Title of Document:	HANDLING MANUAL	Issue No. CHM-1-2680	Rev. 0
Customer:	GENERAL	Issue date: March 26, 2020	
Title subject:	DA Connector (For Discrete Wire)	Revision date:	

This manual describes control points about harness processing operation for insulation displacement connector (IDC) of DA connector by using JST's fully automatic insulation displacement (ID) machine, pneumatic ID machines and hand presses.

Refer to handling manual of ID machine for smooth operation as well.

C O N T E N T S

JST	Title subject: DA Connector (For Discrete Wire)	No. CHM-1-2680

1. Composition and Parts Identification

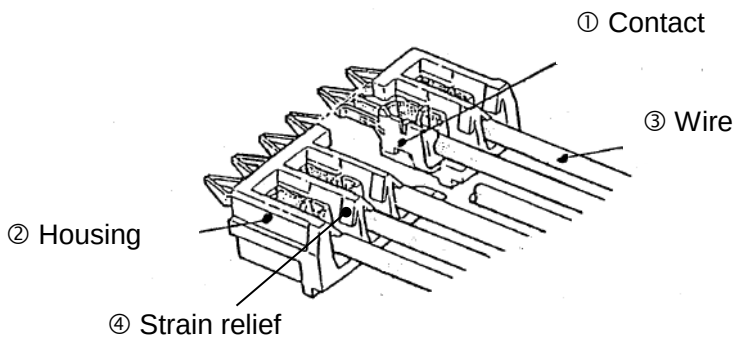


Fig.-1 Harness

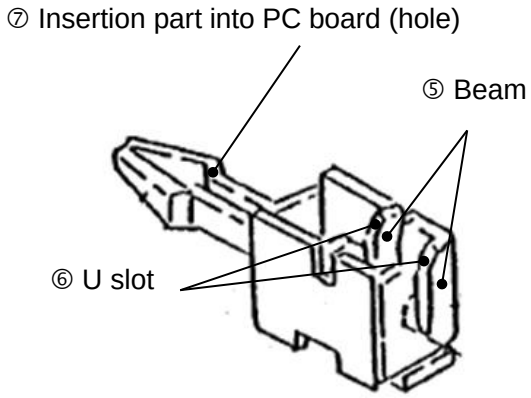


Fig.-2 Contact

(4) Strain relief: ....It retains wire insulation not to apply external load that places on wires to U slot.
(5) Beam: .....Two beams have an individual U slot configuration.
(6) U slot:.....It cuts wire insulation to contact with wire conductors electrically and mechanically.
(7) Insertion part into PC board (hole).....It is inserted in a PC board and soldered.

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 processed products

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

3-1 Wire size, UL style and wire insulation outer diameter

Model No.	Wire size	Insulation outer dia.
**DA-6S (LF)(SN)	AWG #26	ϕ0.90 - ϕ1.0 mm
**DA-8M (LF)(SN)	AWG #28	ϕ0.90 - ϕ1.0 mm

Note$_1$: Use wires that we've confirmed the applicability.

3-2 UL style..... 1571, 1061
Contact JST for wires you are planning to use, because features of wire insulation depend on wire suppliers.

3-2 Wire conductors:..... 7 stranded wire (Annealed wires with tin plating)
Tin-coated stranded wire

4. Applicable ID Tools

4-1 Hand press

ID tools and model No.	ID applicator model No.
Hand press model No.: HPD-M2A	H2A-DA

Note$_2$:When termination is conducted by using other than JST applicable termination machinery, JST cannot guarantee the performance of the connector.

4-2 Pneumatic press

Contact JST for the model number of the pneumatic press.

Note$_3$: When termination is conducted by using other than JST applicable termination machinery, JST cannot guarantee the performance of the connector.

4-3 Automatic ID machine

Contact JST for the model number of automatic ID machines.

