ZERTIFIKAT ◆ CERTIFICATE ◆ 認證證書 ◆ СЕРТИФИКАТ ◆ CERTIFICADO ◆ CERTIFICAT

DAkkS Deutsche Akkreditierungsstelle D-ZE-11321-01-00

TÜV SÜD Product Service

Certificate

No. ESY 070122 0058 Rev. 00

Holder of Certificate: **SMA Solar Technology AG**
Sonnenallee 1
34266 Niestetal
GERMANY

Product: **PV inverter**
Solar Inverter

Model(s): **STP 50-80, STP 60-80**

Parameters: See next pages.

Applicable standards: EN 50549-1:2019
EN 50549-10:2022

This Certificate confirms the compliance with the above listed standards on a voluntary basis. It refers only to the sample submitted to TÜV SÜD Product Service GmbH and does not certify the quality or safety of the serial products. It was issued according to TÜV SÜD Product Service certification program Photovoltaics and Grid Integration. For details see: www.tuvsud.com/ps-cert

Test report no.: 704092518914-00

Date, 2025-12-18

(Zhengdong Ma)

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Parameters:

Models	STP 50-80	STP 60-80
PV-Input:		
Max. input voltage	DC 1100 V	
Mppt voltage range	DC 200 V, ..., 1000 V	
Max. input current	DC 5*40 A	
Isc PV (absolute maximum)	DC 5*50 A	
AC-Output (Grid side):		
Rated output voltage	3/N/PE AC 230/400 V	
Rated output frequency	50 Hz	
Rated output power	50000 W	60000 W
Max. apparent output power	50000 VA	60000 VA
Max. continuous output current	AC 79.5 A	AC 95.3 A
Power factor range	-0.8, …, 1, …, +0.8	

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Evaluated protection function and operational capabilities

Clause(s) / subclause(s) of EN 50549-1:2019	Applicable clause(s) / subclause (s) of this document	Remarks, optional modes and constraints	Verdict
4.4.2 Operating frequency range	5.2.1 Frequency operating range	--	Pass
4.4.3 Minimal requirement for active power delivery at underfrequency	5.2.1 Frequency operating range	--	Pass
4.4.4 Continuous operating voltage range	5.2.2 Voltage operating range	--	Pass
4.5.2 Rate of change of frequency (ROCOF) immunity	5.3.1 Immunity to disturbances – Rated of change of frequency (ROCOF)	--	Pass
4.5.3.2 Generating plant with non-synchronous generating technology	5.3.3 Immunity to disturbances - Fault ride through, over-voltage (OVRT) and under-voltage (UVRT)	--	Pass
4.5.4 Over-voltage ride through (OVRT)	5.3.3 Immunity to disturbances - Fault ride through, over-voltage (OVRT) and under-voltage (UVRT)	--	Pass
4.6.1 Power response to overfrequency	5.4 Active response to frequency deviation	--	Pass
4.6.2 Power response to underfrequency	5.4 Active response to frequency deviation	--	Pass
4.7.2.2 Voltage support by reactive power, Capabilities	5.5.1 Power capabilities assessment	--	Pass
4.7.2.3 Voltage support by reactive power, Control modes	5.5.2 Voltage support by reactive power - test to determine the reactive power control modes	Q setp. Q(U) Cos φ setp. Cos φ (P)	Pass
4.7.2.3.2 Set point control modes	5.5.2.3 Verification procedure for set point control	Q setp. Cos φ setp.	Pass
4.7.2.3.3 Voltage related control modes	5.5.2.5 Verification procedure for power related control modes for reactive power	Q(U)	Pass
4.7.2.3.4 Power related control mode	5.5.2.5 Verification procedure for power related control modes for reactive power	Cos φ (P)	Pass
4.7.3 Voltage related active power reduction	5.6 Voltage related active power reduction - P(U)	P(U)	Pass
4.7.4.2.2 Zero current mode for converter connected generating technology	5.3.3 Immunity to disturbances - Fault ride through, over-voltage (OVRT) and under-voltage (UVRT)	--	Pass
4.9.3 Requirements on voltage and frequency protection	5.8.3 Verification procedure for generating plants to be connected to a LV distribution network with Interface protection as internal device	--	Pass
4.9.4 Means to detect island situation	5.8.6 Islanding detection	Active methods tested with a resonant circuit	Pass

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		according to EN 62116	
4.10.2 Automatic reconnection after tripping	5.9.3 Automatic reconnection after tripping	--	Pass
4.10.3 Starting to generate electrical power	5.9.4 Starting to generate electrical power	--	Pass
4.11.1 Ceasing active power	5.10 Active power reduction on set point	--	Pass
4.11.2 Reduction of active power on set point	5.10 Active power reduction on set point	--	Pass
4.12 Remote information exchange	5.11 Remote information exchange	SMA Modbus / SunSpec Modbus / Speedwire declared by manufacturer	Pass
4.13 single fault tolerance of interface protection system and interface switch	5.12 Requirements regarding single fault tolerance of interface protection system and interface switch	--	Pass

