# **OFS-936R**

# **Ribbon Splicer**



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### **Chapter 1 Technical Parameters**

### 1.1 Applied fiber type

- SM(ITU-TG.652)/MM(ITU-TG.651)/DS(ITU-TG.653)/NZDS(ITU-TG.655)/ITU-TG.657A/ITU-TG.657B
- Fiber count: one to twelve fibers

### 1.2 Splice Loss

Use the same fiber to continue, if using ITU-T standard insertion method, measure its splice loss, the typical value is:

- SM:0.05dB
- MM:0.02dB
- DS:0.08dB
- NZDS:0.08dB

### 1.3 Splice mode

- 100 kinds of modes can be stored and 39 kinds of splice modes can be preset
- 2000 pieces of latest splice results record can be internally stored.

### 1.4 Fiber heating groove

- Heating time: 20 to 900s for choose
- Typical heating time: 30s
- Heating mode: 32 kinds of heating mode and four types of heating mode can be preset

### 1.5 Power supply

- External direct mains input: input voltage is 12V, input current≧3A
- Lithium battery supply: 12V, 5.2Ah, full charging time is about three hours.

### 1.6 Size and weight

- Size: Length\*Width\*Height=124mm\*123mm\*138mm
- Weight: 2.2Kg (Battery included)/1.9kg
- Operating conditions: Temperature: -10°C+ 50°C; Humidity: 0-95%; Altitude:0-2000m; Maximum wind speed: 15m/s
- Storage environment: temperature: -10°C-+ 50°C; Humidity: 0 -95%; Battery:-20°C--30°C for long time storage



- Observe and display method: Two cameras, 4.3 inch color liquid crystal screen (High intensity resistant protective layer on its surface)
- One to four cores X and Y amplify 38 times, five to eight cores X and Y amplify 28 times and nine to twelve cores X and Y amplify 18 times.

• Strain relief test: 1.96-2.25N

#### Port:

Port	Description
SD card port	Internally installed, back apron inner side, SD card start, store program
Serial port	Internally installed, back apron inner side, conduct debugging
Mini Hdmi port	External installed Mini USB: Encryption and data transmission USB 2.0: Software upgrading and image preserve



### **Chapter 2 Installation**

### 2.1 Safety warning and prevention measures

It is very important that OFS-936R is designed for splice quartz glass fiber, not applied for any other purpose. Since Fusion splicer is point-device machine, you should be cautious when carry it. So, please follow the safety rules and general specification when you use and carry the OFS-936R. Manners don't take these safety measurements or don't comply with the warnings and attention matters that this manual offers will violate the security standard of fusion splicer design, manufacture and practical use.

PRO assumes no responsibility due to violate the requirements.

#### 2.1.1 Operating safety warns

- 1) Do not use Fusion splicer in flammable and combustible place.
- 2) Do not touch the electrode when opening the machine.

**Note:** Only special electrode bar can be used on Fusion splicer. When you need to replace the electrode, please choose replace electrode option on maintenance menu, or you must turn off the power ahead of time. Discharging operation is strictly forbidden if couple electrode bars haven't been installed.

- 3) Do not dismantle any part of Fusion splicer except the elements which can be replaced by users permitted in this manual, components renewal or internal alignments can only be conduct by Precision Rated Optics or maintenance staff authorized by Precision Rated Optics.
- 4) Please be careful when connect battery adapter cable, don't pull the cable when take it down from the socket, just hold the plug. Please make sure the cables are in good condition for fear from the risk of fire or electric shock accidents.
- 5) Do not expose Fusion splicer to fire, electric shock or humidity environment.
- 6) Please wear protective glasses when prepare fiber and in splice course, otherwise fiber scrap enter into your eyes, fall on your skin or swallow will lead to serious outcomes.
- 7) When the following cases occurred, please turn off the Splicer and pull out the adapter immediately, otherwise it will lead to serious consequences, such as Fusion splicer will work abnormally or beyond repair.

Be wary of fumes, peculiar smell, abnormal sound or heating abnormal. Liquid or foreign matters fall into the inner of Fusion splicer. Fusion splicer suffered from strong vibration or impact.

- 8) Do not use compress or canned gas to clean Fusion splicer, otherwise the arc produced in splice course will light the inflammable goods left.
- 9) Please just use exclusive Precision Rated Optics AC adapter. Inappropriate alternating current power supply will lead to fumes, electric shock or facility damage; even it will result in fire accident, body hurt and death.
- 10) Please just use exclusive AC power cord. Heavy items should not be placed on the power line, please not let power line heated or change the power line. Inappropriate or damaged power line will lead to fumes, electric shock and facility damage; even it will result in fire accident, body hurt or death.

