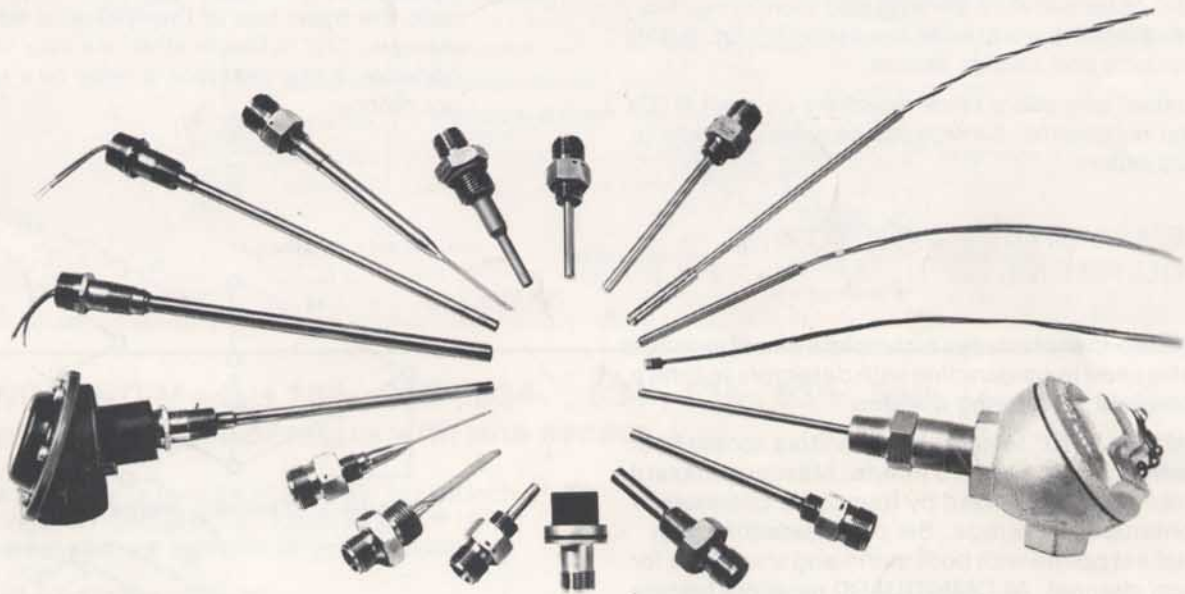


# Omniguard

Temperature Sensors



## OMNIGUARD<sup>®</sup> RTDs



## Resistance Temperature Detectors & Accessories Catalog

ARMTEC/RAGEN INC

# General Information

## ARMTEC RTDs OFFER

- Superior accuracy
- Superior sensitivity
- Superior response time
- Superior durability

## MANY BASIC UNITS IN STOCK

Armtec Industries, an acknowledged leader in the field of temperature sensing and monitoring, has established a world-wide reputation for top quality products and reliable service.

Armtec now offers stock deliveries on most RTDs and accessories through our network of stocking distributors.

## TEMPERATURE MONITORING EQUIPMENT

Armtec manufactures a complete line of monitors to be used in conjunction with detectors to form a complete monitoring system.

OMNIGUARD® temperature monitors accept both thermocouple and RTD inputs. Maximum hazard protection is provided by four or six channels of continuous coverage. Six point monitors offer dual set points with both alarm and shutdown for each channel. All OMNIGUARD monitors feature digital display, set points which are read and adjusted from the front panel, and complete electronic self-test. Optional 4 to 20 mA output provides the capability to function as a Computer Interface Device. Field changeable modular construction and factory options offer almost unlimited capability - and the monitors are backed by a two year warranty.

## PRODUCT WARRANTY

Armtec Industries, Inc. will, at its option, repair and return without charge (freight prepaid) any Armtec OMNIGUARD® product used in accordance with Armtec's rating and instructions and found by us to be defective in workmanship or materials. For complete details of the OMNIGUARD Warranty, please request a copy of the specific OMNIGUARD Warranty applicable to the product under consideration. OMNIGUARD RTDs are warranted for a period of one year.

## OPERATION

Armtec RTDs are essentially temperature sensitive elements, the electrical resistance of which increases with increasing temperature in a repeatable and predictable manner. A small electrical current passing through the detector produces an output signal proportional to the temperature. Accuracy depends on a suitable power source and proper selection of precision bridge resistors which do not vary with temperature change.

The simplified bridge circuits shown below illustrate the basic use of the RTD as a sensing element. "G" in the illustrations may be a galvanometer, a null detector, a relay or a signal conditioner.

