



Always Available for Highest Yields

FusionSolar Smart PV Solutions

HUAWEI TECHNOLOGIES CO., LTD.



Always Available for Highest Yields



20,000 green base site

Neimenggu, China
Huawei has deployed nearly 20,000 green base site powered by wind and solar energy, realized 80% reduction in fuel consumption, to make a cleaner grass and sky.

North latitude 78°13'test

June 2011, Svalbard, Norway
After the test of -50°C in the Arctic, Huawei launched the northernmost LTE site for customers, 100M wireless Internet service to benefit local residents.



2900m subsea connection

April 12, 2010, Suriname, Guyana, Caribbean seafloor
In Deep seabed 2,900 meters, laying 1,127 km of submarine cable systems, help local network bandwidth upgrade 3000 times.

6500m commitment

November 2007, China Everest
For the 6500 meters commitment, Huawei deployed the world's highest altitude wireless base stations to achieve the Everest ascent route mobile signal coverage.



25 years maximum yields

Huawei dedicates to "Customer-centric", combines digital information technology and power electronics technology, has released "Smart, Efficient, Safe, Reliable" string inverter, helps customers achieve 25 years maximum yields.

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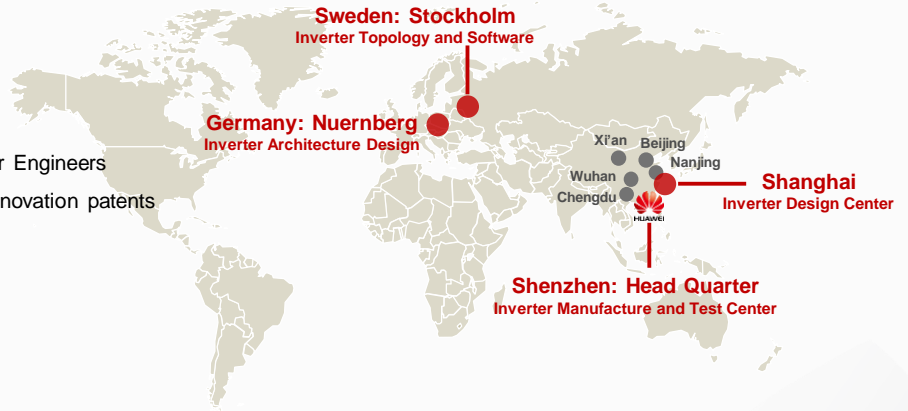


Global R&D Centers

9 Global R&D Centers of Network Energy

2000+ Engineers, 100+ PhDs., 500+ Inverter Engineers

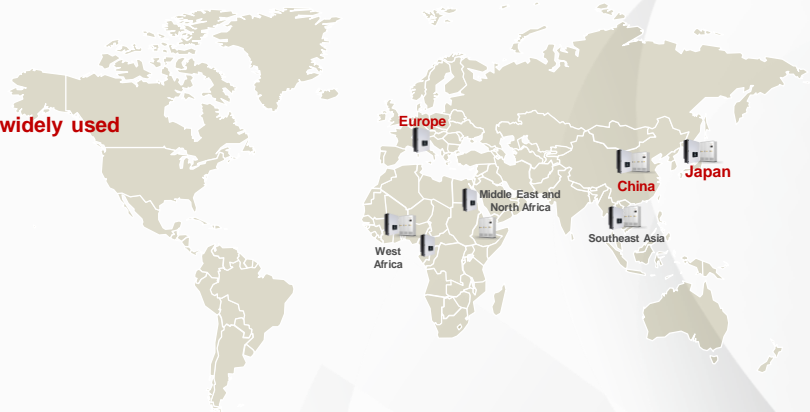
550+ patents, 100+ Inverter patents, 90% Innovation patents



Global Application

Huawei smart PV plant solution is global widely used

4GW shipment, 5.5GW order, In 2014



Global Service

Where there are our products, there are our services

170+ Countries and regions

129+ Spare parts center

300+ Global warehouse

22,000+ Service staff



HUAWEI Smart PV Solution Family



SUN2000 String Inverter



8KTL/12KTL



17KTL/20KTL/23KTL



33KTL (New)

SUN2000 String Inverter



28KTL

Smart PV Management System



FusionSolar Cloud Management Center



FusionSolar APP Smart PV Terminal

Plant Management System Production Management System

Monitoring System



Smart Logger



NetEco (Huawei Inverter Monitor System)

Certification

<p>The Solar Power Magazine International</p> <p>Huawei Technologies Sun2000-20KTL</p> <p>A+</p> <p>98.1 % at high irradiation 3/2013</p> <p>www.photon.info</p>	<p>The Solar Power Magazine International</p> <p>Huawei Technologies Sun2000-20KTL</p> <p>A+</p> <p>98.0% for medium irradiation 3/2013</p> <p>www.photon.info</p>
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String Inverter (8-23KTL)



SUN2000-8/12/17/20/23KTL



Smart

- Maximum of 3 MPPT for versatile adaption to different module types or quantities built up with different alignments
- Up to 6 strings intelligent monitoring and fault detection
- RS 485 and USB ports for connectivity and data management
- Local graphic LCD and remote monitoring