#### 2.1.2 Maintenance and appearance protect

- 1) Avoid using hard articles to clean V groove and electrode bar.
- 2) Avoid using acetone, painted diluents or alcohol to clean any part of the Fusion splicer unless after careful consideration.
- 3) Please use dry cloth to clean the dust and dirt.
- 4) If the external appearance of the fusion splicer is very dirty, you can put soft cloth into diluted cleaning fluid and then do the cleaning. Then use dry cloth to dry the machine. Please not use furniture lighting material or other detergent.
- 5) Please adhere to the maintenance method that this manual introduced.

#### 2.1.3 Transportation and Storage

- 1) When moving Fusion splicer to warm place from cold environment, try to gradually warming, otherwise condensation will be produced in the inner of the device, thus will do adverse effects to it.
- 2) Please pack it when you don't use it.
- 3) Please keep Fusion splicer clean and dry.
- 4) Fusion splicer has been precisely calibrated and aligned, please place it in carrying case for protection, proper buffer box should be needed during long-distance transportation.
- 5) Please avoid direct sunlight or put it in overheated environment.
- 6) Keep the minimum humidity when storing, relative humidity should be less than 95%.

#### 2.2 Installation

#### 2.2.1 Unpack

Hold the handle of the Fusion splicer upward and take it out. Please refer to the following picture.







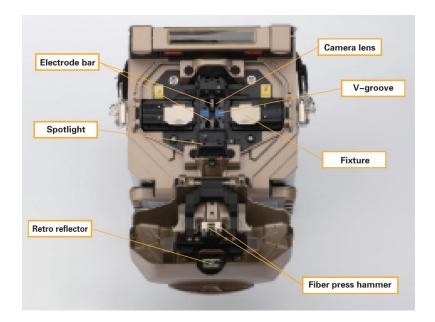
### 2.2.2 Standard configuration of OFS-936RFusion splicer (depend on the goods as criterion)

- OFS-936R Fusion splicer/one piece/Standard configuration
- Cutting knife
- Heat strip machine
- Battery/one piece /standard configuration
- Cooling rack
- Power line(EU/UK/US)/one /standard configuration
- Charger and adapter/one /standard configuration
- Electrode bar (two pairs)
- Random user CD/standard configuration
- OFS-936Rtool box/1/standard configuration
- OFS-936Rspecial fixture of heat melt connector/one set/optional

### 2.3 Appearance overview







#### Power supply mode 2.4

#### 2.4.1 Two types of power supply mode

1) Battery powered, please refer to the following picture:





2) Use power pack which connects to the alternating current to do power supply, the method of install the power pack to fusion splicer is same as battery installation. Please refer to the following picture about power supply connection:





### 2.5 Battery charge

#### 2.5.1 Charging process

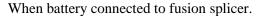
Indication lights range from 20% to 100%, with the increase of the capacity, these lights will be bright one by one until finish charging.

Electric quantity indication



### 2.5.2 Two kinds of charging methods







When battery separate from fusion splicer

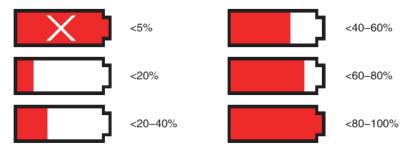
**Note:** Please do not use battery to charge when the fusion splicer is splicing or charging under battery power supply mode, otherwise will reduce the battery service life.



#### 2.5.3 Battery state

You can check battery power through two ways.

1) Battery power will display if battery is connected to fusion splicer. Power supply indication is displayed on the upper right of the screen; please refer to the following picture.



If power supply is connected to the power supply of adapter, Power supply indication is displayed on the upper right of the screen; please refer to the following picture.



2) LED indication light on the battery will show electric quantity (refer to the following picture)



### 2.6 Battery activate

If the battery is drained in short amount of time after full charge, before next time charging, drain remaining battery.

Keep fusion splicer on until battery drains and automatically powers off

### 2.7 Heater



Heater



Cooling tray



### **Chapter 3 Basic operation**

#### 3.1 Workbench

Fix cleaver to the worktable using screws.

Press the worktable which contain cleaver to the relative groove of carry box.



Fix cleaver to the worktable using screws

#### 3.2 Power connection

To use battery, slide into side of splicer. For AC power insert power cord into power port on side of battery.

# 3.3 Battery operation

Please check the battery is more than 20% before preforming fusion splice or heating. (Please refer to chapter 2-battery state for checking method of battery electric quantity).

# 3.4 Starting up

Press the power button on the left side of fusion splicer and wait for its starting up and enter into working interface, please refer to the following picture.





#### 3.4.1 Adjust the position of screen

Adjust the angle of fusion splicer until you think it is the best place.



#### 3.4.2 Adjust the brightness of LCD backlight

On initial interface, press up and down key to adjust LCD backlight brightness until desired.

**Note:** LCD screen is pin-point device that is produced in strict quality control factory. However, the screen may appear black, red, blue or green dots. Since screen observation angle is different, the viewing brightness will also be different. This phenomenon is not flaw of LCD, it is natural phenomena.

