



TEST REPORT

Engineering Recommendation G98

Issue 1 – Amendment 7

Requirements for the connection of Fully Type Tested Micro-generators (up to and including 16 A per phase) in parallel with public Low Voltage Distribution Networks on or after 27 April 2019

Ningbo AUX Solar Technology Co., Ltd.

For the unit(s) **ASG-5TL-ZH, ASG-6TL-ZH, ASG-8TL-ZH, ASG-10TL-ZH**

Test report no. **HC2412240307GC04**

Date **2025-04-07**



Test report number.....: **HC2412240307GC04**

Date of issue.....: 2025-04-07

Total number of pages.....: 65

Testing laboratory: **LYNS-TCI TECHNOLOGY GUANGDONG CO., LTD.**

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P.R. China

Testing location / address.....: Same as above

Applicant's name: **Ningbo AUX Solar Technology Co., Ltd.**

Address.....: No. 17 Fenglin Road, Cicheng Town, Jiangbei District, Ningbo City, Zhejiang Province, China

Test specification

Standard: Engineering Recommendation G98
Issue 1 – Amendment 7
3 October 2022
Requirements for the connection of Fully Type Tested Micro-generators (up to and including 16 A per phase) in parallel with public Low Voltage Distribution Networks on or after 27 April 2019

Test report form number.....: EREC G98_v1.0

Test report form(s) originator.....: Lyns-tci Technology Guangdong Co., Ltd.

Master TRF: Dated 2022-02-01

Test item description.....: Device Category: **Inverter**
Device Type: **Hybrid Inverter (PV + DC coupled Electricity Storage)**

Trademark: **AUXSOL**

Model / Type reference.....: ASG-5TL-ZH, ASG-6TL-ZH, ASG-8TL-ZH, ASG-10TL-ZH

Technical data: See section 3.1 on p.8

Dates of testing.....: 2025-02-06 to 2025-03-21

Tested by



Leslie He (Test engineer)

Approved by



Lukes Lin (Project manager)

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1 General information of test report

1.1 Important Note

General disclaimer

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1.2 Revision history

Revision	Date	Editor	Modification / Change	Status
HC2412240307GC04	2025-04-07	Leslie He	Initial report was written	Active

2 General remarks for documentation

The test results presented in this report relate only to the object(s) tested.

Throughout this report a ☐ comma ',' / ☒ point '.' is used as decimal separator and a ☐ point '.' / ☒ comma ',' as thousands separator.

The following **suffixes/indices** are used for variables in tables and figures:

n	Nominal value
max	Maximum value
Lx	index of phase x
LxLy	phase-to-phase voltages of phase x and phase y

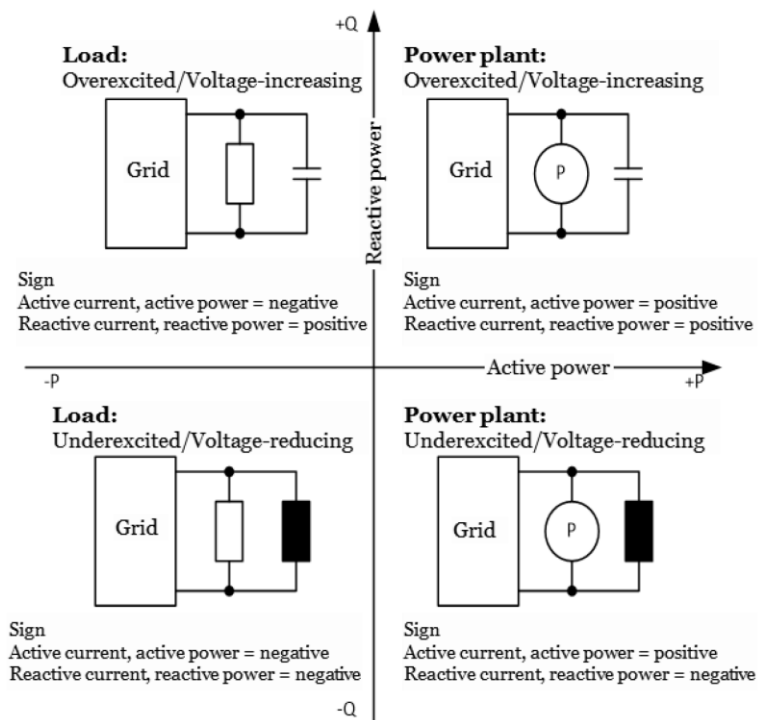
Abbreviations

AC	:	Alternating Current
DC	:	Direct Current
EUT	:	Equipment Under Test
LV	:	Low Voltage
MP	:	Measurement Point
MPP	:	Maximum Power Point
MV	:	Medium Voltage
PGF	:	Power Generating Facility
PGM	:	Power Generating Module
PGU	:	Power Generating Unit
P _{max}	:	Registered Capacity
PPM	:	Power Park Module
PWHD	:	Partial Weighted Harmonic Distortion
THD	:	Total Harmonic Distortion
PWHD	:	Partial Weighted Harmonic Distortion

Direction definition of P and Q

in this test report, the regarded system of the voltage and current vectors is the active sign convention system:

- If the inverter feeds to the grid the active power is measured with positive sign.
- If the inverter injects reactive power / current with leading power factor the reactive power / current is marked “leading” or “inductive” (under-excited) or has a negative sign.
- If the inverter injects reactive power / current with lagging power factor the reactive power / current is marked “lagging” or “capacitive” (over-excited) or has a positive sign.



3 General product information

Factory's name : Ningbo AUX Solar Technology Co., Ltd.

Factory address : No. 17 Fenglin Road, Cicheng Town, Jiangbei District, Ningbo City, Zhejiang Province, China

3.1 Technical data of the unit(s)

Unit / Type	ASG-5TL-ZH	ASG-6TL-ZH	ASG-8TL-ZH	ASG-10TL-ZH
Hardware version (tested)	A			
Software version (tested)	DSP;A6053/ARM;A3023			
Input DC:				
Max. input voltage [V]	1000			
MPPT voltage range [V]	170-900			
Max. input current [A]	16*2	16*2	26*2	26*2
Battery input:				
Battery voltage range [V]	180-800			
Max. charge / discharge current [A]	30/30			
Battery type:	Li-ion			
Output AC (Grid side):				
Rated grid voltage [V]	380/400, 3/N/PE; 50 /60 Hz*			
Max. output current [A]	11.4	13.6	18.2	22.7
Rated output power [kW]	5.0	6.0	8.0	10.0
Registered Capacity ¹ P _{max} [kW]	5.0	6.0	8.0	10.0
Max. apparent output power [kVA]	5.0	6.0	8.0	10.0
Input AC (Grid side):				
Rated input voltage [V]	380/400, 3/N/PE; 50 /60 Hz			
Max. input current [A]	7.6	9.1	12.1	15.2
Rated input power [kW]	5.0	6.0	8.0	10.0
Output AC (Back-up):				
Rated output voltage [V]	380/400			
Max. AC output current [A]	7.6	9.1	12.1	15.2
Rated output power [KW]	5.0	6.0	8.0	10.0
Note:				
* All tests are performed at 230V, 50Hz.				

¹ In this report, the stated values of "registered capacity" related to single Generating Unit.

Note:

For Power Park Module (Generating Unit) ASG-5TL-ZH, ASG-6TL-ZH, ASG-8TL-ZH and ASG-10TL-ZH to meet the requirement:

*“When operating at **Registered Capacity** the **Power Generating Module** shall be capable of operating at a **Power Factor** within the range 0.95 lagging to 0.95 leading relative to the voltage waveform”*

- a semi-permanent active power reduction to a value:

- ASG-5TL-ZH: $P_{\max} \leq 4.750 \text{ kW}$
- ASG-6TL-ZH: $P_{\max} \leq 5.700 \text{ kW}$
- ASG-8TL-ZH: $P_{\max} \leq 7.600 \text{ kW}$
- ASG-10TL-ZH: $P_{\max} \leq 9.500 \text{ kW}$

can be applied by software (the parameter setting needs to follow the manufacturer's guidance).

- or this need to be considered in the Power Generating Module design
- or otherwise agreed with the DNO
- Setting range of the Power Factor
0.800 lagging to 0.800 leading

Datasheet of the generating units:

Model	ASG-5TL-ZH	ASG-6TL-ZH	ASG-8TL-ZH	ASG-10TL-ZH
Input DC				
Max. input power	7.5kW	9kW	12kW	15kW
Max. input voltage	1000V			
Rated voltage	600V			
Start-up voltage	160V			
MPPT voltage range	170-900V			
MPPT number	2			
Max. input strings number	2	2	4	4
Max. input current	16A/16A	16A/16A	26A/26A	26A/26A
Max. short circuit current	20A/20A	20A/20A	32A/32A	32A/32A
Battery input				
Battery type	Li-ion			
Battery voltage range	180-800V			
Max. charge / discharge current	30A/30A			
Communication mode	CAN/RS485			
Charging Strategy for Li-Ion Battery	Self-adaption to BMS			

Model	ASG-5TL-ZH	ASG-6TL-ZH	ASG-8TL-ZH	ASG-10TL-ZH
Output AC (Grid side)				
Rated output power	5kW	6kW	8kW	10kW
Max. apparent output power	5kVA	6kVA	8kVA	10kVA
Max. output current	11.4A	13.6A	18.2A	22.7A
Grid voltage range286-498V				
Rated grid voltage3 / N / PE,380V / 400V				
Rated grid frequency50Hz / 60 Hz				
Power factor> 0.99 (leading 0.8...lagging 0.8)				
THDi<3%				
Input AC (Grid side)				
Rated input power	5kW	6kW	8kW	10kW
Max. input power	10kW	12kW	16kW	20kW
Max. apparent input power	10kVA	12kVA	16kVA	20kVA
Max. input current	15.2A	18.2A	24.2A	30.3A
Rated input voltage3 / N / PE,380V / 400V				
Rated input frequency50 Hz / 60 Hz				
Output AC (Back-up)				
Rated output power	5kW	6kW	8kW	10kW
Max. output current	7.6A	9.1A	12.1A	15.2A
Back-up switch time<10ms				
Rated output voltage380V / 400V				
Rated frequency50 Hz / 60 Hz				
THDv<2%				

Equipment mobility : Permanent connection

Operating condition..... : Continuous

Class of equipment..... : Class I

Protection against ingress of water : IP66 according to EN 60529

Mass of equipment [kg] : approx. 35










Type of internal transformer : No internal transformer (transformerless)










3.2 Description of the differences of the models within the product series










The units in the product series:










- sharing the same control electronics,
- with the same implemented control and firmware,
- with the same construction solutions including the power part,
- with the same number of phases,
- with the same power electronics, filters and transducers.

3.3 Copy of marking plate

AUXSOL Hybrid solar inverter ASG-5TL-ZH	
PV Input	
Max. input voltage	1000V
MPPT voltage range	170-900V
Max. input current	16A/16A
Max. short circuit current	20A/20A
Input Battery	
Battery type	Li-Ion
Battery voltage range	180-800V
Max. charge/discharge current	30A/30A
Output AC (Grid side)	
Rated output power	5kW
Max. apparent output power	5kVA
Rated grid voltage	3/N/PE, 380V/400V
Rated grid frequency	50/60Hz
Max. output current	11.4A
Power Factor	>0.99 (0.8 leading...0.8 lagging)
THDi	<3%
Input AC (Grid side)	
Rated input power	5kW
Max. input power	10kW
Max. input current	15.2A
Rated input voltage	3/N/PE, 380V/400V
Rated input frequency	50/60Hz
Output AC (Back-up)	
Rated output power	5kW
Max. output current	7.6A
Back-up switch time	< 10ms
Rated output voltage	380V/400V
Rated frequency	50/60Hz
 IP66, Outdoor, -30...+60°C Overvoltage category: III[Mains], II[PV-DC]	
       	
Ningbo AUX Solar Technology Co., Ltd. Address: No.17 Fenglin Road, Cicheng Town, Jiangbei District, Ningbo City, Zhejiang Province, China Tel.: 86-574-8765-2201 web: www.auxsol.com Email: info@auxsol.com Postal Code: 315031	
Made in China	

AUXSOL Hybrid solar inverter ASG-6TL-ZH	
PV Input	
Max. input voltage	1000V
MPPT voltage range	170-900V
Max. input current	16A/16A
Max. short circuit current	20A/20A
Input Battery	
Battery type	Li-Ion
Battery voltage range	180-800V
Max. charge/discharge current	30A/30A
Output AC (Grid side)	
Rated output power	6kW
Max. apparent output power	6kVA
Rated grid voltage	3/N/PE, 380V/400V
Rated grid frequency	50/60Hz
Max. output current	13.6A
Power Factor	>0.99 (0.8 leading...0.8 lagging)
THDi	<3%
Input AC (Grid side)	
Rated input power	6kW
Max. input power	12kW
Max. input current	18.2A
Rated input voltage	3/N/PE, 380V/400V
Rated input frequency	50/60Hz
Output AC (Back-up)	
Rated output power	6kW
Max. output current	9.1A
Back-up switch time	< 10ms
Rated output voltage	380V/400V
Rated frequency	50/60Hz
 IP66, Outdoor, -30...+60°C Overvoltage category: III[Mains], II[PV-DC]	
       	
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AUXSOL Hybrid solar inverter ASG-8TL-ZH	
PV Input	
Max.input voltage	1000V
MPPT voltage range	170-900V
Max.input current	26A/26A
Max.short circuit current	32A/32A
Input Battery	
Battery type	Li-ion
Battery voltage range	180-800V
Max.charge/discharge current	30A/30A
Output AC (Grid side)	
Rated output power	8kW
Max. apparent output power	8kVA
Rated grid voltage	3/N/PE,380V/400V
Rated grid frequency	50/60Hz
Max. output current	18.2A
Power Factor	>0.99 (0.8 leading...0.8 lagging)
THDi	<3%
Input AC (Grid side)	
Rated input power	8kW
Max. input power	16kW
Max. input current	24.2A
Rated input voltage	3/N/PE,380V/400V
Rated input frequency	50/60Hz
Output AC (Back-up)	
Rated output power	8kW
Max. output current	12.1A
Back-up switch time	< 10ms
Rated output voltage	380V/400V
Rated frequency	50/60Hz
 IP66, Outdoor, -30...+60°C Overvoltage category: III[Mains], II[PV-DC]	
       	
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Made in China	

AUXSOL Hybrid solar inverter ASG-10TL-ZH	
PV Input	
Max.input voltage	1000V
MPPT voltage range	170-900V
Max.input current	26A/26A
Max.short circuit current	32A/32A
Input Battery	
Battery type	Li-ion
Battery voltage range	180-800V
Max.charge/discharge current	30A/30A
Output AC (Grid side)	
Rated output power	10kW
Max. apparent output power	10kVA
Rated grid voltage	3/N/PE,380V/400V
Rated grid frequency	50/60Hz
Max. output current	22.7A
Power Factor	>0.99 (0.8 leading...0.8 lagging)
THDi	<3%
Input AC (Grid side)	
Rated input power	10kW
Max. input power	20kW
Max. input current	30.3A
Rated input voltage	3/N/PE,380V/400V
Rated input frequency	50/60Hz
Output AC (Back-up)	
Rated output power	10kW
Max. output current	15.2A
Back-up switch time	< 10ms
Rated output voltage	380V/400V
Rated frequency	50/60Hz
 IP66, Outdoor, -30...+60°C Overvoltage category: III[Mains], II[PV-DC]	
       	
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Made in China	

Note:

The marking plates shown above may be only a draft. The use of certification marks on products must be approved by the respective NCBs to which these marks belong.

The marking plate is attached to the side surface or the back of the enclosure and is visible after installation.

3.4 Description of the power circuit

The input and output of the unit are protected by varistors to Earth. The unit is providing EMI filtering at the PV input, batteries input and output toward mains. The unit does not provide galvanic separation from input to output (transformerless).

The internal control is redundant built. It consists of Microcontroller slave ARM (U888) and main DSP (U666).

The main DSP control the relays by switching signals; measures the Bus voltage, grid voltage, frequency, AC current with injected DC and the array insulation resistance to ground. In addition, it tests the current sensors and the RCMU circuit before each start up.

The slave ARM measures the PV voltage, BAT voltage, PV current, BAT current, grid voltage, grid frequency, RMS, also can switch off the relays independently, and communicate with the main DSP each other.

The current is measured by a current sensor. The AC current signal and the injected DC current signal are sent to the main DSP. The main DSP tests and calibrates before each start up all current sensors.

The unit provides two relays in series in all output conductors. When single fault applied to one relay, alarm an error code in display panel, another redundant relay provides basic insulation maintained between the PV array and the mains. All the relays are tested before each start up.

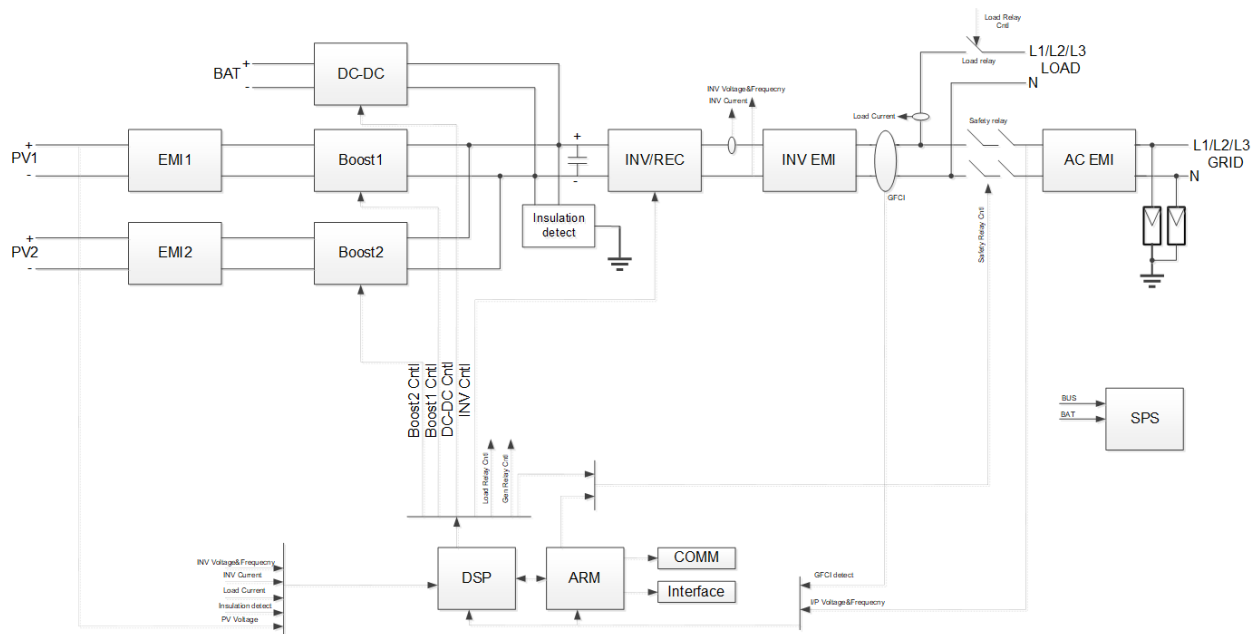


Figure 1 – Block diagram of the power circuit

4 General remarks for testing

4.1 Energy Conversion Technology

According to EREC G98, Table 2:

Photovoltaic (11) *	Fuel Cells (2)	Hydro (x)	Wind (x)	Electricity Storage devices (x)	Other
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	---

Numbering according to Table 2. Number "x" needs to be determined when the Energy Conversion Technology of the Micro-generator defined.

