Optical Fiber Fusion Splicer

TYPE-25U

Type-25S

Type-25M

Guide to Operation

This manual contains the handling, operation procedures and safety instructions concerning the TYPE-25U, Type-25S, and Type-25M. Please read this manual before starting.

WARNING -FOR YOUR SAFETY-
To reduce the risk of, electric shock or injury to persons, please follow the instructions contained in this operation manual.

IMPORTANT
This manual contains the important information concerning the software license.

Issue 1 2004. 4.20

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IMPORTANT SAFETY PRECAUTIONS

This product has been designed and manufactured to assure personal safety. Improper use can result in fire, electric shock or injury to persons. Please read and observe all warning instructions given in this operation manual.
Use your splicer only for its intended purpose.

¨ Symbols

In this operation manual, symbols are used to highlight warnings and cautions that you should so that accidents can be prevented. The meanings of these symbols are as follows:

	This symbol indicates explanations about extremely dangerous matters. If users ignore this symbol and handle the splicer the wrong way, serious injury such as fire or electric shock, or death could result.
	This symbol indicates explanations about dangerous matters. If users ignore this symbol and handle the splicer the wrong way, bodily injury and damage to the equipment could result.

1. Do not use a voltage other than the allowable power voltage indicated. Doing so may cause a fire or electric shock.
2. To reduce the risk of fire, electric shock or malfunction, do not get liquid or metallic objects inside the splicer. Check for condensation before operating. If necessary, allow the condensation to evaporate before using the splicer.
3. Do not make mechanical or electrical modifications to the splicer, this may expose you to dangerous voltages or other hazards.
4. If liquid, a metallic object or other foreign substance gets inside the splicer, immediately turn off the power and disconnect the power source. Contact qualified service personnel.
5. This fusion splicer performs an arc discharge. Avoid the use of the splicer in a hazardous location in which flammable gas can generate or only electrical
6. Do not touch the electrodes. Doing so may cause personal injury or electric shock.
7. If an abnormal condition such as unusual noise, smoke or unusual odor occurs, immediately turn off the power and disconnect the power source. Next, contact the maintenance service center.

8. Do not let water come in contact with the battery. Safety and protective devices to prevent danger are built in the battery, but if these devices are damaged, excessive current flow may cause abnormal chemical reaction in the battery fluid, heat generation, bursting and fire may result.
9. Do not use or leave the battery exposed to high temperature conditions, such as a fire.
10. Only use the specified battery charger. Not doing so can cause the battery to be overcharged or excessive current flow may cause abnormal chemical reaction in battery fluid, heat generation, bursting and fire could result.
11. Make sure the polarities are correctly connected. Reversed connections may cause abnormal chemical reaction in battery fluid, heat generation, bursting and fire could result.
12. Do not attach the battery to a power supply plug or directly to a car's cigarette lighter. Excessive current flow may cause heat generation.
13. Use the battery only for the application for which it was designed. Not doing so will result in a loss of performance and a shortened life expectancy. Also excessive current flow may cause loss of control during charging or discharging of the battery, heat generation, bursting and fire.
14. When using the battery, observe the following tips.

- Do not burn the battery or throw it into a fire. Doing so may cause heat generation, bursting and fire.
- Charging with polarity reversed can cause a reversal in battery polarity resulting in abnormal chemical reaction, heat generation, bursting or fire.
- Do not directly connect the positive and negative terminals with a conductive material such as a wire. Do not carry or store the battery together with any personal jewelry, hairpins or other metallic objects. Metallic objects can cause an electrical short circuit. Also excessive current flow may cause abnormal chemical reaction in battery, heat generation, bursting and fire.
- Do not throw or damage the battery. Safety and protective devices to prevent danger are built in the battery. If these devices are damaged, excessive current flow may cause abnormal chemical reaction in battery fluid, heat generation, bursting and fire.
- Do not pierce the battery with nails, strike the battery with a hammer, or step on the battery. Doing so will cause internal short circuit, heat generation, bursting and fire.
- Do not solder any lead wires directly to the battery.
- Do not place the battery in microwave ovens, or high-pressure containers.
- Avoid mixed usage of the batteries differing in capacity, type, and manufacturer.

16. Do not disassemble or modify the battery. Safety and protective devices to prevent danger are built in the battery. If these devices are damaged, excessive current flow may cause loss of control during charging or discharging of the battery, heat generation, bursting and fire.
17. Do not place the battery close to heat sources or leave exposed directly to the sun for long periods of time. Safety and protective devices to prevent danger are built in the battery. If these devices are damaged, excessive current flow may cause loss of control during charging or discharging of the battery, heat generation, bursting and fire.

18. In the event the battery leaks and the fluid gets into one's eyes, do not rub the eyes. Immediately wash them thoroughly with clean water and consult a doctor immediately.
19. Unplug the fusion splicer before attempting electrode replacement. Avoid contact with the high-voltage electrodes used to produce the arc.
20. Do not use compressed gas (i.e., canned air) to clean the splicer. Poor splice performance may result.

1. Avoid places with too much dust or dirt. Dirt or dust that can accumulate in the fusion splicer causing short circuits or insufficient cooling, which may lead to splicer malfunction or deterioration, resulting in fire or electric shock.
2. Always use and store the splicer in the locations defined in this manual. Not doing so may cause splicer malfunction or deterioration, resulting in fire or electric shock.
3. To reduce the risk of electric shock, do not plug/unplug the power cord or remove the battery with wet hands.
4. Disconnect the power cord by grasping the plug, not the cord.
5. The battery's optimum charging temperature range is 0 to 45°C. Whenever possible, place the charger in a location that is within this temperature range. Do not charge the battery at extremely low temperature (below 0°C). Doing so may lead to deterioration in performance and battery leakage.
6. If you are not going to use the splicer for a while, remove the battery before storing it. Not doing so will shorten a battery life.
7. The TYPE-25U is a precision instrument. When transporting the splicer, use its specified transport case to protect it from dust, dirt, moisture, shock and impact.
8. We recommend your splicer to be inspected annually to keep it in good condition.
9. Wear safety glasses at all times for protection from glass fibers.
10. Only use 99% pure alcohol to clean the splicer. To prevent malfunction and damage, do not use any other kind of chemicals.
11. In a high location, fix the splicer to a tripod with the M8 screw or ½-20 screw on the bottom of the splicer or use a specified strap to prevent the splicer from dropping.
12. Ensure that the strap is attached to the ring of the splicer. Not doing so may cause the splicer to drop.
13. The heating plate of the heat shrink oven may be hot during and after heating. Do not touch it directly.
14. Do not operate the splicer in rain. Doing so may cause the battery or AC power supply to be short-circuited.

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d) create a document (manual or execution report) concerning the maintenance of the splicer in which this software is installed or control its splice-quality upon displayed information and the writings.
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CONTENTS

1. General

The TYPE-25U, Type-25S, & Type-25M Fusion Splicer can splice optical fiber and reinforce the spliced portion by heating. Pre-splice inspection is automatically performed on fiber by built-in microscope. Operation is simple and easy to understand.

Read this manual in its entirety to understand fully the machine capabilities.

If you would like to start splicing operation now, read from the Chapter 2.

