

Universal Polarization Maintaining Fiber Fusion Splicer

Instruction Manual



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Comcore Optical Intelligence Technologies Co., Ltd.

Preface

Thank you for choosing and using PFS-500(S) Universal Polarization Maintaining (PM) Fiber Fusion Splicer developed and manufactured by Comcore Optical Intelligence Technologies Co., Ltd. The innovative PM fiber fusion splicer breaks through the technical barrier of traditional PM splicers, and separates the fiber polarization axis angle orientation alignment function and the fiber fusion function completely, which makes the PM fiber fusion splicer structure simple, easy to operate and maintain. And the PFS-500(S) fusion splicer uses a more intuitive end-face imaging technology than the traditional side-view imaging technology, the end-face images can be displayed directly on a high-resolution monitor. Therefore, the user can carry out angular positioning of the fiber polarization axis intuitively and clearly. The positioning process is simple and controllable. In addition, the most significant advantage of PFS-500(S) is its capability of splicing different kinds of PM fibers with various special stress region structure. The splicing outcome is always great.

Traditional PM fiber fusion splicers have significant angular orientation error during splicing of different kinds of optical fiber. Even worse, they cannot identify the PM fibers of some special stress area structures. On the contrary, PFS-500(S) is immune to the problems. It has a very wide range of applicability, including panda, elliptical core, “I”-type, and many other types of structural PM fiber. The polarization extinction ratio can reach greater than 30dB after splicing. Moreover, because of its simple configuration, the PFS-500(S) greatly reduces the maintenance cost, which is very helpful to the fast-developing optical communications, fiber laser, and optical sensor industries.



Comcore Optical Intelligence Technologies Co., Ltd. developed PFS-500(S) universal polarization maintaining fiber fusion splicer has decomposed the core issues of PM fiber splicing into two parts: regular single mode fiber fusion function and fiber end-face imaging positioning function. It is so easy to conduct PM fiber fusion splicing now. The PFS-500(S) system structure is simple, the principle is easy to understand, the polarization axis positioning and aligning is intuitive, and the operation is so easy.

Please read and understand this manual carefully before using the fusion splicer

Please follow all safety warnings and precautions in this manual



Contents

1 General.....	6
1.1 Instructions for use.....	6
1.2 Standard configuration of fusion splicer.....	7
1.3 Product specifications.....	8
1.4 Name of main components of fusion splicer.....	10
1.5 Descriptions of the keypad of fusion splicer.....	11
2 Basic operation of positioning unit and fusion unit.....	13
2.1 Co-axis fusion of PM fiber.....	13
2.2 Power supply of fusion splicer.....	27
2.3 Battery operation precautions.....	32
2.4 Battery hazard warning.....	33
2.5 Power-saving mode operation.....	34
2.6 Under voltage alarm (battery-powered).....	35
2.7 Start up and shut down.....	35
2.8 LCD brightness adjustment.....	36
3 Management menu.....	38
3.1 Overview of first-level menu.....	38
3.2 [Splice Mode] operations.....	40
3.3 [Heater Mode] operation.....	48
3.4 [Arc Calibration] operation.....	52
3.5 [Splice Options] operation.....	55
3.6 [Maintenance] operations.....	60
3.7 [Settings] operation.....	69
4 High level operation.....	77
4.1 Select splice mode according to the type of optical fibers.....	77
4.2 Selecting / editing splice mode.....	78
4.3 Splicing operation.....	78
4.4 Tension testing.....	84
4.5 Saving splice records.....	84
4.6 Reinforcement of fiber splice point.....	85
4.7 Manual drive motor.....	87
5 Inspection and maintenance.....	90
5.1 Cleaning V-groove.....	90
5.2 Cleaning fiber clamp.....	91
5.3 Cleaning mirror and objective lens.....	91
5.4 Replace the electrodes.....	93
5.5 Stabilizing electrodes.....	94
5.6 Clear arc times.....	95

5.7 Dust check.....	96
5.8 Calendar settings.....	98
5.9 Heater / battery / environment.....	99
5.10 Replacement of spare lithium batteries.....	99
6 Problems and troubleshoot.....	100
6.1 Power supply.....	100
6.2 Fusion splicing operation.....	100
6.3 Heating operation.....	102
6.4 High level setting.....	103
Appendix A: Warranty period and conditions.....	104
Appendix B: Contact information.....	106

1 General

1.1 Instructions for use

Polarization maintaining fiber fusion splicer is a mechanical device which connects two PM fiber end faces with physical method. This process varies depending on the type of fiber being fused.

PFS-500(S) universal polarization maintaining fiber fusion splicer has precise angular positioning function and precise fiber core alignment mechanism, which is used to align two fiber end faces.

Two optical fibers were fused by automatic discharge. In this way, the fused joint is solid with low insertion loss and low reflection loss.

To achieve the best splicing result, it is necessary to correctly follow the operation steps of the fusion unit, understand the function of the angular positioning unit and the optical fiber specifications, since different fibers have different fusion temperature.

In order to reduce the insertion loss and reflection loss, it is very important to adjust the intensity and time of discharge correctly. PFS-500(S) universal polarization maintaining fiber fusion splicer has the function of discharge calibration, which can help users to adjust the discharge parameters properly.

Other intrinsic factors which lead to the increase of fusion loss are: mismatch of core diameter, mismatch of cladding diameter, mismatch of numerical aperture, concentricity and quality of the fibers used.

1.2 Standard configuration of fusion splicer

Order	Parameter	Specification	Qty	Photo
1	Universal PM Fiber Fusion Splicer	PFS-500(S)	1	
2	Rotary Fiber Clamp	RFH-250	1 pair	
3	Fiber Cleaver	FC-20	1	
4	Power Adaptor for Splicer	GM85-135480-F (Input: AC100-240V, 1.8A, 50-60Hz; Output: DC13.5V,4.8A)	1	
5	Power Adaptor for Angular Alignment Unit	GM50-120300-F (Input: AC100-240V, 1.5A; Output: DC12V, 3.0A)	1	
6	Portable Power Source	YG20A (Input:AC220V~50Hz; Output:DC12V, 1.5A)		
7	Accessory Case	Including a spare electrode pair, a ceramic ferrule, a plastic tweezers clamp, and a brush.	1	
8	Fiber Coating Striper	FT-2	1	
9	Carrying Case	Black and impact resistance	1	
10	Document CD		1	

1.3 Product specifications

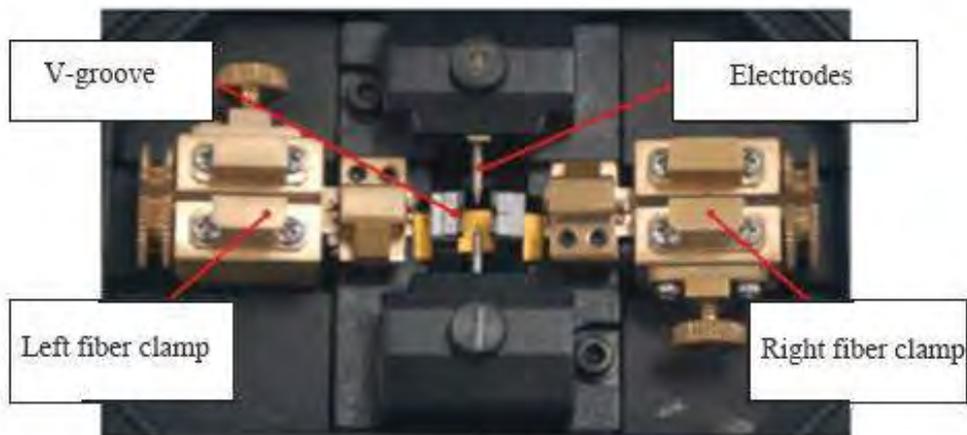
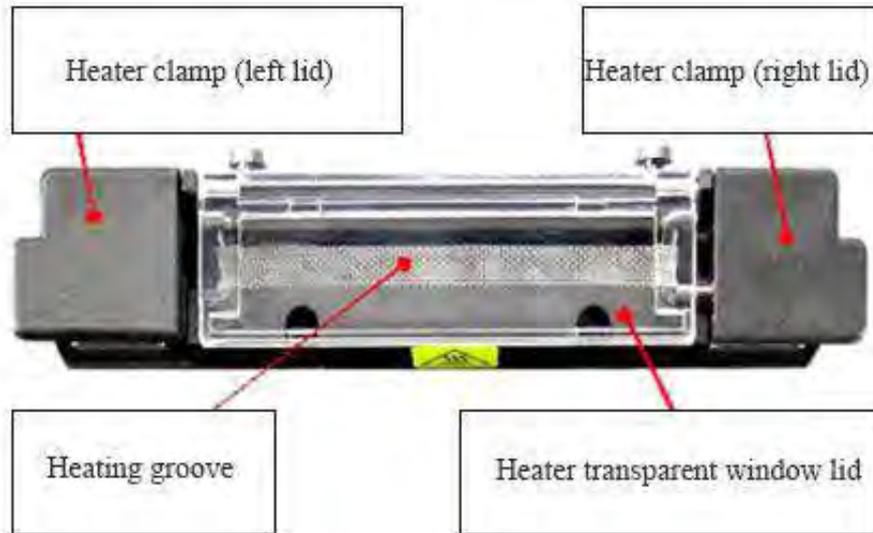
Parameter	Unit	Specification		Note
Equipment Type	N/A	PM Fiber Fusion Splicer		
Equipment Model	N/A	PFS-500S	PFS-500	
Applicable Fibers	N/A	Circularly symmetrical fiber, Panda fiber, Bow-tie fiber, I-type fiber, Elliptical core fiber, Photonic-crystal fiber, Multicore fiber, Polygonal fiber and etc.		Fiber with any structures
Typical Splicing Loss	dB	0.05		General conditions
Typical Polarization Crosstalk	dB	33		For linear PM fibers
Splicing Point Crosstalk Range	dB	30-40		For linear PM fibers
Typical Splicing Time	Sec	150		
Bearable Tension of Splicing Point	kpsi	>100		Before re-coating
Fiber Cladding Diameter	um	60-80	70-150	
Fiber Coating Diameter	um	100-165	135-400	
Fiber End-face Image Magnification Factor	times	400		
Minimum Total Length of Fusion Splice without Coating	mm	10		
Minimum Fusible Tail Length	mm	60		
Splicing Data Storage	group	10000		



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Capacity			
Fiber's End-face Imaging Processing (optional)	Connecting to a Laptop Via USB, the end Face Imaging of the Fiber Can be Directly Positioned, Measured, and it's Image Can be Stored.		
Power Supply	Built-in 12.5V lithium battery power supply, the charging time ≤ 3.5 hours; External adapter, input AC100-240V 50 / 60HZ, Output DC13.5V / 4.8A		
Working Environment	Temperature: -10 ~ +50 °C, Humidity: <95% RH (non-condensing)		
External Dimensions	285mm(length)*250mm(width) *170mm (height)		
Weight	6.5kg		

1.4 Name of main components of fusion splicer



1.5 Descriptions of the keypad of fusion splicer



Buttons of keypad

Button	Readiness	Manual mode	Automatic mode	Parameters menu
	Power switch	Power switch	Power switch	Power switch
	Moving cursor	Upward movement of fiber	In valid	Increasing the amount of parameters/ moving cursor
	Moving cursor	Downward movement of fiber	In valid	Reducing the amount of parameters/ moving cursor
	Moving cursor	Leftward movement of fiber	In valid	Reducing the amount of parameters/ moving cursor
	Moving cursor	Rightward movement of fiber	In valid	Increasing the amount of parameters/ moving cursor
	Enter splice mode menu	Open the function to move motor by buttons at pause	In valid	Enter lower level menu/operation screen

	Start splicing	Continue forward/ Start splicing	Start splicing	Confirming option function/ Parameter modification
	In valid	Motor reset/ Return to higher level menu	Motor reset/ Return to higher level menu	Return to standby screen/ higher level menu
	Heater Switch	Heater switch	Heater switch	Heater switch
	In valid	Next step/ arc	In valid	In valid
	In valid	Switching over X / Y display screen	Switching over X / Y display screen	In valid

Description of readiness screen of fusion splicer



- Top right corner of screen : indicating the power supply mode as “power adapter” at present.
- Top right corner of screen : indicating “Heater is warming up” at present.
- Bottom of screen :Enter Menu :Start Welding : indicating “Keypad operation” on current screen.

2 Basic operation of positioning unit and fusion unit

2.1 Co-axis fusion of PM fiber

2.1.1 Specific equipment and accessory

<1> Monitor Screen



Dimension: 240 (L) ×42 (W) ×195 (H) mm, weight: 0.65kg

The monitor screen is of high resolution, and through system's amplification, it gains an enlarged, high contrast optical fiber end face image. It can show various stress area graph clearly.

In addition, the screen is also embedded with horizontal, vertical and 45° diagonal lines. It helps to realize PM fiber fusing at 0°, 90° and 45° angle, to meet different alignment requirements.

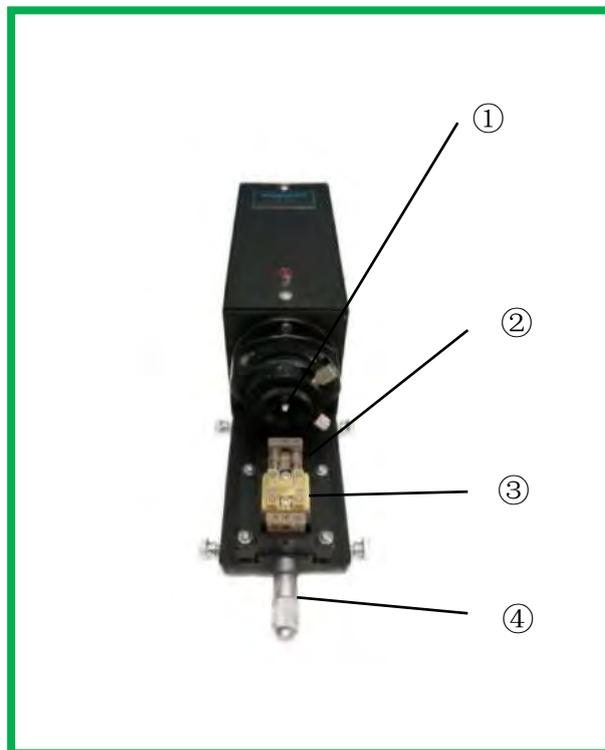
<2> FAL-100 Angular Positioning Unit

The FAL-100 angular positioning unit has a built-in CCD camera, which achieves 400 times optical amplification of the optical fiber end face.

Ceramic ferrule center positioning: an optical fiber is inserted into the ceramic ferrule. The fiber end face image can always be displayed in

the center position of the CCD. Users can repeatedly use it without necessity to adjust the ferrule's position.

High-precision sliding shaft: it is fast, convenient, accurate and efficient. The user can repeatedly push the rotary fixture forward and pull it backward without losing position accuracy, which guarantees the efficiency of co-axis alignment. And the slider can be perfectly engaged with the rotary fixture, and the positioning is ensured accurate and stable.



- ① Ceramic Ferrule
- ② High Precision Sliding Shaft
- ③ Sliding Block
- ④ Focusing Knob

Dimension: 320 (L) * 90 (W) *108 (H)mm, Weight 1.45kg

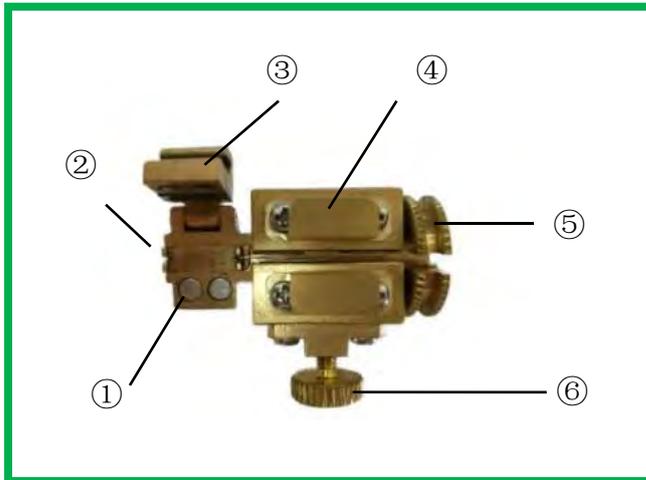
Tunable focusing: for a variety of stress zone structures of PM fibers, the best focus point is slightly different. The end face position can be adjusted by tuning the focal knob of the FAL-100. In this way, you can obtain the clearest and most accurate optical fiber end-face images. The built-in LED light bulb's working lifetime is up to 100,000 hours.

<3> Rotary fixture

The rotary fixture comes with two functions of clamping and rotation, so the two operating components are combined into one, which reduces errors and improves efficiency.

The rotary fixture can hold fibers up to 400um coating diameter. The large attracting magnet can make the fiber holding stable.

The rotary knob can rotate fast. It can do 360°smooth rotation and conduct angular positioning efficiently.

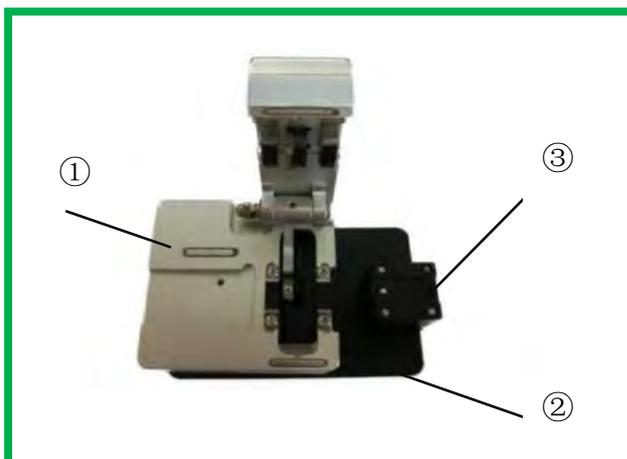


- ① Large Suction Magnet
- ② Position Stopper
- ③ Cover Block
- ④ Handler
- ⑤ Rotary Knob
- ⑥ Fixing Knob

The fixing knob adopts a proprietary design structure, which enables 360° locking without dead angle.

The base of the rotary fixture is delicately designed and it can quickly and stably engage with the moving slider of the angular positioning unit, the fusion splicer’s translation platform and the fiber cleaver’s base. It is very convenient to place and remove.

<4> Fiber cleaver



- ① Fiber Cleaver
- ② Cleaver Base
- ③ Rotary Clamp Platform

The fiber cleaver is placed on to the cleaver base. The fiber rotary fixture will be placed on this base for fiber cleaving. When a fiber is

cleaved, the rotary fixture holding the cleaved fiber will be placed directly on the translation platform of the fusion splicer. The whole process is simple and easy, which avoids settling the fiber repeatedly to keep the fiber end face clean. Therefore, it enhances the operation repeatability and fusion efficiency.

2.1.2 System Installation

<1> Connect the two ends of the video cable to the video output port of the FAL-100 angular positioning unit and the video input port of the monitor (the central input port is selected by default)



<2> Insert the two 12V output plugs of the power adapter into the monitor and the 12V input sockets at the back end of the FAL-100 angular positioning unit.



<3> Connect the Power Adapter to a 220V/110V power supply, then turn on the switch on the back of the FAL-100 positioning unit. When the LED indicator is on, turn on the monitor switch, then the equipment will work properly.



<4> If the monitor displays a blue screen, it is most likely a wire connection error, please carefully check if the video cable is plugged in correctly.

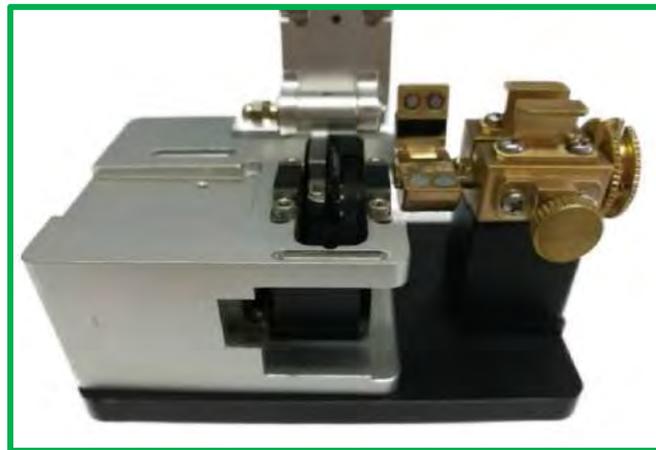
<5> The monitor will enter into a sleep mode if it is idle for a while, click any key on the front panel to wake up the monitor

<6> Insert the 13.5V output port of the power adapter into the fusion splicer's power input port, connect the input port of the adaptor with a 220V/110V supply, then the fusion splicer is ready for power. Press the power button of the splicer for seconds, it will be powered on. (Special note: The fusion splicer unit is equipped with a rechargeable lithium battery. But please remove the battery when it is used indoor since it can be powered by a 220V/110V supply. The lithium battery is a consumable part, so there is a safe use term. Normally, it can last about 300 times charge and discharge before it requires recharge. The storage lifetime is not more than 12 months.)

