

# **FIBER FUSION SPLICER OPERATION MANUAL**

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# **1. Instructions before Usage**

## **1.1. Safety Instruction**

*Please read the following information before first using.*

1. Please use the battery and adapter specified by our company, otherwise it may cause an explosion or permanent damage to the machine;
2. Do not use the optical fiber fusion splicer in high temperature, flammable and explosive environments (such as near gas stations);
3. Do not disassemble the fusion splicer and its accessories without authorization. Only authorized institutions can repair the fusion splicer;
4. Do not touch the electrode rod under working conditions, it may cause personal injury;
5. When liquid or foreign objects enter the machine, or smoke, odor, abnormal noise, etc., or the machine is strongly impacted, please turn off the fusion splicer immediately and unplug the AC power supply.

## 1.2. Notes

*When using this fusion splicer, it may cause damage to the machine or endanger human health due to improper operation. It is recommended to use the fusion splicer in the following ways.*

1. This type of fusion splicer is only used for splicing silica glass optical fibers, and cannot splice any other substances.
2. Do not use and store the fusion splicer in an environment with high temperature and humidity (otherwise it may damage the equipment or cause the performance of the machine to decline).
3. When used in a dusty environment, the fusion splicer should try to avoid dust;
4. When the fusion splicer moves from a low temperature environment to a high temperature environment, try to have a heating process to eliminate condensation;
5. Please use high-purity anhydrous alcohol (purity>99%) to clean the surface of magnifying glass, reflector and fiber V-groove;
6. Handle the fusion splicer gently, try to avoid strong

vibration and collision, and use the equipped carrying case for transportation and storage;

7. Carry out maintenance of the whole machine once a year.

### **1.3. Legal Statement**

The products described in this manual include the company's software, and no one can copy, distribute, modify, extract, decompile, disassemble, decrypt, reverse engineer the aforementioned software in any form unless the permission of the relevant right holder is obtained , rental, assignment, sublicense, and other violations of software copyright.

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Limitation of Liability: To the extent permitted by applicable law, under no circumstances shall the company be liable for any special, incidental, indirect or

consequential damages arising from the use of the relevant contents of this manual and the products described in this manual Indemnification, nor for any loss of profits, data, goodwill or anticipated savings.

To the extent permitted by relevant laws, under any circumstances, the company's maximum liability for losses suffered by you as a result of the use of the products described in this manual (except for damages under applicable laws in the case of personal injury) shall be The price you paid for this product is limited.

## 2. Overview of Fiber Splicer

### 2.1. Overview of Splicer

#### 2.1.1. Keyboard Appearance

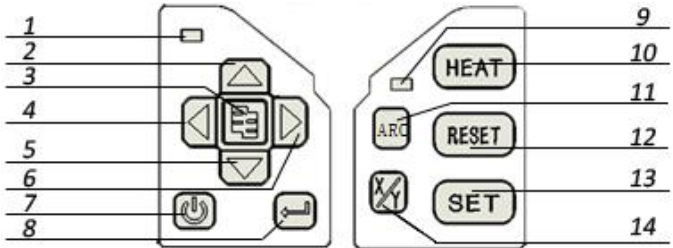




Figure2.1 Keypads





Table 1-- Function of Button






|               |                |                 |
|---------------|----------------|-----------------|
| 1 Power Light | 2 Up           | 3 Menu          |
| 4 Left        | 5 Down         | 6 Right         |
| 7 Power       | 8 Enter        | 9 Heating light |
| 10 Heat       | 11 Arc         | 12 Reset        |
| 13 Splice     | 14 Switch View |                 |

Table 2 --Keypads on the panel

|                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                        |
|-------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|    | <ul style="list-style-type: none"> <li>● While Power On, press this key to shut down.</li> <li>● While Power OFF, press this key to Power On.</li> </ul>                                                                                                                                                                                                                               |
|  | <ul style="list-style-type: none"> <li>● Under standby interface, press this key to discharge weak arc, usually for fiber cleaning</li> <li>● In menu interface, press this key to enter to submenu.</li> <li>● In the test interface such as arc testing and motor checking, press this key to execute the test.</li> <li>● In camera brightness or motor adjusting, press</li> </ul> |



|                                                                                     |                                                                                                                                                                                                                                    |
|-------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                     | <p>this key to switch the left and right sides of CMOS Sensor, Motors and so on.</p>                                                                                                                                               |
|    | <ul style="list-style-type: none"> <li>● Under standby interface, press this key to enter main menu.</li> <li>● Under the main menu interface, press this key back to the upper menu.</li> </ul>                                   |
|    | <ul style="list-style-type: none"> <li>● In motor adjust; press this key to drive up the fiber.</li> <li>● In menu interface, press this key to move up the cursor.</li> </ul>                                                     |
|    | <ul style="list-style-type: none"> <li>● In motor adjust; press this key to move down the fiber.</li> <li>● In menu interface, press this key to move down the cursor.</li> </ul>                                                  |
|  | <ul style="list-style-type: none"> <li>● Under standby interface, after closed the windproof cover, press this key to gap the fiber.</li> <li>● Under the main menu interface, press this key to move to the left icon.</li> </ul> |

|                                                                                     |                                                                                                                                                                                                                                                                                                                                          |
|-------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                     | <ul style="list-style-type: none"> <li>● In motor adjust; press this key to drive the left motor back or the right motor forward</li> </ul>                                                                                                                                                                                              |
|    | <ul style="list-style-type: none"> <li>● Under standby interface after closed the windproof cover, press this key to align the fiber.</li> <li>● Under the main menu interface, press this key to move to the right icon.</li> <li>● In motor adjust; press this key to drive the left motor forward or the right motor back.</li> </ul> |
|    | <ul style="list-style-type: none"> <li>● Under standby interface, press this key to fuse.</li> </ul>                                                                                                                                                                                                                                     |
|    | <ul style="list-style-type: none"> <li>● In Power On state, press this key to reset motor position.</li> </ul>                                                                                                                                                                                                                           |
|   | <ul style="list-style-type: none"> <li>● Under standby interface, press this key to switch X/Y view.</li> </ul>                                                                                                                                                                                                                          |
|  | <ul style="list-style-type: none"> <li>● Under standby interface, after closed the windproof cover, press this key to run auto splice.</li> </ul>                                                                                                                                                                                        |

