| Title of Document: | HANDLING MANUAL | Issue No. CHM-1-2569 | Rev. 2 |
|---|---|---|---|
| Customer: | GENERAK | Issue date: November 19, 2015 | |
| Title subject: | ASU Connector (Cable Side Connector) | Revision date: December 12, 2022 | |

This manual describes important and required points of assembling and handling the ASU connector cable side. Be sure to read this manual thoroughly before using this connector.

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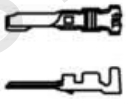
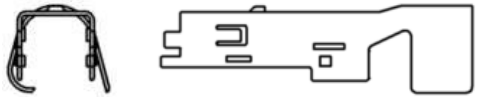
1. Part Name and Model Number

Connector component

| Part name | Model number | Part figure |
|---|---|---|
| Contact | SASU-002GD-P0.15 |  |
| Shell | ASU-PS4-3RPT-1 |  |
| Cover shell | ASU-PCS4-3RPT |  |
| Inside housing | ASU-PHN4-K |  |
| Outside housing | ASU-PHG4-K |  |
| Retainer | ASU-PRT-H |  |

2. Storage

2-1 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.

2-2 Storing the processed connectors

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

| Item | | | Specification |
|---|---|---|---|
| Applicable wire (Note$_1$ | Signal/Power source wire | Conductor size | AWG#26 - AWG#28 |
| | | Insulation O.D. | $\phi$0.8mm - $\phi$1mm |
| | Sheath O.D. | | $\phi$4mm |

Note$_1$: The conductor specification of the signal wire and power source wire shall be annealed stranded wires with tin plating.
The applicable wires need to be evaluated separately.

Details of the evaluated wire specification

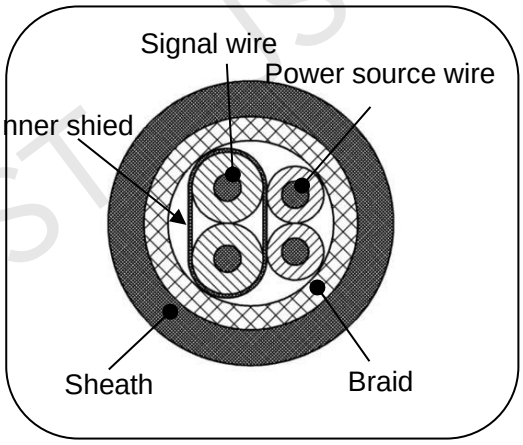
Wire part structure

| Item | | Signal wire | Power source wire |
|---|---|---|---|
| Core conductor | Material | Annealed copper stranded wire with tin plating | Annealed copper stranded wire with tin plating |
| | Composition | 7/0.127 mm | 7/0.127 mm |
| | O.D. | 0.38 mm | 0.38 mm |
| Insulation | Material | Polyethylene | Polyethylene |
| | Thickness | 0.31 mm | 0.21 mm |
| | O.D. | 1.0 mm | 0.8 mm |

Other structures except wire part

| Item | | Other than wire part |
|---|---|---|
| Inside shield | Material | Aluminum foil polyester tape |
| | O.D. | 2.1 mm |
| Braid | Material | Annealed copper stranded wire with tin plating |
| | Wire dia. | 0.08 mm |
| Sheath | Material | Flame-retardant halogen-free resin |
| | Thickness | 0.5 mm |
| | O.D. | 4.0±0.3 mm |

Note$_2$: Other wires are necessary to be evaluated separately.




4. Crimping Tool and Processing Tool

| Processing process | Model numbers of crimping tool and processing tool | | | |
|---|---|---|---|---|
| Crimping the contact | Press | Applicator | Dies | Applicator with dies |
| | AP-K2( ) | MKS-L | MK/SASU-002-015 | APLMK SASU-002-015 |
| Inserting the contact | IT-CN-ASU | | | |
| Inserting the shell | H3-SIT-ASU | | | |
| Squeezing the shell | Hand press | | Applicator | |
| | HPD-M2A | | H2-CP-ASU | |
| Inserting the cover shell | H3-CVIT-ASU | | | |
| Inserting the retainer | IT-RET-ASU | | | |

Note$_3$: When contact crimping operation and shell squeezing operation are conducted by using other than the above crimping tool and processing one, JST cannot guarantee the performance of the connector.

