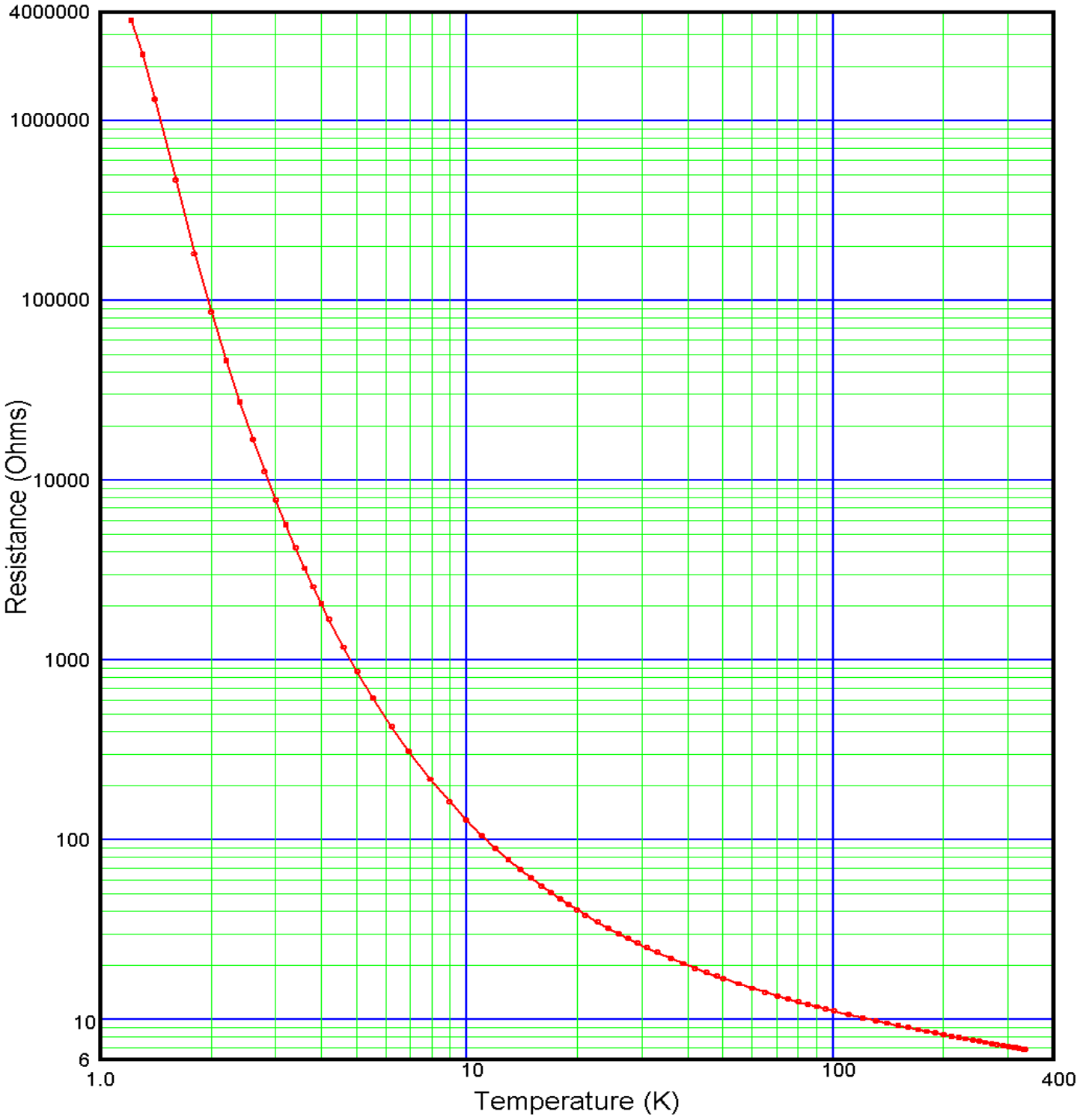
DATA PLOT

Calibration Report: 403501
Sensor Model: CGR-1-2000-1.4L
Sensor Type: Carbon Glass Resistor
Temperature Range: 1.40K to 325K

Sales Order: 13426
Serial Number: C19522
Sensor Excitation: 2mV±50%



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TEST DATA

Calibration Report: 403501
Sensor Model: CGR-1-2000-1.4L
Sensor Type: Carbon Glass Resistor
Temperature Range: 1.40K to 325K

Sales Order: 13426
Serial Number: C19522
Sensor Excitation: 2mV±50%

Index	Temperature (K)	Resistance (Ω)	Index	Temperature (K)	Resistance (Ω)
1	1.21023	3.61341e+6	46	41.9683	19.3722
2	1.30071	2.34433e+6	47	44.9777	18.3649
3	1.40496	1.31084e+6	48	48.0027	17.4949
4	1.60043	467894.	49	50.0313	16.9776
5	1.80136	181872.	50	55.0898	15.8813
6	2.00010	86599.7	51	60.1380	14.9906
7	2.19914	46314.2	52	65.1765	14.2464
8	2.39698	27187.1	53	70.2056	13.6197
9	2.60109	16855.0	54	75.2206	13.0815
10	2.80042	11209.2	55	80.2427	12.6153
11	3.00077	7793.65	56	85.2545	12.2045
12	3.20102	5641.85	57	90.2568	11.8432
13	3.40166	4216.25	58	95.2636	11.5153
14	3.60260	3240.42	59	100.273	11.2211
15	3.79934	2563.61	60	110.267	10.7085
16	4.00200	2055.10	61	120.251	10.2816
17	4.19877	1688.72	62	130.260	9.91448
18	4.60270	1180.64	63	140.226	9.59493
19	5.01352	863.459	64	150.207	9.31468
20	5.52808	618.327	65	160.197	9.06420
21	6.21908	426.340	66	170.178	8.84192
22	6.91864	312.739	67	180.163	8.63833
23	7.93381	217.814	68	190.137	8.44830
24	8.94483	163.418	69	200.136	8.28277
25	9.95482	129.090	70	210.125	8.12783
26	10.9600	106.047	71	220.125	7.98237
27	11.9624	89.7440	72	230.111	7.85358
28	12.9641	77.7220	73	240.129	7.73147
29	13.9632	68.5639	74	250.131	7.61208
30	14.9585	61.3993	75	260.130	7.50208
31	15.9590	55.6360	76	270.133	7.39910
32	16.9538	50.9381	77	280.118	7.30162
33	17.9521	47.0246	78	290.136	7.20862
34	18.9513	43.7215	79	300.058	7.12066
35	19.9537	40.9009	80	310.037	7.04025
36	21.0612	38.2337	81	314.991	7.00112
37	22.6816	34.9981	82	321.256	6.95590
38	24.3163	32.3293	83	328.759	6.89698
39	25.9435	30.1294	84	333.747	6.86194
40	27.5545	28.2875			
41	29.1543	26.7317			
42	30.9441	25.2335			
43	33.0225	23.7517			
44	35.9998	21.9919			
45	38.9773	20.5671			

