



交流电源测试报告  
Test Report of KGS

南京璞骏新能源技术有限公司  
Nanjing Bridge New Energy Technology Co.,Ltd

测试日期: \_\_\_\_\_

TEST DATE: \_\_\_\_\_

测试人员: \_\_\_\_\_

TESTER: \_\_\_\_\_

项目编号: \_\_\_\_\_

SERIAL NO: \_\_\_\_\_

产品型号: \_\_\_\_\_

MODEL: \_\_\_\_\_

产品规格/Specification:  $V_{RATED} = 750\text{ V}$ ,  $I_{RATED} = 100\text{ A}$ ,  $P_{RATED} = 100\text{ KW}$

No.	Instruments	Model
1	功率分析仪/Power analyzer	ZIMMER LMG670
2	示波器/Oscilloscope	Tektronix DPO2002B/ DS4000E
3	电压探头/Voltage Probe	RIGOL RP1050D
4	电流探头/Current Probe	CAT III 600V/1000A

### 测试系统连接示意图/ Schematic diagram of test system

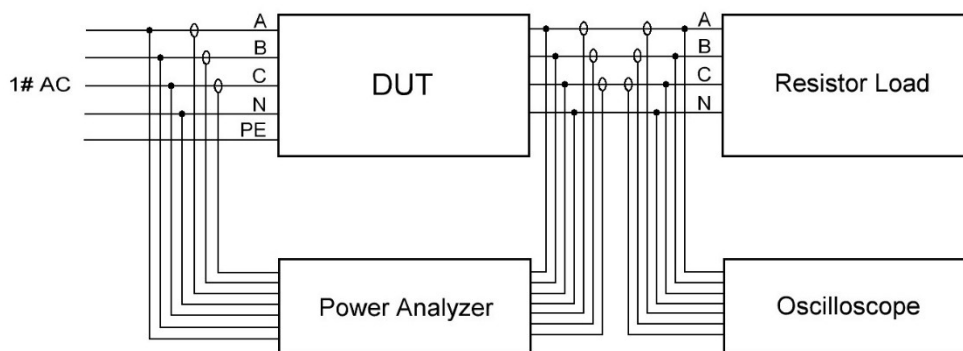


图 1 使用阻性负载测试/ Figure 1 Testing with Resistive Load

DUT: Device Under Test, 待测设备

Resistor Load: 阻性负载

Power Analyzer: 功率分析仪

Oscilloscope: 示波器

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## 1 外观和结构检查/Appearance and Structural Inspection

电源处于非工作状态，用目测或手感方法检查，确保没有产品装配产生的严重外观缺陷，或超出规格要求的装配缝、断差等不良。如划痕、压痕、色差、掉漆。相关安全标识应满足 GB2894-2008 标准中相应要求。

When the power supply is in non-working state, it should be inspected by visual inspection or hand feeling method to ensure that there are no serious appearance defects caused by product assembly, or bad assembly seams and breakages that exceed the specifications. Such as scratch, indentation, color difference, paint drop. Relevant safety labels should meet the corresponding requirements of GB2894-2008 standard.

**Facilities and instruments:** No equipment or instruments are required.

No.	Inspection contents	Confirmation (√ or ×)
1	无产品装配产生的严重外观缺陷，存在超出规格要求的装配缝、断差等不良 No serious appearance defects caused by product assembly, such as assembly seams and breaks beyond specifications, etc.	
2	无严重影响产品外观的缺陷：划痕、压痕、色差、掉漆 No serious defects affecting the appearance of products: scratches, indentations, color differences, paint dropping	
3	相关安全标识应满足 GB2894-2008 标准中相应要求 Relevant safety labels should meet the requirements of GB2894-2008	
4	合格证、说明书、保修卡齐全，包装材料用错或多放配件 Complete certificates, instructions and warranty cards, no misuse of packaging materials or multiple accessories	

Signature:

## 2 工作电压范围/Voltage Range

交流电源接在配电网侧，使输入电压在交流电源的工作电压范围内，设定被测电源的输出电压，记功率分析仪上的电压值，在额定电压范围内调整输出电压值，并记录各个测试点的测量值。

The AC power supply is connected to the distribution network side, so that the input voltage is within the rated voltage range of the AC power supply. Set the output voltage of the power supply under test, record the voltage value on the power analyzer, adjust the output voltage value within the rated voltage range, and record the measured value of each test point.

**Facilities and instruments:** power analyzer

No.	Setting Voltage (A/B/C Phases)	Voltage Measured (A/B/C Phases)		
1	75	73.41	73.27	73.35
2	150	148.33	147.81	148.06
3	225	222.85	223.65	224.17

4	300	298.19	298.95	300.05
5	375	373.54	375.61	373.39
6	450	448.54	448.21	450.19
7	525	523.32	522.89	524.08
8	600	597.95	598.59	597.38
9	675	672.12	673.28	673.28
10	750	747.02	748.29	749.09

Signature:

### 3 交流输出/AC Output

交流电源接在配电网侧，使输入电压在交流电源的工作电压范围内。输出额定电压，改变交流电源的频率设定值，读取测量仪器的频率显示值。

The AC power supply is connected to the distribution network side, so that the input voltage is within the rated voltage range of the AC power supply. Setting rated output voltage, adjust the frequency setting value of the AC power supply, and record the frequency display value of the power analyzer.

Facilities and instruments: power analyzer

No.	Setting Voltage	Setting Frequency	Measured Frequency (A/B/C Phases)			Max Frequency Bias
1	300	50	49.97	49.97	49.97	0.0015%
2	300	1000	999.97	999.97	999.97	0.0015%
3	300	2000	1999.99	1999.99	1999.99	0.0005%
4	400	200	199.95	199.95	199.95	0.0025%
5	400	600	599.96	599.96	599.96	0.0020%
6	400	1200	1199.98	1199.98	1199.98	0.0010%
7	400	2000	1999.96	1999.96	1999.96	0.0020%
8	750	50	49.99	49.99	49.99	0.0005%
9	750	1000	999.97	999.97	999.97	0.0015%
10	750	2000	1999.99	1999.99	1999.99	0.0005%

标注：软件界面设置值可至 0.1HZ，仪器测量值可至 0.01HZ

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### 4 额定电流/Rated Current

交流电源接在配电网侧，使输入电压在交流电源的工作电压范围内。改变交流电源的电压设定值，使输出电流达到设备的额定电流值，读取电压、电流测量仪器的显示值。

The AC power supply is connected to the distribution network side, so that the input voltage is within the rated voltage range of the AC power supply, adjust the voltage setting value of AC power supply, make the output current reach the rated current value of power supply, record the measured value of power analyzer.

**Facilities and instruments:** power analyzer, resistor load (3 Sets of 75kW/7.5Ohm for phase A/B/C)

No.	Setting Voltage			Current of AC Source (A/B/C Phases)			Voltage Measured (A/B/C Phases)			Current Measured (A/B/C Phases)		
1	30	30	30	10.30	11.14	10.74	30.20	31.40	31.40	10.43	10.76	10.75
2	60	60	60	20.70	21.14	21.59	60.10	59.00	60.30	21.33	22.15	21.69
3	90	90	90	30.41	31.84	32.15	89.20	89.10	89.70	31.60	33.51	32.96
4	120	120	120	40.48	42.58	42.99	119.20	119.70	119.80	41.68	43.71	43.58
5	150	150	150	51.16	53.63	53.76	150.60	150.70	149.20	52.08	54.66	54.51
6	180	180	180	60.90	64.21	65.31	179.50	180.80	181.80	62.45	65.78	65.86
7	210	210	210	71.73	75.22	75.18	211.60	211.40	209.00	73.58	76.29	77.37
8	240	240	240	81.42	85.69	85.93	239.60	240.70	239.40	83.20	87.24	87.63
9	270	270	270	91.61	95.91	97.07	269.90	269.00	269.60	93.87	98.45	98.85
10	290	280	280	100.75	100.06	101.47	289.90	279.40	279.40	100.06	101.52	102.45

Signature:

## 5 电压精度/Voltage Accuracy

交流电源接在配电网侧，使输入电压在交流电源的工作电压范围内。改变输出电压，读取功率分析仪和交流电源上的输出电压显示值。在规定的输出电压范围的內调整输出电压值进行测试，取其中误差最大的进行计算，以确定其精度。

其精度由下式求得：

The AC power supply is connected to the distribution network side, make sure that the input voltage is within the working voltage range of the AC power supply. Adjust the output voltage, record the output voltage on the power analyzer and AC power supply. The output voltage value is adjusted within the specified range of output voltage for testing, and the maximum error is calculated to determine its accuracy.

Its accuracy is obtained from the following formula:

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

And:

$\delta_U$ ——Voltage Accuracy;

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

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

$U_N$ ——Rated Voltage, V;

**Facilities and instruments:** power analyzer

No.	Setting Voltage	Voltage of AC Source (A/B/C Phases)	Voltage Measured (A/B/C Phases)	Voltage Accuracy (A/B/C Phases)
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1	10% V <sub>RATED</sub>	75	75.00	74.80	75.20	73.41	73.27	73.35	0.21%	0.20%	0.25%
2	20% V <sub>RATED</sub>	150	150.00	150.20	149.30	148.33	147.81	148.06	0.22%	0.32%	0.17%
3	30% V <sub>RATED</sub>	225	225.00	225.00	225.10	222.85	223.65	224.17	0.29%	0.18%	0.12%
4	40% V <sub>RATED</sub>	300	299.70	300.80	299.10	298.19	298.95	300.05	0.20%	0.25%	0.13%
5	50% V <sub>RATED</sub>	375	375.60	375.10	375.00	373.54	375.61	373.39	0.27%	0.07%	0.21%
6	60% V <sub>RATED</sub>	450	449.90	449.60	448.90	448.54	448.21	450.19	0.18%	0.19%	0.17%
7	70% V <sub>RATED</sub>	525	524.60	525.40	524.70	523.32	522.89	524.08	0.17%	0.33%	0.08%
8	80% V <sub>RATED</sub>	600	600.80	599.90	599.80	597.95	598.59	597.38	0.38%	0.17%	0.32%
9	90% V <sub>RATED</sub>	675	675.20	675.00	674.80	672.12	673.28	673.28	0.41%	0.23%	0.20%
10	100% V <sub>RATED</sub>	750	749.70	750.30	748.60	747.02	748.29	749.09	0.36%	0.27%	0.07%

标注：软件界面设置值和测量值可至 0.1V，仪器测量可至 0.01V

Signature:

## 6 电流精度/Current Accuracy

交流电源接在配电网侧，使输入电压在交流电源的工作电压范围内。改变交流电源输出电压的设定值，读取功率分析仪和交流电源上的电流读数值。在规定的输出电流范围的內调整输出电流值进行测试，取其中误差最大的进行计算，以确定其精度。

其精度由下式求得：

The AC power supply is connected to the distribution network side so that the input voltage is within the rated voltage range of the AC power supply. Adjust the setting value of output voltage of AC power supply, record the current reading value of power analyzer and AC power supply. The output current value is adjusted within the specified range of output current for testing, and the maximum error is calculated to determine its accuracy.

Its accuracy is obtained from the following formula:

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

And:

$\delta_I$ ——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 (3 Sets of 75kW/7.5Ohm for phase A/B/C)

No.	Setting Voltage (A/B/C Phases)			Current of AC Source (A/B/C Phases)			Current Measured (A/B/C Phases)			Current Accuracy (A/B/C Phases)		
1	30	30	30	10.30	11.14	10.74	10.43	10.76	10.75	0.13%	0.38%	0.01%

2	60	60	60	20.70	21.14	21.59	21.33	22.15	21.69	0.63%	1.01%	0.10%
3	90	90	90	30.41	31.84	32.15	31.60	33.51	32.96	1.19%	1.67%	0.81%
4	120	120	120	40.48	42.58	42.99	41.68	43.71	43.58	1.20%	1.13%	0.59%
5	150	150	150	51.16	53.63	53.76	52.08	54.66	54.51	0.92%	1.03%	0.75%
6	180	180	180	60.90	64.21	65.31	62.45	65.78	65.86	1.55%	1.57%	0.55%
7	210	210	210	71.73	75.22	75.18	73.58	76.29	77.37	1.85%	1.07%	2.19%
8	240	240	240	81.42	85.69	85.93	83.20	87.24	87.63	1.78%	1.55%	1.70%
9	270	270	270	91.61	95.91	97.07	93.87	98.45	98.85	2.26%	2.54%	1.78%
10	290	275	275	100.75	100.06	101.47	100.06	101.52	102.45	0.69%	1.46%	0.98%
标注：软件界面设置值和测量值可至 0.1A，仪器测量可至 0.01A												

Signature:

## 7 功率精度/Power Accuracy

交流电源接在配电网侧，使输入电压在交流电源的工作电压范围内。在规定的输出功率范围的內通过调整输出电压来调整输出功率值进行测试，读取功率分析仪和交流电源上的功率显示值。取其中误差最大的进行计算，以确定其精度。

其精度由下式求得：

The AC power supply is connected to the distribution network side so that the input voltage is within the rated voltage range of the AC power supply. The output power value is adjusted by adjusting the output voltage within the specified range of output power, and record the power display value on the power analyzer and AC power supply. The maximum error is calculated to determine its accuracy.

Its accuracy is obtained from the following formula:

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

And:

$\delta_p$ ——Power Accuracy;

$P_1$ ——Power value measured via power analyzer, kW;

$P_0$ ——Power value displayed on power supply, kW;

$P_N$ ——Rated Power, kW;

**Facilities and instruments:** power analyzer, resistor load (3 Sets of 7.5kW/7.5Ohm for phase A/B/C)

No.	Setting Voltage		Power of AC Source (A/B/C Phases)			Power Measured (A/B/C Phases)			Power Accuracy (A/B/C Phases)		
1	10% $V_{RATED}$	75	0.33	0.34	0.33	0.34	0.34	0.33	0.03%	0.01%	0.01%
2	20% $V_{RATED}$	150	1.35	1.38	1.30	1.35	1.38	1.32	0.01%	0.01%	0.06%
3	30% $V_{RATED}$	225	3.03	3.09	2.96	3.05	3.15	3.02	0.06%	0.18%	0.18%



4	40% V <sub>RATED</sub>	300	5.35	5.53	5.23	5.42	5.59	5.37	0.21%	0.18%	0.42%
5	50% V <sub>RATED</sub>	375	8.38	8.61	8.23	8.49	8.79	8.29	0.33%	0.54%	0.18%
6	60% V <sub>RATED</sub>	450	11.98	12.27	11.67	12.16	12.43	11.98	0.54%	0.48%	0.93%
7	70% V <sub>RATED</sub>	525	16.19	16.67	15.89	16.43	16.79	16.13	0.72%	0.36%	0.72%
8	80% V <sub>RATED</sub>	600	21.08	21.58	20.73	21.30	21.85	20.84	0.66%	0.81%	0.33%
9	90% V <sub>RATED</sub>	675	26.55	27.27	26.75	26.75	27.47	26.33	0.60%	0.60%	1.26%
10	100% V <sub>RATED</sub>	750	32.71	33.63	32.07	32.93	33.84	32.49	0.66%	0.63%	1.26%

Signature:

## 8 输出特性/Output Characteristic

交流电源接在配电网侧，使输入电压在交流电源的工作电压范围内。改变交流电源输出电压的设定值，读取功率分析上的各项参数值及 THD、PF 值、效率，并记录。

The AC power supply is connected to the distribution network side so that the input voltage is within the rated voltage range of the AC power supply. Adjust the set value of the output voltage of AC power supply, record the parameters of power analysis, THD, PF, efficiency, and record.

**Facilities and instruments:** power analyzer, resistor load (3 Sets of 75kW/7.50hm for phase A/B/C)

Input $\Sigma P_i$	Setting Voltage		$\Sigma P_0$	Output						Efficiency	Voltage THD	Power Factor
	Setting Voltage			U/I of Phase A		U/I of Phase B		U/I of Phase C				
8.20	10%VR ATE	75	1.01	73.41 4.61	73.27 4.73	73.35 4.52	12.32%	3.59%	0.99			
11.60	20%VR ATE	150	4.06	148.3 9.22 3	147.8 9.44 1	148.0 9.01 6	35.00%	2.21%	0.99			
17.00	30%VR ATE	225	9.23	222.8 13.81 5	223.6 14.22 5	224.1 13.59 7	54.29%	1.76%	0.99			
24.80	40%VR ATE	300	16.39	298.1 18.36 9	298.9 18.87 5	300.0 18.08 5	66.09%	1.69%	0.99			
34.30	50%VR ATE	375	25.59	373.5 22.91 4	375.6 23.61 1	373.3 22.43 9	74.61%	1.84%	0.99			
46.30	60%VR ATE	450	36.59	448.5 27.32 4	448.2 27.97 1	450.1 26.86 9	79.03%	1.92%	0.99			
60.10	70%VR ATE	525	49.36	523.3 31.59 2	522.8 32.34 9	524.0 31.02 8	82.13%	1.28%	0.99			
75.60	80%VR ATE	600	63.99	597.9 35.81 5	598.5 36.72 9	597.3 35.09 8	84.64%	1.26%	0.99			
93.40	90%VR ATE	675	80.56	672.1 39.99 2	673.2 41.01 8	673.2 39.32 8	86.25%	1.92%	0.99			

112.8	100%VR ATE	750	99.27	747.0 2	44.27	748.2 9	45.43	749.0 9	43.59	88.01%	1.64%	0.99
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### 9 三相不平衡输出/ Unbalanced Output, Negative/Zero-Sequence Component

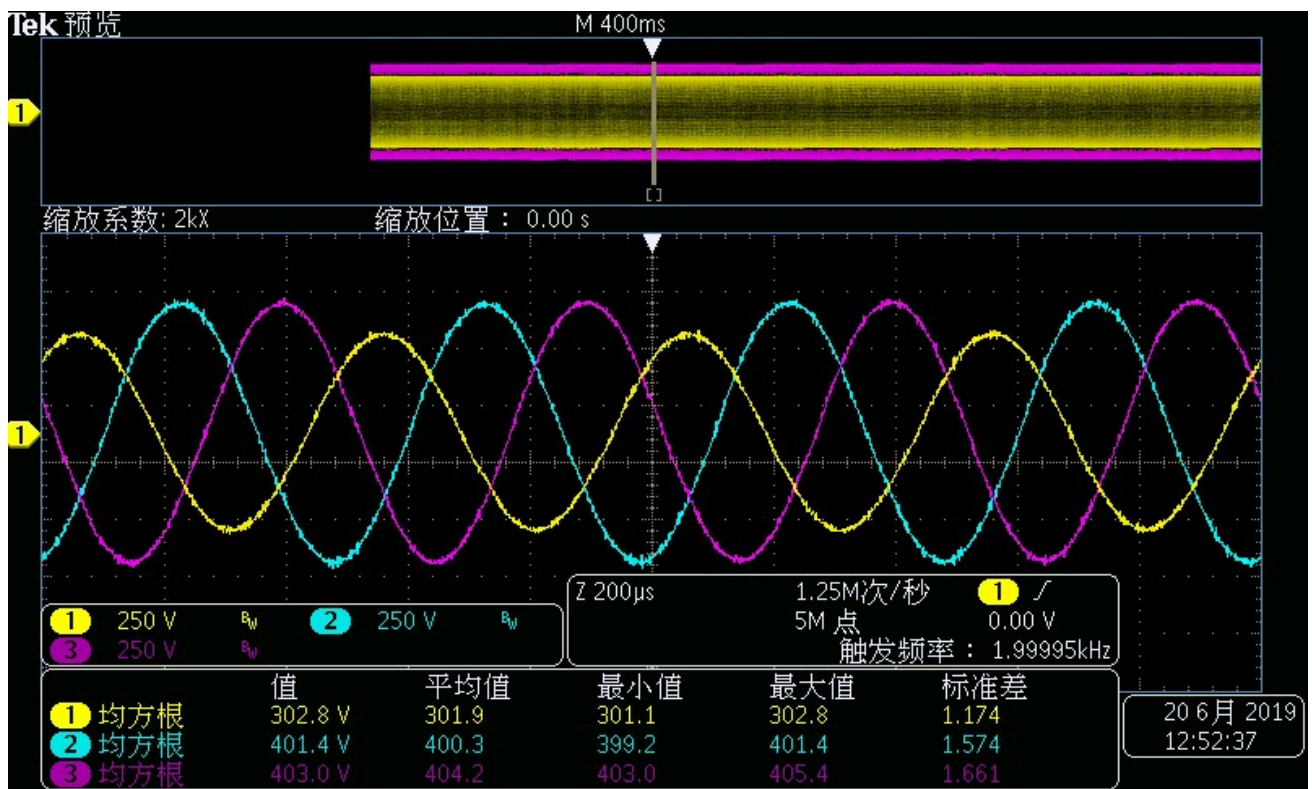
交流电源接在配电网侧，使输入电压在交流电源的工作电压范围内，输出端接负载。在额定输出范围内，改变交流电源各相输出电压及相角的设定值，记录示波器或功率分析仪上的读数或波形。

The AC power supply is connected to the distribution network side so that the input voltage is within the rated voltage range of the AC power supply, connect the load to output terminals of power supply. In the rated output range, adjust the set values of output voltage and phase angle of each phase of AC power supply, and record the readings of power analyzers or waveforms on oscilloscopes.

