

TITLE:	Board-to-Wire Connector Guidelines	ETAD-H1023-00
PRODUCT:	DF SERIES	PAGE: 1 OF 15

Board-to-Wire Connector Guidelines

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ETAD-H1023-00

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1. Introduction

Precautions on how to handle the board to wire connector are described.
In order to use the connector without any trouble, be sure to read and use it correctly before use.
Refer to the "Cable Assembly Procedure" and "Mating/Unmating Instruction Manual" for specific procedures.

CL Code No.	Series No.	CL Code No.	Series No.
CL218	HNC	CL667	DF59, DF59S, DF59M, DF64
CL536	DF13	CL665	DF50
CL538	DF14	CL668	DF52
CL541	DF1, DF1B, DF1E	CL676	DF5, DF33C
CL543	DF3, DF11, DF51	CL680	DF22, DF60, DF63, DF63W, DF63SF
CL544	DF62, DF62W	CL685	DF19
CL547	MDF	CL686	DF20
CL666	DF57, DF58, DF61, DF61Y, DF65		

*The photographs and illustrations used herein are for our company's representative products and may vary from product to product.
The guideline information is subject to change without prior notice.

2. Safety Precautions

In this "Board to Wire Connectors Guidelines" safety precautions are ranked as follows:
Classified as **Warning/Caution**.

■ Meaning of Prohibited Matters and Precautions

 Warning	The table below shows the precautions that should not be taken when handling this product incorrectly, as it may cause serious injury or death .
 Caution	Incorrect handling indicates possible damage to property .

 **Warning**

- Be sure to turn off the power before proceeding as there is a risk of electric shock or damage.
- Do not touch the metal parts. There is a risk of electric shock.
- Do not insert or remove hot conductors.
- Do not use with voltage or current exceeding the rated value. May cause fire or electric shock.
The rated current in the product specification sheet indicates the current that can be applied per pin.
(If the rated current of the connector is 3A, but the allowable current of the wire used is 1A, the overall rating is 1A.)
- Do not branch current to multiple circuits.
- Do not use if the crimp contact is deformed or severely damaged. Failure to do so may cause contact failure or fire.
- Incorrect handling of jigs and tools may cause injury or accident.
Please follow the instruction manual and work properly.
- Be careful not to injure the metal or edge of the connector.
In particular, if you insert or remove a connector that is not attached to the board, you may not be able to insert or remove it properly because the holding part is small and you may be injured.
- Be careful not to cut your hands with the interlayer paper of the reel contact.

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Caution

[How to use the product]

- We do not guarantee the mating with other companies' products.
- Do not use by mating "Tin Plating" and "Gold Plating" together.
Because the potential difference between tin and gold is large, a corrosion phenomenon called "potential difference corrosion" may occur, which may degrade the performance of the contact.
- To prevent unpredictable shorting, ensure that the panel or piece of metal does not touch the connector.
- When silk printing is performed on the board, do not touch the bottom of the connector.
There is a risk of mounting failure.
- Damage to the connector, deformation of the contact points, and solder cracks may occur.
 - When routing wires, make the wires loose so that loads are not applied to the connectors.
 - Fix the connector and the wire inside the equipment to prevent the connector contact from moving.
 - Be careful to apply load to the connector.

[Product storage and transportation]

- Please keep the packing form at the time of delivery until you use it.
- As the product may deform, be careful not to apply a load that deforms the packaging (cardboard) or drop it when storing, moving or transporting the product.
In particular, if an extreme load is applied to the housing lock and lance, there is a risk of damage.

3. Selection of Products

[Product Applications]

- It is assumed to be used for household appliances indoors.
If you are planning to use the product for any other purpose (Automobiles, ships, medical devices, etc.), please contact our company's sales representative in advance.
Depending on the conditions, we will consider whether we can guarantee it or not.
- Do not use for aeronautics, space, nuclear power, etc.

