Test Report of Bidirectional AC source

Nanjing Bridge New Energy Technology Co., Ltd

TEST DATE: 2020/09/25

TESTER: Shawn Qiu

SERIAL NO: NP2019112701

MODEL: ESA 30-300-46-R-ATI

Specification: P_{RATED}= 30 kW, V_{RATED}= 300 V, I_{RATED}= 46 A/ph

No.	Instruments	Model
1	Power Analyzer	ZIMMER LMG670
2	Oscilloscope	Tektronix DPO2002B/ DS4000E
3	Voltage Probe	RIGOL RP1050D
4	Current Probe	CAT Ⅲ 600V/1000A
5	Circuit Breaker	Schneider C4A
6	AC Contactor	CHNT NC2-150
7	Noise Detector	SOUND LEVEL METER
8	Temperature scanner	FLUKE MT4 MAX
9	Arbitrary Waveform Generator	RIGOL DG812

Schematic diagram of the test system

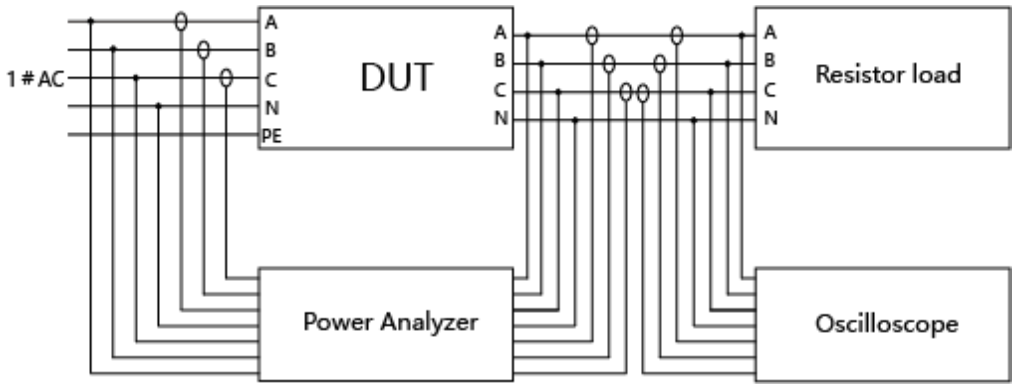


Figure 1 Test with resistive load

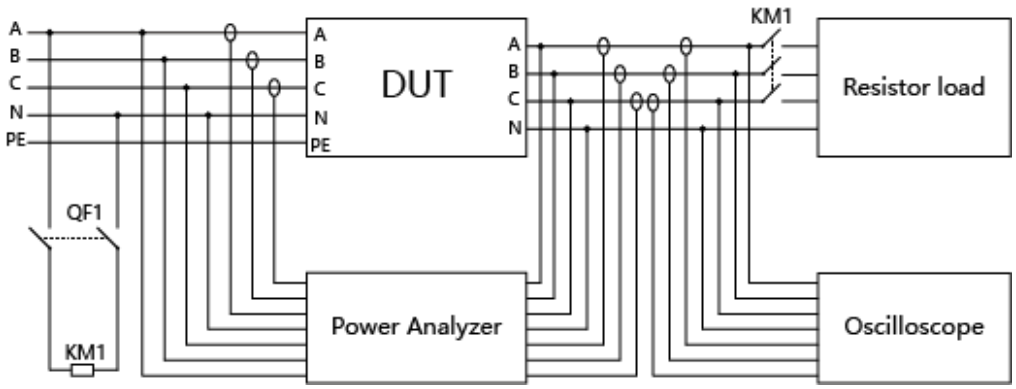


Figure 2 Step Load Change

DUT (Device Under Test)

Resistor Load

Power Analyzer

Oscilloscope

KM1 (AC contactor)

QF1 (Circuit breaker)

CONTENT

1. Appearance and Structural Inspection

When the power supply is power off, thorough appearance inspection checks should be conducted using either the visual inspection method or the hand feel method to ensure that there are no serious appearance defects such as scratches, indentations, color difference, paint drops, etc., caused by product assembly or bad assembly seams and breakages that exceed the specifications. Relevant safety labels should meet the corresponding requirements of the GB2894-2008 standard.

No.	Inspection contents	Confirmation (√or×)
1	No serious appearance defects were caused by product assembly, such as assembly seams and breaks beyond specifications, etc.	
2	No serious defects affect product appearance e.g. scratches, indentations, color differences, and paint dropping.	
3	Relevant safety labels should meet the GB2894-2008 requirement.	
4	Complete certificates, instructions and warranty cards, and no misuse of packaging materials, or multiple accessories.	

Signature:

2. Voltage Range

Connect the input of the AC source to the power grid to keep the input voltage within the operating voltage range of the power supply, and connect the output to a purely resistive load. Adjust the output voltage value within the rated voltage range. Read and record the measured value(s) on the power analyzer.

Facilities and instruments: Power analyzer, Resistor load (5.3 ohms for phase A/B/C)

No.	Setting Voltage (A/B/C Phase)			Voltage Measured (A/B/C Phase)		
1	30	30	30	30.01	30.01	30.02
2	60	60	60	60.05	60.04	60.06
3	90	90	90	90.08	90.06	90.10
4	120	120	120	120.1	120.07	120.12
5	150	150	150	150.1	150.07	150.14
6	180	180	180	180.12	180.09	180.17

7	210	210	210	210.14	210.09	210.19
8	240	240	240	240.16	240.11	240.21
9	270	270	270	270.17	270.12	270.23
10	300	300	300	300.18	300.13	300.25

Signature:

3. Current Range

Connect the input of the AC source to the power grid to keep the input voltage within the operating voltage range of the power supply, and connect the output to a purely resistive load. Adjust the output voltage value within the rated voltage range to ensure that the output current reaches the rated current value of the power supply. Read and record the measured value(s) on the power analyzer.

Facilities and instruments: Power analyzer, Resistor load (5.3 ohms for phase A/B/C)

No.	Setting Voltage (A/B/C Phase)			Current Measured (A/B/C Phase)		
1	30	30	30	5.81	5.7	5.87
2	60	60	60	11.62	11.41	11.75
3	90	90	90	17.42	17.10	17.61
4	120	120	120	23.19	22.75	23.44
5	150	150	150	28.95	28.38	29.23
6	180	180	180	34.65	33.91	34.94
7	210	210	210	40.31	39.37	40.58
8	220	220	220	42.15	41.11	42.38
9	225	225	225	43.04	41.92	43.23
10	230	230	230	43.93	42.73	44.08

Signature:

4. Voltage Accuracy

Connect the input of the AC source to the power grid to keep the input voltage within the operating voltage range of the power supply while the output is connected to a purely resistive load. Set the output voltage value to ensure that the power supply works within the rated output voltage range, read and record the output voltage measurement value on the power analyzer and the power supply, and take the largest error for calculation. The voltage accuracy is obtained using the following formula:

$$\delta_U = \frac{|U_0 - U_1|}{U_N} \times 100\%$$

where:

δ_U——Voltage accuracy;

U_1——Voltage value measured via power analyzer, V;

U_0——Voltage value displayed on the power supply, V;

U_N——Rated voltage, V.

Facilities and instruments: Power analyzer, Resistor load (5.3 ohms for phase A/B/C)

No.	Setting Voltage (A/B/C Phase)		Voltage of AC Source (A/B/C Phase)			Voltage Measured (A/B/C Phase)			Voltage Accuracy (A/B/C Phase)		
1	10% V_{RATED}	30	29.9	30.0	29.9	30.01	30.01	30.02	0.04%	0.00%	0.04%
2	20% V_{RATED}	60	59.9	60.0	59.9	60.05	60.04	60.06	0.05%	0.01%	0.05%
3	30% V_{RATED}	90	90.0	89.9	90.0	90.08	90.06	90.10	0.03%	0.05%	0.03%
4	40% V_{RATED}	120	119.9	120.1	120.1	120.1	120.07	120.12	0.07%	0.01%	0.01%
5	50% V_{RATED}	150	149.8	149.9	150.1	150.1	150.07	150.14	0.10%	0.06%	0.01%
6	60% V_{RATED}	180	179.9	179.9	180.1	180.12	180.09	180.17	0.07%	0.06%	0.02%
7	70% V_{RATED}	210	210.1	209.9	210.1	210.14	210.09	210.19	0.01%	0.06%	0.03%
8	80% V_{RATED}	240	239.9	240.1	240.1	240.16	240.11	240.21	0.09%	0.00%	0.04%
9	90% V_{RATED}	270	270.2	270.1	270.1	270.17	270.12	270.23	0.01%	0.01%	0.04%
10	100% V_{RATED}	300	300.1	300.1	300.2	300.18	300.13	300.25	0.03%	0.01%	0.02%

Signature:

5. Current Accuracy

Connect the input of the AC source to the power grid to keep the input voltage within the operating voltage range of the power supply while the output is connected to a purely resistive load. Set the output voltage value to make the power supply work within the rated output current range, read and record the output current measurement value on the power analyzer and the power supply, and take the largest error for calculation. The current accuracy is obtained using the following formula:

$$\delta_I = \frac{|I_0 - I_1|}{I_N} \times 100\%$$

where:

δ_I——Current accuracy;

I_1——Current value measured via power analyzer, A;

I_0——Current value displayed on power supply, A;

I_N——Rated current, A.

