Back

Certificate No. AK 50296639

Certificate Holder:	**HUAWEI TECHNOLOGIES CO., LTD.** Administration Building, Headquarters of Huawei Technologies Co., Ltd. Bantian, Longgang District, Shenzhen, 518129 Guangdong China (Mainland)
Certificate Number:	AK 50296639
Order Number:	154056116
Certified Product:	PV-Inverter (Grid-Connected PV Inverter) Model Designation: SUN2000-xKTL
Fulfilled Standards:	IEC 61727:2004 IEC 62116:2014 The standard(s) listed here reflect the status at the time of the release of this certificate.
Date of Issue:	2014-11-03
Certificate Type:	Certificate of Conformity The certificate of conformity (CoC) refers to the product specified in the certificate. The certificate demonstrates that a product sample was tested and evaluated at a specific time, and found to be in conformity with the assessment requirements specified in the certificate. A CoC is relevant to importers and exporters to prove that products comply with local regulations. This certificate does not imply an assessment of the product's production and does not permit the use of a TÜV Rheinland test mark.

Digitally signed by Mereacre Andrei
Date: 2021.08.26 13:57:46 EEST
Reason: MoldSign Signature
Location: Moldova

Further Information

- Request more information on HUAWEI TECHNOLOGIES CO., LTD.
- All product certificates of HUAWEI TECHNOLOGIES CO., LTD.

Declaration of Conformity

Equipment:	**SOLAR INVERTER**
Brand Name:	HUAWEI
Test Model No.:	**SUN2000-8KTL-M0, SUN2000-10KTL-M0, SUN2000-12KTL-M0, SUN2000-15KTL-M0, SUN2000-17KTL-M0, SUN2000-20KTL-M0, SUN2000-8KTL-M2, SUN2000-10KTL-M2, SUN2000-12KTL-M2, SUN2000-15KTL-M2, SUN2000-17KTL-M2, SUN2000-20KTL-M2**
Applicant:	**Huawei Technologies Co., Ltd.** Administration Building, Headquarters of Huawei Technologies Co., Ltd., Bantian, Longgang District, Shenzhen, 518129, P.R.C

Use in accordance with regulations:

Power generation systems connected to the low-voltage distribution network.

Technical minimum requirements for the connection to and parallel operation with low-voltage distribution networks.

Applied rules and standards

DIN VDE V 0124-100 (VDE V 0124-100):2012-07 – Grid integration of power generation systems – Low voltage

Test requirements for generation units to be connected and operated parallel with the low voltage distribution networks

VDE-AR-N 4105:2018-11 –Generators connected to the low-voltage distribution network

Technical requirements for the connection to and parallel operation with low-voltage distribution networks

Name: James Huang
Technical Manager/ New Energy Team
Date: 2019-05-28

Declaration of Conformity

Equipment:	**SOLAR INVERTER**
Brand Name:	HUAWEI
Test Model No.:	**SUN2000-8KTL-M0, SUN2000-10KTL-M0, SUN2000-12KTL-M0, SUN2000-15KTL-M0, SUN2000-17KTL-M0, SUN2000-20KTL-M0, SUN2000-8KTL-M2, SUN2000-10KTL-M2, SUN2000-12KTL-M2, SUN2000-15KTL-M2, SUN2000-17KTL-M2, SUN2000-20KTL-M2**
Applicant:	**Huawei Technologies Co., Ltd.** Administration Building, Headquarters of Huawei Technologies Co., Ltd., Bantian, Longgang District, Shenzhen, 518129, P.R.C

Use in accordance with regulations:

Power generation systems connected to the low-voltage distribution network.

Technical minimum requirements for the connection to and parallel operation with low-voltage distribution networks.

Applied rules and standards

DIN VDE V 0124-100 (VDE V 0124-100):2012-07 – Grid integration of power generation systems – Low voltage

Test requirements for generation units to be connected and operated parallel with the low voltage distribution networks

VDE-AR-N 4105:2018-11 –Generators connected to the low-voltage distribution network

Technical requirements for the connection to and parallel operation with low-voltage distribution networks

Name: James Huang
Technical Manager/ New Energy Team
Date: 2019-05-28

Product Service

EU Type Examination Certificate

Certificate No: TPS-RED500156 i03

Certificate Holder: **Huawei Technologies Co., Ltd.**
Administration Building
Headquarters of Huawei Technologies Co., Ltd.
Bantian, Longgang District
518129 Shenzhen
PEOPLE'S REPUBLIC OF CHINA

Product Type: **Wireless LAN equipment**
Solar Inverter

Model(s): **SUN2000-20KTL-M0, SUN2000-8KTL, SUN2000-10KTL, SUN2000-12KTL, SUN2000-8KTL-M0, SUN2000-10KTL-M0, SUN2000-12KTL-M0, SUN2000-15KTL-M0, SUN2000-17KTL-M0, SUN2000-15KTL-M2, SUN2000-17KTL-M2, SUN2000-20KTL-M2, SUN2000-8KTL-M2, SUN2000-10KTL-M2, SUN2000-12KTL-M2**

We, as Notified Body number 0123, have examined the technical documentation and supporting evidence for the above listed equipment and found it to comply with the requirements of Annex III Module B of Radio Equipment Directive 2014/53/EU in relation to the following essential requirements covered by the examination

Essential Requirements: Article 3.1 (a) in respect of Health and Safety
Article 3.1 (b) in respect to EMC
Article 3.2 in respect to the use of the Radio Spectrum

This is based upon examination of the following Technical Data file. Please refer to the Annex for further technical details.

Technical Documentation: SUN2000-8KTL-M0 (v) up2 RED TCF

Valid from: 2020-07-16

(Laurentiu Dan Miiler)

Total pages: Page 1 of 3

The certificate has been issued in accordance with the Certification Regulations of TÜV SÜD Product Service GmbH (Notified Body Number 0123) and constitutes page 1 of the combined Certificate and Annex.

The CE marking may be used on the equipment described above subject to the equipment meeting the compliance requirements of all applicable EU directives.

The conditions for the validity of this certificate are listed in the Annex.
For further details related to this certification please contact ps-zert@tuev-sued.de

Issued by TÜV SÜD Product Service under document number: RED1A 041829 4241 Rev. 00

TÜV SÜD Product Service GmbH • Certification Body • Ridlerstraße 65 • 80339 Munich • Germany

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Annex to
EU-Type Examination Certificate

1 Equipment Description

Equipment is a Solar Inverter supporting WLAN technology.

1.1 Models

	Model	Variant HW/SW Differences	HW Version	SW Version
Original	SUN2000-20KTL-M0	All models have the same technical construction including circuit diagram, PCB Layout, components and component layout, all electrical construction and mechanical construction, with SOLAR INVERTER SUN2000-20KTL-M0. The differences among these models are the output power ratings and CPU	V100	V100
Variant	SUN2000-8KTL, SUN2000-10KTL, SUN2000-12KTL, SUN2000-8KTL-M0, SUN2000-10KTL-M0, SUN2000-12KTL-M0, SUN2000-15KTL-M0, SUN2000-17KTL-M0 SUN2000-15KTL-M2, SUN2000-17KTL-M2, SUN2000-20KTL-M2, SUN2000-8KTL-M2, SUN2000-10KTL-M2, SUN2000-12KTL-M2			

1.2 Supported Functions and Features

1.2.1 Non-radio features

d.c. Max. Input Voltage: 1080VDC; d.c. Max. Input Current: 22A/22A;

MPPT Voltage Range: 160VDC – 950VDC; Output Voltage 3/N/PE, 380/220V; 3/N/PE, 400/230V

Output Frequency: 50/60Hz

1.2.2 Radio features

Radio	Features	Operating Spectrum / Power	
IEEE 802.11 – 2.4 GHz	b/g/n20, Adaptive	2400-2483.5 MHz	17.99 dBm

1.3 Associated Parts

Model/Part Number	Description
N/A	N/A

2 Assessed Standards

Article 3.1(a)	Article 3.1(b)	Article 3.2
EN 62109-1:2010 EN 62109-2:2011 EN 50385:2017 EN 62232:2017	EN 55011:2016 EN 62920:2017 EN 61000-6-1:2007 EN 61000-6-2:2005 EN 61000-6-3:2007/A1:2011 EN 61000-6-4:2007/A1:2011 EN 301 489-1 V2.2.3 Draft EN 301 489-17 V3.2.2 EN 61000-3-2:2014 EN 61000-3-3:2013 EN 61000-3-11:2000 EN 61000-3-12:2011	EN 300 328 V2.1.1

Annex to
EU-Type Examination Certificate

3 Technical Documentation

3.1 Technical Documentation

Technical documentation and supporting evidence were examined and found to comply with the EU-type examination requirements in conjunction with Annex V requirements of the directive.

