OME1624005

Fusion Splicer

T-400S

Guide to operation

SUMITOMO ELECTRIC INDUSTRIES, LTD.

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 warnings instructions given in this operation manual.

Use your splicer only for its intended purpose.

♦ The meaning of these symbols

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

○Symbol used in the product

	This symbol, where it appears on the unit, indicates that hazardous voltage is present inside of the splicer.

○The meaning of these symbols

	This symbol indicates a warning, caution, or danger and alerts you important instructions have been included on the product or in the manual.
	This symbol indicates actions that are prohibited.
	This symbol indicates actions that must be taken.

○The meaning of Warning and Caution

 Warning	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.
 Caution	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.

Be sure to read all the following warnings and cautions before use.

*Some of functions mentioned in this manual may not be incorporated in the product depending on the countries it is shipped to.

 [Warning]

<Setting up, transportation and using splicer>

	1. This fusion splicer performs an arc discharge. Do not use the splicer in a hazardous location in which inflammable gas can generate or only electrical apparatus for explosive gas atmosphere can be used. 2. Never use spray cleaners such as Freon or Flammable gas on the splicer. Decomposition of arc by heat will cause toxic gas, or abnormal arc may result in damage or fire.

	3. Do not use and store the splicer out of the locations defined in a brochure and this manual. Doing so can cause splicer malfunction or deterioration, resulting in fire or electric shock. 4. To reduce the risk of fire, electric shock or malfunction, do not allow the splicer to be exposed to rain and get liquid such as water or a metallic object inside the splicer. Doing so can cause fire, electric shock or malfunction by shorting out internal components. 5. Never use the battery pack, AC adapter and power cables for the machines other than the specified splicer. Doing so can cause these items to damage, resulting in fire or heat generation. 6. Do not make mechanical or electrical modifications to the splicer since this may expose you to dangerous voltage or other hazards. 7. Do not touch the electrodes during and after arc discharge. Doing so can cause personal injury or electric shock. 8. The heating plate of the heat shrink oven may be hot during heating. Do not touch the protection sleeve directly after heating. Doing so can cause burn. A protection sleeve may also be hot after heating. Handle with care. 9. Do not operate the splicer in the rain. Doing so can cause AC adapter or battery pack to be short-circuited. 10. Do not expose the splicer to extremely high temperature and high humidity or to direct sunlight for prolonged periods. 11. Do not continuously use the heat shrink oven for long hours, keeping it high temperature. Doing so can cause heat shrink oven to malfunction. The following case is the exception for repairing and replacing the product free of charge: The Heating duration is set to a long time (e.g. 180 sec.) and the Finish temperature is set to a high temperature (e.g. 200 °C). The heat shrink oven is used for long hours by continuing to press the Heat key shortly after the heat cycle is completed. 12. Only use alcohol to clean the splicer. To prevent malfunction and damage, do not use any other kind of chemicals. 13. Never use spray cleaners such as Freon or flammable gas on the splicer. Heat by arc can cause chemical reactions to occur to gas component, which will deteriorate a microscope lens, resulting in a loss of splicing capability. 14. Parts that compose the heat shrink ovens might become high temperatures. When those parts are damaged, do not use it and contact our service center. 15. Because it is likely to injure by shards of glass when the monitor is damaged, do not use it and contact our service center. 16. When parts that compose this product and the accessory (battery pack, AC adapter, and power cord, etc.) are damaged, do not use it and contact our service center. 17. If this product gets wet with dew or the like, do not turn it on. 18. Do not use this product near the electronic equipment that handles a highly accurate control and the faint signal such as the heart pacer. The influence of the miss-operation of electronic equipment might be given. 19. Alcohol is prohibited on air transportation. Empty alcohol dispenser before transportation.

	20. Avoid places with too much dust or dirt. Dirt or dust that can accumulate in the fusion splicer causes short circuit and insufficient cooling, which may lead to splicer malfunction or deterioration, resulting in fire or electric shock. 21. Only use the battery pack, AC adapter and power supply cord for the splicer as defined in this manual. Failure to do so can cause these items or the fusion splicer to damage, resulting in fire or electric shock. 22. Only use a voltage within the indicated power voltage. Failure to do so can cause fire or electric shock. 23. Check for condensation before operation. If this product gets wet with dew or the like, leave it in a room temperature for about one day before turning it on. If water or other liquid, a metallic object or other foreign substance gets inside the splicer, immediately turn off the power and disconnect the power plug. Contact our qualified service personnel. 24. In a high location, take safety measures to prevent fall of operators. Dropping the splicer could result in personal injury. Fix the splicer to a worktable or a tripod with the screw on the bottom of the splicer. 25. If an abnormal condition such as unusual noise, smoke or unusual odor occurs, immediately turn off the power and disconnect the power plug. Next, contact our qualified service personnel. 26. Be sure to turn off the splicer and unplug the power cord or remove the battery pack before replacing the electrodes. 27. Only use Sumitomo genuine electrodes (ER-10). And use the splicer with electrodes installed in it. Failure to do so can cause the splicer to damage, resulting in fire, electric shock or malfunction. 28. If the heat shrink oven keeps running for a prolonged time, the surrounding parts may become hot. Pay attention to the heat particularly in a high temperature environment and use protective gloves as needed. 29. The supplied alcohol dispenser is not an airtight container. Pour alcohol into an airtight container before transportation, so it does not spill out.

<Handling of power cord and plug >

	1. To reduce the risk of electric shock, do not plug/unplug the power cord or remove the battery pack with wet hands.
	2. Disconnect the power cord by grasping the plug, not the cord. Failure to do so can cause damage to the power cord, resulting in fire, electric shock or malfunction. 3. Before charging the battery pack, make sure that the pins of the battery charge cord are not bent or broken. Using the battery charge cord with a bent or broken pin can cause internal short circuit, resulting in fire or electric shock. 4. In case AC power supply cord is damaged, replace with approved cord with appropriate voltage and current rating.

<Handling of battery pack>

	1. Do not burn the battery pack or throw it into a fire. Doing so can cause heat generation, bursting and fire. 2. Do not place the battery pack in microwave ovens and high-pressure containers. 3. Do not let water or sea water wet or soak the battery pack. Safety and protective devices to prevent danger are built in the battery pack. If these devices are damaged, excessive current flow can cause abnormal chemical reaction in battery fluid, heat generation, bursting and fire. 4. Do not throw or impact the battery pack. Safety and protective devices to prevent danger are built in the battery pack. If these devices are damaged, excessive current flow can cause abnormal chemical reaction in battery fluid, heat generation, bursting and fire. 5. Do not pierce the battery pack with nails, strike the battery pack with a hammer, or step on the battery pack. Doing so can cause internal short circuit, heat generation, bursting and fire. 6. Do not disassemble or modify the battery pack. Safety and protective devices to prevent danger are built in the battery pack. If these devices are damaged, excessive current flow can cause loss of control during charging or discharging of the battery pack, heat generation, bursting and fire. 7. Make sure the polarities are correctly connected. Do not attempt to connect the battery pack or other equipment when you cannot do. Reversed connections can cause abnormal chemical reaction in battery fluid, heat generation, bursting and fire. 8. Do not solder any lead wires directly to the battery pack. Do not directly connect the positive and negative terminals with a conductive material such as a wire. Do not carry or store the battery pack together with any personal jewelry, hairpins or other Metallic objects. Doing so can cause an electrical short circuit. Also excessive current flow can cause abnormal chemical reaction in battery, heat generation, bursting and fire.
	9. Only use a specified battery charger. Failure to do so can cause the battery to be overcharged or excessive current flow can cause abnormal chemical reaction in battery fluid, heat generation, bursting and fire. 10. Use the battery pack only for the application for which it was designed. Failure to do so will result in a loss of performance and a shortened life expectancy. Also excessive current flow can cause loss of control during charging or discharging of the battery pack heat generation, bursting and fire.

⚠ [Caution]

<Transportation and storage>

	1. This product is a precision instrument. When transporting the splicer, use its specified carrying case to protect the splicer from excessive shock or impact. 2. Do not use and store the splicer out of the locations defined in a brochure and this manual. Failure to do so can cause splicer malfunction or deterioration, resulting in fire or electric shock. 3. Do not store any items other than the product, package contents and optional accessories in the carrying case. Overloading the case can cause damage to the body of the carrying case, case handle, strap and latch. 4. Do not throw or fall the carrying case. Doing so can cause damage to the body of the carrying case, case handle, strap and latch. 5. Do not use a carrying case where there is a visible sign of damage and screw looseness. 6. Do not store the hand strap in the windshield. It causes damage to the machine. 7. Do not carry the machine grabbing the hood or the monitor. 8. Do not brandish the machine with the hand strap, and brandish neither AC adapter nor the power cord. There are fear of machine damage and the injury. 9. Do not use the machine with the lid of the battery pack slot opened.
	10. When shipping this product, inform the transport company that this product contains the lithium-Ion battery. Follow the direction of the transport company. 11. Before carrying the case, make sure that there is no visible sign of damage and screw looseness on the handle and latch. If the case with damage and screw looseness is carried, it could drop down, causing personal injury or splicer malfunction. 12. Before picking up the case, ensure that the latch is completely locked. Carrying the case with the latch unlocked can cause the case to fall open and result in personal injury or splicer malfunction due to heavy impact. 13. Be careful that your fingers not to be caught in the hinge part and the lid when you open and shut the case. 14. Confirm the work table of the carrying case is surely fixed to the case when you carry it. 15. Do not modify the handle, strap or strap attachment points. Only use the carrying strap supplied by us. 16. Avoid places with too much dust or dirt. Dirt or dust that can accumulate in the fusion splicer causes short circuit and insufficient cooling, which may lead to splicer malfunction or deterioration, resulting in fire or electric shock. 17. If you are not going to use the splicer, remove the battery pack from the splicer. Failure to do so will shorten a battery life. 18. Unplug the fusion splicer or remove the battery pack before attempting any maintenance or if not using the splicer for a prolonged period. Failure to do so can cause fire. 19. The monitor, the hood, and the heater clamping, etc. do the opening and shutting operation. Be careful of your fingers not to be caught.

<Battery handling and charging>

	1. Make sure the polarities are correctly connected. Do not attempt to connect the battery pack or other equipment when you cannot do. Reversed connections can cause abnormal chemical reaction in battery fluid, heat generation, bursting and fire. 2. Do not carry or store the battery pack together with any personal jewelry, hairpins or other Metallic objects. Doing so can cause an electrical short circuit. Also excessive current flow can cause abnormal chemical reaction in battery fluid, heat generation, bursting and fire. 3. Do not use a dry cell battery and the batteries differing in capacity, type, and manufacturer. Doing so can cause heat generation, bursting and fire.
	4. The battery's optimum charging temperature range is 0 to 40˚C. Under high temperature conditions such as in direct sunlight or near a fire, safety and protective devices to prevent danger which are built in the battery pack will be activated, resulting in failure of charging. Or if these devices are damaged, excessive current flow can cause loss of control during charging or discharging of the battery pack, heat generation, bursting and fire. Avoid charging the battery pack at extremely low temperature (below 0˚C). Failure to do so may lead to deterioration in performance and battery leakage. 5. Always turn off the power to the splicer after use. Failure to do so can cause the battery to be over discharged and deteriorated in performance. 6. In the event the fluid inside the battery leaks, take extremely care not to expose it to your eyes and skin. If it does, immediately wash them thoroughly with clean water enough from the tap and consult a doctor urgently. 7. Unplug the fusion splicer or remove the battery pack before attempting any maintenance or if not using the splicer for a prolonged period. Failure to do so can cause fire. 8. Pay attention not to drop the battery pack when installing and removing it. Dropping the battery pack can cause personal injury.

<Handling of optical fiber >

	1. Never look into optical fibers or the end of an optical cable attached to the optical output when the device is active. The laser radiation can seriously damage your eyesight.
	2. Wear safety glasses at all times for protection from glass fibers.

< Others >

	1. Do not press the keys on the keypad with a sharp object (e.g. a ballpoint pen, screwdriver, or nail) Doing so will damage the keypad. 2. Do not press strongly the touch screen with a sharp object. 3. Do not use or store the battery pack at high temperature, such as in strong direct sunlight, and in cars during hot weather. This can cause deterioration of the battery. 4. Do not press the liquid crystal display with force or the display may fail. 5. Take care to keep spliced fiber straight. Do not flex it back and forth. Doing so can cause the spliced fiber to be broken, resulting in loss of the long term reliability of the fiber. 6. Do not use a canned air for cleaning. Chemical reaction may deteriorate the lens, resulting in a loss of splicing capability.

