Title of Document:	HANDLING MANUAL	Issue No. CHM-1-171	Rev. 1
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This handling manual describes points to check for smooth crimping operation of the contacts of the BHL connector.

C O N T E N T S

1. Part Name and Model Number

Part name	Model No.
Contact	SBHL-002T-P0.5
Housing	BHLR-02VS
Header	SM02B-BHLS-1 (LF)(SN)

Note$_1$: The identification mark of lead-free, "(LF)(SN)" shall be given as suffix to the model number on the label.

2. Applicable Wire

Contact	SBHL-002T-P0.5
Wire size	AWG #24 ~ AWG #28
Insulation outer dia. (mm)	ϕ0.9 ~ ϕ1.7
Conductor	Annealed copper stranded wires with tin plating

Note$_2$: Special wires such as solid wires, tin-coated wires and other special wires cannot be used in principle.
When you use annealed copper stranded wire with no plating, need the confirmation of the applicability before using.

3. Crimping Tool

Part name	Model No.
	SBHL-002T-P0.5
Dies	MK/SBHL-002-05
Crimping press	AP-K( )
Crimping applicator	MKS-L

Note$_3$: When crimping operation is conducted by using other than the above applicator and die set, JST cannot guarantee the connector performance.

4. Storage

4-1 Storing the connectors

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) and dusty place.
Also, keep the storage room from 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.
After unpacking, return the products in the original package to store.

4-2 Storing the crimped contacts

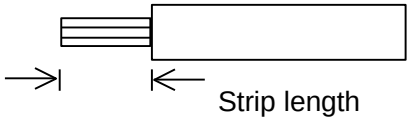
Not leaving the crimped contact to stand in a place exposed to high humidity and direct sunshine, and not placing them directly on the ground. Keep them in a clean storage room.

5. Crimping Operation

5-1 Wire strip length

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

Reference value of wire strip length: 2.2 mm



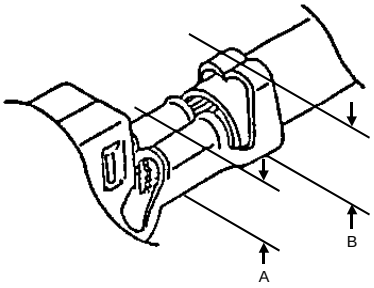
Note$_4$: Do not leave such a stripped wire for a long time not to oxidize the conductor's surface, which may result in the fluctuation of the contact resistance. Complete crimping work soon after stripping.

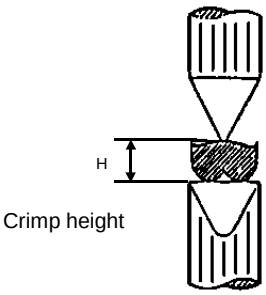
5-2 Crimping

Check the below points for correct crimping at beginning, middle and end of crimping condition.

5-2-1 Crimp height

According to wires to be used, adjust the dials (the conductor part and the insulation part) of the applicator to a proper crimp height.





A: The crimp height at the wire barrel should be set to the pre-determined dimensions.

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

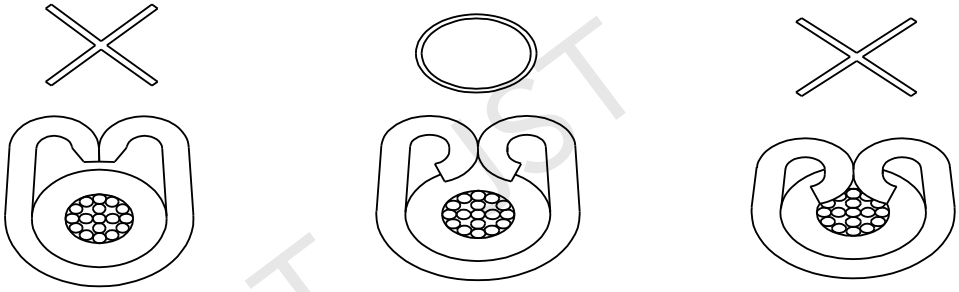
H: Measure the crimp height at the center of the barrel using a micrometer.

