



## Hand Tools For Formed (Stamped) Contacts

### Low Cost Tool

This tool is recommended for prototype and low volume applications. It supports the full range of stamped contacts

Stamped Signal Contacts	Part Number
14-26 AWG	192922-1440



### Ratcheted Hand Tool

A range of single action, factory calibrated tools are available to support the stamped contacts and 30 A power contacts.

Signal Contact	Power Contact	Part Number
14-16 AWG	N/A	112108-0013
16-18, 20-22, 24-26 AWG	N/A	112108-0014
16-18 AWG	12-14 AWG	112108-0011
N/A	14-16, 18-20 AWG	112108-0012



## Hand Tools For Machined and Coaxial Contacts

This is a ratcheted, four indent crimp tool that is fully adjustable. They crimp all sizes of machined and coaxial contacts.

- MIL-C-22520 1/01\*

Description	Hand Tool Part Number	Locator
Machined Crimp*	192990-2050	192990-7600 (Calibrated)
Machined Crimp*	192990-2050	192933-8470 (Low Cost)
Coaxial Outer	274-7613-000	326-7512-000
Coaxial Inner	995-0001-584	326-7511-000

## Automatic Tools

### Mini Applicators



Mini Applicators are interchangeable modules that will fit into many standard crimping machines. They are available for all sizes of stamped signal and power contacts.

Contact Description	Part Number
14-16 Trident Signal	193800-0029
16-18 Trident Signal	193877-5630
20-22 Trident Signal	193877-5640
24-26 Trident Signal	193877-5640
12-14 Trident 30 A Power	193800-0023
14-16 Trident 30 A Power	193800-0024
18-20 Trident 30 A Power	193800-0031

## Crimper/Stripper Systems

ITT offers a wide range of automatic crimping and stripping systems. These systems will support all of the stamped and machined contacts. Contact ITT for details.

### Crimper/Stripper for Formed (Stamped) Contacts



### Vibra-Bowl Crimper for Machined Contacts



## Installation Tools

No installation tooling is required for Neptune. The force needed to insert contacts into the housings is very low and a light push on the wire is sufficient to snap the contact into position. Stitching tools are optional assembly aids for Neptune and TNM connectors. These tools puncture the membrane seal and guide contacts into place. They are not required for assembly, but many customers find that they reduce assembly time.

Description	Part Number
Signal Sockets	192900-0606
Signal Pins	192900-0605
Power Sockets	192900-0608
Power Pins	192900-0607



## Extraction Tools

Contacts can readily be removed from the housings using an extraction tool. The tool is placed over the contact and the sleeve rotated slightly as it is pushed home to release the spring. Light pressure on the knob then ejects the contact from the rear of the housing.

Description	Part Number
Signal	192922-1450
Power	192900-0176



Dimensions shown in mm (inch)  
Specifications and dimensions subject to change

[www.ittcannon.com](http://www.ittcannon.com)

### Crimping Instructions — Formed (Stamped) Crimp Contacts

#### Assembly Instructions:

- Strip wires to length. For wire strip lengths, see page 48.
- Open the hand tool and place the contact in the chosen die, ensuring that the locating plate is positioned between the collar and crimp saddle. Then squeeze tool gently to hold the contact in place.
- Insert the wire.
- Cycle the tool.
- Remove the wire and inspect the crimp. The strands should be visible at both ends of the crimp. There should be no loose strands (see Figures 1-3). The contact should be co-linear with the wire (see Figure 4). Bent contacts are unacceptable (see Figure 5).

