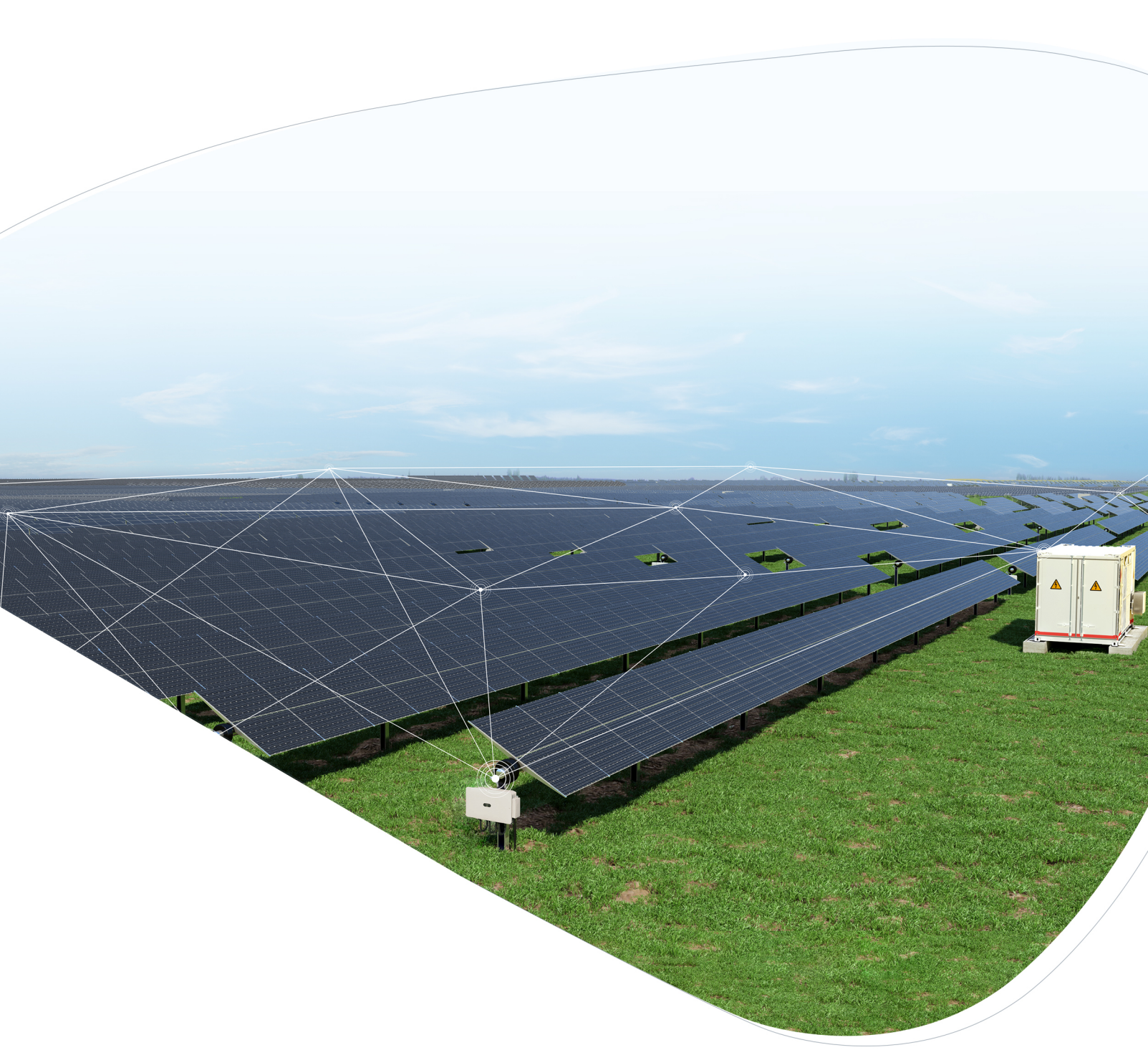


FusionSolar

Utility Smart PV Solution

SOLAR.HUAWEI.COM

HUAWEI



HUAWEI

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 commit- ted 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. In 2019, our sales revenue rounded off at 122.9 USD billion.

