



Fusionsolar

Smart Microgrid Solution

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About Huawei

Huawei is a leading global provider of information and communications technology (ICT) infrastructure and smart devices. With integrated solutions across four key domains – telecom networks, IT, smart devices, and cloud services – we are committed to bringing digital to every person, home and organization for a fully connected, intelligent world. Huawei's end-to-end portfolio of products, solutions and services are both competitive and secure. Through open collaboration with ecosystem partners, we create lasting value for our customers, working to empower people, enrich home life, and inspire innovation in organizations of all shapes and sizes. At Huawei, innovation focuses on customer needs. We invest heavily in basic research, concentrating on technological breakthroughs that drive the world forward.



Employees

207,000+



R&D Personnel

55%



Countries

170+



Best Global Brands

92



R&D Investment

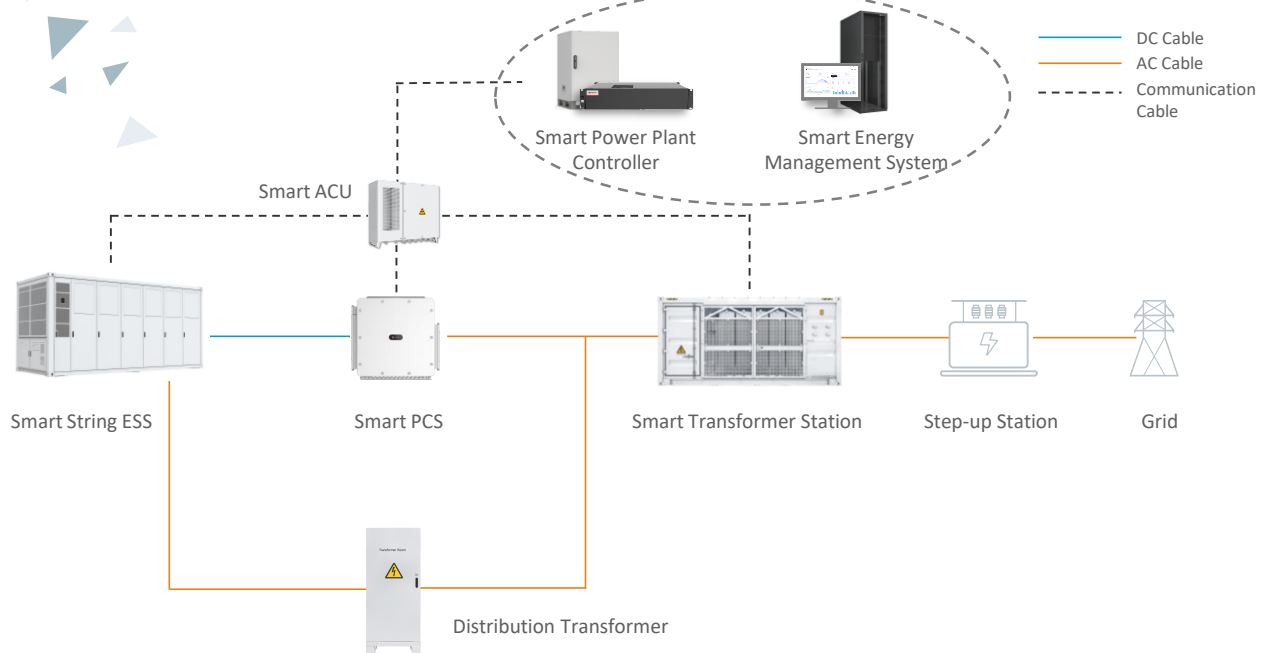
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Most Innovative
Companies

8

FusionSolar Smart String ESS Solution



Ultra Safety

Native Stability

Higher Revenue

All-round Smart Mgmt.



