



DF9M TABLETOP WIRE ARRANGING MACHINE

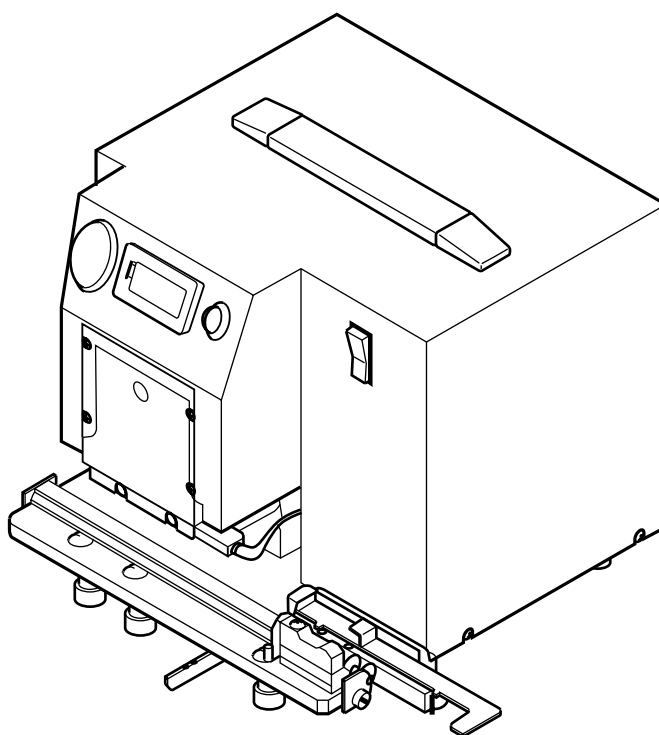
Model SA702/DF9M
(CL903-4508-0)

INSTRUCTION MANUAL



CAUTION :

Be sure to read this Instruction Manual carefully before using it to secure safety in operation. In addition, save this Instruction Manual so that it is available whenever necessary for review.






HIROSE ELECTRIC CO., LTD.

SAFETY INSTRUCTIONS

When operating this machine there is always the possibility of contact with the moving parts. The machine operator and maintenance personnel are required to read the following **SAFETY INSTRUCTIONS** so as to handle the machine taking care not to get hurt. To fully understand the description given in this Instruction Manual and the warning labels attached on the machine, the warning messages are used in accordance with the below-stated classification. Please be sure to thoroughly understand the messages and follow the instructions.

(I) Description of warning messages

 DANGER	Used in the case where it is assumed that misuse of the machine will expose the operator to immediate danger of major injury or death.
 WARNING	Used in the case where it is assumed that misuse of the machine can expose the operator to danger of major injury or death.
 CAUTION	Used in the case where it is assumed that misuse of the machine can expose the operator to danger of injury and can cause damage to property.






* Determine the degree of impairment referring to the below-stated classification.

Major injury: Indicates the loss of eyesight, wounds, burns (hyperthermal burns and hypothermal burns), electric shocks, fracture of a bone, poisoning, etc. attended with aftereffect, requiring hospital treatment or attending-to-hospital treatment for an extended period of time.

Injury (Minor injury): Indicates wounds, burns, electric shocks, etc. requiring neither hospital treatment nor attending-to-hospital treatment for an extended period of time.

Damage to property: Indicates damage spread to premises, household goods, livestock and pets.

(II) Explanation of warning labels and indication labels

Warning label		* Danger of cuts on fingers is present. Never place fingers inside the safety cover.	Warning label		* Indicates extreme heat. If touching, you could get burns.
		* Rotating component is installed inside the cover.			* Indicates the correct direction of rotation.
		* Electrical components are installed inside. Danger of electric shocks is present.			

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Chapter 1 Features

- **Ideal for sample production and small lot production!**

A 1-wire-at-a-time wire arranging, type electric tabletop machine suitable for uses from sample production to small lot production.

- **Compact and easy to carry!**

Compact and light weight, weighing only 6kg, making this machine easy to carry around.

- **Easy to operate!**

It is necessary only to turn power ON and set the connector, and preparation is complete.