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Evaluated parameter and parameter range

Name of parameter set		[EU] EN50549-1:2018 LV			
Specific technical requirement (e.g. grid codes)		EN 50549-1:2019			
Clause(s) / subclause(s) of EN 50549-1:2019	Parameter	Remarks/ additional information	Configurable value range	Default value	
4.4.2 Operating frequency range	47.0 – 47.5 Hz Duration	--	0 – 20 s	Unlimited with protection setting only	
	47.5 – 48.5 Hz Duration	--	30 – 90 min	Unlimited with protection setting only	
	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 with protection setting only	
	51. 5 – 52 Hz Duration	--	0 – 15 min	Unlimited with protection setting only	
4.4.3 Minimal requirement for active power delivery at underfrequency	Reduction threshold	--	not configurable	No reduction	
	Maximum reduction rate	--	not configurable	N/A	
4.4.4 Continuous operating voltage range	Upper limit	115% U_n	not configurable	115% U_n	
	Lower limit	80% U_n	not configurable	80% U_n	
4.5.2 Rate of change of frequency (ROCOF) immunity	ROCOF withstand capability (defined with a sliding measurement window of 500 ms)	ROCOF withstand capability across the entire protection range, with the ROCOF protection value set at 10 Hz/s	configurable	--	
4.5.3.2 Under-voltage ride through (UVRT) Generating plant with non-synchronous generating technology	Maximum power resumption time	--	not configurable	1 s	
	Voltage-Time-Diagram	--	See figure 6 default requirement curve of EN 50549-1:2019	Time [s]	U [p.u.]
				0.0	0.2
				3.0	0.85
				180	0.85
				180	0.90
4.5.4 Over-voltage ride through (OVRT)	Voltage-Time-Diagram	--	not configurable See figure 8 of EN 50549-1:2019	Time [s]	U [p.u.]
				0.1	1.25
				0.2	1.20
				60	1.20
				60	1.15
				60	1.10
4.6.1 Power response to overfrequency	Threshold frequency f_1	--	50.2 Hz – 52 Hz	50.2 Hz	

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	Droop	--	2 % – 12 %	5 %
	Power reference	--	P_M | P_{max}	P_M
	Intentional delay	--	0 – 2 s	0 s
	Deactivation threshold f_{stop}	--	50.0 Hz – f_1	deactivated
	Deactivation time t_{stop}	--	0 – 600 s	--
	Acceptance of staged disconnection	--	yes | no	yes
4.6.2 Power response to underfrequency	Threshold frequency f_1	--	49.8 Hz – 46 Hz	49.8 Hz
	Droop	--	2 – 12 %	5 %
	Power reference	--	P_M | P_{max}	P_{max}
	Intentional delay	--	0 – 2 s	0 s
4.7.2.2 Voltage support by reactive power - Capabilities	Active factor / Reactive power (%Pd) range overexcited	--	0.8 – 1 / 66.67 % P_D – 0	0.8 – 1 / 66.67 % P_D – 0
	Active factor / Reactive power (%Pd) range underexcited	--	0.8 – 1 / 66.67 % P_D – 0	0.8 – 1 / 66.67 % P_D – 0
4.7.2.3 Voltage support by reactive power - Control modes	Enabled control mode	--	Q setp. Q(U) Cos φ setp. Cos φ (P)	deactivated
4.7.2.3.2 Voltage support by reactive power - Setpoint control modes	Q setpoint and excitation	--	0 –66.67 % P_D	0
	cos φ setpoint and excitation	--	1 – 0.8	1
4.7.2.3.3 Voltage support by reactive power - Voltage related control modes	Characteristic curve – Q (U)	--	--	Indicate default characteristic
	Point a	--	50% U_n – 100% U_n	94% U_n
	Point b	--	50% U_n – 100% U_n	97% U_n
	Point c	--	100% U_n – 120% U_n	103% U_n
	Point d	--	100% U_n – 120% U_n	106% U_n
	Min. reactive power	--	0 –66.67 % P_D ($Q_{max\ under}$)	44 % Pn
	Max. reactive power	--	0 –66.67 % P_D ($Q_{max\ over}$)	44 % Pn
	Time constant	--	3 s – 60 s	10 s
	Min cos φ	--	0.0 – 1	0.4
	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 – Cos φ (P)	--	--	Indicate default characteristic
	Point a	--	0 – 100%Pn/ PF:-0.8, …,+0.8	50%Pn/ PF=1
	Point b	--	0 – 100%Pn/ PF:-0.8, …,+0.8	100%Pn/ PF=0.9
	Point c	--	0 – 100%Pn/ PF:-0.8, …,+0.8	deactivated
	Point d	--	0 – 100%Pn/ PF:-0.8, …,+0.8	deactivated

