

Calibration Certificate

This space has been reserved for the logo of your accrediting body.

Certificate Number: 2023000001

Customer:

My First Customer
456 Poplar Avenue
Somewhere ST 50001

My Lab
6920 Seaway Blvd
Everett WA 98203
USA

Job Number		ID	sample-179
Procedure Name	179 Handheld DMM Validation	Description	True RMS Multimeter
Technician	System Administrator	Manufacturer	Fluke
Temperature	23	Model Number	179
Humidity	40	Serial Number	60690011
WO Results	Pass	Service Date	7/21/2023
Received	In Tolerance	Due Date	7/21/2023

Issuing lab certifies that the instrument described above meets or exceeds all specifications as stated in the referenced procedure (unless otherwise noted). It has been calibrated using measurement standards traceable to the SI through the National Institute of Standards and Technology (NIST), or other national measurement institutes, and meets the requirements of ISO/IEC 17025:2019.

The quality system is registered to ISO 9001:2015.

This calibration is a direct comparison of the unit under test to the listed reference standards and did not involve any sampling plans to complete. No allowance has been made for the instability of the test device due to use, time, etc. Such allowances would be made by the customer as needed.

The uncertainties were computed in accordance with the ISO Guide to the Expression of Uncertainty in Measurement (GUM). A coverage factor of approximately 2 sigma (k=2) has been applied to the standard uncertainty to express the expanded uncertainty at approximately 95% confidence level.

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Standards Used			
Description	Service Date	Due Date	ID
Calibrator	4/28/2023	4/28/2028	SAMPLE-5500

Fluke 179 DMM						
MET/CAL Results	Pass	In Tolerance		PC-EVT-HGKZSD2		
Test Description	True Value	Lower Limit	Test Results	Upper Limit	Status	TSR
AC Volts Test						
300.0 mV @ 45 Hz	300.00 mV	296.7 mV	299.9 mV	303.3 mV	Pass	19.41
500.0 mV @ 500 Hz	500.00 mV	494.7 mV	499.1 mV	505.3 mV	Pass	25.24
500.0 mV @ 1 kHz	500.00 mV	489.7 mV	496.3 mV	510.3 mV	Pass	49.05
5.000 V @ 45 Hz	5.0000 V	4.947 V	4.994 V	5.053 V	Pass	20.38
5.000 V @ 500 Hz	5.0000 V	4.947 V	4.998 V	5.053 V	Pass	20.38
5.000 V @ 1 kHz	5.0000 V	4.897 V	4.959 V	5.103 V	Pass	39.62
50.00 V @ 45 Hz	50.000 V	49.47 V	49.96 V	50.53 V	Pass	16.77
50.00 V @ 500 Hz	50.000 V	49.47 V	50.13 V	50.53 V	Pass	16.77
50.00 V @ 1 kHz	50.000 V	48.97 V	50.13 V	51.03 V	Pass	32.59
300.0 V @ 45 Hz	300.00 V	296.7 V	300.0 V	303.3 V	Pass	21.07
500.0 V @ 500 Hz	500.00 V	494.7 V	501.1 V	505.3 V	Pass	16.06
500.0 V @ 1 kHz	500.00 V	489.7 V	501.0 V	510.3 V	Pass	31.21
1000 V @ 45 Hz	1000.0 V	987 V	996 V	1013 V	Pass	22.41
1000 V @ 500 Hz	1000.0 V	987 V	1003 V	1013 V	Pass	22.41
1000 V @ 1 kHz	1000.0 V	977 V	1003 V	1023 V	Pass	39.66
FREQUENCY TEST						
45.00 Hz @ 1 V	45.000 Hz	44.94 Hz	45.00 Hz	45.06 Hz	Pass	25.88
900 Hz @ 1 V	900.0 Hz	899 Hz	900 Hz	901 Hz	Pass	42.55
9 kHz @ 1 V	9.0 kHz	9 kHz	9 kHz	9 kHz	Pass	44.25
50 kHz @ 5 V	50.0 kHz	50 kHz	50 kHz	50 kHz	Pass	47.43
DV Volts Test						
30.0 mV	30.00 mV	29.8 mV	30.0 mV	30.2 mV	Pass	51.04
-300.0 mV	-300.00 mV	-300.6 mV	-300.0 mV	-299.4 mV	Pass	30.95
600.0 mV	600.00 mV	598.9 mV	600.0 mV	601.1 mV	Pass	31.43
5.000 V	5.0000 V	4.990 V	5.000 V	5.010 V	Pass	31.67
50.00 V	50.000 V	49.90 V	50.00 V	50.10 V	Pass	29.23
300.0 V	300.00 V	299.4 V	300.0 V	300.6 V	Pass	38.24
1000 V	1000.0 V	996 V	1000 V	1004 V	Pass	61.95
FREQUENCY TEST						
45 kHz @ 3 V	45.0 kHz	45 kHz	45 kHz	45 kHz	Pass	57.02
50 kHz @ 30 V	50.0 kHz	50 kHz	50 kHz	50 kHz	Pass	55.34
Resistance Test						
500.0 Ohm	500.00 Ohm	495.3 Ohm	500.0 Ohm	504.7 Ohm	Pass	44.76
5.000 kOhm	5.0000 kOhm	4.954 kOhm	5.000 kOhm	5.046 kOhm	Pass	43.81
50.00 kOhm	50.000 kOhm	49.54 kOhm	50.00 kOhm	50.46 kOhm	Pass	40.00
500.0 kOhm	500.00 kOhm	495.4 kOhm	500.0 kOhm	504.6 kOhm	Pass	35.38
5.000 MOhm	5.0000 MOhm	4.954 MOhm	4.998 MOhm	5.046 MOhm	Pass	12.96
19.00 MOhm	19.000 MOhm	18.68 MOhm	19.00 MOhm	19.32 MOhm	Pass	16.11
Result of Operator Evaluation					Pass	
Result of Operator Evaluation					Pass	
Capacitance Test						
900 nF	900.0 nF	887 nF	900 nF	913 nF	Pass	3.94
9.00 µF	9.000 µF	8.87 µF	8.98 µF	9.13 µF	Pass	3.08
90.0 µF	90.00 µF	88.7 µF	89.7 µF	91.3 µF	Pass	2.33
900 µF	900.0 µF	810 µF	898 µF	990 µF	Pass	9.68
Diode Test						
2.000 V	2.0000 V	1.978 V	1.999 V	2.022 V	Pass	209.52
Milli Amps Test						
3.00 mA @ 45 Hz	3.000 mA	2.92 mA	3.00 mA	3.08 mA	Pass	22.73
50.00 mA @ 1 kHz	50.000 mA	49.22 mA	50.05 mA	50.78 mA	Pass	10.40
400 mA @ 1 kHz	400.0 mA	394 mA	400 mA	406 mA	Pass	9.00