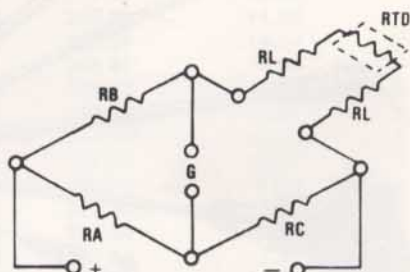


Figure 1 Two-wire bridge circuit

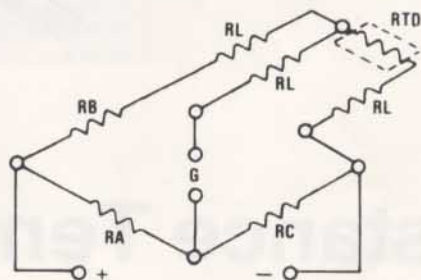


Figure 2 Three-wire bridge circuit

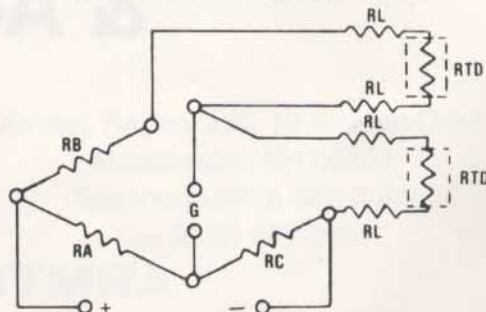


Figure 3 Four wire differential bridge circuit



# Tip Sensitive Detectors

## USING TIP SENSITIVE DETECTORS

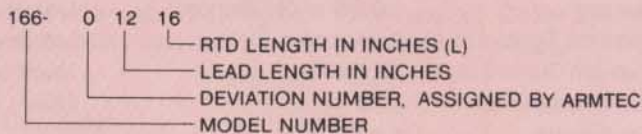
The Armtec tip sensitive detectors described in this section are designed to measure the temperature of metal surfaces, bearings, bushings, etc. The tip, which is pressed firmly by a spring-loaded holder against the surface being measured, responds rapidly to changes in temperature.

Armtec tip sensitive detectors can be used in two-wire systems, or in three-wire systems designed to reduce the effect of lead wire resistance. Most tip sensitive RTDs can be mounted in thermowells if desired, and can be formed on a one inch minimum radius at any point greater than two inches from the tip.

A typical Armtec tip sensitive detector assembly, using a dual element unit, is shown below.

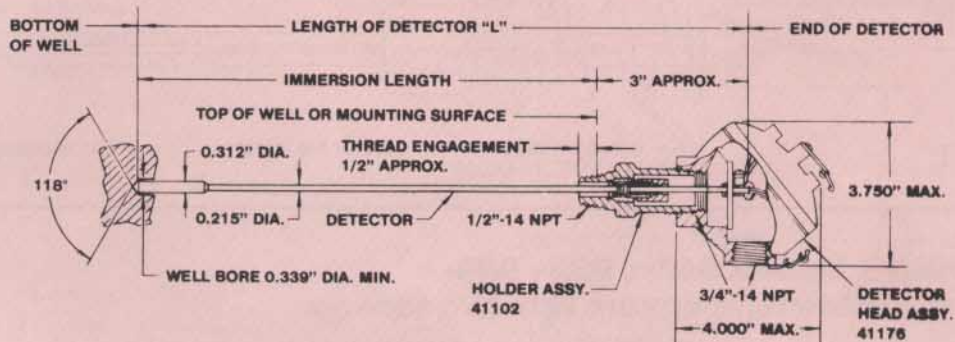
## HOW TO ORDER

Order by complete part number as shown below for the following tip sensitive RTD models: 166-, 269-, 334-, 347-, 534-, 536-, 569-, and 986-.



Ordering information for other tip sensitive RTD models is given on the appropriate product page.

## TYPICAL TIP SENSITIVE DETECTOR ASSEMBLY



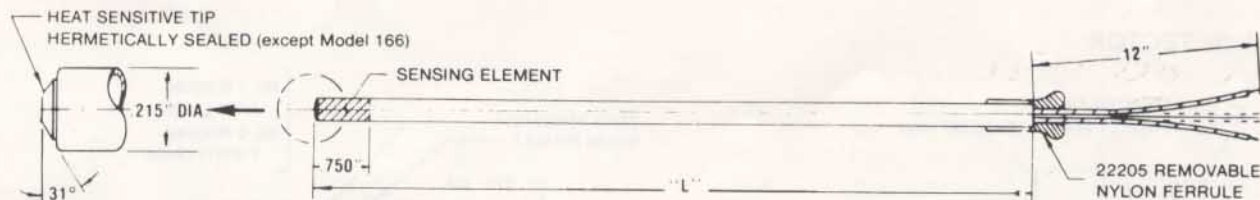
## SINGLE WINDING Models 166-, 269-, 334-, 534-, 536-, 538-, 569- To measure surface temperature with one sensor

Detectors are available in lengths of 4" to 99" in one inch increments, longer on special order. A lead length of 12" is standard, other lengths are available on special order.

## COMMON CHARACTERISTICS

Accuracy	±1% of resistance	Leads	Stranded nickel-clad copper with Teflon® insulation		
Response Time	2 seconds; 7 seconds for Models 534- and 569-	Maximum Pressure	75 psig at tip except: Model 166- is 0 psig		
Max. Current in Air	.015 amp	Accessories	Holder	Head	Wrench
Stem Diameter	.215"		41102	41176	22363
Materials			41683	41985	42240
Tip	Copper		42078	42690	
Stem	#316 S/S				

## TYPICAL DETECTOR



MODEL NO.	166, 269, 334	534, 569	536	528, 538
TEMPERATURE RANGE	-57°C TO +260°C (-70°F TO +500°F)	-57°C TO +260°C (-70°F TO +500°F)	-45°C TO +149°C (-50°F TO +300°F)	-57°C TO +260°C (-70°F TO +500°F)
T/R CHARACTERISTIC	#7 (120Ω@0°C, Ni)	#11 (100Ω@0°C, Pt) (.00392)	#15 (10Ω@25°C, Cu)	#8 (100Ω@0°C, Pt) (.00385)
NO. OF LEADS	2 ON MODELS 166 & 334 3 ON MODEL 269	2 ON MODEL 534 3 ON MODEL 569	3 ON MODEL 536	3 ON MODEL 538

