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This handling manual describes points to check for smooth crimping operation of contact for PUD connector.

C O N T E N T S

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Title: HANDLING MANUAL PUD Connector	No. CHM-1-2278	Rev. No. R1

1. Handling Precautions

Considering mating feeling, PBT resin which has a low dimensional change rate is adopted in this connector. As the resistance to shock of PBT resin is lower than that of PA resin, trouble such as crack and deformation of housing and breakage of lock part and lance part may be caused when applying shock due to harness handling and treating in transportation, etc.
In order to prevent such troubles and to bring out fully performance of connector, pay careful attention to the following points in connector use.

① Careful operation is required for storage and transport of housing and harness in a stacking condition.
Careful handling is required for the assembled harness because the rough handling may cause the deformation and breakage of housing.
Stacking allowance in storage are up to 5 stacks of carton box for housing, and storage and transport harnessed product with as little load as possible.

② Store contact and housing in a place where temperature is 5°C ~ 35°C and humidity is 45% ~ 85%. Keep them free from damp, dust and direct sunshine.

③ Fasten the tip of remaining chain contact in the reel with wire, string, etc. to the reel so as not to unravel, and store it in a carton box.

④ Do not mate socket contact without inserting them into housing in order to prevent from deformation of contact part.

⑤ When electrical continuity test for harness is conducted, use counterpart of pin.
Never use different type of pin like a tester pin because contacting part may be deformed.

- Carefully check that connector for electrical continuity is free from deformation, damage and stains. When they are found, replace with a new one at once. Periodical replacement of header should be conducted as well.

- Carefully conduct mating and unmating connector, holding housing without prying.
When inspection board is used, design it considering that mating and unmating works are not difficult.

⑥ Do not spray fumy insecticide in the place where connector and harnessed product are stored, or harness operation is conducted, because such spray may cause rusting of metal part.

⑦ Conduct assembly and mating operation of connector in an ambient temperature (10 ~ 35°C) as much as possible.

2. Part Name and Model Number

Part name			Model No.
Receptacle	Housing		PUDP-**V-( )$_1$
	Contact	001 type	SPUD-001T-P0.5
		002 type	SPUD-002T-P0.5
Header	Top entry type		B**B-PUD( )$_1$S-( )$_2$ (LF)(SN)
	Side entry type		B**B-PUD( )$_1$S -1 (LF)(SN)

Note$_1$: Number of circuits in two-digit figure is indicated by asterisk.
Note$_2$: An alphabet indicating connector color in ( )$_1$
Note$_3$: A character indicating the presence of boss in ( )$_2$
None: Without boss, 1: With boss

3. Applicable Wire

Model No.	Wire size	Insulation outer dia.	Conductor spec.
SPUD-001T-P0.5	AWG#26 ~ #22	ϕ1.0 ~ ϕ1.5 mm	Annealed copper stranded tin-plated wire
SPUD-002T-P0.5	AWG#28 ~ #24	ϕ0.8 ~ ϕ1.5 mm	

Note$_4$: Special wires such as bare wire, solid wire, tin-coated wire, shielded wire and other than above wires cannot be used in principle.
When using such special wires, contact JST.

4. Crimping Tool

Part name	Model No.	
	SPUD-001T-P0.5	SPUD-002T-P0.5
Semi-automatic press	AP-K2N	
Applicator	MKS-L	
Die	MK/SPUD-001-05	MK/SPUD-002-05
Applicator and die set	APLMK SPUD001-05	APLMK SPUD002-05

Note$_5$: When crimping operation is conducted by using other than above applicator and die set, JST cannot guarantee the performance of connector.

5. Check Points of Crimping Operation and Harness Assembly

Operation of crimping and assembly affects reliability of connector.
It is recommended that operation of crimping and assembly and finished products are controlled concentrating upon the following check points.

