Certificate of Calibration

1000210967

ACCREDITED
Calibration Laboratory
Certificate # 1618.01

Customer Information

Accurate Calibration & Repair
1924 Pinnacle Drive
Aurora, IL 60504

PO #: 2019006
Reference #: 1946856Rg17025
Account #: 00317
SO #: 46856

Instrument Identification

Instrument Id: **02.20.002725**
Location:

Noun: Handheld Calibrator
Model: Memocal 2000
Mfr: ERO Electronic
Serial #: 02.20.002725
Accuracy: See manufacturer's specifications

Certification Information

Reason For Service: Calibration with Data
Technician: Appeaelle Bullock
Type Of Calibration: Accredited 17025
Cal Date: 03 JUL 19
As Found Condition: In Tolerance
Cal Due: 03 OCT 19
As Left Condition: Left As Found
Temperature: 22.7 °C
Procedure: MFR Manual :
Humidity: 44.0 %
Technician Remarks: Datasheet reflects customer specified calibration points. Unit 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 productin results that are traceable through NIST to the Insternational 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: Jul 03, 2019

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	-3.99976	✓	As Found		-4.004	-3.996	0.00060 mV
	0.000	0.00049	✓	As Found		-0.004	0.004	0.00059 mV

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Calibration Data

Range	Nominal	As Found		As Left		Min	Max	Uncertainty
mV Output								
	5.000	4.99985	✓	As Found		4.996	5.004	0.00060 mV
	10.000	9.99963	✓	As Found		9.996	10.004	0.00061 mV
	15.000	14.99969	✓	As Found		14.996	15.004	0.00062 mV
	20.000	19.99975	✓	As Found		19.996	20.004	0.00063 mV
-40 mV to 200 mV	-40.00	-39.99708	✓	As Found		-40.04	-39.96	0.0058 mV
	0.00	0.00434	✓	As Found		-0.04	0.04	0.0058 mV
	50.00	49.99753	✓	As Found		49.96	50.04	0.0058 mV
	100.00	99.99632	✓	As Found		99.96	100.04	0.0059 mV
	150.00	149.99342	✓	As Found		149.96	150.04	0.0059 mV
	200.00	199.9958	✓	As Found		199.96	200.04	0.0060 mV
-400 mV to 2000 mV	-400.0	-400.0089	✓	As Found		-400.4	-399.4	0.058 mV
	0.0	0.00695	✓	As Found		-0.4	0.4	0.058 mV
	500.0	499.9517	✓	As Found		499.6	500.4	0.058 mV
	1000.0	999.9118	✓	As Found		999.6	1000.4	0.058 mV
	1500.0	1499.8473	✓	As Found		1499.6	1500.4	0.059 mV
	2000.0	1999.978	✓	As Found		1999.6	2000.4	0.060 mV
-4000 mV to 20000 mV	-4000	-3999.729	✓	As Found		-4005	-3995	0.58 mV
	0	0.43694	✓	As Found		-5	5	0.58 mV
	5000	5000.061	✓	As Found		4995	5005	0.58 mV
	10000	9999.410	✓	As Found		9995	10005	0.58 mV
	15000	14999.426	✓	As Found		14995	15005	0.59 mV
	20000	19999.54	✓	As Found		19995	20005	0.61 mV
mV Measurement								
-20 mV to 20 mV	-20.000	-19.998	✓	As Found		-20.006	-19.994	0.00090 mV
	0.000	0.001	✓	As Found		-0.006	0.006	0.00077 mV
	5.000	5.001	✓	As Found		4.994	5.006	0.00080 mV
	10.000	10.001	✓	As Found		9.994	10.006	0.00083 mV
	15.000	15.000	✓	As Found		14.994	15.006	0.00086 mV
	20.000	20.001	✓	As Found		19.994	20.006	0.00090 mV
-200 mV to 200 mV	-200.00	-199.98	✓	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	100.00	✓	As Found		99.94	100.06	0.0060 mV
	150.00	150.00	✓	As Found		149.94	150.06	0.0061 mV

