



Certificate of compliance

Applicant: ZIEHL industrie-elektronik GmbH+Co KG
Daimlerstraße 13
74523 Schwäbisch Hall
Germany

Product: Automatic disconnection device between a generator and the public low-voltage grid

Model: UFR1001E

Use in accordance with regulations:

Automatic disconnection device with three-phase mains surveillance in accordance with Engineering Recommendation G98/1 for generation systems with a parallel coupling in the public mains supply. This serves as a replacement for the disconnection device with isolating function that can access the distribution network provider at any time.

Applied rules and standards:

Engineering Recommendation G98/1-2:2018

Requirements for the connection of generation equipment in parallel with public distribution networks

DIN V VDE V 0126-1-1:2006-02 (Functional safety)

Automatic disconnection device between a generator and the public low-voltage grid

At the time of issue of this certificate the safety concept of an aforementioned representative product corresponds to the valid safety specifications for the specified use in accordance with regulations.

Report number: 11TH0501-G98/1_0
Certificate number: U19-0155
Date of issue: 2019-03-07

Certification body



Holger Schaffer

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

Compliance Verification Report for Inverter Connected Power Generating Modules

Extract from test report according to the Engineering Recommendation G98/1

Nr. 11TH0501-G98/1_0

Type Approval and declaration of compliance with the requirements of Engineering Recommendation G98/1.

| | |
|---|---|
| Manufacturer / applicant: | ZIEHL industrie-elektronik GmbH+Co KG Daimlerstraße 13 74523 Schwäbisch Hall Germany |
| Generating Unit technology | Automatic disconnection device between a generator and the public low-voltage grid |
| Rated values | UFR1001E |
| Supply voltage range [V] | 24...270 DC/AC |
| Supply frequency range [Hz] | 0/40...70 |
| Monitoring voltage range [V] | 15...520 (P-P) 15 – 300 (P-N) |
| Monitoring frequency range [Hz] | 45...70 |
| Firmware version | 0.xx |
| <p>⁽¹⁾ The tests were performed with Firmwareversion 0-04. Changes in the Firmwareversion on position xx has no effect on the required electrical properties. x = could be any number or sign</p> | |
| Measurement period: | 2019-02-04 to 2019-02-06 |
| <p>Description of the structure of the unit: The device serves as disconnection facility for illegitimate frequency and voltage limits. The output is switched off by two relays in series which are controlled by the external NS-protection device. This assures that the opening of the output circuit will also operate in case of one error.</p> <p>The above stated Units are tested according the requirements in the Engineering Recommendation G98/1-2. Any modification that affects the stated tests must be named by the manufacturer/supplier of the product to ensure that the product meets all requirements of the Engineering Recommendation G98/1-2.</p> | |

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| Protection. Voltage tests. | | | | | | |
|----------------------------|-------------|----------------|-------------|----------------|----------------|-----------------|
| Phase 1 | | | | | | |
| Function | Setting | | Trip test | | No trip test | |
| | Voltage [V] | Time delay [s] | Voltage [V] | Time delay [s] | Voltage / time | Confirm no trip |
| U/V | 184 | 2,5 | 184,1 | 2,570 | 188V / 3,5s | No trip |
| | | | | | 180V / 2,48s | No trip |
| O/V stage 1 | 262,2 | 1,0 | 262,5 | 1,066 | 258,2V 2,0s | No trip |
| O/V stage 2 | 273,7 | 0,5 | 274,4 | 0,569 | 269,7V 0,98s | No trip |
| | | | | | 277,7V 0,48s | No trip |
| Phase 2 | | | | | | |
| Function | Setting | | Trip test | | No trip test | |
| | Voltage [V] | Time delay [s] | Voltage [V] | Time delay [s] | Voltage / time | Confirm no trip |
| U/V | 184 | 2,5 | 184,0 | 2,570 | 188V / 3,5s | No trip |
| | | | | | 180V / 2,48s | No trip |
| O/V stage 1 | 262,2 | 1,0 | 262,5 | 1,058 | 258,2V 2,0s | No trip |
| O/V stage 2 | 273,7 | 0,5 | 274,4 | 0,558 | 269,7V 0,98s | No trip |
| | | | | | 277,7V 0,48s | No trip |
| Phase 3 | | | | | | |
| Function | Setting | | Trip test | | No trip test | |
| | Voltage [V] | Time delay [s] | Voltage [V] | Time delay [s] | Voltage / time | Confirm no trip |
| U/V | 184 | 2,5 | 184,1 | 2,570 | 188V / 3,5s | No trip |
| | | | | | 180V / 2,48s | No trip |
| O/V stage 1 | 262,2 | 1,0 | 262,5 | 1,066 | 258,2V 2,0s | No trip |
| O/V stage 2 | 273,7 | 0,5 | 274,5 | 0,558 | 269,7V 0,98s | No trip |
| | | | | | 277,7V 0,48s | No trip |

