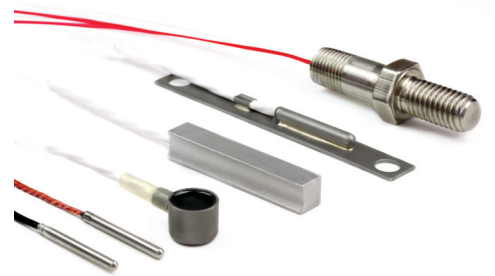




BURNS
ENGINEERING



Series B

Surface Sensors: RTDs and Thermocouples



Temperature Measurement Experts®

Since 1960, Burns Engineering has been an industry leader in the design and manufacture of temperature sensors to meet a multitude of measurement applications. Accuracy, reliability and consistency are hallmarks of the Burns brand. At Burns, we focus on the measurement. We understand the subtleties of temperature measurement, from selection through installation, and how they impact your processes and ultimately your success. We worry about the details so you don't have to. When you select Burns you're getting more than a sensor, you're getting your own team of Temperature Measurement Experts.

Series B Surface Sensors

These sensor designs allow you to obtain a temperature measurement without insertion into your process. Available as both RTDs and thermocouples, these durable and accurate sensors can provide measurements in even the most challenging locations.

If you don't see something that meets your needs, give us a call and we'll customize for your specific application.



Get a Web Quote:

Visit [BurnsEngineering.com](https://www.burnsengineering.com) to configure your sensor today.

Here's how:

1. Register or sign-in
2. Search for the model (B01, B04, etc.) using the search box (upper right) or click on the Product/Quote tab and select the model of interest.
3. Click on 'configure my part'.
4. Select the parameters to support your application
5. Add to Quote Cart.
6. Submit Cart for Quote – We'll be in touch shortly.

Surface Sensor Selection Guide

Operating Range:

Series B Surface Sensors provide a temperature measurement range of -50°C to 200°C. The ambient temperature limit is dependent on external configuration choices such as connection heads, cable glands and use of a local transmitter. We recommend the use of insulation over the installed sensor; the configuration allows the external components to reach beyond the insulation if temperature limits could be exceeded.

Response Time:

Surface sensors are typically slower to respond to temperature variations than immersion style sensors. Insulating the measurement location will improve accuracy and responsiveness. The use of heat transfer compound will also significantly improve response time. Responsiveness and ruggedness are often a trade-off; for example, the Model B02 typically responds up to 3 times faster than Model B06 which is designed for harsher environments. See the Burns technical paper on measuring response time of surface sensors at: <http://www.burnsengineering.com/tech-papers/>

Other Custom Surface Sensors:



This design uses simple hose clamps to attach to a heat exchanger pipe.



This approach is approved for Explosive Environments incorporating a Burns Series 200A style sensor and a mounting kit for an effective surface measurement in a challenging environment.



This design incorporates a Burns spring loaded Series 200L RTD and a saddle clamp. A copper tip on the sensor further improves response time and accuracy.

For more information about custom surface sensor designs, tighter accuracy, wider operating temperature range or a different installation approach, contact Burns at: info@BurnsEngineering.com

B01: Plate Surface Sensor

Specification

The B01 incorporates a bolt-down stainless steel plate with integral RTD or thermocouple. The B01 can be installed to most flat surfaces to provide temperature monitoring. The low profile sensor with PTFE / FEP jacketed cable allows the measurement location to be fully insulated with plenty of cable to connect to system electronics.

Features and Benefits:

- **Application:** Surface measurement of a pipe, duct, or other surface where direct immersion is impossible or impractical. Mounts with hose clamps or bolts directly to the measurement surface.
- **Accuracy:**
 - » RTD: Standard 0.10% of resistance at 0.0°C
 - » Thermocouple: Special limits of error per ANSI MC96.1, see table below
- **Element/ Lead Wire Configuration:**
 - » RTD: Single 3 or 4 wire, Dual 3 wire
 - » Thermocouple: Single or Dual, Type E, J, K, and T
- **Lead Wire:**
 - » RTD: PTFE insulated conductors with FEP jacket; Three-wire single- 22 AWG, Four-wire single and Dual- 26 AWG
 - » Thermocouple: PTFE tape insulated conductors with PTFE tape cover, 24 AWG

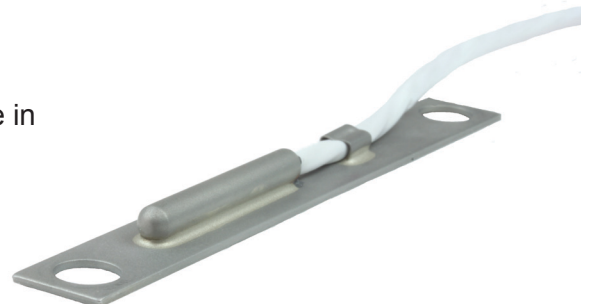
Specifications:

- **Element Configuration:**
 - » RTD: Single and Dual, 100 ohms at 0°C, 0.00385 ohm/ohm/°C nominal alpha
 - » Thermocouple: Single or Dual, Type E, J, K, and T
- **RTD Temperature Range:** -50°C to 200°C
- **Thermocouple Temperature Range:** See table below

ANSI Thermocouple Type	Temperature Range	Special Limits Accuracy
E	-50°C to 125°C 125°C to 200°C	0.5°C 0.4%*
J	0°C to 200°C	1.1°C
K	0°C to 200°C	1.1°C
T	-50°C to 125°C 125°C to 200°C	0.5°C 0.4%*

* % applies to measurement in °C

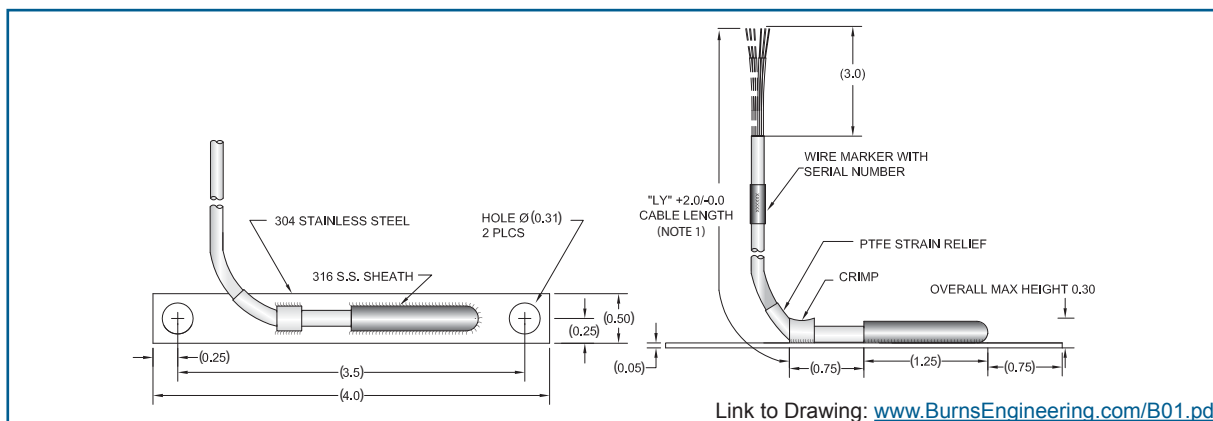
- **Cable Temperature Limits:** -50°C to 200°C
- **Insulation Resistance:** 500 MΩ, 100 VDC at room temperature (Note 1)
- **Time Response:** Maximum time to 63.2% of a step change in temperature of water moving at 3 fps
 - » 22.2 seconds with heat transfer compound between sensor plate and measurement surface
 - » 39.8 seconds without heat transfer compound



