



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 ± 0.13 and angles have a tolerance of $\pm 2^\circ$. Figures and illustrations are for identification only and are not drawn to scale.

For an overview of the PTL connector system, [view the video](http://www.te.com) on www.te.com.

1. INTRODUCTION

This specification covers the requirements for application of the PTL MFBL system which is a variation of the PTL Wire to Wire connector system. The connector system consists of a plug housing that accepts receptacle contacts and cap housing that accepts tab contacts and a ground contact, which provides the first electrical connection in the center position. The housings have 3 positions with a centerline spacing of 6.0 for panel mount applications and external latches.

Optional connector position assurance (CPA) and terminal position assurance (TPA) are available to install onto the housing. These devices provide added security to ensure that the mated housings remain together and ensure proper contact insertion and retention in the circuit cavities. The CPA prevents the plug housing mating latch from being accidentally depressed.

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

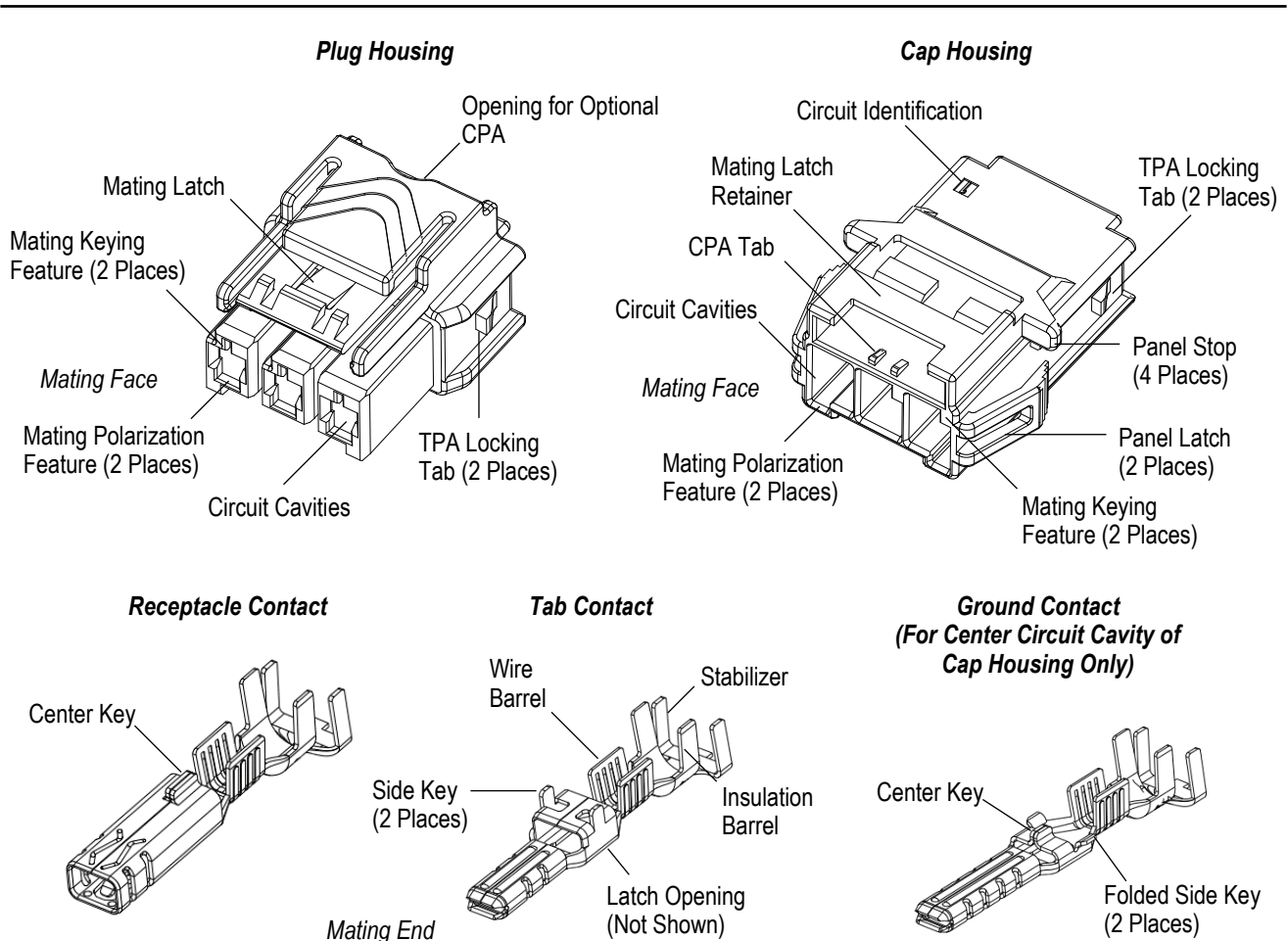
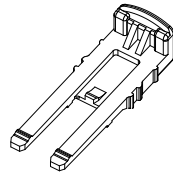


Figure 1 (Cont'd)

Optional Connector Position Assurance (CPA)



Optional Terminal Position Assurance (TPA)

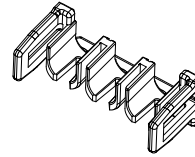


Figure 1 (End)

The housing features contact cavities each having a keying feature, mating polarization feature, a mating latch (plug) or mating latch retainer (cap) that provides positive mating. The ribs surrounding the mating latch prevent wires from becoming caught underneath the latch. The polarization feature prevents mating housings of different keying configuration. The cap housing features panel stops and flexible panel latches (on the sides of the housing) for snap-in panel mounting. In use, the panel latches secure the housing to a panel without the use of mounting hardware.