Facilities and instruments: Power analyzer, Resistor load (5.3 ohms for phase A/B/C)

No.	Setting Voltage (A/B/C Phase)		Current of AC Source (A/B/C Phase)			Current Measured (A/B/C Phase)			Current Accuracy (A/B/C Phase)		
1	10% V_{RATED}	30	5.81	5.71	5.87	5.81	5.7	5.87	0.00%	0.02%	0.00%
2	20% V_{RATED}	60	11.62	11.42	11.73	11.62	11.41	11.75	0.00%	0.02%	0.04%
3	30% V_{RATED}	90	17.45	17.1	17.58	17.42	17.10	17.61	0.07%	0.00%	0.07%
4	40% V_{RATED}	120	23.19	22.77	23.42	23.19	22.75	23.44	0.00%	0.04%	0.04%
5	50% V_{RATED}	150	29.01	28.44	29.19	28.95	28.38	29.23	0.13%	0.13%	0.09%
6	60% V_{RATED}	180	34.69	33.97	34.93	34.65	33.91	34.94	0.09%	0.13%	0.02%
7	70% V_{RATED}	210	40.29	39.41	40.56	40.31	39.37	40.58	0.04%	0.09%	0.04%
8	73% V_{RATED}	220	42.12	41.14	42.36	42.15	41.11	42.38	0.07%	0.07%	0.04%
9	75% V_{RATED}	225	43.1	41.95	43.25	43.04	41.92	43.23	0.13%	0.07%	0.04%
10	78% V_{RATED}	230	43.97	42.70	44.07	43.93	42.73	44.08	0.09%	0.07%	0.02%

Signature:

6. Frequency Accuracy

Connect the input of the AC source to the power grid to keep the input voltage within the operating voltage range of the power supply. After setting the voltage value, change the frequency setting value of the power supply, read and record the output frequency measurement value of the power analyzer and the power supply, and select the one with the largest error for calculation. The frequency accuracy is obtained using the following formula:

$$\delta_f = \frac{|f_0 - f_1|}{f_N} \times 100\%$$

where:

δ_f——Frequency accuracy;

f_1——Frequency value measured via power analyzer, Hz;

f_0——Frequency value displayed on power supply, Hz;

f_N——Rated frequency, Hz.

Facilities and instruments: Power analyzer

No.	Setting Voltage /Frequency		Frequency of AC Source (A/B/C Phase)			Frequency Measured (A/B/C Phase)			Frequency Accuracy (A/B/C Phase)		
1	220	30	30	30	30	29.99	29.99	29.99	0.01%	0.01%	0.01%
2	220	40	40	40	40	39.99	39.99	39.99	0.01%	0.01%	0.01%
3	220	50	50	50	50	49.99	49.99	49.99	0.01%	0.01%	0.01%
4	220	60	60	60	60	59.99	59.99	59.99	0.01%	0.01%	0.01%
5	220	70	70	70	70	70.00	70.00	70.00	0.00%	0.00%	0.00%
6	220	80	80	80	80	80.00	80.00	80.00	0.00%	0.00%	0.00%
7	220	90	90	90	90	90.01	90.01	90.01	0.01%	0.01%	0.01%
8	220	100	100	100	100	99.99	99.99	99.99	0.01%	0.01%	0.01%

Signature:

7. Power Accuracy

Connect the input of the AC source to the power grid to keep the input voltage within the operating voltage range of the power supply, and the output is connected to a purely resistive load. Set the output voltage value to ensure a functioning power supply within the rated output power range, read and record the output power measurement value on the power analyzer and the power supply, and take the largest error for calculation. The power accuracy is obtained using the following formula:

$$\delta_P = \frac{|P_0 - P_1|}{P_N} \times 100\%$$

where:

δ_P——Power accuracy;

P_1——Power value measured via power analyzer, Hz;

P_0——Power value displayed on power supply, Hz;

P_N——Rated power, Hz.

Facilities and instruments: Power analyzer, Resistor load (5.3 ohms for phase A/B/C)

No.	Setting Voltage		Power of AC Source (A/B/C Phase)			Power Measured (A/B/C Phase)			Power Accuracy (A/B/C Phase)		
1	10% V_{RATED}	30	0.17	0.17	0.17	0.17	0.17	0.17	0.00%	0.00%	0.00%
2	20% V_{RATED}	60	0.69	0.68	0.70	0.69	0.68	0.70	0.00%	0.00%	0.00%
3	30% V_{RATED}	90	1.56	1.53	1.57	1.56	1.53	1.58	0.00%	0.00%	0.10%
4	40% V_{RATED}	120	2.77	2.73	2.81	2.78	2.73	2.81	0.10%	0.00%	0.00%
5	50% V_{RATED}	150	4.35	4.25	4.36	4.34	4.25	4.38	0.10%	0.00%	0.20%
6	60% V_{RATED}	180	6.25	6.09	6.27	6.24	6.10	6.29	0.10%	0.10%	0.20%
7	70% V_{RATED}	210	8.47	8.24	8.51	8.46	8.25	8.51	0.10%	0.10%	0.00%
8	73% V_{RATED}	220	9.24	8.99	9.27	9.26	9.00	9.29	0.20%	0.10%	0.20%
9	75% V_{RATED}	225	9.65	9.39	9.66	9.67	9.40	9.70	0.20%	0.10%	0.40%
10	76% V_{RATED}	230	10.07	9.74	10.08	10.08	9.75	10.08	0.10%	0.10%	0.00%

Signature:

8. Output Characteristics

Connect the input of the AC source to the power grid to keep the input voltage within the operating voltage range of the power supply, and the output is connected to a purely resistive load. Set the output voltage value to provide a functioning power supply within the rated output voltage range, read and record the output measurement value, efficiency, and PF value on the power analyzer.

Facilities and instruments: Power analyzer, Resistor load (5.3 ohms for phase A/B/C)

Input	Output								Efficiency	Power Factor
ΣP_i	Setting Voltage (V)	ΣP_O	U/I of Phase A		U/I of Phase B		U/I of Phase C			
1.51	30	0.53	30.03	5.83	30.02	5.74	30.05	5.91	35.10%	0.99
3.28	60	2.09	60.06	11.65	60.05	11.48	60.07	11.81	63.72%	0.99
6.14	90	4.71	90.07	17.44	90.07	17.19	90.10	17.68	76.71%	0.99
10.10	120	8.36	120.10	23.19	120.09	22.86	120.14	23.51	82.77%	0.99
15.17	150	13.03	150.12	28.98	150.09	28.51	150.15	29.35	85.89%	0.99
21.36	180	18.72	180.15	34.71	180.11	34.10	180.19	35.11	87.64%	0.99
28.65	210	25.39	210.17	40.39	210.12	39.61	210.21	40.80	88.62%	0.99
31.30	220	27.75	220.17	42.20	220.13	41.30	220.22	42.55	88.66%	0.99
32.64	225	28.97	225.18	43.11	225.14	42.14	225.22	43.42	88.76%	0.99
34.06	228	30.21	230.18	44.01	230.14	42.96	230.23	44.28	88.70%	0.99

Signature:

9. Load Regulation

Connect the input of the AC source to the power grid to keep the input voltage within the operating voltage range of the power supply, and the output is connected to a purely resistive load. Set the output voltage value to make the power supply work within the rated output voltage range, read and record the output voltage measurement value on the power analyzer during a no-load and on-load. The load adjustment rate can be obtained using the following formula:

$$L = \frac{|U_0 - U_1|}{U_1} \times 100\%$$

where:

L——Voltage accuracy;

U_1——On-load voltage, V;

U_0——No-load voltage, V;

U_N——Rated voltage, V.

Facilities and instruments: Power analyzer, Resistor load (5.3 ohms for phase A/B/C)

No.	Setting Voltage		On-load Voltage Measured (A/B/C Phase)			No-load Voltage Measured (A/B/C Phase)			Load Regulation (A/B/C Phase)		
1	10% V_{RATED}	30	30.03	30.02	30.05	30.01	30.02	30.03	0.01%	0.00%	0.01%
2	20% V_{RATED}	60	60.06	60.05	60.07	60.05	60.04	60.06	0.00%	0.00%	0.00%
3	30% V_{RATED}	90	90.07	90.07	90.10	90.08	90.06	90.10	0.00%	0.00%	0.00%
4	40% V_{RATED}	120	120.10	120.09	120.14	120.09	120.07	120.10	0.00%	0.01%	0.01%
5	50% V_{RATED}	150	150.12	150.09	150.15	150.90	150.70	150.14	0.26%	0.20%	0.00%
6	60% V_{RATED}	180	180.15	180.11	180.19	180.12	180.09	180.17	0.01%	0.01%	0.01%
7	70% V_{RATED}	210	210.17	210.12	210.21	210.13	210.09	210.20	0.01%	0.01%	0.00%
8	73% V_{RATED}	220	220.17	220.13	220.22	220.13	220.09	220.20	0.01%	0.01%	0.01%
9	75% V_{RATED}	225	225.18	225.14	225.22	225.13	225.09	225.20	0.02%	0.02%	0.01%
10	76% V_{RATED}	230	230.18	230.14	230.23	230.13	230.09	230.20	0.02%	0.02%	0.01%

Signature:

10. Voltage THD

Connect the input of the AC source to the power grid to keep the input voltage within the operating voltage range of the power supply, and the output is connected to a purely resistive load. Set the output voltage value to make the power supply work within the rated output voltage range, read and record the output voltage measurement value on the power analyzer during a no-load and on-load, and set the frequency value to 50Hz/100Hz. Read and record the on-load and no-load voltage THD on the power analysis.

Facilities and instruments: Power analyzer, Resistor load (5.3 ohms for phase A/B/C)

No.	Setting Voltage	Voltage THD/50Hz (A/B/C Phases)			Voltage THD/100Hz (A/B/C Phases)		
1	100V-LOAD	0.47%	0.51%	0.0.49%	0.46%	0.51%	0.47%
2	100V-NO LOAD	0.51%	0.57%	0.66%	0.51%	0.54%	0.58%
3	220V-LOAD	0.35%	0.39%	0.36%	0.31%	0.34%	0.33%
4	220V-NO LOAD	0.37%	0.38%	0.43%	0.41%	0.44%	0.43%

Signature:

11. Harmonic Test

Connect the input of the AC source to the power grid to keep the input voltage within the operating voltage range of the power supply, and the output is connected to a purely resistive load. Select the CV mode and set the output voltage value to provide a functioning power supply within the rated output voltage range, enable the harmonic editing function, set the superimposition value of each harmonic, read and record the measured value of the harmonic component on the power analysis, and record the oscilloscope waveform.