Model: LUNA2000-4.5MWH-2H1

Smart String ESS (Preliminary)



Ultra Safety



Native Stability



Higher Revenue



Smart O&M

| Battery Container | |
|---|--|
| Model | LUNA2000-4.5MWH-2H1 |
| DC Rated Voltage | 1,331.2 V |
| DC Max. Voltage | 1,500 V |
| Nominal Energy Capacity | 4,472 kWh |
| Charge & Discharge Rate | ≤ 0.5 C |
| Rated Power | 2,236 kW |
| Dimension (W x H x D) | 6,058 x 2,896 x 2,438 mm |
| Weight | ≤ 41 t |
| 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 | Ethernet / SFP |
| 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 | LFP |
| Number of Cell | 104 |
| Nominal Capacity | 280 Ah / 93.18 kWh |
| Protection Degree | IP65 |
| Weight | 670±10 kg |
| Dimensions (W x H x D) | 785 x 249 x 2182 mm |

Smart String ESS

Battery Pack & Smart Rack Controller



| Battery Pack | | |
|-----------------------------------|--|--------------------|
| General | | |
| Cell Material | | LFP |
| Pack Configuration | | 18S 1P |
| Rated Voltage | | 57.6 V |
| Nominal Capacity | | 280 Ah / 16.13 kWh |
| Supported Charge & Discharge Rate | | ≤ 1 C |
| Weight | | ≤ 140 kg |
| Dimensions (W x H x D) | | 442 x 307 x 660 mm |



| Smart Rack Controller | | |
|---------------------------|--|--------------------|
| Battery Side | | |
| Rated Voltage | | 1,209.6 V |
| Operating Voltage Range | | 40 V ~ 1,400 V |
| Rated Power Voltage Range | | 1,075 V ~ 1,320 V |
| Min. Start Voltage | | 350 V |
| Bus Side | | |
| Max. DC Voltage | | 1,500 V |
| Rated Voltage | | 1,250 V |
| Rated Current | | 275.2 A |
| Rated Power | | 344,000 W |
| General | | |
| Dimensions (W x H x D) | | 600 x 270 x 820 mm |
| Weight | | ≤ 90 kg |
| Cooling Method | | Smart Air Cooling |
| Protection Degree | | IP66 |

Model: LUNA2000-213KTL-H0

Smart PCS (Preliminary)



Max. Efficiency 99%



Modular Design



IP66 Protection



Built-in Intelligent
Active Breaking Device

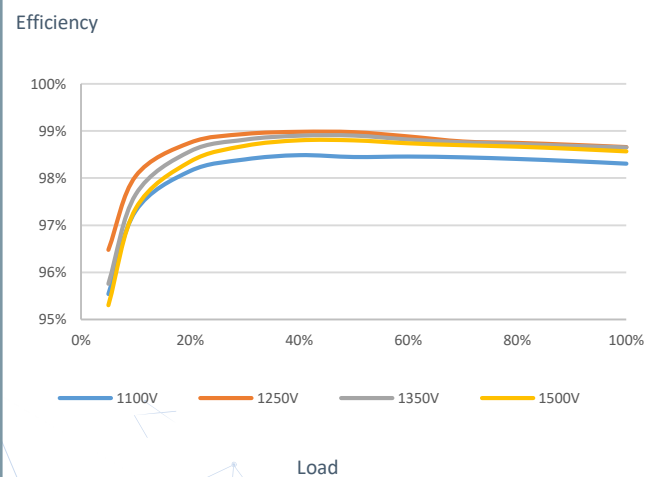


Dual-stage
Architecture

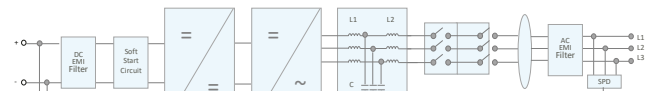


Smart Grid Forming
Algorithm

Efficiency Curve



Circuit Diagram



LUNA2000-213KTL-H0

Technical Specifications **(Preliminary)**

| 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-1500V |
| 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 | THD _i ≤ 1.5% (Rated) |
| 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 x H x D) | 875 x 865 x 365 mm |
| Weight | ≤ 110 kg |
| 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. | |

Model: JUPITER-9000K-H0 / STS-6000K /3000K-H1

Smart Transformer Station



Simple

Prefabricated and Pre-tested, No Internal Cabling Needed Onsite
Compact 20' HC Container Design for Easy Transportation