Process	Check point	Description
Crimping	Appearance	① Check that model Nos. of contact and applicator are adequate for wire to be used. ② Check that wire is crimped at normal position. ③ Check that crimp configuration is normal and excessive burr does not appear. ④ Check that uncrimped wire is not left behind. ⑤ Check that contact is not bent, deflected or deformed. ⑥ Check that contact is free from dirt, scratches, stains or discoloration.
	Tensile strength	① Check that crimp height and tensile strength are adequate.
Harness assembly	Appearance	① Check that contact is properly inserted into housing. ② Check that contact is securely locked with housing. ③ Check that housing is free from dirt and foreign matters.
Finished product (Harness)	Appearance	① Follow all descriptions stated above in “Appearance.”

Note$_6$: It is recommended that microscope or loupe is used in appearance check.

6. Crimping Operation

6-1 Wire strip length

Referring to reference value of wire strip length stated below, conduct wire stripping.
As wire strip length differs depending on type of wire and crimping method, decide the best wire strip length considering processing condition. When wire is stripped, do not damage or cut off wire conductors.

Reference value of wire strip length: Approx.2.0 mm

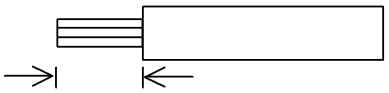


Fig.-1

6-2 Crimping

Before crimping operation, be sure to check the combination of contact, wire to be used and crimping die are correct.
Check the below points for correct crimping at beginning and middle of crimping operation.

① Measurement of crimp height

According to wire to be used, adjust dials of applicator to a proper crimp height.

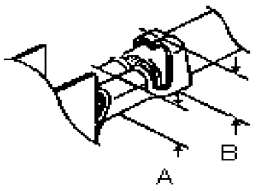


Fig.-2

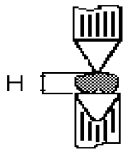


Fig.-3

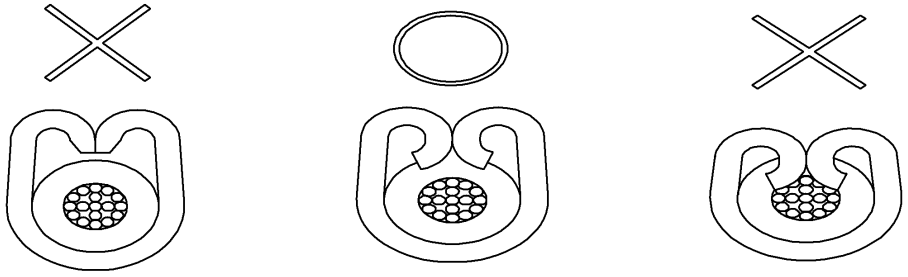
A: Crimp height at wire barrel should be set to pre-determined dimensions.
B: Adjust crimp height at wire insulation barrel to the extent that wire insulation is slightly pressed, and set it so that crimping is not excessively.
H: Measure crimp height at the center of barrel using specified micrometer.

Table of crimp height

Contact	Wire		Insulation	Crimp height (mm)	
	Type	Size	O. D. (mm)	Conductor part	Insulation part
SPUD-001T-P0.5	UL1007	AWG #26	1.3	0.52 ~ 0.57	1.6
	UL1007	AWG #24	1.4	0.55 ~ 0.60	1.8
	UL1061	AWG #22	1.3	0.62 ~ 0.67	1.8
SPUD-002T-P0.5	UL1007	AWG #28	1.2	0.47 ~ 0.52	1.5
	UL1007	AWG #26	1.3	0.52 ~ 0.57	1.6
	UL1007	AWG #24	1.4	0.57 ~ 0.62	1.7

Note$_7$: Crimp height at insulation part is a reference value. Be sure to check the crimping condition at insulation part, and conduct operation.

② Crimping condition at insulation barrel



Insufficient crimping (pressed weak)
When tension is applied to wire, wire insulation easily comes off contact.

Good

Excessive crimping (pressed excessively)
Barrel bites wire too much and may damage wire conductors.

Fig.-4

③ Checks of crimping condition at insulation barrel

Cut only wire insulation barrel, remove wire insulation and check if wire conductors are not damaged as below.