Each contact features a wire barrel, insulation barrel, stabilizer, and key(s). The underside at the mating end of the contact has a latch opening that engages the housing contact cavity latch and secures the contact to the housing. The key(s) allow the contact to only be inserted into the associated housing and appropriate position.

2. REFERENCE MATERIAL

2.1. Revision Summary

Revisions to this application specification include:

- Corrected latch opening and ground contact keying in Figure 1
- Revised allowable bellmouth dimensions in Figure 3

2.2. Customer Assistance

Reference Product Base Part Numbers 2232723 (receptacle contact) and 2232724 (ground contact) and Product Code L755 are representative of PTL MFBL 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 or calling the number at the bottom of page 1.

2.3. Drawings

Customer drawings for product part numbers are available from www.te.com. Information contained in the customer drawing takes priority. Also available for this product are:

- [1969744](#) PTL Receptacle Contact Continuity Test Fixture Design Guidelines
- [1969745](#) PTL Tab Contact Continuity Test Fixture Design Guidelines

2.4. 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. Instructional material that pertains to this product are:

- [408-10389](#) Ocean Side-Feed Applicators
- [408-32084](#) SDE-SA Commercial Hand Tool 2217208-1
- [408-32184](#) Guidelines for PTL Receptacle Contact Continuity Test Fixture Design and Probing
- [408-32187](#) Guidelines for PTL Tab Contact Continuity Test Fixture Design and Probing
- [408-32206](#) Re-Work Procedure for Power Triple Lock (PTL) Connector System
- [409-5128](#) AMP-O-LECTRIC* Model "K" Terminator Machine 1-471273-2
- [409-5842](#) AMP-O-LECTRIC Model "G" Terminating Machines 354500-[]

- 409-10047 AMP 3K* Terminating Machines 1725950-[] and AMP 5K* Terminating Machines 1725900-[]
- 409-10099 AMP 3K/40* Terminating Machines 2119683-[] and AMP 5K/40* Terminating Machines 2119684-[]

2.5. Specifications

Product Specification [108-106147](#) provides expected product performance requirements and test information.

3. REQUIREMENTS

3.1. Storage

A. Ultraviolet Light

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

B. 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.

C. Reels

Contacts are supplied interconnected by a carrier and wound continuous on a reel. When using reeled contacts, store coil wound reels horizontally. When storing partial reeled contacts, the end of the strip should be secured to the flange using a wire tie or similar method.

D. Chemical Exposure

Product must not be stored 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



NOTE

Contacts that contain brass must not be stored or used in environments where these chemicals exist.

3.2. Wire Selection and Preparation

The contacts accept 1 stranded copper wire sizes 0.65 to 1.30 mm² (19 to 16 AWG) with an insulation diameter range of 2.00 to 3.30 or 2 stranded copper wires sizes 0.34 mm² (2x22 AWG) with a maximum insulation diameter of 2.00.

Each wire must be stripped to the dimension given in Figure 2.



CAUTION

Care must be taken not to nick, scrape, or cut any part of the wire during the stripping operation.

Note: Not to Scale

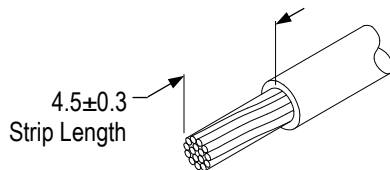


Figure 2

3.3. Contact Crimp

A. Cutoff Tab and Burr

The cutoff tab is the remaining portion of the carrier strip after the contact is cut from the strip, and the burr is the result from the cutoff tab shearing. The cutoff tab and burr must not exceed the dimension given in Figure 3.

B. Mating End

There must be no damage or distortion to the mating end of the contact. See Figure 3.

C. Bellmouths

The front bellmouth and rear bellmouth shall be evident and conform to the dimensions given in Figure 3.

D. Wire Barrel Flash

Wire barrel flash is the formation that may appear on both sides of the wire barrel as the result of the crimping process. It must not exceed the dimension provided in Figure 3.

E. Stabilizer

The stabilizer at the rear of the contact must not be crimped or deformed. The width of the stabilizer must be within the dimension given in Figure 3. Otherwise, in addition to reducing the function of the stabilizer, a deformed stabilizer will cause the TPA to be ineffective.