Efficient

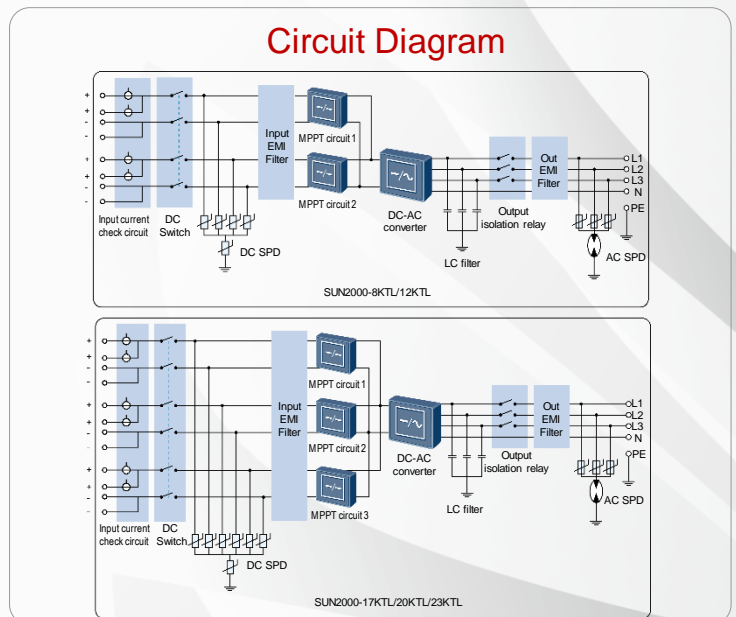
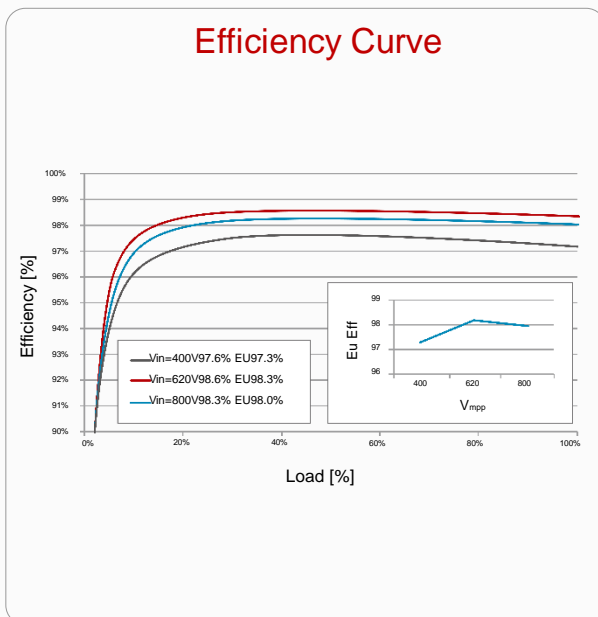
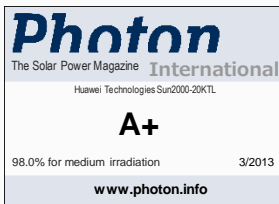
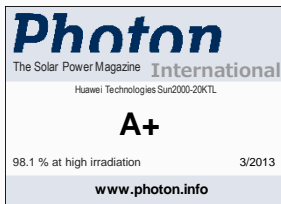
- SUN2000-20KTL Photon test result: A+/A+ at medium and high irradiation
- Maximum efficiency 98.6%
- European efficiency 98.3%

Safe

- Type II DC and AC surge protection devices integrated
- Noise ≤ 29 dB, Class-B electromagnetic radiation
- RCD protection function

Reliable

- Warranty up to 25 years
- No need of external fan with natural cooling technology
- Outdoor application of IP65



String Inverter (8-23KTL)



