



Certificate of Calibration

1000214651

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Customer Information

Accurate Calibration & Repair
1924 Pinnacle Drive
Aurora, IL 60504

PO #: 2020002
Reference #: 2047950Rg17025
Account #: 00317
SO #: 47950

Instrument Identification

Instrument Id: **R051089 / 02.41.002791**

Location: **R051089**

Noun: Handheld Calibrator

Model: Memocal 2000

Mfr: ERO Electronic

Serial #: 02.41.002791

Accuracy: See manufacturer's specifications

Certification Information

Reason For Service: Calibration with Data
Type Of Calibration: Accredited 17025
As Found Condition: In Tolerance
As Left Condition: Left As Found
Procedure: MFR Manual :

Technician: Appealle Bullock
Cal Date: 29 JAN 20
Cal Due: 29 APR 20
Temperature: 22.0 °C
Humidity: 33.0 %

Technician Remarks: Datasheet reflects customer specified calibration points. Calibrated per AMS 2750 E.

- No sampling plan or other procedure was used for this calibration. Measurements and information on this certificate are valid at time of calibration only and any number of factors may cause calibration to drift out of tolerance prior to calibration due date.
- The calibration results published in this certificate were obtained using equipment capable of producing results that are traceable through NIST to the International System of Units (SI).
- The expanded uncertainty of the measurement process has not exceeded 25% of the tolerance allowed for the individual characteristics measured, unless otherwise stated. The uncertainties are based on a 95% confidence level, K=2.
- (!) Designates that the expanded uncertainty of measurement does not meet the 95% confidence level.
- J.H. Metrology Co., Inc's Calibration Control System complies with applicable requirements of ANSI Z540-1-1994, ISO 9001, and ISO/IEC 17025-2005.
- The results contained herein relate only to the item calibrated. This certificate shall not be reproduced except in full, without the written approval of J.H. Metrology Co., Inc.

Approved By:

President

Date: Jan 30, 2020

Calibration Data

✓ In Tolerance ✗ Out of Tolerance

Range	Nominal	As Found	As Left	Min	Max	Uncertainty
mV Output						
-4 mV to 20 mV	-4.000	-4.00029	✓ As Found	-4.004	-3.996	0.00060 mV
	0.000	-0.00016	✓ As Found	-0.004	0.004	0.00059 mV



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✓ In Tolerance ✗ Out of Tolerance

Calibration Data

Range	Nominal	As Found		As Left	Min	Max	Uncertainty
mV Output							
	5.000	5.00058	✓	As Found	4.996	5.004	0.00060 mV
	10.000	10.00076	✓	As Found	9.996	10.004	0.00061 mV
	15.000	15.00141	✓	As Found	14.996	15.004	0.00062 mV
	20.000	20.00157	✓	As Found	19.996	20.004	0.00063 mV
-40 mV to 200 mV	-40.00	-40.00358	✓	As Found	-40.04	-39.96	0.0058 mV
	0.00	-0.00540	✓	As Found	-0.04	0.04	0.0058 mV
	50.00	50.00153	✓	As Found	49.96	50.04	0.0058 mV
	100.00	100.00625	✓	As Found	99.96	100.04	0.0059 mV
	150.00	150.00754	✓	As Found	149.96	150.04	0.0059 mV
	200.00	200.0141	✓	As Found	199.96	200.04	0.0060 mV
-400 mV to 2000 mV	-400.0	-400.0527	✓	As Found	-400.4	-399.4	0.058 mV
	0.0	-0.05458	✓	As Found	-0.4	0.4	0.058 mV
	500.0	499.9904	✓	As Found	499.6	500.4	0.058 mV
	1000.0	1000.0097	✓	As Found	999.6	1000.4	0.058 mV
	1500.0	1500.0389	✓	As Found	1499.6	1500.4	0.059 mV
	2000.0	2000.233	✓	As Found	1999.6	2000.4	0.060 mV
-4000 mV to 20000 mV	-4000	-4000.547	✓	As Found	-4005	-3995	0.58 mV
	0	-0.49611	✓	As Found	-5	5	0.58 mV
	5000	5000.332	✓	As Found	4995	5005	0.58 mV
	10000	10000.119	✓	As Found	9995	10005	0.58 mV
	15000	15000.743	✓	As Found	14995	15005	0.59 mV
	20000	20001.65	✓	As Found	19995	20005	0.61 mV
mV Measurement							
-20 mV to 20 mV	-20.000	-19.999	✓	As Found	-20.006	-19.994	0.00090 mV
	0.000	-0.001	✓	As Found	-0.006	0.006	0.00077 mV
	5.000	4.999	✓	As Found	4.994	5.006	0.00080 mV
	10.000	9.999	✓	As Found	9.994	10.006	0.00083 mV
	15.000	14.999	✓	As Found	14.994	15.006	0.00086 mV
	20.000	19.999	✓	As Found	19.994	20.006	0.00090 mV
-200 mV to 200 mV	-200.00	-199.97	✓	As Found	-200.06	-199.94	0.0063 mV
	0.00	0.00	✓	As Found	-0.06	0.06	0.0058 mV
	50.00	50.00	✓	As Found	49.94	50.06	0.0059 mV
	100.00	99.99	✓	As Found	99.94	100.06	0.0060 mV
	150.00	150.00	✓	As Found	149.94	150.06	0.0061 mV



