Safety requirements

At any stage of operation of the fusion splicer,the following general safety measures must be taken. Failure to take these measures or to comply with the warnings and cautions described elsewhere in this manual will violate the safety standards for design,manufacture, and operation of the splicer. The company is exempted from any liability for any consequences of the user who violates these requirements.

Operation environment and power

Requirements for working, storage environment and power of the splicer
Working temperature: 0℃ – +40 ℃
Limit temperature: –10 ℃ – +40 ℃
Working humidity: below 95RHC (no condensation)
Max. wind speed: 15m / S
Storage conditions: –20C– +60 C (no condensation)
Before power on, make sure a matching power voltage is provided and all safety precautions are in place.
Do not use splicer in flammable and explosive environment.
Do not use splicer in the presence of flammable gas or smoke.
Do not disassemble any part of the splicer.

AC/DC adapter

The output characteristics of the AC / DC power adapter must meet the following requirements. Voltage: 13.5V,
Current: greater than or equal to 4.81A,
Polarity: center is positive. Too high or too low voltage will cause damage to the splicer.
The input AC voltage of AC / DC power adapter is 100V–240V, 50 / 60Hz,which, if exceeding this range, may cause permanent damage to the adapter.

Built–in lithium battery

A special lithium ion battery is built in the machine. Using other batteries may damage the splicer and endanger the safety of users. For safety concern, do not disassemble the lithium battery pack, to prevent short circuit. Do not violently hit the battery, put the battery close to or into the ignition source and heat, to prevent lithium battery explosion.

Operation of fusion splicer

Immediately after the following conditions occur, close the splicer and pull out the adapter from the power inlet of the splicer. Otherwise, it may not lead to serious consequences such as failure to work properly or be repaired.

1. Liquid or foreign object enter the splicer;
2. The splicer suffers strong vibration and impact.
3. The splicer is repaired wrongly after being disassembled which is forbidden;
4. In the electrode discharge process of the splicer, the voltage between the two electrode rods reaches up to several thousand volts. Do not touch the electrode; otherwise it will cause damage to the splicer, personal injury and other serious consequences.

Built–in lithium battery

1. After resting for a long time, the battery is easy to enter the dormant state. At this time, the capacity is lower than the normal value, and the use time is shortened accordingly. However, the battery can be activated and the normal capacity restored upon 2–3 times of normal charge and discharge cycles. Lithium battery has almost no memory effect, which can be used as charged.
2. Self–discharge phenomenon does occur on lithium battery. If the battery is stored under low voltage for a long time, its inner structure may be damaged due to self–discharge, and battery lifetime shortened. Therefore, for long–term preservation, the lithium batteries should be charged to 60%–80%, instead of 100%, once every 3–6 month.
3. For long–term storage (more than 6 months) the temperature range: 0 ℃ – +40 ℃. For short–term storage (less than or equal to 6 months) the temperature range: –20 ℃ – +60 ℃.
4. In order to ensure the safety of charging, the charging temperature range of the built–in lithium battery is 0 ℃ – +40 ℃.

LCD screen

1. Do not use sharp objects click on or force to strike against the LCD screen.
2. Do not drop organic solvents or contaminants on the LCD screen.
3. Wipe and clean the LCD screen with silk cloth or soft fabric.
4. Based on the viewing angles of the screen, the brightness will be different. And some color dots may exist on the screen. These are natural phenomena.

1. Introduction

The high–precision fusion splicer, with high–speed image processing technology and special precision positioning technology, can complete the whole process of fiber fusion splicing automatically in 9 seconds. Characterized by light weight, easy to carry and convenient to operate, fast splicing speed and low losses, it is especially suitable for optical fiber and cable projects, maintenance scientific research and teaching in telecommunications, radio and television, railway, petrochemical, electric power, military and public security and other communications fields.

This machine is mainly used for the connection of optical fibers, which can be further connected with ordinary optical fiber cables, jumpers and multiple single–mode, multi–mode and dispersion –shifted quartz optical fibers with a cladding diameter of 50 μ m –150 μ m. Keep it clean and protect it against strong vibrations and shocks.

