Title of Document:	HANDLING MANUAL	Issue No. TCM-0-037	Rev. 4
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This manual describes the points to be noted on termination and assembly works so as to enhance the reliability further and exercise the connector features before using the CZ connector.

Make use of this manual together with handling manuals of ID machine main bodies as well.

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1. Composition and Parts Identification

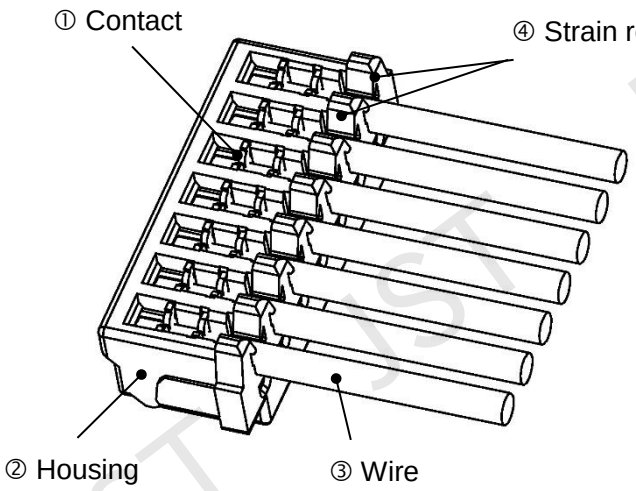


Fig.1: Harness

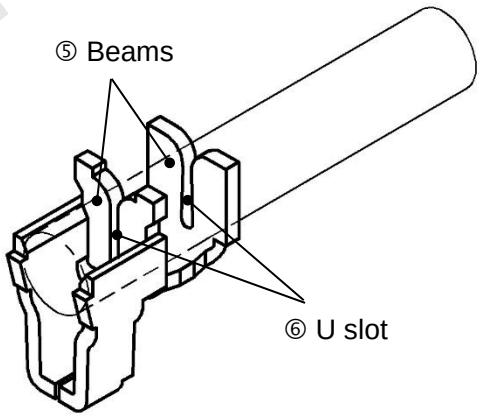


Fig.2: Contact

④Strain relief: It retains wire insulation not to give to U slot part any external loads applied to wires.

⑤ Beam: The connector has two beams which are processed into U slot.

⑥ U slot: It strips wire insulation to touch wire conductors touch electrically and mechanically.

2. Model Number

Connector model umber, housing color and applicable wire size

Product name	Model number	Housing color	Applicable wire
Socket	∗CZ-6H	Natural	AWG#26, AWG#28
	∗CZ-6K	Black	

Note$_1$: 2-digit figures in an asterisk denote the circuit number.

Applicable parts

Product name				Model number
CZ Connector	DIP type	Top entry type		B∗B-CZ(※1)K-B-(※2) (LF)(SN)
		Side entry type		S∗B-CZ(※1)K-B-(※2) (LF)(SN)
	SMT type	Loose piece	Top entry type	BM∗B-CZ(※1)S-(※2) (LF)(SN)
			Side entry type	SM∗B-CZ(※1)S-(※2) (LF)(SN)
		Taping	Top entry type	BM∗B-CZ(※1)S-(※2)-TF (LF)(SN)
			Side entry type	SM∗B-CZ(※1)S-(※2)-TF (LF)(SN)
CZW Connector	DIP type	Top entry type		B∗B-CZW(※1)K-V-B-(※2) (LF)(SN)
		Side entry type		S∗B-CZW(※1)S-B-(※2) (LF)(SN)
	SMT type	Loose piece	Top entry type	BM∗B-CZWSS-(※2) (LF)(SN)
		Taping	Top entry type	BM∗B-CZWSS-(※2)-TF (LF)(SN)
Socket holder				CZWH-∗-S

Note$_2$: 2-digit figures in "∗" denote the circuit number.
Note$_3$: A letter in "※1"" denotes colors.
Note$_4$: A letter in "※2"" denotes presence and absence of bosses.
Note$_5$: "(LF)(SN)" is the identification marking indicating lead-free product. The marking is shown on the label.

3. Storage

3-1 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.

3-2 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.

4. Applicable Wire

4-1 Wire size, UL style and wire insulation outer diameter

Table-1

Wire size	UL style	Insulation material	Insulation O.D.	Insulation O.D. (Standard value)
AWG#26	UL10272, UL11079, UL3610	PVC	ϕ0.70 – ϕ0.83 mm	ϕ0.77
	UL3619	Halogen-free material		
AWG#28	UL10272, UL11079, UL3610	PVC		ϕ0.73

Note$_6$: Use wires we have confirmed the applicability of termination.

4-2 Wire conductors:..... 7 stranded wires (annealed copper wires with tin plating)

5. Applicable Insulation Displacement Machine

5-1 Hand press type/pneumatic type ID machine

Termination method	Applicator model number
Hand press type ID machine	H2A-CZ H2-CZ20ED-X
Pneumatic type ID machine	MP-2A-CZ

Note that the processed product with other than JST applicable ID tools is out of our guarantee.

