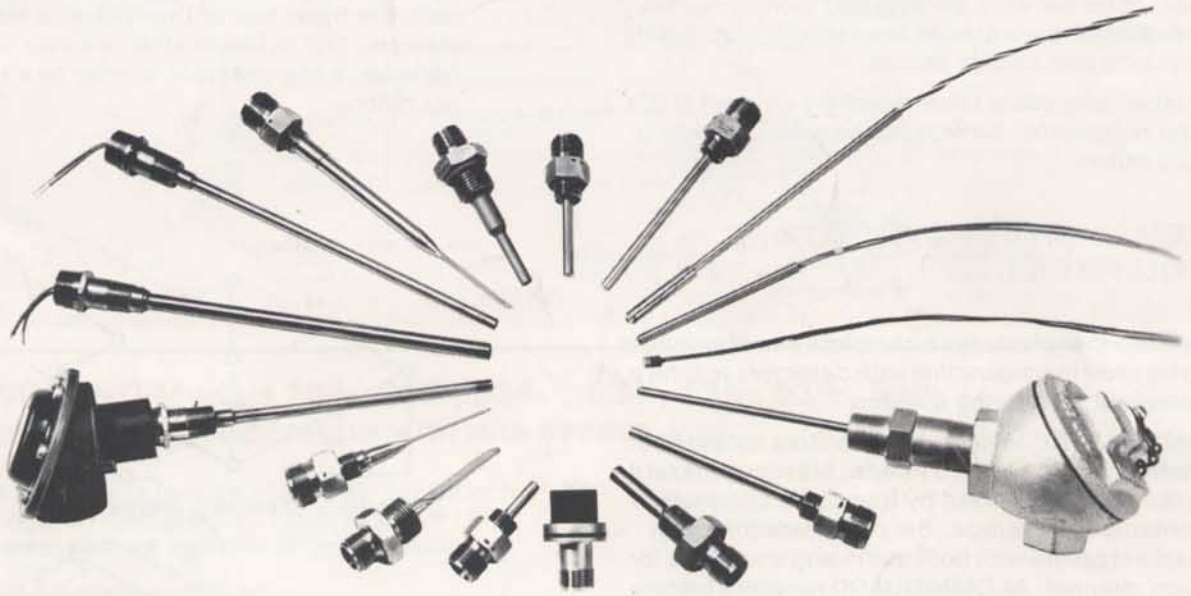
Omniguard

Temperature Sensors

OMNIGUARD® RTDs



Resistance Temperature Detectors & Accessories Catalog

ARMTEC/RAGEN INC

MEGGITT AEROSPACE

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.

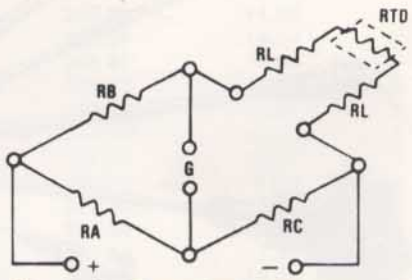


Figure 1 Two-wire bridge circuit

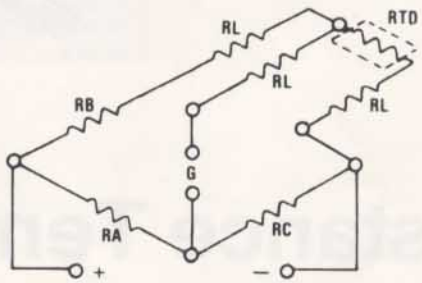


Figure 2 Three-wire bridge circuit

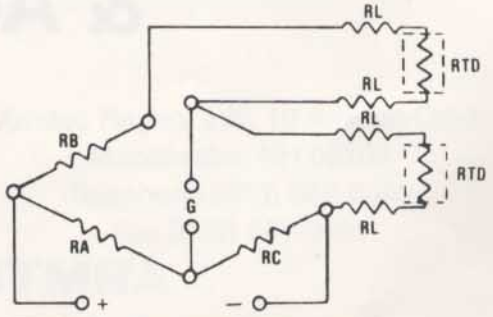


Figure 3 Four wire differential bridge circuit

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.

