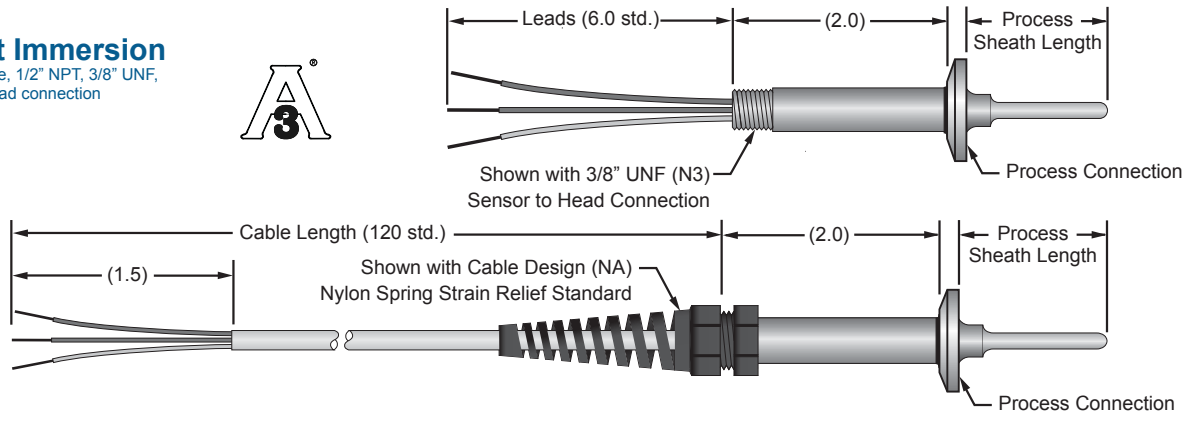
S01 & S03 Direct Immersion Sensors

Specifications

S01-
1/8” Direct Immersion

Available with cable, 1/2” NPT, 3/8” UNF, and 1/2” NPSM head connection



All dimensions in inches.

S01 Application

The 1/8” diameter direct immersion (S01) is generally used in process lines less than 1 inch in diameter and/or when the process has physical constraints that limit the immersion to less than 3.5 inches. This sensor is available with cable or various thread sizes for connection heads.

