Title of Document:	**HANDLING MANUAL**	Issue No. CHM-1-045	Rev. 5
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LV connector is designed for wire-to-PC board connector which is compact, highly reliable and low in cost. It is suitable for consumer electronic products, office automation equipment and various electronic products used under applying high current. (5A max.)
This handling manual describes operation points of crimping, assembling, etc. for further reliability and performance of the connector's features.

C O N T E N T S

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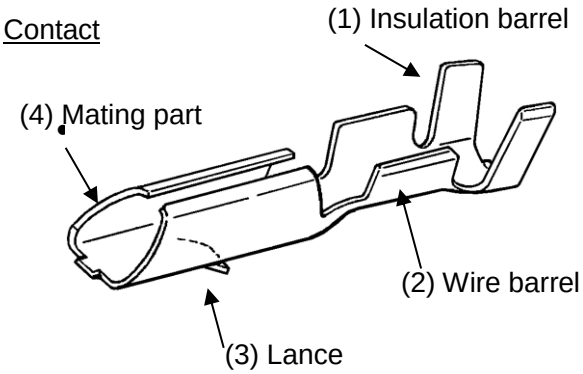
1. Parts Identification

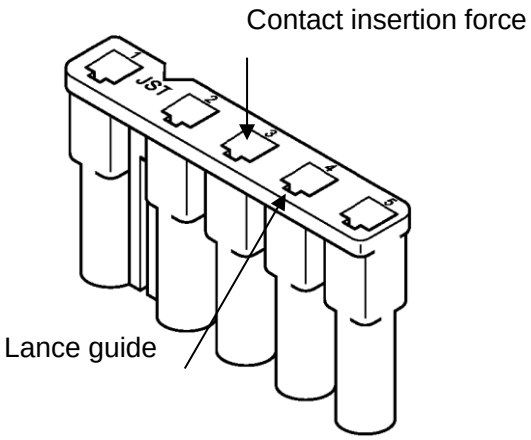
LV connector consists of the contact, the housing and the header.
On processing and assembling, understand each structure and name.

Contact

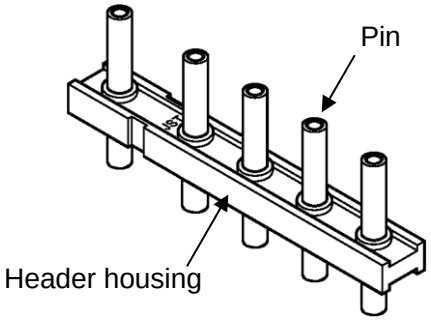


It holds wire insulation.
(2) It crimps wire conductors.
(3) It engages the contact to the housing.
(4) Contacting part with the header

Housing



Header



2. Part Name and Model Number

Product name		Model No.
Contact	Standard type	SVF-01T-2.36N
	Low insertion force type	SVF-01T-2.36LN
Housing	Noryl	S1P-LV $**_1$ P-LV
	PBT	S1P-LV-P $**_1$ P-LV-P
Header	Nickel-undercoated Tin/Copper alloy- plating	B $**_2$ P-LV-TA (LF)
	Nickel plated	B $**_3$ P-LV-TN

Note$_1$: Figures in $**_1$ to $**_3$ denote the circuit number.
$**_1$: 2 to 6
$**_2$: (Standard type)……1 or 2, (Low insertion force type)……1 to 6
$**_3$: (Standard type)……1 to 6, (Low insertion force type)……No setting
The type in ( ) shows the contact which is combined with.

Note$_2$: When using Noril (modified PPE) resin housings, handle with care not to attach oils and fats to them, because the resin has low resistance to oil and organic solvents.
Also, avoid cleaning the printed circuit board with the harness connector mounted on.

Note$_3$: (LF) as identification part number indicating lead-free of TA-type header shall be displayed on 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.

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

UL1007 (annealed copper stranded wire with tin-plated) or its equivalent can be used.