5. Harness Processing

5-1 Before harness processing

Harness processing is a very important process to decide the connector performance and the harness quality. Do the processing, paying attention to the following points.
Unless the following points are obeyed, physically injury, poor processing or breakdown of facilities may be caused.

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 Never use the cable whose end processing is bad nor use the parts deformed and broken.

④ Clean the working area periodically because wire cutting residues scatter.

⑤ Take care of your bodies, such as hand not to damage in cutting wires, shell and cover shell.

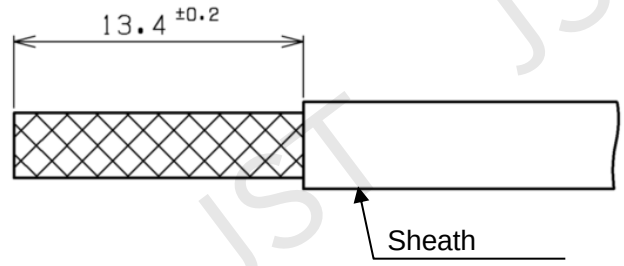
5-2 Outline of harness processing

| Processing flow | Operations |
|---|---|
| 1.Cable end processing | - Strip the sheath.<br>- Fold and cut the braid.<br>- Wrap a copper foil tape.<br>- Strip the inner shield.<br>- Strip the cable. |
| 2.Crimping the contact | Crimp the contact with wire conductors with the specified applicator. |
| 3.Inserting the contact | - Insert the crimped contact in the inside housing.<br>- Insert the contact up to the insertion end position by the specified jig with secure. |
| 4.Inserting the shell | - Remove the shell from the reel.<br>- Pre-insert the shell.<br>- Set the shell to the specified jig and insert it. |
| 5.Squeezing the shell | Set the shell to the specified jig and squeeze it. |
| 6.Inserting the cover shell | - Remove the cover shell from the reel.<br>- Pre-insert the cover shell.<br>- Set the cover shell to the specified jig and insert it. |
| 7.Inserting the outside housing | Insert the outside housing. |
| 8.Inserting the retainer | - Pre-insert the retainer.<br>- Insert the retainer by the specified jig. |

5-3 Harness processing process

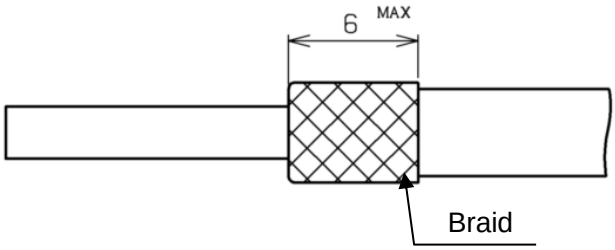
5-3-1 Cable end processing

① Strip a sheath not to damage the braid.

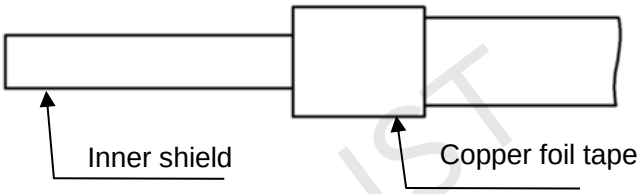



In case of too long/short strip length, the shell cannot be squeezed at the proper position, which may deteriorate the mechanical and electrical performance.

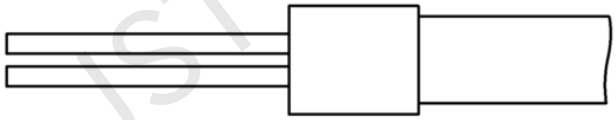
② Fold and cut the braid.
The length from the folding part of the braid to the cutting position is maximum 6.