Efficient

High Efficiency Transformer for Higher Yields
Lower Self-consumption for Higher Yields



Smart

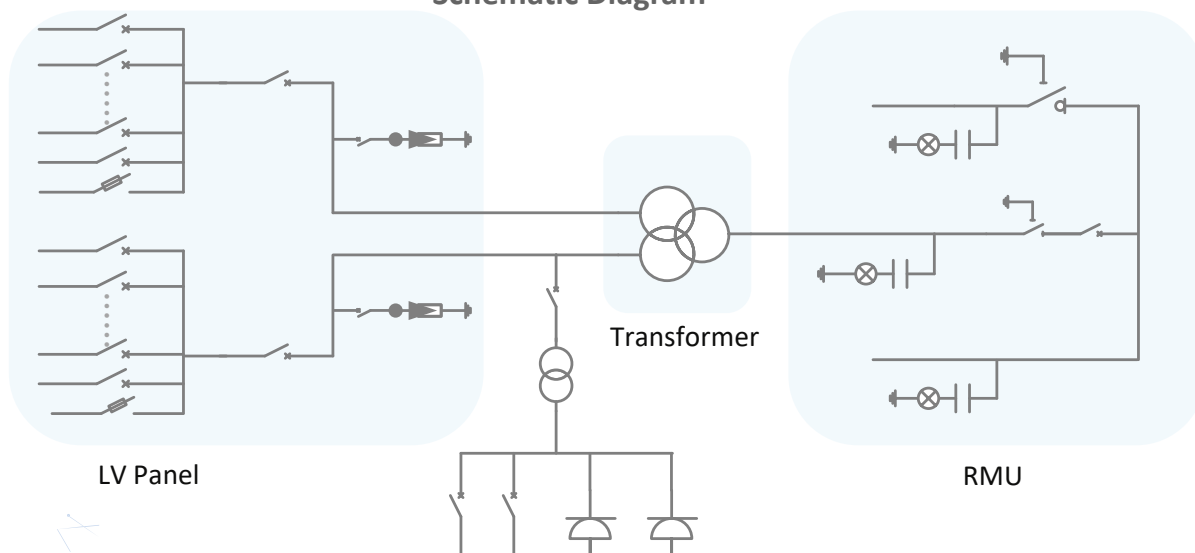
Real-time Detection of Transformer, LV Panel and RMU
High Precision Sensor of LV Electricity Parameters
Remote Control of ACB and MV Circuit Breaker



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



Technical Specifications

| Technical Specifications | | JUPITER-9000K-H0 | STS-6000K-H1 | STS-3000K-H1 |
|--|--|---|------------------------------|--------------|
| Input | | | | |
| Available Inverters | LUNA2000-213KTL / LUNA2000-200KTL | | | |
| Max. LV AC Inputs | 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 | Form 2b | | | |
| LV Main Switches | ACB (4,000 A, 2 x 1 pcs) | ACB (2,900 A, 2 x 1 pcs) | ACB (2,900 A, 1 pcs) | |
| LV Main Switches for SUN2000-215KTL-H0 | MCCB (250 A, 2 x 22 pcs) | MCCB (250 A, 2 x 17 pcs) | MCCB (250 A, 17 pcs) | |
| Output | | | | |
| Rated Output Voltage | 10~35 kV ² | | | |
| Frequency | 50 Hz / 60 Hz | | | |
| Transformer Type | Oil-immersed, Conservator Type | | | |
| Transformer Cooling Type | ONAN | | | |
| Transformer Tappings | ± 2 x 2.5% | | | |
| Transformer Oil Type | Mineral Oil (PCB Free) | | | |
| Transformer Vector Group | Dy11-y11 | | Dy11 | |
| Transformer Min. Peak Efficiency Index | Tier 1 or Tier 2 In Accordance with EN 50588-1 | | | |
| RMU Type | SF 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 | | | |
| Auxiliary Transformer | Dry Type Transformer, 5 kVA, Single-phase, li0 | Dry Type Transformer, 5 kVA, Three-phase, Dyn11 | | |
| Output Voltage of Auxiliary Transformer | 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 | | | |
| Internal Arcing Fault of STS | IAC A 20 kA 1s | | | |
| MV Relay Protection | 50/51, 50N/51N | | | |
| LV Overvoltage Protection | Type I+II | | | |
| Anti-rodent Protection | C5-Medium | | | |
| Features | | | | |
| 2 kVA UPS | Optional ³ | | | |
| MV Surge Arrester for MV VCB | Optional ³ | | | |
| General | | | | |
| Dimensions (W x H x D) | 6,058 x 2,896 x 2,438 mm (20' HC ISO Container) | | | |
| Weight | < 28 t | < 22 t | < 15 t | |
| Operating Temperature Range | -25°C ~ 60°C ⁴ | | | |
| Relative Humidity | 0% ~ 95% (Non-condensing) | | | |
| Max. Operating Altitude | 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 | Modbus TCP, Preconfigured with SmartACU2000D | Modbus RTU, Preconfigured 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