7. Check the voltage of AC power before use. If voltage or frequency beyond the range stated flows in the AC adapter, a safety and protective device to prevent danger is activated and the AC adapter will stop. In that case, a new AC adapter should be purchased. Please contact our qualified service personnel.
8. Charge the battery pack within the following temperature range. Failure to do so may lead to deterioration in performance.
   *Battery pack's required temperature range: 0°C ~ +40°C
9. Before using the battery pack for the first time, charge it.
10. The battery pack is consumables. Repeated charging and discharging decreases battery life.
11. Store the battery pack within the following temperature range. Failure to do so may lead to deterioration in performance.
    *Battery pack storage temperature range: -20°C ~ +50°C (if stored for less than 1 months) -20°C ~ +40°C (if stored for less than 3 months) -20°C ~ +20°C (if stored for less than 1 year)
12. Charge the battery pack fully before storing it for a prolonged period.
13. Even if you are not going to use the battery pack for a prolonged period, charge it once every 6 months.
14. If you are getting fewer than splice cycles per fully charged battery, consider replacing the battery pack by a new one.
15. When disposing of the battery pack, contact our qualified service personnel or follow the local regulations.
16. Although bright spots or dark spots may appear on the screen, this is a unique characteristic of liquid crystal displays, and such do not constitute or imply a machine defect.
17. We recommend your splicer to be annually over-hauled to keep it in good condition.
18. Glass fiber fragments are extremely sharp. Handle with care.
19. Turn off the splicer before maintenance work. Failure to do so can cause electric shock.
20. Be sure to remove moisture, alcohol or dust on the heater element with a dry cotton swab.
21. Only use Sumitomo genuine electrodes (ER-10). Failure to do so can cause the splicer to malfunction.
22. Do not clean the electrode. Doing so can cause unstable arcing performance.
23. Storing and transporting the splicer with the battery pack installed can cause the battery pack to be damaged or deteriorated, resulting in fire. Remove the battery pack from the splicer before storage.
24. Transporting the splicer with fiber holders loaded can cause the V-grooves or clamps to be damaged, resulting in the failure of splice. Remove the fiber holders from the splicer before storage.
25. Ensure that the strap should be completely secured.
26. Whenever you use the strap rings, be sure to hold the splicer with your hand. Failure to do so can cause the splicer to turn over and accessories such as fiber holder will drop.
27. If you don't use the strap, hold and carry the splicer with both hands securely.

RoHS Directive (2011/65/EU)

The T-400S optical fusion splicer is RoHS-compliant.

WEEE Directive (Waste Electrical and Electronic Equipment; 2002/96/EC)

The European Union has enacted a Directive 2002/96/EC on Waste Electrical and Electronic Equipment (WEEE Directive). This directive is applicable in the European Union member states. The crossed out wheelie bin symbol found on our products indicates that it should not be disposed of together with household waste.

To prevent possible harm to human health and the environment, waste electrical equipment must be disposed of in an approved and environmentally safe recycling process.

For further information on how to dispose of the product correctly, please contact the product supplier, or the local authority responsible for waste disposal in your area.

IMPORTANT: REGION LIMITATION

WARNING:

This product is sold for the use in a limited sales area and the sale, resale, transfer, lease or otherwise of this product to the other regions is prohibited, except written consent of Sumitomo Electric Industries, LTD.

YOU NEED TO AGREE ABOUT A SOFTWARE LICENCE AND REGION LIMITATION BEFORE USE.

Reference of Sales Area and Sumitomo Sales & Service Representatives:

Sales Area	Sumitomo Sales and Service Representatives	
North America	SEL	Sumitomo Electric Lightwave Corp.
Europe, Middle east, Africa (EMEA),UK	SEEL	Sumitomo Electric Europe Ltd.
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	SEAC	Sumiden Asia(Shenzhen) Co., Ltd.
Thai, Vietnam	SET	Sumitomo Electric(Thailand) Limited
Indonesia, Singapore	SEAP	Sumitomo Electric Asia Pacific Pte. Ltd.
India, South Asia	SETI	SEI Trading India Pvt. Ltd.
Philippines	SEPI	SEI (Philippines) Incorporated
Japan	SEI	Sumitomo Electric Industries ,Ltd.

Other sales area and authorized sales and service agencies may be provided according to the country, area and trading conditions. Refer to the information which appears on the splicer screen.

IMPORTANT: PATENT NOTICE

This product and/or the use of this product are/is covered by one or more of the following Patents of Sumitomo Electric Industries, LTD.:

Australia	Design No(s).: 314929; 329420
Canada	Design No(s).: 120205; 133128
China P. Rep.	Patent No(s).: 98109577.1; 200780001246.9 Design No(s).: 200730144402.X; 200930286514.8
Europe	Design No(s).: 000712583-0001; 001183206-0001
Germany	Patent No(s).: 0880039;
Italy	Patent No(s).: 1355177;
Sweden	Patent No(s).: 0880039;
United Kingdom	Patent No(s).: 0880039;
India	Design No(s).: 209372; 225957
Japan	Patent No(s).: 3065271; 3119822; 3952822; 4032960; 4196972; 4305468; 4613796 Design No(s).: 1311936; 1382022
Malaysia	Design No(s).: MY07-00454-0101; MY09-01316-0101
Singapore	Design No(s).: D2007/402/A; D2009/1085/Z
South Korea	Design No(s).: 30-0472617; 30-0594853
Taiwan	Design No(s).: D122221; D140150
United States	Patent No(s).: 6,206,583; 7,546,020 Design No(s).: D578,072; D628,462S

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c) create an execution report of construction based on displayed information, and the writings.
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.
e) make one copy of the writings for archival or backup purpose.

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If any provision of this agreement is declared by the court of competent jurisdiction to be invalid, illegal, or unenforceable, such provision shall be severed from the agreement and the other provisions shall remain in full force and effect.

Table of contents

Sumitomo Electric Industries, Ltd. reserves the right to change the specification or design without notice and may therefore not coincide with the contents of this manual. E&OE

1. General

Thank you very much for purchasing the T-400S Fusion Splicer (hereinafter called “the T-400S”).

The T-400S automatically pre-inspects and aligns a pair of optical single fibers with equipped microscopes, and then fuses them together with heat from an electric arc to form a low-loss splice. A protection sleeve is applied over the bare glass and cured in the built-in heat shrink oven.
Before using the T-400S, read all instructions completely.

> Caution
>
> Read this manual carefully in its entirety to fully understand machine capabilities. Save this manual in a location in which you can easily get to see.

Product overview

Optical fiber requirement

The T-400S can splice the following optical fiber types.

Material	Silica glass
Profile types	SMF (ITU-T G.652), MMF (ITU-T G.651), DSF (ITU-T G.653), NZDSF (ITU-T G.655, G.656), BIF (ITU-T G.657)
Fiber diameter	125µm
Fiber coating diameter	250µm-3mm by multi clamp
Fiber count	Single fiber
Cleave length *1	5 - 16mm *2

*1 The applicable fiber protection sleeves vary depending on the cleave length.
*2 Over 250µm coating diameter with the length of less than 8mm require fiber holder operation.

Features overview

The T-400S key features are:

- **Auto start** (For more information, refer to page 5-3.)
  In addition to the function that automatically starts the splicing process when the hood is closed, the function that automatically starts the heating cycle when fiber is placed into the heat shrink oven is provided.
- **Fully automatic splice mode (Auto mode)**
  Automatic arc calibration (For more information, refer to page 2-12.)
  T-400S analyzes the arc and has the function to calibrate the arc condition automatically at each splice. Therefore, arc test is not needed usually in the Auto mode.
- **ECO Mode**
  Power consumption can be reduced by changing monitor brightness and heat shrink oven time. The splice cycle per battery in ECO mode can also be greater than in normal mode.

Standard package

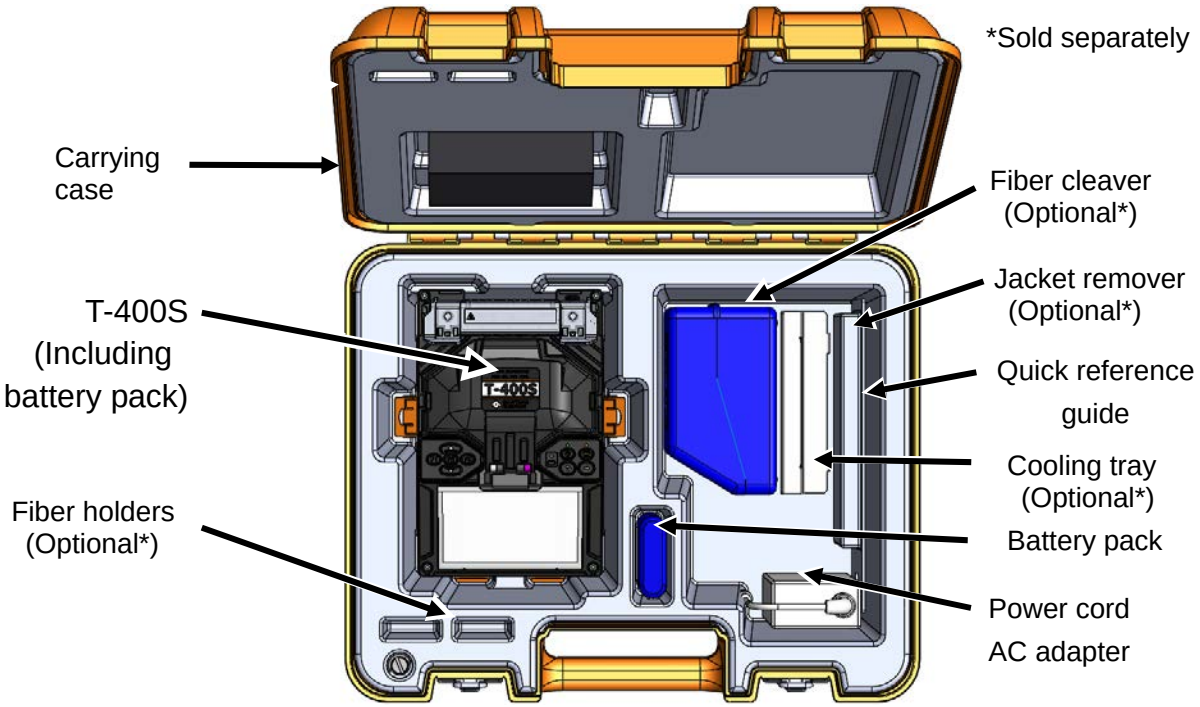
Here is an example of T-400S standard package.

Package contents (example)

No.	Description	Part number	Quantity
1	Fusion splicer T-400S	T-400S	1 pc
2	AC adapter	ADC-15	1 pc
3	Power cord	PC-AC＜X＞*1 -2P	1 pc
4	Battery pack	BU-15	1 pc
5	Quick reference guide*2	OME1624008	1 pc
6	Carrying case	CC-15	1 pc

*1 ：X = 2(USA), 3(EU), 5(UK/HK), 6(AUS), 8(CHINA), 9(INDIA)
*2: The latest version is provided.

The above package is an example.
The package contents vary depending on the customers' requests.



Optional accessories

The following optional accessories are provided for the T-400S. For further details, please contact our sales personnel.

Part name	Part No.	Description	Quantity
<Optional accessories for main unit>			
Battery pack	BU-15	Li-ion battery for T-400S(10.8V, 35.64Wh)	1 pc
Car battery cable	PC-V25	Plugged into a car's cigarette light jack to supply power to splicer	1 pc
AC adapter	ADC-15	AC adapter for T-400S	1 pc
Fiber holders	FHS-025	For 0.25mm coated fiber	1 pair
	FHS-09	For 0.9mm coated fiber	1 pair
	FHS-05	For 0.5mm coated fiber	1 pair
	FHS-025/LB5	For 0.9mm loose buffered single fiber	1 pair
	FHS-SOC	For other brands' Splice on connector stabs	1 pc
	FHD-1	For drop and in door cable	1 pair
Cooling tray	FCT-15	Cooling tray for T-400S	1 pc
Work table	WT-15	Handy table with neck strap	1 set
USB cable	USB 2.0 cable	Housing dimensions 8mm x 4.8mm	1 pc
<Tools>			
Fiber cleaver	FC-5S	Applicable coating diameter: 250 - 900μm Applicable fiber diameter: 125μm Replacement blade for FC-6R and FC-8R: FCP-20BL(7R) Replacement blade for FC-5S and FC-6: FCP-20BL	1 pc
	FC-8R-FC		1 pc
	FC-8R-F		1 pc
	FC-6S(-C)		1 pc
	FC-6RS(-C)		1 pc
	FC-6S-5C		1 pc
Jacket remover	JR-M03	Jacket remover for single fiber	1 pc
	JR-25	Jacket remover for single fiber	1 pc
	JR-26-D	Remover for drop cable splicing	1 pc
Dispenser	HR-3	Dispenser for alcohol	1 pc
V-groove cleaning brush	VGT-2	Brush for cleaning V-groove	1 pc
Loose tube cutter	LTC-01	—	1 pc

Consumables

Fiber protection sleeves, electrodes and battery pack are consumables. Please place an order if you need any.

