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This handling manual describes points to check for smooth crimping operation of PHD connector contact.

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1. Part Name and Model Number

Part name		Model No.	
Contact		SPHD-001T-P0.5	
		SPHD-002T-P0.5	
Housing		PHDR-**VS	
Header	Glass-filled PA 66	Top entry type	B**B-PHDSS (LF)(SN)
		Side entry type	S**B-PHDSS (LF)(SN)
	PA 66	Top entry type	B**B-PHDSS-B (LF)(SN)
		Side entry type	S**B-PHDSS-B (LF)(SN)

Note₁: 2-digit figures in asterisks denote the circuit number.

Note₂: Identification marking "(LF)(SN)" stands for lead-free product.
 "(LF)(SN)" shall be displayed on the product 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.

After unpacking, return products in the original package to store.

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.

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3. Applicable Wire

3-1 Applicable wire per barrel size

UL1007 (stranded wire) and its equivalent stranded wire with tin plating can be used. Regarding AWG #22, use UL1061 having a small insulation outer diameter or its equivalent stranded wire with tin plating.

Wire size and wire insulation outer diameter applicable to each contact are as below.

Model No.	Wire size	Insulation outer dia.
SPHD-001T-P0.5	AWG #26 ~ #22	φ1.0 ~ φ1.5 mm
SPHD-002T-P0.5	AWG #28 ~ #24	φ0.9 ~ φ1.5 mm

Note₃: The type of the conductor shall be annealed copper stranded wire with tin plating.

Note₄: Special wires such as solid, tin-coated, shielded and tin-coated ones other than above wires cannot be used in principle.

4. Crimping Tool

Part name		Model No.
Semi-automatic press		AP-K2()
Crimping applicator		MKS-L-10
Die	001 type	MK/SPHD-001-05
	002 type	MK/SPHD-002-05
Applicator and die set	001 type	APLMK SPHD001-05
	002 type	APLMK SPHD002-05

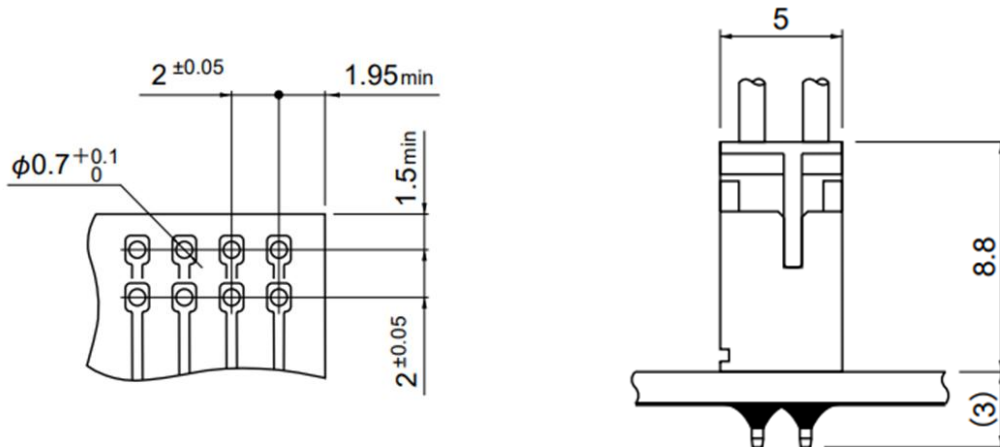
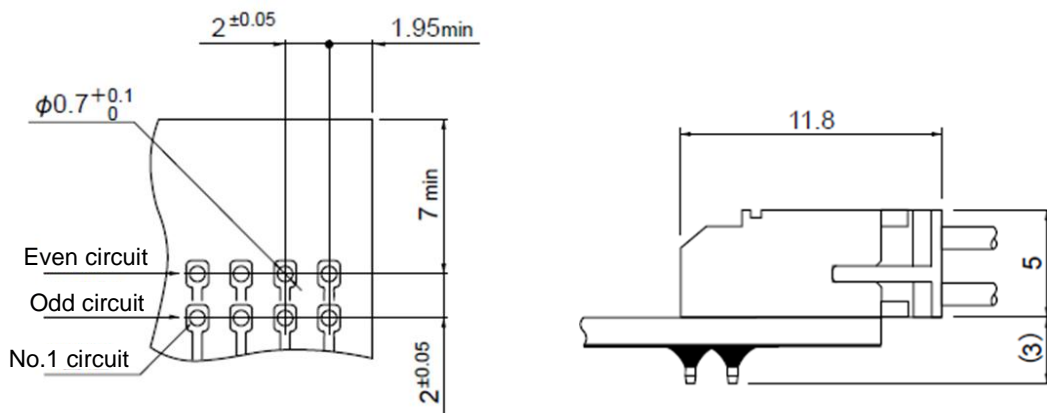
Note₅: When crimping operation is conducted by using other than the above applicator and die set, JST cannot guarantee the performance of the connector.

