Optical Fiber Fusion Splicer

# USER'S MANUAL

# FOREWORD

This manual describes the purpose, performance characteristics, use and precautions of the product. To help you become familiar with and master the instrument's operating methods and points as quickly as possible. Please read this manual carefully and correctly guide the operator in accordance with the manual.

⚠ 1. This device complies with Part 18 of the FCC Rules.

2. Information on the following matters shall be provided to the user in the Instruction manual:

(a) The interference potential of the device or system;

(b) Maintenance of the system;

(c) Simple measures that can be taken by the user to correct interference;

(d) Manufacturers of RF lighting devices must provide an advisory statement, either on the product packaging or with other user documentation, similar to the following: This product may cause interference to radio equipment and should not be installed near maritime safety communications equipment or other critical navigation or communication equipment operating is between 0.43 kHz and 30 kHz. Variations of this language are permitted provided all the points of the statement are addressed.

# CONTENTS


**Safety Requirements** 01
**Warnings** 02
**Attention** 03
**Chapter I Introduction for Function Keys** 05
**Chapter II Splicer Operation** 08
**Chapter III Maintenance** 13
8.1 Dustproof and Remove Dust 13
8.2 Prevent Strong Shock or Vibration 14
8.3 Storage 14
8.4 Precautions 15
8.5 Troubleshooting 16
**Appendix A: Electrode Replacement** 17
**Appendix B Fiber Cleaver Operation** 19

# Safety Requirements

Any stage of operation on the fusion splicer, you must take the following general safety precautions. Not take these warnings and precautions or not comply with the warnings which described in this manual, would violate the fusion splicer design, manufacture and use of safety standards. My company does not assume any responsibility for the consequences of breaching these requirements for users caused!

- The fusion splicer's work, environment and the power supply, please refer to the technical parameters in Chapter III. Before connect the power supply, please be sure to provide a matching power supply voltage for the fusion splicer, and take all the safety measures.
- **Do not use the fusion splicer in explosive environments**
- **Do not use the fusion splicer in the presence of flammable gases or fumes**
- **Do not attempt to disassemble any of the components of fusion splicer**

In addition to the statements in this manual to allow user-replaceable parts, please do not attempt to disassemble any of the components of fusion splicer. Replacement parts and internal adjustments can only be commissioned by our authorized service personnel.

## Warnings

► **AC/DC Adapter**
The output characteristics of the power adapter must meet the following requirements. Voltage: 13V ~ 14V; Current: ⩾ 4.4A; Polarity: Center is positive. Using higher voltage will cause damage to the fusion splicer. AC / DC power adapter input AC voltage of 100 ~ 240V, 50/60Hz, if input voltage exceeds this range may cause permanent damage to the adapter!

► **Internal Lithium Battery**
There is a lithium-ion battery cells in the fusion splicer, the use of other batteries may damage the fusion splicer and jeopardize personal safety.
For safety sake, lithium battery pack can not be disassembled to prevent short circuits; do not crash battery, do not let the battery close to a fire or an excessive heat to prevent lithium battery explosion.

► **The use of fusion splicer**
When below situation happens on fusion splicer, please immediately turn off the fusion splicer and unplug the power adapter input from fusion splicer, otherwise it will cause the fusion splicer may not work properly or can not be repaired and other serious consequences.
liquid, foreign substances enter the interior of fusion splicer
fusion splicer subjected to strong vibrations and shocks
There is no necessary parts that need to maintain inside the fusion splicer, it is forbidden to dismantle the fusion splicer, any dismantlement may result in personal injury or equipment can not be repaired.
In the discharge electrode of fusion splicer, the voltage between the two electrodes rods up to several thousand volts, please do not touch the electrode, otherwise it will cause fusion splicer damage, personal injury, serious consequences etc.

# Attention

► **AC/DC Adapter**

Please use our company provided adapter for the fusion splicer, use of other adapters may cause damage to the fusion splicer.

