Certificate for the NS protection

Manufacturer / applicant:

SUNGROW POWER SUPPLY CO., LTD
No, 1699 Xiyou Rd, New & High Technology Industrial Development Zone,
Hefei, 230088
P.R. China

Type of grid and plant protection:	**Integrated NS protection**
Assigned to generation unit type:	**SH10RT, SH8.0RT, SH6.0RT, SH5.0RT**

Firmware version: **ARM_SAPPHIRE-H_V11_V01_A, MDSP_SAPPHIRE-H_V11_V01_A**

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):2019-09 – 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

BV project number: **SGR-ESH-P20011901**
Certification program: **NSOP-0032-DEU-ZE-V01**

Certificate number: **U20-0322**
Date of issue: **2020-05-08**

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 **"Determination of electrical properties"**	**Nr. SGR-ESH-P20011901**

NS protection as integrated NS protection

Manufacturer / applicant:	SUNGROW POWER SUPPLY CO., LTD No, 1699 Xiyou Rd, New & High Technology Industrial Development Zone, Hefei, 230088 P.R. China
Type of grid and plant protection:	Integrated NS protection
Assigned to generation unit type:	SH10RT, SH8.0RT, SH6.0RT, SH5.0RT
Firmware version:	ARM_SAPPHIRE-H_V11_V01_A, MDSP_SAPPHIRE-H_V11_V01_A
Integrated interface switch:	Type of switching equipment 1: Relay Type of switching equipment 2: Relay
Measurement period:	2020-01-09 - 2020-04-13

Protection function	Setting value	Trip value	Disconnection time [a]
Voltage drop protection U <	184,0 V	184,1 V	3090 ms
Voltage drop protection U <<	103,5 V	103,6 V	345 ms
Rise-in-voltage protection U>	253,0 V	--	456,3 s[b]
Rise-in-voltage protection U>>	287,5 V	286,0 V	113 ms
Frequency decrease protection f<	47,50 Hz	47,50 Hz	105 ms
Frequency increase protection f>	51,50 Hz	51,50 Hz	95 ms

[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 passive method (three-phase voltage monitoring).

The above mentioned NS protection meets the requirements for synchronization.