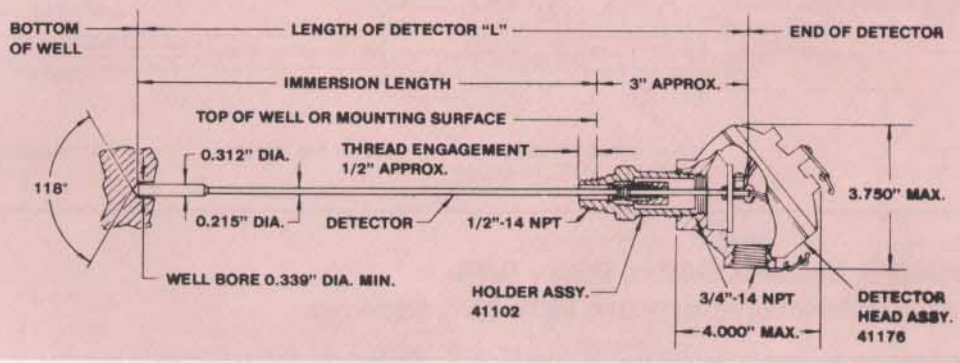
HOW TO ORDER

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

166- 0 12 16
- 16 — RTD LENGTH IN INCHES (L)
- 12 — LEAD LENGTH IN INCHES
- 0 — DEVIATION NUMBER, ASSIGNED BY ARMTEC
- 166- — MODEL NUMBER

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.

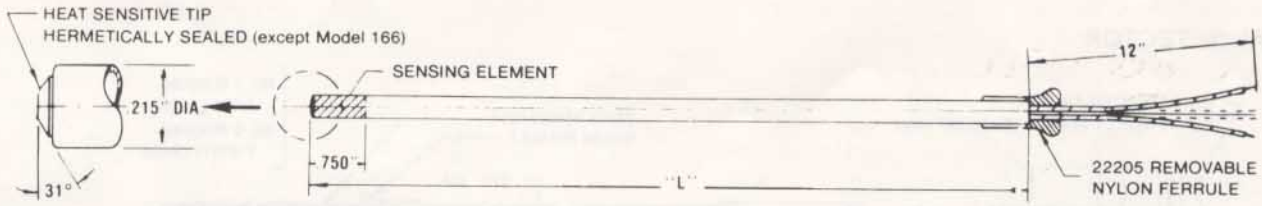
COMMON CHARACTERISTICS

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

Accessories

Holder		Head	Wrench
41102		41176	22363
41683	41985	42240	
42078		42690	

TYPICAL DETECTOR



MODEL NO.	166,269,334	534,569	536	538,538
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

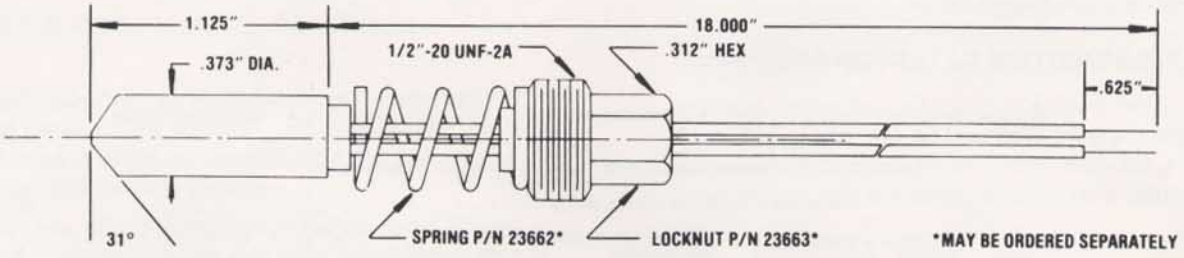
SINGLE WINDING MODEL 298-01802–For use in radiation environment