[Product Appearance]

- There may be black spots on the surface of the housing or differences in color (including discoloration due to aging), but this does not affect the quality of the product.
- Please note that the following minor changes may be made without prior notice.
(mold bridge notch, protruding pin mark, gate position, font/size/spacing, etc.)

[Product Standards]

- Use within the ratings and standards specified in the product specification sheet.
Please check the product standards on our website.
Website: <https://www.hirose.com/jp/>

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[Plating Selection]

- For "Tin plating" and "Gold Plating", use the following operating conditions as a guide.

plating specification	tin plating	gold plating
Number of insertions and removals *1	30 times or less	50 times or less
Microsliding *2	None	Yes
Environmental impact * 3	None	Yes
current used	100 μA or more	100 μA or Less

- *1: The number of insertions and removals varies depending on the series. For details, please check the product Specification sheet of each product.
- *2: Condition subject to constant or intermittent sliding.
Select gold plating because it may cause contact failure.
- *3: Example of environmental impact ... Continuous temperature cycle environment, hot and humid environment, etc.

[Storage and Use Environment]

- Please store and use this product indoors, away from direct sunlight, and within the "storage temperature/humidity range" and "use temperature/humidity range".
- Do not store or use the product under conditions containing corrosive substances that may cause deterioration of plastic properties or metal rust.



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4. Wiring Procedure

4-1. Preparation for Wiring

[Documents required for work]

Before starting the wiring work, prepare the following work-related documents. (Documents Required: ×)

If you do not have all the necessary documents, contact our company Sales.

name of document	Contents	automatic machine pressure deposition	hand tool pressure deposition
1) Main unit of crimping machine instruction manual	Description of main unit of crimping machine	×	-
2) Applicator spare parts identification	Applicator mounting instructions	×	-
3) Crimping condition sheet	Crimpheight Standard value of tensile strength	×	-
4) Crimp quality standard	Various standards of crimping condition	×	-
5) Manual crimping tool instruction manual	crimpheight Standard value of tensile strength Other check items	-	×

[Combination]

- Check that the combination of crimp contact, tool, and wire is appropriate.
The manual crimping tool can only crimp compatible wires (specific).
- Check that the combination of crimp contact and housing is appropriate.

[Product]

- Check that the product (crimp terminal, housing, etc.) matches the product drawing.
Also, check that there is no deformation or dirt.
- Do not touch the crimp contact directly with your hands.
- Do not pull the contact forcibly when it is entangled as it may deform.
Do not apply external force to the crimp contact.

[Tools]

- Please use a tool designated by our company.
We do not guarantee the quality of the product because crimping with other tools may cause contact failure, disconnection, etc.
- Before crimping, be sure to carefully read the operation manual of the tool (crimping machine, applicator, manual crimping tool).
- The manual crimping tool can only crimp compatible wires.

[Wire Used]

- Make sure that the electric wires to be used are inside the scope.
- In principle, tin plating soft copper twisted wire is applied.
Do not crimp single wires, wires with polyester threads, etc., or tin-coated wires.
- When using an electric wire other than the applicable electric wire listed in the catalog, request "crimping condition sheet".
 - Items to be presented when requesting "Crimping Condition Sheet"
 - Crimp contact name
 - Wire used (UL Style, AWG Size, Core Wire Configuration, Coating Outer Diameter, Materials (Core Wire/Coating), Plating Specifications)
 - If the crimp height has not been set, a new conformance test will be carried out to set the crimp height.
Therefore, our company Sales Co., Ltd.
Please consult with the counter. For crimping work, an applicator with adjustable crimp height is used.
 - Wires required for compliance testing: 30 m

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[Quality Control]

- We have defined crimp height as an important item for quality control. In order to set the optimum crimp height accurately, our company conducts crimp testing on each wire and sets the optimum value.
- Even if the same wire is used, the crimp height setting value may differ between the tin-plated contact and the gold-plated contact.
- Even in the same calculation cross section area, the crimp height setting value may differ depending on the configuration of the conductor.