NOTE 1: Not applicable for grounded thermocouples

B01: Plate Surface Sensor

Ordering Information



Link to Drawing: www.BurnsEngineering.com/B01.pdf

All dimensions in inches

B01- PLATE SURFACE SENSOR

RTD (Accuracy)

10 Standard RTD +/- 0.10% of resistance at 0 degrees C

Thermocouple (Type)

E Chromel/ Constantan (Leadwire Code = Purple +, Red -)
 J Iron/ Constantan (Leadwire Code = White +, Red -)
 K Chromel/ Alumel (Leadwire Code = Yellow +, Red -)
 T Copper/ Constantan (Leadwire Code = Blue +, Red -)

RTD Element/ Lead Wire Configuration (Note 1)

A Three Wire Single Element
 B Four Wire Single Element
 C Three Wire Dual Element

Thermocouple Junction Configuration

D Single, Ungrounded
 E Single, Grounded
 F Dual, Ungrounded
 G Dual, Grounded

Cable Length "LY" in Inches (Note 1)

-024 24 Inches Cable Length
 -120 120 Inches Cable Length,
 - * Specify Cable Length In Inches

NOTE 1: For 3 wire designs – Order the expected installed length. To maintain stated RTD accuracy, 3 wire Single designs with LY>324" AND 3 wire Dual designs with LY>120" cannot be shortened.

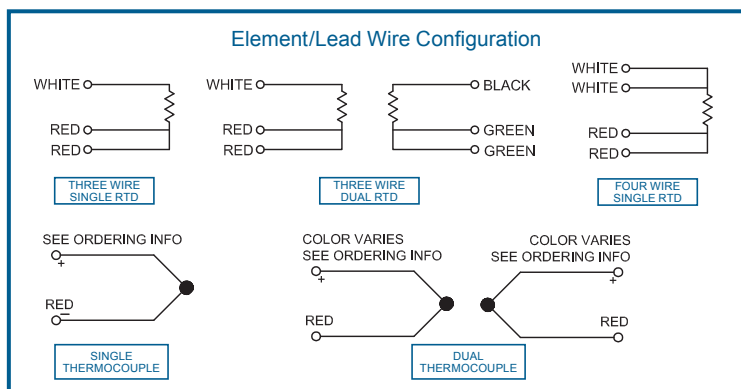
Basic Order Codes: **B01-**

Options:

Transmitter:

(Leave blank if not required)

Example Part Number: B01-10A-240



B02: Thimble Surface Sensor

Specification

The B02 thimble style sensor incorporates a highly contact-sensitive sensing surface in a less than ½ inch high housing. Low-profile and durable - the B02 can fit into tight locations with minimal disruption to surrounding piping, fixtures and insulation.

Features and Benefits:

- **Application:** Surface measurement of a pipe, duct, or other surface where direct immersion is impossible or impractical. Mounts with hose clamp or adhesive directly to surface to be measured.
- **Accuracy:**
 - » RTD: Standard 0.10% of resistance at 0.0°C
 - » Thermocouple: Special limits of error per ANSI MC96.1, see table below
- **Element/ Lead Wire Configuration:**
 - » RTD: Single 3 or 4 wire, Dual 3 wire
 - » Thermocouple: Single or Dual, Type E, J, K, and T
- **Lead Wire:**
 - » RTD: PTFE insulated conductors with FEP jacket; Three-wire single- 22 AWG, Four-wire single and Dual- 26 AWG
 - » Thermocouple: PTFE tape insulated conductors with PTFE tape cover, 24 AWG

Specifications:

- **Element Configuration:**
 - » RTD: Single and Dual, 100 ohms at 0°C, 0.00385 ohm/ohm/°C nominal alpha
 - » Thermocouple Type E, J, K, and T
- **RTD Temperature Range:** -50°C to 200°C
- **Thermocouple Temperature Range:** See table below

ANSI Thermocouple Type	Temperature Range	Special Limits Accuracy
E	-50°C to 125°C 125°C to 200°C	0.5°C 0.4%*
J	0°C to 200°C	1.1°C
K	0°C to 200°C	1.1°C
T	-50°C to 125°C 125°C to 200°C	0.5°C 0.4%*

* % applies to measurement in °C

- **Cable Temperature Limits:** -50°C to 200°C
- **Insulation Resistance:** 500 MΩ, 100 VDC at room temperature (Note 1)
- **Time Response:** Maximum time for 63.2% response to a step change in temperature of water moving at 3 fps.
 - » 9.6 seconds with heat transfer compound between sensor and measurement surface
 - » 54.8 seconds without heat transfer compound



NOTE 1: Not applicable for Grounded Thermocouples



B02- THIMBLE SURFACE SENSOR

10	Standard RTD +/- 0.10% of resistance at 0 degrees C
----	---

E	Chromel/ Constantan (Leadwire Code = Purple +, Red -)
J	Iron/ Constantan (Leadwire Code = White +, Red -)
K	Chromel/ Alumel (Leadwire Code = Yellow +, Red -)
T	Copper/ Constantan (Leadwire Code = Blue +, Red -)

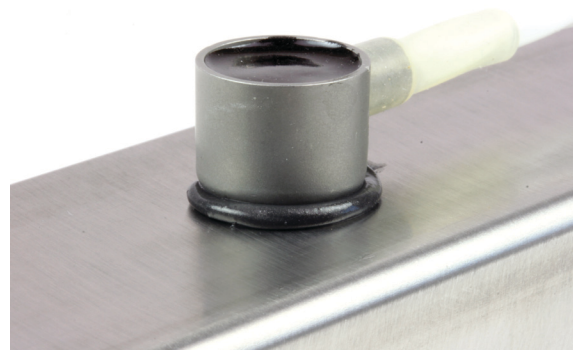
A	Three Wire Single Element
B	Four Wire Single Element
C	Three Wire Dual Element

D	Single, Ungrounded
E	Single, Grounded
F	Dual, Ungrounded
G	Dual, Grounded

-024	24 Inches Cable Length
-120	120 Inches Cable Length,
- *	Specify Cable Length In Inches

Example Part Number: B02-10A-120

NOTE 1: For 3 wire designs – Order the expected installed length. To maintain stated RTD accuracy, 3 wire Single designs with LY>324" AND 3 wire Dual designs with LY>120" cannot be shortened.



B03: Block and Clamp Surface Sensor

Specification

The B03 housing offers various radius sizes to match your process piping to ensure proper thermal contact and heat transfer to the sensing element. The flexible clamp installation makes attachment quick and reliable.

