Precision Rated Optics

Work with a PRO!

OFS-904S

Fusion Splicer

Operation Guide

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V.5.12.16

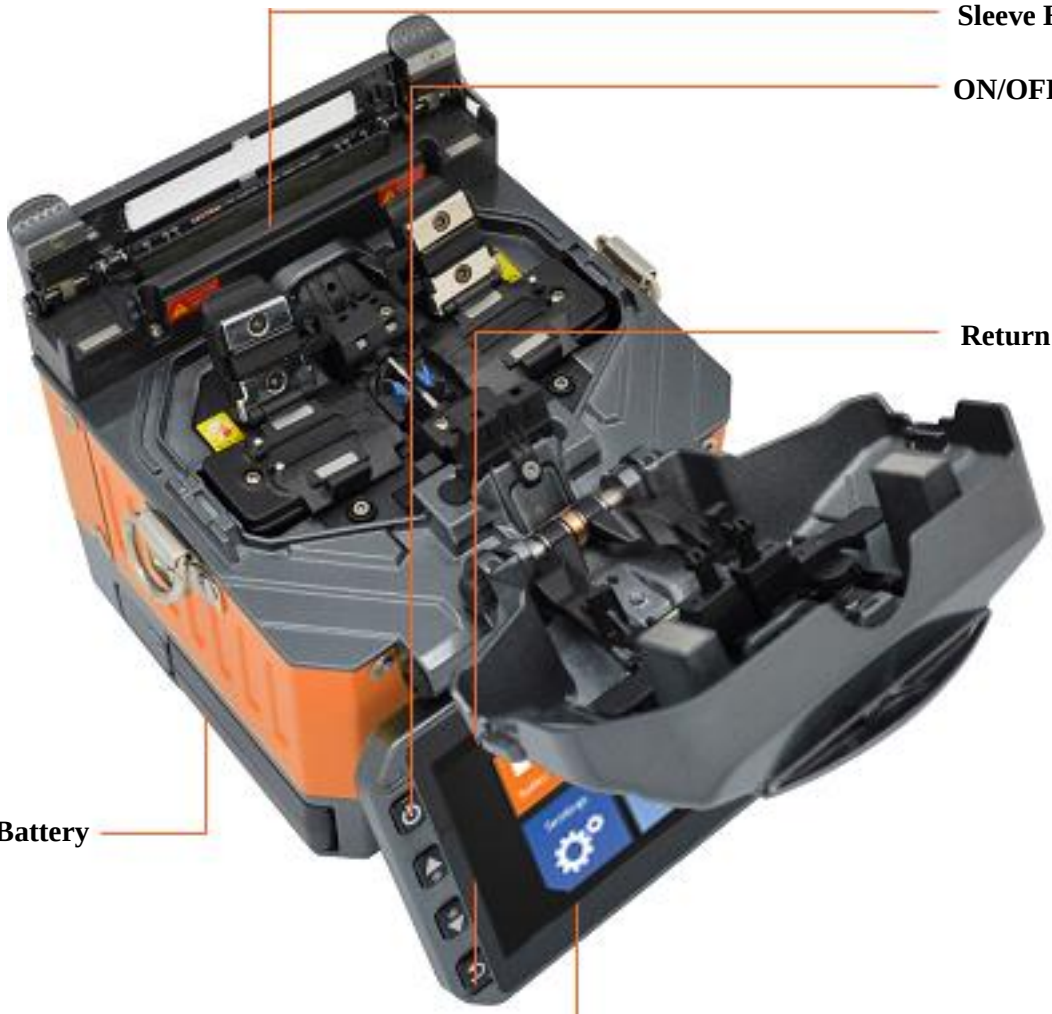
Introduction

With innovative design and precise manufacturing technology, the OFS-904S gives users an unparalleled experience. Cutting-edge splicing improvements and new technology greatly reduce splicing and heating time. Its advanced estimate method and core alignment technique ensure the accuracy of splice loss estimation. Additionally, its small size, compact design and reliable protection shell make it suitable for any operating environment. A dynamic operation interface and automatic splice mode gives the user added efficiency

This manual explains the features, specifications, operation, maintenance and warnings. The primary goal of this manual is to make the user as familiar with the splicer as possible.

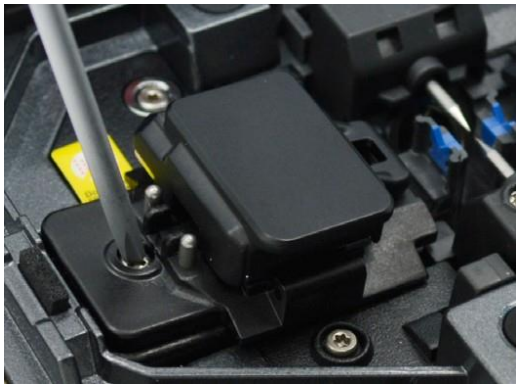
Technical specifications

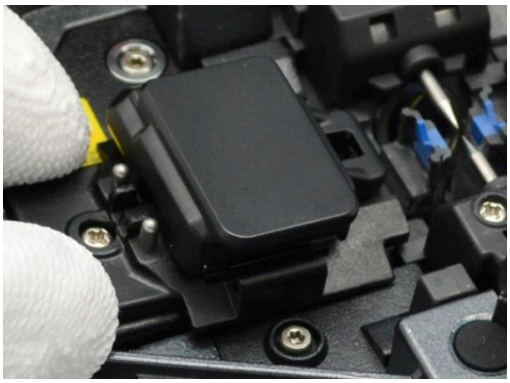
Splicing Method	Active Alignment DDA (Digitalized Active Alignment)
Average Loss	(SM)0.03dB, (MM)0.01dB, (DS)0.05dB, (NZDS)0.05dB, (G.657)0.03dB
Return Loss	>>60dB
Splice Time	12s average SM I SM 7s Quick mode
Electrode Lifespan	>3,500 arcs
Applicable Fiber	SM(ITU-T G.652, MM(ITU-T G.651), DS(ITU-T G.653), NZDS(ITU-T G.655), IT-G657A, IT-G657B 0.25mm, 0.9mm, 2.0mm, 2.4mm, 3.0mm, FLAT(indoor cable)
Cleaved Length	Coating Diameter< 0.25mm = 5-16mm. Coating Diameter > 0.25mm = 8-16mm Minimum
Coating Diameter	100-1000um
Cladding Diameter	80-150um
Heating Programs	Factory Installed Mode: 3, User Installable Mode: 23
Heating Time	Typical 18sec
Protection Sleeve	40mm, 60mm, SDC-3.0, SOC-0.9
Data Output	Micro HDMI-USB Master Device
Splice Programs	8 User Modes, User Installable Mode : 70+
Splice Memory	Up to 2000 Records
Battery	Typical 200 Cycles (Splice & Heat) / Single Battery <2 Batteries Standard>
Power Supply	AC 100-240V Input or DC 9-14V
Monitor	Color 4.3” LCD Monitor, with Touch Screen (Tempered Glass)
Cameras	2 CCD Camera System
Magnification	XY : 150 Times , X/Y: 300 Times
Fiber Display	X/Y or XY, single X.Y
Size/Weight (WxDxH)	4.8” x 4.88” x 5.43”in / 2.88lb (122 x 124 x 138mm / 1.31Kg w/o Battery)
Wind Protection	The Max Wind Speed 15m/s
Operating Environment	Elevation: 0-5,000 Meters,Temp: 5 ~ 140°F (-15~60°C), 0-95% Relative Humidity
Storage Conditions	Temp: -40~176°F (-40~80°C), 0-95% Relative Humidity, Battery: -4~86°F (-20-30°C)
Pull Test	1.96-2.25N (Standard)