Technical Specifications	SUN2000-8KTL	SUN2000-12KTL	SUN2000-17KTL	SUN2000-20KTL	SUN2000-23KTL
Efficiency					
Max. efficiency	98.5%	98.5%	98.6%	98.6%	98.6%
European efficiency	98.0%	98.0%	98.3%	98.3%	98.3%
Input					
Max. DC input	9,100 W	13,700 W	19,200 W	22,500 W	23,600 W
Max. input voltage	1000 V	1000 V	1000 V	1000 V	1000 V
Max. input current per MPPT	18 A	18 A	18 A	18 A	18 A
Max. short circuit current per MPPT	25 A	25 A	25 A	25 A	25 A
Operating voltage range	200 V - 950 V	200 V - 950 V	200 V - 950 V	200 V - 950 V	200 V - 950 V
MPP voltage range at full loading	320 V - 800 V	380 V - 800 V	400 V - 800 V	480 V - 800 V	480 V - 800 V
Rated input voltage	620 V	620 V	620 V	620 V	620 V
Max. number of inputs	4	4	6	6	6
Number of MPP trackers	2	2	3	3	3
Output					
Rated output power	8,000 W	12,000 W	17,000 W	20,000 W	23,000 W
Max. apparent output power	8,800 VA	13,200 VA	18,700 VA	22,000 VA	23,000 VA
Rated output voltage	3×230V/400V+N+PE 3×220V/380V+N+PE	3×230V/400V+N+PE 3×220V/380V+N+PE	3×230V/400V+N+PE 3×220V/380V+N+PE	3×230V/400V+N+PE 3×220V/380V+N+PE	3×230V/400V+N+PE 3×220V/380V+N+PE
AC power frequency	50 Hz/60 Hz	50 Hz/60 Hz	50 Hz/60 Hz	50 Hz/60 Hz	50 Hz/60 Hz
Max. output current	12.8 A	19.2 A	27.2 A	32 A	33.5 A
Adjustable power factor	0.8 leading ... 0.8 lagging	0.8 leading ... 0.8 lagging	0.8 leading ... 0.8 lagging	0.8 leading ... 0.8 lagging	0.8 leading ... 0.8 lagging
Max. total harmonic distortion	<3%	<3%	<3%	<3%	<3%
Protection					
Input-side disconnection protection	Yes	Yes	Yes	Yes	Yes
Anti-islanding protection	Yes	Yes	Yes	Yes	Yes
AC over current protection	Yes	Yes	Yes	Yes	Yes
DC reverse-polarity protection	Yes	Yes	Yes	Yes	Yes
PV array string fault monitoring	Yes	Yes	Yes	Yes	Yes
DC surge arresters	Type II	Type II	Type II	Type II	Type II
AC surge arresters	Type II	Type II	Type II	Type II	Type II
Insulation monitoring	Yes	Yes	Yes	Yes	Yes
Residual current detection	Yes	Yes	Yes	Yes	Yes
Display and Communication					
Display	Graphic LCD	Graphic LCD	Graphic LCD	Graphic LCD	Graphic LCD
RS485	Yes	Yes	Yes	Yes	Yes
USB	Yes	Yes	Yes	Yes	Yes
General Data					
Dimensions(W/H/D)	520 x 610 x 255 mm (20.5 x 24.0 x 10.0 in.)	520 x 610 x 255 mm (20.5 x 24.0 x 10.0 in.)	520 x 610 x 255 mm (20.5 x 24.0 x 10.0 in.)	520 x 610 x 255 mm (20.5 x 24.0 x 10.0 in.)	520 x 610 x 255 mm (20.5 x 24.0 x 10.0 in.)
Weight	40 kg	40 kg	48 kg	48 kg	48 kg
Operating temperature range	-25 °C to +60 °C (-13 °F to +140 °F)	-25 °C to +60 °C (-13 °F to +140 °F)	-25 °C to +60 °C (-13 °F to +140 °F)	-25 °C to +60 °C (-13 °F to +140 °F)	-25 °C to +60 °C (-13 °F to +140 °F)
Cooling	Natural convection	Natural convection	Natural convection	Natural convection	Natural convection
Operating altitude	3000 m	3000 m	3000 m	3000 m	3000 m
Relative humidity (non-condensing)	0 - 100%	0 - 100%	0 - 100%	0 - 100%	0 - 100%
DC connector	Amphenol H4	Amphenol H4	Amphenol H4	Amphenol H4	Amphenol H4
AC connector	Amphenol C16/3	Amphenol C16/3	Amphenol C16/3	Amphenol C16/3	Amphenol C16/3
Degree of protection	IP65	IP65	IP65	IP65	IP65
Self-consumption at night	< 1 W	< 1 W	< 1 W	< 1 W	< 1 W
Topology	Transformerless	Transformerless	Transformerless	Transformerless	Transformerless
Noise emission	≤ 29 dB	≤ 29 dB	≤ 29 dB	≤ 29 dB	≤ 29 dB
Warranty	5 years 10/15/20/25 years optional	5 years 10/15/20/25 years optional	5 years 10/15/20/25 years optional	5 years 10/15/20/25 years optional	5 years 10/15/20/25 years optional
Standards Compliance					
Safety/EMC	EN61000-6-2, EN61000-6-3, EN61000-3-2, EN61000-3-3, EN61000-3-11, EN61000-3-12, EN/IEC62109-1, EN/IEC62109-2				
Grid Code	VDE-AR-N4105, VDE0126-1-1, BDEW 2008, Enel-Guideline, CEI 0-21, G59/3, G83/2, AS4777, CGC/GF004:2011, IEC61727, IEC62116, RD1669, UTE C 15-712-1				

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String Inverter (28KTL)



SUN2000-28KTL



Smart

- Maximum of 3 MPPT for versatile adaption to different module types or quantities built up with different alignments
- Up to 6 strings intelligent monitoring and fault detection
- RS 485 and USB ports for connectivity and data management
- Local graphic LCD and remote monitoring

Efficient

- Maximum efficiency 98.7%, European efficiency 98.4%
- Reduce 30% AC cable loss with higher output voltage of 480V
- Saving AC cable investment up to 20% without N-Line

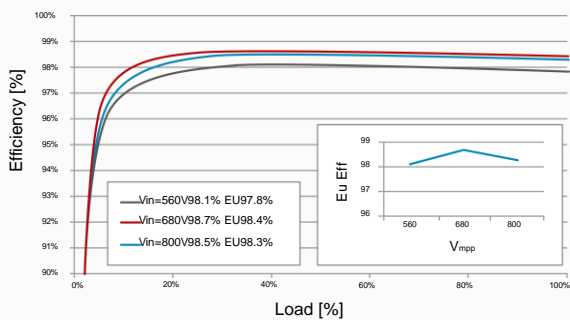
Safe

- Type II DC and AC surge protection devices integrated
- Noise $\leq 29\text{dB}$, Class-B electromagnetic radiation
- RCD protection function

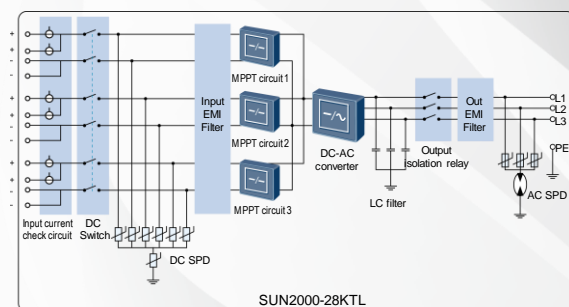
Reliable

- Warranty up to 25 years
- No need of external fan with natural cooling technology
- Outdoor application of IP65

Efficiency Curve



Circuit Diagram



String Inverter (28KTL)



