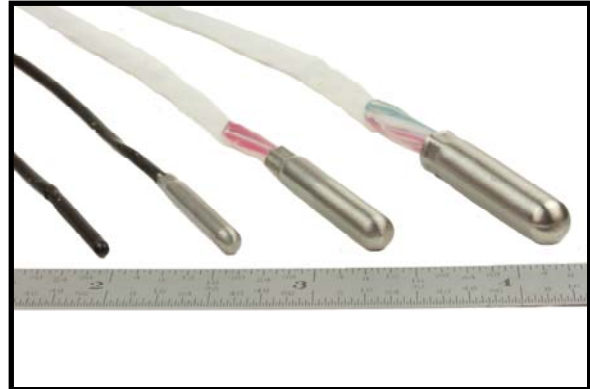




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Notes:

Introduction

Thank you for choosing Burns Engineering for your temperature measurement application. This manual covers Burns Engineering Series A product, specifically A01, A02, A03, A04, A05 and A06 models. Following the guidelines in this Manual will ensure that your Burns engineering Series A product will give you many years of accurate temperature measurement service.

Handling

Resistance Temperature Detectors, commonly referred to as RTDs, are precision instruments and should be handled accordingly. Extensive service life can be expected in the absence of high vibration, extreme temperature, and rough handling. The Series A sheaths are not bendable. The Models A04 and A06 require care in handling as the PFA sheath is more delicate than the stainless sheathed models, specifically near the sensor tip.

Inspection - Electrical

Element Resistance: (Figure 1)

Check element resistance using an ohmmeter with a test current of no more than 10 milliamps. Do not use an insulation resistance meter as these devices use voltage/current levels that may permanently damage the RTD.

Element resistance is determined by subtracting the compensation loop resistance (R2) from the element loop resistance (R1). The resulting resistance should approximately equal the resistance given in the Resistance Vs. Temperature Tables at ambient temperatures.

Insulation Resistance:

Using a meter capable of measuring resistance in the range of 5 to 500 megohms (10⁶ ohms), measure the insulation resistance between the lead wires and the sheath when the RTD is at room temperature. The insulation resistance should be at least 500 megohms. This criteria does not apply to the A04 or A06 as they do not include a metal sheath.

Installation Guidelines

RTDs should be connected to the recorder, controller, transmitter, or computer with copper wires. Do not use Thermocouple extension wire. Long lengths (even several hundred feet) do not affect accuracy if 4 wires sensors and appropriate signal conditioners are used. It is recommended that shielded wire be used whenever possible. Make sure that the field wiring and sensor lead style comply with the schematic for the signal conditioner in use. Lead wire resistance should not exceed the limitations of the signal conditioner.

Avoid electromagnetic fields. Never route sensor cables along side high voltage cables. When necessary route cables inside a grounded metal conduit to provide shielding from electromagnetic fields.

3 Wire sensors (both single and dual element) with long leads may have a warning label that states DO NOT CUT CABLE – MAY EFFECT ACCURACY. To maintain the required accuracy of the temperature measurement Burns Engineering adjusts the individual resistances of the wires in the cable so that they are, within tolerance, equal. Cutting a cable that has been adjusted may negatively affect the resistance balance and subsequently the accuracy of the sensor.