2.1.3 Operation Procedure

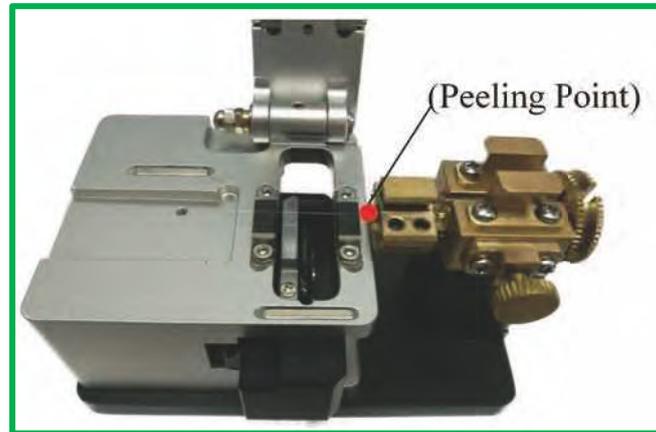
<1> Turn on the splicer unit, the monitor and the angular positioning unit, and make sure all are working properly.

<2> Remove one of the two rotary fixtures from the fusion splicer unit and place it on the base of the fiber cleaver to ensure that the base of the rotary fixture and the base of the fiber cleaver are tightly touched.



<3> Take a fiber to be fused, remove the coating layer with a peeling plier. The peeling off length is about 25mm. Then wipe the bare fiber clean with a rubbing paper dipped with alcohol.

<4> Place the cleaned fiber on to the rotary fixture, the fiber peeling point (the junction point of the peeled bare fiber and the fiber with a coating layer) is aligned with the stopper of the rotating fixture, close the rotating clamp lid, close the fiber cleaver knife lid, slide the fiber cleave blade slider forward to the end, open the fiber cleaver blade lid, the fiber end face has been cleaved out sharply. Remove the rotary fixture from the base of the fiber cleaver, place it on to the fusing splicer's translation platform, ensure the rotary fixture base and the translation platform are tightly engaged, and the fiber is now held in the V-groove of the splicing machine.



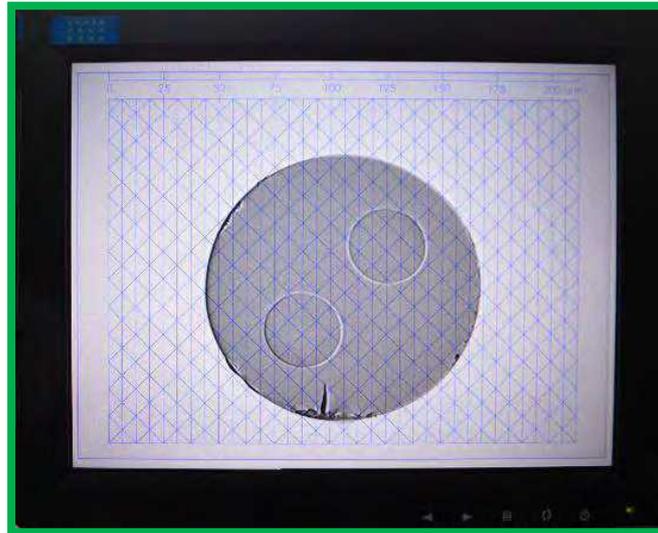
<5> Remove the other rotary fixture from the splicer and place it on the fiber cleaver base to ensure that the rotary fixture base and the cleaver base are tightly engaged, and repeat Steps <3>and<4>.

<6>Close the fusion splicer's dust Cover (note: Do not put the dust cover on to the fiber), the fiber will be automatically positioned and cleaned by electrical discharge. After discharge cleaning, promptly open the dust cover, to avoid fusion action by the splicer.

<7> Take out one rotary fixture holding the cleaned fiber and place it on to the slider of the angular positioning unit. At this point, the moving slider should be in the initial position. Ensure that the rotary fixture and the moving slider are tightly engaged and push the slider forward to the end. Fine tune the focusing knob, observe the monitor display, till a clearest optical fiber end face image is seen. (Note: Focusing adjustment should be fine-tuning. If there is no optical fiber end face seen, user should check whether there are any abnormal issues, such as broken fiber and so on. Do not push the fiber end face too deep, this may damage the internal mirror of the angular positioning unit).

<8> Rotate the knob, align the PM fiber end face's stress pattern with the base lines shown on the monitor screen properly (Here only a panda

polarization maintaining fiber end face is used). Its slow axis is aligned with the horizontal or diagonal base lines. Users can choose different positioning mode according to the actual situation. Finally, the fixing knob is gently tightened to complete the positioning procedure.



<9> Pull the moving slider backward, pick up the rotary fixture, put it back to the translation platform of the splicer, ensure that the rotary fixture and the splicer translation platform is tightly engaged.

<10> Take the other rotary fixture and place it on the moving slider of the angular positioning unit. Repeat Step <7>, <8>, and <9>

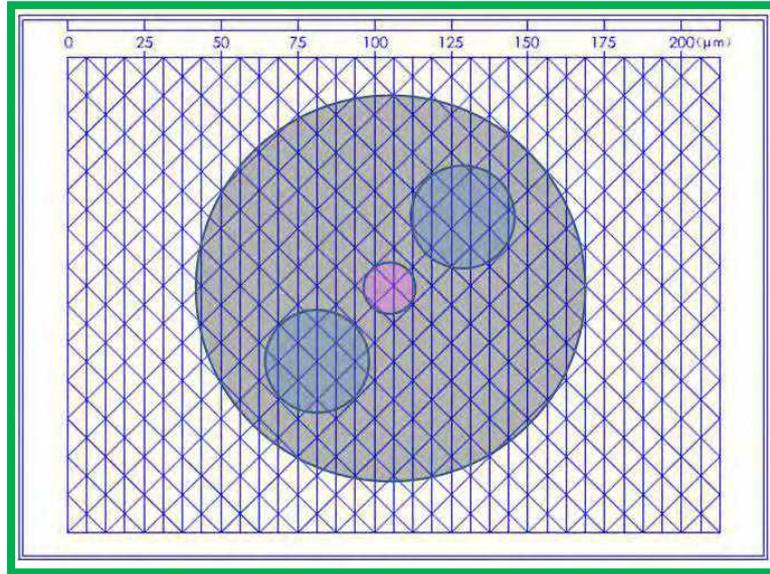
<11> Cover the dust-proof lid of fusion splicer, the fiber is automatically fused.

<12> After the fusion is finished, press and hold the rotary fixture and loosen the two fixing knobs, then open the fiber holding clamp lids, then reset two rotate knobs to the up position, finally remove the fiber, finish the fiber fusion procedure.

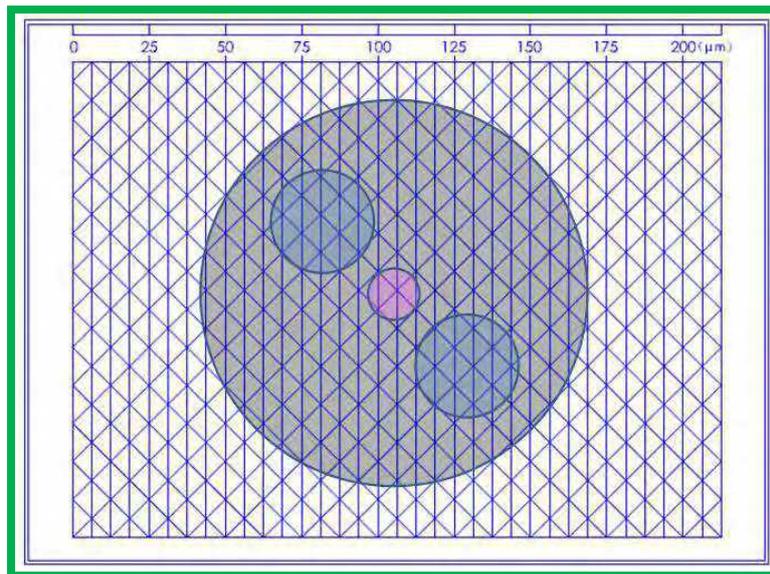
2.1.4 Description of Typical Angular Positioning Method

<1> Slow axis aligns with slow axis (fast axis aligns with fast axis)

The slow axis of the fiber on the right is at a +45-degree angle to the

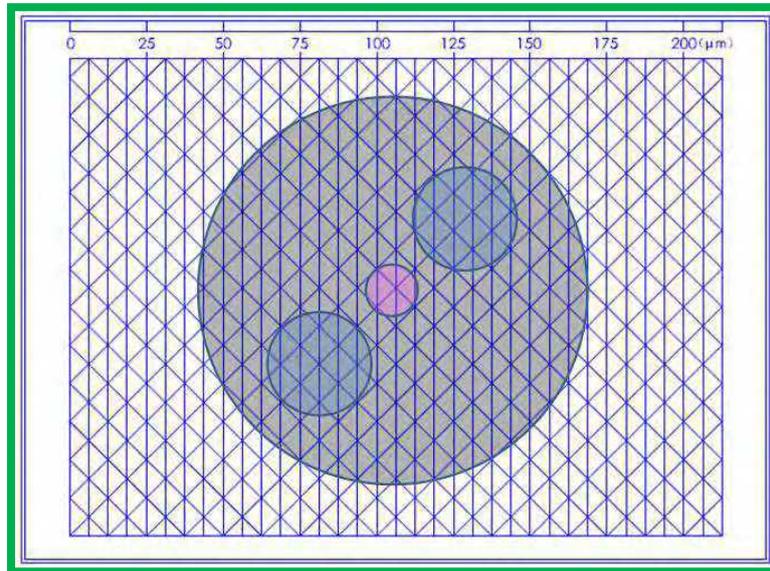


The slow axis of the fiber on the left is at a -45° angle (or $+135^\circ$ -degree angle) to the horizontal lines.

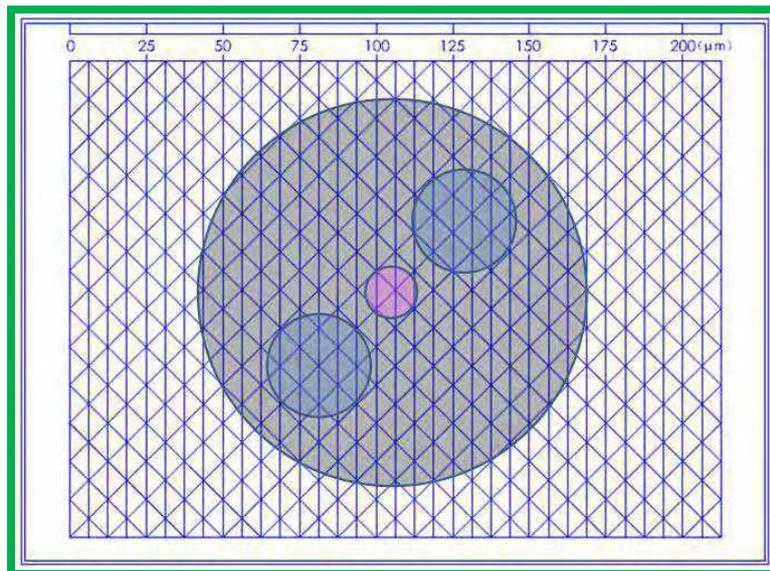


<2> Slow axis aligns with fast axis (fast axis aligns with slow axis)

The slow axis of the fiber on the right is at a $+45^\circ$ angle to the horizontal lines.

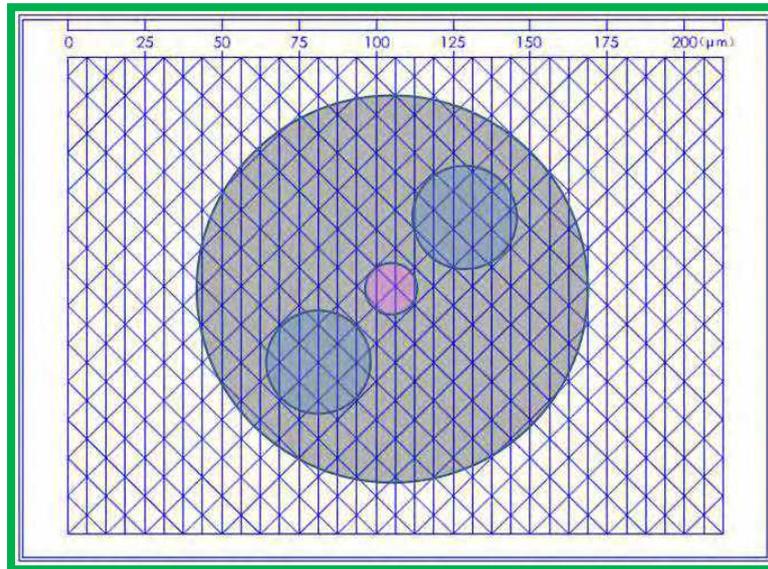


The slow axis of the fiber on the left is also positioned at a +45-degree angle to the horizontal lines.

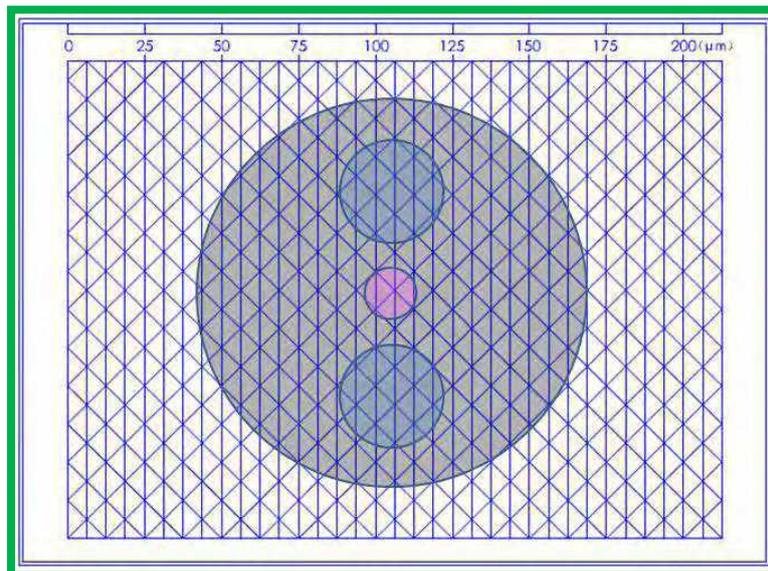


<3> Slow axis aligns with fast axis at a 45degree angle

The slow axis of the fiber on the right is at a +45degree angle to the horizontal lines.



The slow axis of the fiber on the left is positioned at a +90degree angle to the horizontal lines.

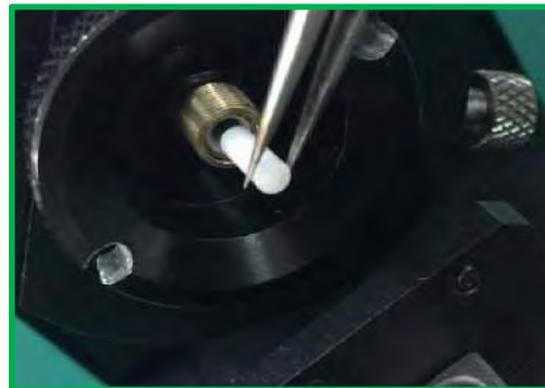


2.1.5 Trouble shooting of fiber fusion procedure

<1> The improper operation will cause the fiber to break inside the ceramic ferrule or dust gets into the ceramic ferrule. If this happened,

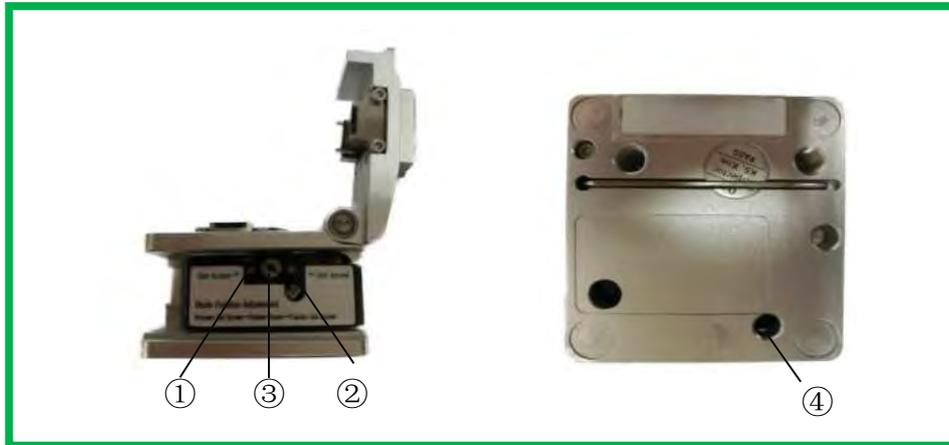
clean the ceramic ferrule according to the following procedure:

- A. Remove the fixing screw, pick up the ceramic ferrule using tweezers holding the ferrule end (larger hole at the ferrule end), take out the ceramic ferrule.
- B. Place the ceramic ferrule into alcohol and rinse it with ultrasonic for 5 minutes.
- C. Take out the ceramic ferrule and place it on a clean wiping paper to allow the alcohol to evaporate thoroughly.
- D. Pick up the ceramic ferrule with tweezers and insert it into the angular positioning unit in a right direction (ceramic ferrule head in first).



<2>If the cleaved angle is too large, the fusion splicer cannot fuse. In this case it needs to adjust the fiber cleaver blade. Mainly this issue can be classified into two categories:

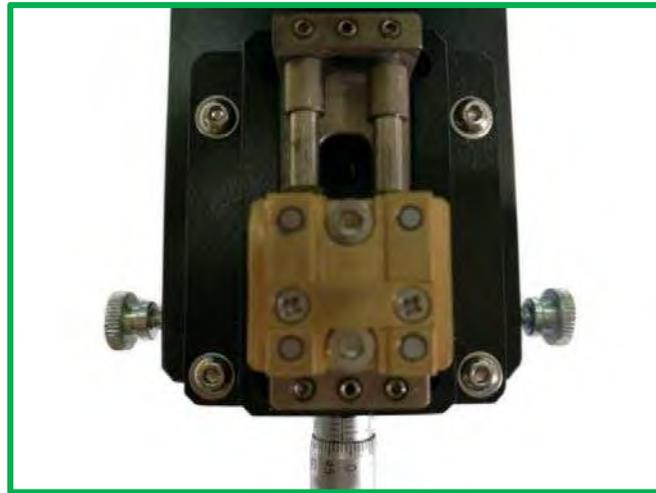
- A. Adjust the blade angle: unscrew the 2 fastening screws on the fiber cleaver base, remove the fiber cleaving blade, loosen the screw①②, gently rotate the blade angle (you can see the angle readings at the right bottom corner), and then tighten the screw①②to complete the blade angle adjustment. Finally, the fiber cleaver is mounted back on the base, tightening the 2 screws.



B. Adjust the blade height: Remove the 3 fastening screws from the base of the fiber cleaver, remove the fiber cutting blade, unscrew the screw ③, loosen the screw ④, rotate the screw ③ position, adjust the height of the blade, tighten the screw ④, screw back the screws, and then finish one time blade height adjustment. However, usually multiple fine tuning is required to obtain an ideal blade height.

<3> The base of the rotary fixture, the translation platform and the V-groove of the splicer, and the moving slider of the angular positioning unit all should be kept clean. Any residual dusts will make the fiber positioning incorrect to impact the fiber fusion quality.

<4> When an optical fiber is placed into the rotary fixture, and when a user pushes the moving slider into the angular positioning unit, if the fiber end face cannot be placed into the ceramic ferrule, you need to adjust the position of high-precision sliding shaft. Loosen the 4 fastening screws on the base of the high-precision sliding shaft, adjust the ferrule to either left or right, so that the fiber can be inserted into the ceramic ferrule, and then tighten the 4 screws.



Please follow the following steps when operating the splicer:

- 1. Firstly, please open the menu to retrieve the required program. The popular polarization maintaining fiber fusing programs are listed as 13, 14, and 15. Please choose an appropriate fusion program for your fiber.**
- 2. Take out the rotary jig from the fusion splicer and put it on to the fiber cleaver base. Please make sure the jig and the base are closely touched. Turn the opening of the jig upwards, let the fiber touch the cleave blade up edge. Then close the fiber holder on the jig. If the fiber to be fused is bent, please turn on the heating tank to heat the fiber until it is straight before cleaving.**
- 3. After fiber-cleaning discharge is complete, place the rotary jig on to the slider of the angular positioner and make sure the jig and the slider is tightly engaged. Then gently push the jig forward and let the fiber into the ceramic ferrule of the angular positioner. After angular positioning is complete, pull the jig back to its initial place on the angular positioner before removing it from the positioner.**

2.2 Power supply of fusion splicer

The power supply of this series fusion splicers adopts two-in-one power supply design. The power supply modes are divided into external power adapter or lithium battery, wherein the lithium battery power supply is divided into built-in battery and independent removable battery. For the correct and safe use of this series fusion splicers, the operator must use the parts (power adapter, charger and lithium battery) provided by the company and read carefully following operation manual.

2.2.1 Power supply of power adapter

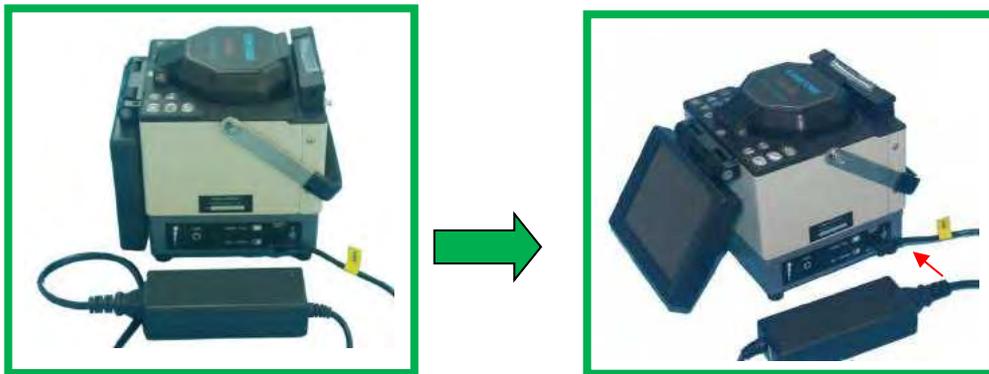
The basic parameters of the exclusive AC/DC power supply adapter of the fusion splicer produced by our company are as follows:

- INPUT: AC100-240V ~ 1.8A 50 / 60HZ
- OUTPUT: DC13.5V / 4.8A

- **Use only AC adapter power cable supplied with the machine.**
- **The ground terminal of AC input power cable must be effectively grounded.**
- **When using AC generator, the operator shall check regularly whether it conforms to AC input requirements of the output voltage.**
- **Use only DC output power cable supplied with the adapter.**
- **Prohibit strictly handling AC power cable, adapter and fusion splicer with wet hand, otherwise, an electrical shock may occur.**

The power adapter is connected with this fusion splicer in two ways as follows.

