S50 Industrial RTDs & Thermocouples with NPT Connections

**TYPICAL USES**
- Industrial process, petrochemical, oil and gas applications
- Process temperature measurements for oil, gas and power generation systems
- Process control, monitoring asset protection
- General purpose or hazardous area
- Available with DIN mounting plate or spring loaded fitting designs

**DESCRIPTION**
Ashcroft® S50 temperature sensor assemblies provide accurate temperature measurements. Each temperature sensor assembly consists of a spring-loaded temperature sensor, magnesium oxide (MgO), insulated insert, connection head and lag extension. The assembly may also include an optional terminal block and/or transmitters. Thermocouple assemblies are manufactured to IEC 60584-2 or ANSI MC 96.1 and RTDs assemblies are manufactured to IEC 60751.

**SPECIFICATIONS**
Ashcroft Series: S50
Sheath Diameter: ¼", ¾", ¾", 3 mm, 4.5 mm, 6 mm, 8 mm
Stem Length: Minimum: 50 mm/2 in
Maximum: 3 m/120 in
Sensor Type & Measuring Range
- RTDs Platinum 385
  - Pt 100 -200 to 600 °C
  - Pt 1000 -40 to 600 °C
- Thermocouples
  - Type J -40 to 750 °C
  - Type E -200 to 800 °C
  - Type K -200 to 1000 °C
  - Type N -200 to 1000 °C
  - Type T -250 to 350 °C
Wiring Configuration:
- RTDs - single or dual
  - 2 Wire
  - 3 Wire
  - 4 Wire
- Thermocouples - single or dual
Accuracy Class
- RTDs - (IEC 60751)
  - Class A: ±(0.15 + 0.0020 * |t|)
  - Class B: ±(0.30 + 0.0050 * |t|)
  - 1/2 Class B: ±(0.15 + 0.0025 * |t|)
  - 1/3 Class B: ±(0.10 + 0.0017 * |t|)
- Thermocouples (ANSI MC 96.1)
  - Standard
    - ±2.2 °C or ±0.0075*|t|
    - ±1.7 °C or ±0.0050*|t|
    - ±2.2 °C or ±0.0040*|t|
    - ±1.0 °C or ±0.0075*|t|
  - Special
    - ±1.1 °C or ±0.0040*|t|
    - ±1.0 °C or ±0.0040*|t|
    - ±1.0 °C or ±0.0150*|t|
- Thermocouples (IEC 60584-2)
  - Class 1
    - ±1.5 °C or ±0.0040*|t|
    - ±1.5 °C or ±0.0040*|t|
    - ±1.5 °C or ±0.0040*|t|
    - ±1.5 °C or ±0.0040*|t|
  - Class 2
    - ±2.5 °C or ±0.0075*|t|
    - ±2.5 °C or ±0.0075*|t|
    - ±2.5 °C or ±0.0075*|t|
    - ±2.5 °C or ±0.0075*|t|
  - Class 3
    - N/A
    - ±2.5 °C or ±2.5 °C or ±2.5 °C or ±2.5 °C
    - ±2.5 °C or ±2.5 °C or ±2.5 °C or ±2.5 °C

(1) Absolute temperature in °C

**KEY BENEFITS**
- Industrial process applications.
- Designs for hazardous locations.

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ashcroft.com | 1.800.328.8258 | Contact Us
OPTIONAL S50 HEADS

<table>
<thead>
<tr>
<th>Head Type</th>
<th>Material</th>
</tr>
</thead>
<tbody>
<tr>
<td>BUZH-AL</td>
<td>Cast Iron Type Y</td>
</tr>
<tr>
<td>BUZH-AL</td>
<td>Polypropylene Type A</td>
</tr>
<tr>
<td>DIN B</td>
<td>Type H</td>
</tr>
<tr>
<td>PR 7501</td>
<td>Type P</td>
</tr>
<tr>
<td>SCCA-AL</td>
<td>Type G</td>
</tr>
<tr>
<td>SCCT-Stainless Steel</td>
<td></td>
</tr>
<tr>
<td>Type F</td>
<td>Ex d-AL</td>
</tr>
<tr>
<td>Type S</td>
<td>Ex d-Stainless Steel</td>
</tr>
</tbody>
</table>

