



Certificate of Calibration

1000217493

Page 1 of 8



Customer Information

Accurate Calibration & Repair
1924 Pinnacle Drive
Aurora, IL 60504

PO #: 2020005
Reference #: 2048603nw
Account #: 00317
SO #: 48603

Instrument Identification

Instrument Id: **R054494**

Location: **Secondary Standard**

Noun: Multifunction Calibrator, 2 Channel

Model: CL525

Mfr: Omega

Serial #: 82334

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: 22 JUN 20
Cal Due: 22 SEP 20
Temperature: 23.5 °C
Humidity: 40.0 %

Technician Remarks: Calibrated per AMS 2750 E at customer specified calibration points.
Battery Charger's wires were received not soldered to the connector. UUT successfully passed calibration after minor repair.

- 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: Jun 22, 2020

Calibration Data

✓ In Tolerance ✗ Out of Tolerance

Range	Nominal	As Found	As Left	Min	Max	Uncertainty
Voltage Output Accuracy						
-20 to 200 mV	-20.000	-20.00046	✓ As Found	-20.004	-19.996	0.00063 mV



Certificate of Calibration

1000217493

Page 2 of 8



✓ In Tolerance ✗ Out of Tolerance

Calibration Data

Range	Nominal	As Found		As Left	Min	Max	Uncertainty
Voltage Output Accuracy							
	0.000	-0.00008	✓	As Found	-0.002	0.002	0.00059 mV
	10.000	10.00019	✓	As Found	9.997	10.003	0.00061 mV
	50.000	49.99985	✓	As Found	49.993	50.007	0.00073 mV
	100.000	99.99962	✓	As Found	99.988	100.012	0.00097 mV
	200.000	200.0017	✓	As Found	199.978	200.022	0.0016 mV
-0.2 to 2 V	-0.20000	-0.2000016	✓	As Found	-0.20003	-0.19997	0.0000060 V
	-0.10000	-0.09999968	✓	As Found	-0.10002	-0.09998	0.0000059 V
	0.00000	0.00000242	✓	As Found	-0.00001	0.00001	0.0000058 V
	0.50000	0.5000029	✓	As Found	0.49994	0.50006	0.0000064 V
	1.00000	1.0000032	✓	As Found	0.99989	1.00011	0.0000077 V
	2.00000	2.000019	✓	As Found	1.99979	2.00021	0.000016 V
-2 to 20 V	-2.00000	-2.000016	✓	As Found	-2.00028	-1.99972	0.000060 V
	-1.00000	-0.9999975	✓	As Found	-1.00018	-0.99982	0.000058 V
	0.00000	0.00002289	✓	As Found	-0.00008	0.00008	0.000058 V
	5.00000	5.000032	✓	As Found	4.99942	5.00058	0.000064 V
	10.00000	10.000027	✓	As Found	9.99892	10.00108	0.000077 V
	20.00000	20.00017	✓	As Found	19.99792	20.00208	0.00020 V
Voltage Input Accuracy							
-20 to 200 mV	-20.000	-19.999	✓	As Found	-20.005	-19.995	0.00090 mV
	-10.000	-10.000	✓	As Found	-10.004	-9.996	0.00083 mV
	0.000	-0.001	✓	As Found	-0.003	0.003	0.00077 mV
	50.000	49.998	✓	As Found	49.993	50.007	0.0012 mV
	100.000	99.997	✓	As Found	99.987	100.013	0.0016 mV
	200.000	199.996	✓	As Found	199.977	200.023	0.0024 mV
-200 to 2000 mV	-200.00	-199.99	✓	As Found	-200.04	-199.96	0.0063 mV
	-100.00	-100.00	✓	As Found	-100.03	-99.97	0.0060 mV
	0.00	0.00	✓	As Found	-0.02	0.02	0.0058 mV
	100.00	99.99	✓	As Found	99.97	100.03	0.0060 mV
	500.00	499.98	✓	As Found	499.93	500.07	0.0070 mV
	1000.00	999.97	✓	As Found	999.88	1000.12	0.0090 mV
	2000.00	1999.96	✓	As Found	1999.78	2000.22	0.014 mV
-2 to 20 V	-2.0000	-1.9999	✓	As Found	-2.0004	-1.9996	0.000060 V
	-1.0000	-1.0000	✓	As Found	-1.0003	-0.9997	0.000059 V
	0.0000	0.0000	✓	As Found	-0.0002	0.0002	0.000058 V



