



# 校准证书

## CALIBRATION CERTIFICATE

证书编号 DBB202403717  
Certificate No.

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客户名称 西安特达计量检测研究院有限公司  
Name of the Customer

联络信息 西安市高新区锦业路69号创业研发园C区18号南二层  
Contact Information

计量器具名称 电能质量分析仪  
Description

型号/规格 5000  
Model/Type

制造厂 广东铱电测控技术有限公司  
Manufacturer

出厂编号 5000240059 设备管理编号 ---  
Serial No. Equipment No.

接收日期 2024 年 03 月 26 日  
Date of Receipt Y M D

结论 见校准结果  
Conclusion Shown in the results of calibration

校准日期 2024 年 03 月 29 日  
Date of Calibration Y M D

批准 Authorized by 吴海益  
核验 Reviewed by 王晓东 王晓东  
校准 Calibrated by 叶跃华 叶跃华

证书专用章  
Stamp



扫一扫查真伪



## 说 明

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### DIRECTIONS

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1. 本中心是国家市场监督管理总局在华南地区设立的国家法定计量检定机构, 本中心的质量管理体系符合 ISO/IEC 17025:2017 标准的要求。

This laboratory is the National Legal Metrological Verification Institution in southern China set up by the State Administration for Market Regulation. The quality system is in accordance with ISO/IEC 17025:2017.

2. 本中心所出具的数据均可溯源至国家计量基准和/或国际单位制(SI)。

All data issued by this laboratory are traceable to national primary standards and/or International System of Units (SI).

3. 校准地点、环境条件:

Place and environmental conditions of the calibration:

地点 本院电磁实验室

Place (Electrics-magnetics Lab)

温度 (20~22) °C

Temperature

相对湿度 (50~60) %

R.H.

4. 本次校准的技术依据:

Reference documents for the calibration:

JJF1667-2017 工频谐波测量仪器校准规范  
Frequency

C. S. for Harmonics Analyzing Instruments at Power

5. 本次校准所使用的主要计量标准器具:

Major standards of measurement used in the calibration:

设备名称/型号规格/测量范围 Name of Equipment /Model/Type/Range	编号 Serial No.	证书号/有效期/溯源单位 Certificate No./Due Date /Traceability to	计量特性 Metrological Characteristic
谐波功率标准 Electrical Power Standard /6105A/6106A/"ACV:(0~1000)V; (0~80)A; AC Power:(0~1000)V, (0~80)A; Phase:±180°"	355771114/3406 70824/34067084 8	DCjd2023-00923 /2024-05-17 /国家计量院	ACI Harmonic: ±0.0065%; ACV Harmonic: ±0.0060%; ACV: ±0.006%; ACI: ±0.006%; AC Power: ±0.01%; Phase: ±0.003°
钳形表检定装置 Clamp Meter Calibration Device /TD1050A/ACV: (0~1000)V, ACI: (0~1000)A	101822571	DBB202306940 /2024-07-24 /本中心	ACV: ± (0.03%rdg+0.02%FS) , ACI: ± (0.03%rdg+0.02%FS)

注: 1. 本证书校准结果只与受校准仪器有关。The results relate only to the items calibrated.

Note: 2. 未经本机构书面批准, 不得部分复制此证书。This certificate shall not be reproduced except in full, without the written approval of our laboratory.

3. “委托方”、“委托方联络信息”由委托方提供, “制造厂”、“型号规格”、“出厂编号”以及“设备编号”为仪器上标注, 委托方对上面内容如有异议, 须在收到证书后二十个工作日内提出。

The information Client and Contact Information are provided by client, and the Manufacturer, Model/Type, Serial No. and Equipment No. are marked on the items. Client shall submit any objection within 20 working days after receiving the certificate for the information above.

4. 本次校准日期视为发布日期。The calibration date is the date of issue of the certificate.