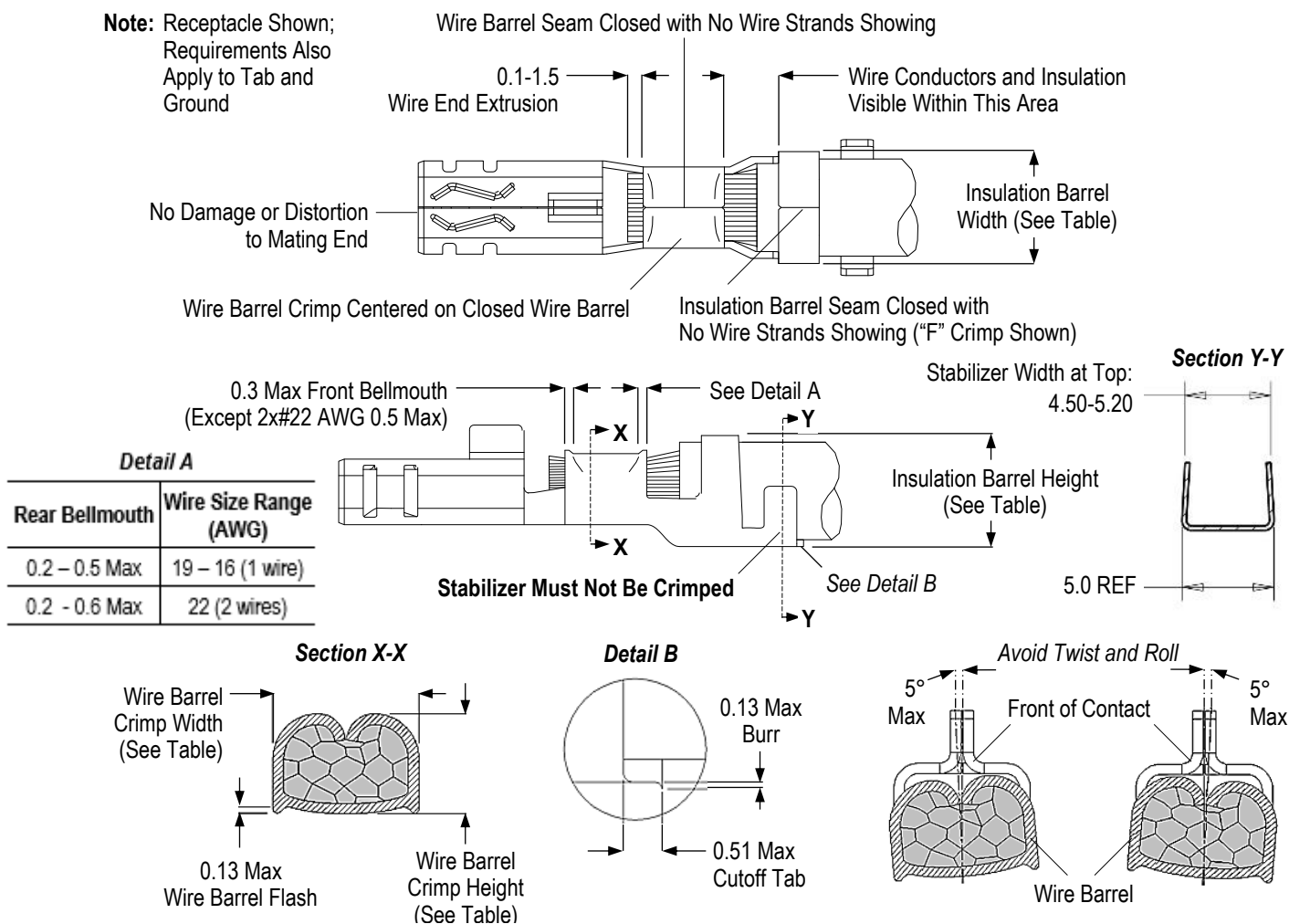


Figure 3 (Cont'd)

NO. OF CONDUCTORS	WIRE		CONTACT CRIMP ("F") is "F" Crimp; (OV) is Overlap Crimp								
			USING APPLICATOR				USING HAND TOOL				
	SIZE		INSULATION DIAMETER RANGE	Wire Barrel		Insulation Barrel		Wire Barrel		Insulation Barrel	
	mm ²	AWG		Width (See Note)	Height	Width (See Note)	Height (Ref)	Width	Height	Width	Height (Ref)
1	0.70	19	2.00-2.70	2.03 ("F")	1.08±0.04	3.56 (OV)	2.5	2.03 ("F")	1.08 +0.04/-0.08	3.56 (OV)	2.5
	0.80	18	2.65-2.95		1.21±0.04		2.7		1.21 +0.04/-0.08		2.7
	1.30	16	2.00-3.30		1.37±0.04		3.2		1.37 +0.04/-0.08		3.2
2	0.34	22	2.00 Max	2.03 ("F")	1.07±0.04	3.56 (OV)	4.0	NA	NA	NA	NA

Note: For reference only. Width of applicator is given; actual crimp width may be slightly larger.

Figure 3 (End)

F. Wire End Extrusion

The wire conductor ends must extend beyond the end of the wire barrel within the dimensions given in Figure 3.

G. Wire Barrel Crimp

The crimp applied to the wire barrel portion of the contact is the most compressed area and is most critical in ensuring optimum electrical and mechanical performance of the crimped contact. The crimp must be centered on the closed wire barrel. The crimp must result in an "F" crimp where the wire barrel forms a closed seam with no evidence of loose wire strands or wire strands visible in the seam. The crimp height and width must be within the dimensions provided in Figure 3.

H. Insulation Barrel Crimp

The crimp applied to the insulation barrel of the contact must result in either an overlap crimp (OV) where the tips of the insulation barrel overlap each other and wrap firmly around the wire insulation without cutting into the wire insulation or an "F" crimp where the insulation barrel forms a closed seam with no evidence of wire insulation in the seam or. The crimp height and width must be within the dimensions provided in Figure 3.

