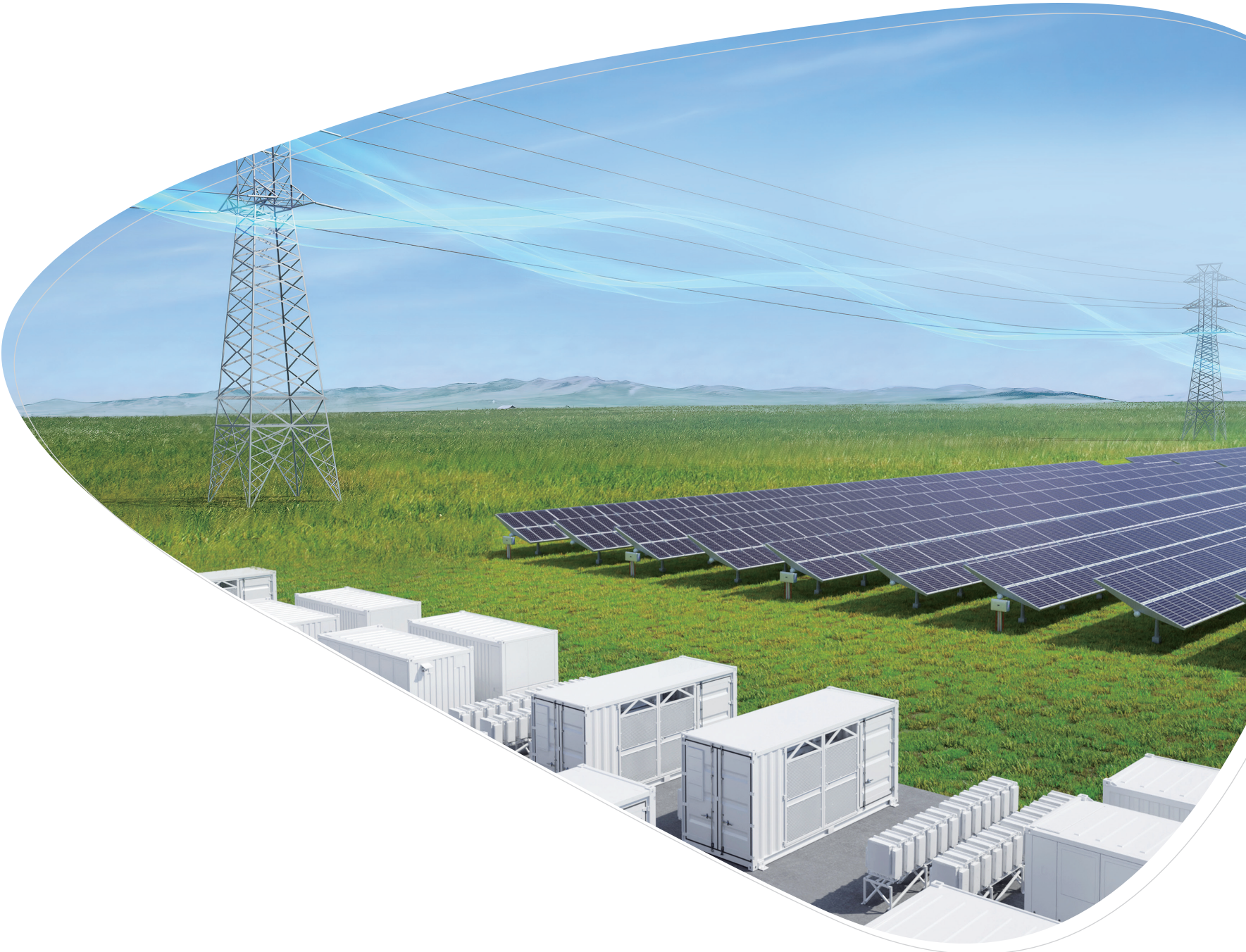




HUAWEI

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Fusionsolar

Utility Smart PV & ESS Solution

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HUAWEI



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Employees
207,000+



Employees Work in R&D
55%



Countries and Regions
170+



Interbrand
Best Global Brands
92nd



in Global R&D Investment
NO.5



Boston Consulting Group
Most Innovative Companies
8th

Smart PV & ESS Solution

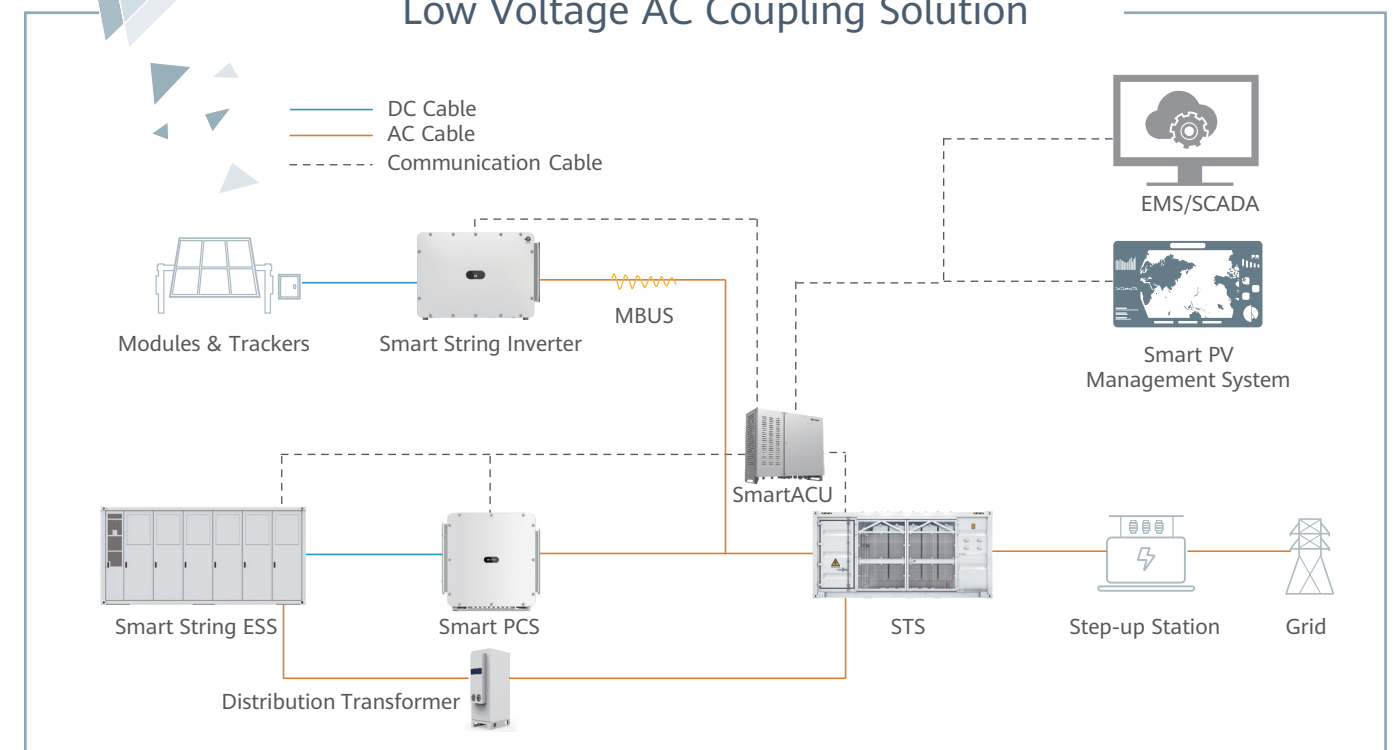
Optimal Investment

Grid Supporting

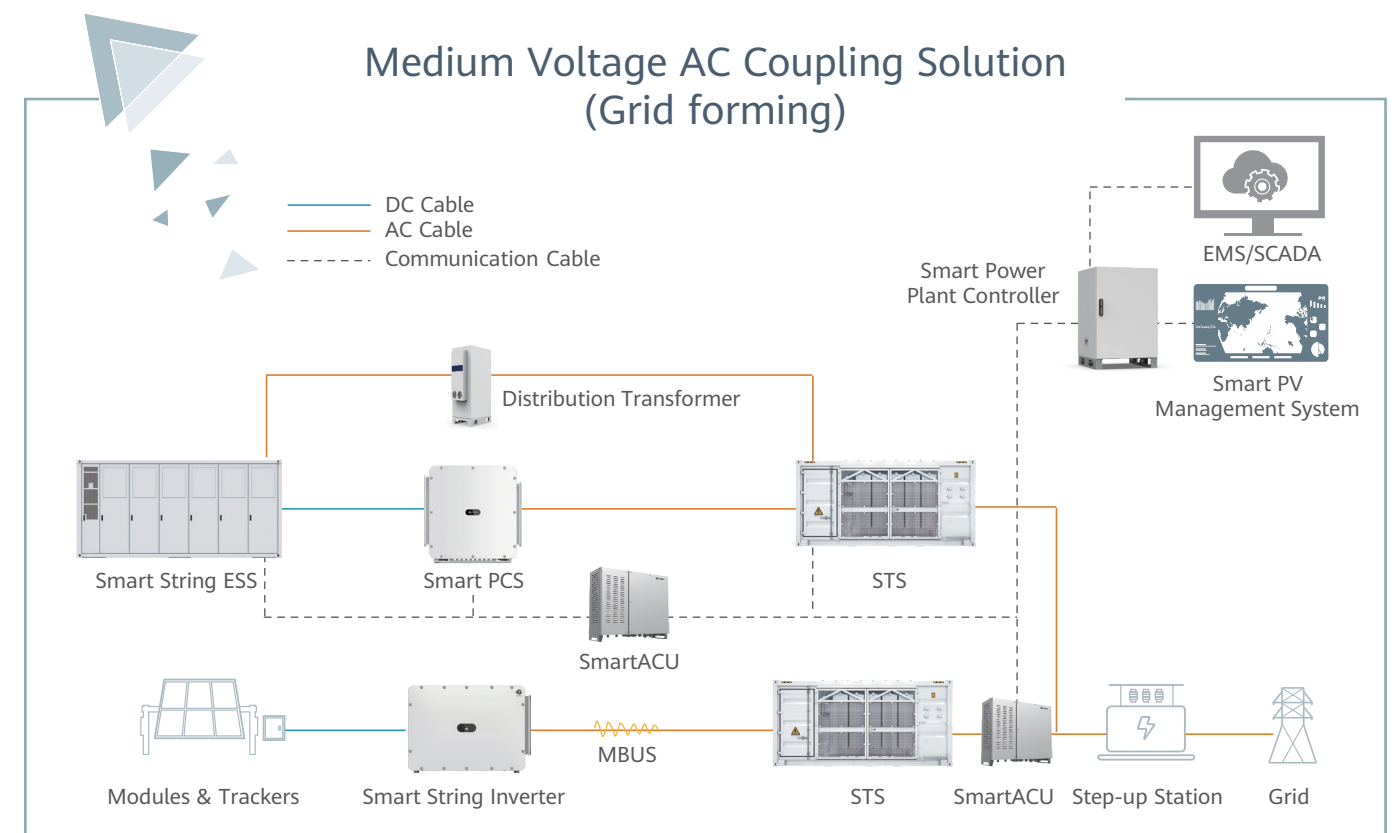
Smart O&M

Safe & Reliable

Low Voltage AC Coupling Solution

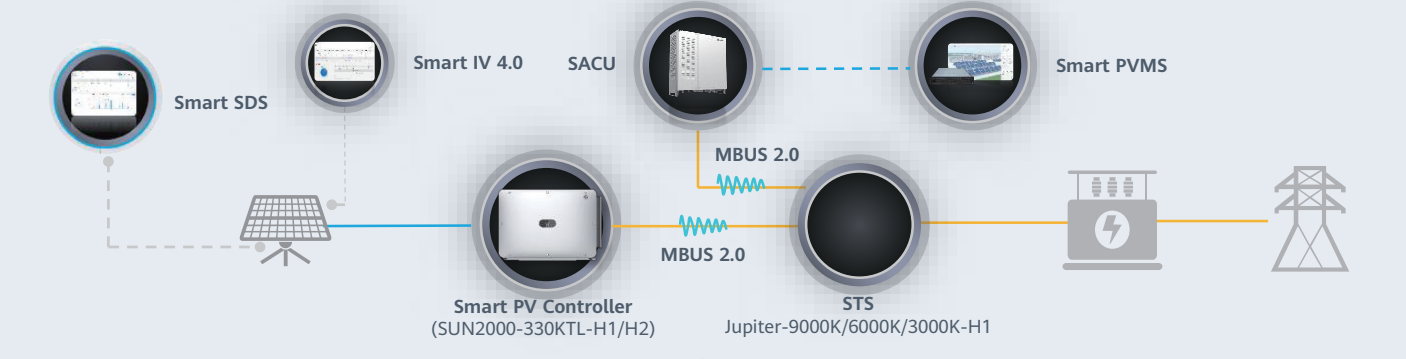


Medium Voltage AC Coupling Solution (Grid forming)



► FusionSolar 8.0 Smart PV Solution

Better BOS, Higher Yields, Smart O&M, Safe & Reliable, Grid Forming



	Traditional Solution		Huawei Solution
Better BOS	Cable selection discontinuity Multiple models adapt to modules of different specifications, and the 1p tracker cannot be reused		0.36 ¢ /W saved
Higher Yields	Inverter availability and real efficiency		Yields improved by 2%
Smart O&M	Manual O&M, no intelligent or digital O&M method		O&M efficiency improved by 26.6%
Safe & Reliable	No active safety protection on the DC side		Proactive security protection
Grid Forming	Failure to operate at full power in weak grid conditions		Operation at full power in weak grid conditions

Better BOS

Recommended 9 MW PV array The BOS saves 0.3 ¢ /W		
Subarray	9 MW	9 MW
Model	330 KTL	350 KTL
Quantity	30	28
AC cable diameter	300 mm ²	400 mm ²
AC/DC cable price (¢ /W)	1.46	1.47
Transformers (¢ /W)	1.45	1.45
Array attachment (installation cost, etc.) (¢ /W)	0.39	0.40
BOS price (¢ /W)	3.30	3.62

The comprehensive derating coefficient of AC cables is 0.78 based on the application environment of the plant.