3.2 Declarations

Declaration of Conformity of SUN2000-8KTL(v) up2 for RED, Draft	Dated	2020-07-02
Declaration of multiple model difference	Dated	2020-07-10
Modification description for SUN2000-8KTL(v) up2	Dated	2020-06-07

3.3 Strategic Documentation

Risk Assessment Letter of SUN2000-8KTL(v) up1 for RED	Issued	2020-06-07
Justification of Conformity of SUN2000-8KTL(v) up2 for RED	Modified	2020-07-16

3.4 Technical Compliance Documentation

3.4.1 Article 3.1(a)

083-52008201-200 part 1 of 2	Issued	2020-07-03
083-52008201-200 part 2 of 2	Issued	2020-07-03
SYBH(R-EMF)05606530EA-1	Issued	2019-09-19

3.4.2 Article 3.1(b)

68.760.20.0076.03	Issued	2020-07-02

3.4.3 Article 3.2

ES190709018W	Issued	2019-08-18

4 Additional Information

None

5 Conditions of Validity

None

Signature: _____ Date: 2020-07-16

On behalf of TÜV SÜD Product Service

Certificate of Conformity

Certificate No.:	**1988AP0424N048008**
Equipment:	**SOLAR INVERTER**
Brand Name:	HUAWEI
Test Model No.:	**SUN2000-8KTL-M0, SUN2000-10KTL-M0, SUN2000-12KTL-M0, SUN2000-15KTL-M0, SUN2000-17KTL-M0, SUN2000-20KTL-M0, SUN2000-8KTL-M2, SUN2000-10KTL-M2, SUN2000-12KTL-M2, SUN2000-15KTL-M2, SUN2000-17KTL-M2, SUN2000-20KTL-M2**
Applicant:	**Huawei Technologies Co., Ltd.** Administration Building, Headquarters of Huawei Technologies Co., Ltd., Bantian, Longgang District, Shenzhen, 518129, P.R.C
Report No.:	**PVCZ190424N048**

Use in accordance with regulations:
Automatic disconnection device with three-phase mains surveillance in accordance with EN 50438:2013 for photovoltaic systems with a three-phase parallel coupling via an inverter in the public mains supply. The automatic disconnection device is an integral part of the aforementioned inverter.

Applied rules and standards
EN 50438:2013, CSN EN 50438:2014
DIN V VDE V 0126-1-1:2006-02 (Functional safety)
PRAVIDLA PROVOZOVÁNÍ DISTRIBUČNÍCH SOUSTAV PŘÍLOHA 4 2017

The generators SUN2000-12KTL-M0, SUN2000-15KTL-M0, SUN2000-17KTL-M0, SUN2000-20KTL-M0, SUN2000-12KTL-M2, SUN2000-15KTL-M2, SUN2000-17KTL-M2, and SUN2000-20KTL-M2 are rated > 16A per phase. However all requirements of the EN 50438:2013 are fulfilled.
At the time of issue of this certificate the safety concept of an aforementioned representative product corresponds to the valid safety specifications for the specified use in accordance with regulations.

Name: James Huang
Technical Manager/ New Energy Team
Date: 2019-05-30

Certificate of Conformity

Certificate No.:	**2088AP0511N069001**
Equipment:	**SOLAR INVERTER**
Brand Name:	**HUAWEI**
Test Model No.:	**SUN2000-8KTL-M0, SUN2000-10KTL-M0, SUN2000-12KTL-M0, SUN2000-15KTL-M0, SUN2000-17KTL-M0, SUN2000-20KTL-M0, SUN2000-8KTL-M2, SUN2000-10KTL-M2, SUN2000-12KTL-M2, SUN2000-15KTL-M2, SUN2000-17KTL-M2, SUN2000-20KTL-M2**
Applicant:	**Huawei Technologies Co., Ltd.** Administration Building, Headquarters of Huawei Technologies Co., Ltd., Bantian, Longgang District, Shenzhen, 518129, P.R.C
Report No.:	**PVFR200511N069**

Use in accordance with regulations:

Automatic disconnection device with three-phases mains surveillance in accordance with DIN V VDE V 0126-1-1/A1 VFR2014, DIN V VDE V 0126-1-1/A1 VFR2019 (Protection of production installations connected to the public distribution network, ERDF-NOI-RES_13E, Version 7, 14/12/2018), for photovoltaic systems with a three-phases parallel coupling via an inverter in the public mains supply. The automatic disconnection device is an integral part of the aforementioned inverter. This serves as a replacement for the disconnection device with isolating function that can access the distribution network provider at any time.

Applied rules and standards

UTE C15-712-1:2013-07, UTE C 15-712-1:2010-07, rectificatif 0:2010-09 et rectificatif 1:2012-02

Photovoltaic installations connected to the public distribution network

DIN V VDE V 0126-1-1/A1:2012-02

Automatic disconnection device between a generator and the public low-voltage grid; Amendment 1.

The safety concept of an aforementioned representative product corresponds at the time of issue of this attestation to valid safety specifications for the specified use in accordance with regulations.

BUREAU VERITAS CONSUMER PRODUCTS SERVICES

Name: James Huang
Technical Manager/ New Energy Team
Date: 2020-05-26

Certificate of Conformity

Certificate No.:	**2088AP080041001**
Product:	**SOLAR INVERTER**
Brand Name:	HUAWEI
Test Model No.:	**SUN2000-12KTL-M2, SUN2000-15KTL-M2, SUN2000-17KTL-M2, SUN2000-20KTL-M2**
Applicant:	**Huawei Technologies Co., Ltd.** Administration Building, Headquarters of Huawei Technologies Co., Ltd., Bantian, Longgang District, Shenzhen, 518129, P.R.C
Report No.:	**PV2008WDG0041, H202007301123-01EN**

Use in accordance with regulations:

The inverters are tested for specified environmental influences and efficiency. For detailed information, please watch the corresponding test reports.

Applied rules and standards

IEC 60068-2-1:2007	Environmental testing – Part 2-1: Tests – Test A: Cold
IEC 60068-2-2:2007	Environmental testing – Part 2-2: Tests – Test B: Dry heat
IEC 60068-2-6:2007	Environmental testing – Part 2-6: Tests –Test Fc: Vibration (sinusoidal)
IEC 60068-2-14:2009	Environmental testing – Part 2-14: Tests – Test N: Change of temperature
IEC 60068-2-27:2008	Environmental testing – Part 2-27: Tests –Test Ea and guidance: Shock
IEC 60068-2-30:2005	Environmental testing – Part 2-30: Tests –Test Db and guidance: Damp heat, cyclic (12 + 12-hour cycle)
IEC 60068-2-31:2008	Environmental testing – Part 2-31: Tests – Test Ec: Rough handling shocks, primarily for equipment-type specimens
IEC 60068-2-64:2008	Environmental testing – Part 2-64: Tests –Test Fh: Vibration, broadband random and guidance
IEC 60068-2-78:2012	Environmental testing – Part 2-78: Tests –Test Cab: Damp heat, steady state
IEC 61683:1999	Photovoltaic systems – Power conditioners – Procedure for measuring efficiency

Name: James Huang
Technical Manager/ New Energy Team
Date: 2020-10-21

Bureau Veritas Shenzhen Co., Ltd. Dongguan Branch
No. 96, Guantai Road (Houjie Section), Houjie Town, Dongguan Town, City, Guangdong Province, 523942, People's Republic of China
Tel: +86 769 8998 2098 Fax: +86 769 8599 1080
Email: customerservice.dg@bureauveritas.com

Certificate of Conformity

Certificate No.:	**2088AP110256002**
Equipment:	**SOLAR INVERTER**
Brand Name:	HUAWEI
Test Model No.:	**SUN2000-20KTL-M3**
Applicant:	**Huawei Technologies Co., Ltd.** Administration Building, Headquarters of Huawei Technologies Co., Ltd., Bantian, Longgang District, Shenzhen, 518129, P.R.C
Report No.:	**PV2011WDG0256**

Use in accordance with regulations:

Automatic disconnection device with three-phases mains surveillance in accordance with IEC 61727:2004 for photovoltaic systems with a three-phases parallel coupling via an inverter in the public mains supply. The automatic disconnection device is an integral part of the aforementioned inverters.

