TESTING FOR THE VERIFICATION OF COMPLIANCE OF MICROINVERTER WITH :

VDE 0126-1-1 +VFR:2013 + VFR:2014 and VFR: 2019: AUTOMATIC DISCONNECTION DEVICE BETWEEN A GENERATOR AND THE PUBLIC LOW-VOLTAGE GRID. 2013

Protocol PE.T-LE-62

Test Report Number	:	GZES240300433301
Equipment	:	Microinverter
Trademark	:	ADAYO
Tested Model	:	ID800D
Variant Models	:	ID400A, ID400D, ID400M, ID600A, ID600D, ID600M, ID800A, ID800M

APPLICANT

Name	:	Huizhou Foryou Optoelectronics Technology Co., Ltd
Address	:	Building 6, B Area, No.1 North Shangxia Road, Dongjiang High-Tech Industry Park, Huizhou, Guangdong, China

TESTING LABORATORY

Name	:	SGS-CSTC Standards Technical Services Co., Ltd. Guangzhou Branch
Address	:	198 Kezhu Road, Science City, Economic & Technology Development Area, Guangzhou, Guangdong, China
Conducted (tested) by	:	Doris Tao Doris Tao (Project Engineer)
Reviewed & Approved by	:	Colin Chen (Technical Reviewer)
Date of issue	:	2024/04/22
Number of pages	:	68

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Test Report Historical Revision:

Test Report Version	Date	Resume
GZES240300433301	2024/04/22	First issuance. **Remarks:** According to the declaration from the applicant, the only difference between the EUT (test samples in this report) and testing sample of report GZES240100061701, which was issued by SGS-CSTC Standards Technical Services Co., Ltd. Guangzhou Branch as below: -Update applicant, manufacturer, trademark, models name, label, appearance and equipment type ect. After evaluation, no clause needs to retest. All test data originate from the report GZES240100061701, which was issued by SGS-CSTC Standards Technical Services Co., Ltd. Guangzhou Branch.

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1 SCOPE

SGS-CSTC Standards Technical Services Co., Ltd. Guangzhou Branch has been contract by Huizhou Foryou Optoelectronics Technology Co., Ltd to perform the testing according the VDE 0126-1-1:2013 +VFR:2013 + VFR:2014 and VFR: 2019: Automatic disconnection device between a generator and the public low-voltage grid.

The following standard are covered with testing:

- Enedis-PRO-RES_10E:26/06/2020 Description et étude des protections de découplage pour le raccordement des Installations de Production raccordées au Réseau Public de Distribution

2 GENERAL INFORMATION

2.1 Testing Period and Climatic conditions

The necessary testing has been performed between the 27th of January and the 13rd of March of 2024.

All the tests and checks have been performed in accordance with the reference Standard (the tests are done at 25 ± 5ºC, 96 kPa ± 10 kPa and 65% RH ± 10% RH).

SITE TEST

Name ..... : Dongguan BALUN Testing Technology Co., Ltd.

Address ..... : Room 104, 204, 205, Building 1, No. 6, Industrial South Road, Songshan Lake District, Dongguan, Guangdong, China.

2.2 Equipment under Testing

Apparatus type ..... : Microinverter (Sinlge phase)

Installation ..... : Fixed(permanent connection)

Manufacturer ..... : Huizhou Foryou Optoelectronics Technology Co., Ltd

Address ..... : Building 6, B Area, No.1 North Shangxia Road, Dongjiang High-Tech Industry Park, Huizhou, Guangdong, China

Trade mark ..... : ADAYO

Model / Type reference ..... : ID800D

Serial Number ..... : WWA2344068

Software Version ..... : DH01.001-000-000

Rated Characteristics ..... : DC Input: MPPT 33~55 Vdc (60 Vdc max.),
14 A*2 Maximum.
AC Output: 230 Vac, 50 Hz, 3.48 A, 800 W.

Date of manufacturing: 2023

Input ..... : DC

Output ..... AC

Class of protection against electric shock... : Class I

Degree of protection against moisture..... : IP 67

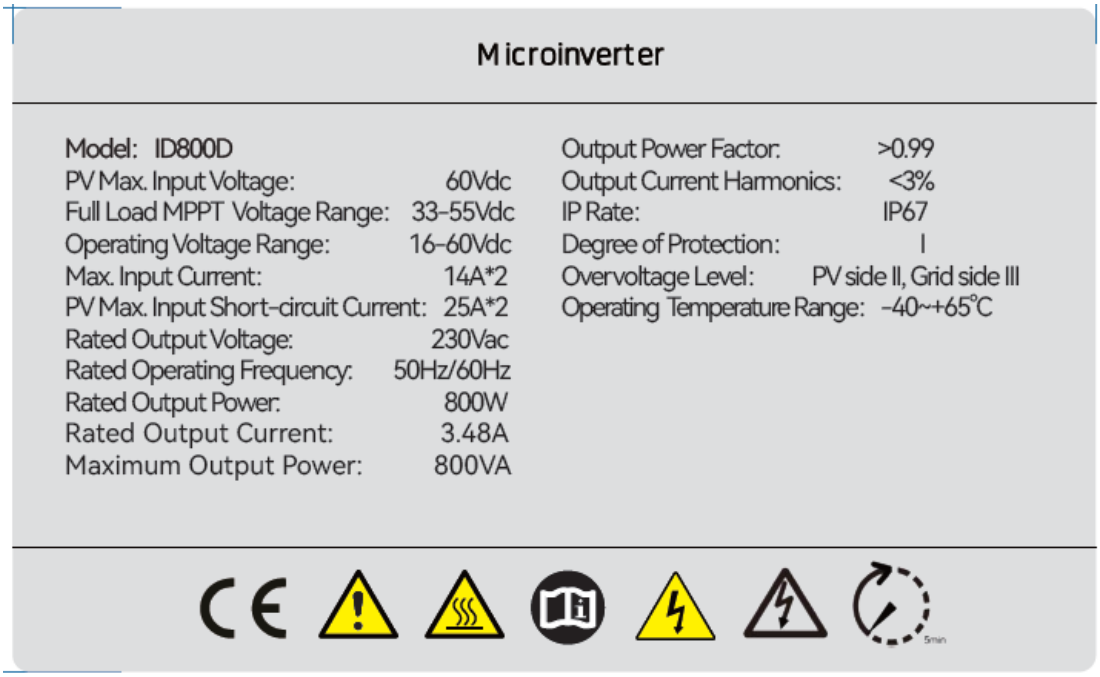
Type of connection to the main supply ..... : TN

Cooling group ..... : Natural Cooling

Modular ..... : No

Internal Transformer ..... : Yes

Copy of marking plate(representative):



Note:

1. The above markings are the minimum requirements required by the safety standard. For the final production samples, the additional markings which do not give rise to misunderstanding may be added.
2. Label is attached on the back of enclosure and visible after installation.
3. Labels of other models are as the same with ID800D's except the parameters of rating.

Equipment under testing:

- ID800D

The variants models are:

- ID800A
- ID800M
- ID600A
- ID600D
- ID600M
- ID400A
- ID400D
- ID400M

The variant models have been included in this test report without tests because the following features don´t change regarding to the tested model:

- Same connection system and hardware topology.
- Same control algorithm.
- Output power within 1/√10 and 2 times of the rated output power of the EUT or Modular inverters.
- Same Firmware Version.

The models of ID400A, ID400D, ID400M, ID600A, ID600D, ID600M, ID800A, ID800D and ID800M are identical on topological schematic circuit diagram and control solution codes.

The results obtained apply only to the particular sample tested that is the subject of the present test report.

The most unfavorable result values of the verifications and tests performed are contained herein.

Throughout this report a point (~~comma~~) is used as the decimal separator.

Following table shows the full ratings of all the models referenced in this report, marked in **bold letters** is the one subjected to testing:

Model	ID400A ID400M ID400D	ID600A ID600M ID600D	ID800A ID800M ID800D
PV Input			
Number of MPPT Trackers	2		
Max. Input Voltage	60 Vdc		
Start-up Operating Voltage	30 Vdc		
Operating Voltage Range	16V-60 Vdc		
MPPT Voltage Range	33V-55 Vdc		
Max. Input Current	7 A * 2	12 A * 2	14 A * 2
Max. Short Current	15 A * 2	20 A * 2	25 A * 2
AC Output			
Nominal Grid Voltage	L/N/PE, 230Vac		
Nominal Grid Frequency	50 Hz		
Rated AC Power	400 W	600 W	800 W
Max. AC Power	400 VA	600 VA	800 VA
Rated AC Current	1.74 A	2.60 A	3.48 A
Output Power Factor	>0.99		
General Data			
Operating temperature range	-40 ºC ~ +65 ºC		
Protection degree	IP67		
Protective class	Class I		
Altitude	Max. 2000m		
Cooling method	Natural Cooling		
Topology	Transformer		

2.3 Manufacturer and Factory information

Manufacturer Name ..... :	Huizhou Foryou Optoelectronics Technology Co., Ltd
Manufacturer Address..... :	Building 6, B Area, No.1 North Shangxia Road, Dongjiang High-Tech Industry Park, Huizhou, Guangdong, China
Factory Name ..... :	Shenzhen Donnergy Technology Co., Ltd
Factory Address..... :	6F Building 8, Xianan Third Industrial Zone, Shangcun Community, Gongming Street, Guangming District, Shenzhen, China

2.4 Test Equipment List

From	No.	Equipment Name	Trademark / Model No.	Equipment No.	Calibration Period
LBALUN	1	Power analyzer	ZLG/ PA6000H	BZ-DGD-L059	2023/09/20 to 2024/09/19
	2	Power analyzer	DEWETRON/ TRIONet	BZ-DGW-L048-1	2023/10/31 to 2024/10/30
	3	Oscilloscope	RIGOL/ MSO5104	DNG2021017	2023/06/15 to 2024/06/14
	4	Current Clamp	HIOKI/ CT6863-05	BZ-DGD-L026-1	2024/01/23 to 2025/01/22
	5	Current Clamp	HIOKI/ CT6863-05	BZ-DGD-L026-2	2024/01/23 to 2025/01/22
	6	Current Clamp	HIOKI/ CT6863-05	BZ-DGD-L026-3	2024/01/23 to 2025/01/22
	7	Current Clamp	CYBERTEK/ CP8150A	BZ-DGD-L067	2024/01/23 to 2025/01/22
	8	Differential probe	CYBERTEK/ VP5200A	BZ-DGD-L241-1	2024/01/23 to 2025/01/22
	9	Oscilloscope probe	Tektronix/ TPP0500	BZ-DGD-L028-1	2024/01/23 to 2025/01/22
	10	Temperature & Humidity meter	CEM/ DT-322	BZ-DGD-L270	2023/09/13 to 2024/09/12
SGS	11	True RMS Multimeter	FLUKE / 15B	GZE012-43	2023/10/29 to 2024/10/28

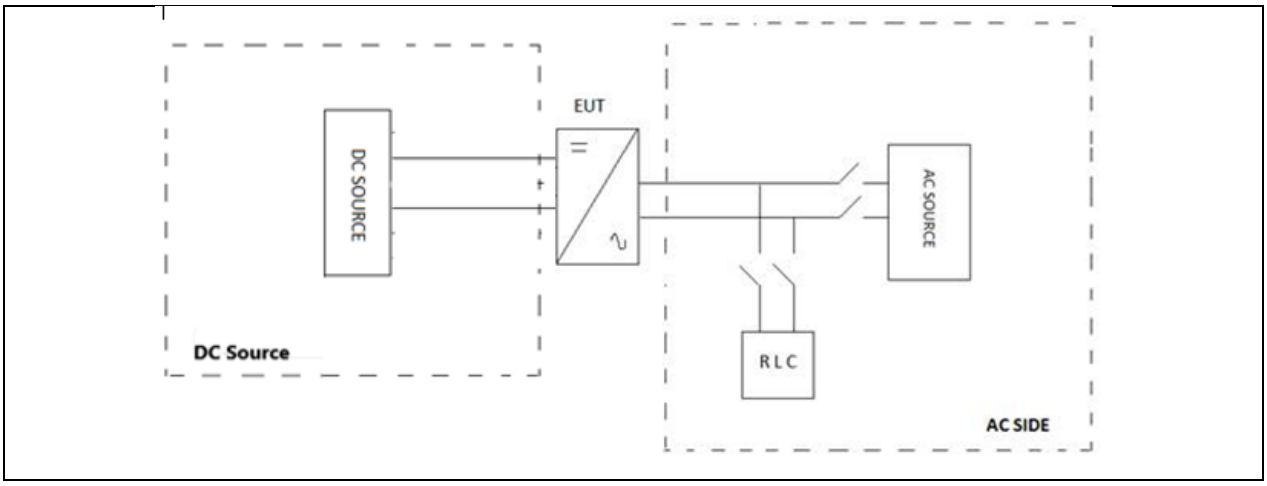
2.5 Measurement Uncertainty

Associated uncertainties through measurements showed in this this report are the maximum allowable uncertainties.

Magnitude	Uncertainty
Voltage measurement	±1.5 %
Current measurement	±2.0 %
Frequency measurement	±0.2 %
Time measurement	±0.2 %
Power measurement	±2.5 %
Phase Angle	±1 º
Temperature	±3 ºC
Note1: Measurements uncertainties showed in this table are maximum allowable uncertainties. The measurement uncertainties associated with other parameters measured during the tests are in the laboratory at disposal of the petitioner. Note2: Where the standard requires lower uncertainties that those in this table. Most restrictive uncertainty has been considered.	

2.6 Test set up of the different standard

Below is the simplified construction of the test set up.



Different equipment has been used to take measures as it shows in chapter 2.4. Current and voltage clamps have been connected to the inverter input / output for all the tests.
All the tests described in the following pages have used this specified test setup.

The test bench used includes:

EQUIPMENT	MARK / MODEL	RATED CHARACTERISTICS	OWNER / ID. CODE
AC source	WAGO / WLPA-33030kVA	30 kVA max. 45-65 Hz	BZ-DGD-L272
DC source	Chroma / 6215011-1000S	15 kVA max.	BZ-DGD-L009
RLC load	Qunlin / ACLT-3820	68 kW, 68 kVAr	BZ-DGD-L063

2.7 Definitions

In	Nominal Current	P	Power
p.u	Per unit	I	Current
Pn	Nominal Power	M	Change for real power
Sn	Apparent Power	N	Change for reactive power
PGU	Power Generation Unit	F	Frequency
Pst	Short-term flicker strength	Q_f	Quality factor
Plt	Long-term flicker strength	NS	Network and System
$C_{\psi K}$	Flicker coefficient for continuous operation	Un	Nominal Voltage
S_r	Apparent Power Rated	PWHD	Partial weight harmonic distortion
S_k	Short-circuit Apparent Power	THD	Total harmonic distortion
K_{imax}	Maximum switching current factor	Z_{test}	Test circuit impedance at which the emission test
Z_{ref}	The reference impedance	EUT	Equipment under test

3 RESUME OF TEST RESULTS

INTERPRETATION KEYS

Test object does meet the requirement ..... **P** Pass
Test object does not meet the requirement ..... **F** Fails
Test case does not apply to the test object..... **N/A** Not applicable
To make a reference to a table or an annex. ..... See additional sheet
To indicate that the test has not been performed..... **N/P** Not performed

CHAPTER OF THE STANDARD, DESCRIPTION AND VERIFICATION			
4	**Requirements**		
4.1	Functional safety		P
4.2	Reconnection		P
4.3.1	Voltage monitoring -20%		P
4.3.2	Voltage monitoring +10%		P
4.3.3	Voltage monitoring +15%		P
4.4.1	Frequency monitoring: 51.5Hz		P
4.4.2	Frequency monitoring: 47.5Hz		P
4.5	DC current monitoring		N/A
4.6	Anti-Islanding Protection		P
4.7	Marking		P
4.8	Residual Current		P
4.9	Table: Active poewr output feed-in at overfrequency		P

4 TEST RESULTS

4.1 FUNCTIONAL SAFETY

The security as defined in 4.3 to 4.8 of the standard must turn in an error state and display this error condition.

Testing of the single-fault tolerance and fault detection with subsequent disconnection is carried out by fault simulation, if necessary with additional fault tests.
It must be checked that a single fault does not lead to loss of the safety function.

The results are offered in the table below:

Based on an analysis of the products circuits, capacitors, diodes, solid –state devices and similar component were subjected to shorting or opening while the product was energized at rated voltage and under load (if grid connected it shall be tied to a simulated grid). Evidence of malfunction as specified above shall be noted and recorder.

In addition the utility – interactive inverter was monitored for backfeed current that flows from the simulated utility source into the photovoltaic array as a result of a faulted components. This was done by monitoring the dc current to the dc supply input with the dc source off and the simulated circuit operating.

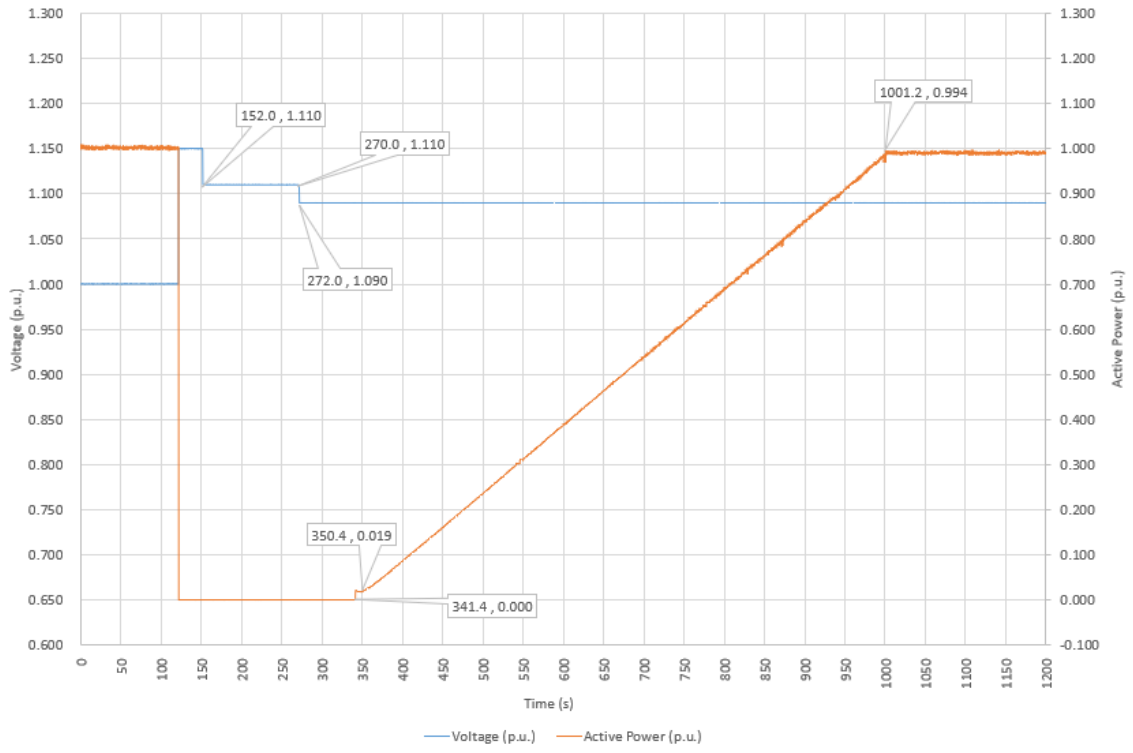
The compliances with these requirements are stated in section 4.4 on pages 51 to 53 of the following test report:

- IEC 62109-1:2010: Test Report nº GZES231202137901 on Dec. 18, 2023 which issued by SGS-CSTC Standards Technical Services Co., Ltd. Guangzhou Branch.

4.2 CONNECTION AND RECONNECTION CONDITIONS

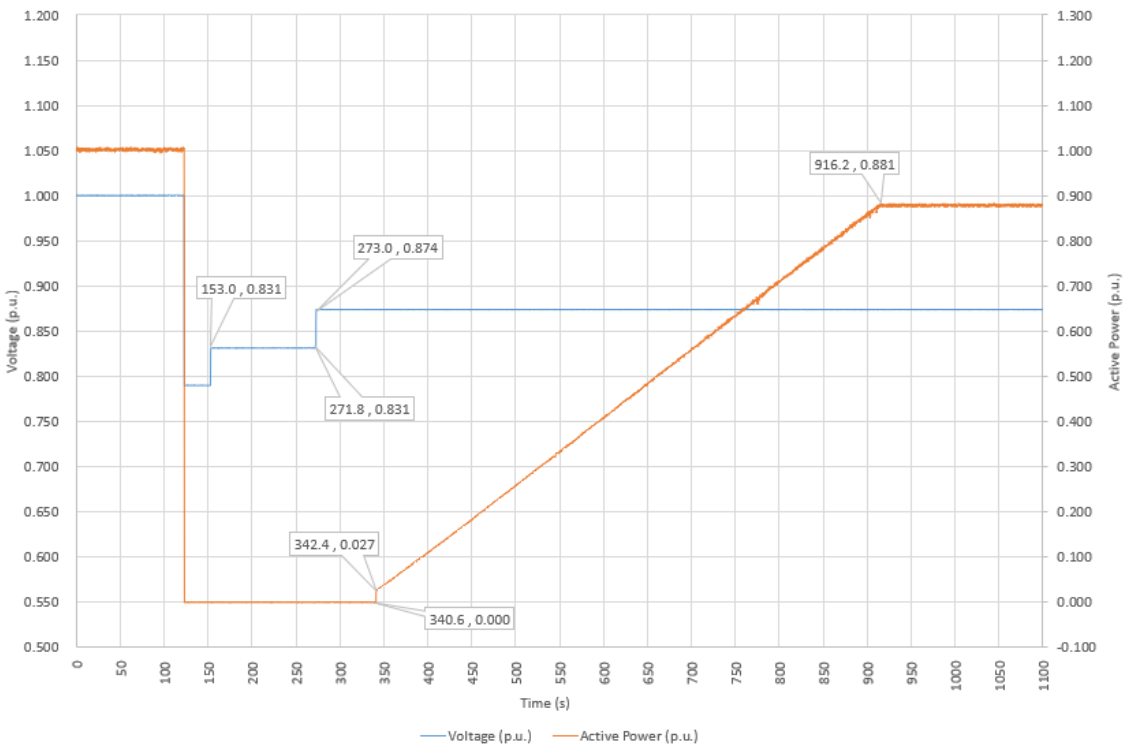
The power generation system shall be connected to the network only if both voltage and frequency are within the tolerance range according to article 4.2. It is shown that the active power don't exceed the gradient of 10 % of the active power per minute (green line).

Overvoltage Un+10%Un



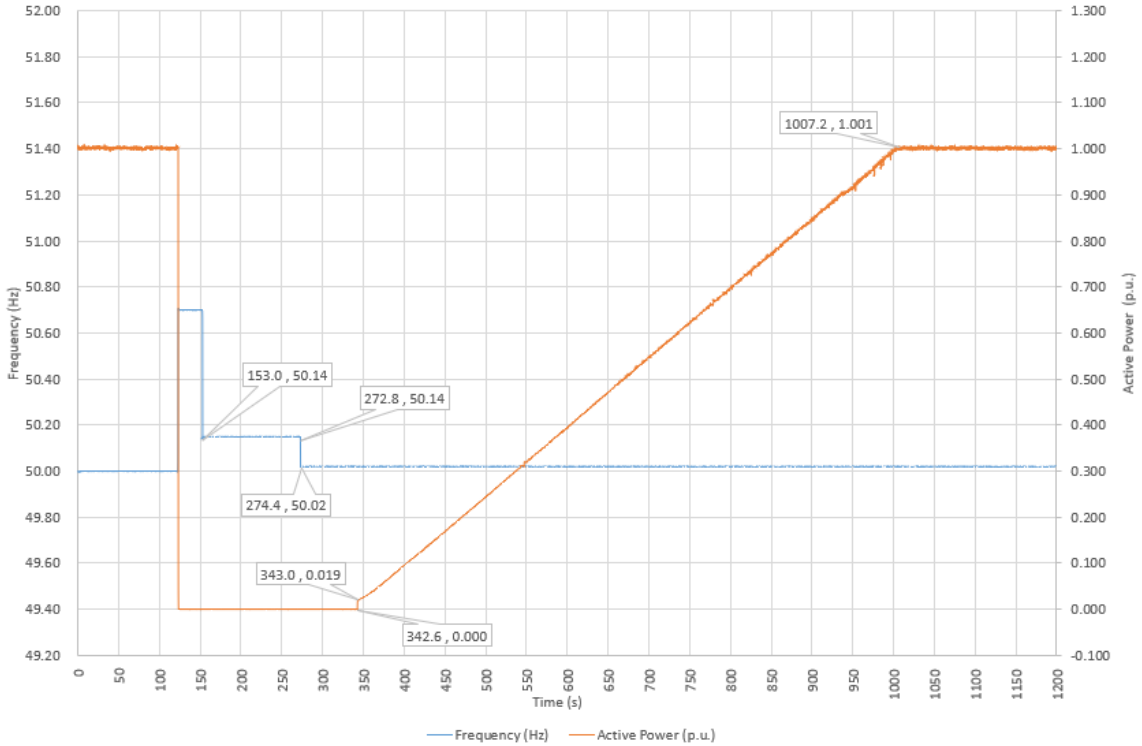
Reconnection delay time limit: 60 s	Reconnection time measured: 69.4 s
Gradient (ΔP) desired (%Pn/min) limit:10%	Gradient measured (%P_n/min):9.0%

Undervoltage Un-15%Un

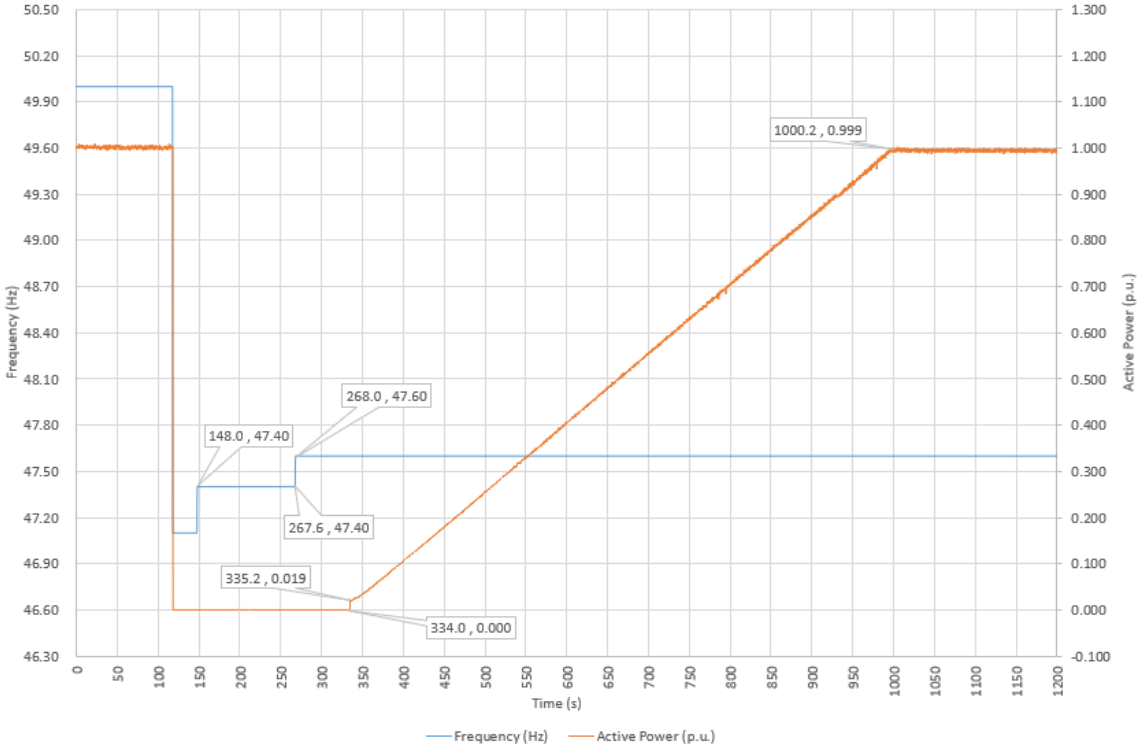


Reconnection delay time limit: 60 s	Reconnection time measured:67.6 s
Gradient (ΔP) desired (%Pn/min) limit:10%	Gradient measured (%P_n/min):8.9%

Overfrequency 50.05 Hz



Reconnection delay time limit: 60 s	Reconnection time measured: 68.2 s
Gradient (ΔP) desired (%Pn/min) limit:10%	Gradient measured (%P_n/min):8.9%

Underfrequency 47.5 Hz	
	
Reconnection delay time limit: 60 s	Reconnection time measured: 66.0 s
Gradient (ΔP) desired (%Pn/min) limit:10%	Gradient measured (%P_n/min):8.8%

4.3 VOLTAGE MONITORING

According to article 4.3 the NS protection should disconnect the power generation system from the net in the event of inadmissible voltage values. This point of the standard redirect to the point 6.5 of the VDE AR-N 4105:2011.

a) For measurement of the phase to phase voltages the phase angle must be turned so that one phase to phase voltage reaches the limit value, whereby the phase to neutral voltages for testing the overvoltage are set to 110 % *U*n and for undervoltage to 90 % *U*n.

b) For the measurement of the phase to neutral voltage, one phase to neutral voltage should be changed, whereby both other phase to neutral voltages are maintained at the nominal voltage. This test must be carried out separately for each phase.