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✓ In Tolerance ✗ Out of Tolerance

Calibration Data

Range	Nominal	As Found		As Left	Min	Max	Uncertainty
mV Measurement							
	200.00	200.00	✓	As Found	199.94	200.06	0.0063 mV
-2000 mV to 2000 mV	-2000.0	-1999.7	✓	As Found	-2000.6	-1999.4	0.060 mV
	0.0	0.0	✓	As Found	-0.6	0.6	0.058 mV
	500.0	500.0	✓	As Found	499.4	500.6	0.058 mV
	1000.0	999.9	✓	As Found	999.4	1000.6	0.059 mV
	1500.0	1500.0	✓	As Found	1499.4	1500.6	0.059 mV
	2000.0	2000.0	✓	As Found	1999.4	2000.6	0.060 mV
-20000 mV to 20000 mV	-20000	-19997	✓	As Found	-20008	-19992	0.59 mV
	0	0	✓	As Found	-8	8	0.58 mV
	5000	5000	✓	As Found	4992	5008	0.58 mV
	10000	9999	✓	As Found	9992	10008	0.58 mV
	15000	14999	✓	As Found	14992	15008	0.59 mV
	20000	20000	✓	As Found	19992	20008	0.59 mV
mA Output							
0 mA to 21 mA	0.000	-0.00002268	✓	As Found	-0.003	0.003	0.00058 mA
	1.000	0.9999956	✓	As Found	0.997	1.003	0.00058 mA
	5.000	5.000119	✓	As Found	4.997	5.003	0.00060 mA
	10.000	10.000402	✓	As Found	9.997	10.003	0.00062 mA
	15.000	15.000638	✓	As Found	14.997	15.003	0.00066 mA
	21.000	21.00065	✓	As Found	20.997	21.003	0.00072 mA
mA Measurement							
-20 mA to 20 mA	-20.000	-19.999	✓	As Found	-20.006	-19.994	0.0011 mA
	0.000	0.000	✓	As Found	-0.006	0.006	0.00058 mA
	5.000	4.999	✓	As Found	4.994	5.006	0.00063 mA
	10.000	9.998	✓	As Found	9.994	10.006	0.00074 mA
	15.000	15.000	✓	As Found	14.994	15.006	0.00087 mA
	20.000	19.999	✓	As Found	19.994	20.006	0.0011 mA
-130 mA to 130 mA	-130.00	-130.00	✓	As Found	-130.05	-129.95	0.0094 mA
	0.00	0.00	✓	As Found	-0.05	0.05	0.0058 mA
	10.00	10.00	✓	As Found	9.95	10.05	0.0058 mA
	50.00	50.00	✓	As Found	49.95	50.05	0.0067 mA
	100.00	100.00	✓	As Found	99.95	100.05	0.0082 mA
	130.00	130.01	✓	As Found	129.95	130.05	0.0094 mA



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✓ In Tolerance ✗ Out of Tolerance