Note:

* Connection scenario:

☐ Photovoltaic Power Park Module connected to the DNO's Distribution Network via an Inverter

☒ Hybrid converter:

Photovoltaic Power Park Module with DC coupled storage unit connected to the DNO's Distribution Network via an Inverter

In this case the Registered Capacity is based on the Inverter rating. The storage unit has no compliance effect, compliance based on the inverter.

4.2 Exceptions

According to EREC G98, Appendix 1:

☐ **Emerging Technology**

the following sections of EREC G98 do not apply:

- 9.1 (frequency withstand capability)
- 9.2 (rate of change of frequency)
- 9.3 (Limited Frequency Sensitive Mode – Overfrequency)
- 9.4 (constant Active Power output)
- 10.1.3 (Interface Protection settings)

☐ **Registered Capacity < 800 W**

the following sections of EREC G98 do not apply:

- 9.3 (Limited Frequency Sensitive Mode – Overfrequency)
- 9.4.2 and 9.4.3 (constant Active Power output)

- ☒ • **Registered Capacity of single Micro-generator < 800 W, but aggregate installed capacity ≥ 800W**
- **800 W ≤ Registered Capacity ≤ {(Registered Capacity of up to and including 16 A per phase, corresponding to 3.68 kW (single-phase, 230/400 V system) or 11.04 kW (three-phase, 230/400 V system)}**

No exceptions.

4.3 Scope of measurements

Date of receipt of test items : 2025-02-06

Date(s) of performance of tests : 2025-02-06 to 2025-03-21

During the test period stated above following environmental data were recorded:

- Temperature: 20.3 ~ 25.2°C
- Rel. humidity: 36.5 ~ 57.3%RH
- Air pressure: 985.2 ~ 1003.6 hPa

Test items	Testing requirements (Section EREC G98)	Section in this test report	Tests completed
1. Operating Range	9.1, 10.1	6.1	<input checked="" type="checkbox"/>
2. Harmonics	11.1	6.2	<input checked="" type="checkbox"/>
3. Voltage Fluctuation and Flicker	11.1	6.3	<input checked="" type="checkbox"/>
4. DC injection	11.2	6.4	<input checked="" type="checkbox"/>
5. Power Factor (PF)	9.5	6.5	<input checked="" type="checkbox"/>
6. Frequency protection trip and ride through tests	10.1	6.6.1	<input checked="" type="checkbox"/>
7. Voltage protection trip and ride through tests	10.1	6.6.2	<input checked="" type="checkbox"/>
8. Protection – Loss of Mains Test	10.2	6.6.3	<input checked="" type="checkbox"/>
9. Protection – Frequency change, Vector Shift Stability test	10.3	6.6.4	<input checked="" type="checkbox"/>
10. Protection – Frequency change, RoCoF Stability test	10.3	6.6.5	<input checked="" type="checkbox"/>
11. LFSM-O Test	9.3	6.7	<input checked="" type="checkbox"/>
12. Power output with falling frequency test	9.4.2	6.8	<input checked="" type="checkbox"/>
13. Reconnection Timer	9.6	6.9	<input checked="" type="checkbox"/>
14. Fault Level Contribution	11.4, A.1.3.5	6.10	<input checked="" type="checkbox"/>
15. Logic Interface (input port)	9.4.4	6.11	<input checked="" type="checkbox"/>
16. Self-monitoring Solid State Switch	10.1.9	6.12	<input type="checkbox"/>
17. Cyber security	9.7	6.13	<input type="checkbox"/> ²

² Manufacturer's declaration provided, for details see section 6.13.

Note:

- The tests were performed on EUT **ASG-10TL-ZH** which provides the highest current / power.
- The product was tested on
 - Hardware Version: A
 - Software Version: DSP;A6053/ARM;A3023

- Measurement done at output terminals of the EUT, see Figure 3, Figure 4 and Figure 5.
- According to EREC G98, section 6.3.1 the following applies:
- since the rated power of ASG-5TL-ZH, ASG-6TL-ZH and ASG-8TL-ZH is between $1/\sqrt{10} \cdot P_{n, \text{ASG-10TL-ZH}}$ and $2 \cdot P_{n, \text{ASG-10TL-ZH}}$, a family approach to type testing is acceptable.
- A transfer of measurement results from the ASG-10TL-ZH to other units in the product series according to EREC G98, section 6.3.2 is allowed (for details see section 5 *Assessment overview*.)
- Technical justification for transferability of measurement results:
see section 3.2 on p.11.

4.4 Reference values

Reference values for the p.u. or percentage calculations:

	ASG-5TL-ZH	ASG-6TL-ZH	ASG-8TL-ZH	ASG-10TL-ZH
Registered Capacity ³ P _{max} [kW]	5.0	6.0	8.0	15.0
Rated voltage (phase-to-neutral), U _n [V]	230			
Rated current, I _n ⁴ [A]	7.25	8.70	11.60	14.50

Note:

* see also “

Note” on p.9.

4.5 Measurement setup

Tests documented in this test report were performed using the following test configuration:

- ☐ Measurements in the field on real grid
- ☐ Test bench tests on real grid
- ☒ Test bench tests on an AC grid simulator

The PGU is connected on the DC-side to a PV-simulator and on the AC-side to an AC-grid simulator. The AC-grid simulator is operated with nominal conditions of U_n = 230 V (phase-to-neutral) and f_n = 50 Hz unless stated otherwise by the applied test requirement.

Available primary power is modified by adapting the short circuit current (I_{sc}) value of the I-V curve. Following example shows a PV-curve (I_{sc} = 18.78 A, U_{oc} = 705.56 V) simulated according to EN50530:

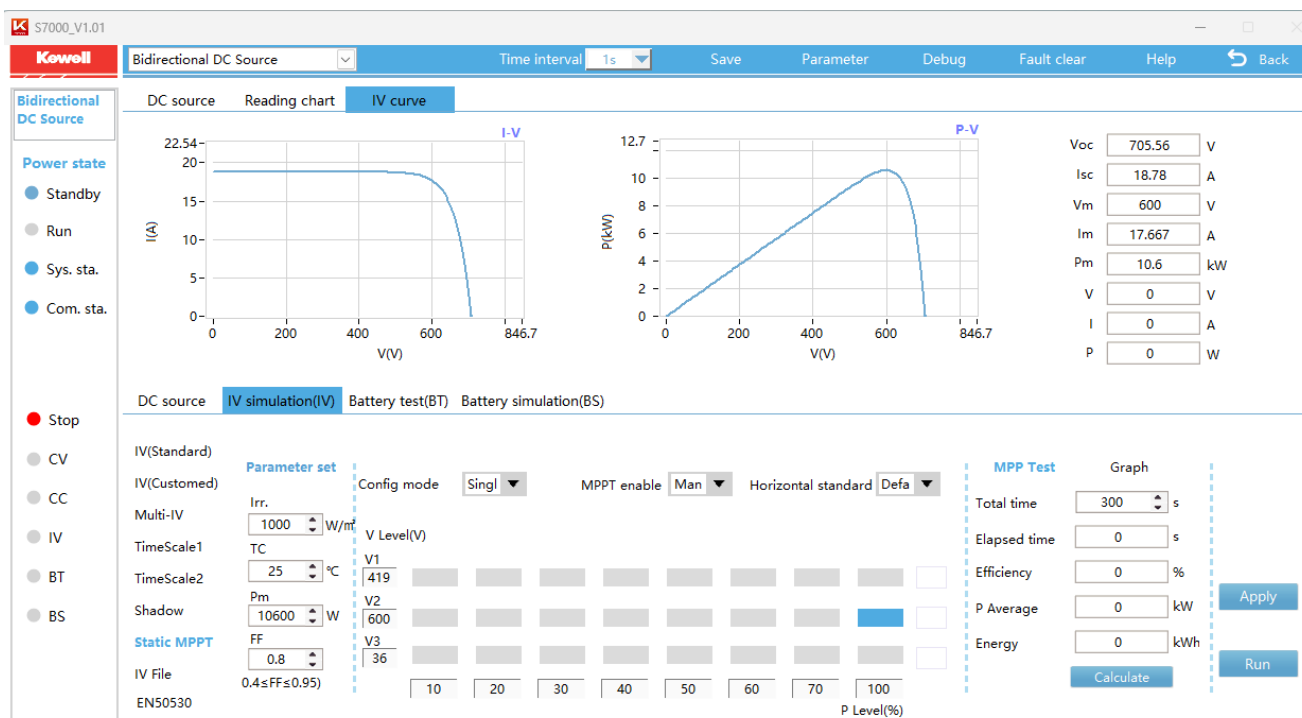


Figure 2 – DC characteristics for testing

³ In this report, the stated values of "registered capacity" related to single Generating Unit.

⁴ The rated current stated in this report is calculated based on the "registered capacity" and the rated voltage.

The measurement setups are shown in Figure 3 Figure 4 and Figure 5. The specific test and measurement devices are stated in section 4.6.

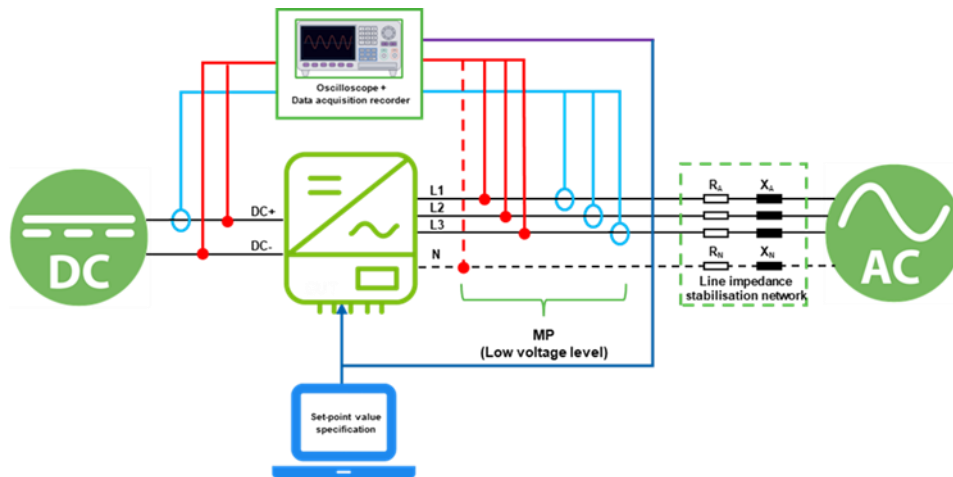


Figure 3 – Measurement setup used for tests except Loss of Mains and Short Circuit test

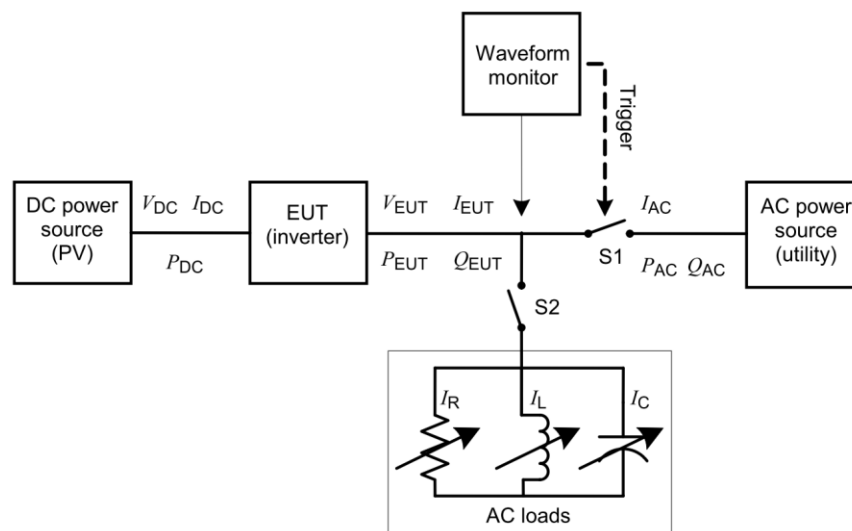


Figure 4 – Test circuit for Loss of Mains according to IEC 62116:2014

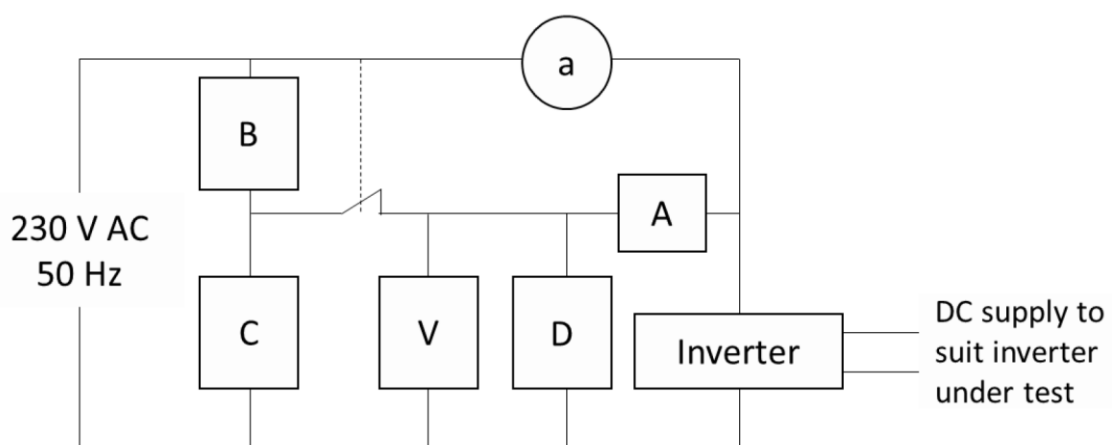


Figure 5 – Short circuit test circuit according to EREC G98, Figure A.1.5

4.6 Measurement equipment

Equipment	Internal No.	Manufacturer	Type	Serial No.	Next Calibration
DC power supply ⁵	HC-ENG-052	KEWELL	S7000-21K-2000-0040	6018888220400696	--
	HC-ENG-053	KEWELL	S7000-21K-2000-0040	6018888220501273	
AC Simulator ⁵	HC-ENG-055	KEWELL	KAC-45-345-33	6018888220903254	
RLC load ⁵	HC-ENG-058	Guangdong HuaChuang Technology Service Co., Ltd.	IMAX3312-120KW	20230325002	
Data acquisition instrument	HC-ENG-046	DEWETRON	TRION-1820-POWER	A1222035/C5220875	2026/03/20
Transformer	HC-ENG-046-001	LEM	CT 400	1221300591	2026/03/20
	HC-ENG-046-002	LEM	CT 400	1221300592	2026/03/20
	HC-ENG-046-003	LEM	CT 400	1221300593	2026/03/20
	HC-ENG-046-004	LEM	CT 400	1221300594	2026/03/20
Humidity&Temperature recorder	HC-ENG-002	Elitech Technology, Inc.	GSP-8A	CMA21500031	2025/03/26
Oscilloscope	--	KEYSIGHT	DSOX 3024T	--	2025/05/19
Oscilloscope	--	YOKOGAWA	DLM3024	--	2026/01/14

Note:

All measurement equipment was used within the calibration period. Copy of calibration certificates are available at the laboratory for reference.

⁵ The AC simulator and DC sources do not need to be calibrated, since the AC voltage and current is measured and determined using the calibrated oscilloscope and power analyser.

5 Assessment overview

Possible test case verdicts:

Test item does meet the requirement.....: P (Pass)

Test item does not meet the requirement.....: F (Fail)

Test case does not apply to the test object....: N/A

Test case is not rated: N/R

Reference to declaration documents.....: R/D

Items	Technical requirements (Section EREC G98)	Remark / Transfer of measurement results *	Verdict
1. Operating Range	9.1, 10.1	See section 6.1 / The verified operating range of the ASG-10TL-ZH can be applied to other units in the product series directly.	P
2. Harmonics	11.1	See section 6.2 / The percentage harmonics results of the ASG-10TL-ZH can be considered as worst case results and applied to other units in the product series directly.	P
3. Voltage Fluctuation and Flicker	11.1	See section 6.3 / The Flicker results of the ASG-10TL-ZH can be considered as worst case results and applied to other units in the product series directly.	P
4. DC injection	11.2	See section 6.4 / The percentage DC injection of the ASG-10TL-ZH can be considered as worst case results and applied to other units in the product series directly.	P
5. Power Factor (PF)	9.5	See section 6.5 / The Power Factor results of the ASG-10TL-ZH can be considered as worst case results and applied to other units in the product series directly.	P
6. Frequency protection trip and ride through tests	10.1	See section 6.6.1 / The measurement results of the ASG-10TL-ZH can be considered as worst case results and applied to other units in the product series directly.	P
7. Voltage protection trip and ride through tests	10.1	See section 6.6.2 / The measurement results of the ASG-10TL-ZH can be considered as worst case results and applied to other units in the product series directly.	P

8. Protection – Loss of Mains Test	10.2	See section 6.6.3 / The measurement results of the ASG-10TL-ZH can be considered as worst case results and applied to other units in the product series directly.	P
9. Protection – Frequency change, Vector Shift Stability test	10.3	See section 6.6.4 / The measurement results of the ASG-10TL-ZH can be considered as worst case results and applied to other units in the product series directly.	P
10. Protection – Frequency change, RoCoF Stability test	10.3	See section 6.6.5 / The measurement results of the ASG-10TL-ZH can be considered as worst case results and applied to other units in the product series directly.	P
11. LFSM-O Test	9.3	See section 6.7 / The determined droops of the ASG-10TL-ZH can be considered as worst case results and applied to other units in the product series directly.	P
12. Power output with falling frequency test	9.4.2	See section 6.8 / The measurement results of the ASG-10TL-ZH can be considered as worst case results and applied to other units in the product series directly.	P
13. Reconnection Timer	9.6	See section 6.9 / The measurement results of the ASG-10TL-ZH can be considered as worst case results and applied to other units in the product series directly.	P
14. Fault Level Contribution	11.4, A.1.3.5	See section 6.10 / The measurement results of the ASG-10TL-ZH can be considered as worst case results and applied to other units in the product series directly.	P
15. Logic Interface (input port)	9.4.4	See section 6.11 / The measurement results of the ASG-10TL-ZH can be considered as worst case results and applied to other units in the product series directly. The high-level description of logic interface applies to the whole product series.	P
16. Self-monitoring Solid State Switch	10.1.9	See section 6.12 / ---	N/A
17. Cyber security	9.7	See section 6.13 / Manufacturer's declaration provided. See <i>Annex 2 - Manufacturer's declaration regarding Cyber Security</i> .	R/D

Note:

Conformity statements are decided in accordance with ILAC-G8:09/2019 Binary Statement for Simple Acceptance Rule, unless otherwise normatively specified or contractually agreed.

