Title of Document: **HANDLING MANUAL**	Issue No. CHM-1-2111	Rev. 6
Customer:	Issue date: January 06, 2004	
Title subject: GH Connector	Revision date: October 25, 2019	

This handling manual describes operation points of crimping and handling of the GH connector contact.
Be sure to read through this manual before handling and crimping; keep it at the place where a person who handle the connector and adjust the tool checks it when required.

C O N T E N T S

1. Part Name and Model Number

Part name		Model No.
Contact	002 type	SSHL-002T-P0.2
Housing		GHR-∗∗V-S

Note$_1$: "∗∗" denotes 2-digit circuit number.
Note$_2$: The 003 type contact (SSHL-003T-P0.2) cannot be used in the GH connector.

2. Applicable Wire

	SSHL-002T-P0.2
Type of contact	002 type
Applicable wire size	AWG #26 ~ #30
Wire insulation outer diameter (mm)	ϕ0.76 ~ϕ1.0 mm
Conductor	Annealed copper stranded wire with tin plating

Note$_3$: Special wires such as bare, solid core, shielding and tin-coated other than the above wires cannot be used in principle.

3. Crimping Tool

Product name		Model No.
Semi-automatic press		AP-K2( )
Crimping applicator		MKS-L-10-3
Die set (002 type)	Dies	MK/SSHL-002-02
	Applicator & dies set	APLMK SSHL002-02

Note$_4$: When crimping operation is conducted by using other than the above applicator and die set, JST cannot guarantee the performance of the connector.
Note$_5$: ( ) denotes an alphabet. (e.g.: AP-K2N)

4. Check Points of Crimping Operation and Harness Assembly

The operations of crimping and assembly affect the reliability of the connector.
It is recommended that crimping and assembly operations and the finished products be 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 crimp height and 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 the housing is free from dirt and foreign matters.
Finished product (Harness)	Appearance	① Follow all descriptions stated above in "Appearance."

The GH connector contact is designed to be thin and compact to meet the demand for narrow pitch and space saving.
It is recommended that microscope or loupe be used at appearance inspection.

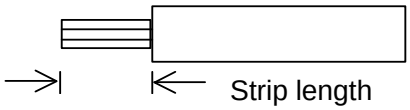
5. Crimping Operation

Before crimping operation, be sure to check that the combination of the contact, wires, and the crimping die is correct.

5-1 Wire strip length

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

Reference value of wire strip length: 1.5 mm



Do not leave such a stripped wire for long time in order to prevent oxidation of the conductor surface, since such oxidation may lead fluctuation of contact resistance.
After stripping, complete crimping operation as soon as possible.

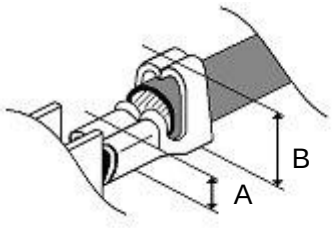
5-2 Crimp height

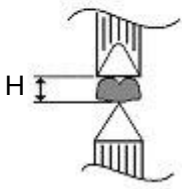
According to wires, adjust the dials of the applicator to a proper crimp height as listed below.

	Wire		Crimp height (mm)		
	Size	Insulation O. D. (mm)	Conductor part		Insulation part (Ref. value)
			Target	Range	
002 type	AWG #26	ϕ1.00	0.54	0.52 ~ 0.56	1.20
	AWG #28	ϕ0.92	0.50	0.48 ~ 0.52	1.18
	AWG #30	ϕ0.84	0.46	0.44 ~ 0.48	1.15

Note$_6$: The crimp height at the insulation part shall be a reference value because it varies, depends on wire insulation O.D. and materials. According to the item 5-2-4, set the appropriate crimp height at the insulation part in crimping.