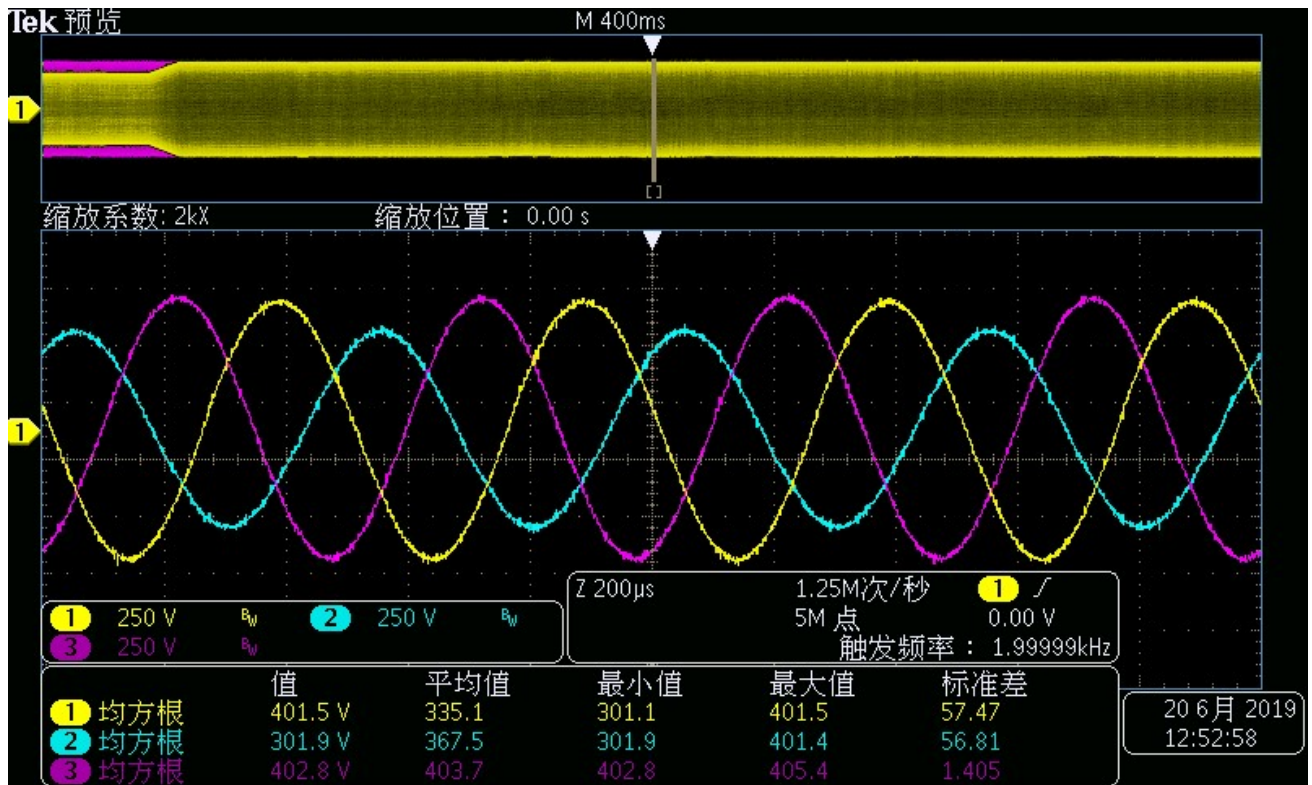
**Facilities and instruments:** power analyzer, resistor load, oscilloscopes (3 Sets of 75kW/7.5Ohm for phase A/B/C)

Setting						Output Measured						Waveform Recording
U of Phase A		U of Phase B		U of Phase C		U of Phase A		U of Phase B		U of Phase C		
U	$\varphi$	U	$\varphi$	U	$\varphi$	U	$\varphi$	U	$\varphi$	U	$\varphi$	
300	0	400	-120	400	-240	305.9	0	404.9	-120	405.6	120	①
400	0	300	-120	400	-240	404.4	0	304.8	-120	406.2	120	②
400	0	400	-120	300	-240	404.7	0	405.9	-120	306.8	120	③
100	0	200	-120	300	-240	102.9	0	200.6	-120	305.6	120	④
300	0	400	-120	500	-240	306.2	0	404.8	-120	502.8	120	⑤
500	0	600	-120	700	-240	503.3	0	600.9	-120	699.5	120	⑥

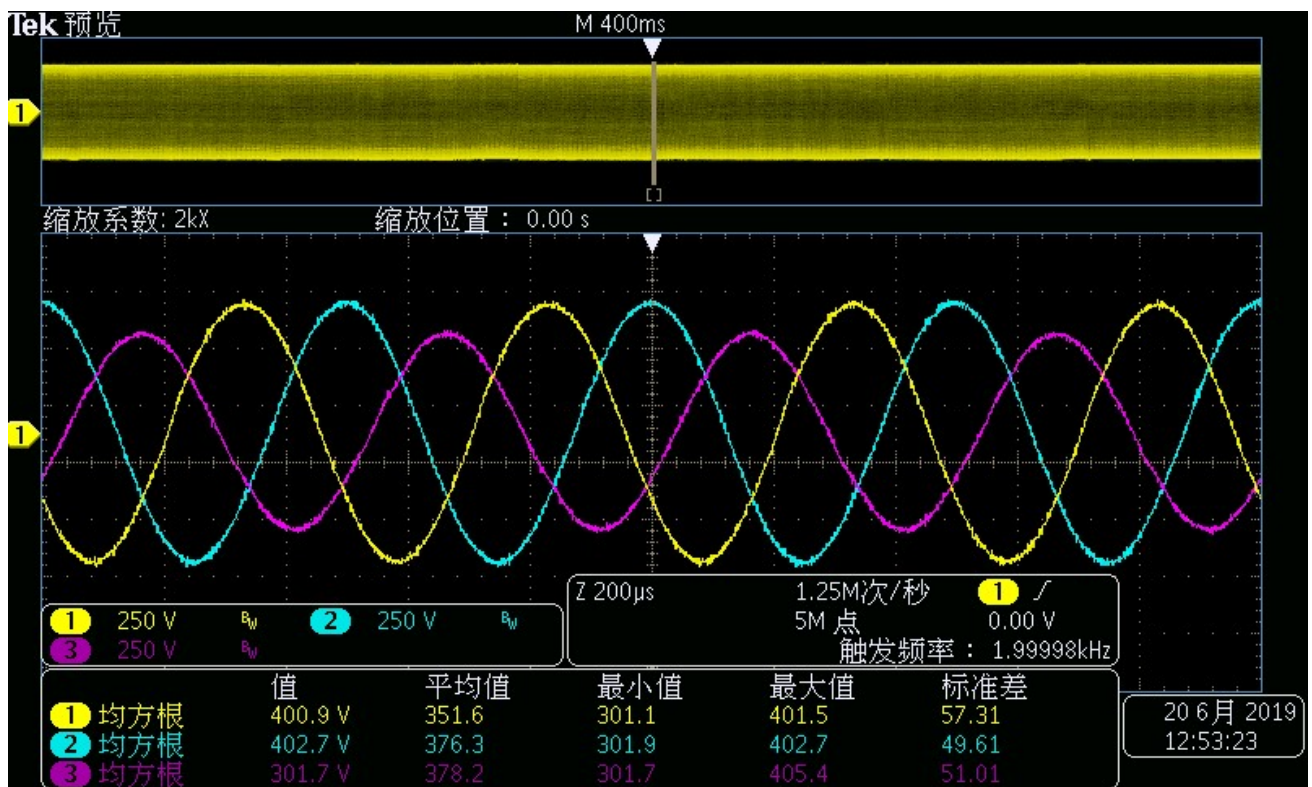
Waveform①



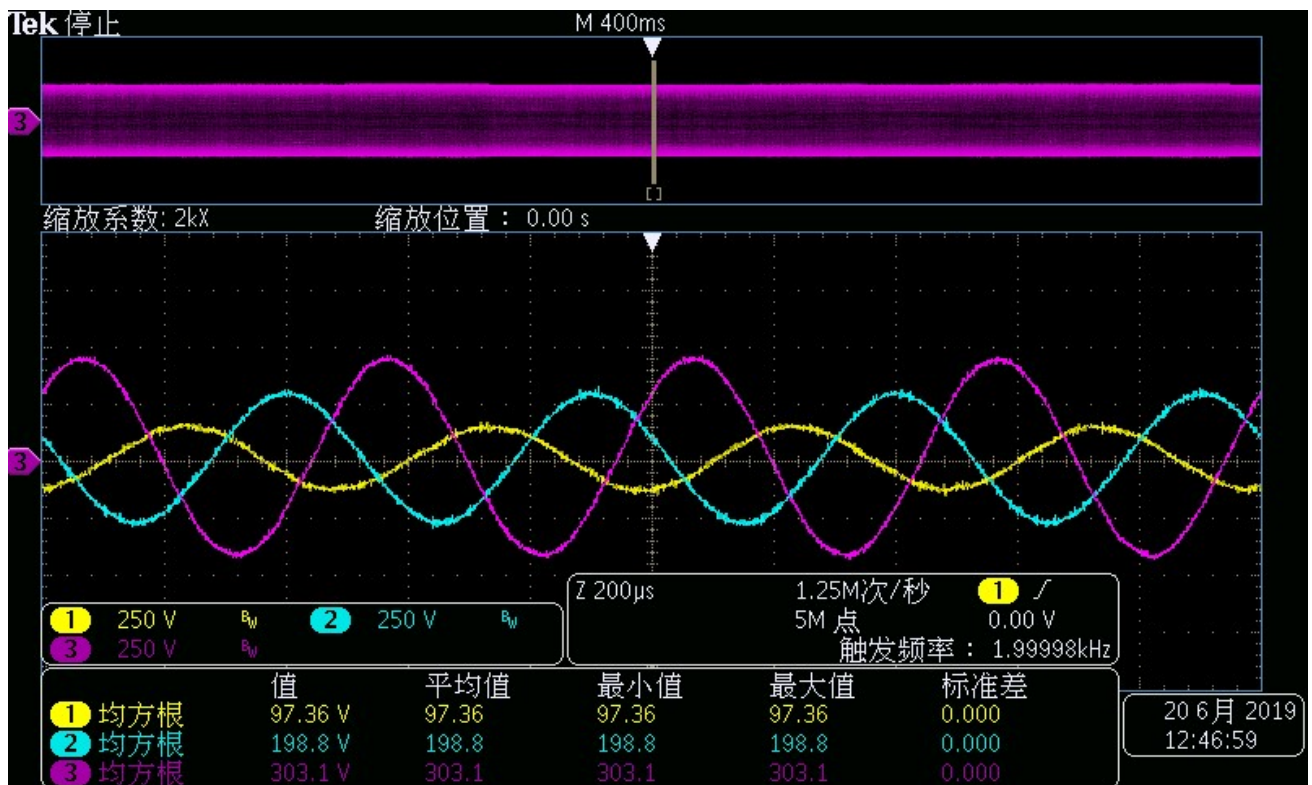
Waveform②



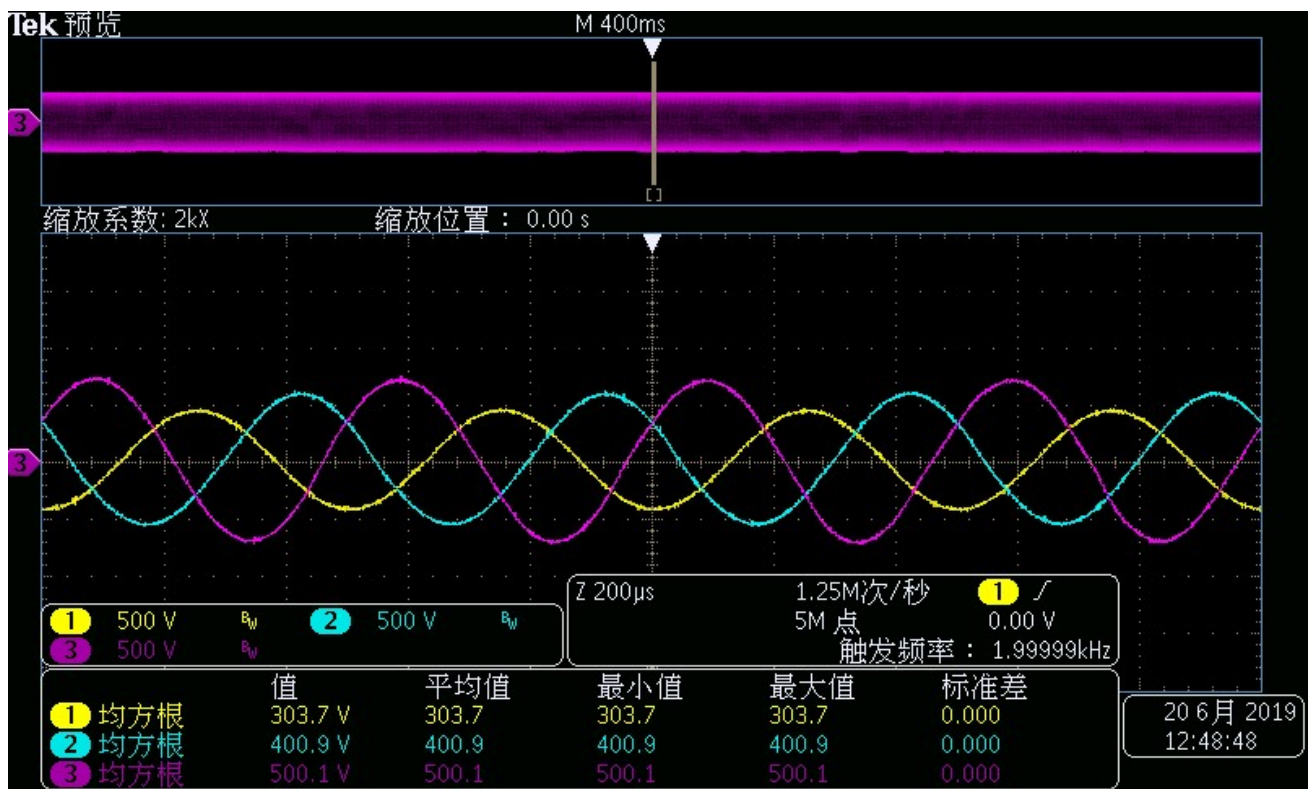
Waveform③



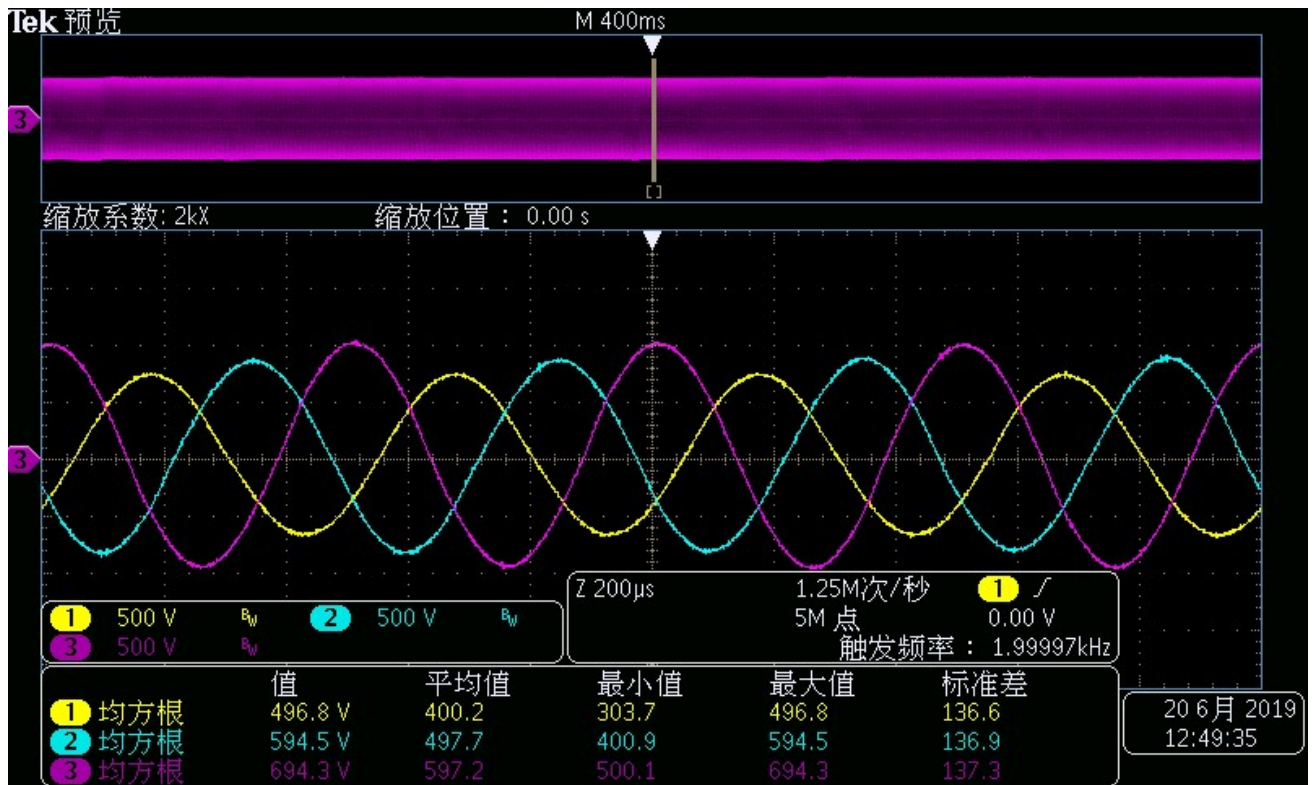
Waveform④



Waveform⑤



Waveform⑥



Signature:

## 10 谐波测试/Harmonics Test

交流电源接在配电网侧，使输入电压在交流电源的工作电压范围内，输出端接负载。改变交流电源输出电压的设定值，并启用谐波功能，设定各次谐波叠加值，读取功率分析上的谐波分量和 THD，记录示波器波形。

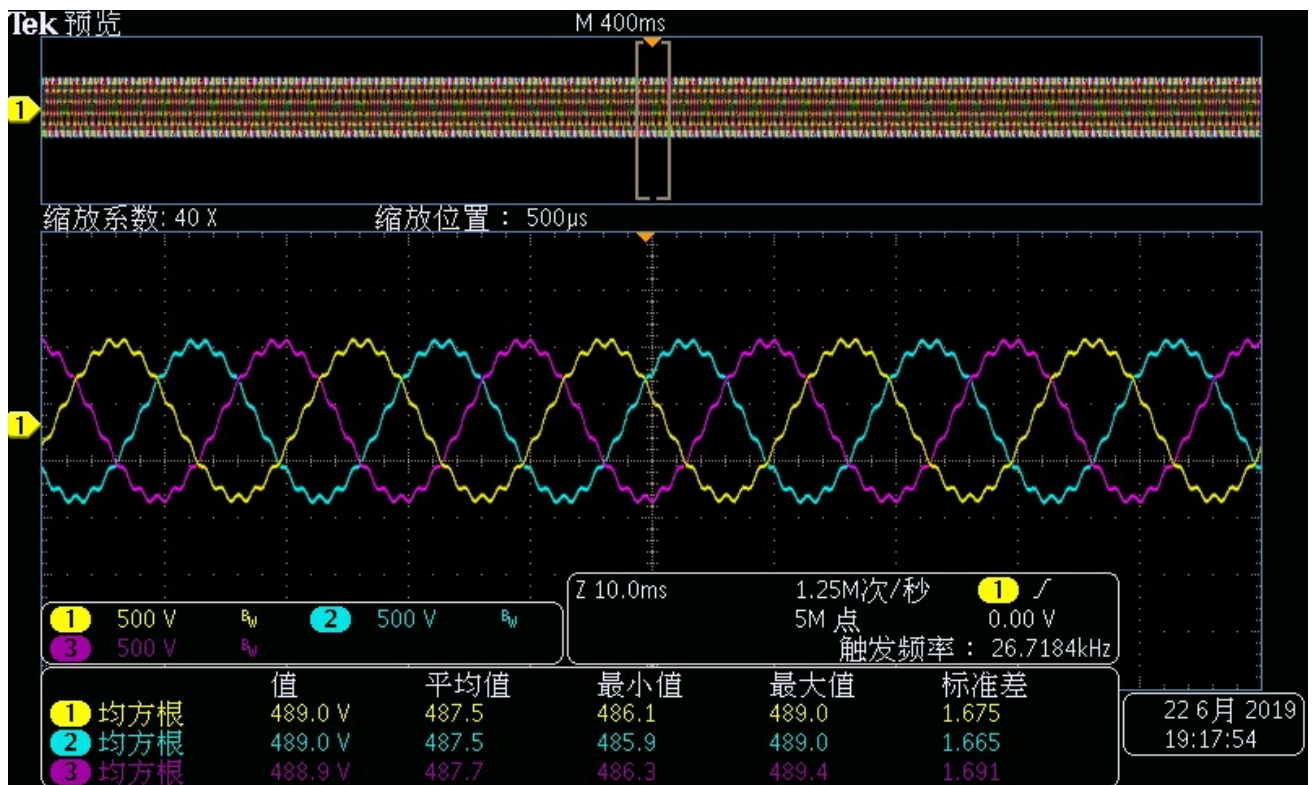
The AC power supply is connected to the distribution network side so that the input voltage is within the rated voltage range of the AC power supply, connect the load to output terminals of power supply. Adjust the set value of the output voltage of AC power supply, and enable the Harmonic function, set the volume of each order. Record the measured value of each order harmonic, also with the waveform on oscilloscopes.