Figure 1 - Correct

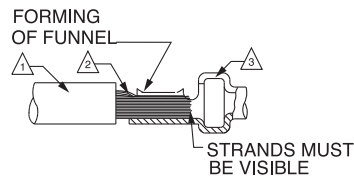


Figure 2 - Unacceptable

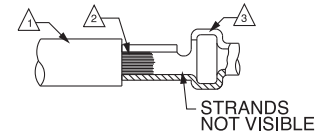


Figure 3 - Unacceptable

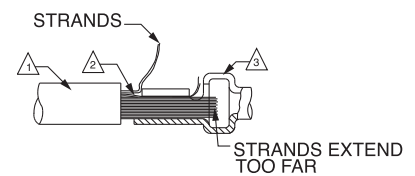
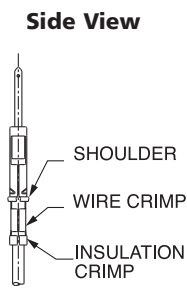


Figure 4 - Correct



Front View

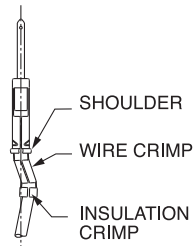
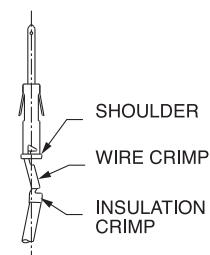
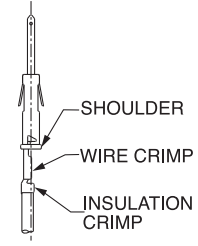


Figure 5 - Unacceptable

Side View



Front View



### Crimping Instructions — Machined Crimp Contacts

#### Assembly Instructions:

- Strip wires to length. For wire strip lengths, see page 47.
- Attach the correct locator (turret) to the hand tool.

Contact Type	Locator Color
Pin	Blue
Socket	Green
Earthing	Black

- Adjust the dial for the wire gauge.
- Place the contact into the locator and insert the wire into the contact as indicated on the locator (turret) label.

Figure 6 - Correct

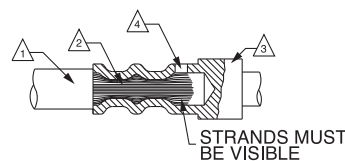
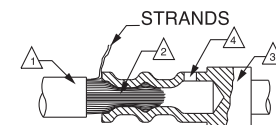


Figure 7 - Unacceptable



#### Notes:

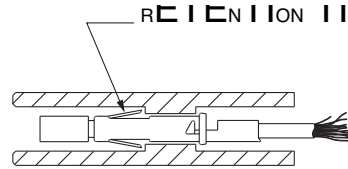
- △ Wire Insulation.
- △ Wire Strands.
- △ Contact.
- △ Inspection Window. Strands must be visible.

- Cycle the tool.
- Remove and inspect the contact. Strands should be visible through the inspection window (see Figure 6). There should be no loose strands (see Figure 7).

## Contact Insertion

No insertion tool is required. Trident contacts are inserted from the rear of the connector and held in place by retention tines (cantilever springs). These tines compress during insertion. They expand once contact is in place and prevent the contact from backing out.

### Proper Insertion of Trident Contact



## Contact Retention Forces

- Minimum retention force of the contact to the insulator.

Contact	Newton(s)
Signal Contacts	67
(Formed Crimp, Machined Crimp, Solder Cup, Flow Solder)	
Coaxial Contacts	67
30 A Power Contacts	100

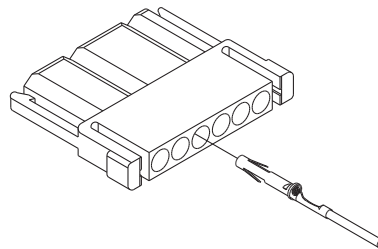
Note: Newton is a metric unit of force. One pound = 4.45 Newtons

## Trident Assembly Instructions (For Neptune and TNM Assembly, see page 55)

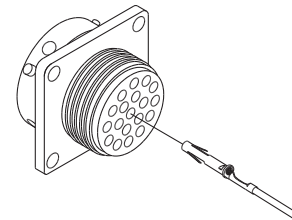
### Assembly instructions:

1. Grasp the crimped or soldered contact just behind where the wire enters the contact.
2. Push the contact into the connector cavity until it locks into place.
3. Pull on the wire slightly to verify that the contact is secure.
4. Inspect the mating face of the connector. The contacts should extend the same distance into the connector