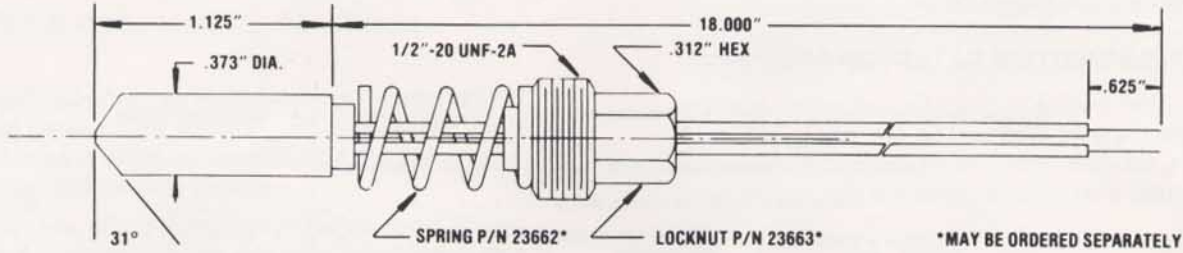
# Tip Sensitive Detectors

## SINGLE WINDING MODEL 298-01802-For use in radiation environment

### SPECIFICATIONS

Temperature Range	-100°C to +300°C (-148°F to +572°F)	Materials	
T/R Characteristic	#7 (120Ω @ 0°C, Ni)	Tip	Aluminum
Accuracy	±0.5% of resistance	Stem	Aluminum
Response Time	5 seconds	Maximum Pressure	250 psig at tip
Maximum Current in Air	.015 amp	Maximum Radiation	500 r/hr
Stem Diameter	.373"	Number of Leads	2
Stem Length	1-1/8"	Lead Length	18"

### MODEL 298-01801



## DUAL WINDING Models 347-, 982-, 986- To measure surface temperature with two sensors

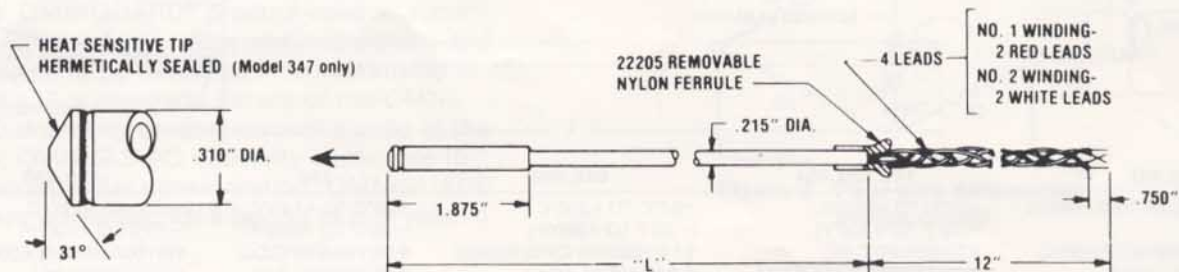
Two concentric sensing elements permit use in dual function applications such as activating an alarm on rising and falling temperatures (high-low alarm), or giving a warning signal and then shutting down the equipment being monitored. Spring-loaded holders press the tip firmly against the surface being measured.

Detectors are available in lengths of 4" to 99" in one inch increments, longer on special order. A lead length of 12" is standard, other lengths are available on special order.

### COMMON CHARACTERISTICS

Temperature Range	-57°C to +260°C (-70°F to +500°F)	Leads	Stranded nickel-clad copper with Teflon® insulation		
Accuracy	±0.5% of resistance for 986- ±1.0% of resistance for 347- & 982-	Maximum Pressure	75 psig at tip		
Response Time	2 seconds	T/R Characteristic			
Maximum Current in Air	.015 amp	Model 347-	#7(120Ω@0°C, Ni)		
Stem Diameter	.215"	Model 982-	#8(100Ω@0°C, Pt)(.00385)		
Tip Diameter	.310"	Model 986-	#11(100Ω@0°C, Pt)(.00392)		
Materials		Accessories	Holder	Head	Wrench
Tip	Copper		41102	41176	25345
Stem	#316 S/S		41683	41985	42240
			42078	42690	

### TYPICAL DETECTOR





# Tip Sensitive Detectors

## BAYONET - To measure surface temperatures difficult to reach Model 251-

This tip sensitive detector is designed to measure the inner surface temperatures of machine parts such as aircraft engine cylinder heads, compressors and pump cylinders. Each has a spring-loaded bayonet holder to ensure that the tip of the detector is held securely to the bottom of the well under the most severe vibration. The

leads are encased in a stainless steel flexible armored jacket which eliminates abrasion of the insulation. Some are designed for use on aircraft engines and to satisfy military specifications.

See reference drawings for stem lengths. Order by complete part number shown in reference drawings.

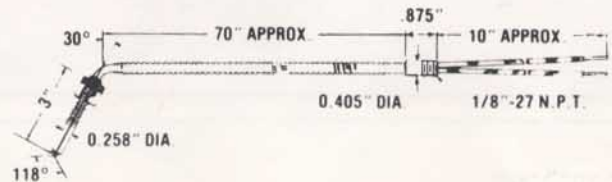
### COMMON CHARACTERISTICS

Temperature Range	-50°C to +300°C (-58°F to +572°F)
T/R Characteristic Model 251-	#7(120Ω@0°C, Ni)
Accuracy	±1.0% of resistance
Response Time	5 seconds
Maximum Current in Air	.015 amp.
Max. Mounting Force	15 pounds
Stem Diameter	.258"

### Materials

Tip	Copper
Stem	#316 S/S
Spring	#302 S/S
Cap	#303 S/S
Flexible Armor	Type SL S/S
Leads	Nickel with felted asbestos silicone glass braid
Accessories	35912 Fitting

### MODEL 251-00001



# Tip Sensitive Detectors

## MINIATURE Models 327-, 669- - Designed to be embedded in bearings

Miniature detectors are designed to be embedded in bearings. The shell is tinned so that the detector may be covered with babbitt after being installed in a hole drilled in the bearing surface. Installation should be in dry loca-

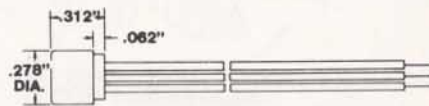
tions since the detectors are not hermetically sealed. Standard lead lengths are shown below, other lengths are available on special order.

