Certificate of compliance

Applicant:	**KACO new energy GmbH** Carl-Zeiss-Straße 1 74172 Neckarsulm **Germany**
Product:	**Grid-tied photovoltaic (PV) inverter**
Model:	**KACO blueplanet 50.0 TL3 M1 WM OD IIGM** **KACO blueplanet 50.0 TL3 M1 WM OD IIGB** **KACO blueplanet 50.0 TL3 M1 WM OD IIGX** **KACO blueplanet 50.0 TL3 M1 WM OD IIGS** **KACO blueplanet 50.0 TL3 M1 WM OD FRGX** **KACO blueplanet 29.0 TL3 M1 WM OD II4M** **KACO blueplanet 29.0 TL3 M1 WM OD II4X** **KACO blueplanet 29.0 TL3 M1 WM OD II4S** **KACO blueplanet 50.0 TL3 M1 WM OD HUGM** **KACO blueplanet 50.0 TL3 M1 WM OD HUGX**

Use in accordance with regulations:

Automatic disconnection device with three-phase mains surveillance in accordance with EN50549-2:2019 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:

EN 50549-2:2019
Requirements for parallel connection of installations with distribution networks - Part 2: Connection to an MV distribution network - Production of installations up to and including Type B

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 numbers:	**15TH0250-EN50549-2_0** **15TH0250-FRT_0**	**Certification Program:**	**NSOP-0032-DEU-ZE-V01**
Certificate number:	**U20-0266**	**Date of issue:**	**2020-04-17**

Certification body

Holger Schaffer

DAkkS Deutsche Akkreditierungsstelle D-ZE-12024-01-00

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 50549-2 **Nr. 15TH0250-EN50549-2_0 15TH0250-FRT_0**

Type Approval and declaration of compliance with the requirements of EN 50549-2.				
Manufacturer / applicant:	**KACO new energy GmbH** Carl-Zeiss-Straße 1 74172 Neckarsulm **Germany**			
Micro-generator Type	Grid-tied photovoltaic inverter			
	KACO blueplanet 50.0 TL3	KACO blueplanet 29.0 TL3	KACO blueplanet 50.0 TL3 M1 WM OD HUGM	KACO blueplanet 50.0 TL3 M1 WM OD HUGX
MPP DC voltage range [V]	580 – 900	200 – 800	580 – 900	
Input DC voltage range [V]	580 – 1100	360 – 900	580 – 1100	
Input DC current [A]	90 Inom / 190 Isc max	85 Inom / 190 Isc max		
Output AC voltage [V]	220 / 380; 230 / 400; 240 / 415 (3/N/PE – 3/PEN); 42 – 68 Hz	220/127 (3/N/PE – 3/PEN); 42 – 68 Hz	220 / 380; 230 / 400; 240 / 415 (3/N/PE – 3/PEN); 42 – 68 Hz	
Output AC current [A]	3 x 76,5			
Output power [VA]	50000 nom / 52000 max.	29000 nom / 30100 max.	49900 nom. / 52000 max.	
Firmware version	PKT: 5.67			
Measurement period:	2019-06-18 – 2019-08-01			

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 (transformerless). 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.

Description of the differences of the units within a series:

The *KACO blueplanet 50.0TL3 M1 WM OD IIGB* does not contain fuses or surge protection devices, up to 1 solar module string can be connected to the inverter via DC switch.

The *KACO blueplanet 50.0TL3 M1 WM OD IIGM* without fuses contains enhanced functionality of internal DC/AC overvoltage protection, up to 1 solar module string can be connected to the inverter via DC switch.

The *KACO blueplanet 50.0 TL3 M1 WM OD FRGX* has identical hardware to *KACO blueplanet 50.0TL3 M1 WM OD IIGM* with exception of following: the FRGX model provides additional insulation at the DC-wiring-compartment.

