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Certification body of BV CPS GmbH
Accredited according to EN 45011 -
ISO / IEC Guide 65

Certificate of compliance

Applicant: **Bender GmbH & Co. KG**
Londorfer Str. 65
35305 Grünberg
Germany

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

Model: **VMD460**

Use in accordance with regulations:

Automatic disconnection device with three-phase mains surveillance in accordance with Engineering Recommendation G59/3 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 G59/3:2013

Recommendation for the Connection of Generating Plant to the Distribution Systems of licensed Distribution Network Operators.

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.

The aforementioned product does not provide direct current injection monitoring and residual current monitoring. Therefore these protection functions need to be installed externally if required.

Report number: **13TH0057-G59/3**
Certificate number: **U14-0132**
Date of issue: **2014-02-28**

Certification body

Dieter Zitzmann



QUALITY



HEALTH



SAFETY



ENVIRONMENT



SOCIAL
ACCOUNTABILITY

Appendix 13.1 Type Testing a Generating Unit

Extract from test report according the Engineering Recommendation G59/3

Nr. 13TH0057

Type Approval and declaration of compliance with the requirements of Engineering Recommendation G59/3	
Manufacturer / applicant:	Bender GmbH & Co. KG Londorfer Str. 65 35305 Grünberg Germany
Generating Unit technology	Automatic disconnection device between a generator and the public low-voltage grid
Rated values	VMD460
Supply voltage range [V]	AC/DC 75...300
Supply frequency range [Hz]	0 / 40...70
Monitoring voltage range [V]	0...300 (L-N) / 0...520 (L-L)
Monitoring frequency range [Hz]	45...65
Firmware version	Watchdog: D397 V1.03 Messtechnik: D398 V1.xx*
<p>* The tests were performed with Firmware version Messtechnik D398 V1.21. Changes in the Firmware "Messtechnik: D398 V1.xx" version on position xx has no effect on the required electrical properties. x = could be any number or sign</p>	
Measurement period:	2014-01-30 – 2014-02-25

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Description of the structure of the power generation unit (Figure 1):

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.