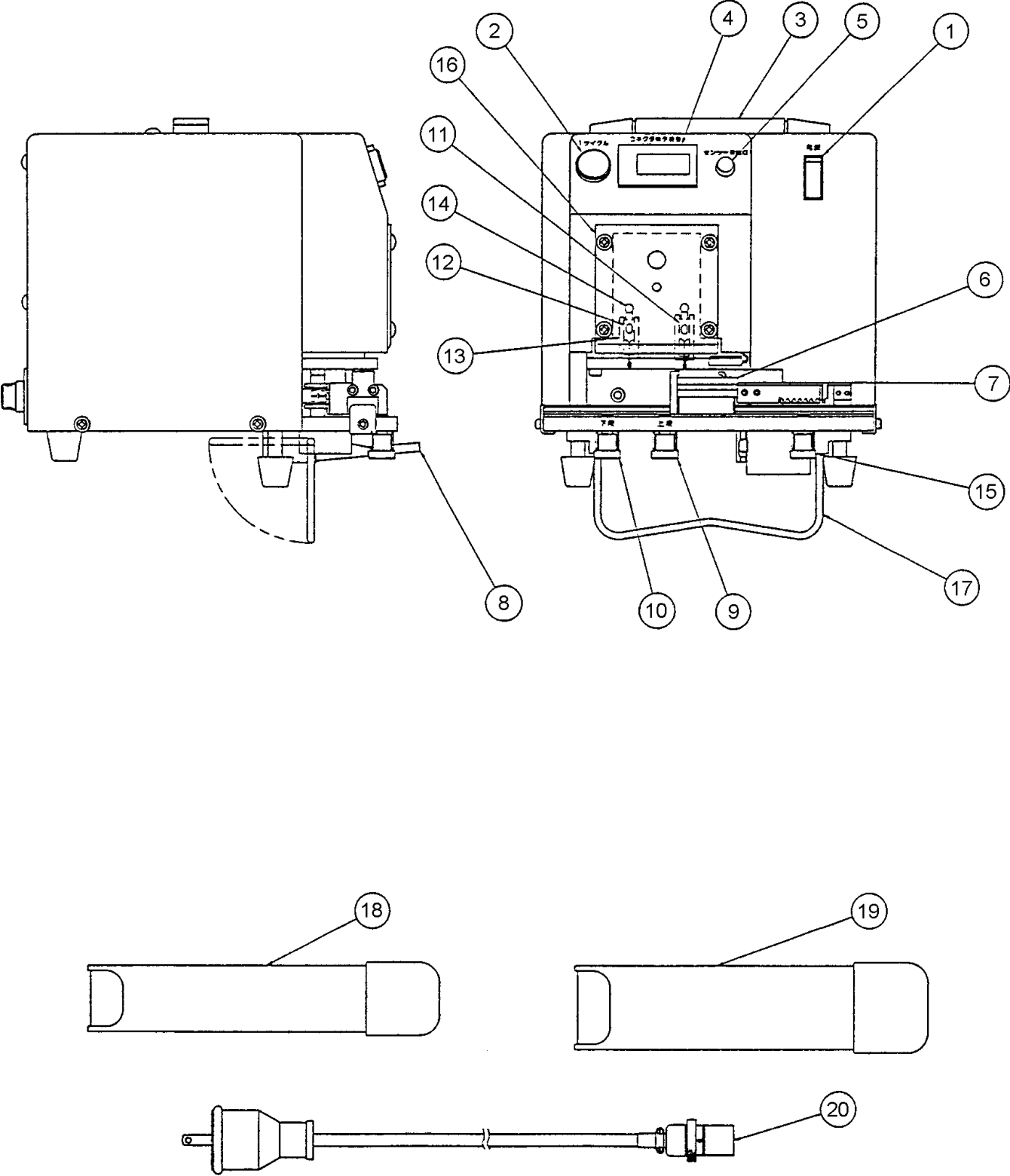
When the connector is moved to the press fitting start position and the cable is inserted into the cable insertion hole, the cable is automatically press fitted and connector pitch feed is performed. In addition, arbitrary connector pitch feed can be performed with one button.

- **Increased efficiency of wire arranging operation!**

The "wire arranging" operation, which takes most of the time of the harness processing operation, has been reduced to merely inserting the cable into the cable insertion hole, increasing the efficiency of the operation and greatly shortening the operation time.

Chapter 2 Specifications and System Composition

2. 1 Names and functions of parts



Specifications and System Composition

No.	Name	Explanation of function
①	Power switch	Turns power ON. When turned ON, lamp lights up.
②	1-cycle switch	Performs 1 cycle of press fitting operation. Used for example when performing 1 pitch feed manually.
③	Handle	Carrying handle for the unit.
④	Connector contact number indication counter	Indicates the number of the contact on which press fitting is to be performed.
⑤	Sensor confirmation lamp (lamp to indicate abnormal operation)	Lights up when cable insertion is detected. In addition, flashes when, for example, operation is abnormal.
⑥	Connector holder	Sets the connector and performs pitch feed.
⑦	Connector holding lever	Holds the connector set in the holder in place.
⑧	Connector holder release lever	Releases the connector holder lock.
⑨	Upper positioning pin	Positions the upper connector holder.
⑩	Lower positioning pin	Positions the lower connector holder.
⑪	Upper punch	Punch that fits the cable into protector (A).
⑫	Lower press fitting punch	Punch that fits the cable into protector (B).
⑬	Punch guide	Guide for press fitting of the cable
⑭	Press fitting height adjustment cotter	This is for the purpose of adjusting the press fitting height. Adjustment can be set to any of 5 levels in 0.1mm steps.
⑮	Connector holder lock pin	Locks the connector holder in place temporarily. Used when assembling protector (B).
⑯	Safety cover	Cover to maintain safety of operation. Remove when replacing the press fitting punch.
⑰	Stand	Set the stand up during operation.
⑱	Protector (B) press fitting jig (31 pins)	Jig used to install 31-contacts protector (B) into protector (A).
⑲	Protector (B) press fitting jig (41 pins)	Jig used to install 41-contacts protector (B) into protector (A).
⑳	Power cable	This is the AC100V (50/60Hz) power cable.

Specifications and System Composition

2. 2 Specifications and configuration

No.	Item	Specification
1	Model number and HRS No.	Model No. : SA702/DF9M HRS No. : 903-4508-0
2	Matching connectors	DF9M series (31, 41 contacts) Protector (A) For use with 31 contacts : DF9M-31S-PA (540-0232-6) For use with 41 contacts : DF9M-41S-PA (540-0235-4) Protector (B) For use with 31 contacts : DF9M-31S-PB (540-0233-9) For use with 41 contacts : DF9M-41S-PB (540-0236-7)
3	Matching cable	UL1571 AWG28 (0.127/7) covering outer diameter 0.58mm
4	Power supply	100VAC (50/60Hz)
5	Environment in use	Temperature : 10 to 35 °C Relative humidity : 35 to 85%
6	Exterior dimensions	200W x 230D x 210H (mm) (when stand legs are closed)
7	Weight	6 kg
8	Form of operation and manpower required	Manpower required : 1 person Posture when working : sitting Working height : about 100 mm above table top (when stand legs are opened)
9	Processing capacity	3 seconds/wire (varies with worker's skill)

Chapter 3 Operation

3. 1 Installing the machine

Installation location

Install the machine on a level table. Do not install where the cooling holes on the rear and side surfaces of the machine will be blocked. (Leave a space of at least 15cm between the machine and the nearest wall.)

Also, after installing do not place any objects near (within 15cm of) the cooling holes.

(Caution) In particular, do not install in any of the following locations.

- (1) A location in direct sunlight.
- (2) A location with a great deal of dust or dirt.
- (3) A location with large temperature and/or humidity fluctuations.
- (4) A location exposed to fire.
- (5) A location exposed to volatile substances.
- (6) A location with vibrations.
- (7) A location where the machine can easily become wet.