SPECIFICATIONS

Temperature Range	−100°C to +300°C (−148°F to +572°F)
T/R Characteristic	#7 (120Ω @ 0°C, Ni)
Accuracy	±0.5% of resistance
Response Time	5 seconds
Maximum Current in Air	.015 amp
Stem Diameter	.373"
Stem Length	1-⅛"

Materials	
Tip	Aluminum
Stem	Aluminum
Maximum Pressure	250 psig at tip
Maximum Radiation	500 r/hr
Number of Leads	2
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

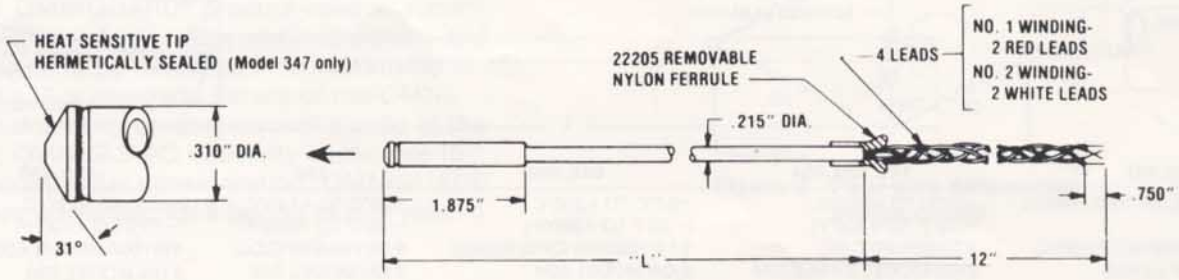
Temperature Range	−57°C to +260°C (−70°F to +500°F)
Accuracy	±0.5% of resistance for 986- ±1.0% of resistance for 347- & 982-
Response Time	2 seconds
Maximum Current in Air	.015 amp
Stem Diameter	.215"
Tip Diameter	.310"
Materials	
Tip	Copper
Stem	#316 S/S

Leads	Stranded nickel-clad copper with Teflon® insulation
Maximum Pressure	75 psig at tip
T/R Characteristic	
Model 347-	#7(120Ω@0°C, Ni)
Model 982-	#8(100Ω@0°C, Pt)(.00385)
Model 986-	#11(100Ω@0°C, Pt)(.00392)

Accessories

Holder		Head	Wrench
41102		41176	25345
41683	41985	42240	
42078		42690	

TYPICAL DETECTOR



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.

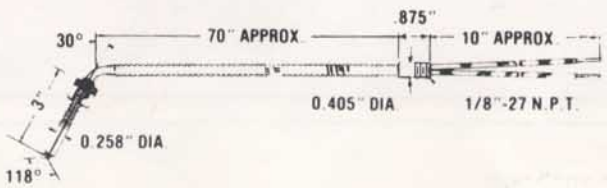
COMMON CHARACTERISTICS

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

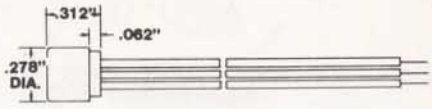
Miniature detectors are designed to be embedded in bearings. The shell is tinned so that the detector may be covered with babbit after being installed in a hole drilled in the bearing surface. Installation should be in dry locations since the detectors are not hermetically sealed. Standard lead lengths 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.
Accuracy	±1.0% of resistance
Response Time	5 seconds
Maximum Current in Air	0.15 amp
Body Material	Tinned Brass
Maximum Pressure	2500 psig when encased in babbit
Specification	MIL-T-22051 and MIL-T-17600B (Ships); (309-01801 & 327-01801)
Accessories	41820 Terminal block 42036 Terminal block

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

- LEAD MATERIAL: 01 – SOLID NICKEL, VARGLASS SILICONE INSULATION; 02 – STRANDED NICKEL, ETCHED TEFLON® INSULATION
- LEAD LENGTH (18" STD) LONGER ON SPECIAL ORDER
- DEVIATION NUMBER (ASSIGNED BY ARMTEC AS REQUIRED)

