Fiber Fox

ARC FUSION SPLICER

MINI 12R

User Manual

This User Manual explains the use, performance characteristics, and cautions about MINI12R fusion splicer and how to install and operate it. The primary goal of this manual is to make the user as familiar with the splicer as possible.

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catalogue

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

◆Applied cores: one to twelve cores

1.2 Splice Loss

Use the same fiber to continue, if adopt ITU-T standard insertion method to 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 5 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:1.9kg (Battery included)

1.7 Environment Condition

◆Operating conditions: Temperature: -10℃- 50℃; Humidity: 0-95%; Altitude:0-2000m; Maximum wind speed: 15m/s

◆Storage environment: temperature: -10℃- 50℃; Humidity: 0 -95%; Battery:-20℃--30℃ for long time storage

1.8 Other

◆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 HS-12 : USB charge function

Chapter Two Installation

2.1 Safety warning and prevention measures

It is very important that MINI12R is designed for splice quartz glass fiber, not applied for any other purpose. Since Fusion splicer is point-device machine, you should be seriously cautious when carry it. So, please keep strictly to the following safety rules and general specification when you use and carry MINI12R. Manners don't take these safety measurements or don't comply with the warnings and attention matters that this manual offered will violate the security standard of fusion splicer design, manufacture and practical use.

Fiber Box assumes no responsibility due to violate the requirements.

2.1.1 Operating safety warns

1). Please not use Fusion splicer in flammable and combustible place.

2) Please not touch the electrode when open 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). Please 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 Fiber Fox or maintenance staff authorized by Fiber Fox.

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) Please 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.

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) Please not use compress or canned gas detergent to clean Fusion splicer, otherwise the arc produced in splice course will light the inflammable goods left.
9) Please just use exclusive Fiber Fox 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. Weighty 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 move Fusion splicer to warm place from cold environment, try to adopt gradual warming mode, 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 have been precisely calibrate and alignment, please place it in carrying case for fear it will be damaged or polluted, proper buffer box shook should be needed during long-distance transportation.
5)Please avoid direct sunlight or put it in overheated environment.
6)Keep the minimum humidity when preserve, relative humidity should be less than 95%.

2.2 Installation

Important.
Please keep to the following explanations carefully.

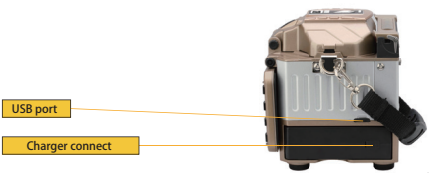
2.2.1 Unpack

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

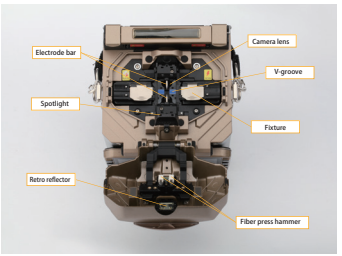
2.2.2 Standard configuration of MINI12R Fusion splicer (depend on the goods as criterion)

1	MINI12R Fusion splicer/one piece/Standard configuration			Electrode bar (two pairs)	
2	Cutting knife			Random user CD/standard configuration	
3	Heat strip machine			MINI12R tool box/1/standard configuration	
4	Battery/one piece /standard configuration			MINI12R special fixture of heat melt connector/one set/optional	
5	Cooling rack				
6	Power line(EU/UK/US)/one /standard configuration				
7	Charger and adapter/one /standard configuration				

2.3 Appearance overview



Side



2.4 Power supply mode

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 b attery 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 connect with fusion splicer

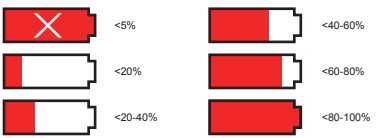
◆ When battery separate from fusion splicer

Note: Please 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

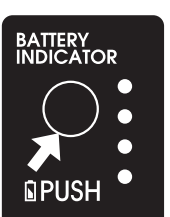
You can check battery electric quantity through two ways.

1) Electric quantity will be display if battery is connecting to fusion splicer. Power supply indication is displayed on the upper right of the screen; please refer to the following picture.