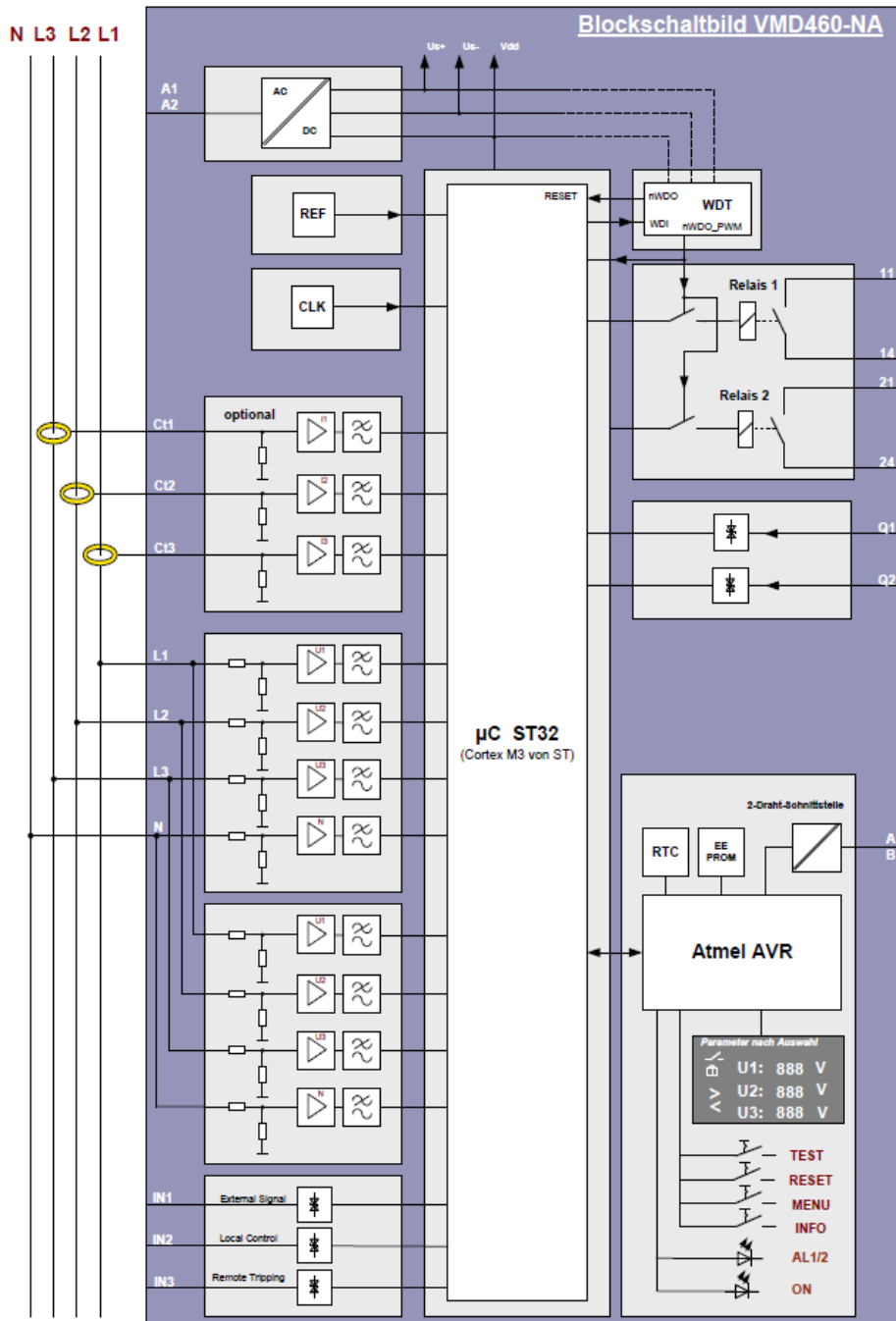


Figure 1 – Schematic structure of the power generation unit

The above stated automatic disconnection device is tested according the requirements in the Engineering Recommendation G59/3. 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 G59/3.

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Protection. Voltage tests.						
Phase 1						
Function	Setting		Trip test		No trip test	
	Voltage	Time delay	Voltage	Time delay	Voltage / time	Confirm no trip
U/V stage 1	200,1V	2,5s	200,2V	2,512s	204,1V / 3,5s	No trip
U/V stage 2	184V	0,5s	184,1V	0,515s	188V / 2,48s	No trip
					180V / 0,48s	No trip
O/V stage 1	262,2V	1,0s	262,6V	1,008s	258.2V 2,0s	No trip
O/V stage 2	273,7V	0,5s	274,0V	0,513s	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.

Protection. Voltage tests.						
Phase 2						
Function	Setting		Trip test		No trip test	
	Voltage	Time delay	Voltage	Time delay	Voltage / time	Confirm no trip
U/V stage 1	200,1V	2,5s	200,2V	2,508s	204,1V / 3,5s	No trip
U/V stage 2	184V	0,5s	184,1V	0,512s	188V / 2,48s	No trip
					180V / 0,48s	No trip
O/V stage 1	262,2V	1,0s	262,7V	1,012s	258.2V 2,0s	No trip
O/V stage 2	273,7V	0,5s	274,0V	0,515s	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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Protection. Voltage tests.						
Phase 3						
Function	Setting		Trip test		No trip test	
	Voltage	Time delay	Voltage	Time delay	Voltage / time	Confirm no trip
U/V stage 1	200,1V	2,5s	200,1V	2,513s	204,1V / 3,5s	No trip
U/V stage 2	184V	0,5s	184,0V	0,511s	188V / 2,48s	No trip
					180V / 0,48s	No trip
O/V stage 1	262,2V	1,0s	262,4V	1,010s	258.2V 2,0s	No trip
O/V stage 2	273,7V	0,5s	273,8V	0,513s	269,7V 0,98s	No trip
					277,7V 0,48s	No trip
<p>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.</p>						

Protection. Frequency tests.						
Function	Setting		Trip test		No trip test	
	Frequency	Time delay	Frequency	Time delay	Frequency / time	Confirm no trip
U/F stage 1	47,5Hz	20s	47,50Hz	20,193s	47,7Hz / 25s	No trip
U/F stage 2	47Hz	0,5s	47,00Hz	0,549s	47,2Hz / 19,98s	No trip
					46.8Hz / 0,48s	No trip
O/F stage 1	51,5Hz	90s	51,51Hz	90,237s	51,3Hz / 95s	No trip
O/F stage 2	52Hz	0,5s	52,01Hz	0,545s	51,8Hz / 89,98s	No trip
					52,2Hz / 0,48s	No trip
<p>Note. For Frequency Trip tests the Frequency required to trip is the setting $\pm 0,1Hz$. 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 $\pm 0,2Hz$ and for the relevant times as shown in the table above to ensure that the protection will not trip in error.</p>						

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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.					
Voltage					
Time delay setting		Measured delay			
20s		20,032s			
Frequency					
Time delay setting		Measured delay			
20s		20,025s			
		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 51,6Hz
Confirmation that the Generating Unit does not re-connect.	No reconnection	No reconnection	No reconnection	No reconnection	

Protection. Frequency change, Stability test.				
	Start Frequency	Change	End Frequency	Confirm no trip
Positive Vector Shift	49,5Hz	+9 degrees		No trip
Negative Vector Shift	50,5Hz	- 9 degrees		No trip
Positive Frequency drift	49,5Hz	+0,19Hz/sec	51,5Hz	No trip
Negative Frequency drift	50,5Hz	-0,19Hz/sec	47,5Hz	No trip