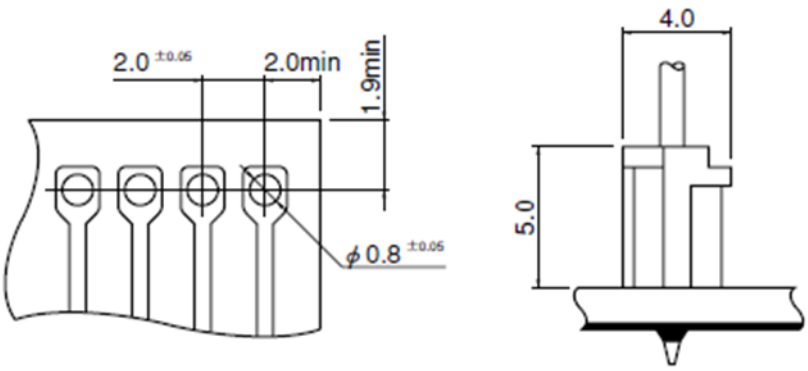
Note$_4$: When termination is conducted by using other than JST applicable termination machinery, JST cannot guarantee the performance of the connector.

5. Applicable PC Board

5-1 Applicable PC board thickness

Use PC boards 1.2 mm or 1.6 mm in thickness.

5-2 PC board layout and assembly layout



Note$_5$: The tolerance of PC board hole size: ± 0.05 all over with no accumulated tolerance

Note$_6$: The PC board hole diameters are reference values for drilled holes.
Set them according to your usage, because they may different by how to make holes such as drilling and punching and the PC board materials such as paper-based one and glass-based ones.

6. Control Points of Terminating Operation

Check the following points to conduct an appropriate terminating operation.

6-1 Check ID machine operates properly.

Refer to the handling manual of the ID machine before conducting an operation.

Main check points

① Hand press
Check that the check system of the bottom dead center is properly adjusted.
Check that the connector setting position is properly adjusted.
Check no wire cutting residues on the termination punch.

② Pneumatic press
Check that the connector setting position is properly adjusted.
Check that the pneumatic pressure is normal.
Check no wire cutting residues on the termination punch.

③ Automatic ID machine
- Check the operation sequence is normal.
- Check the bowl-feeder run normally.
- Check wire tension is appropriate.
- Check the wire measuring system operates accurately.
- Check the connector is set in place.

6-2 Check the connector size fits to wire size.

6-3 Check wire color and wire length conform to the drawing.

6-4 Check the termination depth is applicable. (Refer to item 7 “Termination Depth.”)

6-5 Check the wire retention force satisfies the specified value. (Refer to item 8 “Wire Retention Force.”)

6-6 Check the termination appearance is good. (Refer to item 9 “Termination Appearance.”)

6-7 Check whether connectors with different circuit No. used in previous operation do not remain in the bowl-feeder of the automatic ID machine and the pneumatic press or the straight-chute of the automatic ID machine.

6-8 Check that the stripping is proper, the strip length conforms to the drawing and stripped conductors are free from damage. (Refer to item 9-8 “Wire insulation strip”.)

6-9 Conduct periodically cleaning to remove wire chips and connector cutting residues.

7. Termination Depth

Applicable termination depth is stated below.

7-1 Termination appearance

Wires must be located under the protrusion of the strain relief of the connector as shown in Fig.-3.
Depending on how much wire insulation remain after punching ribbon wires, wrinkles as shown in Fig.-4 sometimes appear on wire insulation at the strain relief part of the connector.
If such a wrinkle is found, be sure to check the wire retention force referring to item 8 “Wire Retention Force.”
When the measured wire retention force satisfies the specified value mentioned in item 8, the termination has no problems.

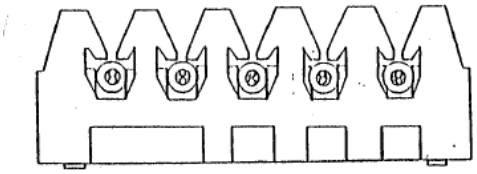


Fig.-3

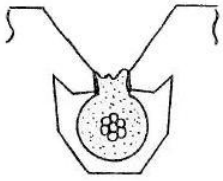


Fig.-4 (Example of wrinkling)

7-2 Wire conditions at the termination part (U slot part)

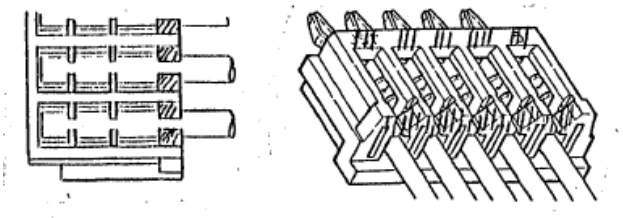


Fig.-5

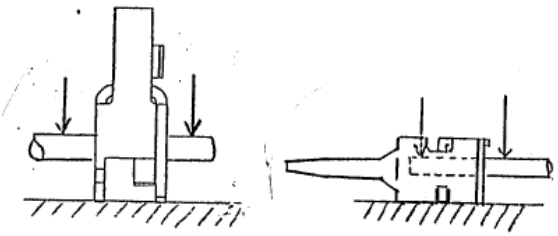


Fig.-6

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 the terminated wires by using pliers.
Then, hold down the wires as shown in Fig.6 and take them out of the contact U slot with care.

