

NOTE

All numerical values are in metric units [with US customary units in brackets]. Dimensions are in millimeters [and inches]. Unless otherwise specified, dimensions have a tolerance of ± 0.13 [± 0.005] and angles have a tolerance of $\pm 2^\circ$. Figures and illustrations are for identification only and are not drawn to scale.

1. INTRODUCTION

This specification covers the requirements for application of the AMPSEAL 16 Mini-Lever Connector System. The connector system includes a plug assembly, cap assembly, mounting clip, wire shield, 90° elbow and circular stamped and formed terminals. The connector system offers environmental protection by providing sealing to the wires, between the connector halves and to the panel.

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

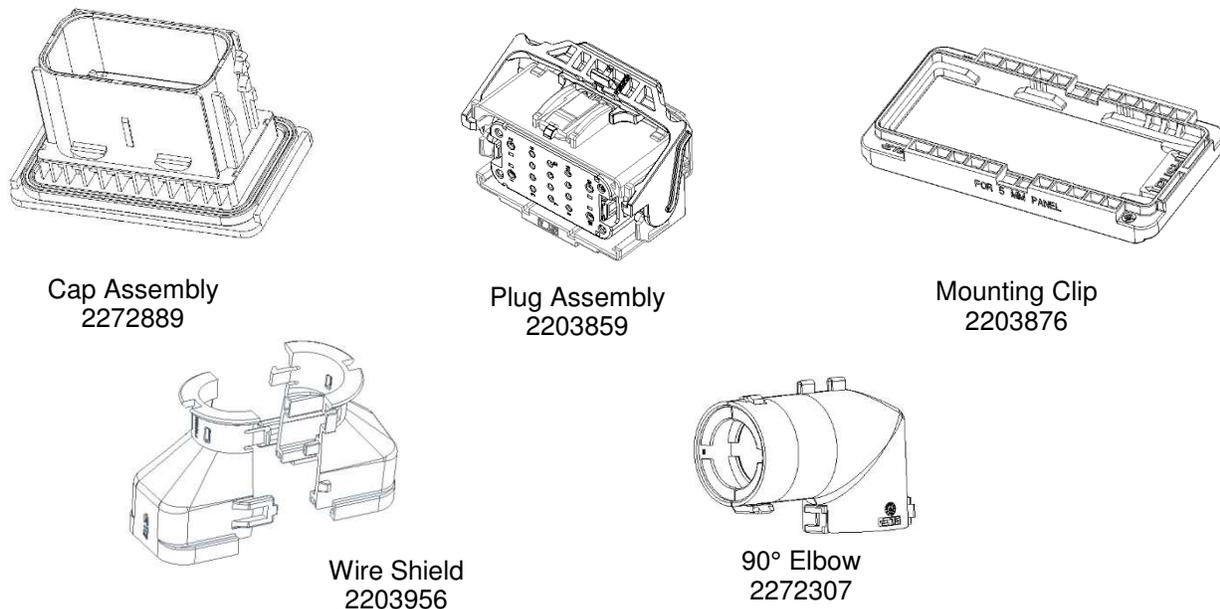


Figure 1

2. REFERENCE MATERIAL

2.1 Revision summary

Initial release of application specification

2.2 Customer Assistance

Reference Product Base Part Numbers 2203859, 2272889, 2203876 and Product Code M097 are representative of the AMPSEAL 16 Mini-Lever Connector System. Use of these numbers will identify the product line and help you obtain product and tooling information. Such information can be obtained through a local TE Representative, by visiting our website at www.te.com or by calling the TOOLING ASSISTANCE CENTER or PRODUCT INFORMATION at the numbers at the bottom of page 1.

2.3 Drawings

Customer Drawings for product part numbers are available from the service network. If there is a conflict between the information contained in the Customer Drawings and this specification or with any other technical documentation supplied, the information contained in the Customer Drawings takes priority.

3. REQUIREMENTS

3.1 Safety

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

3.2 Storage

A. Reel Storage

When using reeled contacts, store coil wound reels horizontally and traverse reels vertically.

B. Shelf Life

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

C. 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

3.3 Contact and Wire Selection

A. Wire Selection

The stamped and formed contacts used with the Mini-Lever Connector System will accept the wire sizes shown in Table 1.

Contact size	Wire Range	Insulation OD (mm)
Deutsch Size 12 Stamped Contact	10 – 14 AWG	2.26 – 4.10
AMPSEAL 16 Stamped Contact	14 – 20 AWG	1.42 – 2.77
Deutsch Size 20 Stamped Contact	16 – 22 AWG	1.50 – 2.34

Table 1

B. Further Processing

Care should be taken to ensure that the wire insulation is not cut, broken or damaged during the crimping operation and to ensure the insulation is not crimped into the wire barrel. Care must be taken when transporting, storing, or further processing the crimped contacts and wires so that any damage or soiling of the contact body or crimped area is avoided. When processing the end of the wire or anywhere along the wire length, damage or impairment of the crimped contact must be avoided.

C. Contact Selection and Crimp Information

The contacts used on the Mini-Lever Connector System should be crimped per the information shown in Table 2

Contact Size	Contact Part Number	Wire Size	Crimp Specification
Size 12 Pin	1060-12-0222	10 AWG	114-151006
Size 12 Pin	1060-12-0166	12-14 AWG	114-151002
Size 12 Socket	1062-12-0222	10 AWG	114-151006
Size 12 Socket	1062-12-0166	12-14 AWG	114-151002
Size 16 Pin	1924463-3	18-20 AWG	114-13045
Size 16 Pin	2098250-3	16-18 AWG	
Size 16 Pin	2098252-3	14 AWG	
Size 16 Socket	1924464-2	18-20 AWG	
Size 16 Socket	2098251-2	16-18 AWG	
Size 16 Socket	2098253-2	14 AWG	
Size 20 Pin	1060-20-0122	16-22 AWG	114-151003
Size 20 Pin	1060-20-0222	16-22 AWG	
Size 20 Socket	1062-20-0122	16-22 AWG	
Size 20 Socket	1062-20-0222	16-22 AWG	

Table 2

3.4 Shipping Features

The “As Shipped” state of the connectors is as shown in Figure 2. The lever of the plug assembly is in the closed position and the plug TPA is in the “Pre-Staged” position. In the cap assembly, the cap TPA is also in the “Pre-Staged” position.

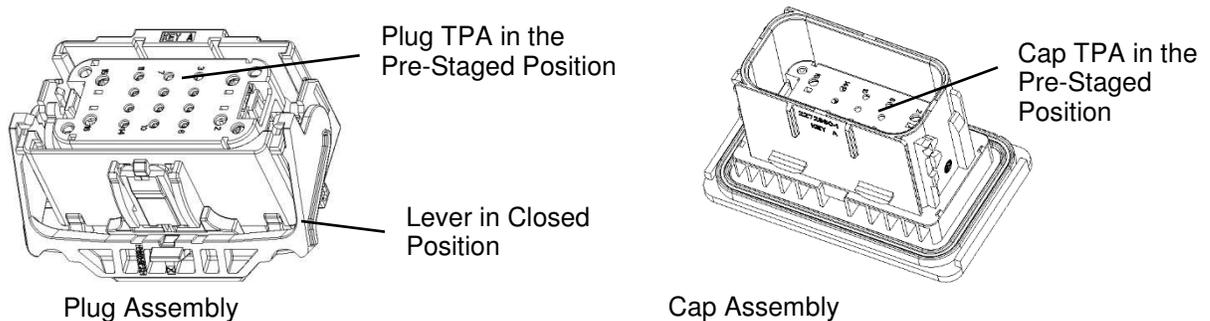


Figure 2

3.5 Mechanical Keying and Color Coding

The connector system has slots in the plug assembly and corresponding ribs in the cap assembly. These features act as mechanical keys and prevent mismatching of the connector. For easy identification the assemblies have key markings and the color of the housings change as the key configuration changes. See Figure 3 for mechanical keying features.