After the power adapter is connected to AC mains power, DC output power cable is connected to the "POWER INPUT" of the power supply module of the fusion splicer, then the fusion splicer is powered by the external power adapter.



If AC voltage of the mains power (or generator) is lower than 100V or higher than 240V or unstable, AC / DC power adapter will not provide normal DC output. The adapter DC output cable cannot be connected to "POWER INPUT" of the fusion splicer power module ("DC IN" of power adapter) in such a case.

• Do not use external power supply which does not meet the requirements of our company, otherwise, it will burnout fusion splicer or cause personal injury. When the AC/DC power supply adapter input cable is connected to AC200V, 50/60Hz power supply, the operator must use an effectively grounded three-hole socket.

2.2.2 Power supply of lithium battery

A. Lithium battery installation

Tilt the fusion splicer and open the power module cover at the bottom of the fusion splicer as shown in figure:



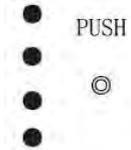
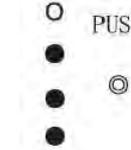
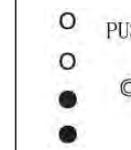
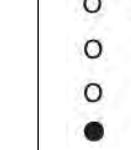
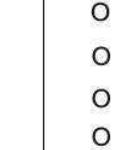
See the figure below. The lithium battery cable is connected with the power cable inside the battery case. Confirm reliable connection put the cable first into the side hole of the battery case and then install the Lithium battery. Close the battery case cover on the bottom of the fusion splicer. If replacing the lithium battery, follow the procedure above.



B. Lithium battery capacity check

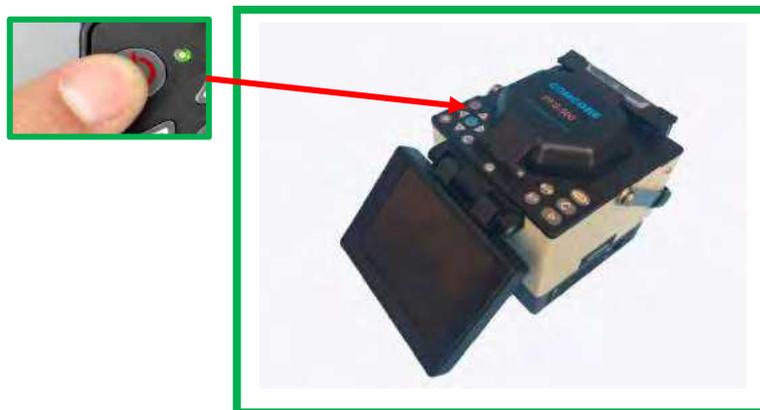
After installing the built-in lithium battery according to the steps above, press "PUSH" button on the power module at the side of the fusion splicer as shown in the figure below. Four battery capacity indicators (red) arranged vertically on the left side of the battery are ON. When more indicators are ON, the battery capacity is higher. The battery capacity description is shown in the table below.



				
Battery capacity $\geq 80\%$ Battery voltage $\geq 12.2V$	Battery capacity $\geq 60\%$ Battery voltage about 11.8V	Battery capacity $\geq 40\%$ Battery voltage about 11.4V	Battery capacity $\geq 15\%$ Battery voltage about 11V	Battery capacity $\leq 10\%$ Battery voltage $< 11V$
<p>● The indicators are On. ○ The indicators are Off.</p>				

Remarks:

- A. When the fusion splicer is not connected with the external power supply adapter, the current battery capacity indication on the table above is valid.
- B. When the fusion splicer is connected to the power adapter, the built-in battery is at the charging state, and four battery capacity indicators (red) arranged vertically on the left side of the power module are ON, it represents only the charging voltage of the battery at current time, does not mean the battery capacity.



- C. Starting up by Lithium battery power Upon completion of the operations above, make sure the internal lithium battery is installed

correctly and the lithium battery capacity is enough, the fusion splicer can be started.

D. Charging lithium battery

When only one of the lithium battery indicators (red) is ON, or "under voltage" alarm is ON during the operation of the fusion splicer, the lithium battery shall be charged in time.

The power adapter's DC power cable is connected with "POWER INPUT" of the power module of fusion splicer. The built-in lithium battery of the fusion splicer can be charged then.



- **Always use the designated AC / DC power adapter for battery charging.**
- **Long-term power shortage of the lithium battery will damage the lithium battery.**

<1>. No matter what capacity of the battery is at present, whenever DC output cable of AC/DC adapter is connected to "POWER INPUT" of the fusion splicer power module, the power module (Lithium battery) will start charging process.

<2>. Indication of charging status: In charging, the charging indicator (RED CHARGE) is red. When charging is completed, the charging

indicator (GREEN FULL) is green;

<3>. At OFF state, the charging time is maximum 3 hours and 30 minutes and minimum 40 minutes, as the capacity of the lithium battery at present determines the charging time.

<4>.When charging at ON state, the charging time is longer. Suggestion: The operator shall try to charge the Lithium battery at the OFF state as this would shorten the charging time.

2.3 Battery operation precautions:

<1> Please use the battery in a normal environment. Battery charge and arc and storage need strict environmental conditions:

- Battery charging temperature: 0°C ~ 40°C;
- Operating ambient temperature: -20°C~ 60°C;
- Storage ambient temperature: -5°C~ + 35°C;
- Relative humidity: 65 ± 20% RH.

<2>The battery shall keep away from heat, moisture, high pressure and high electrostatic environment and so on during use, as well as collision and knocking.

<3> Battery charging is a complex chemical reaction process and the matching charger shall be used only for safety. The attendant must be at site during battery charging. More than five hours charging is prohibited.

<4>When the battery will not be used for a long time, keep the battery with half of full capacity. In the storage state, the battery shall be charged once every 2-3 months.

<5>The voltage and appearance of the battery should be checked once every 2 to 3 months and the battery shall have a thorough charge and arc once in every six months.

<6>For the battery delivered from the factory within one year, in case the charging and discharging time is significantly shorter (only half the time of normal use and shorter) or when there is obvious bulging, do not use the battery immediately and return it to the factory for inspection and maintenance.

<7> The fusion splicer battery is a consumable item and has a safe service life. Extended use after safe service life is strictly prohibited. Safe service life means: The charge-air times in normal use are less than 300 times and the storage period does not exceed one year (12 months).

2.4 Battery hazard warning

<1>It is strictly prohibited to dismantle the battery

The battery inside is fitted with protective circuit, which can guarantee the battery safety when used under normal environment. Improper assembly will damage the protective function of the battery, could cause short circuit in the battery core and cause the instantaneous heat, combustion, and other dangerous of the battery.

<2>Battery short circuit is strictly prohibited.

In any case, do not short-circuit the positive and negative terminals of the battery, otherwise, once the battery core protection circuit fails, there will be a large current, causing the battery heating up, smoking, firing and other hazards.

<3>Never heat up or incinerate battery.

Heating or incinerating battery will cause melting of the core spacer, burning of electrolyte, and the risk of fire or explosion.

<4>Avoid sunlight exposure or rain water

Sunlight exposure may cause the battery to generate high

temperature and rain water may cause battery short circuit and other faults, and easily cause the failure of the protection function.

<5>No battery shall be submerged.

Battery pack is not waterproof. The battery submerged in water will make the battery cells have abnormal chemical reaction, smoke, fire and other hazards.

<6>The dedicated charger shall be used and the battery shall be properly charged.

Battery charging process is a special process of electric ions reactions. The performance requirements of battery cell in charging are fully taken into account in the design of the dedicated battery charger. The multiple protecting functions can prevent the risk of heating up, burning and so on of the battery in charging process. The battery shall be charged in accordance with the correct way and charging for too long could pose a safety risk.

<7>Do not contact directly with battery leak electrolyte.

The leaking electrolyte has certain corrosion. Once leakage occurs, do not touch it directly with hand. If the battery fluid gets into the eyes, rinse immediately the eyes with clear water. Do not rub the eyes. Go quickly to the hospital for treatment. When the electrolyte leakage is found, take out the battery quickly from the machine, so as to eliminate safety risks and avoid also the machine corrosion.

<8> The battery should be placed away from children.

The identification and control ability of the child is poor. The battery should be placed outside the child's reach to avoid accidents.

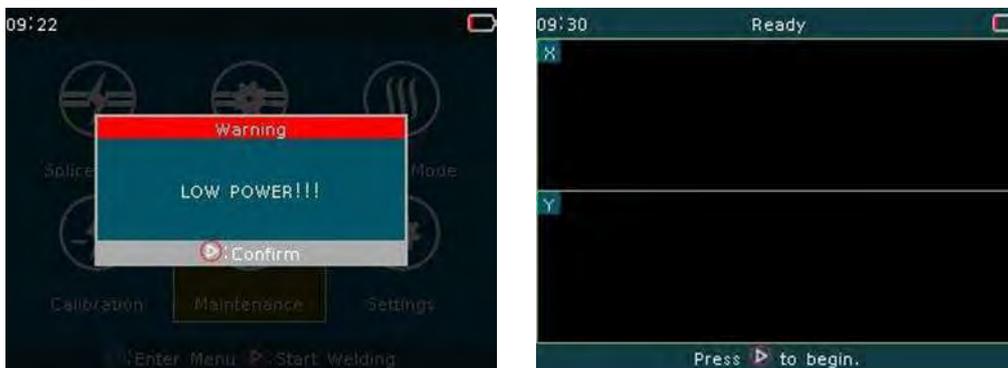
2.5 Power-saving mode operation

To save battery power and based on the work site conditions, the fusion splicer can be set to enter the power saving mode or shutdown

mode when the fusion splicer is not operated within a certain period of time. See [Settings] power save menu (Section 3.7).

2.6 Under voltage alarm (battery-powered)

This series fusion splicer has "low power warning" function. When the lithium battery (group) power is below a certain value (this value is set at the factory and is about 10.3V), the fusion splicer screen will have "LOWER POWER!!!" warning window as shown below. Top right corner of the screen has battery under voltage icon and buzzer alarms automatically. At this point, the operator should promptly adopt adapter power supply or charge the lithium battery, hold down  for a long time to turn off the fusion splicer. Otherwise, it will shut down automatically after about 30 seconds.



Note: Top right corner of the screen  : display the battery under voltage alarm(simultaneously).

2.7 Start up and shut down

Start up:

Press  for a long time. When the LED indicator on the keypad is changed to green, release . All motors are back to the initial position, the fusion splicer shows "readiness" screen. The starting up operation is complete.

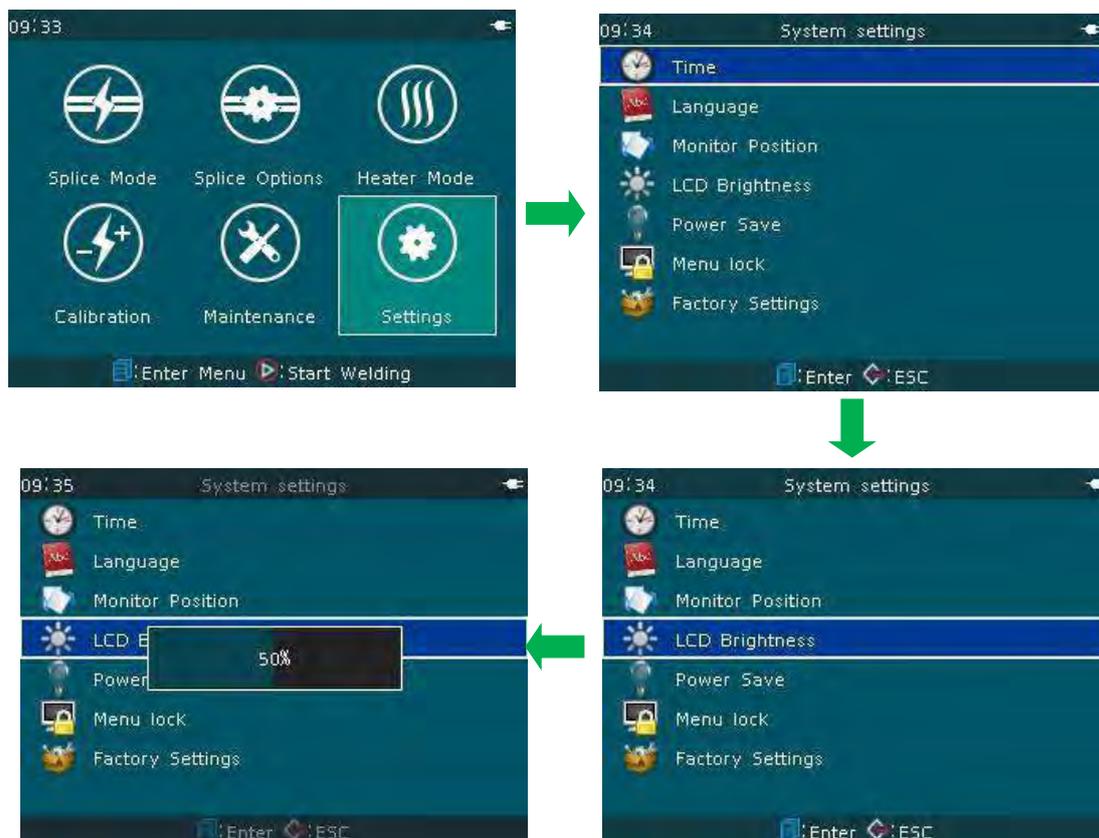


Shut down:

Press . After the LED indicator on the keypad is changed from green to red, release . The machine completes the normal soft shutdown.

2.8 LCD brightness adjustment

On the one hand, the LCD brightness determines power consumption; on the other hand, when the external lighting of the work environment is not the same, in order to facilitate the operation of the fusion splicer, the operator can adjust the LCD brightness. Set-up procedure is as follows:



<1> Move the cursor to [Settings] window of the fusion splicer, press  button to enter the window.

<2> In the "Settings" screen, press  button to select "LCD Brightness".

<3> Press  button. The brightness amplitude percentage value window appears. Select  or  button to select the appropriate brightness value. The modified value is recognized as valid by the machine in default.

<4> Press  button, return to the readiness operation screen.

• When the LCD brightness is set to be moderate and not too high, power consumption can be reduced and the duration of lithium battery is extended.

3 Management menu

This chapter details the management of the operation menu of this series fusion splicers.

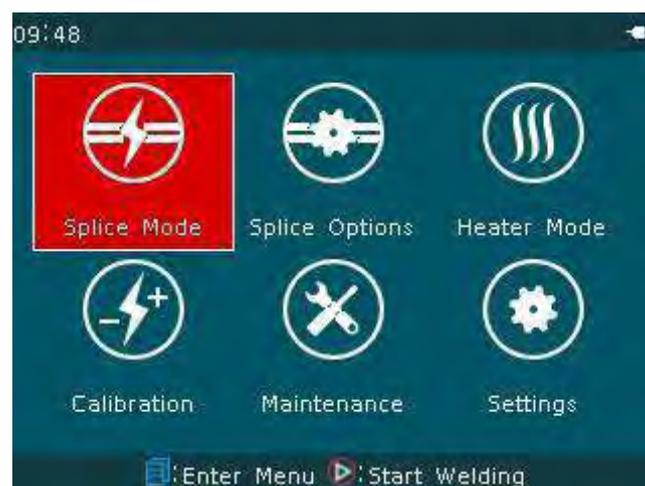
3.1 Overview of first-level menu

There is one first-level main menu in the operation screen of the fusion splicer and six operation windows (second level menu) under the first-level main menu.

On the first level main menu window, press  button to execute the default splicing parameter files (factory setting, user mode) for fiber splicing. Press  button to execute the default splicing parameter files (factory setting, user mode) for heater operation.

On the first level main menu window, press  button or  button, press  or  button for switching over six operating windows in the first-level main menu window. Press  button to enter the current operation window for operation. The options included in each operating window and the next level menu will be described in section 3.2-3.7 of this manual. The first-level main menu and six operating windows (second-level menu) are respectively as follows:

A. "Splice Mode"



B. "Splice Options"



C. "Heater Mode"



D. "Calibration"



E. "Maintenance"



F. "Settings"



3.2 [Splice Mode] operations

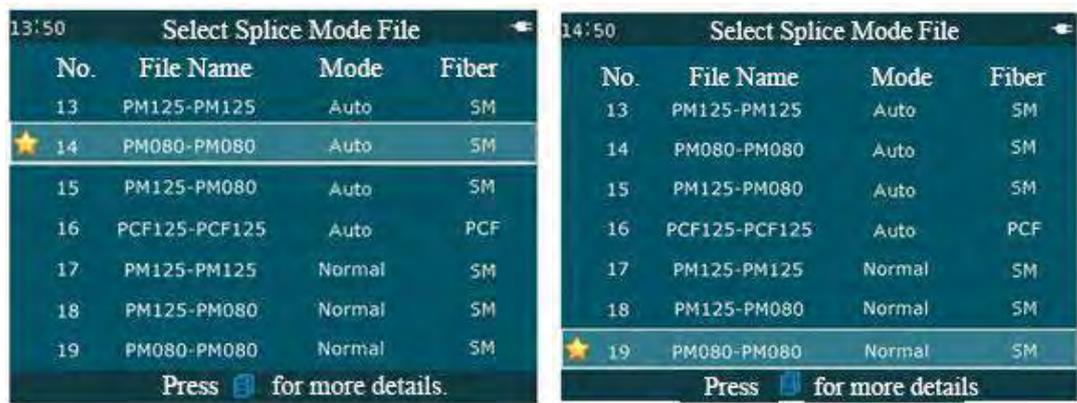
3.2.1 Overview

A. [Splice Mode] has 100 built-in user splice modes (splice mode files) for different types of fibers to be selected by the users. Three kinds of the default modes included in the machine are: Auto, Calibrate, Normal. Each set of fiber splicing parameter files include the options, important parameters and so on for fiber splicing.

B. [Splice Mode] has also 53 built-in factory modes (library) or 53 sets

of splicing parameter files for the special operation by the users (The splicing parameter files in the factory mode "Library" shall be introduced into 100 user splice modes).

C. Description of menu "Select Splice Mode File" in different "Mode" settings (including: Auto, Calibrate, Normal), the users can open the splice parameter files with two level permissions. Press  button or  button for switching over different windows.  button or  button in turn to return back to the original operation window.



D. Functional description of splicing mode

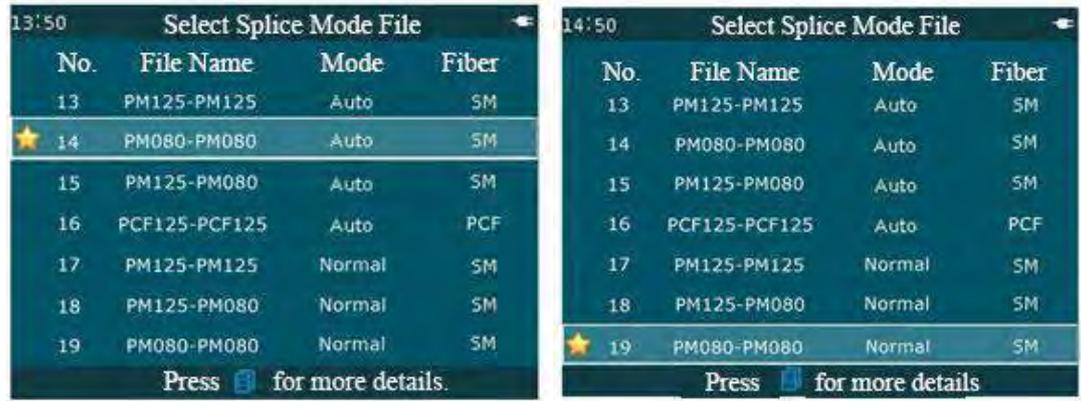
Splice Mode	Function Description
Auto	Fusion arc strength is automatically adjusted and controlled during fusion (only calibrate the selected fusion mode).
Calibration	<p>During the fusion process, the discharge arc strength is automatically adjusted and controlled, and the electrodes discharge arc strength is calibrated.</p> <p>“Calibrate-SM”: The fusion arc strength is effective to all fusion modes and the arc strength of all fusion modes is calibrated.</p> <p>"Calibrate-MM": the fusion arc strength is locally effective, and only the arc strength of the selected</p>

	<p>fusion mode and the "auto-mm" mode are calibrated.</p> <p>"Calibrate-DS": the fusion arc strength is locally effective, and only the arc strength of the selected fusion mode and the "auto-DS" mode are calibrated.</p> <p>"Calibrate-NZ": the fusion arc strength is locally effective, and only the arc strength of the selected fusion mode and the "auto-NZ" mode are calibrated.</p>
Normal	Fusion of same fiber type, the default factory optimized fusion parameters are used.
Special	Fusion of different fiber type, the default factory optimized fusion parameters are used.
Other modes	There are more other fusion modes listed in the database of the fusion splicer. New fusion modes will also be added in the future. You can contact your sales agent and ask for the latest fusion mode.