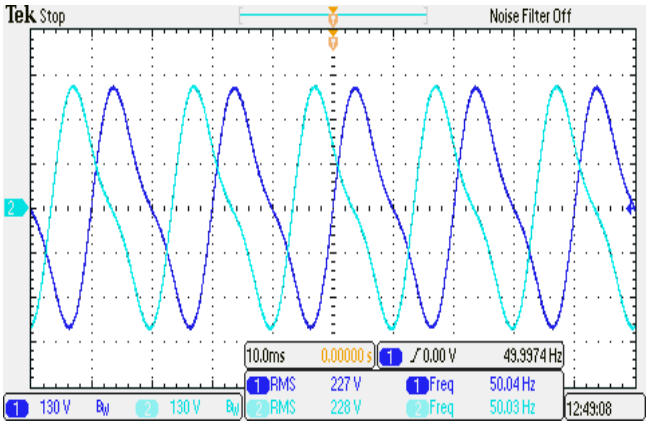
Facilities and instruments: Power analyzer, Oscilloscope, Resistor load (5.3 ohms for phase A/B/C)

220V / No.	Setting harmonic component			Output Measured		
	Phase A	Phase B	Phase C	Phase A	Phase B	Phase C
2	30%	30%	30%	29.09%	29.08%	29.10%

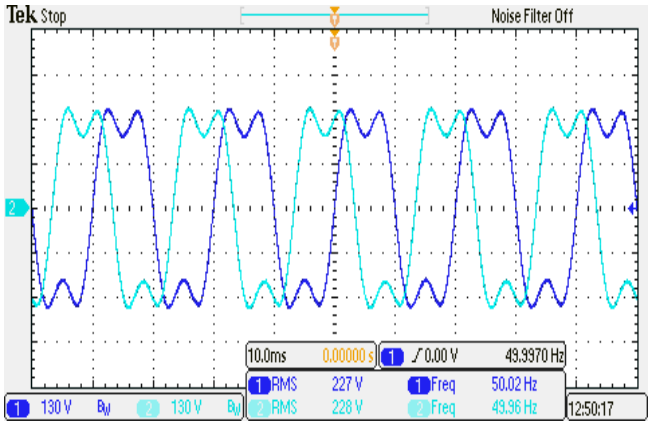
3	30%	30%	30%	29.20%	29.23%	29.21%
15	9%	9%	9%	9.29%	9.29%	9.31%
21	15%	15%	15%	14.97%	15.01%	14.93%
27	10%	10%	10%	9.89%	9.92%	9.87%
33	7%	7%	7%	6.64%	6.71%	6.64%
39	6%	6%	6%	5.14%	5.13%	5.16%
40	5%	5%	5%	4.06%	4.15%	4.18%
50	5%	5%	5%	3.68%	3.64%	3.78%

Note:

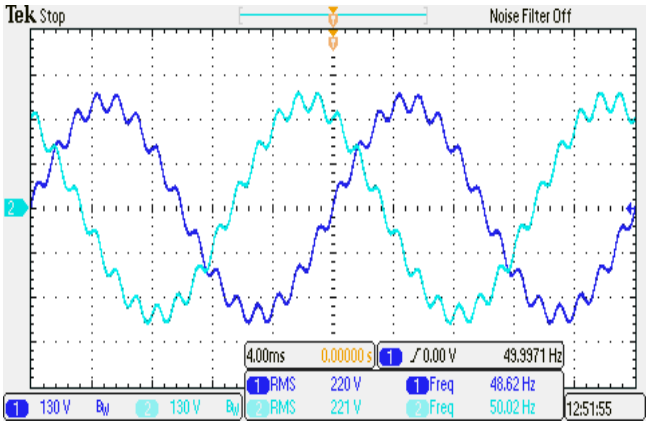
1. The shape of this harmonic wave is AC 220V output 0-50th harmonic transformation waveform.
2. Oscilloscope: DPO 2002b (only 2-channel input). Channel 1: Harmonic of phase A. Channel 2: Harmonic of phase B.



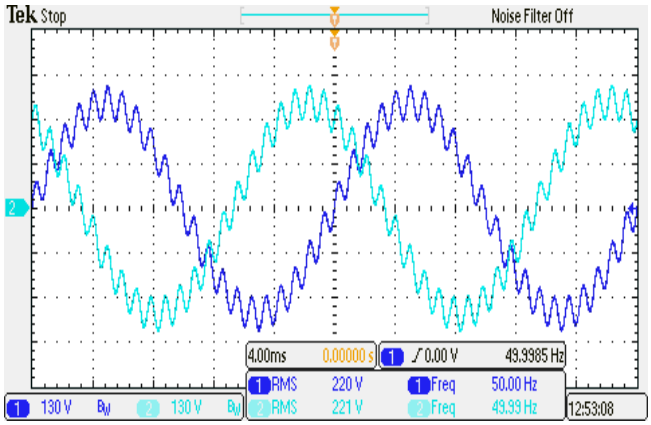
AC/220V 2rd harmonic - 30%



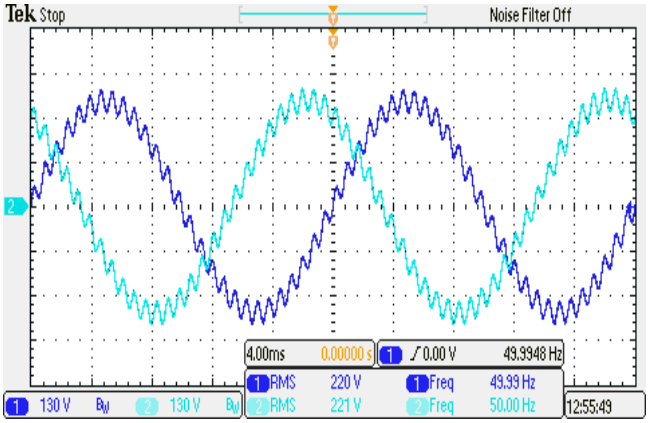
AC/220V 3rd harmonic - 30%



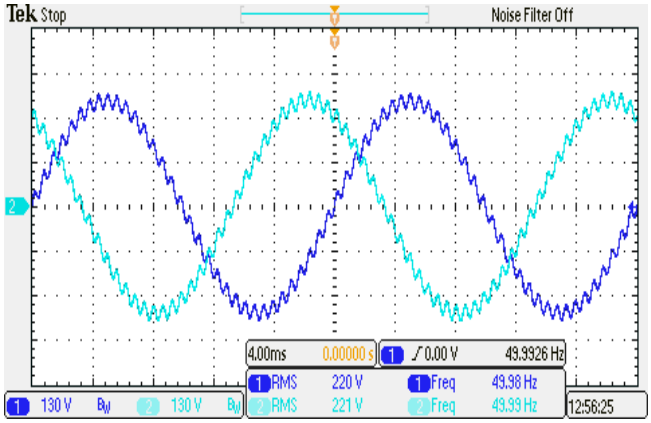
AC/220V 15rd harmonic -9%



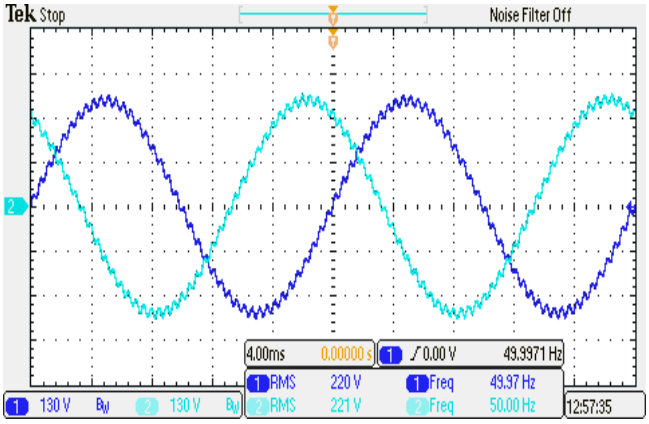
AC/220V 21rd harmonic - 15%



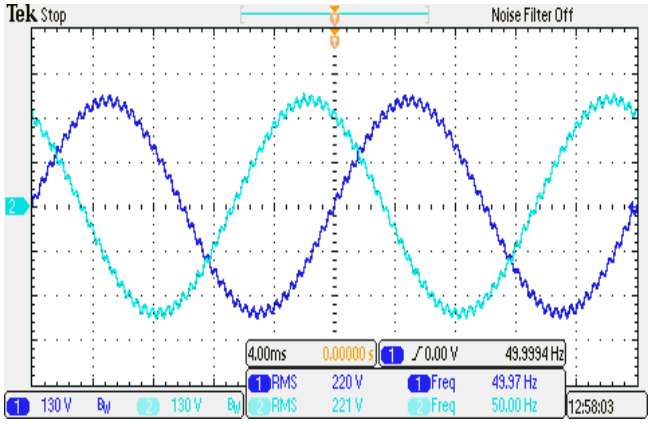
AC/220V 27rd harmonic - 10%



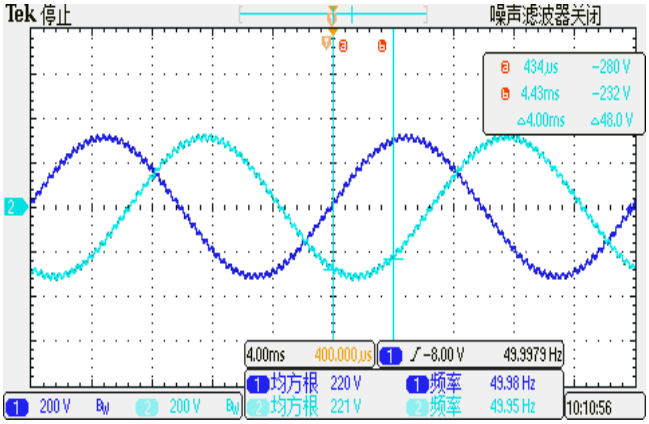
AC/220V 33rd harmonic - 7%



AC/220V 39rd harmonic - 6%



AC/220V 40rd harmonic - 5%



AC/220V 50rd harmonic - 5%

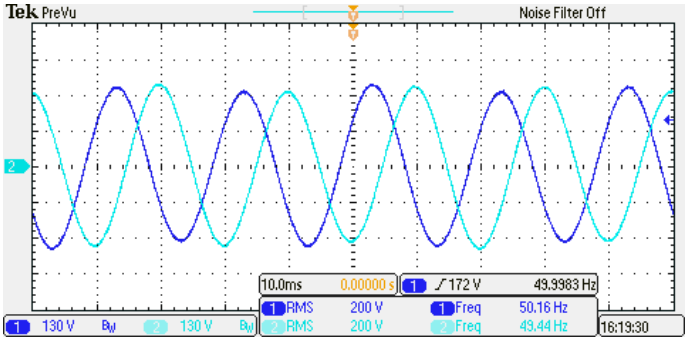
Signature:

