



Title of Document:	HANDLING MANUAL	Issue No. CHM-1-2018	Rev. 2
Customer:	GENERAL	Issue date: July 22, 2002	
Title subject:	PA Connector (Retainer Mountable Type)	Revision date: October 30, 2019	

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

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1. Part Name and Model Number

Part name			Model No.
Contact			SPA-001T-P0.5
Receptacle housing			PARP-()V-*
Retainer			PMS-()V-S
Header	Top entry type	Without a boss	B()B-PA*K (LF)(SN)
		With a boss	B()B-PA*K-1 (LF)(SN)
	Side entry type		S()B-PA*K-2 (LF)(SN)

Note₁: Number of circuits is indicated in (). An asterisk indicates connector color.

Note₂: Identification marking "(LF)(SN)" stands for lead-free product.

"(LF)(SN)" shall be displayed on product label.

2. Applicable Wire

2-1 Applicable wire

UL1007 (stranded wire) and its equivalent stranded wire can be used.

Regarding the AWG #22, UL1061, which insulation outer diameter is small, and its equivalent stranded wire can be used.

Model No.	Wire size	Insulation outer dia.
SPA-001T-P0.5	AWG #26 ~ #22	φ 0.9 ~ φ 1.5 mm

2-2 Precautions

Special wires such as solid wire, tin-coated wire, shielded wire and other than above wires cannot be used in principal.

3. Crimping Tool

Part name	Wire size
Semi-automatic press	AP-K2
Applicator	MKS-L
Die set	MK-DS SPA001-05

Note₃: When crimping operation is conducted by using other than the above applicator and die set, JST cannot guarantee the performance of the connector.

4. Crimping Operation

Before crimping operation, be sure to check the combination of contact, wire to be used and crimping die are correct.

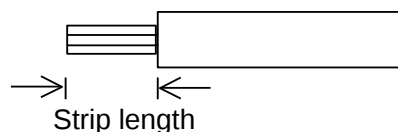
Check the below points for correct crimping at beginning and middle of crimping operation.

4-1 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: 2.2 mm



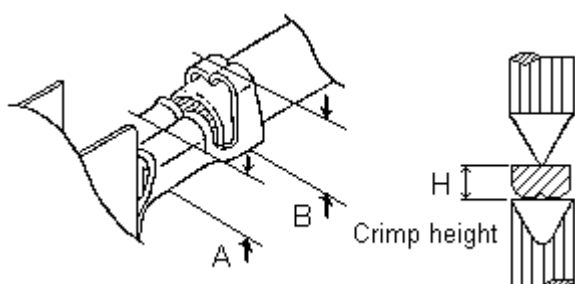
Note: Regarding wire stripping of no-plated wire such as KV wire, etc., conduct stripping just before crimping operation. Do not leave such stripped wire in order to prevent oxidation of conductor surface, because such oxidation may lead fluctuation of contact resistance.

4-2 Crimp height

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

Contact	Wire		Insulation outer dia. (mm)	Crimp height (mm)	
	Type	Size		Conductor part	Insulation part
SPA-001T-P0.5	UL1007	AWG #26	1.3	0.60 ~ 0.70	1.7
	UL1007	AWG #24	1.4	0.65 ~ 0.75	1.8
	UL1061	AWG #22	1.3	0.70 ~ 0.80	1.7

Note₄: Crimp height at insulation part is a reference value.

Measurement of crimp height

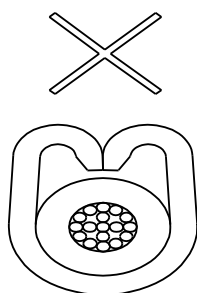
A: Crimp height at wire barrel should be set to pre-determined dimensions.

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.

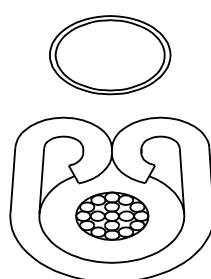
H: Measure crimp height at the center of barrel using specified micrometer.