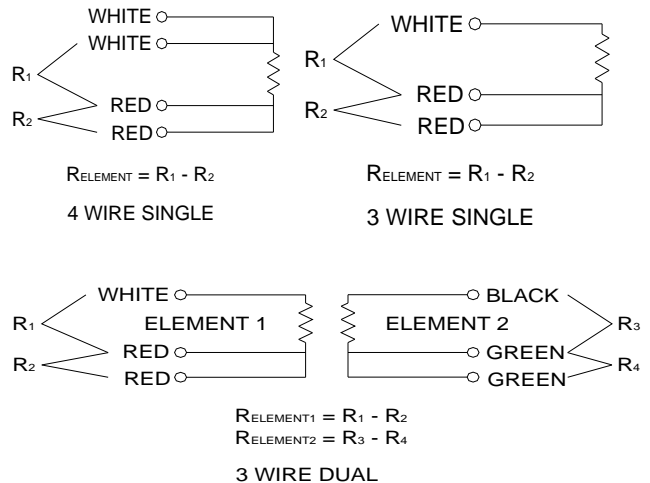


Figure 1
Sensor Resistance-Check Wiring

Output

The RTD output is based on 100 ohm resistance at the ice point and an Alpha of 0.00385 ohms/ohms/°C. Refer to the Resistance Vs. Temperature tables.

Safety

When used in their intended applications Series A RTD sensors are inherently safe, low power devices that pose no significant safety risk. Follow the guidelines below to ensure safe operation.

- Never connect a Series A sensor to a high voltage electrical supply. The Series A sensors are designed to be used with a small excitation current (typically 1 mA). Connecting to a high voltage electrical supply will damage the sensor and could significantly increase the risk of electrocution.
- Do NOT Use in an Explosive Environment. Series A Sensors are not designed or approved for use in an explosive environment.
- Handle with Care. Depending on the Series a model the temperature range can be as wide as -196°C to 200°C. When the sensor is being used at extreme temperatures (both high and low) the user should wear the appropriate personal protection equipment when handling the sensor. The sensor, after removal from the application may remain at a dangerous temperature for a period of time.

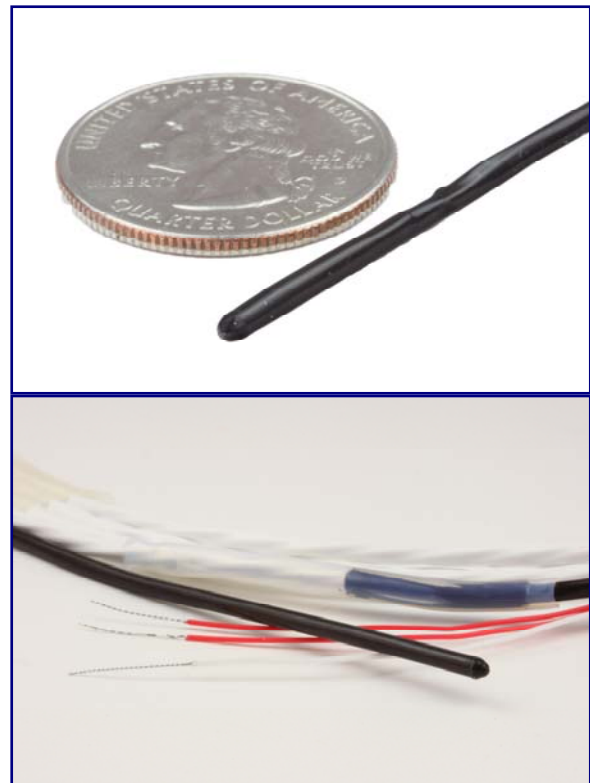
Periodic Verification

As with most high accuracy measurement devices, it is prudent to make periodic accuracy performance checks of an RTD against a known standard/specification to ensure that the integrity of the measurement is maintained. Taking a resistance reading at 0°C (R0) is the most efficient way to determine the accuracy of the probe. Fortunately it is a relatively easy and low cost task to create an

ice/water bath that provides a sufficiently accurate 0°C temperature point. By monitoring the R0 value of the probe over subsequent verification intervals it is possible to build up a history that can be used to predict the future performance of the probe. (For more information visit the Burns Engineering Website at http://www.burnsengineering.com/document/papers/RTD_Calibration_Verification.pdf)

Responsible Disposal

The high quality Series A sensors will give many years of reliable and accurate service. However, when the time comes to replace the sensor it must be taken to a collection point for the recycling of electronic and electrical equipment to ensure the product is recycled properly.