Technical Specifications	SUN2000-28KTL
	Efficiency
Max. efficiency	98.7%
European efficiency	98.4%
	Input
Max. DC input	28,200 W
Max. input voltage	1000 V
Max. input current per MPPT	18 A
Max. short circuit current per MPPT	25 A
Operating voltage range	200 V - 950 V
MPP voltage range at full loading	480 V - 800 V
Rated input voltage	680 V
Max. number of inputs	6
Number of MPP trackers	3
	Output
Rated output power	27,500 W
Max. apparent output power	27,500 VA
Rated output voltage	3×277 V/480 V+PE
AC power frequency	50 Hz/60 Hz
Max. output current	33.5 A
Adjustable power factor	0.8 leading ... 0.8 lagging
Max. total harmonic distortion	< 3%
	Protection
Input-side disconnection device	Yes
Anti-islanding protection	Yes
AC over current protection	Yes
DC reverse-polarity protection	Yes
PV-array string fault monitoring	Yes
DC surge arresters	Type II
AC surge arresters	Type II
Insulation monitoring	Yes
Residual current detection	Yes
	Display and Communication
Display	Graphic LCD
RS485	Yes
USB	Yes
	General Data
Dimensions (W/H/D)	520×610×255 mm (20.5 x 24.0 x 10.0 in.)
Weight	48 kg
Operating temperature range	-25 °C to +60 °C (-13 °F to +140 °F)
Cooling	Natural convection
Operating altitude	3000 m
Relative humidity (non-condensing)	0 - 100%
DC connector	Amphenol H4
AC connector	Amphenol C16/3
Degree of protection	IP65
Self-consumption at night	< 1 W
Topology	Transformerless
Noise emission	29 dB
Warranty	5 years, 10/15/20/25 years optional
	Standards Compliance
Safety/EMC	EN61000-6-2, EN61000-6-3, EN61000-3-2, EN61000-3-3, EN61000-3-11, EN61000-3-12, EN/IEC62109-1, EN/IEC62109-2
Grid Code	VDE0126-1-1, BDEW 2008, CGC/GF004:2011, GB/T 19964-2012, G59/3, UTE C 15-712-1

String Inverter (33KTL)



SUN2000-33KTL



Smart

- Maximum of 3 MPPT for versatile adaption to different module types or quantities built up with different alignments
- Up to 6 strings intelligent monitoring and fault detection
- Wireless communication network
- LED status indication

Efficient

- Maximum efficiency 98.6%
- European efficiency 98.3%

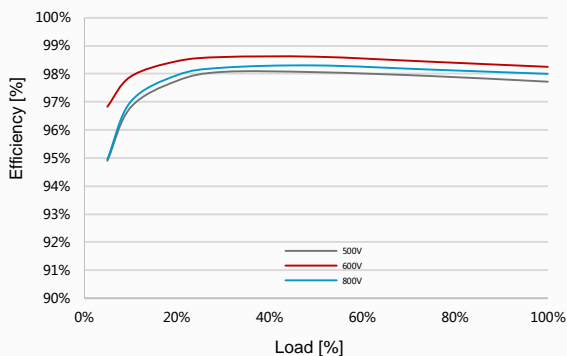
Safe

- Type II DC and AC surge protection devices integrated
- Easy to handle with weight of 50kg by 2 people
- RCD protection function

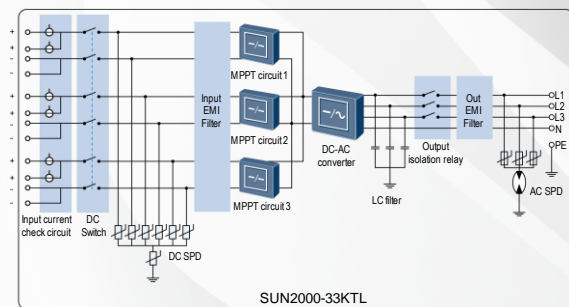
Reliable

- Warranty up to 25 years
- No need of external fan with natural cooling technology
- Outdoor application of IP65

Efficiency Curve



Circuit Diagram



String Inverter (33KTL)



Technical Specifications	SUN2000-33KTL
	Efficiency
Max. efficiency	98.6%
European efficiency	98.3%
	Input
Max. DC input	33,800 W
Max. input voltage	1000 V
Max. input current per MPPT	23 A
Max. short circuit current per MPPT	32 A
Operating voltage range	200 V - 980 V
MPP voltage range at full loading	480 V - 850 V
Rated input voltage	620 V
Max. number of inputs	6
Number of MPP trackers	3
	Output
Rated AC output power	30,000 W *
Max. apparent output power	33,000 VA
Rated output voltage	220V - 230V, 3W+N+PE / 380V - 400V, 3W+N+PE
AC power frequency	50 Hz / 60 Hz
Max. output current	48 A
Adjustable power factor	0.9 leading ... 0.9 lagging
Max. total harmonic distortion	< 3%
	Protection
Input-side disconnection device	Yes
Anti-Islanding protection	Yes
AC over current protection	Yes
DC reverse-polarity protection	Yes
PV-array string fault monitoring	Yes
DC surge arresters	Type II
AC surge arresters	Type II
Insulation monitoring	Yes
Residual current detection	Yes
	Display and Communication
Display	LED Indicators
RS485	Yes
USB	Yes
PLC	Optional
Bluetooth + APP	Yes
	General Data
Dimensions (W/H/D)	550×770×270 mm
Weight	50 kg
Operating temperature range	-25 °C to +60 °C
Cooling	Natural convection
Operating altitude	4000 m
Relative humidity (non-condensing)	0 - 100%
DC connector	Amphenol H4
AC connector	Waterproof PG terminal + OT connector
Degree of protection	IP65
Self-consumption at night	< 1 W
Topology	Transformerless
Noise emission	33 dB
Warranty	5 years, 10/15/20/25 years optional
	Standards Compliance
Safety/EMC	EN61000-6-2, EN61000-6-3, EN61000-3-11, EN61000-3-12, EN/IEC62109-1, EN/IEC62109-2
Grid Code	VDE-AR-N4105, VDE0126-1-1, BDEW 2008, G59/3, AS4777, NB/T 32004-2013, UTE C 15-712-1, C10/11, IEC61727, IEC62116, RD1669, EN50438, MEA 2013, PEA 2013, GB/T 19964-2012

