

## Instruction Manual

**LAZERMaster™**  
**LZM-100**

***LZM-100 series***

**Read this instruction manual carefully  
before operating the equipment.**

**Adhere to all safety instructions and warnings  
contained in this manual.**

**Keep this manual in a safe place.**

Contents in this manual may change without prior notice due to  
improvements in product features and specifications.



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# **Warning and Caution**

The LZM-100 Series has been designed for splicing Silica-based optical fibers. Do not attempt to use this machine for other applications.

Fujikura Ltd. gives careful consideration and regard to personal injury. Misuse of the machine may result in electric shock, fire and/or serious personal injury.

## **Follow all safety instructions**

Read and understand all safety instructions.

## **Stop using if unit malfunctions**

Ask our service centers for repair as soon as possible.

## **Instruction Manual**

Read this instruction manual carefully before operating this machine.  
Store this instruction manual in a safe place.

Images / letters in the screen shown in this manual may differ from the actual image on the monitor on the splicer.

The following alert symbols are used in this instruction manual and machine to indicate warnings and caution for safe use. Understand the meanings of these symbols.



### **WARNING**

There is a possibility of death or serious injury resulting from improper use by ignoring this indication.



### **CAUTION**

There is a possibility of personal injury or physical loss resulting from improper use by ignoring this indication.



Symbol means “Pay attention”



Pay attention to hot surface!



Symbol means “Must not do”



You must not disassemble!



Symbol means “Must do”



You must disconnect a plug!



### **WARNINGS**

Disconnect the AC power cord from the DC inlet or the wall socket (outlet) immediately if user observes the following or if the splicer receives the following faults:



- Fumes, bad smell, noise, or over-heating occurs.
- Liquid or foreign matter falls into cabinet.
- Splicer is damaged or dropped.

If this occurs, ask our service center for repair. Leaving the splicer in a damaged state may cause equipment failure, electric shock or fire and may result in personal injury, death or fire.

Use only a proper power source.



- AC generators commonly produce abnormally high AC output voltage or irregular frequencies. Measure the output AC voltage with a circuit tester before connecting the AC power cord. Such abnormally high voltage or frequency from a generator may cause fuming, electric shock or equipment damage and may result in personal injury, death or fire. Make sure the generator is regularly checked and serviced. When using an AC generator with AC output voltage of AC220~240V especially, Fujikura Ltd. recommends the following measures to correct the condition.

- (1) Connect a step-down transformer between the generator and the AC adapter in order to lower the AC voltage from AC220~240V to AC100~120V.
- (2) Or, use an AC generator with AC output voltage of AC100V.



Do not disassemble or modify the splicer. In particular, do not remove or bypass any electrical or mechanical device (e.g. a fuse or safety switch) incorporated into the design and manufacturing of this equipment. Modification could cause damage that may result in personal injury, death, electric shock or fire.



Use the supplied AC power cord. Do not place heavy objects on the AC power cord. Use of an improper cord or a damaged cord may cause fuming, electric shock or equipment damage and may result in personal injury, death or fire.



The splicer uses a three-prong (core) AC cord that contains an earthed ground safety mechanism. The splicer **MUST** be Grounded. Use only the supplied three-prong (core) AC power cord. NEVER use a two-prong (core) power cord, extension cable or plug.

## **Warning and Caution**

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### **⚠️ WARNINGS**

-  Never operate the splicer in an environment where flammable liquids or vapors exist. Risk of dangerous fire or explosion could result from the splicer's electrical arc in such an environment.
-  Do not use compressed gas or canned air to clean the splicer. They may contain flammable materials that could ignite during the electrical discharge.
-  Do not touch the electrodes when the splicer is on and power is supplied to the unit. The electrodes generate high voltage and high temperatures that may cause a severe shock or bum.  
**Note** Laser discharge stops when wind protector is opened. Turn the splicer off and disconnect the AC power cord before moving the unit.
-  Safety glasses should always be worn during fiber preparation and splicing operation. Fiber fragments can be extremely dangerous if they come into contact with the eyes, skin, or are ingested.
-  Don't touch the splicer, AC power cord, or AC plugs with wet hands. This may result in electric shock.
-  Do not operate splicer near hot objects, in hot temperature environments, in dusty / humid atmospheres or when water-condensation is present on the splicer. This may result in electric shock, splicer malfunction or poor splicing performance.



### CAUTIONS



Do not store splicer in any area where temperature and humidity are extremely high. Possible equipment failure may result.



Do not touch the internal optical components during heating or immediately after completion of heating. These surfaces are very hot and touching these may result in skin burn.



Do not place the splicer in an unstable or unbalanced position. The splicer may shift or lose balance, causing the unit to fall. Possible personal injury or equipment damage may result.



The splicer is precision adjusted and aligned. Do not allow the unit to receive a strong shock or impact. Possible equipment failure may result. Use supplied carrying case for transportation and storage. The carrying case protects the splicer from damage, moisture, vibration and shock during storage and transportation.

Follow the below listed instructions for handling the laser component.



- Utilize the laser only in the manner outlined in this manual.
- Do not adjust the position of the laser component on the LZM-100.
- Do not attempt to connect the laser component to any other equipment.

Failure to follow the above instructions may cause damage to the splicing unit. It can result in equipment damage or degradation in splicing performance.



Do not use any chemical other than pure alcohol (99% or greater) to clean the objective lens, V-groove, mirror, LCD monitor, etc., of the splicer. Otherwise blurring, discoloration, damage or deterioration may result.



The splicer requires no lubrication. Oil or grease may degrade the splicing performance and damage the splicer.



The equipment must be repaired or adjusted by a qualified technician or engineer. Incorrect repair may cause fire or electric shock. Should any problems arise, please contact the authorized distributor.

## ***Warning and Caution***

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<b>RECYCLING and DISPOSAL</b>	
<b>In European Union</b>	 <p>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 going for landfill can be minimized.</p>
	<p>In the European Union, do not discard this product as unsorted municipal waste. Contact your local authorities.</p>
<b>In other countries</b>	<p>[Recycling]</p> <p>To recycle this product, disassemble it first, sort each part separately by material components and follow your local recycling regulations.</p> <p>[Disposal]</p> <p>This product can be disposed of in a similar manner as standard electric products. Follow your local disposal regulations.</p>

### **Notes**

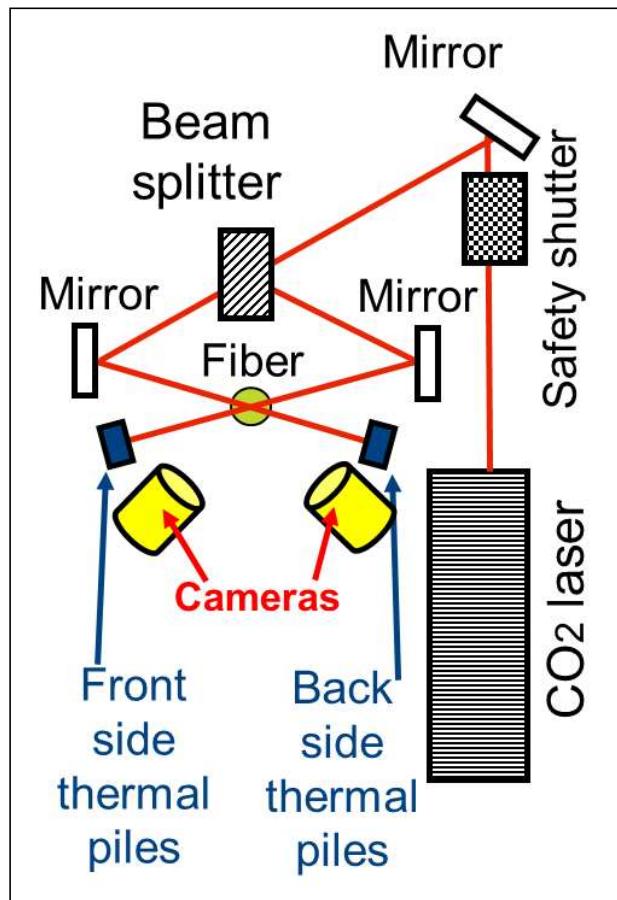
#### **LCD (Liquid Crystal Display) monitor**

The splicer is equipped with a LCD monitor, manufactured in a high quality-controlled factory environment. However, some black dots may appear, or red/blue/green dots may remain on the screen. The screen brightness may not appear uniform depending on the viewing angle. Note that these symptoms are not defects, but are the nature of LCD.

## 1. Optical Alignment of Lzm-100

### 1-1. Optical Paths of Lzm-100

- One 30 W CO<sub>2</sub> laser is used for each Lzm-100
- The laser beam is split into 2 paths to heat fiber on opposite sides with an angle to avoid coupling
- The remaining laser power is completely absorbed by 2 thermal piles for safety and measurement of power, beam size and beam position
- The beam position should be aligned to the fiber and cameras accurately for optimal performance
- Beam position adjustment is very important after shipping or moving the Lzm-100 machine a long distance



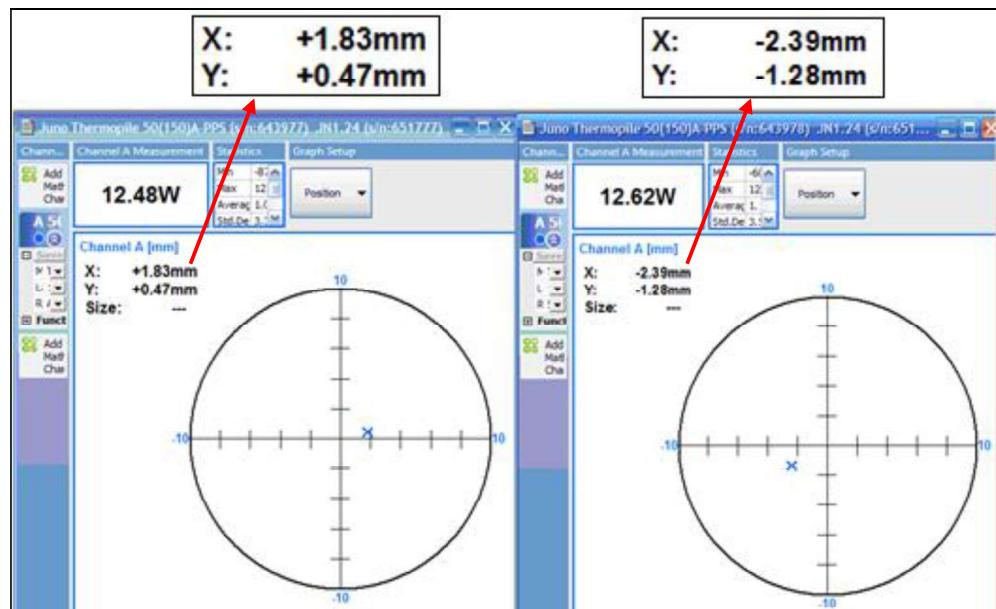
# Quick Start Guide

## 1-2. Step #1: Check the Beam Position

- Turn on the splicer and wait for “Ready” to appear on top of splicer monitors. Do not load fiber.
- Open the StarLab software installed in your PC
- Select both sensor drivers and click Separate
- On the splicer select a standard SMF mode and then press ARC button to start laser

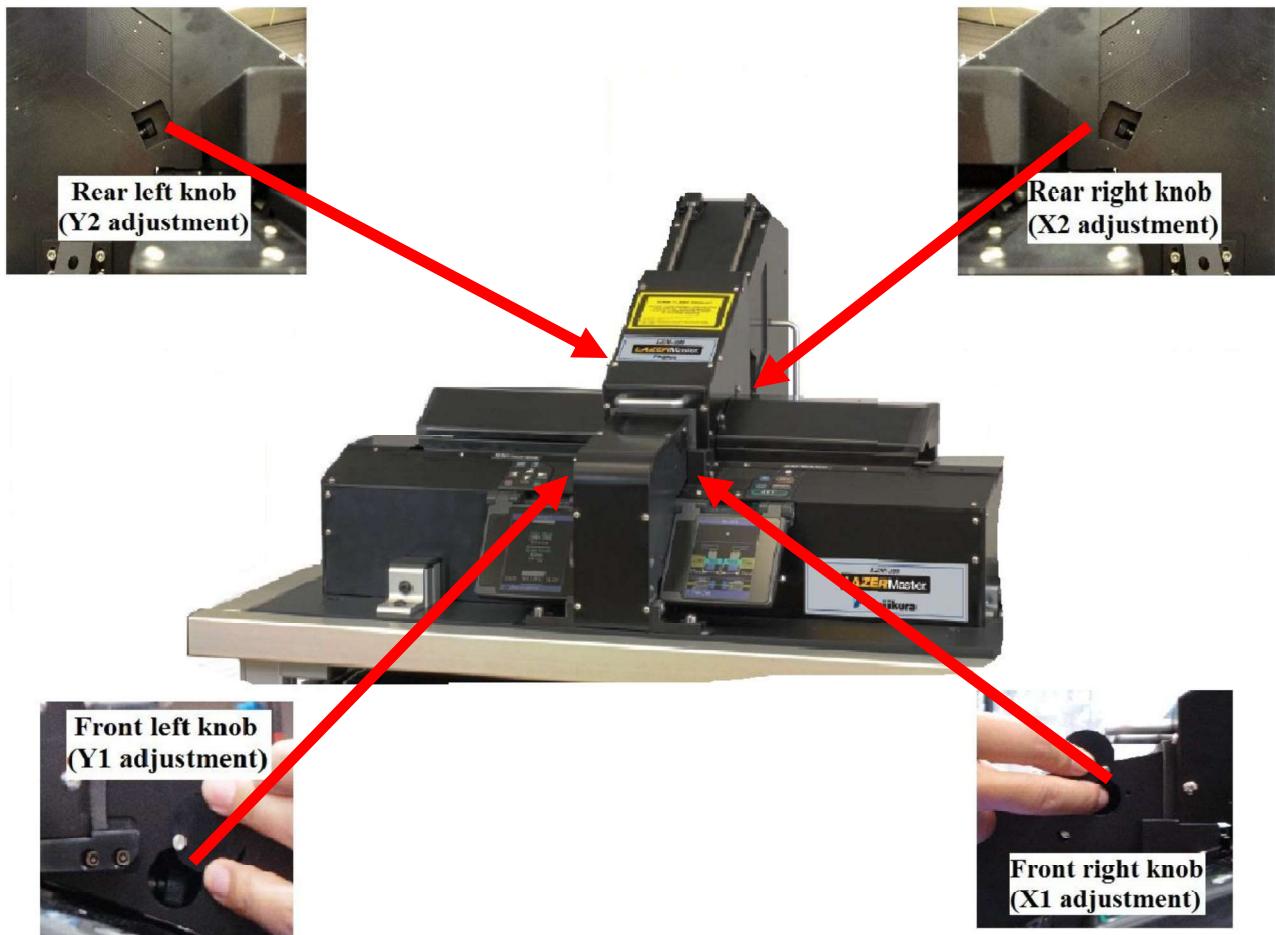


- Read horizontal X1, X2 and vertical Y1, Y2 positions on both front and back sensors. Then press ARC to stop laser.



## 1-3. Step #2: Rough Beam Position Adjustment

- In Step #1, if all absolute values of X and Y readings are less than 3 mm, you can skip this step and go to Step #3 for fine alignment
- Left knobs adjust beam vertical position and right knobs adjust beam horizontal position
- While turning knobs watch X1, X2, Y1, and Y2 value change to decide which PC window is for front or rear thermal pile
  - Example: If adjusting left knob for vertical position, watch the StarLab beam display to see which “X” is moving vertically (the X in the Channel A plot or the X in the Channel B plot). This will tell you which Channel (A or B) corresponds to which thermal pile (Front or Rear).
- The target value is to adjust X1, X2, Y1, and Y2 absolute values below 2 mm
- The knobs are tight to prevent self moving. If necessary, please use your finger nail to turn knobs



# Quick Start Guide

## 1-4. Step #3: Rough Horizontal Center Adjustment

- Load window-stripped SMF28 fiber across the 2 v-groves and fiber holders
- Select “Motor Drive” in Maintenance Menu and fiber will be shown at the middle of screen



- Press ARC button twice to start laser beam and then hold Up Arrow button to increase the beam power until the fiber becomes bright

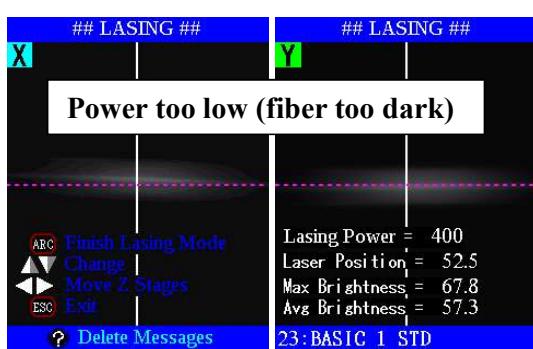
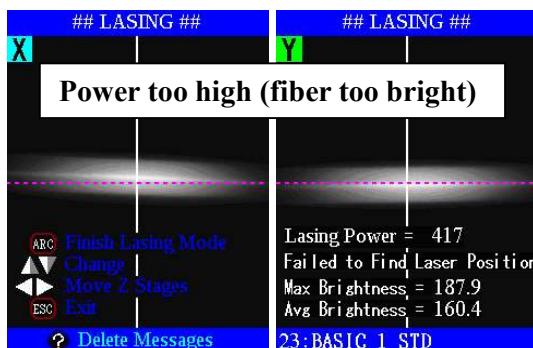


- The brightest point may not initially be located at the center of screen. Adjust the 2 side screws by hand to center the bright portion of the fiber



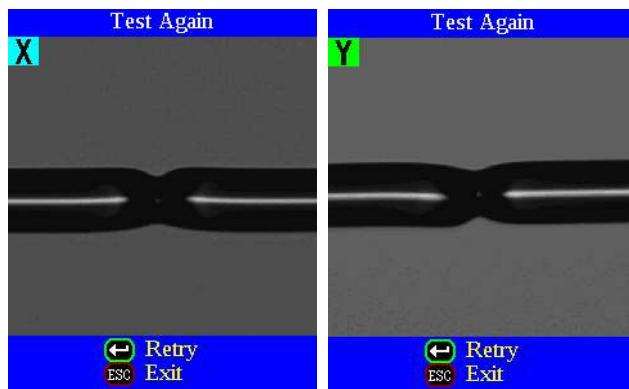
## 1-5. Step #4: Fine Center Adjustment

- Continue to use side screws to roughly center the bright point. The fiber may tilt since XY v-groove was not aligned. It is normal.
- Adjust right side mirror knobs to make the bright fiber portion as short and as bright as possible
- Adjust both left side mirror knobs to make the bright fiber portion as bright as possible. If fiber is too bright, reduce the laser power by Down Arrow button.
- Use Up/Down Arrow button to increase/decrease the beam power until you can see Laser Position reading. Try to make absolute value Laser position below 20 by moving the side side screws and write down the laser power (411 in the example of bottom right picture)
- If the splicer monitor is stuck by touching the wall of optical head, move the side screws back and adjust the two right side mirror knobs to center the Laser Position reading. Make sure the bright fiber portion is as short and bright as possible.

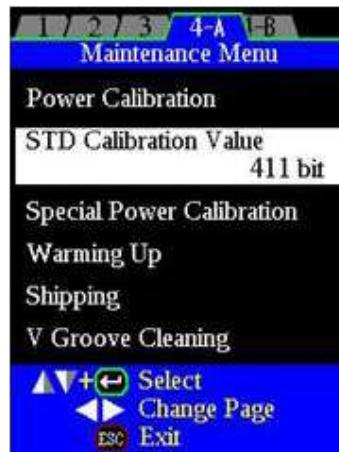


## 1-6. Step #5: Power Calibration

- Load 2 pieces of cleaved SMF28 fiber
- Run Power Cal process
- If the current STD Calibration value from Step #4 is much higher than the current requirement, you may get a poor fiber shape (see below) which Power Cal firmware cannot handle.

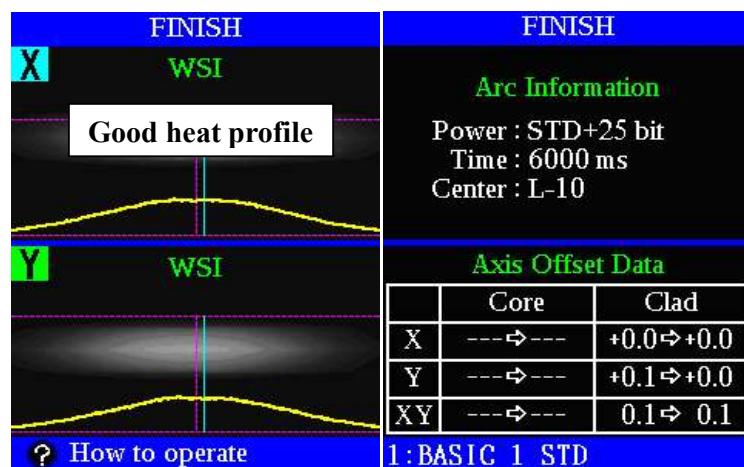
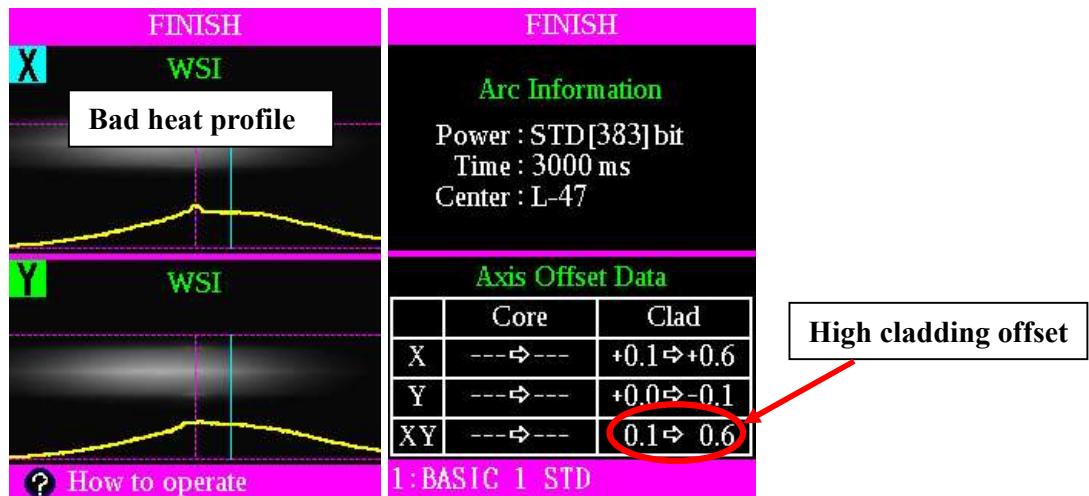


- If this occurs, navigate to page 4-A of the main menu [Maintenance Menu] and input the lasing power value (in this example, 411) from Step#4 for the STD Calibration Value, then run Power Cal again until the test is complete.



## 1-7. Step #6: Make a test splice using SMF 28

- Make a SMF28 splice with standard mode.
- Check if power is off centered ( $> 20$ )
- Check if the power is high enough for a low cladding offset (below 0.2)
- Check if the heat profile is good – one peak and near Gaussian shape



# Quick Start Guide

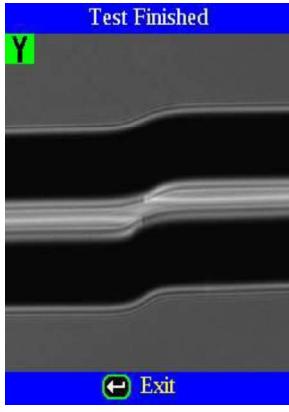
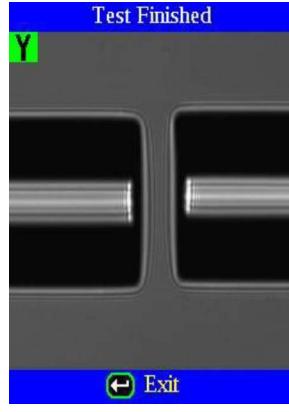
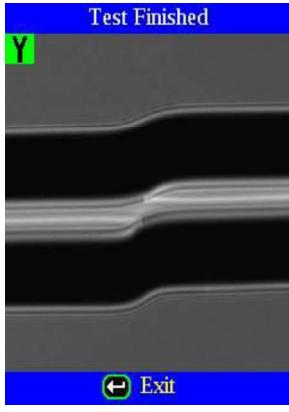
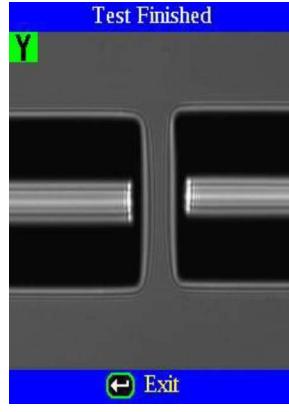
## 2. Convenient Functions

### 2-1. Arc Calibration

The relation between the arc method and the arc calibration is shown below.



**\*NOTE:** It is important to note that any reference to “Arc” refers to the laser output used for splicing.

Parameter	Standard Arc Calibration	No Calibration
Arc Calibration Method	STD(Standard) If STD is not selected, it doesn't operate.	NC (No Calibration) No calibration function
V Height Shift	0µm	Existing value
Clad Diameter	125µm	Existing value
Arc Center Compensation	Installed	Not Installed
Calibration Result	In all modes when STD is selected, the result of the arc calibration is updated to the arc power.	-
Other Setting	When the arc calibration is executed, each parameter automatically sets above mentioned. Please execute Special Arc Calibration when needed to execute the calibration in other settings.  	 

## **2-2. Estimate WSI/CSI**

WSI or CSI can be selected for the method of estimating the MFD mismatch.

WSI method is suitable for fiber without depressed cladding like fluorine.

CSI method is suitable for fiber with depressed cladding.

- ※ WSI (Warm Splice Image)
- ※ CSI (Cold Splice Image)

➤ See section [Function Introduction][MFD Mismatch]

## **2-3. IPA Data (theta option only)**

The splicer aligns theta by using the memorized IPA data of each fiber.

PAS is recommended for PANDA fiber alignment. This alignment method is fast and accurate.

Please use the IPA mode when the standard alignment is not accurate.

- ※PAS (Profile Alignment System)
- ※IPA (Interrelation Profile Alignment)

➤ See section [IPA Data (Theta Option Only)]

## **2-4. End-View Observation System (theta option only)**

Optical fiber is observed in axial direction by a means of a mirror for fine alignment. Uniquely structured fibers, such as PM, multi-core or non-circular fibers can now be more precisely aligned. However, conventional PAS (Profile Alignment System) is recommended for PANDA fiber splicing for fast and accurate alignment.

In the case that certain fibers show poor theta alignment with PAS, use IPA or end-view observation system.

➤ See section [Function Introduction] [End-View observation system]

## **3. Fiber Data Learning**

### **3-1. Fiber Type Compare**

The feature of each fiber core profile can be memorized.

- See section [Function Introduction][Fiber Type Compare]

### **3-2. IPA Data**

The feature of IPA of each optical fiber can be memorized.

- See section [Function Introduction][IPA Data (Theta Option Only)]

# Quick Start Guide

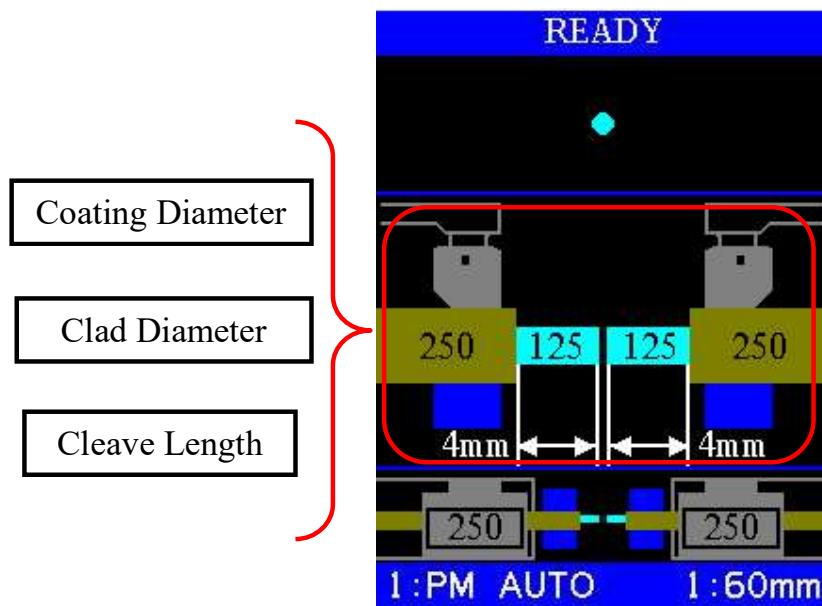
## 4. Input Fiber Data

In the LZM-100 series, the V-groove and clamp are adjusted automatically for a variety of fibers.

Each parameter can be changed in the [Fiber Information]. (Left/Right)

### Input Data

The input value is displayed in the Sub-monitor.



➤ See section [Error! Reference source not found.] [Editing Splice Mode]

- When splicing large diameter fibers, enter correct cladding diameter. Software automatically decides the adjusting method based on the numerical value.
- There is a possibility to generate axis offset when a correct numerical value is not input.
- Please use the proper fiber holder to place the large diameter fiber on the V-groove.

