

1. INTRODUCTION

This specification covers the requirements for the application of UnManned Power Connectors (UMP). UMP connectors are to be used where low-profile power, and optional signal, connections are needed in robust, low-altitude applications, including, but not limited to, drones and other unmanned vehicle applications.

UMP Connectors are available in four main styles with multiple mounting options including power, mixed power and signal, plug and receptacle connectors. The housing styles include wired connectors with or without panel mounting flanges and PCB mount connectors with solder tail or press fit terminations. Wired power connectors can be used with wire gages ranging from 8-14awg and signal contacts can be used with 22-26awg wires. When describing the connector type, plug or receptacle, the contact gender determines the connector gender.

Each connector is available to be purchased at various levels of assembly. See part number table below to determine which parts best fit your application's needs.

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

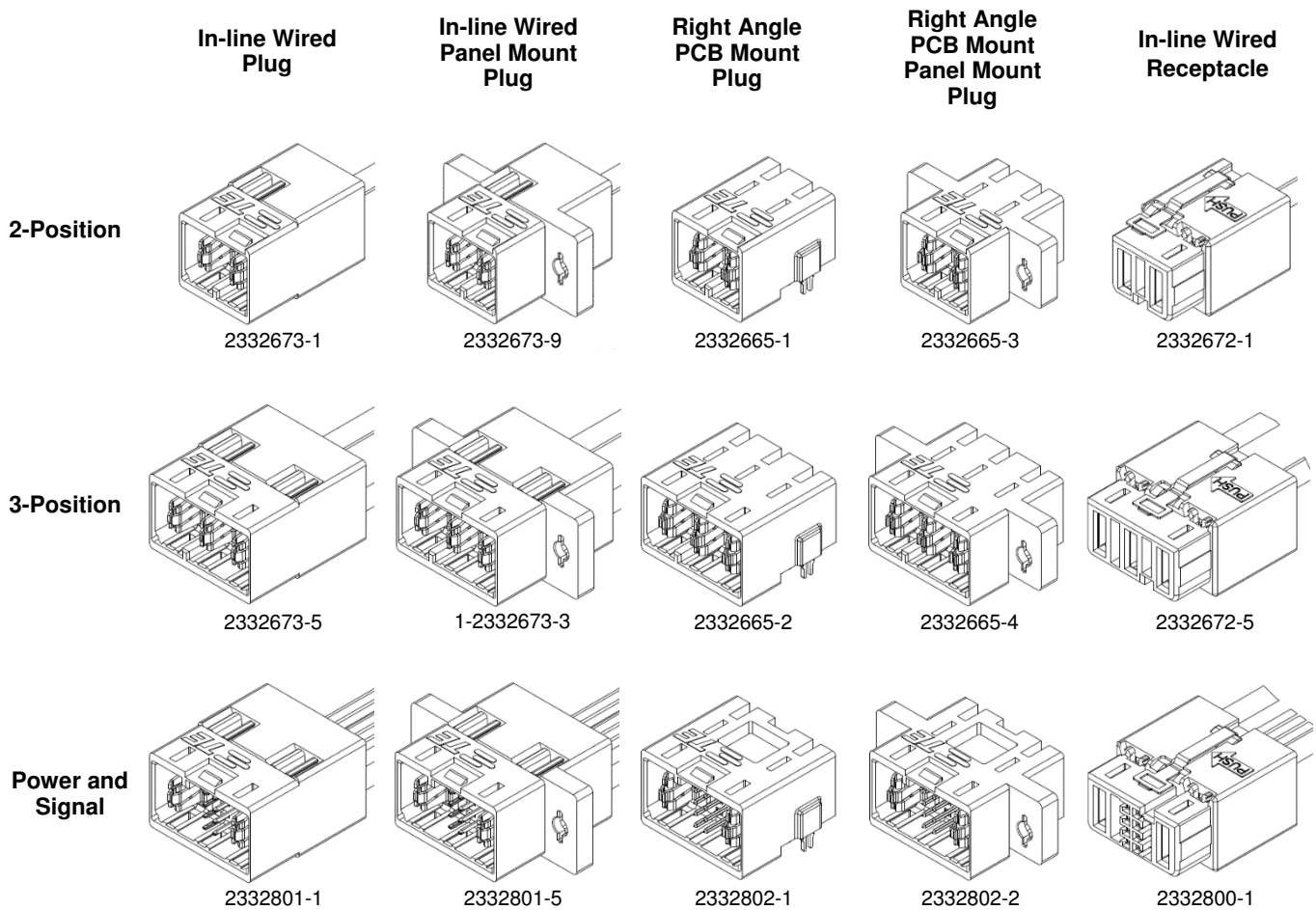


Figure 1

NOTE

Figures and illustrations are for identification only and are not drawn to scale.

2. REFERENCE MATERIAL

2.1. Customer Assistance

Reference product base part numbers 2332663 & 2332664 for *power* connectors and 2332798 & 2332799 for *power & signal* connectors. The product code, Y296, is representative of the UMP 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.

2.2. Drawings

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

2.3. Manuals

Manual 402-40 is available upon request and can be used as a guide to soldering. This manual provides information on various flux types and characteristics with the commercial designation and flux removal procedures. A checklist is included in the manual as a guide for information on soldering problems.

2.4. Specifications

<u>Document Number</u>	<u>Document Title</u>
108-163021	Product Specification; provides product performance and test results.
501-134114	Qualification Test Report; provides product performance and test information for the UMP Connectors.
109-11	Test Specification; provides solderability requirements and evaluation methods.
101-21	Workmanship Specification; provides solder fillet requirements.

2.5. Instructional Material

The following list includes available instruction sheets (408--series) that may provide assembly procedures for product, operation, maintenance and repair of tooling.

<u>Document Number</u>	<u>Document Title</u>
408-163029	UMP Instruction Sheet
408-7424	Checking Terminal Crimp Height or Gaging Die Closure

2.6. Standards and Publications

<u>Document Number</u>	<u>Document Title</u>
IEC 60352-5	Solderless Connections Part 5: Press-In Connections—General Requirements, Test Methods and Practical Guidance
(EIA)-364	Electronic Industries Alliance, Electrical Connector Test Procedures Including Environmental Classifications

2.7. Purchasing Options

UMP connectors can be purchased in various states of completeness.

Fully assembled, mated-pair kits are available, which include plug and receptacle connectors with contacts, terminated to the wire size of your choice, installed and locked into the housings. For example, to purchase a 3-position, panel mount, power connector mated pair with 8awg wire, the part number would be 1-2332663-6. For a mixed power/signal, 12awg wire to PCB mated pair connector, the part number would be 2332799-2.