5-2 Auto-ID machine

Contact JST for the model number of auto-ID machine.
Note that the processed product with other than JST applicable ID tools is out of our guarantee.

6. Termination Work

6-1 Termination depth

The connector terminated at proper termination depth is as follows:

Termination appearance

Wire position must be under the protrusion of the strain relief of the connector as shown in Fig.3. Depending on the hardness of wire insulation and the connector, wrinkles as shown in Fig.4 may appear on wire insulation at the strain relief part of the connector. If wrinkles are found, measure the wire retention force referring to item 6-2 “Wire retention force.” When the measured wire retention force satisfies the requirement mentioned in item 6-2, the termination is good.

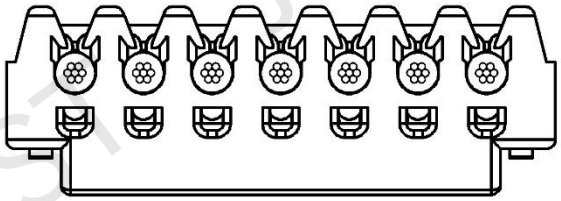


Fig.3

Fig.4 (Appearance example of a large wrinkle)

Wire condition at terminated part (U slot part)

After termination, cut off the shaded area (the strain relief and the housing wall) of the housing as shown in Fig.5 and pick up the connector contact with terminated wires attached by using pliers. Then, carefully take a wire off the contact U slot while holding it as shown in Fig.6.

Check a wire caught between the U slot. When termination is conducted properly, the wire insulation at the terminated part is as shown in Fig.7.

Do the observation soon after the wires are pulled out because of elasticity that the wire insulation tries to return to the original condition by the lapse of time.

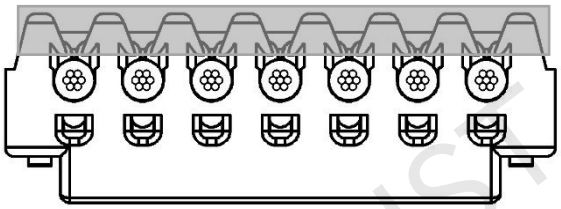


Fig.5

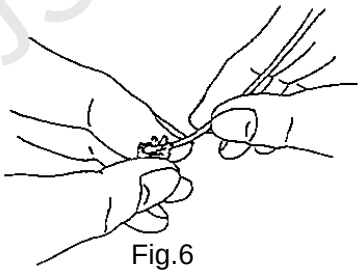


Fig.6

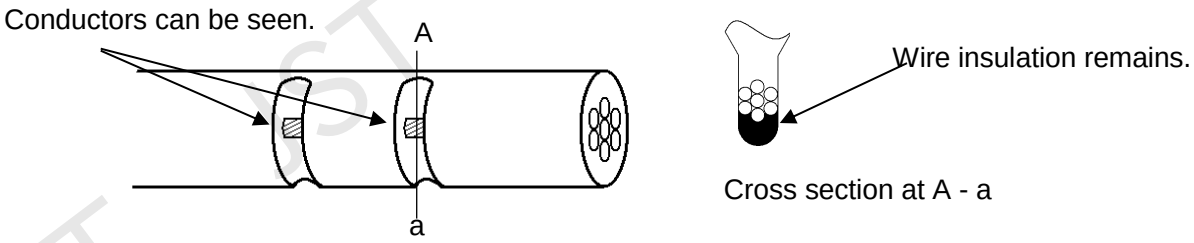


Fig.7

Termination depth dimension……Reference value

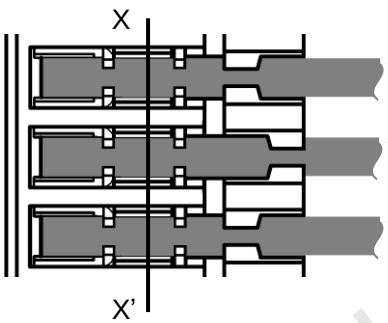


Fig.8

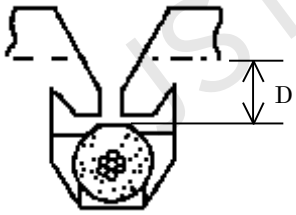


Fig.9

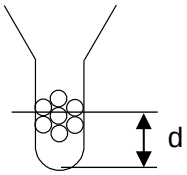


Fig.10

Measure the termination depth dimension “D” in Fig.9 at X - X' part in Fig.8, where is in the center part between two U slots and a flattened part by the termination punch, and check it satisfies the specified value in Table-3.