Better fit 1p tracker
Reduced ≥ 0.06 ¢ /W

Requirements for the installation height of the inverter tracking support: Waterproof height 500mm, Height of the DC wiring terminal 100mm, Reserved space at the top 50mm

One model adapts to mainstream modules

Module type	Module power	Number of serial and parallel connection	330K proportioning	3XXK proportioning
182 module	545W	28/20~28	1~1.4	1~1.3
210 module	660W	30/16~24	1~1.6	1~1.5

- Applicable to 182 mm/210 mm modules, which can be purchased at the best price in the market. Replacing modules for uncontrollable reasons without inverter replacement
- Spare parts management is convenient for scenarios where modules of multiple specifications are used.

Higher Yields

A project in Heilongjiang Smart PV energy yield increased by 1.98%

Comparison time		
Type	HUAWEI	Other
Model	196KTL	2XXkW
Proportioning	1.30	1.39
Array capacity	3748.68kW	3309.02kW
Accumulated energy yield	961421.17kWh	817909.1kWh
Energy yield per kW	256.469kWh	251.492kWh
Energy yield increase	+1.98%	--

A project in Jiangxi Smart PV energy yield increased by 1.24%

Comparison time			
Type	HUAWEI	HUAWEI	Other
Model	196KTL	196KTL	2XXkW
Proportioning	1.237	1.2	1.176
Array capacity	1210.68kW	1177.74kW	1321.65kW
Accumulated energy yield	323421kWh	316585kWh	349847kWh
Energy yield per kW	267.14kWh	268.808kWh	264.705kWh
Energy yield increase	+0.92%	+1.55%	--

SDS- Optimized smart tracker control algorithm Energy yield increased by 1%

► +1.51% Anhui, China

► +1.69% Guangxi, China

► +0.7% Inner Mongolia, China

► FusionSolar 8.0 Smart PV Solution

Better BOS, Higher Yields, Smart O&M, Safe & Reliable, Grid Forming

Smart O&M

Alarm discriminator
PV plant alarm level visibility

- Real-time alarm visibility
- Supporting alarmfiltering
- Pushing major alarms

String coefficient of variation (CV) analysis, quickly locates less efficient strings

- Accurately calculate the coefficient of variation rate of PV strings
- Quickly locate faults and low-efficiency PV Strings
- Helping users accurate and efficient O&M

Smart I-V Curve Diagnosis
Identify 14 types of module faults

- Scheduled scanning
- Exporting the diagnosis report
- Energy yield loss assessment
- Accurately locate faulty PV strings
- Supporting ISV being integrated

Safe & Reliable

Smart string-level disconnection
Ensure the safety of the DC system

- PV string fault connection
- DC input current reverse-flow
- Inverter internal short circuit

Smart PV connector-level detection
Ensures the safety of DC wiring

- Built-in NTC temperature sampling, realtime detection
- DC terminals on board, automatic production, higher reliability

Smart self-clean fan
Ensures heat dissipation safety

- IP68 high protection degree fan
- The fan is automatically reversed and selfcleaned based on conditions such as illumination and temperature.

Grid friendly

Supports full power operation at SCR~1.1Upgrade again weak grid adaptability

- Automatic disturbance-resistance synchronous phase-Locked technology
- Active impedance remodeling algorithm

SCCR~0.7+SCR~1.1
Great adaptation to complex weak grid with series compensation

- Series compensation adaptive virtual impedance technology to effectively suppress oscillations

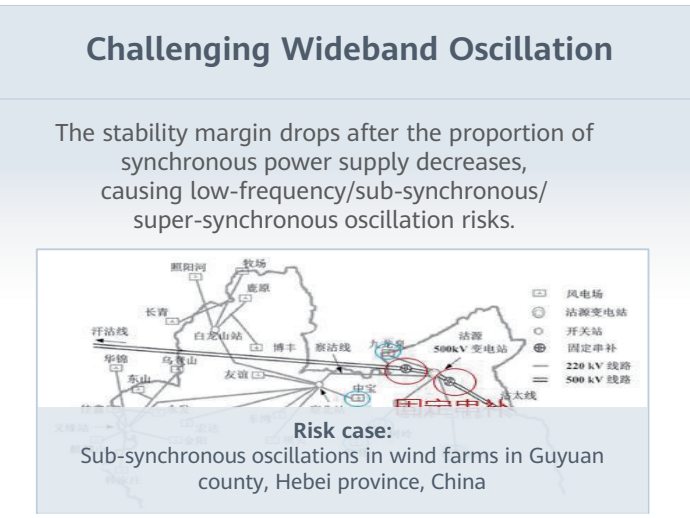
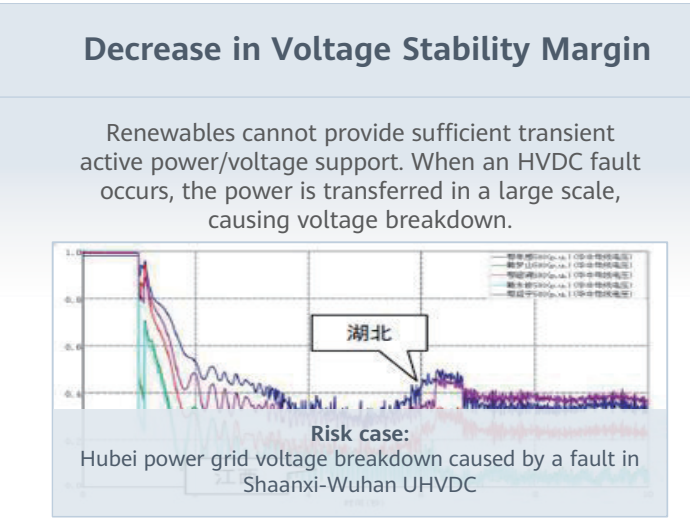
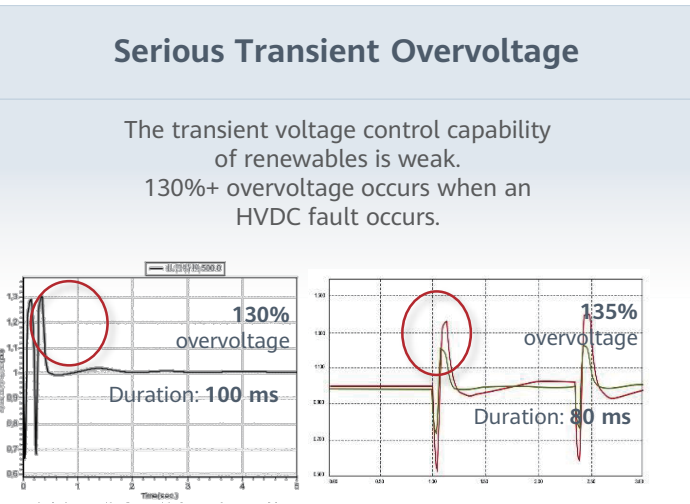
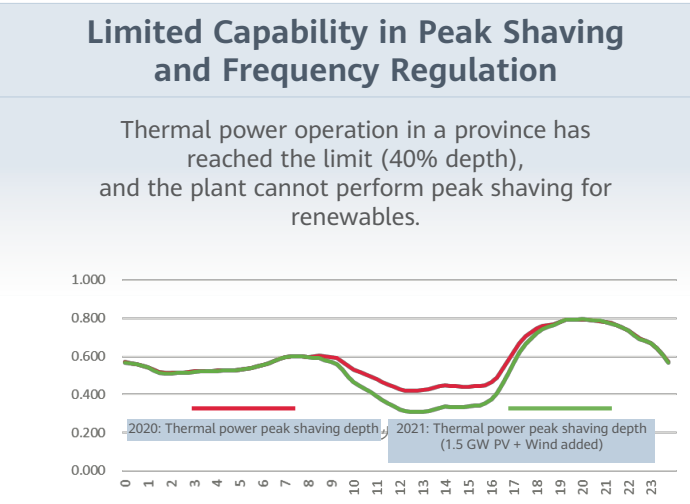
THDi < 1%
Higher power quality in all scenarios

- Fast calculation and identification of harmonics
- Active suppression of harmonic components

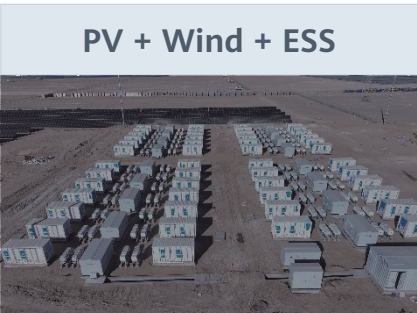
► FusionSolar Smart String ESS Solution

Challenges and Application Scenarios

A high penetration rate of renewables weakens the power grid and compromises power system stability.



Three Major Application Scenarios



- Smooth renewable energy output
- Peak capacity regulation
- Improving renewables integration



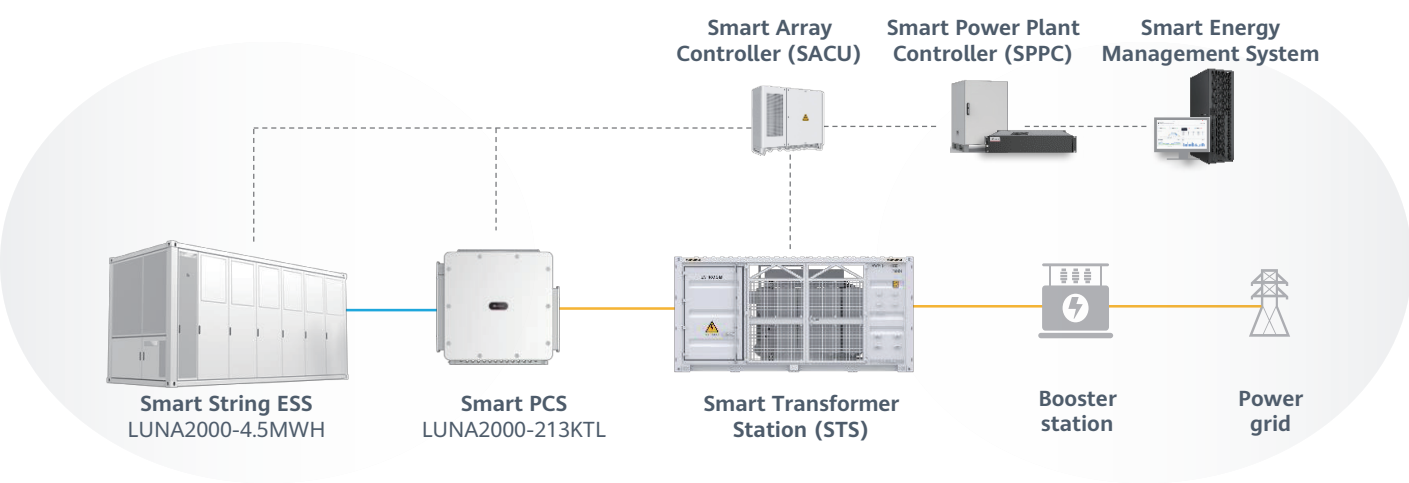
- Delaying the need for power transmission system expansion
- Alleviating power transmission congestion
- Auxiliary services such as peak shaving and frequency regulation