Measurement timing of crimp height

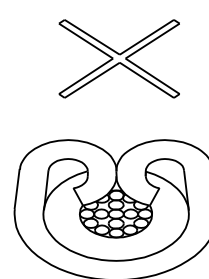
- ① When operation starts at morning and afternoon, starts after pausing and finishes.
- ② When contact reel is exchanged.
- ③ When applicator is adjusted.
- ④ When crimping dies are exchanged.

Crimping condition at insulation barrel

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



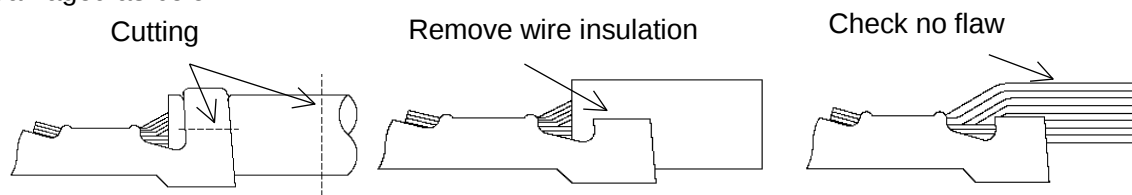
Good



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

Check of crimping condition at insulation barrel

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



4-3 Tensile strength at crimped part

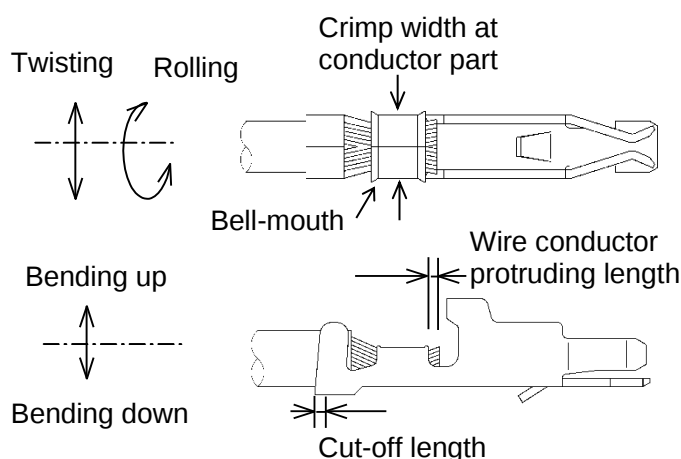
After adjusting crimp height, check tensile strength using test samples, and then, start continuous crimping operation. In case tensile strength greatly differs from normal tensile strength (actual value), check if there is a defect. Tensile strength may be different even in the same wire size due to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

Unit: N

Contact	Wire		Tensile strength (actual value)			Requirement
	Type	Size	Ave.	Max.	Min.	
SPA-001T-P0.5	UL1007	AWG #26	38.95	42.1	36.2	20 min.
	UL1007	AWG #24	53.13	57.1	48.8	30 min.
	UL1061	AWG #22	82.03	85.3	77.2	40 min.

4-4 Crimping appearance

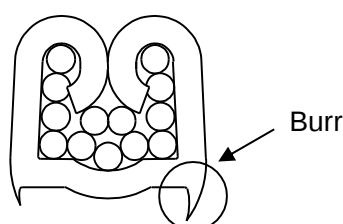
Check crimping appearance visually for correct crimping with equipment such as a loupe.

Bending up and rolling

Item	Reference value
Bending up	approx. 3° max.
Bending down	approx. 3° max.
Twisting	approx. 4° max.
Rolling	approx. 5° max.
Bell-mouth	approx. 0.1 ~ 0.3 mm
Cut-off length	approx. 0 ~ 0.3 mm
Wire conductor protruding length	approx. 0.3 ~ 0.7 mm

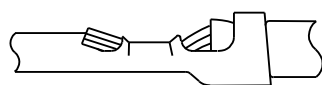
Remarks: As far as crimped contact can be inserted into housing, bending up of contact may be allowed.

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

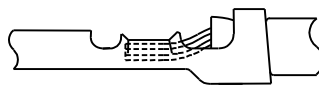


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Examples of defective crimping



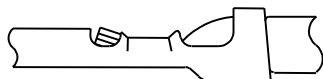
Wire conductor protruding length is long.