Certificate of Calibration

1000217493

Page 3 of 8



✓ In Tolerance ✗ Out of Tolerance

Calibration Data

Range	Nominal	As Found		As Left	Min	Max	Uncertainty
Voltage Input Accuracy							
	2.0000	1.9999	✓	As Found	1.9996	2.0004	0.000060 V
	5.0000	4.9998	✓	As Found	4.9993	5.0007	0.000063 V
	10.0000	9.9997	✓	As Found	9.9988	10.0012	0.000072 V
	20.0000	19.9996	✓	As Found	19.9978	20.0022	0.00011 V
mAmp Output Accuracy							
0 to 50 mA	0.0000	0.00016832	✓	As Found	-0.0004	0.0004	0.000058 mA
	1.0000	1.0000652	✓	As Found	0.9995	1.0005	0.000062 mA
	5.0000	5.000048	✓	As Found	4.9991	5.0009	0.00015 mA
	10.0000	10.000183	✓	As Found	9.9986	10.0014	0.00023 mA
	30.0000	30.00026	✓	As Found	29.9966	30.0034	0.0026 mA
	50.0000	50.00086	✓	As Found	49.9946	50.0054	0.0038 mA
mAmp Input Accuracy							
-5 to 50 mA	-5.0000	-4.9998	✓	As Found	-5.0013	-4.9987	0.00026 mA
	1.0000	0.9999	✓	As Found	0.9994	1.0006	0.000076 mA
	5.0000	4.9997	✓	As Found	4.9990	5.0010	0.00026 mA
	10.0000	9.9996	✓	As Found	9.9985	10.0015	0.00046 mA
	30.0000	29.9996	✓	As Found	29.9966	30.0034	0.0023 mA
	50.0000	49.9992	✓	As Found	49.9945	50.0055	0.0033 mA
Thermocouple Input Accuracy							
Type J -210 to 1200°C	-190.0	-189.99	✓	As Found	-190.2	-189.8	0.0072 °C
RJ ext. @ 0.0°C	-50.0	-50.01	✓	As Found	-50.2	-49.8	0.0064 °C
	0.0	0.00	✓	As Found	-0.2	0.2	0.0063 °C
	100.0	99.97	✓	As Found	99.8	100.2	0.0063 °C
	300.0	299.97	✓	As Found	299.8	300.2	0.0063 °C
	600.0	599.96	✓	As Found	599.7	600.3	0.0070 °C
	750.0	749.93	✓	As Found	749.7	750.3	0.0082 °C
	1000.0	999.97	✓	As Found	999.7	1000.3	0.0082 °C
	1200.0	1200.02	✓	As Found	1199.7	1200.3	0.011 °C
Degrees F	32.0	32.0	✓	As Found	31.7	32.3	0.058 °F
Type K -270 to 1370°C	-160.0	-160.01	✓	As Found	-160.2	-159.8	0.049 °C
	-50.0	-50.02	✓	As Found	-50.2	-49.8	0.0070 °C
	0.0	0.00	✓	As Found	-0.2	0.2	0.0070 °C
	100.0	100.01	✓	As Found	99.8	100.2	0.0070 °C