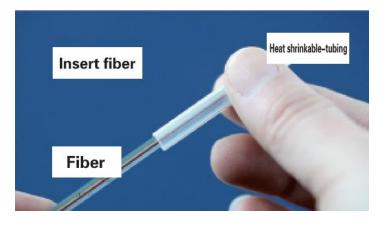
### 3.5 Prepare Fiber

Four steps should be finished before inserting the fiber to fusion splicer.

1) Clean the fiber

Use cloth with alcohol or soft enough tissue to clean the fiber about 100mm from the tail end. If dust on the fiber coating layer is put into inner side of heat-shrinkable tubing this will lead to broken fiber or loss increase.

2) Insert fiber into heat-shrinkable tubing.





#### 3) Strip and clean fiber

Put fiber in the fixture. If ribbon fiber is bent on its tail end about 100mm, please smooth it out.

Fiber fixture is divide into two kinds, respectively are used for left side and right side, be sure to keep right fixture direction, with label upward.

Open the fixture cover, put number one fiber (generally blue) near the slide and retain 30-40mm outside, finally close the fixture cover.

Open heating strip plier and outermost layer sheath, install fiber fixture to the designated position, and close heat striper and protective layer. Hold fixture and striper tightly. Heat for five seconds, and then gently slide to the outside to remove the coating layer. Use gauze or thin tissue with alcohol to clean the fiber. Gauze and tissue cannot be repeatedly used.

Please use high-purity alcohol, more than 99% purity is better.

Surface adhesive force may lead neighbor fiber to overlay, gently flick it to adjust the fiber.

During clean process, please use your finger to press the fixture cover.

#### 4) Cutting fiber

- a. Gently raise arm of cleaver.
- b. Place stripped fiber into fiber holder, and place onto cleaver.
- c. Gently close lever.
- d. Push cleave button until you can hear a click.
- e. Raise cleaver arm, fiber scrap will fall into scrap container.
- f. Remove fiber then close cleaver arm.

*Important:* From now on to make sure the fiber won't be dirty. (For example, please not put it on dirty worktable, or swing it on the air). Also you should check the V-groove whether it is clean, otherwise, you must clean it.

### 3.6 Splice operation

#### 3.6.1 Place fiber

- 1) Open the wind-proof cover.
- 2) Open the fiber holder

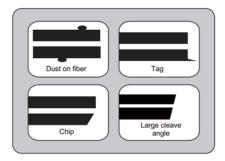




- 3) Put fiber into v-groove and make sure the tail end is positioned between v-groove margin and electrode tip point.
- 4) Use fiber holder to hold down the fiber.
- 5) Close wind-proof cover.

#### 3.6.2 Check fiber

- 1) Before splicing, you should check and confirm whether the fiber surface is clean and smooth.
- 2) Adjust the position of X and Y.
- 3) If any flaw appears, please take off the fiber and recut and/or clean it. Please refer to the following picture.



**Note:** Fiber check is automatic, press splice button, fusion splicer will auto- focus and check the fiber whether there is damage or dust particle.



#### **3.6.3 Splice**

In order to guarantee better splice, an image processing system has been installed in OFS-936R to observe fiber. However, under some situation, the image processing system may not check some splice error. So, to achieve better splice result, we need to do visual inspection via screen, then the following described standard splice procedure.

Fiber will do opposite direction movement after putting in fusion splicer, after clean discharging, the fiber will stop at a specific position, and then fusion splicer will check the cutting angle and end quality. If cutting angle is larger than threshold value or the fiber end face is not smooth, then the buzzer will ring, at the same time, screen will show error message to warn operator. After finish checking, fusion splicer will stop, the screen will display offset, clearance distance and cutting angle value.

If no error message display, we should check the following fiber end, if similar situation appear, we should take down the fiber from fusion splicer and prepare again. Surface flaw on the fiber may lead to a failure splice.

### **Chapter 4 Splice Procedure**

PRO has an easy program structure which you can browse. Splice procedure has defined splice current, splice time and various kinds of parameters used to finish splicing. Select a splice procedure that's consistent with your fiber type.

Usually, fiber combination splice procedure has a predefined value, in this way, which makes it easy for parameter optimize, modify and reestablish splice procedure of not commonly used fiber combination.

NO.Name		5	NZ AUTO
1	Auto	6	MM CALIBRATION
2	MM AUTO	7	SM CALIBRATION
3	SM AUTO	8	DS CALIBRATION
4	DS AUTO	9	NZ CALIBRATION

Part predefine splice procedure

### 4.1 Display effective splice procedure

Current effective splice procedure is displayed on the top of the screen. (Refer to the following picture)



### 4.2 Display effective splice procedure

- 1) Enter the main menu.
- 2) Select the SPLICE MENU option
- 3) Press the up and down keys to select SPLICE PROCEDURE and press key to confirm.
- 4) Check the selected splice mode, press **1** to return to the initial interface.



