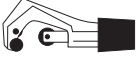




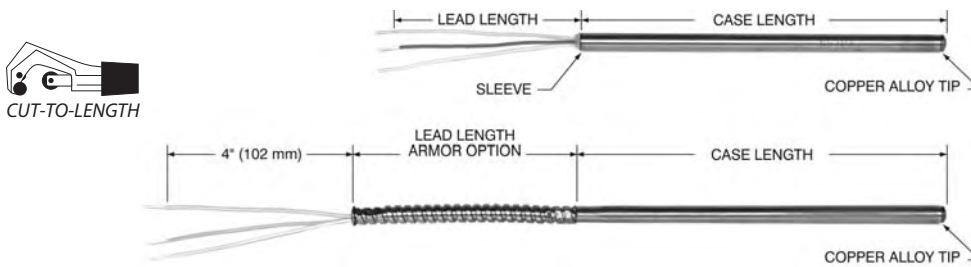
▶ SECTION 3: PROBES

- RTDs and thermocouples in a variety of configurations for easy installation
- Tip-sensitive and fast response probes for quick and accurate temperature sensing
- High temperature probes to 850°C for extreme environments
- Single and dual elements offer high reliability
- Cut-to-length models are marked with  (see page 3-18 for instructions)

CUT-TO-LENGTH

Tip-sensitive RTDs	3-2, 3-6, 3-14
Tip-sensitive thermocouples.....	3-3, 3-7, 3-15
Fast Response RTDs.....	3-4 to 3-5
Bayonet mount RTDs, thermocouples.....	3-6, 3-7
Electrically isolated RTDs, thermocouples	3-8, 3-9
550°C RTDs, thermocouples	3-10, 3-11
600°C and 850°C RTDs	3-12
Mineral-insulated RTDs.....	3-13
Process style RTDs, thermocouples	3-14, 3-15
Melt bolt RTDs, thermocouples.....	3-16, 3-17
How to shorten cut-to-length probes.....	3-18
PFA, FEP encapsulation tubing	3-18

Tip-sensitive RTDs



Overview

The probe sensing tip is constructed of copper alloy which is twenty times more conductive than stainless steel. The sensors react more quickly to changes and indicate tip temperature instead of stem temperature which increases accuracy. Minco recommends 0.250" diameter probes for use in thermowells.

Specifications

Temperature range: -50 to 260°C (-58 to 500°F).

Case: Stainless steel with copper alloy tip.

Minimum case length:

Single element probes: 2.8" (71.1 mm).

Dual element probes: 4.0" (101.6 mm).

Maximum case length:

48" (1220 mm), longer on special order.

Leads: 2, 3, or 4 leadwires, stranded copper with PTFE insulation. AWG 22, except 0.188" diameter dual probes AWG 24. For 2-lead RTDs add 0.03 Ω per foot (0.05 Ω per foot for 0.188" diameter dual probes) of combined case and lead length to element tolerance. Copper (CA, CC) models must have 3 leads.

Time constant: 2.0 seconds typical in moving water. 3.0 seconds for dual element models.

Pressure rating: 100 psi (6.9 bar).

Insulation resistance:

Single element probes: 1000 megohms min. at 500 VDC, leads to case.

Dual element probes: 100 megohms min. at 100 VDC, between elements and leads to case.

Vibration: Withstands 10 to 2000 Hz at 20 G's min. per MIL-STD-202, Method 204, Test Condition D.

Shock: Withstands 100 G's min. sine wave shock of 8 milliseconds duration.

Specification and order options

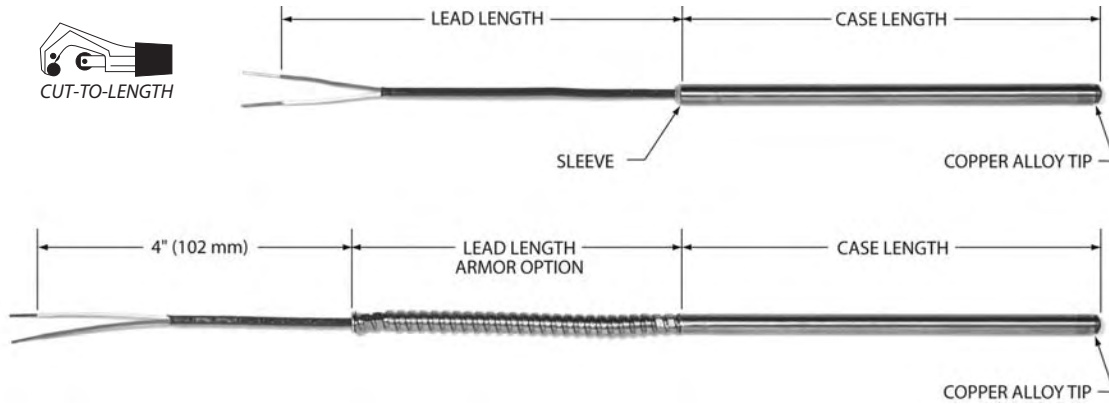
S56NA	Model number from table
125	Case length: Specify in 0.1" increments (Ex: 125 = 12.5 inches)
Y	Number of leads per sensing element: Y = 2 leads Z = 3 leads X = 4 leads (PD only)
36	Lead length in inches
S56NA125Y36 = Sample part number	

Model numbers

Element	Model for probe diameter:		
	0.188" (4.8 mm)	0.215" (5.5 mm)	0.250" (6.4 mm)
Single element RTDs: No armor over leads			
Platinum (0.00392 TCR) 100 Ω ±0.5% at 0°C	S54PA	S51PA	S53PA
Platinum (0.00385 TCR) 100 Ω ±0.06% at 0°C (Meets EN60751, Class A)	S554PM	S551PM	S553PM
Platinum (0.00385 TCR) 100 Ω ±0.1% at 0°C (Meets EN60751, Class B)	S854PD	S851PD	S853PD
Platinum (0.00385 TCR) 100 Ω ±0.5% at 0°C	S884PE	S881PE	S883PE
Copper (0.00427 TCR) 10 Ω ±0.2% at 25°C	S54CA	S51CA	S53CA
Nickel (0.00672) 120 Ω ±0.5% at 0°C	S54NA	S51NA	S53NA
Single element RTDs: With armor over leads			
Add element code (Ex: S154__ = S154NA)	S154__	S151__	S153__
Dual element RTDs: No armor over leads			
Platinum (0.00392 TCR) 100 Ω ±0.5% at 0°C	S59PA	S56PA	S57PA
Platinum (0.00385 TCR) 100 Ω ±0.06% at 0°C (Meets EN60751, Class A)	S559PM	S556PM	S557PM
Platinum (0.00385 TCR) 100 Ω ±0.1% at 0°C (Meets EN60751, Class B)	S859PD	S856PD	S857PD
Platinum (0.00385 TCR) 100 Ω ±0.5% at 0°C	S889PE	S886PE	S887PE
Copper (0.00427 TCR) 10 Ω ±0.5% at 25°C		S56CC	S57CC
Nickel (0.00672) 120 Ω ±0.5% at 0°C	S59NA	S56NA	S57NA
Dual element RTDs: With armor over leads			
Add element code (Ex: S159__ = S159NA)	S159__	S156__	S157__

Specifications subject to change

Tip-sensitive Thermocouples



PROBES

Overview

The probe sensing tip is constructed of copper alloy which is twenty times more conductive than stainless steel. The sensors react more quickly to changes and indicate tip temperature instead of stem temperature. The result is better accuracy in thermowells, bearings, and other installations. Minco recommends 0.250" diameter probes for use in thermowells.

- Copper alloy tip for fast response
- Accurate sensing to 260°C (500°F)
- Non-armor models can be user-shortened

Specifications

Temperature range: -184 to 260°C (-300 to 500°F).

Case: Stainless steel with copper alloy tip.
 Minimum case length: 2.5" (63.5 mm).
 Maximum case length: 48" (1220 mm), longer on special order.