Wire size: Standard type..... AWG #24 ~ AWG #20 (0.2 ~ 0.5 mm^2)
Low insertion force type..... AWG #24 ~ AWG #18 (0.2 ~ 0.83 mm^2)
Wire insulation O. D.: Standard type..... ϕ1.4 mm ~ϕ2.7 mm
Low insertion force type..... ϕ1.4 mm ~ϕ2.9 mm

Note$_4$: Special wires such as solid wires, tin-coated wires and shielded wires other than above wires cannot be used in principle.
When using special wires, contact JST.
Regarding shielded wires, refer to item 7-6 “Handling method of special wires.”

5. Crimping Tool

Part name		Model No.
Crimping machine		AP-K2( )
Applicator	Standard type	MK-L
	Low insertion force type	MKS-L
Die	Standard type	MK / SVF-01-236N
	Low insertion force type	MK / SVF-01-236LN
Applicator with die	Standard type	APLMK SVF01-236N
	Low insertion force type	APLMK SVF01-236LN

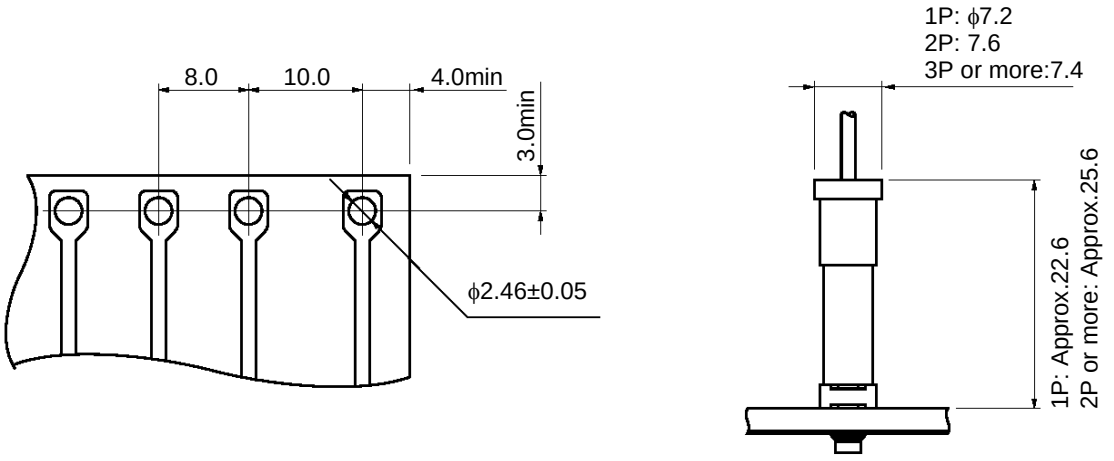
Note$_5$: When crimping operation is conducted by using other than the above applicator and die set, JST cannot guarantee the connector performance.

6. Applicable PC Board

6-1 Applicable PC board thickness

1.6 mm

6-2 PC board layout and assembly layout



Note$_6$: Tolerances for PC board are non-cumulative ±0.05 mm for all centers.

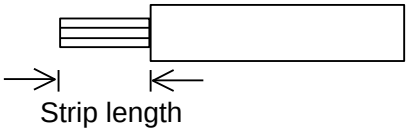
Note$_7$: The dimensions above should serve as a guideline for drilling. The hole diameters differ according to piercing method and PC board material.

7. Crimping Operation

7-1 Wire strip length

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

Reference value of wire strip length: 4.0 ~ 4.5 mm



7-2 Crimping

Before crimping operation, be sure to check the combination of the contact, a wire to be used and the crimping die are correct.
Check the below points for correct crimping at the beginning and the middle of crimping operation.