Observe the wires that had been caught between the U slots. Fig.7 shows good termination.

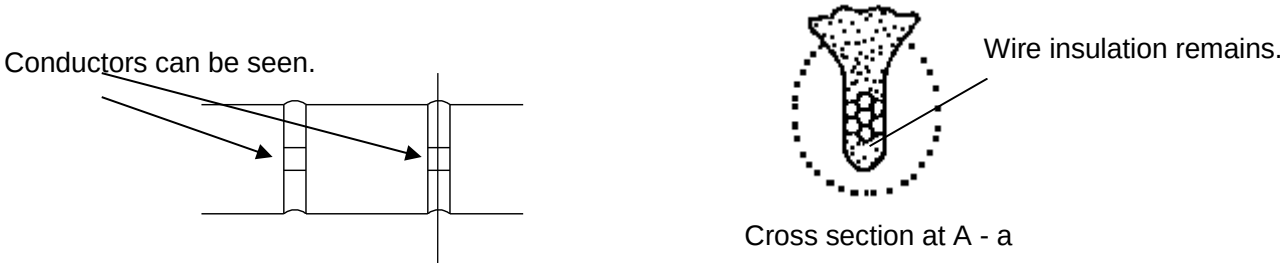


Fig.-7

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

7-3 Termination depth dimension (Reference value)

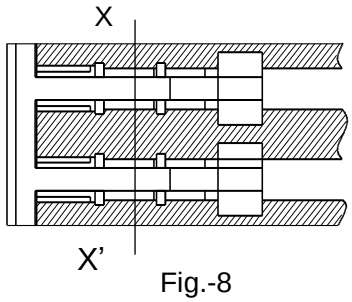


Fig.-8

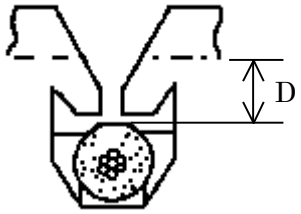


Fig.-9

Measure the termination depth dimension “D” in Fig.-9 at X-X’ part in Fig.-8, where is in the middle part of two U slots and a flattened part pressed by a termination punch, and check it satisfies the specified value in the following table.

	UL1571,UL1061
AWG #26 AWG #28	1.50 +0.05/-0.10

The above value is applied to the following wire insulation.

	UL1571,UL1061
AWG #26	ϕ1.0mm
AWG #28	ϕ0.9mm

Contact JST for other than the above UL style.

Regarding the measurement of 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 a connector is decided according to U slot dimension.
Therefore, it is good to control where wire conductors are located in U slot.
This is the concept of termination depth.
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, not 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.

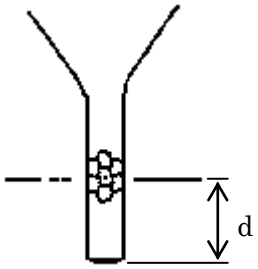


Fig.-10

7-4 Shallow termination depth……Insufficient termination

When termination is insufficient,

① Wire insulation is not located under protrusions of the strain relief as shown in Fig.11.
② Wire conductors in U slot are hardly seen or not seen at all as shown in Fig.-12.