Power cable connection



CAUTION :

When the power plug is plugged into an outlet, make sure that the power switch on the front of the machine is OFF.

Connect the accessory power cable to the power cable connector on the rear of the machine.

Plug the power plug on the other end of the cable into a 100V electrical outlet (50/60Hz).

Stand

When starting work, open the stand on the bottom of the machine. This will tilt the machine to make it easier to work.

Operation

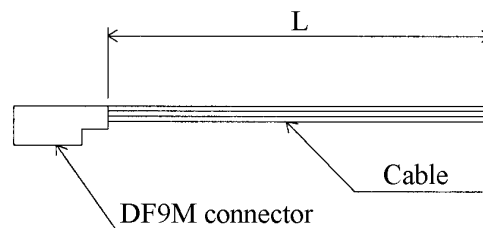
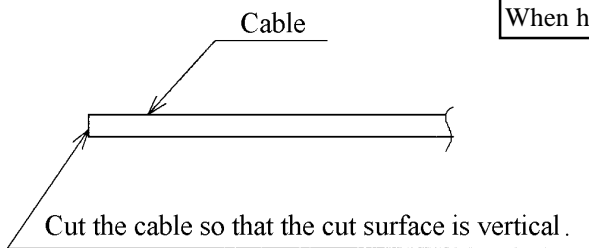
3.2 Preparation before starting work

Preparing the cable

Precut the required number of discrete cables (UL1571, AWG28) to the specified length. Make sure that the cable tips are straight.

In addition, make sure that the cut surfaces of the cables are as shown in the figure. The relation between the length L (mm) of the harness to be made and the cut lengths of the upper and lower discrete cables is as follows.

Cable length	Upper	Lower
When harnessed only on one end.	L+10 (mm)	L+4 (mm)



Checks when turning power ON



CAUTION :

When the power plug is plugged into an outlet, make sure that the power switch on the front of the machine is OFF.

Plug the power cable connector securely into the main unit and confirm that the connector holding screw is tightened firmly.

Confirm that the power plug is plugged into the outlet securely.

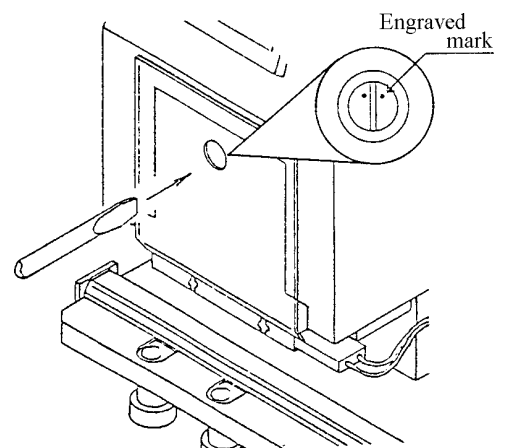
Confirm that the press fitting punch is at the upper dead point.

(It is at the upper dead point when the mark engraved on the shaft is on top.)

If it is not at the upper dead point, insert a slotted screwdriver through the cover window on the front of the machine and turn it counterclockwise until the engraved mark is on top.

Turn the power switch on the front of the machine ON. The switch will light up.

Immediately after turning power ON, confirm that the connector contact number indication counter is set to "0".



Operation

3.3 Operation procedure

Complete the preparations in section "3.2 Preparation before starting work".

- (1) While depressing the connector holder release lever downward, move the connector holder to the right edge of the base.
- (2) While pulling the connector holding lever, set protector (A) in the connector holder. At this time, be careful that the connector does not float up above its correct place. If it is set while it is floating up, there is danger that the protector will be destroyed and the press fitting punch will be damaged.

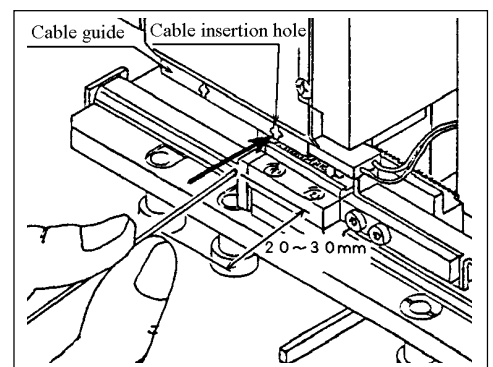
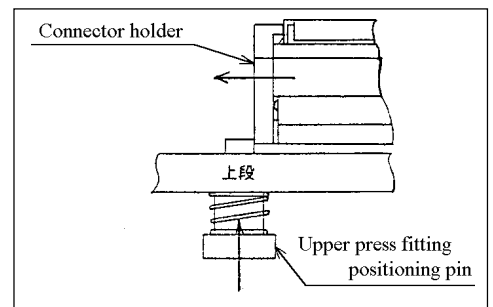
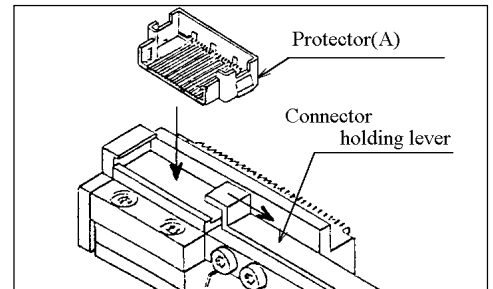
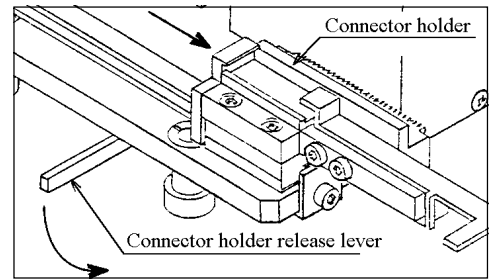
(Caution)

The connector must be set in the correct direction. Make sure that the open side of the connector is forward as shown in the figure.