I. Wire Location

All conductors must be held firmly inside the wire barrel. No strands can be folded back over the wire insulation. The wire insulation must be inside the insulation barrel, but must not enter the wire barrel. The wire conductors and insulation must be visible within the area between the wire barrel and insulation barrel as shown in Figure 3.

J. Contact Length

The contact length measured from the front of mating end to the back of the contact stabilizer (not including the carrier strip cutoff tab) must be within the dimensions given in Figure 4.



NOTE

Exceeding the contact length given may prevent the TPA from engaging the housing.

K. Twist and Roll

There should be no twist or roll of the wire barrel or mating portion of the crimped contact that would cause overstress or impair usage. See Figure 3.

Contact Length (After Crimping)

Note: Not to Scale

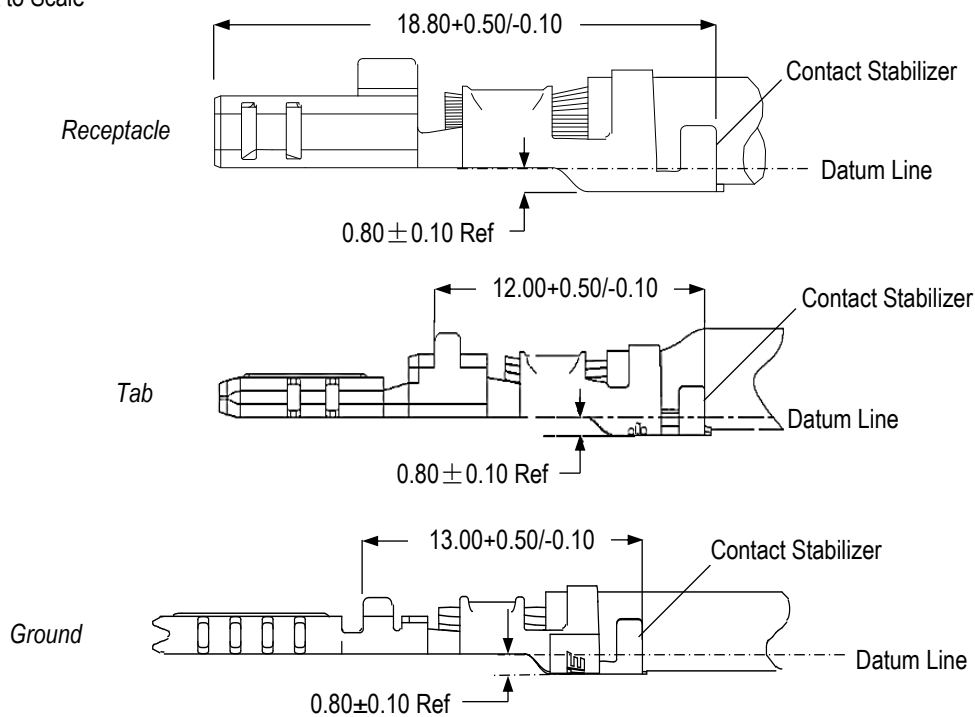


Figure 4

L. Bend Allowance

The bend allowance between the wire barrel and cable is acceptable within the limits given in Figure 5.

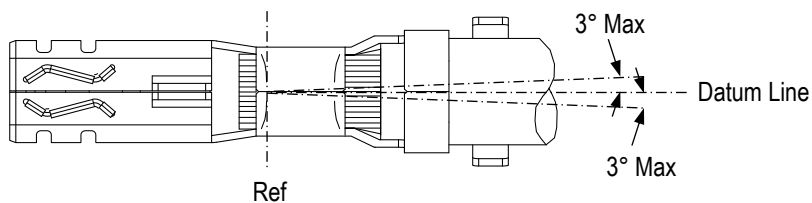
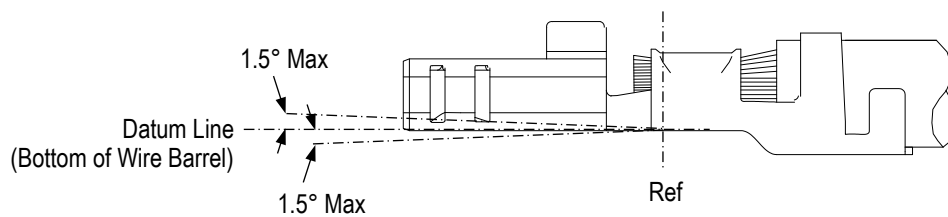
Side-to-Side Bend Allowance

Up-and-Down Bend Allowance


Figure 5

3.4. Keying

A. Contact Keying

The key(s) of the contact must match the contact keying feature of the housing circuit cavity to allow insertion into the associated housing. The ground contact can only be inserted into the center position of the cap housing.

B. Housing Mating Keying Feature

Only plug housings and cap housings with identical keying configuration will mate. PTL MFBL cap housings will only mate with PTL MFBL plug housings.

3.5. Contact Insertion and Extraction

A. Insertion

Each contact must be aligned with the appropriate circuit cavity from the wire end of the housing so that the contact key(s) faces the housing mating latch (plug housing) or latch retainer (cap housing). Refer to Figure 6.