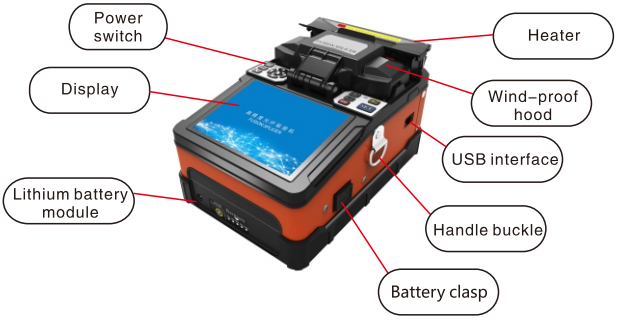
2. Technical indicators

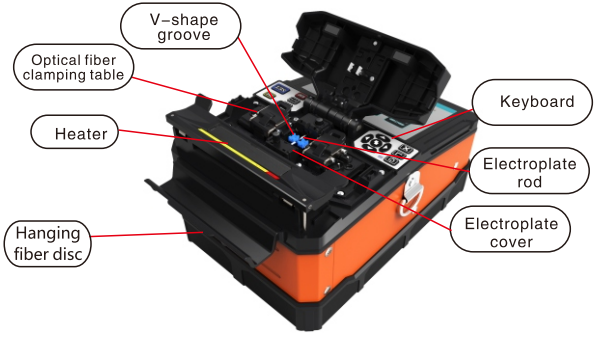
Applicable optical fiber	SM(G.652&G.657)、MM(G.651)、DS(G.653)、NZDS(G.655) and self-defined optical fiber types
Splicing loss	0. 02dB (SM)、0. 01dB (MM) 0. 04dB (DS/NZDS)
Return loss	Over60dB
Typical splicing duration	9 seconds
Typical heating duration	26 seconds (configurable heating time and adjustable heating temperature)
Optical fiber alignment	Precise alignment, fiber core alignment, cladding alignment
Optical fiber diameter	Cladding diameter 80~150 μ m, coating layer diameter 100~1000 μ m
Cutting length	Coating layer below 250 μ m：8~16mm ; coating layer 250~1000 μ m：16mm
Tension test	Standard 2N（optional）

Optical fiber clamp	Multi-function clamp for bare fiber, tail fiber, jumpers, leather line; changing clamp applicable for SC and other connectors for a variety of FTTx optical fiber and cable.
Amplification factor	300 times (X axis or Y axis)
Heat shrink bush	60mm、40mm and a series of miniature bush
Display	5.0 inches TFT color LCD display Reversible, convenient for bi-directional operation
External interface	USB interface, convenient for data download and software upgrade
Splicing mode	17 groups of operation modes
Heating mode	9 groups of operation modes
Splicing loss storage	5000 latest splicing results are stored in the built-in storage.
Built-in battery	Supports continuous splicing and heating for not less than 200 times
Power supply	The built-in lithium battery 11.8V supplies the power, charging time≤3.5h; External adapter, input AC100-240V50/60HZ, output DC13.5V/4.81A
Power saving	15% of the power of the lithium battery can be saved in a typical environment.
Working environment	Temperature: -10~+50℃, Humidity : <95%RH (no condensation), Working altitude: 0~5000m, Max. wind speed: 15m/s
Outer dimension	205mm (long) ×140mm (wide) ×123mm (high)
Lighting	Convenient for optical fiber installation in the evening
Weight	1434g (excl. battery) 1906g (incl. battery)

3. Descriptions of operating units

3.1 Name of operating units





Front view of unit

Front view of un

Battery charging interface

Right view of host machine

Battery capacity indication

3.2 Descriptions of keys on keyboard

Indication of left and right keyboard

Key	Standby status	Manual working mode status	Auto working mode status	Parameters menu status
	Power switch	Power switch	Power switch	Power switch
	Enter	Enter next page	Void	Void
	Return/Exit	Exit the menu	Void	Exit the menu

	Move up	Move up	Void	Move up
	Move up	Move left	Void	Move left
	Mode menu	Select to edit splicing parameters	Void	Select to edit splicing parameters
	Switch camera	Switch X/Y display	Void	Void
	Manual discharging	Discharging	Void	Void
	Heater switch	Heater switch	Heater switch	Heater switch
	Motor reset	Motor reset	Motor reset	Exit the menu
	Confirm/ Splicing	Continue to push, start splicing	Void	Continue to push, start splicing

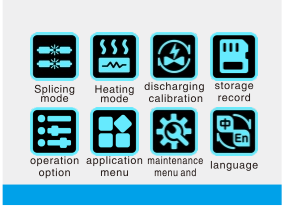
●Manual (by step) splicing working method

1.On the operation page of [Edit splicing operation option] of the splicer, set up [Pause 1], [Pause 2] to “start” operation option function;

