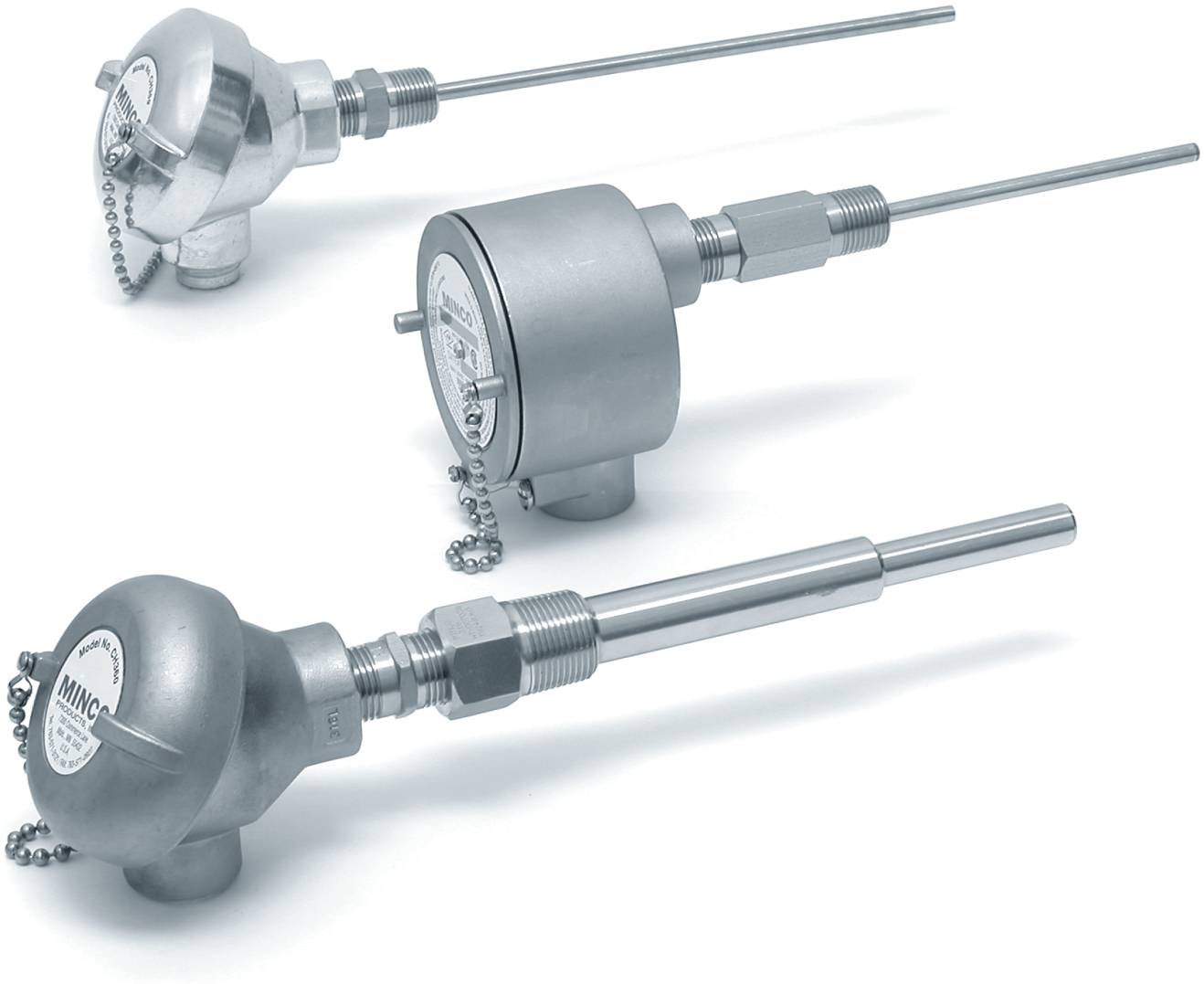
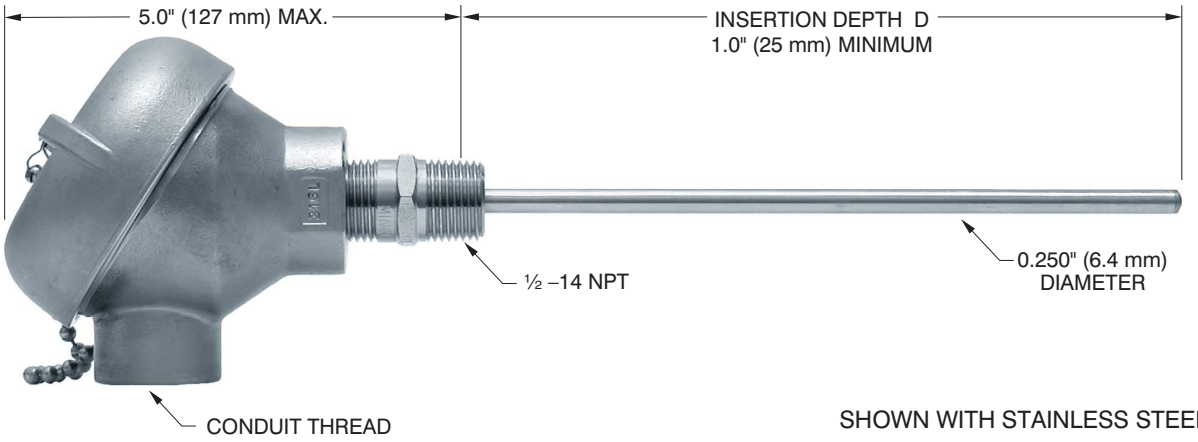


Section 2: Temperature Sensor Assemblies

- Standard, easy-to-order assemblies to fit a variety of applications
- RTDs, thermocouples, and transmitters
- Fittings, connection heads, and thermowells included
- Tip-sensitive, high temperature, explosionproof, and flameproof versions

To specify custom assemblies see:

Probes:	Section 3
Accessories:	Section 4
Transmitters:	Section 5



SHOWN WITH STAINLESS STEEL HEAD

Tip-Sensitive Spring-Loaded RTDs

- Tip-sensitive RTD probe for use to 260°C (500°F)
- Spring-loaded holder with fluid seal
- Cast iron, stainless steel, or aluminum connection head

Get fast and accurate readings from bearings, blocks, and other solids. Minco's spring-loaded holder ensures solid contact in drilled holes and has a built-in oil seal. The sensing probe features a copper alloy tip for quick response to temperature changes.

Specifications

Temperature range:
-50 to 260°C (-58 to 500°F).
Material:
Probe: Stainless steel with copper alloy tip.
Holder: Stainless steel with Viton O-ring.
Connection head: Cast iron, aluminum, or stainless steel.
Pressure rating: 50 psi (3.4 bar).
Insulation resistance: 100 megohms min. at 100 VDC, leads to case.
Connection: Terminal block for wires to 14 AWG.
Time constant: Typical value in moving water:
Single element: 2.0 seconds.
Dual element: 3.0 seconds.

Sensing element		Code
Platinum 392	100 Ω ±0.5% at 0°C	PA
Platinum 385 (Meets EN60751, Class B)	100 Ω ±0.1% at 0°C	PD
Platinum 385	100 Ω ±0.5% at 0°C	PE
Copper	10 Ω ±0.2% at 25°C	CA
(dual)	10 Ω ±0.5% at 25°C	CC
Nickel	120 Ω ±0.5% at 0°C	NA

Transmitters

Minco's Temptran™ transmitters provide a 4 to 20 mA signal that can be sent over long distances with a simple 2-wire system. Add any Minco model transmitter (except electrically isolated models). See Section 5 for complete details and ordering information.

TT211, TT711
miniature transmitter

TT176, TT676
standard transmitter

Special high-accuracy calibration

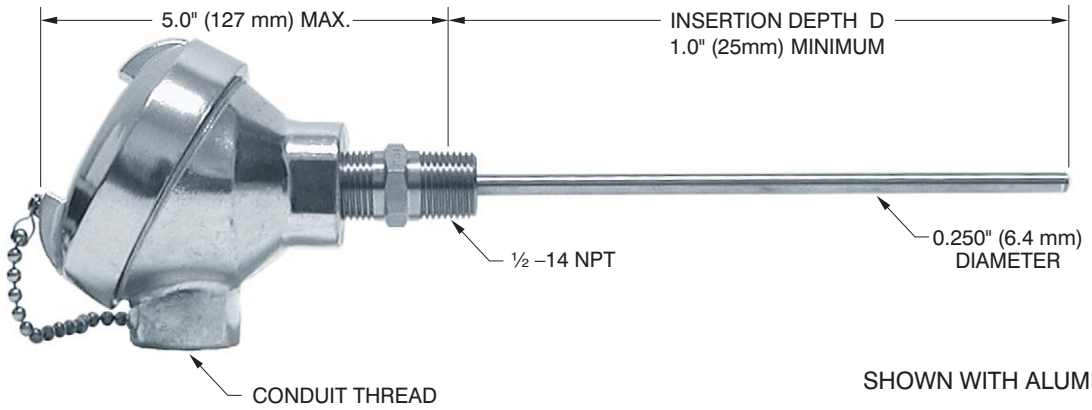
For guaranteed system accuracy of ± 0.75% of temperature span, specify transmitters with high-accuracy calibration as shown on page 5-13. Calibration data traceable to NIST will also be provided.

IN STOCK

Single element models (except PE)
Contact Minco for currently available Temptran models and ranges

How to order

AS5004	**Assembly number:** AS5004: Single element RTD AS5005: Dual element RTD
PA	**Sensing element from table**
67	**Insertion depth D:** Specify in 0.1" increments (Ex: 67 = 6.7 inches)
Z	**Leads per sensing element:** Y = 2 leads Z = 3 leads (required for CA and CC copper elements) X = 4 leads (PD elements only)
2	**Conduit thread:** 1 = ½ - 14 NPT 2 = ¾ - 14 NPT
C	**Connection head:** C = Cast iron A = Aluminum S = Stainless steel
To order standard assembly, stop here. To order with transmitters (single platinum element only, 2 or 3 leads) add:	
211	**Temptran model:** 211 = TT211: 2-lead RTDs 176 = TT176: 3-lead RTDs 711 = TT711: 2-lead RTDs, match calibrated 676 = TT676: 3-lead RTDs, match calibrated
A	**Temperature range code:** See page 5-10 for a list of codes
AS5004PA67Z2C211A ← Sample P/N	



SHOWN WITH ALUMINUM HEAD

Tip-Sensitive Spring-Loaded Thermocouples

- Tip-sensitive Thermocouple for use to 260°C (500°F)
- Spring-loaded holder with fluid seal
- Cast iron, stainless steel or aluminum connection head

Get fast and accurate readings from bearings, blocks, and other solids. Minco's spring-loaded holder ensures solid contact in drilled holes and has a built-in oil seal. The sensing probe features a copper alloy tip for quick response to temperature changes.

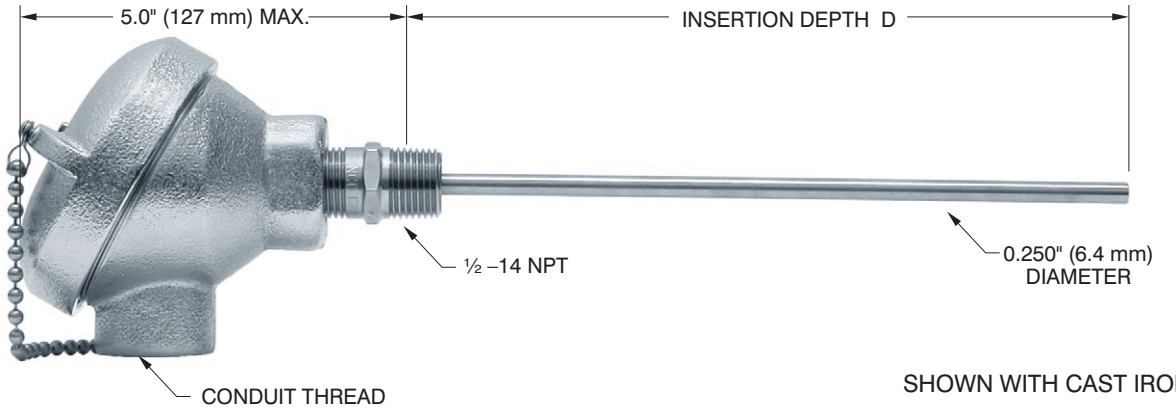
Specifications

Temperature range:
-50 to 260°C (-58 to 500°F).
Material:
Probe: Stainless steel with copper alloy tip.
Holder: Stainless steel with Viton O-ring.
Connection head: Cast iron, aluminum, or stainless steel.
Pressure rating: 50 psi (3.4 bar).
Insulation resistance: 10 megohms min. at 100 VDC, leads to case. Ungrounded junctions only.
Connection: Terminal block for wires to 14 AWG.
Time constant: Typical value in moving water:
Grounded junction: 1.5 seconds.
Ungrounded junction: 7 seconds.

How to order

AS5192	**Assembly number:** AS5191: Single junction AS5192: Dual junction
E	**Junction type:** E = Chromel-Constantan J = Iron-Constantan K = Chromel-Alumel T = Copper-Constantan
U	**Junction grounding:** G = Grounded U = Ungrounded
133	**Insertion depth D:** Specify in 0.1" increments (Ex: 133 = 13.3 inches)
P	
1	**Conduit thread:** 1 = ½ - 14 NPT 2 = ¾ - 14 NPT
C	**Connection head:** C = Cast iron A = Aluminum S = Stainless steel
AS5192EU133P1C ← Sample P/N	

⚠ Thermocouple transmitters are available in section 5.



SHOWN WITH CAST IRON HEAD

Direct Immersion RTDs

- RTD probe for use to 260°C (500°F)
- Adjustable fluid seal fitting
- Cast iron, stainless steel, or aluminum connection head

Mount sensors directly in fluid flow for fast response. Probes are rated to 100 psi (6.9 bar). For non-corrosive fluids only.

Specifications

Temperature range:
-50 to 260°C (-58 to 500°F).
Material:
Probe: Stainless steel.
Fitting: Stainless steel, silicone rubber O-ring.
Connection head: Cast iron, aluminum, or stainless steel.
Pressure rating: 100 psi (6.9 bar).
Insulation resistance: 100 megohms min. at 100 VDC, leads to case.
Connection: Terminal block for wires to 14 AWG.
Time constant: Typical value in moving water:
Single element: 2.0 seconds.
Dual element: 3.0 seconds.

Sensing element		Code
Platinum 392	100 Ω ±0.5% at 0°C	PA
Platinum 385 (Meets EN60751, Class B)	100 Ω ±0.1% at 0°C	PD
Platinum 385	100 Ω ±0.5% at 0°C	PE
Copper	10 Ω ±0.2% at 25°C	CA
(dual)	10 Ω ±0.5% at 25°C	CC
Nickel	120 Ω ±0.5% at 0°C	NA

Transmitters

Minco's Temptran™ transmitters provide a 4 to 20 mA signal that can be sent over long distances with a simple 2-wire system. Add any Minco model transmitter (except electrically isolated models). See Section 5 for complete details and ordering information.

TT211, TT711
miniature transmitter

TT176, TT676
standard transmitter

Special high-accuracy calibration

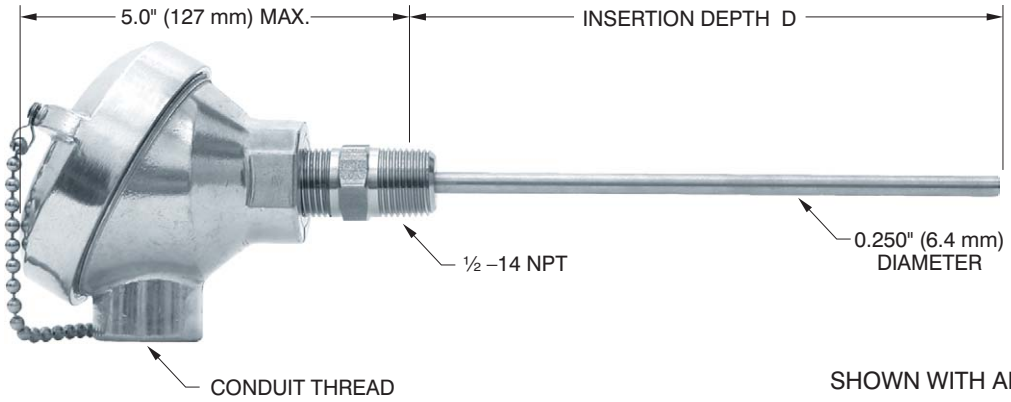
For guaranteed system accuracy of ± 0.75% of temperature span, specify transmitters with high-accuracy calibration as shown on page 5-13. Calibration data traceable to NIST will also be provided.

IN STOCK

Single element models (except PE)
Contact Minco for currently available Temptran models and ranges

How to order

AS5200	**Assembly number:** AS5200: Single element AS5201: Dual element
PD	**Sensing element from table**
100	**Insertion depth D:** Specify in 0.1" increments (Ex: 100 = 10.0 inches)
Z	**Number of leads per sensing element:** Y = 2 leads Z = 3 leads (required for CA and CC copper elements) X = 4 leads (PD elements only)
2	**Conduit thread:** 1 = ½ - 14 NPT 2 = ¾ - 14 NPT
C	**Connection head:** C = Cast iron A = Aluminum S = Stainless steel
To order standard assembly, stop here. To order with transmitters (single platinum element only, 2 or 3 leads) add:	
211	**Temptran model:** 211 = TT211: 2-lead RTDs 176 = TT176: 3-lead RTDs 711 = TT711: 2-lead RTDs, match calibrated 676 = TT676: 3-lead RTDs, match calibrated
A	**Temperature range code:** See page 5-10 for a list of codes
AS5200PD100Z2C211A ← Sample P/N	



SHOWN WITH ALUMINUM HEAD

Direct Immersion Thermocouples

- Thermocouple for use to 260°C (500°F)
- Adjustable fluid seal fitting
- Cast iron, stainless steel or aluminum connection head

Mount sensors directly in fluid flow for fast response. Probes are rated to 100 psi (6.9 bar). For non-corrosive fluids only.

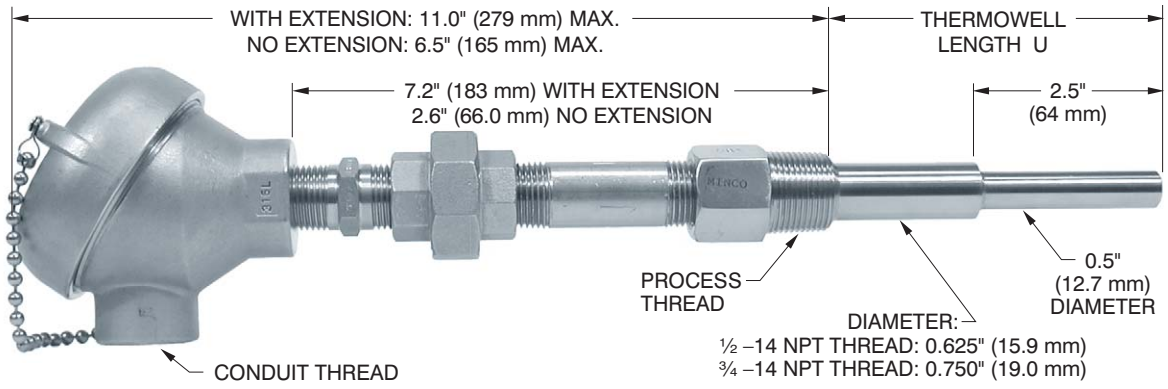
Specifications

Temperature range:
-50 to 260°C (-58 to 500°F).
Material:
Probe: Stainless steel.
Fitting: Stainless steel, silicone rubber O-ring.
Connection head: Cast iron, aluminum, or stainless steel.
Pressure rating: 100 psi (6.9 bar).
Insulation resistance: 10 megohms min. at 100 VDC, leads to case. Ungrounded junctions only.
Connection: Terminal block for wires to 14 AWG.
Time constant: Typical value in moving water:
Grounded junction: 1.5 seconds.
Ungrounded junction: 7 seconds.

How to order

AS5206	**Assembly number:** AS5205: Single junction AS5206: Dual junction
E	**Junction type:** E = Chromel-Constantan J = Iron-Constantan K = Chromel-Alumel T = Copper-Constantan
U	**Junction grounding:** G = Grounded U = Ungrounded
215	**Insertion depth D:** Specify in 0.1" increments (Ex: 215 = 21.5 inches)
P	
1	**Conduit thread:** 1 = ½ - 14 NPT 2 = ¾ - 14 NPT
C	**Connection head:** C = Cast iron A = Aluminum S = Stainless steel
AS5206EU215P1C ← Sample P/N	

⚠ Thermocouple transmitters are available in section 5.



SHOWN WITH STAINLESS STEEL HEAD AND UNION/NIPPLE EXTENSION

Tip-Sensitive RTDs With Thermowells

- 316 stainless steel thermowell
- Tip-sensitive RTD probe for use to 260°C (500°F)
- Spring-loaded probe
- Cast iron, stainless steel, or aluminum connection head

Thermowells protect sensors from the effects of fluid flow and pressure. These assemblies are spring-loaded for positive probe contact against the bottom of the thermowell. The probe's copper alloy tip provides superior time response and reduces error from stem conduction.

Specifications

Temperature range:
-50 to 260°C (-58 to 500°F).
Material:
Probe: Stainless steel with copper alloy tip.
Connection head: Cast iron, aluminum, or stainless steel.
Thermowell: 316 stainless steel.
Extension: Stainless steel.
Pressure rating: 7000 psi (483 bar) at 21°C, reducing to 6300 psi (433 bar) at 260°C.
Standard U dimensions: 2.5, 4.5, 6.0, 7.5, 8.0, 10.5, 13.5, 16.5, and 22.5".
Insulation resistance: 100 megohms min. at 100 VDC, leads to case.
Connection: Terminal block for wires to 14 AWG.
Time constant: 17 seconds typical in moving water.

Sensing element		Code
Platinum 392	100 Ω ±0.5% at 0°C	PA
Platinum 385 (Meets EN60751, Class B)	100 Ω ±0.1% at 0°C	PD
Platinum 385	100 Ω ±0.5% at 0°C	PE
Copper	10 Ω ±0.2% at 25°C	CA
(dual)	10 Ω ±0.5% at 25°C	CC
Nickel	120 Ω ±0.5% at 0°C	NA

Transmitters

Minco's Temptran™ transmitters provide a 4 to 20 mA signal that can be sent over long distances with a simple 2-wire system. Add any Minco model transmitter (except electrically isolated models). See Section 5 for complete details and ordering information.

TT211, TT711
miniature transmitter

TT176, TT676
standard transmitter

Special high-accuracy calibration

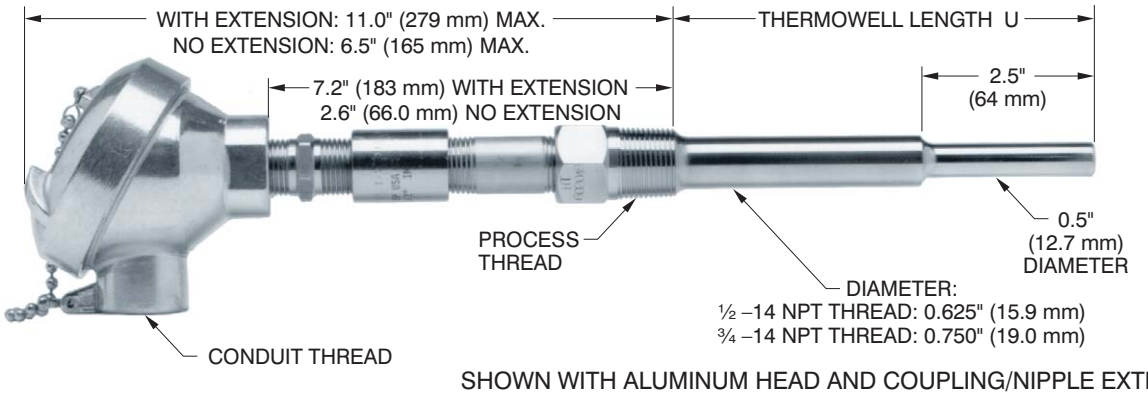
For guaranteed system accuracy of ± 0.75% of temperature span, specify transmitters with high-accuracy calibration as shown on page 5-13. Calibration data traceable to NIST will also be provided.

IN STOCK

Standard thermowell lengths to 8.0"
Single element models (except PE)
Contact Minco for currently available Temptran models and ranges

How to order

AS5140	**Assembly number:** AS5140: Single element RTD AS5141: Dual element RTD
CA	**Sensing element from table**
60	**Thermowell length U:** Specify in 0.1" increments (Ex: 60 = 6.0 inches)
Z	**Leads per sensing element:** Y = 2 leads Z = 3 leads (required for CA and CC copper elements) X = 4 leads (PD elements only)
2	**Conduit thread:** 1 = ½ - 14 NPT 2 = ¾ - 14 NPT
C	**Connection head:** C = Cast iron A = Aluminum S = Stainless steel
1	**Thermowell process thread:** 1 = ½ - 14 NPT 2 = ¾ - 14 NPT
U	**Extension option:** P = Coupling/nipple extension N = No extension U = Union/Nipple extension
To order standard assembly, stop here. To order with transmitters (single platinum element only, 2 or 3 leads) add:	
211	**Temptran model:** 211 = TT211: 2-lead RTDs 176 = TT176: 3-lead RTDs 711 = TT711: 2-lead RTDs, match calibrated 676 = TT676: 3-lead RTDs, match calibrated
A	**Temperature range code:** See page 5-10 for a list of codes
AS5140CA60Z2C1U211A ← Sample P/N	



SHOWN WITH ALUMINUM HEAD AND COUPLING/NIPPLE EXTENSION

Tip-Sensitive Thermocouples With Thermowells

- 316 stainless steel thermowell
- Tip-sensitive thermocouple for use to 260°C (500°F)
- Spring-loaded probe
- Cast iron, stainless steel, or aluminum connection head

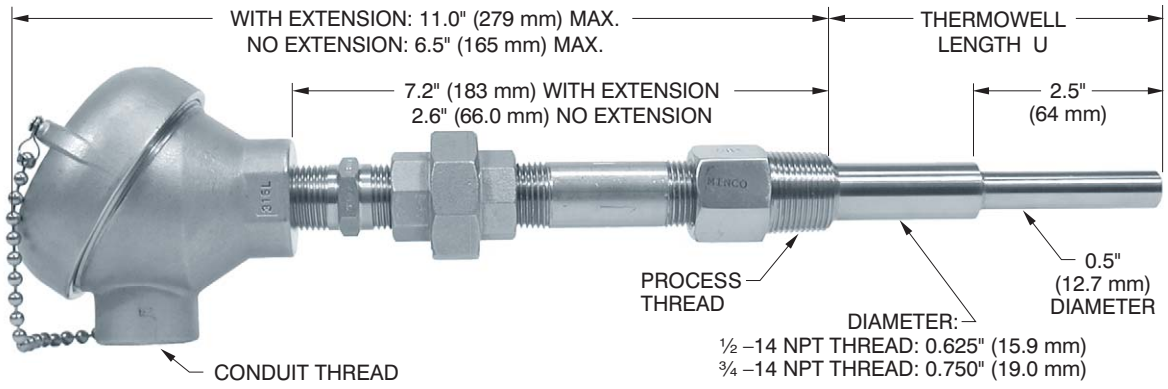
Specifications

Temperature range:
-50 to 260°C (-58 to 500°F).
Material:
Probe: Stainless steel with copper alloy tip.
Connection head: Cast iron, aluminum, or stainless steel.
Thermowell: 316 stainless steel.
Extension: Stainless steel.
Pressure rating: 7000 psi (483 bar) at 21°C, reducing to 6300 psi (433 bar) at 260°C.
Standard U dimensions: 2.5, 4.5, 6.0, 7.5, 8.0, 10.5, 13.5, 16.5, and 22.5".
Insulation resistance: 10 megohms min. at 100 VDC, leads to case. Ungrounded junctions only.
Connection: Terminal block for wires to 14 AWG.
Time constant: Typical value in moving water.
Grounded junction: 17 seconds.
Ungrounded junction: 22 seconds.

How to order

AS5145	**Assembly number:** AS5145: Single junction TC AS5146: Dual junction TC
E	**Junction type:** E = Chromel-Constantan J = Iron-Constantan K = Chromel-Alumel T = Copper-Constantan
G	**Junction Grounding:** G = Grounded U = Ungrounded
135	**Thermowell length U:** Specify in 0.1" increments (Ex: 135 = 13.5 inches)
P	
1	**Conduit thread:** 1 = ½ - 14 NPT 2 = ¾ - 14 NPT
C	**Connection head:** C = Cast iron A = Aluminum S = Stainless steel
1	**Thermowell process thread:** 1 = ½ - 14 NPT 2 = ¾ - 14 NPT
U	**Extension option:** P = Coupling/nipple extension N = No extension U = Union/Nipple extension
AS5145EG135P1C1U ← Sample P/N	

Thermocouple transmitters are available in section 5.



SHOWN WITH STAINLESS STEEL HEAD AND UNION/NIPPLE EXTENSION

550°C RTDs With Thermowells

- 316 stainless steel thermowell
- RTD probe for use to 550°C (1022°F)
- Spring-loaded probe
- Cast iron, stainless steel, or aluminum connection head

Sense temperature in high-pressure fluids and gases. These assemblies are spring-loaded for positive probe contact against the bottom of the thermowell.

Note: For temperatures less than 260°C (500°F), assemblies using tip-sensitive sensors are recommended.

Specifications

Temperature range:
Thermowell and sensor:
-100 to 550°C (-148 to 1022°F).
Connection head:
Cast iron: 260°C (500°F) max.
Aluminum: 316°C (600°F) max.
Stainless steel: 121°C (250°F) max.
Material:
Probe: 316 stainless steel.
Connection head: Cast iron, aluminum, or stainless steel.
Thermowell: 316 stainless steel.
Extension: Stainless steel.
Pressure rating: 7000 psi (483 bar) at 21°C, reducing to 2500 psi (172 bar) at 550°C.
Standard U dimensions: 2.5, 4.5, 6.0, 7.5, 8.0, 10.5, 13.5, 16.5, and 22.5".
Insulation resistance: 10 megohms min. at 100 VDC, leads to case.
Connection: Terminal block for wires to 14 AWG.
Time constant:
23 seconds typical in moving water.

Sensing element	Code
Platinum 391 100 Ω ±0.1% at 0°C	PB
Platinum 385 100 Ω ±0.1% at 0°C (Meets EN60751, Class B)	PD

Transmitters

Minco's Temptran™ transmitters provide a 4 to 20 mA signal that can be sent over long distances with a simple 2-wire system. Add any Minco model transmitter (except electrically isolated models). See Section 5 for complete details and ordering information.

TT211, TT711 miniature transmitter

TT176, TT676 standard transmitter

Special high-accuracy calibration

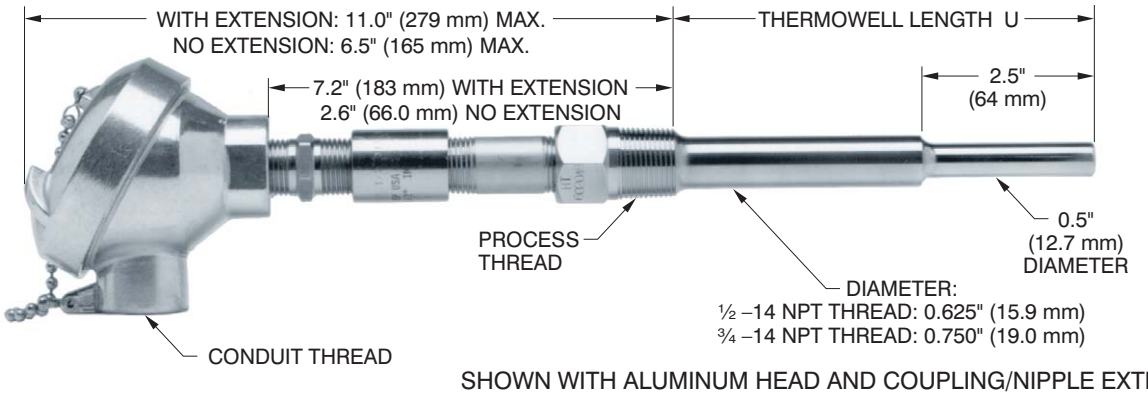
For guaranteed system accuracy of ± 0.75% of temperature span, specify transmitters with high-accuracy calibration as shown on page 5-13. Calibration data traceable to NIST will also be provided.

IN STOCK

Standard thermowell dimensions 2.5, 4.5, 6.0, 7.5, 8.0"
Single element models (except PE)
Contact Minco for currently available Temptran models and ranges

How to order

AS5160	**Assembly number: AS5160**
PB	**Sensing element from table**
105	**Thermowell length U:** Specify in 0.1" increments (Ex: 105 =10.5 inches)
Z	**Number of leads:** Y = 2 leads Z = 3 leads X = 4 leads (PD elements only)
2	**Conduit thread:** 1 = ½ - 14 NPT 2 = ¾ - 14 NPT
C	**Connection head:** C = Cast iron A = Aluminum S = Stainless steel
1	**Thermowell process thread:** 1 = ½ - 14 NPT 2 = ¾ - 14 NPT
U	**Extension option:** P = Coupling/nipple extension N = No extension U = Union/Nipple extension
To order standard assembly, stop here. To order with transmitters (2 or 3 leads), add:	
211	**Temptran model:** 211 = TT211: 2-lead RTDs 176 = TT176: 3-lead RTDs 711 = TT711: 2-lead RTDs, match calibrated 676 = TT676: 3-lead RTDs, match calibrated
A	**Temperature range code:** See page 5-10 for a list of codes
AS5160PB105Z2C1U211A ← Sample P/N	



SHOWN WITH ALUMINUM HEAD AND COUPLING/NIPPLE EXTENSION

550°C Thermocouples With Thermowells

- 316 stainless steel thermowell
- Thermocouple probe for use to 550°C (1022°F)
- Spring-loaded probe
- Cast iron, aluminum or stainless steel connection head

Sense temperature in high-pressure fluids and gases. These assemblies are spring-loaded for positive probe contact against the bottom of the thermowell.

Note: For temperatures less than 260°C (500°F), assemblies using tip-sensitive sensors are recommended.

Specifications

Temperature range:
Thermowell and sensor:
-100 to 550°C (-148 to 1022°F).
Connection head:
Cast iron: 260°C (500°F) max.
Aluminum: 316°C (600°F) max.
Stainless steel: 121°C (250°F) max.
Material:
Probe: 316 stainless steel.
Connection head: Cast iron, aluminum, or stainless steel.
Thermowell: 316 stainless steel.
Extension: Stainless steel.
Pressure rating: 7000 psi (483 bar) at 21°C, reducing to 2500 psi (172 bar) at 550°C.
Standard U dimensions: 2.5, 4.5, 6.0, 7.5, 8.0, 10.5, 13.5, 16.5, and 22.5".
Insulation resistance: 10 megohms min. at 100 VDC, leads to case. Ungrounded junctions only.
Connection: Terminal block for wires to 14 AWG.
Time constant: 60 seconds typical in moving water.

How to order

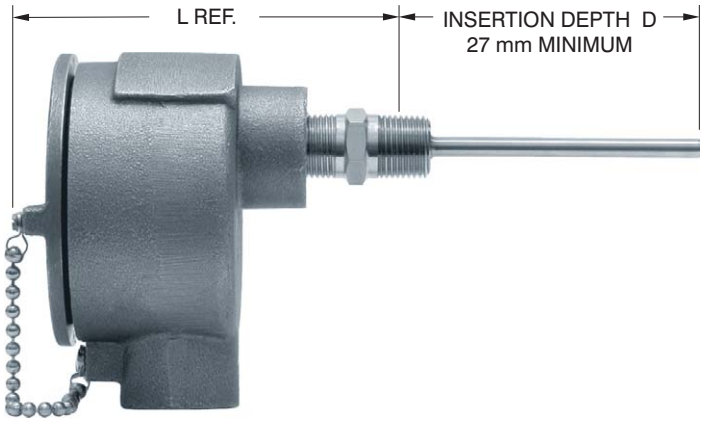
AS5165	**Assembly number: AS5165**
K	**Junction type:** E = Chromel-Constantan J = Iron-Constantan K = Chromel-Alumel
U	**Junction grounding:** G = Grounded U = Ungrounded
135	**Thermowell length U:** Specify in 0.1" increments (Ex: 135 = 13.5 inches)
P	
1	**Conduit thread:** 1 = ½ - 14 NPT 2 = ¾ - 14 NPT
C	**Connection head:** C = Cast iron A = Aluminum S = Stainless steel
1	**Thermowell process thread:** 1 = ½ - 14 NPT 2 = ¾ - 14 NPT
U	**Extension option:** P = Coupling/nipple extension N = No extension U = Union/Nipple extension
AS5165KU135P1C1U ← Sample P/N	

⚠ Thermocouple transmitters are available in section 5.

FM APPROVED

CSA

Ex d IIC
AEx d IIC



Flameproof/Explosionproof Sensors

- Tip sensitive, all stainless or MgO filled probes available
- RTD or thermocouple sensors
- Hazardous area rated

Specifications

Temperature range:
-50 to 260°C (-58 to 500°F).
Material:
Probe: Stainless steel (tip sensitive models have copper alloy tip).
Holder: Stainless steel.
Connection head:
Copper free aluminum alloy (CH104)
316L stainless steel (CH106).
Pressure rating: See table on facing page.
Insulation resistance: 10 megohms min. at 100 VDC, leads to case. Ungrounded junctions only on thermocouples.
Connection: Terminal block for wires to 14 AWG.
Time constant: Typical value in moving water.
Tip sensitive: 3 seconds.
All stainless and MgO filled: 10 seconds.
Explosionproof and flameproof ratings:
National and Canadian Electrical Code:
Class I, Divisions 1 and 2, Groups B, C, and D,
Class II, Groups E, F, and G,
T6 (Ta = 40°C),
T2 (Ta = 260°C). Ta limited to 160°C for CSA Class II locations.
National Electrical Code (Article 505):
Class I, Zones 1 and 2, AEx d IIC,
T6 (Ta =40°C), T2 (Ta = 260°C).
Canadian Electrical Code (IEC 60079):
Class 1, Zones 1 and 2, Ex d IIC,
T6 (Ta = 40°C), T2 (Ta = 260°C).

How to order RTDs

AS720	**Assembly number:** (see table on facing page)
4	**Connection head/fitting:** (see table on facing page)
PD	**Sensing element:** (see table on facing page)
100	**Insertion depth D (in mm):** (43–1219 mm)
X	**Number of leads:** Y = 2 leads (n/a for copper) Z = 3 leads X = 4 leads (n/a for dual models)
3	**Conduit thread:** 3 = ½ - 14 NPT 4 = ¾ - 14 NPT

AS7204PD100X3 ← Sample P/N

How to order thermocouples

AS706	**Assembly number:** (see table on facing page)
4	**Connection head/fitting:** (see table on facing page)
E	**Junction type:** (see table on facing page)
U	**Junction Grounding:** G = Grounded U = Ungrounded
100	**Insertion depth D (in mm):** (27–3000 mm)
P	
3	**Conduit thread:** 3 = ½ - 14 NPT 4 = ¾ - 14 NPT

AS7064EU100P3 ← Sample P/N

Hazardous Area Requirements

Request Application Aid #19 for information on how to classify a hazardous area, methods of protection, and the various standards and agencies (including FM, CSA, CENELEC and ATEX).

Flameproof/Explosionproof Sensors

RTDs

Probe diameters	0.215" (5.5 mm)		0.236" (6.0 mm)		0.250" (6.4 mm)	
Number of elements	Single	Dual	Single	Dual	Single	Dual
Tip-sensitive	AS760	AS761	AS700	AS701	AS720	AS721
All stainless	AS762	AS763	AS702	AS703	AS722	AS723
MgO filled (platinum only)			AS704		AS724	

Sensing element		Code	
		Single	Dual
Platinum 392	100 Ω ±0.5% at 0°C	PA	PAPA
Platinum 385 (Meets EN60751, Class B)	100 Ω ±0.1% at 0°C	PD	PDPD
Platinum 385	100 Ω ±0.5% at 0°C	PE	PEPE
Copper	10 Ω ±0.2% at 25°C	CA	
(dual)	10 Ω ±0.5% at 25°C		CCCC
Nickel 672	120 Ω ±0.5% at 0°C	NA	NANA
Nickel 618	100 Ω ±0.22% at 0°C	NB	NBNB

Thermocouples

Probe diameters	0.215" (5.5 mm)		0.236" (6.0 mm)		0.250" (6.4 mm)	
Number of elements	Single	Dual	Single	Dual	Single	Dual
Tip-sensitive	AS766	AS767	AS706	AS707	AS726	AS727
MgO filled			AS708	AS709	AS728	AS729

Thermocouple Junction	Code	
	Single	Dual
Chromel-Constantan	E	EE
Iron-Constantan	J	JJ
Chromel-Alumel	K	KK
Copper-Constantan	T	TT

Connection head and fitting options

CH104: Aluminum IP65, Type 3 and 4.
CH106: 316L stainless steel IP66, Type 3, 4, and 4X.

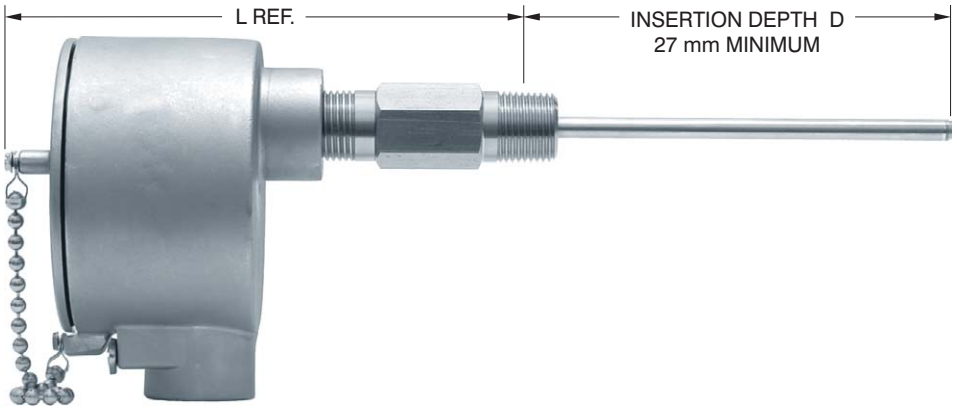
Fitting	Process thread	Pressure Rating	L REF.	Head	Code
Welded	½ - 14 NPT	200 psi (13.8 bar)	4.4" (112 mm)	CH104	0*
Welded	½ - 14 NPT	200 psi (13.8 bar)	4.2" (106 mm)	CH106	1*
Welded	G½	200 psi (13.8 bar)	4.2" (107 mm)	CH104	2*
Welded	G½	200 psi (13.8 bar)	4.0" (101 mm)	CH106	3*
Spring-loaded holder	½ - 14 NPT	50 psi (3.4 bar)	5.7" (144 mm)	CH104	4
Spring-loaded holder	½ - 14 NPT	50 psi (3.4 bar)	5.4" (138 mm)	CH106	5
Spring-loaded holder	G½	50 psi (3.4 bar)	5.7" (144 mm)	CH104	6
Spring-loaded holder	G½	50 psi (3.4 bar)	5.4" (138 mm)	CH106	7

* 0.250 diameter only for all stainless and MgO probes.

FM APPROVED

CSA

Ex d IIC
AEx d IIC



Flameproof/Explosionproof RTDs With Transmitters

- Tip sensitive, all stainless or MgO filled RTD probe
- Temptran transmitter for long signal path
- Hazardous area rated

Specifications

Temperature range:
-50 to 260°C (-58 to 500°F).
Material:
Probe: Stainless steel (tip sensitive models have copper alloy tip).
Holder: Stainless steel.
Connection head:
Copper free aluminum alloy (CH104)
316L stainless steel (CH106).
Pressure rating: See table on facing page.
Insulation resistance: 10 megohms min. at 100 VDC, leads to case.
Connection: Terminal block for wires to 14 AWG.
Time constant: Typical value in moving water.
Tip sensitive: 3 seconds.
All stainless and MgO filled: 10 seconds.
Explosionproof and flameproof ratings:
National and Canadian Electrical Code:
Class I, Divisions 1 and 2, Groups B, C, and D,
Class II, Groups E, F, and G,
T6 (Ta = 40°C),
T2 (Ta = 260°C). Ta limited to 160°C for CSA Class II locations.
National Electrical Code (Article 505):
Class I, Zones 1 and 2, AEx d IIC,
T6 (Ta =40°C), T2 (Ta = 260°C).
Canadian Electrical Code (IEC 60079):
Class 1, Zones 1 and 2, Ex d IIC,
T6 (Ta = 40°C), T2 (Ta = 260°C).

Transmitters

Output: 4 to 20 mA over specified range, linear with temperature.
Calibration accuracy: ±0.1% of span.
Linearity: 0.1% of span.
Adjustments: Zero and span, ±5% of span. Factory calibrated to nominal R/T curve.
Ambient operating temperature:
TT211, TT711: -25 to 85°C (-13 to 185°F).
TT176, TT676: -40 to 85°C (-40 to 185°F).
Supply voltage: 10 to 35 VDC.
Maximum load resistance:

$$R_{loop\ max} = \frac{V_{supply} - 10}{0.020\ \text{amps}}$$

Leadwires:
TT211, TT711: 2-lead RTD.
TT176, TT676: 3-lead RTD for resistance compensation.
Physical: Epoxy potted for moisture resistance.
Mounting: Transmitter mounts in connection head.

TT211, TT711
miniature transmitter

TT176, TT676
standard transmitter

Special high-accuracy calibration

For guaranteed system accuracy of ± 0.75% of temperature span, specify transmitters with high-accuracy calibration as shown on page 5-13. Calibration data traceable to NIST will also be provided.

How to order

AS710	**Assembly number:** (see table on facing page)
4	**Connection head/fitting:** (see table on facing page)
TT176	**Temptran model number:** TT211: 2-lead RTDs TT176: 3-lead RTDs TT711: 2-lead RTDs, match calibrated TT676: 3-lead RTDs, match calibrated
N	**Code for temperature range:** (see table on facing page)
100	**Insertion depth D (in mm):** (27 – 3000 mm)
PD	**Sensing element**
3	**Conduit thread:** 3 = ½ - 14 NPT 4 = ¾ - 14 NPT
AS7104TT176N100PD3 ← Sample P/N	

Hazardous Area Requirements

Request Application Aid #19 for information on how to classify a hazardous area, methods of protection, and the various standards and agencies (including FM, CSA, CENELEC and ATEX).

Flameproof/Explosionproof RTDs With Transmitters

RTD with Transmitter

Probe diameters	0.215" (5.5 mm)	0.236" (6.0 mm)	0.250" (6.4 mm)
Tip-sensitive	AS770	AS710	AS730
All stainless	AS772	AS712	AS732
MgO filled		AS714	AS734

Transmitters:

Popular ranges:

Code	Range	
EO	-50 to 100°C	-58 to 212°F
BC	-30 to 30°C	-22 to 86°F
S	-17.8 to 37.8°C	0 to 100°F
AC	-17.8 to 93.3°C	0 to 200°F
AN	-17.8 to 148.9°C	0 to 300°F
AG	-17.8 to 260°C	0 to 500°F
AP	-6.7 to 21.1°C	20 to 70°F
A	-6.7 to 48.9°C	20 to 120°F
N	0 to 50°C	32 to 122°F
C	0 to 100°C	32 to 212°F
J	0 to 150°C	32 to 302°F
K	0 to 200°C	32 to 392°F
V	10 to 65.6°C	50 to 150°F
P	37.8 to 179.4°C	100 to 355°F
BH	50 to 150°C	122 to 302°F

⚠ Complete range table is on page 5-10.

Connection head and fitting options

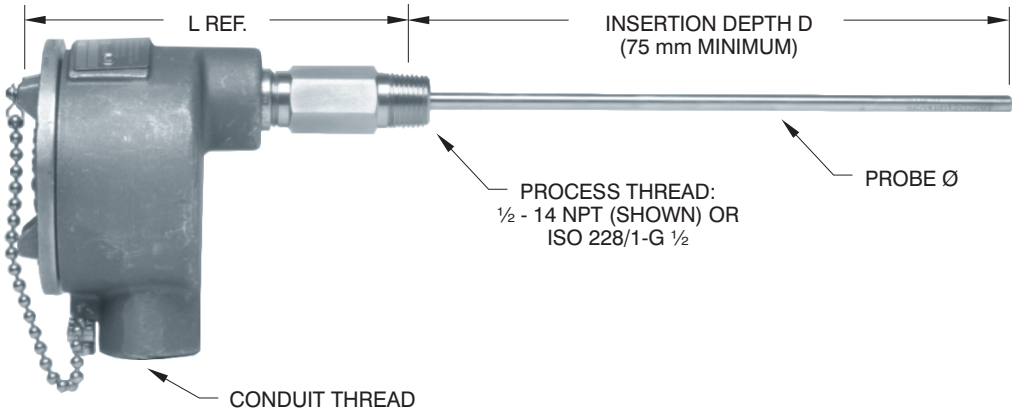
CH104: Aluminum IP65, Type 3 and 4.
CH106: 316L stainless steel IP66, Type 3, 4, and 4X.

Fitting	Process thread	Pressure Rating	L REF.	Head	Code
Welded	½ - 14 NPT	200 psi (13.8 bar)	4.4" (112 mm)	CH104	0*
Welded	½ - 14 NPT	200 psi (13.8 bar)	4.2" (106 mm)	CH106	1*
Welded	G½	200 psi (13.8 bar)	4.2" (107 mm)	CH104	2*
Welded	G½	200 psi (13.8 bar)	4.0" (101 mm)	CH106	3*
Spring-loaded holder	½ - 14 NPT	50 psi (3.4 bar)	5.7" (144 mm)	CH104	4
Spring-loaded holder	½ - 14 NPT	50 psi (3.4 bar)	5.4" (138 mm)	CH106	5
Spring-loaded holder	G½	50 psi (3.4 bar)	5.7" (144 mm)	CH104	6
Spring-loaded holder	G½	50 psi (3.4 bar)	5.4" (138 mm)	CH106	7

* 0.250 diameter only for all stainless and MgO probes.

