



**BUREAU
VERITAS**

Certificate for the NS protection

Manufacturer / applicant: KACO new energy GmbH
Werner-von-Siemens-Allee 1
74172 Neckarsulm
Germany

| | |
|---|--|
| Type of grid and plant protection: | Integrated NS protection |
| Assigned to generation unit type: | KACO blueplanet gs 50.0 TL3-S B1 WM OD IIGL KACO blueplanet gs 50.0 TL3-S B1 WM OD IIGX KACO blueplanet gs 50.0 TL3-S B1 WM OD IIGB KACO blueplanet gs 50.0 TL3-S B1 WM OD IIGM |

Firmware version: Beginning with PKT: V5.56; ARM: V6.54; CFG: V6.1477; DSP: V5.03, PCU: V1.22

Connection rule: VDE-AR-N 4105:2018-11 – Power generation systems connected to the low-voltage distribution network
Technical minimum requirements for the connection to and parallel operation with low-voltage distribution networks.

Applicable standards / directives: DIN VDE V 0124-100 (VDE V 0124-100):2020-06 – Grid integration of power generation systems – low voltage
Test requirements for power generation units to be connected and operated parallel with the low-voltage distribution networks

The above-mentioned grid and plant protection has been tested and certified according to the test guideline VDE 0124-100. The electrical properties required in the connection rule are satisfied.

- Setting values and disconnect times
- Properly functioning functional chain "NS protection – interface switch"
- Technical requirements of the switching device
- Integrated interface switch that can also be used in conjunction with a central interface protection relay (VDE-AR-N 4105:2018-11 §6.4.1)
- Active detection of unintended islanding
- Single-fault tolerance

The certificate contains the following information:

- Technical specifications of the NS protection and corresponding power generation types
- Setting values of the protection functions
- Trip values of the protection functions

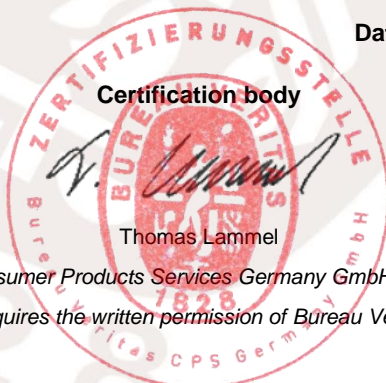
Report number: 18TH0378-ARN-4105-2018_1

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Certificate number: U21-0424

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Certification body



Thomas Lammel



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

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E.6 and E.7 Requirements for the test report for the NS protection

Extract from test report for NS protection
 "Determination of electrical properties"

Nr. 18TH0378-ARN-4105-2018_1

NS protection as integrated NS protection

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| Assigned to generation unit type: | KACO blueplanet gs 50.0 TL3-S B1 WM OD IIGL KACO blueplanet gs 50.0 TL3-S B1 WM OD IIGX KACO blueplanet gs 50.0 TL3-S B1 WM OD IIGB KACO blueplanet gs 50.0 TL3-S B1 WM OD IIGM |
| Firmware version: | Beginning with PKT: V5.56; ARM: V6.54; CFG: V6.1477; DSP: V5.03, PCU: V1.22 |
| Integrated interface switch: | Type of switching equipment 1: Relay Type of switching equipment 2: Relay |
| Measurement period: | 2015-10-24 to 2015-11-12 2019-07-01 to 2019-07-05 2021-03-29 to 2021-04-08 |

Inverter / direct coupled synchron and asynchrone generators with $P_n > 50kW$

| Protection function | Setting value | Trip value | Disconnection time ^a |
|----------------------------------|---------------|------------|---------------------------------|
| Voltage drop protection U < | 184,0 V | 184,3 V | 3000 s |
| Voltage drop protection U << | 103,5 V | 103,5 V | 0,178 s |
| Rise-in-voltage protection U> | 253,0 V | -- | 522 s ^b |
| Rise-in-voltage protection U>> | 287,5 V | 287,2 V | 0,179 s |
| Frequency decrease protection f< | 47,50 Hz | 47,50 Hz | 0,174 s |
| Frequency increase protection f> | 51,50 Hz | 51,50 Hz | 0,173 s |

^a proper time of interface switch 4 ms

^b longest disconnection of the rise-in-voltage protection as a moving 10-minute-average, tested according clause 5.5.7 Protection devices and protection settings of VDE 0124-100

The disconnect time (sum of trip time of grid and plant protection and delay time of interface switch) must not exceed 200 ms.

A check of the overall functional chain "NS protection – interface switch" resulted in a successful disconnection.

The above-mentioned grid and plant protection with the assigned power generation units has met the requirements for islanding detection with the help of the active method (resonant circuit test).

The above-mentioned NS protection meet the requirements for synchronization.

Note:

For systems larger than 30kVA, a central NS protection at the central meter station in accordance with VDE AR-N 4105: 2018 is required. The use of the internal NS protection for the inverters listed above must be clarified with the grid operator.