To measure the response time, a voltage changes of:

– Nominal voltage to 118 % *U*n for overvoltage and
– Nominal voltage to 77 % *U*n for undervoltage

is carried out.

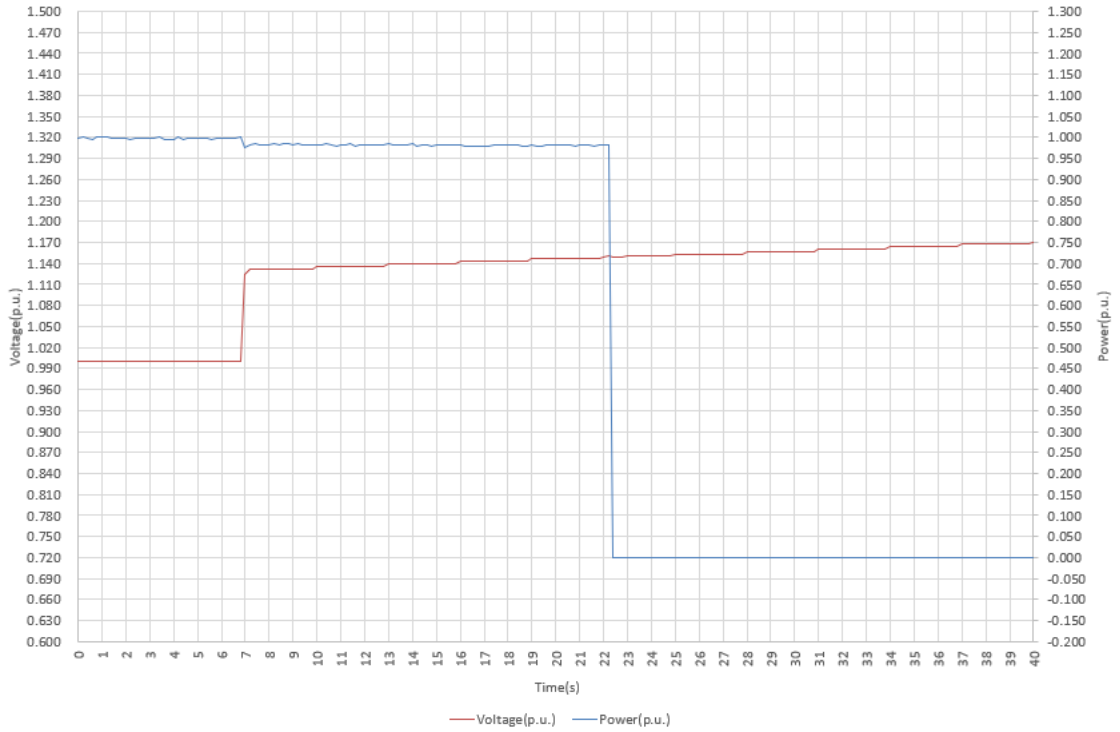
All tests for verification of the disconnection values and times must be carried out three times.

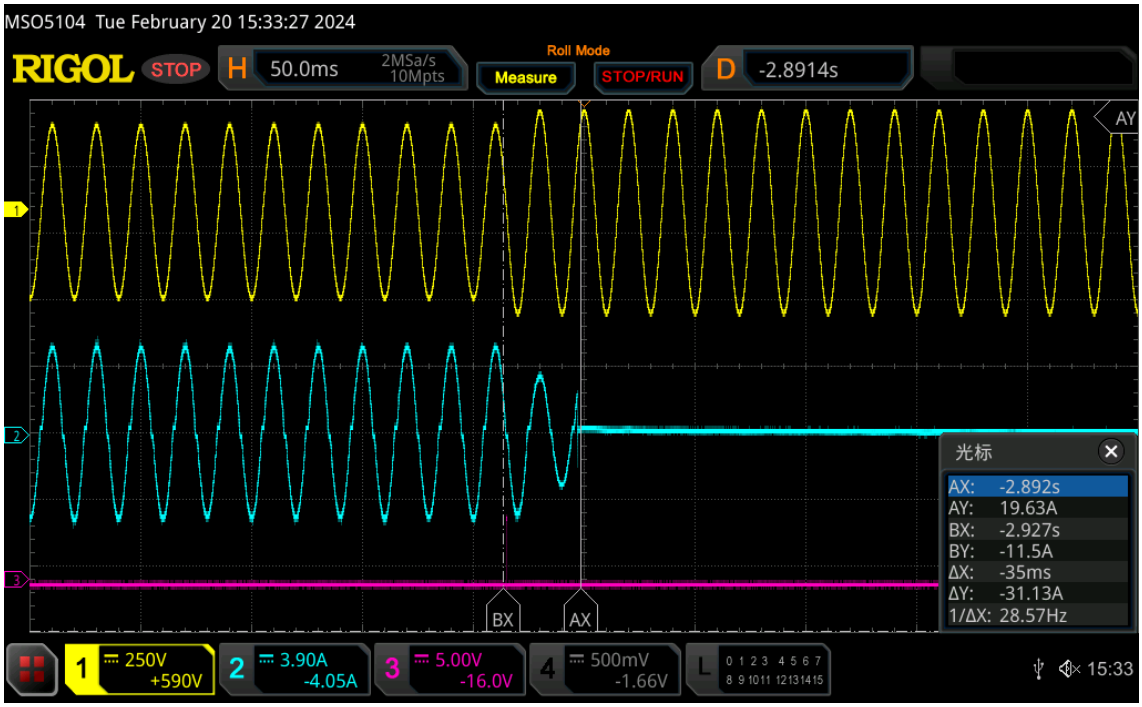
The results are offered in the table below:

Disconnection time measured					
Protective function	**Voltage changes**	**Disconnection time limits**	**Test 1**	**Test 2**	**Test 3**
Rise-in-voltage protection (U>>)	100% Un to 118% Un	< 200 ms	35 ms	43 ms	34 ms
Voltage drop protection (U<)	100% Un to 77% Un	< 200 ms	144 ms	144 ms	142 ms

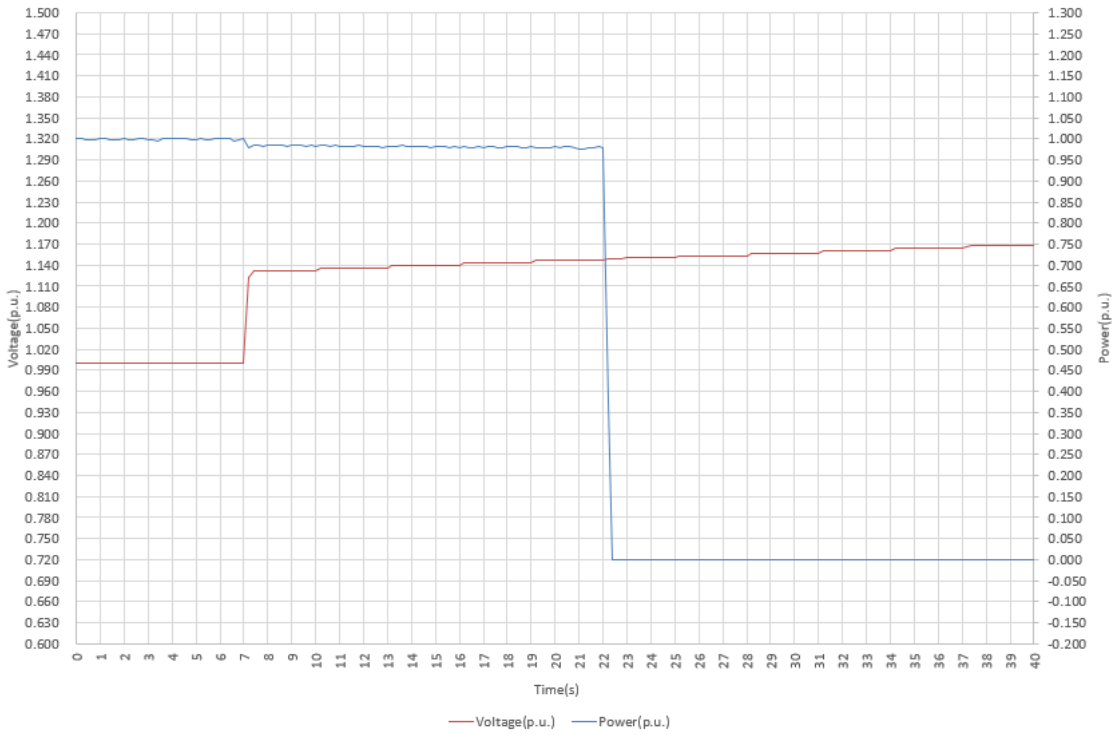
In the picture below are offered waveforms and graphically the results of the test.

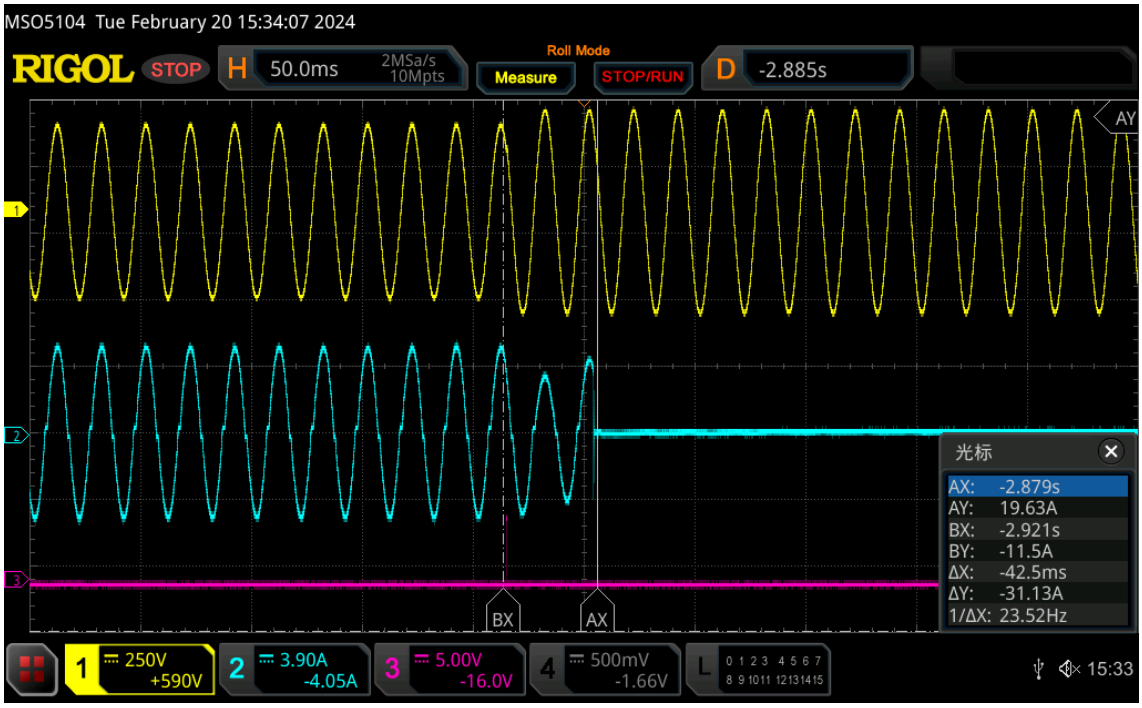
Nominal voltage to 118 % Un for overvoltage - Test 1



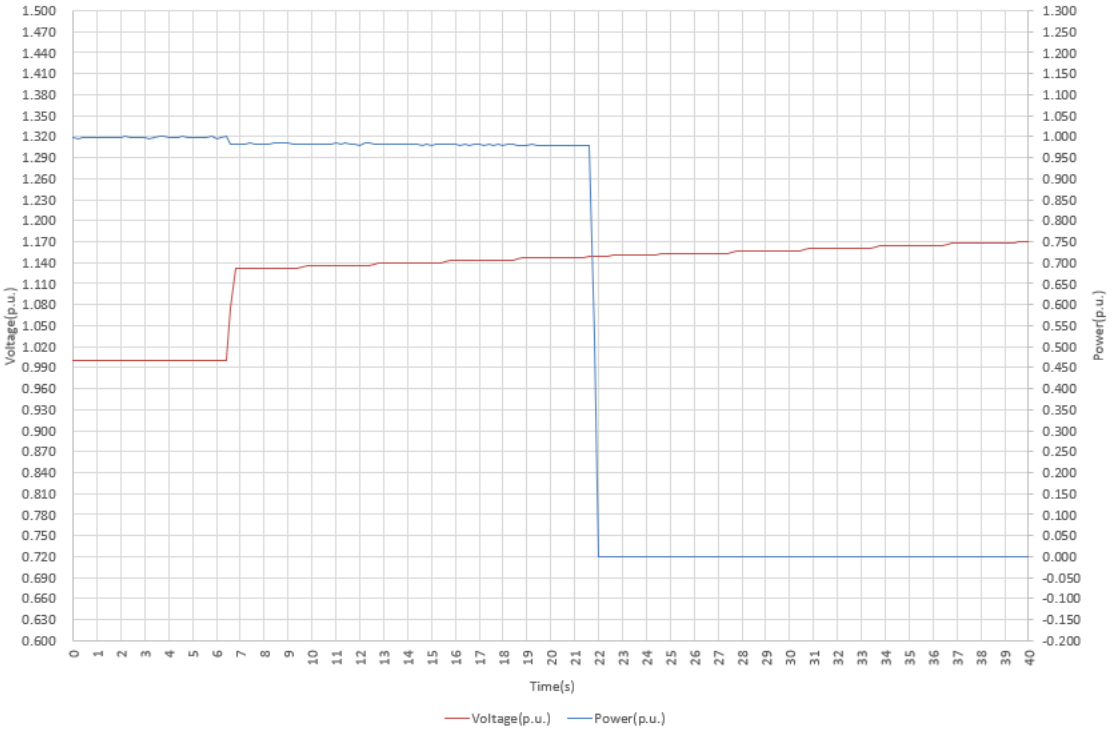


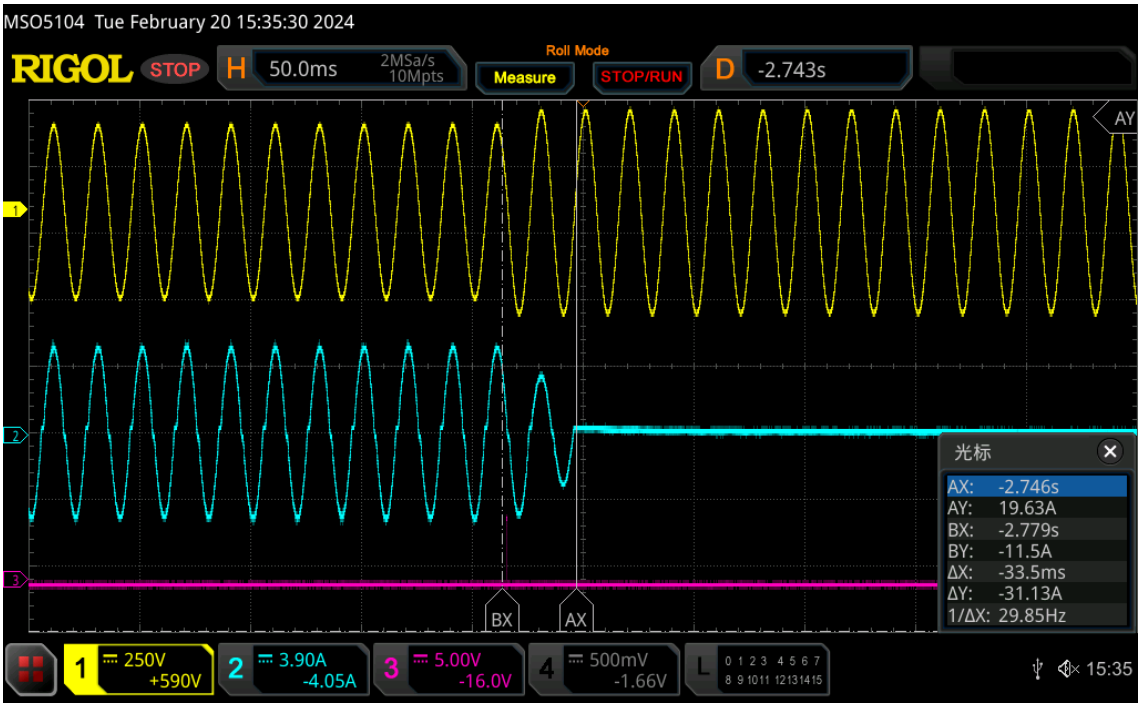
Nominal voltage to 118 % Un for overvoltage - Test 2



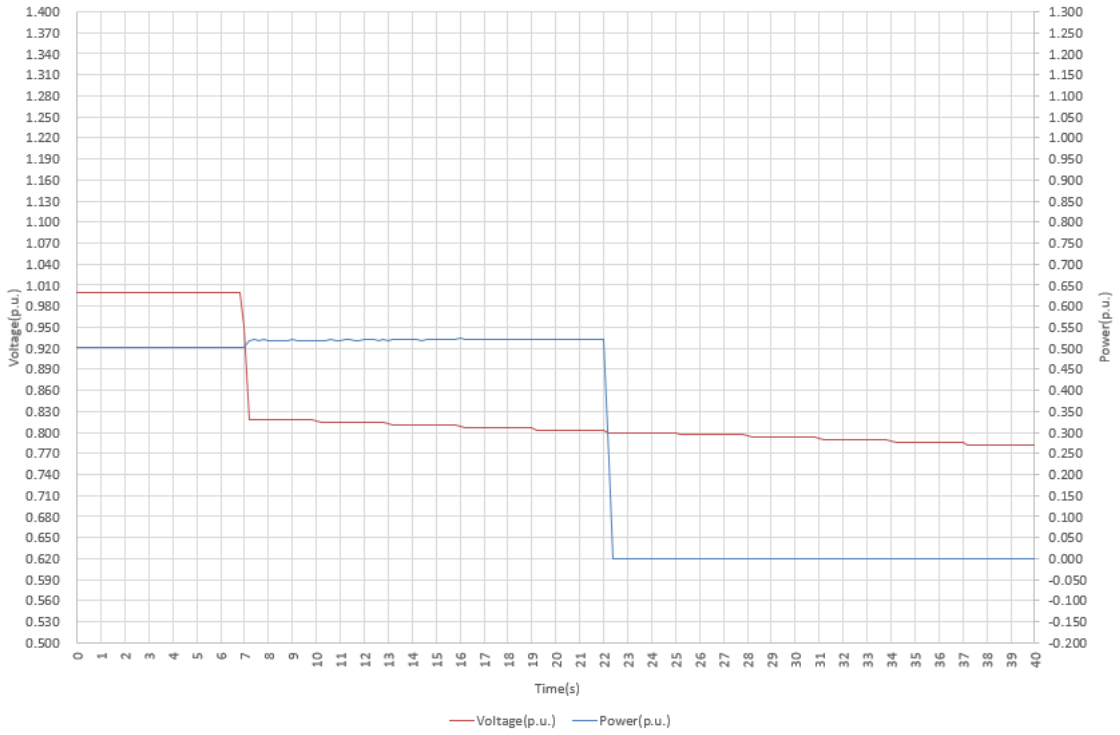


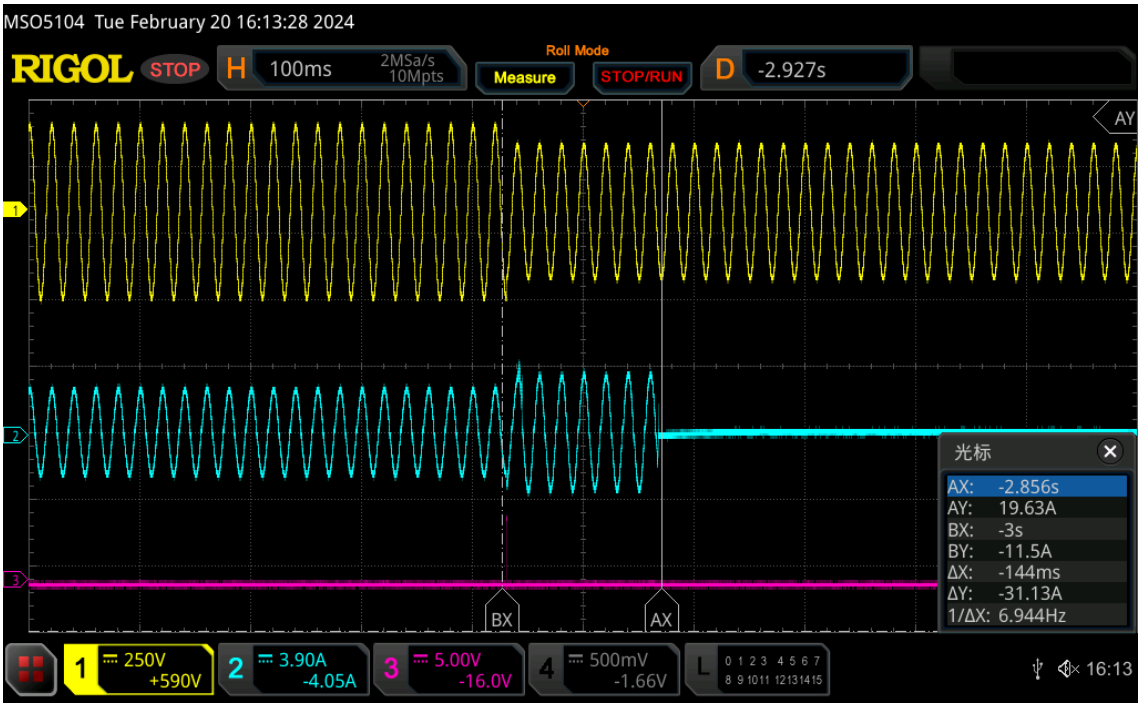
Nominal voltage to 118 % Un for overvoltage - Test 3



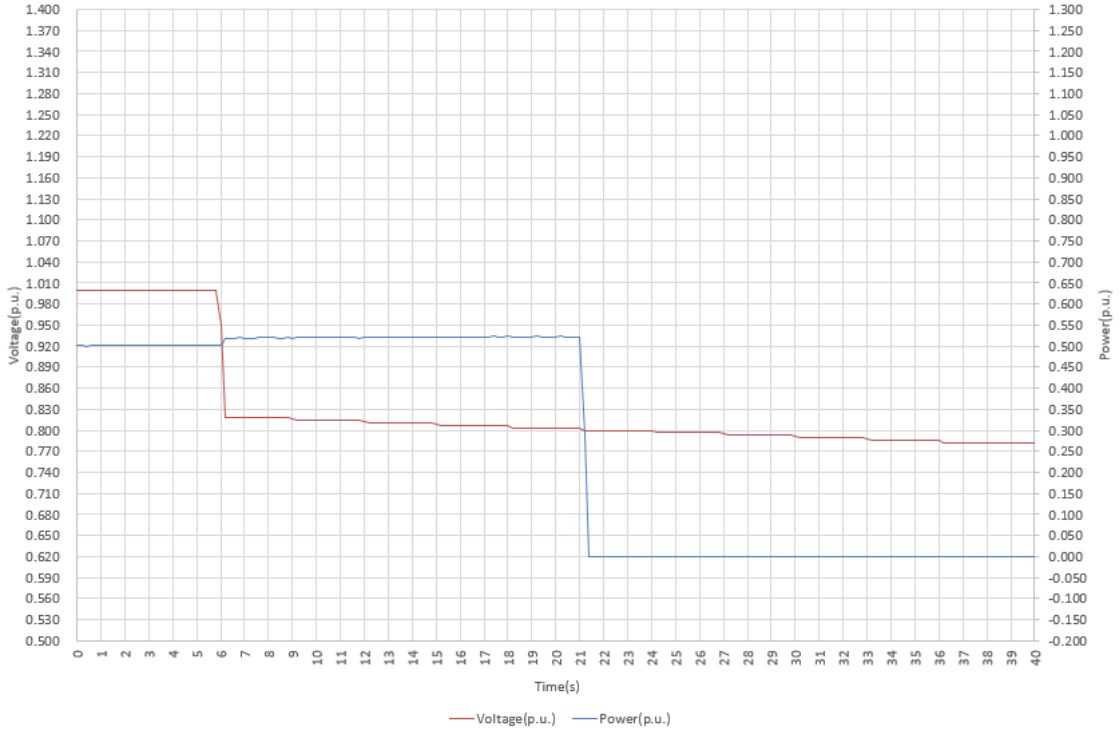


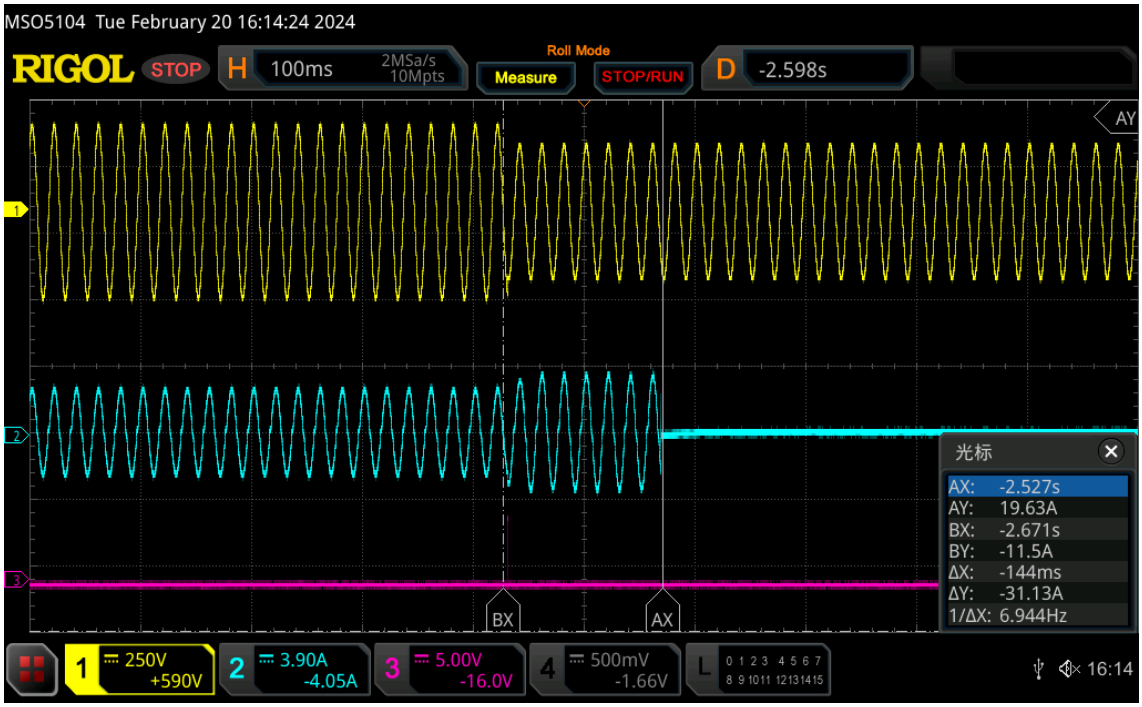
Nominal voltage to 77 % Un for undervoltage - Test 1