Approvals

The Burns Engineering Series A RTDs have been self certified as complying with the European Parliament Directive 2011/65/EU on the restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS). Consequently the CE mark has been applied to the Burns Engineering Series A product for compliance to directive 2011/65/EU. No other "New Approach" directives were found to apply.

The Series A products have been self certified for European Parliament Directive 2001/95/EC on General Product Safety.

The CE mark below applies to the following Burns Engineering part numbers:

A01-*****,
A02-*****,
A03-*****,
A04-*****,
A05-*****-***,
A06-*****-***

Where the "*****" portions represent the accuracy and cable length variables. See the Series A catalog for complete details. (http://www.burnsengineering.com/series_a.pdf)

These parts are manufactured by

Burns Engineering, Inc
10201 Bren Road East,
Minnetonka, MN 55343
UNITED STATES OF AMERICA

Additional Information

Burns Engineering is available to answer your questions regarding RTD applications.
Call toll free 1-800-328-3871.



European Parliament Directive 2011/65/EU on the restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS).

Resistance vs Temperature

RTD Reference Table

Resistance in Ohms for Series A RTDs in Degrees C (-196° to +200°)

	0	2	4	6	8
200	175.86				
190	172.17	172.91	173.65	174.38	175.12
180	168.48	169.22	169.96	170.70	171.43
170	164.77	165.51	166.26	167.00	167.74
160	161.05	161.80	162.54	163.29	164.03
150	157.33	158.07	158.82	159.56	160.31
140	153.58	154.33	155.08	155.83	156.58
130	149.83	150.58	151.33	152.08	152.83
120	146.07	146.82	147.57	148.33	149.08
110	142.29	143.05	143.80	144.56	145.31
100	138.51	139.26	140.02	140.78	141.54
90	134.71	135.47	136.23	136.99	137.75
80	130.90	131.66	132.42	133.18	133.95
70	127.08	127.84	128.61	129.37	130.13
60	123.24	124.01	124.78	125.54	126.31
50	119.40	120.17	120.94	121.71	122.47
40	115.54	116.31	117.08	117.86	118.63
30	111.67	112.45	113.22	114.00	114.77
20	107.79	108.57	109.35	110.12	110.90
10	103.90	104.68	105.46	106.24	107.02
0	100.00	100.78	101.56	102.34	103.12

	0	-2	-4	-6	-8
0	100.00	99.22	98.44	97.65	96.87
-10	96.09	95.30	94.52	93.73	92.95
-20	92.16	91.37	90.59	89.80	89.01
-30	88.22	87.43	86.64	85.85	85.06
-40	84.27	83.48	82.69	81.89	81.10
-50	80.31	79.51	78.72	77.92	77.12
-60	76.33	75.53	74.73	73.93	73.13
-70	72.33	71.53	70.73	69.93	69.13
-80	68.33	67.52	66.72	65.91	65.11
-90	64.30	63.49	62.68	61.88	61.07
-100	60.26	59.44	58.63	57.82	57.01
-110	56.19	55.38	54.56	53.75	52.93
-120	52.11	51.29	50.47	49.65	48.83
-130	48.00	47.18	46.36	45.53	44.70
-140	43.88	43.05	42.22	41.39	40.56
-150	39.72	38.89	38.05	37.22	36.38
-160	35.54	34.70	33.86	33.02	32.18
-170	31.34	30.49	29.64	28.80	27.95
-180	27.10	26.24	25.39	24.54	23.68
-190	22.83	21.97	21.11	20.25	

Resistance vs Temperature

RTD Reference Table

Resistance in Ohms for Series A RTDs in Degrees F (-320° to +392°)