Table-3 Termination depth in dimension “D”

Conductor size	UL style	Termination depth	Insulation O.D. (Standard value)
AWG #26	UL10272, UL11079, UL3619	0.60 +0.05/-0.1	ϕ0.77
AWG #28	UL10272, UL11079, UL3610		ϕ0.73

Note7: Contact JST for other than the above UL style and the insulation O.D.

Regarding the measurement of the termination depth dimension, refer to appendix IDC Manual No.TCM-0-002 “Method of Measuring Termination Depth by Dial Depth Gauge.”

The termination depth dimension for ID connectors is similar control points to crimp height for crimp type connectors, but it is totally different in principle.
Crimp height for crimp type connectors is one of important control points, because a coefficient of wire conductors greatly fluctuates, having a great impact on electrical and mechanical connection with the connector.
On the other hand, U slot dimensions of ID connectors varies every wire size, and connection between wire conductors and the connector is decided according to U slot dimension.
Therefore, we just need to control where wire conductors are located in U slot.
This is the concept of termination depth.
The values of termination depth dimensions are reference values due to the following reasons.
The termination depth which is measured at the dimensions between the terminated wire insulation and the housing datum plane is subject to influence by wire hardness and wire outer diameter. Thus, the value of the termination depth is reference values, because it cannot be decided as absolute ones.

Exact termination depth is to measure “d” between the bottom of the slot and the position of center core wire of wire conductors as shown in Fig.10; however, it is very troublesome to conduct daily.
Thus, JST specifies termination depth dimension “D” in Fig.9 instead of “d” by measuring the conditions of wire conductors in U slot and wire retention force.

Shallow termination depth……Insufficient termination

When termination is insufficient,

① Wire insulation is not located under the protrusions of the strain relief as shown in Fig.11 and 12.

② Wire conductors in U slot are hardly seen or not seen at all as shown in Fig.13.

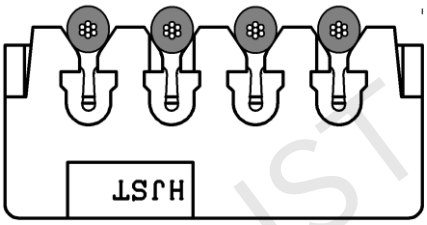


Fig.11

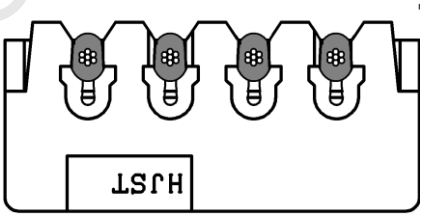
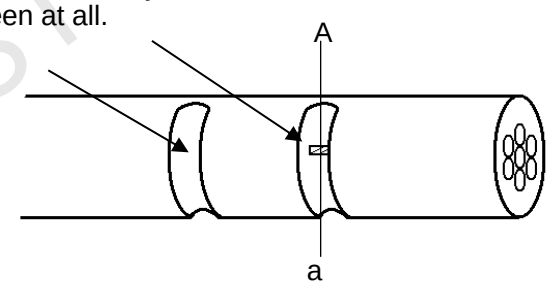
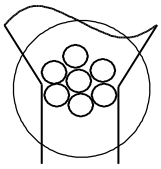


Fig.12

Wire conductors are hardly seen or not seen at all.





Cross section at A - a

Fig.13

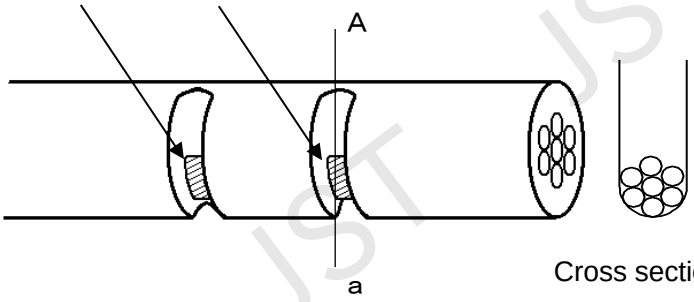
Deep termination depth……Excessive termination

When termination is excessive,

① Wire insulation is cut at the bottom of the U slot and wire conductors are seen as shown in Fig.14.

② Dents caused by the termination punch appear on the flange of the housing as shown in Fig.15.

A wire insulation is cut and the wire conductors are seen.



Cross section at A - a

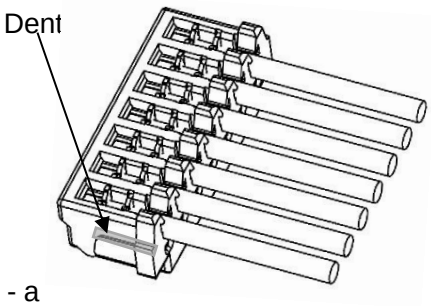


Fig.14

Fig.15

6-2 Wire retention force

Pull a terminated wire every one circuit in the direction of an arrow shown in Fig.16 and measure the force by using such a jig as push-pull gauge when the wire comes off the contact. (Wire retention force)
Then, check that the measured wire retention force satisfies the specified value in Table-4.
Refer to the manual No. TCM-0-005 “Method of Measuring Wire Retention Force” for how to measure wire retention force.

