Certificate of compliance

Applicant:	**SMA Solar Technology AG** **Sonnenallee 1** **34266 Niestetal** **Germany**
Product:	**Battery inverter**
Model:	**STPS30-20** **STPS50-20** **SI30-20** **SI50-20**

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

Inverter for three-phase parallel connection to the public grid or via transformer to a MV and HV 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
4.12 Remote information exchange

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 A and B plants.

Note
This certificate proofs 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: **22TH0488-EN50549-10_0**
22TH0488-EN50549-10_5.3_0

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

Certificate number: **U25-0203**

Date of issue: **2025-03-20**

Certification body

Georg LORITZ
Lab Supervisor Energy Systems

Accreditation

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

Type Approval and declaration of compliance with the requirements of EN 50549-2 and Commission Regulation (EU) 2016/631 of 14 April 2016				
Manufacturer	SMA Solar Technology AG Sonnenallee 1 34266 Niestetal Germany			
Product type	Battery inverter			
Static converter model	STPS30-20	STPS50-20	SI30-20	SI50-20
Input DC (battery)				
DC operating range [V]	350 - 980	350 - 980	350 - 980	350 - 980
DC voltage range [V]	200 - 980	200 - 980	200 - 980	200 - 980
Max. DC voltage [V]	980	980	980	980
Max. DC current per DC input [A]	150	150	150	150
Output AC				
Rated AC voltage [V]	400	400	400	400
Rated output current [A]	43,3	72,2	43,3	72,2
Max. output current [A]	45,6	75,5	45,6	75,5
Nom. converter output (P_{NINV}) [W]	30000	50000	30000	50000
Rated apparent power [VA]	30000	50000	30000	50000
In on-grid battery mode AC				
P_{sn} (nom. discharge power) [W]	30000	50000	30000	50000
P_{cn} (nom. charging power) [W]	30000	50000	30000	50000
P_{smax} (max. discharge power) [W]	30000	50000	30000	50000
P_{cmax} (max. charging power) [W]	30000	50000	30000	50000
Type	Bidirectional	Bidirectional	Bidirectional	Bidirectional
In off-grid battery mode				
P_{sn} (nom. discharge power) [W]	N/A	N/A	30000	50000
P_{smax} (max. discharge power) [W]	N/A	N/A	30000	50000

Interface protection system and interface switch (Network and system protection "NS-protection")	
Type of protection	Integrated NS-protection
Assigned to generation unit type	STPS30-20 STPS50-20 SI30-20 SI50-20
Integrated interface switch	Type of switching equipment 1: Relay (Model AZSR190 100AMP) Type of switching equipment 2: Relay (Model AZSR190 100AMP)
	Note: The output is switched off by the inverter bridge and two relay in series in each line and neutral.
Firmware version	03.xx.xx.R
	Note: The tests were performed with firmware version 03.02.31.R. Changes in the firmware version on position "x" have no effect on the required electrical properties. "x" could be any number or sign higher than the tested version.

Note

The settings of the inverter 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 50549-2:2019/A1:2023 and 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.

Parameter Table					
Name of parameter set	EN50549-2:2018 MV				
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	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	0,3 s	
	47,5 – 48,5 Hz Duration		30 – 90 min	unlimited	
	48,5 – 49,0 Hz Duration		30 – 90 min	unlimited	
	49,0 – 51,0 Hz Duration		not configurable	unlimited	
	51,0 – 51,5 Hz Duration		30 – 90 min	unlimited	
	51,5 – 52,0 Hz Duration		0 – 15 min	0,3 s	
4.4.3 Minimal requirement for active power delivery at underfrequency	Reduction threshold		49,0 Hz – 49,5 Hz	Electronic inverter, no power reduction take place	
	Maximum reduction rate		2 – 10% P_M/Hz	N/A	
4.4.4 Continuous operating voltage range	Upper limit		1,0 U_n – 2,0 U_n	1,15 U_n	
	Lower limit		0 U_n – 1,0 U_n	0,8 U_n	
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:		0 – 10 Hz/s yes no	10 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 50549-1:2019	Time [s]	U [p.u.]
				3,0	0,20
				3,0	0,85
				180	0,85
				180	0,90
	Fast fault current		Not configurable	inverter model: rated current	
	Active power recovery after a short circuit		configurable	Start at 90% U_n	
	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%	
	Reactive power contribution has priority		yes | no	Yes	

