

HANDHELD SINGLE FIBER FUSION SPLICER



USER'S MANUAL

Issue 2

**FURUKAWA
ELECTRIC**

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1. Introduction

The FITEL NINJA NJ001 is a compact designed fusion splicer.

This Fusion Splicer splices single fibers. After setting the prepared fibers, NJ001 automatically feeds the fiber ends and inspects their cleave condition and axis offset. Then the NJ001 discharges the arc to melt the glass and butts the end together. The NJ001 has the heater applied for 40mm and 60mm protection sleeves for reinforcing the spliced fiber.

The NJ001 can be powered by the AC adaptor and Battery. The Battery is made of Li-polymer cells and is charged by the NJ001 body.



2. Safety Information and Instructions

This manual contains complete operating and maintenance instructions for the NJ001 Fusion Splicer. Please review this manual carefully before operating.

2.1 Safety Information

The following safety instructions must be observed during NJ001 fusion splicer operation, serviced or repaired. Failure to comply with any of these instructions or with any precaution or warning contained in the User's Manual is in direct violation of the standards of design, manufacture and intended use of the instrument. Furukawa Electric Co., Ltd. assumes no liability for the customer's failure to comply with these safety requirements.

2.2 Safety Messages

The following messages may appear in the User's Manual. Please observe all safety instructions that are associated with the message.

	Refer to the User's Manual for instructions on handling and operating the instrument safely.
WARNING	The procedure can result in serious injury or loss of life if not carried out in proper compliance with all safety instructions. Ensure that all conditions necessary for safe handling and operation are met before proceeding.
CAUTION	The procedure can result in serious damage to or destruction of the instrument if not carried out in compliance with all instructions for proper use. Ensure that all conditions necessary for safe handling and operation are met before proceeding.



Please contact Furukawa Electric Co., Ltd. or your local representative with any questions relating to any subject described within this manual.

In no case will Furukawa Electric Co., Ltd. be liable to the buyer, or to any third parties, for any consequential or indirect damage which is caused by product failure, malfunction, or any other problem.

2.3 WARNINGS and CAUTIONS



WARNING

The power cord supplied with this equipment must be connected to a power socket, which provides a reliable protective ground. Or, ground it with the Ground terminal on the fusion splicer.

Use only the cords attached to the fusion splicer. Connecting inappropriate cords or extending the cords may cause them to heat up abnormally and may cause fire.

This product contains a Lithium Cell. The device is identified by a warning label. Do not dispose of in fire. Disposal of this device must be carried out by qualified personnel.

Never touch the electrodes when the fusion splicer is powered on. Doing so may cause electrical shock. Warning symbol is placed on the windshield for notification.

Do not operate the fusion splicer without electrodes.

Do not disassemble the instrument except as described in the maintenance section of this manual. The fusion splicer contains no user serviceable parts. Warranty on this product will be void if any of the potted nuts are disturbed.

Avoid soaking the fusion splicer with water. Doing so may cause fire, electrical shock or malfunction.



WARNING

Do not use inappropriate input voltage. Doing so may cause fire, electrical shock or malfunction.

Do not insert or drop any metal or any flammable material into the main body through any aperture. Doing so may cause fire, electrical shock or malfunction.

Avoid direct skin contact with the heating portion. This may cause burn or injury. ⚠ Warning symbol is placed on the lid of the protection sleeve heater for notification.

Do not remove the panels of the fusion splicer. Some parts generate high voltage. Removing the panels may cause electrical shock.

If abnormal sounds or extra high temperatures are observed, turn off the power, disconnect the power cord, remove the battery from the fusion splicer, and contact Furukawa Electric Co., Ltd. or your local representative. Continuing to operate under these conditions may cause fire or electrical shock.

Do not use a damaged power cord where the inner cable is exposed or severed. Doing so may cause fire or electrical shock.

If water is spilled into the fusion splicer, turn off the power switch, disconnect the power cord, remove the battery, and contact Furukawa Electric Co., Ltd. or your local representative. Continuing to operate under these conditions may cause fire or electrical shock.

If smoke or strange smells are observed, turn off the power switch, disconnect the power cord, remove the battery, and contact Furukawa Electric Co., Ltd. or your local representative. Continuing to operate under these conditions may cause fire, electrical shock or malfunction.

If the fusion splicer is dropped and damaged, turn off the power switch, disconnect the power cable, remove the battery, and contact Furukawa Electric Co., Ltd. or your local representative. Continuing to operate may cause fire or electrical shock.



WARNING

Do not look into a fiber with naked eye during operation. Wearing a protection glass is recommended.

STOP using the fusion splicer when problems are experienced with the protection sleeve heater. Turn off the power immediately, disconnect the power cord, remove the battery, and contact service center.

Do not use a gas spray to the splicer. The hazardous gas may come out by electric discharge. It may cause a fire and machine failure.

The NJ001 can be used after following tests:

Drop resistance – 76cm drop from 5 different angles. Water resistance – IPX2 rating drip proof (exposed to 3mm/min drip for 10 min with 15° tilt). Dust resistance – IP5X rating dust proof (exposed to dust particles with a diameter of 0.1 to 25µm for 8 hours)

Above tests were performed at Furukawa Electric laboratories and do not guarantee that the machine will not be damaged when subjected to these conditions.



CAUTION

Do not place the fusion splicer on an unstable or inclined surface. There is a possibility that the fusion splicer will fall and cause injury.

Disconnect all cords when moving the fusion splicer. Failure to do so may damage the cords which may cause fire or electrical shock.

Do not place the cords around any heating instrument. Doing so may damage the cords which cause fire or electrical shock.

Do not connect or disconnect cords with wet hands. Doing so may cause fire or electrical shock.

Do not pull the cord to disconnect. Doing so may damage the cords which may cause fire or electrical shock. Hold the plug portion and disconnect the cord.



CAUTION

Do not put heavy items on the cords. Doing so may damage the cords which may cause fire or electrical shock.

Do not modify the cords and do not over-bend, over-twist, or over-stretch the cords. Doing so may cause fire or electrical shock.

Ensure that the cords are disconnected and the batteries are removed from machine's main body when storing the fusion splicer.

Never use aerosol dust cleaners or alcohol-based solvents to clean the electrodes.

Non oil-based solvents should be used to clean the optical lenses.

Store the fusion splicer in a cool dry place.

When the temperature of the splicer body is different from the operating temperature limit extremely even if the environment temperature is in the operating temperature limit, please use after the temperature of the splicer body near the operating temperature. Or, the splicer might not work normally.

The battery is made of Li-polymer battery cells. Refer to following safety instructions on handling and operating the Battery safety.



CAUTION

Do not dispose the Battery in fire, or leave the Battery near a high-temperature object. Doing so may cause fire or explosion.

Do not short-circuit the recharging connector or the output terminal for splicer. Doing so may cause fire by generation of heat.

Charge the S946 battery by NJ001. If charging by other equipment that is not suitable for charging S946 battery, it may cause fire.



CAUTION

Avoid soaking the Battery with water. Doing so may cause fire or electrical shock.

Do not disassemble the Battery. Avoid damage by dropping or heavy shock. Doing so may cause fire or electrical shock. If inner cells rupture and electrolytic solution leaks outside, it may cause inflammation to your skin or eyes.

Disposal of used Battery must be carried out according to disposal established by Law. For instructions, contact Furukawa Electric Co., Ltd. or your local representative.

Immediately after the battery has been charged it may have a high temperature. Take care of handling the Battery.

NOTES



This symbol mark is for EU countries only.

This symbol mark is according to the directive 2006/66/EC Article 20 Information for end-users and Annex II.

This symbol means that batteries and accumulators, at their end-of-life, should be disposed of separately from your household waste.

If a chemical symbol is printed beneath the symbol shown above, this chemical symbol means that the battery or accumulator contains a heavy metal at a certain concentration. This will be indicated as follows:

Hg: mercury (0.0005%), Cd: cadmium (0.002%), Pb: lead (0.004%)

In the European Union there are separate collection systems for used batteries and accumulators.

Please, dispose of batteries and accumulators correctly at your local community waste collection/recycling centre.

Please, help us to conserve the environment we live in!

2.4 Power Requirements

The NJ001 fusion splicer can also operate using AC power with the S978 AC adapter with AC power source that supplies between 100-240 V at a frequency of 50-60 Hz. The S946 battery is charged by NJ001 through the S978 AC adapter



WARNING

To avoid the risk of injury or death, **ALWAYS** observe the following precautions before initializing the NJ001 fusion splicer.

- If using a voltage-reducing auto-transformer to power the NJ001 fusion splicer, ensure that the common terminal connects to the grounded pole of the power source.
- Use only the type of power cord supplied with the NJ001 fusion splicer.
- Connect the power cord to a power outlet equipped with a protective ground contact only (never connect to an extension cord that is not equipped with this feature).
- Willfully interrupting the protective ground connection is prohibited.

2.5 Toxic Hazards

The NJ001 fusion splicer presents no toxic hazards (under normal conditions of use, storage, and handling). However, under the following conditions, certain precautions are necessary.

2.5.1 Incineration

Some of the electronic components included in the assembly are constructed with resins and other chemicals that produce toxic fumes during incineration.



2.5.2 Acidic or caustic compounds

Some of the electronic components included in the assembly, particularly electrolytic capacitors, contain acidic or caustic compounds. In the event that a damaged component comes in contact with the skin, wash the affected area immediately with cold water. In the event of eye contamination, wash thoroughly with a recognized eye-wash and seek medical assistance.

2.5.3 Physical damage

Some of the components used in the assembly may contain very small quantities of toxic materials. There is a remote possibility that physically damaged electronic components may present a toxic hazard. As a general precaution, avoid unnecessary contact with damaged electronic components, and arrange for disposal in accordance with local regulations.



3. Getting Started

3.1 Unpacking and Initial Inspection

1. Inspect the shipping container for any indication of excessive shock to the contents.
2. Remove the NJ001 carrying case from the shipping container, and open the case.
3. Ensure that the carrying case is right side up before opening. (It applies in the package form with the carrying case.)
4. Inspect the contents to ensure that the shipment is complete.
5. Lift the NJ001 fusion splicer out of the carrying case, and place the instrument on a flat, smooth surface.
6. Visually inspect the NJ001 fusion splicer and all accompanying components for structural damage that may have occurred during shipping.

Immediately inform Furukawa Electric and the carrier, if the contents of the shipment are incomplete, or if any of the NJ001 fusion splicer components are damaged, defective, or if the NJ001 fusion splicer does not pass the initial inspection.

Protection sheet is pasted on the surface of LCD cover, the surface of the switch panel, and the surface of the label. Please peel off before using NJ001.



WARNING

To avoid electrical shock, do not initialize or operate the NJ001 fusion splicer if it bears any sign of damage to any portion of its exterior surface, such as the outer cover or panels.



4. Operating Specifications and Components

4.1 Specifications

The specifications of each splicer are referred the following table.

Item		Specification and Features
Fiber type*1		SM / MM / DS / NZDS
Fiber count		Single Fiber Only
Coating diameter		0.25, 0.9mm
Clad diameter		0.125mm
Applicable sleeve length		40mm, 60mm
Power		DC : 11 - 21V AC : 90 - 265V 50/60Hz (AC Adaptor)
Weight		Main Body: 970g (Including Battery)
Power Consumption		Max: 39W Normal operation: 5W
Environmental Conditions	Operation	Temperature: -10 - +50 °C Humidity: Below 90%(No condensation)
	Storage	Temperature: -40 - +60 °C Humidity: Below 95%
Average Splice Loss*2		SMF: 0.05 dB, MMF: 0.03 dB DSF: 0.08 dB, NZDS: 0.08dB
Typical Splicing Time		13s
Typical Heating Time*3 (in the AC Adaptor use)		17s :40mm sleeve*4 (Pre-heating mode) 20s :60mm sleeve*4 (Pre-heating mode) 31s :S922 40mm sleeve / S921 60mm sleeve (Regular mode)
Program Number Available		Splice: 150 / Heat: 30
Maximum Number for Data Storage		Splice: 1,500 / Fiber Image: 24
Input/Output Terminals		Data Input/Output : USB 2.0

*1: Applied to ITU-T standard

*2: Tested in a laboratory environment with similar fibers. Not guaranteed results.

*3: In the battery use, the heating time might be longer than typical heating time.

The heating time might be longer depending on the environment too.

*4: The heating time might be longer depending on the sleeves.



4.2 Components

4.2.1 Standard Components

The NJ001 Fusion Splicer comes with the following standard equipment. Be sure to confirm their presence before starting any operation. The component is difference by ordering number.

Components	Model Number	QTY
NJ001 Main Body	NJ001	1
Battery Pack(Built-in)	S946	1
AC Adapter	S978A	1
AC Cable Cord	-	1
Spare Electrodes	ELR-01	1
Electrode Sharpener	D5111	1
Cleaning Brush	VGC-01	1
Hard Carrying Case	HCC-03	1
Manual	UMC-01	1
Quick Reference Guide	FTS-B492 / FTS-B495	1

4.2.2 Optional Components

Components	Model Number	QTY
Cooling Tray	CTX-02	1
Spare Electrodes	ELR-01	1
USB Cable	USB-01	1
Battery Pack	S946	1
Cleaning Brush	VGC-01	1
AC Adapter	S978A	1
AC Cable Cord	-	1
Electrode Sharpener	D5111	1
Fiber Holder for 250um	S712S-250	1pair
Fiber Holder for 500um	S712S-500	1pair
Fiber Holder for 900um	S712S-900	1pair



4.3 Optional Accessories

Contact Furukawa Electric Co., Ltd. or your local representative for a more detailed specification.