At the time of issue of this certificate the safety concept of an aforementioned representative product corresponds to the valid safety specifications for the specified use in accordance with regulations.

Applied rules and standards

IEC 61727:2004 Characteristics of the utility interface

BUREAU VERITAS CONSUMER PRODUCTS SERVICES

Name: James Huang
Technical Manager/ New Energy Team
Date: 2020-12-15

APPROVALS®

Certificate of Suitability

Certificate No.: SAA192066

Certificate Holder: Huawei Technologies Co., Ltd.
Administration Building,
Headquarters of Huawei Technologies Co., Ltd.,
Bantian, Longgang District,
Shenzhen 518129
P.R. China

Class Description: Non-Declared
Product Description: Solar Inverter
Trade Name: HUAWEI
Model No.: SUN2000-20KTL-M0
Markings: Input: MPPT Range: 160-950Vdc, Max 1080Vdc, 22A/22A, Isc: 30A/30A
Output: 230/400V~ 3N+PE, 50Hz 20kVA, Max 22kVA 33.5A
-25°C to +60°C, Class I, IP65
Standard: IEC 62109-1 Ed. 1.0
IEC 62109-2 Ed. 1.0
AS/NZS 4777.2:2015
Conditions: Nil

Certification Mark: SAA192066 or RCM

Date First Registered: 15 August 2019
Date of Expiry: 15 August 2024

For and on Behalf of
SAA Approvals Pty Ltd

SAA Approvals CERTIFIED

SAA Approvals Pty Ltd as accredited by JAS-ANZ under ISO/IEC 17065 certifies in accordance with the SAA Approvals Electrical Product Safety Certification Scheme that the product nominated in this certificate complies with standard/s listed.

When using the RCM the requirements of all relevant parts of AS/NZS 4417 applicable to the article must be fulfilled.

For SAA Contact Details and to verify this Certificate go to:
www.saaapprovals.com.au

JAS-ANZ
www.jas-anz.org/register

Issued: 15-08-19 192066/1

Product Service

ATTESTATION OF CONFORMITY

Client:	Huawei Technologies Co., Ltd Administration Building Headquarters of Huawei Technologies Co., Ltd., Bantian, Longgang District, 518129 Shenzhen, PEOPLE'S REPUBLIC OF CHINA
Manufacturing place:	1) Huawei Machine Co., Ltd. No. 2 City Avenue, Songshan Lake Sci. & Tech. Industry Park, 523808 Dongguan, Guangdong, PEOPLE'S REPUBLIC OF CHINA 2) Shenzhen Fugui Precision Industry Co., LTD Floor 1~4, Building 1, F8d District, Foxconn Science and Technology Industrial Park, East side of Min Qing Road, Longhua Subdistrict, Longhua District, 518109, Shenzhen, Guangdong, PEOPLE'S REPUBLIC OF CHINA
Test subject:	SOLAR INVERTER Type: SUN2000-50KTL-M0, SUN2000-60KTL-M0, SUN2000-65KTL-M0, SUN2000-70KTL-INM0
Test specification:	EN 50530:2010/A1:2013 Overall efficiency of grid connected photovoltaic inverters
Purpose of examination:	Test according to the test specification
Test result:	The test results show that the presented product is tested according to procedure for measuring efficiency of specified standard above(see attachment for detail efficiency measurement result)
Test report No.	70.409.18.051.17-00

Date, 2018-04-12

(Zhengdong Ma)

Number-ID : TPSF0952.11E/ Revision 0 / Effective: 2011-04-01 – to be printed on attestation paper C/03/06

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Product Service

Attachment

Measuring of efficiency	
Extract from test report:	No. 70.409.18.051.17-00

Static MPPT Efficiency - SUN2000-50KTL-M0@3/N/PE~, 230/400V						
Technology	cSi	cSi	cSi	TF	TF	TF
DC voltage	U_{MPPmax}* (800V)	$U_{DC,r}$ (600V)	U_{MPPmin} (520V)	U_{MPPmax}* (770V)	$U_{DC,r}$ (600V)	U_{MPPmin} (520V)
P/P_n						
5%	99,29	99,94	99,95	99,94	99,94	99,95
10%	99,96	99,98	99,96	99,97	99,98	99,96
20%	99,97	99,99	99,98	99,99	99,99	99,98
25%	99,96	99,99	99,98	99,98	99,99	99,98
30%	99,97	99,98	99,98	99,96	99,98	99,98
50%	99,98	99,98	99,99	99,99	99,98	99,99
75%	99,99	99,99	99,98	99,99	99,99	99,98
100%	99,98	99,99	99,93	99,95	99,99	99,93

Note: * The value of U_{MPPmax} or 0,8*U_{DCmax}(cSi)/0,7*U_{DCmax}(TF), whichever is lower shall be used.
Static MPPT Efficiency:

$$\eta_{MPPTstat} = \frac{1}{P_{MPP,PVS} \cdot T_M} \sum_i U_{DC,i} \cdot I_{DC,i} \cdot \Delta T$$

Conversion Efficiency - SUN2000-50KTL-M0@3/N/PE~, 230/400V						
Technology	cSi	cSi	cSi	TF	TF	TF
DC voltage	U_{MPPmax}* (800V)	$U_{DC,r}$ (600V)	U_{MPPmin} (520V)	U_{MPPmax}* (770V)	$U_{DC,r}$ (600V)	U_{MPPmin} (520V)
P/P_n						
5%	96,03	96,92	96,01	96,50	96,92	96,01
10%	97,60	98,02	97,22	97,85	98,02	97,22
20%	98,30	98,56	97,80	98,37	98,56	97,80
25%	98,39	98,60	97,95	98,41	98,60	97,95
30%	98,45	98,67	98,12	98,45	98,67	98,12
50%	98,52	98,72	98,26	98,46	98,72	98,26
75%	98,44	98,65	98,22	98,33	98,65	98,22

Product Service

Attachment

100%	98,32	98,55	98,13	98,17	98,55	98,13

Note: * The value of U_{MPPmax} or 0,8*U_{DCmax}(cSi)/0,7*U_{DCmax}(TF), whichever is lower shall be used.

Static Power Conversion Efficiency:

$$\eta_{conv} = \frac{\int_0^{T_{ref}} p_{AC}(t) \cdot dt}{\int_0^{T_{ref}} p_{DC}(t) \cdot dt}$$

Max. conversion efficiency is 98,72% at $U_{DC,r}$(600VDC) with 50% rated output power.

Calculation of Static MPPT, Conversion and Overall Efficiency - SUN2000-50KTL-M0@3/N/PE~, 230/400V

Technology	DC voltage	Static MPPT Efficiency		Conversion Efficiency		Overall Efficiency	
		EU	CEC	EU	CEC	EU	CEC
cSi	U_{MPPmax}* (800V)	99,96	99,98	98,31	98,41	98,27	98,39
	$U_{DC,r}$ (600V)	99,98	99,99	98,56	98,63	98,55	98,62
	U_{MPPmin} (520V)	99,97	99,98	98,03	98,15	98,00	98,13
TF	U_{MPPmax}* (770V)	99,98	99,98	98,29	98,35	98,27	98,33
	$U_{DC,r}$ (600V)	99,98	99,99	98,56	98,63	98,55	98,62
	U_{MPPmin} (520V)	99,97	99,98	98,03	98,15	98,00	98,13

Note: * The value of U_{MPPmax} or 0,8*U_{DCmax}(cSi)/0,7*U_{DCmax}(TF), whichever is lower shall be used.