Specifications – TYPE-25U

Item	TYPE-25U
Optical fiber requirements	
Material	Silica glass
Profile type	SMF, MMF
Cladding diameter	125μm
Coating diameter	250 to 900 um (single)
Cleave length	10mm
Fiber count	1
Size and weight	
Size (Main body)	120(W) x 145(D) x 160(H) mm 4.7" x 5.7" x 6.3"
Weight*	Approx. 1.4Kg (without the BU-HH2 battery).
Monitor	2.5 inch color monitor
Standard performance	
Splice Loss (typical)*1	SMF: <0.10dB MMF: 0.03dB
Splice cycle time*1	Approx. 15 sec.
Heat shrink oven cycle time*2	Approx. 50 sec. (for 60mm single fiber protection sleeve)
Splice cycles per fully charged battery*3	Approx. 30 splices
Function	
Splice loss estimation	NO
Splice data storage	250 splices
Tension test *4	1.96N
Heat shrink oven	O
Arc test	O
V-groove illumination	O
Programs	
Splice programs	Max. 15
Heating programs	Max. 5
Power supply	
Power source	DC operation (with battery), AC operation (with PS-HH2 or PM-HH2)
DC operation	Lithium-Ion battery "BU-HH2" Nominal voltage 11.1V, Nominal capacity 2.0Ah
AC operation	Operated with expansion unit "PS-HH2" / "PM-HH2" Input 100-240V, 50/60Hz Output DC 12V
Environmental conditions	
Operation temperature *5	-10 to +50°C
Storage temperature *5 *6	-40 to +70°C
Altitude	0-3,660m
Windproof	Max. 15m/s

* Fiber holders are provided in a standard package. Use the fiber holders suitable for the application.

*1 :With identical Sumitomo fibers in room temperature

*2 :AC power supply is used in room temperature (20°C). In battery operation, heat shrink oven cycle time is longer depending on the outside temperature or the battery remaining capacity.

*3 :A three-minute splice and heating cycle is repeated with a new fully charged battery in room temperature.

*4 :Performed on the receptacle after splicing.

*5 :Non-condensing

*6 :Battery storage temperature range is 0 to 45°C (if stored for less than 1 month). For further details, please refer to the battery specifications.

Specifications – Type-25S

Item	Type-25S
Optical fiber requirements	
Material	Silica glass
Profile type	SMF, MMF
Cladding diameter	125μm
Coating diameter	250 to 900 um (single)
Cleave length	10mm
Fiber count	1
Size and weight	
Size (Main body)	120(W) x 145(D) x 160(H) mm 4.7" x 5.7" x 6.3"
Weight*	Approx. 1.4Kg (without the BU-HH2 battery).
Monitor	2.5 inch color monitor
Standard performance	
Splice Loss (typical)*1	SMF: 0.05dB MMF: 0.03dB
Splice cycle time*1	Approx. 15 sec.
Heat shrink oven cycle time*2	Approx. 50 sec. (for 60mm single fiber protection sleeve)
Splice cycles per fully charged battery*3	Approx. 30 splices
Function	
Splice loss estimation	YES
Splice data storage	250 splices
Tension test *4	1.96N
Heat shrink oven	O
Arc test	O
V-groove illumination	O
Programs	
Splice programs	Max. 15
Heating programs	Max. 5
Power supply	
Power source	DC operation (with battery), AC operation (with PS-HH2 or PM-HH2)
DC operation	Lithium-Ion battery "BU-HH2" Nominal voltage 11.1V, Nominal capacity 2.0Ah
AC operation	Operated with expansion unit "PS-HH2" / "PM-HH2" Input 100-240V, 50/60Hz Output DC 12V
Environmental conditions	
Operation temperature *5	-10 to +50°C
Storage temperature *5 *6	-40 to +70°C
Altitude	0-3,660m
Windproof	Max. 15m/s

* Fiber holders are provided in a standard package. Use the fiber holders suitable for the application.

*1 :With identical Sumitomo fibers in room temperature

*2 :AC power supply is used in room temperature (20°C). In battery operation, heat shrink oven cycle time is longer depending on the outside temperature or the battery remaining capacity.

*3 :A three-minute splice and heating cycle is repeated with a new fully charged battery in room temperature.

*4 :Performed on the receptacle after splicing.

*5 :Non-condensing

*6 :Battery storage temperature range is 0 to 45°C (if stored for less than 1 month). For further details, please refer to the battery specifications.

Specifications – Type-25M

Item	Type-25M
Optical fiber requirements	
Material	Silica glass
Profile type	SMF, MMF
Cladding diameter	125μm
Coating diameter	250 to 900 um (single) 250um (4 fiber ribbon)
Cleave length	10mm
Fiber count	1
Size and weight	
Size (Main body)	120(W) x 145(D) x 160(H) mm 4.7" x 5.7" x 6.3"
Weight*	Approx. 1.4Kg (without the BU-HH2 battery).
Monitor	2.5 inch color monitor
Standard performance	
Splice Loss (typical)*1	SMF: 0.05dB MMF: 0.03dB
Splice cycle time*1	Approx. 15 sec.
Heat shrink oven cycle time*2	Approx. 50 sec. (for 60mm single fiber protection sleeve)
Splice cycles per fully charged battery*3	Approx. 30 splices
Function	
Splice loss estimation	YES
Splice data storage	250 splices
Tension test *4	1.96N
Heat shrink oven	O
Arc test	O
V-groove illumination	O
Programs	
Splice programs	Max. 15
Heating programs	Max. 5
Power supply	
Power source	DC operation (with battery), AC operation (with PS-HH2 or PM-HH2)
DC operation	Lithium-Ion battery "BU-HH2" Nominal voltage 11.1V, Nominal capacity 2.0Ah
AC operation	Operated with expansion unit "PS-HH2" / "PM-HH2" Input 100-240V, 50/60Hz Output DC 12V
Environmental conditions	
Operation temperature *5	-10 to +50°C
Storage temperature *5 *6	-40 to +70°C
Altitude	0-3,660m
Windproof	Max. 15m/s

* Fiber holders are provided in a standard package. Use the fiber holders suitable for the application.
*1 :With identical Sumitomo fibers in room temperature
*2 :AC power supply is used in room temperature (20°C). In battery operation, heat shrink oven cycle time is longer depending on the outside temperature or the battery remaining capacity.
*3 :A three-minute splice and heating cycle is repeated with a new fully charged battery in room temperature.
*4 :Performed on the receptacle after splicing.
*5 :Non-condensing
*6 :Battery storage temperature range is 0 to 45°C (if stored for less than 1 month). For further details, please refer to the battery specifications.

Optional accessories

Item	Description
<BU-HH2 battery charger> *1 Please read the Chapter 3 before use.	
Size	159(W) x 120(D) x 49(H) mm
Weight	Approx. 500g
Input voltage	DC 16V
Terminals	DC input terminal (for ADC-1635)
	DC output terminal (for charging BU-HH2)
The number of battery cells to be charged	1 or 2
<PS-HH2 (Expansion unit, optional accessories)>*2 For further details, please refer to the PS-HH2 specifications.	
Size	130(W) x 171(D) x 35(H) mm
Weight	Approx. 250 g
Input voltage	DC 10.0 to 16.0 V
Terminals	DC output / communication connector (connected to TYPE-25U)
	DC input terminal (for ADC-1635)
	DC 12V output terminal (for hot jacket remover)
	Monitor signal output terminal (RCA jack)
	Data output terminal (serial port: D-sub 9pin)
< AC adapter>*3	
Size	120(W) x 72(D) x 27(H) mm
Weight	Approx. 400g
Input voltage	AC 100 to 240 V, 50/60Hz
Output voltage	DC 16V

*1: The BU-HH2 is used only for the BC-HH2.
*2: The PS-HH2 is used only for the Type-25x.
*3: The AC/DC adapter is used for the BU-HH2, the PS-HH2.

Supplies

Standard package items, optional accessories, and consumables are provided for the splicers.