Sleeve Heater
ON/OFF Button
Return Button
Power Display/Battery
Monitor


Micro HDMI
Battery Charging Port

How to replace the fiber holder





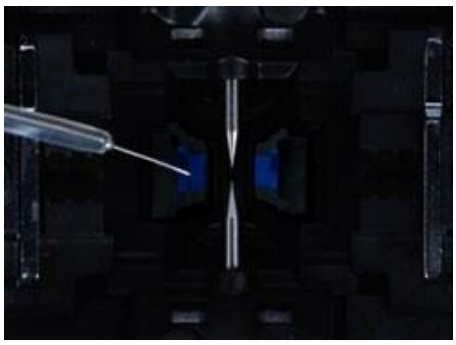
1) Unscrew the bolt.
2) Take out the worn holder.
3) Replace it by new one.
4) Tighten up the screw.

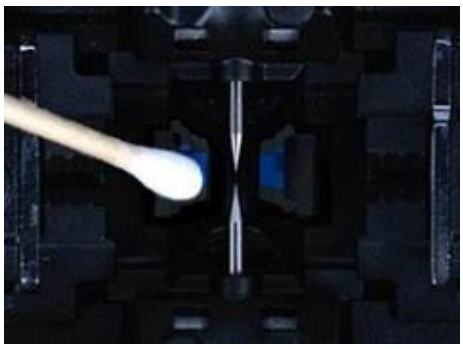
Caution

1) The unscrewed bolts remains in the holder (Do not take the bolts out).
2) Do not screw down the holder too tight.

Cleaning

V-Grooves





Clean fiber after cleaning with cotton swab

Caution

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

Splice

[Stabilize Electrodes]

In the event of a sudden change in environmental conditions or after cleaning electrodes, the arc power sometimes becomes unstable, resulting in higher splice loss. 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 set the arc power stable. If many tests are needed to get the "Test ok" message in [Arc calibration], use this function as well.

[Arc Calibration]

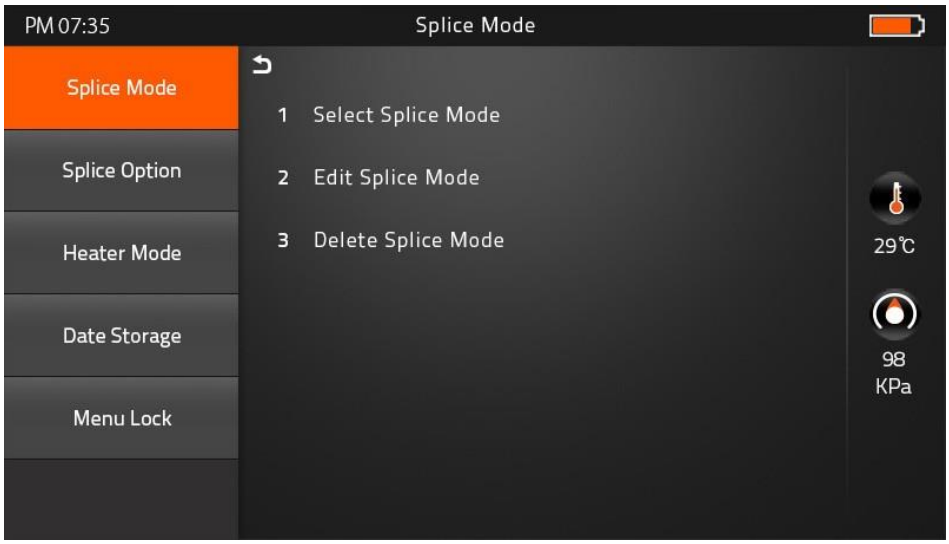
Atmospheric conditions such as temperature, humidity, and pressure are constantly changing, which creates variability in the arc temperature. This splicer is equipped with temperature and pressure sensors that are used in a constant feedback monitoring control system to regulate the arc power at a constant level. However, changes in arc power due to electrode wear and glass adhesion cannot be corrected automatically. 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 those 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.

