

Optical Fiber Arc Fusion Splicer

Read this user manual carefully before running FX Fusion Splicer

FX Fusion Splicer

USER MANUAL

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Device Type	Notification
A Class Device (Broadcasting and communication device, commercial use)	Users need to understand that this device(A Class) has obtained EMI(Electromagnetic compatibility) and been designed to be used in places other than home.

Contents

I.	SAFETY INSTRUCTIONS	3
II.	PRODUCT SPECIFICATIONS AND COMPONENTS	7
	2.1 Product Specifications	7
	2.2 Product package	8
III.	PRODUCT OUTLINE	9
	3.1 Function buttons	9
	3.2 Component name	10
IV.	INSTRUCTIONS FOR USE	11
	4.1 Power supply	12
	4.2 How to turn the power on/off	14
	4.3 FX Fusion Splicer Sleeve Heater	15
	4.4 Splice procedure	16
	4.5 Removing the spliced fiber	17
	4.6 Heating protection sleeve	17
V.	MAINTENANCE OF SPLICE QUALITY	18
	5.1 Cleaning and inspection before splice	18
	5.2 Regular inspection and cleaning	19
VI.	MENU	21
	6.1 SPLICE	28
	6.2 HEATER	33
	6.3 HISTORY (Splice result)	37
	6.4 OPTION	39
	6.5 CALIBRATION	43
	6.6 Electrodes	48
	6.7 Setting	51
	6.8 Information	54

VII. ERROR MESSAGES	57
7.1 Too dirty fiber	57
7.2 Replace fiber	57
7.3 Too long fiber	58
7.4 Fiber over angle	58
7.5 Loss limit over	59
7.6 Fiber thin error	59
7.7 Fiber thick error	59
7.8 Bubble error	59
7.9 Cleaved surface error	59
VIII. SPlicing PROBLEM SOLVING	60
8.1 When loss is high	60
8.2 Abnormal splicing operation	60
IX. PROBLEM OCCURRENCES AND QUESTIONS	61
9.1 Power	61
9.2 Splice	62
9.3 Sleeve heater	63
9.4 Others	63
X. WARRANTY AND REPAIR	64
10.1 Information necessary for repair	64
10.2 Transportation	64
10.3 Repair	64

I. Safety Instructions

The FX Fusion Splicer is designed for convenient use on indoor and outdoor work sites. Please read all instructions to prevent accidents and malfunctions. This user guide provides the information necessary for safe operation.

Keep this user guide with the product at all times.

Belden does not take any responsibility for equipment damage and personal or physical loss incurred due to improper use or alteration.

Warnings

If any of the following situations occur during use, turn off the power immediately and contact your local Belden office or representative:

- Smoke, abnormal smell, noise or abnormal overheating
- A foreign substance or liquid falls into the equipment
- The splicer is visibly damaged

Use only the power cord and connecting devices provided with or intended for the FX Fusion Splicer. Failure to do so may result in fire, electrical shock or injury.

Do not touch the electrodes when the power is on. High voltage and high temperatures generated from the electrodes may result in serious shock or burn.

Connect the provided AC power cord only as directed. Ensure that there is no foreign substance on the terminal before connecting it to the AC power socket. Improper use may result in smoke, electrical shock, fire, equipment damage, serious injury or even death.

Warnings

Use proper power voltage.

AC power for the charger is AC100–240V, 50~60 Hz.

Test the AC power before use. When the output voltage of AC power is high, or abnormal frequency is generated, the product is damaged; serious injury or even death may result.

AC output voltage should be measured using a circuit tester before connecting the AC power cable; regular inspection should also be conducted.

Do not pull the AC power cord with excessive force, apply heat or transform it. When a damaged power cord is used, it may cause fire or injury.

Use a three-plug AC power cord. Never use a two-plug power cord, cable or plug.

Do not touch the AC plug, AC power cord or splicer with wet hands. It may cause electrical shock.

Do not disassemble the AC charger, battery or FX Fusion Splicer. Deformation may cause fire, electrical shock or injury.

Refer to the following when using the battery:

- Failure to use batteries and chargers provided by Belden may result in smoke, equipment damage, burn, injury or even death.
- Do not incinerate any conductive materials.
- Do not charge the battery near flame.
- Do not give an excessive shock to the battery.
- When the battery does not completely charge in two hours, or when the green LED is not turned on, stop charging immediately and contact Belden.
- Do not put anything on the AC charger while charging.

Use only the AC charger provided. Do not use another AC power cord or battery. Excessive current may result in equipment damage or injury.

Do not use the FX Fusion Splicer where there is harmful gas or flammable liquid. Explosion or fire may result.

Warnings

Do not use compressed air or compressed gas when cleaning the FX Fusion Splicer.

To inspect, carry case belt before transportation. If fallen the carry case due to damage on the belt, it may incur equipment damage or injury.

Always follow safety best practices, including the use of safety goggles and protective clothing when working with fiber optic products, including FX Fusion Splicers.

Do not use the FX Fusion Splicer around high temperatures or flame. Injury or equipment damage may occur.



: *Caution: high temperatures*



: *Do not spray Freon gas*



: *Caution: high voltage*

Cautions

Be aware of and avoid hot surfaces associated with thermal strippers and sleeve heaters. Allow sleeves to cool before handling.

Use the splicer only on a stable surface to avoid falls that may cause damage or injury.

The FX Fusion Splicer should be accurately adjusted and treated in alignment. Do not give it a strong shock.
Use the carrying case provided for transporting and storing the FX Fusion Splicer to reduce humidity, vibration and shock.

When replacing the electrodes:

- Always use Belden-approved replacements
- Ensure correct positioning
- Always replace in pairs

Failure to follow all warnings and cautions to ensure proper function of the FX Fusion Splicer may result in equipment damage or a faulty splice.

Use only ethyl alcohol (96% or higher) or other approved cleaning solutions to clean the lens, V-groove, LCD monitor and main body.

Use the splicer only within the stated operating environmental ranges. Store in a controlled environment to avoid long-term exposure to damaging temperatures and humidity levels.

The FX Fusion Splicer should receive regular service by a Belden-authorized service technician to ensure long-term functionality and safety.

II. Product Specifications and Components

2.1 Product Specifications

Item	Description
Fiber alignment	IPAAS, active V-groove alignment
Applicable fiber types	0.25 mm, 0.9 mm, 2.0 mm, 3.0 mm indoor cable
Fiber count	Single fiber
Applicable fiber dimensions	Cladding diameter: 125 μ m, coating diameter: 150 μ m to 3 mm
Fiber setting and cleaved length	5 mm to 16 mm
Splicing modes	Splice mode: 300, heat mode: 100
Typical splice loss	SM: 0.02 dB, MM: 0.01 dB, DS: 0.04 dB, NZDS: 0.04 dB
Return loss	> 60 dB
Splicing time	Typically 7 seconds with SM
Splice loss estimate	Available
Sleeve heating time	Typically 13 sec with IS-60 mode, IS-60 sleeve
Applicable protection sleeve	60 mm, 40 mm and micro sleeves
Storage of splice result	Up to 5,000 data sets and 5,000 images
Tension test	1.96N to 2.25N
Operating condition	Altitude: 0~5,000 m above sea level, temperature: -10 $^{\circ}$ C to 50 $^{\circ}$ C, humidity: 0 to 95%, wind: 15 m/s, non-condensing, dust proof, waterproof, shock proof
Storage condition	Temperature: -40 $^{\circ}$ C to 80 $^{\circ}$ C, humidity: 0 to 95%
Dimension	124(W) x 189(L) x 75(H) mm (without rubber protector)
Weight	1.1 kg (including battery)
Viewing method and display	2 Axis Two CMOS cameras with 4.3-inch color LCD monitors
Fiber view and magnification	X/Y : 130X , max :260X
Power supply	Lithium-ion battery(DC 14.8V, 3400 mAh), 100 to 240V AC charger
No. of splice cycles with battery	Typically 200 cycles
Electrode life	3,000 splices

2.2 Product package

2.2.1 Standard package – FX Fusion Splicer Kit FXFSTOSPL includes:

Parts Description	Quantity
Fusion Splicer	1
Lithium-ion battery (installed)	1
Shoulder strap	1
Cooling tray	1
AC adapter charger	1
Cleaning brush	1
Electrodes (1 pair installed)	2 pairs
Test report	1
Allen key	1
Screwdriver	1
Fiber holders (left and right) (installed)	1 pair
Tackle box	1
CD-ROM with user manual (English, French and Spanish)	1
USB cable	1
Carrying case	1
Carrying-case keys	2

2.2.2 Optional package

Belden Product Number	Product Description
FXFSTOSAC	AC adapter/charger
FXFSTOSSS	Case shoulder strap
FXFSTOSCB	Cleaning brush
FXFSTOSFC	Fiber holder/clamp
FXFSTOSSE	Spare electrode
FXFSTOSCT	Cooling tray
FXFSTOSCC	Carrying case
FXFSTOSKY	Keys for lock
FXFSTOSSD	Screwdriver
FXFSTOSTB	Tackle box
FXFSTOSCD	User manual CD-ROM
FXFSTOSBT	Splicer battery

III. Product Outline

3.1 Function buttons

Button	Description
	Press and hold about 1 second to turn the power on/off.
	Move the cursor to the left. Move fiber to manual mode and adjust the camera's focus. Stripping popup menu should load.
	Move the cursor to the right. Move fiber to manual mode and adjust the camera's focus. VFL should load (shortcut).
	Move the cursor upward. Move each motor to manual mode. Splice popup menu should load.
	Move the cursor downward. Move each motor to manual mode. Heater popup menu should load.
	Initialize the splice function. Return to the menu screen.
	Complete a selection. Follow the next step on the menu screen.
	Splice execution.
	Return to the initial screen and initialize splice function.
	Turn on the heater. When it is on, the lamp on the left is in the red. Press once more when it is on, and the heater is turned off.

3.2 Component name





IV. Instructions for Use

The following is the FX Fusion Splicer's initial screen. For accurate splice results, splice mode and heater mode should be selected. Basic information about the FX Fusion Splicer is displayed on the initial screen. Check that the proper mode is selected before splicing.



4.1 Power supply

The battery pack is built into the battery chamber. Loosen the bottom-cover bolts and exchange the battery. Please be cautious when you detach the battery from the chamber.

4.1.1 Built-in battery



4.1.2 Battery charging

Before connecting the AC/DC charger's DC cable to the DC jack of the battery to charge the

battery, make sure you check the voltage and frequency.

When the battery is fully charged, the LED will turn green and power is disconnected, activating protection circuit to avoid overcharge. The power is turned back on as the battery needs to be charged; charging resumes when the charger's DC cable is connected to the battery's DC jack.



4.2 How to turn the power on/off

To power on the FX Fusion Splicer, press  and hold about 1 second with the wind cover closed. After the functions, including motors, initialize, the screen displays the following. Splice and heater mode should be selected. The current splice and heater mode are displayed at the bottom of the screen.



