



**BUREAU
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Certificate of compliance

Applicant: SMA Solar Technology AG
Sonnenallee 1
34266 Niestetal
Germany

Product: Photovoltaic (PV) inverter

Model: STP 50-40
STP 50-41

Inverter for three-phase parallel connection to the public grid. The network monitoring and disconnection device is an integral part of the above-mentioned model.

Applied rules and standards:

EN 50549-1:2019

Requirements for parallel connection of installations with distribution networks - Part 1: Connection to an LV distribution network - Production of installations 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
- 4.13 Requirements regarding single fault tolerance of interface protection system and interface switch

EN 50438:2013

Requirements for micro-generating plants to be connected in parallel with public low-voltage distribution networks

DIN V VDE V 0126-1-1:2006 (4.1 Functional safety)

Automatic disconnection device between a generator and the public low-voltage grid

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 Type A and Type B

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: 17TH0199-EN50549-1_1

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

Certificate number: U21-0133

Date of issue: 2021-02-16

Certification body



Thomas Lammel



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

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



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

Manufacturer / applicant:	SMA Solar Technology AG Sonnallee 1 34266 Niestetal Germany
Micro-generator Type	Photovoltaic inverter STP 50-40 STP 50-41
MPP DC voltage range [V]	500 – 800
Input DC voltage range [V]	max. 1000
Input DC current [A]	6 x 20
Output AC voltage [V]	400
Output AC current [A]	72,5
Output power [VA]	50000
Firmware version	Beginning with V03.10.03.R
Measurement period:	2019-12-27 to 2020-02-12
Description of the structure of the power generation unit: The power generation unit is equipped with a PV 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 two series-connected relays in each line and neutral. This enables a safe disconnection of the power generation unit from the network in case of error.	



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Parameter Table:

Clause EN 50549-1	Ref	Parameter	Micro generator setting range	Default settings used	
4.3.2 Interface switch	n.a.	Single fault tolerance for interface switch	yes no	yes	
4.4.2 Operating frequency range	A,B	47,0 – 47,5 Hz Duration	0 – 20 s	0,3 s	
	A,B	47,5 – 48,5 Hz Duration	30 – 90 min	unlimited	
	A,B	48,5 – 49,0 Hz Duration	30 – 90 min	unlimited	
	A,B	49,0 – 51,0 Hz Duration	not configurable	unlimited	
	A,B	51,0 – 51,5 Hz Duration	30 – 90 min	unlimited	
	A,B	51, 5 – 52 Hz Duration	0 – 15 min	0,1 s	
4.4.3 Minimal requirement for active power delivery at under frequency	A,B	Reduction threshold	49 Hz – 49,5 Hz	Electronic inverter no power reduction take place	
	A,B	Maximum reduction rate	2 – 10 % P_M/Hz	≤ 2 %	
4.4.4 Continuous operating voltage range	n.a.	Upper limit	100 – 110%	N/A	
	n.a.	Lower limit	90 – 100%	N/A	
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: synchronous generating technology:	not defined	2,5 Hz/s	
4.5.3.2 Generating plant with non-synchronous generating technology (FRT)	B	Maximum power resumption time	not defined	≤1 s	
	B	Voltage-Time-Diagram	see Figure 6, EN 50549-1	Time [s]	U [p.u.]
				0,0	0,05
				0,25	0,05
3,0	0,85				
4.5.3.3 Generating plant with synchronous generating technology (FRT)	B	Maximum power resumption time	not defined	N/A	
	B	Voltage-Time-Diagram	see Figure 7, EN 50549-1	Time [s]	U [p.u.]
				N/A	N/A
				N/A	N/A
				N/A	N/A
				N/A	N/A
N/A	N/A				