5-2-1 Measurement of crimp height



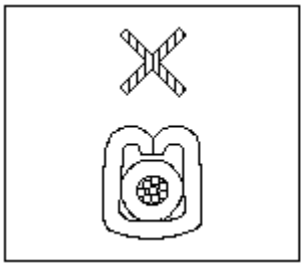


A: The crimp height at the wire barrel should be set to a pre-determined dimensions.
B: Adjust the crimp height at the wire insulation barrel to the extent that the wire insulation is slightly pressed, and set it so that crimping is not excessive.
H: Measure the crimp height at the center of the barrel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

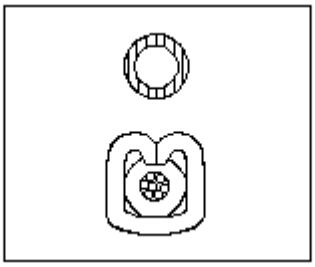
5-2-2 Measurement timing of crimp height

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

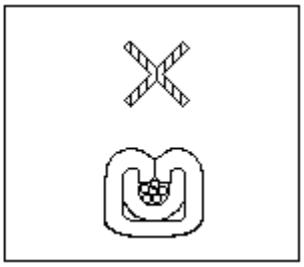
5-2-3 Crimping condition at insulation barrel



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



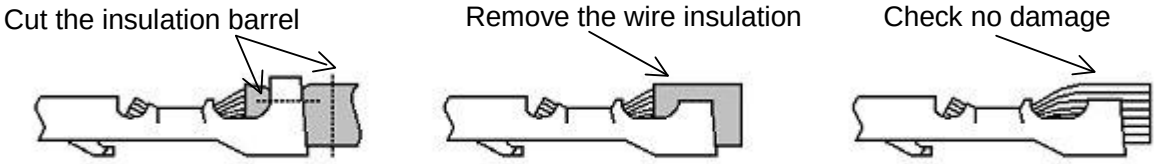
Good



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

5-2-4 Checks of crimping condition at insulation barrel

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



5-3 Tensile strength at crimped part

After adjusting the crimp height, check the tensile strength using 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 tensile strength may be different even in the same wire size due to the difference in wire strength itself.

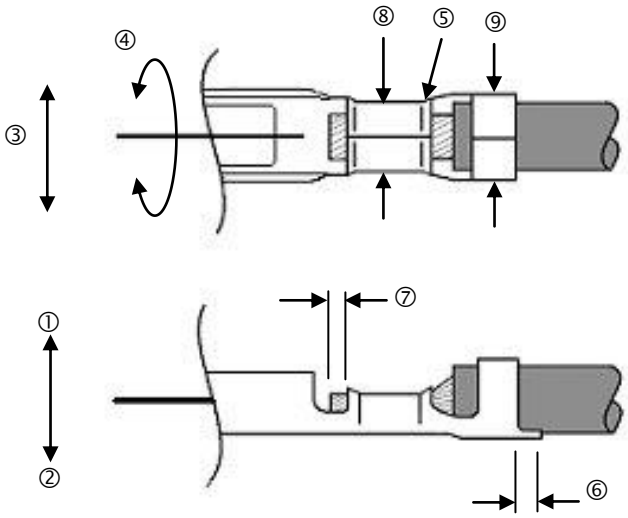
Unit: N

Wire size	Requirement	Actual value
AWG #26	≥20	33 ~ 39
AWG #28	≥10	21 ~ 26
AWG #30	≥5	14 ~ 18

5-4 Crimping appearance

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

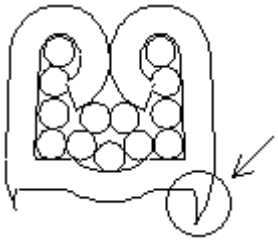
Part name of crimped contact



Check item		Reference value
①	Bending up	≤ 2°
②	Bending down	≤ 3°
③	Twisting	≤ 2°
④	Rolling	≤ 5°
⑤	Bell-mouth	0.05 ~ 0.25 mm
⑥	Cut-off length	0.05 ~ 0.3 mm
⑦	Protruded brush length	0.2 ~ 0.6 mm
⑧	Crimp width at wire conductor part	approx. 0.7 mm
⑨	Crimp width at wire insulation part	≤1 mm

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

5-4-1 There must not be large burr or one-sided burr.



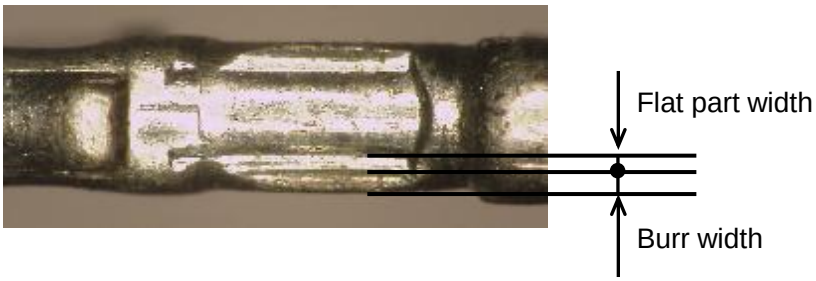
Abrasion of crimping die

It is considered that the abrasion of the crimping die causes burrs. When burrs becomes large, a crack of the crimping die may cause electrical discontinuity. Check the appearance of the crimping part of the contact and replace the die with a new one occasionally in order to prevent electrical discontinuity.