4.3 FX Fusion Splicer Sleeve Heater

The sleeve heater of the FX Fusion Splicer reinforces the spliced point of the single fiber. The quality of fusion splicing on the fiber should be good.

The fiber and inserted sleeve tube should be properly aligned and installed on the heater. Close the heater cover while the heater is on.

Cable diameter	$\Phi 250 \mu\text{m}$, $\Phi 900 \mu\text{m}$, $\Phi 2.0 \text{ mm} \sim \Phi 3.0 \text{ mm}$
Sleeve length	standard 32 mm
Heating time	10~35 seconds
Temperature range	130°C ~ 200 °C

- i. Choose heater mode after confirmation of sleeve-tube length when placing a sleeve tube on a heater.
- ii. Place the spliced point in the middle of the sleeve tube first. Then check the heating part on the heater and place the sleeve tube in the right position.

⚠ Selecting the improper heater mode may not shrink the sleeve tube



properly.

[Optical Fiber]

- iii. After settling the fiber, turn on the heater by pressing



. (Heating time will vary based on settings.)



- iv. After cooling, open the heater cover and remove fiber.

⚠ The appropriate sleeve position helps reduce heating operation time.

4.4 Splice procedure

The status and cleaved quality of the fiber can be monitored by using a FX Fusion Splicer image processing system. For better splice results, however, visual inspection is also required.

In auto mode, the splicing procedure begins automatically as the wind cover is closed.

- i. Fibers installed on the splicer advance toward each other and stop. The fibers align once arc cleaning is done. After that, the splicer checks the cleaved angle of each fiber, the shape of the end-face contaminations and so on. When the measured cleaved angle is bigger than the preset value, or damage is detected on the fiber, an error message is displayed on the screen. The splice procedure stops as well. Even if there is no error message displayed, visual inspection of the monitor screen is always recommended.
- ii. Fibers are aligned, cladding to cladding, after inspection. Deviation on clad axis can be displayed on the screen.
- iii. After alignment completes, arcing is conducted to splice fibers.
- iv. After splicing is completed, the estimated value of the loss is displayed on the screen. The estimated value of splice loss is subject to various factors related to the error. These factors related to an error affect the estimation and calculation of estimated loss value as well. Calculation of estimated loss is based on factors such as MFD. When estimated loss value exceeds the preset value, an error message is displayed on the screen. The error message is also displayed when the spliced fibers are too thick or thin, or when bubbles are generated on the spliced point. If the splice result shown on the screen is not considered good enough, it is recommended that splicing be conducted again.
- v. The splice result is saved as follows.

When splice is completed, the splice result is automatically saved.



4.5 Removing the spliced fiber

- i. Open the cover of the sleeve heater.
- ii. Open the wind cover.
- iii. Hold the fiber on the left and open the clamp on the left.
- iv. Open the fiber clamp on the right.
- v. Hold both sides of the spliced fiber and separate the fiber from the FX Fusion Splicer with care.

4.6 Heating protection sleeve

- i. Move the spliced point to the center of the protecting sleeve. Place the protected pin face down in the sleeve.
- ii. Place the protecting sleeve at the center of the sleeve heater.
- iii. Hold and put down both fibers as shown in the figure; the heater cover will automatically close.
- iv. Heating starts by pressing  .
- v. LED turns off when heating is completed.
- vi. Open the heater cover and take out the fiber. Do not touch the protecting sleeve or heater at any point during or right after heating.
- vii. Conduct a final inspection to check for bubbles, fragments or dust on the sleeve.

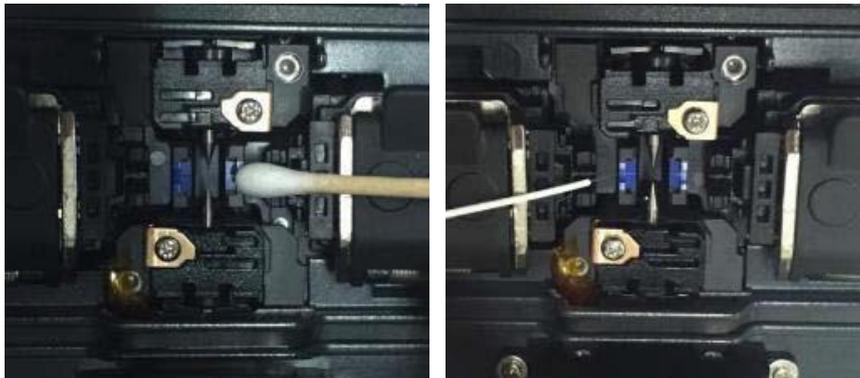
V. Maintenance of Splice Quality

5.1 Cleaning and inspection before splice

5.1.1 V-groove cleaning

When the inside of the V-groove is contaminated, splice quality may deteriorate. It is important to regularly inspect and frequently clean the V-groove as follows.

- i. Open the wind cover.
- ii. Clean the V-groove using a cotton swab moistened with alcohol and any proper cleaning agents. Remove the remaining alcohol from the V-groove using a clean, dry, lint-free cotton swab.
- iii. When a foreign substance cannot be removed with a cotton swab, clean it with the tip of a cleaved fiber and repeat the steps above.



5.1.2 Pusher block cleaning

Pusher block contamination causes poor splice quality due to irregular pressure applied to the fibers. It is important to frequently inspect and regularly clean it.



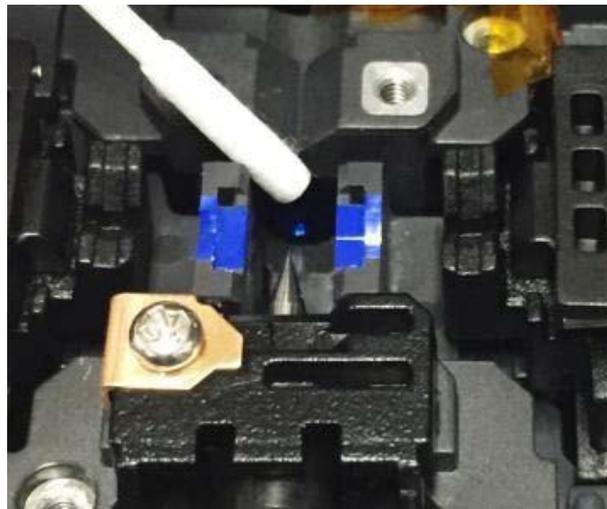
5.2 Regular inspection and cleaning

To ensure splicing quality, regular inspection and cleaning are required.

5.2.1 Object lens cleaning

Contamination on the object lens surface disturbs the identification of fiber core location and consequently causes high splice loss. Object lenses should be kept clean at all times. If dust accumulates for a prolonged period, it may be difficult to remove. Clean the lens frequently as follows.

- i. Turn the power off before cleaning the object lens.
- ii. Separate the electrodes.
- iii. Use a soft cotton swab moistened with alcohol to clean in a circular motion from the center as shown in the figure below. Dry the remaining alcohol using a clean, dry, lint-free cotton swab.

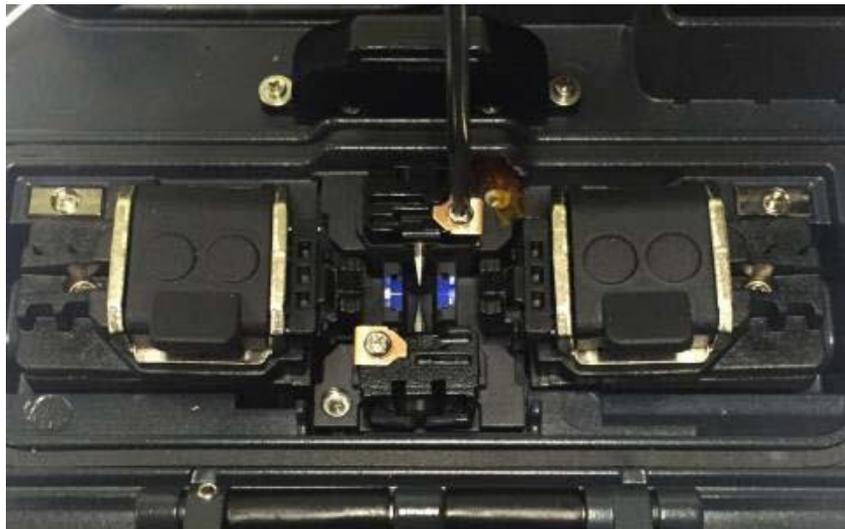


- iv. The surface of the object lens should be clean without any lines or stains.
- v. Reassemble the electrodes.
- vi. Turn the power on; check for any lines or stains on the monitor; conduct a self- diagnosis.

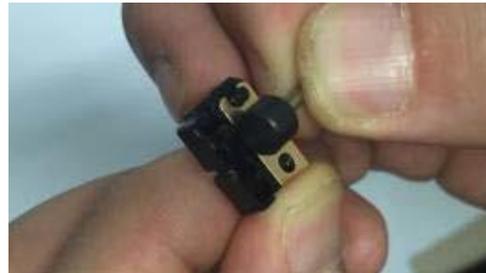
5.2.2 Electrodes replacement

The electrodes should be replaced after being used approximately 3,000 times. If the number of arcs exceeds the replacing cycle, an electrode replacement message is displayed on the screen. If electrodes are not replaced, splice loss increases and the tensile force at the splicing point weakens.

- i. Turn the power off when replacing the electrodes.
- ii. Open the wind cover and unscrew the clamp screw on the electrodes block.



- iii. Remove the electrode block and the electrodes.



- iv. Clean the electrodes carefully by using a soft cotton swab moistened with alcohol; then install.
- v. Turn the power on and conduct the electrode stabilization process in the menu.

VI. Menu

The main menu has eight submenus. Press  to load the main menu. The eight submenus can be selected by using    , or by pressing the screen. The main menu screen displays as follows.