**Facilities and instruments:** power analyzer, resistor load, oscilloscopes (3 Sets of 75kW/7.5Ohm for phase A/B/C)

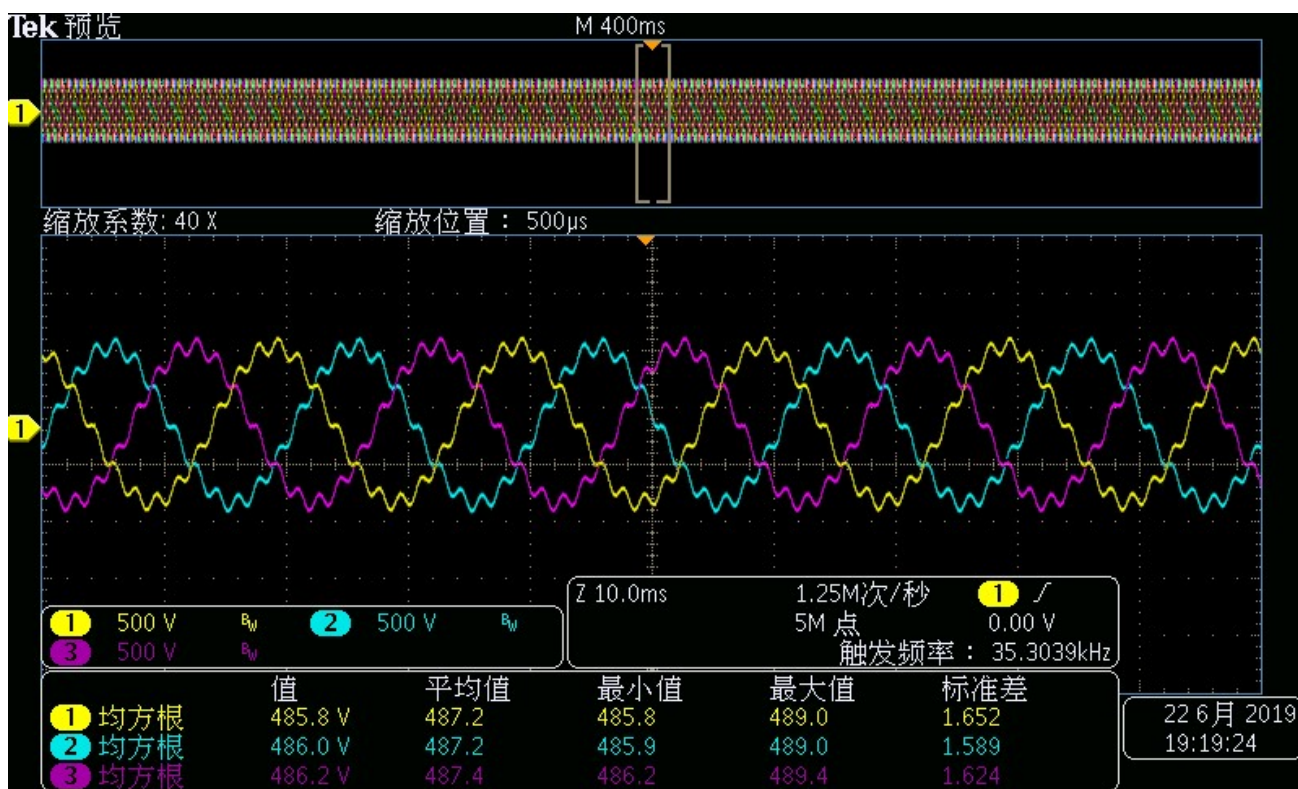
Settin g Volta ge	Setting						Output Measured						Waveform Recording
	U of Phase A		U of Phase B		U of Phase C		U of Phase A		U of Phase B		U of Phase C		
	Order	Vol	Order	Vol	Order	Vol	Order	Vol	Order	Vol	Order	Vol	
100V	13	5%	13	5%	13	5%	13	5.071 %	13	5.068 %	13	5.084 %	①
	10	10%	10	10%	10	10%	10	9.982 %	10	9.993 %	10	10.06 8%	
	7	15%	7	15%	7	15%	7	14.94 0%	7	14.97 0%	7	15.10 2%	
	4	20%	4	20%	4	20%	4	20.38 3%	4	20.26 5%	4	20.32 2%	
	2	30%	2	30%	2	30%	2	30.07 7%	2	30.46 4%	2	30.56 9%	
300V	14	5%	14	5%	14	5%	14	5.052 %	14	5.046 %	14	5.040 %	
	11	10%	11	10%	11	10%	11	10.15 1%	11	10.13 8%	11	10.15 1%	
	8	15%	8	15%	8	15%	8	15.13 5%	8	15.13 9%	8	15.14 7%	
	5	20%	5	20%	5	20%	5	20.11 6%	5	20.09 8%	5	20.11 0%	
	2	30%	2	30%	2	30%	2	30.14 7%	2	30.08 4%	2	30.11 2%	
500V	15	5%	15	5%	15	5%	15	5.120 %	15	5.118 %	15	5.103 %	

	12	10%	12	10%	12	10%	12	10.11 4%	12	10.12 7%	12	10.10 7%
	9	15%	9	15%	9	15%	9	15.12 3%	9	15.15 2%	9	15.13 1%
	6	20%	6	20%	6	20%	6	20.10 1%	6	20.12 1%	6	20.09 5%
	3	30%	3	30%	3	30%	3	29.96 8%	3	29.98 8%	3	29.99 6%

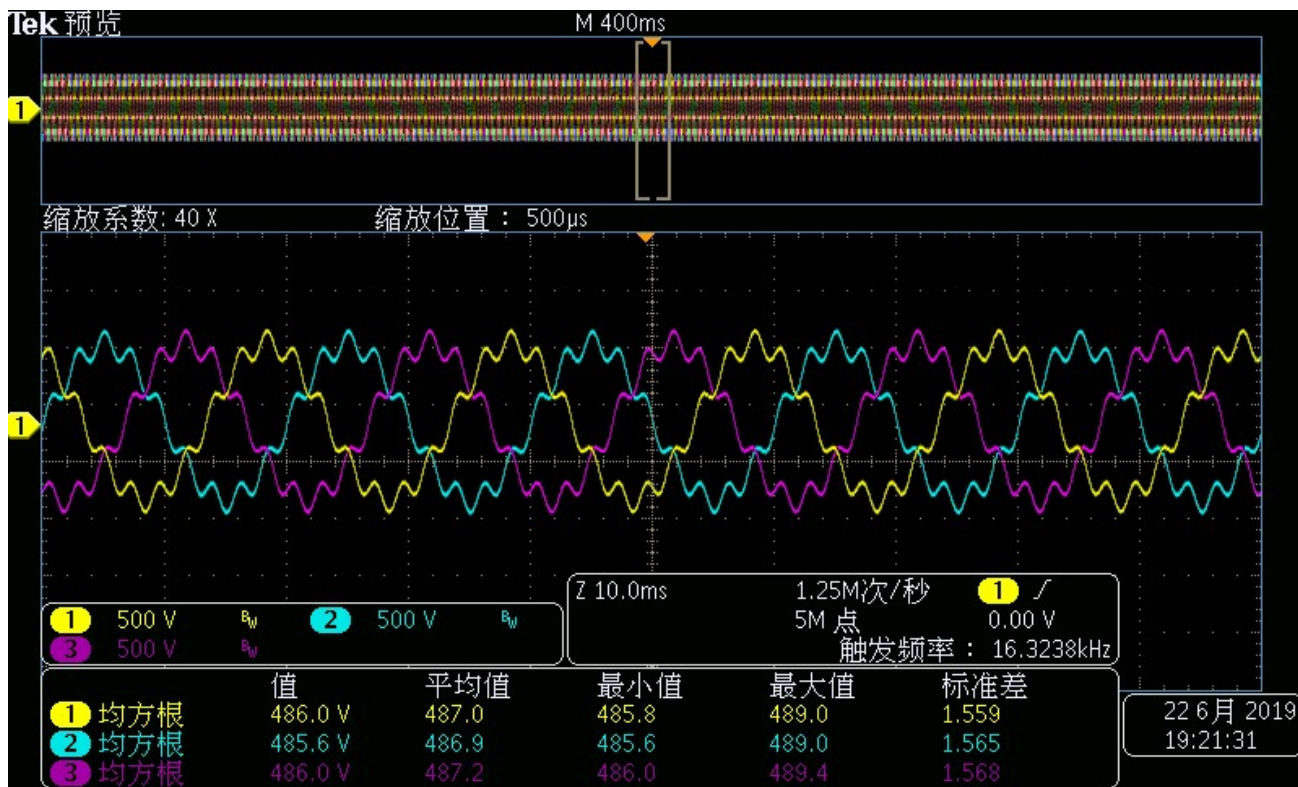
500V (15 次谐波, Harmonic5%)



500V (12 次谐波, Harmonic10%)

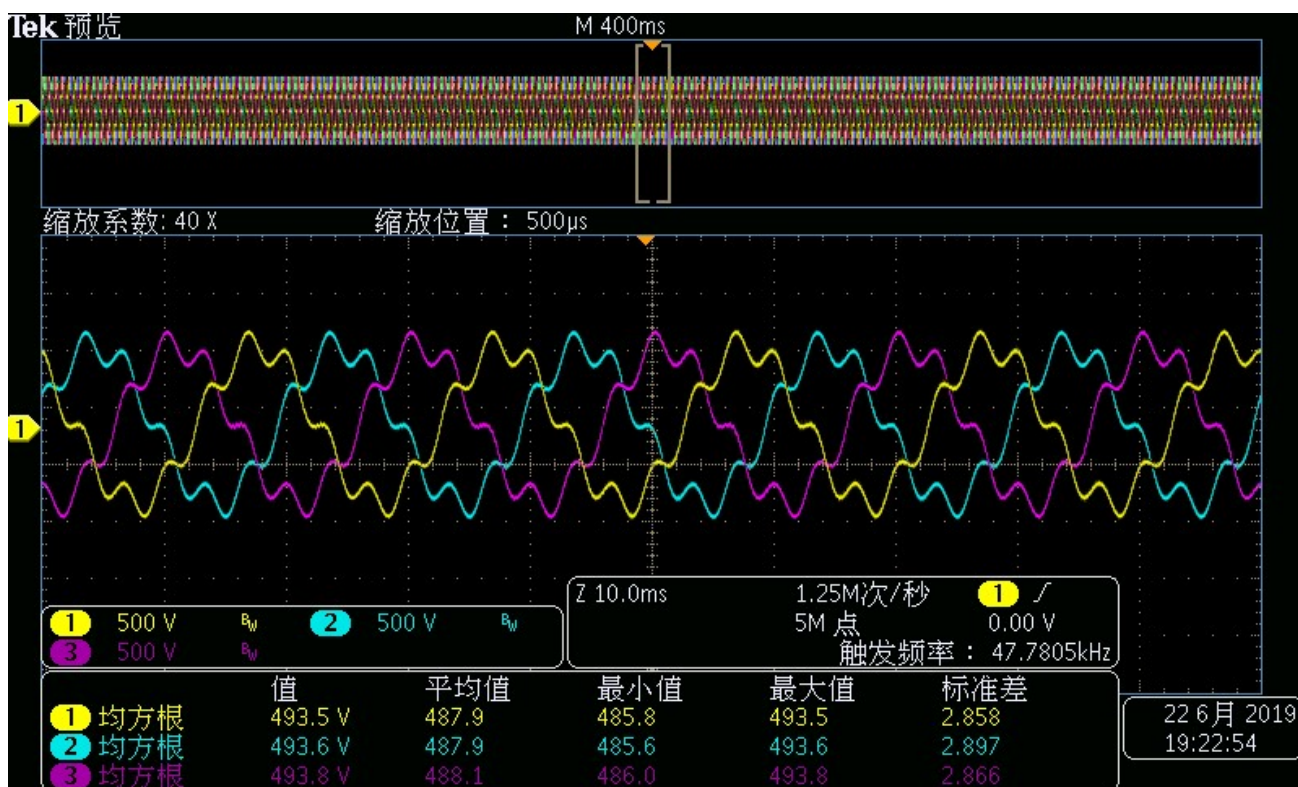


500V (9 次谐波, Harmonic15%)

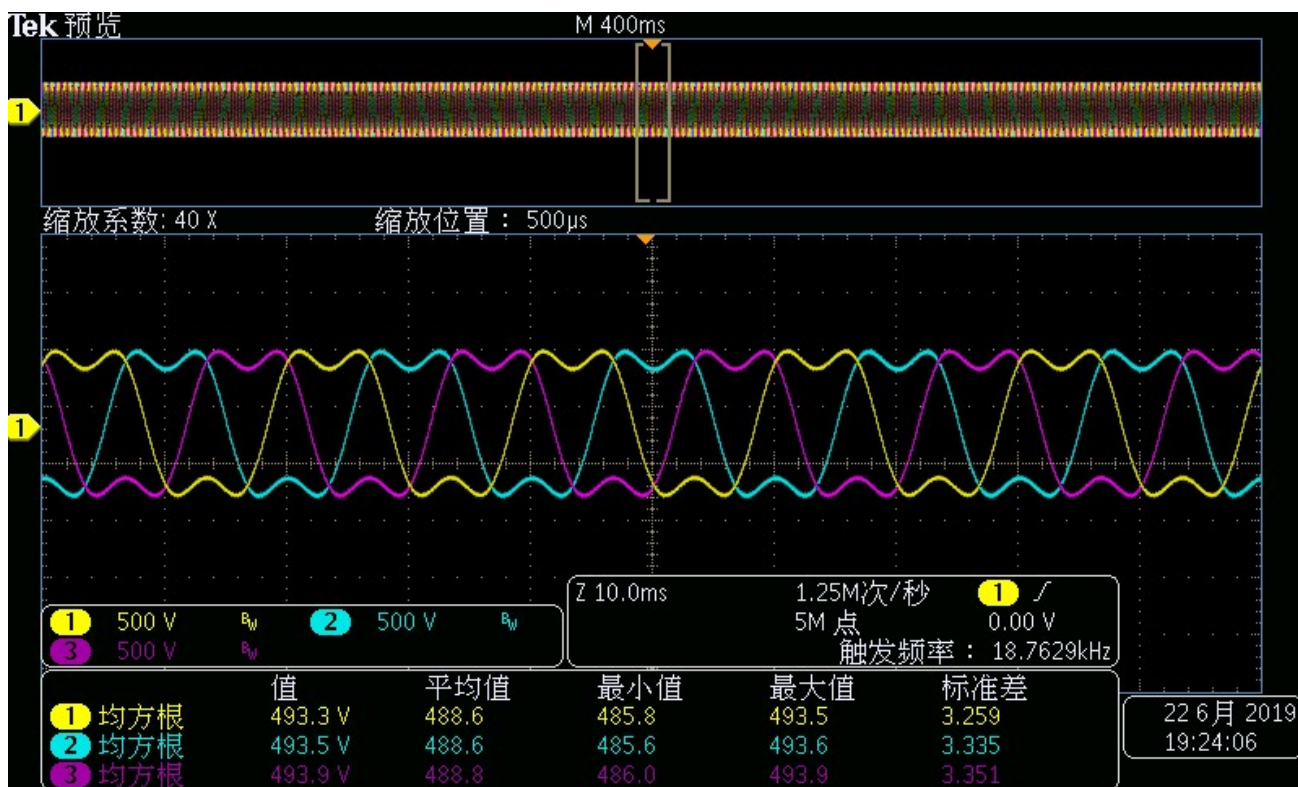




500V (6 次谐波, Harmonic20%)



500V (3 次谐波, Harmonic30%)



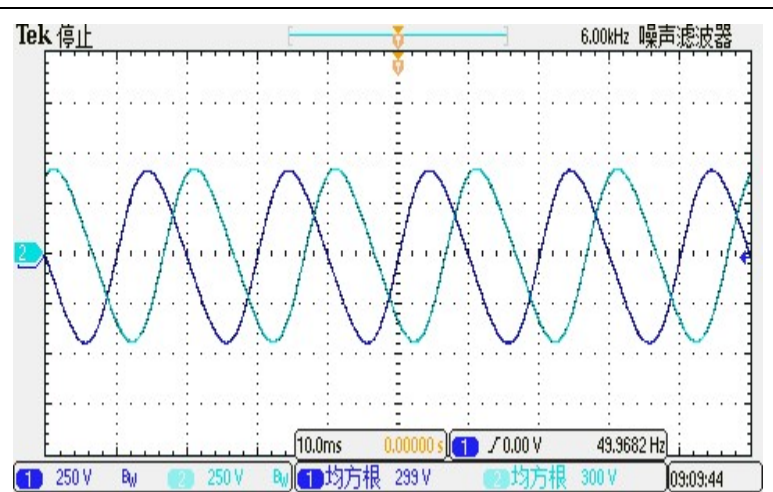
Signature:

**Facilities and instruments:** power analyzer, resistor load, oscilloscopes (3 Sets of 75kW/7.5Ohm for phase A/B/C)

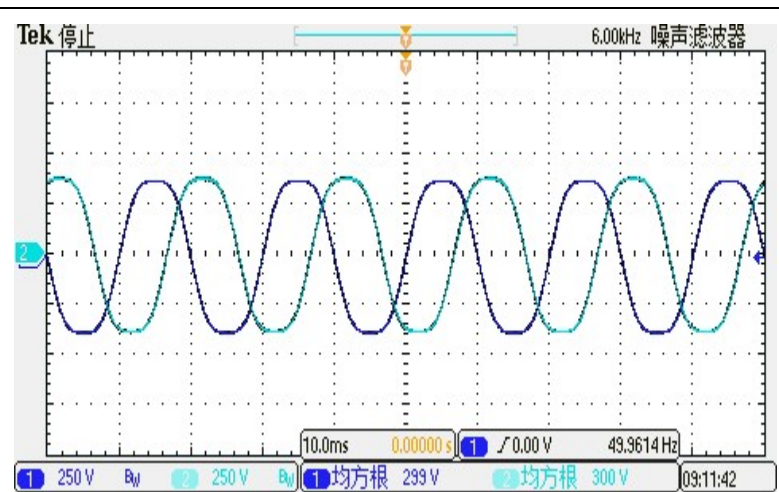
NO.	300v	Setting			Output Measured			Waveform Recording
		U of Phase A	U of Phase B	U of Phase C	U of Phase A	U of Phase B	U of Phase C	
		Vol	Vol	Vol	Vol	Vol	Vol	
1		0	0	0	0	0	0	
2		10	10	10	9.87	9.82	9.82	
3		10	10	10	9.95	9.94	9.94	
4		10	10	10	10.06	10.03	10.05	
5		10	10	10	9.95	10.06	10.07	
6		10	10	10	9.96	10.03	10.05	
7		10	10	10	10.03	9.99	10.02	
8		10	10	10	10.03	10.04	10.06	
9		10	10	10	10.02	10.04	10.03	
10		10	10	10	10.07	10.08	10.08	
11		10	10	10	10.09	10.08	10.07	
12		10	10	10	10.10	10.09	10.08	
13		10	10	10	10.11	10.10	10.09	
14		10	10	10	10.13	10.12	10.13	
15		10	10	10	10.11	10.13	10.13	
16		10	10	10	10.17	10.16	10.16	
17		10	10	10	10.18	10.17	10.18	
18		10	10	10	10.18	10.18	10.16	
19		10	10	10	10.20	10.23	10.21	
20		10	10	10	10.25	10.23	10.22	
21		10	10	10	10.21	10.23	10.23	
22		10	10	10	10.27	10.26	10.26	
23		10	10	10	10.31	10.29	10.28	
24		10	10	10	10.32	10.33	10.31	

25	10	10	10	10.33	10.35	10.29
26	10	10	10	10.31	10.34	10.30
27	10	10	10	10.32	10.32	10.30
28	10	10	10	10.34	10.37	10.33
29	10	10	10	10.37	10.40	10.34
30	10	10	10	10.38	10.41	10.43
31	10	10	10	10.46	10.43	10.40
32	10	10	10	10.45	10.40	10.44
33	10	10	10	10.45	10.44	10.43
34	10	10	10	10.48	10.46	10.47
35	10	10	10	10.53	10.48	10.48
36	10	10	10	10.53	10.55	10.50
37	10	10	10	10.54	10.56	10.55
38	10	10	10	10.55	10.59	10.55
39	10	10	10	10.55	10.61	10.54
40	10	10	10	10.59	10.58	10.60

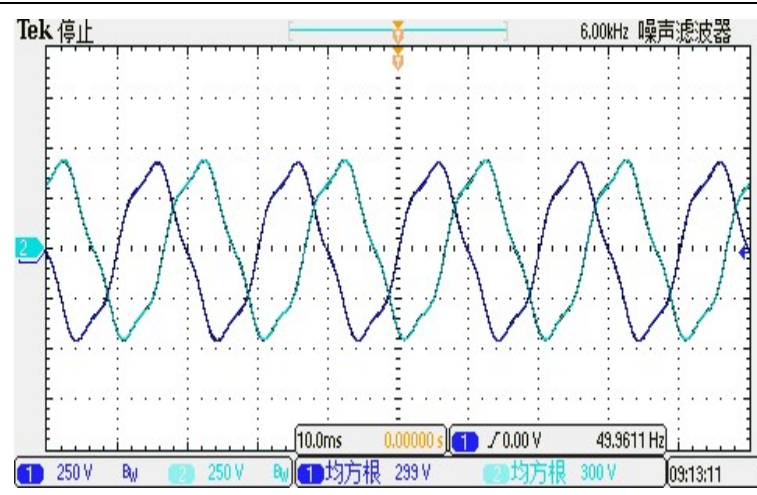
Waveform 2-40



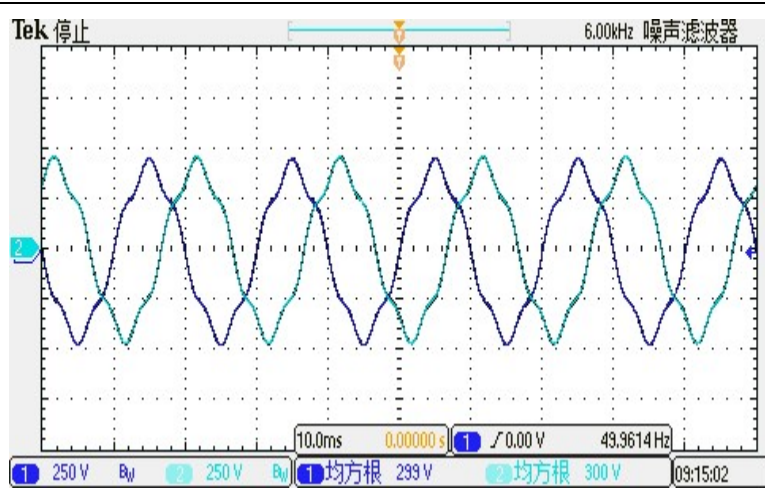
2 (AC/300V 2次谐波-10%)



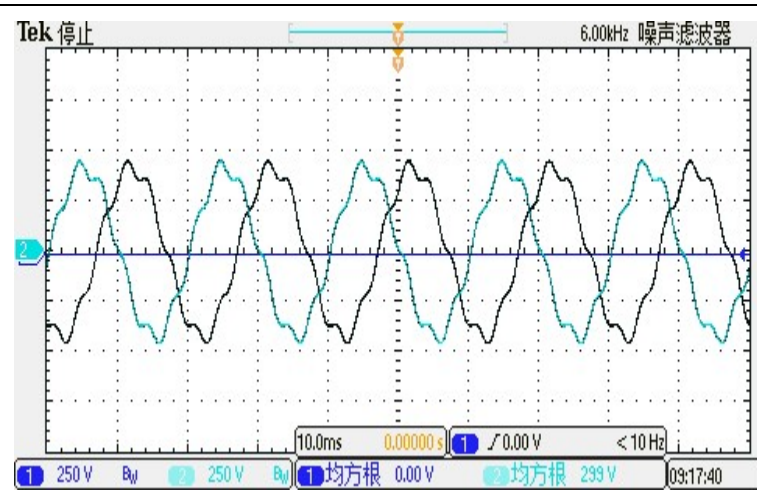
3 (AC/300V 3次谐波-10%)



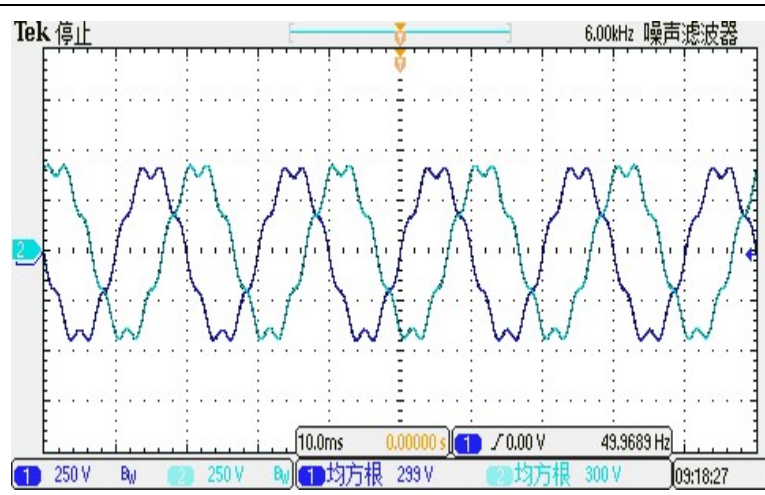
4 (AC/300V 4次谐波-10%)



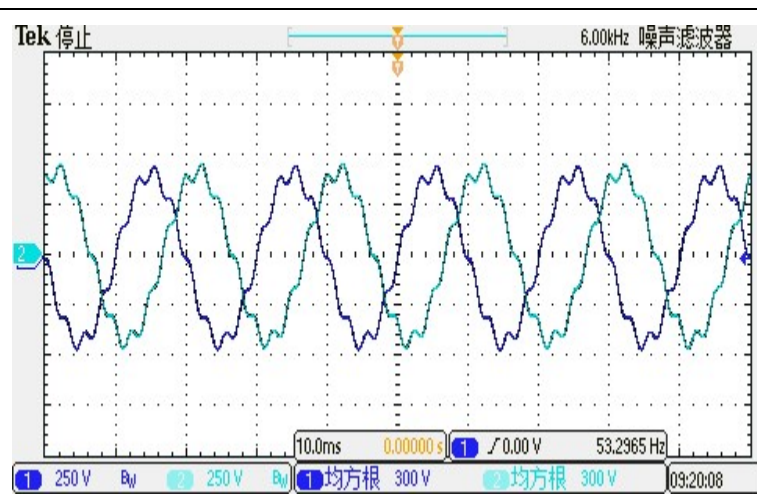
5 (AC/300V 5次谐波-10%)



