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Certificate of compliance

Applicant: **SUNGROW POWER SUPPLY CO., LTD.**
No,1699 Xiyou Rd, New & High Technology Industrial Development Zone, Hefei, 230088
P.R.China

Product: **Photovoltaic inverter**

Model: **SG75CX-P2**
SG110CX-P2
SG125CX-P2

The device is designed to work as a generation unit of the type: B, C and D

Inverter for three-phase parallel connection to a MV distribution network.

Applied rules and standards:

EN 50549-2:2019/A1:2023

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

- 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

EN 50549-10:2022

Requirements for generating plants to be connected in parallel with distribution networks - Part 10: Tests for conformity assessment of generating units **Commission Regulation (EU) 2016/631 of 14 April 2016**

Establishing a network code on requirements for grid connection of generators (NC RFG).

Type approval for generation units to use in Type B, C and D plants.

Note:

This certificate proves the conformity of a generating unit based on NC RFG. However, some requirements, such as frequency sensitive mode (FSM), reactive power capacity etc. can be applicable on the generating plant level, which assessment can be out of the scope of this certificate. Consequently, it is possible that the conformity assessment of a generating unit does not cover all aspects of the above-mentioned standardization documents, typically when a requirement is rather evaluated on a plant level.

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: **SGR-ESH-P24072405**

Certificate number: **U24-1078**

Certification Program: **NSOP-0032-DEU-ZE-V10**

Date of issue: **2024-11-15**

Accreditation



Accredited certification body by Deutsche Akkreditierungsstelle GmbH (DAkKS) according to ISO/IEC 17065. The accreditation is valid only for the scope listed in the annex of the accreditation certificate D-ZE-12024-01-00. The Deutsche Akkreditierungsstelle GmbH (DAkKS) is signatory of the multilateral arrangements of EA, ILAC and IAF for mutual recognition.

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Type Approval and declaration of compliance with the requirements of EN 50549-2, EN50549-10 and Commission Regulation (EU) 2016/631 of 14 April 2016				
Manufacturer	SUNGROW POWER SUPPLY CO., LTD. No,1699 Xiyou Rd, New & High Technology Industrial Development Zone, Hefei, 230088 P.R.China			
Product type	Photovoltaic inverter			
Static converter model	SG75CX-P2	SG110CX-P2	SG125CX-P2	--
Input DC (photovoltaic)				
MPP voltage range [V]	180-1000	180-1000	180-1000	--
Max. input voltage [V]	1100	1100	1100	--
Max. input current per MPPT [A]	30	30	30	--
Output AC				
Rated AC voltage [V]	3L/N/PE, 230, 50/60Hz	3L/N/PE, 230, 50/60Hz	3L/N/PE, 230, 50/60Hz	--
Rated output current [A]	113,9	167,1	181,1	--
Max. output current [A]	113,9	167,1	181,1	--
Nom. converter output (P _{NINV}) [kW]	75,0	110,0	125,0	--
Rated apparent power [kVA]	75,0	110,0	125,0	--
Interface protection system and interface switch (Network and system protection "NS-protection")				
Type of protection	Integrated NS-protection			
Assigned to generation unit type	SG75CX-P2 SG110CX-P2 SG125CX-P2			
Integrated interface switch	Type of switching equipment 1: Relay (Model HF172F-200/12-HTF) Type of switching equipment 2: Relay (Model HF172F-200/12-HTF) Note: The output is switched off by the inverter bridge and two relay in series in each line and neutral.			
Firmware version	LCD_GARNET-S_V11_V01_A; MDSP_GARNET-S_V11_V01_A			
Note	<p>The settings of the interface protection are password protected adjustable.</p> <p>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.</p> <p>The above stated generators are tested according to the requirements in the EN 50549-1:2019 Commission Regulation (EU) 2016/631 of 14 April 2016. 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.</p>			

Type Approval and declaration of compliance with the requirements of EN 50549-1 and Commission Regulation (EU) 2016/631 of 14 April 2016

