



**NOTE**

All numerical values are in metric units [with U.S. customary units in brackets]. Dimensions are in millimeters. Unless otherwise specified, dimensions have a tolerance of  $\pm 0.13$  and angles have a tolerance of  $\pm 2^\circ$ . Dimensions shown in parenthesis are for reference only. Figures and illustrations are for identification only and are not drawn to scale.

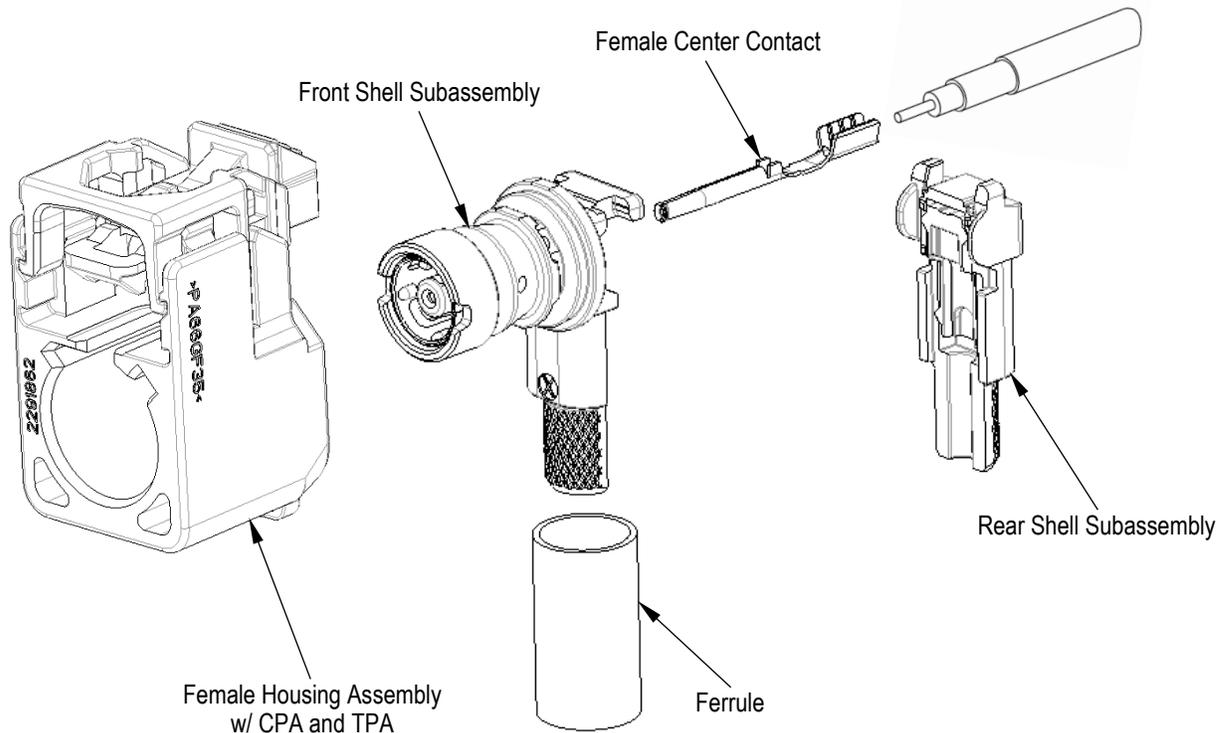
**1. INTRODUCTION**

This specification covers the requirements for application of FAKRA Automated 90-degree connector system. This connector system is designed for use on automotive RF applications including AM/FM radio, navigation systems, SDARS, video, and other applications. The system accommodates DACAR 462, RG-174 LL, RG-316, RTK031, RG-58 LL, and Dacar 037-6 coaxial cables. The connector system consists of an Unsealed Female Plug Assembly available with a 1-position Housing Assembly.

Each connector consists of a Housing Assembly, Front Shell Subassembly, Rear Shell Subassembly, Ferrule, and Female Center Contact. Each component is available separately or as part of a kit. The Female Connector Assembly has integral key coded sockets that mate with the integral key coded ribs on the Male Connector Assembly (not included in this application specification). Keying is used to prevent inadvertent mating of similar connector assemblies. These connectors are terminated using hand or automatic machine crimping tools.

When corresponding with TE Connectivity Personnel, use the terminology provided in this specification to facilitate your inquiries for information. Basic terms and features of this product are provided in Figure 1.

**1-Position 90° Unsealed Female Connector for All Coaxial Cable Sizes**



**Figure 1**

## 2. REFERENCE MATERIAL

### 2.1. Revision Summary

Revision A: Draft

### 2.2. Customer Assistance

Reference Product Base Part Numbers 2304626, 2306475, 2306484, 2306490, 2308044 and Product Code W766 are representative of the FAKRA Automated right angle connector system. Use of these numbers will identify the product line and help you to obtain product and tooling information when visiting [www.te.com](http://www.te.com) or calling the PRODUCT INFORMATION number at the bottom of page 1.

### 2.3. Customer Drawings

Customer drawings for product part numbers are available from [www.te.com](http://www.te.com). Information contained in the customer drawing takes priority if there is a conflict with this specification or any other technical document provided by TE.

### 2.4. Specifications

These connectors are compatible with SAE USCAR-17 (Rev 5-Dec-2016).

### 2.5. Instructional Material

Instruction Sheets (408-series) provide product assembly instructions or tooling setup and operation procedures and Customer Manuals (409/412-series) provide machine setup and operating procedures. Documents available that pertain to this product are:

<a href="#">408-7424</a>	Checking Terminal Crimp Height or Gaging the Die closure
<a href="#">408-10389</a>	Ocean Side-Feed Applicators
<a href="#">409-32035</a>	AMP-O-ELECTRIC* Model G II Terminator 2217000-[ ]
<a href="#">412-94328</a>	AT-300 Electric Benchtop Crimping Machine 539630-[ ]
<a href="#">1673663-2</a>	AT-300 SDE Die Adaptor 1673663-[ ]

## 3. REQUIREMENTS

### 3.1. Safety

Do not stack product shipping containers so high that the containers buckle or deform.

### 3.2. Limitations

The connectors are designed to operate in a temperature range of -40 to 125°C [-40 to 257°F].



#### NOTE

*Temperature rating of the coaxial cable must be considered when determining operating temperature of the connector and cable assembly.*

### 3.3. Storage

#### A. Ultraviolet Light

Prolonged exposure to ultraviolet light may deteriorate the chemical composition used in the product material.

#### B. Reeled Contacts

When using tape-mounted reeled contacts, care must be taken to prevent stretching, sagging, or other distortion that would prevent smooth feeding of the reeled product through automatic machine feed mechanisms. Store coil wound reels horizontally and traverse wound reels vertically.

#### C. Shelf Life

The product should remain in the shipping containers until ready for use to prevent deformation to components. The product should be used on a first in, first out basis to avoid storage contamination that could adversely affect performance.

### D. Chemical Exposure

Do not store product near any chemical listed below as they may cause stress corrosion cracking in the material.

Alkalies	Ammonia	Citrates	Phosphates	Citrates	Sulfur Compounds
Amines	Carbonates	Nitrites	Sulfur Nitrites		Tartrates

### 3.4. Cable Preparation

1. Proper strip length is necessary to properly apply the cable to the contact. See Figure 2.



**CAUTION**

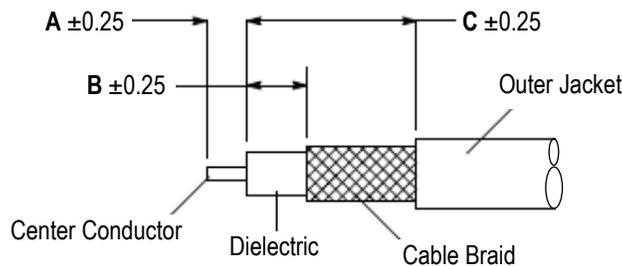
Reasonable care must be taken not to nick, scrape, or cut any strands during the stripping operation.



