Certificate for the NS protection

Manufacturer / applicant: **FOXESS CO., LTD.**
Room A203, Building C, No 205, Binghai Six Road, New Airport Industry Area,
Longwan District, Wenzhou, Zhejiang Province
China

Type of grid and plant protection:	**Integrated NS protection**
Assigned to generation unit type:	**F3000** **F3600** **F4600**

Firmware version: **Beginning with Master: V1.09; Slave: V1.01; ARM: V1.01**

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: **AVSV-ESH-P21010369**
Certification program: **NSOP-0032-DEU-ZE-V01**
Certificate number: **U21-0569**
Date of issue: **2021-07-02**

Certification body

Thomas Lammel

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

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 **Nr. AVSV-ESH-P21010369**
"Determination of electrical properties"

NS protection as integrated NS protection

Manufacturer / applicant:	FOXESS CO., LTD. Room A203, Building C, No 205, Binghai Six Road, New Airport Industry Area, Longwan District, Wenzhou, Zhejiang Province China
Type of grid and plant protection:	integrated NS protection
Assigned to generation unit type:	F3000 F3600 F4600
Firmware version:	Beginning with Master: V1.09; Slave: V1.01; ARM: V1.01
Integrated interface switch:	Type of switching equipment 1: Relay Type of switching equipment 2: Relay
Measurement period:	2020-12-20 to 2021-05-20

Protection function	Setting value	Trip value	Disconnection time [a]
Voltage drop protection U <	184,0 V	183,9 V	3,006 s
Voltage drop protection U <<	103,5 V	103,6 V	0,312 s
Rise-in-voltage protection U>	253,0 V	--	475 s[b]
Rise-in-voltage protection U>>	287,5 V	287,2 V	0,124 s
Frequency decrease protection f<	47,50 Hz	47,50 Hz	0,137 s
Frequency increase protection f>	51,50 Hz	51,49 Hz	0,123 s

[a] proper time of interface switch 10 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.