* According to EREC G98, section 6.3.2 the following applies:

*All absolute values (e.g. operating range tests) from the tested **Micro-generator** shall be transferred directly in the compliance forms of an assumed compliant **Micro-generator** of the same family. All relative results related to design **Active Power** or current (e.g. power quality fluctuation and flicker) from the tested **Micro-generator** shall be transferred to the compliance form of a **Micro-generator** in the same family according to the ratio of the respective nameplate rating (W) of the tested **Micro-generator** and the assumed compliant **Micro-generator**. For the avoidance of doubt, the **Manufacturer** shall register each **Micro-generator** in the family on the Energy Networks Association Type Test register.*

Since the tests were performed on ASG-10TL-ZH which provides the highest current / power, in this report the relative results of EUT ASG-10TL-ZH are considered as worst case results and applied to other units in the product series directly.

6 Measurement results

Form C: Type Test Verification Report

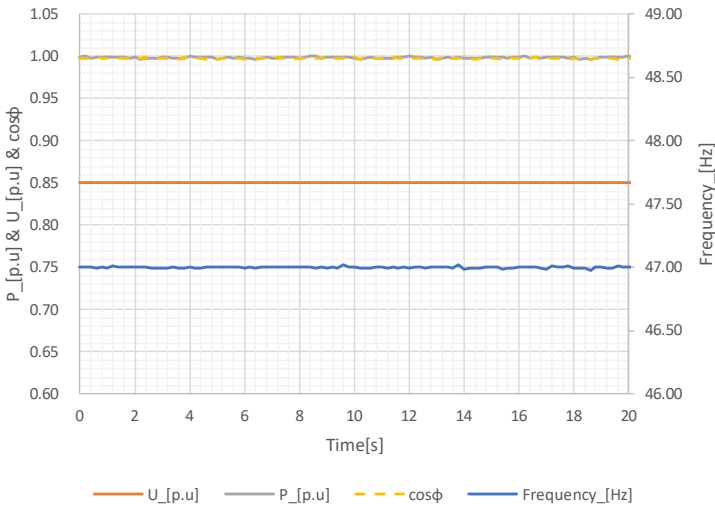
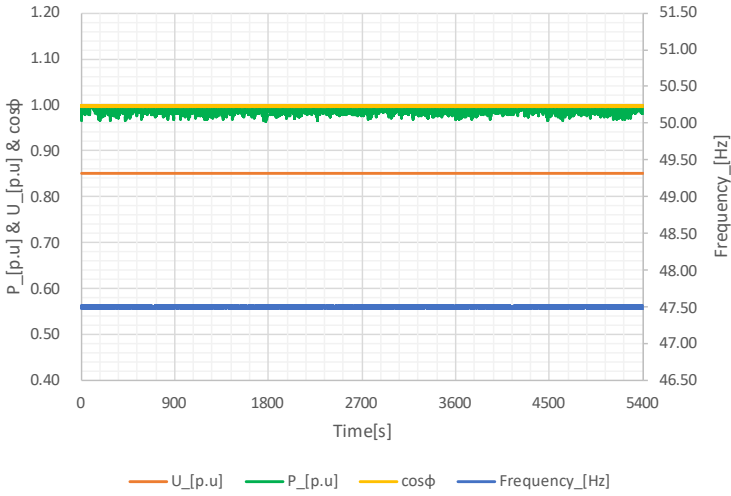
6.1 Operating Range

This test should be carried out as specified in A.1.2.10.

Pass or failure of the test should be indicated in the fields below (right hand side), for example with the statement "Pass", "No disconnection occurs", etc. Graphical evidence is preferred.

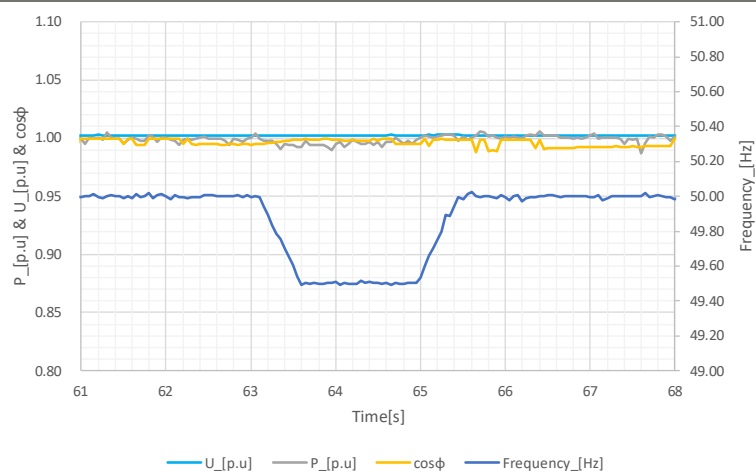
Note:

During the test, the LFSM-O function was deactivated.

<p>Test 1</p> <p>Voltage = 85% of nominal (195.5 V), Frequency = 47.0 Hz,</p> <p>Power factor = 1,</p> <p>Period of test 20 seconds</p>	<p>Pass, no disconnection occurs.</p> 
<p>Test 2</p> <p>Voltage = 85% of nominal (195.5 V), Frequency = 47.5 Hz,</p> <p>Power factor = 1,</p> <p>Period of test 90 minutes</p>	<p>Pass, no disconnection occurs.</p> 
<p>Test 3</p> <p>Voltage = 110% of nominal (253 V), Frequency = 51.5 Hz,</p> <p>Power factor = 1,</p> <p>Period of test 90 minutes</p>	<p>Pass, no disconnection occurs.</p>

<p>Test 4</p> <p>Voltage = 110% of nominal (253 V), Frequency = 52.0 Hz,</p> <p>Power factor = 1,</p> <p>Period of test 15 minutes</p>	<p>Pass, no disconnection occurs.</p>
<p>Test 5</p> <p>Voltage = 100% of nominal (230 V), Frequency = 50.0 Hz,</p> <p>Power factor = 1,</p> <p>Period of test 90 minutes</p>	<p>Pass, no disconnection occurs.</p>
<p>Test 6 RoCoF withstand</p> <p>Confirm that the Micro-Generating Plant is capable of staying connected to the Distribution Network and operate at rates of change of frequency up to 1 Hz/s as</p>	<p>Pass, no disconnection occurs.</p>

measured over a period of 500 ms.



6.2 Power Quality – Harmonics

These tests should be carried out as specified in BS EN 61000-3-2. The chosen test should be undertaken with a fixed source of energy at two power levels a) between 45 and 55% and b) at 100% of **Registered Capacity**. The test requirements are specified in Annex A1 A.1.3.1 (**Inverter** connected) or Annex A2 A.2.3.1 (Synchronous).

Micro-generator tested to BS EN 61000-3-2								
Micro-generator rating per phase (rpp)				3.333		kW		
For 3-phase Micro-generators , tick this box if harmonic measurements are identical for all three phases. If the harmonics are not identical for each phase, please replicate this section with the results for each phase.				three phases				
Harmonic	At 45-55% of Registered Capacity			At 100% of Registered Capacity				
	Measured Value (MV) in Amps			Measured Value (MV) in Amps				
Order	L ₁	L ₂	L ₃	L ₁	L ₂	L ₃	Limit in BS EN 61000-3-2 in Amps	Higher limit for odd harmonics 21 and above
2	0.019	0.018	0.016	0.040	0.038	0.025	1.080	
3	0.045	0.052	0.046	0.069	0.068	0.068	2.300	
4	0.005	0.005	0.004	0.009	0.011	0.007	0.430	
5	0.073	0.081	0.070	0.089	0.100	0.083	1.140	
6	0.003	0.003	0.003	0.005	0.006	0.004	0.300	
7	0.030	0.040	0.030	0.024	0.033	0.026	0.770	
8	0.002	0.002	0.003	0.004	0.004	0.003	0.230	
9	0.022	0.023	0.025	0.019	0.022	0.020	0.400	
10	0.002	0.002	0.002	0.003	0.004	0.003	0.184	
11	0.019	0.022	0.022	0.014	0.023	0.019	0.330	
12	0.002	0.002	0.002	0.003	0.004	0.003	0.153	
13	0.022	0.021	0.022	0.013	0.019	0.016	0.210	
14	0.002	0.003	0.003	0.003	0.004	0.003	0.131	
15	0.028	0.029	0.024	0.015	0.020	0.016	0.150	
16	0.003	0.003	0.003	0.003	0.004	0.003	0.115	
17	0.024	0.033	0.024	0.007	0.019	0.013	0.132	
18	0.003	0.003	0.003	0.003	0.004	0.003	0.102	
19	0.027	0.036	0.029	0.008	0.019	0.013	0.118	
20	0.004	0.004	0.004	0.004	0.005	0.004	0.092	
21	0.054	0.059	0.050	0.016	0.023	0.020	0.107	0.160
22	0.005	0.005	0.005	0.005	0.006	0.005	0.084	
23	0.036	0.041	0.040	0.010	0.019	0.019	0.098	0.147
24	0.006	0.006	0.006	0.005	0.007	0.005	0.077	
25	0.024	0.039	0.046	0.007	0.017	0.020	0.090	0.135
26	0.006	0.005	0.006	0.006	0.008	0.007	0.071	

27	0.053	0.048	0.047	0.024	0.031	0.029	0.083	0.124
28	0.005	0.006	0.005	0.007	0.009	0.007	0.066	
29	0.026	0.033	0.023	0.007	0.019	0.013	0.078	0.117
30	0.005	0.005	0.005	0.007	0.010	0.007	0.061	
31	0.021	0.031	0.035	0.010	0.010	0.008	0.073	0.109
32	0.004	0.004	0.004	0.007	0.008	0.007	0.058	
33	0.018	0.018	0.016	0.017	0.015	0.021	0.068	0.102
34	0.003	0.004	0.003	0.008	0.008	0.007	0.054	
35	0.016	0.021	0.019	0.009	0.012	0.008	0.064	0.096
36	0.003	0.003	0.003	0.010	0.011	0.008	0.051	
37	0.012	0.017	0.016	0.015	0.017	0.011	0.061	0.091
38	0.002	0.002	0.002	0.014	0.013	0.011	0.048	
39	0.009	0.009	0.010	0.019	0.019	0.020	0.058	0.087
40	0.002	0.002	0.002	0.017	0.016	0.015	0.046	

Note:

the higher limits for odd harmonics 21 and above are only allowable under certain conditions, if these higher limits are utilised please state the exemption used as detailed in part 6.2.3.4 of BS EN 61000-3-2 in the box below.

Additional comments:

6.3 Power Quality – Voltage fluctuations and Flicker

These tests should be undertaken in accordance with EREC G98 Annex A1 A.1.3.3 (**Inverter** connected) or Annex A2 A.2.3.3 (Synchronous).

The standard test impedance is 0.4 Ω for a single-phase **Micro-generating Plant** (and for a two-phase unit in a three-phase system) and 0.24 Ω for a three-phase **Micro-generating Plant** (and for a two-phase unit in a split phase system). Please ensure that both test and standard impedance are completed on this form. If the test impedance (or the measured impedance) is different to the standard impedance, it must be normalised to the standard impedance as follows (where the **Power Factor** of the generation output is 0.98 or above):

d_{\max} normalised value = (Standard impedance / Measured impedance) x Measured value.

Where the **Power Factor** of the output is under 0.98 then the X to R ratio of the test impedance should be close to that of the standard impedance.

The stopping test should be a trip from full load operation.

The duration of these tests needs to comply with the particular requirements set out in the testing notes for the technology under test.

The test date and location must be declared.

Test start date	2025-02-21	Test end date	2025-02-21
Test location	LYNS-TCI TECHNOLOGY GUANGDONG CO., LTD. (see <i>Testing location</i> on p.2)		
* <input checked="" type="checkbox"/> three-phase Micro-generators	<input type="checkbox"/> split single phase Micro-generators		
^ <input type="checkbox"/> single phase Micro-generators	<input type="checkbox"/> Micro-generators using two phases on a three-phase system		

	Phase no.	Starting			Stopping			Running	
		d _{max} [%]	d _c [%]	d(t) [ms]	d _{max} [%]	d _c [%]	d(t) [ms]	P _{st}	P _{It} 2 hours
Measured Values at test impedance	L1	0.440	0.360	0	0.380	0.330	0	0.140	0.130
	L2	0.410	0.350	0	0.350	0.290	0	0.140	0.130
	L3	0.490	0.400	0	0.410	0.330	0	0.150	0.150
	Overall worst case	0.490	0.400	0	0.410	0.330	0	0.150	0.150
Normalised to standard impedance	L1	0.440	0.360	0	0.380	0.330	0	0.140	0.130
	L2	0.410	0.350	0	0.350	0.290	0	0.140	0.130
	L3	0.490	0.400	0	0.410	0.330	0	0.150	0.150
	Overall worst case	0.490	0.400	0	0.410	0.330	0	0.150	0.150
Normalised to required maximum impedance	L1	--	--	--	--	--	--	--	--
	L2	--	--	--	--	--	--	--	--
	L3	--	--	--	--	--	--	--	--
	Overall worst case	--	--	--	--	--	--	--	--
Limits set under BS EN 61000-3-3		4	3.3	500 (3.3%)	4	3.3	500 (3.3%)	1.0	0.65
Test Impedance	R:	0.24	Ω		X:	0.15	Ω		
Standard Impedance	R:	<input checked="" type="checkbox"/> 0.24 * <input type="checkbox"/> 0.4 ^	Ω		X:	<input checked="" type="checkbox"/> 0.15 * <input type="checkbox"/> 0.25 ^	Ω		
Maximum Impedance	R:	--	Ω		X:	--	Ω		

6.4 Power Quality – DC injection

This test should be carried out in accordance with A 1.3.4 as applicable.

The % **DC** injection (“as % of rated AC current” below) is calculated as follows:

% **DC** injection = Recorded **DC** value in Amps / base current

where the base current is the **Registered Capacity** (W) / 230 V. The % **DC** injection should not be greater than 0.25%.

Test power level	20%	50%	75%	100%
Recorded DC value in Amps	0.007	0.015	0.023	0.032
as % of rated AC current	0.016	0.035	0.053	0.074
Limit [%]	0.25	0.25	0.25	0.25

Note:

* Calculation is the same for 1 phase and 3 phase devices

6.5 Power Factor

This test shall be carried out in accordance with A.1.3.2 and A.2.3.2 at three voltage levels and at **Registered Capacity** and the measured **Power Factor** must be greater than 0.95 to pass. Voltage to be maintained within $\pm 1.5\%$ of the stated level during the test.

Voltage	0.94 pu (216.2 V)	1 pu (230 V)	1.1 pu (253 V)
Measured value	0.999	0.999	0.999
Power Factor Limit	>0.95	>0.95	>0.95

Note:

See also “

Note” on Power Factor on p.9.

6.6 Protection

The Interface Protection setting information can be displayed in one or more of the following ways:

- ☒ A display on a screen
- ☒ A display on a PC which can communicate with the Micro-generator and confirm that it is the correct Micro-generator by means of a serial number permanently fixed to the Micro-generator and visible on the PC screen at the same time as the settings
- ☐ Display of all Interface Protection settings and nominal voltage and current outputs, alongside the serial number of the Micro-generator, permanently fixed to the Micro-generator
- ☒ Other (APP)

Note:

The protection device considered in this report is the integrated protection relay / generating unit switch in the Power Generating Modules.

Manufacturer Data:

The integrated Interface Protection in the Power Generating Modules considered in this report is capable of measuring voltage to an accuracy of $\pm 1.5\%$ of the nominal value and of measuring frequency to $\pm 0.2\%$ of the nominal value across its operating range of voltage, frequency and temperature ($-30^{\circ}\text{C} \sim +60^{\circ}\text{C}$).

(See also subsections 6.6.1 ~ 6.6.5 below)

6.6.1 Protection – Frequency tests

These tests should be carried out in accordance with Annex A1 A.1.2.3 (**Inverter** connected) or Annex A2 A.2.2.3 (Synchronous). For trip tests, frequency and time delay should be stated. For “no trip tests”, “no trip” can be stated.

Function	Setting		Trip test		“No trip tests”	
	Frequency	Time delay	Frequency	Time delay	Frequency / time	Confirm no trip
U/F stage 1	47.5 Hz	20 s	47.50 Hz	20.031 s	47.7 Hz 30 s	No trip occurred
U/F stage 2	47 Hz	0.5 s	46.97 Hz	0.514 s	47.2 Hz 19.5 s	No trip occurred
					46.8 Hz 0.45 s	No trip occurred
O/F stage 1	52 Hz	0.5 s	52.04 Hz	0.513 s	51.8 Hz 120.0 s	No trip occurred
					52.2 Hz 0.45 s	No trip occurred

Note:

for frequency trip tests the frequency required to trip is the setting ± 0.1 Hz. In order to measure the time delay a larger deviation than the minimum required to operate the protection can be used. The “No trip tests” need to be carried out at the setting ± 0.2 Hz and for the relevant times as shown in the table above to ensure that the protection will not trip in error.