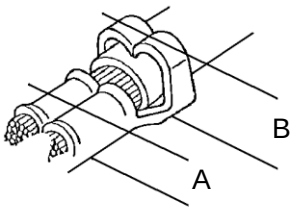
7-2-1 Applicator

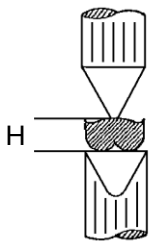
Before crimping, check that contact to be crimped and applicator are appropriate.

Note$_6$: Crimping applicator to be used differs between standard product and low insertion force product.

7-2-2 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.



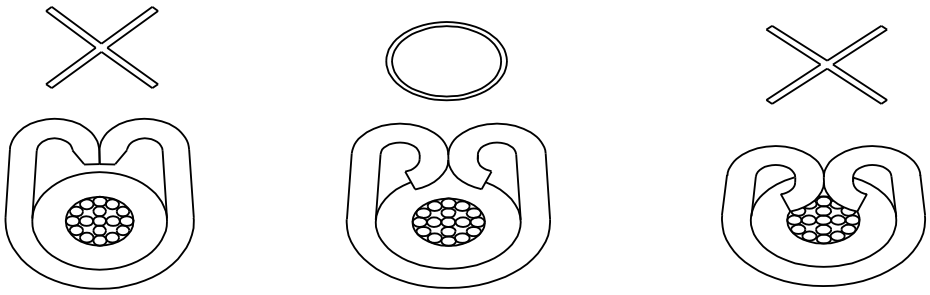


A: The crimp height at the wire barrel should be set to the pre-determined dimensions.

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.

7-2-3 Crimping condition at insulation barrel



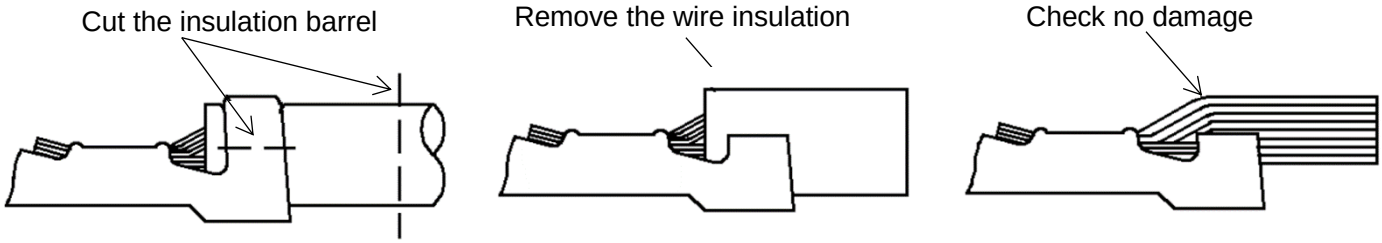
Insufficient crimping (pressed weak) When tension applies to the wire, the wire insulation easily comes off of the contact.

Good

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

7-2-4 Check of crimping condition at insulation barrel

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



7-3 Crimp height table

Unit: mm

Wire (UL 1007)		Crimp height			
		Standard type		Low insertion force type	
Wire size	Insulation O.D.	Conductor part	Insulation part	Conductor part	Insulation part
AWG#24	1.5	0.85±0.05	2.0	0.70 to 0.75	2.2
AWG#22	1.7	0.90±0.05	2.1	0.75 to 0.80	2.3
AWG#20	1.9	0.95±0.05	2.2	0.8 ± 0.05	2.4
AWG#18	2.1	---	---	1.00 ± 0.05	2.6