Calibration Data

Range	Nominal	As Found		As Left	Min	Max	Uncertainty
RTD Pt. 100 Ohm Measurement (-200° to 850°C)							
20.68 Ohms	-195.0	-195.0	✓	As Found	-195.6	-194.4	0.058 °C
60.26 Ohms	-100.0	-100.0	✓	As Found	-100.6	-99.4	0.058 °C
100.00 Ohms	0.0	-0.1	✓	As Found	-0.6	0.6	0.058 °C
138.51 Ohms	100.0	100.0	✓	As Found	99.4	100.6	0.058 °C
280.98 Ohms	500.0	500.0	✓	As Found	499.4	500.6	0.059 °C
389.02 Ohms	845.0	845.1	✓	As Found	844.1	845.9	0.060 °C
Ohms Measurement							
0 to 800 Ohms	0.0	0.0	✓	As Found	-0.2	0.2	0.058 Ohms
	10.0	10.0	✓	As Found	9.8	10.2	0.058 Ohms
	100.0	100.0	✓	As Found	99.8	100.2	0.058 Ohms
	300.0	300.0	✓	As Found	299.8	300.2	0.058 Ohms
	500.0	500.0	✓	As Found	499.8	500.2	0.058 Ohms
	790.0	790.0	✓	As Found	789.8	790.2	0.059 Ohms
Thermocouple Measurement							
Type E -328° to 1832°F	-328.0	-327.8	✓	As Found	-329.0	-327.0	0.061 °F
	-200.0	-200.0	✓	As Found	-201.0	-199.0	0.058 °F
	0.0	0.0	✓	As Found	-1.0	1.0	0.058 °F
	32.0	32.0	✓	As Found	31.0	33.0	0.058 °F
	200.0	199.9	✓	As Found	199.0	201.0	0.058 °F
	400.0	399.9	✓	As Found	399.0	401.0	0.058 °F
	600.0	600.1	✓	As Found	599.0	601.0	0.058 °F
	800.0	800.1	✓	As Found	799.0	801.0	0.058 °F
	1000.0	1000.0	✓	As Found	999.0	1001.0	0.058 °F
	1200.0	1200.0	✓	As Found	1198.8	1201.2	0.058 °F
	1400.0	1399.8	✓	As Found	1398.6	1401.4	0.059 °F
	1600.0	1599.8	✓	As Found	1598.4	1601.6	0.059 °F
	1832.0	1832.0	✓	As Found	1830.2	1833.8	0.059 °F
Type J -328° to 2192°F	-328.0	-328.0	✓	As Found	-329.0	-327.0	0.058 °F
	-200.0	-200.0	✓	As Found	-201.0	-199.0	0.058 °F
	0.0	0.0	✓	As Found	-1.0	1.0	0.058 °F
	32.0	32.0	✓	As Found	31.0	33.0	0.058 °F
	200.0	199.8	✓	As Found	199.0	201.0	0.058 °F
	400.0	399.7	✓	As Found	399.0	401.0	0.058 °F
	600.0	600.1	✓	As Found	599.0	601.0	0.058 °F



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✓ In Tolerance ✗ Out of Tolerance