Dynamic MPPT Efficiency - SUN2000-50KTL-M0@3/N/PE~, 230/400V

Dynamic MPPT-Test 10 % ⇒ 50 %G_{STC}

Number	Slope W/m²/s	Ramp UP s	Dwell time s	Ramp DN s	Dwell time s	Dynamic MPPT Efficiency
2	0,5	800	10	800	10	99,98
2	1	400	10	400	10	99,96
3	2	200	10	200	10	99,96
4	3	133	10	133	10	99,95
6	5	80	10	80	10	99,94
8	7	57	10	57	10	99,88
10	10	40	10	40	10	99,87
10	14	29	10	29	10	99,85
10	20	20	10	20	10	99,80
10	30	13	10	13	10	99,66

Attachment

10	50	8	10	8	10	99,55
Overall Dynamic MPPT Efficiency						99,85

Dynamic MPPT-Test 30 % ⇒ 100 %G_{STC}

Number	Slope W/m²/s	Ramp UP s	Dwell time s	Ramp DN s	Dwell time s	Dynamic MPPT Efficiency
10	10	70	10	70	10	99,96
10	14	50	10	50	10	99,92
10	20	35	10	35	10	99,91
10	30	23	10	23	10	99,90
10	50	14	10	14	10	99,87
10	100	7	10	7	10	99,92
Overall Dynamic MPPT Efficiency						99,91

Start-up and shut-down

Number	Slope W/m²/s	Ramp UP s	Dwell time s	Ramp DN s	Dwell time s	Dynamic MPPT Efficiency
1	0,1	980	30	980	30	99,90
Overall Dynamic MPPT Efficiency						99,90

Product Service

Attachment

Static MPPT Efficiency - SUN2000-60KTL-M0@3/N/PE~, 230/400V						
Technology	cSi	cSi	cSi	TF	TF	TF
DC voltage	U_{MPPmax}* (800V)	$U_{DC,r}$ (600V)	U_{MPPmin} (520V)	U_{MPPmax}* (770V)	$U_{DC,r}$ (600V)	U_{MPPmin} (520V)
P/P_n						
5%	99,99	99,88	99,98	99,94	99,88	99,98
10%	99,99	99,97	99,99	99,97	99,97	99,99
20%	99,99	99,98	99,99	99,99	99,98	99,99
25%	99,99	99,99	99,99	99,98	99,99	99,99
30%	99,99	99,99	99,99	99,96	99,99	99,99
50%	99,99	99,99	99,99	99,99	99,99	99,99
75%	99,99	99,97	99,99	99,99	99,97	99,99
100%	99,99	99,98	99,99	99,95	99,98	99,99
Note: * The value of U_{MPPmax} or 0,8*U_{DCmax}(cSi)/0,7*U_{DCmax}(TF), whichever is lower shall be used.						

$$\eta_{MPPTstat} = \frac{1}{P_{MPP,PVS} \cdot T_M} \sum_i U_{DC,i} \cdot I_{DC,i} \cdot \Delta T$$

Static MPPT Efficiency

Conversion Efficiency - SUN2000-60KTL-M0@3/N/PE~, 230/400V						
Technology	cSi	cSi	cSi	TF	TF	TF
DC voltage	U_{MPPmax}* (800V)	$U_{DC,r}$ (600V)	U_{MPPmin} (520V)	U_{MPPmax}* (770V)	$U_{DC,r}$ (600V)	U_{MPPmin} (520V)
P/P_n						
5%	96,37	97,25	96,04	96,50	97,25	96,04
10%	97,75	98,21	97,31	97,85	98,21	97,31
20%	98,31	98,59	97,91	98,37	98,59	97,91
25%	98,41	98,66	98,04	98,41	98,66	98,04
30%	98,46	98,71	98,09	98,45	98,71	98,09
50%	98,47	98,68	98,05	98,46	98,68	98,05
75%	98,28	98,57	97,84	98,33	98,57	97,84
100%	98,12	98,44	97,90	98,17	98,44	97,90
Note: * The value of U_{MPPmax} or 0,8*U_{DCmax}(cSi)/0,7*U_{DCmax}(TF), whichever is lower shall be used.						

Static Power Conversion Efficiency:

Product Service

Attachment

$$\eta_{conv} = \frac{\int_0^{T_{ref}} p_{AC}(t) \cdot dt}{\int_0^{T_{ref}} p_{DC}(t) \cdot dt}$$

Max. conversion efficiency is 98,71% at $U_{DC,r}$(600VDC) with 30% of rated output power.

Calculation of Static MPPT, Conversion and Overall Efficiency - SUN2000-60KTL-M0@3/N/PE~, 230/400V

Technology	DC voltage	Static MPPT Efficiency		Conversion Efficiency		Overall Efficiency	
		EU	CEC	EU	CEC	EU	CEC
cSi	U_{MPPmax}* (800V)	99,99	99,99	98,27	98,31	98,26	98,30
	$U_{DC,r}$ (600V)	99,98	99,98	98,55	98,59	98,53	98,57
	U_{MPPmin} (520V)	99,99	99,99	97,90	97,90	97,89	97,89
TF	U_{MPPmax}* (770V)	99,98	99,98	98,29	98,35	98,27	98,33
	$U_{DC,r}$ (600V)	99,98	99,98	98,55	98,59	98,53	98,57
	U_{MPPmin} (520V)	99,99	99,99	97,90	97,90	97,89	97,89

Note: * The value of U_{MPPmax} or 0,8*U_{DCmax}(cSi)/0,7*U_{DCmax}(TF), whichever is lower shall be used.

Dynamic MPPT Efficiency - SUN2000-60KTL-M0@3/N/PE~, 230/400V

Dynamic MPPT-Test 10 % ⇒ 50 %G_{STC}

Number	Slope W/m²/s	Ramp UP s	Dwell time s	Ramp DN s	Dwell time s	Dynamic MPPT Efficiency
2	0,5	800	10	800	10	99,98
2	1	400	10	400	10	99,97
3	2	200	10	200	10	99,96
4	3	133	10	133	10	99,93
6	5	80	10	80	10	99,94
8	7	57	10	57	10	99,88
10	10	40	10	40	10	99,89
10	14	29	10	29	10	99,86
10	20	20	10	20	10	99,79
10	30	13	10	13	10	99,79
10	50	8	10	8	10	99,61
Overall dynamic MPPT efficiency						99,87

Product Service

Attachment

Dynamic MPPT-Test 30 % ⇒ 100 %G_{STC}						
Number	Slope W/m²/s	Ramp UP s	Dwell time s	Ramp DN s	Dwell time s	Dynamic MPPT Efficiency
10	10	70	10	70	10	99,95
10	14	50	10	50	10	99,90
10	20	35	10	35	10	99,92
10	30	23	10	23	10	99,86
10	50	14	10	14	10	99,88
10	100	7	10	7	10	99,89
Overall dynamic MPPT efficiency						99,90

Start-up and shut-down						
Number	Slope W/m²/s	Ramp UP s	Dwell time s	Ramp DN s	Dwell time s	Dynamic MPPT Efficiency
1	0,1	980	30	980	30	99,91
Overall dynamic MPPT efficiency						99,91

Product Service

Attachment

Static MPPT Efficiency - SUN2000-60KTL-M0@3~, 480V						
Technology	cSi	cSi	cSi	TF	TF	TF
DC voltage	U_{MPPmax}* (850V)	$U_{DC,r}$ (720V)	U_{MPPmin} (600V)	U_{MPPmax}* (770V)	$U_{DC,r}$ (720V)	U_{MPPmin} (600V)
P/P_n						
5%	99,32	99,97	99,94	99,98	99,97	99,94
10%	99,99	99,98	99,98	99,98	99,98	99,98
20%	99,99	99,98	99,97	99,99	99,98	99,97
25%	99,98	99,99	99,95	99,99	99,99	99,95
30%	99,97	99,99	99,98	99,98	99,99	99,98
50%	99,98	99,98	99,98	99,99	99,98	99,98
75%	99,99	99,99	99,97	99,98	99,99	99,97
100%	99,99	99,98	99,98	99,98	99,98	99,98
Note: * The value of U_{MPPmax} or 0,8*U_{DCmax}(cSi)/0,7*U_{DCmax}(TF), whichever is lower shall be used.						

$$\eta_{MPPTstat} = \frac{1}{P_{MPP,PVS} \cdot T_M} \sum_i U_{DC,i} \cdot I_{DC,i} \cdot \Delta T$$

Static MPPT Efficiency

Conversion Efficiency - SUN2000-60KTL-M0@3~, 480V						
Technology	cSi	cSi	cSi	TF	TF	TF
DC voltage	U_{MPPmax}* (850V)	$U_{DC,r}$ (720V)	U_{MPPmin} (600V)	U_{MPPmax}* (770V)	$U_{DC,r}$ (720V)	U_{MPPmin} (600V)
P/P_n						
5%	96,12	97,00	95,62	96,42	97,00	95,62
10%	97,75	98,18	97,00	97,86	98,18	97,00
20%	98,47	98,72	97,64	98,56	98,72	97,64
25%	98,54	98,78	97,80	98,66	98,78	97,80
30%	98,59	98,83	97,92	98,71	98,83	97,92
50%	98,66	98,90	98,15	98,80	98,90	98,15
75%	98,60	98,80	98,16	98,74	98,80	98,16
100%	98,49	98,75	98,09	98,66	98,75	98,09
Note: * The value of U_{MPPmax} or 0,8*U_{DCmax}(cSi)/0,7*U_{DCmax}(TF), whichever is lower shall be used.						