Individual components can also be purchased if your application needs allow for contact termination and connector assembly processes. A housing kit, which includes the molded connector housing and contact locks, can be purchased (i.e. 2332668-2) to go along with the matching contacts on continuous strip (i.e. 2349000-3) or loose

piece (i.e. 2349000-1). After terminating the wire of proper size to the contacts, they can then be assembled into the housing and locked into the place with the contact locks (2332670-1 for plugs & 1600903-1 for receptacles).

Position numbers, wire sizes, PCB termination type, and panel mount features can also be specified, using “dash number” options, to further customize your order. Wire sizes include 14, 12, 10, & 8 AWG. PCB termination style can be soldertail or press fit. Flanges can be chosen to allow the plug connector to be mounted to a panel in your application. Two- and three-position power connectors are available and signal contacts can also be included in the connector by selecting the Power/Signal Hybrid connector part numbers.

All purchasing options and part numbers are displayed in detail in the UMP Product Brochure and on te.com. Please refer to these resources for more information.

3. **REQUIREMENTS**

3.1. Safety



DANGER

Temperature of connectors energized with maximum allowable current will exceed standard TE values. To avoid personal injury, handle with care.

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

3.2. Limitations

The connectors are to operate within a temperature range of -65° to 150°C [-85° to 302°F]. With higher current levels, depending on the level of temperature rise the connector is expected to experience, the ambient temperature must be limited to prevent the connector from exceeding its maximum operating temperature.

Voltage ratings for these connectors are based upon a circuit pad diameter of 1.60+0.064 [.063+.0025] and UL Material Group IIIb. This material group has a comparative tracking index (CTI) of 100<CTI<175. Voltage ratings according to contact centerline spacing and circuit pad travel are rated up to 300V.

3.3. Material

Each module housing is made of molded, high-temperature rated, glass-filled nylon (UL94V-0). All power and signal contacts are made of copper alloy; both are plated with gold at the contact interface and both are underplated with nickel and have tin plated PCB termination tails.

3.4. Storage

A. Ultraviolet Light

Prolonged exposure to ultraviolet light may deteriorate the chemical composition used in the contacts or connectors

B. Shelf Life

The contacts and connector kits should remain in the shipping containers until ready for use to prevent damage. These products should be used on a first in, first out basis to avoid storage contamination

C. Chemical Exposure

Do not store contacts or connector kits near any chemicals listed below, as they may cause stress corrosion cracking in the components:

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

3.5. Wire Selection and Preparation

Power contacts can be crimped onto wire ranging from 14 to 8awg. Signal contacts can be crimped onto wire ranging from 26 to 22awg. Maximum insulation diameters and strip length of each wire can be found in Figure 2

WIRE		CONTACT TYPE	CONTACT SIZE	STRIP LENGTH
SIZE (AWG)	INSULATION DIAMETER (Max)			
26	1.52 [.060]	Signal	22 - 26	3.18 - 3.96 [.125 - .156]
24	1.52 [.060]			
22	1.52 [.060]			
14	3.96 [.156]	Power	12 - 14	5.97 - 6.73 [.235 - .265]
12	4.47 [.176]			
10	5.46 [.215]	Power	8 - 10	6.73 - 7.49 [.265 - .295]
8	6.92 [.272]			

Figure 2

3.6. Crimped Contact Requirements

A. Power Contacts

A.1. Coil Set

For wire size 8 AWG and heavy-stranded wire size 10 AWG, the wire must have a slight downward bow from the top of the contact. This orientation is important to ensure proper alignment in the final assembly. Refer to Figure 3

NOTE When being fed into the application tooling, the wire must be orientated to the top of the contact so that there is a downward bow when crimped.

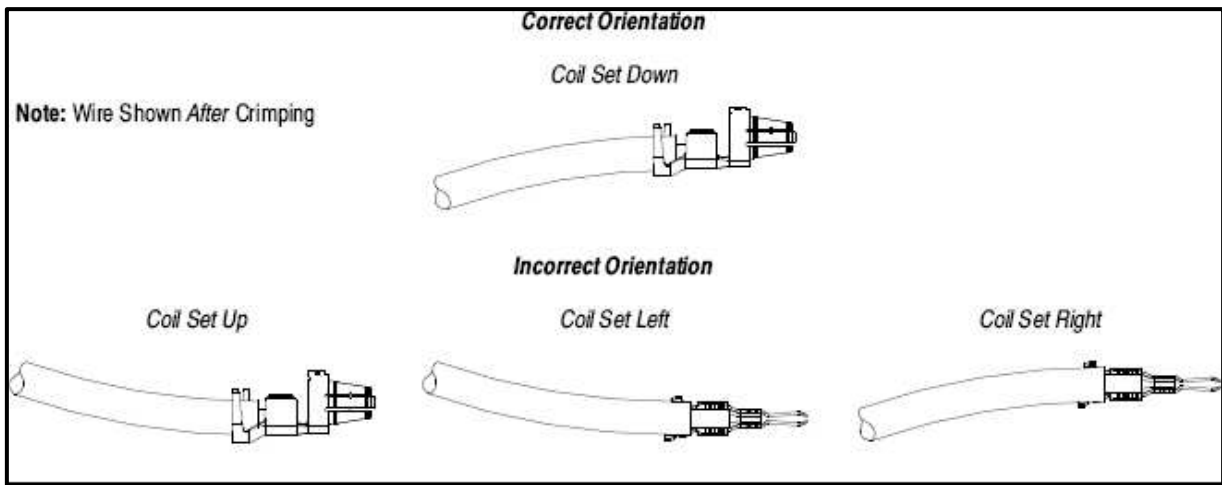


Figure 3

A.2. Cutoff Tab and Burr

The cutoff tab is the remaining portion of the carrier strip after the contact has been cut from the carrier strip. There must be no burr as a result of the cutoff tab shearing. The cutoff tab must not exceed the dimension shown in Figure 4.

A.3. Mating Beams and Stabilizer

The mating beams and stabilizer must not be deformed in any way. See Figure 4.

A.4. Bellmouths

The rear bellmouth length must be no less than and the front bellmouth must be no more than the dimensions given in Figure 4.

A.5. 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 4.

A.6. Wire Barrel Seam

The seam between the two sides of the wire barrel must be completely closed and there must be no evidence of loose wire strands or wire strands visible in the seam as shown in Figure 4.

A.7. Wire Conductor and Insulation Location

All wire 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 support barrel and must not enter the wire barrel. Wire conductor ends must be flush with, or extend slightly beyond, the end of the wire barrel. See Figure 4.

