

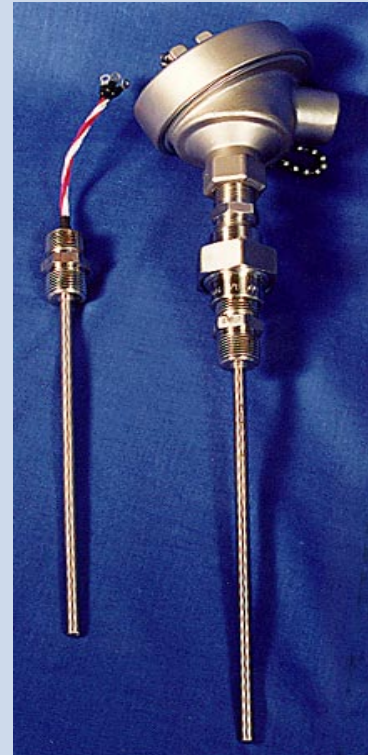


**Weed  
Instrument**

Temperature, Pressure, and Fiber Optic Technology

## Model 601 and 611 Nuclear Qualified RTD with Welded Fitting

- **Suitable for a Wide Range of Applications**
- **Direct Immersion into Process**
- **IEEE 323-1974, IEEE 323-1983, IEEE 344-1975, IEEE 344-1987, and NUREG 0588 Qualified**
- **40 Year Qualified Life**
- **Also Available for Non-Safety Related Applications**
- **Extended Recalibration Intervals (minimal drift)**
- **High Accuracy**



**W**eed Instrument **Model 601** and **611 Series** Platinum RTDs are Direct Immersion Temperature Sensors designed for Nuclear applications where a threaded male fitting is required for mounting. This sensor is supplied with a threaded hex fitting which is welded to the sheath of the RTD to provide a pressure seal for different process applications. They have been seismically and environmentally tested to IEEE standards, qualifying them for use as 1E equipment for Nuclear Power Generating Stations. These same models can be ordered as Non-Safety Related. They will offer the same reliability and construction as the qualified versions except without the certification.

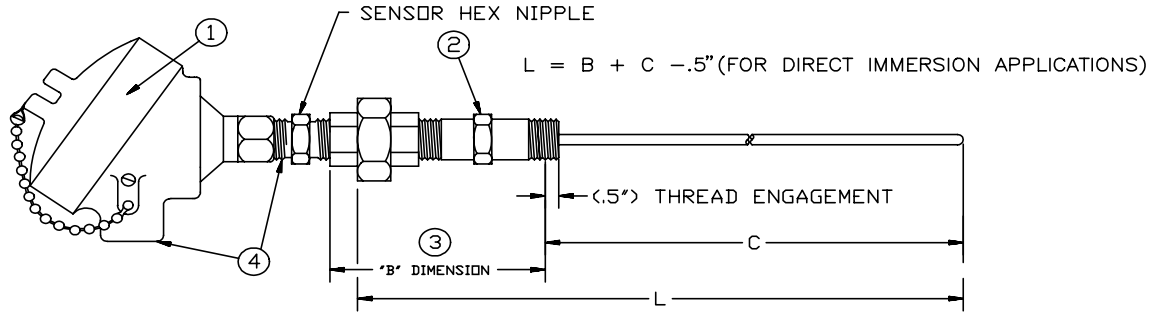
These RTDs can be configured for use with connection heads and/or Quick Disconnect Electrical Connectors. Custom configurations are available. Consult factory with details and requirements.