### Contact Insertion - Slimline



### Contact Insertion - Ringlock



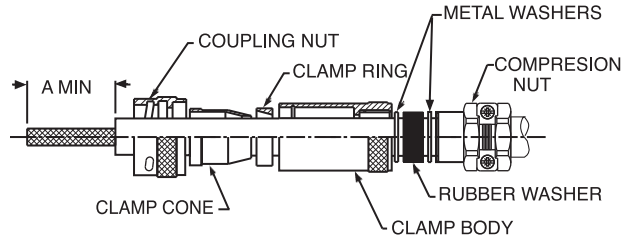
## Neptune and TNM Assembly Instructions (For Trident Assembly, see page 54)

Neptune and TNM connectors feature membrane seals. These seals have a thin membrane that seals unused contact cavities. No sealing plugs are required for unused cavities. Neptune connectors do not require insertion tools. Cannon offers stitching tools as an optional assembly aid for high volume usage. Many customers find that stitching tools reduce the assembly time.

### Assembly Instructions:

1. On Neptune and TNM connectors do not remove the Securing Nut holding the Wire Seal in place, unless an accessory such as Metal Endbell, Conduit Adapter, HC or SR Clamp assembly is to be used in its place. Then remove the Securing Nut (to be replaced by the accessory), make sure the tab on the Seal is positioned in the receiving slot in the connector, fit the accessory over the cables/wires and proceed as follows.
2. Grasp the crimped or soldered contact just behind where the wire enters the contact. If using a stitching tool, insert the contact into the rear of the tool.
3. Push the contact through the membrane seal into the insulator. Continue to push until the contact locks into place. If using a stitching tool, first insert the tool into the required contact position in the seal and examine the mating face to confirm that the correct contact cavity has been entered, if not, this can be corrected by partially removing the tool and engaging the correct position. Then fit the contact to the stitching tool and push the CONTACT through until it locks into place; remove the stitching tool.

### Contact Insertion For Neptune and TNM Connectors



- IMPORTANT NOTE:** The stitching tool is not designed to pull the contact through; it is intended to ease the insertion process with high density connectors. On the high density connectors, such as 0-48, it is beneficial to start loading contacts on a center row first and filling adjacent rows fully each side, so progressively filling the connector from the center in a controlled manner.
4. Pull on the wire slightly to verify that the contact is secure.
  5. Inspect the mating face of the connector. The contacts should extend the same distance into the connector.
  6. Secure the nut, or other accessory, to hold the membrane seal in place.

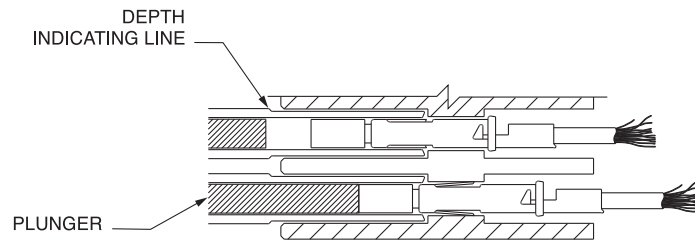
## Contact Extraction

Contacts may be removed with an extraction tool. The tool has an outer tube and an internal spring loaded plunger. The outer tube depresses the retention tines on the contact. The plunger then pushes the contact back out of the connector.