**NOTE**

All qualification testing has been completed with the specific cables listed in the table below. See Figure 2. The use of cables other than that specified in the table may need to be qualified independently.

**Cable Stripping Dimensions**

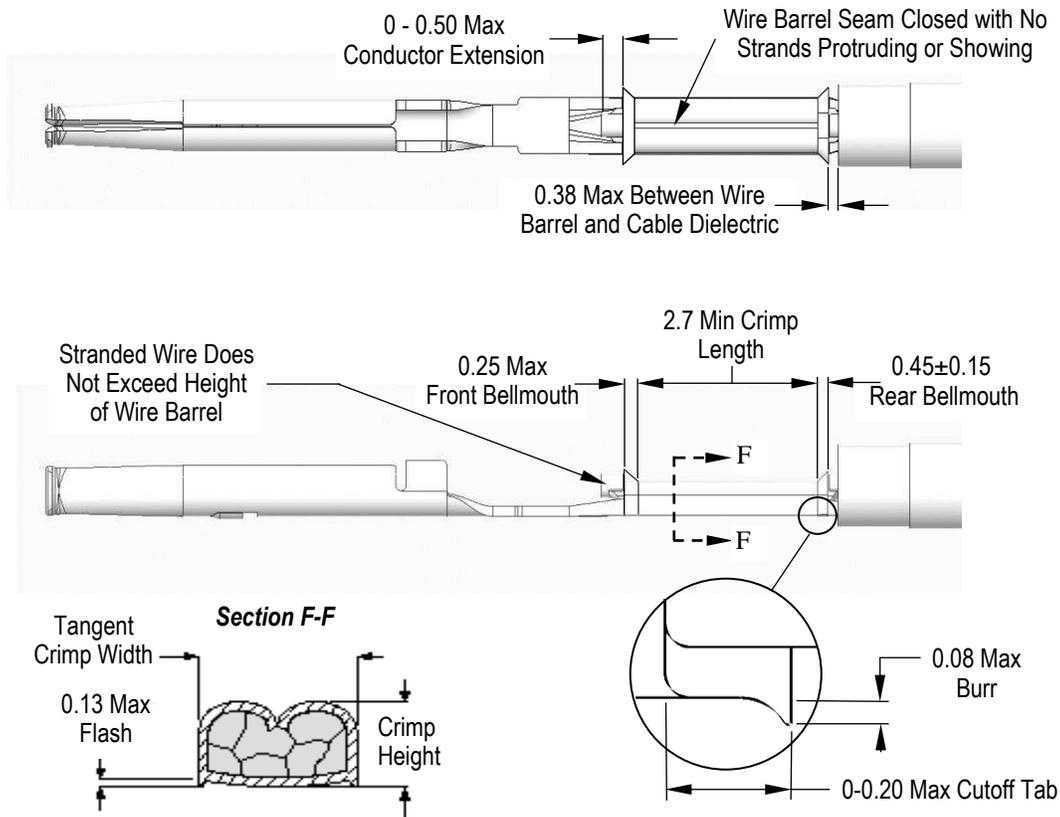


CABLE SIZE	A	B	C
Dacar 462 (Leoni P/N: 85D00029B#), Dacar 462-2 (Leoni P/N: 85D00100#), Dacar 462-6 (Leoni P/N: 8500000E#)	(3.75)	(1.20)	(6.80)
RG-174LL (Condumex P/N: 800289-49)	(3.75)	(1.20)	(6.80)
RG-316 (Harbour Industries P/N: M17/113-RG316)	(3.75)	(1.20)	(6.80)
RG-316 (Condumex P/N: 1557495-1)	(3.75)	(1.20)	(6.80)
RTK-031 (Condumex P/N: FL09YHBCYW KX-50), Dacar 302-4 (Leoni P/N: 85120420H)	(3.75)	(1.20)	(6.80)
RG-58 LL (Belden P/N: AG50847) / RG-58LL (Condumex P/N: 800315-49)	(3.90)	(1.35)	(8.45)
Dacar 037-6 (Leoni P/N: 8500000R#)	(3.20)	(1.75)	(8.90)

**Figure 2**

### 3.5. Crimped Female Center Contact

Crimp the Female Center Contact onto center conductor of cable. Refer to instructions packaged with crimp tooling for appropriate procedures. (See Figure 3)



CABLE SIZE	FEMALE CENTER CONTACT PART NO.	APPLICATOR	CONTACT WIRE BARREL ("F" CRIMP)		TENSILE (N)
			CRIMP HEIGHT	TANGENT CRIMP WIDTH (Ref)	
Dacar 462 (Leoni P/N: 85D00029B#), Dacar 462-2 (Leoni P/N: 85D00100#), Dacar 462-6 (Leoni P/N: 8500000E#)	2304634-4	2836529-[ ]	0.71±0.02	(1.000)	27
RG-174LL (Condumex P/N: 800289-49)		2266046-[ ]	0.69±0.03	(1.067)	
RG-316 (Harbour Industries P/N: M47442-PC24C)			0.72±0.03		
RG-316 (Condumex P/N: 1557495-1)			0.72±0.03		
RTK-031 (Condumex P/N: FL09YHBCYW KX-50), Dacar 302-4 (Leoni P/N: 85120420H)	2304634-8	2266048-[ ]	0.84±0.03	(1.270)	50
Dacar 037-6 (Leoni P/N: 8500000R#)	1-2304634-0	2266049-[ ]	0.96±0.03	(1.397)	90
RG-58 LL (Belden P/N: AG50847) / RG-58LL (Condumex P/N: 800315-49)					

Figure 3

**i NOTE** All qualification testing has been completed with the specific cables listed in the table above. See Figure 3. The use of cables other than that specified in the table must be qualified independently.

**i NOTE** Tangent Crimp Widths are reference because they are controlled by the applicator.

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### **A. Crimp Qualification**

The center conductor crimp must meet the requirements of TE “Making and Evaluation of Cross Sections for F-Crimp Terminations” (114-18022-10). See this document for cross section requirements and evaluation.

### **B. Wire Barrel Crimp**

The crimp applied to the wire barrel is the most compressed area and is most critical in ensuring optimum electrical and mechanical performance of the crimped contact. The contact wire barrel crimp height must be within the dimension provided in Figure 3.

### **C. Effective Crimp Length**

For optimum crimp effectiveness, the crimp must be within the area shown in Figure 3. Effective crimp length shall be defined as that portion of the wire barrel, excluding bellmouth(s), fully formed by the crimping tool. Instructions for adjusting, repairing, and inspecting tools are packaged with the tools.

### **D. Bellmouths**

Front and rear bellmouths shall conform to the dimensions given in Figure 3.

### **E. Cutoff Tab**

The cutoff tab shall be cut to the dimensions shown in Figure 3.

### **F. Burr**

The cutoff burr shall not exceed the dimensions shown in Figure 3.

### **G. Wire Barrel Flash**

The wire barrel flash shall not exceed the dimensions shown in Figure 3.

### **H. Conductor Extension**

The conductor must extend beyond the wire barrel, but less than the maximum shown in Figure 3.