- S210 Stripper
- S218R Hot Stripper
- S326 High Precision Cleaver
- S921 60mm Splice Length Protection Sleeves for Single fiber
- S922 40mm Splice Length Protection Sleeves for Single fiber
- S924 40mm Splice Length Protection Sleeves for Ribbon fiber

4.4 Recommended Consumables

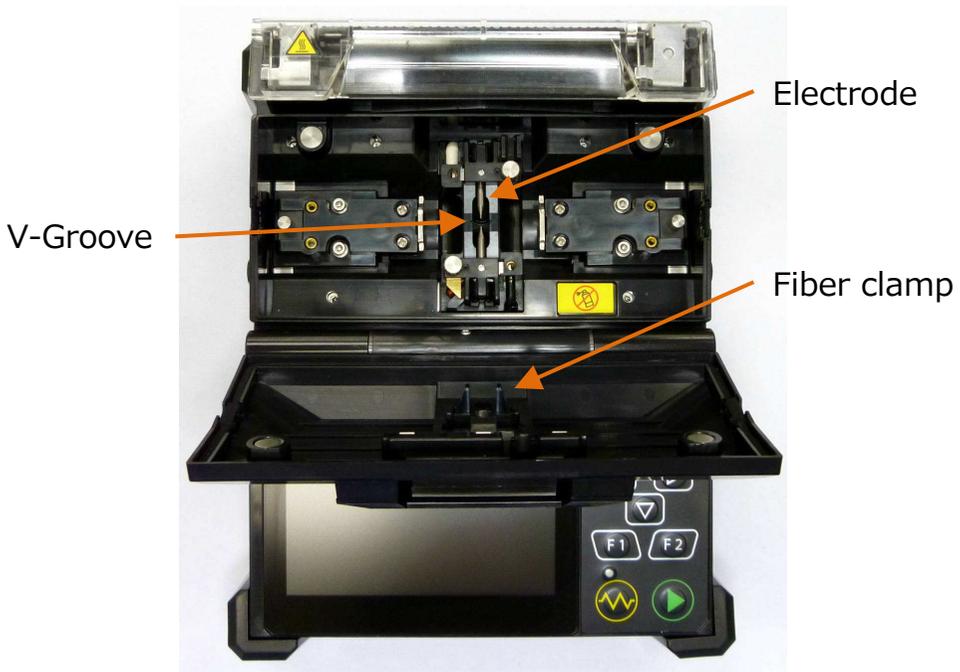
Keep a supply of the following items with the NJ001 fusion splicer at all times.

- Tweezers
- Protective eye glasses
- Denatured alcohol
- Lint-free tissues or swabs
- Container for disposal of scrap fiber



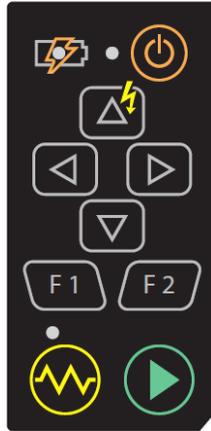
5. External Description

5.1 Main Body



5.2 Operating Keys and Status LED

5.2.1 Operating Keys



Indicator	Name	Main Functions
	Start	Start/Pause/Restart the splicing process.
	Function 1	Selecting the function(s) shown on left bottom corner of LCD.
	Function 2	Selecting the function(s) shown on right bottom corner of LCD.
	Up	Move upward/Increase value/Add additional arc
	Down	Move downward/Reduce value
	Left	Move left
	Right	Move right
	Heating	Start heating/Stop heating
	Power	Turn on/off the power

5.2.2 LED Indicators

Indicator	Name	Color	Main Functions
	Power LED	Green	Lit : Tuned on Blinking : Sleep mode
	Heater LED	Red	Lit : During heat Blinking : During cool
	Charge LED	Charge	Lit: During charge Blinking: Error

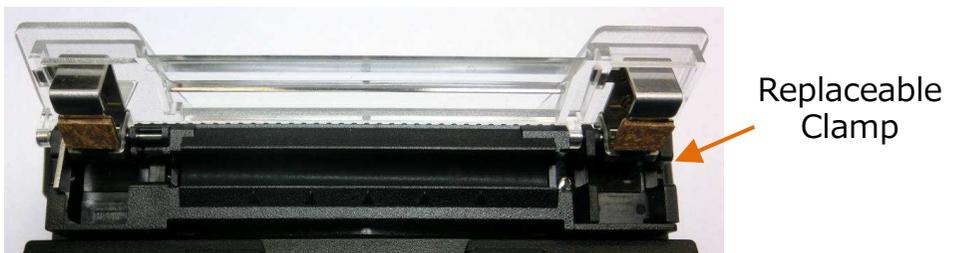
5.2.3 Buzzer

A buzzer will ring whenever any key is pressed. In addition, the following buzzer patterns indicate status of operation.

- Operating key: One beep
- Completing machine reset: One beep
- Error occurred: Three beeps
- Splicing finished: A series of beeps
- Saving data: Two beeps
- Heating process finished: One long beep

5.3 Heater

The right clamp of the heater is replaceable to heat the SOC connector. Do not remove this clamp if unnecessary, because the small pin falls out.



5.4 Screens

5.4.1 Ready Screen

Once the NJ001 fusion splicer is powered up and initialized, the “Ready” screen is displayed.



5.4.2 Screen during Splice



Fiber Images

X from front camera and Y from back camera. X and Y views can be switched.

One fiber image is displayed in the center of screen.



Pop-up Window

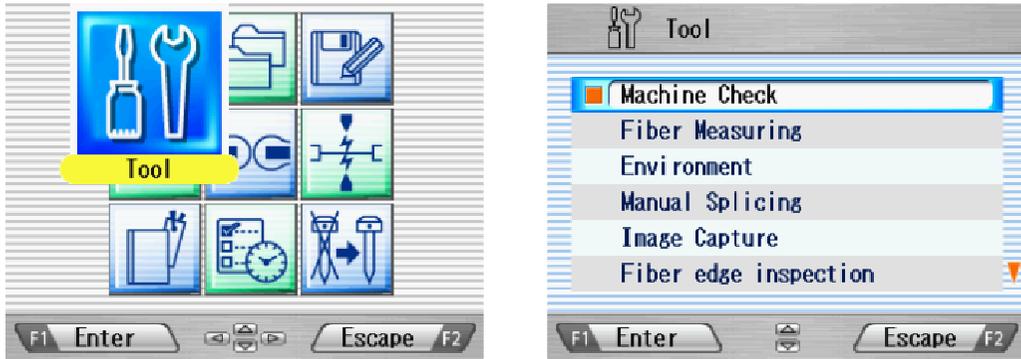
Pops up when new functions are selected. Also, shows warning and error messages.

5.4.3 Status Icons

Type	Icon	Content
Power		Using external power.
	  	Using internal battery. The level of battery is displayed in percentage. The lamp will start to flash when the level is very low.
		No battery.
		Charging battery.
	Backup Battery warning	
Heater Status		Blue: Ready Mode Red/Yellow: Heating Mode
		Cooling Mode *
		Error Occurring
Running Mode	Splicing is triggered by closing the wind shield.	
		Splicing process goes on until the end of splicing.
		Splicing process pauses once before arc discharge.
		Splicing process pauses at each sub-step.
	Splicing is triggered by pressing the Start key.	
		Splicing process goes on until the end of splicing.
		Splicing process pauses once before arc discharge.
		Splicing process pauses at each sub-step.
		Semi-Auto mode. The fiber is loaded to the center by closing windshield, and stops temporarily. Splicing is triggered by pressing the Start key.
Data Output		Various measurement and calculation information is shown on the fiber image area.

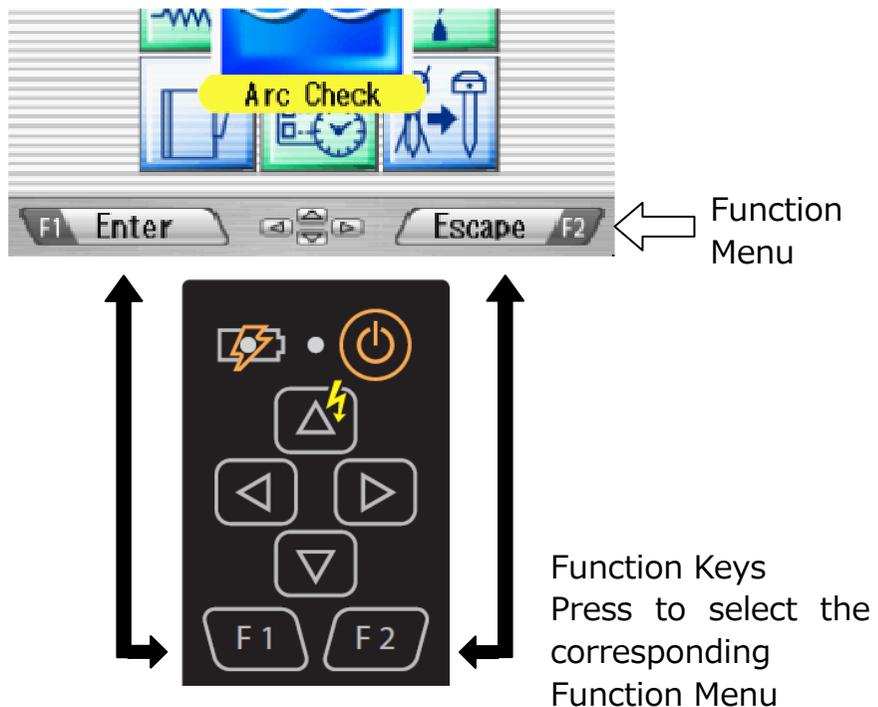
*) The cooling fan will temporarily pause during splicing, but the icon will remain on cooling mode. After splicing has finished, the cooling fan will go on again if the temperature is still high.

5.4.4 Menu Screen



Press ◀ ▶ and ▲ ▼ to access the desired menu and the pointed menu pop-ups to a large icon. Press Enter to select the menu.

Function keys are provided to initiate current available functions displayed above the function keys.

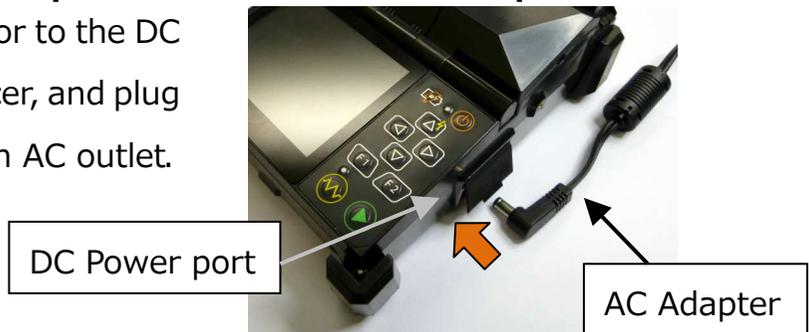


6. Basic Operation

6.1 Preparations for Power Supply

6.1.1 Connecting the power cable to AC the adapter

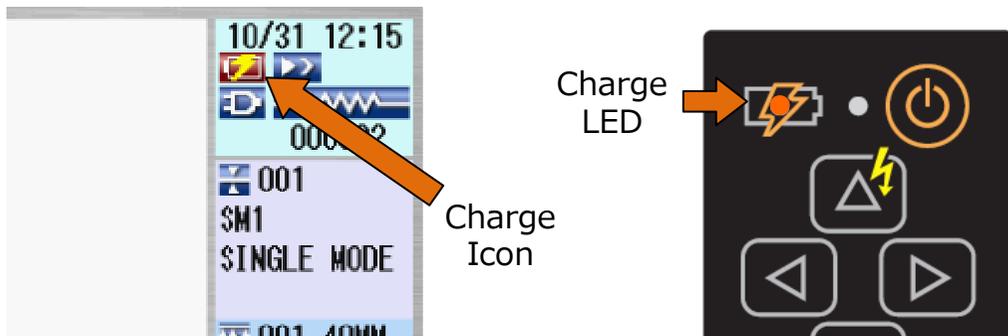
Connect the AC adaptor to the DC Power port of the Splicer, and plug the AC adaptor into an AC outlet.



6.1.2 Charging the Battery

After connecting the power cable to AC adapter and plugging the power cable into AC outlet, the charging process starts.

(When splicing, the charging process stops temporarily. The charging time will be longer. The charging time will vary depending on the remaining power level of battery.)



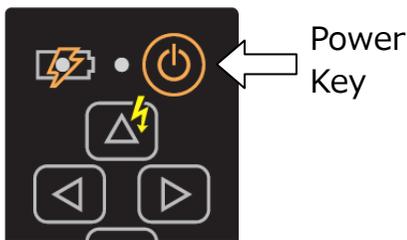
i S946 battery is lithium polymer type rechargeable battery; it can be recharged at any time, regardless if it is fully empty or still with some residual power. If storing the battery for a long time, the power level becomes very low caused by self-discharging and the battery may be degraded. Be sure to recharge the battery at least every 2 months even when not in use.



It is possible that the battery could not be fully charged, if moving the battery from a cold place (<math><5^{\circ}\text{C}</math>) to a warm place (around

6.1.3 Turn Splicer ON and OFF

Keep pushing power key (for about 2 seconds) to turn on/off.



Turning ON power

The opening message will appear on the LCD screen for a short while, before the ready screen showing up.



Turning OFF power

The LCD screen is turned off.

The power supply cuts after all motors perform the reset operation.



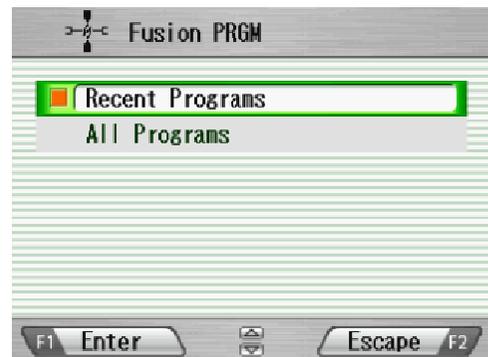
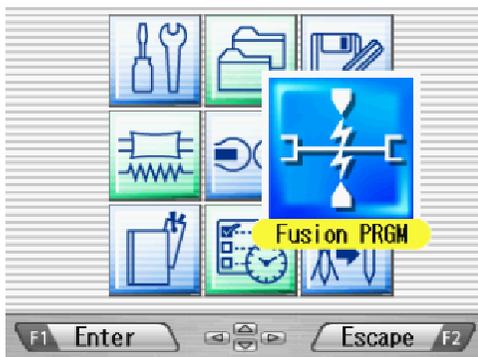
6.2 Load programs

Install appropriate programs before operation. The NJ001 fusion splicer already has pre-defined programs installed for major fiber types and protection sleeves. Select the program for fusion and heat, or edit and store a new program.

6.2.1 Fusion Program

Install an appropriate fusion program for specific fibers to be spliced.

1. Press **Menu** to call the menu screen.
2. Select "Fusion PRGM" and press **Enter**, and the Fusion PRGM screen is displayed.
3. Select "Recent Programs" to select from the programs recently used, or "All Programs" to select from all the programs installed.
4. Select the proper program by pressing **▲ ▼** and press **Select**. A comment of the pointed program is displayed by pressing **►**, and will disappear by pressing **◀**.

