

No. CHM-1-2103		Date issued: May 23, 2005
Title of Document: HANDLING MANUAL		Revision No.
Title Subject: XMA Connector (Wire-to-Wire, Hanging Type)		Date revised:
		Issued by: Osaka Engineering Center

This handling manual describes points to check for smooth crimping operation of wire-to-wire XMA connector (hanging type).

## C O N T E N T S

	Page
1. Part Name and Model Number.....	2
2. Applicable Wire .....	2
2-1 Applicable wire .....	2
2-2 Precautions .....	2
3. Crimping Tool.....	2
4. Crimping Operation .....	3
4-1 Wire strip length .....	3
4-2 Crimping.....	3
4-3 Tensile strength at crimped part.....	4
4-4 Crimping appearance.....	5
4-5 Precautions for crimping operation .....	6
4-6 Control of crimping operation.....	6
4-7 Precautions for storage and handling of crimped contact.....	6
5. Harness Assembly Operation.....	7
5-1 Inserting crimped contact into housing.....	7
5-2 Inserting retainer into housing.....	8
6. How to Extract Crimped Contact from Housing in Case of Mis-insertion .....	10
7. Handling Precautions .....	12

Prepared by:  <i>T.Sawano</i>	Checked by:  <i>K.Takematsu</i>	Reviewed by:  <i>K.Ichimi</i>	Approved by:  <i>S.Koyama</i>
-------------------------------------	---------------------------------------	-------------------------------------	-------------------------------------

Title: HANDLING MANUAL XMA Connector (Wire-to-Wire, Hanging Type)	No. CHM-1-2103	Rev. No.
--	-------------------	----------

### 1. Part Name and Model Number

Part name		Model No.	
Pin contact		SXM-001T-P0.6	
Socket contact		SXA-001T-P0.6L	
Receptacle housing	2 ~ 3 circuits	Key pattern 1	XMAR-*VF-1-S
		Key pattern 2	XMAR-*VF-2-R
	4 ~ 6 circuits	Key pattern 2	XMAR-*VF-3-E
		Without key	XMAR-*VF-S
Plug housing	2 ~ 3 circuits	Key pattern 1	XMAP-*V-1-S
		Key pattern 2	XMAP-*V-2-R
	4 ~ 6 circuits	Key pattern 2	XMAP-*V-3-E
		Without key	XMAP-*V-S
Retainer	2 ~ 5 circuits	XMAS-*V-S	
	6 circuits	XMS-*V	

Note 1: Number of circuits in two-digit figure is indicated by asterisk.

### 2. Applicable Wire

#### 2-1 Applicable wire of each contact

Contact	SXM-001T-P0.6	SXA-001T-P0.6L
Wire size	AWG #26 ~ #22	AWG #26 ~ #22
Insulation outer dia. (mm)	φ 1.3 ~ φ 1.9	φ 1.3 ~ φ 1.9
Conductor	Annealed copper stranded tin-plated wire	

#### 2-2 Precautions

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

When using such special wires, contact JST.

### 3. Crimping Tool

Part name	Crimping tool	
	Part name	Model No.
SXM-001T-P0.6	Semi-automatic press	AP-K( )
	Crimping applicator	MKS-L
	Die	MK/SXA/M-001-06
	Applicator and dies set	APLMK SXA/M001-06
SXA-001T-P0.6L	Semi-automatic press	AP-K( )
	Crimping applicator	MKS-L
	Die	MK/SXA-001-06L
	Applicator and dies set	APLMK SXA001-06L

Note 2: The alphabet or figure is indicated in parentheses.

Note 3: When crimping operation is conducted by using other than above applicator and die set, JST cannot guarantee the performance of connector.

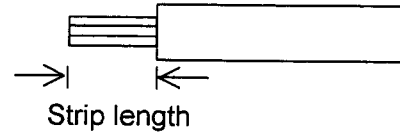
Title: HANDLING MANUAL XMA Connector (Wire-to-Wire, Hanging Type)	No. CHM-1-2103	Rev. No.
--	----------------	----------

## 4. Crimping Operation

### 4-1 Wire strip

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.