## Specifications

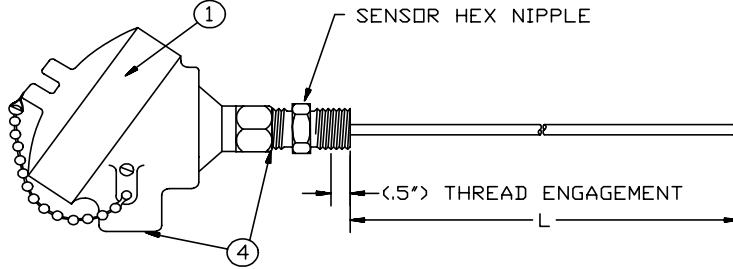
<b>Accuracy:</b>	<p>Sensor Accuracy <math>\pm 0.5^{\circ}\text{F}</math> inclusive of hysteresis and repeatability. Safety-related sensors will include specific calibration tables for each sensor in <math>10^{\circ}</math> increments. Consult factory if special accuracy and/or calibration tables are required for either safety or non-safety related sensors.</p>
<b>Self Heating:</b>	<p>In <math>20^{\circ}\text{C}</math> water flowing transverse to the sensor sheath at 3 fps, with a sheath diameter of 1/4" the self heating will be <math>50\text{mw}/^{\circ}\text{C}</math>.</p>
<b>Temperature Range:</b>	<p>Temperature range - <math>0^{\circ}\text{F}</math> to <math>900^{\circ}\text{F}</math> (<math>-17.8^{\circ}\text{C}</math> to <math>482^{\circ}\text{C}</math>)</p>
<b>Insulation Resistance:</b>	<p>At <math>70^{\circ}\text{F} \pm 10^{\circ}\text{F}</math> (<math>21^{\circ}\text{C} \pm 5.5^{\circ}\text{C}</math>) with dry external surfaces, the resistance between all lead wires and the sensor sheath is 100 Megohms or greater at 100 VDC.</p>
<b>Stability:</b>	<p>RTD drift to remain within <math>\pm 1^{\circ}\text{F}</math> over a 40 year period exclusive of process induced drift.</p>
<b>Current:</b>	<p>A continues current of 20 mA (RMS) and a short term pulsed current of 40 mA (RMS) shall not damage the sensor. Standard operating current is between 1 and 4 mA.</p>
<b>Time Response:</b>	<p>The RTD time constant to 63.2% of a step change in temperature from room temperature to water at <math>175^{\circ}\text{F}</math> to <math>180^{\circ}\text{F}</math> (<math>79^{\circ}\text{C}</math> to <math>82^{\circ}\text{C}</math>) flowing transverse to the sensor sheath at approximately 3 fps to be 5.0 seconds or less.</p>
<b>Qualifications:</b>	<p>RTDs can be supplied qualified to IEEE 323-1974, 323-1983 and IEEE 344-1975, IEEE 344-1987 and NUREG 0588 for a design life of 40 years per Weed Test Report 060-8680-003 Rev: 1.</p>
<b>QA/QC:</b>	<p>RTDs are supplied in accordance with Weed Instrument's Quality Assurance and Quality Control Program 100-1. In addition, Safety Related RTDs are supplied in accordance with NRC 10 CFR 50 Appendix B, 10CFR21, ANSI N45.2, and NQA-1.</p>