### 4.3 General splice procedure

This chapter explains the procedure to enter into auto splice and expands different kinds of relative parameters. General splice procedure can divide into two stages, prefusing and splice.

#### 4.3.1 Prefusing

Fusion splicer will finish auto alignment and splice, fiber will receive a low prefusing current for de-ashing, prefusing image will be shown. User will observe any discrepancies that were tested by prefusing image analysis, such as bad prefusing phenomenon. Fusion splicer will warn before fiber splice.

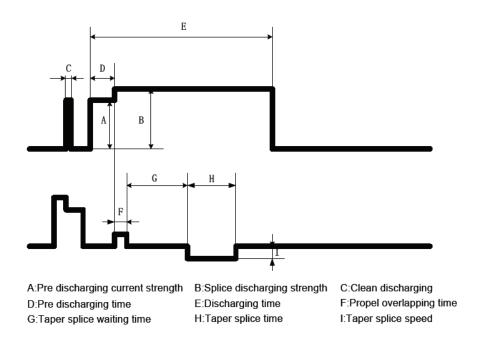
#### **4.3.2 Splice**

During splice process, fiber will connect together and suffer five different kinds of current impact. Modify parameter in fusion process for the distance between fibers. Fiber is separate in prefusing period, according to the variation of main current, fiber will be pressed together.

#### 4.3.3 Splice process

The most important splice parameter is time and current in splice process. Each current phase is shown in the following picture. Name, function and other parameters are very important. Please refer to "splice procedure parameter" in the following chapter.

The following picture shows the relationship between "discharging current strength" and "Motor operate". We can change discharging condition through changing the following listed splice parameters.



#### Splice parameter of general splice process 4.4

Description	Parameter
LCD	Splice mode chart is stored in the data base of fusion splicer, according to the proper input splice mode to store in the data base, the selected splice mode will copy to user programmable zone.
Name	Subjects of splice mode, seven characters at most.
Note	Detailed expound of splice mode, fifteen characters at most will display on select splice mode option.
Discharging adjustment	According to the fiber to adjust the arc power.
Strain relief test	If set Strain relief test to ON, when open the wind-proof after finish splicing will complete strain relief test, or click SET key.
Loss evaluation	Loss evaluation should be viewed as the evaluation of continuous loss value. According to the fiber image to calculate the continuous loss will be deviation with the true value. The arithmetic of estimation loss based on monomode optical fiber; take 1.31um transmission wavelength to advance. This estimated value possesses preferable reference value when in good splice condition, but it can't be viewed as the evidence of project acceptance.
Minimum loss	This value will estimate the minimum splice loss, when special or different fibers splice will generate high splice loss, even it is in best splice discharging condition. In order to make actual splice loss access to the minimum splice loss, we must set the minimum estimated value according to the optimal actual splice loss.
Fiber core offset limiting value	If the curvature of two fibers beyond the threshold values it will display error message.
Cutting angle limiting value	If the fiber end cutting angle of the left and right fiber or either of each beyond the selective value will display error message
Distance	Set the end spacing distance of alignment fibers and prefusing discharging.
Overlap volume	Set the overlap volume in fiber propel stage, if the "prefusing discharging current strength" is low, we recommend "relative lower overlap volume", if the "prefusing discharging current strength" is relative larger, we recommend "relative larger overlap value".
Clean discharging time	Clean discharging can burn the tiny dust on fiber surface in very short discharging circle, so discharging time can make parameter changes through this.
Prefusing discharging current strength	Set prefusing discharging power, this is the discharging current strength when begin discharging to propel the fiber time. If the "prefusing discharging current strength" is too low while the cut angle is relative bad, then axial offset will occurred. If the "prefusing discharging current strength" is too high, then fiber end face will melt excessively, and the splice loss will increased.
Preheat discharge time	Set prefusing discharging circle, this is the length when begin discharge to propel fiber time. "Preheat discharge time" is high synchronous with "prefusing discharging current strength"
Splice discharging current strength	Set electric arc discharging current strength.
Splice discharging time	Set electric arc discharging time.



# **Chapter 5 Splice option**

For setting splice mode

- 1) Enter into the splice option menu.
- 2) Press up and down button to select the option to modify.
- 3) Press left and right key to modify. After modification, press of for confirmation.