### COMMON CHARACTERISTICS

Temperature Range	-57°C to +232°C (-70°F to +450°F) continuous; +232°C to +316°C (+450°F to +600°F) 5 minutes max.	Maximum Pressure Specification	2500 psig when encased in babbitt MIL-T-22051 and MIL-T-17600B (Ships); (309-01801 & 327-01801)
Accuracy	±1.0% of resistance	Accessories	41820 Terminal block 42036 Terminal block
Response Time	5 seconds		
Maximum Current in Air	0.15 amp		
Body Material	Tinned Brass		

**MODEL 327-** NOT SHOWN; SAME AS MODEL 669-, EXCEPT WITH 2 LEADS  
T/R CHARACTERISTIC #7(120Ω@0°C, Ni)

**MODEL 669-\***  
T/R CHARACTERISTIC #11(100Ω@0°C, Pt) (.00392)  
\*AVAILABLE WITH TWO LEADS ON SPECIAL ORDER



327- or 669- 0 XX XX

01 - SOLID NICKEL, VARGLOSS SILICONE INSULATION  
02 - STRANDED NICKEL, ETCHED TEFLON® INSULATION

LEAD MATERIAL

LEAD LENGTH (18" STD) LONGER ON SPECIAL ORDER

DEVIATION NUMBER (ASSIGNED BY ARMTEC AS REQUIRED)

## MINIATURE Model 975- - Designed to be threaded into bearings

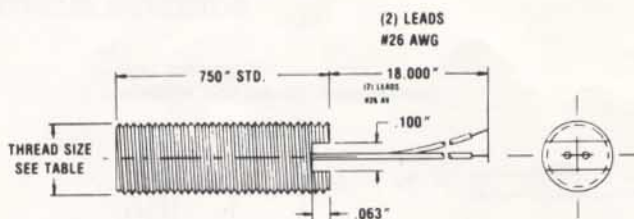
Model 975 is a miniature tip sensitive RTD, designed for ease of installation, and to eliminate the need for potting. Thread size 5/16"-18 UNF is standard. Other lengths and

materials are also available to suit any installation requirement. If necessary, the detector can be locked in place using a standard lock nut.

### SPECIFICATIONS

Temperature Range	-57°C to +260°C (-70°F to +500°F)	Lead End Material	400 psig
T/R Characteristic	#7(120Ω@0°C, Ni)	Body	Brass (other materials on special order)
Accuracy	±1% of resistance	Leads	Stranded nickel, Teflon® insulated
Maximum Current in Air	.015 amp		
Maximum Pressure			
Tip	1500 psig		

### MODEL 975-



975- x 1802

THREAD SIZE (SEE TABLE 1)

LEAD LENGTH (18" STD.)

DEVIATION (ASSIGNED BY ARMTEC AS REQUIRED)

FOR INSTALLATION TOOL, ORDER PART NO. 465M62418M...\*

\*MUST BE THE SAME AS THE LAST TWO DIGITS OF RTD PART NO.

TABLE 1

CODE	THREAD SIZE
02	5/16-18 UNF



# Stem Sensitive Detectors

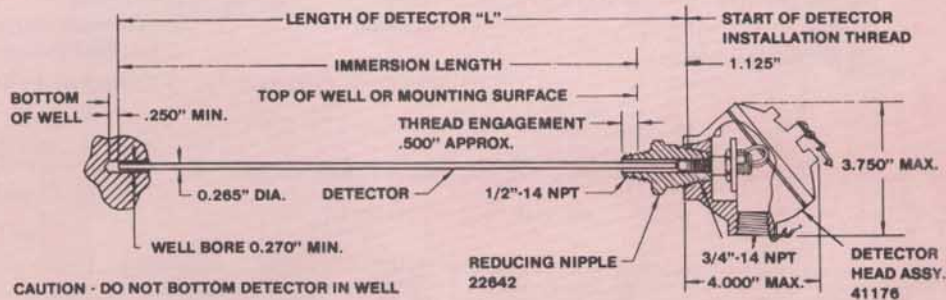
## USING STEM SENSITIVE DETECTORS

The Armtec stem sensitive detectors described in this section are designed to measure the temperatures of liquids and gases. The stem should be immersed in the liquid or gas being measured to a depth that at least equals the length of the sensitive portion of the model used. Armtec stem sensitive RTDs are hermetically sealed, and may be immersed in fluid where pressure will not exceed the rating for the specific detector. For higher pressures or severe turbulence, thermowells should be used.

Armtec stem sensitive detectors can be used in two-wire systems, or in three-wire systems designed to reduce the effect of lead wire resistance.

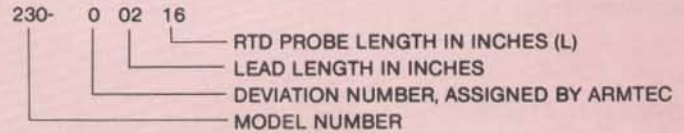
A typical stem sensitive detector assembly is shown below.

### TYPICAL STEM SENSITIVE DETECTOR ASSEMBLY



### HOW TO ORDER

Order all RTD models by complete part number. Construct the complete part number as shown below for the following stem sensitive RTD models: 230-, 330-, and 242-.



