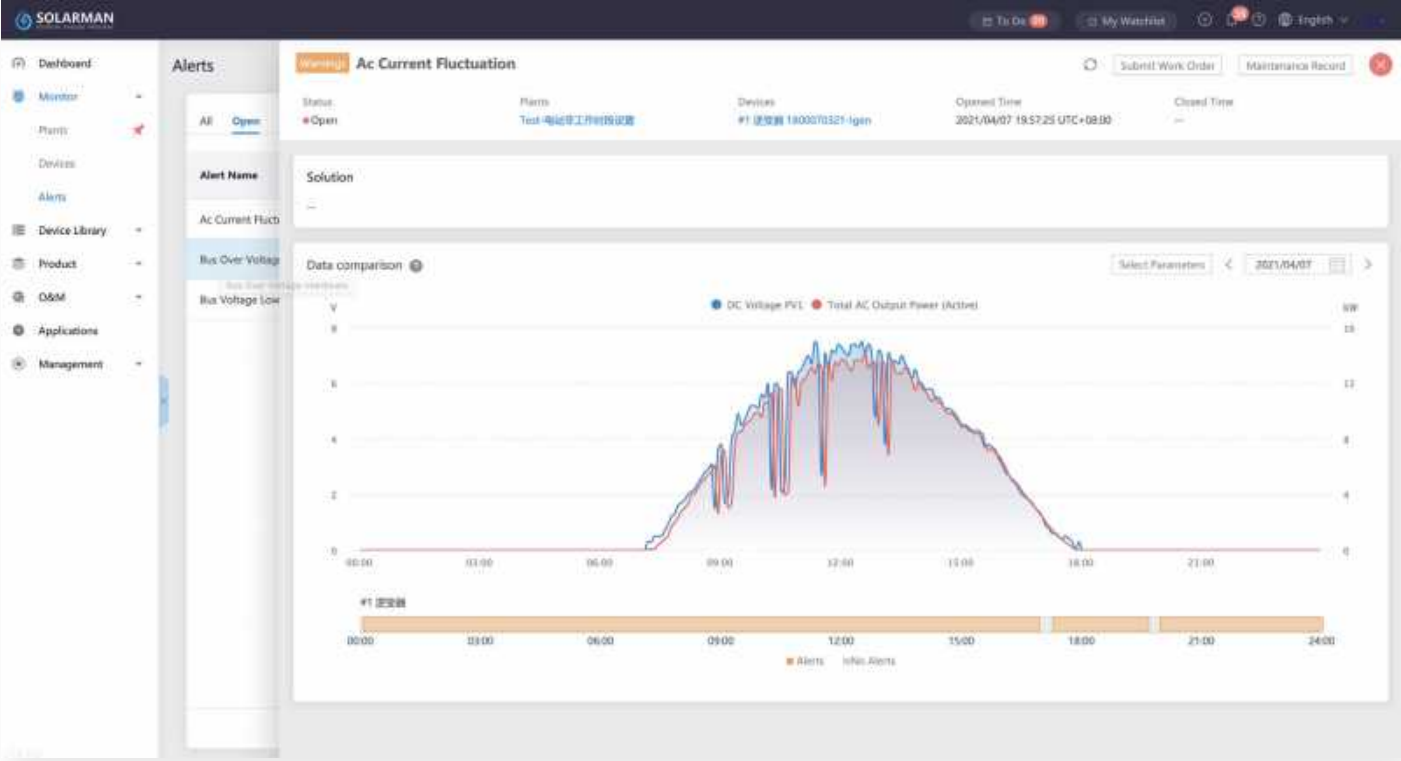
Key features of SOLARMAN Business – Device Sector:

- Fast adaption with new devices and protocols;
- Remote upgrade device firmware in batches;
- Intelligent device controls under local/remote mode, fast response within seconds;
- Customization for warnings and alerts;
- Great flexibility for real-time data processing and authorization.

SOLARMAN Business - PV Plant Management

SOLARMAN Business perfectly fulfills the needs of technical professionals, making PV plant management easy, effective and efficient.

Besides visualizing real-time data and analyzing performance indexes, i.e. PR, the product enables comparison among different plants, and comparison between plant's actual generation and weather-based simulation. The expanded performance analysis gives extra meaningful messages for plant management.