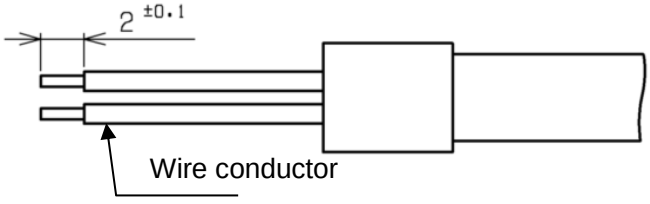

③ Wrap the copper foil tape along the folding position of the braid.
The tape width shall be 6 mm which is the length to cover the braid one and a half round.
The cutting braid shall not protrude from the copper foil tape.




④ Strip the inner shield.
Do not damage the conductor in stripping.

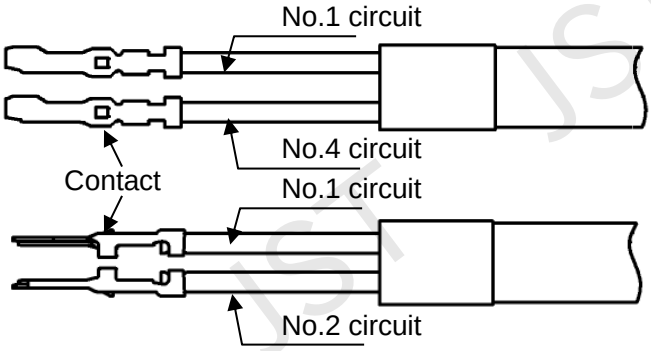


⑤ Strip 4 pieces of wire conductors.
Do not damage the core conductor in stripping.



5-3-2 Crimping the contact (by using the specified applicator)

Crimp the contact with the cable conductor part with the specified applicator.




After crimping the contact, as was shown in the above figure, set the crimping direction of the contact so that the No.1 circuit contact and the No.4 circuit one turns to the same direction, and the No.1 circuit one and the No.2 circuit one face each other. That makes working property better when inserting the contact in item 5-3-3.

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

As the gold-plated contact tends to cause more troubles such as biting into the face of the crimper dies rather than the tin-plated contact, lubricate JST specified oil to the contact as shown below in crimping. (Oil: Nihon Kohsakuyu Co., Ltd.-made blanking oil, G6316)
In lubricating oil, use a JST-specified lubricator and coat oil throughout the barrel bottom surface and the carrier of the contact. At this time, be careful not to loose the coating brush of the lubricator which coats oil, because coating becomes insufficient.
Moreover, in case that an interval is made due to pause until crimping after oil lubrication, lubricate oil before crimping.