Parameter	Description		
Auto-begin	If auto-begin is set to "ON", and then it will auto-splicing after close the windproof cover.		
Pause One	If "pause One" is set to "ON", when fiber move to the interval position, splice will stop and will show cutting angle.		
Pause Two	If "pause Two" is set to "ON", operating will be pause after fiber finish "core to core" alignment.		
Re alignment after pause Two	Alignment may be invalid after long-time "pause Two", so, the fusion splicer will execute alignment function again. If set this function to "OFF", It won't execute alignment function, when spliced fiber axial displacement caused by "pause Two", we suggest manual splice mode rather than use the function option "OFF".		
	Neglect splice fault		
Cutting angle	Set it to "OFF" will prevent the fusion splicer continue to discharge when display "cutting angle error".		
Fiber Core angle	Set it to "OFF" will prevent the fusion splicer continue to discharge when display "fiber core angle error".		
Bad condition on Cutting end	Set it to "OFF" will prevent the fusion splicer continue to discharge when display "cutting angle error".		
Loss			
Thick	Set it to "OFF" will prevent fusion splicer continue to finish splicing when display the warning signals such as "excessive loss", "excessive fiber core intersection angle", "bubble", "fiber too thick" or "fiber too thin".		
Thin	thick of fiber too thin.		
	Fiber images on the screen		
Interval set	Set the fiber display mode during splice course.  I Display X scene interface image separately		
Pause One			
Pause Two			
Discharging	<ul><li>Y : Display Y scene interface image separately.</li><li>XY : Simultaneously display X and Y scene interface image.</li></ul>		
Estimate	Simulationally display It and I seem mortuee mage.		

### **Chapter 6 Heating Mode**

There are thirty two kinds of heating modes installed in the fusion splicer, among it PRO preinstalled four kinds of modes, and users can custom defines the rest.

Each kind of heat shrinkable tubing is optimized by PRO. All these modes can found in the database for reference. Copy a template and paste them to the user defined mode, then users can edit its parameter.

### 6.1 Heating template

60mm	Standard 60mm protective cased pipe.
40mm	Standard 40mm protective cased pipe.

### 6.2 Select heating mode

Select a heating mode to substitute the current effective mode. You must enter into "heating mode selection" menu to change.

- 1) Enter the main menu
- 2) Enter into heating selection mode
- 3) Press up and down key to select the heating procedure, press of for confirmation.
- 4) Check the selected heating mode, press to return to the initial interface.

### 6.3 Edit the heating mode

Heating mode can be edited or changed under heating condition.

- 1) Enter into "Edit heating mode" menu (through heating mode menu)
- 2) Press up and down keys to select the mode to edit, O press to confirm
- 3) Press up and down keys to select the parameter to edit. Press left and right keys to edit. Press of to confirm

### 6.4 Delete heating mode

- 1) First enter into the heating mode menu.
- 2) Select "delete heating mode", press to enter into.
- 3) Select the heating mode you need to delete, press to confirm deletion.

**Note:** The mode that displayed in green color is system preset initial mode (40mm, 50mm) and can't be delete.

#### Heating mode parameter 6.5

Parameter	Description	
Template	Set the heating mode template, all the heating mode will be display, select a kind of mode and copy it to the user programmable pattern.	
Name	Use some characters to show a kind of heating mode.	
Note	The note of the heating mode will be display on the upper right of the monitor.	
Heating control	Set the heating mode:  Long: For the protective cased pipe that longer than 30mm, please heat the middle section first than both ends.  Short: For the protective cased pipe that shorter than 30mm, please heat both ends first, than the middle section.	
Heating temperature	Set the heating temperature.	
Heating time	Set the heating time, from "begin to heat to finish heating".	
Cooling time	Set cooling time, begin from finish heating.	

### **Chapter 7 Maintenance Menu**

This chapter will expound how to use maintenance menu.

- 1) Select "Maintenance" in main menu and then press O to enter into the maintenance menu.
- 2) Select the function to execute.

### 7.1 Replace the electrode.

The electrodes will wear due to long-time use, so you must do regular cleanness according to the build-up extent of the oxide. We suggest that the electrode should be replaced after discharging one thousand times. When the electrode discharging time reaches one thousand times, a message will remind you to replace the electrode will appear. If you don't replace the electrode after long-time use will result in splice loss increase and splice strength reduction.

Procedure to replace the electrode:

- 1) Implement "replace electrode" in "maintenance menu" option.
- 2) The screen will show the message to turn off the power, press until LED shut down.
- 3) Remove the old electrode.
  - a. Loosen the screw that fixed to the electrode lid.





- 4) Please use clean cloth with alcohol or soft lint to clean the new electrode and then install it to the Fusion Splicer<sub>o</sub>
  - a. Put them under the electrode cover.
  - b. Take out the electrode. (Put the electrode to the electrode cover).

#### Note:

Please do not pull the wire out when replacing the electrode. The torque should be 2kgf-cm when tight the screws



PRO recommends that after replacing the electrode, you should stabilize the electrode and do discharging alignment. (Concrete operations will be expounded below), otherwise better splice loss and splice strength can't be guaranteed.



#### 7.2 Electrode stabilize

When external environment suddenly changes, discharging current strength will sometimes become unstable, thus may lead to splice loss increase. Especially when fusion splicer moves to high altitude place from lower altitudes, it takes some time to stable the discharging current strength. Under this condition, stabilize the electrode can accelerate the discharging current strength process; several tests should be done until it shows that the operation had been finished.

