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This manual describes control points about harness assembling operation for insulation displacement connector (IDC) of DB connector (pre-tinplated product) by using JST's automatic insulation displacement (ID) machine, pneumatic press and hand press.

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

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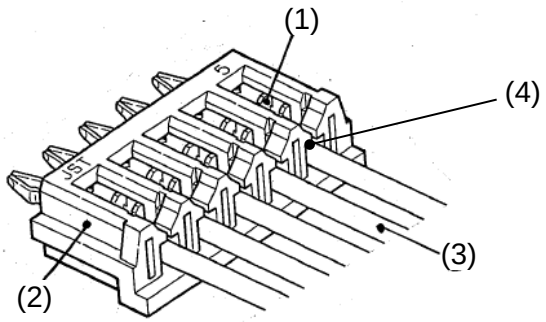
1. Composition and Parts Identification



(1) Contact (2) Housing (3) Wire

Fig.-1

Contact

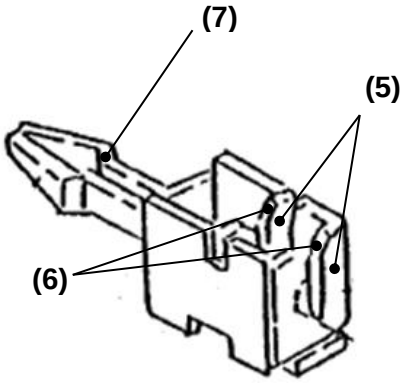


Fig.-2

(4) Strain relief: ..... Strain relief retains wire insulation to prevent from that external force loaded on wire affects U slot.

(5) Beam: ..... Two beams have an individual U slot construction.

(6) U slot: ..... It cuts wire insulation to contact with wire conductors electrically and mechanically.

(7) PC board insertion section: ..... It is inserted into PC board to be soldered there.

2. Storage

2 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 connectors

Not leaving the processed connectors 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 and wire insulation outer diameter

Table-1

Wire size	Wire insulation O. D.
AWG #28	ϕ1.0 to ϕ1.5 mm
AWG #26	
AWG #24	

3-2 UL style: UL1007
Note: Characteristics of wire insulation differs depending on each wire supplier, so that contact JST for checking wires to be used.

3-3 Wire conductor: ..... 7 stranded wires (tin-plated) and tin-coated stranded wires

4. Applicable ID Tools

4-1 Hand press

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

Note: The connectors terminated with other than JST applicable ID tool is out of our guarantee.

4-2 Pneumatic press

Contact JST for the model number of automatic ID machine.
Note: The connectors terminated with other than JST applicable ID machine is out of our guarantee.

4-3 Automatic ID machine

Contact JST for the model number of automatic ID machine.
Note: The connectors terminated with other than JST applicable ID machine is out of our guarantee.

5. Model Number and Housing Color

Table-2

Model No.	Housing color	Applicable wire	Marking
**DB-8M (LF)	Green	AWG #28	8
**DB-6S (LF)	White	AWG #26	6
**DB-4K (LF)	Black	AWG #24	4

Note: "**" denotes the circuit number.E.g.) 2-circuit: 02, 10-circuit: 10

U slot Dimension of ID connectors vary according to wire size.
To prevent from mistake in combination of connector (dimensions of twin U slot) and applicable wire size, figures shown in Table-2 are stamped on connector (Refer to Fig.-3) show applicable wire size.
As standard color of housing is specified to an applicable wire size, check the combination between wire to be used and connector.

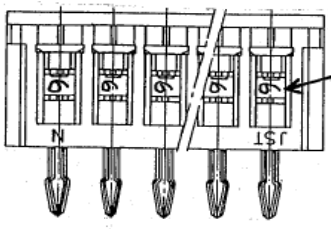


Fig.-3

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 handling manual of ID machine before conducting an operation.

Main check points

① Hand press

- Check punch is securely pulled down to lower dead point.
- Check connector set position is normal.
- Check no wire chips remain inside of terminating punch, etc.

② Pneumatic press

- Check connector is fed to the normal ID position.
- Check air pressure is normal.
- Check no wire chips remain inside of terminating punch, etc.

③ Automatic ID machine

- Check operation sequence is normal.
- Check bowl-feeder runs normal.
- Check wire tension is appropriate.
- Check wire measuring system operates accurately.
- Check connector set position is normal.