Parameter Table

Name of parameter set		EN50549-2&EN50549-10			
Specific technical requirement		EN 50549-2			
Clause of EN 50549-1	Parameter	Remarks / additional information	setting range	default settings used	
4.3.2 Interface switch (EN 50549-1)	Single fault tolerance for interface switch		yes no	yes	
4.4.2 Operating frequency range	47,0 – 47,5 Hz Duration		0 s – 20 s	0s	
	47,5 – 48,5 Hz Duration		30 – 90 min	30 min	
	48,5 – 49,0 Hz Duration		30 – 90 min	30 min	
	49,0 – 51,0 Hz Duration		not configurable	unlimited	
	51,0 – 51,5 Hz Duration		30 – 90 min	30 min	
	51,5 – 52,0 Hz Duration		0 – 15 min	0 s	
4.4.3 Minimal requirement for active power delivery at under frequency	Reduction threshold		not configurable 49,0 Hz – 49,5 Hz	Electronic inverter, no power reduction take place 49,5 Hz	
	Maximum reduction rate		not configurable 2 – 10% P _M /Hz	≤ 2 % 10% P _M /Hz	
4.4.4 Continuous operating voltage range	Upper limit		not configurable 1,0 U _n – 2,0 U _n	1,15 U _n 1,10 U _n	
	Lower limit		not configurable 0,9 U _n – 1,0 U _n	0,85 U _n , 0,90 U _c	
4.5.2 Rate of change of frequency (ROCOF) immunity	ROCOF withstand capability (defined with a sliding measurement window of 500 ms) non-synchronous generating technology (inverter): synchronous generating technology:		not configurable 0 – 10 Hz/s		
		yes		2 Hz/s	
		no		1 Hz/s	
4.5.3.2 Under-voltage ride through (UVRT) Generating plant with non-synchronous generating technology (inverter)	Voltage-Time-Diagram		see Figure 6 of EN 50549-2:2019	Time [s]	U [p.u.]
				0,00	0,20
				0,15	0,20
				1,50	0,85
				180	0,85
	180	0,90			
	Fast fault current		Rated value	SG125CX-P2: 181,1 A SG110CX-P2: 159,4 A SG75CX-P2: 108,7 A (rated current)	
Active power recovery after a short circuit		configurable	Start at 90% U _n		
Fault recovery of active power (times calculated)		configurable	≤ 1 s		



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Extract from test report SGR-ESH-P24072405 issued by a testing laboratory accredited by “Deutsche Akkreditierungsstelle GmbH (DAKKS)” according to ISO/IEC 17025. The accreditation is only valid for the scope listed in the annex of the accreditation certificate “D-PL-12024-03-04”.

	from the removal of the short circuit)				
	Value for recovered active power		configurable	≥ 90 %	
	Accuracy for recovery of active power		not configurable	≤ 10 %	
	Reactive power contribution has priority		yes no	Yes	
4.5.4 Over-voltage ride through (OVRT)	Voltage-Time-Diagram		not configurable see Figure 8 of EN 50549-2:2019	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
				60,0	1,15
				60,0	1,10
	Active power recovery after a short circuit		configurable	Start at 90% Un	
	Fault recovery of active power (times calculated from the removal of the short circuit)		configurable	≤ 5 s	
	Value for recovered active power		configurable	≥ 90%	
	Accuracy for recovery of active power		not configurable	≤ 10%	
4.6.1 Power response to over frequency (LFSM-O)	Threshold frequency f_1		50,2 Hz – 52,0 Hz	50,2 Hz	
	Droop		2% – 12%	5%	
	Power reference		P_M P_{max}	P_M for other non-synchronous generating technology (inverter)	
	Intentional delay		0 s – 2 s	0 s	
	Deactivation threshold f_{stop}		50,0 Hz – f_1	deactivated	
	Deactivation time t_{stop}		0 s – 600 s	-	
	Acceptance of staged disconnection		yes no	yes	
4.6.2 Power response to under frequency (LFSM-U)	Threshold frequency f_1		49,8 Hz – 46,0 Hz	49,8 Hz	
	Droop		2 % – 12%	5%	
	Power reference		P_M P_{max}	P_{max}	
	Intentional delay		0 s – 2 s	0 s	
4.7.2.2 Capabilities	Active factor range overexcited		0,90 – 1 / 48% P_d - 0 0,95 – 1 / 33% P_d - 0	0,80 – 1 / 75% P_d - 0	
	Active factor range underexcited		0,90 – 1 / 48% P_d - 0 0,95 – 1 / 33% P_d - 0	0,80 – 1 / 75% P_d - 0	