► **Internal Lithium Battery**

1.The batter may goes into hibernation after long time placed, the capacity is lower than normal at this time, the durable battery time has also come to be shortened, but only after 2 to 3 times of normal charge-discharge cycles, the battery can be activated to restore normal capacity. Lithium is almost no memory effect, can be charged at any time.

2.The lithium batteries has the phenomenon of self-discharge, if the battery is preserved for a long time in low battery power, the internal structure of the battery may damage from self-discharge, reducing battery life. Therefore, long-term preservation of lithium batteries please recharge it every 3 to 6 months, pay attention to the battery charge capacity can be 60% to 80%, not full.

3.Long-term storage battery (stored for more than 6 months) temperature range: 0 ℃ ~ 40 ℃. Battery short-term storage (storage time is less than or equal to 6 months) temperature range: -20 ℃ ~ 60 ℃.
4.To ensure that the security of battery charging, the lithium battery in the fusion splicer is charging temperature range of 0 ℃ ~ 40 ℃.

## Attention

► **LCD Display**

1.Please do not let sharp object click on the LCD display, LCD display can not be forced shock.

2.Do not use organic solvents or contaminants dripping on the LCD display , such as acetone, oil, antifreeze, grease, etc., otherwise may cause the LCD display not working.

3.Use silk or soft fabric to wipe & clean the LCD display.

4.Depending on the perspective of the viewing screen, the brightness of the display will be different. But may also have some black, red, blue or green dots on the screen, these are not the fault of the LCD display, it is normal phenomenon.

► **The use of fusion splicer**

1.Fusion splicer is for welding silica glass fiber, please do not use this equipment for other purposes. Please read this manual carefully before using.

2.When used in dusty environments, please try to keep the windshield to be closed on fusion splicer.

3.When fusion splicer machine moved from a cold to a high temperature environment, please try to take a gradual warming way, otherwise it will cause condensation inside the instrument, it will has an adverse effect on the instrument.

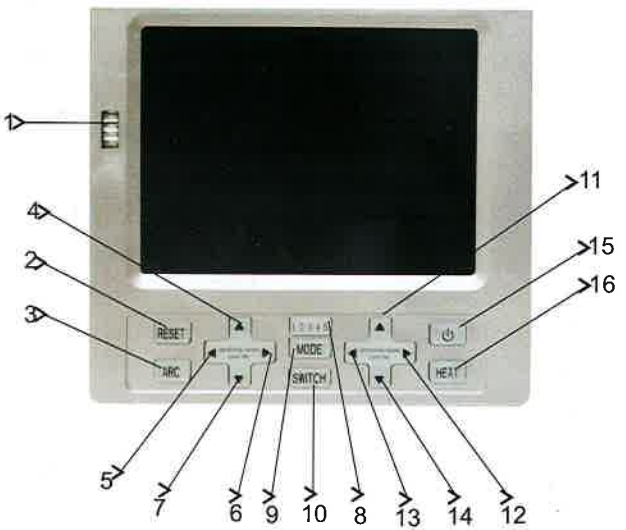
4.Fusion splicer machine is a calibrated precision instrument, it is strongly advised to avoid vibration and shock. Storage should be used with a dedicated carrying case, long-distance transportation needs to pack a carrying case outside plus a suitable buffer box.

# Chapter I Introduction for Function Keys

The fusion splicer machine is mainly used for permanent splicing fiber, it is widely used in optical fiber communication engineering and production testing of optical passive devices. By replacing the fiber holder, the machine can continue to splice ordinary rubber-covered fiber cable, jumper wire and a cladding diameter of 80 μ m ~ 150 μ m, single mode, multimode and other quartz-based dispersion shifted fiber. Fusion splicer is integration with light, mechanical, electrical products, the operation process should be taken to keep clean, free subjected to strong vibration or shock.

Figure 1-1 is for Splicer outside view, Figure 1-2 is for each function keys, these function keys are only for manual mode.