## 1. Optional Components

### Fiber Holder

Name	Model	Note	
Fiber Holder	FH-100-060	60 $\mu\text{m}$	Applicable Diameter: 55~71 $\mu\text{m}$
	FH-100-100	100 $\mu\text{m}$	Applicable Diameter: 94~117 $\mu\text{m}$
	FH-100-125	125 $\mu\text{m}$	Applicable Diameter: 118~139 $\mu\text{m}$
	FH-100-150	150 $\mu\text{m}$	Applicable Diameter: 140~169 $\mu\text{m}$
	FH-100-180	180 $\mu\text{m}$	Applicable Diameter: 170~199 $\mu\text{m}$
	FH-100-210	210 $\mu\text{m}$	Applicable Diameter: 200~239 $\mu\text{m}$
	FH-100-250	250 $\mu\text{m}$	Applicable Diameter: 240~289 $\mu\text{m}$
	FH-100-300	300 $\mu\text{m}$	Applicable Diameter: 290~339 $\mu\text{m}$
	FH-100-350	350 $\mu\text{m}$	Applicable Diameter: 340~389 $\mu\text{m}$
	FH-100-400	400 $\mu\text{m}$	Applicable Diameter: 390~489 $\mu\text{m}$
	FH-100-500	500 $\mu\text{m}$	Applicable Diameter: 490~589 $\mu\text{m}$
	FH-100-600	600 $\mu\text{m}$	Applicable Diameter: 590~689 $\mu\text{m}$
	FH-100-700	700 $\mu\text{m}$	Applicable Diameter: 690~789 $\mu\text{m}$
	FH-100-800	800 $\mu\text{m}$	Applicable Diameter: 790~889 $\mu\text{m}$
	FH-100-900	900 $\mu\text{m}$	Applicable Diameter: 890~1000 $\mu\text{m}$
	FH-100-****	**** $\mu\text{m}$	Applicable Diameter: 1000~2000 $\mu\text{m}$
	FH-40-LT900	900 $\mu\text{m}$ Loose Tube	

\*\*Note: Fiber Holder sizes up to 2800um will be available for LZM-100

### Fiber holder placement for fibers with cladding larger than 250 $\mu\text{m}$



- Please change the direction of the fiber holder as shown below when the size of the fiber cladding is larger than 250 $\mu\text{m}$ . Better alignment and splicing performance will be achieved for such large diameter fibers (LDF) when there is a longer distance between the fiber holder clamps and the splicer's alignment V-grooves.
- Fiber holder position can be reversed on the LZM-100. Use this function to allow fiber holder to be placed as far as possible from v-groove so that the fiber ends are aligned accurately.

## ***Description of Products***

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### **End View Fiber Holder**

The LZM-100 is available with an optional internal end-view system to view fiber end faces. Use FH-100-XXX-EV for end-view observation. This fiber holder has a transparent part so that LED light is transmitted through to the fiber for end-view observation.



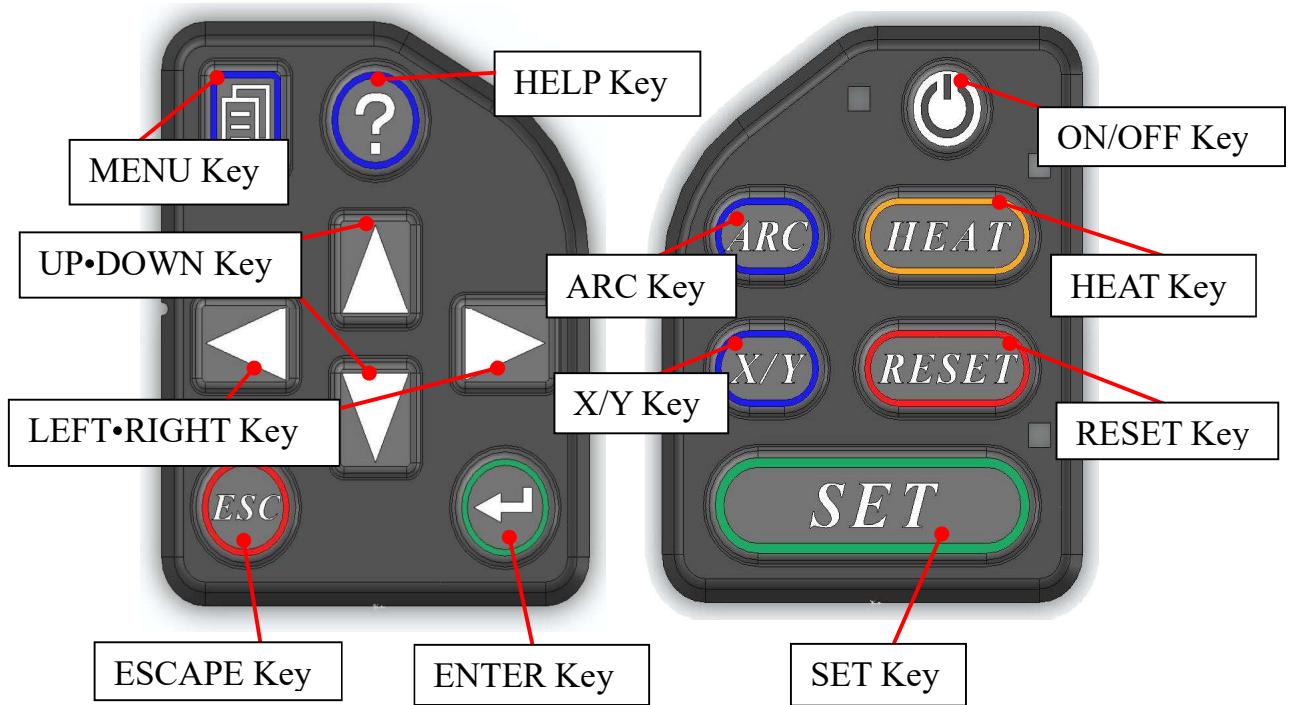
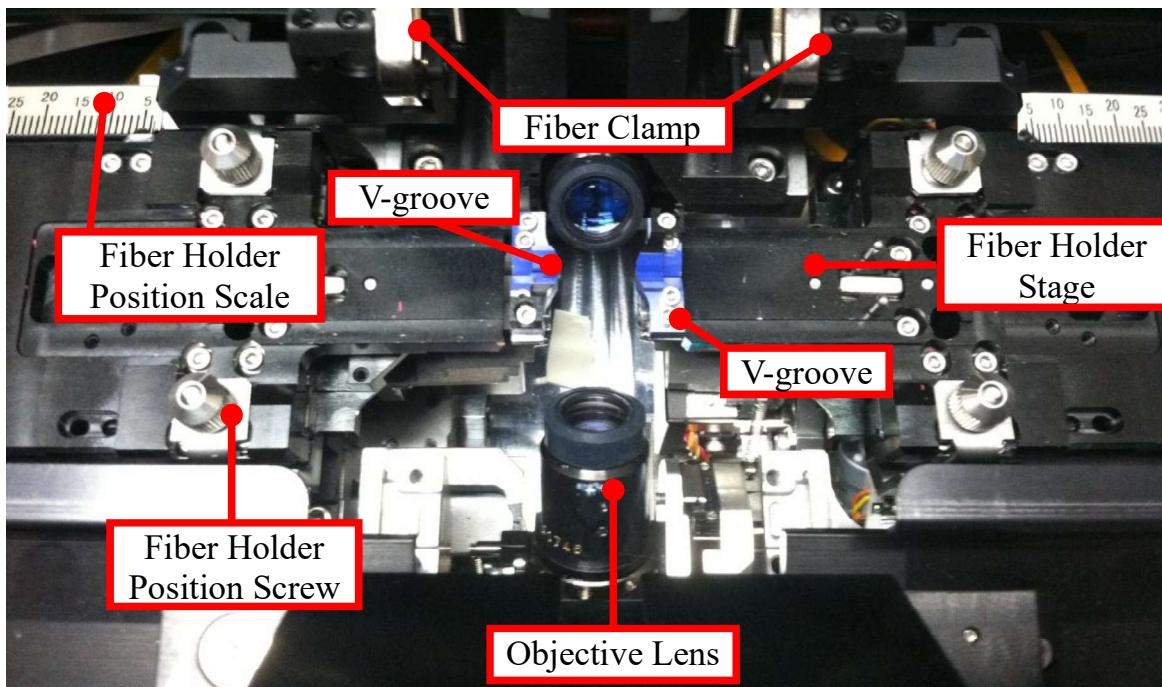
FH-100-XXX-EV fiber holder



FH-100-XXX fiber holder

There are a variety of FH-100-XXX-EV fiber holders to accommodate 60 to 2000 um coating diameter fibers.

## 2. Description and Function of Splicer



# ***Basic Operation***

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## ***1. Power Supply***

The LZM-100 has integrated power supplies and corresponding AC power cords for the splicer, RF Driver, and monitor (optional).

(1) Confirm voltage before operation.

- Make sure the power source is 100 → 240 VAC, 50 or 60 Hz. When connecting to an AC generator, always check the output voltage of the generator with a circuit tester before connecting the AC power cord.
- Make sure the AC power cord is free from damage, etc.

(2) Connecting the AC power cords to the AC power source.

Plug the AC power cords into a surge protector that is rated for the total voltage of the power being connected. Make sure the plugs are fully seated and in the correct position.

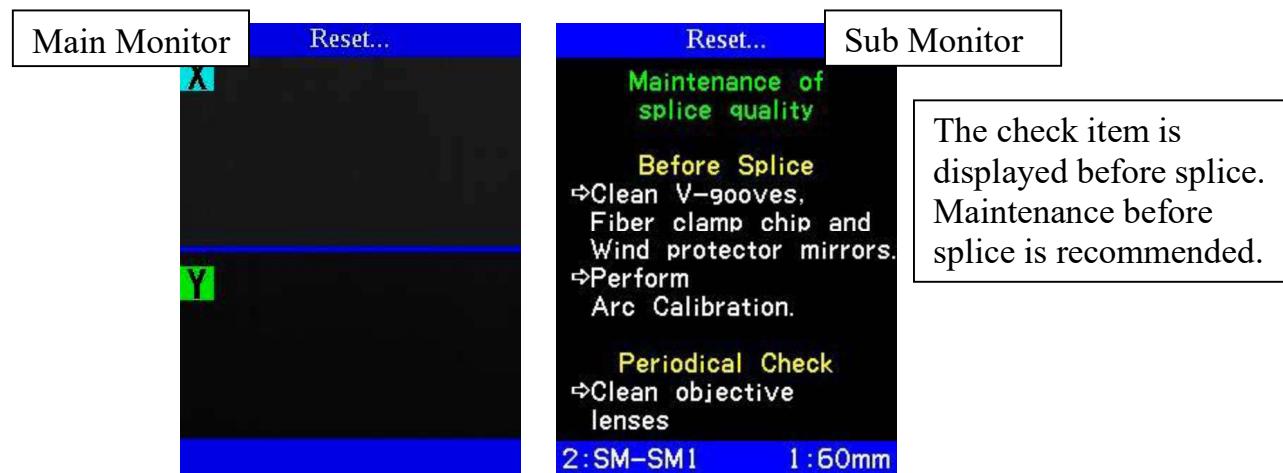
- During extended operation using the AC adapters, the surface of the AC adapters will become warm. This is normal and will not result in any loss of performance.

## 2. Turning Splicer "ON"

Pressing [ON/OFF] turns on the power to the splicer and the following image is displayed on the monitor.



All of the motors go to their home position and are reset.



The startup sequence of screens is [Fiber Set Diagram] and [READY].



# Basic Operation

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## Fiber Set Diagram

### **Main Monitor (Left)**

Currently selected splice mode and heater mode.

#### **Splice Mode**

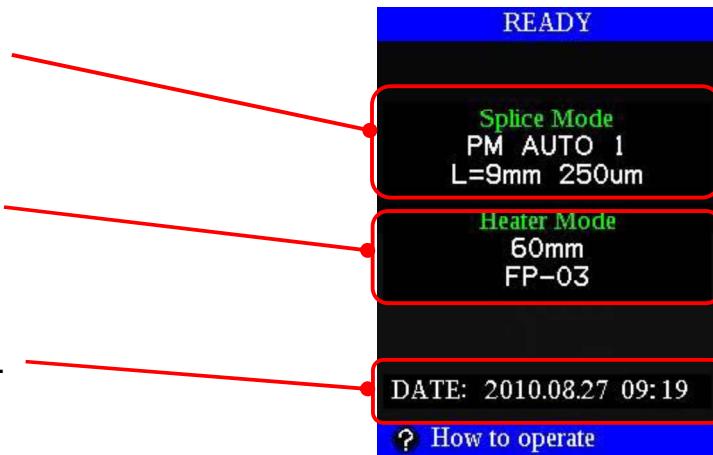
Currently selected splice mode.

#### **Heater Mode**

Currently selected heater mode.

#### **Calendar (Additional Date Area)**

Present date and time is displayed.



### **※ About Additional Date Area**

Item to be displayed on READY screen is selectable.

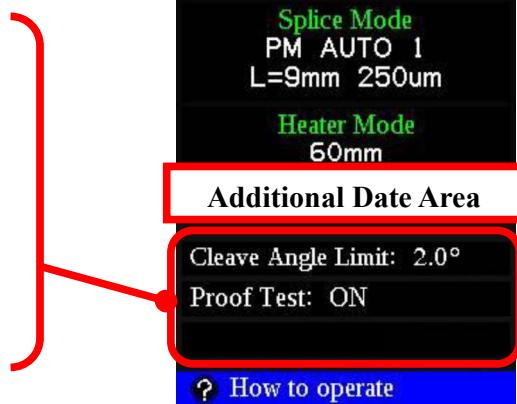
→ See section [Setting Menu] [Maintenance Settings]

#### **Cleave Limit**

The threshold of the cleave angle limit is displayed.

#### **Proof Test**

Proof test status [ON or OFF] is displayed.



## Sub Monitor (Right)

Each setting of the selected [Splice Mode] is displayed.

[V Height Shift], [Cleave Length], [Coating Diameter], [Clad Diameter], [Fiber Holder] These setting are displayed.

### (A) [V Height Shift]

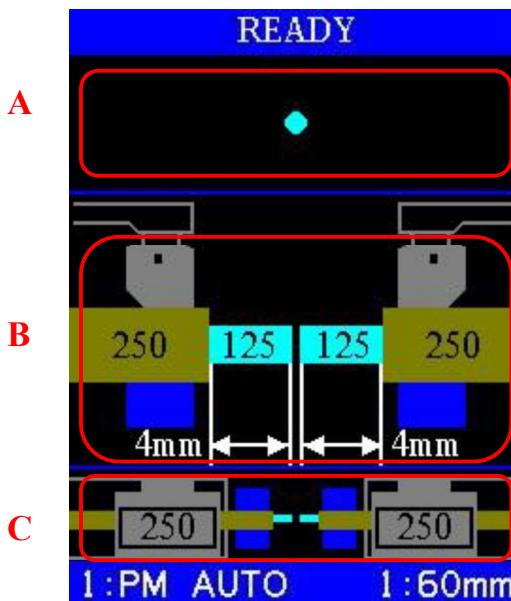
The setting of [V Height Shift] is displayed When the setting of [V Height Shift] is not displayed, [V Height Shift] is 0 um.

### (B) [Cleave Length], [Coating Diameter], and [Clad Diameter]

The setting of [Cleave Length] and [Coating Diameter] and [Clad Diameter] is displayed.

### (C) [Fiber Holder]

The setting of [Fiber Holder] is displayed.



•If [Dust Check] or [Arc Calibration] is needed at once after turning on the power supply, see section [Machine Settings].

# **Basic Operation**

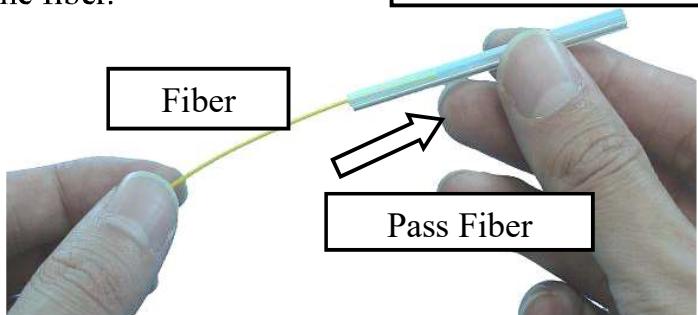
## **3. Cleaning Optical Fiber**

Clean optical fiber with alcohol-moistened gauze or lint-free tissue approximately 100mm from the tip. Dust particulates from the fiber-coating surface can enter inside the protection sleeve and might result in a future fiber break or attenuation increase.

## **4. Placing Protection Sleeve over Fiber**

Place the protection sleeve over the fiber.

Fiber Protection Sleeve

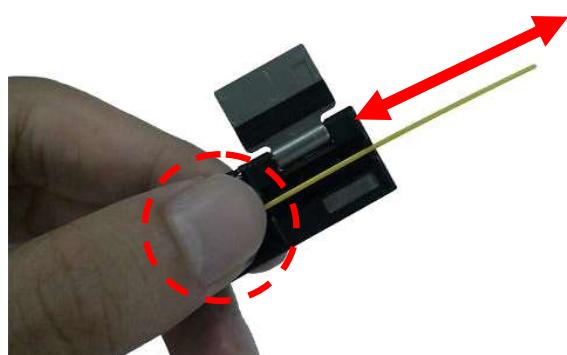


## **5. Setting the Fiber onto the Fiber Holder**

Set the fiber onto the fiber holder with 25 to 35 mm protruding from the end of the fiber holder and then close the fiber holder lid.



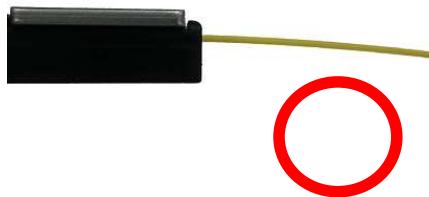
- Close the lid of the fiber holder while pressing down with a finger on the coating (refer to figure below).
- Select a suitable fiber holder based on the fiber coating diameter.



Fiber length 25 from 35 mm.  
No curving at the fiber.



Example of curved fiber (09NY).



## 6. Stripping and Cleaving Fiber

### 6-1. Stripping

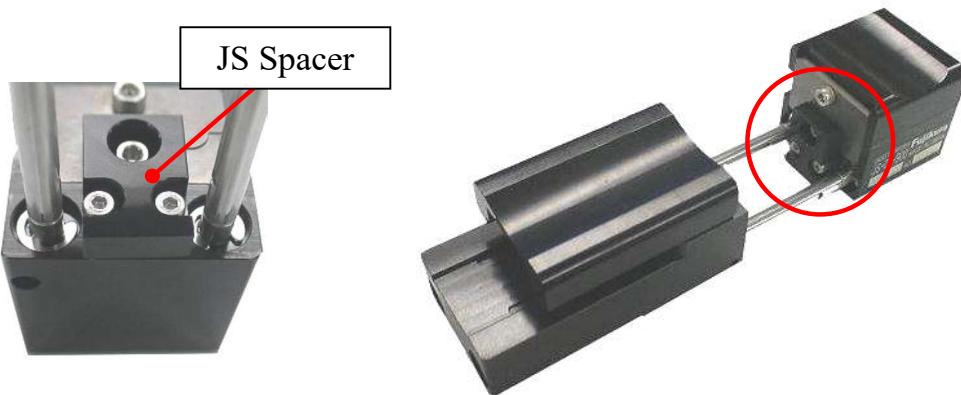
#### Using Jacket Stripper JS-02-900

The 900 $\mu\text{m}$ -coated fiber is stripped with the JS-02-900.

- (1) Attachment of the JS spacer.

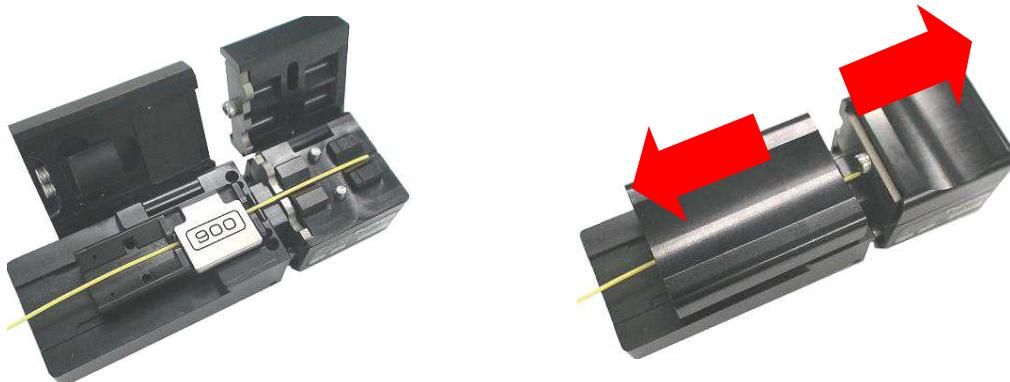
Attach the JS spacer for 3~5mm cleave length.

Rotate stripper upright on base and then fix the spacer with the two screws. Do not attach the spacer with an inclination.



- (2) Fiber stripping.

Slide the holder base inwards so that it touches the fiber base, then place the fiber holder (with the fiber) into the holder base. After verifying that the fiber position is in the center of the blade, close the holder clamp.



Pull the holder base slowly to strip the fiber coating.



- See the JS-02-900 instruction manual for more details.

# Basic Operation

## Using Hot Jacket Stripper HJS-02

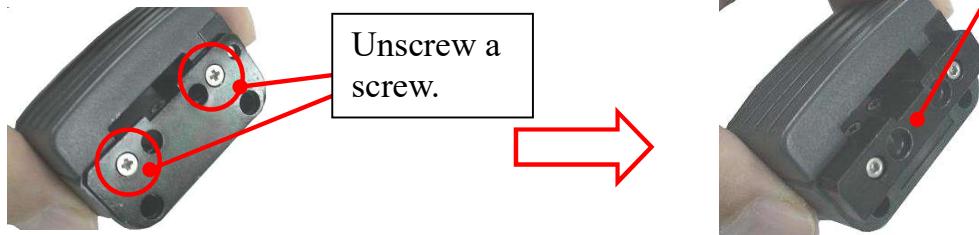
The 250 $\mu\text{m}$  and 400 $\mu\text{m}$  coated fiber is stripped with the HJS-02.

- (1) Attachment of the HJS spacer.

Attach the HJS spacer for 3→5mm cleave length.

- (2) To attach the HJS spacer, remove the fiber holder base by loosening two screws.

- (3) Attach the HJS spacer to the fiber holder base by two long screws as below.



- (4) Attach the fiber holder base to the HJS-02 by two screws as below.



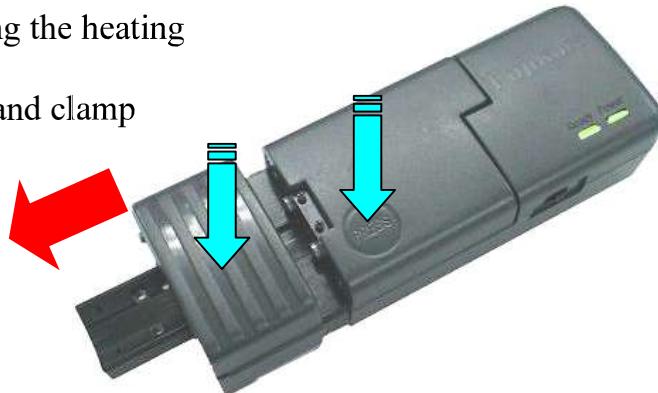
- Be sure to attach the washers for the two screws at the end of the rods.

- (5) Fiber Stripping.

Set the fiber holder onto a hot jacket stripper. Then, strip the coating.

Hold this point firmly during the heating and sliding.

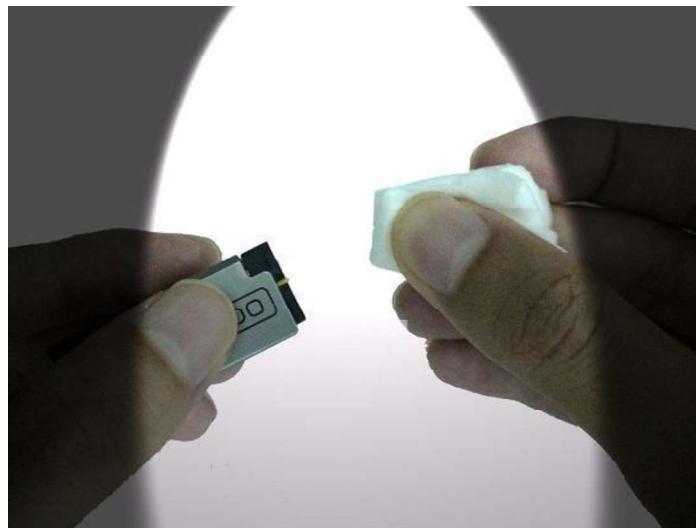
Slide the fiber holder base and clamp gently.



- An AC adapter is needed to use the HJS-02.
- See the HJS-02 instruction manual for more details.

### **6-2. Cleaning Optical Fiber**

Clean the bare part of the fiber with alcohol-moistened gauze or lint-free tissue.



- After this operation, handle the fiber with care so as not to damage or contaminate the bare glass.
- Use a high quality alcohol, greater than 99% pure.

## ***Basic Operation***

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### ***6-3. Fiber Cleaving (Use of the CT-30)***

- (1) To unlock the cutting lever, press it gently and slide the stopper.



- (2) Push the slide button until it locks. Set the stripped optical fiber on the cleaver.
- (3) Press down on the cutting lever.
- (4) Release the pressure on the cutting lever. A spring will return it to its open position. The scrap collector rollers drive the fiber scrap into the fiber scrap container box automatically when the cutting lever is raised.
- (5) When storing the cleaver, press the cutting lever down until the stopper can slide into place to lock the anvil lever.



- See the CT-30 instruction manual for more details.

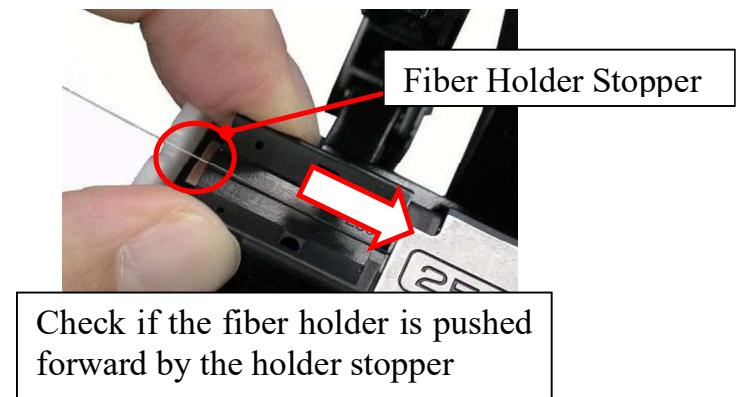
## 6-4. Fiber Cleaving (How to use CT-100 Cleaver)

- (1) Confirm the power is supplied and push the right lever forward. The clamp unit will move to home position.

\*Clamp will not move if it is already at the home position.

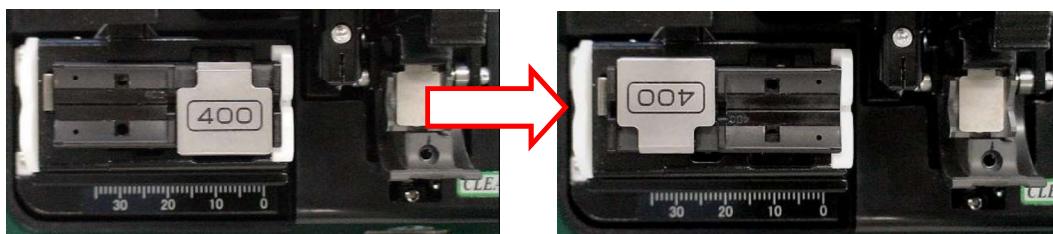
\*Even if the power is supplied after pushing the right lever, clamp unit will move to the home position.

- (2) Push the left lever forward and set the prepared optical fiber with the fiber holder



### How to use CT-100 cleaver with LZM-100 series.

- If 250um or larger cladding diameter fiber is used, reverse fiber holder as show below.
- Set fiber holder at “18mm” in the cleaver for 9mm cleave length splicing, which is the standard cleave length for LZM-100.



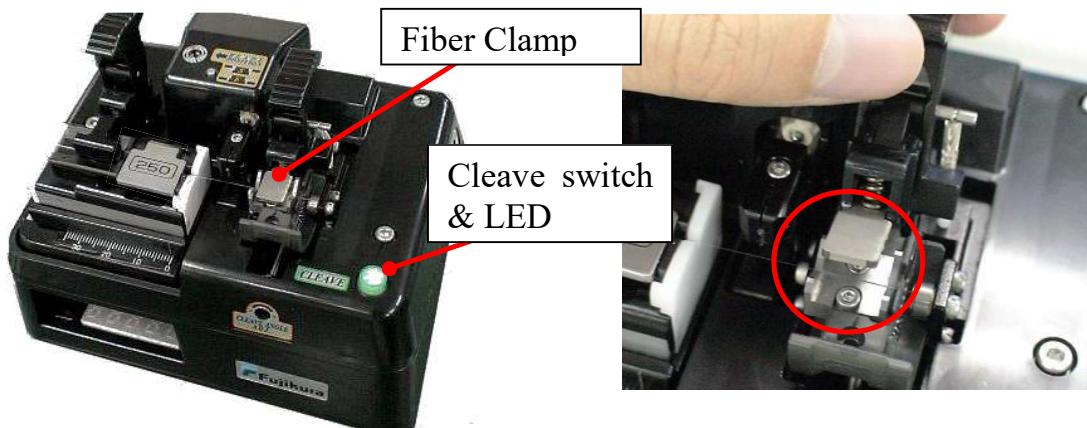
## **Basic Operation**

---

- (3) Pull back the left lever to firmly clamp the optical fiber with the holder clamp.  
If the fiber is thin and does not require much tension for cleaving, this action can be skipped.