★Warning: “AUTO-XX” and “CALIBRATE-XX” have different effective range for arc intensity calibration. Therefore, the selected fiber type for “AUTO-XX” and “CALIBRATE-XX” modes must match that of the real fiber to be fused. Otherwise, incorrect calibration will be performed. Sometimes, it will result in consequences of fusion failure. If this error happens, user can select correct fibers and perform “preheating and fusion” if the splicer can still conduct a fusion action. The error will be corrected.

Description of "Auto, Calibrate" splice mode files

Parameter	Description
File (name)	Splice parameter file name is up to seven characters for users.
Splice Mode	The splice mode offers four options: Auto, Calibrate, Normal, Special. The last is a special operation option.
Fiber Type	Splice modes corresponding to different fibers have been stored in the database. The operator can choose the appropriate splice mode in the database according to different fiber types and copy them to the user splice modes.
Alignment	Setting fiber alignment modes. "Precise": The fiber is aligned according to the fiber core position and the clad position at the same time. "Fiber core": The fiber is aligned according to the fiber core position. "Clad": The fiber is aligned according the clad position.
Tension test	If "tension test" is set to "ON", after the splicing is completed, the tensile test is performed automatically.
Cutting angle limit	Setting cutting angle limit. When the cutting angle of any of the fibers exceeds the limit, a limit alarm message appears on the splicer display screen.
Loss limit	When the estimated splice loss exceeds the setting splice loss limit, a limit alarm message appears on the screen.
Cleaning arc time	Cleaning arc is a short duration arc and used to remove tiny dust on the surface of the fiber. Changing this parameter can change the length of the cleaning arc time.
Manually Replenishing arc time	Under certain conditions, the splice loss can be improved by more arcs. Changing this parameter can change the length of the arc time.



No.	File Name	Mode	Fiber
13	PM125-PM125	Auto	SM
★ 14	PM080-PM080	Auto	SM
15	PM125-PM080	Auto	SM
16	PCF125-PCF125	Auto	PCF
17	PM125-PM125	Normal	SM
18	PM125-PM080	Normal	SM
★ 19	PM080-PM080	Normal	SM

Description of "Normal" splice parameter files

Parameter	Description
File (name)	Name of splice parameter file is up to seven characters for users.
Splice mode	The splice mode offers four options: Auto, Calibrate, Normal, Special.
Type of fibers	Splice modes corresponding to different fibers have been stored in the database. The operator can choose the appropriate splice mode in the database according to different fiber types and copy them to the user splice modes.
Alignment	Setting fiber alignment method. "Precise": The fiber is aligned according to the fiber core position and the clad position at the same time. "Fiber core": The fiber is aligned according the fiber core position. "Clad": The fiber is aligned according the clad position.
Tension test	If "tension test" is set to "ON", after the fusing is completed, the tensile test is performed automatically.
Cutting angle limit setting	Setting cutting angle limit. When the cutting angle of any of the fibers exceeds the limit, a limit alarm message appears on the screen.
Loss limit setting	When the estimated splice loss exceeds the setting splice loss limit, a limit alarm message appears on the screen.
Cleaning arc time	Cleaning arc is a short duration arc and used to remove tiny dust on the surface of the fiber. Changing this parameter can change the length of the cleaning arc time.

Manually replenishing arc time	Under certain conditions, the splice loss can be improved by more arcs. Changing this parameter can change the length of the arc time.
Fiber gap setting	Setting the gap between right and left fiber end faces in the alignment and pre-arc setting.
splicing position setting	The relative position of the splicing place is set to the center of the electrodes. Different types of fiber have different value of MFD. The operator can reduce the splice loss by moving the position of the gap toward the fiber with larger value of MFD.
Fiber pre-melting strength	Setting the pre-arc intensity in the process from the arc start to the fiber moving forward. If [pre-arc intensity] is too large, the end face of the fiber will be excessively melted. This will result in undesirable splice loss.
Fiber pre-melting time	Setting the pre-arc time in the process from the arc start time to the start time of fiber moving. Long [pre-arc time] and big [pre-arc intensity] will lead to the same result.
Overlap	Setting the amount of overlap of fiber. When [pre-arc intensity] is set to be lower, it is suggested [overlap] is set to a smaller value, on the contrary, it should be set to a larger value.
Intensity of arc 1	Arc can be divided into two stages and arc1 is the first stage of arc. Setting the arc intensity of arc 1 here.
Time of arc 1	Setting the time of arc 1.
Intensity of arc 2 (Factory setting)	Arc 2 is the second stage of arc. Setting the intensity of arc 2 here.
Time of arc 2 (Factory setting)	Setting the time of arc 2.

3.2.2 Edit / select

<1>Editing splice parameter files

On the readiness window as shown in the figure below, move the cursor to [Splice Mode] and click  and enter the window of [Select

Splice Mode File], where "☆" No. 1 is the "Splice Mode File" of current default splice.

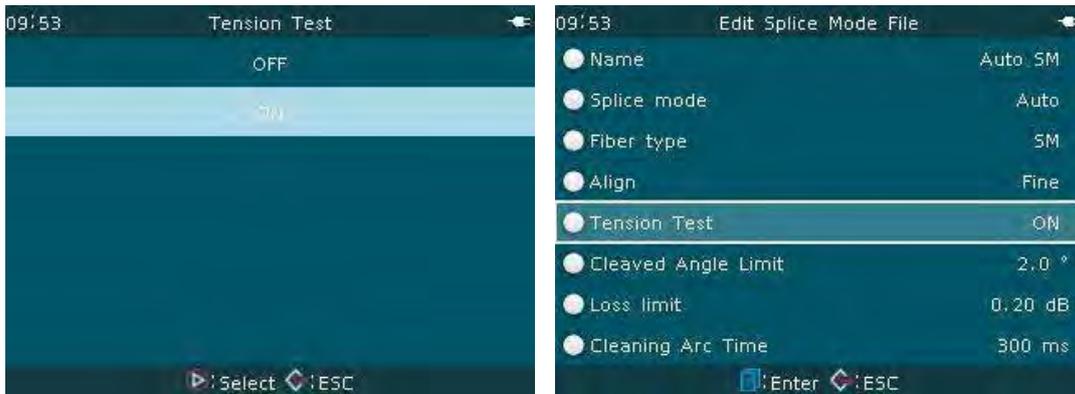


If the operator wants to add "Tension Test" function in the current fiber splicing point, the operator shall modify the default splice parameters. The steps of "Edit" splice parameter file are as follows:

- A. On the window of [Select Splice Mode File] and "☆" No. 14, click  button. "Edit, Export" option window appears. Move the cursor to "Edit" and click  button, "Edit Splice Mode File" window of current default splice appears.



- B. Move the cursor to "Tension Test" item and click  button. "OFF, ON" options window appears. Move the cursor to "ON" and click  button, No. 14 splice parameter "Tension Test is ON".



C. Press  button to return to the readiness window. "Tension Test" on the fiber splice point is performed once the fiber splicing is completed.

<2> Select splice parameters file

If the user's current splicing environment, including atmospheric pressure, temperature, etc., has been greatly changed with the last splicing environment, in order to ensure the fusion splicing parameters under current harsh environment remain stable, the splice mode shall be changed. The steps of "select" splice parameter are as follows:

- A. Move the cursor to No.14 in the window of [Select Splice Mode File] and click  button. "Edit, Select, Delete, Export" option window appears. Move the cursor to "Select" and press  button, "☆" No. 14 is the "Splice Mode File" of current default splice.
- B. Press  button to return to the readiness window. The real-time automatic calibration can be realized in fusion splicing procedure, realizing finally the target to stabilize the fusion splicing parameters in harsh environment.



● The "export, delete, import" and other operating options are the special features and shall be used with caution as recommended.

3.3 [Heater Mode] operation

3.3.1 Overview

A. [Heater Mode] has 40 built-in user heating modes (heating parameter files) for different types of fiber heat-shrink sleeves to be used by the users. There are 9 default heating modes according to the length, diameter, material and other specifications of the fiber heat shrink sleeves, including: Standard, Micro250, Micro400 and Micro900 and so on. Each set of heating parameter files include the options, important parameters and so on for fiber heat-shrink sleeve heating.

B. [Heater Mode] has also 11 built-in factory modes (library), i.e. 11 sets of heating parameter files for the special use by the users (The heating parameter files in the factory modes "Library" shall be introduced into 40 user heating modes).

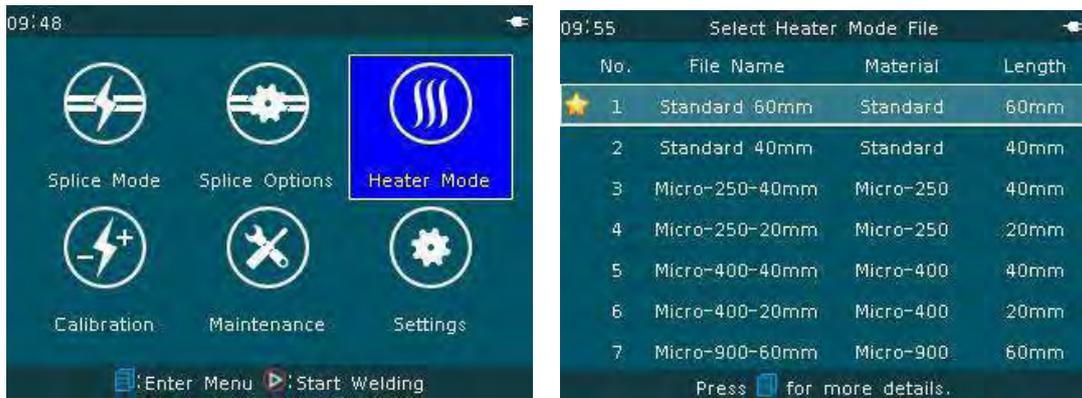
Description of heating parameter files

Parameter	Description
File (name)	Heating parameter file name is up to 13 characters for users.
Materials category	Setting material of heat shrink sleeves: Standard, Micro250, Micro400, Micro900 and Connector and so on.
Length category	Setting the length of heat shrink sleeves: 60mm, 40mm, 20mm, etc. (Some functions are optional)
Heating control	Heating control "Automatic" or "Manual" is optional. A, E models do not have automatic heating function.
Heating time	Setting the holding and delaying time of "heating temperature".
Heating temperature	Setting the thermostat heating temperature.
Heating end temperature	Setting the heating end temperature. When the heater is near this temperature, the buzzer alarms. At this moment, the heater has been cooled and can be removed from the furnace.

3.3.2 Edit / Select

<1>Editing heater mode files

In the readiness window as shown in following figure, move the cursor to [Heater Mode] window and click  button and enter the window of [Select Heater Mode File]. "☆" No. 1 is the current default "Heater Mode File".



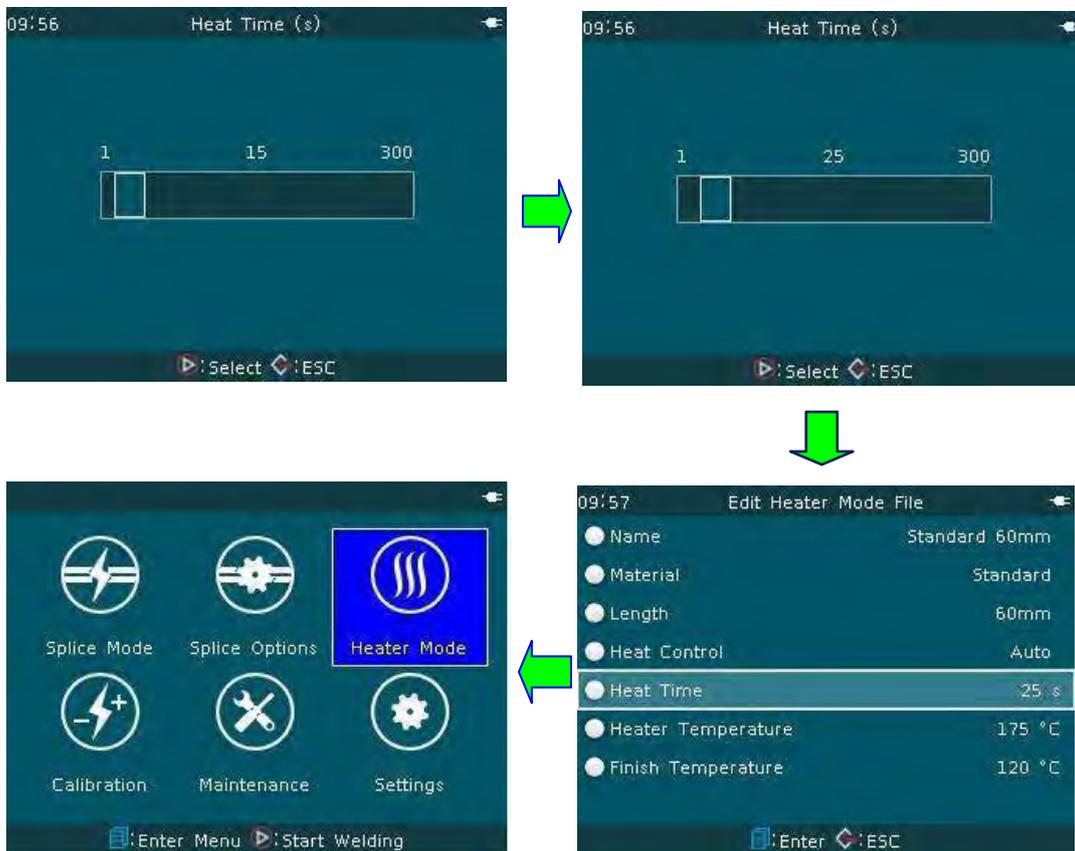
The operator can adjust the heating parameters and options according to the demand. If the operator wants to add "Heat Time" function due to the special needs of heat shrink sleeve, the operator shall modify the machine default heating parameter value. The steps of "edit" heating parameter document are as follows:



A. In the window of [Select Heater Mode File] and "☆" no. 1, press  button. "Edit, Export" option window appears. When the cursor moves to "Edit" and click  button, the current default "Edit Heater Mode File" appears.

B. When the cursor moves to "Heat Time", click  button, "Heat Time" window appears. Click  or  button to increase the value to

"25". Press again the  button to confirm that the modified value is valid. No.1 heating parameter is "Heat Time 25s".



C. Press  button, the machine is returned to the readiness window.

"Heat Time" of the heater of the machine is 25s in each time.

<2>Selecting heater mode file

If the operator adopts "Micro- 900" heat shrink sleeve, in order to meet the quality requirements of the work, the operator shall select corresponding heating mode of "Material". The steps of "Select Heater Mode File" are as follows:

A. In the window of [Select Heater Mode File], move the cursor to No.7 and press  button. "Edit, Select, Delete, Export" option window appears. When the cursor moves to "Select" and click button , "☆" No. 7 is the current default " Heater Mode File" of the machine.



B. Press  button the machine is returned to the readiness window.
The machine implements "Micro-900-60mm" heating mode in heating operation each time.

- **The "Export, Delete, Import" and other operating options are the special features and shall be used with caution as recommended.**
- **This series fusion splicer heater temperature range is 100 ~165°C.**

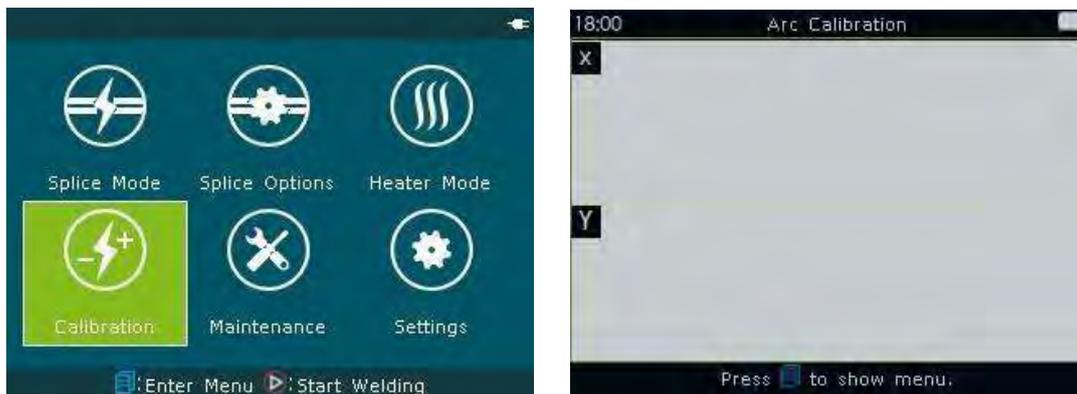
3.4 [Arc Calibration] operation

<1>The temperature, barometric pressure and humidity in the operating environment are always changed. This series of fusion splicers are equipped with temperature and barometric sensor. The amount of change in the external environment can be transmitted in real time to the control system, thus ensuring the arc intensity of the machine is always

in a state of balance. However, electrode wear and fiber debris bonding which may cause the change of arc intensity, left or right offset of the arc center and other abnormal circumstances cannot be corrected by the fusion splicer sensor only, so the operator shall adjust the arc to compensate the arc intensity, the offset of the fiber splicing position relative to the arc center. The [Arc Calibration] function can check the current arc intensity and correct the vault to the standard arc intensity.

<2>Steps of arc calibration

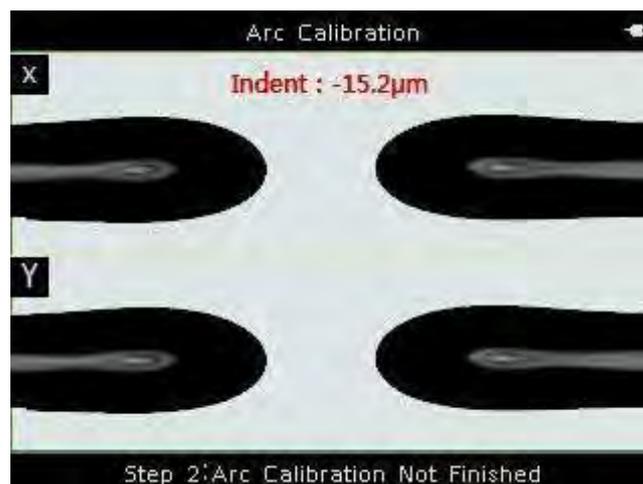
- A. Arc calibration is divided into two steps: "arc correction step 1" and "arc correction step 2".
- B. In the readiness window as shown in the following figure, move the cursor to [Calibration] window and click  button to enter "Arc Calibration" operation window.



- C. Prepare qualified G652 single-mode fiber and put it into the splicer V-groove.
- D. In "Arc Calibration" window, press  button. The arc calibration will start automatically. The arc calibration starts from "arc calibration step 1". If "arc calibration step 1" is "not finished", the machine will not enter "arc calibration step 2". The operator is required to follow the prompts and continue to prepare and put the fiber into the machine. The operation above shall be repeated.



E. When "arc calibration step 1" is finished, "arc calibration step 2" is started automatically. The operator shall prepare repeatedly the fiber and let the splicer go into automatic arc calibration until the machine shows "arc calibration step 2 is finished" as shown in following figure.



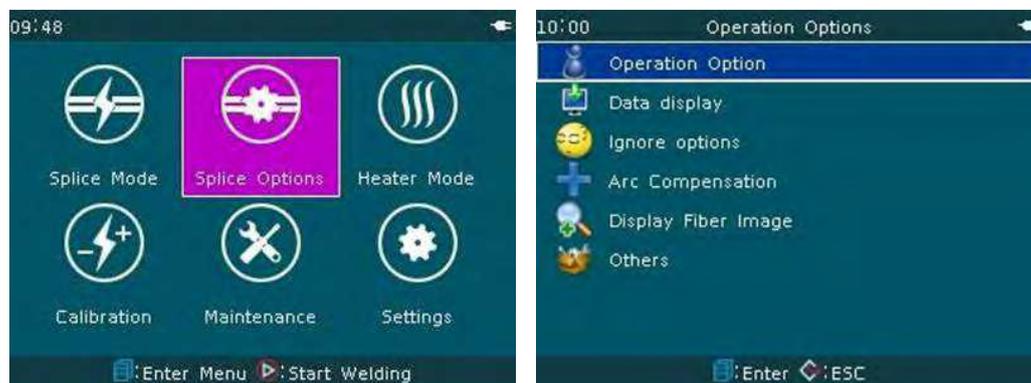
F. When "arc calibration step 2" is finished, it indicates one time of arc calibration (Step 1, Step 2) is passed. When "arc calibration step 2 is finished" has appeared for three times, the splicer exits automatically the arc calibration window and returns to the readiness window.



- To ensure best splicing quality, we recommend strongly the user repeats arc calibration until three times of arc calibration are completed, i.e. the message of "arc calibration step 2 is finished" has been appeared for three times. The calibration of arc intensity and splicing position at this moment has the best results.**

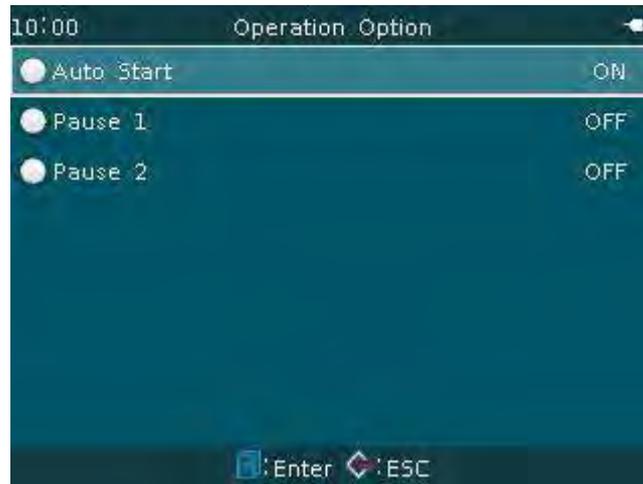
3.5 [Splice Options] operation

[Splice Options] window provides a number of important splicing options. In the readiness window as shown in the following figure.