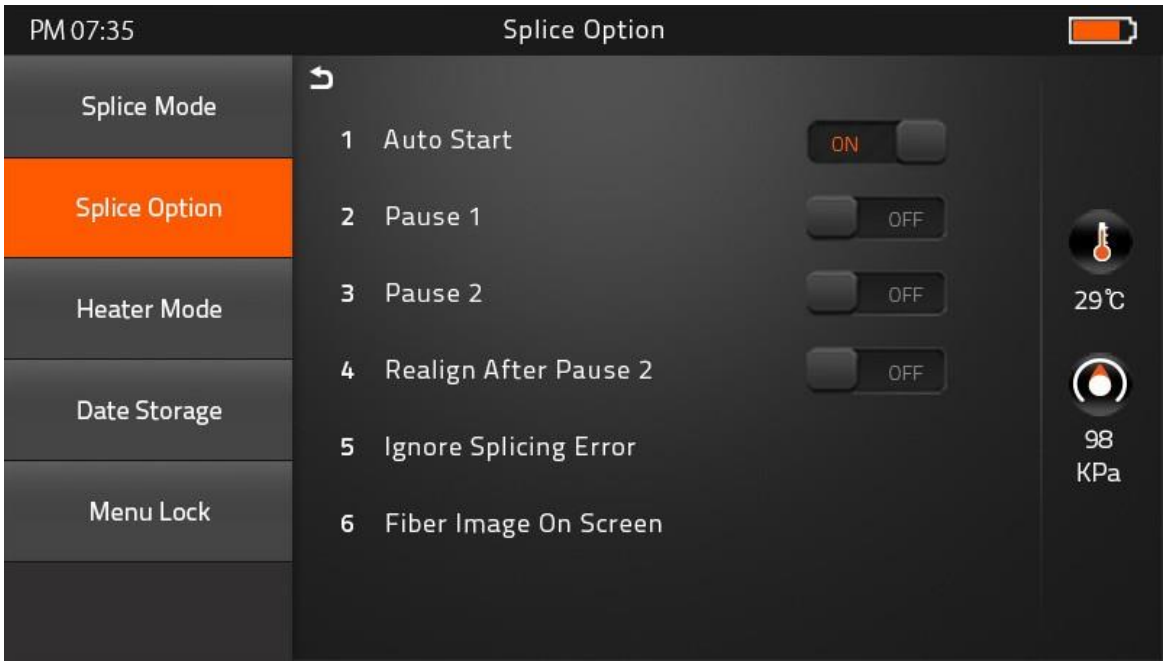
Splice Menu

1) Splice Mode



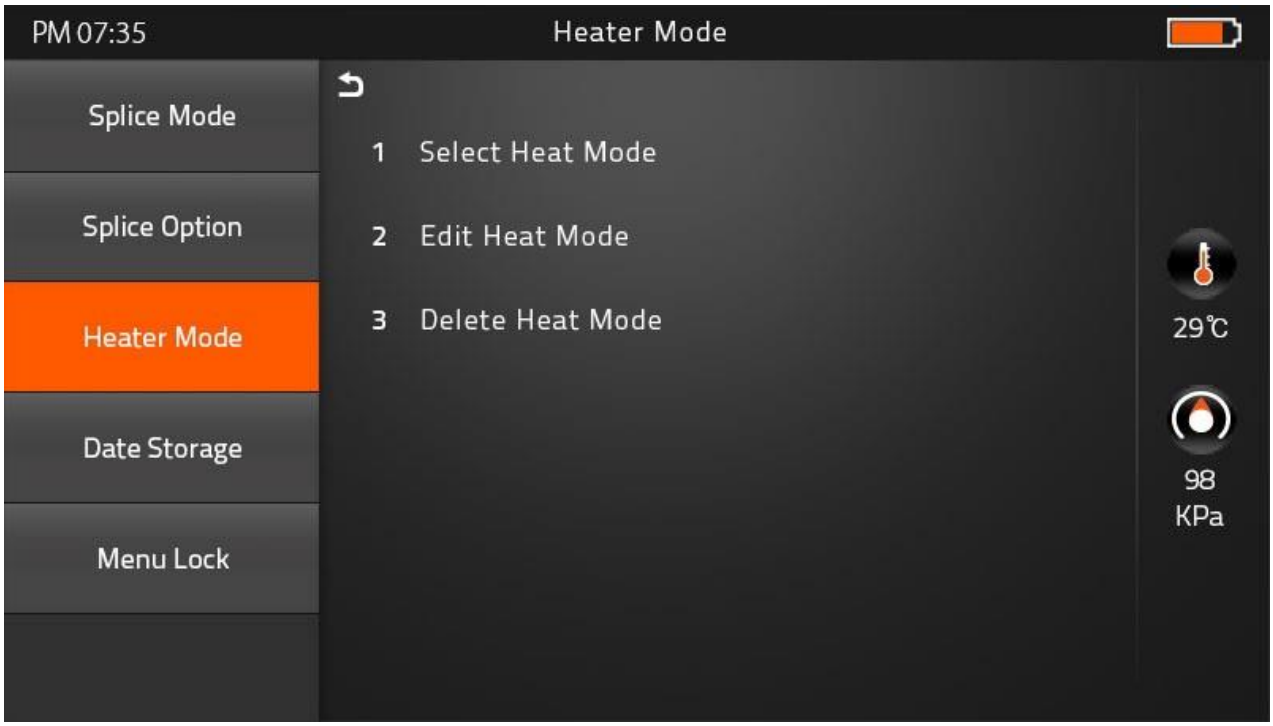
Factory Pre-Set Mode	8
User Mode	70+
Delete Splice Mode	-

2) Splice



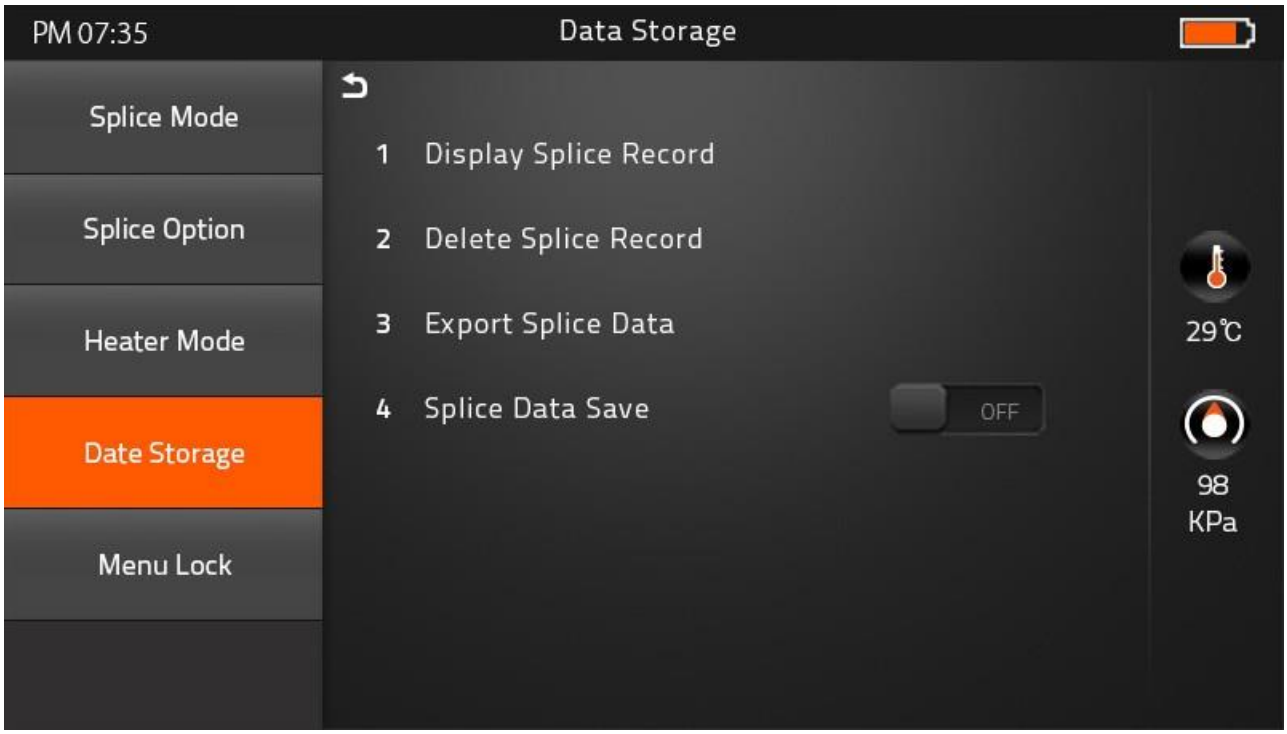
Auto Start	ON : Automatic splicing procedure
	OFF : Manual splicing procedure
Pause 1	ON : Pause after the fiber gap position process
	OFF : Proceeding without the pause
Pause 2	ON : Pause after camera focus & Axis alignment process
	OFF : Proceeding without the pause
Realign After Pause 2	ON : Automatically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