- (4) Pull back the right lever to clamp optical fiber with the fiber clamp.



- (5) Press the “Cleave Button” to perform cleaving.  
LED in the cleave button shows the status of the cleaving as shown in Table 7-1.

Table 7-1. LED in the cleave button

LED	Status of the cleaving
ON	Cleaving
OFF	Error, Power off
■■■... Blinking three times	Finished

- (6) Tilt the left lever back to take the fiber holder off the cleaver.  
(7) Tilt the right lever and take the fiber scrap out of the cleaver. The clamp unit automatically comes back to home position.

In case of cleaving an optical fiber which has a stress applying region, such as a PANDA fiber.

There is a possibility of a cleave failure as shown below after cleaving the optical fiber which has a stress applying region, such as a PANDA fiber. Please lower the tension slightly and cleave the optical fiber again.

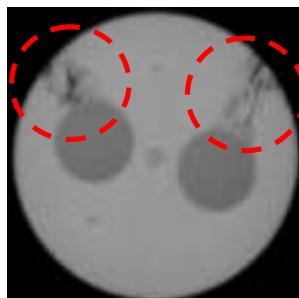
 e.g.) PANDA Fiber cladding diameter: 125um

Tension: 240gf → 150gf

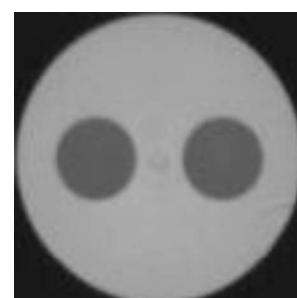
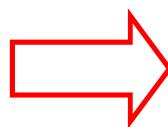
If the optical fiber is cleaved correctly, the end face is shown like below.

※ There is a possibility of not cleaving an optical fiber instantly, when a cleaving blade is in touch with the optical fiber. Adjust tension accordingly and check cleave quality.

e.g.) PANDA Fiber cladding diameter: 125um



Tension: 240gf



Tension: 150gf



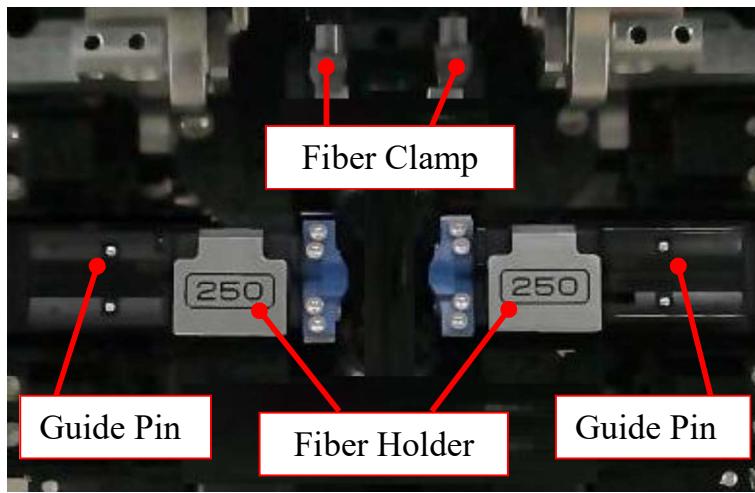
• See CT-100 instruction manual for detail.

# **Basic Operation**

## **7. Placing Fiber Holders onto Splicer**

### **7-1. How to load fiber holder to LZM-100**

- (1) Open the wind protector.
- (2) Lift up the left and right fiber clamps. Lower the fiber holder with guide holes onto the base guide pins and position the fiber holder onto the fiber holder base.



#### **Fiber holder placement for fibers with cladding diameter larger than 250μm:**

Please reverse the direction of the fiber holder in the splicer as shown below when the fiber cladding is larger than 250um. Better alignment and splicing performance will be achieved for such large diameter fibers (LDF) when there is a longer distance between the fiber holder clamps and the splicer's alignment V-grooves.



- (3) Reverse the fiber holder positions as shown above
- (4) Set the optical fiber on both sides in the same manner.
- (5) The fiber clamp is lowered at the same time the wind protector is closed.



- Observe fiber position in the V-groove. The fiber should rest in the bottom of the V-groove. Reload the fiber holder if it does not rest properly.
- Fiber end-face contact on any item including the V-groove bottom may result in poor quality splices.

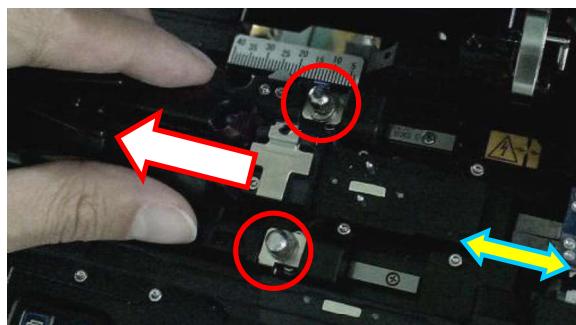
### 7-2. How to load fiber holder to LZM-100

- (1) Open the wind protector.
- (2) Open the LED unit lid.



Open/Close LED unit lid

- (3) Loosen the fixing screw of Z-slide unit and move them back when LDF is loaded.



Move Z-slide unit back as much as possible when LDF is spliced.

#### How to load LDF to LZM-100

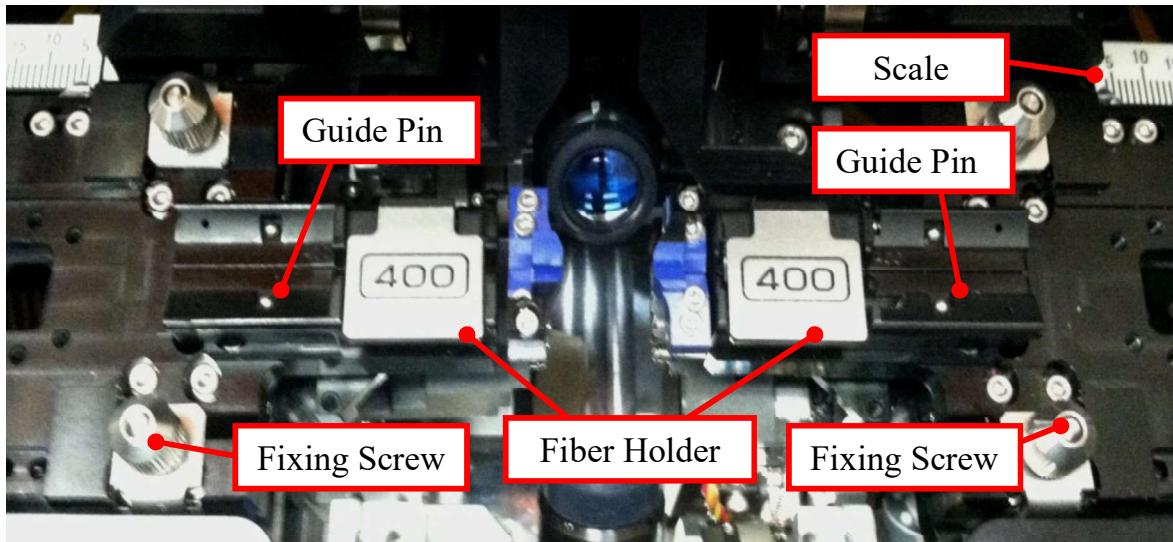


- When the cladding diameter of the fiber is over 250um, adjust z-slide holder. Allow as much distance as possible between fiber holder and v-groove. This is to reduce fiber angle at splice point, which may increase splice loss.
- Z-Slide is fixed to the position [10] of the scale with the screw when shipping. This “Locking function” is used for transportation. When you move the Z-slide unit the first time after the splicer is delivered, you need to loosen the fixing screw enough and release the “Locking function”.

## **Basic Operation**

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(4) Set fiber holder using guide pins as shown below.



(5) Follow the same to set the other fiber.

(6) Close the LED unit lid.

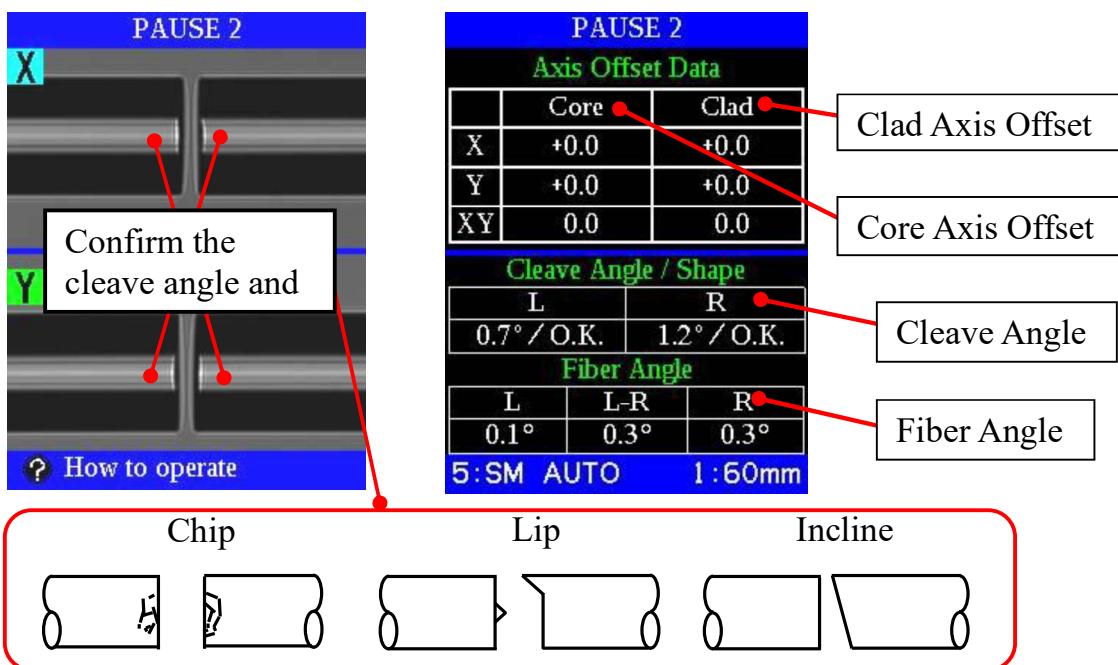
(7) Fiber clamps move over the fiber automatically by closing the wind protector.

## 8. Splicing Procedure

To assure a good splice, the optical fiber is observed with the image processing system equipped in the LZM-100. However, there are some cases when the image processing systems cannot detect small particles and defects. Visual inspection with the monitor is often necessary for better splicing evaluation.

Procedure below describes standard operating procedure.

- (1) Press [SET], the fibers loaded in the splicer move forward toward each other. The fiber forward motion stops at a certain position shortly after the cleaning arc is performed. Next, the cleave angle and end-face quality are checked. If the measured cleave angle is greater than its set threshold, the buzzer will sound and an error message warns the operator. The splicing procedure pauses. If no error message is displayed, the below stated end-face conditions are used for visual inspection. If defects are observed, remove the fiber from the splicer and repeat fiber preparation. These visual defects may cause a faulty splice.



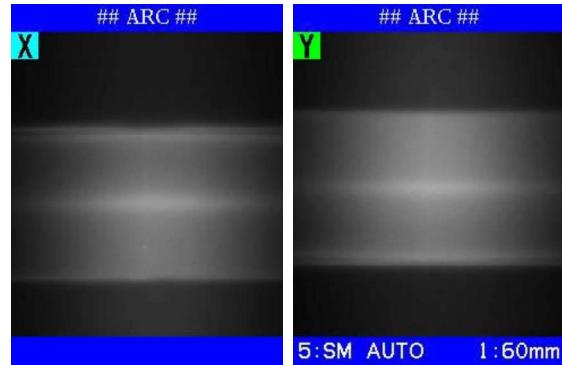
- (2) After fiber inspection, the fibers are aligned core-to-core or cladding-to-cladding depending on the splice mode. Cladding axis offset and core axis offset measurements can be displayed.
  - The pause after cleave angle check and fiber alignment can be set to disabled.
  - The cleave angle threshold can be changed. See the [Checking or Editing Splice Mode] for details.
  - The cleave angle error message can be ignored by pressing the [SET] key to go on to the next step. To disable the cleave angle error; see the [Configurations] for details.

## **Basic Operation**

- (3) After completion of fiber alignment, the arc discharge is performed to splice the fibers. During arc discharge, observe the fiber image on the monitor screen. If some part of the image exhibits an extremely bright glow (hot spot), which is created by burning contaminants located on the surface or end-face of the glass, there is a possibility that the fiber core will be deformed. Although deformation can be detected by the loss estimation function, a re-splice is recommended.

Both main monitor and sub monitor display the image of the arc discharge.

Confirm there is no burning dust.



If a set value of the Lasing Power is too low, the lasing discharge may be abnormal.

In this case, the following action is recommended.

- Increase the value of the Lasing Power. Moreover, adjust the V height Shift, and keep the fiber away from the lasing discharge.  
Or
- In the sequence of lasing, for example, Prefuse and Main Arc, set the higher value of the Prefuse Arc power for the stable arc discharge during the Main Arc. When the value of the Arc Power is too low even if the above-mentioned action is done, the arc discharge may be abnormal.



- (4) Estimated splice loss is displayed upon completion of splicing. Splice loss is affected by certain factors stated on the next page. These factors are taken into account to calculate, or estimate, splice loss. The calculation is based on certain fiber dimensional parameters, such as MFD.

If either the measured cleave angle or the estimated splice loss exceeds its set threshold, an error message is displayed. If the spliced fiber is detected as abnormal, such as “Fat”, “Thin” or “Bubble”, an error message is displayed. If no error message is displayed but the splice image looks poor by visual inspection, it is strongly recommended to repeat the splice from the beginning.

Splice loss may be improved in some cases by additional arc discharges.  
Press **ARC** key for additional lasing.  
Splice loss estimate and splice check are performed again.



- The splice point sometimes looks a bit fatter than other parts. This is considered a normal splice and does not affect splice loss.
- To change the threshold for estimated splice loss or cleave angle, see the [Checking or Editing Splice Mode] for details.
- To change the “Loss Est.” or “Angle Offset” and to change the threshold of loss error, Angle Offset error, or core angle error, see the [Checking or Editing Splice Mode].
- Error messages, such as “High estimated splice loss”, “Splice angle”, “Fat”, “Thin” and “Bubble” can be ignored. This function can be set to “disabled”. See the [Splice Setting] for details.

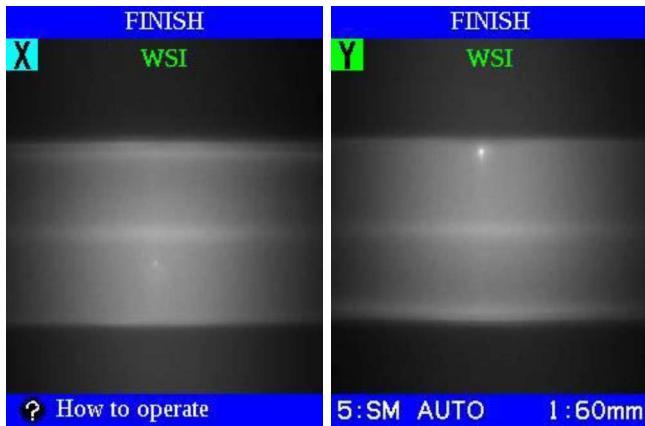


# Basic Operation

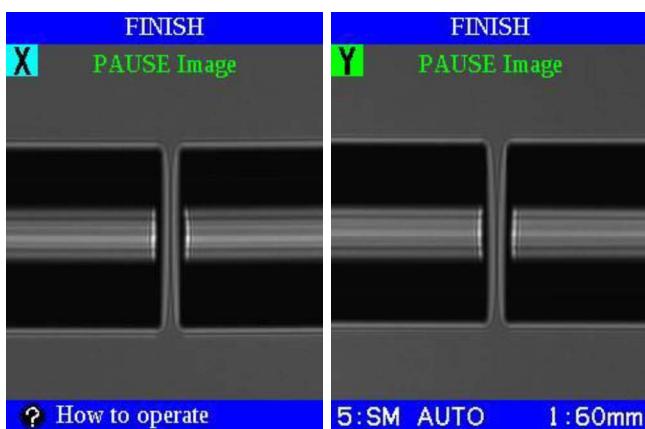
## 9. Display after the finished splice.

The default display setting is the following. The display can be switched with **X/Y** button.





Main Monitor (L)	Sub Monitor (R)
WSI (X)	WSI (Y)



Main Monitor (L)	Sub Monitor (R)
PAUSE Image (X)	PAUSE Image (Y)

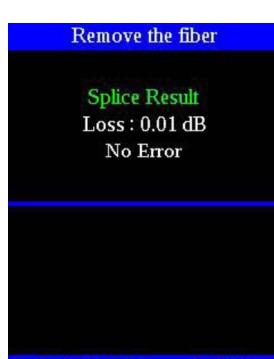
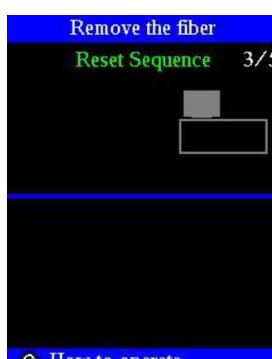
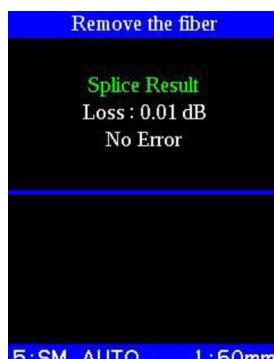
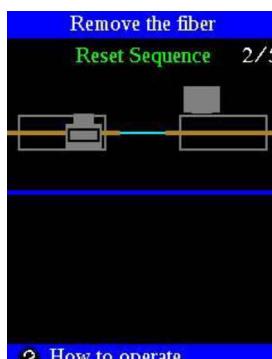
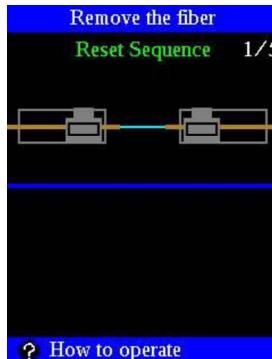


•The display setting is programmable. See section [**Editing Splice Mode**].

## Basic Operation

When the wind protector is opened after the splice, the instruction animation is automatically displayed.

Remove the fiber from the splicer as shown in the instructions.



In the case of the splice with theta alignment, the instruction animation is started after the wind protector is opened and **SET** button is pushed.

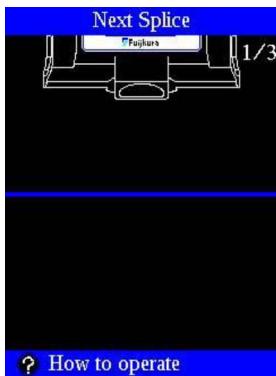
The wind protector is opened after the splice.

Open the lid of the fiber holder.

Take out the fiber from the splicer.

Push the **SET** button.  
The instruction animation is started for the next splice.

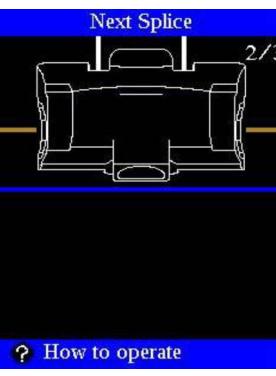
The instruction animation is displayed for the next splice.



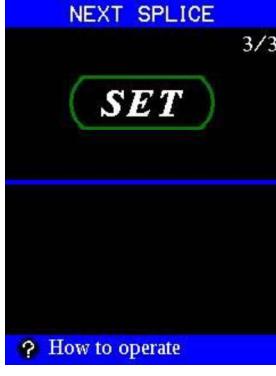
A current splice setting is displayed in the sub monitor.  
The **MENU** key can change the splice setting.



Place the fiber on both sides.



Close the wind protector.



Push **SET** key.  
The splice is started automatically.

# **Basic Operation**

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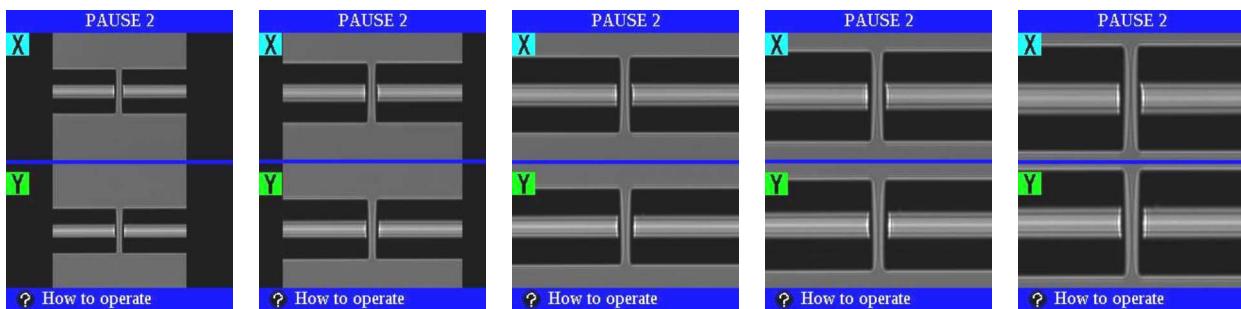
## **10. Fiber Image**

### **Zoom in and out of the fiber image**

The magnification of the PAS and WSI fiber image can be changed by the **UP** **DOWN** key.

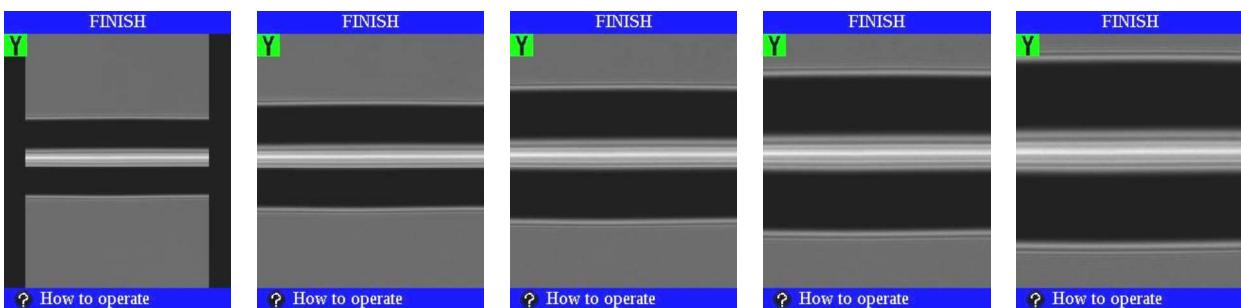
### **The fiber image at the gap set**

Check the contamination and cleave shape, etc.



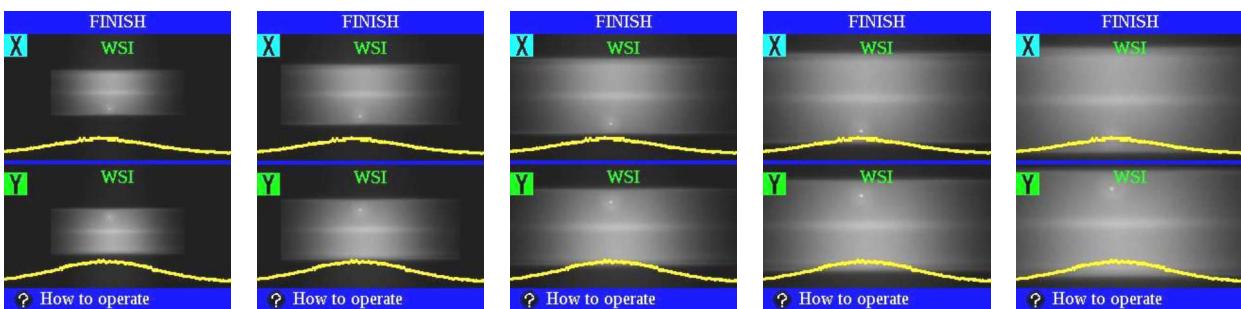
### **Image of spliced fiber**

Check the image after fiber is spliced.



### **WSI image**

Check the burning dust during laser discharge.



## How to enter Mode title / Comments / Password

Character list below is displayed by selecting Mode Title / Comments / Password.

- (1) Move the cursor by pressing **△▽◀▶**, and press **[ENT]** key to input the selected character. Move the cursor to **←** and press **[ENT]** key to highlight the character, and then enter the proper character over it.
- (2) Move cursor to [ENTER] and press **[ENT]** key on completion of entering characters. In the case of Password input, the next screen image is displayed if the correct password was entered. If the password is incorrect, the previous screen image is displayed.

At the time of shipment from factory, the password is set at “0”.



Edit display of mode title.

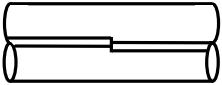
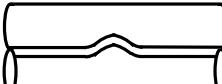
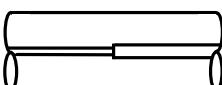


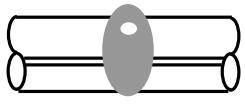
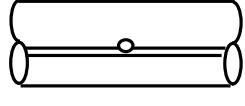
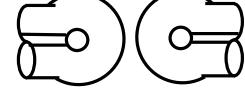
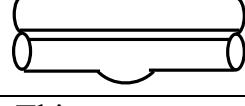
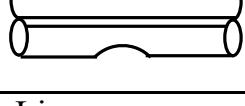
Edit display of password.

## **Basic Operation**

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Splice loss increase: Cause and remedy

Symptom	Cause	Remedy
Core axial offset 	Dust on V-groove or fiber clamp chip	Clean V-groove and fiber clamp chip.
Core angle 	Dust on V-groove or fiber clamp chip	Clean V-groove and fiber clamp chip.
	Bad fiber end-face quality	Check if fiber cleaver is functioning properly.
Core step 	Dust on V-groove or fiber clamp chip	Clean V-groove and fiber clamp chip.
Core curve 	Bad fiber end-face quality	Check if fiber cleaver is functioning properly.
	Prefuse power too low or prefuse time too short	Increase [Prefuse Power] and/or [Prefuse Time].
MFD Mismatch 	Lasing power too low	Increase [Lasing Power] and/or [Lasing Time].

Symptom	Cause	Remedy
Combustion 	Bad fiber end-face quality	Check the cleaver
	Dust still present after cleaning fiber or cleaning arc	Clean fiber thoroughly or increase [Cleaning Arc Time]
Bubbles 	Bad fiber end-face quality	Check if fiber cleaver is functioning properly
	Prefuse power too low or prefuse time too short	Increase [Prefuse Power] and/or [Prefuse Time]
Separation 	Fiber stuffing too small	Perform [Motor Calibration]
	Prefuse power too high or prefuse time too long	Decrease [Prefuse Power] and/or [Prefuse Time]
Fat 	Fiber stuffing too high	Decrease [Overlap] and perform [Motor Calibration]
Thin 	Lasing power not adequate	Increase lasing power
	Some parameters not adequate	Adjust [Prefuse Power], [Prefuse Time] or [Overlap]
Line 	Some parameters not adequate	Adjust [Prefuse Power], [Prefuse Time] or [Overlap]

-  • A vertical line sometimes appears at the splice point when MM fibers, or dissimilar fibers (different diameters), are spliced. This does not affect splice quality, such as splice loss or tensile strength.

# Maintenance of Splicing Quality

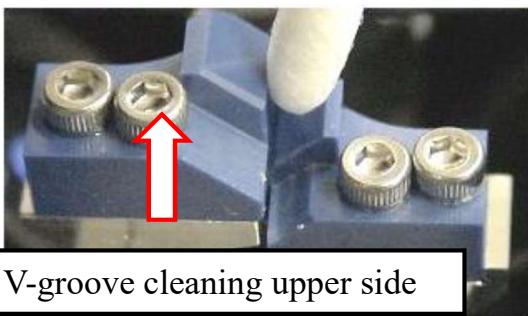
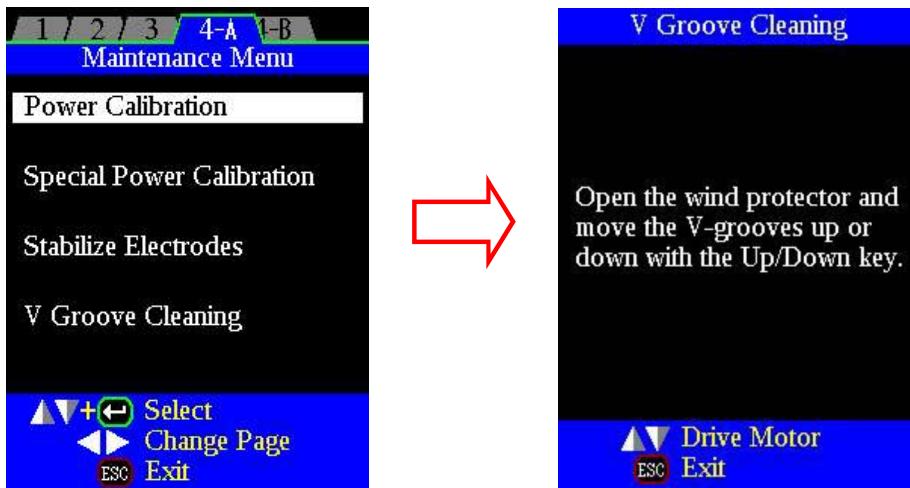
## 1. Cleaning and Checking before Splicing

Critical cleaning points and maintenance checks are described below.