5. Applicable PC Board

5-1 Applicable PC board thickness

1.6 mm

5-2 PC board layout and assembly layout

Top entry typeSide entry type

Note₆: Tolerances for PC board size are non-cumulative ± 0.05 mm for all centers.

Note₇: 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.

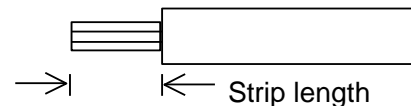
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6. Crimping Operation

6-1 Wire strip length

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

Reference value of wire strip length: 2.1 mm



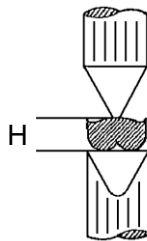
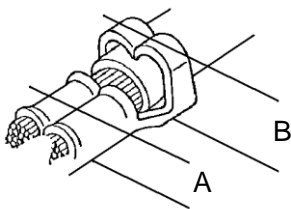
6-2 Crimping

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

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

6-2-1 Measurement of crimp height

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



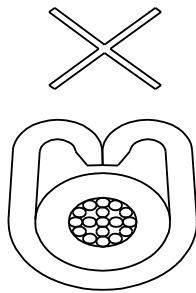
- A: The crimp height at the wire barrel should be set to the pre-determined dimensions.
- B: Adjust and set the crimp height at the wire insulation barrel as per finished outer diameter and a kind of a wire so that the wire insulation does not come off the contact easily and is not crimped excessively.
- H: Measure the crimp height at the center of the barrel using a micrometer.

Table of crimp height

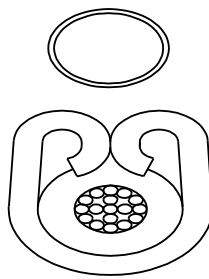
Contact	Wire		Insulation O. D. (mm)	Crimp height (mm)	
	Type	Size		Conductor part	Insulation part
SPHD-001T-P0.5	UL1007	AWG #26	1.3	0.60 ~ 0.70	1.7
	UL1007	AWG #24	1.5	0.65 ~ 0.75	1.8
	UL1061	AWG #22	1.4	0.70 ~ 0.80	1.8
SPHD-002T-P0.5	UL1007	AWG #28	1.2	0.55 ~ 0.60	1.6
	UL1007	AWG #26	1.3	0.60 ~ 0.65	1.7
	UL1007	AWG #24	1.5	0.62 ~ 0.67	1.8

Note₈: The crimp height of the insulation part is reference.

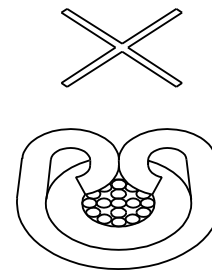
6-2-2 Crimping condition at wire insulation barrel



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



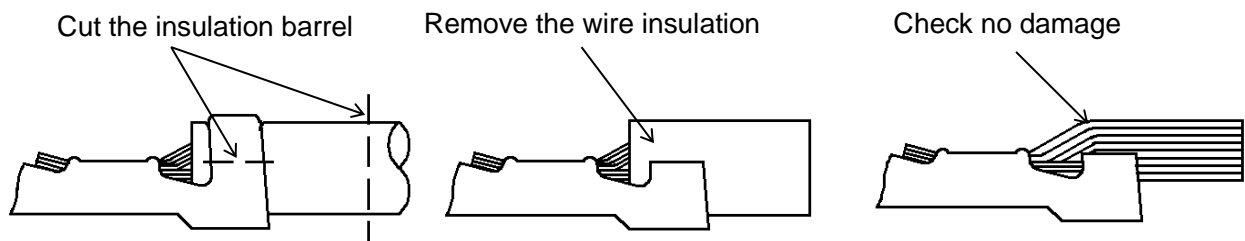
Good



Excessive crimping
(pressed excessively)
The barrel bites the wire,
which may damage
the wire conductors.