2. When optical fiber “gap setting” is completed after [standby], it enters [Pause 1] and pauses. Operator manually press the key, and after the left and right optical fiber arrive at the optimum gap alignment position driven by motor, press  to continue topush;

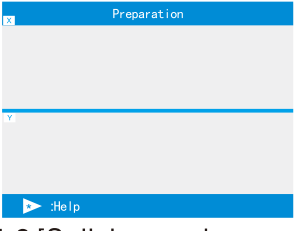
3. When optical fiber “alignment” is completed after [Pause 1], it enters [Pause 2] and pauses. Operator manually press the key, and after the left and right optical fiber arrive at the optimum gap alignment position driven by motor, press  so that the splicer discharges and welds,and shows loss estinmaion;

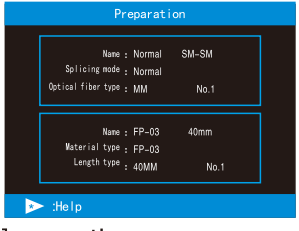
4. Description of common software page



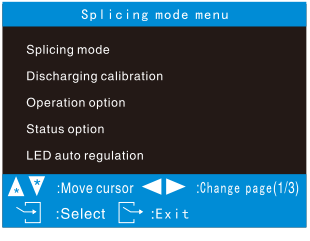
Select one of the 8 function modes, including splicing mode, heating mode, discharging calibration, storage record, operation option, application menu, maintenance menu and language, on the home page display of the splicer to configure the related parameters. Switch language, Chinese or English, in the Language mode, and all the icons, parameters and operation pages will be displayed in the selected language.

4.1 Standby page of the splicer

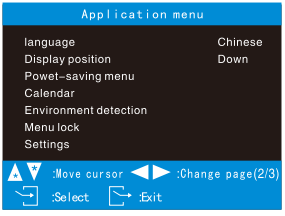


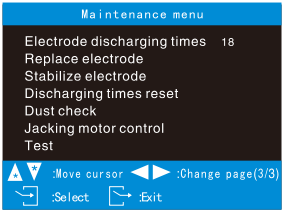


4.2 [Splicing mode menu] operation page

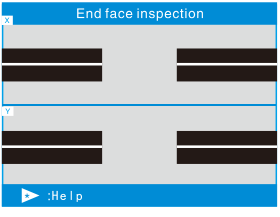


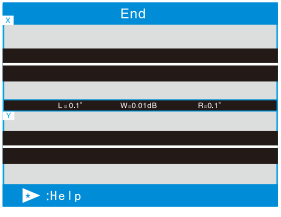
[Application menu] page





4.4 [End face inspection] page





5. ON/OFF and power supply

5.1Turn on

Long press the ⏻ on the left top of the keyboard, wait for a long tick and the green LED light is on, release the ⏻ .

5.2Turn off

Long press the ⏻ on the left top of the keyboard, wait for tick twice and the green LED light is off, release the ⏻.

5.3 Power supply

5.3 Power supply

5.3.1 Power supply of power adapter

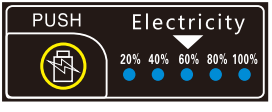
Adapter AC input

1, Only the AC power cable that comes with the adapter can be used, input voltage: AC100–240V50 ~ 60HZ;
2, AC power cable input must be effectively grounded;
3, The AC generator, if used, should be regularly checked if the output voltage is consistent with the AC input requirements.

Adapter DC output

1, Only the DC power cable supplied with the adapter can be used;
2, Output voltage: DC13.5V4.81A;
3, Insert the DC power cable into the power input port "POWERINPUT" of the lithium battery module of the splicer;
The splicer is powered by the adapter.

5.3.2 Battery supply



1, As shown in the right figure, the splicer is powered by lithium batteries.
2. When the power module is in the non–charging working state, press the "PUSH" button at the side of the battery module, till the five battery power indicators (blue) along the up–down direction are on. More lights mean higher battery power (only refers to the normal battery).

Battery charging

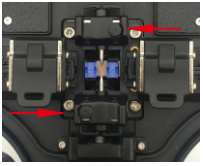
1. Connect the AC adapter to AC100–240V50 / 60Hz;
2. AC power cable input must be effectively grounded;
3. Insert the DC power cable into the power input port "POWER INPUT" of the power module of the lithium battery, and a charging process of the battery module will start;
4. At charging, charging work indicator light is on (RED).

CHARGE) is blue; when charging is completed, the light turns off automatically.
When the machine is down, charging time should be not more than 3h, 40 minutes at minimum.

