



CERTIFICATE

Applicant: SolarEdge Technologies LTD
1 HaMada Street
4673335 Herzeliya
Israel

Product: Hybrid Inverter (Battery/PV) with integrated automatic disconnection device between a generator and the public low-voltage grid

Model: NX8K, NX10K, NX12.5K, NX13K, NX15K, NX16K, NX17K, NX20K

Intended use:

Hybrid inverter in accordance with EN 50549-1 with three-phase parallel coupling to the distribution network. The automatic disconnection device is an integral part of the aforementioned inverter.

Applied standards and guidelines:

SOP-9-1_15 GCC Certification Program, 09/21

Based on:

EN 50549-1:2019

Requirements for generating plants to be connected in parallel with distribution networks Part 1: Connection to a LV distribution network - Generating plants up to and including Type B

Tested according to:

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

The generating plant(s) are also considered to be compliant with the relevant Articles of Commission Regulation (EU) 2016/631 of 14 April 2016 establishing a network code on requirements for grid connection of generators (NC RfG), provided, that all settings as provided by the DSO and the responsible party are complied with.

The safety concept of an aforementioned representative product corresponds at the time of issue of this certificate to the valid safety specifications for the specified use in accordance with regulations.

Report No: 24PP442-05_0

Certificate No: 25-353-00

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Tanja Rottach
Certification Engineer





Parameter table acc. EN50549-10:2022 (Parameters as declared by the manufacturer and not according to a specific grid code. Additional testing for deviation to a specific grid code can be necessary)						
Parameter setting name in the generating unit:		Europe EN50549				
Software Version:		DSP 1: 1.30 DSP 2: 2.30				
Clause(s) / subclause(s) of EN50549-1 or EN 50549-2:2019	Parameter	Parameter name in the generating unit	Configurable range	Default value	Minimum step size	Considered value range
4.4.2 Operating frequency range	47,0 – 47,5 Hz Duration		not configurable	0s		
	47,5 – 48,5 Hz Duration		not configurable	30 min		
	48,5 – 49,0 Hz Duration		not configurable	30 min		
	49,0 – 51,0 Hz Duration		not configurable	unlimited		
	51,0 – 51,5 Hz Duration		not configurable	30 min		
	51, 5 – 52 Hz Duration		not configurable	0 s		
4.4.3 Minimal requirement for active power delivery at underfrequency	Reduction threshold		not configurable	49,5 Hz		
	Maximum reduction rate		not configurable	10 % PM/Hz		
4.4.4 Continuous operating voltage range	Upper limit		not configurable	110% Un		
	Lower limit		not configurable	85% Un		
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: synchronous generating technology:	AI Rocof detection threshold2	1Hz/s-20Hz/s	10 Hz/s		1-20
4.5.3.2 Under-voltage ride through (UVRT) Generating plant with non-synchronous generating technology	Maximum power resumption time	not configurable				
	Voltage-Time-Diagram	not configurable	see Figure 6 of EN 50549-1:2019 and EN 50549-2:2019	Time [s]	U [p.u.]	
		not configurable		0,0	0,2	
		not configurable		0,15	0,2	
not configurable		1,5		0,85		



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Software Version:		DSP 1: 1.30 DSP 2: 2.30					
Clause(s) / subclause(s) of EN50549-1 or EN 50549-2:2019	Parameter	Parameter name in the generating unit	Configurable range	Default value		Minimum step size	Considered value range
4.5.3.3 Under-voltage ride through (UVRT) Generating plant with synchronous generating technology	Maximum power resumption time	not configurable					
	Voltage-Time-Diagram	not configurable	see Figure 7 of EN 50549-1:2019 and EN 50549-2:2019	Time [s]	U [p.u.]		
		not configurable		0,0	0,3		
		not configurable		0,15	0,3		
		not configurable		0,15	0,7		
		not configurable		0,7	0,7		
not configurable	1,5	0,85					
4.5.4 Over-voltage ride through (OVRT)	Voltage-Time-Diagram	not configurable	Not configurable see Figure 8 of EN 50549-1:2019 and EN 50549-2:2019	Time [s]	U [p.u.]		
		not configurable		0,0	1,25		
		not configurable		0,1	1,25		
		not configurable		0,1	1,20		
		not configurable		5,0	1,20		
		not configurable		5,0	1,15		
		not configurable		60	1,15		
not configurable	60	1,10					
FRT modes (UVRT and OVRT)	2 modes available	FRT Mode: 313 Thresholds: LVRT: 355, OVRT:356	0 = Zero mode (FRT disable) 2 = zero current mode	2	0,8 1,10	0,01	
4.5.5 Phase jump immunity	Phase jump immunity		Not configurable	20°			4.5.5 Phase jump immunity
4.6.1 Power response to overfrequency	Threshold frequency f1	LMPwrFrqDerating Over frequency deadband	50,2 Hz – 52 Hz	50,2 Hz		0,01Hz	
	Droop	LMPwrFrqDerating K Of	2 % – 12 %	5 %		0,01%	