— SPLICING

- ✓ Replace: Selects and replaces a certain splice mode within the database
- ✓ Add: Selects and adds a certain splice mode within the database
- ✓ Select: Selects a splice mode to run
- ✓ Edit: Edits set values of splice mode
- ✓ Cancel: Closes the menu window
- ✓ Delete: Deletes splice mode

— HEATER

- ✓ Replace: Selects and replaces a certain heater mode within the database
- ✓ Add: Selects and adds a certain heater mode within the database
- ✓ Select: Selects a heater mode to run
- ✓ Edit: Edits set values of heater mode
- ✓ Cancel: Closes the menu window
- ✓ Delete: Deletes heater mode

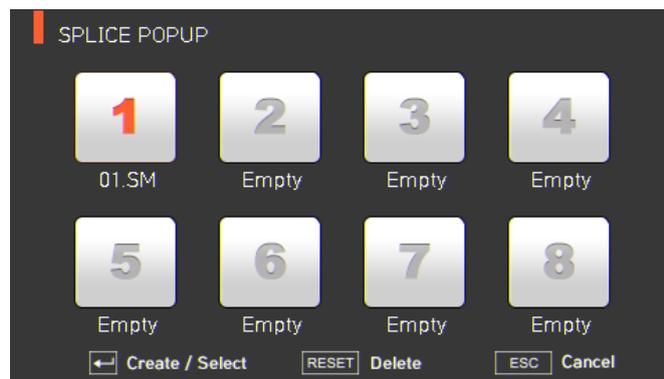
- **HISTORY** (Splice results)
 - ✓ DISPLAY HISTORY: Displays splice result and image
 - ✓ CLEAR HISTORY: Deletes all data
- **OPTION**
 - ✓ DEFAULT: Auto, pause, auto heater
 - ✓ MENU LOCK: Menu lock setting
 - ✓ PASSWORD: Password sets upon locking
- **CALIBRATION**
 - ✓ ARC CALIBRATION: Adjusts arc calibration intensity
 - ✓ DIAGNOSTIC TEST: Diagnoses equipment state
 - ✓ MOTOR DRIVE: Operates motor manually
 - ✓ MOTOR CALIBRATION: Initializes motor speed and location
- **ELECTRODE**
 - ✓ ELECTRODE STABILIZE: Conducts stabilization of electrodes
 - ✓ ELECTRODES CAUTION: Sets the number of uses to inform about electrode replacement
 - ✓ ELECTRODES REPLACE: Explains how to replace the electrodes
 - ✓ ELECTRODE USED: Displays the electrode-use count
- **SETTING**
 - ✓ LANGUAGE: Selects a language
 - ✓ DATE: Sets the present time
 - ✓ POWER SAVE: Sets sleep mode
 - ✓ VOLUME: Adjusts the intensity of the buzzer sound
 - ✓ LCD BRIGHTNESS: Adjusts screen brightness
- **INFORMATION**
 - ✓ MAINTENANCE INFO: Displays maintenance schedule
 - ✓ SENSOR VALUE: Indicates temperature and pressure
 - ✓ VERSION: Shows the current version of the product
 - ✓ HELP: Consists of:
 - NAME OF PARTS
 - CLEAN AND INSPECT
 - WARNINGS
 - A/S CONTACT LIST

Popup Menu

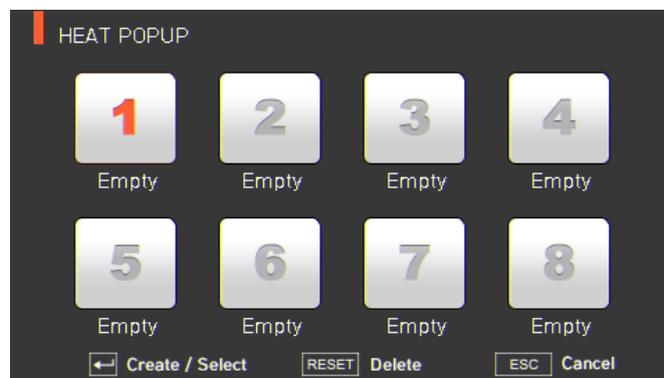
The purpose of the popup menu is to facilitate quick, easy access to the splice mode and heater mode. The user can access the popup menu in various ways.

[Displaying popup menu]

- i. Splice popup menu can display the current splice mode by pressing  on the initial screen.



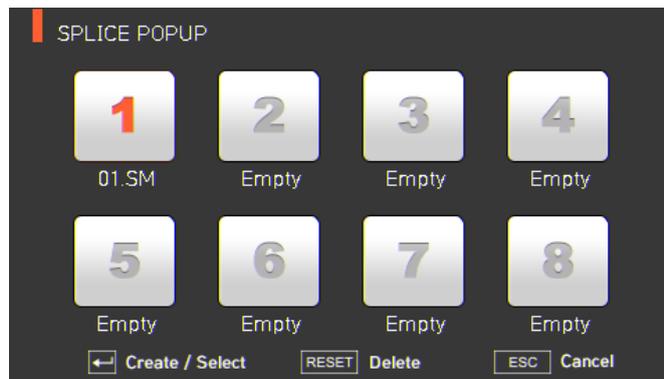
- ii. Heater popup menu can be displayed by pressing  on the initial screen.



[Splice popup menu]

- Adding splice mode

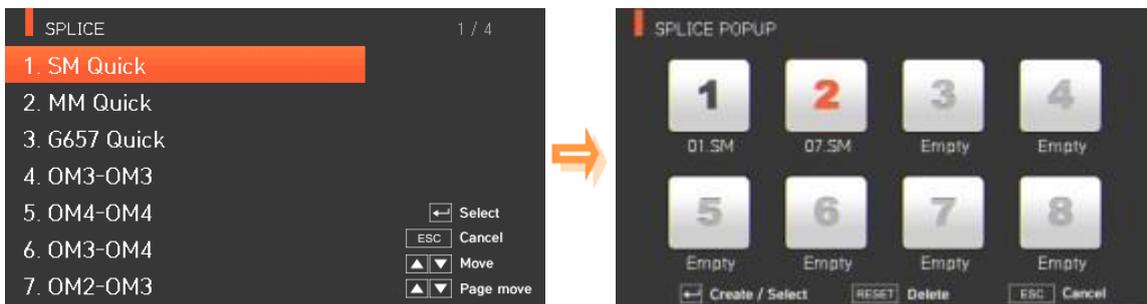
- Display splice popup menu by pressing  on the initial screen.



- Select an empty slot by pressing   and then press .

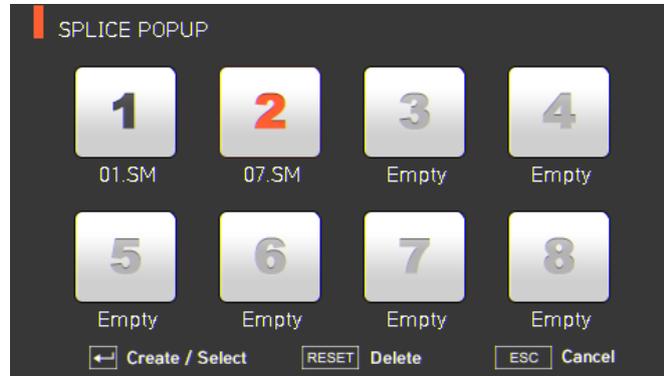


- Select a splice mode to add into the empty slot.



- Deleting splice mode

i. Select a mode to be deleted.



ii. Delete it by pressing .



[Heater popup menu]

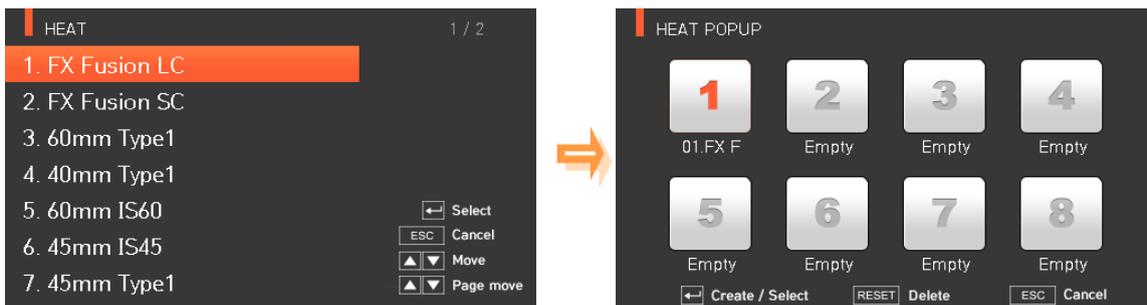
- Adding heater mode

- Display heater popup menu by pressing  on the initial screen.



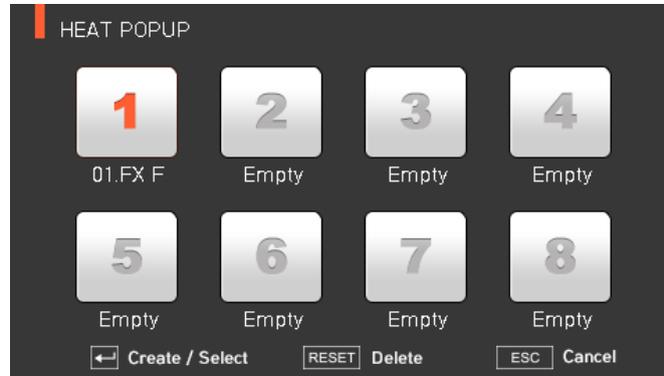
- Select an empty slot by pressing     and then pressing .

- Select a heater mode to add into the empty slot.

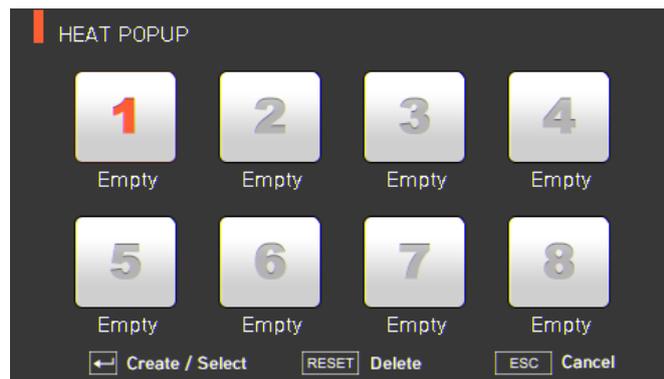


- Deleting heater mode

- Select a mode to be deleted.



- Delete it by pressing .



6.1 SPLICE

To display splice mode, press  and select “SPLICE” menu with the  button. It displays a screen for splice mode selection as follows. The screen has a list of splice modes to facilitate easy selection. Up to 300 splice modes can be saved. These splice modes are classified into general modes and user-defined modes.