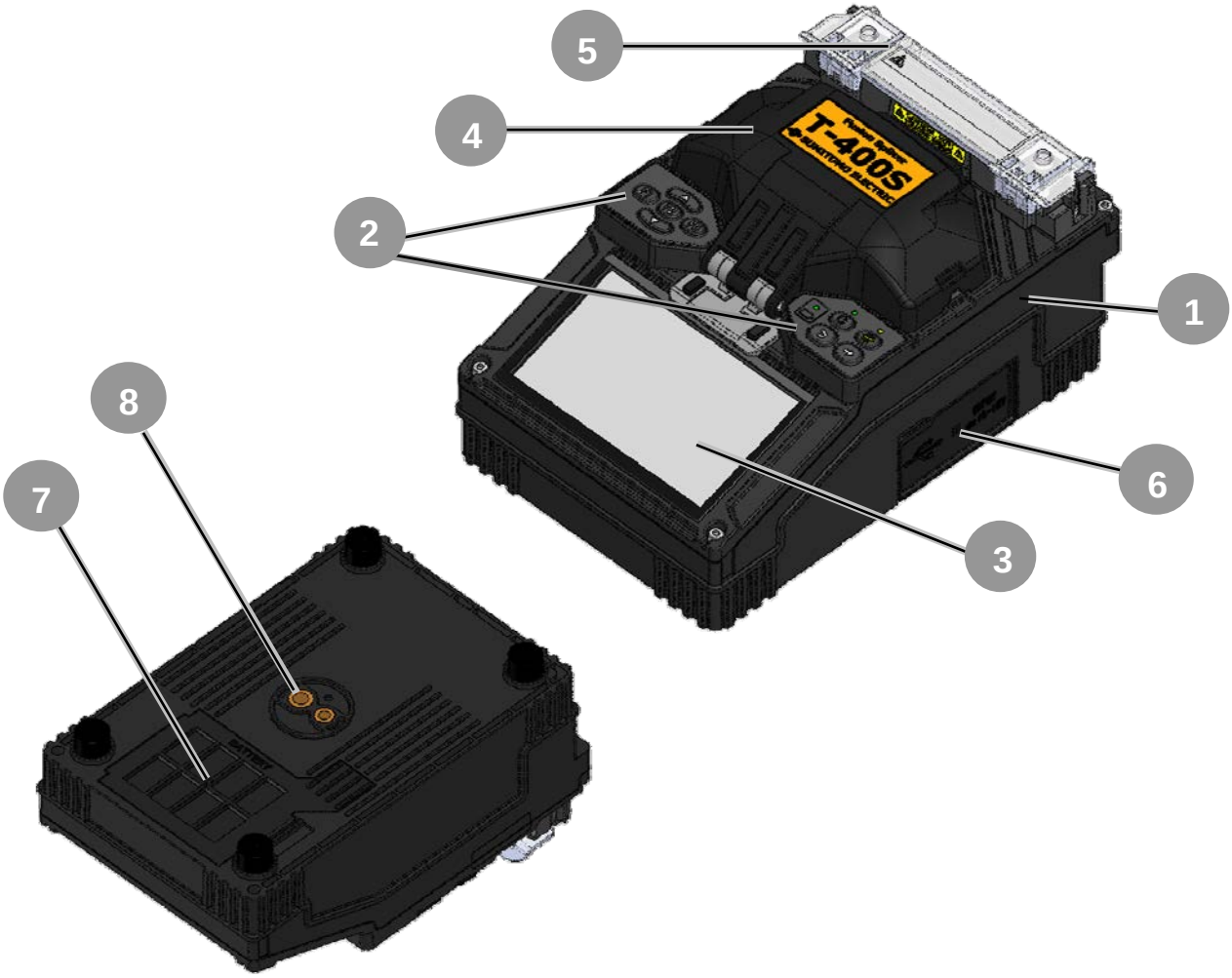
Part name	Part No.	Description	Quantity
Fiber protection sleeves	FPS-1	For single fiber φ0.25mm~0.9mm Length 60mm, Cleave length ≤16mm	50 pcs/pack
	FPS-61-2.6	For single fiber φ0.25mm~0.9mm Length 61mm, Cleave length ≤16mm	100 pcs/pack
	FPS-40	For single fiber φ0.25mm~0.9mm Length 40mm, Cleave length ≤10mm	50 pcs/pack
Fiber protection sleeve for cable sheath	FPS-D60	For drop cable, small-sized indoor cable Length 60mm, Cleave length ≤10mm	25 pcs/pack
Electrodes	ER-10	These parts degrade with time and usage and cannot be recycled. New parts as a replacement should be purchased.	1 pair
Battery pack	BU-15		1 pc

- Regarding standard equipment, consumables, or optional accessories, please order the new item you need with the item description and part number to our sales personnel.

- For repair, please read “Warranty and repair service” at page 7-2 and contact our maintenance service center.

Structure

Fusion splicer



1 Main body
T-400S fusion splicer

2 Keypad
Keys are used to turn on/off the power, perform a splice and heat shrink protection, and setup functions.

3 Monitor
Displays fiber image, splice data and menu.

4 Hood
Provides protection from the environment.

5 Heat shrink oven
Used to heat and shrink fiber protection sleeves.

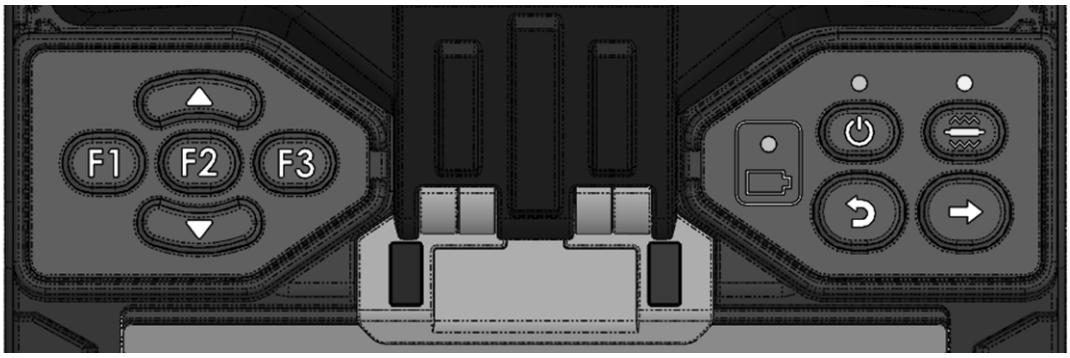
6 Connector panel
Protects DC input connector and USB connectors from foreign objects such as dust.

7 Battery cover
Protects a battery from foreign objects such as dust.

8 Threaded female screw
A dedicated working tray or tripod can be secured with the screw.

Keypad

The keys are provided on the top of the splicer.



Heat shrink oven key/LED

Starts the heat shrink oven process.
The LED illuminates while the process is in progress and the oven is heated up.

Power key/LED

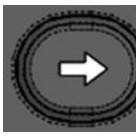
Switches ON/OFF the splicer.
The LED illuminates during power on.

Function keys

Correspond to the icons located on the left upper corner of the screen and are pressed to use the function being displayed.

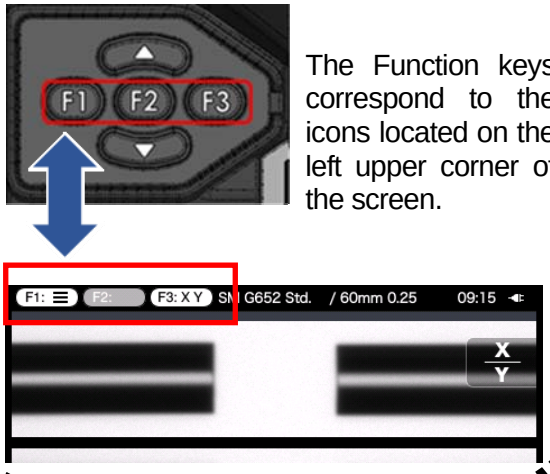
RESET key

Cancels the splicing process and goes back to a previous step.



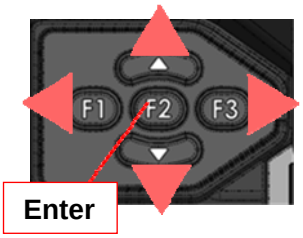
SET key

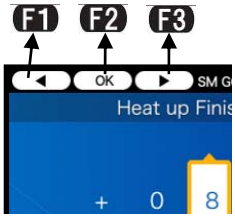
Starts the splicing process and advances to a next step.



The Function keys correspond to the icons located on the left upper corner of the screen.

The left-hand keys are sometimes used to move the cursor "□" up and down, and to left and right. F2 key is pressed to enter the selected item.

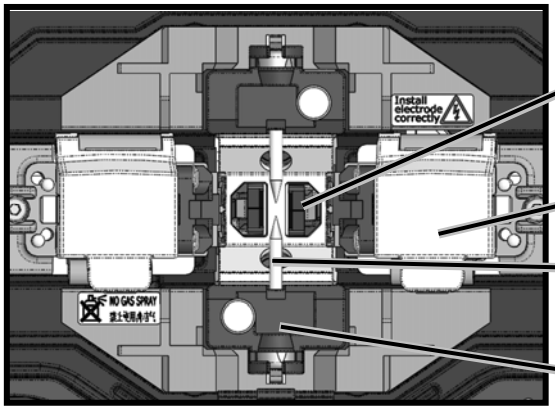




Caution

Do not press the keys on the keypad with a sharp object (e.g. a ballpoint pen, screwdriver, or nail) Doing so will damage the keypad.

V-grooves, electrodes, other components

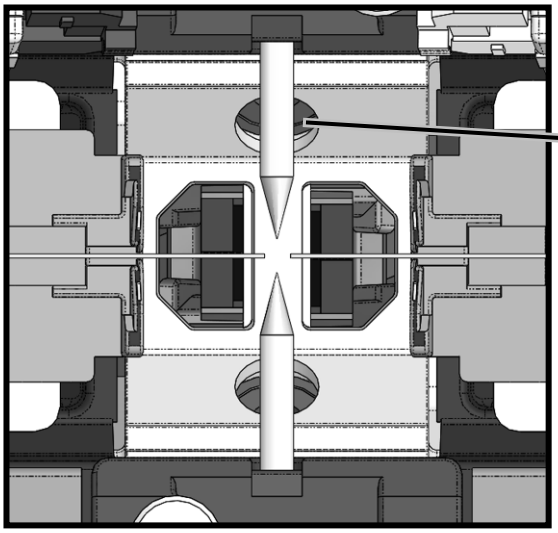


1 V-grooves
Keep bare fibers aligned.

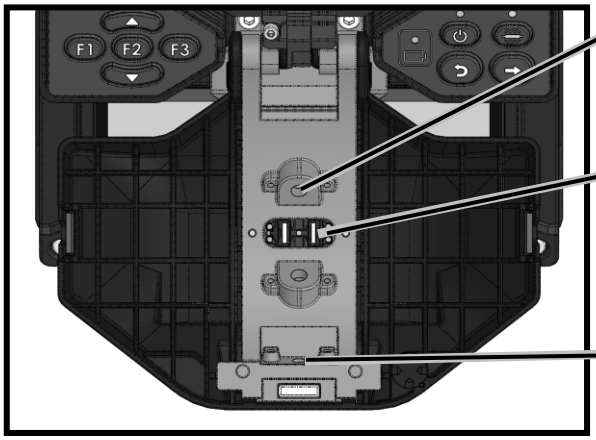
2 Fiber coating clamp
Holds fiber coating.