## 2.2. Technical Parameters

Table 3 Technical Parameter

|                     |                                                                                                                |
|---------------------|----------------------------------------------------------------------------------------------------------------|
| Applicable fiber    | SM, MM, DS, NZDS, others                                                                                       |
| Cladding diameter   | 80 -150um                                                                                                      |
| Coating diameter    | 160 - 1000um                                                                                                   |
| Typical loss        | SM: $\leq 0.02$ dB; MM: $\leq 0.01$ dB;<br>DS: $\leq 0.04$ dB; NZDS: $\leq 0.04$ dB                            |
| Return loss         | Better than 60dB                                                                                               |
| Cutting length      | 5-16mm(Coating layer Diameter: $<250\mu\text{m}$ )<br>16mm(Coating layer Diameter: $250\sim 1000\mu\text{m}$ ) |
| Program             | 40 groups                                                                                                      |
| Operation mode      | Auto mode and Manual mode                                                                                      |
| Auto heating        | Supported                                                                                                      |
| Typical splice time | 7 seconds                                                                                                      |
| Heating time        | 26 seconds, heater temperature and time are adjustable,                                                        |

|                     |                                                                                               |
|---------------------|-----------------------------------------------------------------------------------------------|
| Observation mode    | Dual high-sensitivity cameras XY axis real-time observation                                   |
| Fusion Records      | Support to store 4000 groups of fusion records                                                |
| Estimate loss       | Supported                                                                                     |
| Tension             | Supported, 1.8~2.2N                                                                           |
| Operation Interface | Support touch screen operation and physical button operation, graphical menu interface, clear |
| Battery capacity    | Large capacity power, pluggable and replaceable, real-time power monitoring                   |
| Power supply        | Adapter : AC100-240V(50/60HZ); Output : DC11~13.5V                                            |
| Electrodes times    | More than 4000 times, easy to replace                                                         |
| Interface           | USB2.0 for export record and software upgrading                                               |

### **3. Detail of Splicing Operation**

A full fiber splice procedure including: the fiber preparation, fiber splicing, and tension testing, heating and cooling of shrink tube. This chapter will introduce details of the specific process of the fiber splice.

### 3.1. Power on

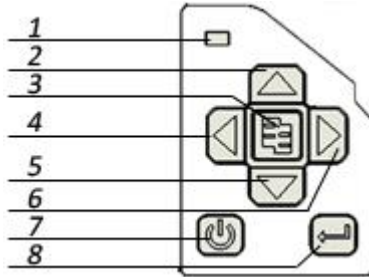


Figure 3.1 Power On

Press and hold the power button until the power indicator light is on, then, LCD is lit, and the machine enters to the self-test screen as showed in Figure 3.1.

### 3.2. Fiber End Face Preparation

Prepare two optical fibers; put one side into the heat shrink tube as shown in Figure 3.2.

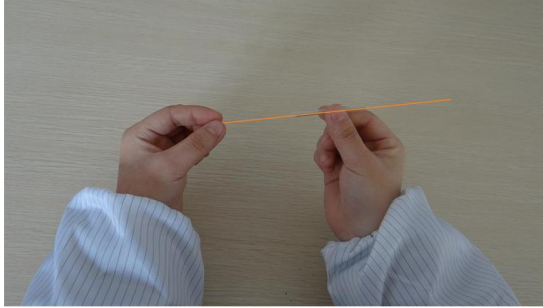


Figure 3.2 Heat Shrink Tubing

As shown in Figure 3.3, clenched fiber cleaver, place the fiber into the tooth of clamp by the left hand, reserve bare fiber 30 to 40 mm stripped fiber coating. Use a cotton ball dipped in anhydrous alcohol (purity>99%) wipes off the remaining coating debris on the fiber surface, as shown in Figure 3.4.



### Figure 3.3 Remove Fiber Coating

Put the cleaned fiber into the cutter positioned groove, the edge alignment of the fiber coating cutter ruler “13” scale outside (the scale is greater than 13, shown in Figure 3.4). Close small platen; the bare fiber must be put straight on the left and right rubber on the chopping block. Then close the large plate, and push the cutter blade slider to the other end to cut off the fiber.

After cleaving, open the large pressure plate and the small pressure plate in turn, carefully take out the optical fiber with the cut end face, and do not let the optical fiber section touch any other objects to avoid damage or contamination of the end face. Take away the cut and broken fibers and put them in the waste fiber storage box (the broken fibers are extremely harmful to human health, please be sure to collect and dispose of the broken fibers uniformly). A second fiber is then prepared in the same way.



Figure 3.4 Fiber Cleaving

### **3.3. Setting Fibers in Splicer**

Open the windproof cover and fiber platens put the prepared fiber into V-groove through the locating slot. Make sure that the fiber end face should be located between V-groove edge and two electrodes as shown in Figure 3.5.

Please operate carefully and don't let the fiber end face touch any other object. Then close the large platen to fix optical fiber, which should be placed horizontally in the V-groove, without upturned phenomenon. If clamping failed, you can lift fiber carefully and repeat the above operation until the fiber clamping is qualified.



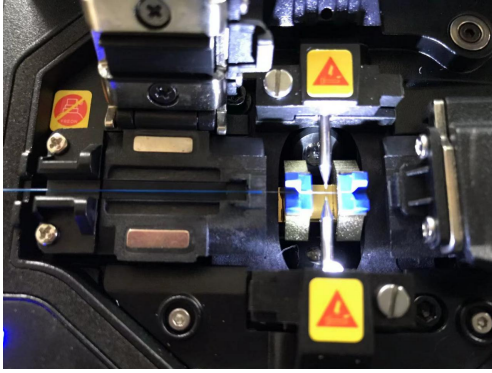


Figure 3.5 Fiber Clamping

Similarly, prepare and clamp another optical fiber.

Then, close the windproof and continue to observe the amplified fiber from the display. If the fiber end face is obviously uneven, tilt or damaged, please remove the fiber to cut again.

### **3.4. Splicing Operation**

After clamping, the machine is in ready state, as shown in Figure 3.6. If in "Automatic" splice mode, auto splice begins once the windproof closed. If in "Manual" splice mode, user needs to click the icon “▷” bottom of the screen or press the "SET" button to run the splice routine.



Figure 3.6 Ready Interface

If the splice parameters are not set correctly, please select the splice parameter group according to the type of fiber to be spliced. Steps as below:

Press “MENU” to enter the main menu, and then select the “parameters” icon and press the “enter” key or touch “parameters” icon, to enter the menu. Select fusion parameter group matched with splice fiber type.

When the fusion splicer starts to splicing, it first drives the motor, which will promote both sides of fibers to the middle of the screen, judging the fiber end face to see if it meets the requirements. And display the fiber end face information on the screen in the form of angle. If qualified, turn to the next process, otherwise a tip of bad end face will show on the screen, a new fiber need to be prepared.

After meeting the set end face conditions, the pushing motor will further push the fiber to the position to be spliced, and the aligning motor precisely aligns the fiber. Finally, the electrode discharges to splice the fiber. After the welding is completed, the machine will give the estimated value of this welding loss and perform a tension test.

### **3.5. Storing the Splice**

Due to that optical fiber fusion point is relatively fragile and easy to break; it needs to be protected by heat shrinkable sleeves.

The procedures as following:

Open the windproof cover, large platen, take out the optical fiber gently, do not bend the optical fiber greatly to avoid the broken of fusion point. Move the heat shrink sleeve to the splice point, which is in the middle of the sleeve. Open the heater tank's cover, pull the optical fiber with both hands, put the heat shrinkable sleeve into the heating furnace, and the sleeve is located in the middle of the heating furnace. Close the heater's cover and the heater light is on, it starts to heat. Wait until the light is off, the heat shrinking is completed. Figure 3.7 shows the fiber heat

shrinkable sleeves before and after heat shrinking from top to bottom.