Table 4

UL style, wire size	Parallel direction	Perpendicular direction
UL10272, UL11079, UL3619 AWG #26	15N min.	7N min.
UL10272, UL11079, UL3610 AWG #28	10N min.	

Parallel direction　　Perpendicular direction

Fig.16

6-3 Termination appearance

Inspect the following points after termination

6-3-1 Dents on the housing caused by the termination punch……The housing must be free from dents. When the connector set position deviates to the pitch direction, scratches and deformation caused by the termination punch may appear at the shaded area of the housing as shown in Fig.17.

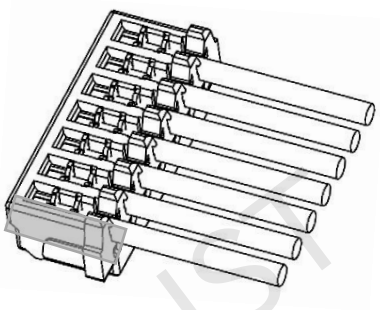


Fig.17

6-3-2 Flaws and deformation at the contact beams……The beams must be free from flaws and deformation.
When the connector set position deviates to the wire axis direction, scratches and deformation caused by the termination punch may appear at the contact beams as shown in Fig.18.
In this case, not only the contact but also the termination punch may be damaged.

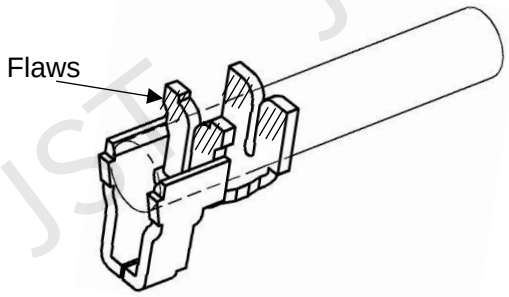


Fig.18

6-3-3 Bursts of wire insulation around the contact beams……Wire conductors must not be exposed.
When the connector set position deviates to the wire axis direction, wire insulation may burst in front or back of the contact beams. When a special wire with thin insulation on is used, wire conductors are exposed a little even if the connector is set properly.

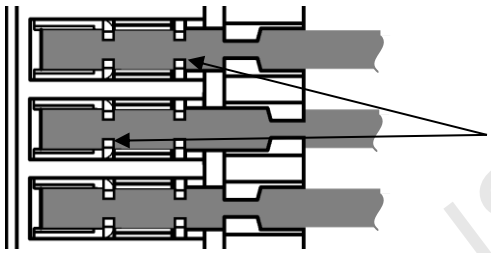


Fig.19

6-3-4 Gap between the housing wall and wire tips (Wire protruding length)
Gap “G” between the housing wall and wire tips in Fig.20 should be 0.3 mm max.

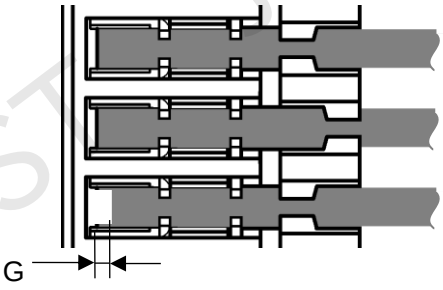


Fig.20

6-3-5 Overrun of wire……Wires must not overrun.
When wire tension is not adequate, overrun of a wire may happen as shown in Fig.21.

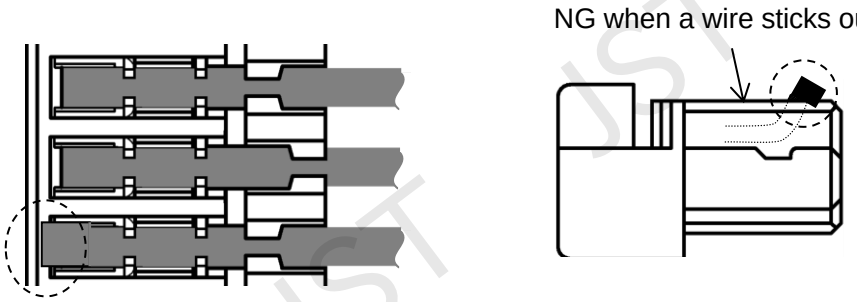


Fig.21

6-3-6 Deviation of insulation displacement center……Deviation of insulation displacement center must not happen.
When the connector set position or a wire deviates to the pitch direction, the termination punch, a wire and the U slots do not align, so that insulation displacement center deviate as shown in Fig.22 and 23.