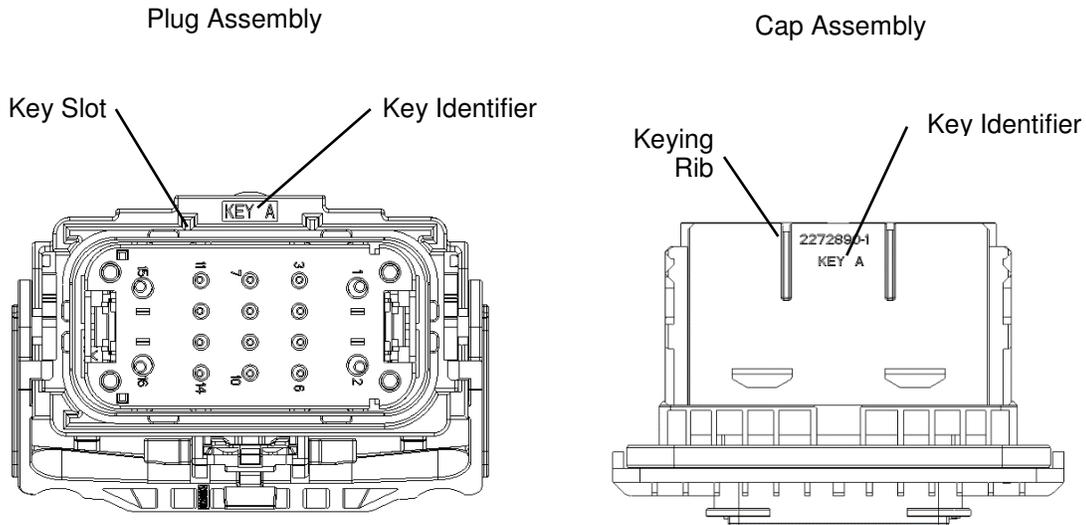
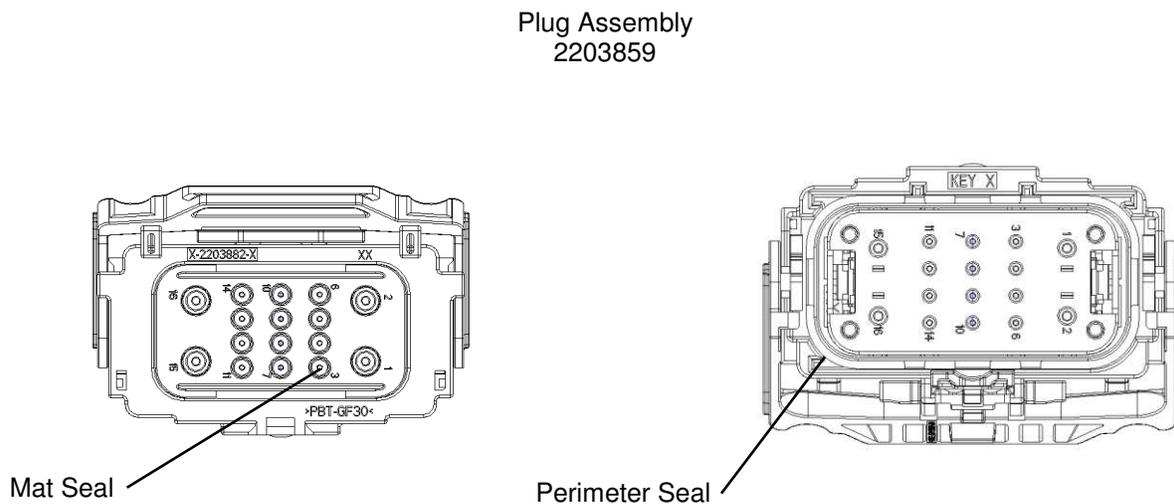


Figure 3

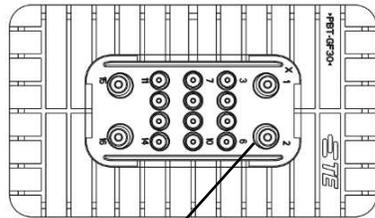
3.6 Sealing

The connector system provides for sealing to the wires using a mat seal, sealing between connector halves using a peripheral seal and sealing to the panel using a facial seal. The wire range that can be accommodated in the mat seal is listed in Table 2.

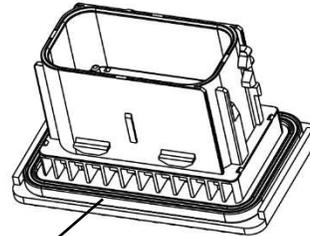


3.6 Sealing (cont)

Cap Assembly 2272889



Mat Seal



Facial Seal



CAUTION

Only wires with the insulation diameters that are within the recommended insulation range shown should be used with this product



Sealing plugs should be used on any circuit which is not loaded with a crimped lead. See Table 3 for the proper seal plug for the terminal size.

Terminal Size	Seal Plug Part Number
Deutsch Size 12	114017
AMPSEAL Size 16	776363-1
Deutsch Size 20	0413-204-2005

Table 3

3.7 Panel Cutout

The recommended panel cutout dimensions are as shown in Figure 4. The panel cutout and Cap Housing are keyed in the corners so the Cap Assembly can only be oriented in one direction.

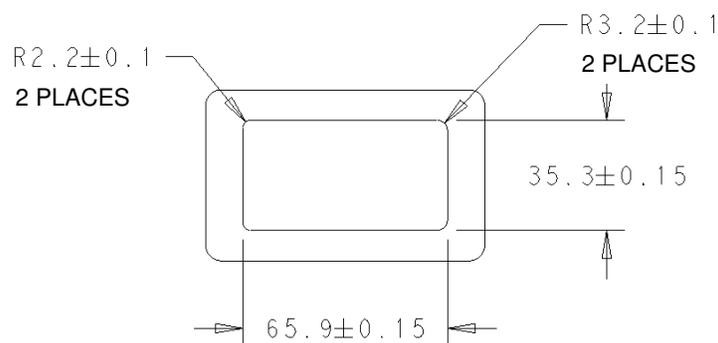


Figure 4

3.8 Panel Mounting

Mounting clips are to be used to mount the cap assembly to the panel. The mounting clips are sold as separate saleable part numbers. Different panel thicknesses will need different mounting clips. The mounting clip is marked with the panel thickness and the color of the mounting clip also changes depending on the panel thickness that it is designed for. Refer to Table 4

Mounting Clip Part Number	Recommended Panel Thickness	Mounting Clip Color
2203876-1	5.0 ± 0.10mm	RED
2203876-2	4.0 ± 0.10mm	YELLOW
2203876-3	3.0 ± 0.10mm	BLACK

Table 4

3.9 Connector Pre-Staging

The connector system allows for the pre-staging of the plug assembly onto the cap assembly with the use of a latch on the Plug Assembly and a detent on the Cap Assembly thus enabling the mating cycle to be completed with one hand. The pre-staging allows the operator to reposition their hand and complete the mating cycle. Refer Figure 5 for details.