Employees
194,000+

R&D Personnel
96,000+

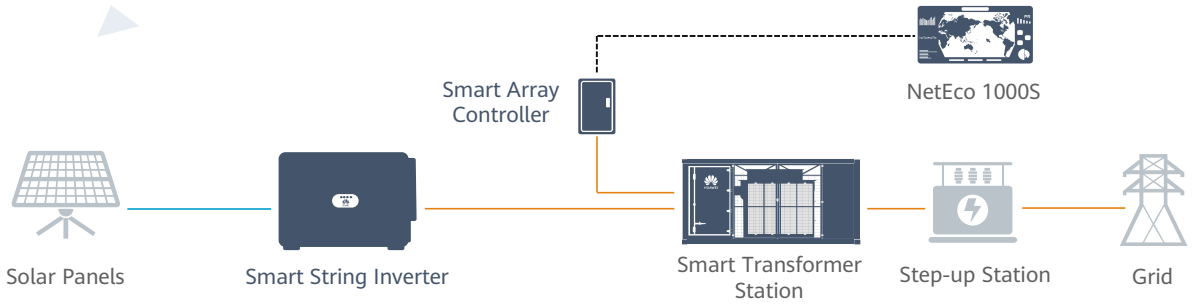
Countries
170+

Fortune Global 500
49

No.1
In global shipment 2015-2019

130GW+
Accumulated global shipment by 2020 H1

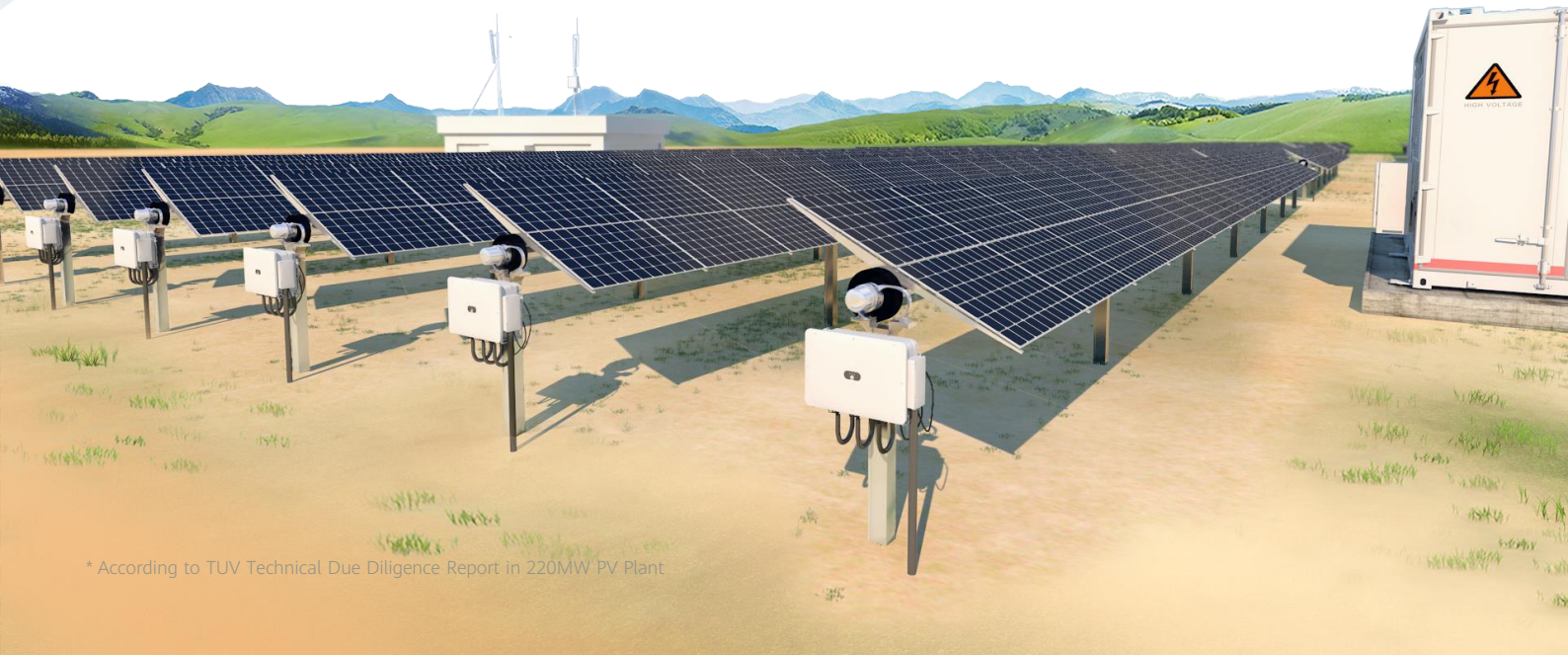
FusionSolar Smart PV Solution



Higher Yields
>2% Higher *

Smart O&M
Lower OPEX

Safe & Reliable
25-year's Reliability



* According to TUV Technical Due Diligence Report in 220MW PV Plant

SUN2000-215KTL-H0
Smart String Inverter



9
MPP Trackers

99.0%
Max. Efficiency

String-level
Management

Smart I-V Curve
Diagnosis Supported

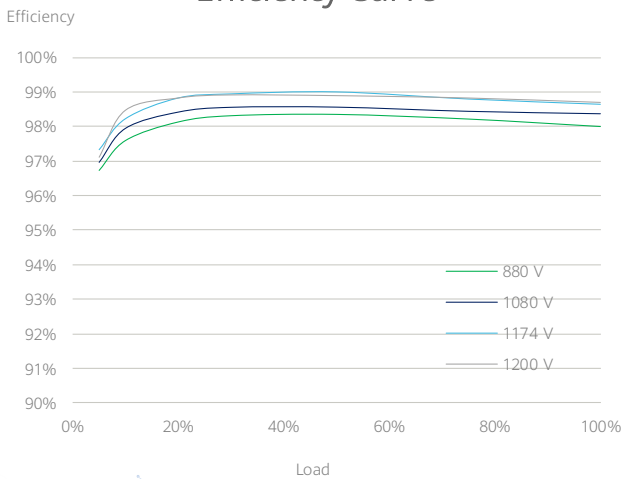
MBUS
Supported

Fuse Free
Design

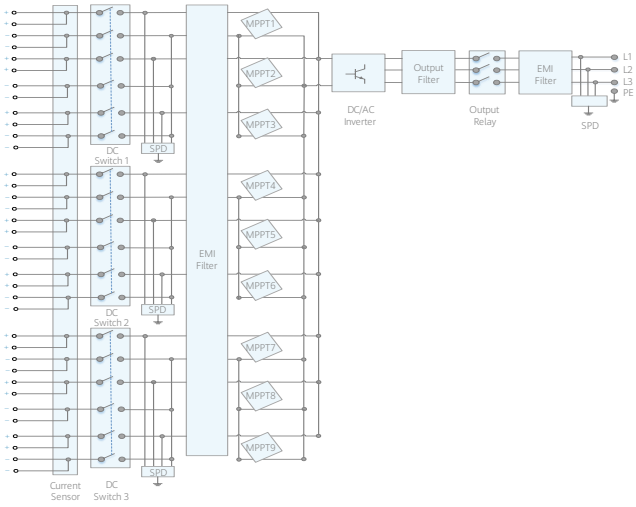
Surge Arresters for
DC & AC

IP66
Protection

Efficiency Curve



Circuit Diagram



SUN2000-215KTL-H0

Technical Specifications

Efficiency	
Max. Efficiency	99.00%
European Efficiency	98.60%
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 MPP Trackers	9
Output	
Nominal AC Active Power	200,000 W
Max. AC Apparent Power	215,000 VA
Max. AC Active Power (cosϕ=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 LG ... 0.8 LD
Max. Total Harmonic Distortion	< 3%
Protection	
Input-side Disconnection Device	Yes
Anti-islanding Protection	Yes
AC Overcurrent Protection	Yes
DC Reverse-polarity Protection	Yes
PV-array String Fault Monitoring	Yes
DC Surge Arrester	Type II
AC Surge Arrester	Type II
DC Insulation Resistance Detection	Yes
Residual Current Monitoring Unit	Yes
Communication	
Display	LED Indicators, WLAN + APP
USB	Yes
MBUS	Yes
RS485	Yes
General	
Dimensions (W x H x D)	1,035 x 700 x 365 mm (40.7 x 27.6 x 14.4 inch)
Weight (with mounting plate)	≤86 kg (189.6 lb.)
Operating Temperature Range	-25°C ~ 60°C (-13°F ~ 140°F)
Cooling Method	Smart Air Cooling
Max. Operating Altitude without Derating	4,000 m (13,123 ft.)
Relative Humidity	0 ~ 100%
DC Connector	Staubli MC4 EVO2
AC Connector	Waterproof Connector + OT/DT Terminal
Protection Degree	IP66
Topology	Transformerless