Leads: Solid thermocouple wire, AWG 20 (except AWG 24 on model TC355). Specify PTFE insulation, stainless steel overbraid, or stainless steel armor.

Time constant: Typical value in moving water:
 Grounded junction: 1.5 seconds.
 Ungrounded junction: 7 seconds.

Pressure rating: 100 psi (6.9 bar).

Insulation resistance: 10 megohms minimum at 100 VDC, leads to case, ungrounded junctions only.

Vibration: Withstands 10 to 2000 Hz at 20 G's minimum per MIL-STD-202, Method 204, Test Condition D.

Shock: Withstands 100 G's min. sine wave shock of 8 milliseconds duration.

Model numbers

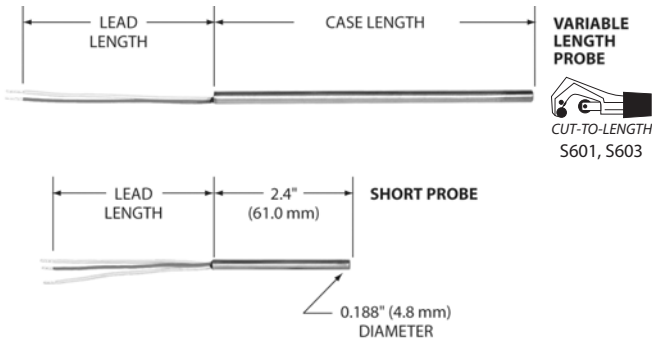
	Model for probe diameter:		
	0.188" (4.8 mm)	0.215" (5.5 mm)	0.250" (6.4 mm)
Single junction	TC354	TC356	TC358
Dual junction	TC355	TC357	TC359

Specification and order options

TC356	Model number from table
T	Junction type: E = Chromel-Constantan J = Iron-Constantan K = Chromel-Alumel T = Copper-Constantan
G	Junction grounding: G = Grounded U = Ungrounded
200	Case length: Specify in 0.1" increments: Ex: 200 = 20.0 inches
S	Covering over leadwires: T = PTFE only G = Glass braid only S = Stainless steel overbraid A = Stainless steel armor
24	Lead length in inches
TC356TG200S24 = Sample part number	

Specifications subject to change

Fast Response RTDs



Overview

These probes have rugged stainless steel cases for use in high pressures or corrosive fluids. Yet their time constants are comparable to copper-tipped probes at 2 to 4 seconds, compared to 8 to 10 seconds for other all-stainless probes.

- All-stainless steel probes for use to 260°C (500°F)
- Unique low-mass element reacts quickly to temperature changes

Specifications

Temperature range: -269 to 260°C (-452 to 500°F).

Case material:

S601, S603, S604: 316 stainless steel.
S602, S614: 304/305 stainless steel.

Case length:

Minimum case length:
S602, S604: 2.0" (50.8 mm) with PTFE insulated leads;
3.0" (76.2 mm) with SS braid over leads.
S601, S603: 3.0" (76.2 mm).

Maximum case length:
48" (1220 mm), longer on special order.

Time constant: Typical in moving water:

S602, S604, S614: 2 seconds.
S601: 3 seconds.
S603: 4 seconds.

Pressure rating: 1500 psi (103 bar).

Leads: 2, 3, or 4 leadwires, AWG 22, stranded copper with PTFE insulation, stainless steel braid, or stainless steel armor. For 2-lead RTDs add 0.03 Ω per foot of combined case and lead length to element tolerance (model S602 has AWG 26; add 0.08 Ω per foot for 2-lead).

Insulation resistance: 1000 megohms minimum at 500 VDC, leads to case.

Vibration: Withstands 10 to 2000 Hz at 20 G's minimum per MIL-STD-202, Method 204, Test Condition D.

Shock: Withstands 100 G's minimum sine wave shock of 8 milliseconds duration.

Sensing elements

RTD sensing element		Code
Platinum (0.00392 TCR)	100 Ω ±0.5% at 0°C	PA
Platinum (0.00385 TCR) (Meets EN60751, Class B)	100 Ω ±0.1% at 0°C	PD
Platinum (0.00385 TCR)	100 Ω ±0.5% at 0°C	PE
Platinum (0.00385 TCR) (N/A for model S602)	1000 Ω ±0.1% at 0°C	PF
Copper (0.00427 TCR)	10 Ω ±0.2% at 25°C	CA
Nickel (0.00672 TCR)	120 Ω ±0.5% at 0°C	NA

Specification and order options:

Fast response probes

Specify 0.125" or 0.188" for fastest response, 0.250" or 0.215" for greater strength and cut-to-length capability (PTFE and SS braid models).

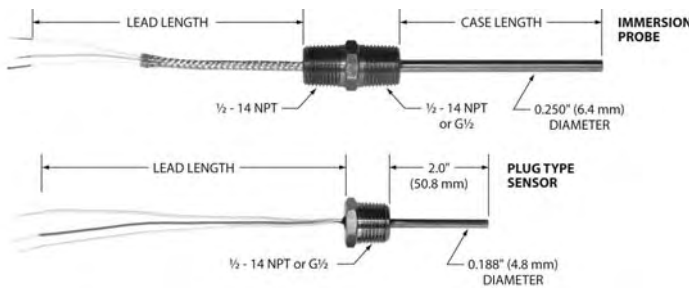
S604	Model number: S601: Ø 0.215" (5.5 mm) Cut-to-length probe S602: Ø 0.125" (3.2 mm) S603: Ø 0.250" (6.4 mm) Cut-to-length probe S604: Ø 0.188" (4.8 mm)
PD	Sensing element from table
140	Case length: Specify in 0.1" increments (Ex: 140 = 14.0 inches)
X	Number of leadwires: Y = 2 leads Z = 3 leads X = 4 leads (PD only)
36	Lead length in inches
T	Covering over leadwires: T = PTFE only S = Stainless steel braid A = Stainless steel armor (S, A not available on S602)
S604PD140X36T = Sample part number	

Short probes

This model has a case with fixed length of 2.4" (61 mm). Use it as an all-purpose sensing element.

S614	Model number
PA	Sensing element from table
Z	Number of leadwires: Y = 2 leads Z = 3 leads X = 4 leads (PD only)
12	Lead length in inches
S	Covering over leadwires: T = PTFE only S = Stainless steel braid
S614PAZ12S = Sample part number	

Fast Response Immersion RTDs



Overview

You can mount these probes directly in fluid streams for accurate, reliable sensing. Time constant is just 2 seconds, compared to 10 seconds for an ordinary stainless probe or up to 50 seconds for a thermowell. The result is more accurate monitoring of dynamic processes.

- Stainless steel probes for use to 260°C (500°F)
- Pressure rating 1500 psi (103 bar)
- Quick reaction to changing fluid and gas temperatures
- NPT (U.S.) or metric threads

Specifications

Temperature range: -269 to 260°C (-452 to 500°F).

Case material:

S623, S628: 316 stainless steel.
S634, S639: 304/305 stainless steel.

Case length:

Minimum case length: 1.5" (38.1 mm).
Maximum case length: 48" (1220 mm), longer on special order.

Time constant: Typical value in moving water:

S623, S628: 4 seconds.
S634, S639: 2 seconds.

Pressure rating: 1500 psi (103 bar).

Leads: 2, 3, or 4 leadwires, AWG 22, stranded copper with PTFE insulation, stainless steel braid, or stainless steel armor.
For 2-lead RTDs add 0.03 Ω per foot of combined case and lead length to element tolerance.

Insulation resistance: 1000 megohms minimum at 500 VDC, leads to case.

Vibration: Withstands 10 to 2000 Hz at 20 G's minimum per MIL-STD-202, Method 204, Test Condition D.

Shock: Withstands 100 G's minimum sine wave shock of 8 milliseconds duration.

