Certificate of Calibration

1000238174

ACCREDITED
CERT #1618.01

Customer Information

Accurate Calibration & Repair
1924 Pinnacle Drive
Aurora, IL 60504

PO #: 2304
Reference #: 2354075Rg17025
Account #: 00317
SO #: 54075

Instrument Identification

Instrument Id: 49103
Location: **Secondary Standard**

Noun: Multifunction Calibrator, 2 Channel
Model: CL525
Mfr: Omega
Serial #: 49103
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 Remarks: Calibrated per AMS 2750 G at Customer specified calibration points.

Technician: Appeaelle Bullock
Cal Date: 31 JUL 23
Cal Due: 31 OCT 23
Temperature: 23.0 °C
Humidity: 43.0 %

- *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 the calibrated item to drift out of tolerance before the assigned calibration interval.*
- *The calibration results published in this certificate were obtained using test equipment that has been calibrated by Certified Standards and are traceable through the National Institute of Standards and Technology (NIST), derived from natural physical constants, from ratio measurements, or compared to consensus standards to the International System of Units (SI).*
- *Reported uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of k=2. J.H. Metrology Co., Inc. does not apply the reported calculated measurement uncertainty to manufacturer or other sources of tolerances/specifications to determine the instrument pass or fail status. (Uncertainties are listed separately for each test point.) It is the responsibility of the Customer to consider measurement uncertainty when determining the instrument suitability.*
- *(!) Designates that the expanded uncertainty of measurement does not meet the 95% confidence level.*
- *This certificate may contain data that is not covered by our 17025 Scope of Accreditation and are marked with an asterisk (*). Pass/Fail tests are not accredited. Calibration Standards listed on this Certificate of Calibration with a Due Date of 00 0000 are support items that do not require calibration (NPCR).*
- *J.H. Metrology Co., Inc.'s Calibration Control System complies with applicable requirements of ANSI Z540-1, ISO 9001:2015 (by DQS, Inc), ISO/IEC 17025:2017 (by A2LA), and when required contractually, 10CFR21.*
- *The results contained herein relate only to the item calibrated. This certificate shall not be reproduced except in full, without the written permission of J.H. Metrology Co., Inc.*

Metrology Technician

Neil Willert, President

Quality Approval Date: Jul 31, 2023

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	-20.00015	✓	As Found		-20.004	-19.996	0.00063 mV
	0.000	-0.00003	✓	As Found		-0.002	0.002	0.00059 mV
	10.000	9.99983	✓	As Found		9.997	10.003	0.00061 mV
	50.000	49.99976	✓	As Found		49.993	50.007	0.00073 mV
	100.000	99.99969	✓	As Found		99.988	100.012	0.00097 mV
	200.000	199.99961	✓	As Found		199.978	200.022	0.0016 mV
-0.2 to 2 V	-0.20000	-0.20000249	✓	As Found		-0.20003	-0.19997	0.0000060 V
	-0.10000	-0.10000312	✓	As Found		-0.10002	-0.09998	0.0000059 V
	0.00000	-0.00000265	✓	As Found		-0.00001	0.00001	0.0000058 V
	0.50000	0.49999657	✓	As Found		0.49994	0.50006	0.0000064 V
	1.00000	0.99999571	✓	As Found		0.99989	1.00011	0.0000077 V
	2.00000	1.9999948	✓	As Found		1.99979	2.00021	0.000016 V
-2 to 20 V	-2.00000	-2.0000088	✓	As Found		-2.00028	-1.99972	0.000060 V
	-1.00000	-1.0000185	✓	As Found		-1.00018	-0.99982	0.000058 V
	0.00000	-0.00002154	✓	As Found		-0.00008	0.00008	0.000058 V
	5.00000	4.9999581	✓	As Found		4.99942	5.00058	0.000064 V
	10.00000	9.9999473	✓	As Found		9.99892	10.00108	0.000077 V
	20.00000	19.999895	✓	As Found		19.99792	20.00208	0.00020 V
Voltage Input Accuracy								
-20 to 200 mV	-20.000	-20.000	✓	As Found		-20.005	-19.995	0.00090 mV
	-10.000	-10.000	✓	As Found		-10.004	-9.996	0.00083 mV
	0.000	0.000	✓	As Found		-0.003	0.003	0.00077 mV
	50.000	49.999	✓	As Found		49.993	50.007	0.0012 mV
	100.000	100.000	✓	As Found		99.987	100.013	0.0016 mV
	200.000	200.000	✓	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	500.00	✓	As Found		499.93	500.07	0.0070 mV
	1000.00	999.99	✓	As Found		999.88	1000.12	0.0090 mV
	2000.00	1999.99	✓	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