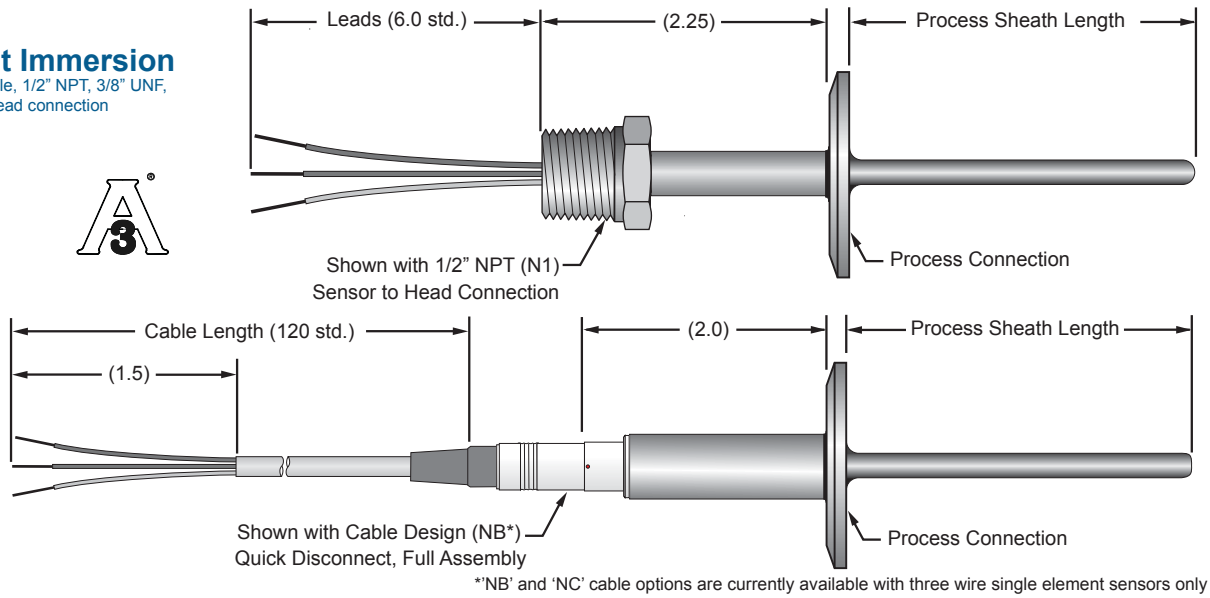
S01 Specifications

Time Constant: Maximum time to reach 63.2% of a step change in temperature in water flowing at 3 fps.	1.5 seconds
RTD Repeatability: Maximum change in resistance at 0°C after 10 cycles over the full temperature range.	0.04%
RTD Long Term Stability: Maximum change in resistance at 0°C after 1000 hours at 200°C	Precision: 0.01% Standard: 0.10%
RTD Hysteresis: Maximum % error at the mid point of the operating temperature range. (Example: 0.04% over a 250°C range = 0.10°C)	Precision: 0.04% Standard: 0.08%

See page 4 for General and Thermocouple Specifications.

S03-
1/4” Direct Immersion

Available with cable, 1/2” NPT, 3/8” UNF, and 1/2” NPSM head connection



*’NB’ and ‘NC’ cable options are currently available with three wire single element sensors only

All dimensions in inches.

S03 Application

The S03 direct immersion is generally used in process lines greater than 1 inch in diameter and for immersion lengths between 3.5 and 24.0 inches.

S03 Specifications

Time Constant: Maximum time to reach 63.2% of a step change in temperature in water flowing at 3 fps.	6.0 seconds
RTD Repeatability: Maximum change in resistance at 0°C after 10 cycles over the full temperature range.	0.04%
RTD Long Term Stability: Maximum change in resistance at 0°C after 1000 hours at 200°C	Precision: 0.01% Standard: 0.10%
RTD Hysteresis: Maximum % error at the mid point of the operating temperature range. (Example: 0.04% over a 250°C range = 0.10°C)	Precision: 0.04% Standard: 0.08%

See page 4 for General and Thermocouple Specifications.

S01 & S03 Direct Immersion Sensors

Ordering Information

Sensor Style		Min Process Sheath Length	Max Process Sheath Length	Sheath Length Tolerance
01-	1/8" Direct Immersion (NOTE 1)	1.0"	8.5"	+/- 0.05"
03-	1/4" Direct Immersion	3.5"	40.0"	+/- 0.125"

RTD (Accuracy)

10	Standard RTD +/- 0.10% of resistance at 0 degrees C
05	Precision RTD +/- 0.05% of resistance at 0 degrees C (not currently available with the S01 model)

Thermocouple (Type)

E	Chromel/Constantan (leadwire code = purple+, red-)
J	Iron/Constantan (leadwire code = white+, red-)
K	Chromel/Alumel (leadwire code = yellow+, red-)
T	Copper/Constantan (leadwire code = blue+, red-)

RTD Element Lead Configuration

A	Three Wire Single
B	Four Wire Single
C	Three Wire Dual

Thermocouple Junction Configuration

D	Single Ungrounded
E	Single Grounded
F	Dual Ungrounded
G	Dual Grounded

Process Sheath Length (Note sensor type minimum & maximum values above)

0110	1.1 inches
0250	2.5 inches
0300	3.0 inches
0350	3.5 inches
0400	4.0 inches
0500	5.0 inches
0550	5.5 inches
1200	12.0 inches
	Specify Process Sheath Length in Inches

Connection Head (NOTE 2)		Sensor/Head Connection
-1C	Cast Iron, Black Enamel	1/2" NPT
-1EN	Cast Iron, White Epoxy Coated, N.E.T. Solution	1/2" NPSM
-2A	Aluminum, Gray	1/2" NPT
-2E	Aluminum, Epoxy Coated	1/2" NPT
-2EN	Aluminum, Epoxy Coated, N.E.T. Solution	1/2" NPSM
-5A	Aluminum	1/2" NPT
-5E	Aluminum Epoxy Coated	1/2" NPT
-5EN	Aluminum, Epoxy Coated, N.E.T. Solution	1/2" NPSM
-9P	Polypropylene, White	1/2" NPT
-9PN	Polypropylene, White, N.E.T. Solution	1/2" NPSM
-14S	Stainless Steel	1/2" NPT
-14SN	Stainless Steel, N.E.T. Solution	1/2" NPSM
-16AN	Miniature Aluminum, N.E.T. Solution	3/8" UNF
-19A	Aluminum with LED Indicator	1/2" NPT
-19AN	Aluminum with LED Indicator, N.E.T. Solution	1/2" NPSM
-20P	Plastic with LED Indicator	1/2" NPT
-20PN	Plastic with LED Indicator, N.E.T. Solution	1/2" NPSM
-N1	No Connection Head, Bushing	1/2" NPT
-N2	No Connection Head, Bushing, N.E.T. Solution	1/2" NPSM
-N3	No Connection Head, No Bushing, N.E.T. Solution	3/8" UNF
-NA	No Connection Head, Cable Design, 120", Nylon Spring Standard	n/a
-NB	No Head. Sensor with Quick Disconnect and Mating 120" cable (NOTE 3)	n/a
-NC	No Head. Sensor with Quick Disconnect only, no cable (NOTE 3)	n/a

Process Type

T	Hygienic Ferrule, (Tri-clamp style)

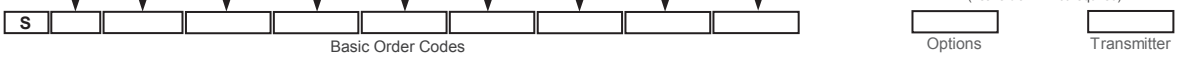
Process Connection Size		(Used with tube sizes)
05	1/2"	1/2", 3/4"
15	1 1/2"	1", 1 1/2"
20	2"	2"
25	2 1/2"	2 1/2"
30	3"	3"
40	4"	4"

Wetted Surface Material

03	316 Stainless Steel
06	316L Stainless Steel

Wetted Surface Finish

M32	32 Ra mechanical finish, max.
M25	25 Ra mechanical finish, max.
M20	20 Ra mechanical finish, max.
M15	15 Ra mechanical finish, max.
E32	32 Ra mechanical finish, max. with electropolish
E25	25 Ra mechanical finish, max. with electropolish
E20	20 Ra mechanical finish, max. with electropolish
E15	15 Ra mechanical finish, max. with electropolish
E10	10 Ra mechanical finish, max. with electropolish



Basic Order Codes

(Leave blank if not required)

Options | Transmitter

See pages 35 - 39

NOTE 1: ±0.05% accuracy is not currently available with the S01 model
NOTE 2: For full descriptions see page 40 or: www.BurnsEngineering.com/Con-Heads.pdf
NOTE 3: Currently available with three wire single only

Specifications

RTDS

Operating Temperature Range:

-50ºC to 200ºC

Element Resistance:

100 ohms at 0°C nominal

Temperature Coefficient of Resistance (alpha):

0.00385 Ω/Ω/°C nominal

Accuracy:

Standard: 0.10% of resistance at 0°C

Precision: 0.05% of resistance at 0°C

Insulation Resistance:

100 megohms minimum at 100 VDC at 25°C

(Not applicable for grounded thermocouples)

Interchangeability:

For 100 ohm elements the tolerance values at any temperature for these specifications are given by:

Tolerance °C = ±(0.13 + 0.00185 ItI) for accuracy code 05

Tolerance °C = ±(0.26 + 0.0037 ItI) for accuracy code 10

(ItI = absolute value of temperature in °C)