7-4 Tensile strength at 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

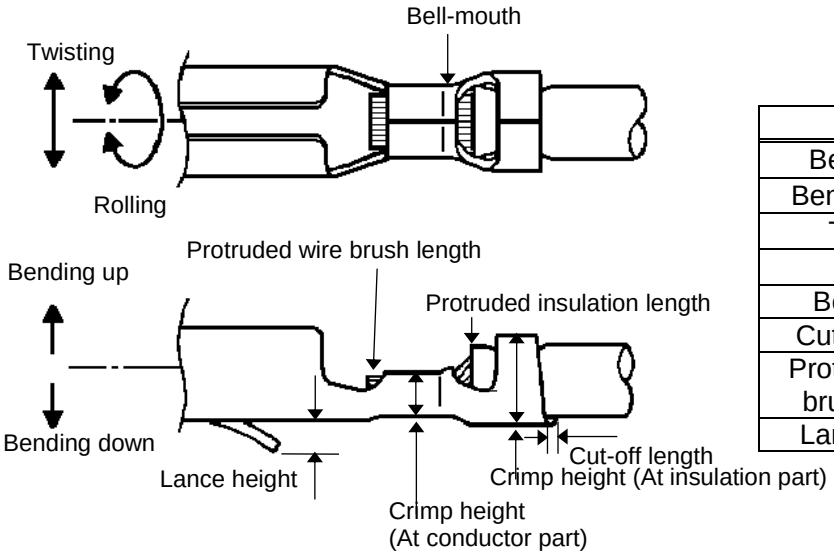
Wire size	Tensile strength at crimped part			
	Standard type		Low insertion force type	
	Requirement	Actual value (Ref.)	Requirement	Actual value (Ref.)
AWG#24	29.4 min.	55 to 66	30 min.	52 to 63
AWG#22	58.8 min.	80 to 90	45 min.	84 to 90
AWG#20	78.4 min.	151 to 161	70 min.	131 to 145
AWG#18	---	---	80 min.	146 to 166

* Actual values show the crimped tensile strength of a sample with only the core wire crimped.

7-5 Crimping appearance

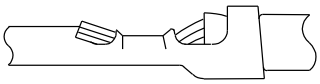
Check the crimping appearance visually for correct crimping with equipment such as a loupe.

7-5-1 Part name of crimped contact

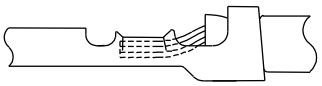


Item	Reference value
Bending up	approx. 3° max.
Bending down	approx. 3° max.
Twisting	approx. 3° max.
Rolling	approx. 5° max.
Bell-mouth	approx. 0.1 ~ 0.3 mm
Cut-off length	approx. 0.1 ~ 0.3 mm
Protruded wire brush length	approx. 0.5 ~ 1.0 mm
Lance height	Approx. 1.0 mm

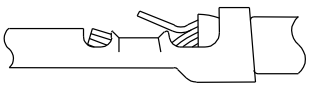
7-5-2 Examples of defective crimping



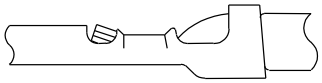
Long protruded wire brush



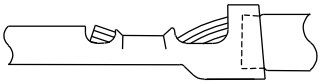
Short protruded wire brush



Stray wire conductor

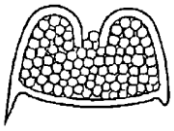


Bitten wire insulation with Wire barrel



Poor crimping on wire insulation

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

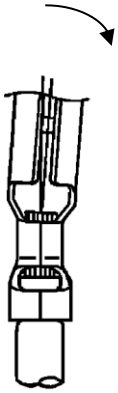


No large burr is made

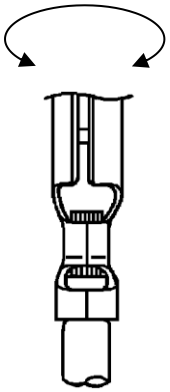
7-5-3 Bending up, bending down, twisting and rolling