Sensing elements

RTD sensing element		Code
Platinum (0.00392 TCR)	100 Ω ±0.5% at 0°C	PA
Platinum (0.00385 TCR) (Meets EN60751, Class B)	100 Ω ±0.1% at 0°C	PD
Platinum (0.00385 TCR)	100 Ω ±0.5% at 0°C	PE
Platinum (0.00385 TCR) (N/A for model S602)	1000 Ω ±0.1% at 0°C	PF
Copper (0.00427 TCR)	10 Ω ±0.2% at 25°C	CA
Nickel (0.00672 TCR)	120 Ω ±0.5% at 0°C	NA

Specification and order options:

Immersion probes

These probes have welded fittings to mount directly into fluid vessels. Add a connection head for termination of extension leads.

S623	Model number: S623: 1/42 - 14 NPT thread [2] S628: ISO 228/1-G1/42 process thread (1/42 - 14 NPT on leads end)
PF	Sensing element from table
60	Case length: Specify in 0.1" increments (Ex: 60 = 6.0 inches)
Y	Number of leads: Y = 2 leads Z = 3 leads X = 4 leads (PD only)
72	Lead length in inches
A	Covering over leadwires: T = PTFE only S = Stainless steel braid A = Stainless steel armor
S623PF60Y72A = Sample part number	

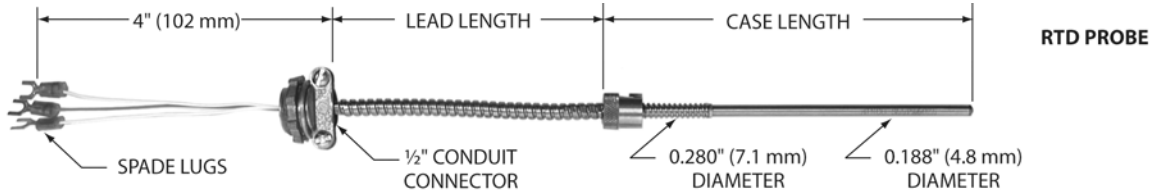
Plug type sensors

Save space and get accurate readings with this compact, easy-to-install probe.

S634	Model number: S634: 1/42 - 14 NPT thread S639: ISO 228/1-G1/42 thread
NA	Sensing element from table
Y	Number of leads: Y = 2 leads Z = 3 leads X = 4 leads (PD only)
24	Lead length in inches
T	Covering over leadwires: T = PTFE only S = Stainless steel braid
S634NAY24T = Sample part number	

Specifications subject to change

Bayonet Mount Tip-sensitive RTDs



Overview

Bayonet mounting provides easy and inexpensive spring-loaded installation of probes into solids. All models have a copper alloy tip for fast time response and increased tip sensitivity.

See page 4-9 for bayonet fittings or page 4-10 for metric fittings.

- Lockcap and spring for twist-and-release spring-loading
- Accurate sensing to 260°C (500°F)

Specifications

Temperature range: -50 to 260°C (-58 to 500°F).

Case: Stainless steel with copper alloy tip.

Minimum case length: 3.0" (76.2 mm).

Maximum case length: 48" (1220 mm), longer on special order.

Time constant: 2 seconds typical in moving water.

Leads: 2, 3, or 4 leadwires, AWG 22, stranded copper with PTFE insulation, stainless steel armor, and 1/4" conduit connector. For 2-lead RTDs add 0.03 Ω per foot of combined case and lead length to element tolerance.

Insulation resistance: 1000 megohms min. at 500 VDC, leads to case.

Vibration: Withstands 10 to 2000 Hz at 20 G's minimum per MIL-STD-202, Method 204, Test Condition D.

Shock: Withstands 100 G's minimum sine wave shock of 8 milliseconds duration.

Model numbers

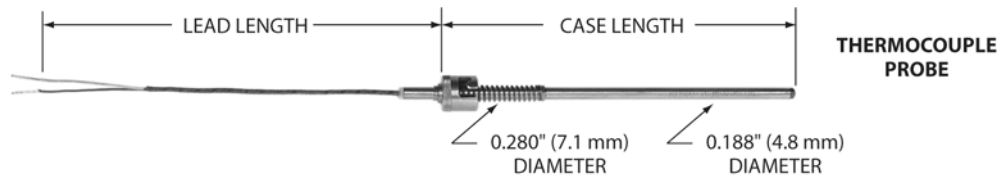
RTD sensing element		Model
Platinum (0.00392 TCR)	100 Ω ±0.5% at 0°C	S44PA
Platinum (0.00385 TCR) (Meets EN60751, Class B)	100 Ω ±0.1% at 0°C	S844PD
Platinum (0.00385 TCR)	100 Ω ±0.5% at 0°C	S874PE
Copper (0.00427 TCR)	10 Ω ±0.2% at 25°C	S44CA
Nickel (0.00672 TCR)	120 Ω ±0.5% at 0°C	S44NA

Specification and order options

S874PE	Model number from table
110	Case length: Specify in 0.1" increments (Ex: 110 = 11.0 inches)
Y	Number of leads: Y = 2 leads Z = 3 leads X = 4 leads (PD only)
36	Lead length in inches
S874PE110Y36 = Sample part number	

Specifications subject to change

Bayonet Mount Tip-sensitive Thermocouples



PROBES

Overview

Bayonet mounting provides easy and inexpensive spring-loaded installation of probes into solids. All models have a copper alloy tip for fast time response and increased tip sensitivity.

See page 4-9 for bayonet fittings or page 4-10 for metric fittings.

- Lockcap and spring for twist-and-release spring-loading
- Accurate sensing to 260°C (500°F)

Specifications

Temperature range: -50 to 260°C (-58 to 500°F).

Case: Stainless steel with copper alloy tip.
 Minimum case length: 3.0" (76.2 mm).
 Maximum case length: 48" (1220 mm), longer on special order.

Leads: Solid thermocouple wire, AWG 20 (single) or AWG 24 (dual). Specify PTFE insulation, glass braid insulation, stainless steel braid over glass braid, or stainless steel armor over PTFE.

Time constant: Typical value in moving water:
 Grounded junction: 1.5 seconds.
 Ungrounded junction: 7 seconds.

Insulation resistance: 10 megohms minimum at 100 VDC, leads to case, ungrounded junctions only.

Vibration: Withstands 10 to 2000 Hz at 20 G's minimum per MIL-STD-202, Method 204, Test Condition D.

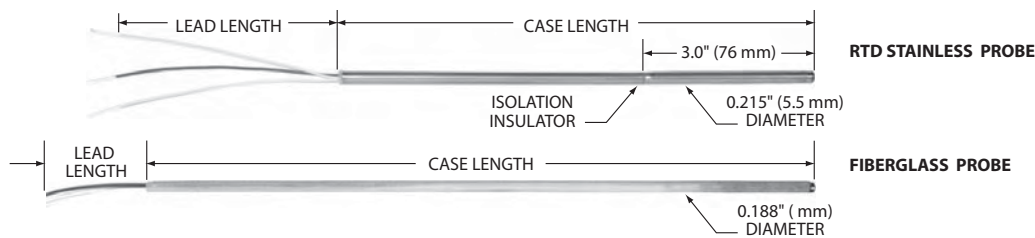
Shock: Withstands 100 G's minimum sine wave shock of 8 milliseconds duration.

Specification and order options

TC360	Model number: TC360 = Single junction TC361 = Dual junction
E	Junction type: E = Chromel-Constantan J = Iron-Constantan K = Chromel-Alumel T = Copper-Constantan
G	Junction grounding: G = Grounded U = Ungrounded
95	Case length: Specify in 0.1" increments (Ex: 95 = 9.5 inches)
A	Covering over leadwires: T = PTFE only G = Glass braid A = Stainless steel armor S = Stainless steel overbraid
12	Lead length in inches
TC360EG95A12 = Sample part number	

Specifications subject to change

Electrically Isolated RTDs



Overview

- Electrically isolated sensing tip for “hot” bearings.
- Accurate sensing to 260°C (500°F), 155°C (311°F) for fiberglass probes.
- Copper alloy tip for fast time response and increased tip sensitivity.

