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# 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:** **Grid-tied Photovoltaic (PV) inverter**

**Model** SUN2000-168KTL-H1  
SUN2000-185KTL-H1

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 inverters

**Firmware version:** **V300R001**

**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

**Standards / directives for testing:** FGW TG3, Rev. 25: 2018-09-01, referencing IEC 61400-21 Ed. 2: 2008 and 61000-4-7: 2002

**Report number:** 19TH0240\_50549-2\_0  
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**Certification scheme:** NSOP-0032-DEU-ZE-V01  
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A partial representation of the certificate requires the written approval of Bureau Veritas Consumer Products Services Germany GmbH

**Type Approval and declaration of compliance with the requirements of EN 50549-2**

<b>Manufacturer / applicant:</b>	Huawei Technologies Co., Ltd. Administration Building, Headquarters of Huawei Technologies Co., Ltd., Bantian, Longgang District, Shenzhen, 518129 P.R. China	
<b>Product description:</b>	Grid-tied photovoltaic inverter	
<b>Unit / Type:</b>	SUN2000-168KTL-H1	SUN2000-185KTL-H1
<b>Full-load MPP DC voltage range [V]:</b>	880 - 1300	
<b>Input DC voltage range [V]:</b>	500 - 1500	
<b>Input DC current [A]:</b>	max. 9 x 26	
<b>Nominal output AC voltage [V]:</b>	800 (3~ + PE, 50/60Hz)	
<b>Output AC current [A]:</b>	max. 122,5	max. 134,9
<b>Nominal active output power [kW]:</b>	150	175
<b>Max. apparent / active output power [kVA / kW]:</b>	168	185
<b>Firmware version:</b>	V300R001	

**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 line and neutral. This enables a safe disconnection of the power generation unit from the network in case of error.

Parameter Table						
Clause(s) / subclause(s) of this EN	Ref	Parameter	Typical value range	Value default		DSO Requirement
4.4.2 Operating frequency range	A,B	47,0 – 47,5 Hz Duration	0 – 20 s	0,5 s		--
	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	0,5 s		--
4.4.2 Operating frequency range	A,B	Reduction threshold	49 Hz – 49,5 Hz	--		--
	A,B	Maximum reduction rate	2 – 10%P <sub>M</sub> /Hz	0%P <sub>M</sub> /Hz		--
4.4.4 Continuous operating voltage range	n.a.	Upper limit	not configurable	110%U <sub>c</sub>		--
	n.a.	Lower limit	not configurable	90%U <sub>c</sub>		--
4.5.2 Rate of change of frequency (ROCOF) immunity	A,B	ROCOF withstand capability (defined with a sliding measurement window of 500 ms) non-synchronous generating technology: synchronous generating technology:	not defined	2,5 Hz/s[Disable] 1 Hz/s		--
4.5.3.2 Generating plant with non-synchronous generating technology	B	Maximum power resumption time	not defined	0,4 s		--
	B	Voltage-Time-Diagram	--	Time [s]	U [p.u.]	--
				0,0	0,05	
				0,25	0,05	
				3	0,85	
				180	0,85	
180	0,9					
4.5.3.3 Generating plant with synchronous generating technology	B	Maximum power resumption time	not defined	3 s		--
	B	Voltage-Time-Diagram	--	Time [s]	U [p.u.]	--
0,0				0,3		
0,15				0,3		
0,15				0,7		
0,7				0,7		
1,5				0,85		
180	0,85					
180	0,9					
4.5.4 Over-voltage ride through (OVRT)	n.a.	Voltage-Time-Diagram	not configurable	Time [s]	U [p.u.]	--
				0,0	1,25	
				0,1	1,25	
				0,1	1,20	
				5,0	1,20	
				5,0	1,15	

Clause(s) / subclause(s) of this EN	Ref	Parameter	Typical value range	Value default	DSO Requirement
4.6.1 Power response to overfrequency	A,B	Threshold frequency $f_1$	50,2 Hz – 52 Hz	50,2 Hz	--
	A,B	Droop	2%– 12%	5%	--
	A,B	Power reference	$P_M$   $P_{max}$	$P_{max}$ , for synchronous generating technology and EESS $P_M$ for other non-synchronous generating technology	--
	n.a.	Intentional delay	0 – 2 s	0s	--
	n.a.	Deactivation threshold $f_{stop}$	50,0 Hz – $f_1$	50,15 Hz	--
	n.a.	Deactivation time $t_{stop}$	0 – 600 s	30	--
	A	Acceptance of staged disconnection	yes   no	yes	--
4.6.2 Power response to underfrequency	n.a.	Threshold frequency $f_1$	49,8 Hz – 46 Hz	--	--
	n.a.	Droop	2 – 12%	--	--
	n.a.	Power reference	$P_M$   $P_{max}$	--	--
	n.a.	Intentional delay	0 – 2 s	--	--
4.7.2.2 Capabilities	B	Reactive power range overexcited	0 – 0,33	0,6	--
	B	Reactive power range underexcited	0 – 0,33	0,6	--
4.7.2.3 Control modes	n.a.	Enabled control mode	Q setp. Q(U) Q(P) cos $\varphi$ setp. cos $\varphi$ (P)	cos $\varphi$	--
4.7.2.3.2 Setpoint control modes	n.a.	Q setpoint and excitation	0 – 33% $P_D$	0	--
	n.a.	cos $\varphi$ setpoint and excitation	1 – 0,9	1	--
4.7.2.3.3 Voltage related control modes	n.a.	Characteristic curve	--	--	--
	n.a.	Time constant	3 s – 60 s	10 s	--
	n.a.	Min cos $\varphi$	0,0 – 1	0,9	--
	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% $U_c$ – 120% $U_c$	110% $U_c$	
	B	Static voltage range undervoltage	80% $U_c$ – 100% $U_c$	90% $U_c$	
	B	Insensitivity range of $\Delta U_{50per}$	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	disable	
	n.a.	Reactive current limitation [%rated current]	0%–100%	disable	
	n.a.	Zero current threshold	20% $U_c$ – 100% $U_c$	disable	