**Figure 1-1 Splicer Outside View**



# Chapter I Introduction for Function Keys

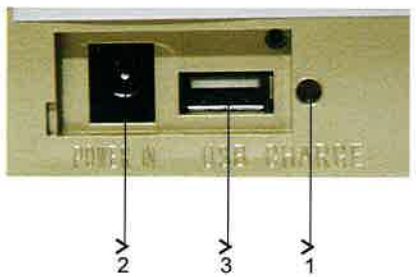
| NO. | Name | Function Specification |
|---|---|---|
| 1 | Battery Indicator | Four grids indicate full charged, the light is on after turn on the splicer |
| 2 | Reset | Press this key, the parameters of propulsion can be restored to the initial state. |
| 3 | ARC | Press this key, the electrode will discharge arc and fusion the fiber by the selected arc, also propulsion the fiber. |
| 4 | Fiber Up | Lift up left fiber |
| 5 | Fiber Back | Draw back left fiber |
| 6 | Fiber Front | Move forward left fiber |
| 7 | Fiber Down | Move down left fiber |
| 8 | Arc Intensity | ARC Intensity Splice Mode |
| 9 | Mode | At standby mode, press this key to select different discharge mode, the green indicator light shows corresponding mode. Arc intensity from 1 to 5 in order to enhance,Mode 1–4 are for single mode fiber (usually please select mode 2). Mode 5 is only for multi-mode fiber. |
| 10 | Switch | Press this key, choose left or right side aligning optical fiber, the corresponding green light is lit, its corresponding side button to enter the mode of operation, and it locked on the other side of aligning key which the operation is invalid; press this button, the camera also switches to the corresponding simultaneously lens |
| 11 | Fiber Up | Lift up right fiber |
| 12 | Fiber Back | Draw back right fiber |
| 13 | Fiber Front | Move forward right fiber |
| 14 | Fiber Down | Move down right fiber |
| 15 | Power ON/OFF | When the fusion splicer is at off status, press the button then release. the red indicator light is on and the machine is ON. When the fusion splicer is switched on, press this button, fusion splicer will be OFF. |
| 16 | Heat | Press this key corresponding to the red indicator light, automatic completion of a heating process. Pressing this key during heating,, you can stop heating |

**Figure 1-2 Illustration for Function Keys**

# Chapter I Introduction for Function Keys

**Figure 1-3 Back Panel for Splicer**

Each key's feature please refer to Figure 1-4 Illustration for Back Panel




| NO. | Name | Function Specification |
|---|---|---|
| 1 | CHARGE | Charge indicator. A red indicator means lithium is charging; green indicates lithium battery is fully charged |
| 2 | POWER IN | DC power adapter input, 13.5V, 4.5A. After the access adapter, the adapter supplies power to the instrument, while charging the internal lithium battery |
| 3 | USB | USB interface, it can also be used to charge the phone. |

**Figure 1-4 Illustration for Back Panel**

**Heating tank for shrinkable tube :**

After opening the lid, the fiber should be placed on the two columns then you can close it

# Chapter II Splicer Operation

## ► Introduction for Automatic Mode

Software use

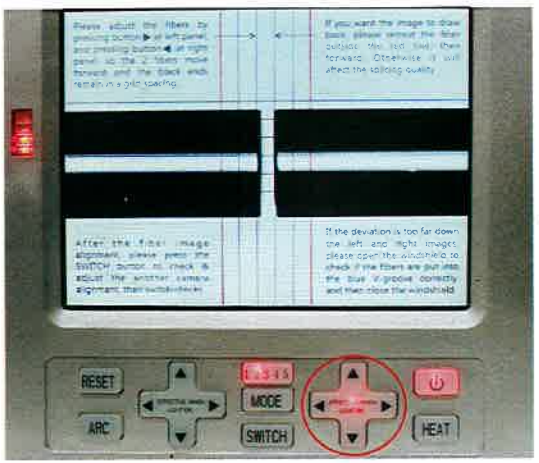
Splicer automatic mode realization need use the APP software.

For detailed operation please visit "Leam how to operate" in APP software.