Ordering information for stem sensitive RTD model 315- is given on the appropriate product page.

## SINGLE WINDING Models 230- , 330- For general application - nominal temperature and pressure

Stem lengths are available from 6" to 48" in one inch increments, longer on special order. A lead length of 2" is standard, other lengths are available on special order.

### COMMON CHARACTERISTICS

Accuracy	±0.5% of resistance	Stem Diameter	.265"
Response Time	2 seconds	Materials	
Maximum Current		Stem	#304 S/S
In Air	015 amp	Fitting	#416 S/S
In agitated water	.025 amp	Leads	nickel-clad copper glass braid silicone varnish insulation
Maximum Pressure	200 psig		

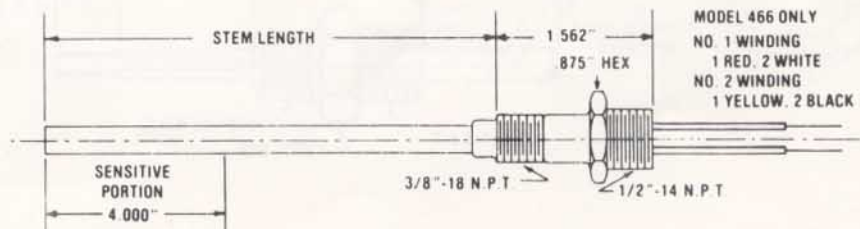
### SPECIFICATIONS

#### Single Element

	Model 230	Model 330
Temperature Range	-73°C to +300°C (-100°F to +572°F)	0°C to +400°C (+32°F to +752°F)
T/R Characteristic	#7(120Ω@0°C, Ni)	#11(100Ω@0°C, Pt)(.00392)
Number of Leads	2*	2*

\*3 leads on special order

### TYPICAL DETECTOR



# Stem Sensitive Detectors

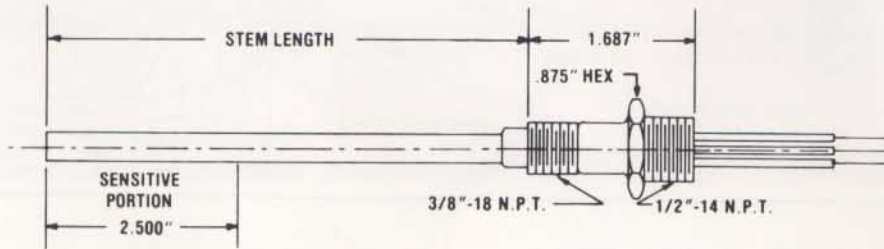
## SINGLE WINDING Model 242-\* – For temperatures over 400°F

This high temperature detector measures the temperature of fluids and gases up to +1500°F. The first 2½" of the stem must be completely immersed for accurate reading. This model is stainless steel, can be used with or without a thermowell, and is hermetically sealed for hazardous environments.

Stem lengths are available from 4" to 44" in two inch increments, longer on special order. A lead length of 2½" is standard, other lengths are available on special order.

### SPECIFICATIONS

Temperature Range	-51°C to +816°C (-60°F to +1500°F) +260°C (+500°F) max. at receptacle end	Maximum Current	
T/R Characteristic	#8(100Ω@0°C, Pt)(.00385)	In Air	.015 amp
Accuracy	±0.5% between 0°C to +316°C (+32°F to +600°F)	In agitated water	.025 amp
Response Time	10 seconds (approx.)	Stem Diameter	.365"
		Materials	
		Stem	#347 S/S
		Leads	nickel with varglass insulation & silicone sleeving
		Maximum Pressure	300 psig at +749°C (+1380°F)

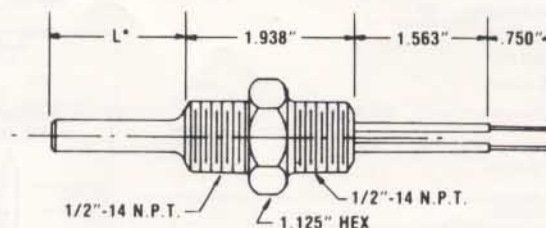


## SINGLE WINDING Model 315-00304 – For pressure over 200 psig

### SPECIFICATIONS

Temperature Range	-70°C to +250°C (-94°F to +482°F)	Stem Diameter	.375"
Accuracy	±1.0% of resistance	Stem Length	1½"
T/R Characteristic	#7 (120Ω @ 0°C, Ni)	Materials	#403 S/S
Response Time	8 seconds	Maximum Pressure	5500 psig
Maximum Current			
In air	.015 amp		
In agitated water	.025 amp		

