Certificate of Calibration

1000181103

ACCREDITED
Calibration Laboratory
Certificate # 1618.01

Customer Information

Accurate Calibration & Repair
1924 Pinnacle Drive
Aurora, IL 60504

PO #: 344922
Reference #: 1437726nw
Account #: 00317
SO #: 37726

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
Technician: Appeaelle Bullock
Type Of Calibration: Accredited 17025
Cal Date: 16 JAN 15
As Found Condition: In Tolerance
Cal Due: 16 APR 15
As Left Condition: Left As Found
Temperature: 23.3 °C
Procedure: MFR Manual :
Humidity: 44.0 %
Technician Remarks: Ohms input function not calibrated & 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.*
- *This instrument has been calibrated using standards with accuracies traceable to the National Institute of Standards and Technology, derived from natural physical constants, from ratio measurements, or compared to consensus standards.*
- *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.*
- *Measurement uncertainties are not used in the determination of In or Out of Tolerance of the Unit under test.*
- *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: Lead Metrologist

Printed: 1/19/2015 14:00:10

Date: Jan 19, 2015

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	-20.00148	✓	As Found		-20.004	-19.996	0.000559 mV

JH Metrology Co, Inc. • 1801 Hicks Road, Unit E • Rolling Meadows, Illinois 60008 • Phone: (847) 991-0290 • Fax: (847) 991-0348

✓ In Tolerance ✗ Out of Tolerance

Calibration Data

Range	Nominal	As Found		As Left		Min	Max	Uncertainty
Voltage Output Accuracy								
	0.000	0.00082	✓	As Found		-0.002	0.002	0.000514 mV
	10.000	10.00147	✓	As Found		9.997	10.003	0.000533 mV
	50.000	50.00491	✓	As Found		49.993	50.007	0.000669 mV
	100.000	100.00978	✓	As Found		99.988	100.012	0.001271 mV
	200.000	200.0209	✓	As Found		199.978	200.022	0.001506 mV
-0.2 to 2 V	-0.20000	-0.2000268	✓	As Found		-0.20003	-0.19997	0.00000641 V
	-0.10000	-0.10001439	✓	As Found		-0.10002	-0.09998	0.000005771 V
	0.00000	-0.00000174	✓	As Found		-0.00001	0.00001	0.00000500 V
	0.50000	0.5000558	✓	As Found		0.49994	0.50006	0.00000776 V
	1.00000	1.0001083	✓	As Found		0.99989	1.00011	0.00000707 V
	2.00000	2.000207	✓	As Found		1.99979	2.00021	0.00001074 V
-2 to 20 V	-2.00000	-2.000236	✓	As Found		-2.00028	-1.99972	0.00001074 V
	-1.00000	-1.0001068	✓	As Found		-1.00018	-0.99982	0.00005501 V
	0.00000	0.00002235	✓	As Found		-0.00008	0.00008	0.00005012 V
	5.00000	5.000563	✓	As Found		4.99942	5.00058	0.0000776 V
	10.00000	10.001062	✓	As Found		9.99892	10.00108	0.0001001 V
	20.00000	20.00204	✓	As Found		19.99792	20.00208	0.0002405 V
Voltage Input Accuracy								
-20 to 200 mV	-20.000	-19.998	✓	As Found		-20.005	-19.995	0.0012 mV
	-10.000	-9.999	✓	As Found		-10.004	-9.996	0.0011 mV
	0.000	0.001	✓	As Found		-0.003	0.003	0.0010 mV
	50.000	49.996	✓	As Found		49.993	50.007	0.0015 mV
	100.000	99.991	✓	As Found		99.987	100.013	0.0019 mV
	200.000	199.984	✓	As Found		199.977	200.023	0.0028 mV
-200 to 2000 mV	-200.00	-199.97	✓	As Found		-200.04	-199.96	0.006 mV
	-100.00	-99.99	✓	As Found		-100.03	-99.97	0.005 mV
	0.00	0.00	✓	As Found		-0.02	0.02	0.005 mV
	100.00	99.99	✓	As Found		99.97	100.03	0.005 mV
	500.00	499.96	✓	As Found		499.93	500.07	0.006 mV
	1000.00	999.90	✓	As Found		999.88	1000.12	0.008 mV
	2000.00	1999.82	✓	As Found		1999.78	2000.22	0.014 mV
-2 to 20 V	-2.0000	-1.9998	✓	As Found		-2.0004	-1.9996	0.00005 V
	-1.0000	-0.9998	✓	As Found		-1.0003	-0.9997	0.00005 V
	0.0000	0.0000	✓	As Found		-0.0002	0.0002	0.00005 V