Features and Benefits:

- **Application:** Surface measurement of a pipe where direct immersion is impossible or impractical. Mounts with hose clamp (included) directly to surface to be measured. Block is available in 316 stainless steel or aluminum.
- **Accuracy:**
 - » RTD: Standard 0.10% of resistance at 0.0°C
 - » Thermocouple: Special limits of error per ANSI MC96.1, see table below
- **Element/ Lead Wire Configuration:**
 - » RTD: Single 3 or 4 wire, Dual 3 wire
 - » Thermocouple: Single or Dual, Type E, J, K, and T
- **Lead Wire:**
 - » RTD: PTFE insulated conductors with FEP jacket; Single- 22 AWG, Dual- 26 AWG
 - » Thermocouple: PTFE tape insulated conductors with PTFE tape cover, 24 AWG

Specifications:

- **Element Configuration:**
 - » RTD: Single and Dual, 100 ohms at 0°C, 0.00385 ohm/ohm/°C nominal alpha
 - » Thermocouple: Single or Dual, Type E, J, K and T
- **RTD Temperature Range:** -50°C to 200°C
- **Thermocouple Temperature Range:** See table below

ANSI Thermocouple Type	Temperature Range	Special Limits Accuracy
E	-50°C to 125°C 125°C to 200°C	0.5°C 0.4%*
J	0°C to 200°C	1.1°C
K	0°C to 200°C	1.1°C
T	-50°C to 125°C 125°C to 200°C	0.5°C 0.4%*

* % applies to measurement in °C

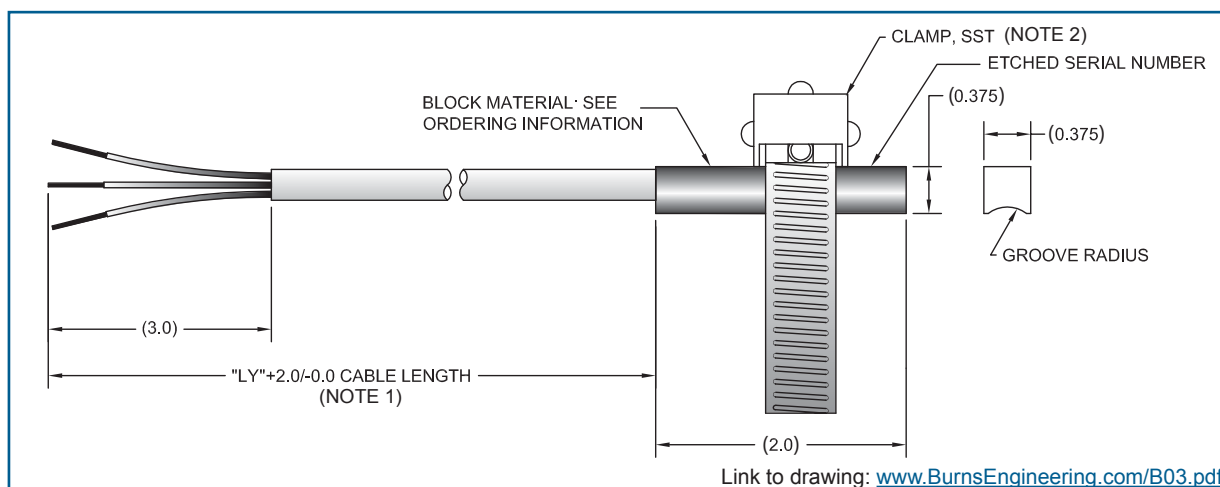
- **Cable Temperature Limits:** -50°C to 200°C
- **Insulation Resistance:** 500 MΩ, 100 VDC at room temperature (Note 1)
- **Time Response:** Maximum time for 63.2% response to a step change in temperature of water moving at 3 fps.
 - » 26.0 seconds with heat transfer compound between sensor block and measurement surface
 - » 67.0 seconds without heat transfer compound



NOTE 1: Not applicable for Grounded Thermocouples

B03: Block and Clamp Surface Sensor

Ordering Information



B03- BLOCK AND CLAMP SURFACE SENSOR

All dimensions in inches

RTD (Accuracy)	
10	Standard RTD +/- 0.10% of resistance at 0 degrees C

Thermocouple (Type)	
E	Chromel/ Constantan (Leadwire Code = Purple +, Red -)
J	Iron/ Constantan (Leadwire Code = White +, Red -)
K	Chromel/ Alumel (Leadwire Code = Yellow +, Red -)
T	Copper/ Constantan (Leadwire Code = Blue +, Red -)

RTD Element/ Lead Wire Configuration	
A	Three Wire Single Element
B	Four Wire Single Element
C	Three Wire Dual Element

Thermocouple Junction Configuration (NOTE 1)	
D	Single, Ungrounded
E	Single, Grounded
F	Dual, Ungrounded
G	Dual, Grounded

Pipe/ Tube Diameter Range	Groove Radius
-A 0.500 to 0.540	1/4"
-B 0.625 to 0.840	3/8"
-C 0.875 to 1.660	1/2"
-D 1.900 to 3.000	None
-E 3.250 to 5.563	None
-F 6.000 to 11.000	None
-G 11.25 to 20.000	None

Cable Length "LY" In Inches (NOTE 1)	
024	24 Inches Cable Length
120	120 Inches Cable Length
*	Specify Cable Length In Inches

Block Material	
-03	316 Stainless Steel
-09	Aluminum

(Leave blank if not required)

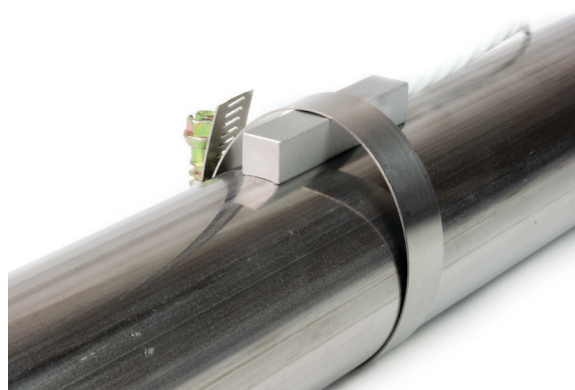
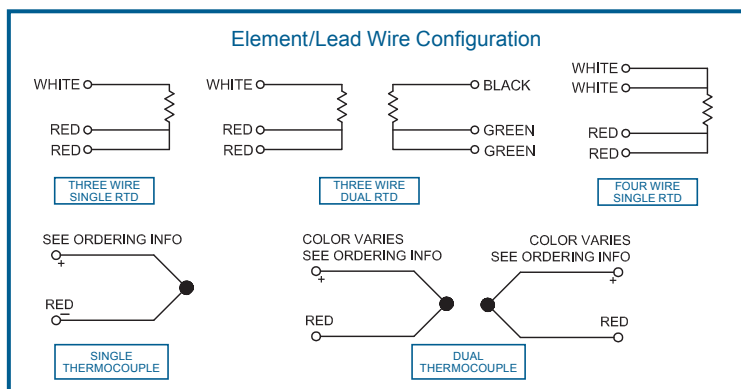
Options Transmitter

Basic Order Codes

NOTE 1: For 3 wire designs – Order the expected installed length. To maintain stated RTD accuracy, 3 wire Single designs with LY>324" AND 3 wire Dual designs with LY>120" cannot be shortened.