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	Cos φ	--	0.8 – 1	0.8
	Time constant	--	3 s – 60 s	10 s
	Lock in voltage	--	105% U_n	deactivated
	Lock out voltage	--	100% U_n	deactivated
4.7.3 Voltage related active power reduction	Characteristic curve - P (U)	--	--	Indicate default characteristic
	Point a	--	0 – 100%Pn/ U:0 V, …,264.5 V	100%Pn/ U=253 V
	Point b	--	0 – 100%Pn/ U:0 V, …,264.5 V	0%Pn/ U=257.6 V
	Point c	--	0 – 100%Pn/ U:0 V, …,264.5 V	deactivated
	Point d	--	0 – 100%Pn/ U:0 V, …,264.5 V	deactivated
	Time constant	--	3 s – 60 s	3 s
4.7.4.2.2 Zero current mode for converter connected generating technology	Enabling	--	enable | disable	disabled
	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
4.9.3 Requirements on voltage and frequency protection	Threshold for protection as dedicated device [in A or kW. kVA]	--	16 A – 250 kVA	Not specified, inverter integrated as default
	Undervoltage threshold stage 1	--	0.2 U_n – 1 U_n	0.8 U_n
	Undervoltage operate time stage 1	--	0.1 s – 100 s	3 s
	Undervoltage threshold stage 2	--	0.2 U_n – 1 U_n	0.2 U_n
	Undervoltage operate time stage 2	0.1 s – 10 s	0.1 s – 5 s	10 s
	Overvoltage threshold stage 1	--	1.0 U_n – 1.2 U_n	1.2 U_n
	Overvoltage operate time stage 1	--	0.1 s – 100 s	0.2 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	--	1.0 U_n – 1.15 U_n	1.15 U_n
	Underfrequency threshold stage 1	--	47.0 Hz– 50.0 Hz	47.5 Hz

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	Underfrequency operate time stage 1	--	0.1 s – 100 s	0.1 s
	Underfrequency threshold stage 2	--	47.0 Hz – 50.0 Hz	--
	Underfrequency operate time stage 2	--	0.1 s – 5 s	--
	Overfrequency threshold stage 1	--	50.0 Hz – 52.0 Hz	51.5 Hz
	Overfrequency operate time stage 1	--	0.1 s – 100 s	0.1 s
	Overfrequency threshold stage 2	--	50.0 Hz – 52.0 Hz	--
	Overfrequency operate time stage 2	--	0.1 s – 5 s	--
	ROCOF protection	0 – 10 Hz/s configurable by manufacturer	configurable	10 Hz/s
	ROCOF operate time	0 – 10 s configurable by manufacturer	configurable	10 s
4.10.2 Automatic reconnection after tripping	Lower frequency	--	47.0 Hz – 50.0 Hz	49.5 Hz
	Upper frequency	--	50.0 Hz – 52.0 Hz	50.2 Hz
	Lower voltage	--	50% U_n – 100% U_n	85% U_n
	Upper voltage	--	100% U_n – 120% U_n	110% U_n
	Observation time	--	10 s – 600 s	60 s
	Active power increase gradient	--	5% – 3000% /min	9% /min
4.10.3 Starting to generate electrical power	Lower frequency	--	47.0 Hz – 50.0 Hz	49.5 Hz
	Upper frequency	--	50.0 Hz – 52.0 Hz	50.1 Hz
	Lower voltage	--	50% U_n – 100% U_n	85% U_n
	Upper voltage	--	100% U_n – 120% U_n	110% U_n
	Observation time	--	10 s – 600 s	60 s
	Active power increase gradient	--	5% – 3000% /min	deactivated
4.11.1 Ceasing active power	Activation option	--	Can be achieved via digital input or SunSpec protocol, and acceptance shall be made by the DSO and the responsible party.	
4.11.2 Reduction of active power on set point	Activation option	--		
4.12 Remote information exchange	Available communication standards	--	The manufacturer declared in the datasheet with the following protocols: SMA Modbus / SunSpec Modbus / Speedwire. Such protocols shall be agreed between the DSO and the producer in final installations during the project phase. The information contained in the Operating Manual must be considered.	

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Remark: P_D in above table means the maximum AC active power output at an active factor of 0.9.
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.
The interface protection system has been integrated into power generation unit. Detail settings of interface protection system and power controls are according to EN 50549-1:2019 and should be discussed with local DSO and followed with local grid regulation.
Software version: 01.00.00.R