Standard package

Standard package included:

Part name	Part No.	Unit	Type-25U	Type-25S	Type-25M
Main unit		pc.	•	•	•
Fiber holder – 250um	FH-250-HH	pair	•	•	
Fiber holder – 4ct ribbon	FH-4-HH	pair			•
Battery	BU-HH2	pc.	•	•	•
Battery charger for BU-HH2	BC-HH2	pc.	•	•	•
AC adapter	ADC-1635	pc.	•	•	•
Spare electrodes	ER-9	pair	•	•	•
Neck strap	—	pc.	•	•	•
V-groove cleaning brush	—	pc.	•	•	•
Operation manual	—	pc.	•	•	•
Carrying case	—	pc.	•	•	•

The kits mentioned above are the minimum composition. Please ask customer service for additional details.

Optional accessories

The following optional accessories are provided for the Type-25. For further details, please contact our sales personnel.

Description	Part No.	Description	Type-25x
<Optional accessories for main unit>			
Interface unit	PS-HH2	Expansion unit for AC operation	•
AC adapter *	ADC-1635	AC adapter for BC-HH2, PM-HH2, & PS-HH2	•
Battery	BU-HH2	Li-Ion battery for	•
Battery charger for BU-HH2	BC-HH2	Battery charger only for BU-HH2 2 batteries can be charged simultaneously.	•
Fiber holder	FH-250-HH	Fiber holder for single fiber with 0.25μm coating	•
	FH-900-HH	Fiber holder for single fiber with 0.9μm coating	•
	FH-4-HH	Fiber holder for ribbon fiber, 4 count	•**
<Other accessories (preparation tools)>			
Fiber cleaver	FC-6SC	Fiber cleaver for single fiber	•
Jacket remover	JR-22	Jacket remover for single fiber	•
Thermal jacket remover	JR-5	Jacket remover for ribbon fiber	•
Battery operated thermal jacket remover	JR-5B	Battery operated jacket remover for ribbon fiber	•
Dispenser	HR-3	Dispenser for alcohol	•

* The ADC-1635 is included as standard equipment for purchase of the PM-HH2 or the PS-HH2.
** FH-4-HH is only compatible with the Type-25M

Consumables

Fiber protection sleeve, electrode, and battery are consumables. Please place an order when necessary.

Description	Part No.	Type-25U/ Type-25S	Type-25M
Fiber protection sleeves	FPS-1	•	•
	FPS-40	•	•
	FPS-5		•
Electrodes	ER-9	•	•
Battery	BU-HH2	•	•

Structure

This chapter describes the name and function of each part of the splicer.

Main unit

1 **Main body**
main unit

2 **Keypad**
Used to turn on the splicer, perform a splice, initiate heating cycle and set a function.

3 **Monitor**
Displays fiber image and splice data. The viewing angle is adjustable for easy viewing in direct sunlight.

4 **Brightness control**
Display brightness can be adjusted.

5 **Hood**
The hood for maintaining high quality splicing under various environmental conditions.

6 **Heat shrink oven**
The device for heating and shrinking the fiber protection sleeve.

7 **Battery compartment**
The BU-HH2 is installed in this compartment.

8 **Connector**
The connector to connect to the expansion unit is positioned in the cap.

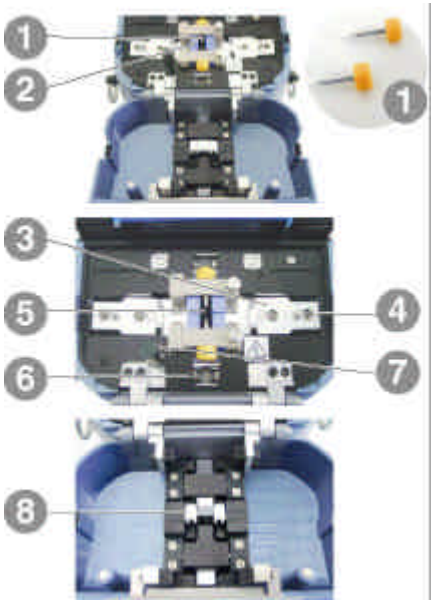
9 **Hook**
Attaching a neck strap to the hook enables hanging the splicer around an operator's neck or carrying it with a hand.

Keypad

Keypad control keys are used to perform splicing process. Each key has the following function.

1. **On**
   Power on
2. **Off**
   Power off
3. **Up arrow**
4. **Down arrow**
   Move cursor / Change value
5. **Information**
   Go to menu screen, Back to previous screen, Help
6. **Select**
   Confirm current selection
7. **Reset**
   Initialization
8. **Heat**
   Start and cancel (force to complete) heating cycle
9. **Manual**
   Re-arcing
10. **Power LED**
    The Power LED is lit up when the splicer is on.
11. **Sleep LED**
    The Sleep LED is lit up when the sleep mode (power save mode) is active.

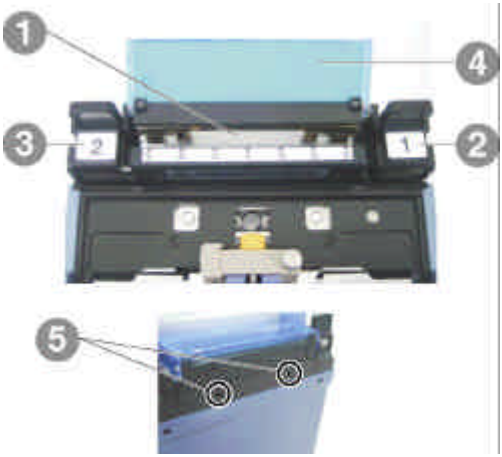
Electrodes, V-grooves and peripheral parts



1. **Electrode**
   An arc is generated between the electrodes. “ER-9” is used for the TYPE-25.
2. **V-groove**
   Desingned for fiber loading.
3. **Z stage (right & left)**
   Desingned for fiber holder placement.
4. **Fixing pin**
   The pin that is fitted inside the hole of the fiber holder to place the fiber holder on the Z stage.
5. **Microscope**
   Used to observe fiber. (Positioned below the electrode.)
6. **Illumination LED**
   Illumination for microscope
7. **Illumination LED for V-groove**
   Illuminates the V-groove and helps fiber loading in dark workplaces.
8. **Fiber clamp**
   Used to clamp the fiber to the V-groove. Attached to the hood.

Heat shrink oven

The heat shrink oven is used to heat and shrink the fiber protection sleeve that is centered over the spliced portion.

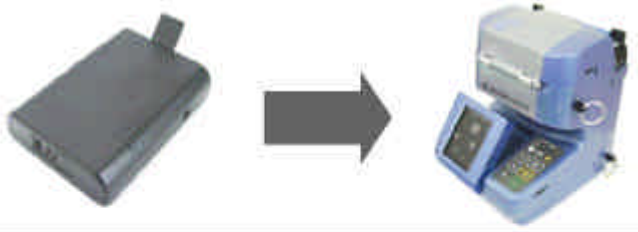


1. **Heating plate**
   Keeps high temperature during heating and shrinks fiber protection sleeve.
2. **Right side clamp**
   Clamps the fiber coating and has a built in tensile mechanism that is used to apply 50gf of tension on the splice when the left side clamp is closed, keeping the fiber taut.
3. **Left side clamp**
   Clamps the fiber coating.
4. **Acrylic lid**
   Closed during the shrinking process so that an operator does not touch the heating plate by mistake.
5. **Fixing screw**
   The screw hole used to attach an optional cooling tray retainer block.