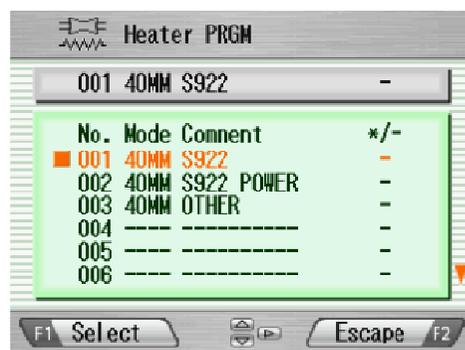
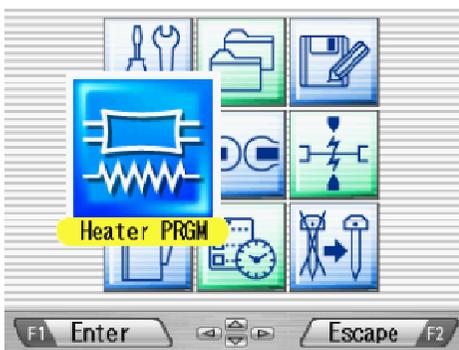


The NJ001 Fusion Splicer is installed with the factory-set Fusion Programs as follows.

No.	Mode	Comment	Description
1	SM1	SINGLE MODE	Standard single SM fiber
2	MM1	MULTI MODE	Standard single MM fiber
3	DS1	DISPERSION SHIFT	Standard single DS fiber
4	NZ1	NON ZERO DS	Single None-Zero DS fiber
5	G657	G657	Single Bend-Insensitive SM fiber

6.2.2 Heater Program

1. Press **Menu** to display the menu screen.
2. Select heater program and press **Enter**, and the "Heater PRGM" screen is displayed.
3. Select the proper program by pressing **▲ ▼** and press **Select**.
4. Press **Escape** repeatedly until the ready screen is displayed.



The NJ001 Fusion Splicer is installed with the factory-set Heat Programs as follows.

No.	Mode	Comment	Description
1	40MM	S922	Furukawa S922 sleeve (40mm)
2	40MM	S922 POWER	Furukawa S922 sleeve (40mm) with pre-heating.*
3	40MM	OTHER	Other 40mm length sleeve
4	40MM	SMOUV POWER	TE connectivity SMOUV-02 sleeve (40mm) with pre-heating.*
5	----	---	Vacant
6	----	---	Vacant
7	60MM	S921	Furukawa S921 sleeve (60mm)
8	60MM	S921 POWER	Furukawa S921 sleeve (60mm) with pre-heating *
9	60MM	OTHER	Other 60mm length sleeve
10	60MM	SMOUV POWER	TE connectivity SMOUV-01 sleeve (60mm) with pre-heating.*
11	60MM	CONTINUOUS	Heating continuously for 60mm
12	----	---	Vacant
13	40MM	S924	Furukawa S924 sleeve (40mm)
14	40MM	S924 POWER	Furukawa S924 sleeve (40mm) with pre-heating *
15	40MM	S927B	Furukawa S927B sleeve (40mm)
16	40MM	S927B POWER	Furukawa S927B sleeve (40mm) with pre-heating *
17	MINI	S928A	Furukawa S928A sleeve (20/25/30mm length)
18	MINI	OTHER	Other 20/25/30mm length sleeve
19 : 27			
28	60MM	S921DC	Furukawa S921DC sleeve (60mm)
29	---	SOC	20mm length sleeve for SOC
30	---	CURL REMOVE	Removing giber curl

*) Pre-heating warms the heater to shorten the heating time in advance, before the heating program starts. Pre-heating starts after arc discharge and heating process.



	<p>When the NJ001 is turned on, the last program used is selected automatically.</p>
	<p>The curl removing program is installed in program No.010. The curl-removing program can be selected from the heater program menu. Additionally, it can be selected by long pressing the heating key, when the heating status icon is blue. It automatically returns to the heating program of the previous state, when all processes of curl-removing end once. When doing curl-removing heating, set the fiber which isn't prepared in a heater. Please close the clamp in both sides and the cover like usual heating.</p>

6.2.3 Selecting the Operating Language

The NJ001 fusion splicer can be set to provide operating prompts in several languages. The default operating language is English.

1. In the Ready screen, press to access the Menu screen.
2. Select "Setting" and press .
3. Select "Parameter" sub-menu and press .
4. Select "Language" and press .
5. Pop-up window shows the current language. Press ▲ ▼ to scroll the languages and press to change.
6. Press and the pop-up window will confirm the change. Select "Over write" to confirm the change, or "Cancel" to cancel the operation and press .
7. Press repeatedly until the Ready screen is displayed.



7. Fusion Splicing

7.1 Basic Splicing

7.1.1 Arc Check

Fusion splicing is used to melt the glass of two optical fiber ends by arc discharging, and joins them together by butting the ends together. Fibers melt or fuse at different temperatures. It is necessary to adjust the arc power in order to ensure optimum splicing results. As well, electrode wear, environmental conditions, e.g., temperature, humidity, altitude, can affect the splicing results.

The arc check function inspects the arc power, and adjusts it to a proper one. At the arc check, the splicer melts the fiber ends not to join together, but to check the melting condition

The arc check should be performed as follows. In addition, when splice errors occur continuously, perform the arc check to check whether Arc Power is correct or not.

- At the beginning of daily operation
 - When the environmental condition has changed considerably
 - After replacing or cleaning electrodes
1. Open the windshield and load fibers. Ensure that the fibers are properly stripped, cleaned and cleaved. Refer to “7.1.2 Preparing the Fiber” for detail.
 2. Close the windshield.
 3. Select “Arc Check” in the menu screen and press .
 4. The NJ001 fusion splicer automatically feeds the fibers and discharges an arc.



- During the arc discharge, the fiber feeding motors of the NJ001 fusion splicer remain idle, preventing the fiber ends from butting. As a result, the fiber ends melt back.
- The arc check function inspects how far the fibers melt back and the centered position of the fiber. If the arc check results are good, the message “RESULT: OK” is displayed in the pop-up window. Press **OK** to return to the Menu screen.
- If the results are negative, “RESULT: NG Try again” is displayed. Press **Retry** and the machine will automatically adjust the arc power, and then return to the Menu screen.



5. If result is NG, repeat the arc check until the new values are acceptable. It is necessary to remove the fibers and prepare them again with a new cleave. If unsatisfactory results are obtained after 4 arc check attempts, inspect the electrodes for wear or damage, and replace them if necessary.



- A visual arc check can be made by viewing the arc on the monitor by pressing ▲. Electrode discharge should produce a straight and steady arc. Swaying in the arc indicates that the electrodes require either cleaning or replacing.
- When the “Data Output” in the “Parameter” of “Setting” menu is set “Active” or “PC”, detailed arc check data are shown in the result. Pressing Optimize enables automatic adjustment of the arc power, while Cancel does not adjust or complete the arc check.

■ RETREAT AAA(BBB-CCC)

AAA: Melt back value
 BBB: Lowest allowable value
 CCC: Highest allowable value

■ POWER DDD(+EEE)→FFF(+EEE)

DDD: Current arc power
 EEE: Compensated value for environment changes
 FFF: Recommended arc power

■ CENTER GGG (±HHH)→III

GGG: Current arc center
 HHH: Allowable range of arc center
 III: Recommended arc center

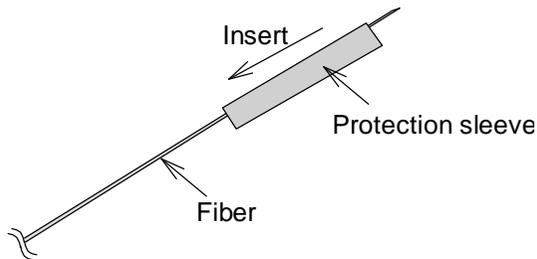


7.1.2 Preparing the Fiber

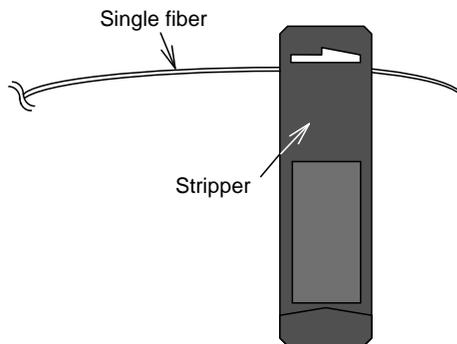
Splice loss is directly affected by the quality of the fiber preparation. For best results, ensure that the V-grooves are clean and that the fiber ends are properly cleaned and cleaved.

Prepare the single fiber according to the following procedure.

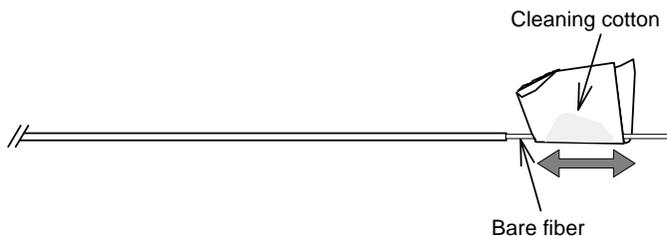
1. Insert a splice protection sleeve onto either the right or the left fiber.



2. Strip off a portion of fiber coating by using the fiber stripper. For details, refer to the manual of the stripper.

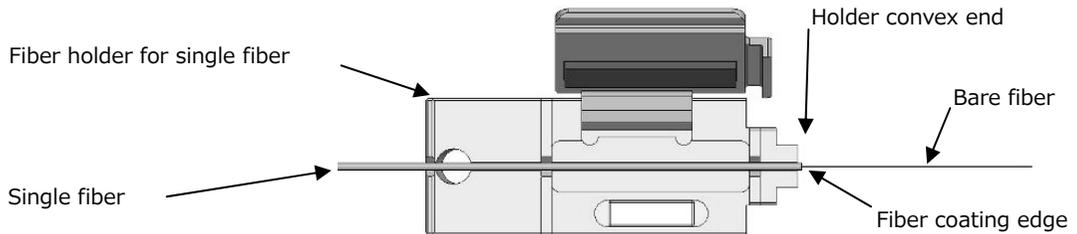


3. Wipe the bare fiber with a lint-free tissue soaked with denatured alcohol.



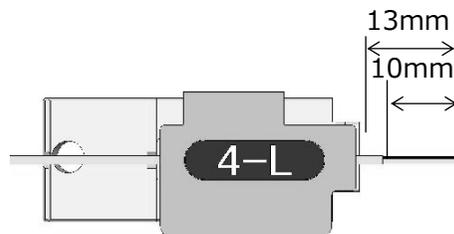
Please use ethanol of more than 99% of purity for cleaning fiber.

4. Make sure to use the suited fiber holder according to the diameter of the fiber coating. Place the fiber in such a manner that the fiber coatings removal edge matches the holder convex end as below.



In the case of splicing with 5mm cleaving length for NJ001, clean the fiber carefully, especially around the ragged edge of the coating to remove the residue. If the residue remains at edge and such fiber is put into the V-groove, it may cause the axis offset subsequently.

5. Cleave the fiber so that 10mm length of bare fiber extends past the fiber coating. Refer to the manual of the cleaver for details.



- Do not clean the bare fiber after it has been cleaved.
- Do not let the bare fiber tip come in contact with any surfaces.
- Do not look into a fiber with the naked eye during operation. Wearing protection glasses is recommended.

7.1.3 Loading the Fiber

1. Open the windshield.
2. Set the fiber holder by inserting the hole on the fiber holder to the pin on the fusion splicer as shown in the picture. Be sure that nothing touches the bare fiber tip.
3. Make sure the bare fiber is placed right on the V-groove. If not, remove the fiber holder and set again.
4. Repeat the process for other fiber holders.
5. Close the windshield, and the ready screen is displayed.

Do not slide the tips of the fiber ends through the V-groove tracks.



WARNING

When placing fibers on V-grooves, take care not to break them by hitting them against the V-groove or other parts of the splicer. Broken fiber may get into your eyes.



NJ001 fusion splicer has very short V-groove length to accommodate with short cleaving length of fiber. Set the fiber with short cleaving length on to the V-groove, as shown below.



In case of splicing 900 μ m coating fiber, if the fiber has curls or bendings, it may be difficult to put such fiber on to V-groove as the fiber jumps out from the V-groove. In such case, it may be better to put the fiber edge in a downward direction (flip fiber with 180 degree).



If the fiber has curls or bendings, it may make it difficult to sit properly in the V-groove. Please remove the curls or bending before preparing the fiber, and then place it in the V-grooves.

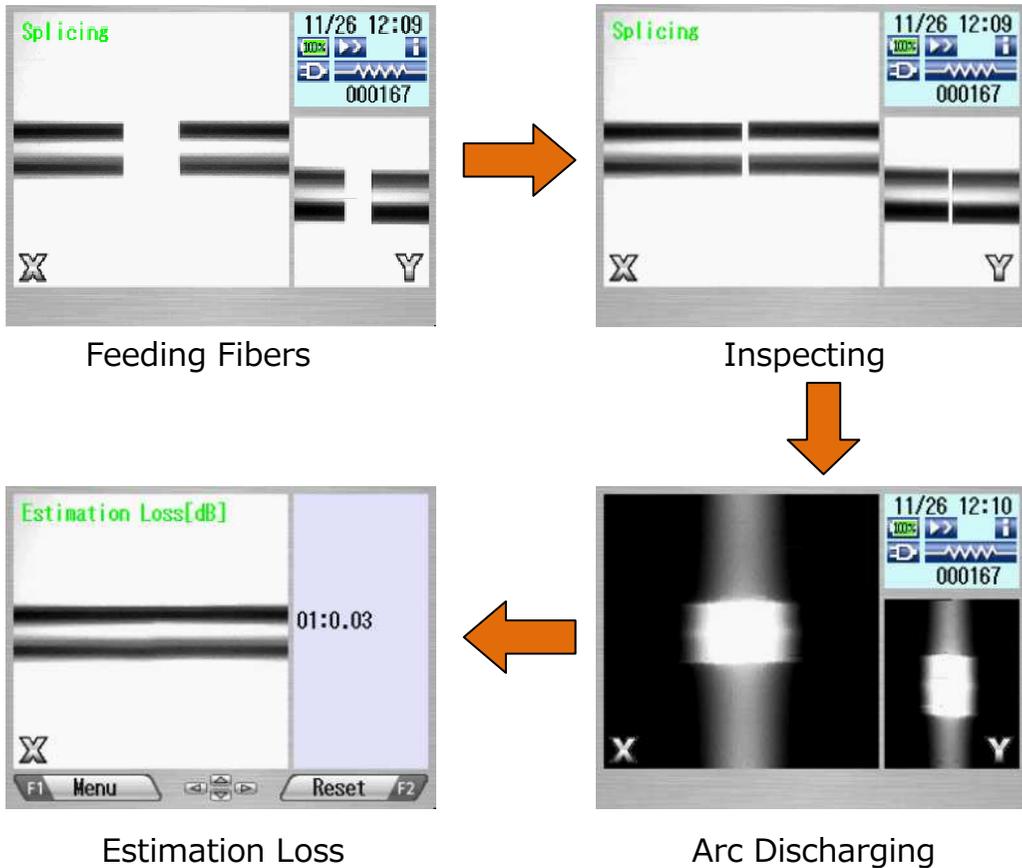
7.1.4 Fusion Splicing

1. Ensure that the "READY" screen is displayed on the monitor.
2. Press  to initiate the fusion splicing cycle.
3. The NJ001 fusion splicer performs the following functions automatically.
To pause the NJ001 fusion splicer during any of these functions, press . The message PAUSE will be displayed on the monitor. To restart the operation, press  again.