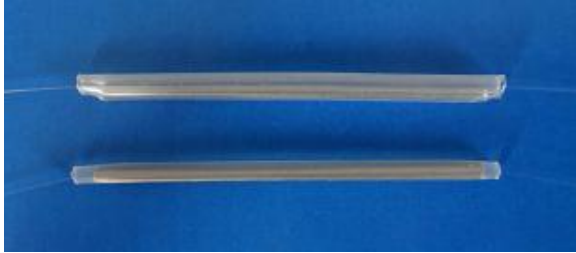


Figure 3.7 Heat Shrinkable Sleeves

### **3.6. Cooling**

Please pay attention that the temperature of the sleeve after heat shrinking is very high and needs to be cooled. Hang the cooling tray on the handle, so after the heating is completed, pull the optical fiber out of the heating furnace with both hands, put it into the cooling tray, wait until the sleeves cool to normal temperature.

## **4. Introduction of Menu**


The machine adopts METRO-style menu, which is simple, beautiful and convenience for operation. It supports touch screen function. The operation interface has 6 icons, and each icon corresponds to different functional menu as


showed in Figure 4.1.




Figure 4.1 Menu Interface

For the main menu interface:



In standby state, press the key  to enter interface of main menu.



In the main menu, press the key  to exit the main menu to standby interface.

In the main menu, press the direction keys, and the corresponding direction on the next icon is selected.

Press the key  to enter the submenu.

In submenu:

Press the key  or  to select the up down cursor.

Press the key  or  to modify the current value.

Press the key  $\leftarrow$  to enter the next submenu.



Press the key  $\equiv$  to enter the upper menu.


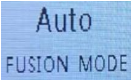
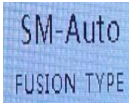

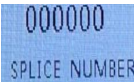




## 4.1. Workbench

In the main menu interface, touch the workbench or press the  $\equiv$  key to enter the standby interface. The standby interface is shown in Figure 4.2



Figure 4.2 Standby Interface

|                                                                                     |                                                                                                             |
|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------|
|  | The time bar of the fusion splicer, showing the current time of the fusion splicer;                         |
|  | The status bar of the fusion splicer, showing the status of fusion splicer and splicing process information |

|                                                                                     |                                                                                                                                             |
|-------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------|
|    | <p>The battery bar of the fusion splicer, showing the battery level.</p>                                                                    |
|    | <p>Display the fusion mode of the fusion splicer. Click it to quickly enter the operation mode setting menu to set the welding process.</p> |
|    | <p>Showing the current splice parameters ;Click to quickly modify the parameters of the welding group;</p>                                  |
|    | <p>Showing the temperature of the heater. Click to quickly modify the heating parameter.</p>                                                |
|    | <p>Showing total splicing numbers</p>                                                                                                       |
|    | <p>Click to turn on /off heater</p>                                                                                                         |
|   | <p>Click to start fiber splicing</p>                                                                                                        |
|  | <p>Click to the main menu;</p>                                                                                                              |
|  | <p>Click to switch X/Y view</p>                                                                                                             |

## 4.2. Parameter



| Parameter          |        |
|--------------------|--------|
| Operation mode     |        |
| Selest Paras Group |        |
| Temperature        | 180°C  |
| Heating Time       | 36S    |
| Pre-Heat           | NORMAL |
| Tension            | OFF    |

Figure 4.3 Splice Parameter

"Parameter" menu is used to select and set the operation mode, fiber splicing parameters, heating etc..

### 4.2.1. Operation Mode

The operation mode is the process method of the fusion splicer splicing optical fibers, which consists of the following parameters (as shown in Figure 4.4).



| Operation Mode |      |
|----------------|------|
| Fusion Mode    | Auto |
| Gapping Pause  | OFF  |
| Aligning Pause | OFF  |
| Reset Second   | 03S  |
| Aligning View  | ON   |
| Last View      | -X-  |

Figure 4.4 Operation Mode

**Fusion Mode:** There are automatic and manual modes. If it is “automatic” mode, the fusion splicer starts to run the fiber splicing program automatically, after closing the windshield in the standby interface. Under the manual mode, the user needs to press the "SET" button or touch the icon  $\triangleright$  before the fusion splicer starts to splice the fiber. Press the key  $\leftarrow$  or touch this option, the parameter value will be switched between "Auto" and "Manual".

**Gapping Pause:** It means that during fiber splicing, after the optical fiber is forwarded to meet the gap condition, the program suspends operation and waits for further operation by the user. To continue splicing, press "SET" button or  $\triangleright$  at the bottom of the screen. To interrupt splicing, press the "RESET" button. Press the key  $\leftarrow$  or touch this

option, the parameter value will be switched between” ON” and “OFF”.

**Aligning Pause:** It means fiber suspend the running at the end of the subsequent process of aligning. To continue splicing, press "SET" button or ▷ at the bottom of the screen. Press the key ←↵ or touch this option, the parameter value will be switched between” ON” and “OFF”.

**Reset Second:** After the optical fiber is spliced, open the windshield and wait for a period of time for the motors back to initial position. The waiting time is “reset second”. After selecting this menu, press key ◀ or ▶ ; or touch ◀ or ▶ icon on the screen to change the parameter values.

**Aligning View:** When it is” ON”, the fiber is aligned and the fiber is centered during aligning process; when “OFF”, the fiber is not aligned, and it may not be centered. Press the key ←↵ or touch this option, the parameter value will be switched between” ON” and “OFF”.

**Last View:** It is used to switch the last view mode when splice completed. Users can press the key ←↵ or touch this option to switch the fiber image view mode.

## 4.2.2. Operation Mode

| Parameters        |    |
|-------------------|----|
| 7 Calibrate/DS-DS |    |
| 8 Calibrate/NZ-NZ |    |
| 9 Normal/SM-SM    |    |
| 10 Normal/SM-SM   |    |
| 11 Normal/SM-SM   | ON |
| 12 Normal/SM-SM   |    |

Figure 4.5 Parameters

Menu forms by different splicing parameters, as shown in Figure 4.5. Each sub-menu is a group of splicing parameters, and the menu is composed by 4 parts with the number, file name, mode and status. Number from 1 to 40, a total of 40 groups of parameters can be used. There are three modes: Auto, Calibrate, and Normal. The Auto parameters are optimized by the manufacturer and cannot be modified. It is recommended for new users. The data of the Calibrate parameters can be modified except the prefuse time and fusion time. All values in “Normal group” parameters can be modified.

Type is the fiber type corresponding to the parameter group.

SM, MM, DS, and NZ represent the parameters of this group for single-mode fiber, multi-mode fiber, dispersion-shifted fiber, and non-zero dispersion-shifted fiber, which must be consistent with the type to be spliced. Status indicates whether the group of parameters are currently in usage, ON/OFF means in use/unused.