CE 0344

Ex II 2 G EEx d IIC T6



Flameproof Sensors

- Approved for use in hazardous locations defined by CENELEC EN50014 and EN50018, ATEX directive 94/4/EC (KEMA 03 ATEX 2389)
- Features tip-sensitive, all stainless or MgO filled RTD or thermocouple probe for fast response
- Spring-loaded holder ensures good probe contact
- U.S. or European threads

Flameproof sensors are designed to contain an explosion, and prevent the transmission of the explosion to the surrounding atmosphere. These sensors are suitable for use in Zone 1 or Zone 2.

Specifications

Temperature range:
-50 to 260°C (-58 to 500°F).
Material:
Tip-sensitive probe: Stainless steel with copper alloy tip.
All stainless RTD: Stainless steel.
MgO filled RTD: Inconel.
MgO filled thermocouple: Stainless steel.
Fittings: Stainless steel.
Connection head:
CH357: Copper free aluminum alloy; IP65.
CH358: Epoxy coated copper free; IP66.
Pressure rating: Spring-loaded holder: 50 psi (3.4 bar). Fluid seal fitting: 100 psi (6.9 bar).
Insulation resistance: 100 megohms min. at 100 VDC, leads to probe case. Ungrounded junction models only on thermocouples.
Connection: Terminal block for wires up to AWG 14.

How to order RTDs

MAS600	**Assembly number:** (see table on facing page)
4	**Connection head/fitting:** (see table on facing page)
CA	**Sensing element:** (see table on facing page)
100	**Insertion depth D (in mm):** (75 – 1219 mm)
X	**Number of leads:** Y = 2 leads (n/a for copper) Z = 3 leads X = 4 leads (n/a for dual models)
3	**Conduit thread:** 3 = ½ - 14 NPT 4 = ¾ - 14 NPT

MAS6004CA100X3 ← Sample P/N

How to order thermocouples

MAS607	**Assembly number:** (see table on facing page)
5	**Connection head/fitting:** (see table on facing page)
EE	**Junction type:** (see table on facing page)
U	**Junction Grounding:** G = Grounded U = Ungrounded
450	**Insertion depth D (in mm):** (75 – 1219 mm)
P	
3	**Conduit thread:** 3 = ½ - 14 NPT 4 = ¾ - 14 NPT

MAS6075EEU450P3 ← Sample P/N

Hazardous Area Requirements

Request Application Aid #19 for information on how to classify a hazardous area, methods of protection, and the various standards and agencies (including FM, CSA, CENELEC and ATEX).

Flameproof Sensors

RTDs

Probe diameters	0.236" (6.0 mm)		0.250" (6.4 mm)	
Number of elements	Single	Dual	Single	Dual
Tip-sensitive	MAS600	MAS601	MAS620	MAS621
All stainless	MAS602	MAS603	MAS622	MAS623
Platinum, MgO filled*	MAS604		MAS624	

*MAS604_ and MAS624_, not available with head/fitting options “8” or “9”.

Sensing element		Code	
		Single	Dual
Platinum 392	100 Ω ±0.5% at 0°C	PA	PAPA
Platinum 385 (Meets EN60751, Class B)	100 Ω ±0.1% at 0°C	PD	PDPD
Platinum 385	100 Ω ±0.5% at 0°C	PE	PEPE
Copper	10 Ω ±0.2% at 25°C	CA	
(dual)	10 Ω ±0.5% at 25°C		CCCC
Nickel 672	120 Ω ±0.5% at 0°C	NA	NANA
Nickel 618	100 Ω ±0.22% at 0°C	NB	NBNB

Thermocouples

Probe diameters	0.236" (6.0 mm)		0.250" (6.4 mm)	
Number of elements	Single	Dual	Single	Dual
Tip-sensitive	MAS606	MAS607	MAS626	MAS627
MgO filled	MAS608	MAS609	MAS628	MAS629

Thermocouple Junction	Code	
	Single	Dual
Chromel-Constantan	E	EE
Iron-Constantan	J	JJ
Chromel-Alumel	K	KK
Copper-Constantan	T	TT

Connection head and fitting options

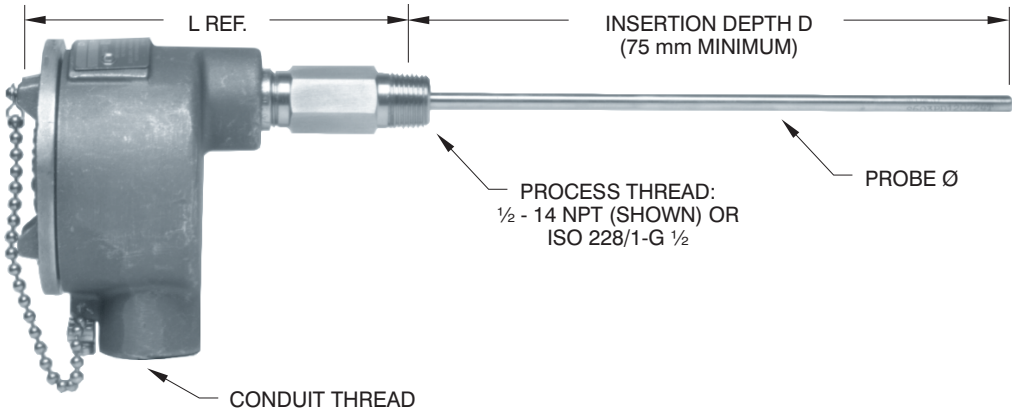
CH357: Aluminum alloy; meets IP65.
CH358: Epoxy coated; meets IP66.

Fitting	Process thread	L REF.	Head	Code
Fluid seal	½ - 14 NPT	4.6" (117 mm)	CH357	0
Fluid seal	½ - 14 NPT	4.6" (117 mm)	CH358	1
Fluid seal	G½	4.4" (111 mm)	CH357	2
Fluid seal	G½	4.4" (111 mm)	CH358	3
Set screw spring-loaded holder	½ - 14 NPT	5.6" (143 mm)	CH357	4
Set screw spring-loaded holder	½ - 14 NPT	5.6" (143 mm)	CH358	5
Set screw spring-loaded holder	G½	5.4" (136 mm)	CH357	6
Set screw spring-loaded holder	G½	5.4" (136 mm)	CH358	7
Release knob spring-loaded holder	½ - 14 NPT	5.7" (144 mm)	CH357	8*
Release knob spring-loaded holder	½ - 14 NPT	5.7" (144 mm)	CH358	9*

*MAS604_ and MAS624_, not available with head/fitting options “8” or “9”.

CE 0344

II 2 G EEx d IIC T6



Flameproof RTDs With Transmitters

- Approved for use in hazardous locations defined by CENELEC EN50014 and EN50018, ATEX directive 94/4/EC (KEMA 03 ATEX 2389)
- Features tip-sensitive RTD probe for fast response
- Spring-loaded holder ensures good probe contact
- U.S. or European threads
- Temperature transmitters for 2-lead RTDs or 3-lead RTDs

Flameproof sensors are designed to contain an explosion, and prevent the transmission of the explosion to the surrounding atmosphere. These sensors are suitable for use in Zone 1 or Zone 2.

Specifications

Temperature range:
-50 to 260°C (-58 to 500°F).
Material:
Tip-sensitive probe: Stainless steel with copper alloy tip.
All stainless RTD: Stainless steel.
MgO filled RTD: Inconel.
MgO filled thermocouple: Stainless steel.
Fittings: Stainless steel.
Connection head:
CH357: Aluminum alloy; meets IP65.
CH358: Epoxy coated; meets IP66.
Pressure rating: Spring-loaded holder: 50 psi (3.4 bar). Fluid seal fitting: 100 psi (6.9 bar).
Insulation resistance: 100 megohms min. at 100 VDC, leads to probe case.
Connection: Terminal block for wires up to AWG 14.

Transmitters

Output: 4 to 20 mA over specified range, linear with temperature.
Calibration accuracy: ±0.1% of span.
Linearity: 0.1% of span.
Adjustments: Zero and span, ±5% of span. Factory calibrated to nominal R/T curve.
Ambient operating temperature:
TT211, TT711: -25 to 85°C (-13 to 185°F).
TT176, TT676: -40 to 85°C (-40 to 185°F).
Supply voltage: 10 to 35 VDC.
Maximum load resistance:

$$R_{loop\ max} = \frac{V_{supply} - 10}{0.020\ \text{amps}}$$

Leadwires:
TT211, TT711: 2-lead RTD.
TT176, TT676: 3-lead RTD for resistance compensation.
Physical: Epoxy potted for moisture resistance.
Mounting: Transmitter mounts in connection head.