3: Extra expense needed for optional features which standard product doesn't contain, more options upon request.

4: When ambient temperature ≥55°C, awning shall be equipped for STS on site by customer.

5: For higher operating altitude, pls consult with Huawei.

Model: DTS-200K-D0

Distribution Transformer



| 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 | AF |
| Transformer Vectoring Group | Dyn11yn11 |
| Transformer Tappings | ± 2 x 2.5% |
| Transformer Winding | Al |
| Transformer Insulation Class | H |
| Transformer Impedance (at 145°C) | 4% (±10%) @50Hz / 4.8% (±10%) @60Hz |
| Transformer No-load Loss | ≤ 500 W (+15%) |
| Transformer Load Loss | ≤ 3,044 W (+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 x H x D) | 900 x 2,100 x 1,200 mm |
| Weight | < 1.3 t |
| Communication Mode | Dry Contacts |
| Cooling Type | Smart Cooling without Air-across for Higher Availability |
| Standards Compliance | |
| IEC 60076, IEC 61439 | |

Model: SPPC2000

Smart Power Plant Controller



SPPC2000



POC PT/CT direct sampling



PV&ESS Synergy



Fast Power Response



Power Oscillation Damping

| Technical Specifications | 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-F) | P-F Curve Control | |
| Reactive Power Control (Q or PF) | Reactive Power Control with Dynamic or Fixed Q/PF Setpoints | |
| Voltage Control (Q-U) | Q-U Curve Control | |
| Smart Reactive Power Compensation | System Level Dynamic Reactive Power Response Based on Inverter/Converter | |
| Ramp Control (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 | Supports IRIGB (≤ 1 ms) and Other Time Synchronization Protocols (e.g., NTP) | |
| 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 | SFP x 2, 100 / 1,000 Mbps | |
| RS485 | COM x 4 | |
| 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 x L x W) | 1000 x 650 x 650 mm (Without Base) | |
| Weight | ≤ 80 kg (Without Pallet and Optional Components) | |
| Operating Temperature Range | -25℃ ~ 60℃ | |
| Relative Humidity | 0% ~ 100% (Non-condensing) | |
| Max. Operating Altitude | 4,000 m | |
| Protection Degree | IP55 | |
| Anti-corrosion Protection | C5-Medium | |
| Installation Options | Floor Mounting, Wall Mounting (Optional) | |

Please confirm the available countries with Huawei Fusionsolar engineers

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Model: SmartACU2000D

Smart Array Controller



With 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

Technical Specifications

| | |
|--|---|
| SmartLogger | SmartLogger3000B x 1 |
| SmartModule1000A | Standard with 1 |
| RS485 | COM x 6, 1,200 / 2,400 / 4,800 / 9,600 / 19,200 / 115,200 bps |
| Number of MBUS Module ¹ | 2 |
| Number of SmartPID2000 | 2 |
| Switch with 4*SFP and 8*100 / 1,000 Mbps | 2 |