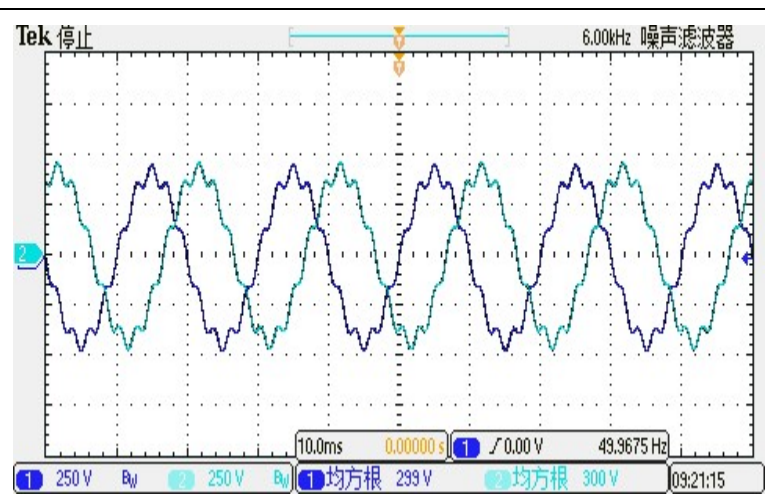
6 (AC/300V 6次谐波-10%)



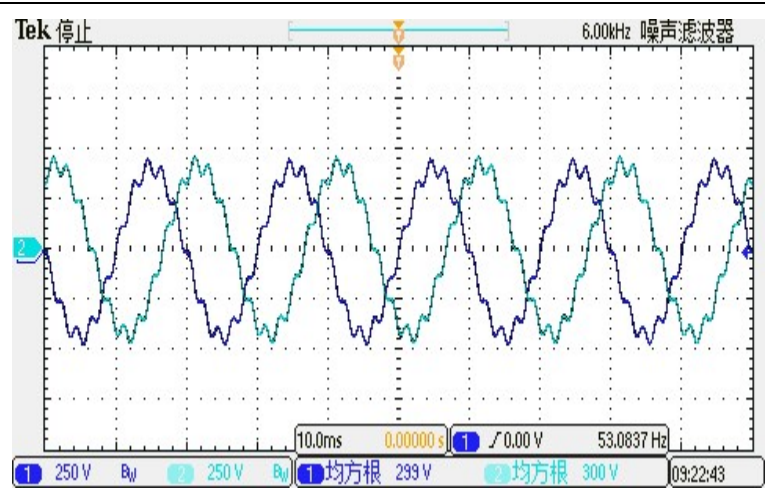
7 (AC/300V 7次谐波-10%)



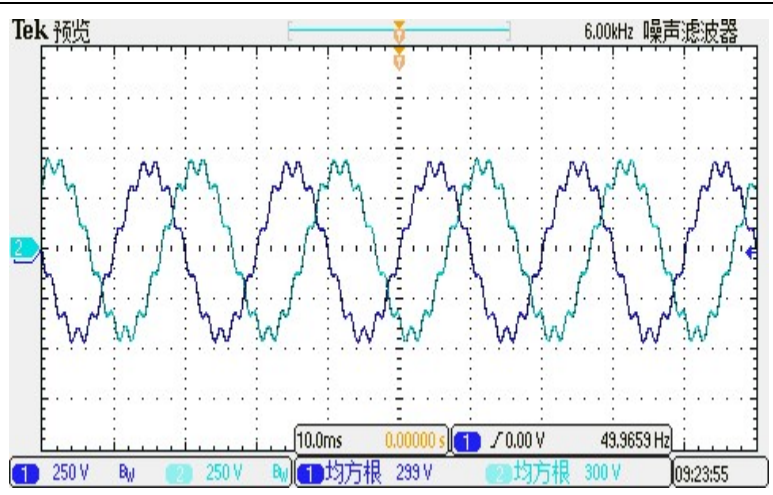
8 (AC/300V 8次谐波-10%)



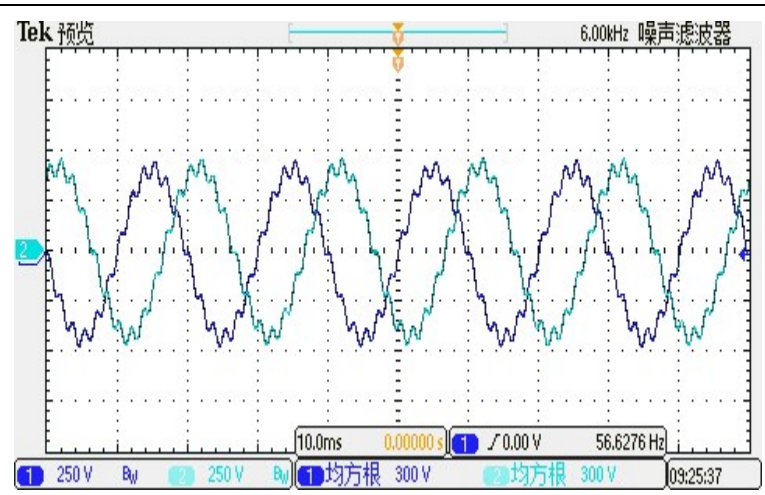
9 (AC/300V 9次谐波-10%)



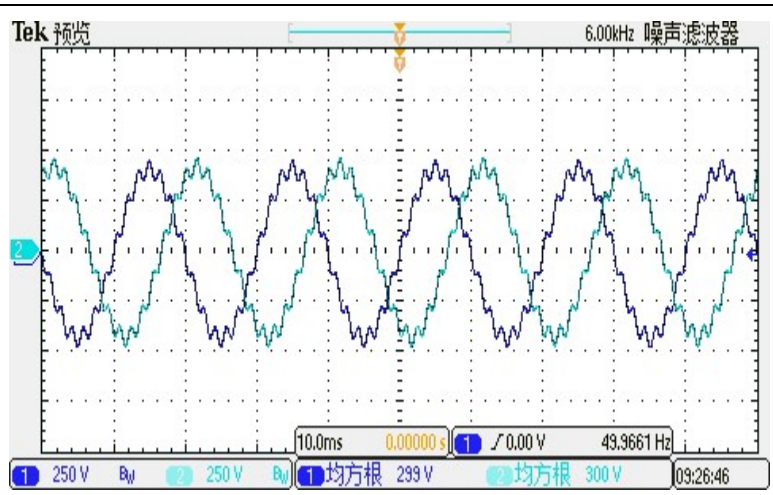
10 (AC/300V 10次谐波-10%)



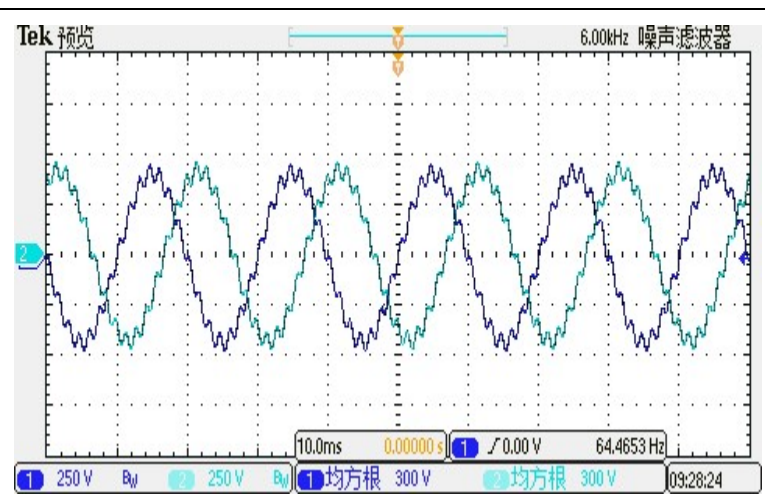
11 (AC/300V 11次谐波-10%)



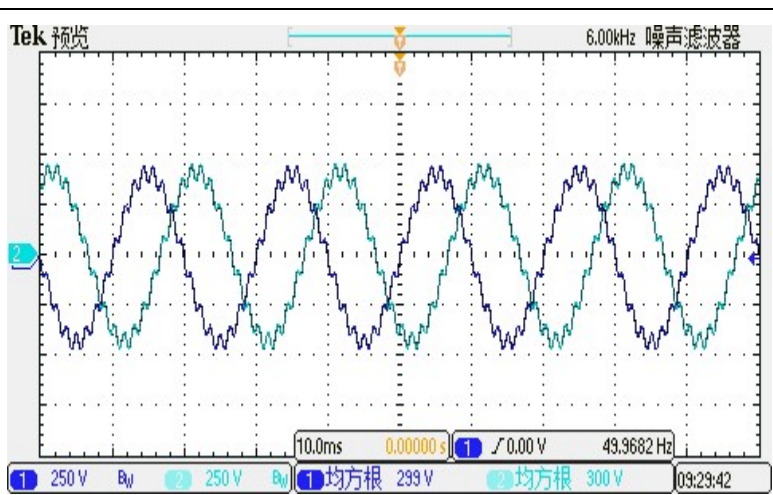
12 (AC/300V 12次谐波-10%)



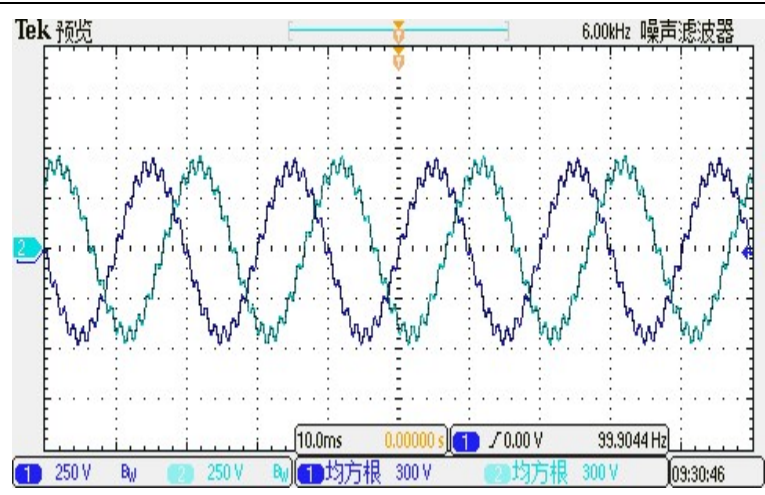
13 (AC/300V 13次谐波-10%)



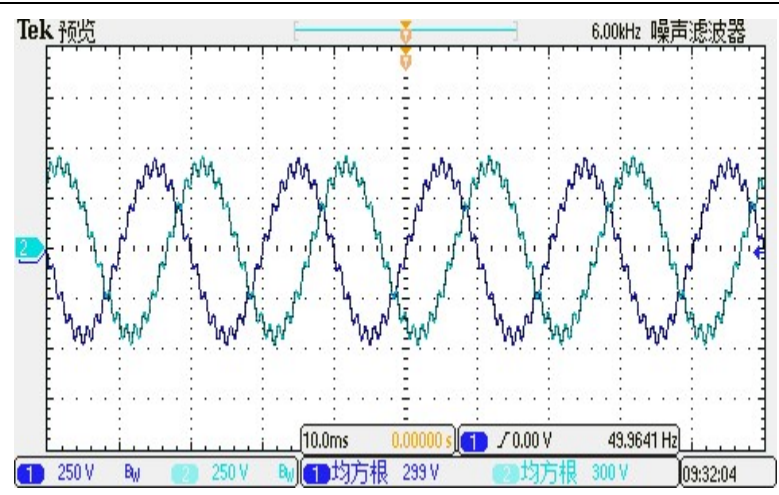
14 (AC/300V 14次谐波-10%)



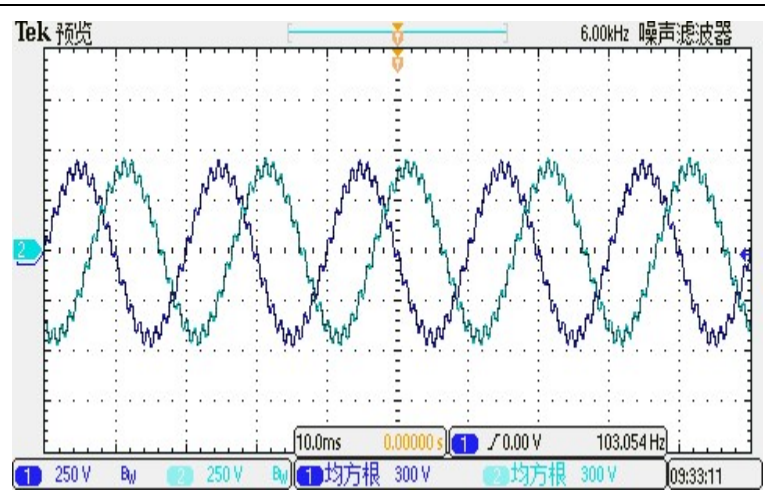
15 (AC/300V 15次谐波-10%)



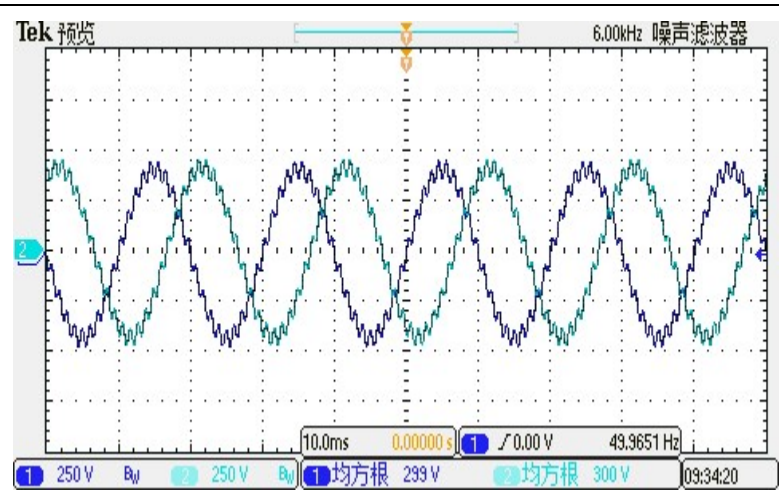
16 (AC/300V 16 次谐波-10%)



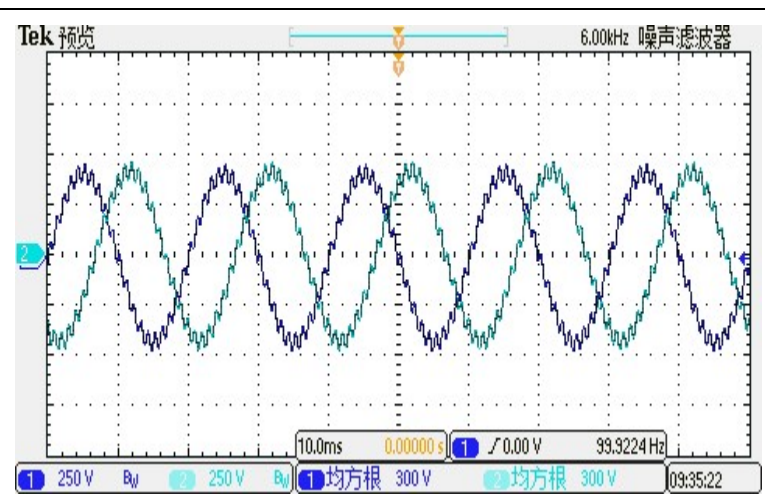
17 (AC/300V 17 次谐波-10%)



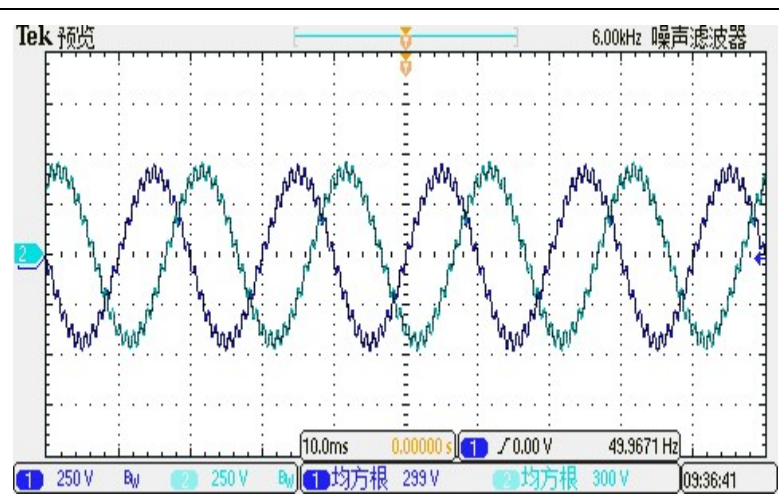
18 (AC/300V 18 次谐波-10%)



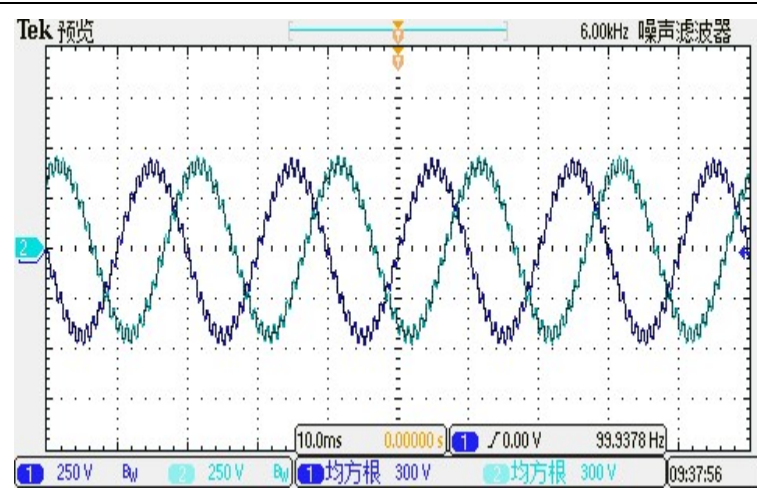
19 (AC/300V 19 次谐波-10%)



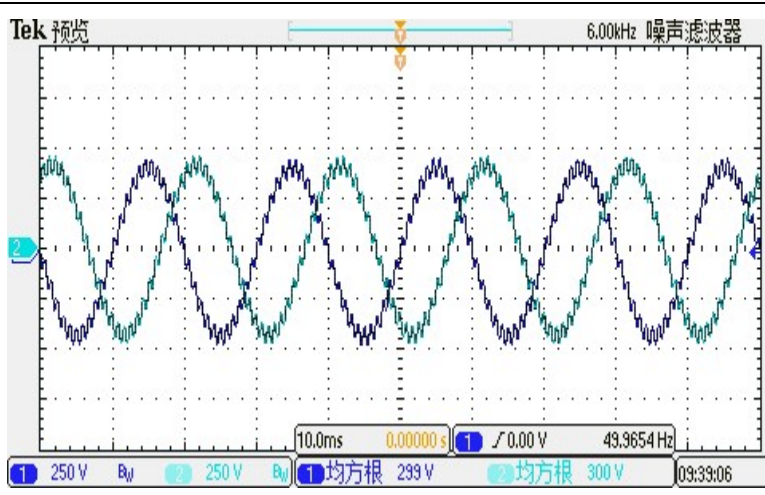
20 (AC/300V 20 次谐波-10%)



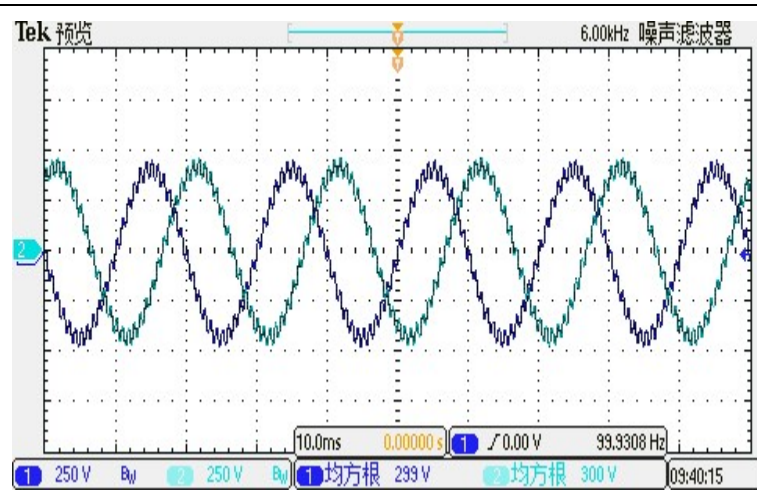
21 (AC/300V 21 次谐波-10%)



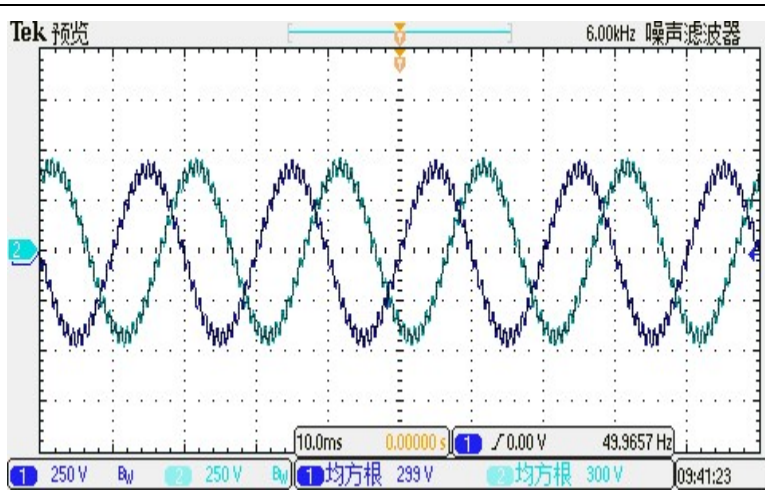
22 (AC/300V 22次谐波-10%)



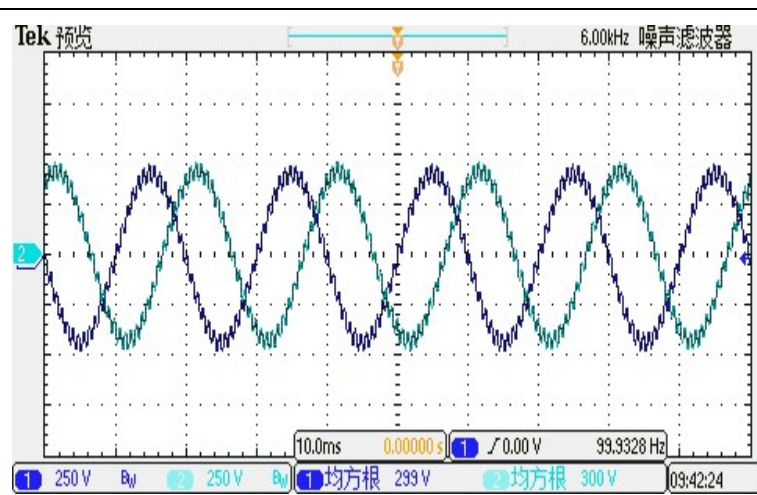
23 (AC/300V 23次谐波-10%)