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设备名称/型号规格/测量范围 Name of Equipment /Model/Type/Range	编号 Serial No.	证书号/有效期/溯源单位 Certificate No./Due Date /Traceability to	计量特性 Metrological Characteristic
多功能校准源 Multi function calibration source /5522A/ACV: (0~1000)V;ACI: (0~20)A;ACP: (0~1000)V,(0~20)A;PHASE:±1 80°	3032901	DBS202302353 /2024-04-20 /本中心	ACV:±0.012%;ACI:±0.035%; ACP:±0.08%;PHASE:±0.10°
多功能校准源(频率) Multi function calibration source /5522A/0.01Hz~2MHz	3032901	WWM202400334 /2025-03-21 /本中心	频率:±2.5×10 <sup>-6</sup> Hz Freq:±2.5×10 <sup>-6</sup> Hz

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# 校准结果

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1 外观: 符合要求  
Apparent inspection: Pass

2 交流电压: 见表1,  $f=50$  Hz  
ACV: Shown in table 1

表 1

Table 1

回路 Channel	示 值 Indication Value	实际值 Reference Value	误 差 Error	允许误差 MPE	结 论 Conclusion
	(V)	(V)	(V)	(V)	(Pass/Fail)
1	49.8	50.00	- 0.2	±0.8	Pass
	100	100.0	0	±1	Pass
	200	200.0	0	±6	Pass
	299	300.0	- 1	±7	Pass
	399	400.0	- 1	±7	Pass
2	49.7	50.00	- 0.3	±0.8	Pass
	100	100.0	0.0	±1	Pass
	200	200.0	0	±6	Pass
	299	300.0	- 1	±7	Pass
	399	400.0	- 1	±7	Pass
3	49.7	50.00	- 0.3	±0.8	Pass
	100	100.0	0	±1	Pass
	200	200.0	0	±6	Pass
	299	300.0	- 1	±7	Pass
	399	400.0	- 1	±7	Pass



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3 交流电流: 见表2,  $f=50$  Hz  
ACI: shown in table 2

表 2  
Table 2

回路	量程	示 值	实际值	误 差	允许误差	结论	
Channel	Range	Indication Value	Reference Value	Error	MPE	Conclusion	
1	1000 A	(A)	(A)	(A)	(A)	(Pass/Fail)	
		200	200.0	0	±13	Pass	
		400	400.0	0	±18	Pass	
		600	600.0	0	±23	Pass	
		800	800.0	0	±28	Pass	
		(kA)	(kA)	(kA)	(kA)		
2	1000 A	1.00	1.000	0.00	±0.11	Pass	
		(A)	(A)	(A)	(A)		
		201	200.0	+ 1	±13	Pass	
		403	400.0	+ 3	±18	Pass	
		604	600.0	+ 4	±23	Pass	
		804	800.0	+ 4	±28	Pass	
3	1000 A	(kA)	(kA)	(kA)	(kA)		
		1.00	1.000	0.00	±0.11	Pass	
		(A)	(A)	(A)	(A)		
		201	200.0	+ 1	±13	Pass	
		400	400.0	0	±18	Pass	
		600	600.0	0	±23	Pass	
		799	800.0	- 1	±28	Pass	
		(kA)	(kA)	(kA)	(kA)		
		1.00	1.000	0.00	±0.11	Pass	



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4 交流功率: 见表3,  $f=50$  Hz, PF=1  
ACP: shown in table 3

表 3  
Table 3

回路 Channel	示 值 Indication Value	实际值 Reference Value	误 差 Error	允许误差 MPE	结 论 Conclusion
	(kW)	(kW)	(kW)	(kW)	(Pass/Fail)
1	39.91	40.000	- 0.09	±1.26	Pass
	79.66	80.000	- 0.34	±2.46	Pass
	119.3	120.00	- 0.7	±4.2	Pass
	159.0	160.00	- 1.0	±5.4	Pass
	198.8	200.00	- 1.2	±6.6	Pass
2	40.32	40.000	+ 0.32	±1.26	Pass
	80.29	80.000	+ 0.29	±2.46	Pass
	120.1	120.00	+ 0.1	±4.2	Pass
	160.0	160.00	0.0	±5.4	Pass
	200.0	200.00	0.0	±6.6	Pass
3	40.03	40.000	+ 0.03	±1.26	Pass
	79.74	80.000	- 0.26	±2.46	Pass
	119.4	120.00	- 0.6	±4.2	Pass
	159.0	160.00	- 1.0	±5.4	Pass
	198.8	200.00	- 1.2	±6.6	Pass