6-2-3 Check of crimping condition at wire insulation barrel

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



6-3 Tensile strength at the crimped part

After adjusting the crimp height, check the tensile strength using the test samples. 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.

Unit: N

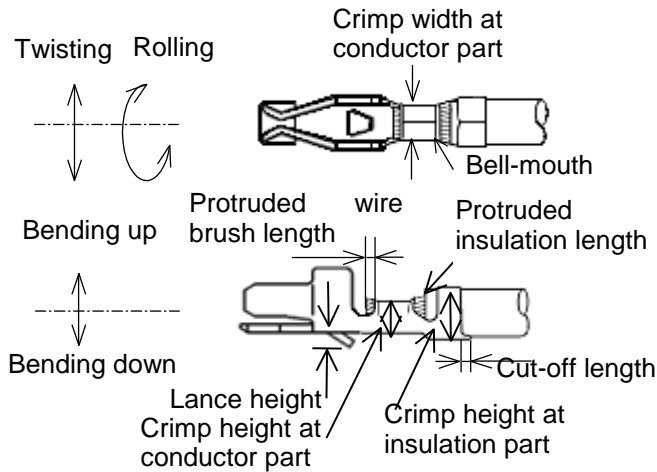
Contact	Wire		Actual value			Requirement
	Type	Size	Ave.	Max.	min.	
SPHD-001T-P0.5	UL1007	AWG # 26	42.6	45.1	39.2	20 min.
	UL1007	AWG # 24	71.3	74.5	68.6	30 min.
	UL1061	AWG # 22	93.9	96.0	92.1	40 min.
SPHD-002T-P0.5	UL1007	AWG # 28	31.7	34.3	27.0	15 min.
	UL1007	AWG # 26	46.1	48.0	44.1	20 min.
	UL1007	AWG # 24	69.7	71.5	66.6	30 min.

Note₉: The actual value of the tensile strength is for the samples with the conductor part only crimped.

6-4 Crimping appearance

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

6-4-1 Bending up and rolling



Item	Reference value
Bending up	3° max.
Bending down	3° max.
Twisting	3° max.
Rolling	5° max.
Bell-mouth	0.1 ~ 0.3 mm
Cut-off length	0 ~ 0.3 mm
Protruded wire brush length	0.3 ~ 0.6 mm
Crimp width at conductor part	Approx. 1.4 mm

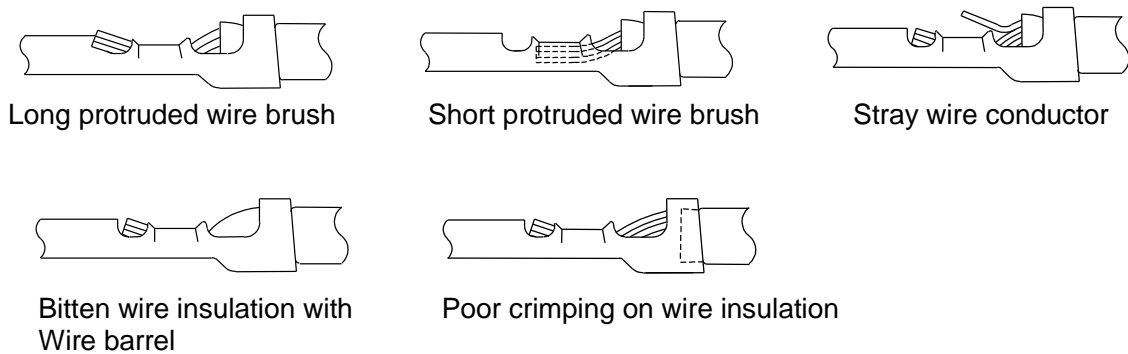
6-4-2 There must not be large burr or one-sided burr. Wire conductors must not be visible.

No opening is made.
(Wire conductors must not be visible.)

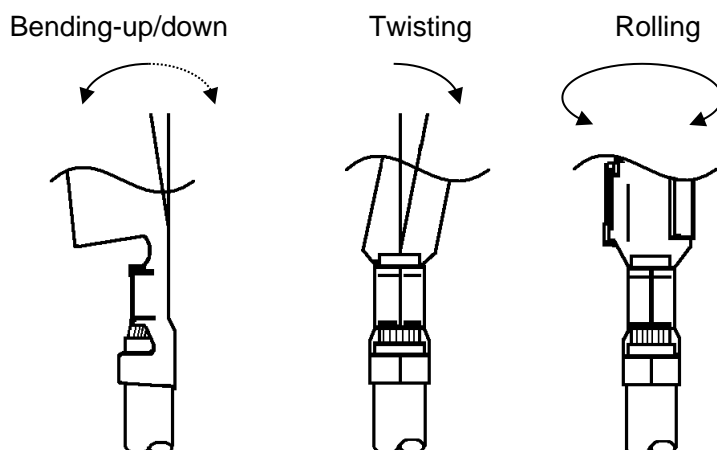


No large burr is made.