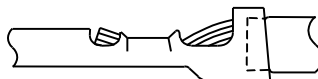
Wire conductor protruding length is short.



Wire conductors comes off.



Wire barrel bites wire insulation.



Wire insulation is not crimped sufficiently.

4-5 Precautions for crimping operation

- ① Conduct crimping operation properly and inspect crimping appearance of crimped product with loupe, etc.
Note: If conductors are not crimped at the center in barrel, contact may twist slightly but it does not affect the performance.
- 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 and the surrounding area occasionally and conduct appropriate crimping.
- ④ 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.

4-6 Precautions for storage and handling of crimped contact

As crimped contact before inserting into housing is subject to deformation, etc. by external forces, pay careful attention to the following 3 points for storage and handling.

- ① 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. 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.

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5. 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.

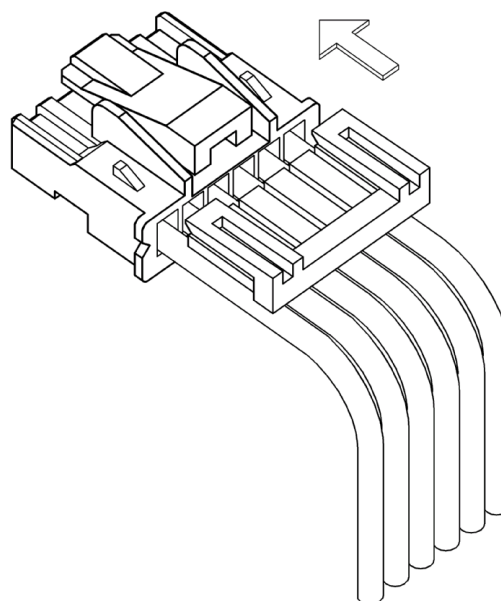
5-1 Inserting crimped contact into housing

- ① Insert crimped contact parallel to housing without prying.
- ② Insert contact into housing without stopping to innermost.
When contact is fully inserted into housing, it clicks and there is feeling of response.
- ③ Check secure locking per each insertion by pulling wire softly 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.)

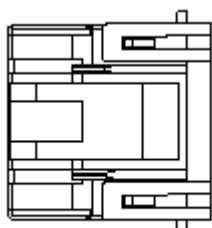
5-2 Insertion of retainer

- ① Insert retainer after all contacts are completely inserted into housing.
As retainer is not the insertion jig to push contact, be sure to insert it after inserting all contacts.
- ② Insertion method
Make comb of retainer face to wire and push it without stopping until it is locked. When locked, click sounds.

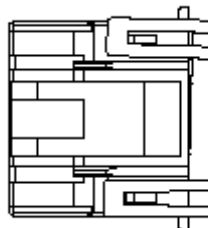
Parallel housing and retainer, then insert retainer pushing the both right and left ends of it without stopping in order to fasten the both locks at the same time.



- ③ Check after inserting retainer
Check visually that both right and left locks of retainer are positively fastened to housing.



Assembly layout (Good)



Only one side is locked. (Defective)