3 Electrodes
Arc is generated between the electrodes.

4 Electrode cover plate
Holds the electrode seated into the retaining groove.



5 Microscope objective lens
Fiber is observed with the lens.

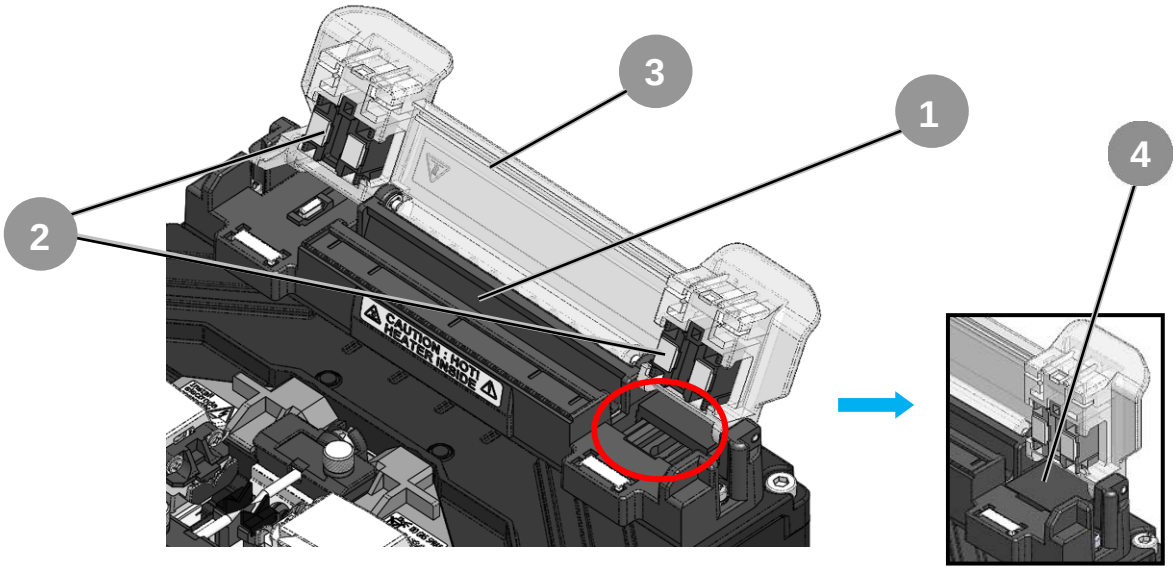


6 LED for fiber observation
Illuminates the fiber and make an image on the microscope.

7 Bare fiber pads
Hold fibers seated into the V-grooves. Normally they are attached to the hood.

8 V-groove illumination
Illuminates the V-groove. Lit when the hood is opened.

Heat shrink oven



1 Heating plate
Heats fiber protection sleeve.

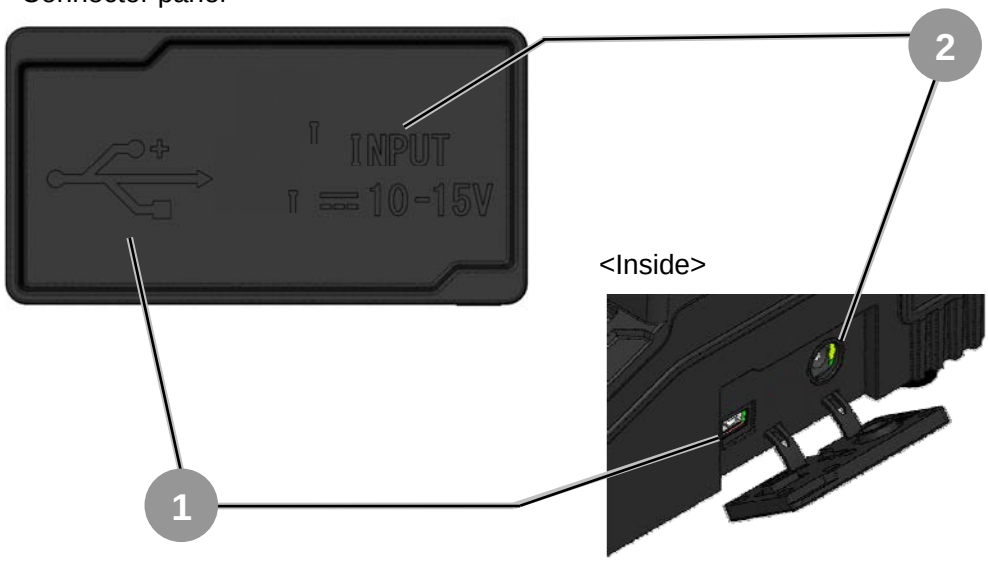
3 Heat shrink oven lid
Is a cover for the heat shrink oven and should be closed during the heat shrink oven process.

2 Heat shrink oven clamps
Hold fibers straight.

4 Slide block
For heat shrink protection some of Splice on connecters, slide the slide block and then place the connector therein. ▸**Refer to Page5-5.**

Connector panel

<Connector panel>

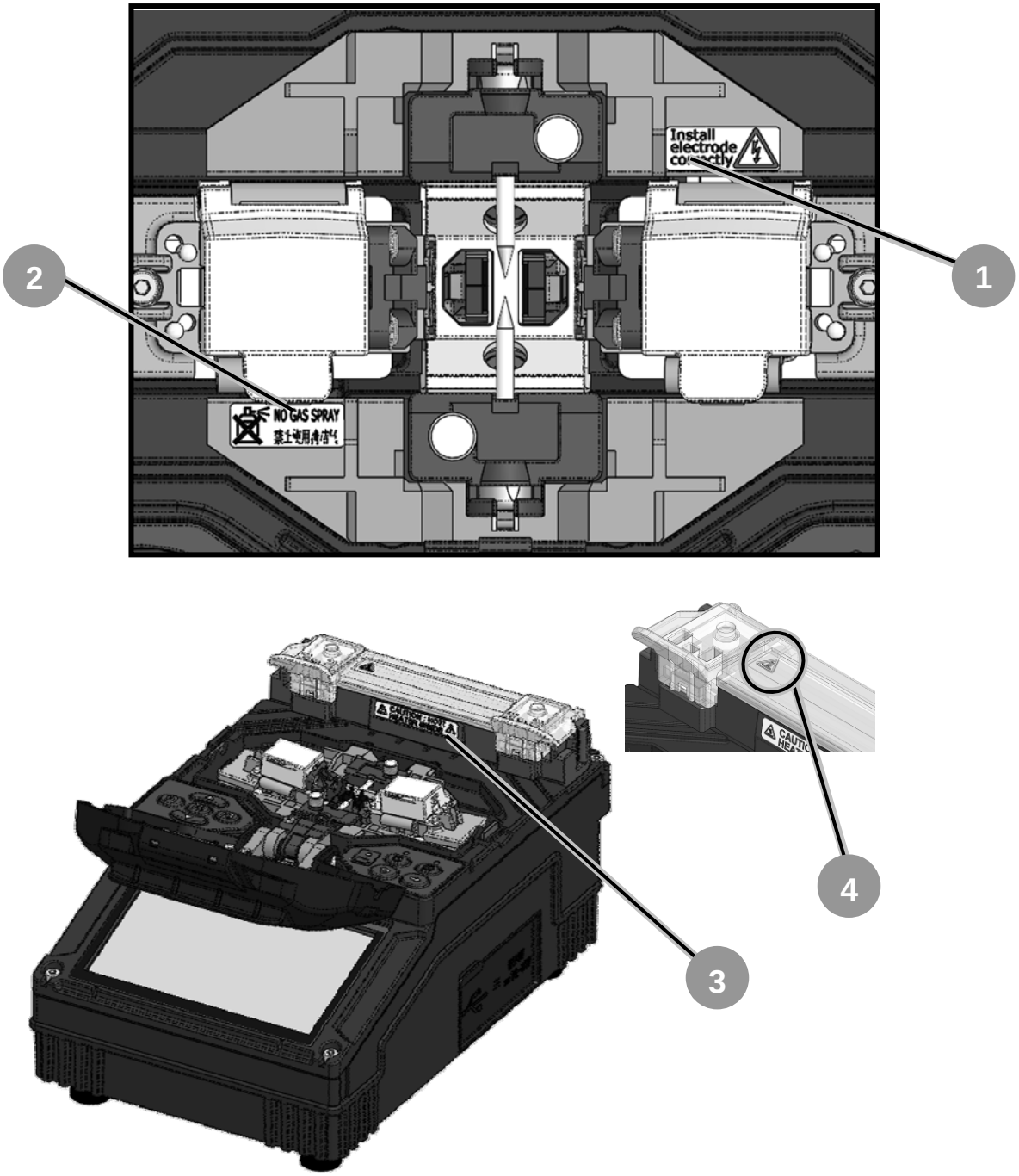


1 USB port
Used to download stored splice loss data when connected to a PC.

2 DC input terminal
Inputs power via AC adapter.

*The recommended dimensions for USB housing are 9mm x 5mm or smaller.

Caution label



1 **High voltage**
When an arc is discharged, a high voltage is generated in the electrode. Please pull out the power cord, and detach the battery pack when you touch the electrode for replacement.

2 **Prohibition of using spray**
Do not use any gas spray such as gas duster or canned air.

3 **High temperature heater**
4 The heat shrink oven may reach 200°C. Please take care of the heat when you use the oven.

2. Splice / Protection

[Preparation for splicing]

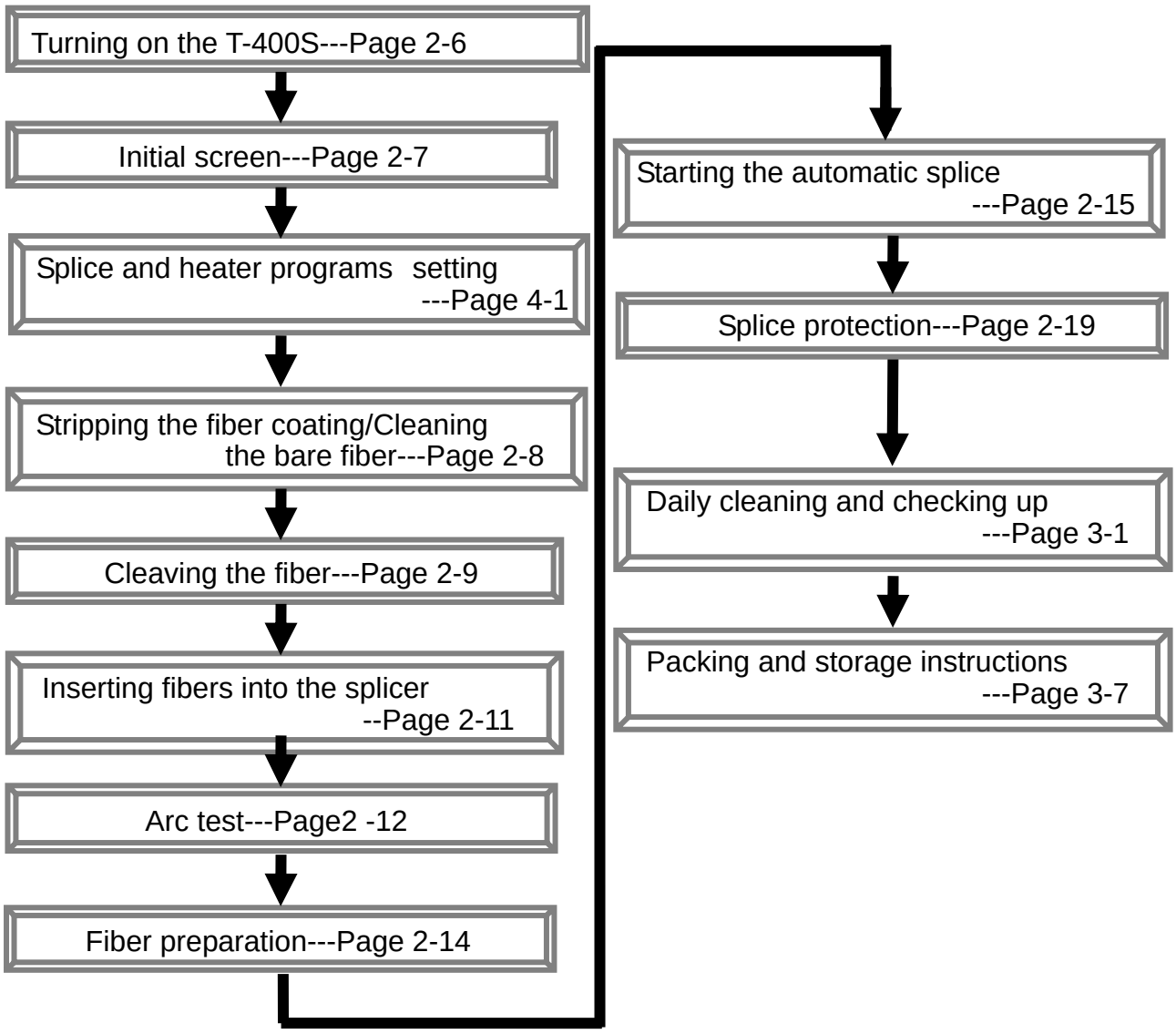
Before splicing, collect all of the necessary equipment.

- T-400S
- Optical fiber being spliced
- Jacket remover
- Fiber cleaver
- Pure (more than 99%) alcohol
- Lint-free gauze wipes
- Fiber protection sleeves*

*Note that the applicable fiber protection sleeves are different depending on the cleave length.