Static Power Conversion Efficiency:

Product Service

Attachment

$$\eta_{conv} = \frac{\int_0^{T_{ref}} p_{AC}(t) \cdot dt}{\int_0^{T_{ref}} p_{DC}(t) \cdot dt}$$

Max. conversion efficiency is 98,90% at $U_{DC,r}$(720VDC) with 50% of rated output power

Calculation of Static MPPT, Conversion and Overall Efficiency - SUN2000-60KTL-M0@3~, 480V

Technology	DC voltage	Static MPPT Efficiency		Conversion Efficiency		Overall Efficiency	
		EU	CEC	EU	CEC	EU	CEC
cSi	U_{MPPmax}* (850V)	99,96	99,99	98,46	98,57	98,43	98,55
	$U_{DC,r}$ (720V)	99,98	99,99	98,74	98,79	98,72	98,78
	U_{MPPmin} (600V)	99,98	99,97	97,90	98,05	97,88	98,03
TF	U_{MPPmax}* (770V)	99,99	99,98	98,60	98,70	98,59	98,68
	$U_{DC,r}$ (720V)	99,98	99,99	98,74	98,79	98,72	98,78
	U_{MPPmin} (600V)	99,98	99,97	97,90	98,05	97,88	98,03

Note: * The value of U_{MPPmax} or 0,8*U_{DCmax}(cSi)/0,7*U_{DCmax}(TF), whichever is lower shall be used.

Dynamic MPPT Efficiency - SUN2000-60KTL-M0@3~, 480V

Dynamic MPPT-Test 10 % ⇒ 50 %G_{STC}

Number	Slope W/m²/s	Ramp UP s	Dwell time s	Ramp DN s	Dwell time s	Dynamic MPPT Efficiency
2	0,5	800	10	800	10	99,98
2	1	400	10	400	10	99,97
3	2	200	10	200	10	99,90
4	3	133	10	133	10	99,93
6	5	80	10	80	10	99,90
8	7	57	10	57	10	99,80
10	10	40	10	40	10	99,85
10	14	29	10	29	10	99,83
10	20	20	10	20	10	99,76
10	30	13	10	13	10	99,52
10	50	8	10	8	10	99,67
Overall dynamic MPPT efficiency						99,83

Product Service

Attachment

Dynamic MPPT-Test 30 % ⇒ 100 %G_{STC}						
Number	Slope W/m²/s	Ramp UP s	Dwell time s	Ramp DN s	Dwell time s	Dynamic MPPT Efficiency
10	10	70	10	70	10	99,95
10	14	50	10	50	10	99,93
10	20	35	10	35	10	99,91
10	30	23	10	23	10	99,95
10	50	14	10	14	10	99,91
10	100	7	10	7	10	99,88
Overall dynamic MPPT efficiency						99,92

Start-up and shut-down						
Number	Slope W/m²/s	Ramp UP s	Dwell time s	Ramp DN s	Dwell time s	Dynamic MPPT Efficiency
1	0,1	980	30	980	30	99,89
Overall dynamic MPPT efficiency						99,89

Product Service

Attachment

Static MPPT Efficiency - SUN2000-65KTL-M0@3~, 480V						
Technology	cSi	cSi	cSi	TF	TF	TF
DC voltage	U_{MPPmax}* (850V)	$U_{DC,r}$ (720V)	U_{MPPmin} (600V)	U_{MPPmax}* (770V)	$U_{DC,r}$ (720V)	U_{MPPmin} (600V)
P/P_n						
5%	99,72	99,91	99,92	99,91	99,91	99,92
10%	99,98	99,97	99,99	99,99	99,97	99,99
20%	99,97	99,98	99,93	99,96	99,98	99,93
25%	99,98	99,99	99,98	99,97	99,99	99,98
30%	99,99	99,98	99,93	99,99	99,98	99,93
50%	99,99	99,99	99,99	99,98	99,99	99,99
75%	99,98	99,98	99,99	99,95	99,98	99,99
100%	99,99	99,99	99,99	99,99	99,99	99,99
Note: * The value of U_{MPPmax} or 0,8*U_{DCmax}(cSi)/0,7*U_{DCmax}(TF), whichever is lower shall be used.						

$$\eta_{MPPTstat} = \frac{1}{P_{MPP,PVS} \cdot T_M} \sum_i U_{DC,i} \cdot I_{DC,i} \cdot \Delta T$$

Static MPPT Efficiency

Conversion Efficiency - SUN2000-65KTL-M0@3~, 480V						
Technology	cSi	cSi	cSi	TF	TF	TF
DC voltage	U_{MPPmax}* (850V)	$U_{DC,r}$ (720V)	U_{MPPmin} (600V)	U_{MPPmax}* (770V)	$U_{DC,r}$ (720V)	U_{MPPmin} (600V)
P/P_n						
5%	96,65	97,50	96,11	97,06	97,50	96,11
10%	97,96	98,44	97,13	98,15	98,44	97,13
20%	98,57	98,80	97,81	98,61	98,80	97,81
25%	98,64	98,84	97,88	98,70	98,84	97,88
30%	98,67	98,86	98,04	98,71	98,86	98,04
46%	-	98,91	-	-	98,91	-
50%	98,70	98,88	98,18	98,71	98,88	98,18
75%	98,64	98,79	98,16	98,61	98,79	98,16
100%	98,59	98,74	98,04	98,49	98,74	98,04
Note: * The value of U_{MPPmax} or 0,8*U_{DCmax}(cSi)/0,7*U_{DCmax}(TF), whichever is lower shall be used. Static Power Conversion Efficiency:						

Attachment

$$\eta_{conv} = \frac{\int_0^{T_{ref}} p_{AC}(t) \cdot dt}{\int_0^{T_{ref}} p_{DC}(t) \cdot dt}$$

Max. conversion efficiency is 98,91% at $U_{DC,r}$(720VDC) with 46% of rated output power

Calculation of Static MPPT, Conversion and Overall Efficiency - SUN2000-65KTL-M0@3~, 480V							
Technology	DC voltage	Static MPPT Efficiency		Conversion Efficiency		Overall Efficiency	
		EU	CEC	EU	CEC	EU	CEC
cSi	U_{MPPmax}* (850V)	99,98	99,98	98,55	98,62	98,53	98,61
	$U_{DC,r}$ (720V)	99,98	99,98	98,77	98,80	98,76	98,78
	U_{MPPmin} (600V)	99,97	99,98	97,96	98,09	97,94	98,07
TF	U_{MPPmax}* (770V)	99,98	99,97	98,57	98,62	98,55	98,58
	$U_{DC,r}$ (720V)	99,98	99,98	98,77	98,80	98,76	98,78
	U_{MPPmin} (600V)	99,97	99,98	97,96	98,09	97,94	98,07
Note: * The value of U_{MPPmax} or 0,8*U_{DCmax}(cSi)/0,7*U_{DCmax}(TF), whichever is lower shall be used.							