4-2. Crimping

- Please follow the “Documents required for work” in “4 -1. Preparations for wiring work” and work correctly.

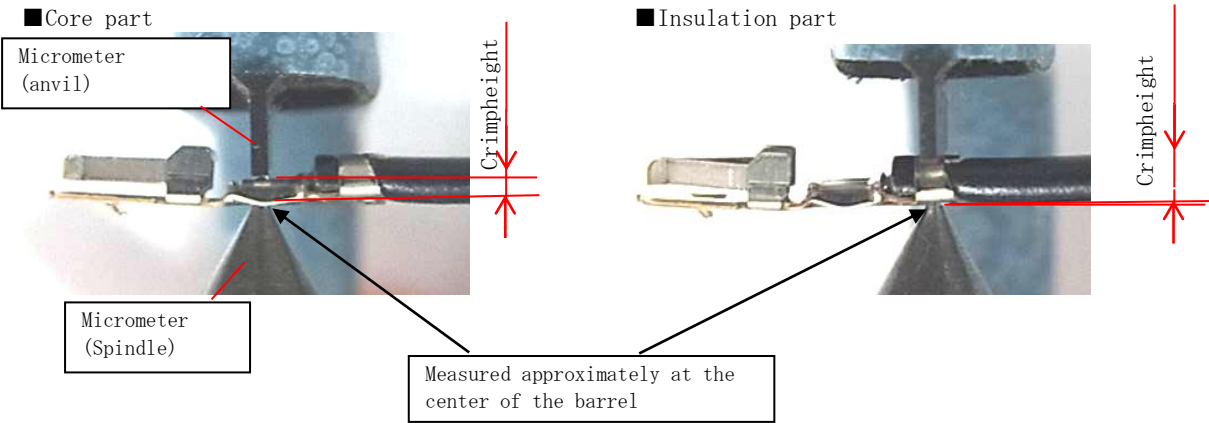
4-2-1. Wire Strip

- The wire strip length is described in the crimping quality standard. Since it varies depending on the type of connector and wire used, set according to the machining conditions.
- Check that the core wire is not damaged, partially broken, or detached.
Pay special attention to multi-core twisted wires with thin core wires.
- Make sure that the length of the core wire and the insulation cut end face are not scattered or separated.

4-2-2. Crimp Height Measurement

- Be sure to measure the crimp height value at the beginning, middle and end of crimping work.
Exceeding the crimp height setting may cause serious quality problems.
- Use a crimp height micrometer for crimp height measurement.