[Operating procedures]

The following is a summary of the steps required to make a splice with the fusion splicer. For further information on each step, please see the page described below.

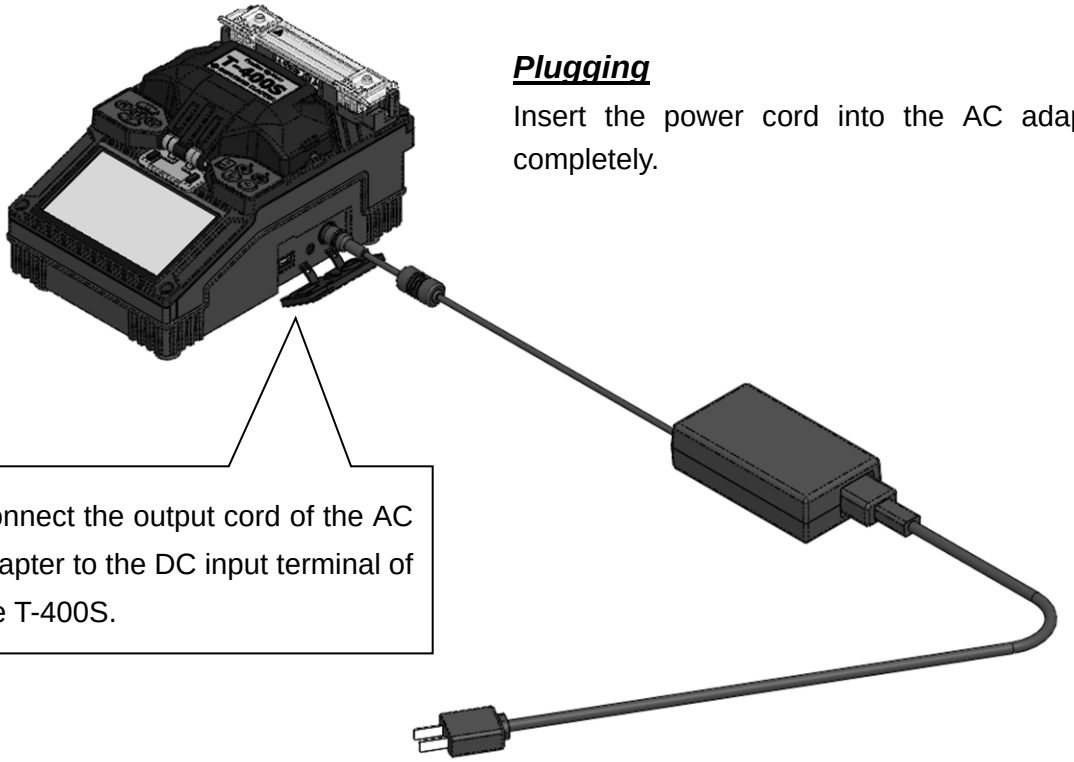


Preparing power supply

The power for the T-400S is supplied by AC adapter or battery.

AC operation

Please connect the AC adapter (ADC-15) with T-400S when you operate with the AC adapter.



Plugging

Insert the power cord into the AC adapter completely.

Connect the output cord of the AC adapter to the DC input terminal of the T-400S.

CAUTION

1. Please check the voltage of the AC power supply before using.

2. The safety function might be activated when voltage and frequency which are beyond specification are input to the AC adapter and the AC adapter will stop operating.
   In this case, it is necessary to purchase a new AC adapter. Please contact our maintenance service center.

3. Please place the AC adapter on an appropriate location so the power cord can be unplugged promptly in case of emergency. (Do not make the AC adapter out of reach.)

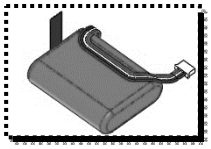
4. In case AC power supply cord is damaged, replace with approved cord with appropriate voltage and current rating.

Battery operation

Install the battery pack (BU-15) in the T-400S.
Turn off the splicer and disconnect the AC adapter before installing and removing the battery pack.

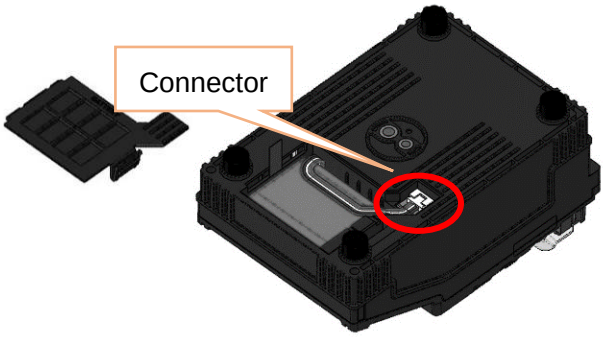
Battery pack installation

<1> Open the battery cover. Install the battery in the battery compartment so the wires and strap face outside. (See the picture on the right.)



<2> Connect the connector of the battery to the connector of the splicer.

<3> Close the battery cover properly.



CAUTION

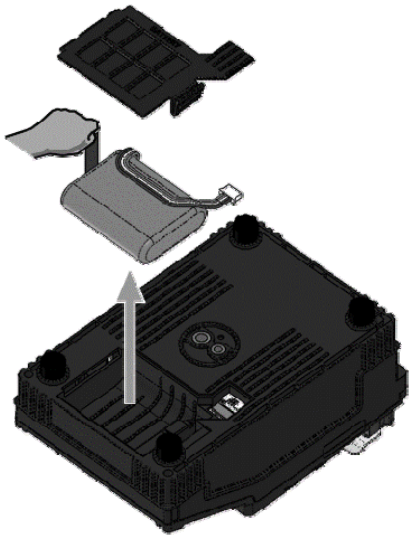
- Take care not to get the wires trapped.
- Make sure to connect the connector completely.

Battery pack removal

<1> Open the battery cover.

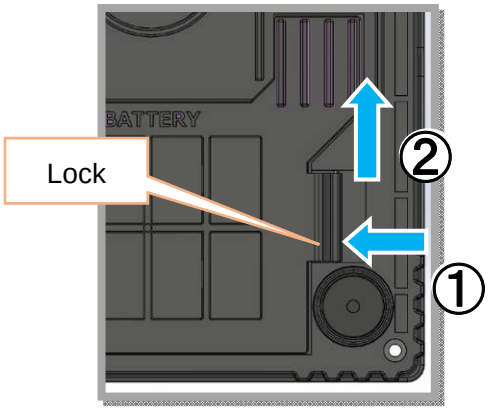
<2> Disconnect the connector of the battery from the splicer.

<3> While holding and lifting the strap up, remove the battery pack.

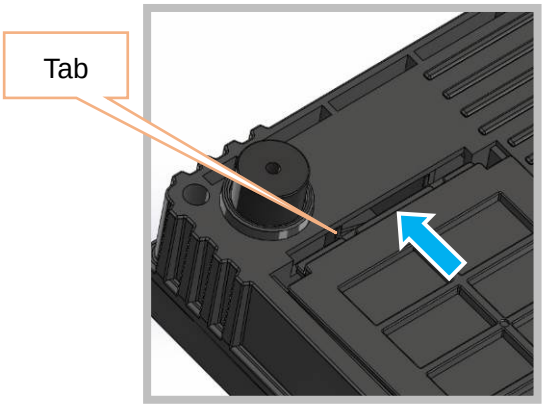


Opening/Closing the battery cover

- To open the battery cover, keep pushing the lock in the direction indicated by the arrow and lift it up.

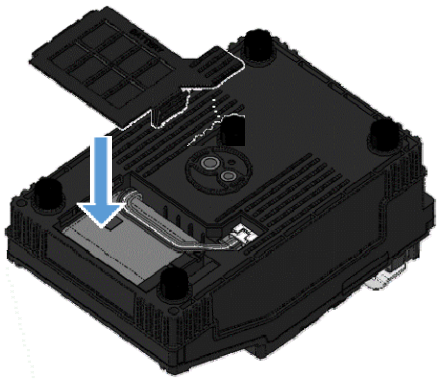


- To close the cover, re-fit the tab of the cover into the splicer until it clicks and then push the cover down.

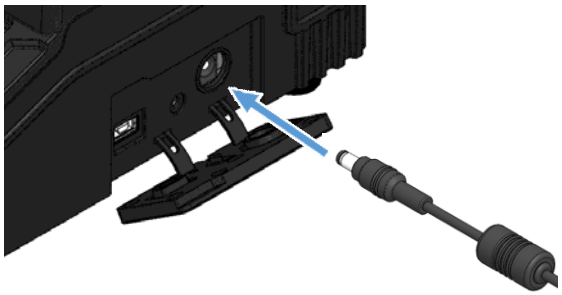


Battery charging

1. Install the battery pack in the T-400S.
2. Connect the AC adapter to the T-400S.
3. A green LED on the key pad lights up when charging starts.
4. It takes about 4 hours to finish charging though it varies depending on the remaining capacity. The green LED goes off when charging is complete.

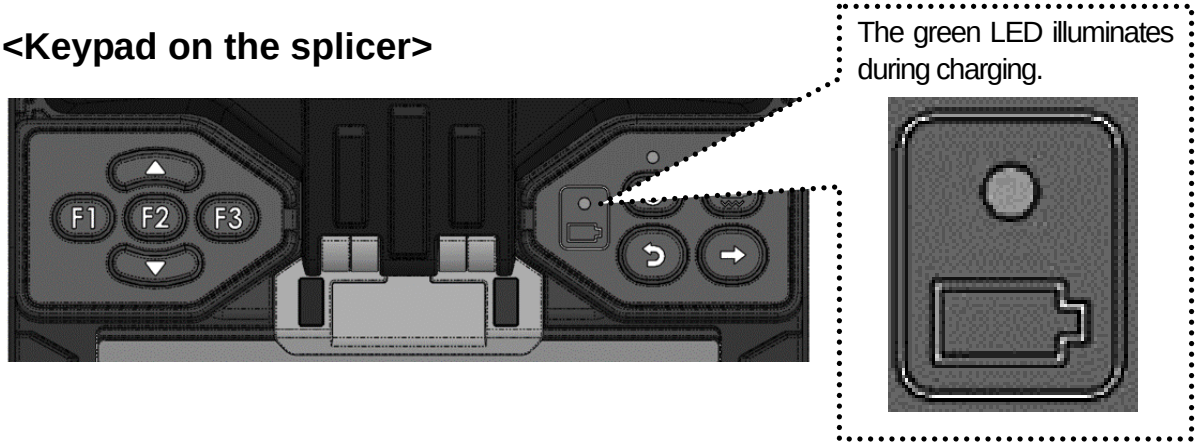


Install the battery pack



Connect the AC adapter

<Keypad on the splicer>



CAUTION

- The battery pack can be charged while the splicer is in use. However, it takes longer hours (about 14 hours) compared with the time when the splicer is powered off.
- Please charge the battery pack in the following temperature range. The battery pack might be deteriorated (decrease in capacity) at the temperature that exceeds this range.

***Temperature range for charging: 0°C~+40°C**

DC operation (car battery)

The car battery cable PC-V25(option) is required to operate the splicer on DC power (car battery). Contact a sales representative.

Precautions for battery pack

- **Before using the battery pack for the first time, charge the battery pack. (The battery is not fully charged before shipping.)**
- The battery pack is a consumable. Repeated charging and discharging decreases battery life.
- Store the battery pack within the following temperature range. Failure to do so may lead to deterioration in performance.
  *Battery pack storage temperature range:
  -20°C ~ +50°C (if stored for less than 1 month)
  -20°C ~ +40°C (if stored for less than 3 months)
  -20°C ~ +20°C (if stored for less than 1 year)
- Do not use or store the battery pack at high temperature, such as in strong direct sunlight, in cars during hot weather. This may cause leakage of battery fluid.
- If you are not going to use the battery pack for a long period, charge the battery pack once every 6 months.
- If you are not going to use the splicer, remove the battery pack from the splicer.

When should the battery be replaced?

When the splice frequency decreased extremely with fully charged battery, please purchase a new battery pack.

When disposing of the battery pack, contact our maintenance service center or follow the local regulations.

