



**BUREAU
VERITAS**

Certificate of conformity NS protection

Manufacturer / applicant: REFU Elektronik GmbH
Marktstraße 185
72793 Pfullingen
Germany

Type of grid and plant protection:	Integrated NS protection
Assigned to generation unit type:	REFUsoI 08K (867P008) REFUsoI 10K (867P010) REFUsoI 13K (867P013) REFUsoI 17K (867P017) REFUsoI 20K (867P020) REFUsoI 23K (867P023)

Firmware version: AEFP_300-01-03-00-S

Connection rule: VDE-AR-N 4105:2011-08 – 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): 2012-07 – 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
- Passive / active detection of stand-alone power systems
- Single-fault tolerance
- Possibility of remote tripping of the internal switching device by external NS protection

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: 14TH0086

Certificate number: U16-0121

Date of issue: 2016-03-04

Zertifizierungsstelle



Dieter Zitzmann



(A partial representation of the certificate requires the written permission of Bureau Veritas Consumer Products Services Germany GmbH)
Certification body of Bureau Veritas Consumer Products Services Germany GmbH
Accredited according to DIN EN ISO/IEC 17065

F.4 Requirements for the test report for the NS protection

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

Nr. 14TH0086

NS protection as integrated NS protection

Manufacturer / applicant:	REFU Elektronik GmbH Marktstraße 185 72793 Pfullingen Deutschland
Type of grid and plant protection:	Integrated NS protection
Assigned to generation unit type:	REFU _{sol} 08K (867P008) REFU _{sol} 10K (867P010) REFU _{sol} 13K (867P013) REFU _{sol} 17K (867P017) REFU _{sol} 20K (867P020) REFU _{sol} 23K (867P023)
Firmware version:	AEFP_300-01-03-00-S
Integrated interface switch:	Type of switching equipment 1: Relay 66.22-1700S Type of switching equipment 2: Relay 66.22-1700S
Measurement period:	2014-03-24 - 2014-05-12; 2014-10-27 - 2014-11-05

Protection function	Setting value	Trip value	Disconnection time ^a
Voltage drop protection U <	184 V	184,7 V	156 ms
Rise-in-voltage protection U >	253 V	253 V	494 s ^b
Rise-in-voltage protection U >>	264,5 V	264,5 V	157 ms
Frequency decrease protection f <	47,5 Hz	47,49 Hz	132 ms
Frequency increase protection f >	51,5 Hz	51,51 Hz	109 ms

^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 5.4.5.3.3 measurement a) 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) and active method (resonant circuit test).

The above mentioned NS protection meets the requirements for synchronization.