3) Heater



Factory Pre-Set Mode	3
User Mode	32
Delete Heater Mode	-

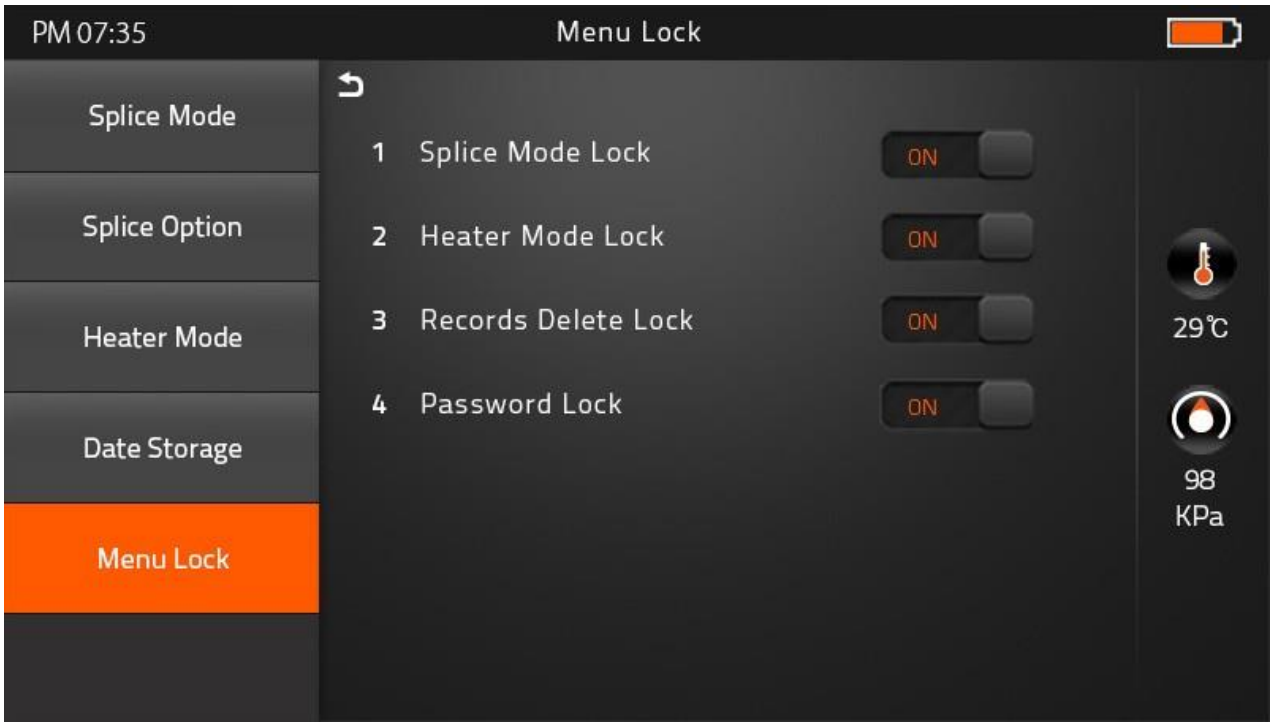
4) Data



Display Splice Record	Displaying your detailed splice record
Export Splice Data	Downloading saved data (Splice record or Image)
Splice Data Save	ON : Automatic data save * Image data is saved manually *
	OFF : Do not save splice record