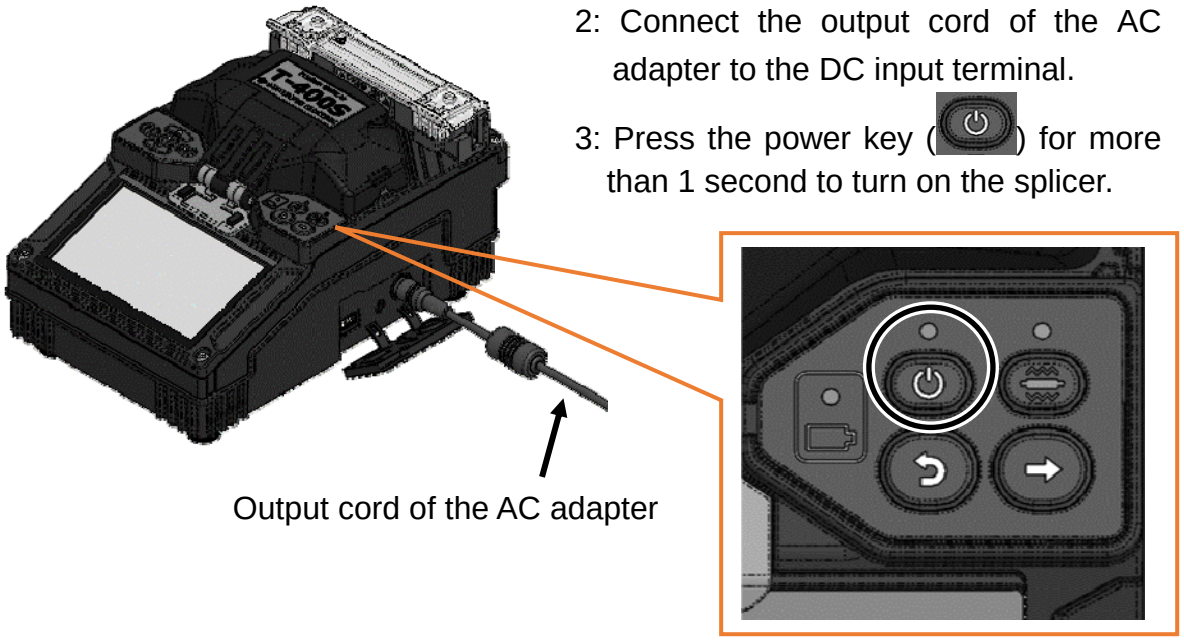
Operating procedures

Turning on the T- 400S

1: Ensure that the electrodes are fully inserted in the splicer.

2: Connect the output cord of the AC adapter to the DC input terminal.

3: Press the power key ( ) for more than 1 second to turn on the splicer.



If you press the power key right after connecting the power cord to the power supply module, it may take a few seconds until the splicer is powered on.

Special note on monitors

Although bright spots or dark spots may appear on the screen, this is a unique characteristic of liquid crystal displays, and such do not constitute or imply a machine defect.

Initial screen

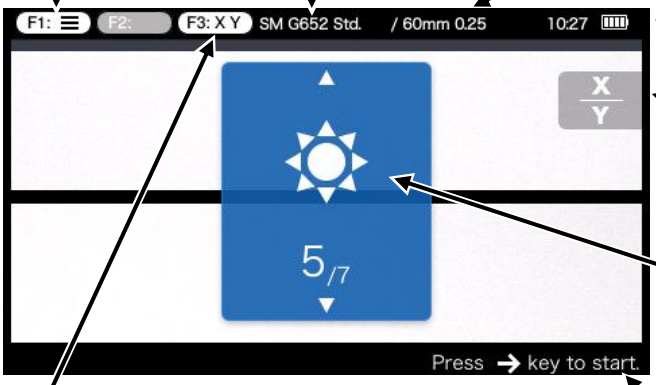
Startup screen

Initialize screen

Each motor of the splicer initializes after the power is turned on and the initial screen is displayed a few seconds later.

Initial screen

The function of each icon in the initial screen



Corresponds to F1 key. Press to go to function setup screen and program change screen.

Selected splice program is displayed. (Page 4-1 describes how to select splice program.)

Selected heater program is displayed. (Page 4-2 describes how to select heater program.)

Shows a power source type being used.
AC power:
Battery:

Shows a selected view type.

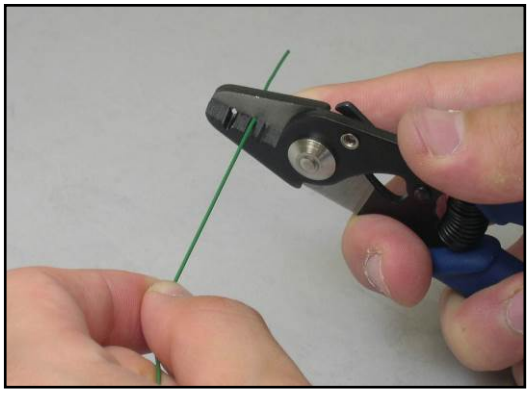
Screen brightness can be adjusted by pressing the up and down (▲▼) keys on the initial screen.

A message for key guidance is displayed.
Ex.) Press key to start (the splicing process).

Corresponds to F3 key. Every time this key is pressed, a view of the fiber is switched.
X/Y(X above Y) ⇒X/Y(X beside Y) ⇒X⇒Y

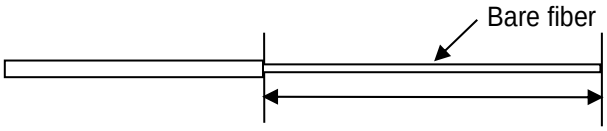
Stripping the fiber coating / Cleaning the bare fiber

1: Clean the fiber coating thoroughly to remove cable gel or other stains.



2: Strip Approx. 30~40mm of the fiber coating with a jacket remover. (An example shows use of Sumitomo JR-M03 jacket remover and the strip length shown below applies to any stripping tools. If you use other model, please refer to its operation manual.)

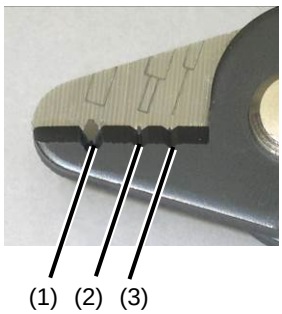
*If the stripping length is too long, the fiber cleaver cannot collect an off-cut in the off-cut collector.



Stripping length= Approx. 30~40mm

Use the correct groove of the remover according to the fiber coating diameter.
→ See figure <1>.

<1> Check the fiber coating diameter.



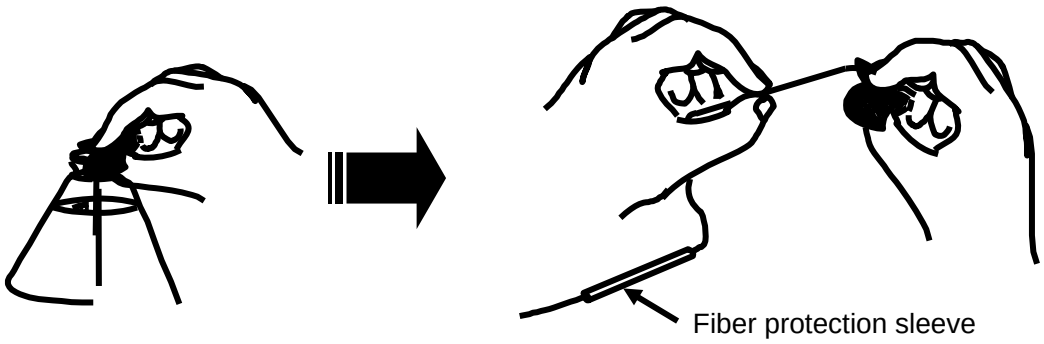
(1) Fiber coating diameter : 1.6-3mm
(2) Fiber coating diameter : 600-900μm
(3) Fiber coating diameter : 250μm

The JR-M03 strips approx. 25mm of fiber coating at a time. To strip 30~40mm of the fiber coating, repeat the stripping operation.

3: Repeat the stripping process for the other fiber.

4: Clean the bare fiber from the end of the fiber coating with a lint-free gauze pad moistened with pure alcohol. Pull the bare fiber through the gauze pad. Rotate the fiber by 90 degrees to remove any coating residue. Do not reuse the gauze pad that was used.

Keep the fiber squeaky clean.

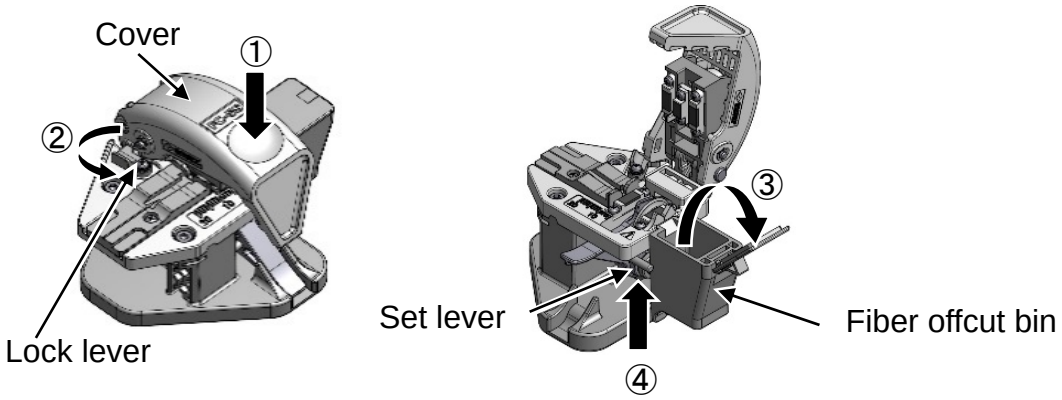


Cleaving the fiber

Cleave the fiber. (An example shows use of Sumitomo FC-5S cleaver. The cleave lengths described below are also applicable to any cleaving tools. If you use other models of cleavers, please refer to the operation manual.)

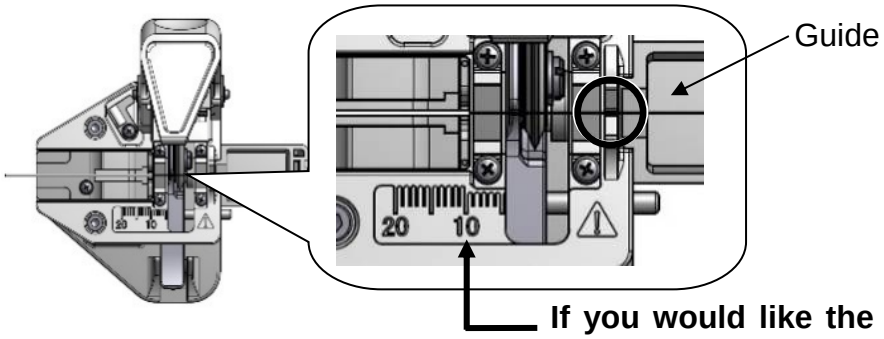
Applicable cleave length: 5mm-16mm (For φ0.25m coating dia.), 8-16mm (For >φ0.25mm coating dia.)

1:



・While pushing down the cover lightly, release the lock lever. The cover will open. Push up the set lever.

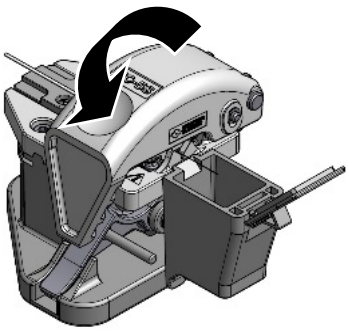
2:



If you would like the cleave length to be 10mm, set <u>the end of the fiber coating at 10mm mark on the ruler.</u>

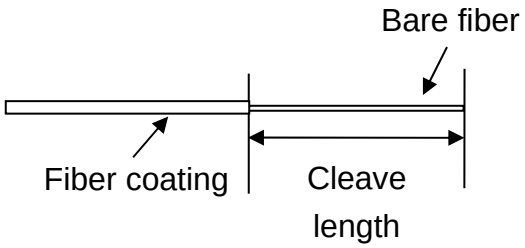
・Lower the fiber into the groove of the single fiber adapter and the guide. Make sure the end of the fiber coating is placed at an appropriate mark on the ruler corresponding to the cleave length you would like to get.

3:



・While holding the fiber with your finger, lower the cover and push it down. The fiber will be cleaved.

4: Open the cover. Take out the fiber and fiber offcut from the cleaver.



5: Insert the fiber into the splicer.