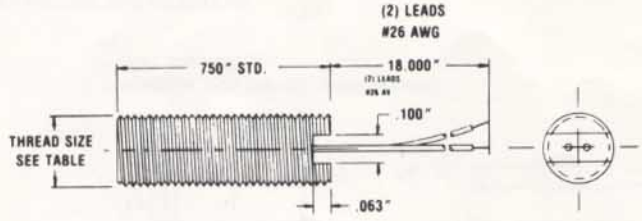
MINIATURE Model 975- – Designed to be threaded into bearings

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@O°C, Ni)	Body	Brass (other materials on special order)
Accuracy	±1% of resistance		
Maximum Current in Air	.015 amp	Leads	Stranded nickel, Teflon® insulated
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.

HOW TO ORDER

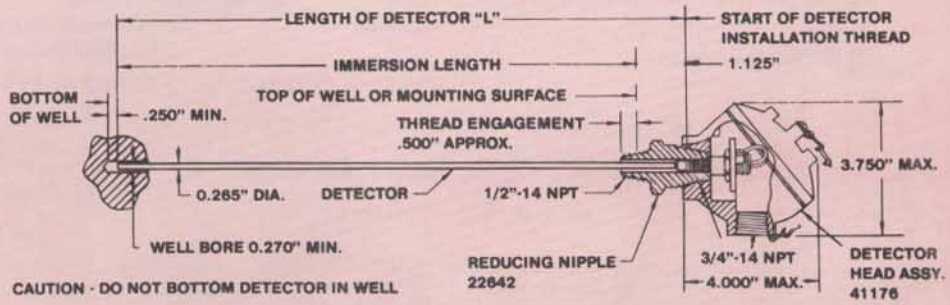
Order all RTD models by complete part number. Construct the complete part number as shown below for the following stem sensitive RTD models: 230-, 330-, and 242-.

230- 0 02 16

- 16 — RTD PROBE LENGTH IN INCHES (L)
- 02 — LEAD LENGTH IN INCHES
- 0 — DEVIATION NUMBER, ASSIGNED BY ARMTEC
- 230- — MODEL NUMBER

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

TYPICAL STEM SENSITIVE DETECTOR ASSEMBLY



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

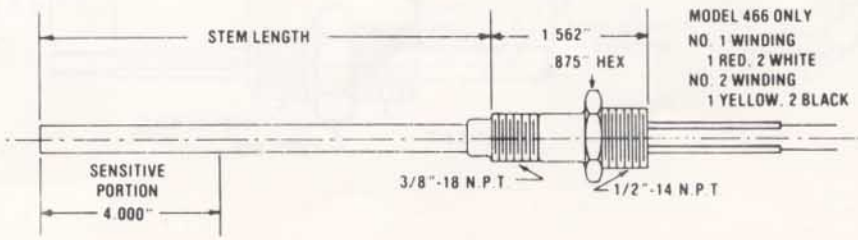
SPECIFICATIONS

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

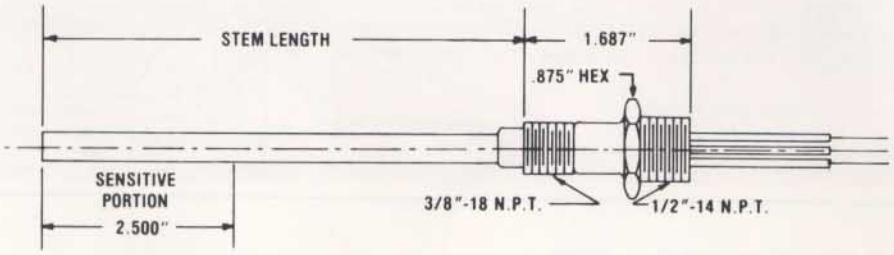
SINGLE WINDING Model 242-* – For temperatures over 400°F