6-2 Check connector size fit to wire size.

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

6-4 Check termination depth of each connector is applicable. Refer to item 7 "Termination Depth."

6-5 Check wire retention force satisfies specified value. Refer to item 8 "Wire Retention Force."

6-6 Check termination appearance is good. Refer to item 9 "Termination Appearance."

6-7 Check whether connectors with different circuit No. or wire size, which were used in previous operation, remain in bowl-feeder or chute of automatic ID machine, or of pneumatic machine.

6-8 Check strip length dimension of stripped wire conforms to drawing and conductors of stripped part are free from damage. Refer to item 9-7 "Wire insulation stripping."

7. Termination Depth

Applicable termination depth is stated below.

7-1 Termination appearance

Wire position must be under the protrusion of strain relief of connector as shown in Fig.-4. Condition of remaining wire insulation on notch processing of shielded ribbon wire may cause wrinkle on wire insulation at strain relief part of connector as shown in Fig.-5. If wrinkle is found, check wire retention force referring to item-8 "Wire Retention Force." When measured wire retention force satisfies specified value mentioned in item 8, termination is good.

Fig.-4

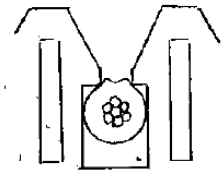


Fig.-5 (Example of wrinkling)

7-2 Wire conditions at terminated part (U slot part)

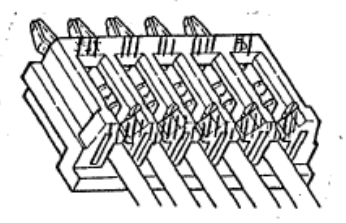


Fig.-6

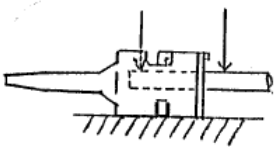


Fig.-7

After termination, cut off diagonally shaded area (strain relief and housing wall) of housing as shown in Fig.-6 and pick up connector contact having terminated wire with pliers.
Then, carefully take wire off contact U slot, holding wire as shown in Fig.-7.

Check terminated part of wire at U slot. When termination is conducted properly, wire insulation at terminated part remains as shown in Fig.-8.

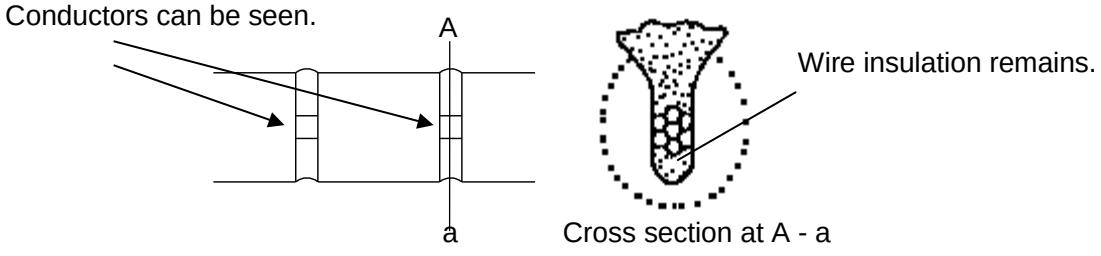


Fig.-8

Note: Conduct observation right after taking wire off U slots of contact without delay due to elasticity of wire insulation.

7-3 Termination depth dimension……Reference value

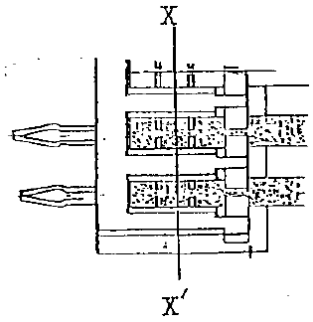


Fig.-9

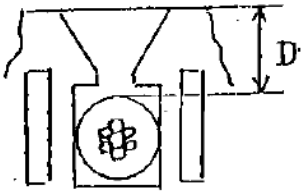


Fig.-10

Measure termination depth dimension "D" in Fig.-10 at X - X' part in Fig.-9, where is in the center part of two U slots and a flattened part pressed by termination punch, and check it satisfies specified value in Table-3.