12. Inter-harmonic Test

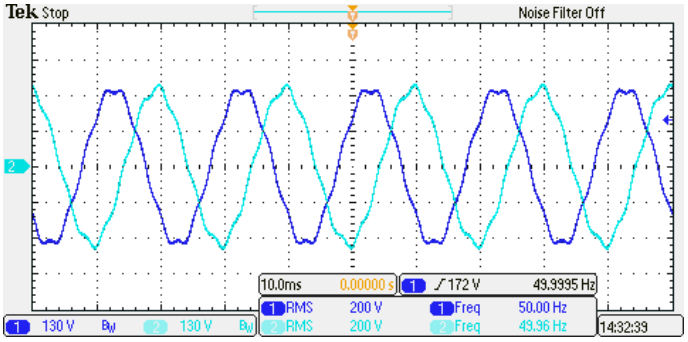
Connect the input of the AC source to the power grid to keep the input voltage within the operating voltage range of the power supply, and the output is connected to a purely resistive load. Set the output voltage value to make the power supply work within the rated output voltage range, enable the inter-harmonic editing function, set the frequency and harmonic superimposition value, read and record the inter-harmonic component measurement value on the power analysis, and record the oscilloscope waveform.

Facilities and instruments: Power analyzer, Oscilloscope, Resistor load (5.3 ohms for phase A/B/C)

200V / No.	Setting harmonic frequency (Phase A/B/C)	Setting harmonic component (Phase A/B/C)	Frequency Measured (Phase A/B/C)			Harmonic component Measured (Phase A/B/C)		
1	30	5	29.99	29.99	29.99	5.00	5.00	5.00
2	40	8	39.99	39.99	39.99	7.96	7.99	7.97
3	55	10	54.99	54.99	54.99	10.10	10.11	10.09
4	70	10	69.99	69.99	69.99	10.11	10.11	10.09
5	100	10	99.99	99.99	99.99	10.10	10.16	10.12



AC/200V 0.6rd harmonic - 5%



AC/200V 4rd harmonic - 5%

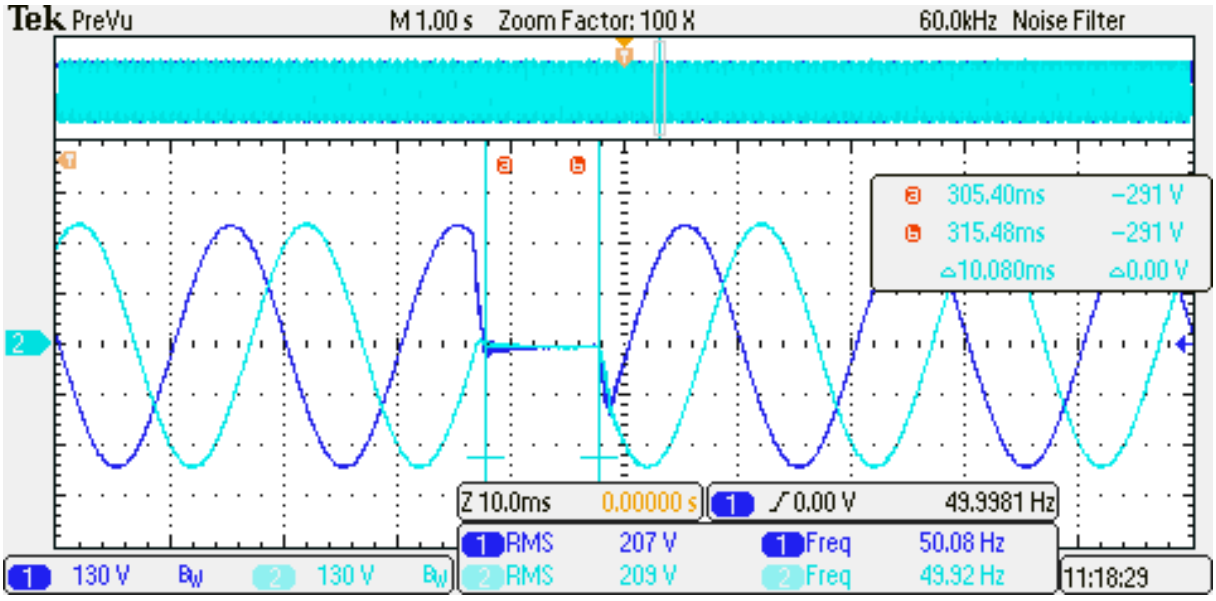
Signature:

13. Voltage Drop Change

Connect the input of the AC source to the power grid to keep the input voltage within the operating voltage range of the power supply, and the output is connected to a purely resistive load. In the sequence mode, set the output voltage value, duration, and change rate of each step. Read and record the oscilloscope waveform.

Facilities and instruments: Power analyzer, Oscilloscope, Resistor load (5.3 ohms for phase A/B/C)

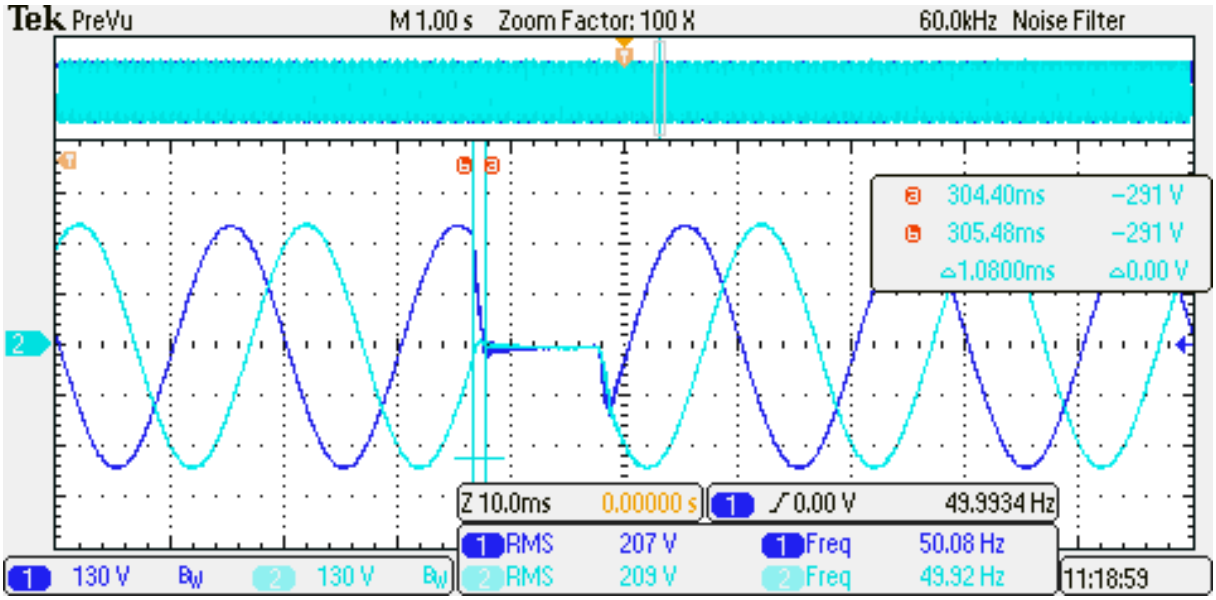
Steps	Setting Voltage			Setting Time	
	Phase A	Phase B	Phase C	Dwell T	Ramp T
1	220	220	220	10ms	1ms
2	0	0	0	10ms	1ms
3	220	220	220	10ms	1ms



The voltage first drops from 220V to 0V, then rises to 220V in 10ms

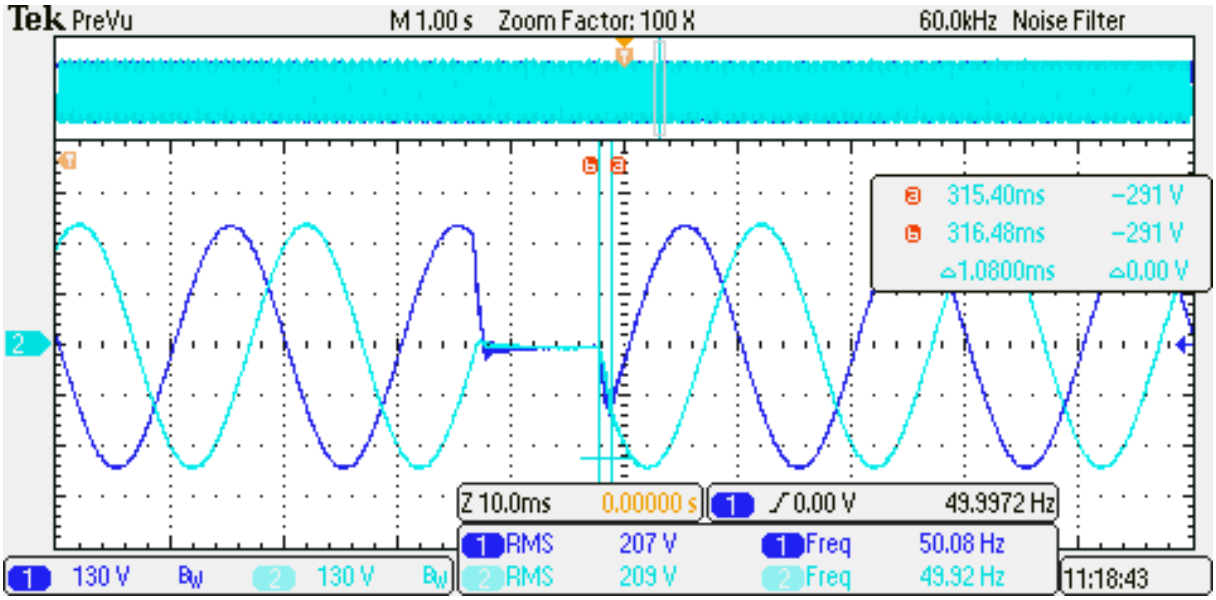
Phase A voltage (Channel 1), Phase B voltage (Channel 2)

.