- Bridging the energy divide
- Solving the problem of high genset costs
- Ensuring stable power supply

► FusionSolar Smart String ESS Solution

Unparalleled Safety, Native Stability, Higher Revenue, Smart O&M



Unparalleled Safety: Four-Level Safety Assurance Throughout the Lifecycle

Grid Safety	Device Safety	Cyber Security	Supply Security
Stable grid connection at any SCR	Cell-level isolation/ Pack-level fire suppression/ Rack-level 6-layer protection	Solution-level third-party certification	Key components
Stable grid connection throughout the lifecycle	Detection, exhaust, suppression, and relief	Higher cyber security certification	Transmission equipment
Dual-stage architecture for enhanced battery safety	Multiple protections for LV and MV in STS	Cloud-pipe-device synergy for security isolation	SCADA operating system
Stable output of active power at HVRT	Reliable model selection/design and strict testing for long-term stability	Longitudinal encryption	Centralized management system

Native Stability: Six Key Grid Forming Features, Reducing Costs by ¥0.3/Wh and increasing Revenue by ¥0.035/Wh

On-grid

Supporting grid Stability Improving renewables integration by 40%

Stable Generation Three Innovations

- Redefine voltage stability: 3x reactive current and response within 10 ms
- Redefine frequency stability: equivalent moment of inertia and action time less than 5 ms
- Redefine phase angle stability: wideband oscillation damping, and continuous HVRT and LVRT in weak grids

Stable Transmission Under Transient Impact

- Continuous HLRT and LVRT, preventing a loss of ¥0.1/Wh due to grid breakdown
- 150% impact resistance, stronger system, and more reliable power supply, reducing CAPEX by ¥0.2/Wh

Reliable Consumption Better Power Quality

- High power quality
- On-grid: THDi < 1%
- Off-grid: THDu < 1.5%
- DCI < 0.5%

Off-grid

Reliable, stable, and continuous power Supply Bridging the energy divide

Rapid Black-Start GW-Level

- GW-level grid black-start, fast power restoration in 10 min

Rapid Transfer Seamless Switching

- 0 ms for planned switching, 300 ms for unplanned switching, avoiding loss when switching between on-grid and standalone modes in case of a power outage

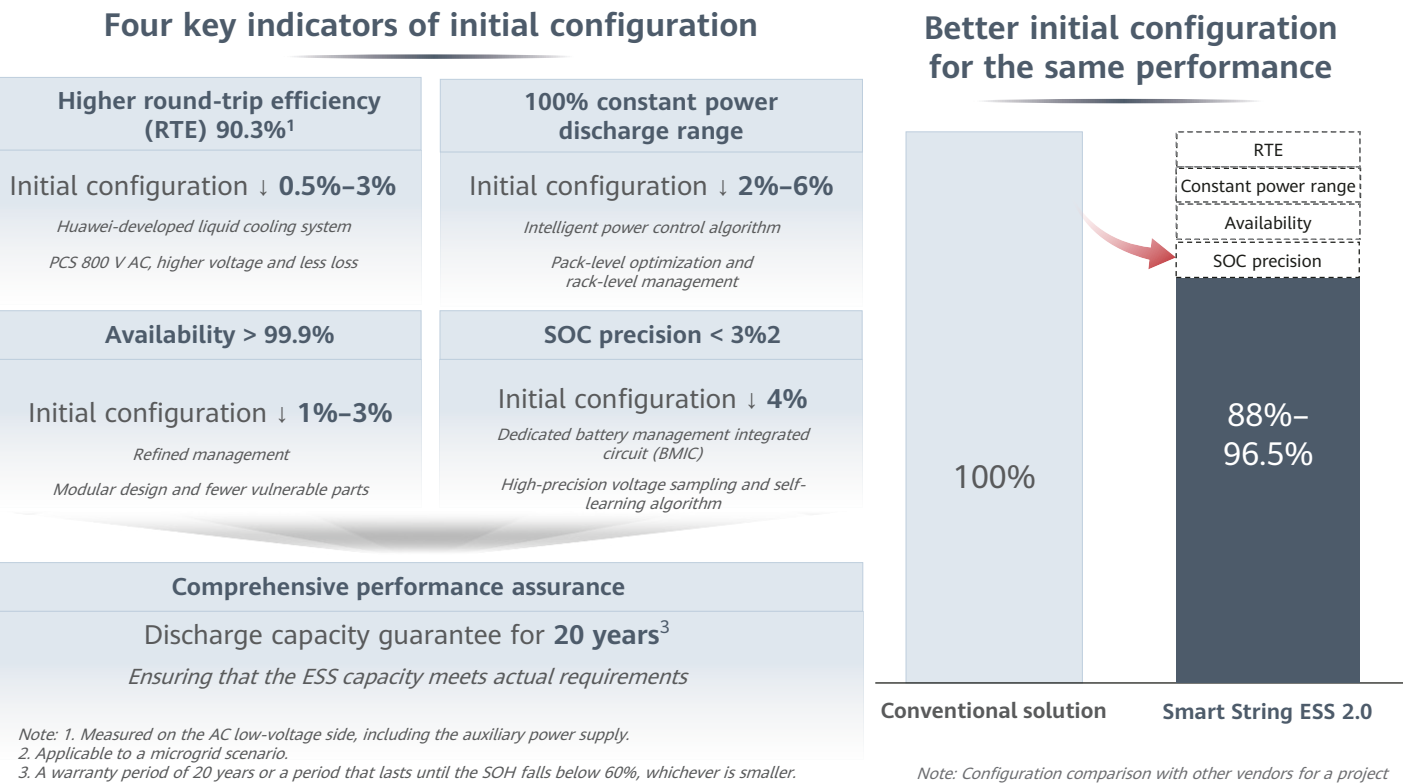
Rapid Scheduling Less Scheduling Time

- Plant-level: 200 ms
- Array-level: 50 ms

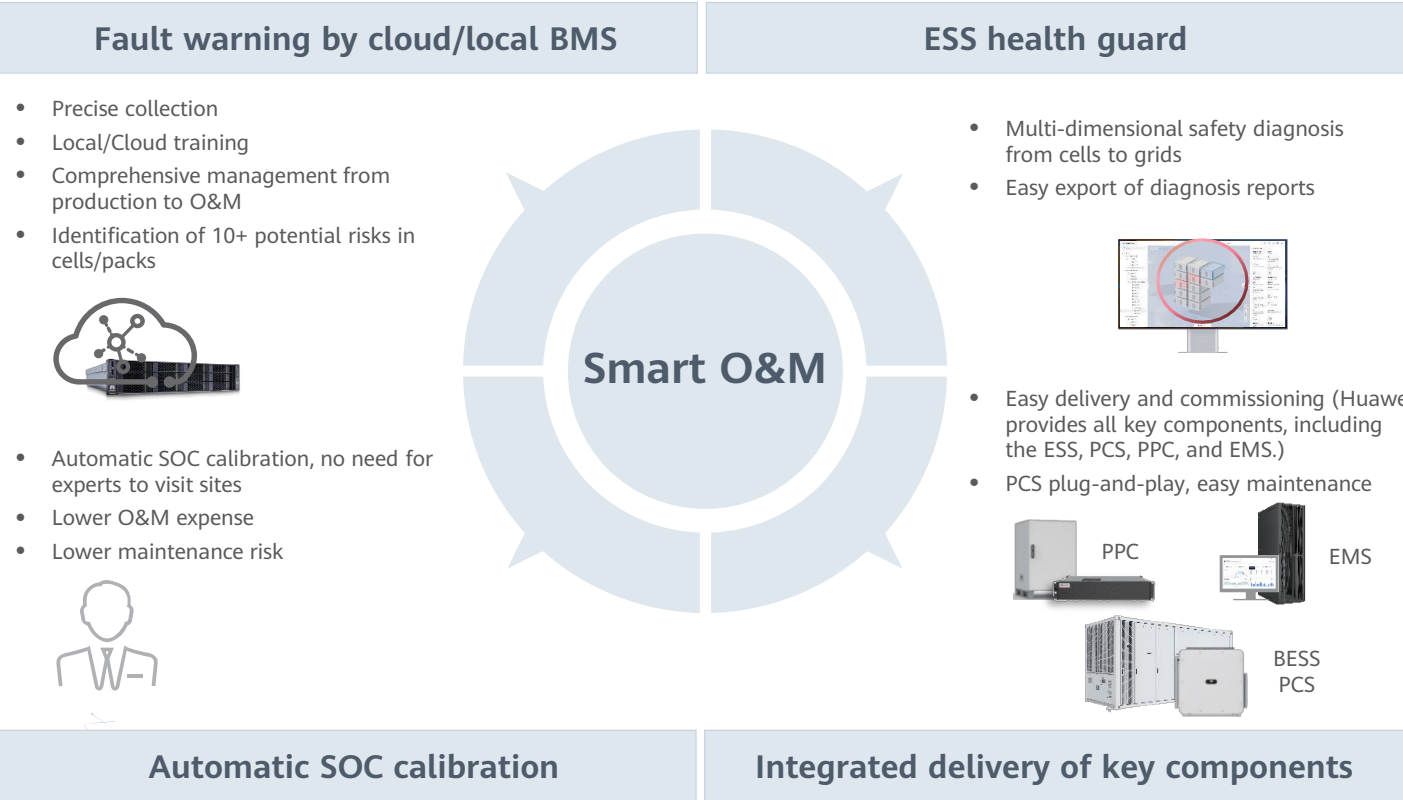
► FusionSolar Smart String ESS Solution

Unparalleled Safety, Native Stability, Higher Revenue, Smart O&M

Higher Revenue: Higher Performance Throughout the Lifecycle,
3.5%–12% Better Configuration



Smart O&M: High-Precision Automatic SOC Calibration, Active Balancing,
Health Diagnosis in Five Dimensions

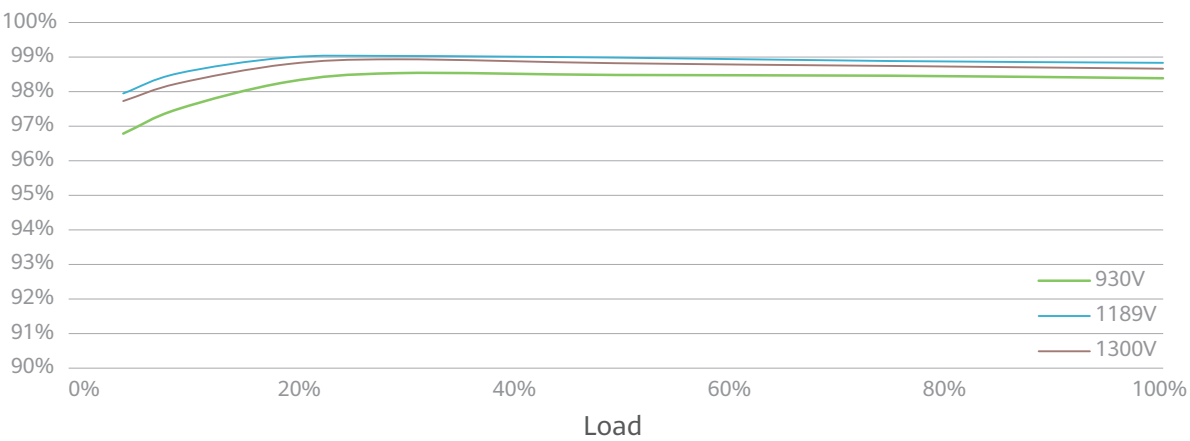


► SUN2000-330KTL

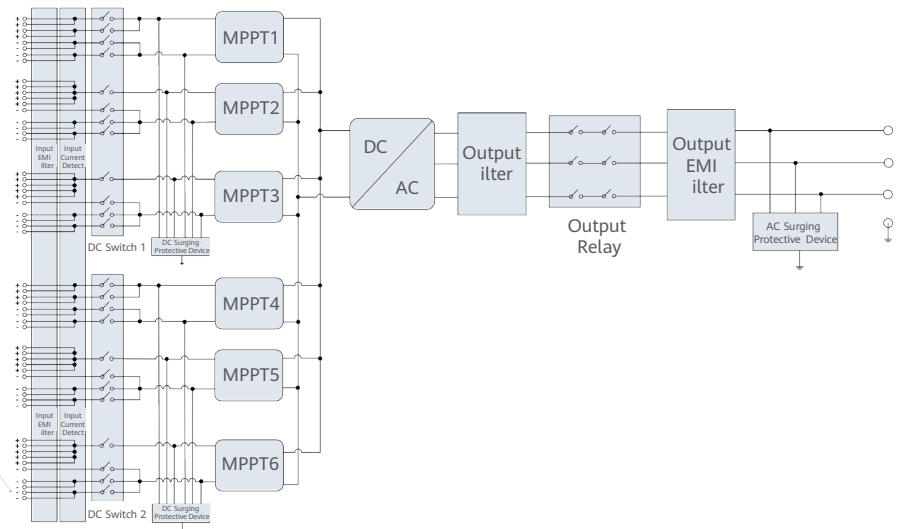
Smart String Inverter



- Max. Efficiency ≥ 99.0%
- Smart Connector-level Detection (SCLD)
- Smart Self-cleaning Fan (SSCF)
- IP66 Protection
- MBUS Supported
- Smart String-level Disconnection (SSLD)
- Smart IV Curve Diagnosis Supported
- Surge Arresters for DC & AC