6-4-3 Examples of defective crimping



6-4-4 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.

6-5 Precautions for crimping operation

- ① Conduct crimping operation properly and inspect crimping appearance of crimped product with such a tool as loupe.
- ② Do not crimp with no contacts or twice, because they may cause outstanding burrs at the crimped part and may lead to abrasion of the crimping die quickly.
- ③ As cutting residues (powder) adhered to the crimping die part affects the life of the dies, clean around the crimping part occasionally and conduct appropriate crimping.
- ④ When chips or excessive roughness are observed on the crimping die, replace it without delay.
- ⑤ As 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, the wire conductors may come off or the wire barrel may bite the wire insulation.

6-6 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

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6-7 Precautions for the handling of the crimped contact

The crimped contact is subject to deformation by external force before inserting into the housing, pay careful attention to the following 2 points for the handling:

- ① Protect the crimped contacts to avoid deformation and adhesion of foreign matters.
In case of bundling, limit the number of harnesses to be bundled to avoid deformation, and protect the contact part.
- ② Do not stack too much quantity of the crimped contacts nor place anything on them, because the weight of themselves may deform the contact and troubles such as defective contacting.

7. Harness Assembly Operation

The harness assembly operation is a very important process for the connector performance and the harness quality. Careful operation is required for the harness assembly.

7-1 Before inserting the crimped contact into the housing

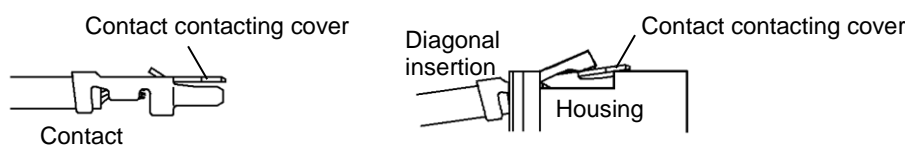
Before inserting the contact into the housing, check the below points:

- 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 crimped contact into the housing

- ① Insert the crimped contact parallel to the housing without prying not to apply tension to the crimping part.
- ② Insert the contact into the housing without stopping to the innermost.
- ③ Do not use such a pin as an insertion jig, because the tip of the pin accidentally reaches the contact mating part, possibly leading to poor contact and contact deformation.
- ④ Check secure locking per each insertion by pulling the wire softly in order to check that the contact does not come off the housing. Besides, check that there is backlash in the direction of the insertion axis. (When a wire is pulled with too much force, the contact lance may be deformed and the contact may come off the housing.)
- ⑤ Insert the contact into the housing on the same axis.
When the contact is diagonally inserted, the contact contacting cover may come out of the clearance of the housing lance as was shown in the figure below.

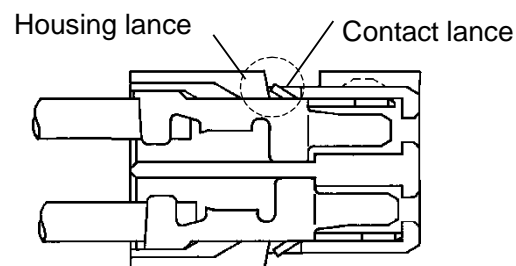
Example of bad diagonal contact insertion



Note₁₀

In case that the contact comes out of the housing without engaging with the housing lance due to the diagonal insertion by mistake as shown above, extract the contact and put back the housing lance to its original position, and then reinsert the contact.

After inserting the contact, check that the housing lance is securely engaged with the lance.