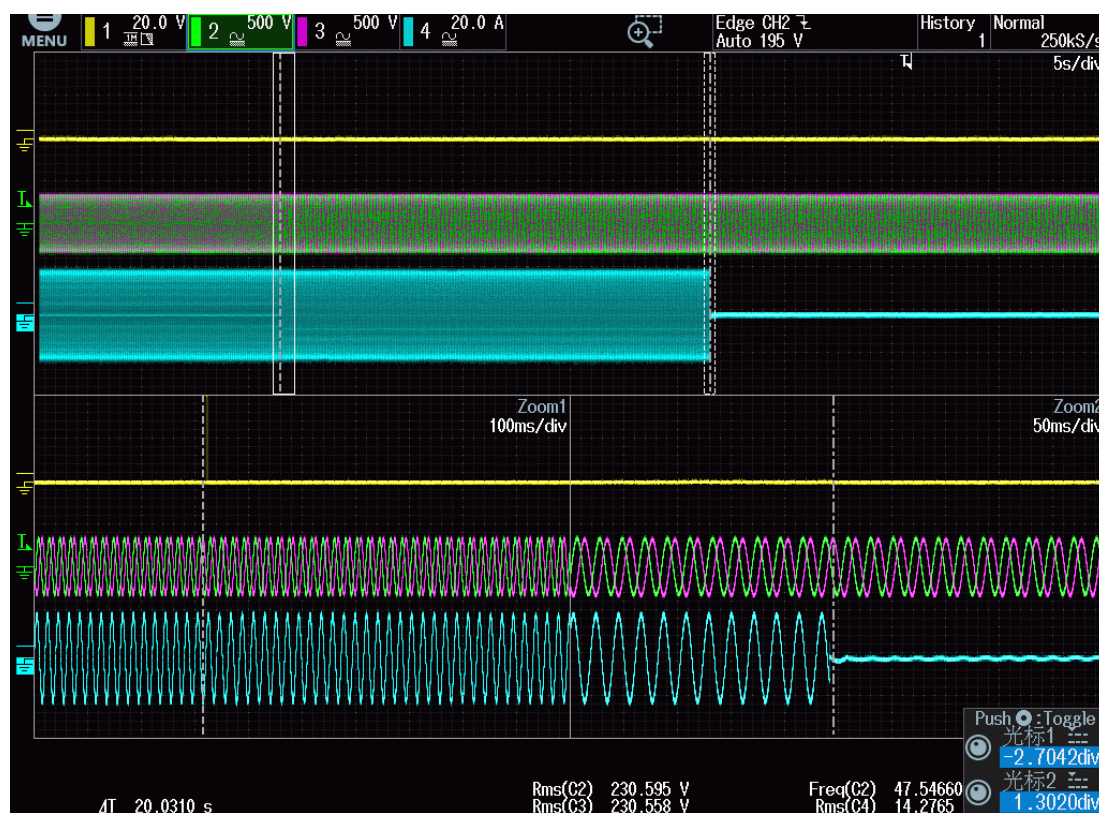


Figure 6 – Test U/F stage 1 (Trip test)

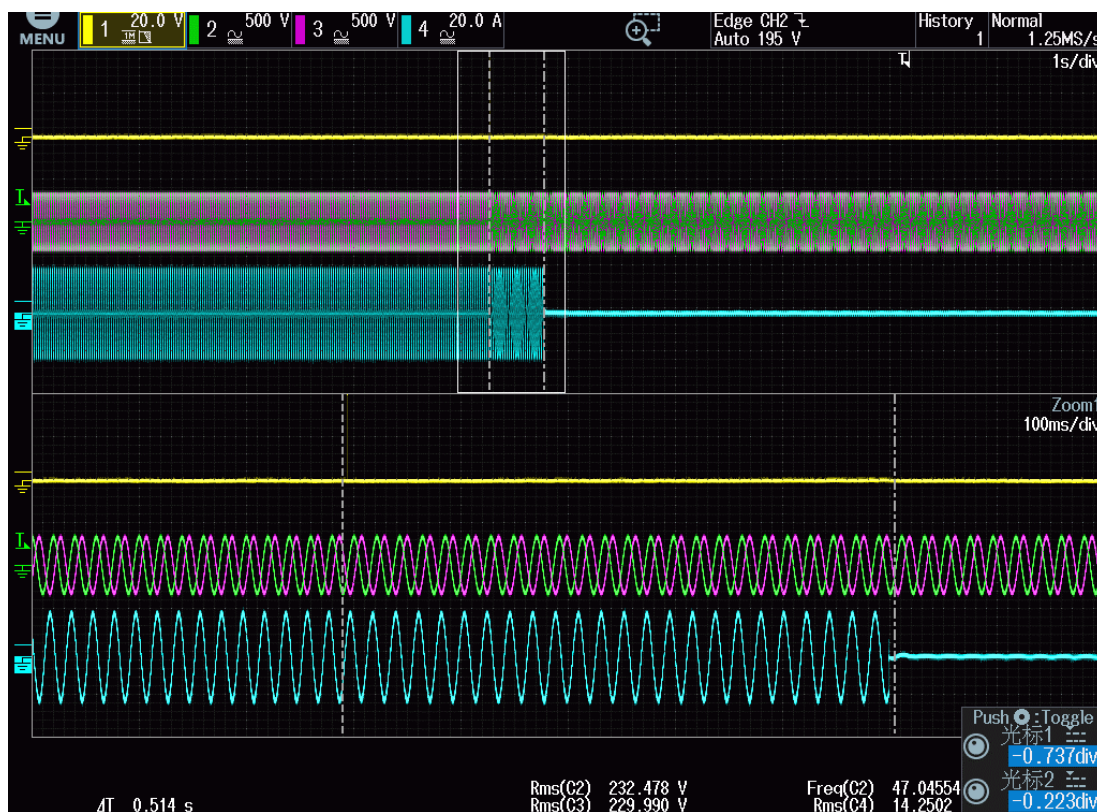


Figure 7 – Test U/F stage 2 (Trip test)

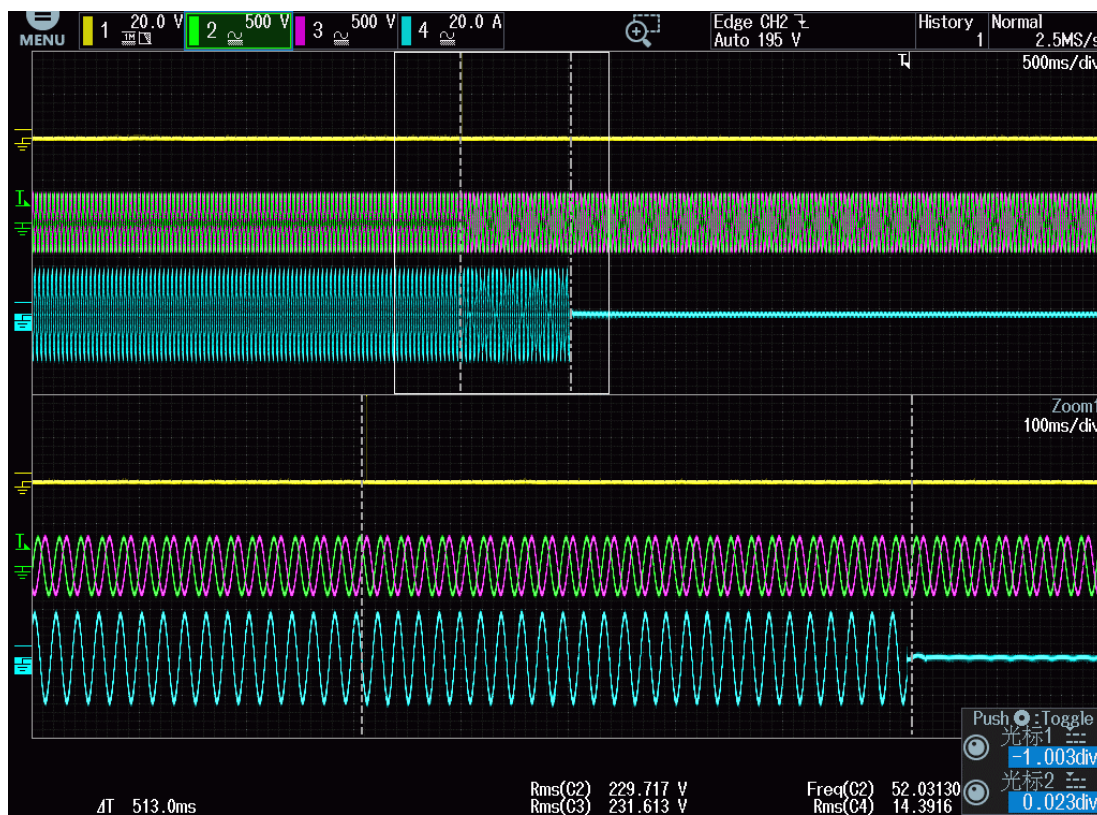


Figure 8 – Test O/F stage 1 (Trip test)

6.6.2 Protection – Voltage tests

These tests should be carried out in accordance with Annex A1 A.1.2.2 (Inverter connected) or Annex A2 A.2.2.2 (Synchronous). For trip tests, voltage and time delay should be stated. For “no trip tests”, “no trip” can be stated.							
Function		Setting		Trip test		“No trip tests”	
		Voltage	Time delay	Voltage	Time delay	Voltage / time	Confirm no trip
U/V	L1-N	0.8 pu (184 V)	2.5 s	183.77 V	2.520 s	188 V 5.0 s	No trip occurred
	L2-N			183.64 V	2.550 s		No trip occurred
	L3-N			183.80 V	2.540 s		No trip occurred
						180 V 2.45 s	No trip occurred
O/V stage 1	L1-N	1.14 pu (262.2 V)	1.0 s	262.45 V	1.050 s	258.2 V 5.0 s	No trip occurred
	L2-N			262.38 V	1.030 s		No trip occurred
	L3-N			262.30 V	1.040 s		No trip occurred
O/V stage 2	L1-N	1.19 pu (273.7 V)	0.5 s	273.60 V	0.535 s	269.7 V 0.95 s	No trip occurred
	L2-N			274.37 V	0.550 s		No trip occurred
	L3-N			273.42 V	0.550 s		No trip occurred
						277.7 V 0.45 s	No trip occurred
Note: for voltage tests the Voltage required to trip is the setting ± 3.45 V. 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 ± 4 V and for the relevant times as shown in the table above to ensure that the protection will not trip in error.							

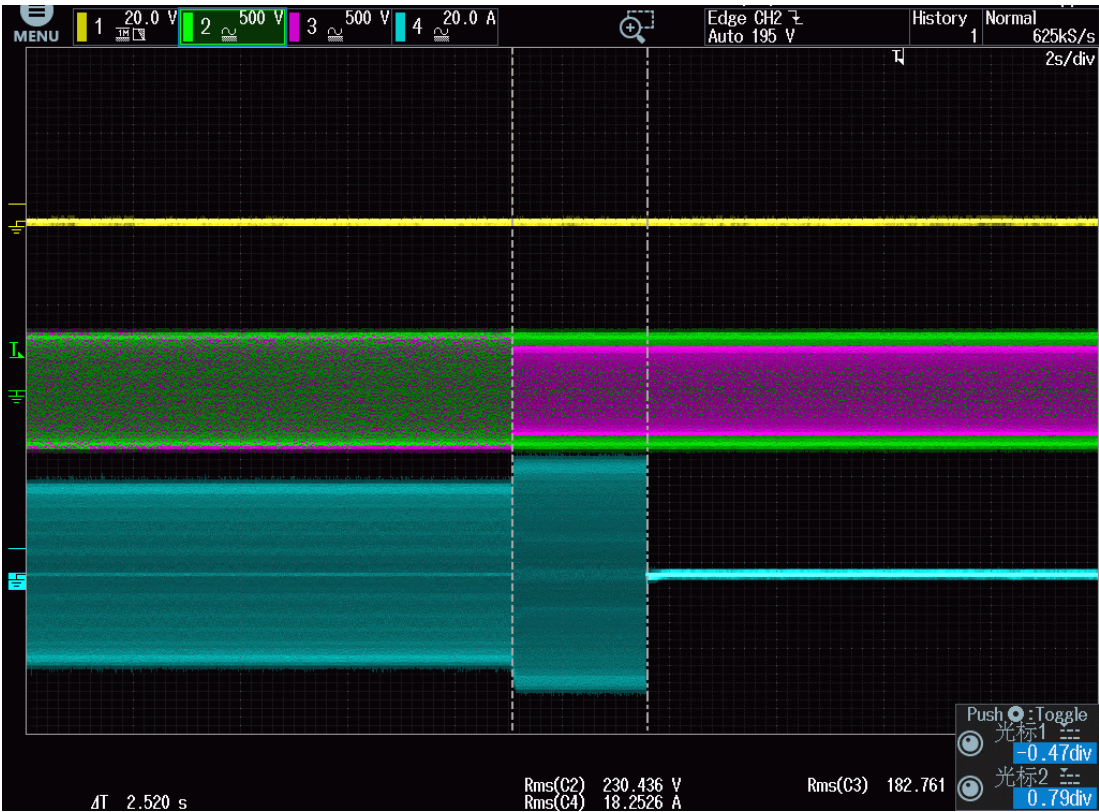


Figure 9 – Test U/V (Trip test, L1-N)

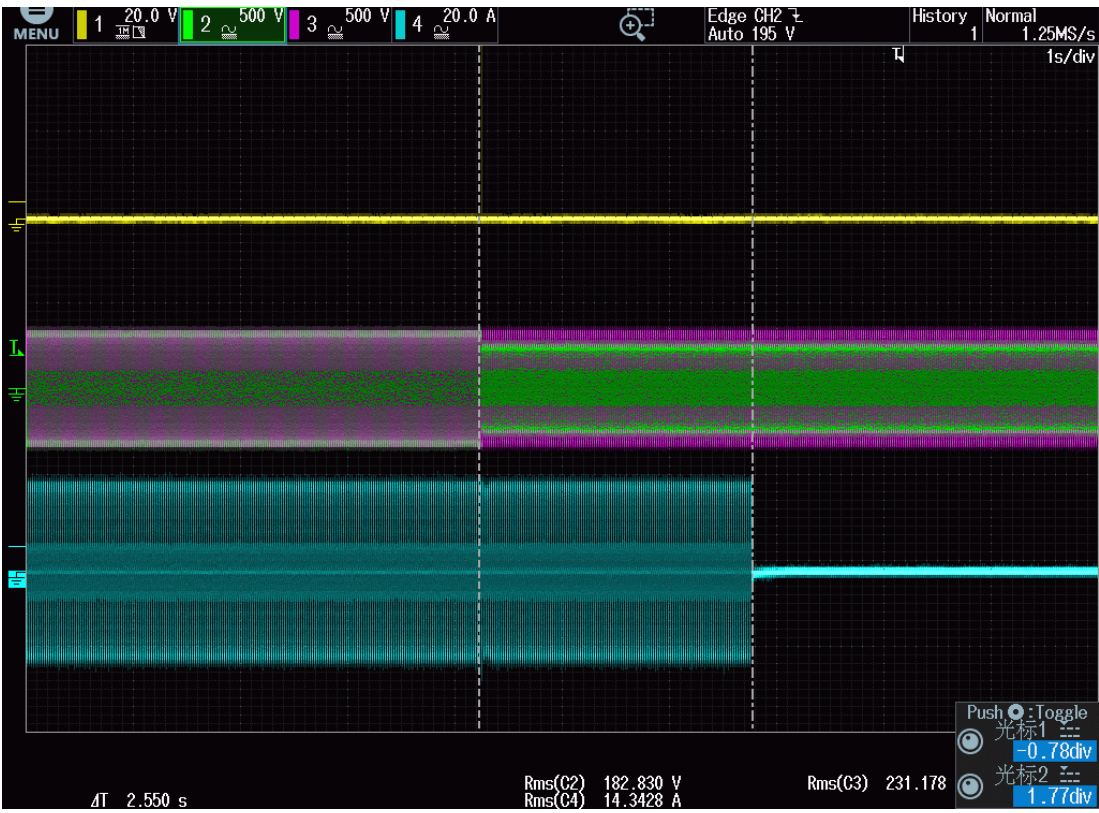


Figure 10 – Test U/V (Trip test, L2-N)

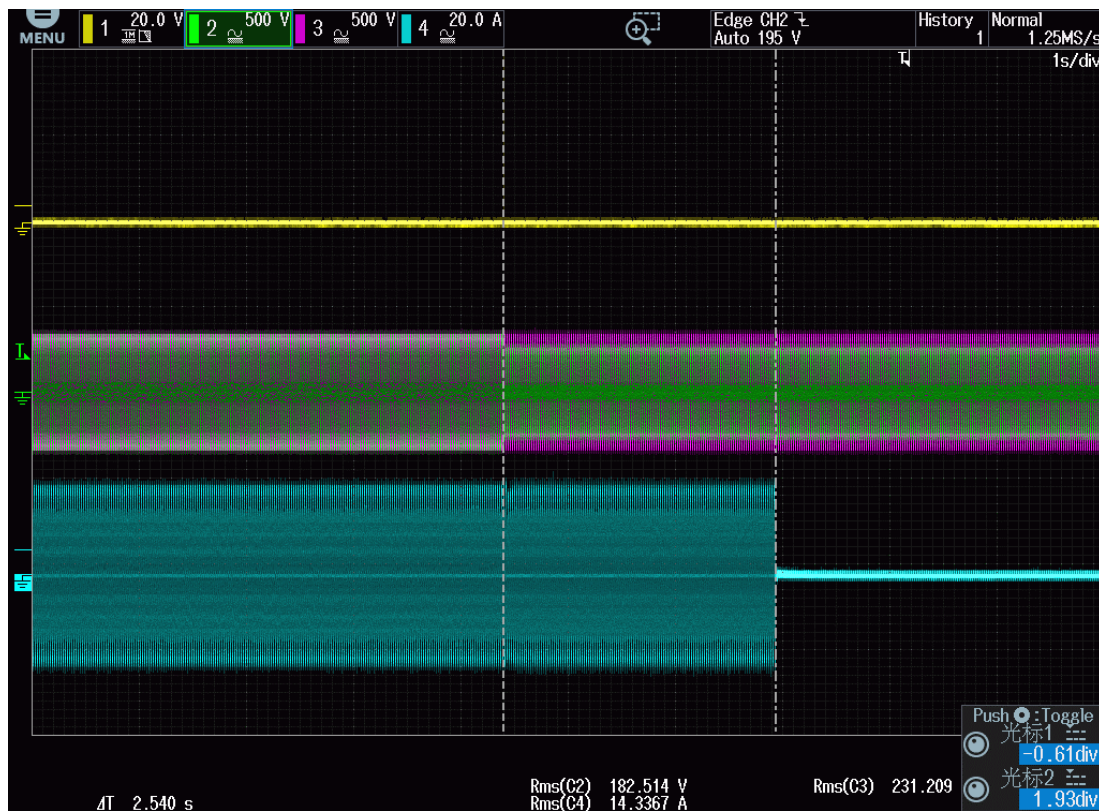


Figure 11 – Test U/V (Trip test, L3-N)