A.8. Effective Crimp Length

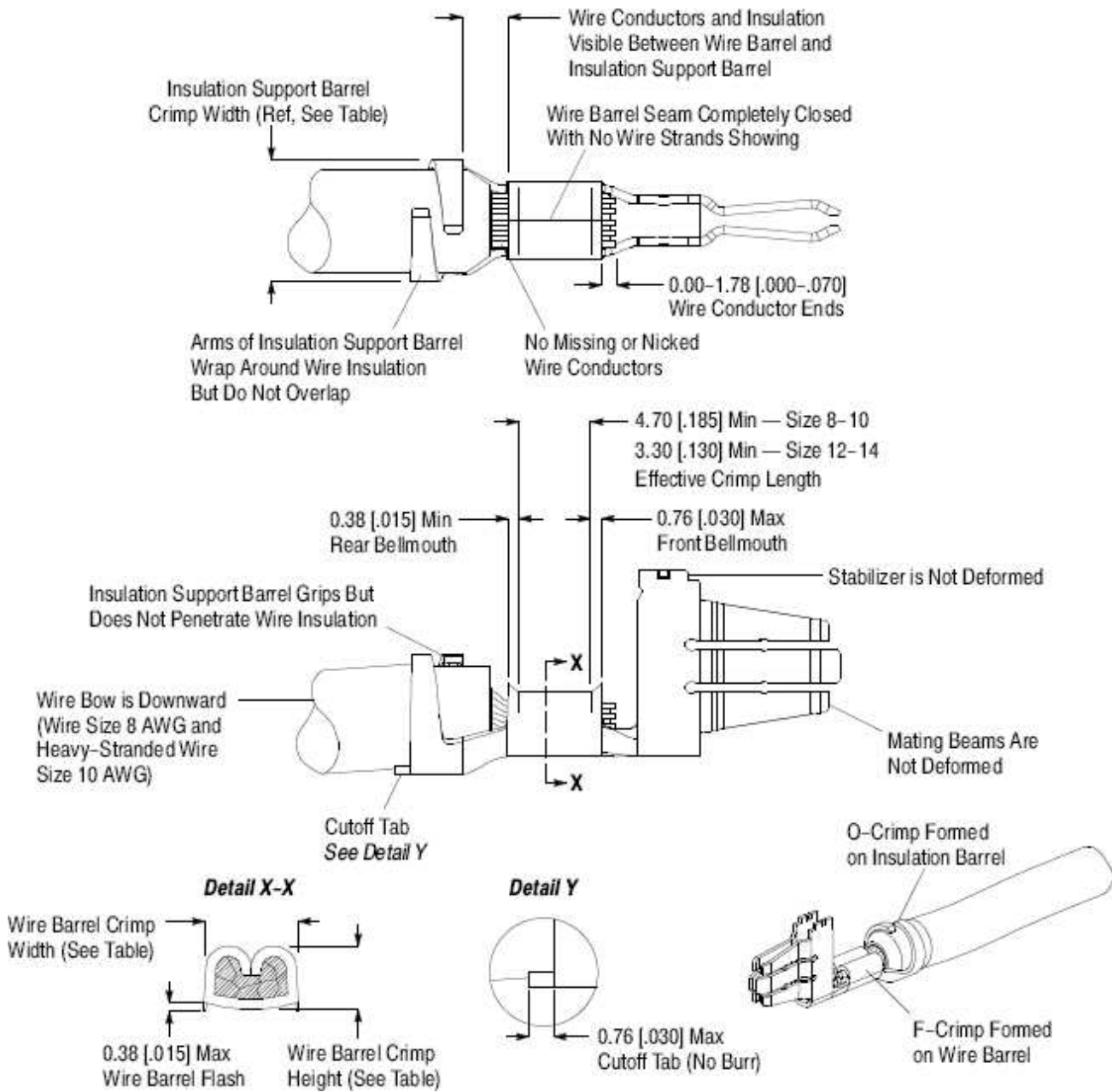
Effective crimp length is the portion of the wire barrel, excluding bellmouths, fully formed by the crimping tool. For optimum crimp effectiveness, the crimp must be within the area shown and no longer than the dimension provided in Figure 4.

A.9. Crimp Height and Width

The crimp height and crimp width must be within the dimensions provided in Figure 4.

A.10. Crimp Configuration

The wire barrel must be formed in the F-crimp where the tips of the wire barrel are turned inward and all wire conductors are captured in the wire barrel. The insulation support barrel must be formed in the O-crimp where the tips of the insulation support barrel are parallel and the wire insulation is captured in the insulation support barrel.



POWER CONTACT SIZE	WIRE SIZE (AWG)	WIRE BARREL CRIMP		INSULATION SUPPORT BARREL CRIMP WIDTH (Ref)
		HEIGHT	WIDTH	
12 - 14	14	2.08 – 2.18 [.082 - .086]	3.48 – 3.63 [.137 - .143]	4.37 – 4.52 [.172 - .178]
	12	2.34 – 2.44 [.092 - .096]		5.00 – 5.16 [.197 - .203]
8 - 10	10	2.57 – 2.67 [.101 - .105]	4.45 – 4.70 [.175 - .185]	5.77 – 5.92 [.227 - .233]
	8	3.05 – 3.15 [.120 - .124]		7.16 – 7.32 [.282 - .288]

Figure 4

B. Signal Contacts

B.1. Crimped Configuration and Location

The wire barrel will be crimped in the F-crimp configuration where the tips of the wire barrel will turn inward and capture all wire strands. The insulation barrel will be crimped to the O-crimp configuration where the tips of the insulation barrel will overlap and capture the wire insulation and form the insulation support. The effective crimp length (excluding bellmouths) over the length of the wire barrel shall be within the limits shown in Figure 5.

B.2. Wire Barrel Seam

The wire barrel seam shall be completely closed with no portion of the conductors protruding from the seam. See Figure 5.

B.3. Crimp Height and Width

The crimp applied to the wire portion of the contact is the most compressed area and is the most critical in assuring optimum performance. The crimp applied to the contact must be within the range specified for each wire size as specified in Figure 5.

B.4. Bellmouth

The front and rear bellmouths caused by extrusion of the contact metal during the crimping process shall be within the limits provided in Figure 5.

B.5. Cutoff Tab and Burr

The front cutoff tab must not extend beyond the contact box and the rear cutoff tab must not extend beyond the insulation barrel more than the limits specified in Figure 5.

Burrs resulting from the shearing of the cutoffs must not exceed the limits shown in Figure 5.