### MODEL 315-00304





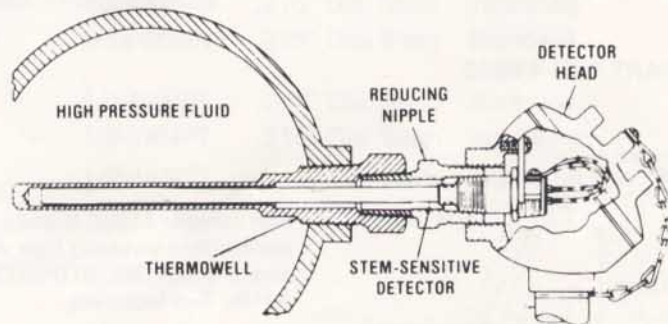
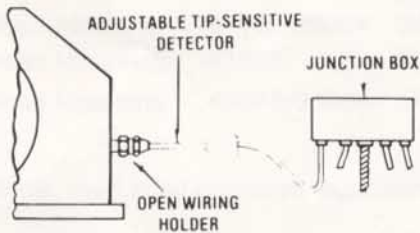
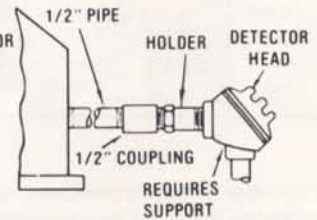
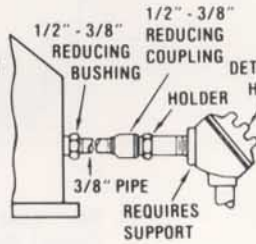
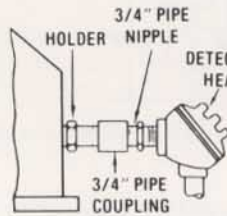
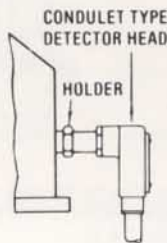
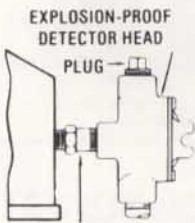
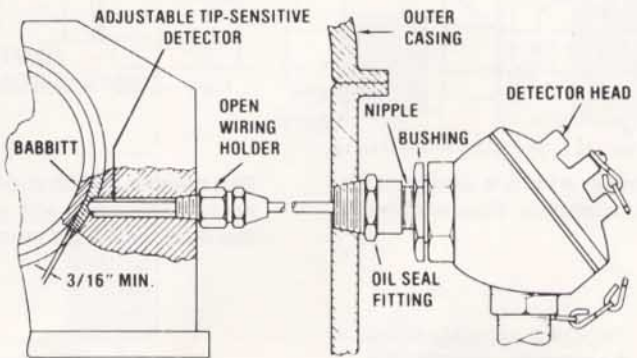
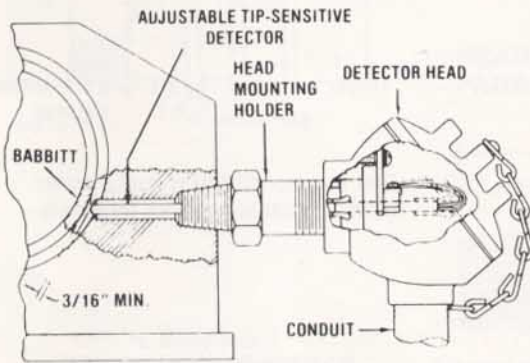
# Accessories

## USING RTD ACCESSORIES

This section describes accessories for use when installing Armtec RTDs. Included are detector heads, holders, reducing nipples, oil seal fittings, terminal blocks, a mounting kit assembly, and thermowells. Order accessories by complete part number.

Methods of combining various accessories to meet specific installation problems are virtually unlimited. A few of the more common uses are shown below. Select the accessories which best suit your needs.

## ACCESSORIES USED IN TYPICAL INSTALLATIONS

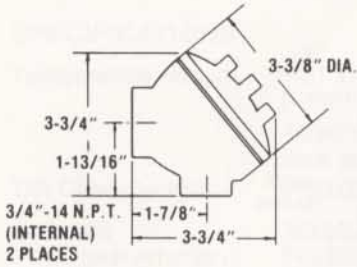


# Accessories

## DETECTOR HEADS

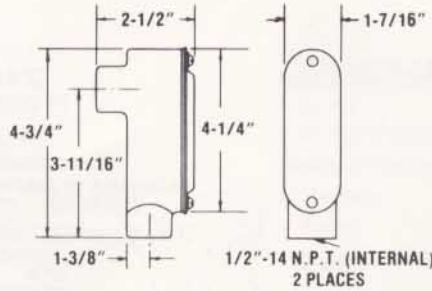
The detector head provides a means of making conduit enclosure. Reference dimensions for Armtec detector heads are shown below. Order by complete part number.

### PART NO. 41176



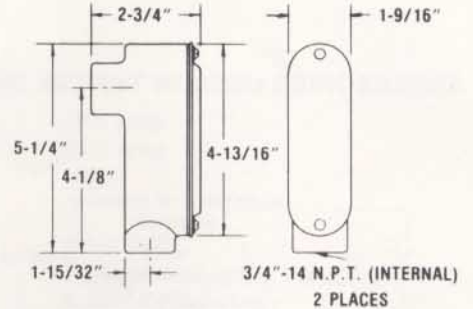
Part number 41176 is designed for normal installation. Four terminals.

### PART NO. 42688



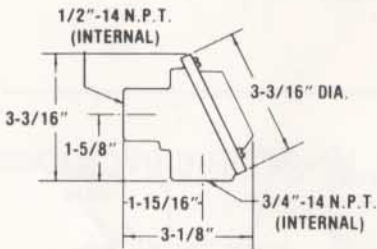
Part number 42688 is designed for normal installation with stem-sensitive detectors. Four terminals.

### PART No. 42690



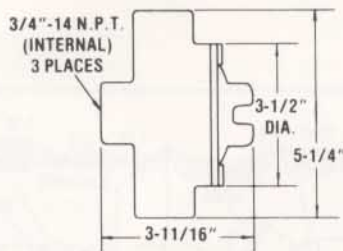
Part number 42690 is designed for normal installation. Four terminals.

### PART NO. 41607



Part number 41607 is designed for applications involving high vibration and/or shock (MIL-STD-167 & MIL-S-901B) with stem-sensitive detectors. Two terminals.

