CeramTec

CeramTec North America Corporation

Pressure

SEMICONDUCTOR | ANALYTICAL EQUIPMENT | AEROSPACE | TELECOMMUNICATIONS

OIL EXPLORATION | R&D | HIGH ENERGY PHYSICS | MILITARY/DEFENSE | BIOTECHNOLOGY

Advanced Ceramic-to-Metal &
Glass-Ceramic Sealing Technology

Description

CeramTec's pressure feedthroughs are terminated in NPT (National Pipe Thread) fittings or other threaded fittings to allow for easy bulkhead installation. The NPT pressure units are designed to be sealed using Teflon tape or other acceptable sealants. All other designs use an o-ring seal.

These Ceramaseal® components are usually used in pressure vessels or industrial environments. High vacuum applications are also common but note that the use of threaded connections in a vacuum system should be minimized. The small spaces between the threads can cause virtual leaks.

CeramTec has been designing and manufacturing high pressure, high-reliability, ceramic-to-metal assemblies for more than 55 years.

The pressure feedthroughs in this section show capability in design for pressures up to 25,000 psig. In every design, the ceramic used is high-grade alumina or glass-ceramic, the NPT mounting members are 304 or 316 stainless steel and the ceramic-metal braze materials are silver, silver-copper or copper.

Standard Specifications

- 1/8" to 1/2" NPT fittings
- Internal pressures from 1 x 10^{-10} torr to 25,000 psig
- Feedthrough, multipin connector, coaxial, CeramTite and Tec-Seal units available
- 1 to 10 conductors

Extreme / Custom Design

- Different fittings: cone and thread, NPT, straight thread and weld designs
- Internal pressures from 1 x 10^{-10} torr to 40,000 psig

- Instrumentation, multipin connector, coaxial, and thermocouple units are available
- Precious metal braze alloys

Installation

CeramTec's high quality pressure feedthroughs mount easily through NPT fittings or other threaded fittings.

Applications

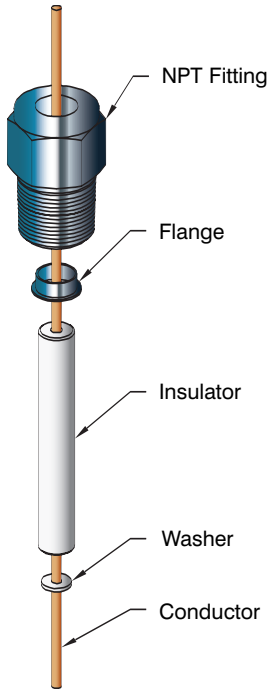
A few of the many applications in which these pressure feedthroughs are commonly used are:

- Undersea communications
- Geothermal energy exploration
- Power generation
- Furnaces

New Products

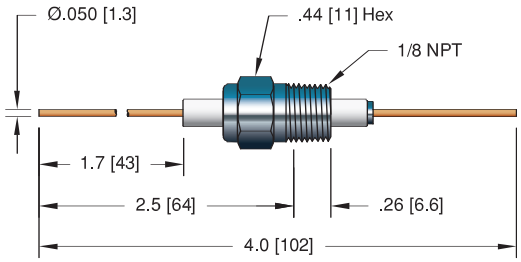
- Power Plug feedthroughs mounted in NPT fittings
- CeramTite™ glass-ceramic sealed high pressure feedthroughs
- Tec-Seal™ high pressure feedthroughs