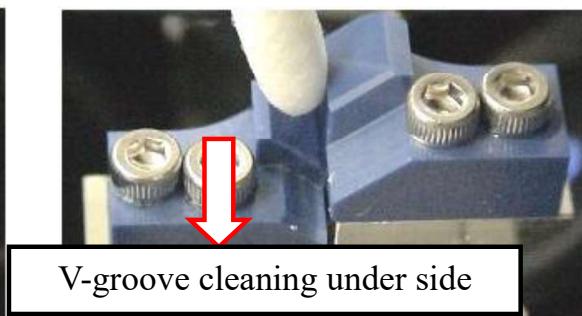
### 1-1. Cleaning V-grooves

If contaminants are present in the V-grooves, proper clamping may not occur, resulting in higher splice loss. The V-grooves should be frequently inspected and periodically cleaned during normal operation.

- (1) Press [MENU] select [V-Groove Cleaning] from [Maintenance Menu].
- (2) Open the wind protector, move the V-groove by the [UP] [DOWN].
- (3) Clean the bottom of the V-groove with an alcohol-moistened thin cotton swab.  
Remove excess alcohol from the V-groove with a clean dry swab.



V-groove cleaning upper side



V-groove cleaning under side

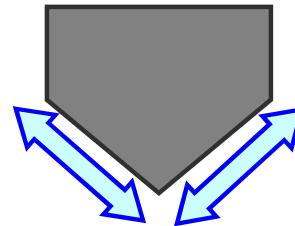
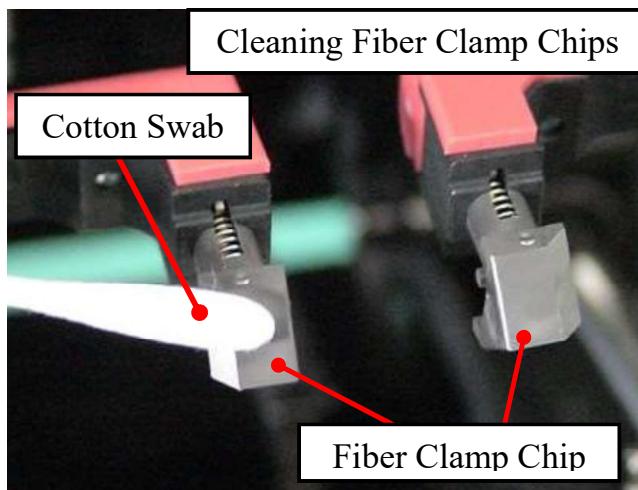
Clean V-grooves moving up and down also right too left during this procedure.

Clean V-grooves like shown in the above picture moving the swab right and left.

## 1-2. Cleaning Fiber Clamp Chips

If contaminants are present on the clamp chips, proper clamping may not occur, resulting in poor quality splices. The fiber clamp chips should be frequently inspected and periodically cleaned during normal operation. To clean the clamp chips, do the following.

- (1) Open the wind protector.
- (2) Clean the surface of the chip clamp with an alcohol-moistened thin cotton swab.  
Remove excess alcohol from the chip clamp with a clean dry swab.



Clean this area with  
Cotton Swab.

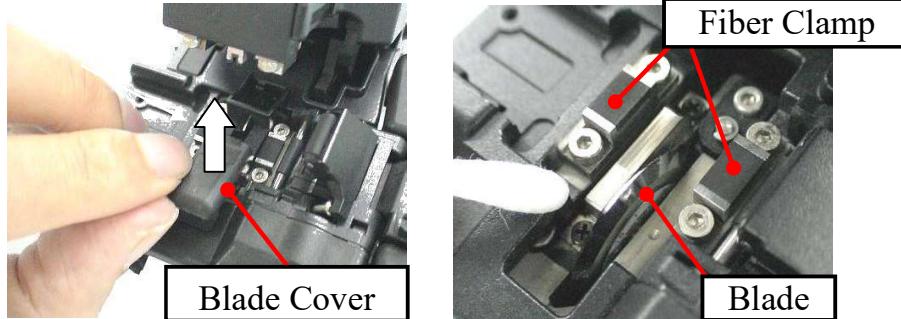
# Maintenance of Splicing Quality

## 1-3. Cleaning Fiber Cleaver

If the circular blade or clamp pads of the fiber cleaver become contaminated the cleaving quality could degrade. This may lead to fiber surface or end-face contamination, resulting in higher splice loss.

CT-30 Series

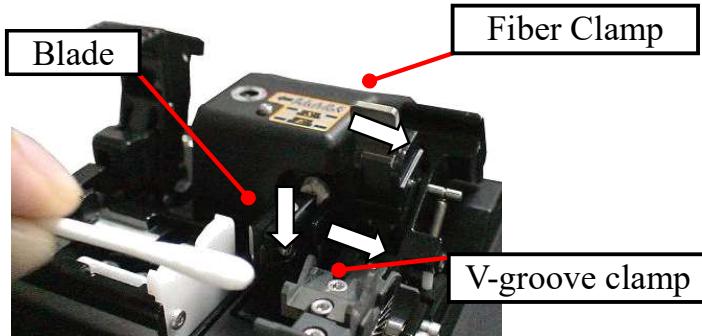
Clean the circular blade or clamp pads with a cotton swab moistened with alcohol.



CT-100

Clean the circular blade, clamp and V-grooves with a cotton swab moistened with alcohol.

\* Move cotton swabs along the white arrows shown in the picture below.



## 2. Periodic Checking and Cleaning

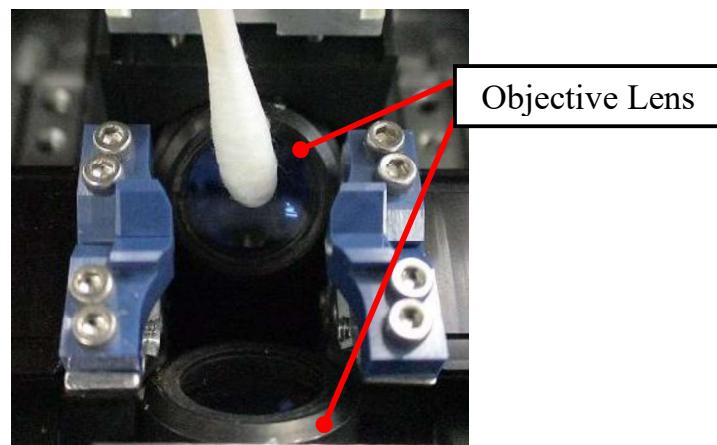
In order to maintain the splicing quality of the splicer, periodic inspection and cleaning are recommended.

### 2-1. Cleaning Objective Lenses

If the objective lens' surface becomes dirty, normal observation of the core position may be incorrect, resulting in higher splice loss or poor splicer operation. Therefore, clean both lenses at regular intervals. Otherwise, dirt may accumulate and become impossible to remove.

To clean the objective lenses, do the following:

- (1) Before cleaning the objective lenses, always turn off the splicer.
- (2) Gently clean lenses' (X-axis and Y-axis) surface with an alcohol-moistened thin cotton swab. Using the cotton swab, start at the center of the lens and move the swab in a circular motion until you spiral out to the edge of the lens surface. Remove excess alcohol from the lens surface with a clean dry swab.



- (3) The lens surface should be clean and free of streaks or smudges.
- (4) Turn on the power and make sure no smudges or streaks are visible on the monitor screen. Press **X/Y** key to change the screen and check the state of the lens surface on both the X- and Y-screens. Perform dust check.

### 2-2. Diagnostic Test

- See section [Diagnostic Test].

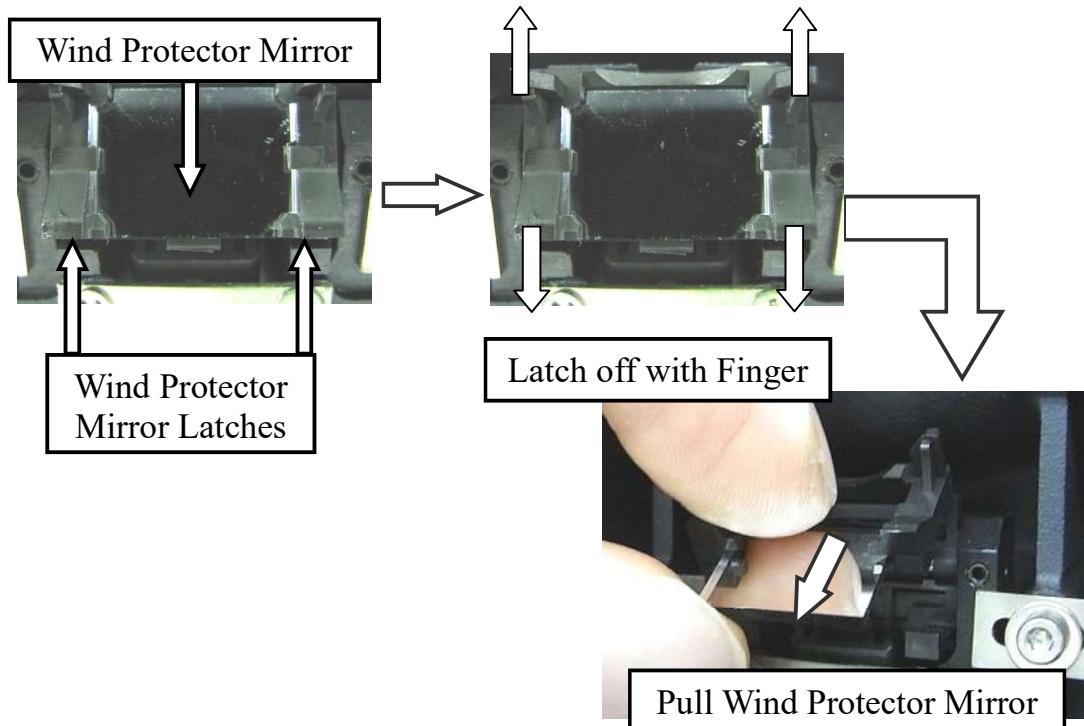
# Maintenance of Splicing Quality

## 2-3. Replace Wind Protector Mirror

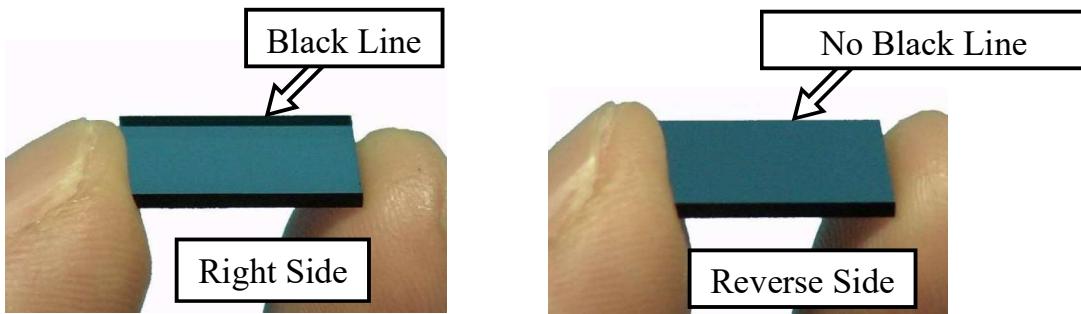
Replace the wind protector mirror if it cannot be cleaned or if it remains clouded.

To replace, do the following.

- (1) Turn the splicer power off.
- (2) Open the wind protector. Pull and unlock wind protector mirror latch with fingers. While still pulling on mirror latch, use other hand's fingers to pull on wind protector mirror frame. The frame should raise and rotate back. Pull out the mirror from its frame.



- (3) Insert the new mirror into the frame. The clear glass side should face upward while inserting mirror into the frame. Look into the mirror obliquely to identify. If it is the correct side, the black line can be seen.



- 💡 • Make sure the wind protector mirror is inserted the correct way. If not, the fiber cannot be observed correctly.
- Wind protector mirror Fujikura part number is **WPM-08**.

## 1. Fiber Type Compare

### 1-1. The Fiber identification function

Using the fiber identification function ensures repeatable results for production splicing applications. The fiber identification function identifies fiber that is about to be spliced from core profile data that is stored in splicer memory.

Therefore, it is necessary to install the core profile data of the fiber into splicer memory beforehand. This fiber identification function can prevent accidental splicing with the wrong splicer mode and parameters (not optimized for that particular fiber), and also prevents splicing the wrong fibers.

#### Installation of the core profile of the fiber

[MENU] → [Fiber Data Learning] → [Fiber Type Compare]

Put the cleaved fiber on the left side.

With an LZM-100 base model equipped with theta motors:

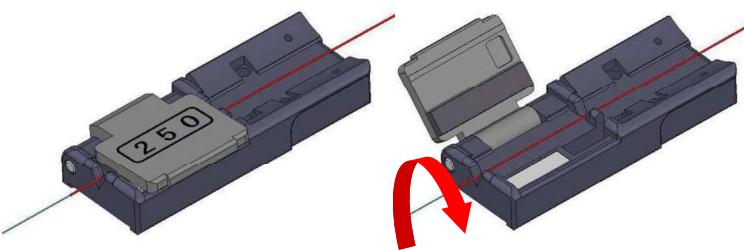
The core profile of the fiber is installed automatically. (The fiber will be rotated during the process.)

With an LZM-100 base model not equipped with theta motors

If the message is displayed on the screen, set the fiber again. Before resetting the fiber, note that the fiber should be rotated inside the fiber holder.

#### Manual Rotation with the LZM-100M/M+

**Rotation requires opening the fiber holder lid, rotating the fiber, closing the lid and recording the image; rotation angles are random.**



#### Fiber Type Compare

Fiber Data used in Fiber Type Compare function can be registered using this function.

Register the data according to the guidance message.

Continue  
ESC Exit

Select Where to Save

1: SM	Installed
2:	Not Installed
3:	Not Installed
4:	Not Installed
5:	Not Installed

▲▼+◀ Select  
◀ Remove  
ESC Exit

Fiber Type Compare

Store Position  
No: 1  
Comment  
SM

Fiber data will be stored, when you press Ent key.

If you want to continue measurement using another lot of fiber, press SET key.

Save  
SET Continue  
ESC Exit

Select Where to Save

1: SM	Installed
2: LEAF	Installed
3:	Not Installed
4:	Not Installed
5:	Not Installed

▲▼+◀ Select  
◀ Remove  
ESC Exit

Select the memory area at the [Select Where to Save] screen, assign a fiber name and save. Data can be deleted by pushing the [MENU] key.

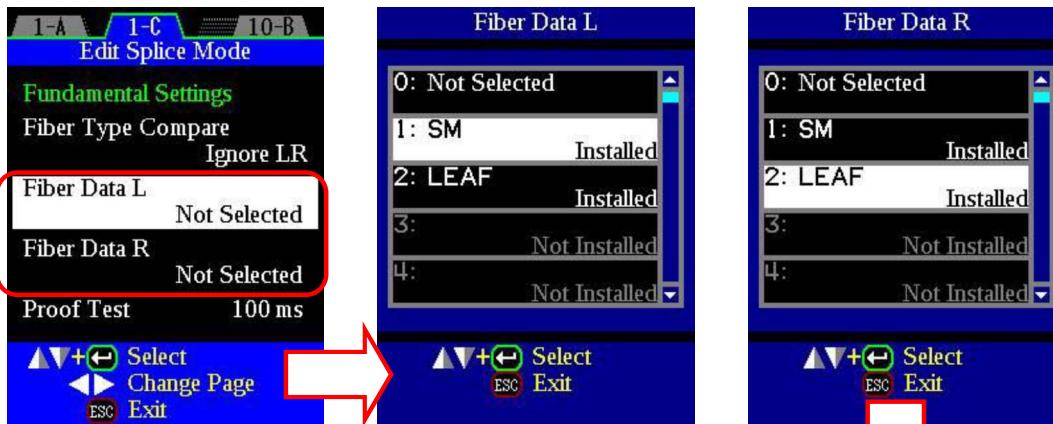
# Function Introduction

## 1-2. Using the core profile of the fiber

The splicing time can be shortened by using the core profile of the fiber.

Enter [Edit Splice Mode] for the splice mode and edit [Fiber Data L/R].

Load the core profile data of the fiber on screen.

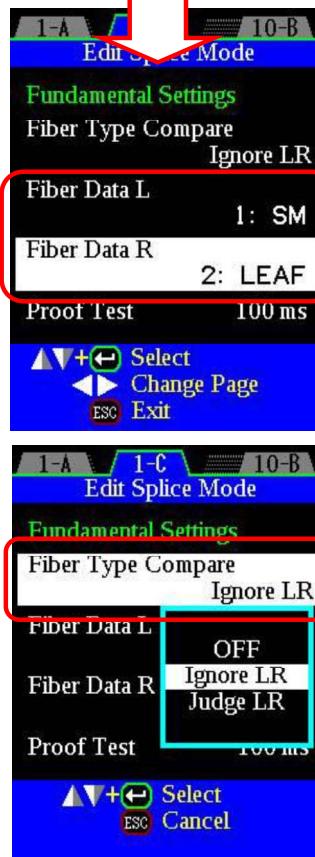


### [Fiber Data L/R]

Selection the appropriate core profile for both the left and right fibers.

### [Fiber Type Compare]

Set the [Fiber Type Compare] function to enable the fiber identification function. The fiber will then be identified from the core profile of the fiber as compared to the data in splicer memory.



Setting	Description
Ignore LR	If the combination of the fiber is corresponding to the settings for the fiber types, splicing will proceed regardless of left/right fiber placement. (Ex.: Left: SM/Right: LEAF or Left: LEAF/Right:SM)
Judge LR	Even if the combination of fibers is correct, the splicer will only enable splicing if the fibers are placed with the correct left/right orientation. (Ex.: Only Left: SM, Right: LEAF when the setting is an above figure)

## 2. IPA Data (Theta Option Only)

### 2-1. IPA Data

The splicer aligns theta by using the memorized IPA data of each fiber.

PAS is recommended for the PANDA fiber alignment. The alignment of high speed and accuracy is enabled.

Please use the IPA mode when PANDA alignment is impossible.

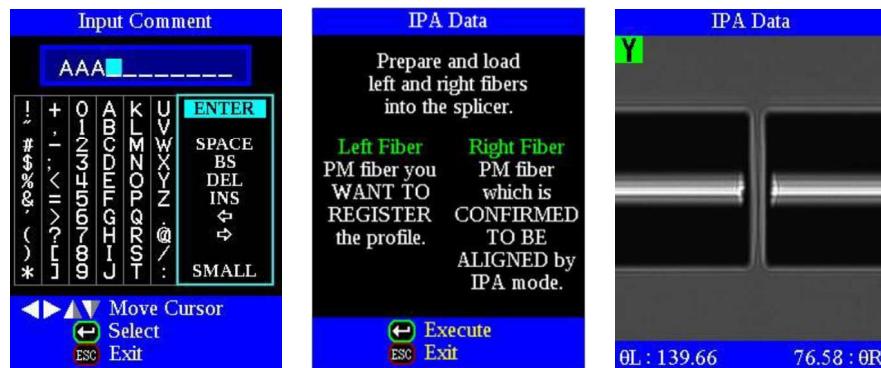
#### Method of acquiring Fiber Profiling Data

The fiber to memorize the profile data is set on the left side with glass clamping. On the right side, the PM fiber that profiled data is already memorized in the splicer with glass clamping. More accurate align can be done by connecting with the light source and the power meter and executing this IPA data. To acquire more accurate IPA data, use the light source and PER meter for precise alignment.

##### (1) Select the IPA Data in the Fiber Data Learning menu.

Select the saving area for the IPA data and input the data name.

Execute the acquiring of IPA data according to the guidance.

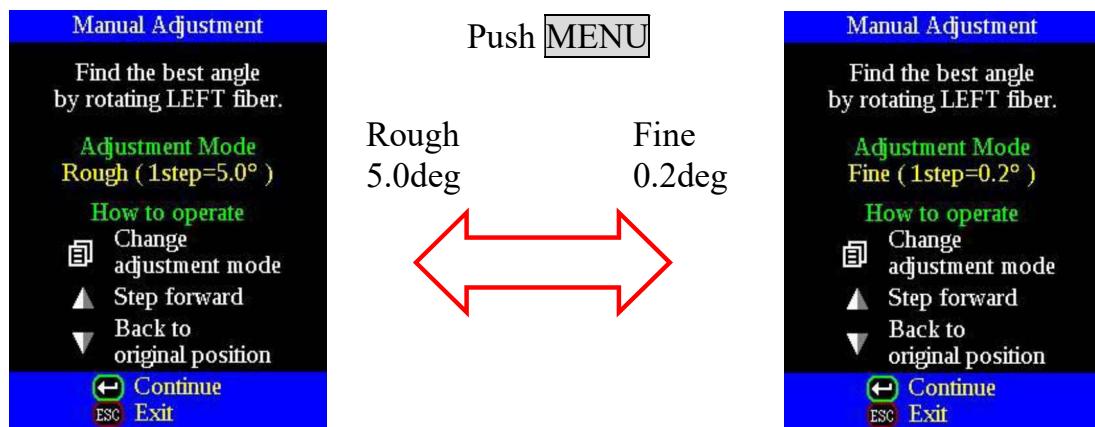
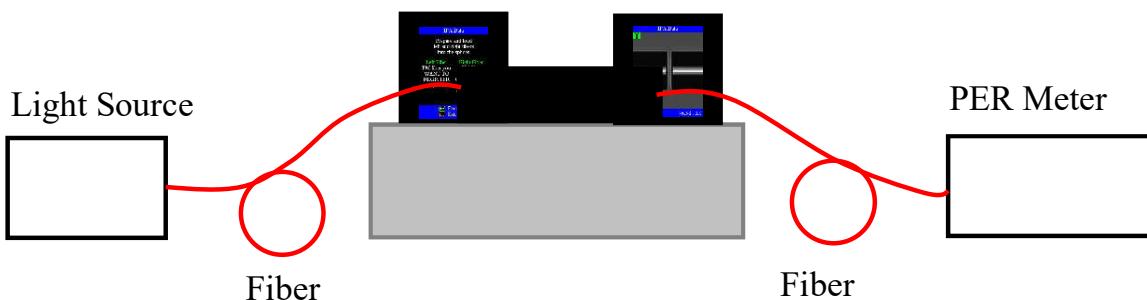


The fiber is rotated.  
And, fiber information is  
memorized.

# Function Introduction

- (2) After data acquisition of the profile, the fiber is aligned by the splicer. To align more precisely, use the light source and PER meter for manual alignment. To push △ Step forward the fiber rotates. The rough tuning or fine-tuning is selectable by pushing MENU. Search the most suitable fiber angle by the measured value of the PER meter.

LZM-100 with theta motors



- (3) After the manual alignment is fulfilled with light source and PER meter, push ENT key to save the IPA data to the splicer.



When IPA is selected in the [Alignment Mode],  
the splicer aligns the fiber by referring to the IPA data.

## 3. Laser Center Compensation

### 3-1. Laser Center Compensation Function

This function is used to analyze the laser brightness of fiber during laser discharge, which is used to establish the arc discharge center position.

**[MENU] → [Edit Splice Mode] → [Laser Center Compensation] → [ON].**



During laser discharge the laser centers about the fibers and is saved. See screens below.



The value will be updated afterwards

# Function Introduction

## 4. MFD Mismatch

### 4-1. MFD Mismatch Estimation Function

This function is the estimation of MFD Mismatch Loss after splicing. MFD Mismatch Loss is caused by mismatch of MFD (Mode Field Diameter) between different kinds of fibers.

If you splice the same kind of fibers, this function is not available.



- (1) [MENU] → [Edit Splice Mode] → [MFD Mismatch] WSI or CSI.

WSI (Warm Splice Image) means that estimating the MFD Mismatch Loss by an image during lasing. CSI (Cold Splice Image) means that estimating by an image after finished splicing.

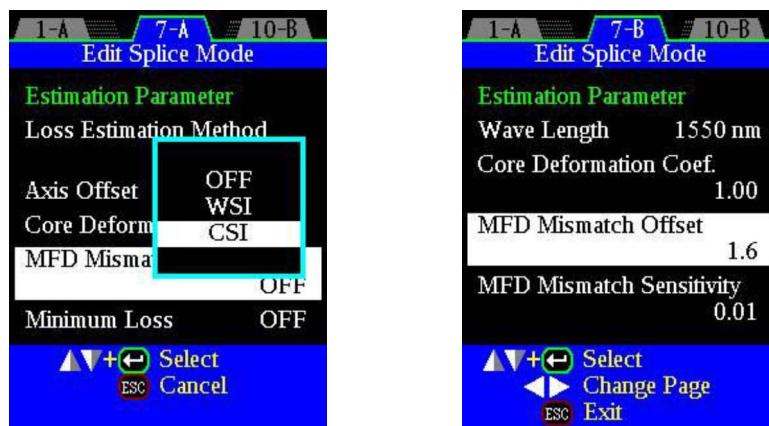
WSI method is suitable for fiber without depressed cladding like fluorine.

CSI method is suitable for fiber with depressed cladding.

- (2) When you use this function, you need to set two parameters, [MFD Mismatch Offset] and [MFD Mismatch Sensitivity].

[MFD Mismatch Offset] means the standard value of estimating the MFD Mismatch Loss.

[MFD Mismatch Sensitivity] means the sensitivity of the MFD Mismatch Loss.



## 4-2. MFD Mismatch Offset / MFD Mismatch Sensitivity

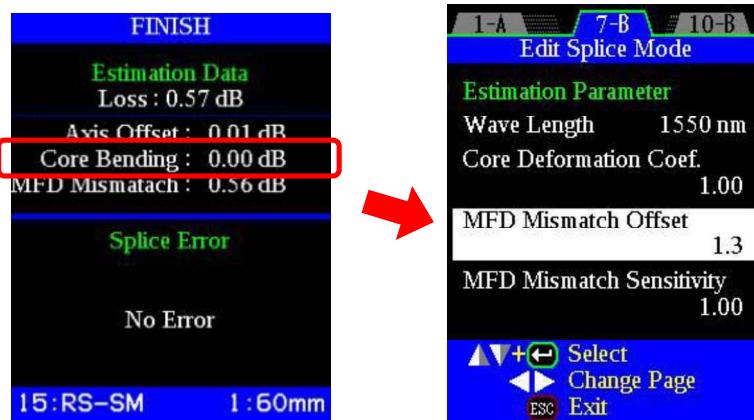
You need to optimize these parameters according to the following steps, because [MFD Mismatch Offset] and [MFD Mismatch Sensitivity] depend on property of fibers.

- (1) First, input the initial value as below.

[MFD Mismatch Offset] : 0.0  
 [MFD Mismatch sensitivity] : 1.00



- (2) Next, splice the fiber by using suitable setting. Input the value of MFD Mismatch after splicing as the MFD Mismatch Offset in the Edit Splice Mode.



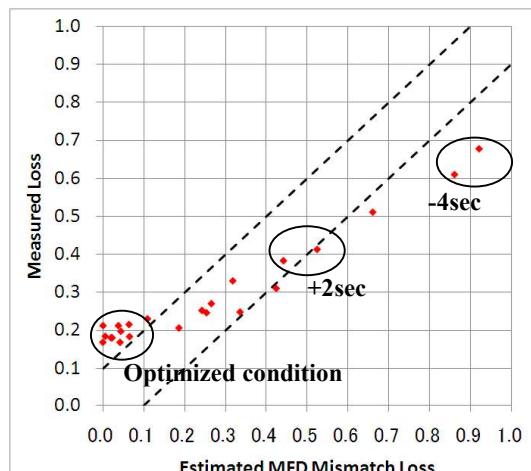
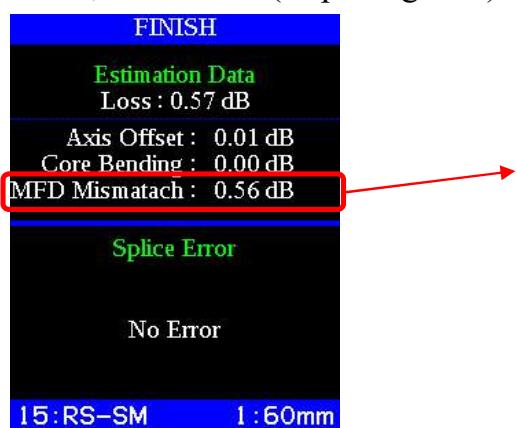
# Function Introduction

(3) Next, splice the fibers under various conditions to acquire the data.

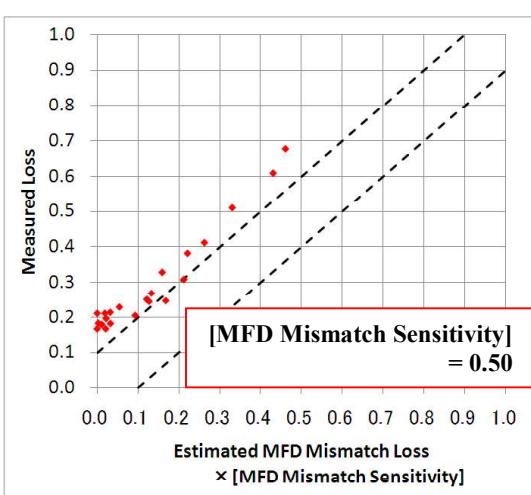
Measured splice loss and estimated MFD Mismatch data are needed under conditions as the following.

Conditions:

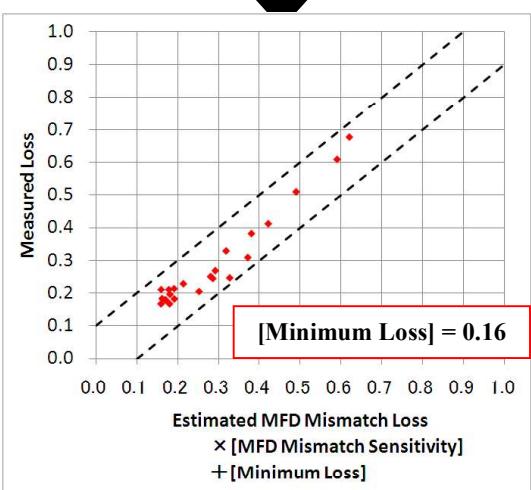
Main Arc Time +/-4000ms, +/-3000ms, +/-2000ms, +/-1000ms (8 splicing data)



(4) Optimize the MFD Mismatch Sensitivity so that the dotted line in the graph becomes same tendency to the sampled data.