OPTIONAL APPROVALS

<table>
<thead>
<tr>
<th>Approval Type</th>
<th>Approval Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>FM Explosion Proof</td>
<td>Class I, Division 1, Groups A, B, C, D</td>
</tr>
<tr>
<td></td>
<td>T4 for -40 °C ≤ Ta ≤ 80 °C</td>
</tr>
<tr>
<td></td>
<td>T6 for -40 °C ≤ Ta ≤ 60 °C</td>
</tr>
<tr>
<td>FM Intrinsically Safe</td>
<td>Class I, Division 1, Groups A, B, C, D</td>
</tr>
<tr>
<td></td>
<td>T4 for -55 °C ≤ Ta ≤ 80 °C</td>
</tr>
<tr>
<td></td>
<td>T5 for -55 °C ≤ Ta ≤ 55 °C</td>
</tr>
<tr>
<td></td>
<td>T6 for -55 °C ≤ Ta ≤ 40 °C</td>
</tr>
<tr>
<td>FM Non-Incendive</td>
<td>Class I, Division 2, Groups A, B, C, D</td>
</tr>
<tr>
<td></td>
<td>T4 for -55 °C ≤ Ta ≤ 80 °C</td>
</tr>
<tr>
<td></td>
<td>T5 for -55 °C ≤ Ta ≤ 55 °C</td>
</tr>
<tr>
<td></td>
<td>T6 for -55 °C ≤ Ta ≤ 40 °C</td>
</tr>
<tr>
<td>ATEX or IECEx</td>
<td>ATEX or IECEx</td>
</tr>
<tr>
<td></td>
<td>II 1 G Ex ia IIC T6 Ga -50 °C to 60 °C</td>
</tr>
<tr>
<td></td>
<td>II 2 G Ex ib IIC T6 Gb -50 °C to 60 °C</td>
</tr>
<tr>
<td></td>
<td>II 2 G Ex e IIC T6 Gb -55 °C to 60 °C</td>
</tr>
<tr>
<td></td>
<td>II 2 G Ex d IIC T6 Gb -55 °C to 60 °C</td>
</tr>
</tbody>
</table>
# S50 Industrial RTDs

## S50 RTD ORDERING CODE

<table>
<thead>
<tr>
<th>Example:</th>
<th>S50</th>
<th>1</th>
<th>T</th>
<th>1</th>
<th>A</th>
<th>A</th>
<th>B</th>
<th>A</th>
<th>D</th>
<th>2</th>
</tr>
</thead>
</table>

### Area Classification

- 1 - Standard - General purpose
- 2 - Explosion proof (must order head type F or S)
- 3 - Intrinsic Safety - ia
- B - Intrinsic Safety - ib
- E - Increased Safety
- N - Non-Incendive

### Sheath Diameter

- R - 1/8" 3.18 mm
- S - 3/16" 4.76 mm
- T - 1/4" 6.35 mm
- 3 - 3 mm
- 4 - 4.5 mm
- 6 - 6 mm
- 8 - 8 mm

### RTD Type

- 1 - Pt 100 Platinum 385 temperature coefficient
- 3 - Pt 1000 Platinum 385 temperature coefficient

### Accuracy or Class (IEC 60751)

- A - Class A
- B - Class B
- C - 1/2 DIN
- D - Class AA - 1/3 DIN

### RTD Element/Range

- A - -50 to 400 °C
- B - -200 to 600 °C
- D - Vibration-proof

### Electrical Circuit

- A - Single 2-wire
- B - Single 3-wire
- C - Single 4-wire
- D - Dual 2-wire
- E - Dual 3-wire
- F - Dual 4-wire

### Sheath Material

- A - 316 Stainless steel - AISI 316/1.4404

### Head Type

- F - Ex d Aluminum
- S - Ex d Stainless steel
- G - SCCJ Stainless steel
- N - SCCA Aluminum
- B - DIN B Aluminum
- D - BUZ Aluminum
- E - BUZH Aluminum
- P - PR 7501 (N/A with FM approval)
- Y - Cast iron (N/A with FM approval)
- A - Polypropylene (N/A with FM approval)
- H - E&H Housing (N/A with FM approval)

### Instrument Connection - ½ Conduit Connection

- 2 - ½ NPT
- M - M20 x 1.5
- A - Adapter M20 x 1.5
- P - Pg 16

### Instrument Connection - ¾ Conduit Connection

- 3 - ¾ NPT
- 4 - ¾ NPT
- 5 - M20 x 1.5
### S50 RTD ORDERING CODE  Example: (Cont’d)