#### Operating steps:

- 1) Select "stabilize the electrode".
- 2) After press SET key, the fusion splicer will execute discharging accurate measurement to test the electrode position for five times (please not place fibers when you are stabilize the electrode, or it will influence the electrode accuracy).

### 7.3 Auto diagnosis test

OFS-936R has a diagnosis testing function; it permits the operators to evaluate some variable elements after execute a simple step, if the fusion splicer encounter operating trouble, and then at this time the function can be conduct.

#### **Operating steps:**

1) Select "auto-diagnosis" (through the maintenance menu), press to enter into.



2) In auto-diagnosis, there are some testing functions below

Serial Number	Inspection items	Description
1	Brightness detection	Test and adjust the LED brightness.
2	Motor alignment	Automatic calibrate the speed of the three motors.
3	Discharging alignment	Automatic calibrate the factor of discharging current strength and the position of fiber splice.

#### 7.4 Dust examination

The fusion splicer can observe the dust on fiber, camera, objective lens and retroreflector through the images; dust will interfere with normal fiber observation and may lead to improper splice results. This function can detect whether there are dust.

- 1) Select "dust examination" in "maintenance menu"
- 2) If fibers have been put in the fusion splicer, take them out and press SET key to do dust examination.
- 3) If there is no dust, the fusion splicer will remind you that operations have been finished. If it discovers the dust, fusion splicer will indicate that "camera lens found the dust". Press the return key for two times, fusion splicer will show the dust position, you need to clean the retroreflector and the objective lens, and then do dust examination again until it indicates that operations have been finished.

**Note:** If you have already do the cleaning and replace the retroreflector protective plate, but the dust still existing, please contact with the nearest dealer.

### 7.5 Electrical machine alignment

The motor had been aligned before leaving factory, of course, these setting may change due to several reasons, this function automatically adjust the speed of three motors.

Operating process:

- 1) Select "electrical alignment" in "maintenance menu".
- 2) Put the prepared fibers to the SET key in the fusion splicer.
- 3) The speed of all the motors is automatic calibrated. After finish, the fusion splicer will indicate you that the operations have been completed.

**Note:** This function can be executed when some errors appear, such as "excessive thick", "excessive thin" or alignments are too slowly for the fibers.



### 7.6 Discharging alignment

Atmospheric environment is always changing, such as the temperature, humidity and air pressure, and these will make the discharging temperature varied. OFS-936R internally installed temperature and barometer; they can feed back the external environment parameter to the system to maintain the frame skip discharging current strength within a stable state. However, the variation of discharging current strength result from electrical machine abrasion can't be auto corrected, in addition, the discharging center position sometimes will move left or right. Under this situation, the splice position will offset with the discharging center position; now discharging alignment should be executed to solve the problem.

**Note:** Discharging alignment will be auto execute just under "AUTO" mode, so under this mode, you needn't to do discharging alignment.

Execute "discharging alignment" will change the parameter values of discharging current strength, this value will be applied in all the splice procedure, but the discharging current strength value under current splice mode can't be altered.

### Operating steps:

- 1) After select "discharging current alignment" will display discharging alignment screen in "splice menu".
- 2) Put the prepared fibers to the fusion splicer, and then press SET key to do discharging alignment.

#### Note:

- 1) Please use standard SM, DS or MM fiber to do discharging alignment.
- 2) Please make sure that the fiber is clean, if dust on the surface will influence the alignment consequence.
- 3) The fusion splicer will show two pieces of numbers after discharging alignment, if the right side value up to 70±10, the fusion splicer will remind you that operating have been finished, otherwise you need to cut the fiber again to do discharging alignment until finish the operations.

### 7.7 Electrode setting

Set the warning of electrode use, Precision Rated Optics recommends that after 2500 splices should replace the electrode to guarantee high quality fusion.

- 1) Select "electrode setting" and enter into under "Maintenance menu" option.
- 2) Set electrode use reminding and warning.

Parameter	Description
Electrode use reminding	If the electrode discharging times beyond the electrode use reminding that had been set, the prompt dialogue box will indicate you to "replace the electrode" when start the fusion splicer. Precision Rated Optics suggests setting the parameter to "2500".
Electrode use warning	If the electrode discharging times beyond the electrode use warning that had been set, the prompt dialogue box will indicate you that "must replace the electrode" when starting up the fusion splicer. Precision Rated Optics suggest set the parameter to "3500"

### 7.8 Software upgrading

- 1) Select "software upgrading" under "maintenance menu" option.
- 2) Connect the USB flash disk which carried with the software upgrading program to the Mini Hdmi port.
- 3) Press confirmation key, the fusion splicer will finish upgrade software program automatically, after upgrading, the fusion splicer will restart automatically.



