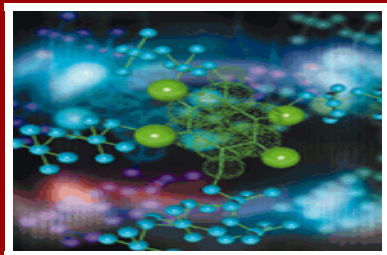
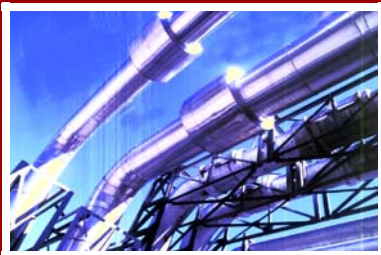


AccuTru Sensor Technologies



**High Temperature ExL
Ceramic Sheathed Thermocouples**

AccuTru Sensor Technologies

A DIVISION OF ACCUTRU INTERNATIONAL CORPORATION

NEW TECHNOLOGIES

(exclusively from AccuTru)

Mi-Dry®, ExL®, SVS®

AccuTru is becoming well known in the process control community as a leading edge sensor technology company. New technologies ranging from the first ever self-validating/self-diagnostic temperature sensor to extended life thermocouples constructed with AccuTru's proprietary mineral insulation, Mi-Dry, are making a major impact on the marketplace. Read more about these new technologies that are exceeding user expectations in increased accuracy, repeatability, and service life.

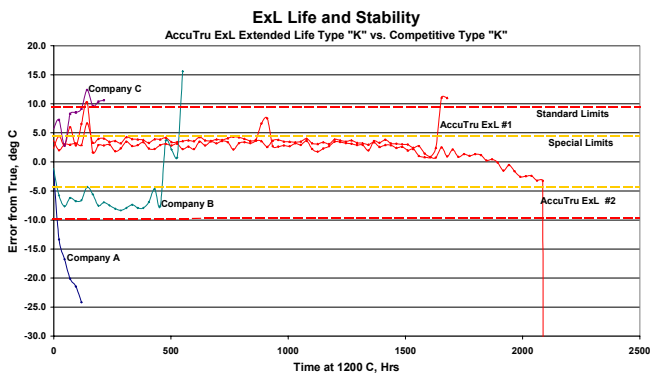
NEW TECHNOLOGIES

- ExL Extended Life Thermocouples with Mi-Dry
- Mi-Dry Resistance Temperature Detectors (RTD's)
- ExL Longer Life High Temperature Ceramic Sheathed Thermocouples
- SVS Self-validating/Self-diagnosing Temperature Sensors
- Flame Probes

ExL Extended Life Thermocouples made with Mi-Dry

Made with our exclusive Mi-Dry ceramics, these highly stable mineral insulated, metal sheathed thermocouples outlast thermocouples made with MgO by 2 to 4 times. High performance AccuTru ExL thermocouples, available only from AccuTru, are intended for use in temperature sensing applications where accuracy, repeatability, and long life are important. The chart below illustrates the result of a life test conducted with AccuTru's ExL thermocouples compared to standard thermocouples.

The unique Mi-Dry insulating material in this product slows



or prevents typical failure modes common to other mineral insulated thermocouples. The increased signal stability and life improves process control and reduces downtime. Better control allows for more precise process optimization, reduced operating costs and improved process safety.

Mi-Dry Resistance Temperature Detectors (RTD's)

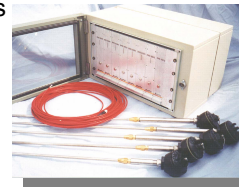
Mi-Dry RTD's are constructed with the same proprietary insulating material used in AccuTru's ExL extended life thermocouples. Taking advantage of this material's superior moisture resistance and higher electrical resistance vs. MgO, Mi-Dry RTD's have better shelf life and higher temperature range when compared to standard RTD's constructed with MgO cable.

ExL Longer Life High Temperature Ceramic Sheathed Thermocouples

AccuTru offers an extensive line of ceramic sheathed noble metal thermocouples. Designed for profile or spike (control) applications, AccuTru uses the highest quality ceramic materials treated with a proprietary process that extends the life and stability of the sensor.

SVS—Self-Validating/Self-Diagnostic Temperature Sensors

AccuTru's patented Self-Validating/Self-Diagnostic sensors are producing a sea-change in the process control industry. These sensors demonstrate measurement accuracies up to three times better than special limits of error for the service life of the sensor, and up to twice the life of conventional thermocouples.



The SVS sensors are available in three different temperature ranges, covering measurements from -200°C to 1750°C (-325°F to 3200°F). The SVS series of temperature sensors are intended for use in critical temperature measurement and control applications found in almost every industrial process. Examples of existing applications include heat treating, chemicals, petrochemicals, pharmaceuticals, gas turbines, glass melters, pilot plants, and research laboratories.

The patented SVS technology detects and corrects sensor drift and warns of sensor deterioration before failure. These features provide high value by providing highly reliable measurements and predictive maintenance. This enables improved process control, and increases yields while reducing operating risks and costs.

AccuTru Flame Rods

AccuTru produces a series of ionization probes for use in pilot furnaces or other applications where moisture adsorption is a problem. The probes are charged with an electric potential and if a flame is present, the charge is transferred to the flame probe sheath. The detection of a flame is critical in processes where fuel is introduced to a combustion process.

AccuTru Sensor Technologies

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AccuTru's Full Line of Quality Temperature Measurement Products

In addition to being a recognized leader in the development and marketing of new temperature measurement technology, AccuTru is a full service, quality manufacturer of a wide array of temperature measurement devices and accessories. AccuTru stands ready to address your temperature measurement needs. Fast response, quality products, and superb engineering support are our hallmarks.

FEATURING:

- *Multi-Point Thermocouples*
- *Thermocouples*
- *Resistance Temperature Detectors (RTD's)*
- *Thermowells*
- *Transmitters—Digital and Analog Thermocouple and RTD*
- *Calibration Services*

Multi-Point Thermocouples

Our design engineers and technicians have extensive experience in the design and manufacture of multi-point thermocouples. We offer multi-points in both ExL and conventional MgO insulating materials. AccuTru maintains a stock of multi-point materials in order to provide quick response in critical need situations.

Thermocouples

If you want economically priced MgO insulated thermocouples but want to be assured of the highest possible quality, AccuTru offers a complete line of industrial thermocouples, including Types E,J,T,K,N,R,S,and B. You can select from a wide range of designs from quick connect type to transition style. We also manufacture thermocouples for use in thermowells, as well as a variety of other specialty items, including weld-pad thermocouples. These sensors cover the entire range from -200°C to 1750°C.

These sensors are made to AccuTru's exacting quality standards using MgO mineral insulated cable.

Resistance Temperature Detectors (RTD's)

If initial cost is of paramount importance, contact AccuTru for a quote on our RTD's. We manufacture a variety of styles, including thin film and bulb RTD's, in multiple configurations in an extensive variety of sheath materials to meet your specific requirements.

Thermowells

Let AccuTru's team of experts help you select the proper materials for your applications. All of our thermowells are manufactured to exacting specifications and we are able to provide quick response to your needs. Our engineering team specializes in the design of special thermowells for demanding applications.

Transmitters—Digital and Analog Thermocouple and RTD

AccuTru carries a complete line of both digital and analog thermocouple and RTD transmitters, in both hockey puck, and DIN rail mounted styles.



Whether you require fully isolated and linearized transmitters or low budget transmitters, AccuTru can provide them. Intrinsically safe and/or plug-in loop powered read-out transmitters are also available.

Most of these products incorporate microprocessor technology and are quickly and easily programmed using any PC and the software included with the transmitter.

HART protocol transmitters also available.

Calibration Services

Contact AccuTru for a price quote on calibration services. We provide quick, reliable service. All of our sensor products can be ordered with calibration at single or multiple points, traceable to NIST.

Why AccuTru?

What sets AccuTru apart from other manufacturers is our advanced temperature technologies.

There is more to selecting temperature measurement devices than just price. When you have at risk significant capital investments, product quality, yield costs, energy expenses, and environmental issues, you need to look to AccuTru's advanced technologies.

- *Self-Validating, Self-Diagnostic temperature measurement systems.*
- *ExL Extended Life Thermocouples*
- *MI-Dry Resistance Temperature Detectors (RTD's)*
- *All Thermocouples manufactured using special limits of error cable and special limits thermocouple wire for extension wire*
- *All Thermocouple and RTD connectors use solid metal pins.*

The AccuTru team looks forward to discussing your temperature measurement needs and sharing with you, the benefits of AccuTru technology.

AccuTru Sensor Technologies

A DIVISION OF ACCUTRU INTERNATIONAL CORPORATION

Ex-L High Temperature Ceramic Sheathed Thermocouples

AccuTru's research into electrical insulating materials has led to the development of a process for producing highly stable and extended life ceramic insulated high temperature sensors.

The noble metal AccuTru ExL Extended Life series of thermocouples are intended for use in critical high temperature sensing uses that exceed the limits of metal sheathed thermocouples. AccuTru uses a special, ultra-high purity ceramic that has a higher density than conventional ceramic tubes, helping to reduce the risk of the process environment penetrating the ceramic and damaging the noble metal thermocouple elements.

AccuTru's proprietary processing of Alumina ceramic closed end protection tubes and ceramic insulators helps increase the stability and life of these sensors in high temperature applications. The increased stability and longer life improves control of critical processes. The enhanced control reduces process variation, increases yield, and improves quality.

SPECIFICATIONS:

Temperature Range:

0°C to 1750°C (32°F to 3182°F)

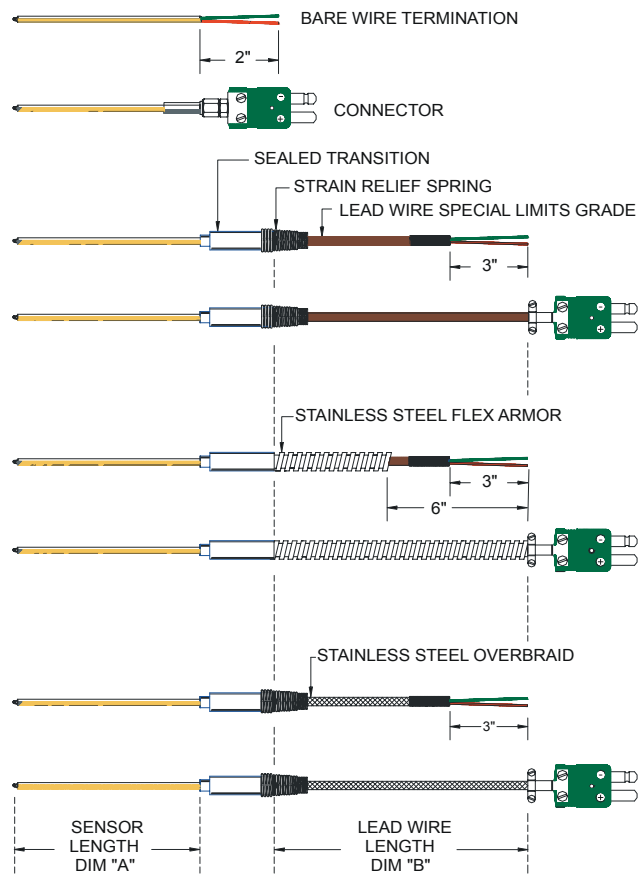
Expected Life:

Up to 2X the life in comparative studies with conventional sheath materials and closed end tubes.

Accuracy (Limits of Error, ANSI MC 96.1)

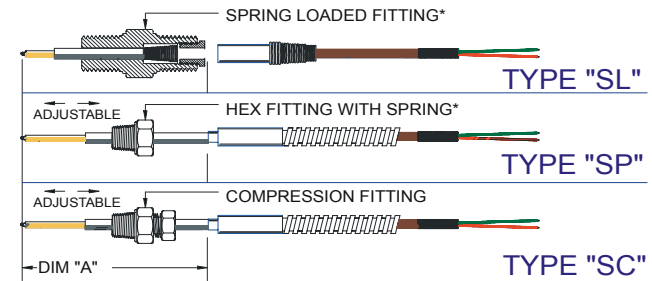
± 0.60°C (± 1°F) or ± 0.1% of reading, whichever is greater for Type S and Type R. Limits for Type B are 0.25% above 870°C

THERMOCOUPLE STYLES

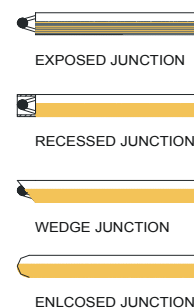


CONNECTION FITTING OPTIONS

*NOTE: RECESSED JUNCTION IS RECOMMENDED FOR SPRING LOADED FITTINGS



JUNCTION OPTIONS



AccuTru Sensor Technologies

A DIVISION OF ACCUTRU INTERNATIONAL CORPORATION

ACCUTRU QUICK ORDER Part Number Guide for ExL-C Noble Metal-Ceramic Sheathed Control Thermocouples:

1. CALIBRATION

S = Type S
R = Type R
B = Type B
DS = Dual Type S
DR = Dual Type R
DB = Dual Type B
(0.020" Dia. Wire)
[24 ga]

6. TERMINATION

B = Bare ends
M = Standard Male Plug (350°F)
F = Standard Female Jack (350°F)
N = Mini Male Plug
G = Mini Female Jack
H = Std High Temp Male Plug (550°F, Brown Case)
K = Std High Temp Female Jack (550°F, Brown Case)
L = Ultra High Temperature Ceramic Male Plug (1200°F)
P = Ultra High Temperature Ceramic Female Jack (1200°F)
S = Compensating Spade Lugs

8. LEAD WIRE

X = None
T = Teflon
G = Fiberglass
AT = Armor Teflon
AG = Armor Fiberglass
TAT = Teflon Coated Armor over Teflon
TAG = Teflon Coated Armor over Glass
PAT = PVC Coated Armor over Teflon
PAG = PVC Coated Armor over Glass
BT = Overbraid over Teflon
BG = Overbraid over Glass

2. JUNCTION

C = Closed End
E = Exposed
R = Recessed
W = Open Wedge

3. SHEATH MATERIAL

ALXL = AT ExL Alumina

4. SHEATH DIAMETER

157D = .157" diameter
197D = .197" diameter
315D = .315" diameter
354D = .354" diameter
472D = .472" diameter
500D = .500" diameter
550D = .550" diameter
670D = .670" diameter

5. SHEATH LENGTH

(Dim A in inches)

7. LEAD WIRE LENGTH

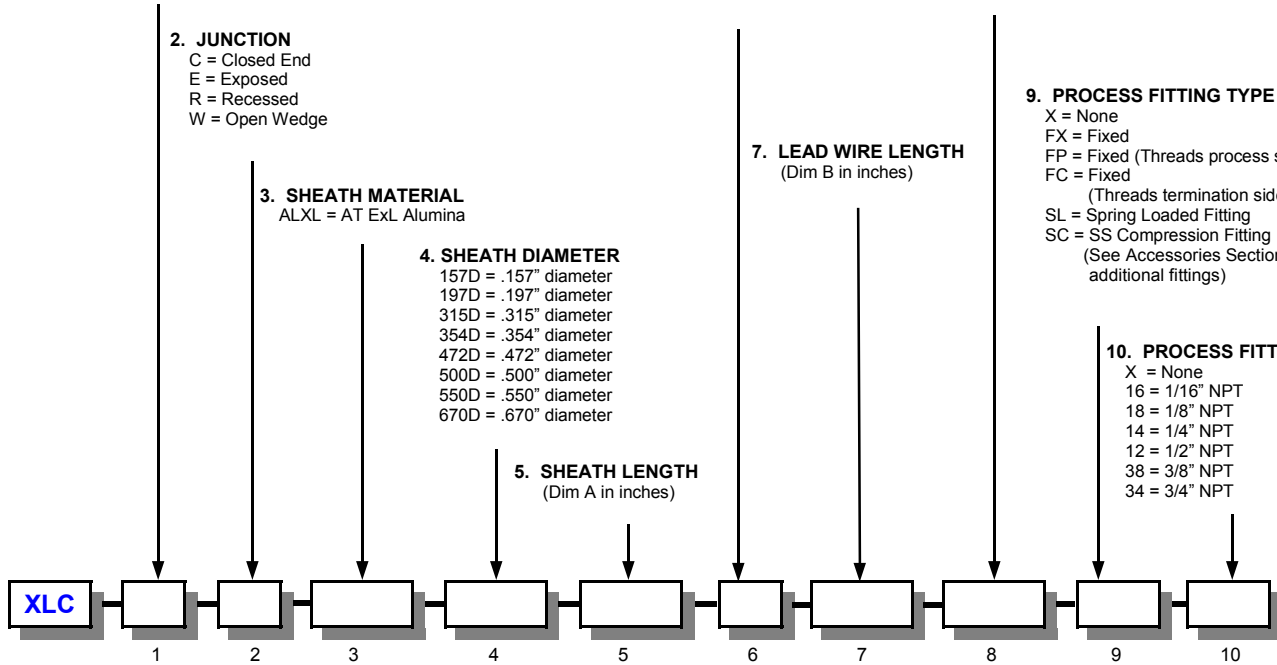
(Dim B in inches)

9. PROCESS FITTING TYPE

X = None
FX = Fixed
FP = Fixed (Threads process side)
FC = Fixed (Threads termination side)
SL = Spring Loaded Fitting
SC = SS Compression Fitting
(See Accessories Section for additional fittings)

10. PROCESS FITTING (NPT)

X = None
16 = 1/16" NPT
18 = 1/8" NPT
14 = 1/4" NPT
12 = 1/2" NPT
38 = 3/8" NPT
34 = 3/4" NPT



EXAMPLE: XLC-S-C-ALXL-500D-21-B-X-X-X-X



OPTIONS (Add to End of Part Number)

1. NIST Calibration

C105 **500C, 900C, 1200C**

Example: NIST Calibration at 3 Temperature Points

2. Double Sheath

C120

Example: Double Ceramic Sheath

OPTION CODES

C105 = NIST Calibration (Specify Temperature Points)
C108 = SS Tag attached via SS Wire
C109 = Other Tag Specify
C110 = Certified Drawings
C111 = Self Gripping Spring on Sensor
C112 = CGB Cord Grip Connector at end of Armor
C120 = Double Ceramic Sheath

AccuTru Sensor Technologies

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Ex-L Connection Head Style High Temperature Ceramic Sheathed Thermocouples

AccuTru uses a special, ultra-high purity ceramic that has a higher density than conventional ceramic tubes, helping to reduce the risk of the process environment penetrating the ceramic and damaging the noble metal thermocouple elements. AccuTru offers a wide variety of styles and materials, including stainless steel heads for applications where aluminum suffers from pitting and corrosion.

SENSOR HEAD CODES					
Order Code	Head Style	Material	Rating	Conduit Fitting	Process Fitting
1	1	Aluminum	1	34	12
4	1	Aluminum	3	34	12
8	2	316 Stainless	3	34	12
12	3	Aluminum	2	34	12
14	3	Cast Iron	2	34	12
16	3	Poly—White	2	34	12
17	3	Cast Iron-HD	2	34	34
18	3	Aluminum	4	34	12
19	4	Aluminum/Epoxy	2	34	12
20	5	Aluminum/Epoxy	5	34	12
21	6	Aluminum/Epoxy	1	34	12
24	7	Nylon Din	7	12	12
25	8	Aluminum	8	12	12

RATINGS

- 1 = General Purpose NEMA 4X
- 2 = General Purpose NEMA 4
- 3 = Explosion Proof FM/CSA, NEMA 4X
- 4 = FDA Polypropylene White FDA Compliant
- 5 = Explosion Proof NEMA 7 and 9
- 6 = Explosion Proof
- 7 = UL Rated
- 8 = Hinged Standard Din

CONDUIT CONNECTIONS

- 12 = 1/2" NPT
- 34 = 3/4" NPT

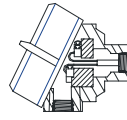
PROCESS CONNECTIONS

- 12 = 1/2" NPT
- 34 = 3/4" NPT

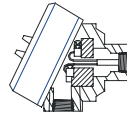
SEE ACCESSORIES SECTION FOR ADDITIONAL FITTINGS AND HEAD STYLES

THERMOCOUPLE STYLES

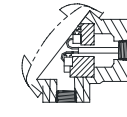
HEAD STYLES



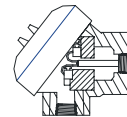
STYLE 1



STYLE 2

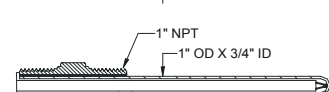
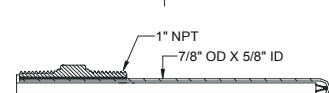
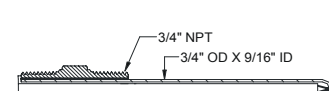
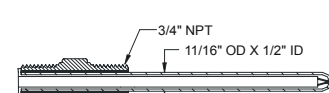
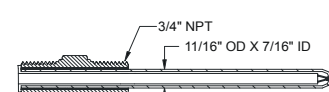
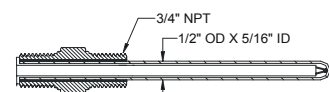
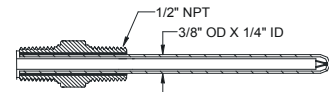
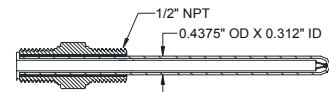


STYLE 3

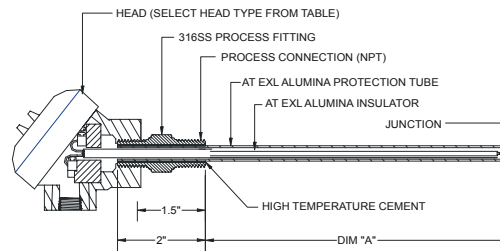


STYLE 4

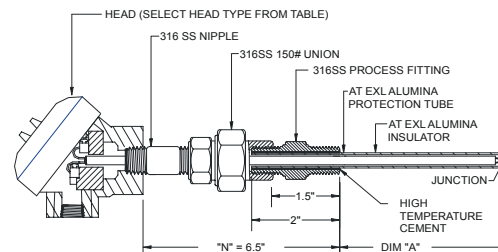
TUBE OPTIONS



SINGLE PROTECTION TUBE ASSEMBLIES



PROCESS CONNECTION STYLE "FX"



PROCESS CONNECTION STYLE "UF"

AccuTru Sensor Technologies

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ACCUTRU QUICK ORDER Part Number Guide for ExL-C Ceramic Sheathed Control with Connection Head:

1. CALIBRATION

S = Type S
R = Type R
B = Type B
DS = Dual Type S
DR = Dual Type R
DB = Dual Type B
(0.02" Dia. Wire)
[24 ga]

8. LEAD WIRE

X = None
T = Teflon
G = Fiberglass
AT = SS Flex Armor Teflon
AG = SS Flex Armor Fiberglass
TAT = Teflon Coated Flex Armor over Teflon
TAG = Teflon Coated Flex Armor over Glass
PAT = PVC Coated Flex Armor over Teflon
PAG = PVC Coated Flex Armor over Glass
BT = SS Overbraid over Teflon
BG = SS Overbraid over Glass

2. JUNCTION

C = Closed End
E = Exposed
R = Recessed
W = Open Wedge

6. CONNECTION HEAD

Enter head style choice from table at left.

3. SHEATH MATERIAL

ALXL = AT ExL Alumina

4. SHEATH DIAMETER

375D = .375" diameter
437D = .437" diameter
500D = .500" diameter
687D = .687" diameter
750D = .750" diameter
875D = .875" diameter
1000D = 1.00" diameter

5. SHEATH LENGTH

(Dim A in inches)

7. LEAD WIRE LENGTH

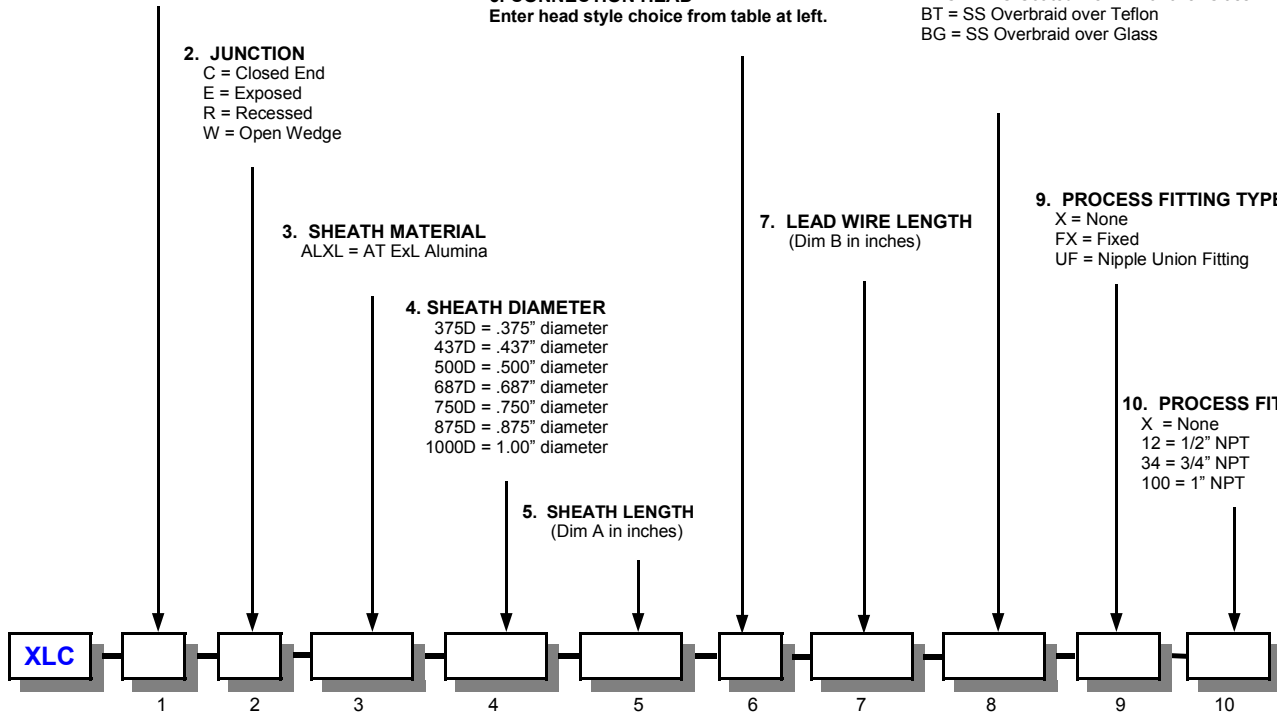
(Dim B in inches)

9. PROCESS FITTING TYPE

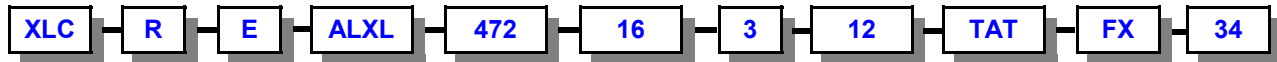
X = None
FX = Fixed
UF = Nipple Union Fitting

10. PROCESS FITTING (NPT)

X = None
12 = 1/2" NPT
34 = 3/4" NPT
100 = 1" NPT



EXAMPLE: XLC-R-E-ALXL-472-16-3-12-TAT-FX-34



OPTIONS (Add to End of Part Number)

1. NIST Calibration

C105 | **500C, 900C, 1200C**

Example: NIST Calibration at 3 Temperature Points

2. Double Sheath

C120

Example: Double Ceramic Sheath

OPTION CODES

C105 = NIST Calibration (Specify Temperature Points)
C108 = SS Tag attached via SS Wire
C109 = Other Tag Specify
C110 = Certified Drawings
C120 = Double Ceramic Sheath

AccuTru Sensor Technologies

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High Temperature ExL Profile Thermocouples

AccuTru's research into electrical insulating materials has led to the development of a highly stable and extended life ceramic insulated high temperature sensor line.

These devices are profile sensors, used to measure the temperature along a heating zone. A variety of configurations are offered to meet industrial application needs.

The noble metal ExL Extended Life series of thermocouples are intended for use in critical high temperature sensing uses found within industrial applications. AccuTru's proprietary processing of the Alumina ceramic closed end protection tubes and ceramic insulators dramatically increases the stability and life of the sensor in high temperature applications. The increased stability and longer life improves the control of these critical processes. The enhanced control reduces process variation, increases yield, and improves quality.

AccuTru uses a special, ultra-high purity ceramic that has a higher density than conventional ceramic tubes, helping to reduce the risk of the process environment penetrating the ceramic and damaging the noble metal thermocouple elements.

SPECIFICATIONS:

Temperature Range:

0°C to 1750°C (32°F to 3182°F)

Expected Life:

Up to 2X the life in comparative studies with conventional sheath materials and closed end tubes.

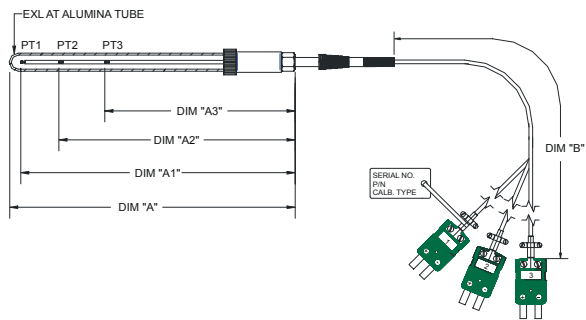
Accuracy (Limits of Error, ANSI MC 96.1)

$\pm 0.60^{\circ}\text{C}$ ($\pm 1^{\circ}\text{F}$) or $\pm 0.1\%$ of reading, whichever is greater for Type S and Type R. Limits for Type B are 0.25% above 870°C

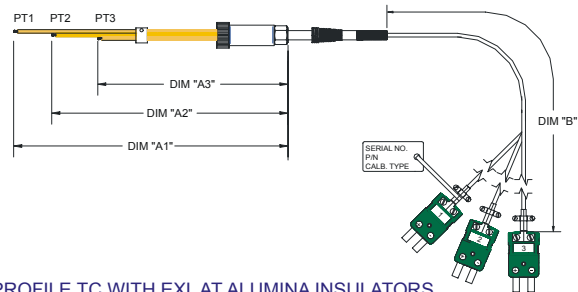
APPLICATIONS:

- Semiconductor manufacturing Glass melting
- Heat treating
- Glass melting
- Laboratories
- Other critical industrial processes

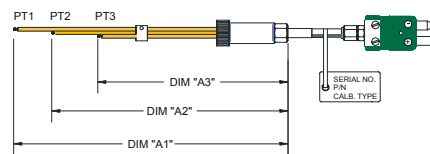
THERMOCOUPLE STYLES



PROFILE TC WITH EXL AT ALUMINA PROTECTION TUBE SHOWN WITH EXTENSION LEAD AND MINI MALE PLUG OPTION

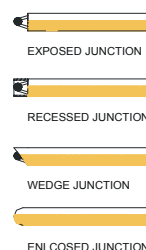


PROFILE TC WITH EXL AT ALUMINA INSULATORS

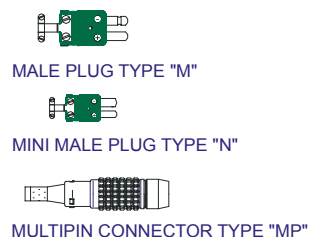


DIRECT MOUNT OPTION SHOWN WITH FIXED TRI - MALE PLUG CONNECTION

JUNCTION OPTIONS



TERMINATION OPTIONS



AccuTru Sensor Technologies

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ACCUTRU QUICK ORDER Part Number Guide for ExL-C Noble Metal-Ceramic Sheathed Profile Thermocouples:

1. CALIBRATION/# OF JUNCTIONS

S2 = Type S/2 Junctions
 S3 = Type S/3 Junctions
 S4 = Type S/4 Junctions
 S5 = Type S/5 Junctions
 R2 = Type R/2 Junctions
 R3 = Type R/3 Junctions
 R4 = Type R/4 Junctions
 R5 = Type R/5 Junctions
 B2 = Type B/2 Junctions
 B3 = Type B/3 Junctions
 B4 = Type B/4 Junctions
 B5 = Type B/5 Junctions
 (0.02" Dia. Wire)
 [24 ga]

6. TERMINATION

B = Bare ends
 M = Standard Male Plug (350°F)
 F = Standard Female Jack (350°F)
 N = Mini Male Plug
 G = Mini Female Jack
 H = Std High Temp Male Plug (550°F, Brown Case)
 K = Std High Temp Female Jack (550°F, Brown Case)
 L = Ultra High Temperature Ceramic Male Plug (1200°F)
 P = Ultra High Temperature Ceramic Female Jack (1200°F)
 S = Compensating Spade Lugs
 T = Tri-Junction w/Strain Relief
 C = Tri-Junction w/fixed Mini Connector
 Z = 3-4-5 Junction Multi-pin Connector

8. LEAD WIRE

X = None
 T = Teflon
 G = Fiberglass
 AT = SS Flex Armor Teflon
 AG = SS Flex Armor Fiberglass
 TAT = Teflon Coated Flex Armor over Teflon
 TAG = Teflon Coated Flex Armor over Glass
 PAT = PVC Coated Flex Armor over Teflon
 PAG = PVC Coated Flex Armor over Glass
 BT = SS Overbraid over Teflon
 BG = SS Overbraid over Glass

2. JUNCTION

C = Closed End
 E = Exposed
 R = Recessed
 W = Open Wedge

3. SHEATH MATERIAL

X = No sheath
 ALXL = AT ExL Alumina

4. SHEATH DIAMETER

280D = .280" diameter
 320D = .320" diameter
 380D = .380" diameter
 500D = .500" diameter
 590D = .590" diameter
 690D = .690" diameter
 Other = Contact AccuTru