- Replacement timing of crimping die

① The size of a burr exceeds the following condition in the appearance at the underside of wire conductor crimped part.

Appearance at underside of wire conductor crimped part



Replacement timing of crimping die:

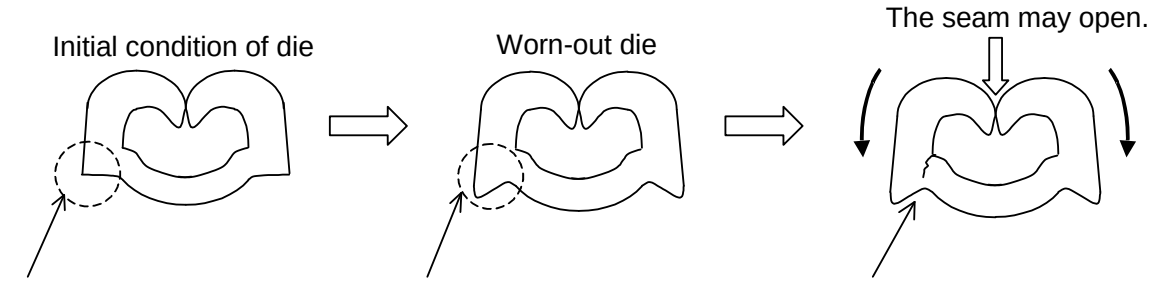
$$\frac{\text{Burr width}}{\text{Flat part width + Burr width}} > \frac{1}{3}$$

② When the crimped contact surface becomes rough.
(The gloss of the contact surface disappears.)

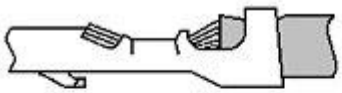
③ When the seam of the crimped part opens. (See figure below.)

Note$_7$: If crimping is conducted beyond the reference timing, a crack may appear on the contact as shown below.

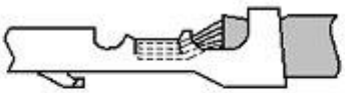
- Mechanism of occurrence of crack (Cross section at wire conductor part)



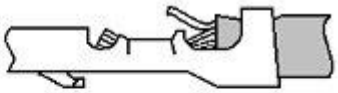
5-4-2 Examples of defective crimping



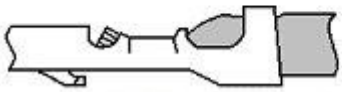
Protruded wire brush length is long.



Protruded wire brush length is short.



Wire conductor comes off.



Wire barrel bites wire insulation.

Wire insulation is not crimped sufficiently.

5-5 Precautions for crimping operation

① Conduct crimping operation properly and inspect the crimping appearance of the crimped product with a microscope or loupe.

② Do not crimp with no contact and twice, because they may cause outstanding burrs at the crimped part and may lead to the abrasion of the crimping die quickly.

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

④ Abrasion of the crimping die and insufficient adjustment of the applicator may cause the poor crimping appearance. Do not fail to conduct daily inspection.

5-6 Precautions for the storage and the handling of the crimped contact

The crimped contact is subject to deformation, etc. by external force before inserting into the housing, pay careful attention to the following 4 points for storage and handling:

① Protect the contacts by wrapping with thick paper to prevent the deformation of the contact surface and adhesion of foreign substances. Keep them in an adequate box.

② Do not place the 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 overstack the crimped contacts or place anything on them, because the weight may cause deformation of the contact and defective continuity.

④ When the crimped contact is taken out of the bundle, do not pull a wire but hold the wire near the crimped section and take it out.

6. 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 harness assembly as well as the said crimping operation.

6-1 Before inserting the crimped contact into the housing

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 mistake.

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

③ Do not use the improperly crimped contact and deformed it.

④ Rough handling of the crimped contacts at bundling may cause the deformation.

⑤ When the bundled harnesses are loosened, do not pull the crimped contacts forcibly even if they get entangled.