B.6. Flash

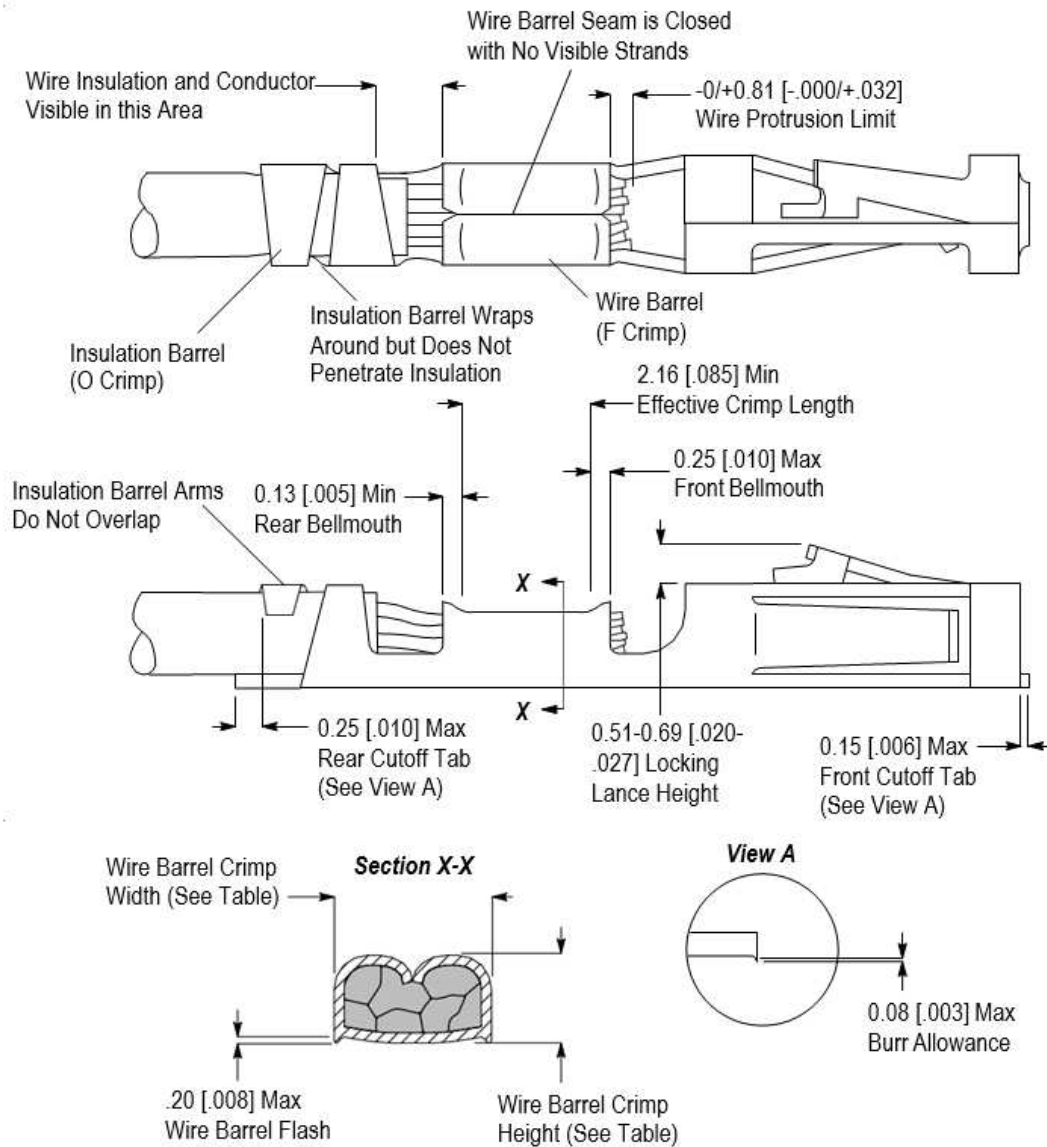
Flash that may appear on either side of the crimped contact shall not exceed the maximum limit specified in Figure 5.

B.7. Conductor Location

The conductor of the wire must be flush or within the protrusion limit specified from the front of the wire barrel. Both insulation and conductor must be visible in the transition area between the insulation barrel and wire barrel. No insulation must be in the wire barrel. See Figure 5.

B.8. Locking Lance

Inspection of several uncrimped contacts will provide a visual reference for the contact. The height of the locking lance, measuring from the contact box, must be within the specified limit provided in Figure 5.



SIGNAL CONTACT SIZE	WIRE SIZE (AWG)	WIRE BARREL CRIMP		INSULATION SUPPORT BARREL CRIMP WIDTH (Ref)
		HEIGHT	WIDTH (Ref)	
22 - 26	26	0.71 - 0.81 [.028 - .032]	1.07 [.042]	1.58 [.062]
	24	0.76 - .086 [.030 - .034]		
	22	0.86 - 0.96 [.034 - .038]		

Figure 5

3.7. PC Board

A. Material and Thickness

The pc board material shall be glass epoxy (FR-4 or G-10). The pc board thickness shall be 1.40-2.62mm [.055-.103"] for solder tail connectors and 1.35mm [.053"] minimum for press fit connectors.

B. Hole Dimensions and Durability

The contact holes must be drilled and plated through to specific dimensions to prevent stubbing during placement of the connector on the pc board and to ensure optimum continuity for circuits after soldering. If applicable, holes for the retention clips or mounting hardware may be used with or without plated through holes. The drilled hole size, plating types, plating thickness, and finished hole size must be as stated to provide unrestricted insertion. See Figure 6.

For connectors with press-fit contacts, the pc board holes cannot withstand connector removal more than three times. The radius of any board hole must not increase more than 0.038 mm [.0015"] or decrease less than 0.0508 mm [.002"].

The pc board circuit pads must be solderable in accordance with Test Specification 109-11.

C. Layout

The holes in the pc board must be precisely located to ensure proper placement and optimum performance of the connector. The pc board layout must be designed using the dimensions provided on the customer drawing for the specific connector. A sample of the recommended pc board layout is shown in Figure 6.