Clause of EN 50549-1	Parameter	Remarks / additional information	setting range	default settings used	
4.5.4 Over-voltage ride through (OVRT)	Voltage-Time- Diagram		EN 50549-2:2019	Time [s]	U [p.u.]
				0,1	1,25
				0,2	1,20
				60,0	1,20
				60,0	1,15
				60,0	1,15
				60,0	1,10
	Active power recovery after a short circuit		configurable	Start at 90% U_n	
	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 overfrequency	Threshold frequency f1		50,2 Hz – 52,0 Hz	50,2 Hz	
	Droop		2% – 12%	5%	
	Power reference		P_M | P_{max}	P_{max} for other non-synchronous generating technology (inverter)	
	Intentional delay		0 s – 2 s	0 s	
	Deactivation threshold fstop		50,0 Hz – f_1	deactivated	
	Deactivation time tstop		0 s – 600 s	-	
	Acceptance of staged disconnection		yes | no	Yes	
4.6.2 Power response to underfrequency	Threshold frequency f1		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 voltage support by reactive power - Capabilities	Active factor / Reactive power (%P_d) range overexcited		0,90 – 1 / 48% P_d - 0 0,95 – 1 / 33% P_d - 0	0,95 – 1 / 33% P_d - 0	
	Active factor / Reactive power (%P_d) range underexcited		0,90 – 1 / 48% Pd - 0 0,95 – 1 / 33% Pd - 0	0,95 – 1 / 33% Pd - 0	

Clause of EN 50549-1	Parameter	Remarks / additional information	setting range	default settings used
4.7.2.3 voltage support by reactive power - Control modes	Enabled control mode		Q setp. Q(U) Q(P) cos φ setp. cos φ (P)	deactivated deactivated deactivated deactivated deactivated
4.7.2.3.2 voltage support by reactive power - Set point control modes	Q set point and excitation		0% – 48% P_D, 0% – 33% P_D	0
	cos φ set point and excitation		1,0 – 0,9	1
4.7.2.3.3 voltage support by reactive power - Voltage related control modes	Characteristic curve		cos φ (P) Q(P)	Both can be set
	Time constant		3 s – 60 s	10 s
	Min cos φ		0,0 – 1	deactivated
	Lock-in power		0% – 20%	deactivated
	Lock-out power		0% – 20%	deactivated
4.7.2.3.4 voltage support by reactive power - Power related control mode	Characteristic curve		Q(U) P(U)	Q(U) (three-phase inverter) 0,94…0,44 0,97…0 1,03…0 1,06…-0,44 P(U) and Q(U) deactivated
only EN 50549-2:2019, 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
/ Generating Plant with non-synchronous generator (inverter)	Insensitivity range of ΔU50per		0% – 15%	5%
	Gradient k1		0 – 6	2
	Gradient k2		0 – 6	2
	Fast fault current		Rated value	rated current
only EN 50549-2:2019, 4.7.4.2.1.2 Optional Modes / Generating Plant with non-synchronous generator	Active power priority		enable | disable	disable
	Reactive current limitation [% rated current]		0% – 100%	disable
	Zero current threshold		20% U_c – 100% U_c	disable
4.7.4.2.2 Zero current mode for converter connected generating technology / Generating Plant with non-synchronous generator	Enabling		enable | disable	disable
	Static voltage range overvoltage		100% U_n – 120% U_n	120% U_n
	Static voltage range undervoltage		20% U_n – 100% U_n	50% U_n