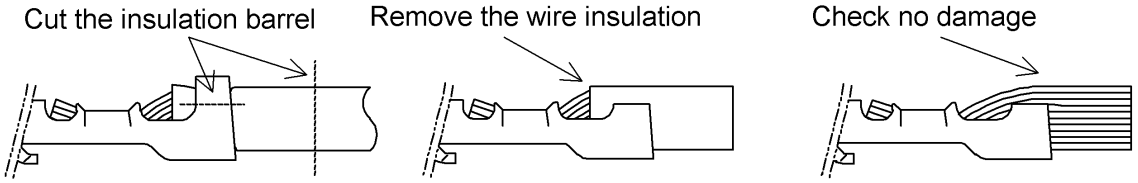


Fig.-5

6-3 Tensile strength at crimped part

After adjusting crimp height, check tensile strength using test samples, and then, start continuous crimping operation. In case tensile strength greatly differs from normal tensile strength (actual value), check if there is a defect. Tensile strength may be different even in the same wire size due to different strength of wire itself.

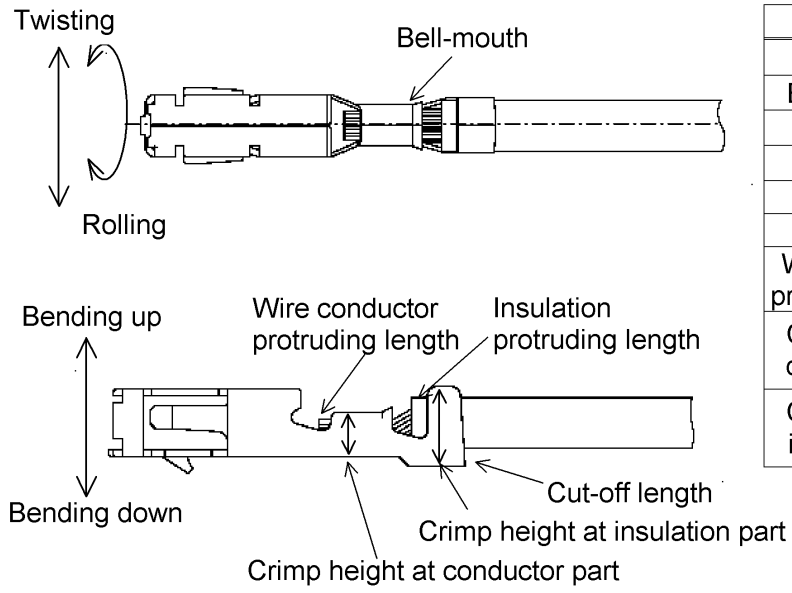
Unit: N

Contact	Wire		Tensile strength (actual value)			Requirement
	Type	Size	Ave.	Max.	Min.	
SPUD-001T-P0.5	UL1007	AWG #26	39.0	42.1	37.2	19.6 min.
	UL1007	AWG #24	56.9	61.5	53.1	29.4 min.
	UL1061	AWG #22	74.6	77.2	69.0	39.2 min.
SPUD-002T-P0.5	UL1007	AWG #28	26.2	29.7	23.8	9.8 min.
	UL1007	AWG #26	38.3	40.7	34.6	19.6 min.
	UL1007	AWG #24	57.6	59.5	53.3	29.4 min.

6-4 Crimping appearance

Check crimping appearance visually for correct crimping with equipment such as a loupe.

Bending up and rolling



Item	Reference value	
Bending up	6° max.	
Bending down	3° max.	
Twisting	5° max.	
Rolling	7° max.	
Bell-mouth	0.1 ~ 0.3 mm	
Cut-off length	0 ~0.5 mm	
Wire conductor protruding length	0.3 ~ 0.6 mm	
Crimp width at conductor part	001 type	approx. 1.3 mm
	002 type	approx. 1.2 mm
Crimp width at insulation part	001 type	approx. 1.4 mm
	002 type	approx. 1.4 mm

Fig.-6

There must not be large burr or one-sided burr.

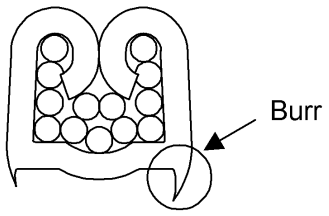
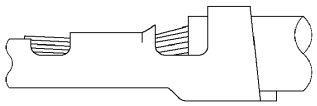
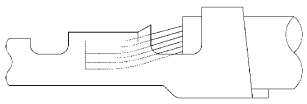


Fig.-7

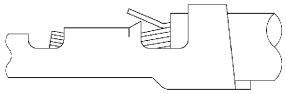
Examples of defective crimping



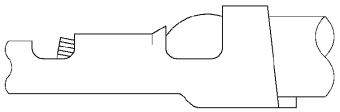
Wire conductor protruding length is long.



