

# Mini 4S

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## User Manual



website



youtube

Sales : sales@fiberfox.co.kr

Technical Support : support@fiberfox.co.kr

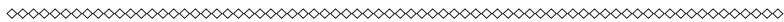
80, Dongseo-daero 179beon-gil,  
yuseong-gu, Daejeon 305-320, Korea



## ◆ Contents ◆



· Introduction	4
· Technical specifications	4
· Splicer description & Part name	6
· How to the replace the fiber folder	7
· Cleaning	7
· Splice Program	
- Stabilize Electrodes	8
- Arc Calibration	8
- Splice Menu	
1) Splice Mode	9
2) Splice Option	10
3) Heater Mode	11
4) Data Storage	13
5) Menu Lock	14
6) Reset	15
- Maintenance	
- Setting	
1) System Setting	18
2) Language	19
3) Power Save Option	20
4) Set Calendar	21



5) Password	23
6) System Information	24
• <b>Appendix I</b>	26
• <b>Appendix II</b>	28
• <b>Appendix III</b>	31

## **Important**

FiberFox highly recommends that all users read this manual before operating Mini 4S. This manual is valid for the following software version.

## **Cautions**

The Battery must be taken out of the splicer, when stored in the Hand carrying case.

## ◆ Introduction

Thank you for choosing Mini 4S FTTx Master from FiberFox. The Mini 4S with innovative design and excellent manufacturing technology gives customers assurance of trust.

Exceptional splicing experience and new technology greatly reduces splicing and heating time. Advanced estimate method and core alignment technique ensure the accuracy of the splice loss estimation. Its small size, compact design and reliable protective casing make it suitable for any operating environment. Dynamic operation interface and automatic splice mode give the customers great user-friendliness. For more information, please contact your local distributor or visit our website at [www.fiberfox.co.kr](http://www.fiberfox.co.kr)

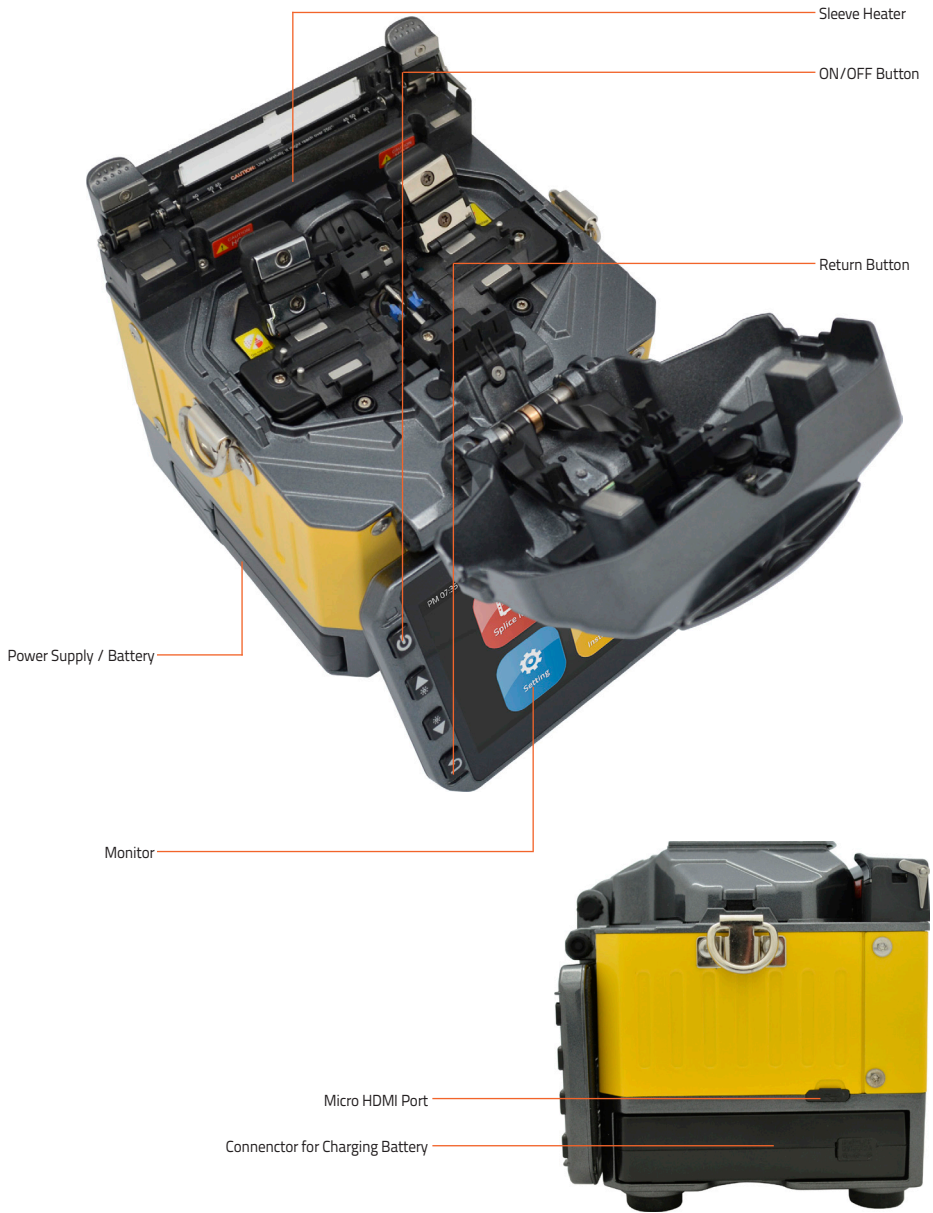
This manual explains the features, specifications, operation, maintenance and warnings about Mini 4S. The primary goal of this manual is to make the user very familiar with the splicer operation.

## ◆ Technical specifications

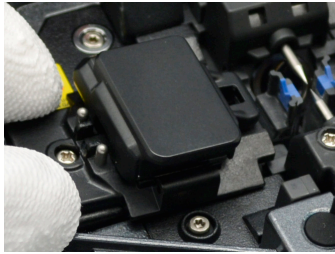
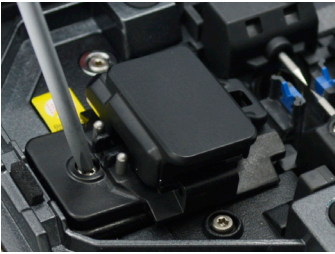
<b>Camera</b>	High precision dual camera		
<b>Display</b>	4.3" wide color reinforced LCD		
<b>Microscope</b>	x150 : X&Y axis dual view		
	x300 : X axis single view		
	x300 : Y axis single view		
<b>Power Supply</b>	Splicer	AC 100~240V	
		50~60HZ	
		DC 9~14V	
	Li-ion Battery	DC 11.1V	
<b>Data Capacity</b>	Splice Mode	Factory pre-set	11 ea
		User Mode	11 ea
	Data Storage (Splicing result)		2,000 Max 10,000
<b>Splice Speed</b>	SM Quick mode	7 Sec.	
	SM AUTO mode	9 Sec.	

