

Keithley Instruments  
28775 Aurora Road  
Cleveland, Ohio 44139  
1-800-935-5595  
[tek.com/keithley](http://tek.com/keithley)

## 3-Slot Male HV Triaxial Cable Connector Instructions

### Description

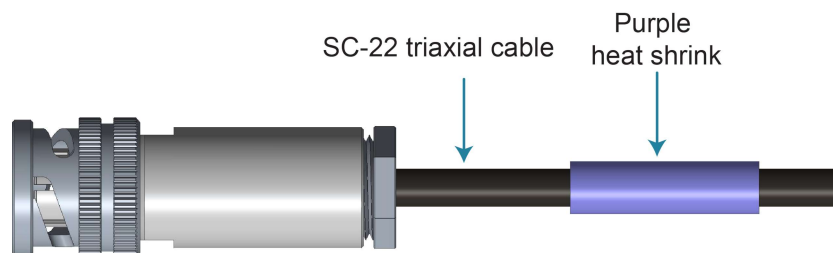
The Keithley Instruments TRX-1100V-CONN is a 3-slot male voltage triaxial cable connector rated for 1100 V. This connector can be used in applications that use the Keithley Instruments Model 2470 High Voltage SourceMeter® Instrument. It can be used for instrument testing that requires high voltage and high throughput combined with DC measurement capability and broad testing flexibility.

**Figure 1: TRX-1100V-CONN**



This connector is commonly mated to the Keithley Instruments TRX-1100V-PCBCONN High-Voltage Female PCB Connector. It is intended for use with the Keithley Instruments SC-22 Triaxial Cable, which is an unterminated cable. Instructions for installing the TRX-1100V-CONN onto a SC-22 cable are provided in this document. The connector and cable assembly is shown in the following figure.

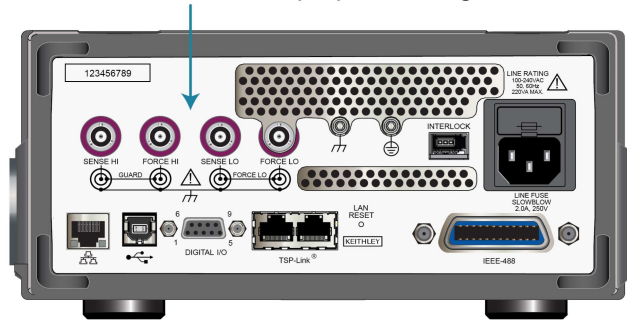
**Figure 2: Fully assembled TRX-1100V-CONN**



This triaxial connector is shipped with purple heat-shrink tubing. As shown in the previous figure, it should be installed on the SC-22 cable. The purple marking indicates that the cable and connector assembly is rated for up to 1500 V and conforms to IEC 61010-1 and IEC 61010-2-30 safety standards. The purple marking also indicates that they can be attached to other connectors with purple markings, such as the FORCE and SENSE connectors on the Model 2470 rear panel, shown in the following figure.

**Figure 3: Model 2470 rear-panel purple connections**

2470 connections with purple markings

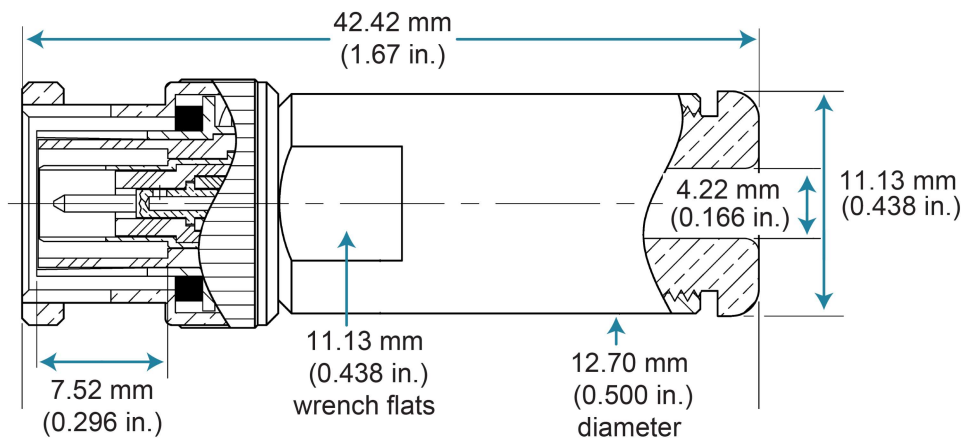


## CAUTION

Do not attach male triaxial connectors without purple markings to female connectors with purple markings. Triaxial connectors without purple markings are not rated for high voltage. Mating incompatible connectors can cause damage to the connectors.

## Dimensions

**Figure 4: TRX-1100V-CONN connector dimensions**



## Triaxial cable connector electrical characteristics

Characteristic impedance:

- Nonconstant

Insulation resistance:

- $4 \times 10^{15}$  minimum

Voltage rating:

- Center contact to intermediate 500  $V_{RMS}$
- Intermediate contact to outer body 1000  $V_{RMS}$

Dielectric withstanding voltage:

- Center contact to intermediate 1500  $V_{RMS}$
- Intermediate contact to outer body 2500  $V_{RMS}$

Operating environment: 0 °C to 50 °C up to 70% relative humidity at  $\leq 35$  °C

## SC-22 triaxial cable construction

Figure 5: SC-22 triaxial cable dimensions



## SC-22 electrical characteristics

- Characteristic impedance:
  - 40  $\Omega$  nominal center conductor to inner shield
  - 15.3  $\Omega$  nominal shield to shield
- Center conductor resistance:
  - $< 0.1 \Omega$  per 0.3048 cm (1 foot)
- Voltage breakdown:
  - 2655 volt DC minimum between shields
- Flexural noise:
  - Peak-to-peak  $\leq 7$  mV
- Leakage resistance (3.048 m [3 ft] cable length):
  - Center conductor to inner shield  $> 1.2 \times 10^{11} \Omega$  at 1200 V
  - Inner shield to outer shield  $> 1.6 \times 10^{11} \Omega$  at 1600 V

## TRX-1100V-CONN assembly instructions

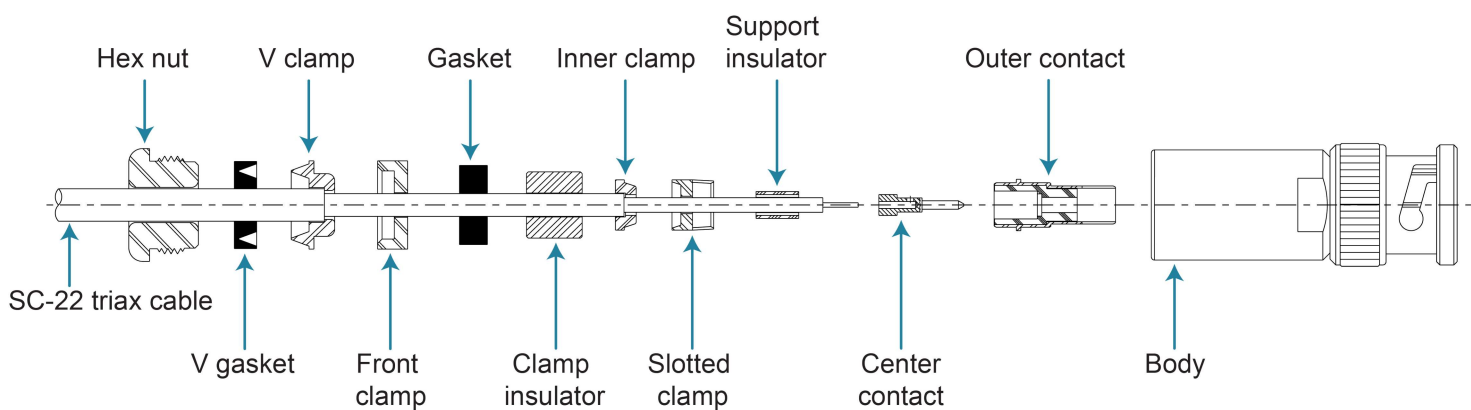
The TRX-1100V-CONN needs to be assembled before use. The following figures and instructions guide you through this process. See the following figure and use it to help guide you step-by-step with the assembly.

Note that you will have to prepare the SC-22 triaxial cable in order to insert it in the TRX-1100V-CONN. The internal triaxial cable wire must be stripped to the proper dimensions to ensure the correct insertion depth in the connector. Excessive exposed conductor length presents electrical shock hazards to equipment and personnel. If the strip length is too short, improper termination will result due to the lack of electrical conductive surface area making contact with the terminal conductor.

### **⚠ WARNING**

**Excessive exposed conductor length can result in electrical shock hazards to equipment and personnel. To prevent electrical shock that could cause injury or death, make sure the stripped wire is the correct length.**

Figure 6: TRX-1100V-CONN exploded view



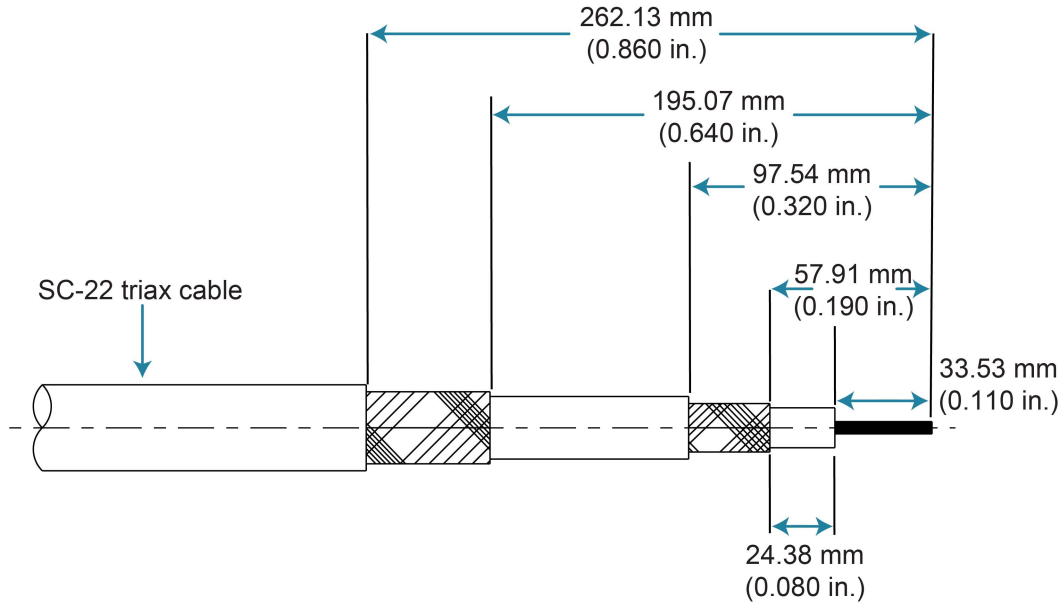
Equipment needed for assembly:

- A cable ringing tool or wire stripper
- Cleaning solvent for removal of exposed graphite lubricant
- A torque wrench

**To prepare the SC-22 cable for assembly to the TRX-1100V-CONN:**

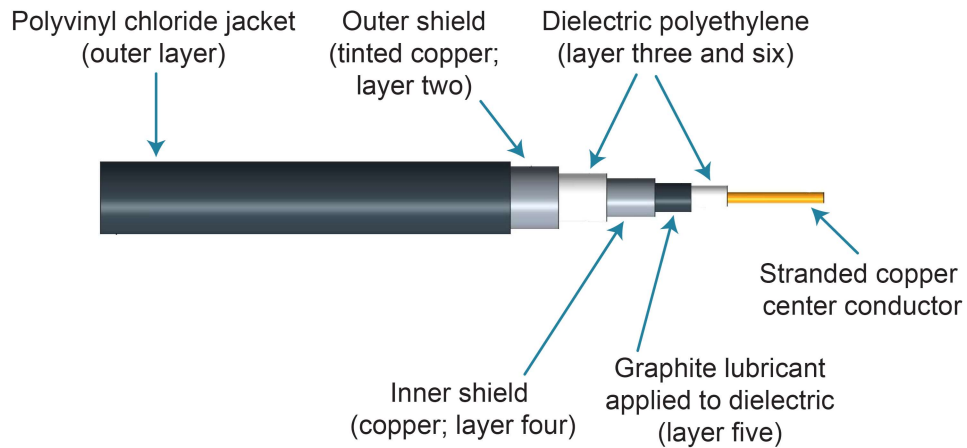
1. Use the cable ringing tool or wire stripper to strip the cable to the proper dimensions.

**Figure 7: Strip SC-22 cable**



2. Remove the graphite lubricant applied to the dielectric (layer five in the following figure).

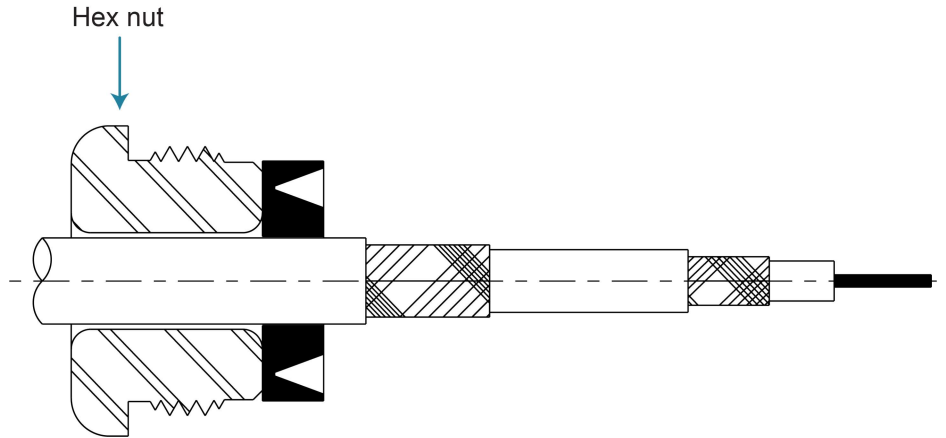
**Figure 8: Prepare SC-22 cable**



**To assemble the triaxial male HV connector and SC-22 triaxial cable:**

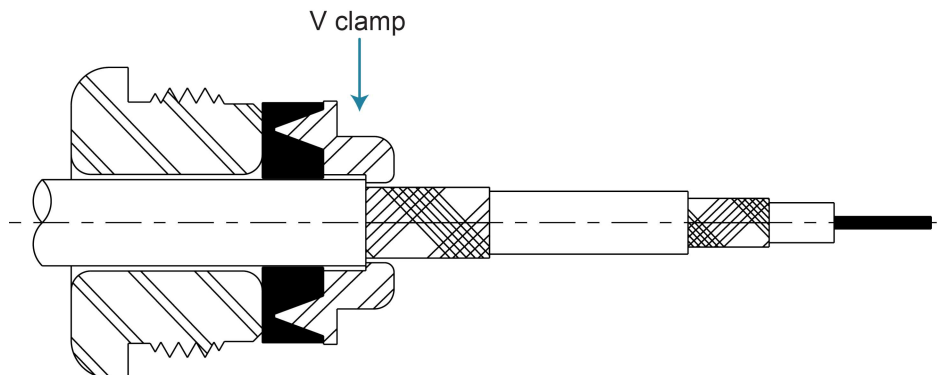
1. Slide the hex nut and V gasket onto the SC-22 triaxial cable as shown in the following figure.

**Figure 9: Add hex nut and V gasket to triax cable**



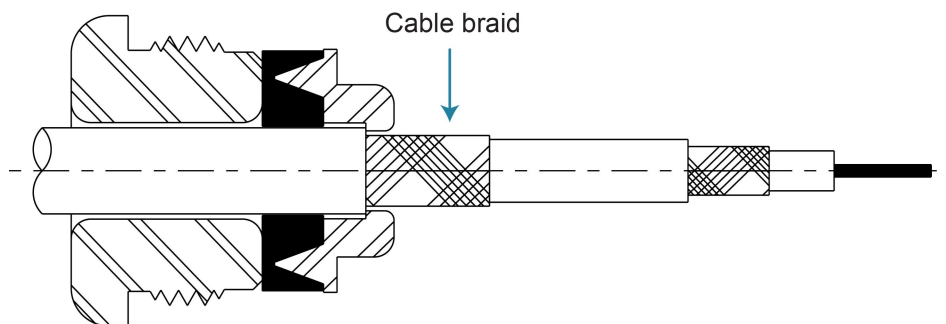
2. Install the V clamp as shown in the following figure. Carefully seat the V clamp into the V gasket when inserting. The sharp edge of the V clamp must split the gasket to seal properly.

**Figure 10: Add V clamp**



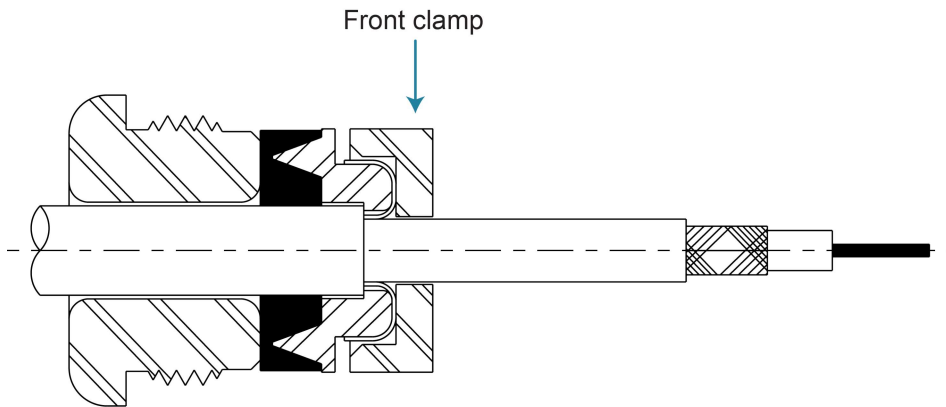
3. Flare the exposed outer shield cable braid back over the V clamp, as shown in the following figure. Make sure you trim the excess braid so it does not protrude from the connector.

**Figure 11: Flare braid over V clamp**



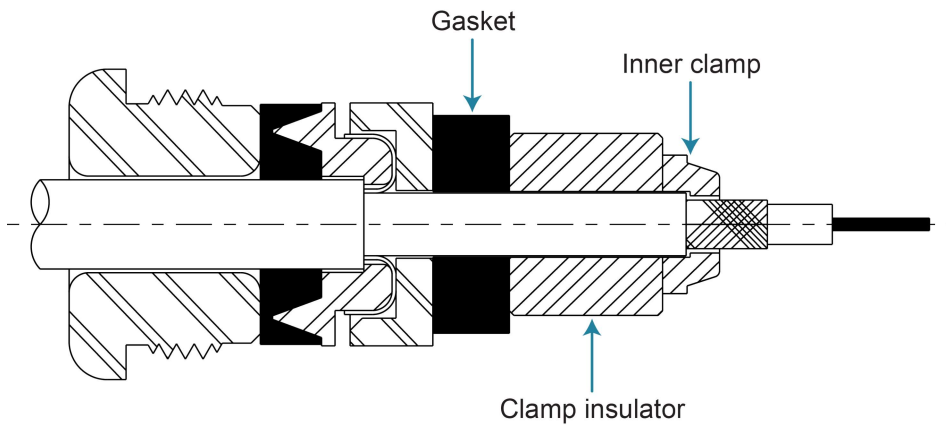
- Slide the front clamp against the braid as shown in the following figure. Make sure to fully seat the front clamp onto the V clamp.

**Figure 12: Add front clamp**



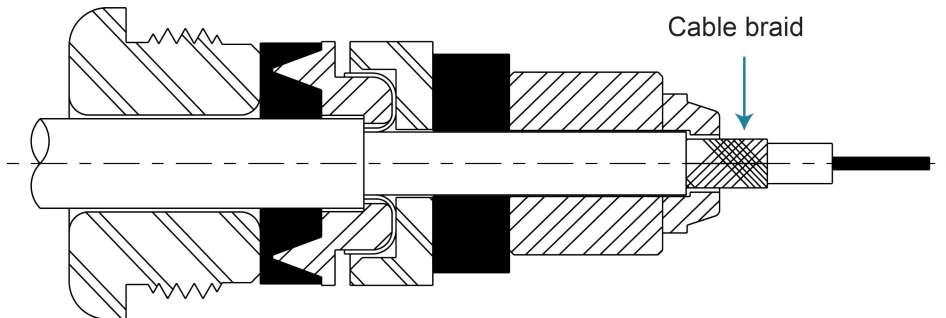
- Install the gasket, clamp insulator, and inner clamp, as shown in the following figure.

**Figure 13: Add gasket, clamp insulator, and inner clamp**



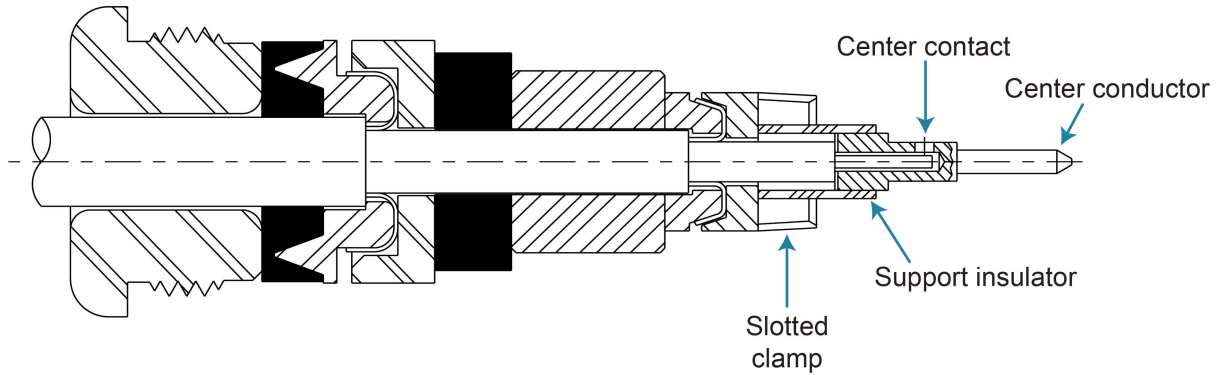
- Flare the exposed inner shield cable braid back over the inner clamp as shown in the following figure. Make sure you trim the excess braid so it does not protrude from the connector.

**Figure 14: Flare braid over slotted clamp**



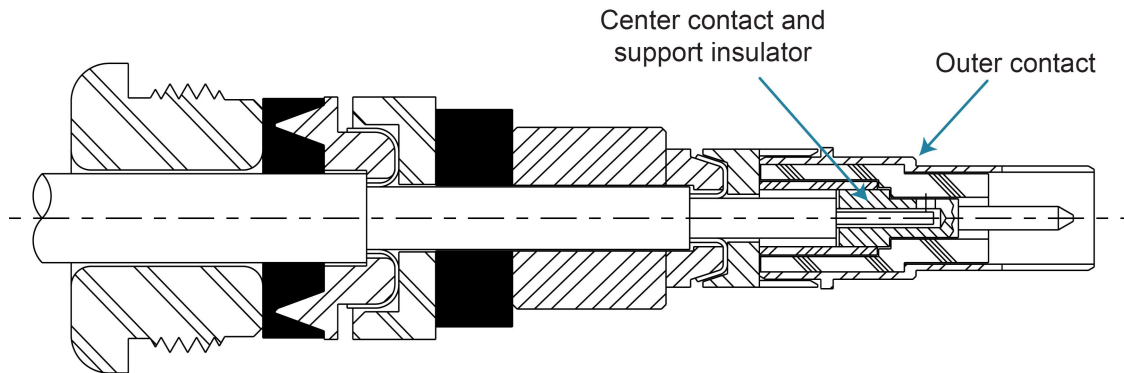
7. Install the slotted clamp, support insulator, and center contact. Crimp the center contact to the center conductor cable as shown in the following figure.

**Figure 15: Add slotted clamp, support insulator, and center contact**



8. Slide the outer contact over the center contact and support insulator as shown in the following figure. Make sure to seat the outer contact fully onto the slotted clamp.

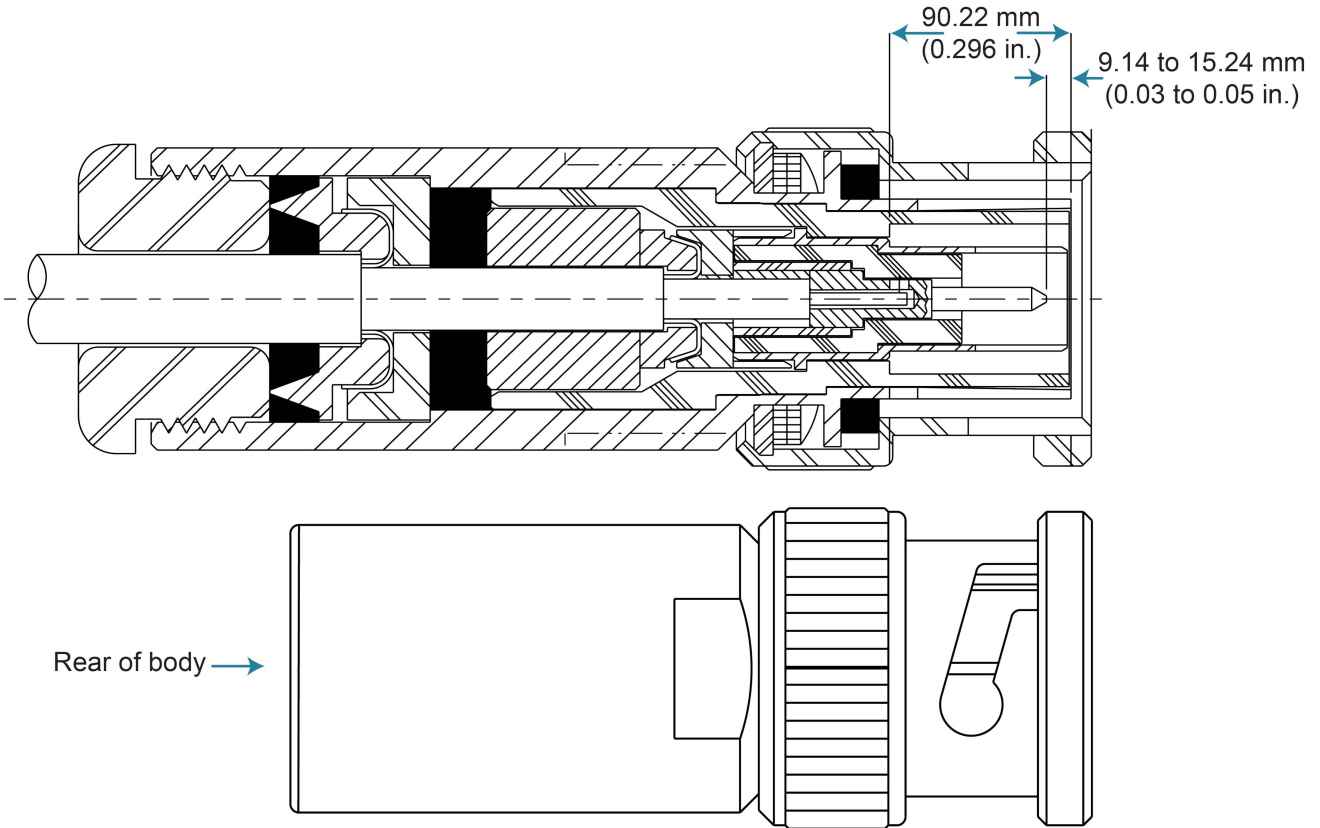
**Figure 16: Add contact assembly**





9. Insert the terminated cable assembly into the rear of the connector body as shown in the following figure.
10. Tighten the cable nut with a wrench to 3.39 Newton meters (30 inch-pounds).

**Figure 17: Add connector body to terminated cable assembly**



The following safety precautions should be observed before using this product and any associated instrumentation. Although some instruments and accessories would normally be used with nonhazardous voltages, there are situations where hazardous conditions may be present.

This product is intended for use by personnel who recognize shock hazards and are familiar with the safety precautions required to avoid possible injury. Read and follow all installation, operation, and maintenance information carefully before using the product. Refer to the user documentation for complete product specifications.

If the product is used in a manner not specified, the protection provided by the product warranty may be impaired.

The types of product users are:

**Responsible body** is the individual or group responsible for the use and maintenance of equipment, for ensuring that the equipment is operated within its specifications and operating limits, and for ensuring that operators are adequately trained.

**Operators** use the product for its intended function. They must be trained in electrical safety procedures and proper use of the instrument. They must be protected from electric shock and contact with hazardous live circuits.

**Maintenance personnel** perform routine procedures on the product to keep it operating properly, for example, setting the line voltage or replacing consumable materials. Maintenance procedures are described in the user documentation. The procedures explicitly state if the operator may perform them. Otherwise, they should be performed only by service personnel.

**Service personnel** are trained to work on live circuits, perform safe installations, and repair products. Only properly trained service personnel may perform installation and service procedures.

Keithley products are designed for use with electrical signals that are measurement, control, and data I/O connections, with low transient overvoltages, and must not be directly connected to mains voltage or to voltage sources with high transient overvoltages. Measurement Category II (as referenced in IEC 60664) connections require protection for high transient overvoltages often associated with local AC mains connections. Certain Keithley measuring instruments may be connected to mains. These instruments will be marked as category II or higher.

Unless explicitly allowed in the specifications, operating manual, and instrument labels, do not connect any instrument to mains.

Exercise extreme caution when a shock hazard is present. Lethal voltage may be present on cable connector jacks or test fixtures. The American National Standards Institute (ANSI) states that a shock hazard exists when voltage levels greater than 30 V RMS, 42.4 V peak, or 60 VDC are present. A good safety practice is to expect that hazardous voltage is present in any unknown circuit before measuring.

Operators of this product must be protected from electric shock at all times. The responsible body must ensure that operators are prevented access and/or insulated from every connection point. In some cases, connections must be exposed to potential human contact. Product operators in these circumstances must be trained to protect themselves from the risk of electric shock. If the circuit is capable of operating at or above 1000 V, no conductive part of the circuit may be exposed.

For maximum safety, do not touch the product, test cables, or any other instruments while power is applied to the circuit under test. ALWAYS remove power from the entire test system and discharge any capacitors before: connecting or disconnecting cables or jumpers, installing or removing switching cards, or making internal changes, such as installing or removing jumpers.

Do not touch any object that could provide a current path to the common side of the circuit under test or power line (earth) ground. Always make measurements with dry hands while standing on a dry, insulated surface capable of withstanding the voltage being measured.


For safety, instruments and accessories must be used in accordance with the operating instructions. If the instruments or accessories are used in a manner not specified in the operating instructions, the protection provided by the equipment may be impaired.

Do not exceed the maximum signal levels of the instruments and accessories. Maximum signal levels are defined in the specifications and operating information and shown on the instrument panels, test fixture panels, and switching cards.

Chassis connections must only be used as shield connections for measuring circuits, NOT as protective earth (safety ground) connections.

The **WARNING** heading in the user documentation explains hazards that might result in personal injury or death. Always read the associated information very carefully before performing the indicated procedure.

The **CAUTION** heading in the user documentation explains hazards that could damage the instrument. Such damage may invalidate the warranty.

The **CAUTION** heading with the  symbol in the user documentation explains hazards that could result in moderate or minor injury or damage the instrument. Always read the associated information very carefully before performing the indicated procedure. Damage to the instrument may invalidate the warranty.

Instrumentation and accessories shall not be connected to humans.

Before performing any maintenance, disconnect the line cord and all test cables.

To maintain protection from electric shock and fire, replacement components in mains circuits — including the power transformer, test leads, and input jacks — must be purchased from Keithley. Standard fuses with applicable national safety approvals may be used if the rating and type are the same. The detachable mains power cord provided with the instrument may only be replaced with a similarly rated power cord. Other components that are not safety-related may be purchased from other suppliers as long as they are equivalent to the original component (note that selected parts should be purchased only through Keithley to maintain accuracy and functionality of the product). If you are unsure about the applicability of a replacement component, call a Keithley office for information.

Unless otherwise noted in product-specific literature, Keithley instruments are designed to operate indoors only, in the following environment: Altitude at or below 2,000 m (6,562 ft); temperature 0 °C to 50 °C (32 °F to 122 °F); and pollution degree 1 or 2.

To clean an instrument, use a cloth dampened with deionized water or mild, water-based cleaner. Clean the exterior of the instrument only. Do not apply cleaner directly to the instrument or allow liquids to enter or spill on the instrument. Products that consist of a circuit board with no case or chassis (e.g., a data acquisition board for installation into a computer) should never require cleaning if handled according to instructions. If the board becomes contaminated and operation is affected, the board should be returned to the factory for proper cleaning/servicing.

Safety precaution revision as of June 2017.