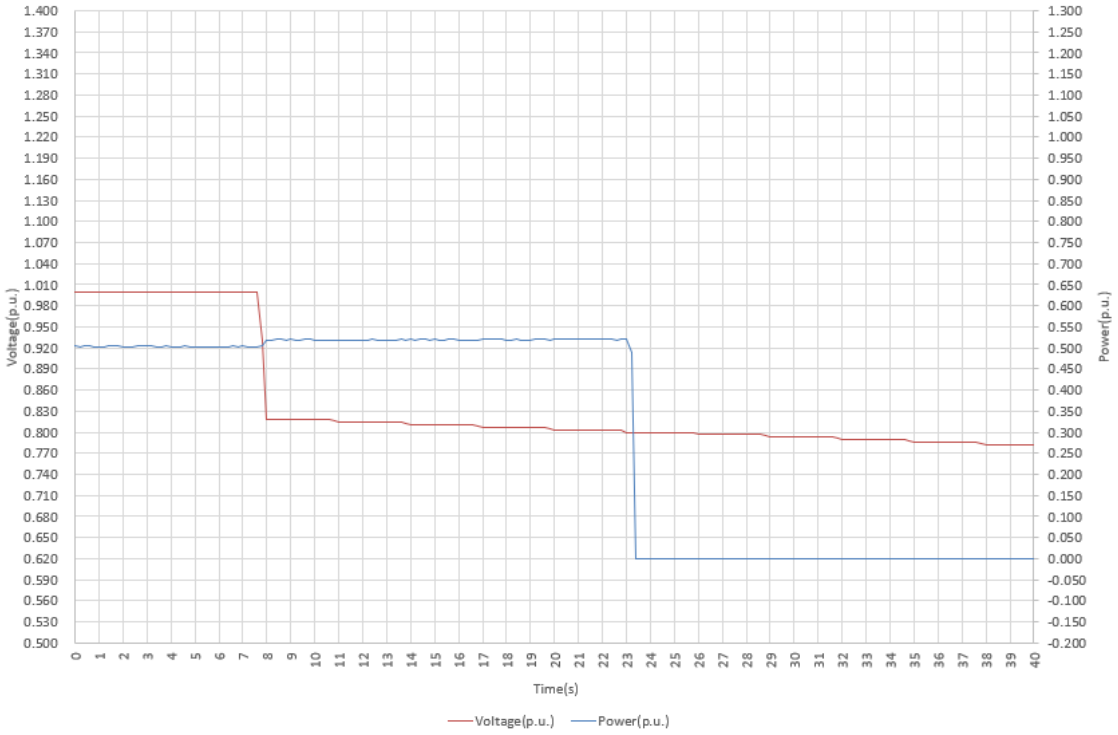


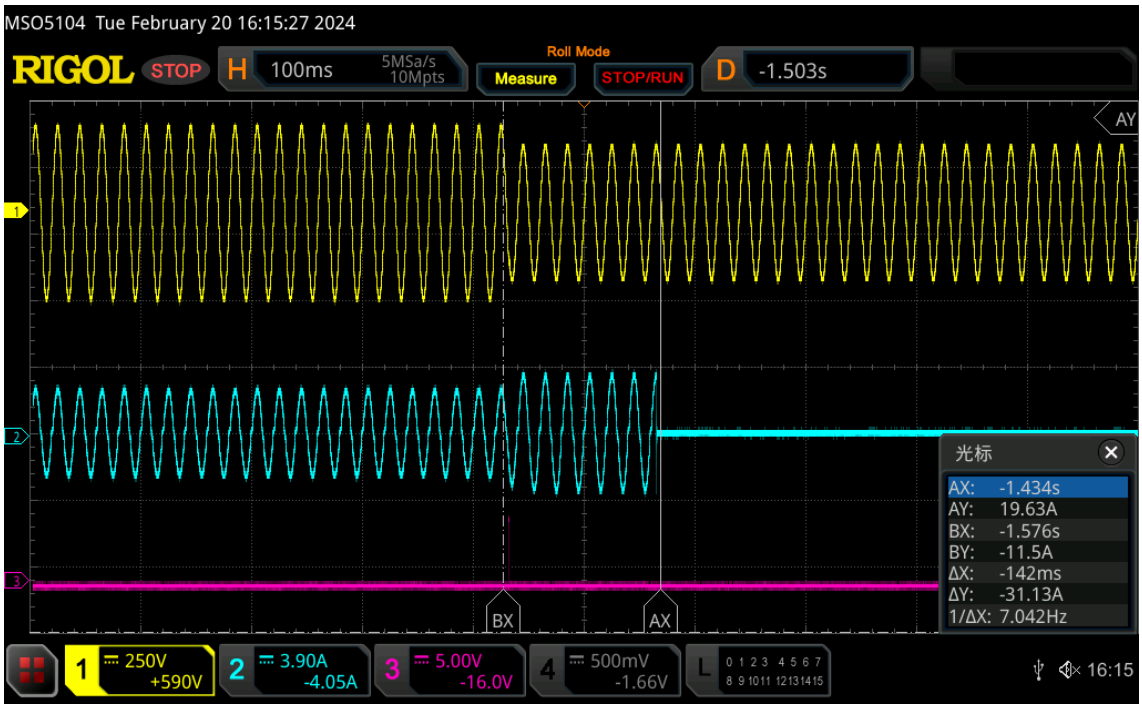
Nominal voltage to 77 % Un for undervoltage - Test 2





Nominal voltage to 77 % Un for undervoltage - Test 3





The rise-in voltage protection $U>$ test is carried out as follows:

a) The voltage is set to 100 % U_n and maintained for 600 s. The voltage is then set to 112 % U_n. Disconnection must be effected within 600 seconds.

NOTE This test serves to verify the measuring accuracy and the maximum set time.

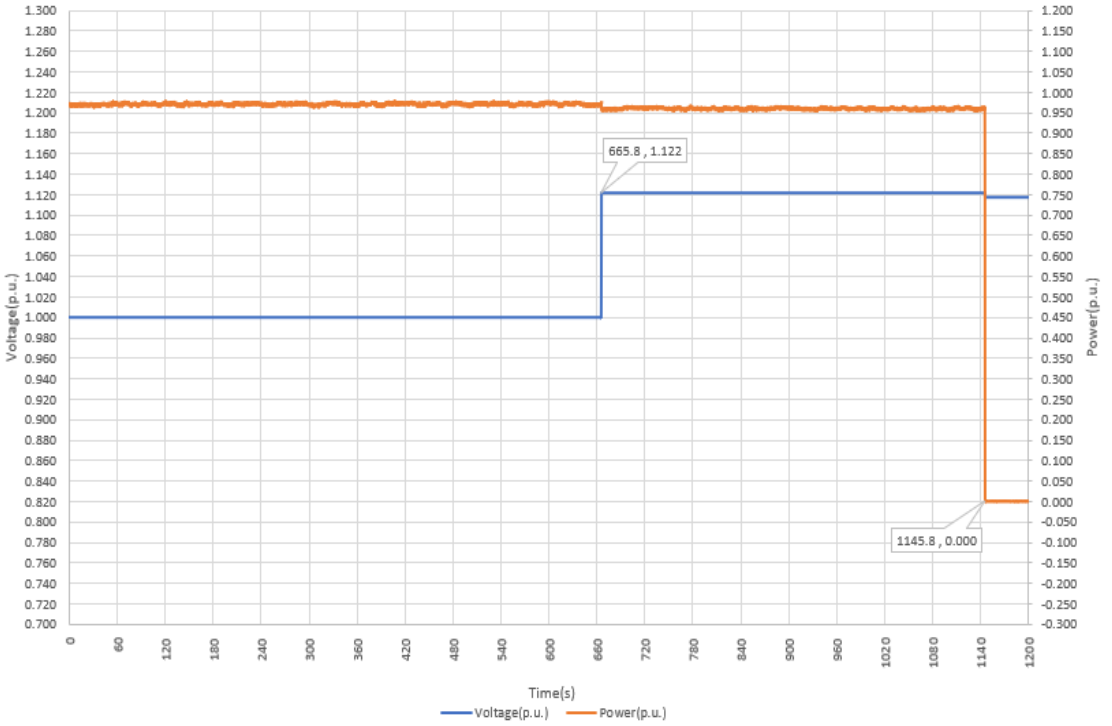
b) The voltage is set for 600 s to U_n, then for 600 s to 108 % U_n. Disconnection should not occur.

NOTE This test serves to verify the measuring accuracy.

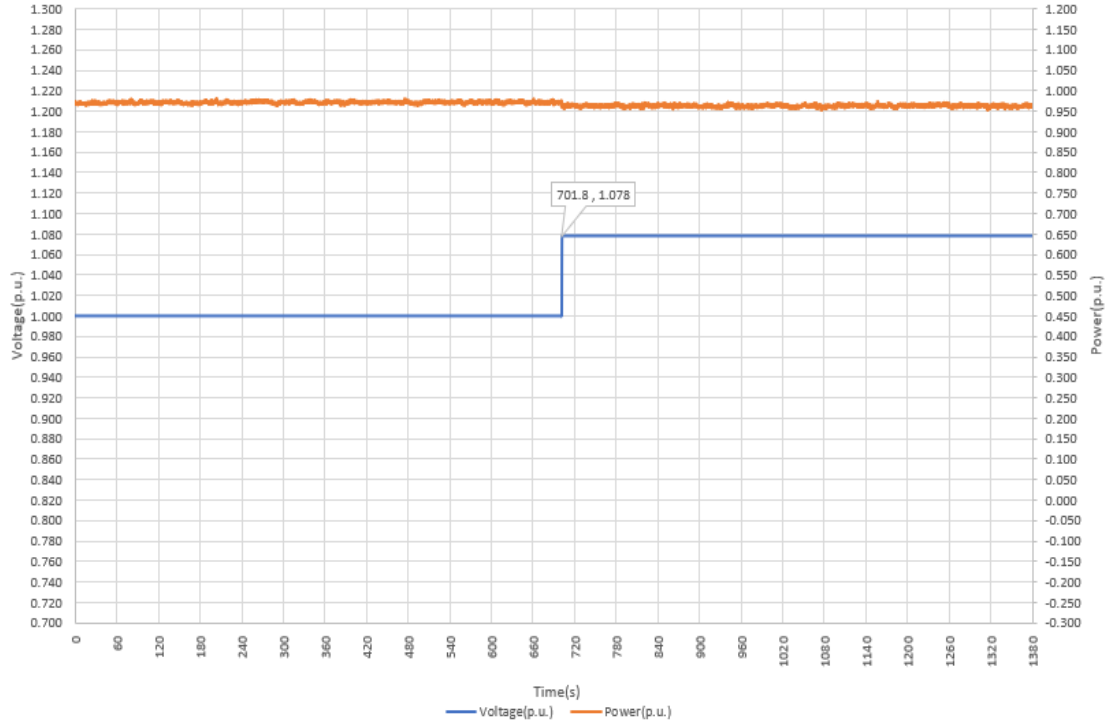
c) The voltage is set to 106 % U_n and maintained for 600 s. The voltage is then set to 114 % U_n. Disconnection must be effected within 300 seconds.

In the pictures below are offered graphically the results of the test.

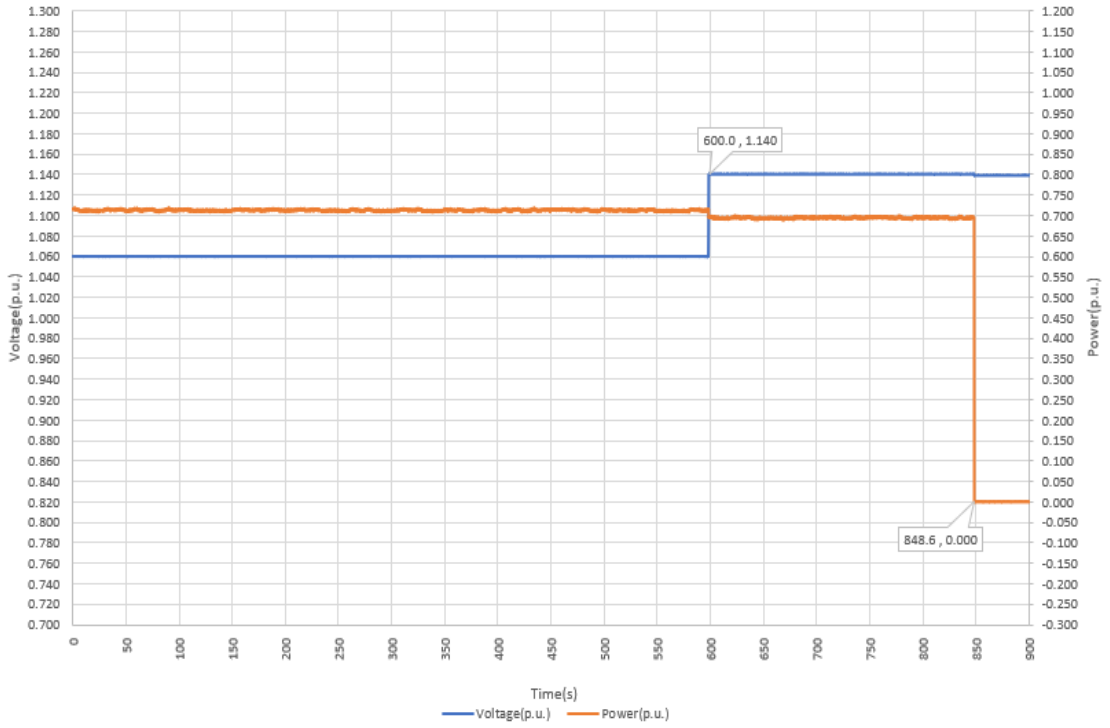
Measured a)



Measured b)



Measured c)


600.0 , 1.140
848.6 , 0.000
Voltage(p.u.)
Power(p.u.)
Time(s)
Voltage(p.u.)
Power(p.u.)

4.4 FREQUENCY MONITORING

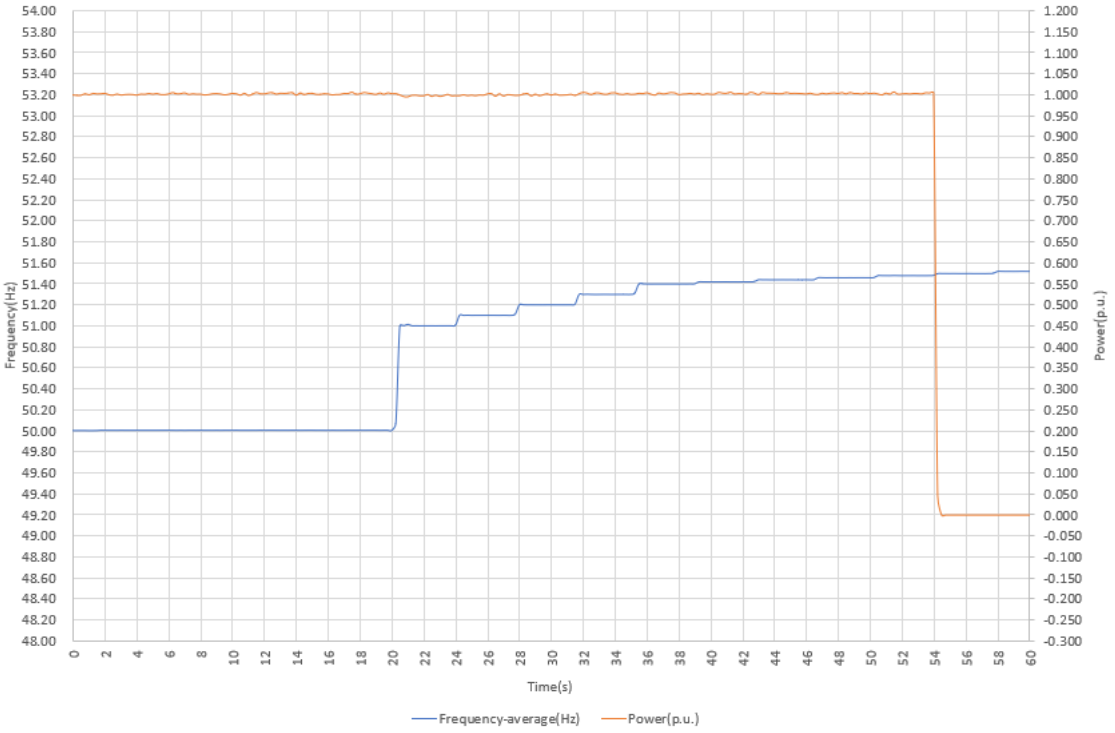
According to article 4.4 the NS protection should disconnect the power generation system from the net in the event of inadmissible frequency values.

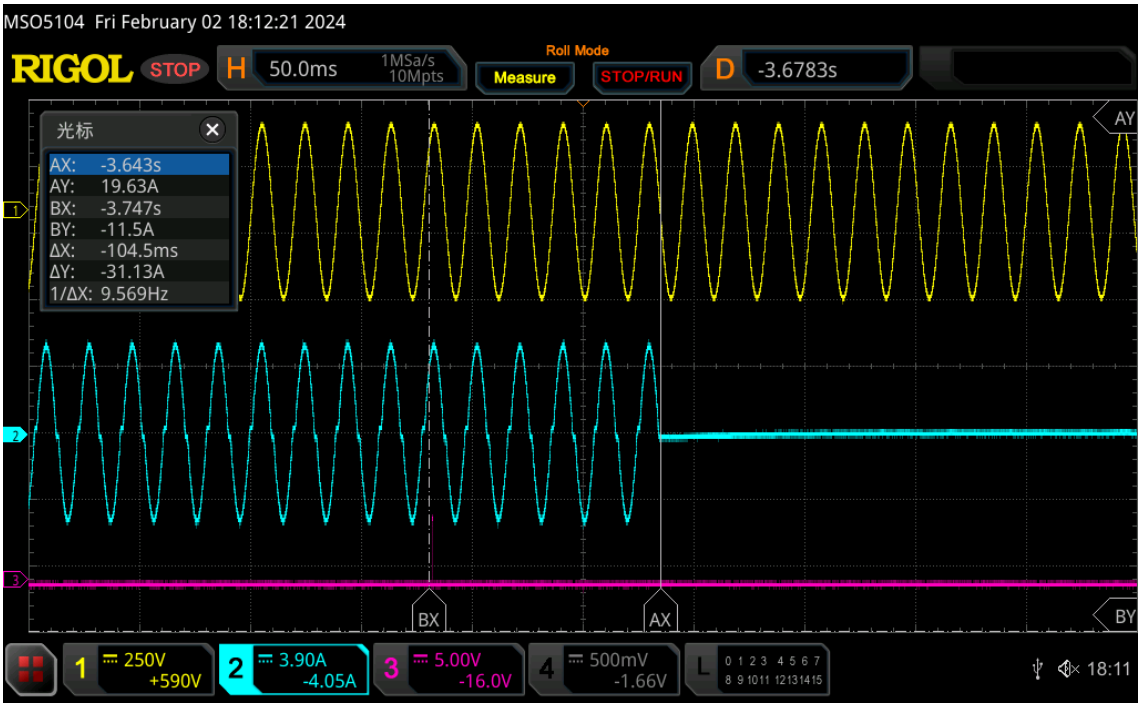
The requirement from Enedis-PRO-RES_10E:26/06/2020 have been consider in this section.

Disconnection time measured					
Protective function	**Frequency changes**	**Disconnection time limits**	**Test 1**	**Test 2**	**Test 3**
Frequency increase protection (f>)	50.00 Hz to 51.48 Hz to 51.55 Hz	< 200 ms	105 ms	108 ms	86 ms
Frequency decrease protection (f<)	50.00Hz to 47.53Hz to 47.45 Hz	< 200 ms	96 ms	92 ms	99 ms

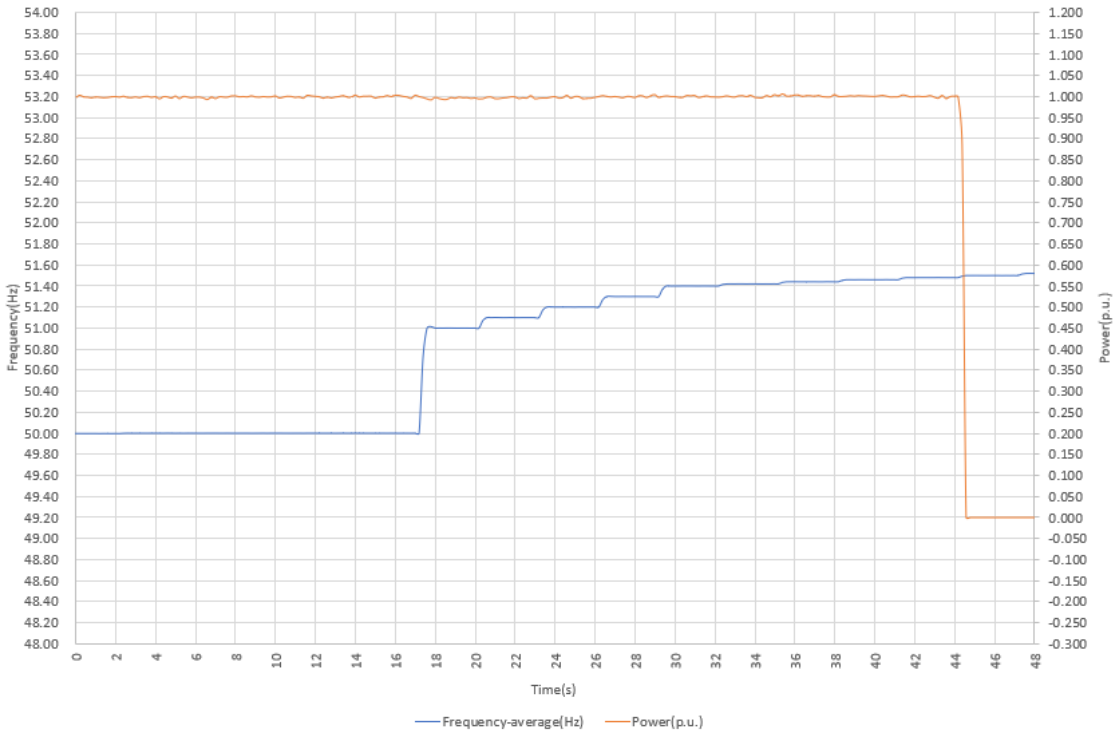
In the picture below are offered waveforms and graphically the results of the test.