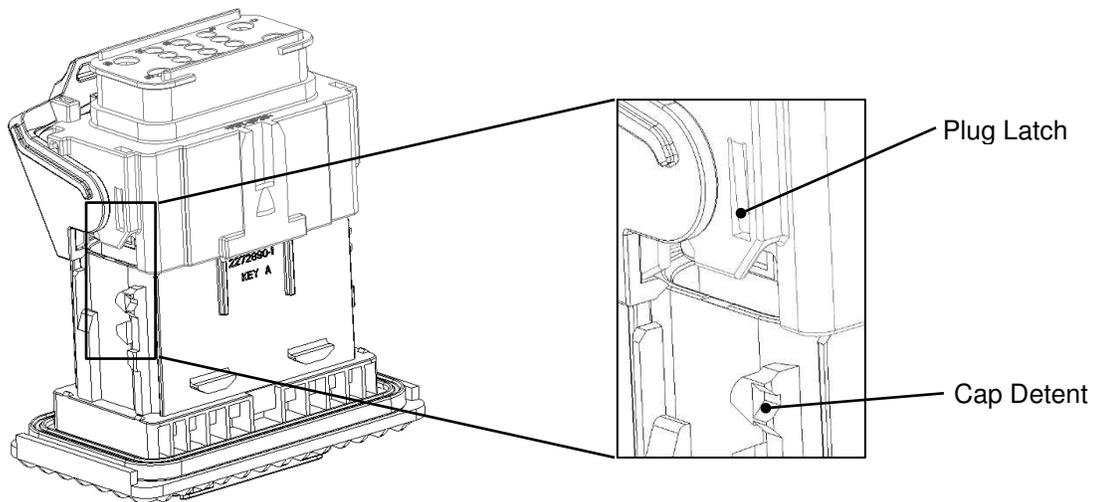


Figure 5

3.10 Mounting Clip Locking

The Mounting Clip has a slot on it which will engage with a corresponding tab on the Plug Assembly Lever when the Plug Assembly is completely mated. This prevents accidental disengagement of the Mounting Clip once the connector system is completely mated. Refer to Figure 6 for details.

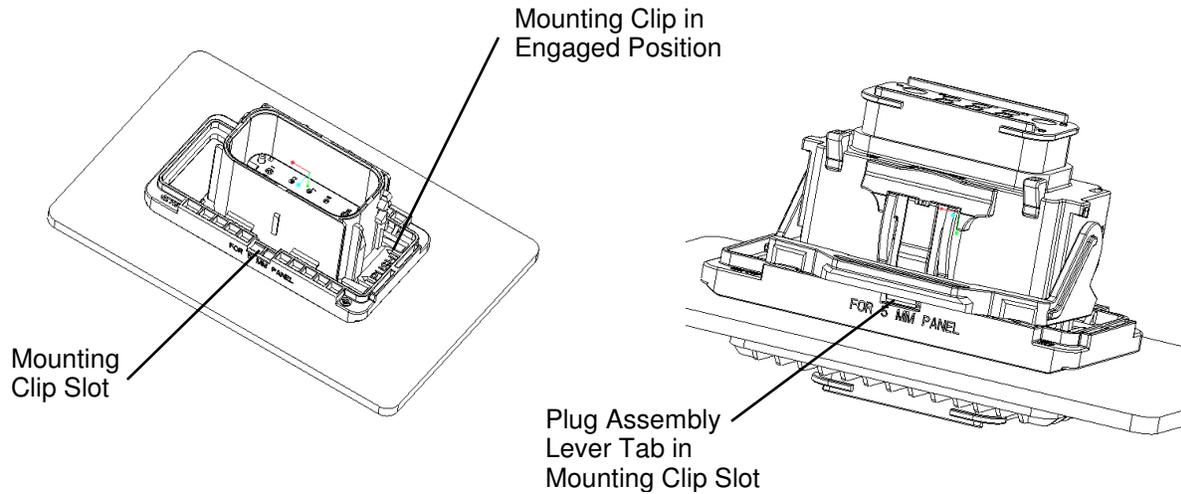


Figure 6

3.11 Assembly Procedure

A. Terminal Insertion

Terminals crimped on leads per the applicable crimp specifications (refer to Table 1 and Table 2) shall be manually loaded into the plug and cap assemblies. Socket terminals are to be inserted into the plug assembly while the pin terminals are to be inserted into the cap assembly. Refer to Figure 7 and the steps outlined below to insert terminals into the assemblies.

1. Align the appropriate crimped terminal with the desired cavity at the rear of the plug or cap assembly.
2. While holding the wire as close as possible to the terminal push it straight into the cavity until the terminal retention latch snaps behind the terminal retention shoulder as indicated by a tactile and audible “click”.

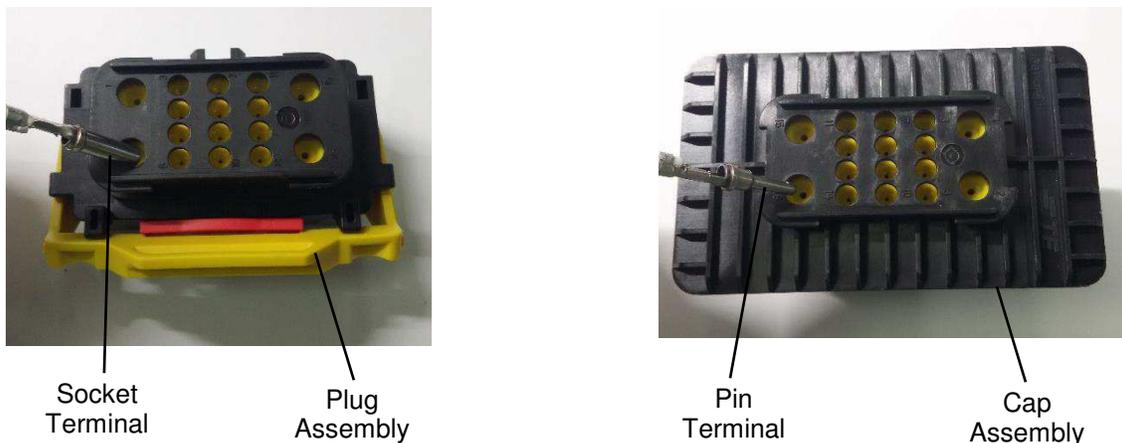


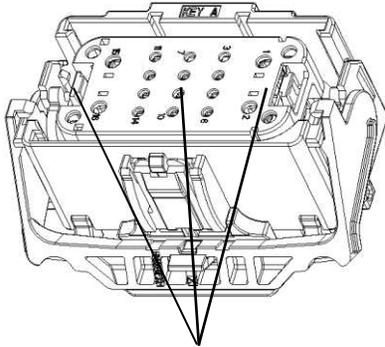
Figure 7



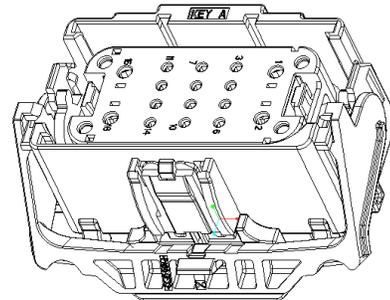
NOTE. Ensure the terminals are fully seated by giving a slight tug on each wire

