

## Data Sheet

# 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:	1/8", 3/16", 1/4", 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: $\pm(0.15 + 0.0020 *  t ^{(1)})$ Class B: $\pm(0.30 + 0.0050 *  t ^{(1)})$ 1/2 Class B: $\pm(0.15 + 0.0025 *  t ^{(1)})$ 1/3 Class B: $\pm(0.10 + 0.0017 *  t ^{(1)})$

(1) Absolute temperature in °C

### KEY BENEFITS

- Industrial process applications.
- Designs for hazardous locations.

#### Thermocouples (ANSI MC 96.1)

	Type J	Type K	Type E	Type N	Type T
Standard	$\pm 2.2$ °C or $\pm 0.0075 *  t ^{(1)}$	$\pm 2.2$ °C or $\pm 0.0075 *  t ^{(1)}$	$\pm 1.7$ °C or $\pm 0.0050 *  t ^{(1)}$	$\pm 2.2$ °C or $\pm 0.0040 *  t ^{(1)}$	$\pm 1.0$ °C or $\pm 0.0075 *  t ^{(1)}$
Special	$\pm 1.1$ °C or $\pm 0.0040 *  t ^{(1)}$	$\pm 1.1$ °C or $\pm 0.0040 *  t ^{(1)}$	$\pm 1.0$ °C or $\pm 0.0075 *  t ^{(1)}$	$\pm 1.1$ °C or $\pm 0.0040 *  t ^{(1)}$	$\pm 0.5$ °C or $\pm 0.0040 *  t ^{(1)}$

#### Thermocouples (IEC 60584-2)

	Type J	Type K	Type E	Type N	Type T
Class 1	$\pm 1.5$ °C or $\pm 0.0040 *  t ^{(1)}$	$\pm 1.5$ °C or $\pm 0.0040 *  t ^{(1)}$	$\pm 1.5$ °C or $\pm 0.0040 *  t ^{(1)}$	$\pm 1.5$ °C or $\pm 0.0040 *  t ^{(1)}$	$\pm 0.5$ °C or $\pm 0.0040 *  t ^{(1)}$
Class 2	$\pm 2.5$ °C or $\pm 0.0075 *  t ^{(1)}$	$\pm 2.5$ °C or $\pm 0.0075 *  t ^{(1)}$	$\pm 2.5$ °C or $\pm 0.0075 *  t ^{(1)}$	$\pm 2.5$ °C or $\pm 0.0040 *  t ^{(1)}$	$\pm 1.0$ °C or $\pm 0.0075 *  t ^{(1)}$
Class 3	N/A	$\pm 2.5$ °C or $\pm 0.0040 *  t ^{(1)}$	$\pm 2.5$ °C or $\pm 0.0150 *  t ^{(1)}$	$\pm 2.5$ °C or $\pm 0.0150 *  t ^{(1)}$	$\pm 1.0$ °C or $\pm 0.0150 *  t ^{(1)}$

## Data Sheet

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### OPTIONAL S50 HEADS



BUZH-AL  
Type E



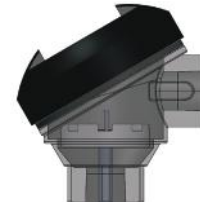
BUZH-AL  
Type D



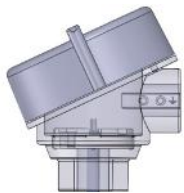
DIN B  
Type B



PR 7501 with display  
Type P



Cast Iron  
Type Y



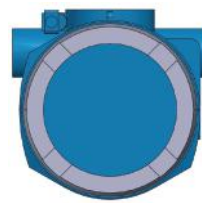
Type F Ex d-AL  
Type S Ex d-Stainless Steel



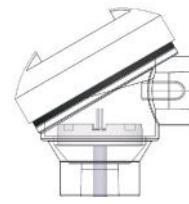
SCCA-AL  
Type N



SCCI-Stainless Steel  
Type G



E&H Display Housing  
Type H



Polypropylene  
Type A

### OPTIONAL APPROVALS

FM Explosion Proof: Class I, Division 1, Groups A, B, C, D  
T4 for  $-40\text{ °C} \leq T_a \leq 80\text{ °C}$   
T6 for  $-40\text{ °C} \leq T_a \leq 60\text{ °C}$