Specifications

Dielectric strength of isolation insulator and fiberglass tubing: 1000 volts RMS at 60 Hz for 30 seconds, between case sections, 1 mA max. leakage current.

Pressure rating: 30 psi (2.1 bar).

Vibration: Withstands 10 to 2000 Hz at 20 G’s minimum per MIL-STD-202, Method 204, Test Condition D.

Shock: Withstands 100 G’s minimum sine wave shock of 8 milliseconds duration.

Fiberglass sheath RTDs

RTD sensing element	Model
Platinum (0.00392 TCR) 100 Ω ±0.5% at 0°C	S101659PA
Platinum (0.00385 TCR) 100 Ω ±0.1% at 0°C (Meets EN60751, Class B)	S101659PD
Platinum (0.00385 TCR) 100 Ω ±0.5% at 0°C	S101659PE
Copper (0.00427 TCR) 10 Ω ±0.2% at 25°C	S101659CA
Nickel (0.00672 TCR) 120 Ω ±0.5% at 0°C	S101659NA

Temperature Range: -50 to 155°C (-58 to 311°F).

Case: Filament braided glass/epoxy tubing with copper alloy tip. Minimum case length: 3.0" (101.6 mm). Maximum case length: 40" (1220 mm).

Leads: 2 (not available with CA element models), 3, or 4 leadwires, AWG 22, stranded copper with PTFE insulation. For 2-lead RTDs add 0.03 Ω per foot of combined case and lead length to element tolerance.

Time constant: 2.5 seconds typical in moving water.

Insulation resistance: 1000 megohms min. at 500 VDC, leads to tip.

Isolated tip RTDs

RTD sensing element	Model
Platinum (0.00392 TCR) 100 Ω ±0.5% at 0°C	S52PA
Platinum (0.00385 TCR) 100 Ω ±0.1% at 0°C (Meets EN60751, Class B)	S852PD
Platinum (0.00385 TCR) 100 Ω ±0.5% at 0°C	S882PE
Copper (0.00427 TCR) 10 Ω ±0.2% at 25°C	S52CA
Nickel (0.00672 TCR) 120 Ω ±0.5% at 0°C	S52NA

Temp. Range: -50 to 260°C (-58 to 500°F).

Case: Stainless steel with copper alloy tip.

Minimum case length: 4.0" (101.6 mm).

Maximum case length: 48" (1220 mm), longer on special order.

Leads: 2, 3, or 4 leadwires, AWG 22, stranded copper with PTFE insulation. For 2-lead RTDs add 0.03 Ω per foot of combined case and lead length to element tolerance.

Time constant: 2 seconds typical in moving water.

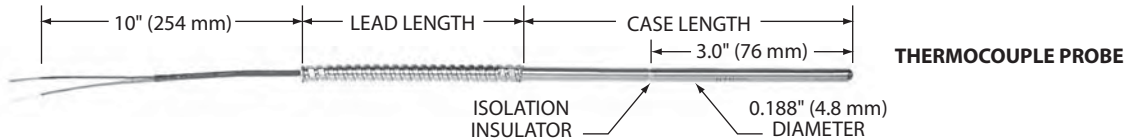
Insulation resistance: 1000 megohms min. at 500 VDC, leads to case.

Specification and order options

S52CA	Model number from isolated tip or fiberglass sheath table
355	Case length: Specify in 0.1" increments (Ex: 355 = 35.5 inches)
Z	Number of leads: Y = 2 leads Z = 3 leads X = 4 leads (PD only)
36	Lead length in inches
S52CA355Z36 = Sample part number	

Specifications subject to change

Electrically Isolated Thermocouples



Overview

- Electrically isolated sensing tip for “hot” bearings
- Accurate sensing to 260°C (500°F)
- Copper alloy tip for fast time response and increased tip sensitivity

Time constant: Typical value in moving water:
 Grounded junction: 1.5 seconds.
 Ungrounded junction: 7 seconds.

Insulation resistance: 10 megohms min. at 100 VDC, leads to case, ungrounded junctions only.

Specifications

Dielectric strength of isolation insulator: 1000 volts RMS at 60 Hz for 30 seconds, between case sections, 1 mA max. leakage current.

Pressure rating: 30 psi (2.1 bar).

Vibration: Withstands 10 to 2000 Hz at 20 G's minimum per MIL-STD-202, Method 204, Test Condition D.

Shock: Withstands 100 G's minimum sine wave shock of 8 milliseconds duration.

Temp. Range: -50 to 260°C (-58 to 500°F).

Case: Stainless steel with copper alloy tip.
 Minimum case length: 4.0" (101.6 mm).
 Maximum case length: 48" (1220 mm), longer on special order.

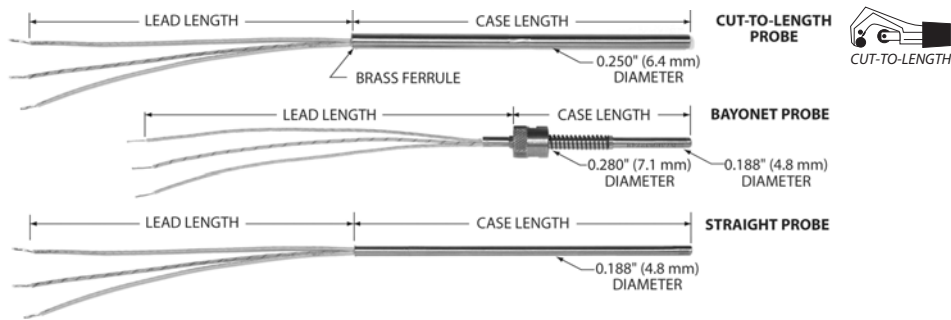
Leads: Solid thermocouple wire, AWG 20 (AWG 24 for stainless steel braid option). Specify PTFE insulation or PTFE with stainless steel armor and shrink tubing over all.

Specification and order options

TC2198	Model number: TC2198
E	Junction type: E = Chromel-Constantan J = Iron-Constantan K = Chromel-Alumel T = Copper-Constantan
U	Junction grounding: G = Grounded U = Ungrounded
225	Case length: Specify in 0.1" increments (Ex: 225 = 22.5 inches)
T	Covering over leadwires: T = PTFE only A = Stainless steel armor plus shrink tubing S = SS braid over PTFE (5" min. case length)
48	Lead length in inches
TC2198EU225T48 = Sample part number	

Specifications subject to change

550°C RTD Probes



Overview

Install these probes in steam lines, exhaust gases, or wherever you need precise readings of elevated temperatures. RTD probes feature high temperature ceramic elements, assembled into stainless steel cases in a configuration that provides long-term reliable service.

Models S80 and S81 can be shortened by the user. You can stock standard lengths and cut them to the size required with an ordinary tubing cutter.

Bayonet-style probes have a lockcap and spring for spring-loaded installation. See page 4-9 for more information on bayonet fittings.

- 0.250" diameter cut-to-length RTDs
- 0.188" diameter straight and bayonet RTDs

Specifications

Temperature range:

-100 to 550°C (-148 to 1022°F).

Leadwires: 500°C (932°F) max.

Case: 316 stainless steel.

Minimum case length:

0.250" diameter: S80, S81: 4.0" (101.6 mm).

0.188" diameter: S71, S72: 2.0" (50.8 mm)

S73, S74: 3.0" (76.2 mm).

Maximum case length: 48" (1220 mm), longer on special order.

Pressure rating: 1500 psi (103 bar).

Vibration: Withstands 10 to 2000 Hz at 20 G's minimum per MIL-STD-202, Method 204, Test Condition D.

Shock: Withstands 100 G's minimum sine wave shock of 8 milliseconds duration.