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4.5.4 Over-voltage ride through (OVRT)	n.a.	Voltage-Time-Diagram	not configurable	Time [s]	U [p.u.]
				N/A	N/A
				N/A	N/A
				N/A	N/A
				N/A	N/A
				N/A	N/A
				N/A	N/A
4.6.1 Power response to over frequency (LFSSM-O)	A,B	Threshold frequency f_1	50,2 Hz – 52 Hz	50,2 Hz	
	A,B	Drop	2 % – 12 %	5 %	
	A,B	Power reference	P_M P_{max}	P_M	
	n.a.	Intentional delay	0 – 2 s	0 s	
	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	No	
4.6.2 Power response to under frequency	n.a.	Threshold frequency f_1	49,8 Hz – 46 Hz	N/A	
	n.a.	Drop	2 – 12 %	N/A	
	n.a.	Power reference	P_M P_{max}	N/A	
	n.a.	Intentional delay	0 – 2 s	N/A	
4.7.2.2 Capabilities	B	Active factor range overexcited	0,9 – 1	0,9	
	B	Active factor range underexcited	0,9 – 1	0,9	
4.7.2.3 Control modes	n.a.	Enabled control mode	Q setp. Q(U) cos φ setp. cos φ (P)	All can be set!	
4.7.2.3.2 Set point control modes	n.a.	Q setpoint and excitation	0 – 48 % P_D	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	10 s	
	n.a.	Min cos φ	0,0 – 1	0,9	
	n.a.	Lock in power	0 % – 20 %	deactivated	
	n.a.	Lock out power	0 % – 20 %	deactivated	
4.7.2.3.4 Power related control mode	n.a.	Characteristic curve	cos φ (P)	-	
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	N/A	
	n.a.	Static voltage range undervoltage	20 % U_n – 100 % U_n	N/A	



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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	N/A
	B	Undervoltage threshold stage 1	$0,2 U_n - 1 U_n$	$0,8 U_n$
	B	Undervoltage operate time stage 1	0,1 s – 100 s	3 s
	B	Undervoltage threshold stage 2	$0,2 U_n - 1 U_n$	N/A
	B	Undervoltage operate time stage 2	0,1 s – 5 s	N/A
	B	Overvoltage threshold stage 1	$1,0 U_n - 1,2 U_n$	$1,20 U_n$
	B	Overvoltage operate time stage 1	0,1 s – 100 s	0,2 s
	B	Overvoltage threshold stage 2	$1,0 U_n - 1,3 U_n$	$1,25 U_n$
	B	Overvoltage operate time stage 2	0,1 s – 5 s	0,1 s
	B	Overvoltage threshold 10 min mean protection ^a	$1,0 U_n - 1,15 U_n$	$1,15 U_n$
	B	Overvoltage operate time 10 min mean protection ^a	0 – 3 s	10 min (disconnection after 0,4s)
	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	0,3 s
	B	Underfrequency threshold stage 2	47,0 Hz – 50,0 Hz	N/A
	B	Underfrequency operate time stage 2	0,1 s – 5 s	N/A
	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	0,1s
	B	Overfrequency threshold stage 2	50,0 Hz – 52,0 Hz	N/A
B	Overfrequency operate time stage 2	0,1 s – 5 s	N/A	
B	Loss of mains according EN 62116 (LoM)	0-6000s	2 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	50,1 Hz
	B	Lower voltage	$50 \% U_n - 100 \% U_n$	$85 \% U_n$
	B	Upper voltage	$100 \% U_n - 120 \% U_n$	$110 \% U_n$
	B	Observation time	10 s – 600 s	60 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	50,1 Hz
	A,B	Lower voltage	$50 \% - 100 \% U_n$	$85 \% U_n$
	A,B	Upper voltage	$100 \% - 120 \% U_n$	$110 \% U_n$
	A,B	Observation time	10 s – 600 s	60 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	No
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	No
4.12 Remote information exchange	B	Remote information exchange required NOTE: If yes further definition is provided by the DSO	yes no	No



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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.

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 of the EN 50549-1:2019.