* Output 30 kW at 40 °C

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PLC (Power Line Communication)



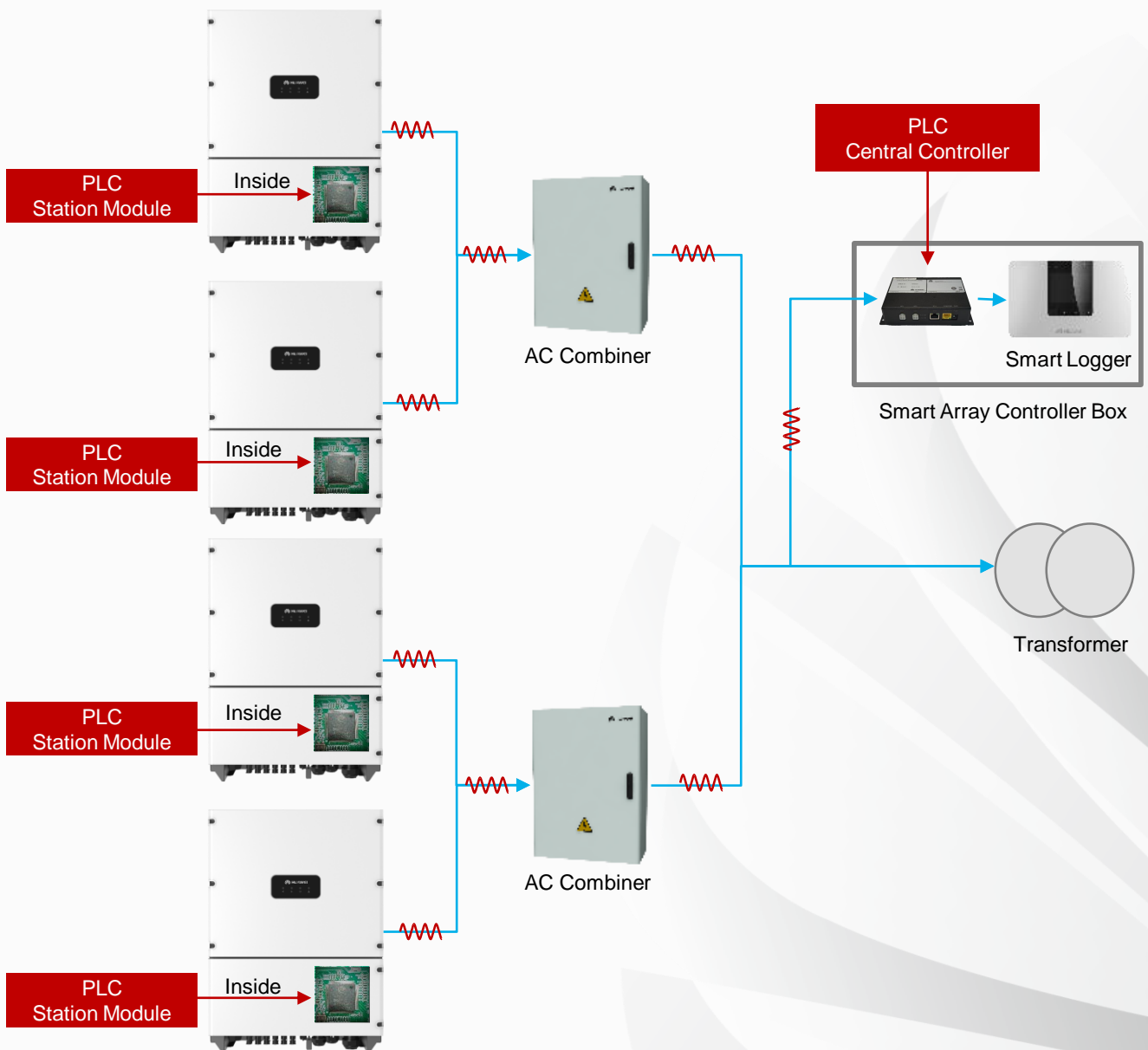
PLC Module



Customer Value

- No need for RS485 cable, reducing construction costs
- Overcome the problem of hard-to-do troubleshooting for RS485 cable
- Higher data transmission rate, 115.2Kbps
- Max. range 1000m