Bending up/down

Twisting



Rolling

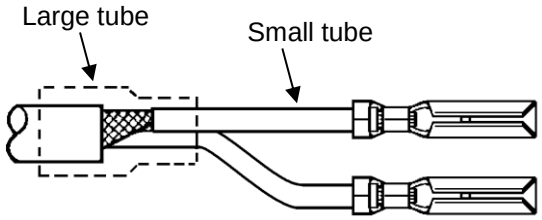


***About bending up, bending down, twisting and rolling**

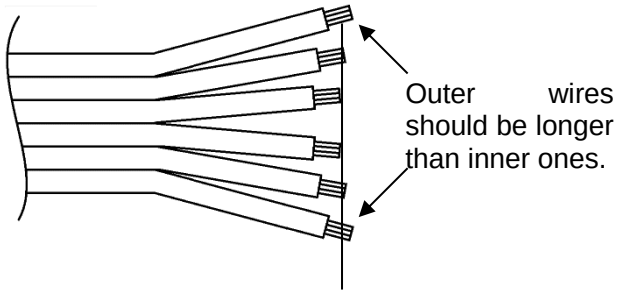
Please note that they may cause poor insertion into the housing, retentivity down, or mating failure.

7-6 Handling method of special wires

Split length of core wire and braided shielded wire



Split length of flat-ribbon cable



Some special wires need processing as shown in above figures to ensure easy insertion of the contact into the housing, and to prevent the contact deformation and wire cutting during the inserting operation.
Adjust split length of braided shielded wired and flat-ribbon cabled so that tension is not applied to a wire in small size for braided shielded wire, and so that tension is uniformly applied to each of split wires for flat-ribbon cables (lengthen the both outer wire).

Crimping of braided shielded wire

After stripping and slightly twisting braided shielded wires, trim the tip with a nipper and crimp aligning the tip. Not aligning the tip may cause improper crimping.
The tube insulation outer diameter should meet the applicable insulation outer diameter of the contact.

7-7 Precautions for storage and handling of crimped contact

As the crimped contact before inserting into the housing is subject to deformation, etc. by external forces, pay careful attention to the following 6 points for the storage and the handling:

① The number of the crimped contacts for one bundle should be 300 pcs. max. Protect the contacts by wrapping with thick paper, etc. to prevent from deformation and adhesion of foreign matters, and keep them in an adequate box.

② Do not stack too much quantity of the crimped contacts nor place anything on them, because weight of themselves may deform the contact and troubles such as poor contact.

③ When the crimped contact is taken out of the bundle, do not pull the contact forcibly which is entangled with each other since it may deform the mating part.
Come apart the entangled contacts carefully.

8. Harness Assembly Operation

Harness assembly operation is a very important process to decide the connector performance and the harness quality. Careful operation is required for the harness assembly as well as the said crimping operation.

8-1 Before inserting the crimped contact into the housing

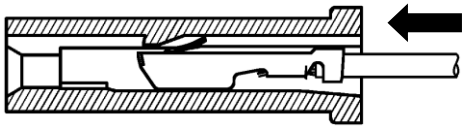
Before inserting the contact into the housing, check below points:

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 that is improperly crimped and deformed such as at the lance and PC board insertion part.

8-2 Inserting contact into housing

① Hold the contact with its lance part up, and align the contact lance guide at the housing with the contact lance, and then, insert the contact parallel to the insertion axis.



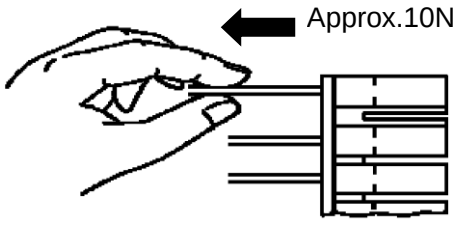
- Precautions for inserting the contact

  Do not tilt the contact to the direction that the housing lance is pushed or insert the contact prying up and down or right and left, because such handling may deform the contact lance and the mating part.

② Insert the contact into the housing without stopping to the innermost.
When the contact is fully inserted into the housing, the housing lance clicks and there is feeling of response.

8-3 After inserting the crimped contact into the housing

Check secure locking per each insertion by pulling a wire softly with force of approx. 10N.



Note$_8$: When wires are pulled with too much force, the contact lance may be deformed and the contact may come off the housing.

8-4 How to extract the crimped contact from the housing in case of mis-insertion

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

① Do not reuse once used housing but use a new one.
(Method of extracting contact from housing is as below.)