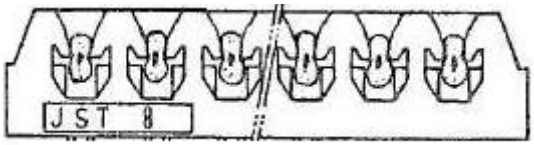


Fig.-11-1

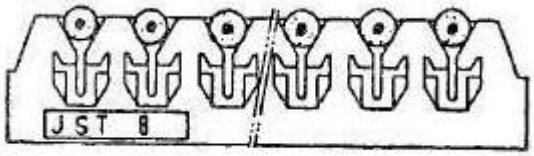
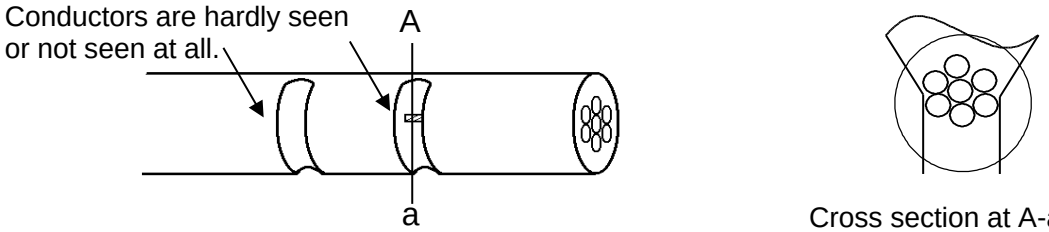


Fig.-11-2



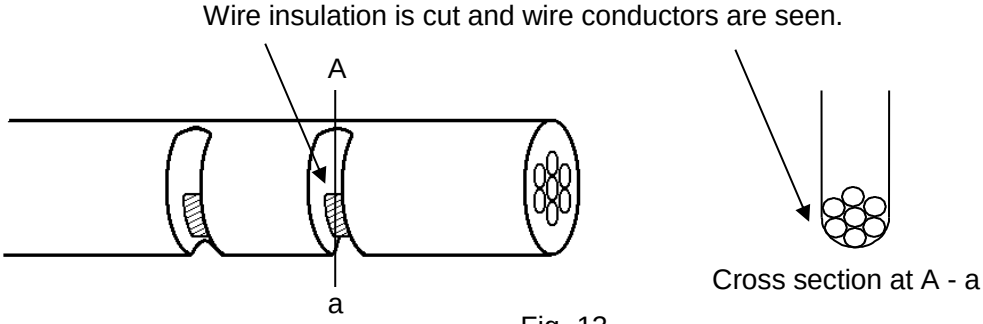
Cross section at A-a

Fig.-12

7-5 Deep termination depth……Excessive termination

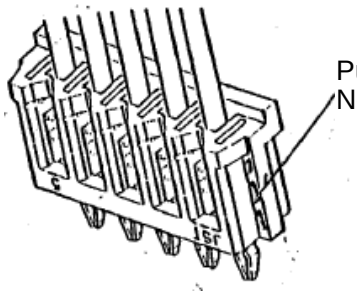
When termination is excessive,

① Wire insulation is cut at the bottom of the U slot and wire conductors are visible as shown in Fig.-13.
② Dents caused by a termination punch appear on the flange of the housing as shown in Fig.-14.



Cross section at A - a

Fig.-13



Punching flaws caused by termination punch
Note: They are acceptable as long as ① does not occur.

Fig.-14

8. Wire Retention Force

Pull a terminated wire one by one in the direction of arrow in Fig.-15 and measure the force to separate the wire from the contact by using a push-pull gauge. (Wire retention force)
Then, check that the measured wire retention force satisfies the value specified in the following table.

Refer to appendix manual No. TCM-0-005 “Method of Measuring Wire Retention Force” for how to measure the wire retention force.

Table-4

AWG #26	9.8N min.
AWG #28	7.8N min.

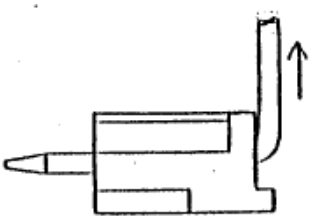


Fig.-15

9. Termination Appearance

Inspect the following points after termination.

9-1 Dents on the housing caused by a termination punch……Housing must be free from flaws.
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.-16.

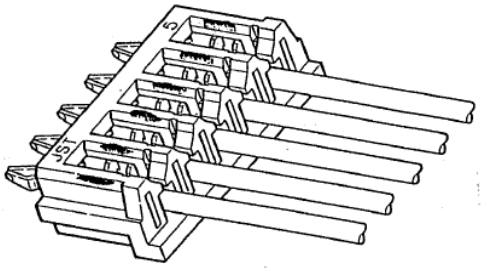


Fig.-16

9-2 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.-17.
In this case, note that not only the contact but also the termination punch may be damaged.