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Voltage Input Accuracy								
	2.0000	1.9998	✓	As Found		1.9996	2.0004	0.00005 V
	5.0000	4.9995	✓	As Found		4.9993	5.0007	0.00006 V
	10.0000	9.9990	✓	As Found		9.9988	10.0012	0.00007 V
	20.0000	19.9982	✓	As Found		19.9978	20.0022	0.00010 V
mAmp Output Accuracy								
0 to 50 mA	0.0000	0.00000013	✓	As Found		-0.0004	0.0004	0.000050405 mA
	1.0000	1.0000459	✓	As Found		0.9995	1.0005	0.00005385 mA
	5.0000	5.000478	✓	As Found		4.9991	5.0009	0.0001393 mA
	10.0000	10.001035	✓	As Found		9.9986	10.0014	0.0002256 mA
	30.0000	30.00309	✓	As Found		29.9966	30.0034	0.002655 mA
	50.0000	50.00530	✓	As Found		49.9946	50.0054	0.003800 mA
mAmp Input Accuracy								
-5 to 50 mA	-5.0000	-4.9991	✓	As Found		-5.0013	-4.9987	0.00031 mA
	1.0000	0.9998	✓	As Found		0.9994	1.0006	0.00010 mA
	5.0000	4.9993	✓	As Found		4.9990	5.0010	0.00031 mA
	10.0000	9.9988	✓	As Found		9.9985	10.0015	0.00051 mA
	30.0000	29.9970	✓	As Found		29.9966	30.0034	0.00240 mA
	50.0000	49.9946	✓	As Found		49.9945	50.0055	0.00340 mA
Thermocouple Input Accuracy								
Type J -210 to 1200°C	-205.0	-204.9	✓	As Found		--	--	0.12 °C
	-190.0	-189.94	✓	As Found		-190.2	-189.8	0.12 °C
RJ ext. @ 0.0°C	-50.0	-50.03	✓	As Found		-50.2	-49.8	0.12 °C
	0.0	0.02	✓	As Found		-0.2	0.2	0.12 °C
	100.0	99.98	✓	As Found		99.8	100.2	0.12 °C
	300.0	299.98	✓	As Found		299.8	300.2	0.12 °C
	600.0	599.95	✓	As Found		599.7	600.3	0.12 °C
	750.0	749.92	✓	As Found		749.7	750.3	0.12 °C
	1000.0	999.94	✓	As Found		999.7	1000.3	0.12 °C
	1200.0	1199.99	✓	As Found		1199.7	1200.3	0.12 °C
Degrees F	32.0	32.0	✓	As Found		31.7	32.3	0.22 °F
Type K -270 to 1370°C	-160.0	-159.97	✓	As Found		-160.2	-159.8	0.12 °C
	-50.0	-49.99	✓	As Found		-50.2	-49.8	0.12 °C
	0.0	0.01	✓	As Found		-0.2	0.2	0.12 °C

