Certificate of compliance

Applicant:	**Kostal Industrie Elektrik GmbH** Lange Eck 11 58099 Hagen **Germany**
Product:	**Grid-tied photovoltaic (PV) inverter**
Model:	PIKO 10 PIKO 12 PIKO 15 PIKO 17 PIKO 20

Use in accordance with regulations:

Automatic disconnection device with three-phase mains surveillance in accordance with DANSK ENERGI:2019 for photovoltaic systems with a three-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:

DANSK ENERGI:2019
Technical requirements for connection of power-generating plants to the low-voltage grid (≤1kV)
Type A

DIN V VDE V 0126-1-1:2006-02 (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:	**19TH0373-DK1/DK2_0**	**Certification Program:**	**NSOP-0032-DEU-ZE-V01**
Certificate number:	**U19-0581**	**Date of issue:**	**2019-10-31**

Certification body

Holger Schaffer

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

Type Verification Test Report	
Extract from test report according to DANSK ENERGI	**Nr. 19TH0373-DK1/DK2_0**

Type Approval and declaration of compliance with the requirements of DANKS ENERGI				
Manufacturer / applicant:	Kostal Industrie Elektrik GmbH Lange Eck 11 58099 Hagen Germany			
Micro-generator Type	Grid-tied photovoltaic inverter			
Rated values	PIKO 10	PIKO 12	PIKO 15	PIKO 17
MPP DC voltage range [V]	290 – 800	345 - 800	260 - 800	290 - 800
Input DC voltage range [V]	290 – 1000	345 - 1000	260 - 1000	290 - 1000
Input DC current [A]	20			
Output AC voltage [V]	3N~, 400V, 50Hz			
Output AC current [A]	16,2	19,3	24,2	27,4
Output power [VA]	10000	12000	15000	17000
Rated values	PIKO 20			
MPP DC voltage range [V]	345 - 800			
Input DC voltage range [V]	345 - 1000			
Input DC current [A]	20			
Output AC voltage [V]	3N~, 400V, 50Hz)			
Output AC current [A]	32,2			
Output power [VA]	20000			
Firmware version	D6.1A / 06.50			
Measurement period:	2019-07-30 to 2019-09-15			

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 line and neutral. This enables a safe disconnection of the power generation unit from the network in case of error.

Setting of the parameter values for DK1 and DK2:

	Settings for DK1	**Setting for DK2**
	LFSM-O	
Threshold frequency [Hz]	50,2	50,5
Droop [% of Pn]	5% (40% Pn/Hz)	4% (50% Pn/Hz)
Intentional Delay	500ms	500ms
	Reactive Power	
	Q fix	Q fix
Active/disabled [On/Off]	On	On
Q setpoint [VAr]	0	0
	cos φ fix	
Active/disabled [On/Off]	Off	Off
PF setpoint [PF]	1	1

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	Settings for DK1	Setting for DK2
	cos φ (P)	
Active/disabled [On/Off]	Off	Off
Cos φ (P) P1 [% of P_n]	0	0
Cos φ (P) PF1 [PF]	1	1
Cos φ (P) P2 [% of P_n]	50	50
Cos φ (P) PF2 [PF]	1	1
Cos φ (P) P3 [% of P_n]	100	100
Cos φ (P) PF3 [PF]	0,9 inductive	0,9 inductive
Cos φ (P) Lockin [% of U_n]	105	105
Cos φ (P) Lockout [% of U_n]	100	100
	Connection and Reconnection	
Gradient [% of P_n/min]	20	20
Observation time [seconds]	180	180
U_{min} [% of U_n]	85	85
U_{max} [% of U_n]	110	110
f_{min} [Hz]	47,5	47,5
f_{max} [Hz]	50,2	50,5
	System Protection	
f> [s]	0,2	0,2
f> [Hz]	51,5	51,5
f< [s]	0,2	0,2
f< [Hz]	47,5	47,5
U> [s]	60	60
U> [% of U_n]	110	110
U>> [s]	0,2	0,2
U>> [% of U_n]	115	115
U< [s]	50	50
U< [% of U_n]	85	85
	Loss of Mains Detection	
U<< [s]*	0,2	0,2
U<< [% of U_n]*	80	80

Note.
*Loss of Mains Detection: Under voltage stage 2 used for the Loss of Mains Detection
B1.2.8.5 Harmonics:
Unit PIKO 12 passed the criteria for a Connection Point with a SCR ≥120
Unit PIKO 20 passed the criteria for a Connection Point with a SCR ≥250