Power supply

There are 2 methods for operation. One is battery operation, which is performed by means of the BU-HH2 battery. The other option is AC operation, which is performed by attaching the expansion unit to the TYPE-25 and connecting the expansion unit to the AC adapter. Always use one of the following power supply method. Failure to do so will damage the fusion splicer.

BU-HH2



Expansion unit

Expansion unit

Optional expansion units can be used for various applications.

<PS-HH2> ……

1. **DC output/Communication connector**
   Connected to the TYPE-25 for power feeding and data communication.
2. **DC input terminal**
   DC input terminal from the AC adapter (ADC-1635).
3. **DC 12V output terminal**
   DC output terminal for the JR-5 hot jacket remover or other 12V device.
4. **Monitor signal output terminal**
   RCA jack type.
5. **Data output terminal**
   For serial communication: D-sub 9Pin.
6. **Fixing screw**
   The hand screw for fixing the TYPE-25.
7. **Hook**
   For positioning the TYPE-25.

BC-HH2 battery charger

The BC-HH2 is the battery charger exclusively for the BU-HH2.

1. **DC input terminal**
   Input terminal from the AC adapter (ADC-1635).
2. **Battery compartment**
   The BU-HH2 is installed in this compartment.
3. **Terminal for battery charge**
   Output terminal used to charge the BU-HH2.
4. **Power LED (green)**
   LED for indicating the operating state of power supply.
5. **Charging LED (red)**
   LED for indicating the charging state.

2. Making a splice/protecting the splice

This Chapter describes basic splicing operation.

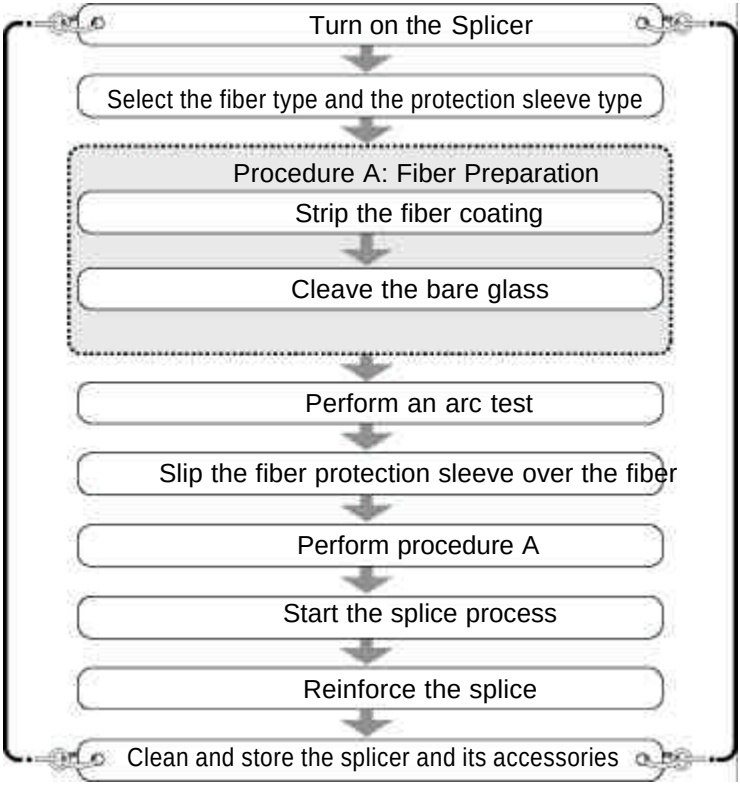
Preparing the fiber

The following preparation is required to make a splice with the TYPE-25. This procedure assumes that the JR-22 jacket remover is used to strip the fiber coating and the FC-6S fiber cleaver is used to cleave the bare glass.

1. Take the splicer and its accessories out of the case.
2. Fill the dispenser with 99.5% alcohol.
3. Have lint free gauze and fiber protection sleeves available for the splicing operation.
4. Install the battery and plug the power plug.

Operating procedures

The following is a summary of the steps required to make a splice. The details of each step are described in the next pages.



Turning on the Splicer

Select the power supply considering the application. Note that each power supply has a different use.

Battery (BU-HH2)

1. Open the bottom cover.

2. Install the battery as shown in the photo.

3. Close the bottom cover.

Caution Note that the battery should be installed with the correct polarity.

Caution Be sure to close the cover completely.

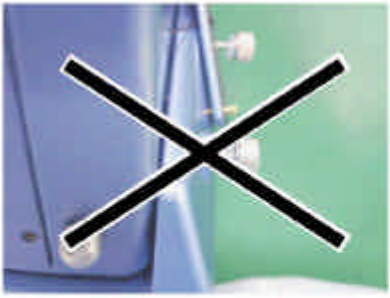
1. Remove the cover on the back of the splicer.

2. Fit the guide on the expansion unit into the guide hole on the bottom of the unit.

Expansion unit (PM-HH2, PS-HH2: optional accessories)

3. Connect the connector on the back of the splicer the expansion unit.

4. Connect the ADC-1635 to the expansion unit.



Caution Ensure that the expansion unit is fixed to the unit with the fixing screw.

Tips Please remove a screw using coin.

Caution **When the expansion unit is used with a battery installed, AC operation is prioritized. (The battery is not in use or being charged)**

After preparing the power supply, press “ON”. A beep sounds and the splicer is powered on.

Selecting the fiber type and the protection sleeve type

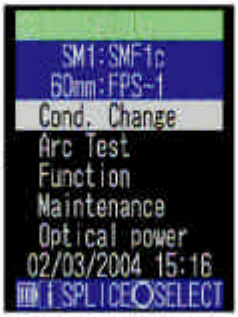
Select the fiber type and the protection sleeve type according to the following procedures.

1. Turn on the splicer.

2. Press the " I " key & select condition change.

3. Move the cursor to select the fiber type to be spliced.

4. Move the cursor to select the protection sleeve type to being used.



5. The display automatically returns to the menu screen.

The switch functiosn are shown on the bottom of the monitor.

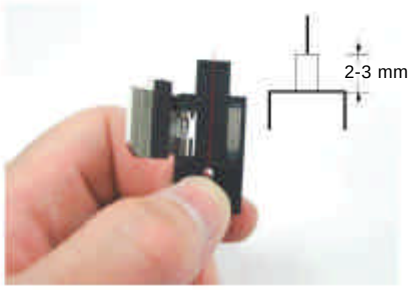
Removing the fiber coating – TYPE-25U & Type-25S

This section describes the procedure of removing the fiber coating and placing the fiber into the fiber holder for the TYPE-25U or the Type-25S.

1. Thoroughly clean the fiber to be spliced.

2. Remove the fiber coating with the JR-22. (Shown with the JR-22)

3. Clean the bare fiber with a lint-free gauze pad moistened with pure alcohol, and wipe 1-2 times to remove any coating residue.



4. Place the fiber into the fiber holder. Ensure that 2-3 mm of the fiber coating protrudes from the edge of the fiber holder.

5. The fibers must now be cleaved, see the next section for details on the proper procedure for cleaving. After cleaving, insert the fiber holder into the splicer and begin preparing the second fiber to be spliced.

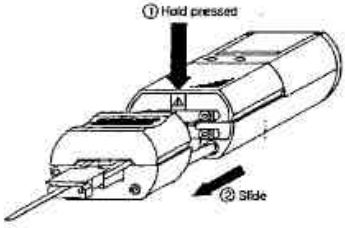
Caution In step 4, if too much fiber coating protrudes, the fiber coating will extend onto the rubber pads of the cleaver and the fiber cannot be cleaved properly.