Typical Pressure Feedthrough Construction

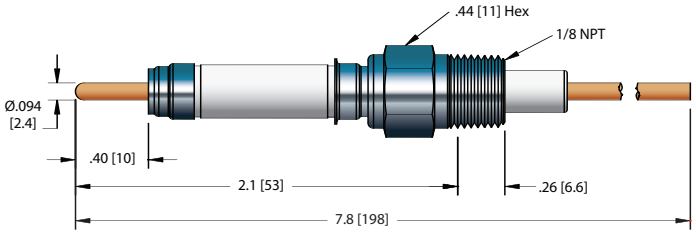


Type	Voltage DC	Current (Amps per pin)	Pressure @ 20˚C	Number of Conductors	Conductor Material	Sub-section	Section Pages
			PSIG (Bar)				
	to 25 kV	to 185 Amps	4000 (275)	1, 4, 6 & 10	Feedthrough: Copper Multipin: Alumel Coaxial: 304 Stn. Stl. or Nickel	NPT	G.1 184-187
	500 V	4 Amps	to 25,000 (1724)	1 to 3	Alumel	CeramTite™	G.2 188-189
	1.5 kV	15 Amps	to 25,000 (1724)	1	52 Nickel iron	Tec-Seal™	G.3 190-191

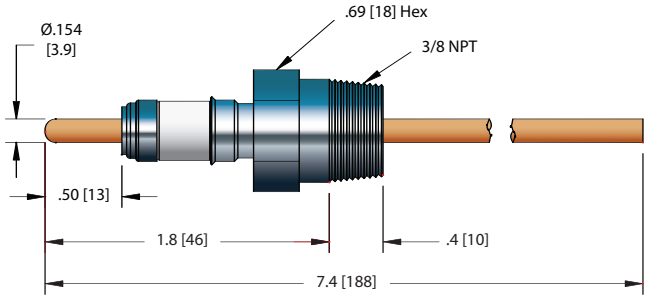
.050 [1.3] Dia. Conductor – 1/8" NPT



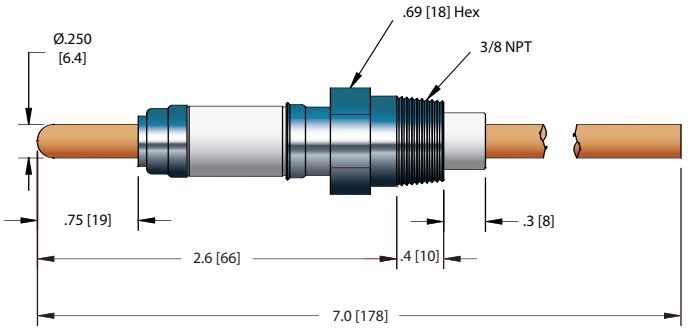
20 KV Power Plug – 1/8" NPT



.154 Power Plug – 3/8" NPT

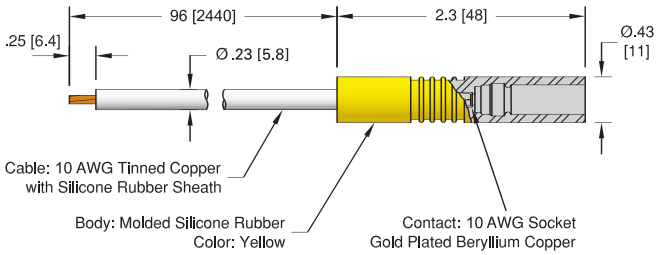


.250 Power Plug – 3/8" NPT

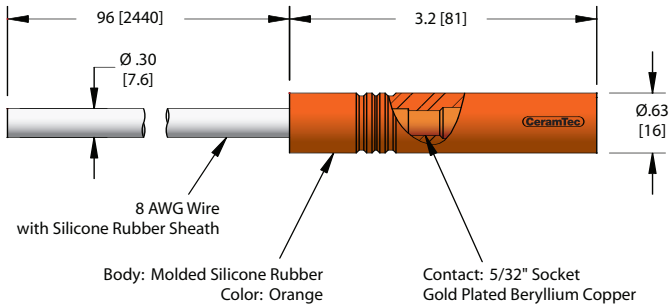


Power Plug Cable Assemblies

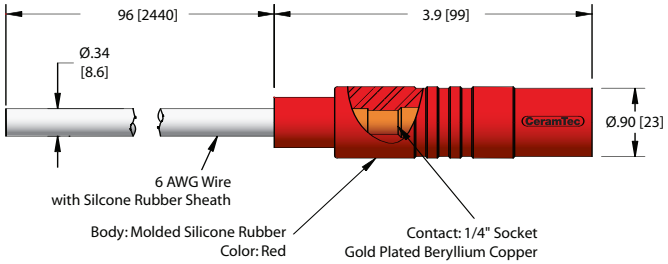
20 kV Power Plug



.154 Power Plug



.250 Power Plug



Feedthrough Specifications

Materials

NPT Fitting: 316 Stainless steel
Conductor: Copper or 304 Stainless steel