<b>Heater</b>	Applicable Sleeve	Standard : 20, 25, 30, 35, 40, 60mm	
		Custom : 4*32mm sleeve (For SOC)	
	Heating Time	8~900sec (Typical: 15sec)	
	Heater mode	Factory pre-set	4 ea
		User Mode	4 ea
	Heating block	Standard	1 ea(Pre-installed)
SOC Customized		1 ea(In Package)	
<b>Applicable Fiber</b>	Fiber count : Single core		
	Fiber Type : SM(ITU-TG.652)/ DS(ITU-TG.653)/ NZDS(ITU-TG.655)/ ITU-TG.657 A,B Type / MM(ITU-TG.651)		
<b>Applicable Cable</b>	Fiber count : Single core fiber in cable		
	Applicable diameter : 0.25mm / 0.9mm / 2.0mm / 2.4mm / 3.0mm		
	Applicable buffer Diameter : Cladding diameter : 80~150µm, Coating diameter : 100~3,000 µm		
<b>Splice Loss</b>	SM : 0.03dB		
	MM : 0.01dB		
	DS : 0.05dB		
	NZDS : 0.05dB		
	G.657 : 0.03dB		
<b>Reliability</b>	Operating Condition	Altitude	0~5,000M
		Humidity	0~95%
		Temperature	-15~60°C
		Wind Speed	15m/s
	Storage Condition	Humidity	0~95%
		Temperature	Splicer
Battery	-20~30°C		

## ◆ Splicer description & part name



## ◆ How to replace the fiber holder



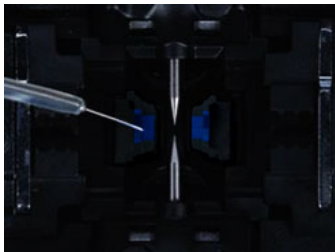
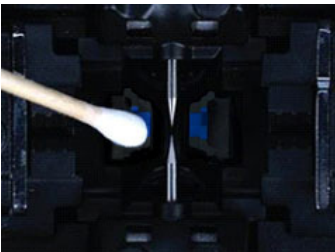
- 1) Unscrew the screws
- 2) Take out the worn holder
- 3) Replace it with new one
- 4) Tighten up the screw

### ⚠ Caution

- 1) The unscrewed screws remain in the holder (Do not remove the screws out)
- 2) Do not screw down the holder too tight

## ◆ Cleaning

### V-Grooves

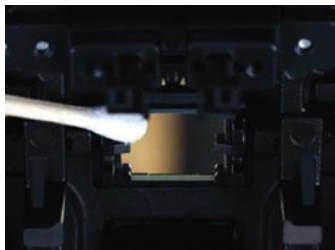


Check fiber after cleaning with cotton swab

### Lens



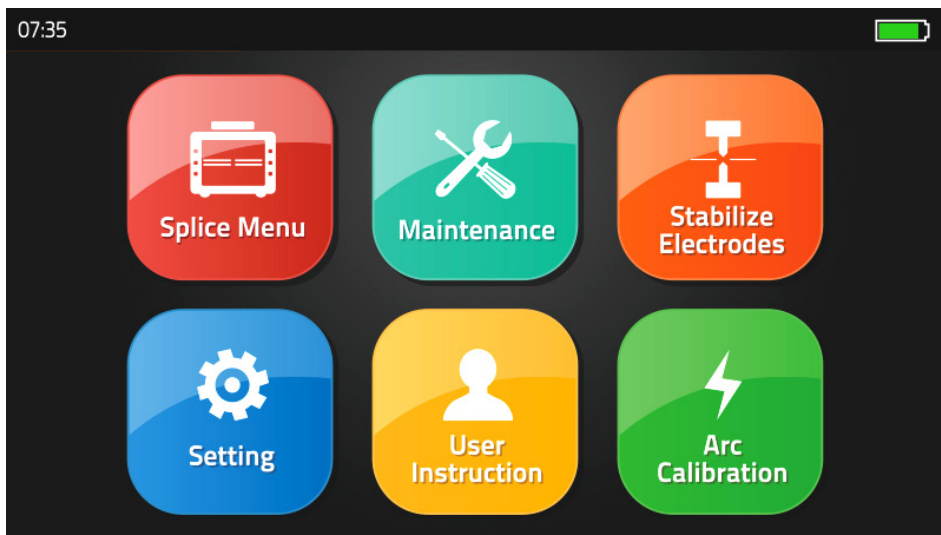
### Mirrors



### ⚠ Caution

- 1) Do not disturb the electrode tips
- 2) Use only 99% or better purity alcohol

## ◆ Splice Programs



Splice Menu, Maintenance, Stabilize Electrodes, Setting, User Instruction, Arc Calibration

### **[Stabilize Electrodes]**

In the event of sudden change in environmental conditions or after cleaning electrodes, the arc power sometimes becomes unstable, resulting in higher splice loss. This is especially a concern when the splicer is moved from lower altitudes to higher, it takes time for the arc power to stabilize. In this case, stabilizing electrodes will expedite the process to normalize the arc power. If many tests are required to get the 'Test ok" message appearing the [Arc calibration], use this function as well.

### **[Arc Calibration]**

Atmospheric conditions such as temperature, humidity, and pressure are constantly changing, which creates variability in the arc temperature. This splicer is equipped with temperature and pressure sensors that are used in a constant feedback monitoring control system to regulate the arc power at a constant level. However, changes in arc power due to electrode wear and glass adhesion cannot be automatically corrected. Also, the center position of arc discharge sometimes shifts to the left or to the right. In this case, the fiber splicing position has to be shifted in relation to the arc discharge center. It is necessary to perform an arc power calibration to eliminate these problems.