Clause(s) / subclause(s) of this EN	Ref	Parameter	Typical value range	Value default	DSO Requirement
4.7.4.2.1 Voltage support during faults and voltage steps - General	B	Enabling	enable   disable	enable	--
	B	Static voltage range overvoltage	100%U <sub>c</sub> – 120%U <sub>c</sub>	110%U <sub>c</sub>	--
	B	Static voltage range undervoltage	80%U <sub>c</sub> – 100%U <sub>c</sub>	90%U <sub>c</sub>	--
	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	disable	--
	n.a	Reactive current limitation [%rated current]	0%–100%	disable	--
	n.a	Zero current threshold	20%U <sub>c</sub> – 100%U <sub>c</sub>	disable	--
4.7.4.2.2 Zero current mode for converter connected generating technology	n.a.	Enabling	enable   disable	disable	--
	n.a	Static voltage range undervoltage	20%U <sub>c</sub> – 100%U <sub>c</sub>	50%U <sub>c</sub>	--
4.9.3 Requirements on voltage and frequency protection	B	Undervoltage threshold stage 1	0,2 U <sub>c</sub> – 1 U <sub>c</sub>	0,8 U <sub>c</sub>	--
	B	Undervoltage operate time stage 1	0,1 s – 100 s	5 s	--
	B	Undervoltage threshold stage 2	0,2 U <sub>c</sub> – 1 U <sub>c</sub>	0,5 U <sub>c</sub>	--
	B	Undervoltage operate time stage 2	0,1 s – 5 s	3 s	--
	B	Overvoltage threshold stage 1	1,0 U <sub>c</sub> – 1,2 U <sub>c</sub>	1,15 U <sub>c</sub>	--
	B	Overvoltage operate time stage 1	0,1 s – 100 s	61 s	--
	B	Overvoltage threshold stage 2	1,0 U <sub>c</sub> – 1,3 U <sub>c</sub>	1,2 U <sub>c</sub>	--
	B	Overvoltage operate time stage 2	0,1 s – 5 s	6 s	--
	B	Overvoltage threshold 10 min mean protection	1,0 U <sub>c</sub> – 1,15 U <sub>c</sub>	1,1 U <sub>c</sub>	--
	B	Underfrequency threshold stage 1	47,0 Hz– 50,0 Hz	47,5 Hz	--
	B	Underfrequency operate time stage 1	0,1 s – 100 s	0,5 s	--
	B	Underfrequency threshold stage 2	47,0 Hz – 50,0 Hz	47,0 Hz	--
	B	Underfrequency operate time stage 2	0,1 s – 5 s	0,2 s	--
	B	Overfrequency threshold stage 1	50,0 Hz – 52,0 Hz	51,5 Hz	--
	B	Overfrequency operate time stage 1	0,1 s – 100 s	0,5 s	--
	B	Overfrequency threshold stage 2	50,0 Hz – 52,0 Hz	52,0 Hz	--
	B	Overfrequency operate time stage 2	0,1 s – 5 s	0,2 s	--
	B	Positive sequence under-voltage protection threshold	20%– 100%	0%	--
	B	Positive sequence under-voltage protection operate time	0,2 s – 100 s	0,5 s	--
	B	Negative sequence over-voltage protection threshold	1%– 100%	100%	--
B	Negative sequence over-voltage protection operate time	0,2 s – 100 s	0,5 s	--	
B	Zero sequence over-voltage protection threshold	0%– 100%	100%	--	
B	Zero sequence over-voltage protection operate time	0,2 s – 100 s	0,5 s	--	

Clause(s) / subclause(s) of this EN	Ref	Parameter	Typical value range	Value default	DSO Requirement
4.10.2 Automatic reconnection after tripping	B	Lower frequency	47,0 Hz – 50,0 Hz	49,5 Hz	--
	B	Upper frequency	50,0 Hz – 52,0 Hz	50,2 Hz	--
	B	Lower voltage	50%U <sub>c</sub> – 100%U <sub>c</sub>	90%U <sub>c</sub>	--
	B	Upper voltage	100%U <sub>c</sub> – 120%U <sub>c</sub>	110%U <sub>c</sub>	--
	B	Observation time	10 s – 600 s	60 s	--
	B	Active power increase gradient	6%– 3000%/min	10%/min	--
4.10.3 Starting to generate electrical power	A,B	Lower frequency	47,0 Hz – 50,0 Hz	49,5 Hz	--
	A,B	Upper frequency	50,0 Hz – 52,0 Hz	50,1 Hz	--
	A,B	Lower voltage	50%– 100%U <sub>c</sub>	90%U <sub>c</sub>	--
	A,B	Upper voltage	100%– 120%U <sub>c</sub>	110%U <sub>c</sub>	--
	A,B	Observation time	10 s – 600 s	60 s	--
	A,B	Active power increase gradient	6%– 3000%/min	disabled	--
4.11.1 Ceasing active power	A,B	Remote operation of the logic interface	yes   no	No	--
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	No	--
4.12 Remote information exchange	B	Remote information exchange required NOTE: If yes further definition is provided by the DSO	yes   no	No	--