5-3 How to extract crimped contact from housing in case of mis-insertion

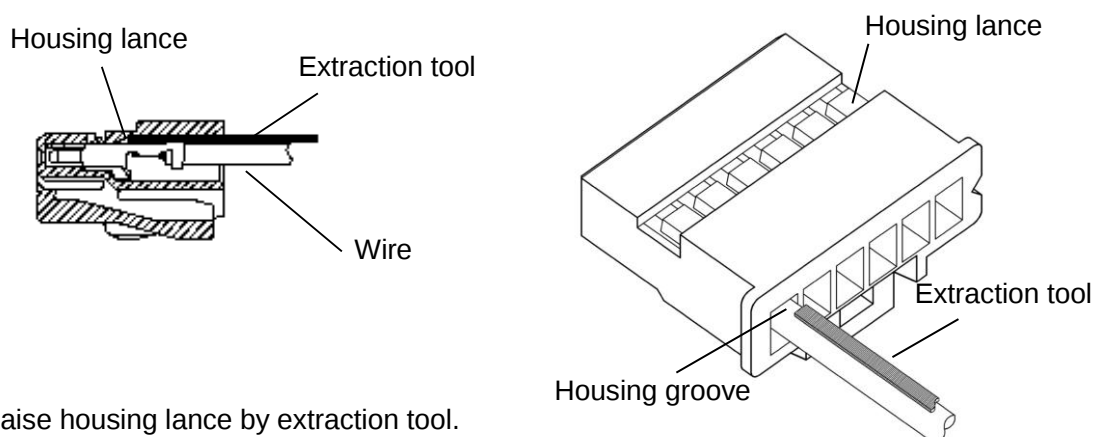
5-3-1 Extraction of contact

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

- ① Do not recycle once used housing and contact but use a new one.
- ② When improperly inserted contact is extracted from housing and the contact is recycled.
 - Only specified person conducts the operation.
 - The recycle should be once. From twice, use a new contact and housing.
 - After modification completes, be sure to check secure locking stated in item 5-1 ③.
When contact comes off housing, use a new housing.

How to extract contact from housing

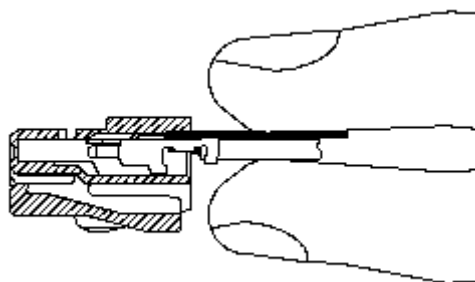
- 1) Insert contact extraction tool, EJ-PH, into groove at housing.



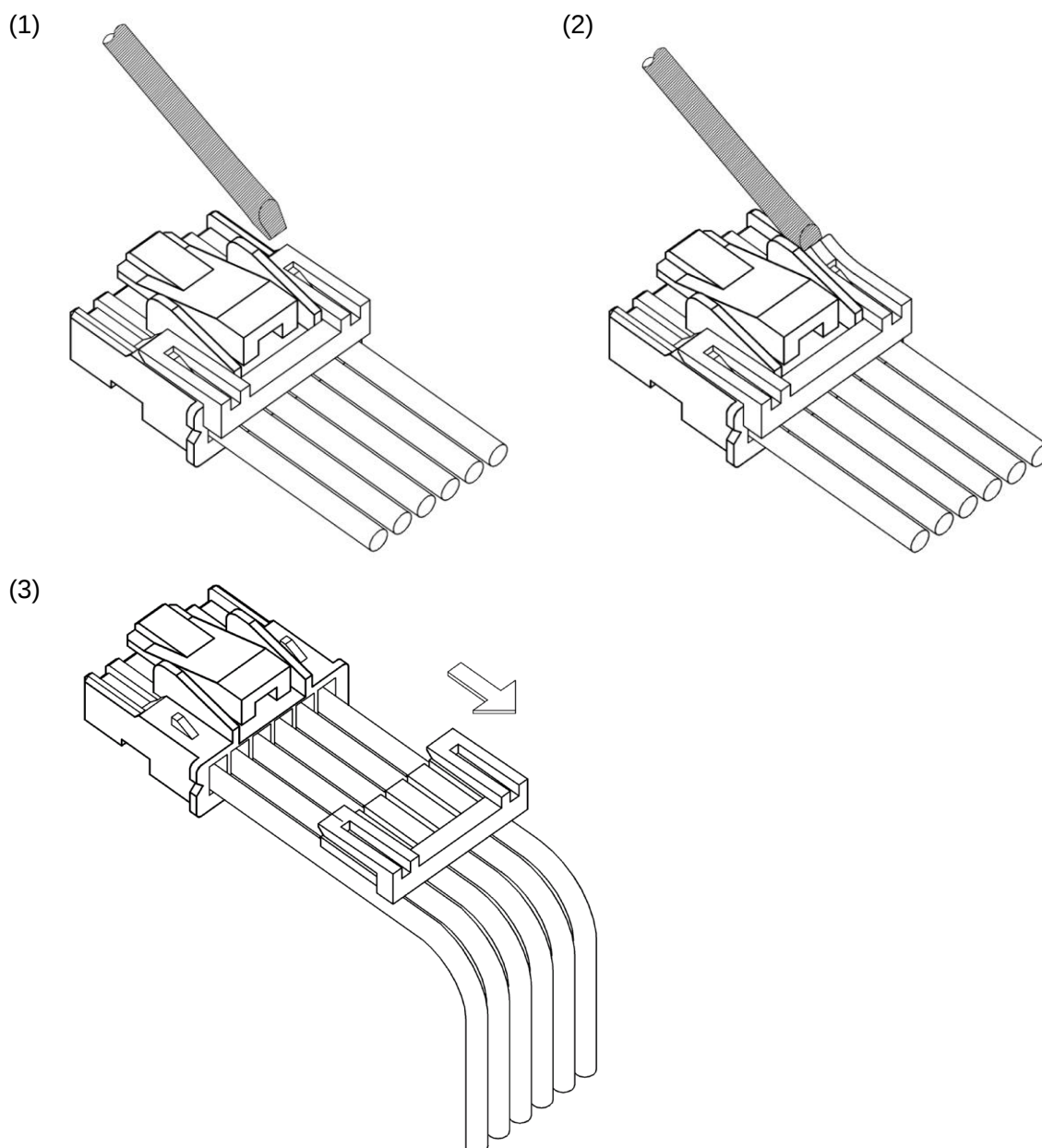
- 2) Raise housing lance by extraction tool.