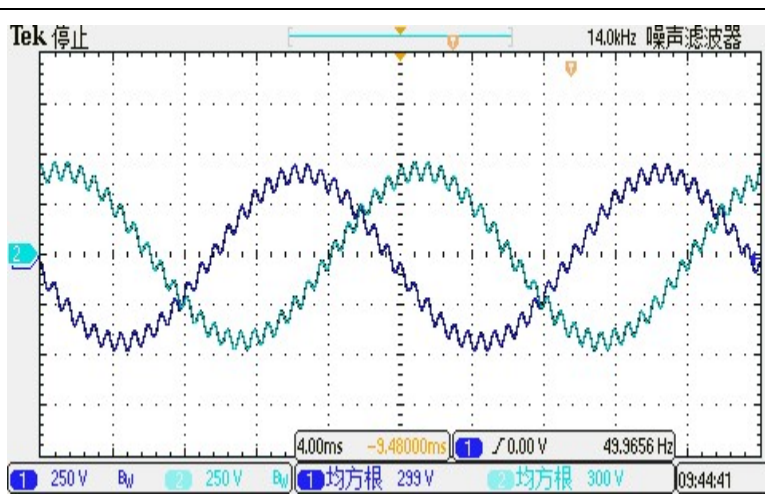
24 (AC/300V 24次谐波-10%)



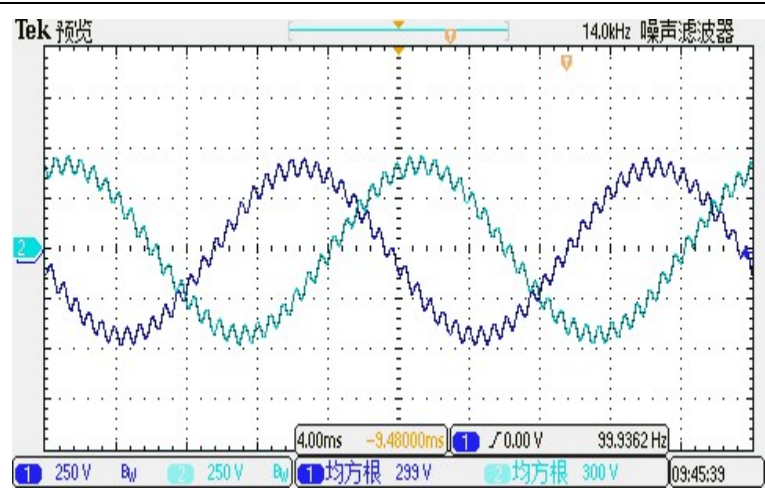
25 (AC/300V 25次谐波-10%)



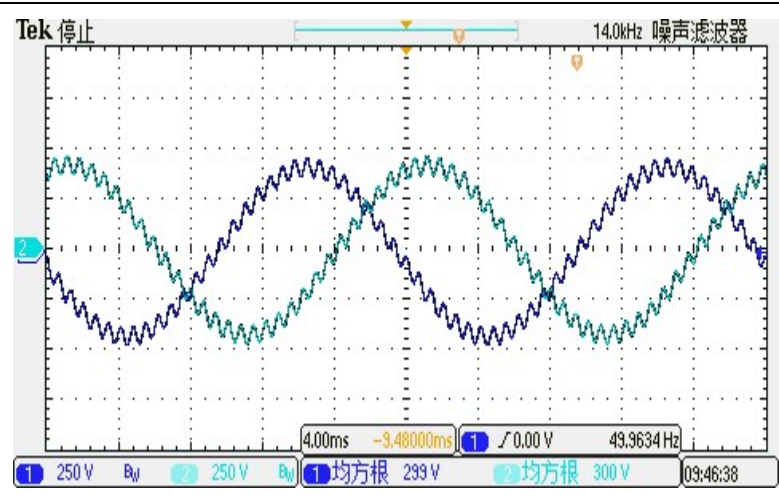
26 (AC/300V 26次谐波-10%)



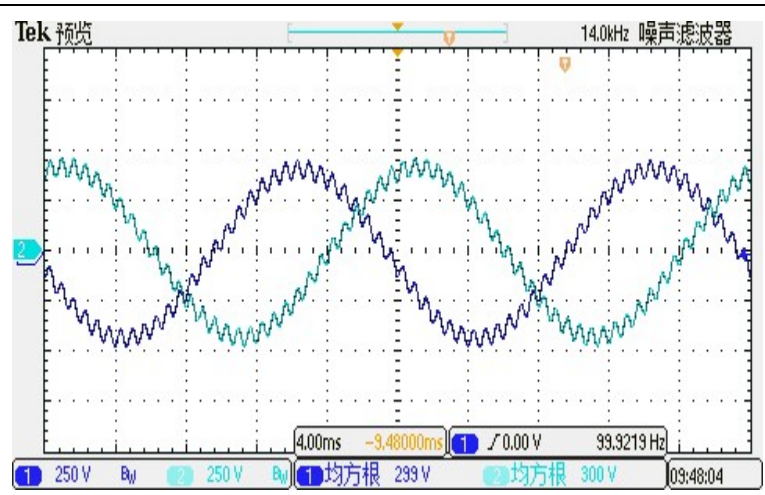
27 (AC/300V 27次谐波-10%)



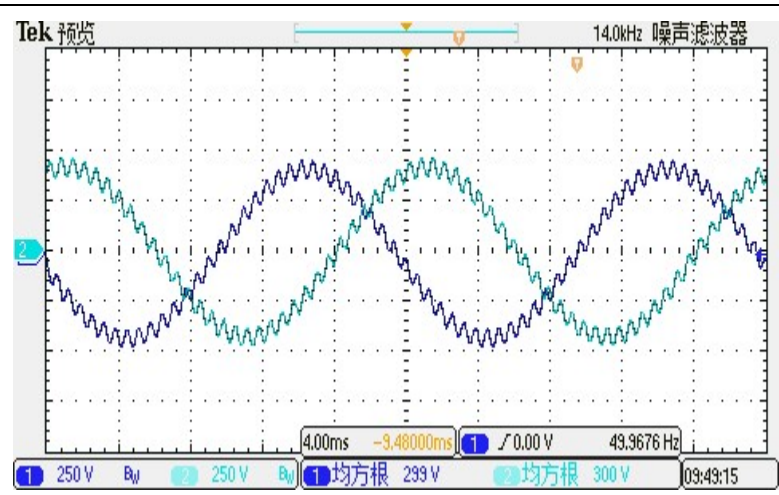
28 (AC/300V 28 次谐波-10%)



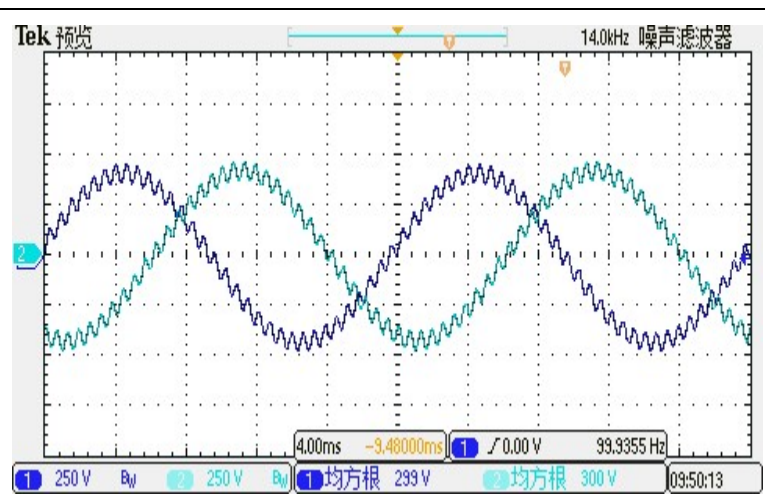
29 (AC/300V 29 次谐波-10%)



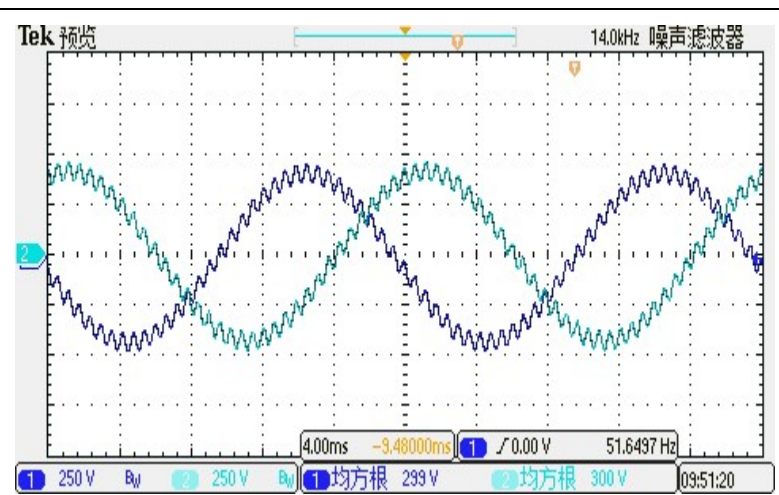
30 (AC/300V 30 次谐波-10%)



31 (AC/300V 31 次谐波-10%)

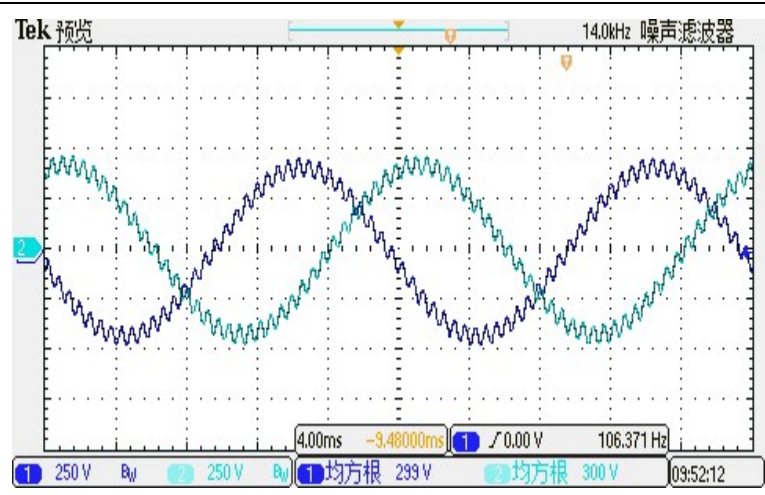


32 (AC/300V 32 次谐波-10%)

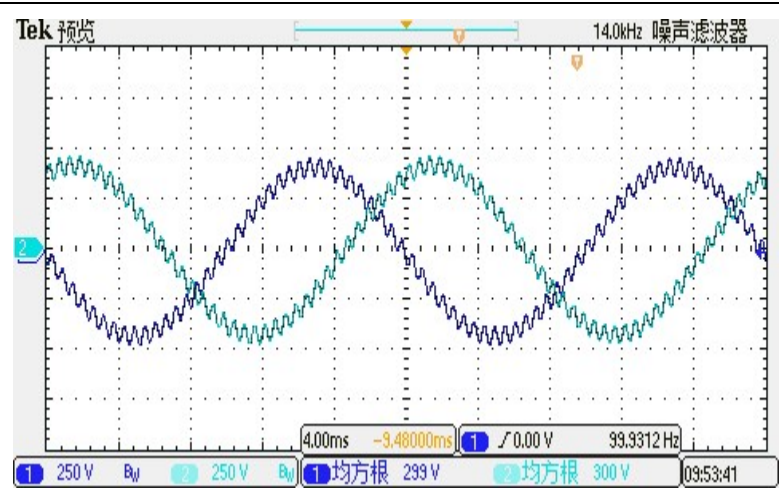


33 (AC/300V 33 次谐波-10%)

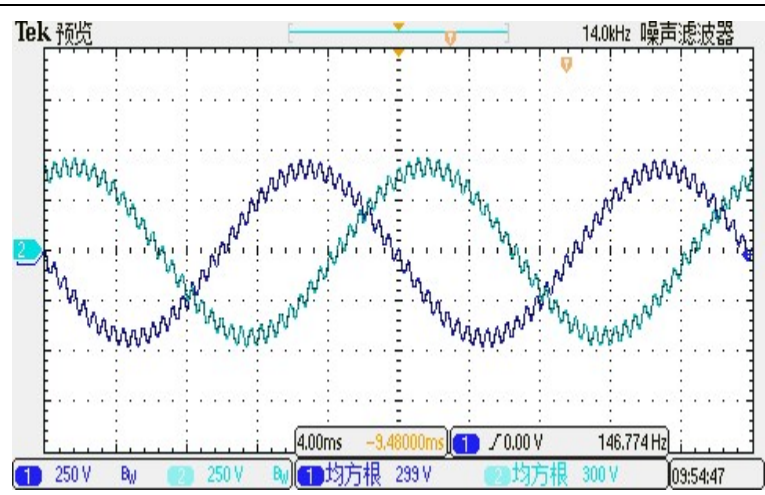




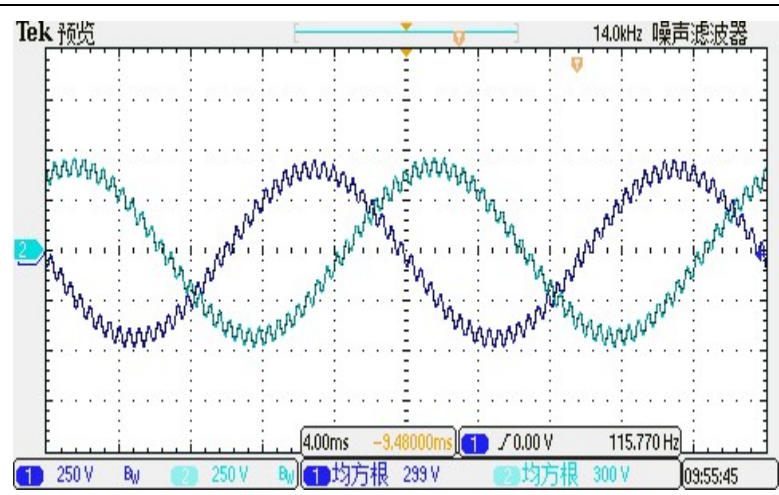
34 (AC/300V 34次谐波-10%)



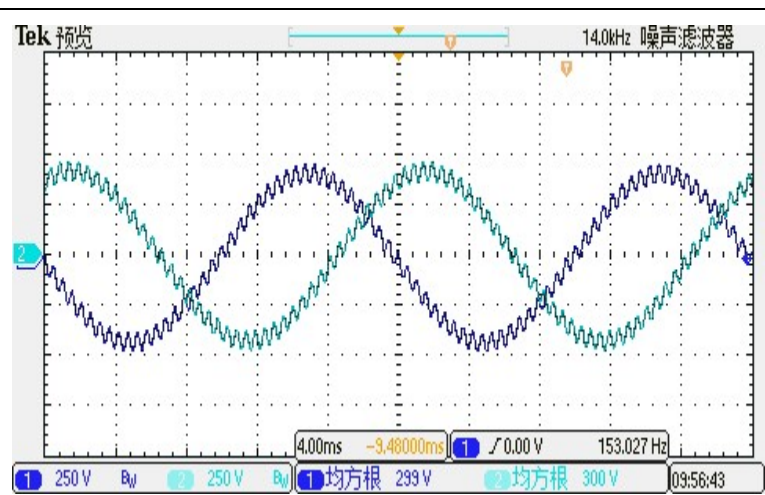
35 (AC/300V 35次谐波-10%)



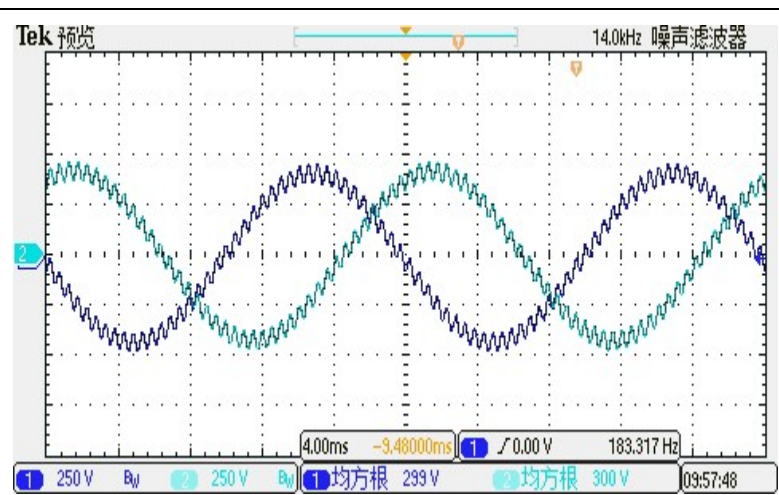
36 (AC/300V 36次谐波-10%)



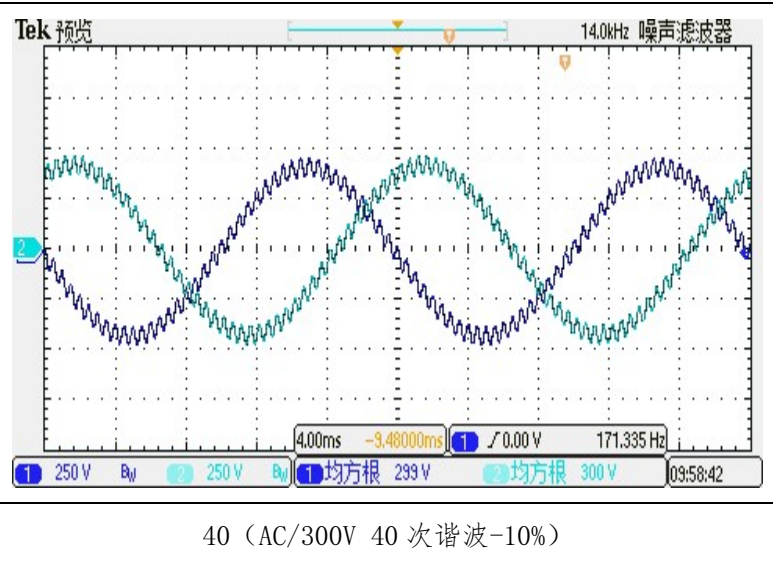
37 (AC/300V 37次谐波-10%)



38 (AC/300V 38次谐波-10%)



39 (AC/300V 39次谐波-10%)



备注：此谐波波形为 AC 300V 输出 0-40 次谐波 10%的变换波形

示波器：DPO 2002B（只有 2 通道输入）

通道①为 A 相谐波

通道②为 B 相谐波

Signature:

### 11 电压跌落/变化 Voltage Drop/Variation

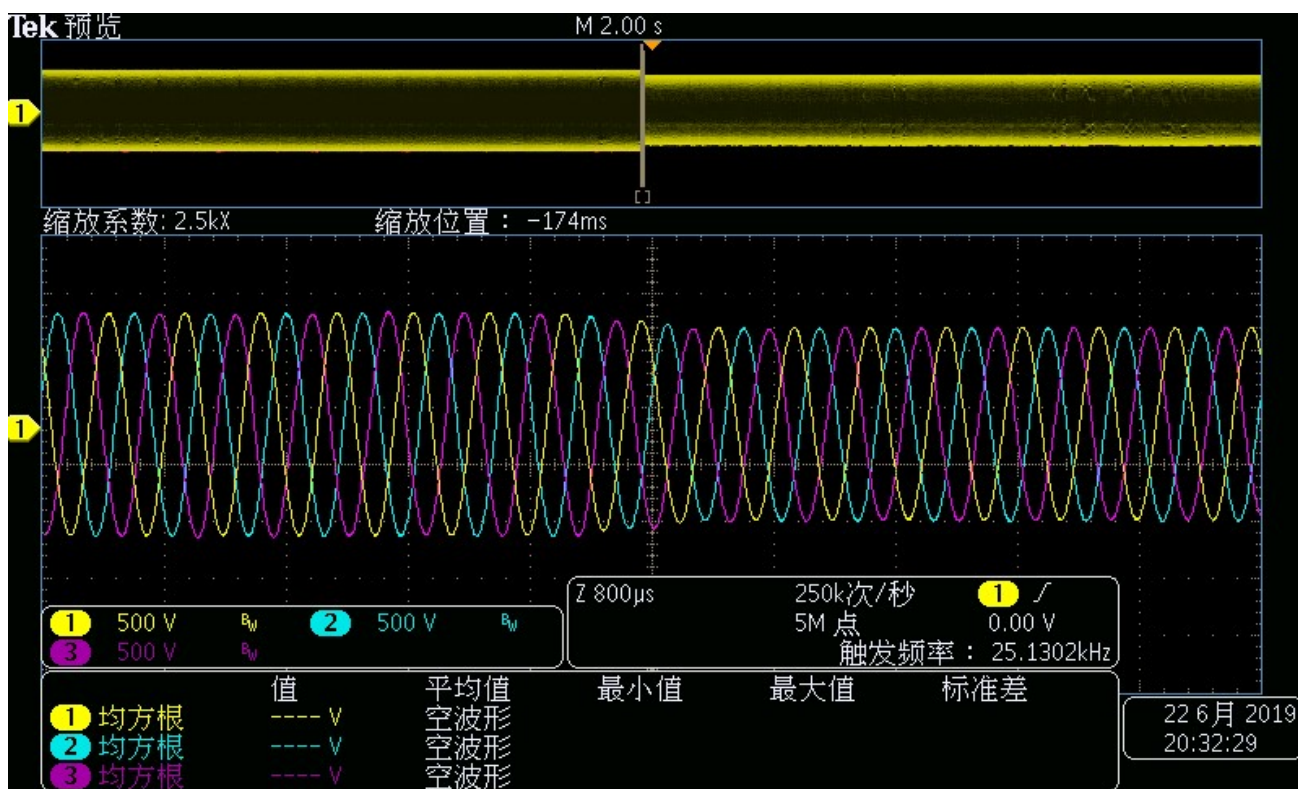
交流电源接在配电网侧，使输入电压在交流电源的工作电压范围内，输出端接负载。在序列模式中，设定每个工步的交流电源输出电压值、持续时间和变化速率，启动交流源输出，记录示波器波形。

The AC power supply is connected to the distribution network side so that the input voltage is within the rated voltage range of the AC power supply, connect the load to output terminals of power supply. In sequence mode, set the voltage/duration/rate of each step, enable the output of power, record the waveform on oscilloscopes.