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POLYNOMIAL EQUATION

Calibration Report: 403501 Sales Order: 13426
Sensor Model: CGR-1-2000-1.4L Serial Number: C19522
Sensor Type: Carbon Glass Resistor Sensor Excitation: 2mV±50%
Temperature Range: 1.40K to 325K

Polynomial Type: Chebychev
Useful Range of Fit:

1.40K	to	6.92K
1.358e+6 Ohms	to	312.7 Ohms

Lower and Upper limits of Log(resistance) used in computing Chebychev coefficients:

ZL = 2.21329914928 ZU = 6.55791736274

Order	Coefficient	Std. Deviation of Coefficient	Ratio (Coeff./Std Dev.)
0	3.575874	2.3679E-04	15101.22
1	-3.273228	3.7272E-04	-8781.94
2	1.292927	3.3387E-04	3872.57
3	-0.507631	3.4248E-04	-1482.21
4	0.180133	3.3403E-04	539.28
5	-0.074465	3.1589E-04	-235.73
6	0.024800	3.0026E-04	82.60
7	-0.010167	3.0425E-04	-33.42
8	0.003896	3.0953E-04	12.59
9	-0.001663	3.0199E-04	-5.51

Z = Log(resistance)

X = ((Z-ZL)-(ZU-Z))/(ZU-ZL)

Temp. (K) = ΣA_i* COS(i * ARCCOS(X)), where 0 <= i <= 9
and the A_i's are the coefficients in the table above.

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POLYNOMIAL EQUATION

Calibration Report: 403501
Sensor Model: CGR-1-2000-1.4L
Sensor Type: Carbon Glass Resistor
Temperature Range: 1.40K to 325K

Sales Order: 13426
Serial Number: C19522
Sensor Excitation: 2mV±50%

Polynomial Type: Chebychev
Temp. (K) vs. Log(resistance)

	R Meas. (Ω)	T Meas. (K)	T Eq. (K)	T diff. (mK)
1	3.613411e+6	1.21023	1.21048	-0.24
2	2.344334e+6	1.30071	1.29976	0.94
3	1.310839e+6	1.40496	1.40643	-1.47
4	467893.8	1.60043	1.59851	1.92
5	181872.5	1.80136	1.80339	-2.04
6	86599.74	2.00010	1.99968	0.42
7	46314.17	2.19914	2.19836	0.78
8	27187.14	2.39698	2.39653	0.46
9	16854.97	2.60109	2.60154	-0.45
10	11209.19	2.80042	2.80087	-0.44
11	7793.650	3.00077	3.00125	-0.48
12	5641.851	3.20102	3.20096	0.06
13	4216.248	3.40166	3.40151	0.15
14	3240.417	3.60260	3.60228	0.32
15	2563.610	3.79934	3.79888	0.47
16	2055.098	4.00200	4.00204	-0.04
17	1688.722	4.19877	4.19868	0.09
18	1180.642	4.60270	4.60284	-0.15
19	863.4590	5.01352	5.01417	-0.64
20	618.3272	5.52808	5.52818	-0.10
21	426.3399	6.21908	6.21828	0.80
22	312.7394	6.91864	6.91893	-0.29
23	217.8142	7.93381	7.93390	-0.10
24	163.4177	8.94483	8.94478	0.05

Order of Fit = 9 RMS error of fit = .77 mK
Largest absolute error = -2.04 mK at data point no. 5

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POLYNOMIAL EQUATION

Calibration Report: 403501 Sales Order: 13426
Sensor Model: CGR-1-2000-1.4L Serial Number: C19522
Sensor Type: Carbon Glass Resistor Sensor Excitation: 2mV±50%
Temperature Range: 1.40K to 325K

Polynomial Type: Chebychev
Useful Range of Fit:

6.92K	to	30.9K
312.7 Ohms	to	25.23 Ohms

Lower and Upper limits of Log(resistance) used in computing Chebychev coefficients:

ZL = 1.34226199742 ZU = 2.7912183514

Order	Coefficient	Std. Deviation of Coefficient	Ratio (Coeff./Std Dev.)
0	14.969753	5.3858E-04	27794.96
1	-13.167617	9.1011E-04	-14468.19
2	5.089885	7.8205E-04	6508.36
3	-1.842736	6.4114E-04	-2874.15
4	0.632594	5.4077E-04	1169.80
5	-0.206374	5.7655E-04	-357.95
6	0.065316	7.0624E-04	92.48
7	-0.019480	7.3624E-04	-26.46
8	0.006861	6.4226E-04	10.68

Z = Log(resistance)

X = ((Z-ZL)-(ZU-Z))/(ZU-ZL)

Temp. (K) = ΣA_i* COS(i * ARCCOS(X)), where 0 <= i <= 8
and the A_i's are the coefficients in the table above.