# Ordering Information - Head & Extension

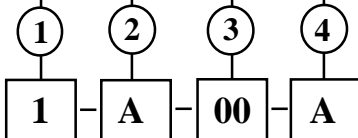
## MODEL 601 & 611



## MODEL 601 & 611



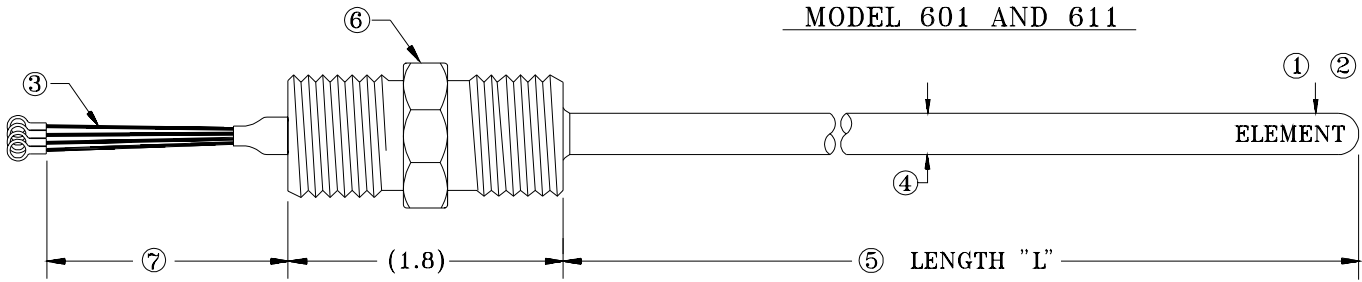
CODE Head Style & Material	
1	Cast Iron
2	Aluminum
8	Stainless Steel
CODE Extension Style & Material	
A	Direct Assembly
J	Union/Nipple Ext. - (316) Stainless Steel 3" min.
G	Nipple/Union Ext. - (316) Stainless Steel 3" min.
	Other - Consult Factory
CODE Extension Length ("B" Dimension)	
00	0" (Direct Assembly Only)
35	3.5"
40	4"
50	5" (Maximum with Qualified Assembly)
60	6"
	Other - Specify Length
CODE Head Connection (Instr. x Conduit)	
A	1/2" NPT x 1/2" NPT
D	1/2" NPT x 3/4" NPT



Sample Model Number

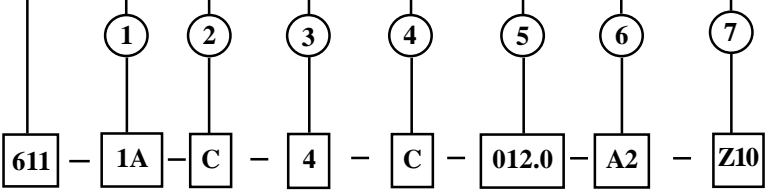
# Ordering Information - Sensor

MODEL 601 AND 611



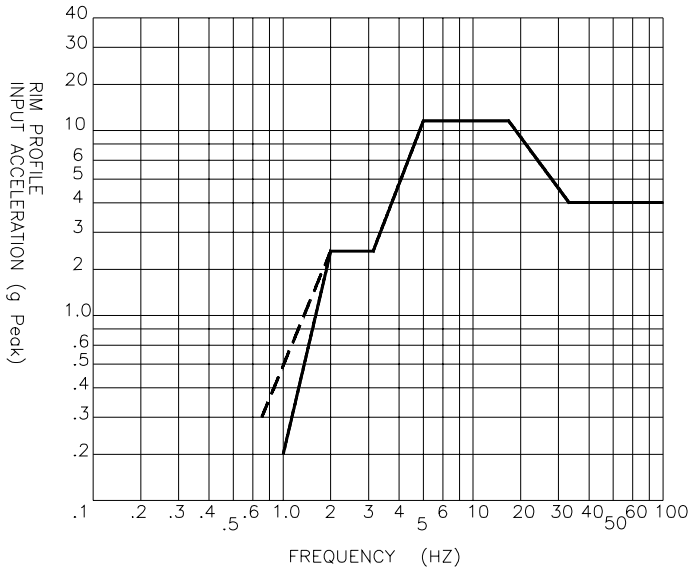
<b>601</b>	<b>DIRECT IMMERSION, Al<sub>2</sub>O<sub>3</sub> SHEATH INSULATION (601D FOR DUAL ELEMENT)</b>
<b>611</b>	<b>DIRECT IMMERSION, MgO SHEATH INSULATION (611D FOR DUAL ELEMENT)</b>
<b>CODE R<sub>0</sub> &amp; TEMPERATURE COEFFICIENT</b>	
<b>1A</b>	100 ohm Platinum .003902 TCR (100 ohms @ 0°C)
<b>2A</b>	200 ohm Platinum ↓ (200 ohms @ 0°C)
<b>1B</b>	100 ohm Platinum .00385 TCR (100 ohms @ 0°C)
<b>2B</b>	200 ohm Platinum ↓ (200 ohms @ 0°C)
Other - Consult Factory	
N.S. Note (IAH) for high accuracy	
<b>CODE TEMPERATURE RANGE</b>	
<b>A</b>	500°F Maximum
<b>C</b>	900°F Maximum
<b>CODE NUMBER OF LEAD WIRES</b>	
<b>4</b>	4-Wire (Complete Compensation) - Can be used for 3 wire connection
<b>6</b>	Dual 3-Wire (With Dual Element)
<b>8</b>	Dual 4-Wire (With Dual Element)
<b>CODE SHEATH DIAMETER</b>	
<b>C</b>	.250" Diameter
<b>F</b>	.375" Diameter
Other - Consult Factory	
<b>CODE SHEATH LENGTH</b>	
<b>xxx.x</b>	Specify Length to Nearest .1"
<b>CODE WELDED FITTINGS</b>	
<b>A2</b>	1/2" NPT Hex Nipple - 316 Stainless Steel
Other - Consult Factory	
<b>CODE LEAD LENGTH</b>	
<b>O</b>	Standard with Head (Approximately 4")
<b>Z</b>	Other - List to nearest Inch