Certificate of Calibration

1000217493

Page 4 of 8



✓ In Tolerance ✗ Out of Tolerance

Calibration Data

Range	Nominal	As Found		As Left	Min	Max	Uncertainty
Thermocouple Input Accuracy							
	300.0	299.94	✓	As Found	299.8	300.2	0.0070 °C
	500.0	499.99	✓	As Found	499.7	500.3	0.0070 °C
	700.0	700.01	✓	As Found	699.7	700.3	0.0080 °C
	900.0	899.97	✓	As Found	899.7	900.3	0.0080 °C
	1100.0	1100.03	✓	As Found	1099.7	1100.3	0.011 °C
	1260.0	1259.98	✓	As Found	1259.7	1260.3	0.013 °C
Degrees F	32.0	32.0	✓	As Found	31.7	32.3	0.059 °F
Type T -270 to 400°C	-260.0	-260.0	✓	As Found	-260.2	-259.8	0.091 °C
	-130.0	-130.02	✓	As Found	-130.11	-129.89	0.0080 °C
	-50.0	-49.99	✓	As Found	-50.12	-49.88	0.0071 °C
	0.00	0.00	✓	As Found	-0.11	0.11	0.0070 °C
	100.00	100.01	✓	As Found	99.89	100.11	0.0070 °C
	200.00	199.97	✓	As Found	199.87	200.13	0.0064 °C
	300.00	299.99	✓	As Found	299.86	300.14	0.0070 °C
	400.00	400.00	✓	As Found	399.85	400.15	0.0070 °C
Degrees F	32.0	32.0	✓	As Found	31.8	32.2	0.058 °F
Type E -270 to 1000°C	-200.0	-200.02	✓	As Found	-200.2	-199.8	0.013 °C
	-100.0	-100.00	✓	As Found	-100.2	-99.8	0.0070 °C
	0.0	0.00	✓	As Found	-0.2	0.2	0.0062 °C
	50.0	49.98	✓	As Found	49.8	50.2	0.0062 °C
	100.0	100.03	✓	As Found	99.8	100.2	0.0070 °C
	200.0	199.99	✓	As Found	199.8	200.2	0.0070 °C
	400.0	399.97	✓	As Found	399.8	400.2	0.0070 °C
	500.0	499.97	✓	As Found	499.7	500.3	0.0070 °C
	750.0	750.01	✓	As Found	749.7	750.3	0.0090 °C
	1000.0	999.97	✓	As Found	999.7	1000.3	0.0090 °C
Degrees F	32.0	31.9	✓	As Found	31.7	32.3	0.058 °F
Type R -50 to 1760°C	150.0	149.95	✓	As Found	149.7	150.3	0.016 °C
	300.0	299.97	✓	As Found	299.7	300.3	0.016 °C
	500.0	500.02	✓	As Found	499.6	500.4	0.015 °C
	1000.0	999.95	✓	As Found	999.6	1000.4	0.014 °C
	1200.0	1199.95	✓	As Found	1199.68	1200.32	0.014 °C
	1760.0	1759.98	✓	As Found	1759.5	1760.5	0.017 °C
Type S -50 to 1760°C	170.0	170.01	✓	As Found	169.7	170.3	0.016 °C
	300.0	299.96	✓	As Found	299.7	300.3	0.016 °C