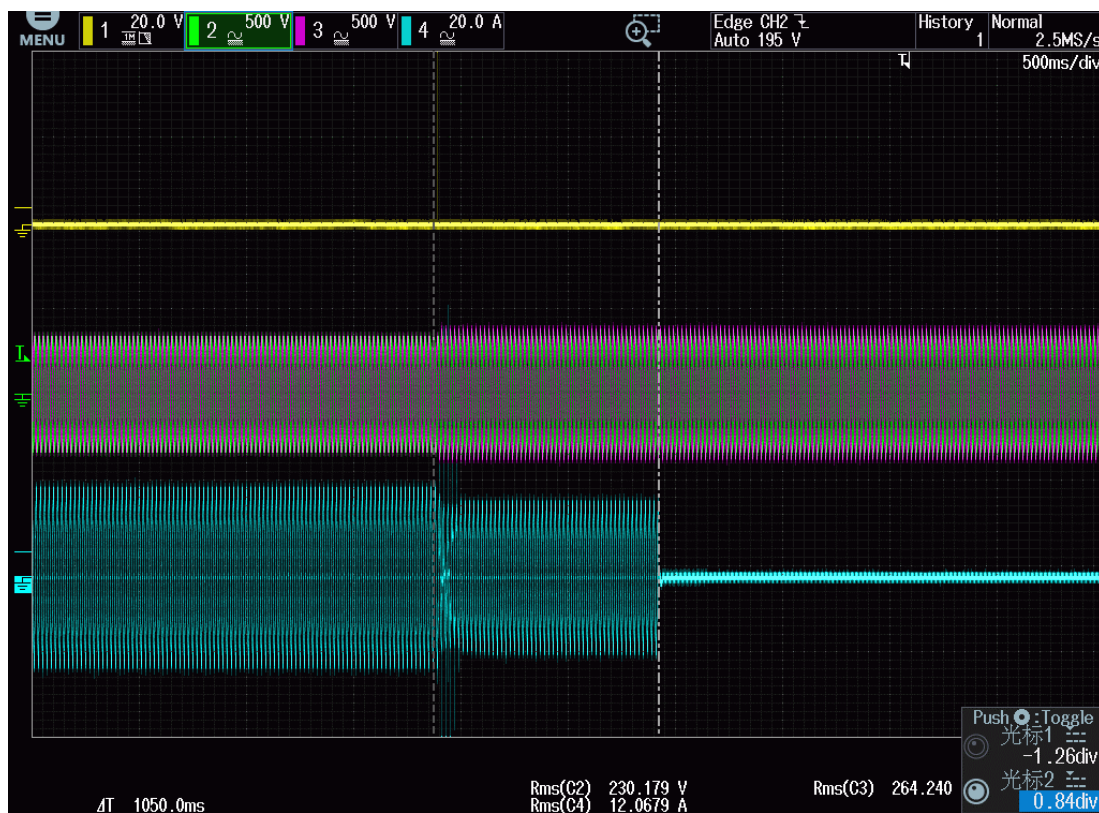


Figure 12 – Test O/V stage 1 (Trip test, L1-N)

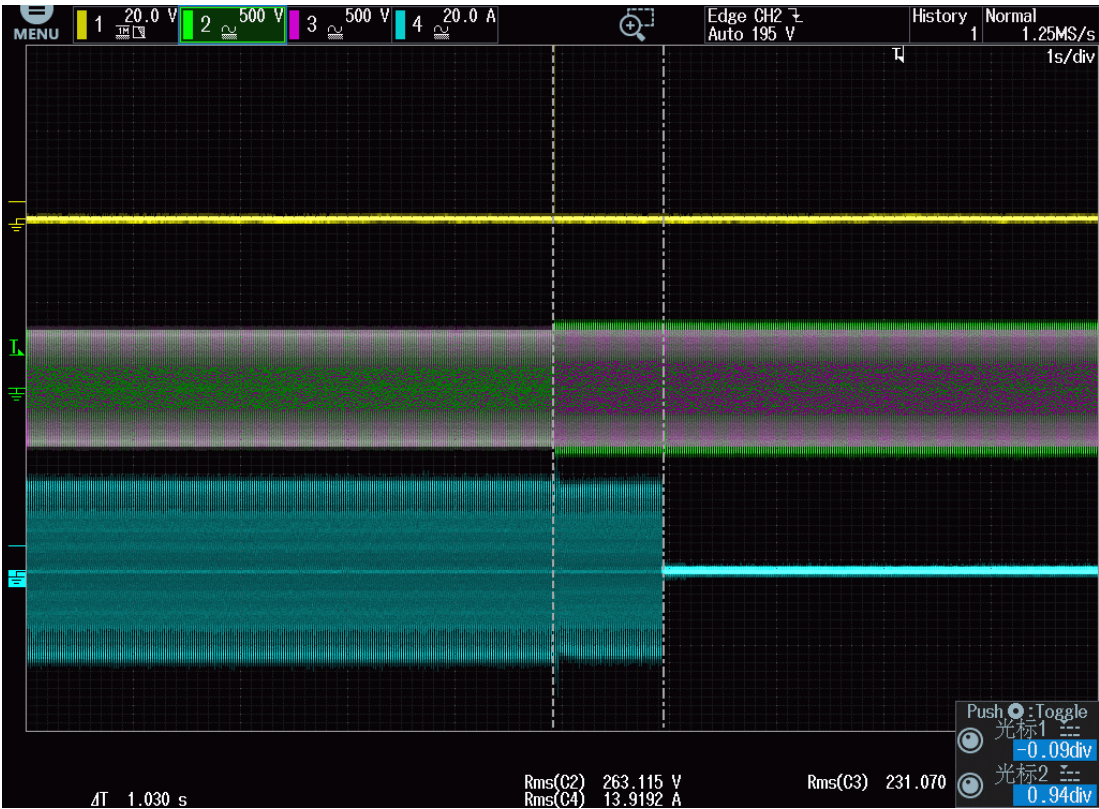


Figure 13 – Test O/V stage 1 (Trip test, L2-N)

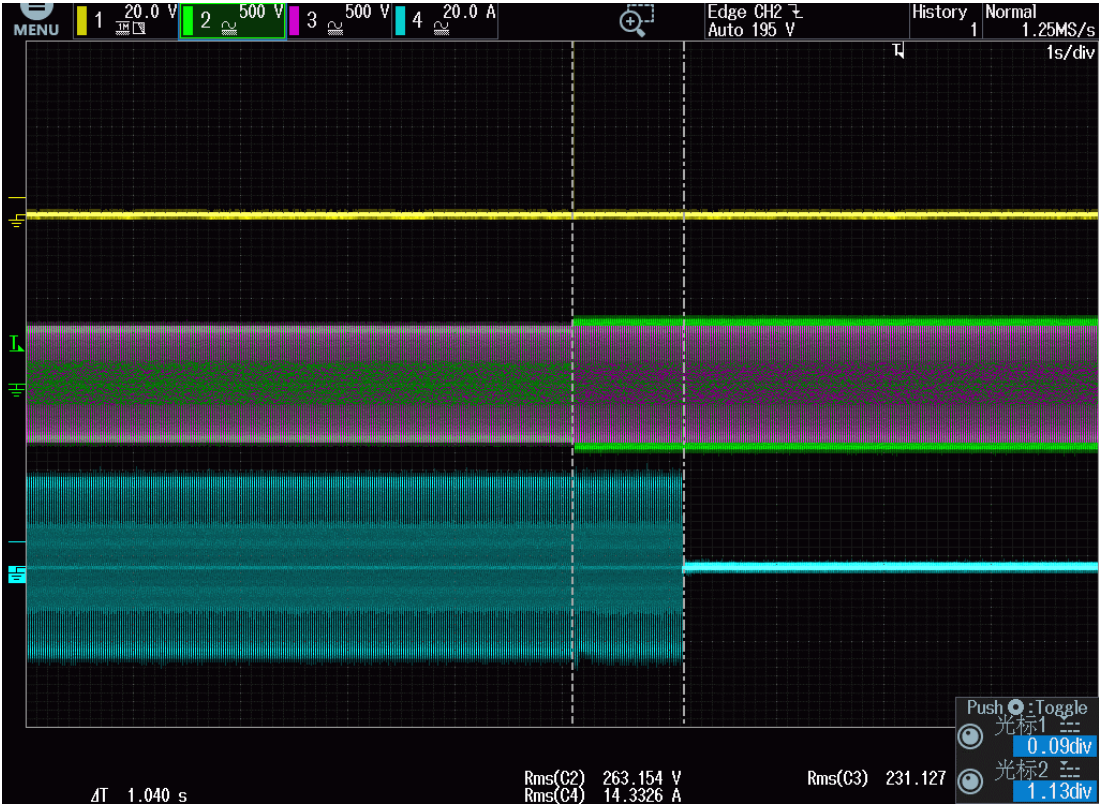


Figure 14 – Test O/V stage 1 (Trip test, L3-N)

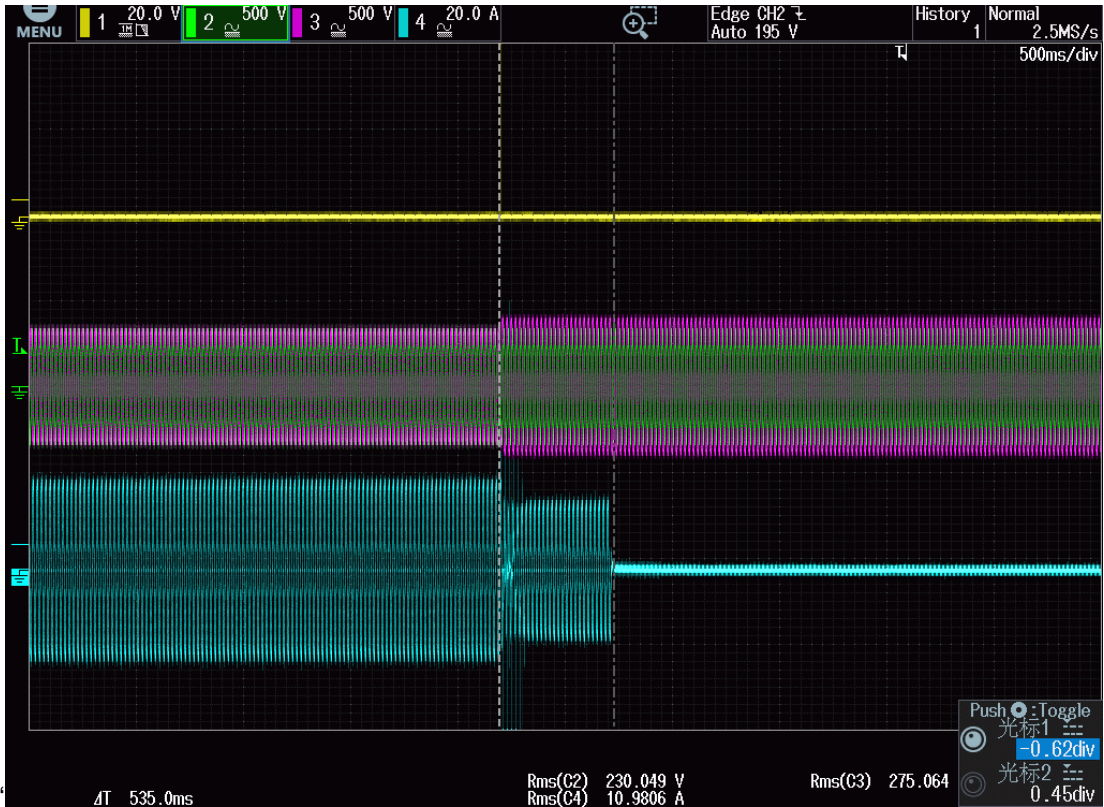


Figure 15 – Test O/V stage 2 (Trip test, L1-N)

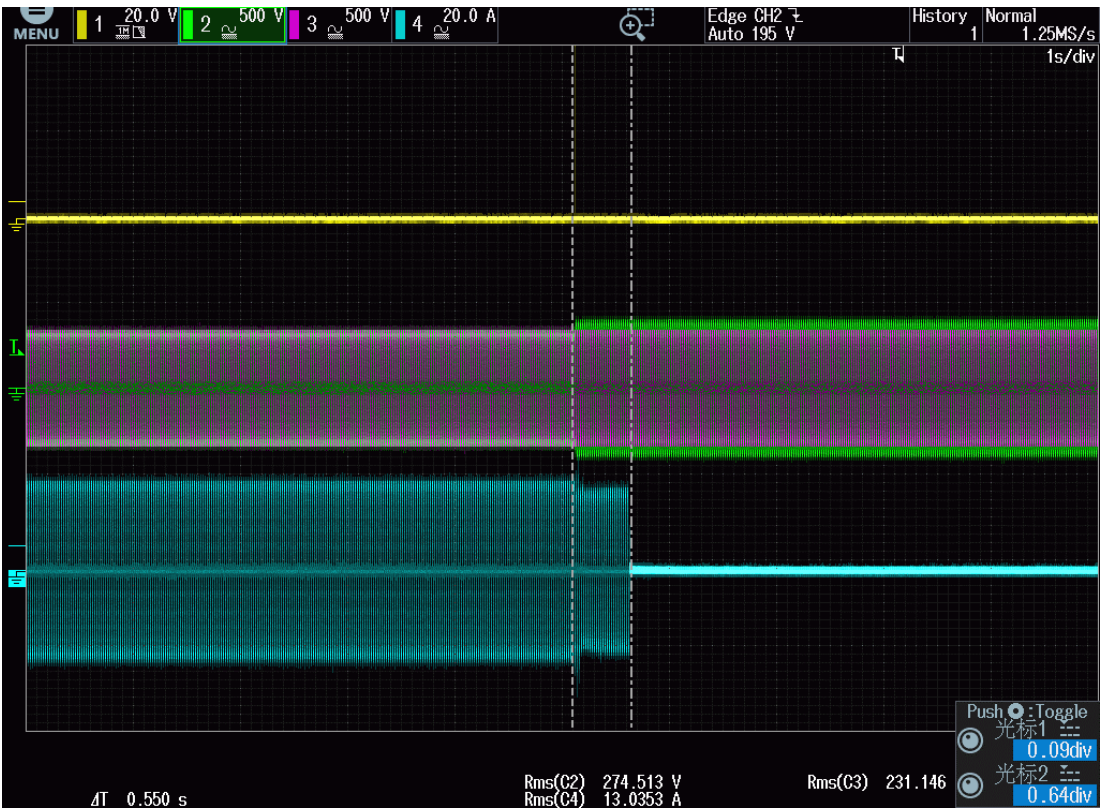


Figure 16 – Test O/V stage 2 (Trip test, L2-N)

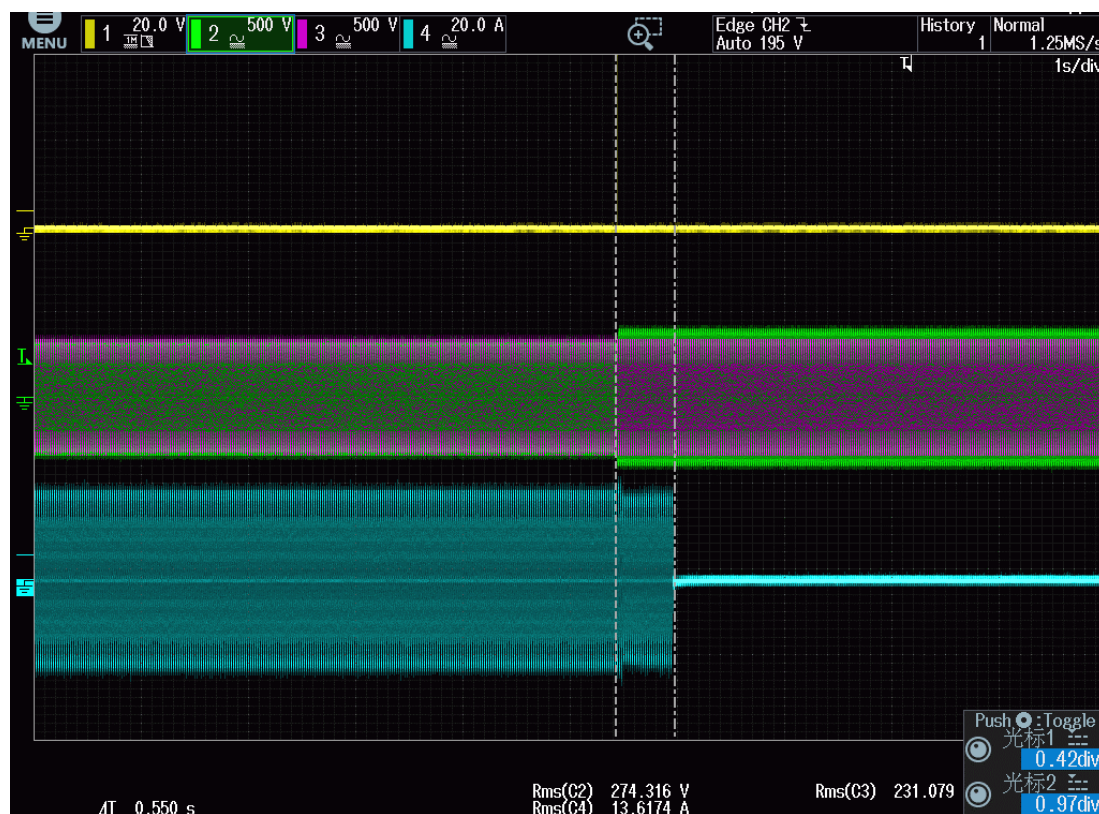


Figure 17 – Test O/V stage 2 (Trip test, L3-N)

6.6.3 Protection – Loss of Mains test

For PV **Inverters** shall be tested in accordance with BS EN 62116. Other **Micro-generators** should be tested in accordance with A.2.2.4 at 10%, 55% and 100% of rated power.

☒ **Micro-generator** technology: PV **Inverter** ⁶

The following sub set of tests should be recorded in the following table. **Micro-generator** technology

Test Power and imbalance	33% -5%Q (Test 22)	66% -5%Q (Test 12)	100% -5%P (Test 5)	33% +5%Q (Test 31)	66% +5%Q (Test 21)	100% +5%P (Test 10)
Trip time [s]	0.144	0.224	0.150	0.136	0.224	0.150
Trip time limit [s]	0.5s ⁷					

Note:

For full testing according to BS EN 62116 see *Annex 1 - Loss of Mains test according to BS EN 62116*.

6.6.4 Protection – Frequency change, Vector Shift Stability test

This test should be carried out in accordance with EREC G98 Annex A1 A.1.2.6 (**Inverter** connected) or Annex A2 A.2.2.6 (Synchronous). Confirmation is required that the **Micro-generating Plant** does not trip under positive / negative vector shift.

The following sub set of tests should be recorded in the following table.

Test 1: according to EREC G98, Appendix 3, Form C

⁶ In this report, the PV inverter test method is applied to hybrid inverters (PV + DC-coupled energy storage).

⁷ If the device requires additional shut down time (beyond 0.5 s but less than 1 s) then this should be stated on this form.

