Certificat de conformité

Applicant:	**Huawei Technologies Co., Ltd.** Administration Building, Headquarters of Huawei Technologies Co., Ltd., Bantian, Longgang District, Shenzhen, 518129, **P.R. China**
Product:	**SOLAR INVERTER**
Model:	**SUN2000-15KTL-M3, SUN2000-17KTL-M3, SUN2000-20KTL-M3, SUN2000-23KTL-M3, SUN2000-30KTL-M3, SUN2000-36KTL-M3, SUN2000-40KTL-M3**

Use in accordance with regulations:

Automatic disconnection device with three-phase mains surveillance in accordance with C10/11 – 01.09.2019 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. This serves as a replacement for the disconnection device with insulating function which the distribution network provider can access at any time.

Applied rules and standards:

EN 50549-1:2019-02
Requirements for parallel connection of installations with distribution networks - Part 1: Connection to an LV distribution network - Production of installations up to and including Type B

4.4 Normal operating range
4.5 Immunity to disturbances
4.6 Active response to frequency deviation
4.7 Power response to voltage variations and voltage changes
4.8 EMC and power quality
4.9 Interface protection
4.10 Connection and starting to generate electrical power
4.11 Ceasing and reduction of active power on set point
4.13 Requirements regarding single fault tolerance of interface protection system and interface switch

C10/11:2019-09
Specific technical requirements for generator in parallel operation with the distribution network

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

Report number:	**PVBE200511N092**	**Certification program:**	**NSOP-0032-DEU-ZE-V01**
Certificate number:	**U20-0900**	**Date of issue:**	**2020-11-11**

Certification body

Thomas Lammel

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

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

Appendix

Extract from test report according to EN 50549-1 / C10/11 **Nr. PVBE200511N092**

Type Approval and declaration of compliance with the requirements of EN 50549-1 / C10/11.				
Manufacturer / applicant:	Huawei Technologies Co., Ltd. Administration Building, Headquarters of Huawei Technologies Co., Ltd., Bantian, Longgang District, Shenzhen, 518129, P.R. China			
Micro-generator Type	SOLAR INVERTER			
	SUN2000-15KTL-M3	SUN2000-17KTL-M3	SUN2000-20KTL-M3	SUN2000-23KTL-M3
MPP DC voltage range [V]	200-1000			
Input DC voltage range [V]	200-1100			
Input DC current [A]	Max. 26A*4			
Output AC voltage [V]	230/400 Vac, 3W+N+PE; 50Hz			
Output AC current [A]	21,7A	24,5A	28,9A	33,3A
Output power [kW]	15,0	17,0	20,0	23,0
Output power [kVA]	16,5	18,7	22,0	23,0
	SUN2000-30KTL-M3	SUN2000-36KTL-M3	SUN2000-40KTL-M3	
MPP DC voltage range [V]	200-1000			
Input DC voltage range [V]	200-1100			
Input DC current [A]	Max. 26A*4			
Output AC voltage [V]	230/400 Vac, 3W+N+PE; 50Hz			
Output AC current [A]	43,3A	52,0A	57,8A	
Output power [kW]	30,0	36,0	40,0	
Output power [kVA]	30,0	40,0	44,0	
Firmware version	V100R001			
Measurement period:	2020-05-11 - 2020-09-10			
Description of the structure of the power generation unit: The power generation unit is equipped with a PV and line-side EMC filter. The power generation unit has no galvanic isolation between DC input and AC output. Output switch-off is performed with single-fault tolerance based on two series-connected relays in (each) line and neutral. This enables a safe disconnection of the power generation unit from the network in case of error.				