SUN2000-185KTL-H1
Smart String Inverter



9
MPP Trackers

99.0%
Max. Efficiency

String-level
Management

Smart I-V Curve
Diagnosis Supported

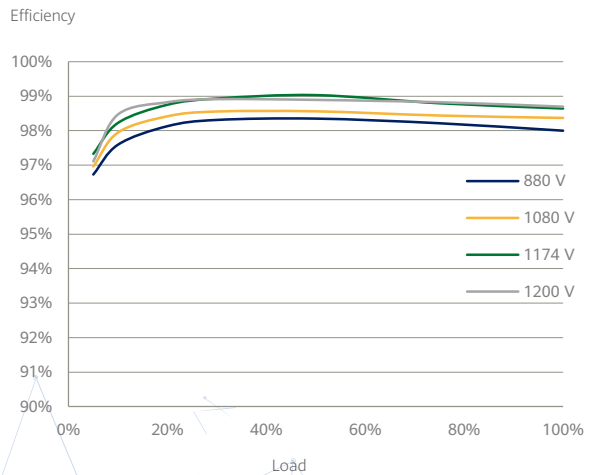
MBUS
Supported

Fuse Free
Design

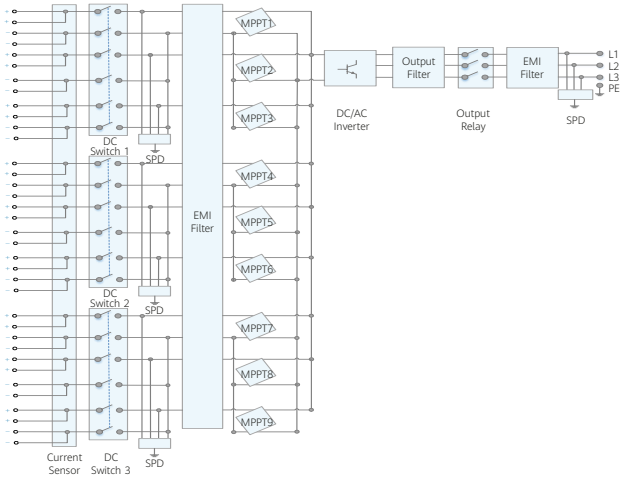
Surge Arresters for
DC & AC

IP66
Protection

Efficiency Curve



Circuit Diagram



Technical Specifications

Efficiency	
Max. Efficiency	99.03%
European Efficiency	98.69%
Input	
Max. Input Voltage	1,500 V
Max. Current per MPPT	26 A
Max. Short Circuit Current per MPPT	40 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 MPP Trackers	9
Output	
Nominal AC Active Power	175,000 W @40°C, 168,000 W @45°C, 160,000 W @50°C
Max. AC Apparent Power	185,000 VA
Max. AC Active Power (cosϕ=1)	185,000 W
Nominal Output Voltage	800 V, 3W + PE
Rated AC Grid Frequency	50 Hz / 60 Hz
Nominal Output Current	126.3 A @40°C, 121.3 A @45°C, 115.5 A @50°C
Max. Output Current	134.9 A
Adjustable Power Factor Range	0.8 LG ... 0.8 LD
Max. Total Harmonic Distortion	<3%
Protection	
Input-side Disconnection Device	Yes
Anti-islanding Protection	Yes
AC Overcurrent Protection	Yes
DC Reverse-polarity Protection	Yes
PV-array String Fault Monitoring	Yes
DC Surge Arrester	Type II
AC Surge Arrester	Type II
DC Insulation Resistance Detection	Yes
Residual Current Monitoring Unit	Yes
Communication	
Display	LED Indicators, Bluetooth/WLAN + APP
USB	Yes
RS485	Yes
MBUS	Yes
General	
Dimensions (W x H x D)	1,035 x 700 x 365 mm (40.7 x 27.6 x 14.4 inch)
Weight (with mounting plate)	84 kg (185.2 lb.)
Operating Temperature Range	-25°C ~ 60°C (-13°F ~ 140°F)
Cooling Method	Smart Air Cooling
Max. Operating Altitude without Derating	4,000 m (13,123 ft.)
Relative Humidity	0 ~ 100%
DC Connector	Staubli MC4 EVO2
AC Connector	Waterproof Connector + OT/DT Terminal
Protection Degree	IP66
Topology	Transformerless
Standard Compliance (more available upon request)	
Certificates	EN 62109-1/-2, IEC 62109-1/-2, EN 50530, IEC 62116, IEC 60068, IEC 61683, G99/1, PEA, MEA, Philippine Resolution No. 07, IEEE 1547, IEC 61727, IEC 62910, P.O. 12.3, RD 1699, RD 661, RD 413, RD 1565, RD 1663, UNE 206007-1, UNE 206006