- The right and left fiber ends appear on the LCD monitor.
- A cleaning arc is discharged to clean the fiber ends.
- The fibers are set with a gap of about 30 μm between the ends.
- The fibers are inspected for axis offset and cleave condition.
- The electrodes discharge.
- The splice is inspected.
- The splice loss is estimated and displayed on the LCD monitor as shown in the picture.



Splicing Flow



4. After displaying the estimation loss, the following operations are available.

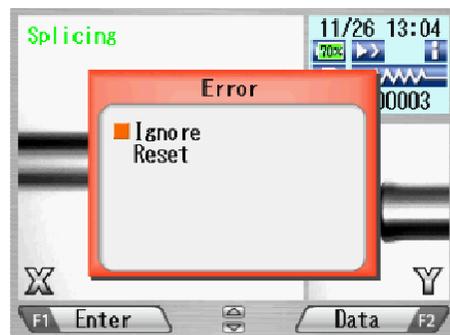
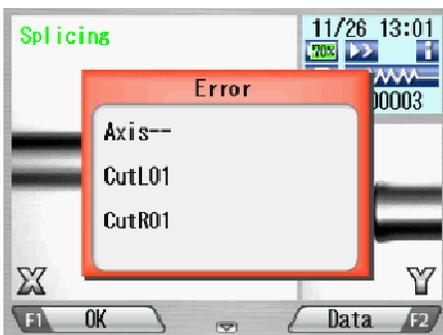
- Press ◀ ▶ to switch the screen of X ⇔ Y.
- Press ▲ to discharge an additional arc, splice inspection and loss estimation are re-performed
- Press ▼ to display the inspecting data before and after splicing.

5. While in Pause status, pressing **Menu** displays options available in the process. To resume the process, press  again.

- Menu: Display the menu screen.
- Zoom: Zoom in the fiber image.
- Capture: Capture the fiber image and store it with the splice data.
- Field X \leftrightarrow Y: Switch the fiber view between X and Y.



•If the fibers fail the inspections for cleave criteria, the fusion cycle is paused and an appropriate error message is displayed as below. Press **▼** to temporarily hide message and check the state of the fiber. Open the windshield, remove the fibers after READY is displayed and retry the splice by repeating the entire procedure, starting from the fiber preparation process. To ignore the error and continue the cycle, press **OK** and press **Enter**.



After splicing, The splicer inspects the splicing state by image processing. However, please also check viewing on the LCD screen.

7.1.5 Splicing Defects

Defects	Possible Cause	Action
Bubbling	Wrong fiber type selected	Select the correct Fusion Program, and repeat fusion splicing.
	Faulty cleave	Repeat fiber preparation and fusion splicing.
	Dirty fiber end	Repeat fiber preparation and fusion splicing.
	Degradation of electrodes	Replace the electrodes.
Bubbling (MMF)	Depending on fiber	Increase "Pre_fuse_time" in the Fusion Program (e.g. Increase by 50[msec])
Not spliced or Neck-down	Wrong Fusion Program selected	Select the correct Fusion Program, and repeat fusion splicing.
	Faulty cleave	Repeat fiber preparation and fusion splicing.
	Excessive arc current	Perform an arc check, and adjust arc power.
	Insufficient fiber feed	Adjust the fiber feed amount.
	Degradation of electrodes	Replace the electrodes.
Thickening	Wrong Fusion Program selected	Select the correct Fusion Program, and repeat fusion splicing.
	Excessive fiber feed	Adjust the fiber feed amount.
	Degradation of electrodes	Replace electrodes.
	Excessive arc current	Perform an arc check, and adjust arc power.
Streak	Wrong Fusion Program selected	Select the correct Fusion Program, and repeat fusion splicing.
	Degradation of electrodes	Replace the electrodes.
	Weak arc	Perform an arc check and adjust arc power, or apply an additional arc.

7.1.6 Removing the Spliced Fiber

1. Raise both heater clamps before removing the fiber.
2. Open the windshield. A tension test (1.96N) is performed on the fibers.
3. A buzzer beeps once when the tension test is completed.
4. Open the lid of both fiber holders.
5. Remove the spliced fiber, pulling slightly so that the fiber is taut.

Handle the spliced fiber carefully. Do not twist the fiber.

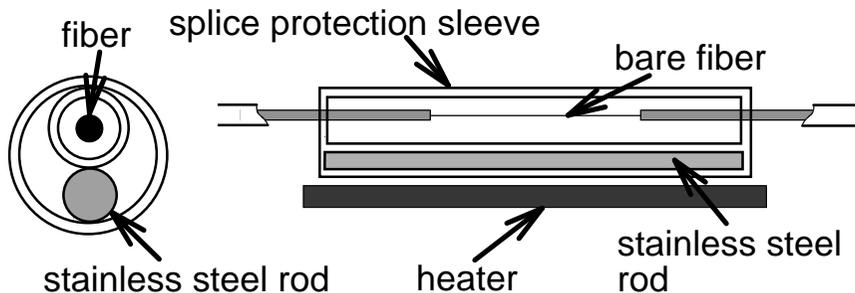


CAUTION

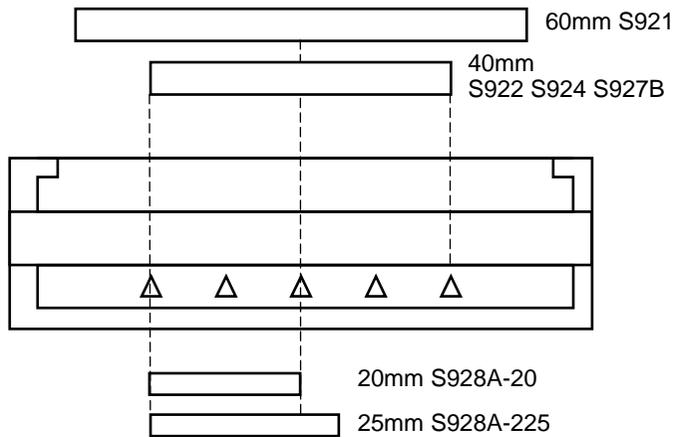
Do not attempt to load fibers while the NJ001 fusion splicer is resetting. Load the fibers only after the reset operation is complete and the READY screen is displayed.

7.1.7 Reinforcing the Fusion Splice

1. Slide the splice protection sleeve over the splice.
2. Place the spliced fiber in the heater – Right-side first – to force the Right heater clamp to close.
3. Ensure that the splice protection sleeve rests in the middle section of the heater and that the stainless steel rod in the sleeve faces down.



4. Keeping the fiber taut with the left hand, lower the spliced fiber to force the left heater clamp to close.



i If protection sleeve is placed incorrect position during heater cycle, this may cause a shrinking error.

5. Close the heater cover.
6. When the fiber is set and the left clamping is shut, the heat LED turns on red and the heating starts automatically. (When heater auto start setting is "0", press  to activate the heater.)

The heating process is displayed in the LCD monitor with status icons as below. When the heating and cooling operations are completed, a beep sound is heard.

Type	Icon	Content
Heater Status		Blue: Ready Mode Red/Yellow: Heating Mode
		Cooling Mode
		Error Occurring

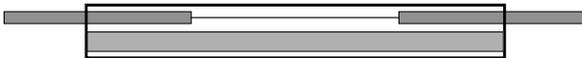
- To stop the heating operation (the HEAT LED is lit), press . The heating stops immediately.
- When the ambient temperature is lower than 10 °C, the heating time is automatically extended by app. 5 to 20 seconds.



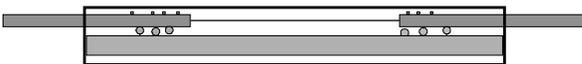
During the heater cycle, do not open the heater clamp or lid. This may cause a shrinking error.

7. Remove the fiber from the heater, and inspect the splice protection sleeve.

normal heating

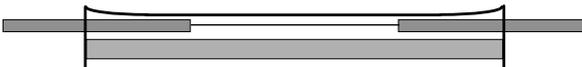


excessive heating



Decrease the heating temperature.

insufficient heating



Extend the heating time.



WARNING

STOP using the fusion splicer when problems are experienced with the protection sleeve heater. Turn off the power immediately, disconnect the power cord, remove the battery, and contact our service center.

DO NOT touch the heater element during the heater cycle and right after the heat process is complete. The element is very hot and may burn you.

8. Programming Guide

8.1 Programming Function and Menu

To start programming, the user needs to access each function through the menu screen.

1. Press **Menu** (function key) to access the Menu screen. The **Menu** key is available in the Ready screen and splice screens. When the menu is displayed in a pop-up screen, select the Menu and press **Enter**.
2. Menu screen is displayed as shown (in picture to the right). Press **Escape** (function key) to return to the previous screen.



The following table is a list of functions available to the operator for programming and maintenance.

Menu	Features	Contents
 <p>Arc Check</p>	Perform arc check	Check previous splicing data, add comment, erase the data or transfer the data to PC.
 <p>Tool</p>	Perform a self machine check	Automatically diagnose condition of machine.
	Measure fiber	Measure and indicate fiber's clad diameter, core diameter, core offset between fibers, cleaving angles and/or gap between fibers.
	Measure environment condition	Measure and indicate ambient temperature, pressure, as well as heater temperature.
	Manually splice fiber	Manually control entire splicing cycle (using the keypad).
	Capture image	Store, record or erase fiber image
 <p>History</p>	Splice Data	Check previous splicing data, add comment, erase the data or transfer the data to PC.
	Arc Check History	Check arc data, add comment, erase the data or transfer the data to PC.
	Image Data	Check fiber image, add comment, erase the image or transfer the image to PC.
 <p>Program Edit</p>	Edit splicing programs	Change parameter values in the program, adjust inspection criteria for the splicing process or change program name.
	Edit heating programs	Change heat temperature, heat duration, and/or program name.

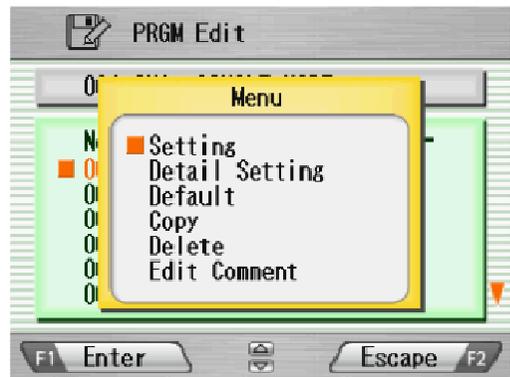
Menu	Features	Contents
 <p>Heater PRGM</p>	<p>Select heat program list.</p>	<p>List all available heat programs for fiber reinforcement. User can select any from the list. See “Selecting a Fiber Program” in “Getting Started”.</p>
 <p>Fusion PRGM</p>	<p>Select fusion program list</p>	<p>List all available fusion splicing programs. User can select any from the list. See “Changing Fiber Program” in “Getting Started”.</p>
 <p>Shortcut</p> <p>Short Cut</p>	<p>Set up short cut key</p>	<p>Save frequently used screen with short cut key, so user can immediately access desired screen, when necessary.</p>
 <p>Setting</p>	<p>Set up parameters</p>	<p>Set up default language, login name, sleep function, splicing start pattern, etc.</p>
	<p>Set up counter</p>	<p>Get arc discharge times, splice counts. Set up recommended splice counts for the replacement/cleaning of electrodes.</p>
	<p>Configure the data indicator</p>	<p>Turn measurement and/or estimation data during the splicing process on/off.</p>
	<p>Adjust Date/Time</p>	<p>Adjust the date and time. Change the timer format indicating date and time.</p>
	<p>Check machine info</p>	<p>Get machine’s manufacturer S/N, software version.</p>
 <p>Maintenance</p>	<p>Replace/Clean electrodes</p>	<p>Step-by-step tutorial that illustrates how to replace/clean the electrodes, clean lens or clean V-grooves & fiber clamps.</p>
	<p>Clean lens</p>	
	<p>Clean V-groove & fiber clamp.</p>	
	<p>SOC Reference Guide</p>	<p>Procedure of splicing with ferrule.</p>

8.2 Program Edit

1. Select "PRGM Edit" in the Menu screen and press **Enter**.
2. Select "Fusion" or "Heater" and press **Enter**.

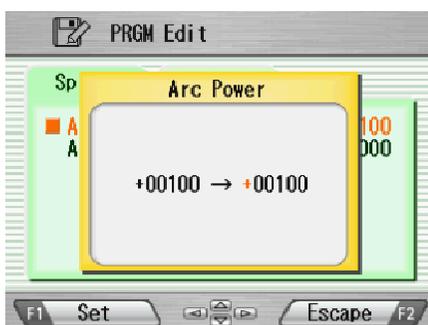
The following procedures and pictures are for Fusion program editing; however, the same procedure can be applied to the Heat programs.

3. Stored program list is displayed (as shown in picture to the right). Comment for highlighted program can be displayed by pressing **▶**, and turned off by pressing **◀**.
4. Select a program to be modified by pressing **Enter** and press **Menu** to access to pop-up menu. Select a function and press **Enter**.
 - Setting: Modify parameters.
 - Detail Setting: Modify detailed parameters.
 - Default: Return the parameters to default value.
 - Copy: Copy the program and store with a new name.
 - Delete: Erase the program from the program list.
 - Edit Comment: Edit comment of the program.



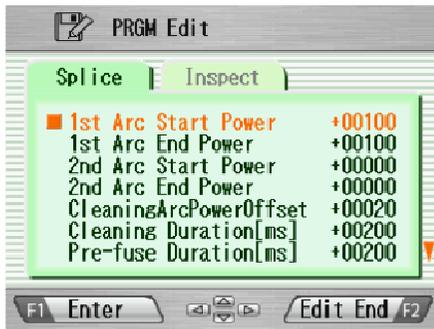
8.2.1 Setting

1. Select "Setting" and press **Enter** in the pop-up menu.
2. Select "Splice" or "Inspect" tab with **◀ ▶**. Select parameters with **▲ ▼** and press **Enter** to edit.
3. Change the parameter with **◀ ▶** (increase/decrease appropriate digits) and/or **▲ ▼** (actual value), and press **Set**.
4. Press **Edit End**. The pop-up menu will show up and ask the following questions.
 - Over Write: Replace the parameter with the edited value.
 - Other Location: Store the program with new/changed parameter to a new location as a new program.
 - Cancel: Cancel the change and return to the previous screen.
5. Return to the parameter list. Select another parameter for editing or press **Escape** to complete the edit.