<Measurement Method>



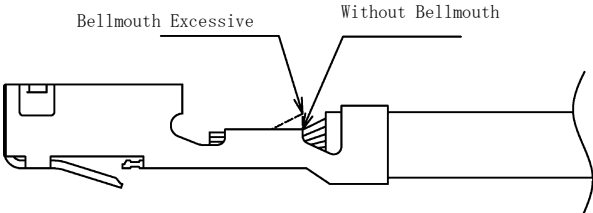
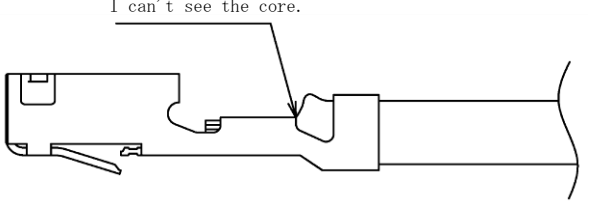
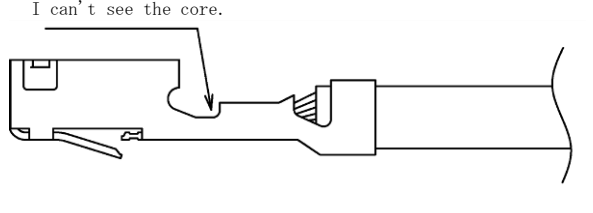
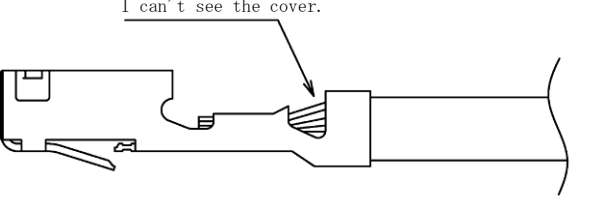
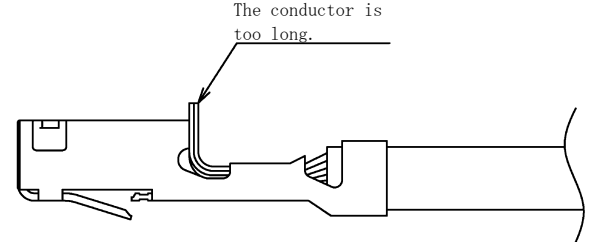
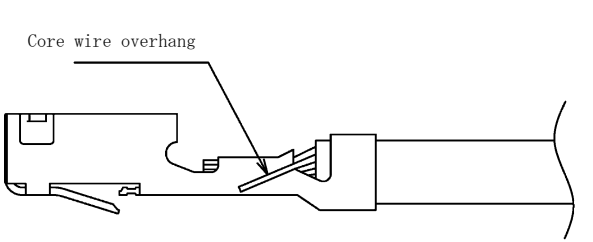
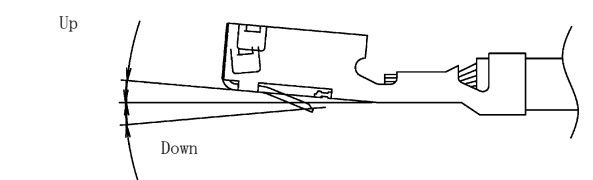
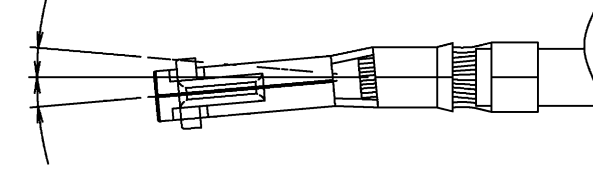
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4-2-3. Confirmation of Crimping Appearance and Dimensions

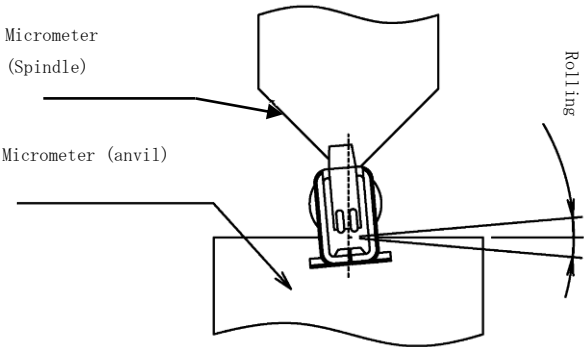
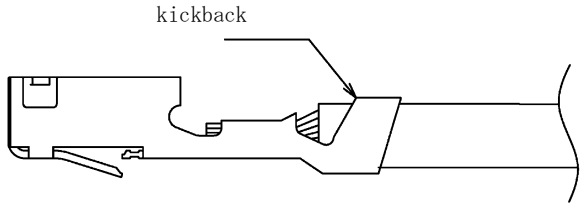
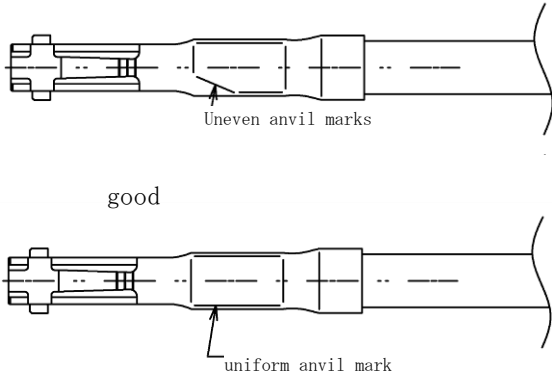
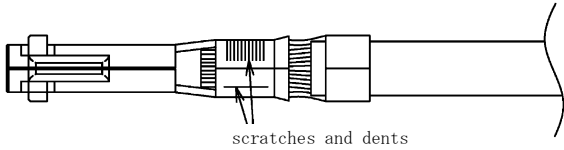
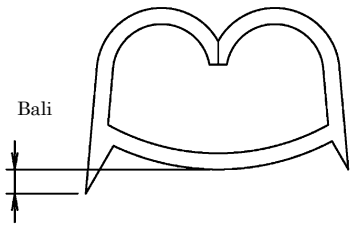
Check the crimping condition after crimping and before harness processing.