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Range	Nominal	As Found		As Left		Min	Max	Uncertainty
Thermocouple Input Accuracy								
	100.0	100.02	✓	As Found		99.8	100.2	0.12 °C
	300.0	299.95	✓	As Found		299.8	300.2	0.12 °C
	500.0	499.99	✓	As Found		499.7	500.3	0.12 °C
	700.0	700.00	✓	As Found		699.7	700.3	0.12 °C
	900.0	899.97	✓	As Found		899.7	900.3	0.12 °C
	1100.0	1099.99	✓	As Found		1099.7	1100.3	0.12 °C
	1260.0	1259.92	✓	As Found		1259.7	1260.3	0.12 °C
	1360.0	1359.9	✓	As Found		--	--	0.12 °C
Degrees F	32.0	32.0	✓	As Found		31.7	32.3	0.22 °F
Type T -270 to 400°C	-260.0	-259.7	✓	As Found		--	--	0.12 °C
	-130.0	-129.98	✓	As Found		-130.11	-129.89	0.12 °C
	-50.0	-49.96	✓	As Found		-50.12	-49.88	0.12 °C
	0.00	0.02	✓	As Found		-0.11	0.11	0.12 °C
	100.00	100.02	✓	As Found		99.89	100.11	0.12 °C
	200.00	199.98	✓	As Found		199.87	200.13	0.12 °C
	300.00	299.99	✓	As Found		299.86	300.14	0.12 °C
	400.00	400.00	✓	As Found		399.85	400.15	0.12 °C
Degrees F	32.0	32.0	✓	As Found		31.8	32.2	0.22 °F
Type E -270 to 1000°C	-260.0	-259.8	✓	As Found		--	--	0.12 °C
	-200.0	-199.96	✓	As Found		-200.2	-199.8	0.12 °C
	-100.0	-99.97	✓	As Found		-100.2	-99.8	0.12 °C
	0.0	0.01	✓	As Found		-0.2	0.2	0.12 °C
	50.0	49.99	✓	As Found		49.8	50.2	0.12 °C
	100.0	100.05	✓	As Found		99.8	100.2	0.12 °C
	200.0	200.00	✓	As Found		199.8	200.2	0.12 °C
	400.0	399.97	✓	As Found		399.8	400.2	0.12 °C
	500.0	499.97	✓	As Found		499.7	500.3	0.12 °C
	750.0	749.99	✓	As Found		749.7	750.3	0.12 °C
	1000.0	999.94	✓	As Found		999.7	1000.3	0.12 °C
Degrees F	32.0	32.0	✓	As Found		31.7	32.3	0.22 °F
Type R -50 to 1760°C	150.0	150.12	✓	As Found		149.7	150.3	0.12 °C
	300.0	300.11	✓	As Found		299.7	300.3	0.12 °C
	500.0	500.12	✓	As Found		499.6	500.4	0.12 °C
	1000.0	1000.04	✓	As Found		999.6	1000.4	0.12 °C
	1200.0	1200.01	✓	As Found		1199.68	1200.32	0.12 °C

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Range	Nominal	As Found		As Left		Min	Max	Uncertainty
Thermocouple Input Accuracy								
	1760.0	1759.97	✓	As Found		1759.5	1760.5	0.12 °C
Type S -50 to 1760°C	-50.0	-49.8	✓	As Found		--	--	0.12 °C
	170.0	170.12	✓	As Found		169.7	170.3	0.12 °C
	300.0	300.06	✓	As Found		299.7	300.3	0.12 °C
	500.0	499.97	✓	As Found		499.6	500.4	0.12 °C
	1000.0	999.99	✓	As Found		999.6	1000.4	0.12 °C
	1760.0	1759.99	✓	As Found		1759.5	1760.5	0.12 °C
Type B 50 to 1820°C	50.0	51	✓	As Found		--	--	0.12 °C
	500.0	500.1	✓	As Found		--	--	0.12 °C
	920.0	920.10	✓	As Found		919.5	920.5	0.12 °C
	1200.0	1200.10	✓	As Found		1199.5	1200.5	0.12 °C
	1600.0	1599.98	✓	As Found		1599.4	1600.6	0.12 °C
	1820.0	1819.98	✓	As Found		1819.4	1820.6	0.12 °C
Degrees F	2000.0	2000.1	✓	As Found		1999.2	2000.8	0.22 °F
Type N -270 to 1300°C	0.0	0.05	✓	As Found		-0.2	0.2	0.12 °C
	50.0	50.06	✓	As Found		49.8	50.2	0.12 °C
	100.0	100.06	✓	As Found		99.8	100.2	0.12 °C
	250.0	250.00	✓	As Found		249.8	250.2	0.12 °C
	300.0	300.00	✓	As Found		299.8	300.2	0.12 °C
	500.0	500.01	✓	As Found		499.7	500.3	0.12 °C
	700.0	699.97	✓	As Found		699.7	700.3	0.12 °C
	1000.0	999.98	✓	As Found		999.7	1000.3	0.12 °C
	1300.0	1299.96	✓	As Found		1299.7	1300.3	0.12 °C
Thermocouple Output Accuracy								
Type J -210 to 1200°C	-205.0	-205.05	✓	As Found		--	--	0.075 °C
	-190.0	-190.05	✓	As Found		-190.12	-189.88	0.075 °C
	0.00	-0.04	✓	As Found		-0.10	0.10	0.075 °C
	100.0	100.04	✓	As Found		99.89	100.11	0.075 °C
	300.0	300.05	✓	As Found		299.87	300.13	0.075 °C
	500.0	500.01	✓	As Found		499.85	500.15	0.075 °C
	1200.0	1200.05	✓	As Found		1199.78	1200.22	0.075 °C
Degrees F	32.0	31.94	✓	As Found		31.82	32.18	0.135 °F
Type K -270 to 1370°C	-160.0	-160.02	✓	As Found		-160.12	-159.88	0.075 °C
	0.0	-0.01	✓	As Found		-0.10	0.10	0.075 °C

