



**BUREAU
VERITAS**

Certificate of compliance

Applicant: KOSTAL Solar Electric GmbH
Hanferstraße 6
79108 Freiburg i. Br.
Germany

Product: Grid-tied photovoltaic (PV) inverter and battery inverter

Model: PIKO MP plus 1.5-1, PIKO MP plus 2.0-1, PIKO MP plus 2.5-1, PIKO MP plus 3.0-1, PIKO MP plus 3.0-2, PIKO MP plus 3.6-1, PIKO MP plus 3.6-2, PIKO MP plus 4.6-2; PIKO MP plus 5.0-2

Use in accordance with regulations:

Automatic disconnection device with single-phase mains surveillance in accordance with EN50549-1:2019 for photovoltaic systems with a single-phase parallel coupling via an inverter in the public mains supply. The automatic disconnection device is an integral part of the aforementioned inverter.

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
- 4.12 Remote information exchange
- 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

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: 18TH0316-PIKO-Hybrid-EN50549-1_0 **Certification Program:** NSOP-0032-DEU-ZE-V01

Certificate number: U20-0374 **Date of issue:** 2020-05-28

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

Appendix

Extract from test report according to EN 50549-1

Nr. 18TH0316-PIKO-Hybrid-EN50549-1_0

Type Approval and declaration of compliance with the requirements of EN 50549-1.

Manufacturer / applicant:	KOSTAL Solar Electric GmbH Hanferstraße 6 79108 Freiburg i. Br. Germany
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Micro-generator Type	Grid-tied photovoltaic inverter and battery inverter			
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	PIKO MP plus 1.5-1	PIKO MP plus 2.0-1	PIKO MP plus 2.5-1	PIKO MP plus 3.0-1
MPP DC voltage range [V]	75-360	75-360	75-360	125-600
Input DC voltage range [V]	Max 450	Max 450	Max 450	Max 750
Input DC current [A]	13	13	13	13
Output AC voltage [V]	230; N; PE			
Output AC current [A]	12	12	14	14
Output power [VA]	1500	2000	2500	3000

	PIKO MP plus 3.0-2	PIKO MP plus 3.6-1	PIKO MP plus 3.6-2	PIKO MP plus 4.6-2
MPP DC voltage range [V]	125-600	125-600	150-600	150-600
Input DC voltage range [V]	Max 750			
Input DC current [A]	13	13	13	13
Output AC voltage [V]	230; N; PE			
Output AC current [A]	14	16	16	20
Output power [VA]	3000	3680	3680	4600

	PIKO MP plus 5.0-2			
MPP DC voltage range [V]	150-600			
Input DC voltage range [V]	Max 750			
Input DC current [A]	13			
Output AC voltage [V]	230; N; PE			
Output AC current [A]	22			
Output power [VA]	5000			

Firmware version	PU_APP_3.7.0 and PAR_23.0.2 or higher
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Measurement period:	2019-11-11 to 2020-05-18
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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.

Appendix

Extract from test report according to EN 50549-1

Nr. 18TH0316-PIKO-Hybrid-EN50549-1_0

Setting of the interface protection EN 50549-1 and VDE 0124-100:

Parameter	Max. disconnection time	Min. operate time	Trip value
Over voltage (stage 1) ^a	5s	-	230V +15% (264,5V)
Over voltage (stage 2)	0,2s	0,1s	230V +20% (276V)
Under voltage	1,5s	1,2s	230V -15% (195,5V)
Over frequency	0,5s	0,3s	50Hz +4% (52Hz)
Under frequency	0,5s	0,3s	50Hz -5% (47,5Hz)
Reconnection settings for voltage (normal operational startup)	$0,85V_n (195,5V) \leq V \leq 1,10V_n (253V)$		
Reconnection settings for frequency (normal operational startup)	$49,5Hz \leq f \leq 50,1Hz$		
Reconnection time (normal operational startup)	$\geq 60 s$		
Reconnection settings for voltage (automatic reconnection after tripping)	$0,85V_n (195,5V) \leq V \leq 1,10V_n (253V)$		
Reconnection settings for frequency (automatic reconnection after tripping)	$49,5Hz \leq f \leq 50,1Hz$		
Reconnection time (automatic reconnection after tripping)	$\geq 60 s$		
Active power gradient after reconnection	10% $P_{E_{max}}$ / per minute		
Active power delivery at under frequency	electronic inverter, no active power reduction		
Power response to over frequency (frequency / droop s)	50,2Hz / 5%		
Permanent DC-injection	0,5% of rated inverter output current or 20mA		
Rate of change of frequency (ROCOF)	2Hz/s		
Loss of mains according EN 62116 (LoM)	2,0s		

Note:

Over voltage – stage1: 10 min-mean-value corresponding to EN 50160.

Default interface setting according to EN 50438:2013 are used.

The settings of the interface protection are password protected adjustable.

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. 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.