5) Menu

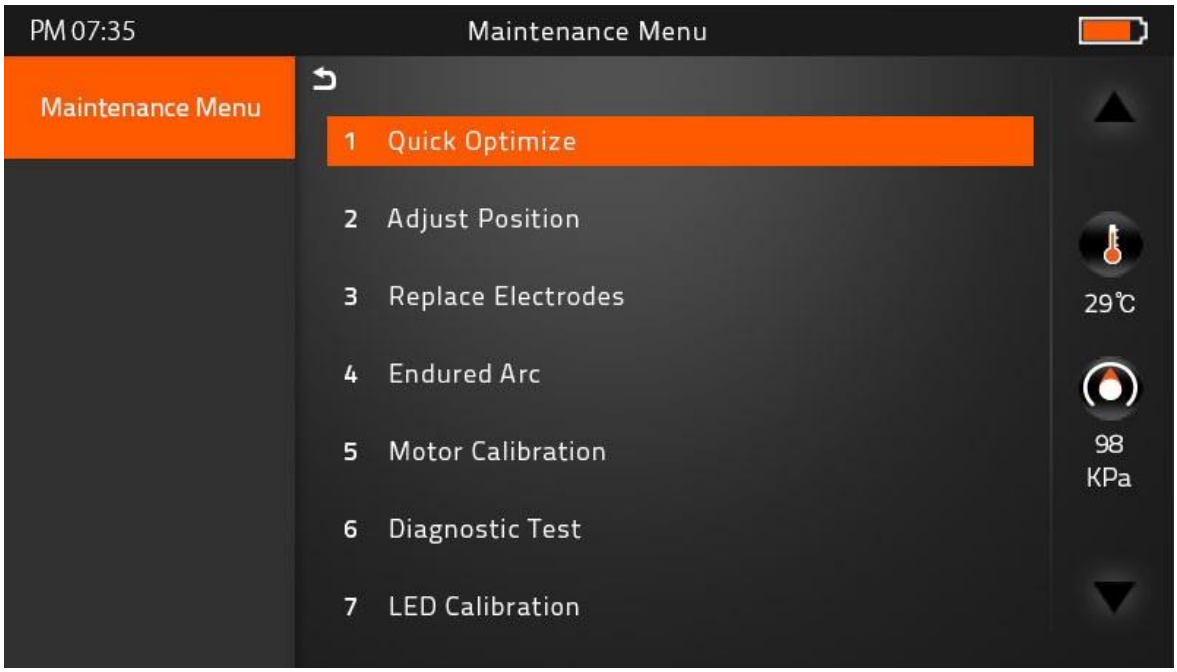
Input password to access the sub-menus



Splice Mode Lock	ON : Disable ‘Splice mode’ edit
	OFF : Enable ‘Splice mode’ edit
Heater Mode Lock	ON : Disable ‘Heater mode’ edit
	OFF : Enable ‘Heater mode’ edit
Records Delete Lock	ON : Disable ‘Record mode’ edit
	OFF : Enable ‘Heater mode’ edit
Password Lock	ON : Disable to change the password
	OFF : Enable to change the password

Maintenance

1) Maintenance Menu



▸ **Quick Optimize**

Quick & Easy overall maintenance.

Automatic process ‘Lens focus+motor calibration+fiber training’.

▸ **Adjust Position**

Find the optimized position for ‘Press & Align Motor’.

▸ **Replace Electrodes**

Instruction on how to replace electrodes FiberFox recommendation.

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

▸ **Endured Arc**

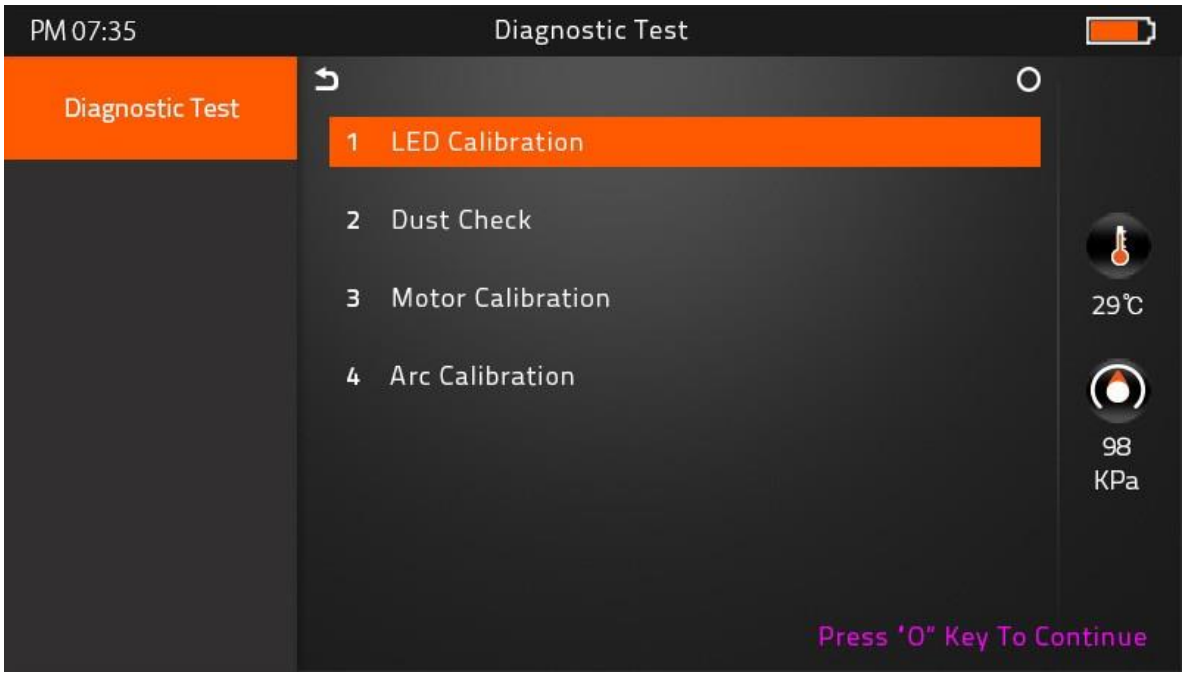
Training for new electrodes adjustment.

It occurs 30 times arc training for adjusting new electrodes function. It is recommended to try after finished Replace Electrodes menu.

▸ **Motor Calibration**

Automatically calibrates the speed of all six motors.