Leadwire:

PTFE insulated nickel-plated stranded copper, 22 and 24 AWG typical

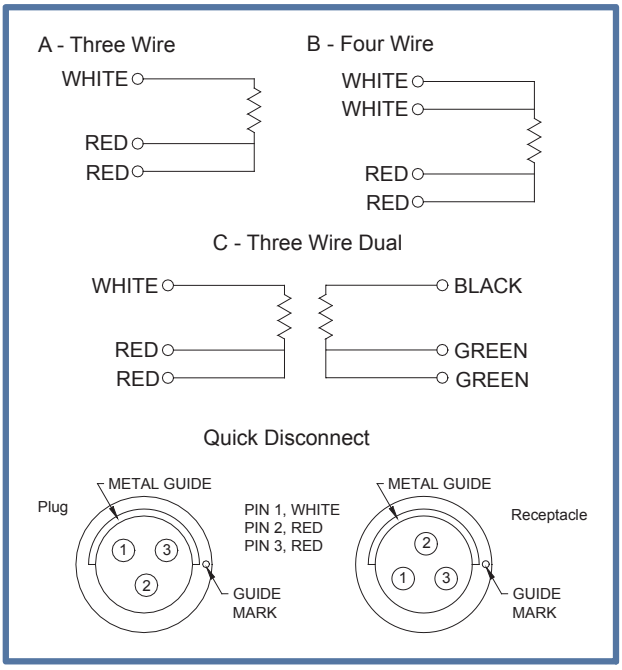
Sheath Material:

316L stainless steel typical

100% Tested:

For accuracy at 0°C and insulation resistance

Color Codes Element/Leadwire Configuration



Temperature °C	Temperature °F	Interchangeability 0.05%**		0.10%	
-50	-58	±.23°C	±.41°F	±.45°C	±.80°F
0	32	±.13°C	±.23°F	±.26°C	±.46°F
100	212	±.32°C	±.57°F	±.64°C	±1.15°F
200	392	±.50°C	±.90°F	±1.00°C	±1.80°F

** ±0.05 accuracy is not currently available with all models. See the Ordering Information Table for each model for applicability.

Thermocouples

The tables listed below are provided to the user for a ready reference of thermocouple designations as compared to the generic and trade names for the most common thermocouple materials. The letter “P” in the designation indicates the positive (+) leg of the thermocouple while the letter “N” designates the negative (-). Color coding and other means of conductor identification are also provided. Specification reference per ASTME230 / E230M.

ANSI Thermocouple Type	Temperature Range	Special Limits
E	-50°C to 125°C 125°C to 200°C	±0.5°C ±0.4%*
J	0°C to 200°C	±1.1°C
K	0°C to 200°C	±1.1°C
T	-50°C to 125°C 125°C to 200°C	±0.5°C ±0.4%*

* % applies to measurement in °C

Thermocouple Grade Wire

ANSI Type	Grade or Generic Trade Names	Single Conductors	Magnetic	Conductor Color Code	Overall Color Code
E	Chromel® Constantan	EP EN	No No	Purple Red	Brown w/ Purple Tracer
J	Iron Constantan	JP JN	Yes No	White Red	Brown w/ White Tracer
K	Chromel® Alumel®	KP KN	No Yes	Yellow Red	Brown w/ Yellow Tracer
T	Copper Constantan	TP TN	No No	Blue Red	Brown w/ Blue Tracer

Extension Grade Wire

ANSI Type	Grade or Generic Trade Names	Single Conductors	Magnetic	Conductor Color Code	Overall Color Code
EX	Chromel® Constantan	EPX ENX	No No	Purple Red	Purple
JX	Iron Constantan	JPX JNX	Yes No	White Red	Black
KX	Chromel® Alumel®	KPX KNX	No Yes	Yellow Red	Yellow
TX	Copper Constantan	TPX TNX	No No	Blue Red	Blue