	Start Frequency	Change	Confirm no trip
Positive Vector Shift	49.0 Hz	+50 degrees	No trip occurred
Negative Vector Shift	50.0 Hz	- 50 degrees	No trip occurred
Test 2: according to EREC G98 clause 10.3.4			
	Start Frequency	Change	Confirm no trip
Positive Vector Shift	49.5 Hz	+50 degrees	No trip occurred
Negative Vector Shift	50.5 Hz	- 50 degrees	No trip occurred



Figure 18 – Test 1: Positive Step Change (+50 degrees)

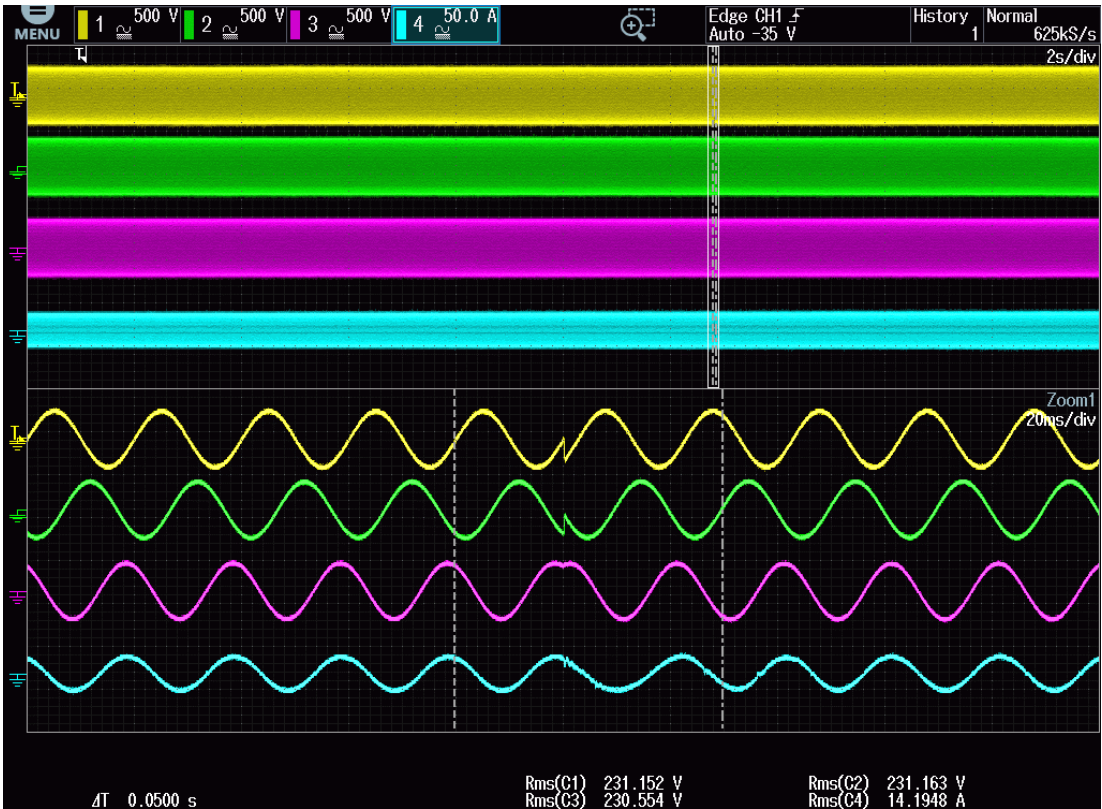


Figure 19 – Test 1: Negative Step Change (-50 degrees)

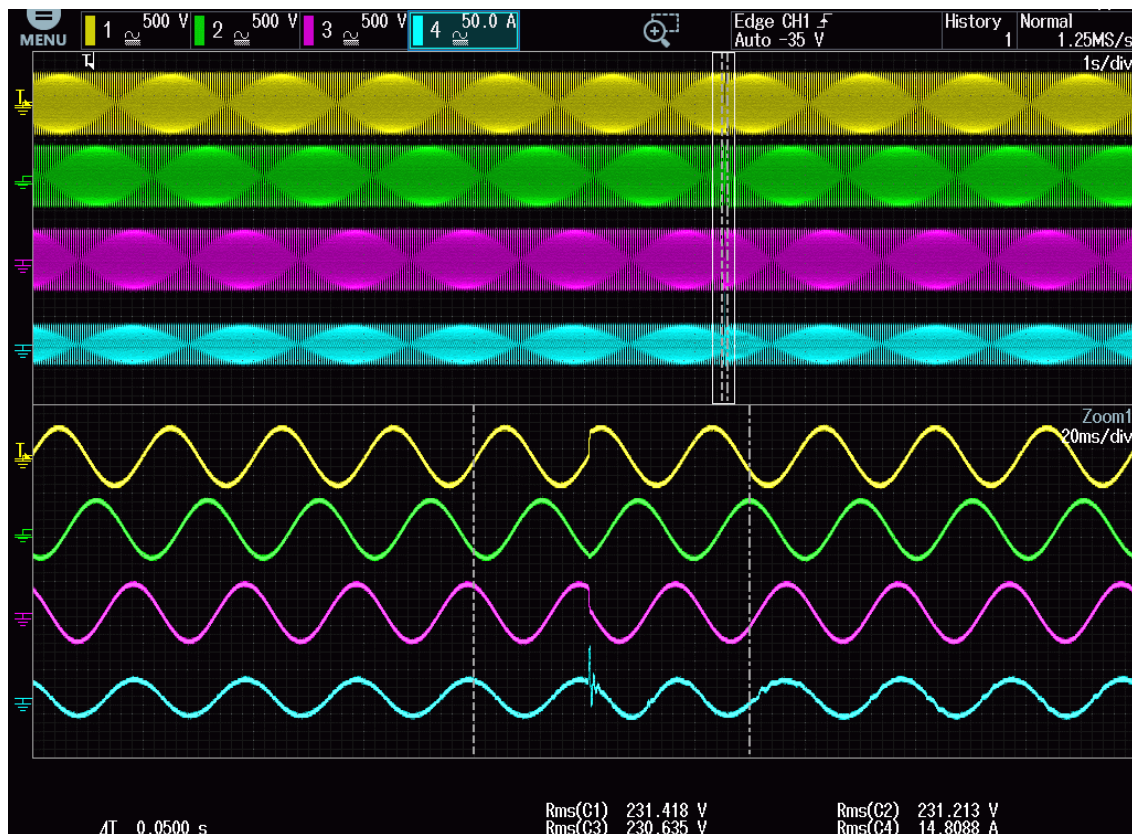


Figure 20 – Test 2: Positive Step Change (+50 degrees)

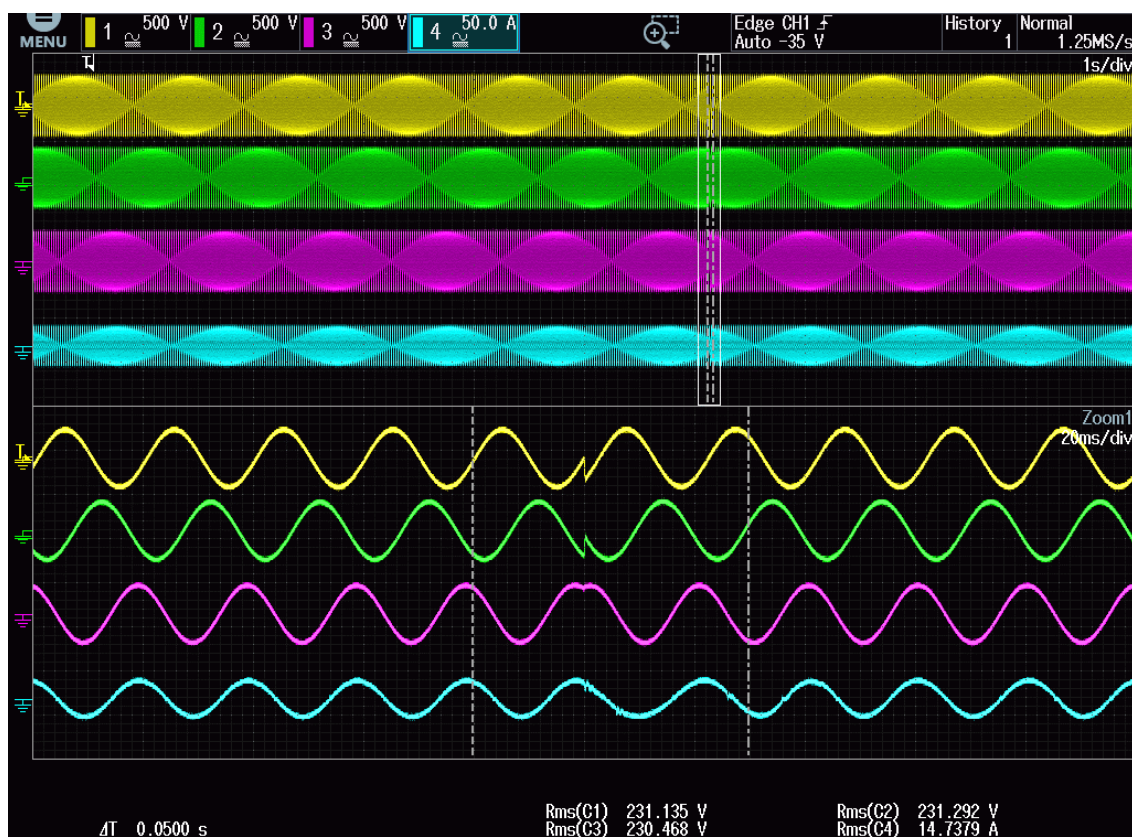


Figure 21 – Test 2: Negative Step Change (-50 degrees)

6.6.5 Protection – Frequency change, RoCoF Stability test

The requirement is specified in section 11.3, test procedure in Annex A.1.2.6 (Inverter connected) or Annex A2 A.2.2.6 (Synchronous). Confirmation is required that the Micro-generating Plant does not trip for the duration of the ramp up and ramp down test.

The following sub set of tests should be recorded in the following table.

Ramp range	Test frequency ramp:	Test Duration	Confirm no trip
49.0 Hz to 51.0 Hz	+0.95 Hz/s	2.1 s	No trip occurred
51.0 Hz to 49.0 Hz	-0.95 Hz/s	2.1 s	No trip occurred

Note:

During the test, the LFSM-O function was activated.

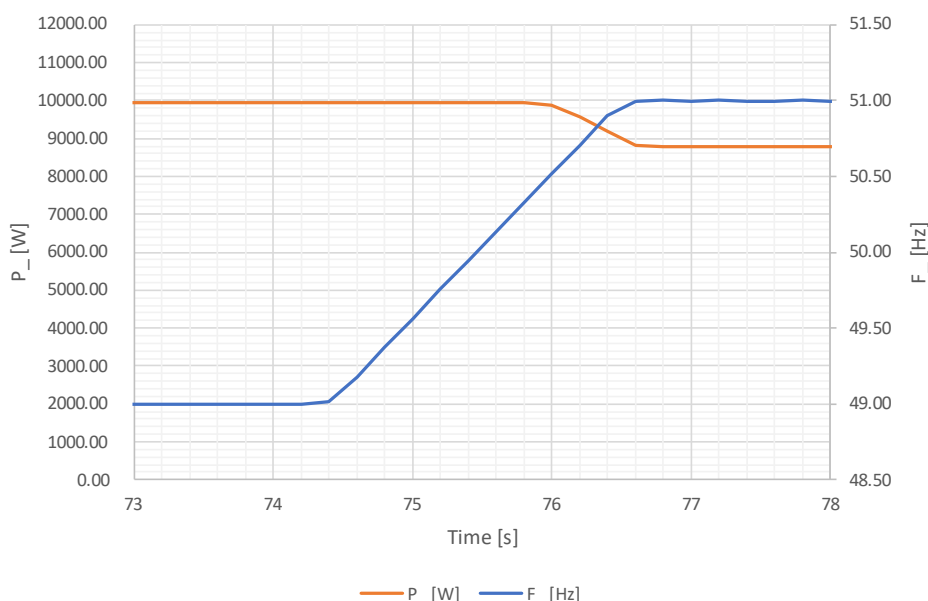


Figure 22 – Positive Frequency Drift (+0.95 Hz/s)

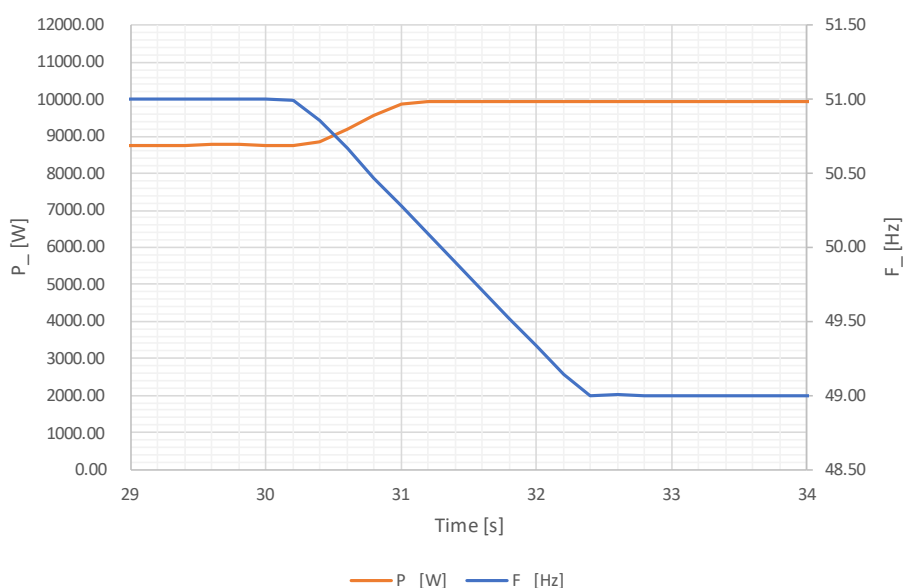


Figure 23 – Negative Frequency Drift (-0.95 Hz/s)

6.7 Limited Frequency Sensitive Mode – Overfrequency test

This test should be carried out in accordance with A.1.2.8. The test should be carried out using the specific threshold frequency of 50.4 Hz and Droop of 10%. The measurement tolerances are contained in A.1.2.8.				
Test sequence at Registered Capacity >80%	Measured Active Power Output [W]	Frequency [Hz]	Primary Power Source [W]	Active Power Gradient Droop
Step a) 50.00Hz ± 0.01Hz	10052	50.00	10600	---
Step b) 50.45Hz ± 0.05Hz	9952	50.45		---
Step c) 50.70Hz ± 0.10Hz	9370	50.70		8.60% ¹⁾
Step d) 51.15Hz ± 0.05Hz	8480	51.15		10.12% ²⁾
Step e) 50.70Hz ± 0.10Hz	9367	50.70		10.15% ³⁾
Step f) 50.45Hz ± 0.05Hz	9951	50.45		8.57% ⁴⁾
Step g) 50.00Hz ± 0.01Hz	10052	50.00		---
	1 st Droop (calculated using frequency and power between steps d) & b))			9.52%
	2 nd Droop (calculated using frequency and power between steps f) & d))			9.52%
Test sequence at Registered Capacity 40% - 60%	Measured Active Power Output [W]	Frequency [Hz]	Primary Power Source [W]	Active Power Gradient Droop
Step a) 50.00Hz ± 0.01Hz	4971	50.00	5300	---
Step b) 50.45Hz ± 0.05Hz	4903	50.45		---
Step c) 50.70Hz ± 0.10Hz	4410	50.70		10.14% ¹⁾
Step d) 51.15Hz ± 0.05Hz	3514	51.15		10.04% ²⁾
Step e) 50.70Hz ± 0.10Hz	4410	50.70		10.04% ³⁾
Step f) 50.45Hz ± 0.05Hz	4903	50.45		10.14% ⁴⁾
Step g) 50.00Hz ± 0.01Hz	4973	50.00		---
	1 st Droop (calculated using frequency and power between steps d) & b))			10.08%
	2 nd Droop (calculated using frequency and power between steps f) & d))			10.08%

Note:

* Test according to Annex A.1.2.9. Frequency/time plots attached (see Figure 24 & Figure 9)

¹⁾ Droop calculated using frequency and power between steps c) & b)

- 2) Droop calculated using frequency and power between steps d) & c)
- 3) Droop calculated using frequency and power between steps e) & d)
- 4) Droop calculated using frequency and power between steps f) & e)

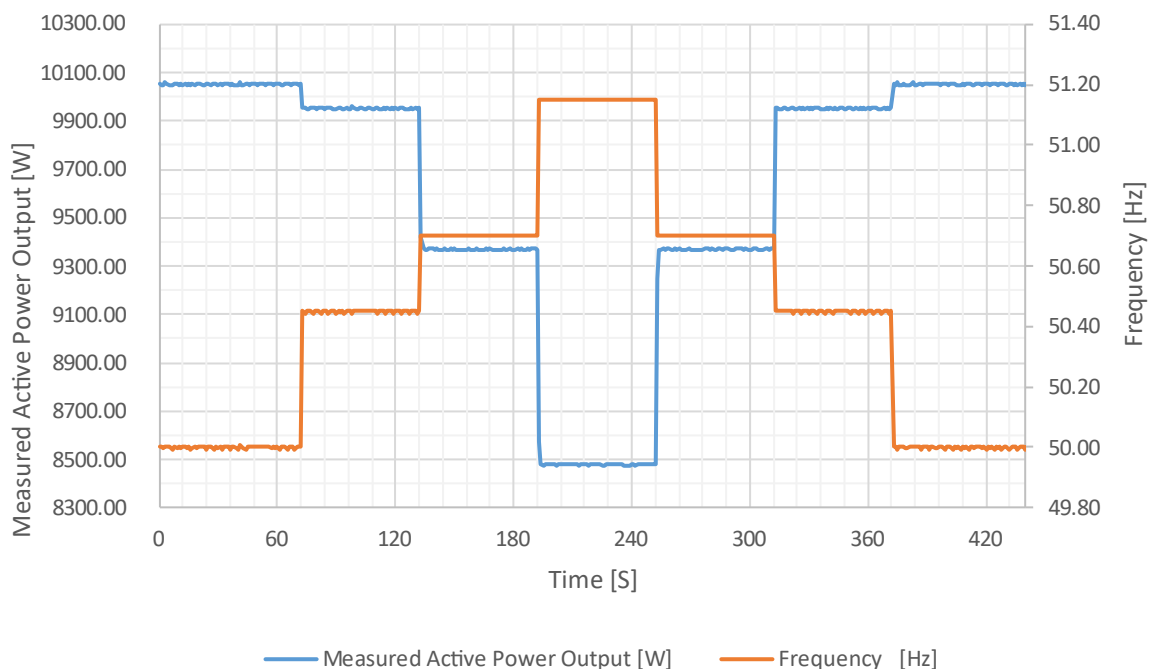


Figure 24 – Test sequence at Registered Capacity >80%

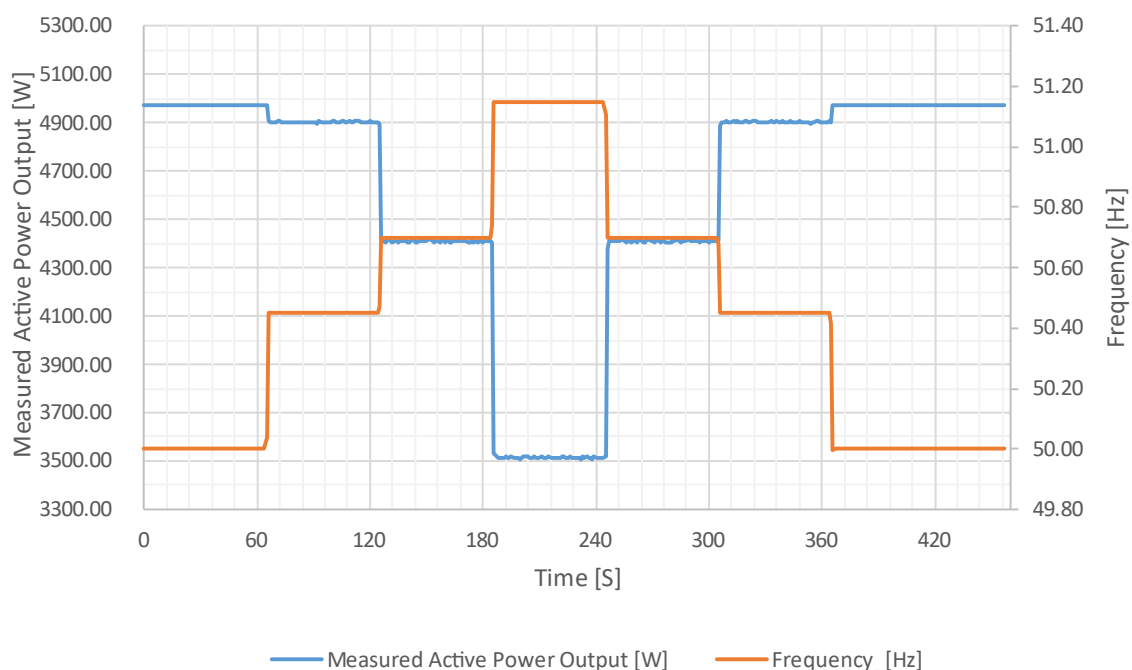


Figure 25 – Test sequence at Registered Capacity 40% - 60%

6.8 Power output with falling frequency test

This test should be carried out in accordance with A.1.2.7.

