SOLAR ELECTRIC

Self-Declaration

to Country setting EN50549-1:2019

The company

KOSTAL Solar Electric GmbH
Hanferstrasse 6
79108 Freiburg i. Br., Germany

hereby confirms that for the inverters

PIKO 10 - 20

when selecting the country setting EN50549-1:2019, the following parameters and functions are preset as default values according to the following table. Adjustments and changes can be made using the PARAKO software. All changes must always be coordinated with the responsible grid operator.

This declaration applies to all identical specimens of the product. This declaration becomes invalid if a change is made to the unit or the unit is improperly installed.

KOSTAL Solar Electric GmbH – 15.09.2021

Frank Henn
(Managing Director)

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(Vicepresident R&D)

Type Approval and declaration of compliance with the requirements of EN 50549-1, Commission Regulation (EU) 2016/631 of 14 April 2016				
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	not configurable	yes
4.4.2 Operating frequency range	A,B	47,0 – 47,5 Hz Duration	not configurable	unlimited
	A,B	47,5 – 48,5 Hz Duration	not configurable	unlimited
	A,B	48,5 – 49,0 Hz Duration	not configurable	unlimited
	A,B	49,0 – 51,0 Hz Duration	not configurable	unlimited
	A,B	51,0 – 51,5 Hz Duration	not configurable	unlimited
	A,B	51, 5 – 52 Hz Duration	not configurable	unlimited
4.4.3 Minimal requirement for active power delivery at under frequency	A,B	Reduction threshold	not configurable	no power reduction
	A,B	Maximum reduction rate	not configurable	≤ 1 %
4.4.4 Continuous operating voltage range	n.a.	Upper limit	not configurable	120%
	n.a.	Lower limit	not configurable	80%
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 configurable	≥3 Hz/s
4.5.3.2 Generating plant with non- synchronous generating technology (FRT)	B	Maximum power resumption time	0 s .. 15 s	0,5 s
	B	Voltage-Time-Diagram	not configurable	Time [s]
				0
				1
				5
				180
4.5.3.3 Generating plant with synchronous generating technology (FRT)	B	Maximum power resumption time	N/A	N/A
	B	Voltage-Time-Diagram	N/A	N/A
4.5.4 Over-voltage ride through (OVRT)	n.a.	Voltage-Time-Diagram	not configurable	Time [s]
				0
				0,1
				0,1
				0,6
				0,6
				60
4.6.1 Power response to over frequency (LFSM-O)	A,B	Enabling	enabled | disabled	enabled
	A,B	Threshold frequency f1	50,0 Hz .. 53,1 Hz	50,2 Hz
	A,B	Droop	1 % .. 12 %	5,00%
	A,B	Power reference	Pmax | PM	PM
	n.a.	Intentional delay	0 s .. 10 s	0,0 s
	n.a.	Deactivation threshold fstop	50,0 Hz .. 53,1 Hz	disabled
	n.a.	Deactivation time tstop	0 s .. 600 s	disabled
	A	Acceptance of staged disconnection	not configurable	N/A

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Clause EN 50549-1	**Ref**	**Parameter**	**Micro generator setting range**	**Default settings used**
4.6.2 Power response to under frequency (LFSM-U)	n.a.	Enabling	enabled | disabled	disabled
	n.a.	Threshold frequency f1	46,9 Hz .. 50,0 Hz	49,8 Hz
	n.a.	Droop	1% .. 12%	5,00%
	n.a.	Power reference	Pmax | PM	Pmax
	n.a.	Intentional delay	0 s .. 10 s	0,0 s
4.7.2.2 Capabilities	B	Active factor range overexcited		0.8 oe
	B	Active factor range underexcited		0.8 ue
4.7.2.3 Control modes	n.a.	Enabled control mode	Q setp.| Q(U) | Q(P) | cos ϕ setp. | cos ϕ (P)	cos ϕ setp.
4.7.2.3.2 Set point control modes	n.a.	Q setpoint and excitation	60%*Sn oe .. 60%*Sn ue	0,0% disabled
	n.a.	cos ϕ setpoint and excitation	0.8 oe .. 0.8 ue	1,00 enabled
4.7.2.3.3 Voltage related control modes	n.a.	Characteristic curve	Q(U) (80% .. 120% Un; 60%ue .. 60%oe Sn)	disabled (0,0% ; 0,0%) (0,0% ; 0,0%) (0,0% ; 0,0%) (0,0% ; 0,0%)
	n.a.	Time constant	1 s .. 60s	0,0 s
	n.a.	Min cos ϕ	0,2 .. 1	0,9
	n.a.	Lock in power	0 % .. 100 % Un	disabled
	n.a.	Lock out power	0 % .. 100 % Un	disabled
4.7.2.3.4 Power related control mode	n.a.	Characteristic curve	cos ϕ (P) (P in %Sn ; cos ϕ) Q (P) (P in %Sn ; Q in %Sn)	disabled
4.7.3 Voltage related active power reduction	n.a.	Enabling	enabled | disabled	disabled
	n.a.	Characteristic curve	P(U) (80% .. 120% Un ; 0% .. 100% Pn)	(110,0 ; Pn) (112,0 ; 0 %)
4.7.4.2.2 Zero current mode for converter connected generating technology	n.a.	Enabling	enabled | disabled	disabled
	n.a	Static voltage range overvoltage	100 % .. 150 % Un	120,00%
	n.a	Static voltage range undervoltage	0 % .. 100 % Un	50,00%