Battery under-voltage alarm (battery power mode)

The splicer has a "low voltage alarm function", when the lithium battery pack is less than or equal to 10% (this value has been set to 10.3V at the factory), the splicer will automatically give alarm to remind and shut down directly, in order to better protect the service life of the battery group. The original adapter should be promptly used to power on the machine or the lithium battery pack. When the battery is low, the interface will automatically display red "battery power less than 10%", and it will automatically shut down.

Operation of replacement of needle electrode



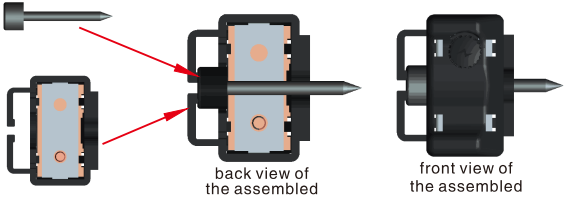
When the needle electrode was used for close to 3000 times, the splicing loss will increase, the need to replace the needle electrode, otherwise, it will affect the splicing specifications.

1, Firstly, enter the "Maintenance Menu", select "Replace Electrode", the dialogue window automatically pops up showing alarm of turn off the power. Then twist the plastic nut on the electrode holder (as shown by the red arrow).

2. Remove the electrode cap and needle electrode, install the new needle electrode onto the electrode cap and then onto the bracket, tighten the plastic nut.

3, After replacing the electrode, re-stabilize the electrode and calibrate discharge.

Schematic diagram of needle electrode assembly



Operation of discharging calibration

Firstly, use the cutting knife to cut the two optical fibers on the left and right into the V–groove, close the windshield, press the key to display "splicing mode menu", enter "discharging calibration", and then press the SET key to enter calibration, the machine will automatically calibrate; if it failed, a reminder will should calibration failure. As calibration is accurate, a reminder will automatically show calibration completion. (Note: calibration is to measure the orientation of temperature and pressure, need to be adjusted for several times).

Clean the V–groove

Clean the bottom of the V–groove with a fine cotton swab moistened with absolute ethanol.

Then use a dry cotton swab to suck off the residual V–tank anhydrous ethanol.

Remove dirt with a clean, well–cut, fiber ends

The above cleaning process must be done when the machine is shut down.

Do not touch the tip of the electrode bar during cleaning.

Clean the fiber cutting knife.

Clean the upper and lower rubber cushion (4), clean blade, broken fiber pressure head (pad).

Make regular maintenance.

Clean objective lens.

As quartz or dust accumulate on the objective lens which can not be cleaned in time, the user is required to conduct regular or monthly cleaning of the surface of the objective lens, with a cotton swab dipped in ethanol.

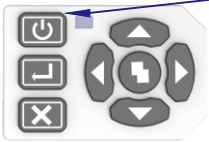
Replacement of electrode bar

When the electrode bar exceeds the service life, the splicing loss of the optical fiber will increase and the strength after splicing reduced; or when the tip of the electrode bar is damaged, replace the electrode bar.

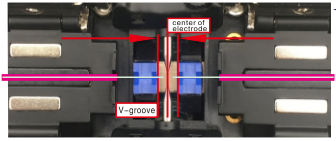
Battery

The lithium batteries must be charged under the temperature in the range of 0℃–+40℃, and stored for long periods of time: –5℃–+35℃, in humidity of 65 ± Àlated.

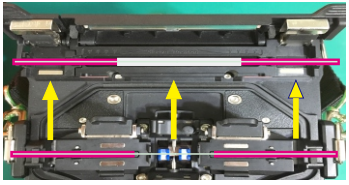
Start the splicer:



To splice the standard single-mode fiber SM (G.652 & G.657), the "Auto Sm" splicing mode is recommended. To shrink the standard 60mm-long protective sleeve, the "Standard 60mm" heating mode is recommended.