The voltage first drops from 220V to 0V, the switching time is 1ms

Phase A voltage (Channel 1), Phase B voltage (Channel 2)



The voltage first rises from 0V to 220V, the switching time is 1ms

Phase A voltage (Channel 1), Phase B voltage (Channel 2)

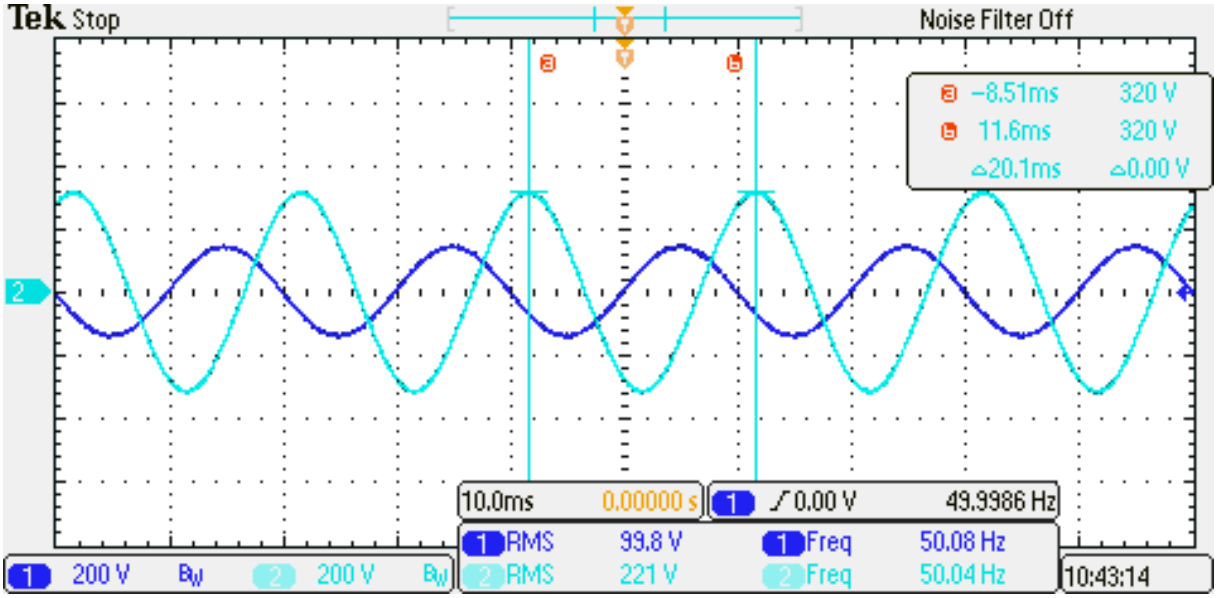
Signature:

14. Three-Phase Unbalanced Output

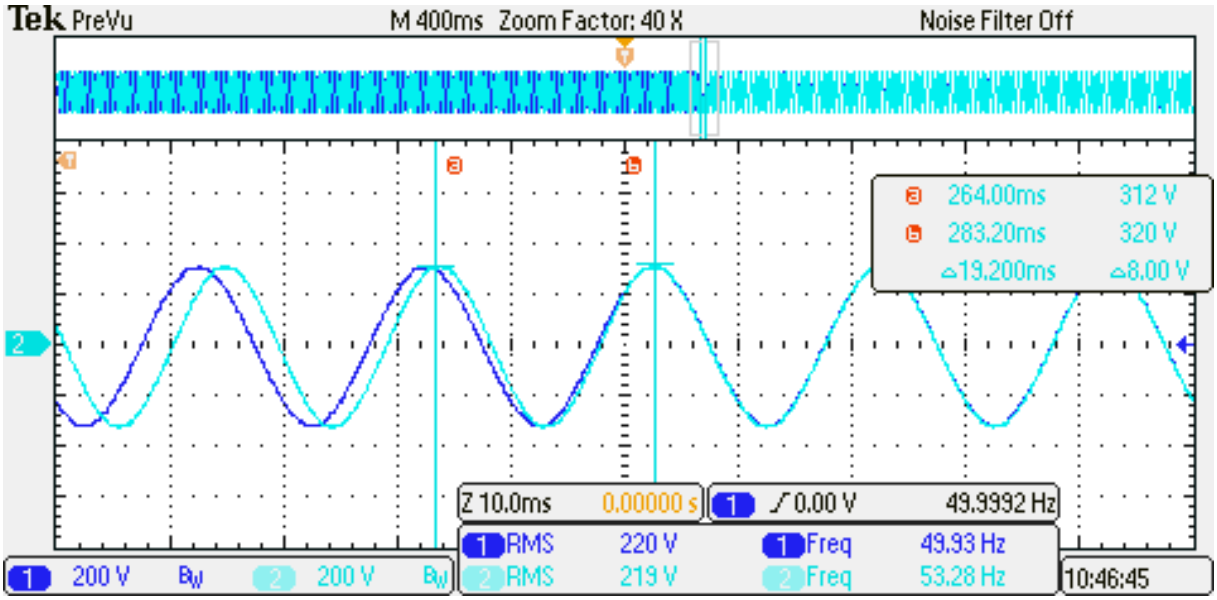
Connect the input of the AC source to the power grid to keep the input voltage within the operating voltage range of the power supply, and the output is connected to a purely resistive load. Set the output voltage value to make the power supply work within the rated output voltage range and set the phase angle value. Read and record the waveform data on the oscilloscope and power analyzer.

Facilities and instruments: Power analyzer, Oscilloscope, Resistor load (5.3 ohms for phase A/B/C)

Setting						Output Measured					
Phase A		Phase B		Phase C		Phase A		Phase B		Phase C	
U	φ	U	φ	U	φ	U	φ	U	φ	U	φ
100	0°	220	-120°	100	-240°	100.01	0°	220．00	-120.01°	100.12	-240.04°
220	0°	220	0°	100	-240°	220.17	0°	220.07	0°	100.07	-239.90°



Channel 1 — Phase A voltage (100V) and Channel 2 — Phase B voltage (220V)



Channel 1 — Phase A voltage (220V), Channel 2 — Phase B voltage (220V)

The phase angle of phase B waveform shifts from - 120 ° to 0 °

and overlaps with phase A' s waveform

Signature:

15. Step Load Change

Connect the input of the AC source to the power grid to keep the input voltage within the operating voltage range of the power supply, and the output is connected to a purely resistive load through an AC contactor. When the AC power is output to 200V, regulate the AC contactor to on/off, and record the oscilloscope waveform. The output power calculation is obtained using the following formula:

$$P = \frac{(U_N)2}{R} \times 3 = \frac{40000}{5.3} \times 3 = 22.64KW$$

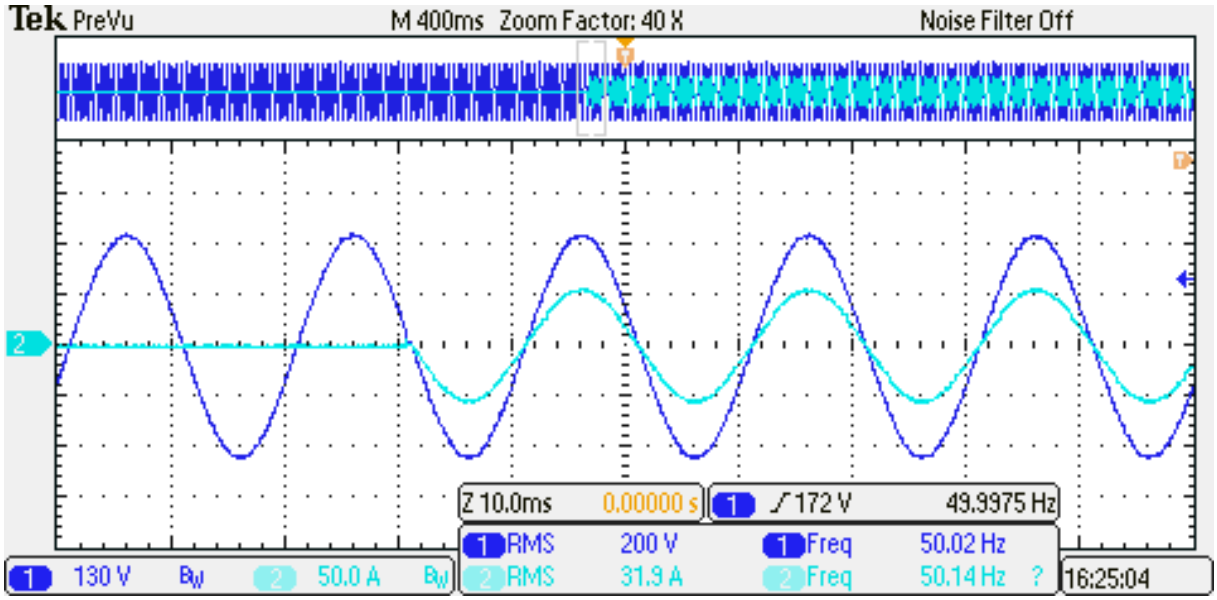
where:

P ——Total output power of three-phase, kW;

U_N——Setting voltage value, V;

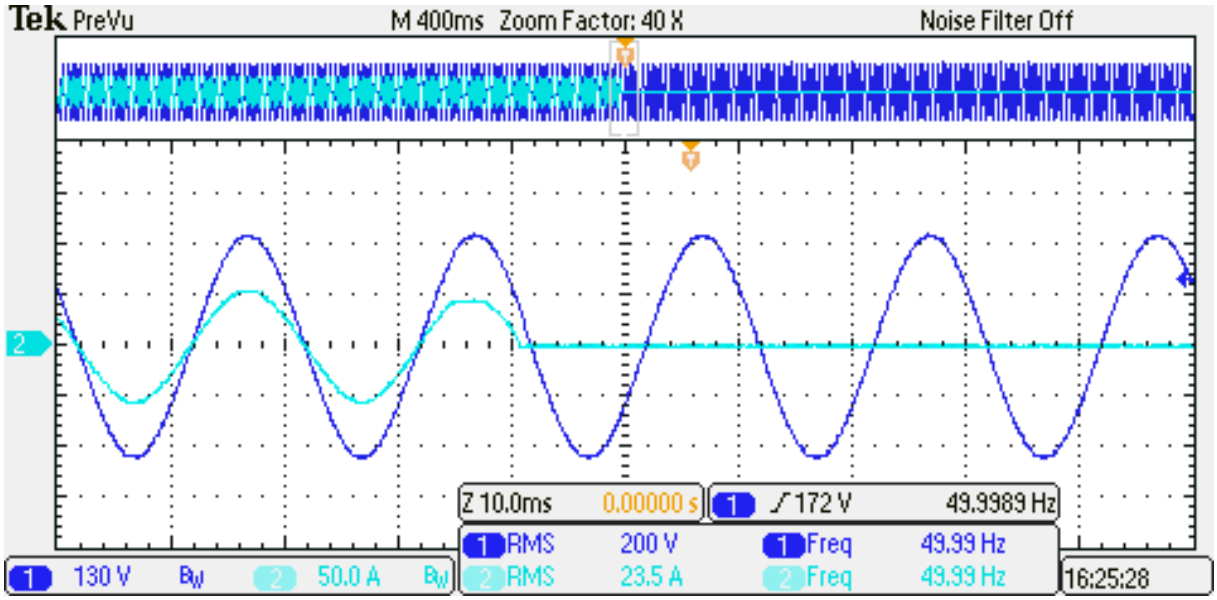
R ——5.3 ohms for each phase (A/B/C).

Facilities and instruments: Power analyzer, Oscilloscope, Resistor load (5.3 ohms for phase A/B/C)



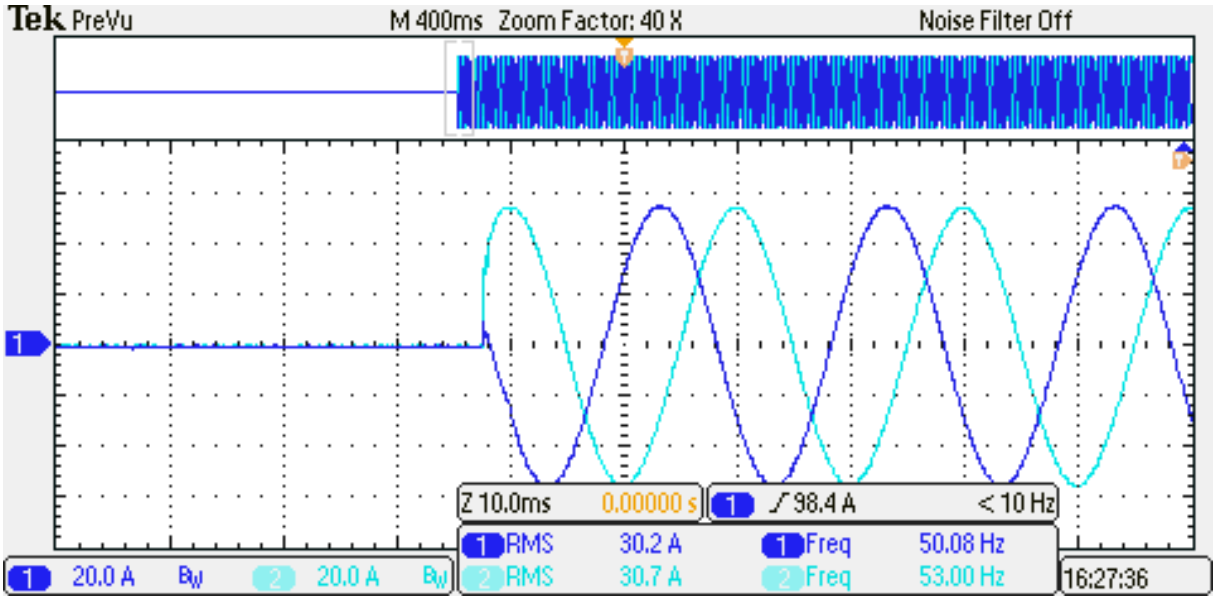
Output load increases from 0 to about 6.38kW by closing the contactor

Channel 1 is voltage and channel 2 is current



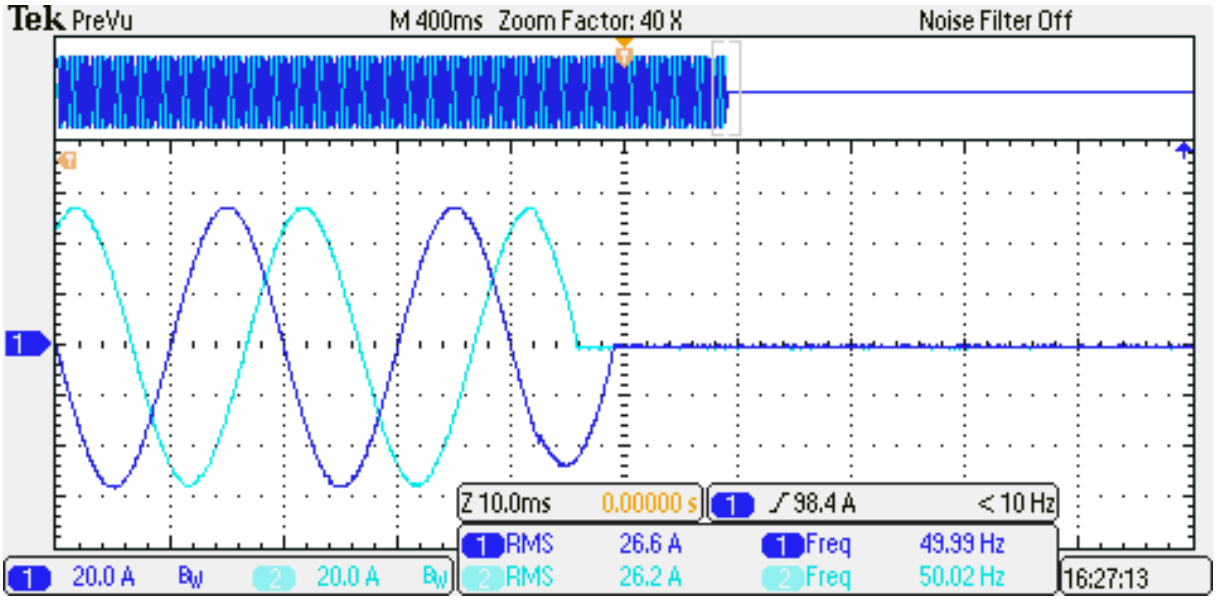
Output load decreases from about 4.70kW to 0 by setting the contactor to open circuit.

Channel 1 (voltage), Channel 2 (current)



Output load increases from 0 to about 6.38kW by closing the contactor

Phase A current (Channel 1), Phase B current (Channel 2)



Output load decreases from about 4.70kW to 0 by setting the contactor to open circuit

Phase A current (Channel 1), Phase B current (Channel 2)

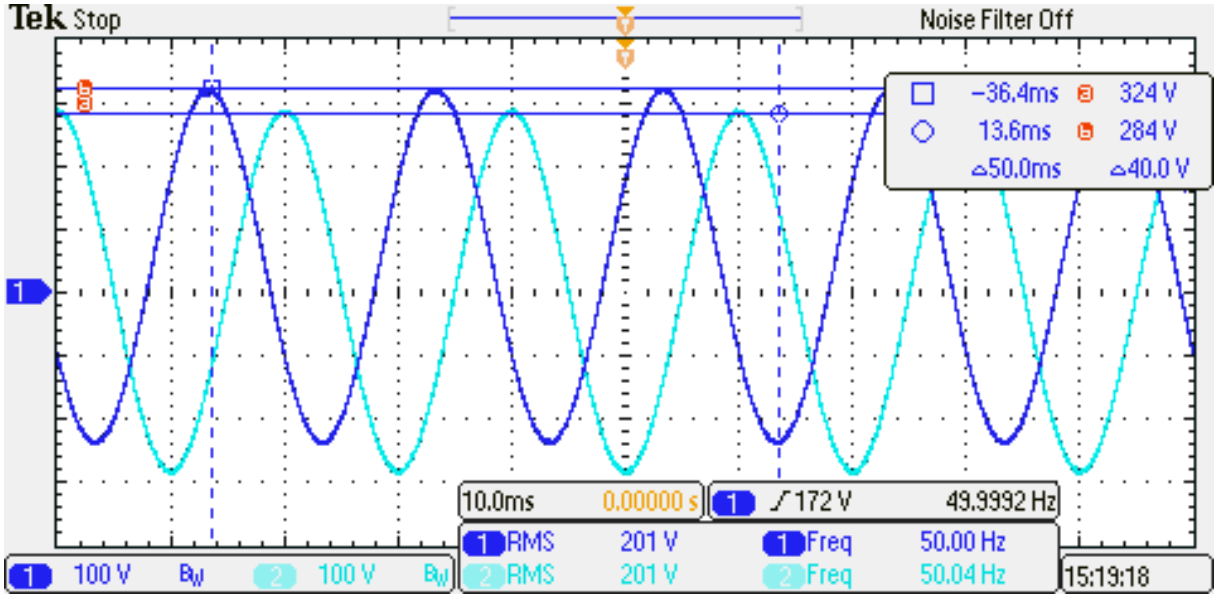
Signature:

16. Voltage Offset Test

Connect the input of the AC source to the power grid to keep the input voltage within the operating voltage range of the power supply, and the output is connected to a purely resistive load. Set the output voltage offset to ensure that the power supply works within the rated output voltage range, read and record the offset measurement values on the power analyzer.