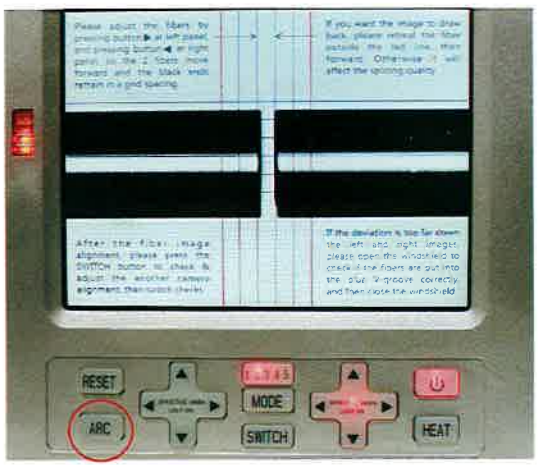
When you install the software first time, we strongly recommend you to do ARC calibration, please see APP software tips for details.

The selection and operation for fiber holders, please read the flyleaf "Operation Guide for Fiber Holder" that we packed with the machine.

# Chapter II Splicer Operation




Fiber aligning: please press SWITCH button, then the light at right panel is on, it indicates the right fiber is adjustable. Please press UP and DOWN button to adjust the right fiber, so it is aligned with the left side of the fiber at the same horizontal line. When it finished, please press the SWITCH button several times to confirm the fibers are aligned in the horizontal direction under 2 cameras.




After check and assure the fibers are horizontally aligned, please click ARC button, wait for the completion of splicing.

## Chapter II Splicer Operation

Upon completion of splicing, please put a heat-shrinkable tube to wrap bare fiber portion and place it to central heating tank and press the HEAT key (it is in heating process when the light on the HEAT key is on, the heating has been completed when the light is off)

Please put the shrink tube inside the protective sleeve, the process of splicing is completed. (If you hear the beep voice for consecutive 5 times when you turn on the machine, it indicates that the electrode life has almost expired, please replace the original electrode)

# Chapter III Maintenance

**8.1 Dustproof and Remove Dust**

Bare fiber positioning groove, and microscopic electrodes must be kept clean and windshield cover should be closed when not in operation

a) If the V-groove has dirty, it can not properly hold the fiber, which will cause the splice loss is too large. Thus in the daily work, you should always check the V-groove and regular cleaning V-groove. Follow the steps below to clean the V-groove.

(1) Open the windshield cover

(2) Use a cleaved fiber tail in one direction push the pollutants removed from the V-groove

(3) If the fiber can not clear the V-groove pollutants, then moistened with alcohol cotton swab to clean the bottom of the V-groove, and use a dry cotton swab to wipe off the extra alcohol in the V-groove.

b) Cleaning and replacing the electrode

(1) If the electrode is dirty, you can clean electrode by using the cleaning electrode function in main menu in the equipment maintenance, and then use a cotton swab dipped in alcohol to gently wipe the electrode tip, or use 3mm wide, 50mm long metallographic sandpaper to gently rub the electrode tip. Note To protect the electrode tip from damage.

(2) The electrode on fusion splicer has a very long life, but hen the electrode needs to be replaced, the machine will have intermittent beep to remind you; If the electrode life limit is reached, the machine will have a long beep and automatically close the program. Please refer to Appendix F.

c) Clean the objective lens

If the objective lens is dirty, the normal position of the observation optical fiber core may be affected, which leads to a higher splice loss or poor fusion. So you should regularly clean two objective lenses, otherwise it will continue to accumulate dust and ultimately can not be removed. Follow the steps below to clean the objective lens

(1) Before cleaning the objective lens, please must turn off the power.

(2) Use cotton swab moistened with alcohol to gently wipe the objective lens. Beginning with a cotton swab to wipe from the middle of the lens, do a circular motion, until the edges of the lens spin out. Then wipe with a clean, dry cotton swab to remove extra alcohol.

(3) Turn on the power, make sure that the display is not visible dust and stripes.

**8.2 Prevent Strong Shock or Vibration**

When you need to move or transport the fusion splicer, you should handle with care and gently. In addition, do not forget to put the machine into a carrying case and shipping box during long-distance transportation.