SUN2000-100KTL-M1
Smart String Inverter



10
MPP Trackers

98.8% (@480V)
Max. Efficiency

String-level
Management

Smart I-V Curve
Diagnosis Supported

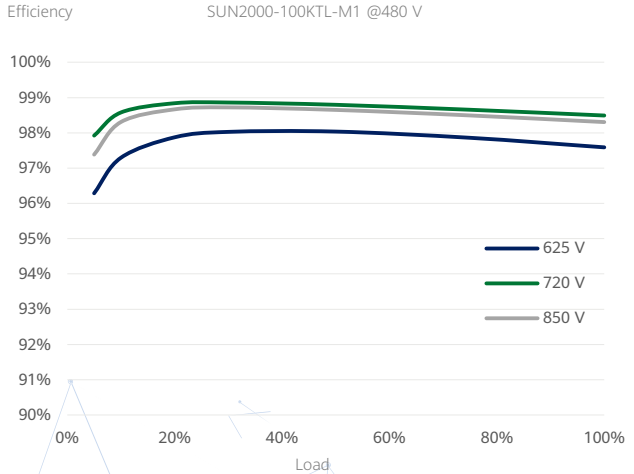
MBUS
Supported

Fuse Free
Design

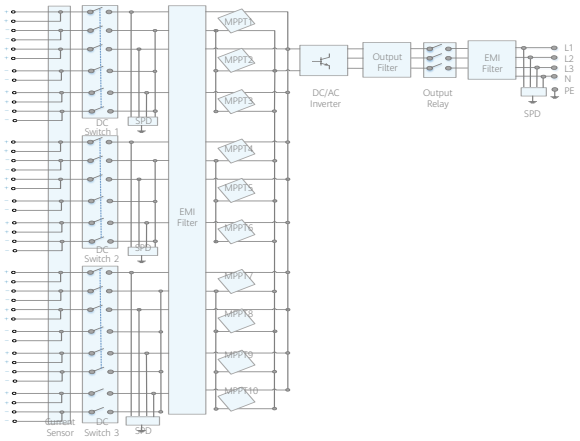
AFCI & PID Recovery
Optional

IP66
Protection

Efficiency Curve



Circuit Diagram



Technical Specifications

Efficiency	
Max. Efficiency	98.8% @480 V, 98.6% @380 V / 400 V
European Efficiency	98.6% @480 V, 98.4% @380 V / 400 V
Input	
Max. Input Voltage	1,100 V
Max. Current per MPPT	26 A
Max. Short Circuit Current per MPPT	40 A
Start Voltage	200 V
MPPT Operating Voltage Range	200 V ~ 1,000 V
Nominal Input Voltage	720 V @480 Vac, 600 V @400 Vac, 570 V @380 Vac
Number of Inputs	20
Number of MPP Trackers	10
Output	
Nominal AC Active Power	100,000 W
Max. AC Apparent Power	110,000 VA
Max. AC Active Power (cosϕ=1)	110,000 W
Nominal Output Voltage	480 V/ 400 V/ 380 V, 3W+(N)+PE
Rated AC Grid Frequency	50 Hz / 60 Hz
Nominal Output Current	120.3 A @480 V, 144.4 A @400 V, 152.0 A @380 V
Max. Output Current	133.7 A @480 V, 160.4 A @400 V, 168.8 A @380 V
Adjustable Power Factor Range	0.8 LG ... 0.8 LD
Max. Total Harmonic Distortion	< 3%
Protection	
Input-side Disconnection Device	Yes
Anti-islanding Protection	Yes
AC Overcurrent Protection	Yes
DC Reverse-polarity Protection	Yes
PV-array String Fault Monitoring	Yes
DC Surge Protection[1]	Yes
AC Surge Protection[1]	Yes
DC Insulation Resistance Detection	Yes
Residual Current Monitoring Unit	Yes
Arc Fault Protection	Optional
Communication	
Display	LED Indicators, WLAN + APP
USB	Yes
MBUS	Yes (isolation transformer required)
RS485	Yes
General	
Dimensions (W x H x D)	1,035 x 700 x 365 mm (40.7 x 27.6 x 14.4 inch)
Weight (with mounting plate)	90 kg (198.4 lb.)
Operating Temperature Range	-25°C ~ 60°C (-13°F ~ 140°F)
Cooling Method	Smart Air Cooling
Max. Operating Altitude without Derating	4,000 m (13,123 ft.)
Relative Humidity	0 ~ 100%
DC Connector	Staubli MC4
AC Connector	Waterproof Connector + OT/DT Terminal
Protection Degree	IP66
Topology	Transformerless
Standard Compliance (more available upon request)	
Certificates	EN 62109-1/-2, IEC 62109-1/-2, EN 50530, IEC 62116, IEC 61727, IEC 60068, IEC 61683

1: Compatible Type II protection class according to IEC / EN 61643-11

SmartACU2000D
Smart Array Controller



With SmartPID2000 Module



Without SmartPID2000 Module

Smart

All inverters acting as one unit;
Active and reactive power control

Simple

One unit managing one array;
Available for up to 150 inverters connection

Reliable

Performance and energy yield recollection;
Preventing power loss caused by PID effect

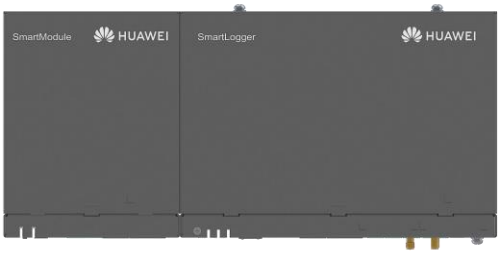
Technical Specification	SmartACU2000D-D-00	SmartACU2000D-D-02	SmartACU2000D-D-01	SmartACU2000D-D-03
Configuration				
Smart Logger	SmartLogger3000B x 1			
SmartModule1000A	Optional			Standard with SmartModule1000A x 1
RS485	Supported			
No. of MBUS[1]	1	2	1	2
No. of SmartPID2000	0	0	1	2
Environment				
Operating Temperature Range	-40°C ~ 60°C (-40°F ~ 140°F)			
Relative Humidity	4% ~ 100%			
Max. Operating Altitude	4,000 m (13,123 ft.)			
Electrical				
AC Input Voltage for SACU	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 / 60 Hz			
Power Supply	Standard: 12 V DC Optional: 24 V DC[2]			
Mechanical				
Cable Entries	Bottom in & out			
Maintenance	Front			
Dimensions (W x H x D)	640 x 770 x 315 mm (25.2 x 30.3 x 12.4 inch)		880 x 770 x 369 mm (34.6 x 30.3 x 14.5 inch)	
Weight	29 kg (63.9 lb.)	32 kg (70.5 lb.)	49 kg (108.0 lb.)	61 kg (134.5 lb.)
Protection Degree	IP65			
Installation Options	Wall Mounting, Rack Mounting, Pole Mounting			

1. Compatible with communication mode of PLC (Power Line Communication).
2. 24V DC power supply is optional to power devices that require 24Vdc input and output.