Facilities and instruments: Power analyzer, Oscilloscope, Resistor load (5.3 ohms for phase A/B/C)

No.	Setting Offset (Phase A/B/C)		Measured (Phase A/B/C)			Max Offset (Phase A/B/C)		
1	Udc	10	10.16	10.18	10.20	0.16	0.18	0.20
2		20	20.19	20.20	20.26	0.19	0.20	0.26
3		30	30.21	30.20	30.31	0.21	0.20	0.31
4		40	40.21	40.24	40.33	0.21	0.24	0.33
5		50	50.31	50.31	50.36	0.31	0.31	0.36



DC Voltage Offset – 40V

Signature:

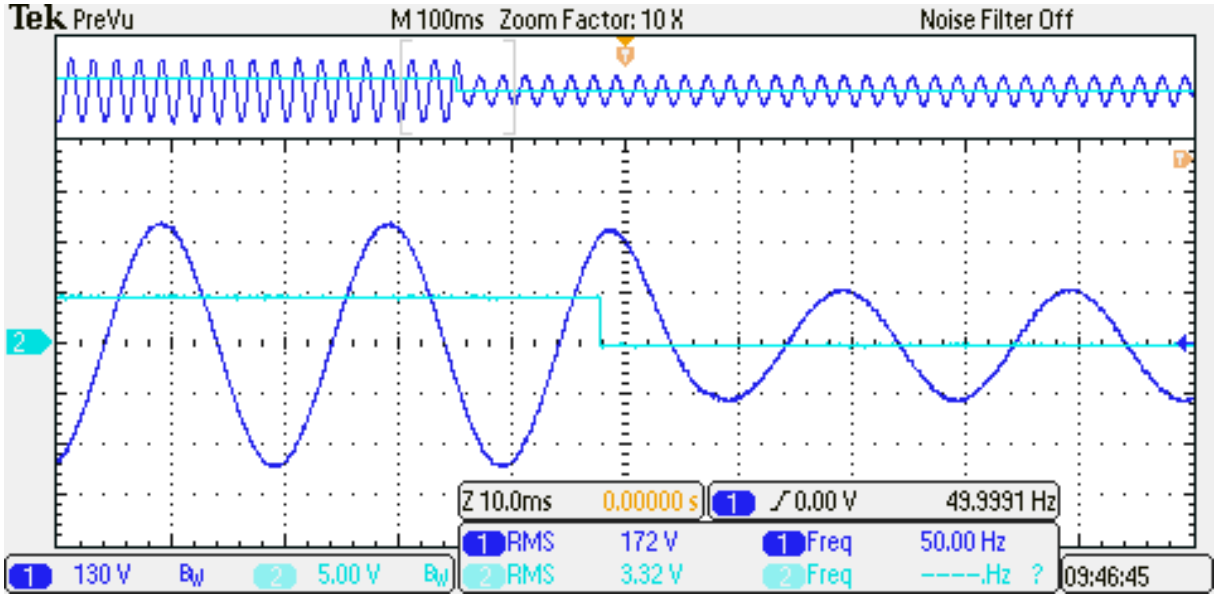
17. TTL Signal Trigger

Connect the input of the AC source to the power grid to keep the input voltage within the operating voltage range of the power supply. Set the output voltage value, phase angle, frequency, duration, and change rate in each step of the sequence mode to ensure that the power supply operates within the required rated output voltage range. Read and record the oscilloscope waveform.

17.1 Voltage Trigger

Facilities and instruments: Power analyzer, Oscilloscope

Steps	Parameter Setting		Condition Setting			
	Output Voltage (Phase A/B/C)	Output Frequency	Dwell T	Ramp T	Phase	Angle
1	220	50	100	100		
2	100	50	100	5m		



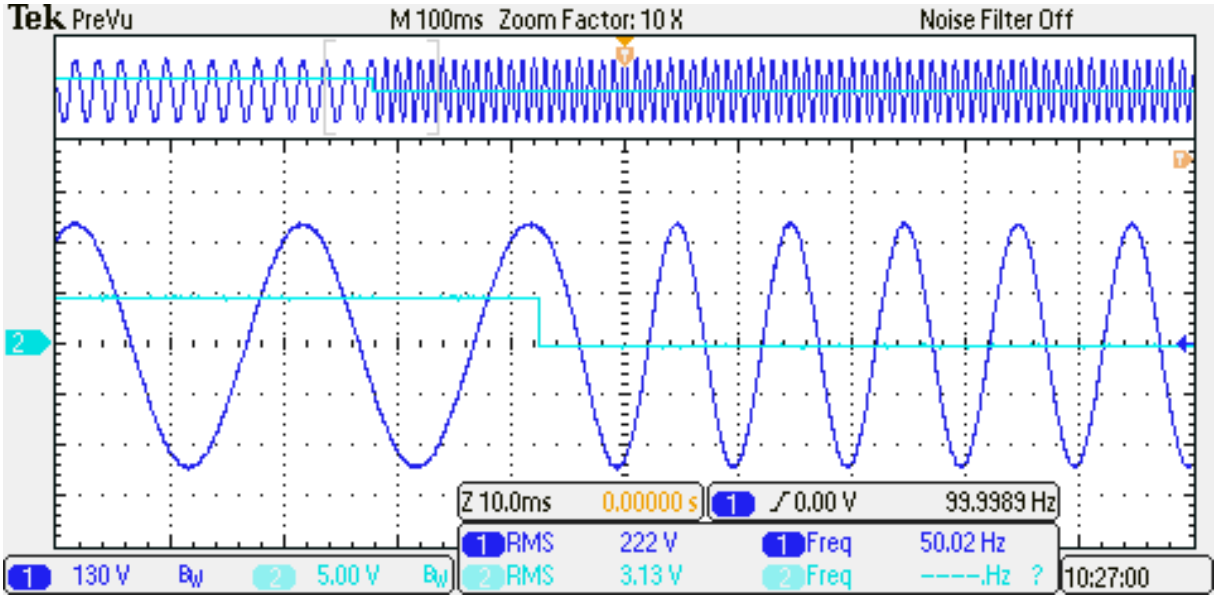
Voltage trigger

(The figure shows the trigger waveform of TTL when the voltage drops from 300V to 200V)

17.2 Frequency Trigger

Facilities and instruments: Power analyzer, Oscilloscope

Steps	Parameter Setting		Condition Setting			
	Output Voltage (Phase A/B/C)	Output Frequency	Dwell T	Ramp T	Phase	Angle
1	220	50	100	100		
2	220	100	100	5m		



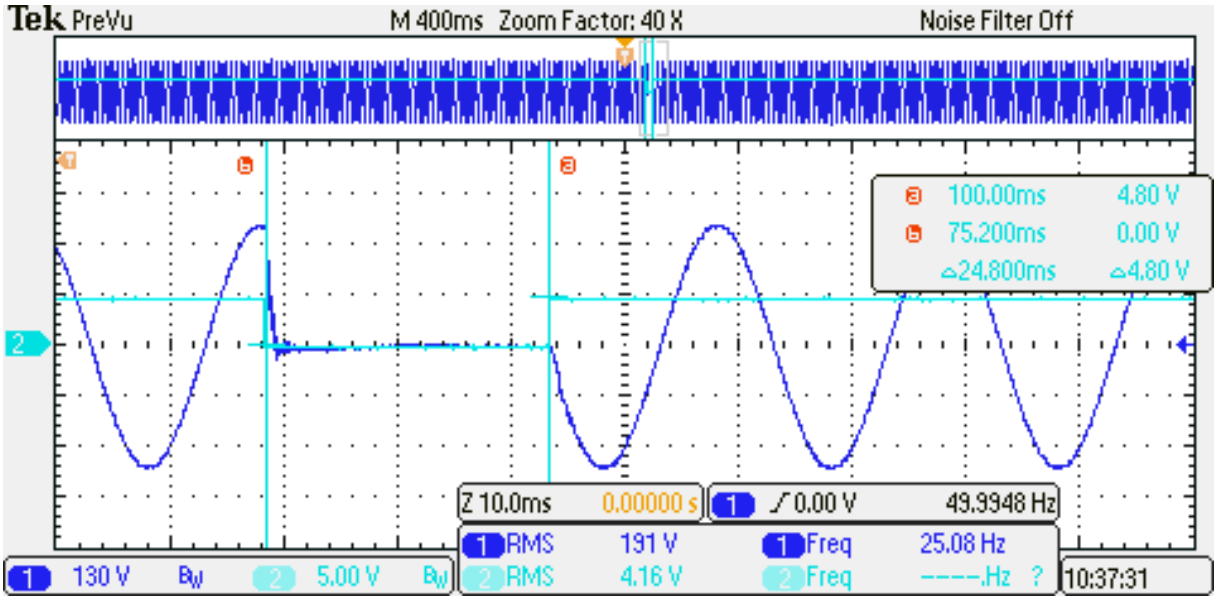
Frequency trigger

(The figure shows the trigger waveform of TTL when the frequency rises from 50Hz to 100Hz)