If power supply by connect the power pack 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

Battery activate
If the battery is using in short time after full charge, maybe it owns memorize effect, before next time charging, you had better discharging the total

electric quantity.
Please keep fusion splicer in starting up state when discharging until the electric quantity is use up and automatically power off.

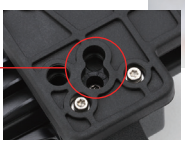
2.7 Heating groove

Open the heating groove

Cooling shelf

Chapter 3 Basic operation

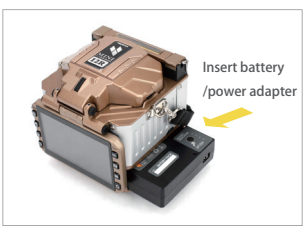
Fix cutting knife to the worktable using screws .
Press the worktable which contain cutting knife to the relativ e groove of carry box.



3.2 Power connection

Power supply groove that locate on the downside of fusion splicer can contain two types of power supply modes.

If use external power source to do power supply, please adopt AC adapter.
If use battery to do power supply, please use detachable battery.



Insert battery/power adapter

3.3 Battery operation

Please check the electric quantity whether it is more than 20% before operate fusion splicer, otherwise battery will not support fusion splicer do splicing and 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 displayer

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 upper and down key to rapid adjust LCD backlight brightness until you think it is the most distinct display intensity.

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

3.5 Fiber preparation

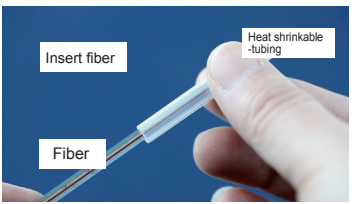
Four steps should be finished before inserting the fiber to fusion splicer.

1. Clean the fiber

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

2. Sheathe fiber heat-shrinkable tubing

Coat fiber with heat-shrinkable tubing



3. Strip and clean fiber

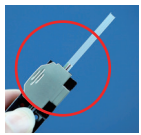
Put fiber in the fixture, if ribbon fiber is bent on its tail end about 100mm, please smooths it.

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 is blue) near the slide and retain 30-40mm outside, finally close the fixture cover.

O pen heating strip plier and outermost layer sheath, install fiber fixture to the designated position, and close heat strip plier and protective layer. Hold fixture and strip plier tightly, heating it for five seconds, and then smoothly slide to the outside to remove the coating layer. Use gauze or thin tissue that dipped in alcohol to utterly clean the fiber. Gauze and tissue cannot be repeatedly use.

- Please use high-purity alcohol, more than 99% purity is better.
- Surface adhesive force may lead neighbor fiber interlapping; gently flick it to adjust the fiber.
- During clean process, please use your finger to press the fixture cover.



4. Cutting fiber

1) Gently hold the press arm of cutting knife and then slide the shackle to unlock the cutting knife.
2) Propel the slide of cutting knife until it locked.
3) Put the stripped fiber on the cutting knife.
4) Screw down the press arm.
5) Gently loose the press arm, the elastic force will let it back to the initial position.
6) When press arm lift, fiber scrap collector will rotate and automatically roll th e fiber scrap to debris taper.
7) Completely close the press arm and slide the shackle to lock the cutting knife.

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

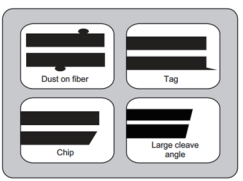
3.6.1 Put fiber

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

3) Put fiber into V-groove and make sure the tail end is locate between V-groove margin and electrode tip point.
4) Use fiber gland 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) Through adjust the position of displayer to finish switching foresight and back vision
3) If any flaw appears, please take off the fiber and rehandling it. Please refer to the following picture.



Note: Fiber check is automatically, press splice button, fusion splicer will auto- focus and checks 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 MINI12R 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 displayer, then the following described standard splice procedure.

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

2.5.1 Charging process

Fiber Box has a n easy program structure which can direct browse and effective. Splice procedure has defined splice current, splice time and various kinds of parameters used to finish splicing. Select a splice procedure that consistent with your fiber type is very important.
Usually, fiber combination splice procedure has a predefine value, in this way, it made easy for parameter optimize, modify and reestablish splice procedure if not commonly used fiber combination.

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

Part predefine splice procedure

4.1 Display effective splice procedure

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

4.1 Display effective splice procedure

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

①Enter into the main menu.

② Enter into the splice mode that belong to SPLICE MENU option.

③Press upper and down key to select splice procedure, and then press [O] for confirmation.

④Check the selected splice mode, press ↩ to return to the initial interface.

4.3 General splice procedure

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

4.3.1 Prefusing

Fusion splicer will finish auto alignment and splice, fiber receive a low prefusing current to deashing, prefusing image will be shoot. User will observe any question that tested by prefusing image analysis, such as bad prefusing phenomenon. Fusion splicer will warn before fiber splice.

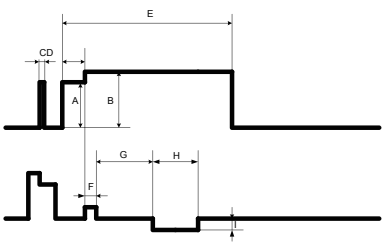
4.3.2 Splice

During splice process, fiber will connect together and suffer five different kinds of current impact. Modify an important parameter in fusion process is 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 show in the following picture. Name, function and other parameter is very important to splice. 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 change the following listed splice parameter.



A:Pre discharging current strength B :Splice discharging strength C :Clean discharging
D:Pre discharging time E:Discharging time F:Propel overlapping time
G:Taper splice waiting time H:Taper splice time I:Taper splice speed

4.4 Splice parameter of general splice process

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 the setting of splice mode

① Enter into the splice option menu.

② Press up and down button to select the option that need to modify.

③ Press left and right key to modify. After modification, press [O] for confirmation.

Parameter	Description
Auto-Start	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.
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 Thin	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”.
Fiber images on the screen	
Interval set Pause One	Set the fiber display mode during splice course. X ： Display X scene interface image separately.
Pause Two Discharging Estimate	Y : Display Y scene interface image separately. XY ： Simultaneously display X and Y scene interface image.

Chapter 6 Heating Mode

Thirty two kinds of heating modes have been internally installed in the fusion splicer, among it Fiber Box preinstalled four kinds of mode, and users can custom defines the remains.

Each kind of heat shrinkable tubing is optimized that defined by Fiber Box, all these modes can find in the database for reference. Copy the similar the template and paste them to the user defined position, then users can edit its parameter.

6.1 Heating template

ParameterD	escription
60mmS	tandard 60mm protective cased pipe.
40mmS	tandard 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.

① Enter into the main menu

② Enter into heating select heat mode

③ Press up and down key to select the heating procedure, click [O] for confirmation

④ Check the selected heating mode, press [↩] to return to the initial interface

6.3 Edit the heating mode

Drive pipe that stored in heating mode can be edit or change under heating condition

① Enter into “edit heating mode menu” (through heating mode menu to enter into)

② Press up and down key to select the mode which need to edit, press [O] for confirmation.

③ Press up and down key to select the parameter that need to edit, press left an d right key to edit, after finish editing press confirm key to preserve.

6.4 Delete heating mode

① First enter into the heating mode menu.

② Select “delete heating mode”, press [O] to enter into.

③ Select the heating mode you need to delete, press [O] to confirm deletion.

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

6.5 Heating mode parameter

ParameterD	escription
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 middl e 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

Fusion splicer owns the capacity to finish routine maintenance, this chapter will expound how to use maintenance menu.

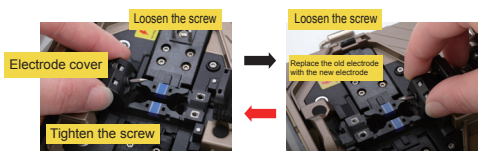
① Select “Maintenance” in main menu and then press [O] to enter into the maintenance menu.
② Select the function to execute.

7.1 Replace the electrode

The electrode will abrasion due to long-time use, so you must do regular cleanness according to the aggregation extent of the oxide. We suggest that the electrode should be replaced after discharging one thousand times. When the electrode discharging time up to one thousand times, the message to remind you to replace the electrode will be 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 he screen will show the message to turn off the power, press [O] until LED shut down.
③ Remove the old electrode.
(i) Loosen the screw that fixed to the electrode lid.
(ii) Take out the electrode.(Put the electrode to the electrode cover).



④ Please use clean cloth that contain alcohol or soft lint to clean the new electrode and then install it to the Fusion Splicer。
(i) Put them under the electrode cover.
(ii) Take out the electrode.(Put the electrode to the electrode cover).

Note:
Please not pull the wire out when replace the electrode.
The torque should be 2kgf-cm when tight the screws.

Fire Fox recommend that after replace 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 guarantee.

7.2 Electrode stabilize

When external environment suddenly change, discharging current strength will sometimes become unstable, thus may lead to splice loss increased. Especially when fusion splicer moves to high altitude place from lower altitudes, it takes some times 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 Autodiagnosis test

MINI12R internally installed the 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 "autodiagnosis" (through the maintenance menu),press [O] to enter into

② In autodiagnosis, 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

Fusion splicer can observe the dust on fiber, camera, objective lens and retroreflector through the images; the dust will interfere normal fiber observation and may lead to improper splice results. This function can detect whether there are dusts on the fiber path and can judge whether they will lead to bad splice quality.

Operation process:

(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 adjusted before leave factory, of course, these setting may changed 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. MINI4R internally installed temperature and baroceptor; 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 abrasioncan'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:

①Please use standard SM, NZ or MM fiber to do discharging alignment.

②Please 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 numerical 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, Fiber Fox recommend that after splice 2500 times 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. Fiber Fox suggest setting the parameter to "2500".
Electrode usewarning	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. Fiber Fox suggest set the parameter to "3500"

7.8 Software upgrading

① Select"software upgrading"and enter into under"maintenance menu"option.

② Connect the USB flash disk which carried with the sftware 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 total deleted.

①Input the specific splicing result number (starting number and terminating number) can delete these results.

②Select "execute deleting the record"option, press (O) for confirmation, and then the selected splicing records will be deleted. The deleted results will be substituted by the subsequent result.

8.1.3 Splice data storage

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

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

Change the position of the displayer

① Enter into "displayer position" menu (through the system setting menu).

② Select the position that you need (front/back), and then preserve.

Note: You can also fast switch the position of displayer, press the left and right key 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 [displayer auto off] and [fusion splicer auto off].

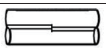
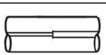
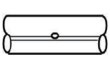
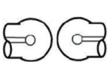
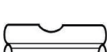
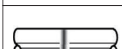
Parameters	Description
Displayer auto off	During some certain time period,if the fusion splicer didn't work, then the displayer will auto off.When the battery is in use,you should set a specific turn-off time. When the displayer is turning off,the indication light which near the power supply key will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

8.2.3 System information

After you select [system information] 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 A: The reasons of high splicing loss and its solutions

Phenomenon	Name	Reason	Solution
	Fiber core axial direction skewing	There exists dust in V groove or fiber pressure hammer.	Clean the V groove and fiber pressure hammer.
	Error in fiber core angle	There exists dust in V groove or fiber pressure hammer.	Clean the V groove and fiber pressure hammer
		Poor quality on fiber end face	Check the fiber cutting knife to make sure whether it is in good working condition.
	Fiber core bending	Poor quality on fiber end face	Check the fiber cutting knife to make sure whether it's in good working condition
		Prefusing discharging current strength is low or the prefusing splicing time is short.	Gain the discharging current strength and discharging time.
	Mode field diameter mismatch.	Discharging current strength is too low.	Gain the discharging current strength and discharging time.
	Mode field diameter mismatch	Dust burn	Increase"Discharging strength" or"Discharging time".
	Bubble	Poor quality on fiber end face	Check the fiber cutting knife to make sure whether it 's in good working condition.
		Prefusing discharging current strength is low or prefusing discharging time is short.	Gain the discharging current strength and discharging time.
	Fiber being separated	Impelling strength is too low.	Do [electrical machine alignment] maintenance.
		Prefusing discharging current strength is high or prefusing discharging time is long.	Reduce the discharging current strength and discharging time.
	Too thick	Impelling strength is too high.	Reduce [overlap degree] and do [electrical alignment] maintenance.
	Too thin	Inappropriate discharging current strength .	Execute [discharging alignment]
		Some discharge parameters are improper.	Adjust [prefusing discharging current strength] or increase [[overlap]
	Error in core angle	Dust in V-Groove or in fiber press hammer.	Clean the V-groove and fiber press hammer
		Poor quality on fiber end face	Check the cutting knife to see whether it is in good working condition.

