



CERTIFICATE

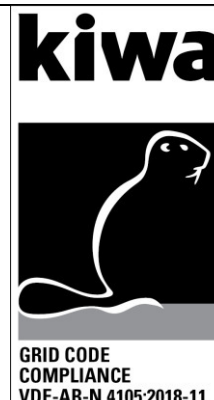
Certificate of NS protection						Nr.: 19-090-02							
Manufacturer / Applicant		KOSTAL Solar Electric GmbH Hanferstr. 6 79108 Freiburg i. Br. Deutschland											
Type of NS protection		Assigned to power generation unit of type											
		PIKO IQ						PLENTICORE plus					
		3.0	4.2	5.5	7.0	8.5	10	3.0	4.2	5.5	7.0	8.5	10
Central NS protection		☐											
Integrated NS protection		☒ Assigned to power generation unit of type											
		PIKO IQ						PLENTICORE plus					
		3.0	4.2	5.5	7.0	8.5	10	3.0	4.2	5.5	7.0	8.5	10
Network connection rule		SOP-9-1_13 GCC Certification Program, 06/19 <u>Based on:</u> VDE-AR-N 4105:2018-11 Generators connected to the low-voltage distribution network – Technical minimum requirements for connection and parallel operation of power generation systems connected to the low-voltage network											
Test requirement		E DIN VDE V 0124-100 (VDE V 0124-100):((2019-04)) Arbeitsstand 27.03.2019 “Network integration of power generation systems – Low voltage” Test requirements for power generation units intended for connection to and parallel operation on the low-voltage network											
Test Report		17PP205-28_2 from 04.09.2020											
The network and system protection designated above meets the requirements of VDE-AR-N 4105:2018-11.													

Kaufbeuren, 15.09.2020

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Raphael Rader

Certification Engineer



This NS protection certificate shall not be used in extracts





Annex 1

E.7 Extract of the test report for NS protection

No.: 17PP205-28_2

„Bestimmung der elektrischen Eigenschaften“

Test report NS protection

Type of NS protection:	Assigned to power generation unit of type											
	PIKO IQ						PLENTICORE plus					
	3.0	4.2	5.5	7.0	8.5	10	3.0	4.2	5.5	7.0	8.5	10
Software-Version:	FW 01.43 UI 01.15.04581											
Manufacturer:	KOSTAL Solar Electric GmbH Hanferstr. 6 79108 Freiburg i. Br. Germany											
Measurement period:	from 2017-09-27 to 2020-07-30											
	Sitriling generators, fuel cells						Inverter(s)					
	Synchronous and asynchronous generators with $P_n \leq 50\text{kW}$ coupled directly or via inverters						Directly coupled synchronous and asynchronous generators with $P_n > 50\text{kW}$					
Protective function	Set Value	Tripping Value	Tripping time NS Protection*	Set Value	Tripping Value	Tripping time NS Protection*	Set Value	Tripping Value	Tripping time NS Protection*	Set Value	Tripping Value	Tripping time NS Protection*
Rise-in-voltage protection $U_{>>}$	$1,15 * U_n$	—	—	$1,25 * U_n$	288,0 V	16 ms	$1,25 * U_n$	288,0 V	16 ms	$1,25 * U_n$	288,0 V	16 ms
Rise-in-voltage protection $U_{>}$	$1,10 * U_n$	—	—	$1,10 * U_n$	253,0 V	10min. Mittelwert	$1,10 * U_n$	253,0 V	10min. Mittelwert	$1,10 * U_n$	253,0 V	10min. Mittelwert
Voltage drop protection $U_{<}$	$0,8 * U_n$	—	—	$0,8 * U_n$	185,2 V	3087 ms	$0,8 * U_n$	185,2 V	3087 ms	$0,8 * U_n$	185,2 V	3087 ms
Voltage drop protection $U_{<<}$	Not Applicable						$0,45 * U_n$	105,0 V	281 ms	$0,45 * U_n$	105,0 V	281 ms
Frequency decrease protection $f_{<}$	47,5Hz	—	—	47,5 Hz	47,59 Hz	174,6 ms	47,5 Hz	47,59 Hz	174,6 ms	47,5 Hz	47,59 Hz	174,6 ms
Frequency decrease protection $f_{>}$	51,5Hz	—	—	51,5 Hz	51,49 Hz	179,8 ms	51,5 Hz	51,49 Hz	179,8 ms	51,5 Hz	51,49 Hz	179,8 ms
* The tripping time includes the period from the limit value violation U_{lf} until the tripping signal to the interface switch.												
☒ For integrated NS protection												
Assigned to power generation unit of type	PIKO IQ						PLENTICORE plus					
	3.0	4.2	5.5	7.0	8.5	10	3.0	4.2	5.5	7.0	8.5	10
Type integrated interface switch							Redundant mechanical relays					
Response time of interface switch for integrated NS protection							included in values above					
Verification of the entire functional chain "integrated NS protection – interface switch" has resulted in successful disconnection												☒