- 3) In the condition that the housing lance has been raised, pull wire to extract crimped contact from housing.



5-3-2 Extraction of retainer



(1)→(2) Insert the extraction tool almost parallel to housing into one side of retainer lock part and unlock it lifting retainer with extraction tool.
Do not lift retainer over the height of retainer, because excessive lifting may break retainer.

(3) After unlocking, pull the retainer to extract it from the housing.

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6. Mating and Unmating Connector

① Inserting connector

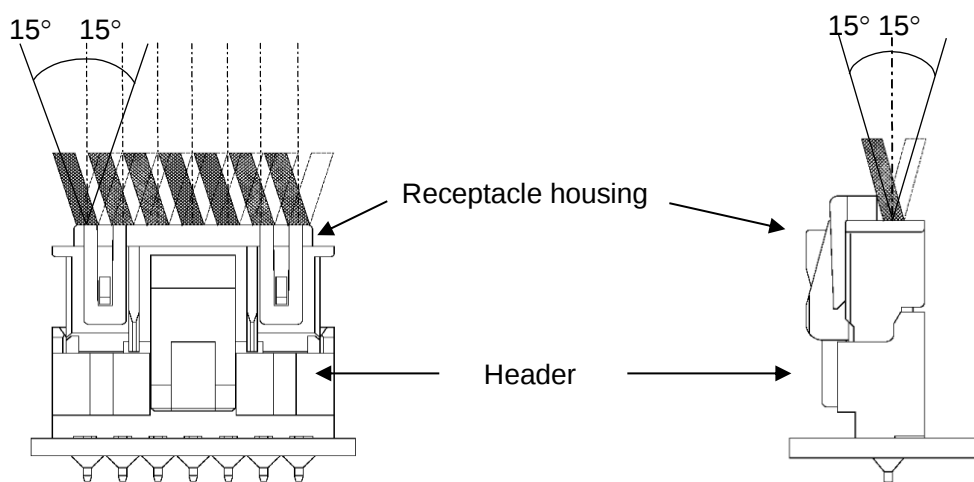
Hold receptacle housing securely and insert it into header straight against to header post until click sounds.

② Unmating connector

Hold wires securely and withdraw receptacle housing on the mating axis.

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 prying withdrawal within 15 degrees against the mating axis.



④ Routing of wire

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.