✓ In Tolerance ✘ Out of Tolerance

Calibration Data

Range	Nominal	As Found		As Left		Min	Max	Uncertainty
Voltage Input Accuracy								
	0.0000	0.0000	✓	As Found		-0.0002	0.0002	0.000058 V
	2.0000	1.9999	✓	As Found		1.9996	2.0004	0.000060 V
	5.0000	4.9999	✓	As Found		4.9993	5.0007	0.000063 V
	10.0000	9.9999	✓	As Found		9.9988	10.0012	0.000072 V
	20.0000	19.9999	✓	As Found		19.9978	20.0022	0.00011 V
mAmp Output Accuracy								
0 to 50 mA	0.0000	0.000003475	✓	As Found		-0.0004	0.0004	0.000058 mA
	1.0000	0.9998978	✓	As Found		0.9995	1.0005	0.000062 mA
	5.0000	4.999736	✓	As Found		4.9991	5.0009	0.00015 mA
	10.0000	9.999506	✓	As Found		9.9986	10.0014	0.00023 mA
	30.0000	29.99888	✓	As Found		29.9966	30.0034	0.0026 mA
	50.0000	49.99911	✓	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	4.9999	✓	As Found		4.9990	5.0010	0.00026 mA
	10.0000	9.9999	✓	As Found		9.9985	10.0015	0.00046 mA
	30.0000	30.0003	✓	As Found		29.9966	30.0034	0.0023 mA
	50.0000	50.0000	✓	As Found		49.9945	50.0055	0.0033 mA
Thermocouple Input Accuracy								
Type J -210 to 1200°C	-190.0	-189.98	✓	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	299.98	✓	As Found		299.8	300.2	0.0063 °C
	600.0	599.95	✓	As Found		599.7	600.3	0.0070 °C
	750.0	749.96	✓	As Found		749.7	750.3	0.0082 °C
	1000.0	999.98	✓	As Found		999.7	1000.3	0.0082 °C
	1200.0	1199.98	✓	As Found		1199.7	1200.3	0.011 °C
Degrees F	32.0	31.9	✓	As Found		31.7	32.3	0.058 °F
Type K -270 to 1370°C	-160.0	-160.00	✓	As Found		-160.2	-159.8	0.049 °C
	-50.0	-50.03	✓	As Found		-50.2	-49.8	0.0070 °C
	0.0	0.00	✓	As Found		-0.2	0.2	0.0070 °C

Calibration Data

✓ In Tolerance ✘ Out of Tolerance

Range	Nominal	As Found		As Left		Min	Max	Uncertainty
Thermocouple Input Accuracy								
	100.0	100.01	✓	As Found		99.8	100.2	0.0070 °C
	300.0	299.95	✓	As Found		299.8	300.2	0.0070 °C
	500.0	500.00	✓	As Found		499.7	500.3	0.0070 °C
	700.0	700.01	✓	As Found		699.7	700.3	0.0080 °C
	900.0	899.98	✓	As Found		899.7	900.3	0.0080 °C
	1100.0	1100.02	✓	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	-130.00	✓	As Found		-130.11	-129.89	0.0080 °C
	-50.0	-50.01	✓	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	199.98	✓	As Found		199.87	200.13	0.0064 °C
	300.00	300.00	✓	As Found		299.86	300.14	0.0070 °C
	400.00	399.98	✓	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	-199.97	✓	As Found		-200.2	-199.8	0.013 °C
	-100.0	-100.01	✓	As Found		-100.2	-99.8	0.0070 °C
	0.0	0.00	✓	As Found		-0.2	0.2	0.0062 °C
	50.0	49.99	✓	As Found		49.8	50.2	0.0062 °C
	100.0	100.01	✓	As Found		99.8	100.2	0.0070 °C
	200.0	199.98	✓	As Found		199.8	200.2	0.0070 °C
	400.0	399.96	✓	As Found		399.8	400.2	0.0070 °C
	500.0	499.97	✓	As Found		499.7	500.3	0.0070 °C
	750.0	749.98	✓	As Found		749.7	750.3	0.0090 °C
	1000.0	999.99	✓	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	150.00	✓	As Found		149.7	150.3	0.016 °C
	300.0	300.03	✓	As Found		299.7	300.3	0.016 °C
	500.0	500.07	✓	As Found		499.6	500.4	0.015 °C
	1000.0	999.99	✓	As Found		999.6	1000.4	0.014 °C
	1200.0	1199.98	✓	As Found		1199.68	1200.32	0.014 °C
	1760.0	1760.01	✓	As Found		1759.5	1760.5	0.017 °C

