Title of Document:	HANDLING MANUAL	Issue No. CHM-1-038	Rev. 5
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This handling manual describes points to check for smooth crimping operation of contact for HR connector.

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1. Part Name and Model Number

Part name		Model No.
Contact		SHR-001T-P0.6
Housing		HRP-∗∗-S
Header	Top entry type	B∗B-EH-A (LF)(SN)
	Side entry type	S∗B-EH (LF)(SN)

Note$_1$: Number of circuits in two-digit figure is indicated by asterisk.
Note$_2$: (LF)(SN) as identification part number indicating lead-free product shall be displayed on a label.

2. Storage

2-1 Connector storage

Recommended storage condition: Temperature: 5 – 35 ˚C, Relative humidity 60 % or less
(Under packaging like the state of JST shipment)

Keep off direct sunlight, places exposing to such corrosive gas as industrial gas (generate from a stove and whatnot) and ammonia gas (generate from a toilet and whatnot), dusty place and condensation.

Note that the resin molding part may break due to transportation and handling, such as processing and mating, under dry or low temperature condition.

2-2 Storage of the crimped contacts

Not leaving the crimped contact to stand in a place exposed to high humidity and direct sunshine, and not placing them directly on the ground, keep them in a clean storage room,

3. Applicable Wire

UL style	UL1007 (stranded wire)
Conductor size	AWG #26 to AWG #22
Wire insulation outer diameter	ϕ1.3 ~ ϕ1.7 mm

Note$_3$: Wire conductor type shall be annealed copper stranded tin-plated wire.
Special wires such as solid wire, tin-coated wire, shielded wire, etc. other than above wires cannot be used in principle.

4. Crimping Tool

Part name	Model No.
Semi-automatic press	AP-K2( )
Applicator	MKS-L
Die	MK/SHR/MR-001-06
Applicator and die set	APLMK SHR/MR001-06

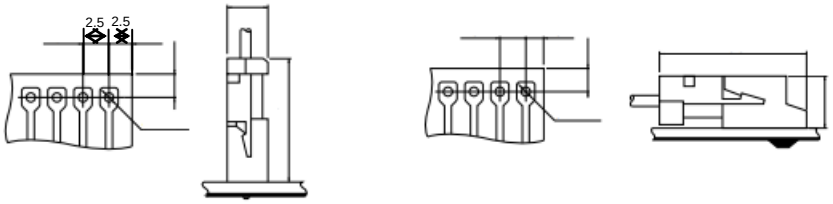
Note$_4$: When crimping operation is conducted by using other than above applicator and die set, JST cannot guarantee the performance of connector.

5. Applicable PC Board

5-1 Applicable PC board thickness

0.8 ~ 1.6 mm

5-2 PC board layout and assembly layout



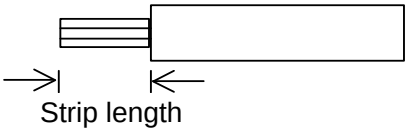
Note$_5$: Tolerances for PC board size are non-cumulative ±0.05 mm for all centers.
Note$_6$: The dimensions above should serve as a guideline for copper coating on one side drilling.
The hole diameters differ according to piercing method (drill hole, punching hole, etc.) and PC board material (paper-based epoxy resin, glass-based epoxy resin, etc.). Depending on the usage, set it.

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: 2.3 mm

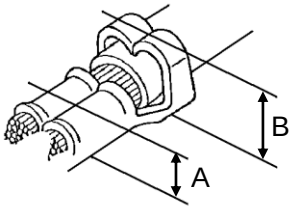


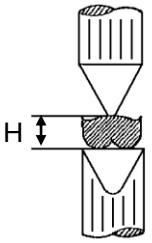
6-2 Crimping

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.

6-2-1 Crimp height

Measurement of crimp height





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

B: Adjust and set crimp height at insulation barrel as per finished outer diameter and kind of wire so that wire insulation does not come off contact easily and is not crimped excessively.

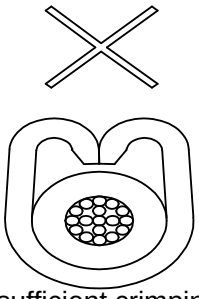
H: Measure crimp height at the center of barrel using specified micrometer.

Table of crimp height

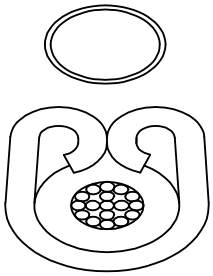
Wire: UL1007		Crimp height (mm)	
Size	Insulation O.D. (mm)	Conductor part	Insulation part
AWG #26	1.3	0.60 ± 0.05	(1.6)
AWG #24	1.5	0.65 ± 0.05	(1.7)
AWG #22	1.6	0.70 ± 0.05	(1.8)

Note$_7$: Crimp height at insulation part is a reference value.