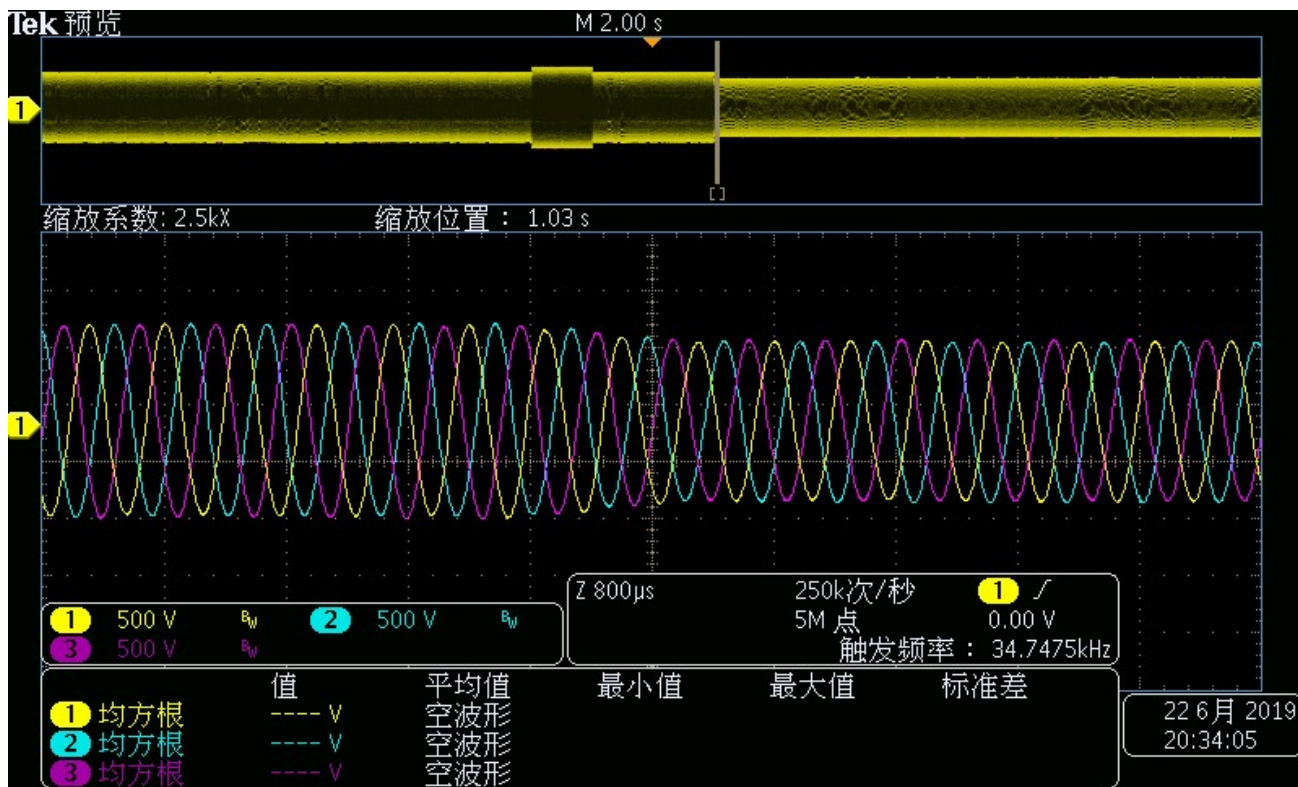
**Facilities and instruments:** resistor load, oscilloscopes (3 Sets of 75kW/7.5Ohm for phase A/B/C)

Steps	Setting					Waveform Recording
	U <sub>A</sub>	U <sub>B</sub>	U <sub>C</sub>	Duration	Rate	
1	700	700	700	5000ms	10ms	① - ⑥
2	600	600	600	5000ms	10ms	
3	500	500	500	5000ms	10ms	
4	400	400	400	5000ms	10ms	
5	300	300	300	5000ms	10ms	
6	200	200	200	5000ms	10ms	

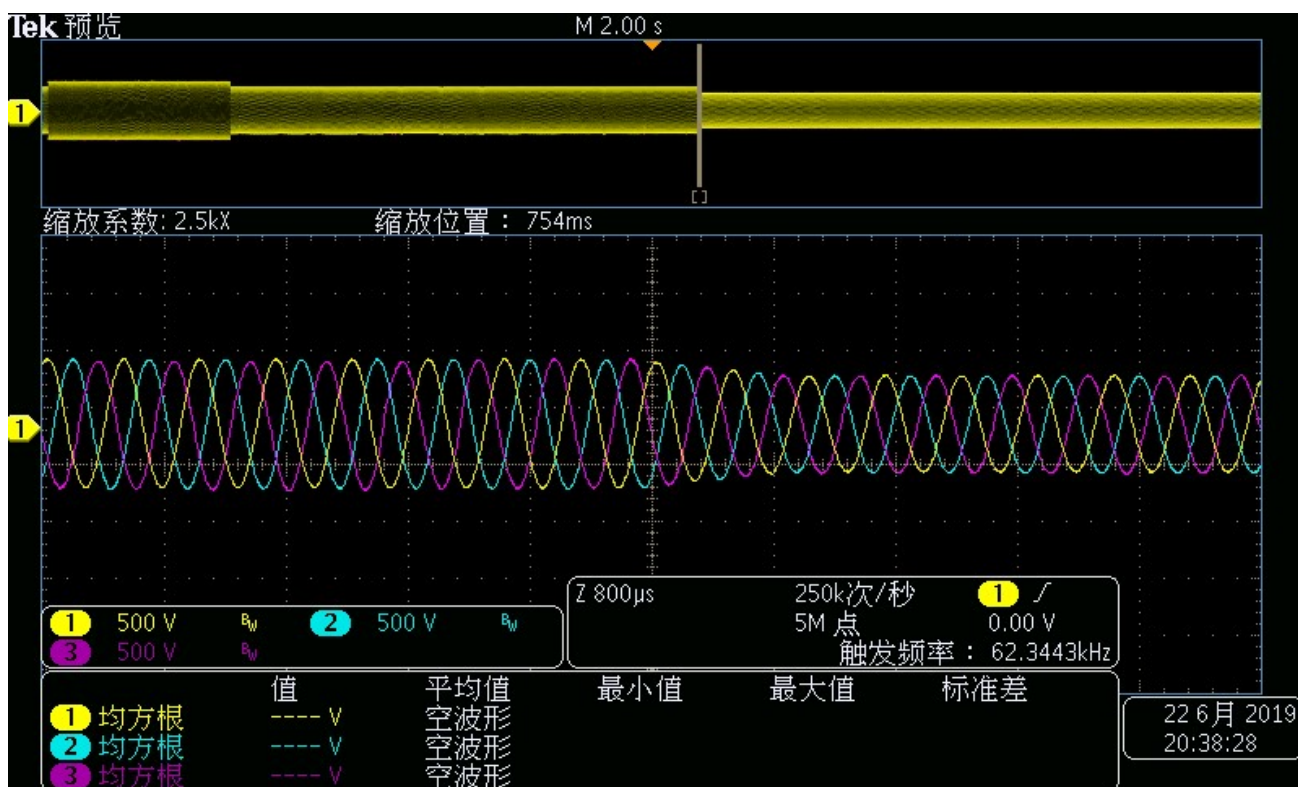
Waveform① (700V-600V)



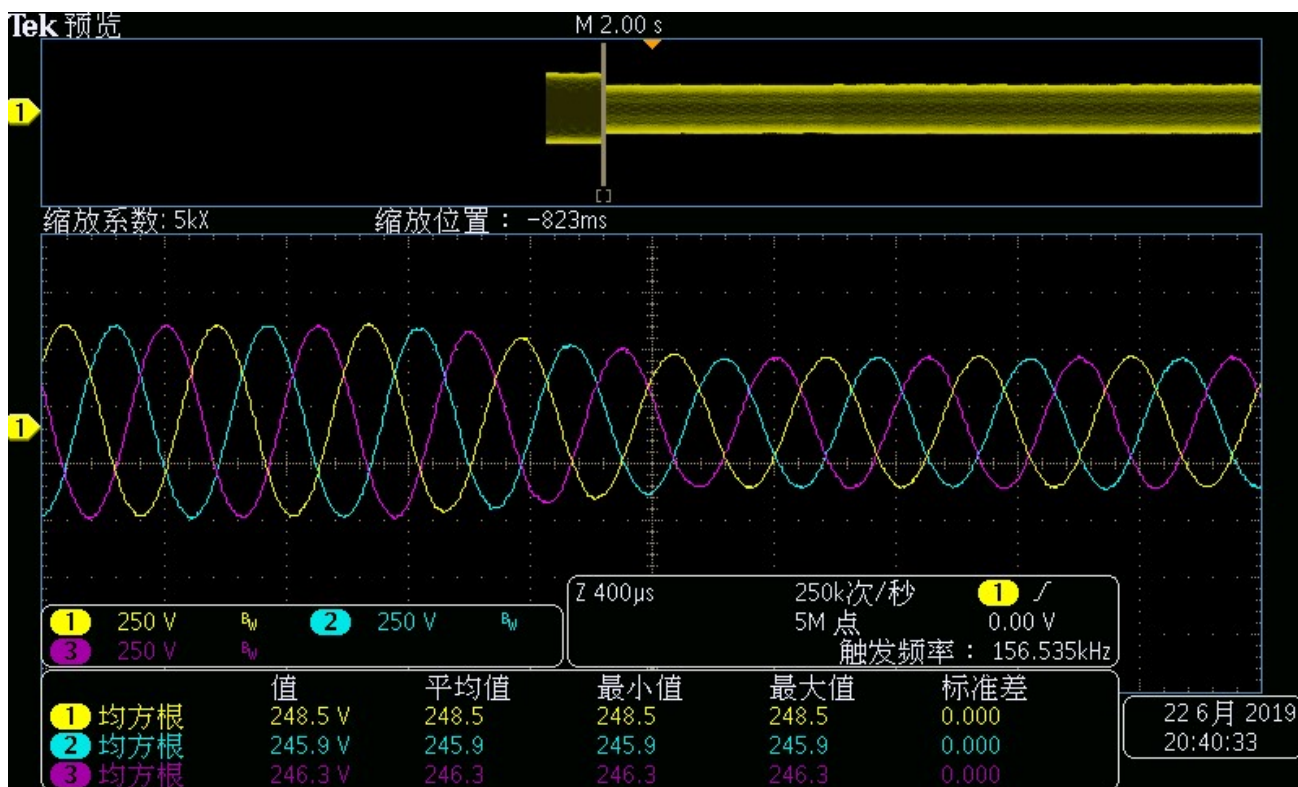
Waveform② (600V-500V)



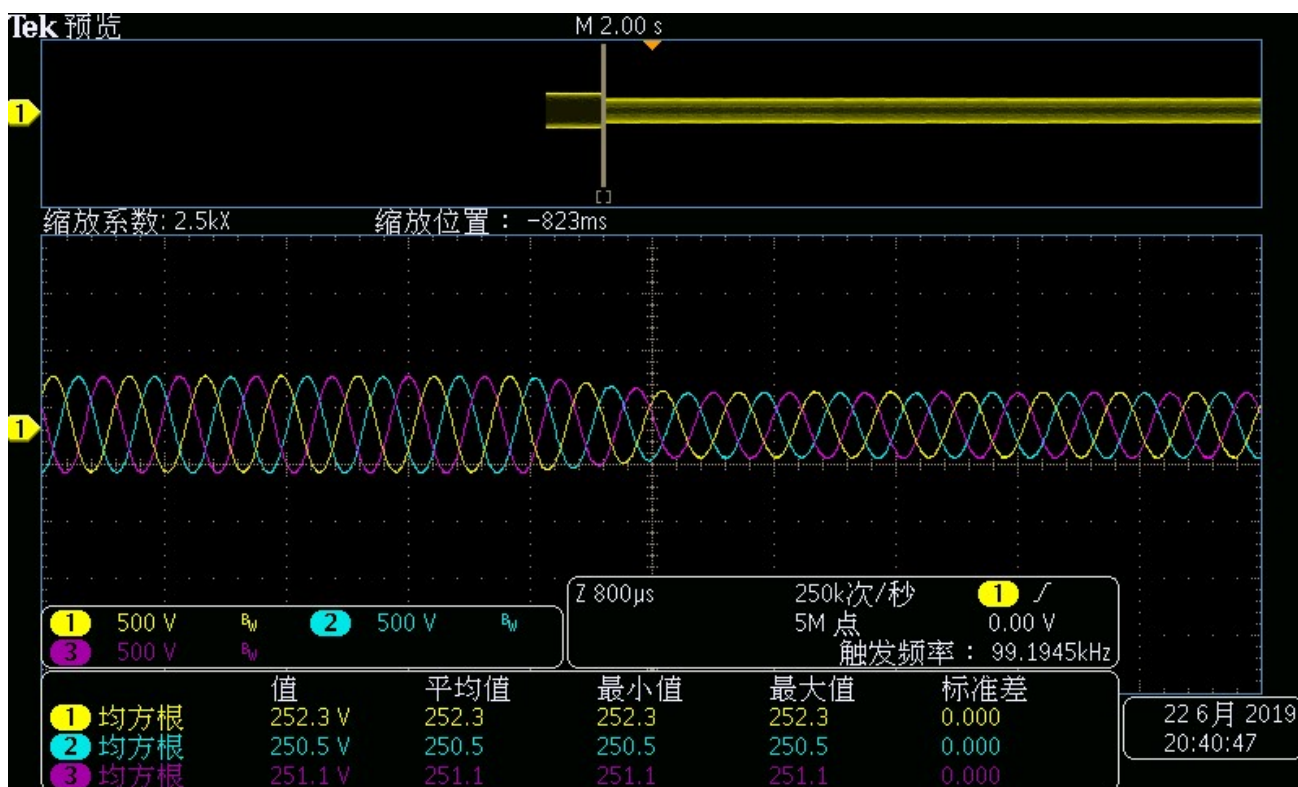
Waveform③ (500V-400V)



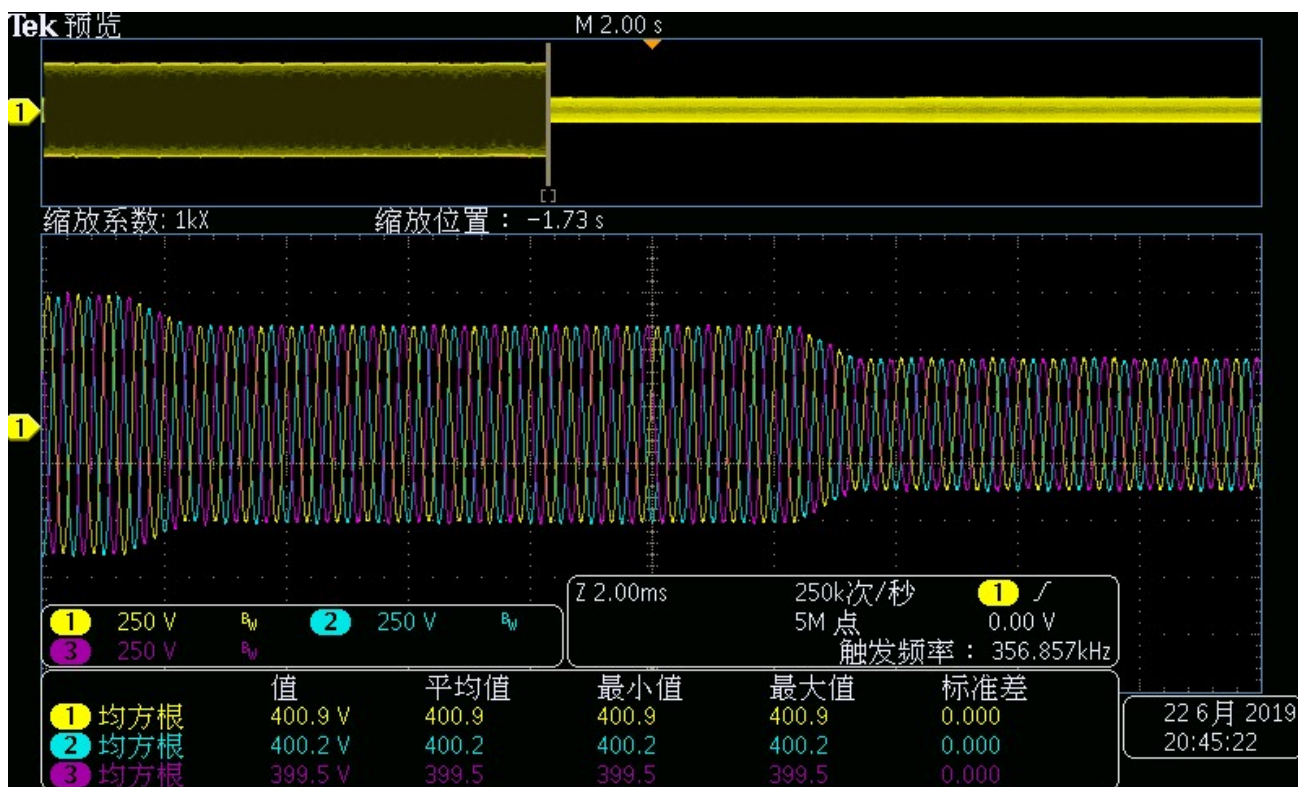
Waveform④ (400V-300V)



Waveform⑤ (300V-200V)



Waveform⑥ (500V-400V-300V)



Signature:

## 12 负载调整率/Load Regulation

交流电源接在配电网侧，使输入电压在交流电源的工作电压范围内。在规定的输出电压范围的范围内调整输出电压值，读取空载和带载时功率分析仪的输出电压显示值。取其数值进行计算，以确定其负载调整后电压精度。

其精度由下式求得：

The AC power supply is connected to the distribution network side, make sure that the input voltage is within the working voltage range of the AC power supply. Adjust the output voltage within the specified range of output voltage, and read the output voltage display value of power analyzer when no-load or on-load. The numerical value is calculated to determine the voltage accuracy after load adjustment.

Its accuracy is obtained from the following formula:

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

And:

$\delta_U$ ——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 (3 Sets of 75kW/7.5Ohm for phase A/B/C)

No.	Setting Voltage		On-load voltage (A/B/C Phases)			No-load voltage (A/B/C Phases)			Voltage Accuracy (A/B/C Phases)		
1	10% $V_{RATED}$	75	73.41	73.27	73.35	73.29	73.53	73.52	0.02%	0.03%	0.02%
2	20% $V_{RATED}$	150	148.33	147.81	148.06	148.5	148.67	148.54	0.02%	0.11%	0.06%
3	30% $V_{RATED}$	225	222.85	223.65	224.17	223.69	223.42	223.51	0.11%	0.03%	0.09%
4	40% $V_{RATED}$	300	298.19	298.95	300.05	298.68	298.63	299.09	0.07%	0.04%	0.13%
5	50% $V_{RATED}$	375	373.54	375.61	373.39	373.80	374.12	374.23	0.03%	0.20%	0.11%
6	60% $V_{RATED}$	450	448.54	448.21	450.19	449.41	449.08	449.05	0.12%	0.12%	0.15%
7	70% $V_{RATED}$	525	523.32	522.89	524.08	523.93	524.23	524.56	0.08%	0.18%	0.06%
8	80% $V_{RATED}$	600	597.95	598.59	597.38	598.91	599.82	599.91	0.13%	0.16%	0.34%
9	90% $V_{RATED}$	675	672.12	673.28	673.28	674.01	674.40	674.73	0.25%	0.15%	0.19%
10	100% $V_{RATED}$	750	747.02	748.29	749.09	748.70	749.74	749.85	0.22%	0.19%	0.10%

Signature:

## 13 馈网模式/ Feeder mode

测试系统连接示意图/ Schematic diagram of test system

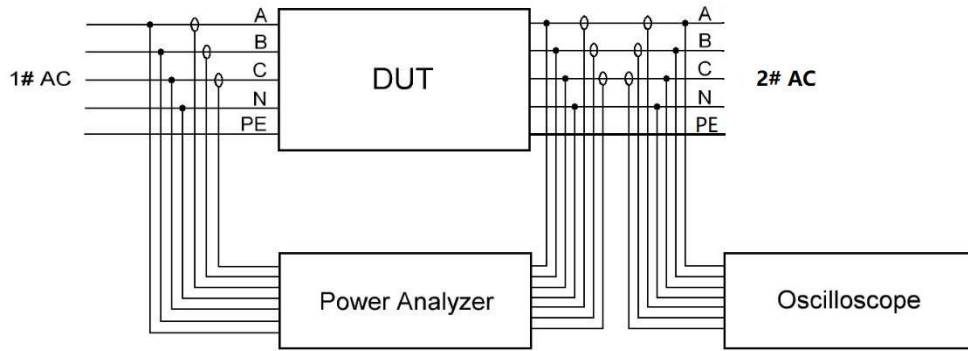


图 1

DUT: Device Under Test: 待测设备

Power Analyzer: 功率分析仪

Oscilloscope: 示波器

1#、2#: 网测配电柜开关 1,2

交流电源进线端接在配电网一侧，出线端接在配电网另一侧（如图一）。使输入电压在交流电源的工作电压范围内。指定交流电源输出电压值，读取功率分析上的各项参数值及 THD、PF 值、效率，并记录。

The input end of AC power supply is connected to one side of the distribution network, and the outlet end is connected to the other side of the distribution network (Fig. 1). The input voltage is within the rated voltage range of the AC power supply. Designated output voltage of AC power supply, record the parameters of power analysis, THD, PF, efficiency, and record.

**Facilities and instruments:** power analyzer

输入侧	Phase A	U	225.58
		I	78.06
	Phase B	U	236.18
		I	78.60
	Phase C	U	235.74
		I	74.26
$\Sigma P_1$			53.31
	Phase A	U	237.09

网测		I	97.73
	Phase B	U	235.64
		I	96.72
	Phase C	U	235.32
		I	96.79
	$\Sigma P_0$		
Efficiency			79.11%
Current THD			2.42%

Signature:

#### 14 电压纹波/Voltage Ripple

交流电源接在配电网侧，使输入电压在交流电源的工作电压范围内。控制界面给定输出电压 750V，频率 0Hz。读取示波器波形并记录。取其有效值计算纹波系数。

其纹波系数由下式求得：

The AC power supply is connected to the distribution network side so that the input voltage is within the working voltage range of the AC power supply. The output voltage of the control interface is 750V and the frequency is 0Hz. The oscilloscope waveform is read and recorded. Read the RMS to calculate the ripple coefficient.