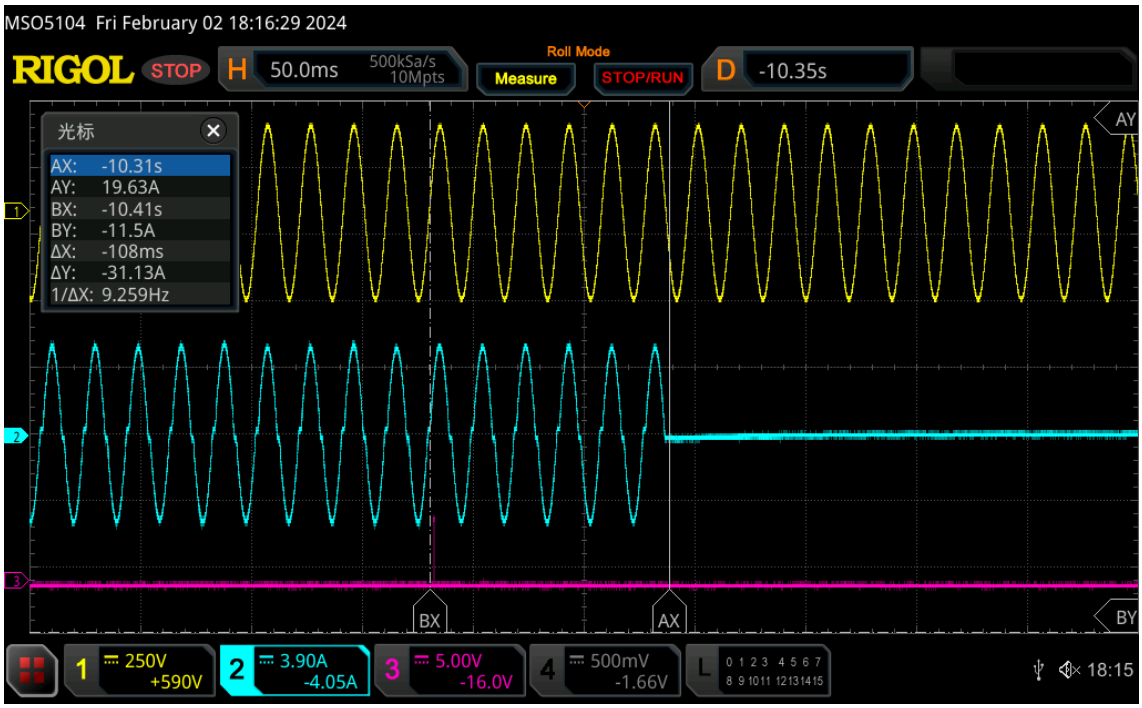
Overfrequency 51.5 Hz- Test 1



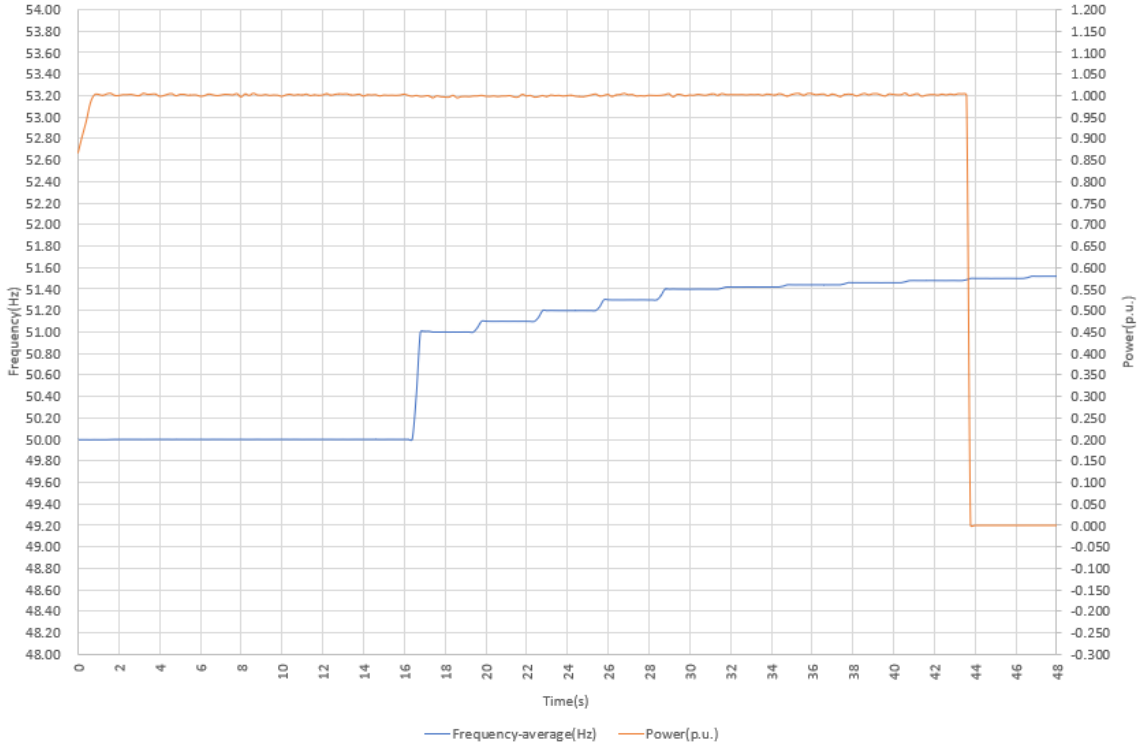


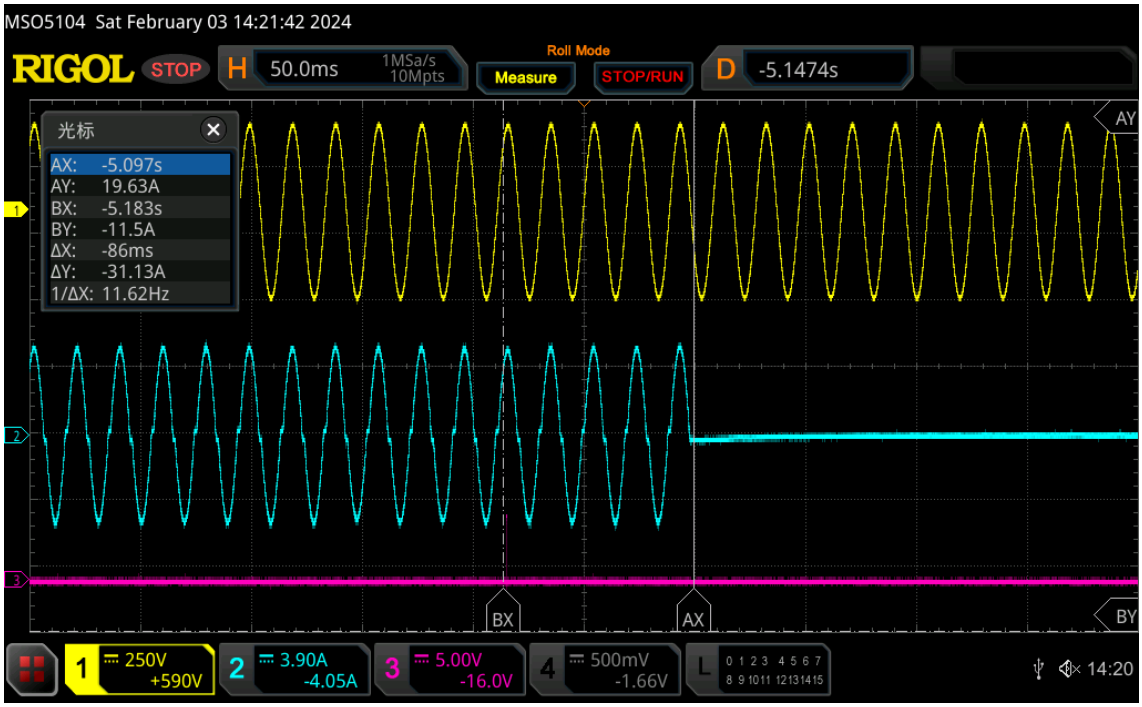
Overfrequency 51.5 Hz- Test 2



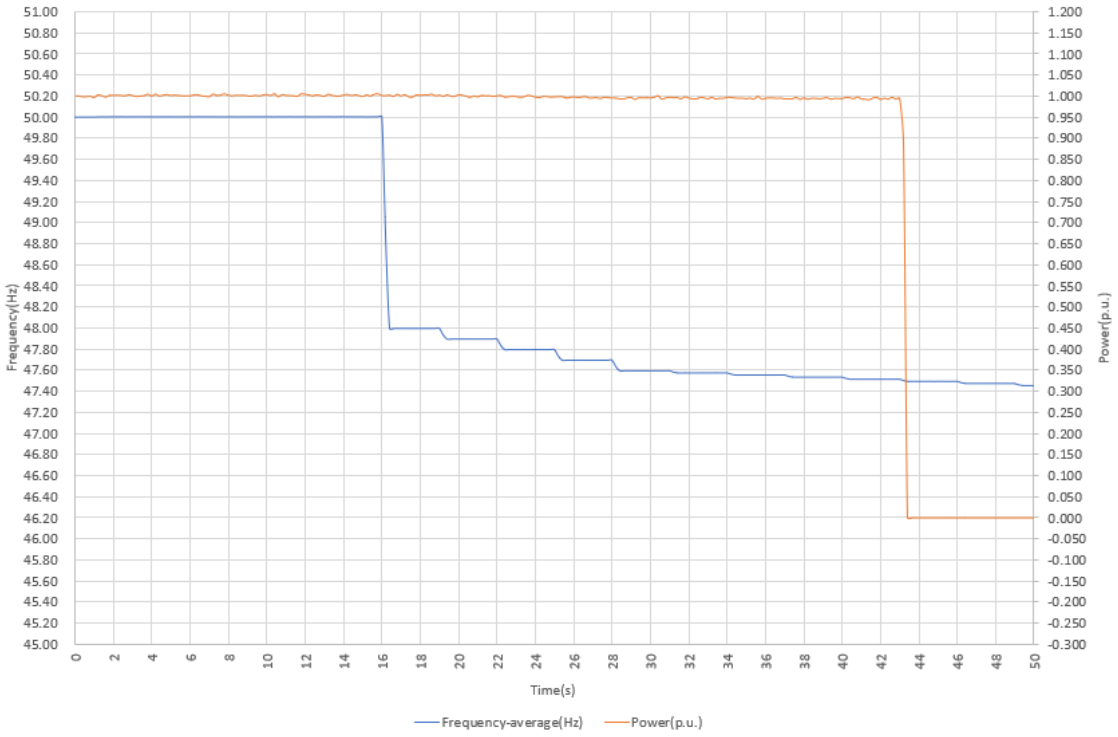


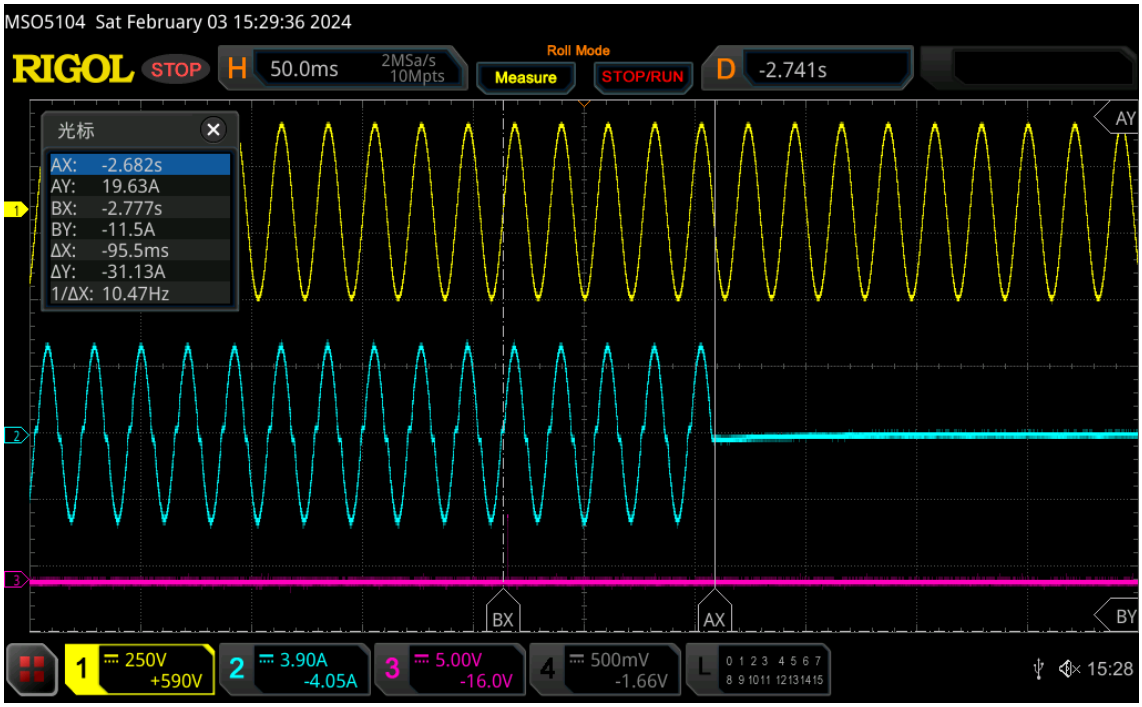
Overfrequency 51.5 Hz- Test 3



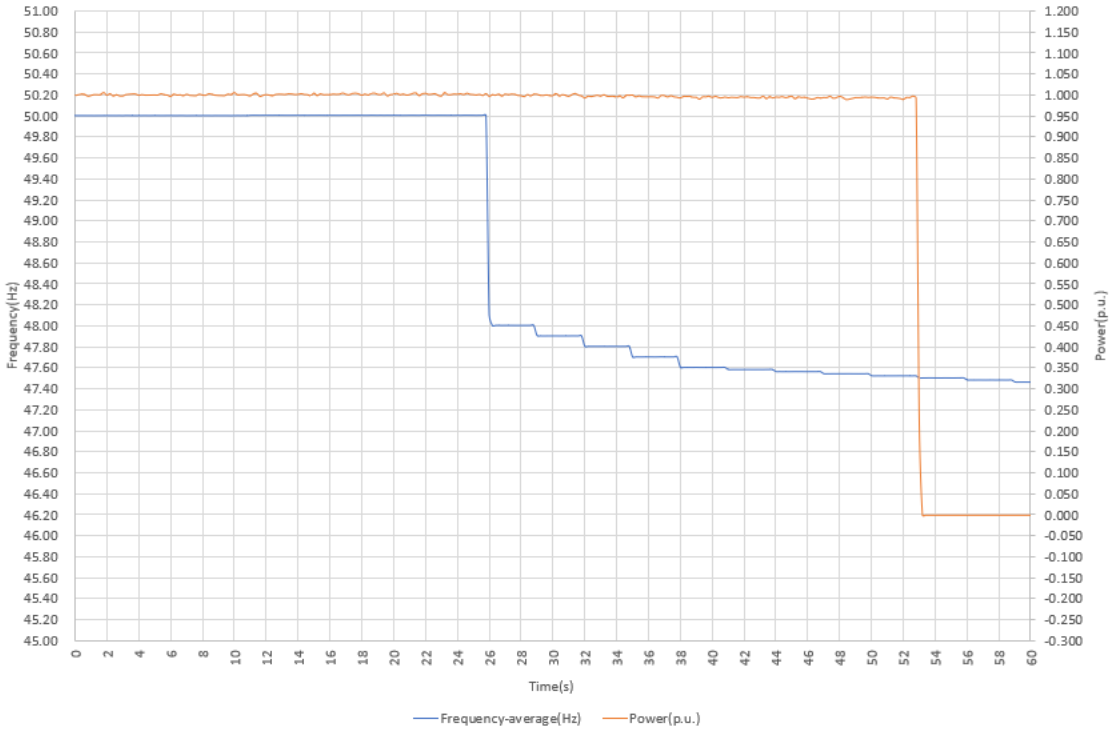


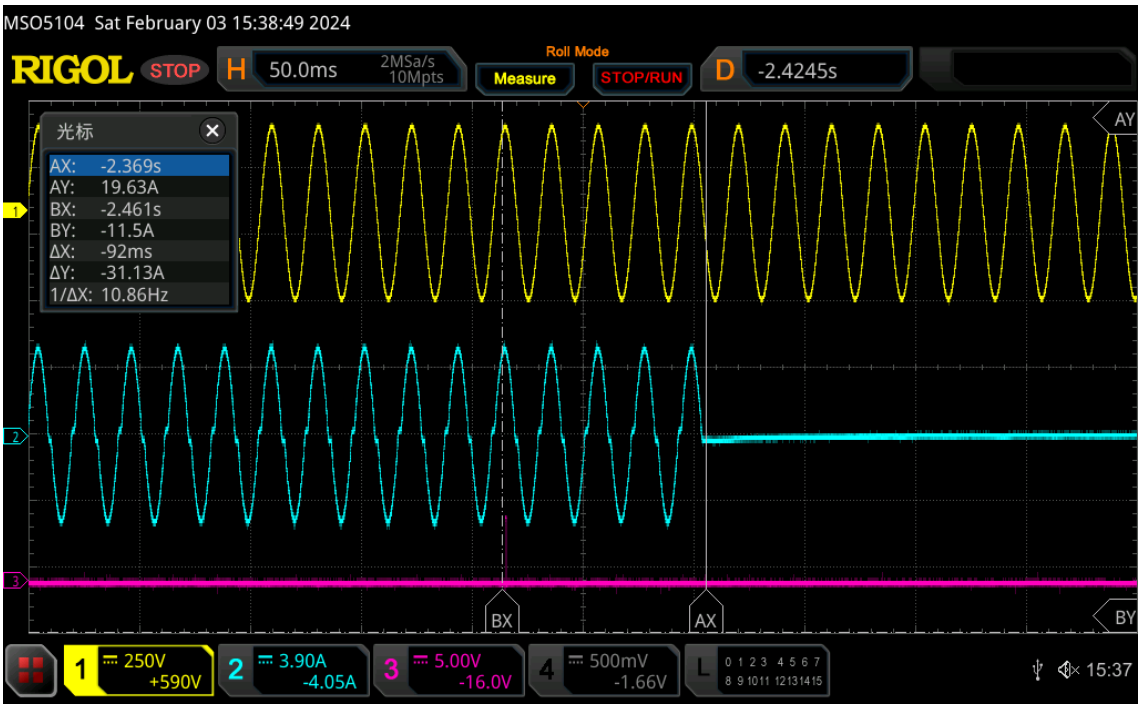
Underfrequency 47.5 Hz- Test 1



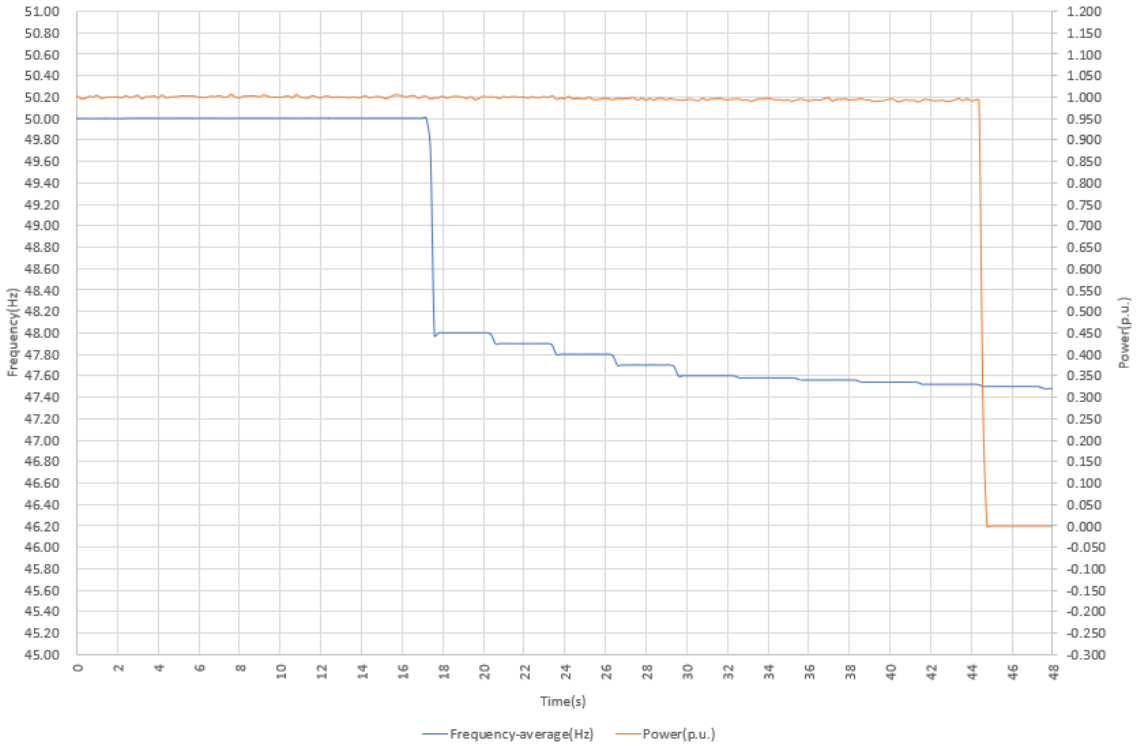


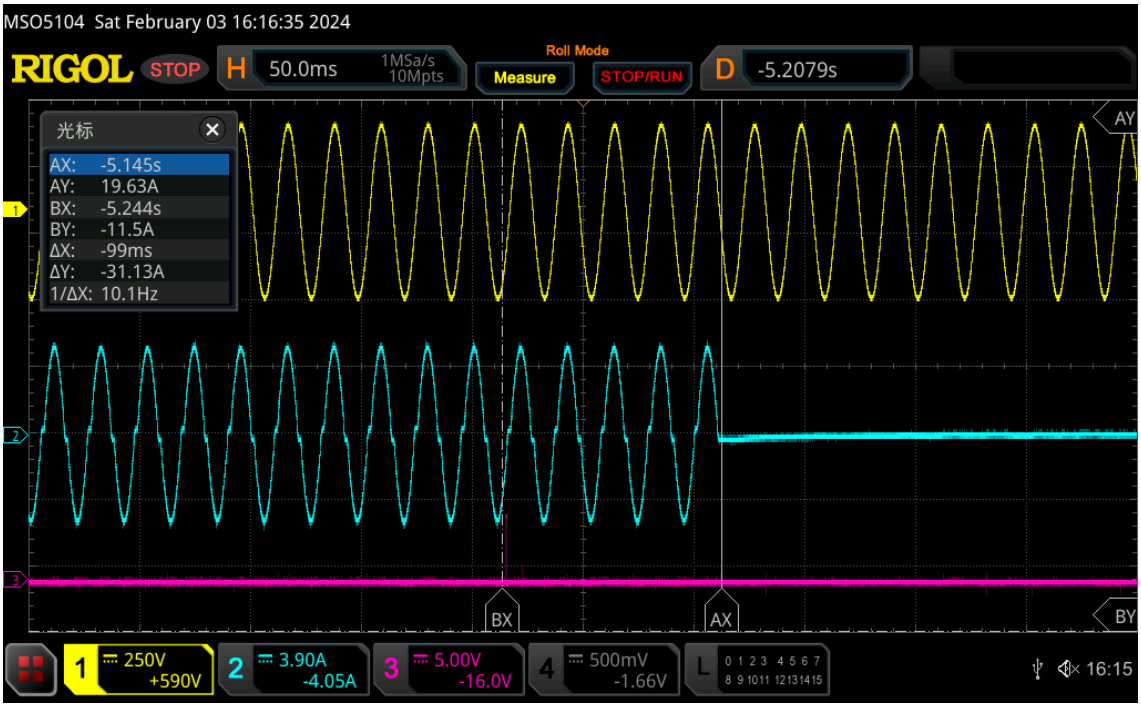
Underfrequency 47.5 Hz- Test 2





Underfrequency 47.5 Hz- Test 3





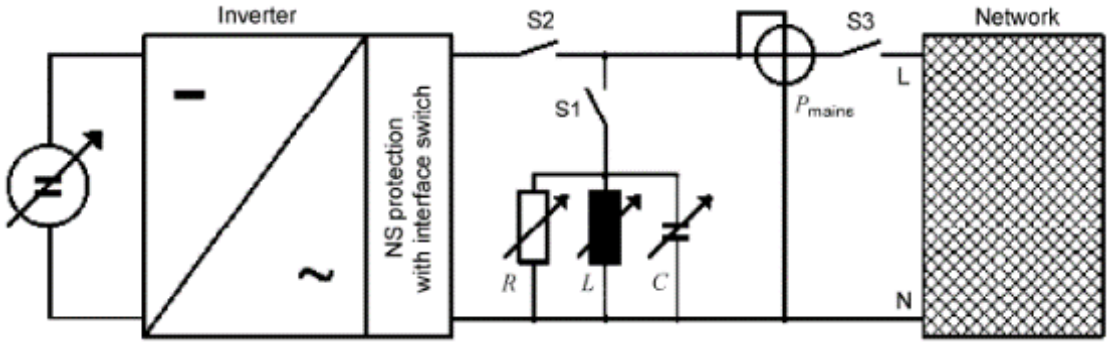
4.5 DC CURRENT MONITORING

The verification of the protection against DC component emission test has been measured according to the standard, at the required active power levels.

The inverter has an isolation transformer, so this test item is not aplicable.

4.6 ANTI ISLANDING PROTECTION

This test has been performed according to the point 6.5.3 of VDE-AR-N 4105:2011-08 and the paragraph 5.4.6 of VDE V 0124-100:2012-07.

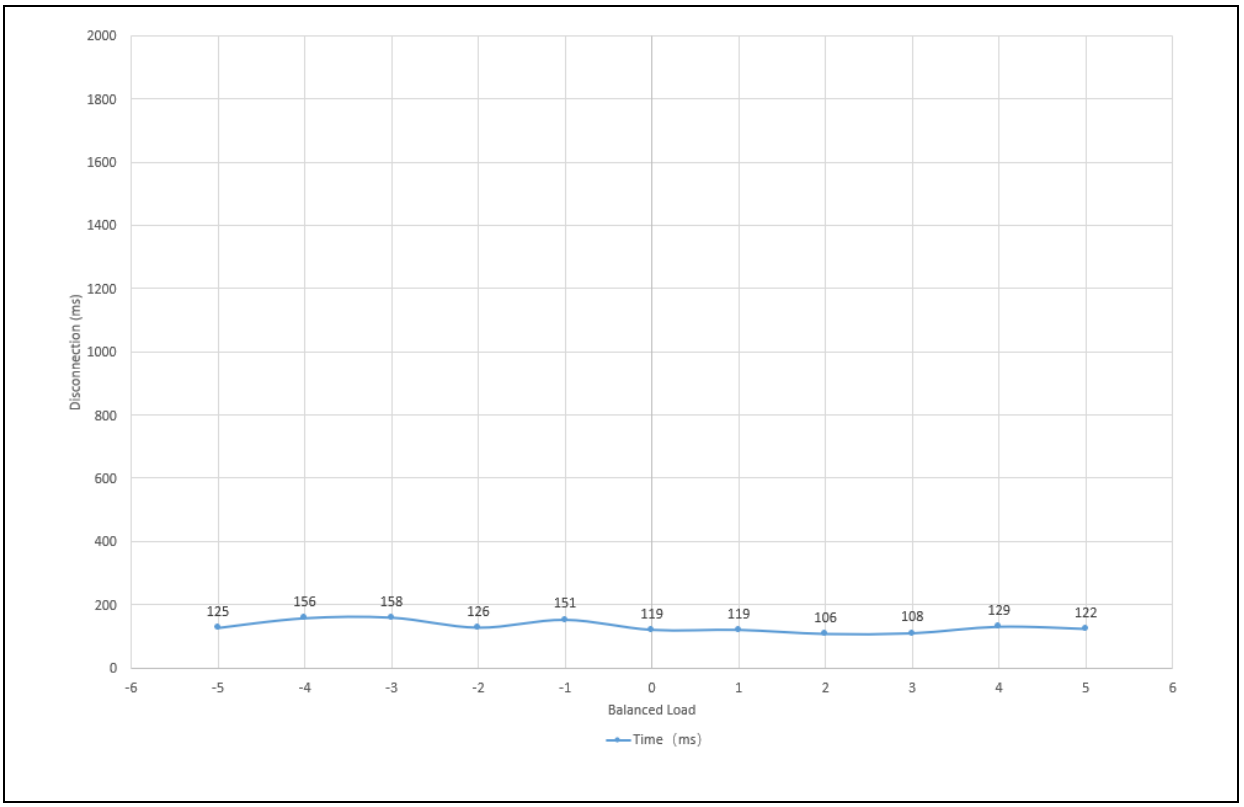


All the tests and checks have been performed in accordance with the reference Standard as specified previously. The used quality factor of resonant load was Qf=2.
There are required three different tests:

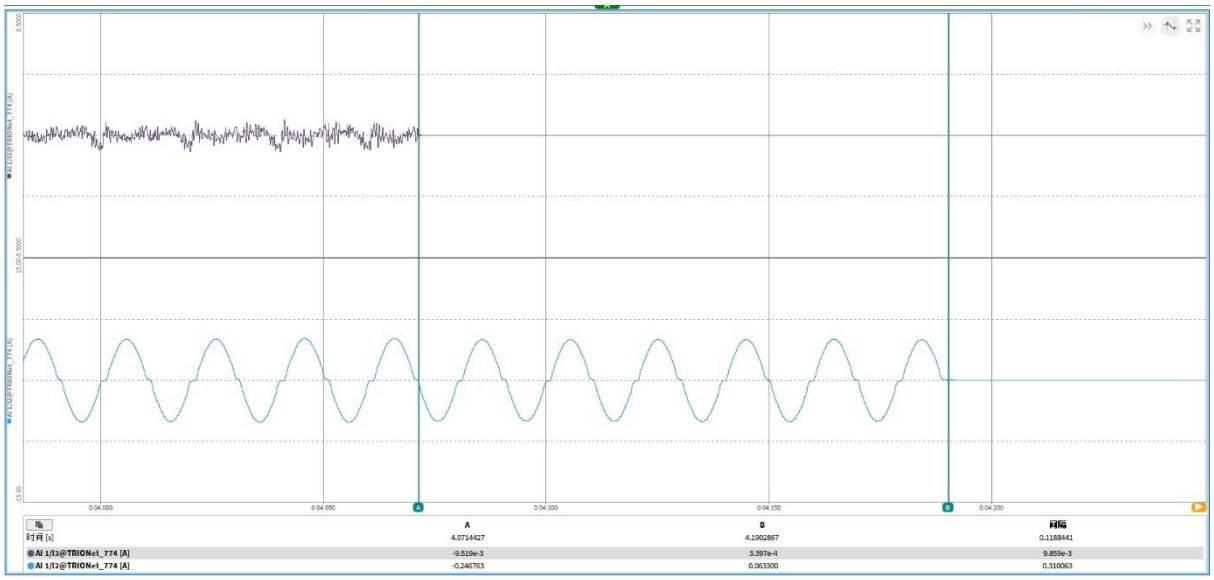
Test A is at full power
Test B is at 50%Pn
Test C is at 20%Pn

4.6.1 Test A

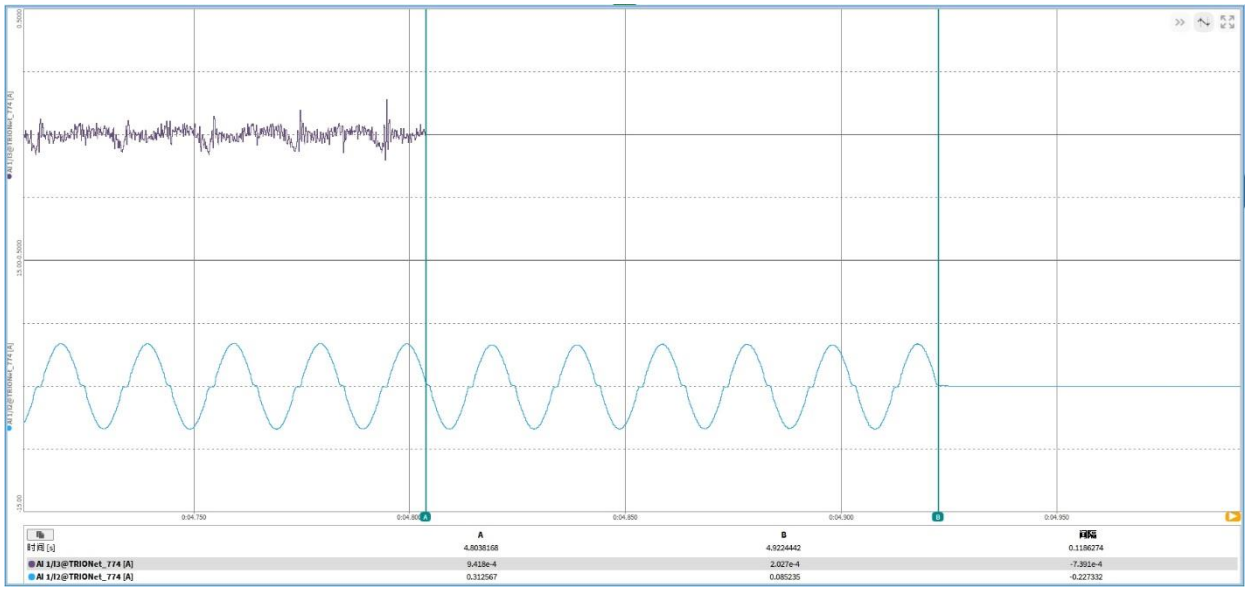
Balanced Load		
M (%)	**N (%)**	**Disconnection (ms) (limit at t=5s)**
0	-5	125
0	-4	156
0	-3	158
0	-2	126
0	-1	151
0	0	119
0	1	119
0	2	106
0	3	108
0	4	129
0	5	122



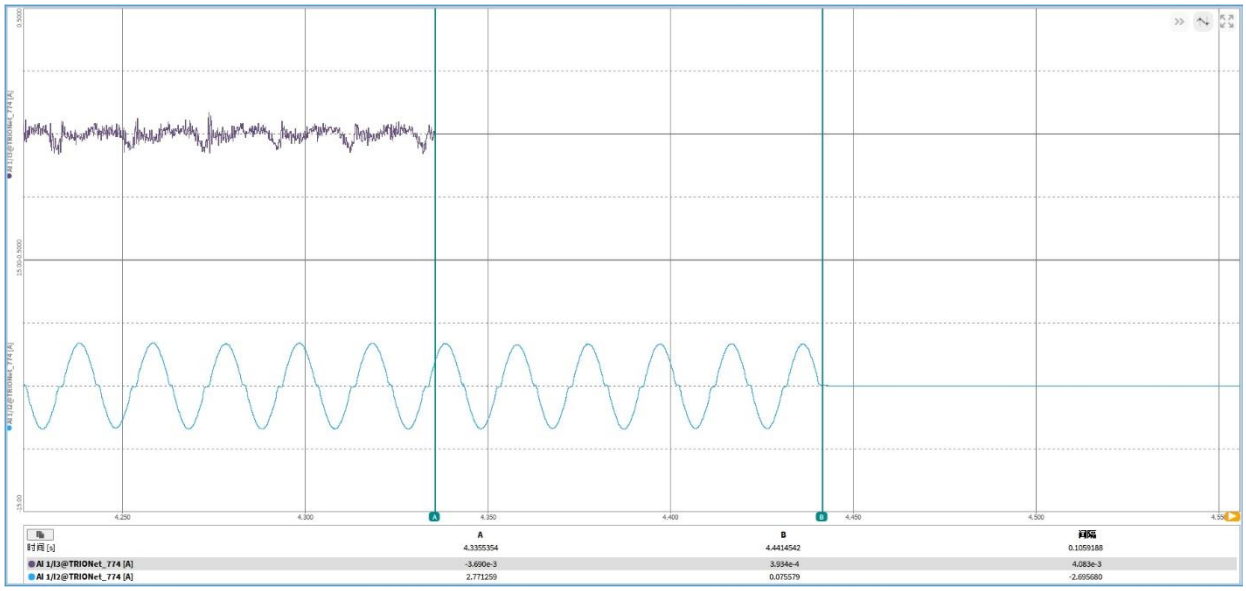
Test A(50Hz)	M(%)=0 & N(%)=0



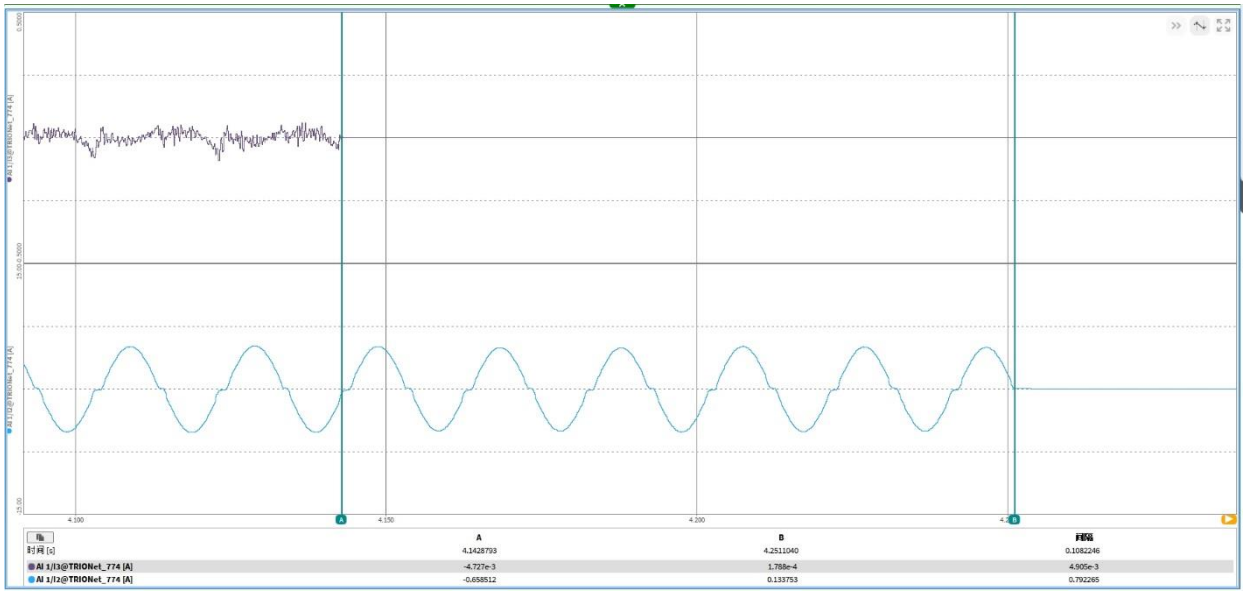
Test A(50Hz)	M(%)=0 & N(%)=+1



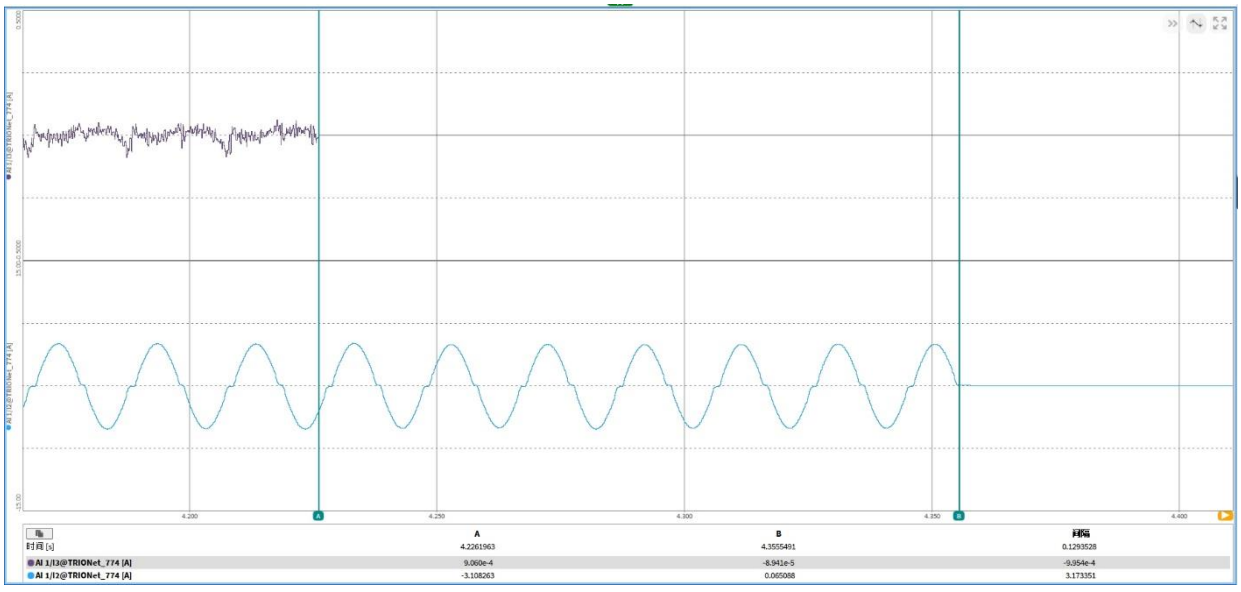
Test A(50Hz)	M(%)=0 & N(%)=+2



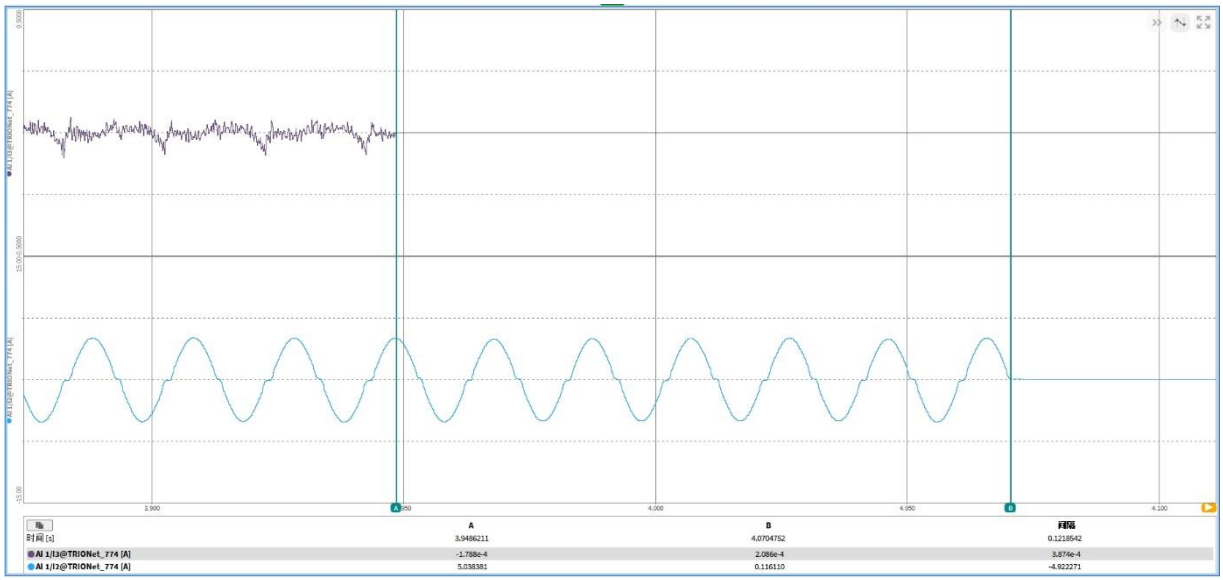
Test A(50Hz)	M(%)=0 & N(%)=+3



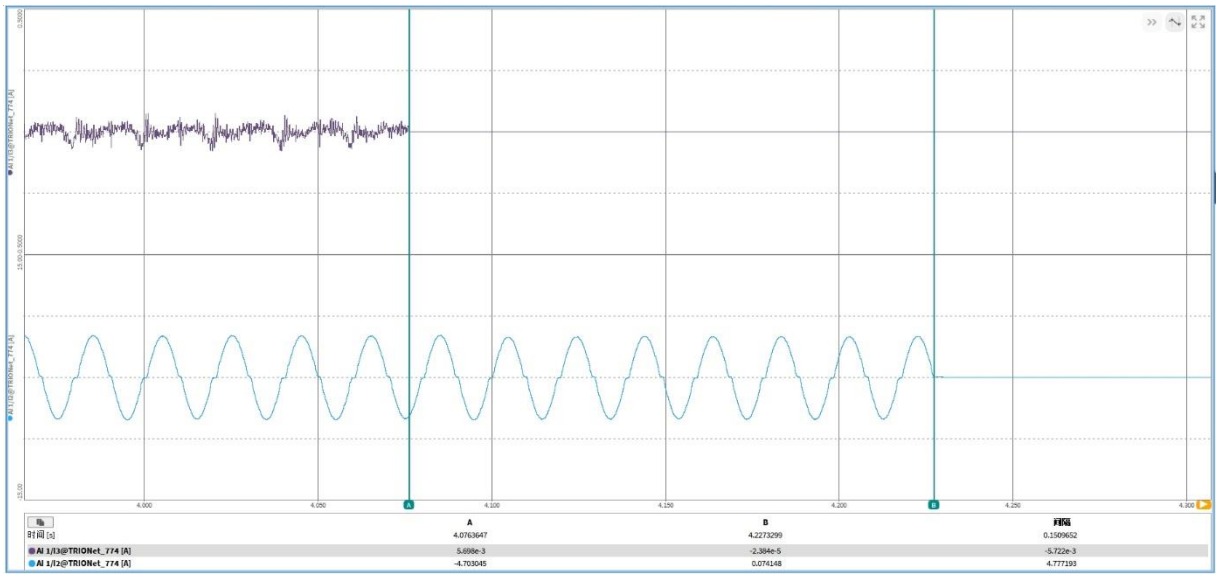
Test A(50Hz)	M(%)=0 & N(%)=+4



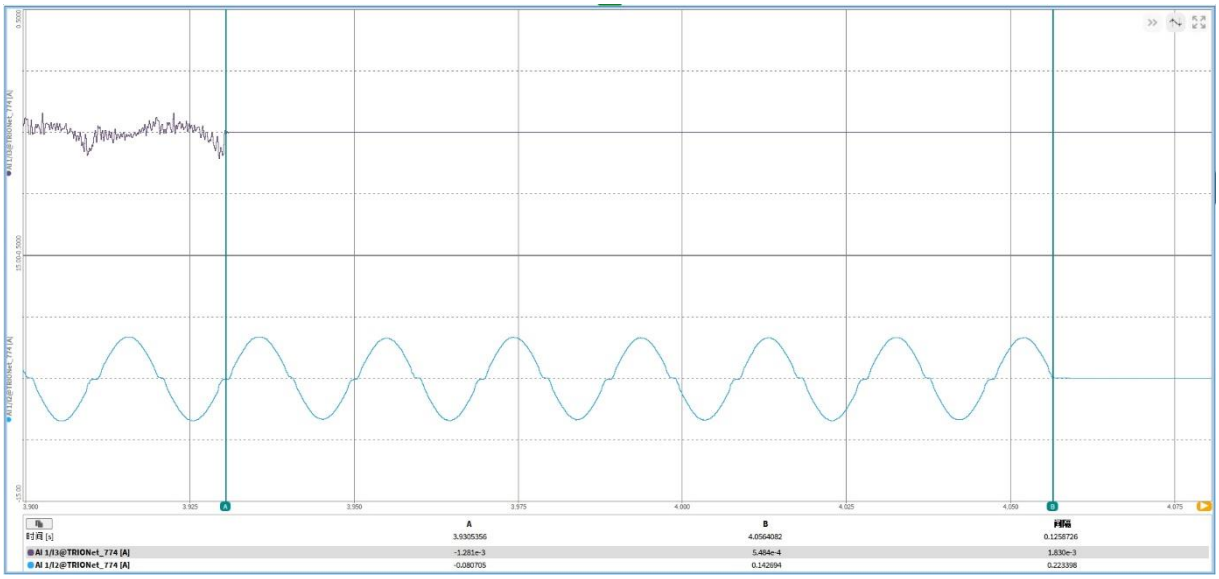
Test A(50Hz)	M(%)=0 & N(%)=+5



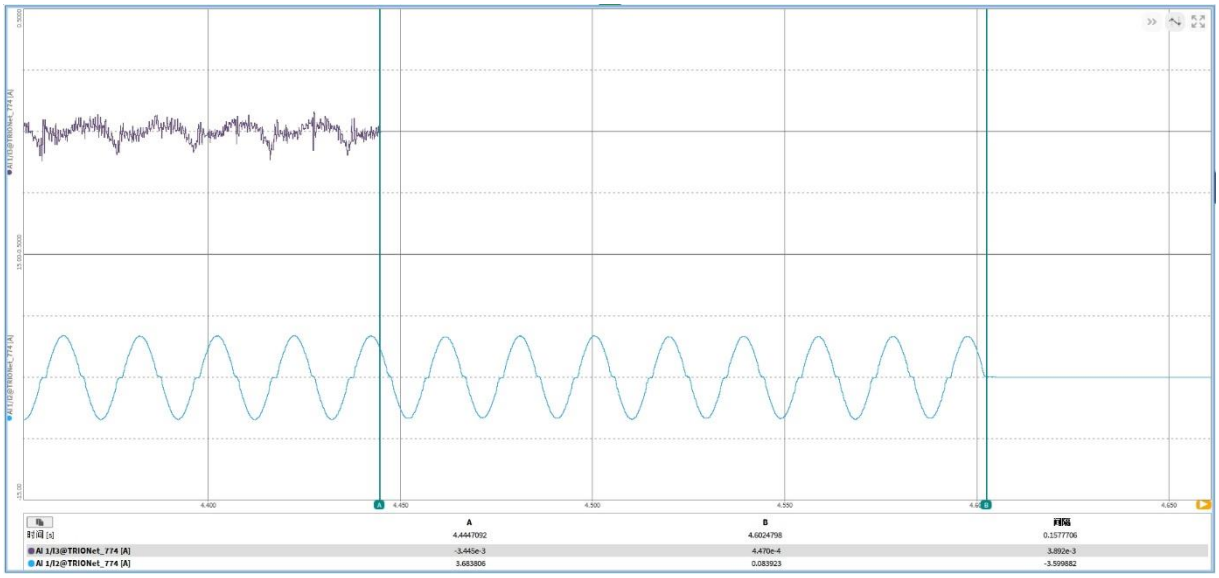
Test A(50Hz)	M(%)=0 & N(%)=-1



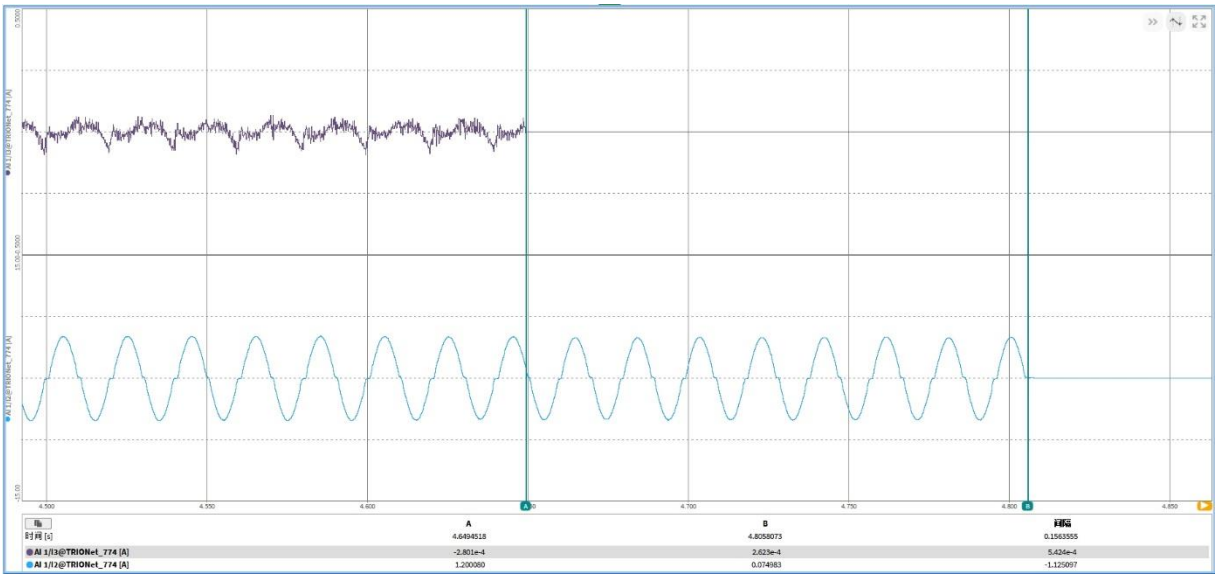
Test A(50Hz)	M(%)=0 & N(%)=-2



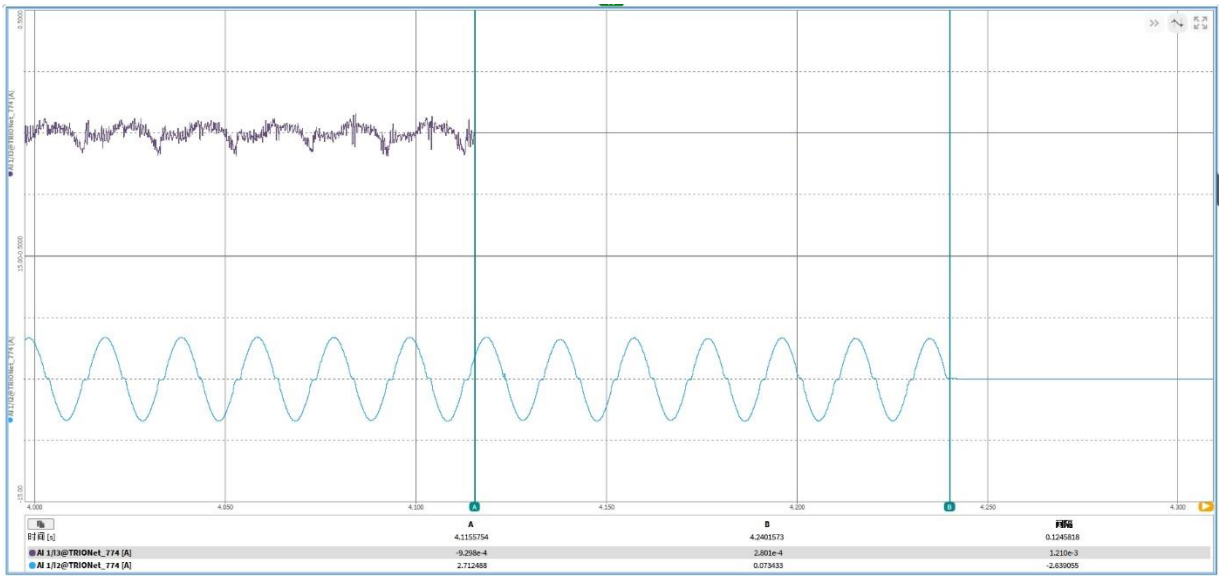
Test A(50Hz)	M(%)=0 & N(%)=-3



Test A(50Hz)	M(%)=0 & N(%)=-4

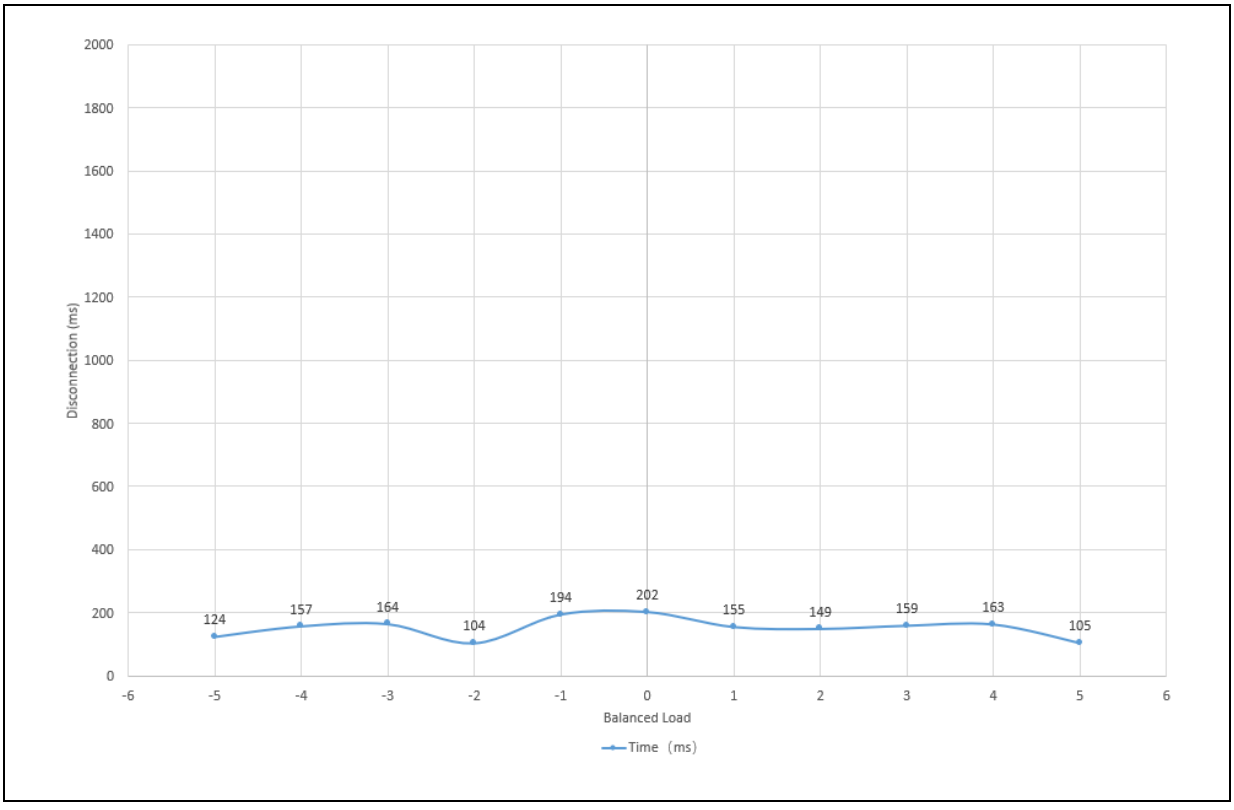


Test A(50Hz)	M(%)=0 & N(%)=-5

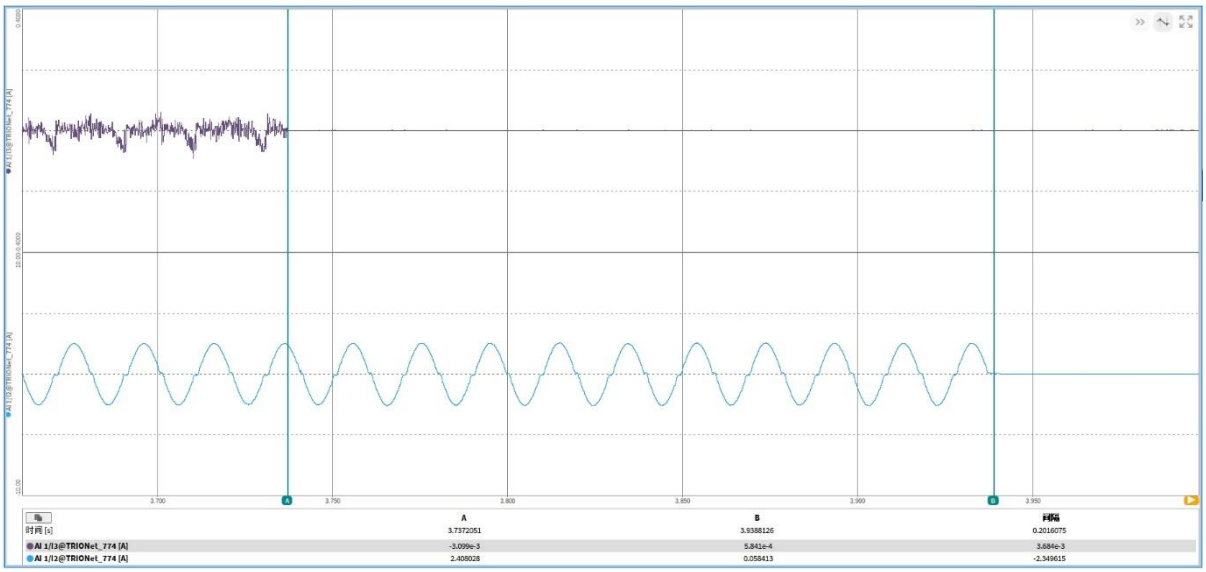


4.6.2 Test B

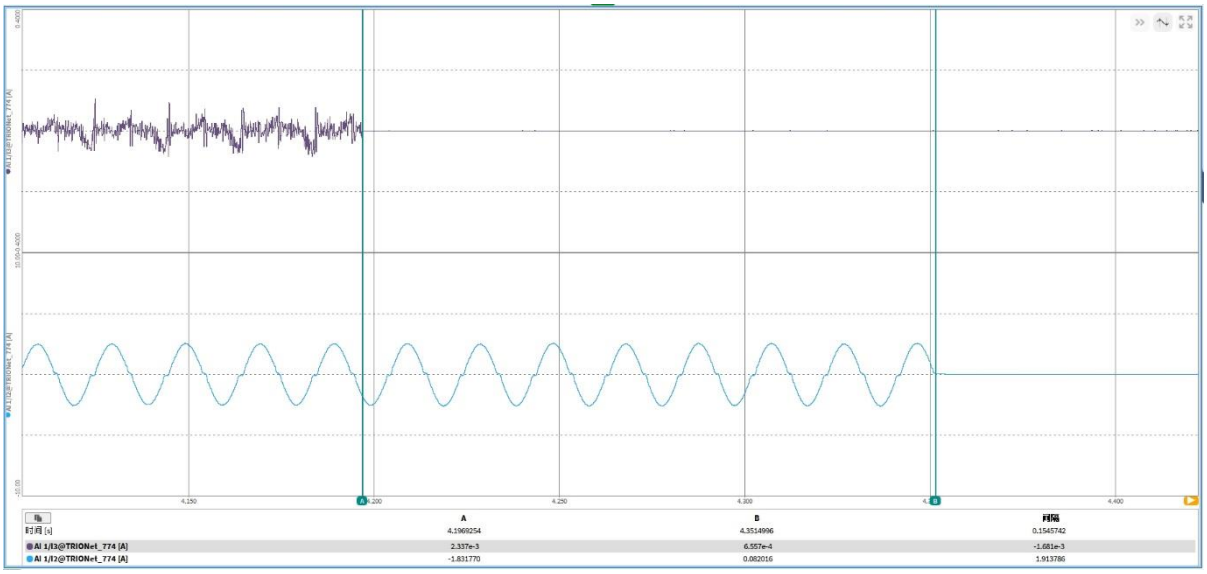
Balanced Load		
M (%)	**N (%)**	**Disconnection (ms) (limit at t=5s)**
0	-5	124
0	-4	157
0	-3	164
0	-2	104
0	-1	194
0	0	202
0	1	155
0	2	149
0	3	159
0	4	163
0	5	105