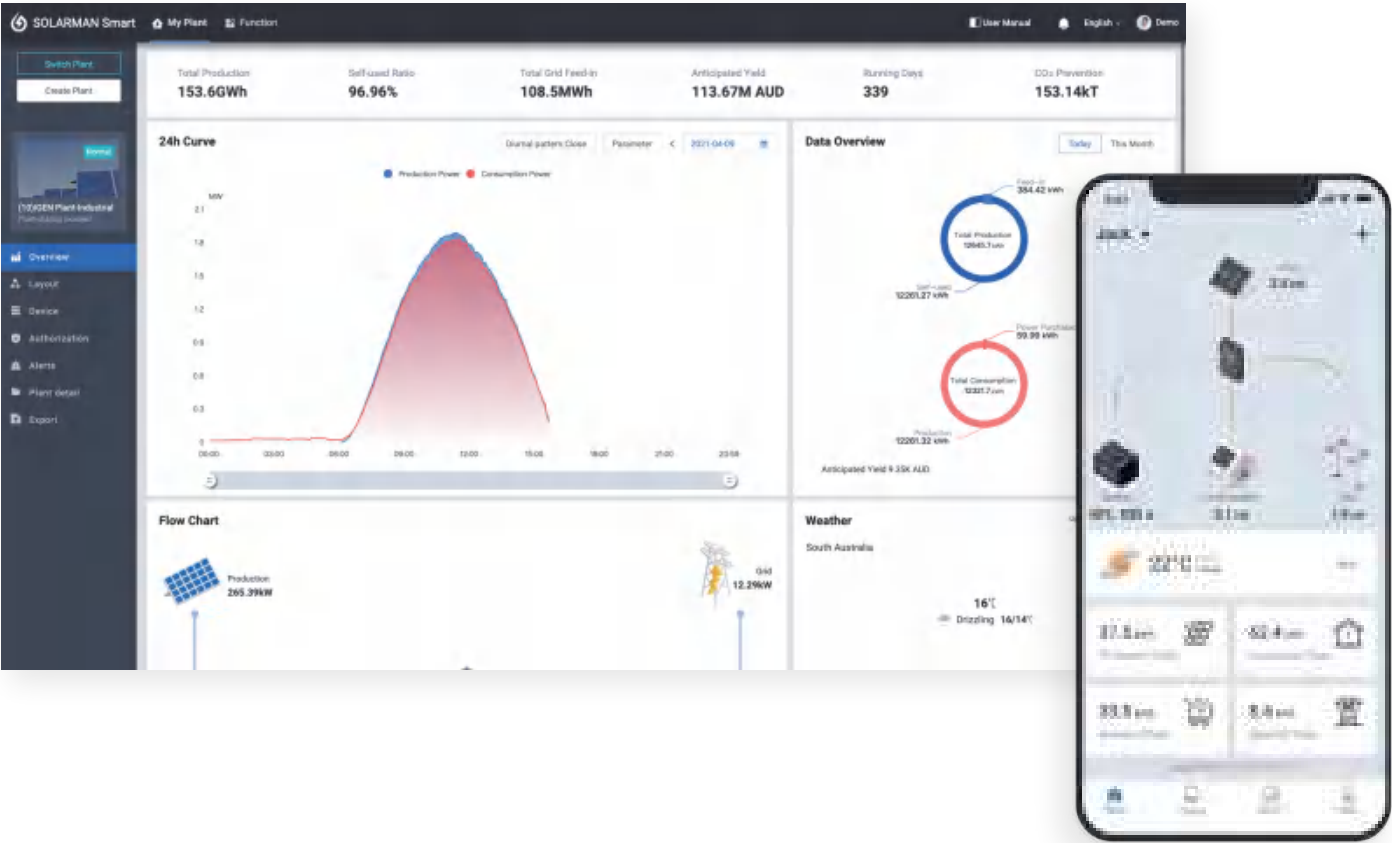


Furthermore, 'Intelligent and Intuitive Alerts' allows O&M staff to spot fault information you care about at a glance.

To get rid of tons of alerts, SOLARMAN system merges the same type of alerts, and plots them on a distribution graph with intuitive trending display. As a specific device alert is linked to key parameter curves, you can easily find out impacts, such as yield loss, etc.

SOLARMAN Smart - An Energy Expert Around You

SOLARMAN Smart monitors and visualizes all conditions of smart devices at end- user's home, the household energy management has never been easier.