- (3) Perform wire arrange of protector (A). While pushing the upper press fitting positioning pin upward, move the connector holder to the left slowly and push the connector holder up against the press fitting positioning pin. This performs press fitting positioning. After positioning has been performed, remove the hand from the positioning pin.
- (4) Insert a prepared cable into the cable guide cable insertion hole. At this time, grasp the cable about 20 to 30mm from the end and keep the tip straight while inserting. The sensor confirmation lamp lights up, and press fitting starts. After press fitting is performed on the cable, the connector holder is automatically fed forward 1 pitch.

(Caution)

1. Do not let go of the cable until the press fitting punch comes to the upper dead point.
2. Do not insert anything except a cable into the cable insertion hole.



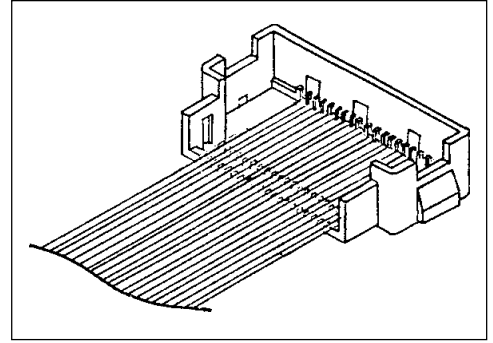
WARNING :

Do not insert the hand between the connector holder and the cable guide.

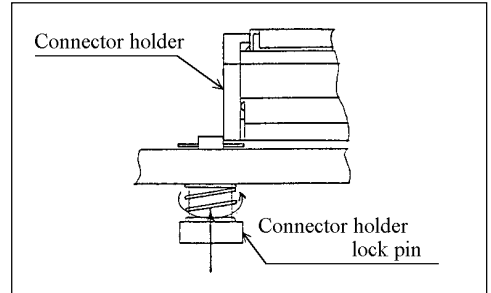
- (5) Repeat (4) until wire arrange of protector (A) is completed.

Operation

- (6) When wire arrange of protector (A) is completed, depress the connector holder release lever downward, and move the connector holder to the right. At this time, confirm that wire arrange to the protector is performed correctly (see p. 11 "3.6 Press fitting quality check").



- (7) Lock the connector holder. While pushing the connector holder up against the right side, push the connector holder lock pin upward and turn it left or right until the lock catches. Hold the lock pin in the up position.



- (8) Assemble protector (B). Using the protector (B) press fitting jig, as shown in Fig. (a) tilt the protector inward and pull the press fitting jig forward while assembling. After assembling, confirm that the assembly has been done correctly (see Fig. (b)).

(Caution)

1. The protector has to be in the correct direction. Set so that the "HRS" mark is on the left as shown in the figure.
2. Perform press fitting of protector (B) while pushing by hand so that there is no play in the machine.

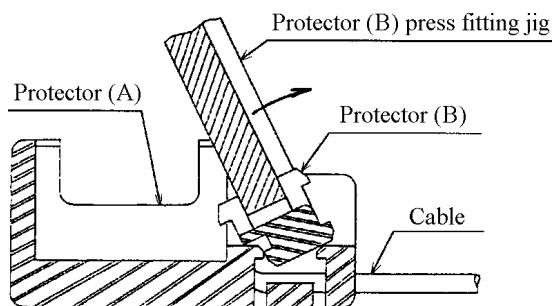
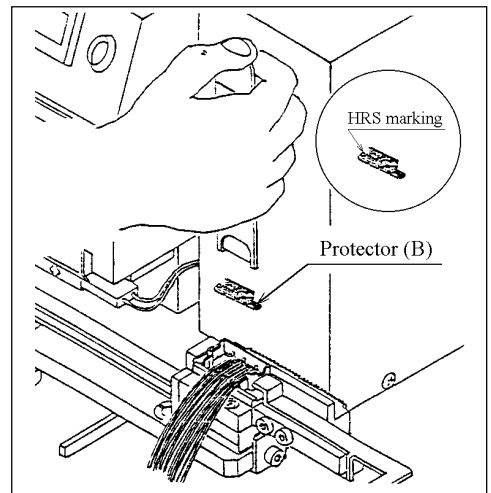


Fig.(a)

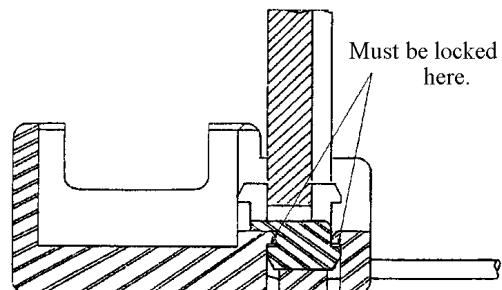
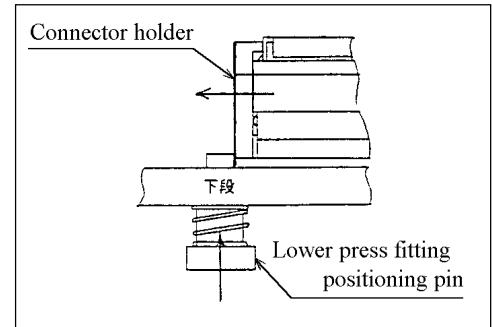


Fig.(b)

Operation

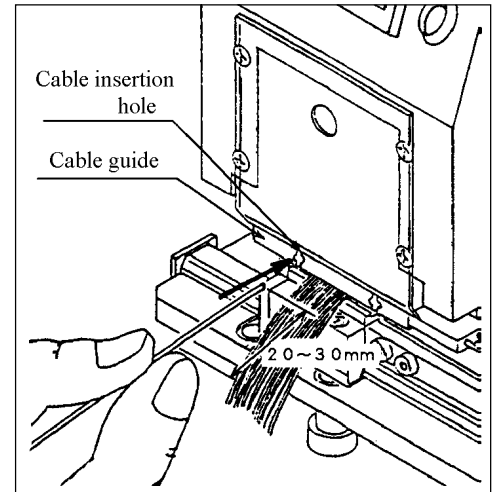
(9) Perform wire arrange of protector (B). Turn the protector holder lock pin to release the lock. While pushing the lower press fitting positioning pin upward, move the connector holder slowly to the left and push the connector holder up against the press fitting positioning pin. This will determine the press fitting position. When the position has been determined, let go of the positioning pin.