8.2.2 Detail Setting

1. Select "Detail Setting" and press in the pop-up menu.
2. A more detailed set of parameters is possible. The setting method is the same as "Setting".



Press ▲ ▼ : Move one by one item
Press  : Move to next page

8.2.3 Default

Follow the procedures shown below to reset the modified program to the default parameters.

1. Select "Default" from Menu screen and press in the pop-up menu.
The pop-up message window appears.
2. Press .
3. Select "Yes" and press to reset parameters to default parameters;
or select "No" and press to cancel the operation.



8.2.4 Copy

Follow the procedures shown below to copy the selected program.

1. Select "Copy" and press in the pop-up menu.
2. Select a new destination for the program. The locations of the factory pre-installed programs cannot be selected.
3. Press to paste the program.



8.2.5 Delete

Follow the procedures shown below to delete the selected program.

1. Select "Delete" and press in the pop-up menu.
2. A pop-up message will be displayed on the screen asking "Delete Program?". Press to proceed with the operation.
3. Select "Yes" and press to delete the program; or select "No" and press to cancel the operation. The factory pre-installed programs cannot be deleted.



8.2.6 Edit Comment

Follow the procedure shown below to edit the comment of the selected program.

1. Select "Edit Comment" and press **Enter**.
2. The screen shows current comment in the upper window and characters available for editing in the lower window.
3. Select a character in the lower window with **◀ ▶** and **▲ ▼**. Press **Set** to choose the character. The character with red color in the current comment is replaced with the selected character.
4. Press **Escape** after new comment is edited.
5. The pop-up menu shows up and asks the following questions
 - Over Write: Replace the current comment with the edited one.
 - Cancel: Cancel the change and return to the previous screen.
6. Select "Over Write" and press **Enter** to save edited comment; or select "Cancel" and press **Enter** to cancel the operation.



NJ001 splicer can store a maximum of 150 fusion programs.

8.2.7 Parameter table

Parameter Table for Splice

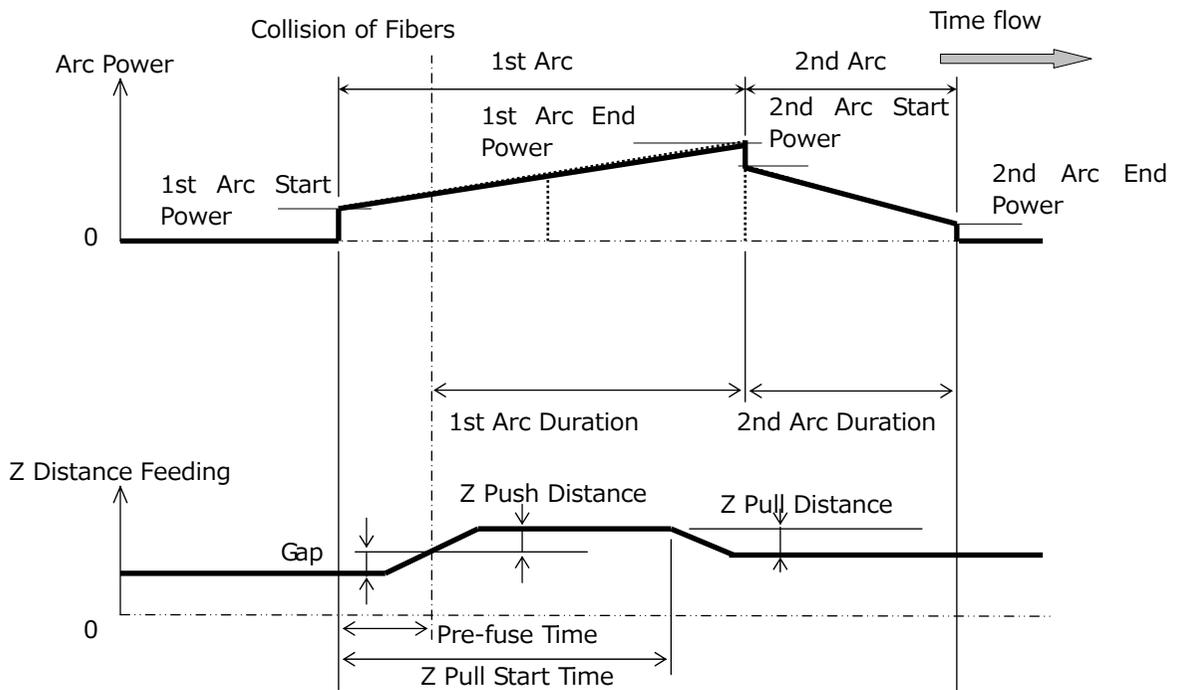
Parameter Name	Min	Max	Description
1 st Arc Start Power	0	200	Starting arc power in 1 st arc discharge
1 st Arc End Power	0	200	Ending arc power in 1 st arc discharge
2 nd Arc Start Power	0	200	Starting arc power in 2 nd arc discharge
2 nd Arc End Power	0	200	Ending arc power in 2 nd arc discharge
Cleaning Arc Power Offset	-127	128	Additional Arc Power for cleaning purposes
Cleaning Duration	0	32767	Arc duration for cleaning [msec]
Pre-fuse Duration	0	32767	Time between arc starting and fibers first butting [msec]
1 st Arc Duration	0	32767	1st arc time duration [msec]
2 nd Arc Duration	0	32767	2nd arc time duration [msec]
Z Pull Start Time [ms]	0	32767	Time to start to pull back the fiber [msec]
Z Push Distance [μm]	0	32767	Overlapping distance from fibers first butting position [μm]
Z Pull Distance [μm]	0	32767	Pulling back distance from the final overlapping position [μm]
Re Arc Times [times]	0	255	Allowable numbers for the repeat arc in programmed additional arc mode
Re Arc Duration [ms]	0	32767	Duration of additional arc [msec]
Re Arc Interval [ms]	0	32767	Interval between additional arc and additional arc [msec]
Repeat Arc Power Offset	-127	128	Power of additional arc is Arc Power added by Repeat Arc Power Offset
Re Arc Power	0	255	Power of additional arc
Gap [μm]	0	184	Gap for the final position tuning before the splicing [μm]



Parameter Table for Splice

Parameter	Min	Max	Description
Offset [μm]	0	99.9	Maximum permissible fiber offset [μm]
Cleave Angle [deg]	0	90.0	Maximum permissible angle of cleaved fiber end for splicing to continue [deg]
Loss Limit [dB]	0	15.0	Maximum loss allowed for machine not to give a splicing error [dB]
Gap Difference [μm]	0	99.99	Maximum permissible gap difference before splicing [μm]

Time chart of fusion parameters



Arc power Compensation Table

Arc Power	Cleaning Arc Power	Fusion Arc Power	Repeat Arc Power
Cleaning Power Offset ^{*1}	+	0	0
Repeat Arc Power offset ^{*1}	0	0	+
Environment Compensation	+	+	+
Real Time Arc Control ^{*2}	0	+	+

The items marked with "+" are added at the time of calculating each arc power.

*1 This is a parameter of the splicing program, and can be changed.

*2 Possible to change to "Active" or "Cancel" in "Setting". Added when set to "Active".



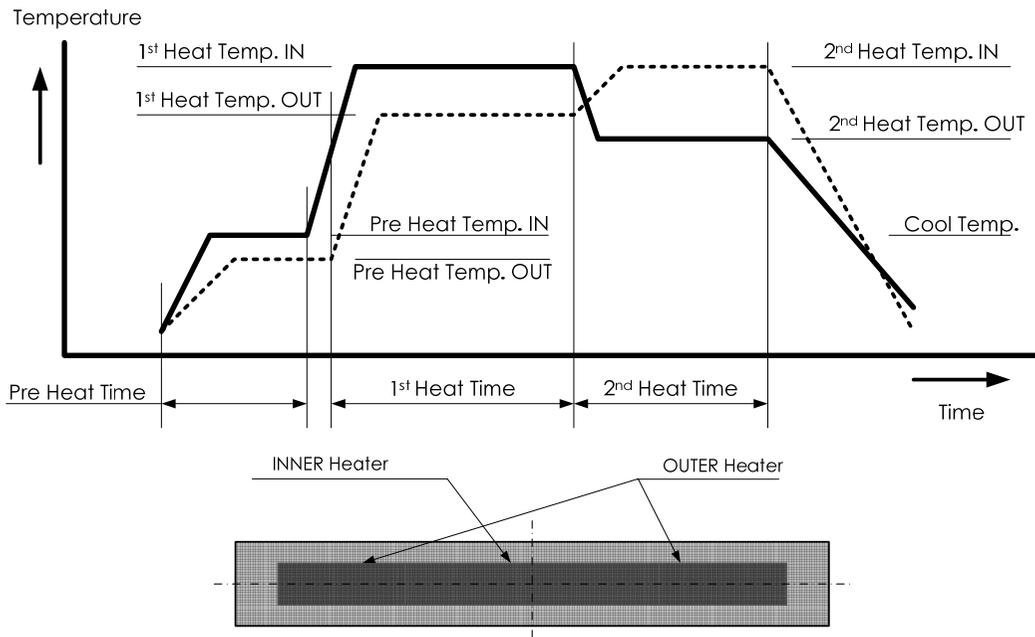
Parameter Table for Heater Program

Parameter	Min	Max	Description
1 st Heat Temp IN [deg C]	0	280	Temperature of INNER heater for the first half.
1 st Heat Temp OUT [deg C]	0	280	Temperature of OUTER heater for the first half.
1 st Heat Time [sec]	0	300	Operation time of the first half.
2 nd Heat Temp IN [deg C]	0	280	Temperature of INNER heater for The latter half.
2 nd Heat Temp OUT [deg C]	0	280	Temperature of OUTER heater for The latter half.
2 nd Heat Time [sec]	0	300	Heating time after 1 st heating
Cool Temp [deg C]	0	280	Temperature to arrive at end of cooling process.
Pre Heat temp IN [deg C]	0	280	Temperature of INNER heater for preliminary heating. Preliminary heating temperature before the first half.
Pre Heat temp OUT [deg C]	0	280	Temperature of OUTER heater for preliminary heating. Preliminary heating temperature before the first half.
Pre Heat Time [sec]	0	300	Operation time of preliminary heating after the end of cooling process or before the first half.
Auto Start	0	2	Setting for automatic start function. [0] : Manual start operation. [1] : When fiber set and left clamping is shut, heating start automatically.* [2]: Consecutive heating operation.
Compensation Auto Start	0	30	Expansion time of the automatic operation.

*Do not leave the protection sleeve in a heater after finish of shrinkage. The coating may melt.



Time chart of heater parameters



8.3 History

By selecting “History” in the Menu screen, the user can access detailed splice data, arc check history and image archives; the user can also add comments to each individual data point. The data also can be transferred/ uploaded to PC or deleted from the memory.

1. In the Menu screen, select the “History” and press .
2. Select “Splice Data” or “Image Data” and press to get the stored data.



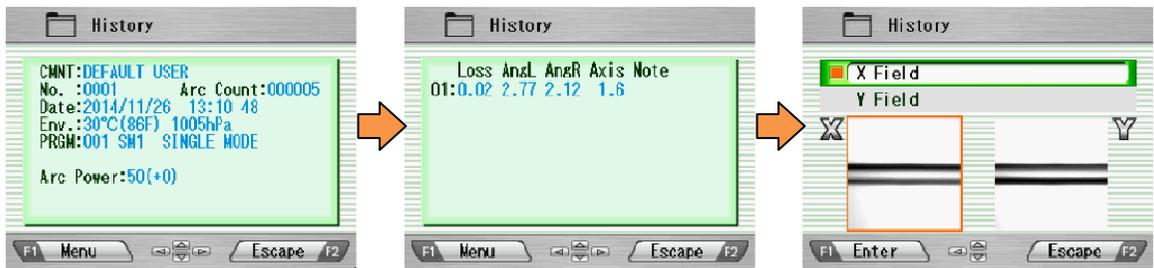
8.3.1 Splice data

1. If "Splice Data" is selected, a list of previous splice data is displayed on the screen.

(As for the history with "*", the splice image is preserved automatically.)

2. Select a targeted date and press to obtain the details of the data as shown in the picture.

3. Press **▶** to display the detail data of each fiber as follows.



Data Title	Description
CMNT	Comment of the data, which can be edited.
No.	No. 1 is the data for the last splice and the number increases for older splices.
Arc Count	Arc Count when splice was performed.
Date	Date and time for the splice performed.
Env.	The environmental temperature and the air pressure, when Splicing was done.
PRGM	Name of Fusion Program.
Arc Power	Value of the strength of the electric discharge when splicing
Retreat	Retreat value in arc check
Center	Retreat center position in arc check
Loss	Estimated splice loss
AngL	Cleave angle of the left fiber
AngR	Cleave angle of the right fiber
Axis	Axis offset before splice
Note	Error codes and additional arc memo if any. The data with error is highlighted. L: Estimated loss exceeds the target value S: Streak or bubble at the splice point or not spliced A: Cleave angle exceeds the criteria C: Cleave end face has excessive defects G: Gap difference exceeds the criteria +: Additional arc is applied

4. Press **Menu** and the pop-up shows available functions. Select desired function and press **Enter** to initiate the operation.

- Edit Comment: Edit the Comment of data.
- PC-OUT: Transfer/Uploading the data to PC.
- Delete: Delete the data.



Comment Edit

Refer to 8.2.6 for how to edit comment.

PC-OUT

When connecting the NJ001 to a PC, install driver software for NJ001 on your PC. Ask your representative or Furukawa Electric to obtain the driver software. Follow the procedures shown below to upload the data to PC.

1. Turn on NJ001 and PC.
2. Connect NJ001 to PC with a USB cable.
3. Open the termination emulator such as "HYPER TERMINAL" of windows. For explanation, this manual uses HYPER TERMINAL of Windows XP.
4. In "Connection Description" screen, name "NJ001" in the box for the name of new connection and select dial-up icon.
5. Select an appropriate communication port (COM2, for example) from "Connect To" screen.
6. Cancel the "Port Setting" window.
7. In HYPER TERMINAL menu. Select Transfer then Capture Text.
8. Name TEST for example. Remember the location that TEST will be stored in. (Default would be C: / Program files/ Accessory/Hypertext.) Now HYPER TERMINAL is ready for receiving data.
9. Select "PC-OUT" in the pop-up menu of NJ001 and press .
10. Select "Current" for the desired/selected data or "All" for all the stored data and press . NJ001 will send data through HYPER TERMINAL to PC and you will see data in the window.