Head & Extension Code



Sample Model Number

# Seismic Spectrum



## Earthquake Response Spectra: OBE, H&V

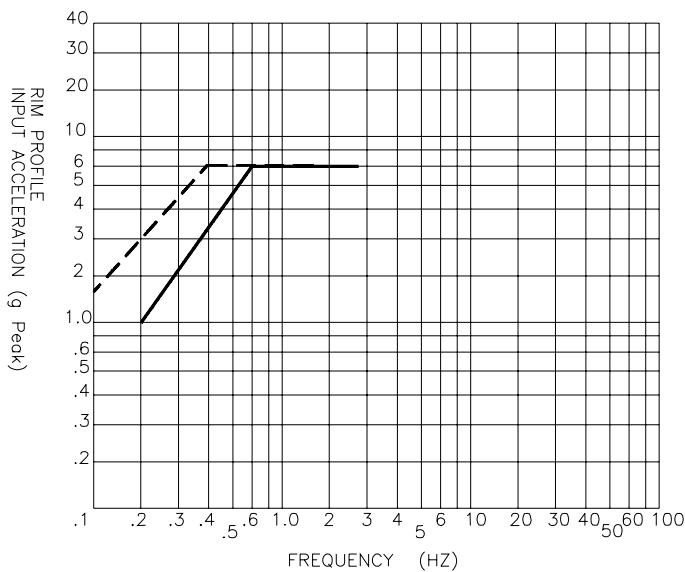
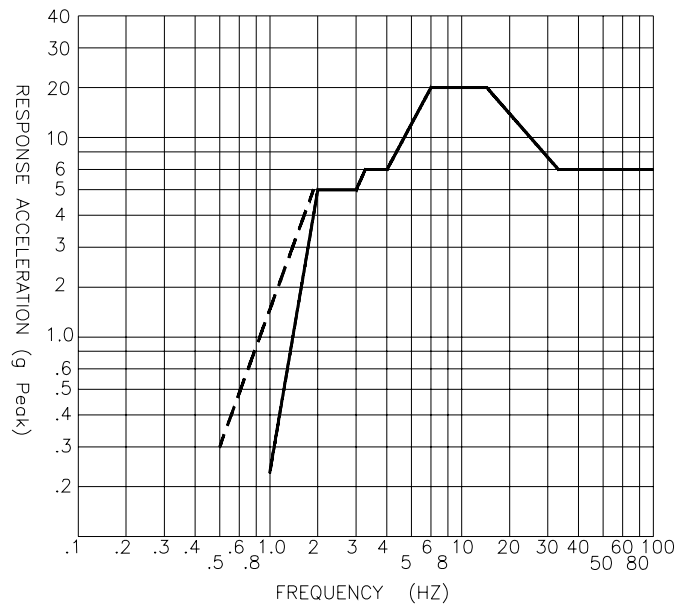
**Damping: 1%**

The dashed line of the profile represents regions to be tested analytically.

## Earthquake Response Spectra: SSE, H&V

**Damping: 1%**

The dashed line of the profile represents regions to be tested analytically.

