

Certificate of Calibration

Customer: TEST COMPANY
100 PRODUCTION LANES
ANYWHERE, OH, 29161S

P.O. Number:

ID Number: 123456



Description: DIGITAL MULTIMETER, 6 1/2 DIGIT
Manufacturer: FLUKE
Model Number: 8845A
Serial Number: 123456
Technician: SCOTT CHAMBERLAIN
On-Site Calibration: **
Comments:

Calibration Date: 07/02/2019
Calibration Due: 07/31/2020
Procedure: METCAL FLUKE 8845A
Rev: 7/28/2015
Temperature: 71 °F
Humidity: 46 % RH
As Found Condition: IN TOLERANCE
Calibration Results: IN TOLERANCE

Limiting Attribute:

This instrument has been calibrated using standards traceable to the SI units through the National Institute of Standards and Technology (NIST) or other National Metrological Institute (NMI). The method of calibration is direct comparison to a known standard, derived from natural physical constants, ratio measurements or compared to consensus standards.

Reported uncertainties are expressed as expanded uncertainty values at an approximately 95% confidence level using a coverage factor of k=2. Statements of compliance are based on test results falling within specified limits with no reduction by the uncertainty of the measurement.

TMI's Quality System is accredited to ISO/IEC 17025:2017 and ANSI/NCSL Z540-1-1994. ISO/IEC 17025:2017 is written in a language relevant to laboratory operations, meeting the principles of ISO 9001 and aligned with its pertinent requirements. This calibration complies with all the requirements of ANSI/NCSL Z540-1-1994 and TMI's Quality Manual, QM-1.

Results contained in this document relate only to the item calibrated. Calibration due dates appearing on the certificate or label are determined by the client for administrative purposes and do not imply continued conformance to specifications.

This certificate shall not be reproduced, except in full, without the written permission of Technical Maintenance, Inc.

Measurements not currently on TMI's Scope of Accreditation are identified with an asterisk.

S. COURNOYER, BRANCH MANAGER

Scott Chamberlain, QUALITY MANAGER

Calibration Standards

<u>Asset Number</u>	<u>Manufacturer</u>	<u>Model Number</u>	<u>Date Calibrated</u>	<u>Cal Due</u>
2990501	FLUKE	5730A/03	11/16/2018	11/16/2019
3279001	FLUKE	5725A	11/16/2018	11/16/2019



Technical Maintenance, Inc.

3060 VENTURE LANE, SUITE 106, MELBOURNE, FL 32934

ANSI/NCSL Z540-1-1994

Instrument Data Sheet

ID Number: 123456
 Serial Number: 123456

Test Run: FOUND-LEFT
 Date Tested: 2 July 2019

Test Results

<u>Test Description</u>	<u>True Value</u>	<u>Test Result</u>	<u>Lower Limit</u>	<u>Upper Limit</u>	<u>Units</u>	<u>Results</u>	<u>Exp Uncert</u>
IDENTIFICATION & FIRMWARE REVISION							
Name:	FLUKE						
Model:	8845A						
Serial No:	123456						
Firmware Level:	08/02/10-11:53						
FRONT PANEL OHM ZERO OFFSET VERIFICATION							
0.0000 Ohm @ 2 -Wire		0.0059	-0.2000	0.2000	Ω	Pass	1.2e-004 Ohm
0.0000 Ohm		-0.0004	-0.0040	0.0040	Ω	Pass	1.4e-004 Ohm
0.000000 kOhm		-0.000000	-0.000010	0.000010	kΩ	Pass	5.8e-004 Ohm
0.00000 kOhm		-0.000000	-0.00010	0.00010	kΩ	Pass	6.7e-003 Ohm
0.0000 kOhm		-0.0001	-0.0010	0.0010	kΩ	Pass	5.8e-002 Ohm
0.000000 MOhm		0.000000	-0.000010	0.000010	MΩ	Pass	5.8e-001 Ohm
0.00000 MOhm		0.000000	-0.00010	0.00010	MΩ	Pass	5.8e+000 Ohm
0.0000 MOhm		0.0000	-0.0100	0.0100	MΩ	Pass	5.8e+001 Ohm
FRONT PANEL DCI ZERO OFFSET VERIFICATION							
0.0000 μA		-0.0079	-0.0250	0.0250	μA	Pass	1.3e-009 A
0.000000 mA		-0.000010	-0.000050	0.000050	mA	Pass	2.2e-009 A
0.00000 mA		-0.00101	-0.00200	0.00200	mA	Pass	5.1e-008 A
0.0000 mA		-0.0009	-0.0050	0.0050	mA	Pass	2.2e-007 A
0.000 mA		-0.001	-0.020	0.020	mA	Pass	5.8e-007 A
0.000000 A		-0.000069	-0.000200	0.000200	A	Pass	1.3e-005 A
0.00000 A		-0.00010	-0.00060	0.00060	A	Pass	7.4e-006 A
0.00000 A		-0.00009	-0.00080	0.00080	A	Pass	7.4e-006 A
FRONT PANEL DCV ZERO OFFSET VERIFICATION							
0.0000 mV		0.0012	-0.0035	0.0035	mV	Pass	2.0e-007 V
0.000000 V		0.000001	-0.000007	0.000007	V	Pass	7.4e-007 V
0.00000 V		0.00000	-0.00005	0.00005	V	Pass	5.8e-006 V
0.0000 V		0.0001	-0.0006	0.0006	V	Pass	9.1e-005 V
0.000 V		0.000	-0.100	0.100	V	Pass	5.8e-004 V
REAR PANEL OHM ZERO OFFSET VERIFICATION							

