




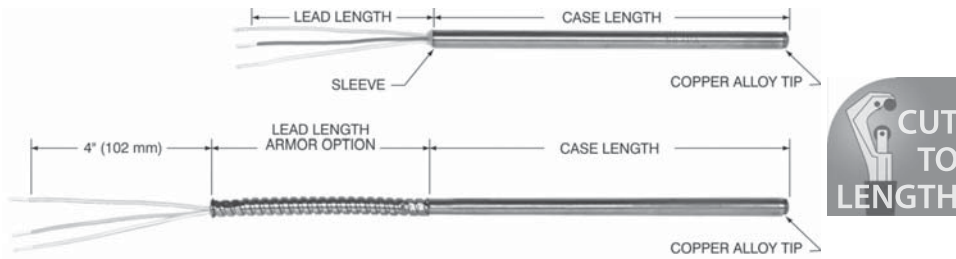
▶ SECTION 2: PROBES

- 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 650°C for extreme environments
- Single and dual elements offer high reliability
- Cut-to-length models are marked with  (see page 2-18 for instructions)

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Tip-sensitive RTDs & Thermocouples



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:

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

RTD: -50 to 260°C (-58 to 500°F).

Case:

Stainless steel with copper alloy tip.

Minimum case length:

Thermocouple: 2.5" (63.5 mm).

- RTD:**
- 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:

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

RTD: 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:

Thermocouple: Typical value in moving water:

- Grounded junction: 1.5 seconds.
- Ungrounded junction: 7 seconds.

RTD:

- 2.0 seconds typical in moving water.
- 3.0 seconds for dual element models.

Pressure rating:

100 psi (6.9 bar).

Insulation resistance:

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

RTD:

- 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.

Model numbers: Thermocouples

	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: Thermocouples

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
120	Case length: Specify in 0.1" increments: Ex: 120 = 12.0 inches ▼ : 60, 120, 240
T	Covering over leadwires: ▼ T = PTFE only G = Glass braid only S = Stainless steel overbraid A = Stainless steel armor
80	Lead length in inches: ▼80
TC356TG120T80 = Sample part number	

▼ = STANDARD OPTIONS

Specifications subject to change

Model numbers: RTD's

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	S856PM	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__



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Specification and order options: RTD's

S59PA	Model number from table
120	Case length: Specify in 0.1" increments (Ex: 120 = 12.0 inches) ▼ : 40, 50, 60, 70, 80, 90, 100, 110, 120, 140, 160, 180, 200, 240
Z	# of leads per sensing element: Y = 2 leads ▼ Z = 3 leads (req'd for copper elements) ▼ X = 4 leads (PD only)
36	Lead length in inches ▼ : 36, 80, 120
S59PA120Z36 = Sample part number	

Minco also offers probes equivalent to those shown on this page with the added certifications of:

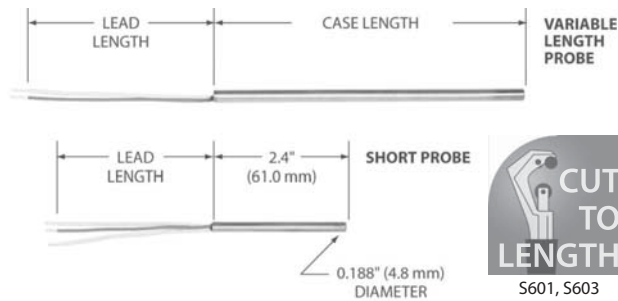
- ATEX Ex ia and EX e (Zones 0 and 1)
- IECEx Ex ia and EX e (Zones 0 and 1)
- TR CU (EAC) Ex ia and EX e (Zones 0 and 1)

▼ = **STANDARD OPTIONS**

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.

- Unique low-mass element reacts quickly to temperature changes
- Non-armor models can be user-shortened
- ATEX, IECEx and TR CU (EAC) Ex e and Ex ia options available

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 ▼: PA, PD, PF
240	Case length: Specify in 0.1" increments (Ex: 240 = 24.0 inches) ▼: 30, 40, 60, 90, 120, 240
X	Number of leadwires: Y = 2 leads ▼Z = 3 leads (required for copper elements) ▼X = 4 leads (PD only)
36	Lead length in inches ▼: 36, 120
T	Covering over leadwires: (S, A not available on S602) ▼T = PTFE only ▼S = Stainless steel braid A = Stainless steel armor
S604PD240X36T = Sample part number	

Short probes

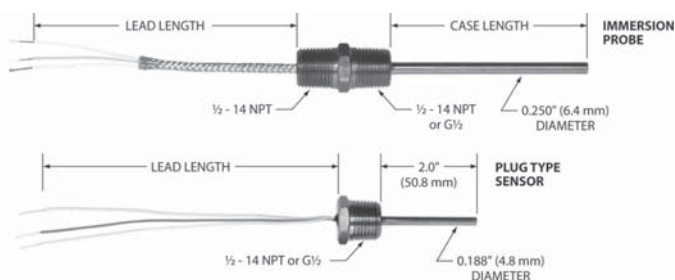
▼S614	Model number (case with fixed length of 2.4" (61 mm))
PA	Sensing element from table ▼: PA, PD, PF
Z	Number of leadwires: Y = 2 leads ▼Z = 3 leads (required for copper elements) X = 4 leads (PD only)
36	Lead length in inches ▼36
T	Covering over leadwires: ▼T = PTFE only S = Stainless steel braid
S614PAZ36T = Sample part number	



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Specifications subject to change

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.

- Pressure rating 1500 psi (103 bar)
- Quick reaction to changing fluid and gas temperatures
- NPT (U.S.) or metric threads
- ATEX, IECEx and TR CU (EAC) Ex e and Ex ia options available

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)	100 Ω ±0.1% at 0°C (Meets EN60751, Class B)	▼PD
Platinum (0.00385 TCR)	100 Ω ±0.5% at 0°C	PE
Platinum (0.00385 TCR)	1000 Ω ±0.1% at 0°C (N/A for model S602)	▼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: 1/2 - 14 NPT thread [2] S628: ISO 228/1-G1/2 process thread (1/2 - 14 NPT on leads end)
PF	Sensing element from table ▼: PD, PF
60	Case length: Specify in 0.1" increments (Ex: 60 = 6.0 inches) ▼: 20, 60, 120
Z	Number of leads: Y = 2 leads X = 4 leads (PD only) ▼Z = 3 leads (required for copper elements)
72	Lead length in inches ▼: 72
T	Covering over leadwires: ▼T = PTFE only A = Stainless steel armor S = Stainless steel braid
S623PF60Z72T = Sample part number	

Plug type sensors

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

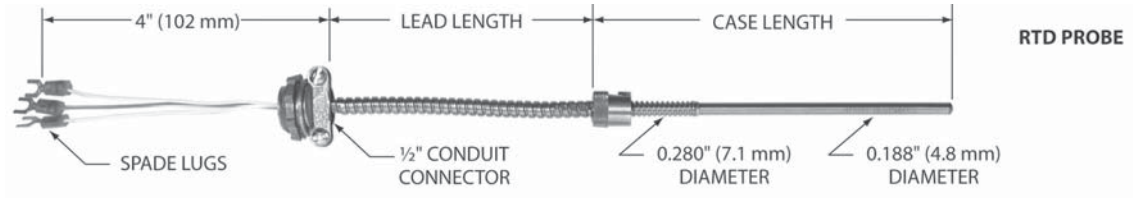
S634	Model number: S634: 1/2 - 14 NPT thread S639: ISO 228/1-G1/2 thread
NA	Sensing element from table
Y	Number of leads: Y = 2 leads X = 4 leads (PD only) Z = 3 leads (required for copper elements)
24	Lead length in inches
T	Covering over leadwires: T = PTFE only S = Stainless steel braid
S634NAY24T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



STOCKED PARTS AVAILABLE

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 3-9 for bayonet fittings or page 3-10 for metric fittings.

- Lockcap and spring for twist-and-release spring-loading
- Accurate sensing to 260°C (500°F)
- ATEX, IECEx and TR CU (EAC) Ex e and Ex ia options available

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 1/2" 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)	100 Ω ±0.1% at 0°C (Meets EN60751, Class B)	▼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

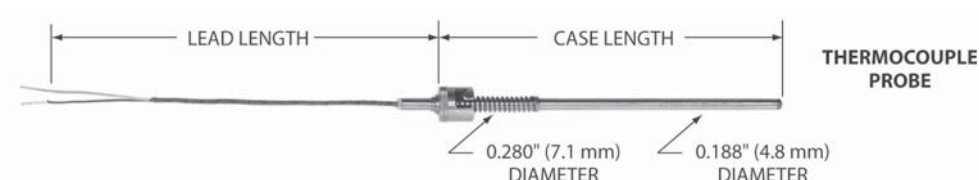
Specification and order options

S44PA	Model number from table
120	Case length: Specify in 0.1" increments (Ex: 120 = 12.0 inches) ▼: 49, 55, 120
Z	Number of leads: Y = 2 leads ▼Z = 3 leads (required for copper elements) X = 4 leads (PD only)
80	Lead length in inches ▼: 80
S44PA120Z80 = Sample part number	

▼ = STANDARD OPTIONS

Specifications subject to change

Bayonet Mount Tip-sensitive Thermocouples



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 3-9 for bayonet fittings or page 3-10 for metric fittings.

- Lockcap and spring for twist-and-release spring-loading
- Accurate sensing to 260°C (500°F)
- ATEX, IECEx and TR CU (EAC) Ex e and Ex ia options available

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.

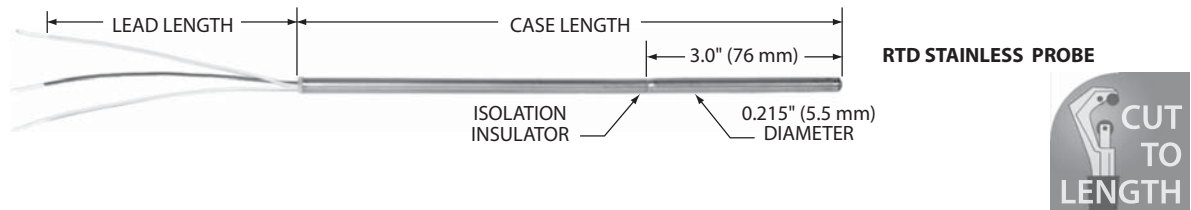
Shock: Withstands 100 G's minimum sine wave shock of 8 milliseconds duration.

Specification and order options

TC360	Model number: ▼TC360 = Single junction ▼TC361 = Dual junction
J	Junction type: E = Chromel-Constantan ▼J = Iron-Constantan ▼K = Chromel-Alumel T = Copper-Constantan
G	Junction grounding: ▼G = Grounded ▼U = Ungrounded
30	Case length: Specify in 0.1" increments (Ex: 95 = 9.5 inches) ▼: 30, 120
A	Covering over leadwires: T = PTFE only G = Glass braid ▼A = Stainless steel armor S = Stainless steel overbraid
120	Lead length in inches ▼: 120
TC360JG30A120 = Sample part number	

▼ = STANDARD OPTIONS
Specifications subject to change

Electrically Isolated RTDs



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
- ATEX, IECEx and TR CU (EAC) Ex e and Ex ia options available

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.

Isolated tip RTDs

RTD sensing element		Model
Platinum (0.00392 TCR)	100 Ω ±0.5% at 0°C	▼ S52PA
Platinum (0.00385 TCR) (Meets EN60751, Class B)	100 Ω ±0.1% at 0°C	▼ 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

Temperature 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

S52PA	Model number from isolated tip table
240	Case length: Specify in 0.1" increments (Ex: 240 = 24.0 inches) ▼: 120, 180, 240
Z	Number of leads: Y = 2 leads ▼ Z = 3 leads (required for copper elements) X = 4 leads (PD only)
36	Lead length in inches ▼: 36, 120
S52PA240Z36 = Sample part number	

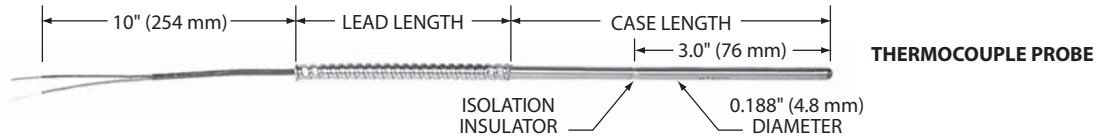


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▼ = **STANDARD OPTIONS**

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
- ATEX, IECEx and TR CU (EAC) Ex e and Ex ia options available

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.

Temperature 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.

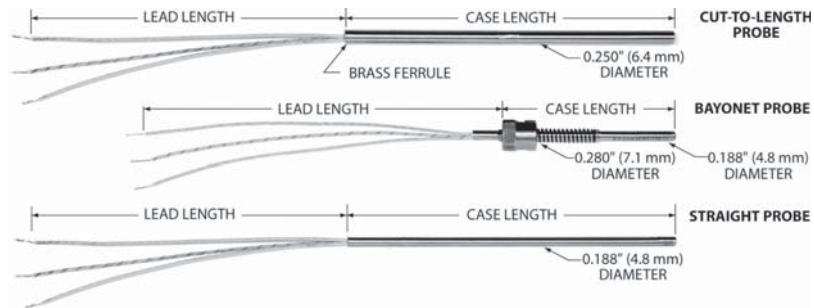
Specification and order options

TC2198	Model number: TC2198
J	Junction type: E = Chromel-Constantan ▼ J = Iron-Constantan ▼ K = Chromel-Alumel T = Copper-Constantan
U	Junction grounding: ▼ G = Grounded ▼ U = Ungrounded
60	Case length: Specify in 0.1” increments (Ex: 60 = 6.0 inches) ▼ : 60, 120
T	Covering over leadwires: ▼ T = PTFE only ▼ A = Stainless steel armor plus shrink tubing S = SS braid over PTFE (5” min. case length)
120	Lead length in inches ▼ : 120
TC2198JU60T120 = Sample part number	

▼ = STANDARD OPTIONS

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 3-9 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

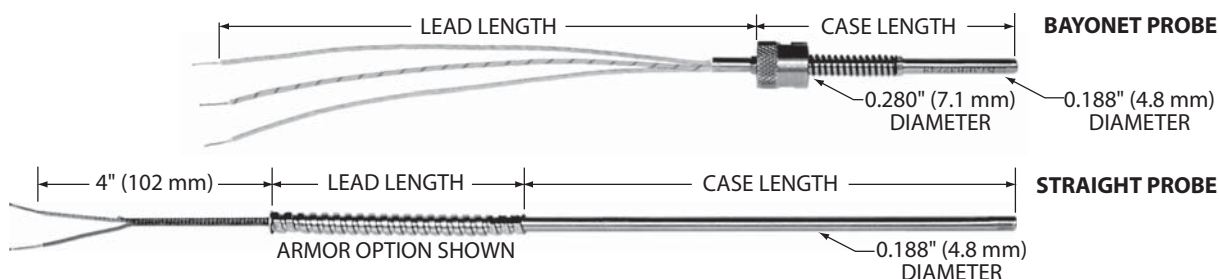
S74PD	Model number from table
240	Case length: Specify in 0.1" increments (Ex: 240 = 24.0 inches) ▼: 20, 30, 120, 240
Z	Number of leads: Y = 2 leads ▼ Z = 3 leads
36	Lead length in inches ▼: 36, 120
S74PD240Z36 = Sample part number	



STOCKED PARTS AVAILABLE

▼ = STANDARD OPTIONS
Specifications subject to change

550°C Thermocouple 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 3-9 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.

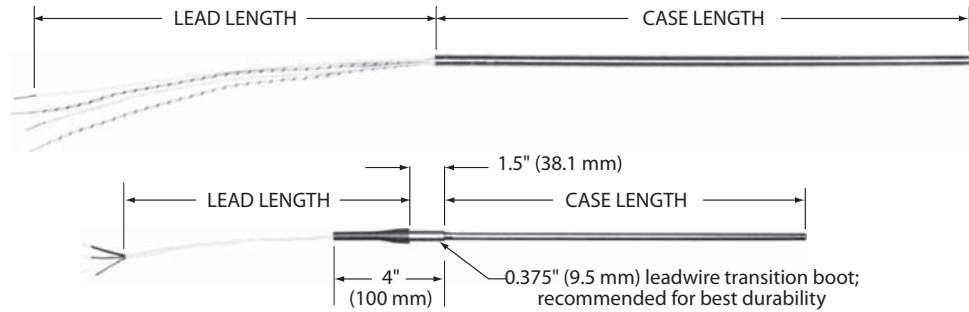
Specification and order options

TC173	Model number: ▼TC173: Straight probe ▼TC171: Bayonet mount
E	Junction type: ▼E = Chromel-Constantan J = Iron-Constantan ▼K = Chromel-Alumel T = Copper-Constantan
U	Junction grounding: ▼G = Grounded ▼U = Ungrounded
60	Case length: Specify in 0.1" increments (Ex: 45 = 4.5 inches) ▼: 30, 60, 120, 180
G	Covering over leadwires: ▼G = Glass braid only ▼S = Stainless steel overbraid A = Stainless steel armor
120	Lead length in inches ▼: 120
TC173EU60G120 = Sample part number	

▼ = STANDARD OPTIONS

Specifications subject to change

600°C RTDs



Overview

These RTDs cover the full temperature scale of the international standard EN60751. Precision sensing elements are capable of measurements from -200 to 600°C (-328 to 1112°F) with typical ice point drift less than $\pm 0.05^\circ\text{C}$.

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

Specifications

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

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

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.

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
40	Case length: Specify in 0.1" increments (Ex: 40 = 4.0 inches) ▼: 40, 60, 90, 120, 180
Z	Number of leads: ▼Z = 3 leads X = 4 leads
120	Lead length in inches ▼: 120
BS	Probe termination: ▼BS = Boot and spring B = Boot only ▼N = No boot or spring
S914PD06G40Z120BS = Sample part number	

▼ = STANDARD OPTIONS

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.

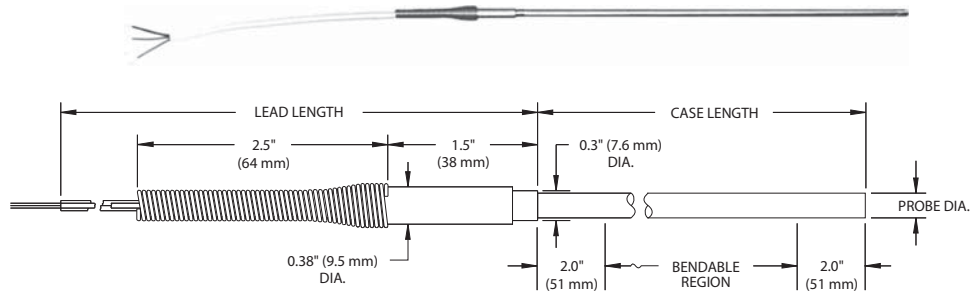
Vibration: Withstands 10 to 5000 Hz at 2 G's per EN60751. Also withstands 50 to 250 Hz at 50 G's at 500°C.

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)	550°C (1022°F)	316 stainless steel	S953

Specification and order options

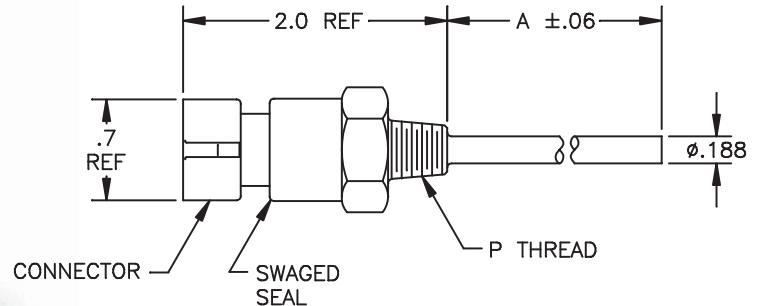
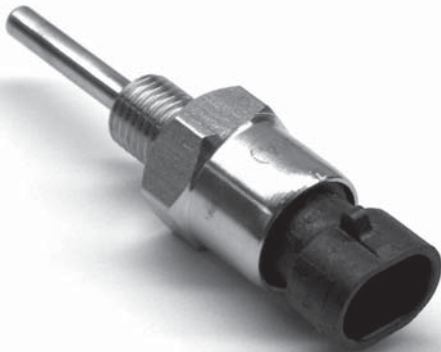
S933	Model number from table
PD	100 Ω platinum, 0.00385 TCR
06	Tolerance at 0°C: ▼06 = $\pm 0.06\%$, EN60751 Class A (NA for dual element S953) 12 = $\pm 0.12\%$, EN60751 Class B
T	Leadwire insulation: ▼T = PTFE leadwires C = PTFE cable (4 lead only, NA for dual element S953)
30	Case length: Specify in 0.1" increments (Ex: 30 = 3.0 inches) ▼: 30, 40, 120, 180
Z	Number of leadwires: Y = 2 leads per element ▼Z = 3 leads per element X = 4 leads per element
120	Lead length in inches ▼: 120
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
S933PD06T30Z120BS = Sample part number	

▼ = STANDARD OPTIONS

Specifications subject to change



Compact Plug Sensor



Overview

The S205459 is a platinum RTD temperature sensor with convenient plug in connection.

- Sensor measuring and operating range is from -50 to 300°F (-45.5 to 148.9°C).
- Connection is made using an industry-standard Packard/Delphi: Metri-pack 150 connector

Specifications

Temp Range: -50 to 300°F (-45.5 to 148.9°C)

Case Material: 316 Stainless Steel

Connector: Packard /Delphi METRI-PACK 150

Pressure Rating:

Stainless Steel: 1500 psi

Brass: 500 psi

Insulation Resistance: 1000 megaohms min at 500 V

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.