Removing the fiber coating – Type-25M

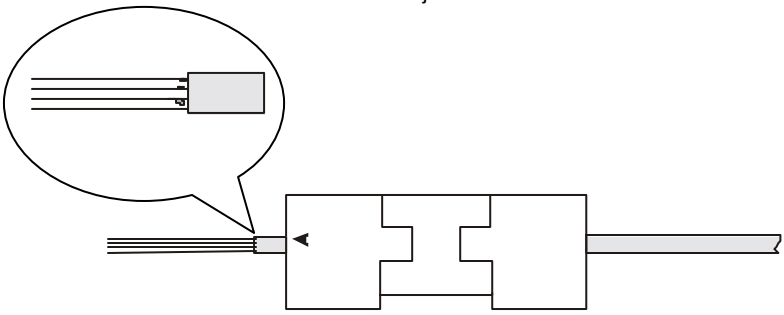
This section describes the procedure of removing the fiber coating and placing the fiber into the fiber holder for the Type-25M.

1. Thoroughly clean the ribbon to be spliced.

2. Place the ribbon into the fiber holder.



3. Remove the ribbon matrix using the JR-5 thermal jacket remover.



4. Clean the bare fiber with a lint-free gauze pad moistened with pure alcohol, and wipe 1-2 times to remove any coating residue.

5. The fibers must now be cleaved, see the next section for details on the proper procedure for cleaving. After cleaving, insert the fiber holder into the splicer and begin preparing the second fiber to be spliced.

Cleaving the bare glass

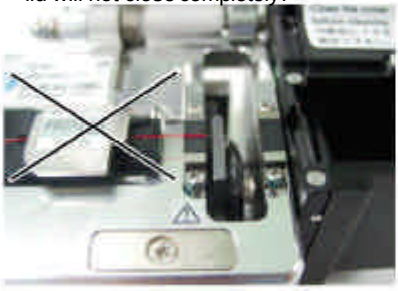
This section describes the procedure of cleaving the bare fiber.

1. Place the stripped and cleaned fiber into the cleaver.

2. Push the front edge of the holder against the receptacle of the cleaver, making sure the holder is square.

3. Close the lid of the cleaver. If the cleaver is equipped with a scrap collector, gently lower the lid of the offcut collector. The lid will not close completely.

4. Press the blade shuttle through it's full travel and open the lid. Cleaving is completed.



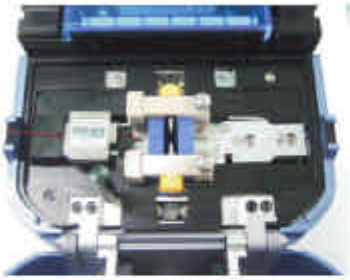
Caution In step 1, ensure that the fiber coating is not passed the rubber clamp.

Caution In step 3, do not force the lid of the scrap collector bin closed. It will close after the cleave has been performed.

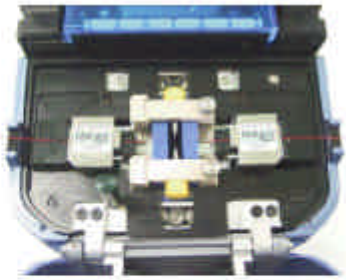
Caution Glass-fiber fragments are extremely sharp. Handle with care.

Performing an arc test

Arc power varies depending on the environmental conditions. To achieve optimal splicing, be sure to perform an arc test. The arc power will calibrate the arc power for the current environment.



1. Prepare the first fiber and place it into the splicer. The hinges on the holder should face the back of the unit.



2. Prepare the second fiber and place the holder into the unit.

3. Close the hood.

4. From the menu screen (refer to 2-2-2), select "Arc test".

5. Start an arc test by pressing the START key.

5. "OK" is displayed when arc discharge is completed. The arc power calibration is also completed.

Tips After fitting the pin of the receptacle into the hole of the fiber holder, lower the fiber holder down onto the V-groove.

Caution If "OK" is not displayed even if arc discharge is completed, repeat step 1 through 6 until "OK" is displayed.

Inserting one of the fibers to be spliced through a fiber protection sleeve

Be sure to slide a fiber protection sleeve over one of the fibers to be spliced before the fiber preparation process.

1. Select the fiber protection sleeve suitable for the fiber to be spliced and the available storage space.

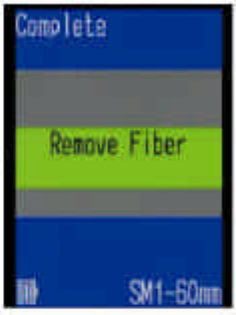
2. Slip the fiber protection sleeve over the fiber.

Starting the splice process

Repeat the fiber preparation procedure and prepare the fiber for splicing. Load the fiber into the receptacle and close the hood.

1. From the splice screen, press the START key to initiate the splicing process.

2. After the splice is completed, a message is displayed "Open Hood".
3. When the hood is opened, automatically tension test is initiated.



4. After the message "Remove fiber" appears on the screen, remove the spliced fiber from the fiber holder.

Tips The data and splice information are displayed by pressing the " I " key on a splice completion screen.

Caution

- Press the " I " key to move to the splice screen from the menu screen.
- If an error messages is displayed on the screen during splicing, press the " I " key. A troubleshooting message will appear.
- The TYPE-25U does not display estimated splice losses.

Reinforcing the splice

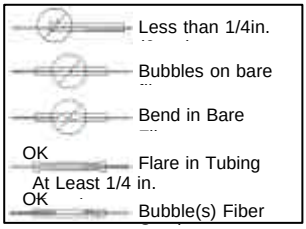
1. Slide the sleeve over the spliced portion.

2. Lower the fiber onto the right clamp arm and push down.

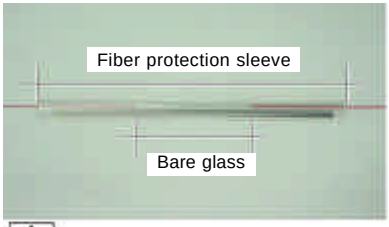
3. Lower the fiber onto the left clamp arm and push down while pulling the fiber.

4. Close the acrylic lid.

5. Press the “HEAT” key to start the heating cycle.



6. A beep sounds when the heating process is completed. Please check a state.



- Ensure that the fiber protection sleeve is centered over the splice.
- Ensure that the fiber protection sleeve is centered on the heat shrink oven.

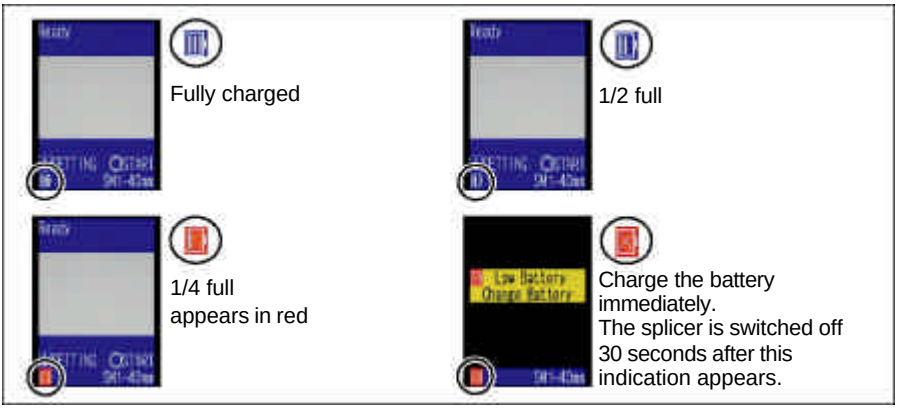
- A protection sleeve is hot after heating and may cause personal injury if touched.
- Never touch the heat shrink oven during heating. Doing so may cause personal injury or damage the heat shrink oven.