Model No. of contact	Strip length (mm) [Ref. value]
SXM-001T-P0.6	2.2
SXA-001T-P0.6L	2.2



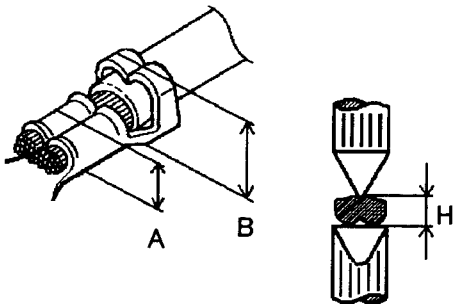
### 4-2 Crimping

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, middle and end of crimping operation.

#### 4-2-1 Crimp height

According to wire to be used, adjust dials of applicator at conductor part and insulation part to a proper crimp height.

#### 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.

#### Table of crimp height

Contact	Wire			Crimp height (mm)	
	Type	Size	Insulation O. D. (mm)	Conductor part	Insulation part
SXM-001T-P0.6	UL1007	AWG #26	1.3	0.65 ± 0.05	1.7
	UL1007	AWG #24	1.5	0.70 ± 0.05	1.8
	UL1007	AWG #22	1.6	0.75 ± 0.05	1.9
SXA-001T-P0.6L	UL1007	AWG #26	1.3	0.55 ~ 0.60	1.7
	UL1007	AWG #24	1.5	0.60 ~ 0.65	1.8
	UL1007	AWG #22	1.6	0.65 ~ 0.70	1.9

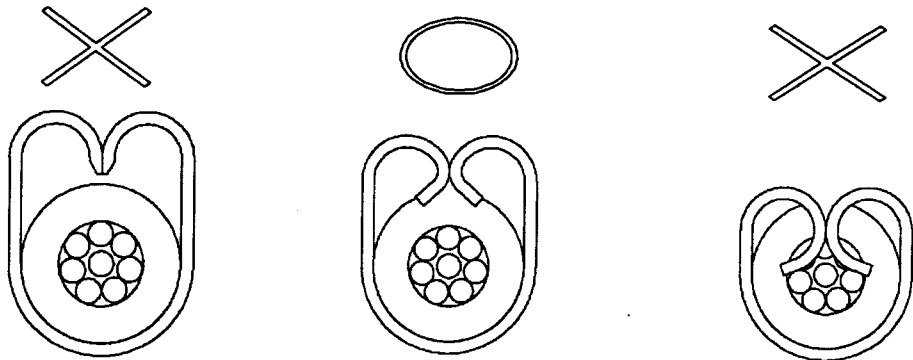
Note: Crimp height at insulation part is a reference value. Be sure to check the crimping condition at insulation part, and conduct operation.

#### 4-2-2 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. (after trouble-shooting, etc.)
- ④ When crimping dies are exchanged.

Title: HANDLING MANUAL XMA Connector (Wire-to-Wire, Hanging Type)	No. CHM-1-2103	Rev. No.
--	----------------	----------

Crimping condition at wire insulation barrel

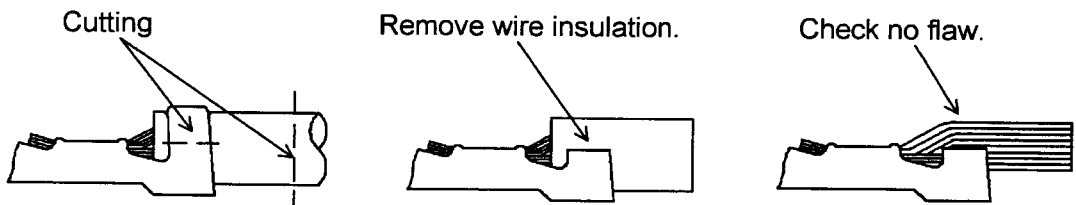


Insufficient crimping  
(pressed weak)  
When tension is applied  
to wire, wire insulation  
easily comes off contact.

Good

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

Check of crimping condition at wire insulation barrel



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.

Table of tensile strength at crimped part

Unit: N

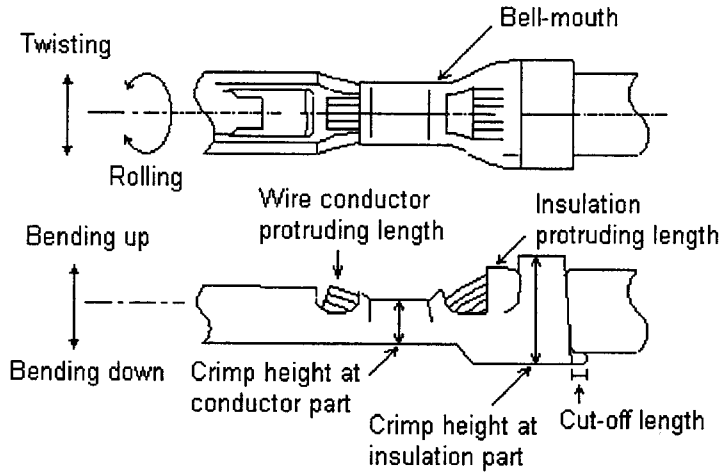
Contact	Wire		Tensile strength (Actual value)	Requirement
	Type	Size		
SXM-001T-P0.6	UL1007	AWG #26	31 ~ 38	15 min.
		AWG #24	56 ~ 64	20 min.
		AWG #22	80 ~ 91	35 min.
SXA-001T-P0.6L	UL1007	AWG #26	33 ~ 46	15 min.
		AWG #24	55 ~ 64	20 min.
		AWG #22	82 ~ 92	35 min.

Title: HANDLING MANUAL XMA Connector (Wire-to-Wire, Hanging Type)	No. CHM-1-2103	Rev. No.
--	----------------	----------

### 4-4 Crimping appearance

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

#### Part name of crimped contact

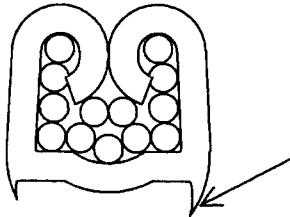


Item	Reference value
Bending up	3° max.
Bending down	3° max.
Twisting	4° max.
Rolling	5° max.
Bell-mouth	Approx. 0.1 ~ 0.3 mm
Cut-off length	Approx. 0 ~ 0.3 mm
Wire conductor protruding length	Approx. 0.3 ~ 0.7 mm
Crimp width at conductor part	Approx. 1.4 mm
Crimp width at wire part	Approx. 1.8 mm

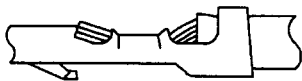
Remark: Mating part and contact lance must be free from deformation.

Note: Note that bending up, bending down, twisting and rolling may cause deterioration of operability of inserting contact into housing, deterioration of contact retention force, and defective mating.

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



#### Examples of defective crimping



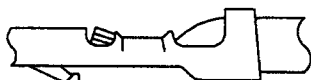
Wire conductor protruding length is long.



Wire conductor protruding length is short.



Wire conductor comes off.



Wire barrel bites wire insulation.



Wire insulation is not crimped sufficiently.

Title: HANDLING MANUAL XMA Connector (Wire-to-Wire, Hanging Type)	No. CHM-1-2103	Rev. No.
--	-------------------	----------

#### 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 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 extracted, they may cause that wire conductors come off or wire barrel bites wire insulation.

#### 4-6 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

#### 4-7 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 100 pcs. max. (Preferable quantity is approx. 50 pcs.) 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.
- ④ When a crimped contact is taken out of bundle, do not pull wire but hold wire near crimped section and take it out.
- ⑤ Do not stain contact with household goods such as oils, detergent, seasoning, fruit juice, etc. If stained, never use stained contact.
- ⑥ Do not use improperly crimped contact and deformed contact.

Title: HANDLING MANUAL XMA Connector (Wire-to-Wire, Hanging Type)	No. CHM-1-2103	Rev. No.
--	----------------	----------

## 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

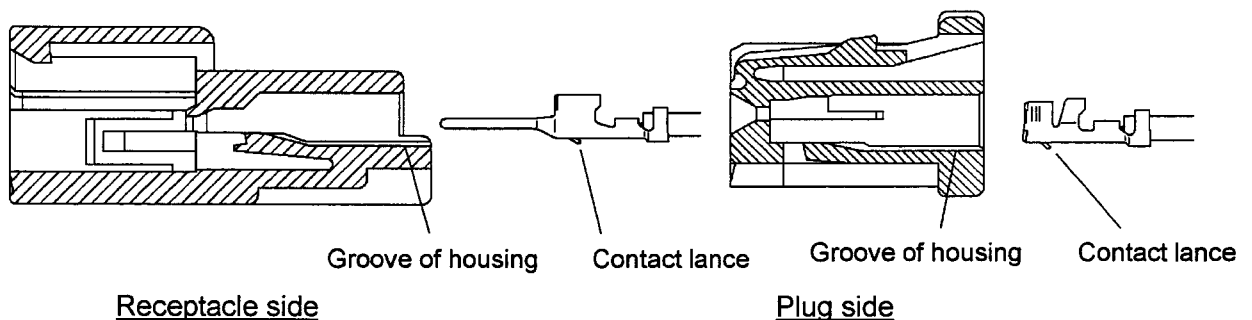
#### 5-1-1 Precautions before inserting crimped contact into housing

Before inserting contact into housing, check below points.

- ① Check that housing is correctly combined with contact.
- ② 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.
- ③ Do not stain contact with household goods such as oils, detergent, seasoning, fruit juice, etc. If stained, never use stained contact.
- ④ Do not use improperly crimped contact and deformed contact such as contact lance and PC board insertion part.

#### 5-1-2 How to insert crimped contact into housing

Insert crimped contact into housing aligning backside (lance side) of contact with groove of housing where circuit number indication is viewed as shown below.



#### 5-1-3 Precautions when inserting crimped contact into housing

- ① Do not apply any pulling force to crimped part. Insert crimped contact parallel to housing without prying.
- ② Insert contact into housing without stopping up to backmost.
- ③ Do not use pin such as insertion jig, etc., because the tip of pin accidentally reach contact mating part and it may cause defective contacting or deformation of contact.
- ④ Retainer is not an insertion jig for contact, so, do not use it to insert contact into housing.
- ⑤ When insertion is difficult, do not insert forcibly. Check insertion direction and confirm that there is no damage or deformation on contact and housing.

#### 5-1-4 Precautions after inserting crimped contact into housing

Do not depend on retainer but 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.)

Title: HANDLING MANUAL XMA Connector (Wire-to-Wire, Hanging Type)	No. CHM-1-2103	Rev. No.
--	----------------	----------

## 5-2 Inserting retainer into housing

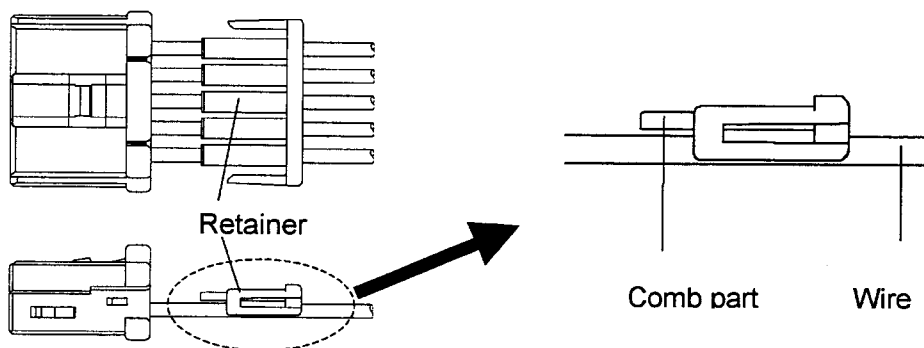
### 5-2-1 Precautions before inserting retainer into housing

Before inserting retainer into housing, check below points.