(10) Insert a prepared cable into the cable guide cable insertion hole. At this time, grasp the cable 20 to 30mm from the tip and insert it with the tip straight. The sensor confirmation lamp will light up, and press fitting will start. After press fit of the cable is completed, the connector holder is automatically fed forward 1 pitch.

(Caution)

1. Do not let go of the cable until the press fitting punch comes to the upper dead point.
2. Do not insert anything except the cable into the cable insertion hole.

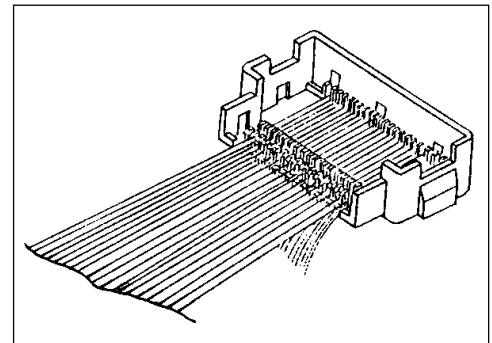


WARNING :

Do not insert the hand between the connector holder and the cable guide.

(11) Repeat (10) until wire arrange of connector (B) is completed.

(12) When wire arrange of connector (B) is completed, depress the connector holder release lever downward and move the connector holder to the right. At this time, confirm that wire arrange to the protector has been performed correctly (see p. 11 "3.6 Press fitting quality check").



This completes the wire arranging operation.

Perform insulation displacement of the connector main unit using the insulation displacement jig DF9M/ID-MP (902-4500-1) (optional accessory). For details, see the insulation displacement jig instruction manual.

Operation

3.4 Connector contact number indication

The number shown on the connector terminal number indicator counter on the top of the front machine surface is the number of the next connector terminal to be press fitted. It is convenient to refer to this number when performing skip wiring or cross wiring.

- (Caution)
1. Before starting work, confirm that the connector terminal number indicator counter indicates "0".
 2. When power is turned OFF temporarily during work because of trouble or the connector holder has been moved by hand to the position where press fit is to be performed, the number indicated might differ from the number of the terminal actually being worked on.

In this case, move the connector holder all the way to the right. This will reset the counter indication. After it has been reset, move the connector holder to the upper (or lower) press fitting start position, then press the 1 cycle switch to move it to the desired press fitting position.

3.5 Special wiring

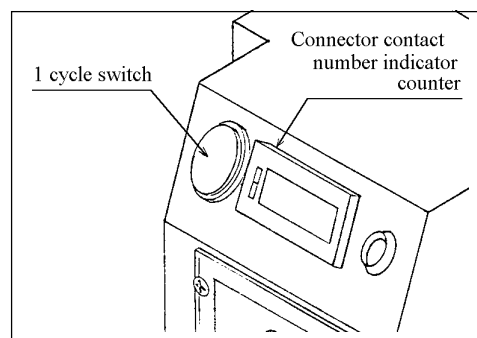
Skip wiring



WARNING :

When pressing the 1 cycle switch, there is danger so do not let the hand approach the lower part of the press fitting punch (near the cable guide or connector holder).

When performing skip wiring, press the "1 cycle" switch on the front of the machine. The press fitting punch will operate and be fed forward 1 pitch. At this time, do not insert a cable into the cable insertion hole.



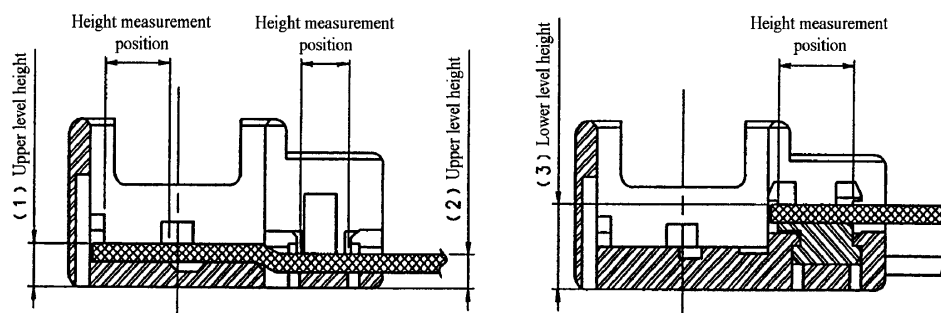
- (Caution) When performing skip wiring, refer to p. 12 "Other precautions" item .

Operation

3.6 Press fitting quality check

The press fitting quality check locations and standards are as follows.

Wire arrange height

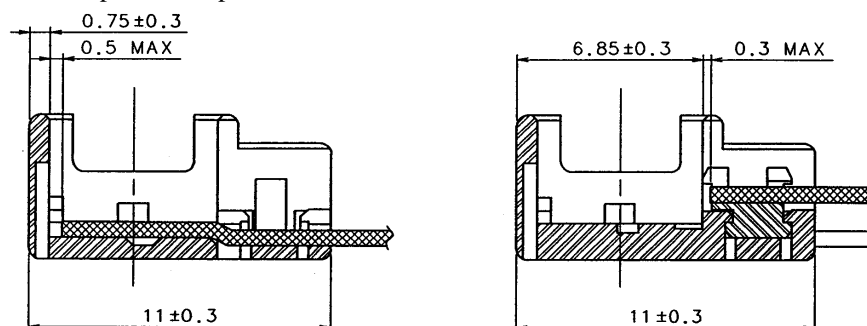


Wire arrange height measurement locations	Heights
(1) Upper level height	1.38 ± 0.3
(2) Upper level height	1.08 ± 0.3
(3) Lower level height	2.7 ± 0.25

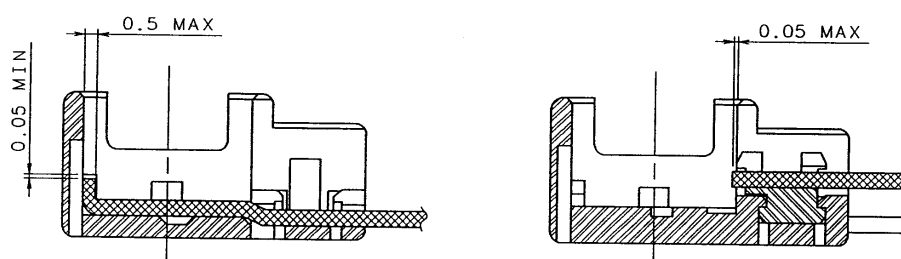
(Caution) If the measurement is performed while the position relation between the connector and the height gauge is unstable, in some cases an accurate measurement will not be obtained. Accordingly, take care to make sure that both are positioned correctly when making a measurement (the height gauge should be positioned at the center of the electric wire).

