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!

<table>
<thead>
<tr>
<th>SENSOR TYPE</th>
<th>STYLE</th>
<th>SECONDARY TUBE CONFIGURATION</th>
<th>CALIBRATION</th>
<th>WIRE GAUGE</th>
<th>BEAD MATERIAL</th>
<th>SECONDARY TUBE LENGTH</th>
<th>OPTIONS</th>
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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
3 – 3/4” O.D. 7 – 1-1/4” O.D.
4 – 7/8” O.D. 8 – 1-1/2” O.D.
5 – 1” O.D. 9 – 1-3/4” O.D.
6 – 1-1/10” O.D.

Outer protection tube material
C – Silicon Carbide, oxide bonded*  H – Hexalloy®
S – Sialon®  L – LT1
* Other grades of silicon carbide available upon request. Consult AST.

Bushing thread and material
Carbon Steel 316 Stainless steel
2 – 1” NPT 6 – 1” NPT
3 – 1-1/4” NPT 7 – 1-1/4” NPT
4 – 1-1/2” NPT 8 – 1-1/2” NPT
5 – 2” NPT 9 – 2” NPT

Inner protection tube material
A – Alumina (98.8% aluminum oxide)
M – Mullite (not recommended over 1200°C)

CALIBRATION
Single junction Dual junctions
R – Platinum and Platinum/13% Rhodium RR
S – Platinum and Platinum/10% Rhodium SS
B – Platinum/6% Rhodium and Platinum/30% Rhodium 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
### TERMINAL HEAD OPTIONS

#### NEMA 4 OR 4X TERMINAL HEAD OPTIONS

<table>
<thead>
<tr>
<th>Option Description</th>
<th>Head without ground screw</th>
<th>Head with internal ground screw</th>
<th>Process Connection</th>
<th>Conduit Connection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cast aluminum, screw cover with chain, NEMA 4</td>
<td>HD10*</td>
<td>HD11*</td>
<td>1/2&quot;</td>
<td>1/2&quot;</td>
</tr>
<tr>
<td>Std.*</td>
<td>HD13*</td>
<td>1/2&quot;</td>
<td>3/4&quot;</td>
<td></td>
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<tr>
<td>Epoxy-coated aluminum, screw cover with chain, NEMA 4X</td>
<td>HD50*</td>
<td>HD51*</td>
<td>1/2&quot;</td>
<td>1/2&quot;</td>
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<tr>
<td>HD52*</td>
<td>HD53*</td>
<td>1/2&quot;</td>
<td>3/4&quot;</td>
<td></td>
</tr>
<tr>
<td>Cast iron, screw cover with chain, NEMA 4</td>
<td>HD20*</td>
<td>HD21*</td>
<td>1/2&quot;</td>
<td>1/2&quot;</td>
</tr>
<tr>
<td>HD22*</td>
<td>HD23*</td>
<td>1/2&quot;</td>
<td>3/4&quot;</td>
<td></td>
</tr>
<tr>
<td>316 stainless steel, screw cover with chain, NEMA 4X</td>
<td>HD40*</td>
<td>HD41*</td>
<td>1/2&quot;</td>
<td>3/4&quot;</td>
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<tr>
<td>White polypropylene, screw cover with chain, NEMA 4</td>
<td>HD30</td>
<td>N/A</td>
<td>1/2&quot;</td>
<td>3/4&quot;</td>
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<tr>
<td>Black polypropylene, screw cover with chain, NEMA 4</td>
<td>HD31</td>
<td>N/A</td>
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<td>3/4&quot;</td>
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<td>Nylon, screw cover</td>
<td>HD32</td>
<td>N/A</td>
<td>1/2&quot;</td>
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</tr>
</tbody>
</table>

*can be used with transmitters

#### TRANSMITTERS – For complete specs, see Transmitters section

- **TR1** 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)

#### OUTER TUBE O.D.

<table>
<thead>
<tr>
<th>CODE</th>
<th>2 ((\frac{3}{4})&quot;)</th>
<th>3 (1-1/4&quot;)</th>
<th>4 (1-1/2&quot;)</th>
<th>5 (2&quot;)</th>
<th>6 (1&quot;)</th>
<th>7 (1-1/4&quot;)</th>
<th>8 (1-1/2&quot;)</th>
<th>9 (2&quot;)</th>
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</thead>
<tbody>
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<td>H</td>
<td>H</td>
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<td></td>
</tr>
<tr>
<td>4 (7/8&quot;)</td>
<td>LS</td>
<td>LS</td>
<td>LS</td>
<td>LS</td>
<td>LS</td>
<td>LS</td>
<td>L5</td>
<td>LS</td>
</tr>
<tr>
<td>5 (1&quot;)</td>
<td>H</td>
<td>H</td>
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<td>H</td>
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<td>H</td>
<td>H</td>
<td></td>
</tr>
<tr>
<td>6 (1-1/10&quot;)</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td></td>
</tr>
<tr>
<td>7 (1-1/4&quot;)</td>
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</tr>
<tr>
<td>8 (1-1/2&quot;)</td>
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<td>H</td>
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<td>H</td>
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</tr>
<tr>
<td>9 (1-3/4&quot;)</td>
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</table>

### Notes:

1. 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).

2. 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.

3. In many cases platinum thermocouples can be recycled, thereby reducing the long-term overall cost. Please contact Applied Sensor Technologies for further information.

4. 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.

### ASSEMBLY OPTIONS

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</tr>
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<tbody>
<tr>
<td>TAG1</td>
<td>Stainless steel tag and wire</td>
</tr>
<tr>
<td>CAL1</td>
<td>NIST traceable calibration [specify point(s)]</td>
</tr>
<tr>
<td>CRT1</td>
<td>Certificate of conformance</td>
</tr>
<tr>
<td>WC20</td>
<td>Wiring cable gland for 0.187 - 0.312 diameter cables, for terminal heads with 1/2&quot; NPT conduit connections</td>
</tr>
<tr>
<td>WC21</td>
<td>Wiring cable gland for 0.125 - 0.187 diameter cables, for terminal heads with 1/2&quot; NPT conduit connections</td>
</tr>
</tbody>
</table>

### STYLE 81B

**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

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