FM Intrinsically Safe: Class I, Division 1, Groups A, B, C, D  
T4 for  $-55\text{ °C} \leq T_a \leq 80\text{ °C}$   
T5 for  $-55\text{ °C} \leq T_a \leq 55\text{ °C}$   
T6 for  $-55\text{ °C} \leq T_a \leq 40\text{ °C}$

FM Non-Incendive: Class I, Division 2, Groups A, B, C, D  
T4 for  $-55\text{ °C} \leq T_a \leq 80\text{ °C}$   
T5 for  $-55\text{ °C} \leq T_a \leq 55\text{ °C}$   
T6 for  $-55\text{ °C} \leq T_a \leq 40\text{ °C}$

ATEX or IECEx: ATEX or IECEx  
II 1 G Ex ia IIC T6 Ga  $-50\text{ °C}$  to  $60\text{ °C}$   
II 2 G Ex ib IIC T6 Gb  $-50\text{ °C}$  to  $60\text{ °C}$   
II 2 G Ex e IIC T6 Gb  $-55\text{ °C}$  to  $60\text{ °C}$   
II 2 G Ex d IIC T6 Gb  $-55\text{ °C}$  to  $60\text{ °C}$

# Data Sheet

## S50 Industrial RTDs

S50 RTD ORDERING CODE	Example:	S50	1	T	1	A	A	B	A	D	2
<b>Area Classification</b>											
1 - Standard - General purpose			1								
2 - Explosion proof (must order head type F or S)											
3 - Intrinsic Safety - ia											
B - Intrinsic Safety - ib											
E - Increased Safety											
N - Non-Incendive											
<b>Sheath Diameter</b>											
R - 1/8" Ø3.18 mm											
S - 3/16" Ø4.76 mm											
T - 1/4" Ø6.35 mm				T							
3 - 3 mm											
4 - 4.5 mm											
6 - 6 mm											
8 - 8 mm											
<b>RTD Type</b>											
1 - Pt 100 Platinum 385 temperature coefficient					1						
3 - Pt 1000 Platinum 385 temperature coefficient											
<b>Accuracy or Class (IEC 60751)</b>											
A - Class A						A					
B - Class B											
C - 1/2 DIN											
D - Class AA - 1/3 DIN											
<b>RTD Element/Range</b>											
A - -50 to 400 °C							A				
B - -200 to 600 °C											
D - Vibration-proof											
<b>Electrical Circuit</b>											
A - Single 2-wire											
B - Single 3-wire								B			
C - Single 4-wire											
D - Dual 2-wire											
E - Dual 3-wire											
F - Dual 4-wire											
<b>Sheath Material</b>											
A - 316 Stainless steel - AISI 316/1.4404											
<b>Head Type</b>											
F - Ex d Aluminum											
S - Ex d Stainless steel											
G - SCCI Stainless steel											
N - SCCA Aluminum											
B - DIN B Aluminum											
D - BUZ Aluminum										D	
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)											
<b>Instrument Connection - 1/2 Conduit Connection</b>											
2 - 1/2 NPT											2
N - 3/4 NPT											
M - M20 x 1.5											
A - Adapter M20 x 1.5											
P - Pg 16											
<b>Instrument Connection - 3/4 Conduit Connection</b>											
3 - 1/2 NPT											
4 - 3/4 NPT											
5 - M20 x 1.5											

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# Data Sheet

## S50 Industrial RTDs

<b>S50 RDT ORDERING CODE</b>	<b>Example: (Cont'd)</b>	-	<b>X</b>	<b>N-H9</b>	<b>R3</b>	-	-	<b>3P</b>	<b>T</b>	<b>N=60</b>	<b>LN=400</b>
<b>Head Conduit Gland</b>											
- - Without		-								Lag length in mm	Nominal length in mm
P - Polyamide PA, for unarmored cable											
L - Nickel plated brass, for unarmored cable											
M - Nickel plated brass, single seal for braided cable											
N - Nickel plated brass, double seal for braided cable											
S - Stainless steel, for unarmored cable											
T - Stainless steel, single seal for braided cable											
U - Stainless steel, double seal for braided cable											
<b>Inset Nominal Length</b>											
X - LN= (min=50, max=100000). Add actual nominal length in mm at end of ordering code LN=??			X								mm = inches x 25.4
<b>Lag Extension and Length</b>											
Lag length (add actual length N=?? At the end of code in mm)											
<b>For DIN Mounting Plate</b>											
0--- - 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											
<b>For Spring-loaded Mounting (N/A with FM approval)</b>											
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											
<b>Process Connection</b>											
R3 - Thread ½ NPT											
C3 - Compression fitting ½ NPT, AISI 316											
A3 - Compression fitting G, AISI 316 (N/A with FM approval)											
-- - Without connection											
<b>Electrical Connection</b>											
<b>For DIN Mounting Plate</b>											
-- - With DIN terminal block											
1 - With transmitter											
3 - Without terminal block, with flying leads											
<b>For Spring-loaded Mounting (N/A with FM approval)</b>											
B - With terminal block											
T - With transmitter											
F - Without terminal block, with flying leads											
<b>Certifications</b>											
-- - 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											
<b>Calibration Report</b>											
-- - Without											
3P - 3 points single											
5P - 5 points single											
3D - 3 points dual											
5D - 5 points dual											
<b>Tagging</b>											
-- - Without											
T - Label in stainless steel with tag											