Leads: 2 or 3 leadwires, AWG 22, stranded copper with mica/glass insulation. For 2-lead RTDs add 0.04 Ω per foot of combined case and lead length to element tolerance.

Time constant: 10 seconds typical in moving water.

Insulation resistance: 10 megohms min. at 100 VDC, leads to case.

Model numbers:

Straight probe: Ø 0.188" (4.8 mm)

Element		Model
Platinum (0.00391 TCR)	100 Ω ±0.1% at 0°C	S71PB
Platinum (0.00385 TCR)*	100 Ω ±0.1% at 0°C	S72PD

Bayonet probe: Ø 0.188" (4.8 mm)

Element		Model
Platinum (0.00391 TCR)	100 Ω ±0.1% at 0°C	S73PB
Platinum (0.00385 TCR)*	100 Ω ±0.1% at 0°C	S74PD

Cut-to-length: Ø 0.250" (6.4 mm)

Element		Model
Platinum (0.00391 TCR)	100 Ω ±0.1% at 0°C	S80PB
Platinum (0.00385 TCR)*	100 Ω ±0.1% at 0°C	S81PD

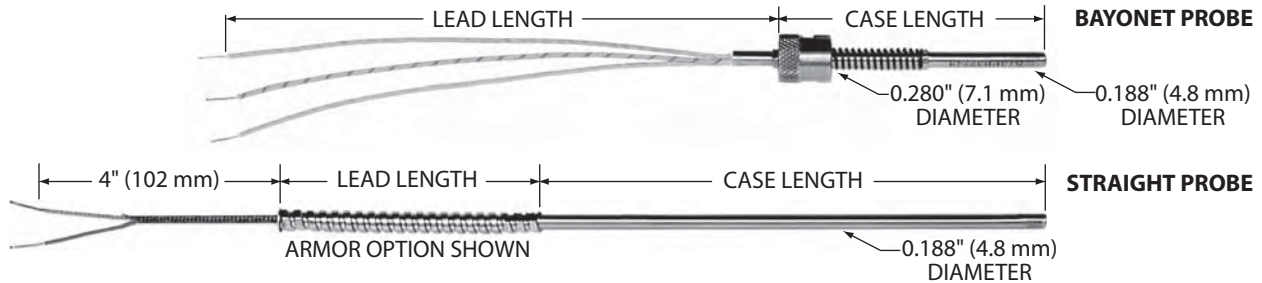
*Meets EN60751, Class B

Specification and order options

S74PD	Model number from table
145	Case length: Specify in 0.1" increments (Ex: 145 = 14.5 inches)
Z	Number of leads: Y = 2 leads Z = 3 leads
6	Lead length in inches
S74PD145Z6 = Sample part number	

Specifications subject to change

550°C Thermocouple Probes



PROBES

Overview

Install these probes in steam lines, exhaust gases, or wherever you need precise readings of elevated temperatures.

Bayonet-style probes have a lockcap and spring for spring-loaded installation. See page 4-9 for more information on bayonet fittings.

Specifications

Temperature range:

-100 to 550°C (-148 to 1022°F).

Leadwires: 500°C (932°F) max.

Case: 316 stainless steel.

Minimum case length: 2.5" (63.5 mm)

Maximum case length: 48" (1220 mm), longer on special order.

Pressure rating: 1500 psi (103 bar).

Vibration: Withstands 10 to 2000 Hz at 20 G's minimum per MIL-STD-202, Method 204, Test Condition D.

Shock: Withstands 100 G's minimum sine wave shock of 8 milliseconds duration.

Leads: Solid thermocouple wire, AWG 20. Specify glass braid insulation, stainless steel overbraid, or stainless steel armor.

Time constant: 7 seconds typical in moving water.

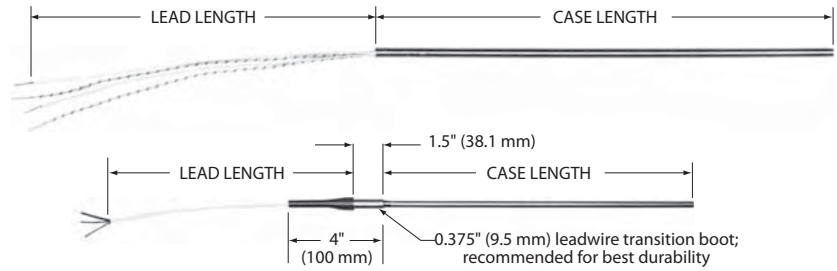
Insulation resistance: 10 megohms minimum at 100 VDC, leads to case, ungrounded junctions only.

Specification and order options

TC173	Model number: TC173: Straight probe TC171: Bayonet mount
J	Junction type: E = Chromel-Constantan J = Iron-Constantan K = Chromel-Alumel T = Copper-Constantan
U	Junction grounding: G = Grounded U = Ungrounded
45	Case length: Specify in 0.1" increments (Ex: 45 = 4.5 inches)
G	Covering over leadwires: G = Glass braid only S = Stainless steel overbraid A = Stainless steel armor
24	Lead length in inches
TC173JU45G24 = Sample part number	

Specifications subject to change

600°C and 850°C RTDs



Overview

These RTDs cover the full temperature scale of the international standard EN60751. Precision sensing elements and nickel alloy sheaths are capable of measurements from -200 to 850°C (-328 to 1562°F) with typical ice point drift less than $\pm 0.05^\circ\text{C}$.

600°C models have stainless steel sheaths for reduced cost. They use the same element structure as 850°C models for excellent accuracy and stability.

- Platinum elements to EN60751, Class A or B
- English and metric diameters

Specifications

Element: Platinum, 100 Ω at 0°C, TCR = 0.00385 $\Omega/\Omega/^\circ\text{C}$.

Tolerance: EN60751 Class A or B.

Class A: $\pm 0.06\%$

Class B: $\pm 0.12\%$

Repeatability: Meet IEC requirements. Typical shift less than 0.05°C (0.02 Ω) at 0°C after ten cycles over range.

Stability: Meet IEC stability specifications after 250 hours exposure to extremes of temperature range. Typical drift is less than 0.05°C (0.02 Ω) at 0°C.

Vibration: Will withstand 10 to 5000 Hz at 2 G's minimum per EN60751.

Shock: Will withstand 250 mm drop onto 8 mm thick steel plate (approximately 1400 G's for 0.08 ms).

Time constant: 10 seconds typical in moving water.

Pressure rating: 1000 psi (69 bar) at 25°C.

Insulation resistance: 10 megohms minimum at 100 VDC, leads to case.

600°C probes

Temperature range: -200 to 600°C (-328 to 1112°F). Reduced temperature rating for leads and last 2" (50 mm) of case — see leadwire chart.

Case: 316 stainless steel.

Minimum case length: 2.0" (50.8 mm).

Maximum case length: 48.0" (1220 mm),

longer on special order.

Probe diameter	Model
0.188" (4.8 mm)	S914
0.236" (6.0 mm)	S912
0.250" (6.4 mm)	S913

850°C probes

Temperature range: -200 to 850°C (-328 to 1582°F). Reduced temperature rating for leads and last 2" (50 mm) of case — see leadwire chart.

Case: Nickel alloy.

Minimum case length: 6.0" (150 mm).

Maximum case length: 18.0" (460 mm), longer on special order.

Probe diameter	Model
0.157" (4.0 mm)	S926
0.236" (6.0 mm)	S922
0.250" (6.4 mm)	S923

Leadwire options:

Code	Description	Max. temp.*
G	Mica/glass insulated stranded copper, AWG 22.	600°C 1112°F
T	PTFE insulated stranded copper, AWG 22.	260°C 500°F
C	AWG 24, PTFE insulated, stranded copper wires with silver-plated copper braid and PTFE over all (4 leads only).	260°C 500°F

* Temperature rating for leads and last 2" of case.