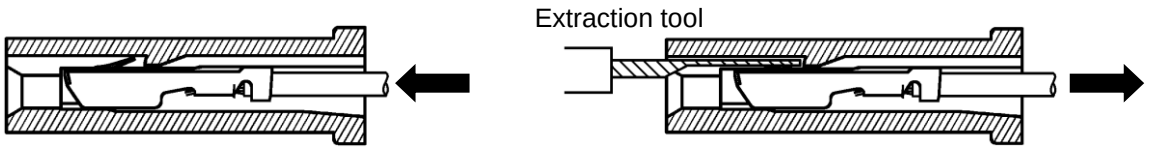
② When the contact that is inserted into an improper circuit is extracted from the housing and the housing is reused.

- Only a specified person conducts the operation.
- Housing reuse should be once.
- The housing lance should be modified to its original position (approx.1.0mm).

How to extract the crimped contact from the housing

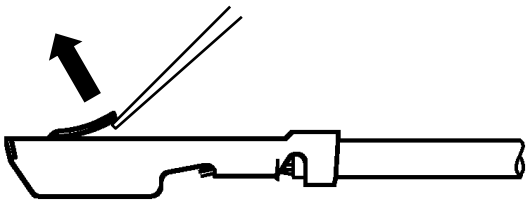
① Push a wire to unhook the housing lance. Never fail to conduct the operation before ②, since the lance and the housing may damage.

② When insert the extraction tool, LVJ-08, with pushing a wire, the contact lance is pressed. In the condition, the contact comes off by pulling a wire.



How to raise the lance

Insert something like an edge of knife or a flat-blade screwdriver from between the lance and the contact, and raise the lance.
Do not use something like a needle to raise the lance, since it may come into the contact and deform the mating part.



How to re-insert the extracted contact and to check after insertion

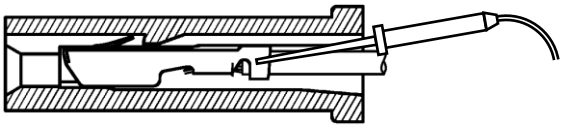
① Inserting method: Refer to item 6-2
② Check after insertion: Refer to item 6-3

In case that the contact cannot be re-inserted or come off soon after the insertion because the lance or the housing are damaged during the contact extraction, do not use such damaged parts.

9. Inspection of Finished Product (Continuity Check)

9-1 Simple wiring inspection using a tester

① Do not insert a tester stick into the mating part.
The inadequate diameter and the prying operation of the tester stick may deform the mating part.
② Contact the tester stick with the wire insulation side by inserting it from the entrance of the contact, and do the inspection.



9-2 Wiring inspection using an inspection jig

Pay attention to the following pointes.

① Use the header applicable to the connector as an inspection.

② Use the header free from deformation, damage and stains. If found, replace it with a new one and check whether the inspected items by the header are free from abnormalities.

③ Periodical replacement of the header should be conducted.

④ Mate and unmate the connector with care, holding the housing without prying.
When the inspection board is used, design it considering that the mating and unmating operation is not difficult.