Circuit Diagram



Technical Specifications

Efficiency	
Max. Efficiency	99.03%
European Efficiency	98.8%
Input	
Max. Input Voltage	1,500 V
Number of MPPT	6
Max. Current per MPPT	65 A
Max. Short Circuit Current per MPPT	115 A
Max. PV Inputs per MPPT	4/5/5/4/5/5
Start Voltage	550 V
MPPT Operating Voltage Range	500 V ~ 1,500 V
Nominal Input Voltage	1,080 V
Output	
Nominal AC Active Power	300,000 W
Max. AC Apparent Power	330,000 VA
	330,000 W
Nominal Output Voltage	800 V, 3W + PE
Rated AC Grid frequency	50 Hz / 60 Hz
Nominal Output Current	216.6 A
Max. Output Current	238.2 A
Adjustable Power Factor Range	8 8
Total Harmonic Distortion	THDi < 1% (Rated)
Protection	
Smart String-level Disconnection (SSLD)	Yes
Smart Connector-level Detection (SCLD)	Yes
AC Overcurrent Protection	Yes
DC Reverse-polarity Protection	Yes
PV-array String fault Detection	Yes
DC Surge Arrester	Type II
AC Surge Arrester	Type II
DC Insulation Resistance Detection	Yes
Residual Current Detection Unit	Yes
Communication	
Display	LED Indicators, WLAN + APP
USB	Yes
MBUS	Yes
RS485	Yes
General	
Dimensions (W H D)	8 7
Weight (with mounting plate)	
Operating Temperature Range	-25°C ~ 60°C
Cooling Method	Smart Air Cooling
Max. Operating Altitude without Derating	4,000 m
Relative Humidity	0 ~ 100% (Non-condensing)
DC Connector	
AC Connector	
Protection Degree	IP 66
Anti-corrosion Protection	C5-Medium
Topology	Transformerless
Standards Compliance	
IEC 62109-1/-2, IEC 62920, IEC 60947-2, EN 50549-2, IEC 61683, etc.	

► SUN2000-215KTL

Smart String Inverter



9
MPPTs



Max.
Efficiency
≥99.0%



Smart
String-level
Disconnection



Smart I-V
Curve
Diagnosis
Supported



MBUS
Supported



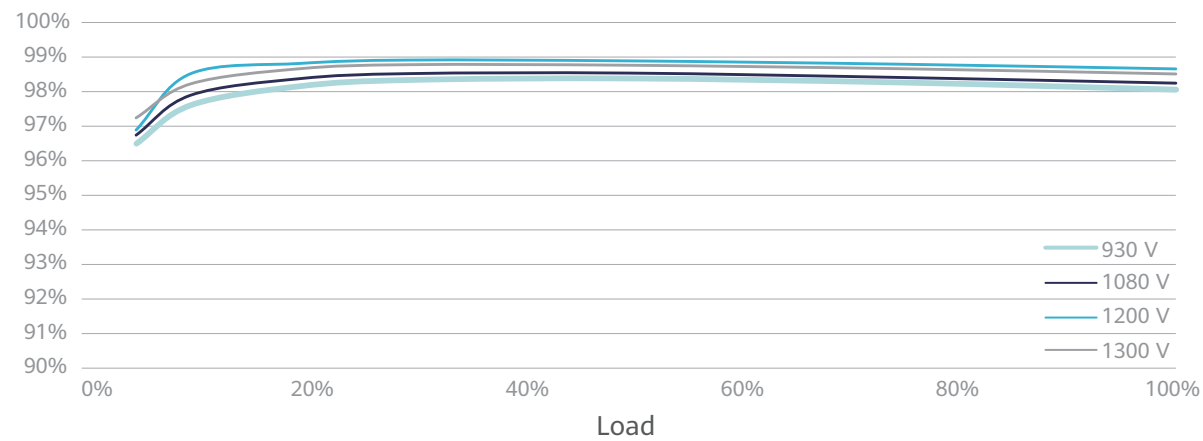
Fuse Free
Design



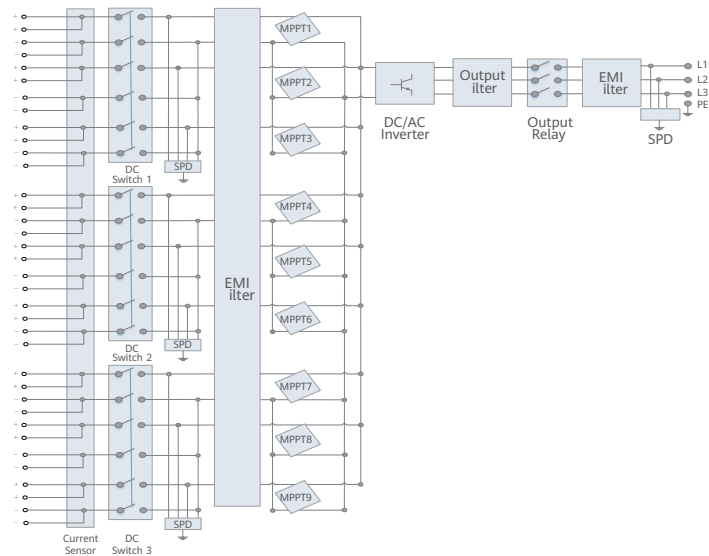
Surge
Arresters for
DC & AC



IP66
Protection



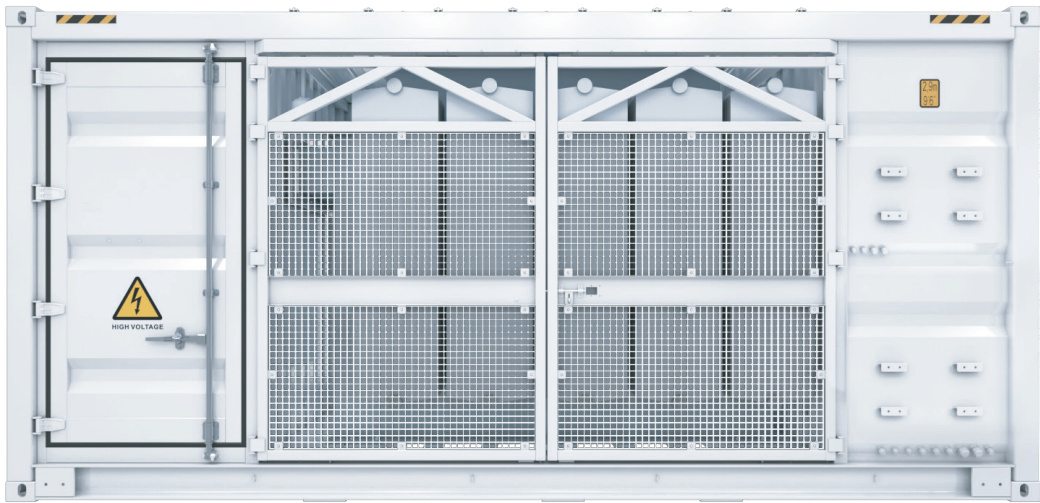
Circuit Diagram



Technical Specifications

Efficiency	
Max. Efficiency	
European Efficiency	88
Input	
Max. Input Voltage	1,500 V
Max. Current per MPPT	30 A
Max. Short Circuit Current per MPPT	50 A
Start Voltage	550 V
MPPT Operating Voltage Range	500 V ~ 1,500 V
Nominal Input Voltage	1,080 V
Number of Inputs	18
Number of MPPT	9
Output	
Nominal AC Active Power	200,000 W
Max. AC Apparent Power	215,000 VA
Max. AC Active Power (cos φ=1)	215,000 W
Nominal Output Voltage	800 V, 3W + PE
Rated AC Grid Frequency	50 Hz / 60 Hz
Nominal Output Current	144.4 A
Max. Output Current	155.2 A
Adjustable Power Factor Range	0.8 ~ 0.98
Total Harmonic Distortion	THDi < 1% (Rated)
Protection	
Smart String-level Disconnection (SSLD)	Yes
AC Overcurrent Protection	Yes
DC Reverse-polarity Protection	Yes
PV-array String Fault Detection	Yes
DC Surge Arrester	Type II
AC Surge Arrester	Type II
DC Insulation Resistance Detection	Yes
Residual Current Detection Unit	Yes
Communication	
Display	LED Indicators, WLAN + APP
USB	Yes
MBUS	Yes
RS485	Yes
General	
Dimensions (W × H × D)	7
Weight (with mounting plate)	8
Operating Temperature Range	-25°C ~ 60°C
Cooling Method	Smart Air Cooling
Max. Operating Altitude without Derating	4,000 m
Relative Humidity	0 ~ 100% (Non-condensing)
DC Connector	MC4 EVO2
AC Connector	Support OT / DT Terminal
Protection Degree	IP66
Anti-corrosion Protection	C5-Medium
Topology	Transformerless
Standards Compliance	
IEC 62109-1/-2, IEC 62920, EN 50549-2, EN 50530, etc.	

► JUPITER-9000K/STS-6000K/3000K
Smart Transformer Station



Simple

Prefabricated and pre-tested,
no internal cabling needed onsite



Efficient

Lower self-consumption for higher yields



Smart

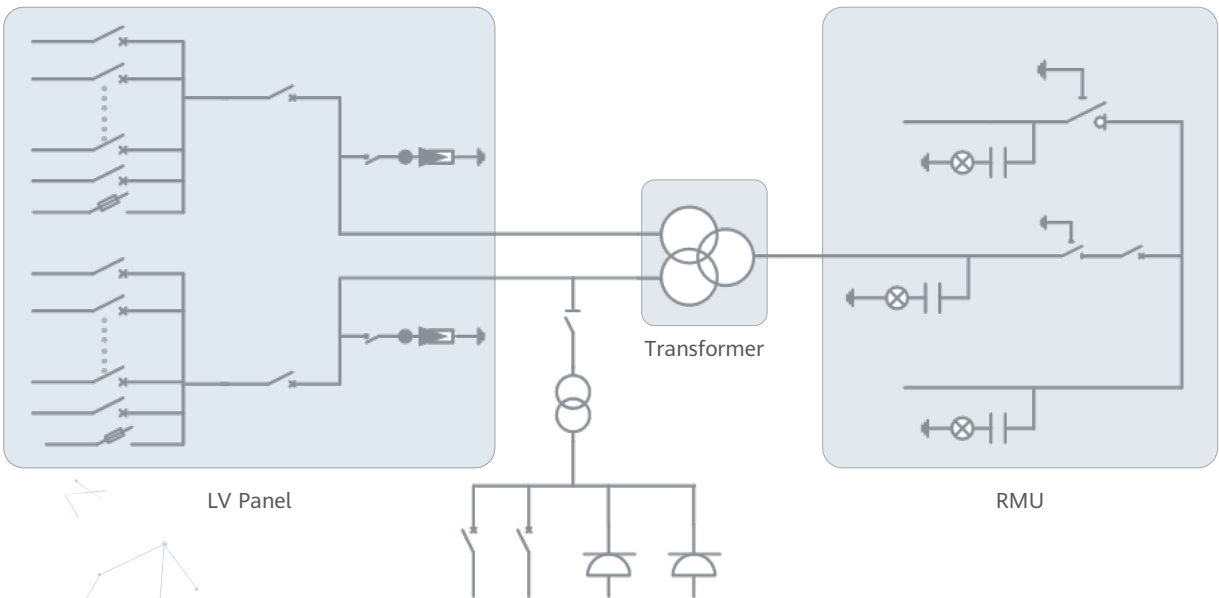
Real-time detection of transformer,
LV panel and RMU high precision sensor
of LV electricity parameters
Remote control of ACB and MV circuit breaker



Reliable

Robust design against harsh environments optimal cooling
Design for high availability and easy O&M
Comprehensive tests from components, device to solution