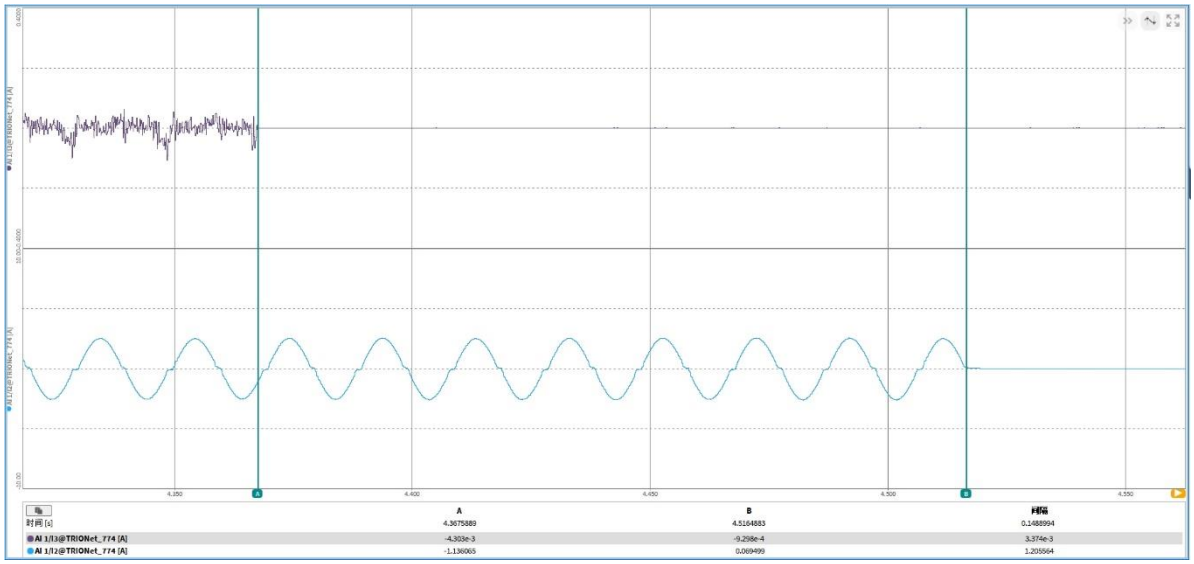
Test B(50Hz)	M(%)=0 & N(%)=0



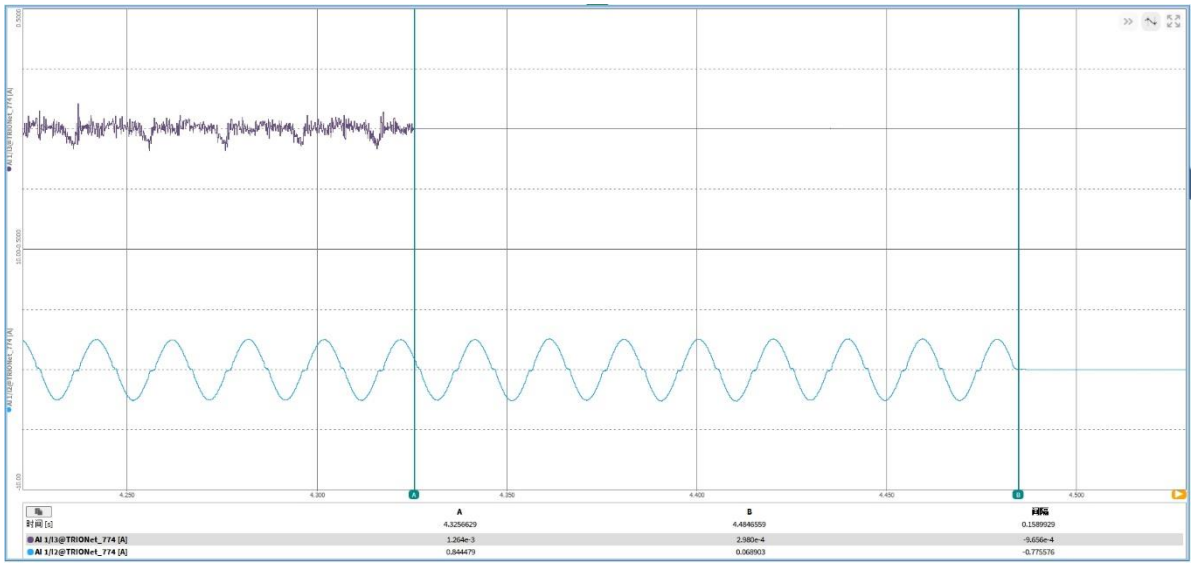
Test B(50Hz)	M(%)=0 & N(%)=+1



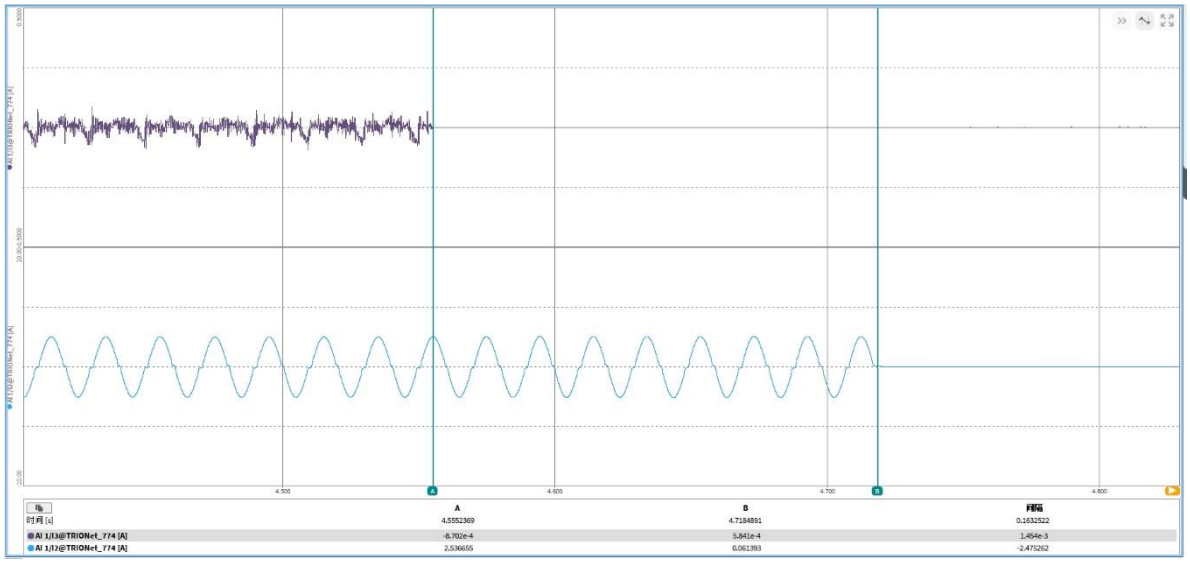
Test B(50Hz)	M(%)=0 & N(%)=+2



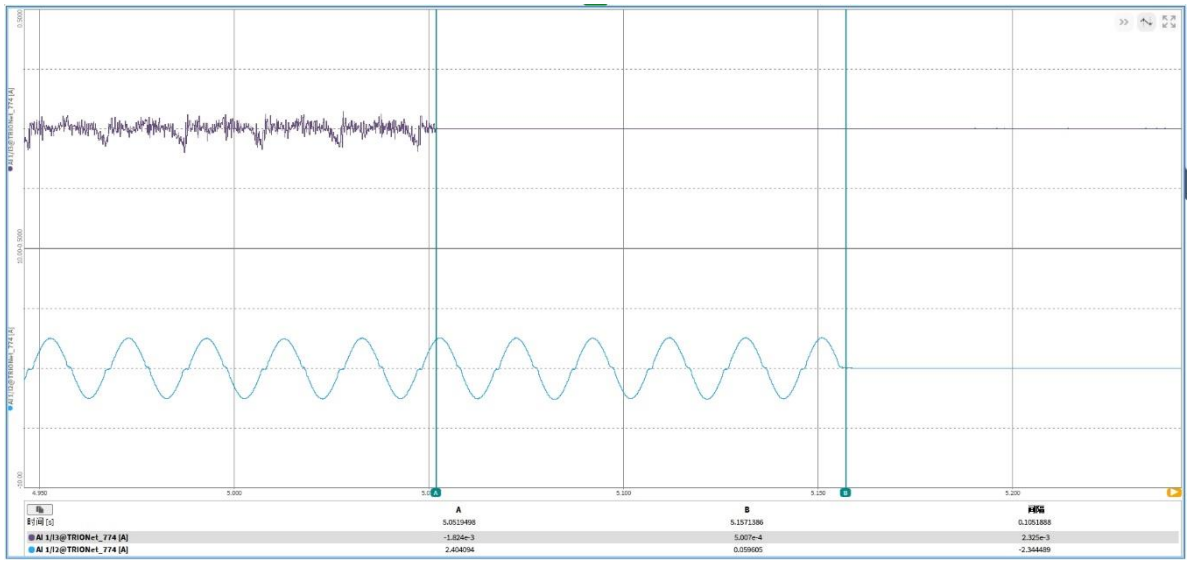
Test B(50Hz)	M(%)=0 & N(%)=+3



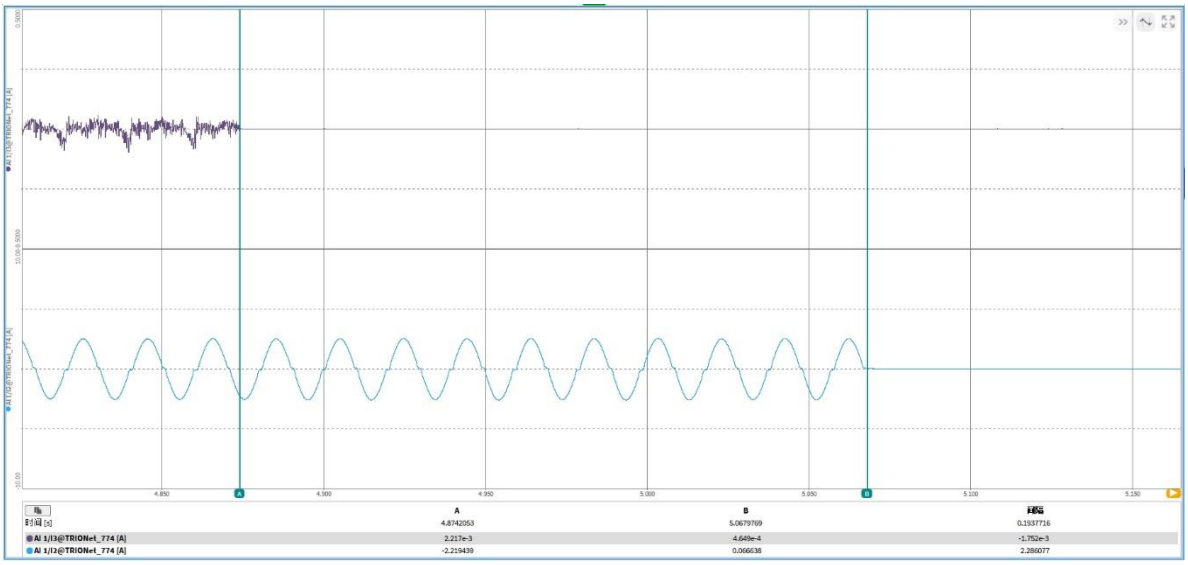
Test B(50Hz)	M(%)=0 & N(%)=+4



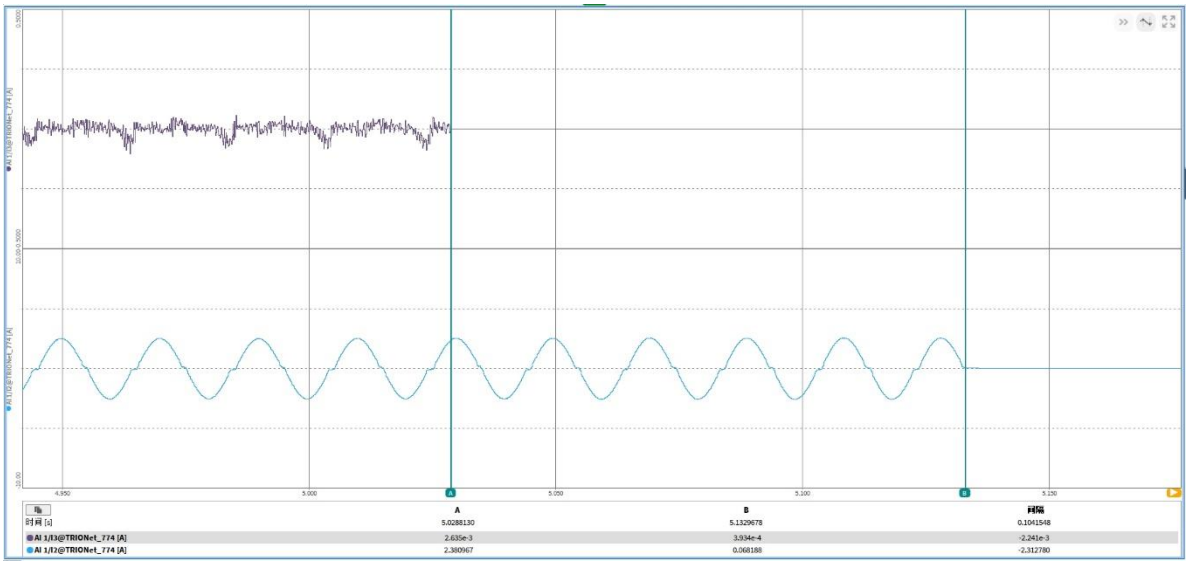
Test B(50Hz)	M(%)=0 & N(%)=+5



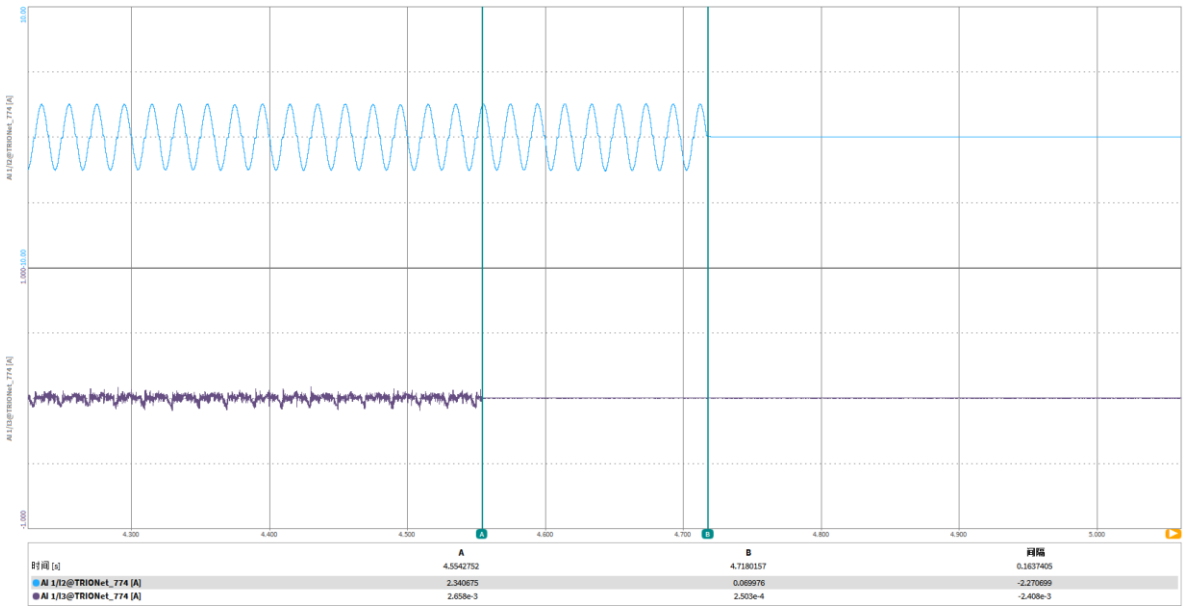
Test B(50Hz)	M(%)=0 & N(%)=-1



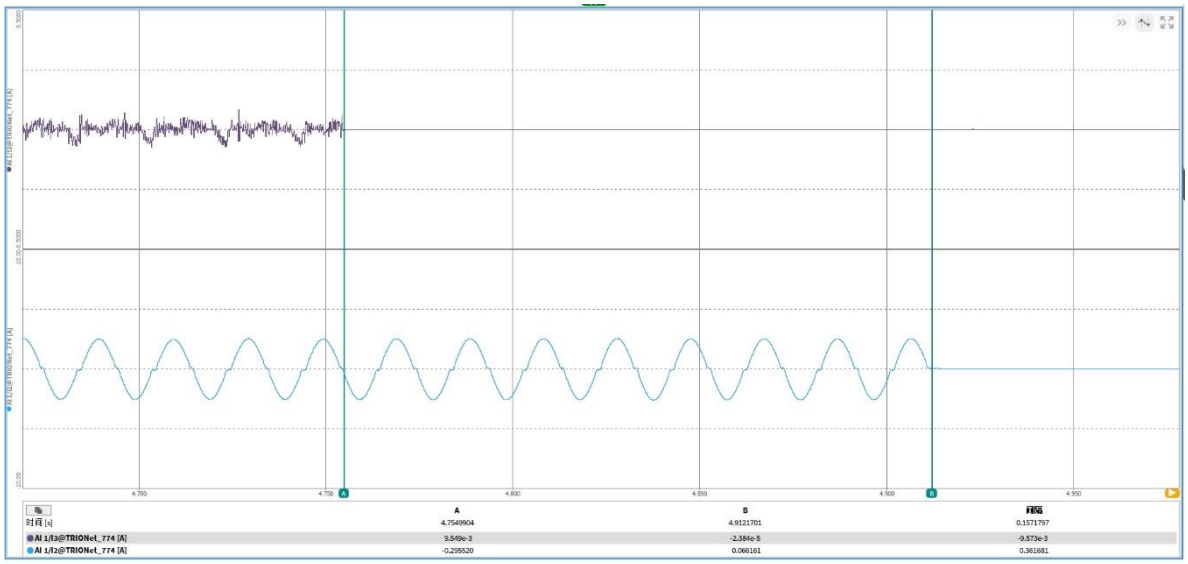
Test B(50Hz)	M(%)=0 & N(%)=-2



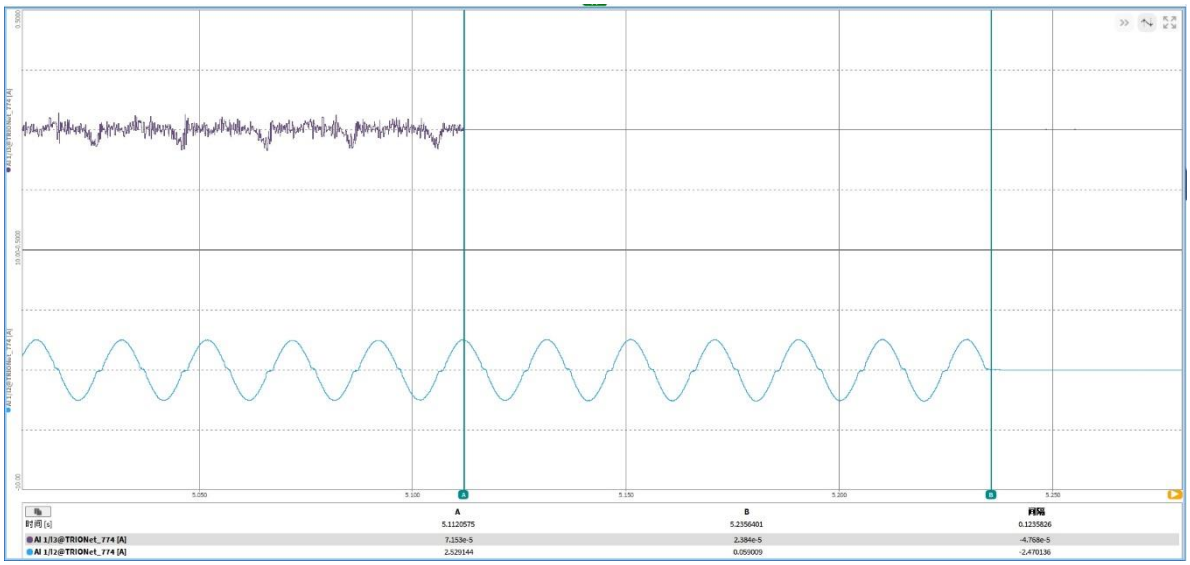
Test B(50Hz)	M(%)=0 & N(%)=-3



Test B(50Hz)	M(%)=0 & N(%)=-4

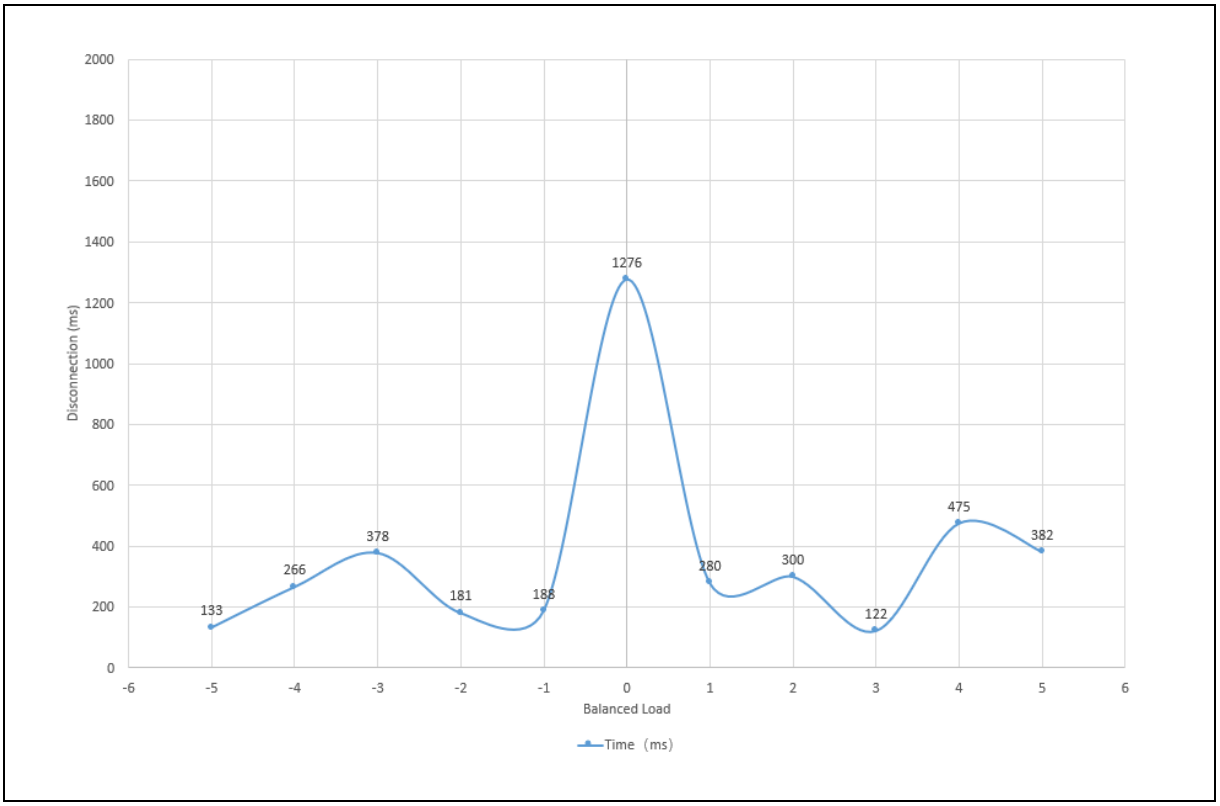


Test B(50Hz)	M(%)=0 & N(%)=-5

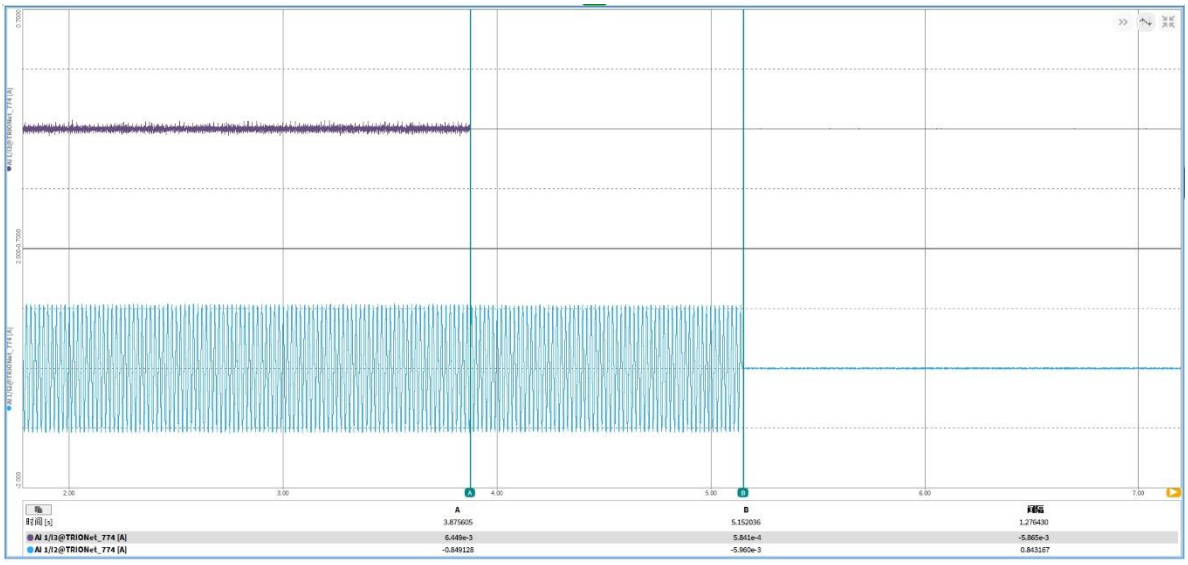


4.6.3 Test C

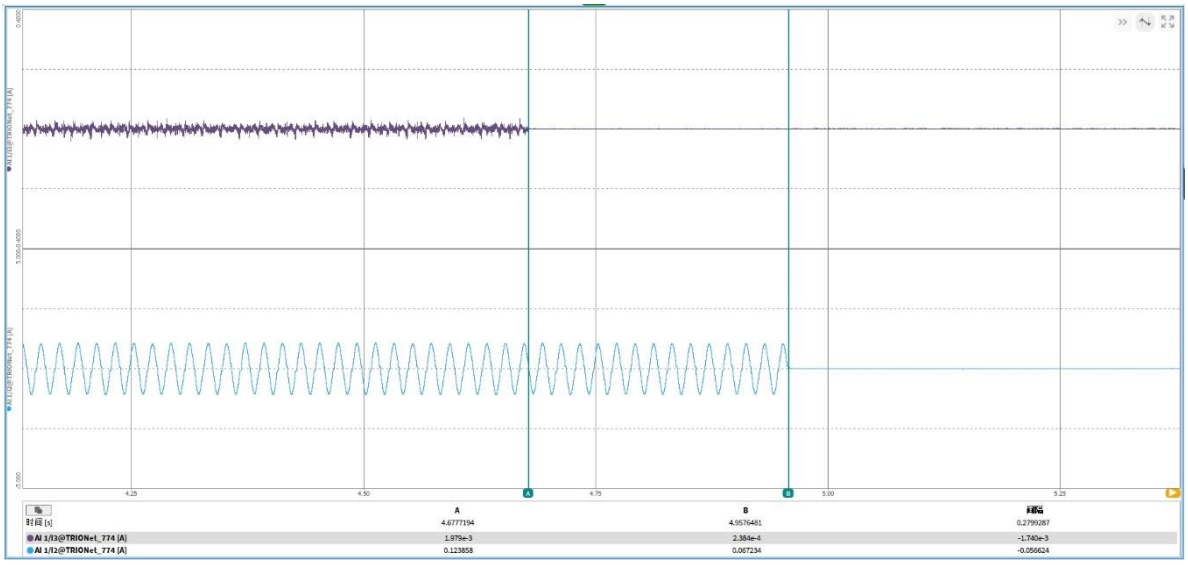
Balanced Load		
M (%)	**N (%)**	**Disconnection (ms) (limit at t=5s)**
0	-5	133
0	-4	266
0	-3	378
0	-2	181
0	-1	188
0	0	1276
0	1	280
0	2	300
0	3	122
0	4	475
0	5	382



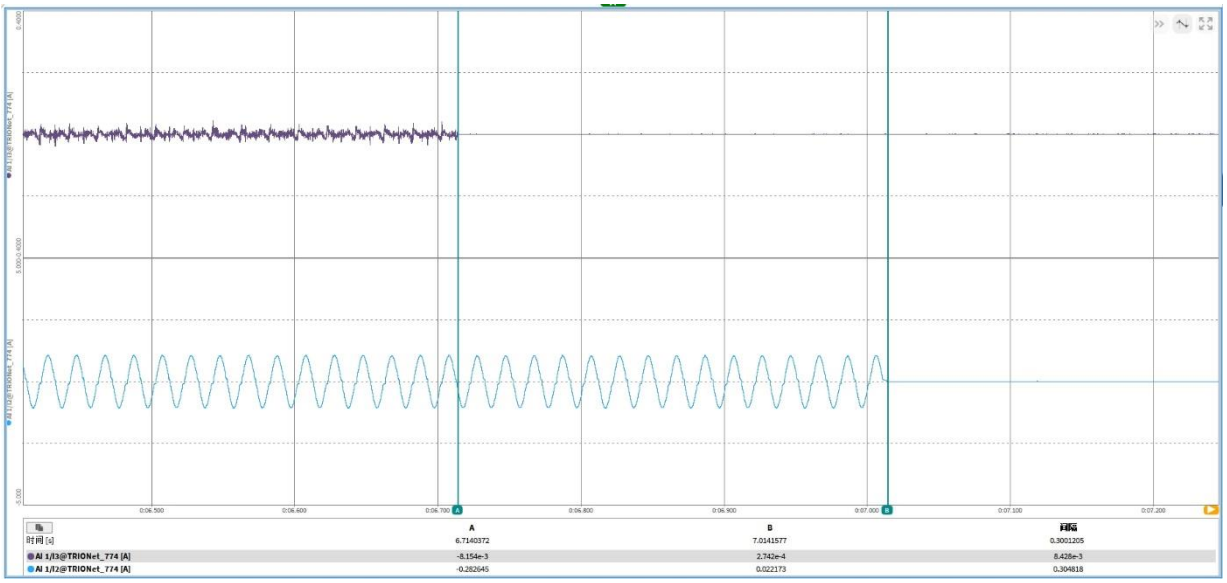
Test C(50Hz) M(%)=0 & N(%)=0



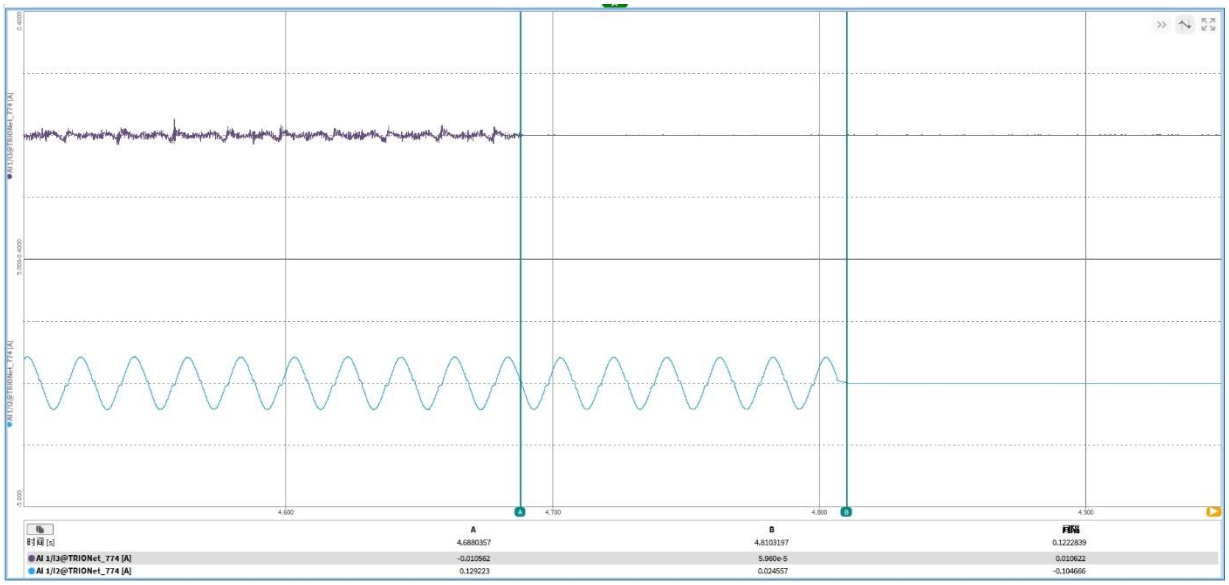
Test C(50Hz) M(%)=0 & N(%)=+1



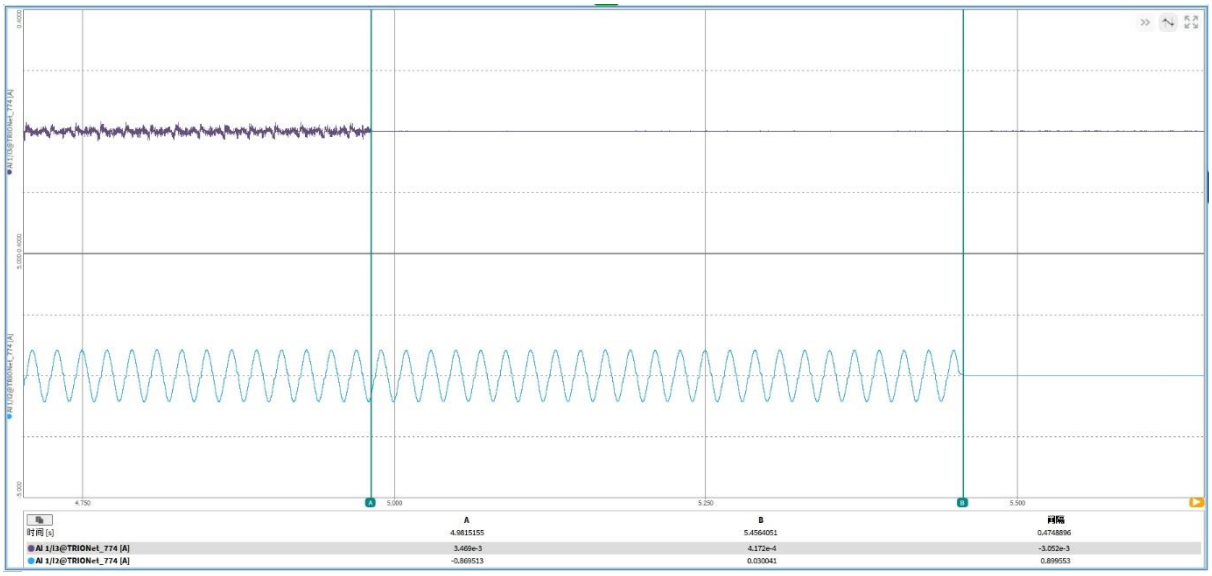
Test C(50Hz)	M(%)=0 & N(%)=+2



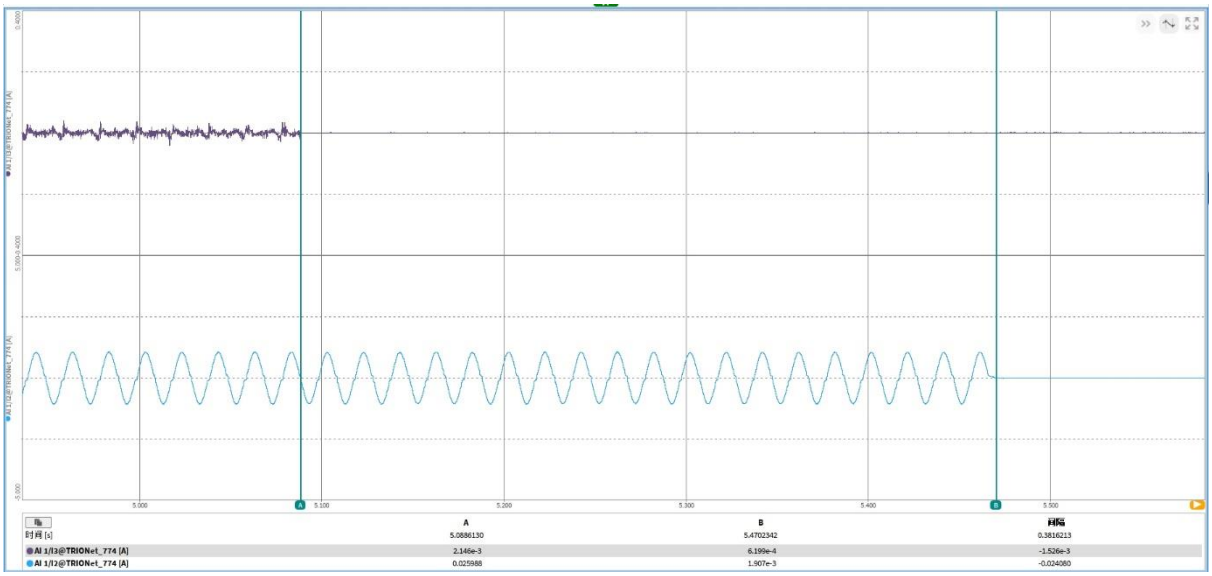
Test C(50Hz)	M(%)=0 & N(%)=+3



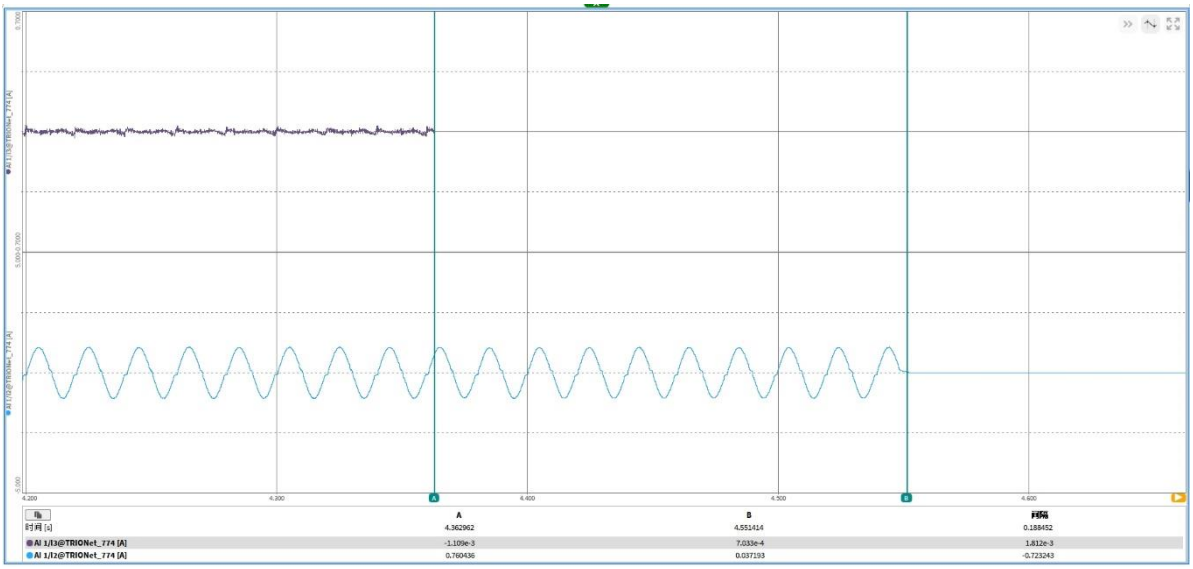
Test C(50Hz)	M(%)=0 & N(%)=+4



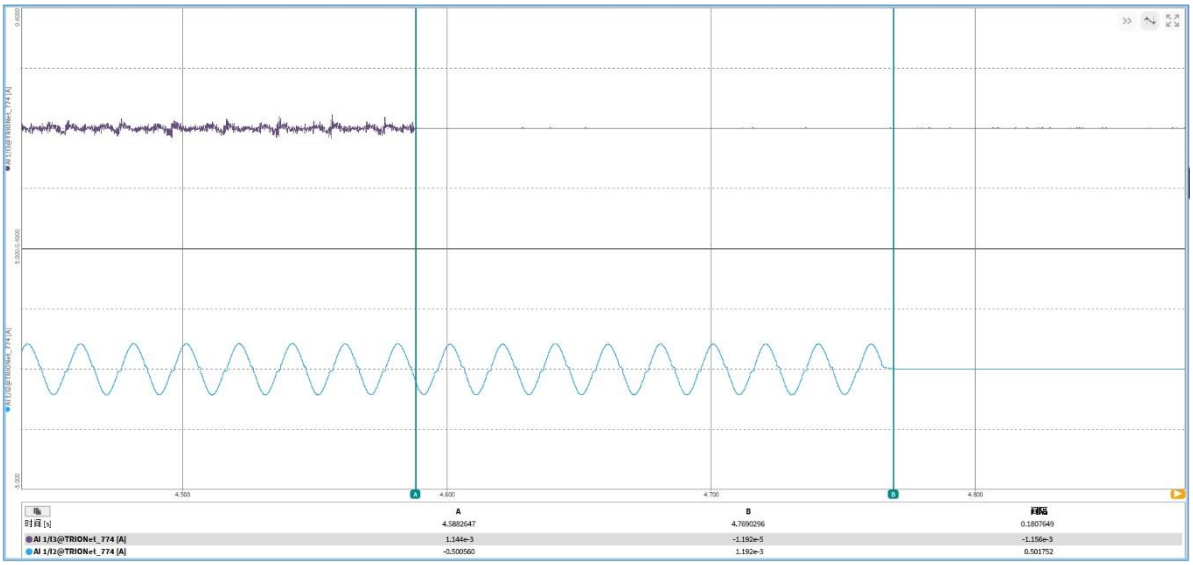
Test C(50Hz)	M(%)=0 & N(%)=+5



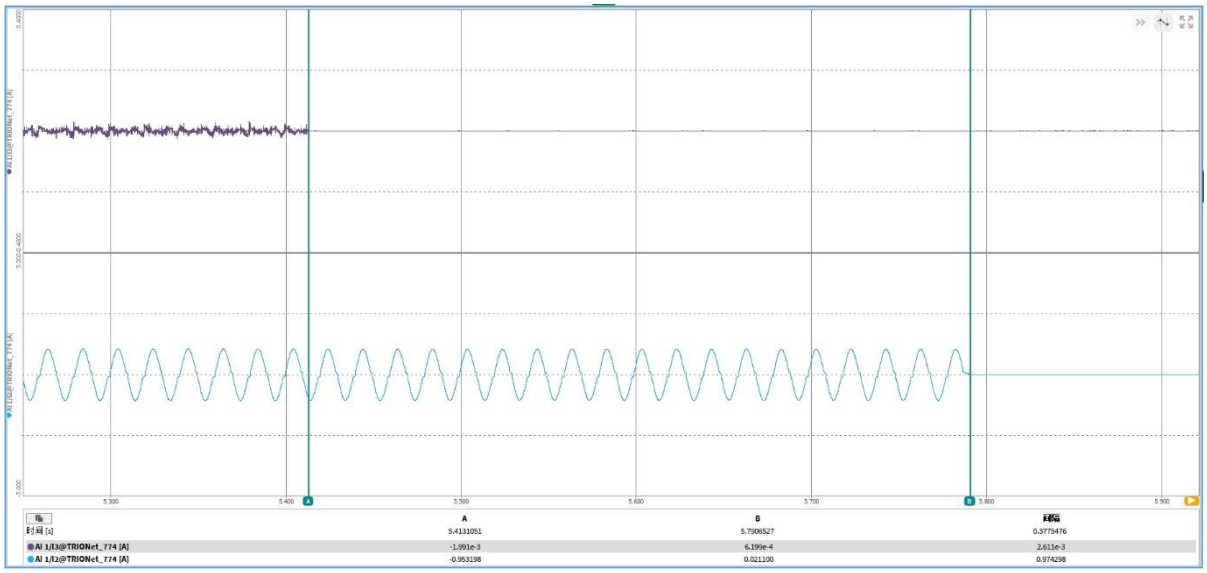
Test C(50Hz) M(%)=0 & N(%)=-1



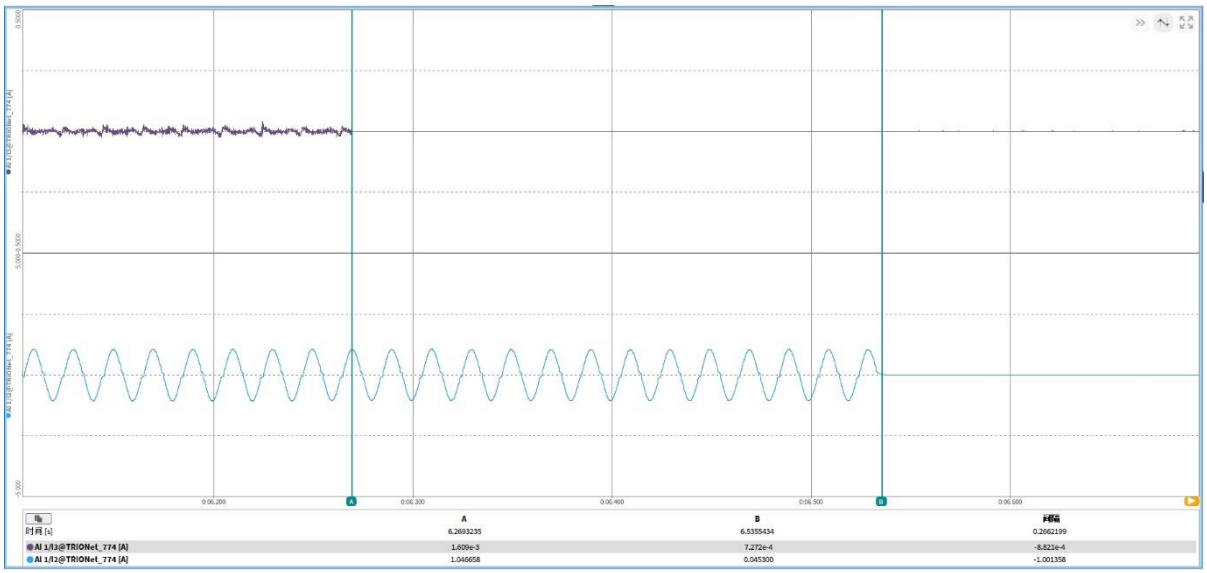
Test C(50Hz) M(%)=0 & N(%)=-2



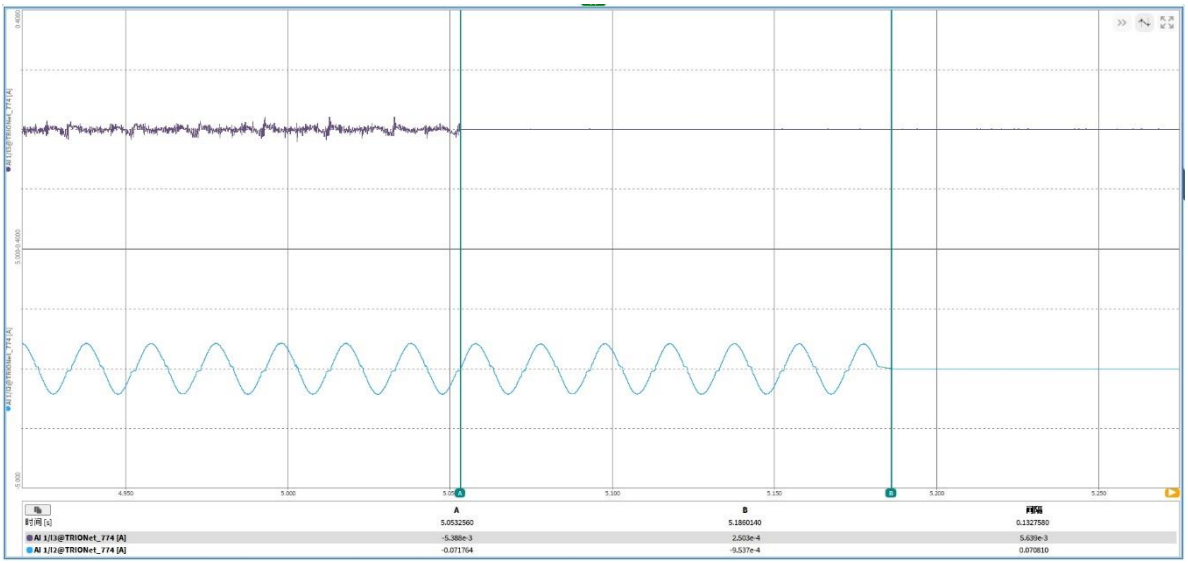
Test C(50Hz)	M(%)=0 & N(%)=-3



Test C(50Hz)	M(%)=0 & N(%)=-4



Test C(50Hz)	M(%)=0 & N(%)=-5



4.7 MARKING

As it can be seen in the pictures below (chapter 5 in this report) and the picture of the rating plate on 2.2 of this report the inverter accomplish all the requirements in this point of the VDE V 0126-1-1.