	0	2	4	6	8		0	-2	-4	-6	-8
390	175.45	175.86				0	93.03	92.60	92.16	91.72	91.29
380	173.40	173.81	174.22	174.63	175.04	-10	90.85	90.41	89.97	89.54	89.10
370	171.35	171.76	172.17	172.58	172.99	-20	88.66	88.22	87.78	87.34	86.91
360	169.30	169.71	170.12	170.53	170.94	-30	86.47	86.03	85.59	85.15	84.71
350	167.24	167.66	168.07	168.48	168.89	-40	84.27	83.83	83.39	82.95	82.51
340	165.18	165.60	166.01	166.42	166.83	-50	82.07	81.63	81.19	80.75	80.31
330	163.12	163.53	163.95	164.36	164.77	-60	79.86	79.42	78.98	78.54	78.10
320	161.05	161.47	161.88	162.29	162.71	-70	77.66	77.21	76.77	76.33	75.88
310	158.98	159.40	159.81	160.23	160.64	-80	75.44	75.00	74.55	74.11	73.67
300	156.91	157.33	157.74	158.15	158.57	-90	73.22	72.78	72.33	71.89	71.45
290	154.83	155.25	155.66	156.08	156.49	-100	71.00	70.55	70.11	69.66	69.22
280	152.75	153.17	153.58	154.00	154.42	-110	68.77	68.33	67.88	67.43	66.99
270	150.67	151.08	151.50	151.92	152.33	-120	66.54	66.09	65.64	65.20	64.75
260	148.58	149.00	149.41	149.83	150.25	-130	64.30	63.85	63.40	62.95	62.50
250	146.49	146.91	147.32	147.74	148.16	-140	62.06	61.61	61.16	60.71	60.26
240	144.39	144.81	145.23	145.65	146.07	-150	59.81	59.35	58.90	58.45	58.00
230	142.29	142.71	143.13	143.55	143.97	-160	57.55	57.10	56.65	56.19	55.74
220	140.19	140.61	141.03	141.45	141.87	-170	55.29	54.83	54.38	53.93	53.47
210	138.08	138.51	138.93	139.35	139.77	-180	53.02	52.56	52.11	51.65	51.20
200	135.97	136.40	136.82	137.24	137.66	-190	50.74	50.29	49.83	49.38	48.92
190	133.86	134.28	134.71	135.13	135.55	-200	48.46	48.00	47.55	47.09	46.63
180	131.74	132.17	132.59	133.01	133.44	-210	46.17	45.71	45.26	44.80	44.34
170	129.62	130.05	130.47	130.90	131.32	-220	43.88	43.42	42.96	42.49	42.03
160	127.50	127.93	128.35	128.78	129.20	-230	41.57	41.11	40.65	40.19	39.72
150	125.37	125.80	126.22	126.65	127.08	-240	39.26	38.80	38.33	37.87	37.40
140	123.24	123.67	124.09	124.52	124.95	-250	36.94	36.47	36.01	35.54	35.08
130	121.11	121.53	121.96	122.39	122.82	-260	34.61	34.14	33.68	33.21	32.74
120	118.97	119.40	119.82	120.25	120.68	-270	32.27	31.80	31.34	30.87	30.40
110	116.83	117.26	117.68	118.11	118.54	-280	29.93	29.46	28.98	28.51	28.04
100	114.68	115.11	115.54	115.97	116.40	-290	27.57	27.10	26.62	26.15	25.68
90	112.53	112.96	113.39	113.82	114.25	-300	25.20	24.73	24.25	23.78	23.30
80	110.38	110.81	111.24	111.67	112.10	-310	22.83	22.35	21.87	21.39	20.92
70	108.23	108.66	109.09	109.52	109.95	-320	20.44				
60	106.07	106.50	106.93	107.36	107.79						
50	103.90	104.34	104.77	105.20	105.63						
40	101.74	102.17	102.60	103.04	103.47						
30	99.57	100.00	100.43	100.87	101.30						
20	97.39	97.83	98.26	98.70	99.13						
10	95.21	95.65	96.09	96.52	96.96						
0	93.03	93.47	93.91	94.34	94.78						