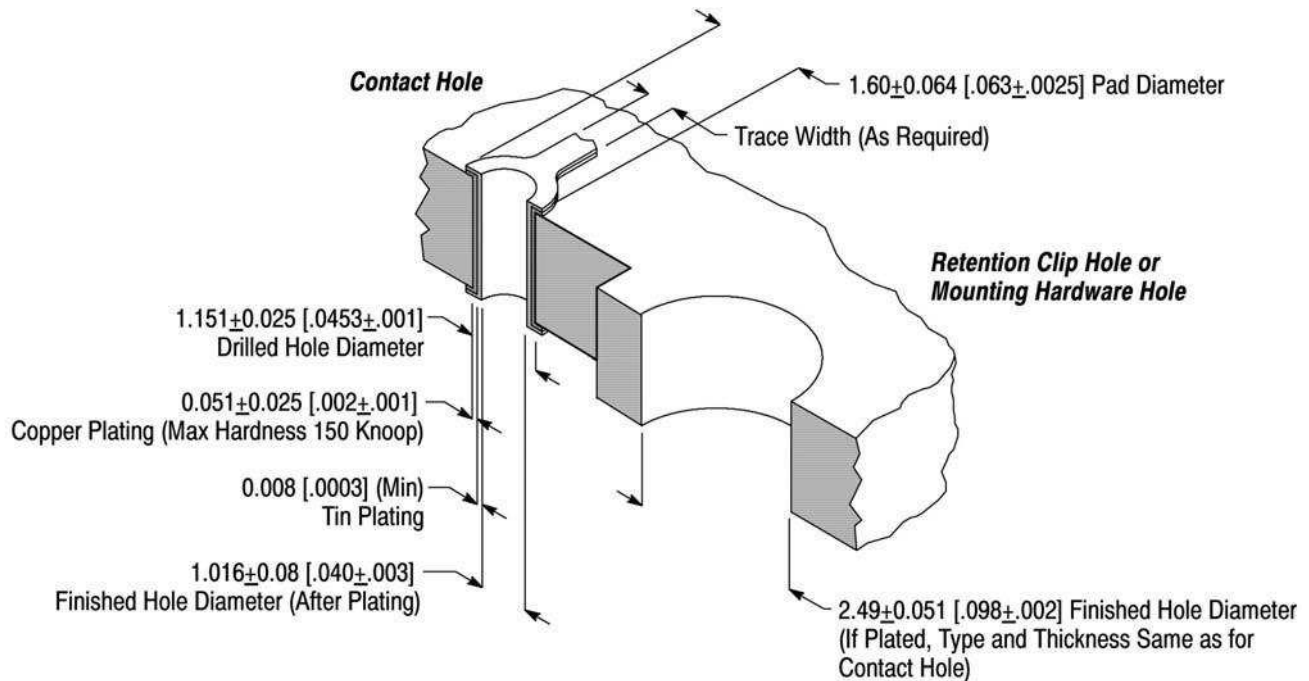


Figure 6

3.8. Panel

A. Thickness

The panel thickness range for UMP connectors with flanges shall be a minimum of 1.0mm [.040"]

B. Cutout

The panel must be cut using the dimensions provided on the customer drawing for the specific connector. Reference *samples* of recommended panel cutouts are shown in Figure 7.

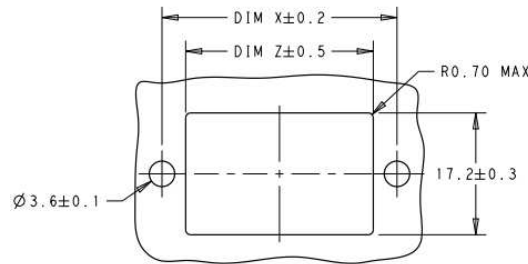


Figure 7

2-position – DIM X=25.20 & DIM Z=18.50

3-position – DIM X=33.20 & DIM Z=26.50

C. Mounting

The UMP connectors with flanges are designed to be rear panel mounted using M3 hardware chosen according to the thickness of the panel. A low-profile M3 hex nut, conforming to DIN 439, is to be installed into the rear of connector flanges where it will be retained until installation. Typically, the connector should be oriented so that the latching bump feature is on top. Each M3 nut must be fastened with a torque value of 0.63 Nm.

3.9. Mating/Unmating

A. Polarization & Keying

UMP power connectors cannot mate with UMP power+signal connectors. If they are mated together, contact damage would occur. Therefore, the two types of connectors are keyed so that they will not be able to mate incorrectly. Corner radii in the mating interface are also sized to add an additional level of polarization. Connectors must be mated in the proper orientation in order for the latch features to engage.

B. Mating Force

There are two sizes of UMP connectors: 3 position wide and 2 position wide. Note that 3-position wide size includes 3-position power connectors and mixed power and signal connectors.

	3-Position Wide	2-Position Wide
Average Mating Force (lbs)	14	11
Average Unmating Force (lbs)	14	10

Figure 8

C. Mating Sequence

The UMP connectors have been designed to always allow the power contacts to mate before the signal connectors. Also, with over 3mm minimum contact wipe, unmated contact conditions will not occur if the contacts, latch, and housings are assembled correctly.

D. Unmating with Latch

To unmate the connectors, the latch on the receptacle connector must be deflected up to bypass the latching bump feature on the plug connector. To deflect the latch, press down in the center of the long, rear section of the latch next to the "PUSH" arrow. This will force the latch to pivot up and it will deflect above the latch bump and the connectors can be unmated by pulling apart while the latch is deflected. Be sure to unmate the connectors *as straight as possible* to prevent bending the latch upward and deforming into a position which could reduce latching strength.

4. TOOLING

The contacts can be terminated to wire using a hand crimping tool or semi-automatic machine. The wire size range of the contact will determine the tooling to be used. After a contact is crimped, it can be inserted into the housing with or without the use of a tool (Section 5.1).

4.1. Contact Crimp Hand Tooling

TE PIGTAIL P/N	AWG	TE HAND TOOL	DMC DIESET
2332666-1 / 2332667-1	14	2217330 (or DMC TOOL: HDE36B)	HD36-174
2332666-2 / 2332667-2	12		HD36-173
2332666-3 / 2332667-3	10		HD36-172
2332666-4 / 2332667-4	8		HD36-171
2332803-1	22-26	91517	-
2332804-1	22-26	91518	-

Figure 9

4.2. Contact Extraction Tooling

A. Power Receptacle Contact Removal Tool: 2364196-2

B. Signal Receptacle Contact Removal Tool: 2364197-2

4.3. Installing Solder Tail Plugs

A. Board Locks

Plug connectors can be placed on PCBs and held in place using the pair of board lock components assembled into each connector. The board locks will hold the connector in place during the soldering process.

Refer to sections 5.4 and 5.5 for further details on the soldering process.

4.4. Installing Press Fit Plugs

A. Tooling

The application tooling (such as an arbor press) used to seat these connectors must provide sufficient amount of downward force to insert the contacts into the pc board holes.