<table>
<thead>
<tr>
<th>Head Conduit Gland</th>
<th>-</th>
<th>X</th>
<th>N-H9</th>
<th>R3</th>
<th>-</th>
<th>3P</th>
<th>T</th>
<th>N=60</th>
<th>LN=400</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lag length in mm</td>
<td>mm</td>
<td>mm</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Without
- Polyamide PA, for unarmored cable
- Nickel plated brass, for unarmored cable
- Nickel plated brass, single seal for braided cable
- Nickel plated brass, double seal for braided cable
- Stainless steel, for unarmored cable
- Stainless steel, single seal for braided cable
- Stainless steel, double seal for braided cable

**Inset Nominal Length**

| X | LN = (min=50, max=100000). Add actual nominal length in mm at end of ordering code LN=?? |

**Lag Extension and Length**

| Lag length (add actual length N=?? at the end of code in mm) |

**For DIN Mounting Plate**

| 0-4 | Without lag extension, without plug |
| 0-4 | Without lag extension, with plug lag length (add actual length N=?? at the end of code in mm) |

| B-H6 | Nipple AISI 316, N=40 |
| M-H7 | Nipple AISI 316, N=100 (4) |
| N-H9 | Nipple AISI 316, N= non std |
| U-J7 | Nipple-Union-Nipple AISI 316, N=120 |
| N-J9 | Nipple-Union-Nipple AISI 316, N= not std |

**For Spring-loaded Mounting (N/A with FM approval)**

| N-S1 | Spring-loaded Nipple AISI 316 |
| M-S4 | Spring-loaded Nipple-Union-Nipple 4” AISI 316, N=100 |
| R-S6 | Spring-loaded Nipple-Union-Nipple 6” AISI 316, N=153 |
| N-S9 | Spring-loaded Nipple-Union-Nipple AISI 316, N= not std |

**Process Connection**

| R3 | Thread ½ NPT |
| C3 | Compression fitting ½ NPT, AISI 316 |
| A3 | Compression fitting G, AISI 316 (N/A with FM approval) |

- Without connection

**Electrical Connection**

**For DIN Mounting Plate**

| 1- | With transmitter |
| 3- | Without terminal block, with flying leads |

**For Spring-loaded Mounting (N/A with FM approval)**

| B | With terminal block |
| T | With transmitter |
| F | Without terminal block, with flying leads |

**Certifications**

| - | None required |
| F | FM |
| A | ATEx |
| X | IECEx |
| S | SIL 2 + ATEx |
| I | INMETRO |
| D | ATEx + IECEx |
| 2 | SIL 2 |
| P | EAC (Gost R) + Metrological Russia |

**Calibration Report**

| 3P | 3P points single |
| 5P | 5P points single |
| 3D | 3D points dual |
| 5D | 5D points dual |

**Tagging**

| - | Without |
| T | Label in stainless steel with tag |

Consult factory for additional configurations.
## S50 TC ORDERING CODE

### Example:

<table>
<thead>
<tr>
<th>Area Classification</th>
<th>S50</th>
<th>S</th>
<th>T</th>
<th>K</th>
<th>N</th>
<th>1</th>
<th>1</th>
<th>3</th>
<th>D</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>S - Standard - General purpose</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D - Explosion proof (must order head type F or S)</td>
<td>S</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>J - Intrinsic Safety - ia</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B - Intrinsic Safety - lb</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>E - Increased Safety</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>N - Non-Incendive</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Sheath Diameter

- R - ¼" Ø3.18 mm
- S - ⅜" Ø4.76 mm
- T - ⅛" Ø6.35 mm
- 3 - 3 mm
- 4 - 4.5 mm
- 6 - 6 mm
- 8 - 8 mm

### Thermocouple Type

- E - Temperature range: -200 to 800 °C
- J - Temperature range: -40 to 750 °C
- K - Temperature range: -200 to 1000 °C
- N - Temperature range: -200 to 1000 °C
- T - Temperature range: -250 to 350 °C

### Accuracy or Class

- N - ANSI MC 96.1: Standard limits
- S - ANSI MC 96.1: Special limits
- 1 - IEC 60584-2: Class 1
- 2 - IEC 60584-2: Class 2
- 3 - IEC 60584-2: Class 3

### Junction

- 1 - Ungrounded
- 2 - Grounded
- 3 - Ungrounded, vibration-proof
- 4 - Grounded, vibration-proof