Delete

1. Select "Delete" and press .
 2. Select "Current" for deleting desired/selected data only or "All Data" for all the stored data and press . The selected data are then deleted.
- 1,500 splice data entries can be stored on the NJ001. Data older than 1,500 splices are automatically erased.
 - When the splice is performed with an additional arc, the data show final results after the additional arc.

8.3.2 Arc Check History

1. The list of previous arc checks is shown on the same screen as splice data.
2. Select a targeted time and press to display the detail of the data as shown in the picture.



The data displayed are as follows;

Data Title	Description
CMNT	Comment of the data, which can be edited.
No.	No. 1 is the data for the last arc check and the number is counted up for older arc checks.
Arc Count	Arc count when splice was performed.
Date	Date and time for the arc check performed.
PRGM	Name of Fusion Program.
Arc Power	Value of Arc Power
Retreat	Value of how far the fibers melt back
Center	Value for centered position of the melt back

3. Press **Menu** and the pop-up shows available functions. Select desired function and press **Enter** to initiate the operation.

- Comment Edit: Edit the Comment of the data.
- PC-OUT: Upload the data to PC.
- Delete: Delete the data.

Follow the same procedure as for Splice Data.

8.3.3 Image Capture

1. The list of captured photos is displayed.

2. Select a photo and press **Enter** to show the image and data as shown in the picture.

3. Press **Menu** and the pop-up shows available functions. Select desired function and press **Enter** to initiate the operation.

- Edit Comment: Edit the Comment of the data.
- FULL Screen: Display the image in the full screen size.
- Delete: Delete the data.

Follow the same procedure for splice data.

The data displayed are as follows;

Sample	Description
001 SM4	Name of the Fusion Program
00319	Arc Count when splice was performed.
Ready	Splicing process when the image is captured.
X Field/Y Field	X or Y image
32 °C 1023hPa	Temperature and ambient pressure when splice was performed.
DEFAULT USER	Comment



8.4 Tool

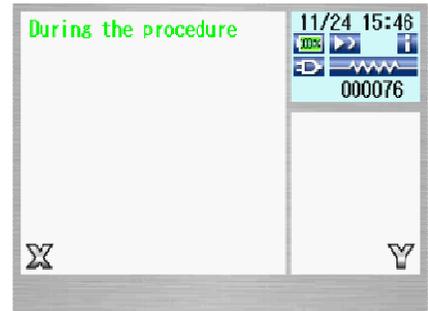
This menu provides various kinds of utility functions.

1. Select "Tool" in the Menu screen and press .
2. Select a Sub-Menu in the table below and press .
3. Press repeatedly to return to the Ready screen.

Sub-Menu	Function
Machine Check	Perform a self-check of the machine condition.
Fiber Measuring	Perform auto or manual inspection of the fiber with regards to clad and core offset, relative eccentricity, gap, tilt and relative cleave angle.
Environment	View ambient temperature, pressure, as well as heater temperature.
Manual Splicing	Allows operator to manually control entire splicing cycle (using the keypad)
Image Capture	Store and delete the fiber image.
Fiber edge inspection	Measure cleave angle. (Not guaranteed)
Sleeve Shrink Adjustment	Adjust the shrinking condition of the sleeve.

8.4.1 Machine Check

1. A pop-up message prompts the user to remove the fiber from the machine. Follow the message and press **OK**.
2. NJ001 automatically checks for dust in the camera and verifies the motor movements (see sample screen to the right).



Pop-up screen then prompts the user to set the fiber in place.

3. Set the fibers on both sides and press **▶** to initiate the remaining check.
4. NJ001 automatically performs the remaining check and a pop-up message prompts the user to perform an arc check.
5. Press **Enter** and select "Execute" or "Cancel" to perform the arc check. In the pop-up screen, press **Enter** again.
6. After the machine check is complete, the pop-up screen shows "Status OK". Press **Escape** key to finish the check.
7. If the machine fails the machine check, a pop-up screen shows "Status NG Call the Service Center". Please call your representatives or Furukawa Electric for further assistance.
8. If the arc check fails, pop-up screen shows "Status NG Remove fibers, and retry Arc Check". Perform an arc check to optimize the arc power.

	When execute "Machine Check" function, please use fibers on which stripping, cleaning and cleaving were performed right.
	When the result is "Status NG ", please refer to "Maintenance" about disposal.

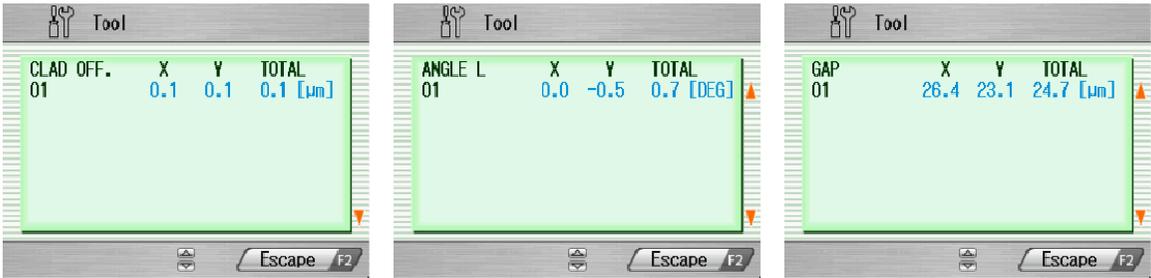
8.4.2 Fiber Measuring

The NJ001 performs an auto or manual inspection of the fiber (specifically, the clad offset, gap, fiber tilt and relative cleave angle).

1. Select "Fiber Measuring" in the "Tool" screen and the sub-menu is displayed.
 - Fiber feed & Measuring: Fiber is fed automatically at the measuring position, machine measures the fiber and displays the result.
 - Fiber Measuring: Performs the measurement only. Fibers must be placed at an acceptable position manually. The results will be displayed after the measurement.
 - Motor Manual Move: Allows the measuring process to be done manually.
2. Load fiber on the machine.
3. Select "Fiber Feed & Measuring" and press . The machine automatically feeds and measures the fibers, and then displays the result.
4. Repeatedly press until the Ready screen is obtained.
5. The same content of results are displayed when the measuring is performed, using "Fiber Measuring" sub-menu. Be sure to place the fiber at an acceptable position before selecting the sub-menu.
6. Refer to "8.4.4. Manual Splicing" for operating the "Motor Manual Move".



Measuring Results



The results are shown as in the pictures.

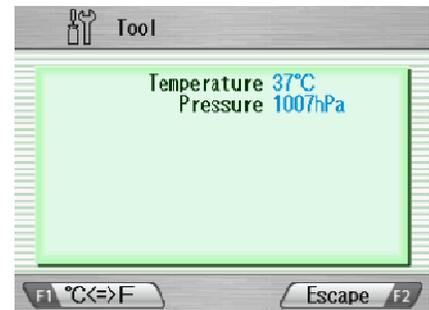
The following parameters are measured. Press ▲▼ keys to change the parameters.

Sample	Description
CLAD OFF	Amount of CLAD OFFSET between the two fibers [μm]
ANGLE L	Cleave angle of the left fiber [degree]
ANGLE R	Cleave angle of the right fiber [degree]
REL.ANGLE	RELATIVE cleave angle between the two fibers [degree]
GAP	GAP between the two fibers [μm]
CLAD W L	Clad width of the left fiber [μm]
CLAD W R	Clad width of the right fiber [μm]
TILT L	Tilt angle of the left fiber clad center [degree]
TILT R	Tilt angle of the right fiber clad center [degree]

8.4.3 Environment

The NJ001 allows the user to view environmental conditions.

1. Select "Environment" in the Tool menu screen and press Enter.
2. "Temperature" and Ambient "Pressure" are displayed. Press °C<=>F key to convert the temperature unit.
3. Press Escape to return to the previous screen.



8.4.4 Manual Splicing

Manual splicing allows the entire cycle of splicing to be operated manually using the keypad.



1. Select "Manual Splicing" in the Tool menu screen and press .
2. Select the preferred operating mode and press . Load fibers before selecting "Semi Auto".
 - Semi Auto: Fibers are automatically fed and stopped at pre-splice position. Splice is done by manual operation as described below.
 - Manual: All operations are done manually following the procedures.
3. The fibers are fed to the pre-splice position by pressing in the "Semi Auto" mode.
4. Select "Manual" and press to initiate manual operation (see picture to the right). The left window shows the fiber image, and the right window displays the motion control commands.
5. The active motion control command is highlighted in red. Move to other motions by pressing ▲▼. Press ◀▶ to change the value or to activate the function. In "Arc" and "Reset", press to activate the action.
6. Press to return to the previous screen.

Variables which can be manipulated

Command	Setting Item	Description
Motor	Z_L	Activate left fiber feeding
	Z_R	Activate right fiber feeding
Move	◀	Drive the motor leftward
	▶	Drive the motor rightward
Speed	HIGH	Select high speed for motor movement
	LOW	Select low speed for motor movement
Dist.	FREE	Drive the motor step by step by pressing ◀ ▶ key.
	(Value) [µm]	Motor moves based on pre-set value. Selections from: 5/50/500
Arc	Clean	Cleaning arc
	Arc	Fusion splice arc
	Add	Additional arc
Reset	Current	Reset the activated motor
	All	Reset all the motors
Field	X	Display X-axis image
	Y	Display Y-axis image
Pulse	(value)	Current pulse position of the activated motor

8.4.5 Image Capture

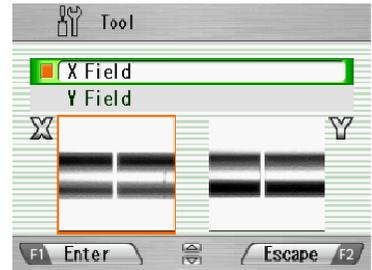
The NJ001 allows the user to store and delete fiber images.

1. Select "Image Capture" and press .
2. Select "Capture" to capture and store image or "Delete data" to delete the image and press .



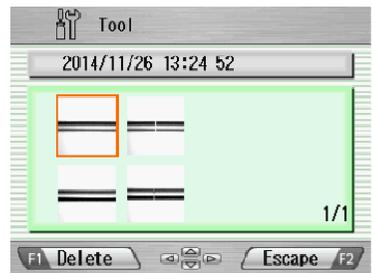
<Capture>

1. Select "X Field" or "Y Field" to store the image.
Press (the image is then stored).
2. Press to return to the previous screen.



<Delete Data>

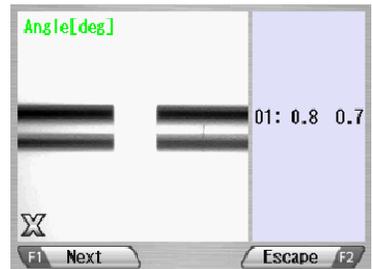
1. Select data with ▲▼ and ◀▶ and press to erase it.
2. Press to return to the previous screen.



8.4.6 Fiber Edge Inspection

Measuring the cleave angle.

1. Select "Fiber edge inspection" and press .
2. Set the fiber you want to measure. And, close the windshield and press .



The fibers are fed. Cleave angles are subsequently displayed on the right side of the screen after cleaning the arc discharge.

A result of measurement is judged based on a chosen splice program.

If the measurement angle is bigger than the check limit value, the angle is indicated by the red character. Even when the fiber edge is bad, it is displayed as an error.

- When measuring other fibers, please press **Next**. When ending, please press **Escape**.



The inspection is possible only at one side. Please set fiber in either and measure.

8.4.7 Sleeve Shrink Adjustment

Optimize shrinking condition for the sleeve.

- Select "Sleeve Shrink Adjustment".
- Select a pattern (A~E) that is similar to the current shrinking condition of the sleeve. And press **Enter**.

Code	Condition of Sleeve
A	Not shrinking enough at sleeve end
B	Bubble in the center of sleeve
C	Fiber coating melts
D	Sleeve melts too much
E	Default to the factory setting

- The heating condition is adjusted so that the shrinking condition for the sleeve becomes better.
- If the adjustment is insufficient, repeat the above operation.



8.5 Setting

The following functions are available in Settings. The initial setting is noted in bold character.

1. Select "Setting" in the Menu screen and press .
2. Select Sub-Menu and press .
3. Select Setting item and press .
4. Follow the procedure below for setting each item.
5. Press to return to the previous screen.

Setting Items of Parameter

Setting Item	Contents
Language	Select language. English , Japanese, Chinese, Portuguese, French, German, Dutch, Spanish, Czech, Danish, Finnish, Italian, Swedish, Polish, Russian, Korean, Norwegian, etc.
Auto Start for Fusion	Select auto start mode Auto / SemiAuto / Cancel
Auto Start for Heater	Activating auto start mode Active: Depends on the Auto-start mode of the selected heating program. Auto: Not depending on the heating program. Heating starts automatically. Cancel: Not depending on the heating program. Auto-start is invalid. *In 60/40mm CONTINUOUS heating program, it does not start automatically. Push  .
Data Output	Activating data output mode Cancel / Active / PC
Stepping Action	Selecting splice operation mode Cancel / Type 1(Stops at before splice) / Type 2 (Stops at every process) Press  to resume the process



Setting Item	Contents
Common Arc Power	Set common arc power Any value from 0 to 255. Select a digit with ◀ ▶ and press ▲ ▼ to increase/decrease the value. When “+” is selected, press ▲ key to jump to 255 or press ▼ key to jump to 0.
Buzzer Sound	Select buzzer volume. +2 / +1 / 0
Buzzer Tone	Select buzzer tone. +2 / +1 / 0
Sleep Time	Set time for auto power off 1 / 2 / 3 / 4 / 5 / 6 / 7 / 8 / 9 / 10 (min.)
Calendar Format	Select calendar format YYMMDD / MMDDYY / DDMMYY
Login Message	Activate login password Active / Cancel
Sensor	Activate environmental compensation Active / Cancel
Real Time Arc Control	Activate RTAC mode Active / Cancel
Zoom Image	Select Fiber image at splicing Active / Cancel
Display Image	Activate fiber image during arc discharging Type 1 / Type 2
Tension Test	Activate tension test Active / Cancel
Direction of Monitor	Select direction of LCD screen Front / Rear
Illumination Lamp	Power of LED light. (Weak ⇔ Strong) OFF/1/2/3/4/5/6/7/8/9/10/11/12/13/14/ 15
Arc Counter	Display and edit arc counter Display the current count and can be adjusted to any count (up to 32767). Select a digit with ◀ ▶ and press ▲ ▼ to increase/decrease the value. When “+” is selected, press ▲ key to advance to 32767 or press ▼ key to advance to 0.
Total Arc Counter	Total arc count. Only displays the current count and cannot edit.