Diagnostic



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

▸ **LED Calibration**

Measures and adjusts the brightness of LED

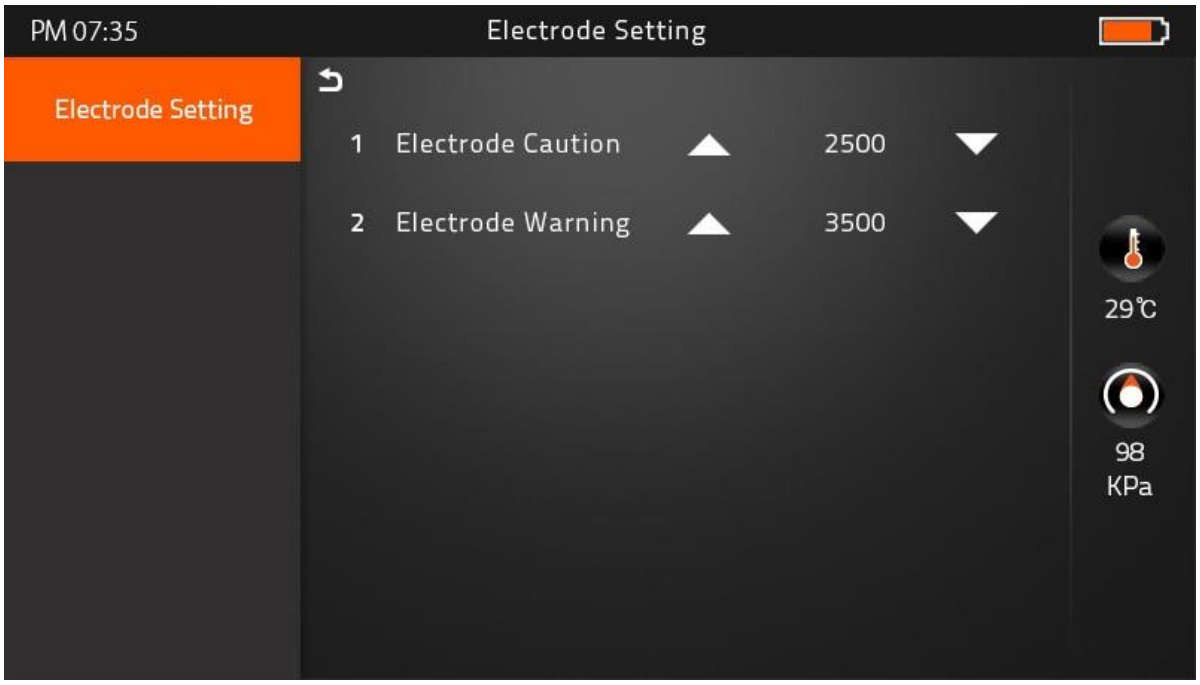
▸ **Dust Check**

Detect dust and 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 or LED may cause improper splicing result.

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

Electrode



Electrode Caution	Caution alarm will be displayed when it reaches the number of splicing cycles you set
Electrode Warning	Caution alarm will be displayed when it reaches the number of splicing cycles you set

▸ **Motor Drive**

It checks the operation status of 6 motors (L, R Press, X, Y Focus, X, Y Align).

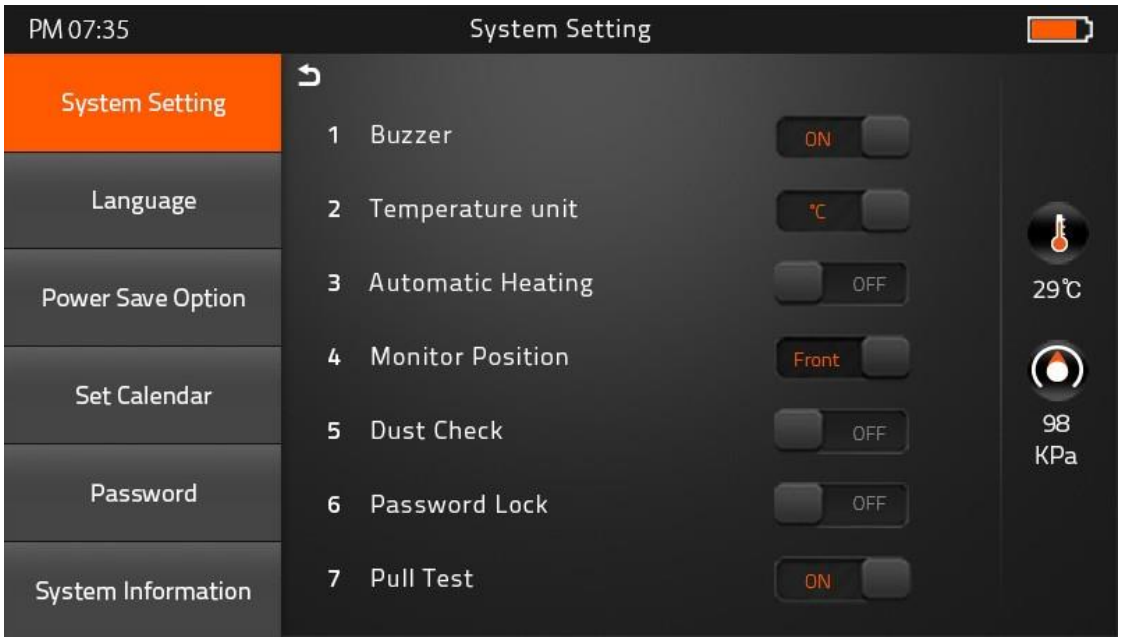
▸ **Update Software**

Upgrade to the latest 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.