3. Handling of the battery

The BU-HH2 is a rechargeable Lithium-Ion battery. You can recharge the battery before you have fully discharged it. The battery can be recharged approximately 500 times under proper conditions of charging and discharging. However, the battery capacity might be lowered, depending on the environment, the storage condition, or the charging environment. To maintain battery performance, the following handling method should be used.

Battery remaining capacity

The battery remaining capacity can be checked on the TYPE-25 monitor.



* These indications are a “reference”. The correct battery status might be changed because of battery deterioration status or environment such as temperature.

Charging the battery

The BC-HH2 battery charger is capable of charging 2 batteries simultane ously. Charge the battery according to the following procedure. Full charging of a discharged battery takes 2-3 hours.

1. Place the BC-HH2 battery charger on a flat table.

2. Connect the ADC-1635 AC adapter to the BC-HH2. (The Power LED lights up green.)

3. Insert the BU-HH2 into the battery compartment. (The Charging LED flashes in Red.)

4. The Charging LED lights up Red when the charge is completed.

5. Take the battery out of the battery charger.

The BC-HH2 LED status indications are shown below.

LED status	Power LED (green)	Charging LED (red)
Lit	The BC-HH2 is powered on.	Charging is completed
Flashing	—	Charging is being performed
Off	The BC-HH2 is powered off	Battery faulty

Warning

Charge the battery within a temperature range of 0 to 45°C. Not doing so will decrease battery life and may cause battery leakage, heat generation, bursting and fire.

Storing the battery

Storing a discharged battery for a while may cause the battery to be deteriorated. Charge the battery fully before storage. Observe the following storage temperature range.

	< 1 month	> 1 month
Storage temperature	0 to 45°C	0 to 25°C

4. Other functions

The splicer is provided with a variety of functions and capabilities. This section describes the units flexibility for different applications and how to configure the splicer settings.

Usage examples

Monitor position

The monitor viewing angle is adjustable. However, do not force the monitor over the maximum viewing angle. Adjust the monitor angle within the allowable angle settings until the image is clear.

* The monitor is not positioned if the monitor is tilted at a small angle.
* Low temperature will give a darker image. This is the characteristic of LCD monitor, not a defect.

1. Standard position (storage position)

2. Maximum rotation

3. Halfway rotation

Caution

Do not apply too much force when adjusting the monitor angle.

Hook for neck strap

The neck strap allows an operator to hang the splicer around their neck. Use the four hooks on the splicer according to the operational environment.

Ex. 1: Attach the strap to the upper 2 hooks.

Ex. 2: Attach the strap to the lower 2 hooks.

Caution

- Ensure that the strap should be attached to the hooks.
- Whenever you use the lower 2 hooks, hold the splicer with your hand. Not doing so will cause the splicer to turn over and accessories such as fiber holder will drop out.

Tripod fixing screw

The TYPE-25 and the expansion unit have a screw hole in the base for mounting a work platform or tripod.

Tripod fixing screw

Ex. attach a tripod to the splicer

Splicer settings

Function settings

Select “Function” on the setting screen.

<Arc pause> This function stops the splicing process before arcing occurs. If you would like to check offset and fiber end-faces before the arc, set this function to ON. **<Sleep>** If the splicer is not in use for a certain span of time, to minimize power consumption on standby, the camera and the LED are powered off. The splicer can be re-activated by pressing any key except OFF. **<Power off>** If the splicer is in Sleep mode and is not in use for another certain span of time, the splicer is automatically powered off. You need to switch on the splicer again. **<Auto start>** This function automatically starts the splice process when the hood is closed.	
<Memory> This function stores splice data such as cleave angle, gap, offset, date, time, estimation(if applicable). **<Display>** This function displays stored splice data by designating the splice data number. **<Print>** This function outputs the splice data for a designated splice data number. If you would like to print out splice data, connect the expansion unit (optional accessory) to PC with serial cable. For further details, please refer to Chapter 4-5. **<Clear all data>** Data for of a maximum of 250 splices can be stored. After data of 250 splices are stored, the oldest splice data is deleted and the latest splice data is stored. This function deletes all the stored data at a time.	
<Light for V-groove> This function sets the V-groove illumination to ON or OFF. **<Date>** This function sets the built-in clock of the splicer to local time. **<Manual splice>** This function performs a manual splice if errors occur in pre-splice inspection.	

Maintenance function

Select “Maintenance” on the setting screen.

<Conditioning arc>	
After electrodes are replaced, this function is used to condition new electrodes. Refer to the “Maintenance” section for electrode replacement.	
<Arc count reset>	
After the electrodes are replaced, the arc count is reset. The number of the arc discharges, on the current pair of electrodes is shown.	
<Total arc count>	
This function checks total arc counts on the splicer. The total arc count can never be reset.	

Changing the parameter

The splice program and heating program can be changed. Please check the appendix in the this manual for the parameter list.

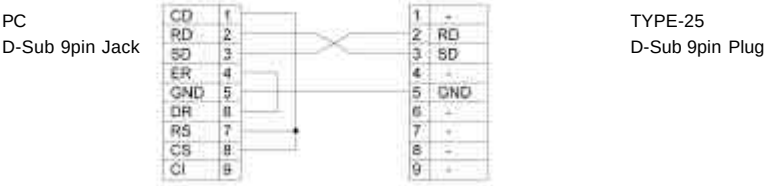
Printing the data

The optional expansion unit enables printing of stored data. Connect the expansion (PM-HH2) unit to your PC. And print out the data after setting up the PC. If you need further information, please contact our maintenance service center.

RS-232C Interface
RS-232C interface parameters are shown below.

Bit per second	Data bits	Parity	Stop bits	Flow control
38400	8	None	1	None

An example of connection between splicer and PC (IBM compatible machine) is shown below.



5. Maintenance

To maintain excellent splice quality, regular cleaning and inspection are required. Cleaning should be performed before and after each use. It is recommended to have your splicer seviced by a Sumitomo service groups once a year.

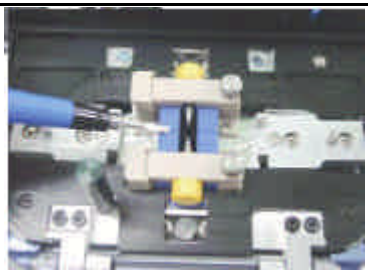
Cleaning

Clean each part with a V-groove cleaning brush or a cotton swab. Daily cleaning is a recommended practice and will maintain splice quality.

Cleaning the V-grooves

Dirt in the V-grooves can cause fiber offset and prevent good splices. To avoid offset, carefully clean the V-grooves with a V-groove cleaning brush or scrap fiber moistened with alcohol.

1. Prepare a V-groove cleaning brush or a cotton swab moistened with alcohol.



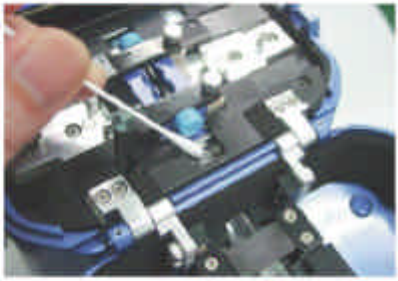
2. Brush the surface of the V-grooves.

Caution Do not apply too much force when cleaning.