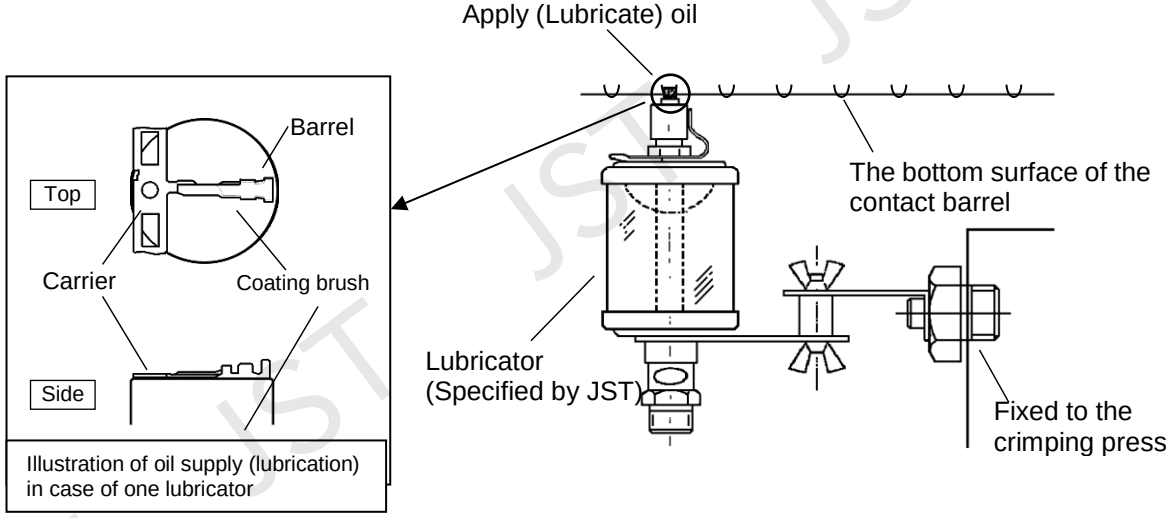
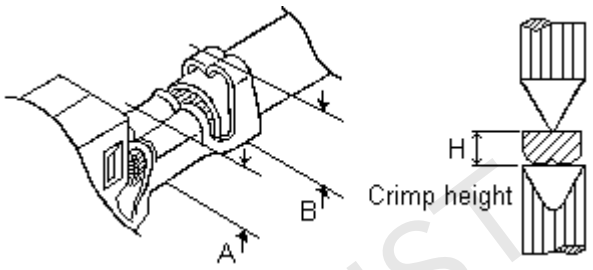



Illustration of oil supply (lubrication) in case of one lubricator

In case that it is difficult to supply (lubricate) oil as shown above because of the connector size, as we can provide the lubricator for large size connector, contact JST.

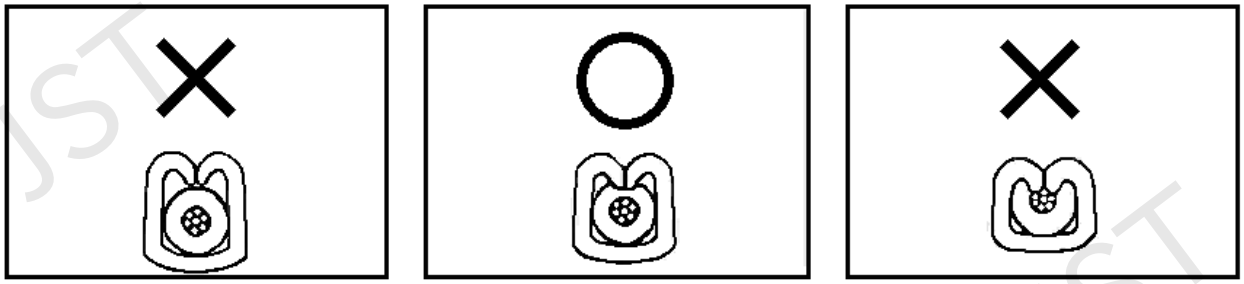
Measurement of crimp height

According to wires, 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 wire insulation barrel as per finished outer diameter and kind of wires so that the wire insulation does not come off of the contact easily and is not crimped excessively.
H: Measure the crimp height at the center of the barrel using a micrometer.

Crimping condition at insulation barrel



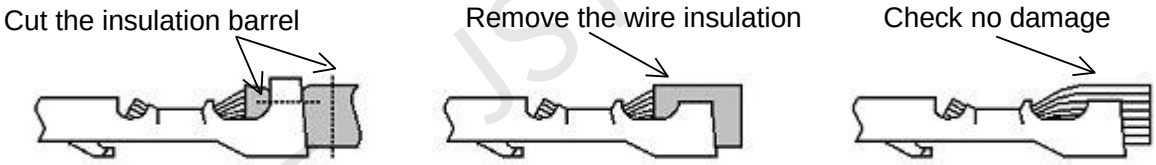
Insufficient crimping (pressed weak)
When tension is applied to a wire, the wire insulation easily comes off the contact.

Good

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

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.



Crimp height table:

| SASU-002GD-P0.15 | | | |
|---|---|---|---|
| Wire size | Insulation O.D. (mm) | Crimp height (Note$_4$) | |
| | | Conductor part | Insulation part (Ref. value) (Note$_5$) |
| AWG#28 | 1.0 (Signal wire)<br>0.8 (Power source wire) | 0.57 - 0.62 | 1.2 |

Note$_4$: Other than the applicable wires are necessary to be evaluate separately. Depending on the evaluation results, the crimp height may be changed.

Note$_5$: The crimp height at the insulation part is a reference. Be sure to check the crimping condition of the insulation part before crimping.

Crimp tensile strength

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.

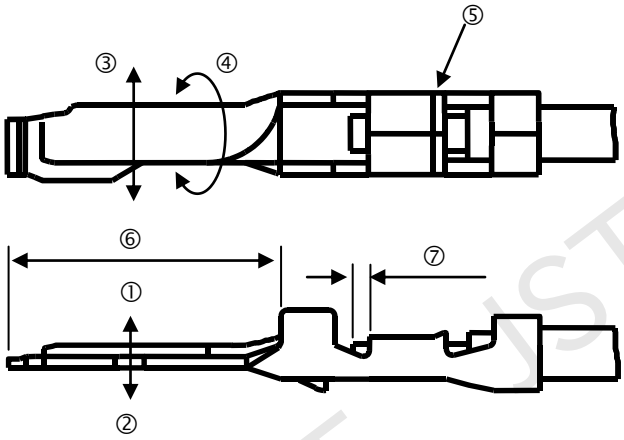
Crimp tensile strength:

| SASU-002GD-P0.15 | | |
|---|---|---|
| Wire size | Measured value | Requirement |
| AWG#28 | 15.1 - 22.0N | 10N min. |

Crimping appearance

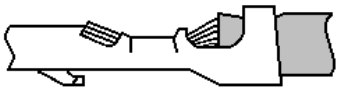
Check the crimping appearance visually for correct crimping with equipment such as a loupe.

Part name of crimped contact

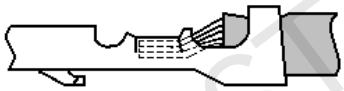



| Check item | | Reference value |
|---|---|---|
| ① | Bending up | 3° max. |
| ② | Bending down | 3° max. |
| ③ | Twisting | 3° max. |
| ④ | Rolling | 5° max. |
| ⑤ | Bell-mouth | 0.1 – 0.3 mm |
| ⑥ | Cut-off length | 4.3 – 4.5 mm |
| ⑦ | Protruded wire brush length | 0.2 - 0.5 mm |

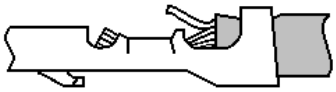
Examples of defective crimping



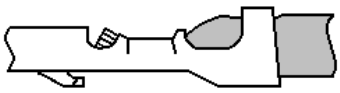
Protruded wire brush length is long.



Protruded wire brush length is short.



Stray wire conductor

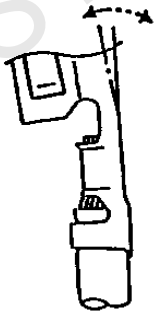


Wire barrel bites wire insulation.

Wire insulation is not crimped sufficiently.

Bending up (down), twisting and rolling

Bending up (down)



Twisting

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.