Key features of SOLARMAN Smart:



Fast Setup - completes a plant setup after a few steps and adds smart devices as you need;



Graphic Display - understands power production&consumption status from a glimpse of energy flow chart;



Accurate Analysis - calculates and reports energy usage pattern and give reasonable advice;



Device Management - adds, deletes, changes, controls any devices at any time, any place;



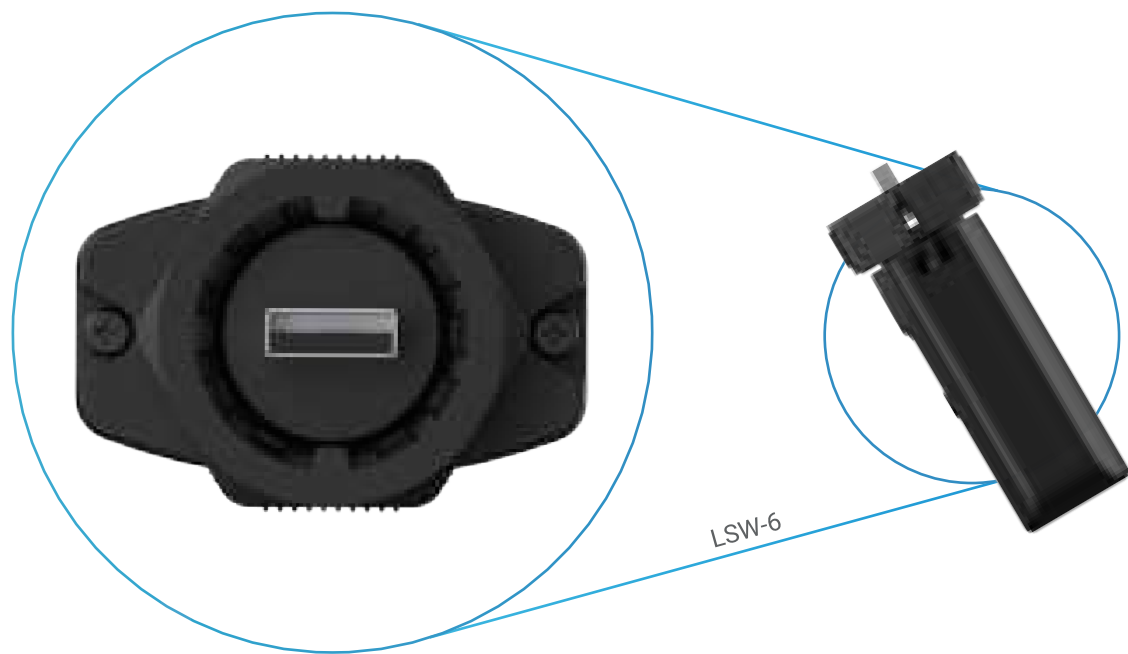
Plant Management - shares a plant to a service provider or any friends within SOLARMAN platform, creating great convenience.

Stick Logger

4G/GPRS/WiFi/Ethernet

SOLARMAN stick logger supports GPRS, WiFi, 4G, Ethernet and other communication method. Furthermore, stick logger supports RS485/RS232/TTL/USB and other serial communication. With the design of multiple covers, it is compatible with the vast majority of inverters. By collecting operating status and power generation of inverter, stick logger can run a long-term and efficient monitoring of PV system, which increases work efficiency and reduces management cost significantly.

- External indicator lights, ensuring collection status at a glance.
- Plug and play, no extra power supply is required.
- Independent module, protecting internal parts of inverter.
- Waterproof design, resistant to bad weather.
- External design, easy to replace and maintain.



Product Model	LS4G-6-G	LS4G-6C-D	LSW-6	LSW-Mini	LSE-4W	LSG-3
Product Picture						
Remote Communication Interface	WiFi6 2.4GHz 4G CAT1	4G Cat1	WiFi6 2.4GHz	WiFi6 2.4GHz	2.4G WiFi+LAN	GPRS
Antenna	External Antenna	External Antenna	Internal Antenna	Internal Antenna	—	External Antenna
Data Interface	RS485/RS232/TTL/USB					
Working Voltage	DC 5-12V(±5%)					
Working Power	4W	4W	1.5W	2W	1.5W	3W
SIM Card	Chip Card/MicroSIM	Chip Card/MicroSIM	—	—	—	Chip Card/MicroSIM
Data Storage	8MB Flash	8MB Flash	8MB Flash	8MB Flash	4MB Flash	2MB Flash
Working Temperature	-30°C~+70°C					
Working Humidity	10%-90%RH, No Condensation					
No. of Connections	One					
Serial Communication Rate	9600bps(1200—115200bps Configurable)					
Data Uploading Interval	Default: 5 mins					
User Configuration	BT/APP/Remote	BT/APP/Remote	BT/APP/Web/Remote	BT/APP/Remote	BT/Web/Remote	Remote
Firmware Upgrade	Remote/Web	Remote	Remote/Web	Local/Remote	Remote/Web	Remote
Real-time Control	√					
Breakpoint Resuming	√					

DIN-Rail Logger

4G/WiFi/Ethernet



By collecting operating status and power generation of inverter, meter and other devices, DIN-Rail logger can run a long-term and efficient monitoring of PV system.