⑥ Tie wire harnesses at 30mm or more away from the connector not to apply any tensions to wires of the both ends.

⑦ Do not apply any strong force or shock to the housing during handling the housing in order to prevent damages, such as cracks and deformation of the housing lock part.

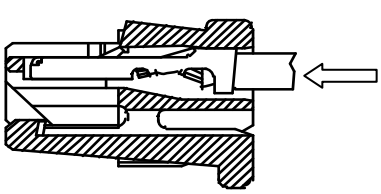
6-2 Inserting the crimped contact into the housing

① Hold the contact with its lance part up, and straightly insert the contact into the housing.
(Do not pry or diagonally insert it.)

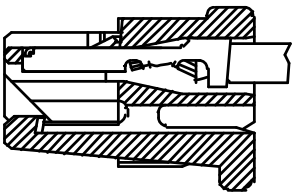
② Insert the contact into the housing without stopping to innermost.
When the contact is fully inserted into the housing, the housing lance clicks and there is a feeling of response.

③ Check secure locking per each insertion by pulling wires so softly that wires are not cut in order to check that the contact does not come off the housing. Besides, check visually that each contact lance is securely engaged with the housing lance as shown below.
Do not pull wires so strongly that the housing is broken and the wires are cut.

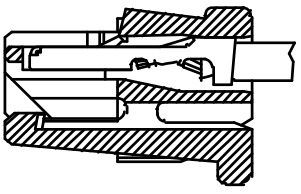
④ In order to prevent from cracks, deformation and fatigue of the housing lock part after the harness assembly, control and handle the harness assembly not to be affected by such a load as strong force, shock or the weight of the bundled harness for a long time.



Inserting method



Good



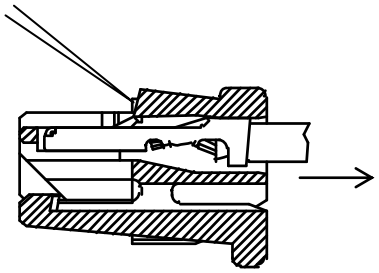
Incomplete insertion

6-3 How to extract the crimped contact from the housing in case of mis-insertion

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

① Raise the housing lance with a sharp-pointed tool like a needle or jig as shown in the figure, and release the lock.
② Pull a wire softly and extract the contact from the housing.

Note$_8$: Do not reuse once used housing, but use a new one.
Do not reuse the extracted contact in principle, but use a new one.
When the extracted contact is reused in some reason, the contact reuse should be once, and check that the extracted contact is free from damages.



7. Inspection of Finished Product (Continuity Check)

7-1 Simple wiring inspection using a tester

- Do not insert a tester stick into the mating part, because the mating part may be deformed.
- Contact a tester stick with the wire insulation side inserting it from the contact entrance of the connector housing, and conduct the inspection.

7-2 Wiring inspection using an inspection jig

- Use the header applicable to the housing for inspection. (Refer to the table below.)
The lock part of the header shall be removed before the use. Do not remove the housing wall of the header. If removed, the contact may be pried easily during inspection, which may result poor contact.
- Use the header free from deformation, damage and stains. When they are found, replace with a new one at once. Periodical replacement of the header should be conducted as well.
- Mate and unmated the connector with care, holding the housing without prying.
When an inspection board is used, consider that mating and unmuting works are not difficult to conduct.

Contact to be used	Housing to be used	Applicable header
SSHL-002T-P0.2	GHR-**V-S	SM**B-GHS (LF)(SN) BM**B-GHS (LF)(SN)

Note$_9$: 2-digit figure in " ** " denotes the circuit number.

8. Handling of Connector

① Handle the wires with care no to apply tension due to wire bending to the connector.

② Insert the socket connector into the header on the mating axis as straightly as possible.
At this time, do not diagonally insert the socket, because such a handling may damage the housing or deform the header contact.

③ Do not mate the socket with the deformed header, because the housing may be damaged or the contact may be deformed.

④ In unmating the connector, release the lock with holding all wires together and withdraw the connector within 20 degrees on the mating axis as straightly as possible.

⑤ When all wires are held together in mating and unmating the connector, do not collect the wires at the center from the pitch (lateral) direction but hold them at the top and the bottom as below.
(The connector may be deformed and broken like a sector.)

×

Do not collect the wires at the center from the pitch (lateral) direction.

○

Hold the wires at the top and the bottom.