Sensor Housing: Stainless steel sensor end with a choice of NPT threads; end connector (Packard/Delphi: Metri-pack 150)

Specification and order options

S205459	Model number: S205459 Compact Plug Sensor
PD	Element Type: ▼PD Platinum (0.00385 TCR) 100Ω +/- 0.12% at 0°C ▼PF Platinum (0.00385 TCR) 1000Ω +/- 0.12% at 0°C
20	Case Length: ▼10 = 1.0" ▼20 = 2.0" ▼30 = 3.0" ▼40 = 4.0"
P2	Thread size: ▼P2 = 1/8 -27 NPT ▼P4 = 1/4 -18 NPT ▼P6 = 3/8 -18 NPT ▼P8 = 1/2 -14 NPT
S	Case Material: ▼S = Stainless Steel
S205459PD20P2S = Sample Part Number	

Contact Minco to learn more about custom design options for your application.

S205459 Mating Cable Assembly

- 72" Shielded cable
- 2-conductor, AWG #18, copper braid shield with drain wire
- Terminated with a female Metri-pack 150 connector

Specification and order options:

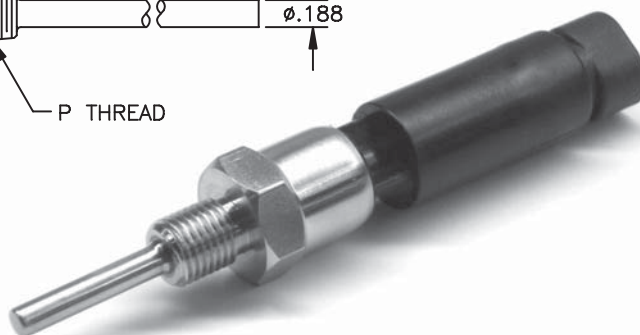
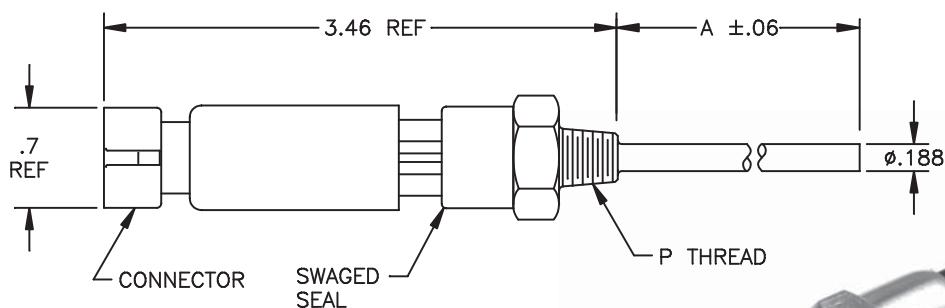
S205459 Mating Cable Assembly

AC203350	Model Number: AC203350
L72	72" lead length
AC203350L72 = Sample Part Number	

▼ = STANDARD OPTIONS

Specifications subject to change

Integrated Sensor/Transmitter



Overview

The TT363 is an integrated platinum RTD temperature sensor with 4-20mA current loop output. Combines transmitter capability with a platinum sensing element in a single package for an easier-to-install temperature sensing solution.

- Power and signal are provided through a 4-20mA current loop connection.
- Sensor measuring and operating range is from -50 to 300°F (-45.5 to 148.9°C).
- The high-temperature plastic case and electronics can be used in applications with an ambient temperature up to 185°F (85°C).
- Connection is made using an industry-standard Packard/Delphi: Metri-pack 150 connector.

Specifications

Output: 4-20mA over range specified, linear with temperature.

Sensor Operating Temperature: -50 to 300°F (-45.5 to 148.9°C)

Ambient Temperature:

Operation: -40 to 185°F (-40 to 85°C), non-condensing

Storage: -67 to 212°F (-55 to 100°C), non-condensing

Supply Voltage: 7.6 to 35VDC, reverse polarity protected

Loop resistance: Maximum allowable resistance of the signal-carrying loop, including wires and load resistors given by: $R_{loopmax} = (V_{supply} - 7.6) / .02Amps$

Warmup drift: Less than +/-0.025mA; stable within 30 minutes.

Ambient temperature error: Less than +/-0.15mA

Voltage Stability: Change in loop current $< \pm 0.01$ mA from 7.6 to 35 VDC

Sensor Housing: Stainless steel sensor case with a choice of NPT threads; transmitter body is nylon with 30% glass plastic encapsulation; end connector (Packard/Delphi: Metri-pack 150)

Specification and order options

TT363	Model number: TT363 Temperature Sensor/Transmitter
AN	Range Code: Temperature range code [AN = -17.8 to 148.9°C(0 to 300°F)]
20	Case Length: 10 = 1.0" 20 = 2.0" 30 = 3.0" 40 = 4.0"
P2	Thread size: P2 = 1/8 -27 NPT P4 = 1/4 -18 NPT P6 = 3/8 -18 NPT P8 = 1/2 -14 NPT
S	Case Material: S = Stainless Steel
TT363AN20P2S = Sample Part Number	

Contact Minco to learn more about custom design options for your application.

TT363 Mating Cable Assembly

- 72" Shielded cable
- 2-conductor, AWG #18, copper braid shield with drain wire
- Terminated with a female Metri-pack 150 connector

Specification and order options:

TT363 Mating Cable Assembly

AC203350	Model Number: AC203350
L72	72" lead length
AC203350L72 = Sample Part Number	

Specifications subject to change

Conductivity Level Sensor



Overview

The LT364 Level Sensor provides point fluid detection with virtually any conductive fluid. Two 316 stainless steel pins provide for operation in mildly corrosive fluids within plastic or metal containers. Fluid presence is measured by passing a low voltage AC signal between the stainless steel probes. The use of an AC voltage eliminates the effects of galvanic corrosion on the probes. Power to the sensor and output from the sensor is derived from a current loop. Sensor output is 8 mA with fluid present and 16 mA with no fluid present.

- No calibration necessary.
- Injection molded, high-temperature plastic case.
- Electronics can be used in applications with an ambient temperature up to 185°F (85°C).
- Connection is made using an industry-standard Packard/Delphi Metri-pack 150 connector providing an easy-to-connect, polarized connection.

Application Ideas

- Radiator low-fluid level detection
- Pump recovery tanks
- Fluid leak detection
- Parts washers
- Automated test equipment

Specifications

Sensor Output:

8 mA ± 1 mA with fluid present and 16 mA ± 1 mA with no fluid present

Ambient Temperature (electronics):

Operation: -40 to 185°F, non-condensing
Storage: -67 to 212°F, non-condensing

Supply Voltage: 7.6 to 35VDC, reverse polarity protected

Loop resistance: Maximum allowable resistance of the signal-carrying loop, including wires and load resistors given by: $R_{loopmax} = (V_{supply} - 7.6) / .02Amps$

Voltage Stability: Change in loop current < ±.01 mA from 7.6 to 35 VDC

Sensor Housing: $\frac{3}{8}$ - 18 NPT process thread, nylon with 30% glass plastic encapsulation; end connector is Packard/Delphi Metri-pack 150.

Weight: Approximately 2.5 oz (70 g)

Specification and order options

L015	Model number: L015 Level Sensor
<i>Variable lengths are available. Contact Minco to learn more about custom design options for your application.</i>	

LT364 Mating Cable Assembly

- 72" Shielded cable
- 2-conductor, AWG #18, copper braid shield with drain wire
- Terminated with a female Metri-pack 150 connector

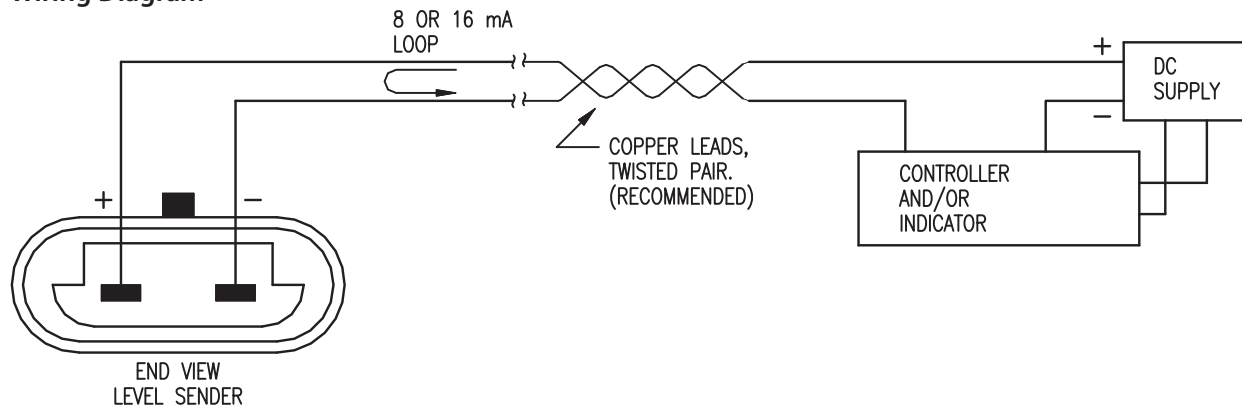
Specification and order options

LT364 Mating Cable Assembly

AC203350	Model Number: AC203350
L72	72" lead length
AC203350L72 = Sample Part Number	