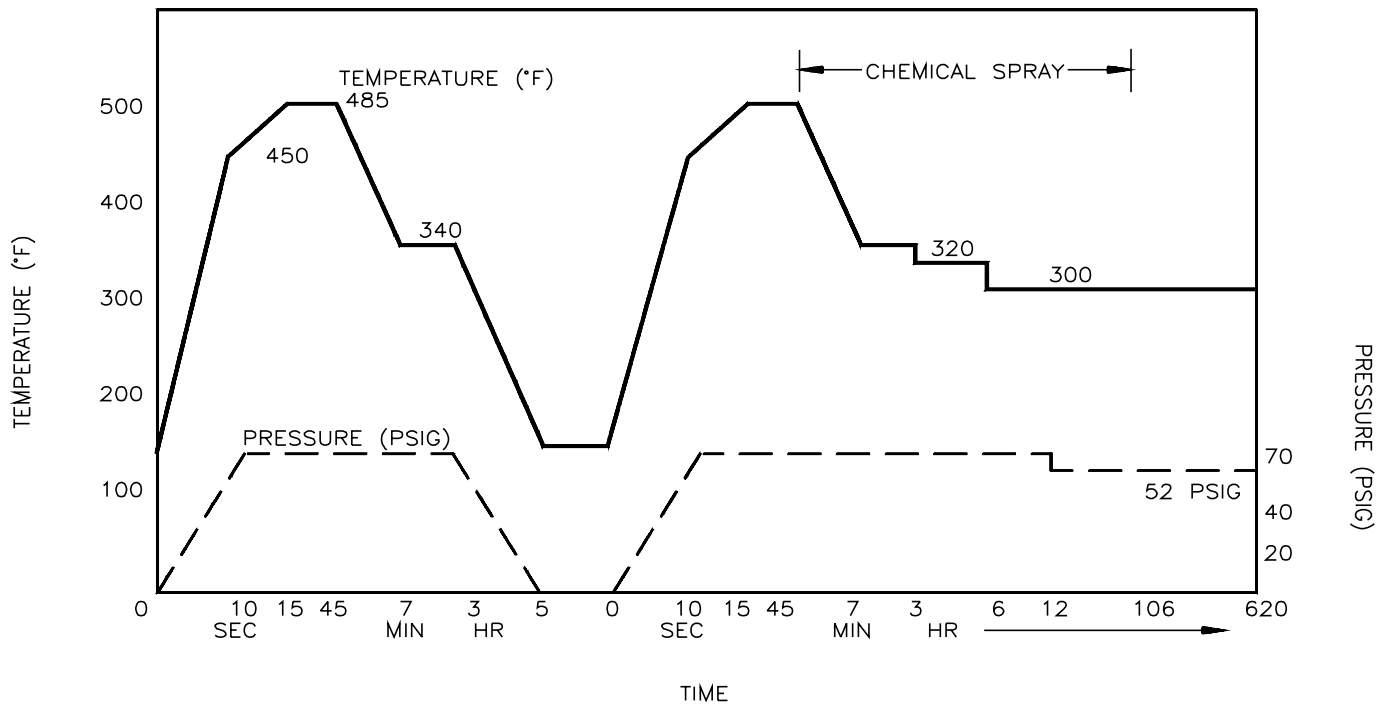


## Required Input Motion (RIM)

The dashed line of the profile represents regions to be tested analytically.

# LOCA Profile (In-Containment)

The **Safety-Related Temperature Sensors** described in this literature underwent Radiation Aging (300 Megarads T.I.D.), Thermal Aging, and Humidity Aging all of which simulated end-of-service-life condition of 40 years. Proceeding these tests was the Loss of Coolant Accident (LOCA) Simulation (see figure below). The LOCA Profile also simulates 2 years post-LOCA operational service condition. After completion of these tests the sensors were able to perform their safety-related functions.