NOTE 2: Clamp size provided is based on the largest Tube/Pipe diameter in range.

Example Part Number: B03-10A-A120-06



B04: Stainless Tipped Miniature Thermocouple

Specification

The B04 miniature thermocouple offers flexibility to attach in nearly any fashion—from clamping to epoxy. This 1/8" diameter stainless steel sheath sensor is durable and designed to fit almost anywhere.

Features and Benefits:

- **Application:** Surface measurement of a pipe, duct, or other surface where direct immersion is impossible or impractical. Mounts with hose clamp, epoxy, or tape, directly to surface to be measured.
- **Accuracy:** Special limits of error per ANSI MC96.1, see table below
- **Element/ Lead Wire Configuration:** Thermocouple Type E, J, K, and
- **Lead Wire:** PTFE tape insulated conductors with PTFE tape cover, 24 AWG

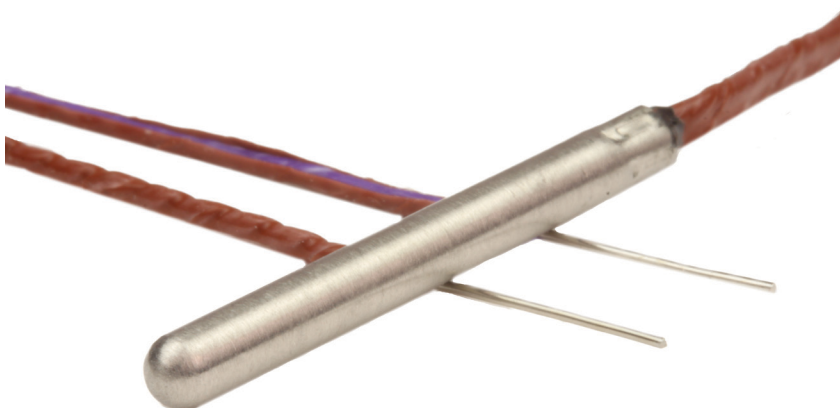
Specifications:

- **Element Configuration:** Thermocouple Type E, J, K, and T
- **Temperature Range:** See table below

ANSI Thermocouple Type	Temperature Range	Special Limits Accuracy
E	-50°C to 125°C 125°C to 200°C	0.5°C 0.4%*
J	0°C to 200°C	1.1°C
K	0°C to 200°C	1.1°C
T	-50°C to 125°C 125°C to 200°C	0.5°C 0.4%*

* % applies to measurement in °C

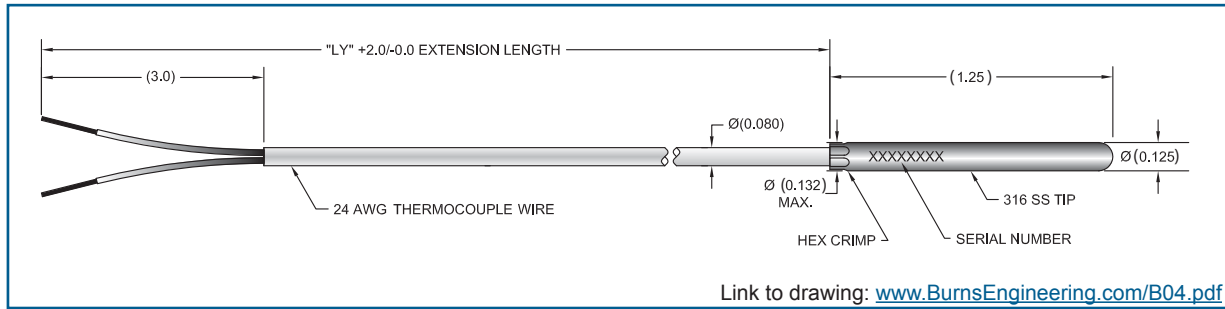
- **Cable Temperature Limits:** -50°C to 200°C
- **Insulation Resistance:** 500 MΩ, 100 VDC at room temperature (Note 1)
- **Time Response:** Maximum time for 63.2% response to a step change in temperature of water moving at 3 fps.
 - » 8.9 seconds with heat transfer compound between sensor and measurement surface
 - » 14.8 seconds without heat transfer compound



NOTE 1: Not applicable for Grounded Thermocouples

B04: Stainless Tipped Miniature Thermocouple

Ordering Information



All dimensions in inches

B04- STAINLESS TIPPED MINIATURE THERMOCOUPLE

Thermocouple (Type)	
E	Chromel/ Constantan (Leadwire Code = Purple +, Red -)
J	Iron/ Constantan (Leadwire Code - White +, Red -)
K	Chromel/ Alumel (Leadwire Code = Yellow =, Red -)
T	Copper/ Constantan (Leadwire Code - Blue +, Red -)

Thermocouple Junction Configuration	
-D	Single, Ungrounded
-E	Single, Grounded

"LY" Extension Length In Inches	
-024	24 Inches
-120	120 Inches
- *	Specify Cable Length In Inches

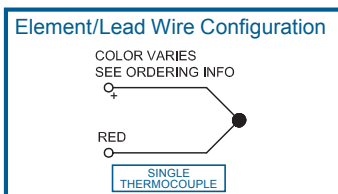
Basic Order Codes

B04-

(Leave blank if not required)

Options Transmitter

Example Part Number: B04-E-024



B05: Stainless Tipped Miniature RTD

Specification

The B05 is the ultimate in fit anywhere surface sensor. The 1/8" diameter sensor sheath and extended PTFE cable can be mounted in various ways and easily insulated to provide a confident measurement. It's small size yields a thermal response time as low as 8.9 seconds.

Features and Benefits:

- **Application:** Surface measurement of a pipe, duct, or other surface where direct immersion is impossible or impractical. Mounts with hose clamp, epoxy, or tape, directly to surface to be measured.
- **Accuracy:** Standard 0.10% of resistance at 0.0°C
- **Element/ Lead Wire Configuration:** Single 3 or 4 wire
- **Lead Wire:** PTFE insulated conductors with PFA jacket and PFA cable extension; 32 AWG

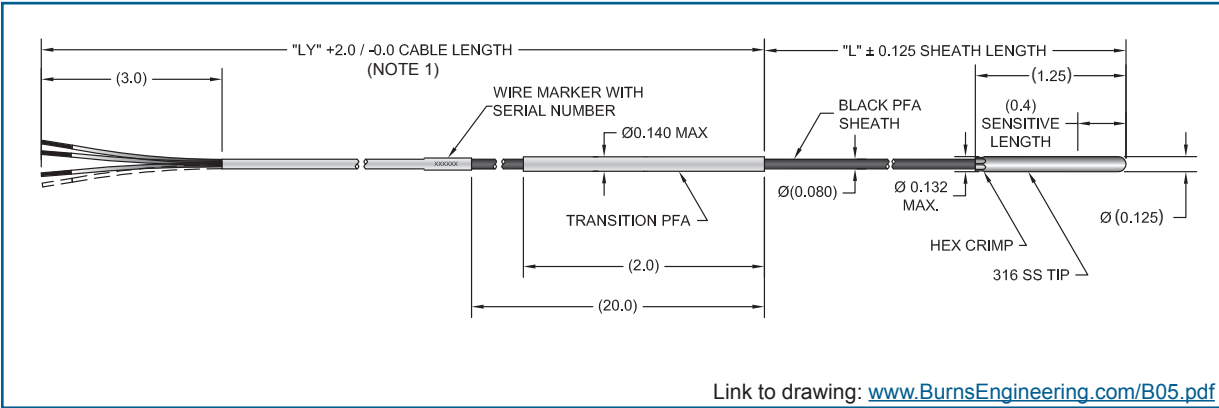
Specifications:

- **Element Configuration:** 100 ohms at 0°C, 0.00385 ohm/ohm/°C nominal alpha
- **Temperature Range:** -50°C to 200°C
- **Cable Temperature Limits:** -50°C to 200°C
- **R0 Interchangeability:** $R_0 \pm 0.10$ ohms
- **Insulation Resistance:** 500 MΩ, 100 VDC at room temperature
- **Time Response:** Maximum time for 63.2% response to a step change in temperature of water moving at 3 fps.
 - » 8.9 seconds with heat transfer compound between sensor and measurement surface
 - » 14.8 seconds without heat transfer compound



B05: Stainless Tipped Miniature RTD

Ordering Information



All dimensions in inches

B05- STAINLESS TIPPED MINIATURE RTD

Element Configuration	
A	3- Wire Single (NOTE 1)
B	4- Wire Single

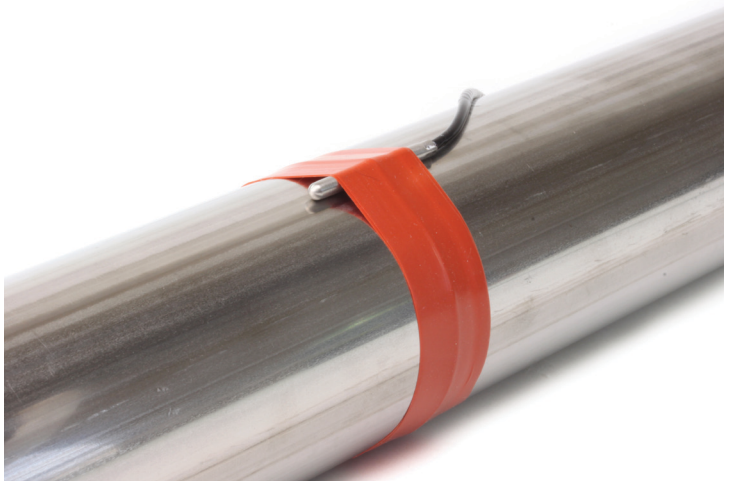
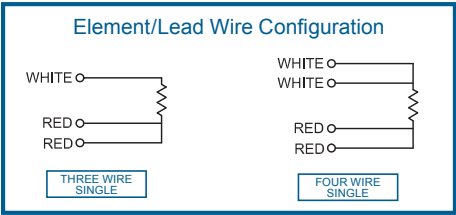
"L" PFA Sheath Length In Inches	
120	12.0 Inches
240	24.0 Inches
360	36.0 Inches

Cable Length "LY" In Inches (NOTE 1)	
-024	24.0 Inches
-120	120.0 Inches
- *	Specify Cable Length In Inches

Basic Order Codes	
B05-	

(Leave blank if not required)	
Options	Transmitter

Example Part Number: B05-B120-120



NOTE 1: For 3 wire designs – Order the expected installed length. To maintain stated RTD accuracy, 3 wire designs cannot be shortened.

B06: Threaded Surface Sensor with Connection Head

Specification

Providing the utmost in durability, the B06 Threaded Sensor with Connection Head is threaded and locks in place, making solid surface contact through the use of a welded-in-place stainless steel nut. The environmentally sealed connection head ensures confident operation in nearly any location. (Mounting and locking nut included).

Features and Benefits:

- **Application:** Surface measurement of a pipe, duct, or other surface where direct immersion is impossible or impractical. The sensor is threaded into a nut welded to the surface to be measured
- **Accuracy**
 - » RTD: Standard 0.10% of resistance at 0.0°C
 - » Thermocouple: Special limits of error per ANSI MC96.1, see table below
- **Element/ Lead Wire Configuration:**
 - » RTD: Single 3 or 4 wire, Dual 3 wire
 - » Thermocouple: Single or Dual, Type E, J, K, and T
- **Lead Wire:**
 - » RTD: PTFE insulated conductors; Single and Dual- 22 AWG
 - » Thermocouple: PTFE tape insulated conductors with PTFE tape cover, 24 AWG

Specifications:

- **Element Configuration:**
 - » RTD: Single and Dual- 100 ohms at 0.0°C, 0.00385 ohm/ohm/°C nominal alpha
 - » Thermocouple: Single or Dual Type E, J, K, and T
- **RTD Temperature Range:** -50°C to 200°C
- **Thermocouple Temperature Range:** See table below

ANSI Thermocouple Type	Temperature Range	Special Limits Accuracy
E	-50°C to 125°C 125°C to 200°C	0.5°C 0.4%*
J	0°C to 200°C	1.1°C
K	0°C to 200°C	1.1°C
T	-50°C to 125°C 125°C to 200°C	0.5°C 0.4%*

* % applies to measurement in °C

- **Ambient Temperature Limit:** 93°C (Note 2)
- **R0 interchangeability:** $R0 \pm 0.10$ ohms
- **Insulation Resistance:** 500 MΩ, 100 VDC at room temperature (Note 1)
- **Time response:** Maximum time for 63.2% response to a step change in temperature of water moving at 3 fps.
 - » 41.3 seconds with heat transfer compound between sensing surface and measurement surface
 - » 66.5 seconds without heat transfer compound