✓ In Tolerance ✗ Out of Tolerance

Calibration Data

Range	Nominal	As Found		As Left		Min	Max	Uncertainty
Thermocouple Input Accuracy								
	500.0	499.88	✓	As Found		499.6	500.4	0.016 °C
	750.0	749.92	✓	As Found		749.6	750.4	0.015 °C
	1000.0	999.93	✓	As Found		999.6	1000.4	0.015 °C
	1760.0	1760.00	✓	As Found		1759.5	1760.5	0.019 °C
Type B 50 to 1820°C	920.0	919.98	✓	As Found		919.5	920.5	0.017 °C
	1200.0	1199.97	✓	As Found		1199.5	1200.5	0.015 °C
	1400.0	1399.93	✓	As Found		1399.4	1400.6	0.015 °C
	1600.0	1599.94	✓	As Found		1599.4	1600.6	0.016 °C
	1820.0	1819.96	✓	As Found		1819.4	1820.6	0.016 °C
Degrees F	2000.0	1999.9	✓	As Found		1999.2	2000.8	0.061 °F
Type N -270 to 1300°C	0.0	0.00	✓	As Found		-0.2	0.2	0.0080 °C
	50.0	49.99	✓	As Found		49.8	50.2	0.0074 °C
	100.0	100.02	✓	As Found		99.8	100.2	0.0070 °C
	250.0	249.96	✓	As Found		249.8	250.2	0.0070 °C
	300.0	299.97	✓	As Found		299.8	300.2	0.0070 °C
	500.0	500.01	✓	As Found		499.7	500.3	0.0074 °C
	700.0	699.96	✓	As Found		699.7	700.3	0.0074 °C
	1000.0	999.98	✓	As Found		999.7	1000.3	0.0090 °C
	1300.0	1299.99	✓	As Found		1299.7	1300.3	0.011 °C
Thermocouple Output Accuracy								
Type J -210 to 1200°C	-190.0	-189.97	✓	As Found		-190.12	-189.88	0.0072 °C
	0.00	-0.02	✓	As Found		-0.10	0.10	0.0063 °C
	100.0	100.05	✓	As Found		99.89	100.11	0.0063 °C
	300.0	300.06	✓	As Found		299.87	300.13	0.0063 °C
	500.0	499.99	✓	As Found		499.85	500.15	0.0070 °C
	1200.0	1199.96	✓	As Found		1199.78	1200.22	0.011 °C
Degrees F	32.0	31.98	✓	As Found		31.82	32.18	0.058 °F
Type K -270 to 1370°C	-160.0	-159.95	✓	As Found		-160.12	-159.88	0.049 °C
	0.0	0.03	✓	As Found		-0.10	0.10	0.0070 °C
	100.0	100.02	✓	As Found		99.89	100.11	0.0070 °C
	300.0	300.08	✓	As Found		299.87	300.13	0.0070 °C
	500.0	499.99	✓	As Found		499.85	500.15	0.0070 °C
	1260.0	1260.03	✓	As Found		1259.77	1260.23	0.013 °C
Degrees F	32.0	32.05	✓	As Found		31.82	32.18	0.059 °F