✓ 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	-1999.9	✓	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	1000.0	✓	As Found		999.4	1000.6	0.059 mV
	1500.0	1500.1	✓	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	-19999	✓	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	10000	✓	As Found		9992	10008	0.58 mV
	15000	15000	✓	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	0.00017913	✓	As Found		-0.003	0.003	0.00058 mA
	1.000	0.9999241	✓	As Found		0.997	1.003	0.00058 mA
	5.000	5.000425	✓	As Found		4.997	5.003	0.00060 mA
	10.000	9.999813	✓	As Found		9.997	10.003	0.00062 mA
	15.000	14.999387	✓	As Found		14.997	15.003	0.00066 mA
	21.000	20.99941	✓	As Found		20.997	21.003	0.00072 mA
mA Measurement								
-20 mA to 20 mA	-20.000	-20.000	✓	As Found		-20.006	-19.994	0.0011 mA
	0.000	-0.001	✓	As Found		-0.006	0.006	0.00058 mA
	5.000	5.000	✓	As Found		4.994	5.006	0.00063 mA
	10.000	10.000	✓	As Found		9.994	10.006	0.00074 mA
	15.000	15.000	✓	As Found		14.994	15.006	0.00087 mA
	20.000	20.001	✓	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	10.01	✓	As Found		9.95	10.05	0.0058 mA
	50.00	50.00	✓	As Found		49.95	50.05	0.0067 mA
	100.00	100.01	✓	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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Range	Nominal	As Found		As Left		Min	Max	Uncertainty
RTD Pt. 100 Ohm Measurement (-200° to 850°C)								
20.68 Ohms	-195.0	-195.1	✓	As Found		-195.6	-194.4	0.058 °C
60.26 Ohms	-100.0	-100.1	✓	As Found		-100.6	-99.4	0.058 °C
100.00 Ohms	0.0	-0.2	✓	As Found		-0.6	0.6	0.058 °C
138.51 Ohms	100.0	99.9	✓	As Found		99.4	100.6	0.058 °C
280.98 Ohms	500.0	499.9	✓	As Found		499.4	500.6	0.059 °C
389.02 Ohms	845.0	844.9	✓	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	9.9	✓	As Found		9.8	10.2	0.058 Ohms
	100.0	99.9	✓	As Found		99.8	100.2	0.058 Ohms
	300.0	300.0	✓	As Found		299.8	300.2	0.058 Ohms
	500.0	499.9	✓	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	-328.0	✓	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	1200.2	✓	As Found		1198.8	1201.2	0.058 °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
	1832.0	1832.2	✓	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	399.9	✓	As Found		399.0	401.0	0.058 °F
	600.0	600.1	✓	As Found		599.0	601.0	0.058 °F

✓ 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	1200.0	✓	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	2192.2	✓	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	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	0.059 °F
	1200.0	1200.2	✓	As Found		1198.8	1201.2	0.059 °F
	1400.0	1400.2	✓	As Found		1398.6	1401.4	0.059 °F
	1600.0	1600.2	✓	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	2199.7	✓	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	0.0	✓	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
	752.0	752.0	✓	As Found		751.0	753.0	0.058 °F
Type R -58° to 3214°F	-50.0	-51.2	✓	As Found		-52.6	-47.4	0.065 °F
	0.0	-1.1	✓	As Found		-2.6	2.6	0.065 °F
	32.0	31.6	✓	As Found		29.4	34.6	0.065 °F
	200.0	199.9	✓	As Found		198.4	201.6	0.061 °F
	400.0	399.4	✓	As Found		398.8	401.2	0.060 °F