**8.3 Storage**

When you do not use the machine for a long time, please must turn on the machine once half a year. Especially in high moisture season, should always be turned on, and the desiccant should be placed inside the carry case to prevent mildew microscope head.

# Chapter III Maintenance

**8.4 Precautions**

a) When the fusion splicer is using AC power , please take attention to protect the adapter , and the power supply is properly grounded.

b) When the fusion splicer is in the discharge process, there are several kilovolt high voltage between the electrodes, please do not touch the electrode rod at this time!

c) Please be sure that there is no gasoline, mashgas, freon gas and other flammable gas in the environment and, so as not to lead to poor fusion or accident.

d) When you wipe to clean the fiber holder and microscope head, please must us absolute ethanol, cotton swab to wipe the direction should be one-way, two-way wipe is forbidden.

e) There are many mechanical components in the fusion splicer with structural precision, in addition to the electrodes, the other part is prohibited for user disassemble and change. Because these mechanical parts are precision-machining and calibration, once there is any changes, it is difficult to return to its original position. You can replace only the electrode-yourself

The objective lens, V-groove, display screen, etc should be kept clean. Clean only with absolute ethanol, you can not use other chemicals

# Chapter III Maintenance

## 8.5 Troubleshooting

Table 8-1 shows the general troubleshooting method for user reference. When the user can resolve the problem, please contact the manufacturer.

**Table 8-1 General Troubleshooting**

| Problem | Reason | Solutions |
|---|---|---|
| No image after place the fiber | 1.Not turn on<br>2.Fiber not place into the V-groove<br>3.Fiber cleaved length is too short or broken<br>4.Fiber is not put into the holder<br>5.Aligning mechanism is not reset | 1.Turn ON<br>2.Place the fiber again<br>3.Cleave the fiber again<br>4.Re-position the fiber and cleave<br>5.Restart the machine |
| Can not switch on | lower power | 1.Recharge the battery<br>2.Use external power by the adapter |
| Fail to splice or have a scar after splicing. | 1.Poor quality of fiber end cleaving.<br>2.Splicing parameter is set too small. | 1.Re-cleave the fiber.<br>2.Use a higher splicing mode. |
| Image tilt | Fiber not enter the V-groove completely | 1.Place the fiber again<br>2.Restart the machine |
| Image very weak | 1.Fiber not enter the V-groove<br>2.The V-groove has dirty | 1.Place the fiber again<br>2.Clean the V-groove |
| No beep by pressing key | Machine stops respond | Restart the machine |
| Propulsion motor does not stop after turn on | reset sensor does not send a signal | Restart the machine |

# Appendix A: Electrode Replacement

When you need to replace the electrode, the machine will have intermittent beep to remind you; If the electrode life limit is reached, the machine will have a long beep and automatically close the program.

When replace the electrode, you must use the original electrode which is designed specifically by our factory for this machine. When the using time of electrode has reached the limit frequency, the electrode should be replaced, otherwise it may affect the fusion quality. Even automatically close the program and can not be spliced.

Electrode replacement procedure is as follows:

A） Electrode replacement must be carried out when the machine is switched off. Because there are several kilovolt high-voltage at the electrode when discharge, causing greater damage to human life.

b） Open the windshielf, you can see the electrode structure as shown in Figure 5-2 in Chapter V.

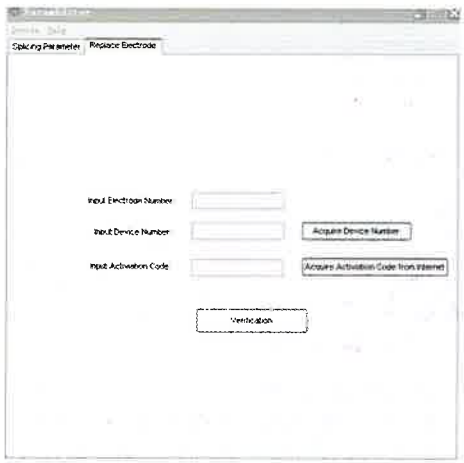
c） Loosen "electrode layering" screws first, use forceps to hold "electrode", and then screw off "screw" and remove "electrode layering" out. Be careful not to let the "electrode" fall into the fusion splicer. Then put the new "electrode" into the electrode holder slot, in the meanwhile insert the "electrode layering" to the "holder", and screw the screws , pushed the"electrode" to the end, and then tighten the "screws" .

d） Replace another electrode.