Test Description	True Value	Lower Limit	Test Results	Upper Limit	Status	TSR
3.00 mA	3.000 mA	2.97 mA	3.00 mA	3.03 mA	Pass	75.00
50.00 mA	50.000 mA	49.47 mA	49.98 mA	50.53 mA	Pass	63.86
-400.0 mA	-400.00 mA	-404.3 mA	-400.0 mA	-395.7 mA	Pass	26.22
Amps Test						
4.000 A @ 45 Hz	4.0000 A	3.937 A	4.002 A	4.063 A	Pass	14.32
9.00 A @ 1 kHz	9.000 A	8.84 A	9.01 A	9.16 A	Pass	5.21
4.000 A	4.0000 A	3.937 A	4.000 A	4.063 A	Pass	23.08
-9.00 A	-9.000 A	-9.16 A	-9.00 A	-8.84 A	Pass	28.80
Temperature (type K) Test						
0.0 °C	0.00 °C	-1.0 °C	0.2 °C	1.0 °C	Pass	6.25
-40 °C	-40.0 °C	-41 °C	-40 °C	-39 °C	Pass	5.78
400 °C	400.0 °C	399 °C	400 °C	401 °C	Pass	5.38

179 Handheld DMM Validation						
MET/CAL Results	Pass	FOUND_LEFT		PC-EVT-HGKZSD2		
Test Description	True Value	Lower Limit	Test Results	Upper Limit	Status	TSR

Results Run: 2.00

179 Handheld DMM Validation						
AC VOLTS	Pass	FOUND_LEFT		PC-EVT-HGKZSD2		
Test Description	True Value	Lower Limit	Test Results	Upper Limit	Status	TSR