Schematic Diagram



Model	JUPITER-9000K	STS-6000K	STS-3000K
Input			
Available Inverters	SUN2000-215KTL / LUNA2000-200KTL		
	44	34	17
AC Power	9,000 kVA @40°C ¹	6,800 kVA @40°C ¹	3,400 kVA @40°C ¹
Rated Input Voltage	800 V		
LV Panel Segregation			
LV Main Switches			ACB (2,900 A, 1 pcs)
LV Main Switches for SUN2000-215KTL-H0		7	MCCB (250 A, 17 pcs)
Output			
Rated Output Voltage	10~35 kV ²		
	50 Hz / 60 Hz		
Transformer Type	Oil-immersed, Conservator Type		
Transformer Cooling Type	ONAN		
Transformer Tappings			
Transformer Oil Type			
Transformer Vector Group	Dy11-y11	Dy11	
	Tier 1 or Tier 2 In Accordance with EN 50588-1		
RMU Type	6 Gas Insulated		
RMU Transformer Protection Unit	MV Vacuum Circuit Breaker Unit		
RMU Cable Incoming / Outgoing Unit	Direct Cable Unit or Cable Load Break Switch Unit		
	Dry Type Transformer, 5 kVA, Single-phase, li0	Dry Type Transformer, 5 kVA, Three-phase, Dyn11	
	230 / 127 Vac	400 / 230 Vac or 220 / 127 Vac	
Protection			
Transformer Detection & Protection	Oil Level, Oil Temperature, Oil Pressure and Buchholz		
Protection Degree of MV & LV Room	IP 54		
	IAC A 20 kA 1s		
MV Relay Protection	50/51, 50N/51N		
LV Overvoltage Protection	Type I+II		
Anti-rodent Protection	C5-Medium		
2 kVA UPS	Optional ³		
MV Surge Arrester for MV VCB	Optional ³		
General			
	8	8	8
Weight	< 28 t	< 22 t	< 15 t
Operating Temperature Range	-25°C ~ 60°C ⁴		
Relative Humidity	0% ~ 95% (Non-condensing)		
	1,000 m ⁵		
MV-LV AC Connections	Prewired and Pretested, No Internal Cabling Onsite		
LV & MV Room Cooling	Smart Cooling without Air-across for Higher Availability		
Communication	with SmartACU2000D		with SmartACU2000D
Standards Compliance			
IEC 62271-202, EN 50588-1, IEC 60076, IEC 62271-200, IEC 61439-1			

1: More detailed AC power of STS, please refer to the de-rating curve.

2: Rated output voltage from 10 kV to 35 kV, more available upon request

C, awning shall be equipped for STS on site by customer.

► LUNA2000-213KTL

Smart PCS



- 

Max. Efficiency 99%
- 

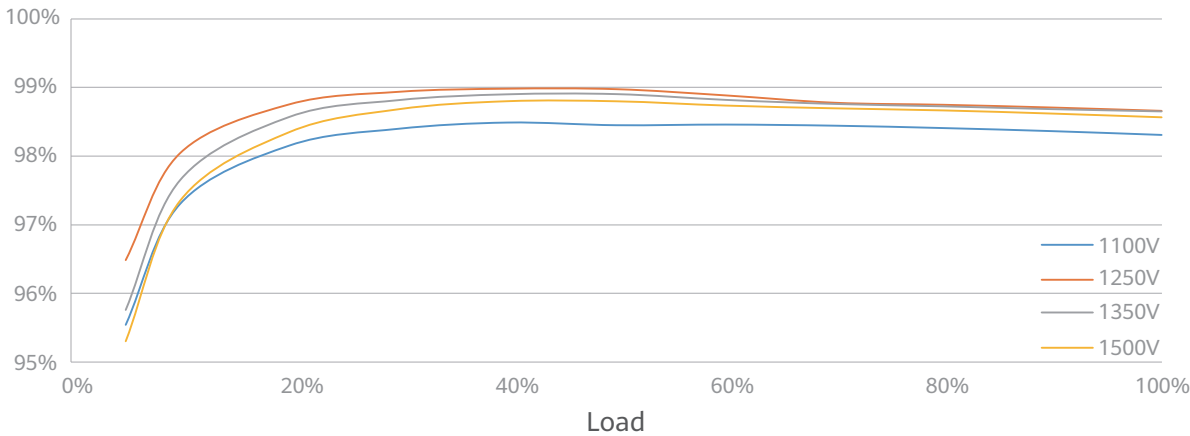
Modular Design
- 

IP66 Protection
- 

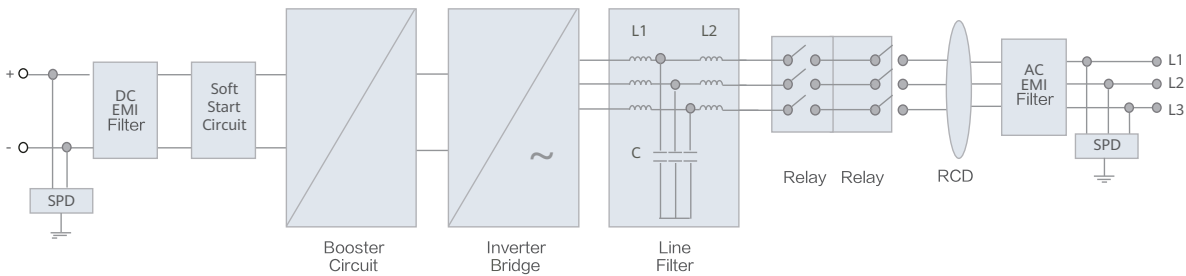
Built-in Intelligent Active Breaking Device
- 

Dual-stage Architecture
- 

Smart Grid Forming Algorithm



Circuit Diagram



LUNA2000-213KTL

Efficiency	
Max. Efficiency	99.01%
DC Side	
Rated DC Voltage	1,331 V
Max. DC Voltage	1,500 V
Operating DC Voltage Range	800 V ~ 1,500 V
Rated Power Operating Voltage Range	1100V ~ 1500 V
Max. DC Current	218.5 A
Max. Number of Inputs	1
AC Side	
Rated AC Active Power	213,000 W @40°C; 192,000 W @50°C
Max. Apparent Power	236,400 VA
Rated AC Voltage	800 V
Rated AC Grid Frequency	50 Hz / 60 Hz
Max. AC Current	170.6 A
Adjustable Power Factor Range	-1 ... +1
Max. Total Harmonic Distortion	THDi
Protection	
AC Overcurrent Protection	Yes
DC Reverse-polarity Protection	Yes
Insulation Resistance Detection	Yes
Residual Current Protection	Yes
DC Surge Protection	Type II
AC Surge Protection	Type II
Communication	
Display	LED Indicators, WLAN + APP
USB	Yes
Communication Protocol	Ethernet, CAN
General	
Dimension (W H D)	87 8
Weight	
Operating Temperature Range	-25°C ~ 60°C
Cooling Method	Smart Air Cooling
Max. Operating Altitude without Derating	4,700 m
Relative Humidity	0 ~ 100% (Non-condensing)
DC Connector	OT / DT Terminal
AC Connector	OT / DT Terminal
Protection Degree	IP66
Anti-corrosion Degree	C5-Medium
Topology	Transformerless
Standards Compliance	
GB/T 34120, GB/T 34133, IEC/EN62477-1, etc.	

►► LUNA2000-4.5MWH
Smart String Energy Storage System



Ultra Safety



Native Stability



Higher Revenue



Smart O&M

Battery Container	
Model	LUNA2000-4.5MWH
DC Rated Voltage	1,331.2 V
DC Max. Voltage	1,500 V
Nominal Energy Capacity	4,472 kWh
Charge & Discharge Rate	
Rated Power	2,236 kW
Dimension (W H D)	8 8 8
Weight	
Operation Temperature Range	-30°C ~ 55°C
Storage Temperature Range	-40°C ~ 60°C
Relative Humidity	0 ~ 100% (Non-condensing)
Max. Operating Altitude	4,700 m
Cooling Method	Liquid Cooling
Fire Suppression System	Water Sprinkler, Novec 1230 (Optional)
Communication Interface	
Communication Protocol	Modbus TCP
Protection Degree	IP55
Anti-corrosion Degree	C5-Medium
Standards Compliance	
RoHS, IEC62477-1, IEC62040-1, IEC61000-6-2, IEC62933-5-2, UL9540A, IEC62619, UN38.3, etc.	
Battery PACK	
Cell Material	
Number of Cell	104
Nominal Capacity	280 Ah / 93.18 kWh
Protection Degree	IP65
Weight	670±10 kg
Dimensions (W H D)	78 8

►► DTS-200K-D0
Distribution Transformer



Technical Specifications

Electrical	
AC Power	210 kVA@ 400 Vac / 4 kVA@ 110 Vac
Rated Input Voltage	800 Vac
Max. Input Current at Nominal Voltage	151.6 A
Rated Output Voltage	400V (3P) /110V (1P)
Rated frequency	50 / 60 Hz
Transformer Type	Dry Type
Transformer Cooling Type	
Transformer Vectoring Group	Dyn11yn11
Transformer Tappings	
Transformer Winding	Al
Transformer Insulation Class	H
Transformer Impedance (at 145°C)	4% (±10%) @50Hz / 4.8% (±10%) @60Hz
Transformer No-load Loss	(+15%)
Transformer Load Loss	(+15%)
Cablings	
Number of outputs	five MCCBs, each connected to two outputs
Cabling mode	Routed in and out from the bottom
Protection	
Protection Degree	IP 55
LV SPD	Type II
Transformer Protection	Transformer Temperature Protection
Environment	
Operating Temperature Range	- 30°C ~ 55°C
Relative Humidity	0% ~ 95% (Non-condensing)
Max. Operating Altitude	4,000 m
General	
Dimensions (W H D)	
Weight	< 1.3 t
Communication Mode	Dry Contacts
Cooling Type	Smart Cooling without Air-across for Higher Availability
Standards Compliance	
IEC 60076, IEC 61439	

► SPPC2000
Smart Power Plant Controller

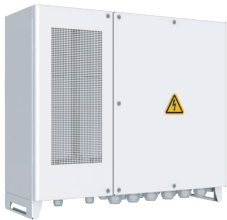


- POC PT/CT
Direct Sampling
- PV&ESS
Synergy
- Fast Active/Reactive
Power Response
- Power Oscillation
Damping

Technical Specifications

Model	SPPC2000-A01	SPPC2000-A02
Device Management		
Networking Mode	Active/Standby and Master-Slave Control Mode	
Features		
Active Power Control	System-level 30ms-40ms Dynamic Reactive Power Response	
Frequency Control (P-)		
Reactive Power Control (Q or P)		
Voltage Control (Q-U)	Q-U Curve Control	
Smart Reactive Power Compensation	System Level Dynamic Reactive Power Response Based on Inverter/Converter	
Ramp Control (Active and Reactive Power)	Control the Active/Reactive Power Up and Down Ramp Rates	
Cooperative Control of PV and ESS	Yes	
Power Oscillation Damping (POD)	Oscillation Suppression Range (0.1~2.5 Hz)	
Waveform Recording function	Supports Instantaneous Value (0.5ms) and rms Value Recording of Current and Voltage	
Time Synchronization function		
Circuit Breaker Status Acquisition and Control	Control Substations Disconnection and Connection	
Simulation Model	PSSE, DigSILENT, PSCAD	
PT/CT Sampling current	1A	5A
Communication Interface		
Ethernet	6 + 2	
Optical Ethernet		
RS485		
Current/Voltage Sampling	6U + 6I	
CAN	2	
Communication Protocol	Modbus-TCP, IEC60870-5-104, GOOSE	
Interaction		
WEB	Yes	
HMI	Smart PV Management System Smart Energy Management System	
General		
Dual Power Supply	AC: 90 V~264 V, 47 Hz ~ 63 Hz, DC: 110 V ± 10%, 220 V ± 10%	
DC/AC Surge Arrester	Type II	
Dimensions (H L W)		
Weight	8	
Operating Temperature Range	-25°C ~ 60°C	
Relative Humidity	0% ~ 100% (Non-condensing)	
Max. Operating Altitude	4,000 m	
Protection Degree	IP55	
Anticorrosion Protection	C5-Medium	
Installation Options		

► SmartACU2000D
Smart Array Controller



With SmartPID2000 Module



Without SmartPID2000 Module

- Smart

Support one-click commissioning
Patented anti-PID module
- Simple

SmartPID2000 & Smartlogger3000B
pre-installed with multiple interfaces
- Reliable

Industrial-level application
and high reliability

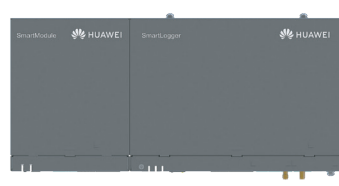
Model	SmartACU2000D-D-08	SmartACU2000D-D-09	SmartACU2000D-D-10	SmartACU2000D-D-11
SmartLogger				
SmartModule1000A	Optional		Standard with 1	
RS485	8			
Number of MBUS Module ¹	1	1	2	2
Number of SmartPID2000	0	1	2	2
8*100 / 1,000 Mbps	Optional with 1			Standard with 2
Environment				
Operating Temperature Range	-40°C ~ 60°C			
Relative Humidity	0% ~ 100% (Non-condensing)			
Altitude	4,000 m			
Electrical				
AC Input Voltage for Cabinet	100 V ~ 240 V, L / N (L)+ PE			
AC Input Voltage for MBUS	380 V ~ 800 V, 3Ph			
AC Input Voltage for PID	8	8		
	50 Hz / 60 Hz			
Power Supply	Standard: 12 V DC			
Mechanical				
Cable Entries	Bottom in & out			
Maintenance				
	640mm×770mm×365mm	880mm×770mm×369mm		
Weight	33kg	54kg	64kg	66kg
Protection Degree	IP65			
Installation Options	Wall Mounting, Rack Mounting, Pole Mounting			

1: Compatible with communication mode of PLC (Power Line Communication).