Dynamic MPPT Efficiency - SUN2000-65KTL-M0@3~, 480V						
Dynamic MPPT-Test 10 % ⇒ 50 %G_{STC}						
Number	Slope W/m²/s	Ramp UP s	Dwell time s	Ramp DN s	Dwell time s	Dynamic MPPT Efficiency
2	0,5	800	10	800	10	99,98
2	1	400	10	400	10	99,97
3	2	200	10	200	10	99,95
4	3	133	10	133	10	99,97
6	5	80	10	80	10	99,94
8	7	57	10	57	10	99,92
10	10	40	10	40	10	99,86
10	14	29	10	29	10	99,79
10	20	20	10	20	10	99,77
10	30	13	10	13	10	99,82
10	50	8	10	8	10	99,70
Overall dynamic MPPT efficiency						99,88

Product Service

Attachment

Dynamic MPPT-Test 30 % ⇒ 100 %G_{STC}						
Number	Slope W/m²/s	Ramp UP s	Dwell time s	Ramp DN s	Dwell time s	Dynamic MPPT Efficiency
10	10	70	10	70	10	99,96
10	14	50	10	50	10	99,91
10	20	35	10	35	10	99,92
10	30	23	10	23	10	99,85
10	50	14	10	14	10	99,88
10	100	7	10	7	10	99,92
Overall dynamic MPPT efficiency						99,91

Start-up and shut-down						
Number	Slope W/m²/s	Ramp UP s	Dwell time s	Ramp DN s	Dwell time s	Dynamic MPPT Efficiency
1	0,1	980	30	980	30	99,92
Overall dynamic MPPT efficiency						99,92

Product Service

Attachment

Static MPPT Efficiency - SUN2000-70KTL-INM0@3~, 500V						
Technology	cSi	cSi	cSi	TF	TF	TF
DC voltage	U_{MPPmax}* (850V)	$U_{DC,r}$ (750V)	U_{MPPmin} (625V)	U_{MPPmax}* (770V)	$U_{DC,r}$ (750V)	U_{MPPmin} (625V)
P/P_n						
5%	99,93	99,87	99,97	99,82	99,87	99,97
10%	99,97	99,98	99,99	99,99	99,98	99,99
20%	99,99	99,98	99,98	99,97	99,98	99,98
25%	99,96	99,99	99,99	99,98	99,99	99,99
30%	99,97	99,99	99,96	99,98	99,99	99,96
50%	99,99	99,98	99,99	99,99	99,98	99,99
75%	99,99	99,99	99,98	99,91	99,99	99,98
100%	99,99	99,99	99,91	99,99	99,99	99,91

Note: * The value of U_{MPPmax} or 0,8*U_{DCmax}(cSi)/0,7*U_{DCmax}(TF), whichever is lower shall be used.

$$\eta_{MPPTstat} = \frac{1}{P_{MPP,PVS} \cdot T_M} \sum_i U_{DC,i} \cdot I_{DC,i} \cdot \Delta T$$

Static MPPT Efficiency

Conversion Efficiency - SUN2000-70KTL-INM0@3~, 500V						
Technology	cSi	cSi	cSi	TF	TF	TF
DC voltage	U_{MPPmax}* (850V)	$U_{DC,r}$ (750V)	U_{MPPmin} (625V)	U_{MPPmax}* (770V)	$U_{DC,r}$ (750V)	U_{MPPmin} (625V)
P/P_n						
5%	96,28	97,07	95,77	97,22	97,07	95,77
10%	97,82	98,25	97,10	98,27	98,25	97,10
20%	98,50	98,73	97,72	98,69	98,73	97,72
25%	98,65	98,80	97,93	98,76	98,80	97,93
30%	98,70	98,84	98,03	98,79	98,84	98,03
37,5%	-	99,00	-	-	99,00	-
50%	98,78	98,89	98,20	98,80	98,89	98,20
75%	98,72	98,84	98,20	98,71	98,84	98,20
100%	98,64	98,78	98,13	98,59	98,78	98,13

Note: * The value of U_{MPPmax} or 0,8*U_{DCmax}(cSi)/0,7*U_{DCmax}(TF), whichever is lower shall be used.
Static Power Conversion Efficiency:

Product Service

Attachment

$$\eta_{conv} = \frac{\int_0^{T_{det}} p_{AC}(t) \cdot dt}{\int_0^{T_{det}} p_{DC}(t) \cdot dt}$$

Max. conversion efficiency is 99,00% at $U_{DC,r}$(750VDC) with 46% of rated output power

Calculation of Static MPPT, Conversion and Overall Efficiency - SUN2000-65KTL-M0@3~, 480V							
Technology	DC voltage	Static MPPT Efficiency		Conversion Efficiency		Overall Efficiency	
		EU	CEC	EU	CEC	EU	CEC
cSi	U_{MPPmax}* (850V)	99,99	99,99	98,58	98,68	98,56	98,67
	$U_{DC,r}$ (750V)	99,98	99,99	98,75	98,82	98,73	98,81
	U_{MPPmin} (625V)	99,97	99,98	97,97	98,11	97,94	98,09
TF	U_{MPPmax}* (770V)	99,98	99,95	98,66	98,71	98,65	98,66
	$U_{DC,r}$ (750V)	99,98	99,99	98,75	98,82	98,73	98,81
	U_{MPPmin} (625V)	99,97	99,98	97,97	98,11	97,94	98,09
Note: * The value of U_{MPPmax} or 0,8*U_{DCmax}(cSi)/0,7*U_{DCmax}(TF), whichever is lower shall be used.							

Dynamic MPPT Efficiency - SUN2000-70KTL-INM0@3~, 500V						
Dynamic MPPT-Test 10 % ⇒ 50 %G_{STC}						
Number	Slope W/m²/s	Ramp UP s	Dwell time s	Ramp DN s	Dwell time s	Dynamic MPPT Efficiency
2	0,5	800	10	800	10	99,98
2	1	400	10	400	10	99,97
3	2	200	10	200	10	99,97
4	3	133	10	133	10	99,95
6	5	80	10	80	10	99,94
8	7	57	10	57	10	99,92
10	10	40	10	40	10	99,89
10	14	29	10	29	10	99,83
10	20	20	10	20	10	99,72
10	30	13	10	13	10	99,52
10	50	8	10	8	10	99,58
Overall dynamic MPPT efficiency						99,84

Product Service

Attachment

Dynamic MPPT-Test 30 % ⇒ 100 %G_{STC}						
Number	Slope W/m²/s	Ramp UP s	Dwell time s	Ramp DN s	Dwell time s	Dynamic MPPT Efficiency
10	10	70	10	70	10	99,96
10	14	50	10	50	10	99,93
10	20	35	10	35	10	99,94
10	30	23	10	23	10	99,92
10	50	14	10	14	10	99,90
10	100	7	10	7	10	99,87
Overall dynamic MPPT efficiency						99,92
Start-up and shut-down						
Number	Slope W/m²/s	Ramp UP s	Dwell time s	Ramp DN s	Dwell time s	Dynamic MPPT Efficiency
1	0,1	980	30	980	30	99,91
Overall dynamic MPPT efficiency						99,91

Certificate of compliance

with the requirements of the standard CEI 0-16

CERTIFICATION ORGANIZATION: **Bureau Veritas Consumer Products Services Germany GmbH**
Accreditation to DAkkS, D-ZE-12024-01-00, ref. to DIN EN ISO/IEC 17065

STANDARD / GUIDE: **CEI 0-16: 2019-04**
Reference technical rules for the connection of active and passive consumers to the HV and MV electrical networks of distribution company.

TYPE OF SYSTEM DECLEARED:

INTERFACE DEVICE	PROTECTION INTERFACE	STATIC ELECTRONIC INVERTER	ROTATING GENERATION MACHINE
		X	

MANUFACTURER: **Huawei Technologies Co., Ltd.**
Administration Building, Headquarters of Huawei Technologies Co., Ltd.,
Bantian, Longgang District, Shenzhen, 518129
P.R.C

PRODUCT TYPE:	**SOLAR INVERTER**					
MODEL:	**SUN2000-8KTL-M0** **SUN2000-8KTL-M2**	**SUN2000-10KTL-M0** **SUN2000-10KTL-M2**	**SUN2000-12KTL-M0** **SUN2000-12KTL-M2**	**SUN2000-15KTL-M0** **SUN2000-15KTL-M2**	**SUN2000-17KTL-M0** **SUN2000-17KTL-M2**	**SUN2000-20KTL-M0** **SUN2000-20KTL-M2**
NOMINAL POWER:	**8kW**	**10kW**	**12kW**	**15kW**	**17kW**	**20kW**
MAXIMUM POWER:	**8,8kVA**	**11,0KVA**	**13,2kVA**	**16,5kVA**	**18,7kVA**	**22,0kVA**

FIRMWARE VERSION: **V100R001**

PHASE NUMBER: **Three-phase**

NOTE:
The device is for plants of each power.
The inverters of Huawei Technologies Co., Ltd. have a maximum apparent power limit. In the case where a system should be able to reach in every working condition a determined power factor, it is necessary to set the maximum active power in such a way, that you can reach at any time the cos-phi wanted.

