



**BUREAU
VERITAS**

Certificate of compliance

Applicant: SMA Solar Technology AG
Sonnenallee 1, 34266 Niestetal
Germany

Product: Photovoltaic (PV) inverter

Model: STP 125-70

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

Applied rules and standards:

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

- 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, Type C and Type 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 representative product listed above corresponds to the stated rules and standards.

Report number: SGR-ESH-P23121837-R1

Certification Program: NSOP-0032-DEU-ZE-V01

Certificate number: U24-0858

Date of issue: 2024-10-22

Certification body



Domenik Koll
Head of Energy Systems Germany



Deutsche
Akkreditierungsstelle
D-ZE-12024-01-00

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

Testing laboratory accredited according to DIN EN ISO/IEC 17025

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

Appendix

Extract from test report according to EN 50549-2

No. SGR-ESH-P23121837-R1

Type Approval and declaration of compliance with the requirements of EN 50549-2 and Commission Regulation (EU) 2016/631 of 14 April 2016.

Manufacturer / applicant	SMA Solar Technology AG Sonnenallee 1, 34266 Niestetal Germany
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Generator Type	Photovoltaic inverter
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	STP 125-70	--	--	--
Photovoltaic (DC)				
MPP DC voltage range [V]	180-1000	--	--	--
Max DC voltage [V]	1100	--	--	--
Input DC current [A]	12*30	--	--	--
Connection (AC)				
Output AC voltage [V]	3L/N/PE, 230, 50/60Hz	--	--	--
Max AC current [A]	181,1	--	--	--
Max. apparent power [kVA]	125	--	--	--

Firmware version	4.X.X.R
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Note:

The tests were performed with firmware version 4.0.0.R changes in the firmware version on position 4.X.X have no effect on the required electrical properties. "X" could be any number (or sign) higher (newer) than the tested version.

Description of the structure of the power generation unit

The power generation unit is equipped with a DC 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 the inverter bridge and two series-connected relays in each line. This enables a safe disconnection of the power generation unit from the network in case of error.

Note:

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 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.

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Type Approval and declaration of compliance with the requirements of EN 50549-2 and Commission Regulation (EU) 2016/631 of 14 April 2016

Parameter Table:

Clause EN 50549-2	Ref	Parameter	Micro generator setting range	Default settings used	
4.4.2 Operating frequency range	A,B	47,0 – 47,5 Hz Duration	0 – 20 s	20s	
	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	unlimited	
	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 under frequency	A,B	Reduction threshold	not configurable	49,5 Hz	
	A,B	Maximum reduction rate	not configurable	10 % PM/Hz	
4.4.4 Continuous operating voltage range	n.a.	Upper limit	not configurable	110 % Un	
	n.a.	Lower limit	not configurable	85 % Un, 90 % Uc	
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 (inverter): synchronous generating technology:	not configurable	2 Hz/s 1 Hz/s	
4.5.3.2 Generating plant with non-synchronous generating technology (FRT)	B	Maximum power resumption time	not configurable	1 s	
	B	Voltage-Time-Diagram	see Figure 6 of EN 50549-1:2019 and EN 50549-1:2019	Time[s]	U[p.u.]
				0,0	0,05
				0,25	0,05
				3,0	0,85
				180	0,85

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4.5.4 Over-voltage ride through (OVRT)	n.a.	Voltage-Time-Diagram	not configurable see Figure 8 of EN 50549-1:2019 and EN 50549-1:2019	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	1,15
4.6.1 Power response to over frequency (LFSM-O)	A,B	Threshold frequency f_1	50,2 Hz – 52 Hz	50,2 Hz	
		Droop	2 % – 12 %	5 %	
		Power reference	PM Pmax	Pmax, for synchronous generating technology and EESS PM for other nonsynchronous generating technology	
	n.a.	Intentional delay	0 – 2 s	0s	
	n.a.	Deactivation threshold f_{stop}	50,0 Hz – f_1	deactivated	
	n.a.	Deactivation time t_{stop}	0 – 600 s	-	
	A	Acceptance of staged disconnection	yes no	yes	
4.6.2 Power response to under frequency (LFSM-U)	n.a.	Threshold frequency f_1	49,8 Hz – 46 Hz	49,8 Hz	
	n.a.	Droop	2 % – 12 %	5 %	
	n.a.	Power reference	PM Pmax	Pmax	
	n.a.	Intentional delay	0 – 2 s	0s	
4.7.2.2 Capabilities	B	Active factor range overexcited	0,9 – 1 / 48 %Pd - 0 0,95 – 1 / 33 %Pd - 0	0,95–1 / 33 %Pd-0	
	B	Active factor range underexcited	0,9 – 1 / 48 %Pd - 0 0,95 – 1 / 33 %Pd - 0	0,95–1 / 33 %Pd-0	
4.7.2.3 Control modes	n.a.	Enabled control mode	Q setp. Q(U) Q(P) cos φ setp. cos φ (P)	Q set point	
4.7.2.3.2 Set point control modes	n.a.	Q setpoint and excitation	0 – 48 % PD, 0 – 33 %PD	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		indicate default characteristic	
	n.a.	Time constant	3 s – 60 s	10 s	
	n.a.	Min cos φ	0,0 – 1	0,9	
	n.a.	Lock in power	0 % – 20 %	deactivated	