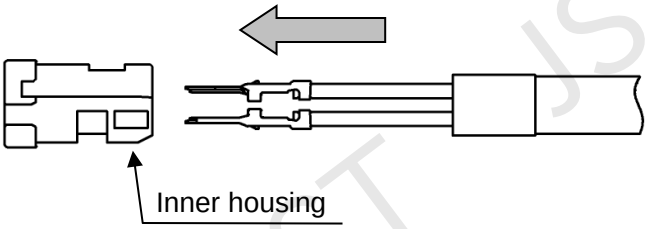
Precautions for handling the crimped contact

As the crimped contact before inserting into the housing is subject to deformation, etc. by external forces, pay careful attention to the following 2 points for the handling:

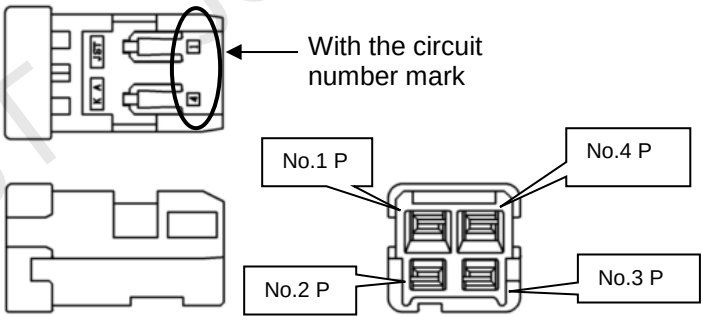
① Protect their contacts by wrapping with paper and the like to prevent from deformation and adhesion of foreign matters.
② Do not stack too much quantity of the crimped contacts nor place anything on them, because the weight of themselves may cause the deformation of the contact and troubles such as defective contacting and other defects.

5-3-3 Inserting the contact (by using the specified jig)

① Insert the crimped contacts (4 pcs.) in the inner housing by hand.
The contacts shall be inserted in the proper circuit numbers.

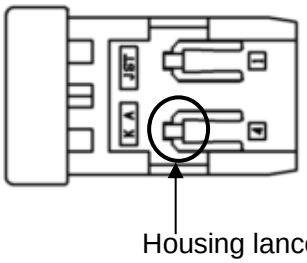


Inner housing




Inner housing circuit number

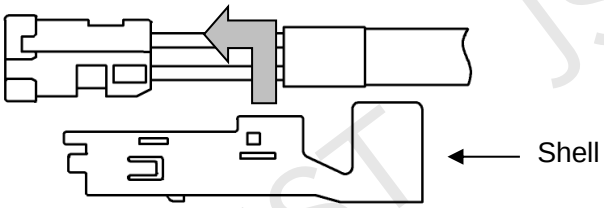
② Insert the contacts up to the insertion end position by the contact inserting jig.
The contacts shall be engaged with the housing lance parts.



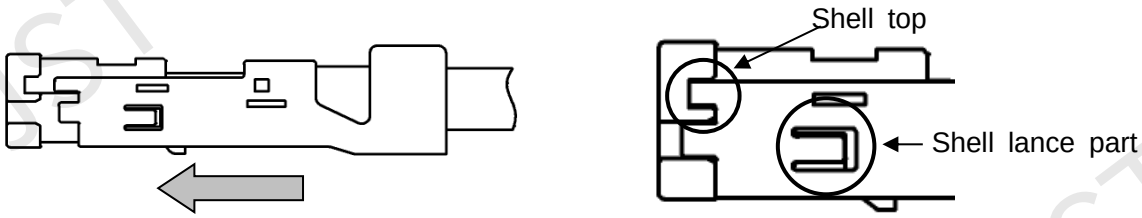
Housing lance part

5-3-4 Inserting the shell (by using the specified jig)

① Remove the shell from the reel by hand.
② Pre-insert the shell by hand.