### **I. Wire Barrel Seam**

The wire barrel seam must be closed with no evidence of wire visible in the seam.

### **J. Twist and Roll**

There shall be no twist, roll, deformation or other damage to the mating portion of the crimped contact that will impair usage of the contact.

### **K. Straightness**

The force applied during crimping may cause some bending between the crimped wire barrel and the mating portion of the contact or between the crimped wire barrel and the cable dielectric. Such deformation is acceptable within the limits provided in Figure 4.

1. The side-to-side bend of the contact may not exceed the limits provided.
2. The up and down bend of the contact, including cutoff tab and burr, shall not be bent above or below the datum line more than the amount given.

**NOTE**

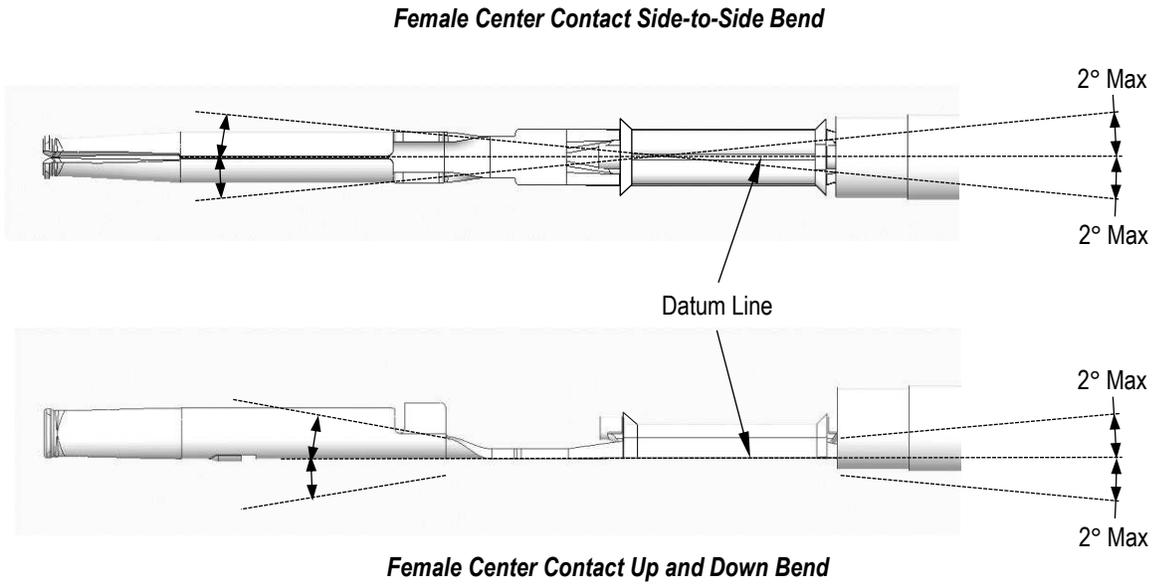
*Periodic inspections must be made to ensure crimped contact formation is consistent.*

**NOTE**

*Tangent crimp widths are reference because they are controlled by the applicator.*

**NOTE**

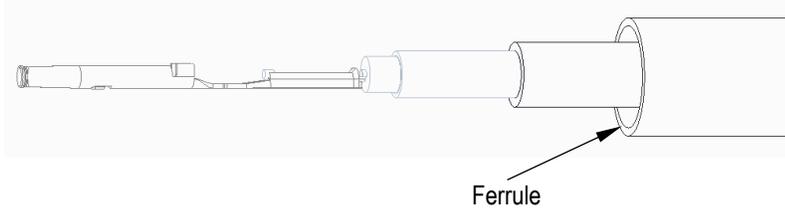
*All features listed in this section (3.5 Crimped Contact) are considered critical and must be reviewed before the release of a process and/or crimp tool. Periodic inspections (on attributes) and statistical analysis (when applicable) must also be made.*



**Figure 4**

**3.6. Install the Ferrule**

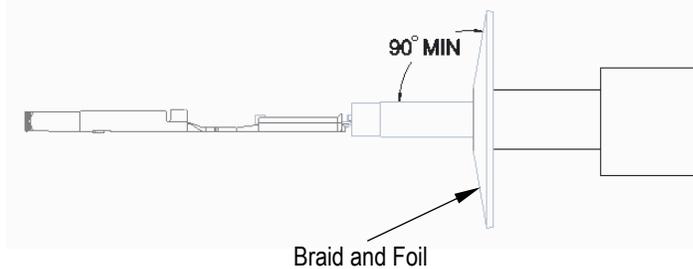
Once the cable has been stripped and the Female Center Contact has been crimped onto the cable, slide the Ferrule over the contact and onto the cable. See Figure 5.



**Figure 5**

**3.7. Flare the cable braid and foil**

After the Ferrule is loaded onto the cable, the cable braid and foil (if present) must be flared outward away from the coaxial cable dielectric until they are roughly perpendicular to the main axis. See Figure 6.



**Figure 6**

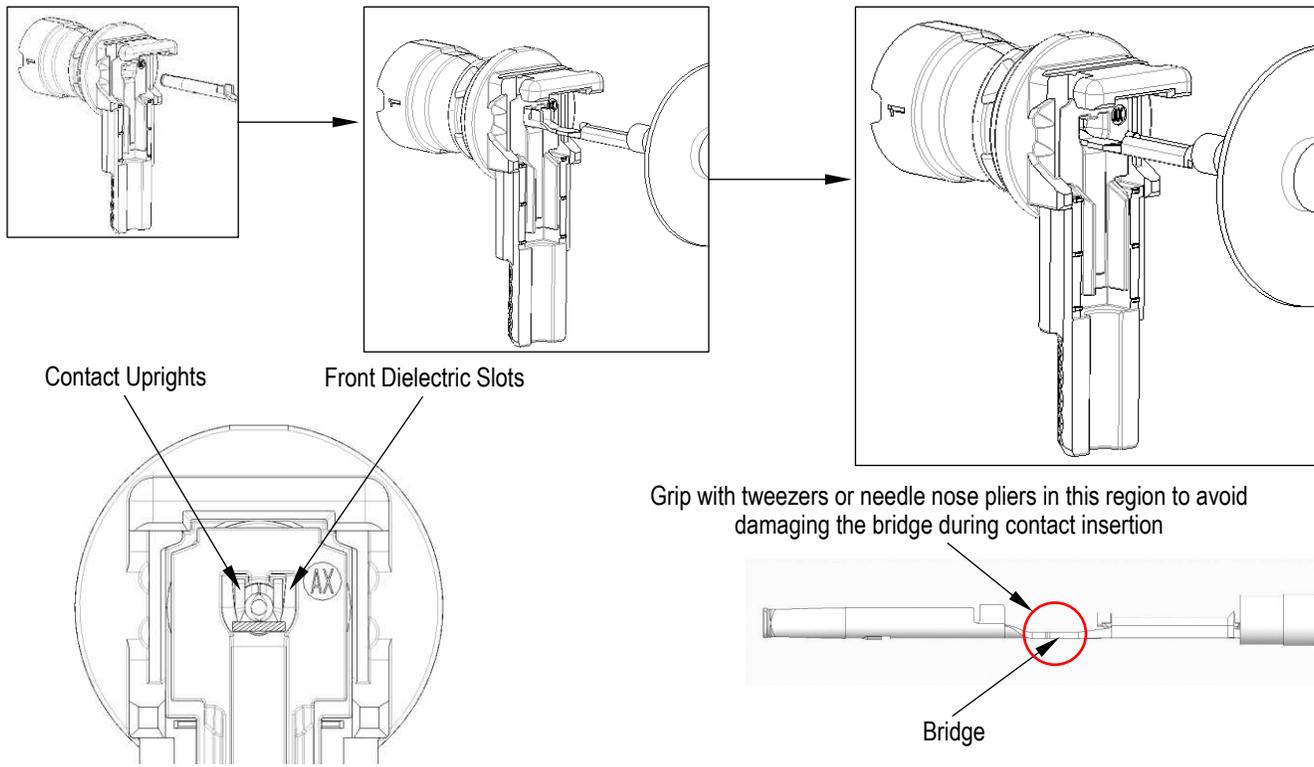
**NOTE**

*When the cable incorporates a foil wrap, it must ideally be flared outward and crimped with the braid, however, it can be trimmed to jacket strip length if necessary (as alternate construction allowance).*

### 3.8. Insert Female Center Contact into Front Shell Subassembly

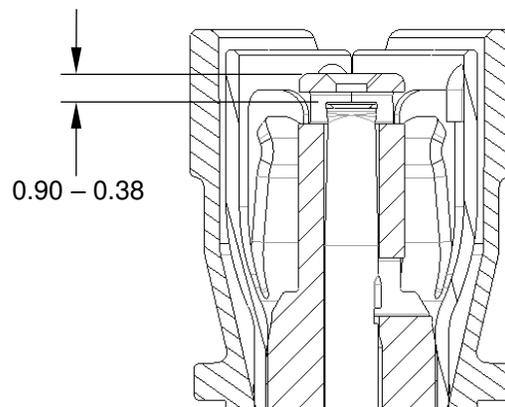
When the braid and foil have been flared, grasp the bridge with tweezers or needle nose pliers and insert the Female Center Contact into the Front Shell Subassembly, making certain to align the uprights on the Center Contact with the slots in the Front Dielectric. Push the Center Contact until it snaps into position in the Front Dielectric. See Figures 7 and 8.

**Caution:** do not damage the bridge that connects the front of the contact to the wire barrel. See Figure 7.



**Figure 7**

**Caution:** do not damage the beams of the Center Contact during inspections efforts. See Figure 8.



**Figure 8**



**NOTE**  
100% Contact depth in-process inspections are required (Critical Characteristic).

### 3.9. Bend Center Contact

Once the Female Center Contact is fully inserted into the Front Shell Subassembly, grasp the Cable Assembly and bend the bridge portion of the Contact approximately 90° using the Front Dielectric as a mandrel to guide the bend. See Figure 9.

**Caution:** the bridge may only be bent once and the Center Contact must remain snapped in place during bending. See Figure 9.

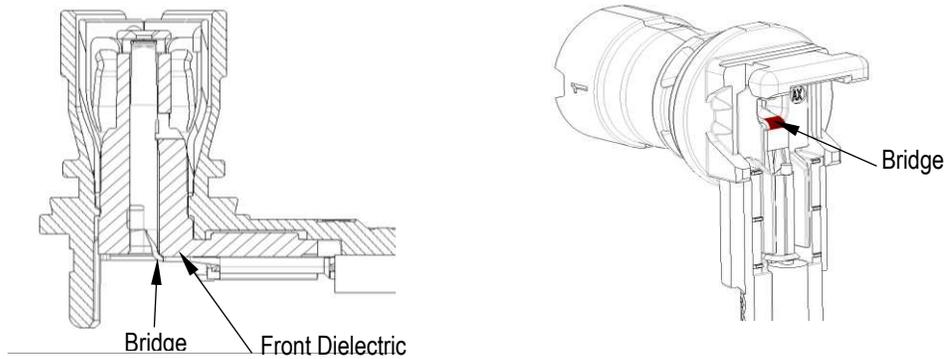


Figure 9

### 3.10. Install Rear Shell Subassembly

After the Cable Assembly has been bent into position, install the Rear Shell Subassembly. Insert the prongs of the Rear Shell Subassembly around the T-shaped post on the Front Shell Subassembly and then pivot the Rear towards the Front until both pieces close around the Cable Assembly. See Figure 10.

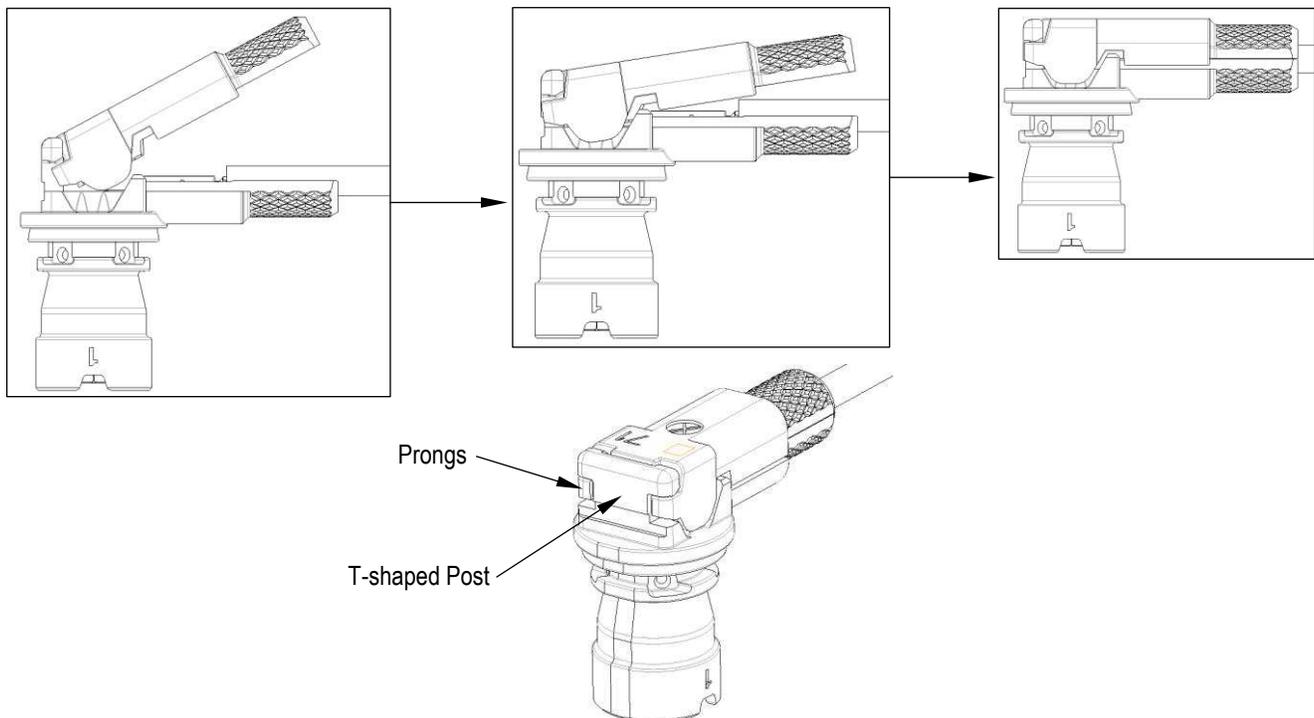
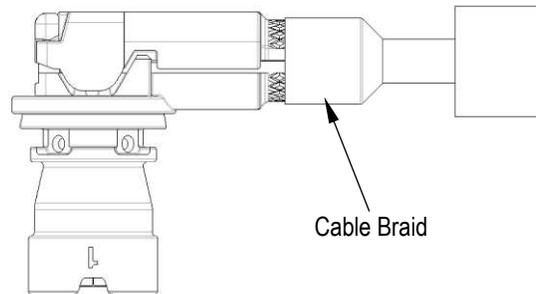


Figure 10

### 3.11. Position cable braid and foil

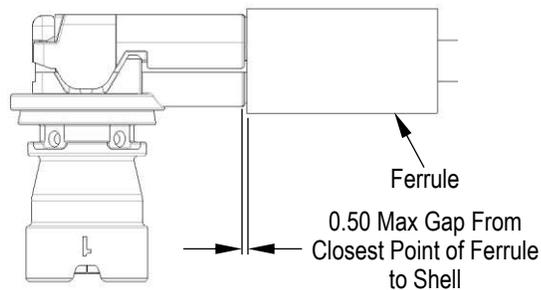
Once the Rear Shell Subassembly has been correctly installed, position the foil (if present) and the braid over the knurled regions of both the Front and Rear Shell Subassemblies. Make certain that the foil and braid are evenly distributed around circumference of knurled region. See Figure 11.



**Figure 11**

### 3.12. Position Ferrule

After the foil (if present) and braiding are in position, slide the Ferrule over the braid until it abuts the shoulders of the Front and Rear Shell Subassemblies. The braid must not be permitted to get trapped between the Ferrule and the Shell Subassemblies. See Figure 12.



**Figure 12**

### 3.13. Crimp Ferrule

When in the correct position, crimp the Ferrule to secure the cable braid to the Front and Rear Shell Subassemblies. The crimp applied to the Ferrule is the most critical feature in ensuring optimum electrical and mechanical performance of the terminated connector. The Ferrule must be crimped according to the instructions packaged with the applicable tooling and must meet the requirements listed in Figure 13.

**i NOTE**  
Periodic inspections must be made to ensure Ferrule crimp formation is consistent.

**i NOTE**  
All qualification testing has been completed with the specific cables listed in the table below. See Figure 2. The use of cables other than that specified in the table may need to be qualified independently.

CABLE SIZE	FERRULE PART NO.	DIE SET PART NO.	CRIMP FIGURE	FERRULE BRAID HEX (±0.05) SECTION A-A	FERRULE MIDDLE HEX (±0.05) SECTION B-B	FERRULE JACKET HEX (±0.05) SECTION C-C
Dacar 462 (Leoni P/N: 85D00029B#), Dacar 462-2 (Leoni P/N: 85D00100#), Dacar 462-6 (Leoni P/N: 8500000E#)	1418993-1	2335317	14	4.10	4.56 ++	3.84 *
RG-174LL (Condemex P/N: 800289-49)		2335317		4.20	4.59	3.87 *
RG-316 (Harbour Industries P/N: M17/113-RG316)		2335316		4.14	4.74	3.45
RG-316 (Condemex P/N: 1557495-1)		2335317		4.20	4.59	3.87 *
RTK-031 (Condemex P/N: FL09YHBCYW KX-50), Dacar 302-4 (Leoni P/N: 85120420H)		2354509		4.10	4.60*	3.92
Dacar 037-6 (Leoni P/N: 8500000R#)	1488499-3	2363572	15	N/A	5.35	O-crimp: 6.10
RG-58 LL (Belden P/N: AG50847) / RG-58LL (Condemex P/N: 800315-49)		2335318			5.41	N/A

Figure 13

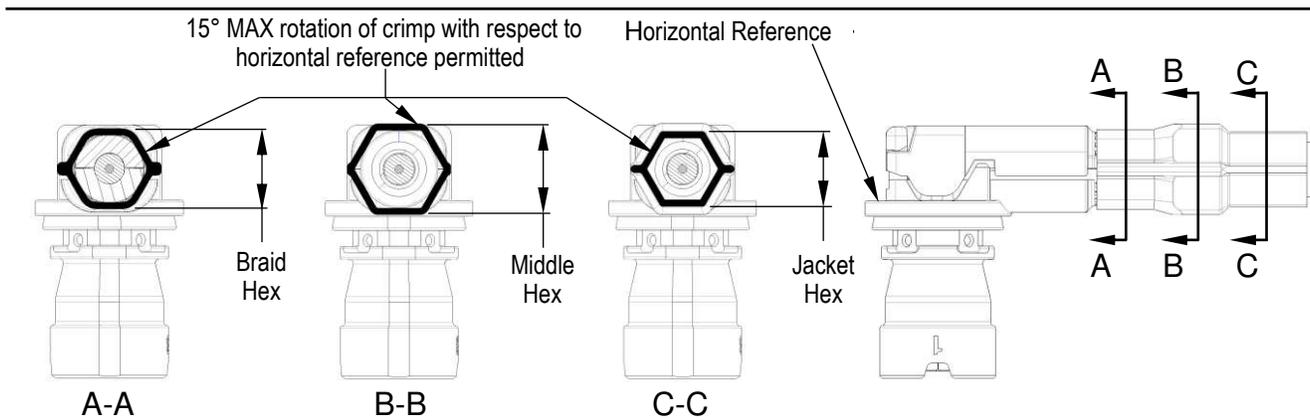


Figure 14

(\*) Indicates that crimp height in that section is REF

(++) Indicates that tolerance is +/-0.10mm

**i NOTE**  
Ferrule crimp must withstand an axial pull-out force of 110N MIN (all cable types). Ferrule crimp dimensions and tensile are considered critical characteristics and must be reviewed before the release of a process and/or crimp tool. Periodic inspections and statistical analysis must also be made.

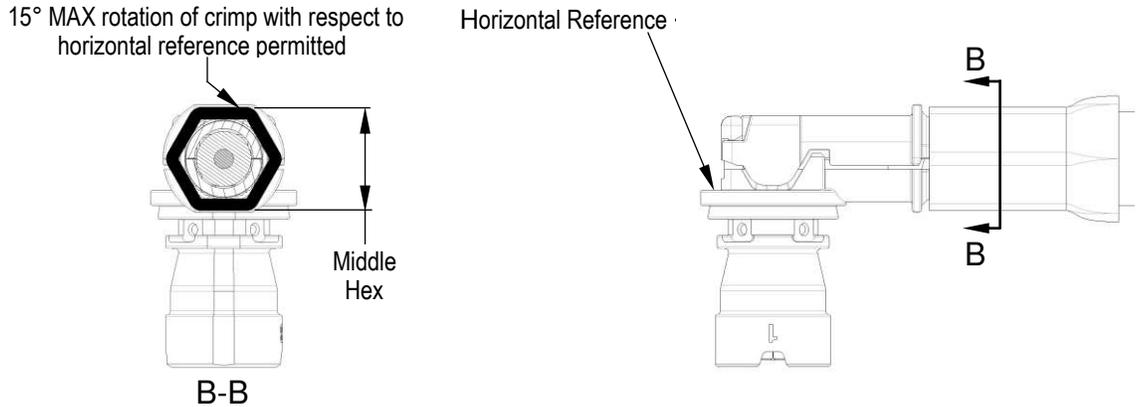


Figure 15

**3.14. Install Unsealed Female Plug Assembly into the Housing Assembly (Typical for all cable sizes)**

The Plug Assembly must be installed into the Housing Assembly by inserting one side of the snap-fit feature into the Housing and then snapping the other side in. There will be an audible snap indicating that the Plug Assembly is fully seated. Confirm that it has been properly installed by holding the Housing Assembly and rotating the Plug. See Figure 16.

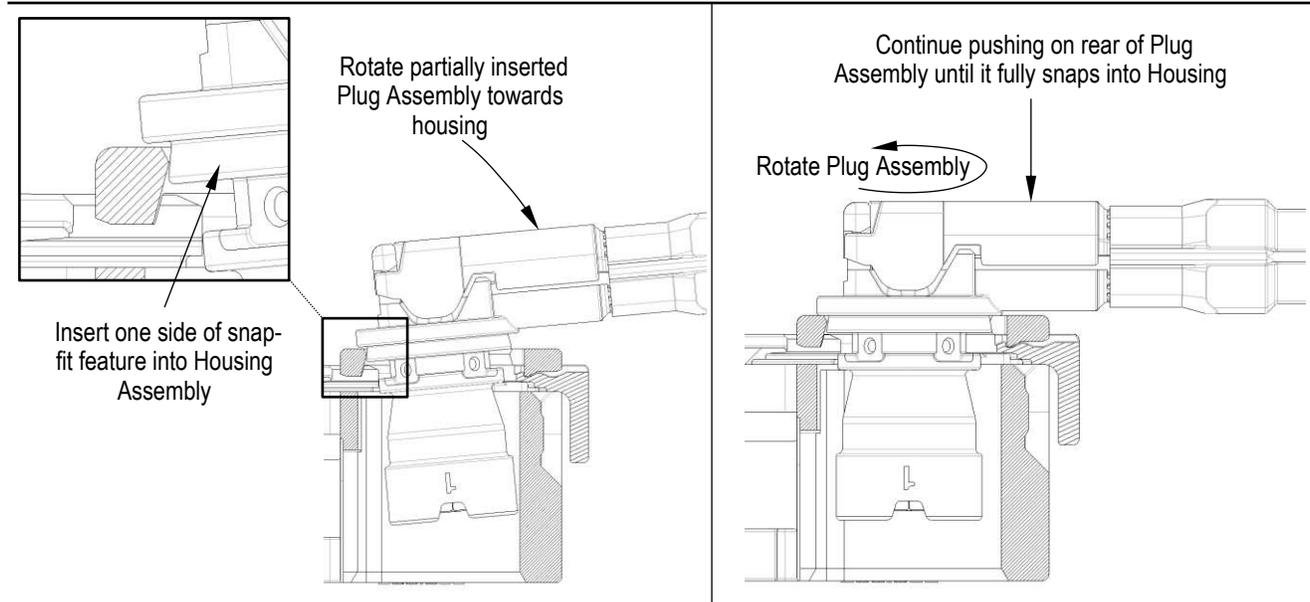


Figure 16

**3.15. Secure Female Plug Assembly to the Housing Assembly via primary and secondary locks (Typical for all cable sizes)**

Once the Female Plug Assembly is fully snapped into the Housing Assembly, secure it by moving the Retainer (primary lock) and the TPA (secondary lock) from their pre-set to set positions. See Figure 17. Both components will produce an audible snap and will sit sub flush to adjacent Housing surfaces, indicating that they are fully seated. Confirm that the Housing Assembly has been properly installed, once again, by rotating the Plug with respect to the Housing Assembly. There should be enough friction between the Plug Assembly and the Housing to prevent the connector from spinning loosely, yet it should still be easy to adjust the angle of the Plug Assembly.

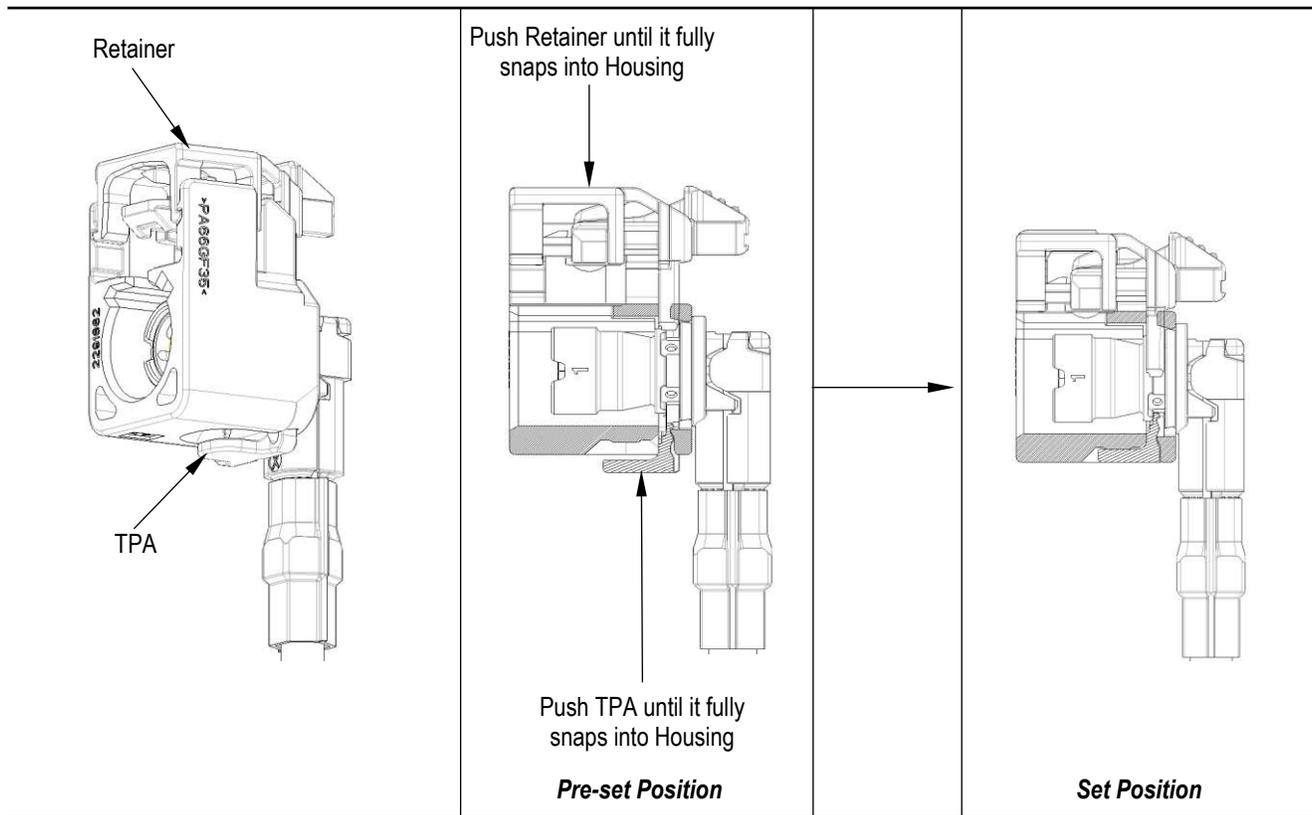


Figure 17

### 3.16. Mate Female and Male Connector Assemblies (typical for all cable sizes and key code configurations)

Insert the Male Connector Assembly into the Female Connector Assembly making certain to align the key coded ribs (Male) with the key coded sockets (Female). Keying information is defined on the customer drawing for the specific connector. After mating, the Female Connector Assembly locking latch must be latched and fully seated on the Male Connector Assembly locking tab. There will be an audible snap as the latch drops over the tab indicating that the pair have been successfully mated. See Figure 18.

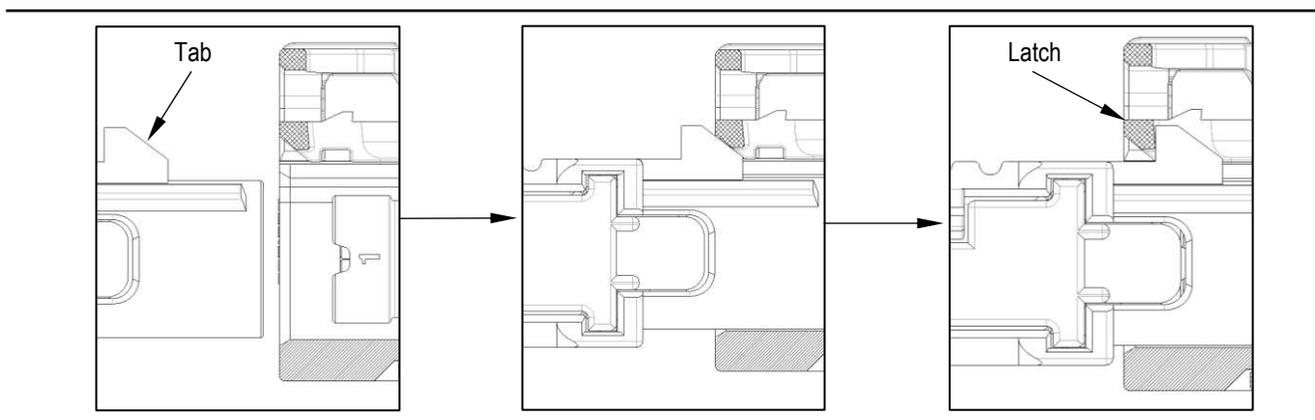


Figure 18

### 3.17. Place CPA into set position

Once the Female and Male Connector Assemblies are fully mated, push the CPA from the pre-set to the set position. There will be an audible snap as the CPA moves into its set position. If the CPA does not move easily, make certain that the Female and Male Connector halves are properly mated. See Figure 19.

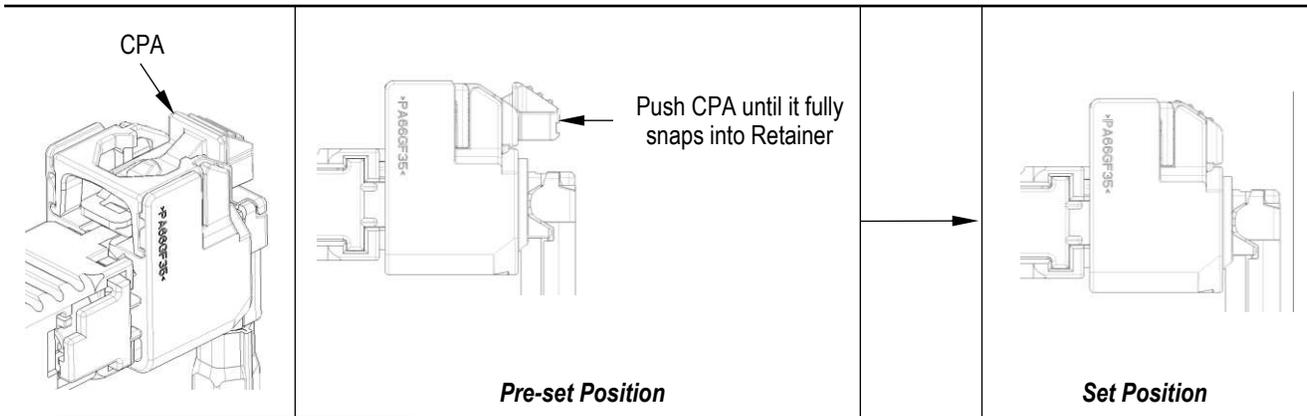


Figure 19

### 3.18. Cable Routing and Strain Relief

When bending or forming cable, the cable bundle must be held at least 6.35 mm beyond the Ferrule before bending in any direction. If the installation is to be subject to bending forces, strain relief should be provided on the cable bundle approximately 25.4 mm from the back of the Ferrule. Maintain a minimum bend radius of 10 times the cable outside diameter.



**CAUTION**

Unsupported cable must NOT be bent as this may cause strain on the contact inside the connector.

### 3.19. Repair and Replacement

These connector components are not repairable. Any damaged components must be replaced. Terminated Contacts, Ferrules, or Subassemblies must NOT be re-used by removing the cable. Do not reuse Housings, Retainers, or TPAs.

## 4. QUALIFICATION

FAKRA Automated 90° Connectors are not required to be agency evaluated and tested.

## 5. TOOLING

The Center Contacts and Ferrules can be terminated to the cable using semi-automatic or automatic crimping tools. Recommended tooling is provided in Figure 20.



**NOTE**

Machines for a variety of application requirements are available. For assistance in setting up prototype and production line equipment, contact your local TE Representative or call the PRODUCT INFORMATION number at the bottom of page 1.

### 5.1. Applicator

Applicators are designed for the full cable size range of strip-fed, precision formed contacts, and provide for high volume, heavy duty, and production requirements. The applicators can be used in bench or floor model power units.



**NOTE**

Some changes may have to be made to the applicators to run in all related power units. Contact the PRODUCT INFORMATION number at the bottom of page 1 for specific changes.

## 5.2. Power Unit

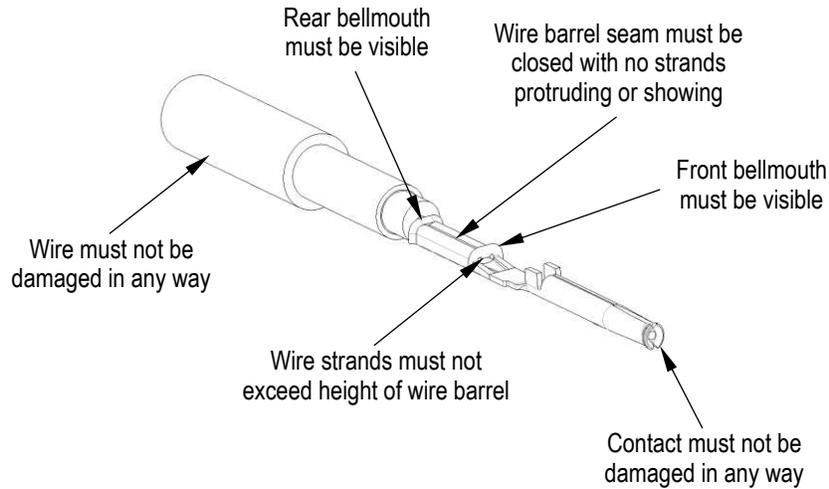
A power unit is an automatic or semi-automatic device used to assist in the application of a product. The power unit includes the source used to supply the force or power to an applicator. See Figure 20.

CABLE SIZE	POWER UNIT (DOCUMENT)	APPLICATOR (408-10389)	BENCH TOP CRIMPER (412-94328)
	COMPONENT	CENTER CONTACT (See Figure 3)	FERRULE (See Figure 13)
Dacar 462 (Leoni P/N: 85D00029B#), Dacar 462-2 (Leoni P/N: 85D00100#), Dacar 462-6 (Leoni P/N: 8500000E#)	TE PART NUMBER	2217000-[ ] (409-32035)	539630-2
RG-174LL (Condumex P/N: 800289-49)			
RG-316 (Harbour Industries P/N: M17/113-RG316)			
RG-316 (Condumex P/N: 1557495-1)			
RTK-031 (Condumex P/N: FL09YHBCYW KX-50), Dacar 302-4 (Leoni P/N: 85120420H)			
Dacar 037-6 (Leoni P/N: 8500000R#)			
RG-58 LL (Belden P/N: AG50847) / RG-58LL (Condumex P/N: 800315-49)			

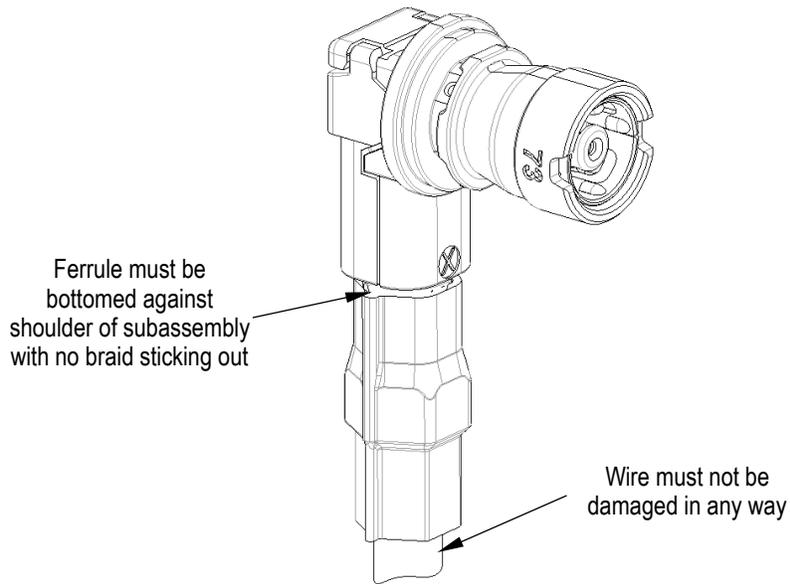
Figure 20

**6. VISUAL AID**

The illustration below shows a typical application of this product. This illustration should be used by production personnel to ensure a correctly applied product. Applications which do not appear correct should be inspected using the information in the preceding pages of this specification and in the instructional material shipped with the product or tooling. See Figure 21.

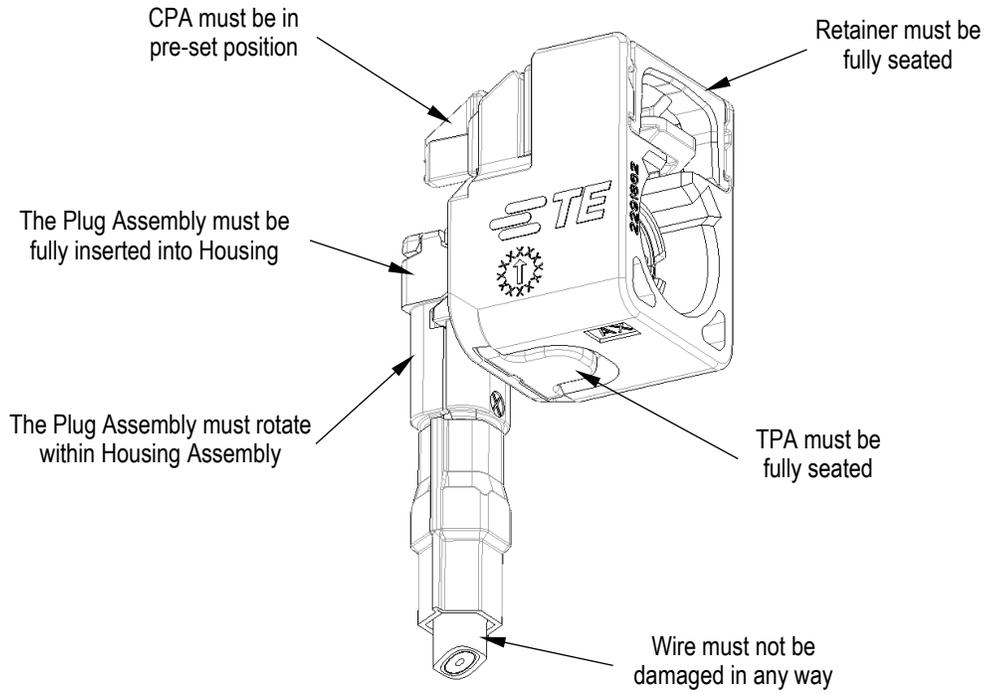


**Crimped Contact**

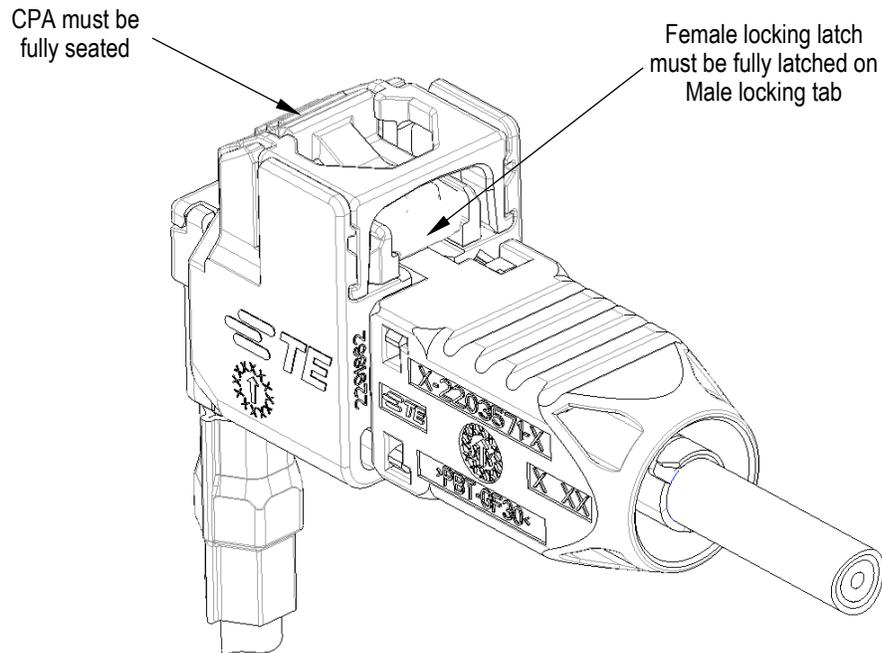


**Crimped Ferrule**

**Figure 21 (cont'd)**



**Female Connector Assembly**



**Mated Assemblies**

**Figure 21 (end)**

Revision	Description	Author	Date
A	Initial release	C Brandt	06Feb2019
B	Fixed typo in Figure 12 Section C-C was Section B-B. Added RTK-031 and RG-316 (Condumex version) details. Updated Ferrule hex crimp dimensions.	C Brandt	04Jun2019
C	Updated Ferrule hex crimp dimensions. Added additional handling instructions when stitching Center Contact into Front Shell Subassembly.	C Brandt	13Sep2019
D	Added pertinent information for cables Dacar 462-6 and 037-6	C Brandt	24Aug2020
E	Added inspection details for Center Contact insertion depth	C Brandt	21Oct2020
F	Jacket crimp for ferrule crimp tool 2335317 is converted to REF	A Puig	18Nov2021
G	Added pertinent information for cable Dacar 302-4, Ferrule Crimp Section B for RTK031 & 302-4 is converted to REF, Adding allowance for 'foil trimming', Center contact crimp tensile added.	A Puig	03May2023
H	Cables Dacar 462 and Dacar 462-2 added to Figure 2, Figure 3, Figure 13, and Figure 20	A Puig	26FEB2024
J	Ferrule crimp for Dacar 462 updated (tolerance for Section B-B is changed to +/-0.10mm)	A Puig	18-APR-2024