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 | 380 V ~ 800 V, 3Ph + FE (Functional Earth) |
| AC Input Frequency | 50 Hz / 60 Hz |
| Power Supply | Standard: 12 V DC |

Environment

| | |
|-----------------------------|----------------------------|
| Operating Temperature Range | - 40°C ~ 60°C |
| Relative Humidity | 0% ~ 100% (Non-condensing) |
| Max. Operating Altitude | 4,000 m |

Mechanical

| | |
|------------------------|---|
| Dimensions (W x H x D) | 880mm × 770mm × 369mm |
| Weight | 66 kg |
| Protection Degree | IP65 |
| Installation Options | Wall Mounting, Rack Mounting, Pole Mounting |
| Cable Entries | Bottom in & out |
| Maintenance | Front |

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

Model: SmartPID2000 Module Inside Smart Array Controller



The SmartPID2000 Module is installed in the SmartACU2000D cabinet and support continuous DC & AC insulation detection with optional Smart IMD.



Smart

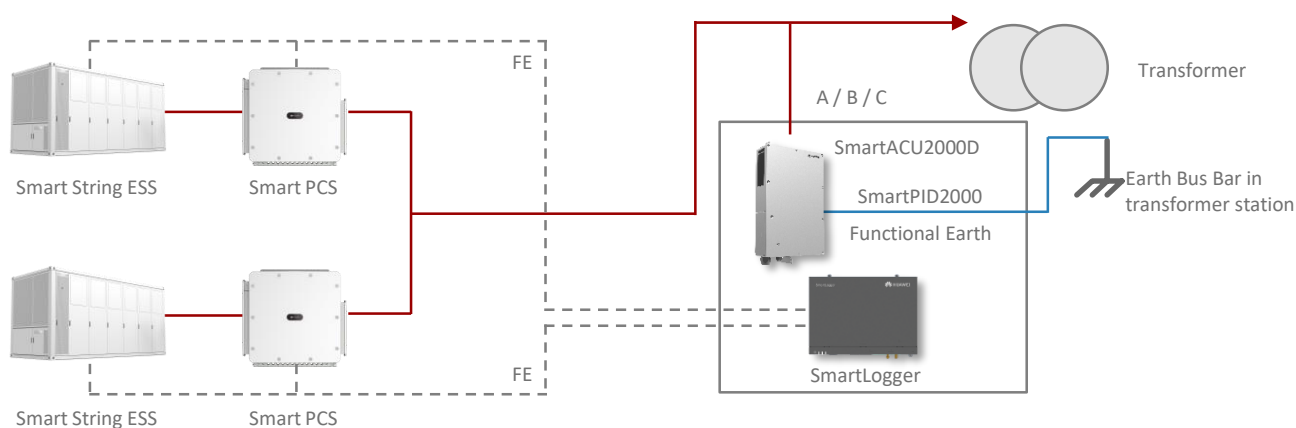
Data read and software upgrade through USB or the embedded Web



Safe & Reliable

Inject LV AC voltage to earth
Continuous DC & AC insulation detection with optional Smart IMD

SmartPID2000 Solution Diagram

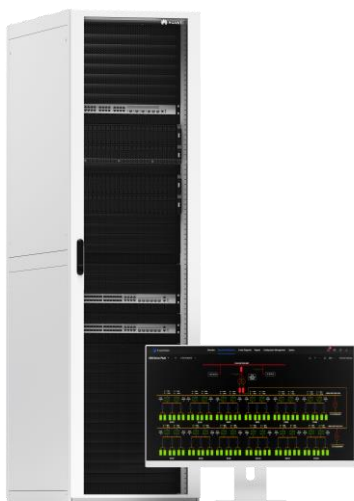


Note:

- 1 - The SmartPID module could ONLY be deployed in utility scenarios where the LV sides of transformer stations are IT system.
- 2 - The SmartPID module must work with FusionSolar SmartLoggers and smart PV controllers / smart PCS.