B. TPA Seating

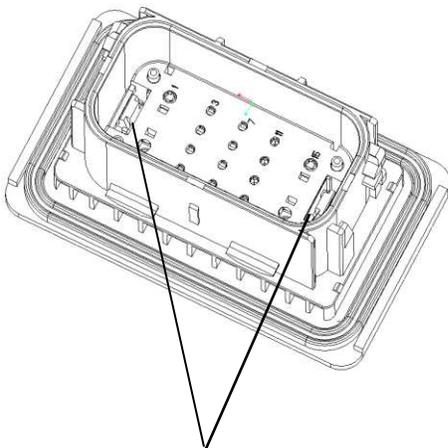
When all the required terminals have been inserted into the assemblies and any unused circuits have been blocked off with sealing plugs, complete the assembly by seating the TPA into its fully locked position. See Figure 8 for seating instructions



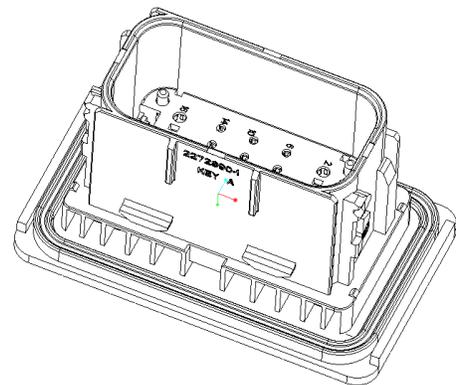
Press down on the ends of the plug TPA to move it to the fully seated position and the center to ensure a fully seated TPA



Plug TPA in fully seated position



Use the notch on removal tool 776441-1 to press the latches inward and simultaneously press down to move the TPA to the fully seated position. Press on the latches one side at a time



Cap TPA in fully seated position



CAUTION

Do not push in the center of the Cap TPA with a screw driver as this could potentially damage the terminals

Figure 8

C. Wire Routing - With and Without Conduit and Application of the Wire Exit Cover and 90° Elbow

Once all the circuits have been populated with crimped leads and/or sealing plugs, the wire bundle can be routed with the help of wire exit cover and/or a 90° elbow. Customers can tie down the wire bundle to the smooth exit covers or use NW22 conduit as per their requirements. The wire exit cover can be used on both the plug assembly and cap assembly. See Table 5 for wire exit cover part numbers

Configuration	Wire Exit Cover	90° Elbow
Smooth Exit	2203956-1	2272307-1
NW22 Conduit	2203956-2	2272307-2

Table 5



CAUTION

When routing the wires without the wire exit cover, care must be taken not to side load the mat seal which can potentially create a leak path. Start the wire bundle 1.5 – 2.0 inches (38.1 – 50.8mm) from the back of the connector. This applies to both the plug and cap assemblies.



CAUTION

The wire exit cover must be used in applications where there is a likelihood of the connector being exposed to high pressure spray



NOTE

The plug and cap assemblies can accommodate a Normal Profile NW22 conduit. Both un-slit and slit conduit may be used

C-1. Connector without a wire shield

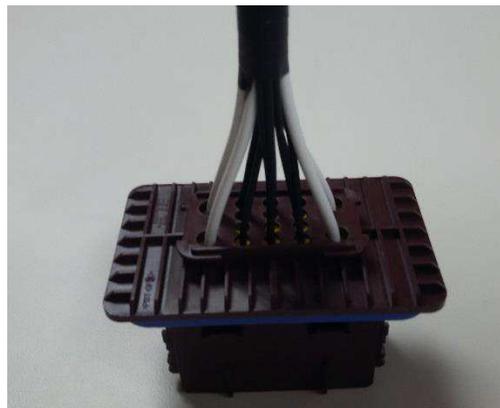


Figure 9

Wire bundle should start 1.5 – 2.0 inches from the back of the connector to reduce the side load on the mat seal

C. Wire Routing - With and Without Conduit and Application of the Wire Exit Cover and 90° Elbow (cont.)

C-2. Connector with Wire Exit Cover – No Conduit

i **NOTE**
Cap assembly shown, plug assembly similar

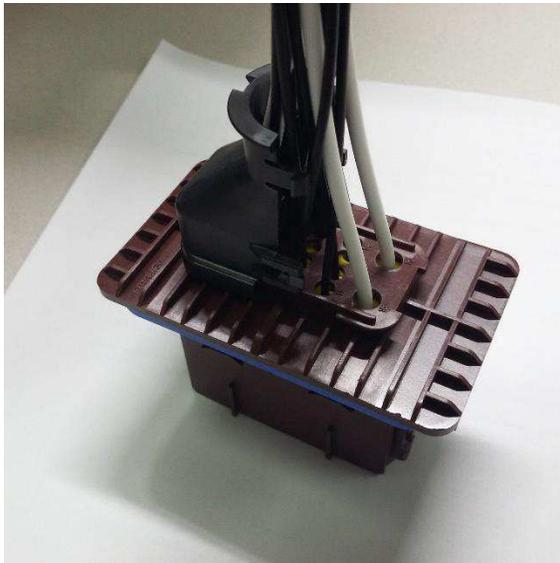


Figure 10



Figure 11



Figure 12

Figure 10. Slide one half of the wire exit cover onto the back of the connector

Figure 11. Holding the wires inside the first half of the wire exit cover to reduce the chance of pinching a wire, slide the second half of the wire exit cover onto the back of the connector, pushing them together until the latches fully engage.

Figure 12. Visually inspect the latches to ensure they are fully engaged on both sides of the wire exit cover

C-3. Connector with wire cover and NW-22 conduit

i **NOTE**
Cap assembly shown, plug assembly similar



Figure 13

Slide the corrugate tubing onto the wires



Figure 14

Slide one half of the wire exit cover onto the back of the connector, engaging the wire exit rib with the slot on the conduit



Figure 15

Ensure the wire exit rib is engaged with the slot on the conduit and the conduit stop rib



Figure 16

Slide the second half of the wire exit cover onto the back of the connector, pushing them together until the latches fully engage.

C-4. Adding the 90° Elbow to the Wire Exit Cover

The 90° elbow assembles to the wire exit cover using the same steps as shown in Figures 10 through 12. The two halves of the 90° elbow are connected by living hinges which allows it to be assembled in any position. Slide one half of the elbow onto the mounting rib of the wire exit cover in the desired position. Route the wires through the elbow and snap the other half into place. See Figure 17 and 18. Use the same procedure if using conduit to route the wires. See Figure 13 through 16 and 17 to 18.