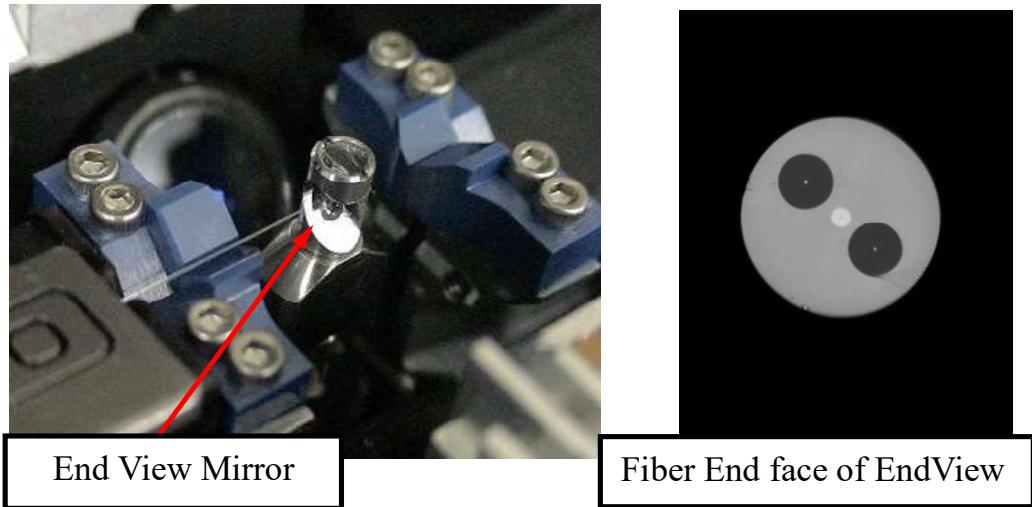


(5) Finally, optimize the value of Minimum Loss so that almost all of the sampled data is in the range of the dotted line in the graph.

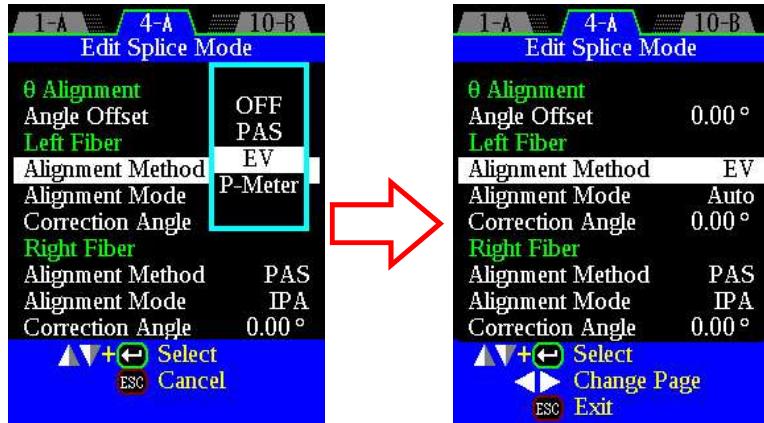


## 5. End-View observation system

The cleaved ends of the optical fiber are observed in the axial direction by a means of a mirror that directs the fiber end image into the camera system. This allows precise alignment and splicing of uniquely structured fibers, such as PM, multi-core, non-circular (hexagonal, octagonal, etc.) or micro-structured “holey” fibers.



- (1) Select the [Edit Splice Mode] → [θ Alignment] → [Alignment Method] then [EV].



- (2) Press **SET** key, then fibers move forward and stop at certain position after cleaning arc. When [EV] is selected, End view observation is performed for theta alignment.

## 6. Camera Window Size

The [Camera Window Size] functions allow for the selection of the amount of the FOV of the camera that is used to generate images on the splicer screens. The four levels are listed below:

Magnification Level	Description
X1	Magnifies image from 1/3 camera FOV to full screen
X2	Magnifies image from 1/2 camera FOV to full screen
X3	Displays images of entire FOV of camera to full screen
AUTO	Selects magnification level based on fiber cladding diameter

This can be selected by navigating to **[MENU]** → **[Edit Splice Mode]** → **[Edit Splice Mode 1-D]** → **[Camera Window Size]** and selecting from the four options.



# Function Introduction

## 7. Stage Positions at Start

The [Stage Positions at Start] function can be used to restrict the movement of the various motors/stages in the LZM100. Under default settings, the stages will move to a predefined position whenever the [RESET] button is pushed, wind protector is opened and/or the wind protector is closed. The options are described below:

Function	Option	Description
[Except Z Stages]	Predefined	Moves all stages except Z stage to their predefined positions during [RESET] or opening/closing of wind protector
	Keep	Prevents all stages except Z stage from moving during [RESET] or opening/closing of wind protector
[Z Stages]	Predefined	Moves Z stage to a predefined positions during [RESET] or opening/closing of wind protector
	Keep	Prevents Z stage from moving during [RESET] or opening/closing of wind protector

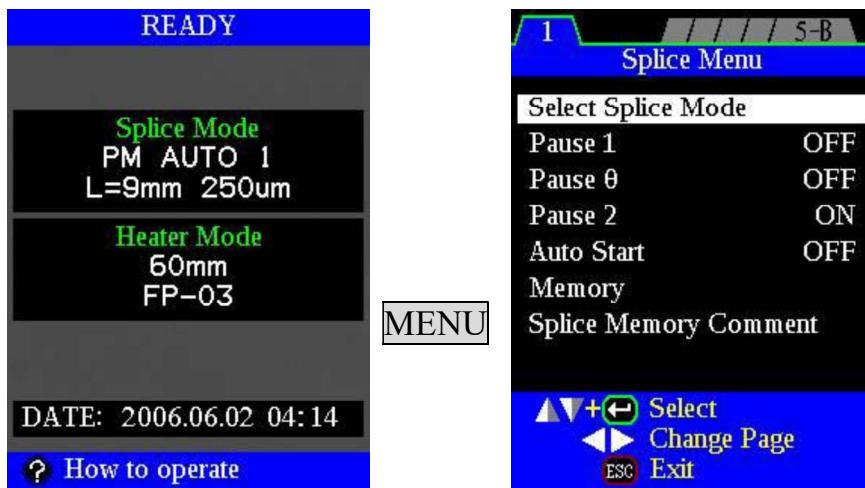


# Splice Mode

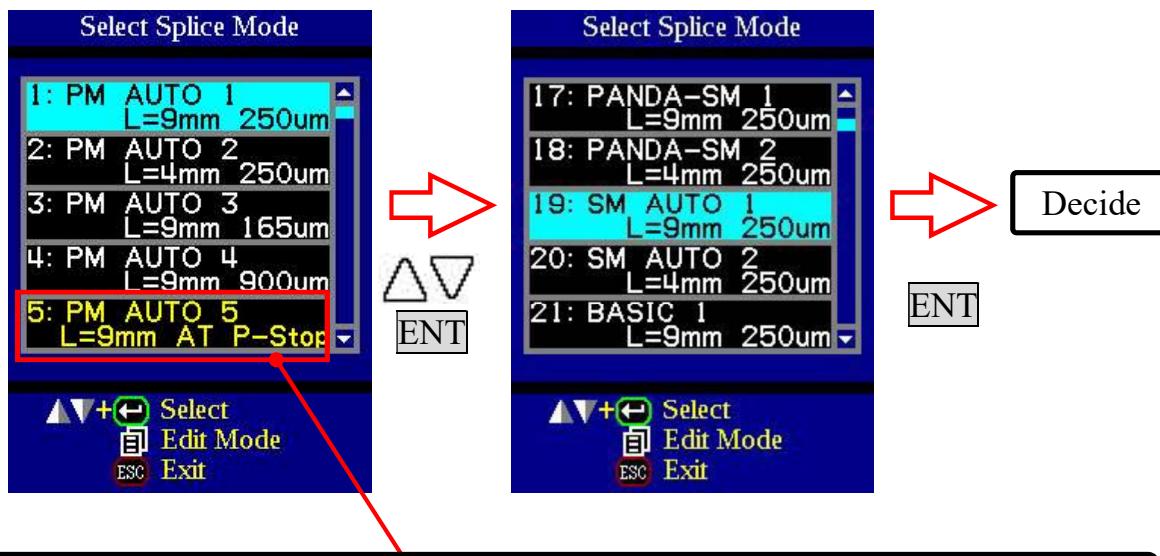
## 1. Splice Mode Selection

Select an appropriate splice mode for type of fiber to be spliced.

- (1) Press [MENU] key at [READY] state to open [Splice Menu]. Select [Select Splice Mode] is displayed.



- (2) Move cursor by pressing  $\Delta$ ,  $\nabla$  and press [ENT] key to select [Splice Mode].



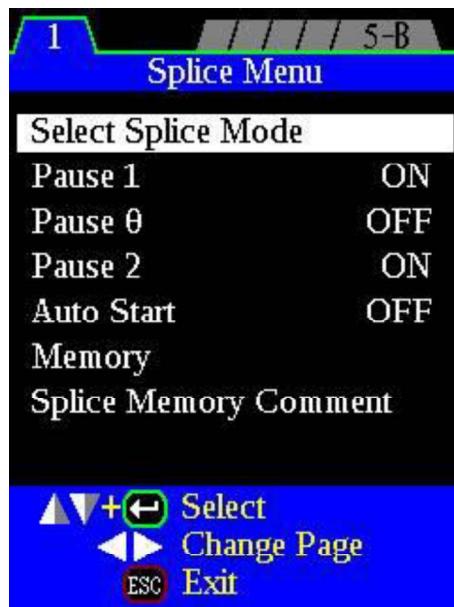
- When [Auto Stuff Control] is set to [OFF], Splice Mode is displayed in yellow. The displayed color can select [Yellow letters] or [White letters]. See Section[Machine Settings]

- (3) Please confirm whether the selection is correct on the READY screen.

## 2. Splice Option

This parameter is a set value common to all modes.

- (1) Press **MENU** key at [READY], [PAUSE] or [FINISH] state.
- (2) Move cursor by pressing  $\Delta$ ,  $\nabla$  keys to a parameter to be changed.
- (3) Press **ENT** key to select parameter and change the parameter.



Splice Menu Parameter

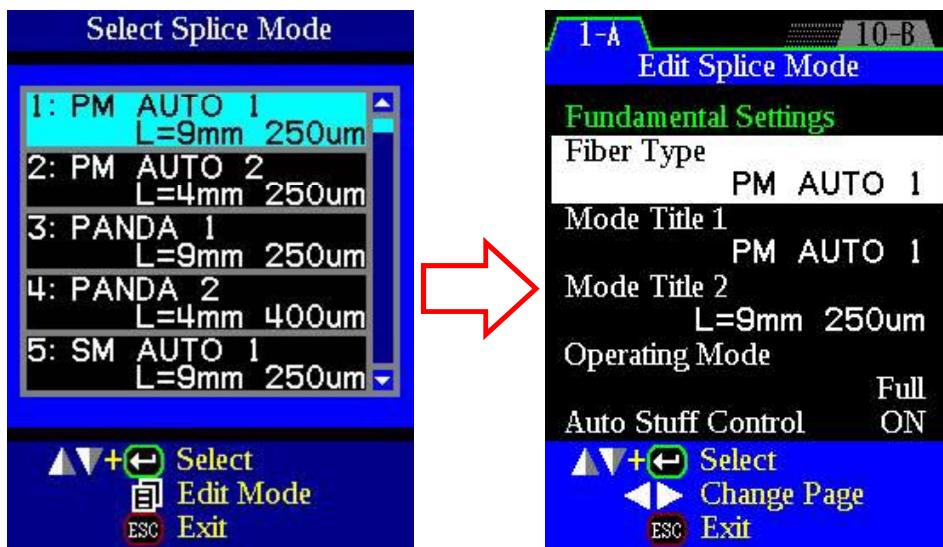
Parameter	Description
Select Splice Mode	Refers to selected condition parameter.
Pause1	Pauses after Gap Set are measured.
Pauseθ	Pauses after $\theta$ when "ON".
Pause2	Pauses after ECF function when "ON".
Auto Start	When [Auto Start] is "ON", the selected operation starts automatically after the fibers have been loaded and the wind protector closed.
Memory	Refers to a previously stored result.

# Splice Mode

## 3. Editing Splice Mode

Splicing parameters in each splice mode can be modified. Lasing power and lasing time are considered the two most vital parameters. To edit these parameters do the following:

- (1) In [Select Splice Mode], move cursor to a splice mode to be modified. Press **MENU** key to display [Edit Splice Mode] menu.



- (2) Move cursor by pressing  $\Delta$ ,  $\nabla$  keys to a parameter to be changed.
- (3) Press **ENT** key to select Parameter. Press **Left/Right** key to change its value. Press **ENT** key to accept changed values.

In other splice modes in the user-selectable database, the user can select one from a series of factory-set splicing modes for various splicing combinations. Below are the descriptions of the various parameters used in these modes.

Parameter	Description
<b>Fundamental Settings</b>	
Fiber Type	<p>A list of splice modes stored in the splicer database is displayed. Upon inputting the appropriate mode, the selected splice mode stored in database area is copied to a selected splice mode in user-programmable area.</p> <p>※The parameter doesn't exist according to the model because this chapter explains in the Full mode.</p> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;">  • The menu composition changes when the mode is changed and selected with Operating Mode.         </div>
Mode Title 1	Title for a splice mode expressed in up to nine characters.
Mode Title 2	Detail explanation for a splice mode expressed up to 15 characters.
Operating Mode	<p>[Full] [Basic] [Fiber Shaping] selected [Edit Splice Mode] of The composition of the parametrical expression changes.</p>  <p>Use [Full] mode when you want to do a detailed setting</p> <p>The Basic mode doesn't include the Special Function mode.</p> <p>The Fiber Shaping mode can be used for the roller end face processing etc.</p>
Auto Stuff Control	<p>[Prefuse Power] and [Prefuse Time] change to the recommended value when [ON] is selected and the splicer controls [Stuff Speed] at the optimum speed.</p> <p>This function doesn't operate when [OFF] is selected.</p> <p>White display indicates [ON]. Yellow display indicates [OFF].</p> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;">  • The splice loss will be inconsistent for specific types of fiber combinations when not using [Auto Stuff Control] function.         </div>

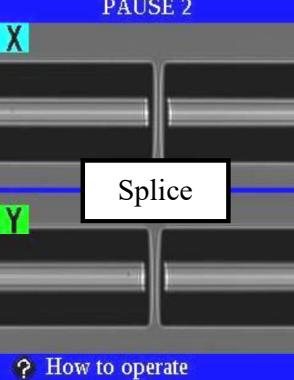
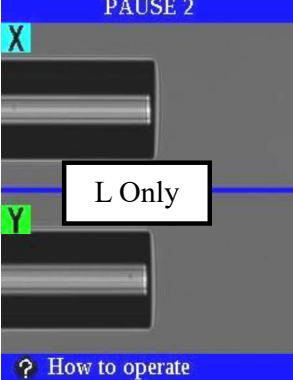
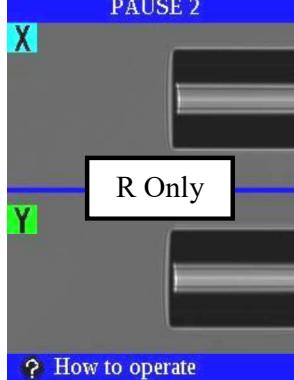
## Splice Mode

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Parameter	Description
<b>Fundamental Settings</b>	
V Height Shift	Change in the height of the V-grooves.
Calibration Method	<b>STD(Standard)</b> Lasing power is updated by calibration in <u>all modes</u> , and is highlighted in white on the display <b>NC(No Calibration)</b> This item is highlighted in red.
Auto Calibration	This function calibrates the lasing power at splice. Whenever this function is on, the lasing power is automatically corrected. The correction value is used in the next splice.
Laser Center Compensation	The center of the laser discharge is calculated and the [Gapset Position] is adjusted selecting ON.
Fiber Type Compare	[Fiber Type Compare]: fiber splice data. [Ignore LR]: Ignore data [Judge LR]: determines whether fibers are correct. [Fiber Data]: load fiber data.
Proof Test	Selects Proof Test settings.
Except Z Stages	[Predefined]: All stages except Z stages <u>move to home position</u> after pressing RESET. [Keep]: All stages except Z stages <u>do not move positions</u> after pressing RESET.
Z Stages	[Predefined]: Z stages <u>move to home position</u> after pressing RESET. [Keep]: Z stages <u>do not move positions</u> after pressing RESET.

Parameter	Description	
<b>Fiber Information</b>		
Left Fiber	Coating Diameter	Sets the fiber coating diameter.
	Clad Diameter	Sets the fiber cladding diameter.
	Core Diameter	Sets the fiber core diameter.
	MFD	<ul style="list-style-type: none"> <li>When the MFD settings of the left and right fibers are different, the ratio of the one MFD to the other MFD is used for estimating. Normally, the fiber entered in the parameter [MFD-L] can be placed on either the left or the right side.</li> <li>If the [Gapset Pos.] is shifted from “Center,” the operator may be required to place the correct fiber in the specified side.</li> <li>When splicing the left and right fibers with the same MFD, both the parameters [Left Fiber MFD] and [Right Fiber MFD] must be set to the same value.</li> </ul>
	Cleave Length	Sets the cleave length (bare fiber part length).

## Splice Mode

Parameter	Description		
<b>Gapsetting</b>			
Gap Set	[Splicing] [L Only] [R Only] [Manual] changes Gap Set	  	<p>[Splicing] [L Only] [R Only] [Manual] changes Gap Set</p> <p>PAUSE 2</p> <p>X</p> <p>Splice</p> <p>Y</p> <p>? How to operate</p> <p>PAUSE 2</p> <p>X</p> <p>L Only</p> <p>Y</p> <p>? How to operate</p> <p>PAUSE 2</p> <p>X</p> <p>R Only</p> <p>Y</p> <p>? How to operate</p> <p>Both left and right fibers move to the gap set position.</p> <p>Left fiber moves to the gap set position.</p> <p>Right fiber moves to the gap set position.</p>
Cleaning Power	Sets the Cleaning Power. [STD] or [NC] is selected automatically in Calibration Method.		
Cleaning Time	Adjusts duration of the cleaning. The lasing power of [Cleaning] is the power set in the field [Prefuse Power].		
Gap	Sets the end-face gap between the left and the right fibers at the time of aligning and prefusion discharge. When splicing fibers of small outside diameter, fusing by prefusion discharge can be reduced by diminishing this gap. Adjusting the prefuse power and prefuse time is usually easier method.		
Gapset Position	Sets the relative position of the splicing location to a midpoint. Splice loss may be improved in the case of dissimilar fiber splicing by shifting [Gapset Position] towards a fiber whose MFD is bigger than the other fiber MFD.		

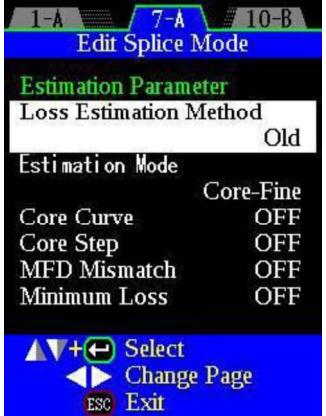
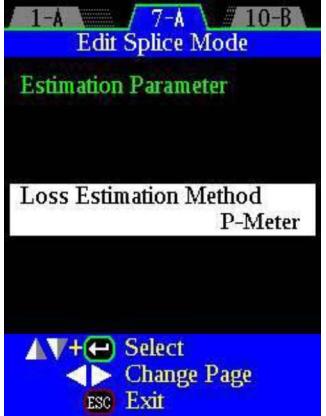
Parameter	Description
<b>XY Alignment</b>	
Alignment Method	<p>Can be set to [PAS] [P-Meter], [EV] or [OFF]. Note : [EV] is able to be only LZM-100P+</p>
Alignment Mode	<p>When [PAS], [Powermeter] or [EV] is selected, following screen image is displayed. Set [Panda], [IPA], [B1500T], [Angle], [Ecc] or [Manual] when [PAS] is selected. Set [Max], [Min] or [Manual] when [Powermeter] is selected. Set [Auto], [Panda], [Bowtie], [Tiger], [PCF], [MCF], [PM-PCF], [DC-Panda], [Octagon] or [Manual] when [EV] is selected. Note : [EV] is able to be only LZM-100P+</p> <p>Set the PM fiber when <math>\theta</math>-axis aligning method is “PAS”. Set both [<math>\theta</math> PAS Align Left] and [<math>\theta</math> PAS Align Right] when both left and right fibers are the same.</p>
ECF	<p>Only for Alignment Mode: [Core] Set the ECF ON or OFF. Set the axial offset ratio for ECF.</p>
<b>Attenuation</b>	<p>Set the Attenuation ON or OFF. If Attenuation is ON, the following setting is ready to edit.</p>
Unit Of Align Target	Sets the units for align target for attenuation splice.
XY Individually	<p>Set the XY Individually ON or OFF. *Only if the [<math>\mu\text{m}</math>] is selected, the setting of XY Individually is available.</p>
Align Target	<p>Align Target units [<math>\mu\text{m}</math>], [dB], [dBm].  *The setting of XY Individually is available in the following conditions Unit Of Align Target:[dB] [dBm] [<math>\mu\text{m}</math>] XY Individually: [OFF]</p>

## Splice Mode

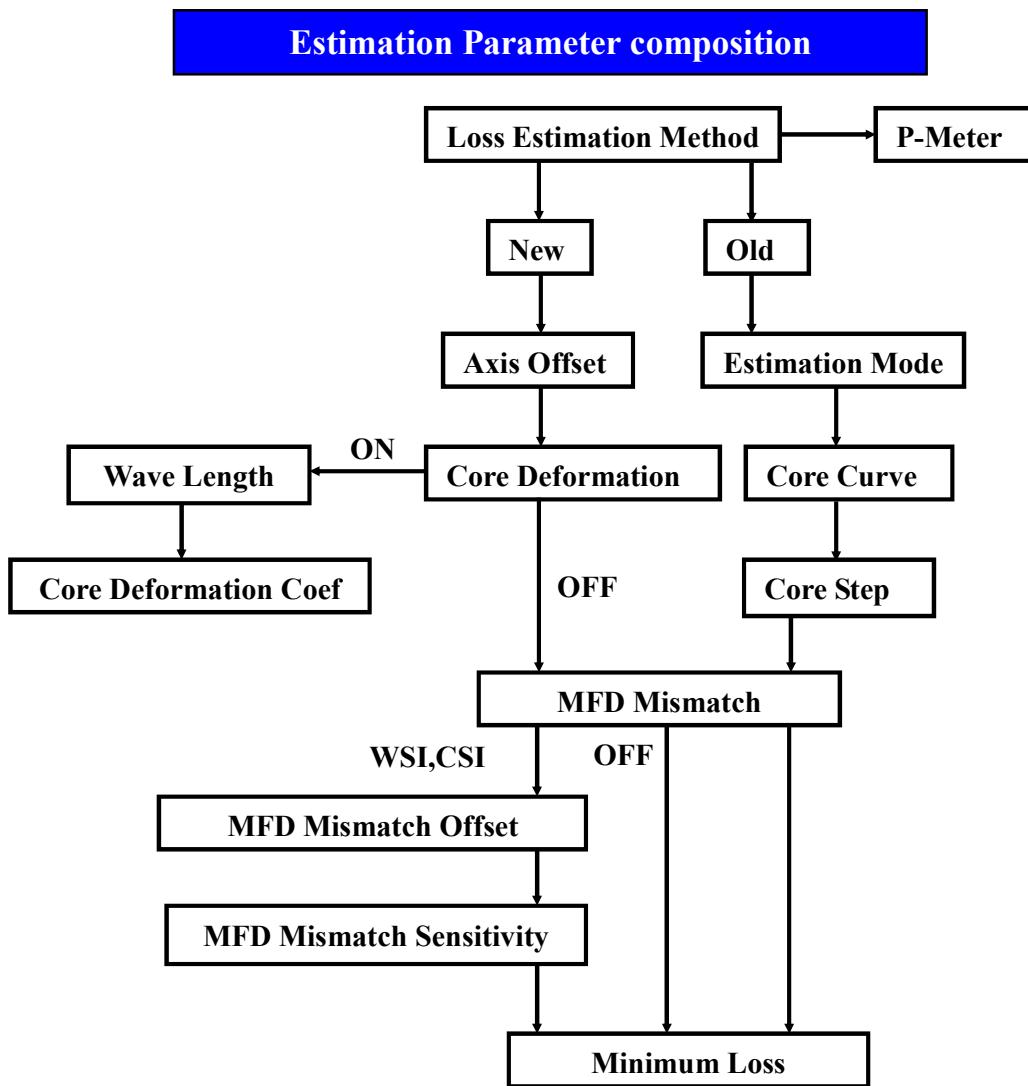
Parameter	Description
<b>Focus Settings</b>	
Focus LX	Views a fiber in one of the four focus settings.
Focus LY	The focus moves toward the core when the [Focus] value is increased.
Focus RX	“Auto” focus is strongly recommended, focusing independently if they are different fiber types (dissimilar fiber splicing).
Focus RY	
<b>Prefuse</b>	
Prefuse Power	Prefuse arc power adjustment. If [Prefuse Power] is set too low, axial offsets may occur if the cleave angles are off. If [Prefuse Power] is set too high, fiber the end faces are exposed to excessive heat and splice losses may be high. Arc Calibration Method [STD] [SP] or [NC] are selected automatically.
Prefuse Time	Sets duration of the prefuse arc, which until the fibers begins stuffing. Longer [Prefuse Time] is equivalent to higher [Prefuse Power].
Prefuse On Time	During prefuse discharge, the heat supplied by the arc can be reduced by changing the duty cycle, time on to time off of the discharge. The period in which prefuse discharge is turned on is set in this field.  •Adjust the prefuse power by adjusting the [Prefuse On Time] and [Prefuse Off Time].
Prefuse Off Time	Sets the time prefuse discharge is off.
Overlap	Sets the overlap amount for stuffing. [Overlap] should be small when the [Prefuse Power] is weak or the [Prefuse Time] is short and large when the [Prefuse Power] is strong or the [Prefuse Time] is long.
<b>Main Lasing</b>	
Main Lasing Power	Sets the power level of lasing used during splicing.
Main Lasing Time	Sets duration of the lasing during splicing.

Parameter	Description
<b>Tapering</b>	
Taper Splice	[ON] enables Taper Splice function Splice loss is sometimes improved when the fiber is tapered (pulled) during arc discharge making the spliced fiber slightly thinner. The following three parameters determine the taper shape.
Taper Wait	If the [Taper Splice] is [ON], the setting of [Taper Wait] is available. Used to establish the taper wait time from the end of the fiber stuffing process to the start of the pulling process.
Taper Speed	If the [Taper Splice] is [ON], the setting of [Taper Speed] is available. Sets the fiber pulling speed.
Taper Length	If the [Taper Splice] is [ON], the setting of [Taper Length] is available. Sets the fiber pulling time.
<b>Special Function</b>	
<b>Edit Special Function</b>	Edit for Special Function

# Splice Mode

Parameter	Description		
<b>Estimation Parameter</b>			
Loss Estimation Method	Select [OFF] or [New] or [Old] or [P-Meter]		
	  		
	<p>[New] [Old] [P-Meter] Differs depending on each setting.</p>		
	<p>If Loss Estimation Method is [New], the following prompts are available. Select the [OFF], [Core], or [Clad]</p>		
Axis Offset	<p>If Loss Estimation Method is [New], the following prompts are available. Select the Core Deformation ON or OFF</p>		
Core Deformation	<p>If Loss Estimation Method is [New] or [Old], the following prompts are available. Select the [OFF], [WSI] or [CSI] See Section [Estimate WSI/CSI]</p>		
MFD Mismatch	<p>If Loss Estimation Method is [New], the following prompts are available. Select the [OFF], [Core], or [Clad]</p>		
Minimum Loss	<p>Set the additional value to the loss estimation. If the error margin of the loss estimation is large, substitute the minimum value of an actual splice loss. The error margin of the loss estimation might be large depending on the splice combination of fiber.</p>		

Parameter	Description
<b>Estimation Parameter</b>	
Wave Length	Set Wave Length. If Loss Estimation Method is [New], this setting is available.
Core Deformation Coef.	Set Core Deformation Coef. If Loss Estimation Method is [New], this setting is available.
MFD Mismatch Offset	If Loss Estimation Method is [WSI],[CSI] the following prompt is available. Set MFD Mismatch Offset.
MFD Mismatch Sensitivity	If Loss Estimation Method is [WSI],[CSI] the following prompt is available. Set MFD Mismatch Sensitivity.