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POLYNOMIAL EQUATION

Calibration Report: 403501
Sensor Model: CGR-1-2000-1.4L
Sensor Type: Carbon Glass Resistor
Temperature Range: 1.40K to 325K

Sales Order: 13426
Serial Number: C19522
Sensor Excitation: 2mV±50%

Polynomial Type: Chebychev
Temp. (K) vs. Log(resistance)

	R Meas. (Ω)	T Meas. (K)	T Eq. (K)	T diff. (mK)
20	618.3272	5.52818	5.52820	-0.02
21	426.3399	6.21828	6.21809	0.19
22	312.7394	6.91893	6.91948	-0.55
23	217.8142	7.93381	7.93304	0.76
24	163.4177	8.94483	8.94485	-0.03
25	129.0897	9.95482	9.95549	-0.67
26	106.0469	10.95998	10.96039	-0.41
27	89.74404	11.96240	11.96233	0.07
28	77.72197	12.96410	12.96310	1.00
29	68.56386	13.96316	13.96235	0.81
30	61.39932	14.95845	14.95909	-0.63
31	55.63600	15.95901	15.95846	0.55
32	50.93810	16.95384	16.95456	-0.72
33	47.02457	17.95210	17.95278	-0.67
34	43.72152	18.95129	18.95265	-1.35
35	40.90088	19.95369	19.95406	-0.37
36	38.23374	21.06119	21.06116	0.03
37	34.99808	22.68164	22.67845	3.19
38	32.32930	24.31634	24.31528	1.06
39	30.12944	25.94354	25.94252	1.02
40	28.28745	27.55448	27.55891	-4.43
41	26.73168	29.15425	29.15486	-0.61
42	25.23349	30.94405	30.94383	0.22
43	23.75169	33.02245	33.02004	2.41
44	21.99186	35.99976	36.00062	-0.86

Order of Fit = 8 RMS error of fit = 1.35 mK
Largest absolute error = -4.43 mK at data point no. 40

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POLYNOMIAL EQUATION

Calibration Report: 403501 Sales Order: 13426
Sensor Model: CGR-1-2000-1.4L Serial Number: C19522
Sensor Type: Carbon Glass Resistor Sensor Excitation: 2mV±50%
Temperature Range: 1.40K to 325K

Polynomial Type: Chebychev
Useful Range of Fit:

30.9K	to	130.K
25.23 Ohms	to	9.914 Ohms

Lower and Upper limits of Log(resistance) used in computing Chebychev coefficients:

ZL = 0.9691680392 ZU = 1.45159385762

Order	Coefficient	Std. Deviation of Coefficient	Ratio (Coeff./Std Dev.)
0	69.989611	3.6480E-03	19185.79
1	-56.308257	5.8293E-03	-9659.45
2	17.729785	5.3106E-03	3338.57
3	-4.782363	5.0542E-03	-946.21
4	1.125603	4.8862E-03	230.36
5	-0.226603	4.7008E-03	-48.21
6	0.036971	4.6319E-03	7.98
7	-0.007387	4.5359E-03	-1.63

Z = Log(resistance)

X = ((Z-ZL)-(ZU-Z))/(ZU-ZL)

Temp. (K) = ΣA_i* COS(i * ARCCOS(X)), where 0 <= i <= 7
and the A_i's are the coefficients in the table above.

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POLYNOMIAL EQUATION

Calibration Report: 403501
Sensor Model: CGR-1-2000-1.4L
Sensor Type: Carbon Glass Resistor
Temperature Range: 1.40K to 325K

Sales Order: 13426
Serial Number: C19522
Sensor Excitation: 2mV±50%

Polynomial Type: Chebychev
Temp. (K) vs. Log(resistance)

	R Meas. (Ω)	T Meas. (K)	T Eq. (K)	T diff. (mK)
40	28.28745	27.55891	27.55736	1.55
41	26.73168	29.15486	29.15883	-3.98
42	25.23349	30.94383	30.94373	0.10
43	23.75169	33.02245	33.01675	5.70
44	21.99186	35.99976	36.00302	-3.26
45	20.56709	38.97730	38.97445	2.85
46	19.37225	41.96828	41.97522	-6.94
47	18.36493	44.97775	44.97351	4.24
48	17.49490	48.00270	48.00237	0.33
49	16.97758	50.03131	50.03929	-7.98
50	15.88125	55.08977	55.08594	3.83
51	14.99058	60.13796	60.12005	17.91
52	14.24637	65.17652	65.17824	-1.72
53	13.61973	70.20562	70.21099	-5.36
54	13.08154	75.22063	75.24141	-20.78
55	12.61529	80.24269	80.24870	-6.01
56	12.20451	85.25452	85.26231	-7.79
57	11.84320	90.25675	90.22533	31.43
58	11.51532	95.26356	95.25394	9.63
59	11.22105	100.27299	100.25942	13.57
60	10.70852	110.26730	110.30681	-39.52
61	10.28159	120.25093	120.25333	-2.39
62	9.914476	130.26018	130.23625	23.93
63	9.594929	140.22618	140.23633	-10.15
64	9.314682	150.20740	150.20658	0.83

Order of Fit = 7 RMS error of fit = 13.57 mK
Largest absolute error = -39.52 mK at data point no. 60

POLYNOMIAL EQUATION

Calibration Report: 403501 Sales Order: 13426
Sensor Model: CGR-1-2000-1.4L Serial Number: C19522
Sensor Type: Carbon Glass Resistor Sensor Excitation: 2mV±50%
Temperature Range: 1.40K to 325K

Polynomial Type: Chebychev
Useful Range of Fit:

130.K	to	325.K
9.914 Ohms	to	6.925 Ohms

Lower and Upper limits of Log(resistance) used in computing Chebychev coefficients:

ZL = 0.83644704161 ZU = 1.02972942316

Order	Coefficient	Std. Deviation of Coefficient	Ratio (Coeff./Std Dev.)
0	202.566674	3.9985E-02	5066.08
1	-109.152874	6.6077E-02	-1651.90
2	19.223602	5.7364E-02	335.12
3	-2.443235	5.1002E-02	-47.91
4	0.253007	4.6732E-02	5.41
5	-0.053884	4.6248E-02	-1.17
6	0.067922	4.9790E-02	1.36
7	-0.096129	5.2498E-02	-1.83
8	-0.065442	5.0396E-02	-1.30

Z = Log(resistance)

X = ((Z-ZL)-(ZU-Z))/(ZU-ZL)

Temp. (K) = ΣA_i* COS(i * ARCCOS(X)), where 0 <= i <= 8
and the A_i's are the coefficients in the table above.

POLYNOMIAL EQUATION

Calibration Report: 403501
Sensor Model: CGR-1-2000-1.4L
Sensor Type: Carbon Glass Resistor
Temperature Range: 1.40K to 325K

Sales Order: 13426
Serial Number: C19522
Sensor Excitation: 2mV±50%

Polynomial Type: Chebychev
Temp. (K) vs. Log(resistance)

	R Meas. (Ω)	T Meas. (K)	T Eq. (K)	T diff. (mK)
60	10.70852	110.30681	110.29964	7.17
61	10.28159	120.25333	120.30211	-48.79
62	9.914476	130.23625	130.13722	99.03
63	9.594929	140.22618	140.24603	-19.85
64	9.314682	150.20740	150.29158	-84.18
65	9.064200	160.19727	160.26873	-71.46
66	8.841920	170.17770	170.06782	109.88
67	8.638325	180.16334	180.00308	160.26
68	8.448302	190.13670	190.26755	-130.86
69	8.282771	200.13571	200.10340	32.31
70	8.127831	210.12499	210.14263	-17.64
71	7.982367	220.12500	220.35528	-230.28
72	7.853581	230.11066	230.07191	38.75
73	7.731465	240.12895	239.90510	223.85
74	7.612081	250.13098	250.14093	-9.95
75	7.502083	260.13032	260.16200	-31.68
76	7.399104	270.13336	270.10773	25.64
77	7.301624	280.11772	280.08140	36.32
78	7.208619	290.13585	290.16424	-28.39
79	7.120655	300.05771	300.27070	-212.99
80	7.040252	310.03662	310.04628	-9.66
81	7.001122	314.99096	315.00436	-13.41
82	6.955904	321.25559	320.90650	349.09
83	6.896976	328.75890	328.88731	-128.41
84	6.861942	333.74713	333.79188	-44.76

Order of Fit = 8 RMS error of fit = 122.57 mK
Largest absolute error = 349.09 mK at data point no. 82

INTERPOLATION TABLE

Calibration Report: 403501
Sensor Model: CGR-1-2000-1.4L
Sensor Type: Carbon Glass Resistor
Temperature Range: 1.40K to 325K