Table-3 Termination depth in dimension "D"

Wire size	UL1007	Insulation O.D.
AWG #28	1.55+0.10/-0.15mm	ϕ1.2mm
AWG #26	1.55+0.05/-0.15mm	ϕ1.3mm
AWG #24	1.55+0.05/-0.15mm	ϕ1.4mm

Note: Contact JST for the use of UL style other than stated in Table-3.

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

Termination depth dimension for ID connectors is a similar control point to crimp height for crimp type connectors, but it is basically quite different.
As crimp height of crimp type connector varies, a coefficient of deformation of wire conductors changes enormously, and electrical and mechanical connection to connector is much affected. so that crimp height is one of important crimp operation control points.

On the other hand, U slot dimension of ID connector is designed for each wire size, and connection between wire conductors and connector is depended on U slot dimension.
Therefore, in order to control of termination depth, it is the best way to control the position where wire conductors are located in U slots. This is the concept of termination depth dimension.

The reason why the value of termination depth is the reference ones is as follows.
As termination depth is calculated from the dimension between the datum surfaces of terminated wire vinyl insulation and connector housing, hardness of wire to be used and its wire insulation outer diameter influence it. Accordingly, termination depth is reference value not an absolute one.

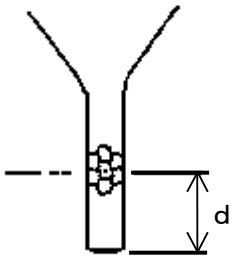


Fig.-11

The true termination depth is to measure "d" between bottom of slot and the central position of wire conductors as shown in Fig.-11. In order to reduce the time consuming in daily management, however, from the condition check of insulation displacement at U slot and the measurement of wire retention force, JST specifies termination depth "D".
Accordingly, dimension "D" becomes not reference value but control value when you use wires that JST has confirmed unless otherwise specified.

7-4 Shallow termination depth……Insufficient termination

When termination is insufficient,
① Wire insulation is not located under protrusions of strain relief as shown in Fig.-12
② Wire conductors in U slot are hardly seen or not seen at all as shown in Fig.-13.