The contact must be inserted into the circuit cavity until the contact internal latch locks onto the circuit cavity locking finger. See Figure 7.

**NOTE**

Gently pulling on the wire after the contact has been inserted will ensure that the contact is locked.

B. Extraction

If the optional TPA is used, the contacts cannot be removed until the TPA is removed from the housing. Contacts must be removed individually from the housing using the extraction tool given in Paragraph 5.4 and the instructions for removing a contact given in 408-32206. After extraction, the contact must be inspected for damage or deformation; if evident, the contact must be replaced.

**NOTE**

If the contact has been pushed or pulled out of the housing, the rework procedure given in 408-32206 must be followed.

3.6. Optional TPA and CPA

An optional TPA is available for the plug housing and cap housing, and an optional CPA is available for the cap housing.

The following requirements apply for installation (refer to Figure 6).

**NOTE**

All contacts must be inserted before the CPA and/or TPA can be installed into the housing.

— The CPA must be fully inserted into the opening at the top of the wire end of the plug housing until the latch engages the plug housing. There should be an audible click. After installation, the tips of the legs must be visible at the top of the mating face of the plug housing.

— The TPA must be installed onto the wire end of the housing so that the latches are secure to the housing TPA locking tabs. There should be an audible click. If the latches do not reach the locking tabs, this indicates that one or more contacts has not been fully inserted or the contact internal latch has not locked onto the circuit cavity.

The following requirements apply for removal (refer to Figure 6):

— The CPA must be removed by depressing the tips of the legs, and sliding the CPA out of the housing.

— The TPA must be removed by lifting each latch so that it clears the housing TPA locking tab, and pulling the TPA straight from the housing.

Note: For clarity, optional TPA and contacts are shown outside of housing.

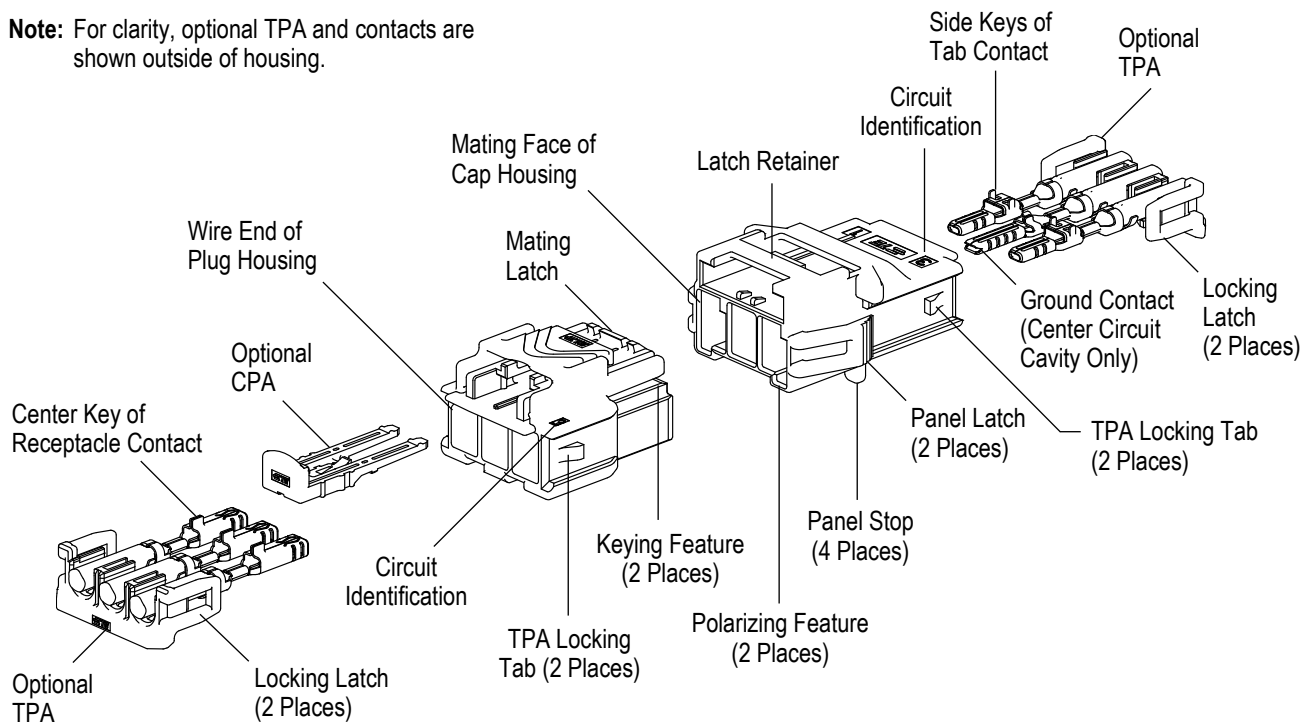


Figure 6

Cross-Section of Contact Insertion
(Plug housing shown. Latching in cap is similar.)