Press the key ▲ or ▼ to change the current splicing parameter group. Press the key ↵ to enter the para group. Or directly click the option to set the parameter group to enter the parameter setting menu; as shown in Figure 4.6.



| Set Parameters |  | No.:07 | ⏪ | ⏩ |
|----------------|--|--------|---|---|
| Prefuse time:  |  | 016ms  |   |   |
| Fusion time:   |  | 2.0S   |   |   |
| Arc value:     |  | 057    |   |   |
| Overlap:       |  | 015um  |   |   |
| Gap:           |  | 006um  |   |   |
| Endface:       |  | 3.0°   |   |   |
| State:         |  | ON     |   |   |

Figure 4.6 Set Parameters

The parameter consists of the following parameters:

**Prefuse time:** After the fiber is forwarded to the fusion splicing position and aligned, the fiber is preheated by short-term discharge. This is prefuse time. The single-mode

time is 16ms, and the multi-mode time is 25ms. It is not recommended for new users to modify this parameter value. Press ◀ or ▶ key or touch this option, click ◀ or ▶ key on the screen, it will increase or decrease the parameter value.

**Fuse time:** After the pre-discharge, the fusion splicer starts the fusion discharge. The discharge lasts for a long time which is called fuse time. The length of this period is 2.0 seconds for both single-mode fiber and multi-mode fiber. It is not recommended for new users to modify this parameter value. Press ◀ or ▶ key or touch this option, click ◀ or ▶ key on the screen, it will increase or decrease the parameter value.

**Arc value:** It refers to the current intensity of the discharge arc when machine starts to splice. A higher current value corresponds to a stronger arc, resulting in higher temperature and more serious fiber ablation. Press ◀ or ▶ key or touch this option, click ◀ or ▶ key on the screen, it will increase or decrease the parameter value..

**Overlap:** When the optical fiber is spliced, the high temperature generated by the arc melts the optical fiber, and the optical fiber needs to be pushed forward to make the optical fiber contact and fuse. The forward advance distance of the optical fiber is the overlap. Press ◀ or

▶ key or touch this option, click ◀ or ▶ key on the screen, you can modify the value.

**Gap:** Before the fiber is spliced and the arc is released, the two fibers need to run to a relatively close position. The distance between the end faces of the two fibers is the gap between the left and right fibers. Press ◀ or ▶ key or touch this option, click ◀ or ▶ key on the screen, you can modify the value

**Endface:** It is the angle between the end face of the left and right fiber and the vertical direction in the X and Y two-way fiber images. The maximum end face angle refers to the maximum allowable end face angle when judging the fiber end face. If the face angle judgment always fails, the value of this parameter can be appropriately increased, but the splicing loss may be increased. Press ◀ or ▶ key or touch this option, click ◀ or ▶ key on the screen, you can modify the value

**State:** It refers to whether the parameter group is the current splicing parameter group. Press the button ◀ or ▶ or touch this option to change the parameter.

### 4.2.3. Temperature

Press the key ◀ / ▶ or click the ◀/▶ on the screen will change the temperature of the heater.

#### **4.2.4. Heating Time**

Press the key ◀ / ▶ or click the ◀/▶ on the screen will change the heating time of the heater.

#### **4.2.5. Pre-Heat**

Press ◀ key or touch the option to switch Normal/Rapid mode.

#### **4.2.6. Tension**

When this option is turned on, once the fiber is spliced, a pulling force of 2 N will be applied to the fiber to test the quality of the splicing. If the fiber is pulled and broken, it indicates that the fiber splicing has failed. Press the key ◀ key or touch the option to switch the tension state between ON and OFF.

### **4.3. Setup**

The “Setup” menu is used to set the data including the camera brightness, language, Flashligh, Beep sound etc., as

shown in Figure 4.7.



Figure 4.7 Setup Menu

### 4.3.1. Camera Brightness

The camera brightness menu sets the value of the CMOS sensor in the camera, increasing the gain will increase the image brightness. Press the key  $\leftarrow$  or touch the option to enter the interface of camera brightness, as shown in Figure 4.8. Under this interface, press the key  $\blacktriangle$  or  $\blacktriangledown$  or touch  $\blacktriangleleft$  or  $\blacktriangleright$  icon on the screen to modify the value of CMOS. Press the key  $\leftarrow$  or touch X/Y on the screen to switch the CMOS camera sensor between X and Y.



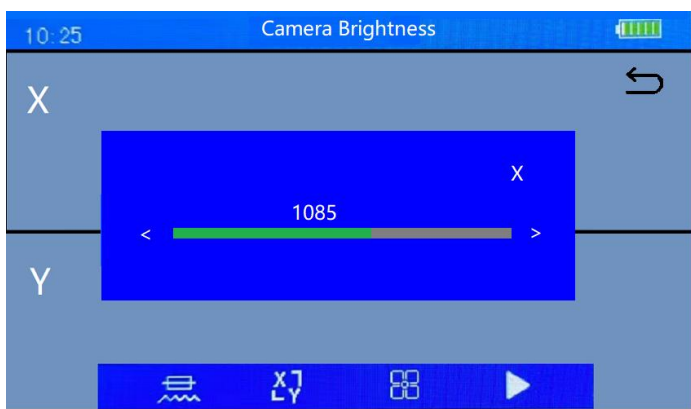


Figure 4.8 Camera Brightness

### 4.3.2. Language

Language shows the current software in usage as showed in Figure 4.9.

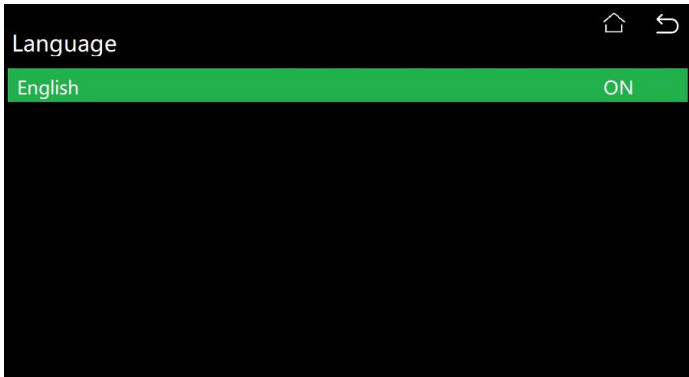


Figure 4.9 Language

### **4.3.3. Flashlight**

This is used to control the LED light on/off. When flipping the screen to splice fiber, users could turn off the LED light to avoid the light directs to eyes.

### **4.3.4. Beep sound**







When beep is on, when pressing the button or touch the screen, there will be a beep sound. When it is off, there will be no sound in such operation.

### **4.3.5. Auto power off**

When the option is turned on, if there is no operation within

10 minutes, the machine will automatically turn off.