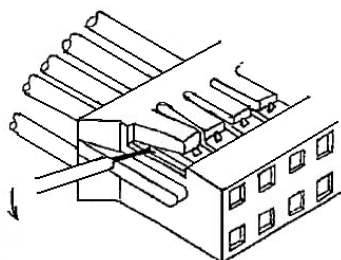
8. How to Extract the Crimped Contact from the Housing in Case of Mis-Insertion

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

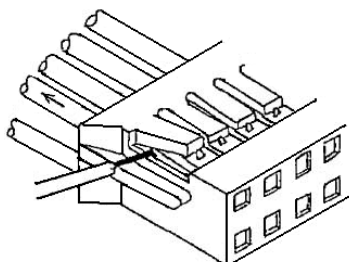
- ① Do not reuse the used housing and contact but use the new ones.
(The way of extracting the contact from the housing is as below.)
- ② When an improperly inserted contact is extracted from the housing and reused.
 - a) Only a specified person conducts the operation.
 - b) In case such contact and housing are reused in some reasons, the reuse should be once.
From twice, use the new contact and housing.
 - c) Be sure to push the housing lance down to the original position.
 - d) After modification completes, be sure to check the inserted contact in the housing.
When the contact comes off the housing, use the new housing.

How to extract the contact from the housing

- (1) Raise the housing lance (0.5 mm max.) with the extraction tool (No. EJ-PHD or EJ-PHD-RB), and disengage the housing lance.



- (2) Pull out a wire softly.



- (3) Put back the raised housing lance to its original position.

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9. Header

9-1 Soldering

① Flux

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

② Dipping soldering

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

③ 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.

④ Cleaning operation

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

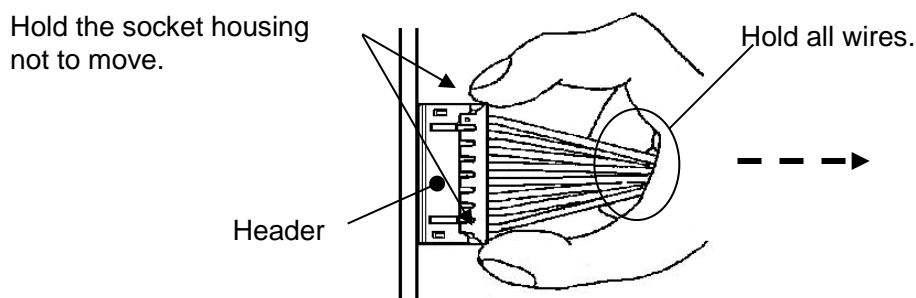
10. Mating and Unmating Connector

① Mating connector

Hold the socket housing securely and insert it straightly into the header until clicking.

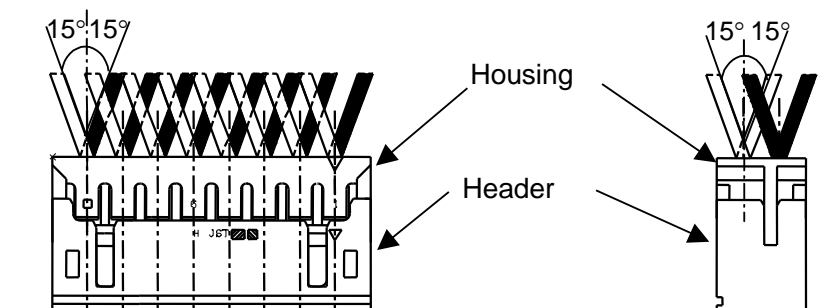
② Unmating connector

Holding the socket housing as well as all wires together with fingers not to pry, and withdraw it on the mating axis.



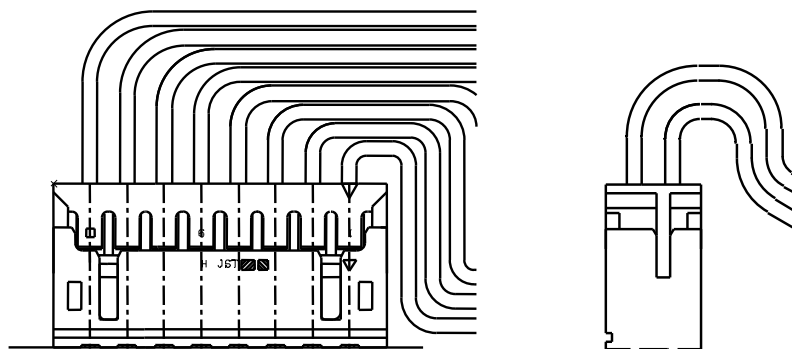
③ Prying

As prying withdrawal may deform the header post and damage the connector, do not conduct prying withdrawal. When the withdrawal operation on the mating axis is difficult, do the operation within 15 degrees against the mating axis.



④ Wire handling

When handling the wires, do not apply other than an external load of wire bucking level by keeping an enough wire length and fixing wires.



11. 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.