Place the optical fiber end in the middle between the edge of V-groove and the center of electrode

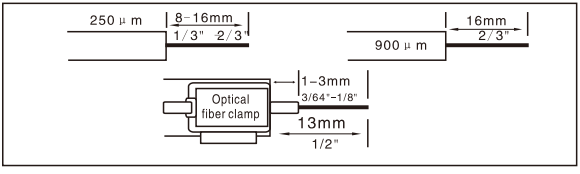


- Turn on the splicer
- Confirm fusion and heating mode
- Clean the coating layer or tight bush of the optical fiber
- Open the optical fiber tight bush
- Insert the optical fiber into the thermal protective bush
- Open and clean the optical fiber
- Cut the optical fiber
- Place the optical fiber in the V-groove of the splicer
- Close the windscreen and start splicing fiber
- Observe fiber splicing from the LCD screen
- Remove fiber
- Place heat-shrink bush in the middle of the heater
- Move fiber so that fusion point lies in the center of heat-shrink bush
- Turn off the heating cover to start heating
- complete

Cautions:

1. "Stable electrode" and "discharge calibration" must be operated before splicing when the environment altitude changes greatly, or the temperature changes greatly, or replace the new electrode.
2, Do not let the cut end of the optical fiber touch any object or be contaminated.

9, Fiber cutting length



10、Visible defects on splicing optical fiber

Appearance	Defects	Causes	Measures
	Bubble	1. Dust on end surface of optical fiber 2. Condensation 3. Poor end surface of optical fiber 4. Too small current of discharge	1. Re-make an end surface 2. Adjust program or current (optimize parameters)
	Not connected	1. Over current 2. Too slow advance speed 3. Small advance of splicing 4. Resistance in feeding	1. Adjust program or current parameters (optimize parameters).
	Small diameter		

Warranty period and conditions

The warranty period of the splicer is:

2 years for the host machine; 1 year for the display;

1 year for the power adapter, 6 months for the battery.

The following cases shall be exempted from the scope of free warranty:
1, Product failure or damage accidentally caused by improper operation (including physical damage to the product, equipment moisture short circuit, etc.);
2, Damage caused by disasters (earthquake, fire, flood, lightning, typhoon, etc.) or in case of force majeure;
3, Product failure or damage caused by improper use of other reasons, improper installation or use of non–original configuration of the battery and accessories or other external factors (such as voltage instability);
4, The label of "the warranty torn is invalid" on the casing of the splicer torn up by the user, and self–operation of disassemble and repair;
5, The label of "the warranty torn is invalid" on the lithium battery torn up by the user;
6, Loss pieces
(such as discharge electrode, cutter blade, splicer carrying boxes, etc.)

Exceptions

The company shall be exempted from any liability for any losses caused by use of battery, battery charger, power adapter and so on which are not supplied by the company.

Warning

The special batteries of the splicer are consumables, the use of which requests a strict safety requirements of life; it supports charge and discharge for 300 times under normal use, and can be stored for less than one year (12 months).

Beyond–the–limit use is prohibited.
●Before sending the splicer, please contact the manufacturer or the agent.

Information Required for Maintenance
(Please attach the following information to the machine)
1, Your full name, company, address, phone number, fax number and e–mail.
2, Splicer model and serial number.
3, Problems.
A. When does it; B. What is the situation now.
C. Characters and optical fiber image information on the display in case of malfunction.
4, List of standard accessories.

Anti–dust and dust–removal

Bare optical fiber positioning groove, electrodes and microscope must be kept clean. Dust cover should be closed when the machine is not in operation.

1, V–groove cleaning

If there are contaminants in the V–groove so that the optical fiber can not be properly clamped, big splicing losses will be caused. Therefore, in normal work, check frequently and clean regularly the V–groove. Follow the steps below to clean the V–groove:

(1) Open the dust cover;

(2) Push the contaminants out of the V–groove with a cut fiber tail pushing in one direction;

(3) If the optical fiber can not remove the contaminants in the V–groove, clean the bottom of the V–groove with a fine cotton swab dipped in alcohol and wipe the excess residual alcohol in the V–groove with a dry cotton swab or a standard brush.

2, Electrode cleaning and replacement

If the electrode is not clean, gently wipe the electrode tip with a cotton swab dipped in alcohol. Be careful to protect the tip of the electrode from damage.

3. If the object lens is dirty, the normal position to observe optical fibers may be affected, resulting in higher splicing loss or poor splicing. Therefore, the two objective lenses should be cleaned regularly, or the dust will accumulate and become permanent.

Follow the following steps to clean the lens;

(1) Before cleaning the objective lenses, firstly, turn off the power.

(2) Gently wipe the lens with a fine cotton swab dipped in alcohol. Wipe with a cotton swab from the middle of the lens, in circular motion till out of the edge of the lens. Then, wipe the remaining alcohol with a clean dry cotton swab.

（3）Power off to make sure there is no dust or stripes on the display.

Ⅱ Protection from strong impact or vibration

Handle the splicer with care to move or transport it. In addition, remember to put it into the carrying box and transportation box for long–distance transportation.