### **Chapter 8 Other functions and application**

### 8.1 Data storage

#### 8.1.1 Display splice record

- 1) The storage results that stored in the fusion splicer can be displayed.
- 2) Enter into the data storage menu, select "show the fusion record" option to check.

#### 8.1.2 Delete the splice record

The splicing record can be partly deleted or totally deleted.

- 1) Input the specific splicing result number (starting number and terminating number) to delete these results.
- 2) Select "execute deleting the record" option, press of for confirmation, and then the selected splicing records will be deleted. The deleted results will be substituted

#### 8.1.3 Splice data storage

If users don't want to store the splicing record, please select "OFF" under "splicing data storage" option for the subsequent result.

### 8.2 System setting

This menu is used to alter the settings or the managers restrict operators to do selection or modification.

Parameters	Description
Buzzer	Set the volume of buzzers
Temperature unit	Set the temperature unit
Language	Set the languages that displayed on the screen, select a kind of language to display.
Monitor position	Set the operating directions of the fusion splicer. [Front] Monitor forward operating. [Back]Monitor backward operating. Please refer to the next page for detailed information.
Power off option	Set power off mode.
Power on option	Set the beginning image and functions. This function carries with the secret key.
Set the calendar	Set the system time.
Password	Set the password, this function carries with the secret key.

#### 8.2.1 The screen position

When the fusion splicer leaves the factory, the position of screen was set to "direction forward", you can also set it to "backward". If the position of the screen was changed, then the cursor of direction operational key should also be reversal.

Change the position of the screen

- 1) Enter into "screen position" menu (through the system setting menu).
- 2) Select the position that you need (front/back), and then preserve.

**Note:** You can right key to fast switch the position of screen, press the left and to do fast operating on initial interface.

#### 8.2.2 Energy saving position

This function is important to energy saving, if this function hasn't been set when the battery is in use, then the welding times will be reduced.

- 1) Insert the battery and power on.
- 2) Select [energy saving] in the [system setting] option.
- 3) Change the values of [screen auto off] and [fusion splicer auto off].

Parameters	Description
Screen auto off	During some certain time period, if the fusion splicer didn't work, then the screen will auto off. When the battery is in use, you should set a specific turn-off time.
	When the screen is turning off, the indication light which near the power supply key will flash, the screen will auto on if you press any key

### 8.2.3 System information

After you select [system information] it will display the following messages.

Parameter	Description	
Machine serial number	Display the serial number of the fusion splicer.	
Software edition	Display the software version number.	
CPLD	Display CPLD version number.	
FPGA	Display FPGA version number.	
Discharging counts	Display the discharging counts after replace the electrode, execute [replace electrode]or[discharging counts deletion] to initialize the parameter to zero	
Total counts	Display the total discharging counts.	
Last maintenance	Display the date of last maintenance.	
Next maintenance	Display the next maintenance time that scheduled.	

# **Appendix I**

Splice loss increase: Reason and solution.

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

Note: A vertical line sometimes appears at the splice point when MM fibers, or dissimilar fibers (different diameters) are spliced. This does not affect splice quality, such as splice loss or tensile strength.

# **Appendix II**

If error message is shown as below during the process, please follow the instruction accordingly. If the problem still remains, please contact us.

Error Message	Reason	Solution
L Fiber Place Error	The fiber end-face is placed on the electrode	Press the "Reset" Button. Reload the fibers, make sure
R Fiber Place Error	centerline, or beyond it	fiber end face between V-groove and the center position of electrodes
Propulsion Motor Overrun	The fiber is no set correctly at the bottom of the V-groove, which results in that the fiber offsets beyond motor formation range	Press the "Reset" button and then re-position the fiber at the bottom of the V-groove
Propulsion Motor Trouble	Motor might be damaged	Consult your nearest sales agency
Failed to Find The Fiber Endface	The fiber is not set correctly at the bottom of the V-groove	Press the "Reset" button and then re-position the fiber correctly at the bottom of the V-groove
No Arc Discharge	Arc Discharge does not occur	Confirm the electrodes in proper position; Replace electrodes
Motor Overrun	The fiber is not set correctly at the bottom of the V-groove	Press the "Reset" button and then re-position the fiber at the bottom of the V-groove
Cannot Find the Edge of the Cladding	The fiber is not set correctly at the bottom of the V-groove	Press the "Reset" button and then re-position the fiber at the bottom of the V-groove
Find Wrong Fiber Edges	There's dust on the fiber surface	Re-prepare the fiber; Clean the lens and protector mirror and then redo "Dust Check"
Unidentified Type of Fiber	Shock occurred to the splicer during the splicing process	Execute "Motor Calibration" If the [problem still exist, please contact the sale agent
Unidentified Type of Fibers	Shock occurred to the splicer during the splicing process	Execute "Motor Calibration"  If the problem still exist, please contact the sale agent
Contact of Fiber End-faces	Overlap too much	Adjust overlap parameter
	Motor is not calibrated	Calibrate and maintain the motor