Logger can connect to multiple devices via RS485/RS232 and other interfaces. Meanwhile, SOLARMAN provides powerful data support for the logger. Logger sends the data to the monitoring platform via WiFi/Ethernet. The real-time status and historical data can be displayed with graphs, enabling intuitive and clear understanding of PV system.

Standard DIN-Rail Mount

Suitable for 35mm DIN-Rail mount.

Remote Upgrade

Remote upgrade and system debugging, easy for O&M.

Timely alert report, helping users understand risks and problems about their plants in time.

Integrated with DIN-Rail power supply device, with more simplified design.

Breakpoint Resuming

Ensure data integrity.

Alert Notification

Real-time alerts with timely notification, ensuring fast troubleshoot.

Review data via APP/Web at anytime and anywhere.



Product Model	LD4G-3B	LDW-3
Product Picture		
Remote Communication Interface	4G(Cat.1)	WiFi/Ethernet
No. of Connections	1-20	1-10
Working Voltage	AC 150-380V	AC 150-380V
Working Power	5W(Max.)	2.5W(Max.)
Local Communication	RS485	
Data Uploading Interval	Default: 5 mins	
Data Storage	32MB Flash	4MB Flash
User Configuration	Local/Remote	
SIM Card	MicroSIM(Plug-in)	—
Antenna	4G/BLE Sucker Antenna	WiFi Sucker Antenna
Working Temperature	-30°C~+70°C	
Working Humidity	10%-90%RH, No Condensation	
Dimension	91*54*68mm	
Installation Method	DIN-Rail	

Smart Meter

SOLARMAN smart meter is applied for energy management purpose, and it works to measure and control electricity consumption of PV plant, power system, communication station, intelligent building and etc,. It features in high reliability, high accuracy, compact size and easy to install, etc.

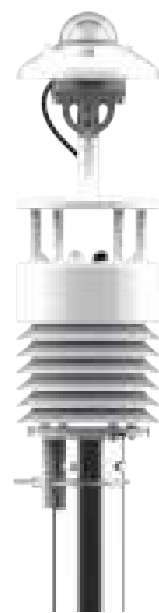
Single-Phase Meter

- Compact size, 1P width.
 - Open-type CT, easy to install.
 - Embedded communication module, supporting WiFi, optional LoRa.
 - Measuring range: 0-100A; Active power accuracy: 1%.
 - High-speed sampling chip, supports a maximum sampling rate of 100ms per time.
- 1P & 2P width, occupies minimal space on the distribution panel.
 - Open-type CT, easy to install.
 - Embedded communication module, supporting WiFi/Ethernet and optional LoRa.
 - Measuring range: 0-150A, Active power accuracy: 1%.
 - High-speed sampling chip, supports a maximum sampling rate of 50ms per time.

	Single-Phase	Three-Phase
Product Model	MR1-D5-WR	MR3-D4-WRE
Product Name	Single-Phase Remote Control Meter	Three-phase Smart Meter
Product Picture		
Dimension	18*89.8*69.6mm	89.5*88*36mm
Remote Communication	WiFi/LoRa	WiFi/Ethernet/LoRa
Rated Voltage	220V	3*230/400V
Rated Frequency	50/60Hz	
Accuracy	±1%	
Two-way Metering	√	
Working Temperature	-40°C~+70°C	-40°C~+70°C
Wiring Method	Single-Phase Two-Wire	Single-Phase Two-Wire Three-Phase Four-Wire
Measurement	Clip-On CT	
No. of CTs	1	3
Max. Measuring Range of CT	100A	
Electrical Parameters	Voltage, Current, Active Power, Active Energy, Reactive power, Reactive Energy, Frequency, Power Factors	Voltage, Current, Active Power, Apparent Power, Active Energy, Apparent Power, Split-phase Energy, Reactive Power, Reactive Energy, Frequency, Power Factors
Remote Switch	×	√
Data Acquisition(Inverter)	Active Power: 100ms (WiFi)	Active Power: 50ms (RS485), 100ms(WiFi)
Installation Method	35mm DIN-Rail	

Weather Station

SOLARMAN weather station is specifically designed for PV system. It provides a comprehensive environmental monitoring solution for users including irradiance, ambient temperature and humidity, wind direction and speed, and module temperature. With the combination of accurate real-time data, durable products and powerful online platform, SOLARMAN helps users evaluate yield efficiency in a more comprehensive and convenient way.