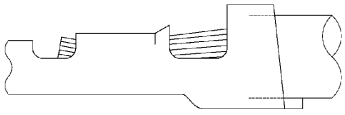
Wire conductor protruding length is short.



Wire conductors comes off.



Wire barrel bites wire insulation.



Wire insulation is not crimped sufficiently.

Fig.-8

Bending up, bending down, twisting and rolling

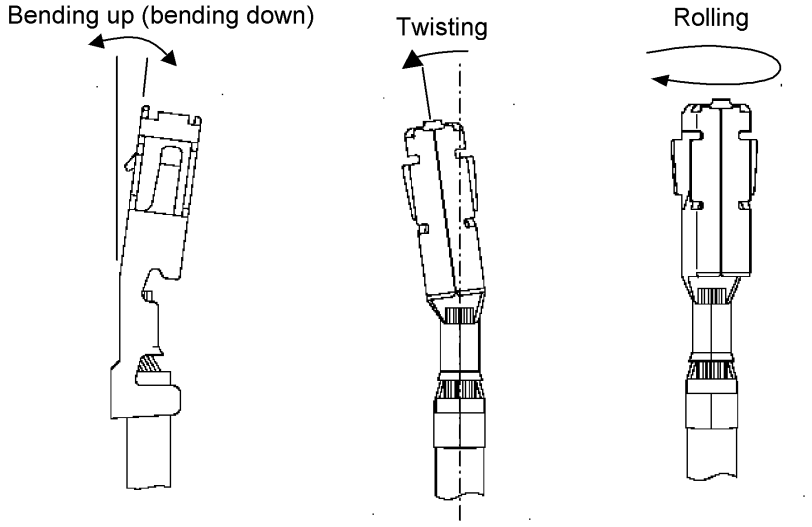


Fig.-9

6-5 Precautions for crimping operation

① Conduct crimping operation properly and inspect crimping appearance of crimped product with loupe, etc.

② Do not conduct empty crimping and crimping twice, because they may cause outstanding burr at crimped part and may lead to abrasion of crimping die quickly.

③ As cutting residue (powder), etc. adhered to crimping die part affects life of dies, clean crimping part occasionally and conduct appropriate crimping.

④ Reference number of crimping die life is 300,000 crimping. When chips or excessive roughness are observed on crimping die, replace it without delay.

⑤ As abrasion of crimping die and insufficient adjustment of applicator may cause defective crimping appearance, do not fail to conduct daily inspection.

⑥ When crimping operation is conducted with wire hold spring damaged or extracted, they may cause that wire conductors come off or wire barrel bites wire insulation.

6-6 Control of crimping operation

To conduct secure crimping operation, record the following items for semi-automatic press and crimping applicator.

① Model No. or control No. of semi-automatic press and applicator
② Contact lot No.
③ The number of crimping and cumulative total
④ Crimp height
⑤ Wire retention force
⑥ Crimping appearance and record of adjustment and replacement of crimping die

6-7 Precautions for storage and handling of crimped contact

As crimped contact before inserting into housing is subject to deformation by external forces, pay careful attention to the following points for storage and handling.

① The number of crimped contacts for one bundle should be 300 pcs. max. Protect contacts by wrapping with thick paper to prevent from deformation and adhesion of foreign matter, and keep them in an adequate box.

② Do not place contacts in humid area, under direct sunshine and directly on the floor in order to prevent the discoloration.
Store them in a clean room with ordinary temperature and humidity.

③ Do not stack too much quantity of crimped contacts nor place anything on them, because weight of themselves may cause deformation of contact and troubles such as defective contacting.

④ Do not stain contact with household goods such as oils, detergent, seasoning, fruit juice, etc. If stained, never use stained contact.

⑤ Do not use improperly crimped contact and deformed contact.