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4.7.2.3 Control modes	Enabled control mode		Q setp. Q(U) Q(P) cos φ setp. cos φ (P)	activated deactivated deactivated deactivated deactivated
4.7.2.3.2 Set point control modes	Q setpoint and excitation		0% – 48% P _D , 0% – 33% P _D	0
	cos φ setpoint and excitation		1,0 – 0,8	1
4.7.2.3.3 Voltage related control modes	Characteristic curve		cos φ (P) Q(P)	indicate default characteristic
	Time constant		3 s – 60 s	10 s
	Min cos φ		0,0 – 1	0,9
	Lock in power		0% – 20%	deactivated
	Lock out power		0% – 20%	deactivated
4.7.2.3.4 Power related control mode	Characteristic curve		Q(U) P(U)	Q(U) (three-phase inverter) 0,00...-0,60 0,92...-0,60 0,94...0,0 1,06...0,0 1,08...0,60 1,20...0,60 P(U) deactivated
4.7.4.2.1 Voltage support during faults and voltage steps - general	Enabling		enable disable	disabled
	Static voltage range overvoltage		100% U _c – 120% U _c	110% U _c
	Static voltage range undervoltage		80% U _c – 100% U _c	90% U _c
	Intensivity range Δ50per		0% – 15%	5%
	Gradient K1		0 – 6	2
	Gradient K2		0 – 6	2
4.7.4.2.1.2 Optional Modes	Active power priority		Rated value	SG125CX-P2: 181,1 A (rated current)
	Reactive current limitation [% rated current]		enable disable	disable
	Zero current threshold		0% – 100%	disable
4.7.4.2.2 Zero current mode for converter connected generating technology	Enabling		20% U _c – 100% U _c	disable
	Static voltage range overvoltage		enable disable	disable
	Static voltage range undervoltage		100% U _n – 120% U _n	120% U _n
4.9.3 Requirements on voltage and frequency protection	Threshold for protection as dedicated device [in A or kW, kVA]		SG125CX-P2:= 200 A, 830 Vac for HF172F-200/12-HTF = 200 A, 800 Vac for 511ZP-1AD-F-C M06 Note: Rated current of internal safety device!	Internal safety device



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	Undervoltage threshold stage 1		$0,2 U_n - 1 U_n$	$0,85 U_n$
	Undervoltage operate time stage 1		0,1 s – 100 s	10,0 s
	Undervoltage threshold stage 2		$0,2 U_n - 1 U_n$	$0,50 U_n$
	Undervoltage operate time stage 2		0,1 s – 5 s	0,1 s
	Overvoltage threshold stage 1		$1,0 U_n - 1,2 U_n$	$1,20 U_n$
	Overvoltage operate time stage 1		0,1 s – 100 s	10,0 s
	Overvoltage threshold stage 2		$1,0 U_n - 1,3 U_n$	$1,25 U_n$
	Overvoltage operate time stage 2		0,1 s – 5 s	0,1 s
	Overvoltage threshold 10 min mean protection ^a		$1,0 U_n - 1,15 U_n$	$1,10 U_n$
	Overvoltage operate time 10 min mean protection ^a		0,04 s – 10,00 s	10 min (update every 3s)
	Underfrequency threshold stage 1		47,0 Hz – 50,0 Hz	47,5 Hz
	Underfrequency operate time stage 1		0,1 s – 100 s	2,0 s
	Underfrequency threshold stage 2		47,0 Hz – 50,0 Hz	47,0 Hz
	Underfrequency operate time stage 2		0,1 s – 5 s	0,1 s
	Overfrequency threshold stage 1		50,0 Hz – 52,0 Hz	51,5 Hz
	Overfrequency operate time stage 1		0,1 s – 100 s	2,0 s
	Overfrequency threshold stage 2		50,0 Hz – 52,0 Hz	52,0 Hz
	Overfrequency operate time stage 2		0,1 s – 5,0 s	0,1 s
	Loss of mains according EN 62116 (LoM)		0 s – 6000 s	ROCOF 2,0 Hz/s (0,5 s) active 2 s (5 s)
4.10.2 Automatic reconnection after tripping	Lower frequency		20% – 100%	
	Upper frequency		0,2 s – 100 s	
	Lower voltage		1% – 100%	
	Upper voltage		0,2 s – 100 s	
	Observation time		1% – 100%	
	Active power increase gradient		0,2 s – 100 s	
	Lower frequency		47,0 Hz – 50,0 Hz	49,5 Hz
	Upper frequency		50,0 Hz – 52,0 Hz	50,2 Hz



4.10.3 Starting to generate electrical power	Lower voltage		50% U_n – 100 % U_n	85% U_n , 90% U_c
	Upper voltage		100% U_n – 120% U_n	110% U_n
	Observation time		10 s – 600 s	60 s
	Active power increase gradient		6% – 3000% / min	10% / min
4.11.1 Ceasing active power	Remote operation of the logic interface		yes no	yes A Modbus signal via RS485 or Ethernet can be used to change or stop the active output. In the case of RS485, a modbus transceiver from RS485 to Ethernet is required.
4.11.2 Reduction of active power on set point	Remote operation NOTE: If yes further definition is provided by the DSO		yes no	yes A Modbus signal via RS485 or Ethernet can be used to change or stop the active output. In the case of RS485, a modbus transceiver from RS485 to Ethernet is required.
4.12 Remote information exchange	Remote information exchange required NOTE: If yes further definition is provided by the DSO		yes no	yes The inverter uses data logger in the smart communication box which can collect information of the inverter, the transformer, and other devices in the system, and upload it to the background monitoring system or iSolarCloud.