Check the shape and dimensions based on the crimping quality standard.

Refer to the following for information on crimp appearance and crimp failure.

1) Without Bellmouth/Excessive If the bellmouth is not attached or the bellmouth is too large, there is a risk of disconnection, insufficient tensile strength, or unstable electrical connection. Bellmouth Excessive Without Bellmouth 	2) deep tapping There is a risk of breaking the core wire due to deep striking. I can't see the core. 
3) Missing conductor insertion There is a risk of insufficient tensile strength or unstable electrical connections due to insufficient insertion of the core wire. I can't see the core. 	4) shallow strike Shallow striking may cause the load on the core wire to directly reach the crimped portion of the lead wire, causing disconnection. I can't see the cover. 
5) The projection of a core wire is too long If the protrusion is too long, there is a risk of contact failure, terminal deformation, or incomplete insertion into the housing. The conductor is too long. 	6) Core wire overflow Peeling of the core wire may cause unstable electrical connection and insufficient tensile strength. Core wire overhang 
7) Terminal deformation (Vent Up, Down) If the venting up or down is remarkable, insertion into the housing may not be possible. In addition, the strength of the terminal may be reduced. Up Down 	8) Terminal Twist If the twist is too large, it may not be inserted into the housing. In addition, the strength of the terminal may be reduced. Twist 

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9) Terminal deformation (rolling) If the rolling is severe, it may not be inserted into the housing. 	10) Deformation of the insulation barrel (kickback) If the kickback is excessive, the terminals may be exposed from the housing after being inserted into the housing, resulting in pressure problems. 
11) Nonuniformity of core crimping part anvil mark If the anvil mark is uneven, the electrical contact may become unstable. 	12) Scratches and dents on the crimped surface If the crimped surface is damaged or scratched, the terminal may deform or the plating may come off. 
13) Excessive crimping burr, uneven right and left There is a risk of terminal cracking at the burr part, unstable electrical connection, insufficient strength, and terminal deformation due to excessive burr or extremely uneven left and right. 	

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4-2-4. Handling of Crimped Products

- When packing and storing crimped products, do not place a load on crimped terminals due to overlapping crimped cables. It may deform.
- When bundling crimped products, take care not to cause deformation of contacts, scratches, or breakage of wire covers due to entanglement.
- When packing a product into a box, the product may be deformed due to excessive packing, so please consider the packing weight per box.

4-3. Harness Machining

- Follow the Cable Assembly Procedure and work properly.