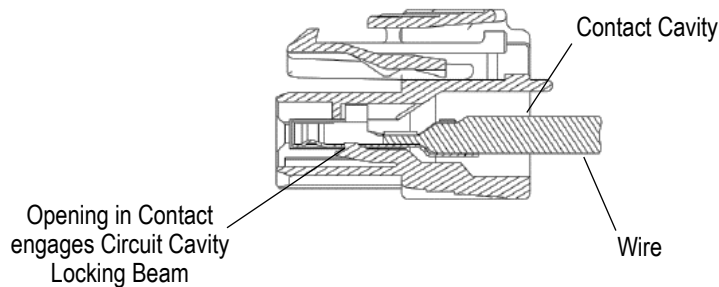


Figure 7

3.7. Continuity Testing

For continuity testing of the housing, design guidelines for the test fixture and pogo pin (probe) must be considered (refer to Paragraphs 2.3 and 2.4); otherwise damage to the contacts may occur.

All contacts must be inserted and locked into the housing prior to placing the housing into the test fixture.

To avoid deformation to the contact, it is extremely important to ensure specific probe location. See Figure 8.

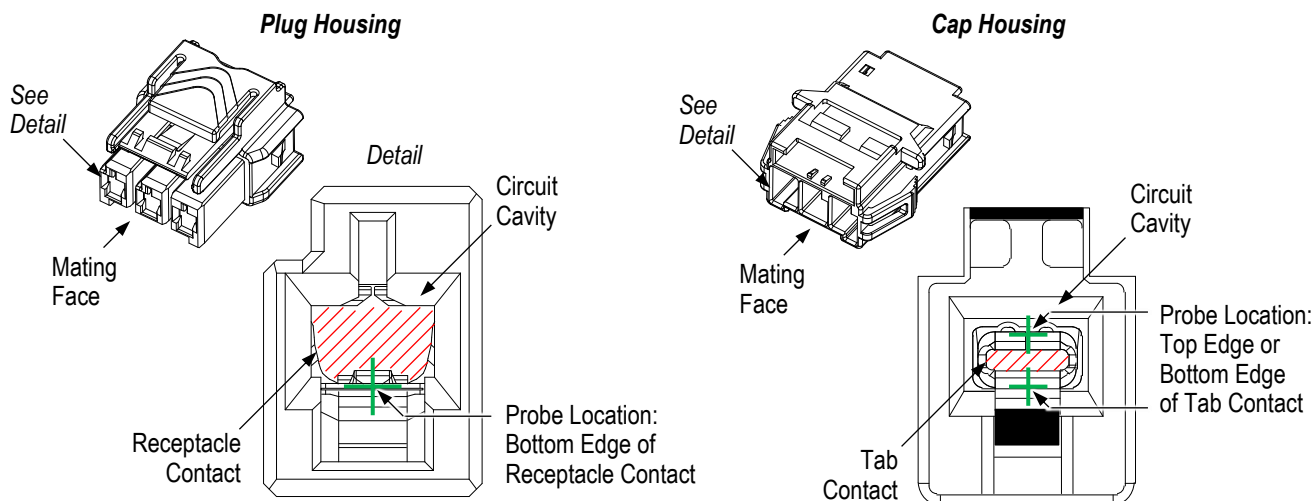


Figure 8

3.8. Panel Mounting

Recommended panel cutout dimensions are provided on the customer drawing for the specific cap housing.

The cap housing must be inserted through the panel in the same direction that the cutout was punched until the panel stops sit against the panel so that the flexible panel latches engage the panel. No hardware is required. See .

To remove the cap housing from the panel, both latches must be simultaneously depressed, then the cap housing must be gently pulled straight out of the panel. If there is no damage to the cap housing, the cap housing can be re-mounted.

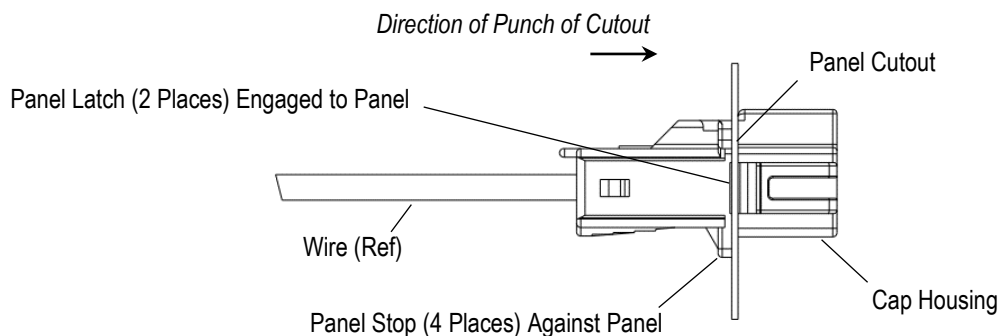


Figure 9

3.9. Mating and Unmating

The mating face of the cap housing must align with the mating face of the plug housing, then the housing must be pushed together until the mating latch is secured to the latch retainer. There should be an audible click. Refer to Figure 6.

To unmate the housings, if used, the CPA must be withdrawn (but not removed). The plug housing mating latch must be depressed until it is released from the latch retainer, then the housings can be pulled straight apart.



CAUTION

These connectors are not intended to be used as an electrical interruption device. To avoid degradation to the contacts, there must be no current flow when unmating.

3.10. Strain Relief and Wire Dress

Wires can be bundled together and supported using cable ties or electrical tape. The wires must remain perpendicular to the housing and avoid an excessively sharp bend radius. The wire bundle must be at least 76 [3.0] from the back of the housing before bending in any direction. Do not bend unsupported wires as this may cause strain on the contacts.