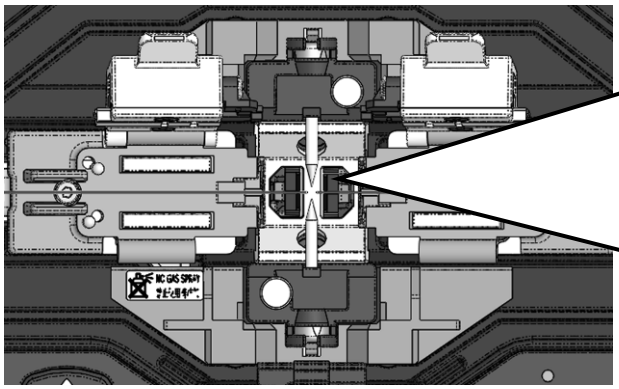
Caution

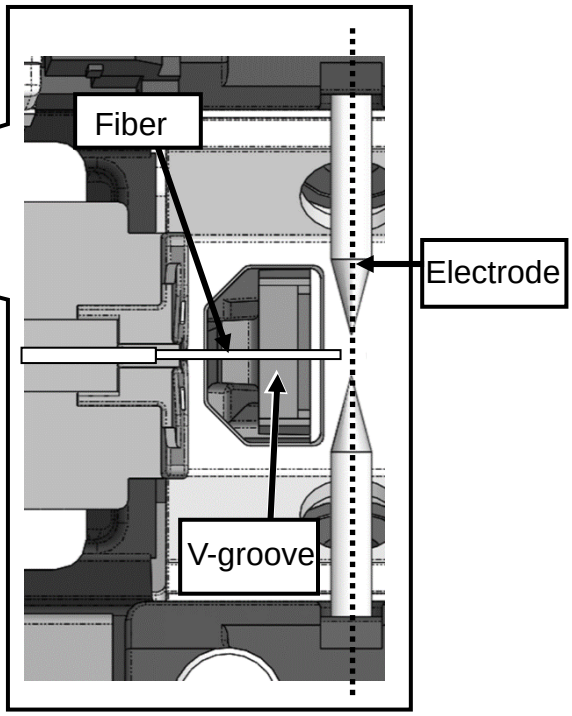
1. Do not re-clean the fiber after cleaving.
2. To avoid damaging or contaminating the delicate fiber ends, insert each fiber immediately after preparation.
3. Glass-fiber fragments are extremely sharp. Handle with care.

・With use of the fiber cleaver (FC-5S), a cleave length of 5-20mm is available (forφ0.25mm coating dia.) Please check the manual of fiber cleaver (FC-5S) for further detailed procedures.

Inserting the fiber into the splicer

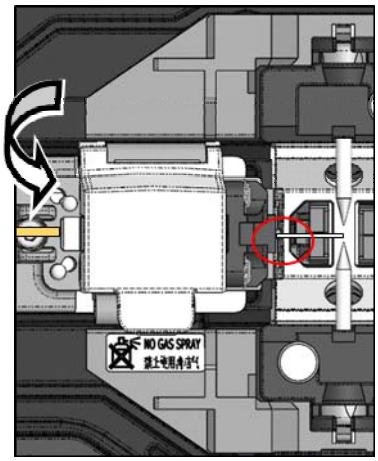
1: Open the hood.





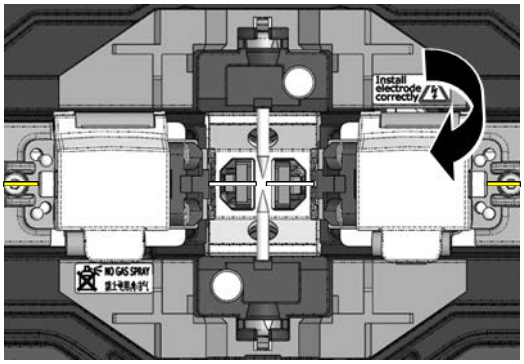
2: Open the fiber coating clamp lid.

3: Place the fiber so the end of the fiber is between the edge of v-groove and the electrode.



4: Close the fiber coating clamp lid.

Do not touch the fiber end face against any surface.



5: Repeat step 2 to 4 for the other fiber.

6: Close the hood.

7: Start an arc test or the splicing process.

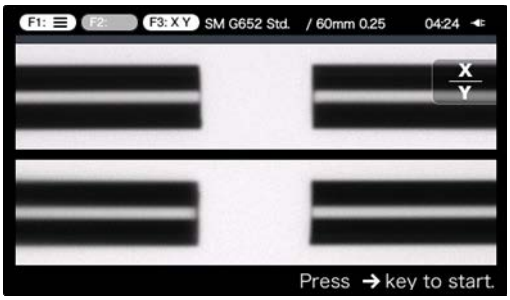
Arc test

Fusion splicing is a method of melting and connecting the point of the optical fiber by heat of electrical discharge. Because optimum arc conditions are different depending on the environments (atmospheric pressure and temperature) and the electrode conditions (wear-out and adhesion of the glass) and the optical fibers (manufacturer and SMF/MMF, etc.), appropriate arc condition is necessary to make a low splice loss. Please perform an arc test before splicing in the typical splice program such as “SMF Standard”.
In Auto mode, the T-400S has the function to analyze an arc and then calibrate the arc condition automatically at each splice. Therefore, an arc test is not needed usually in Auto mode.

As an exception, perform an arc test in the following situations to calibrate the arc power and position.

•Poor splice performance
(high or inconsistent splice losses, poor splice strength)
•After electrode replacement
•Extreme changes in temperatures, humidity or air pressure

Arc test procedure



1: Load prepared fiber in the splicer. (The coating is removed and glass fiber is cleaved.)

2: In the initial screen, make sure the selected splice/heater programs match the fiber/protection sleeve being used.

About setting up and changing the program, please refer to the page 4-1 and 4-2 “Splice and heater programs setting”.

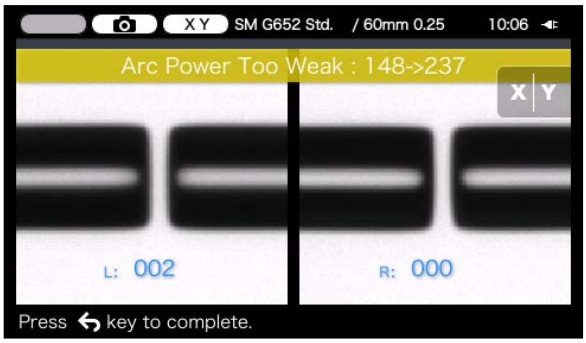
3: Select F1: ☰ icon (press F1 key) to open the setup pane.

4: Move the cursor "□" to "Arc Test" using▲and ▼keys and press F2 key.

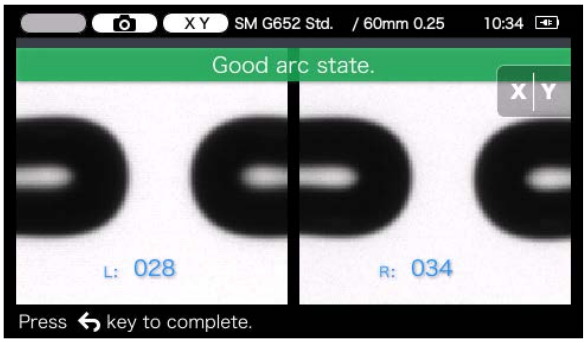
"Arc Test Ready" will appear.

5: After "Arc Test Ready" appears, press SET key.

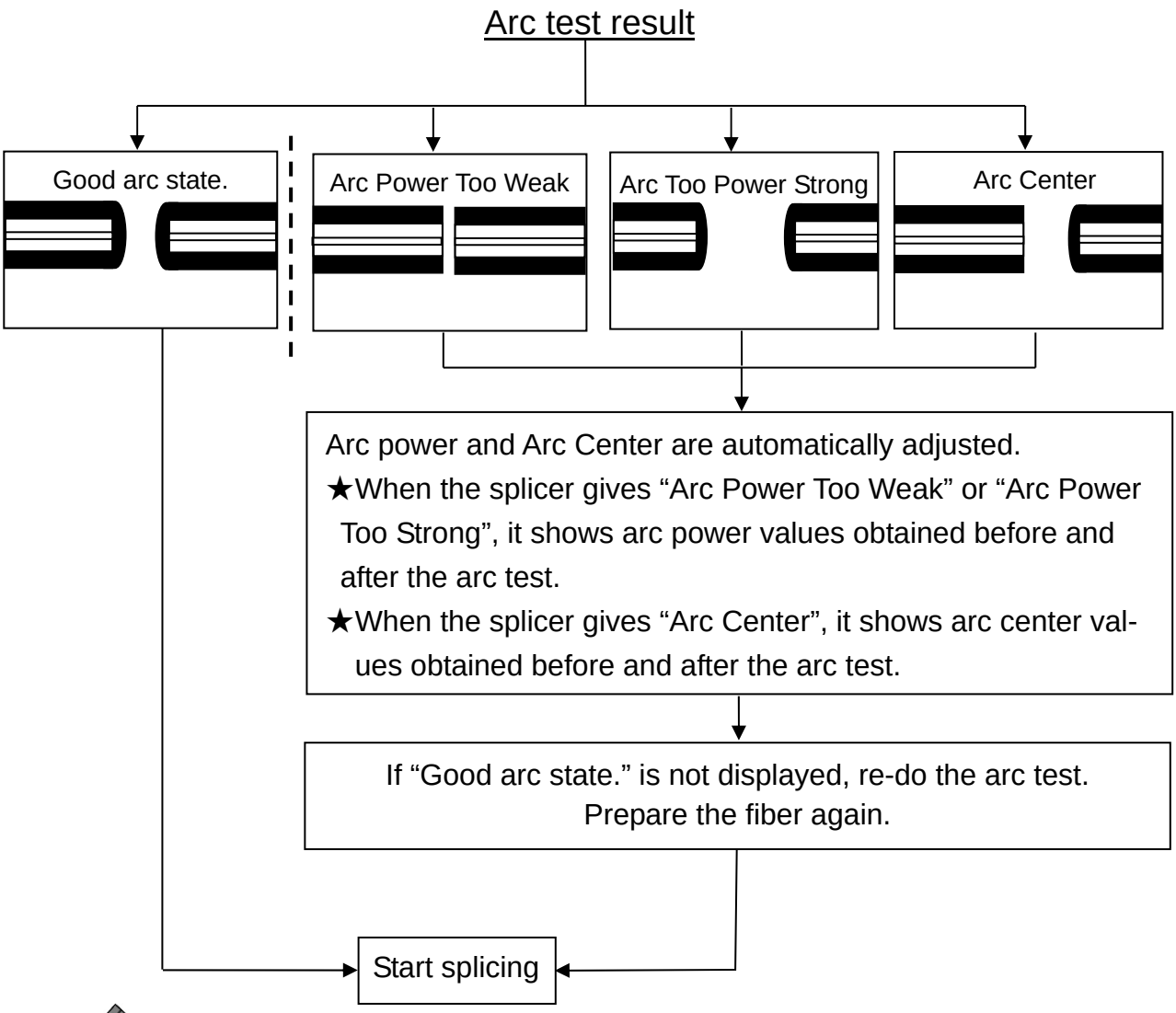
6: An arc test is started. Fibers are not spliced because they are not moved and fed in the arc test.



7: If "Arc Power Too Weak", "Arc Power Too Strong" or "Arc Center" is displayed, prepare the fiber again and repeat the test until "Good arc state." is displayed.
The melt back distance of the left and right fibers and the arc center position which are measured via image processing are displayed on the monitor screen. (The arc center position value is displayed only if the position is shifted.)



8: If "Good arc state." is displayed, begin the fiber preparation procedure to perform a splice.
The splicer automatically initializes when the hood is opened.



The adjusted arc power level is stored even if the splicer is turned off.

Fiber preparation

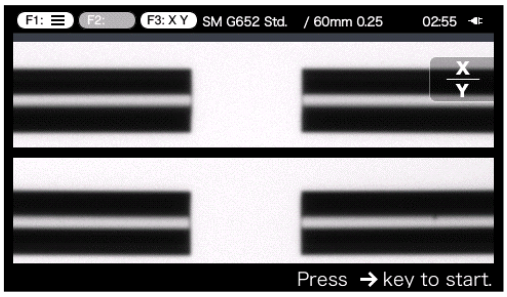
1: Be sure to slip the fiber protection sleeve over one of the fibers to be spliced before stripping and cleaving the fibers. The fiber protection sleeve cannot be installed after splicing.

2: Strip the fiber coating and clean the bare fiber.
Refer to page 2-8.

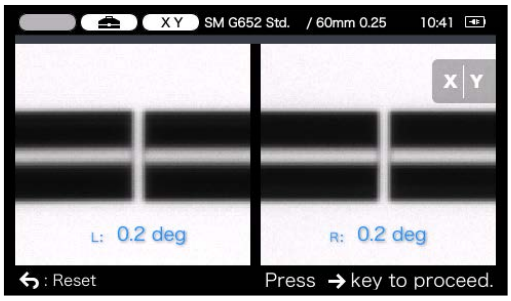
3: Cleave the bare fiber to a proper cleave length.
Refer to page 2-9.

4: Load prepared fiber in the T-400S. Press SET key to start the splicing process.(Please refer to the next pages.)