Move the cursor to [Splice Options] window and click  button and enter "Operation Options" window. The important splicing options can be set then.

3.5.1 Fusion splicing operation:



Parameter Description Table:

Parameter	Description
Auto Start	<p>Setting "On": The fiber will be fused automatically when the windshield cover is closed. This requires the operator to prepare the fiber in advance and put it into the machine.</p> <p>Setting "Off": The fiber will be pushed into the screen automatically when the windshield cover is closed. The window shows "click  button for start".</p>
Pause 1	<p>If "Pause 1" is set to "On", the fiber splicing process will stop when the fiber is pushed to the gap setting value. The operator can see the value of cutting angle at the same time</p>
Pause 2	<p>If "Pause 2" is set to "On", the fiber splicing process will stop when the fiber alignment is finished. The operator can see the offset of the fiber core and the offset of the clad at the same time.</p>

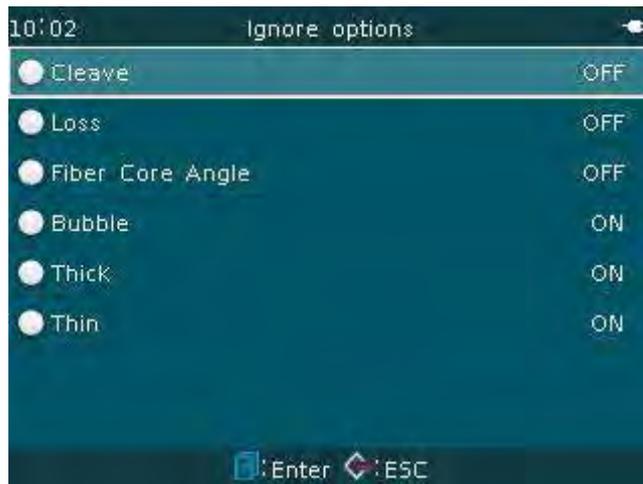
3.5.2 Data display



Parameter Description Table:

Parameter	Description
Cleave Angle	If at "On" status, the cutting angle of the right and left fiber is displayed automatically on the screen after measurement by the machine.
Axis Offset	If at "On" status, the offset of the right and left fiber core and cladding is displayed automatically on the screen.
Arc Corrected Value	Factory default setting.

3.5.3 Ignore options



Parameter Description Table:

Parameter	Description
Cleave	If it is set to "On", the error messages will be ignored in the process of slicing, the machine continues the fusion splicing process.
Loss	
Fiber Core Angle	
Bubble	
Thick	
Thin	

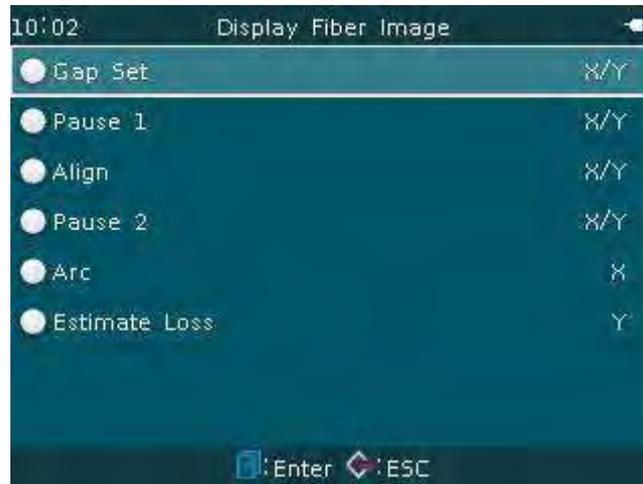
3.5.4 Arc compensation:



Parameter Description Table:

Parameter	Description
Pressure	If it is set to "On", arc intensity will be adjusted so as to compensate the changes of pressure and temperature.
Temperature	

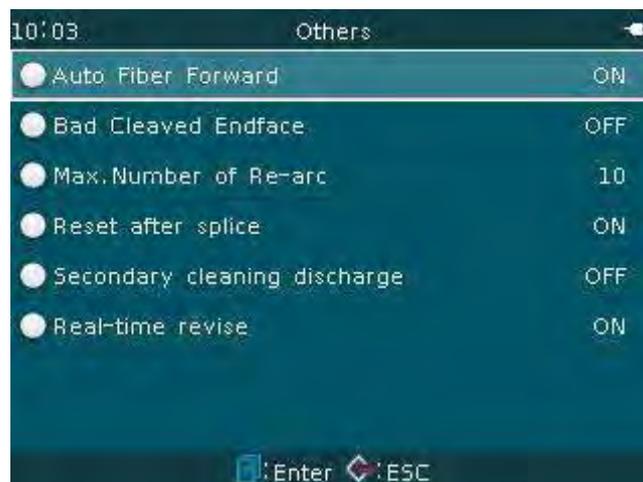
3.5.5 Fiber image display



Parameter Description Table:

Parameter	Description
Gap Set	To set the display methods of the fiber in the fusing process, one has the following options: X: The image of X-field is magnified. Y: The image of Y-field is magnified. X / Y: Vertical display of fiber image in X and Y fields. X Y: Horizontal display of fiber image in X and Y fields.
Pause 1	
Align	
Pause 2	
Arc	
Estimate Loss	

3.5.6 Others



Parameter Description Table:

Parameter	Description
Auto fiber forward	<p>If [splice operation] "automatic start" is set to "On": "Auto fiber forward" setting is invalid. The fiber will be fused automatically when the windshield cover is closed. If "automatic start" is set to "Off":</p> <p>A. "Auto fiber forward" is set to "On" status. When closing the windshield cover, the fiber is pushed into the screen, press  button again, the fiber is fused automatically.</p> <p>B. "Auto fiber forward" is set to "Off" status. When closing the windshield cover, the fiber does not go into the screen. Press  button, the fiber is fused automatically.</p>
Bad cleaved end face	Set to "On": If the cleaved end face exceeds the limit value, the screen shows respectively "red unfilled corner" overrun alarm message for the left and right fiber end faces.
Max. number of re-arc	Re-arc sometimes improves splice loss, but sometimes becomes worse. Multiple re-arcs may reduce the splice strength. This function can limit the number of re-arcs.
Reset after splice	<p>"Off": After the fiber is fused and the loss estimate is displayed, the machine is not reset when opening the windshield cover. Press  button to complete reset.</p> <p>"On": After the fiber is fused and the loss estimate is displayed, when opening the windshield cover, the machine is reset automatically.</p>
Secondary cleaning discharge	This function is mainly applied to "red light online fiber splice", to ensure cleaner on the fiber end processed.
Real-time revise	Only F, G Mode have this function, and the calibration is finished at the factory.

3.6 [Maintenance] operations

[Maintenance] function provides a number of important product maintenance options. In the readiness window as shown in the following

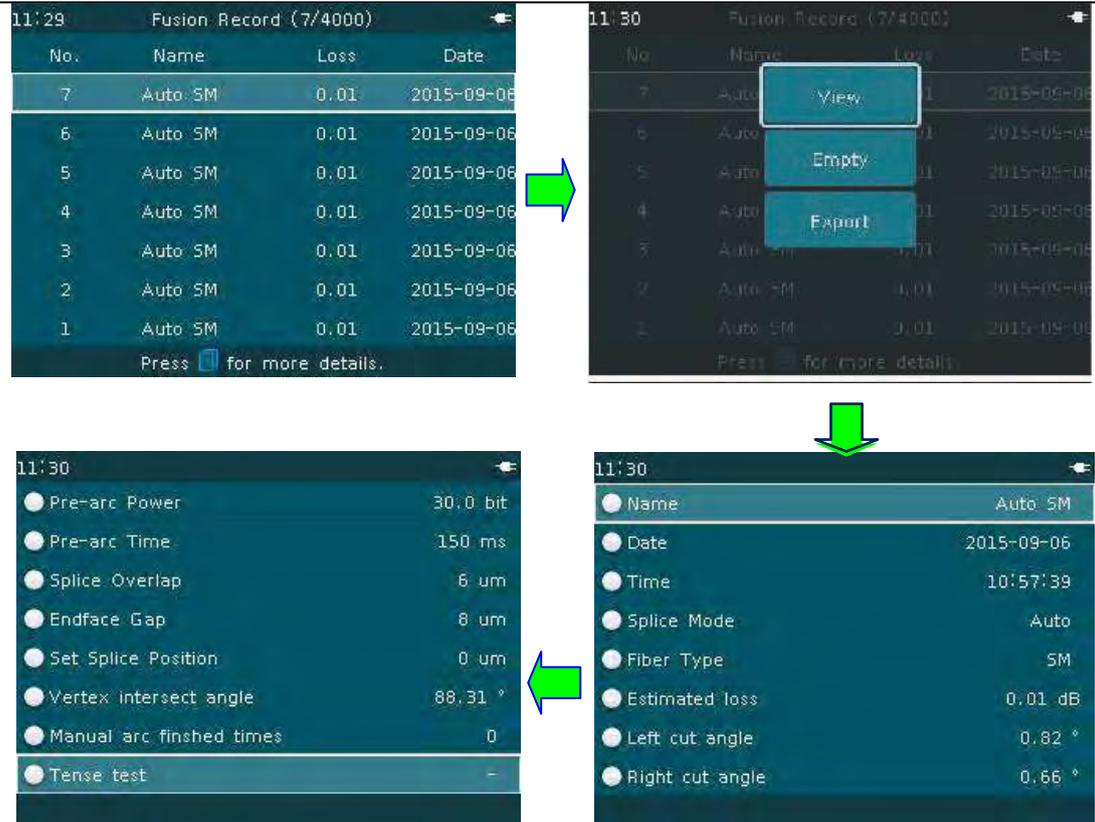
figure, move the cursor to [Maintenance] window and click  button to enter "Maintenance" window. The important product maintenance options can be set then.



3.6.1 Fusion record

"Fusion Record" function provides the history records of fiber splices completed before. The machine can store maximum 10000 splice records.

<1>Inspecting splice records



In "Fusion Record" menu, press  button. "View, Empty, Export" option window appears. When the cursor moves to "View" and click  button, the window displays the detailed information of current splice record number, as shown in following figure.

<2>Clear splice records

A. In "Fusion Record" menu, press  button, "View, Empty, Export" option window appears.

B. When the cursor moves to "Empty" and click  button, "Continue to delete all records?" dialog box appears. If the operator confirms to clear the records, all the splice records will be deleted.

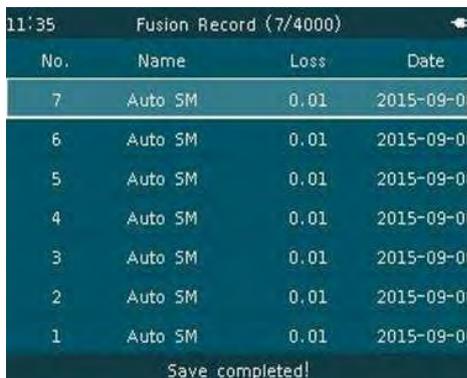


<3>Export splice record

- A. "Fusion Record" menu, press  button, "View, Empty, Export" option window appears. When the cursor moves to "Export" and click  button "Save splice record to USB storage?" dialog box appears.



- B. Insert external U disk correctly into the USB2.0 port on the back of the fusion splicer, then press  button, soon all splice record information is saved to the user's U disk.



3.6.2 Electrode

For the operations and requirements of the electrode, please refer to "5. Inspection and maintenance" of this manual.

3.6.3 Dust Check

For the operations and requirements of the dust checking, please refer to "5. Inspection and maintenance" of this manual.

3.6.4 Status



Parameter Description Table:

Parameter	Description
Inside Temperature	Monitoring the ambient temperature of the circuit board inside the machine.
Heater Temperature	“Heater temperature” can be used to monitor the temperature change process of the heater.
Ambient Temperature	Monitoring the environment temperature in present fiber splicing process and offering self-calibration compensation amount. Satisfied temperature of this series fusion splicers:-10~+50°Coperating environment.
Air Pressure	Monitoring the air pressure in present fiber splicing process. Only F, G model: altitude: 0~5000m operating environment. Other models: altitude: 0~3000m working environment.
Battery Power	Battery feed mode: Dynamically displaying the power (percentage) of current lithium battery. Power adapter feed mode: Not displaying the power (percentage) of current power supply.

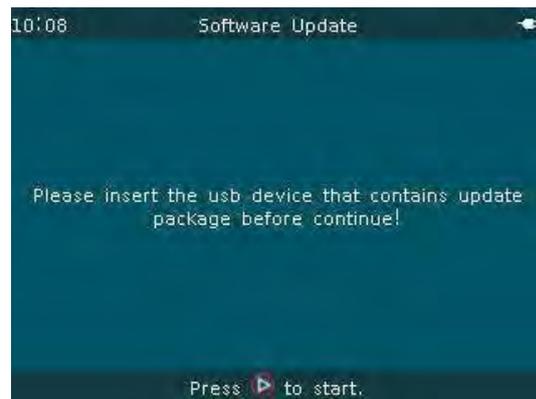
● When the lithium battery power <10%, the machine emits automatically "Low Power!!!" alarm.



3.6.5 System update

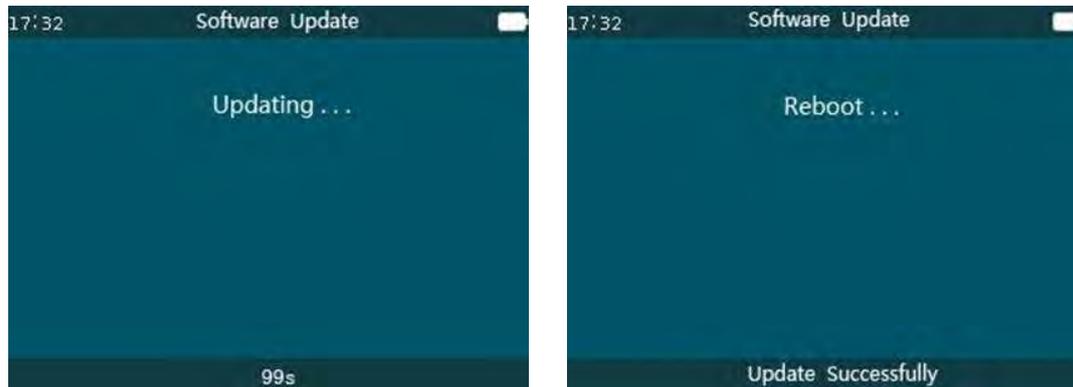
Based on the design concept meeting the requirement of users, the software update of this series fusion splicers adopts 2.0U disk (hereinafter referred to as U disk), fast and simple. The operation steps are as follows:

- A. When the cursor to “System update”, click  button, "Please insert the USB device that contains update package before continue!" dialogue box appears.



- B. The user shall insert U disk with uprate package correctly into the USB2.0 port on the back of the fusion splicer, then press  . The

screen displays "Updating ..." and timekeeping. After about 120S, the screen displays "Reboot ... Update Successfully". The fusion splicer restarts automatically and returns to the readiness screen.



C. Precautions on U disk application

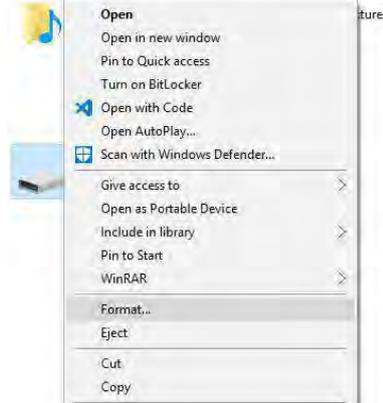
- **"Software update compression package" in the user's U disk must be extracted to the root directory of U disk used at present.**
- **Before using U disk, the operator must confirm the file system is "FAT32", otherwise, U disk shall be "formatted".**

U disk "format" steps are as follows

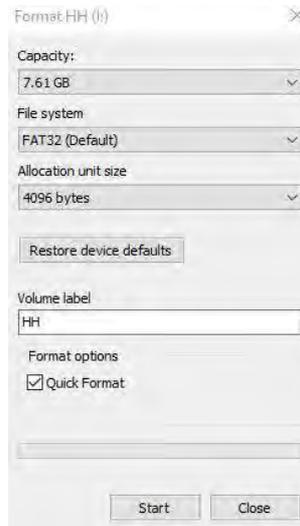
<1>Insert U disk into the computer's USB port and move the cursor to "My Computer". Double-click the cursor mouse and open "My Computer" desktop, find "HH (I:)" folder.



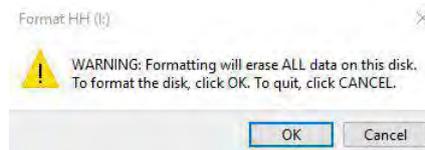
<2>Move the cursor to "HH(I:)" and right-click the cursor mouse. The following dialog box appears. Move again the cursor to "Format " item.



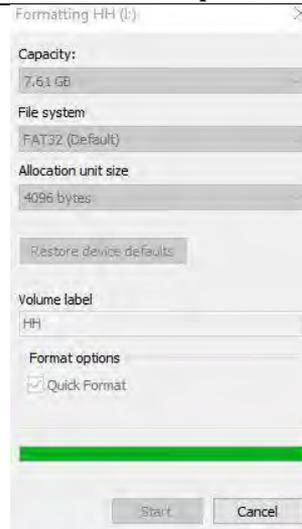
<3>Left click the cursor mouse. The following "Format" dialog box appears.



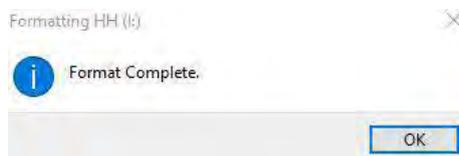
<4>Move the cursor to "Start" dialogue box and left click the mouse. Format warning dialog box appears.



<5>Move the cursor to "OK" dialogue box and left click the mouse. Format progress dialog box appears.



<6>Formatting operation will be done quickly. "Format Complete" dialog box appears.

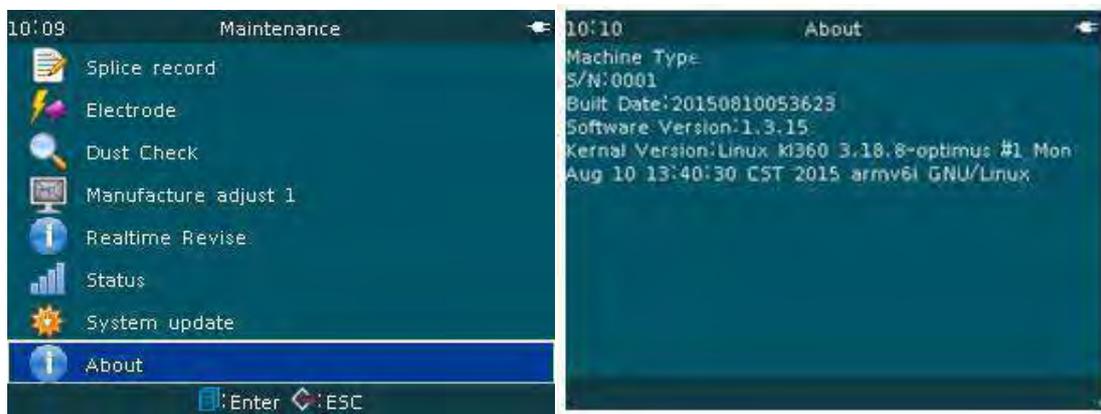


<7>Move the cursor to "OK" dialogue box and left click the mouse. "Format" dialog box appears once again. Move the cursor to "Close" dialogue box and left click the mouse. 2.0 U disk formatting operation is finished. Finally, take out U disk safely from the computer.



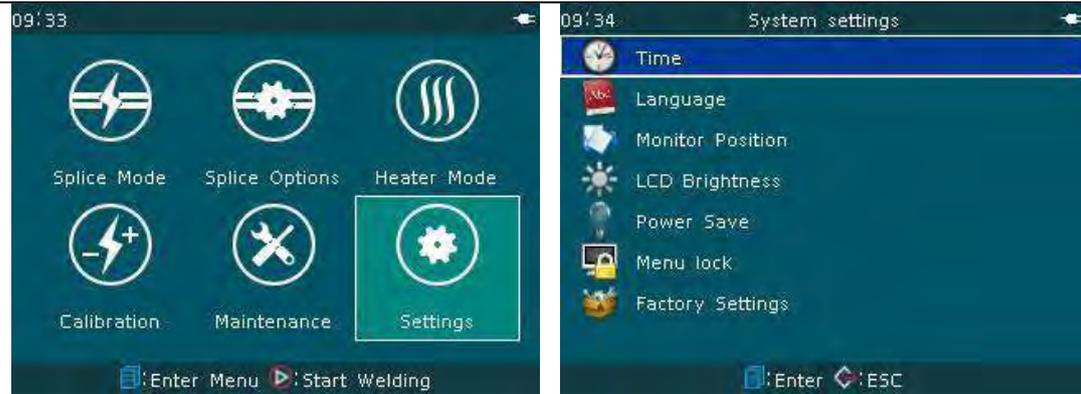
3.6.6 About

"About" provides the model, serial number, software version and related hardware information of the fusion splicer.