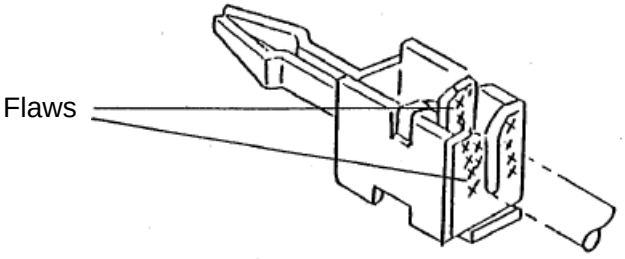


Fig.-17

9-3 Exposure of wire conductors around the beams of the contact……Wire conductors must not be exposed.

When the connector set position deviates to wire axis direction, wire conductors are sometimes visible at the front or back of the beams of the contact as shown in Fig.-18.

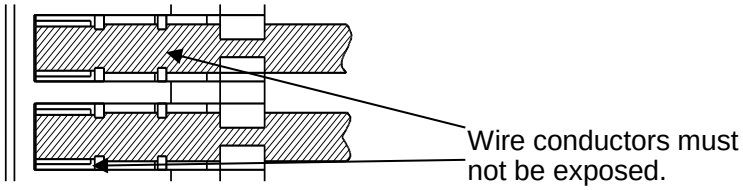


Fig.-18

9-4 Gap between the housing wall and wire front end (Wire protruding length)
Gap “G” between the housing wall and wire front end in Fig.-19 should be 0.3 mm max.

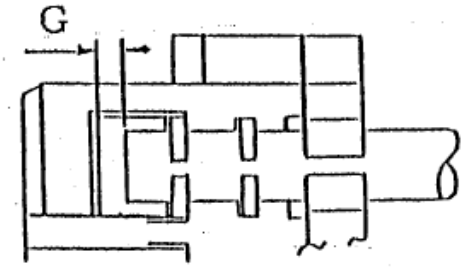


Fig.-19

9-5 Overrun of wires……Wires must not overrun.
When wire tension is inadequate, wires may overrun as shown in Fig.-20.

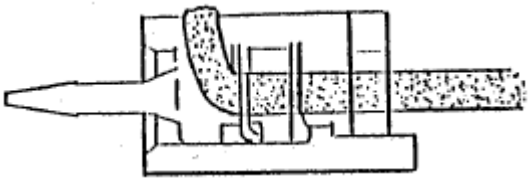


Fig.-20

9-6 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, a termination punch, a wire and the U slots do not align one a line, letting the insulation displacement center deviate as shown in Fig.-21$_{-1}$ and $_{-2}$.

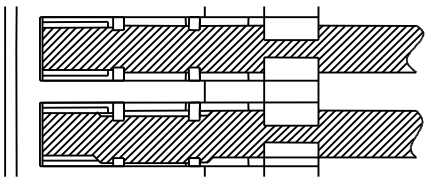


Fig.-21$_{-1}$

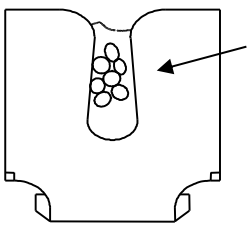
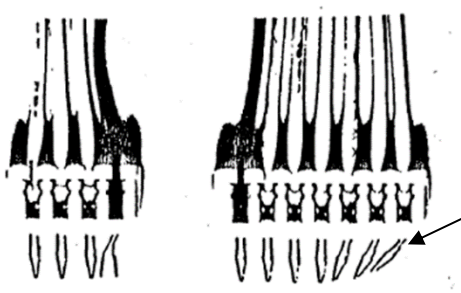


Fig.-21$_{-2}$

9-7 Appearance of the insertion part into PC board



No opening and crush at seam of the insertion part into PC boards as well as entire deformation on it

Insertion part into PC board

Fig.22

9-8 Wire insulation stripping…… No cutting and damage on wire conductor

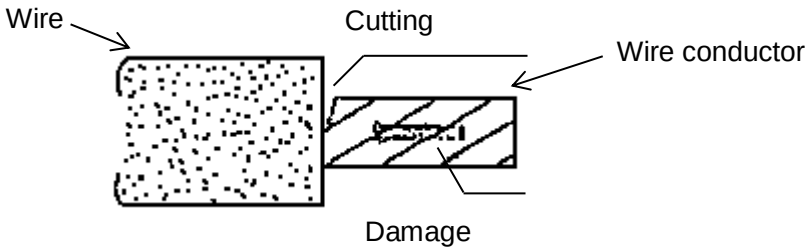


Fig.23

10. Packing

10-1 Packing method

Bundle the harnesses with a rubber band per unit quantity (example: 10 sets, 50 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. 30 mm away from the connector.)
Give consideration for not damaging the connector, such as wrapping a bubble wrap, when packing.