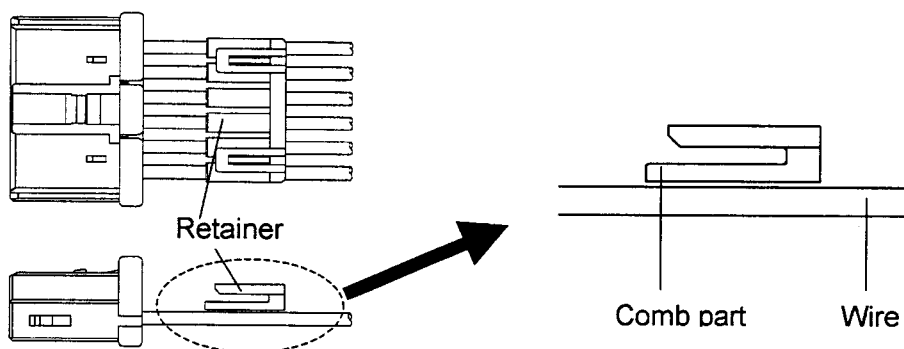
- ① Check that housing is correctly combined with retainer.
- ② Do not place other things on or near working table and do not conduct any other work on same working table to prevent from operation mistake.
- ③ Do not stain contact with household goods such as oils, detergent, seasoning, fruit juice, etc. If stained, never use stained contact.
- ④ After inserting all contacts into housing, insert retainer into it.

### 5-2-2 How to insert retainer into housing

Make comb of retainer face to wire and insert it into housing as shown below.



In case of 2 ~ 5 circuits product



In case of 6 circuits product

### 5-2-3 Precautions when inserting retainer into housing

- ① As retainer is not an insertion jig of contact, be sure to use it after inserting all contacts into housing.
- ② Parallel housing and retainer, then insert retainer pushing the both right and left ends of it without stopping till fastening the both locks at the same time.

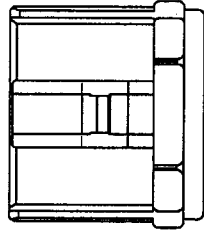


Title: HANDLING MANUAL XMA Connector (Wire-to-Wire, Hanging Type)	No. CHM-1-2103	Rev. No.
--	----------------	----------

### 5-2-4 Check after inserting retainer

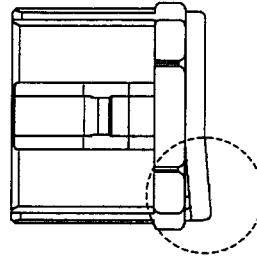
Check visually that retainer is securely locked at both surfaces of housing.

○



Correct assembly layout

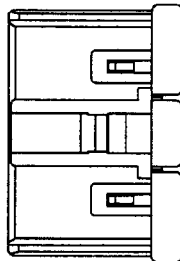
✕



Only one side is locked.  
(In dotted circle)

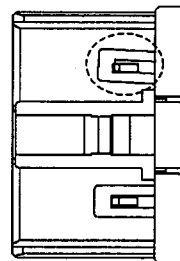
In case of 2 ~ 5 circuits product

○



Correct assembly layout

✕



Only one side is locked.  
(In dotted circle)

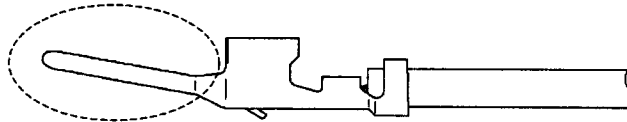
In case of 6 circuits product

Title: HANDLING MANUAL XMA Connector (Wire-to-Wire, Hanging Type)	No. CHM-1-2103	Rev. No.
--	----------------	----------