## Splice Mode

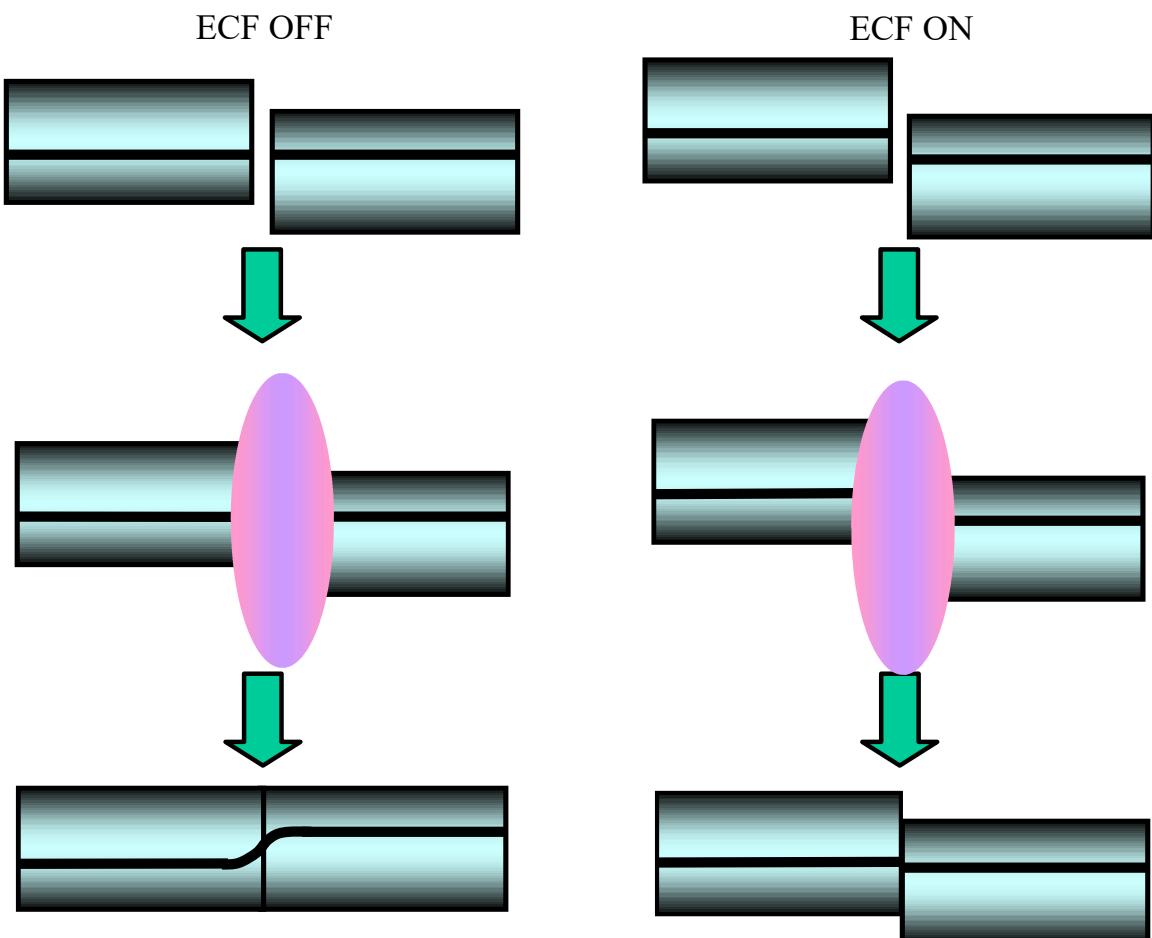
Parameter	Description
<b>Re-lasing</b>	
Re-lasing Power	Sets the power used during re-lasing.
Re-lasing Time	Sets the total duration of the re-lasing process.
On Time	Sets the amount of the re-lasing time in which lasing occurs.
Off Time	Sets the amount of the re-lasing time in which lasing does not occur.

Parameter	Description
<b>Error Limit Threshold</b>	
Cleave Angle Limit	An error message is displayed if the cleave angle of either the left or right fiber ends exceeds the selected threshold (cleave limit). “OFF”: Does not make judgment on cleave angle.
Cleave Shape Error	Set the threshold of Cleave Shape Error limit. “OFF”: Does not make judgment on fiber angle.
Fiber Angle Limit	An error message is displayed if the bend angle of the two fibers spliced exceeds the selected threshold (Fiber Angle Limit). “OFF”: Does not make judgment on fiber angle.
Loss Limit	An error message is displayed if the estimated splice loss exceeds the selected threshold (loss limit). “OFF”: Does not make judgment on splice loss.
Angle Offset Limit	If [Angle Offset Method] is ON. Set the threshold of estimated Angle Offset error. When the estimated Angle Offset is higher than threshold, an error message is displayed. “OFF”: Will not scrutinize estimated Angle Offset.
Bubble Sensitivity	Set the bubble error threshold. When the bubble is higher than the threshold, an error message is displayed.
Fat Sensitivity	Set the fat error threshold. When a bulge in the splice is higher than the threshold, an error message is displayed.
Thin Sensitivity	Set the thin error threshold. When a thin area of the splice is higher than the threshold, an error message is displayed.
Hot Spot Sensitivity	An error message is displayed if the arc discharge is abnormal (Hot Spot Sensitivity). If the value increases, it is easier to detect.

## **4. ECF**

When fibers having some core concentricity-error are aligned using the core-to-core method, their outer claddings are not aligned in line with each other as shown below. However, surface tension created during arc discharge aligns the fibers cladding-to-cladding due to the viscous self-centering effect. This results in high splice loss due to the fact that the cores of the fibers are offset during the process.

The ECF (Eccentricity Correct Function) prevents the high splice loss from happening. The amount of offset expected due to this surface tension phenomenon is calculated in advance, and this is taken into account to determine an intentional core axis offset amount that is added after the fiber cores are aligned. With this function, the fibers are core-to-core spliced even with the effect mentioned above. Some “Core Step” may remain at splice point but this gives much lower splice loss than core axial offset. A long arc discharge counteracts ECF, because surface tension eventually aligns and splices fibers cladding-to-cladding. Canceling [ECF] by setting this “OFF” reduces core step amount and increases core axial offset.

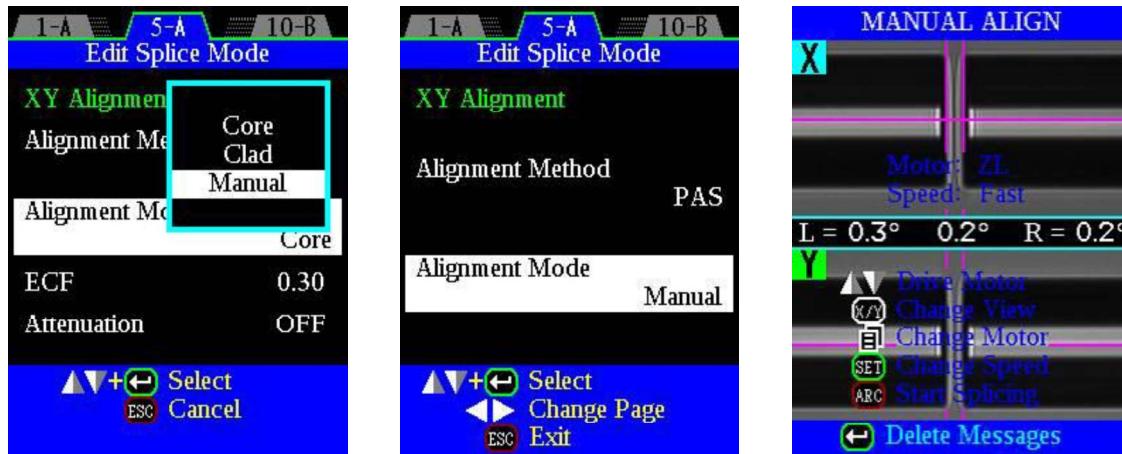


# Splice Mode

## 5. Manual Splice Mode

This mode is used to manually align and splice fibers. The following procedure is required, and is different from standard automatic splicing.

- (1) Press **SET** key to drive the fibers forward. The fibers stop moving forward at the gapset position.
- (2) Select a motor to be manually moved by pressing **MENU** key. The selected motor displayed in the monitor. Motor speed can be set to “fast” or “slow” by pressing **SET** key.
- (3) Press **Up/Down** key to move the selected motor to drive the fibers forward or backward.
- (4) After manual alignment is completed, press **ARC** key to lase to fuse the fibers.



- The beeper sounds if the motor reaches its limit and the stops. Press the opposite allow key to move the motor again.  

- Displayed messages can be erased by pressing **ENT** key. Erased messages can be recovered by pressing the **ENT** key again.

Motor	<b>UP</b>	<b>DOWN</b>
ZL/ZR	Forward	Backward
X/Y	Upward	Downward
Focus X/Focus Y	Lens moves nearer fiber.	Lens moves away from fiber.
Theta L/Theta R	Forward	Backward

## **6. Attenuation Splice Mode**

This is a special mode to produce axial offsets during splicing in order to make attenuators. Attenuation splice mode is selected when the following selections are met; [Attenuation] on, [Unit Of Align Target] selected with [XY Alignment] in [Edit Splice Mode] selected.

### **μm Mode**

Select [ $\mu\text{m}$ ] in [Unit Of Align Target] and enter the offset amount in [Align Target ( $\mu\text{m}$ )]. Using the preset [Arc Power] and [Arc Time], a series of shorter duration arcs is used to help the fibers creep toward the fiber centers to the [Atten. Target ( $\mu\text{m}$ )] during each arc. The splicer does not estimate the splice loss in this mode.

### **dB Mode**

Select [dB] in [Unit Of Align Target] referring to the amount entered in [Align Target (dB)] and [MFD] with core alignment. The splicer uses the preset [Arc Power] and [Arc Time] to complete the splice.

In [dB Mode], the estimated splice loss is displayed on the screen. In some cases, the correct value of estimated loss is not displayed because unidentified fibers have been spliced together. Therefore, it is recommended that a power meter be used to confirm the splice loss.

### **dBm Mode**

Select [dBm] in [Unit Of Align Target] referring to the amount entered in [Align Target (dBm)] with power meter feedback. The splicer produces the first-arc discharge at the preset [Arc Power] and [Arc Time]. Next, short duration arcs are enabled until the power meter value corresponds with the value of [Atten.Target (dBm)]. The splicer then displays the power meter reading.

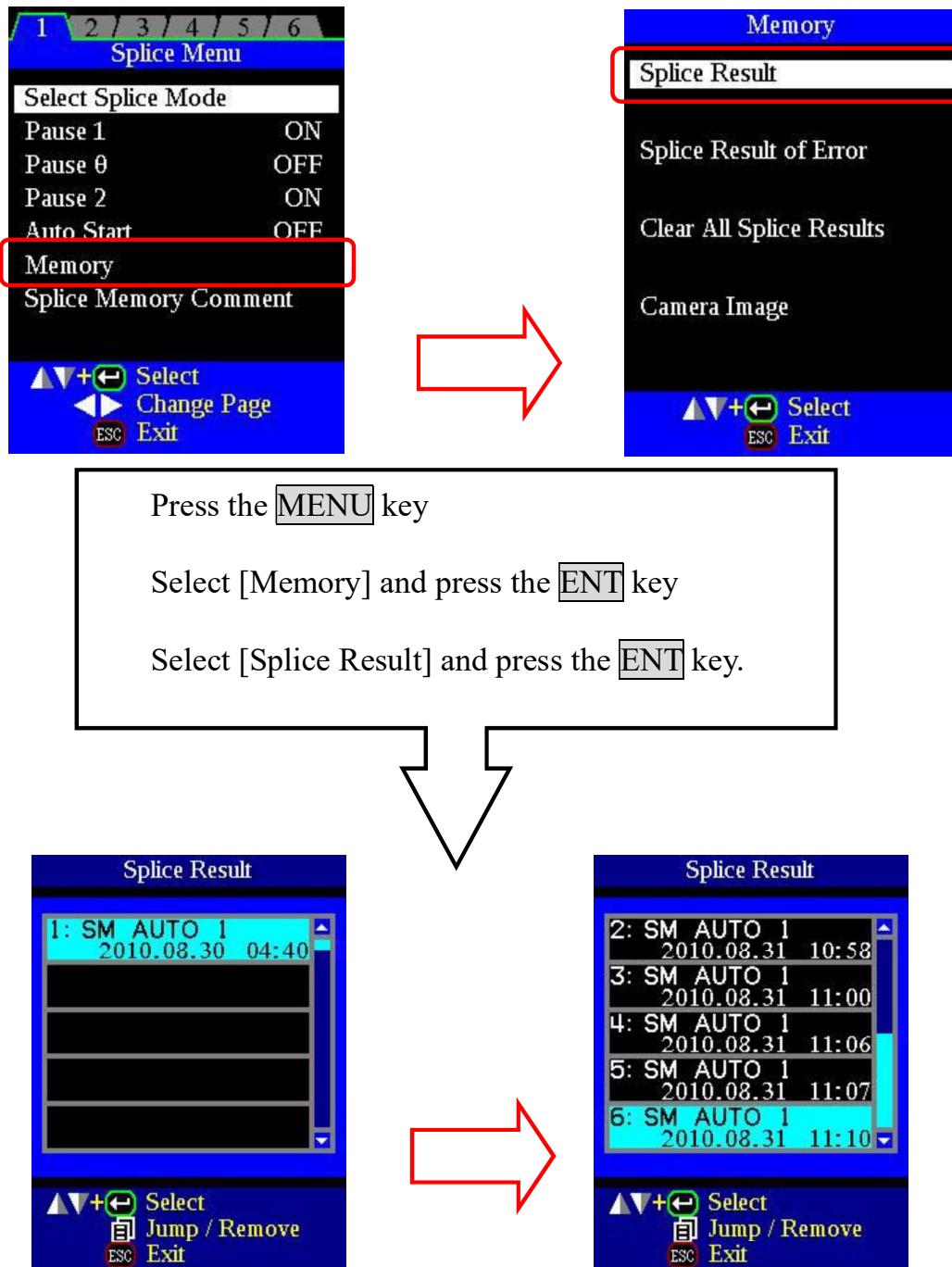


- [ $\mu\text{m}$  Mode] provides more stable performance than [dB Mode], but some variation may inevitably occur. To decrease variations, set the [Cleave limit] as low as possible.
- Attenuation splices made with [dB Mode] and [ $\mu\text{m}$  Mode] are not as accurate as [dBm Mode] or power meter attenuation feedback splicing.
- If [ $\theta\text{Align}$ ] is made effective, it is also possible to make PM fiber attenuators.

# Splice Result Memory

## 1. Save Splice Results in Memory

This splicer stores up to 2000 splicing results. The contents of the data stored are different depending on the splicing mode. No results are stored for “attenuation splicing”.



After every splice, the splice result is stored in memory.  
To view the splice data for any splice, use the **Up/Down** key to highlight that splice. Press the **ENT** key to display the splice data.

## 1-1. List of Splicing Results

Splicing results stored in the memory can be displayed. Comments can be added or edited.

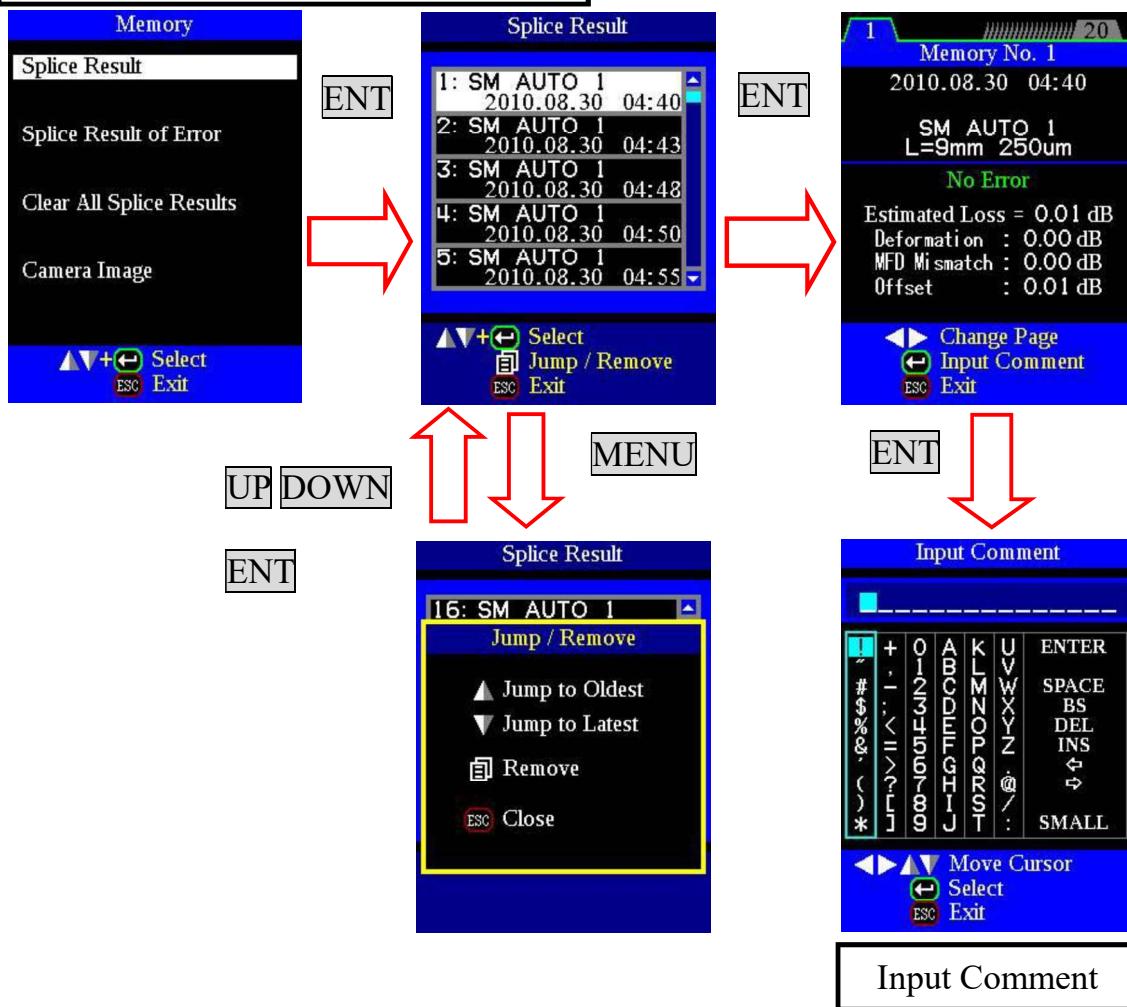


- Memory data can be downloaded to a PC by USB. Refer to the instruction manual “LZM Data Connection”.

### How to display the splice result data

- (1) Select [Memory] in the [Splice Menu].
- (2) Select [Splice Result] and press the **ENT** key to display the [List of Splice Results] menu.
- (3) Move the cursor to a desired specific memory number and press the **ENT** key.  
The selected splicing result is displayed.  
A [Jump To] function may be accessed by pressing the **Menu** key in the [Splice Result] menu. It enables jumping to another memory record.
- (4) Once the desired splicing result is displayed, press the **ENT** key to display the [Input Comment] screen. It is then possible to add or edit comments.

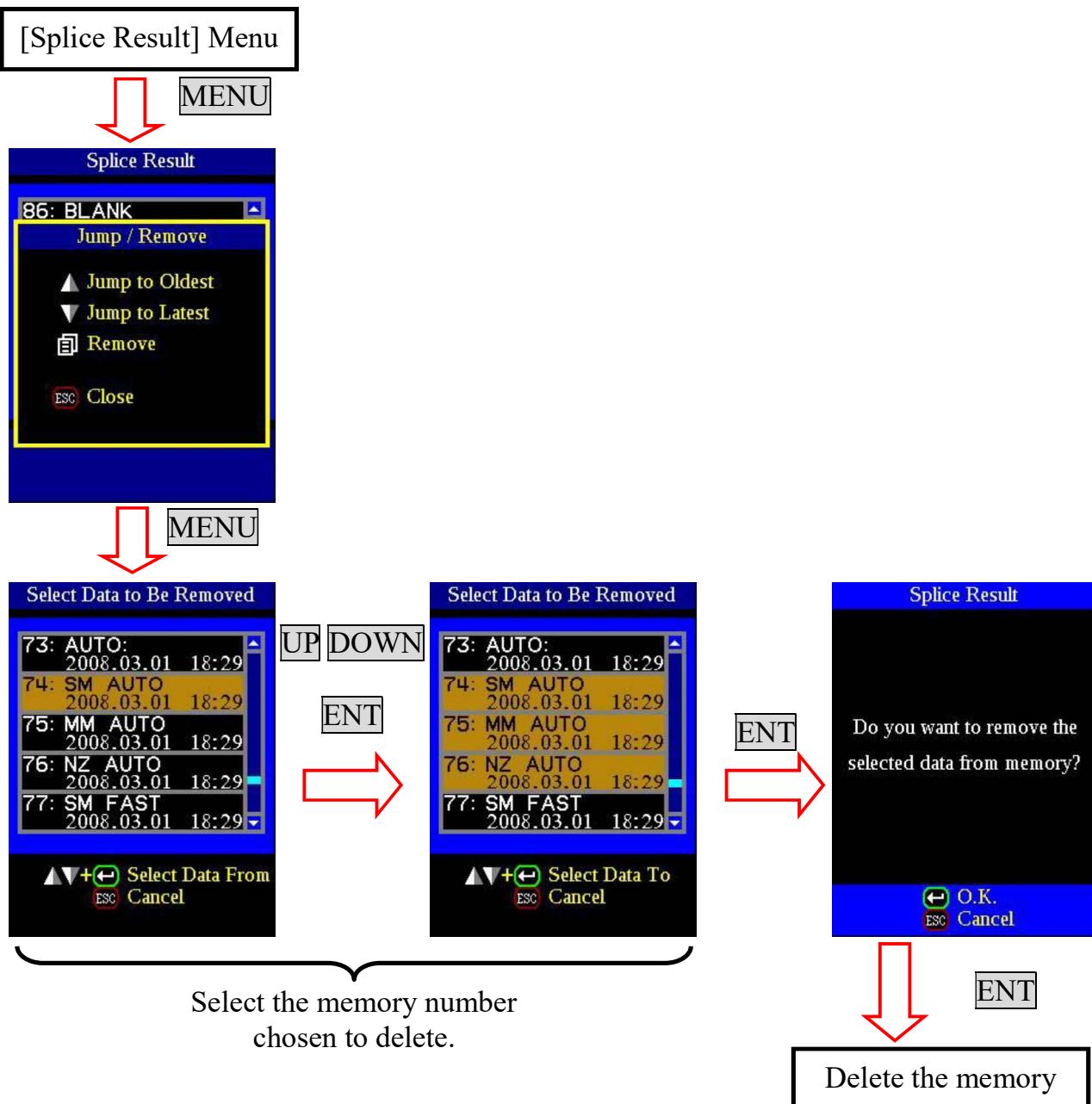
Select [Memory] in the [Splice Menu]



# Splice Result Memory

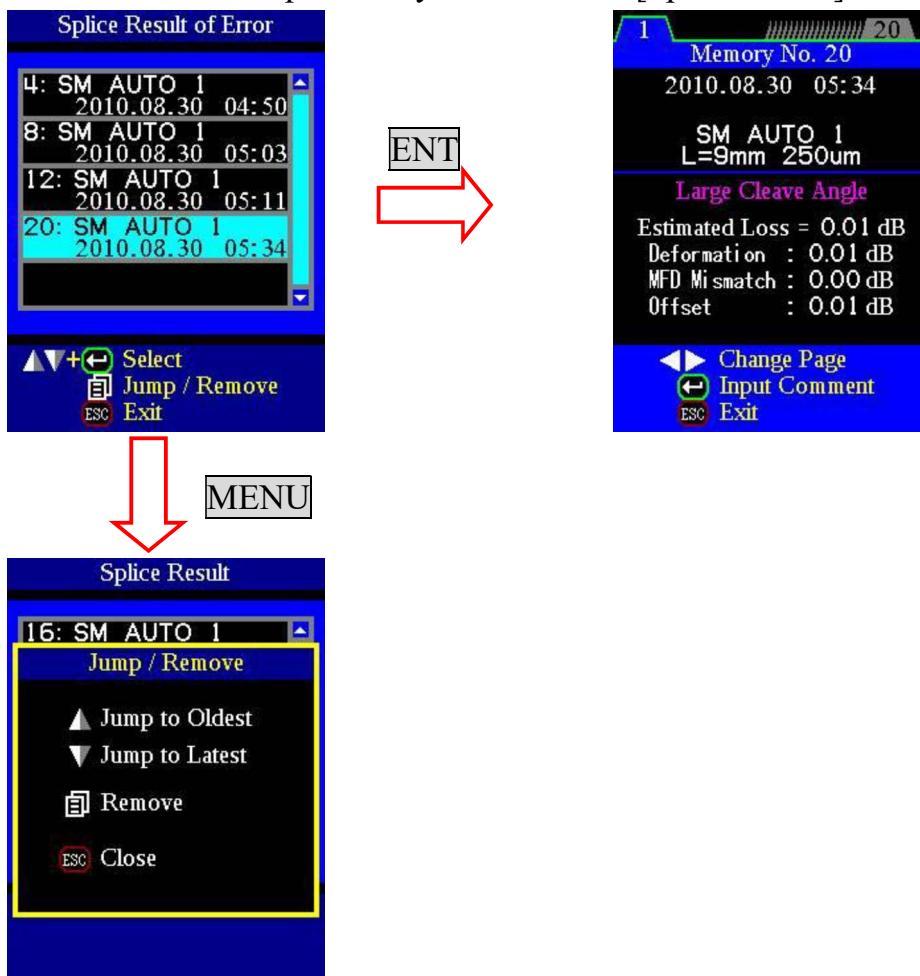
## How to clear the splice results data

- (1) Press the **MENU** key in the [Splice Result] menu.
- (2) Press the **MENU** key in [Jump / Remove] menu.
- (3) Select the memory location number of the beginning of the range that should be deleted by pressing the **ENT** key.
- (4) Select the memory location number of the end of the range that should be deleted by pressing the **ENT** key.
- (5) Press **ENT** key to select the range of data for deletion. Press the **ENT** key again to confirm and execute deletion of the memory data.



## 1-2. Splice Result of Error

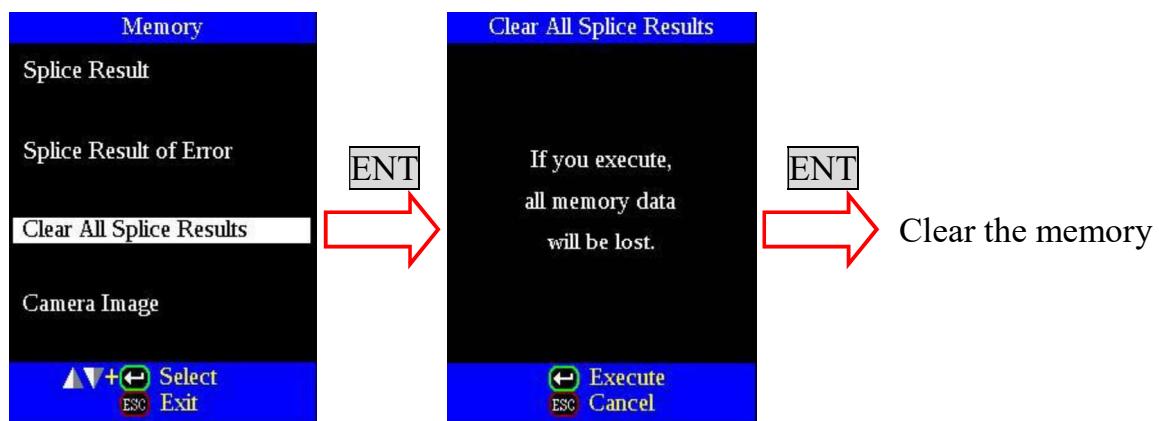
In this case, only splice result data with the error are displayed. From the [Memory] menu, select [Splice Result of Error]. Following this, the method of display and deletion is the same as previously described for [Splice Result].



## 1-3. Clear All Splice Results

All splicing results can be cleared at once.

- (1) Move the cursor to [Clear All Splice Results] in the [Memory] menu. Press the **ENT** key.
- (2) Press the **ENT** key again to confirm and execute the data deletion.



# Splice Result Memory

## 1-4. Camera Image

This function is used to store the fiber image after the splice or when an error has occurred. A total of 100 images can be stored.