Electric wire protrusion position

Minimum electric wire protrusion position



Maximum electric wire protrusion position



Operation

Other precautions

Check whether there is any deformation of or scratches on the wire arranged protector and cable. If any deformation or scratching is found, it is possible that there is a problem with the position relationships of the machine, so check the machine's condition and position relationships, and contact our company's Production Technology Division.

When performing skip wiring to meet a wire-omission specification, do not omit more than 1/3 of the wires on either the upper or lower level. In addition, do not omit 2 or more wires in succession.

Example The case of 31 contacts

[Good example]

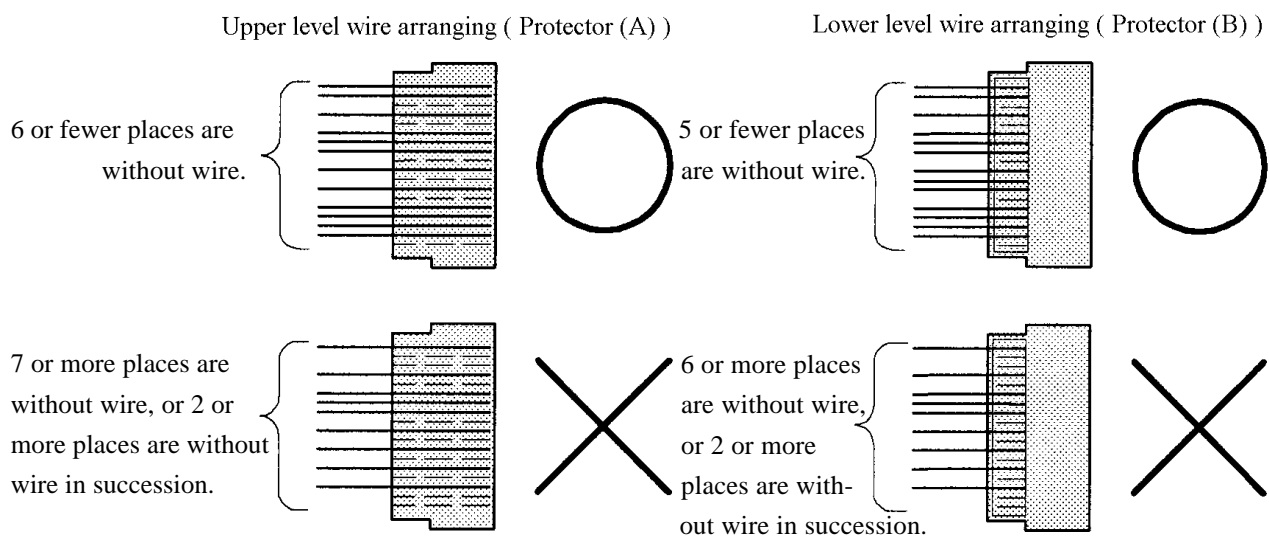
Upper row There must be wires on both ends, and not more than 6 of the 18 wires should be omitted. Of the 2 locations connected to a bracket, there should be a wire on only one side.

lower row There must be wires on both ends, and not more than 5 of the 15 wires should be omitted. Of the 2 end contacts No. 2 and No. 30, there should be a wire on only one side.

[Bad example]

Upper row 7 or more of the 18 wires are omitted. Or, 2 wires in succession are omitted, for example from the bracket and contact No. 1.

Lower row 6 or more of the 15 wires are omitted. Or, 2 wires in succession are omitted, for example from contacts No. 2 and No. 4.



Operation

3.7 Troubleshooting

Take the action indicated in the following table in case trouble occurs.

Symptom	Cause	Action
Power is not supplied to the unit.	The power cable is not connected.	Connect the power cable, referring to page 5 "Power cable connection".
	A fuse has blown.	Replace the fuse. fuse: 6.4 mm diameter x 30 mm (rating AC100V 5A) Turn the power OFF, then insert a slotted screwdriver
After power is turned ON, press fitting action fails to take place.	The press fitting punch is not at the top dead point.	into the camshaft and turn counterclockwise until the projection of the camshaft comes to the top (see p. 6 "Check when turning power ON"). Temporarily move the connector holder all the way to
The sensor confirmation lamp is flashing.	The connector holder is in an press fitting prohibited area.	the right to remove it from the press fitting prohibited area, then reset it at the press fitting start position. If this fails to solve the problem, repair by the manufacturer is required. Temporarily move the connector holder all the way to
	Set in the upper press fitting position while protector (B) is erect.	the right to remove it from the press fitting prohibited area, then reset it at the press fitting start position. If this fails to solve the problem, repair by the manufacturer is required. See p. 14 "Adjustments (1)".
The sensor confirmation lamp is not lit.	The shaft is not up against the sensor.	Repair by the manufacturer is required.
	The shaft does not slide.	Repair by the manufacturer is required.
	The sensor itself has broken down.	See p. 14 "Adjustments (1)".
The sensor confirmation lamp remains lit.	The shaft remains up against the sensor.	Repair by the manufacturer is required.
	The shaft does not slide.	Turn the power OFF, then insert a slotted screwdriver
The machine stopped while cable press fitting was in progress.	The press fitting punch became caught in the connector.	into the camshaft and turn counterclockwise until the projection of the camshaft comes to the top (see p. 6 "Check when turning power ON").
	Something is wrong inside the machine.	Repair by the manufacturer is required.
	The feed claw is worn or broken.	Repair by the manufacturer is required.
The pitch fails to advance.	The feed claw screw spring has come loose.	Hook the screw spring onto a hexagonal bolt with hole.
		If it is damaged, repair by the manufacturer is required. See p. 14 "Adjustments (2)".
	The height setting is incorrect.	Replace the press fitting punch (see p. 15 "4.1 Press fitting punch replacement").
The press fitting height is off.	The press fitting punch is missing.	Replace the press fitting punch (see p. 15 "4.1 Press fitting punch replacement").
	The press fitting punch is worn.	Replace the press fitting punch (see p. 15 "4.1 Press fitting punch replacement").
	The connector holder is dirty.	Clean the connector holder. Replace the press fitting punch (see p. 15 "4.1 Press fitting punch replacement").
	The press fitting punch is missing.	Replace the press fitting punch (see p. 15 "4.1 Press fitting punch replacement").
The cable covering is broken, or the connector is scratched.		Repair by the manufacturer is required.
	The press fitting punch is displaced out of position.	Repair by the manufacturer is required.
	The punch guide is not mounted correctly.	Straighten the cable tip and then insert.
The cable tip does not protrude correctly.	The work was not done correctly.	