Network Structure



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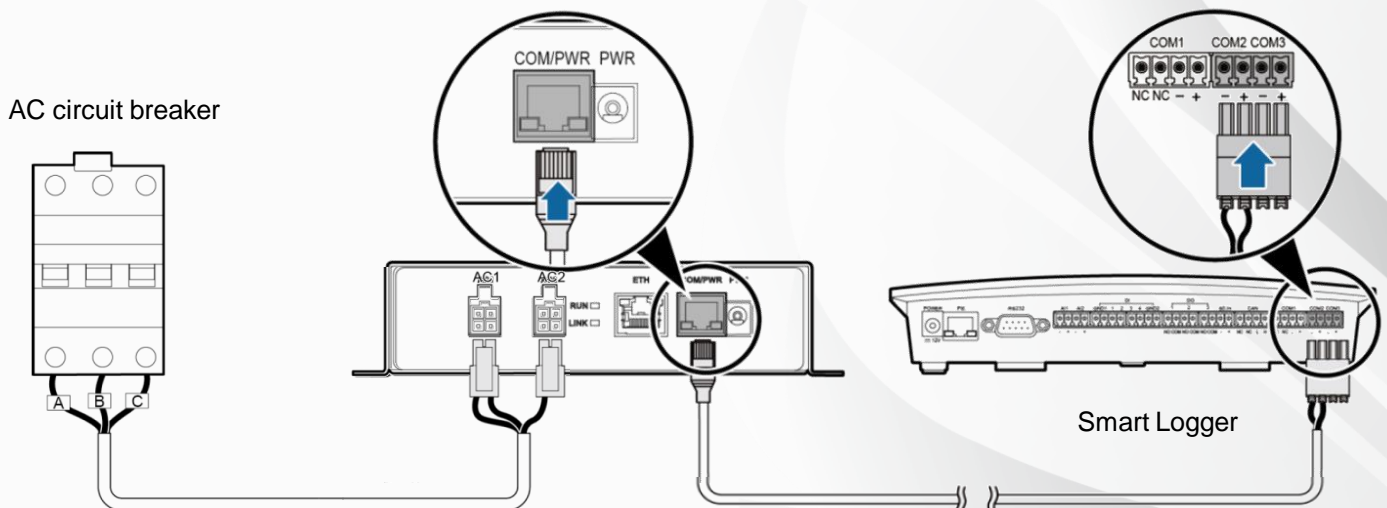
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PLC (Power Line Communication)



Technical Specifications	PLC
	Device Management
Max. number of devices	80
Max. transmission bandwidth	115.2 Kbps
Max. communication range	1000 m
	Display
LED	2 LEDs
	General Data
Power supply	100 V - 240 VAC, 50 Hz / 60 Hz
Power consumption	Typical: 2 W, Maximum: 4 W
Dimensions (W/H/D)	169 × 100 × 39 mm
Weight	550 g
Operating temperature range	-20 °C to +70 °C
Relative humidity (non-condensing)	5 - 95%
Degree of protection	IP20
Installation option	Tabletop, Rail mounting
	Safety / EMC
Safety / EMC	EN61000-6-2, EN61000-6-3, EN61000-3-11, EN61000-3-12, EN/IEC62109-1, EN/IEC62109-2

Connection



For more information, please refer to the document of Quick Installation Guide

Smart PV Management System



FusionSolar Cloud Management Center



Increase Yields

- With PR analysis, to actively increase yields
- Fast fault clearance, to reduce yield loss
- Remote and centralized maintenance to reduce cost

Assist Decisions

- Decision on investment plan
- Decision on equipment choice
- Evaluation on team KPI

FusionSolar Plant Management System



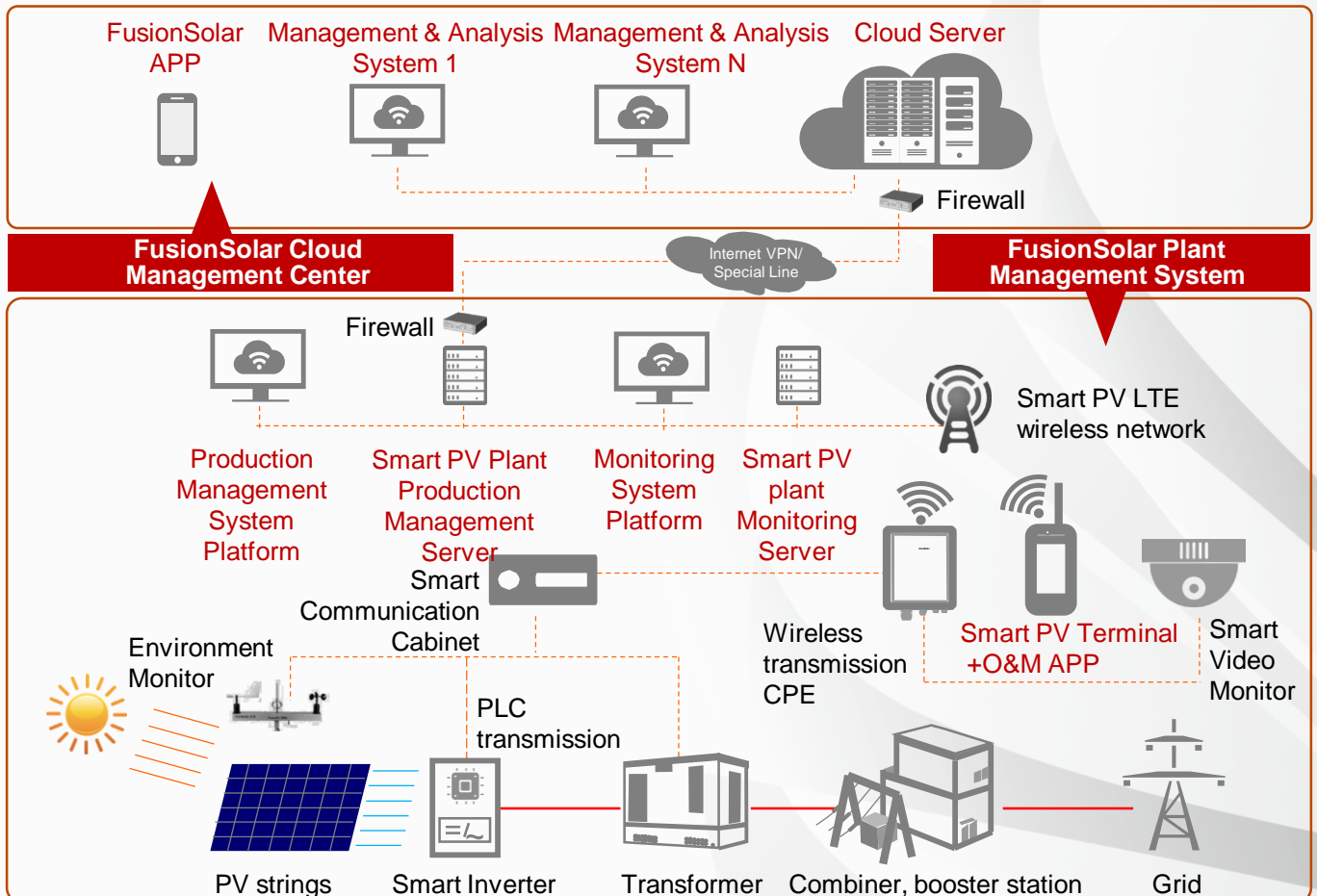
Guarantee Safety

- Guarantee safe and traceable operation
- Guarantee safe and reliable data and information
- Guarantee full-lifecycle assets safety