Sales Order: 13426
Serial Number: C19522
Sensor Excitation: 2mV±50%

Temp (K)	Res. (Ω)	dR/dT (Ω/K)	dlogR/dlogT	Temp (K)	Res. (Ω)	dR/dT (Ω/K)	dlogR/dlogT
1.400	1.35845e+6	-7.5351e+6	-7.7656	15.50	58.1302	-5.7022	-1.5205
1.500	784514.	-4.2363e+6	-8.0999	16.00	55.4213	-5.1474	-1.4860
1.600	464378.	-2.3472e+6	-8.0872	16.50	52.9705	-4.6667	-1.4536
1.700	286356.	-1.3217e+6	-7.8462	17.00	50.7443	-4.2479	-1.4231
1.800	184467.	-7.7119e+5	-7.5251	17.50	48.7140	-3.8811	-1.3942
1.900	123981.	-4.6818e+5	-7.1749	18.00	46.8559	-3.5582	-1.3669
2.000	86505.2	-2.9690e+5	-6.8644	18.50	45.1496	-3.2725	-1.3409
2.100	62299.3	-1.9563e+5	-6.5944	19.00	43.5780	-3.0189	-1.3162
2.200	46095.3	-1.3330e+5	-6.3622	19.50	42.1262	-2.7926	-1.2927
2.300	34897.1	-93479.	-6.1610	20.00	40.7815	-2.5900	-1.2702
2.400	26952.4	-67175.	-5.9816	21.00	38.3704	-2.2441	-1.2282
2.500	21183.5	-49305.	-5.8188	22.00	36.2722	-1.9614	-1.1896
2.600	16911.7	-36860.	-5.6669	23.00	34.4313	-1.7279	-1.1542
2.700	13692.2	-28015.	-5.5244	24.00	32.8038	-1.5327	-1.1214
2.800	11227.9	-21607.	-5.3882	25.00	31.3555	-1.3685	-1.0911
2.900	9314.76	-16890.	-5.2583	26.00	30.0586	-1.2290	-1.0630
3.000	7810.38	-13365.	-5.1337	27.00	28.8908	-1.1096	-1.0370
3.100	6613.23	-10698.	-5.0147	28.00	27.8339	-1.0068	-1.0128
3.200	5650.11	-8653.2	-4.9009	29.00	26.8728	-0.91743	-0.99005
3.300	4867.30	-7068.4	-4.7923	30.00	25.9951	-0.83968	-0.96904
3.400	4225.03	-5826.7	-4.6889	31.00	25.1899	-0.77233	-0.95047
3.500	3693.36	-4844.1	-4.5905	32.00	24.4479	-0.71267	-0.93282
3.600	3249.64	-4059.2	-4.4969	33.00	23.7627	-0.65866	-0.91470
3.700	2876.44	-3426.8	-4.4079	34.00	23.1288	-0.61011	-0.89688
3.800	2560.33	-2912.9	-4.3233	35.00	22.5407	-0.56686	-0.88020
3.900	2290.76	-2492.1	-4.2428	36.00	21.9935	-0.52845	-0.86499
4.000	2059.46	-2144.9	-4.1659	37.00	21.4825	-0.49400	-0.85083
4.200	1686.59	-1615.5	-4.0230	38.00	21.0044	-0.46278	-0.83723
4.400	1403.02	-1240.8	-3.8912	39.00	20.5560	-0.43451	-0.82438
4.600	1183.40	-969.76	-3.7696	40.00	20.1345	-0.40880	-0.81214
4.800	1010.40	-769.83	-3.6571	42.00	19.3632	-0.36386	-0.78923
5.000	872.171	-619.49	-3.5514	44.00	18.6743	-0.32606	-0.76826
5.200	760.244	-504.73	-3.4523	46.00	18.0552	-0.29395	-0.74891
5.400	668.564	-415.77	-3.3582	48.00	17.4955	-0.26638	-0.73083
5.600	592.647	-346.16	-3.2709	50.00	16.9871	-0.24262	-0.71413
5.800	529.165	-290.71	-3.1864	52.00	16.5230	-0.22193	-0.69844
6.000	475.641	-246.11	-3.1046	54.00	16.0977	-0.20379	-0.68362
6.500	373.777	-167.86	-2.9191	56.00	15.7063	-0.18792	-0.67001
7.000	302.862	-119.51	-2.7623	58.00	15.3448	-0.17384	-0.65707
7.500	251.528	-87.900	-2.6210	60.00	15.0099	-0.16134	-0.64494
8.000	213.287	-66.408	-2.4908	65.00	14.2705	-0.13560	-0.61762
8.500	184.045	-51.426	-2.3751	70.00	13.6441	-0.11578	-0.59398
9.000	161.141	-40.787	-2.2780	75.00	13.1056	-0.10019	-0.57334
9.500	142.798	-32.949	-2.1920	77.35	12.8776	-9.3988e-2	-0.56455
10.00	127.877	-27.003	-2.1116	80.00	12.6370	-8.7699e-2	-0.55519
10.50	115.570	-22.415	-2.0365	85.00	12.2248	-7.7533e-2	-0.53909
11.00	105.296	-18.826	-1.9667	90.00	11.8587	-6.9145e-2	-0.52476
11.50	96.6215	-15.978	-1.9017	95.00	11.5311	-6.2128e-2	-0.51185
12.00	89.2255	-13.689	-1.8411	100.0	11.2356	-5.6225e-2	-0.50042
12.50	82.8612	-11.830	-1.7846	105.0	10.9674	-5.1176e-2	-0.48995
13.00	77.3398	-10.306	-1.7323	110.0	10.7228	-4.6739e-2	-0.47947
13.50	72.5120	-9.0434	-1.6837	115.0	10.4989	-4.2981e-2	-0.47080
14.00	68.2617	-7.9891	-1.6385	120.0	10.2917	-4.0001e-2	-0.46640
14.50	64.4953	-7.1008	-1.5964	125.0	10.0984	-3.7298e-2	-0.46168
15.00	61.1385	-6.3470	-1.5572	130.0	9.91918	-3.4329e-2	-0.44991

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INTERPOLATION TABLE

Calibration Report: 403501
Sensor Model: CGR-1-2000-1.4L
Sensor Type: Carbon Glass Resistor
Temperature Range: 1.40K to 325K

Sales Order: 13426
Serial Number: C19522
Sensor Excitation: 2mV±50%

Temp (K)	Res. (Ω)	dR/dT (Ω/K)	dlogR/dlogT	Temp (K)	Res. (Ω)	dR/dT (Ω/K)	dlogR/dlogT
135.0	9.75472	-3.1580e-2	-0.43705	235.0	7.79141	-1.2414e-2	-0.37441
140.0	9.60219	-2.9547e-2	-0.43080	240.0	7.73032	-1.2027e-2	-0.37339
145.0	9.45849	-2.7956e-2	-0.42857	245.0	7.67111	-1.1662e-2	-0.37246
150.0	9.32240	-2.6504e-2	-0.42646	250.0	7.61367	-1.1315e-2	-0.37154
155.0	9.19326	-2.5165e-2	-0.42428	255.0	7.55793	-1.0984e-2	-0.37060
160.0	9.07062	-2.3907e-2	-0.42170	260.0	7.50381	-1.0667e-2	-0.36959
165.0	8.95408	-2.2715e-2	-0.41858	265.0	7.45125	-1.0361e-2	-0.36847
170.0	8.84338	-2.1573e-2	-0.41470	270.0	7.40019	-1.0065e-2	-0.36721
175.0	8.73826	-2.0489e-2	-0.41032	273.15	7.36877	-9.8828e-3	-0.36634
180.0	8.63839	-1.9472e-2	-0.40573	275.0	7.35059	-9.7777e-3	-0.36580
185.0	8.54343	-1.8525e-2	-0.40113	280.0	7.30240	-9.4994e-3	-0.36424
190.0	8.45302	-1.7650e-2	-0.39673	285.0	7.25558	-9.2292e-3	-0.36252
195.0	8.36680	-1.6847e-2	-0.39264	290.0	7.21009	-8.9671e-3	-0.36067
200.0	8.28444	-1.6112e-2	-0.38896	295.0	7.16589	-8.7132e-3	-0.35870
205.0	8.20558	-1.5440e-2	-0.38573	300.0	7.12295	-8.4677e-3	-0.35664
210.0	8.12994	-1.4825e-2	-0.38294	305.0	7.08120	-8.2308e-3	-0.35452
215.0	8.05724	-1.4262e-2	-0.38058	310.0	7.04062	-8.0032e-3	-0.35238
220.0	7.98724	-1.3745e-2	-0.37860	315.0	7.00116	-7.7850e-3	-0.35027
225.0	7.91972	-1.3268e-2	-0.37696	320.0	6.96276	-7.5767e-3	-0.34821
230.0	7.85450	-1.2826e-2	-0.37558	325.0	6.92537	-7.3786e-3	-0.34627