Calibration Data

Range	Nominal	As Found	As Left	Min	Max	Uncertainty	
Thermocouple Measurement							
	800.0	800.1	✓	As Found	799.0	801.0	0.058 °F
	1000.0	1000.0	✓	As Found	999.0	1001.0	0.059 °F
	1200.0	1199.8	✓	As Found	1198.8	1201.2	0.059 °F
	1600.0	1600.0	✓	As Found	1598.4	1601.6	0.059 °F
	1800.0	1800.0	✓	As Found	1798.2	1801.8	0.059 °F
	2192.0	2191.8	✓	As Found	2189.8	2194.2	0.060 °F
Type K -328° to 2498°F	-328.0	-328.0	✓	As Found	-329.0	-327.0	0.079 °F
	-200.0	-200.0	✓	As Found	-201.0	-199.0	0.058 °F
	0.0	0.0	✓	As Found	-1.0	1.0	0.058 °F
	32.0	32.0	✓	As Found	31.0	33.0	0.058 °F
	200.0	199.9	✓	As Found	199.0	201.0	0.058 °F
	400.0	399.7	✓	As Found	399.0	401.0	0.058 °F
	600.0	599.9	✓	As Found	599.0	601.0	0.058 °F
	800.0	799.9	✓	As Found	799.0	801.0	0.058 °F
	1000.0	999.9	✓	As Found	999.0	1001.0	0.059 °F
	1200.0	1200.0	✓	As Found	1198.8	1201.2	0.059 °F
	1400.0	1400.0	✓	As Found	1398.6	1401.4	0.059 °F
	1600.0	1600.0	✓	As Found	1598.4	1601.6	0.059 °F
	1800.0	1799.8	✓	As Found	1798.2	1801.8	0.059 °F
	2000.0	1999.8	✓	As Found	1998.0	2002.0	0.059 °F
	2200.0	2199.7	✓	As Found	2197.8	2202.2	0.062 °F
	2498.0	2497.8	✓	As Found	2495.5	2500.5	0.062 °F
Type T -328° to 752°F	-328.0	-328.0	✓	As Found	-329.0	-327.0	0.066 °F
	-200.0	-200.0	✓	As Found	-201.0	-199.0	0.059 °F
	0.0	-0.2	✓	As Found	-1.0	1.0	0.058 °F
	32.0	31.8	✓	As Found	31.0	33.0	0.058 °F
	200.0	199.9	✓	As Found	199.0	201.0	0.058 °F
	400.0	399.8	✓	As Found	399.0	401.0	0.058 °F
	600.0	600.1	✓	As Found	599.0	601.0	0.058 °F
	752.0	752.0	✓	As Found	751.0	753.0	0.058 °F
Type R -58° to 3214°F	-50.0	-50.6	✓	As Found	-52.6	-47.4	0.065 °F
	0.0	-0.8	✓	As Found	-2.6	2.6	0.065 °F
	32.0	31.6	✓	As Found	29.4	34.6	0.065 °F
	200.0	199.4	✓	As Found	198.4	201.6	0.061 °F
	400.0	399.7	✓	As Found	398.8	401.2	0.060 °F



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✓ In Tolerance ✗ Out of Tolerance

Calibration Data

Range	Nominal	As Found		As Left	Min	Max	Uncertainty
Thermocouple Measurement							
	600.0	599.7	✓	As Found	599.0	601.0	0.060 °F
	800.0	799.9	✓	As Found	799.0	801.0	0.060 °F
	1000.0	999.7	✓	As Found	999.0	1001.0	0.060 °F
	1200.0	1199.8	✓	As Found	1198.8	1201.2	0.060 °F
	1400.0	1399.6	✓	As Found	1398.6	1401.4	0.060 °F
	1600.0	1599.6	✓	As Found	1598.4	1601.6	0.060 °F
	1800.0	1799.8	✓	As Found	1798.2	1801.8	0.060 °F
	2000.0	1999.6	✓	As Found	1998.0	2002.0	0.060 °F
	2200.0	2199.6	✓	As Found	2197.8	2202.2	0.060 °F
	2800.0	2799.9	✓	As Found	2797.2	2802.8	0.063 °F
	3200.0	3199.6	✓	As Found	3196.8	3203.2	0.063 °F
Type S -58° to 3214°F	-50.0	-50.6	✓	As Found	-52.0	-48.0	0.065 °F
	0.0	-0.4	✓	As Found	-2.0	2.0	0.065 °F
	32.0	31.6	✓	As Found	30.0	34.0	0.065 °F
	200.0	199.6	✓	As Found	198.8	201.2	0.061 °F
	400.0	399.6	✓	As Found	398.8	401.2	0.060 °F
	600.0	599.7	✓	As Found	599.0	601.0	0.060 °F
	800.0	799.7	✓	As Found	799.0	801.0	0.060 °F
	1000.0	999.7	✓	As Found	999.0	1001.0	0.061 °F
	1200.0	1199.8	✓	As Found	1198.8	1201.2	0.061 °F
	1400.0	1399.6	✓	As Found	1398.6	1401.4	0.061 °F
	1600.0	1599.6	✓	As Found	1598.4	1601.6	0.061 °F
	1800.0	1799.6	✓	As Found	1798.2	1801.8	0.061 °F
	2000.0	1999.6	✓	As Found	1998.0	2002.0	0.061 °F
	2200.0	2199.6	✓	As Found	2197.8	2202.2	0.061 °F
	2800.0	2799.7	✓	As Found	2797.2	2802.8	0.064 °F
	3200.0	3199.6	✓	As Found	3196.8	3203.2	0.064 °F
Type N 32° to 2570°F	32.0	31.8	✓	As Found	31.0	33.0	0.058 °F
	200.0	199.8	✓	As Found	199.0	201.0	0.058 °F
	400.0	399.7	✓	As Found	399.0	401.0	0.058 °F
	600.0	599.9	✓	As Found	599.0	601.0	0.058 °F
	800.0	799.9	✓	As Found	799.0	801.0	0.058 °F
	1000.0	999.9	✓	As Found	999.0	1001.0	0.059 °F
	1200.0	1199.8	✓	As Found	1198.8	1201.2	0.059 °F
	1400.0	1400.0	✓	As Found	1398.6	1401.4	0.059 °F