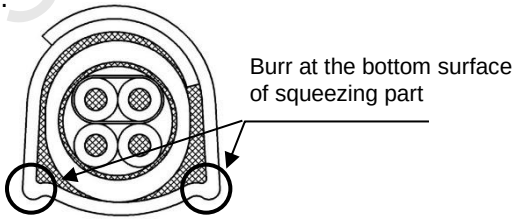


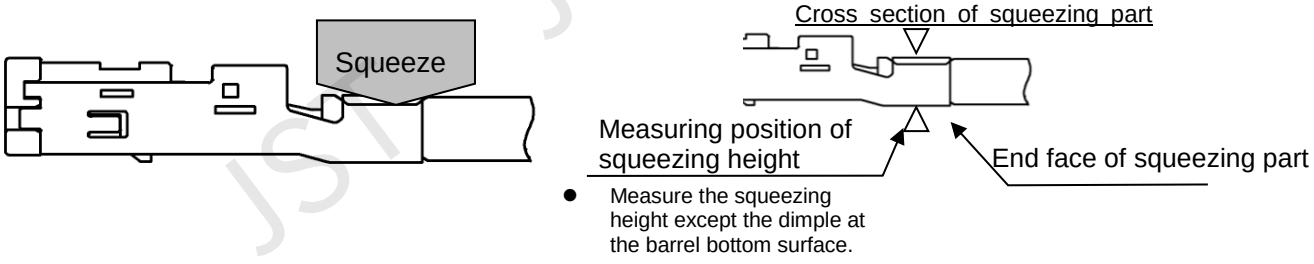

③ Insert the shell by the shell inserting jig.
- The inner housing shall be engaged with the shell lance part.
-The shell top shall be inserted in the inner housing hole.




5-3-5 Squeezing the shell (by using the specified jig)

① Set the shell to the shell squeezing jig and lower the lever to the bottom dead center. Then, squeeze the shell.
- The copper foil tape and the braid shall not protrude from the end face of the squeezing part.
- Burrs at the bottom surface of the squeezing part shall be free from cracks.
- Check the squeezing height.
- Measure it except the dimple at the barrel bottom surface.




According to wires, adjust the dials of the squeezing jig and set a proper squeezing height. After adjusting the height, make sure of the tensile strength using the trial samples.

Squeezing height table

| Insulation O.D | Squeezing height (mm)* |
|---|---|
| 4.0 | 4.8±0.05 |

Squeezing part tensile strength

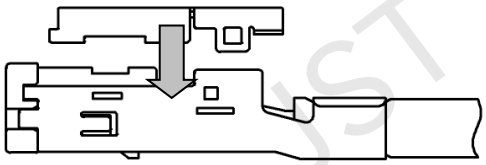
| Insulation O.D. | Measured value | Requirement |
|---|---|---|
| 4.0 | 110 - 123N | 98N min. |

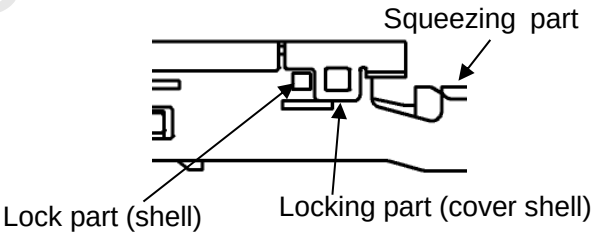
Note$_6$: Other than the applicable wires are necessary to be evaluated separately. Depending on the evaluation results, the crimp height may be changed.

5-3-6 Inserting the cover shell (by using the specified jig)

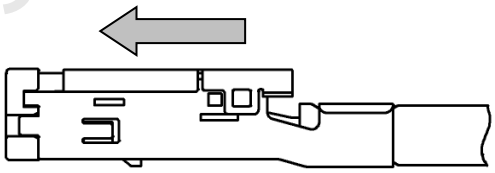
① Remove the cover shell from the reel by hand.

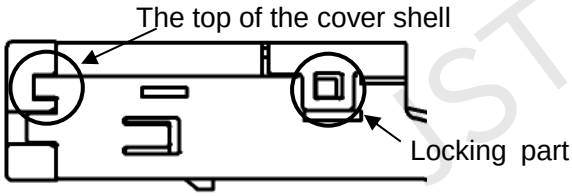
② Pre-insert the cover shell by hand.
The locking part (cover shell) shall be engaged at the squeezing part side from the lock part (shell).