LABORATORY THAT HAS DONE THE TESTING:
Bureau Veritas Consumer Products Services Germany GmbH
Accreditation to DAkkS, D-PL-12024-03-03, ref. to DIN EN ISO/IEC 17025

After verifying the ISO 9001 of the Manufacturer with No. FM 669363, issued by bsi, the Manufacturer with No. 064-17-Q-1267-R1-M, issued by Beijing Standard Certification Centre and verifying the test reports according to CEI 0-16 with No. 19TH0316-CEI 0-16_1 issued by the laboratory Bureau Veritas Consumer Products Services Germany GmbH and verifying the EMC test report with No. SYBH(E)05083256EA, issued laboratory Huawei Technologies Co., Ltd. accredited by CNAS (No. L0310), the listed products are conform to the requirements according to CEI 0-16: 2019-04.

Certificate number: **U20-0627** **Certification Program:** **NSOP-0032-DEU-ZE-V01**

Data of issue: **2020-08-05**

Certification body

Thomas Lammel

Certification body Bureau Veritas Consumer Products Services Germany GmbH accreditation to DIN EN ISO/IEC 17065

A partial representation of the certificate requires the written approval of Bureau Veritas Consumer Products Services Germany GmbH

Declaration of conformity

to the requirements of the Standard CEI 0-21

CERTIFICATION ORGANIZATION: **Bureau Veritas Consumer Products Services Germany GmbH**
Accreditation DAkkS, D-ZE-12024-01-00, Rif. DIN EN ISO/IEC 17065

STANDARD / GUIDE: **CEI 0-21: 2019-04**
Technical reference rule for the connection of active and passive users to the LV electricity distribution networks of companies

TYPE OF SYSTEM DECLEARED:

INTERFACE DEVICE	PROTECTION INTERFACE	STATIC ELECTRONIC INVERTER	ROTATING GENERATION MACHINE
X	X	X	

MANUFACTURER: **Huawei Technologies Co., Ltd.**
Administration Building, Headquarters of Huawei Technologies Co., Ltd.,
Bantian, Longgang District, Shenzhen, 518129,
P.R.C

PRODUCT TYPE:	**SOLAR INVERTER**					
MODEL:	**SUN2000-8KTL-M0** **SUN2000-8KTL-M2**	**SUN2000-10KTL-M0** **SUN2000-10KTL-M2**	**SUN2000-12KTL-M0** **SUN2000-12KTL-M2**	**SUN2000-15KTL-M0** **SUN2000-15KTL-M2**	**SUN2000-17KTL-M0** **SUN2000-17KTL-M2**	**SUN2000-20KTL-M0** **SUN2000-20KTL-M2**
NOMINAL POWER:	**8 kW**	**10 kW**	**12 kW**	**15 kW**	**17 kW**	**20 kW**

FIRMWARE VERSION: **V100R001**

PHASE NUMBER: **three-phase**

NOTE:
The device is able to limit the Idc to 0.5% of the nominal current.
The device is for plants of each power.
The inverters of Huawei Technologies Co., Ltd. have a maximum apparent power limit. In the case where a system should be able to reach in every working condition a determined power factor, it is necessary to set the maximum active power in such a way, that you can reach at any time the cos-phi wanted.

LABORATORY THAT HAS DONE THE TESTING:
Bureau Veritas Consumer Products Services Germany GmbH
Accreditation DAkkS, D-PL-12024-03-03, Rif. DIN EN ISO/IEC 17025

After verifying the ISO 9001 of the Manufacturer with No. FM 669363, issued by BSI and No. 064-17-Q-1267-R1-M issued by Beijing Standard Certification Centre. Verifying the test reports according to CEI 0-21 with No. 19TH0316-CEI 0-21_2, issued by the laboratory Bureau Veritas Consumer Products Services Germany GmbH and verifying the EMC test report with No. SYBH(E)05083256EA, issued laboratory Huawei Technolgies accredited by CNAS (No. L0310), the listed products are conform with the requirements according to CEI 0-21: 2019-04.

Certificate number: **U20-0628** **Certification Program:** **NSOP-0032-DEU-ZE-V01**

Data of issue: **2020-08-05**

Certification body

Thomas Lammel

Certification body Bureau Veritas Consumer Products Services Germany GmbH accreditation to DIN EN ISO/IEC 17065

A partial representation of the certificate requires the written approval of Bureau Veritas Consumer Products Services Germany GmbH

Table Interface Protection System (SPI)

Extract of the test report **No.** 19TH0316-CEI 0-21_2

Interface Protection System (SPI)

Manufacturer:	Huawei Technologies Co., Ltd. Administration Building, Headquarters of Huawei Technologies Co., Ltd., Bantian, Longgang District, Shenzhen, 518129 P.R.C						
Model:	SUN2000-8KTL-M0 SUN2000-8KTL-M2	SUN2000-10KTL-M0 SUN2000-10KTL-M2	SUN2000-12KTL-M0 SUN2000-12KTL-M2	SUN2000-15KTL-M0 SUN2000-15KTL-M2	SUN2000-17KTL-M0 SUN2000-17KTL-M2	SUN2000-20KTL-M0 SUN2000-20KTL-M2
Nominal Power:	SUN2000-8KTL-M0 SUN2000-8KTL-M2	SUN2000-10KTL-M0 SUN2000-10KTL-M2	SUN2000-12KTL-M0 SUN2000-12KTL-M2	SUN2000-15KTL-M0 SUN2000-15KTL-M2	SUN2000-17KTL-M0 SUN2000-17KTL-M2	SUN2000-20KTL-M0 SUN2000-20KTL-M2
Firmware version:	V100R001					
Number of phases (single-phase/ three-phase):	Three-phase					

Temperature Ambient		Intervention thresholds		Time of intervention		Reset Ratio		Time of relapse	
		Detected [V]	Requested [V] ± 1%	Detected [ms]	Requested [ms]	Detected	Requested	Detected [ms]	Requested [ms]
Voltage Threshold	Min	196,8	195,5	1498	1500 ± 20	N/A	1,03 ≤ r ≤ 1,05	N/A	40 ≤tr ≤ 100
	Max	263,2	264,5	212	200 ± 20	N/A	0,95 ≥ r ≥ 0,97	N/A	40 ≤tr ≤ 100

Temperature -25 °C		Intervention thresholds		Time of intervention		Reset Ratio		Time of relapse	
		Detected [V]	Requested [V] ± 1%	Detected [ms]	Requested [ms]	Detected	Requested	Detected [ms]	Requested [ms]
Voltage Threshold	Min	196,9	195,5	1495	1500 ± 20	N/A	1,03 ≤ r ≤ 1,05	N/A	40 ≤tr ≤ 100
	Max	263,7	264,5	219	200 ± 20	N/A	0,95 ≥ r ≥ 0,97	N/A	40 ≤tr ≤ 100

Temperature +60 °C		Intervention thresholds		Time of intervention		Reset Ratio		Time of relapse	
		Detected [V]	Requested [V] ± 1%	Detected [ms]	Requested [ms]	Detected	Requested	Detected [ms]	Requested [ms]
Voltage Threshold	Min	196,9	195,5	1492	1500 ± 20	N/A	1,03 ≤ r ≤ 1,05	N/A	40 ≤tr ≤ 100
	Max	263,9	264,5	216	200 ± 20	N/A	0,95 ≥ r ≥ 0,97	N/A	40 ≤tr ≤ 100

Note:
≤ 1 % for the voltage thresholds
≤ 3 % ± 20 ms for the times of intervention
variation of the error during the repetition of the tests
≤ 2 % for the tensions
≤ 1 % ± 20 ms for the times of intervention

Table Interface Protection System (SPI)