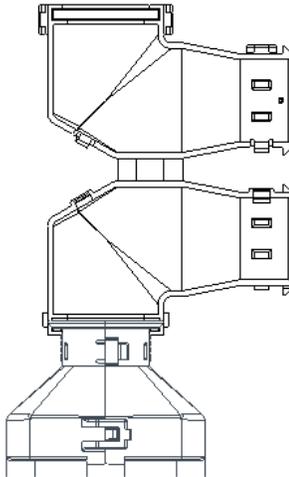


Figure 17

Slide the elbow onto the mounting rib of the wire exit cover in the desired position

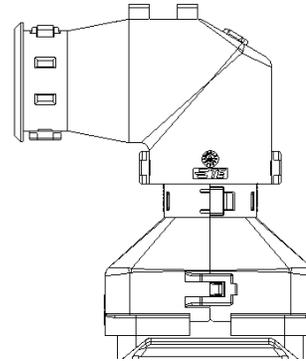


Figure 18

Snap the two halves together to complete the installation

D. Mounting the Cap Assembly to the Panel

1. Insert the Cap Assembly through the panel opening. The Cap Assembly is keyed to the panel, see Figure 4. Ensure that the corners of the Cap Assembly are aligned with the panel during insertion.
2. Holding the Cap Assembly in place, align the openings in the Mounting Clip with the ramps on the Cap Assembly. Insert the Mounting Clip, text facing the operator, over the Cap Assembly, Figure 19, and slide it to lock it in place, Figure 20. Ensure that the latches on the Mounting Clip engage the detents on the Cap Assembly, Figure 21. Depending on the customer's preference, the Mounting Clip can be inserted such that it can be pushed to either side to lock it in place. See Figure 22.

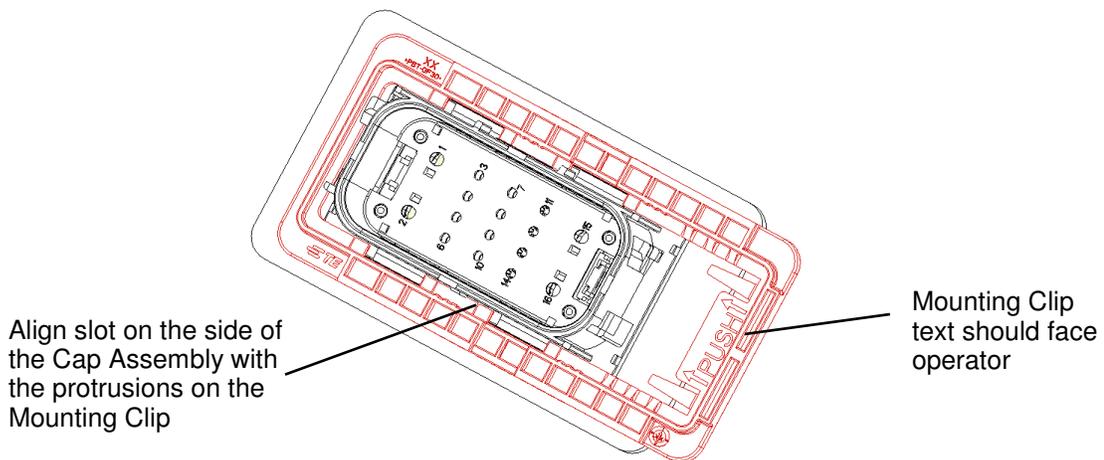


Figure 19

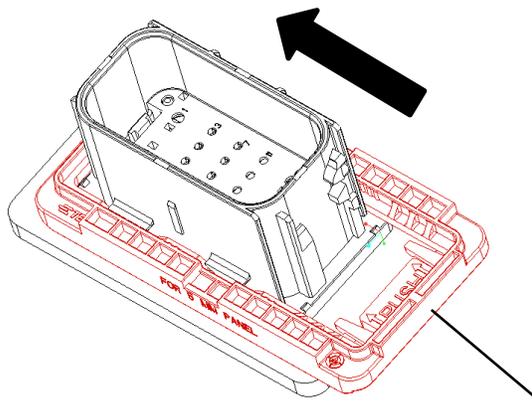


Figure 20

Push the mounting clip until it bottoms against the Cap Assembly

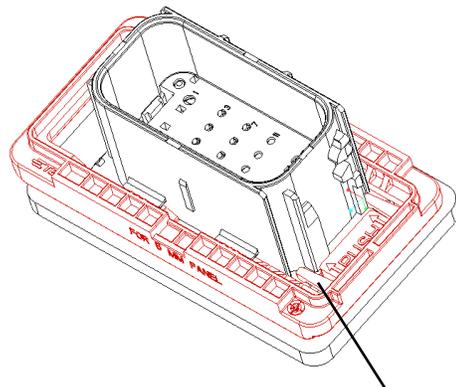
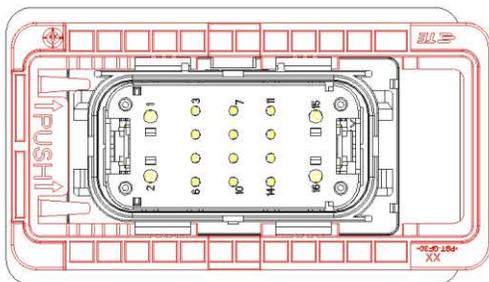
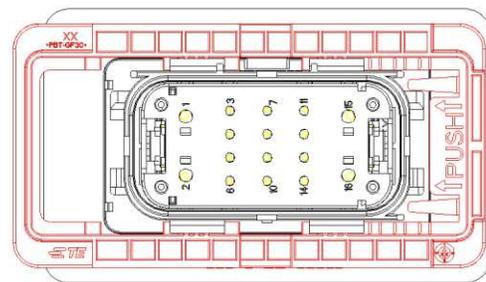


Figure 21

Latches should engage the detents on the Cap Assembly



Mounting Clip engaged to the left



Mounting Clip engaged to the right

Figure 22



CAUTION

It is recommended to mount the Cap Assembly so the flange seal is on the dry side of the panel. This will ensure that there is no direct line between the high-pressure jet and the flange seal. See Figure 23

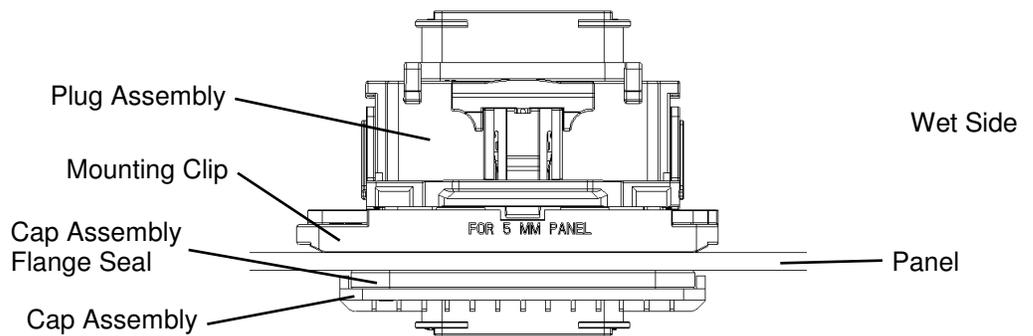


Figure 23

E. Mating Connector Halves

1. Ensure the lever on the plug assembly is in the completely open position. Orient the plug assembly such that the keying features are aligned (see Figure 24). Push the plug assembly onto the cap assembly until the connector pre-staging features engage. An audible “click” can be heard when the connector is pre-staged. See Figure 25