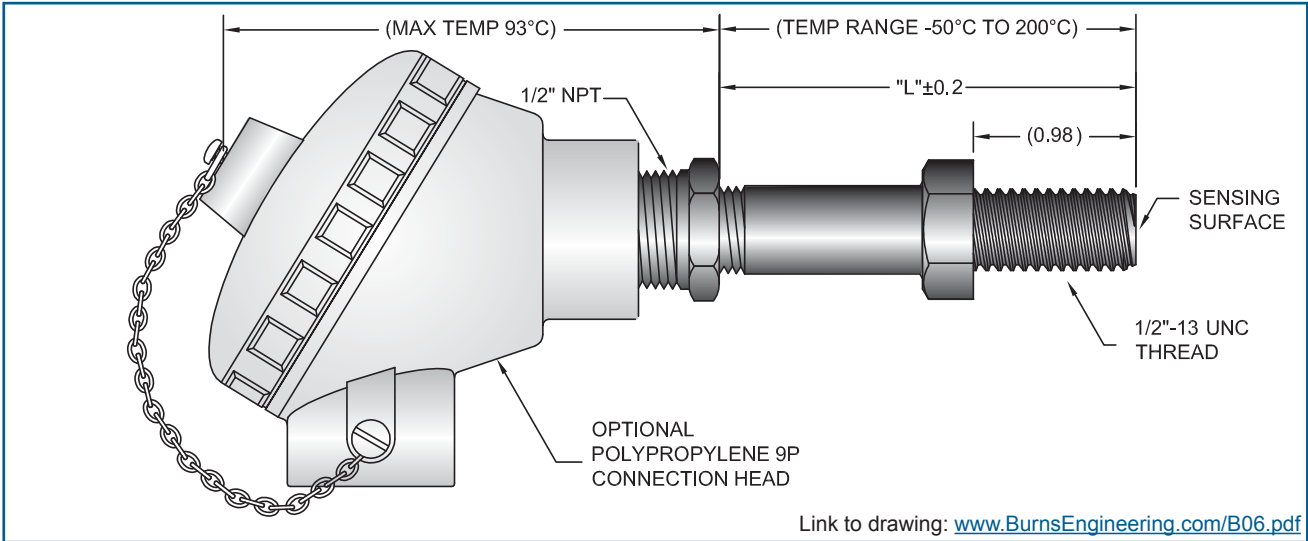


NOTE 1: Not applicable for grounded thermocouples

NOTE 2: Ambient temperature is based on connection head selection

B06: Threaded Surface Sensor with Connection Head

Ordering Information



Link to drawing: www.BurnsEngineering.com/B06.pdf

B06- THREADED SURFACE SENSOR WITH CONNECTION HEAD

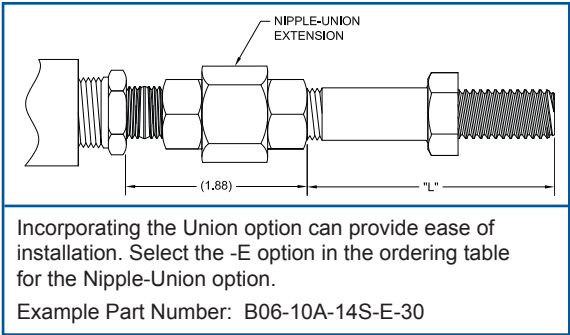
All dimensions in inches

RTD (Accuracy)	
10	Standard RTD +/- 0.10% of resistance at 0 degrees C
Thermocouple (Type)	
E	Chromel/ Constantan (Leadwire Code = Purple +, Red -)
J	Iron/ Constantan (Leadwire Code = White +, Red -)
K	Chromel/ Alumel (Leadwire Code = Yellow +, Red -)
T	Copper/ Constantan (Leadwire Code = Blue +, Red -)
RTD Element/ Lead Wire Configuration	
A	Three Wire Single Element
B	Four Wire Single Element
C	Three Wire Dual Element
Thermocouple Junction Configuration	
D	Single, Ungrounded
E	Single, Grounded
F	Dual, Ungrounded
G	Dual, Grounded
Connection Head Option	
-1C	Medium Cast Iron Head
-2A	Medium Aluminum Head
-5A	Large Aluminum Head
-9P	Polypropylene, FDA, White
-14S	Stainless Steel Head
-*	See Connection Head Supplement For More Options
Extension, Union	
E	Extension, Nipple-Union
	No Extension, Leave Code Blank
"L" Sensor Length (in inches)	
-20	2.0 Inches
-30	3.0 Inches
-40	4.0 Inches

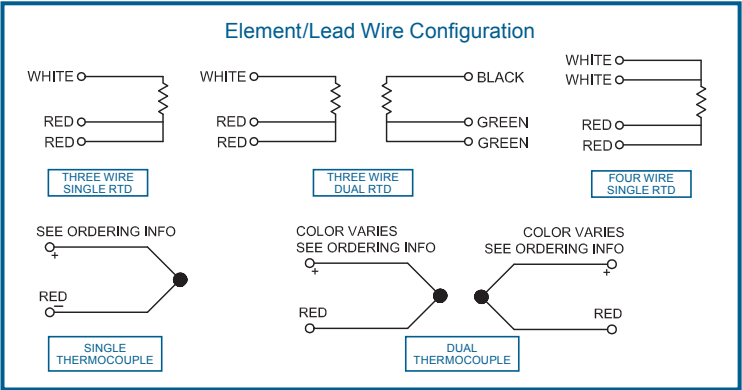
(Leave blank if not required)

Options Transmitter

B06- Basic Order Codes



Example Part Number: B06-10A-1C-20



B07: Threaded Surface Sensor with Cable Gland

Specification

The B07 is a cable version of the B06. Also available in RTD or thermocouple and tank or pipe mountable through a stainless steel nut (welded-in-place). This design provides excellent durability, mounting flexibility and cable to bring the temperature signal to where you need it.

Features and Benefits:

- **Application:** Surface measurement of a pipe, duct, or other surface where direct immersion is impractical or impossible. The sensor is threaded into a nut welded to the surface to be measured (Mounting and locking nut included)
- **Accuracy:**
 - » RTD: Standard 0.10% of resistance at 0.0°C
 - » Thermocouple: Special limits of error per ANSI MC96.1, see table below
- **Element/ Lead Wire Configuration:**
 - » RTD: Single 3 or 4 wire, Dual 3 wire
 - » Thermocouple: Single or Dual, Type E, J, K, and T
- **Lead Wire:**
 - » RTD: PTFE insulated conductors with FEP jacket; Single and Dual- 22 AWG
 - » Thermocouple: PTFE tape insulated conductors with PTFE tape cover, 24 AWG

Specifications:

- **Element Configuration:**
 - » RTD: Single and Dual, 100 ohms at 0.0°C, 0.00385 ohm/ohm/°C nominal alpha
 - » Thermocouple: Single or Dual Type E, J, K, and T
- **RTD Temperature Range:** -50°C to 200°C
- **Thermocouple Temperature Range:** See table below

ANSI Thermocouple Type	Temperature Range	Special Limits Accuracy
E	-50°C to 125°C 125°C to 200°C	0.5°C 0.4%*
J	0°C to 200°C	1.1°C
K	0°C to 200°C	1.1°C
T	-50°C to 125°C 125°C to 200°C	0.5°C 0.4%*

* % applies to measurement in °C

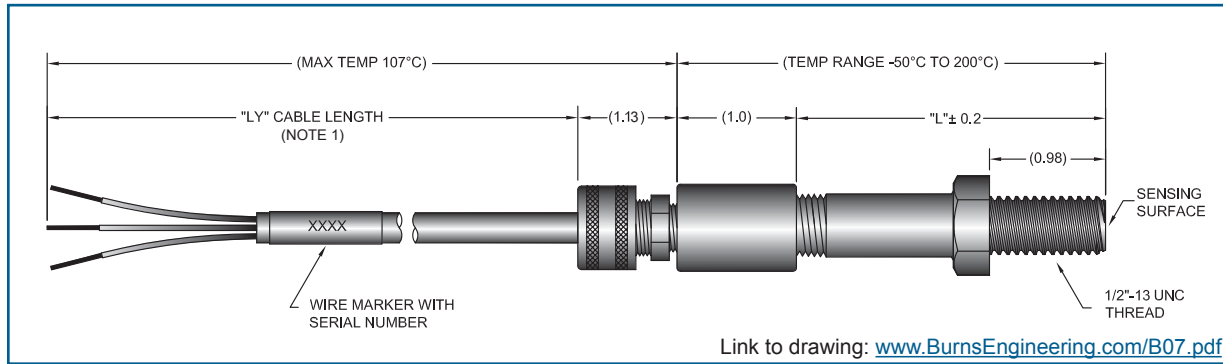
- **Ambient Temperature Limit:** 107°C (cable gland temperature limit)
- **Insulation Resistance:** 500 MΩ, 100 VDC at room temperature (Note 1)
- **Time response:** Maximum time for 63.2% response to a step change in temperature of water moving at 3 fps.
 - » 41.3 seconds with heat transfer compound between sensing surface and measurement surface
 - » 66.5 seconds without heat transfer compound