Settings

1) System Setting

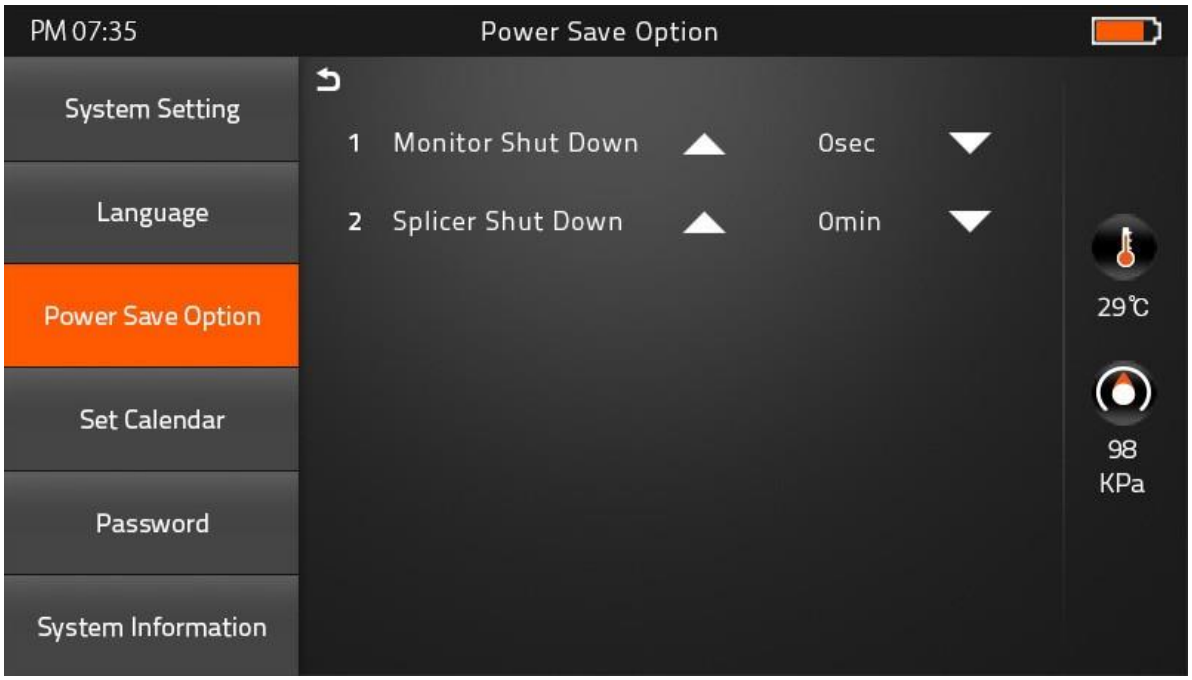


Buzzer	ON : Sound on OFF : Sound off
Temperature Unit	℃ : Celsius ℉ : Fahrenheit
Automatic Heating	ON : Auto start OFF : Manual start
Monitor Position	Front : Normal direction display Rear : Opposite direction display
Dust Check	ON : Check the dust density OFF : Skip dust checking process
Password Lock	ON : Password is required to operate the device OFF : No password is required
Pull Test	ON : Automatic pull test processing after splicing OFF : Skip pull test process

2) Set your own language.

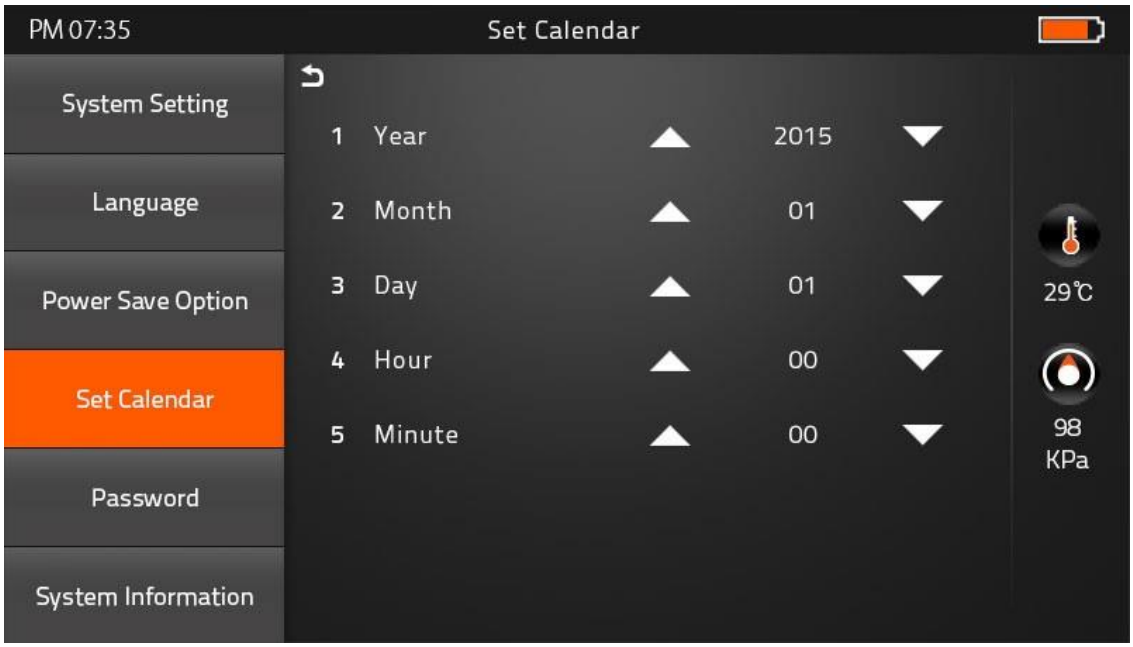
Language Available	
繁体中文	Việt
English	ةيبرعلا
한글	Español
Русский	Italiano
Deutsch	Português
Français	یسراف
ไทย	

3) Power Save



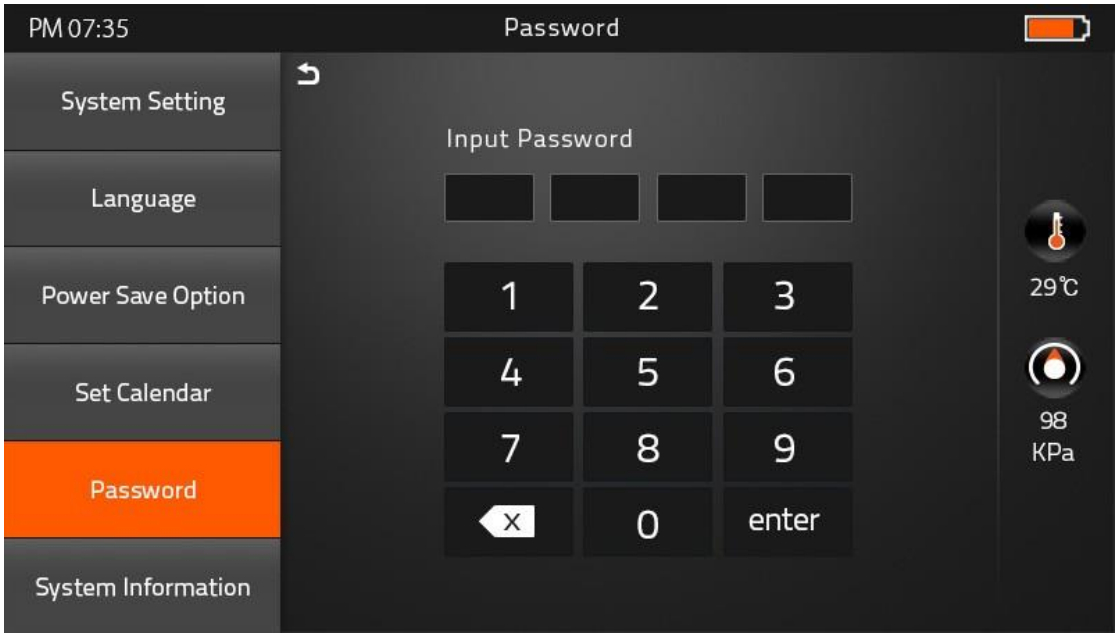
Monitor Shut Down	No input during the time you set, the splicer will block the power supply toward LCD System will be switched over to standby mode.
	Press the power button to resume (Screen will be back on).
Splicer Shut Down	No input during the time you set, the splicer will be shut down to save the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