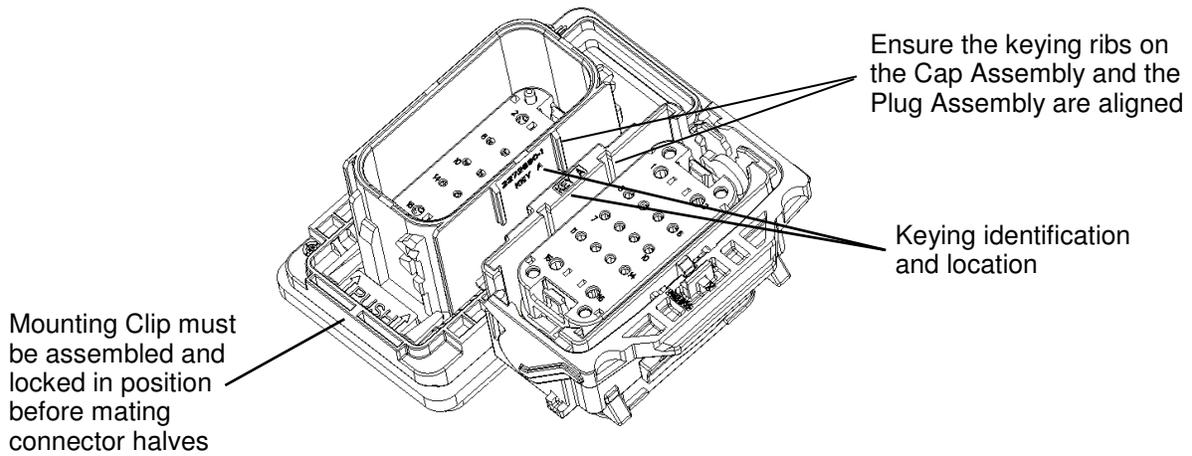


Figure 24

Note *The keying must be the same on the Cap Assembly and the Plug Assembly to mate the connector halves. Keying identification and location are shown in Figure 24*

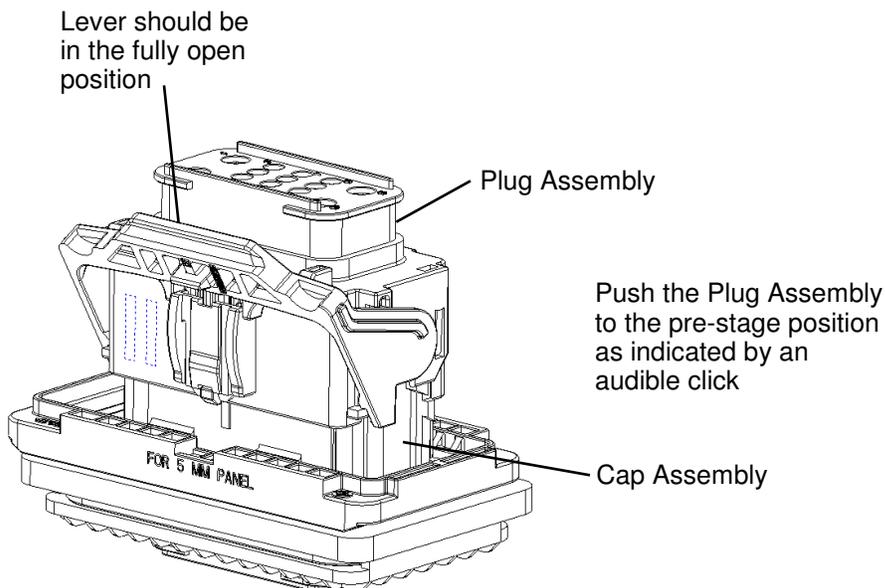
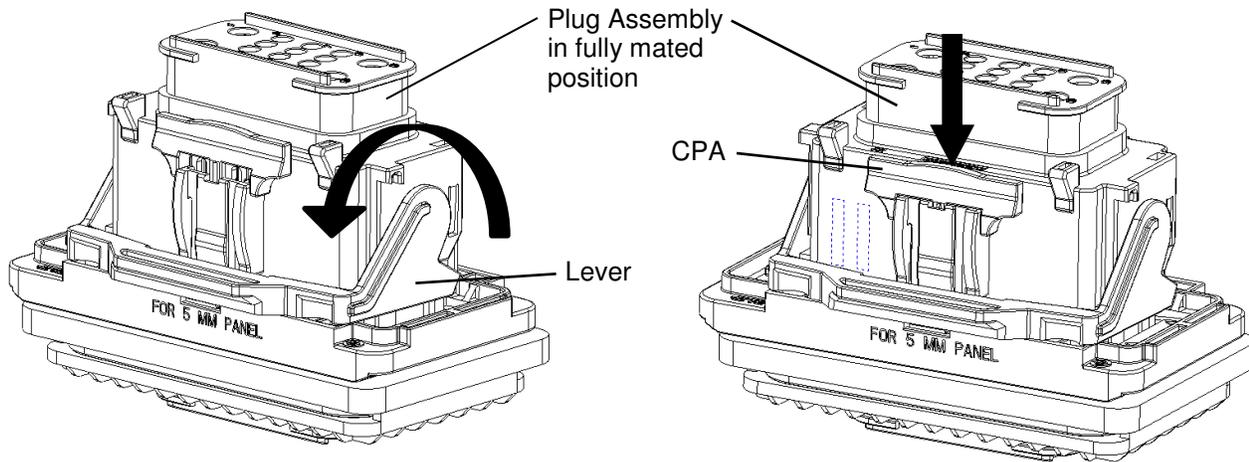


Figure 25

2. Rotate the lever completely till it bottoms out and engages the latch on the Plug Assembly. An audible “click” can be heard when the lever is fully engaged. Push the red CPA down to secure the Plug Assembly latch and prevent the lever from being disengaged during use. See Figure 26



Rotate the lever down to fully mate the connector halves

Push the red CPA down to lock in place

Figure 26

3.12 Disassembly Procedure

A. Unmate the connector

To un-mate the connector, pull the CPA up to release the Plug Assembly latch, press on the latch to release the lever and at the same time rotate the lever from the “closed position” to the “open position”. This moves the Plug Assembly from the “mated” position to the “pre-staged” position. Thereafter, manually pull the Plug Assembly to overcome the connector pre-staging latch and separate the two connector halves. See Figure 27