## 6. How to Extract Crimped Contact from Housing in Case of Mis-insertion

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

- ① Do not reuse the housing after the contact is extracted in principle.  
(Methods of extracting contact and retainer from housing are as below.)
- ② When reuse of contact and housing is unavoidably conducted, keep the following points.
  - (1) Only specified person conducts removing retainer and extracting contact.
  - (2) In case such contact is unavoidably reused, the reuse should be once after checking that the extracted contact is free from deformation.  
From twice, use a new contact. Besides, do not reuse once used housing and retainer.
  - (3) If abnormality such as deformation is found, replace it with a newly crimped contact.

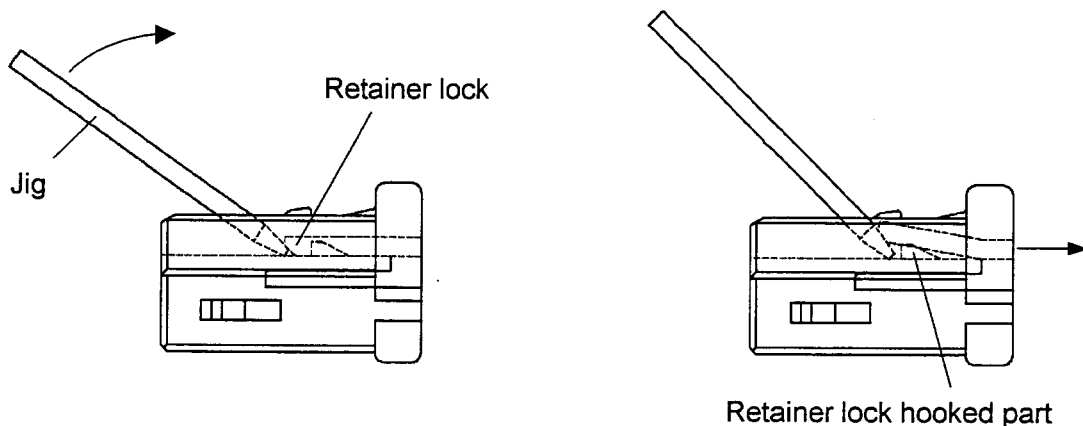


Example: Mating part of pin contact in dotted circle is deformed.  
(Deformation caused by prying when inserting jig.)

- (4) After correction completes, be sure to check secure locking stated in item 5-1.  
When contact comes off housing, use a new housing.

### How to extract retainer

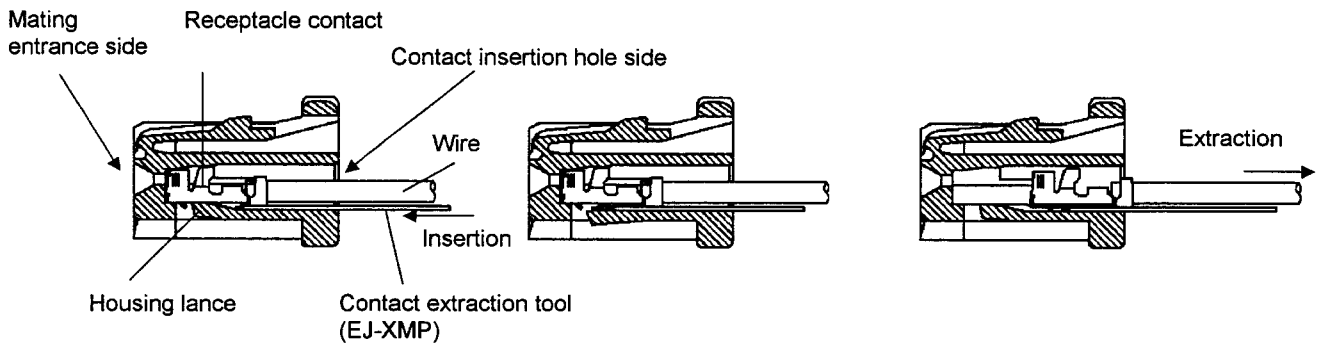
- ① Insert the extraction tool into one side of retainer lock part almost in parallel with housing.
- ② Lift retainer by extraction tool and unlock it.  
At this time, do not lift retainer over the height of retainer lock of housing, because excessive lifting may break retainer.
- ③ After unlocking, pull the retainer to extract from the housing.