3.7 [Settings] operation

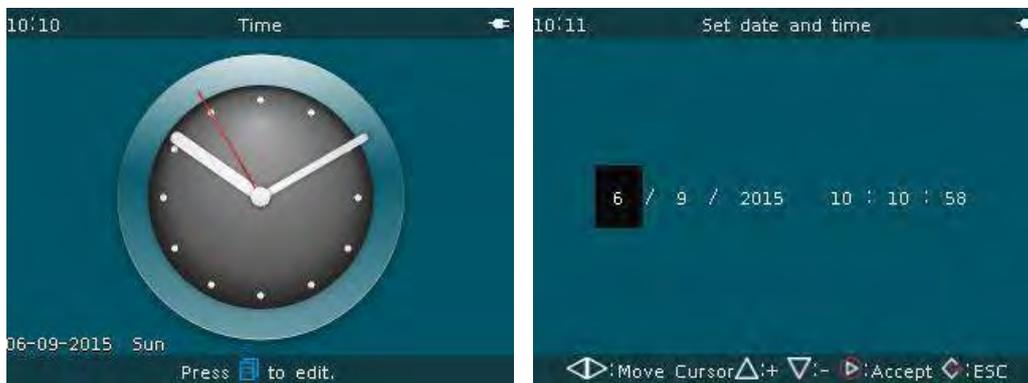
For the convenience of users, [Settings] application menu is provided. In the readiness window as shown in following figure, move the cursor to [Settings] window and click  button to enter the "System settings" window. The corresponding options can be set.



3.7.1 Time

The "Time" setting steps are as follows:

<1>In the "System settings" menu, move the cursor to "Time" item, press  button. "Time" setting window appears, continue to press  button. "Set date and time" and other detailed time information appear.

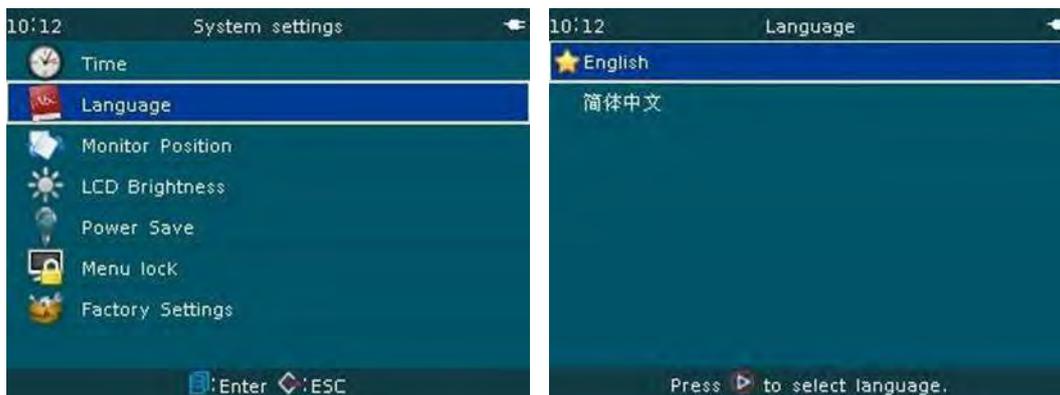


<2>In "Set date and time" window, review and adjust year, month, day, and time according to the "keypad prompt bar" at the lower portion of the window.

3.7.2 Language

This series fusion splicers are provided with built-in language packs, including Chinese, English, French and other languages, total dozen of choices, to meet the domestic and overseas users' customized demands. The factory is also adding continuously new language (language pack)

according to market demand.

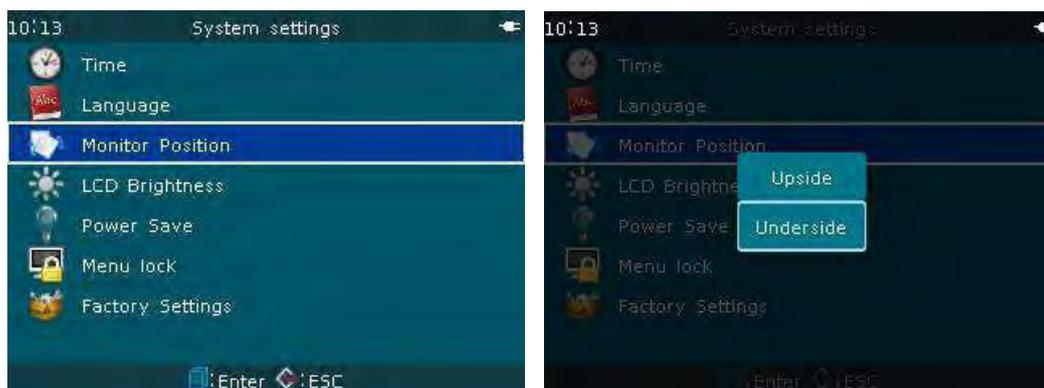


3.7.3 Monitor position

In order to meet users' demand in a special environment, this series of fusion splicers are equipped with monitor window rollover function, providing upside and underside options. Rollover setting steps are as follows:

<1> In the "System settings" menu, move the cursor to "Monitor Position" item, Press  button on. "Upside, Underside" option window appears.

<2> Move the cursor to "Underside", continue to press  button. All the currently displayed menu of the fusion splicer, fiber splicing windows are rollover, meeting users' operation demand.



3.7.4 LCD brightness

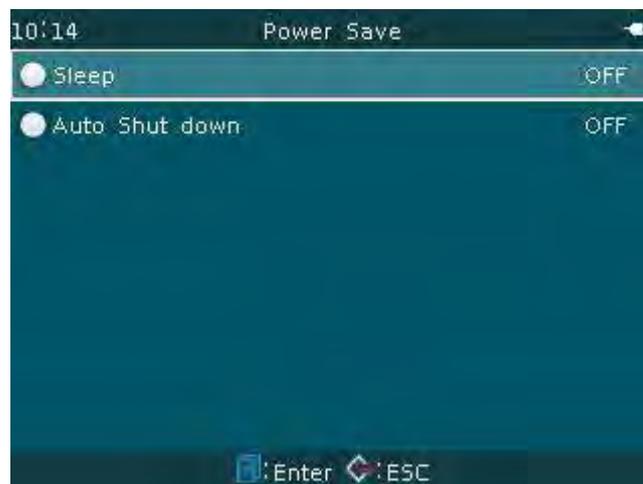
For LCD brightness operation and requirements, refer to "2.8 LCD brightness adjustment" of the manual.

3.7.5 Power save

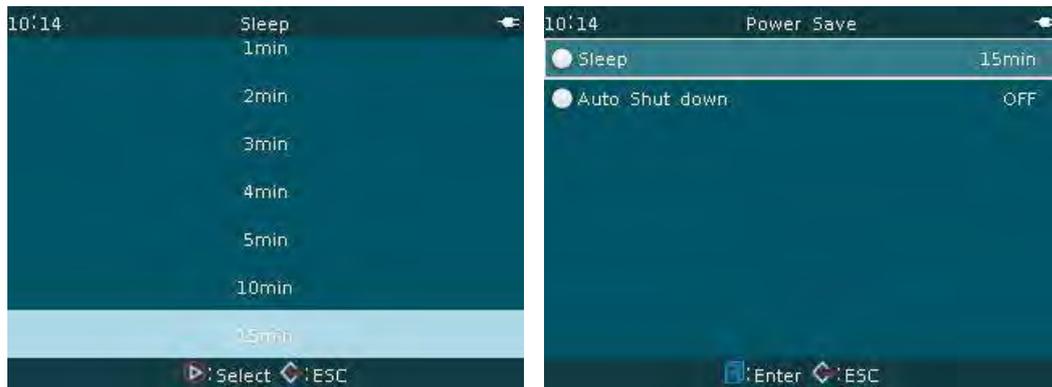
This function is very important to improve lithium battery duration and battery life. When this function is turned ON, the fusion splicer will not operate in the setting time and will enter automatically the sleep state or power off.

<1>Sleep settings

"Sleep" feature of this series fusion splicers is disabled by default.



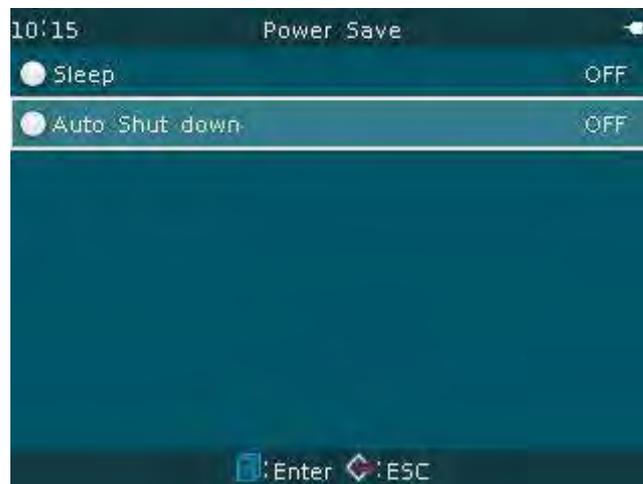
- A. In "Power Save " screen, move the cursor to "Sleep" item, press  button and enter "Sleep" time option setting window. Sleep time setting range is "1~60min" or "OFF". Move the cursor to "15min", press  button, the current sleep time 15min setting of the fusion splicer is effective.



- B. Press  button to return back to the readiness window. The normal splicing operation can be done. When the operator does not operate the keypad of the fusion splicer within 15 minutes, the machine will enter automatically sleep (LCD and electric circuit etc. are closed). If the operator operates any keys on the keypad, the fusion splicer can wake up at any time to work.

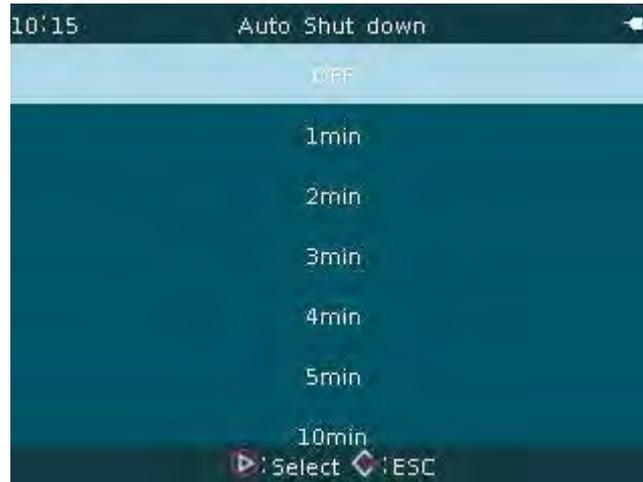
<2>Automatic shutdown setting

"Auto Shut down" feature of this series fusion splicers is disabled by default at the factory.



- A. In "Power Save " screen, move the cursor to "Auto Shut down" item, press  button and enter "Auto Shut down" time option setting

window. Automatic shutdown time setting range is "1~120min" or "OFF". Move the cursor to "×× min", press  button. The current automatic shutdown time ××min setting of the fusion splicer is effective.



B. Press  button or to return back to the readiness window. The normal splicing operation can be done. When the operator does not operate the keypad of the fusion splicer after ××minutes, the machine will automatically enter the automatic shutdown status.

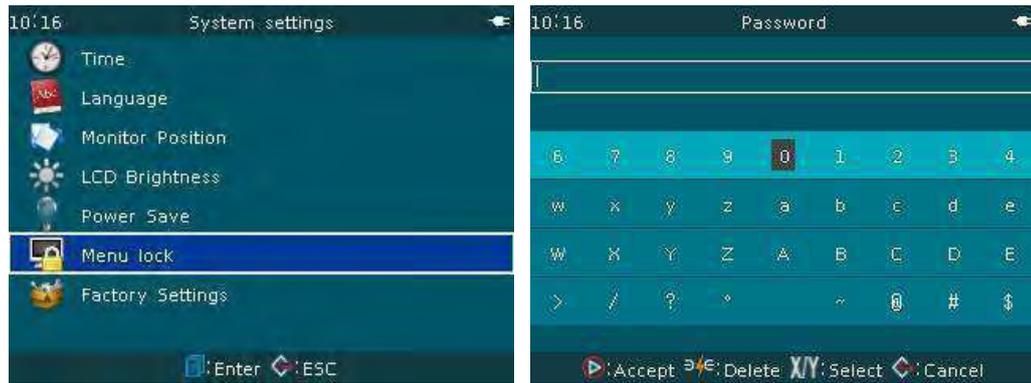
Parameter Description Table

Parameter	Description
Sleep	When the user sets the sleep waiting time, if the fusion splicer does not operate within the set time, the fusion splicer will turn automatically off the LCD. The power consumption of the fusion splicer will be greatly reduced to prevent the speedy consumption of the battery power. When the LCD is off, LED indicator next to  is still green. The operator can press any key to wake up the machine and resume the operation.
Auto shut down	After this feature is turned on and set automatic shutdown waiting time, if the fusion splicer does not operate in the setting time, the fusion splicer will cut automatically off the power supply.

3.7.6 Menu lock

For preventing incorrect operation of the machine, not causing the changes of the parameters of the machine, not affecting the splicing quality, preserving the historic records such as machine splices, the administrator can lock the functions of relevant menu of the fusion splicer according to the need.

<1> In [System settings] menu, move the cursor to "Menu lock", press  button and enter the "Password" screen. Input a valid password to enter the "Menu lock" screen.



<2> The administrator can set "ON" or "OFF" permission on the operating function based on the work. Lockable operating functions are listed in the table below.

Functions	Description
Remove splice records	On: The historic records of splice modes are locked and cannot be deleted. Off: The historic records of splice modes can be deleted.
Arc calibration	On: Arc calibration records are locked and cannot be operated. Off: Arc calibration records can be operated.
Calendar	On: The calendar settings are locked and cannot be operated. Off: Calendar setting can be operated.
Clear-up arc numbers	On: "Clear-up arc numbers" cannot be operated. Off: "Clear-up arc numbers" can be operated.
Password	Password set by the fusion splicer administrator to access

	"menu lock" window.
--	---------------------

3.7.7 Factory settings

"Factory Settings" is used in the factory for machine software and hardware configuration and commissioning. The user cannot access it. Otherwise, the operation in error will lead to the result that fusion splicer cannot be repaired due to protection by password.

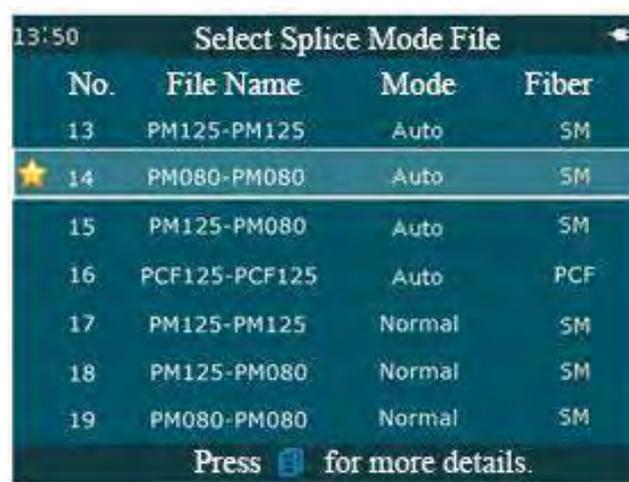


4 High level operation

4.1 Select splice mode according to the type of optical fibers

<1> Different fibers have different splice parameters. In the fiber splice operation, the user shall choose a suitable fiber splice mode according to the type of fibers to be fused.

<2>In "Select Slice Mode File" screen, there are a total of 8 sets of different kinds of fibers. Different modes can be selected and edited by the user as shown in following figure.



No.	File Name	Mode	Fiber
13	PM125-PM125	Auto	SM
★ 14	PM080-PM080	Auto	SM
15	PM125-PM080	Auto	SM
16	PCF125-PCF125	Auto	PCF
17	PM125-PM125	Normal	SM
18	PM125-PM080	Normal	SM
19	PM080-PM080	Normal	SM

Press  for more details.

Type of fibers: Standard Fiber and Special Fiber

Description of some modes:

Splice Mode	Description
Auto	"Real time arc calibration" function: Compensate and adjust in real time "arc time" and other parameters.
Calibrate	"Real time arc calibration" function: Compensate and adjust in real time "splice arc intensity".
Normal	Implement in the default factory optimized parameters.
Other modes	In the splicer database, there are other splice modes different from the modes listed above. The new splice modes are constantly added. The users can contact their sales dealer and ask for the latest splice modes.

4.2 Selecting / editing splice mode

<1>Factory default fiber, splice mode (splice mode file) of this series fusion splicer: No. 1, Auto SM. If the user has no choice on other "splice mode file", No. 1 is used by default as "splice mode file" in the current operation of the fiber splice.

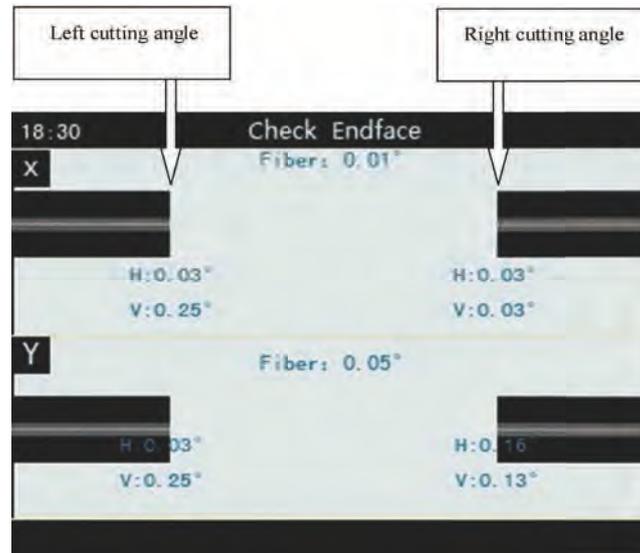
<2> According to the need, users can select and edit the "Select splice mode file". See "3.2.2 Edit/ select" of the manual for the operation method.

4.3 Splicing operation

This series of fusion splicers are installed with an image processing system to observe and inspect the optical fiber. However, the image processing system may not discover fusion splicing errors in some cases. In order to achieve good splicing results, the operator needs the LCD to monitor visually the entire splicing process of the optical fiber. The following describes the standard splicing steps.

4.3.1 Inspection on cutting angle and end face of the optical fiber

<1>Two optical fibers are loaded into the fusion splicer and are moved forward each other. After arc cleaning, two optical fibers are stopped respectively at a set position. The operator shall then check the cutting angle and the quality of the end face of each fiber. If the measured fiber cutting angle is larger than the set limit (factory default value), or the operator checks out the end face of the optical fiber has a burr, the machine buzzer alarms. At the same time, the LCD will show an overrun alarm message. Fiber splicing process is paused automatically. To ensure the quality of splicing, the user is recommended to try to make a better fiber end face and place the fibers into the machine again.

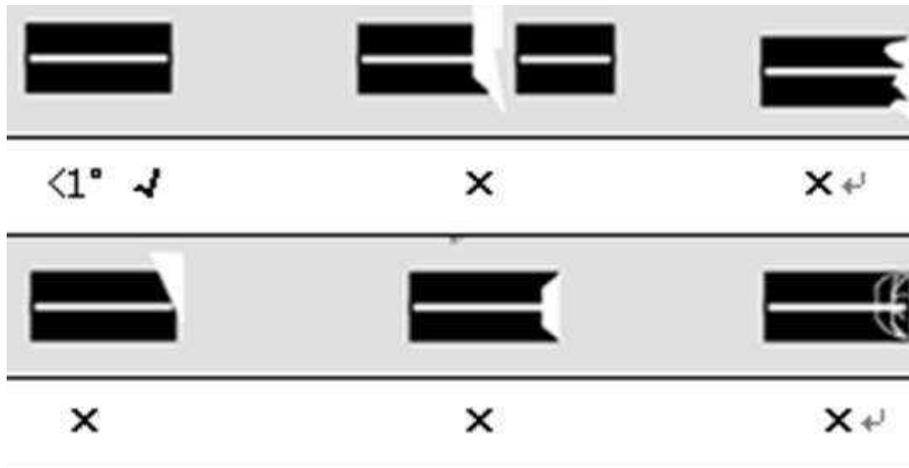


Screen Data Description:

Fiber: Angle between the left fiber (extension line) and the right optical fiber (extension line) on X (Y) screen. H: Angle between the left (right) fiber and the horizontal line. V: Angle between the left (right) fiber end face and the vertical line.

<2>When there is no overrun alarm message displayed on the fusion splicer LCD, the operator should also check manually the fiber end face. If the operator finds a situation similar to the following, take the fiber away from the fusion splicer and prepare again the fiber end face, because the fiber surface defects may lead to a failure of the splicing.

<3>Quality of the fiber end face has a significant influence on the splice loss. Try to make a plane on the fiber end face when cutting the fiber. The angle of the plane with the cross section of the fiber is less than 1°. The end face in the following figure. The first fiber shows a good cutting and can be fused; the rest are ineligible end faces and should be cleaved again.



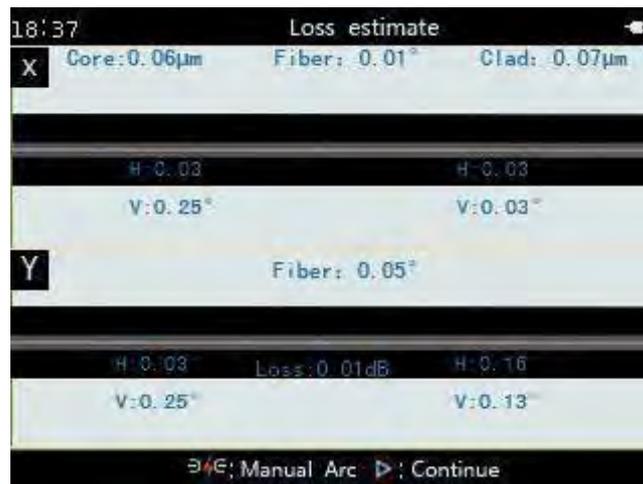
4.3.2 Automatic aligning and splicing

After optical fiber inspection is finished, the fibers will be aligned according to the manner of "core to core" or "clad to clad", and then is spliced with arc.