Accurate real-time and historical data, enabling a comprehensive evaluation of system performance.



Compatible with SOLARMAN data logger, ensuring simple configuration and lower O&M cost.



SOLARMAN platform provides visualized meteorological data.



Real-time alerts with timely notification, ensuring fast troubleshoot.



Standard sensors for general demands (High accuracy sensor for project with high demands).

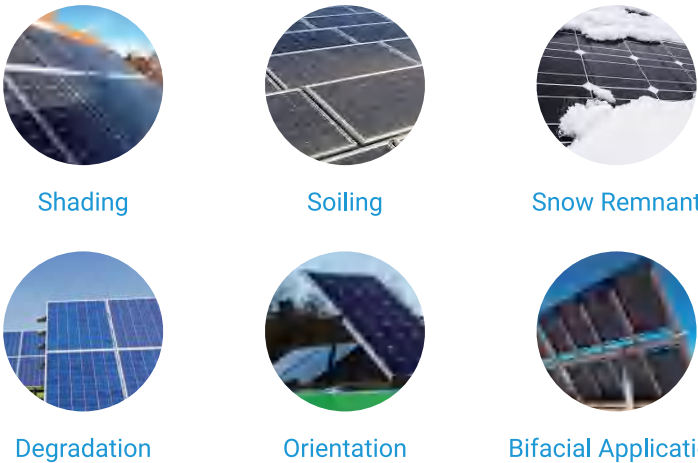


Product Model	WP-2S
Irradiance (Sub-reference Level)	ISO 9060:1990 (Sub-reference Level) Sensitivity: 7~14μV/W/m2 Instability (Year): <0.5% Measuring Range: 0~4000W/m2 Spectral Range: 270~3000μm Zero Offset (No ventilation) (a) Thermal Irradiance (200W/m2): <7W/m2 (b) Temperature Variation (5K/h): <2W/m2 Nonlinear: <0.2% Directional Response (80°, 1000W/m2 at max.): <10W/m2 Spectral Selectivity (350~1500nm): <1% Tilt Response (0°-90°, 1000W/m2): <0.2% Temperature Response (-10°C~+40°C): <1% Visual Angle: 180°
Irradiance (Level 1)	Sensitivity: 7~14μV/W/m2 Instability (Year): ±2% Measuring Range: 0~2000W/m2 Cosine (Deviation between solar altitude angle 10° in sunny day and ideal value): ±2% Spectral Range: 0.28~3.0μm Temperature Characteristic (-20°C~+40°C): ±2% Nonlinear: ±2% Visual Angle: 180° Measurement Accuracy: 2%
Irradiance (Level 2)	Sensitivity: 7~14μV/W/m2 Instability (Year): <2% Measuring Range: 0~2000W/m2 Cosine (Deviation between solar altitude angle 10° in sunny day and ideal value): ±5% Spectral Range: 0.28~3.0μm Temperature Characteristic (-20°C~+40°C): ±5% Nonlinear: ±5% Visual Angle: 180° Measurement Accuracy: 5%
Ambient Temperature	Measuring Range: -50°C~+80°C Resolution: 0.1°C Accuracy: ±0.1°C Working Environment: Temperature -40°C~+80°C Humidity ≤100%RH
Ambient Humidity	Measuring Range: 0.0~100.0%RH Resolution: 0.1%RH Accuracy: ±2% (≤80%), ±5% (>80%) Working Environment: Temperature -40°C~+80°C Humidity ≤100%RH
Wind Direction	Measuring Range: 0~360° Resolution: 3° Accuracy: ±3° Startup Wind Speed: ≤0.5m/s Working Environment: Temperature -40°C~+80°C Humidity ≤100%RH
Wind Speed	Measuring Range: 0~70m/s Resolution: 0.1m/s Accuracy: ±(0.3+0.03V)m/s Startup Wind Speed: ≤0.5m/s Working Environment: Temperature -40°C~+80°C Humidity ≤100%RH
Module Temperature	Measuring Range: -50°C~+80°C Resolution: 0.1°C Accuracy: ±0.1°C Working Environment: Temperature -40°C~+80°C Humidity ≤100%RH
Height	1.5m
Power Supply&Communication Junction Box	Power: AC 230V, COM: RS485
IP Grade	IP65