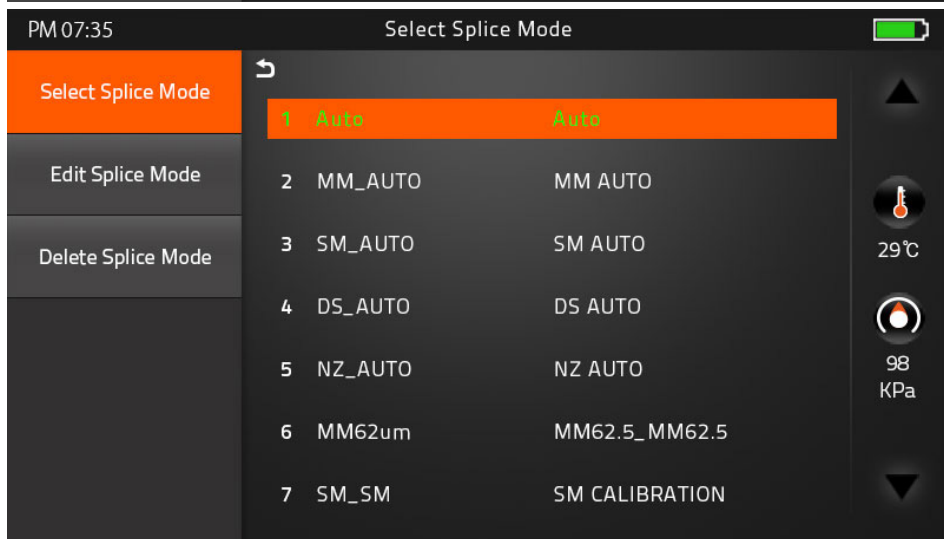
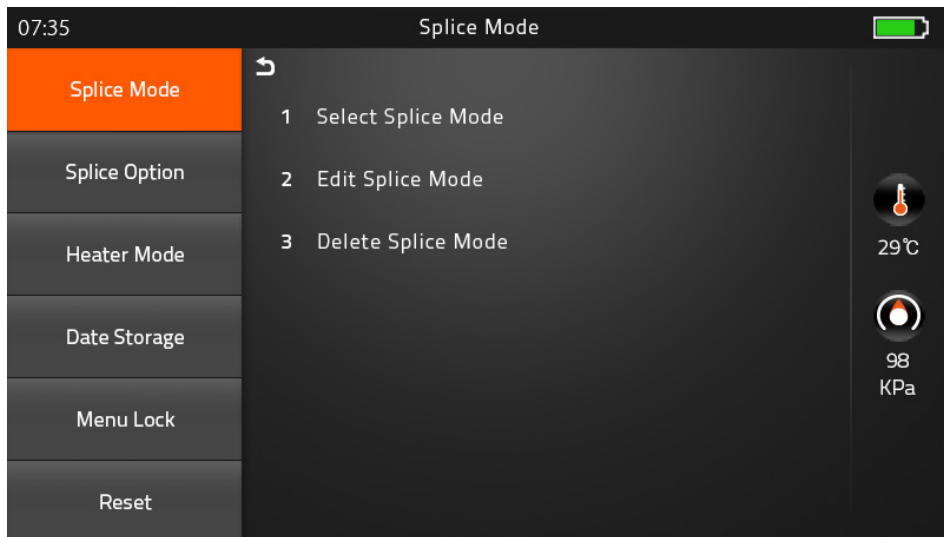
Note : Performing [Arc calibration] function changes the arc power 'Factor" value. The factor value is used in the algorithm program for all splicing. The arc power value will not change in the splice modes.

\* Standard Factor value is changed within  $11 \pm 2$ , It shows 'Complete" word.



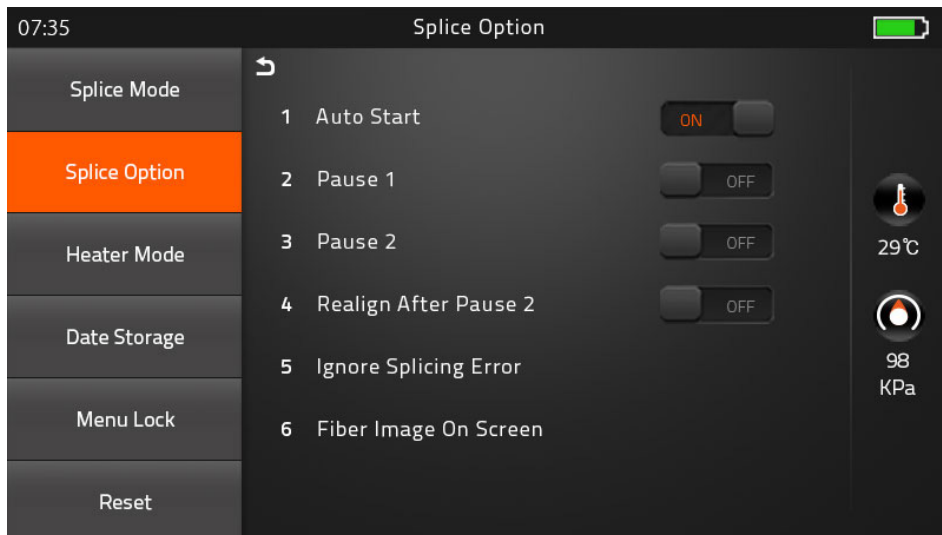
# [Splice Menu]

## 1) Splice Mode



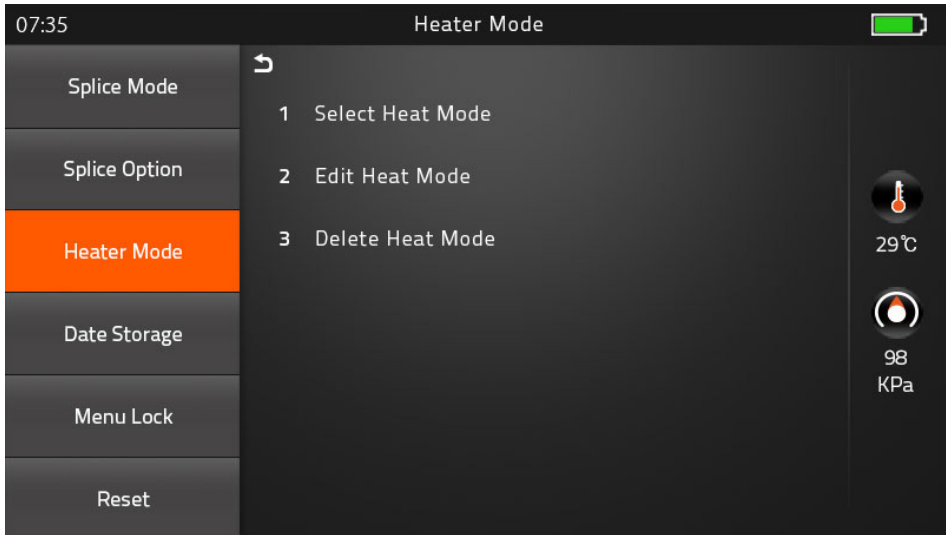
Factory Pre-Set Mode	11 ea
User Mode	User Edit : 11ea Customized mode : 1 ea
Delete Splice Mode	-