✓ In Tolerance ✘ Out of Tolerance

Calibration Data

Range	Nominal	As Found		As Left		Min	Max	Uncertainty
Thermocouple Measurement								
	600.0	599.9	✓	As Found		599.0	601.0	0.060 °F
	800.0	799.9	✓	As Found		799.0	801.0	0.060 °F
	1000.0	999.9	✓	As Found		999.0	1001.0	0.060 °F
	1200.0	1199.8	✓	As Found		1198.8	1201.2	0.060 °F
	1400.0	1399.9	✓	As Found		1398.6	1401.4	0.060 °F
	1600.0	1599.7	✓	As Found		1598.4	1601.6	0.060 °F
	1800.0	1799.8	✓	As Found		1798.2	1801.8	0.060 °F
	2000.0	1999.8	✓	As Found		1998.0	2002.0	0.060 °F
	2200.0	2199.9	✓	As Found		2197.8	2202.2	0.060 °F
	2800.0	2800.0	✓	As Found		2797.2	2802.8	0.063 °F
	3200.0	3200.0	✓	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	-0.2	✓	As Found		-2.0	2.0	0.065 °F
	32.0	32.0	✓	As Found		30.0	34.0	0.065 °F
	200.0	199.6	✓	As Found		198.8	201.2	0.061 °F
	400.0	399.7	✓	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	1399.7	✓	As Found		1398.6	1401.4	0.061 °F
	1600.0	1599.8	✓	As Found		1598.4	1601.6	0.061 °F
	1800.0	1799.8	✓	As Found		1798.2	1801.8	0.061 °F
	2000.0	1999.8	✓	As Found		1998.0	2002.0	0.061 °F
	2200.0	2199.6	✓	As Found		2197.8	2202.2	0.061 °F
	2800.0	2799.9	✓	As Found		2797.2	2802.8	0.064 °F
	3200.0	3199.8	✓	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	1200.0	✓	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	1800.1	✓	As Found		1798.2	1801.8	0.059 °F
	2000.0	2000.1	✓	As Found		1998.0	2002.0	0.059 °F
	2200.0	2200.1	✓	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	150.6	✓	As Found		126.3	173.7	0.15 °F
	200.0	198.1	✓	As Found		176.3	223.7	0.15 °F
	400.0	399.9	✓	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	1199.3	✓	As Found		1198.0	1202.0	0.062 °F
	1400.0	1399.3	✓	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	1999.4	✓	As Found		1998.0	2002.0	0.060 °F
	2200.0	2199.6	✓	As Found		2197.8	2202.2	0.060 °F
	2600.0	2599.8	✓	As Found		2597.4	2602.6	0.060 °F
	3000.0	2999.8	✓	As Found		2997.0	3003.0	0.061 °F
	3272.0	3271.6	✓	As Found		3268.7	3275.3	0.061 °F
Thermocouple Output								
Type E -328° to 1832°F	-328.0	-328.13	✓	As Found		-329.0	-327.0	0.061 °F
	-200.0	-199.91	✓	As Found		-201.0	-199.0	0.058 °F
	32.0	32.02	✓	As Found		31.0	33.0	0.058 °F
	600.0	599.97	✓	As Found		599.0	601.0	0.058 °F
	1000.0	999.97	✓	As Found		999.0	1001.0	0.058 °F
	1832.0	1831.77	✓	As Found		1830.2	1833.8	0.059 °F
Type J -328° to 2192°F	-328.0	-327.93	✓	As Found		-329.0	-327.0	0.058 °F
	-200.0	-200.04	✓	As Found		-201.0	-199.0	0.058 °F
	32.0	32.02	✓	As Found		31.0	33.0	0.058 °F
	800.0	800.01	✓	As Found		799.0	801.0	0.058 °F
	1600.0	1599.82	✓	As Found		1598.4	1601.6	0.059 °F
	2192.0	2191.93	✓	As Found		2189.8	2194.2	0.060 °F
Type K -328° to 2498°F	-328.0	-327.69	✓	As Found		-329.0	-327.0	0.079 °F