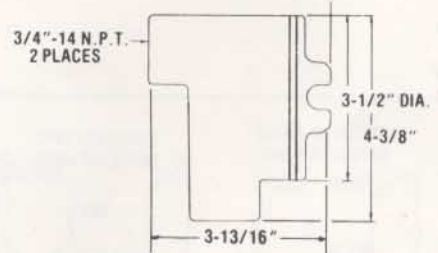
### PART NO. 42240



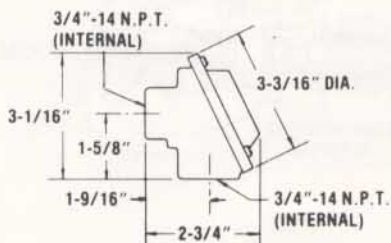
Part number 42240 is designed for application in hazardous areas; Class I, Groups C & D; Class II, Groups F & G.

- #42240-00001 - Cast iron head, aluminum cover, 4 terminals
- #42240-00002 - Cast iron head, aluminum cover, 6 terminals
- #42240-00003 - Cast iron head, aluminum cover, 4 terminals
- #42240-00011 - Aluminum head & cover, 4 terminals

### PART NO. 42240-00003



### PART NO. 41985



Part number 41985 is designed for applications involving high vibration and/or shock (MIL-STD-167 & MIL-S-901B). Two terminals.

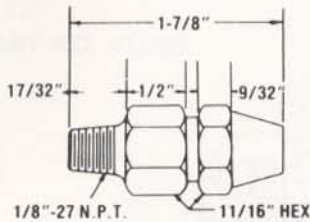


## DETECTOR HOLDERS

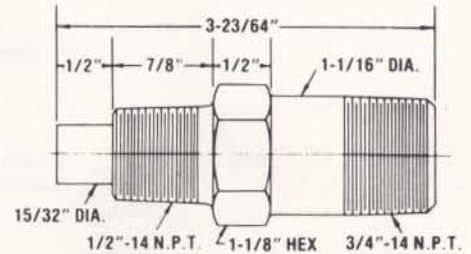
Detector holders are spring loaded to secure tip-sensitive detectors firmly against the surface to be measured. Armtec manufactures two basic types of holders: The Open Wiring Type, which provides a means of mounting the detector; and the Head Mounting Type, which provides a mount as

well as a method of attaching fittings or detector head assemblies, so that conduit or cable may be connected for all three diameters listed. Insulated holders are available. Reference dimensions for Armtec detector holders are shown below. Order by complete part number.

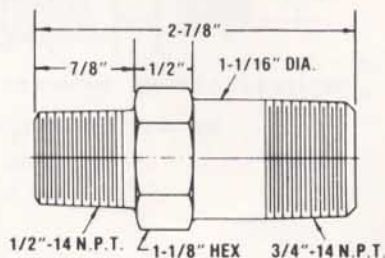
### OPEN WIRING PART NO. 35786 & 42124



### EXPLOSION PROOF PART NO. 42078

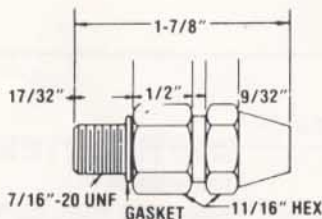


### HEAD MOUNTING PART NO. 41102 & 41683



### OPEN WIRING PART NO. 42838

### EXPLOSION PROOF PART NO. 43168



## DETECTOR HOLDER DATA

Holder Type	Part No.	Material	Mounting Thread	Used With	Special Feature
Open Wiring	35786-00019	303 S/S	1/8-27NPT	.215" Dia. Stem	Standard
Open Wiring	42124	Nylon	1/8-27NPT	.215" Dia. Stem	Insulating
Open Wiring	42838	CRS (C1020) Zinc Plated	7/16-20UNF	.215" Dia. Stem	Standard
Head Mounting	41102-00004	304 S/S	1/2-14NPT	.215" Dia. Stem	Standard
Head Mounting	41683	Nylon	1/2-14NPT	.215" Dia. Stem	Insulating
Head Mounting	42078-00004	304 S/S	1/2-14NPT	.215" Dia. Stem	Explosion Proof*

\*When used in an approved explosion proof assembly.

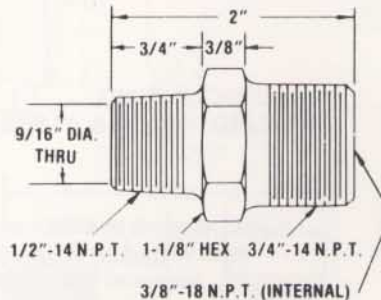
## REDUCING NIPPLES

Reducing nipples are used for mounting stem-sensitive detectors in such a way that no dismantling of conduit lines is required for repair or installation. They also provide a means of mounting a detector having a 3/8-18NPT in a thermowell or mounting boss having a 1/2-14NPT. Order by complete part number.

### REDUCING NIPPLES DATA

Part No.	Material
22642-00004	Type 304 Stainless Steel

**PART NO. 22642-00004**



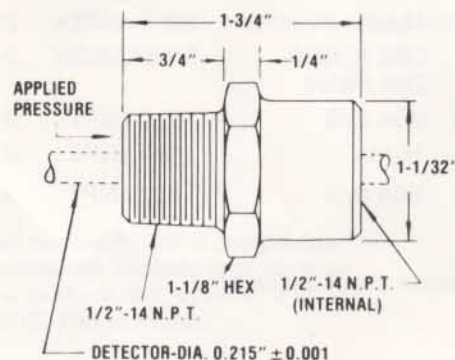
## OIL SEAL FITTINGS

Oil seal fittings are used to allow the stem of tip-sensitive detectors to pass through an outer casing to reach the bearing support. If desired, a detector head may be mounted on this fitting. Fittings withstand up to 200 psig pressure at -70°F to +350°F (-57°C to +177°C).