Operation

3.8 Adjustments

1. The adjustments listed here are those that can be made by the user when something goes wrong.
2. These adjustments should be made only by personnel in the user's organization who have specialized knowledge of this equipment.



WARNING

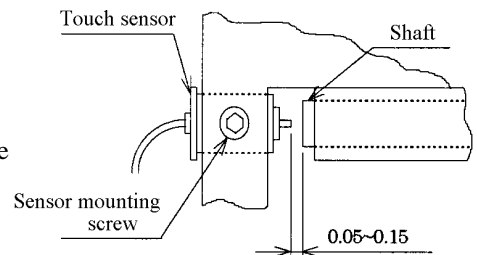
Always make sure that the power is OFF before removing the machine cover.

Do not touch any of the electrical parts inside the machine. There is danger of electric shock.

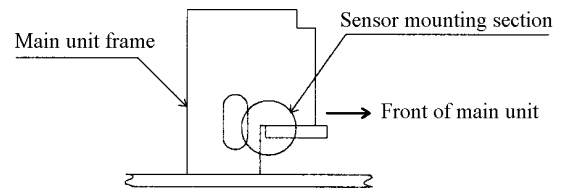
Adjustment (1) Touch sensor position adjustment

Adjust the touch sensor mounting position according to the following procedure.

- (1) Turn the machine power switch OFF.
- (2) Remove the outer machine cover.
- (3) Loosen the main unit frame sensor mounting screw and adjust the distance between the sensor tip and the shaft to 0.05 to 0.15mm.
- (4) Tighten the sensor mounting screw.
- (5) Remount the outer machine cover.
- (6) This completes the adjustment.



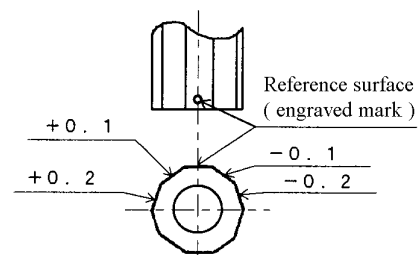
Enlarged view of sensor mounting section



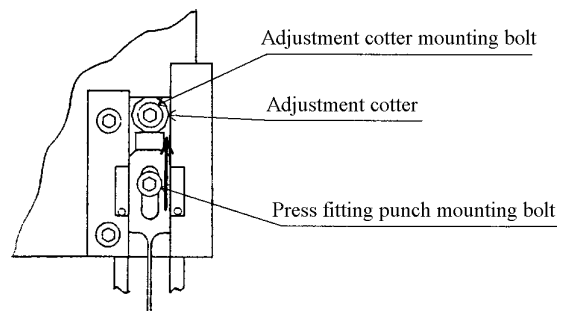
Adjustment (2) Press fitting punch height setting

Set the press fitting punch height as follows.

- (1) Turn the machine power switch OFF.
- (2) Remove the safety cover from the front of the main unit.
- (3) Loosen the press fitting punch mounting bolt and the adjustment cotter mounting bolt.
- (4) Turn the adjustment cotter until the desired height is reached.
- (5) While pushing the press fitting punch up against the top position, tighten the adjustment cotter mounting bolt.
- (6) Tighten the press fitting punch mounting bolt.
- (7) Remount the safety cover.
- (8) This completes the adjustment.