Calibration Data

✓ In Tolerance ✘ Out of Tolerance

Range	Nominal	As Found		As Left		Min	Max	Uncertainty
Thermocouple Input Accuracy								
Type S -50 to 1760°C	170.0	170.06	✓	As Found		169.7	170.3	0.016 °C
	300.0	300.02	✓	As Found		299.7	300.3	0.016 °C
	500.0	499.95	✓	As Found		499.6	500.4	0.016 °C
	750.0	749.98	✓	As Found		749.6	750.4	0.015 °C
	1000.0	1000.01	✓	As Found		999.6	1000.4	0.015 °C
	1760.0	1760.02	✓	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	1200.02	✓	As Found		1199.5	1200.5	0.015 °C
	1400.0	1399.96	✓	As Found		1399.4	1400.6	0.015 °C
	1600.0	1599.93	✓	As Found		1599.4	1600.6	0.016 °C
	1820.0	1819.97	✓	As Found		1819.4	1820.6	0.016 °C
Degrees F	2000.0	2000.0	✓	As Found		1999.2	2000.8	0.061 °F
Type N -270 to 1300°C	0.0	0.01	✓	As Found		-0.2	0.2	0.0080 °C
	50.0	50.03	✓	As Found		49.8	50.2	0.0074 °C
	100.0	100.01	✓	As Found		99.8	100.2	0.0070 °C
	250.0	250.00	✓	As Found		249.8	250.2	0.0070 °C
	300.0	299.95	✓	As Found		299.8	300.2	0.0070 °C
	500.0	499.99	✓	As Found		499.7	500.3	0.0074 °C
	700.0	699.98	✓	As Found		699.7	700.3	0.0074 °C
	1000.0	999.98	✓	As Found		999.7	1000.3	0.0090 °C
	1300.0	1299.97	✓	As Found		1299.7	1300.3	0.011 °C
Thermocouple Output Accuracy								
Type J -210 to 1200°C	-190.0	-190.01	✓	As Found		-190.12	-189.88	0.0072 °C
	0.00	0.01	✓	As Found		-0.10	0.10	0.0063 °C
	100.0	100.02	✓	As Found		99.89	100.11	0.0063 °C
	300.0	300.01	✓	As Found		299.87	300.13	0.0063 °C
	500.0	499.98	✓	As Found		499.85	500.15	0.0070 °C
	1200.0	1199.98	✓	As Found		1199.78	1200.22	0.011 °C
Degrees F	32.0	32.00	✓	As Found		31.82	32.18	0.058 °F
Type K -270 to 1370°C	-160.0	-159.98	✓	As Found		-160.12	-159.88	0.049 °C
	0.0	0.01	✓	As Found		-0.10	0.10	0.0070 °C
	100.0	99.98	✓	As Found		99.89	100.11	0.0070 °C
	300.0	300.05	✓	As Found		299.87	300.13	0.0070 °C
	500.0	499.99	✓	As Found		499.85	500.15	0.0070 °C