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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]	N/A	N/A
	B	Undervoltage threshold stage 1	0,0 V .. 230,0 V	195,5 V
	B	Undervoltage operate time stage 1	0,04 s .. 24 h	1,50 s
	B	Undervoltage threshold stage 2	0,0 V .. 230,0 V	disabled
	B	Undervoltage operate time stage 2	0,04 s .. 24 h	disabled
	B	Overvoltage threshold stage 1	230,0 V .. 310,5 V	264,5 V
	B	Overvoltage operate time stage 1	0,04 s .. 24 h	0,20 s
	B	Overvoltage threshold stage 2	230,0 V .. 310,5 V	disabled
	B	Overvoltage operate time stage 2	0,04 s .. 24 h	disabled
	B	Overvoltage threshold 10 min mean protection1	230,0 V .. 310,5 V	253,0 V
	B	Overvoltage operate time 10 min mean protection1	not configurable	≤ 3 s (not intentionally delayed)
	B	Underfrequency threshold stage 1	46,90 Hz .. 49,99 Hz	47,50 Hz
	B	Underfrequency operate time stage 1	0,04 s .. 24 h	0,50 s
	B	Underfrequency threshold stage 2	46,90 Hz .. 49,99 Hz	disabled
	B	Underfrequency operate time stage 2	0,04 s .. 24 h	disabled
	B	Overfrequency threshold stage 1	50,01 Hz .. 53,10 Hz	52,00 Hz
	B	Overfrequency operate time stage 1	0,04 s .. 24 h	0,50 s
	B	Overfrequency threshold stage 2	50,01 Hz .. 53,10 Hz	disabled
	B	Overfrequency operate time stage 2	0,04 s .. 24 h	disabled
	B	Loss of mains according EN 62116 (LoM)	not configurable	< 2 s
4.10.2 Automatic reconnection after tripping	B	Lower frequency	46,90 Hz .. 49,99 Hz	49,50 Hz
	B	Upper frequency	50,01 Hz .. 53,10 Hz	50,20 Hz
	B	Lower voltage	0,0 V .. 230,0 V	195,5 V
	B	Upper voltage	0,0 V .. 310,5 V	253,0 V
	B	Observation time	1s .. 24h	60 s
	B	Active power increase gradient	6,6 %/min – 6000%/min	10 %/min
4.10.3 Starting to generate electrical power	A,B	Lower frequency	46,90 Hz .. 49,99 Hz	49,50 Hz
	A,B	Upper frequency	50,01 Hz .. 53,10 Hz	50,10 Hz
	A,B	Lower voltage	0,0 V .. 230,0 V	195,5 V
	A,B	Upper voltage	0,0 V .. 310,5 V	253,0 V
	A,B	Observation time	1s .. 24h	60 s
	A,B	Active power increase gradient	6,6 %/min – 6000%/min	6000 %/min
4.11.1 Ceasing active power	A,B	Remote operation of the logic interface	yes | no	yes Digital Input ModBus
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	yes Digital Input ModBus
4.12 Remote information exchange	B	Remote information exchange NOTE: If yes further definition is provided by the DSO	yes | no	yes ModBus

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Parameter Table:				
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Note:
[1] 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.

Inverter:
a: PIKO 10
b: PIKO 12
c: PIKO 15
d: PIKO 17
e: PIKO 20