B. PC Board Support

A pc board support must be used to prevent bowing of the pc board during the placement of these connectors on the board. The board support must have a flat surface with holes or a channel large enough and deep enough to receive any protruding components. The pc board must be secured to the board support to prevent movement of the board during seating.

The board support must also be used when removing these connectors from the pc board.

C. Flat Rock Tooling

Commercially available bar stock (flat rock tooling) with a flat surface large enough to cover all contacts must be used with the application tooling to seat these connectors. For vertical receptacles with guides, the flat rock tooling must be sized to fit between the guides.

Refer to sections 5.3 and 5.5 for further details on the press-fit installation process.

5. APPLICATION INSTRUCTIONS

5.1. Assembling UMP

Cable applied UMP connectors can be assembled by the user. Once each contact is terminated per section 3.6 above, they can be inserted from the rear of the appropriate connector housing. Refer to Figure 10 for a visual assembly aid.

When inserting the plug contact, be sure that there is no metal visible in the contact lock window when viewed from the top. A small tool can be used to press the contact into place from the rear. Once the contact is fully seated, and the window is clear, the plug contact lock, 2332670-1, can be inserted until it clicks into place

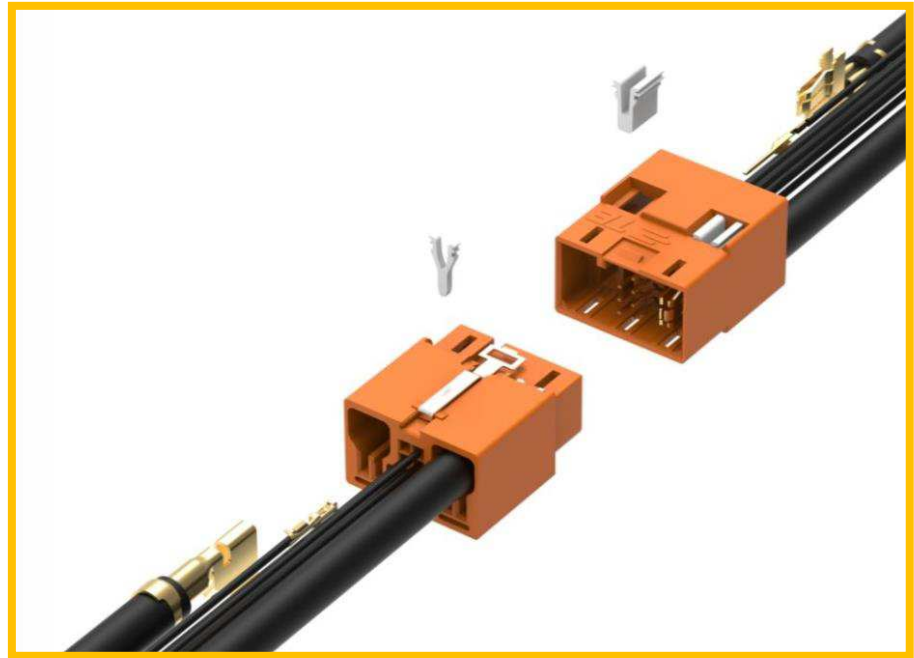


Figure 10: Assembling UMP

The receptacle contact is similar as there can be no metal showing in the contact lock window. A small window in the contact lines up with the contact lock window and the primary latches on the contact engage in the cavity when fully seated. A small tool can be used to press the contact into place from the rear. Insert receptacle contact lock, 1600903-1, to finalize assembly

Each signal contact has latches built into it. The latch must always point outward toward the closest power cavity to be fully seated into the housing. Refer to Figure 11 for orientation details.

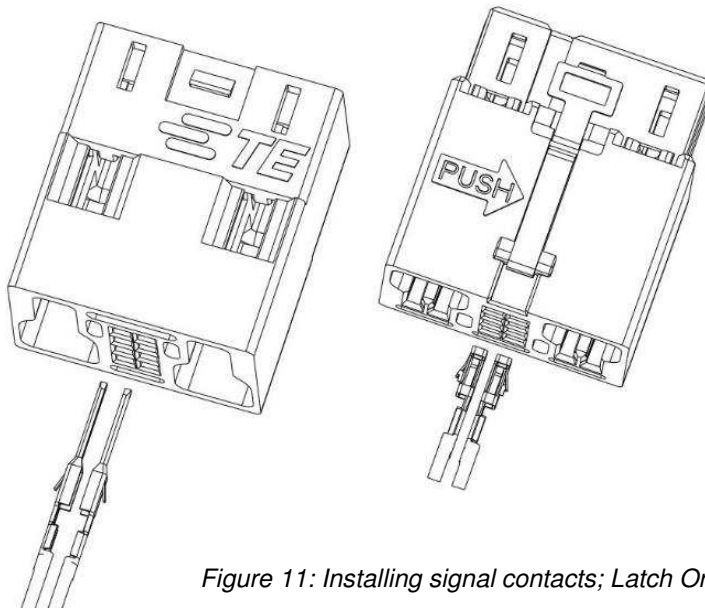


Figure 11: Installing signal contacts; Latch Orientation

For the Panel Mount variation of the UMP connector, mounting nut is not included with the connector kits. The housings are designed to allow a DIN 439 M3x.50 thin profile nut to be installed and retained in the flange. See Figure 12: DIN 439 Nut Installation visual aid for installation guidance.

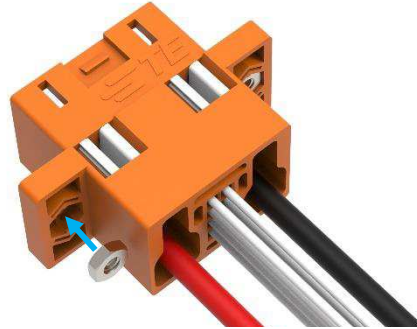


Figure 12: DIN 439 Nut Installation

5.2. Removal of UMP Contacts from Plug and Receptacle Connector Assemblies

To remove the plug power contacts from its housing, simply remove the large contact lock by using tweezers to compress the top of each latch and pulling it out of the housing. Once removed, the plug contact can slide out through the back of the housing.

For the receptacle power contacts, there is an additional step. Remove the thin contact lock with tweezers in the same manner as the large plug lock and put it aside. Each receptacle contact has a primary latching system that can be accessed from the mating side of the connector. Two small beams are formed inward to engage with the center rib in each cavity. To remove the contact, these beams must be bent open to slide past the center rib. Carefully, with the power receptacle removal tool (see section 4.2), bend the beams outwards and pull the contact out through the rear of the housing (Figure 13). The receptacle power contacts cannot be reused.