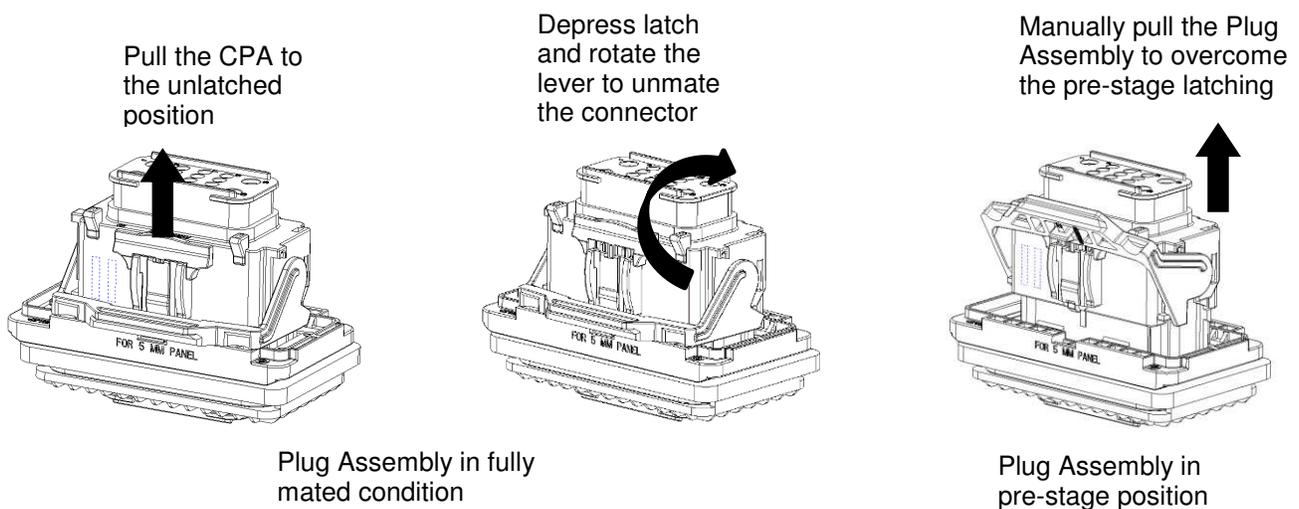


Figure 27

B. Disengaging the Mounting Clip and removing the Cap Assembly from the panel

To disengage the mounting clip, slide it in the direction to overcome the latches until it is stopped by the Cap Assembly housing. Align the openings in the Mounting Clip with the ramps on the Cap Assembly. Remove the Mounting Clip by moving it over the Cap Assembly. The Cap Assembly will be free to remove from the panel. See Figure 28

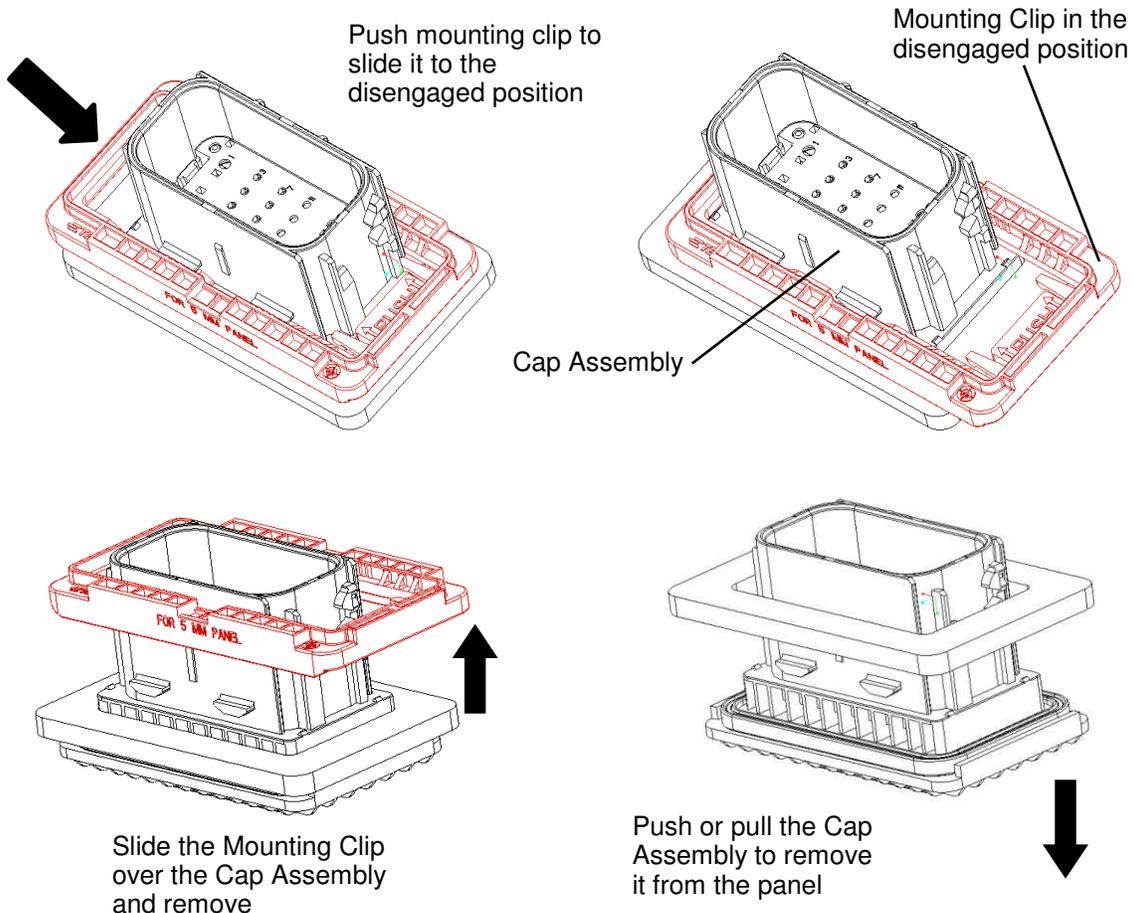


Figure 28

NOTE

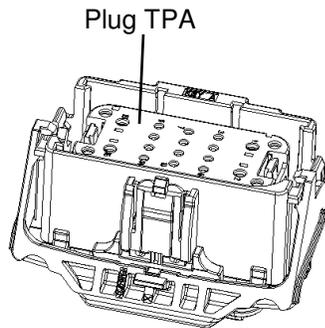


The Cap Assembly will not be retained after the Mounting Clip is removed and must be supported by hand or other methods to prevent damage should it fall.

C. Removing the TPA

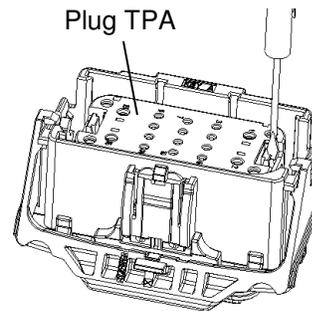
On the Plug Assembly only, the plug TPA can be removed by squeezing the plug TPA latches inwards and pulling them up simultaneously. Alternatively, TE TPA removal tool 776441-1 can be used for TPA removal on the Plug and Cap Assemblies. Use the notch in the tool to hook onto the TPA latches. Squeeze the latch inwards while simultaneously pulling the TPA out. Repeat the procedure on the opposite latch. When using the TPA removal tool it may be necessary to alternate between the latches more than once to unseat the TPA. See Figure 29

TPA removal without a tool



Using your fingers, squeeze the latches inward and pull the TPA out

TPA removal with the TE tool



With the tool hooked onto the TPA latch, squeeze the latch inward and pull on the tool. Repeat the process on the opposite side

Removal tool 776441-1



Use the notch on the tool to hook onto the plug TPA latch

Figure 29

E. Terminal Removal

Ensure that the plug TPA or cap TPA is removed prior to terminal removal. Insert a precision flat blade screw driver into the terminal cavity and deflect the terminal retention latch down. With the terminal latch deflected, gently pull the wire until the terminal is free. Repeat this procedure to service other terminals as needed. See Figure 30