Setting Items of Counter

Setting Item	Sub Menu	Description
Arc	Counter Reset	Reset arc counter to zero.
	Alarm On/Off	Activate alarm of arc counter.
	Alarm Count	Set alarm counter.
Cleaving	Counter Reset	Reset cleaving counter to zero.
	Alarm On/Off	Activate alarm of cleaving counter.
	Alarm Count	Set alarm counter.
Stripping	Counter Reset	Reset stripping counter to zero.
	Alarm On/Off	Activate alarm of stripping counter.
	Alarm Count	Set alarm counter.
Splicing	Counter Reset	Reset splicing counter to zero.
	Alarm On/Off	Activate alarm of splicing counter.
	Alarm Count	Set alarm counter.
Total Arc	Alarm On/Off	Activate alarm of total arc counter.
	Alarm Count	Set alarm counter.

Other Setting Items

Setting Item	Contents
Clock	Setting date and time
LCD Adjustment	Adjustment LCD brightness and contrast
About Machine	Information on machine

8.5.1 Parameter

1. Select a Setting item in the "Parameter" list and press Enter.
2. A pop-up window shows the current setting. Press ▲ ▼ to scroll the available settings and press Set to change.
3. Press Escape and a pop-up window will ask the operator to confirm the change. Select "Overwrite" to confirm the change, or "Cancel" to cancel the operation and press Enter.
4. Repeatedly press Escape until the Ready screen is displayed.



- Language

Select the display language.



- Auto Start for Fusion

『Cancel ⇔ Active ⇔ SemiAuto』

Cancel	Auto start function does not work.
Active	After setting fibers, even if you do not press the start key, splicing process is started by closing the windshield.
SemiAuto	The fibers move to the center of the screen when the windshield is closed after the fibers are set and they stops temporarily. Then, it advances to the next process by pushing the start key and the splicing is done.

	<p>If auto start function does not work because the cleave length of fiber is short, please press Start to start.</p> <p>If the cleaving edge is not good, NJ001 cannot recognize a fiber. Please prepare it correctly and set it again.</p>
--	--

- Auto Start for Heater

『Auto⇔ Cancel』

Auto	When a fiber is set to the heater, heating start automatically.
Cancel	Auto Start function does not work. Press heating key.

- Data Output

Select display mode (display or hide) inspection data

『Cancel ⇔ Active ⇔ PC』

Cancel	No display.
Active	Display data on the LCD screen.
PC	Outputs the data to the PC connected by USB cable.

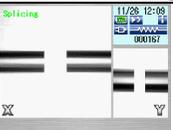
- Stepping Action

『Cancel ⇔ Type1 ⇔ Type2』

Cancel	No pause. If there is any error, pauses and error message are displayed.
Type1	Pauses before splicing. (Press  to resume the process)
Type2	Pauses at every process. (Press  to resume the process)

Splicing flow by Parameter setting

Splicing process and display image by setting of “Stepping Action”, “Data Output” and “Auto Start” are as follows.

Process	Parameter Setting						
	Stepping Action			Data output		Auto Start	
	Cancel	Type1	Type2	Cancel	Active	Cancel	Active
 Fiber Setting	Press 	Press 	Press 	Press 	Press 	Press 	Close Canopy
 1 st Setting Line	↓	↓	Pause	↓	↓	↓	↓
 Cleaning Arc	↓	↓	↓	↓	↓	↓	↓
 2 nd Setting Line	↓	Pause	Pause	↓	↓	↓	↓
 Inspection	↓	Pause	Pause	↓	Pause & Display Data	↓	↓
 Splicing	↓	↓	↓	↓	↓	↓	↓
 Complete	Finish	Finish	Finish	Finish	Finish	Finish	Finish

- Common Arc Power

Any value from 0 to 255. Select a digit with ◀ ▶ and press ▲ ▼ to increase/decrease the value. When “+” is selected, press ▲ to jump to 255 or press ▼ to jump to 0.

- Buzzer Sound

Set Buzzer volume.

『 2 ⇔ 1 ⇔ 0 』

Loud ⇔ Small ⇔ Mute

- Buzzer Tone

Set buzzer tone.

『 2 ⇔ 1 ⇔ 0 』

- Sleep Time

Time until shifting to the power saving mode is set from 1 to 10 minutes.

『10 ⇔ 9 ⇔ 8 ⇔ 7 ⇔ 6 ⇔ 5 ⇔ 4 ⇔ 3 ⇔ 2 ⇔ 1』

- Calendar Format

Setting the display style of the date on the screen

『YYMMDD ⇔ MMDDYY ⇔ DDMMYY』

YYMMDD	Year Month Day (E.g. 2014/11/24)
MMDDYY	Month Day Year (E.g. 11/24/2014)
DDMMYY	Day Month Year (E.g. 24/11/2014)



- Login Message

When a login message is set, comments can be put on the data of the splice history automatically. When the state of “Login message” is active, Setting screen is displayed like figure just after turning on the power.

When changing the comment, set characters by ◀ ▶, ▲ ▼ keys and Set key. The set comment is preserved in splice history data as “CMNT”.



- Sensor

『 Active ⇔ Cancel 』

Active	Depending on the change in barometric pressure of the environment, the arc discharge power is corrected automatically.
Cancel	Cancel auto correction.

- Real Time Arc Control

Activate Real Time Arc Control.

『Cancel ⇔ Active』

- Zoom Image

The fiber image is centered at the brief stop before arc discharge.

『Cancel ⇔ Active』

- Display Image

Activating fiber image during arc discharging

『Type 1 ⇔ Type 2』



- Tension Test

『 Active ⇔ Cancel 』

Active	Tension test starts by opening the windshield. Tension is 1.96N. Reset has been completed, unless the optical fiber is broken, the tension test is passed. Then remove the spliced fiber carefully.
Cancel	Cancel tension test.

- Direction of Monitor

Selecting direction of LCD screen

『Front ⇔ Rear』

Front	The lower side of the LCD screen is the operating key.
Rear	The lower side of the LCD screen is the Heater. It is a direction that looks normal in the top and bottom of the screen when seeing from a rear side of the splicer.

- Illumination Lamp

Adjust the brightness of the lamp. (The lamp illuminates the V-groove)

『15 ⇔ 14 ⇔ 13 ⇔ ⇔ 1 ⇔ OFF』

Bright ----- Dark ⇔ OFF (Turn Off)

- Arc Counter

Display and edit arc count. Displaying the current count and can be adjusted to any count (up to 32767). Select a digit with ◀ ▶ and press ▲ ▼ to increase/decrease the value.

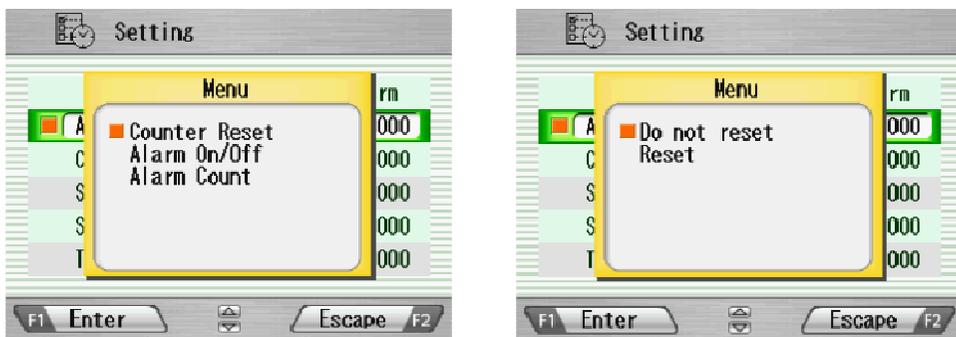
- Total arc Counter

Display total arc count. Only displays the current count and cannot be edited.



8.5.2 Counter

1. Select a Setting item in the "Counter" list and press **Enter**.
2. A pop-up window shows available functions. Press **▲ ▼** to select desired function and press **Enter**.
3. A pop-up window shows available settings. Press **▲ ▼** to select desired setting and press **Enter**.
4. Press **Escape** and a pop-up window prompts the operator to confirm the change. Select "Over write" to confirm the change, or "Cancel" to cancel the operation and press **Enter**.
5. Repeatedly press **Escape** until the Ready screen is displayed.



Edit Alarm Count

Displaying the current count can be adjusted to any count. Select a digit with **◀ ▶** and press **▲ ▼** to increase/decrease the value. When "+" is selected, press **▲** to advance to 32767 or press **▼** to advance to 0.



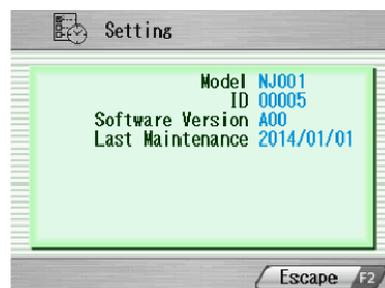
8.5.3 Clock

1. The setting screen is displayed as shown in the picture to the right.
2. Press ▲▼ to select setting item (Day/Month/Year/Hour/Minute) and press .
3. Select a digit with ◀ ▶ and press ▲▼ to increase/decrease the value, and press .
4. Repeatedly press until the ready screen is displayed.



8.5.4 About Machine

Various information of the machine is displayed as shown in the right picture.



8.6 Shortcut

The NJ001 allows the user to register a frequently used screen onto a "Shortcut", and advance to that particular screen quickly.

<Registering>

1. Select "Shortcut" in the Menu screen and keep pressing until the second beep sounds.
2. Select a shortcut menu in the screen. Press ▲▼ to scroll the menu item (highlighted in red color) and ◀ ▶ to change the page.
3. Press to set the shortcut menu. Two short beeps will sound and the display returns to Menu screen.



<Executing>

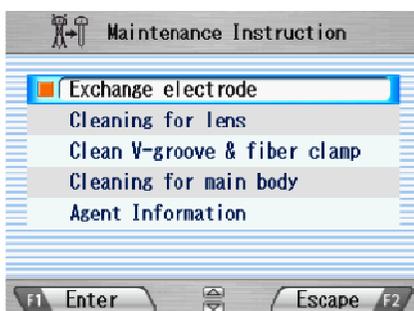
Select "Shortcut" in the Menu screen and press . The screen changes to the registered one.



8.7 Maintenance

The NJ001 allows the user to obtain procedures and pictures for maintenance.

1. Select "Maintenance" in the menu screen and press .
2. Select item from following list and press .
 - Exchange electrodes
 - Cleaning for lens
 - Cleaning V groove and fiber clamp
 - Cleaning for main body
 - Agent Information
3. The maintenance procedures are displayed with text instructions and photographic examples. Press ◀ ▶ to switch the pages. Follow instruction to perform the maintenance.
4. Press to return to the previous screen.



9. Maintenance and Handling Instructions

9.1 Error Messages

The following is a list of major error messages that can be observed. Refer to the following table for trouble-shooting.

Error Message	Cause of Error	Action
NUMBER ERROR (Fiber counts are wrong)	Dust.	Clean lens cover.
	Fiber is broken.	Prepare the fiber again and retry.
CUT ERROR (Cleaving error is found)	Exceeding the inspection criteria for cleave quality	Prepare the fiber again and retry.
	Incorrect parameters setting for cleave quality.	Check and correct the parameters.
AXIS ERROR (Axis offset is high.)	Fiber clamps do not hold the fibers.	Push the button to move fiber clamps for correcting axis offset, or put the fiber on the V-groove again after opening the windshield, and retry inspection.
	Fiber clamps are dirty	Clean the V-groove and the Fiber clamps.
	V-groove or Fiber clamps are dirty.	Cleave again with care not to soil the fibers.
	Fiber bent.	Set the fiber again with reforming its bending.
	Other.	Confirm the setting of Inspection Criteria.
SPLICE DEFECTS	See "Splicing Defects, Fusion Splicing".	



Error Message	Cause of Error	Action
FEEDING ERROR (The motor does not stop after the time limit from the start.)	Defect in the motor driving system.	Contact service center.
OVER-RUN (The motor detected the overrun limit when running forward.)	Fiber is not loaded or not in the proper position.	Load the fiber at the proper position.
	Inappropriate fiber program is selected.	Check and correct the program.
	Bad cleaving quality.	
	Defect in the image processing system.	Contact service center.
	Defect in the motor driving system.	Contact service center.
	V-groove is dirty.	Clean the V-groove.
HEAT TIME OUT (The temperature does not reach the set value within the time limit from heating start up.)	Incorrect parameter is set for heating.	Check and correct the parameters.
	Defect in the heating system.	Contact service center.
Heater Error No.13	Incorrect parameter is set for heating.	Check and correct the heating parameters.
Heater Error No.17	Incorrect parameter is set for heating.	Check and correct the heating parameters.
	Voltage decrease	Recharge the battery. Use the AC adaptor
Heater Error No.18	Incorrect parameter is set for heating.	Check and correct the heating parameters.
Heater Error No.23	Incorrect parameter is set for heating.	Check and correct the heating parameters.



Error Message	Cause of Error	Action
Heater Error No.27	Incorrect parameter is set for heating.	Check and correct the heating parameters.
	Voltage decrease	Recharge the battery. Use the AC adaptor
Heater Error No.28	Incorrect parameter is set for heating.	Check and correct the heating parameters.
COOL TIME OUT (The temperature does not decrease to the set value within the time limit.)	Incorrect parameter is set for cooling.	Check and correct the parameters.
	Defect in the heating system.	Contact service center.
OVER TEMP	Defect in the heating system.	Contact service center.
OUT OF SPEC (The fiber is out of applicable range.)	Inappropriate fiber program is selected.	Check and correct the program.
	Cladding diameter is out of applicable range.	Cannot splice with NJ001
LOW BATTERY	Battery has no power remaining.	See "Recharging Battery".
Inappropriate arc Please perform arc check and retry splicing.	Since the environment changed a lot, the arc power had to be adjusted more than the adjustable range.	Please perform arc check and retry splicing by the optical fiber which pretreated normally.
	Electric discharge became unstable under the influence of dirt, degradation of the electrode, or wind etc.	Please set up "Real Time Arc Control" function "Cancel".