# Data Sheet

## S50 Thermocouples

S50 TC ORDERING CODE	Example:	S50	S	T	K	N	1	1	3	D	2
<b>Area Classification</b>											
S - Standard - General purpose			S								
D - Explosion proof (must order head type F or S)											
J - Intrinsic Safety - ia											
B - Intrinsic Safety - ib											
E - Increased Safety											
N - Non-Incendive											
<b>Sheath Diameter</b>											
R - 1/8" Ø3.18 mm											
S - 3/16" Ø4.76 mm											
T - 1/4" Ø6.35 mm				T							
3 - 3 mm											
4 - 4.5 mm											
6 - 6 mm											
8 - 8 mm											
<b>Thermocouple Type</b>											
E - Temperature range: -200 to 800 °C											
J - Temperature range: -40 to 750 °C											
K - Temperature range: -200 to 1000 °C					K						
N - Temperature range: -200 to 1000 °C											
T - Temperature range: -250 to 350 °C											
<b>Accuracy or Class</b>											
N - ANSI MC 96.1: Standard limits						N					
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											
<b>Junction</b>											
1 - Ungrounded							1				
2 - Grounded											
3 - Ungrounded, vibration-proof											
4 - Grounded, vibration-proof											
<b>Electrical Circuit</b>											
1 - Single								1			
2 - Dual											
<b>Sheath Material</b>											
1 - AISI 316 / 1.4401											
3 - Inconel® 600/ 2.4816									3		
<b>Head Type</b>											
F - Ex d Aluminum											
S - Ex d Stainless steel											
G - SCCI Stainless steel											
N - SCCA Aluminum											
B - DIN B Aluminum											
D - BUZ Aluminum										D	
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)											
<b>Instrument Connection 1/2 NPT Conduit Connection</b>											
2 - 1/2 NPT											2
N - 3/4 NPT											
M - M20 x 1.5											
A - Adapter M20 x 1.5											
P - Pg 16											
<b>Instrument Connection 3/4 NPT Conduit Connection</b>											
3 - 1/2 NPT											
4 - 3/4 NPT											
5 - M20 x 1.5											

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# Data Sheet

## S50 Thermocouples

<b>S50 TC ORDERING CODE</b> Example: (Cont'd)	-	<b>X</b>	<b>N-H9</b>	<b>R3</b>	-	-	<b>3P</b>	<b>T</b>	<b>N=60</b>	<b>LN=400</b>
<b>Head Conduit Gland</b>										
- - Without	-								Lag length in mm	Nominal length in mm
P - Polyamide PA, for unarmored cable									mm = inches x 25.4	
L - Nickel plated brass, for unarmored cable										
M - Nickel plated brass, single seal for braided cable										
N - Nickel plated brass, double seal for braided cable										
S - Stainless steel, for unarmored cable										
T - Stainless steel, single seal for braided cable										
U - Stainless steel, double seal for braided cable										
<b>Inset Nominal Length</b>										
X - LN=_(min=50, max=100000) (add actual length LN=?? At the end of ordering code in mm)		X								
<b>Lag Extension and Length</b>										
Lag length (add actual length N=?? At the end of code in mm)										
<b>For DIN Mounting Plate</b>										
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			N-H9							
U-J7 - Nipple-Union-Nipple AISI 316, N=120										
N-J9 - Nipple-Union-Nipple AISI 316, N= not std										
<b>For Spring-loaded Mounting (N/A with FM approval)</b>										
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										
<b>Process Connection</b>										
R3 - Thread 1/2 NPT				R3						
C3 - Compression fitting 1/2 NPT, AISI 316										
A3 - Compression fitting G, AISI 316 (N/A with FM approval)										
-- - Without connection										
<b>Electrical Connection</b>										
<b>For DIN Mounting Plate</b>										
- With DIN terminal block										
1 - With transmitter										
3 - Without terminal block, with flying leads										
<b>For Spring-loaded Mounting (N/A with FM approval)</b>										
B - With terminal block										
T - With transmitter										
F - Without terminal block, with flying leads										
<b>Certifications</b>										
-- - None										
F - FM										
2 - SIL 2										
A - ATEX										
S - SIL 2 + ATEX										
I - INMETRO										
X - IECEX										
D - ATEX + IECEX										
P - EAC (Gost R) + Metrological Russia										
<b>Calibration Report</b>										
-- - Without										
3P - 3 points single							3P			
5P - 5 points single										
3D - 3 points dual										
5D - 5 points dual										
<b>Tagging</b>										
- - Without										
T - Label in stainless steel with tag								T		