### 4.3.6. Calender

This is used to set the time and date of the machine. Press the key  or touch the option to enter the interface of Date/Time as shown in Figure 4.10. Press the key  or  to move the selection cursor, and then press the key  or  to modify the selection value. Or touch the area where need to be modified. Press  key to effect the change.

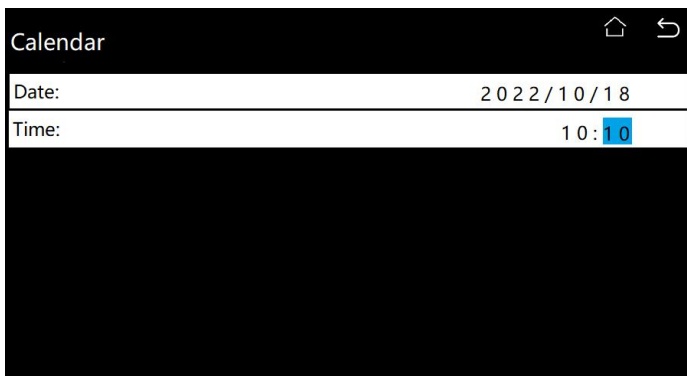


Figure 4.10 Calender

## 4.4. Function

The function menu lists some functions of the fusion splicer, such as motor push test, screen flip, export records,

software upgrading and arc adjustment as shown in Figure 4.12

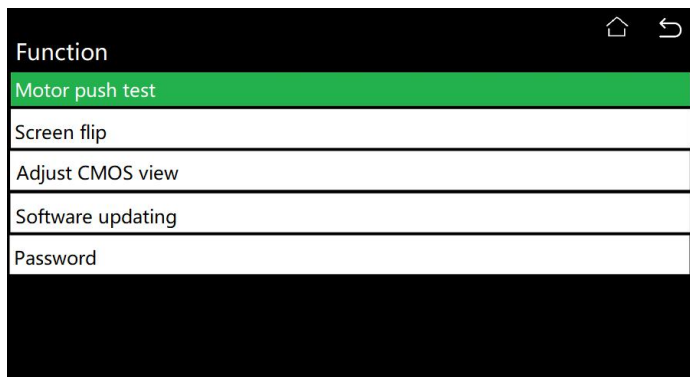


Figure 4.12 Function Menu

#### 4.4.1. Motor Push Test

The motor push test simulates the distance of the push motor moving forward during automatic splicing process. Press the  $\leftarrow$  key or click the option to enter the test interface, completely follow the steps of splicing the optical fiber, cut and clamp the optical fiber, and press the  $\leftarrow$  key or  $\triangleright$  icon on the screen to start the test. The results will be shown after the testing finished, which means the forward distance of fiber during the pushing process, as shown in Figure 4.13.

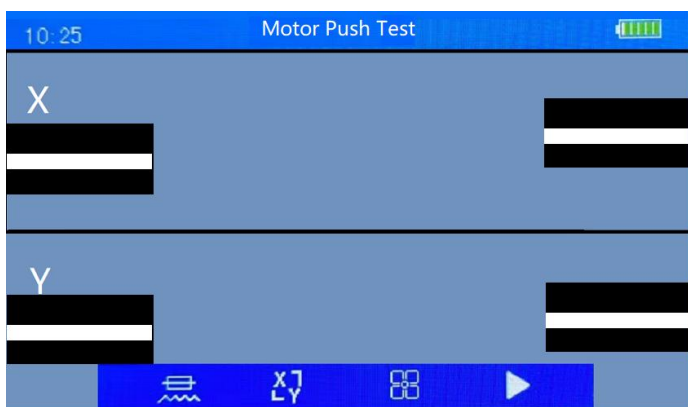


Figure 4.13 Motor Push Test Menu

## 4.4.2. Screen Flip

Press this menu, it could flip screen when the user operate the machine from the back side.



Figure 4.14 Motor Push Test Menu

### 4.4.3. Adjust CMOS View

Press the direction button to adjust the fiber's position in the display, press  $\leftarrow$  key or touch the X/Y icon on the screen to change the X/Y view. Shown as in Figure 4.15.

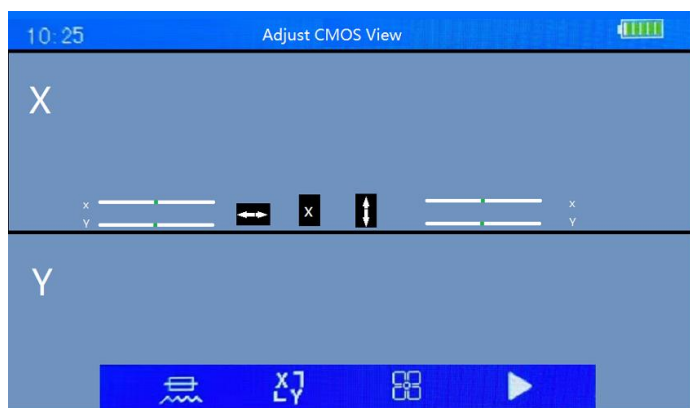


Figure 4.15 Adjust CMOS View

### 4.4.4. Software Updating

This function is used to upgrade software in the machine. After the U disk with upgrade file inserted into USB port, choose this option and press the key  $\leftarrow$  or touch the option to upgrade, otherwise it will remind error. After upgraded, and users need to restart the fusion splicer.

### 4.4.5. Password

This function is used for user to set the password, after this password setting, user needs to input the password every time to turn on the machine.

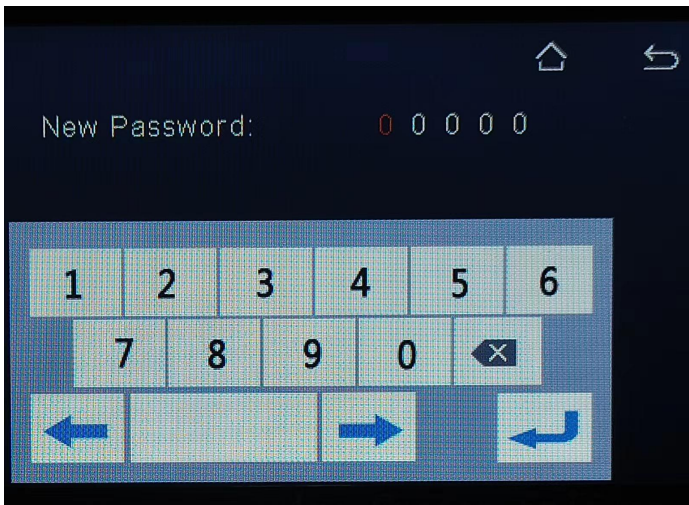


Figure 4.16 Password

## 4.5. Maintain

The Maintain menu consists of rapid diagnosis, motor adjust, electrodes aging, fusion records, fusion numbers, adjust CMOS view, as shown in Figure 4.17.