Promote financing

- Credible and reliable financial analysis
- Intuitive display to investors in multiple ways

Network Structure



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Smart PV Management System



Functions	FusionSolar Cloud Management Center	Production Management System	Plant Management System	FusionSolar APP	Maintenance APP
Group KPI monitoring	●			●	
Plant KPI monitoring	●			●	
Operation, comparison report management	●				
Report library (Custom)	●				
Group yields and loss analysis	●				
Device smart analysis	●				
String smart analysis	●				
Maintenance analysis	●				
Group assets management	●				
Plant monitoring	●				
Plant management	●				
Remote experts diagnosis	●				
Daily office work		●			
Work & operation sheet management		●			●
Fault management		●			●
On-duty management		●			
Plant assets management		●			●
Operation report		●			
Statistical analysis		●			
Combiner monitoring			●		
Section monitoring			●		●
Sub-array monitoring			●		●
Inverter monitoring			●		●
String monitoring			●		●
Alarm management		●	●		●
AGC/AVC			●		
Plant digitalization			●		
System management	●	●	●		

Note : 1. Remote experts diagnosis and maintenance APP requires Smart PV LTE Wireless Network deployed in the PV plant.
 2. The Huawei Smart PV Plant Management System has been available in China, and the release plan to markets overseas will be announced in the local market.

Smart Logger



Smart

- MODBUS-TCP for connect to NetEco and third-party monitoring system
- USB and embedded web for data reading and software update
- Automatically detect equipment and make RS485 address assignment
- Remote active & reactive power control support

Simple

- Up to 80 Inverters feeding into one Smart Logger
- Up to 30 devices per RS485 bus
- Easy to install with wall, tabletop and rail mounting

Stable

- Max. reliable communication range: 1000 m
- Remote configuration, automatically set RS485 address

Technical Specifications	Smart Logger
	Device Management
Max. number of devices	80
Communication interface	3 x RS485
Max. Communication range	1000 m
	Display
LCD	3.5 inch graphic LCD
LED	3 LEDs
Web	Embedded Web
	General Data
Power supply	100 V - 240 VAC, 50 Hz / 60 Hz
Power consumption	Typical: 3 W, Maximum: 7 W
Memory	32 MB flash memory, expanded to 16 GB with optional SD card
Language	English, Chinese, German, Italian, Japanese, French
Dimensions (W/H/D)	225 × 140 × 50 mm (8.9 × 5.5 × 2.0 in.)
Operating temperature range	-20 °C to +60 °C (-4 °F to +140 °F)
Relative humidity (non-condensing)	5 - 95%
Degree of protection	IP20
Installation option	Wall mounting, Tabletop, Rail mounting
	Interface
Ethernet	10 / 100 M, Modbus - TCP
RS485	Modbus - RTU
USB	Yes
Number of digital inputs	4
Number of analog inputs	2
Number of relays	3



Smart

- Easy data access with mobile end devices
- Actively report the yields and alarm information