3.11. Replacement and Repair

Damaged or defective product must not be used. The housings, contacts, CPA, and TPA are not repairable.

A contact can be removed using the extraction tool given in Paragraph 5.4. The contact can be re-inserted into the housing provided there has been no deformation or damage to the contact latch opening or housing internal latch. Refer to Paragraph 3.5.B for contact extraction and insertion information. If the contact has been pushed or pulled out of the housing, the rework procedure given in 408-32206 must be followed.

4. QUALIFICATION

The PTL MFBL connector system is recognized by Underwriters Laboratories Inc. (UL) in File E28476.

5. TOOLING

Tooling part numbers and instructional material packaged with the tooling are given in Figure 10.

5.1. Machine (Power Unit)

The machine provides the force required to drive an applicator for crimping the contacts. These machines can be set up to automatically measure, cut, strip, and terminate the wire.

5.2. Applicator

The applicators are designed to crimp reeled contacts onto pre-stripped wire. The applicator must be installed onto a power unit.

5.3. Hand Tool

The hand tool consists of a tool frame and die assembly that has two crimping chambers. The tool features a ratchet (crimp height) adjustment wheel and locator. This hand tool crimps wire with 1 conductor.

5.4. Extraction Tool

The extraction tool must be used to remove a contact from the housing. The extraction tool is designed to lift the contact latch opening from the housing internal latch without causing deformation or damage. Refer to Paragraph 3.5.B for contact extraction information.

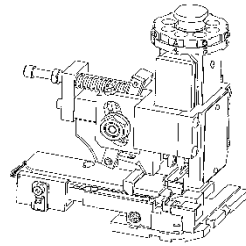
5.5. Test Fixture

The test fixture is used for continuity testing of the housing. The design guidelines drawing provides geometry and instruction of component assembly. Models are available upon request. For information concerning continuity testing of the housing, call the number at the bottom of page 1.



Ocean Side-Feed Applicators
2151743-1 (Atlantic Style) and
2-2151743-1 (Pacific Style)
(408-10389)

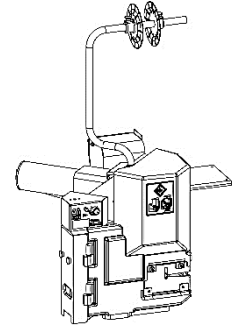
Note: Applicators produce “F” crimp on wire barrel
and overlap (OV) crimp on insulation barrel.



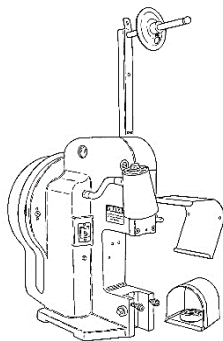
HDE Applicator 1552994-2
(No Instructional Document)



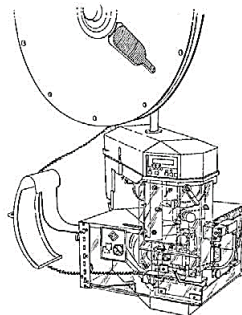
AMP 3K/40 Terminating
Machines 2119683-[] and
AMP 5K/40 Terminating
Machines 2119684-[]
(409-10099)



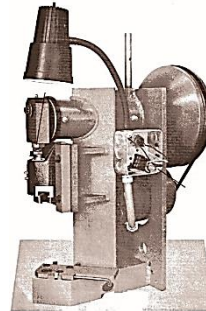
AMP 3K Terminating
Machines 1725950-[] and
AMP 5K Terminating
Machines 1725900-[]
(409-10047)



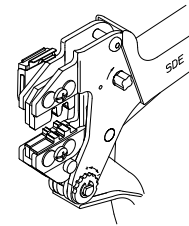
AMP-O-LECTRIC Model “K”
Terminator Machine
1-471273-2 (409-5128)



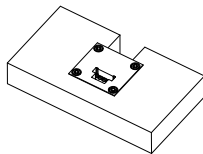
AMP-O-LECTRIC Model “G”
Terminating Machines
354500-[] (409-5842)



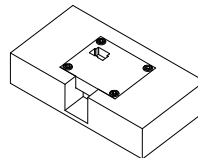
Model “T” Terminating Units
694620-[] (409-5207) or
458000-4 (409-5289)



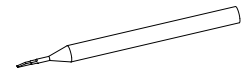
SDE-SA Commercial Hand
Tool 2217208-1
(For Wire with 1 Conductor)
(408-32084)



PTL Receptacle Contact Continuity Test Fixture
(Customer Supplied) (408-32184 and Design
Guidelines Drawing 1969744)



PTL Tab Contact Continuity Test Fixture
(Customer Supplied) (408-32187 and
Design Guidelines Drawing 1969745)