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THERMAL CYCLE TESTING

Sensor Model: CGR-1-2000-1.4L Serial Number: C19522
Sensor Type: Carbon Glass Resistor

This sensor was tested for repeatability through rapid thermal cycles from room temperature into liquid helium. During this test, the following four lead resistance values were recorded:

Room Temperature:	7.08Ω
Liquid Nitrogen:	12.9Ω
Liquid Helium:	1710Ω

The nitrogen and helium values were recorded in OPEN dewars, so precision comparisons with calibration values or other dip test values should not be made.

Recommended Operating Parameters:

For sensors calibrated by LSCI the current to the sensor is adjusted to maintain the sensor output voltage at the values listed below. In order to minimize possible self-heating errors, we suggest that these same guidelines be followed in using the sensor:

Above 1K:	1 to 3 mV
0.1 to 1K:	0.1 mV
Below 0.1K:	0.03 mV

Lead Identification:

White:	I+
Black:	I-
Yellow:	V+
Green:	V-

To avoid possible damage to the sensor, do not exceed 1 Volt and do not exceed 100 mA current.

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BREAKPOINTS 340 FORMAT

Calibration Report: 403501 Sales Order: 13426
Sensor Model: CGR-1-2000-1.4L Serial Number: C19522
Sensor Type: Carbon Glass Resistor
Temperature Range: 1.40K to 325K

Name: CGR-1-2000-1.4L
Serial number: C19522
Format: 4 ;Log Ohms/Kelvin
Limit: 325.
Coefficient: 1 ;Negative

Point 1: .840437,325.000	Point 56: 1.05725, 97.000	Point 111: 1.60762, 20.100	Point 166: 4.76634, 2.120
Point 2: .843014,319.500	Point 57: 1.06186, 95.000	Point 112: 1.62450, 19.500	Point 167: 4.92105, 2.010
Point 3: .845408,314.500	Point 58: 1.06661, 93.000	Point 113: 1.63922, 19.000	Point 168: 5.09190, 1.900
Point 4: .847854,309.500	Point 59: 1.07152, 91.000	Point 114: 1.65460, 18.500	Point 169: 5.28247, 1.790
Point 5: .850356,304.500	Point 60: 1.07658, 89.000	Point 115: 1.67071, 18.000	Point 170: 5.49563, 1.680
Point 6: .852914,299.500	Point 61: 1.08182, 87.000	Point 116: 1.68759, 17.500	Point 171: 5.75393, 1.560
Point 7: .855530,294.500	Point 62: 1.08723, 85.000	Point 117: 1.70532, 17.000	Point 172: 6.13156, 1.400
Point 8: .858207,289.500	Point 63: 1.09284, 83.000	Point 118: 1.72396, 16.500	
Point 9: .860944,284.500	Point 64: 1.09865, 81.000	Point 119: 1.74360, 16.000	
Point 10: .863744,279.500	Point 65: 1.10467, 79.000	Point 120: 1.76222, 15.550	
Point 11: .866606,274.500	Point 66: 1.11093, 77.000	Point 121: 1.78175, 15.100	
Point 12: .869534,269.500	Point 67: 1.11744, 75.000	Point 122: 1.80234, 14.650	
Point 13: .872526,264.500	Point 68: 1.12251, 73.500	Point 123: 1.82405, 14.200	
Point 14: .875586,259.500	Point 69: 1.12772, 72.000	Point 124: 1.84699, 13.750	
Point 15: .878714,254.500	Point 70: 1.13310, 70.500	Point 125: 1.87128, 13.300	
Point 16: .881912,249.500	Point 71: 1.13866, 69.000	Point 126: 1.89705, 12.850	
Point 17: .885183,244.500	Point 72: 1.14440, 67.500	Point 127: 1.92137, 12.450	
Point 18: .888530,239.500	Point 73: 1.15035, 66.000	Point 128: 1.94705, 12.050	
Point 19: .891956,234.500	Point 74: 1.15650, 64.500	Point 129: 1.97430, 11.650	
Point 20: .895467,229.500	Point 75: 1.16288, 63.000	Point 130: 2.00324, 11.250	
Point 21: .899067,224.500	Point 76: 1.16949, 61.500	Point 131: 2.03405, 10.850	
Point 22: .902391,220.000	Point 77: 1.17636, 60.000	Point 132: 2.06691, 10.450	
Point 23: .905796,215.500	Point 78: 1.18302, 58.600	Point 133: 2.10205, 10.050	
Point 24: .909291,211.000	Point 79: 1.18992, 57.200	Point 134: 2.13491, 9.700	
Point 25: .912882,206.500	Point 80: 1.19710, 55.800	Point 135: 2.16979, 9.350	
Point 26: .916577,202.000	Point 81: 1.20456, 54.400	Point 136: 2.20703, 9.000	
Point 27: .919958,198.000	Point 82: 1.21232, 53.000	Point 137: 2.24680, 8.650	
Point 28: .923430,194.000	Point 83: 1.22041, 51.600	Point 138: 2.28948, 8.300	
Point 29: .927004,190.000	Point 84: 1.22886, 50.200	Point 139: 2.33550, 7.950	
Point 30: .930686,186.000	Point 85: 1.23768, 48.800	Point 140: 2.37804, 7.650	
Point 31: .934481,182.000	Point 86: 1.24690, 47.400	Point 141: 2.42352, 7.350	
Point 32: .938397,178.000	Point 87: 1.25657, 46.000	Point 142: 2.47248, 7.050	
Point 33: .942438,174.000	Point 88: 1.26671, 44.600	Point 143: 2.52517, 6.750	
Point 34: .946609,170.000	Point 89: 1.27582, 43.400	Point 144: 2.58210, 6.450	
Point 35: .950914,166.000	Point 90: 1.28532, 42.200	Point 145: 2.64393, 6.150	
Point 36: .955355,162.000	Point 91: 1.29526, 41.000	Point 146: 2.70899, 5.860	
Point 37: .959933,158.000	Point 92: 1.30656, 39.700	Point 147: 2.77742, 5.580	
Point 38: .964652,154.000	Point 93: 1.31753, 38.500	Point 148: 2.85206, 5.300	
Point 39: .969517,150.000	Point 94: 1.32906, 37.300	Point 149: 2.92785, 5.040	
Point 40: .974532,146.000	Point 95: 1.34120, 36.100	Point 150: 3.01052, 4.780	
Point 41: .979707,142.000	Point 96: 1.35293, 35.000	Point 151: 3.10134, 4.520	
Point 42: .984379,138.500	Point 97: 1.36525, 33.900	Point 152: 3.19361, 4.280	
Point 43: .988505,135.500	Point 98: 1.37826, 32.800	Point 153: 3.29500, 4.040	
Point 44: .992773,132.500	Point 99: 1.39201, 31.700	Point 154: 3.38339, 3.850	
Point 45: .997216,129.500	Point 100: 1.40655, 30.600	Point 155: 3.46359, 3.690	
Point 46: 1.00185,126.500	Point 101: 1.42193, 29.500	Point 156: 3.54991, 3.530	
Point 47: 1.00667,123.500	Point 102: 1.43677, 28.500	Point 157: 3.64333, 3.370	
Point 48: 1.01247,120.000	Point 103: 1.45247, 27.500	Point 158: 3.73825, 3.220	
Point 49: 1.01848,116.500	Point 104: 1.46915, 26.500	Point 159: 3.84097, 3.070	
Point 50: 1.02382,113.500	Point 105: 1.48690, 25.500	Point 160: 3.95275, 2.920	
Point 51: 1.02935,110.500	Point 106: 1.50585, 24.500	Point 161: 4.06640, 2.780	
Point 52: 1.03511,107.500	Point 107: 1.52408, 23.600	Point 162: 4.18992, 2.640	
Point 53: 1.04110,104.500	Point 108: 1.54346, 22.700	Point 163: 4.32501, 2.500	
Point 54: 1.04735,101.500	Point 109: 1.56420, 21.800	Point 164: 4.46248, 2.370	
Point 55: 1.05277, 99.000	Point 110: 1.58643, 20.900	Point 165: 4.61299, 2.240	