Results Run: 3.00

AC VOLTS

600 mV Range						
300.0 mV @ 45 Hz	300.00 mV	296.7 mV	299.9 mV	303.3 mV	Pass	19.41
500.0 mV @ 500 Hz	500.00 mV	494.7 mV	498.6 mV	505.3 mV	Pass	25.24
500.0 mV @ 1 kHz	500.00 mV	489.7 mV	495.9 mV	510.3 mV	Pass	49.05
6 V Range						
5.000 V @ 45 Hz	5.0000 V	4.947 V	4.994 V	5.053 V	Pass	20.38
5.000 V @ 500 Hz	5.0000 V	4.947 V	4.992 V	5.053 V	Pass	20.38
5.000 V @ 1 kHz	5.0000 V	4.897 V	4.953 V	5.103 V	Pass	39.62
60 V Range						
50.00 V @ 45 Hz	50.000 V	49.47 V	49.97 V	50.53 V	Pass	16.77
50.00 V @ 500 Hz	50.000 V	49.47 V	50.08 V	50.53 V	Pass	16.77
50.00 V @ 1 kHz	50.000 V	48.97 V	50.08 V	51.03 V	Pass	32.59
600 V Range						
300.0 V @ 45 Hz	300.00 V	296.7 V	299.8 V	303.3 V	Pass	21.07
500.0 V @ 500 Hz	500.00 V	494.7 V	500.5 V	505.3 V	Pass	16.06
500.0 V @ 1 kHz	500.00 V	489.7 V	500.4 V	510.3 V	Pass	31.21
1000 V Range						
1000 V @ 45 Hz	1000.0 V	987 V	997 V	1013 V	Pass	22.41
1000 V @ 500 Hz	1000.0 V	987 V	1002 V	1013 V	Pass	22.41
1000 V @ 1 kHz	1000.0 V	977 V	1002 V	1023 V	Pass	39.66

AC VOLTS FREQUENCY

99.99 Hz Range						
45.00 Hz @ 1 V	45.000 Hz	44.94 Hz	45.00 Hz	45.06 Hz	Pass	25.88

Test Description	True Value	Lower Limit	Test Results	Upper Limit	Status	TSR
999.9 Hz Range						
900.0 Hz @ 1 V	900.00 Hz	899.0 Hz	900.0 Hz	901.0 Hz	Pass	42.55
9.999 kHz Range						
9.000 kHz @ 1 V	9.0000 kHz	8.990 kHz	9.000 kHz	9.010 kHz	Pass	44.25
99.99 kHz Range						
50.00 kHz @ 5 V	50.000 kHz	49.94 kHz	50.00 kHz	50.06 kHz	Pass	47.43

179 Handheld DMM Validation						
DC VOLTS	Pass		FOUND_LEFT		PC-EVT-HGKZSD2	
Test Description	True Value	Lower Limit	Test Results	Upper Limit	Status	TSR
Results Run: 4.00						
DC VOLTS						
6 V Range						
5.000 V	5.0000 V	4.994 V	4.999 V	5.006 V	Pass	21.67
60 V Range						
50.00 V	50.000 V	49.94 V	49.99 V	50.06 V	Pass	20.00
600 V Range						
300.0 V	300.00 V	299.5 V	300.1 V	300.5 V	Pass	27.65
1000 V Range						
1000 V	1000.0 V	996 V	1000 V	1004 V	Pass	61.95
-1000 V	-1000.0 V	-1004 V	-1001 V	-996 V	Pass	61.95
DC VOLTS FREQUENCY						
45.00 Hz @ 3 V	45.000 Hz	44.94 Hz	45.00 Hz	45.06 Hz	Pass	25.88
50.00 kHz @ 30 V	50.000 kHz	49.94 kHz	50.00 kHz	50.06 kHz	Pass	47.43
DC MILLIVOLTS						
30.0 mV	30.00 mV	29.8 mV	30.0 mV	30.2 mV	Pass	47.29
-300.0 mV	-300.00 mV	-300.5 mV	-299.9 mV	-299.5 mV	Pass	22.38
600.0 mV	600.00 mV	599.3 mV	599.8 mV	600.7 mV	Pass	21.14

179 Handheld DMM Validation						
RESISTANCE	Pass		FOUND_LEFT		PC-EVT-HGKZSD2	
Test Description	True Value	Lower Limit	Test Results	Upper Limit	Status	TSR
Results Run: 5.00						
RESISTANCE						
600 Ω Range						
500.0 Ohm	500.00 Ohm	495.3 Ohm	500.0 Ohm	504.7 Ohm	Pass	44.76
6 kΩ Range						
5.000 kOhm	5.0000 kOhm	4.954 kOhm	5.000 kOhm	5.046 kOhm	Pass	43.81
60 kΩ Range						
50.00 kOhm	50.000 kOhm	49.54 kOhm	50.00 kOhm	50.46 kOhm	Pass	40.00

Test Description	True Value	Lower Limit	Test Results	Upper Limit	Status	TSR
600 kΩ Range						
500.0 kOhm	500.00 kOhm	495.4 kOhm	500.1 kOhm	504.6 kOhm	Pass	35.38
6 MΩ Range						
5.000 MOhm	5.0000 MOhm	4.954 MOhm	5.000 MOhm	5.046 MOhm	Pass	12.96
50 MΩ Range						
19.00 MOhm	19.000 MOhm	18.68 MOhm	18.99 MOhm	19.32 MOhm	Pass	16.11