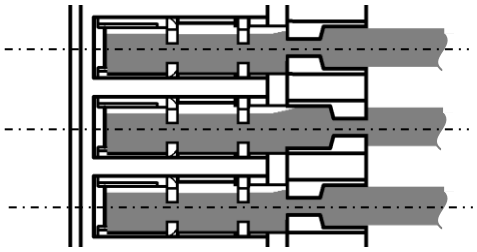


Fig.22

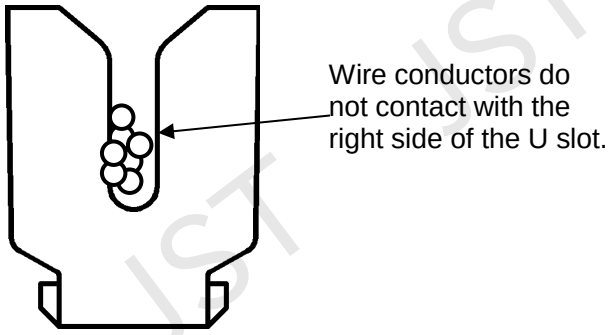


Fig.23

7. Packing

Bundle the harnesses with a rubber band per unit quantity (example: 50 sets, 100 sets) to prevent them from getting entangled with each other, and put it in the product boxes.
(Bundle them with a rubber band at the position approx. 60 mm away from the connector.)
Give consideration for not damaging the connector, such as wrapping a bubble wrap, when packing.

8. Inserting Socket into Holder

When CZ socket connector is inserted into CZW connector socket holder, model No. CZW-**-S, conduct the following points:

① Prepare the CZ connector socket which wires have been properly terminated. (8 to 20 circuits)
② Prepare the CZW connector socket holder (twice the number of circuits) compatible with CZ connector socket. (16 - 40 circuits)
③ Insert CZ connector socket into CZW connector holder from the termination side of the socket as shown in Fig.24. (Insert in a direction perpendicular to the mating axis with the header.)
In case that CZ connector socket is inserted into CZW connector holder from the mating axis direction by mistake, the holder lance (presser in the axial direction) may be deformed, which brings CZ receptacle to come off the holder easily.

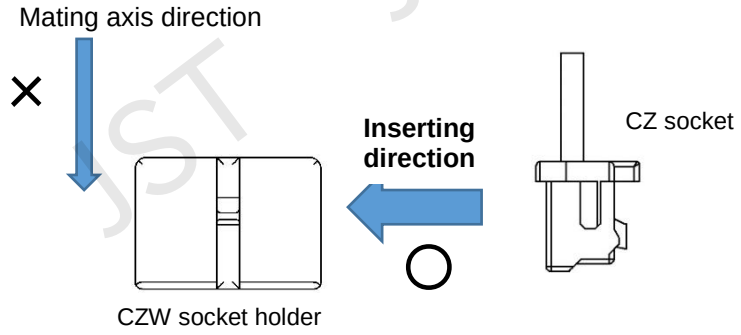


Fig.24 (Method of inserting the socket into holder)

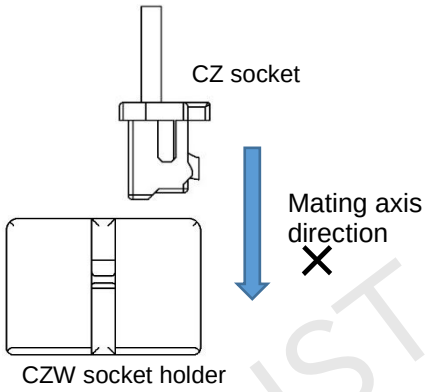
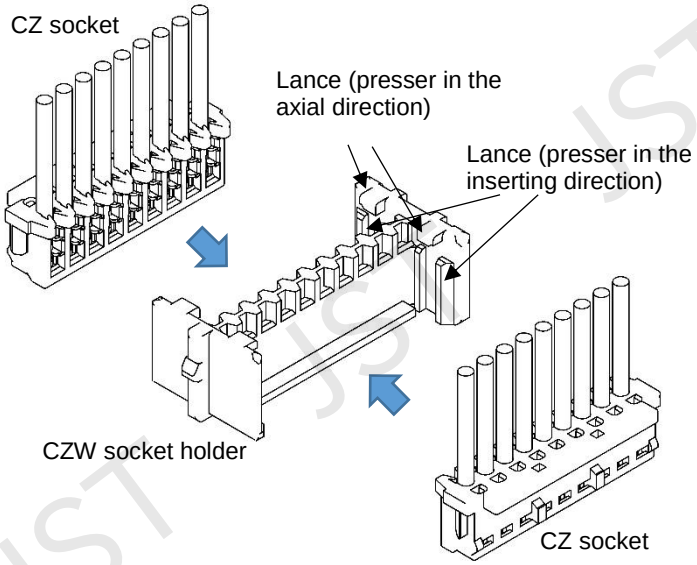


Fig.25 (Inserting direction: NG)

(a) Check the rows of the holder. (As the difference between row A and B of the holder, there are two round holes at the row A side. Pay attention not to insert the socket into an incorrect row. Refer to Fig.26.
(b) Insert CZ connector socket into the holder lance one side by one side with turning the wire terminated side of the socket inside.
(c) Insert another socket into the holder (the remaining rows with the socket not inserted) in the same way as (b).