Appendix

Extract from test report according to EN 50549-1 / C10/11 **Nr. PVBE200511N092**

Setting of the interface protection:			
Parameter	**Max. disconnection time**	**Min. operate time**	**Trip value**
Over voltage (stage 1) [a]	0,2s	-	230V +10% (253V)
Over voltage (stage 2)	0,2s	0,1s	230V +15% (264,5V)
Under voltage	0,2s	0,1s	230V -20% (184V)
Over frequency	0,2s	0,1s	50Hz +3% (51,5Hz)
Under frequency	0,2s	0,1s	50Hz -5% (47,5Hz)
Reconnection settings for voltage (normal operational startup)	$0,85V_n$ (195,5V) ≤ V ≤ $1,10V_n$ (253V)		
Reconnection settings for frequency (normal operational startup)	49,9Hz ≤ f ≤ 50,1Hz		
Reconnection time (normal operational startup)	≥ 60s		
Active power gradient (normal operational startup)	20% P_{Emax} / per minute		
Reconnection settings for voltage (automatic reconnection after tripping)	$0,85V_n$ (195,5V) ≤ V ≤ $1,10V_n$ (253V)		
Reconnection settings for frequency (automatic reconnection after tripping)	49,9Hz ≤ f ≤ 50,1Hz		
Reconnection time (automatic reconnection after tripping)	≥ 60s		
Active power gradient after reconnection	10% P_{Emax} / per minute		
Active power delivery at under frequency	electronic inverter, no active power reduction		
Power response to over frequency (frequency / droop s)	50,2Hz / 5%		
Permanent DC-injection	0,5% of rated inverter output current or 20mA		
Rate of change of frequency (ROCOF)	2Hz/s		
Loss of mains according EN 62116 (LoM)	2,0s		

Note:

[a] Over voltage – stage1: 10 min-mean-value corresponding to EN 50160.

Default interface setting according to C10/11:2019-09 are used.

The settings of the interface protection are password protected adjustable.

In case the above stated generators are used with an external protection device, the protection settings of the inverters are to be adjusted according to the manufacturer's declaration.

The above stated generators are tested according to the requirements in the EN 50549-1:2019 and C10/11:2019. Any modification that affects the stated tests must be named by the manufacturer/supplier of the product to ensure that the product meets all requirements of the EN 50549-1:2019 and C10/11:2019.

Certificate of compliance

Applicant:	**Huawei Technologies Co., Ltd.** Administration Building, Headquarters of Huawei Technologies Co., Ltd., Bantian, Longgang District, Shenzhen, 518129 P.R. China		
Product:	**SOLAR INVERTER**		
Model:	**SUN2000-15KTL-M3,**	**SUN2000-17KTL-M3,**	**SUN2000-20KTL-M3,**
	SUN2000-23KTL-M3,	**SUN2000-28KTL-M3,**	**SUN2000-30KTL-M3,**
	SUN2000-36KTL-M3,	**SUN2000-40KTL-M3,**	**SUN2000-42KTL-M3**

Use in accordance with regulations:

Automatic disconnection device with three-phase mains surveillance in accordance with EN 50549-2:2019 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.

Firmware version:	**V100R001**
Connection rule:	**EN 50549-2:2019:** Requirements for generating plants to be connected in parallel with distribution networks - Part 2: Connection to a MV distribution network - Generating plants up to and including Type B

The power generating units, stated in the certificate, were tested and certified according to the technical guidelines referenced to the grid connection regulation. The electrical characteristics fulfil the requirements of the grid connection regulation:

4.4 Normal operating range
4.5 Immunity to disturbances
4.6 Active response to frequency deviation
4.7 Power response to voltage changes
4.8 EMC and power quality
4.9 Interface protection
4.10 Connection and starting to generate electrical power
4.11 Ceasing and reduction of active power on set point

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.

Report number:	**20TH0373_EN50549-2_0**	**Certification scheme:**	**NSOP-0032-DEU-ZE-V01**
Certificate number:	**U20-0757**	**Date of issue:**	**2020-09-22**

Certification body

Thomas Lammel

DAkkS Deutsche Akkreditierungsstelle D-ZE-12024-01-00

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

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

Extract from test report according to EN 50549-2	Nr. 20TH0373_EN50549-2_0

Type Approval and declaration of compliance with the requirements of EN 50549-2	
Manufacturer / applicant:	Huawei Technologies Co., Ltd. Administration Building, Headquarters of Huawei Technologies Co., Ltd., Bantian, Longgang District, Shenzhen, 518129 P.R. China
Product description:	Grid-tied photovoltaic inverter

Unit / Type:	**SUN2000-15KTL-M3**	**SUN2000-17KTL-M3**	**SUN2000-20KTL-M3**
Input DC voltage range [V]..... :	200-1100		
MPP DC voltage range [V]..... :	200-1000		
Input DC current [A] ..... :	max. 26 A x 4		
Nominal output AC voltage [V]..... :	400, 3~ + (N) + PE; 50 Hz		
Nominal Output AC current [A] ..... :	21,7	24,5	28,9
Max. output AC current [A] ..... :	25,2	28,5	33,5
Nominal active output power [kW] :	15,0	17,0	20,0
Max. apparent output power [kVA] :	16,5	18,7	22,0
Firmware version..... :	V100R001		