Extract of the test report **No.** 19TH0316-CEI 0-21_2

Frequency 49,8Hz … 50,2Hz

Temperature Ambient		Intervention thresholds		Time of intervention		Reset Ratio		Time of relapse	
		Detected [Hz]	Requested [Hz] ± 20 mHz	Detected [ms]	Requested [ms]	Detected	Requested	Detected [ms]	Requested ms]
Frequency Threshold	Min	49,79	49,8	89	100 ± 20 ms	N/A	1,001 ≤ r ≤ 1,003	N/A	40 ≤tr ≤ 100
	Max	50,20	50,2	94	100 ± 20 ms	N/A	0,997 ≥ r ≥ 0,999	N/A	40 ≤tr ≤ 100

Temperature -25 °C		Intervention thresholds		Time of intervention		Reset Ratio		Time of relapse	
		Detected [Hz]	Requested [Hz] ± 20 mHz	Detected [ms]	Requested [ms]	Detected [Hz]	Requested [Hz] ± 20 mHz	Detected [ms]	Requested [ms]
Frequency Threshold	Min	49,79	49,8	97	100 ± 20 ms	N/A	1,001 ≤ r ≤ 1,003	N/A	40 ≤tr ≤ 100
	Max	50,20	50,2	85	100 ± 20 ms	N/A	0,997 ≥ r ≥ 0,999	N/A	40 ≤tr ≤ 100

Temperature +60 °C		Intervention thresholds		Time of intervention		Reset Ratio		Time of relapse	
		Detected [Hz]	Requested [Hz] ± 20 mHz	Detected [ms]	Requested [ms]	Detected [Hz]	Requested [Hz] ± 20 mHz	Detected [ms]	Requested [ms]
Frequency Threshold	Min	49,79	49,8	90	100 ± 20 ms	N/A	1,001 ≤ r ≤ 1,003	N/A	40 ≤tr ≤ 100
	Max	50,20	50,2	87	100 ± 20 ms	N/A	0,997 ≥ r ≥ 0,999	N/A	40 ≤tr ≤ 100

Frequency 47,5Hz … 51,5Hz

Temperature Ambient		Intervention thresholds		Time of intervention		Reset Ratio		Time of relapse	
		Detected [Hz]	Requested [Hz] ± 20 mHz	Detected [ms]	Requested [ms]	Detected [Hz]	Requested [Hz] ± 20 mHz	Detected [ms]	Requested [ms]
Frequency Threshold	Min	47,49	47,5	120	100 ± 20 ms	N/A	1,001 ≤ r ≤ 1,003	N/A	40 ≤tr ≤ 100
	Max	51,50	51,5	119	100 ± 20 ms	N/A	0,997 ≥ r ≥ 0,999	N/A	40 ≤tr ≤ 100

Temperature -25 °C		Intervention thresholds		Time of intervention		Reset Ratio		Time of relapse	
		Detected [Hz]	Requested [Hz] ± 20 mHz	Detected [ms]	Requested [ms]	Detected [Hz]	Requested [Hz] ± 20 mHz	Detected [ms]	Requested [ms]
Frequency Threshold	Min	47,49	47,5	99	100 ± 20 ms	N/A	1,001 ≤ r ≤ 1,003	N/A	40 ≤tr ≤ 100
	Max	51,49	51,5	120	100 ± 20 ms	N/A	0,997 ≥ r ≥ 0,999	N/A	40 ≤tr ≤ 100

Temperature +60 °C		Intervention thresholds		Time of intervention		Reset Ratio		Time of relapse	
		Detected [Hz]	Requested [Hz] ± 20 mHz	Detected [ms]	Requested [ms]	Detected [Hz]	Requested [Hz] ± 20 mHz	Detected [ms]	Requested [ms]
Frequency Threshold	Min	47,49	47,5	117	100 ± 20 ms	N/A	1,001 ≤ r ≤ 1,003	N/A	40 ≤tr ≤ 100
	Max	51,49	51,5	114	100 ± 20 ms	N/A	0,997 ≥ r ≥ 0,999	N/A	40 ≤tr ≤ 100

Nota:
± 20 mHz for the frequency thresholds
≤ 3 % ± 20 ms for the times of intervention
variation of the error during the repetition of the tests
- ≤ 1 % ± 20 ms for the times of intervention

Certificate of Conformity

Certificate No.:	**1988AP0424N048010**
Equipment:	**SOLAR INVERTER**
Brand Name:	HUAWEI
Test Model No.:	**SUN2000-8KTL-M0, SUN2000-10KTL-M0, SUN2000-12KTL-M0, SUN2000-15KTL-M0, SUN2000-17KTL-M0, SUN2000-20KTL-M0, SUN2000-8KTL-M2, SUN2000-10KTL-M2, SUN2000-12KTL-M2, SUN2000-15KTL-M2, SUN2000-17KTL-M2, SUN2000-20KTL-M2**
Applicant:	**Huawei Technologies Co., Ltd.** Administration Building, Headquarters of Huawei Technologies Co., Ltd., Bantian, Longgang District, Shenzhen, 518129, P.R.C
Report No.:	**PVNL190424N048**

Use in accordance with regulations:

Automatic disconnection device with three-phase mains surveillance in accordance with EN 50549-1:2019 for photovoltaic systems with a three-phase parallel coupling via an inverter in the public mains supply. The automatic disconnection device is an integral part of the aforementioned inverter.

Applied rules and standards

EN 50549-1:2019

Requirements for generating plants to be connected in parallel with distribution networks - Part 1-1: Connection to a LV distribution network - Generating plants up to and including Type B

DIN V VDE V 0126-1-1:2006-02 (Functional safety)

Automatic disconnection device between a generator and the public low-voltage grid

At the time of issue of this certificate the safety concept of an aforementioned representative product corresponds to the valid safety specifications for the specified use in accordance with regulations.

BUREAU VERITAS CONSUMER PRODUCTS SERVICES

Name: James Huang
Technical Manager/ New Energy Team
Date: 2020-04-24

Manufacturer's Declaration for Inverter integrated NA-Protection (NA-Schutz)

Manufacturer's declaration on the use of the inverter internal AC coupling relays as an integrated coupling switch in connection with a central Power and Plant protection device (NA protection) in accordance with the requirements of VDE-AR-N 4105:2018-11 and VDE-AR-N 4110.

Huawei Technologies Co., Ltd. hereby confirms that the inverter internal AC coupling relays are capable of performing the function of an integrated coupling switch in conjunction with a central NA protection in accordance with the requirements of VDE-AR-N 4105:2018-11 and VDE-AR-N 4110:2018-11. This applies to below listed Huawei inverter models.

The combination of a central NA protection along with integrated AC coupling relays fulfils the requirements for tie breakers as well as for the function control according to VDE-AR-N 4105:2018-11 and/or VDE-AR-N 4110:2018-11.

As such, a single fault does not lead to loss of the protective function. A functional test of the inverter integrated AC coupling relays is performed each time prior to grid connection. Thus a connection of the inverter with faulty AC coupling relay(s) is impossible.

- The listed inverters comply with VDE-AR-N 4105:2018-11 requirements.
- The grid setting parameters as well as the (total) grid disconnection times are within the required specifications.
- The anti-island detection has been proven by third party testing body.

Huawei Technologies Co., Ltd. hereby confirms conformity to VDE-AR-N 4105:2018-11 for following inverter models:	
Equipment/Series:	Huawei FusionSolar SUN2000 Inverter
Models:	SUN2000-2/3/3.68/4/4.6/5/6KTL-L1/Huawei SUN2000-3/4/5/6/8/10KTL-M0/M1/Huawei SUN2000-12/15/17/20KTL-M0/M2/Huawei SUN2000-33KTL-A/Huawei SUN2000-36KTL/Huawei SUN2000-30/36/40KTL-M3/Huawei SUN2000-50/60KTL-M0/Huawei SUN2000-100KTL-M1/Huawei
Manufacture's Name	Huawei Technologies Co.,Ltd

Huawei Technologies Co., Ltd. hereby confirms conformity to VDE-AR-N 4110:2018-11 for following inverter models:	
Equipment/Series:	Huawei FusionSolar SUN2000 Inverter
Models:	SUN2000-105KTL-H1/Huawei SUN2000-185KTL-H1/Huawei
Manufacture's Name	Huawei Technologies Co.,Ltd

Signature:

Date: