AccuTru Sensor Technologies

High Temperature ExL
Ceramic Sheathed Thermocouples
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’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.

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

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

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.

CONNECTION FITTING OPTIONS

*NOTE: RECESSED JUNCTION IS RECOMMENDED FOR SPRING LOADED FITTINGS

JUNCTION OPTIONS

EXPOSED JUNCTION

RECESSED JUNCTION

WEDGE JUNCTION

ENCLOSED JUNCTION

PAGE D-1
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]

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)

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

7. LEAD WIRE LENGTH
   - (Dim B in inches)

8. LEAD WIRE
   - X = None
   - T = Teflon
   - G = Fiberglass
   - AT = Teflon Coated Armor
   - 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

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
**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.

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**SENSOR HEAD CODES**

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<th>Rate</th>
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<th>Process Fitting</th>
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</table>

**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
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] <<<

2. **JUNCTION**
   - C = Closed End
   - E = Exposed
   - R = Recessed
   - W = Open Wedge

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)

6. **CONNECTION HEAD**
   Enter head style choice from table at left.

7. **LEAD WIRE LENGTH**
   (Dim B in inches)

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

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 = NIST Calibration (Specify Temperature Points)
   - Example: NIST Calibration at 3 Temperature Points
   - C105
   - 500C, 900C, 1200C

2. **Double Sheath**
   - C120 = Double Ceramic Sheath
   - Example: Double Ceramic Sheath
   - C120

**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
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)

± 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

APPLICATIONS:

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

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)

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

7. LEAD WIRE LENGTH
   - (Dim B in inches)

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

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
Accessories

HEAD STYLES | CONNECTION FITTING OPTIONS

STYLE 1 | NIPPLE-UNION-NIPPLE WITH SPRING
          | ADJUSTABLE FITTING CODES
          | TYPE "NU"

STYLE 2 | NIPPLE W/ SPRING
          | ADJUSTABLE FITTING CODES
          | TYPE "SN"

STYLE 3 | HEX FITTING W/ SPRING
          | ADJUSTABLE FITTING CODES
          | TYPE "NP"

STYLE 4 | COMPRESSION FITTING
          | TYPE "SC"

STYLE 5 | NIPPLE-UNION-FITTING
          | WELDED FITTING CODES
          | TYPE "SF"

STYLE 6 | HEX FITTING
          | TYPE "FX"

STYLE 7 | HEX FITTING
          | TYPE "FP"

STYLE 8 | HEX FITTING
          | TYPE "FC"
          | TYPE "FF"

* THREAD ENGAGEMENT
TNG 1/2" NPT = 0.5"
TNG 3/4" NPT = 0.56"

CORD GRIP CONNECTOR
CODE C112
(ADD CODE C112 TO END OF P/N)