Crimp height

SBHL-002T-P0.5		
Wire size	Crimp height (mm)	
	Conductor part	Insulation part (Reference value)
AWG#28	0.57 - 0.62	1.5
AWG#26	0.60 - 0.65	1.7
AWG#24	0.65 - 0.70	1.9

The crimp height at the insulation part is reference values when wires of UL3443 style AWG#28, UL10267 style AWG#26, UL3229 style AWG#24 and UL1007.

5-2-2 Crimping condition at wire insulation barrel



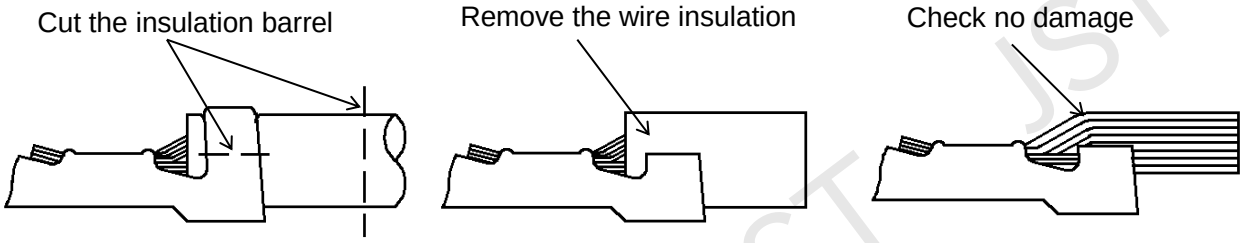
Insufficient crimping
(pressed weak)
When tension is applied to a wire, the wire insulation easily comes off of the contact.

Good

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

5-2-3 Check of crimping condition at the wire insulation barrel

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



5-2-4 Tensile strength at crimped part

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

Table of tensile strength at crimped part

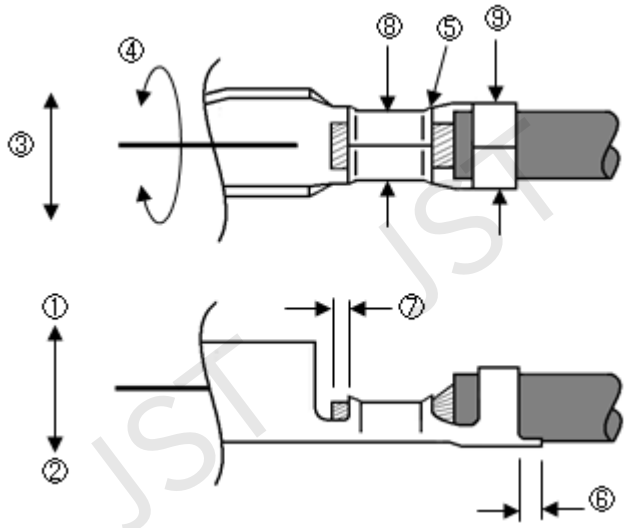
SBHL-002T-P0.5						
Wire size	Req. (N min.)	Actual value (Ref. value) (N)			Crimp height (mm)	
		Ave.	Max.	Min.	Conductor part	Insulation part
AWG#28	10	22.3	23.7	19.0	0.60	1.50
AWG#26	15	33.1	37.4	28.2	0.62	1.82
AWG#24	20	51.9	54.0	48.7	0.67	1.93

Wires: UL10267 AWG#28, UL3670 AWG#26, UL3239 AWG#24

5-2-5 Crimping appearance

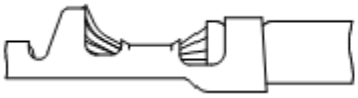
Check the crimping appearance visually for correct crimping with equipment such as a loupe.