# RTD Platinum

## Resistance vs. Temperature Tables

**Curve A**  
**100 ohm Platinum**  
(TCR = .003902 ohms/ohm/°C)

°C	0	-10	-20	-30	-40	-50	-60	-70	-80	-90	-100
0	100.00	96.03	92.05	88.06	84.05	80.04	76.00	71.96	67.91	63.84	59.76
°C	0	+10	+20	+30	+40	+50	+60	+70	+80	+90	+100
0	100.00	103.96	107.90	111.83	115.75	119.66	123.55	127.44	131.31	135.17	139.02
+100	139.02	142.86	146.88	150.49	154.30	158.09	161.86	165.63	169.38	173.13	176.86
+200	176.86	180.58	184.29	187.98	191.67	195.34	199.00	202.65	206.29	209.92	213.53
+300	213.53	217.14	220.73	224.31	227.88	231.44	234.99	238.52	242.04	245.55	249.05
+400	249.05	252.54	256.02	259.48	262.94	266.38	269.81	273.22	276.63	280.02	283.41
+500	283.41	286.78	290.14	293.48	296.82	300.14	303.45	306.75	310.03	313.31	316.57
+600	316.57	319.82	323.06	326.28	329.50	332.70					
°F	0	-20	-40	-60	-80	-100	-120	-140	-160	-180	-200
0	92.94	88.50	84.05	79.59	75.11	70.61	66.10	61.57	57.03	52.47	47.90
°F	0	+20	+40	+60	+80	+100	+120	+140	+160	+180	+200
0	92.84	97.36	101.76	106.15	110.52	114.88	119.23	123.56	127.87	132.17	136.46
+200	136.46	140.73	144.98	149.22	153.45	157.66	161.86	166.05	170.22	174.37	178.51
+400	178.51	182.64	186.75	190.85	194.93	199.00	203.06	207.10	211.13	215.14	219.14
+600	219.14	223.12	227.09	231.04	234.99	238.91	242.82	246.72	250.61	254.47	258.33
+800	258.33	262.17	266.00	269.81	273.60	277.39	281.15	284.91	288.64	292.37	296.08
+1000	296.08	299.77	303.45	307.11	310.76	314.40	318.02	321.62	325.21	328.78	332.34
+1200	332.34										

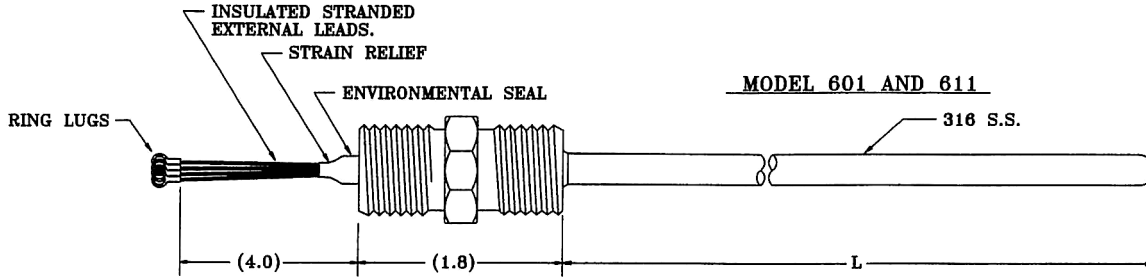
**Curve B**  
**100 ohm Platinum**  
(TCR = .003850 ohms/ohm/°C)