4.3.3 Estimation of splice loss

After fusion splicing is finished, the estimated value of the splice loss will be displayed.



Screen Data Description:

Core: The left fiber core is offset to the right fiber core. Clad: The left fiber clad is offset to the right fiber clad. Fiber: angle between the left fiber (extension line) and the right optical fiber (extension line) on X (Y) screen. H: Angle between the left (right) fiber and the horizontal line. V: Angle between the left (right) fiber end face and the vertical line.

If the fiber after splicing is checked out to have following abnormal circumstance, for example: too thick, too small or bubble, the fusion splicer shows "fusion splicing failure" message or "too large splice loss

estimate" message. When there is no error message displayed, but the splice result is found on the LCD display to be very poor, it is proposed to make splice again.

- **The splice point sometimes looks "thicker" than the rest of the fiber. This is normal fusion splicing and does not affect splice loss.**
- **When the splice loss exceeds the set alarm value, the machine shows red message to warn the operator. If this information is set not be displayed, the user can edit "Ignore Options" (Section 3.5) menu in [Splice Options].**
- **In some circumstances, additional arcs can improve splice loss. Press  button to carry out additional arcs. In some circumstances, additional arcs may increase splice loss. It is recommended to limit the number of arcs. The user can edit it in "Others" (Section 3.5) menu in [Splice options].**
- **When different fibers (different diameters) or multimode fiber are spliced, sometimes a vertical line is produced at the splicing point, this does not affect splice loss and point strength.**

Causes and solutions of increased splice loss are listed in the table below:

Phenomenon	Causes	Solutions
Axial misalignment of fiber core	V-groove or fiber clamp feet have dust.	Cleaning V-groove and fiber clamp.
Angle error of fiber core	V-groove or fiber clamp feet have dust.	Cleaning V-groove and fiber clamp.
	Poor quality of fiber end face	Check whether the fiber cleaver works well.
Steps on fiber core	V-groove or fiber clamp feet have dust	Cleaning V-groove and fiber clamp.
Fiber core bending	Poor quality of fiber end face	Check whether the fiber cleaver works well.
	Low pre-arc intensity	▲ Increase "fiber pre-melting

	or short pre-arc time.	intensity". ▲ Increase "fiber pre-melting time".
Mode field diameter mismatch	Arc intensity is too low.	▲ Increase "arc 1 intensity". ▲ or "arc 1 time".
Dust	Poor quality of fiber end face	Check the cleaver working situation.
	Dust remains after cleaning fiber or cleaning arc.	Clean thoroughly the fiber or increase "clean arc time".
Bubble	Poor quality of fiber end face.	Check whether the cleaver works well.
	Low pre-arc intensity or short pre-arc time.	▲ Increase "fiber pre-melting intensity". ▲ Or Increase "fiber pre-melting time".
Fiber separation	Fiber feed is too small.	▲ Increase "overlap".
	Too high pre-arc intensity or too long pre-arc time.	▲ Reduce "fiber pre-melting intensity". ▲ Or reducing "fiber pre-melting time".
Too thick	Too low pre-arc intensity or too much feed of fiber.	▲ Increase "fiber pre-melting intensity". ▲ Or reduce "overlap"
Too thin	Inappropriate arc intensity.	Doing "arc calibration".
	Some arc parameters inappropriate	▲ Adjust "fiber pre-melting intensity", "Fiber pre-melting time". ▲ or adjust "overlap".
Fine Line	Some arc parameters inappropriate	▲ Adjust "fiber pre-melting intensity", "Fiber pre-melting time". ▲ or adjust "overlap".

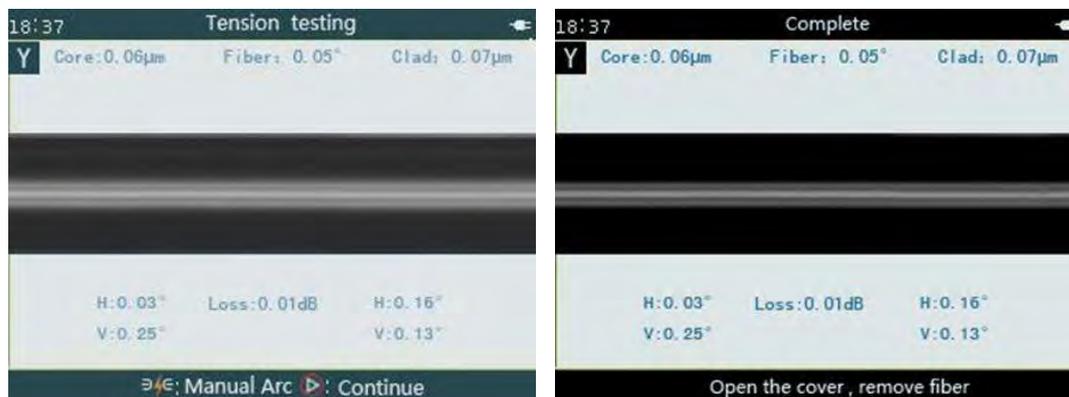
Remarks: ▲ This item can be edited only in "Normal Splice Mode".

4.4 Tension testing

If testing the strength of the splice point, enter the window of "Select Splice Mode File" in splice mode and enter "Edit Splice Mode File" window, click the cursor mouse to select "Tension testing" and "On". Press  button to confirm that the setting and then exit to the readiness window.

After the machine finishes splicing and the splice loss estimate value is displayed, press "Continue" button at the lower portion of the display screen and press  button. The fusion splicer will perform automatically the tension test of the fiber.

When the fiber splice point is not broken during the tension testing, the screen shows "Complete".



- For the specific steps of the tension testing "On", refer to "3.2.2 Edit/select" of the manual.

- **Splice "tension testing" function is OFF as factory default setting.**
- **If "splicing fails" appears in the fiber splicing, the tension testing is not possible.**

4.5 Saving splice records

Upon the fiber splicing is completed and the loss estimate is

displayed, the splice loss value, splice parameters, splicing time and other relevant information will be stored automatically in the machine's memory.

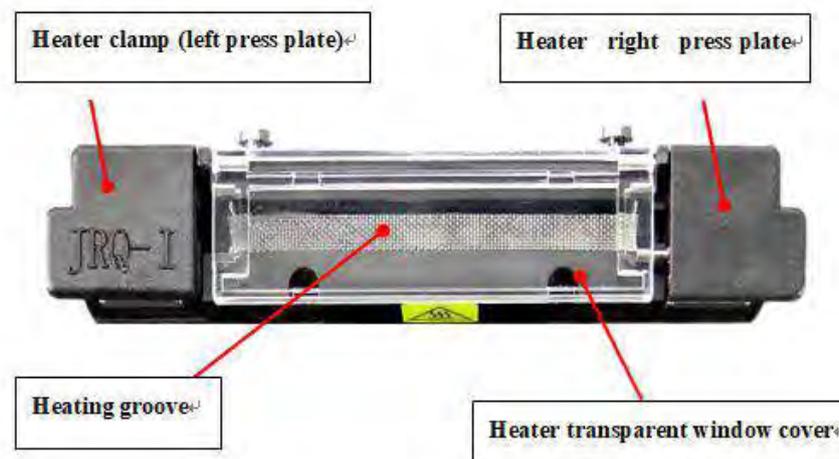
When 10000 splice records have been stored, the 10001th record will overwrite the first one in the storage.

4.6 Reinforcement of fiber splice point

4.6.1 Selecting the heating mode according to heat-shrink sleeve material

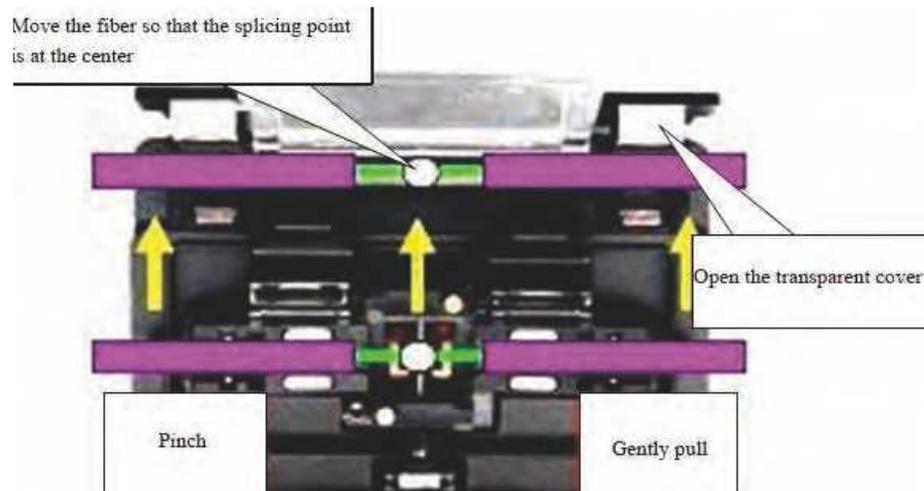
Different heat shrink sleeves have different specifications and sizes. When the user reinforces the fiber splice point, matching heat shrink sleeve shall be used. The heat shrink sleeve shall be operated according to the material type of the heat shrink sleeve used at present. The user shall choose a suitable heating mode.

4.6.2 Heating operation



<1>After opening respectively the heater clamp (left press plate) and the transparent window cover, hold the left end of the optical fiber installed with heat shrink sleeve with the left hand. Straighten gently the other end

of the optical fiber with the right hand. The optical fiber is moved from the V-groove to the heater groove as shown in the figure below.



<2> Confirm that the fiber splice point is placed at the middle position of heat-shrink sleeve. Put the heat shrink sleeve at the center position of the heating groove and straighten the fiber gently. Close the heater transparent window cover (right press plate) and the heater clamp (left press plate).

- **The reinforcing core of the heat shrink sleeve is placed on the bottom and the optical fiber is not distorted.**

<3> Press  button to start heating. Heating processes include: Start heating-up (LED red indicator), constant temperature stage (LED green indicator), cooling stage (LED red indicator). When heating is complete, the buzzer sounds. The heating indicator LED (red) is turned off automatically. If pressing  button during heating, heating process will be terminated.

<4> After opening the heater transparent window, the fiber has been

protected by the heat shrink sleeve and can be removed.

<5>Observe heat shrink sleeve after heating. The qualified fiber inside is free of bubble and dust.

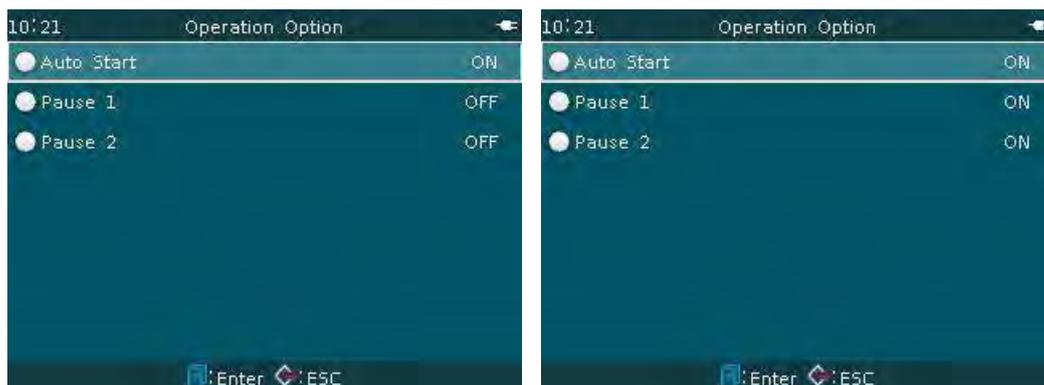
- **Heat shrink sleeve may be stained on the heating bottom plate of the heating groove. In this case, remove the heat-shrink sleeve by a cotton swab.**
- **Heater temperature in heating process is high. Do not touch the heating groove and heat-shrink sleeve.**

4.7 Manual drive motor

4 motors (driving, aligning) in the fusion splicer can be operated separately and manually.

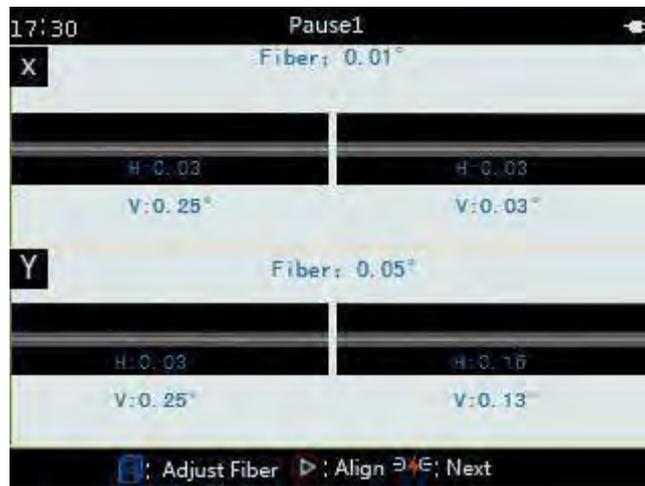
4.7.1 Selecting manual (step by step) splicing

In the "Operation Option" menu of "Splice Options" window, set "Pause 1", "Pause 2" to "On". When the fusion splicer performs the splicing process to "Pause 1" or "Pause 2" status, the motor will stop automatically and the motors can be operated manually by pressing buttons.



4.7.2 Manual (step by step) splice operation steps

<1>The machine goes from the automatic "forward" and other actions to complete the fiber "gap setting", and is suspended in "Pause 1" screen. Press  button, "left fiber", "right fiber", "grid" dialog boxes appear. Move the cursor and select "left fiber (right fiber)", then press  button or  button to confirm "left fiber (right fiber)" operation. The driving and aligning motors of the left fiber (right fiber) can be set as follows.



<2>In the "left fiber" operation window, press  or  to move X (Y) field left driving motor forward or backward;  or  to move X-field alignment motor upward or downward.

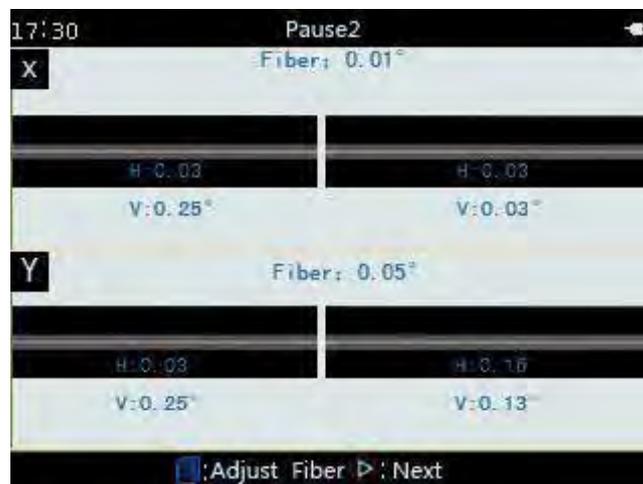
<3>In the "right fiber" operation window,  or  to move X (Y) field right driving motor forward or backward; press  or  to move Y-field alignment motor upward or downward.

Operation comparison table of X (Y) field driving motor and aligning motor

X (Y) field driving motor		
Left driving motor	Forward	Backward
Right driving motor	Backward	Forward
X (Y) field alignment motor		
X field alignment	Upward	Downward

Y field alignment motor	Upward	Downward
-------------------------	--------	----------

<4> Press  button at "Pause 1" status in the splicing process. 4 motors (driving, aligning) can be adjusted manually (step by step) by pressing buttons, so that the gap between the left fiber and right fiber is (aligned) best. Press  button, the machine goes from "Pause 1" to "Pause 2" and suspended.



<5> Press  button as same at "Pause 2" status in the splicing process. 4 motors (driving, aligning) can be adjusted manually (step by step) by pressing buttons. The left fiber and right fiber are aligned best (gap).

Press  button, the fibers are spliced by the arc of the fusion splicer.

<6> After splicing, the machine will calculate automatically "splice loss" and shows it on the screen.

- **When the left (right) motor is advanced forward by pressing buttons to the limit position, the motor will stop running and go back by pressing the buttons in the opposite direction.**

5 Inspection and maintenance

The following describes the key points for cleaning and maintenance inspection.

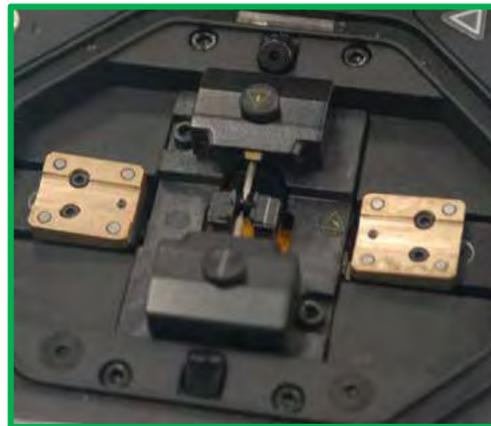
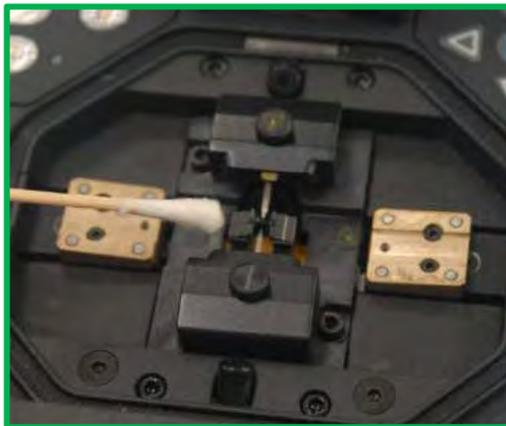
- **For the operation in section 5.1 ~ 5.4, turn off the fusion splicer power.**

5.1 Cleaning V-groove

If the V-groove is contaminated, it cannot grip properly the optical fiber. This will cause the splice loss too large. So in daily work, the V-groove should be checked and cleaned periodically or regularly. V-groove cleaning steps are as follows:

<1> Open the windshield cover.

<2> Clean alcohol the bottom of V-groove with a thin cotton swab moistened with, and wipe off the alcohol left in the V-groove with a dry cotton swab.



- **Be careful not to touch the electrode tip.**
- **Do not use excessive force when cleaning the V-groove, in case damaging V-groove wall**

<3> If the thin cotton swabs moistened with alcohol cannot remove the contaminant in the V-groove, the operator can use the tip of the optical fiber with the coating layer being stripped to remove the contaminants from the V-groove. Then repeat steps <2>.

5.2 Cleaning fiber clamp

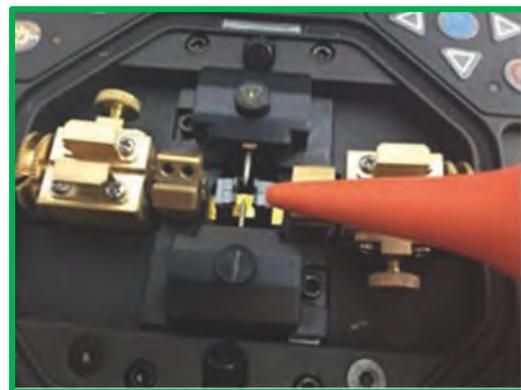
<1> If the fiber clamp is contaminated by dust, the fiber gripping may be a problem. This will likely result in poor quality of the splice point. In routine working process, the fiber clamp should be checked regularly and cleaned regularly.

<2>Cleaning the fiber clamp according to the following steps: Open the windshield cover. Clean the surface of fiber clamp with a thin cotton swab moistened with alcohol. Then wipe the clamp with a dry cotton swab.

5.3 Cleaning mirror and objective lens

5.3.1 Routine maintenance

In routine maintenance, the ear syringe may be used for blowing off the dust from the surface of the mirror and the objective lens of the fusion splicer.



5.3.2 Cleaning with anhydrous alcohol

The mirror and objective lens are dusty after a long time without routine maintenance, resulting in whitening and fuzzy black-clad of fiber image. Steps to clean the objective lens with anhydrous alcohol are as follows:

<1> Before cleaning the lens, turn off first the power of the fusion splicer.

<2> Roll specific lens paper into a stick and then fold it and tear it apart. Then clean the mirror and objective lens surface with the rough edge of the stick.

<3> When the lens paper cleaning is invalid and the objective lens surface is free of visible dust particles, try to use a thin cotton swab dipped in a little pure alcohol (99% and above) and wipe gently the lens surface. It is recommended in principle not using alcohol to clean the mirror surface.

<4> Wipe the lens with a cotton swab from the middle of the lens and make a circular motion up to the edges of the lens. Then wipe off the remaining alcohol with a clean dry swab. The objective lens surface should be clean and free of dirt.



<5> Turn on the power supply of the fusion splicer and make sure the dust and streaks are not visible on the LCD display. X / Y fields shall be switched over to check the condition of the surface of both objective lens and do dust check.

