Report of Calibration
for
Ruthenium Oxide Thermometer
Model No. RO105
Typical Response

Calibration Excitation: 10 microamps DC

Calibration Range: 2.0 to 273K

Record of Revisions						
Rev	ECN#	Description	Rev by	Date	Appr by	Date
-		Initial Release	JWS	11/21/05	JWL	12/15/05

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Ruthenium Oxide Thermometer
Model RO105

2.0 to 17.0K

T = Temperature in Kelvin
R = Resistance in Ohms

$$T = a + bR + \frac{c}{R\sqrt{R}} + d\frac{\ln R}{R^2} + \frac{e}{R^2}$$

$a = -323.4234$ $b = 3.9393E-4$ $c = 2.07111E+11$
$d = -3.024916E+13$ $e = 2.8657273E+14$

T [K]	R [Ohms]	T [K]	R [Ohms]	T [K]	R [Ohms]	T [K]	R [Ohms]
2.0	239556.1	6.0	187171.8	10.0	163317.2	14.0	150299.6
3.0	221769.1	7.0	179524.0	11.0	159409.7	15.0	147881.5
4.0	207807.5	8.0	173177.5	12.0	155998.4	16.0	145688.0
5.0	196463.8	9.0	167849.6	13.0	152986.3	17.0	143684.4

17.0 to 65.0K

$$\frac{1}{T} = a + bR\sqrt{R} + c\frac{R}{\ln R}$$

$a = 0.154589$ $b = 1.1062594E-8$ $c = -5.771048E-5$

T [K]	R [Ohms]	T [K]	R [Ohms]	T [K]	R [Ohms]	T [K]	R [Ohms]	T [K]	R [Ohms]
17.0	143670.5	28.0	129816.3	39.0	122621.7	50.0	118091.3	61.0	114930.8
18.0	141872.3	29.0	128985.8	40.0	122128.3	51.0	117758.9	62.0	114689.2
19.0	140225.3	30.0	128199.6	41.0	121654.2	52.0	117436.8	63.0	114453.9
20.0	138709.8	31.0	127454.0	42.0	121198.4	53.0	117124.6	64.0	114224.5
21.0	137309.5	32.0	126745.8	43.0	120759.6	54.0	116821.8	65.0	114001.0
22.0	136010.9	33.0	126071.9	44.0	120336.9	55.0	116527.9		
23.0	134802.4	34.0	125429.8	45.0	119929.4	56.0	116242.5		
24.0	133674.5	35.0	124817.2	46.0	119536.1	57.0	115965.3		
25.0	132618.6	36.0	124231.9	47.0	119156.4	58.0	115695.8		
26.0	131627.6	37.0	123672.0	48.0	118789.5	59.0	115433.8		
27.0	130695.3	38.0	123135.8	49.0	118434.7	60.0	115178.9		

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Ruthenium Oxide Thermometer
Model RO105

65.0 to 150.0K

T = Temperature in Kelvin
R = Resistance in Ohms

$$T = a + bR + cR\ln R + dR^2 + e\frac{\ln R}{R^2}$$

$a = -1.584227928E + 6$
$b = 217.44918601$
$c = -18.131694205$
$d = 5.89357004E - 5$
$e = 1.08668027E + 14$

T [K]	R [Ohms]	T [K]	R [Ohms]	T [K]	R [Ohms]	T [K]	R [Ohms]	T [K]	R [Ohms]
65.0	113995.3	82.0	110909.5	99.0	108706.3	116.0	107043.8	133.0	105730.5
66.0	113778.4	83.0	110759.9	100.0	108595.9	117.0	106958.3	134.0	105661.5
67.0	113567.0	84.0	110613.2	101.0	108487.3	118.0	106873.9	135.0	105593.2
68.0	113360.8	85.0	110469.3	102.0	108380.4	119.0	106790.7	136.0	105525.6
69.0	113159.5	86.0	110328.1	103.0	108275.2	120.0	106708.6	137.0	105458.9
70.0	112963.0	87.0	110189.5	104.0	108171.7	121.0	106627.5	138.0	105392.8
71.0	112770.9	88.0	110053.4	105.0	108069.8	122.0	106547.5	139.0	105327.5
72.0	112583.2	89.0	109919.8	106.0	107969.4	123.0	106468.6	140.0	105262.9
73.0	112399.5	90.0	109788.7	107.0	107870.6	124.0	106390.6	141.0	105199.0
74.0	112219.9	91.0	109659.8	108.0	107773.3	125.0	106313.6	142.0	105135.7
75.0	112044.0	92.0	109533.3	109.0	107677.4	126.0	106237.6	143.0	105073.2
76.0	111871.8	93.0	109409.0	110.0	107582.9	127.0	106162.5	144.0	105011.2
77.0	111703.2	94.0	109286.8	111.0	107489.8	128.0	106088.3	145.0	104949.9
78.0	111538.0	95.0	109166.7	112.0	107398.1	129.0	106015.1	146.0	104889.3
79.0	111376.1	96.0	109048.7	113.0	107307.6	130.0	105942.7	147.0	104829.2
80.0	111217.5	97.0	108932.6	114.0	107218.5	131.0	105871.1	148.0	104769.8
81.0	111061.9	98.0	108818.5	115.0	107130.5	132.0	105800.4	149.0	104710.9
								150.0	104652.7

