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Product Service

Compliance Document

No. D 091566 0063 Rev. 00

Holder of Certificate: **SINENG ELECTRIC CO.,LTD.**
No.6 Hehui Road, Huishan District
214174 Wuxi City
PEOPLE'S REPUBLIC OF CHINA

Product: **Converter**
GRID-CONNECTED HYBRID INVERTER

This Compliance document confirms the compliance with the listed standards on a voluntary basis. It refers only to the sample submitted for testing and certification and does not certify the quality or safety of the serial products. For details see: www.tuvsud.com/ps-cert

Test report no.: 704092346205-00

Date, 2023-09-15

(Zhengdong Ma)

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Model(s): **SN3.0HS, SN3.68HS, SN4.0HS, SN5.0HS, SN6.0HS**

Parameters:

Please see pages 3 to 6.

Tested according to: EN 50549-1:2019

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Model	SN3.0HS	SN3.68HS	SN4.0HS
PV input parameters:			
Max. Input Voltage	600 Vd.c.		
MPPT voltage range	90 -560 Vd.c.		
Max. input current	16 / 16 Ad.c.		
Isc PV	25 / 25 Ad.c.		
AC output parameters:			
Rated voltage	1/N/PE 230 Va.c.		
Rated frequency	50 Hz		
Rated Output Power	3000 W	3680 W	4000 W
Max. apparent output power	3000 VA	3680 VA	4000 VA
Max. output current	13 Aa.c.	16 Aa.c.	17.4 Aa.c.
Power factor	0.8(leading)-0.8(lagging)		
AC input parameters:			
Max. input power	6000 W	7360 W	8000 W
Max. current from grid	26 Aa.c.	32 Aa.c.	34.8 Aa.c.
Battery input port parameters:			
Voltage range	85 - 460 Vd.c.		
Max. current	25 Ad.c.		

Model	SN5.0HS	SN6.0HS
PV input parameters:		
Max. Input Voltage	600 Vd.c.	
MPPT voltage range	90 -560 Vd.c.	
Max. input current	16 / 16 Ad.c.	
Isc PV	25 / 25 Ad.c.	
AC output parameters:		
Rated voltage	1/N/PE 230 Va.c.	
Rated frequency	50 Hz	
Rated Output Power	5000 W	6000 W
Max. apparent output power	5000 VA	6000 VA
Max. output current	21.7 Aa.c.	26.1 Aa.c.
Power factor	0.8(leading)-0.8(lagging)	
AC input parameters:		
Max. input power	10000 W	12000 W
Max. current from grid	43.4 Aa.c.	52.2 Aa.c.
Battery input port parameters:		
Voltage range	85 - 460 Vd.c.	
Max. current	25 Ad.c.	

Interface protection system default settings and power controls in inverter (based on EN 50549-1:2019)				
Clause(s) / subclause(s) of EN 50549	Ref	Parameter	Typical value range	Value default

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4.3.2 Interface switch	n.a.	Single fault tolerance for interface switch required	yes | no	yes	
4.4.2 Operating frequency range	A,B	47.0 – 47.5 Hz Duration	0 – 20 s	20 s	
	A,B	47.5 – 48.5 Hz Duration	30 – 90 min	90 min	
	A,B	48.5 – 49.0 Hz Duration	30 – 90 min	90 min	
	A,B	49.0 – 51.0 Hz Duration	not configurable	No disconnect	
	A,B	51.0 – 51.5 Hz Duration	30 – 90 min	90 min	
	A,B	51.5 – 52 Hz Duration	0 – 15 min	15 min	
4.4.3 Minimal requirement for active power delivery at underfrequency	A,B	Reduction threshold	49 Hz – 49,5 Hz	N/A	
	A,B	Maximum reduction rate	2 – 10 % P_M/Hz	N/A	
4.4.4 Continuous operating voltage range	n.a.	Upper limit	not configurable	110%	
	n.a.	Lower limit	not configurable	85%	
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	2 Hz/s	
		non-synchronous generating technology:		N/A	
		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	0.05
				0.25	0.05
				3.00	0.85
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.]
				-	-
				-	-
				-	-
4.5.4 Over-voltage ride through (OVRT)	n.a.	Voltage-Time-Diagram	not configurable	Time [s]	U [p.u.]
				0	1.25
				0.1	1.25
				0.1	1.20
				5	1.20
				5	1.15
				60	1.15
				60	1.10
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 EESS	
	n.a.	Intentional delay	0 – 2 s	0.5 s	
	n.a.	Deactivation threshold f_{stop}	50,0 Hz – f_1	50.1 Hz	
	n.a.	Deactivation time t_{stop}	0 – 600 s	30 s	
	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	49.8 Hz	
	n.a.	Droop	2 – 12 %	5%	