Model: SmartEMS2000

Smart Energy Management System(Preliminary)



Comprehensive management

Multi-level refined management
Second-level performance curve drawing



Efficient collaboration

Power generation plan curve
PV&ESS synergy optimization



Intelligent diagnosis

Full-link multi-dimensional plant diagnosis
Cell/module fault pre-warning



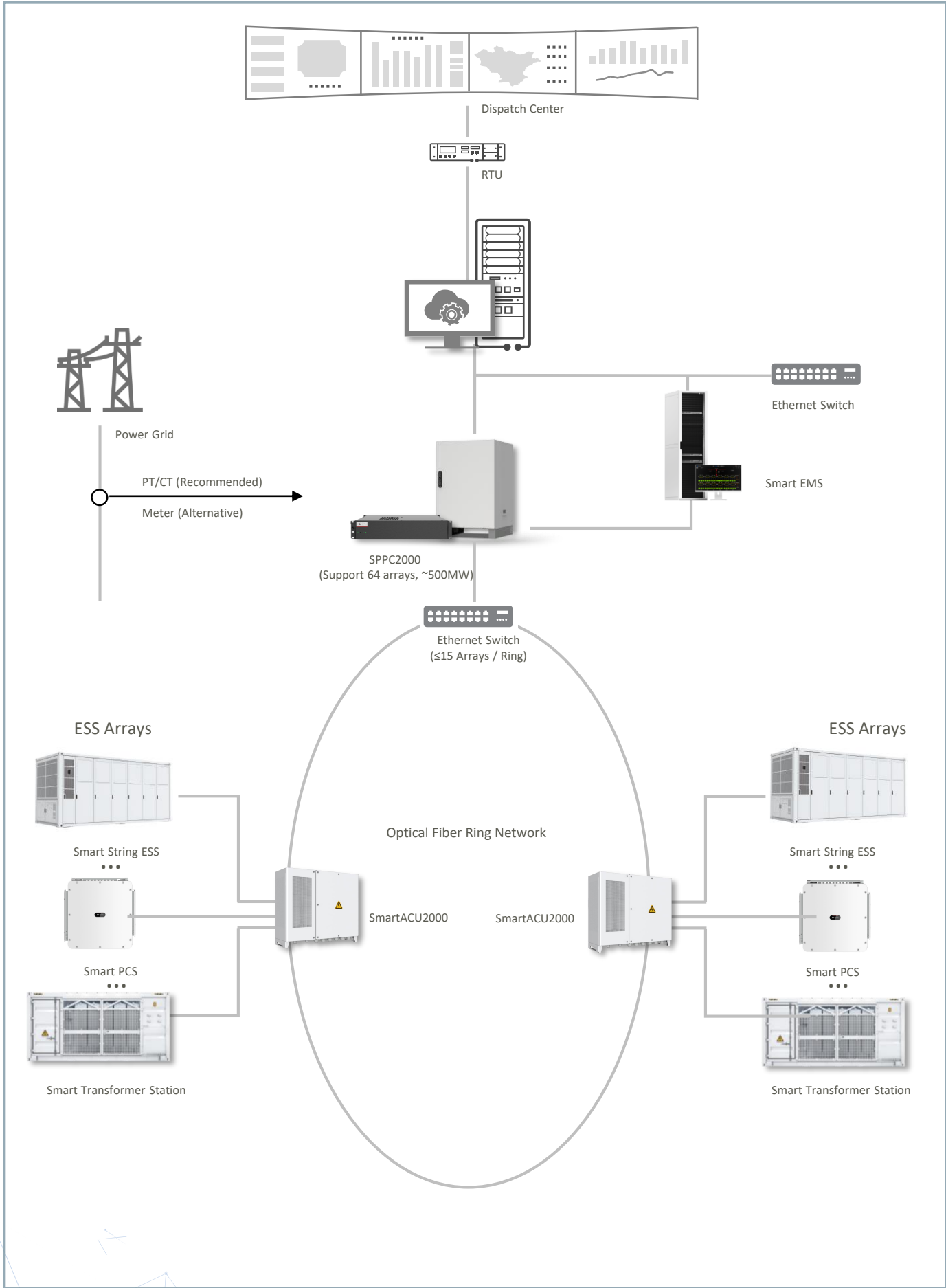
Safe and reliable

IEC62443 certification.
99.99% availability

| EMS cabinet | | |
|-----------------------------|---|---|
| Dimensions (W x D x H) | 600mm×2200mm×1200mm (47u) | |
| Operating Temperature Range | 5 - 30°C | |
| Protection Degree | IP20 | |
| Weight | Net weight approx. 210 kg, full configuration approx. 600 kg | |
| AC Input Voltage | 200V~240V | |
| Rated Frequency | 50 / 60 Hz | |
| Max. Operating Altitude | 4,000 m | |
| Server | | |
| Model | TaiShan 200 (2280) | |
| Dimensions (W x D x H) | 482.6mm*790mm*88.9mm. (2U) | |
| CPU | 2*Kunpeng 920 - 48core @2.6GHz | |
| Database | GaussDB | |
| Operating system | EulerOS | |