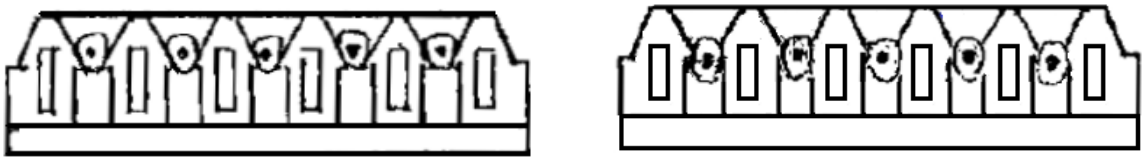


Fig.-12

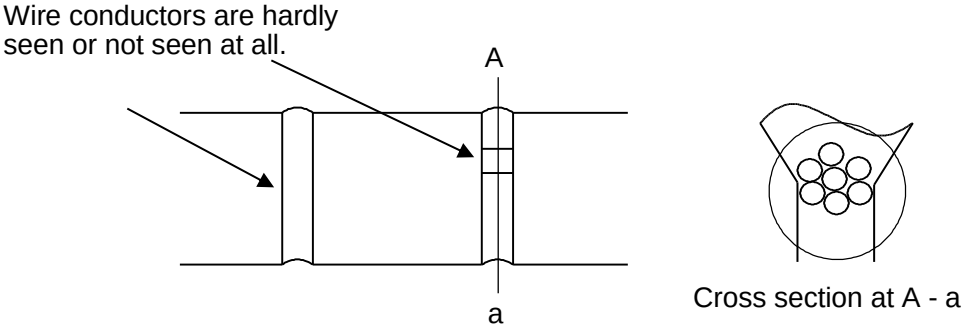


Fig.-13

7-5 Deep termination depth……Excessive termination

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

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

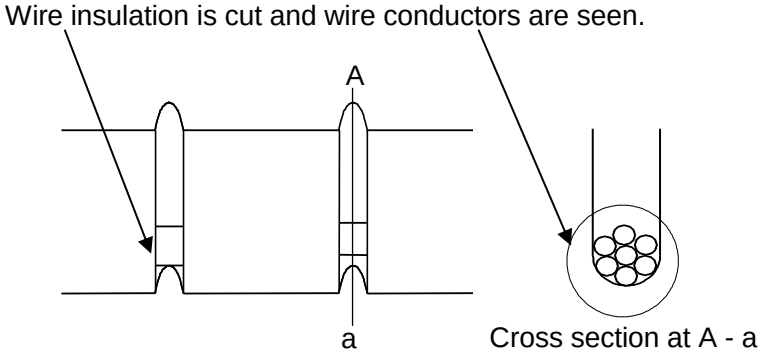
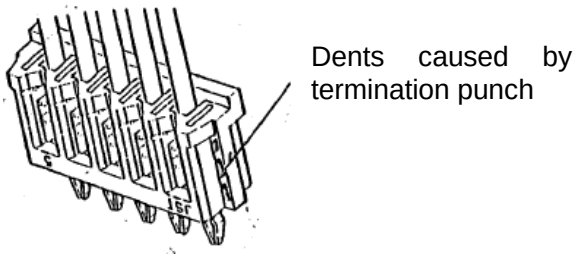


Fig.-14



Note: Though dents appear, they are allowable as long as the said ① is not caused.

Fig.-15

8. Wire Retention Force

Pull wire in the direction of arrow in Fig.-16 and measure force by such a jig as push-pull gauge when wire comes off contact. (Wire retention force)
Then, check that measured wire retention force satisfies the specified value in Table-4.
Refer to appendix manual No. HM-0062 (TCM-0-005) “Method of Measuring Wire Retention Force” for how to measure wire retention force.

Table-4

Wire size	Perpendicular
AWG #28	9.8N min
AWG #26	12.7N min
AWG #24	15.7N min

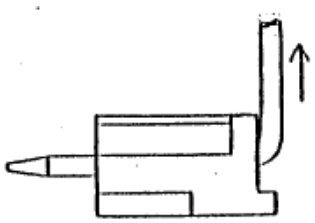


Fig.-16

9. Termination Appearance

Inspect the following points after termination

9-1 Dents on housing caused by termination punch……Housing must be free from dents.
When connector set position deviates to pitch direction, scratches and deformation caused by termination punch may appear at the “●” marked area of housing as shown in Fig.-17.

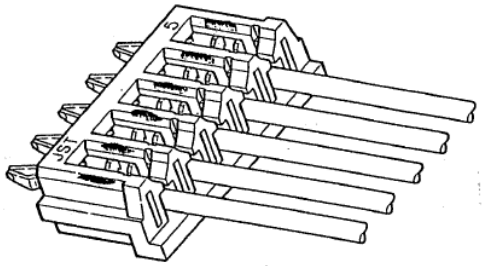


Fig.-17

9-2 Flaws and deformation at beams of contact……Beams must be free from flaws and deformation.
When connector set position deviates to wire axis direction, scratches and deformation caused by termination punch may appear at beams of contact as shown in Fig.-18.
In this case, not only contact but also termination punch may be damaged.

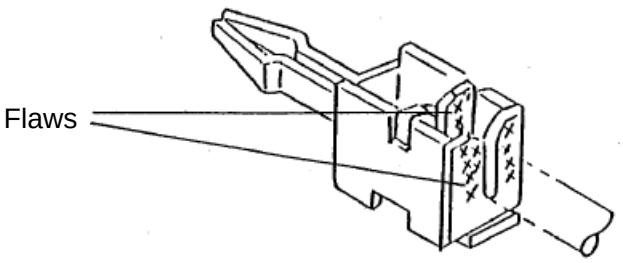


Fig.-18

9-3 Exposure of wire conductors around beams of contact……Wire conductors must not be exposed.
When connector set position deviates to wire axis direction, wire conductors may expose in front or back of beams of contact as shown in Fig.-19.

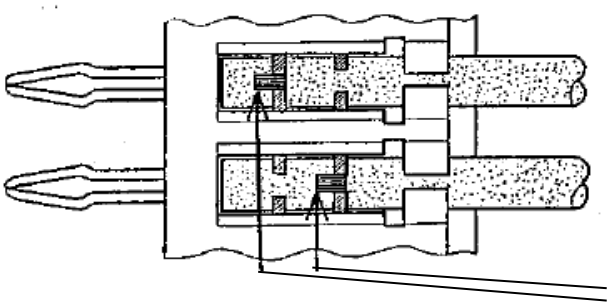


Fig.-19

9-4 Gap between housing wall and wire tip (Wire protruding length)
Gap “G” between housing wall and wire tip in Fig.-20 should be 0.4 mm max.