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5 谐波电压: 见表 4

ACV Harmonic: Shown in table 4

表 4  
Table 4

回路	基波电压	谐波次数	示 值	实际值	误 差	允许误差	结论
Channel	ACV	Harmonic Order	Indication Value	Reference Value	Error	MPE	Conclusion
			(%)	(%)	(%)	(%)	(Pass/Fail)
1	100V,50Hz	2	10.0	10.00	0.0	±0.6	Pass
		3	10.0	10.00	0.0	±0.6	Pass
		4	10.0	10.00	0.0	±0.6	Pass
		5	10.0	10.00	0.0	±0.6	Pass
		6	10.0	10.00	0.0	±0.6	Pass
		7	10.0	10.00	0.0	±0.6	Pass
		8	10.0	10.00	0.0	±0.6	Pass
		9	10.0	10.00	0.0	±0.6	Pass
		10	10.0	10.00	0.0	±0.6	Pass
		20	10.0	10.00	0.0	±0.6	Pass
		30	10.0	10.00	0.0	±1.1	Pass
		40	10.0	10.00	- 0.0	±1.6	Pass
		50	10.0	10.00	- 0.0	±1.6	Pass
2	100V,50Hz	2	10.0	10.00	0.0	±0.6	Pass
		3	10.0	10.00	0.0	±0.6	Pass
		4	10.0	10.00	0.0	±0.6	Pass
		5	10.0	10.00	0.0	±0.6	Pass
		6	10.0	10.00	0.0	±0.6	Pass
		7	10.0	10.00	0.0	±0.6	Pass
		8	10.0	10.00	0.0	±0.6	Pass
		9	10.0	10.00	0.0	±0.6	Pass
		10	10.0	10.00	0.0	±0.6	Pass
		20	10.0	10.00	0.0	±0.6	Pass
		30	10.0	10.00	0.0	±1.1	Pass
		40	10.0	10.00	- 0.0	±1.6	Pass
		50	10.0	10.00	- 0.0	±1.6	Pass



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续表 4  
Table 4

回路 Channel	基波电压 ACV	谐波次数 Harmonic Order	示值 Indication Value (%)	实际值 Reference Value (%)	误差 Error (%)	允许误差 MPE (%)	结论 Conclusion (Pass/Fail)
3	100V,50Hz	2	10.0	10.00	0.0	±0.6	Pass
		3	10.0	10.00	0.0	±0.6	Pass
		4	10.0	10.00	0.0	±0.6	Pass
		5	10.0	10.00	0.0	±0.6	Pass
		6	10.0	10.00	0.0	±0.6	Pass
		7	10.0	10.00	0.0	±0.6	Pass
		8	10.0	10.00	0.0	±0.6	Pass
		9	10.0	10.00	0.0	±0.6	Pass
		10	10.0	10.00	0.0	±0.6	Pass
		20	10.0	10.00	0.0	±0.6	Pass
		30	10.0	10.00	0.0	±1.1	Pass
		40	10.0	10.00	- 0.0	±1.6	Pass
		50	10.0	10.00	- 0.0	±1.6	Pass

6 谐波电流: 见表 5  
ACI Harmonic: Shown in table 5

表 5  
Table 5

回路 Channel	基波电流 ACI	谐波次数 Harmonic Order	示值 Indication Value (%)	实际值 Reference Value (%)	误差 Error (%)	允许误差 MPE (%)	结论 Conclusion (Pass/Fail)
1	50A,50Hz	2	10.0	10.00	0.0	±0.6	Pass
		3	10.0	10.00	0.0	±0.6	Pass
		4	10.0	10.00	0.0	±0.6	Pass
		5	10.0	10.00	0.0	±0.6	Pass
		6	9.9	10.00	- 0.1	±0.6	Pass
		7	9.9	10.00	- 0.1	±0.6	Pass
		8	9.9	10.00	- 0.1	±0.6	Pass
		9	9.9	10.00	- 0.1	±0.6	Pass
		10	9.9	10.00	- 0.1	±0.6	Pass
		20	9.9	10.00	- 0.1	±0.6	Pass
		30	9.8	10.00	- 0.2	±1.1	Pass
		40	9.8	10.00	- 0.2	±1.6	Pass
		50	9.7	10.00	- 0.3	±1.6	Pass