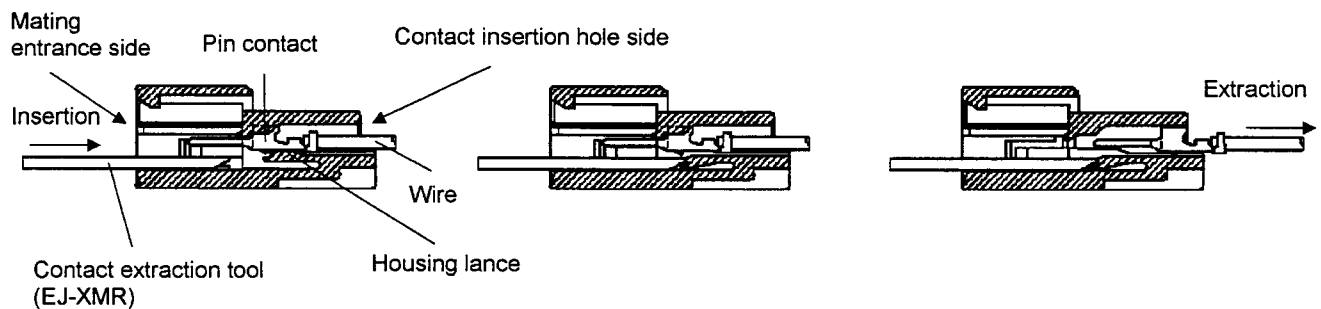
### How to extract contact from housing

- ① Provide contact extraction tool, EJ-XMP for plug and EJ-XMR for receptacle.
- ② Insert EJ-XMP for plug from contact insertion hole side and EJ-XMR for receptacle from mating entrance side parallel between contact lance and housing.
- ③ Insert the tool up to the innermost and press housing lance.
- ④ In the condition that the housing lance has been pressed, pull wire softly and extract contact from housing.  
When contact cannot be extracted even by pulling wire softly, do not pull it forcibly, and try again back to step ①.

Do not conduct operation by using other than JST specified extraction tool, because they may cause deformation of mating part.



### In case of plug



### In case of receptacle

Title: HANDLING MANUAL XMA Connector (Wire-to-Wire, Hanging Type)	No. CHM-1-2103	Rev. No.
--	----------------	----------

## 7. Handling Precautions

- ① 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.
- ② Careful operation is required for storage and transport of housing and harness in a stacking condition to prevent deformation of housing.  
Stacking allowance in storage and transport are up to 5 stacks of carton box for housing, and up to 300 mm stack height with as little load as possible at housing part for harness.
- ③ Do not mate pin and socket contacts without inserting them into housing in order to prevent from deformation of contact part.
- ④ When electrical continuity test for harness is conducted, use counterpart of connector.  
(Example: receptacle side for plug side)  
Never use different type of pin like a tester pin.  
Replace the testing connector periodically for conductivity inspection.
- ⑤ Do not always apply external force to harness other than the tension or load generated in normal wire routing operation.  
Route wire so as not to apply external force to connector except the force, considering an enough length to route and fixing of wire because contacting part or crimped part of contact may be damaged, cause defective contacting.
- ⑥ Inserting connector shall be conducted on the same axis as much as possible.  
Insert connector completely until lock of plug housing and receptacle housing clicks (you feel a click).
- ⑦ When unmating connector, extract connector straight by pressing releasing lever part of the center lock.