Insulation: Alumina ceramic
Magnetic Materials: See table

Voltage Rating See table

Current Rating See table

Temperature Range -269°C to 450°C

Pressure @ 20°C See table

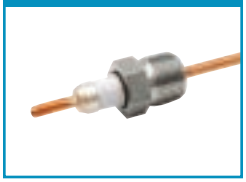
.050 [1.3] Dia. Conductor, 1/8" NPT

VOLTAGE DC	CONDUCTOR AMPS	CONDUCTOR MATERIAL	INSTALLATION	PRESSURE@20°C PSIG	PRESSURE@20°C BAR	MAGNETIC MATERIALS	PART NUMBER
5 kV	27	Copper	1/8" NPT	4000	275	Yes	2846-01-A

20 KV Power Plug 1/8" NPT

20 kV*	3.6	304 Stn. Stl.	1/8" NPT	4000	275	No	21322-01-A
20 kV*	55	Copper	1/8" NPT	4000	275	No	21324-01-A

.154 Power Plug 3/8" NPT



10 kV*	100	Copper	3/8" NPT	1000	69	Yes	21152-01-A

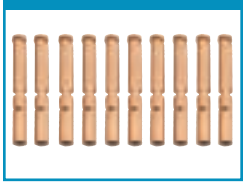
.250 Power Plug 3/8" NPT

25 kV*	185	Copper	3/8" NPT	1000	69	Yes	21143-01-A

Air Side Cable Assemblies

TYPE	CABLE TYPE	LENGTH	VOLTAGE DC	CONDUCTOR AMPS	TEMPERATURE °C MIN	TEMPERATURE °C MAX	PART NUMBER
20 kV Power Plug	10 AWG	8'	20 kV	55	-55	125	14419-02-A
.154 Power Plug	8 AWG	8'	10 kV	75	-55	125	21094-01-A
.250 Power Plug	6 AWG	8'	25 kV	100	-55	125	20956-02-A†

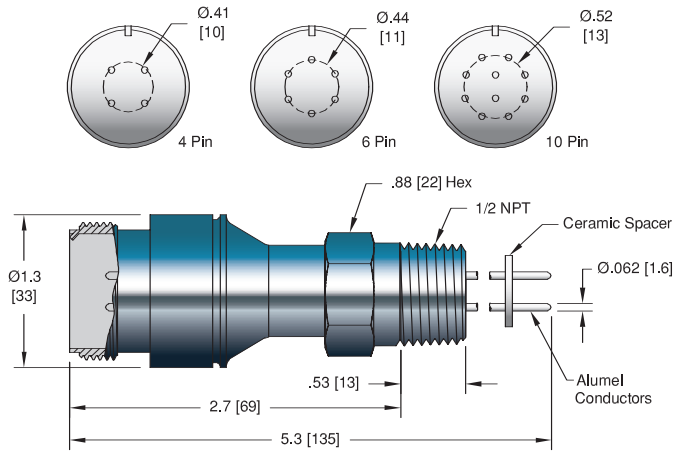
Contacts



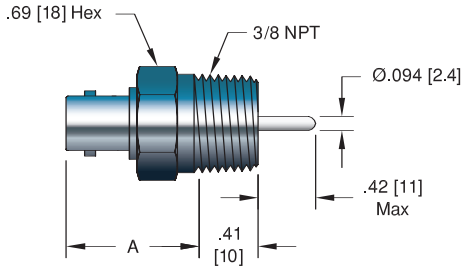
TYPE	MATERIAL	DESCRIPTION	PART NUMBER
0.050 Crimp Contacts	Beryllium Copper	Accepts wire up to 0.062 [1.6]	11911-02-X†
0.094 Set Screw Type Contacts	Beryllium Copper	Accepts wire up to 0.050 [1.3]	7429-01-A
0.094 Barrel Type Contacts	Beryllium Copper	Accepts wire up to 0.094 [2.4]	7332-04-A
0.154 Barrel Type Contacts	Beryllium Copper	Accepts wire up to 0.154 [3.9]	7332-07-A
0.250 Barrel Type Contacts	Beryllium Copper	Accepts wire up to 0.250 [6.4]	7332-06-A
Crimp Tool		For 0.025" - 0.075" Crimp Diameters	2840-05

*When used with airside cable assembly. **Contacts priced and sold in packages of 10. †Shown in photo. See the Accessories section for more information on all accessories. Note that voltage ratings are based on a minimum of 250 volts DC per mil dielectric strength on the pressure side.

MIL-C-5015 Type – 1/2" NPT



Coaxial – 3/8" NPT



Specifications - Multipin Connector

Materials

NPT Fitting: 316 Stainless steel
Conductor: Alumel
Insulation: Alumina ceramic
Magnetic Materials: Yes

Voltage Rating 700 V DC

Current Rating 7 Amps per pin

Temperature Range -269°C to 450°C

Pressure @ 20°C

4 Pin: 600 (41 Bar)
6 Pin: 550 (38 Bar)
10 Pin: 500 (34 Bar)

Specifications - Coaxial Connector

Materials

NPT Fitting: 316 Stainless steel
Conductor:
BNC: 304 Stainless steel
MHV: 304 Stainless steel
SHV: Nickel
Insulation: Alumina ceramic
Magnetic Materials:
BNC: No
MHV: No
SHV: Yes

Voltage Rating BNC: 500 V, MHV: 5 kV, SHV: 5 kV DC

Current Rating

BNC: 3.6 Amps, MHV: 3.6 Amps, SHV: 16.5 Amps

Temperature Range -269°C to 450°C

Pressure @ 20°C

BNC: 1400 (97 Bar)
MHV: 1400 (97 Bar)
SHV: 1600 (110 Bar)

MIL-C-5015 Type 1/2" NPT

CONDUCTOR QTY	AMPS	INSTALLATION	PART NUMBER
4	7	1/2" NPT	10184-08-A†
6	7	1/2" NPT	10185-08-A
10	7	1/2" NPT	10094-11-A

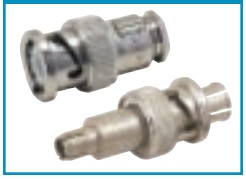
Air Side Plugs

NO. CONTACTS	VOLTAGE DC	CONDUCTOR AMPS	TYPE	DIMENSIONS H	DIMENSIONS L	PART NUMBER
4	700 V	13	Air Side	1.4 [36]	4.4 [112]	15910-01-A†
6	700 V	13	Air Side	1.4 [36]	4.4 [112]	15911-01-A
10	700 V	13	Air Side	1.4 [36]	4.4 [112]	15912-01-A

BNC, MHV & SHV 3/8" NPT

COAXIAL TYPE	CONDUCTOR AMPS	MATERIAL	DIMENSION A	PART NUMBER
BNC	3.6	304 Stn. Stl.	0.90 [23]	9263-04-A†
MHV	3.6	304 Stn. Stl.	0.90 [23]	9263-03-A
SHV	16.5	Nickel	1.2 [30]	9263-06-A

Air Side Plugs



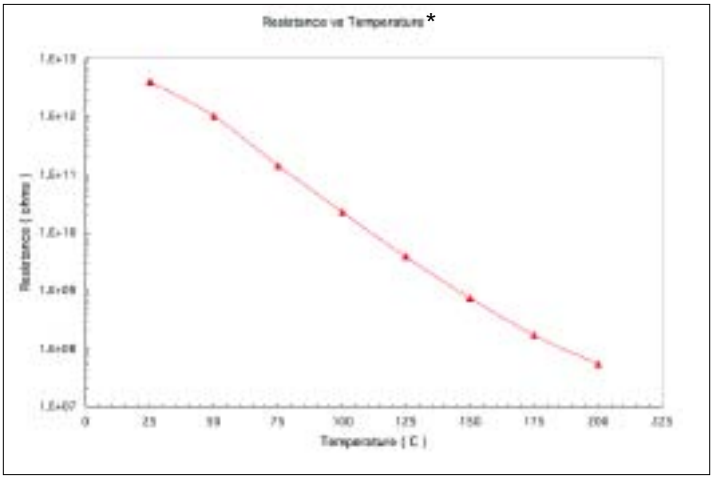
TYPE	VOLTAGE DC	CONDUCTOR AMPS	DIMENSIONS H	DIMENSIONS L	DESCRIPTION	PART NUMBER
Air Side	500 V	5	0.56 [14]	1.1 [28]	BNC Plug	7116-02†
Air Side	5 kV	10	0.56 [14]	1.5 [38]	MHV Plug	7116-01
Air Side	5 kV	10	0.56 [14]	1.8 [46]	SHV 5 kV Plug	8058-01†

†Shown in photo.

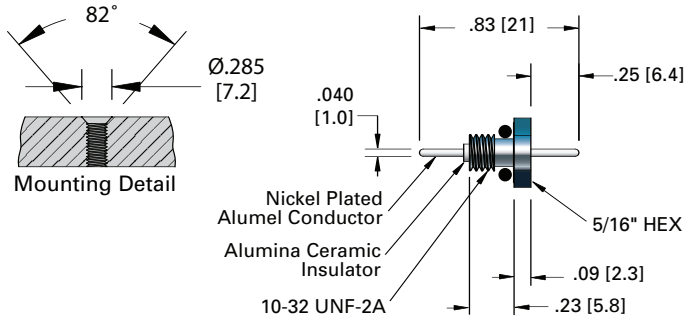
CeramTite™ High Pressure Feedthroughs

CeramTite™ feedthroughs consist of a Nickel plated Alumel pin bonded directly to the threaded bolt using our proprietary glass-ceramic sealing process. These hermetically sealed feedthroughs utilize an O-ring crush seal to make the external pressure seal. The hex bolt side is designed to be the high pressure side of the feedthrough. The temperature rating of the assembly is limited by the O-ring material. Viton® is the standard O-ring material used and this material has a high end temperature capability of 205° C.

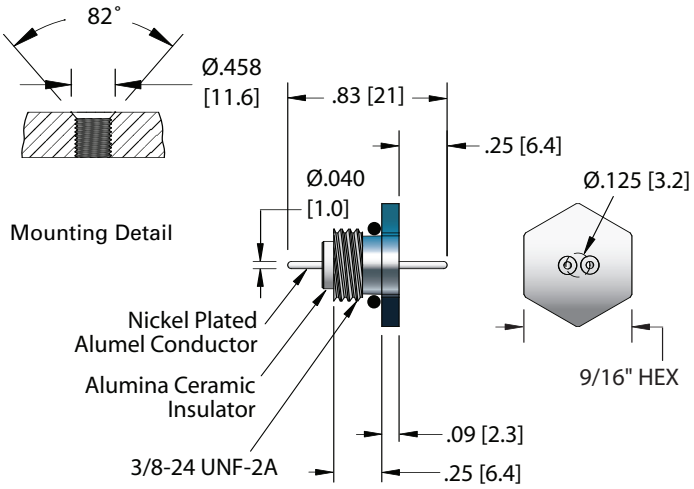
CeramTite™ feedthroughs are typically used for low power or instrumentation applications in pressure vessels or oil systems. 100% of CeramTec's Ceramaseal® products are helium leak tested to meet or exceed 10^{-10} atm-cc/sec (He). Custom bolt sizes, pin configurations or sizes are available upon request.



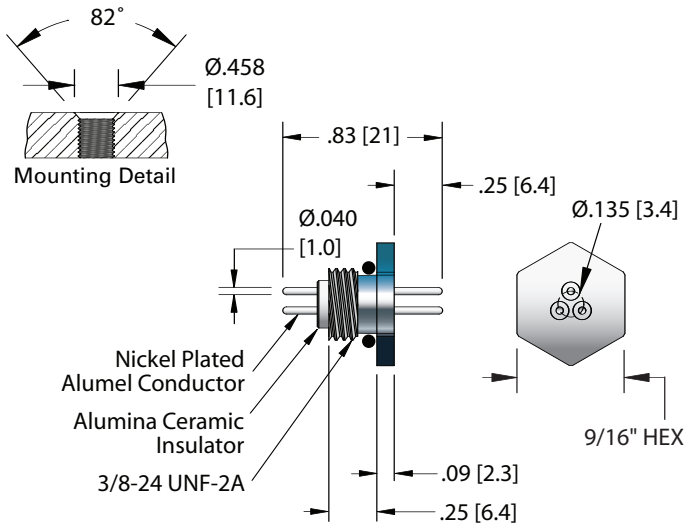
Single Pin



Two Pin



Three Pin



Specifications

Material

Body: 316 Stainless steel
O-ring: Viton®
Pin: Alumel (Nickel Plated)
Insulation: Glass-ceramic & Alumina ceramic
Magnetic Materials: Yes

Voltage Rating 500 V DC

Current Rating 4 Amps per pin

Temperature Range* -269° C to 450° C

Viton® O-ring: -25° C to 205° C

Pressure @ 20°C

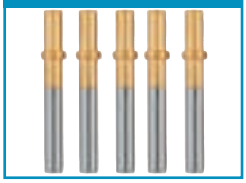
Single Pin: 25,000 (1724 Bar)
2 Pin: 20,000 (1379 Bar)
3 Pin: 20,000 (1379 Bar)

*Maximum temperature ratings listed are for bakeout only. The insulation resistance at these temperatures may not be suitable for all applications.

Single Pin 10-32	NO. PINS	INSTALLATION HEX	INSTALLATION THREAD	PART NUMBER
	1	5/16	10-32	50039-01-A

2 Pin 3/8-24				
	2	9/16	3/8-24	50040-01-A

3 Pin 3/8-24				
	3	9/16	3/8-24	50041-01-A

Contacts	TYPE	MATERIAL	DESCRIPTION	PART NUMBER
	0.040 Crimp Contacts	Copper Alloy - Gold Flash	Accepts wire up to 0.040 [1.0]	16167-03-A†
	Crimp Tool		For 0.025" - 0.075" Crimp Diameters	2840-05

*Contacts priced and sold in packages of 5. †Shown in photo. See the Accessories section for more information on all accessories.

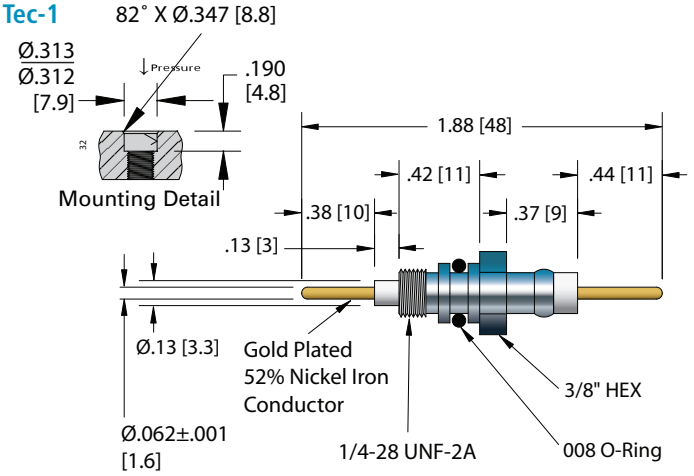
Tec-Seal™ High Pressure Feedthroughs

Tec-Seal™ feedthrough products are built for extreme downhole environments. These rugged hermetic feedthroughs are rated for pressures up to 25,000 psi and temperatures up to 250° C. The Tec-Seal™ embedded seal design will maintain the seal integrity even if one or both sides of the feedthrough are sheared off, thus protecting the bulkhead electronics from damage.

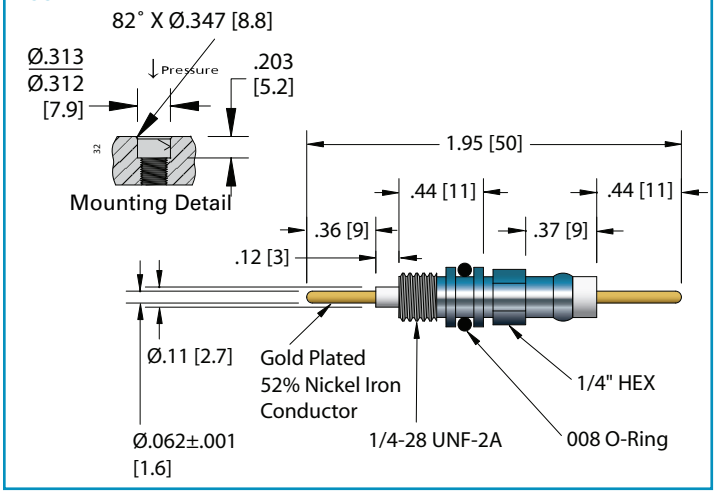
These designs are successfully tested to 50,000 psig but the assembly pressure rating is limited by the o-ring. There isn't a more reliable or durable feedthrough available.

The temperature rating of the assembly is limited by the O-ring material. Viton® is the standard O-ring material used and this material has a high end temperature capability of 205° C. 100% of CeramTec's Ceramaseal® products are helium leak tested to meet or exceed 10^{-10} atm-cc/sec (He). Custom bolt sizes, pin configurations or sizes are available upon request.