TT211, TT711
miniature transmitter

TT176, TT676
standard transmitter

Special high-accuracy calibration

For guaranteed system accuracy of ± 0.75% of temperature span, specify transmitters with high-accuracy calibration as shown on page 5-13. Calibration data traceable to NIST will also be provided.

How to order

MAS624	**Assembly number:** (see table on facing page)
7	**Connection head/fitting:** (see table on facing page)
TT676	**Temptran model number:** TT211: 2-lead RTDs TT176: 3-lead RTDs TT711: 2-lead RTDs, match calibrated TT676: 3-lead RTDs, match calibrated
N	**Code for temperature range:** (see table on facing page)
500	**Insertion depth D (in mm):** (75–1219 mm)
PD	**Sensing element:** (see table on facing page)
4	**Conduit thread:** 3 = ½ - 14 NPT 4 = ¾ - 14 NPT

MAS6247TT676N500PD4 ← Sample P/N

Hazardous Area Requirements

Request Application Aid #19 for information on how to classify a hazardous area, methods of protection, and the various standards and agencies (including FM, CSA, CENELEC and ATEX).

Flameproof RTDs With Transmitters

RTDs

Probe diameters	0.236" (6.0 mm)	0.250" (6.4 mm)
Number of elements	Single	Single
Tip-sensitive	MAS600	MAS620
All stainless	MAS602	MAS622
Platinum, MgO filled*	MAS604	MAS624

*MAS604_ and MAS624_, not available with head/fitting options “8” or “9”.

Sensing element	Code
Platinum 392 100 Ω ±0.5% at 0°C	PA
Platinum 385 100 Ω ±0.1% at 0°C (Meets EN60751, Class B)	PD
Platinum 385 100 Ω ±0.5% at 0°C	PE

Transmitters:

Popular ranges:

Code	Range	
EO	-50 to 100°C	-58 to 212°F
BC	-30 to 30°C	-22 to 86°F
S	-17.8 to 37.8°C	0 to 100°F
AC	-17.8 to 93.3°C	0 to 200°F
AN	-17.8 to 148.9°C	0 to 300°F
AG	-17.8 to 260°C	0 to 500°F
AP	-6.7 to 21.1°C	20 to 70°F
A	-6.7 to 48.9°C	20 to 120°F
N	0 to 50°C	32 to 122°F
C	0 to 100°C	32 to 212°F
J	0 to 150°C	32 to 302°F
K	0 to 200°C	32 to 392°F
V	10 to 65.6°C	20 to 150°F
P	37.8 to 179.4°C	100 to 355°F
BH	50 to 150°C	122 to 302°F

⚠ **Complete range table is on page 5-10.**

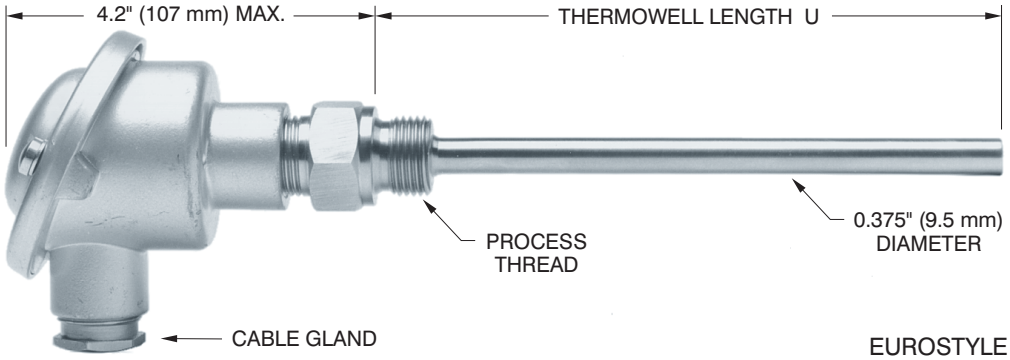
Connection head and fitting options

CH357: Aluminum alloy; meets IP65.
CH358: Epoxy coated; meets IP66.

Fitting	Process thread	L REF.	Head	Code
Fluid seal	½ - 14 NPT	4.6" (117 mm)	CH357	0
Fluid seal	½ - 14 NPT	4.6" (117 mm)	CH358	1
Fluid seal	G½	4.4" (111 mm)	CH357	2
Fluid seal	G½	4.4" (111 mm)	CH358	3
Set screw spring-loaded holder	½ - 14 NPT	5.6" (143 mm)	CH357	4
Set screw spring-loaded holder	½ - 14 NPT	5.6" (143 mm)	CH358	5
Set screw spring-loaded holder	G½	5.4" (136 mm)	CH357	6
Set screw spring-loaded holder	G½	5.4" (136 mm)	CH358	7
Release knob spring-loaded holder	½ - 14 NPT	5.7" (144 mm)	CH357	8*
Release knob spring-loaded holder	½ - 14 NPT	5.7" (144 mm)	CH358	9*

*MAS604_ and MAS624_, not available with head/fitting options “8” or “9”.

Temperature Sensor Assemblies



EUROSTYLE HEAD SHOWN.

Eurostyle Sensors

- Compact, economical RTD or thermocouple assembly
- Metric straight thread or U.S. tapered thread
- Tip-sensitive probe for use to 260°C (500°F)
- Optional European Form B connection head to DIN 43729
- Stainless steel thermowell

These low-priced assemblies come complete with thermowells, spring-loaded probes, and connection heads. They provide accurate sensing and quick response in liquid or air streams. Specify U.S. or metric thread for global compatibility.

Specifications

Temperature range:
-50 to 260°C (-58 to 500°F).
Material:
Probe: Stainless steel with copper alloy tip.
Connection head: Cast aluminum.
Thermowell: 300 series stainless steel.
Pressure rating: 2755 psi (190 bar) at 25°C, reducing to 493 psi (34 bar) at 600°C.
Insulation resistance: 10 megohms min. at 100 VDC, leads to case. Ungrounded junctions only on thermocouples.
Connection: Terminal block for wires to 14 AWG.
Time constant: Typical in moving water:
RTD: 35 seconds.
Thermocouple: 27 seconds.

Transmitters

Minco's Temptran™ transmitters provide a 4 to 20 mA signal that can be sent over long distances with a simple 2-wire system. See Section 5 for complete details and ordering information.

For guaranteed system accuracy of ± 0.75% of temperature span, specify transmitters with high-accuracy calibration as shown on page 5-13. Calibration data traceable to NIST will also be provided.

How to order RTDs

Sensing element		Code
Platinum 392	100 Ω ±0.5% at 0°C	PA
Platinum 385 (Meets EN60751, Class B)	100 Ω ±0.1% at 0°C	PD
Platinum 385	100 Ω ±0.5% at 0°C	PE
Copper	10 Ω ±0.2% at 25°C	CA
(dual)	10 Ω ±0.5% at 25°C	CC
Nickel	120 Ω ±0.5% at 0°C	NA

AS5240	**Assembly number:** AS5240: Single element RTD AS5241: Dual element RTD
PD	**Sensing element from table:**
40	**TW length U in 0.1" increments** [Ex: 40 = 4.0 inches (102 mm)]
Z	**Leads per sensing element:** Y = 2 leads Z = 3 leads (required for CA/CC) X = 4 leads (single element only)
2	**Conduit thread:** 1 = ½ - 14 NPT 2 = ¾ - 14 NPT 3 = PG cable gland (Eurostyle only)
A	**Connection head:** A = Standard aluminum head E = Eurostyle aluminum head
1	**TW process thread:** 1 = ½ - 14 NPT 2 = ¾ - 14 NPT 3 = ISO 228/1 - G½
To order standard assembly, stop here. To order with transmitters, add:	
TT176	**Temptran model:** TT176: 3-lead RTDs TT676: 3-lead RTDs, match calibrated
A	**Temperature range code:** See page 5-10 for a list of codes
AS5240PD40Z2A1TT176A ← Sample P/N	

How to order Thermocouples

AS5245	**Assembly number:** AS5245: Single junction TC AS5246: Dual junction TC
E	**Junction type:** E = Chromel-Constantan J = Iron-Constantan K = Chromel-Alumel T = Copper-Constantan
G	**Junction grounding:** G = Grounded U = Ungrounded
135	**Thermowell length U:** Specify in 0.1" increments [Ex: 135 = 13.5 inches (343 mm)]
P	
3	**Conduit thread:** 1 = ½ - 14 NPT 2 = ¾ - 14 NPT 3 = PG cable gland (Eurostyle head only)
E	**Connection head:** A = Standard aluminum head E = Eurostyle aluminum head
3	**Thermowell process thread:** 1 = ½ - 14 NPT 2 = ¾ - 14 NPT 3 = ISO 228/1 - G½
AS5245EG135P3E3 ← Sample P/N	