NOTE 1: Not applicable for grounded thermocouples

B07: Threaded Surface Sensor with Cable Gland

Ordering Information



All dimensions in inches

B07- THREADED SURFACE SENSOR WITH CABLE GLAND

RTD (Accuracy)

10 Standard RTD +/- 0.10% of resistance at 0 degrees C

Thermocouple (Type)

E Chromel/ Constantan (Leadwire Code = Purple +, Red -)
J Iron/ Constantan (Leadwire Code = White +, Red -)
K Chromel/ Alumel (Leadwire Code = Yellow +, Red -)
T Copper/ Constantan (Leadwire Code = Blue +, Red -)

RTD Element/ Lead Wire Configuration (NOTE 1)

A Three Wire Single Element
B Four Wire Single Element
C Three Wire Dual Element

Thermocouple Junction Configuration

D Single, Ungrounded
E Single, Grounded
F Dual, Ungrounded
G Dual, Grounded

"L" Sensor Length (in inches)

-20 2.0 Inches
-30 3.0 Inches
-40 4.0 Inches

Cable Length "LY" In Inches

-024 24 Inches Cable Length
-120 120 Inches Cable Length
- * Specify Cable Length In Inches (NOTE 1)

NOTE 1: For 3 wire designs – Order the expected installed length. To maintain stated RTD accuracy, 3 wire designs with LY>324" cannot be shortened.

Basic Order Codes

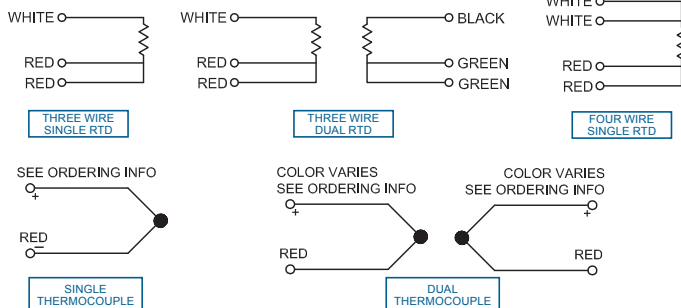
Options

Transmitter

(Leave blank if not required)

Example Part Number: B07-10A-20-120

Element/Lead Wire Configuration



Resistance vs. Temperature

RTD Reference Table °F and °C
(Series B-RTDs)

Resistance vs. Temperature in Degrees F

	0	2	4	6	8
400	177.49	177.90	178.30	178.71	179.12
390	175.45	175.86	176.26	176.67	177.08
380	173.40	173.81	174.22	174.63	175.04
370	171.35	171.76	172.17	172.58	172.99
360	169.30	169.71	170.12	170.53	170.94
350	167.24	167.66	168.07	168.48	168.89
340	165.18	165.60	166.01	166.42	166.83
330	163.12	163.53	163.95	164.36	164.77
320	161.05	161.47	161.88	162.29	162.71
310	158.98	159.40	159.81	160.23	160.64
300	156.91	157.33	157.74	158.15	158.57
290	154.83	155.25	155.66	156.08	156.49
280	152.75	153.17	153.58	154.00	154.42
270	150.67	151.08	151.50	151.92	152.33
260	148.58	149.00	149.41	149.83	150.25
250	146.49	146.91	147.32	147.74	148.16
240	144.39	144.81	145.23	145.65	146.07
230	142.29	142.71	143.13	143.55	143.97
220	140.19	140.61	141.03	141.45	141.87
210	138.08	138.51	138.93	139.35	139.77
200	135.97	136.40	136.82	137.24	137.66
190	133.86	134.28	134.71	135.13	135.55
180	131.74	132.17	132.59	133.01	133.44
170	129.62	130.05	130.47	130.90	131.32
160	127.50	127.93	128.35	128.78	129.20

Resistance vs. Temperature in Degrees F

	0	2	4	6	8
150	125.37	125.80	126.22	126.65	127.08
140	123.24	123.67	124.09	124.52	124.95
130	121.11	121.53	121.96	122.39	122.82
120	118.97	119.40	119.82	120.25	120.68
110	116.83	117.26	117.68	118.11	118.54
100	114.68	115.11	115.54	115.97	116.40
90	112.53	112.96	113.39	113.82	114.25
80	110.38	110.81	111.24	111.67	112.10
70	108.23	108.66	109.09	109.52	109.95
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
---	0	-2	-4	-6	-8
0	93.03	92.60	82.16	91.72	91.29
-10	90.85	90.41	89.97	89.54	89.10
-20	88.66	88.22	87.78	87.34	86.91
-30	86.47	86.03	85.59	85.15	84.71
-40	84.27	83.83	83.39	82.95	82.51
-50	82.07	81.63	81.19	80.75	80.31
-60	79.86	79.42	78.98	78.54	78.10

Resistance vs. Temperature in Degrees C

	0	2	4	6	8
200	175.86	176.59	177.33	178.06	178.79
190	172.17	172.91	173.65	174.38	175.12
180	168.48	169.22	169.96	170.70	171.42
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	152.82
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

Millivolts vs. Temperature

Thermocouple Reference Table °F and °C
(Series B-Thermocouples)

mV vs. Temperature in Degrees F

mV vs. Temperature in Degrees F

	E	J	K	T
395	13.545	10.871	8.205	9.377
390	13.339	10.717	8.094	9.229
385	13.134	10.563	7.983	9.082
380	12.929	10.409	7.872	8.935
375	12.724	10.255	7.761	8.789
370	12.520	10.101	7.650	8.643
365	12.317	9.947	7.540	8.497
360	12.113	9.793	7.429	8.352
355	11.911	9.639	7.318	8.208
350	11.708	9.485	7.207	8.064
345	11.506	9.331	7.096	7.920
340	11.305	9.177	6.985	7.777
335	11.104	9.023	6.874	7.634
330	10.903	8.869	6.763	7.492
325	10.703	8.716	6.652	7.350
320	10.503	8.562	6.540	7.209
315	10.304	8.409	6.429	7.068
310	10.106	8.255	6.317	6.928
305	9.907	8.102	6.205	6.788
300	9.710	7.949	6.094	6.648
295	9.513	7.795	5.982	6.510
290	9.316	7.642	5.869	6.371
285	9.120	7.489	5.757	6.233
280	8.924	7.336	5.644	6.096
275	8.729	7.184	5.532	5.959
270	8.535	7.031	5.419	5.823
265	8.340	6.878	5.306	5.687
260	8.147	6.726	5.192	5.551
255	7.954	6.573	5.079	5.416
250	7.762	6.421	4.965	5.282
245	7.570	6.269	4.852	5.148
240	7.379	6.117	4.738	5.015
235	7.188	5.965	4.623	4.882
230	6.998	5.814	4.509	4.750
225	6.809	5.662	4.395	4.618
220	6.620	5.511	4.280	4.487
215	6.432	5.360	4.165	4.357
210	6.244	5.209	4.050	4.227
205	6.057	5.058	3.935	4.097
200	5.871	4.907	3.820	3.968
195	5.685	4.757	3.705	3.840
190	5.500	4.606	3.590	3.712
185	5.315	4.456	3.474	3.585
180	5.131	4.306	3.359	3.459
175	4.948	4.157	3.244	3.333

