

**NOBLE METAL THERMOCOUPLE WITH SECONDARY PROTECTION TUBE & BUSHING**

**How to build a part number:**

To order an Applied Sensor Technologies temperature sensor, select the requirements for the categories listed below and fill in the corresponding boxes with your selection. Don't see exactly what you need? Give us a call!

SENSOR TYPE	STYLE	SECONDARY TUBE CONFIGURATION	CALIBRATION	WIRE GAUGE	BEAD MATERIAL	SECONDARY TUBE LENGTH	OPTIONS

**SENSOR TYPE**

**BTC** – Beaded construction

**STYLE**

**81B** – Noble metal element with inner and outer protection tubes; threaded bushing process attachment; NEMA 4 aluminum terminal head and ceramic terminal block; 3/4" NPT conduit connection; gasketed screw cover with stainless steel chain

**SECONDARY TUBE CONFIGURATION**

(e.g., **9C5A** = 1.75" O.D. silicon carbide protection tube with 2" NPT carbon steel bushing. See page 1-9b for available combinations of materials and sizes)

Outer protection tube diameter

- |                         |                        |
|-------------------------|------------------------|
| <b>3</b> – 3/4" O.D.    | <b>7</b> – 1-1/4" O.D. |
| <b>4</b> – 7/8" O.D.    | <b>8</b> – 1-1/2" O.D. |
| <b>5</b> – 1" O.D.      | <b>9</b> – 1-3/4" O.D. |
| <b>6</b> – 1-1/10" O.D. |                        |

Outer protection tube material

- |   |                      |
|---|----------------------|
| <b>C</b> – Silicon Carbide, oxide bonded* | <b>H</b> – Hexalloy® |
| <b>S</b> – Sialon®                        | <b>L</b> – LT1       |

\* Other grades of silicon carbide available upon request. Consult AST.

Bushing thread and material

- |                       |                            |
|-----------------------|----------------------------|
| <i>Carbon Steel</i>   | <i>316 Stainless steel</i> |
| <b>2</b> – 1" NPT     | <b>6</b> – 1" NPT          |
| <b>3</b> – 1-1/4" NPT | <b>7</b> – 1-1/4" NPT      |
| <b>4</b> – 1-1/2" NPT | <b>8</b> – 1-1/2" NPT      |
| <b>5</b> – 2" NPT     | <b>9</b> – 2" NPT          |

Inner protection tube material

- A** – Alumina (98.8% aluminum oxide)  
**M** – Mullite (not recommended over 1200°C)

**CALIBRATION**

**Single junction**

- R** – Platinum and Platinum/13% Rhodium  
**S** – Platinum and Platinum/10% Rhodium  
**B** – Platinum/6% Rhodium and Platinum/30% Rhodium

**Dual junctions**

- RR**  
**SS**  
**BB**

**WIRE GAUGE**

**24** – 24 AWG

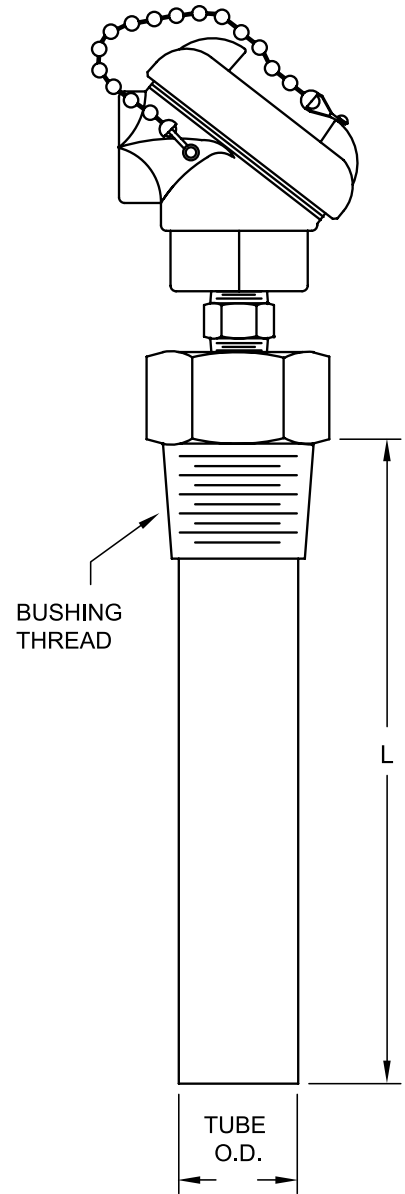
**BEAD MATERIAL**

**A** – Alumina beads (0.125" OD for single junction, 0.188" for dual)

**SECONDARY TUBE LENGTH**

**L#** – (e.g., L12 = 12" outer protection tube length)

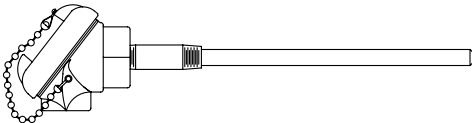
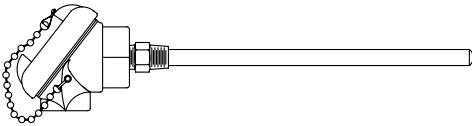
**OPTIONS** – see page 1-9b