Certificate of Calibration

1000217493

Page 6 of 8

✓ In Tolerance ✗ Out of Tolerance

Calibration Data

Range	Nominal	As Found	As Left	Min	Max	Uncertainty	
Thermocouple Output Accuracy							
Type T -270 to 400°C	-260.0	-260.008	✓	As Found	-260.2	-259.8	0.091 °C
	-130.0	-129.99	✓	As Found	-130.12	-129.88	0.0080 °C
	0.0	0.03	✓	As Found	-0.10	0.10	0.0070 °C
	100.0	100.01	✓	As Found	99.89	100.11	0.0070 °C
	250.0	249.99	✓	As Found	249.87	250.13	0.0070 °C
	400.0	399.98	✓	As Found	399.86	400.14	0.0070 °C
Degrees F	32.0	32.06	✓	As Found	31.82	32.18	0.058 °F
Type E -270 to 1000°C	-200.0	-200.02	✓	As Found	-200.12	-199.88	0.013 °C
	0.0	0.03	✓	As Found	-0.10	0.10	0.0062 °C
	100.0	99.99	✓	As Found	99.89	100.11	0.0070 °C
	250.0	250.02	✓	As Found	249.87	250.13	0.0070 °C
	500.0	500.03	✓	As Found	499.85	500.15	0.0070 °C
	1000.0	1000.02	✓	As Found	999.80	1000.20	0.0090 °C
Degrees F	32.0	32.05	✓	As Found	31.82	32.18	0.058 °F
Type R -50.0 to 1760°C	150.0	150.011	✓	As Found	149.78	150.22	0.016 °C
	500.0	499.93	✓	As Found	499.75	500.25	0.015 °C
	800.0	800.09	✓	As Found	799.72	800.28	0.015 °C
	1200.0	1200.12	✓	As Found	1199.68	1200.32	0.014 °C
	1500.0	1499.95	✓	As Found	1499.66	1500.34	0.017 °C
	1700.0	1700.06	✓	As Found	1699.63	1700.37	0.017 °C
Type S -50 to 1760°C	170.0	170.03	✓	As Found	169.78	170.22	0.016 °C
	500.0	500.01	✓	As Found	499.75	500.25	0.016 °C
	800.0	800.12	✓	As Found	799.72	800.28	0.015 °C
	1200.0	1200.13	✓	As Found	1199.68	1200.32	0.015 °C
	1500.0	1500.03	✓	As Found	1499.66	1500.32	0.019 °C
	1700.0	1699.99	✓	As Found	1699.63	1700.37	0.019 °C
Type B 50 to 1820°C	920.0	920.11	✓	As Found	919.61	920.39	0.017 °C
	1000.0	1000.09	✓	As Found	999.60	1000.40	0.017 °C
	1250.0	1250.05	✓	As Found	1249.57	1250.43	0.015 °C
	1500.0	1500.04	✓	As Found	1499.55	1500.45	0.016 °C
	1800.0	1799.96	✓	As Found	1799.52	1800.48	0.016 °C
Degrees F	1688.0	1688.23	✓	As Found	1687.29	1688.71	0.061 °F
Type N -270 to 1300°C	-200.0	-199.96	✓	As Found	-200.12	-199.88	0.016 °C
	0.0	0.06	✓	As Found	-0.10	0.10	0.0080 °C
	100.0	99.99	✓	As Found	99.89	100.11	0.0070 °C



Certificate of Calibration

1000217493

Page 7 of 8



✓ In Tolerance ✗ Out of Tolerance

Calibration Data

Range	Nominal	As Found		As Left	Min	Max	Uncertainty
Thermocouple Output Accuracy							
	300.0	300.03	✓	As Found	299.87	300.13	0.0070 °C
	600.0	600.02	✓	As Found	599.84	600.16	0.0074 °C
	1000.0	1000.02	✓	As Found	999.80	1000.20	0.0090 °C
	1300.0	1300.02	✓	As Found	1299.77	1300.23	0.011 °C
Degrees F	32.0	32.07	✓	As Found	31.82	32.18	0.058 °F
Ohms Input Accuracy							
0 to 500 Ohms	0.000	0.000	✓	As Found	-0.012	0.012	0.00058 Ohms
	100.000	100.000	✓	As Found	99.978	100.022	0.0013 Ohms
	200.000	199.996	✓	As Found	199.968	200.032	0.0027 Ohms
	300.000	299.995	✓	As Found	299.958	300.042	0.0037 Ohms
	400.000	399.993	✓	As Found	399.948	400.052	0.0047 Ohms
	500.000	499.991	✓	As Found	499.938	500.062	0.0057 Ohms
0 to 5.0 kOhms	0.00000	0.00000	✓	As Found	-0.00012	0.00012	0.000058 kOhms
	1.00000	0.99998	✓	As Found	0.99978	1.00022	0.000013 kOhms
	2.00000	1.99998	✓	As Found	1.99968	2.00032	0.000027 kOhms
	3.00000	2.99996	✓	As Found	2.99958	3.00042	0.000037 kOhms
	4.00000	3.99991	✓	As Found	3.99948	4.00052	0.000047 kOhms
	5.00000	4.99991	✓	As Found	4.99938	5.00062	0.000057 kOhms
Ohms Output Accuracy							
0 to 500 Ohms	0.000	0.0026	✓	As Found	-0.020	0.020	0.00084 Ohms
	100.000	100.0041	✓	As Found	99.970	100.030	0.0017 Ohms
	200.000	200.0083	✓	As Found	199.960	200.040	0.0027 Ohms
	300.000	300.0099	✓	As Found	299.950	300.050	0.0037 Ohms
	400.000	400.0143	✓	As Found	399.940	400.060	0.0047 Ohms
	500.000	500.0162	✓	As Found	499.930	500.070	0.0057 Ohms
0 to 5.0 kOhms	0.00000	0.0000104	✓	As Found	-0.00020	0.00020	0.000084 kOhms
	0.50000	0.5000198	✓	As Found	0.49975	0.50025	0.000081 kOhms
	1.00000	1.0000207	✓	As Found	0.99970	1.00030	0.000013 kOhms
	2.00000	2.000049	✓	As Found	1.99960	2.00040	0.000027 kOhms
	3.00000	3.000038	✓	As Found	2.99950	3.00050	0.000037 kOhms
	4.00000	4.000036	✓	As Found	3.99940	4.00060	0.000047 kOhms
	5.00000	5.000023	✓	As Found	4.99930	5.00070	0.000057 kOhms