SmartLogger3000B



Without SmartModule1000A



With SmartModule1000A

Smart

Connecting up to 150 inverters,
One-click commissioning

Simple

Deployment wizard allowed, including
parameters configuration, devices connection

Reliable

Industrial-level application
and high reliability

Technical Specification	SmartLogger3000B	SmartLogger3000B SmartModule1000A
Device Management		
Max. Number of Manageable Devices	200	
Max. Number of Manageable Inverters	150	
Communication Interface		
WAN	WAN x 1, 10 / 100 / 1000 Mbps	
LAN	LAN x 1, 10 / 100 / 1000 Mbps	LAN x 3, 10 / 100 / 1000 Mbps
Optical Ethernet	SFP x 2, 100 / 1000 Mbps	
MBUS	Max. AC 800 V (±10%), 1,000m	
RS485	COM x 3, 1,200 / 2,400 / 4,800 / 9,600 / 19,200 / bps	COM x 6 1,200 / 2,400 / 4,800 / 9,600 / 19,200 / 115,200 bps
Digital / Analog Input / Output	DI x 4, DO x 2, AI x 4	DI x 8, DO x 2, AI x 7
PT100/PT1000	0	2
Active DO	12 V, 100 mA (connection with relay, sensor)	
Lightning Protection Module	Yes	
Communication Protocol		
Ethernet	Modbus-TCP, IEC 60870-5-104	
RS485	Modbus-RTU, IEC 60870-5-103 (standard), DL / T645	
Interaction		
LED	LED Indicator x 3 – RUN, ALM, 4G	LED Indicator x 5 – RUN, ALM, 4G; RUN, ALM
WEB	Embedded Web	
USB	USB 2.0 x 1	
APP	FusionSolar	
Environment		
Operating Temperature Range	-40°C ~ 60°C (-40°F ~ 140°F)	
Storage Temperature	-40°C ~ 70°C (-40°F ~ 158°F)	
Relative Humidity (Non-condensing)	5% ~ 95%	
Max. Operating Altitude	4,000 m (13,123 ft.)	
Electrical		
AC Power Supply	100 V ~ 240 V, 50 Hz / 60 Hz	
DC Power Supply	12 V / 24 V	
Power Consumption	Typical 9 W, Max. 15 W	Typical 10 W, Max. 18 W
Mechanical		
Dimensions (W x H x D)	225 x 160 x 44 mm (8.9 x 6.3 x 1.7 inch) Without mounting ears	350 x 160 x 44 mm (13.8 x 6.3 x 1.7 inch) Without mounting ears
Weight	2 kg (4.4 lb.)	3 kg (6.6 lb.)
Protection Degree	IP20	
Installation Options	Wall Mounting, DIN Rail Mounting, Tabletop Mounting	

SmartPID2000 Module
Inside Smart Array Controller



The SmartPID2000 Module is installed in the Smart Array Controller cabinet to reduce the negative effect of the Potential Induced Degradation (PID), and support 1000 V / 1100 V / 1500 V DC system.