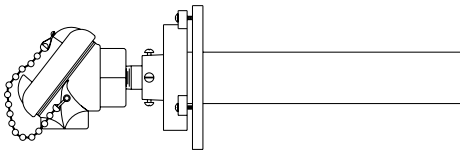
ASSEMBLY OPTIONS	
Option Code	Description
TAG1	Stainless steel tag and wire
CAL1	NIST traceable calibration [specify point(s)]
CRT1	Certificate of conformance
WC20	Wiring cable gland for 0.187 - 0.312 diameter cables, for terminal heads with 1/2" NPT conduit connections
WC21	Wiring cable gland for 0.125 - 0.187 diameter cables, for terminal heads with 1/2" NPT conduit connections

For additional Noble Metal Thermocouple styles, see:

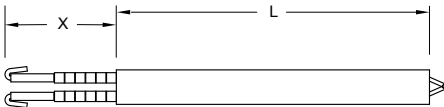
**Style 81N** – Single, primary protection tube only



**Style 81F** – Secondary tube with slip flange mounting



**Style 51** – Replacement Sensor



**Notes:**

- Not all materials and process thread sizes are compatible with all tubing O.D.'s. Use the chart below as a guide for the possible combinations. For each combination of thread and O.D., available materials are noted - Silicon Carbide (C), Sialon® (S), Hexalloy® (H) and LT1 (L).

OUTER TUBE O.D.	CODE	CARBON STEEL				316 STAINLESS			
		2 (1")	3 (1-1/4")	4 (1-1/2")	5 (2")	6 (1")	7 (1-1/4")	8 (1-1/2")	9 (2")
3 (3/4")		H	H	H	H	H	H	H	H
4 (7/8")		L,S	L,S	L,S	L,S	L,S	L,S	L,S	L,S
5 (1")			H	H	H		H	H	H
6 (1-1/10")			S	S	S		S	S	S
7 (1-1/4")				H	H			H	H
8 (1-1/2")				H	H			H	H
9 (1-3/4")					C				C

- Applied Sensor Technologies recommends alumina protection tubes when using platinum thermocouples. Mullite, although less expensive when compared to alumina, can contaminate the platinum, causing drift.
- In many cases platinum thermocouples can be recycled, thereby reducing the long-term overall cost. Please contact Applied Sensor Technologies for further information.
- Applied Sensor Technologies offers many other temperatures sensor designs and technologies, including base metal thermocouples, RTDs, thermistors and Integrated Circuit chips, along with a full line of accessory items such as thermowells, transmitters, etc. Please visit our website or contact us for further information.

# STYLE 81B

## TERMINAL HEAD OPTIONS

NEMA 4 OR 4X TERMINAL HEAD OPTIONS			
Head without ground screw	Head with internal ground screw	Process Connection	Conduit Connection
Cast aluminum, screw cover with chain, NEMA 4			
HD10*	HD11*	1/2"	1/2"
Std.*	HD13*	1/2"	3/4"
Epoxy-coated aluminum, screw cover with chain, NEMA 4X			
HD50*	HD51*	1/2"	1/2"
HD52*	HD53*	1/2"	3/4"
Cast iron, screw cover with chain, NEMA 4			
HD20*	HD21*	1/2"	1/2"
HD22*	HD23*	1/2"	3/4"
316 stainless steel, screw cover with chain, NEMA 4X			
HD40*	HD41*	1/2"	3/4"
White polypropylene, screw cover with chain, NEMA 4			
HD30	N/A	1/2"	3/4"
Black polypropylene, screw cover with chain, NEMA 4			
HD31	N/A	1/2"	3/4"
Nylon, screw cover			
HD32	N/A	1/2"	1/2"
*can be used with transmitters			
<b>TRANSMITTERS</b> – For complete specs, see Transmitters section			
TR11	4-20 mA, 2-wire transmitter, single input, isolated output; specify range, units of measure (e.g., 0-200°C) and optional terminal head with *.		
TR12	4-20 mA, 2-wire transmitter, single input, non-isolated output; specify range and units of measure (e.g., 0-200°C) and terminal head with *.		
TR13	HART®/ 4-20 mA, 2-wire transmitter, single input, isolated output; specify range and units of measure (e.g., 0-200°C) and terminal head with *.		

## PROCESS THREAD (NPT)