The *KACO blueplanet 50.0TL3 M1 WM OD IIGX* with integrated DC fuses contains enhanced functionality of internal DC (type I and II) and AC overvoltage protection, up to 10 solar module strings can be connected to the inverter via SUNCLIX DC Plug-in Connectors.

The *KACO blueplanet 50.0TL3 M1 WM OD IIGB*, *KACO blueplanet 50.0TL3 M1 WM OD IIGM*, *KACO blueplanet 50.0TL3 M1 WM OD IIGX* and *KACO blueplanet 50.0 TL3 M1 WM OD FRGX* have the same firmware rating. There is no difference regarding AC behaviour between the PGU-types.

The *KACO blueplanet 50.0 TL3 M1 WM OD HUGM* is identical to the *KACO blueplanet 50.0 TL3 M1 WM OD IIGM* and the *KACO blueplanet 50.0 TL3 M1 WM OD HUGX* is identical to *the KACO blueplanet 50.0 TL3 M1 WM OD IIGX*.

All the models of *KACO blueplanet 29.0 TL3* use the same hardware and software and have no differences to *the KACO blueplanet 50.0 TL3*. The different powers are realized by software derating.

Appendix

Extract from test report according to EN 50549-2 **Nr. 15TH0250-EN50549-2_0 15TH0250-FRT_0**

Setting of the interface protection:

Parameter	Min. disconnection time	Max. disconnection time	Min. operate value	Max. operate value	Standard set value
Over voltage (stage 1) [a]	---	---	$1,0V_n$	$1,30V_n$	$1,1V_n$
Over voltage (stage 2)	0,05s	24h	$1,0V_n$	$1,30V_n$	0,2s / $1,15V_n$
Under voltage (stage 1)	0,05s	24h	0V	$1,0V_n$	1,5s / $0,85V_n$
Under voltage (stage 2)	0,05s	24h	0V	$1,0V_n$	---
Over frequency	0,05s	24h	50,01Hz	65,0Hz	0,5s / 52Hz
Over frequency (stage 1)	0,05s	24h	50,01Hz	65,0Hz	---
Under frequency	0,05s	24h	44,0Hz	49,99Hz	0,5s / 47,5Hz
Under frequency (stage 2)	0,05s	24h	44,0Hz	49,99Hz	---
Reconnection settings for voltage (normal operational startup)	Adjustement range: min: 0-$1V_n$, max:1-$35V_n$				$0,85V_n$ (195,5V) ≤ V ≤ $1,10V_n$ (253V)
Reconnection settings for frequency (normal operational startup)	Adjustement range: min: 44,0Hz - 49,99Hz, max: 50,01Hz – 65,0Hz				47,5Hz ≤ f ≤ 50,2Hz
Reconnection time (normal operational startup)	Adjustement range: 1s-24h				≥ 60s
Reconnection settings for voltage (automatic reconnection after tripping)	Adjustement range: min: 0-$1V_n$, max:1-$35V_n$				$0,85V_n$ (195,5V) ≤ V ≤ $1,10V_n$ (253V)
Reconnection settings for frequency (automatic reconnection after tripping)	Adjustement range: min: 44,0Hz - 49,99Hz, max: 50,01Hz – 65,0Hz				47,5Hz ≤ f ≤ 50,1Hz
Reconnection time (automatic reconnection after tripping)	Adjustement range: 1s-24h				≥ 60s
Active power gradient after reconnection	Adjustement range: 6,6% / min - 100% / s				10% P_{Emax} / per minute
Active power delivery at under frequency	electronic inverter, no active power reduction				
Power response to over frequency (frequency / droop s)	Adjustement range: 45-65Hz / 1-10000%				50,2Hz / 5%
Permanent DC-injection	≤ 0,5% of rated inverter output current or ≤ 20mA				
Rate of change of frequency (ROCOF)	Adjustement range: 0,01-100Hz/s				5Hz/s
Loss of mains according EN 62116 (LoM)	Adjustement range: 0-6000s				0,5s

Note:

[a] 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 50549-2:2019. 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 50549-2:2019.