17.3 Phase Angle Trigger

Facilities and instruments: Power analyzer, Oscilloscope

Steps	Parameter Setting		Condition Setting			
	Output Voltage (Phase A/B/C)	Output Frequency	Dwell T	Ramp T	Phase	Angle
1	220	50	100	100	A	90
2	0	50	20	1	A	180
3	220	50	100	1		



Angle trigger

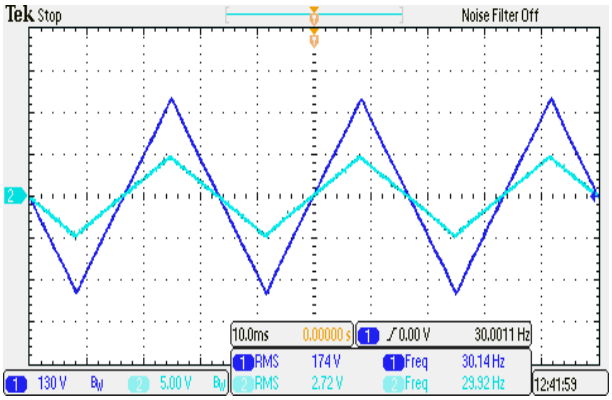
(The figure shows that the phase angle A is triggered at 90 ° and again at 180 ° after 20 m/s when the voltage drops from 220V to 0V and then rises from 0V to 220V)

Signature:

18. Waveform Injection

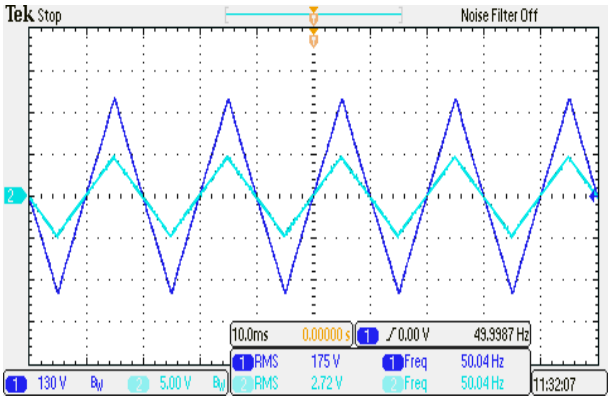
Connect the input of the AC source to the power grid to keep the input voltage within the operating voltage range of the power supply. While it is within the rated voltage range, use either the panel or signal generator to set the output parameters of the AC source. Read and record the oscilloscope waveform.

Facilities and instruments: Signal generator, Oscilloscope



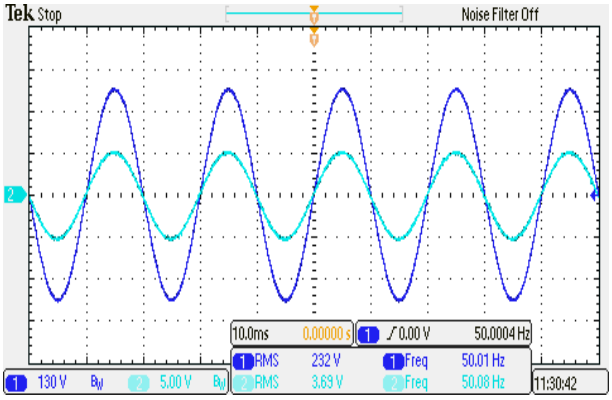
ATI Waveform Injection - Triangle wave

A-3V_{RMS}/0°，Frequency: 30Hz



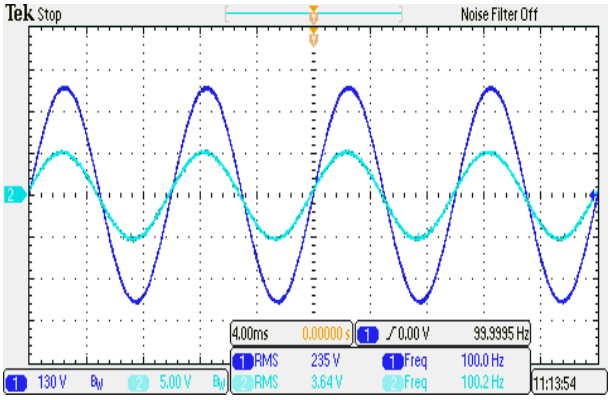
ATI Waveform Injection - Triangle wave

A-3V_{RMS}/0°，Frequency: 50Hz



ATI Waveform Injection - Sine wave

A-4V_{RMS}/0°，Frequency: 50Hz



ATI Waveform Injection - Sine wave

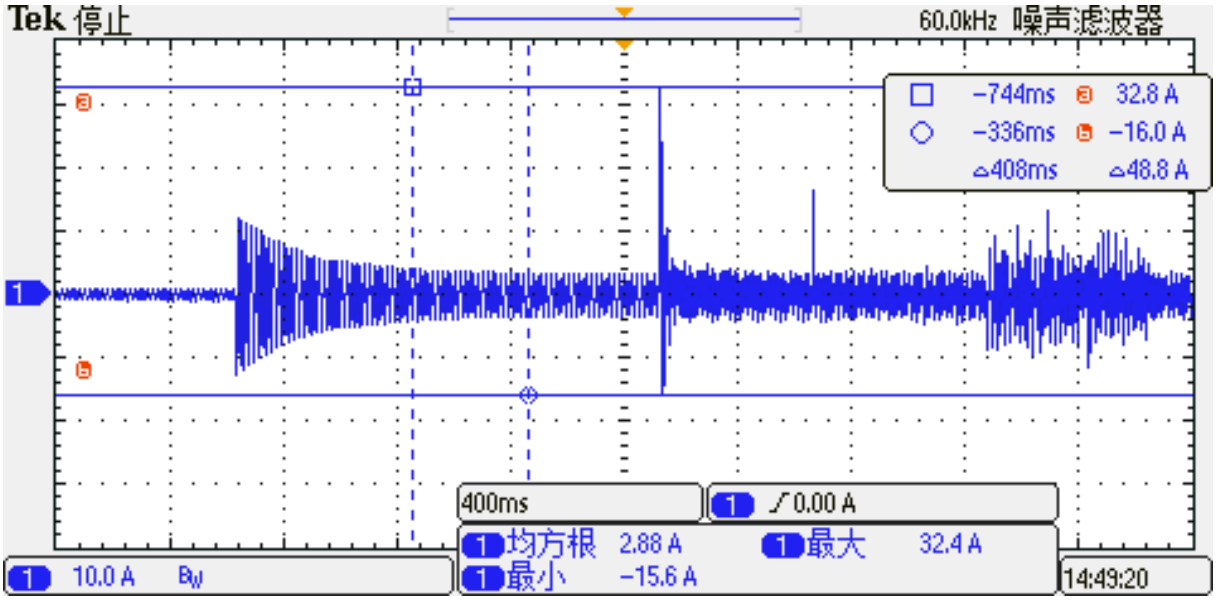
A-4V_{RMS}/0°，Frequency: 100Hz

Signature:

19. Input Impulse Current

Connect the input of the AC source to the power grid to keep the input voltage within the operating voltage range of the power supply. Turn on the power source and read and record the oscillograph waveform at the point of input startup.

Facilities and instruments: Oscilloscope



Signature:

20. Protection

No.	Test Items	Confirmation (√or×)
1	Adjust the output voltage to be slightly above the rated voltage specified by the power supply. The power supply will limit the voltage output.	
2	Adjust the input voltage to be slightly above the rated voltage specified by the power supply. The power supply will promptly disconnect the output and trigger the alarm system.	
3	Adjust the load or output voltage for the output current to be 1.2 times greater than the rated value. The power supply will trigger the protection mechanism and cut off the output.	
4	Adjust the temperature setting value of the software program. When the current measured temperature exceeds 10% of the software setting temperature, the power supply will promptly disconnect the output and trigger the alarm system.	

Signature:

21. Temperature Test

Test point \ No.		1 (Phase A)		2 (Phase B)		3 (Phase C)		4	5	6	7
		In	Out	In	Out	In	Out	IGBT 1	IGBT 2	IGBT 3	IGBT 4
Measured	0min	27.03	26.98	27.37	26.85	26.85	27.29	28.10	29.20	28.20	28.10
	20 min	29.35	33.16	29.62	33.43	28.70	32.93	37.90	39.90	40.10	40.40
	40 min	32.81	40.90	33.15	41.81	31.52	40.31	39.40	40.30	40.70	40.90
	60 min	35.40	45.79	35.63	46.65	33.56	44.84	39.30	40.60	41.20	40.50
	80 min	37.25	48.86	37.43	50.98	35.29	48.18	38.4	40.70	42.10	40.60
	120 min	38.24	50.41	38.29	51.38	36.22	49.32	39.40	39.50	41.90	40.30

Signature:

22. Noise Test

No.	Measured	Equivalent calculation value
1	73.2db	74.17
2	72.6db	
3	72.9db	
4	74.8db	
5	74.6db	
6	76.1db	
7	75.7db	
8	75.3db	
9	73.4db	
10	73.1db	

Signature:

23. Log Function

Enter the settings interface to access and view the log records

Signature:

24. Clock Function

Enter the settings interface to view and set the current time, year, month, day, hour, and minute.

Signature:

25. LCD Display Test

In the setting and running state, no screen flickers and flower appear on the LCD screen.

Signature: