



**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.

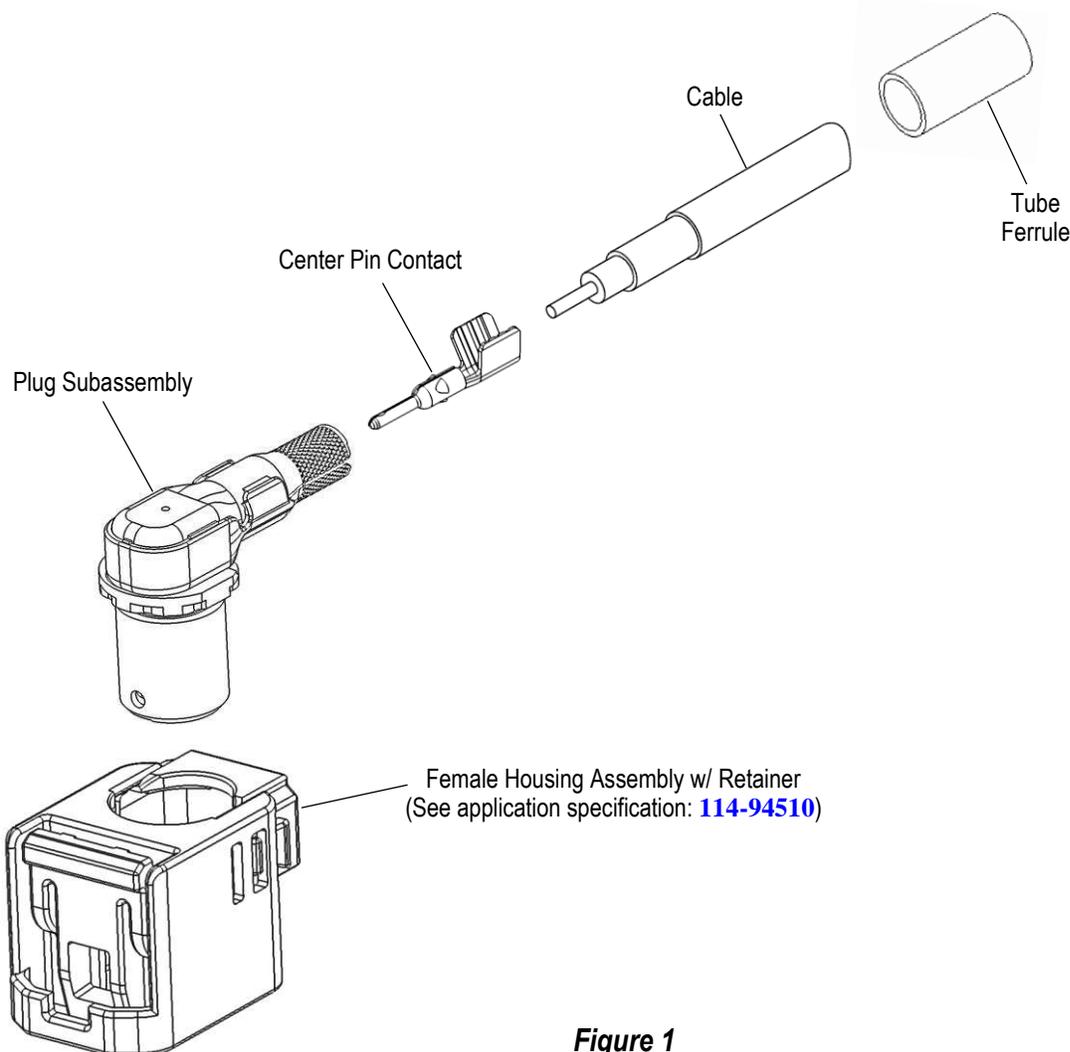
**1. INTRODUCTION**

This specification covers the requirements for application of FAKRA-AX 90° 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, and RTK031 coaxial cable. The connector system consists of a Female Plug Assembly; available in both 1-position and 2-positions.

Each connector consists of a Female Housing Assembly, Plug Subassembly, Center Pin Contact, and Ferrule. Each component is available separately or as part of a kit. The Female Housing Assembly (Not included in the application specification) has integral keys and the Male Housing (Not shown) Assembly has integral keying ribs. Keying is used to prevent inadvertent mating of similar connector assemblies. These connectors are terminated using hand or automatic machine crimping tools.

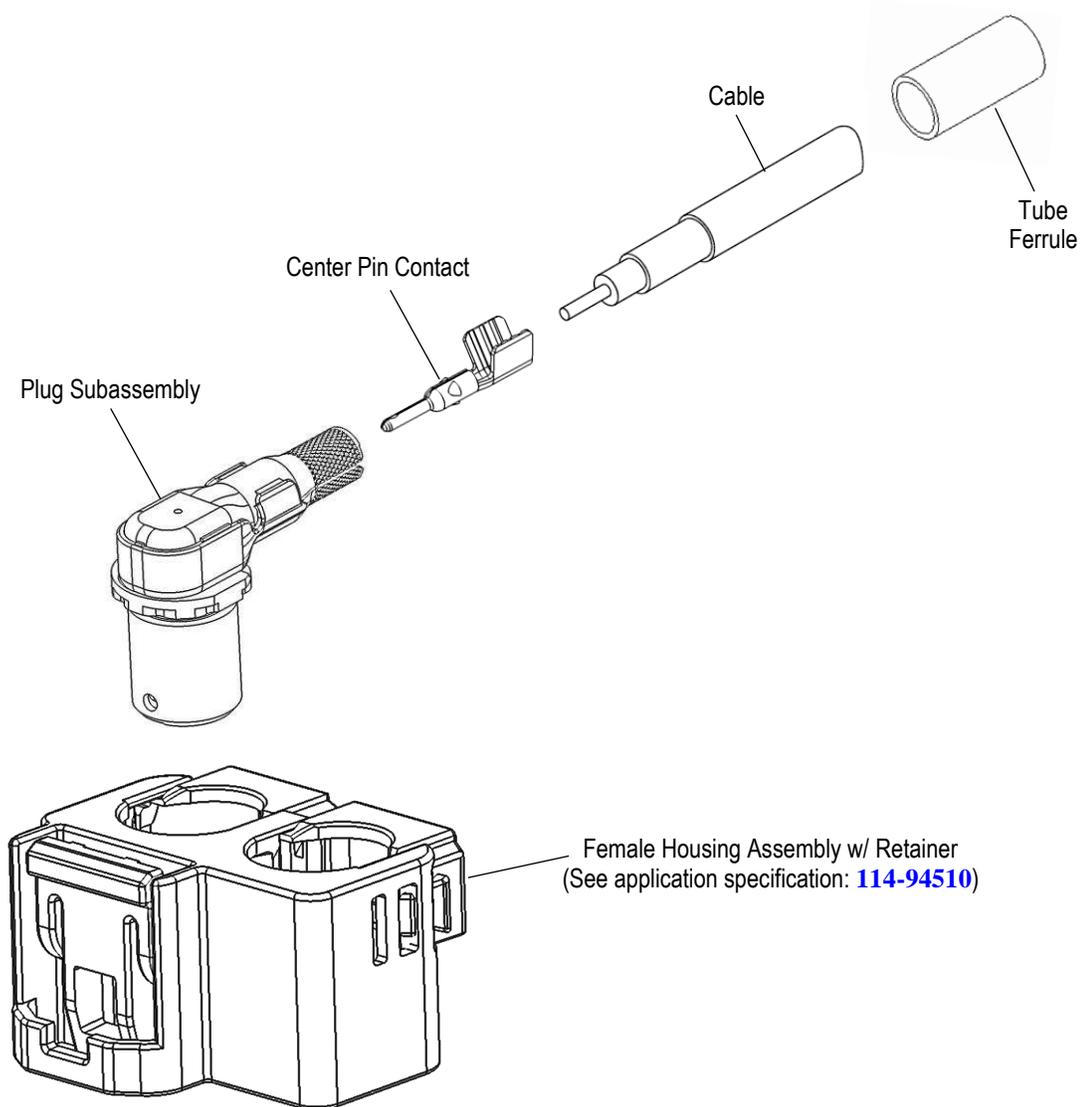
When corresponding with TE Connectivity Personnel, use the terminology provided in this specification to facilitate your inquiries for information. Basic terms and features of this product are provided in Figure 1.

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



**Figure 1**

**2-Position 90° Female Connectors for All Coaxial Cable Sizes**



**Figure 1 (End)**

## 2. REFERENCE MATERIAL

### 2.1. Customer Assistance

Reference Product Base Part Number 2304676, and Product Code W766 are representative of the FAKRA-AX 90° 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.

### 2.2. 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.

### 2.3. Instructional Material

Instruction Sheets (408-series) provide product assembly instructions or tooling setup and operation procedures and Customer Manuals (409-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="#">409-10047</a>	AMP 3K* Terminating Machine 1725950-[ ] and AMP 5K* Terminating Machine 1725900-[ ]
<a href="#">409-10204</a>	AMP 3K/40* CE Terminating Machines 2161400-[ ] and AMP 5K/40* CE Terminating Machines 2161500-[ ]
<a href="#">409-32035</a>	AMP-O-LECTRIC* Model G II Terminator 2217000-[ ]
<a href="#">412-108000</a>	H-2 Terminator 2014000-[ ]

## 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 100°C [-40 to 212°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

#### A. Stripping

Proper strip length is necessary to properly apply the cable to the contact. See Figure 2. Center conductor and dielectric strip lengths must be chosen such that the finished product requirements for center conductor extension (a.k.a. “wire brush”) and braid strand length are met. See Figures 2 and 3.

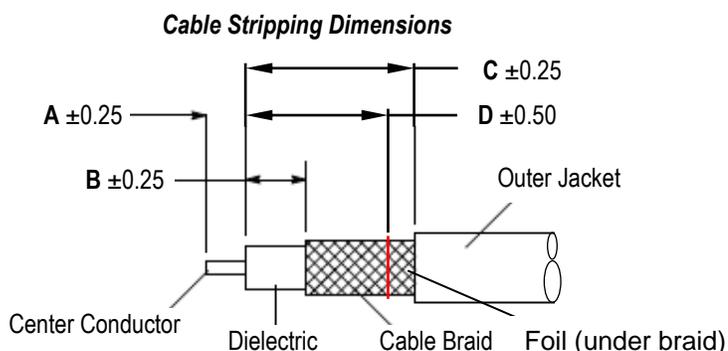
#### B. Braid and Foil Cutting

In order to completely remove braid and foil, it is sometimes necessary to partially cut into the dielectric cable material. Although this practice is allowable, the cut into the dielectric must not reach the center conductor. The cut into the dielectric cable material should be as small as possible.



#### CAUTION

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



Cable Size	Cable Manufacturer	A	B	C	D
DACAR 462	Leoni	2.60	3.20	7.70	6.40
GG Cospeed 5031	Gebauer & Griller	2.60	3.20	7.90	6.50
DACAR 302-4	Leoni				
COFDATA 50 031 105 COFDATA 50 031 105-9	Coficab				
FDC402	Force				

**Figure 2**

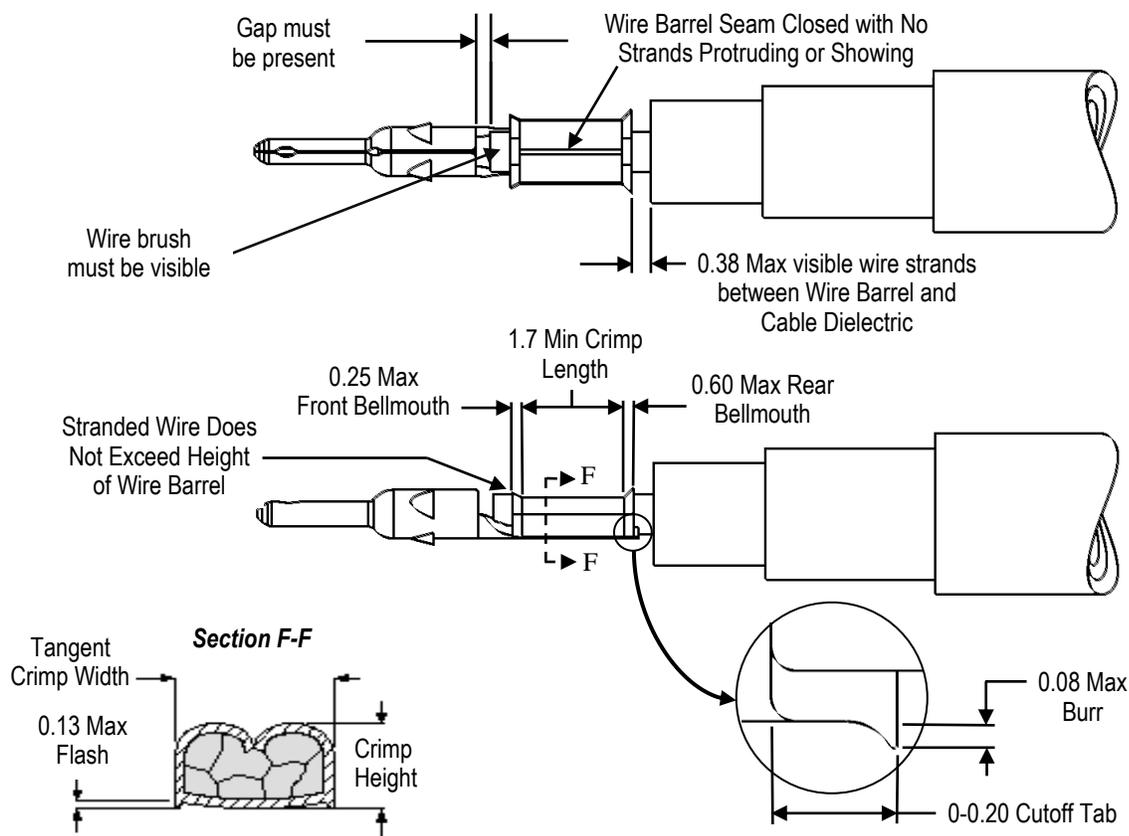


#### NOTE

Cable strip dimensions listed in parentheses (X.XX) are reference only, validation testing has not been completed.

### 3.5. Crimping Center Pin Contact

Crimp the Center Pin Contact onto center conductor of cable (see Figure 3). Refer to instructions packaged with crimp tooling for appropriate procedure.



CABLE SIZE	CENTER PIN CONTACT PART NUMBER	APPLICATOR	CONTACT WIRE BARREL ("F" CRIMP)		MIN TENSILE (N)
			CRIMP HEIGHT	TANGENT CRIMP WIDTH (Reference)	
DACAR 462	2297252-4	2836598-[]	0.71±0.03	(1.000)	50
GG Cospeed 5031 DACAR 302-4 COFDATA 50 031 105 COFDATA 50 031 105-9 FDC402	2297252-8	2836593-[]	0.84±0.03	(1.270)	50

**Figure 3**



**NOTE**

Crimp Heights listed in parentheses (X.XX) are reference only, validation testing has not been completed.



**NOTE**

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



**NOTE**

Please refer to Figure 2 for the cable manufactures that have been qualified and acceptable to use. The use of other cable manufactures needs to be qualified independently.

### **A. 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.

### **B. 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.

### **C. Bell-mouths**

Front and rear bell-mouths shall conform to the dimensions given in Figure 3.

### **D. Cutoff Tab**

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

### **E. Burr**

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

### **F. Wire Barrel Flash**

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

### **G. Conductor Extension**

The conductor must extend beyond the wire barrel, but not touch the end of the window as shown in Figure 3.

### **H. Wire Barrel Seam**

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

### **I. 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.

### **J. Crimp Retention**

Center contact crimp must exceed minimum tensile force defined in Figure 3.



#### **NOTE**

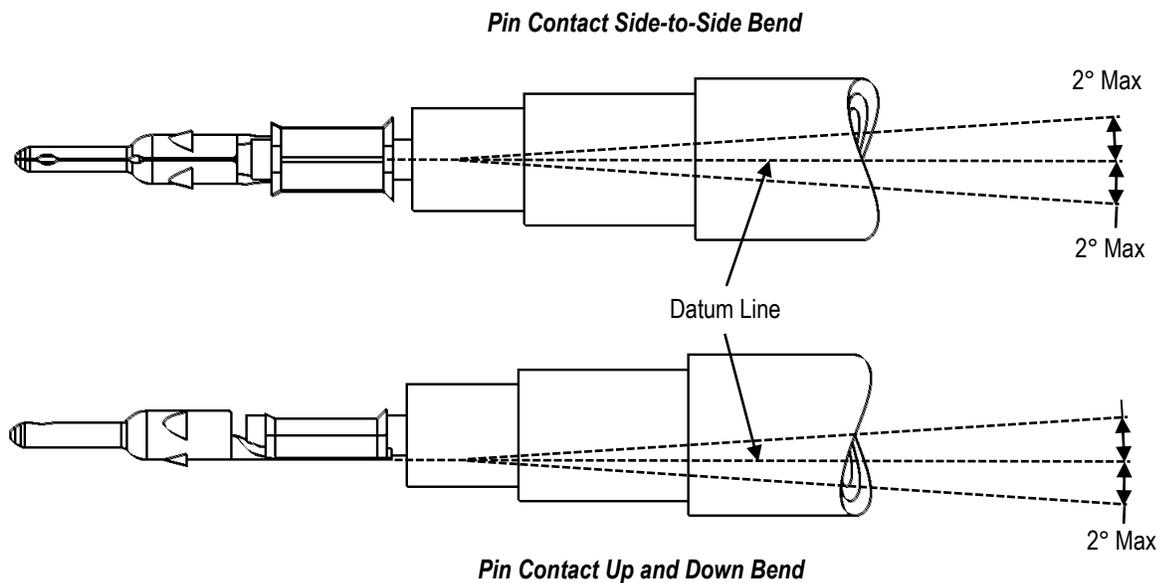
*Periodic inspections must be made to ensure crimped contact formation is consistent.*

### K. Recommended 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.

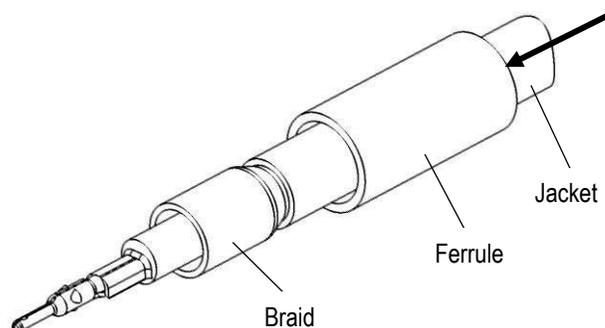
1. The side-to-side bend of the pin contact should not exceed the limits provided.
2. The up and down bend of the pin contact, including cutoff tab and burr, should not be bent above or below the datum line more than the amount given.

**Figure 4**



### 3.6 Installing the Ferrule

Ferrule must be installed over the cable jacket as shown in Figure 5. Do not allow Ferrule to slide past and damage the cable braid.



**Figure 5**

### 3.7 Flaring Cable Braid

Cable braid must be flared outward from the cable dielectric to allow knurled end of Plug Subassembly to be inserted underneath the braid. Cable strands must not be damaged. *(If aluminum foil is present between braid and dielectric, the foil is to be cut as defined by Figure 2 and Figure 6.*

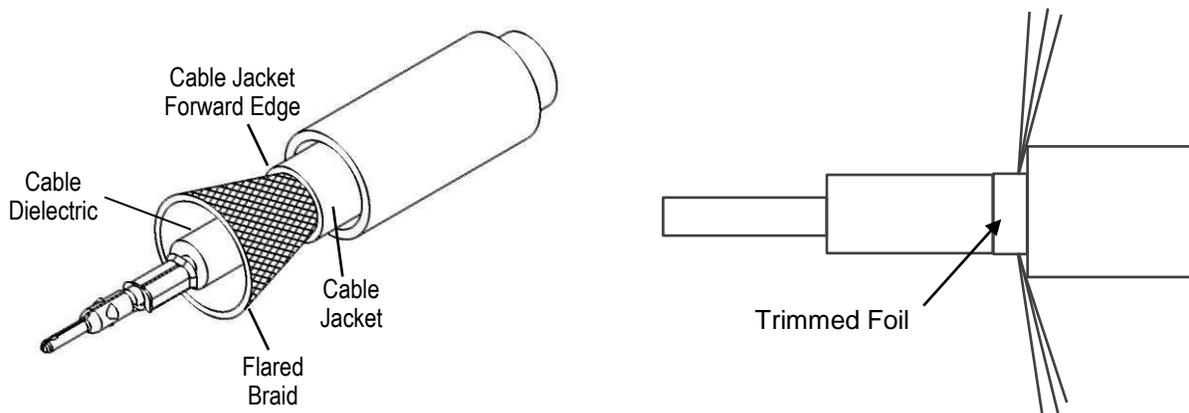
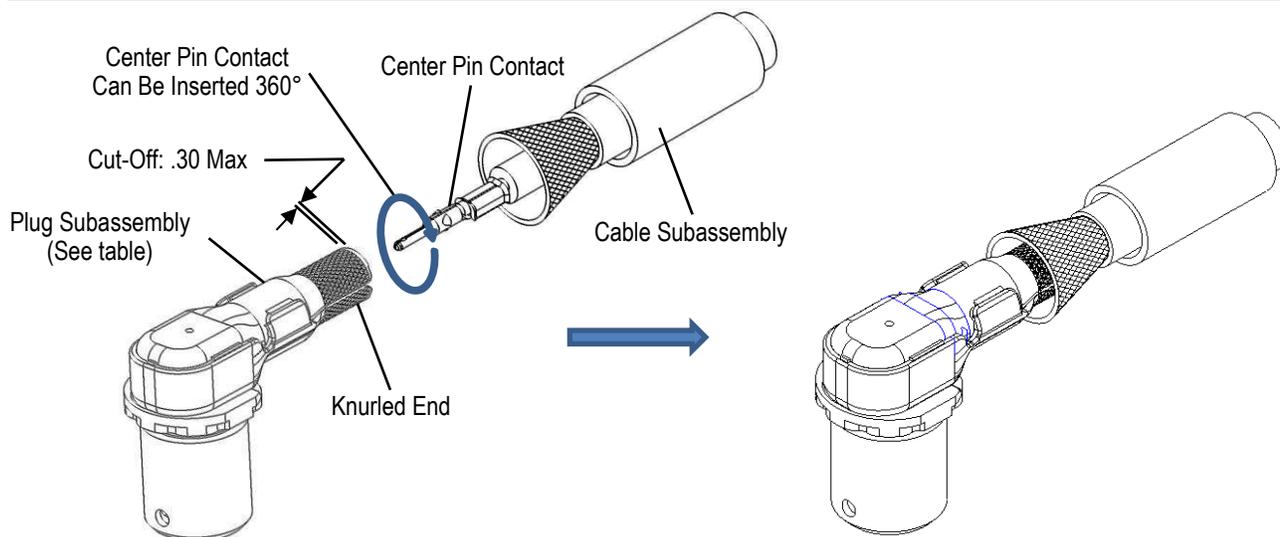


Figure 6

### 3.8 Inserting Cable Subassembly into Plug Subassembly

After the braid is flared, push the cable Subassembly into the knurled end of the Plug Subassembly. The Center Pin Contact cable assembly does not require clocking and can be inserted at any clock position. The Center Pin Contact must be inserted into the Plug Subassembly until it “snaps” into the internal detent feature. Braid strands are to be evenly distributed around the knurled end. See Figure 7.



CABLE SIZE	PLUG SUBASSEMBLY PART NUMBER
DACAR 462	2272590-2 2272590-5
GG Cospeed 5031 DACAR 302-4 COFDATA 50 031 105 COFDATA 50 031 105-9 FDC402	2272590-1 2272590-4

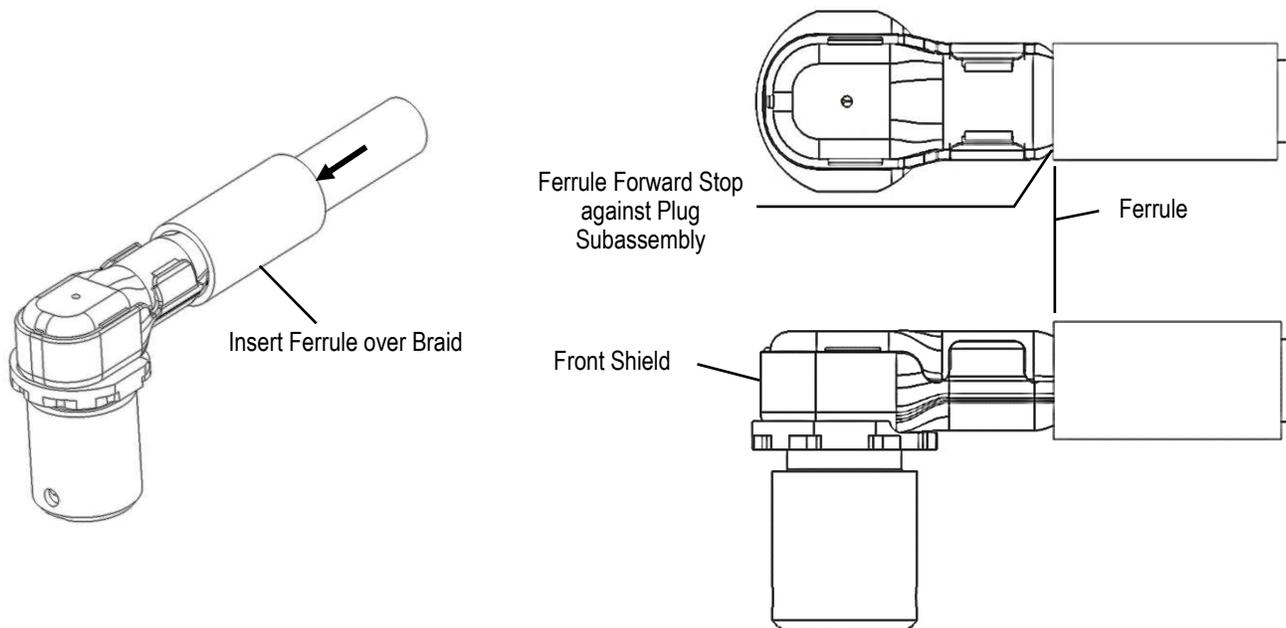
**Figure 7**



When the cable incorporates a foil wrap, it is to be removed as described by section 3.7.

### 3.9 Positioning the Ferrule

After cable Subassembly is inserted into the Plug Subassembly, push the Ferrule forward over the braid until it stops on the Plug Subassembly. No braid strands are to be visible.



**Figure 8**

### 3.10 Crimping the Ferrule

The Ferrule must now be crimped to the cable braid and Plug Subassembly according to the instructions packaged with the applicable tooling (See Figures 9 & 10). Ferrule seam to be  $0\pm 2^\circ$  maximum from the horizontal datum line. Ferrule bellmouth to be  $0.45\pm 0.20\text{mm}$ , measured only at the top as shown below.

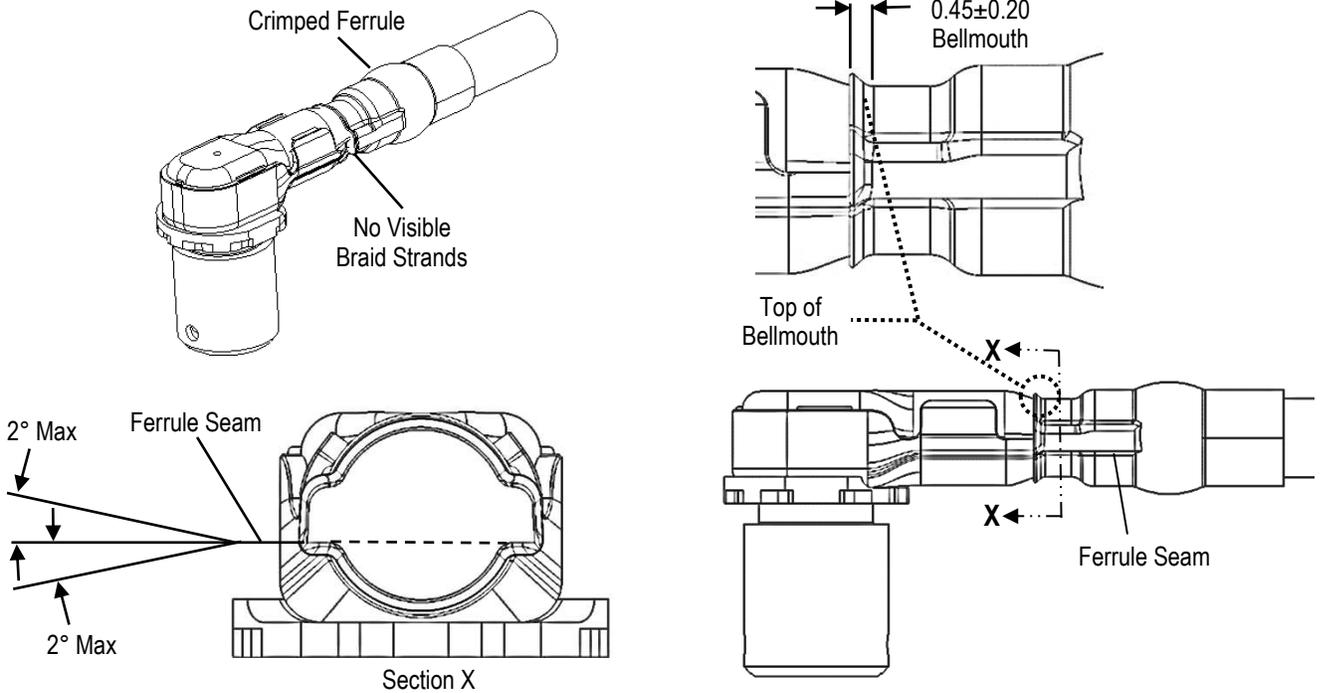
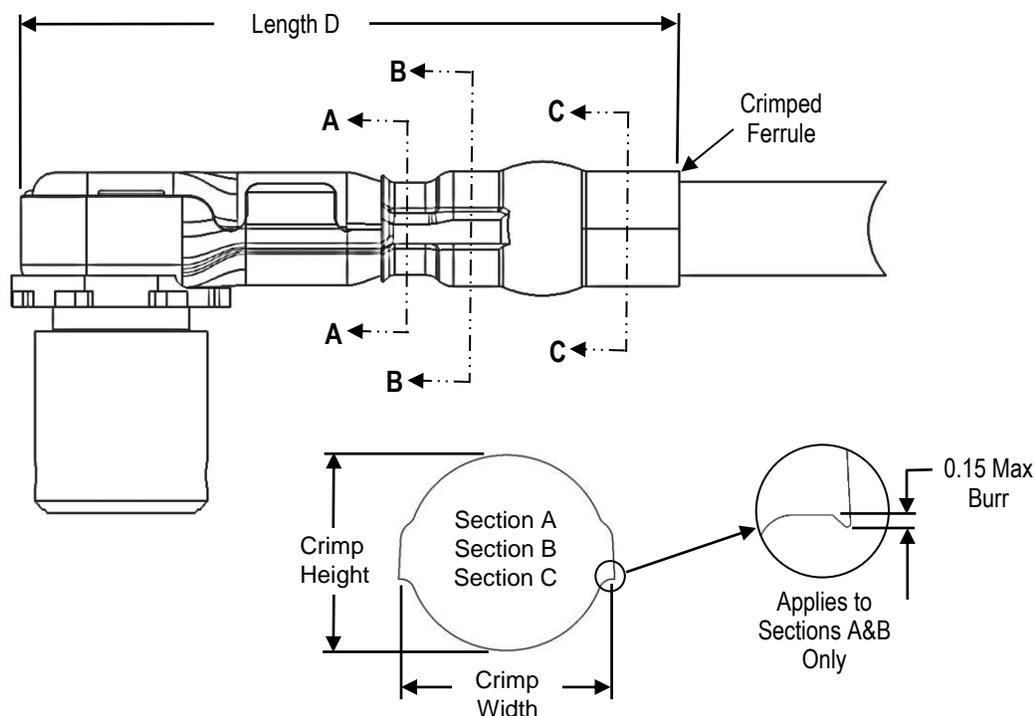


Figure 9

## A. Crimp Height

The crimp applied to the Ferrule is most critical in ensuring optimum electrical and mechanical performance of the terminated connector. For cable assembly processing, make certain that the Section A crimp height is within the dimensions provided in Figure 10. The crimp heights and widths listed for Sections B and C are primarily for internal crimp die design and can be considered as reference dimensions for end users.

### Crimped Plug Subassembly



CABLE SIZE	PRIMARY FERRULE PART NUMBER	PRIMARY APPLICATOR PART NUMBER	FERRULE BRAID CRIMP HEIGHT <i>SECTION A</i> $\pm 0.10$	FERRULE BRAID CRIMP HEIGHT <i>SECTION B</i> (Reference Only)	FERRULE JACKET CRIMP HEIGHT <i>SECTION C</i> (Reference Only)	FERRULE CRIMP WIDTH <i>SECTION A&amp;B</i> (Reference Only)	OVERALL LENGTH <i>D</i> ( $\pm 0.15$ )
DACAR 462	2331346-3	2416039-1	2.70	(3.10)	(3.35)	(3.88)	TBD
GG Cospeed 5031 DACAR 302-4 COFDATA 50 031 105 COFDATA 50 031 105-9 FDC402	2331345-3	2416038-1	3.60	(4.00)	(4.05)	(4.40)	22.75

**Figure 10**



#### NOTE

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

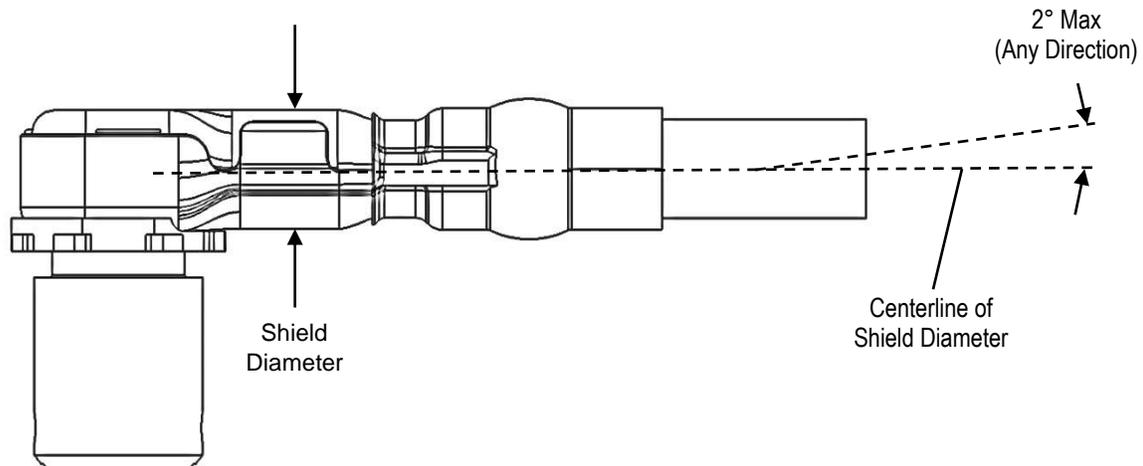


#### NOTE

Section A crimp heights listed in parentheses ( ) are listed as reference only, until validation testing has been completed.

## B. Straightness

The crimping process may cause some bending between the Ferrule and the Plug Subassembly. The allowable bending must not exceed the angle provide in Figure 11. Angle measurement to be made relative to the Plug Subassembly Shield diameter shown in Figure 11.



**Figure 11**



### NOTE

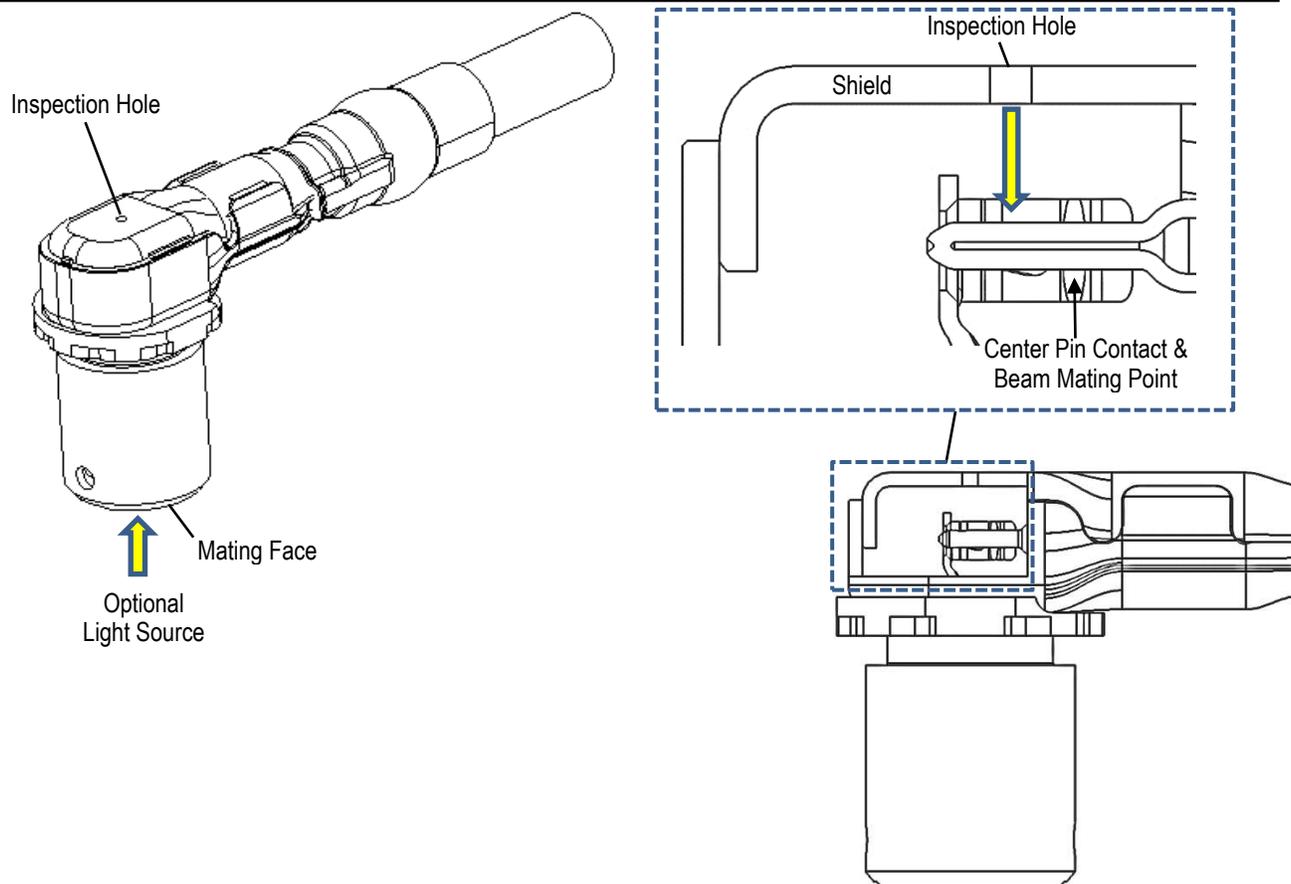
*Periodic inspections must be made to ensure straightness is consistent.*

## C. Crimp Retention

Ferrule crimp must withstand an axial pull-out force of 110N MIN (Applies to all cable types).

### 3.11 Verification of Final Center Pin Contact Position

After insertion of the terminated cable pin subassembly into the connector subassembly, and after crimping the Ferrule, it must be ensured that the Center Pin is in the correct position (i.e. snapped into position). The inspection hole in the top of the Shields can be used for verification of the final Center Pin location. The Pin Terminal must be visible through this hole. A light source below the mating face is recommended. See Figure 12.



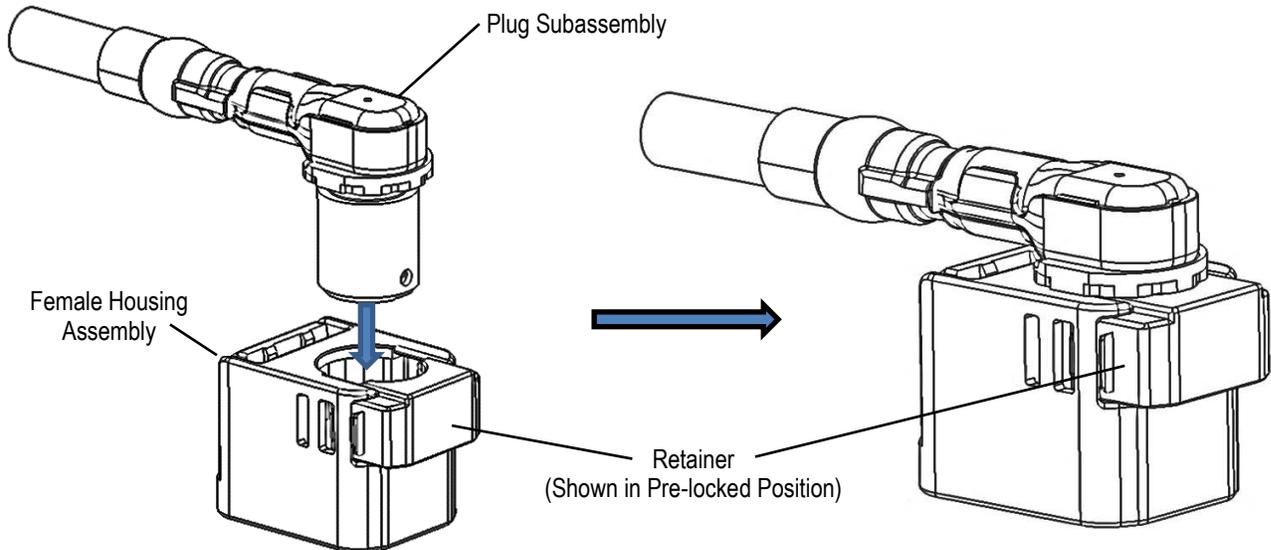
**Figure 12**

### 3.12 Female housing assemblies

The FAKRA-AX 90° Plug Subassembly is compatible with all the FAKRA 2 90° (Right Angle) connector Housings listed in application specification [114-94510](#). Please refer to this specification for detailed assembly and additional housing information not covered with in this specification.

### 3.13 Installing Plug Subassembly into Female Housing Assembly (1-Position Shown)

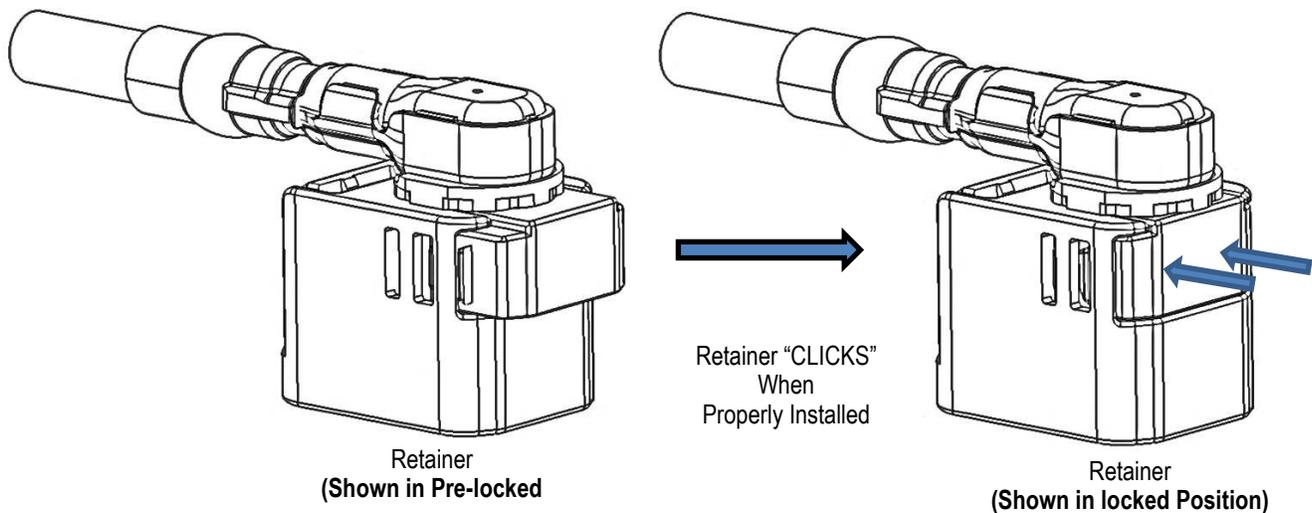
With the Retainer in the pre-locked position, insert the Plug Subassembly into the Female Housing Assembly as shown in figure 13 below (Female Housing Assembly is shipped with the retainer in the pre-locked position). Please refer to application specification [114-94510](#) for more detailed Retainer information.)



**Figure 13**

### 3.14 Locking Plug Subassembly with Retainer

Once the Plug Subassembly has been installed into the Female Housing Assembly the Retainer can now be pushed into the “locked” position as shown below in Figure 14. Retainer will “click” when properly seated into locked position.



**Figure 14**

### 3.15 Keying

Keying prevents inadvertent mating of similar assemblies. The keying rib position (Male Assembly) must be compatible with the key position (Female Assembly). The quantity and position of the keying combinations varies. Keying information is defined on the customer drawing for the specific connector.

### 3.16 Mating and Un-Mating Connectors

The mating, un-mating and latching of Connector Housings is detailed in application specification [114-94510](#).

### 3.17 Cable Routing and Strain Relief

When bending or forming cable, the cable bundle must be held at least (X.XX) mm beyond the back of the housing 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 (X.XX) mm from the back of the housing.

**CAUTION**

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

**CAUTION**

*To ensure optimum performance, routing of cable and/or the strain relief must not bias or reduce the float of the subassembly inside the housing.*

### 3.18 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. Female Housings and Retainers already assembled must **NOT** be re-used but may be replaced with new components per application specification [114-94510](#).

## 4 QUALIFICATION

FAKRA Automated 90° Stamped and Formed 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 15.

**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**

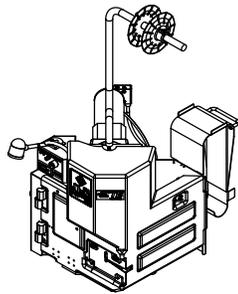
*Some changes may have to be made to the applicators to run in all related power units. Contact the PRODUCT INFORMATION number at the bottom of page 1 for specific changes.*

### 5.2 Power Unit

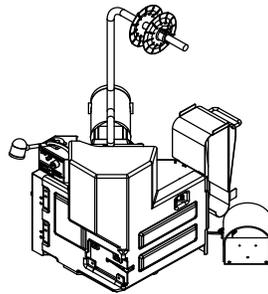
A power unit is an automatic or semi-automatic device used to assist in the application of a product. The power unit includes the source used to supply the force or power to an applicator.

CABLE SIZE	APPLICATOR (408-10389)			POWER UNIT (DOCUMENT)
	CENTER PIN CONTACT	PRIMARY FERRULE	ALTERNATE FERRULE	
RG-174	2297252-4	2331346-3	(X.XX)	1725900-[ ] (409-10047) 1725950-[ ] (409-10047)
GG Cospeed 5031 DACAR 302-4 COFDATA 50 031 105 COFDATA 50 031 105-9 FDC402	2297252-8	2331345-3	(X.XX)	2014000-[ ] (412-108000) 2161400-[ ] (409-10204) 2161500-[ ] (409-10204) 2217000-[ ] (409-32035)

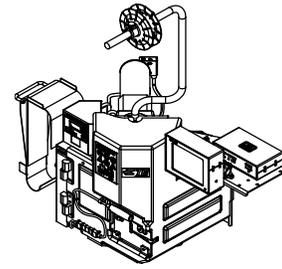
**Figure 15**



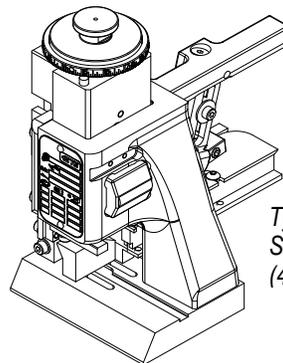
AMP 3K Terminating Machine 1725950-[] (409-10047)



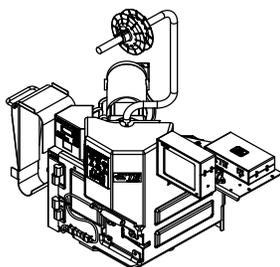
AMP 5K Terminating Machine 1725900-[] (409-10047)



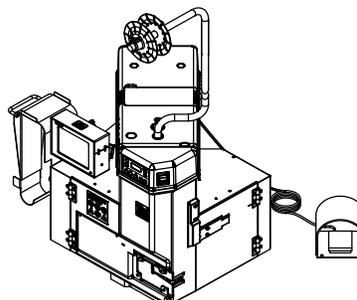
AMP 3K/40 CE Terminating Machine 2161400-[]



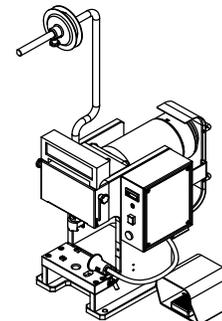
Typical Ocean Side-Feed Applicator (408-10389)



AMP 5K/40 CE Terminating Machine 2161500-[]



AMP-O-LECTRIC\* Model G II Terminator 2217000-[] (409-32035)



H2 Machine Terminator 2014000-[] (412-108000)

## 6 REVISION RECORD

REVISION	DESCRIPTION	AUTHOR	DATE
1	Initiate document using 114-32145 format	NFS	1/16/2017
2	Change ferrule design	NFS	4/11/2018
3	Obsolete and update cable sizes.	NFS	1/14/2021
4	Added housing details, cable manufacturers, and processing info.	NFS	2/10/2021

5	Removed RG-58 cable size. Updated cable strip dimensions in Figure #2. Added pin applicator dash numbers. Removed GnG cable manufacturer from RTK031 cable size. Removed Dacar 462 cable size.	NFS	9/20/2021
6	Replaced Condumex RTK-031 cable type with G&G Cable type. Added automated ferrule applicator part numbers. Cable foil to be removed from ferrule crimp interface. (Sect. 3.7) Replaced Fakra II female housings with clicking feature housings (App Spec 114-94510) in sections, 1,3.12, & 3.13. Added solder procedure to check crimp height, section 3.10 A. Replaced hex crimp figure and data with O-crimp figure and data in sections 3.9 3.10, & Figure 8,9,10 &11. Added straightness information for crimped Subassembly, Figure 11.	NFS	1/11/2022
7	Replaced RG174 (Leoni) cable with Dacar462 cable. (Page4) Updated crimped ferrule views. Added crimp width reference to figure 10. Added estimated crimp heights for Dacar462 cable in figure 10. Changed section A crimp height tolerance from $\pm 0.05$ to $+0.15/-0.05$ mm. Added new ferrule crimp applicator part numbers.	NFS	5/10/2022
8	Added $+0.20$ bellmouth tolerance. Changed "C" crimp height tolerance	NFS	5/27/2022
9	Added more definition to ferrule positioning. Clarified bellmouth measurement location. Changed product name to FAKRA-AX 90. Added position tolerance disclaimer in section 3.10. Added burr measurement to ferrule O-Crimp. Added clock position detail to section 3.8. Added clarification "B Braid and Foil Cutting" to section 3.4 Cable Prep. Added "Recommended Straightness" to section 3.5 J. Added section 3.11 for clarification of the center pin final location. Added terminal cut-off dimension in section 3.8	NFS	6/2/2022
10	Removed ( ) for CH dimensions confirmed during PV testing	JLDG	8/17/22
A	Released to production	Unknown	09/29/22
B	Changes based on Production feedback: added foil stripping length and adjusted lengths in Figure 2, added dimension to wire brush length and visibility and added definition to gap between contact and cable dielectric in Figure 3, added trimmed foil view to Figure 6, added part number table to Figure 7, added crimp tolerance clarity and column "D" to Figure 10.	CPB	09/08/23
B1	Added refence value to column D Figure 2	CPB	10/05/2023
C	Replaced RTK-031 in tables with qualified cables G&G Cospeed 5031,Leoni DACAR 302-4, Coficab COFDATA 50 031 105, Force FDC402. Removed TE PN's for cables in Figure 2.	AEN	01/25/2024
D	Added retention forces in Figures 3 and in section 3.10.C. Increased cutoff length to .30 MAX in Figure 7.	AEN	04/22/2024

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E	Updated ferrule crimp dimensions in Figure 10. Added part numbers to table in Figure 7. Added COFDATA 50 031 105-9to all tables.	AEN	4/4/2025
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