✓ In Tolerance ✘ Out of Tolerance

Calibration Data

Range	Nominal	As Found		As Left		Min	Max	Uncertainty
Thermocouple Output Accuracy								
	1260.0	1260.01	✓	As Found		1259.77	1260.23	0.013 °C
Degrees F	32.0	32.00	✓	As Found		31.82	32.18	0.059 °F
Type T -270 to 400°C	-260.0	-259.958	✓	As Found		-260.2	-259.8	0.091 °C
	-130.0	-129.99	✓	As Found		-130.12	-129.88	0.0080 °C
	0.0	0.01	✓	As Found		-0.10	0.10	0.0070 °C
	100.0	99.97	✓	As Found		99.89	100.11	0.0070 °C
	250.0	249.98	✓	As Found		249.87	250.13	0.0070 °C
	400.0	400.00	✓	As Found		399.86	400.14	0.0070 °C
Degrees F	32.0	32.02	✓	As Found		31.82	32.18	0.058 °F
Type E -270 to 1000°C	-200.0	-200.03	✓	As Found		-200.12	-199.88	0.013 °C
	0.0	0.01	✓	As Found		-0.10	0.10	0.0062 °C
	100.0	99.98	✓	As Found		99.89	100.11	0.0070 °C
	250.0	250.03	✓	As Found		249.87	250.13	0.0070 °C
	500.0	500.02	✓	As Found		499.85	500.15	0.0070 °C
	1000.0	999.99	✓	As Found		999.80	1000.20	0.0090 °C
Degrees F	32.0	32.02	✓	As Found		31.82	32.18	0.058 °F
Type R -50.0 to 1760°C	150.0	149.97	✓	As Found		149.78	150.22	0.016 °C
	500.0	499.95	✓	As Found		499.75	500.25	0.015 °C
	800.0	799.96	✓	As Found		799.72	800.28	0.015 °C
	1200.0	1200.01	✓	As Found		1199.68	1200.32	0.014 °C
	1500.0	1500.03	✓	As Found		1499.66	1500.34	0.017 °C
	1700.0	1699.98	✓	As Found		1699.63	1700.37	0.017 °C
Type S -50 to 1760°C	170.0	169.93	✓	As Found		169.78	170.22	0.016 °C
	500.0	500.04	✓	As Found		499.75	500.25	0.016 °C
	800.0	800.04	✓	As Found		799.72	800.28	0.015 °C
	1200.0	1200.03	✓	As Found		1199.68	1200.32	0.015 °C
	1500.0	1500.00	✓	As Found		1499.66	1500.32	0.019 °C
	1700.0	1700.01	✓	As Found		1699.63	1700.37	0.019 °C
Type B 50 to 1820°C	920.0	919.97	✓	As Found		919.61	920.39	0.017 °C
	1000.0	999.99	✓	As Found		999.60	1000.40	0.017 °C
	1250.0	1249.98	✓	As Found		1249.57	1250.43	0.015 °C
	1500.0	1500.01	✓	As Found		1499.55	1500.45	0.016 °C
	1800.0	1799.98	✓	As Found		1799.52	1800.48	0.016 °C
Degrees F	1688.0	1687.95	✓	As Found		1687.29	1688.71	0.061 °F

Calibration Data

✓ In Tolerance ✗ Out of Tolerance

Range	Nominal	As Found		As Left		Min	Max	Uncertainty
Thermocouple Output Accuracy								
Type N -270 to 1300°C	-200.0	-199.94	✓	As Found		-200.12	-199.88	0.016 °C
	0.0	0.01	✓	As Found		-0.10	0.10	0.0080 °C
	100.0	99.98	✓	As Found		99.89	100.11	0.0070 °C
	300.0	300.03	✓	As Found		299.87	300.13	0.0070 °C
	600.0	599.99	✓	As Found		599.84	600.16	0.0074 °C
	1000.0	999.99	✓	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	32.02	✓	As Found		31.82	32.18	0.058 °F
Ohms Input Accuracy								
0 to 500 Ohms	0.000	0.002	✓	As Found		-0.012	0.012	0.00058 Ohms
	100.000	99.997	✓	As Found		99.978	100.022	0.0013 Ohms
	200.000	199.999	✓	As Found		199.968	200.032	0.0027 Ohms
	300.000	299.999	✓	As Found		299.958	300.042	0.0037 Ohms
	400.000	399.998	✓	As Found		399.948	400.052	0.0047 Ohms
	500.000	499.996	✓	As Found		499.938	500.062	0.0057 Ohms
0 to 5.0 kOhms	0.00000	0.00000	✓	As Found		-0.00012	0.00012	0.0000058 kOhms
	1.00000	1.00000	✓	As Found		0.99978	1.00022	0.000013 kOhms
	2.00000	2.00000	✓	As Found		1.99968	2.00032	0.000027 kOhms
	3.00000	2.99999	✓	As Found		2.99958	3.00042	0.000037 kOhms
	4.00000	3.99999	✓	As Found		3.99948	4.00052	0.000047 kOhms
	5.00000	4.99998	✓	As Found		4.99938	5.00062	0.000057 kOhms
Ohms Output Accuracy								
0 to 500 Ohms	0.000	-0.0001	✓	As Found		-0.020	0.020	0.00084 Ohms
	100.000	100.00017	✓	As Found		99.970	100.030	0.0017 Ohms
	200.000	200.0001	✓	As Found		199.960	200.040	0.0027 Ohms
	300.000	300.0009	✓	As Found		299.950	300.050	0.0037 Ohms
	400.000	400.0015	✓	As Found		399.940	400.060	0.0047 Ohms
	500.000	500.0026	✓	As Found		499.930	500.070	0.0057 Ohms
0 to 5.0 kOhms	0.00000	0.0000051	✓	As Found		-0.00020	0.00020	0.0000058 kOhms
	0.50000	0.5000056	✓	As Found		0.49975	0.50025	0.0000081 kOhms
	1.00000	1.0000119	✓	As Found		0.99970	1.00030	0.000013 kOhms
	2.00000	1.999987	✓	As Found		1.99960	2.00040	0.000027 kOhms
	3.00000	3.000009	✓	As Found		2.99950	3.00050	0.000037 kOhms