Note: When different fiber (different in diameter) or multimode fiber splicing, maybe there will appear an upright line at the junction point, we call it "weld line", this won't affect splicing quality (splice loss and splice strength).

Appendix B Error information sheet

When you use Fusion Splicer，error message may appear on the screen，please refer to the solutions that the following table provide。If the problems cannot be solved ，there maybe something wrong with Fusion Splicer，please contact the dealer。

Error information	Reasons	Solution
Left side fiber lie incorrectly	The fiber end face beyond the electrode center line.	Press RESET key, place the fiber again to make the fiber end face lies between electrode center line and V groove margin.
Right side fiber lie incorrectly		
Beyond the distance of impelling electric machine	The fiber haven't been correctly placed on the bottom of V groove thus lead to fiber skewing beyond the formation range of electrical machine.	Press RESET key and then correctly place the fiber.
Impelling electric machine is wrong	Motor malfunction	Please contact with dealer.
Fiber end haven't been found.	Error in optical fiber placing.	Press RESET key and then correctly place the fiber.
Not discharging	The electrode doesn't discharging.	Confirm the electrode position; replace the electrode.
Beyond the distance of alignment electrical machine.	Error in optical fiber placing.	Press RESET key and then correctly place the fiber.
The cladding margin hasn't been found.	Error in optical fiber placing.	Press RESET key and then correctly place the fiber.
Not correctly in find the fiber upper and down margins	Dust on fiber surface.	Prepare fiber again, clean the camera lens and retroreflector.
Unidentifiable fiber type	Dust on fiber surface. P	repare fiber again.
	Both sides' fiber types are different.	AUTO splicing mode can't be used, replace the improper fusion mode.
	Fiber is nonstandard.	AUTO mode can only identify standard SM, MM and NZ fiber.
Fiber margins beyond the boundaries.	Fiber margins are not within the camera scope.	Adjust fiber position and do [electrical machine maintenance].
Both end faces contact	[Overlap counts] is set too large.	Adjust the parameter of [overlap counts].
	Electrical machine haven't been aligned.	Make [electrical machine] maintenance.
Fiber core is too dirty.	Dust or dirty on the fiber surface.	Prepare fiber again.
	Dust or dirty on the camera lens or retroreflector.	Clean the camera lens and retroreflector, and then check whether there are dusts again.