The ripple coefficient is obtained from the following formula:

$$Y = \frac{U_{mrs}}{U_N} \times 100\% = \frac{3.28}{750} \times 100\% = 0.44\%$$

And:

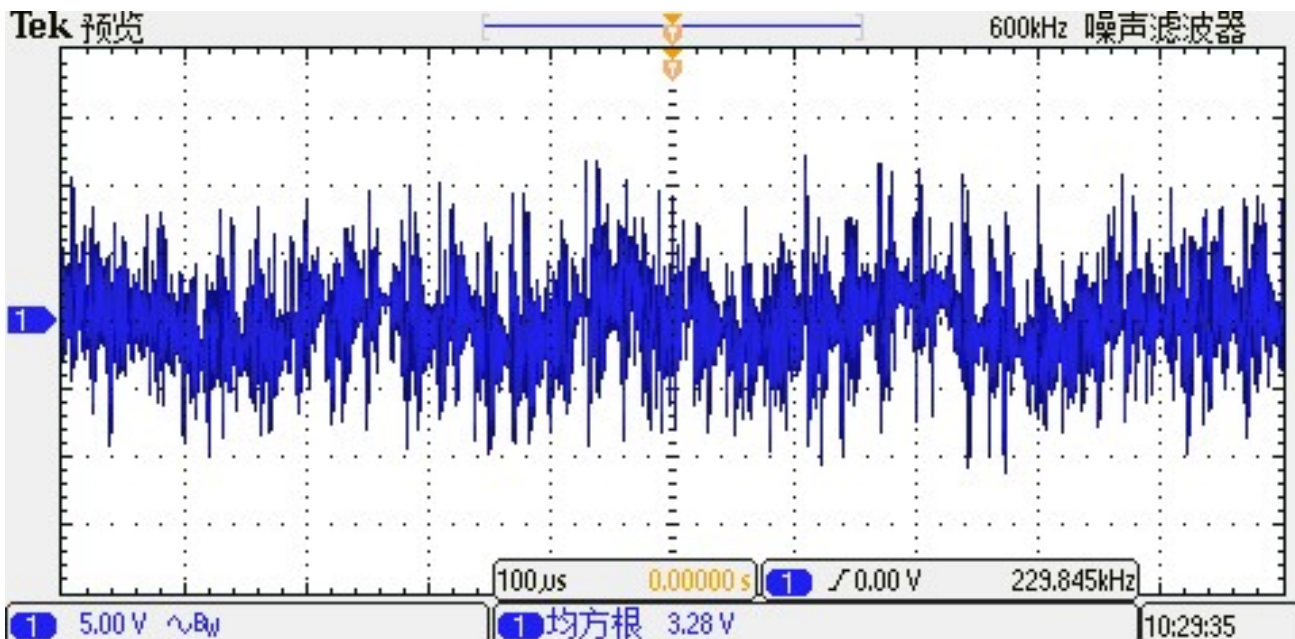
Y ——Ripple coefficient;

$U_{mrs}$  ——RMS of voltage ripple, V;

$U_N$  ——Rated Voltage, V;

示波器设置：通道耦合：AC，带宽：20MHz，探头变比：500X，噪音滤波器：600KHz，采样深度：1.00M，采样时间：100us。读取电压纹波波形如下图：





Signature:

## 15 电压 THD/Voltage THD

交流电源接在配电网侧，使输入电压在交流电源的工作电压范围内，输出端接负载。改变交流电源输出电压的设定值，频率设定值（50HZ/1000HZ/2000HZ），读取并记录功率分析上的各项电压 THD。

The AC power supply is connected to the distribution network side so that the input voltage is within the rated voltage range of the AC power supply, connect the load to output terminals of power supply. Adjust the set value of the output voltage of AC power supply, and frequency of AC power supply (50HZ/1000HZ/2000HZ), read and record all voltage THD on power analysis

**Facilities and instruments:** power analyzer, resistor load (3 Sets of 75kW/7.5Ohm for phase A/B/C)

No.	Setting Voltage		Voltage THD/50HZ (A/B/C Phases)			Voltage THD/1000HZ (A/B/C Phases)			Voltage THD/2000HZ (A/B/C Phases)		
1	10%	75	3.046%	2.942%	2.166%	3.647%	3.027%	3.269%	3.597%	3.104%	4.066%
	$V_{RATED}$										
2	20%	150	1.208%	1.065%	1.430%	2.594%	2.702%	2.409%	2.213%	2.185%	2.085%
	$V_{RATED}$										
3	30%	225	0.905%	0.962%	1.218%	1.758%	1.627%	1.664%	1.464%	1.745%	1.769%
	$V_{RATED}$										
4	40%	300	0.874%	0.920%	1.014%	1.178%	1.303%	1.470%	1.384%	1.696%	1.608%
	$V_{RATED}$										
5	50%	375	0.602%	0.522%	0.849%	1.103%	1.026%	1.115%	1.845%	1.741%	1.838%
	$V_{RATED}$										
6	60%	450	0.477%	0.429%	0.620%	1.099%	0.799%	1.010%	1.146%	1.332%	1.924%
	$V_{RATED}$										

	V <sub>RATED</sub>										
7	70%	525	0.429%	0.341%	0.526%	1.075%	0.715%	0.925%	1.277%	0.773%	0.797%
	V <sub>RATED</sub>										
8	80%	600	0.422%	0.279%	0.356%	0.919%	0.659%	0.968%	1.029%	1.256%	0.738%
	V <sub>RATED</sub>										
9	90%	675	0.360%	0.232%	0.347%	0.908%	0.793%	0.790%	1.918%	0.865%	1.018%
	V <sub>RATED</sub>										
10	100%	750	0.269%	0.306%	0.359%	0.854%	0.570%	0.993%	1.470%	1.637%	1.299%
	V <sub>RATED</sub>										

Signature:

## 16 输入冲击电流/Input Inrush Current

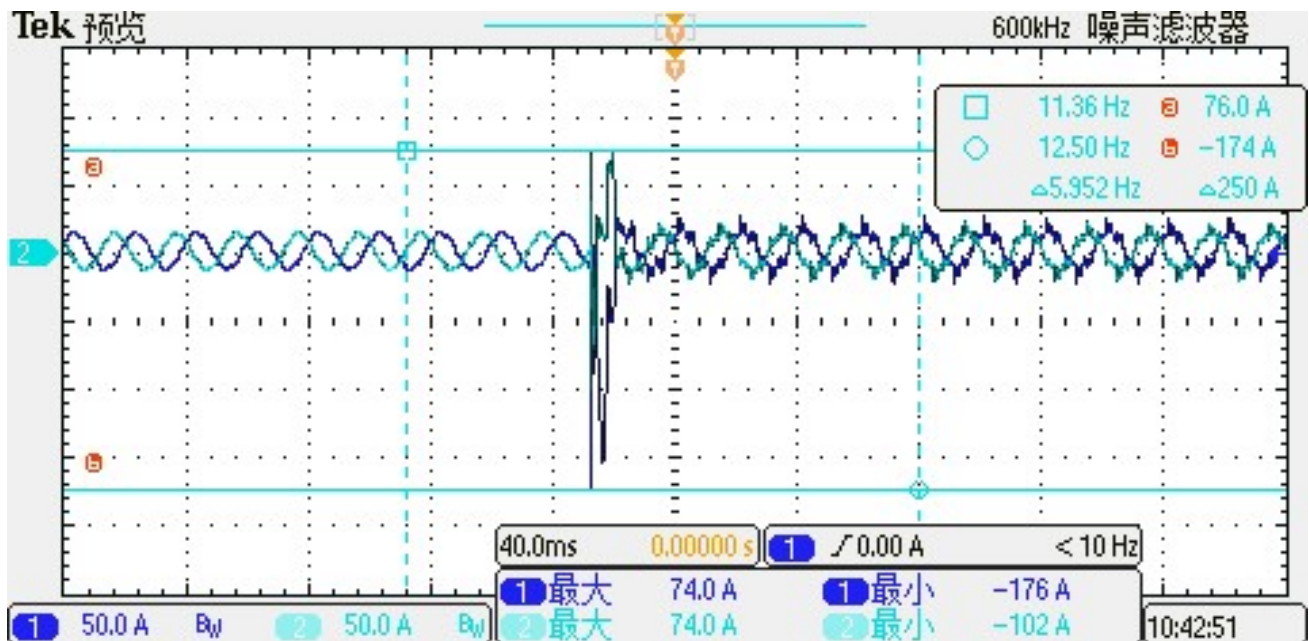
交流电源接在配电网侧，使输入电压在交流电源的工作电压范围内。输入启动，读取并记录输入启动瞬间示波器波形。

The AC power supply is connected to the distribution network side so that the input voltage is within the working voltage range of the AC power supply. Input start, read and record the oscilloscope waveform at the moment of input start.

示波器设置: 通道耦合: DC, 带宽: 20MHz, 探头变比: 1X(100A RANGE:10MV/A), 噪音滤波器: 600KHz, 采样深度: 1.25M, 采样时间: 40ms。

读取电流波形如下图 (通道一为 A 相电流, 通道二为 B 相电流):

Facilities and instruments: resistor load, oscilloscopes (3 Sets of 75kW/7.5Ohm for phase A/B/C)



Signature

## 17 电压上升时间/Slew Rate

交流电源接在配电网侧，使输入电压在交流电源的工作电压范围内。带电阻负载，改变输出电压(50-700V)和电压切换时间(1ms)，读取示波器显示波形，计算并记录其切换时间内输出功率变化。

其输出功率计算由下式求得：

The AC power supply is connected to the distribution network side, make sure that the input voltage is within the working voltage range of the AC power supply. With resistive load, Changing the Output Voltage (50-700V) and Voltage Switching Time(1ms), read the oscilloscope display waveform, Calculate and record the change of output power during its switching time.

Its output power is calculated by the following formula:

$$P_1 = \frac{(U_N)^2}{R} \times 3 = \frac{25}{15.75} \times 3 = 4.76KW$$

$$P_2 = \frac{(U_N)^2}{R} \times 3 = \frac{490000}{15.75} \times 3 = 93.33KW$$

And:

$P_1$  —— Total output power of 50V;

$P_2$  —— Total output power of 700 V;

$U_N$  —— Setting Voltage Value, V;

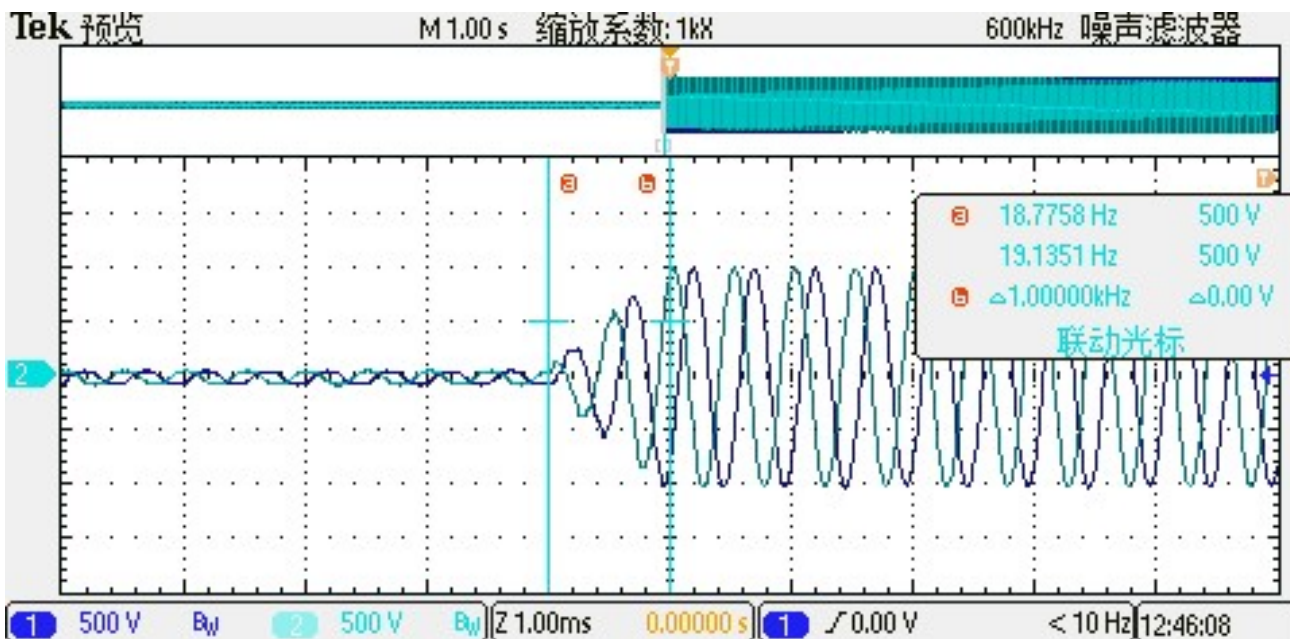
R —— 15.75Ohm for phase A/B/C,

**标注：**设定电阻负载值单项 15.75Ω，在 1ms 切换时差内电压由 50V 上升至 700V，1ms 时间内其功率变化由 4.76KW 至 99.33KW 如上公式所得，读取电压上升波形如下图（通道一为 A 相电压，通道二为 B 相电压）：

**Note:** Setting the resistance load of each phase to 15.75, the voltage rises from 50V to 700V in 1ms switching time difference, and the power changes from 4.76KW to 99.33KW in 1ms switching time difference. Read the voltage rise waveform as follows (channel 1 is A phase voltage, channel 2 is B phase voltage):

**示波器设置：**通道耦合：DC，带宽：20MHz，探头变比：500X，噪音滤波器：600KHz，采样深度：1.25M，采样时间：1ms。

**Facilities and instruments:** resistor load, oscilloscopes (3 Sets of 75kW/7.5Ohm for phase A/B/C)



Signature:

### 18 阶跃载荷变化/ Step Load Change

No.	Tool Instruments	Model
1	示波器/Oscilloscope	Tektronix DPO 2002B
2	电压探头/Voltage Probe	RIGOL RP1050D
3	电流探头/Current Probe	CAT III 600V/1000A
4	断路器/Circuit breaker	Schneider C4A
5	交流接触器/ AC contactor	CHNT NC2-150

#### 测试系统连接示意图/ Schematic diagram of test system

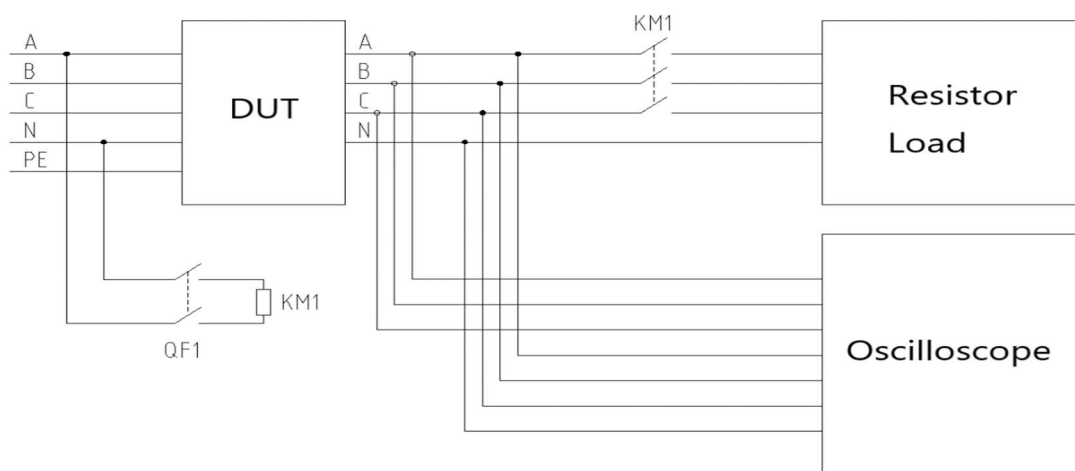


图 2 使用阻性负载测试/ Figure 1 Testing with Resistive Load

DUT: Device Under Test, 待测设备

Resistor Load: 阻性负载

Oscilloscope: 示波器

KM1 (AC contactor):交流接触器

QF1 (Circuit breaker):断路器

交流电源接在配电网侧，使输入电压在交流电源的工作电压范围内，输出端经过交流接触器到负载。当交流电源输出至 600V 时，控制交流接触器吸合或断开，记录示波器波形。

其输出功率计算由下式求得

The AC power supply is connected to the distribution network side, so that the input voltage is within the working voltage range of the AC power supply, and the output is connected to the load through the AC contactor. When the AC power is output to 600V, the AC contactor is controlled to open or close, and the oscilloscope waveform is recorded.

Its output power is calculated by the following formula:

$$P = \frac{(U_N)^2}{R} \times 3 = \frac{360000}{15.75} \times 3 = 68.57KW$$

And:

P ——Total output power of three phase;

R ——15.75Ohm for each phase (A/B/C);

$U_N$  ——Setting Voltage Value, V;

**标注:** 设定电阻负载值单项 15.75  $\Omega$ ，在交流输出为 600V 时，控制交流接触器吸合或断开，实现输出侧空载和带载状态，读取示波器波形如下图:

**Note:** Setting the resistance load value of 15.75  $\Omega$ . When the AC output is 600V, the AC contactor can be switched on or off to realize the no-load and on-load state of the output side. The oscilloscope waveform is read as follows:

**示波器设置:** 通道耦合: DC, 带宽: 20MHz, 电压探头: 500X, 电流探头:100A RANGE:10MV/A, 噪声滤波器: 600KHz, 采样深度: 1.25M, 采样时间: 400us。

Facilities and instruments: resistor load, oscilloscopes (3 Sets of 75kW/7.5Ohm for phase A/B/C)

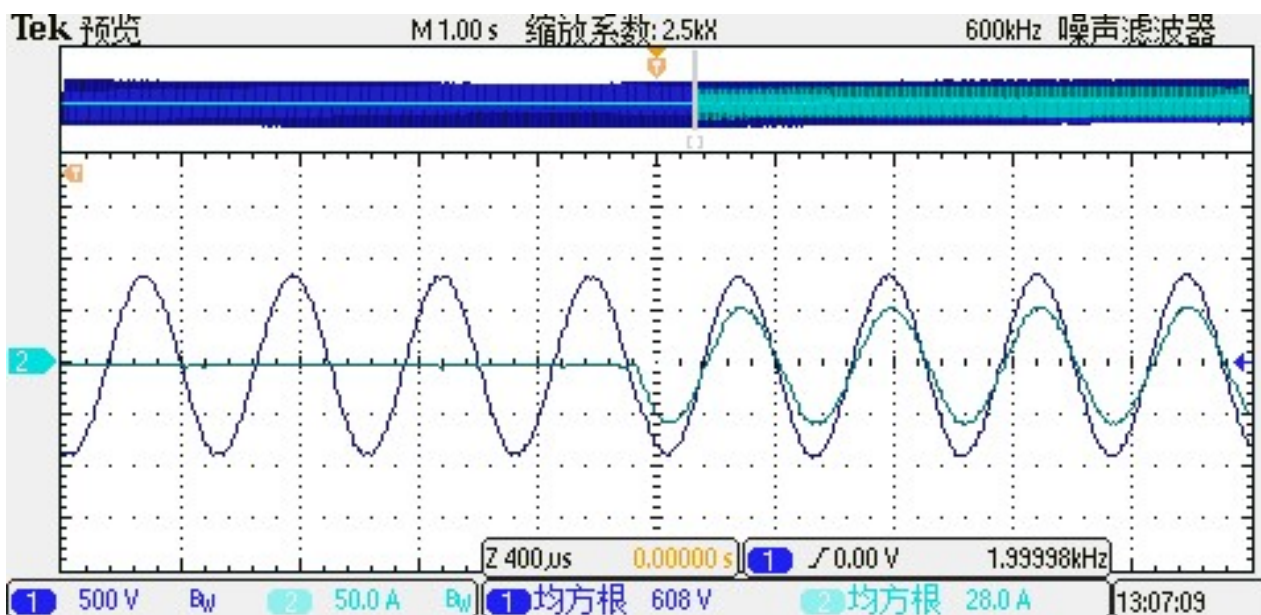


图 1-1

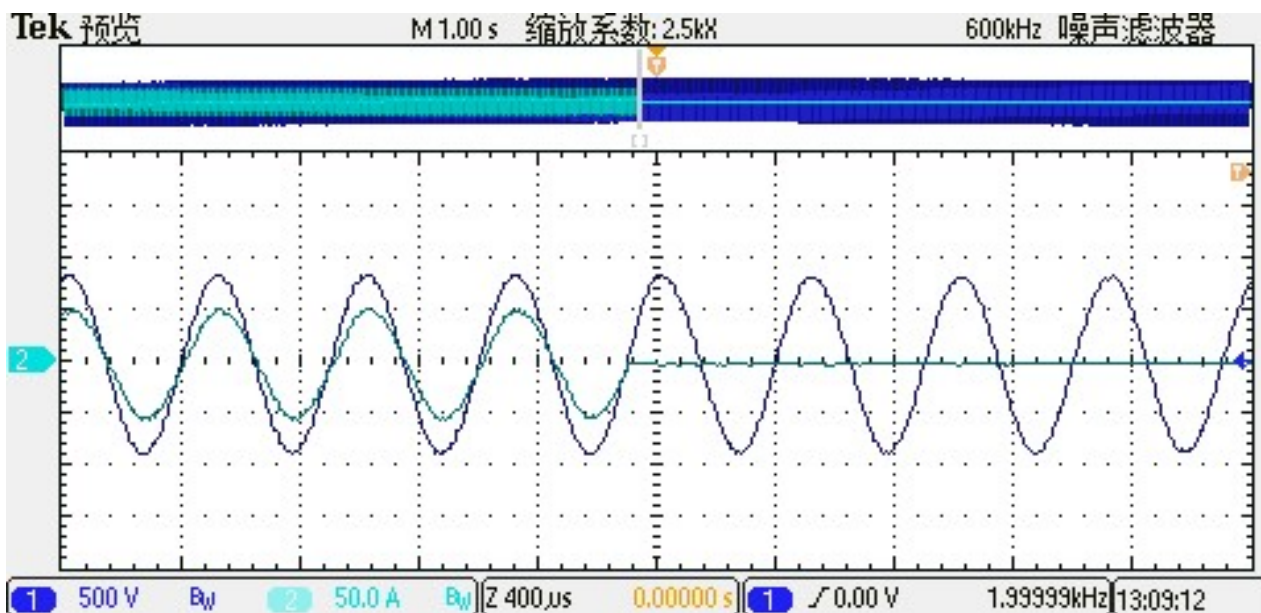


图 1-2

图 1-1: 通道 1 为 A 相电压, 通道 2 为 A 相电流。此波形为 600V 输出, 接触器吸合, 瞬时带载波形

图 1-2: 通道 1 为 A 相电压, 通道 2 为 A 相电流。此波形为 600V 输出, 接触器断开, 瞬时空载波形

Figure 1-1: Channel 1 is phase A voltage and channel 2 is phase A current. Output load increases from 0 to about 68.57KW by closing contactor.

Figure 1-2: Channel 1 is phase A voltage and channel 2 is phase A current. Output load decreases from about 68.57KW to 0 by setting contactor to open circuit.