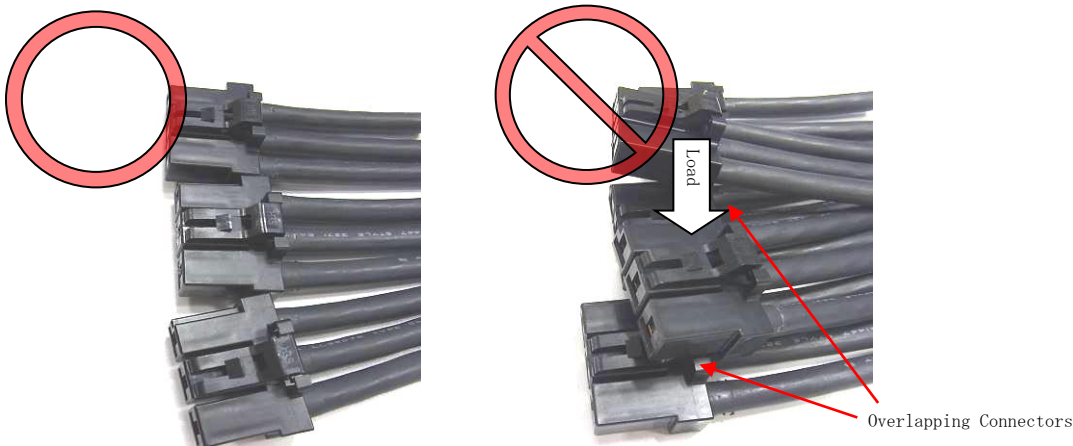
4-3-1. Handling of harness processed products

[Cable Bundling]

- If the wires are strung together, the wires may break, the terminals may come off, or contact may become unstable. Be careful not to apply a load to the wires.
- When bending electric wires, refer to the warranty of the electric wire manufacturer.
- When using a thick wire, if the wire is short, the terminal may be deformed due to the twisted wire. Set the wire so that it does not twist when wiring.
- Ensure that the force applied to the wires is uniform and that no force is concentrated on one wire (or on a certain number of wires).
- When the harness parts are entangled with each other, do not pull them forcibly. Excessive force may be applied to the connector, causing the contact to come off or other problems that may damage the connector.

[Packaging, Storage and Transportation]

- When packing, storing, and transporting harness-processed products, be careful not to place excessive loads on the connectors due to overlapping connectors. In particular, if an extreme load is applied to the locking part or thin-walled part, it may cause damage.



- Do not leave the product under high temperature and high humidity for a long period of time with a load on the lock. The lock part may deform and cause fitting failure.
- When storing, moving, or transporting the product, be careful not to drop it or load it too heavily, and apply a load that deforms the packaging (cardboard). The product may deform.

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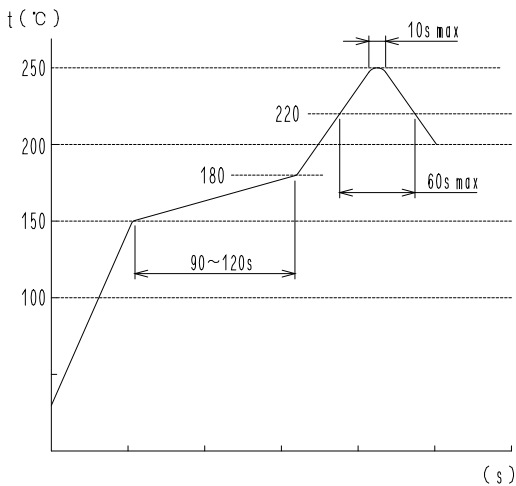
5. Connector Mounting

5-1. Surface Mount Connector (SMT Type)

5-1-1. Temperature Profile

- Temperature conditions for the installation should be specified in the temperature profile recommended by our company. (It is listed in the catalog of each product.)

Example:DF52 Series



< Application conditions >
Reflow peak: 250°C within 10 seconds
Reflow Part: From 220°C to within 60 seconds
Preheat section: 150 to 180 °C, 90 to 120 seconds
Reflow frequency: 2 times or less

- *The temperature is measured at the contact lead.
- *It may vary depending on the type of cream solder, board size, and other conditions such as mounting materials. Please check the mounting condition before use.

- Please note that the recommended temperature profile for moisture-proof silica gel packaging changes 168 hours after opening.

5-1-2. Metal Mask

For metal mask thickness, opening shape, and opening ratio, refer to the our company recommended conditions in the product drawings for each product.