## 2) Splice Option



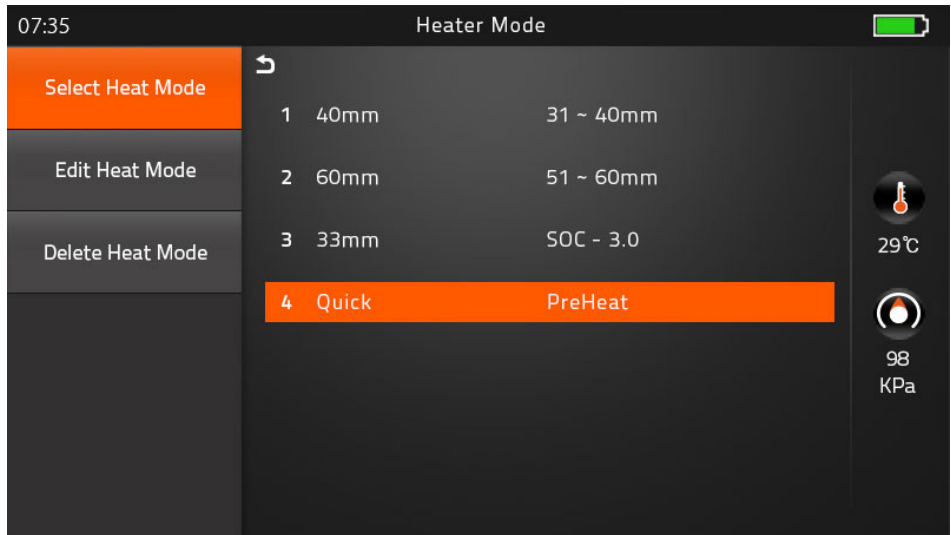
<b>Auto Start</b>	ON : Automatic splicing procedure
	OFF : Maunal Splicing procedure
<b>Pause 1 (Press Motor)</b>	ON : Pause after the fiber gap position process
	OFF : Proceeding without the pause
<b>Pause 2 (Align Motor)</b>	ON : Pause after camera focus & Axis alignment process
	OFF : Proceeding without the pause
<b>Realign After Pause 2</b>	ON : Automatically proceed realignment
	OFF : Proceeding without the pause
<b>Ignore Splicing Error</b>	'splicing error' message is not displayed
<b>Fiber Image On Screen</b>	Select display structure for each splicing process

### 3) Heater Mode



<b>Factory Pre-Set Mode</b>	4 ea
<b>User Mode</b>	User Edit : 4ea Customized mode : 1 ea
<b>Delete Heater Mode</b>	-

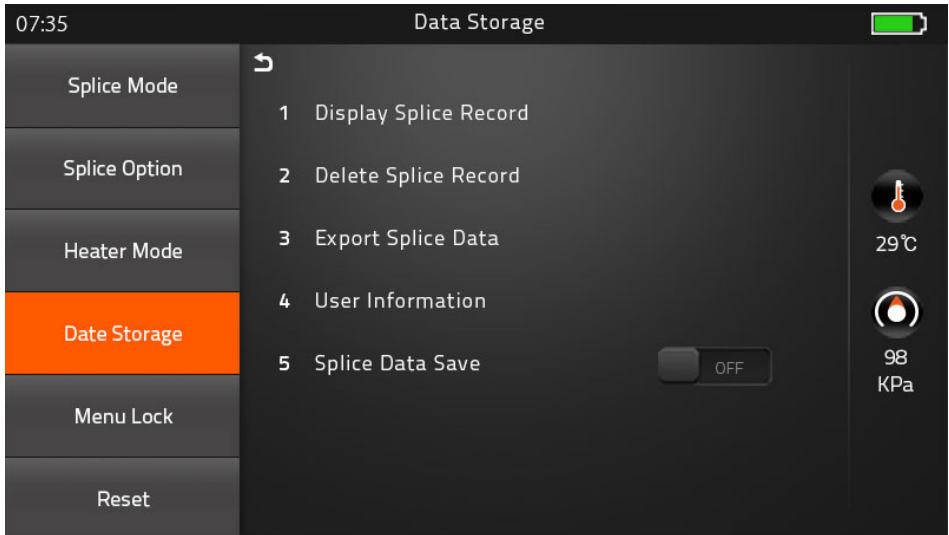
## ► Preheat Mode



It is performed for reducing heating time and rapid heating task. When it comes to turned on program, red LED keeps blinking which means it is warming up the heater about 120 to 160°C itself. After a few minutes, it is available to shrink the sleeve in 15 seconds (Refer to 60mm sleeve which used to perform in 20 seconds)

However, Please be attention, it wastes more the battery power than Normal heating mode. (Normal Cycle is approximately 400, whereas, it performs 295 cycle)

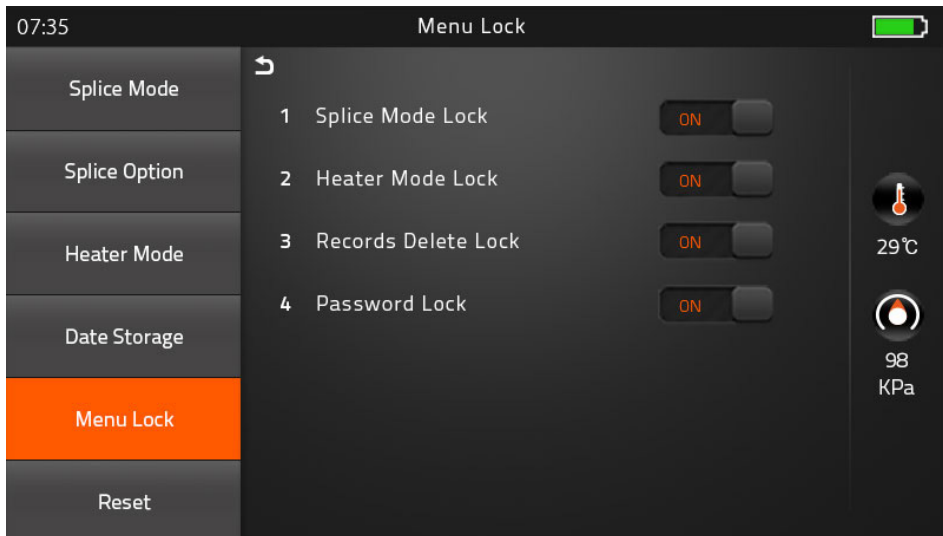
#### 4) Data Storage



<b>Display Splice Record</b>	Displaying your detailed splice record
<b>Delete Splice Record</b>	-
<b>Export Splice Data</b>	Downloading saved data (Splice record or Image)
<b>User Information</b>	Record the work information into the data save file
<b>Splice Data Save</b>	ON : Automatic data save * Image data is saved manually *
	OFF : Do not save splice record