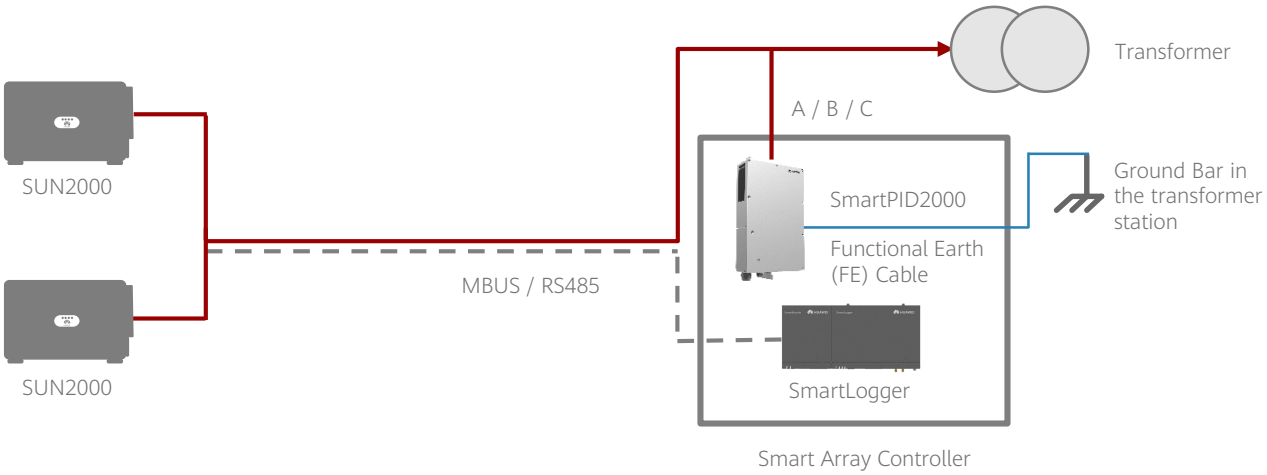
Smart

Data read and software upgrade through USB or the embedded Web

Reliable

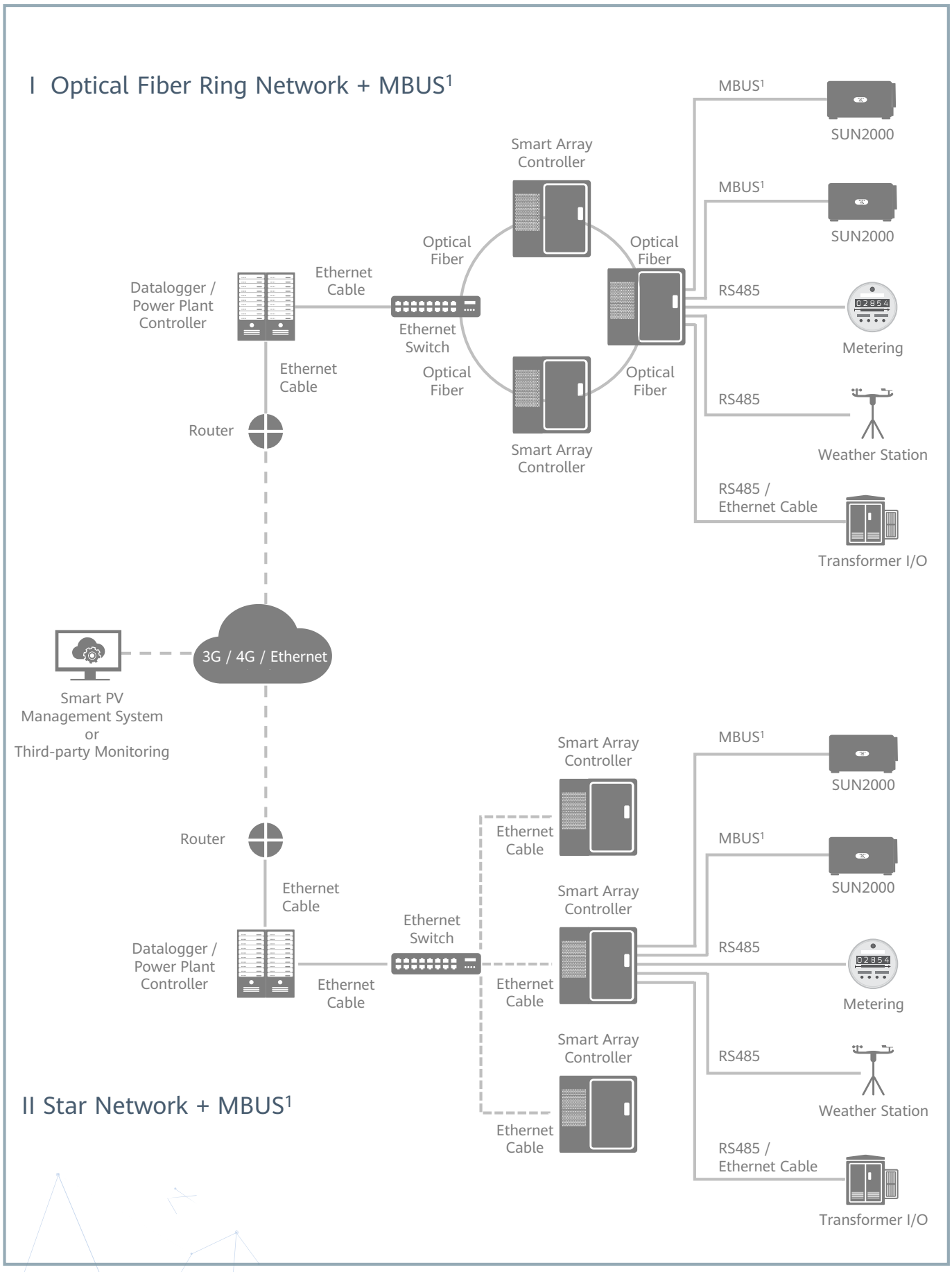
Protection degree of IP65

SmartPID2000 Solution Diagram



Note:
1. The Anti-PID solution could ONLY be deployed in utility installations which are normally connected to the medium voltage (MV) grid running WITHOUT neutral line.
2. The Anti-PID module must work with Huawei SmartLoggers and Huawei inverters.