Specification and order options

S914	Model number from table
PD	100 Ω Platinum, 0.00385 TCR
06	Tolerance at 0°C: 06 = $\pm 0.06\%$, EN60751 Class A 12 = $\pm 0.12\%$, EN60751 Class B
G	Leadwire code from table
120	Case length: Specify in 0.1" increments (Ex: 120 = 12.0 inches)
X	Number of leads: Z = 3 leads X = 4 leads
24	Lead length in inches
BS	Probe termination: BS = Boot and spring B = Boot only (Boot required on S926) N = No boot or spring
S914PD06G120X24BS = Sample part number	

Specifications subject to change

Mineral-insulated RTDs

Overview

Mineral-insulated RTDs provide excellent performance, even when exposed to high levels of shock and vibration in tough industrial environments. Typical applications include process control and steam turbine efficiency measurement.

Probes can be bent around a mandrel diameter at least 3 times the probe diameter without kinking.

Custom designed RTDs and thermocouples are available.

- Mineral MgO packing protects element from shock and contamination
- Field bendable
- Inconel or stainless steel sheath
- High precision RTD elements for stable, repeatable measurements
- Dual sensing element model S953 is excellent for redundancy and failure protection

Specifications

Element: Platinum, 100 Ω at 0°C, TCR=0.00385 $\Omega/\Omega/^\circ\text{C}$.

Temperature range: Reduced to 260°C (500°F) for leadwires and potting boot.

S932, S933: -200 to 650°C (-328 to 1202°F).

S942, S943, S944: -200 to 550°C (-328 to 1022°F).

S953: -200 to 260°C (-328 to 500°F).

Tolerance: EN60751 Class B ($\pm 0.12 \Omega = \pm 0.3^\circ\text{C}$) or Class A ($\pm 0.06 \Omega = \pm 0.15^\circ\text{C}$)

Repeatability: Meets EN60751 requirements. Typical shift less than 0.05°C (0.1°F) when cycled over temperature range.

Stability: Meets EN60751 specifications after 250 hours exposure to extremes of temperature range. Typical drift of less than 0.05°C (0.1°F) at 0°C.

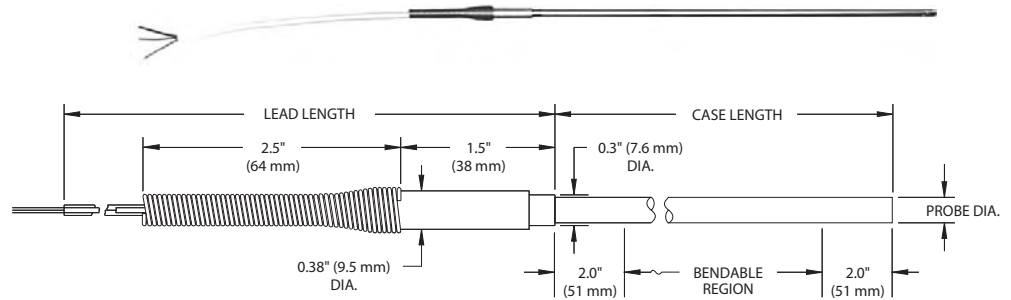
Vibration: Withstands 10 to 5000 Hz at 2 G's per EN60751. Also withstands 50 to 250 Hz at 50 G's at 500°C.

Shock: Withstands a 1 meter drop onto an 8 mm steel plate (1 meter is 4 times the EN60751 height requirement of 250 mm).

Time constant: 10 seconds typical in moving water.

Pressure rating: 69 bar (1000 psi) at 25°C.

Insulation resistance: 10 megohms minimum at 100 VDC.



Single element models

Probe diameter	Max. temp.	Case material	Model
0.236" (6.0 mm)	550°C (1022°F)	316 stainless steel	S942
0.236" (6.0 mm)	650°C (1202°F)	Inconel 600	S932
0.250" (6.4 mm)	550°C (1022°F)	316 stainless steel	S943
0.250" (6.4 mm)	650°C (1202°F)	Inconel 600	S933
0.188" (4.8 mm)	550°C (1022°F)	316 stainless steel	S944

Dual element model

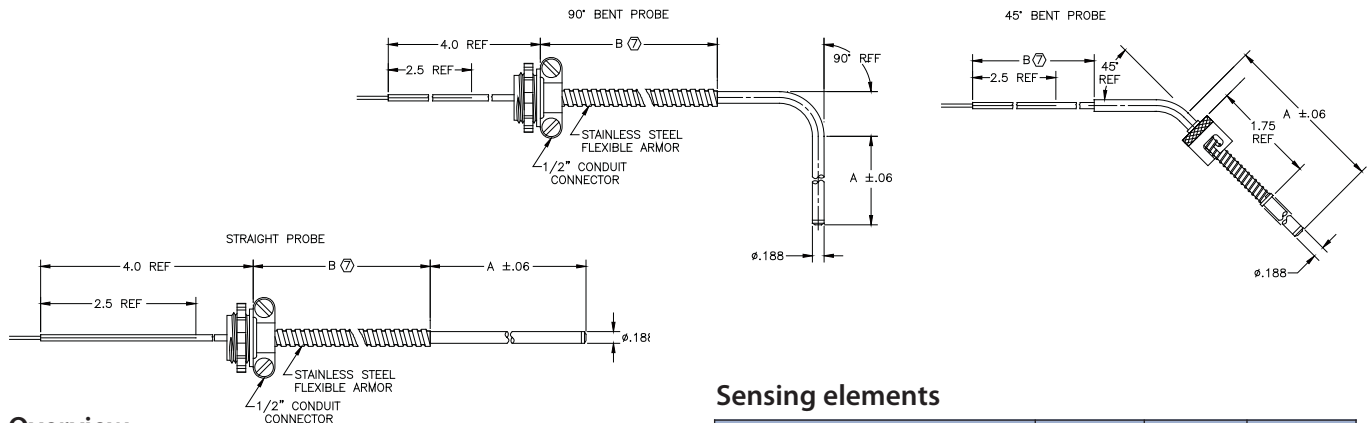
Probe diameter	Max. temp.	Case material	Model
0.250" (6.4 mm)	260°C (500°F)	316 stainless steel	S953

Specification and order options

S933	Model number from table
PD	100 Ω platinum, 0.00385 TCR
06	Tolerance at 0°C: 06 = $\pm 0.06\%$, EN60751 Class A (NA for dual element S953) 12 = $\pm 0.12\%$, EN60751 Class B
T	Leadwire insulation: T = PTFE leadwires C = PTFE cable (4 lead only, NA for dual element S953)
120	Case length: Specify in 0.1" increments (Ex: 120 = 12.0 inches)
X	Number of leadwires: Y = 2 leads per element Z = 3 leads per element X = 4 leads per element
36	Lead length in inches
BS	Lead exit configuration: (B or BS option recommended for best lead exit strength) BS = Potting boot and strain relief spring B = Potting boot N = No potting boot or spring
S933PD06T120X36BS = Sample part number	

Specifications subject to change

Process Style Tip-sensitive RTDs



Overview

These probes are specially designed for use in the process and plastics industries. The copper tip makes these probes fast reacting. Probes are available in all configurations simplifying substitution of existing probes.

- Straight, 45, and 90 degree bend
- Connector option
- Lock cap and spring option

Specifications

Temperature range: -50 to 260°C (-58 to 500°F).

Case: Stainless steel with copper alloy tip.

Maximum case length:

48" (1220 mm), longer on special order.

Leads: 2, 3, or 4 leadwires, stranded copper with PTFE insulation; AWG 22; dual probes AWG 24. For 2-lead RTDs add 0.03 Ω per foot (0.05 Ω per foot for 0.188" diameter dual probes) of combined case and lead length to element tolerance. Copper (CA, CC) models must have 3 leads.

Time constant: 2.0 seconds typical in moving water. 3.0 seconds for dual element models.