°C	0	-10	-20	-30	-40	-50	-60	-70	-80	-90	-100
0	100.00	96.09	92.16	88.22	84.27	80.31	76.33	72.33	68.33	64.30	60.25
°C	0	+10	+20	+30	+40	+50	+60	+70	+80	+90	+100
0	100.00	103.90	107.79	111.67	115.54	119.40	123.24	127.07	130.89	134.70	138.50
+100	138.50	142.29	146.06	149.82	153.58	157.31	161.04	164.76	168.46	172.16	175.84
+200	175.84	179.51	183.17	186.82	190.45	194.07	197.69	201.29	204.88	208.45	212.02
+300	212.02	215.57	219.12	222.65	226.17	229.67	233.17	236.65	240.13	243.59	247.04
+400	247.04	250.48	253.90	257.32	260.72	264.11	267.49	270.86	274.22	277.56	280.90
+500	280.90	284.22	287.53	290.83	294.11	297.39	300.65	303.91	307.15	310.38	313.59
+600	313.59	316.80	319.99	323.18	326.35	329.51	332.66				
°F	0	-20	-40	-60	-80	-100	-120	-140	-160	-180	-200
0	93.03	88.65	84.21	79.85	75.42	70.98	66.52	62.04	57.52		
°F	0	+20	+40	+60	+80	+100	+120	+140	+160	+180	+200
0	93.03	97.39	101.74	106.07	110.38	114.68	118.97	123.24	127.50	131.74	135.97
+200	135.97	140.18	144.38	148.57	152.74	156.90	161.04	165.17	169.29	173.39	177.47
+400	177.47	181.54	185.60	189.64	193.67	197.69	201.69	205.67	209.64	213.60	217.54
+600	217.54	221.47	225.38	229.28	233.17	237.04	240.90	244.74	248.57	252.38	256.18
+800	256.18	259.97	263.74	267.49	271.23	274.96	278.68	282.37	286.06	289.73	293.39
+1000	293.39	297.03	300.65	304.27	307.87	311.45	315.02	318.58	322.12	325.64	329.16
+1200	329.16	332.66									

**Note:** For other platinum resistances multiply the above values by the following:

- 200 ohm platinum = value x 2
- 400 ohm platinum = value x 4
- 500 ohm platinum = value x 5
- 1000 ohm platinum = value x 10

# Dimensional Drawing

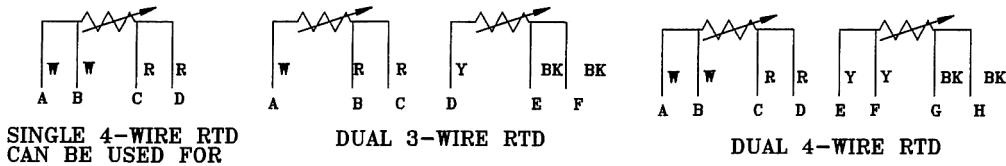


MODEL 601-LEAD WIRE 24 AWG TEFZEL INSULATION  
 MODEL 611-LEAD WIRE 20 AWG POLYOLEFIN INSULATION

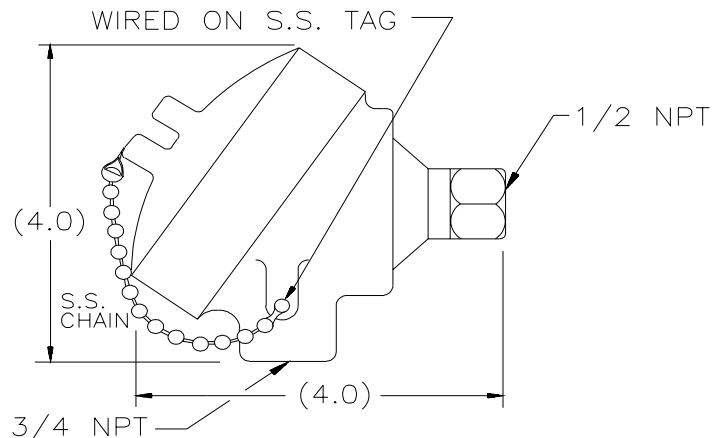
ALL MEASUREMENTS IN INCHES UNLESS OTHERWISE NOTED  
 CONSULT FACTORY FOR CUSTOM DESIGN

THIS SENSOR IS DESIGNED FOR USE WITH WEED INSTRUMENT'S  
 CONNECTION HEAD ASSEMBLY AND MAY NOT BE COMPATIBLE  
 WITH OTHER MANUFACTURER'S HEAD ASSEMBLY.

## WIRING DIAGRAMS



## S.S. Head Dimensions



**Weed Instrument**  
 Temperature, Pressure, and Fiber  
 Optic Technology

Nuclear Division  
 707 Jeffrey Way, P. O. Box 300  
 Round Rock, Texas 78680-0300  
 Phone: 512-434-2950, Fax: 512-434-2951  
 E-Mail: nuclear@weedinstrument.com  
 Home Page: <http://www.weedinstrument.com>