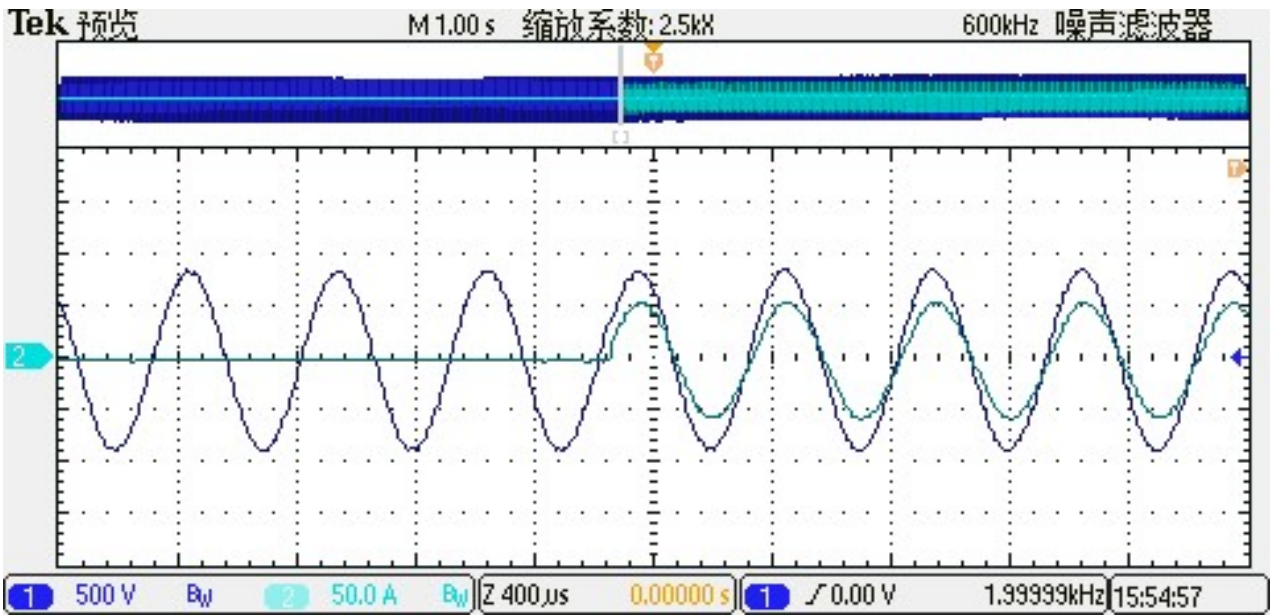


图 2-1

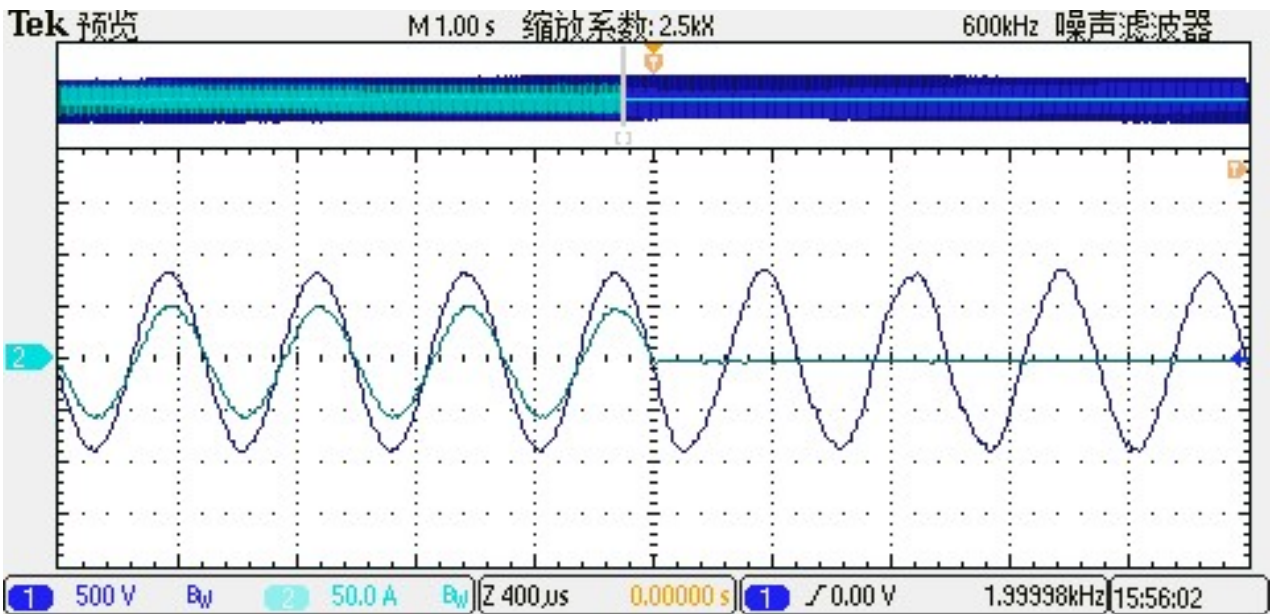


图 2-2

图 2-1: 通道 1 为 B 相电压, 通道 2 为 B 相电流。此波形为 600V 输出, 接触器吸合, 瞬时带载波形

图 2-2: 通道 1 为 B 相电压, 通道 2 为 B 相电流。此波形为 600V 输出, 接触器断开, 瞬时空载波形

Figure 2-1: Channel 1 is phase B voltage and channel 2 is phase B current. Output load increases from 0 to about 68.57KW by closing contactor.

Figure 2-2: Channel 1 is phase B voltage and channel 2 is phase B current. Output load decreases from about 68.57KW to 0 by setting contactor to open circuit.

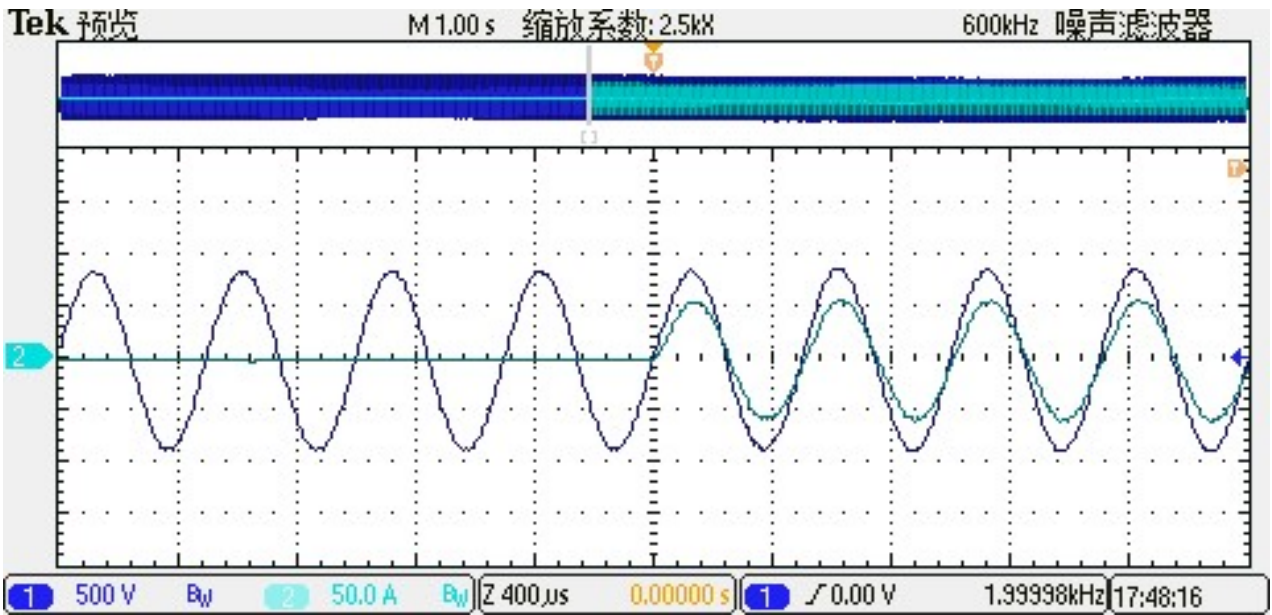


图 3-1

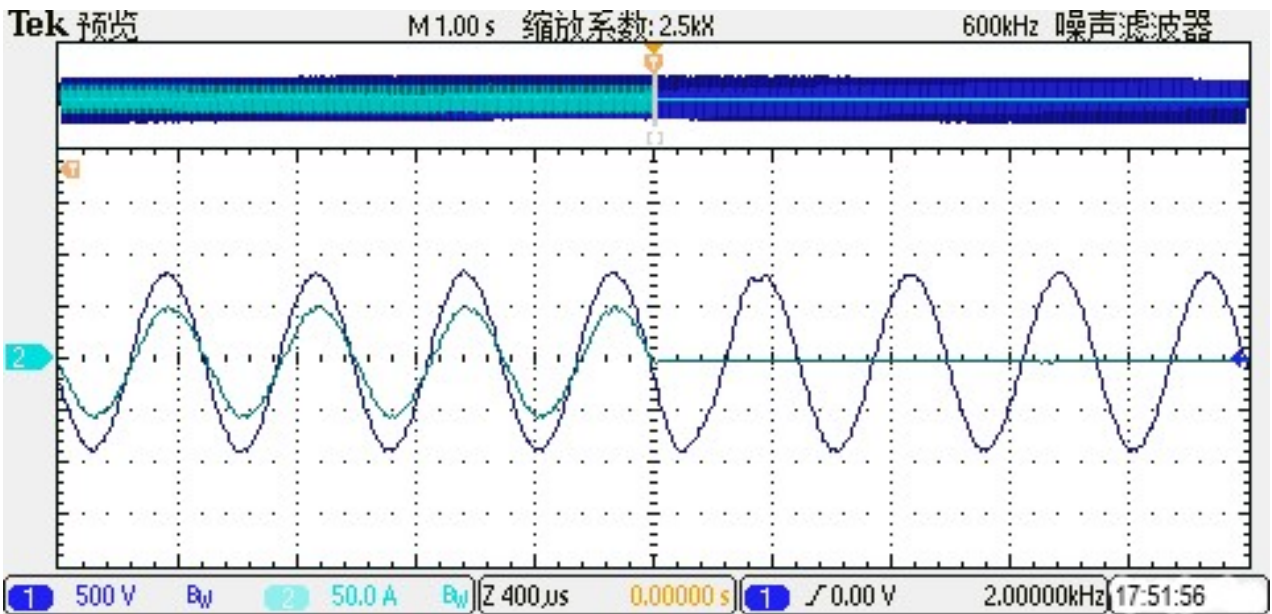


图 3-2

图 3-1: 通道 1 为 C 相电压, 通道 2 为 C 相电流。此波形为 600V 输出, 接触器吸合, 瞬时带载波形

图 3-2: 通道 1 为 C 相电压, 通道 2 为 C 相电流。此波形为 600V 输出, 接触器断开, 瞬时空载波形

Figure 3-1: Channel 1 is phase C voltage and channel 2 is phase C current. Output load increases from 0 to about 68.57KW by closing contactor.

Figure 3-2: Channel 1 is phase C voltage and channel 2 is phase C current. Output load decreases from about 68.57KW to 0 by setting contactor to open circuit.



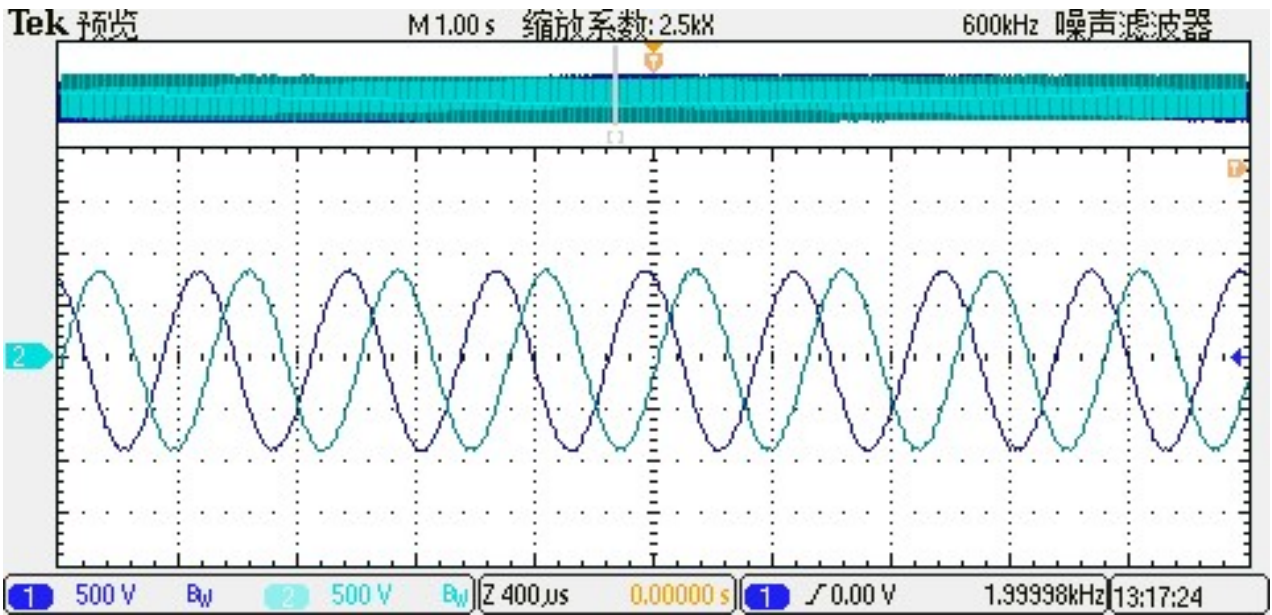


图 4-1

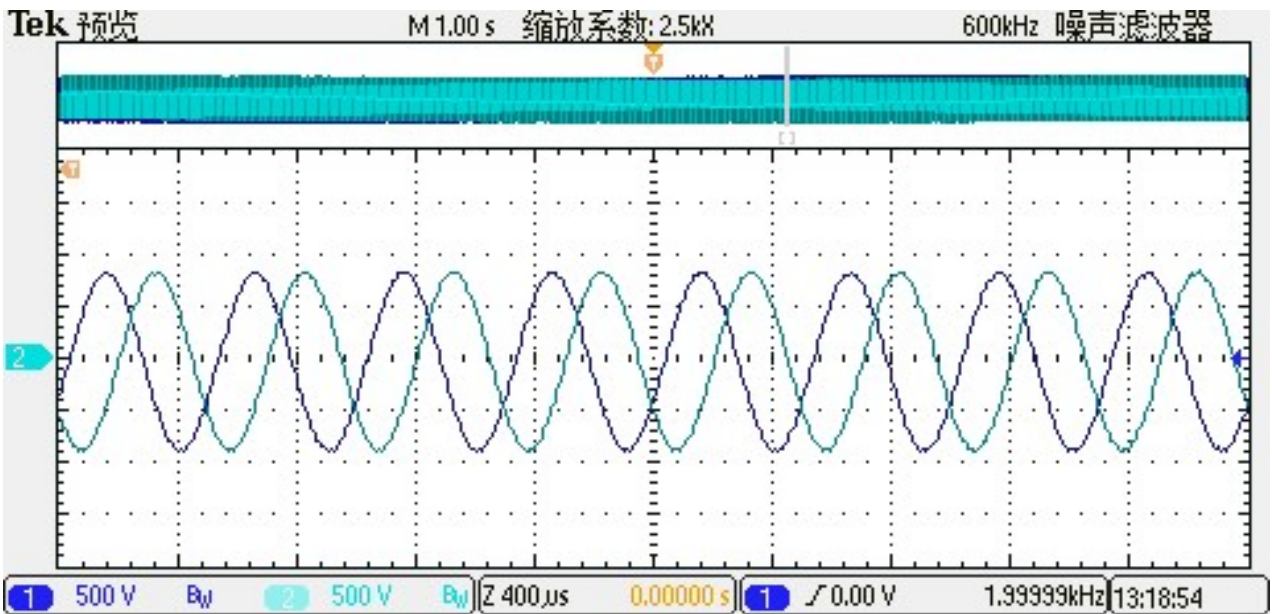


图 4-2

图 4-1: 通道 1 为 A 相电压, 通道 2 为 B 相电压。此波形为 600V 输出, 接触器吸合, 瞬时带载波形

图 4-2: 通道 1 为 A 相电压, 通道 2 为 B 相电压。此波形为 600V 输出, 接触器断开, 瞬时空载波形

Figure 4-1: Channel 1 is phase A voltage and channel 2 is phase B voltage. Output load increases from 0 to about 68.57KW by closing contactor.

Figure 4-2: Channel 1 is phase A voltage and channel 2 is phase B voltage. Output load decreases from about 68.57KW to 0 by setting contactor to open circuit.

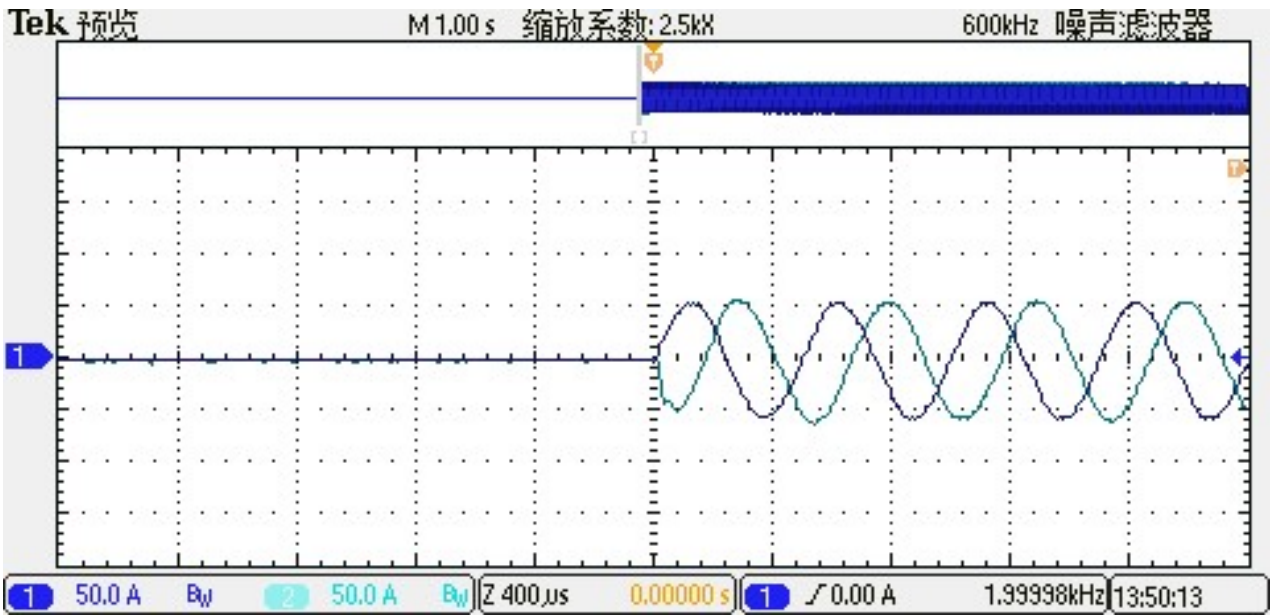


图 5-1

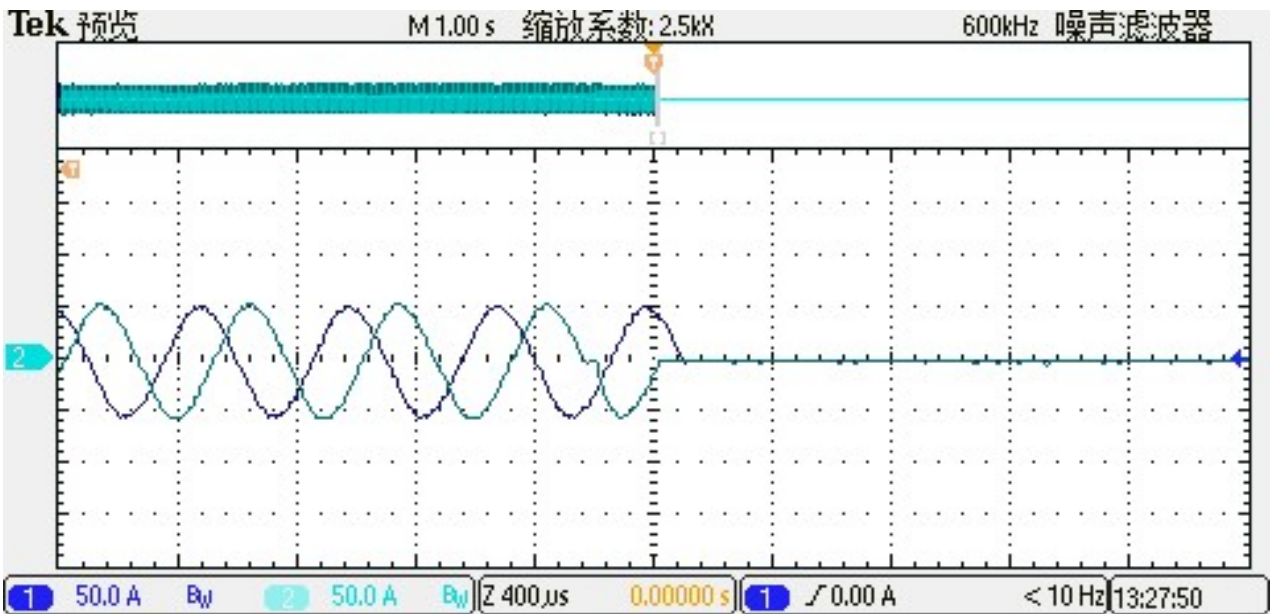


图 5-2

图 5-1: 通道 1 为 A 相电流, 通道 2 为 B 相电流。此波形为 600V 输出, 接触器吸合, 瞬时带载波形

图 5-2: 通道 1 为 A 相电流, 通道 2 为 B 相电流。此波形为 600V 输出, 接触器断开, 瞬时空载波形

Fig. 5-1: Channel 1 is phase A current and channel 2 is phase B current. Output load increases from 0 to about 68.57KW by closing contactor.

Fig. 5-2: Channel 1 is phase A current and channel 2 is phase B current. Output load decreases from about 68.57KW to 0 by setting contactor to open circuit.

Signature:

## 19 保护功能/Protections

Facilities and instruments: power analyzer, resistor load (3 Sets of 75kW/7.5Ohm for phase A/B/C)

No.	Test Items	Confirmation (√ or ×)
1	将输出电压调到电源所规定的额定电压以上，电源应能限制电压输出。 If the output voltage is set above the rated voltage specified by the power supply, the power supply should be able to limit the voltage output.	
2	将输入电压调到电源所规定的额定电压以上，主机应立即切断输出，并报警 If the input voltage is set above the rated voltage specified by the power supply, the power supply should cut off the input immediately and give an alarm.	
3	调整负载或输出电压，使输出电流为额定值的 1.2 倍，电源应能持续输出 60s Adjust the load or output voltage so that the output current is 1.2 times the rated value, and the power supply should be able to output continuously for 60 seconds.	
4	调整负载或输出电压，使输出电流大于额定值的 1.2 倍，电源应能立即启动保护，切断输出 Adjust the load or output voltage so that the output current is more than 1.2 times the rated value. The power supply should be able to start protection immediately and cut off the output.	
5	调整软件程序温度设定值，当前测量温度大于软件设定温度 10% 时，主机立即切断输出，并报警 Adjust the temperature setting value of the software program. When the current measuring temperature is more than 10% of the software setting temperature, the host immediately cuts off the output and alarms.	

Signature:

## 20 日志功能/Log Function

进入设置界面可以查看日志记录，并在出厂前清除日志记录。

Enter the settings interface to view log records and clear them before they leave the factory.

Signature:

## 21 时钟功能/Clock Function

进入设置界面可以查看并设置当前时间，年、月、日、时、分。

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

Signature:

## 22 液晶屏测试/LCD Display Test

在设置及运行状态下，液晶屏显示无闪烁、花屏现象。

In the setting and running state, there is no flicker and flower on LCD screen.

Signature:

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