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

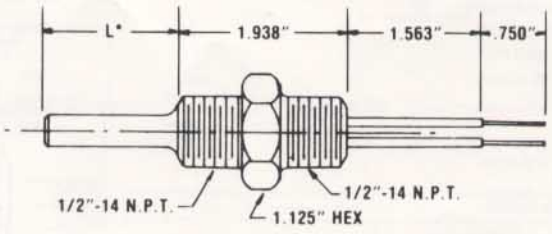


SINGLE WINDING Model 315-00304–For pressure over 200 psig

SPECIFICATIONS

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

MODEL 315-00304

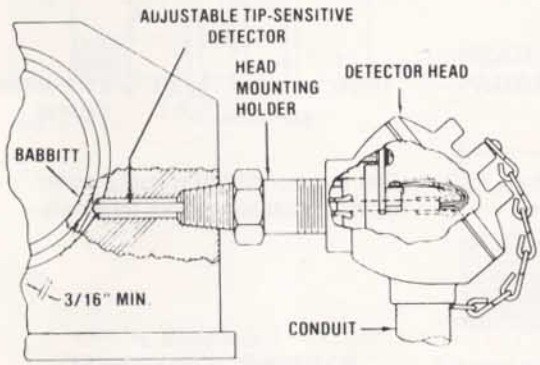


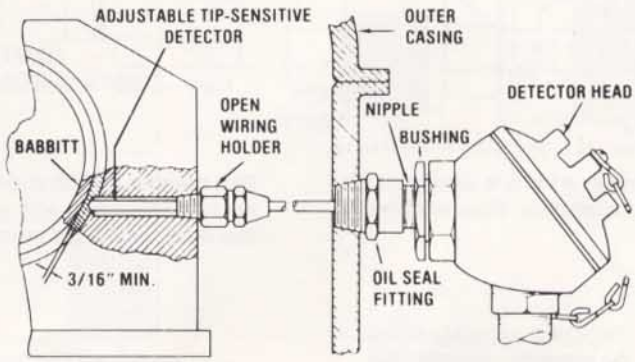
USING RTD ACCESSORIES

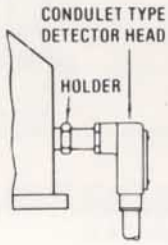
This section describes accessories for use when installing Armtec RTDs. Included are detector heads, holders, reducing nipples, oil seal fittings, terminal blocks, a mounting kit assembly, and thermowells. Order accessories by complete part number.

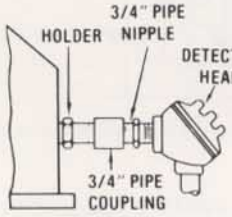
Methods of combining various accessories to meet specific installation problems are virtually unlimited. A few of the more common uses are shown below. Select the accessories which best suit your needs.

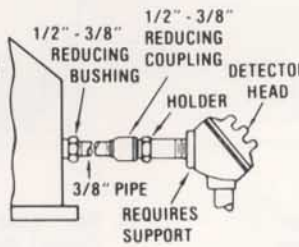
ACCESSORIES USED IN TYPICAL INSTALLATIONS