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	n.a.	Lock out power	0 % – 20 %	deactivated
4.7.2.3.4 Power related control mode	n.a.	Characteristic curve		indicate default characteristic
only EN 50549-2:2019, 4.7.4.2.1 Voltage support during faults and voltage steps – General / Generating Plant with non-synchronous generator	n.a.	Enabling	enable disable	disabled
	n.a.	Static voltage range overvoltage	100 % U_c – 120 % U_c	110 % U_c
	n.a.	Static voltage range undervoltage	80 % U_c – 100 % U_c	90 % U_c
	n.a.	Insensitivity range of $\Delta U_{50\text{per}}$	0 % – 15 %	5 %
	n.a.	Gradient k_1	0 – 6	2
	n.a.	Gradient k_2	0 – 6	2
only EN 50549-2:2019, 4.7.4.2.1.2 Optional Modes / Generating Plant with non-synchronous generator	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
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	120 % U_n
	n.a.	Static voltage range undervoltage	20 % U_n – 100 % U_n	50 % U_n

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4.9.3 Requirements on voltage and frequency protection	n.a	Threshold for protection as dedicated device [in A or kW, kVA]	16 A – 250 kVA Note: Rated current of internal safety device!	
	B	Undervoltage threshold stage 1	0,2 Un – 1 Un	0,2 Un – 1 Un
	B	Undervoltage operate time stage 1	0,1 s – 100 s	0,1 s – 100 s
	B	Undervoltage threshold stage 2	0,2 Un – 1 Un	0,2 Un – 1 Un
	B	Undervoltage operate time stage 2	0,1 s – 5 s	0,1 s – 5 s
	B	Overvoltage threshold stage 1	1,0 Un – 1,2 Un	1,0 Un – 1,2 Un
	B	Overvoltage operate time stage 1	0,1 s – 100 s	0,1 s – 100 s
	B	Overvoltage threshold stage 2	1,0 Un – 1,3 Un	1,0 Un – 1,3 Un
	B	Overvoltage operate time stage 2	0,1 s – 5 s	0,1 s – 5 s
	B	Overvoltage threshold 10 min mean protection	1,0 Un – 1,15 Un	1,0 Un – 1,15 Un
	B	Underfrequency threshold stage 1	47,0 Hz– 50,0 Hz	47,0 Hz– 50,0 Hz
	B	Underfrequency operate time stage 1	0,1 s – 100 s	0,1 s – 100 s
	B	Underfrequency threshold stage 2	47,0 Hz – 50,0 Hz	47,0 Hz – 50,0 Hz
	B	Underfrequency operate time stage 2	0,1 s – 5 s	0,1 s – 5 s
	B	Overfrequency threshold stage 1	50,0 Hz – 52,0 Hz	50,0 Hz – 52,0 Hz
	B	Overfrequency operate time stage 1	0,1 s – 100 s	0,1 s – 100 s
	B	Overfrequency threshold stage 2	50,0 Hz – 52,0 Hz	50,0 Hz – 52,0 Hz
	B	Overfrequency operate time stage 2	0,1 s – 5 s	0,1 s – 5 s
Note: If needed, it must be provided by an external protection relay	B	Positive sequence under-voltage protection threshold	20 % – 100 %	20 % – 100 %
	B	Positive sequence under-voltage protection operate time	0,2 s – 100 s	0,2 s – 100 s
	B	Negative sequence over-voltage protection threshold	1 % – 100 %	1 % – 100 %
	B	Negative sequence over-voltage protection operate time	0,2 s – 100 s	0,2 s – 100 s
	B	Zero sequence overvoltage protection	1 % – 100 %	1 % – 100 %

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		threshold		
	B	Zero sequence overvoltage protection operate time	0,2 s – 100 s	0,2 s – 100 s
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 % Un – 100 % Un	85 % Un 90 % Uc
	B	Upper voltage	100 % Un – 120 % Un	110 % Un
	B	Observation time	10 s – 600 s	600 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	50,2 Hz
	A,B	Lower voltage	50 % Un – 100 % Un	85 % Un 90 % Uc
	A,B	Upper voltage	100 % Un – 120 % Un	110 % Un
	A,B	Observation time	10 s – 600 s	600 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	e.g. digital input, IEC 61850, sunspec
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	e.g. digital input, IEC 61850, sunspec
4.12 Remote information exchange	B	Remote information exchange required NOTE: If yes further definition is provided by the DSO	yes no	e.g. IEC 61850, sunspec

Note:

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

The settings of the interface protection are password protected adjustable in the stated range above.

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.

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