Cleaning the LED and prism

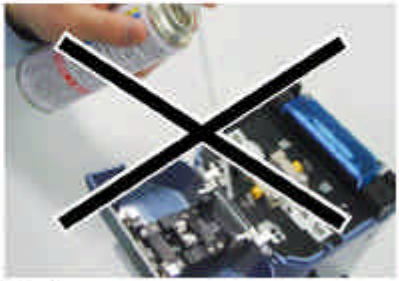
When the light source LED or the prism is dirty, the fiber image is unclear, this could result in improper image processing. If the display is appears uneven or an LED error occurs, clean the LED and prism.

1. Prepare a cotton swab moistened with alcohol.



2. Gently wipe the surface of the LED.

3. Gently wipe the surface of the prism.



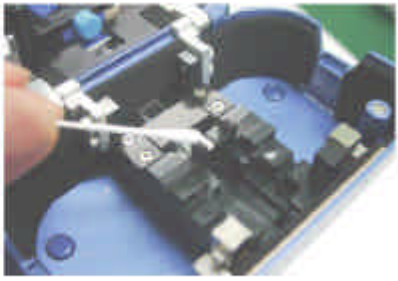
Caution

Do not use a canned air for cleaning. Doing so will contaminate the LED and prism.

Cleaning the fiber clamps

Dirt on a bare fiber clamp canl also cause fiber to be misaligned. When fiber misalignment occurs, clean the fiber clamps.

1. Prepare a cotton swab moistened with alcohol.

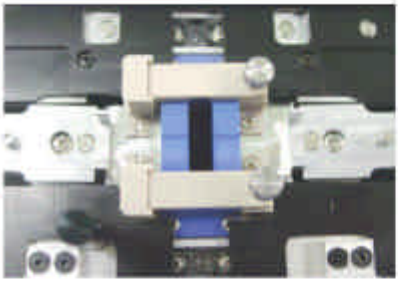


2. Clean the surface of the bare fiber clamps.

Caution Do not apply too much force when cleaning.

Cleaning the microscopes

If an unclear fiber image is displayed or an LED error occurs again after cleaning the prism, clean the microscopes.

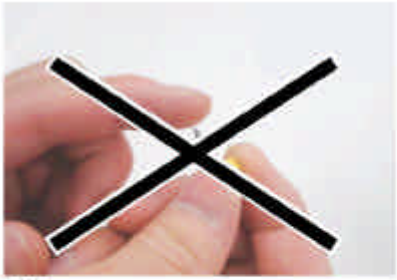


1. Remove the electrodes, see the maintenance section on “Electrode Replacement”.

2. Prepare a cotton swab moistened with alcohol.

3. Gently wipe the lens of the microscope in a circular motion.

4. Attach the electrodes back to the splicer.



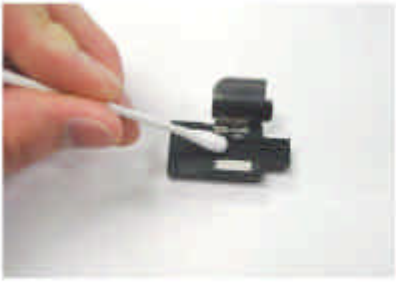
An electrode tip is extremely sharp. Handle with care.

Do not use a canned air for cleaning. Doing so might contaminate the lens.

Turn off the splicer before replacing the electrodes.

Cleaning other parts

The clamping areas of the fiber holder and the heat shrink oven can accumulate dirt or dust. If this occurs clean them thoroughly.



Clean the fiber holder with a cotton swab moistened with alcohol.

Clean the heat shrink oven with a dry cotton swab.

Remove moisture or alcohol on the heat shrink oven with a dry cotton swab.

Replacing the electrodes

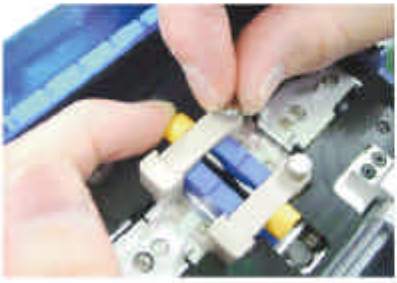
After 1000 discharges, the arc count indicator turns red during arcing. To maintain fusion splicer quality, replace the electrodes after approximately 1000 discharges. Electrode tips are extremely sharp, so care should be taken during handling.

1.Turn off the splicer

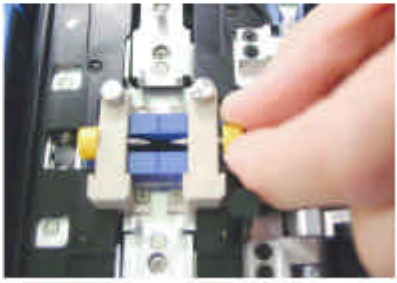
2. Loosen the electrode retainer screws, DO NOT try to remove the retainers from the base.

3. Remove the electrode.

4. Install new electrode.



5. Tighten the screw while pressing the electrode collar on the V-groove.

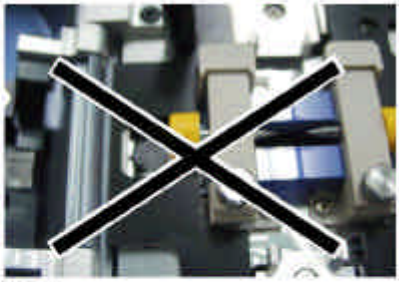


6. Repeat with the second electrode.

7. Turn on the splicer and perform a burn-in routine on the “Maintenance” screen.

Caution You can never remove the electrode retainer after loosening the screw. Do not attempt to remove the electrode retainer.

Caution An electrode tip is extremely sharp. Handle with care.



Caution Ensure that the electrode collar makes contact with the V-groove.

Caution
- **Be sure to turn off the splicer before replacing the electrode.**
- **Discard the old electrodes properly.**

Packing and storage instructions

The TYPE-25 fusion splicer is a precision instrument. Its rugged shipping/ storage case is custom designed to protect it from impact, dust, dirt, and moisture. Always store and transport the machine in the case. Observe the following instructions.

- Clean the TYPE-25, the fiber holders and other accessories before storing them.
- Be sure to remove the battery from the TYPE-25 and store it.

Keeping the battery in the TYPE-25 may cause the battery terminal to be damaged or deteriorated, resulting in fire.

- Be sure to remove the fiber holders from the TYPE-25 and store them properly.

Transporting the TYPE-25 with the fiber holder loaded may cause the V-groove or clamp to be damaged, resulting in the failure of splice

- Store the TYPE-25 and its accessories in the transport case.
- After discarding the liquid solvent in a proper way, or after locking the dispenser completely and putting it in a plastic bag, store it in the case.

Handle the alcohol with extreme care.

- Store the fiber cleaver after disposing of the fiber fragments from the fiber scrap collector.

Glass fiber fragments are extremely sharp. Handle with care.

6. Troubleshooting

For repair and technical support, or if the splicer performance cannot be improved with this troubleshooting guide, please contact a maintenance service center.

Arc problems

The electrodes typically need replacing after 1000 splices. Some common symptoms that indicate the electrodes need replacement:

- Fluttering or unstable arc observed on the monitor
- Sizzling noise while arcing
- Inconsistent amount of melt in arc test (ARC POWER WEAK or ARC POWER STRONG is repeatedly shown in arc test.)
- High or inconsistent splice losses

For electrode replacement, refer to Chapter 5.

Handling the electrode tip with bare fingers or hitting it can deform the electrode, resulting in poor arcing quality.