- General splice mode: Nos. 1~24
- User-defined splice mode: Nos. 25~300



[Splice modes summary]

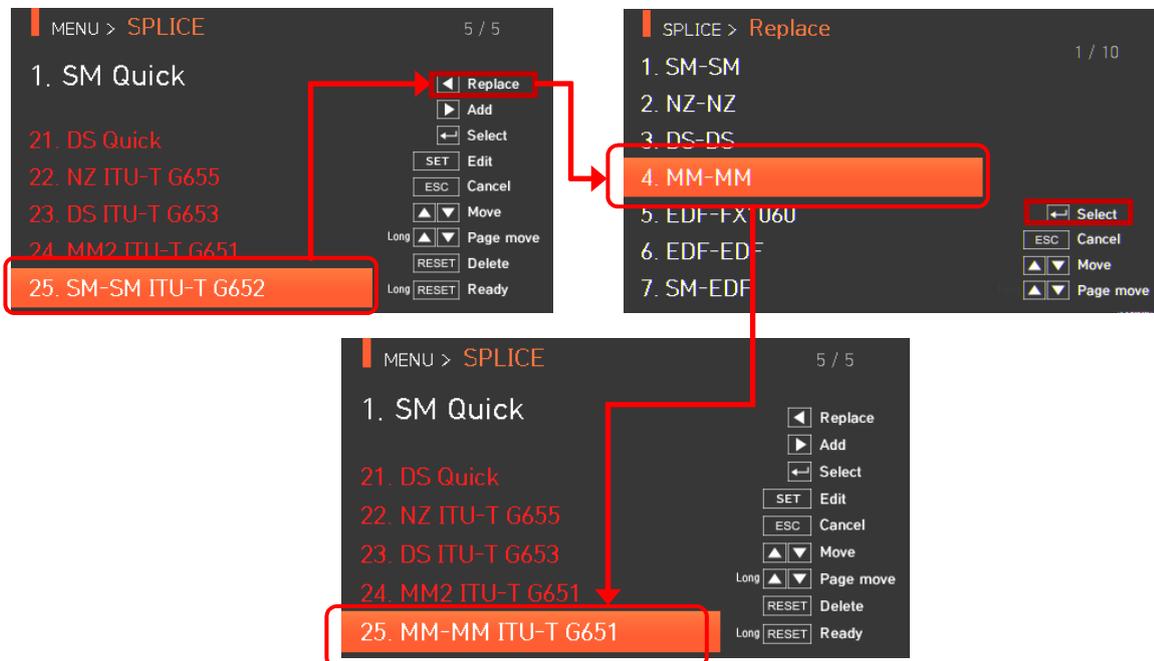
Splice Mode	Description
SM	For basic SM fiber. MFD of singlemode fiber is about 9~10 μm at 1310 nm wavelength.
NZ	For NZDS fiber. MFD of NZDS fiber is about 9~10 μm at 1550 nm wavelength. WDM fiber can also be spliced on this mode.
DS	For DS fiber. MFD of DS fiber is about 7~9 μm at 1550 nm wavelength.
MM	For MM fiber. The core diameter of MM fiber is about 50~62.5 μm .
Other	Other splice modes are saved in the FX Fusion Splicer database. New splice modes are currently being updated. Users should upgrade equipment regularly by contacting Belden.

6.1.1 Deletion

First, select a splice mode by pressing . Then press to delete the selected mode. General modes Nos. 1~24 cannot be deleted.

6.1.2 Replacement

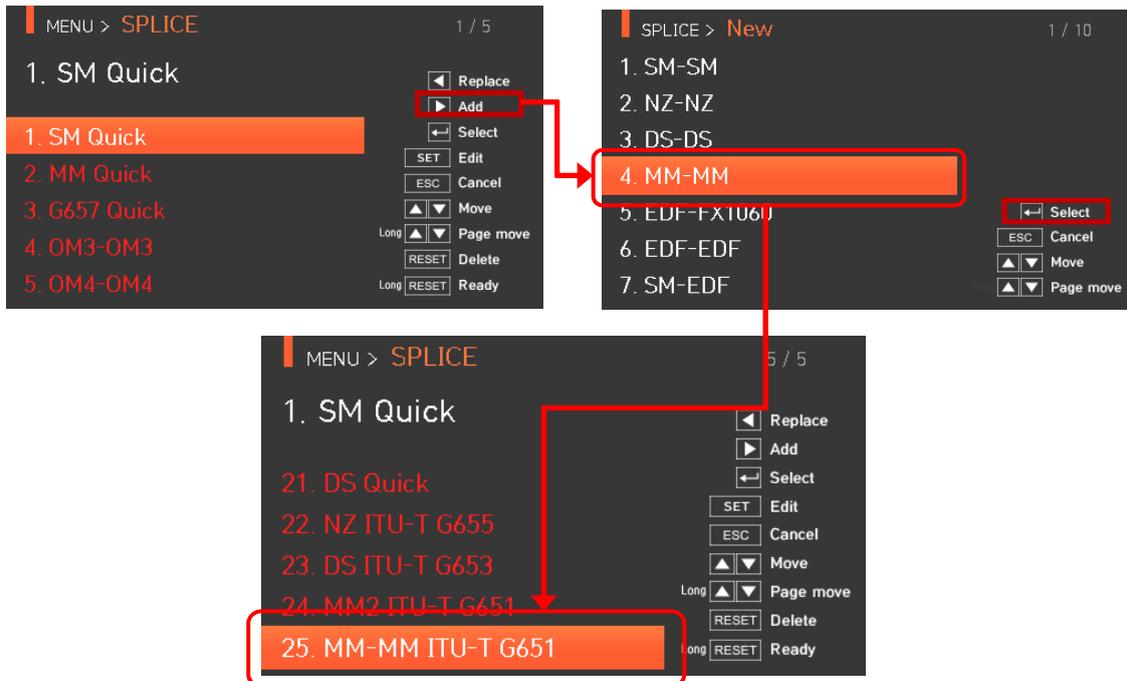
Select a splice mode to replace and press . Splice modes saved in the database are displayed on the screen. Select a splice mode to replace and press . The mode is replaced with the new mode.



Preset modes Nos. 1~24 cannot be replaced.

6.1.3 Addition

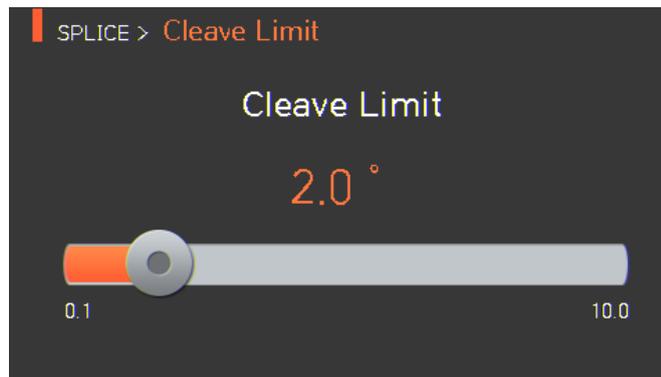
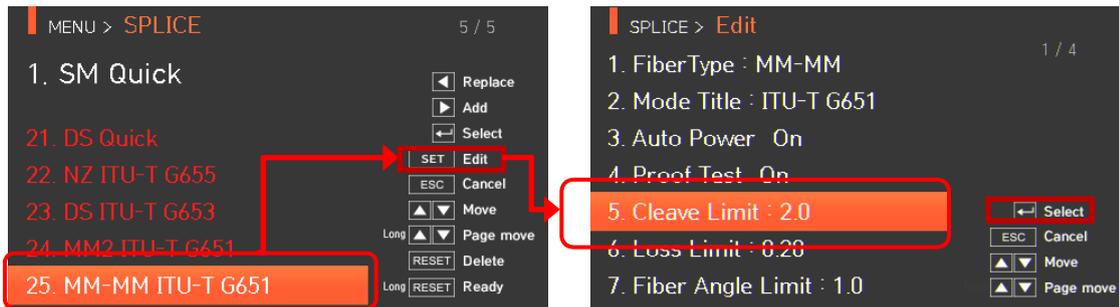
Press  to display splice modes saved in the database. Select a splice mode to add and press . The newly added mode is located on the last number.



Additions cannot be made on general modes Nos. 1~24.

6.1.4 Editing splice modes

Select a splice mode to edit with  and press . Different set values of the selected splice mode are displayed. Press a set value and change it to the proper one.



[Set values editable within mode]

Set Value	Description
Fiber Type	Displays the list of splice modes that are saved on the splicer data to facilitate the selection of a proper mode for use. Among splice modes saved in the database, it copies a similar splice mode to use an editing function.
Mode Title	Mode Title 1 is for indicating splice mode with 11 characters at a maximum.
Cleave Limit	Sets the cleaved angle's error limit.
	Establishes criteria for cleave angle and offers an error message if outside the criteria.
Loss Limit	Sets the estimated loss value's error limit.
	When estimated loss is higher than the limit, an error message is displayed.
Cleaning Power	Sets the power of the short arc cleaning conducted to remove fine dust on the fiber surface upon the initial stage of fiber alignment.
Cleaning Time	Sets the time for the cleaning arc.
ReArc Time	Sets the re-arc time.

6.1.5 Selection

Press  to save the selected splice mode to memory and use upon splicing.

6.1.6 Close

Press  to return to the previous stage.

6.2 HEATER

To display heater mode, press  and then select “HEATER” from the menu using

. The selecting screen is equipped with various heater modes to facilitate easy selection. Heater mode can be expanded and saved for up to 100 modes. Heater mode Nos. 1~12 cannot be deleted or replaced.



[Outline of heater mode]

Set value	Description
1. FX Fusion LC	Micro sleeve for LC type
2. FX Fusion SC	Micro sleeve for SC type
3. 60mm Type1	Standard 60mm micro sleeve
4. 40mm Type1	Standard 40mm micro sleeve
5. 60mm IS60	60mm micro sleeve
6. 45mm IS45	45mm micro sleeve
7. 45mm Type1	45 mm sleeve
8. 34mm Type1	34 mm sleeve
9. 25mm Type1	25 mm sleeve
10. 20mm Type1	20 mm sleeve
11. S09 Type1	28mm sleeve for SOC(ST-0.9mm)
12. S20 Type1	45mm sleeve for 2.0mm cable

Choose the proper mode for each sleeve tube type and SOC.

-  For the SOC, operators must use Belden standard products. For other sleeves, see manufacturer specifications and adjust manually.
-  Heater modes specify temperature, time and heating location on the heater plate.

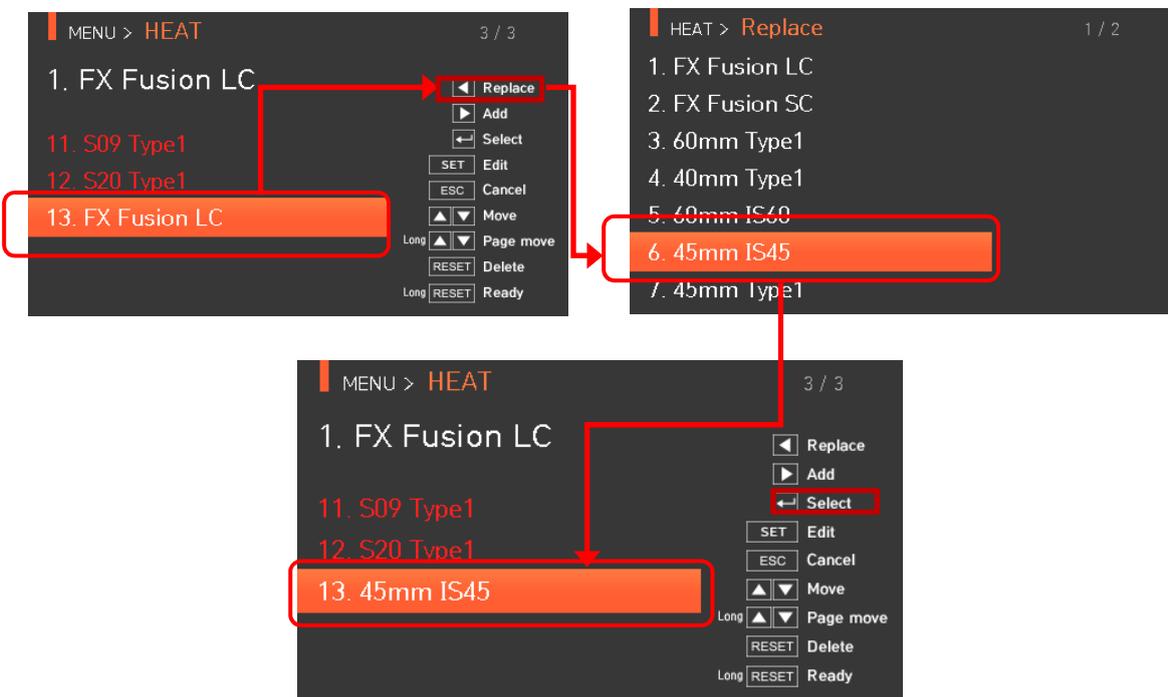
6.2.1 Deletion

First, select a heater mode by pressing . Press to delete. Mode Nos. 1~12 cannot be deleted.