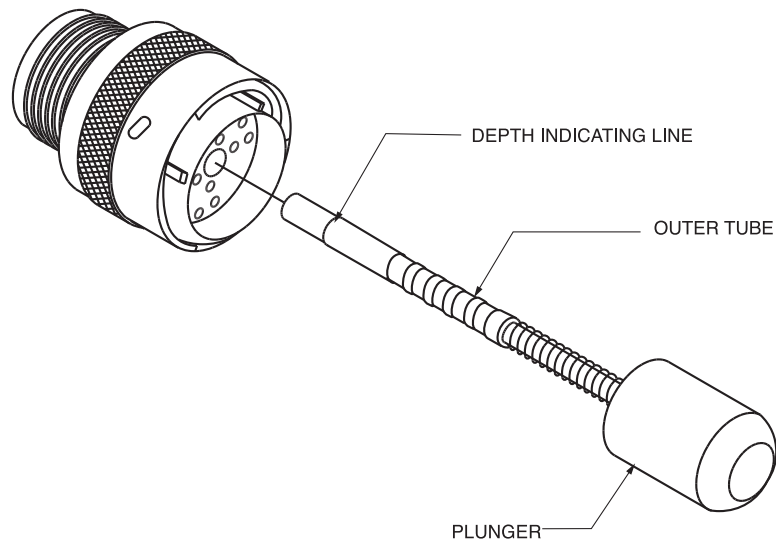
### Extraction Instructions:

1. Grasp the extraction tool on the knurled portion of the outer tube. Do not push on the plunger knob yet.
2. Insert the tube into the contact cavity from the mating surface. Push the tube fully into the cavity.
- IMPORTANT:** Verify that the depth indicating line on the tool is even with the mating face of the connector before depressing the plunger.
3. Depress the plunger. This should only require light pressure to eject the contact. The contact can now be removed from the back of the connector.
4. Inspect the contact. Verify the tines are not damaged.

### Contact Extraction



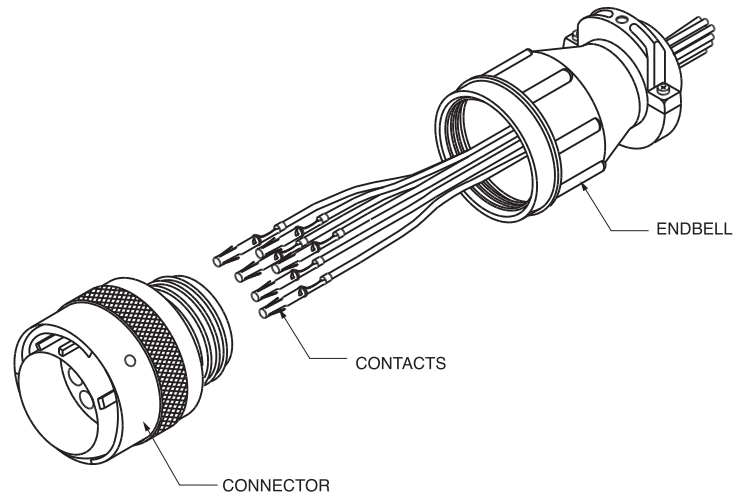
### Extraction Tool



### Endbell — Unsealed

#### Assembly Instructions:

1. Separate the body of the clamp, the two screws, and the clamping bar.
2. Slide the body over the wires or cable and screw onto the threads on the back of the connector. The backshell should be hand-tight. For Neptune and TNM connectors, the cable clamp will fit over the membrane seal and will hold it in place.
3. There are three clamp bars supplied. Select the appropriate one for the wire bundle and attach to the clamp body with the screws.



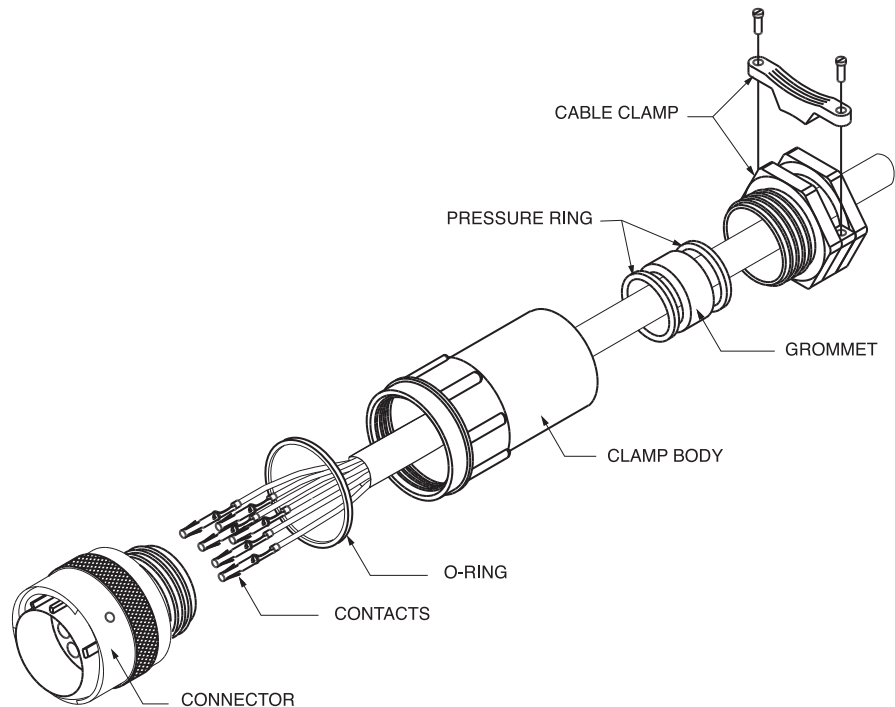
### Endbell — Sealed

#### Assembly Instructions:

1. Separate the body of the clamp body, the two pressure rings, the sealing grommet, the clamp, and O-ring.
2. Slide the backshell components over the cable prior to crimping the contacts and assembling the connector. The farthest part from the connector is the clamp, followed by a pressure ring, then the grommet, then the other pressure ring, then the clamp body and then the O-ring.

Assembly Note: The grommet is a layered design. For large cables one or more of the interior sections can be removed. If the grommet resists sliding over the cable, lubricate with isopropyl alcohol.

3. Crimp and insert the contacts.
4. Slide the O-ring up and over the back of the connector.
5. Screw the clamp body onto the back of the connector. It should be hand-tight. For Neptune and TNM connectors, the cable clamp will fit over the membrane seal and will hold it in place.
6. Slide the pressure rings and grommet forward into the body.
7. Screw the cable clamp into the clamp body. The cable clamp will apply pressure to the grommet causing it to seal the backshell to the cable.
8. Screw down the clamp bar to secure the cable. Note that the bar is reversible, depending on the size of the cable.



## Universal Endball

### Universal Endbell Assembly

The Universal Endbell is suitable to accept shielded and unshielded cable. This cable is sealed with a highly flexible seal and an additional sealing ring with a flexible plastic cable clamp serving as a strain relief. The Universal Endbell can be screwed onto plug and receptacle connectors. The O-ring and the cable sealing meet IP67.

#### Assembly Instructions:

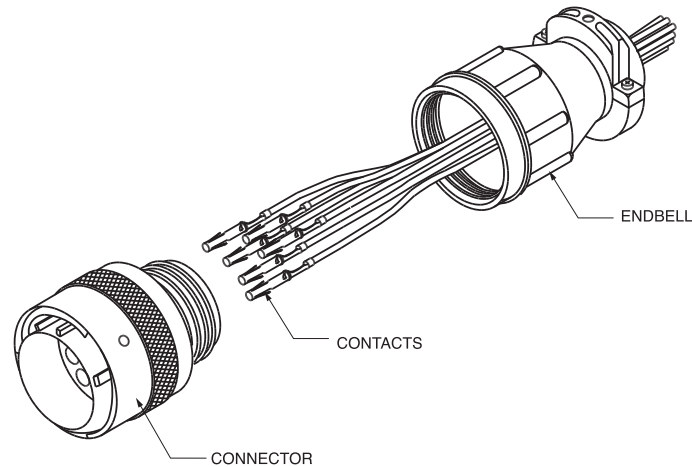
1. Slide O-ring over the back of the connector body.
2. Slide the endbell components onto the cable in the following order:

- Clamp Nut
- Cable Grip1
- Cable Seal2
- Housing
- Grounding Ring
- Support Sleeve
- O-Ring