	E	J	K	T
170	4.766	4.007	3.128	3.207
165	4.584	3.858	3.013	3.082
160	4.403	3.709	2.897	2.958
155	4.222	3.560	2.782	2.835
150	4.042	3.412	2.667	2.712
145	3.863	3.264	2.552	2.590
140	3.685	3.116	2.436	2.468
135	3.507	2.968	2.321	2.347
130	3.330	2.821	2.207	2.227
125	3.153	2.673	2.092	2.107
120	2.977	2.527	1.977	1.988
115	2.802	2.380	1.863	1.870
110	2.628	2.234	1.749	1.752
105	2.454	2.088	1.635	1.635
100	2.281	1.942	1.521	1.519
95	2.109	1.797	1.407	1.403
90	1.938	1.652	1.294	1.288
85	1.767	1.508	1.181	1.174
80	1.597	1.364	1.068	1.060
75	1.427	1.220	0.955	0.947
70	1.259	1.076	0.843	0.834
65	1.091	0.933	0.731	0.723
60	0.924	0.791	0.619	0.611
55	0.757	0.649	0.508	0.501
50	0.591	0.507	0.397	0.391
45	0.262	0.365	0.176	0.282
40	0.426	0.225	0.286	0.173
35	-0.065	0.084	-0.044	0.065
30	0.098	-0.056	0.066	-0.043
25	-0.389	-0.195	-0.262	-0.150
20	-0.227	-0.334	-0.153	-0.256
15	-0.709	-0.473	-0.478	-0.362
10	-0.550	-0.611	-0.370	-0.467
5	-1.026	-0.749	-0.692	-0.571
0	-0.868	-0.886	-0.586	-0.675
-5	-1.183	-1.022	-0.799	-0.777
-10	-1.339	-1.158	-0.905	-0.879
-15	-1.494	-1.293	-1.010	-0.980
-20	-1.648	-1.428	-1.114	-1.081
-25	-1.801	-1.562	-1.218	-1.181
-30	-1.953	-1.695	-1.322	-1.279
-35	-2.105	-1.828	-1.425	-1.378
-40	-2.255	-1.961	-1.527	-1.475
-45	-2.404	-2.092	-1.628	-1.572
-50	-2.552	-2.223	-1.729	-1.667

mV vs. Temperature in Degrees C

mV vs. Temperature in Degrees C

	E	J	K	T
200	13.421	10.779	8.138	9.288
195	13.052	10.501	7.939	9.023
190	12.684	10.224	7.739	8.759
185	12.317	9.947	7.540	8.497
180	11.951	9.669	7.340	8.237
175	11.587	9.392	7.140	7.977
170	11.224	9.115	6.941	7.720
165	10.863	8.839	6.741	7.463
160	10.503	8.562	6.540	7.209
155	10.145	8.286	6.339	6.956
150	9.789	8.010	6.138	6.704
145	9.434	7.734	5.937	6.454
140	9.081	7.459	5.735	6.206
135	8.729	7.184	5.532	5.959
130	8.379	6.909	5.328	5.714
125	8.031	6.634	5.124	5.470
120	7.685	6.360	4.920	5.228
115	7.341	6.087	4.715	4.988
110	6.998	5.814	4.509	4.750
105	6.658	5.541	4.303	4.513
100	6.319	5.269	4.096	4.279
95	5.982	4.997	3.889	4.046
90	5.648	4.726	3.682	3.814
85	5.315	4.456	3.474	3.585
80	4.985	4.187	3.267	3.358

	E	J	K	T
75	4.656	3.918	3.059	3.132
70	4.330	3.650	2.851	2.909
65	4.006	3.382	2.644	2.687
60	3.685	3.116	2.436	2.468
55	3.365	2.850	2.230	2.251
50	3.048	2.585	2.023	2.036
45	2.733	2.322	1.817	1.823
40	2.420	2.059	1.612	1.612
35	2.109	1.797	1.407	1.403
30	1.801	1.537	1.203	1.196
25	1.495	1.277	1.000	0.992
20	1.192	1.019	0.798	0.790
15	0.890	0.762	0.597	0.589
10	0.591	0.507	0.397	0.391
5	0.294	0.253	0.198	0.195
0	0.000	0.000	0.000	0.000
-5	-0.292	-0.251	-0.197	-0.193
-10	-0.582	-0.501	-0.392	-0.383
-15	-0.868	-0.749	-0.586	-0.571
-20	-1.152	-0.995	-0.778	-0.757
-25	-1.432	-1.239	-0.968	-0.940
-30	-1.709	-1.482	-1.156	-1.121
-35	-1.984	-1.722	-1.343	-1.299
-40	-2.255	-1.961	-1.527	-1.475
-45	-2.523	-2.197	-1.709	-1.648
-50	-2.787	-2.431	-1.889	-1.819

Custom solutions designed for your specific needs.

Burns Engineering has a long history of designing and building temperature products to meet the measurement needs of unique and varied applications. The products in this catalog were specifically developed to meet field requirements and allow for configured-to-order flexibility. Not sure what product is right for your application? Our application engineering group is here to help you select, configure, and/or custom design the right product for your specific needs.

Burns Engineering is a leading supplier of temperature measurement solutions for all your process and metrology applications.

Your processes require temperature measurement solutions that you can depend on. We understand that measurement accuracy, reliability and consistency are important to your success.

Temperature measurement is our business.

Turn to Burns as your
Temperature Measurement Expert.®

What will your solution BE?

Surface Sensors, RTDs and Thermocouples



RTDology® Temperature Training Complementary Online Education



RTDology® - learn how to build confidence
in your temperature measurements.

RTD vs.
Thermocouple



To learn more about our
online sessions snap or visit

RTDology.com

RTD Selection
& Application



RTD Accuracy



Optimizing
Measurements

Burns Engineering | 10201 Bren Rd. E., Minnetonka, MN 55343 | email: info@burnsengineering.com
Phone (Toll Free): 800-328-3871 | Phone (Local): 952-935-4400 | Fax: 952-935-8782

Product images provided by Sr. Application Engineer and Photographer Bill Bergquist.

Trademarks contained within this catalog:
Burns Engineering Logo, Temperature Measurement Experts are registered trademarks of Burns Engineering.
Chromel & Alumel are Trademarks of Hoskins Manufacturing.

Copyright 2013, Burns Engineering, Inc.
Printed in U.S.A., Surface Sensors Rev. 5/16