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Software Version:		DSP 1: 1.30 DSP 2: 2.30				
Clause(s) / subclause(s) of EN50549-1 or EN 50549-2:2019	Parameter	Parameter name in the generating unit	Configurable range	Default value	Minimum step size	Considered value range
	Power reference	GRC_APC PwrFrqDeratingConfig	PM Pmax	Pmax, for synchronous Generating technology and EESS PM for other nonsynchronous Generating technology		
	Intentional delay		0 – 5 s	0s		
	Deactivation threshold fstop	GRC_APC APDWF Max Freq [Hz]	50,0 Hz – 55	deactivated	0,01	50-55
	Deactivation time tstop	GRC_APCAPDWFResetTime[ms]	0 – 600 s	0	1	0-900000
	Acceptance of staged disconnection		yes no	yes		
4.6.2 Power response to underfrequency	Threshold frequency f1	LMPwrFrqDerating Under frequency deadband	49,8 Hz – 46 Hz	49,8 Hz	0.01Hz	50-40
	Droop	LMPwrFrqDerating K Uf	2 – 12 %	5 %	0.01%	2-12%
	Power reference	GRC_APC PwrFrqDeratingConfig	PM Pmax	Pmax		
	Intentional delay	APC pvsf Start Action Time[ms]	0 – 2 s	0 s		
4.7.2.2 voltage support by reactive power - Capabilities	Active factor / Reactive power (%Pd) range over-excited	Control Phi Phase1 [deg]	0 to 85deg	0	0,1	0-85
	Active factor / Reactive power (%Pd) range underexcited	Control Phi Phase1 [deg]	0 to - 85deg	0	-0,1	0 to -85
4.7.2.3 voltage support by reactive power – Control modes	Enabled control mode	GRC_APC Reactive Pwr config	Cons PF Cons Q cosFe(P) Q(U)	Cons PF	1	0-3
	Q setpoint and excitation	Control React Pwr Phase1 [var]	0 – 60 % PD	0	1	1-Snom/3



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Clause(s) / subclause(s) of EN50549-1 or EN 50549-2:2019	Parameter	Parameter name in the generating unit	Configurable range	Default value	Minimum step size	Considered value range
4.7.2.3.2 voltage support by reactive power - Set point control modes	cos φ setpoint and excitation	Control Phi Phase1 [deg]	1 – 85	0	0,1	0-85 deg
4.7.2.3.3 voltage support by reactive power – Voltage related control modes	Characteristic curve		-	-		
	Time constant	Vac filter Time ms	0 s – 60 s	10 s	1msec	0-60000
	Min cos φ		0,0 – 1	0,9	0,1 deg	0-85 deg
	Lock in power	GRC_APCMinPwrLockin[W]	0 % – 20 %	deactivated		
	Lock out power	GRC_APCMinPwrLockout[W]	0 % – 20 %	deactivated		
4.7.2.3.4 voltage support by reactive power – Power related control mode	Characteristic curve		-	-		
only EN 50549-2:2019, 4.7.4.2.1 Voltage support during faults and voltage steps – General / Generating Plant with non-synchronous generator	Enabling	GRC_APC FRT Enable/Disable	enable disable	disabled		
	Static voltage range overvoltage	HVRT threshold	100 % U_c – 120 % U_c	110 % U_c		
	Static voltage range undervoltage	LVRT threshold	80 % U_c – 100 % U_c	90 % U_c		
	Insensitivity range of ΔU_{50per}	not configurable				
	Gradient k1	NA				
	Gradient k2	NA				
only EN 50549-2:2019, 4.7.4.2.1.2 Optional Modes / Generating Plant with non-	Active power priority	Reactive power policy type	Reactive Active	reactive		
	Reactive current limitation [% rated current]	I Amp Reference Max [A]	0 % – 100 %	100%	0,1Amp	0 to Inom
	Zero current threshold	LVRT threshold	20 % U_c – 100 % U_c	disable	1V	0 to Vnom