Network Applications



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

NetEco1000S



Smart

Auto fault alarming and report issuing
Smart I-V Curve Diagnosis supported

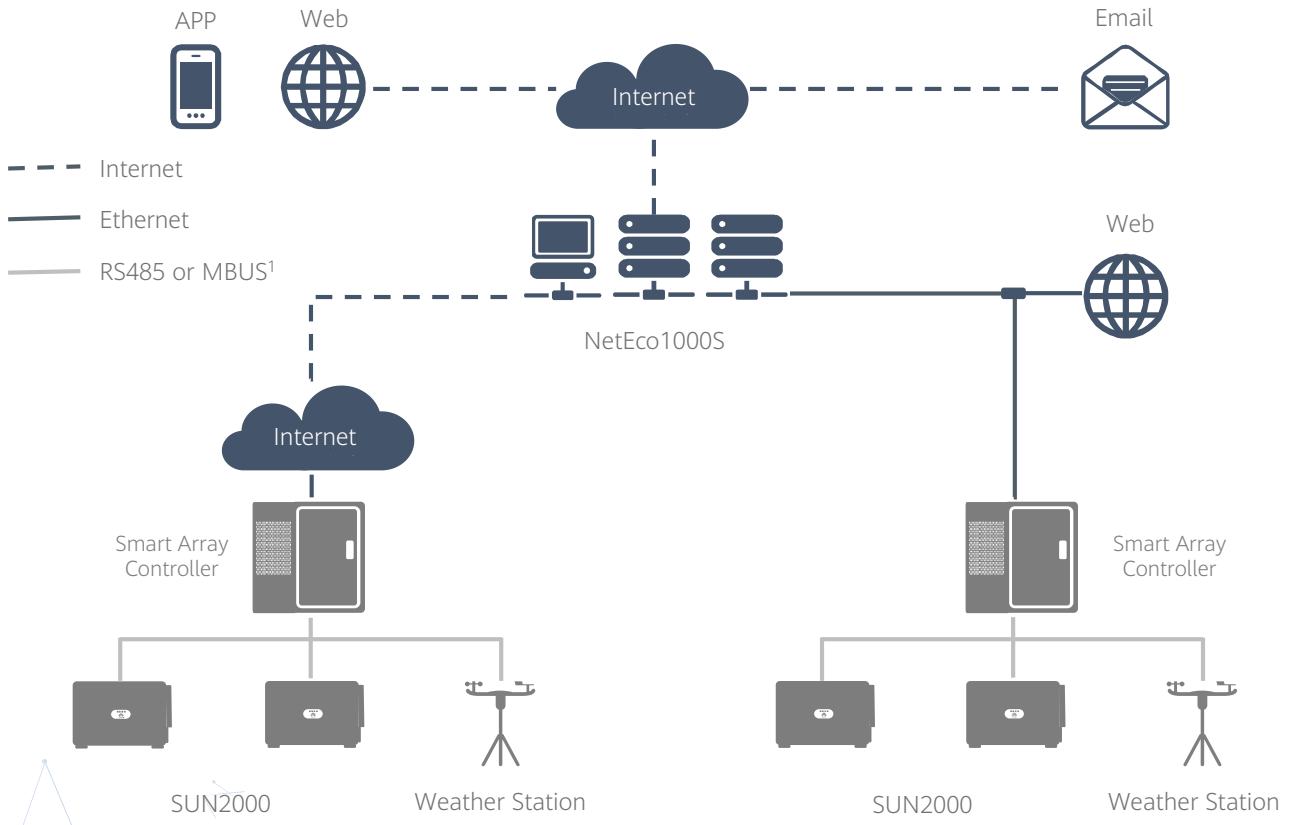
Simple

One-click installation on PC
Fault alarm via SMS and E-mail

Reliable

Hierarchical management
Up to 25 years data storage

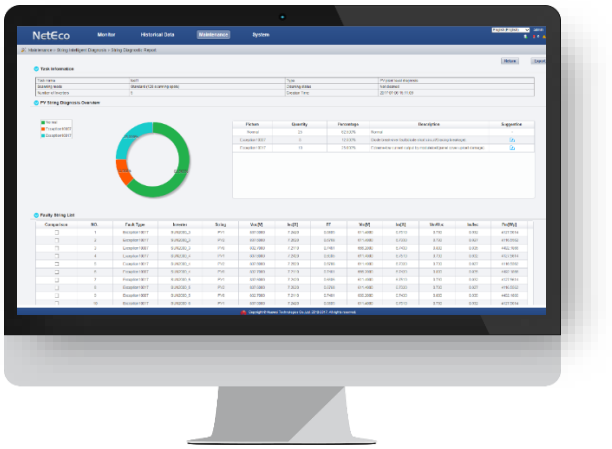
Network Structure



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

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. The scanning would help to find out and identify the strings with low performance or malfunction, which would help to achieve proactive maintenance, higher O&M efficiency and lower operation cost.



Smart

Support plant-level, array-level and inverter-level analysis and diagnosis

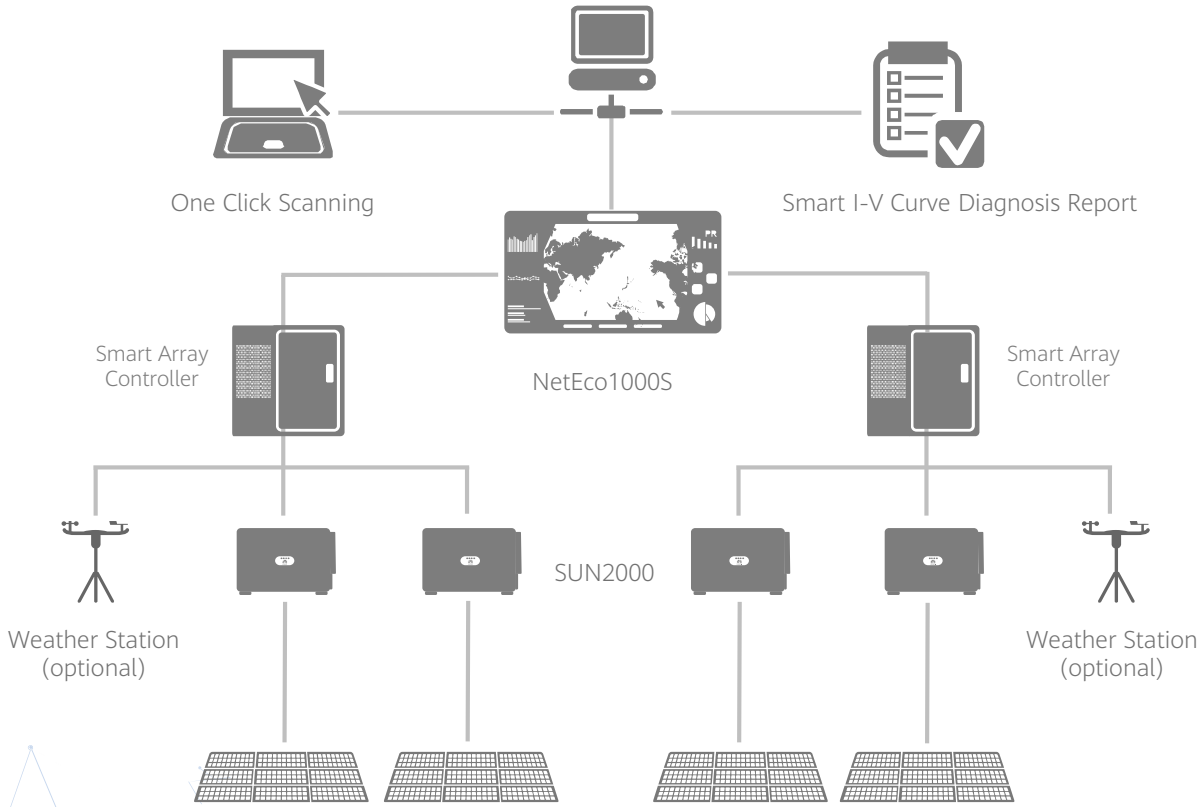
Automatically identify different failure types and provide recovery suggestion

Efficient

One-click scanning without onsite experts or equipment

Completing online I-V curve scanning on all strings of 100 MW plant within 15 minutes

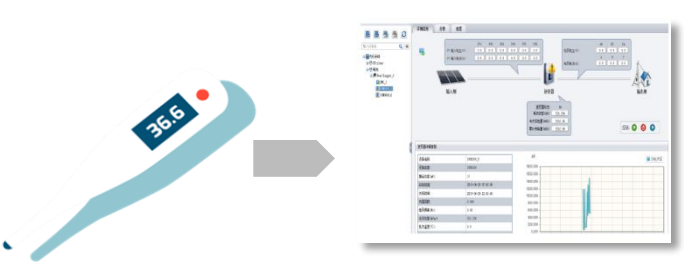
Network Structure



Smart I-V Curve Diagnosis

Technical Specifications	
Smart String Inverter	SUN2000-215KTL-H0,SUN2000-185KTL-H1,SUN2000-100KTL-M1 SUN2000-105KTL-H1, SUN2000-90KTL-H2, SUN2000-60KTL-M0
Control Unit	Smart Array Controller
Management System	NetEco1000S
Scanning Time	<1s per string
Sampling Points per I-V Curve	128
Voltage Accuracy	0.5%rdg. + 1dgt. (rdg.>5, dgt.= 0.3)
Current Accuracy	0.5%rdg. + 2dgt. (rdg.>0.3, dgt.= 0.006)
TÜVRheinland®	Smart I-V Curve Diagnosis is TUV Verified.