► SmartLogger3000B



Without SmartModule1000A



With SmartModule1000A



Smart

Connecting up to 200 devices,
One-click commissioning



Simple

Deployment wizard allowed, including

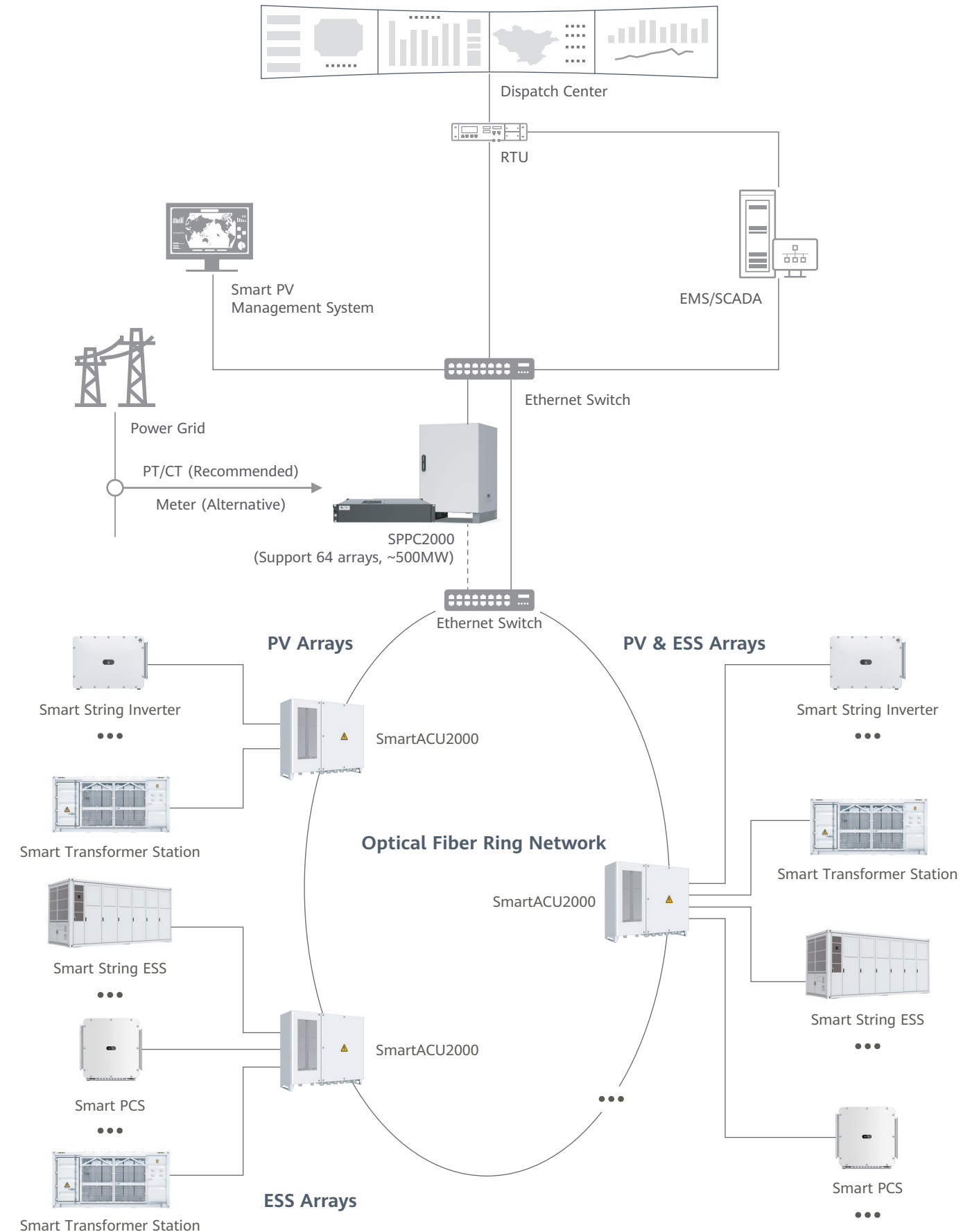


Reliable

Safety improvement
by lightning protection module

Model	SmartLogger3000B	SmartLogger3000B with SmartModule1000A
Device Management		
	200	
String Inverters ¹	150	
Smart PCS / Smart String ESS ¹	44 / 24	
Communication Interface		
WAN		
LAN		
Optical Ethernet		
MBUS		
RS485		
Digital / Analog Input / Output		87
PT100 / PT1000	0	2
Active DO	12 V, 100 mA (connection with relay, sensor)	
Communication Protocol		
Ethernet	Modbus-TCP, IEC 60870-5-104	
RS485	Modbus-RTU, IEC 60870-5-103 (standard), DL / T645	
Interaction		
LED		
WEB	Embedded Web	
USB		
APP	Communication by WLAN for commissioning	
Environment		
Operating Temperature Range	-40°C ~ 60°C	
Storage Temperature Range	-40°C ~ 70°C	
Relative Humidity	5% ~ 95% (Non-condensing)	
	4,000 m	
Electrical		
Power Adapter	AC input: 100 V ~ 240 V, 50 Hz / 60 Hz; DC output: 12 V, 2 A	
DC Power Supply	24 V, 0.8 A	
Power Consumption		8
Mechanical		
Weight	2 kg	3 kg
Protection Degree	IP20	
Installation Options	Wall Mounting, DIN Rail Mounting, Tabletop Mounting	

► Grid Networking Architecture



SPPC does not support the PV & ESS low-voltage AC coupling solution.

Smart I-V Curve Diagnosis

Smart String Inverter	SUN2000-330KTL, SUN2000-330KTL, SUN2000-215KTL...
Data Logger	SmartLogger3000
SmartPVMS, SmartPVMS(Plant)	SmartPVMS, SmartPVMS(Plant)
Sampling Points per I-V Curve	128
Voltage Accuracy	
Current Accuracy	