Test sequence	Measured Active Power Output [W]	Frequency [Hz]	Primary power source [W]
Test a) 50 Hz \pm 0.01 Hz	10066	50.00	10331
Test b) Point between 49.5 Hz and 49.6 Hz	10055	49.55	10288
Test c) Point between 47.5 Hz and 47.6 Hz	9911	47.55	10030

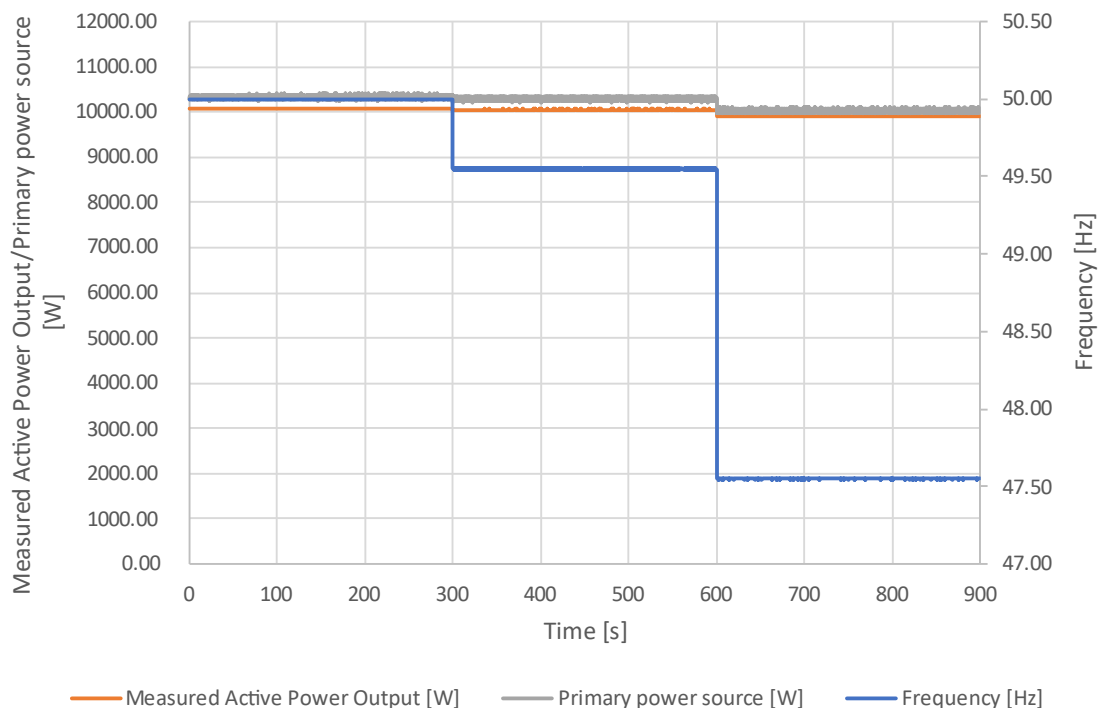


Figure 26 – Power output with falling frequency at Test a) → Test b) → Test c)

Note:

The operating point in Test (b) and (c) shall be maintained for at least 5 minutes.

6.9 Re-connection timer

Test should prove that the reconnection sequence starts after a minimum delay of 20 s for restoration of voltage and frequency to within the stage 1 settings of Table 2. Both the time delay setting and the measured delay should be provided in this form; both should be greater than 20 s to pass. Confirmation should be provided that the **Micro-generating Plant** does not reconnect at the voltage and frequency settings below; a statement of “no reconnection” can be made.

Time delay setting	Measured delay	Checks on no reconnection when voltage or frequency is brought to just outside stage 1 limits of table 2.			
30 s	50.6 s	At 1.16 pu (266.2 V LV connection)	At 0.78 pu (180.0 V LV connection)	At 47.4 Hz	At 52.1 Hz
Confirmation that the Micro-generator does not re-connect.		No reconnection occurred	No reconnection occurred	No reconnection occurred	No reconnection occurred

6.10 Fault level contribution

These tests shall be carried out in accordance with EREC G98 Annex A1 A.1.3.5 (Inverter connected) and Annex A2 A.2.3.4 (Synchronous). Please complete each entry, even if the fault contribution is zero.					
For machines with electro-magnetic output			For Inverter output		
Parameter	Symbol	Value	Time after fault	Volts	Amps
Peak Short Circuit current	i_p	--	20 ms	L1: 67.7 L2: 58.8 L3: 57.6	L1: 8.7 L2: 13.2 L3: 13.5
Initial Value of aperiodic current	A	--	100 ms	L1: 48.1 L2: 47.8 L3: 48.0	L1: 0.6 L2: 0.4 L3: 0.7
Initial symmetrical short-circuit current*	I_k	--	250 ms	L1: 48.8 L2: 48.5 L3: 48.5	L1: 0.6 L2: 0.4 L3: 0.6
Decaying (aperiodic) component of short circuit current*	i_{DC}	--	500 ms	L1: 48.6 L2: 49.4 L3: 48.1	L1: 0.5 L2: 0.5 L3: 0.5
Reactance/Resistance Ratio of source*	X/R	--	Time to trip	0.057	In seconds
<p>Note:</p> <p>For rotating machines and linear piston machines the test should produce a 0 s – 2 s plot of the short circuit current as seen at the Micro-generator terminals.</p> <p>* Values for these parameters should be provided where the short circuit duration is sufficiently long to enable interpolation of the plot</p>					

6.11 Logic interface (input port)

Confirm that an input port is provided and can be used to reduce the Active Power output to zero	Yes
Provide high level description of logic interface, e.g. details in 9.4.3 such as AC or DC signal (the additional comments box below can be used)	Yes
<p>Note:</p> <p>For details see “Additional comments.” Below.</p>	

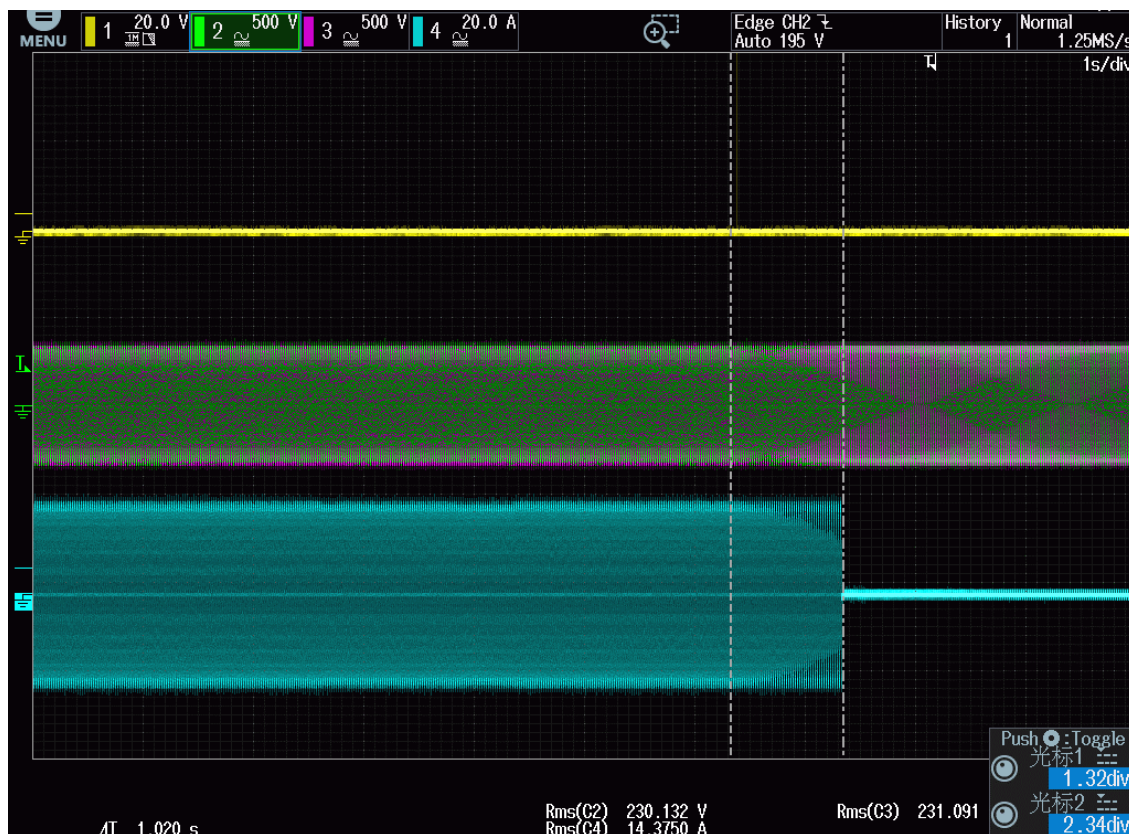


Figure 27 – Test ceasing active power output using logic interface

6.12 Self-Monitoring solid state switching

No specified test requirements. Refer to EREC G98 Annex A1 A.1.3.6 (Inverter connected).	
It has been verified that in the event of the solid state switching device failing to disconnect the Micro-generator , the voltage on the output side of the switching device is reduced to a value below 50 V within 0.5 s.	N/A
<p>Note:</p> <p>The PGU used electromechanical relay to disconnect from the grid. No solid-state switching device available.</p>	

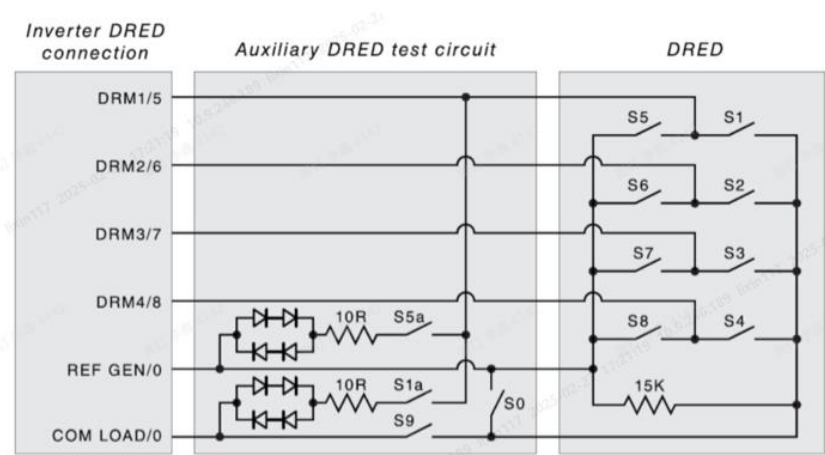
6.13 Cyber security

Confirm that the Manufacturer or Installer of the Micro-generator has provided a statement describing how the Micro-generator has been designed to comply with cyber security requirements, as detailed in 9.7.	Yes. Manufacturer's declaration provided. See <i>Annex 2 - Manufacturer's declaration regarding Cyber Security</i> .
---	---

Additional comments.

High level description of logic interface:
The PGU equipped with a logic interface for ceasing active power output within 5 s following an instruction being received. The following is a possible configuration (if another configuration is required, this can be agreed with the manufacturer):

DRM Schematic Diagram of The Circuit



Software Control Logic

By operating the DRM1, DRM2, DRM3, DRM4 switches, making it in a certain state of 0 and 1, the software is controlled to complete the control within 5s, and the specific control logic is as follows; For example, when the switch is in the 0000 state, the inverter outputs 100% of the maximum power.

FYI: If you have any questions, please contact the manufacturer

	8	4	2	1		output
Ordinal number	DRM4	DRM3	DRM2	DRM1	Decimalism	Max output power
1	0	0	0	0	0	100%
2	0	0	0	1	1	0%
3	0	0	1	0	2	30%
4	0	0	1	1	3	0%
5	0	1	0	0	4	60%
6	0	1	0	1	5	0%
7	0	1	1	0	6	30%
8	0	1	1	1	7	0%
9	1	0	0	0	8	100%
10	1	0	0	1	9	100%
11	1	0	1	0	10	100%
12	1	0	1	1	11	100%
13	1	1	0	0	12	100%
14	1	1	0	1	13	100%
15	1	1	1	0	14	100%
16	1	1	1	1	15	100%

Annex 1 - Loss of Mains test according to BS EN 62116

No.	P _{EUT} ^a (% of EUT rating)	Reactive load (% of Q _L in 6.1d1))	P _{AC} ^b (% of nominal)	Q _{AC} ^c (% of nominal)	Run on time (ms)	P _{EUT} (W)	Actual Q _f	V _{DC} (V)	Remarks ^d
1	100	100	0	0	159	10000	1.012	643	Test A at BL
2	66	66	0	0	224	6600	0.976	485	Test B at BL
3	33	33	0	0	171	3300	1.005	296	Test C at BL
4	100	100	-5	-5	164	10000	1.038	643	Test A at IB
5	100	100	-5	0	150	10000	1.065	643	Test A at IB
6	100	100	-5	+5	146	10000	1.091	643	Test A at IB
7	100	100	0	-5	161	10000	0.986	643	Test A at IB
8	100	100	0	+5	174	10000	1.037	643	Test A at IB
9	100	100	+5	-5	145	10000	0.939	643	Test A at IB
10	100	100	+5	0	150	10000	0.964	643	Test A at IB
11	100	100	+5	+5	161	10000	0.988	643	Test A at IB
12	66	66	0	-5	224	6600	0.951	485	Test B at IB
13	66	66	0	-4	224	6600	0.956	485	Test B at IB
14	66	66	0	-3	224	6600	0.961	485	Test B at IB
15	66	66	0	-2	224	6600	0.966	485	Test B at IB
16	66	66	0	-1	224	6600	0.971	485	Test B at IB
17	66	66	0	1	224	6600	0.981	485	Test B at IB
18	66	66	0	2	224	6600	0.985	485	Test B at IB
19	66	66	0	3	224	6600	0.990	485	Test B at IB
20	66	66	0	4	224	6600	0.995	485	Test B at IB
21	66	66	0	5	224	6600	1.000	485	Test B at IB
22	33	33	0	-5	144	3300	0.979	296	Test C at IB
23	33	33	0	-4	144	3300	0.984	296	Test C at IB
24	33	33	0	-3	148	3300	0.989	296	Test C at IB
25	33	33	0	-2	152	3300	0.994	296	Test C at IB
26	33	33	0	-1	157	3300	1.000	296	Test C at IB
27	33	33	0	1	165	3300	1.010	296	Test C at IB
28	33	33	0	2	155	3300	1.015	296	Test C at IB
29	33	33	0	3	147	3300	1.020	296	Test C at IB
30	33	33	0	4	146	3300	1.024	296	Test C at IB
31	33	33	0	5	136	3300	1.029	296	Test C at IB
Additional tests required if any of the recorded run-on times of tests No. 4 ~ 11 longer than that of test No. 1:									
32	100	100	-10	-10	154	10000	1.067	643	Test A at IB
33	100	100	-10	-5	139	10000	1.096	643	Test A at IB
34	100	100	-10	0	158	10000	1.124	643	Test A at IB
35	100	100	-10	+5	174	10000	1.152	643	Test A at IB
36	100	100	-10	+10	153	10000	1.179	643	Test A at IB

37	100	100	-5	-10	142	10000	1.010	643	Test A at IB
38	100	100	-5	+10	143	10000	1.117	643	Test A at IB
39	100	100	0	-10	150	10000	0.960	643	Test A at IB
40	100	100	0	+10	147	10000	1.061	643	Test A at IB
41	100	100	+5	-10	158	10000	0.914	643	Test A at IB
42	100	100	+5	+10	146	10000	1.011	643	Test A at IB
43	100	100	+10	-10	152	10000	0.873	643	Test A at IB
44	100	100	+10	-5	146	10000	0.897	643	Test A at IB
45	100	100	+10	0	144	10000	0.920	643	Test A at IB
46	100	100	+10	+5	146	10000	0.943	643	Test A at IB
47	100	100	+10	+10	165	10000	0.965	643	Test A at IB

^a P_{EUT} : EUT output power.

^b P_{AC} : Active power flow at S1 in Figure 1. Positive means power from EUT to utility. Nominal is the 0 % test condition value.

^c Q_{AC} : Reactive power flow at S1 in Figure 1. Positive means power from EUT to utility. Nominal is the 0 % test condition value.