⑥ When a crimped contact is taken out of bundle, do not pull wire but hold wire near crimped section and take it out.

7. Harness Assembly Operation

Harness assembly operation is a very important process to decide connector performance and harness quality. Careful operation is required for harness assembly as well as the said crimping operation.

7-1 Precautions before inserting crimped contact into housing

Before inserting contact into housing, check below points.

① Do not place other things on or near working table and do not conduct any other work on same working table to prevent from operation mistake.

② Do not stain contact with household goods such as oils, detergent, seasoning, fruit juice, etc. If stained, never use stained contact.

③ Do not use improperly crimped contact and deformed contact such as lance, mating part, etc.

④ Do not apply shock such as throwing, dropping, etc. in bundling. Rough handling of crimped contacts at bundling may cause deformation and breakage.

⑤ When a bundle of crimped contacts is loosened, do not pull crimped contacts forcibly even if they get entangled.

7-2 Inserting crimped contact into housing

① Hold contact with lance part up, and insert contact into housing straight. (Do not pry or slant to insert.)

② Do not use pin such an insertion jig, etc., because the tip of pin accidentally reach contact mating part and it may cause defective contacting or deformation of contact.

③ Insert contact into housing without stopping to innermost.
When contact is fully inserted into housing, housing lance clicks and there is feeling of response.

Good Insufficient insertion

Fig.-10

Note: Do not tilt contact to the direction exerted pressure on contact lance or insert contact prying up and down or right and left, because such handling may deform contact lance and mating part.

④ Check secure locking per each insertion by pulling wire softly with a force of approx. 5N in order to check that contact does not come off housing. Besides, check whether there is the backlash in the direction of insertion axis.
(When wire is pulled with too much force, contact lance may be deformed and contact may come off housing.)

8. How to Extract Crimped Contact from Housing in Case of Mis-Insertion

When contact is inserted into improper circuit hole, conduct the following points.

① Do not reuse once used housing and contact but use a new one.
(Method of extracting contact from housing is as below.)

② When improperly inserted contact is extracted from housing and the contact is reused.

- Only specified person conducts the operation.

- In case such contact and housing are reused, the reuse should be once.
From twice, use a new contact and housing.
(If abnormality such as damage is found on contact, replace it with a new one at once.)
Never reuse housing.

- After modification completes, be sure to check secure insertion of contact.

How to extract contact

① Raise housing lance with a sharp-pointed tool like a needle or jig as shown in the figure, and release lock.

② Pull wire softly with released lock and extract contact from housing.
Note: Do not reuse once used housing, but use a new one.
Conduct appearance inspection of the extracted contact to check that contacting part has no damage. When abnormality is found, replace it with new one.

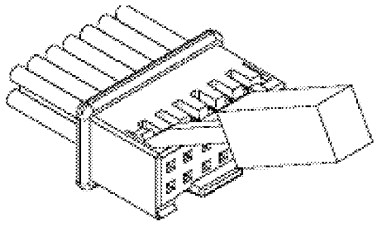


Fig.-11

9. Mating and Unmating Connector

9-1 Mating connector

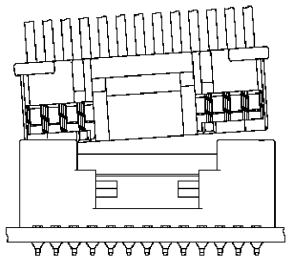
Hold receptacle housing securely and insert it into header straight against to header post until hearing click sounds (you feel a click).
Check secure locking per each insertion by pulling wire softly with a force of approx. 5N in order to check that contact does not come off housing.
Besides, check whether there is the backlash in the direction of insertion axis.
When there is no feeling of a click, there is a possibility that mating is not finished completely. Conduct mating operation again.
(The number of such mating and unmating operation should be decreased as much as possible.)

9-2 Unmating connector

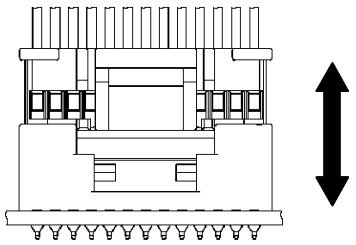
① Hold wire in a bundle and unmate socket housing from header with releasing lock completely (pressing lock releasing part).