| Memory | 4*64G | |
| Hard Disk | 8*1.92T SATA SSD | |
| Fans | Four hot-swappable fans in N+1 redundancy | |
| External Interface | 8*GE | |
| Power supply | 2 x 900 W, 1+1 Redundancy | |
| Weight | Approx. 30 kg | |
| Certification | CCC/CE, etc. | |
| Switches | | |
| Model | CloudEngine S5735-S24ST4XE-V2 | CloudEngine S5735-S24T4XE-V2 |
| Dimensions (W x D x H) | 420mm*442mm*43.6mm (1U) | 420mm*442mm*43.6mm (1U) |
| Weight | 4.95 kg | 4.34 kg |
| Memory | 2 GB | 2 GB |
| Power Supply | 2*80W, 1+1 redundancy | 2 x 80 W, 1+1 redundancy |
| Interface | Eight gigabit electrical ports, four 10GE optical ports, and 24 gigabit optical ports | 24 GE electrical ports and 4 10GE optical ports |
| Rated Voltage | 100V AC~240V AC; 50/60Hz | 100V AC~240V AC; 50/60Hz |
| Certification | CE/VCCI, etc. | CE/VCCI, etc. |

*EMS will be available in Q1.25

Network Applications



*For details about the project configuration and sales area, contact Huawei engineers.
SPPC does not support the PV & ESS low-voltage AC coupling solution.