^d BL: balance condition, IB: imbalance condition.

Annex 2 - Manufacturer's declaration regarding Cyber Security

AUXSOL

Ningbo AUX Solar Technology Co., Ltd.
No. 17 Fenglin Road, Cichang Town, Jiangbei District, Ningbo City, Zhejiang
Province, China

Manufacture's declaration in accordance with the requirements of

G99-Amd.10 (2024-03) standard Sec.s 9.1.7 regarding

"Cyber Security"

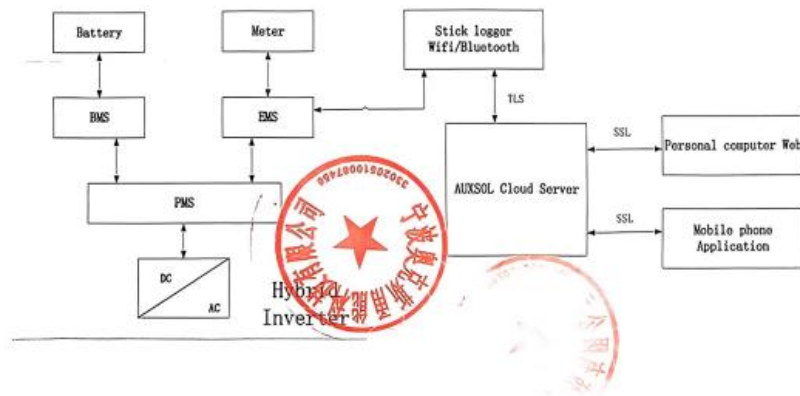
We AUXSOL declare under our sole responsibility that the products referred to below,

Hybrid solar inverter:

ASG-5TL-ZH, ASG-6TL-ZH, ASG-8TL-ZH, ASG-10TL-ZH,
ASG-12TL-ZH, ASG-15TL-ZH, ASG-20TL-ZH

In the name of the Company declares the following:

1)The Hybrid solar inverter include a system of internal and external logic communications as summarized in the following scheme:



AUXSOL

Ningbo AUX Solar Technology Co., Ltd.
No. 17 Fenglin Road, Cicheng Town, Jiangbei District, Ningbo City, Zhejiang
Province, China

where the main components involved and their main functions are explained in the following table:

acronym/name	meaning	function	location
EMS	Energy Management System	Send control instructions from the user to PMS and report the current status data of the inverter to the user	Communication
BMS	Battery Management System	Send battery voltage, current, temperature, status, and other data to EMS	Battery
PMS	Power Management System	Receive data from EMS for power control on the DC and AC sides, and return status data on the DC and AC sides to EMS	Inverter
GW	Gate-Way	Transmission of data to cloud server, reception of commands from user	Stick logger
Meter	AC Meter	Electrical parameters measures, such as feed power, current, voltage	Grid port or Load port

2) All communications between internal components of the inverter, and between EMS and meter, take place via appropriate serial lines (RS485) and are not directly connected to any device or system outside the inverter.

3) The communication port between the inverter and the outside is only composed of optional stick logger on the machine; And the communication method between the inverter and the outside world can be selected according to customer requirements, such as Wifi or Bluetooth.

4) The direct receiver/sender of communication with the inverter is AUXSOL Cloud Server. In this case, communication security is ensured by using TLS technology. By integrating software-hardware encrypted computing capabilities, AUXSOL Cloud delivers a secure and reliable platform environment for diverse scenarios.

5) Based on the above concepts, AUXSOL Cloud has launched the Confidentiality solution, providing integrated AI security and privacy protection mechanisms that span the entire lifecycle of large model data and cover end-to-cloud scenarios. In any case, all communication between the AUXSOL Cloud Server and the subject/parties is protected by SSL technology to achieve the goal of improving internet communication security at the root.

Date: 2025/03/07

Signature:

Annex 3 - CE declaration

LVD


Total Quality. Assured.

Test Verification of Conformity

Verification Number: 240625060GZU-VOC001

On the basis of the tests undertaken, the sample<s> of the below product has been tested by an accredited 3rd party laboratory in accordance to the referenced specification<s>/standard<s> at the time the tests were carried out. This verification is part of the full test report<s> and should be read in conjunction with it <them>.

This document can be used in support of a claim in meeting relevant EU legislation and mandatory Conformity Marking. And in accordance with EU / UK law, the claim is the sole obligation of the Manufacturer/ Importer.

Applicant Name & Address:	Ningbo AUX Solar Technology Co., Ltd. No. 17 Fenglin Road, Cicheng Town, Jiangbei District, Ningbo City, Zhejiang Province, China
Product Description:	Hybrid solar inverter
Ratings & Principle Characteristics:	See APPENDIX: Test Verification of Conformity
Models/Type References:	ASG-5TL-ZH, ASG-6TL-ZH, ASG-8TL-ZH, ASG-10TL-ZH, ASG-12TL-ZH, ASG-15TL-ZH, ASG-20TL-ZH
Brand Names:	AUXSOL
Specification<s>/Standards:	IEC/EN 62109-1: 2010 Safety of power converters for use in photovoltaic power systems – Part 1: General requirements IEC/EN 62109-2: 2011 Safety of power converters for use in photovoltaic power systems – Part 2: Particular requirements for inverters IEC 62477-1:2022 EN 62477-1:2012 + A12:2021 Safety requirements for power electronic converter systems and equipment Part 1: General Low Voltage Directive 2014/35/EU
Verification Issuing Office Name & Address:	Intertek Testing Services Shenzhen Ltd. Guangzhou Branch Room 02, & 101/E201/E301/E401/E501/E601/E701/E801 of Room 01 1-8/F., No. 7-2, Caipin Road, Science City, GETDD, Guangzhou, Guangdong, China
Date of Tests:	04 Jul 2024 – 25 Jul 2024
Test Report Number(s):	240625060GZU-001, 240625060GZU-002, 240625060GZU-003
Additional information in Appendix:	
Signature	
Name: Jason Fu	
Position: Supervisor	
Date: 09 August 2024	

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IntertekPage 1 of 3GFT-OP-11a (09 March 2024)

APPENDIX: Test Verification of Conformity

This is an Appendix to Test Verification of Conformity Number: 240625060GZU-VOC001

Ratings & Principle
Characteristics::

Model	ASG-STL-ZH		ASG-6TL-ZH	ASG-8TL-ZH
PV Input				
Max. input voltage	1000V			
MPPT voltage range	170-900V			
Max. input current	16A/16A		26A/26A	
Max. short circuit current	20A/20A		32A/32A	
Input Battery				
Battery type	Li-ion			
Battery voltage range	180-800V			
Max.charge/discharge current	30A/30A			
Output AC (Grid side)				
Rated output power	5kW	6kW	8kW	
Max. apparent output power	5.0kVA	6.0kVA	8.0kVA	
Rated grid voltage	3/N/PE, 380V/400V			
Rated grid frequency	50Hz/60Hz			
Max. output current	11.4A	13.6A	18.2A	
Power factor	>0.99 default (0.8 leading...0.8 lagging)			
Input AC (Grid side)				
Rated input power	5kW	6kW	8kW	
Max. input power	10kW	12kW	16kW	
Max. input current	15.2A	18.2A	24.2A	
Rated input voltage	3/N/PE, 380/400V			
Rated input frequency	50/60Hz			
Output AC (Back-up)				
Rated output power	5kW	6kW	8kW	
Max. output current	7.6A	9.1A	12.1A	
Rated output voltage	380V/400V			
Rated frequency	50/60Hz			
Ambient temperature range	-30...+60°C			
Degree of protection	IP66			
Software Version	DSP: A6050; ARM: A3023			



Signature

Name: Jason Fu

Position: Supervisor

Date: 09 August 2024

This Verification is for the exclusive use of Intertek's client and is provided pursuant to the agreement between Intertek and its Client. Intertek's responsibility and liability are limited to the terms and conditions of the agreement. Intertek assumes no liability to any party, other than to the Client in accordance with the agreement, for any loss, expense or damage occasioned by the use of this Verification. Only the Client is authorized to permit copying or distribution of this Verification. Any use of the Intertek name or one of its marks for the sale or advertisement of the tested material, product or service must first be approved in writing by Intertek. The observations and test/inspection results referenced in this Verification are relevant only to the sample tested/inspected. This Verification by itself does not imply that the material, product, or service is or has ever been under an Intertek certification program.

APPENDIX: Test Verification of Conformity

This is an Appendix to Test Verification of Conformity Number: 240625060GZU-VOC001

Ratings & Principle
Characteristics::

Model	ASG-10TL- ZH	ASG-12TL- ZH	ASG-15TL- ZH	ASG-20TL- ZH
PV Input				
Max. input voltage	1000V			
MPPT voltage range	170-900V		170-900V	
Max. input current	26A/26A		36A/36A	
Max. short circuit current	32A/32A		45A/45A	
Input Battery				
Battery type	Li-ion			
Battery voltage range	180-800V			
Max. charge/discharge current	30A/30A		2×30A/2×30A	
Output AC (Grid side)				
Rated output power	10kW	12kW	15kW	20kW
Max. apparent output power	10kVA	12kVA	15kVA	20kVA
Rated grid voltage	3/N/PE, 380V/400V			
Rated grid frequency	50Hz/60Hz			
Max. output current	22.7A	27.3A	34.1A	45.5A
Power factor	>0.99 default (0.8 leading...0.8 lagging)			
Input AC (Grid side)				
Rated input power	10kW	12kW	15kW	20kW
Max. input power	20kW	24kW	30kW	40kW
Max. input current	30.3A	36.4A	45.5A	45.5A
Rated input voltage	3/N/PE, 380/400V			
Rated input frequency	50/60Hz			
Output AC (Back-up)				
Rated output power	10kW	12kW	15kW	20kW
Max. output current	15.2A	18.2A	22.7A	30.3A
Rated output voltage	380V/400V			
Rated frequency	50/60Hz			
Ambient temperature range	-30...+60°C			
Degree of protection	IP66			
Software Version	DSP: A6050; ARM: A3023			



Signature

Name: Jason Fu

Position: Supervisor

Date: 09 August 2024

This Verification is for the exclusive use of Intertek's client and is provided pursuant to the agreement between Intertek and its Client. Intertek's responsibility and liability are limited to the terms and conditions of the agreement. Intertek assumes no liability to any party, other than to the Client in accordance with the agreement, for any loss, expense or damage occasioned by the use of this Verification. Only the Client is authorized to permit copying or distribution of this Verification. Any use of the Intertek name or one of its marks for the sale or advertisement of the tested material, product or service must first be approved in writing by Intertek. The observations and test/inspection results referenced in this Verification are relevant only to the sample tested/inspected. This Verification by itself does not imply that the material, product, or service is or has ever been under an Intertek verification program.

EMC


				<p>Shenzhen Nore Testing Center Co., Ltd. South, No.1, Building 10, Maqueling Industrial Zone, Nanshan Shenzhen, Guangdong, 518057, China TEL: +86-755-33525266 Web: www.ntc-c.com</p>	
<h2>CERTIFICATE OF CONFORMITY</h2>					
<p>Electromagnetic Compatibility Directive 2014/30/EU</p>					
<p>Certificate No.: SZNTC2406026EV00</p>					
Applicant	:	Ningbo AUX Solar Technology Co., Ltd.			
Address	:	No. 17 Fenglin Road, Cicheng Town, Jiangbei District, Ningbo City, Zhejiang Province, China			
Manufacturer	:	Ningbo AUX Solar Technology Co., Ltd.			
Address	:	No. 17 Fenglin Road, Cicheng Town, Jiangbei District, Ningbo City, Zhejiang Province, China			
Factory	:	Ningbo AUX Solar Technology Co., Ltd.			
Address	:	No. 17 Fenglin Road, Cicheng Town, Jiangbei District, Ningbo City, Zhejiang Province, China			
E.U.T.	:	Hybrid solar inverter			
Brand Name	:	AUXSOL			
Model No.	:	ASG-20TL-ZH, ASG-15TL-ZH, ASG-12TL-ZH, ASG-10TL-ZH, ASG-8TL-ZH, ASG-6TL-ZH, ASG-5TL-ZH			
Test Report No.	:	SZNTC2406026EV00			
Standard	:	EN IEC 61000-6-1: 2019 EN IEC 61000-6-2: 2019 EN IEC 61000-6-3: 2021 EN IEC 61000-6-4: 2019 EN 61000-3-12: 2011 EN IEC 61000-3-11: 2019			
		 Ran Song July 15, 2024			
<p>The certificate of conformity is based on an evaluation of a sample of the above mentioned product. Technical report and documentation are at the applicant's disposal. This is to certify that the tested sample is in conformity with all provisions of Annex I of Council Directive 2014/30/EU, in its latest amended version, referred to EMC Directive. The certificate does not imply assessment of the production and does not permit the use of Lab's logo.</p>					
<p>Remark: The CE Marking may be used only if all relevant and effective EC Directives are complied with.</p>					





Annex 4 - Proof of conformity of the protection relay



Note:

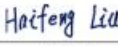
The full version of the attached document is available at the laboratory for reference.

Relay model: HF161F-40W

Zertifikat		Certificate		TÜVRheinland	
Zertifikat Nr.	Certificate No.	Blatt Sheet			
R 50475730		0006			
Ihr Zeichen	Client Reference	Unser Zeichen	Our Reference	Ausstellungsdatum	Date of Issue
H.S.J		01-LHF-50399690	004	20.04.2022	(day/month/year)
Genehmigungsinhaber License Holder			Fertigungsstätte Manufacturing Plant		
Xiamen Hongfa Electroacoustic Co., Ltd.			Refer to latest revision of the annex list of factories		
No. 91-101, Sunban South Rd.					
Jimei North Ind. District					
Xiamen					
361021 Fujian					
P.R. China					
Prüfzeichen Test Mark		Geprüft nach Tested acc. to			
		EN 61810-1:2015+A1			
Type Approved Safety Regular Production Surveillance		IEC 61810-1:2015+A1			
www.tuv.com ID 1111227159					
Zertifiziertes Produkt (Geräteidentifikation) Certified Product (Product Identification)				Lizenzentgelte - Einheit License Fee - Unit	
Relay (Electromechanical Elementary Relays)					
as page 0001					
Change					
Test Requirement : See above					
Additional ratings for					
Type Designation	: HF161F-40W xHTFf				
	: x,f = See appendix 1,1 (HF)				
Rated Contact Voltage	: 277VAC				
Rated Contact Current	: 1) 50A				
	2) Making 20A (100ms)				
	Loading 50A (800ms)				
	Breaking 20A (100ms)				
	3) Making 50A (900ms)				
	Breaking 20A (100ms)				
Electrical Endurance	: 1) 6000 (85°C)				
	2) 3) 50000 (85°C)				
Remark:					
Appendix 1,1 dated on 2022-04-06 replaces Appendix 1,1 dated on 2021-03-10.					
ANLAGE (Appendix): 1,1					
<p>Dem Zertifikat liegt unsere Prüf- und Zertifizierungsordnung zugrunde und es bestätigt die Konformität des Produktes mit den oben genannten Standards und Prüfgrundlagen. Zusätzliche Anforderungen in Ländern, in denen das Produkt in Verkehr gebracht werden soll, müssen zusätzlich beachtet werden. Die Herstellung des zertifizierten Produktes wird überwacht.</p> <p>This certificate is based on our Testing and Certification Regulation and states the conformity of the product with the standards and testing requirements as indicated above. Any additional requirements in countries where the product is going to be marketed have to be considered additionally. The manufacturing of the certified product is subject to surveillance.</p>					
TÜV Rheinland LGA Products GmbH, Tillystraße 2, 90431 Nürnberg				Zertifizierungsstelle	
http://www.tuv.com/safety E-mail: markcheck@tuv.com				Kenny Shi	
Fax: +49 221 806-3935					

										
Certificate No. R50475730 0006 Our Reference 01-LHF-50399690 004 Appendix No. 1.1										
Constructional Data Form (CDF) for Electromechanical Elementary Relays										
Page 1 of 5										
License holder : Xiamen Hongfa Electroacoustic Co., Ltd. (full address) No. 91-101, Sunban South Rd., Jimei North Ind. District, Xiamen, Fujian 361021 P.R. China										
Factory1 : Xiamen Hongfa Electroacoustic Co., Ltd. (full address) No. 91-101, Sunban South Rd., Jimei North Ind. District, Xiamen, Fujian 361021 P.R. China										
Factory2 : Zhangzhou Hongfa Electroacoustic Co., Ltd. (full address) Gangyuan Industrial District, Chenxiang, Changtai, Zhangzhou, Fujian, China										
Type or Model Number : HF161F-40W xHTFf (See nomenclature on the last page) Kind of device: Electromechanical elementary relays										
Specification (contact-circuit)										
Contact material	AgSnO ₂									
Rated contact voltage	220/250/277VAC									
Rated contact current	#Making 20A Loading 40A Breaking 20A	##Ma king 40A Brea king 20A	*40 A	*43 A	#Making 10A Loading 43A Breakin g 10A	##Ma king 43A Breaki ng 10A	50A	#Makin g 20A Loadin g 50A Breakin g 20A	##Ma king 50A Brea king 20A	
cos φ	1									
L/R	--									
Frequency (Hz)	50/60Hz									
Schematics for contact loading <small>*according to Tab 16 of EN 61810-1: 2015</small>	Single-pole: a									
Kind of contacts										
Number of cycles for electrical endurance / Frequency of operation	50000		10000		300 00		6 000		500 00	
	105 °C		85 °C							
	360 Cycles/hour		360 Cycles/hour							
Number of cycles for mechanical endurance / Frequency of operation	500 000 Cycles 10 800 Cycles/hour									
Duty factor	10%									
TÜV Rheinland Group  Date _____ Signature _____					License holder Sandy Huang Xiamen Hongfa Electroacoustic Co., Ltd. Name _____ Company Stamp and Signature _____					

			
Certificate No.	R50475730 0006	Our Reference	01-LHF-50399690 004
		Appendix No.	1.1
Constructional Data Form (CDF) for Electromechanical Elementary Relays			
Type of interruption		full-disconnection	
Note:			
*the overload and endurance test are in accordance with clause 2.2 and 2.1 of annex G of IEC 62368-1:2018			
# Making 100ms, Loading 800ms, Breaking 100ms			
## Making 900ms, Breaking 100ms			

TÜV Rheinland Group		License holder	
		Sandy Huang	
Date		Xiamen Hongfa Electroacoustic Co., Ltd.	
Signature		Name	
		Company Stamp and Signature	

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Annex 5 - ISO 9001 certificate



Annex 6 - Photo of the unit

Enclosure front view



Enclosure left view



Enclosure right view



Enclosure rear view



Enclosure top view



Enclosure bottom view



Internal view



»»»» End of Test Report ««««