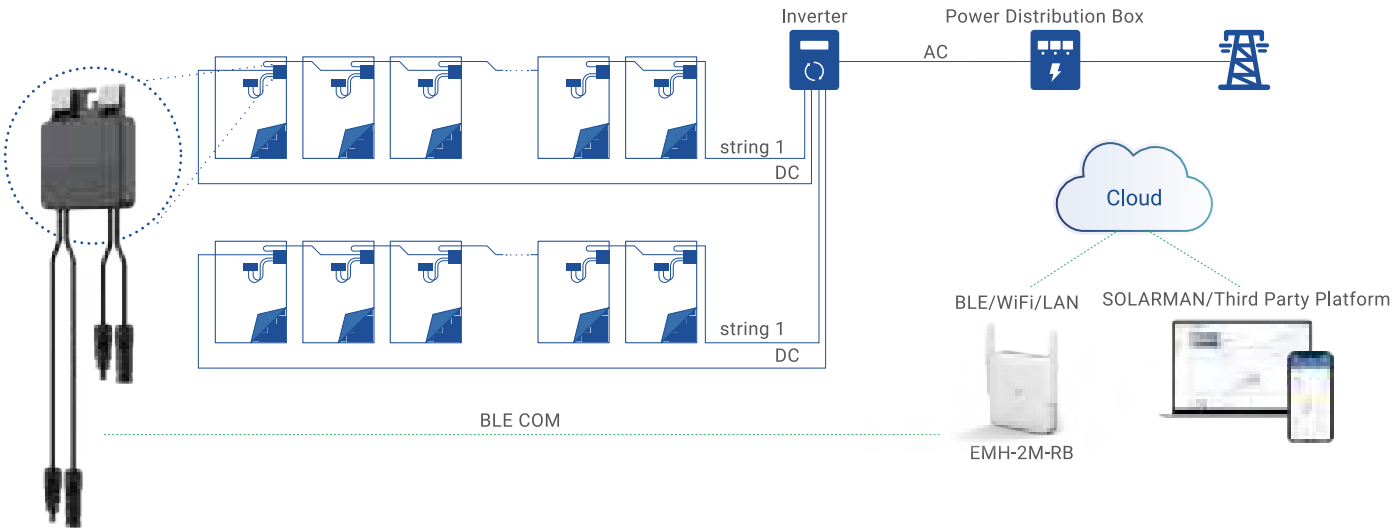
Module PV Optimizer

By utilizing module-level power optimization technology, SOLARMAN module PV optimizer can recover the electricity loss caused by component mismatch, and increase the system power generation by 5% to 30%.

Additionally, SOLARMAN optimizer is equipped with rapid shutdown function compliant with safety regulations of various countries, ensuring fire safety and O&M security. Through module-level data monitoring, SOLARMAN optimizer realizes fine-tuned management, which is able to identify inefficient modules promptly.



Solution




Product Model		MPO 650		MPO 850	
Input Parameter	Peak Conversion Efficiency		99.50%		
	Rate Input Power		650Wp		850Wp
	Max. Input Voltage		70V		
	Max. Input Current		16A		20A
	MPPT Voltage Range		10-70V		
Output Parameter	Max. Output Power		650Wp		850Wp
	Max. Output Voltage		65V		
	Max. Output Current		16A		20A
COM Parameter	Communication Type		BLE Mesh		
	Max. Distance		300m		
	No. of Single Network Connection		300		
Others	Dimension		130.3*102.2*22.7mm		
	Weight(with cable)		711g		868g
	Installation		Screw+Clip		
	Connector		NIU A4 max/QC/MC4		
	Cable		4mm²/10-12AWG		
	Working Temperature		-40℃~+85℃		
	IP Grade		IP68		
	Certification Standard		CE/RoHs/REACH/TUV		
	Lifetime		25-year		

Smart Gateway

SOLARMAN energy management gateway, with its diverse device connection methods, enables real-time monitoring of household energy consumption. Users can clearly understand the generation, storage, and consumption of electricity.



- By monitoring real-time data on household energy consumption, users can clearly understand the situation regarding power generation, energy storage, and electricity usage.
- Extend the monitoring range of equipment by relaying information between two devices.
- Support the connection and data collection of devices in PV, storage, charging, and usage scenarios.