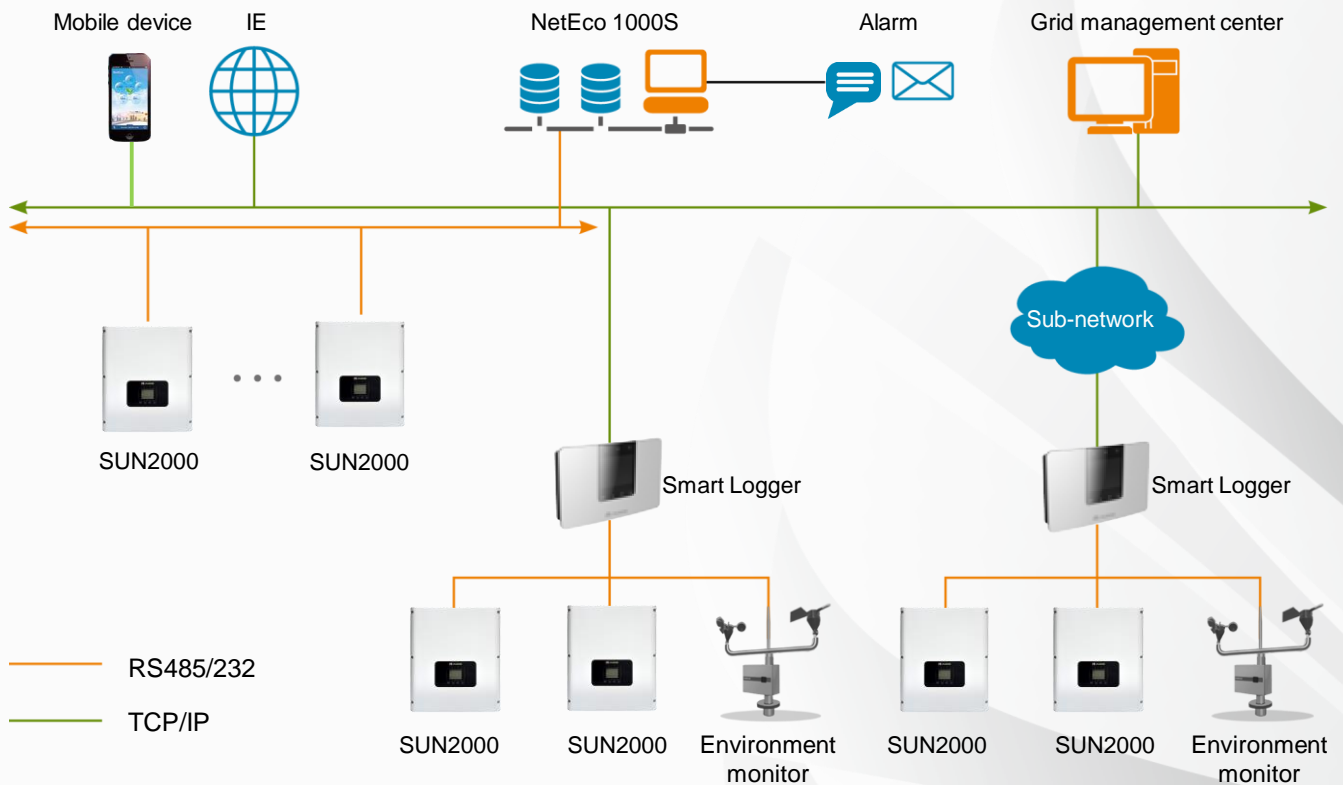
Simple

- One-click installation in PC
- Fault alarm in SMS and E-mail

Stable

- Hierarchical management
- Up to 25 years data storage with CSV file

Network Structure



Smart PV Plant Cases



World's Largest Smart PV Plant, 130MW, Geermu, Qinghai, China



7.8MW Ground-mounted PV Plant in Reden, Germany



8.2MW Ground-mounted PV Plant in France



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Smart PV Plant Cases



2.1MW Ground-mounted PV Plant in Hoyerswerda, Germany



5.3MW Ground-mounted PV Plant in Arneburg, Germany



1.2MW Smart PV Plant Project in Okayama, Japan



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Smart PV Plant Cases



8.1MW Ground-mounted PV Plant in Cardigan, UK



12.8MW Ground-mounted PV Plant in Melksham, UK



9.7MW Ground-mounted PV Plant in Totnes, UK



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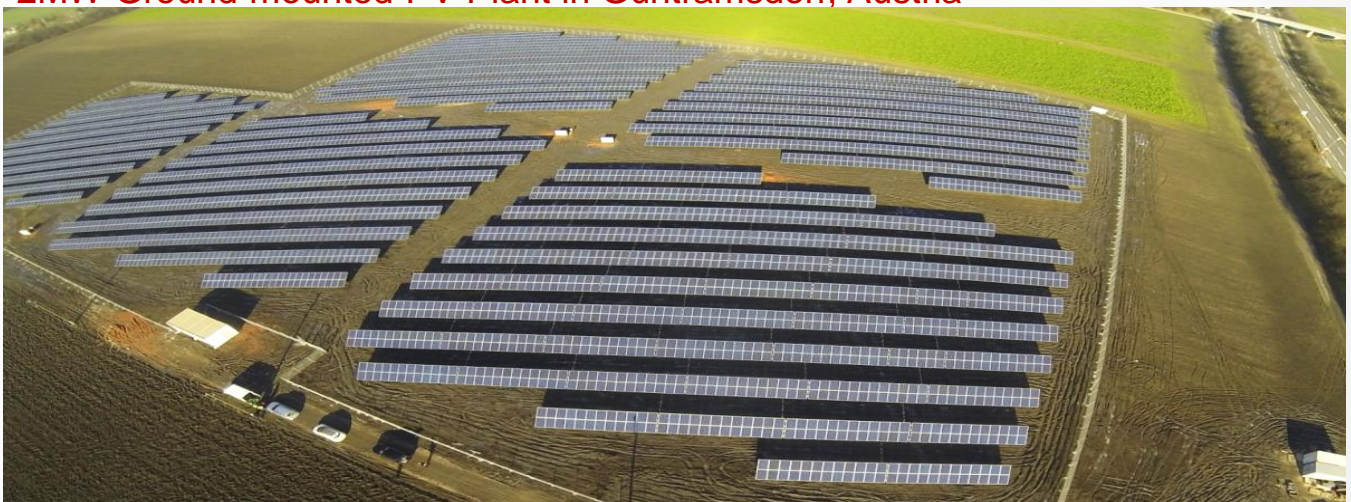
Smart PV Plant Cases



12MW Ground-mounted PV Plant in Theale, UK



2MW Ground-mounted PV Plant in Guntramsdorf, Austria



4MW Ground-mounted PV Plant in Nakskov, Denmark



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Smart PV Plant Cases



30MW Smart PV Plant in Zhejiang, China



6MW Ground-mounted PV Plant in Exmouth, UK



8.3MW Ground-mounted PV Plant in Horam, UK



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Smart PV Plant Cases



4.4MW Rooftop PV Plant in Toulouse, France



1.7MW Ground-mounted PV Plant in Friedland, Germany



2.5MW Ground-mounted PV Plant in Plessa, Germany



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Smart PV Plant Cases



30MW Smart PV Plant in Panzhihua, Sichuan, China



1MW Rooftop PV Plant in Rodental, Germany



10MW Ground-mounted PV Plant in Osternienburg, Germany



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Smart PV Plant Cases



4MW Ground-mounted PV Plant in Reinstedt, Germany



6.3MW Ground-mounted PV Plant in Rooksbridge, UK



20.1MW Ground-mounted PV Plant in Trowbridge, UK



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