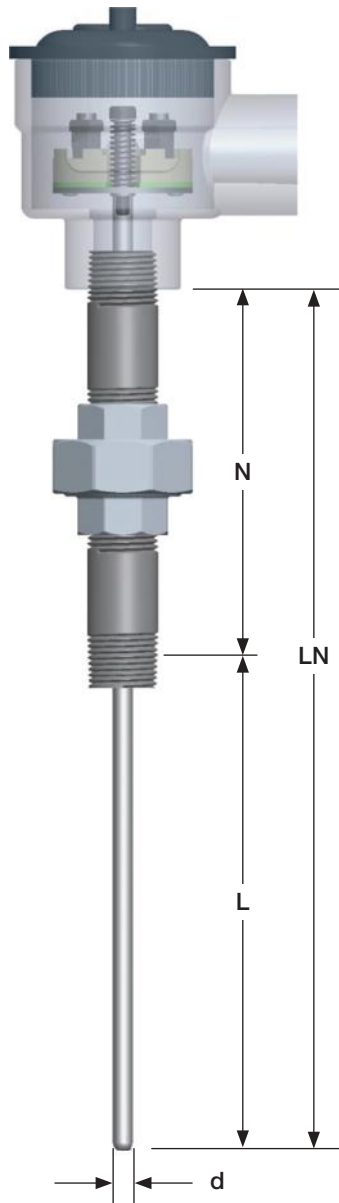
Consult factory for additional configurations.

## Data Sheet

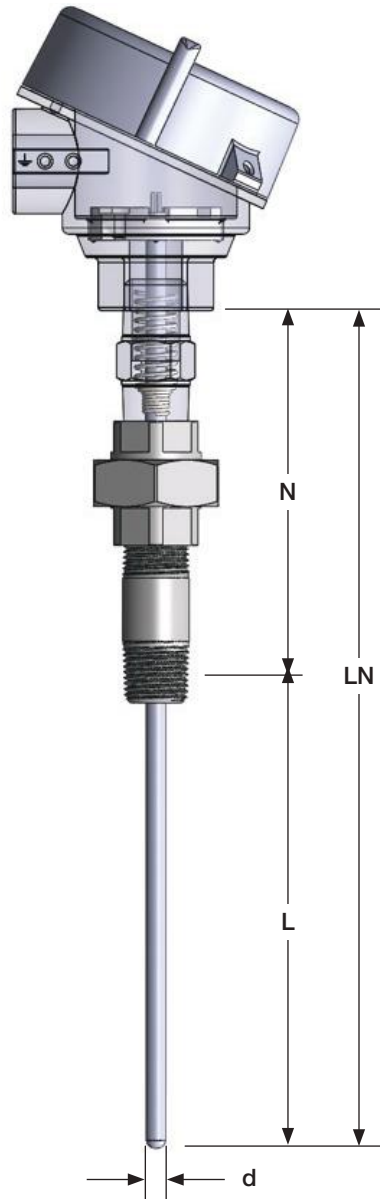
# S50 Industrial RTDs & Thermocouples with NPT Connections

### DIMENSIONS in [ ] are millimeters

For reference only, consult Ashcroft for specific dimensional drawings.



**DIN Mounting Plate Design**



**Spring-loaded Mounting Design**

### 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.  
mm = inches x 25.4

d = Stem diameter

N = Lag extension length

L = Insertion length

LN = Insert nominal length

LN = N + L