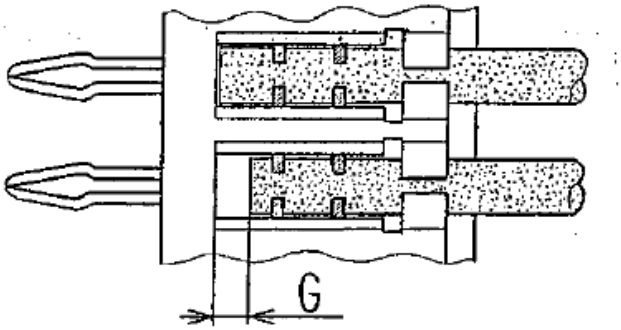


Fig.-20

9-5 Overrun of wire……Wire must not overrun.
When wire tension is not adequate, overrun of wire may happen as shown in Fig.-21.

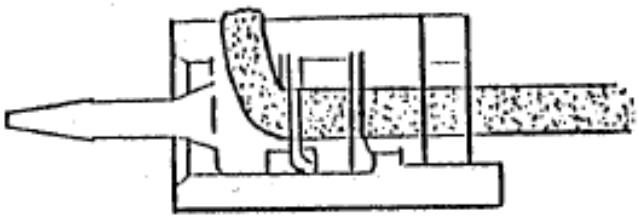


Fig.-21

9-6 Deviation of insulation displacement center……Deviation of insulation displacement center must not happen.

When the connector set position or wire deviates to pitch direction, termination punch, wire and U slots do not align, so that insulation displacement center deviate as shown in Fig.-22$_{-1}$ and $_{-2}$.

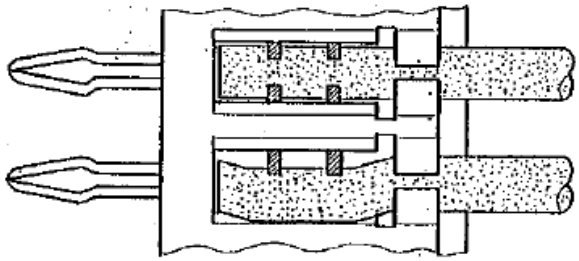


Fig.-22$_{-1}$

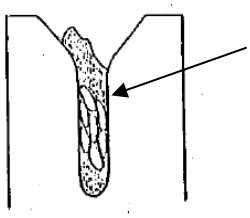
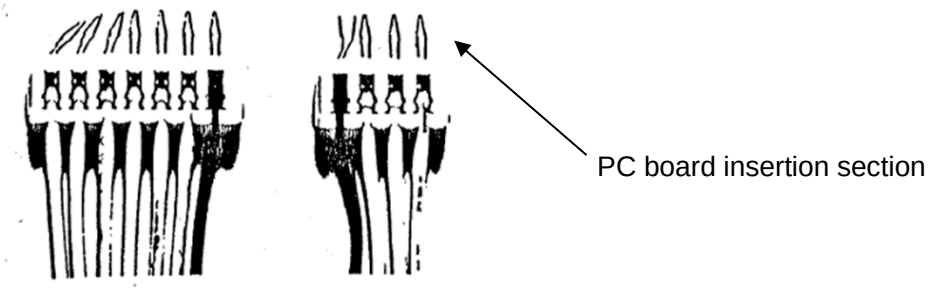


Fig.-22$_{-2}$

9-7 PC board insertion section
Tips of PC board insertion section must not open or deform.
PC board insertion section as a whole must not deform.



9-8 Wire insulation stripping
Wire conductors must be free from cutting and flaws.

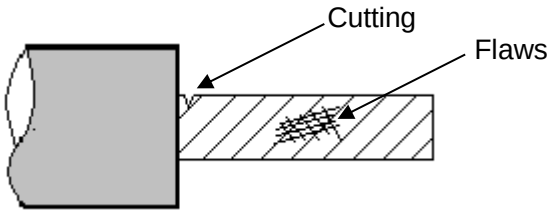


Fig.-23

10. Packing

10-1 Packing method

① When wire length is long,
Bundle the harnesses with a rubber band per unit quantity (example: 50 sets, 100 sets) and put it in a carton box. (Bundle them with a rubber band about 30 mm away from the connector.)