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续表 5  
Table 5

回路	基波电流	谐波次数	示 值	实际值	误 差	允许误差	结论
Channel	ACI	Harmonic Order	Indication Value	Reference Value	Error	MPE	Conclusion
			(%)	(%)	(%)	(%)	(Pass/Fail)
2	50A,50Hz	2	10.0	10.00	0.0	±0.6	Pass
		3	10.0	10.00	0.0	±0.6	Pass
		4	10.0	10.00	0.0	±0.6	Pass
		5	10.0	10.00	0.0	±0.6	Pass
		6	10.0	10.00	0.0	±0.6	Pass
		7	9.9	10.00	- 0.1	±0.6	Pass
		8	9.9	10.00	- 0.1	±0.6	Pass
		9	9.9	10.00	- 0.1	±0.6	Pass
		10	9.9	10.00	- 0.1	±0.6	Pass
		20	9.9	10.00	- 0.1	±0.6	Pass
		30	9.8	10.00	- 0.2	±1.1	Pass
		40	9.8	10.00	- 0.2	±1.6	Pass
50	9.7	10.00	- 0.3	±1.6	Pass		
3	50A,50Hz	2	10.0	10.00	0.0	±0.6	Pass
		3	10.0	10.00	0.0	±0.6	Pass
		4	10.0	10.00	0.0	±0.6	Pass
		5	10.0	10.00	0.0	±0.6	Pass
		6	10.0	10.00	0.0	±0.6	Pass
		7	10.0	10.00	0.0	±0.6	Pass
		8	10.0	10.00	0.0	±0.6	Pass
		9	9.9	10.00	- 0.1	±0.6	Pass
		10	9.9	10.00	- 0.1	±0.6	Pass
		20	9.8	10.00	- 0.2	±0.6	Pass
		30	9.8	10.00	- 0.2	±1.1	Pass
		40	9.8	10.00	- 0.2	±1.6	Pass
50	9.7	10.00	- 0.3	±1.6	Pass		



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\*5 功率因数: 见表4,  $f=50$  Hz  
PF: Shown in table 4

表 4

Table 4

回路 Channel		示 值 Indication Value	实际值 Reference Value	误 差 Error	允许误差 MPE	结论 Conclusion
		( $\cos\phi$ )	( $\cos\phi$ )	( $\cos\phi$ )	( $\cos\phi$ )	(Pass/Fail)
1	L	0.509	0.5000	+ 0.009	$\pm 0.038$	Pass
		0.867	0.8660	+ 0.001	$\pm 0.043$	Pass
		1.000	1.0000	0.000	$\pm 0.045$	Pass
		0.856	0.8660	- 0.010	$\pm 0.043$	Pass
	C	0.487	0.5000	- 0.013	$\pm 0.038$	Pass
2	L	0.501	0.5000	+ 0.001	$\pm 0.038$	Pass
		0.864	0.8660	- 0.002	$\pm 0.043$	Pass
		1.000	1.0000	0.000	$\pm 0.045$	Pass
		0.862	0.8660	- 0.004	$\pm 0.043$	Pass
	C	0.498	0.5000	- 0.002	$\pm 0.038$	Pass
3	L	0.510	0.5000	+ 0.010	$\pm 0.038$	Pass
		0.868	0.8660	+ 0.002	$\pm 0.043$	Pass
		1.000	1.0000	0.000	$\pm 0.045$	Pass
		0.857	0.8660	- 0.009	$\pm 0.043$	Pass
	C	0.488	0.5000	- 0.012	$\pm 0.038$	Pass

说明:

Note:

1.带“\*”号项目“功率因数”不在CNAS认可范围内,依据国家计量校准规范JJF1491-2014《数字式交流电参数测量仪》。

2.测量结果的扩展不确定度:

Expanded uncertainty of measuring results:

交流电压  $U_{rel} = 0.10\%$

ACV

功率因数  $U_{rel} = 0.10\%$

PF

交流电流  $U_{rel} = 0.4\%$

ACI

谐波电压  $U_{rel} = 0.6\%$

ACV Harmonic

交流功率  $U_{rel} = 0.4\%$

AC Power

谐波电流  $U_{rel} = 0.6\%$

ACI Harmonic

包含因子  $k=2$

Coverage factor



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本证书中给出的扩展不确定度依据JJF1059.1-2012《测量不确定度评定与表示》评定，由合成标准不确定度乘以包含概率约为95%时对应的包含因子 $k$ 得到。

The expanded uncertainty given in this certificate is evaluated in accordance with JJF 1059.1-2012 "Evaluation and Expression of Uncertainty in Measurement", which is obtained by multiplying the combined standard uncertainty by the coverage factor  $k$  corresponding to the coverage probability of about 95%.

3. 校准结果符合性判定依据JJF1094-2002《测量仪器特性评定》5.3.1和仪器说明书技术要求。

Decision rule of conformity is in JJF1094-2002 "Evaluation of the Characteristics of Measuring Instruments" (5.3.1) and technical requirements in the manual.

4. 按照所依据技术文件的规定，建议复校时间间隔不超过1年。更换重要部件、维修或对仪器性能有怀疑时，应及时校准。

According to the demand of reference document, next calibration is proposed within 1 year. In case of replacement of important parts, maintenance or doubt on the performance of the instrument, it shall be calibrated in time.