✓ In Tolerance ✘ Out of Tolerance

Calibration Data

Range	Nominal	As Found		As Left		Min	Max	Uncertainty
Thermocouple Output								
	-200.0	-199.84	✓	As Found		-201.0	-199.0	0.058 °F
	32.0	32.02	✓	As Found		31.0	33.0	0.058 °F
	600.0	600.08	✓	As Found		599.0	601.0	0.058 °F
	1600.0	1599.84	✓	As Found		1598.4	1601.6	0.059 °F
	2498.0	2497.78	✓	As Found		2495.5	2500.5	0.062 °F
Type T -328° to 752°F	-328.0	-327.84	✓	As Found		-329.0	-327.0	0.066 °F
	-200.0	-199.88	✓	As Found		-201.0	-199.0	0.059 °F
	32.0	32.04	✓	As Found		31.0	33.0	0.058 °F
	200.0	199.90	✓	As Found		199.0	201.0	0.058 °F
	400.0	399.88	✓	As Found		399.0	401.0	0.058 °F
	752.0	751.86	✓	As Found		751.0	753.0	0.058 °F
Type R -58° to 3214°F	-50.0	-49.58	✓	As Found		-52.6	-47.4	0.065 °F
	32.0	32.20	✓	As Found		29.4	34.6	0.065 °F
	600.0	600.01	✓	As Found		599.0	601.0	0.060 °F
	1600.0	1599.93	✓	As Found		1598.4	1601.6	0.060 °F
	2200.0	2199.83	✓	As Found		2197.8	2202.2	0.060 °F
	3200.0	3199.62	✓	As Found		3196.8	3203.2	0.063 °F
Type S -58° to 3214°F	-50.0	-49.59	✓	As Found		-52.0	-48.0	0.065 °F
	32.0	32.14	✓	As Found		30.0	34.0	0.065 °F
	600.0	599.99	✓	As Found		599.0	601.0	0.060 °F
	1600.0	1599.82	✓	As Found		1598.4	1601.6	0.061 °F
	2200.0	2199.74	✓	As Found		2197.8	2202.2	0.061 °F
	3200.0	3199.77	✓	As Found		3196.8	3203.2	0.064 °F
Type N 32° to 2570°F	32.0	32.04	✓	As Found		31.0	33.0	0.058 °F
	600.0	600.15	✓	As Found		599.0	601.0	0.058 °F
	1400.0	1399.82	✓	As Found		1398.6	1401.4	0.059 °F
	1600.0	1599.89	✓	As Found		1598.4	1601.6	0.059 °F
	2000.0	1999.65	✓	As Found		1998.0	2002.0	0.059 °F
	2370.0	2369.88	✓	As Found		2367.6	2372.4	0.060 °F
Type B 122° to 3276°F	150.0	149.2	✓	As Found		126.3	173.7	0.15 °F
	1200.0	1199.82	✓	As Found		1198.0	1202.0	0.062 °F
	1600.0	1599.93	✓	As Found		1598.4	1601.6	0.060 °F
	2000.0	2000.05	✓	As Found		1998.0	2002.0	0.060 °F
	2600.0	2599.95	✓	As Found		2597.4	2602.6	0.060 °F

Certificate of Calibration

1000210967

ACCREDITED
Calibration Laboratory
Certificate # 1618.01

Calibration Data

✓ In Tolerance ✘ Out of Tolerance

Range	Nominal	As Found		As Left		Min	Max	Uncertainty
Thermocouple Output								
	3272.0	3271.77	✓	As Found		3268.7	3275.3	0.061 °F

End of Datasheet

Calibration Standards

NIST Traceable #	Instrument ID#	Description	Model	Calibration Date	Date Due
1000202498	01241	Precision Process Calibrator	7526A	18 JUL 2018	31 JUL 2019
1000205362	00890	Reference Multimeter	8508A-01	13 NOV 2018	30 NOV 2019
1000207011	00888	Calibrator	5720A	01 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
1000210005	01200	RH/Temperature Data Logger	EL-USB-2-LCD	03 MAY 2019	31 MAY 2020