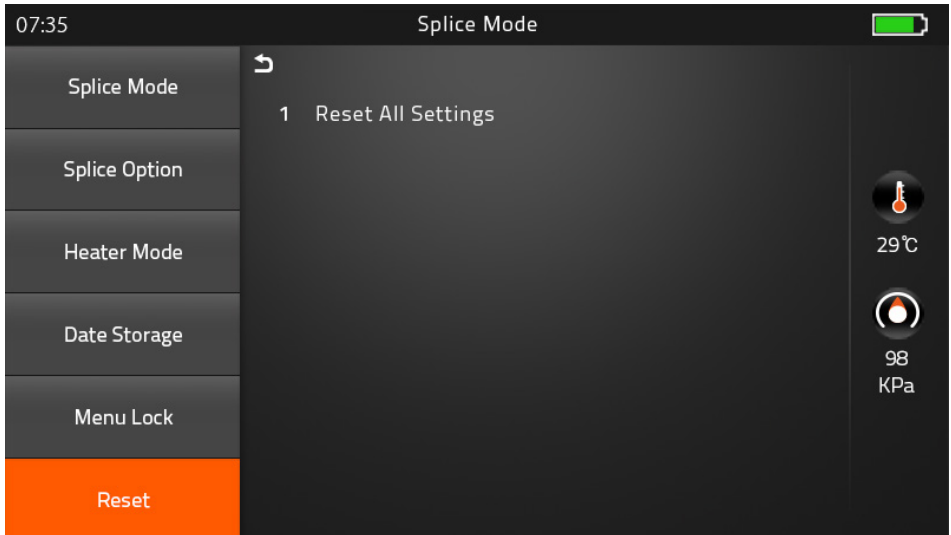
## 5) Menu Lock

Input password to access the sub-menu



<b>Splice Mode Lock</b>	ON : Disable 'Splice mode' edit
	OFF : Enable 'Splice mode' edit
<b>Heater Mode Lock</b>	ON : Disable 'Heater mode' edit
	OFF : Enable 'Heater mode' edit
<b>Records Delete Lock</b>	ON : Disable 'Record mode' edit
	OFF : Enable 'Heater mode' edit
<b>Password Lock</b>	ON : Disable to change the password
	OFF : Enable to change the password

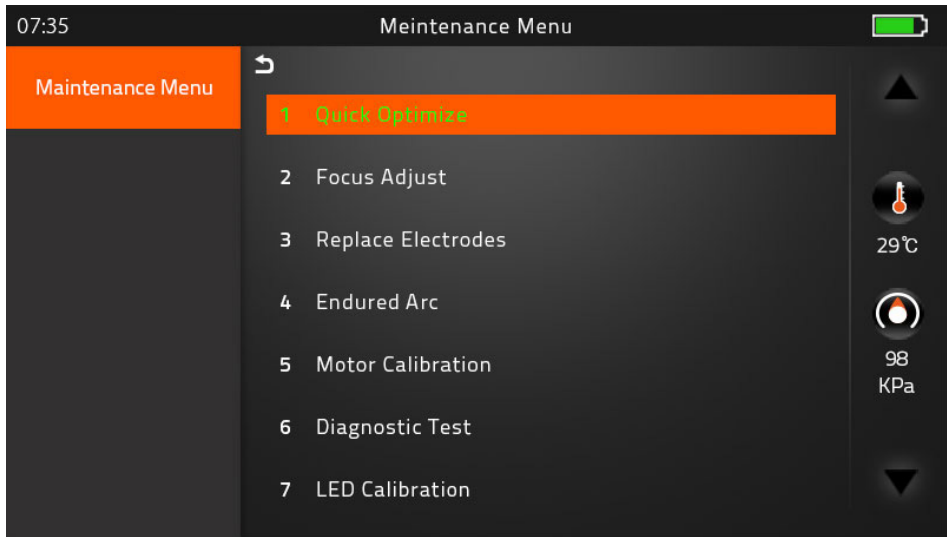
## 6) Reset



Unexpectedly, the malfunction occurred on the splicer, it is necessary to make all the parameters to be the factory set mode. However, it is highly recommended to execute the task after discussing with a fiberfox technician. Whereas a lower 1.34 version is necessary to execute Reset to adapt the new function of the program on the splicer after the upgrading process.

# [Maintenance]

## 1) Maintenance Menu



### ► Quick Optimize

Quick & Easy overall maintenance

Automatic process 'Lens focus+motor calibration+fiber training'

### ► Focus Adjust

Find the optimized position for 'Focus Motor'

### ► Replace Electrodes

Instruction on how to replace electrodes

FiberFox recommendation

It is highly recommended to change the electrodes after every 3,000 splicing

\* After finished to use this menu, the current Arc Count would be reset to '0'

### ► Endured Arc

Training for new electrodes adjustment

It occurs 30 times arc training for adjusting new electrodes function.

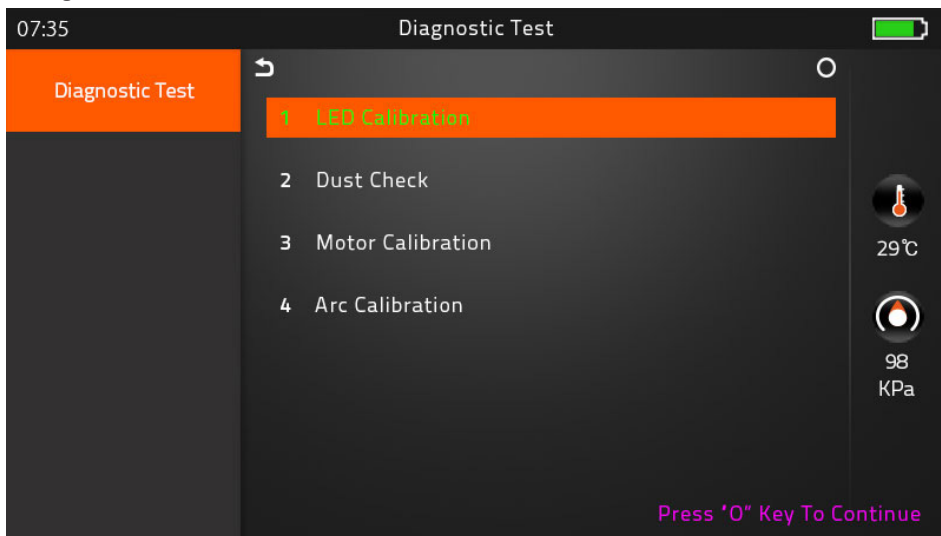
It is recommended to try on completion. Replace Electrodes menu.

### ► Motor Calibration

Automatically calibrates the speed of all six motors



## ► Diagnostic Test



<b>LED Calibration</b>	Measures and adjusts the brightness of LED
<b>Dust Check</b>	Dust checking process
<b>Motor Calibration</b>	Automatically calibrates the motor speed
<b>Arc Calibration</b>	Automatically calibrates the Arc power

### ► LED Calibration

Measures and adjusts the brightness of LED

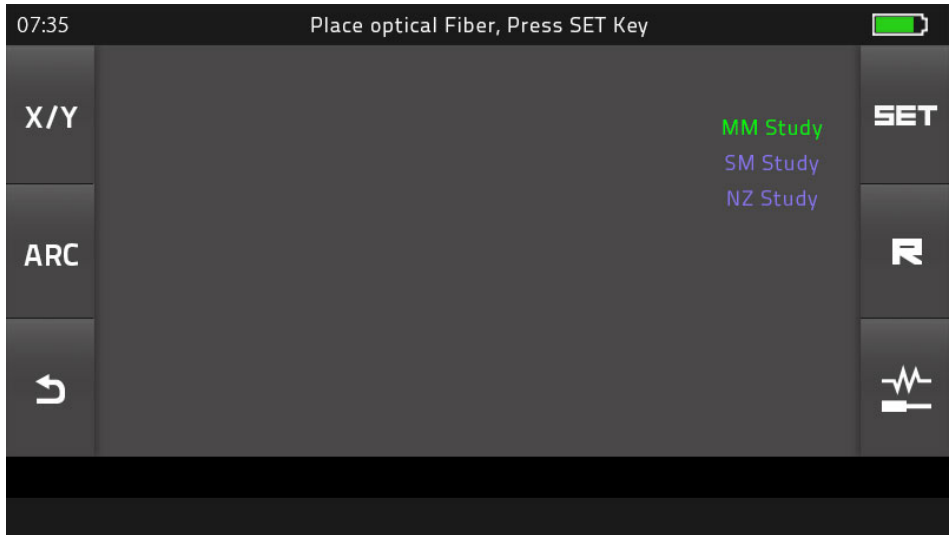
### ► Dust Check

Detects dust&contaminant causing improper splicing

In order to find out optimized position for splicing, the splicer analyses the fiber images being transmitted by the optical camera & LED inside but dust or contaminant on the camera, lenses, LED may cause inaccurate splicing results.