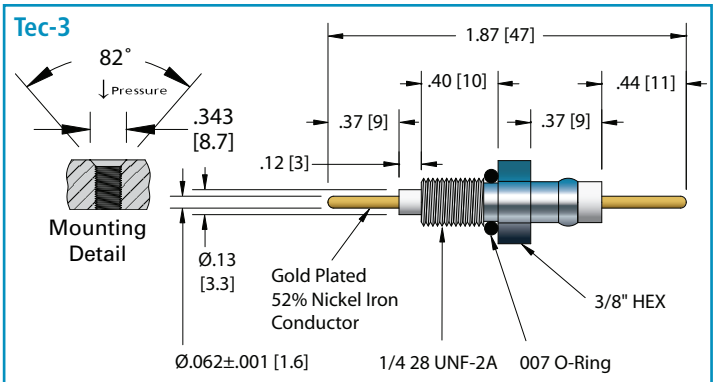
Tec-1



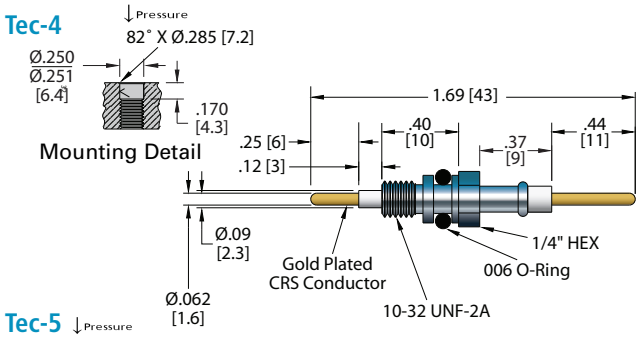
Tec-2



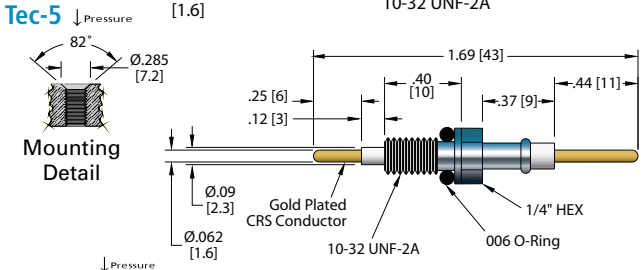
Tec-3



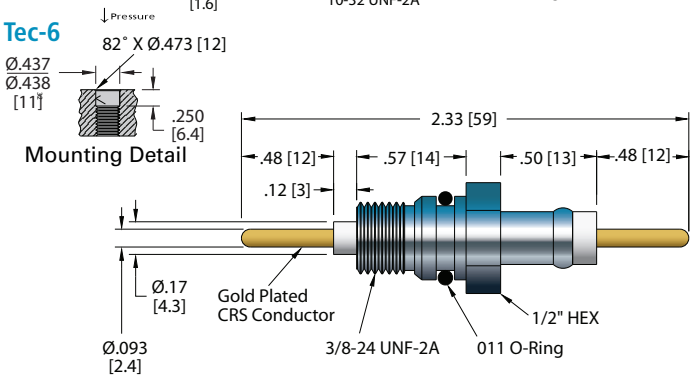
Tec-4



Tec-5



Tec-6



Specifications

Materials

Body: 304 Stainless steel
O-ring: Viton®
Pin: See table
Insulation: Alumina ceramic & glass-ceramic
Magnetic Materials: Yes

Voltage Rating See table

Current Rating See table

Temperature Range -269° C to 250° C
Viton® O-ring: -25° C to 205° C

Pressure @ 20°C 25,000 PSIG (1724 Bar)

PRESSURE

	INSTALLATION HEX	INSTALLATION THREAD	VOLTAGE DC	CONDUCTOR AMPS	CONDUCTOR MATERIAL	PART NUMBER	
Tec-1 	3/8	1/4-28	1.5 kV	7.5	52 Nickel Iron	50015-01-A	
Tec-2 	1/4	1/4-28	1.5 kV	7.5	52 Nickel Iron	50019-01-A	
Tec-3 	3/8	1/4-28	1.5 kV	7.5	52 Nickel Iron	50020-01-A	
Tec-4 	1/4	10-32	1.5 kV	10	Cold Rolled Steel	50054-02-A	
Tec-5 	1/4	10-32	1.5 kV	10	Cold Rolled Steel	50065-01-A	
Tec-6 	1/2	3/8-24	5 kV	20	Cold Rolled Steel	50060-01-A	

Contacts	TYPE	MATERIAL	DESCRIPTION	PART NUMBER	
	0.062 Crimp Contacts	Nickel Alloy	Accepts wire up to 0.062 [1.6]	0821-01-A†	
	0.062 Crimp Contacts	Beryllium Copper	Accepts wire up to 0.062 [1.6]	2044-02-A	
	0.062 Barrel Type Contacts	Beryllium Copper	Accepts wire up to 0.062 [1.6]	7332-03-A	
	0.094 Set Screw Type Contacts	Beryllium Copper	Accepts wire up to 0.050 [1.3]	7429-01-A	
	0.094 Barrel Type Contacts	Beryllium Copper	Accepts wire up to 0.094 [2.4]	7332-04-A	
	Crimp Tool		For 0.025" - 0.075" Crimp Diameters	2840-05	

*Contacts priced and sold in packages of 10. †Shown in photo. See the Accessories section for more information on all accessories.