Focus Motor Overrun	The fiber is misplaced	Press the "Reset" Button and then reposition the fiber correctly
	There's dust or dirt on the fiber surface	Prepare the fiber again
	There's dust or dirt on the fiber surface	Execute the [Dust check] after the lenses and LEDs are cleaned
Fibers Mismatch	The fibers of two sides are different type	It may result in large splice loss if you continue to splice,
		Please use the proper splice mode corresponding to the fibers
Large Cleave Angle	Bad fiber end-face	Check the condition of the fiber cleaver, if the blade is worn, rotate the blade to a new position or change a new one, and then re-prepare the fibers
	[Cleave Limit] is set too low	Increase the [Cleave limit] to an adequate limit(standard:3.0°c)
Large Core Angle	[Core angle limit] is set too low	Increase the [Core angle limit] to an adequate limit (standard:1.0°c)
	Dust or dirt is on the V-groove or the clamp chip	Clean V-groove and clamp chip. Prepare the fibers and reload them
Focus Error	Too large axial offset (>0.4um)	Re-prepare the fibers
	The motor is not calibrated	Execute [Motor calibration]

Dust Error (fiber core)	There's dust or dirt on the fiber surface	Prepare the fiber again
	The lens or LEDs are coated in dust	Execute the dust check after cleaning the lenses and LEDs
	Cleaning Arc time is too short	Set the cleaning arc time to be 180ms
	It is difficult to identify the fiber core by using the method of core alignment to splice	It is difficult to identify the fiber core by using MM splice mode to splice
	There's dust or dirt on the fiber surface	Prepare the fiber again
	There's dust or dirt on the fiber surface	Execute the [Dust check] after the lenses and LEDs are cleaned
	Cleave angle limit is too low	Increase the cleave angle limit to a decent value (standard value: 3.0°c)
Fat Fiber	Overlap too much	Adjust overlap parameter
	Motor is not calibrated	Calibrate and maintain the motor
Thin Fiber	Arc power too low	Execute [Arc Calibration]
	The level of pre-discharge is too high	Decreased pre-discharge of pre-discharge time
	Insufficient overlap	Adjust overlap parameter

### **Appendix III**

### Questions and troubleshooting

- Power does not turn off when pressing On / Off button.
  - o Press and hold the key until the LED color changes from green to red.
- Few splices can be made with a fully charged battery pack
- If the power saving function is not enabled, battery power degrades quicker.
  - o [System setting] Always enable it to conserve power usage.
- If degradation appears (memory effect). The battery pack is stored for an extended period of time, completely discharge it. After discharge completion, recharge the battery pack.
- The battery pack has reached the end of its service life. Install a new battery pack.
- The battery pack uses chemical reaction. The capacity decreases at low temperature, especially at lower than 0 degree °C.
- Error message appears on monitor please refer to appendix II.
- Inconsistent splice loss / High splice loss
  - o Clean the V-grooves, fiber clamps, wind protector mirrors, and objective lenses.
  - o Replace the electrodes.
  - o Please refer to Appendix I.
- The splice loss varies according to the cleave angle, arc conditions and fiber cleanliness.
- Monitor suddenly turned off
  - The monitor suddenly turns off after an extended period of splicer inactivity, if the power saving function is enabled. Press any key to return to the normal state.
- Splicer power suddenly turned off without "Low battery' message.
  - o The monitor will turn off after an extended period of splicer inactivity, if the power saving function is enabled. Press any key to return to the normal state.
- Identify fibers error in AUTO mode
  - o AUTO mode is applicable for SM, MM, NZ fiber. Errors may occur while splicing special fibers.
- Mismatch between Estimated splice loss and actual splice loss
- The estimated loss is a calculated loss, so it can be used for reference only.
- The optical components of the splicer may need to be cleaned.
- Fiber protection sleeve does not shrink completely.
- Extend the heating time.
- Method to change heating process.
- Press Heat key to stop during heating process. The LED light will go off after pressing.
- Fiber protection sleeve adhered to heating plate after shrinking use a cotton swab or a similar soft tip object to push and remove the sleeve.



- Forgot password
  - Please contact the sale agent.
- No arc power change after [Arc calibration]
  - An internal factor is calibrated and adjusted for the specific arc power selected. The displayed arc power in each splice mode does not change.
- Forgot to lay fibers while executing some specified function that fibers are needed. Return key is invalid. Open the wind protection shield, load prepared fibers in the splicer, and press "Set" to continue or press "Reset"
- Upgrading Failure
  - o When users use the "New" U-disk to upgrade, the splice may not be able to correctly identify the upgrade file, you need to re-plug the U-disk, and restart the splicer
- Check if the upgrade file name and the format are correct.
- If you cannot solve the problem, please contact the sale agent.
- Other
  - o Please refer to the video in user's CD

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