Product Model	EMH-2	EMH-2M
Product Picture		
Remote Communication	Ethernet, WiFi, 4G(optional)	WiFi, Ethernet, LoRa, BLE(optional), 4G(optional)
Working Voltage	DC 5V±7%	DC 5V±5%
Working Power	<5W	<4W
Indicator Lights	x6(Run, Server, 4G, LoRa, COM, P1)	x3(LoRa,COM,Net)
Press	Reset button	
External Interface	RS485, DI, DO, P1, Ethernet	RS485, Ethernet
Data Storage	512MB	8MB Flash
Dimension	149*88*25.3mm	103*90*23mm
Working Temperature	-30°C~+70°C	-20°C~+50°C
Working Humidity	10%-70%RH, No Condensation	
Storage Temperature	-40°C~+90°C	
Storage Humidity	≤40%RH, No Condensation	
Power Interface	—	Type-C
Installation Method	Wall-Hanging/Flat-laid	

WiFi P1 Reader

By collecting operating status and consumption data of meter, WiFi P1 reader can run a long-term and efficient monitoring of meter system. It can connect to a single P1 meter via RJ12 interface to receive consumption data from the meter. Furthermore, it sends the data to the monitoring platform via WiFi. The real-time status and historical data can be displayed with graphs, enabling intuitive and clear understanding of the system.



Product Model	P1-2W	
Communication Parameters	Remote Communication	2.4GHz WiFi
	WiFi Standard	802.11b/g/n
	WiFi Frequency	2.412GHz-2.472GHz (CH1~CH13)
	WiFi Transmission Power	802.11b:+17dBm±1.5dBm(@11Mbps) 802.11g:+15dBm±1.5dBm(@54Mbps) 802.11n:+14dBm±1.5dBm(@HT20,MCS7)
	Bluetooth Standard	BLE 5.0
	Bluetooth Frequency	2.402GHz-2.480GHz
Hardware Parameters	Bluetooth Transmission Power	Max 15dBm
	Data Interface	P1-RJ12
	External Interface	USB Type-C & RJ12
	Working Voltage	DC 5.0V±5%
	Working Power	<1W
	Indicator Light	P1 green light shows connection status with meter WiFi blue light shows connection status with server
	Data Storage	8MB Flash
	Working Temperature	-20°C~+50°C
	Working Humidity	10%-90% RH, No Condensation
	Storage Temperature	-30°C~+60°C
Software Parameters	Storage Humidity	≤40%RH, No Condensation
	No. of Connections	One P1 meter
	Serial Communication Rate	Default: 115200bps(Configurable)
	Data Transmission Interval	Default: 5 mins(60-600s Configurable)
	Firmware Upgrade	Remote upgrade/Local upgrade
	User Configuration	APP/Web page
	Software Watchdog	√
	Others	Real-time Control

Smart Socket

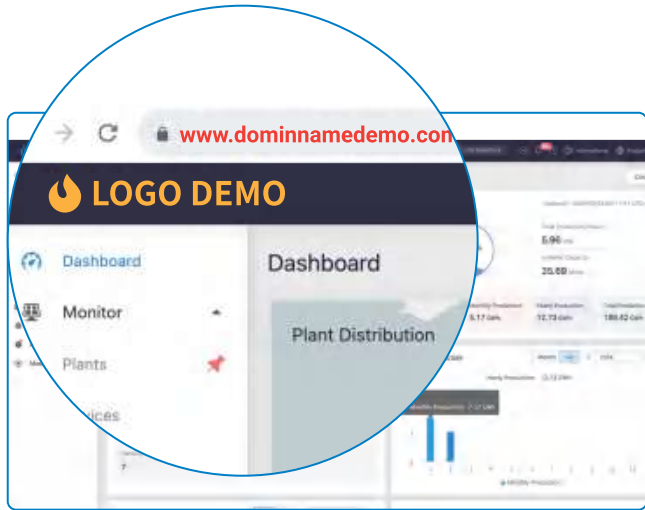
SP-2W-EU is an advanced smart metering socket, specially designed for various household scenarios, which features in bidirectional measurement and remote control. It can send the real-time data to local or remote platform via WiFi. Users can remotely control the socket to switch connected appliances on or off and monitor the consumption data through the smartphone or computer. With the ability to adjust appliance settings as needed, SP-2W-EU enhances the convenience and efficiency of home energy management significantly.