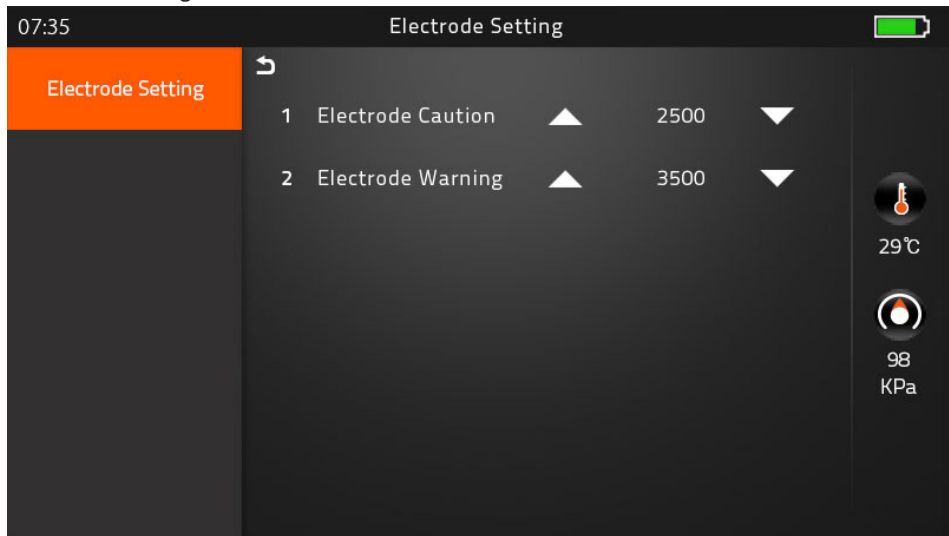
Therefore, the dust check process is recommended to proceed in case of frequent splicing fail or high insertion loss.

► Fiber Training



Automatic Fiber recognition program

► Electrode Setting



<b>Electrode Caution</b>	Caution alarm will be displayed when it reaches the number of splicing cycle you set
<b>Electrode Warning</b>	Caution alarm will be displayed when it reaches the number of splicing cycle you set

► Motor Drive

This checks the operation status of motors.

\* Method : Chosen one of motor by Tapping in middle of motor name, And move to press up and down arrow keys

► Update Software

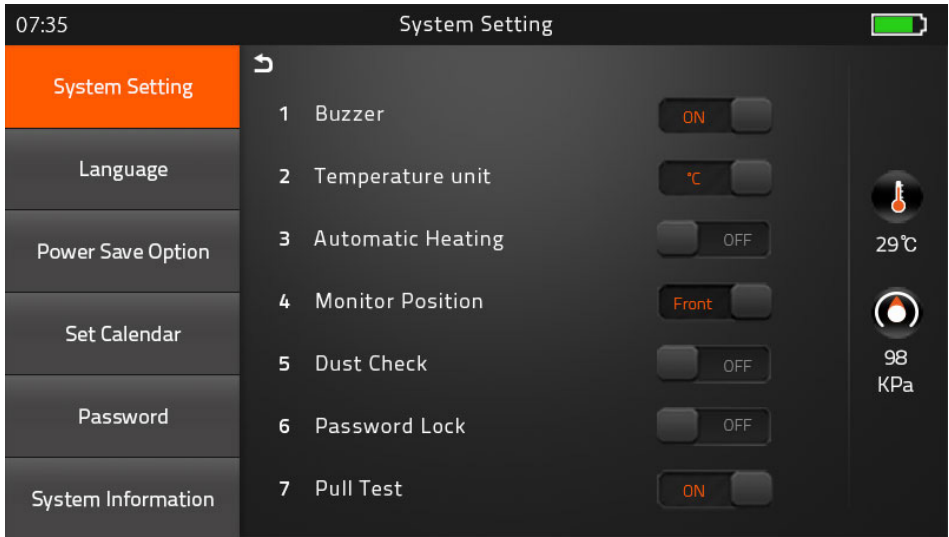
Upgrade to the latest software version.

Procedure

1	Prepare the USB device.
2	Download the latest version software to the USB.
3	Link to the Splicer (Via link cable in the package).
4	Press 'O' Button to proceed update.
5	Device will be rebooted once it is done.
6	Splice Menu > Reset (Format) > Input Password > Execute Format task
7	Execute the Quick Optimize > Stabilize Electrodes > Arc Calibration

# [Setting]

## 1) System Setting



<b>Buzzer</b>	ON : Sound on OFF : Sound off
<b>Temperature Unit</b>	°C : Celcius °F : Fahrenheit
<b>Automatic Heating</b>	ON : Auto start OFF : Manual start
<b>Monitor Position</b>	Front : Normal direction display Rear : Opposite direction display
<b>Dust Check</b>	ON : Check the dust density OFF : Skip dust checking process
<b>Password Lock</b>	ON : Password is required to operate the device OFF : No passwerd is required
<b>Pull Test</b>	ON : Automatic pull test processing after splicing OFF : Skip pull test process

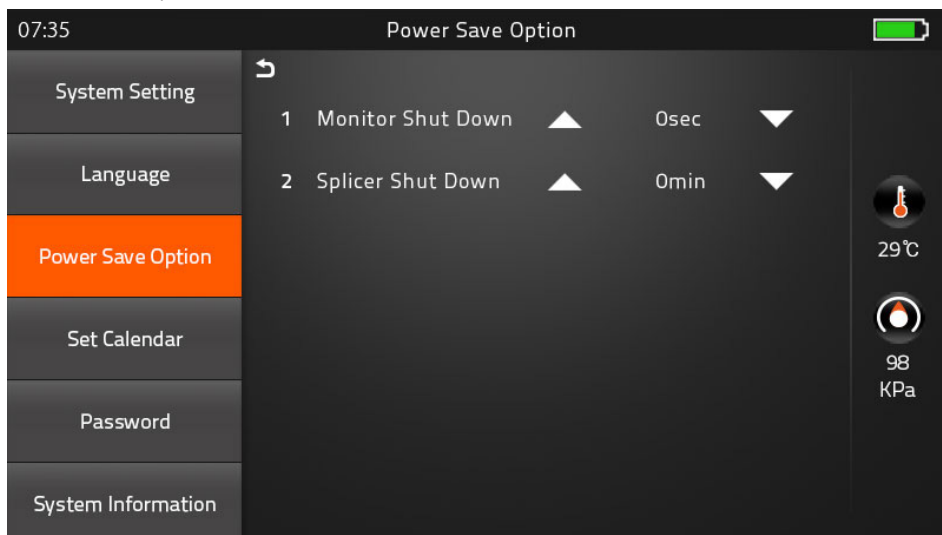
## 2) Language

Set your own language.