E) Please connect the USB port on the splicer with your computer, then turn on the splicer.Click  , then select "Device" , then select "Connect"

## Appendix A: Electrode Replacement

f) Click Replace Electrode, then input electrode number, click Acquire Device Number, so you can get the device number. If the computer you are using has connected to network, you can click the "Acquire Activation Code from Internet" to get the activation code. Or you can access to http://sczhuoshi.com/check by using other methods, input the electrode number and device number to acquire activation code.




g) Input activation code, then click Verification, please restart the splicer after it shows Activation successfully.

# Appendix B Fiber Cleaver Operation

B.1 Summary

Fiber cleaver can cut single mode fiber, multimode and ordinary quartz optical fiber. This cleaver can be used in optical fiber communication engineering construction, manufacturers of fiber optic cable testing, optical devices, such as factory production.

When cleaving ordinary single fiber, just use the cleaver splint which supplied with the cleaver.

To ensure the long-term use of the cleaver, please handle with gently, the operation should be gentle. Should take more attention to shock collision. Cleaver should be kept clean and dry all parts. Please use anhydrous alcohol to clean the cleaver blade and each plastic sheet, do not use other solvents such as acetone. Please clean up the broken fiber in time, to avoid the optical fiber goes into the rail to cause damage to the rail.

B.2 Structural characteristics and method of use

1.Parts and structure function

【 precision guide】 to provide the direction of blade movement

【slide platform】 slide the platform, let the blade across the fiber

【 Chopping plate】 the optical fiber is cleaved once the chopping fall and touch the fiber.

【holder】 To open the holder to provide a fulcrum

【disc blade】 the blade across the fiber lightly and leave sliding mark on fiber surface.

【fiber clamp】 to hold the fibers.

# Appendix B Fiber Cleaver Operation

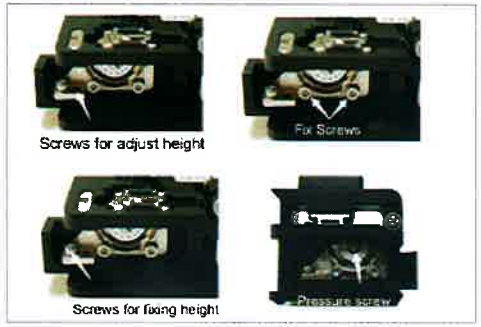



**Figure B-1 side view**

The principle of each structure is as follows

【 Fixing screws】 Loosen this screw first, then you can adjust ‘screws for adjust blade height”.

【Pressure screw】Loosen this screw and you can replace the blade angle, thus change the blade cleaving surface.

【 screws for adjust blade height】 can adjust the blade height by this screw

2.Use of the cleaver

a） Open the holder b） Strip the fiber coating about 40mm, use cotton balls dipped in anhydrous alcohol to wipe clean the bare fiber.

c） Please put the fiber into the fiber holder and fix it according to the required length,
(Figure 5-1 Figure 5-1.2 Figure 5-1.3)

d） Please close the fiber holder, then put the fiber in the positioning groove, push in the end. Then close the upper bracket

e） Hold the cleaver by right hand, then gently slide the platform according to direction of the arrow, let the blade across the fiber lightly.