179 Handheld DMM Validation						
CAPACITANCE	Pass		FOUND_LEFT		PC-EVT-HGKZSD2	
Test Description	True Value	Lower Limit	Test Results	Upper Limit	Status	TSR
Results Run: 6.00						
CAPACITANCE						
1000 nF Range						
900 nF	900.0 nF	887 nF	901 nF	913 nF	Pass	3.94
10 μF Range						
9.00 μF	9.000 μF	8.87 μF	8.99 μF	9.13 μF	Pass	3.08
100 μF Range						
90.0 μF	90.00 μF	88.7 μF	89.8 μF	91.3 μF	Pass	2.33
9999 μF Range						
900 μF	900.0 μF	887 μF	898 μF	913 μF	Pass	1.38

179 Handheld DMM Validation						
CONTINUITY	Pass		FOUND_LEFT		PC-EVT-HGKZSD2	
Test Description	True Value	Lower Limit	Test Results	Upper Limit	Status	TSR
Results Run: 7.00						
CONTINUITY						
Continuity: Beeper On					Pass	
Continuity: Beeper Off					Pass	

179 Handheld DMM Validation						
DIODE	Pass		FOUND_LEFT		PC-EVT-HGKZSD2	
Test Description	True Value	Lower Limit	Test Results	Upper Limit	Status	TSR
Results Run: 8.00						
DIODE						
2.000 V	2.0000 V	1.978 V	1.999 V	2.022 V	Pass	209.52

179 Handheld DMM Validation						
CURRENT - AC MILLIAMPS	Pass		FOUND_LEFT		PC-EVT-HGKZSD2	
Test Description	True Value	Lower Limit	Test Results	Upper Limit	Status	TSR
Results Run: 9.00						
AC MILLIAMPS						
60 mA Range						
3.00 mA @ 45 Hz	3.000 mA	2.92 mA	3.01 mA	3.08 mA	Pass	22.73
50.00 mA @ 1 kHz	50.000 mA	49.22 mA	50.02 mA	50.78 mA	Pass	10.40

Test Description	True Value	Lower Limit	Test Results	Upper Limit	Status	TSR
400 mA Range						
400.0 mA @ 1 kHz	400.00 mA	393.7 mA	399.3 mA	406.3 mA	Pass	9.00

179 Handheld DMM Validation**CURRENT - AC AMPS****Pass****FOUND_LEFT****PC-EVT-HGKZSD2**

Test Description	True Value	Lower Limit	Test Results	Upper Limit	Status	TSR
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Results Run: 10.00

AC AMPS

6 A Range

4.000 A @ 45 Hz	4.0000 A	3.937 A	4.000 A	4.063 A	Pass	14.32
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10 A Range

9.00 A @ 1 kHz	9.000 A	8.56 A	9.01 A	9.44 A	Pass	13.72
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179 Handheld DMM Validation**CURRENT - DC MILLIAMPS****Pass****FOUND_LEFT****PC-EVT-HGKZSD2**

Test Description	True Value	Lower Limit	Test Results	Upper Limit	Status	TSR
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Results Run: 11.00

DC MILLIAMPS

60 mA Range

3.00 mA	3.000 mA	2.94 mA	3.00 mA	3.06 mA	Pass	136.36
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50.00 mA	50.000 mA	49.47 mA	49.97 mA	50.53 mA	Pass	63.86
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400 mA Range

-400.0 mA	-400.00 mA	-404.3 mA	-399.9 mA	-395.7 mA	Pass	26.22
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179 Handheld DMM Validation**CURRENT - DC AMPS****Pass****FOUND_LEFT****PC-EVT-HGKZSD2**

Test Description	True Value	Lower Limit	Test Results	Upper Limit	Status	TSR
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Results Run: 12.00

DC AMPS

6 A Range

4.000 A	4.0000 A	3.957 A	4.000 A	4.043 A	Pass	15.75
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10 A Range

-9.00 A	-9.000 A	-9.12 A	-9.00 A	-8.88 A	Pass	20.94
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179 Handheld DMM Validation**TEMPERATURE****Pass****FOUND_LEFT****PC-EVT-HGKZSD2**

Test Description	True Value	Lower Limit	Test Results	Upper Limit	Status	TSR
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Results Run: 13.00

TEMPERATURE

0.0 °C	0.00 °C	-1.0 °C	0.5 °C	1.0 °C	Pass	6.25
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-40.0 °C	-40.00 °C	-41.4 °C	-39.4 °C	-38.6 °C	Pass	7.78
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400.0 °C	400.00 °C	395.0 °C	400.3 °C	405.0 °C	Pass	19.23
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-- End of measurement results--

Signatory: _____