10. Header

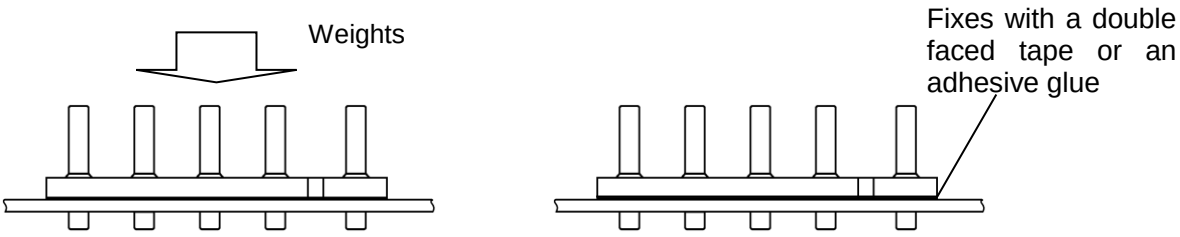
10-1 Selection of plating

Insertion and withdrawal force of LV connector depends on the number of circuits.
In case nickel-plated header of smaller circuits (1 or 2 circuits) have too small insertion and withdrawal force, it is recommended to use tin/copper alloy-plated header instead.
As the tin/copper alloy-plating has higher coefficient of friction than the nickel-plating, it can get higher insertion and withdrawal force.

10-2 Soldering operation

① Floating from PC board

LV connector has no clinches to prevent the disconnection from PC board.
When floating and extraction of the header by external force or vibration are likely, you should take any measures not to stop the disconnection of the header from its PC board.



② Flux

When using nickel-plated header, use an activating flux (specially prepared for nickel-plating).

③ Dip soldering

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

③ Soldering by hand and soldering modification

When soldering by using a soldering iron or soldering repair for bridge, etc. are conducted, note the following points, because deterioration of the resin is considered due to heating.

Soldering iron:	Use soldering iron with small heat capacity (40W max.).
Soldering time:	Conduct soldering operation quickly within 3 seconds.
Soldering method:	Do not press soldering iron tip on connector contact lead part nor apply abnormal force such as lateral load. If done, dismount and change the connector, and conduct soldering again. Do not reuse the dismounted connector.

④ Cleaning operation

On processing normal flux cleaning, the header of LV connector is not affected by cleaning solvent. However, when polluted cleaning solvent by flux is left in the header, the residual cleaner may cause poor contact and other troubles.
Note: In principle, the housing cannot be cleaned.

Housing:
The LV connector housing is made of noryl (modified PPO).
The resin may crack and melt, so pay attention to its chemical resistance.
Therefore, housing (including harnesses) should be free from oil and the mounted connectors on PC board should be cleaned.

11. Control Points for Crimping Operation and Harness Assembly

Operation of crimping and assembly affect reliability of connector (the defective ratio). It is recommended that operation of crimping and assembly and finished products be controlled concentrating upon the following check points.

Process	Check item	Description	Remarks
Crimping	Appearance	① Check that wire is crimped at normal position. ② Check that crimp configuration is normal and excessive burr does not appear. ③ Check that uncrimped wire is not left behind. ④ Check that contact is not bent, deflected or deformed. ⑤ Check that contact is free from dirt, scratches, stains or discoloration.	Item 7
	Crimp height	Check that crimp height is adequate.	
	Tensile strength	Check that tensile strength is adequate.	
Harness assembly	Appearance	① Check that contact is properly inserted into housing. ② Check that contact is securely locked with housing. ③ Check that wiring is correct. ④ Check that housing is free from dirt and foreign matters.	Item 8
Finished product (Harness)	Appearance Continuity	① Follow all descriptions stated above in "Appearance." ② Check that harness passes continuity test.	Item 9

12. Handling Precautions

① Do not stain the contact with household goods such as oils, detergent, seasoning and fruit juice If stained, never use such a stained contact.

② Do the mating and unmating operation of the harness connector with the counterpart mounted on PC boards on the mating axis with holding the housing,
In case that it is difficult to hold the housing from the connecting and soldering conditions of the connector, Hold all wires at once while supporting the housing by your finger to apply even load to wires.
(Mating and unmating operation with a load applied to some wires may cause breakage on the connector.)

③ Never spray fumy insecticide in the place where the connector and the harnessed product are stored, or harness operation is conducted, because such spray may rust the metal part.

④ Do not mate the contact and the receptacle one without inserting them into the housing, because the contacting part may be deformed.

⑤ Handle a wire with care not to apply undue load to the only one circuit.

⑥ Fasten the tip of remaining chain contact in the reel with wire, etc. to the reel so as not to unravel, and store it in a carton box.