② When wire length is short,
Packing harnesses in a small box per unit quantity and then put small boxes in a carton box.

11. Harness Inspection

Inspect the following points:

Inspection point	Inspection method	Requirements
(1) • Harness dimensions • Wire strip length	• Verification with drawings • Caliper (or a scale)	• Satisfy drawing dimensions.
(2) Wire 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.	Table-3 (Reference value) Termination depth dimension "D" See page 4 to 6.
(4) Wire retention force	See item 8 Wire Retention Force.	Satisfy specified value stated in Table-4 of item 8 Wire Retention Force. (See page 7.)
(5) Dents on housing caused by termination punch.	Observe terminated housing visually or by stereomicroscope. See item 9-1 Dents on housing caused by termination punch.	Housing must be free from punching flaws caused by termination punch.
(6 Flaws and deformation at beams of contact	Observe terminated contact beams visually or by stereomicroscope. See item 9-2 Flaws and deformation at beams of contact.	Contact beams must be free from scratches and deformation caused by termination punch.
(7) Wire conductors expose around contact beams.	Observe conditions of wire conductors around contact beams visually or by stereomicroscope. See item 9-3 Exposure of wire conductors around beams of contact.	Wire conductors must not be exposed.
(8) Gap between housing wall and wire tip	Measure by such a tool as gauge and projector. See item 9-4 Gap between housing wall and wire tip.	Gap: 0.4 mm max.
(9) Overrun of wire	Observe tip of terminated wire visually or by stereomicroscope. See item 9-5 Overrun of wire.	Wires must not overrun.
(10) Deviation of insulation displacement center	Observe appearance of terminated wire visually or by stereomicroscope. See item 9-6 Deviation of insulation displacement center.	According to the boundary sample
(11)Appearance of PC board insertion section	Observe appearance of PC board insertion section visually. See item 9-7 PC board insertion section	PC board insertion section must not open or deform.
(12) Stripped condition	Observe stripped condition Visually (or with microscope if necessary) See item 9-8 Wire insulation stripping.	Wire conductors must be free from cutting and damages.

12. Precautions for Soldering

When excessive heat or force is applied to wire termination part of this DB connector in soldering operation, it may cause soldering defect, so pay careful attention to the following 7 points for soldering operation/

① When soldering connector on double-sided through-hole PC board, check the resistance to soldering heat.

When soldering connector on double-sided through-hole PC board, solder wicking happens up to the top of the PC board and it affects greatly termination part, so check resistance to soldering heat with PC board to be used under the customer soldering condition.
We recommend using mating type two-piece connector such as HR connector manufacture by JST.

② Solder connector on PC board within the range of resistance to soldering heat condition specified in product specification.

Recommended condition

Dip soldering:	Dip connector in soldering with a temperature of 250°C within 5 seconds.
Soldering iron:	Use soldering iron with a temperature of 340 ~ 360°C (about 40W) within 2 seconds.

③ Do not apply tension to wire during or right after soldering.

e.g. · Soldering or moving with holding wires
· Stacking up of PC board
· Routing of wire

④ Route wire after soldered wire, PC board and connector have completely cooled to normal temperature.

⑤ Soldering repair (Bridge)

During or right after repair of bridge, solder connector quickly not to apply tension to wire, paying attention not to touch contact directly with the tip of soldering iron as much as possible.

⑥ Repair of floating

It is preferable not to repair the floating.
Even if this ID type connector floats from PC board, such abnormalities as peeling off pattern of PC board which mating type connector has do not occur.
It depends on the technical level of worker.

⑦ Do not reuse the inserted connector in the improper circuit hole of housing.

Do not dismount the once soldered connector from PC board and reuse it.

The aforementioned precautions are commonly applied to ID type board-in type connector.
As a rule, there is no problem to use connector if connector is soldered on PC board at the specified soldering temperature within the specified period without applying the tension to wire during or just after soldering.

12. Other Precautions

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.
If wire-omitted condition is required (pin-omitted condition for crimp type connector), cut a wire of the relevant circuit after terminating all circuits.
As adhesion of foreign matters such as seasoning, fruit juice, detergent, etc. may cause defective continuity and defective soldering. Pay careful attention and if stained, never use the stained connector.

Contact your nearest JST sales office or engineering center for this manual, I.D. machine and I.D. connectors.