	[Clean discharging time is too short]	Set [clean discharging time] to 180ms.
	Use fiber core alignment method to splice the illegible fiber.	Adopt MM mode to splice the illegible fiber.
Beyond the route of focusing electrical machine.	Error in optical fiber placing.	Press RESET key and then correctly place the fiber
	Dust or dirty on the fiber surface	Prepare fiber again.
	Dust or dirty on the camera lens or retroreflector	Clean the camera lens and retroreflector, and then check whether there are dusts again.
Fiber is mismatching.	Both sides fibers are not belong to the same type.	If continue to splicing may result in large splice loss, recommend to use splice mode that correspondent to fiber.
End face angle is too large.	Poor quality of fiber end face.	Prepare the fiber again, if the problem can't be solve, please check the blade whether it has been abrasion, if so, please turn the blade to the new side.
	[Cutting angle limiting value] is too small.	Magnify the [cutting angle limiting value] to a proper numerical value.
Beyond the route of alignment electrical machine.	Error in optical fiber placing.	Press RESET key and then correctly place the fiber
Fiber core angle is too large.	[Fiber core angle limiting value] is too small.	Magnify the [fiber core limiting value] to a proper numerical value(standard angle is 1.0℃)
	Dust or dirty in the V groove or on the fiber pressure hammer.	Clean the V groove and the fiber pressure hammer, and re prepare them, place the fiber.
Failure in fiber alignment.	Axial offset(>0.4um)	Prepare the fiber again.
	The electrical machine hasn't been alignment.	Do [electrical alignment] maintenance].
The fiber is too dirty.	Dust or dirty on the fiber surface.	Prepare the fiber again.
	Dirty on the camera lens or retroreflector.	Clean the camera lens and retroreflector, and then check whether there is dust again.
	[Clean discharging time] is too short.	Set the [clean discharging time] to 180ms.
	Use fiber core alignment method to splice the illegible fiber.	Adopt MM mode to splice the illegible fiber.
The fiber is too thick.	[Overlap value] is too large.	Adjust the parameter of [overlap value]
	The electrical machine hasn't been alignment	Do [electrical alignment] maintenance]
The fiber is too thin.	Discharging current strength is too low.	Do [electrical machine alignment] maintenance.
	Predischarging current strength is too large.	Reduce predischarging current strength and the predischarging time.
	[Overlap value] is not sufficient.	Adjust the parameter of [overlap value]

Appendix C Common faults and solutions

The following information list some solutions to common faults, if users can't solve the issues, please contact with the manufacturer.

C.1 It can't power off when press ON/OFF key.

★Long-time press the ON/OFF key until LED flashes, and then loosens the button, the fusion splicer will power off.

C.2several splices can't be done with full battery electrical quantity.

★ Turn on power saving mode.

★ Memory effect or long-time storage that leads to the deduction of electrical quantity. You can complete discharging the battery and then charge it again.

★ The service life of battery is terminated, please replace the battery.

★ Use the battery in low temperature environment.

C.3 Error in fusion splicer

★ Please refer to appendix B

C.4 Splice loss is too large

★ Clean the V groove, fiber pressure hammer and the retroreflector.

★ Replace the electrode bar.

★ Please refer to appendix A.

★ The fiber cutting angle, discharging condition and cutting degree will affect the splice loss.

C.5 Displayer turns off suddenly.

★ When turn on power saving mode, the displayer will auto turn off after long-time not operating the fusion splicer. Now press any button will let the fusion splicer return to normal working state.

C.6 Fusion splicer turns off suddenly.

★ When turn on power saving mode, the fusion splicer will auto turn off after long-time not operating the fusion splicer.

C.7 Identify fiber error under AUTO mode.

★AUTO mode can only applied to standard SM, MM and NZ fiber, when splice special fiber, AUTO may fail to identify correctly.

C.8 Splice loss estimation is inconsistent with actual loss.

★ Splice loss estimation can obtain through calculating, it can reflect the fusion condition and just used as a reference.

★ The optical component of fusion splicer need to be clean.

C.9 Heat-shrinkable tubing not shrinks entirely.

★ Extend the heating time.

C.10 How to cancel heating

★ If you want to terminate heating during heating process, please press HEAT key, and then the LED will go out.

C.11 After shrink, the heat-shrinkable tubing sticks to the heating groove.

C.12 Forget the password

★ Please contact with the agent.

C.13 There is no change of discharging current strength after doing discharging alignment.

★ Discharging current strength is a kind of internal alignment and it won't change under any splice mode.

C.14 Forget to place the fiber in the maintenance function which need to put in.

★ At this time, press the return key will in vain. You need to open the windproof lid and put the fiber that had been cut to the fusion splicer, press SET key to continue operating or press RESET button.

C.15 Fail in upgrading

★ When users upgrading with new USB flash disk, the fusion splicer may not correctly identify the upgrading file, you need to pluck it again and restart the fusion splicer.

★ Check the name and format of the upgrading file to make sure they are correct.

★ If the problems still exist, please contact with the agent.

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The End

* Products models and specifications are subject to change without prior notice.