Figure 4.17 Maintain Menu

### 4.5.1. Rapid Diagnosis

Rapid diagnosis is used to check the fusion splicer camera brightness, LED brightness, ARC value etc. , press Enter key, it will start checking automatically, this will make the common maintaining work more simply for end users, as shown in Figure 4.18.











Figure 4.18 Rapid Diagnosis

## 4.5.2. Motor Adjust

Motor adjust is used to check the motor performance or change the motor position manually. It includes left and right pushing motors, left and right aligning motors.

Press the key  or touch the option to enter the menu as shown in Figure 4.20. Press the key  to switch the left and right motors. The align motor will move up or down by pressing the key  or . For left pushing motor, press the key  or  to move it back or forward, while the right pushing motor is opposite.

If the direction of the up and down adjustment is not correct, keep moving until it is in the correct position.

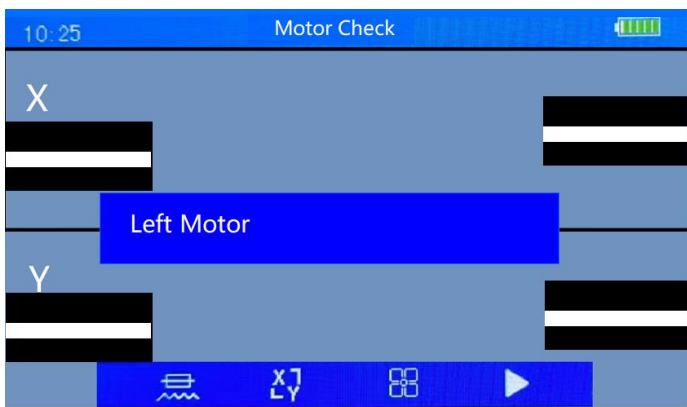


Figure 4.19 Motor Adjust

### 4.5.3. Arc

Arc includes the Arc test, Arc calibration, replace electrodes, electrodes aging, please check figure 4.20.



Figure 4.20 Arc

### 4.5.3.1 Arc Test

Select this option into the interface, as shown in Figure 4.20. According to splicing procedure, cleaving and clamping the fiber, and then press the key  $\leftarrow$  or click  $\triangleright$  on the screen. The calibration program starts to run and give test results. According to the test results, set the arc value in splicing parameter group. Repeat the above steps until the test results meet the requirements.

Parameter modification requirements: the default value is between 8 and 10, modify 1 current parameter every 5 values from the center value, that is, if the calibration result is greater than 10, the discharge current value in the welding parameters should be reduced, and vice versa.

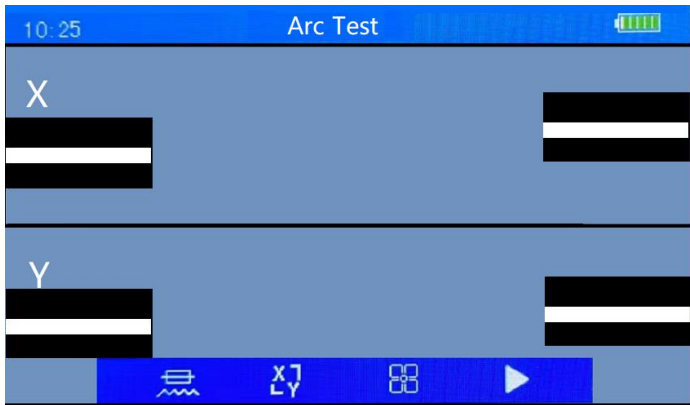


Figure 4.21 Arc Test

### 4.5.3.2 Arc Calibration

Select arc calibration, the screen as shown in Figure 4.22. Cleave and clamp the fiber according to the steps of splicing fiber, touch the icon ">" at the bottom of the screen or press the  $\leftarrow$  key, the calibration program starts to run and the test result is given.

The automatic calibration will automatically change the discharge current in the welding parameters according to the test results. If it shows "Arc calibration complete", the current value is an appropriate current value; if it displays "Arc is too large or arc is too small", then restart prepare the fiber and test again until the test result shows "Arc

Calibration Complete"

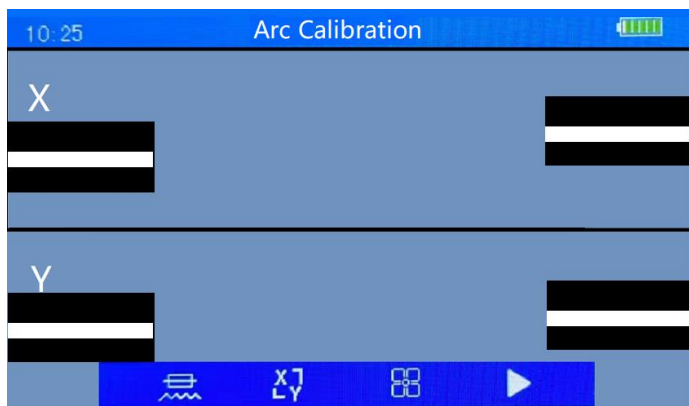


Figure 4.22 Arc Calibration

### 4.5.3.3 Replace electrodes

When replacing electrodes, press  $\leftarrow$  key to start, machine will power off automatically, replace the electrodes, restart the machine, shown as below Figure 4.23. Current Arc Count will be cleared to 0000000.

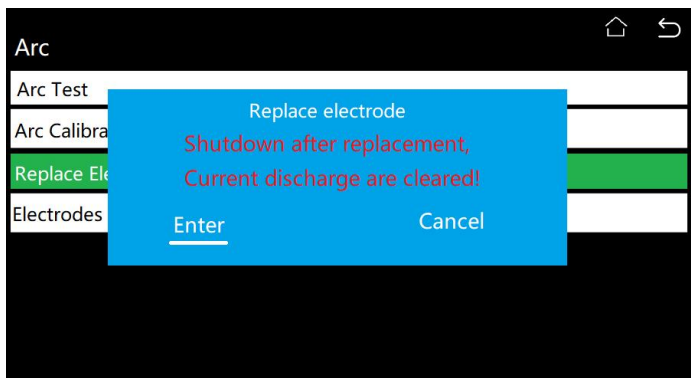


Figure 4.23 Replace electrodes

#### 4.5.3.4 Electrodes aging

Due to the instability of new electrode, it needs to discharge several times to stabilize the arc. This process is called electrode aging.

When new electrode replaced, select this menu and then press the key  $\leftarrow$  or touch the option to start aging the electrode. Do not open windproof cover during the process.