Part name of crimped contact

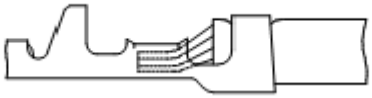


No.	Item	Reference value
①	Bending up	3° max.
②	Bending down	3° max.
③	Twisting	3° max.
④	Rolling	5° max.
⑤	Bell-mouth	0.1 ~ 0.3 mm
⑥	Cut-off length	0 ~ 0.3 mm
⑦	Protruded wire brush length	0.3 ~ 0.7 mm
⑧	Crimp width at conductor part	Approx.1.4 mm
⑨	Crimp width at insulation part	Approx.1.2 mm

Example of defective crimping

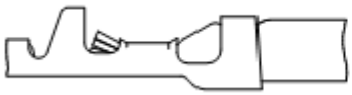


Long protruded wire brush

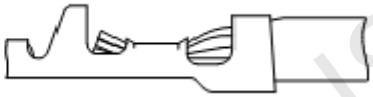


Short protruded wire brush

Stray wire conductor

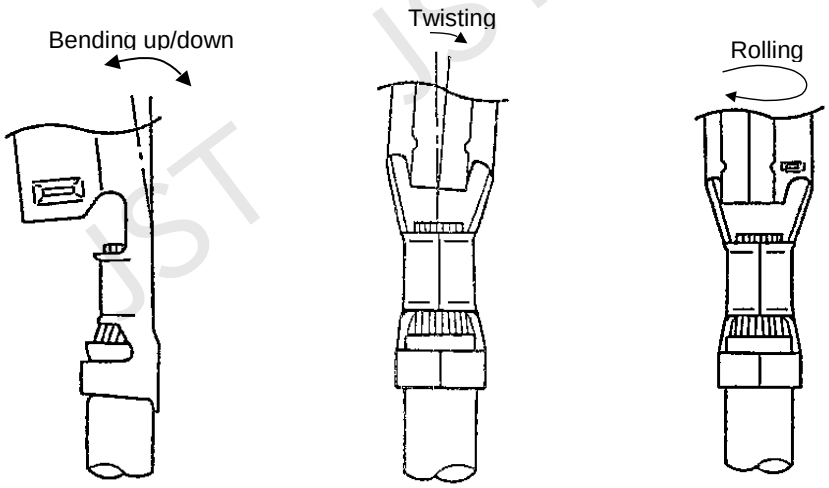


Bitten wire insulation with wire barrel



Poorly crimped wire insulation

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.

5-3 Precautions for crimping operation

① Do crimping operation properly and inspect the crimping appearance of the crimped product with loupe, etc.
Note$_5$: If the conductors are not crimped at the center in barrel, the contact may twist slightly but it does not affect the performance.
② Do not crimp with no contacts and twice, because they may cause an outstanding burr at the crimped part and may lead to the abrasion of the crimping die quickly.
③ As cutting residues (powder) adhered to the crimping die part affects the life of the dies, clean the crimping part occasionally and do crimping properly.
④ The crimping dies are consumables. When chips or excessive roughness are observed on the crimping die, replace it without delay.
⑤ As the abrasion of the crimping die and insufficient adjustment of the applicator may cause defective crimping appearance, do not fail to conduct daily inspection.
⑥ When crimping operation is conducted with the wire-holding spring damaged or extracted, wire conductors may come off or wire barrel may bite the wire insulation.

5-4 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

5-5 Precautions for the handling of the crimped contact

As the crimped contact before inserting into the housing is subject to deformation, etc. by external forces, pay careful attention to the following 5 points for the handling:

① Bundle the crimped contacts and protect their contacts by wrapping with paper to prevent from external damage, deformation and adhesion of foreign matters.

② Do not place the contacts directly on the floor. Store them in a clean room.

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

④ Do not contaminate the contact with household goods such as oils, detergent, seasoning or fruit juice. If contaminated, do not use the contact.

⑤ Do not use the contact poorly crimped or deformed.

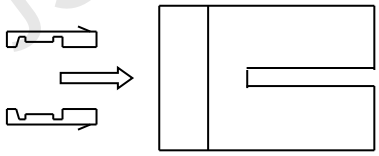
6. Harness Assembly Operation

6-1 Inserting the contact into the housing

① Do not apply any pulling force to the crimped part.

② Insert the contact into the housing in the following direction without stopping to the innermost. (You may feel a sense of fitting when perfect insertion completes.)