Note. For Voltage tests the Voltage required to trip is the setting $\pm 3,45V$. The time delay can be measured at a larger deviation than the minimum required to operate the protection. The No trip tests need to be carried out at the setting $\pm 4V$ and for the relevant times as shown in the table above to ensure that the protection will not trip in error.

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Nr. 11TH0501-G98/1_0

| Protection. Frequency tests. | | | | | | |
|------------------------------|----------------|----------------|----------------|----------------|------------------|-----------------|
| Function | Setting | | Trip test | | No trip test | |
| | Frequency [Hz] | Time delay [s] | Frequency [Hz] | Time delay [s] | Frequency / time | Confirm no trip |
| U/F stage 1 | 47,5 | 20 | 47,49 | 20,072 | 47,7Hz / 25s | No trip |
| U/F stage 2 | 47 | 0,5 | 47,00 | 0,539 | 47,2Hz / 19,98s | No trip |
| | | | | | 46,8Hz / 0,48s | No trip |
| O/F stage 2 | 52 | 0,5 | 52,00 | 0,548 | 51,8Hz / 89,98s | No trip |
| | | | | | 52,2Hz / 0,48s | No trip |

Note. For Frequency Trip tests the Frequency required to trip is the setting $\pm 0,1$ Hz. In order to measure the time delay a larger deviation than the minimum required to operate the projection can be used. The "No-trip tests" need to be carried out at the setting $\pm 0,2$ Hz and for the relevant times as shown in the table above to ensure that the protection will not trip in error.

| Protection. Re-connection timer. | | | | |
|---|---|-----------------------|-----------------|-----------------|
| Over Voltage | | | | |
| Time delay setting | | Measured delay | | |
| 20s | | 20,093s | | |
| Under Voltage | | | | |
| Time delay setting | | Measured delay | | |
| 20s | | 20,038s | | |
| Over Frequency | | | | |
| Time delay setting | | Measured delay | | |
| 20s | | 20,055s | | |
| Under Frequency | | | | |
| Time delay setting | | Measured delay | | |
| 20s | | 20,066s | | |
| | Checks on no reconnection when voltage or frequency is brought to just outside stage 1 limits of table 1. | | | |
| | At 266,2V | At 196,1V | At 47,4Hz | At 52,1Hz |
| Confirmation that the Generating Unit does not re-connect. | No reconnection | No reconnection | No reconnection | No reconnection |

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| Protection. Frequency change, Stability test. | | | | |
|---|----------------------|-------------|---------------|-----------------|
| | Start Frequency [Hz] | Change | Test Duration | Confirm no trip |
| Positive Vector Shift | 49,5 | +50 degrees | | No trip |
| Negative Vector Shift | 50,5 | -50 degrees | | No trip |
| Positive Frequency drift | 49,0 | +0,95Hz/sec | 2,1s | No trip |
| Negative Frequency drift | 51,0 | -0,95Hz/sec | 2,1s | No trip |