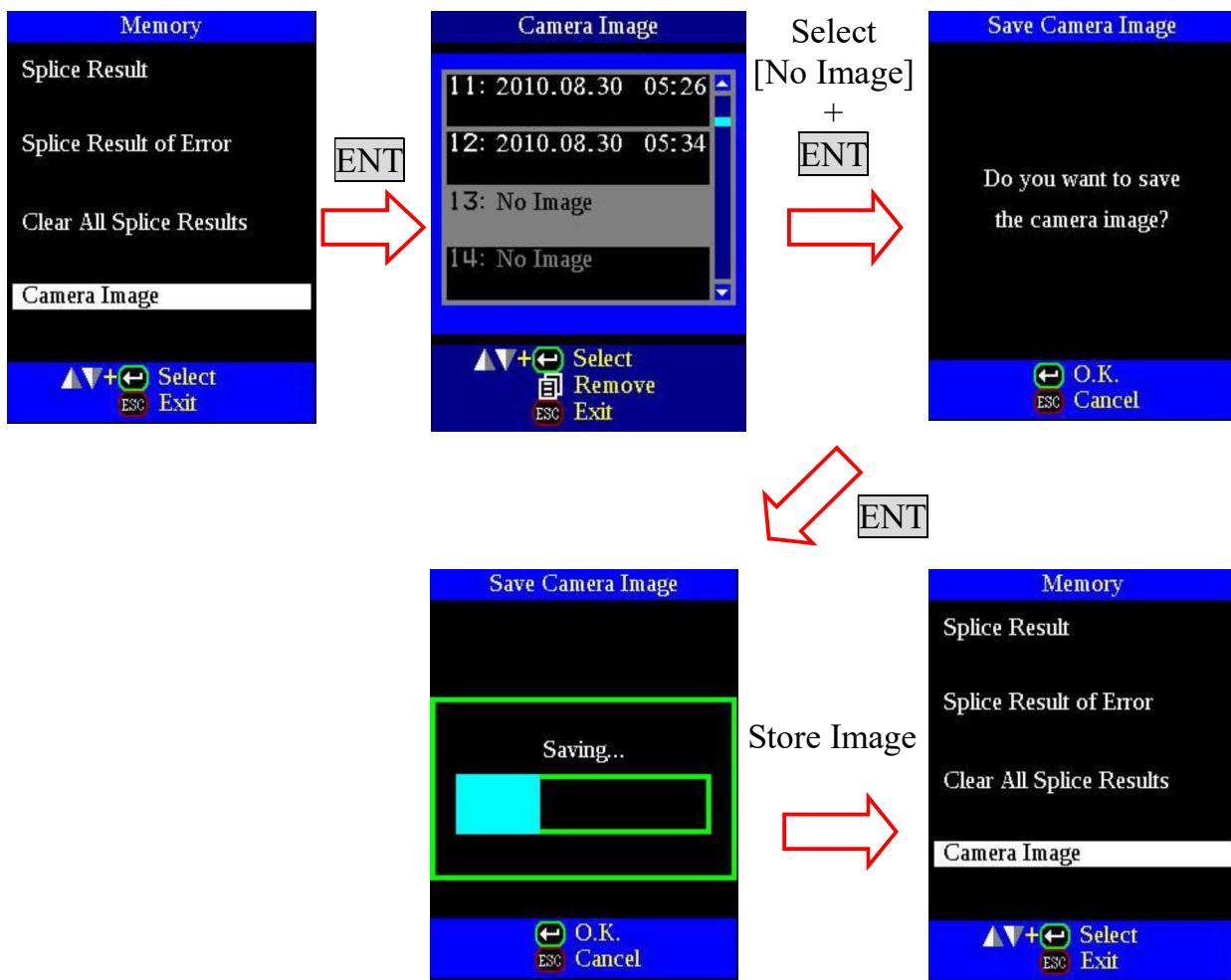
- (1) Select [Memory] in the [Splice Menu].
- (2) Select [Camera Image] and press the **[ENT]** key to display the [Camera Image] menu.

### How to store the Camera Image Data

Select [No Image] by moving the cursor to a specific memory number and pressing the **[ENT]** key. The fiber image data is stored.

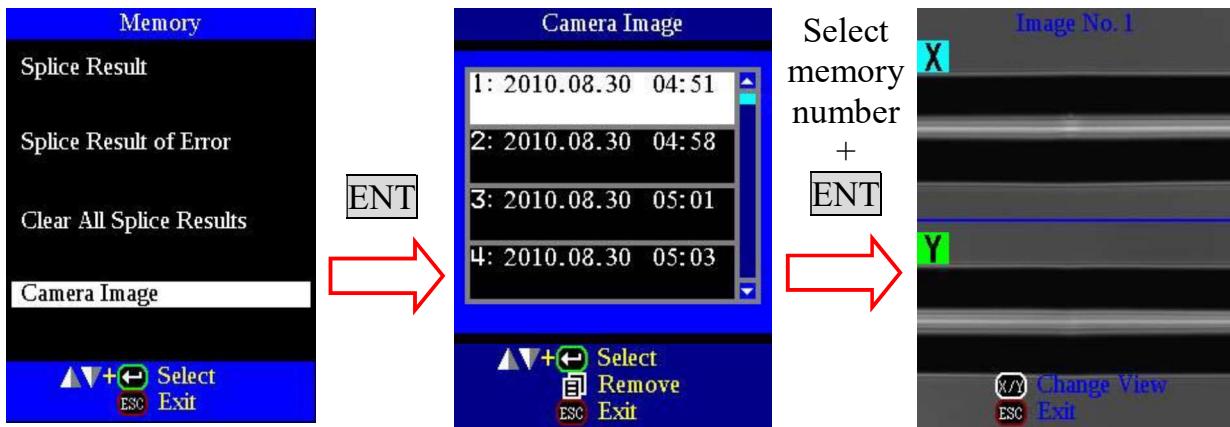


- A maximum of 100 images may be stored. Images cannot be over-written. Delete some old images in order to store new images.



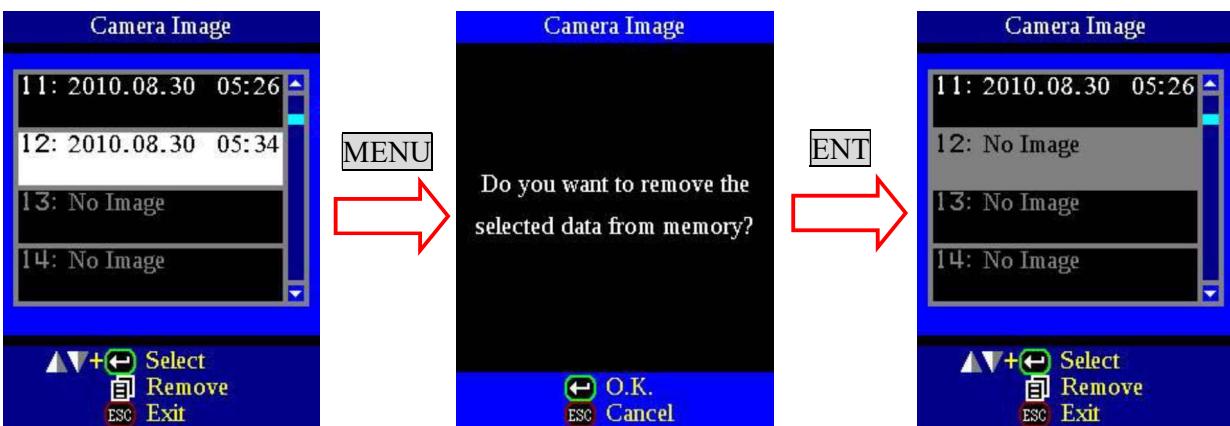
## How to display camera image data

Select the desired image by moving the cursor to a specific memory number and press the [ENT] key. The fiber image data is displayed on the monitor.



## How to delete camera image data

Select the appropriate number in [Camera Image] and the press the [MENU] key. Press the [ENT] key to confirm and execute deletion.



## *2. Comments of Splice Results*

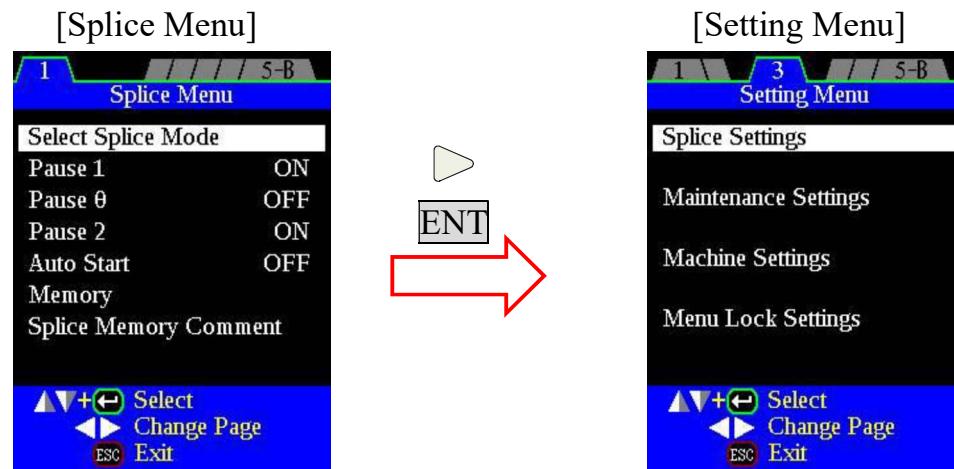
Splicing results data is automatically stored in memory when the [SET] or [RESET] key is pressed upon completion of the splice at the [FINISH] screen, or when the wind protector is opened upon completion of the splice at the [FINISH] screen. Once a comment has been input, the same comment will automatically be input into subsequent splice results. To change comments, see the section [How to input Mode Title / Comment / Password] for instruction on comment input. At the time of shipment from the factory, there is no default comment input.

# Setting Menu

## 1. Splice Settings

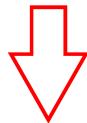
Common parameters for all the splicing modes for can be set in the [Settings Menu]. Since these are common global parameters, they apply to all splicing operations.

- (1) Press the **[MENU]** key in the [READY], [PAUSE], and [FINISH] state and press the **[Left/Right]** key to display [Setting Menu].



- (2) Select [Splice Settings] in the [Setting Menu] to display the [Splice Settings] menu.
- (3) A password is required to enter [Splice Settings]. Enter the correct password.
- (4) Select a parameter to be changed and then press the **[ENT]** key to enable editing.
- (5) Change the parameter value by pressing the **[Up/Down]** key and then press the **[ENT]** key to confirm and store the new value.

Select the [Splice Settings]  
in the [Setting Menu]



Parameter	Description
<b>Ignore Splicing Error</b>	
Cleave Angle	
Cleave Shape	Setting these functions to “Disable” prevents the splicer from continuing the splice sequence when such an error occurs. In this case, the operator must press the <b>RESET</b> key and re-prep fibers.
Fiber Angle	
Loss Angle Offset	
Arc Center	
Bubble Fat Thin Hot Spot	Setting these functions to “Disable” prevents the splicer from finishing its operation when such an error occurs. Splice loss estimation is not displayed and the operator must press the <b>RESET</b> key to continue (start the splice sequence over).

# Setting Menu

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Parameter	Description
<b>Display Settings</b>	
Gapset	<ul style="list-style-type: none"> <li>The images and data displayed on both the [Left Monitor] and [Right Monitor] during these operating sequences can be selected.</li> </ul>
θ Align	<ul style="list-style-type: none"> <li>For each operating sequence select the display [Style] for both monitors.</li> </ul>
XY Align	<ul style="list-style-type: none"> <li>The [Full] display [Style] may be selected to display a single image or data set as the display [Content] for that monitor.</li> </ul>
Special Function	<ul style="list-style-type: none"> <li>The [Up/Down] display [Style] may be selected to display two types of display [Content], one on the top half of the monitor and the other on the bottom half of the monitor.</li> </ul>
Estimate	<ul style="list-style-type: none"> <li>If [Full] is selected, the options for display [Content] are as follows: <b><u>OFF, PAS(X/Y), Splice Settings</u></b></li> <li>If [Up/Down] is selected, there are additional options for display [Content] as follows: <b><u>Cleave data, Fiber Angle Data, Axis Offset Data, Cleave &amp; Fiber Angle, Fiber Data</u></b></li> </ul> <p>For the [Estimate] display, additional [Content] options are as follows:</p> <p><b><u>Splice Error</u></b></p>
Pause 1	<ul style="list-style-type: none"> <li>The images and data displayed on both the [Left Monitor] and [Right Monitor] during these operating sequences can be selected.</li> <li>For [Pause 1] and [Pause 0] 3 sequential display steps may be selected.</li> </ul>
Pause 0	<ul style="list-style-type: none"> <li>For [Pause 2] 4 sequential display steps may be selected.</li> <li>For [Finish] 5 sequential display steps may be selected.</li> <li>For each operating sequence and each step, select the display [Style] for both monitors.</li> </ul>
Pause 2	<ul style="list-style-type: none"> <li>The [Full] display [Style] may be selected to display a single image or data set as the display [Content] for that monitor.</li> <li>The [Up/Down] display [Style] may be selected to display two types of display [Content], one on the top half of the monitor and the other on the bottom half of the monitor.</li> </ul>
Finish	<ul style="list-style-type: none"> <li>If [Full] is selected, the options for display [Content] are as follows: <b><u>OFF, PAS(X/Y), PAUSE(X/Y), Splice Settings</u></b></li> <li>If [Up/Down] is selected, there are additional options for display [Content] as follows: <b><u>Cleave data, Fiber Angle Data, Axis Offset Data, Cleave &amp; Fiber Angle, Fiber Data</u></b></li> <li>For the [Finish] display, additional [Content] options are as follows: <b><u>WSI(X/Y), Estimate Loss Data, Arc Information, Splice Error, Splicer Settings</u></b></li> </ul>

## ***2. Maintenance Settings***

Parameter	Description
<b>Power Calibration</b>	
Cleave Limit	Sets the threshold of cleave angle error for the [Power Calibration].
Max Number of Tests	Sets the number tests to finish the [Power Calibration] and display the “Test Finished” message. The maximum number can be set to infinity for critical splicing operations with heat sensitive splice recipes. In this case the operator may be required to perform mode [Power Calibration] steps before the “Test Finished” message is displayed, and the calibration will be held to a strict standard. For general splicing operations, it may be acceptable to select a small number of tests such as 2 or 3. In this case the resulting [Power Calibration] may not be quite as strict but general splicing performance should still be good.
<b>Maintenance Date</b>	
Last Maintenance	The date of last maintenance and scheduled date for next maintenance are entered in the respective fields. This information is displayed on the [Maintenance Info.] screen. Refer to the next section.
Next Maintenance	

# Setting Menu

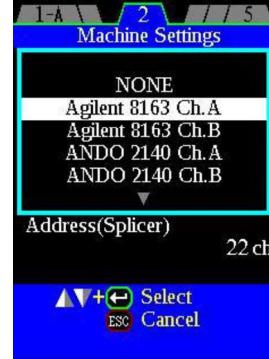
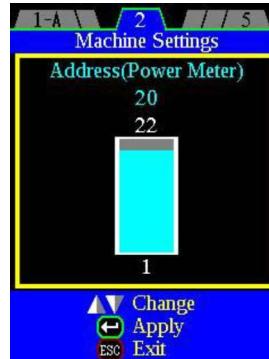
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## 3. Machine Settings

- (1) Press the **Menu** key at the [READY], [PAUSE], or [FINISH] screen and press the **Left / Right** key to display [Setting Menu].
- (2) Select [Machine Settings] in the [Setting Menu].
- (3) Select a parameter to be changed.

Parameter	Description
<b>Basic Settings</b>	
Language	Select a language to be displayed.
Buzzer Volume	Set the sound volume of the buzzer.
Monitor Position	Set the operational direction of splicer. Select [Front] for splicer operation with the front monitor position. Select [Rear] for splicer operation with the monitors in the rear position. If [Auto] is selected, the splicer will automatically orient the monitor data display correctly regardless of splicer operation with the monitor in the front or the rear.
LCD Brightness	Set the LCD Brightness.
Caution to Auto Stuff OFF	The character color of the display can be set to [Yellow letters] or [White letters]. The set character color is reflected in "Select Splice Mode" screen.
Password Setting	Change the password to access the [Splice settings], [Maintenance Settings], [Machine Settings], [Menu Lock Settings] menus. The password is also used to unlock the power-on password lock. Maximum characters: 9 At the time of shipment from the factory, the default password is set to "0". In the event you have forgotten your password, contact the authorized distributor.
Calendar	This function sets the date and time in the calendar incorporated in the splicer. The year, month, day and time are displayed on the [Calendar] screen. Press the <b>MENU</b> key to move the cursor to the desired parameter, and then press the <b>Up/Down</b> arrow key to adjust the numerical values. After completion of calendar setting, press the <b>ENT</b> key. The revised date and time are stored.

## Setting Menu

Parameter	Description
<b>GPIB</b>	
External Instrument	  <p>This function is used to select the proper GPIB communications protocols for a particular power meter to be used for direct power meter feedback splicing functions. Various power meter options are available, and for some of them it is necessary to select the power meter type as well as the power meter channel (for power meters with dual channel capability). Choose from the following options: [NONE] [Agilent 8163 Ch.A] [Agilent 8163 Ch.B] [ANDO 2140 Ch.A] [ANDO 2140 Ch.B] [ADVANTEST 8221 Ch.A] [ADVANTEST 8221 Ch.B] [NEWPORT 2832C Ch.A] [NEWPORT 2832C Ch.B] [ANRITU 9810 Ch.A] [ANRITU 9810 Ch.B] [ILX 8200] [UDT 370]</p>
Address (Power Meter)	<p>Sets the GP-IB address of the power meter.</p> <p>Setting Range: 1 ~ 22ch</p> <p>NOTE: The internal GP-IB address of the power meter must be set to match the selected value for the power meter in the splicer menu. Consult the operation manual for the power meter in use for instructions.</p> 
Address (Splicer)	<p>Sets the GP-IB address of the splicer</p> <p>Setting Range: 1 ~ 22ch</p> 

## Setting Menu

Parameter	Description
<b>Power On Option</b>	
Opening Title1	<p>Sets the message to be displayed when the splicer power is turned on. Max number of characters: 15 for both Opening Titles 1 &amp; 2</p>  <p>Opening Title 1 and Opening Title 2 are displayed during splicer boot-up.</p>
Opening Title2	
Dust Check	Selects whether or not these functions are available immediately after boot-up when the splicer power is turned on.
Password Boot Lock From	<p>The use of this function allows selection of a starting date, after which, a password is required at splicer boot up in order to operate it.</p>  <p>Input date</p> <p>The password is the same as that set in the [Machine Settings] menu</p>

Parameter	Description
<b>Ready Display</b>	
Splice Mode	Select if the Splice Mode is displayed or not at the “Ready” condition.
Heater Mode	Select if the Heater Mode is displayed or not at the “Ready” condition.
Additional Data1	Select optional data that may be displayed at the “Ready” condition. The options for additional data display are as follows:
Additional Data2	<b>Cleave Limit or Proof Test or Calendar or Arc Count</b>

## [Ready Display]

### Main Monitor (Left)

Selected [Splice Mode] and [Heater Mode] are displayed.

#### Splice Mode

Currently selected splice mode.  
Confirm the splice mode.

#### Heater Mode

Currently selected heater mode.  
Confirm the heater mode.

#### Calendar (Additional Data Area)

Present date and time are displayed.



### About the Additional Data Area:

Items to be displayed on the READY screen are selectable.

#### Cleave Limit

The threshold of the cleave angle limit is displayed.

#### Proof Test

Selection of the proof test (“ON” or “OFF”) is displayed.



## Setting Menu

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Parameter	Description
<b>Short Cut</b>	
Ent Key	<p>Two short cut functions are available, one for <b>Ent</b> and one for <b>Esc</b>. If shortcut key function is enabled, the <b>Ent</b> and/or <b>Esc</b> key may be used as a shortcut to one of the menus below. The short cut option is available at the READY condition.</p> <p>Short cut options are as follows:</p> <ul style="list-style-type: none"> <li>[OFF] (The short cut function is not enabled)</li> <li>[Select Splice Mode]</li> <li>[Splice Settings]</li> <li>[Maintenance Settings]</li> <li>[Machine Settings]</li> <li>[Menu Lock Settings]</li> <li>[Fiber Type Compare]</li> <li>[IPA Data]</li> <li>[V Groove Cleaning]</li> <li>[Diagnostic Test]</li> <li>[Dust Check]</li> <li>[Motor Calibration]</li> <li>[Motor Drive]</li> <li>[Initialize]</li> <li>[Maintenance Info.]</li> </ul>
Esc Key	
<b>Turn-Off Time</b>	
Monitor	Setting a time for this function sets the splicer such that the power to the LCD monitor turns off automatically if the splicer has been idle for the selected period of time. When the power to the LCD monitor turns off, the LED near the <b>SET</b> key blinks. Pressing any key turns the LCD monitor back on.
Splicer	Setting a time for this function will set the splicer such that splicer power automatically turns off if it the splicer has been idle for the selected time.

## **4. Menu Lock Settings**

Parameter	Description
<b>Splice Mode</b>	
Edit	Setting to “Disable” prevents unauthorized editing and/or selecting of splice modes.
Select	
<b>Splicer Memory</b>	
Clear	Setting to “Disable” prevents unauthorized erasing of splice data results in the splicer memory.
<b>Splice Settings</b>	
Ignore Splice Error	Setting to “Disable” prevents unauthorized editing and selecting of [Splice Settings]. This can be used to prevent operator from ignoring splice errors.
Display Settings	
Others	
<b>Maintenance Settings</b>	
Maintenance Date	Setting to “Disable” prevents unauthorized editing of the [Maintenance Settings] menu.
<b>Machine Settings</b>	
Basic Settings	Setting to “Disable” prevents unauthorized editing of the [Machine Settings] menu.
GPIB	
Turn-Off Time	
Power On Option	
Ready Display	
Short Cut	

## *Setting Menu*

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Parameter	Description
<b>Fiber Data Learning</b>	
Fiber Set	Setting to “Disable” prevents operation of various functions related to the [Fiber Data Learning].
Fiber Type Compare	
Auto Calibration	
<b>Maintenance Menu</b>	
Power Calibration	Setting to “Disable” prevents operation of various functions related to the [Maintenance Menu].
Special Power Calibration	
V Groove Cleaning	
Diagnostic Test	
Dust Check	
Motor Calibration	
Motor Drive	
Initialize	
Maintenance Info.	

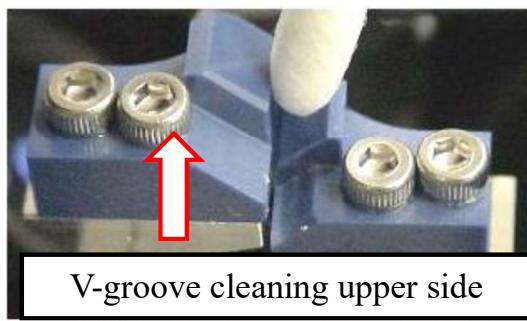
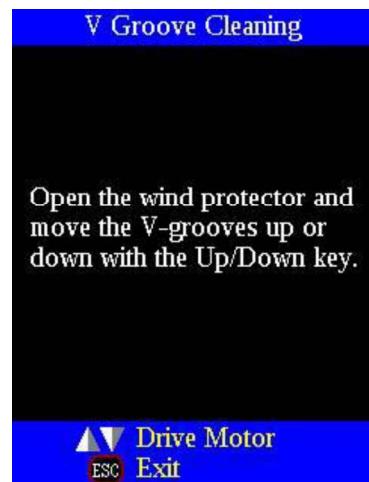
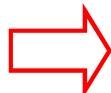
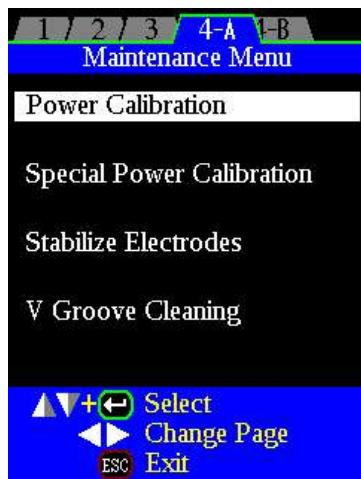
## 1. V-Groove Cleaning

If contaminants are present in the V-grooves, proper clamping may not occur, resulting in higher splice loss. The V-grooves should be frequently inspected and periodically cleaned during normal operation. To clean the V-grooves do the following:

- (1) Press **[MENU]** key, and select [V-Groove Cleaning] in [Maintenance Menu].
- (2) Open the wind protector and move the V-grooves up or down with the **[Up/Down]** key.
- (3) Clean the bottom of the V-groove with an alcohol-moistened swab and dry the V-grooves with a clean dry swab.



- Be careful to not contact any components other than the V-grooves when cleaning.
- Do not use excessive force when cleaning the V-grooves. The V-groove arms may become damaged.



Clean V-grooves moving up and down also right too left during this procedure.

Clean V-grooves like shown in the above picture moving the swab right and left.

## Maintenance Menu

### 2. Diagnostic Test

The LZM-100 series has a built in diagnostic test feature that allows the operator to perform a simple one step evaluation of splicer performance covering several different critical variables. Perform this function in the event of splicer operation trouble.

#### Operation Procedure

- (1) Select the [Diagnostic Test] in the [Maintenance Menu] and execute [Diagnostic Test]. The following checks will be made.

Check Item	Description
LED Check	Measures and adjusts the brightness of the illumination LED.
Dust Check	Checks the optical path for dust or dirt and judges whether this disrupts the fiber observation. If communication exists, this function indicates the location.
Motor Check	Check the Motor Limit Sensor.
I/O Port Check	Checks for normal operation of the input or output terminals of the internal circuit.
Memory Check	Checks the memory of the internal circuit.

- (2) Upon completion of all checks and adjustments, a list of results is displayed. If the Dust Check result is not good, clean the objective lenses. In the case that cleaning cannot eliminate contamination, there is a possibility that the contamination may have entered the inside of the optical path. Please contact the authorized distributor for additional instructions. The Dust Check and Motor Calibration functions exist as independent instructions in [Maintenance Menu]. It is possible to execute them independently.



- Before the start of the test, remove the fibers from the splicer.
- When the Motor Check is completed, prepare and load the fibers into the splicer and press **ENT** key.

### 3. Dust Check

The splicer observes fibers through image processing. Dust or contaminants on the cameras, lenses and wind protector mirrors disturb normal observation of fibers and may result in improper splicing. This function checks the optical path for the presence or absence of contaminants and judges whether they cause trouble for fiber splicing.

#### Operation Procedure

- (1) Select the [Dust Check] in the [Maintenance Menu].



- (2) If fibers are set in the splicer, remove them and press **ENT** key again. The splicer begins the dust check.
- (3) The message [Now Checking · · ·] is displayed in the middle of the screen. After observation, the location of contaminants is judged as a potential problem and blinks. If contaminants are detected, clean the wind protector mirrors and objective lenses and redo [Dust Check]. See the section of [**Maintenance of Splicing Quality**] for cleaning instructions.
- (4) Press to finish dust check.



- In case you have cleaned or replaced the wind protector mirrors, and have cleaned the objective lenses, and dust or dirt still remain, contact the authorized distributor.

# Maintenance Menu

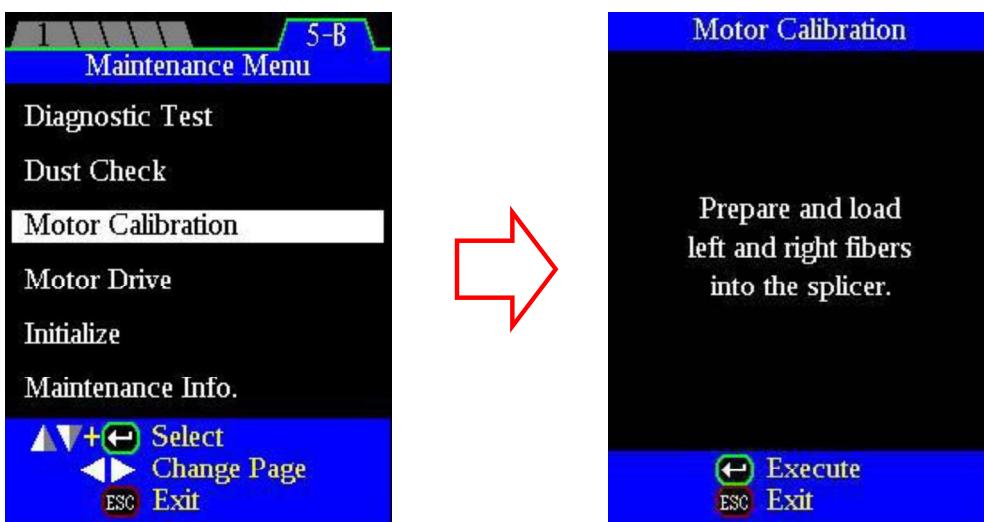
## 4. Motor Calibration

(ZL/R, X/Y, FcsX·Y, θL/R)

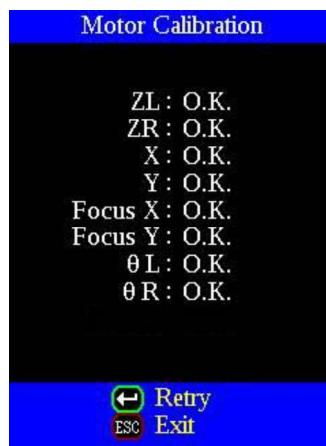
Motors are adjusted at the factory before shipping. However, these settings could have changed due to various reasons. This function automatically calibrates the speed of all motors. (Z, XY, Focus, θ)

### Operation Procedure

- (1) Select the [Motor Calibration] in the [Maintenance Menu].



- (2) Load prepared fibers in the splicer and press [ENT] key.
- (3) Speeds for all motors are automatically calibrated. Upon completion, [Maintenance Menu] is displayed.

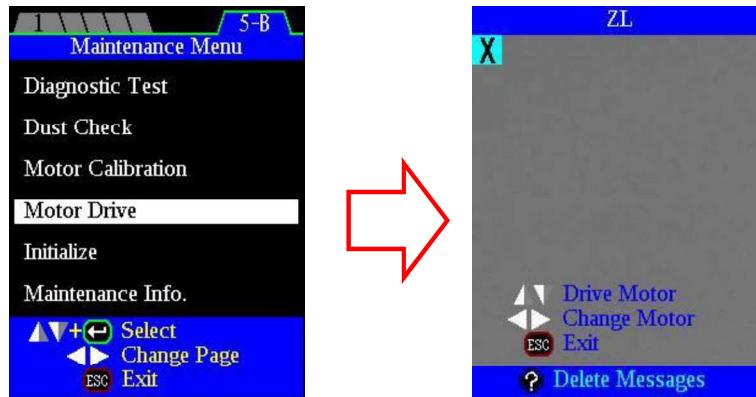


- Perform this function when “Fat” or “Thin” error has occurred, or fiber aligning or focusing is taking too much time.

## 5. Motor Drive

The motors incorporated in the splicer can be manually operated individually. In the course of splicing, the motors can also be operated by selecting this menu in the [PAUSE1], [PAUSE2] or [FINISH] state.

- (1) Select the [Motor Drive].



- (2) Pressing **Left/Right** key changes motor selection. The name of the selected motor is displayed in the upper section of the screen.
- (3) Press **Up/Down** Arrow key to drive the motor in the desired direction.