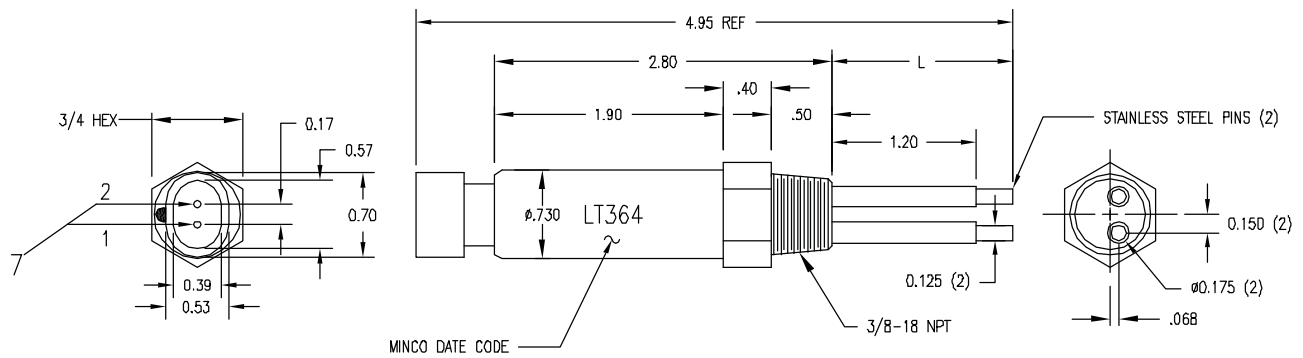
▼ = **STANDARD OPTIONS**
Specifications subject to change

Wiring Diagram

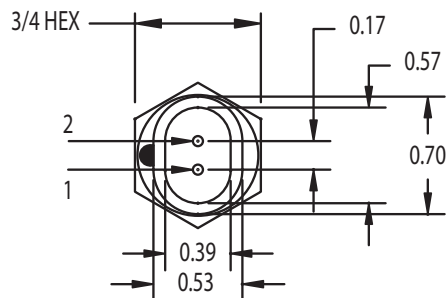


Dimensional Drawings

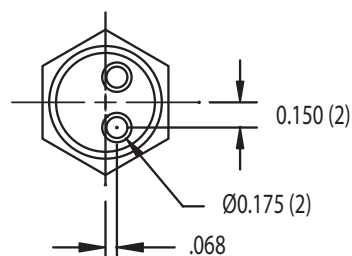
Side View



Connection End

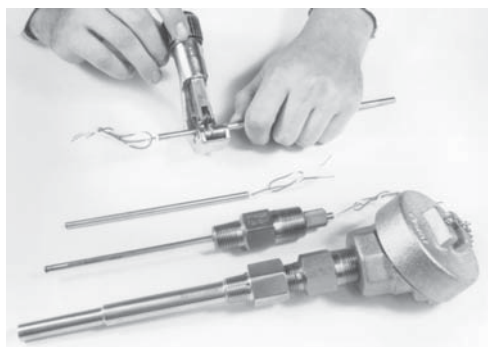


Measurement End

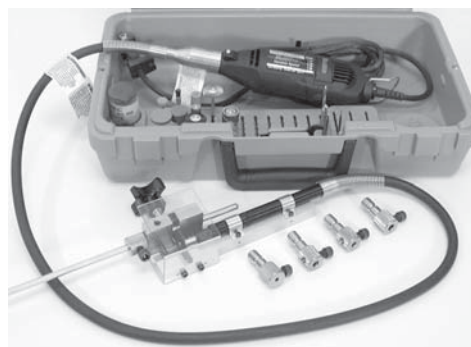


▼ = **STANDARD OPTIONS**
 Specifications subject to change

How to Shorten Cut-to-length Probes



Shorten probes easily with a tubing cutter



The AC101248 probe cutting system makes clean, precise cuts.

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

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
L120	Length: 120 = 12.0" 240 = 24.0" Can be cut to any length
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)
AC100375L120P188 = 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