Unit / Type:	**SUN2000-23KTL-M3**	**SUN2000-28KTL-M3**	**SUN2000-30KTL-M3**
Input DC voltage range [V]..... :	200-1100		
MPP DC voltage range [V]..... :	200-1000		
Input DC current [A] ..... :	max. 26 A x 4		
Nominal output AC voltage [V]..... :	400, 3~ + (N) + PE; 50 Hz	480, 3~ + PE; 50 Hz	400 / 480, 3~ + (N) + PE; 50 Hz
Nominal Output AC current [A] ..... :	33,3	33,1	43,3 / 36,1
Max. output AC current [A] ..... :	35,1	33,5	47,9 / 39,9
Nominal active output power [kW] :	23,0	27,5	30,0
Max. apparent output power [kVA] :	23,0	27,5	33,0
Firmware version..... :	V100R001		

Unit / Type:	**SUN2000-36KTL-M3**	**SUN2000-40KTL-M3**	**SUN2000-42KTL-M3**
Input DC voltage range [V]..... :	200-1100		
MPP DC voltage range [V]..... :	200-1000		
Input DC current [A] ..... :	max. 26 A x 4		
Nominal output AC voltage [V]..... :	400 / 480, 3~ + (N) + PE; 50 Hz	400 / 480, 3~ + (N) + PE; 50 Hz	480, 3~ + PE; 50 Hz
Nominal Output AC current [A] ..... :	52,0 / 43,3	57,8 / 48,1	50,5
Max. output AC current [A] ..... :	58,0 / 48,4	63,8 / 53,2	56,8
Nominal active output power [kW] :	36,0	40,0	42,0
Max. apparent output power [kVA] :	40,0	44,0	47,0
Firmware version..... :	V100R001		

Description of the structure of the power generation unit:

The input and output are protected by Varistors to Earth. The unit is providing EMC filtering at the output toward mains. The unit does not provide galvanic separation from input to output (transformerless). The output is switched off redundant by the high power switching bridge and a two relays. This assures that the opening of the output circuit will also operate in case of one error.

Parameter Table

General parameter settings (rated values or reference values)			
Name	**Description**	**Unit**	**Value default**
Pn	Rated active power	KW	SUN2000-15KTL-M3: 15 SUN2000-17KTL-M3: 17 SUN2000-20KTL-M3: 20 SUN2000-23KTL-M3: 23 SUN2000-28KTL-M3: 27.5 SUN2000-30KTL-M3: 30 SUN2000-36KTL-M3: 36 SUN2000-40KTL-M3: 40 SUN2000-42KTL-M3: 42
Smax	Max apparent power	KVA	SUN2000-15KTL-M3: 16.5 SUN2000-17KTL-M3:18.7 SUN2000-20KTL-M3: 22.0 SUN2000-23KTL-M3: 23.0 SUN2000-28KTL-M3: 27.5 SUN2000-30KTL-M3: 33 SUN2000-30KTL-M3: 30 (For the country setting *C10/C11-MV* and *C10/C11-MV480* the max. output apparent power is limited to 30 kVA) SUN2000-36KTL-M3: 40 SUN2000-40KTL-M3: 44 SUN2000-42KTL-M3: 47
Un	Rated voltage	V	400 / 480
In	Rated current	A	SUN2000-15KTL-M3: 21.7A@400V SUN2000-17KTL-M3: 24.5A@400V SUN2000-20KTL-M3: 28.9A@400V SUN2000-23KTL-M3: 33.3A@400V SUN2000-28KTL-M3: 33.1A@480V SUN2000-30KTL-M3: 43.3A@400V SUN2000-30KTL-M3: 36.1A@480V SUN2000-36KTL-M3: 52.0A@400V SUN2000-36KTL-M3: 43.3A@480V SUN2000-40KTL-M3: 57.8A@400V SUN2000-40KTL-M3: 48.1A@480V SUN2000-42KTL-M3: 50.5A@480V
Fn	Rated frequency	Hz	50

