

Compliance Document

No. D 070122 0013 Rev. 02


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

Product: **Converter**
SUNNY TRIPOWER

This Compliance document confirms the compliance with the listed standards on a voluntary basis. It refers only to the sample submitted for testing and certification and does not certify the quality or safety of the serial products. For details see: www.tuvsud.com/ps-cert

Test report no.: 704092001830-02

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(Zhengdong Ma)



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Model(s): STP 110-60

Parameters:
Please see pages 3 to 6.

Tested according to: EN 50549-1:2019/AC:2019



Product Service

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Model	STP 110-60
PV Input Parameters	
$V_{DC\ max}$	DC 1100 V
$V_{DC\ MPP}$	DC 500V, ..., 800 V
$I_{DC\ max}$	DC 12*26 A
$I_{sc\ PV}$	DC 12*40 A
AC Output Parameters	
$V_{AC,\ r}$	3~, 400 V
$F_{AC,\ r}$	50 Hz
$P_{AC,\ r}$	110000 W
S_{max}	110000 VA
$I_{AC\ max}$	AC 158.8 A
cos (φ)	0.8(overexcited), ..., 1, ..., 0.8(underexcited)

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Interface protection system default settings and power controls in inverter

Clause(s) / subclause(s) of this EN	Ref	Parameter	Typical value range	Value default	
4.3.2 Interface protection system and Interface switch	n.a.	Single fault tolerance of interface protection system and interface switch	yes no	N/A, external interface protection system is required and should be used as a dedicated device	
4.4.2 Operating frequency range	A,B	47,0 – 47,5 Hz Duration	0 – 20 s	100s	
	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	100 s	
4.4.3 Minimal requirement for active power delivery at underfrequency	A,B	Reduction threshold	49 Hz – 49,5 Hz	No reduction	
	A,B	Maximum reduction rate	2 – 10 % PM/Hz	N/A	
4.4.4 Continuous operating voltage range	n.a.	Upper limit	not configurable	110% Un	
	n.a.	Lower limit	not configurable	85% Un	
4.5.2 Rate of change of frequency (ROCOF) immunity	A,B	ROCOF withstand capability (defined with a sliding measurement window of 500 ms)	not defined	-	
		non-synchronous generating technology:		5 Hz/s	
		synchronous generating technology:		N/A	
4.5.3.2 Generating plant with non-synchronous generating technology	B	Maximum power resumption time	not defined	1 s	
		Voltage-Time-Diagram	see Figure 6	Time [s]	U [p.u.]
				0,0	0,05
				0,25	0,05
3	0,85				
4.5.3.3 Generating plant with synchronous generating technology	B	Maximum power resumption time	not defined	N/A	
		Voltage-Time-Diagram	see Figure 7 (N/A)	Time [s]	U [p.u.]
				0,0	0,3
				0,15	0,3
				0,15	0,7
				0,7	0,7
1,5	0,85				
4.5.4 Over-voltage ride through (OVRT)	n.a.	Voltage-Time-Diagram	not configurable	Time [s]	Time [s]
				0,0	1,25
				0,1	1,25
				0,1	1,20
				5,0	1,20
				5,0	1,15
				60	1,15
				60	1,10
4.6.1 Power response to overfrequency	A,B	Threshold frequency f1	50,2 Hz – 52 Hz	50,2 Hz	
	A,B	Droop	2 % – 12 %	5 %	
	A,B	Power reference	PM Pmax	PM for other non-synchronous generating technology	

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	n.a.	Intentional delay	0 – 2 s	0s
	n.a.	Deactivation threshold fstop	50,0 Hz – f1	deactivated
	n.a.	Deactivation time tstop	0 – 600 s	-
	A	Acceptance of staged disconnection	yes no	yes
4.6.2 Power response to underfrequency	n.a.	Threshold frequency f1	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	0 s
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)	Q setpoint
4.7.2.3.2 Setpoint control modes	n.a.	Q setpoint and excitation	0 – 60 % S _{max}	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	-	disabled
4.7.4.2.2 Zero current mode for converter connected generating technology	n.a.	Enabling	enable disable	disabled
	n.a.	Static voltage range overvoltage	100 % Un – 120 % Un	120 % Un
	n.a.	Static voltage range undervoltage	20 % Un – 100 % Un	50 % Un
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	Inverter with voltage and frequency protection, but external interface protection system is required and should be used as a dedicated device
	B	Undervoltage threshold stage 1	0,2 Un – 1 Un	0,5 Un
	B	Undervoltage operate time stage 1	0,1 s – 100 s	100 s
	B	Undervoltage threshold stage 2	0,2 Un – 1 Un	0,2 Un
	B	Undervoltage operate time stage 2	0,1 s – 5 s	5 s
	B	Overvoltage threshold stage 1	1,0 Un – 1,2 Un	1,2 Un
	B	Overvoltage operate time stage 1	0,1 s – 100 s	100 s
	B	Overvoltage threshold stage 2	1,0 Un – 1,3 Un	1,3 Un
	B	Overvoltage operate time stage 2	0,1 s – 5 s	5 s
	B	Overvoltage threshold 10 min mean protection	1,0 Un – 1,15 Un	1,10 Un
	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	100 s
	B	Underfrequency threshold stage 2	47,0 Hz – 50,0 Hz	47 Hz

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	B	Underfrequency operate time stage 2	0,1 s – 5 s	5 s
	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	100 s
	B	Overfrequency threshold stage 2	50,0 Hz – 52,0 Hz	52 Hz
	B	Overfrequency operate time stage 2	0,1 s – 5 s	5 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
	B	Upper voltage	100 % Un – 120 % Un	110 % Un
	B	Observation time	10 s – 600 s	60 s
	B	Active power increase gradient	6 % – 3000 %/min	10 %Pn /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 % Un	85 % Un
	A,B	Upper voltage	100 % – 120 % Un	110 % Un
	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	Can be achieved by PGU. (Logic interface shall be specified by DNO)
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	Can be achieved by PGU. (Definition shall be specified by DNO)
4.12 Remote information exchange	B	Remote information exchange required NOTE: If yes further definition is provided by the DSO	yes no	No

The Column Ref specifies if a parameter is relevant for COMMISSION REGULATION 2016/631 and for what type of generating module the parameter is relevant. If n.a. is set, this parameter is: not applicable for 2016/631, but is introduced into EN50549-1 for local DSO network management reasons and is not considered as cross border issues.

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.