Certificate of Calibration

1000238174

ACCREDITED
CERT #1618.01

Calibration Data

✓ In Tolerance ✘ Out of Tolerance

Range	Nominal	As Found		As Left		Min	Max	Uncertainty
Ohms Output Accuracy								
	4.00000	4.000016	✓	As Found		3.99940	4.00060	0.000047 kOhms
	5.00000	5.000027	✓	As Found		4.99930	5.00070	0.000057 kOhms
Frequency Accuracy Output								
1 to 200 Hz	1.000	0.99999	✓	As Found		0.99895	1.00105	0.00058 Hz
	25.000	25.000	✓	As Found		24.998	25.002	0.00058 Hz
	50.000	50.000	✓	As Found		49.996	50.004	0.00058 Hz
	100.000	99.999	✓	As Found		99.994	100.006	0.00058 Hz
	150.000	149.999	✓	As Found		149.991	150.009	0.00058 Hz
	200.000	199.999	✓	As Found		199.989	200.011	0.00058 Hz
1 to 2000 Hz	1.00	0.99999	✓	As Found		0.99895	1.00105	0.0058 Hz
	250.00	249.999	✓	As Found		249.986	250.014	0.0058 Hz
	500.00	499.998	✓	As Found		499.974	500.026	0.0058 Hz
	1000.00	999.995	✓	As Found		999.949	1000.051	0.0058 Hz
	1500.00	1499.992	✓	As Found		1499.924	1500.076	0.0058 Hz
	2000.00	1999.990	✓	As Found		1999.899	2000.101	0.0058 Hz
1 to 20000 Hz	1.0	0.99999	✓	As Found		0.99895	1.00105	0.058 Hz
	2500.0	2499.987	✓	As Found		2499.874	2500.126	0.058 Hz
	5000.0	4999.975	✓	As Found		4999.749	5000.251	0.058 Hz
	10000.0	9999.944	✓	As Found		9999.499	10000.501	0.058 Hz
	15000.0	14999.923	✓	As Found		14999.249	15000.751	0.058 Hz
	20000.0	19999.889	✓	As Found		19998.999	20001.001	0.058 Hz

End of Datasheet

Calibration Standards

NIST Traceable #	Instrument ID#	Description	Model	Calibration Date	Date Due
1000177504	01240	Time & Frequency Synchronization System	SecureSync®	22 APR 2015	00 0000
1000231831	01090	Universal Counter, 225 MHz	53131A	03 OCT 2022	31 OCT 2023
1000233873	00888	Calibrator	5720A	24 MAR 2023	31 MAR 2024
1000236428	00522	Resistance Standard	RS925A	18 APR 2023	30 APR 2024
1000236451	00266	High Impedance Voltmeter-Null Detector	845AR	20 APR 2023	30 APR 2024
1000236515	01196	RH/Temperature Data Logger	EL-USB-2-LCD	27 APR 2023	30 APR 2024
1000237577	01312	Multimeter	3458A	28 JUN 2023	31 JUL 2024