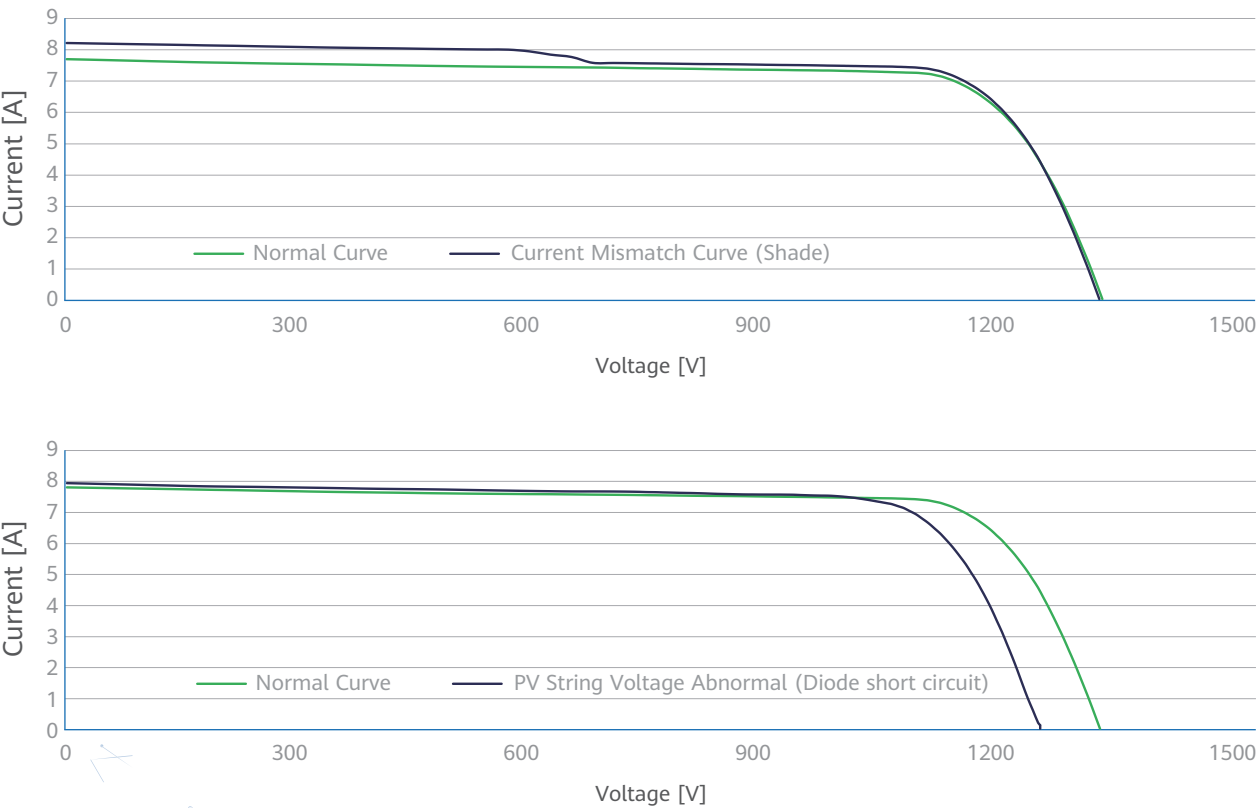
String-level Management

Smart I-V Curve Diagnosis

Real Time Detection

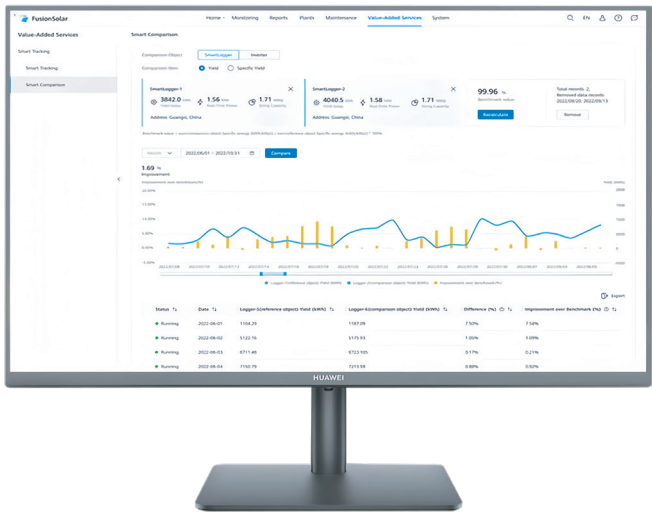
Smart I-V Curve Diagnosis

String I-V Curve Comparison



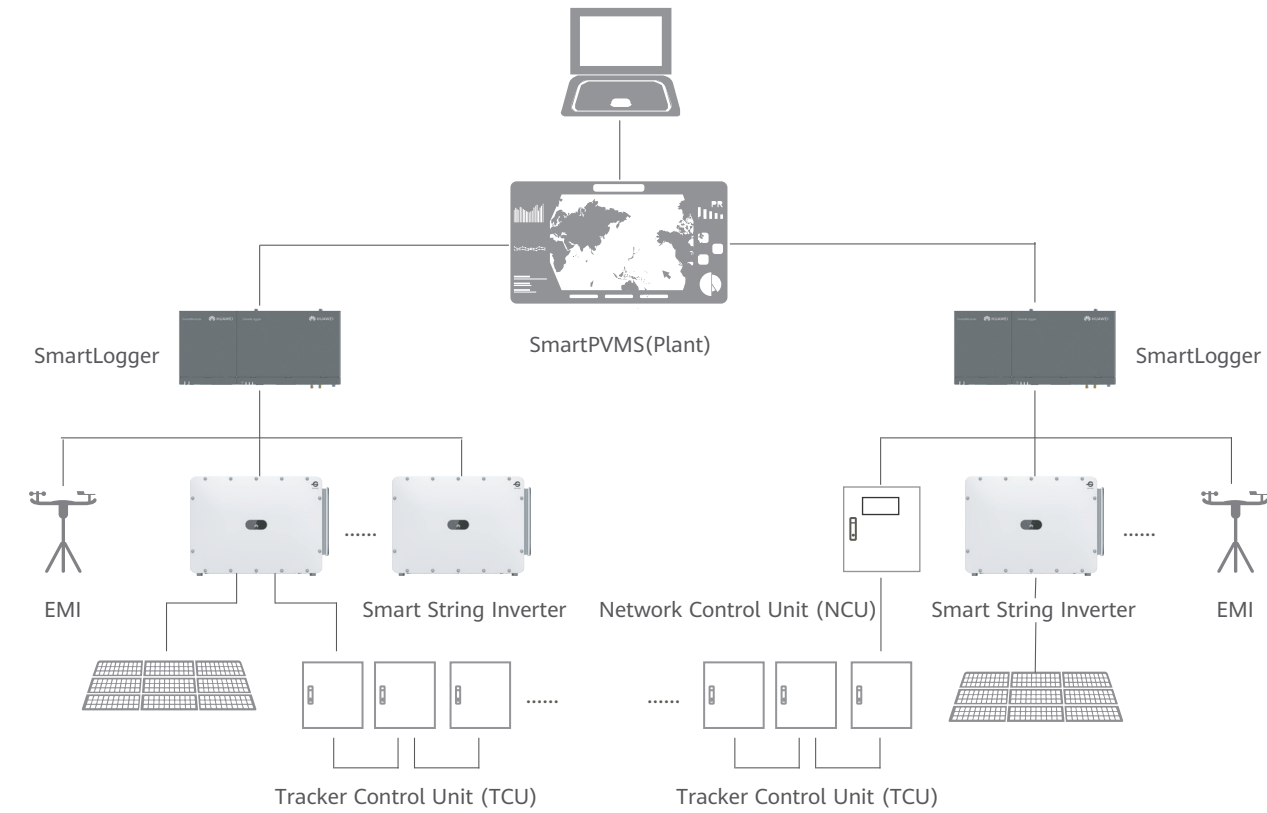
Smart Tracker Control Algorithm (SDS)

Smart Tracker Control Algorithm (SDS) is a valuable software based and closed-loop control. By using the SDS, together and it will bring higher revenue to the customer.



- System level closed-loop control to keep the irradiation and optimal power output of PV module
- Automatic tracking angle optimization and control by using AI technology, automatic sensing of shading and weather information. No need for additional sensing equipment, free from manual and empirical dependence

Network Structure



► Smart PV Plant Management System

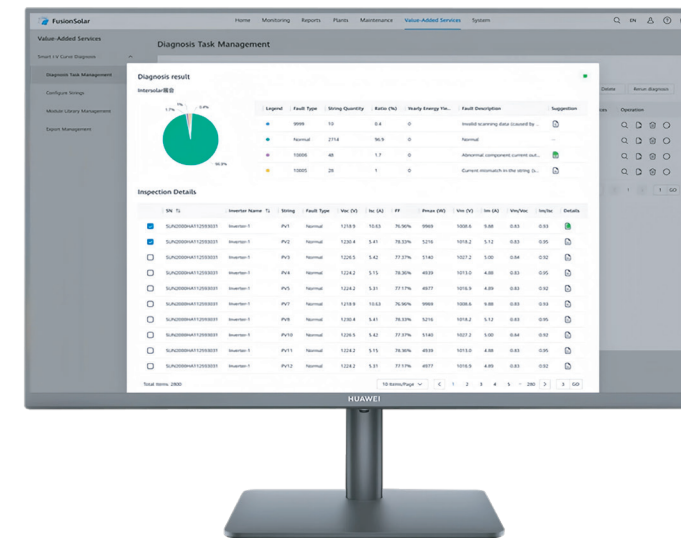
		Description
management	Plant Overview	Provide an overview of the key information of the PV & ESS plant.
	Management	equipment, and components (strings, batteries)...
	Alarm Management	to the alarm center from any interface throughout the system.
	Remote Device Upgrade	Batch device upgrade through SmartPVMS(Plant) without going on-site.
O&M	Plant Diagnosis	Comprehensively evaluates plant performance and alarms, and analyze the loss.
	Power Normalization	
	Discreteness Analysis	linked to Smart IV Curve Diagnosis automatically for further inspection.
	Smart IV Curve Diagnosis	Realize string-level fault localization, provide diagnosis report, O&M report, revenue estimation report, etc.
	Smart Tracker Control Algorithm (SDS)	
Open Eco-system		Data can transfer via northbound IEC104 and Restful API.

Server Parameters

Item	Standard Version	Premium Version
Model	TaiShan200 2280	TaiShan200 2280
	2U rack server	2U rack server
CPU	2*Kunpeng 920-48core@2.6GHz	8
Memory	2*32GB	4*32GB
Internal Storage	2*1920GB	18*1920GB
Operating System	Euler OS	Euler OS
Database	Gauss DB	Gauss DB
Network Ports	8*GE	8*GE
Power Supply	22 hot-swappable PSUs, 1+1 redundancy	2 hot-swappable PSUs, 1+1 redundancy
Voltage	110/220 Vac	
	4 hot-swappable fan modules, N+1 redundancy	4 hot-swappable fan modules, N+1 redundancy
Operating Temperature	5°C ~ 40°C	5°C ~ 40°C
Dimensions	8 7 7	8 7 7
Weight	27 kg	28 kg
	CB+NRTL, etc.	CB+NRTL, etc.

► Smart I-V Curve Diagnosis

Smart I-V Curve Diagnosis is able to carry out online I-V curve analysis on entire strings with advanced diagnosis algorithm.



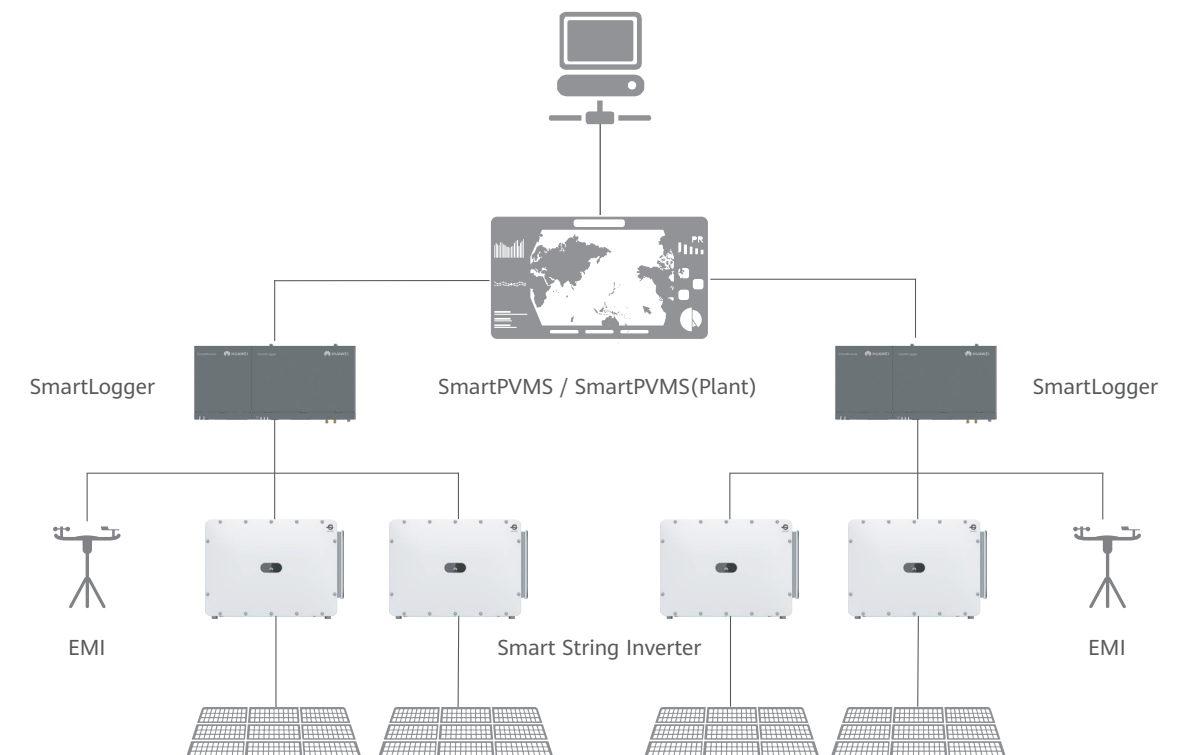
Smart

- Support plant-level, array-level and inverter-level analysis and diagnosis
- Support scheduled scanning and proactive presentation of reports
- and provide recovery suggestion
- assist in accurate O&M

Efficient

- SCompleting online I-V curve scanning on all strings
- accuracy > 95%

Network Structure

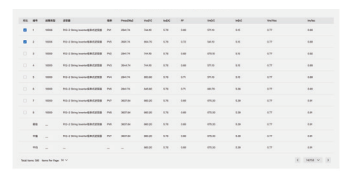
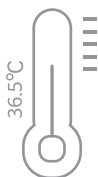


Smart I-V Curve Diagnosis

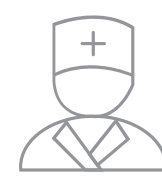
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SmartPVMS, SmartPVMS(Plant)	SmartPVMS, SmartPVMS(Plant)
Sampling Points per I-V Curve	128
Voltage Accuracy	
Current Accuracy	

String-level Management

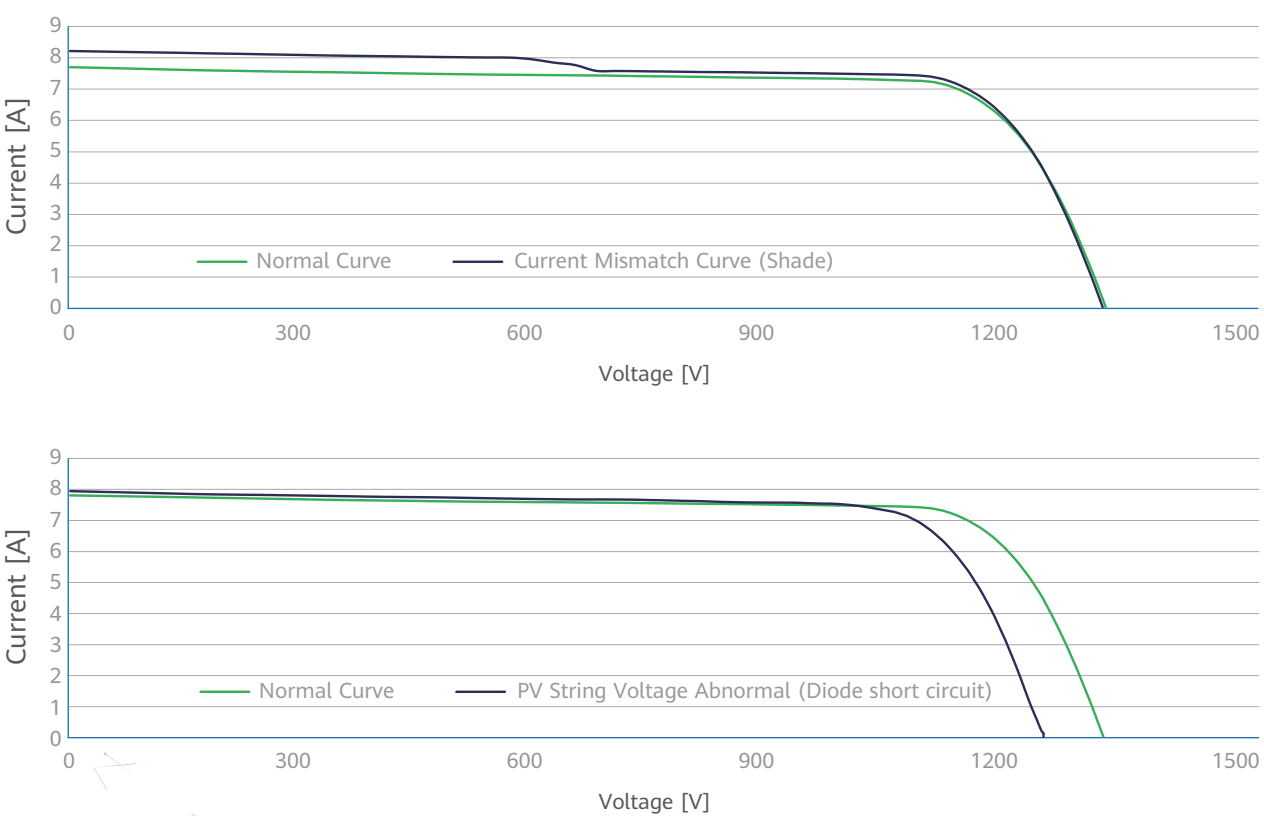
Smart I-V Curve Diagnosis



Real Time Detection



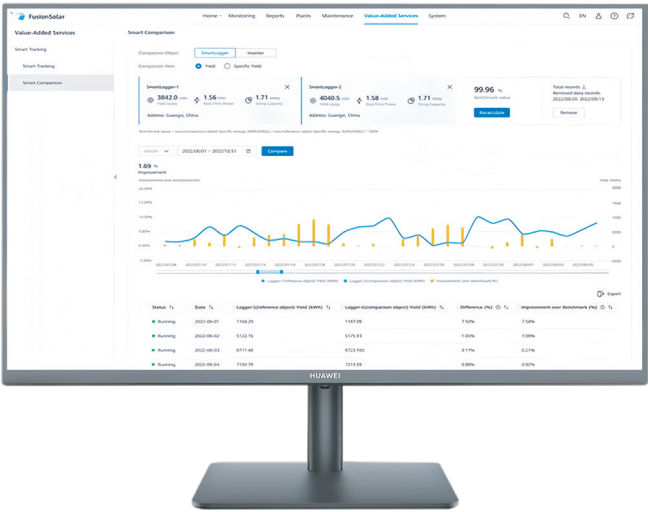
String I-V Curve Comparison



Smart Tracker Control Algorithm (SDS)