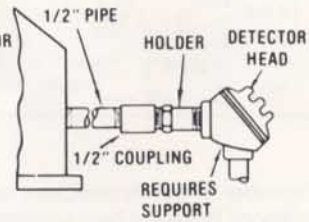


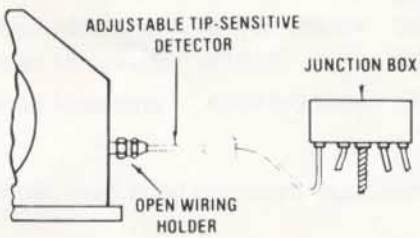


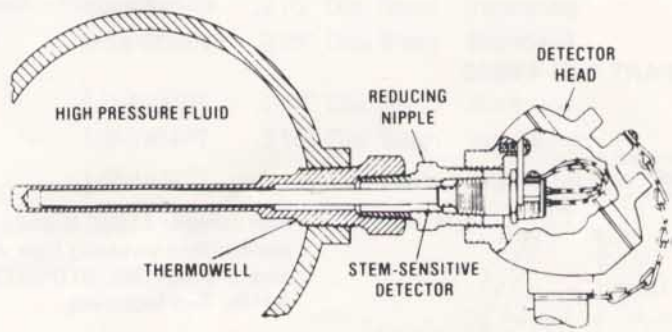








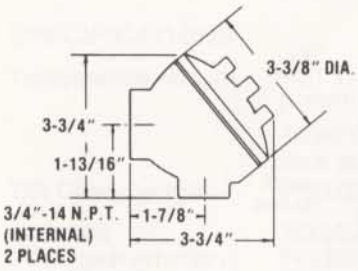




DETECTOR HEADS

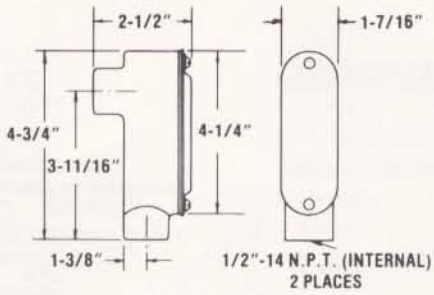
The detector head provides a means of making conduit installations to the detector and serves as a protective enclosure. Reference dimensions for Armtec detector heads are shown below. Order by complete part number.

PART NO. 41176



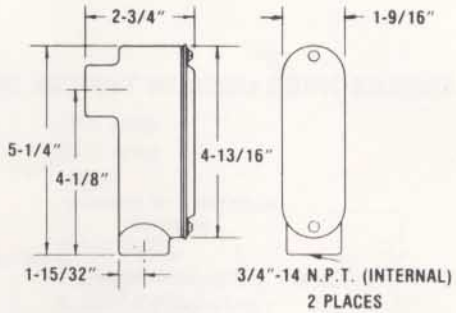
Part number 41176 is designed for normal installation. Four terminals.

PART NO. 42688



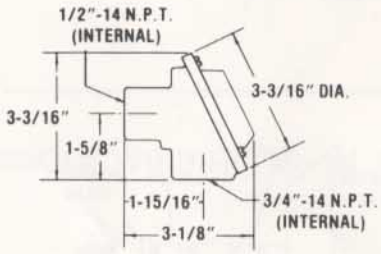
Part number 42688 is designed for normal installation with stem-sensitive detectors. Four terminals.

PART No. 42690



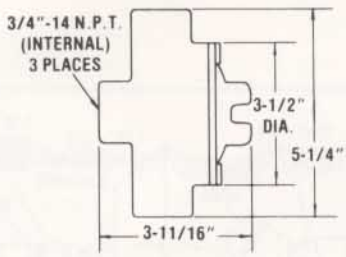
Part number 42690 is designed for normal installation. Four terminals.

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.

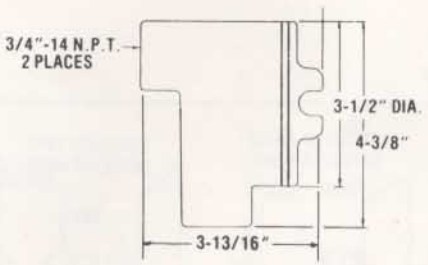
#42240-00001 - Cast iron head, aluminum cover, 4 terminals

#42240-00002 - Cast iron head, aluminum cover, 6 terminals

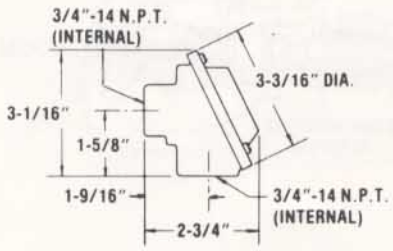
#42240-00003 - Cast iron head, aluminum cover, 4 terminals

#42240-00011 - Aluminum head & cover, 4 terminals

PART NO. 42240-00003



PART NO. 41985

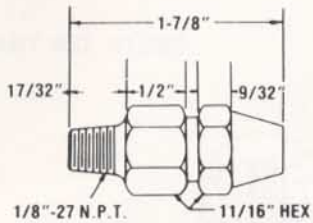


Part number 41985 is designed for applications involving high vibration and/or shock (MIL-STD-167 & MIL-S-901B). Two terminals.