9.2 Maintenance

9.2.1 Arc Check

Perform an arc check whenever high splice losses are observed

9.2.2 Electrode Maintenance

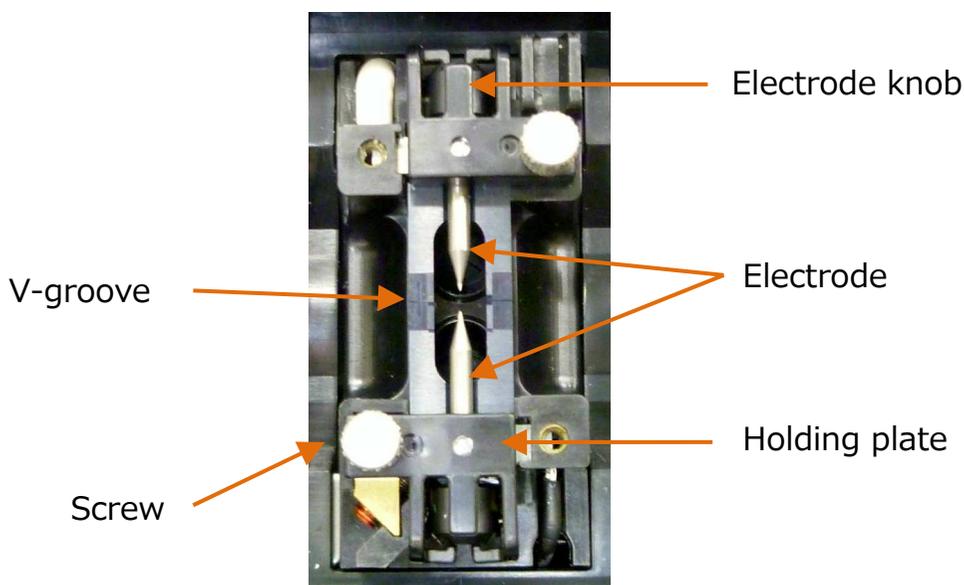
Inspect the electrodes for dirt, wear and damage before using the NJ001. Dust and other particles can be cleaned off by removing the electrodes from the splicing mechanism and polishing the surface of each electrode with the electrode sharpener. Over the course of normal operation, the electrodes can be cleaned & maintained for up to 5,000 splices. Replace the electrodes if any of the following conditions exist:

- Electrode is bent
- Electrode end has become extremely rounded
- Abnormal noise occurs during fusion splicing

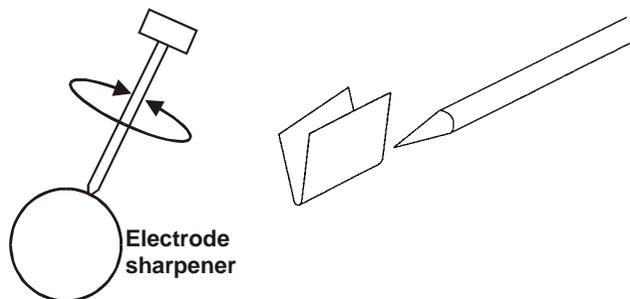
When the Arc Counter number exceeds 1,000, the NJ001 automatically displays a message to prompt replacing the electrodes at power on (when The Counter Alarm is “Active”). Turn off the switch and replace or clean the electrodes by using the electrode sharpener. The NJ001 asks if the electrodes are replaced after prompting the action. Select “Yes” if replaced and “No” if not. When “Yes” is selected, the arc counter is reset to 0 and the message will not appear at power on. When “No” is selected, the prompting message will be displayed again when power is turned on.



- Always replace or clean both electrodes, even if only one electrode is damaged.
 - Be sure to turn off the power switch before starting maintenance. Never touch the electrode while the Power is on.
 - Longer arc duration used in dissimilar fiber splicing requires the electrodes to be cleaned and replaced more often. Frequent electrode maintenance is recommended for dissimilar fiber splicing programs.
1. Loosen the screws of the holding plates, and raise the plates. The electrode is raised together with the holding plate. Be careful not to drop the electrodes into the machine.
 2. Carefully pull and remove the electrodes from the holding plates by grasping the electrode knob. Make sure nothing touches the electrodes tips.
 3. Clean or replace the electrodes, as necessary.



- How to clean the Electrodes by using the electrode sharpener
 - a) Firmly stick the tip of an electrode (approx. 0.5~1.0mm) into the electrode sharpener and turn/twist the electrode 3~4 times.
Attention: Don't grasp the electrode knob (if possible, grasp a section of the electrode rod).
 - b) In an effort to clean the electrode tip, wipe it softly with BEMCOT dipping ethyl alcohol.



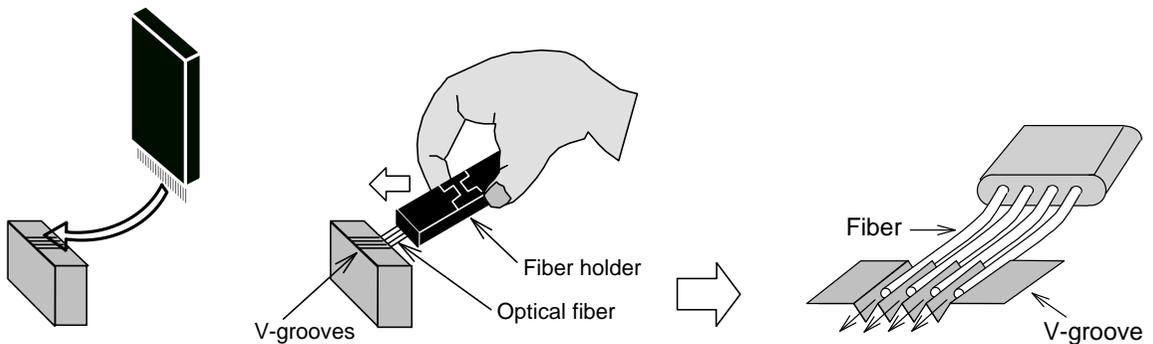
< Attention >

- You can use all faces of the electrode sharpener.
 - Extreme treatment distorts the electrode tip and can possibly move the knob position.
4. When loading the electrodes into the splicer, push the electrode knob flush with the holding plate to ensure correct position.
 5. Tighten the screws of the Holding Plates uniformly. Do not over tighten the screws.
 6. Lower the wind shield, and press ARC at least five (5) times to burn off any residue remaining on the electrodes.

9.2.3 Cleaning the V-grooves

Dirt on the V-grooves or fiber clamps will offset the alignment of the fibers or cause stress points on the glass, making the fiber weak.

1. At first, please clean up the V groove by cleaning brush (VGC-01) in the standard components.
2. Prepare a piece of fiber and cleave it approximately 10mm from the end.
3. Hold the fiber at a 45° angle.
4. Run the cleaved end back and forth along each groove to scrape off any debris.



If the V-grooves are extremely contaminated, it may also be necessary to wipe the grooves with a cotton swab soaked with denatured alcohol.

9.2.4 Cleaning V-groove and Fiber Clamps

1. Two Fiber Clamps are located in the windshield to help press the fiber into the V-grooves. Open the windshield.
2. Clean the top of the fiber clamps with a cotton swab soaked with denatured alcohol.

(Use ethanol of more than 99% purity.)





CAUTION

The V-groove is made of a brittle ceramic material. Clean the V-groove carefully. DO NOT use any abrasive tools such as metal to clean.



CAUTION

As Freon gas might contaminate camera lens, DO NOT use spray including Freon gas or alternatives for cleaning.



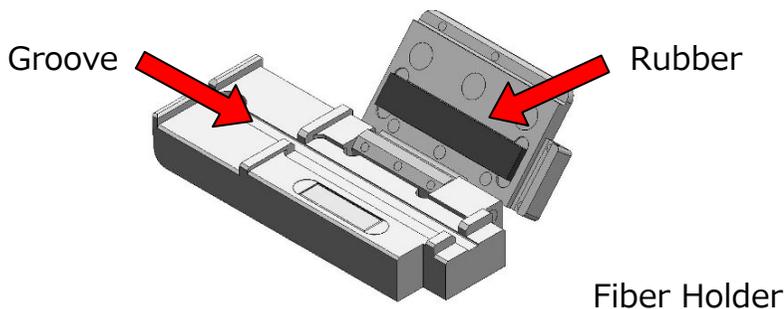
CAUTION

Do not use a gas spray to the splicer. The hazardous gas may come out by electric discharge. It may cause a fire and machine failure.



9.2.5 Cleaning the Fiber Holder

Keep the rubber and groove of the fiber holder clean. When they are dirty, the fiber may be slippery at the tension test. Wipe the rubber and groove with a lint-free tissue and a cotton bud soaked with denatured alcohol. Clean the coating of fiber put on the holder, too.



9.3 Backup Battery

NJ001 has a backup battery other than the battery that operates the splicer. The backup battery is for the calendar and the memory preservation. The backup battery is rechargeable. When the NJ001 is turned on, the backup battery is charged. The backup battery can be used about half a year by the full charge of 14 hours.

When the backup battery residual quantity decreases, the mark  is displayed.

Please turn on the NJ001 to charge the backup battery, when not splicing. If the backup battery empties completely, the data memorized in the memory are deleted.

9.4 Storing and Shipping

To maintain optimum operating reliability, do not store the NJ001 fusion splicer in locations where the temperature falls below -40°C or rises above $+60^{\circ}\text{C}$. Also, avoid any environmental conditions that can result in internal condensation. Ensure that the power cord is disconnected and the battery is removed from machine's main body when storing the fusion splicer. Ensure that these temperatures and humidity requirements are also met whenever the NJ001 fusion splicer is shipped.

9.5 Claims and Repackaging

Immediately inform Furukawa Electric Co., Ltd. or your local sales representative and, if necessary, the carrier, if the contents of the shipment are incomplete, or if the NJ001 fusion splicer or any of its components are damaged or defective, or if the fusion splicer fails during operation. In the event of carrier responsibility, Furukawa Electric Co., Ltd. will allow for the repair or replacement of the NJ001 fusion splicer or component while a claim against the carrier is being processed.

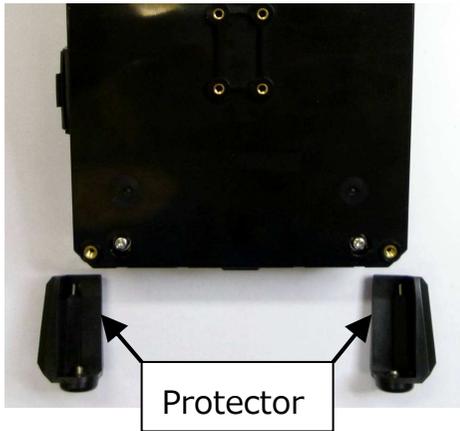
9.6 Return Shipments to Furukawa Electric Co.

Furukawa Electric Co., Ltd. will only accept returns for which an approved Return Material Authorization (RMA) has been issued by Furukawa Electric Co., Ltd. customer service personnel. This number must be obtained prior to shipping any material back to Furukawa Electric Co., Ltd. The owner's name and address, the model number and full serial number of the NJ001 fusion splicer, the RMA number, and an itemized statement of claimed defects must be included with the return material. Never ship the NJ001 fusion splicer without or outside its carrying case.

- If possible, return material in its original shipping container and packing material.
 1. Seal the shipping container securely and clearly mark FRAGILE on its surface.
 2. Always provide the model and serial number of the NJ001 fusion splicer and, if necessary, the RMA number on any accompanying documentation.



9.6.1 Removing Battery



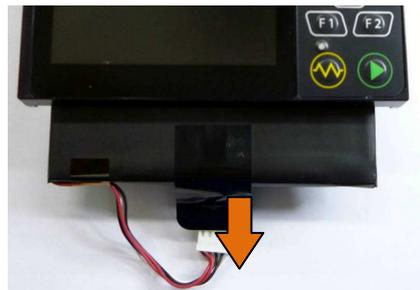
1. Remove the 2 screws of protector, and remove it.



2. Remove the 2 screws of battery cover, and remove it.



3. Remove the connector of battery.



4. Pull the battery straight in the battery slot of fusion splicer.

9.6.2 Installing Battery

How to attach the battery is a procedure opposite to the removing.



CAUTION

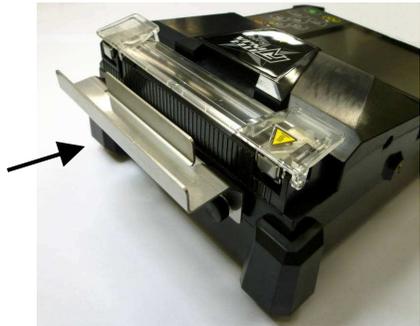
Be sure to turn off the Power switch before installing the battery. When installing and/or removing the battery, be careful not to drop the battery.

10. Optional Components

10.1 Cooling Tray: CTX-02

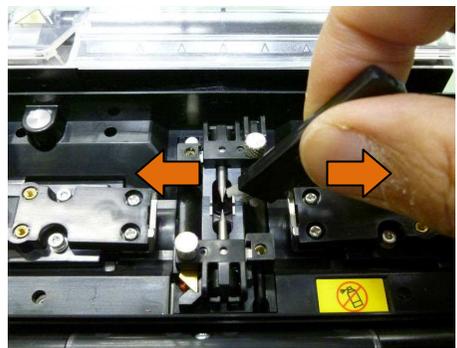
Tray to cool sleeve after heating.
Set it in the back of the main body.

Cooling Tray



10.2 Cleaning Brush: VGC-01

This brush is used to remove the garbage that adheres to V-groove and the fiber clamp.



10.3 Hard Carrying Case: HCC-03

This plastic case can store the NJ001 and S978 AC adapter.



10.4 Spare Battery: S946

Spare battery for NJ001. If the splicing number is significantly reduced, replace the battery.



11. Recycling and Disposal

When you dispose NJ001 fusion splicer or standard components, follow your local disposal regulations, or contact Furukawa Electric Co., LTD or your local representative. To recycle, disassemble it first and sort each part by material and follow your local recycling regulations.



Especially for European Union, in accordance with the European Parliament Directive 2002/96/EC, electrical parts and materials that can be re-used and/or recycled have been identified in order that the use of new resources and the amount of waste can be minimized.

NJ001 has a backup battery for backup memory and calendar. How to take off a battery is indicated in the following.

Removing the built-in battery



1. Remove the 4 screws, and remove the bottom case.



2. Remove all wiring connected to the electric board. And remove 2 screws which fix the board.



3. There is a built-in battery in the back of the board. Please cut the fitting off and tear the battery away.



For sales and service information,
Contact FURUKAWA ELECTRIC CO.,LTD.
Or your local representative.

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