4.8 RESIDUAL CURRENT

This test has been done according to the standard EN 62109-2:2011, 4.8.3

The compliances with these requirements are stated in the following test reports:

- IEC 62109-2:2010: Test Report nº GZES231202137902 on Dec. 18, 2023 which issued by SGS-CSTC Standards Technical Services Co., Ltd. Guangzhou Branch.

4.9 TABLE: ACTIVE POEWR OUTPUT FEED-IN AT OVERFREQUENCY

VFR 2013: Above 50,4Hz the inverter must start de-rating with 40% per Hz based on the output power at the point, when the inverter reached 50.4Hz (~51.5Hz).

VFR 2014: Above 50,6Hz the inverter must start de-rating with 40% per Hz based on the output power at the point, when the inverter reached 50.6Hz (~51.5Hz).

If the grid frequency decreases, the inverter is allowed to increase the output power in the same rate as the decreasing happened before.

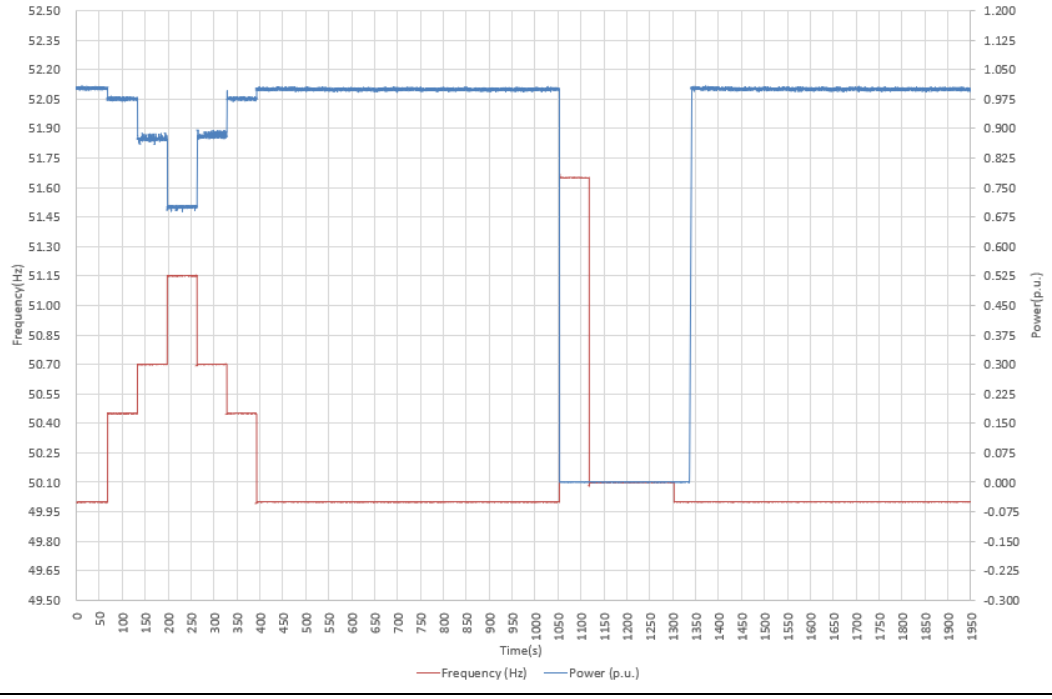
String	1	U_{DC} = Un	45Vdc	Uac = Un	230 Vac	P =P_n= (W)	800 W

Udc (Vdc)	F (Hz)	F (Hz)	P (W)	time
45	a) 50Hz (± 0.01Hz)	50.00	802	1 min
45	b) 50.45Hz (± 0.05Hz)	50.45	781	1 min
45	c) 50.7Hz (± 0.1Hz)	50.70	699	1 min
45	d) 51.15Hz (± 0.05Hz)	51.15	560	1 min
45	e) 50.75Hz (± 0.10Hz)	50.70	706	1 min
45	f) 50.45Hz (± 0.05Hz)	50.45	781	1 min
45	g) 50Hz (± 0.01Hz)	50.00	800	10 mins
45	h) 51.65Hz (± 0.05Hz)	51.65	0	1 min
45	i) 50Hz (+0.06 ~ +0.1Hz)	50.10	0	3mins
45	j) 50Hz (± 0.01Hz)	50.00	800	10 mins

Supplementary information:

See test curve as following

P vs f chart



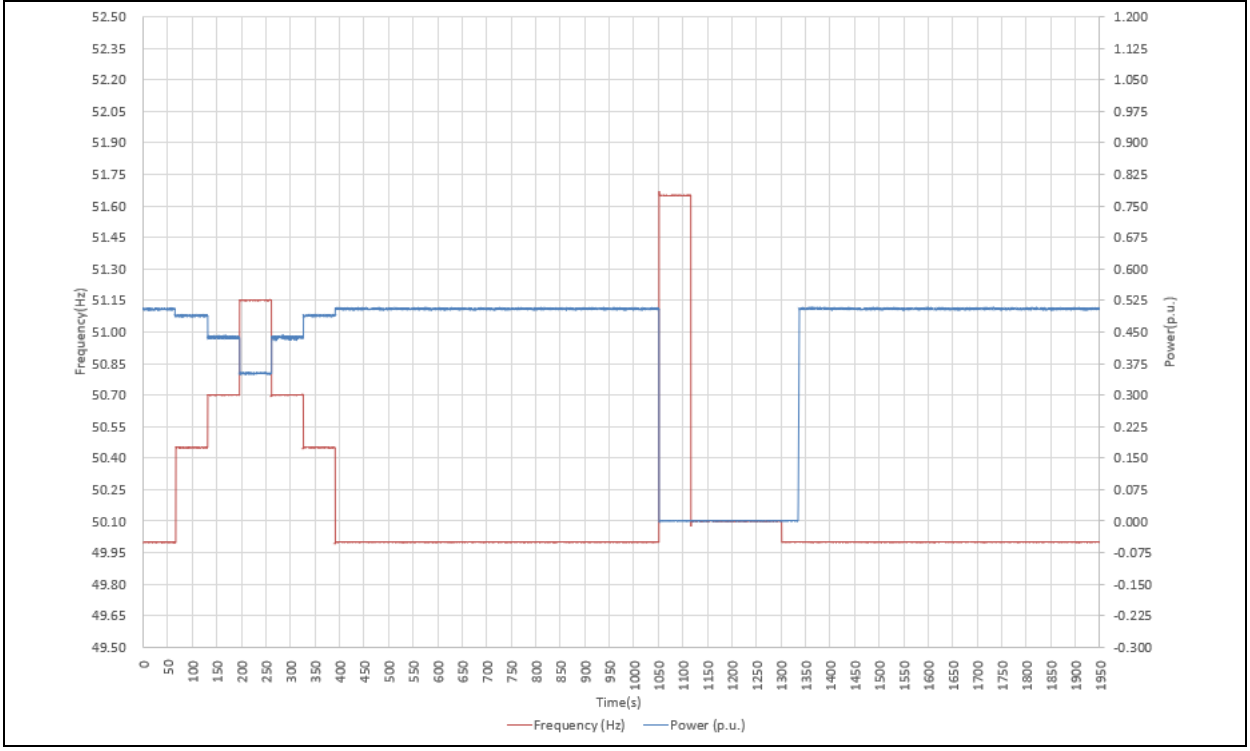
String	2	U_{DC} = Un	45Vdc	Uac = Un	230 Vac	P =0.5 P_n= (W)	400 W

Udc (Vdc)	F (Hz)	F (Hz)	P (W)	time
45	a) 50Hz (± 0.01Hz)	50.00	403	1 min
45	b) 50.45Hz (± 0.05Hz)	50.45	391	1 min
45	c) 50.7Hz (± 0.1Hz)	50.70	350	1 min
45	d) 51.15Hz (± 0.05Hz)	51.15	281	1 min
45	e) 50.75Hz (± 0.10Hz)	50.70	350	1 min
45	f) 50.45Hz (± 0.05Hz)	50.45	391	1 min
45	g) 50Hz (± 0.01Hz)	50.00	404	10 mins
45	h) 51.65Hz (± 0.05Hz)	51.65	0	1 min
45	i) 50Hz (+0.06 ~ +0.1Hz)	50.10	0	3mins
45	j) 50Hz (± 0.01Hz)	50.00	404	10 mins

Supplementary information:

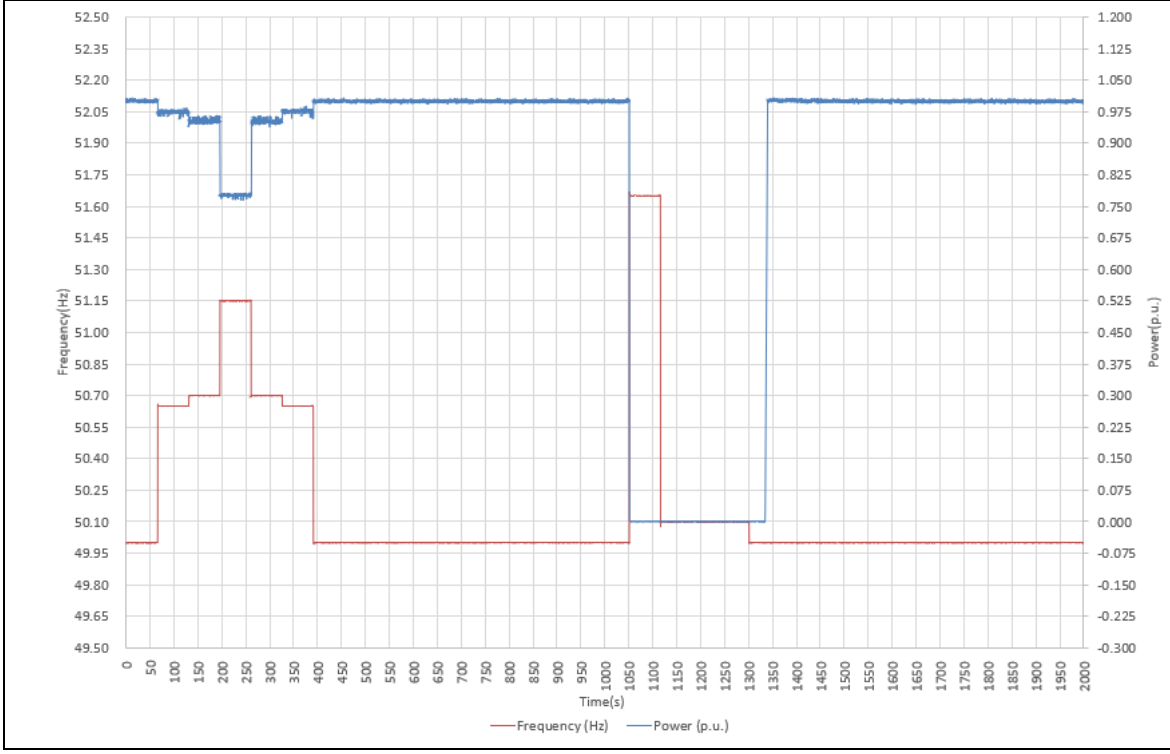
See test curve as following

P vs f chart



String	1	U_{DC} = Un	45Vdc	Uac = Un	230 Vac	P =P_n= (W)	800 W
Udc (Vdc)		F (Hz)		F (Hz)	P (W)		time
45		a) 50Hz (± 0.01Hz)		50.00	801		1 min
45		b) 50.65Hz (± 0.05Hz)		50.65	780		1 min
45		c) 50.7Hz (± 0.1Hz)		50.70	762		1 min
45		d) 51.15Hz (± 0.05Hz)		51.15	621		1 min
45		e) 50.75Hz (± 0.10Hz)		50.70	761		1 min
45		f) 50.65Hz (± 0.05Hz)		50.65	781		1 min
45		g) 50Hz (± 0.01Hz)		50.00	800		10 mins
45		h) 51.65Hz (± 0.05Hz)		51.65	0		1 min
45		i) 50Hz (+0.06 ~ +0.1Hz)		50.10	0		3 mins
45		j) 50Hz (± 0.01Hz)		50.00	800		10 mins
Supplementary information: See test curve as following							

P vs f chart



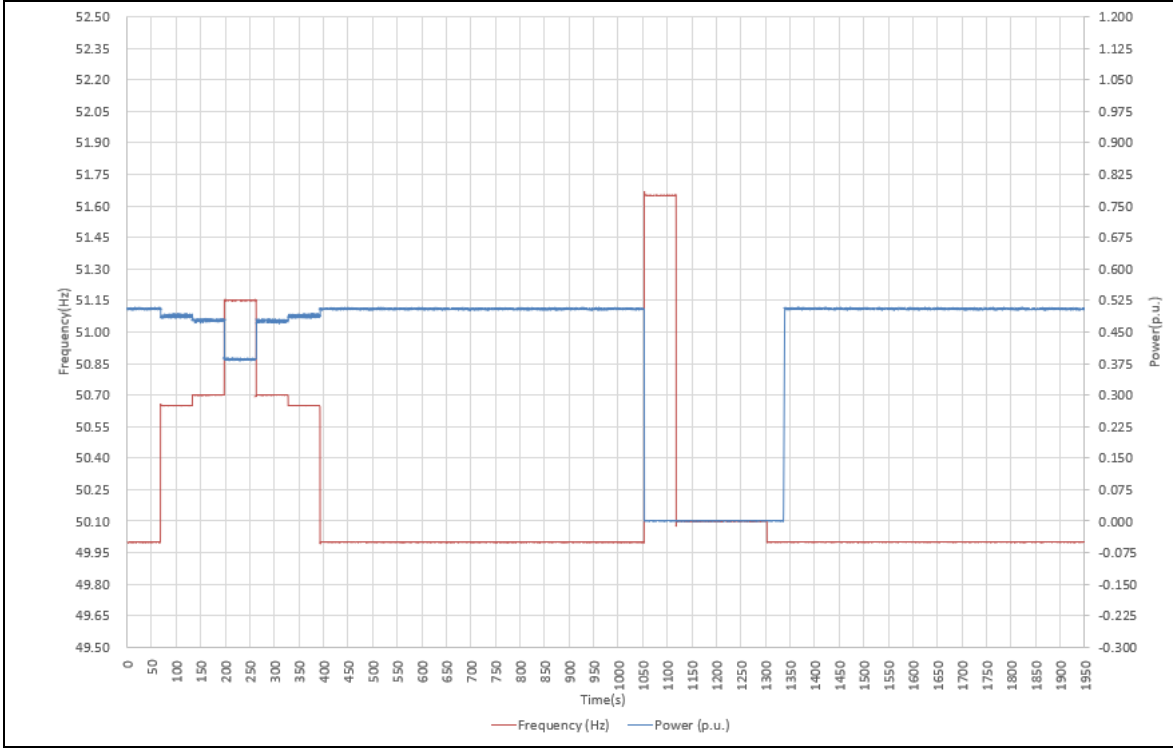
String	2	U_{DC} = Un	45Vdc	Uac = Un	230 Vac	P =0.5 P_n= (W)	400 W

Udc (Vdc)	F (Hz)	F (Hz)	P (W)	time
45	a) 50Hz (± 0.01Hz)	50.00	404	1 min
45	b) 50.65Hz (± 0.05Hz)	50.65	390	1 min
45	c) 50.7Hz (± 0.1Hz)	50.70	382	1 min
45	d) 51.15Hz (± 0.05Hz)	51.15	308	1 min
45	e) 50.75Hz (± 0.10Hz)	50.70	382	1 min
45	f) 50.65Hz (± 0.05Hz)	50.65	390	1 min
45	g) 50Hz (± 0.01Hz)	50.00	404	10 mins
45	h) 51.65Hz (± 0.05Hz)	51.65	0	1 min
45	i) 50Hz (+0.06 ~ +0.1Hz)	50.10	0	3 mins
45	j) 50Hz (± 0.01Hz)	50.00	404	10 mins

Supplementary information:

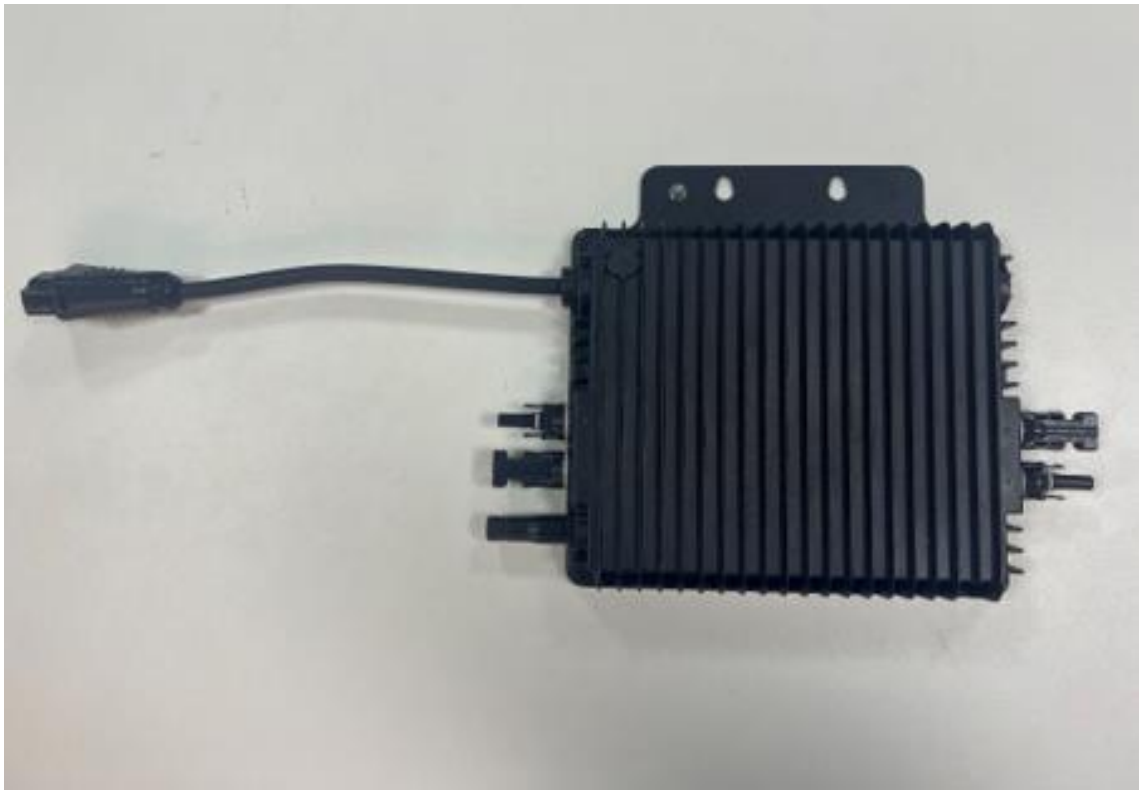
See test curve as following

P vs f chart

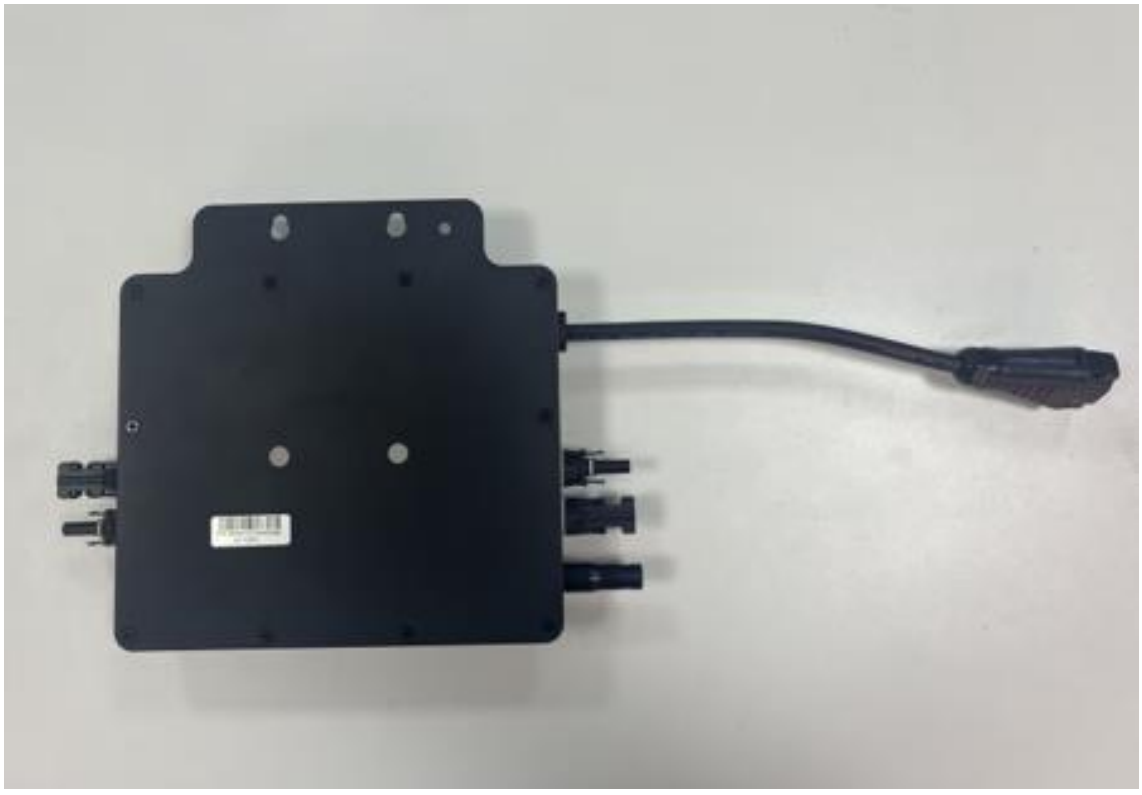


5 PICTURES

Front view for model ID800D, ID600D, ID400D



Back view for model ID800D, ID600D, ID400D



Front view for model ID800M, ID600M, ID400M

Back view for model ID800M, ID600M, ID400M

Front view for model ID800A, ID600A, ID400A

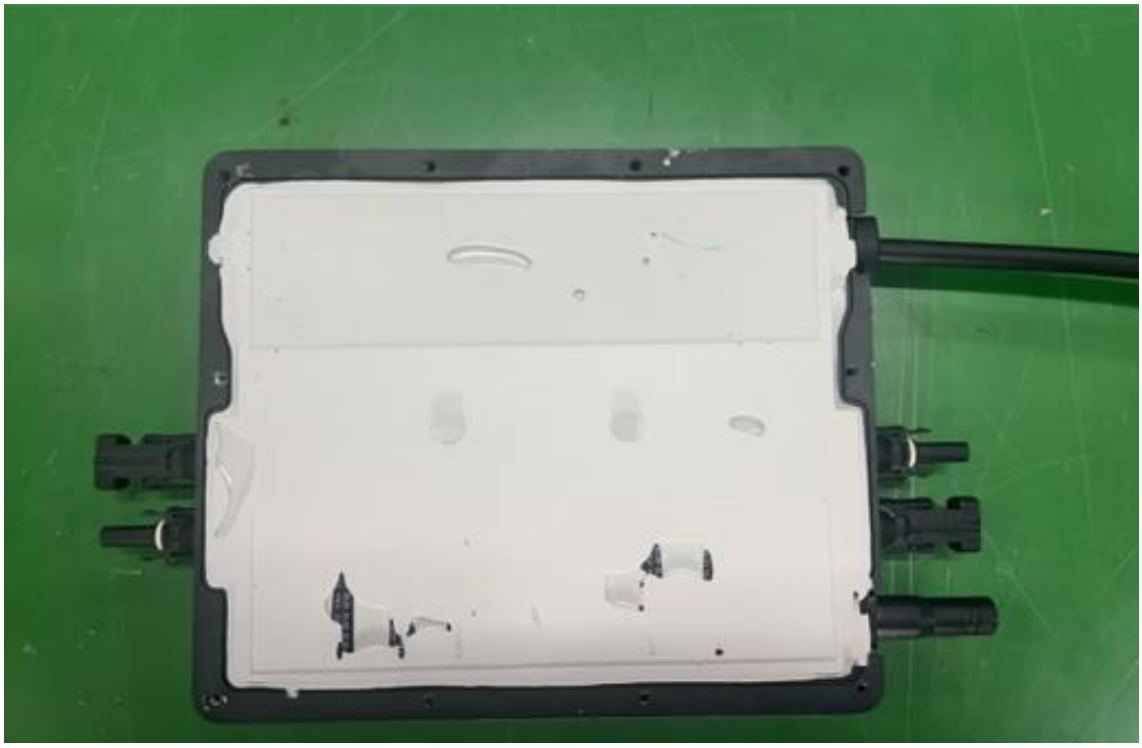
Back view for model ID800A, ID600A, ID400A

Internal view of appearance

Front view of main board

Back view of main board

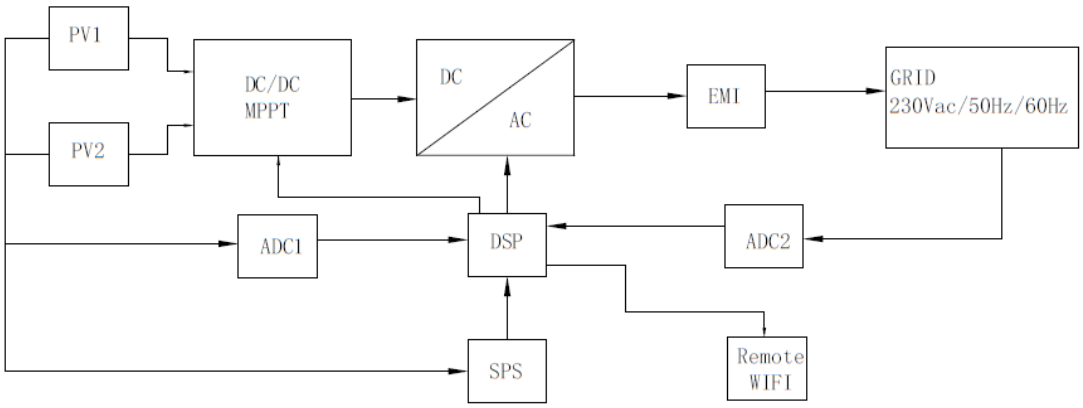
After gluing



Serial Number

Software Version
DH01.001-000-000

6 ELECTRICAL SCHEMES



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