✓ In Tolerance ✗ Out of Tolerance

Calibration Data

Range	Nominal	As Found		As Left		Min	Max	Uncertainty
Thermocouple Measurement								
	1600.0	1600.0	✓	As Found		1598.4	1601.6	0.059 °F
	1800.0	1800.0	✓	As Found		1798.2	1801.8	0.059 °F
	2000.0	1999.9	✓	As Found		1998.0	2002.0	0.059 °F
	2200.0	2199.9	✓	As Found		2197.8	2202.2	0.060 °F
	2370.0	2370.0	✓	As Found		2367.6	2372.4	0.060 °F
Type B 122° to 3276°F	150.0	147.7	✓	As Found		126.3	173.7	0.15 °F
	200.0	196.3	✓	As Found		176.3	223.7	0.15 °F
	400.0	399.0	✓	As Found		396.2	403.8	0.074 °F
	600.0	599.5	✓	As Found		596.2	603.8	0.064 °F
	800.0	799.5	✓	As Found		798.0	802.0	0.064 °F
	1000.0	999.7	✓	As Found		998.0	1002.0	0.062 °F
	1200.0	1199.8	✓	As Found		1198.0	1202.0	0.062 °F
	1400.0	1399.8	✓	As Found		1398.6	1401.4	0.060 °F
	1600.0	1599.4	✓	As Found		1598.4	1601.6	0.060 °F
	1800.0	1799.4	✓	As Found		1798.2	1801.8	0.060 °F
	2000.0	1999.6	✓	As Found		1998.0	2002.0	0.060 °F
	2200.0	2199.6	✓	As Found		2197.8	2202.2	0.060 °F
	2600.0	2599.7	✓	As Found		2597.4	2602.6	0.060 °F
	3000.0	2999.7	✓	As Found		2997.0	3003.0	0.061 °F
	3272.0	3271.5	✓	As Found		3268.7	3275.3	0.061 °F
Thermocouple Output								
Type E -328° to 1832°F	-328.0	-328.02	✓	As Found		-329.0	-327.0	0.061 °F
	-200.0	-199.89	✓	As Found		-201.0	-199.0	0.058 °F
	32.0	32.00	✓	As Found		31.0	33.0	0.058 °F
	600.0	600.01	✓	As Found		599.0	601.0	0.058 °F
	1000.0	1000.06	✓	As Found		999.0	1001.0	0.058 °F
	1832.0	1831.91	✓	As Found		1830.2	1833.8	0.059 °F
Type J -328° to 2192°F	-328.0	-327.86	✓	As Found		-329.0	-327.0	0.058 °F
	-200.0	-200.07	✓	As Found		-201.0	-199.0	0.058 °F
	32.0	31.98	✓	As Found		31.0	33.0	0.058 °F
	800.0	800.02	✓	As Found		799.0	801.0	0.058 °F
	1600.0	1599.94	✓	As Found		1598.4	1601.6	0.059 °F
	2192.0	2192.11	✓	As Found		2189.8	2194.2	0.060 °F
Type K -328° to 2498°F	-328.0	-327.73	✓	As Found		-329.0	-327.0	0.079 °F



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✓ In Tolerance ✗ Out of Tolerance