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150.0 to 215.0K

T = Temperature in Kelvin
R = Resistance in Ohms

$$\frac{1}{T} = a + bR^2\sqrt{R} + cR^3$$

$a = -0.01026231$
$b = -1.706637E-14$
$c = 6.752489E-17$

T [K]	R [Ohms]	T [K]	R [Ohms]	T [K]	R [Ohms]	T [K]	R [Ohms]	T [K]	R [Ohms]
150.0	104653.2	165.0	103861.6	180.0	103188.2	195.0	102608.0	210.0	102102.8
151.0	104596.2	166.0	103813.4	181.0	103146.8	196.0	102572.1	211.0	102071.5
152.0	104539.7	167.0	103765.6	182.0	103105.9	197.0	102536.6	212.0	102040.4
153.0	104484.0	168.0	103718.4	183.0	103065.3	198.0	102501.4	213.0	102009.5
154.0	104428.9	169.0	103671.7	184.0	103025.2	199.0	102466.6	214.0	101979.0
155.0	104374.4	170.0	103625.4	185.0	102985.4	200.0	102432.0	215.0	101948.6
156.0	104320.5	171.0	103579.6	186.0	102946.0	201.0	102397.8		
157.0	104267.2	172.0	103534.3	187.0	102907.0	202.0	102363.8		
158.0	104214.5	173.0	103489.5	188.0	102868.4	203.0	102330.2		
159.0	104162.4	174.0	103445.1	189.0	102830.1	204.0	102296.8		
160.0	104110.9	175.0	103401.2	190.0	102792.2	205.0	102263.8		
161.0	104060.0	176.0	103357.7	191.0	102754.7	206.0	102231.0		
162.0	104009.6	177.0	103314.7	192.0	102717.5	207.0	102198.6		
163.0	103959.7	178.0	103272.1	193.0	102680.6	208.0	102166.4		
164.0	103910.4	179.0	103229.9	194.0	102644.1	209.0	102134.5		

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215.0 to 273.0K

T = Temperature in Kelvin
R = Resistance in Ohms

$$T = a + bR^2\sqrt{R} + c\frac{\ln R}{R} + \frac{d}{R}$$

$$a = 3.851068849E+6$$
$$b = -9.2230924E-8$$
$$c = -2.83719503E+11$$
$$d = 2.9105317596E+12$$

T [K]	R [Ohms]	T [K]	R [Ohms]	T [K]	R [Ohms]	T [K]	R [Ohms]	T [K]	R [Ohms]
215.0	101948.6	227.0	101605.1	239.0	101302.5	251.0	101032.6	263.0	100789.8
216.0	101916.1	228.0	101578.5	240.0	101278.8	252.0	101011.4	264.0	100770.7
217.0	101886.4	229.0	101552.2	241.0	101255.4	253.0	100990.4	265.0	100751.7
218.0	101857.0	230.0	101526.1	242.0	101232.2	254.0	100969.5	266.0	100732.8
219.0	101827.9	231.0	101500.3	243.0	101209.2	255.0	100948.9	267.0	100714.1
220.0	101799.1	232.0	101474.7	244.0	101186.4	256.0	100928.4	268.0	100695.6
221.0	101770.5	233.0	101449.4	245.0	101163.8	257.0	100908.1	269.0	100677.2
222.0	101742.3	234.0	101424.3	246.0	101141.4	258.0	100888.0	270.0	100658.9
223.0	101714.3	235.0	101399.4	247.0	101119.3	259.0	100868.0	271.0	100640.8
224.0	101686.6	236.0	101374.9	248.0	101097.3	260.0	100848.2	272.0	100622.8
225.0	101659.2	237.0	101350.5	249.0	101075.5	261.0	100828.6	273.0	100604.9
226.0	101632.0	238.0	101326.4	250.0	101053.9	262.0	100809.1		

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