



**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: | blueplanet hybrid BSS 10.0 |

Firmware version: ab Controller: 4.7; Com: 4.1

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) [
- Passive 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: 19TH0305-ARN4105-2018_2

Certificate number: U21-0316

Certification program: NSOP-0032-DEU-ZE-V01

Date of issue: 2021-04-08



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. 19TH0305-ARN4105-2018_2

NS protection as integrated 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: | blueplanet hybrid BSS 10.0 |
| Firmware version: | ab Controller: 4.7; Com: 4.1 |
| Integrated interface switch: | Type of switching equipment 1: Relay Type of switching equipment 2: Relay |
| Measurement period: | 2019-05-15 to 2019-11-06 2021-02-22 to 2021-03-05 |

Inverter / direct coupled synchronone and asynchronone generators with $P_n > 50kW$

| Protection function | Setting value | Trip value | Disconnection time ^a |
|----------------------------------|---------------|------------|---------------------------------|
| Voltage drop protection U < | 184,0 V | 182,7 V | 3,000 s |
| Voltage drop protection U << | 103,5 V | 102,6 V | 0,325 s |
| Rise-in-voltage protection U> | 253,0 V | -- | 524 s ^b |
| Rise-in-voltage protection U>> | 287,5 V | 285,6 V | 0,199 s |
| Frequency decrease protection f< | 47,50 Hz | 47,50 Hz | 0,142 s |
| Frequency increase protection f> | 51,50 Hz | 51,50 Hz | 0,142 s |

^a proper time of interface switch 2 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 passive method (three-phase voltage monitoring).

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

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

Extract from test report for NS protection

Nr. 19TH0305-ARN4105-2018_2

“Determination of electrical properties”

NS protection as integrated NS protection

The inverter listed above may be installed with the following batteries:

| | | |
|---|-------------------------|--|
| Manufacturer: | Energy Depot | BYD |
| Accumulator Model / Battery Model: | DOMUS 3.6 / DOMUS 4.1 | Battery-Box H 5.1 / H 6.4 / H 7.7 / H 9.0 / H 10.2 / H 11.5 |
| Capacity of each battery module (kWh): | 3,6 – 28,4 / 4,1 – 32,8 | 5,12 / 6,40 / 7,68 / 8,96 / 10,24 / 11,52 |
| Number(s) of battery modules recommended by the manufacturer: | 1 – 8 | 4 / 5 / 6 / 7 8 / 9 |

Note:

The batteries are not integrated into the inverter and must be installed according to the local regulations.

The inverter listed above may be installed with the following accessories:

| | |
|---------------|----------------------|
| Manufacturer: | KACO new energy GmbH |
| Type: | blueplanet 1.0 EMAS |