6.2.2 Replacement

Select a heater mode to replace, and press to display heater modes on the screen.

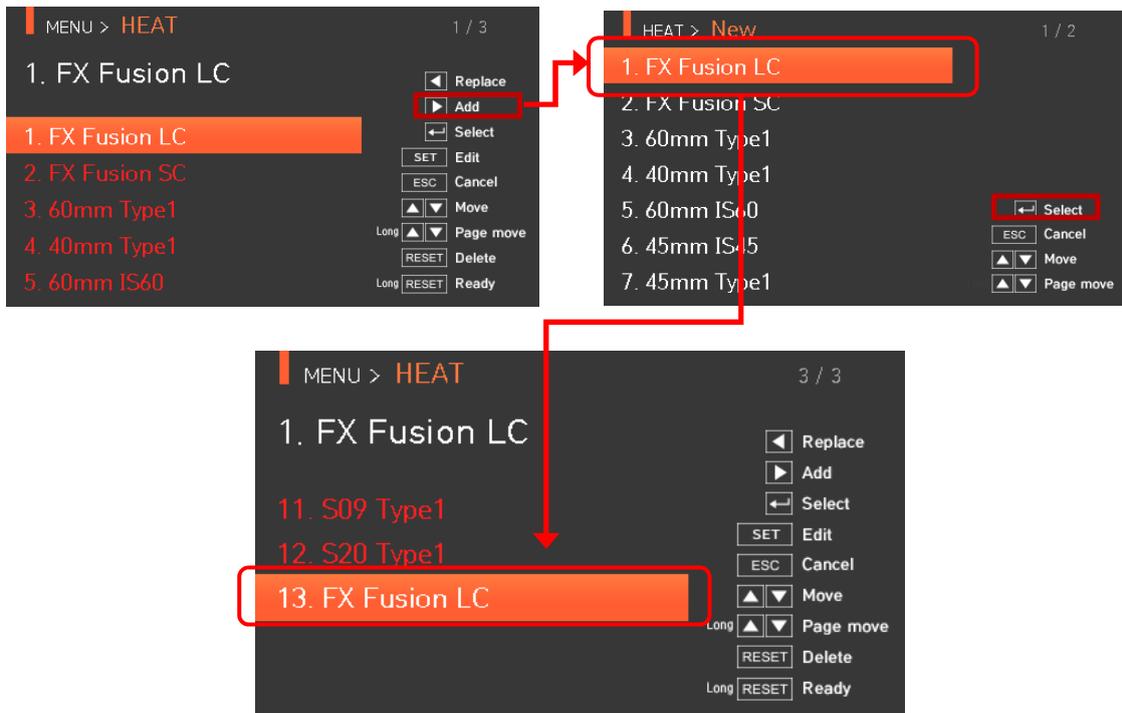
Select desired heater mode and press to replace with the selected mode.



General modes Nos. 1~12 cannot be replaced.

6.2.3 Addition

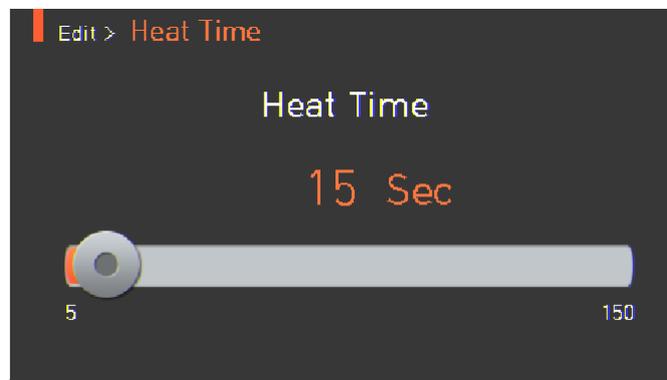
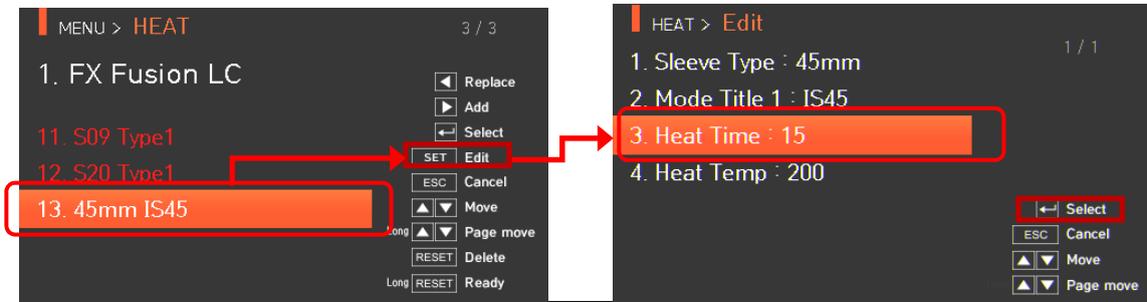
Press  to display heater modes on the screen. Select a heater mode to add and press  to add. The newly added mode is located on the last number.



Additions cannot be made on general modes Nos. 1~12.

6.2.4 Edition

Select a heater mode to edit with  and press . Values of the selected heater mode are displayed. Press a set value to change.



6.2.5 Selection

Press  to save the selected heater mode to memory.

6.2.6 Close

Press  to return to the previous stage.

6.3 HISTORY (Splice result)

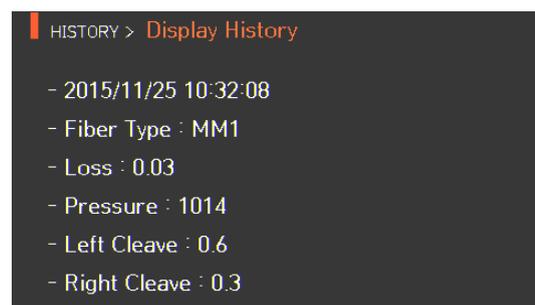
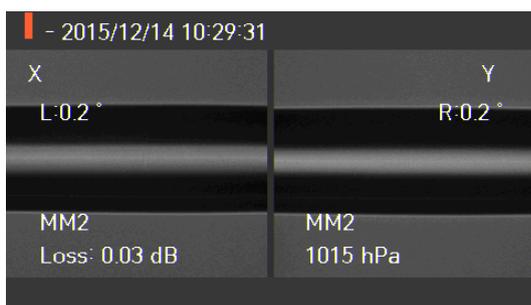
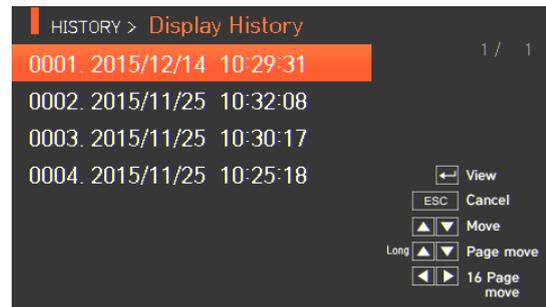
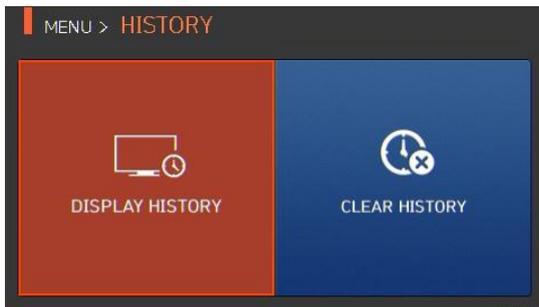
To display splice mode, press . Select "HISTORY" menu with  button to display splice result menu.



6.3.1 Splice result display

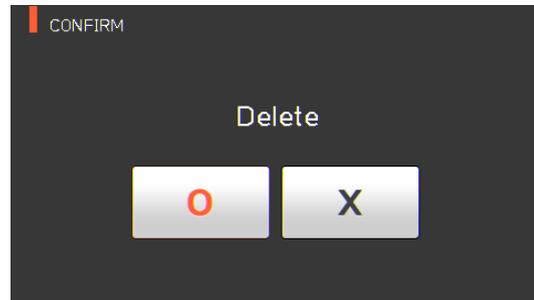
The splicer can save up to 10,000 splice data and images. Each page shows seven splice

data and images. Use     to advance screens.



6.3.2 Deletion of splice result

Data and images can be deleted in a single step.



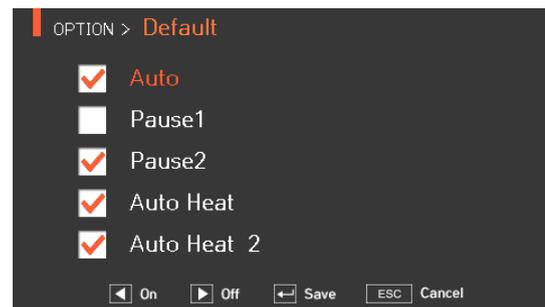
6.4 OPTION

To display options menu, press  and then select “OPTION” menu with  button. This displays options menu as follows.



6.4.1 Splice operation

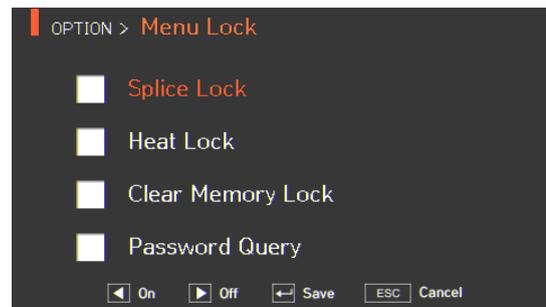
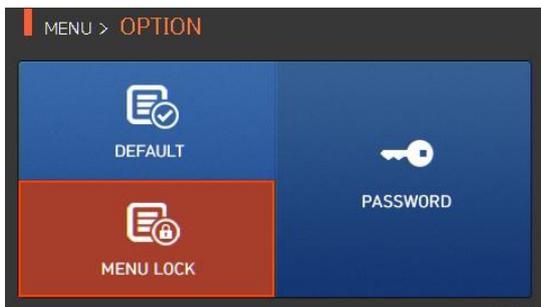
Splice operation consists of five sub-checkboxes. As the user marks a checkbox, each function is activated.