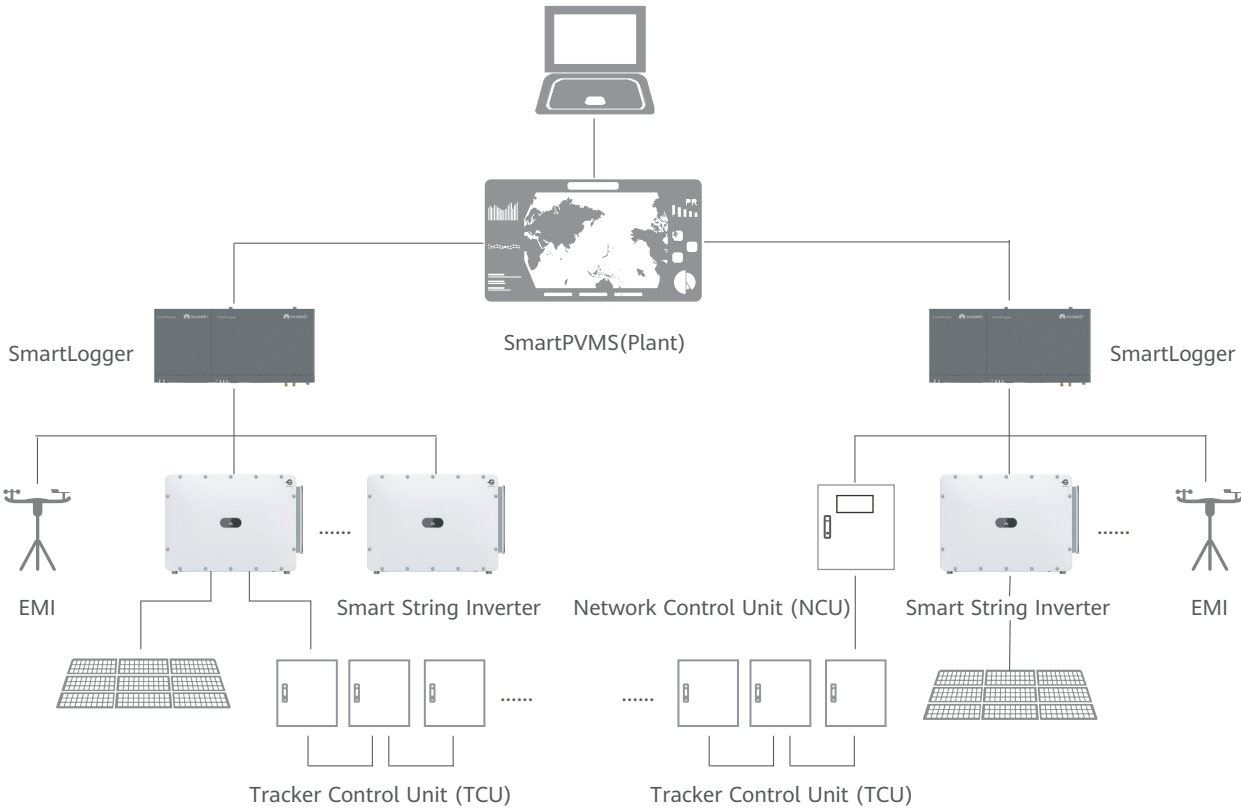
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Network Structure



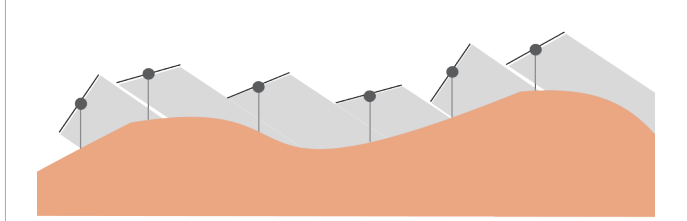
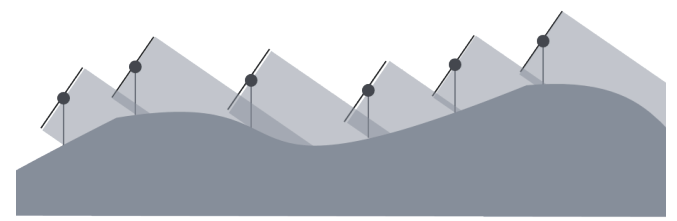
► Smart Tracker Control Algorithm (SDS)

Smart String Inverter	SUN2000-215KTL, SUN2000-215KTL...
Data Logger	SmartLogger3000 series...
Management System	SmartPVMS(Plant)
Tracking Angle Accuracy	0.5°

Comparison of Tracker Algorithms and Angles

Reverse-tracking stage in the morning and at dusk

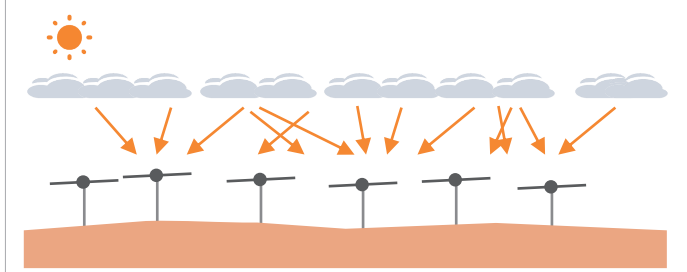
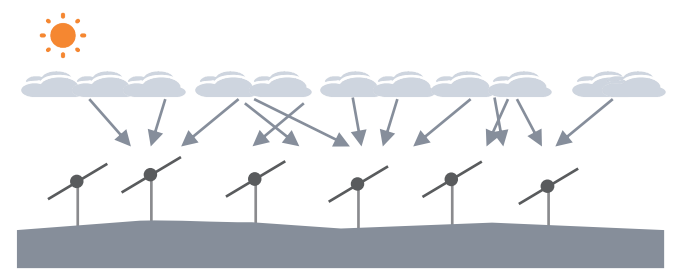
Shadows in the front and back rows of modules, without



Traditional Tracker AlgorithmSmart Tracker Control Algorithm

Cloudy and rainy days

Tracking the angle of the sun is not the best way to get



Traditional Tracker AlgorithmSmart Tracker Control Algorithm

► Success Stories



400MW PV + 1.3GWh BESS Project in New City of Red Sea, Saudi Arabia

- A green city powered by 100% renewable energy
- Grid friendly: continuous high- and low-voltage ride-through, grid-wide black start, and high PV-to-ESS ratio
- Simple installation and O&M: Pre-fabricated before transportation, eliminating the need for internal installation and cable connection onsite and the need for manual SOC calibration

COD:
Dec, 2023
Location:
Saudi Arabia

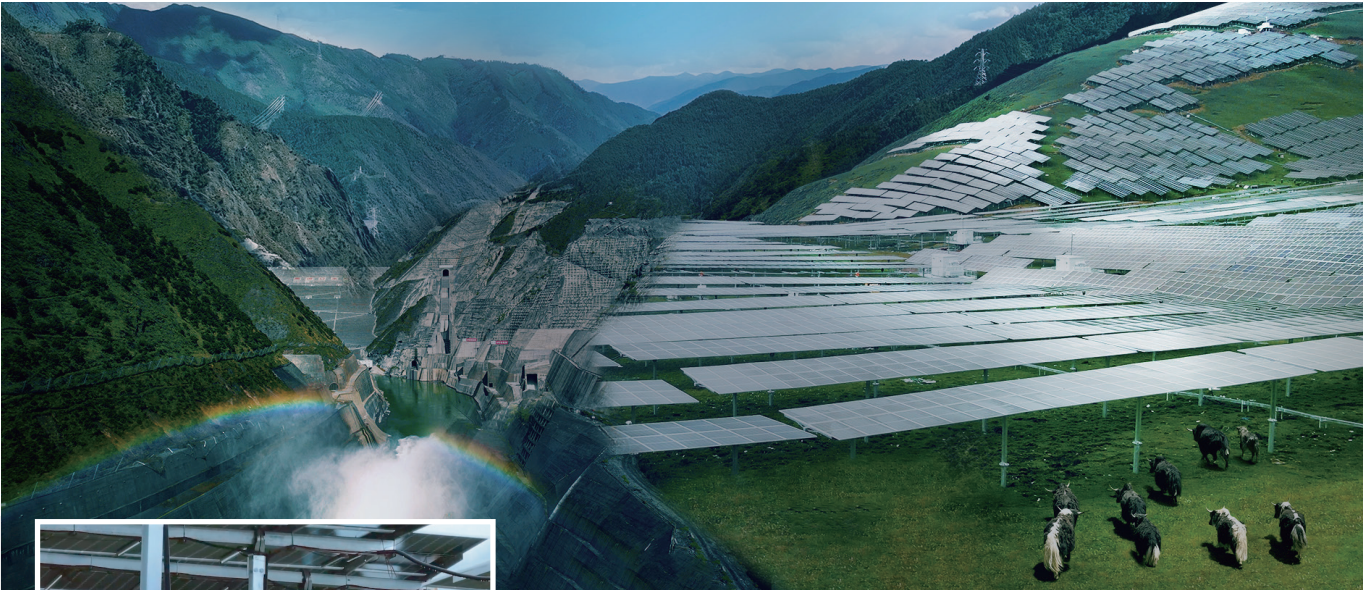


Datang's 260MW Floating PV Plant in Jiangxi, China

- provides troubleshooting suggestions, the array energy yield increases by 1%~2%.
- Within 5 months after the system is deployed, the average 8
- Smart I-V Curve Diagnosis + Drone Inspection

COD:
Dec, 2020
Location:

► Success Stories



Yalong River Hydropower's 1GW Kola PV Plant (Phase I)
World's Largest Hydro&PV Complementary Plant

- Digital planning, construction, maintenance, and operation innovation
 - Located in the Yalong River basin at an altitude of 4000-4600 meters
 - Annual energy yield: 2 billion kWh
 - Reduces carbon emissions by 1.6 million tons per year
- COD:
Jun, 2023
Location:
Sichuan, China



China Resources Power & CGDG's 100MWh Energy Storage Projects

- frequency regulation, and enhanced grid inertia damping characteristics in weak grids
- Renewable energy plants can be connected to weak grids on a large scale

COD:
Jan-May, 2024
Location:



China General Nuclear Power's 100MW/200MWh Energy Storage Plant
China's Largest Plant That Uses Smart String ESS

- Technological innovation of "string ESS + cloud BMS"
 - Hybrid business model of "TOU + leasing"
 - Intelligent active safety of ESS
- COD:
Dec, 2022
Location:
Hubei, China



Tongwei's 200MW Fishery & PV Integration Project in Hubei, China

- SSLD + SCLD, ensuring safety on the DC side
- IP66 + C5-M anti-corrosion, reliable operations in high humidity environments

COD:
Dec, 2022
Location:
Hubei, China

► Success Stories



Datang's 100MW PV + 25MW/50MWh BESS Agrivoltaic Project in Hainan, China

- Supplies more than 174 million kWh of clean energy each year.
 - Constructs a clean energy island and revitalizes rural areas in Hainan, helping achieve the dual-carbon goals.
- COD:
Apr, 2022
Location:
Hainan, China



Sembcorp's 285MWh BESS Project in Singapore*

- Rack-level management, longer-lasting constant-power output,
 - Automatic SOC calibration, slashing O&M costs
 - protection requirements
- COD:
Nov, 2022
Location:
Singapore
- *Huawei accounts for 50%