Ⅲ Storage

Generally, for long–term non–use, turn it on at least once every six months; in high humidity season, turn it on frequently, and put desiccant in the chassis to prevent mildew of microscope.

Ⅳ Operation precautions

1, In the use of AC power, pay attention to protect the adapter and keep the power grounded.

2, In the discharging process, when there are several thousands high voltage between the electrodes, do not touch the electrode bar by hand.

3, Gasoline, gas and freon and other flammable and explosive gases are forbidden in the working environment, so as to avoid poor splicing or accident.

4, Wipe the fiber positioning groove and the microscope with anhydrous ethanol, swab , in one–way direction, instead of two–way.

5, The splicer consists of many mechanical parts in precise structure, which are forbidden to be disassembled or changed except electrode, because these mechanical parts are precisely machined and calibrated, and it is difficult to restore to its original position once changed. The users can replace and operate the electrode by hand.

The retroreflector, the objective lens, the V–groove, the display of the splicer must be kept clean. Use pure alcohol, not any other chemical agents, to clean.

V Common failures and solutions

Anomaly	Causes	Solutions
No image after optical fiber is put	1. It's not powered on. 2. The optical fibers are not into the V-groove or the V-groove are dirty and contaminated; 3.The optical fiber is too short or broken; 4. Alignment mechanism is not reset; 5. No lid closed signal is detected.	1. Press the power switch; 2. Reload the optical fibers or cleaning the V-groove with alcohol and brush; 3. Cut the fiber again; 4. Press the reset button; 5. Check if the magnetic conductive screws are loose or if the windshield magnet is disconnected.
Large splicing loss	1. The end face of cut optical fibers are not good; 2. The parameters for splicing are not reasonable; 3. The electric arc center shifts (rare).	1. Re-cut the end face; 2. Re-discharge and calibrate; 3. Re-discharge and calibrate.
Failure of discharging or existence of scar of splicing	1. The end face of cut optical fibers are not good; 2. The parameters for splicing are too small; 3. Dusts stick to the electrode; 4. Operation data is wrong.	1. Cut the end face again; 2. Increase voltage for cleaning; re-discharge and calibrate; 3. Clean electrode with brush; 4. Stop and restart.
Splicing area becomes thinner	1. The parameters for splicing are not reasonable, the voltage is too high; 2. The splicing overlap is too small.	1. Discharge and calibrate; 2. Increase splicing overlap.
Splicing area becomes thicker	1. The parameters for splicing are not reasonable, the voltage is too high; 2. The splicing overlap is too big.	1. Discharge and calibrate; 2. Decrease splicing overlap.
Bubbles appear during splicing (on multi-mode)	1. The end face of optical fiber has burs, not even.	1. Increase cleaning voltage; 2. Cut the optical fiber again.
Shadow of spot fiber of splicing	1. Optical fiber core do not match (kind or optical fiber core is in different diameter); 2. Very light shadow may appear in multi-module optical fibers.	1. Match optical fibers again, so that the optical fibers at both sides of the splicing are in the same kinds; 2. Normal phenomena, not impacting splicing strength and signal transmission quality.

Routine maintenance of the splicer

Anomaly	Causes	Solutions
The image is tilted.	1. The optical fiber is not completely into the V–groove; 2. V–groove is dirty and contaminated.	1. Load the optical fibers again; 2. Clean the V–groove with alcohol and brush.
The image is virtual.	1. V–groove is dirty and contaminated. 2. The optical fiber is not in the groove;	1. Clean the V–groove with alcohol and brush. 2. Load the optical fibers again;
Cutting blade do not cut optical fiber	1. The optical fiber is not completely into the V–groove; 2. V–groove is dirty and contaminated.	1. Load the optical fibers again; 2. Clean the V–groove.
The image is on the top or the bottom on the display.	1. The coating is not peeled off; 2. The coating is too short; the rubber cushion at both sides of the blade do not press down the optical fiber.	1. Use miller clamp to remove the coating; 2. The length of the peel–off coating should be over 30mm.

Contact

The splicer must be returned to the agent or the factory for repair.
Please attach a copy of description of the exact failure.
Please contact the agent or refer to the following address for repair address.

The company's product performance and indicators are in continuous improvement, and are subject to change without notice.
In case of any discrepancy in the picture in this summary, the material object shall prevail.
For more accurate operation of the splicer, please read carefully the attached operation manual.

High–precision Fusion Splicer Operation Manual