Motor	$\Delta$	$\nabla$	M	P	M+	P+
ZL/ZR	Forward	Backward	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
X/Y	Upward	Downward	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
FocusX/FocusY	Lens moves nearer fiber.	Lens moves away from fiber.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
VAL/VAR	Upward	Downward	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
VBL/VBR	Upward	Downward	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Clamp L/Clamp R	Upward	Downward	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
$\theta$ L/ $\theta$ R ( $\theta$ Motor)	Moves $\theta$ -axis downward.	Moves $\theta$ -axis upward.	—	<input type="radio"/>	—	<input type="radio"/>
EV	Upward	Downward	—	—	<input type="radio"/>	<input type="radio"/>

- When the motor reaches the limit of the operating range, the buzzer sounds and the motor stops. Press the opposite arrow key to reverse and move the motor again.
- Display messages can be erased by pressing **HELP** key. The message can be displayed by pressing **HELP** key again.
- If you finish this operation by pressing **RESET**, the motor will return to the reset position. To finish the operation with the motor held in the adjusted position presses **EXIT**.
- If the motor has moved too much with respect to the spliced fiber, the fiber may break.

# Maintenance Menu

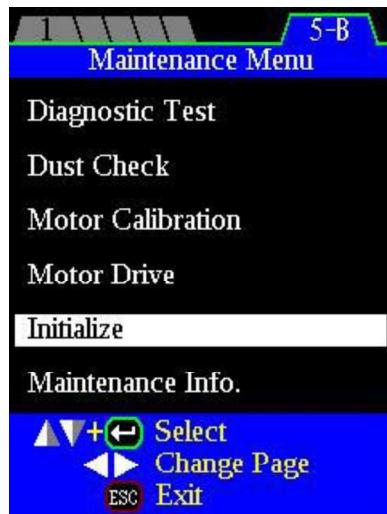
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## 6. Initialize

(SpliceMode, HeaterMode, Setting Menu)

To reset the factory default values;

- (1) Select the [Initialize] in [Maintenance Menu].



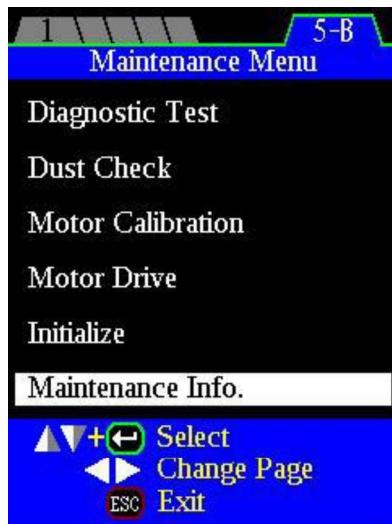
- (2) Select the item.

- (3) Initialize.



## 7. Maintenance Info.

Select the [Maintenance Info]. The following information is displayed.



Parameter	Description
Serial Num.	Displays the serial number of the splicer.
Version.	Displays the version number of the software.
Total Count	Displays the total number of arc discharges.
Last Maintenance	Displays the date of last maintenance.
Next Maintenance	Displays the scheduled date of next maintenance.

## ***Personal Computer Communication Function***

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The splicer can communicate with a personal computer via the USB port.

For the detailed information of the communication method, please contact to your nearest authorized distributor.

## Error Message List

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Error is displayed on the monitor.

Refer to the below list to confirm the solution precisely. If it is impossible to solve the problem, please contact the authorized distributor with the following information.

- Model name of the splicer
- Serial number of the splicer
- Error message
- Situation when the error occurs

Error Message	Reason	Solution
Too Long Fiber	<ul style="list-style-type: none"><li>• [Cleave Length] setting is wrong.</li><li>• The cleave length (bare fiber region) is too long.</li><li>• Dust or dirt on the objective lens or the wind protector mirror.</li></ul>	<ul style="list-style-type: none"><li>• Confirm [Cleave Length] setting.</li><li>• Confirm the setting position of the stripped fiber end on the fiber cleaver. Check the cleave length.</li><li>• Execute the [Dust Check]. Clean the lens or the mirror if dust or dirt exists.</li><li>• In case the error is displayed again after you had tried the measurement, contact the authorized distributor.</li></ul>
Dark Back Ground	<ul style="list-style-type: none"><li>• Dust or dirt on the objective lens or the wind protector mirror.</li><li>• Wind protector mirror is not attached properly.</li><li>• The LED or Camera does not work properly.</li></ul>	<ul style="list-style-type: none"><li>• Execute the [Dust Check]. Clean the lens or the mirror if dust or dirt exists.</li><li>• Confirm the position of wind protector mirror.</li><li>• In case the error is displayed again after you had tried the measurement, contact the authorized distributor.</li></ul>

## Error Message List

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Error Message	Reason	Solution
Too Dusty Fiber	<ul style="list-style-type: none"><li>Dust or dirt is on the fiber surface.</li><li>Dust or dirt is on the objective lens or the wind protector mirror.</li><li>[Focus] Setting value is not adequate.</li><li>[XY Align] is set to “Core” to splice indistinct core fiber.</li></ul>	<ul style="list-style-type: none"><li>Splicer cannot observe the fiber correctly because of dirt on fiber surface. Prepare and set fiber again.</li><li>Execute the [Dust Check]. Clean the lens or the mirror if dust or dirt exists.</li><li>Set [Focus] to “AUTO”.</li><li>Set [XY Align] to “AUTO” to splice indistinctive core fibers (i.e. PM fiber / MM fiber).</li><li>In case the error is displayed again after you had tried the measurement, contact the authorized distributor.</li></ul>

## Error Message List

Error Message	Reason	Solution
θL Motor Overrun (Forward)	<ul style="list-style-type: none"> <li>•θ align parameter is not adequate for the chosen PM fibers.</li> </ul>	<ul style="list-style-type: none"> <li>•Confirm that θ align parameter is adequate for the chosen PM fibers.</li> <li>•In case that you use loose tube fiber, Please use loose fiber dedicated holder.</li> </ul>
θR Motor Overrun (Forward)	<ul style="list-style-type: none"> <li>•The chosen fibers are not PM fibers.</li> <li>•The fiber is not set correctly at the bottom of the V-groove. The fiber misses the camera's field of view.</li> </ul>	<ul style="list-style-type: none"> <li>•Press <b>RESET</b>, and set the fiber again to seat it correctly at the bottom of the V-groove.</li> <li>•Confirm the [Coating Diameter] setting and the [Clad Diameter] setting.</li> <li>•In case of coating clamping, if edge of coating is on V-groove, prepare the fiber again. If edge of coating is still on the V-groove after above operation, confirm setting of Tools.</li> </ul>
θR Motor Overrun (Backward)		<ul style="list-style-type: none"> <li>•If possible, use the glass clamping mode due to increased stability.</li> </ul>
ZL Motor Overrun (Forward)	<ul style="list-style-type: none"> <li>•The end surface of fiber is far from the splicing point. Therefore Z stage doesn't move to splicing point.</li> </ul>	<ul style="list-style-type: none"> <li>•If position of Z slide board is set to backward, then set the Z slide board position to the forward position.</li> <li>•Press <b>RESET</b> key, and re-position the fiber again.</li> </ul>
ZR Motor Overrun (Forward)	<ul style="list-style-type: none"> <li>•The fiber is not set correctly at the bottom of the V-groove. The fiber is not located in the Camera's field of view.</li> <li>•The cleave length (bare fiber part) is too short.</li> </ul>	<ul style="list-style-type: none"> <li>•Confirm the [Coating Diameter] setting and the [Clad Diameter] setting.</li> <li>•Confirm the setting position of the end surface of the fiber cleaver. Check the cleave length.</li> </ul>
ZL Motor Overrun (Backward)	<ul style="list-style-type: none"> <li>•The taper speed or taper time is too high.</li> </ul>	<ul style="list-style-type: none"> <li>•Confirm condition of taper splice</li> </ul>
ZR Motor Overrun (Backward)	<ul style="list-style-type: none"> <li>•This error only occurs in manual motor operation.</li> </ul>	

## Error Message List

Error Message	Reason	Solution
Focus X Motor Overrun (Forward)	<ul style="list-style-type: none"> <li>The fiber is not set correctly at the bottom of the V-groove. The fiber position is out of focus range.</li> </ul>	<ul style="list-style-type: none"> <li>Press <b>RESET</b> key, and re-position the fiber again to seat it correctly at the bottom of the V-groove.</li> <li>If clamping onto coating and the edge of coating is in the V-groove, prepare the fiber again.</li> </ul>
Focus X Motor Overrun (Backward)	<ul style="list-style-type: none"> <li>Dust or dirt is on the fiber surface resulting in focus failure.</li> </ul>	<ul style="list-style-type: none"> <li>If edge of coating is still on the V-groove after above operation, confirm setting of Tools.</li> </ul>
Focus Y Motor Overrun (Forward)	<ul style="list-style-type: none"> <li>Dust or dirt is on the objective lens or the wind protector mirror.</li> </ul>	<ul style="list-style-type: none"> <li>If possible, use the glass clamping mode to increase stability.</li> <li>Confirm the [Coating Diameter] setting and the [Clad Diameter] setting.</li> <li>Prepare the fiber again.</li> <li>Execute the [Dust Check]. Clean the lens or mirror if dust or dirt exists.</li> </ul>
Focus Y Motor Overrun (Backward)		
X-Motor Overrun (Upward)		<ul style="list-style-type: none"> <li>Press <b>RESET</b> key, and re-position the fiber again to seat it correctly at the bottom of the V-groove.</li> </ul>
X-Motor Overrun (Downward)	<ul style="list-style-type: none"> <li>The fiber is not set correctly at the bottom of the V-groove. The fiber is offset too far and it exceeds the X or Y motor range.</li> </ul>	<ul style="list-style-type: none"> <li>Confirm the [Coating Diameter] setting and the [Clad Diameter] setting.</li> <li>If clamping onto coating and the edge of coating is in the V-groove, prepare the fiber again.</li> </ul>
Y-Motor Overrun (Upward)		<ul style="list-style-type: none"> <li>If edge of coating is still on the V-groove after above operation, confirm setting of Tools.</li> </ul>
Y-Motor Overrun (Downward)		<ul style="list-style-type: none"> <li>If possible, use the glass clamping mode to increase stability.</li> </ul>

## Error Message List

Error Message	Reason	Solution
VAL Motor Overrun (Upward)	•There may be some fault.	• Power off and restart the splicer. If error message continues to display, consult the authorized distributor.
VAL Motor Overrun (Downward)		
VAR Motor Overrun (Upward)		
VAR Motor Overrun (Downward)		
CL Motor Overrun (Upward) (Downward)	•There may be some fault.	• Power off and restart the splicer. If error message continues to display, consult the authorized distributor.
CR Motor Overrun (Upward) (Downward)		
Cover Open	• The wind protector is opened during splicing.	•Press <b>RESET</b> key after closing the wind protector.
Motor Trouble	•Motor does not work correctly.	• Power off and restart the splicer. If error message continues to display, consult the authorized distributor.

## Error Message List

Error Message	Reason	Solution
Bad Fiber Position	<ul style="list-style-type: none"> <li>The fiber is not set correctly at the bottom of the V-groove.</li> </ul>	<ul style="list-style-type: none"> <li>Press [RESET] key, and re-position the fiber again to seat it correctly at the bottom of the V-Groove.</li> <li>If clamping onto coating and the edge of the coating is in the V-groove, prepare the fiber again. If edge of coating is still on the V-groove after above operation, confirm setting of Tools. If possible, use the glass clamping mode to increase stability.</li> </ul>
Different Fiber	<ul style="list-style-type: none"> <li>The fiber is not the correct fiber.</li> </ul>	<ul style="list-style-type: none"> <li>In case of [Judge LR] mode, confirm if the left and right fibers are correct.</li> <li>Confirm fiber data.</li> </ul>
Fiber Data Not Installed	<ul style="list-style-type: none"> <li>The fiber is not registered.</li> </ul>	<ul style="list-style-type: none"> <li>Register the fiber data by executing the “Learning Mode”.</li> </ul>
No Laser Discharge	<ul style="list-style-type: none"> <li>Connectivity or alignment problem</li> </ul>	<ul style="list-style-type: none"> <li>Consult the authorized distributor.</li> </ul>
Camera Trouble	<ul style="list-style-type: none"> <li>Camera does not work properly.</li> </ul>	<ul style="list-style-type: none"> <li>Power off and restart the splicer. If error message continues to display, consult the authorized distributor.</li> </ul>
Temperature Sensor NG	<ul style="list-style-type: none"> <li>Temperature Sensor doesn't work properly.</li> </ul>	<ul style="list-style-type: none"> <li>Consult the authorized distributor.</li> </ul>
Communication Error	<ul style="list-style-type: none"> <li>Sending failure</li> <li>Receive failure</li> <li>Wrong channel</li> </ul>	<ul style="list-style-type: none"> <li>Confirm the connection and settings of the power meter.</li> </ul>

## Error Message List

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\* You can select whether operator can continue to splice or not when some kinds of error occur with the settings as following.

Error Message	Reason	Solution
Large Cleave Angle	Bad fiber end-face.	Check the condition of the fiber cleaver. If the blade is worn, rotate the blade to a new position.
	[Cleave Limit] is set too low.	Increase the [Cleave Limit] to an adequate limit.
Cleave Shape NG	Bud shape of end-face.	Check the condition of the fiber cleaver. If the blade is worn, rotate the blade to a new position.
Large Fiber Angle	[Core Angle Limit] is set too low.	Increase the [Core Angle Limit] to an adequate limit. (1.0 degree is standard)
	Dust or dirt is on the V-groove or the clamp chip.	Clean the V-groove and clamp chip.
	Clad diameter too large.	In case of setting the clad diameter value of the fiber greater than 250µm, set fiber holder with reverse orientation.
	In case of coating clamp.	Fiber coating has curl. If curl ratio is too big, fiber angle error might happen. If possible, use the glass clamping mode to increase stability.
Thin Fiber/ Fat Fiber	Optical misalignment	Follow the optical alignment manual to realign the optical components.
	Prefuse power or time is too high	If using the Other mode, adjust or initialize [Prefuse Power] or [Prefuse Time] settings.
	Insufficient [Overlap] setting	If using the Other mode, adjust or initialize [Overlap] setting. The overlap value is fixed and cannot be adjusted in "Normal Splice Mode".
Too Tapering Fiber	Too much fiber taper.	Confirm setting of taper splice.
Bubble	Bad fiber end-face.	Check the condition of fiber cleaver. When the blade is worn, rotate the blade.
	Prefuse power or time is set too low	If using the Other mode, adjust or initialize [Prefuse Power] or [Prefuse Time] settings.
Fiber Separation	The fiber stuff amount is insufficient.	Check the [Overlap] settings in the splice mode.
	The prefuse power or prefuse time is too high.	Check the [Prefuse Power] and [Prefuse Time] settings in the splice mode.

## Error Message List

Error Message	Reason	Solution
High Estimated Loss	Insufficient fiber cleaning.	Dust or dirt on the fiber surface result in high splice loss and low tensile strength. <ul style="list-style-type: none"> <li>• Clean the fiber surface sufficiently.</li> <li>• Do not clean the fiber after cleaving to prevent dust on the fiber end-face.</li> <li>• Avoid any contact with the fiber end-face.</li> </ul>
	Bad fiber end-face.	Check the condition of fiber cleaver. If the blade is worn, rotate the blade to a new position. Confirm the [Cleave Limit] setting. 2.0 degree or less is recommended.
	Dust or dirt is on the V-groove or the clamp chip.	Clean the V-groove and Clamp.
	Dust or dirt is on the lens or mirror	Execute the [Dust Check]. If dust or dirt exists, clean the lenses or mirrors.
	Optical misalignment	Follow the optical alignment manual to realign the optical components.
	Using unsuitable splice mode	Select a suitable splice mode for the fibers to be spliced.
	[Loss Limit] is set too low.	Increase [Loss Limit] to an adequate limit.
	Inadequate parameters	Confirm the parameters are adequate to splice the fibers.
Large Fiber Offset	Inadequate estimating parameters	Confirm the estimating parameters are adequate to estimate the loss. The MFD mismatch function does not work for certain types of specialty fibers. In such cases, set the [MFD Mismatch] to “OFF”.
	Dust or dirt is on the V-groove or the clamp chip.	Clean v-groove and clamp chip. Check setting “Coating Diameter” and “Clad Diameter”.
	Edge of coating is on the V-groove.	Check cleaved length of the fiber.

## Error Message List

Error Message	Reason	Solution
Hot Spot Detected!	Insufficient fiber cleaning.	Dust or dirt on the fiber surface result in bad splice loss and low tensile strength. •Clean the fiber surface sufficiently. •Do not clean the fiber after cleaving to prevent dust on the fiber end-face. •Avoid any contact with the fiber end-face.
High Crosstalk Estimated	Using unsuitable splice mode.	If you cannot confirm the fiber type, select “IPA” mode.
Not Reached to the Target	Setting is strict.	Check setting. In case the setting is strict, relax the setting value.
Estimation Failure	Setting of Estimation Loss isn't proper.	Check setting of Estimation loss. If splicing point was too thin or fat, estimation error occur easily. When the fiber shape is deformed by using [Special Function], set [Loss Estimation Method] and [Axis Offset] to “OFF”.

Content of errors keep updating. Therefore monitor may display the error that is not described in above table.

If it is hard to understand an error, please consult with the authorized distributor.

# *Questions and Troubleshooting*

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## **1. Power Supply**

### (1) Power does not turn off when pressing [ON/OFF] key

- Press and hold the key until the LED color changes from green to red.

### (2) Method to change the power saving function settings

- See section [**Machine Settings**] function.

## **2. Splicing Operation**

### (1) Error message appears on monitor

- See section [**Error Message List**].

### (2) Confirmation of splicing procedures

- See section [**Error! Reference source not found.**].

### (3) Monitor suddenly turned off / No key response

- If the power saving function is enabled, the splicer switches to the power saving state after an extended period of splicer inactivity. Press any key to return to the normal state. To change the length of time before the splicer switches to the power saving state, see [**Machine Settings**] on.

### (4) Method to change error thresholds for Cleave angle, Splice loss and Fiber angle

- See section [**Splice Settings**].

### (5) Error message can be over-ridden

- See section [**Editing Splice Mode**] to not allow error message override.

### (6) Method to set Pause

- See section [**Setting Menu**].

### (7) Method to display Cleave Angle, Fiber Angle and Core/Cladding Offsets

- See section [**Editing Splice Mode**]

### (8) The fiber is aligned again even if the manual operation is executed in Pause2.

- There is a method of using a manual alignment mode. See section [**Editing Splice Mode**]

## ***Questions and Troubleshooting***

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### **(10) Inconsistent splice loss / High splice loss**

- Clean the V-grooves, fiber clamps, wind protector mirrors, and objective lenses. See the [Maintenance of Splicing Quality].
- See the “High Estimated Loss” error message section in the [Error Message List].
- If the secondary coated fiber has a curl or bend memory, set the fiber in such a manner that the crown (curve) of the memory is turned upward. In particular, Nylon coated fiber has a strong curl memory and then the splicer cannot clamp such fiber with the coating clamp without resulting in high splice losses. In this case, splice the Nylon coating fiber with bare fiber clamp.
- The splice loss varies according to cleave angle, lasing conditions and fiber cleanliness.
- If the splice loss is still too high or inconsistent after performing the above-mentioned remedies, contact your nearest authorized distributor. Regular service (at least once a year) is recommended to maintain high splicing quality.
- In the case of splicing loose tube fiber with a coating clamp, the inside fiber is not clamped well even if circumference part could be clamped. Consequently, it causes high splice loss. In this case, clamp coating of the inside fiber or splice with a glass clamp.
- If the coating of fiber is soft and the fiber is stripped with HJS-02 with HJS spacer, the cleave length sometimes becomes longer due to the coating stretch(e. g. 3mm to 2mm). In this case, the splice loss becomes high because of the coating deformation due to the discharge heat. More than 4mm cleave length is recommended for such coating fiber.
- If a fiber with heat sensitive coating, is spliced with 3mm cleave length, fiber axis offset will occur due to coating deformation with discharge heat. In this case, more than 4mm cleave length is recommended. If you use 3mm cleave length, confirm that the splice loss performance is acceptable.
- If cleaving fiber with CT-03HT-06, about 50gf tension is necessary when fiber is set to the cleaver. Too little or too strong tension causes bad cleaves and high splice losses.

### **(11) Mismatch between Estimated splice loss and Actual splice loss**

- The estimated loss is a calculated loss, so it can be used for reference only.
- The optical components of the splicer may need to be cleaned.
- When splicing specialty fibers, adjust [MFD-L], [MFD-R], [Core Step] and [Core Curvature]. When splicing dissimilar fibers, also adjust [Min. Loss] and [MFD Mismatch]. To adjust these parameters, refer to parameter settings of the other splice modes stored in the database area.

### **(12) Method to operate Focus motor after splicing**

- Use the [Motor Drive] function in [Maintenance Menu] while in [PAUSE1], [PAUSE 2] or [Finish] states. Press **Up/Down** Allow key to adjust the focus.

## ***Questions and Troubleshooting***

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### **(13)The fiber vibrates on the monitor**

- Another machine near the splicer could be creating a vibration, which causes the fiber to vibrate. In this case, please place four rubber pads under the machine which is creating vibration and the problem will be solved.



Rubber Pads (RP-01)

### *3. Supervising*

(1) What functions can be disabled

- See section [**Menu Lock Settings**].

(2) Method to lock “selection” or “editing” of Splice mode

- See section [**Menu Lock Settings**].

(3) Forgot password

- Contact the authorized distributor.

## *Questions and Troubleshooting*

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### **4. Other Functions**

#### (1) Method to hide messages on [READY] screen

- Change the fiber image from X/Y view to X magnified view or Y magnified view by pressing **[X/Y]** key.

#### (2) Method to input different comments after each splice in splice results data

- See section **[Splice Result Memory]**.

#### (3) Method to input the same comments automatically in splice results data

- See section **[Splice Result Memory]**.

#### (4) Method to cancel storing splice results in internal memory

- See section **[Splice Result Memory]**.

#### (5) Method to download splice results from splicer to PC

- Contact the authorized distributor.

## **1. Guarantee**

### **1. Guarantee period and limits**

If the splicer becomes out of order within one year from the date of delivery, we will repair it free of charge. However, note that repairs will be charged for the following cases regardless of the guarantee period:

- (1) Trouble or damage due to natural disaster.
- (2) Trouble or damage due to mishandling.
- (3) Trouble or damage due to handling in disregard of the operating procedures or instructions described in the instruction manual.
- (4) Consumable items

Please note that the memory of the splice results, parameters, etc. may be deleted during the repair.

### **2. Necessary information needed for repair**

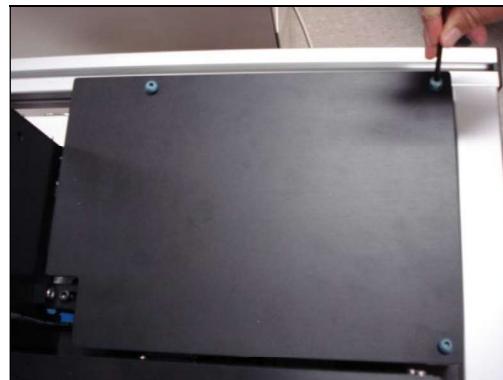
Include documentation with the splicer informing us of the details listed below.

- (1) Your full name, section, division, company, address, phone number, fax number and e-mail address.
- (2) Model name and serial number of the splicer.
- (3) Problems encountered
  - What problems did your splicer get into and when?
  - What is its present operational state?
  - What is the state of the display monitor and the contents of the relevant error message etc...

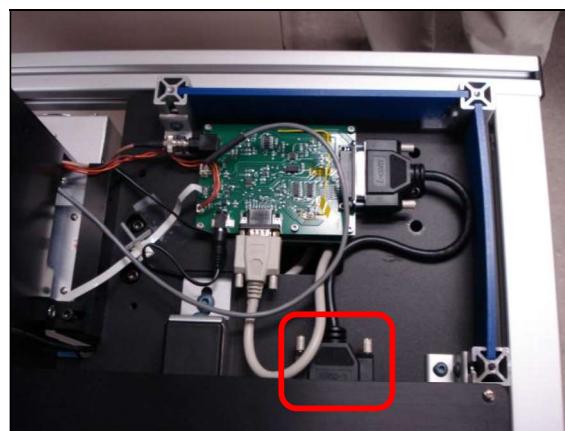
### **3. Transporting the splicer**

Since the splicer is a high-precision machine, always use the original carrying case for transportation and storage in order to protect it against humidity, vibration and shock. When requesting splicer repair, please send it, along with its accessories, in its original carrying case.

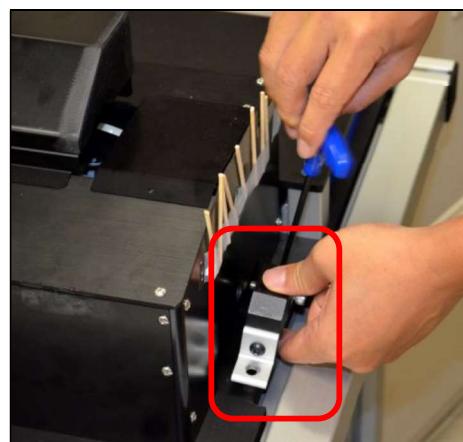
- (1) Remove rear right laser controller cover (4mm hex screws x 3)



- (2) Disconnect the RS232 cable from the splicer as shown below.

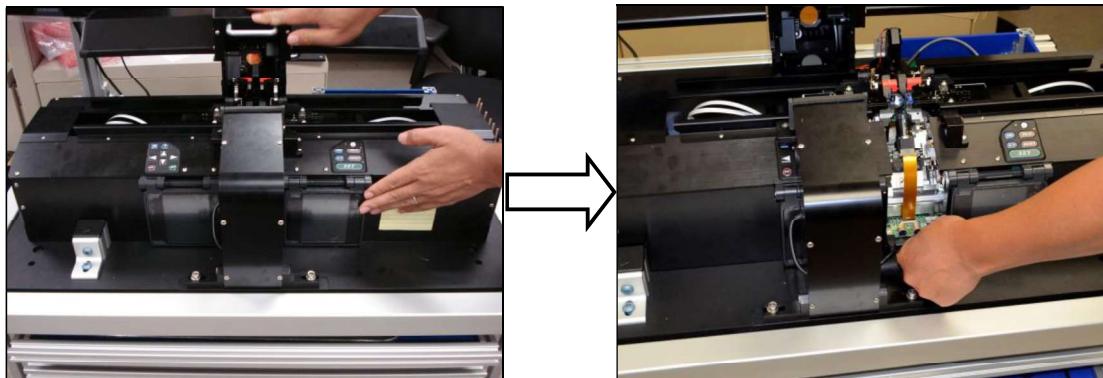


- (3) Remove right push unit (4mm hex screw, x 1)

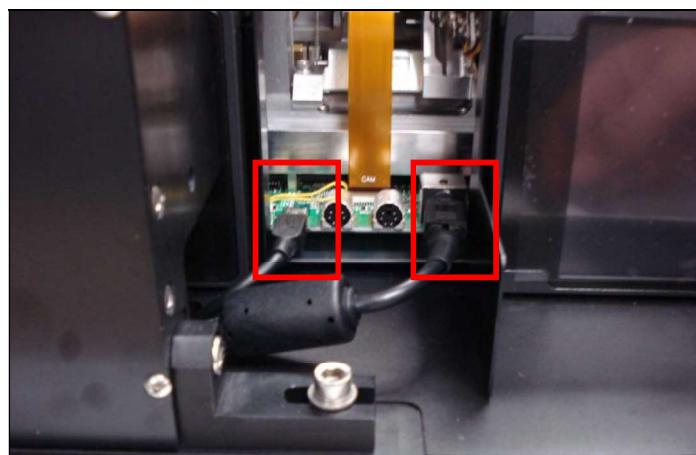


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(4) Make certain LCD screens are flush to splicer and slowly slide splicer to right until power and USB cords are visible. At this point, immediately stop sliding the splicer to avoid damaging connections.



(5) Disconnect splicer power cord and USB cord



(6) Continue sliding splicer left to right and remove it from the LZM-100 unit.

(7) Unclasp the black splicer protection case and remove the top half. Remove the first layer of protective foam from the bottom half of the case. Place the splicer in the outlined area and replace the first layer of protective foam. Replace the top half of the black splicer protection case and make certain all clamps are closed.

Addresses for shipment can be found on the following page.

## *Guarantee and Contact Address*

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Inquiries concerning products should be made to the following:

AFL Telecommunications  
260 Parkway East  
Duncan, SC 29334,USA  
Tel. +1-800-235-3423 (Service: +1-800-866-3602)  
Fax. +1-864-433-5560 (Service: +1-800-433-5452)  
P.O.Box 3127 Spartanburg, SC 29304-3127  
URL <http://www.AFLtele.com>

Fujikura Ltd.  
Optical Fiber & Equipment Department  
International Sales & Marketing  
1-5-1 Kiba, Koto-ku, Tokyo 135-8512  
Japan  
Tel. +81-3-5606-1636 Fax. +81-3-5606-1536  
URL <http://www.fujikura.co.jp>

Fujikura Europe Ltd.  
C51 Barwell Business Park  
Leatherhead Road, Chessington, Surrey KT9 2NY,UK  
Tel. +44-20-8240-2000 (Service: +44-20-8240-2020)  
Fax. +44-20-8240-2010 (Service: +44-20-8240-2029)  
URL <http://www.fujikura.co.uk>

Fujikura Asia Ltd.  
460 Alexandra Road #22-01 PSA Building Singapore 119963  
Tel. +65-6-2711312 Fax. +65-6-2780965  
URL <http://www.fujikura.com.sg>

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