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	n.a.	Power reference	P_M | P_{max}	Pmax
	n.a.	Intentional delay	0 – 2 s	0.5 s
4.7.2.2 Capabilities	B	Active factor range overexcited	0.9 – 1	1
	B	Active factor range underexcited	0.9 – 1	1
4.7.2.3 Control modes	n.a.	Enabled control mode	Q setp. Q(U) cos φ setp. cos φ (P)	cos φ setp
4.7.2.3.2 Setpoint control modes	n.a.	Q setpoint and excitation	0 – 60 % S_{max}	0
	n.a.	cos φ 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	-
	n.a.	Min cos φ	0.0 – 1	-
	n.a.	Lock in power	0 % – 20 %	-
	n.a.	Lock out power	0 % – 20 %	-
4.7.2.3.4 Power related control mode	n.a.	Characteristic curve	-	-
4.7.4.2.2 Zero current mode for converter connected generating technology	n.a.	Enabling	enable | disable	Disable
	n.a	Static voltage range overvoltage	100 % U_n – 120 % U_n	110% Un
	n.a	Static voltage range undervoltage	20 % U_n – 100 % U_n	90% Un
4.9.2 Requirements on voltage and frequency protection	n.a	Threshold for protection as dedicated device [in A or kW, kVA]	16 A – 250 kVA	Interface protection integrated
	B	Undervoltage threshold stage 1	0.2 U_n – 1 U_n	0.85 Un
	B	Undervoltage operate time stage 1	0.1 s – 100 s	3 s
	B	Undervoltage threshold stage 2	0.2 U_n – 1 U_n	0.4 Un
	B	Undervoltage operate time stage 2	0.1 s – 5 s	1.5 s
	B	Overvoltage threshold stage 1	1.0 U_n – 1.2 U_n	1.16 Un
	B	Overvoltage operate time stage 1	0.1 s – 100 s	10 s
	B	Overvoltage threshold stage 2	1.0 U_n – 1.3 U_n	1.25 Un
	B	Overvoltage operate time stage 2	0.1 s – 5 s	0.1 s
	B	Overvoltage threshold 10 min mean protection	1.0 U_n – 1.15 U_n	1.1 Un
	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	5 s
	B	Underfrequency threshold stage 2	47.0 Hz – 50.0 Hz	47 Hz
	B	Underfrequency operate time stage 2	0.1 s – 5 s	0.1 s

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	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	5 s
	B	Overfrequency threshold stage 2	50.0 Hz – 52.0 Hz	52 Hz
	B	Overfrequency operate time stage 2	0.1 s – 5 s	0.1 s
4.10.2 Automatic reconnection after tripping	B	Lower frequency	47.0 Hz – 50.0 Hz	49.5Hz
	B	Upper frequency	50.0 Hz – 52.0 Hz	50.2Hz
	B	Lower voltage	50 % U_n – 100 % U_n	85%Un
	B	Upper voltage	100 % U_n – 120 % U_n	110%Un
	B	Observation time	10 s – 600 s	60 s
	B	Active power increase gradient	6 % – 3000 %/min	9% Pn/min
4.10.3 Starting to generate electrical power	A,B	Lower frequency	47.0 Hz – 50.0 Hz	49.5Hz
	A,B	Upper frequency	50.0 Hz – 52.0 Hz	50.1Hz
	A,B	Lower voltage	50 % – 100 % U_n	85%Un
	A,B	Upper voltage	100 % – 120 % U_n	110%Un
	A,B	Observation time	10 s – 600 s	60s
	A,B	Active power increase gradient	6 % – 3000 %/min	disable
4.11.1 Ceasing active power	A,B	Remote operation of the logic interface	yes | no	Can be achieved by EESS. (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 EESS. (Logic interface shall be specified by DNO)
4.12 Remote information exchange	B	Remote information exchange required NOTE: If yes further definition is provided by the DSO	yes | no	N/A

The Column Ref specifies if a parameter is relevant for COMMISSION REGULATION 2016/631 and for what type of generating module the parameter is relevant. If n.a. is set, this parameter is: not applicable for 2016/631, but is introduce into EN 50549-1 for local DSO network management reasons and is not considered as cross border issues.

Unauthorised access to factory safety parameters setting and software should be prohibited.
A reset to the factory safety parameters requires retesting and verification in conjunction with the end-use system.

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