✓ In Tolerance ✗ Out of Tolerance

Calibration Data

Range	Nominal	As Found		As Left	Min	Max	Uncertainty
Frequency Accuracy Output							
1 to 200 Hz	1.000	0.99998	✓	As Found	0.99895	1.00105	0.00058 Hz
	25.000	25.000	✓	As Found	24.998	25.002	0.00058 Hz
	50.000	49.999	✓	As Found	49.996	50.004	0.00058 Hz
	100.000	99.998	✓	As Found	99.994	100.006	0.00058 Hz
	150.000	149.997	✓	As Found	149.991	150.009	0.00058 Hz
	200.000	199.996	✓	As Found	199.989	200.011	0.00058 Hz
1 to 2000 Hz	1.00	0.99998	✓	As Found	0.99895	1.00105	0.0058 Hz
	250.00	249.996	✓	As Found	249.986	250.014	0.0058 Hz
	500.00	499.991	✓	As Found	499.974	500.026	0.0058 Hz
	1000.00	999.982	✓	As Found	999.949	1000.051	0.0058 Hz
	1500.00	1499.974	✓	As Found	1499.924	1500.076	0.0058 Hz
	2000.00	1999.965	✓	As Found	1999.899	2000.101	0.0058 Hz
1 to 20000 Hz	1.0	0.99998	✓	As Found	0.99895	1.00105	0.058 Hz
	2500.0	2499.956	✓	As Found	2499.874	2500.126	0.058 Hz
	5000.0	4999.912	✓	As Found	4999.749	5000.251	0.058 Hz
	10000.0	9999.824	✓	As Found	9999.499	10000.501	0.058 Hz
	15000.0	14999.736	✓	As Found	14999.249	15000.751	0.058 Hz
	20000.0	19999.647	✓	As Found	19998.999	20001.001	0.058 Hz

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>
1000177504	01240	Time & Frequency Synchronization System	SecureSync®	22 APR 2015	00 0000
1000213932	00872	Calibrator	5520A/SC600	17 JAN 2020	31 JAN 2021
1000213934	00888	Calibrator	5720A	07 FEB 2020	28 FEB 2021
1000213948	00890	Multimeter, 8.5 Digit Reference	8508A-01	14 DEC 2019	31 DEC 2020
1000215434	02049	Universal Counter, 225 MHz	53131A	04 MAR 2020	31 MAR 2021
1000216217	00266	High Impedance Voltmeter-Null Detector	845AR	20 MAY 2020	30 APR 2021
1000216226	00522	Resistance Standard	RS925A	20 APR 2020	30 APR 2021
1000217494	01196	RH/Temperature Data Logger	EL-USB-2-LCD	16 JUN 2020	30 APR 2021