11. 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 drawing dimensions.
(2)	Wires to be used • Wire color • Wire size • UL style, etc.	• Verification with drawings • Visual inspection	• Wire colors conform to drawings. • Wire size and UL style conform to drawings.
(3)	Termination depth • Wire conditions • Termination depth dimensions	See item 7 Termination Depth	See item 7 Termination Depth
(4)	Wire retention force	See item 8 Wire Retention Force	See item 8 Wire Retention Force
(5) Termination appearance	① Dents on housing caused by termination punch.	Observe terminated housing visually (or by microscope if required). See item 9-1 Dents on the housing caused by a termination punch.	Housing must be free from dents caused by a termination punch.
	② Flaws and deformation at the beams of the contact.	Observe terminated contact beam visually (or by microscope if required). See item 9-2 Flaws and deformation at the contact beam.	The contact beams must be free from scratches and deformation caused by a termination punch.
	③ Wire conductors expose around the contact beams	Observe conditions of wire conductors around contact beams visually (or by microscope if required). See item 9-3 Exposure of wire conductors around the beams of the contact.	Wire conductors must not be exposed.
	④ Gap between the housing wall and wire front end	Measure by a gauge, projector. See item 9-4 Gap between the housing wall and wire front end.	Gap: 0.3 mm max.
	⑤ Overrun of wires	Observe wire tip visually (or by microscope if required). See item 9-5 Overrun of wires.	Wire must not overrun.
	⑥ Deviation of insulation displacement center	Observe terminated wire visually (or by microscope if required). See item 9-6 Deviation of insulation displacement center.	No damage on the contact and the housing
	⑦ Appearance of the insertion part into PC board	Observe the appearance of the insertion part into PC board visually. See item 9-7 Appearance of the insertion part into PC board.	No opening and crush at seam of the insertion part into PC boards as well as entire deformation on it
	⑧ Stripping condition	Observe the stripping condition visually (or by microscope if required). See item 9-8 Wire insulation stripping.	No cutting and damage on wire insulation

12. Soldering

Pay attention to the following points in soldering, because applying excessive heat or force to wire termination part in soldering leads to defects.
Keeping the following points in mind when soldering.

① Check separately when soldering to both-sided through-hole PC boards.
Both-sided through-hole PC boards have a great thermal impact on the termination part because solder goes up to the top surface of PC boards. Thus, it is necessary to check the resistance to soldering heat by using the PC boards to be used under your soldering condition.
Basically, we recommend using the mating type 2-piece connectors such as JST-made KR connector on such a PC board.

② Solder the connector to PC boards within the range of heat-resisting test condition specified in the product specification.
Pay attention to soldering not to touch the soldering iron directly to the contact as much as possible.

Recommendable condition: Dipping soldering: 250 °C within 5 seconds
Soldering iron: 340 – 360 °C (soldering iron of 40W or so) within 2 seconds

③ Do not apply tension to wires during or just after soldering.
e.g. Soldering or moving with holding wires
Piling up PC boards
Forming wires

④ Handle or form the soldered wires after the wires, PC boards and the connector are cooled down to room temperature.

⑤ Soldering (bridge) repair
Work quickly so as not to apply tension to wires during or just after repairing bridge.
Also, pay attention not to touch the soldering iron directly to the contact as much as possible.

⑥ Floating repair
Not repairing the floating is preferable.
This connector type does not bring about pattern peel that occurs on the mating type connector, even if the connector floats from PC board. As far as the connector is soldered, it is unnecessary that the connector is exposed to a harmful condition by heating on purpose.
It is considered that this work depends on worker's technique.

⑦ Do not reuse the contact which has been mistakenly inserted.
Reusing the connector which has been soldered and dismounted is not allowed.

13. Precautions

① Be sure to conduct termination operation under the condition that wires are set in all circuits. When even one wire is not set in termination, both-sided circuits of the vacant circuit is affected, possibly leading to breakage on the strain relief.

② If wire-omitted condition is required (pin-omitted condition for crimp type connectors), cut a wire of the relevant circuit after terminating all circuits.

③ Do not contaminate the contact with household goods such as oils, detergent, seasoning or fruit juice. If contaminated, do not use the contact.