② Do not unmate connector forcibly without releasing lock completely, because such handling may cause deformation of lock part, and breakage of connector.

③ Do not unmate socket housing from header from slanting condition as shown in Fig.-12, because socket housing may be deformed.
When socket housing is unmated with holding only several wires at the end of circuit, even if socket housing is extracted in a straight line against mating axis, such handling may cause the same condition as prying connector.
Be sure to hold wires in a bundle, and conduct unmating operation within 15 degrees to each direction with releasing lock completely.



Slant-mating and unmating ×

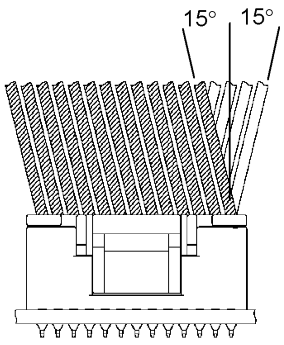


Straight-mating and unmating ○

Fig.-12

9-3 Prying

As prying withdrawal may deform header post and damage receptacle housing, do not conduct prying withdrawal. When withdrawal operation on mating axis is difficult, conduct withdrawal within 15 degrees against the mating axis.



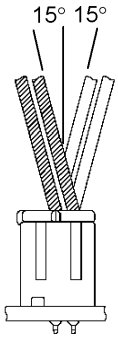


Fig.-13

9-4 Routing of wire

As PUD connector is secure locking type connector, breakage of connector itself such as soldering part, lock part, etc. and breakage of PC board may occur due to routing direction of harness after mating connector or tensile strength.
In order to prevent such troubles and to bring out fully performance of connector, pay careful attention to the following points for routing of harness and mating and unmating operation.

- Do not always apply external force to connector other than the tension or load generated in normal wire routing operation.

- Provide moderate slack for wire which makes mating and unmating of connector easily, and conduct the operation on the mating axis with holding wires in bundle.

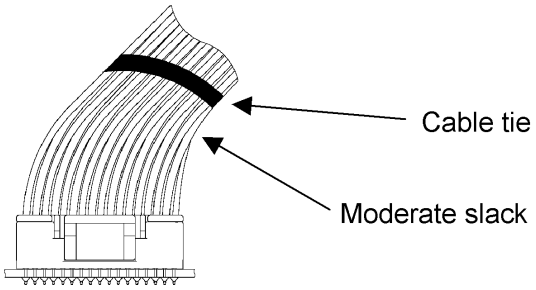
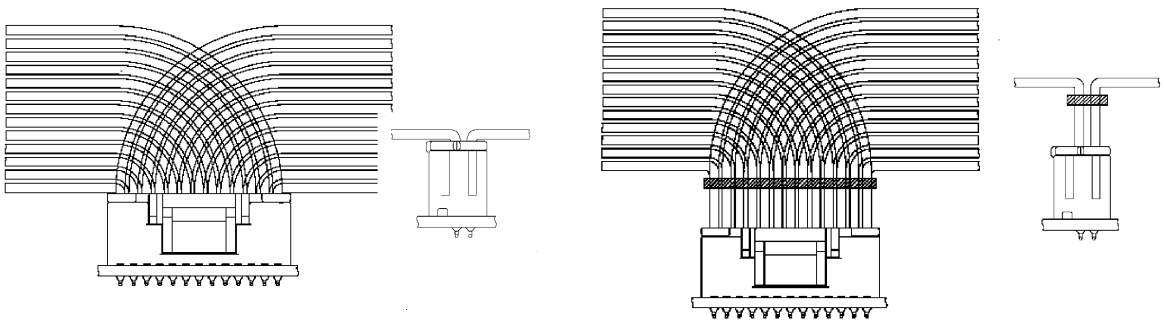


Fig.-14

- Route wire so as not to apply external force to connector except the force to such an extent that wire slightly buckles, considering an enough length to route and fixing of wire.

- Do not use PUD connector at movable part to the utmost.
  Fasten wire not to vibrate contacting part by movement of wire as shown in Fig.-15 when using PUD connector at movable part.



In case of that wire moves freely × In case of that wire is fastened ○

Fig.-15