Clause of EN 50549-1	Parameter	Remarks / additional information	setting range	default settings used
4.9.3 Requirements on voltage and frequency protection	Threshold for protection as dedicated device [in A or kW, kVA]		STPS30-20: 100 A STPS50-20: 100 A SI30-20: 100 A SI50-20: 100 A Note: Rated current of internal safety device!	Internal safety device
	Undervoltage threshold stage 1		0 U_n – 1,0 U_n	0,8 U_n
	Undervoltage operate time stage 1		0 s – 1000 s	3 s
	Undervoltage threshold stage 2		0 U_n – 1,0 U_n	0,2 U_n. Disabled
	Undervoltage operate time stage 2		0,1 s – 100 s	10 s. Disabled
	Overvoltage threshold stage 1		1,0 U_n – 2,0 U_n	1,2 U_n
	Overvoltage operate time stage 1		0,1 s – 1000 s	0,2 s
	Overvoltage threshold stage 2		1,0 U_n – 2 U_n	1,25 U_n
	Overvoltage operate time stage 2		0,1 s – 1000 s	0,1 s
	Overvoltage threshold 10 min mean protection		1,0 U_n – 1,15 U_n	1,15 U_n
	Overvoltage operate time 10 min mean protection		0,04 s – 10,00 s	0,04 s after 10 min
	Underfrequency threshold stage 1		44,0 Hz – 60,0 Hz	47,5 Hz
	Underfrequency operate time stage 1		0 s – 1000 s	0,1 s
	Underfrequency threshold stage 2		47,0 Hz – 50,0 Hz	disabled
	Underfrequency operate time stage 2		0,1 s – 5 s	disabled
	Overfrequency threshold stage 1		50,0 Hz – 66,0 Hz	51,5 Hz
	Overfrequency operate time stage 1		0 s – 1000 s	0,1 s
	Overfrequency threshold stage 2		50,0 Hz – 52,0 Hz	disabled
	Overfrequency operate time stage 2		0,1 s – 5,0 s	disabled
	Loss of mains according EN 62116 (LoM)		0 s – 10 s	2 s

Clause of EN 50549-1	Parameter	Remarks / additional information	setting range	default settings used
only EN 50549-2:2019, 4.9.3 Requirements on voltage and frequency protection	Positive sequence under-voltage protection threshold		20% – 100%	If needed, it must be provided by an external protection relay
	Positive sequence under-voltage protection operate time		0,2 s – 100 s	If needed, it must be provided by an external protection relay
	Negative sequence over-voltage protection threshold		1% – 100%	If needed, it must be provided by an external protection relay
	Negative sequence over-voltage protection operate time		0,2 s – 100 s	If needed, it must be provided by an external protection relay
	Zero sequence over-voltage protection threshold		1% – 100%	If needed, it must be provided by an external protection relay
	Zero sequence over-voltage protection operate time		0,2 s – 100 s	If needed, it must be provided by an external protection relay
4.10.2 Automatic reconnection after tripping	Lower frequency		44,0 Hz – 60,0 Hz	49,5 Hz
	Upper frequency		50,0 Hz – 66,0 Hz	50,2 Hz
	Lower voltage		0% U_n – 100% U_n	90% U_n
	Upper voltage		100% U_n – 200% U_n	110% U_n
	Observation time		0 s – 1600 s	60 s
	Active power increase gradient		1% – 10000% / min	9% / min
4.10.3 Starting to generate electrical power	Lower frequency		44,0 Hz – 60,0 Hz	49,5 Hz
	Upper frequency		50,0 Hz – 66,0 Hz	50,1 Hz
	Lower voltage		0% – 100% U_n	90% U_n
	Upper voltage		100% – 200% U_n	110% U_n
	Observation time		10 s – 1600 s	60 s
	Active power increase gradient		1% – 10000% / min	1200% / min
4.11.1 Ceasing active power	activation option	e.g. digital input, IEC 61850, sunspec	Yes	
4.11.2 Reduction of active power on set point	activation option	e.g. digital input, IEC 61850, sunspec	Yes	
4.12 Remote information exchange	available communication standards	e.g. IEC 61850, sunspec	Yes	

[a] If additional parameters have been evaluated during the test, these shall be added as additional lines in the table.

[b] This column should be used for manufacturer specific parameter descriptions.