Set Value	Description
Auto	Splice automatically starts when closing the wind cover.
Pause 1	It temporarily stops after the first alignment is finished. Press  to advance to the next step.
Pause 2	It temporarily stops after clad alignment is finished. Press  to advance to the next step.
Auto Heat	Heater automatically operates after splice is finished.
Auto Heat 2	Heater operates only when the fiber is located heater inside.

6.4.2 Menu lock

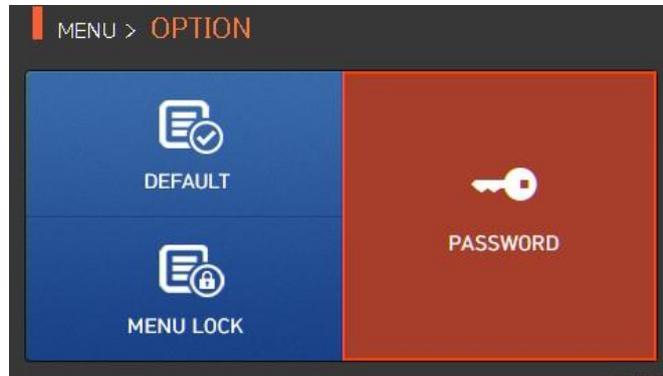
This menu includes a function to restrict access to the splice mode and heater mode settings. There is also a function to disable the deletion of the splice result. After activating this lock function, access to the menu lock can also be restricted. Password entry is required to release this restriction; memorize the password. If you forget the password, send the equipment to Belden to reset the password.



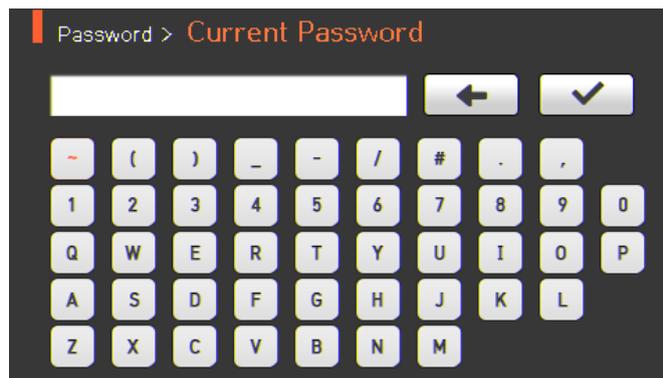
	Test Item	Description
1	Splice Lock	Restricts modification on splice mode.
2	Heat Lock	Restricts modification on heater mode.
3	Clear Memory Lock	Restricts deletion of splice result.
4	Password Query	Shows a screen to enter your password. The initial password is "1234."

6.4.3 Password

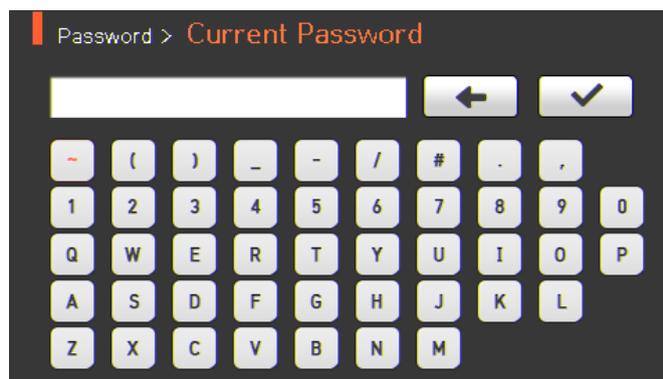
The password can be changed as follows.



- i. Enter the current password.
The initial password is
"1234."



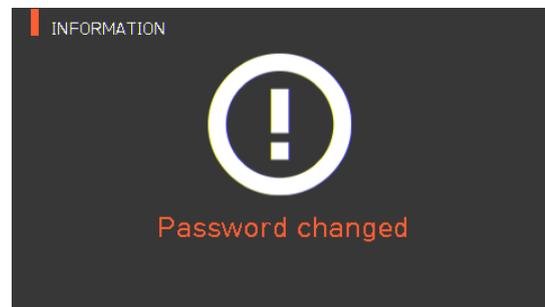
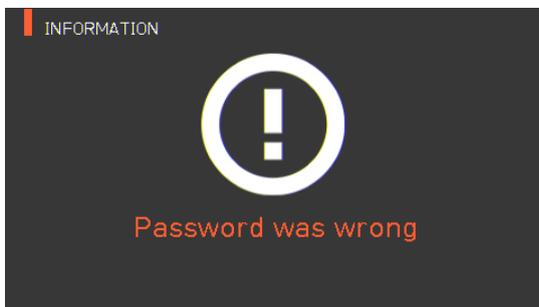
- ii. Enter a new password.



- iii. Enter the new password again.



- When the entered password does not match, the following message is shown and it goes back to the previous stage.



- Memorize the password. If you forget the password, the equipment should be returned to Belden to reset the password.

6.5 CALIBRATION

To display splice mode, press  and select the “CALIBRATION” menu with the  button. The calibration menu is equipped with various functions, such as arc amount calibration, motor operation test, etc.



6.5.1 Arc calibration

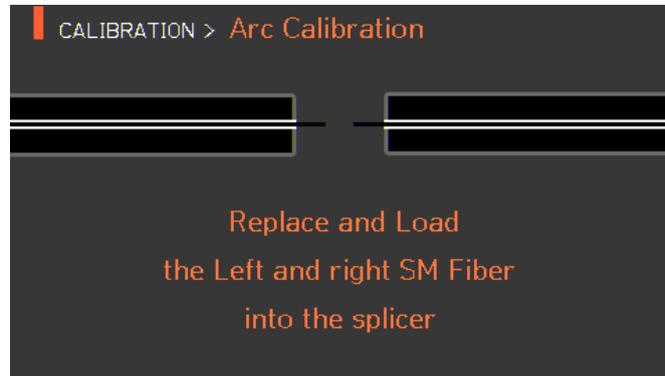
The FX Fusion Splicer continuously checks for a change in temperature and air pressure through each sensor. Based on such data, arc amount is automatically adjusted. A change in arc amount due to abrasion of the electrodes or the fiber splice, however, is not automatically adjusted. The central axis of the arc can also be moved toward the left or right. In this case, arc calibration is required.



- When executing arc calibration, arc voltage is automatically changed to a proper value. This value is calculated internally; the arc voltage cannot arbitrarily be changed.
- Only SM fiber should be used for arc calibration.

i. Prep and insert SM fiber into the splicer using clamps or proper fiber holders.

ii. Press  as follows.



iii. When arc calibration completes, the following screen is displayed.



iv. Press  to stop arc before calibration is completed if necessary.

6.5.2 Diagnostic test

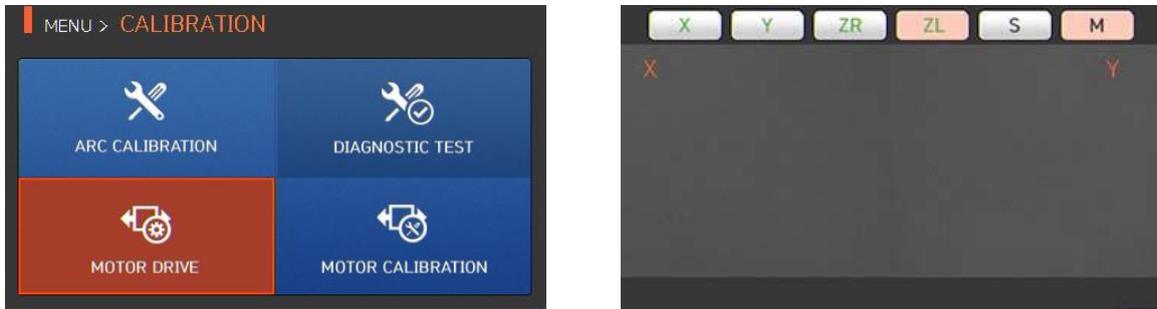
The diagnostic test is a function to facilitate dust examination, LED examination, motor test and calibration.



	Test item	Description
1	Dust Testing	Conducts dust test without fiber
2	LED Testing	Conducts LED test without fiber
3	Motor Testing	Conducts motor test
4	Heater Testing	Conducts heater test

6.5.3 Motor drive

Motor drive checks whether the motor operates normally in manual mode.

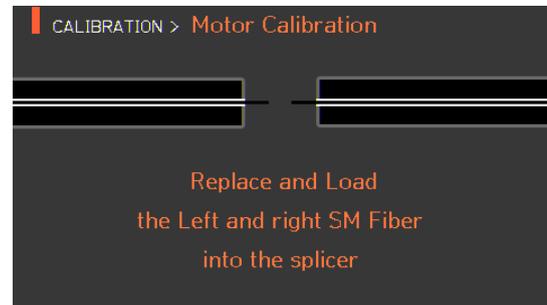


- i. Remove the fiber from the splicer.
- ii. Select “MOTOR DRIVE” with the  button.
- iii. Change the motor selection by pressing . The name of the selected motor is indicated at the top of the screen.
- iv. Operate the motor in a direction wanted by pressing .

Motor		
X/Y	Moves fiber down	Moves fiber up
ZL	Moves right fiber backward	Moves right fiber forward
ZR	Moves left fiber forward	Moves left fiber backward
S	Moves step by step upon every press of the button	
M	Continuously moves upon pressing the button	

6.5.4 Motor calibration

The motor setting is set on splicer as default, but depending on motor setting location, splice speed may slow down. If the speed slows down during the splice operation, or any abnormality is incurred while in the entering position, the motor setting can be automatically calibrated through this function.



- i. Prep and insert SM fiber into the splicer using clamps or proper fiber holders.
- ii. Select "MOTOR CALIBRATION" with the  button.
- iii. If an error message is displayed after testing, immediately contact Belden.
- iv. End the calibration by pressing  .

6.6 Electrodes

To display the electrodes mode, press  and then select “ELECTRODE” menu with the  button. The splicer should be regularly cleaned due to electrode abrasion and precipitation of silica oxide. This menu is related to checking electrode-use count and electrode exchange. There are four submenus.



6.6.1 Electrode stabilization

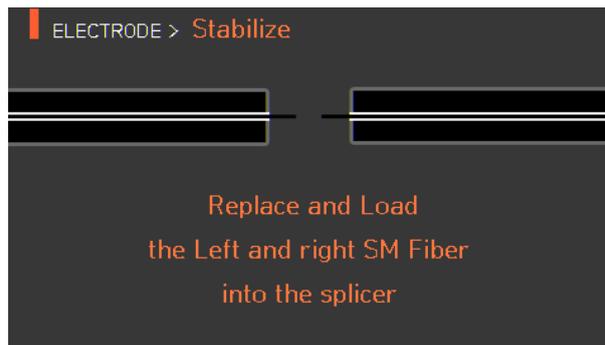
Arcing can sometimes become unstable due to surroundings; consequently, splice loss may increase. Because it takes a long time to stabilize arcing when the splicer is located at low or high elevation, it is particularly important to wait for the electrodes inside to be stabilized. After replacing the electrodes, in particular, stabilizing should be conducted.