BREAKPOINTS 91C/93C/330 FORMAT

Calibration Report: 403501
Sensor Model: CGR-1-2000-1.4L
Sensor Type: Carbon Glass Resistor
Temperature Range: 1.40K to 325K

Sales Order: 13426
Serial Number: C19522

Interpolation Method: Lagrangian
Limit: 325. (Kelvin)
Format: 4 (Log Ohms/Kelvin)
Number of Breakpoints: 41

No.	Units	Temperature (K)	No.	Units	Temperature (K)
1	0.840440	325.0	21	1.07659	89.0
2	0.840910	324.0	22	1.11417	76.0
3	0.842310	321.0	23	1.15444	65.0
4	0.849600	306.0	24	1.23012	50.0
5	0.857400	291.0	25	1.29530	41.0
6	0.865750	276.0	26	1.37231	33.3
7	0.874670	261.0	27	1.45580	27.3
8	0.884200	246.0	28	1.55032	22.4
9	0.894410	231.0	29	1.65465	18.5
10	0.905420	216.0	30	1.77302	15.3
11	0.917420	201.0	31	1.91219	12.6
12	0.930690	186.0	32	2.06285	10.5
13	0.945560	171.0	33	2.24115	8.7
14	0.961110	157.0	34	2.44780	7.2
15	0.974540	146.0	35	2.67728	6.0
16	0.983710	139.0	36	2.94060	5.0
17	0.992060	133.0	37	3.26947	4.1
18	1.00586	124.0	38	3.68729	3.3
19	1.01418	119.0	39	4.13647	2.7
20	1.04214	104.0	40	4.93704	2.0

Temperature for Resistance Decades:

Res. (Ohms)	Temp. (K)
10	127.702
100	11.291
1000	4.811
10000	2.859
100000	1.959
1000000	1.454

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BREAKPOINTS 234 FORMAT

Calibration Report: 403501 Sales Order: 13426
Sensor Model: CGR-1-2000-1.4L Serial Number: C19522
Sensor Type: Carbon Glass Resistor
Temperature Range: 1.40K to 325K

Maximum Temperature Error:

1.4 - 10K:	0.001K
10 - 20K:	0.003K
20 - 40K:	0.014K
40 - 100K:	0.078K
> 100K:	0.367K

BP #	Temp. (K)	Res. (Ω)	Log10 Res.	BP #	Temp. (K)	Res. (Ω)	Log10 Res.
1	286.250	7.244360	0.860	61	10.534	114.8154	2.060
2	252.459	7.585776	0.880	62	10.300	120.2264	2.080
3	223.195	7.943282	0.900	63	10.075	125.8925	2.100
4	197.951	8.317638	0.920	64	9.858	131.8257	2.120
5	176.461	8.709636	0.940	65	9.649	138.0384	2.140
6	157.936	9.120108	0.960	66	9.447	144.5440	2.160
7	141.778	9.549926	0.980	67	9.253	151.3561	2.180
8	127.710	10.00000	1.000	68	9.066	158.4893	2.200
9	115.625	10.47129	1.020	69	8.885	165.9587	2.220
10	105.054	10.96478	1.040	70	8.710	173.7801	2.240
11	95.802	11.48154	1.060	71	8.541	181.9701	2.260
12	87.693	12.02264	1.080	72	8.378	190.5461	2.280
13	80.549	12.58925	1.100	73	8.220	199.5262	2.300
14	74.238	13.18257	1.120	74	8.067	208.9296	2.320
15	68.650	13.80384	1.140	75	7.919	218.7762	2.340
16	63.673	14.45440	1.160	76	7.776	229.0868	2.360
17	59.235	15.13561	1.180	77	7.638	239.8833	2.380
18	55.253	15.84893	1.200	78	7.504	251.1886	2.400
19	51.669	16.59587	1.220	79	7.374	263.0268	2.420
20	48.446	17.37801	1.240	80	7.248	275.4229	2.440
21	45.525	18.19701	1.260	81	7.126	288.4032	2.460
22	42.868	19.05461	1.280	82	7.007	301.9952	2.480
23	40.450	19.95262	1.300	83	6.892	316.2278	2.500
24	38.244	20.89296	1.320	84	6.780	331.1311	2.520
25	36.221	21.87762	1.340	85	6.671	346.7369	2.540
26	34.366	22.90868	1.360	86	6.565	363.0781	2.560
27	32.663	23.98833	1.380	87	6.462	380.1894	2.580
28	31.092	25.11886	1.400	88	6.362	398.1072	2.600
29	29.640	26.30268	1.420	89	6.265	416.8694	2.620
30	28.293	27.54229	1.440	90	6.170	436.5158	2.640
31	27.045	28.84032	1.460	91	6.078	457.0882	2.660
32	25.886	30.19952	1.480	92	5.988	478.6301	2.680
33	24.807	31.62278	1.500	93	5.901	501.1872	2.700
34	23.800	33.11311	1.520	94	5.815	524.8075	2.720
35	22.861	34.67369	1.540	95	5.732	549.5409	2.740
36	21.982	36.30781	1.560	96	5.651	575.4399	2.760
37	21.158	38.01894	1.580	97	5.572	602.5596	2.780
38	20.385	39.81072	1.600	98	5.494	630.9573	2.800
39	19.659	41.68694	1.620	99	5.419	660.6934	2.820
40	18.976	43.65158	1.640	100	5.345	691.8310	2.840
41	18.331	45.70882	1.660	101	5.273	724.4360	2.860
42	17.724	47.86301	1.680	102	5.203	758.5776	2.880
43	17.149	50.11872	1.700	103	5.135	794.3282	2.900
44	16.606	52.48075	1.720	104	5.067	831.7638	2.920
45	16.092	54.95409	1.740	105	5.002	870.9636	2.940
46	15.604	57.54399	1.760	106	4.938	912.0108	2.960
47	15.141	60.25596	1.780	107	4.875	954.9926	2.980
48	14.701	63.09573	1.800	108	4.814	1000.000	3.000
49	14.284	66.06934	1.820	109	4.695	1096.478	3.040
50	13.886	69.18310	1.840	110	4.581	1202.264	3.080
51	13.508	72.44360	1.860	111	4.472	1318.257	3.120
52	13.147	75.85776	1.880	112	4.367	1445.440	3.160
53	12.802	79.43282	1.900	113	4.266	1584.893	3.200
54	12.473	83.17638	1.920	114	4.169	1737.801	3.240
55	12.159	87.09636	1.940	115	4.076	1905.461	3.280
56	11.859	91.20108	1.960	116	3.986	2089.296	3.320
57	11.571	95.49926	1.980	117	3.900	2290.868	3.360
58	11.295	100.0000	2.000	118	3.817	2511.886	3.400
59	11.031	104.7129	2.020	119	3.737	2754.229	3.440
60	10.777	109.6478	2.040	120	3.660	3019.952	3.480

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BREAKPOINTS 234 FORMAT

Calibration Report: 403501 Sales Order: 13426
Sensor Model: CGR-1-2000-1.4L Serial Number: C19522
Sensor Type: Carbon Glass Resistor
Temperature Range: 1.40K to 325K

Maximum Temperature Error:	
1.4 - 10K:	0.001K
10 - 20K:	0.003K
20 - 40K:	0.014K
40 - 100K:	0.078K
> 100K:	0.367K

BP #	Temp. (K)	Res. (Ω)	Log10 Res.	BP #	Temp. (K)	Res. (Ω)	Log10 Res.
121	3.585	3311.311	3.520	136	2.526	19952.62	4.300
122	3.513	3630.781	3.560	137	2.429	25118.86	4.400
123	3.444	3981.072	3.600	138	2.337	31622.78	4.500
124	3.376	4365.158	3.640	139	2.252	39810.72	4.600
125	3.312	4786.301	3.680	140	2.171	50118.72	4.700
126	3.249	5248.075	3.720	141	2.096	63095.73	4.800
127	3.188	5754.399	3.760	142	2.025	79432.82	4.900
128	3.129	6309.573	3.800	143	1.959	100000.0	5.000
129	3.072	6918.310	3.840	144	1.896	125892.5	5.100
130	3.017	7585.776	3.880	145	1.837	158489.3	5.200
131	2.964	8317.638	3.920	146	1.781	199526.2	5.300
132	2.912	9120.108	3.960	147	1.729	251188.6	5.400
133	2.861	10000.00	4.000	148	1.679	316227.8	5.500
134	2.742	12589.25	4.100	149	1.631	398107.2	5.600
135	2.630	15848.93	4.200				

Lake Shore Cryotronics, Inc. • 575 McCorkle Boulevard • Westerville, OH 43082
Sales: (614) 891-2244 • Fax: (614) 891-1392 • sales@lakeshore.com • www.lakeshore.com