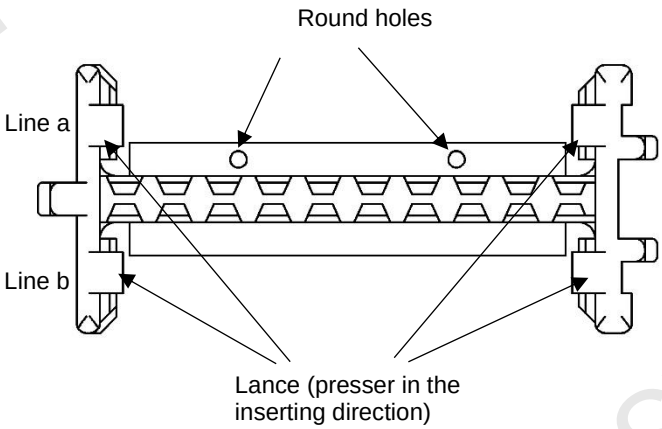


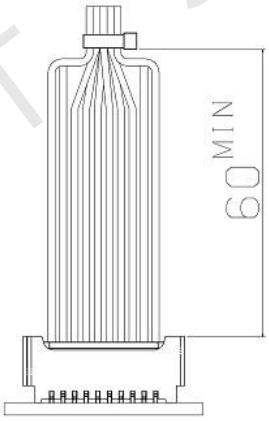
Fig.26

(d) In case of reverse insertion (with turning wire terminated part of both the socket and the holder outside), re-insert the socket in the proper direction (refer to Fig.24 and Fig.26).
The mis-inserted socket cannot be structurally mated with the header.
The mis-inserted socket and the holder slightly are held, but it is easy to remove them.

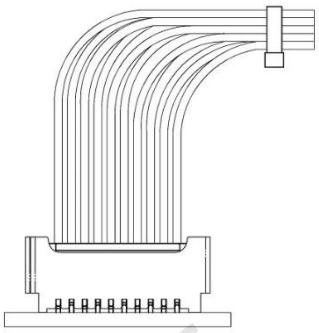
④ In case that CZW holder lance is deformed or damaged, replace it with a new one.
When the holder lance part is deformed or damaged due to in correct insertion direction or the removal operation of the miss-inserted receptacle, do not reuse the inserted holder, since the socket easily comes off the holder.

9. Taping (Binding) of Wires

When binding wire harnesses, handle with care not to apply an undue load to the contact.
The binding position of wires should be 60 mm or more away from the connector so that an operator can hold them in mating and unmating. Especially, as for large circuits and the dual-row harness (with the holder), provide enough wire length at the both end circuits. If binding wires is impossible, take consideration for forming the harnesses in the handling direction before binding.

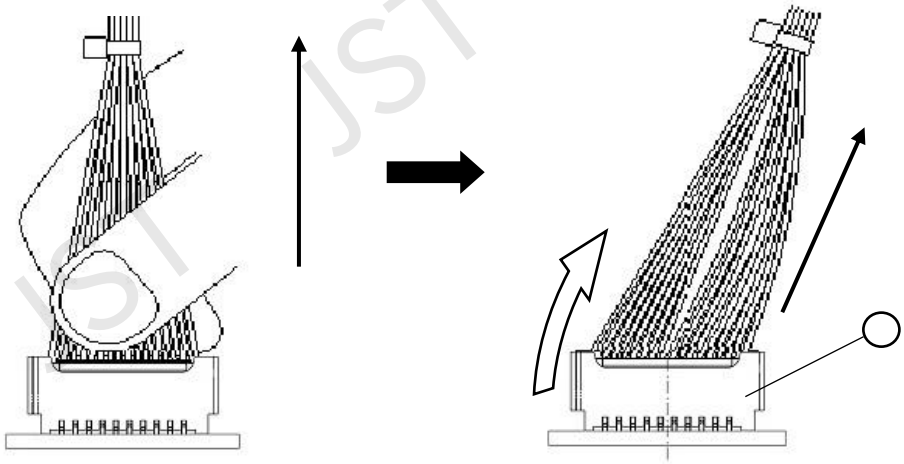


① Binding position



② Binding after forming

Harness Handling in Binding
When prying withdrawal is conducted with the harness bonded, rotating moment is applied to a circle are as a fulcrum as shown below, causing a serious damage to the connector, leading to breakage.



Note$_8$: When a wire does not have enough length to handle, stress by mating and unmating the connector tends to be applied unevenly on wires at both end circuits, which becomes a factor of prying it out of the connector. Eventually, wire breakage, cracks and breakage on the header housing and bending on the header pin may arise.