4) Set



5) Password

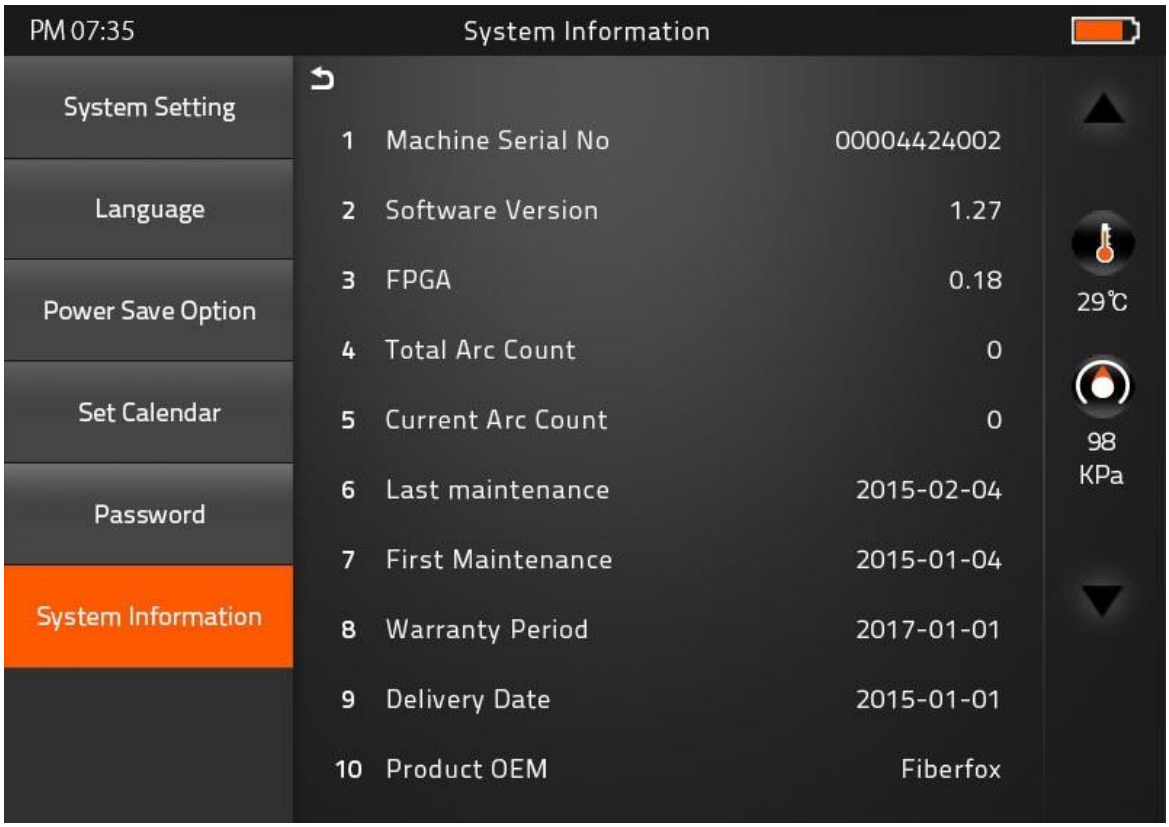
Change your password.



Procedure

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

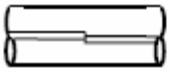
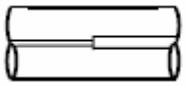
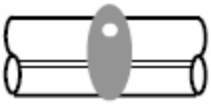
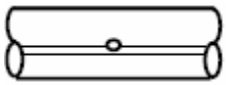
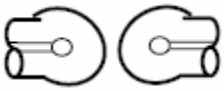
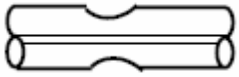
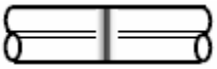
6) System Information



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

Appendix I

Splice loss increase: Reason and solution.

Symptoms	Cause	Corrective measures
Core axis deviation 	Dust on the Ribbon Groove or holder	Clean the Ribbon Groove or holder
Core angle 	Dust on the Ribbon Groove or holder	Clean the Ribbon Groove or holder
	Bad condition of fiber's tip	Check the performance of fiber cutter.
Core deformation 	Dust on the Ribbon Groove or holder	Clean the Ribbon Groove or holder
Irregular core 	Bad condition of fiber's tip	Check the performance of fiber cutter.
	Too low initial discharge or too short initial discharge time	Increase the initial discharge or initial discharge time
Inconsistent MFD 	Too low discharge	Too low discharge
Burned 	Bad condition of fiber's tip	Check the performance of fiber cutter.
	There is still dust after cleaning or discharge for cleaning	Clean the fiber carefully or increase the discharge duration for cleaning.
Bubbles 	Bad condition of fiber's tip	Check the performance of fiber cutter.
	Too low initial discharge or too short initial discharge time	Increase the initial discharge or initial discharge time
Separation 	Too much initial discharge or too long initial discharge time	Increase the duplicated area
		Decrease the initial discharge or initial discharge time
Thick 	Fiber is too long.	Decrease the duplicated area.
Thin 	Incorrect discharge amount	Conduct discharge calibration
	Some discharge elements are not correct	Adjust initial discharge, time and duplicated area.
Line 	Some discharge not correct	Adjust initial discharge, time and duplicated area.

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 center 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 Endface	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 still exist, please contact the sale agent
Unidentified Type of Fibers	Shock occurred to the splicer during the splicing process	Execute "Motor Calibration" 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 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
Fibers Mismatch	The fibers of two sides are different type	It may result in 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 or dirt is on the V-groove or the clamp chip	Clean V-groove and clamp chip. Prepare the fibers and re-load them
Focus Error	Too large axial offset(>0.4um)	Re-prepare the fibers
	The motor is not calibrated	Execute [Motor calibration]

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). 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 turns 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.
    - Extend the heating time.
- Method to change 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.
- 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 lay fibers while executing some specified function that fibers are needed. Return key is invalid. Open the wind protection shield, load prepared fibers in the splicer, and press “Set” to continue or press “Reset”
- Upgrading Failure
    - When users use the “New” U-disk to upgrade, the splice may not be able to correctly identify the upgrade file, you need to re-plug the U-disk, and restart the splicer
- Check if the upgrade file name and the format are correct.
- If you cannot solve the problem, please contact the sale agent.
- Other
    - Please refer to the video in user’s CD

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