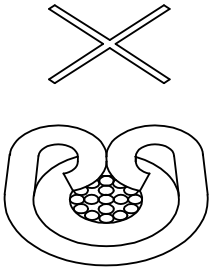
Crimping condition at wire insulation barrel



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



Good

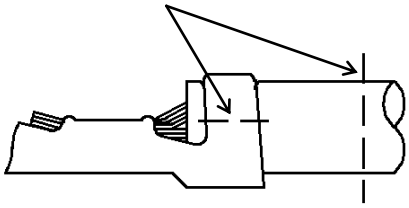


Excessive crimping
(pressed excessively)
Barrel bites wire too much and may damage wire conductors.

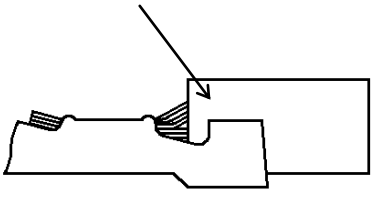
Check of crimping condition at wire insulation barrel

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

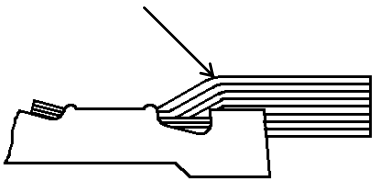
Cut the insulation barrel



Remove the wire insulation



Check no damage



6-2-2 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.

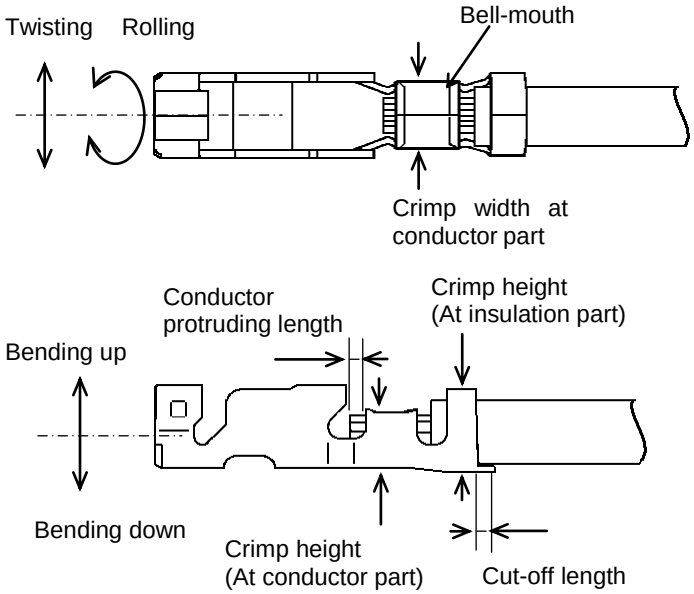
Table of tensile strength at crimped part

Wire size	Requirement (N) min.	Actual value (Ref. value) (N)
AWG #26	20	34.3 to 37.2
AWG #24	30	47.0 to 54.9
AWG #22	50	73.5 to 79.4

6-2-3 Crimping appearance

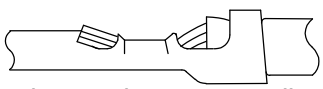
Check crimping appearance visually for correct crimping with equipment such as a loupe.

Part name of crimped contact

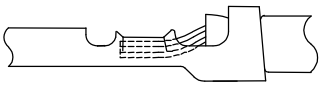


Item	Reference value
Bending up	4° max.
Bending down	4° max.
Twisting	3° max.
Rolling	7° max.
Bell-mouth	0.1 ~ 0.3 mm
Cut-off length	0 ~ 0.3 mm
Wire conductor protruding length	0.3 ~ 0.6 mm
Crimping width at conductor part	Approx.1.4mm

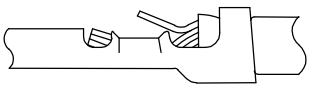
Examples of defective crimping



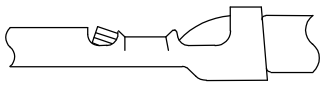
Wire conductor protruding length is long.



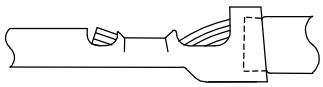
Wire conductor protruding length is short.



Wire conductors comes off.