Adjustment cotter

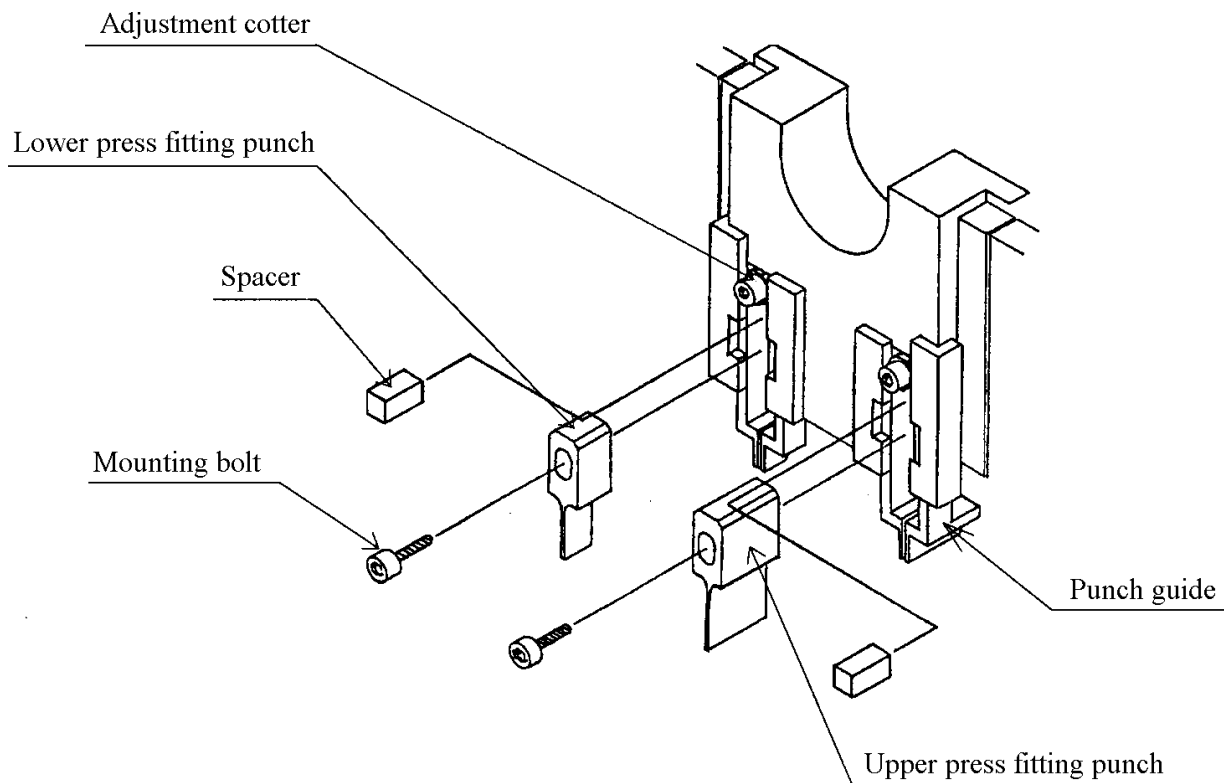


Chapter 4 Maintenance and Supervision

4.1 Press fitting punch replacement

The press fitting punch needs to be replaced when the punch is damaged, or worn so much that the press fitting height cannot be adjusted with the adjustment cotter.

- (1) Turn the power switch OFF.
- (2) Remove the safety cover from the machine front surface.
- (3) Remove the press fitting punch mounting bolt.
- (4) Remove the press fitting punch. At this time, the punch guide and the spacer will come out together with the punch. The punch guide and the spacer are for use with the upper level and the lower level, respectively. Make sure to keep track of them and not confuse them.
- (5) Install a new press fitting punch. Install the punch guide and spacer that were taken out at the same time. After installation, confirm that the punch guide moves up and down smoothly. If it does not move smoothly, reinstall the press fitting punch.
- (6) After replacing the punch, check the press fitting quality in accordance with "3.6 Press fitting quality check". The press fitting height can be adjusted by turning the adjustment cotter (see p. 14 "Adjustments (2)").



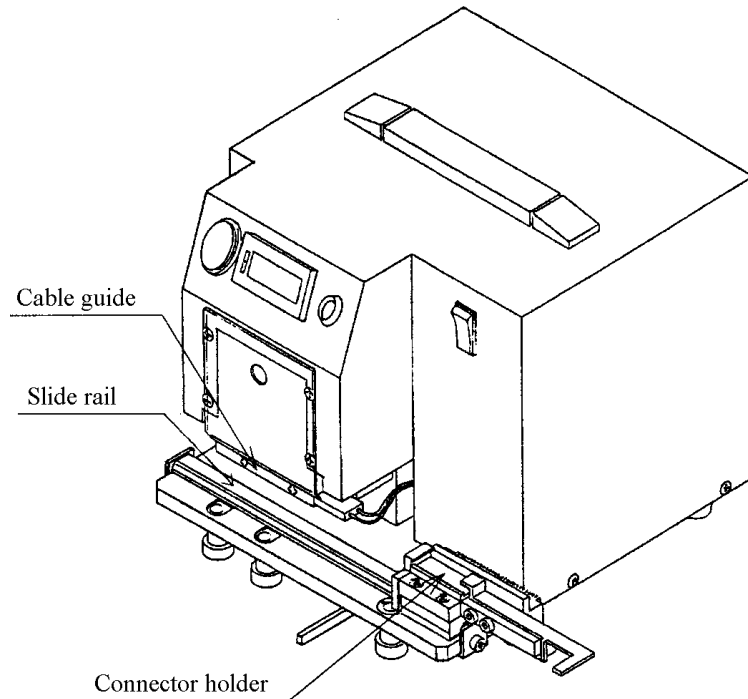
The press fitting punch model numbers (HRS NO.) are as follows.

Name	Model number	HRS NO.
Upper press fitting punch	SA702/DF9M(61)	903-4508-0-61
Lower press fitting punch	SA702/DF9M(62)	903-4508-0-62

Maintenance and Supervision

4.2 Daily care

When this machine is used every day, it is possible that cable cuttings will accumulate around the connector holder and the cable guide. Clean the accumulated cuttings away with a dry cloth.



4.3 On long-term storage

Observe the following guidelines in long-term storage.

- (1) Disconnect the power cable.
- (2) Confirm that the press fitting punch is at the top dead point.
- (3) Clean the areas around the connector holder and the cable guide.
- (4) Lubricate the connector holder slide rail.
- (5) Wrap the machine in a vinyl sheet for storage.
- (6) Move the connector holder to the upper press fitting position, then fix it in place so it will not move.

4.4 Transport

Transport this machine using the handle provided on top.

To transport the machine while it is packaged, fix the connector holder firmly in place, collapse the stand and pack enough packing material around the machine so that it will not be subject to external forces.

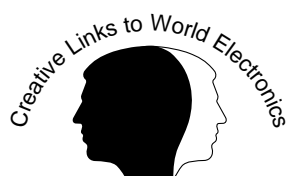
4.5 Prohibitions

As a rule, parts other than the press fitting punch and the touch sensor are not to be adjusted or replaced. And do not remove the machine cover except when making adjustments.

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CAUTION

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- (5) We assume no responsibility for any damage resulting from your improper use of the machine including your failure to follow the instructions given in this Instruction Manual. This includes repair or modification conducted by any third party other than Hirose Electric Co., Ltd.



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