Series No.	Metal Mask Thickness	aperture ratio
DF50, DF52, DF57, DF58, DF59, DF59S, DF59M, DF61, DF61Y, DF64, DF65	0.1 mm	100%
DF13, DF19, DF20, DF63SF	0.15 mm	100%
DF3, DF11, DF14	0.15 to 0.20 mm	100%

5-1-3. Recommended Solder Paste

- Solder paste recommended by our company for mounting work
Solder Components: Sn 96.5/Ag 3.0/Cu 0.5
Flux content: 11.5 wt%

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5-1-4. Recommended Land Pattern

Refer to the recommended land pattern diagram in the product drawing for the recommended land pattern.

5-1-5. Adsorption Area

It is described in the product drawing of each product.
If it is not listed, please contact our company Sales.

5-1-6. After Reflow

(1)Case Discolouration

The insulation case may change color after reflow, but this does not affect the quality of the product.
In case of extreme discoloration, the temperature may exceed the peak temperature of the reflow, so check the temperature profile.

(2)Contact, Shell Discoloration

After reflow, the terminals may change color, but this does not affect the quality of the product.
In case of extreme discoloration, the temperature may exceed the peak temperature of the reflow, so check the temperature profile.

(3)Blister

When mounting, the mold other than the mating surface may swell, but this does not affect product performance.

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5-2. Insert Mounted Connector (THT Type)

5-2-1. Flow Condition

The temperature and immersion time of the mounting work should satisfy the “Resistance to Soldering heat” described in the product standard table of each product.
Operation outside the “Resistance to Soldering heat ” may cause product deformation or solder balls.

Our company conducts evaluations based on IEC 60068-2-20, “Test methods for solderability and resistance to soldering heat of devices with leads.” Please confirm the actual use with the actual machine.

5-2-2. Substrate Thickness

Refer to the board thickness recommended in the product drawing of each product for the recommended board thickness.

Series No.	compatible substrate thickness
DF13	1 mm
HNC, DF1, DF1B, DF1E, DF3, DF5, DF11, DF22, DF33C, DF51, DF60, DF62, DF62W, DF63, DF63SF	1.6 mm

5-2-3. Recommended Solder

- Solder recommended by our company for mounting work
Solder Components: Sn 96.5/Ag 3.0/Cu 0.5
Flux content: 11.5 wt%

5-2-4. Recommended Land Pattern and Substrate Hole

Refer to the recommended board hole size in the product drawing for the recommended land pattern and board hole.

5-3. About Repair (Hand Solder)

When mounting by hand or repairing mounted connectors, make sure that they satisfy the “Resistance to Soldering heat” listed in the product specification table of each product, and be careful not to melt the case or deform the terminals.

6. Connector Cleaning

When using a cleaning agent, select the cleaning agent based on the effect table for metal and resin published by each cleaning agent manufacturer.
For example, for tin-plated connectors, anything that violates the tin plating will not be usable.
Also, make sure that there is no moisture, flux, or cleaning agent left on the connector, as this can cause deterioration in electrical performance.

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7. Mating Operation

Follow the connector operation procedure.