Clause(s) / subclause(s) of this EN	Ref	Parameter	Typical value range	Value default	
4.4.2 Operating frequency range	A,B	47,0 – 47,5 Hz Duration	0 – 20 s	100s	
	A,B	47,5 – 48,5 Hz Duration	30 – 90 min	unlimited	
	A,B	48,5 – 49,0 Hz Duration	30 – 90 min	unlimited	
	A,B	49,0 – 51,0 Hz Duration	not configurable	unlimited	
	A,B	51,0 – 51,5 Hz Duration	30 – 90 min	unlimited	
	A,B	51, 5 – 52 Hz Duration	0 – 15 min	100 s	
4.4.3 Minimal requirement for active power delivery at underfrequency	A,B	Reduction threshold	49 Hz – 49,5 Hz	No reduction	
	A,B	Maximum reduction rate	2 – 10 % PM/Hz	No reduction	
4.4.4 Continuous operating voltage range	n.a.	Upper limit	not configurable	110% Un	
	n.a.	Lower limit	not configurable	85% Un	
4.5.2 Rate of change of frequency (ROCOF) immunity	A,B	ROCOF withstand capability (defined with a sliding measurement window of 500 ms)	not defined	-	
		non-synchronous generating technology:		2 Hz/s	
		synchronous generating technology:		N/A	
4.5.3.2 Generating plant with non-synchronous generating technology	B	Maximum power resumption time	not defined	1 s	
	B	Voltage-Time-Diagram	see Figure 6	Time [s]	U [p.u.]
				0,0	0,05
				0,25	0,05
				3	0,85
				180	0,85
				180	0,90
4.5.3.3 Generating plant with synchronous generating technology	B	Maximum power resumption time	not defined	N/A	
	B	Voltage-Time-Diagram	see Figure 7 (N/A)	Time [s]	U [p.u.]
				-	-
				-	-

Clause(s) / subclause(s) of this EN	Ref	Parameter	Typical value range	Value default	
				-	-
				-	-
				-	-
				-	-
				-	-
4.5.4 Over-voltage ride through (OVRT)	n.a.	Voltage-Time-Diagram	not configurable	Time [s]	Time [s]
				0,0	1,25
				0,1	1,25
				0,1	1,20
				5,0	1,20
				5,0	1,15
				60	1,15
				60	1,10
4.6.1 Power response to overfrequency	A,B	Threshold frequency f1	50,2 Hz – 52 Hz	50,2 Hz	
	A,B	Droop	2 % – 12 %	5 %	
	A,B	Power reference	PM | Pmax	PM for other non-synchronous generating technology	
	n.a.	Intentional delay	0 – 2 s	0s	
	n.a.	Deactivation threshold fstop	50,0 Hz – f1	deactivated	
	n.a.	Deactivation time tstop	0 – 600 s	-	
	A	Acceptance of staged disconnection	yes | no	yes	
4.6.2 Power response to underfrequency	n.a.	Threshold frequency f1	49,8 Hz – 46 Hz	49,5 Hz	
	n.a.	Droop	2 – 12 %	5 %	
	n.a.	Power reference	PM | Pmax	Pmax	
	n.a.	Intentional delay	0 – 2 s	0 s	
4.7.2.2 Capabilities	B	Reactive power range overexcited	0,9-1	0,9(0,8-1 adj. by manufacture)	
	B	Reactive power range underexcited	0,9-1	0,9(0,8-1 adj. by manufacture)	
4.7.2.3 Control modes	n.a.	Enabled control mode	Q setp. Q(U) Q(P)	Q setpoint	

Clause(s) / subclause(s) of this EN	Ref	Parameter	Typical value range	Value default
			cos φ setp. cos φ (P)	
4.7.2.3.2 Setpoint control modes	n.a.	Q setpoint and excitation	0 – 60 % S_{max}	0 (0-60%Smax adj. by manufacturer)
	n.a.	cos φ setpoint and excitation	1 – 0,9	1 (1-0.8 adj. by manufacturer)
4.7.2.3.3 Voltage related control modes	n.a.	Characteristic curve	-	-
	n.a.	Time constant	3 s – 60 s	10 s (1-120s adj. by manufacturer)
	n.a.	Min cos φ	0,0 – 1	0,9 (low to 0.8 by manufacturer)
	n.a.	Lock in power	0 % – 20 %	20%
	n.a.	Lock out power	0 % – 20 %	5%
4.7.2.3.4 Power related control mode	n.a.	Characteristic curve	-	-
4.7.4.2.1 Voltage support during faults and voltage steps - General	B.	Enabling	enable | disable	enable
	B.	Static voltage range overvoltage	100 % Un – 120 % Un	110 % Un
	B.	Static voltage range undervoltage	20 % Un – 100 % Un	90 % Un
	B.	Insensitivity range of ΔU50per	0 % – 15 %	5 %
	B.	Gradient k1	0 – 6	2
	B.	Gradient k2	0 – 6	2
4.7.4.2.1.2 Optional Modes	n.a.	Active power priority	enable | disable	disabled
	n.a.	Reactive current limitation [% rated current]	0 %–100 %	disabled
	n.a.	Zero current threshold	20 % Uc – 100 % Uc	70%
4.7.4.2.2 Zero current mode for converter connected generating technology	n.a.	Enabling	enable | disable	disabled
	n.a.	Static voltage range undervoltage	20 % Un – 100 % Un	70 % Un
4.9.3 Requirements on voltage and frequency protection – inverter self-protection	B	Undervoltage threshold stage 1	0,15 Un – 1 Un	0,8 Un
	B	Undervoltage operate time stage 1	0,05 s – 7200 s	5 s