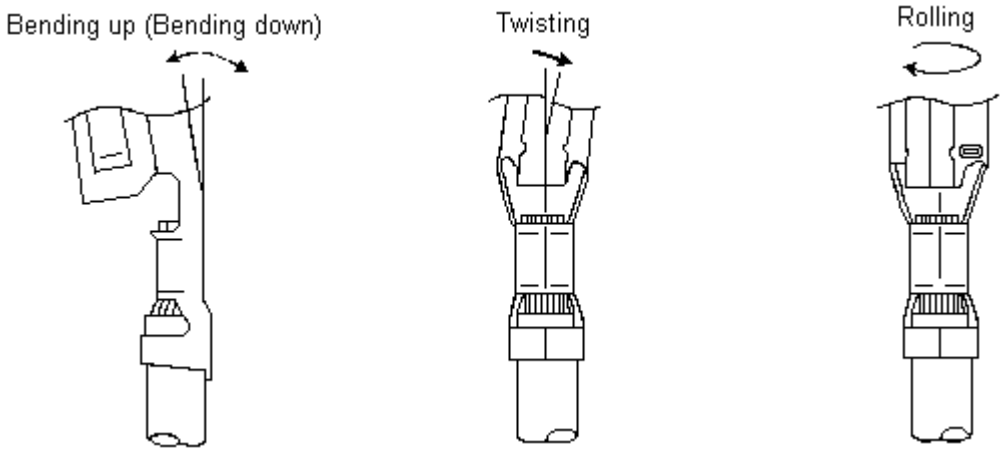


Wire barrel bites wire insulation.



Wire insulation is not crimped sufficiently.

Bending up, bending down, twisting and rolling



※Bending up/down, twisting and rolling

Note that bending up/down, twisting and rolling may lead to deterioration of the contact insertion and the contact retention force as well as poor crimping.

6-3 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 damaged or extracted, they may cause that wire conductors come off or wire barrel bites wire insulation.

6-4 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

6-5 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 paper to prevent from deformation and adhesion of foreign matter, and keep them in an adequate box.

② 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.

7. Harness Assembly Operation

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

7-1 Before inserting the crimped contact into the housing

Before inserting the contact into the housing, check the below points:

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

② Do not use the contact including the lance and the mating part, poorly crimped and deformed.

7-2 Inserting the contact in the housing

① Do not apply any pulling force to crimped part.

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

③ Do not pull wire strongly for checking secure lock after inserting crimped contact into housing. When wire is pulled with too much force, it may cause defective such as correct inserted contact may come off housing or wire breaks.
When checking is conducted, move pinched wire softly by fingers.

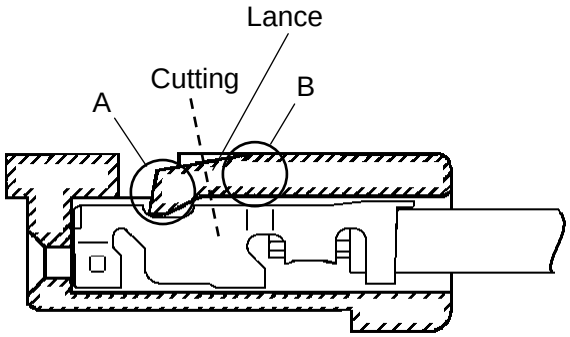
8. How to Extract Crimped Contact from Housing in Case of Mis-insertion

① In extraction of contact, housing lance has to be raised or cut. You can extract contact easily by cutting housing lance rather than raising the lance. Basically, housing damages without exceptions when extracting contact but do not damage contact with care.

② Once used housing cannot be reused, since housing lance is cut or flawed. When mis-inserted contact is corrected, all contacts must be extracted from housing and inserted into new housing.

③ Once used housing with extracted contact cannot satisfy contact retention force specified product specification.

Note$_6$: When raising housing lance by jig, edge of A-part may become chipped or B-part may fatigue. When housing lance is cut, A-part disappears, so housing cannot be reused.



9. Header

① Floating from PC board

The header of HR connector has a mechanism to prevent from coming off PC board when inserting. However, when the header floats by external force or vibration, push the header softly so that the bottom of the header coheres to the surface of PC board, and then, solder it.

② Flux

Use rosin type flux.
As inorganic flux may corrode the wafer, do not use it.

③ Dipping soldering

Conduct soldering operation in a temperature range of 245°C ~ 260°C and within 3 - 5 seconds.

④ Soldering by hand and soldering repair

When soldering by using a soldering iron or soldering repair for bridge are conducted, note the following points, because the header resin may deteriorate due to heating.

Soldering iron:	Use a soldering iron with small heat capacity (40W max.).
Soldering time:	Conduct soldering operation quickly within 3 seconds.
Soldering method:	Do not apply external force by such an operation as pushing the header post with the tip of a soldering iron during soldering operation.

⑤ Cleaning operation

Under normal flux cleaning, the header of HR connector is not subject to cleaning solvent.
However, when polluted cleaning solvent by flux is left in the header, it may cause poor contact and other defect.

10. Handling Precautions

① Do not contaminate the contact with household goods such as oils, detergent, seasoning, fruit juice and insecticide. If contaminated, do not use.

② Do the mating and unmating operation of the harness connector with the counterpart mounted on PC boards on the mating axis with holding the housing,
In case that it is difficult to hold the housing from the connecting and soldering conditions of the connector, Hold all wires at once while supporting the housing by your finger to apply even load to wires.
(Mating and unmating operation with a load applied to some wires may cause breakage on the connector.)