Instrument Data Sheet

ID Number: 123456
Serial Number: 123456

Test Run: FOUND-LEFT
Date Tested: 24 April 2019

Test Results

<u>Test Description</u>	<u>True Value</u>	<u>Test Result</u>	<u>Lower Limit</u>	<u>Upper Limit</u>	<u>Units</u>	<u>Results</u>	<u>Exp Uncert</u>
0.0000 Ohm @ 2 -Wire		0.0053	-0.2000	0.2000	Ω	Pass	1.5e-004 Ohm
0.0000 Ohm		-0.0003	-0.0040	0.0040	Ω	Pass	9.1e-005 Ohm
0.000000 kOhm		0.000000	-0.000010	0.000010	kΩ	Pass	5.8e-004 Ohm
0.000000 kOhm		-0.000000	-0.00010	0.00010	kΩ	Pass	5.8e-003 Ohm
0.0000 kOhm		-0.0000	-0.0010	0.0010	kΩ	Pass	5.8e-002 Ohm
0.000000 MOhm		0.000000	-0.000010	0.000010	MΩ	Pass	5.8e-001 Ohm
0.000000 MOhm		0.000000	-0.00010	0.00010	MΩ	Pass	5.8e+000 Ohm
0.0000 MOhm		0.0000	-0.0100	0.0100	MΩ	Pass	5.8e+001 Ohm

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REAR PANEL DCI ZERO OFFSET VERIFICATION

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0.0000 μA		-0.0058	-0.0250	0.0250	μA	Pass	1.4e-009 A
0.000000 mA		-0.000007	-0.000050	0.000050	mA	Pass	1.6e-009 A
0.000000 mA		-0.000073	-0.00200	0.00200	mA	Pass	1.8e-007 A
0.0000 mA		-0.0007	-0.0050	0.0050	mA	Pass	1.3e-007 A
0.000 mA		-0.001	-0.020	0.020	mA	Pass	6.7e-007 A

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REAR PANEL DCV ZERO OFFSET VERIFICATION

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0.0000 mV		0.0004	-0.0035	0.0035	mV	Pass	1.4e-007 V
0.000000 V		0.000001	-0.000007	0.000007	V	Pass	7.4e-007 V
0.000000 V		0.000000	-0.00005	0.00005	V	Pass	5.8e-006 V
0.0000 V		-0.0001	-0.0006	0.0006	V	Pass	5.8e-005 V
0.000 V		0.000	-0.100	0.100	V	Pass	5.8e-004 V

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DCV GAIN ACCURACY VERIFICATION

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100.0000 mV		100.0016	99.9915	100.0085	mV	Pass	1.3e-006 V
-100.0000 mV		-99.9995	-100.0085	-99.9915	mV	Pass	1.3e-006 V
1.000000 V		1.000002	0.999953	1.000047	V	Pass	7.2e-006 V
-1.000000 V		-1.000001	-1.000047	-0.999953	V	Pass	7.2e-006 V
5.00000 V		5.00001	4.99977	5.00023	V	Pass	3.5e-005 V
-5.00000 V		-5.00001	-5.00023	-4.99977	V	Pass	3.5e-005 V
10.00000 V		10.00002	9.99960	10.00040	V	Pass	6.6e-005 V
-10.00000 V		-10.00002	-10.00040	-9.99960	V	Pass	6.5e-005 V
100.0000 V		100.0000	99.9949	100.0051	V	Pass	7.8e-004 V
-100.0000 V		-100.0001	-100.0051	-99.9949	V	Pass	7.8e-004 V
1000.000 V		1000.000	999.945	1000.055	V	Pass	9.1e-003 V
-1000.000 V		-1000.000	-1000.055	-999.945	V	Pass	9.0e-003 V