Pressure rating: 100 psi (6.9 bar).

Insulation resistance:

Single element probes: 1000 megohms min. at 500 VDC, leads to case.

Dual element probes: 100 megohms min. at 100 VDC, between elements and leads to case.

Vibration: Withstands 10 to 2000 Hz at 20 G's min. per MIL-STD-202, Method 204, Test Condition D.

Shock: Withstands 100 G's min. sine wave shock of 8 milliseconds duration.

Sensing elements

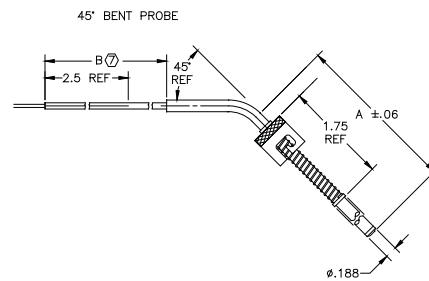
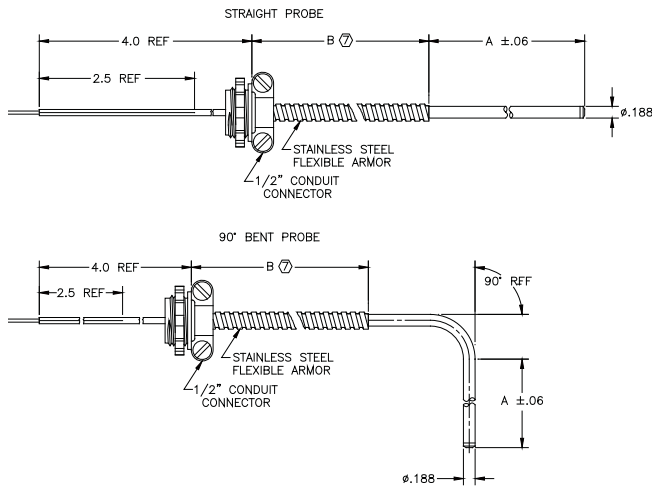
Resistance of each element	TCR	Single element	Dual element
Copper 100 Ω ±0.2% at 25°C	0.00427	CA	N/A
Copper 100 Ω ±0.5% at 25°C	0.00427	N/A	CCCC
Nickel 120 Ω ±0.5% at 0°C	0.00672	NA	NANA
Platinum 100 Ω ±0.5% at 0°C	0.00385	PE	PEPE
Platinum 100 Ω ±0.06% at 0°C	0.00385	PM	PMPM
Platinum 100 Ω ±0.12% at 0°C	0.00385	PD	PDPD
Platinum 100 Ω ±0.5% at 0°C	0.00392	PA	PAPA
Platinum 1000 Ω ±0.12% at 0°C	0.00385	PF	PFPF
Platinum 1000 Ω ±0.12% at 0°C	0.00375	PW	PWPW

Specification and order options

S103464	Model number
PD	Sensing element from table
100	Case length A in .1" increments (100 = 10.0"): Minimum A = 28 (2.8") single element 40 (4.0") dual element Maximum A = 480 (48.0")
R	Probe bend: S = Straight probe (no bend) H = 45° bend in probe R = 90° bend in probe
B	Probe attachment: N = No attachment B = Lockcap and spring for bayonet fitting
Z	Number of leads: Y = 2 leads Z = 3 leads X = 4 leads
6	Lead length B in inches
T	Lead covering: T = TFE insulated leadwires A = stainless steel flexible armor with conduit connector
1	Leadwire termination: 1 = 1/4" strip length 2 = Spade lug 3 = Connector plug (2 or 3 lead models only)
S103464PD100RBZ6T1 = Example of model number	

Specifications subject to change

Process Style Tip-sensitive Thermocouples



PROBES

Overview

These probes are mechanically interchangeable with the probes on the previous page.

Specifications

Temperature range: -184 to 260°C (-300 to 500°F).

Case: Stainless steel with copper alloy tip.
Maximum case length: 48" (1220 mm), longer on special order.

Leads: Solid thermocouple wire, AWG 20 (except AWG 24 on duplex model). Specify PTFE insulation or stainless steel armor.

Time constant: Typical value in moving water:
Grounded junction: 1.5 seconds.
Ungrounded junction: 7 seconds.

Pressure rating: 100 psi (6.9 bar).

Insulation resistance: 10 megohms minimum at 100 VDC, leads to case, ungrounded junctions only.

Vibration: Withstands 10 to 2000 Hz at 20 G's minimum per MIL-STD-202, Method 204, Test Condition D.

Shock: Withstands 100 G's min. sine wave shock of 8 milliseconds duration.

Thermocouple model numbers

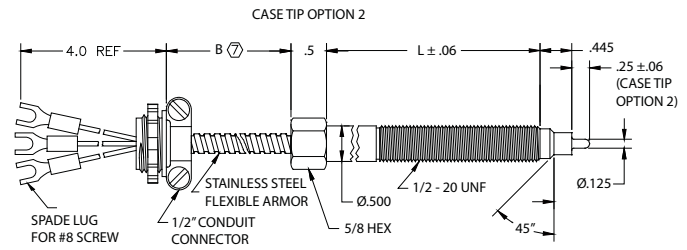
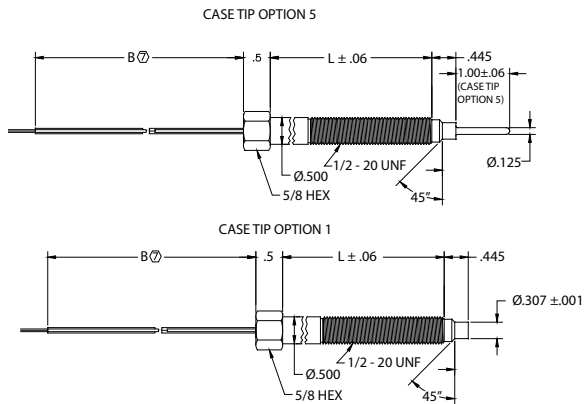
Simplex	Duplex	Thermocouple type
E	EE	Chromel - Constantan
J	JJ	Iron - Constantan
K	KK	Chromel - Alumel
T	TT	Copper - Constantan

Specification and order options

TC103465	Model number
E	Thermocouple type from table
U	Junction: U = Ungrounded (Insulated from case) G = Grounded (Fused internally to case)
100	Case length A in .1" increments (100 = 10.0"): Minimum A = 25 (2.5") Maximum A = 480 (48.0")
R	Probe bend: S = Straight probe (no bend) H = 45° bend in probe R = 90° bend in probe
B	Probe attachment: N = No attachment B = Lockcap and spring for bayonet fitting
6	Lead length B in inches
T	Lead covering: T = TFE insulated leadwires A = stainless steel flexible armor with conduit connector
1	Leadwire termination: 1 = 1/4" strip length 2 = Connector plug
TC103465EU100RB6T1 = Example of model number	

Specifications subject to change

Melt Bolt RTDs



Overview

These probes are specially designed for use in the injection molding plastics industry. The 0.125" tip makes these probes fast reacting. The probes are available in all configurations to simplify the replacement and substitution of existing probes.

- Tip insertion from 1.0" to flush
- 3", 6", or 9" Case Body options

Specifications

Temperature range: -50 to 260°C (-58 to 500°F)

Case: Stainless steel

Leads:

2, 3, or 4 leadwires, stranded copper with PTFE insulation
 Single element models: AWG #22
 Dual element models: AWG #26

Time constant: Typical in moving water

Single element: 2.0 seconds
 Dual element: 3.0 seconds

Insulation resistance:

Single element probes: 1000 megohms min. at 500 VDC, leads to case
 Dual element probes: 100 megohms min. at 100 VDC, between elements and leads to case

Vibration: Withstands 10 to 2000 Hz at 20 G's min. per MIL-STD-202, Method 204, Test Condition D.