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Range	Nominal	As Found		As Left		Min	Max	Uncertainty
Thermocouple Output Accuracy								
	100.0	100.06	✓	As Found		99.89	100.11	0.075 °C
	300.0	300.09	✓	As Found		299.87	300.13	0.075 °C
	500.0	500.02	✓	As Found		499.85	500.15	0.075 °C
	1260.0	1260.14	✓	As Found		1259.77	1260.23	0.075 °C
Degrees F	32.0	31.98	✓	As Found		31.82	32.18	0.135 °F
Type T -270 to 400°C	-260.0	-259.838	✓	As Found		--	--	0.075 °C
	-130.0	-130.03	✓	As Found		-130.12	-129.88	0.075 °C
	0.0	0.01	✓	As Found		-0.10	0.10	0.075 °C
	100.0	99.98	✓	As Found		99.89	100.11	0.075 °C
	250.0	249.99	✓	As Found		249.87	250.13	0.075 °C
	400.0	400.03	✓	As Found		399.86	400.14	0.075 °C
Degrees F	32.0	32.00	✓	As Found		31.82	32.18	0.135 °F
Type E -270 to 1000°C	-260.0	-259.913	✓	As Found		--	--	0.075 °C
	-200.0	-200.07	✓	As Found		-200.12	-199.88	0.075 °C
	0.0	0.02	✓	As Found		-0.10	0.10	0.075 °C
	100.0	99.99	✓	As Found		99.89	100.11	0.075 °C
	250.0	250.04	✓	As Found		249.87	250.13	0.075 °C
	500.0	500.05	✓	As Found		499.85	500.15	0.075 °C
	1000.0	1000.10	✓	As Found		999.80	1000.20	0.075 °C
Degrees F	32.0	32.02	✓	As Found		31.82	32.18	0.135 °F
Type R -50.0 to 1760°C	150.0	150.04	✓	As Found		149.78	150.22	0.075 °C
	500.0	499.87	✓	As Found		499.75	500.25	0.075 °C
	800.0	800.06	✓	As Found		799.72	800.28	0.075 °C
	1200.0	1200.15	✓	As Found		1199.68	1200.32	0.075 °C
	1700.0	1700.10	✓	As Found		1699.63	1700.37	0.075 °C
Type S -50 to 1760°C	-45.0	-45.023	✓	As Found		--	--	0.075 °C
	170.0	169.94	✓	As Found		169.78	170.22	0.075 °C
	500.0	499.95	✓	As Found		499.75	500.25	0.075 °C
	800.0	799.97	✓	As Found		799.72	800.28	0.075 °C
	1200.0	1200.12	✓	As Found		1199.68	1200.32	0.075 °C
	1700.0	1700.06	✓	As Found		1699.63	1700.37	0.075 °C
Type B 50 to 1820°C	50.0	51.220	✓	As Found		--	--	0.075 °C
	500.0	500.088	✓	As Found		--	--	0.075 °C
	920.0	919.96	✓	As Found		919.61	920.39	0.075 °C
	1000.0	999.99	✓	As Found		999.60	1000.40	0.075 °C