#### 4.5.4. Fusion records

It includes current fusion, fusion numbers, fusion records and export records, as below figure4.24 shows.

| Fusion Records  |        |
|-----------------|--------|
| Current fusion: | 000000 |
| Fusion number:  | 000000 |
| Fusion records: | 000000 |
| Export Records  |        |

Figure 4.24 Fusion records

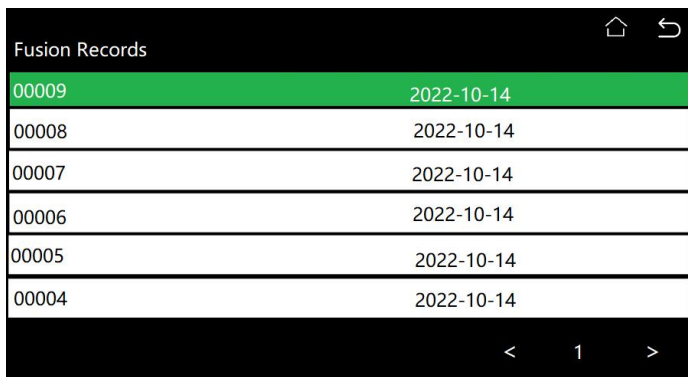
#### 4.5.4.1 Current fusion

This option shows current total Arc discharge number from replacing with an new pair electrodes.

#### 4.5.4.2 Fusion numbers

This option shows the total number of arc discharge.

### 4.5.4.3 Fusion records



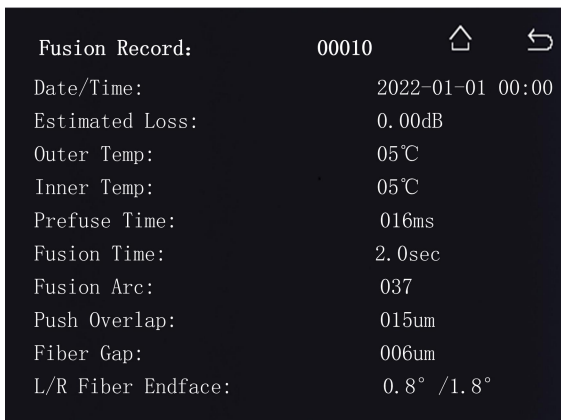
The screenshot shows a mobile application interface titled "Fusion Records". At the top right, there are icons for home and back. The main content is a list of six records, each with an ID and a date. The first record, "00009", is highlighted in green. At the bottom, there are navigation arrows and the number "1".

| ID    | Date       |
|-------|------------|
| 00009 | 2022-10-14 |
| 00008 | 2022-10-14 |
| 00007 | 2022-10-14 |
| 00006 | 2022-10-14 |
| 00005 | 2022-10-14 |
| 00004 | 2022-10-14 |

Figure 4.25 Fusion Records

This option records working parameters, fiber end face, environmental parameter and date in each splicing. The machine can store 4000 groups of fusion records. Press the key  $\leftarrow$  or touch the option to enter the page of fusion record as shown in Figure 4.25. Each page displays 6 records in turn, sequence from top to bottom by the latest fusion time as shown above. Press the key  $\blacktriangleleft$  or  $\blacktriangleright$  to the contiguous page. Press the key  $\leftarrow$  or touch the option to select the record and view the detailed parameters as shown in Figure 4.26.





|                    |                  |   |   |
|--------------------|------------------|---|---|
| Fusion Record:     | 00010            | ↑ | ↶ |
| Date/Time:         | 2022-01-01 00:00 |   |   |
| Estimated Loss:    | 0.00dB           |   |   |
| Outer Temp:        | 05°C             |   |   |
| Inner Temp:        | 05°C             |   |   |
| Prefuse Time:      | 016ms            |   |   |
| Fusion Time:       | 2.0sec           |   |   |
| Fusion Arc:        | 037              |   |   |
| Push Overlap:      | 015um            |   |   |
| Fiber Gap:         | 006um            |   |   |
| L/R Fiber Endface: | 0.8° /1.8°       |   |   |

Figure 4.25 Fusion Records Details

#### 4.5.4.4 Export Records

The option is used to export the fusion records memories in the machine. After the U disk inserted into the USB port, choose this option and press the key  $\leftarrow$  or touch the option to confirm fusion records export. The program starts to detect whether there is U disk inserted in the USB port, and then starts to write the record content into it after finding the record file; if there is no record file, the program will prompt an error. Note: The file format of the U disk is FAT32; create a non-empty RXXXXXX.txt file in the root directory of the U disk.

### 4.5.5. Last maintain date

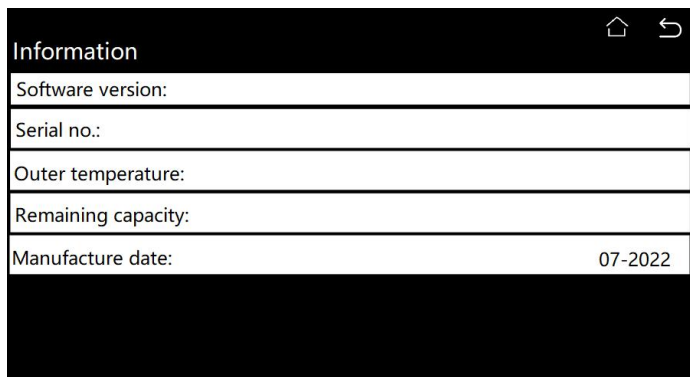
It shows the latest maintaining time this splicer has.

### 4.5.6. Debug entry

This is only for authorized engineer maintaining splicer use.

## 4.6. Information

In the information menu, users can query the machine software version, serial number, temperature, battery remaining capacity and manufacture date, as shown in Figure 4.26.



| Information         |         |
|---------------------|---------|
| Software version:   |         |
| Serial no.:         |         |
| Outer temperature:  |         |
| Remaining capacity: |         |
| Manufacture date:   | 07-2022 |

## 5. Routine Maintenance

### 5.1. Cleaning

#### 5.1.1. Cleaning V Groove

The V-groove is a V-shaped notch on the ceramic substrate. It is wide at the top and narrow at the bottom. It is easy to accumulate dust, which leads to unstable optical fiber movement and big loss of fusion. Therefore, the V-groove should be cleaned regularly.

The following is the way of cleaning the V groove:

1. Place the fiber with good enface into the V groove to remove the pollution, shown in figure 5.1.

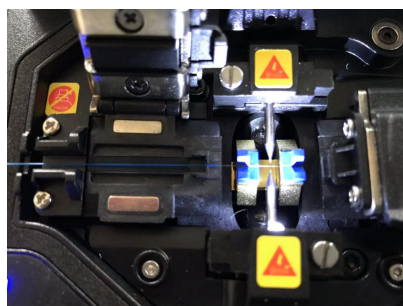


Figure 5.1

2. Use a cotton swab soaked in alcohol to clean the upper surface and bottom of the V-shaped groove, and finally wipe the alcohol in the V-shaped groove with a dry cotton swab as shown in Figure 5.2. Be careful not to leave lint.

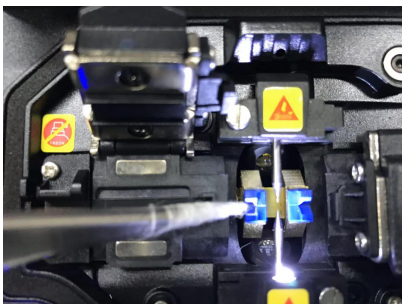


Figure 5.2

### **5.1.2. Cleaning Fiber Clamp Chips**

If there is dust on the fiber clamp chips, it will cause unstable fiber clamping and affect the quality of splicing. Therefore, the fiber presser foot should be cleaned regularly.