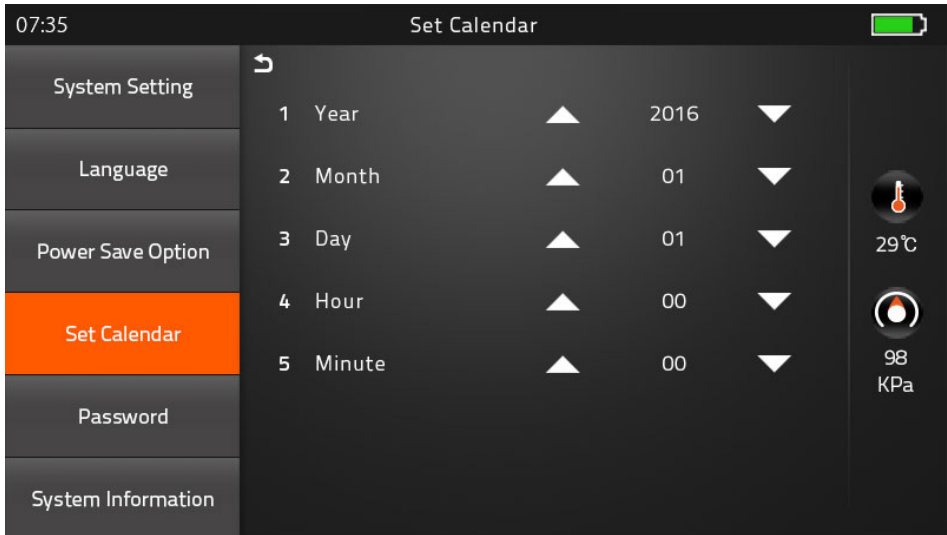
Language Available	
繁體中文	Việt
English	العربية
한글	Español
Русский	Italiano
Deutsch	Português
Français	فارسی
ไทย	

### 3) Power Save Option



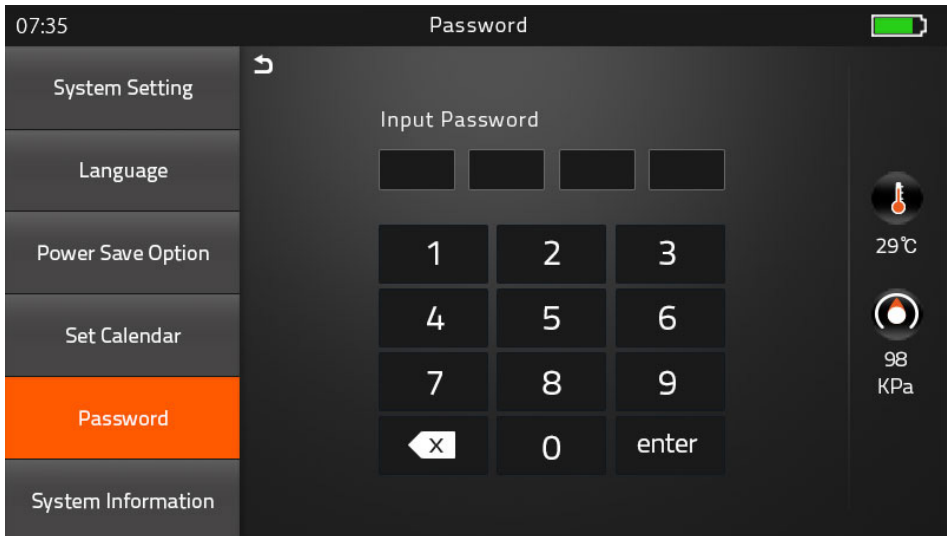
<b>Monitor Shut Down</b>	1) No input during the time you set, the splicer will block the power supply toward LCD 2) System will be switched over to standby mode.
	Press the power button to resume (Screen will be back on)
<b>Splicer Shut Down</b>	No input during the time you set, the splicer will be shut down to save the power
	Pressing the power button for 2sec, to reboot the splicer

#### 4) Set Calendar



#### 5) Password

Change your password.



#### Procedure

1	Input 4-digit old password number
2	Input new 4-digit number for new password

## 6) System Information

07:35 System Information

System Setting	1	Machine Serial No	00004424002
Language	2	Software Version	1.34V
Power Save Option	3	FPGA	0.18
Set Calendar	4	Total Arc Count	0
Password	5	Current Arc Count	0
<b>System Information</b>	6	Last maintenance	2016-02-04
	7	First Maintenance	2016-01-04
	8	Warranty Period	2017-01-01
	9	Delivery Date	2016-01-01
	10	Product OEM	Fiberfox

29°C  
98 KPa







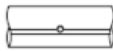

<b>Machine Serial No.</b>	Identification number of the splicer
<b>Software Version</b>	Software version being installed
<b>FPGA</b>	Field programmable gate array' version
<b>Total Arc Count</b>	Total number of Arc discharges
<b>Current Arc Count</b>	Current number of Arc discharge
<b>Last Maintenance</b>	Last maintenance date
<b>First Maintenance</b>	First manufacturing date
<b>Warranty Period</b>	Warranty period
<b>Delivery Date</b>	Delivery date
<b>Product OEM</b>	Manufacturer name








## ◆ Appendix I

Splice loss increase : Reason and solution.

Symptom	Name	Reason	Solution
	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 well conditioned
	Core Step	Dust on v-groove of fiber clamp chip	Clean v-groove and fiber clamp chip
	Core Curve	Bad fiber end-face quality	Check if fiber cleaver is well conditioned
		Pre-fuse power too low or pre-fuse time too short	Increase [Pre-fuse power] and/or [Pre-fuse time]
	MFD Mismatch	Arc power too low	Increase [Arc power]
	Combustion	Bad fiber end-face quality	Check the cleaver
		Dust still present after cleaning fiber of cleaning arc	Clean fiber thoroughly or increase [Cleaning arc time]
	Bubbles	Bad fiber end-face quality	Check if fiber cleaver is well conditioned
		Pre-fuse power too low or pre-fuse time too short	Pre-fuse power too low or pre-fuse time too short
	Separation	Fiber stuffing too small	Perform [Motor calibration]
		Pre-fuse power too high of pre-fuse time too long	Decrease [Pre-fuse power] and/or [Pre-fuse time]

	Fat	Fiber stuffing too much	Decrease [Overlap] and perform [Motor calibration]
	Thin	Arc power not adequate	Perform [Arc calibration]
		Some arc parameters not adequate	Adjust [Prefuse power], [Pre-fuse time] or [Overlap]
	Line	Some arc parameters not adequate	Adjust [Prefuse power], [Pre-fuse time] or [Overlap]

**Note :** 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.

## ◆ Appendix II

If error message is shown as below during the process, Please follow the instruction accordingly. If the problem still remains, please contact us.