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Clause(s) / subclause(s) of EN50549-1 or EN 50549-2:2019	Parameter	Parameter name in the generating unit	Configurable range	Default value	Minimum step size	Considered value range
synchronous generator						
4.7.4.2.2 Zero current mode for converter connected generating technology / Generating Plant with non-synchronous generator	Enabling	GRC APC FRT Enable/Disable	enable disable	disable		
	Static voltage range over-voltage	HVRT threshold	100 % Un – 120 % Un	120 % Un		
	Static voltage range under-voltage	LVRT threshold	20 % Un – 100 % Un	50 % Un		
4.9.2 Requirements on voltage and frequency protection	Threshold for protection as dedicated device [in A or kW, kVA]		16 A – 250 kVA			
	Undervoltage threshold stage 1	V Grid Min1 [V]	0,2 Un – 1 Un			
	Undervoltage operate time stage 1	V Grid Min1 Holdoff Time [mS]	0,1 s – 100 s			
	Undervoltage threshold stage 2	V Grid Min2 [V]	0,2 Un – 1 Un			
	Undervoltage operate time stage 2	V Grid Min2 Holdoff Time [mS]	0,1 s – 100 s			
	Overvoltage threshold stage 1	V Grid Max1 [v]	1,0 Un – 1,25 Un			
	Overvoltage operate time stage 1	V Grid Max1 Holdoff Time [mS]	0,1 s – 100 s			
	Overvoltage threshold stage 2	V Grid Max2 [V]	1,0 Un – 1,25 Un			
	Overvoltage operate time stage 2	V Grid Max2 Holdoff Time [mS]	0,1 s – 100 s			



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Clause(s) / subclause(s) of EN50549-1 or EN 50549-2:2019	Parameter	Parameter name in the generating unit	Configurable range	Default value	Minimum step size	Considered value range
	Overvoltage threshold 10 min mean protection	V Grid Max5 [v]	1,0 Un – 1,25 Un			
	Underfrequency threshold stage 1	F Grid Min1 [Hz]	45,0 Hz – 50,0 Hz			
	Underfrequency operate time stage 1	F Grid Min1 Holdoff Time [mS]	0,1 s – 100 s			
	Underfrequency threshold stage 2	F Grid Min2 [Hz]	45,0 Hz – 50,0 Hz			
	Underfrequency operate time stage 2	F Grid Min2 Holdoff Time [mS]	0,1 s – 100 s			
	Overfrequency threshold stage 1	F Grid Max1 [Hz]	50,0 Hz – 55,0 Hz			
	Overfrequency operate time stage 1	F Grid Max1 Holdoff Time [mS]	0,1 s – 100 s			
	Overfrequency threshold stage 2	F Grid Max2 [Hz]	50,0 Hz – 55,0 Hz			
	Overfrequency operate time stage 2	F Grid Max2 Holdoff Time [mS]	0,1 s – 100 s			
only EN 50549-2:2019, 4.9.3 Requirements on voltage and frequency protection	Positive sequence under-voltage protection threshold	NA				
	Positive sequence under-voltage protection operate time	NA				
	Negative sequence over-voltage protection threshold	NA				
	Negative sequence over-voltage	NA				



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Clause(s) / subclause(s) of EN50549-1 or EN 50549-2:2019	Parameter	Parameter name in the generating unit	Configurable range	Default value	Minimum step size	Considered value range
	protection operate time					
	Zero sequence overvoltage protection threshold	NA				
	Zero sequence overvoltage protection operate time	NA				
4.10.2 Automatic reconnection after tripping	Lower frequency	Freq Min Opr	47,0 Hz – 50,0 Hz	49,5 Hz		
	Upper frequency	Freq Max Opr	50,0 Hz – 53,0 Hz	50,2 Hz		
	Lower voltage	Vg Min Opr	50 % Un – 100 % Un	85 % Un		
	Upper voltage	Vg Max Opr	100 % Un – 120 % Un	110 % Un		
	Observation time	GRM Time	10 s – 600 s	60 s		
	Active power increase gradient	GRC_APC Pwr soft start time[ms]	6 % – 3000 %/min	10 % /min		
4.10.3 Starting to generate electrical power	Lower frequency	Freq Min Opr	47,0 Hz – 50,0 Hz	49,5 Hz		
	Upper frequency	Freq Max Opr	50,0 Hz – 53,0 Hz	50,1 Hz		
	Lower voltage	Vg Min Opr	50 % – 100 % Un	85 % Un		
	Upper voltage	Vg Max Opr	100 % – 120 % Un	110 % Un		
	Observation time	GRM Time	10 s – 600 s	60 s		



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Clause(s) / subclause(s) of EN50549-1 or EN 50549-2:2019	Parameter	Parameter name in the generating unit	Configurable range	Default value	Minimum step size	Considered value range
	Active power increase gradient	GRC_APC Pwr soft start time[ms]	6 % – 3000 %/min	disabled		
4.11.1 Ceasing active power	Remote operation of the logic interface		digital input, modbus over RS485, internal tool over RS485, Modbus over tcp.IP			
4.11.2 Reduction of active power on set point	Remote operation		digital input, modbus over RS485, internal tool over RS485, Modbus over tcp.IP			
4.12 Remote information exchange	Remote information exchange required		digital input, modbus over RS485, internal tool over RS485, Modbus over tcp.IP			