5. SHEATH LENGTH

(Dim A in inches)

7. LEAD WIRE LENGTH

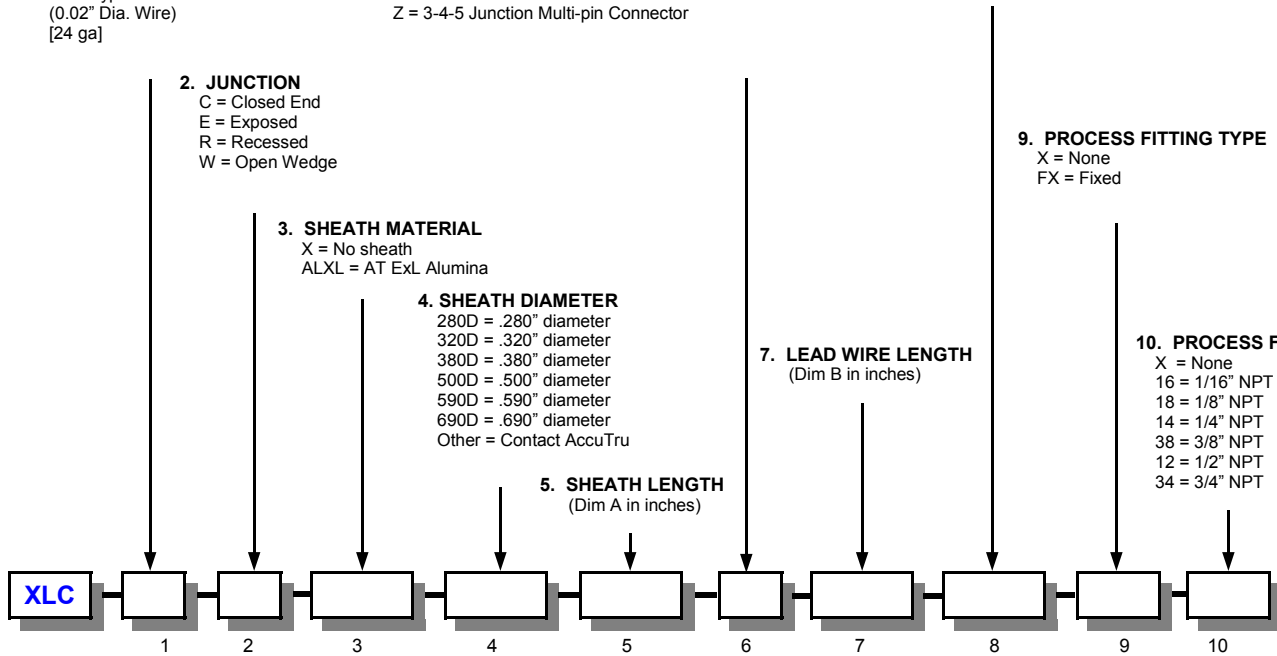
(Dim B in inches)

9. PROCESS FITTING TYPE

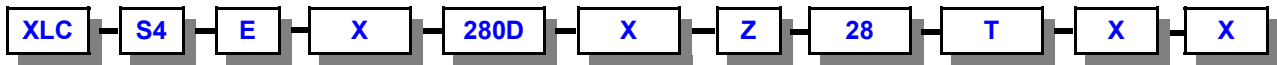
X = None
 FX = Fixed

10. PROCESS FITTING (NPT)

X = None
 16 = 1/16" NPT
 18 = 1/8" NPT
 14 = 1/4" NPT
 38 = 3/8" NPT
 12 = 1/2" NPT
 34 = 3/4" NPT



EXAMPLE: XLC-S4-E-X-280D-X-Z-28-T-X-X



OPTIONS (Add to End of Part Number)

1. NIST Traceable Calibration

C105 **500C, 900C, 1200C**

Example: NIST Traceable Calibration at 3 Temperature Points

2. Double Sheath

C120

Example: Double Ceramic Sheath

3. Multiple Junctions

C150 **12.5" - 18.85" - 29.15"**

Example: Multiple Junctions—Distance from tip

OPTION CODES

C105 = NIST Calibration (Specify Temperature Points)
 C108 = SS Tag attached via SS Wire
 C109 = Other Tag Specify
 C110 = Certified Drawings
 C111 = Self Gripping Spring on Sensor
 C112 = CGB Cord Grip Connector at end of Armor
 C120 = Double Ceramic Sheath
 C150 = Multiple Junctions

AccuTru Sensor Technologies

A DIVISION OF ACCUTRU INTERNATIONAL CORPORATION

Accessories

HEAD STYLES



STYLE 1



STYLE 2



STYLE 3



STYLE 4



STYLE 5



STYLE 6



STYLE 7



STYLE 8

* THREAD ENGAGEMENT

TNG 1/2" NPT = 0.5"

TNG 3/4" NPT = 0.56"

CONNECTION FITTING OPTIONS