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Thermocouple Output Accuracy								
	1500.0	1500.04	✓	As Found		1499.55	1500.45	0.075 °C
	1800.0	1800.04	✓	As Found		1799.52	1800.48	0.075 °C
Degrees F	1688.0	1688.08	✓	As Found		1687.29	1688.71	0.135 °F
Type N -270 to 1300°C	-200.0	-200.12	✓	As Found		-200.12	-199.88	0.075 °C
	0.0	0.03	✓	As Found		-0.10	0.10	0.075 °C
	100.0	99.96	✓	As Found		99.89	100.11	0.075 °C
	300.0	300.09	✓	As Found		299.87	300.13	0.075 °C
	600.0	600.05	✓	As Found		599.84	600.16	0.075 °C
	1000.0	1000.08	✓	As Found		999.80	1000.20	0.075 °C
	1300.0	1300.12	✓	As Found		1299.77	1300.23	0.075 °C
Degrees F	32.0	32.02	✓	As Found		31.82	32.18	0.135 °F
Ohms Input Accuracy								
0 to 500 Ohms	0.000	N/A	✓	As Found		-0.012	0.012	N/A
	100.000	N/A	✓	As Found		99.978	100.022	N/A
	200.000	N/A	✓	As Found		199.968	200.032	N/A
	300.000	N/A	✓	As Found		299.958	300.042	N/A
	400.000	N/A	✓	As Found		399.948	400.052	N/A
	500.000	N/A	✓	As Found		499.938	500.062	N/A
0 to 5.0 kOhms	0.00000	N/A	✓	As Found		-0.00012	0.00012	N/A
	1.00000	N/A	✓	As Found		0.99978	1.00022	N/A
	2.00000	N/A	✓	As Found		1.99968	2.00032	N/A
	3.00000	N/A	✓	As Found		2.99958	3.00042	N/A
	4.00000	N/A	✓	As Found		3.99948	4.00052	N/A
	5.00000	N/A	✓	As Found		4.99938	5.00062	N/A
Ohms Output Accuracy								
0 to 500 Ohms	0.000	0.0010	✓	As Found		-0.020	0.020	0.00111 Ohms
	100.000	100.0173	✓	As Found		99.970	100.030	0.00211 Ohms
	200.000	200.0312	✓	As Found		199.960	200.040	0.00311 Ohms
	300.000	300.0459	✓	As Found		299.950	300.050	0.00411 Ohms
	400.000	400.0512	✓	As Found		399.940	400.060	0.00511 Ohms
	500.000	500.0655	✓	As Found		499.930	500.070	0.00611 Ohms
0 to 5.0 kOhms	0.00000	0.0000106	✓	As Found		-0.00020	0.00020	.00000561 kOhm
	0.50000	0.5000224	✓	As Found		0.49975	0.50025	.00001061 kOhm
	1.00000	1.0000289	✓	As Found		0.99970	1.00030	.00001561 kOhm

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Ohms Output Accuracy								
	2.00000	2.000049	✓	As Found		1.99960	2.00040	0.0000311 kOhms
	3.00000	3.000067	✓	As Found		2.99950	3.00050	0.0000411 kOhms
	4.00000	4.000073	✓	As Found		3.99940	4.00060	0.0000511 kOhms
	5.00000	5.000089	✓	As Found		4.99930	5.00070	0.0000611 kOhms
Frequency Accuracy Output								
1 to 200 Hz	1.000	1.0000170	✓	As Found		0.99895	1.00105	0.00150005 Hz
	25.000	24.99961	✓	As Found		24.998	25.002	0.008005 Hz
	50.000	49.99921	✓	As Found		49.996	50.004	0.005505 Hz
	100.000	99.99842	✓	As Found		99.994	100.006	0.010505 Hz
	150.000	149.99976	✓	As Found		149.991	150.009	0.01555 Hz
	200.000	199.9968	✓	As Found		199.989	200.011	0.02055 Hz
1 to 2000 Hz	1.00	1.0000170	✓	As Found		0.99895	1.00105	0.00600005 Hz
	250.00	249.9960	✓	As Found		249.986	250.014	0.03005 Hz
	500.00	499.9921	✓	As Found		499.974	500.026	0.05505 Hz
	1000.00	999.9842	✓	As Found		999.949	1000.051	0.10505 Hz
	1500.00	1499.976	✓	As Found		1499.924	1500.076	0.1555 Hz
	2000.00	1999.968	✓	As Found		1999.899	2000.101	0.2055 Hz
1 to 20000 Hz	1.0	0.9999841	✓	As Found		0.99895	1.00105	0.05100005 Hz
	2500.0	2499.961	✓	As Found		2499.874	2500.126	0.3005 Hz
	5000.0	4999.921	✓	As Found		4999.749	5000.251	0.5505 Hz
	10000.0	9999.849	✓	As Found		9999.499	10000.501	1.0505 Hz
	15000.0	14999.76	✓	As Found		14999.249	15000.751	1.555 Hz
	20000.0	19999.68	✓	As Found		19998.999	20001.001	2.055 Hz

End of Datasheet

Calibration Standards

NIST Traceable #	Instrument ID#	Description	Model	Calibration Date	Date Due
1000176110	00266	High Impedance Voltmeter-Null Detector	845AR	21 APR 2014	30 APR 2015
1000176725	02037	Humidity/Temperature Chart Recorder	RH520	22 MAY 2014	31 MAY 2015
1000178178	01241	Precision Process Calibrator	7526A	24 JUL 2014	31 JUL 2015
1000180945	00890	Reference Multimeter	8508A-01	29 DEC 2014	31 DEC 2015
2027010175	00872	Calibrator	5520A/SC600	31 DEC 2014	31 DEC 2015