- i. Prep and insert SM fiber into the splicer using clamps or proper fiber holders.

- ii. Select “STABILIZE” with the  button.



- iii. Press “OK.”



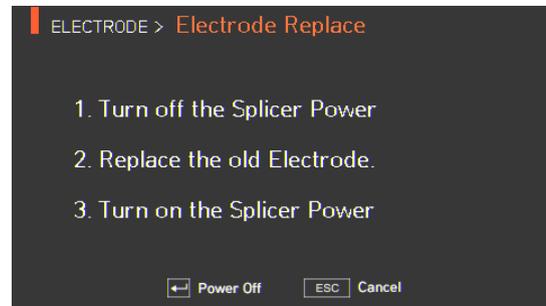
- iv. Arc is conducted 30 times in a row for electrode stabilizing.
- v. When stabilizing is finished, the splicer displays the screen below.



- vi. After stabilizing the electrodes, arc calibration should be conducted again.

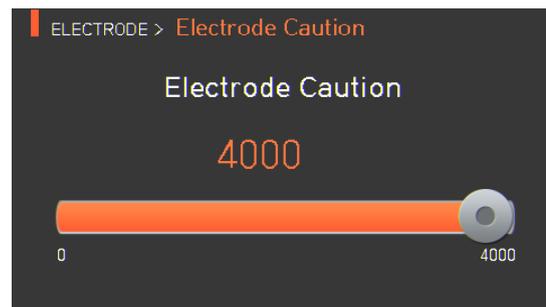
6.6.2 Replacing electrodes

It is recommended to replace electrodes when the number of arcs reaches 3,000. When it exceeds the preset number of times for replacement, a message about an electrode replacement is displayed.



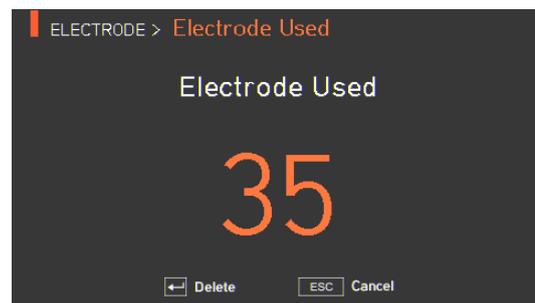
6.6.3 Electrodes caution

The number of electrodes used is set on this menu. It is recommended that electrodes be replaced when the number of arcs reaches 3,000.



6.6.4 Number of electrodes use

Indicates the number of electrodes used as counted up to the present time.



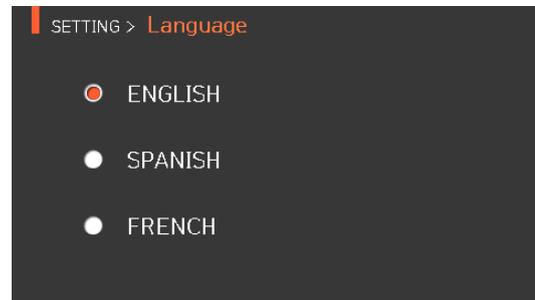
6.7 Setting

Display the setting mode by pressing  and then select “SETTING” menu with the  button.



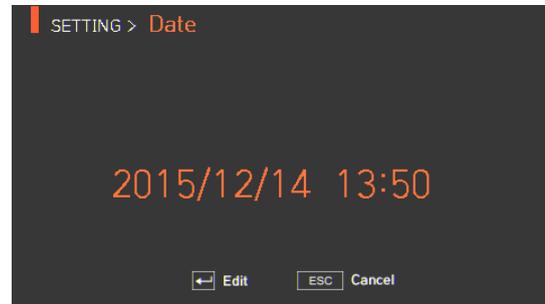
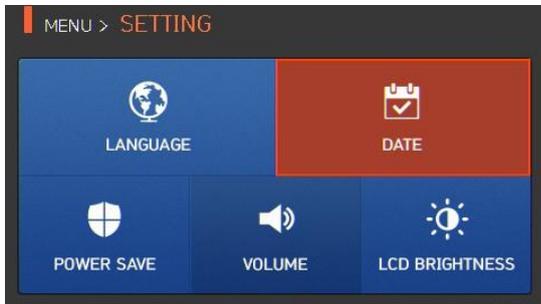
6.7.1 Language

A screen to select a language is displayed.



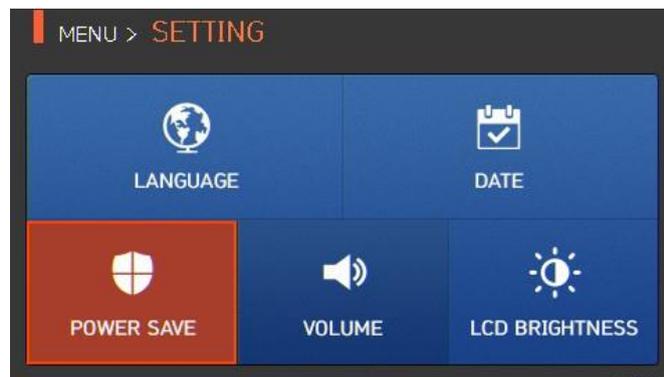
6.7.2 Date

A screen to set the time and date is displayed.



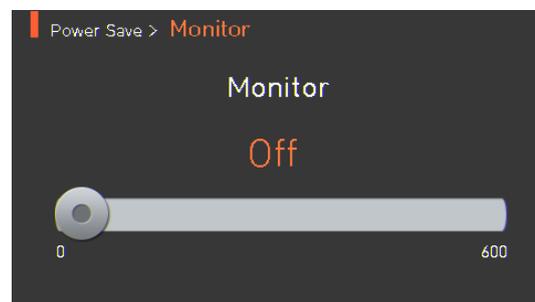
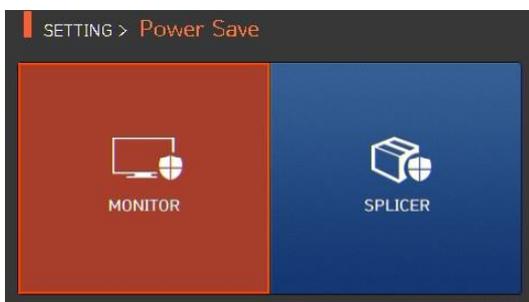
6.7.3 Power save

The power save feature is used to customize power consumption to maximize battery life.



6.7.4 Monitor

When the FX Fusion Splicer is not used for a preset period, the LCD screen automatically turns off. With the push of any button, the screen turns on again.

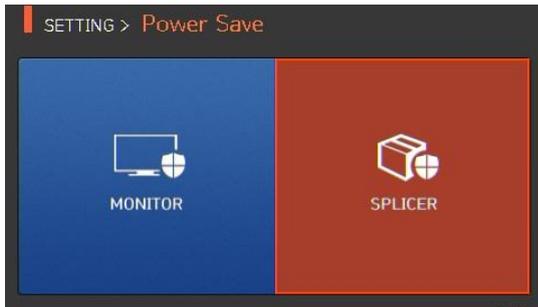


6.7.5 Splicer

When the FX Fusion Splicer is not used for the preset period, power is automatically turned off.

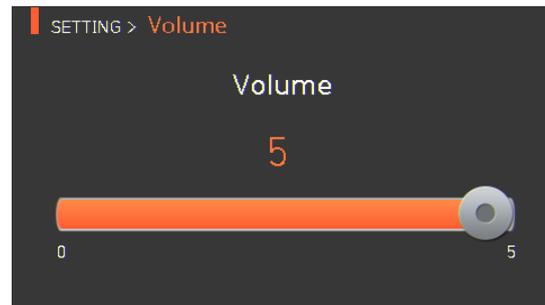
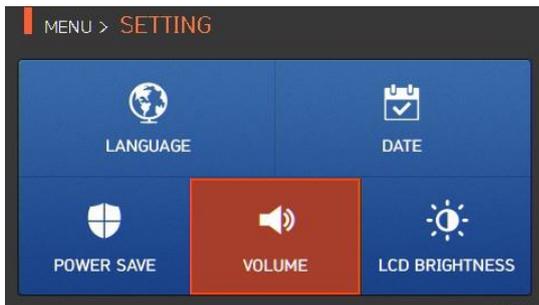


The power is turned on again only when pressing .



6.7.6 Volume

Adjusts the volume of notifications.



6.7.7 LCD brightness

Adjusts LCD brightness.



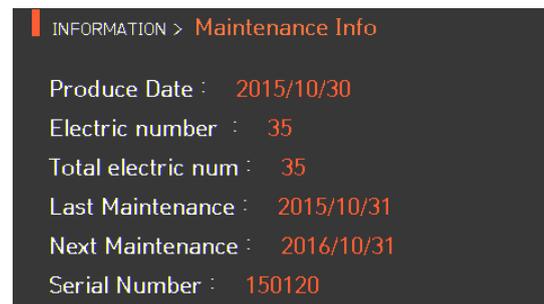
6.8 Information

To display information mode, press  and select “INFORMATION” menu with the  button. This menu provides maintenance information.



6.8.1 Maintenance

Press “MAINTENANCE” to reach the screen below.

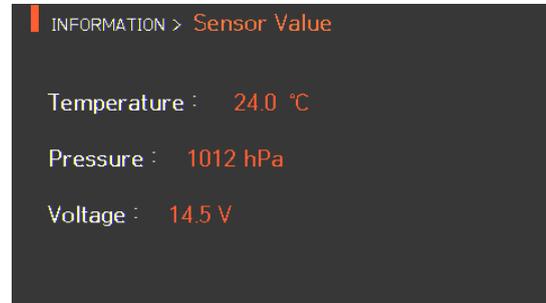
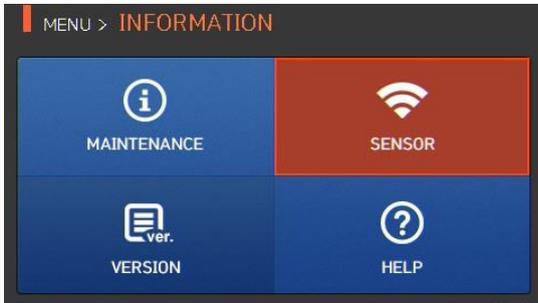


Item	Description
Produce Date	Describes the date of the equipment’s manufacture (year, month, day).
Electric Number	Indicates the number of the arc after electrode replacement.
Total Electric Number	Indicates the total amount of arc after the product’s release.
Last Maintenance	Indicates the date of recent maintenance.
Next Maintenance	Indicates the next maintenance date.
Serial Number	Indicates serial number given to the equipment.