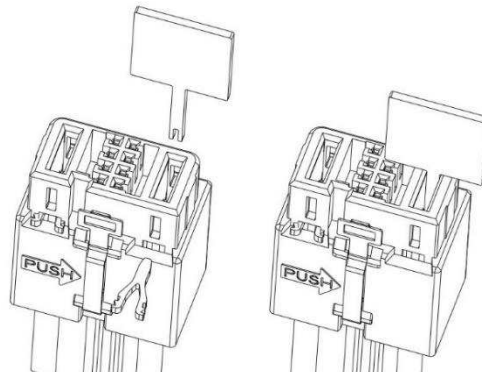


Figure 13: Removing Power Receptacle with Tool

The signal contacts can also be removed from the housing. Using the signal receptacle removal tool (see section 4.2), deflect the latch engaged with the housing and pull the contact through the rear of the housing. For the pin signal contact, a $\text{Ø}.031$ " dowel can be inserted into the contact cavity from the front to deflect the latch and pull the contact through the rear of the housing (Figure 14).

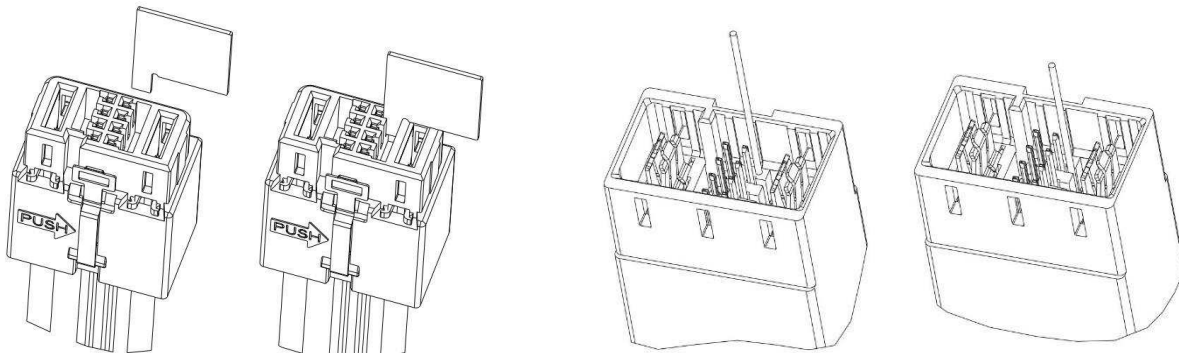


Figure 14: Removing Signal Contacts with Tools

5.3. PC Board Connector Placement

A. Registration

When placing connectors on the pc board, contacts and, if applicable, retention clips or mounting holes must be aligned and started into the matching holes before seating the connector onto the board

B. Insertion Force

The force required to seat the connector with press-fit contacts or retention clips on to the pc board can be calculated by multiplying the number of connector press-fit tails by the force to insert one contact tail. The maximum amount of insertion force per press-fit contact tail is given in Figure 15

	MAXIMUM INSERTION FORCE (N [lb])
POWER PLUG CONTACT	890 [200]
SIGNAL PLUG CONTACT	111 [25]

Figure 15

5.4. Soldering Connectors

Observe guidelines and procedures when soldering contacts. Contact solder tails must be soldered, cleaned, and dried according to the following:

A. Flux Selection

Contact solder tails must be fluxed prior to soldering with a mildly active, rosin base flux. Selection of the flux will depend on the type of pc board and other componets mounted on the board. Additionally, the flux must be compatible with the wave solder line, manufacturing, health, and safety requirements. Flux that is compatible with these connectors are provided in Figure 16

FLUX TYPE	ACTIVITY	RESIDUE	COMMERCIAL DESIGNATION	
			KESTER	ALPHA
RMA	MILD	NONCORROSIVE	186	611

Figure 16: KESTER and ALPHA are trademarks of their respective owners.

B. Process

The connectors can be soldered using wave soldering or equivalent soldering techniques. It is recommended to use tin or tin-lead solder for these connectors. Refer to Manual 402-40 for soldering guidelines. The temperature for wave soldering shall be 265°C [509°F] and connectors should be exposed to this heat for no more than 10 seconds.

C. Cleaning

After soldering, removal of fluxes, residues, and activators is necessary. Consult with the supplier of the solder and flux for recommended cleaning solvents. Cleaners must be free of dissolved flux and other contaminants. Common cleaning solvents that will not affect connectors for the time and temperature specified are listed in Figure 17.

DANGER



Consideration must be given to toxicity and other safety requirements recommended by the solvent manufacturer. Refer to the manufacturer's Material Safety Data Sheet (MSDS) for characteristics and handling of cleaners. Trichloroethylene and Methylene Chloride is not recommended because of harmful occupational and environmental effects. Both are carcinogenic (cancer-causing).



CAUTION Even when using "no clean" solder paste, it is imperative that the contact interface be kept clean of flux and residue, since it acts as an insulator. Flux may migrate under certain conditions with elevated temperatures and therefore, cleaning is necessary.

CLEANER		TIME (Minutes)	TEMPERATURE (Maximum)
NAME	TYPE		
ALPHA 2110	Aqueous	1	132°C [270°F]
BIOACT EC-7	Solvent	5	100°C [212°F]
Butyl CARBITOL	Solvent	1	Ambient Room
Isopropyl Alcohol	Solvent	5	100°C [212°F]
KESTER 5778	Aqueous		
KESTER 5779	Aqueous		
LONCOTERGE 520	Aqueous		
LONCOTERGE 530	Aqueous		
Terpene	Solvent		

Figure 17


NOTE

If a particular solvent is not listed, contact *PRODUCT INFORMATION* listed at the bottom of page 1.

D. Drying

When drying cleaned connectors and pc boards, make certain that temperature limitations are not exceeded: -65° to 150°C [-85° to 302°F]

5.5. Checking Installed Connector
A. With Press-Fit Contacts

The entire “eye” of each press-fit contact must be within the pc board holes. All standoffs must be seated on the pcb board within the dimensions provided in Figure 18.