- **Incorrect use methods or undesirable chemical substances cleaning objective lens can cause optical fiber imaging fuzzy and damage the equipment.**
- **When cleaning, be careful not to bump into or touch the electrode rod.**

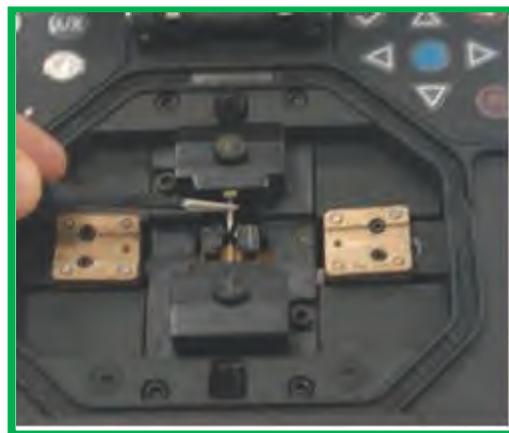
5.4 Replace the electrodes

Electrodes will be worn out after long-term use and silicic oxide will be accumulated on the tip, so regular cleaning is required. It is recommended to replace the electrode after 2500 times of arcs. If the electrode continues in service without changing, the machine will increase splice loss and reduce the strength after fusion splicing. The steps replacing the electrode are as follows:

<1> Before replacing the electrode, turn off the power of the fusion splicer first.

<2> Remove the old electrode. The removal method is as follows:

- a. Loosen the fastening screws on the electrode cover and remove the electrode cover.
- b. Take out the electrode from the electrode holder (Electrodes are fixed inside the electrode cover).



<3>Clean the new electrode with tissue paper dipped in alcohol, then install the electrode to the original holder position.

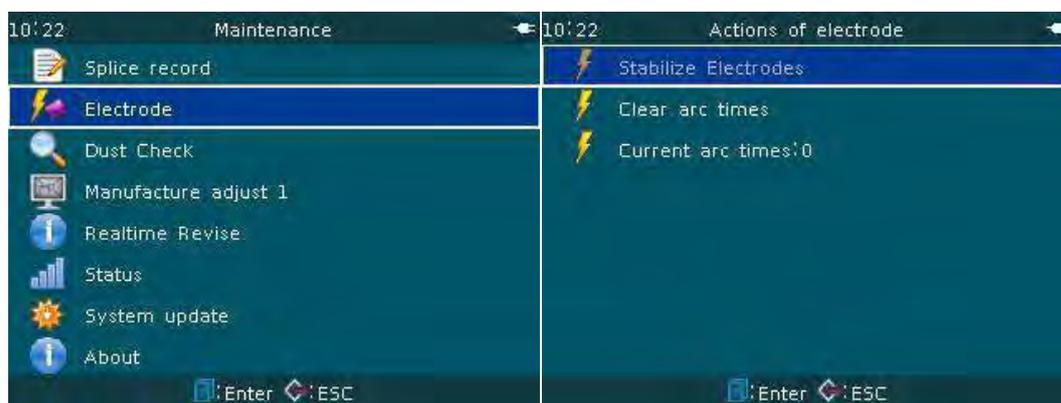
<4>Install the electrode cover and tighten screws.

- **When replacing the electrode, do not pull out the wiring.**
- **Do not tighten the screws with the force larger than finger's maximum force.**

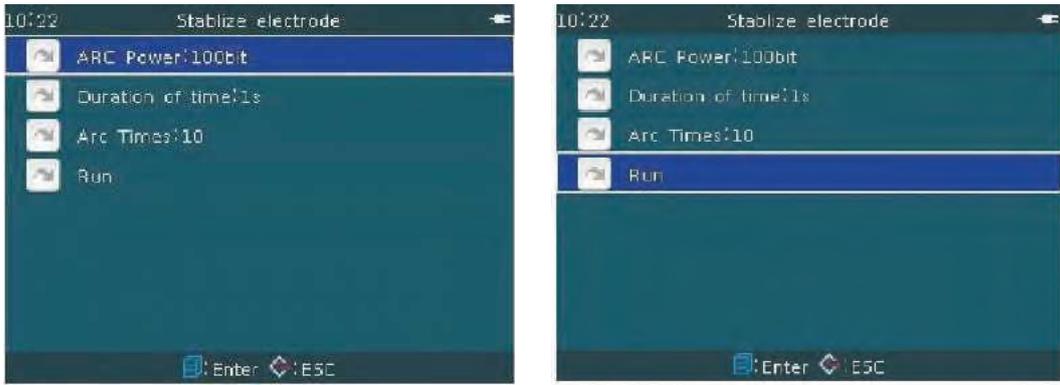
5.5 Stabilizing electrodes

When replacing a new electrode or the external environment is changed, the electrode (tip) surface is covered by dirt. The direct result is that the arc intensity is unstable sometimes and more splice loss. Especially when the fusion splicer moves from low altitudes to high altitudes, it takes some time to stabilize the electrode. In this case, stabilizing electrode will accelerate the process of stabilizing arc intensity. The steps are as follows.

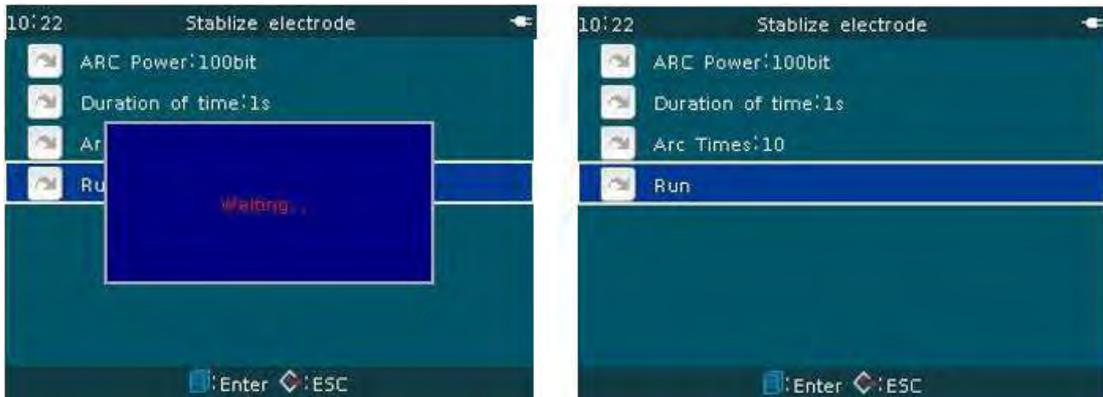
<1>In the "Maintenance" menu, move the cursor to "Electrode" item, press  and enter the lower level menu of "Actions of electrodes". Move the cursor to "Stabilize Electrodes" item.



<2>Continue to press  and enter "Stabilize electrode" operation window. Move down the cursor to "Run" item.



<3> Press . The fusion splicer starts 10 times of "Stabilize Electrodes" arcs.

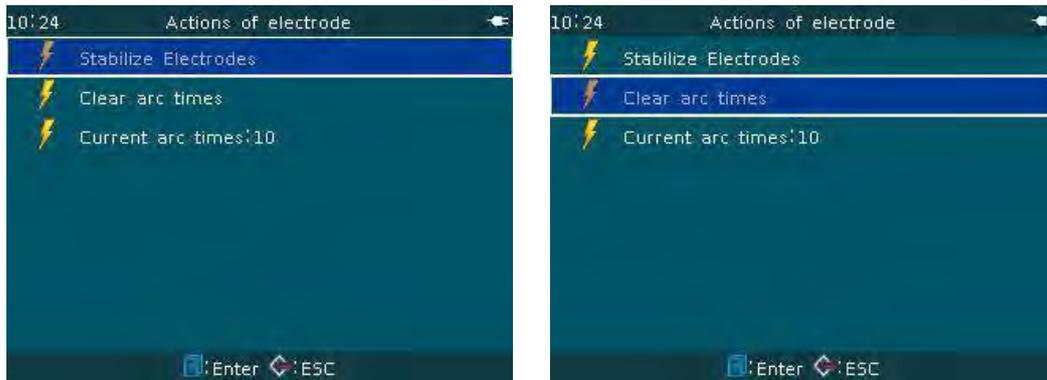


<4> Certainly, the operator can check visually arc stability in fiber splicing to confirm if "Stabilize Electrodes" operations shall be repeated.

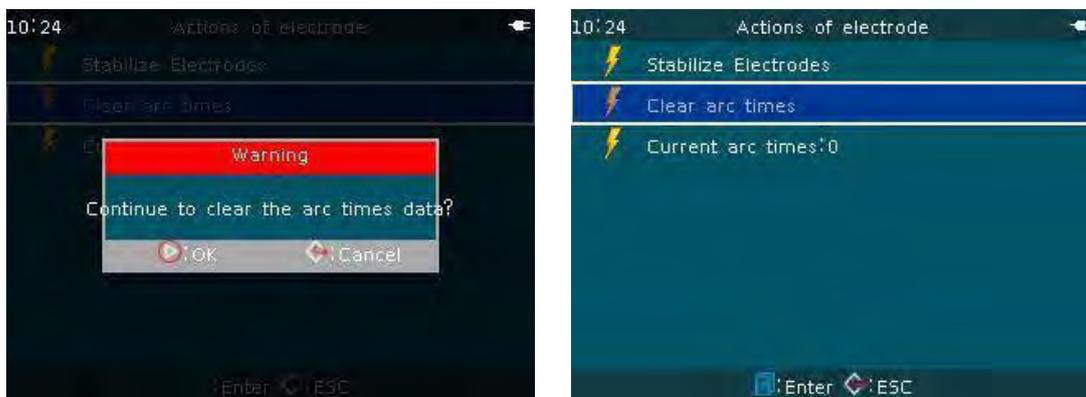
5.6 Clear arc times

This function can reset the times of arcs.

<1> In "Actions of electrode" menu, move the cursor down to "Clear arc times" item.



<2>Press  button, "Continue to clear the arc times data?" dialog box appears. Press  . "Current arc record 10" is cleared and "current arc times" is 0.



5.7 Dust check

The operator can observe the optical fiber through the imaging system of the fusion splicer. The dust or dirt on the camera, the lens and mirror of the imaging system may affect the observation and cause bad splice result. With the dust check function, the operator can check the dust and dirt on the optical fiber path and indicate their location.

5.7.1 This feature allows the user to check the dust or dirt on the optical path and determine whether they affect the detection on the optical fiber.

5.7.2 Operation steps:

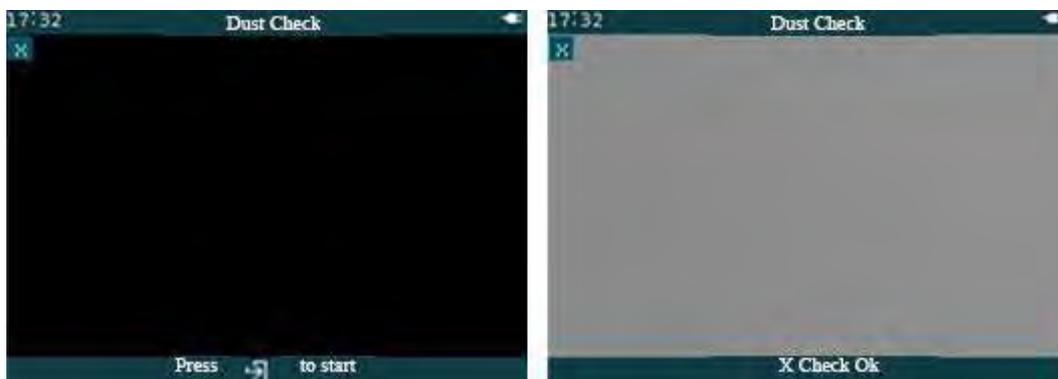
<1>Before starting the test, take out the optical fiber from the fusion splicer.

<2>Check visually if lens and mirror surface are free of foreign material.

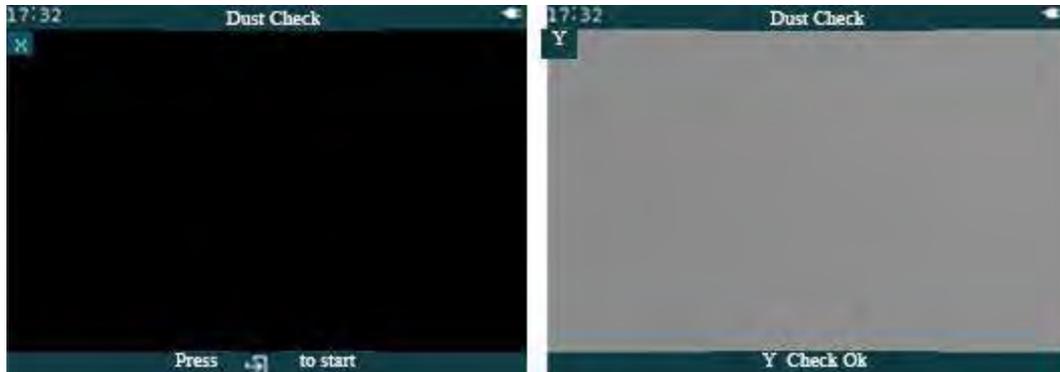
<3>In the "Maintenance" menu, move the cursor to "Dust Check" item and press  button to enter "X Dust Check" operation window.



<4>Press . The fusion splicer completes soon "X Check OK". If there are any dust points, the position is shown on the screen.



<5>Upon completion of "X Check OK", press  button. The screen switches to Y image. Continue to press  or  button. The fusion splicer completes soon "Y Check OK ". If there are any dust points, the position is shown on the screen.

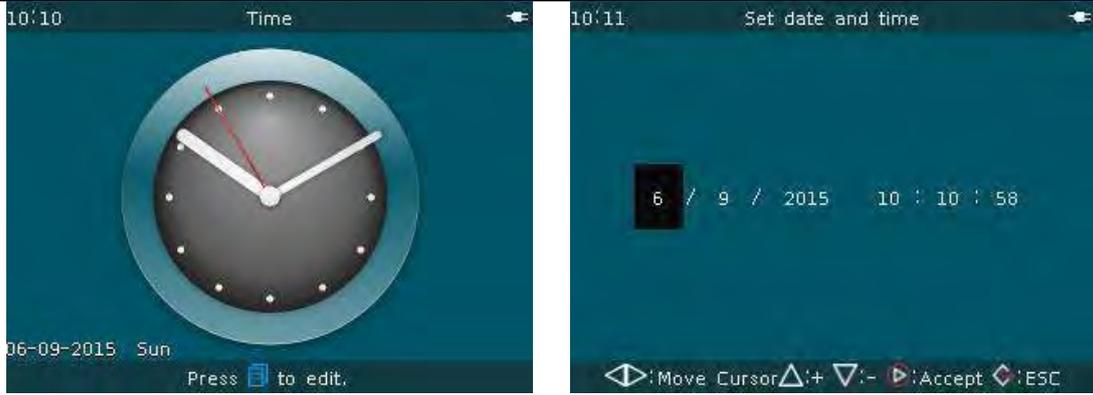


<6>Upon completion of respective 2 image dust checks, press  in turn to return back to the fusion splicing window. The normal optical fiber splicing work can be done.

- **If the screen displays "image dirty" after the dust check, the operator shall clean the objective lens and mirror inside the windshield cover. If after cleaning, the dirt remains after "Dust Check" again, it indicates that the dirt may go into the optical path. Please contact the manufacturer or dealer.**

5.8 Calendar settings

This function is used to set the calendar and time inside the fusion splicer. For the operation steps: refer to "3.7.1 Time" of the manual.



5.9 Heater / battery / environment

This feature not only provides users with information about the current operating environment, and also improves fusion splicing properties, provides software correction values. Operation steps: please refer to "3.6.4 Status" of the manual.



5.10 Replacement of spare lithium batteries

Refer to "2.2.2 Power supply of lithium battery" of the manual. Replace the backup battery.

6 Problems and troubleshoot

6.1 Power supply

The machine does not shut down after pressing .

Press  button until the keypad indicator light is turned from red to green. Release  button, the fusion splicer shuts down.

Even fully charged battery is still not enough for several splices.

- If the fusion splicer power-saving function is turned off, the power consumption will increase.
- As the battery provides power through chemical reaction, the temperature too low will lead to reduced capacity, particular below zero.
- At high altitudes, arc current will increase. In this environment, the battery capacity will decrease rapidly.
- AC/DC adapter is not provided by our company, or the charging time is not enough. LED (power module indicator) blinks during charging
- Temperature is too high (above 50 degrees) or the battery is exposed in direct sunlight.
- Battery is faulty or has exceeded the service life. Insert a new battery, if LED is still blinking, contact the manufacturer or distributor.

6.2 Fusion splicing operation

Splice loss value is unstable / high

- Clean V-groove, optical fiber clamp, mirror and objective lens inside the windshield cover. See [Inspection and maintenance] (Chapter 5).
- Replace the electrode. See [Replace the electrodes] (Section 5.4).
- If the fiber is bent, the bent portion of the optical fiber is placed upward.

- Splice loss is decided by the cutting angle, arc conditions and fiber cleaning.

Confirm splicing program

- See [Splice Mode] operations (Section 3.2).

Display is suddenly closed.

- When the fusion splicer is powered by the battery, the operator shall turn on the power-saving function. If the fusion splicer does not operate after a little time, the display will shut down automatically. Press any key to return to a normal state. Changing the time setting, refer to [Power save] (Section 3.7.5).

Changing the limit of cutting angle, splice loss, offset angle

- See [Splice Mode] operation (Section 3.2)

Error messages can be ignored.

- Enter [Ignore options] in [Splice Options] menu (Section 3.5). Refer to the error messages allowed to be ignored.

Arc intensity and time cannot be changed.

- In Auto-mode or Calibrate-mode, these parameters cannot be changed.
- In the mode above, after executing the arc calibration, the arc intensity is sufficient.
- In Normal mode, arc intensity and time can be changed unless the operator locks them.

Showing cutting angle, fiber angle, fiber core/ clad offset

- For cutting angle, fiber angle, core / clad offset settings, see [Data

display] and [Ignore options]in [Splice options] menu (Section 3.5).

Splice loss estimation and actual value are inconsistent.

- Splice loss estimate is a calculated value by the fusion splicer and is only for reference.
- Splicer optical components may need to be cleaned.

6.3 Heating operation

Heat shrink sleeve is not completely shrunk.

- Prolong heating time or increase temperature. See [Heater Mode] (Section 3.3)
- The reinforcing core of the heat shrink sleeve is not placed on the bottom.
- Optical fiber is not distorted. See [heating operation] (Section 4.6.2).

The heat-shrink sleeve after shrinking is stuck to the heating groove.

- Eliminate it with a cotton swab or other soft material.

Automatic heating function does not work.

- After the transparent window of the heater is closed, the right press plate of the heater cannot effectively hold down the optical fiber (or fiber-optic breaks by pressing). See [heating operation] (Section 4.6.2).

Cancel heating operation

- Press  button once.

6.4 High level setting

Lock "Select" and "Edit" in splice and heating mode.

- See [Menu lock] (Section 3.7.6).



Appendix A: Warranty period and conditions

- Warranty for Fusion splicer:
- Splicer Machine: 1 year
- Angular Positioning Unit: 1 year
- Monitor: 1 year
- Power Supply Adaptors: 1 year
- Lithium Battery Charger: 1 year
- Lithium Battery: 6 months

If the following occurs, they are not within the scope of free warranty.

- ★ The failure or damage caused by the careless use of the operator (including product physical damage, moisture short-circuit etc.);
- ★ Product damage caused by the disasters (earthquake, fire, flood, lightning, typhoons, etc.) or force majeure;
- ★ Other product failure or damage caused by improper use, improper installation, the use of non-original batteries and parts, or other external factors (Such as unsteady voltage);
- ★ The user tears off the seal "warranty void after tearing up the seal" on the enclosure of the fusion splicer, and disassemble and repair the machine without authorization;
- ★ The user tears off seal "warranty void after tearing up the seal" on the enclosure of the lithium battery;
- ★ The warranty seal on the angular positioning unit is damaged or removed
- ★ Consumable parts (such as arc electrode, cleaver blade, fusion splicer carrying case, etc.).

- **Exemption clauses**

For the use of non-original battery, battery charger, power adapter and so on not provided by our company, our company will not accept any liability on all the losses caused.

- ★ **Warning**

The fusion splicer battery is a consumable item and the battery life has safety service life required strictly: The times of charge-discharge in normal use are less than 300 times and the storage life not exceeding one year (12 months). Extended use is strictly prohibited.

- **Before returning a failed fusion splicer, please contact with the manufacturer or dealer.**
- **When returning for maintenance and repair, please provide the following information with the machine:**

<1> Full name, the company, address, phone number, fax number and e-mail.

<2> Fusion splicer model and serial number.

<3> Problems and fault symptom encountered.

- a) What time and under what circumstances the problems occurred?
- b) How is the current situation?
- c) The character and image information of optical fiber appeared on the display when the machine failed.

<4> List of parts in the machine.



Appendix B: Contact information

The fusion splicer must be returned to dealer or factory for repair.
Please provide a description of the exact fault when applying for repair.
Please contact the dealer for repair.

After-sale service: HJ Optronics, Inc.

Address: 4055 Filan Way, San Jose, CA, 95135, USA.

Tel: +1 408-623-9704

Fax: +1 408-623-9704

Email: peterhu@hjobtronicsinc.com

Url: <http://hjobtronicsinc.com>

Comcore Optical Intelligence Technologies Co., Ltd.

Address: 1279 Huadong Road, Bldg.10, Pudong, Shanghai 201209, China

Tel: +86 (21) 50795928

Fax: +86 (21) 50795538

Email: sales@comcore.com

Website: <http://www.comcore.com>

HJ Optronics Inc Agency Company in North America

Address: 4055 Filan Way, San Jose, CA 95135, USA

Tel: +1 408 623 9704

Fax: +1 408 889 8873

Email: sales@hjobtronicsinc.com

www.hjobtronicsinc.com