Fiber breaking

If the fibers are breaking when the tension test is performed, perform an arc test again. If arc power is extremely weak, splice quality is poor and the fiber can break. If the arc test is OK but the fibers are breaking, clean the v-grooves and the fiber clamps thoroughly. Deterioration of the jacket remover or fiber cleaver may lead to fiber breaking. Clean the jacket remover and fiber cleaver.

Power supply problems

If the splicer fails to turn on when the ON key is pressed, check:

- The battery is fully charged
- The cover of the battery compartment is completely closed
- The expansion unit is completely attached to the TYPE-25
- The expansion unit is connected to the AC adapter

If the unit does not turn on after checking the items above, contact a maintenance service center.

Splicing process errors

When an error occurs during the splicing process, press the “ i ” key. The details of the error will be shown. For an explanation of splice errors, please refer to the error message list described in the next chapter.

Error message list

Please contact our maintenance service center if unit performance is not recovered after taking corrective action:

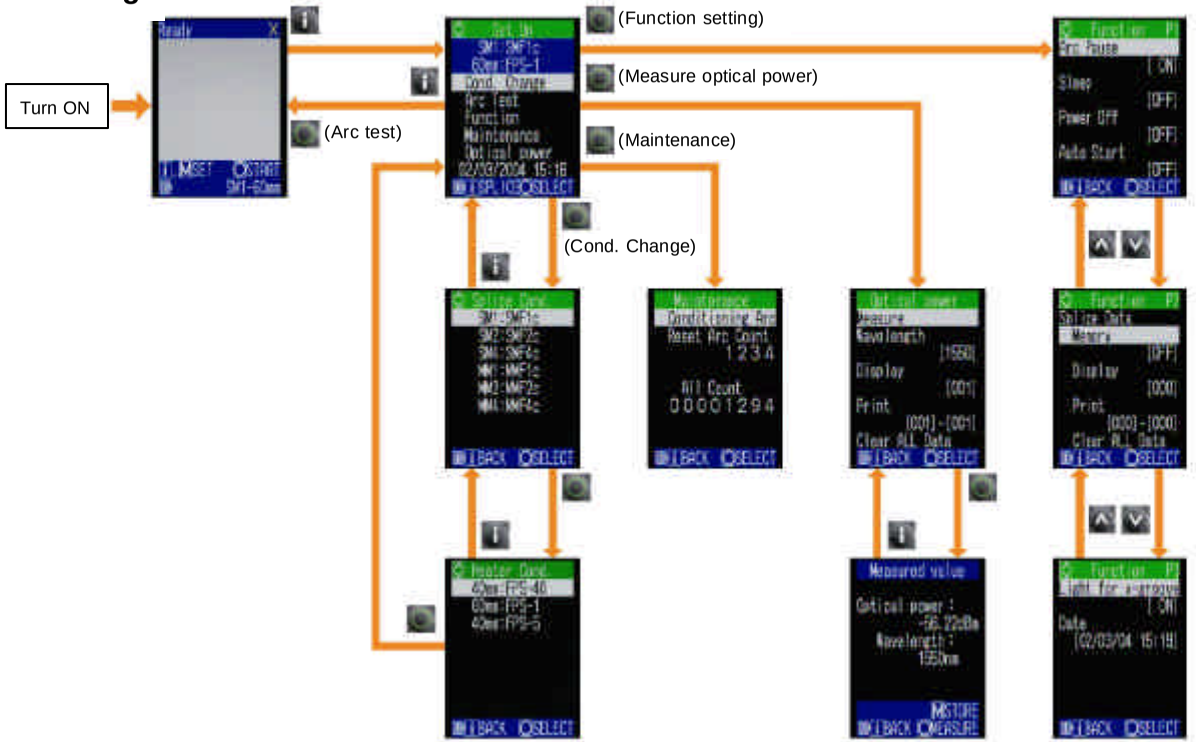
Error message	Description and measure
Brightness var. err **Brightness error** **LED error**	**[Description]** The splicer failed in the brightness adjustment of the illumination LED. **[Measure]** (1) Clean the illumination LED in the hood. (2) Clean the prism in the hood. (3) Clean the lens of the microscope. * If this error repeatedly occurs, please contact Technical Support.
Hood open error	**[Description]** The hood is not closed completely. [Measure] (1) Close the hood completely. * If this error repeatedly occurs, please contact Technical Support.
Insert fiber error	**[Description]** The splicer failed to insert the fibers within the drive time limit. **[Measure]** (1) Re-insert the fiber holders into the unit. (2) Load the fiber into the fiber holder properly.
Cut err (proj.)	[Description] The splicer detected fiber projection during end-face inspection **[Measure]** (1) Re-prepare the fiber, including cleave. (2) Clean the upper and lower rubbers of the clamps of the cleaver. (3) The blade of the cleaver may be worn, if so adjust the blade height or replace the blade.
Fiber check err	**[Description]** The fiber is not placed in the V-groove **[Measure]** (1) Place the fibers into the V-grooves again. (2) Clean the V-grooves with a V-groove cleaning brush.
Fiber count err **Fiber pitch err**	**[Description]** The fiber count is different from the program setting or the fiber pitch is large and the fibers are not positioned properly in the V-grooves. **[Measure]** (1) Check that the proper program is selected for the fiber count being spliced. (2) Check that the fibers are positioned properly in their respective V-groove.

Error message	Description and measure
Irregularity err **Gap error**	**[Description]** The irregularity of the fiber end face positions exceeds the allowable level. **[Measure]** (1) Cleave the fiber again. (2) Clean the upper and lower rubbers of the clamps of the cleaver. (3) The blade of the cleaver might be worn, if so adjust the blade height or replace the blade.
Cut err (crack)	**[Description]** The splicer detected the lip on the fiber end face. [**Measure]** (1) Cleave the fiber again. (2) Clean the upper and lower rubber clamps of the cleaver. (3) The blade of the cleaver might be worn, if so adjust the blade height or replace the blade.
Cut err (angle) **Cut error (lip)**	**[Description]** The cleave angle exceeds the allowable level. **[Measure]** (1) Cleave the fiber again. (2) Clean the upper and lower rubbers of the clamps of the cleaver. (3) The blade of the cleaver might be worn, if so adjust the blade height or replace the blade.
Alignment error	**[Description]** The fiber offset exceeds the allowable level. **[Measure]** (1) Place the fibers into the V-groove again. (2) Clean the V-grooves with a V-groove cleaning brush. (3) Clean the fiber clamps with a cotton swab. (4) Clean the stage and fiber holders with a cotton swab.
Splice error **Thin error** **Thick error** **Bubble error**	**[Description]** There is a problem at the splice point. **[Measure]** (1) Perform an arc test.

Error message	Description and measure
Splice error **Thin error** **Thick error** **Bubble error**	(2) If the Irregularity is large, clean the fiber cleaver. ? Thin : 1) The fiber irregularity is large. 2) The arc power is too strong. ? Thick : 1) The fiber irregularity is large. 2) The arc power is too weak. ? Bubble : The fiber irregularity or the cleaving condition on the fiber end-face is poor. * Unusual splice is performed due to abnormality of the fiber cleaver as well as the splicer. Perform regular maintenance on the fiber cleaver in the same manner as the splicer.
End check error **Diam. check err** **Dust error** **Image pro. err**	**[Description]** The splicer failed in the image processing due to dust on the fiber **[Measure]** (1) Clean the bare glass after removing the fiber coating. (2) Cleave the fiber again. (3) Clean the illumination LED in the hood.
Device error **System abort** **Exception Error**	**[Description]** A system error occurred. **[Measure]** (1) Turn off the splicer and turn it on again. * If this error repeatedly occurs, please contact Technical Support.

Appendix

Program setting



Changing parameter