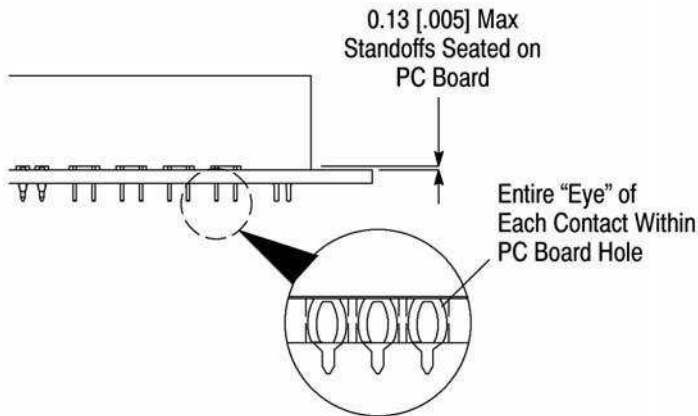
B. With Solder Type Contacts

All solder joints should conform to those specified in Workmanship Specification 101-21 and all other requirements specified in this document. Solder fillets must be evenly formed around each contact solder tail. There must be no visible skips or voids. All standoffs must be seated on the pc board within the dimension provided in Figure 18.

Checking Installed Connector

Note: Requirements apply equally to all connectors.

Vertical Plug With Press-Fit Contacts



Vertical Receptacle With Solder Type Contacts

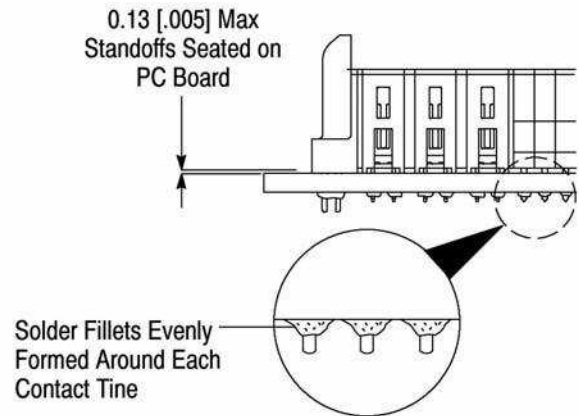


Figure 18

5.6. Connector Removal

A. Solder Type Contacts

Connectors with solder type contacts must be removed from the pc board by standard de-soldering methods. After removal from the board, the connector **MUST NOT** be re-used.

B. Press-Fit Contacts

Connectors with press-fit contacts must be removed from the pc board using a push bar (or flat rock) and pc board support.



CAUTION

For reparability, the tips of the contacts must extend below the surface of the pc board by at least 1.02 mm [.040 in.]; if not, the connector **MUST NOT** be removed from the pc board.

6. QUALIFICATION

Internal qualification have been completed for UnManned Power connectors.

7. VISUAL AID

Figure 19: UMP Visual Aid shows a typical application of UMP connectors and contacts. These illustrations 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.

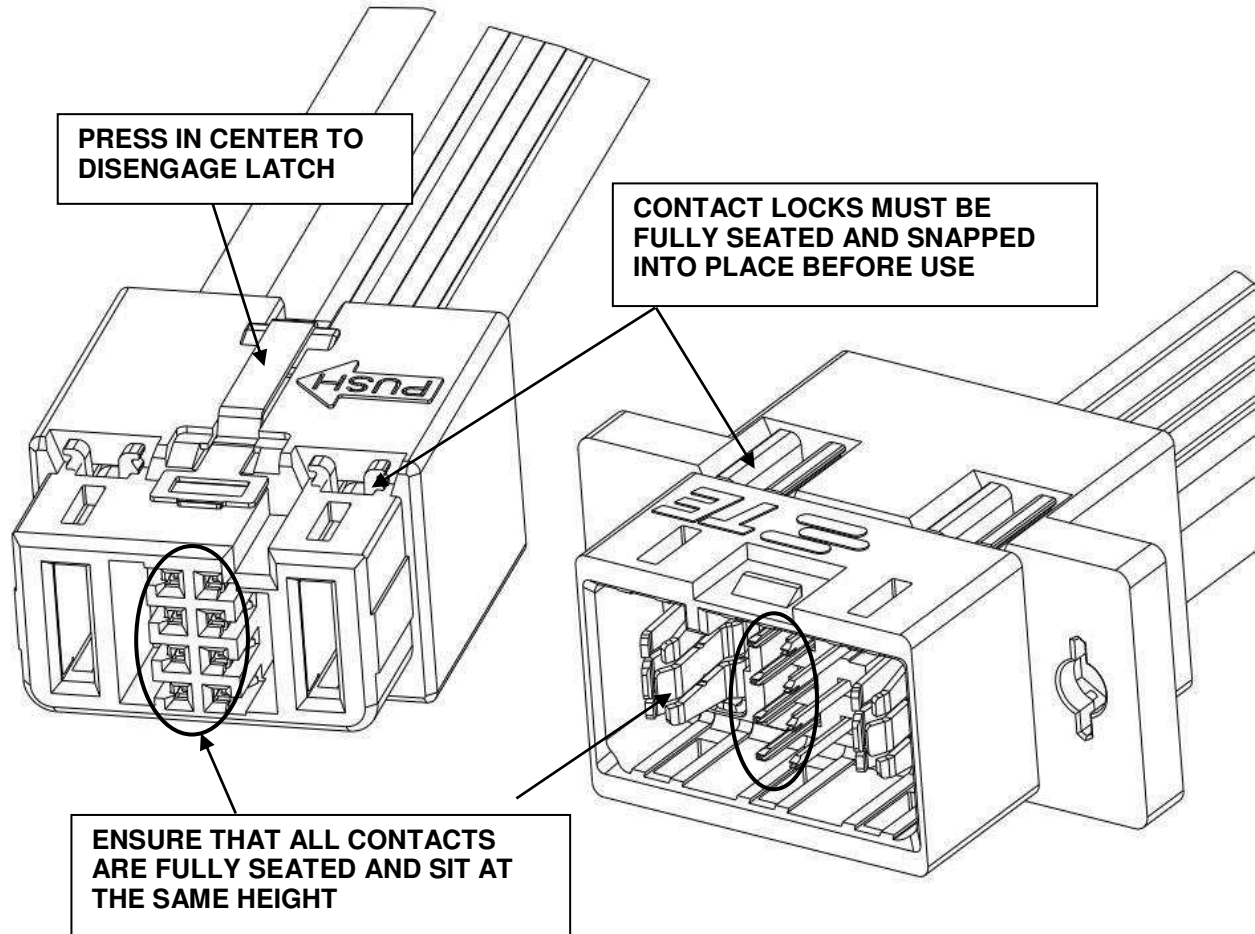


Figure 19: UMP Visual Aid

8. REVISION HISTORY

A: 20 DEC 2019: Initial Release

B: 20 AUG 2020: Update crimp tooling, Temperature rating, and Mating Force. Update PCB install sections with more details.

C: 12 DEC 2020: Clarify unmating notes, clarify power contact installation notes, include crimp tooling numbers

D: 19 NOV 2021: Qualification complete, added 501-134114 report number