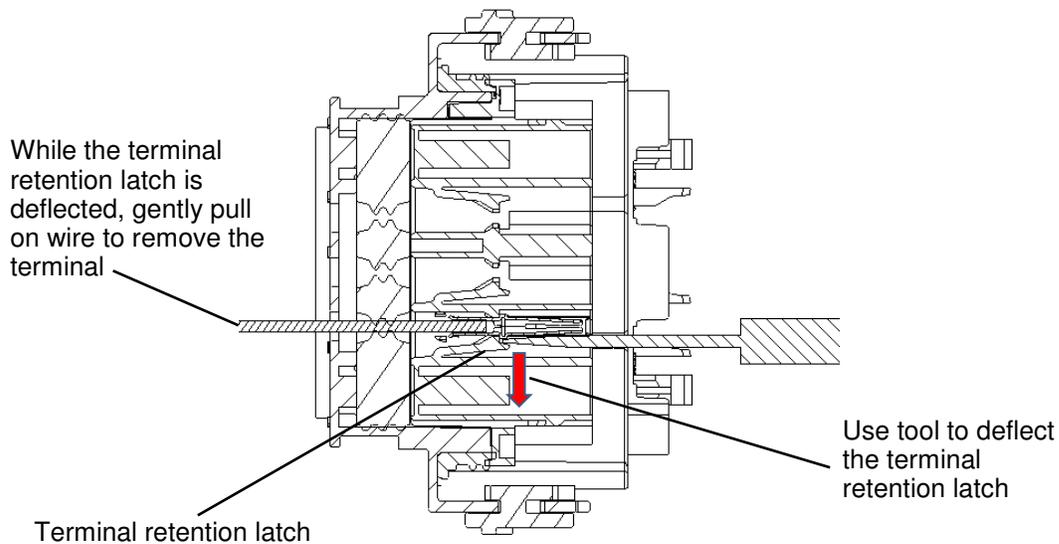


Figure 30

F. TPA Re-Installation

The plug TPA and cap TPA's are keyed to the respective terminal blocks to ensure that the circuit id markings on the TPA's match the markings on the housings. To re-install the TPA's, align the slots in the plug and cap TPA's with the ribs in the respective terminal blocks. With the latches deflected inwards, push the TPA's to their respective "pre-locked positions". See Figure 31

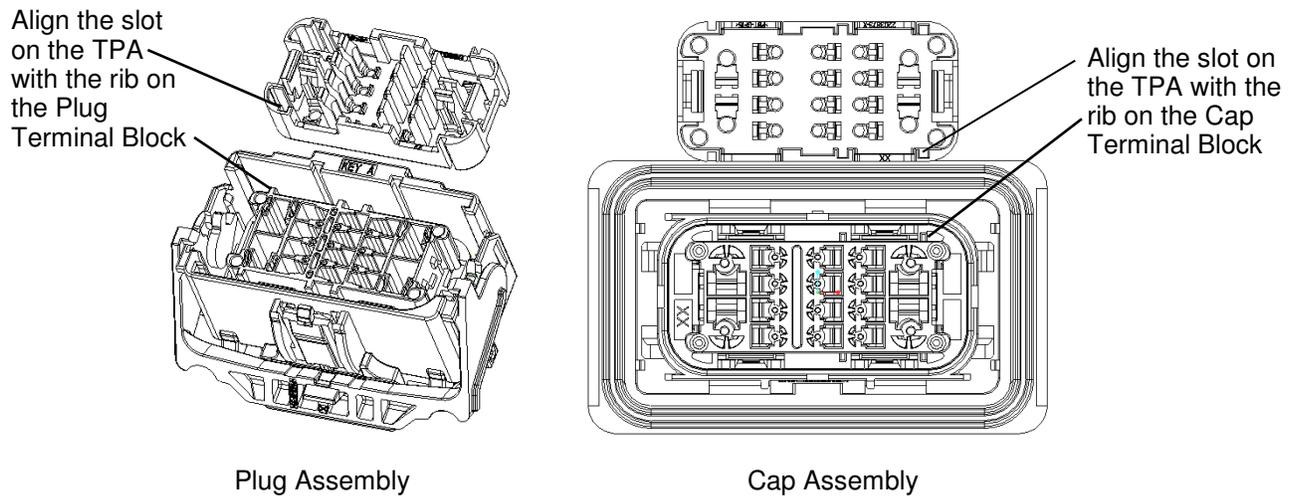


Figure 31

4. QUALIFICATIONS

The AMPSEAL 16 Mini-Lever connectors are not required to be agency evaluated or tested.

5. TOOLING

Figure 32 shows the TPA removal tool 776441-1

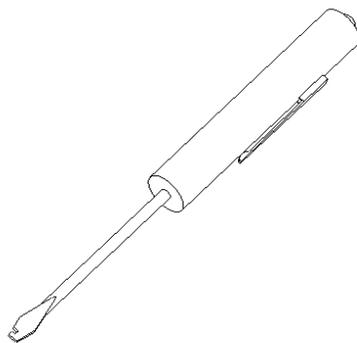
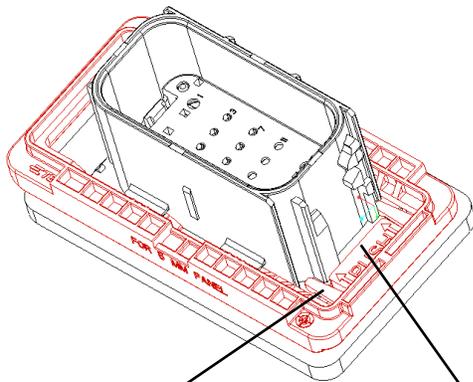
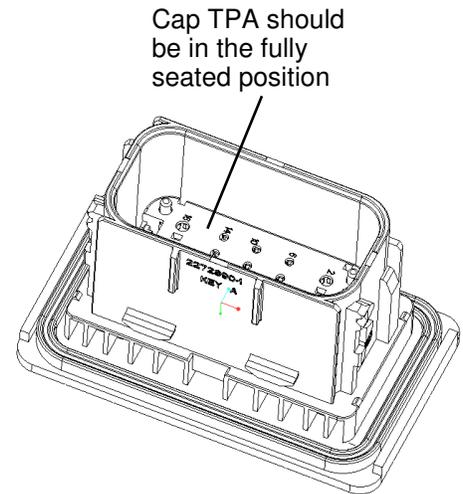
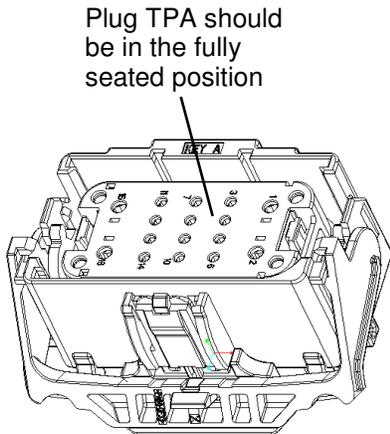


Figure 32

6. VISUAL AID

The illustration below shows a typical application of the AMPSEAL 16 Mini-Lever 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.



Mounting Clip should bottom out against the Cap Assembly when fully inserted

Plug TPA fully engaged