The cleaning method as follows:

Open the windproof cover and then use the cotton dipped in

alcohol to clean the surface of the presser foot. When cleaning, do not use the cotton swab to repeatedly wipe it back and forth, but to wipe it in one direction. Besides user needs to spin the cotton swab, keeping the unused cotton facing the presser foot, waiting for the alcohol to volatile.

### **5.1.3. Cleaning Objective Lens**

The microscope is the core component of the optical system of the fusion splicer, and its optical surface must be kept clean, and the objective lens should be cleaned regularly.

The cleaning method as follows:

Wipe the objective lens with a cotton swab dipped in a little alcohol. The cotton swab makes a spiral motion from the center of the lens to the edge until the edge of lens.

## **5.2. Replacing Electrodes**

When the arc produces high temperature to melt the optical fiber, silicon oxide vapor will be generated, which will partially deposit on the electrode, increasing the surface potential energy of the electrode, which will cause the

electrode to discharge poorly and the arc to be unstable. Therefore, the electrode should be replaced after the number of discharges exceeds 3000 times.

Please replace the electrodes according to the following steps:

1. Turn off the machine.
2. Loosen setscrews of electrodes cover and remove the electrodes cover, as shown in Figure 5.3
3. Take out the old electrode from the electrode holder. (Electrode is fixed on the electrode holder, figure 5.4).

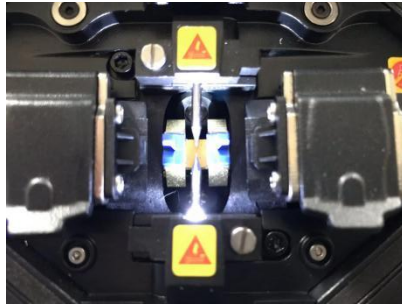


Figure 5.3

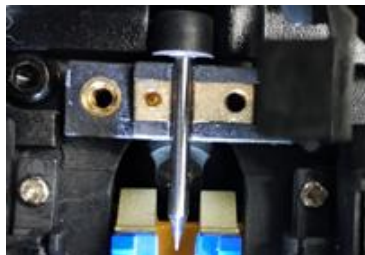


Figure 5.4

4. Use the tissue paper dipped in alcohol to clean the new electrodes, then, install the electrodes into the original electrodes seat position.
5. Close the electrodes cover and tighten the screws.
6. Close the windproof cover and power on the machine.
7. Take an electrode aging.
8. Use the automatic calibration operation in the arc test to correct the discharge current parameters after replacing the electrode.

**Note:** Be gentle when changing electrodes to avoid damaging the splicer or stabbing yourself.

### **5.3. Electrode Aging**


The electrodes arc begins unstably when the external environment such as the temperature and pressure changed

greatly especially moving the machine from low altitude to high altitude. When such happened, users should take certain numbers of discharge to stabilize the circuit operating parameters

**Note:** Please operate according to tips, do not open the windproof cover during operation.

## 5.4. Software Upgrade

The user should copy the upgrade file to the U disk and then insert the USB to the machine. Enter into “maintain” menu, select “software updating” menu, the machine will start and complete the upgrading automatically. After upgrading, restart the machine.

1. Copy the upgrade document named “X40V60.bin” to the U-Disk, whose capacity must be more than 2GB.
2. Insert U-Disk into the USB interface of the machine.
3. Power on the machine. Press the menu button “

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## 6. Common fault and solution

| Problems                           | Reason                                                                                                                                                                                                                                                                                                                        | Solution                                                                                                                                                                                                                                                                                |
|------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Tip of<br>“Please<br>check fiber!” | <ol style="list-style-type: none"><li>1 The cutting length of the bare fiber is too short or the fiber clamping is too backward;</li><li>2. The left (right) fiber is not placed; the fiber forwarding distance exceeds the motor stroke, and the fiber has not yet reached the field of view of the objective lens</li></ol> | When placing the optical fiber, it is best to make the optical fiber enter the field of view of the objective lens, and the end face of the optical fiber can be observed on the screen or the distance between the optical fiber and the center of the electrode does not exceed 2mm.. |
| Tip of<br>“Please<br>reload fiber” | <p>The fiber is not correctly loaded into the V groove;<br/>The fiber image position is offset from the center area of the screen.</p>                                                                                                                                                                                        | Press the Reset key and reload the fiber ,it should be at a position that could be seen from the display                                                                                                                                                                                |

|                                |                                                                                                                                      |                                                                                                               |
|--------------------------------|--------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------|
| Tip of “Fusion failed”         | Improper splicing parameter setting, dirty fiber, unstable fiber advance during splicing                                             | Clean the V groove and fiber press foot; do arc calibration and motor pushing test.                           |
| Tip of “Please close cover”    | The cover is not closed.                                                                                                             | Close the windproof cover.                                                                                    |
| Electrodes do not discharge    | Impurity deposits on the electrode surface are too dirty or the electrode tip is damaged or the high-voltage circuit board is faulty | Clean or replace the electrodes.                                                                              |
| Tip of “Bad L(R) end face”     | The fiber end face is too bad, the fiber is not wiped clean or the fiber image is blurred                                            | 1. Recut fiber and fix clamp.<br>2. clean the V groove. 3. Increase the end face value in splicing parameter. |
| Tip of “Resetting push motors” | The motor exceeds the range of operation and automatically resets                                                                    | Reload the fiber in correct position when resetting completed.                                                |

|                                       |                                                                  |                                                                              |
|---------------------------------------|------------------------------------------------------------------|------------------------------------------------------------------------------|
| Tip of<br>“X(Y) Image<br>Light Error” | Camera light is too dim                                          | Wipe camera lights<br>or mirrors                                             |
| Tip of<br>“Please Gap<br>Again!”      | Manual alignment without<br>prior adjustment of the<br>clearance | Adjust the gap first<br>and then perform<br>the core adjustment<br>operation |

**Note:** If the above-mentioned solutions could not solve your problem, please contact technical support.

## 7. Appendix A

### Warranty Terms and Conditions

If the fusion splicer fails within two years from the date of shipment, it will be repaired free of charge. However, if the following situations occur, it is not covered by the free warranty:

- Failure or damage caused by natural disasters.
- Failure or damage caused by abnormal voltage supply.
- Malfunction or damage caused by wrong operation.
- Failure or damage caused by not following the operation steps in the manual.
- Consumable parts (such as electrodes, etc.).

**Information required for repairs** (please include the following information in the machine)

<1> your full name, company, address, phone number, fax number and e-mail.

<2> model and serial number of the fusion splicer.

<3> the problems encountered.

Under what circumstances, and when the problem occurs?

What is the current situation?

Information of screen display and the error tips etc.

**Notice: Before return the fusion splicer, please contact the manufacturer or agent.**