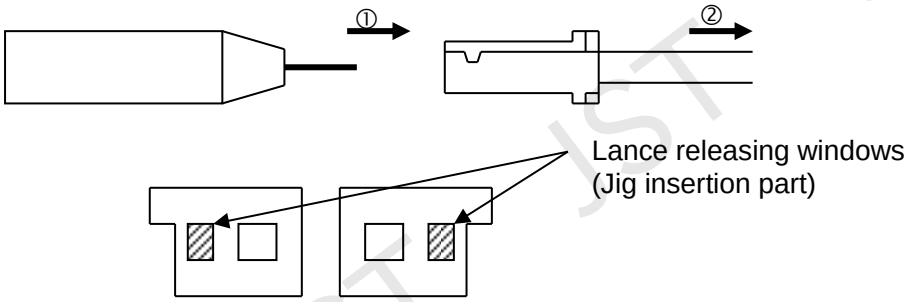
③ Check secure locking per each insertion by pulling the wire softly with force of approx. 5N. (When the wire is pulled with too much force, the contact lance may be deformed and the contact may come off of the housing.)



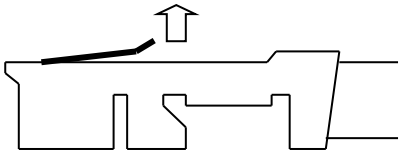
6-2 How to extract the crimped contact from the housing in case of mis-insertion

① Use JST specified jig, EJ-BHS for extracting the contact. Using other than the specified one may deform the mating part.

② Pull the inserted wire out with keeping the jig inserted (unhooking the lance), and extract the contact.



③ Do not reuse the housing from which the contact has been extracted but be sure to replace it with the new one.
Do not use the extracted contact in principal but crimp the new one. When it is inevitable case to reuse it, the number of the reuse shall be only one time and repair the lance to the original position. When the lance is pulled up, the retention force sometimes deteriorate extremely because of metal fatigue at the lance part.



7. Control Points of Crimping Operation and Harness Assembly

The operations of crimping and assembly affect the reliability (defective rate) of the connector.
It is recommended that the operations 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 the contact and the applicator are adequate for wires to be used. ② Check that wires are crimped at the normal position. ③ Check that the crimped configuration is normal and excessive burr does not appear. ④ Check that uncrimped wires are not left behind. ⑤ Check that the contact is not bent, deflected or deformed. ⑥ Check that the contact is free from dirt, scratches, stains or discoloration.
	Tensile strength	① Check that the crimp height and the tensile strength are adequate.
Harness assembly	Appearance	① Check that the contact is properly inserted into the housing. ② Check that the contact is securely locked with the housing. ③ Check that there is no miss-wiring. ④ Check that the housing is free from dirt, scratches, stains or discoloration.
Finished product (Harness)	Appearance	① Follow all descriptions stated above in “Appearance.”
	Continuity	① Check that the harness passes continuity test.

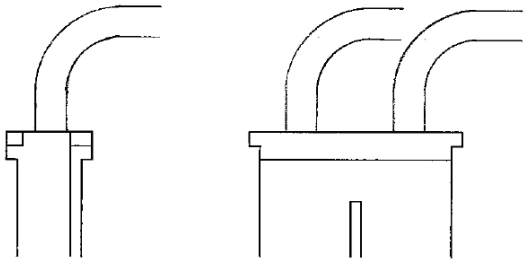
8. Handling Precautions

① Fasten the tip of the remaining chain contacts with a wire, a string, etc. to the reel so as not to unravel, and store it in a carton box.

② Never insert the socket contact in the header without inserting it in the housing, because the contact area may be deformed.

③ Be sure to use JST specified jig (EJ-BHS) for extracting the contact from the housing in such an inevitable case as miss-wiring.

④ Do not always apply external force to the connector assembly other than tension or a load generated in normal wire handling operation.
Handle wires so as not to apply external force to the connector and wires (approx. 30N max.) by giving considering for keeping a distance from the connector and fixing wires because tension applied to the wires damages the contact area and the crimping section, leading to poor contact.



⑤ Insert the connector on the same axis as the mating axis as much as possible. Note that the insertion at an angle by force may damage the housing or deform the post.

⑥ Do not mate the deformed post with the socket, because the housing may be damaged or the contact may be deformed.

⑦ Hold the socket housing firmly and unmate the connector on the same axis (within 20º) against the mating axis as much as possible.