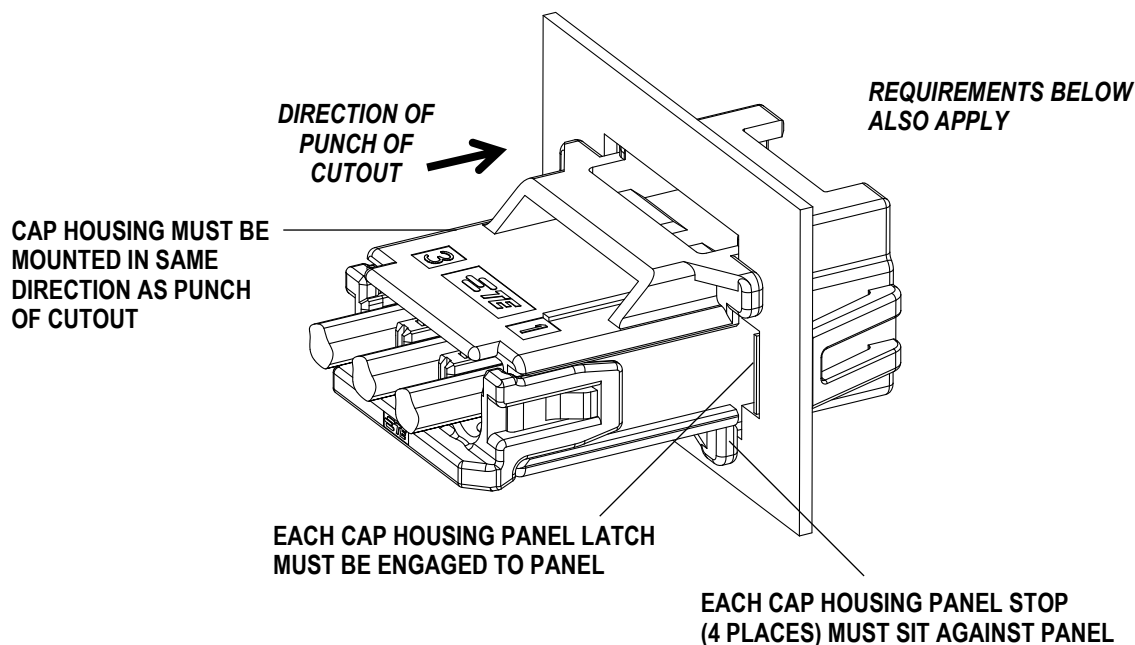
Extraction Tool 2217301-1
(408-32206)

Figure 10

6. VISUAL AID

The illustration below shows a typical application of PTL MFBL connector system. 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.

CAP HOUSING MOUNTED IN PANEL



MATED HOUSINGS (FOR CLARITY, SHOWN WITHOUT PANEL)

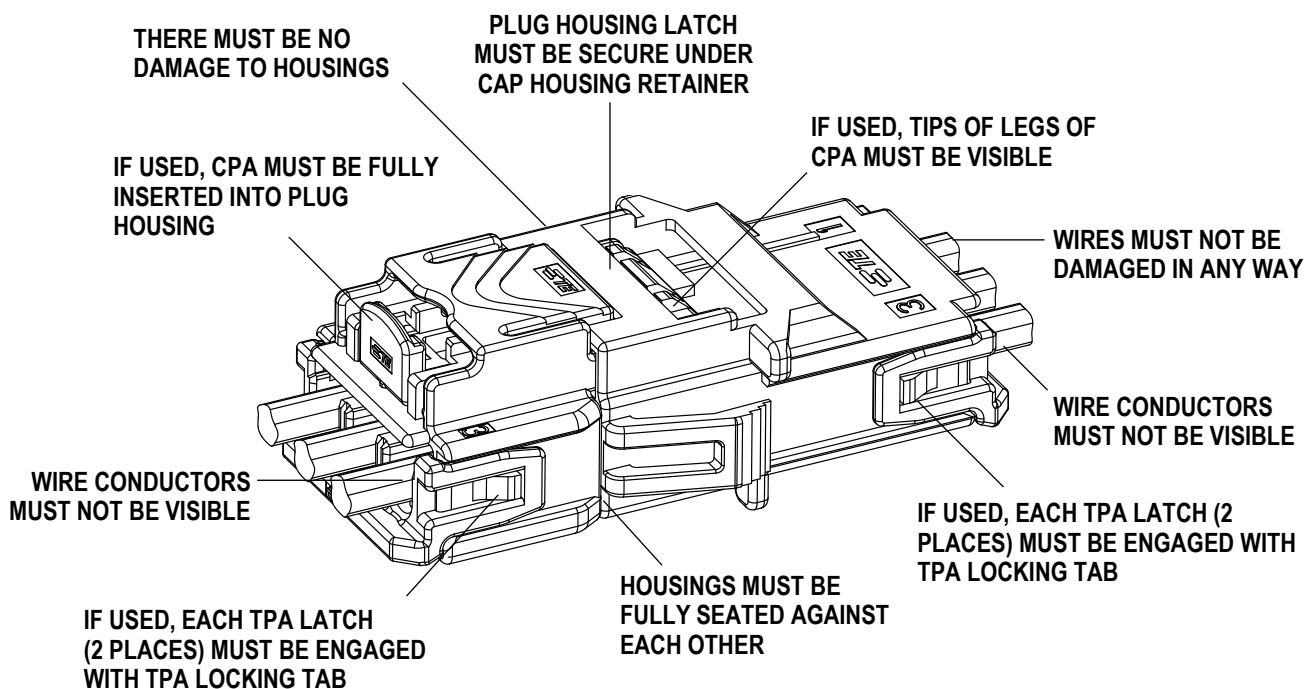


Figure 11