### OIL SEAL FITTINGS DATA

Part No.	Application	Installation
42880	Casing thickness 1/2 inch minimum	Drill 45/65 inch hole, tap 1/2-NPT

**PART NO. 42880**





# Accessories

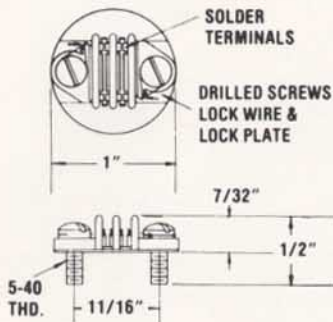
## TERMINAL BLOCKS

Terminal blocks are designed for use with miniature tip-sensitive detectors (Models 327-, 669- & 975-), but may be used to connect the leads of any detector to open wiring where space is limited.

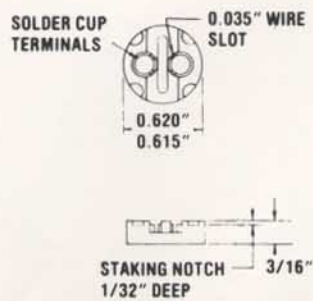
### TERMINAL BLOCK DATA

Part No.	Conductors	Terminals	Mounting Method
41820	2	solder	Two No. 5-40 screws 11/16 in. centers
42036	2	solder	Stake into 5/8 inch dia. hole 3/16 inch deep

### PART NO. 41820



### PART NO. 42036



## DISTRIBUTORS

Armtec now supplies RTDs, accessories, Omniguard Monitors and Omniguard Flame Safeguard products through our network of U.S. distributors. International representatives are also available throughout the world.

## THERMOWELLS

Thermowells are available through our stocking distributors.

# Armtec Resistance Temperature Detectors

## TEMPERATURE-RESISTANCE CHARACTERISTICS

Temperature Degrees		Resistance In Ohms				
		Platinum Windings		Nickel Windings		Copper Winding
°C	°F	#8	#11	#1	#7	#15
-130	-202	47.93	47.28			
-110	-166	56.13	55.52			
-90	-130	64.25	63.71			
-70	-94	72.29	71.86	68.27	73.10	
-60	-76	76.28	75.92	71.19	79.62	
-50	-58	80.25	79.96	74.24	86.17	7.10
-40	-40	84.21	83.99	77.39	92.76	7.49
-30	-22	88.17	88.01	80.56	99.41	7.88
-20	-4	92.13	92.02	83.77	106.15	8.26
-10	+14	96.07	96.02	87.04	113.00	8.65
±0	+32	100.00	100.00	90.38	120.00	9.04
+10	+50	103.90	103.97	93.80	127.17	9.42
+20	+68	107.79	107.93	97.31	134.52	9.81
+30	+86	111.67	111.88	100.91	142.06	10.19
+40	+104	115.54	115.82	104.60	149.79	10.58
+50	+122	119.40	119.75	108.39	157.74	10.97
+60	+140	123.24	123.66	112.28	165.90	11.35
+70	+158	127.07	127.56	116.27	174.27	11.74
+80	+176	130.89	131.45	120.36	182.85	12.12
+90	+194	134.70	135.33	124.55	191.64	12.51
+100	+212	138.50	139.20	128.85	200.64	12.90
+110	+230	142.28	143.06	133.26	209.86	13.28
+120	+248	146.06	146.90	137.78	219.30	13.67
+130	+266	149.82	150.73	142.40	228.96	14.06
+140	+284	153.57	154.55	147.11	238.85	14.44
+150	+302	157.32	158.36	151.91	248.97	14.83
+160	+320	161.04	162.16	156.79	259.37	15.22
+170	+338	164.76	165.94	161.89	269.92	15.61
+180	+356	168.47	169.71	167.13	280.79	16.00
+190	+374	172.16	173.47	172.46	291.96	16.39
+200	+392	175.84	177.22	177.95	303.46	16.78
+210	+410	179.51	180.96	183.55	315.31	17.17
+220	+428	183.17	184.69	189.40	327.53	17.56
+230	+446	186.82	188.40	195.35	340.14	17.95
+240	+464	190.46	192.10	201.55	353.14	18.34
+250	+482	194.08	195.80	208.00	366.53	18.73
+260	+500	197.70	199.47	214.60	380.31	
+280	+536	204.88	206.80	228.45	409.07	
+300	+572	212.03	214.07	242.70	439.43	
+320	+608	219.13	221.30			
+340	+644	226.18	228.48			
+360	+680	233.19	235.62			
+380	+716	240.15	242.70			
+400	+752	247.06	249.74			
+420	+788	253.93	256.74			
+440	+824	260.75	263.68			
+460	+860	267.52	270.58			
+480	+896	274.25	277.43			
+500	+932	280.93	284.24			
+520	+968	287.57	291.00			
+540	+1004	294.16	297.71			
+560	+1040	300.70	304.37			
+580	+1076	307.20	310.99			
+600	+1112	313.65	317.56			
+620	+1148	320.05	324.08			
+640	+1184	326.41	330.56			
+660	+1220	332.72	336.99			
+680	+1256	338.99	343.37			
+700	+1292	345.21	349.70			
+720	+1328	351.38	355.99			
+740	+1364	357.51	362.23			
+760	+1400	363.59				
+780	+1436	369.62				
+800	+1472	375.61				
+820	+1508	381.55				
+840	+1544	387.45				

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