10. Harness Inspection

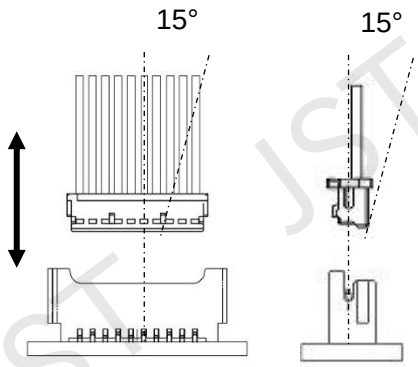
Inspect the following points.

Inspection points	Inspection method	Requirements
(1) • Harness dimensions • Wire strip length	• Verification with drawings • Caliper (or a scale)	• Satisfy the drawing dimensions.
(2) Wire to be used • Wire color • Wire size • UL style, etc.	• Verification with drawings • Visual inspection	• Wire colors conform to the drawings. • Wire size and UL style conform to drawings.
(3) Termination depth • Wire conditions • Termination depth dimensions	See item 6-1.	See item 6-1.
(4) Wire retention force	See item 6-2.	See item 6-2.
(5) Punching flaws on housing caused by termination punch.	Observe the appearance of the terminated housing with a loupe by microscope.	The housing must be free from punching flaws caused by the termination punch.
(6) Flaws and deformation at the contact beams	Observe the terminated contact beam with a loupe or by microscope.	Contact beams must be free from scratches and deformation.
(7) Exposure of wire conductors around the contact beams	Observe the conditions of wire conductors around the contact beams with a loupe or by microscope.	Wire conductors must not be exposed. (Refer to the criteria sample.)
(8) Gap between the housing wall and wire tips	Measure by such a tool as a gauge, projector.	Gap: 0.3 mm max.
(9) Overrun of a wire	Observe wire tips with loupe or by microscope.	Wire must not overrun.
(10) Deviation of insulation displacement center	Observe the appearance of terminated wires with loupe or by microscope.	According to the criteria sample

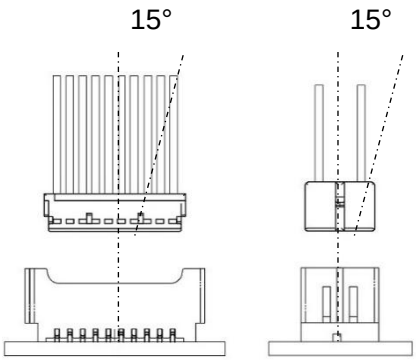
11. Handling Precautions

11-1 Inserting method

① Do the operation along the mating axis.
When it is difficult to conduct it along the mating axis, do within 15°.

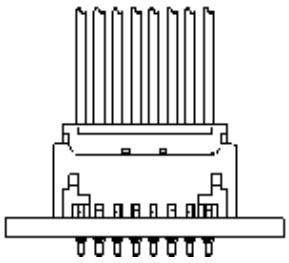


CZ Connector

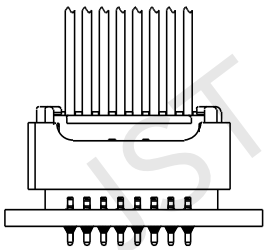


CZW Connector

② Without applying an external load to the socket, insert the socket contact (or the lock) into the header pin until hitting in order to guide the insertion.
The diagonal insertion of the contact may cause troubles such as deformation of the pin.

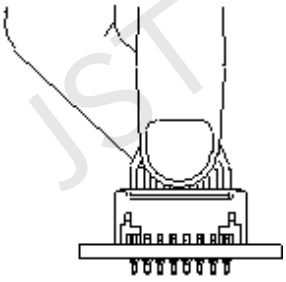


CZ Connector

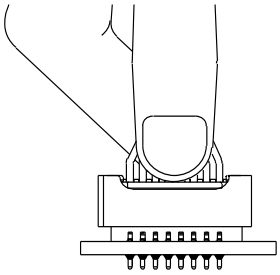


CZW Connector

③ After guiding the socket as described in ①, hold the wire roots, push the center of the socket hood, do the insertion operation as quickly as possible.
Do not push the holder of the CZW connector as much as possible.