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2-WIRE OHMS ACCURACY VERIFICATION

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Instrument Data Sheet

ID Number: 123456
Serial Number: 123456

Test Run: FOUND-LEFT
Date Tested: 24 April 2019

Test Results

<u>Test Description</u>	<u>True Value</u>	<u>Test Result</u>	<u>Lower Limit</u>	<u>Upper Limit</u>	<u>Units</u>	<u>Results</u>	<u>Exp Uncert</u>
1.000000 kOhm	0.9999791	0.999955	0.999869	1.000089	kΩ	Pass	1.9e-002 Ohm
10.000000 kOhm	10.000004	9.99976	9.99890	10.00110	kΩ	Pass	1.6e-001 Ohm
100.000000 kOhm	100.00033	99.9982	99.9893	100.0113	kΩ	Pass	1.1e+000 Ohm
1.000000 MOhm	0.9999661	0.999948	0.999856	1.000076	MΩ	Pass	2.1e+001 Ohm
10.000000 MOhm	9.997962	9.99921	9.99386	10.00206	MΩ	Pass	4.2e+002 Ohm
100.000000 MOhm	99.89269	100.0046	99.0836	100.7018	MΩ	Pass	1.0e+004 Ohm

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4-WIRE OHMS ACCURACY VERIFICATION

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100.0000 Ohm	100.00061	99.9971	99.9866	100.0146	Ω	Pass	1.6e-003 Ohm
1.000000 kOhm	0.9999791	0.999954	0.999869	1.000089	kΩ	Pass	1.2e-002 Ohm
10.000000 kOhm	10.000004	9.99979	9.99890	10.00110	kΩ	Pass	1.1e-001 Ohm
100.000000 kOhm	100.00033	99.9982	99.9893	100.0113	kΩ	Pass	1.2e+000 Ohm

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AC VOLTAGE ACCURACY VERIFICATION

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100.0000 mV @ 10 Hz		99.9960	99.9000	100.1000	mV	Pass	6.0e-005 V
100.0000 mV @ 20 kHz		99.9836	99.9000	100.1000	mV	Pass	1.6e-005 V
100.0000 mV @ 50 kHz		99.9794	99.8300	100.1700	mV	Pass	3.6e-005 V
100.0000 mV @ 100 kHz		100.0784	99.3200	100.6800	mV	Pass	9.3e-005 V
100.0000 mV @ 300 kHz		100.5074	95.5000	104.5000	mV	Pass	1.1e-004 V
1.000000 V @ 10 Hz		0.999958	0.999100	1.000900	V	Pass	5.4e-004 V
1.000000 V @ 20 kHz		0.999905	0.999100	1.000900	V	Pass	7.1e-005 V
1.000000 V @ 50 kHz		0.999954	0.998300	1.001700	V	Pass	1.2e-004 V
1.000000 V @ 100 kHz		1.001180	0.993200	1.006800	V	Pass	2.8e-004 V
1.000000 V @ 300 kHz		1.007193	0.955000	1.045000	V	Pass	4.9e-004 V
10.000000 V @ 10 Hz		9.99885	9.99100	10.00900	V	Pass	5.5e-003 V
10.000000 V @ 20 kHz		9.99917	9.99100	10.00900	V	Pass	7.1e-004 V
10.000000 V @ 50 kHz		9.99806	9.98300	10.01700	V	Pass	1.2e-003 V
10.000000 V @ 100 kHz		9.99938	9.93200	10.06800	V	Pass	2.5e-003 V
3.000000 V @ 300 kHz		3.06522	2.83000	3.17000	V	Pass	2.7e-003 V
100.000000 V @ 45 Hz		99.9894	99.9100	100.0900	V	Pass	8.7e-003 V
100.000000 V @ 20 kHz		99.9969	99.9100	100.0900	V	Pass	7.8e-003 V
100.000000 V @ 50 kHz		99.9957	99.8300	100.1700	V	Pass	2.2e-002 V
100.000000 V @ 100 kHz		100.0418	99.3200	100.6800	V	Pass	5.4e-002 V
750.000000 V @ 45 Hz		749.955	749.325	750.675	V	Pass	6.3e-002 V
750.000000 V @ 1 kHz		749.987	749.325	750.675	V	Pass	5.6e-002 V
750.000000 V @ 10 kHz		750.012	749.325	750.675	V	Pass	1.0e-001 V
320.000000 V @ 20 kHz		319.997	319.583	320.417	V	Pass	4.6e-002 V
320.000000 V @ 50 kHz		319.972	319.241	320.759	V	Pass	1.6e-001 V
320.000000 V @ 100 kHz		320.163	317.480	322.520	V	Pass	6.1e-001 V