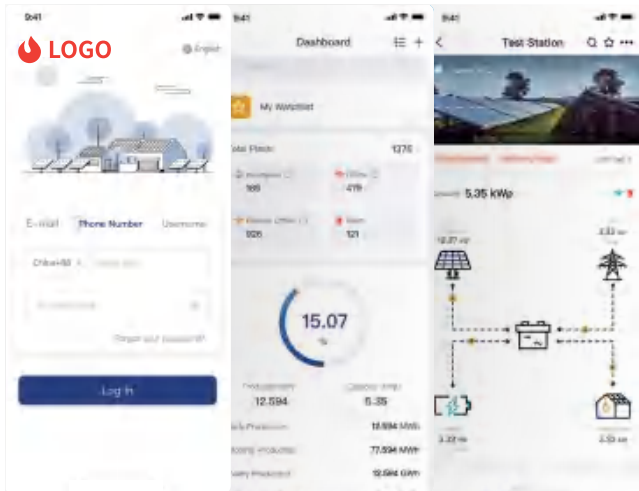
Product Model SP-2W-EU		
Communication Parameters	Remote Communication	2.4GHz WiFi
	WiFi Standard	802.11b/g/n
	WiFi Frequency	2.412GHz-2.472GHz (CH1~CH13)
	WiFi Transmission Power	802.11b:+17dBm±1.5dBm(@11Mbps) 802.11g:+15dBm±1.5dBm(@54Mbps) 802.11n:+14dBm±1.5dBm(@HT20,MCS7)
	Bluetooth Standard	BLE 5.0
	Bluetooth Frequency	2.402GHz-2.480GHz
	Bluetooth Transmission Power	Max 15dBm
Hardware Parameters	Standard	European standard
	Dimension	55.0*55.0*81.8mm
	Working Voltage	AC 110-250V 50Hz/60Hz
	Load Power	16A Max. 3680W resistive load
	Indicator Light	One ON/OFF indicator light
	Measurement Parameter	Power(W)/Energy(kWh)/Voltage(V)/Current(A)
	Metering Accuracy	3%
	Data Storage	2MB Flash
	Working Temperature	-20°C~+50°C
	Working Humidity	10%-70% RH, No Condensation
	Storage Temperature	-45°C~+90°C
	Storage Humidity	<40% RH, No Condensation
	Case Material	UL94 V0
	Anti Electric Shock	Anti Electric Shock Protection Door
Software Parameters	Protection Mechanism	Load Protection
	Data Transmission Interval	Default: 5 mins(when data remain unchanged)/ Data will be uploaded immediately once it changed.
	Firmware Upgrade	APP/Remote Server
	User Configuration	APP
	Remote Control	√

MANOS ODM Solution

ODM Web



ODM APP



ODM Project

ODM service is sharpened by MANOS PaaS platform, which is independently developed by IGEN Tech.

By experiencing a unique software system, SOLARMAN promotes brand identities and enhances user stickiness for professional renewable energy companies.

SOLARMAN ODM service supports web and app customization, providing differentiated services including customized domain name, exclusive logo, language (supporting English, Portuguese, Spanish, Polish, Dutch, etc.), customized colors, E-mail signature, customized privacy agreements and etc. What’s more, by adopting comprehensive security design for data processing, storage and transmission, SOLARMAN is capable of protecting enterprise data security.

Currently, SOLARMAN ODM customization service has served customers in more than 20 countries and regions, including China, France, the United States, Italy, South Africa, India, Australia, Slovenia and etc. SOLARMAN aims to empower customers to highlight personalized brand identities while fully embodying the value proposition of "win-win."



► Exclusive Hardware and Software Custom-Project

Exclusive Hardware and Software Custom-Project is a tailored project for a large-sized PV distributor, who establishes partnerships with many device manufacturers of inverter and battery, e.g. Solis, Growatt, SMA, Huawei, Sofar, GoodWe, SolaX, SolarEdge, Deye, BYD and LG, etc.

SOLARMAN, as a powerful PV monitoring platform, has provided an exclusive and high-quality solution and a tailored general-purpose data logger for the distributor, which enables the monitoring of production/consumption/grid/energy storage data on SOLARMAN platform at anytime and anywhere. By end of 2020, the distributor has established thousands of PV systems on platform, penetrating European market at a much faster pace.

► SOLARMAN Presence in Middle East

At INTERSOLAR EUROPE 2022, an EPC from Middle East area visited SOLARMAN booth. As for security reason of data transmission, the communication mode in Middle East could only be transmitted through the satellite LAN and the monitoring software could only be deployed on the government-owned server.

After learning well about the demands of the EPC, SOLARMAN team developed a tailored data logger with dual network ports to connect inverter and weather station at the same time. Meantime, customized features including UI design, offline map and etc were realized at SOLARMAN platform, which improved O&M efficiency significantly.

Adhering to the vision of zero-carbon future, SOLARMAN is willing to work together with global partners in PV field to achieve the zero-carbon goal in 2060.

