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 grid**
Model:	**UFR1001E**

Use in accordance with regulations:

Automatic disconnection device with three-phase mains surveillance in accordance with Engineering Recommendation G99/1 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 G99/1-3:2018
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-G99/1_1**
Certificate number:	**U19-0182**
Date of issue:	**2019-03-28**

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 G99/1	**Nr. 11TH0501-G99/1_1**

Type Approval and declaration of compliance with the requirements of Engineering Recommendation G99/1.	
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 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
(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	
Measurement period:	2019-02-04 to 2019-02-06
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.	
The above stated Units are tested according the requirements in the Engineering Recommendation G99/1-3. 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 G99/1-3. The network monitoring and disconnection facility UFR1001E is password protected settable to all values requested in A2-1, A2-2 and A2-3 of the G99/1-3. Therefore the network monitoring and disconnection facility UFR1001E fulfil all requirements according to - A2-1 Synchronous Power Generating Modules up to and including 50 kW - A2-2 Synchronous Power Generating Modules > 50 kW and also for Synchronous Power Generating Modules ≤ 50 kW - A2-3 Inverter Connected Power Generating Modules of the G99/1-3.	

Compliance Verification Report for Inverter Connected Power Generating Modules

Extract from test report according to the Engineering Recommendation G99/1 **Nr. 11TH0501-G99/1_1**

Protection. Voltage tests.
A2-1 / A2-2

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 / 5,0s	No trip
					180V / 2,45s	No trip
O/V stage 1	262,2	1,0	262,5	1,066	258,2V 5,0s	No trip
O/V stage 2	273,7	0,5	274,4	0,569	269,7V 0,95s	No trip
					277,7V 0,45s	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 / 5,0s	No trip
					180V / 2,45s	No trip
O/V stage 1	262,2	1,0	262,5	1,058	258,2V 5,0s	No trip
O/V stage 2	273,7	0,5	274,4	0,558	269,7V 0,95s	No trip
					277,7V 0,45s	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 / 5,0s	No trip
					180V / 2,45s	No trip
O/V stage 1	262,2	1,0	262,5	1,066	258,2V 5,0s	No trip
O/V stage 2	273,7	0,5	274,5	0,558	269,7V 0,95s	No trip
					277,7V 0,45s	No trip

Note. For Voltage tests the Voltage required to trip is the setting ±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 ±4V and for the relevant times as shown in the table above to ensure that the protection will not trip in error.

Compliance Verification Report for Inverter Connected Power Generating Modules

Extract from test report according to the Engineering Recommendation G99/1 **Nr. 11TH0501-G99/1_1**

Protection. Voltage tests.
A2-3

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 ±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 ±4V and for the relevant times as shown in the table above to ensure that the protection will not trip in error.

Compliance Verification Report for Inverter Connected Power Generating Modules

Extract from test report according to the Engineering Recommendation G99/1 **Nr. 11TH0501-G99/1_1**

Protection. Frequency tests.
A2-1 / A2-2

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 / 30s	No trip
U/F stage 2	47	0,5	47,00	0,539	47,2Hz / 19,5s	No trip
					46,8Hz / 0,45s	No trip
O/F stage 2	52	0,5	52,00	0,548	51,8Hz / 120s	No trip
					52,2Hz / 0,45s	No trip

Note. For Frequency Trip tests the Frequency required to trip is the setting ±0,1Hz. 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 ±0,2Hz and for the relevant times as shown in the table above to ensure that the protection will not trip in error.

Protection. Frequency tests.
A2-3

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 ±0,1Hz. 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 ±0,2Hz 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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Protection. Re-connection timer.	
Test should prove that the reconnection sequence starts in no less than 20 seconds for restoration of voltage and frequency to within the stage 1 settings of table 10.5.7.1.	
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

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

Additional comments
The network monitoring and disconnection facility UFR1001E is password protected settable to all values requested in A2-1, A2-2 and A2-3 of the G99/1-3. Therefore the network monitoring and disconnection facility UFR1001E fulfil all requirements according to A2-1, A2-2 and A2-3 of the G99/1-3.