6.8.2 Sensor

Press “SENSOR VALUE” to display the screen below.

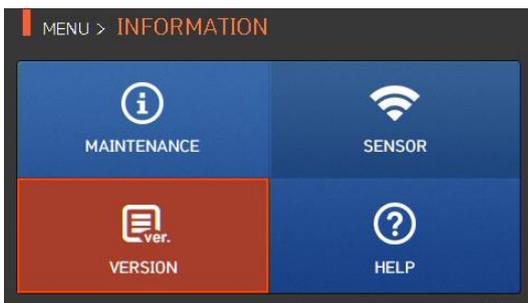
Splicer has sensors to check the temperature, air pressure and voltage.



6.8.3 Version

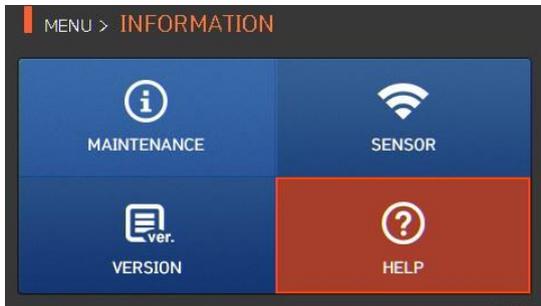
Press “VERSION” to display the screen below.

The version can be upgraded easily by connecting to a PC and using the DataSync program (PC program).



6.8.4 Help

Press “HELP” to display the screen below.



Item	Description
THE NAMES OF PARTS	Names of each component on the FX Fusion Splicer
CLEAN AND INSPECT	Cleaning and inspection method
WARNING S	Important warnings
A/S CONTACT LIST	Contact information for warranty

VII. Error Messages

7.1 Too dirty fiber

Error message generated when the fiber prepared for splicing contains foreign substances that exceed a normal level.

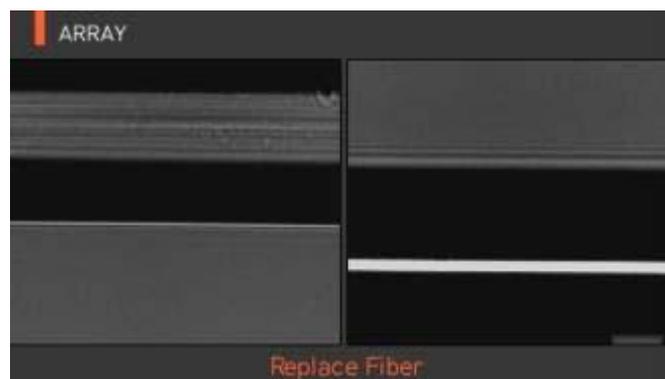
Solution: Repeat splice after cleaning the fiber.



7.2 Replace fiber

Error message generated when the fiber is not located properly or there is a foreign substance on the object lens or reflector.

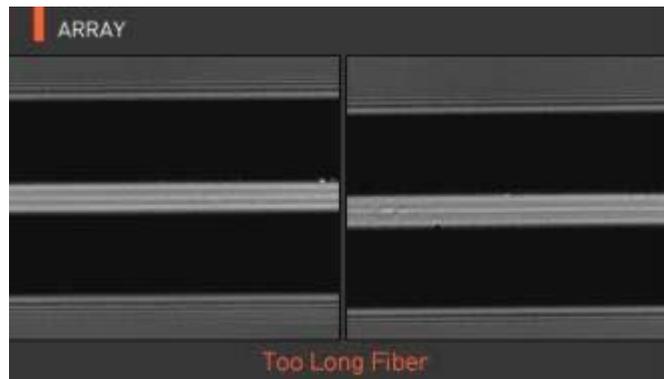
Solution: Press  and reposition fiber again. Clean the object lens and reflector.



7.3 Too long fiber

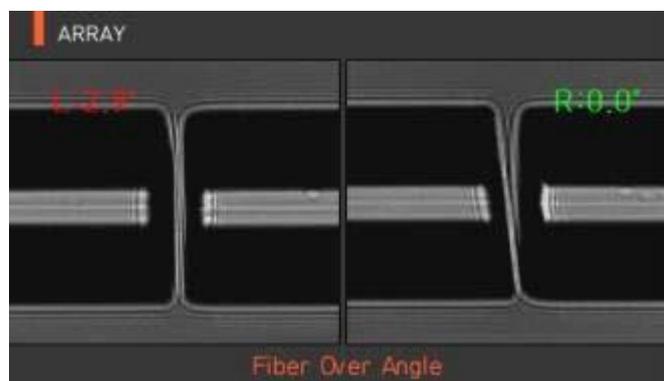
Error message generated when the fiber is located too close to the electrodes, object lens or reflector is dirty, or the LED is not bright enough.

Solution: Press  and reposition fiber. Clean the object lens and reflector. Conduct an LED test. If an error occurs upon performing the LED test, contact Belden.



7.4 Fiber over angle

Error message generated when the cleaved angle of the fiber is higher than specified. Solution: Check the state of the fiber cleaver. Check the cleaved angle limit.



7.5 Loss limit over

Error message generated when the estimated loss value is higher than the preset loss factor limit.

Solution: Check the loss factor limit.



7.6 Fiber thin error

Error message generated when the spliced point becomes thinner than the standard after splicing.

Solution: Make an adjustment to shorten the pulling length of the pulling splice. Check whether the arc amount or arc time is set as too large or too long.

7.7 Fiber thick error

Error message generated when the spliced point becomes thicker than the standard after splicing.

Solution: Reduce the overlap set value. Check whether the arc amount or arc time is set as too small or too short.

7.8 Bubble error

Error message generated when there are bubbles or spots being generated on spliced point after splicing.

Solution: Examine the fiber cleaver. Clean the V-groove. Examine the electrodes.

7.9 Cleaved surface error

Error message generated when the cut surface of the fiber is of poor quality. Solution: Check the condition of the fiber cleaver. Re-cleave the fiber.

VIII. Splicing Problem Solving

8.1 When loss is high

- ❑ Any dust or foreign substance on the fiber surface may cause a poor splice.
 - Clean the fiber surface sufficiently.
 - Do not clean the fiber after cleaving to prevent dust from being gathered in the fiber cross section.
 - Lower fibers into V-grooves rather than pushing in from the sides. Fiber holders will facilitate proper insertion.

- ❑ Any foreign substance on V-groove hinders the correct alignment.
 - Keep the V-groove clean at all times.

- ❑ Electrode condition.
 - When an electrode contains an abrasion or its tip is bent and dirty, replace the electrodes.

- ❑ Arc amount and arc time are inappropriate.
 - Check the setting of arc amount and arc time to reset them with proper values.
 - Changes in arc time and amount are generally considered to be minor adjustments to factory settings.

- ❑ Inappropriate splice mode.
 - Check whether appropriate splice mode is selected for the fiber

8.2 Abnormal splicing operation

- ❑ Alignment operation is repeated.
 - Open the wind cover again and then close.
 - If discontinues, open the wind cover, press  and then turn off the power and contact Belden.

- ❑ The error message “Too Long Fiber” is continuously generated.
 - Turn off the power and contact Belden.

IX. Problem Occurrences and Questions

9.1 Power

- ❑ Power is not turned on by pressing .
 - Check whether the screen is turned off with the switch being pressed for about 1 second.
- ❑ Cannot continue splicing after several times of splices even with the fully charged battery.
 - Power is quickly consumed when “Save mode” is not in use. Refer to the Save Mode to assure proper settings.
 - If the battery’s life ends for long-term use, replace it with approved replacement. Battery wattage drops with low temperature and more rapidly with temperatures below zero. Also, splice current consumption goes up with high temperature and battery’s power consumption accelerates.
- ❑ LED is not turned on upon charging.
 - Disconnect the charger’s AC power cord and connect the DC cord to the charging jack.
Connect the AC power cord after 10~15 seconds. Then the battery’s LED is turned on red and charging starts.
- ❑ No remaining battery indication.
 - Charge the battery.
- ❑ Remaining battery is not well displayed.
 - Remaining battery display is for reference.

9.2 Splice

- The error message displayed on the screen.
 - Refer to the Error message list.

- Splice loss is high or irregular.
 - Clean V-groove, V-block, reflector and object lens by referring to [Maintenance of splice quality]. Replace electrodes by referring to [Electrodes replace]. Refer to the “High estimated loss” from [Error message list].
 - If fiber warps or is bent, place the fiber bent direction to face the bottom. Splice loss varies depending on cleaving angle, arc condition and cleanliness level of fiber. If splice loss is still high or irregular even after implementing these recovery measures, contact Belden. Annual maintenance is required to maintain optimal splice quality.

- The monitor is suddenly turned off.
 - Refer to [Monitor sleep mode menu].

- Power is suddenly turned off.
 - Refer to [Splicer sleep mode menu].

- Either arc amount or arc time does not change.
 - On SM, NZ, MM or AUTO mode, either arc amount or arc time does not change. Implement [Arc Calibration] and the arc amount on these modes properly maintain. When used in another mode, arc amount and arc time are automatically set to prevent their alteration.

- Set pause.
 - Refer to [Option menu].

- Indicate cleaved angle, fiber angle, and clad deviation.
 - Refer to [Option menu].

- Estimated splice loss and measured splice loss do not match.
 - The estimated splice loss is a calculated value so it should be used only as a reference.

9.3 Sleeve heater

- Fiber protecting sleeve does not contract completely.
 - Increase the heating time. Refer to [Heater mode edition].

- The heater is overheated.
 - Stop the heater by pressing , turn the power off and then contact Belden.
 - If the protecting sleeve melts and sticks to the heater cover, remove it by pushing it with a cotton swab.

- Initialize heater mode condition.
 - Refer to [Heat mode edition].

- Cancel heater in the middle of an operation.
 - Heater operation cannot cancel by pressing . Cancel it by pressing  once again.

9.4 Others

- Restrict splice mode and heater mode setting.
 - Refer to [Menu lock].

- Splice mode's arc amount does not change even after [Arc calibration].
 - The internal standard arc amount does calibrate; therefore, the arc amount of each splice mode does not change.

- Forgotten password.
 - Contact Belden.

X. Warranty and Repair

Responsibility limit

For Warranty and Repair information, please contact your Belden representative or use the contact information found in the Help section under the information menu in the splicer unit.

10.1 Information necessary for repair

Before sending the product, contact Belden first.

- i. Company and contact information
(Name, department, company, address, contact information, fax, email)
- ii. Product serial number
- iii. Product condition and problem incurred, error information
- iv. Operating conditions, processes and uses of the splicer prior to error

10.2 Transportation

Please return the splicer in the carry case provided to protect it from humidity, vibration and shock. Include all components in the case.

10.3 Repair Customized modes, configurations and splice data may be lost during repair. Save test data prior to shipment to ensure retention.