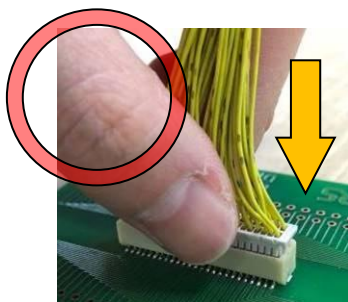
7-1. Connector Insertion Operation

7-1-1. How to Grip the Connector

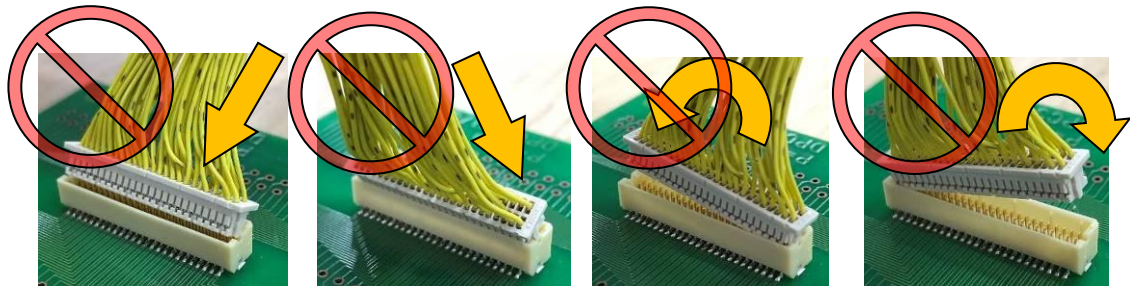
Grasp the root of the wire lightly and insert by pushing the connector with your fingertips.
In that case, grip the entire wire so that the power does not concentrate on a specific wire.

7-1-2. Insertion Angle

Insert the connector straight. Inserting the terminal at an extreme angle may cause terminal deformation and case damage.



Normal insertion method



Prohibited insertion method (diagonal insertion)

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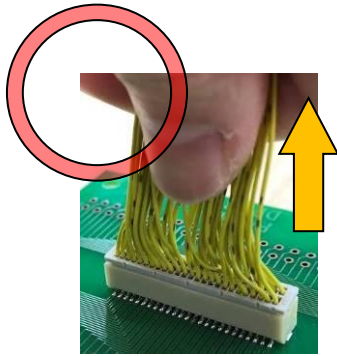
7-2. Connector Removal Operation

7-2-1. How to Grip the Connector

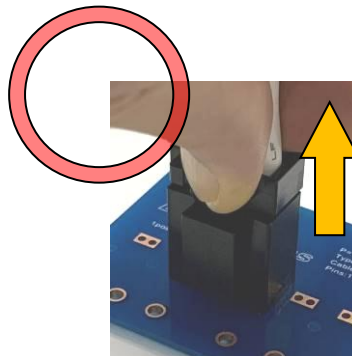
- Grasp the wires so that all wires are drawn evenly and pull them out.
 - When removing the connector with a lock, grasp the wire and firmly release the lock with your whole finger before removing it. If the connector is not unlocked, it may be damaged.
 - If you try to pull it out forcibly, the connector may be damaged.
- If it is difficult to remove, please press it lightly once before operating the lock.

7-2-2. About the Removal Angle

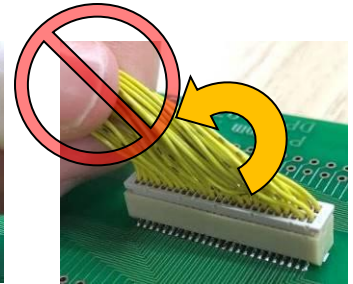
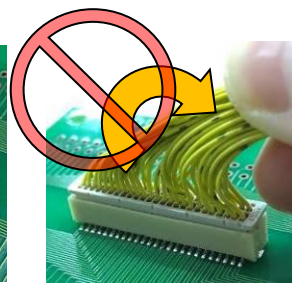
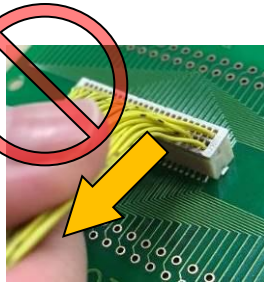
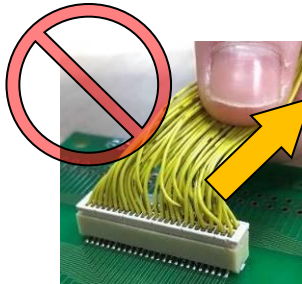
Do not remove the product at an extreme angle. It may cause terminal deformation and case damage.



Normal removal method



Normal Removal Method (With Lock)



Prohibited removal method (oblique removal)