Clause(s) / subclause(s) of this EN	Ref	Parameter	Typical value range	Value default
	B	Undervoltage threshold stage 2	0,15 Un – 1 Un	0,5 Un
	B	Undervoltage operate time stage 2	0,05 s – 7200 s	2 s
	B	Overvoltage threshold stage 1	1,0 Un – 1,25 Un	1,15 Un
	B	Overvoltage operate time stage 1	0,05 s – 7200 s	61 s
	B	Overvoltage threshold stage 2	1,0 Un – 1,25 Un	1,25 Un
	B	Overvoltage operate time stage 2	0,05 s – 7200 s	0,2 s
	B	Overvoltage threshold 10 min mean protection	1,0 Un – 1,25 Un	1,10 Un
	B	Overvoltage threshold 10 min mean protection time	0,05 s – 7200 s	0,2s
	B	Underfrequency threshold stage 1	40,0 Hz– 50,0 Hz	47,5 Hz
	B	Underfrequency operate time stage 1	0,05 s – 7200 s	0,5 s
	B	Underfrequency threshold stage 2	40,0 Hz – 50,0 Hz	47 Hz
	B	Underfrequency operate time stage 2	0,05 s – 7200 s	0,2 s
	B	Overfrequency threshold stage 1	50,0 Hz – 60,0 Hz	51,5 Hz
	B	Overfrequency operate time stage 1	0,05 s – 7200 s	0,5 s
	B	Overfrequency threshold stage 2	50,0 Hz – 60,0 Hz	52 Hz
	B	Overfrequency operate time stage 2	0,05 s – 7200 s	0,2s
	B	Positive sequence under-voltage protection threshold	20 % – 100 %	N/A
	B	Positive sequence under-voltage protection operate time	0,2 s – 100 s	N/A

Clause(s) / subclause(s) of this EN	Ref	Parameter	Typical value range	Value default
	B	Negative sequence over-voltage protection threshold	1 % – 100 %	N/A
	B	Negative sequence over-voltage protection operate time	0,2 s – 100 s	N/A
	B	Zero sequence over-voltage protection threshold	0 % – 100 %	N/A
	B	Zero sequence over-voltage protection operate time	0,2 s – 100 s	N/A
4.10.2 Automatic reconnection after tripping	B	Lower frequency	40,0 Hz – 50,0 Hz	49,5 Hz
	B	Upper frequency	50,0 Hz – 60,0 Hz	50,2 Hz
	B	Lower voltage	45% Un – 100 % Un	90 % Un
	B	Upper voltage	100 % Un – 136 % Un	110 % Un
	B	Observation time	0 s – 7200 s	60 s
	B	Active power increase gradient	3.33 % – 6000 %/min	10 %Pn /min
4.10.3 Starting to generate electrical power	A,B	Lower frequency	40,0 Hz – 50,0 Hz	49,5 Hz
	A,B	Upper frequency	50,0 Hz – 60,0 Hz	50,1 Hz
	A,B	Lower voltage	45 % – 100 % Un	90 % Un
	A,B	Upper voltage	100 % – 136 % Un	110 % Un
	A,B	Observation time	10 s – 600 s	60 s
	A,B	Active power increase gradient	6 % – 3000 %/min	300 %Pn /min
4.11.1 Ceasing active power	A,B	Remote operation of the logic interface	yes | no	Can be achieved by PGU. (Logic interface shall be specified by DNO)
4.11.2 Reduction of active power on set point	B	Remote operation NOTE: If yes further definition is provided by the DSO	yes | no	Can be achieved by PGU. (Definition shall be specified by DNO)
4.12 Remote information exchange	B	Remote information exchange required	yes | no	No

Clause(s) / subclause(s) of this EN	Ref	Parameter	Typical value range	Value default
		NOTE: If yes further definition is provided by the DSO		