Shock: Withstands 100 G's min. sine wave shock of 8 milliseconds duration.

Sensing elements

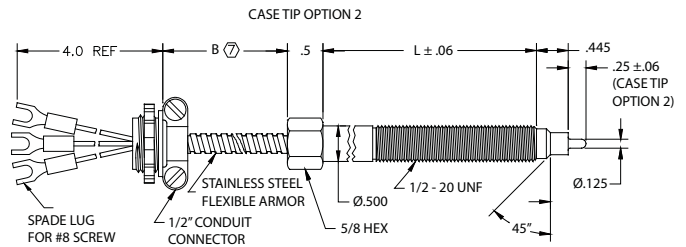
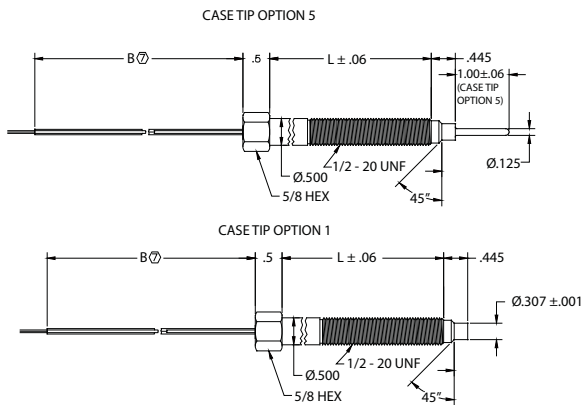
Resistance of each element	TCR	Single element	Dual element
Nickel 120 Ω ±0.5% at 0°C	0.00672	NA	NANA
Platinum 100 Ω ±0.06% at 0°C	0.00385	PM	PMPM
Platinum 100 Ω ±0.12% at 0°C	0.00385	PD	PDPD
Platinum 1000 Ω ±0.12% at 0°C	0.00385	PF	PFPF
Platinum 1000 Ω ±0.12% at 0°C	0.00375	PW	PWPW

Specification and order options

S103472	Model number
PD	Sensing element from table
2	Case tip style options: 1 = Flush tip end, no Ø.125" case with spherical tip end 2 = .25" long spherical tip length 3 = .5" long spherical tip length 4 = .75" long spherical tip length 5 = 1.0" long spherical tip length
L 30	Case length L: 30 = 3.0" long case body 60 = 6.0" long case body 90 = 9.0" long case body
Z	Number of leads: Y = 2 leads Z = 3 leads X = 4 leads
6	Lead lengths B in inches
A	Lead covering: T = TFE insulated leadwires A = Stainless steel flexible armor with conduit connector
2	Leadwire termination: 1 = 1/4" strip length 2 = spade lug 3 = Connector plug (2 or 3 lead models only)
S103472PD2L30Z6A2 = Example of model number	

Specifications subject to change

Melt Bolt Thermocouples



Overview

These probes are specially designed for use in the injection molding plastics industry. The 0.125" tip makes these probes fast reacting. The probes are available in all configurations to simplify the replacement and substitution of existing probes.

- Tip insertion from 1.0" to flush
- 3", 6", or 9" Case Body options

Specifications

Temperature range: -50 to 260°C (-58 to 500°F)

Case: Stainless steel

Leads:

Solid thermocouple wire

- Single junction: AWG #20
- Dual junction: AWG #24

Time constant: Typical in moving water

- Grounded junction: 1.5
- Ungrounded junction: 7 seconds

Insulation resistance (Ungrounded junction models only):

- Single junction: 10 megohms min. at 100 VDC, leads to case
- Dual junction: 10 megohms min. at 100 VDC, between junctions and leads to case

Vibration: Withstands 10 to 2000 Hz at 20 G's min. per MIL-STD-202, Method 204, Test Condition D.

Shock: Withstands 100 G's min. sine wave shock of 8 milliseconds duration.

Thermocouple model numbers

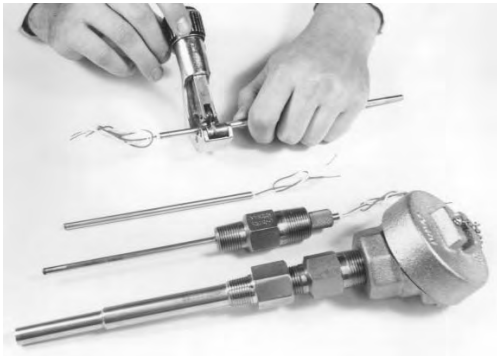
Simplex	Duplex	Thermocouple type
E	EE	Chromel - Constantan
J	JJ	Iron - Constantan
K	KK	Chromel - Alumel
T	TT	Copper - Constantan

Specification and order options

TC103473	Model number
E	Thermocouple type from table
U	Junction: U = Ungrounded (Insulated from case) G = Grounded (Fused internally to case)
2	Case tip style options: 1 = Flush tip end, no \varnothing .125" case with spherical tip end 2 = .25" long spherical tip length 3 = .5" long spherical tip length 4 = .75" long spherical tip length 5 = 1.0" long spherical tip length
L 30	Case length L: 30 = 3.0" long case body 60 = 6.0" long case body 90 = 9.0" long case body
B 6	Lead length B in inches
A	Lead covering: T = TFE insulated leadwires A = Stainless steel flexible armor with conduit connector
1	Leadwire termination: 1 = $\frac{1}{4}$ " strip length 2 = Connector plug
TC103473EU2L30B6A1 = Example of model number	

Specifications subject to change

How to Shorten Cut-to-length Probes



Shorten probes easily with a tubing cutter

Overview

Many probe models can be cut to the required length using an ordinary tubing cutter. Cut-to-length models are marked with the icon shown at right.



Benefits are:

- You can keep standard lengths in inventory, and shorten them as needed for urgent requirements
- Stocking and shortening probes, instead of ordering a few pieces at a time, may let you take advantage of quantity discounts
- Minco stocks most cut-to-length probes and can trim and ship them within 24 hours of your call



The AC101248 probe cutting system makes clean, precise cuts.

How to shorten probes

Remove the PTFE or brass ferrule from the lead exit end of the probe. Mark the proper length, then cut, going slowly to avoid crimping the case or damaging the leads. Use a good quality tubing cutter that is intended to cut stainless steel tubing or conduit. The cutter must have a sharp blade to prevent "rolling in" during cutting of the tubing. Suitable models are available from Imperial Eastman and Sears Industrial.

After cutting, discard the hollow tube section, carefully deburr the cut end, and replace the ferrule. You can slit the PTFE ferrule for easier installation.

If you use many cut-to-length probes consider the AC101248 probe cutting system. It includes an electric Dremel™ tool (120 VAC @ 60 Hz), flexible shaft, and accessories to allow clean, precise cuts. The system includes a convenient carrying case and comes with easy to follow instructions.

PFA or FEP Encapsulation Tubing

Protect probes from chemical attack

Overview

The tube is sealed at one end and can be easily heat-shrunk onto any probe. Supplied separately.

Specification and order options

AC100375	Model number
L60	Length in 0.1" increments
P	Encapsulation type: P = clear PFA F = clear FEP
188	Probe diameter: 125 = 0.125" (3.2 mm) 188 = 0.188" (4.8 mm) 215 = 0.215" (5.5 mm) 250 = 0.250" (6.4 mm)
AC100375L60P188 = Sample part number	

FEP Specifications

FEP: Fluorinated ethylene propylene
Temperature range: -70 to 200°C (-94 to 392°F).
Maximum temperature 204°C (400°F)

Excellent dielectric insulation properties, chemically resistant, unaffected by weather, extreme heat, or cold temperatures.

PFA Specifications

PFA: Perfluoroalkoxy
Temperature range: -70 to 260°C (-94 to 500°F).
Maximum temperature 260°C (500°F)

Combines attributes of PTFE and FEP, chemically resistant to all common solvents, maintains mechanical strength at high temperatures.

Specifications subject to change