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FREQUENCY ACCURACY VERIFICATION

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Instrument Data Sheet

ID Number: 123456
 Serial Number: 123456

Test Run: FOUND-LEFT
 Date Tested: 24 April 2019

Test Results

<u>Test Description</u>	<u>True Value</u>	<u>Test Result</u>	<u>Lower Limit</u>	<u>Upper Limit</u>	<u>Units</u>	<u>Results</u>	<u>Exp Uncert</u>
10.00000 Hz		9.99974	9.99700	10.00300	Hz	Pass	7.8e-004 Hz
40.0000 Hz		39.9987	39.9960	40.0040	Hz	Pass	3.1e-003 Hz
300.000 kHz		299.991	299.970	300.030	kHz	Pass	2.3e+001 Hz

DC CURRENT ACCURACY VERIFICATION (cont)

100.0000 μ A		100.0429	99.9250	100.0750	μ A	Pass	1.3e-008 A
-100.0000 μ A		-100.0442	-100.0750	-99.9250	μ A	Pass	1.2e-008 A
1.000000 mA		1.000426	0.999450	1.000550	mA	Pass	5.4e-008 A
-1.000000 mA		-1.000436	-1.000550	-0.999450	mA	Pass	5.4e-008 A
10.00000 mA		10.00002	9.99300	10.00700	mA	Pass	5.6e-007 A
-10.00000 mA		-10.00015	-10.00700	-9.99300	mA	Pass	5.9e-007 A
100.0000 mA		100.0000	99.9450	100.0550	mA	Pass	6.2e-006 A
-100.0000 mA		-99.9999	-100.0550	-99.9450	mA	Pass	6.2e-006 A
400.000 mA		400.000	399.780	400.220	mA	Pass	5.3e-005 A
-400.000 mA		-399.998	-400.220	-399.780	mA	Pass	5.3e-005 A

AC CURRENT ACCURACY VERIFICATION

10.00000 mA @ 1 kHz		10.00028	9.97900	10.02100	mA	Pass	1.6e-006 A
100.0000 mA @ 1 kHz		100.0002	99.8600	100.1400	mA	Pass	1.7e-005 A
400.000 mA @ 1 kHz		399.969	399.200	400.800	mA	Pass	2.6e-004 A

DC CURRENT ACCURACY VERIFICATION (cont)

1.000000 A		0.999829	0.999300	1.000700	A	Pass	9.8e-005 A
-1.000000 A		-1.000264	-1.000700	-0.999300	A	Pass	9.8e-005 A
1.90000 A		1.90009	1.89750	1.90250	A	Pass	2.2e-004 A
-1.90000 A		-1.90038	-1.90250	-1.89750	A	Pass	2.2e-004 A

AC CURRENT ACCURACY VERIFICATION (cont)

1.000000 A @ 1 kHz		1.000055	0.998600	1.001400	A	Pass	6.1e-004 A
1.90000 A @ 1 kHz		1.90027	1.89535	1.90465	A	Pass	1.1e-003 A

DC CURRENT ACCURACY VERIFICATION (cont)

Instrument Data Sheet

ID Number: 123456
 Serial Number: 123456

Test Run: FOUND-LEFT
 Date Tested: 24 April 2019

Test Results

<u>Test Description</u>	<u>True Value</u>	<u>Test Result</u>	<u>Lower Limit</u>	<u>Upper Limit</u>	<u>Units</u>	<u>Results</u>	<u>Exp Uncert</u>
10.00000 A		10.00150	9.98420	10.01580	A	Pass	3.2e-003 A
-10.00000 A		-10.00172	-10.01580	-9.98420	A	Pass	3.2e-003 A

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AC CURRENT ACCURACY VERIFICATION (cont)

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10.00000 A @ 1 kHz	10.00198	9.97900	10.02100	A	Pass	3.7e-003 A
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***** End of Certificate *****