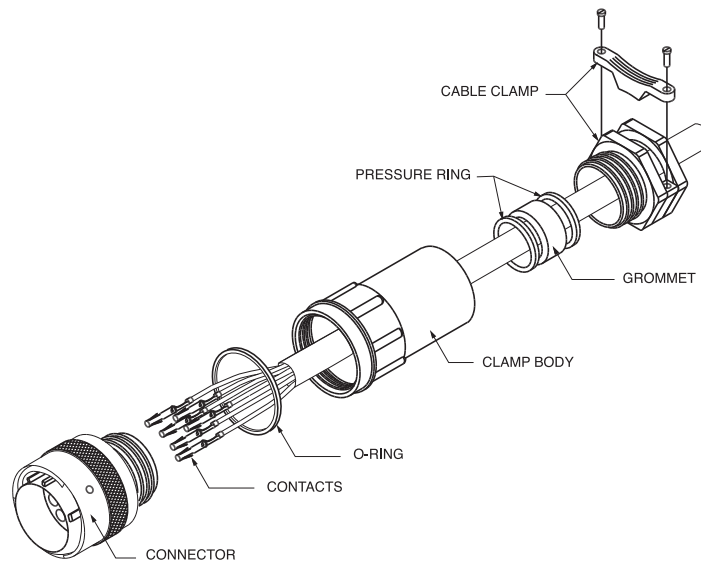
Note: 1. The compression fingers of the Cable Grip face toward the connector.

Note: 2. Isopropyl alcohol will lubricate the Cable Seal making it easier to slide over the cable.

3. Cut back the Outside Jacket to expose 25,40 (1.000) of Braid followed by 12,70 (.500) of Insulated Wires.
4. Terminate the wires and insert contacts per assembly instructions, see page 45.
5. Slide the Support Sleeve down until it reaches the back of the connector.
6. Pull the Braid over the Grounding Ring.
7. Slide the Grounding Ring down until it snaps onto the Support Sleeve. The Braid should be secured between the Support Sleeve and the Grounding Ring. Fold any excess shielding over the Grounding Ring.
8. Slide the Housing over the Grounding Ring and the Support Sleeve and screw it into the connector body. The recommended torque is  $10 \pm 1$  Nm (88.50 in lbs).
9. Slide the Cable Seal and Cable Grip onto the Housing.
10. Tighten the Clamp Nut into the Housing. The recommended torque is  $10 \pm 1$  Nm (88.50 in lbs).



### Wire Strip Length



Shell Size	Wire Strip Length		
	A	B	C
10	38,00 (1.500)	22,00 (.870)	*
12	38,00 (1.500)	22,00 (.870)	*
14	40,00 (1.600)	24,00 (.950)	*
16	40,00 (1.600)	24,00 (.950)	*

\* Strip length will vary based on the contact selected, see page 45.



## Shielded Endbell for Larger Cable Sizes

This Endbell is an alternative to the Universal Endbell for use with larger diameter cables. The outer body is sealed to the connector with an O-ring and the rear cable clamp also incorporates sealing rings for a complete sealed termination. The cable braid is terminated between metal cones. A rear cable clamp provides mechanical strain relief in addition to the clamping and holding of the rear cable seal.

### Assembly Instructions:

1. Assemble all parts onto the cable as shown (Figure 1). Strip sheath of cable to dimensions shown in table below.

Shell Size	Dimension A min.
10	22,30 (.877)
12	22,30 (.877)
14	26,20 (1.031)
16	28,10 (1.106)

2. Fold braid back over cable. Strip and terminate wires with selected contacts (Figure 2).

3. Assemble O-ring in groove of the shell after positioning coupling nut (Figure 3).

Figure 1

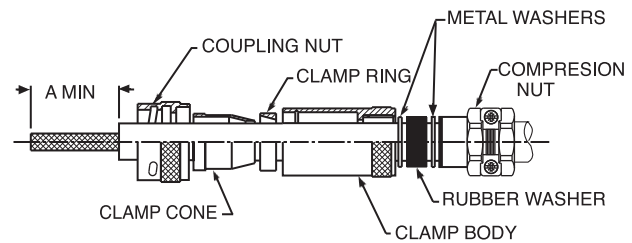
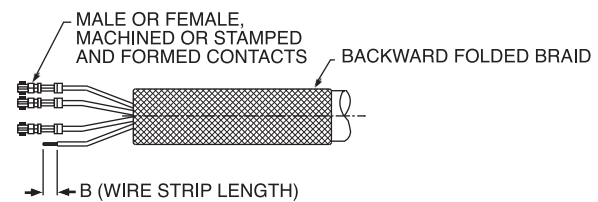


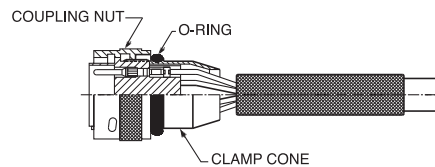
Figure 2



## Wire Stripping Lengths

Contact Type	Wire Size	Wire Range mm <sup>2</sup>	Dimension B
Formed contact	24-16 AWG	0,08 - 1,50	3,95 ± 0,25 (.155 ± .009)
	14 AWG	1,50 - 2,50	5,60 ± 0,25 (.220 ± .009)
Machined contact	26-20 AWG	0,08 - 0,64	5,08 ± 0,25 (.200 ± .009)
	16 AWG	0,60 - 1,51	7,11 ± 0,25 (.279 ± .009)

Figure 3



## Cable Sizes

Shell Size	Endbell Part Number	Cable Outer Sheath Diameter	
		Maximum	Minimum
10	192993-0091	10,00 (.393)	5,00 (.196)
12	192993-0092	12,00 (.472)	6,00 (.236)
14	192993-0093	14,00 (.551)	7,00 (.279)
16	192993-0094	16,00 (.629)	8,00 (.314)

## Shielded Endbell for Larger Cable Sizes (continued from page 59)

4. Fold braid forward as shown and trim to length (Figure 4).

5. Slide on clamp ring in position shown (Figure 5).

6. Screw clamp body onto the connector using a strap wrench (Figure 6). Tighten to the recommended torque values in table below.

Shell Size	Clamp body Torque max.
10	4 Nm
12	6 Nm
14	10 Nm
16	10 Nm

7. Push metal washers and rubber washer into rear of clamp body. Then screw compression nut to compress rubber washer. Avoid overtightening as this may twist the cable. Finally tighten screws to provide the mechanical strain relief (Figure 7).

8. Assembled connector (Figure 8).

Figure 4

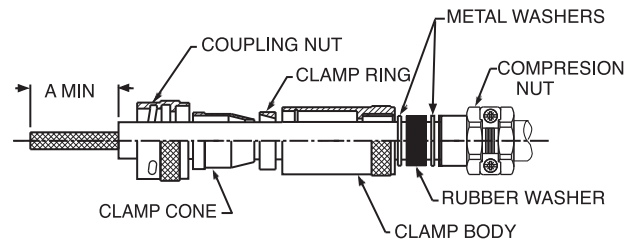


Figure 5

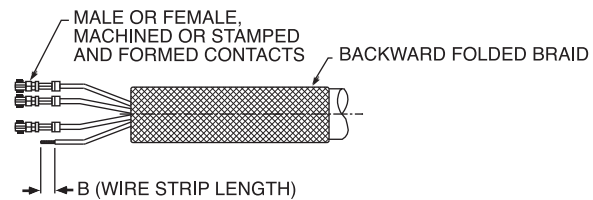


Figure 6

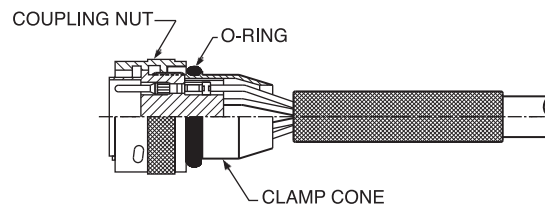


Figure 7