Smart PV Plant Management System



Refined Management



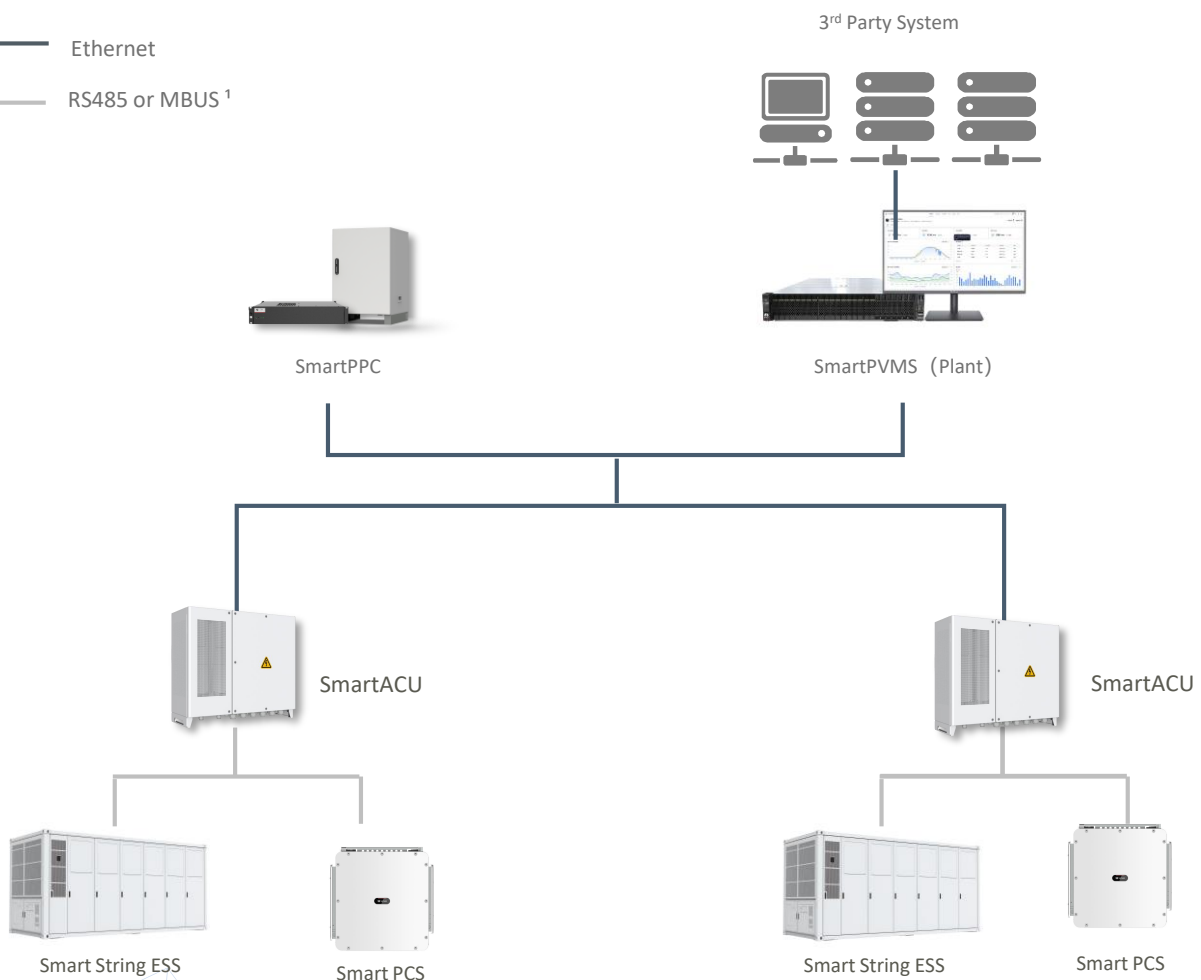
Efficient O&M



Compatible with 3rd party system

Network

- Ethernet
- RS485 or MBUS ¹



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

Smart PV Plant Management System



| Server | Standard Version | Premium Version |
|--|---|---|
| Technical Specifications | | |
| Model | TaiShan200 2280 | TaiShan200 2280 |
| Form Factor | 2U rack server | 2U rack server |
| CPU | 2*Kunpeng 920-48core@2.6GHz | 2xKunpeng 920-48core@2.6GHz |
| 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 | 2 hot-swappable PSUs, 1+1 redundancy | 2 hot-swappable PSUs, 1+1 redundancy |
| Voltage | 110/220 Vac | |
| Fan Modules | 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 (H x W x D) | 86.1 x 447 x 790 mm | 86.1 x 447 x 790 mm |
| Weight | 27 kg | 28 kg |
| Standards Compliance | | |
| CCC CQC RCM VCCI FCC&IC-SDoC CE-SDoC CB+NRTL, etc. | | |



Success Cases



400 MW PV + 1.3 GWh BESS

World's largest microgrid ESS plant

100% renewable energy

World's first GW-level grid-forming PV & ESS plant

GW-level black start and continuous fault traversal

COD: 2023

Location: Saudi Arabia



100MW PV + 200MWh BESS

Largest smart string energy storage plant in China

"String Energy Storage + Cloud BMS"

Introduce the hybrid business model of "peak-valley price difference + leasing"

COD: Dec, 2022

Location: Hubei, China

Success Case



25MW PV + 50MWh BESS

First Large Scale String Inverter + String Energy Storage Demonstration Project in Hainan

More than 174 million kWh of clean energy provided to Wenchang and Hainan power grids annually

COD: Apr, 2022

Location: Hainan, China



115MW PV + 146MWh BESS

Spinning Reserve, Frequency Regulation

One-cluster-one-management, constant power output for a longer time, achieving higher frequency modulation benefits
Automatic SOC calibration greatly reduces O&M costs

COD: Nov, 2022



Location: Singapore



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