String-level Management



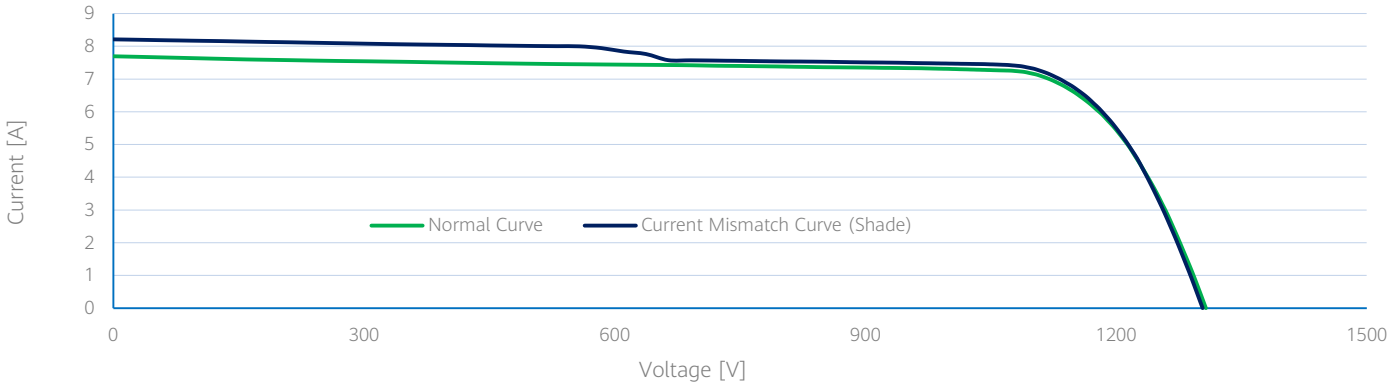
Real-time Monitoring

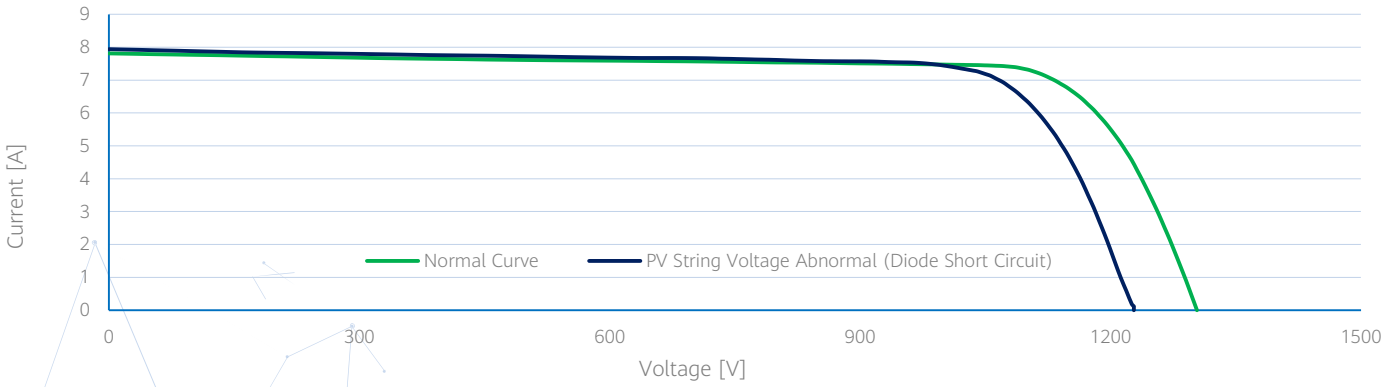
Smart I-V Curve Diagnosis



Fault Analysis

String I-V Curve Comparison





Smart PV Solution Reference





Krabi, Thailand
Ground-mounted Smart PV Plant

Capacity
5 MW

Inverter Model
SUN2000-60KTL-HV-D1-001





Numurkah, Victoria, Australia
Ground-mounted Smart PV Plant

Capacity
2.5 MW

Inverter Model
SUN2000-42KTL





Phnom Penh, Cambodia
Ground-mounted Smart PV Plant

Capacity
100 MW

Inverter Model
SUN2000-65KTL-M0
Smart Transformer Station

Smart PV Solution Reference





Sungai Siput, Malaysia
Mountain-mounted Smart PV Plant

Capacity
49 MW

Inverter Model
SUN2000-42KTL





Huaibei, Anhui, China
Water Floating Smart PV Plant

Capacity
60 MW

Inverter Model
SUN2000-60KTL-HV-D1





Ninh Thuan Province, Vietnam
Ground-mounted Smart PV Plant

Capacity
50 MW

Inverter Model
SUN2000-185KTL-H1
Smart Transformer Station

Smart PV Solution Reference





Delingha, Qinghai, China
Ground-mounted Smart PV Plant

Capacity	Inverter Model
200 MW	SUN2000-100KTL





Haixing, Hebei, China
Ground-mounted Smart PV Plant

Capacity	Inverter Model
62 MW	SUN2000-100KTL





Sihong, Jiangsu, China
Water Surface Smart PV Plant

Capacity	Inverter Model
100 MW	SUN2000-100KTL

Smart PV Solution Reference



SAKAKA, Saudi Arabia
Ground-mounted Smart PV Plant

Capacity	Inverter Model
300 MW	SUN2000-90KTL



Şanlıurfa, Turkey
Ground-mounted Smart PV Plant

Capacity	Inverter Model
12 MW	SUN2000-60KTL-M0



Jinjia, Uganda
Ground-mounted Smart PV Plant

Capacity	Inverter Model
10 MW	SUN2000-90KTL

Smart PV Solution Reference



Milton Keynes, UK
Ground-mounted Smart PV Plant

Capacity	Inverter Model
10 MW	SUN2000-60KTL-HV



Krempendorf, Germany
Ground-mounted Smart PV Plant

Capacity	Inverter Model
20 MW	SUN2000-28KTL



MerleSud + Sénéguier, France
Ground-mounted Smart PV Plant

Capacity	Inverter Model
24 MW	SUN2000-60KTL-HV



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