### Electrical Circuit

- 1 - Single
- 2 - Dual

### Sheath Material

- 1 - AISI 316 / 1.4401
- 3 - Inconel® 600 / 2.4816

### Head Type

- F - Ex d Aluminum
- S - Ex d Stainless steel
- G - SCCI Stainless steel
- N - SCCA Aluminum
- B - DIN B Aluminum
- D - BUZ Aluminum
- E - BUZH Aluminum
- P - PR 7501 (N/A with FM approval)
- Y - Cast iron (N/A with FM approval)
- A - Polypropylene (N/A with FM approval)
- H - E&B Housing (N/A with FM approval)

### Instrument Connection ½ NPT Conduit Connection

- 2 - ½ NPT

### Instrument Connection ¾ NPT Conduit Connection

- 3 - ¾ NPT
- 5 - M20 x 1.5
### S50 TC ORDERING CODE

**Example:** (Cont’d)

<table>
<thead>
<tr>
<th>Head Conduit Gland</th>
<th>-</th>
<th>X</th>
<th>N-H9</th>
<th>R3</th>
<th>-</th>
<th>3P</th>
<th>T</th>
</tr>
</thead>
<tbody>
<tr>
<td>- - - Without</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P - Polyamide PA, for unarmored cable</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>L - Nickel plated brass, for unarmored cable</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M - Nickel plated brass, single seal for braided cable</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>N - Nickel plated brass, double seal for braided cable</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>S - Stainless steel, for unarmored cable</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>T - Stainless steel, single seal for braided cable</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>U - Stainless steel, double seal for braided cable</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Inset Nominal Length**

X - LN=...(min=50, max=100000) (add actual length LN=?? At the end of ordering code in mm)

**Lag Extension and Length**

Lag length (add actual length N=?? At the end of code in mm)

For DIN Mounting Plate

0--- - Without lag extension, without plug (select 0 lag length above)

0-4- - Without lag extension, with plug

B-H6 - Nipple AISI 316, N=40

M-H7 - Nipple AISI 316, N=100 (4)

N-H9 - Nipple AISI 316, N= non std

U-J7 - Nipple-Union-Nipple AISI 316, N=120

N-J9 - Nipple-Union-Nipple AISI 316, N= not std

For Spring-loaded Mounting (N/A with FM approval)

N-S1 - Spring-loaded Nipple AISI 316

M-S4 - Spring-loaded Nipple-Union-Nipple 4’ AISI 316, N=100

R-S6 - Spring-loaded Nipple-Union-Nipple 6’ AISI 316, N=153

N-S9 - Spring-loaded Nipple-Union-Nipple AISI 316, N= not std

**Process Connection**

R3 - Thread ½ NPT

C3 - Compression fitting ½ NPT, AISI 316

A3 - Compression fitting G, AISI 316 (N/A with FM approval)

--- - Without connection

**Electrical Connection**

For DIN Mounting Plate

- - With DIN terminal block

1 - With transmitter

3 - Without terminal block, with flying leads

For Spring-loaded Mounting (N/A with FM approval)

B - With terminal block

T - With transmitter

F - Without terminal block, with flying leads

**Certifications**

- - None

F - FM

2 - SIL 2

A - ATEX

S - SIL 2 + ATEX

I - IECEx

X - IECEX

D - ATEX + IECEx

P - EAC (Gost R) + Metrological Russia

**Calibration Report**

- - Without

3P - 3 points single

5P - 5 points single

3D - 3 points dual

5D - 5 points dual

**Tagging**

- - Without

T - Label in stainless steel with tag

Consult factory for additional configurations.
HOW TO ORDER S50 TEMPERATURE PROBES:

- The ordering code is built by selecting the appropriate configuration for the various sections.
- The insert nominal length LN is measured from base of the head to the tip of the probe.
- The lag extension length N is measured from the base of the head to the center of the threads on the lag extension.
- LN can be calculated by adding the lag extension length N to the probe insertion length L.
- The N length and the LN length are added to the end of the ordering code in millimeters.
- To convert inches to millimeters multiply by 25.4.
  \[ \text{mm} = \text{inches} \times 25.4 \]

\[ \begin{align*}
  d &= \text{Stem diameter} \\
  N &= \text{Lag extension length} \\
  L &= \text{Insertion length} \\
  LN &= \text{Insert nominal length} \\
  LN &= N + L
\end{align*} \]