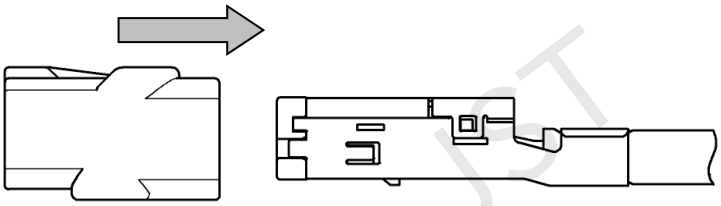

③ Insert the cover shell by using the cover shell inserting jig.
The locking part (cover shell) shall be engaged with the lock part (shell).
The top of the cover shell shall be inserted in the inner housing hole and it shall be inside the shell.

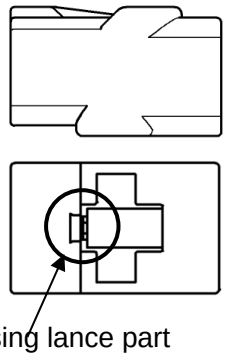





5-3-7 Inserting the outside housing

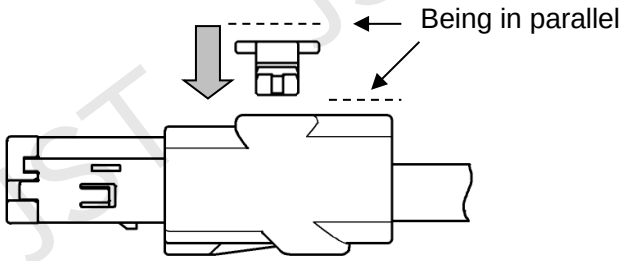
① Insert the outside housing.
The housing lance part shall be engaged with the cover shell.



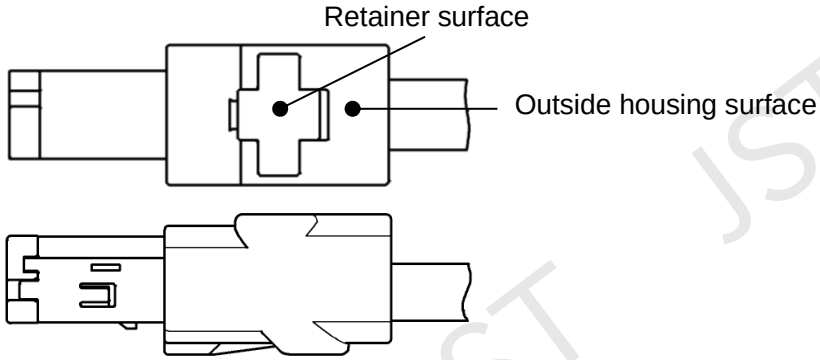


5-3-8 Inserting the retainer

① Pre-insert the retainer in the harness by hand.
Even if the retainer is inverted, the insertion is possible because it has no polarity.
Do not incline the retainer in pre-inserting.
(Parallel the retainer surface to the housing surface.)




② Insert the retainer up to the insertion end position with secure by hand.
There is no difference in level between the retainer surface and the outside housing surface. (Check that the retainer is in the insertion end position.)
When inserting the retainer by hand, only one side of the retainer may be locked.




6. Inspection of Finished Products (Electrical Continuity Inspection)

When conducting wiring inspection using an inspection jig, pay attention to the following points:

- Use the applicable connector shown below.
- Check that the applicable connector is free from deformation, damage and stains. If found, replace it with the new one immediately. Periodical replacement is also necessary.
- Mate and unmate the connector with care not to pry. When using the inspection board, consideration is necessary in designing the chassis so that the mating and unmating operation can be conducted smoothly.

| Applicable connector | Model No. |
|---|---|
| PC board side ASU connector | ASU-4RASM-12T1-K1 (LF)(SN) |