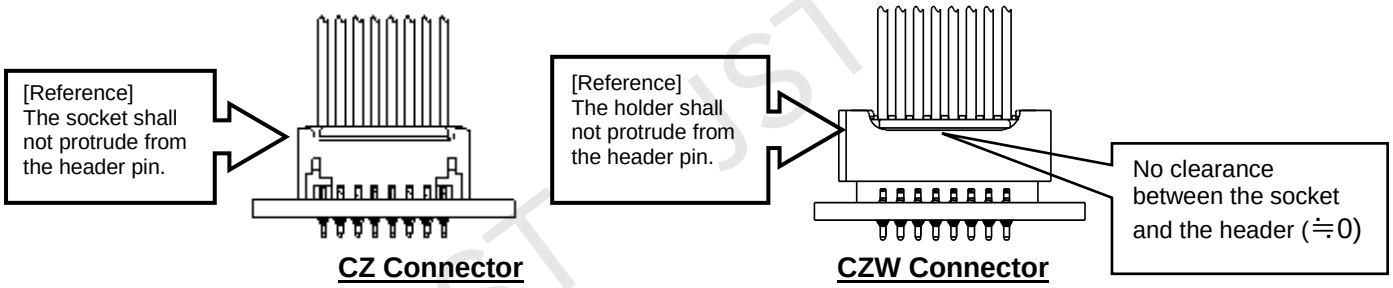


CZ Connector



CZW Connector

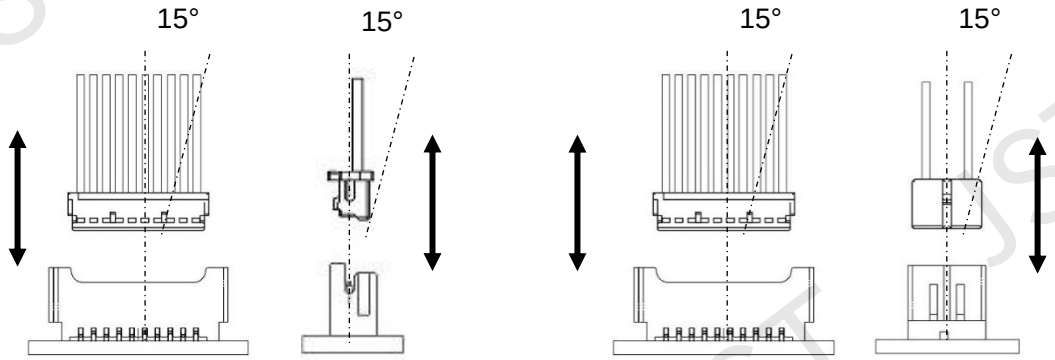
④ There is a sense of clicking with locking. Fully insert the socket until being locked.
Incomplete mating or diagonal mating of the socket may cause electrical discontinuity.



11-2 Withdrawal operation

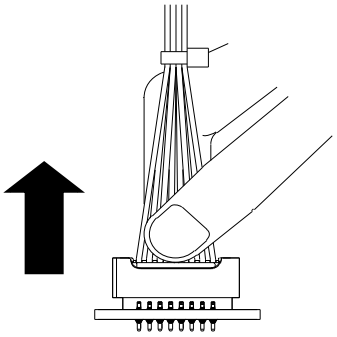
Withdraw the connector straight along the mating axis as quickly as possible.

① Do the operation along the mating axis.
When it is difficult to conduct it along the mating axis, do within 15°.

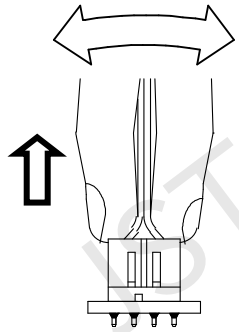


② When the connector cannot be held, hold the roots of all wires (with putting a weight on wires of the central circuits) and withdraw the connector straight.

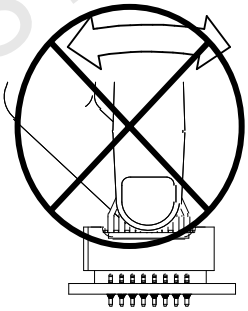
In addition, when wires (harnesses) are tied, hold the wire between the connector and the tying position to conduct the operation.



In case of multiple circuits (32 or more) of the double type (CZW connector), high withdrawal force is required. If it is difficult to operate, pull it out in the row-to-row direction as shown in (a). Never conduct in the pitch direction of (b) below.



A: Row-to-row direction



b: Pitch direction

11-3 Others

- Conduct the harness assembling operation and the mating operation under the following conditions.
  Room temperature: 15 ~ 35ºC
  Humidity: 45 ~ 85%

  Especially, do not conduct such operation under environment of low temperature and low humidity.

- Be sure to terminate the connector with wires inserted in all circuits. Note that termination with even one wire absent influences on the both adjacent circuits of the wire-absent circuit, leading to breakage of the strain relief. When you require wire-omitted state (pin-omitted state for crimping connector), cut the wire of the relevant circuit after terminating all circuits.

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

- Never spray insecticide (in particular, fuming one) in the place where the connectors are stored.

- When forming is done to the harness, do not pull it excessively.
  Do not apply any tension to wires at all the time to them in the direction perpendicular to a wire (the strain relief side).

- Do not press the terminated part with such a tool as a flathead screwdriver, since such handling may open the contact beams and cause poor contact due to excessive termination.

- When wires come off the terminated section, scrap it without being repaired.

- Pay careful attention not to adhere oil, such as grease, anti-rust oil and machine oil, to the socket.