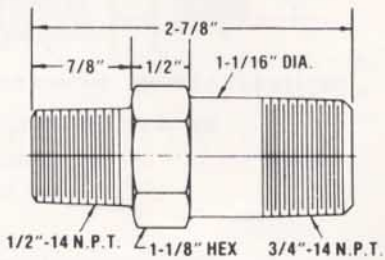
DETECTOR HOLDERS

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.

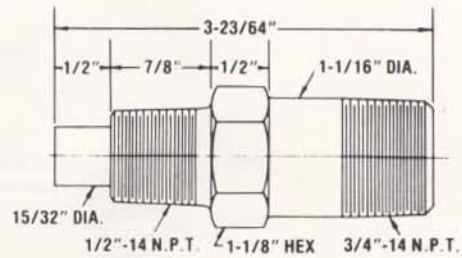
OPEN WIRING
PART NO. 35786 & 42124



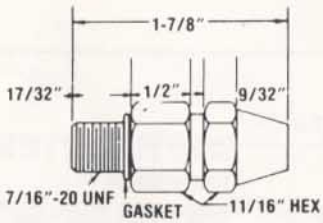
HEAD MOUNTING
PART NO. 41102 & 41683



EXPLOSION PROOF
PART NO. 42078



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.

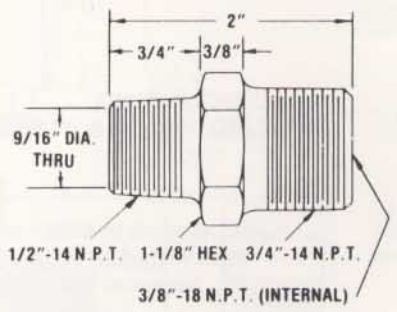
REDUCING NIPPLES

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



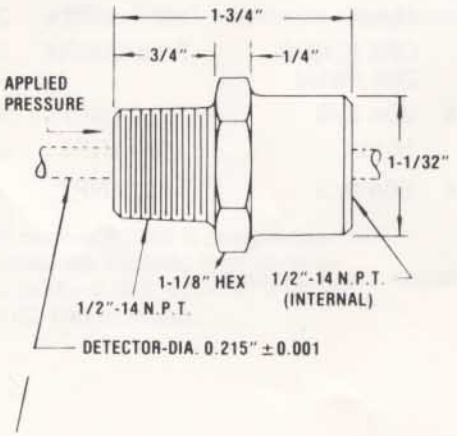
OIL SEAL FITTINGS

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



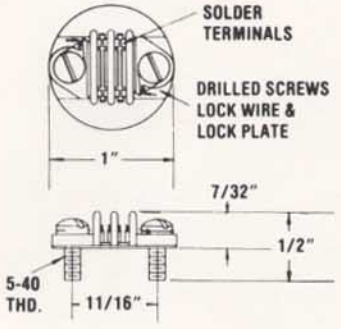
TERMINAL BLOCKS

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.

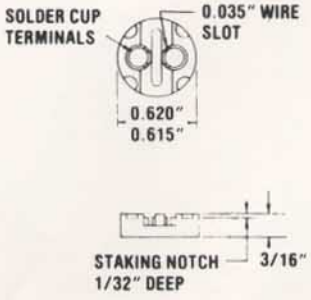
TERMINAL BLOCK DATA

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.

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				

Armtec Ragen, Inc., 10 Ammon Drive
Manchester, NH 03103
Telephone (603) 669-0940
Fax (603) 669-0931

Dimensions and specifications subject to change without notice.

© 1991 All Rights Reserved

Publication 1031188 0295 MP