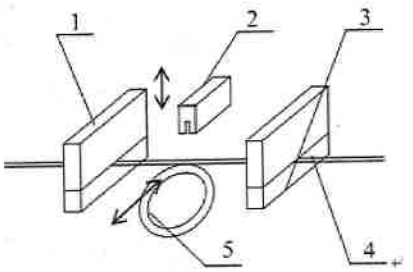
f） Chopping fall down automatically, so that the optical fiber is cleaved once the chopping fall and touch the fiber;

g） Open the holder (right index finger in the cradle, push your thumb on the front slope of the mount), remove the fiber holder and fiber breakage. ;

# Appendix B Fiber Cleaver Operation

**B.3 Working principle and technical parameters**

1.Principle




1.upper platen / 2.chopping / 3.lower platen
4.bare fiber / 5.round blade

**Figure B-2 Principle figure**

Clamp the bare fiber between the upper and lower platen, the sliding round blade to leave microcracks on the tighten bare fiber surface, chopping automatically fall under the action of the spring to make contact with the bare fiber micro-crack and cut fiber

2.Technical parameters

a) Applicable Fiber: Apply to a diameter of 0.08 ~ 0.125mm ordinary single mode or multimode fiber quartz series fiber

b) Fiber Count: Suitable for single fiber

c) End face angle: After cutting the fiber end face squareness ≤ 1

d) Cleaving length: minimum cleave length 10mm

e) Working environment: 0 ~ 40 ℃, 90% RH (40 ℃ no condensation);

f) Round blade life: about 20,000 times

g) Dimensions: 70mm×57mm×49mm;

h) Weight: About 0.3kg

# Appendix B Fiber Cleaver Operation

## B.4 Maintenance and Repair

Precautions

a) Must use cotton balls dipped ethanol to wipe clean before cleave the fiber.

b) Keep each plastic sheet and blade surface cleaning, and please use anhydrous alcohol, when cleaning the blades of each sheet. Do not use of other solvents such as acetone

c) In order to increase the frequency of use blades, please adjust the blade position, please press the number counterclockwise order to adjust the blade, do not mess tune.

d) This is a precision tool, handle with care and gently.

e) Clean up the broken fiber in time, prevent the damage fiber injuries and damage to broken plastic sheet cutter and guide

f) Should carry anti-collision avoidance, to ensure cleaving accuracy

Maintenance

2.1 Blade height adjustment method (refer to Figure B-2)

a) Loose screws for platform

b) Adjust the "screws for adjust blade height" : Please adjust screw to rotate in a clockwise direction when you need to raise blade height.

Please adjust screw to rotate in a counterclockwise direction when you need to reduce blade height.

Use a cotton swab to press the bottom edge of the blade, while rotating blade height adjustment screws.

c) Tighten screws for platform

2.2 Replacement blade method (refer to Figure B-2)

a) Loose screw for blade

b) Replace a new blade

c) Tighten screw for blade

2.3 Cleaving blade position adjustment (refer to Figure B-2)

a) Loose screw for blade

b) Counterclockwise rotation of the blade to the next digit position

c) Tighten screw for blade

# Appendix B Fiber Cleaver Operation

2.4 roubleshooting and solutions solutions Table B-1

| Problem | Reason | Solutions |
|---|---|---|
| Fiber cleaving quality deteriorates | The plastic chop and blade edge has oil dirty | Please clean the plastic chop and disc blade by using a cotton swab dipped ethanol |
| | Disc blade edge is not sharp | a) Adjust cleaving face of disc blade<br>b) Replace the disc blade |
| | Disc Blade is too high | Adjust the blade height carefully |
| cleave fiber failed | Blade is not sharp | a) Adjust cleaving face of disc blade<br>b) Replace the disc blade |
| | Disc Blade is too low | Adjust the blade height carefully |
| | Not strip the coating on fiber | a) please strip the coating |
| Fiber has a rounded edge | | 1.Raise the blade height<br>2.If the rubber plate is abrasion or aging, please replace the rubber plate |
| Fiber cutting face has shadow or gradient | | Blade is too low. In particular, the blade is too high causes large gradient.<br>Please adjust the blade height accordingly. |
| Fiber core defects | | Collapse of the fiber core is usually caused by blade height, please adjust the blade height accordingly. |

**Table B-1 Troubleshooting and solutions**

# OPTICAL FIBER FUSION SPLICER

# USER'S MANUAL

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