Calibration Data

Range	Nominal	As Found		As Left	Min	Max	Uncertainty
Thermocouple Output							
	-200.0	-200.00	✓	As Found	-201.0	-199.0	0.058 °F
	32.0	31.98	✓	As Found	31.0	33.0	0.058 °F
	600.0	600.12	✓	As Found	599.0	601.0	0.058 °F
	1600.0	1599.94	✓	As Found	1598.4	1601.6	0.059 °F
	2498.0	2497.98	✓	As Found	2495.5	2500.5	0.062 °F
Type T -328° to 752°F	-328.0	-327.82	✓	As Found	-329.0	-327.0	0.066 °F
	-200.0	-200.06	✓	As Found	-201.0	-199.0	0.059 °F
	32.0	32.00	✓	As Found	31.0	33.0	0.058 °F
	200.0	199.90	✓	As Found	199.0	201.0	0.058 °F
	400.0	399.90	✓	As Found	399.0	401.0	0.058 °F
	752.0	751.91	✓	As Found	751.0	753.0	0.058 °F
Type R -58° to 3214°F	-50.0	-49.83	✓	As Found	-52.6	-47.4	0.065 °F
	32.0	31.96	✓	As Found	29.4	34.6	0.065 °F
	600.0	599.94	✓	As Found	599.0	601.0	0.060 °F
	1600.0	1599.98	✓	As Found	1598.4	1601.6	0.060 °F
	2200.0	2199.96	✓	As Found	2197.8	2202.2	0.060 °F
	3200.0	3199.55	✓	As Found	3196.8	3203.2	0.063 °F
Type S -58° to 3214°F	-50.0	-49.81	✓	As Found	-52.0	-48.0	0.065 °F
	32.0	31.93	✓	As Found	30.0	34.0	0.065 °F
	600.0	600.01	✓	As Found	599.0	601.0	0.060 °F
	1600.0	1599.89	✓	As Found	1598.4	1601.6	0.061 °F
	2200.0	2199.81	✓	As Found	2197.8	2202.2	0.061 °F
	3200.0	3199.95	✓	As Found	3196.8	3203.2	0.064 °F
Type N 32° to 2570°F	32.0	32.00	✓	As Found	31.0	33.0	0.058 °F
	600.0	600.19	✓	As Found	599.0	601.0	0.058 °F
	1400.0	1399.89	✓	As Found	1398.6	1401.4	0.059 °F
	1600.0	1599.96	✓	As Found	1598.4	1601.6	0.059 °F
	2000.0	1999.83	✓	As Found	1998.0	2002.0	0.059 °F
	2370.0	2370.09	✓	As Found	2367.6	2372.4	0.060 °F
Type B 122° to 3276°F	150.0	148.9	✓	As Found	126.3	173.7	0.15 °F
	1200.0	1199.82	✓	As Found	1198.0	1202.0	0.062 °F
	1600.0	1599.96	✓	As Found	1598.4	1601.6	0.060 °F
	2000.0	1999.99	✓	As Found	1998.0	2002.0	0.060 °F
	2600.0	2600.01	✓	As Found	2597.4	2602.6	0.060 °F



Certificate of Calibration

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✓ In Tolerance ✗ Out of Tolerance

Calibration Data

Range	Nominal	As Found	As Left	Min	Max	Uncertainty
Thermocouple Output						
	3272.0	3271.89	✓ As Found	3268.7	3275.3	0.061 °F

End of Datasheet

Calibration Standards

<u>NIST Traceable #</u>	<u>Instrument ID#</u>	<u>Description</u>	<u>Model</u>	<u>Calibration Date</u>	<u>Date Due</u>
1000206881	00872	Calibrator	5520A/SC600	15 DEC 2018	31 DEC 2019
1000209951	00266	High Impedance Voltmeter-Null Detector	845AR	01 MAY 2019	30 APR 2020
1000209961	00522	Resistance Standard	RS925A	01 MAY 2019	30 APR 2020
1000210003	01195	RH/Temperature Data Logger	EL-USB-2-LCD	03 MAY 2019	31 MAY 2020
1000213948	00890	Reference Multimeter	8508A-01	14 DEC 2019	31 DEC 2020