Error Message	Reason	Solution
L Fiber Place Error	The fiber end-face is placed on the electrode centerline, or beyond it	Press the 'Reset" Button. Reload the fibers, make sure fiber end face between V-groove and the centre position of electrodes
R Fiber Place Error		
Propulsion Motor Overrun	The fiber is no set correctly at the bottom of the V-groove, which results in that the fiber offsets beyond motor formation range	Press the 'Reset" button and then re-position the fiber at the bottom of the V-groove
Propulsion Motor Trouble	Motor might be damaged	Consult your nearest sales agency
Failed to Find The Fiber End-face	The fiber is not set correctly at the bottom of the V-groove	Press the 'Reset" button and then re-position the fiber correctly at the bottom of the V-groove
No Arc Discharge	Arc Discharge does not occur	Confirm the electrodes in proper position; Replace electrodes
Motor Overrun	The fiber is not set correctly at the bottom of the V-groove	Press the 'Reset" button and then re-position the fiber at the bottom of the V-groove
Cannot Find the Edge of The Cladding	The fiber is not set correctly at the bottom of the V-groove	Press the 'Reset" button and then re-position the fiber at the bottom of the V-groove
Find Wrong Fiber Edges	There's dust on the fiber surface	Re-prepare the fiber; Clean the lens and protector mirror and then redo 'Dust Check"
Unidentified Type of Fiber	Shock occurred to the splicer during the splicing process	Execute 'Motor Calibration" If the [problem stillexist, please contact the sale agent

Unidentified Type of Fibers	Shock occurred to the splicer during the splicing process	Execute 'Motor Clibration" If the [problem still exist, please contact the sale agent
Contact of Fiber End-faces	Overlap too much	Adjust overlap parameter
	Motor is not calibrated	Calibrate and maintain the motor
Focus Motor Overrun	The fiber is misplaced	Press the 'Reset" Button and then reposition the fiber correctly
	There's dust of dirt on the fiber surface	Prepare the fiber again
	There's dust of dirt on the fiber surface	Execute the [Dust check] after the lenses and LEDs are cleaned
Fibers Mismatch	The fibers of two sides are different type	It may resul tin large splice loss if you continue to splice, Please use the proper splice mode corresponding to the fibers
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 or change a new one, and then re-prepare the fibers
	[Cleave Limit] is set too low	Increase the [Cleave limit] to an adequate limit(standard:3.0°c)
Large Core Angle	[Core angle limit] is set too low	Increase the [Core angle limit] to an adequate limit (standard:1.0°c)
	Dust of dirt is on the V-groove or hte clamp chip	Clean V-groove and clamp chip. Prepare the fibers and re-load them
Focus Error	Too large axial offset(>0.4um)w	Re-prepare the fibers
	The motor is not calibrated	Execute [Motor clibration]

Dust Error (fiber core)	There's dust or dirt on the fiber surface	Prepare the fiber again
	The lens or LEDs are coated in dust	Execute the dust check after cleaning the lenses and LEDs
	Cleaning Arc time is too short	Set the cleaning arc time to be 180ms
	It is difficult to identify the fiber core by using the method of core alignment to splice	It is difficult to identify the fiber core by using MM splice mode to splice
	There's dust or dirt on the fiber surface	Prepare the fiber again
	There's dust or dirt on the fiber surface	Execute the [Dust check] after the lenses and LEDs are cleaned
	Cleave angle limit is too low	Increase the cleave angle limit to a decent value (standard value: 3.0°c)
Fat Fiber	Overlap too much	Adjust overlap parameter
	Motor is not calibrated	Calibrate and maintain the motor
Thin Fiber	Arc power too low	Execute [Arc Calibration]
	The level of pre-discharge is too high	Decreased pre-discharge of pre-discharge time
	Insufficient overlap	Adjust overlap parameter

## ◆ Appendix III

### [Questions and troubleshooting]

- Power does not turn off when pressing On / Off button.
  - Press and hold the key until the LED color changes from green to red.
- Few splices can be made with a fully charged battery pack
- If the power saving function is not enabled, battery power degrades quicker.
  - [System setting] Always enable it to conserve power usage.
- If degradation appears (memory effect), or if the battery pack is stored for an extended period of time, completely discharge it. After discharge completion, recharge the battery pack.
- The battery pack has reached the end of its service life. Install a new battery pack.
- The battery pack uses chemical reaction. The capacity decreases at low temperature, especially at lower than 0 degree °c.
- Error message appears on monitor please refer to appendix II.
- Inconsistent splice loss / High splice loss
- Clean the V-grooves, fiber clamps, wind protector mirrors, and objective lenses.
- Replace the electrodes.
- Please refer to Appendix I.
- The splice loss varies according to the cleave angle, arc conditions and fiber cleanliness.
- Monitor suddenly turned off
  - The monitor suddenly turn off after an extended period of splicer inactivity, if the power saving function is enabled. Press any key to return to the normal state.
- Splicer power suddenly turned off without 'Low battery' message.
- The monitor will turn off after an extended period of splicer inactivity, if the power saving function is enabled. Press any key to return to the normal state.
- Identify fibers error in AUTO mode
  - AUTO mode is applicable for SM, MM, NZ fiber. Errors may occur while splicing special fibers.
- 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.
  - Fiber protection sleeve does not shrink completely.
- Continue the heating time. [ 60mm Sleeve – 230 °c, 15sec, 40mm Sleeve - 200 °c , 17sec ]
- Extend the heating time.
- Method to cancel heating process.

- Press Heat key to stop during heating process. The LED light will go off after pressing.
- Fiber protection sleeve adhered to heating plate after shrinking use a cotton swab or a similar soft tip object to push and remove the sleeve.
- Forgot password
  - Please contact the sale agent or the Technical Support manager.
- No arc power change after [Arc calibration]
  - An internal factor is calibrated and adjusted for the specific arc power selected. The displayed arc power in each splice mode does not change.
- Forgot to load fibers while execute some specified function that fibers are needed. Return key is invalid. Open the wind protect shield, load prepared fibers in the splicer, and press 'Set' to continue or press 'Reset'
- Upgrading Failure
  - When users use the USB to upgrade, the splicer may not be able to correctly identify the upgrade file, you need to re-plug the USB cable with USB, and retry the upgrade software.
- Check if the upgrade file name and the format are correct.
- SDXX is for SD card Upgrade file, UpdateXX is for USB Upgrade file. The both zip file must be extracted when you place on The USB.
- If you cannot solve the problem, please contact the Technical Support Manager.
- Other
  - If you need more information, Please refer to the video in user's CD.