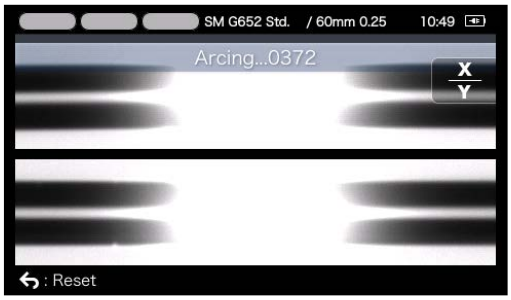
Starting the automatic splice



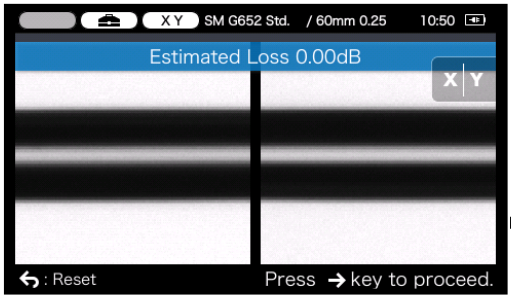
Press SET key.



Inspection of fiber end face & dust.



Arc is generated.



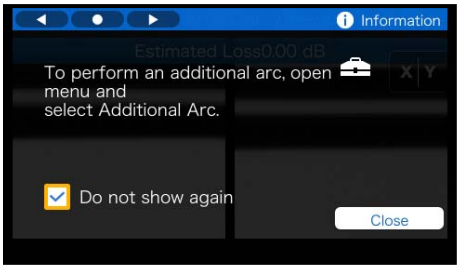
Estimated loss is displayed.

Do you want to check splice data or perform additional arc?

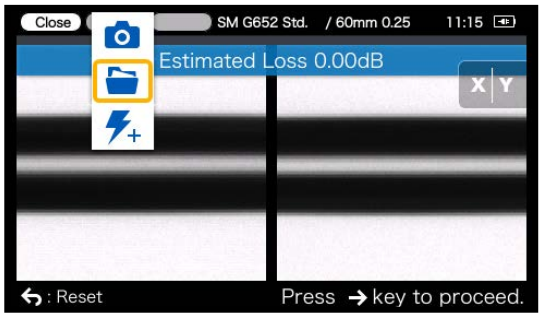
- Yes → See Page 2-16.
- No → See page 2-17.

note

After splicing, a message explaining Additional Arc appears. Tick the box “Do not show again” if you do not want it to appear from next time.



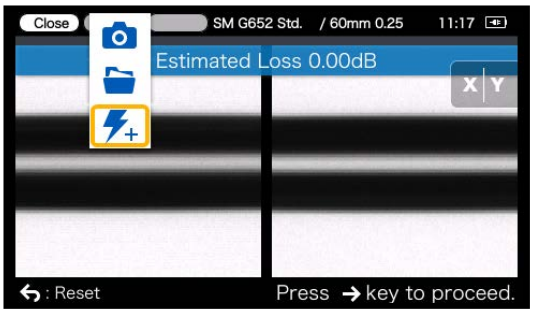
Checking splice data



In the Estimation loss screen, select the Tool box icon. Move the cursor to the view splice data icon and press F2 key.

To use Memo function, in the splice data screen, move the cursor to the Memo icon and press F2 key.

Performing additional arc



In the Estimation loss screen, select the Tool box icon. Move the cursor to the addtional arc icon and press F2 key.

Set Additional arc time and Additional arc power value.
To perform additional arc, select START (press F3 key).
*To edit these settings, set the Additional Arc fucntion to ON first.

Tool box icon

・After splicing, if you would like to view splice data or perform additional arc, select icon (press F2 key). The icons showing these options will appear in a pull-down menu.

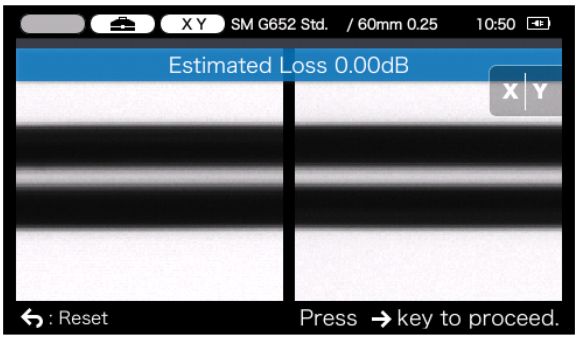
Save image data

View splice data

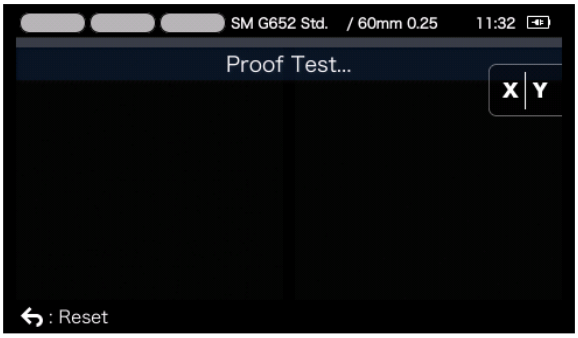
Perform additional arc

Proof test

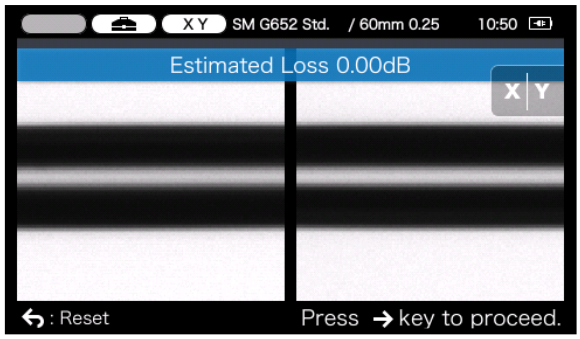
(if automatic proof test is selected)



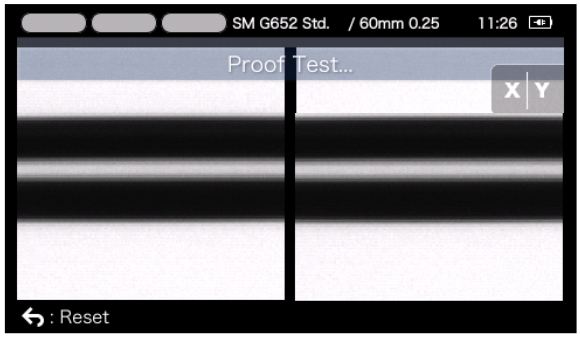
Open the hood.



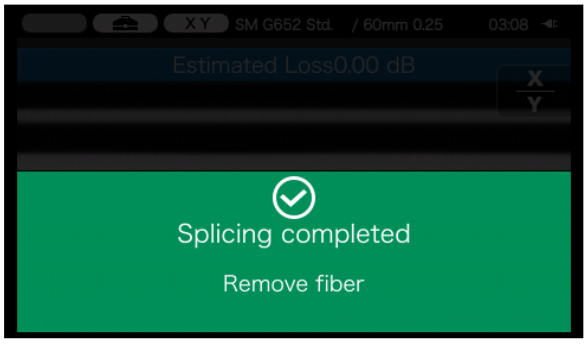
(if manual proof test is selected)



Press SET key.



The proof test is automatically started.(The test cannot be canceled once started.)

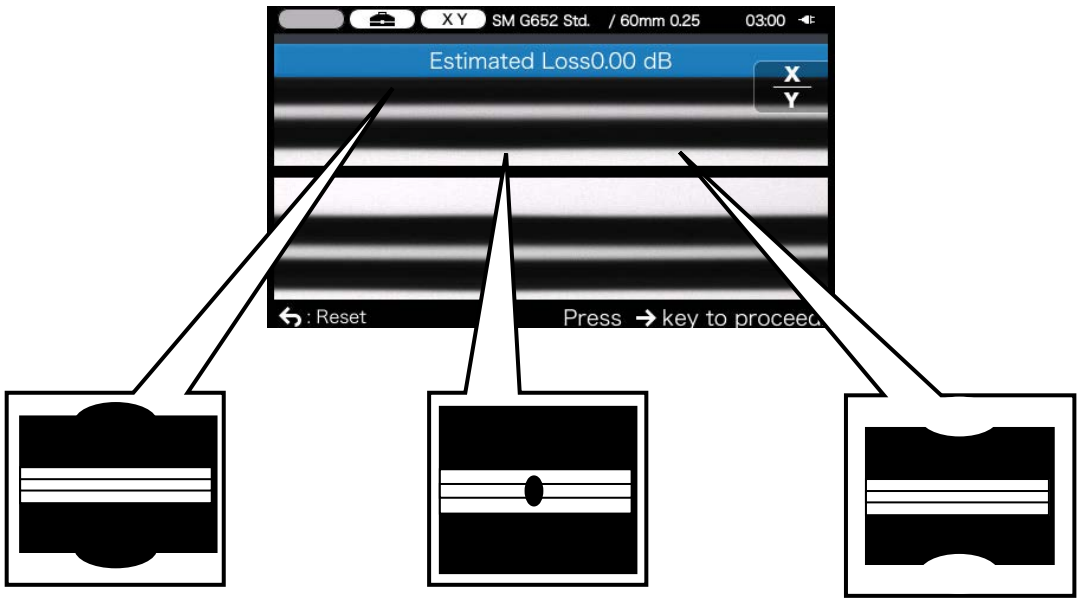


Remove the spliced fiber when the screen above is displayed.

Point! Take care to keep the spliced fiber straight. Do not flex it back and forth. Doing so will cause the spliced fiber to be broken, resulting in loss of the long term reliability of the fiber.

Evaluating splice quality

If the spliced fiber is as follows or estimated losses are high, re-do the entire splice.



Bulging
(Re-do splicing.)

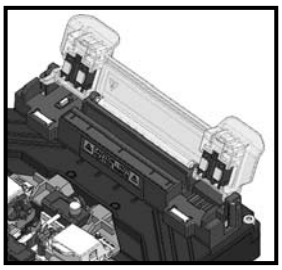
Bubble
(Re-do splicing.)

Neck-down
(Re-do splicing)

After MMF or dissimilar fiber splicing, a line sometimes appears at the splice point. But it does not affect splice quality, such as splice loss, tensile strength, and etc.

Splice protection

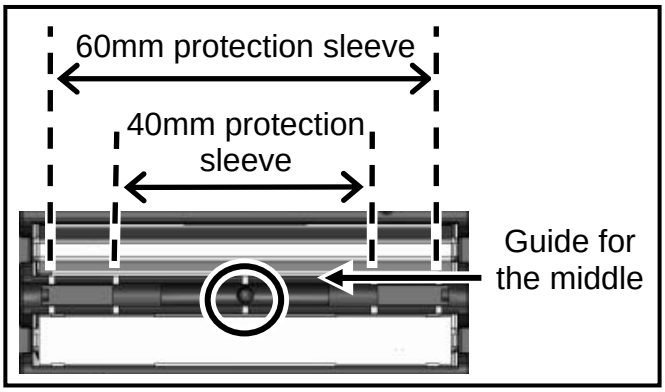
1: Open the oven lid.



2: Make sure that the fiber protection sleeve is centered over the spliced portion of the fiber.

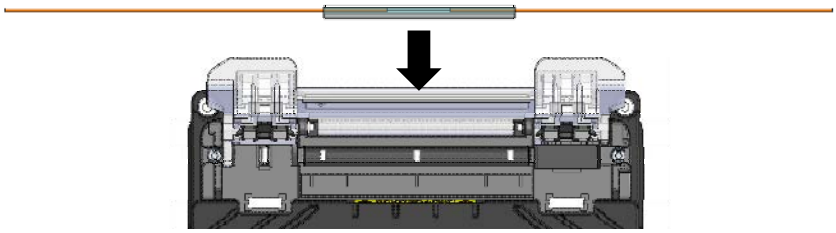
*The applicable fiber protection sleeves vary depending on the cleave length. For more information, refer to page 1-4.

Before placing the protection sleeve in the heat shrink oven, look at the guide for the middle, 40mm length and 60mm length.



3: While maintaining a slight tension on both ends of the fiber, lower the fiber in the heater and push it down.

•Do not twist the fiber.
•Do not flex the fiber.

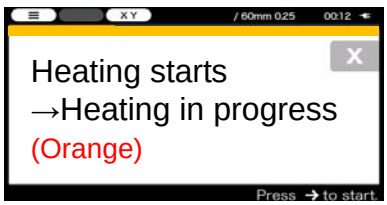


4: Press the Heater key to start the heating process.
To cancel the process, press the Heater key again.

note

If Auto start heating is set to ON, the heating process is automatically started when the fiber is placed into the heat shrink oven.

As the heating process goes on, the indicator banner at the top of the screen changes its color as shown below.



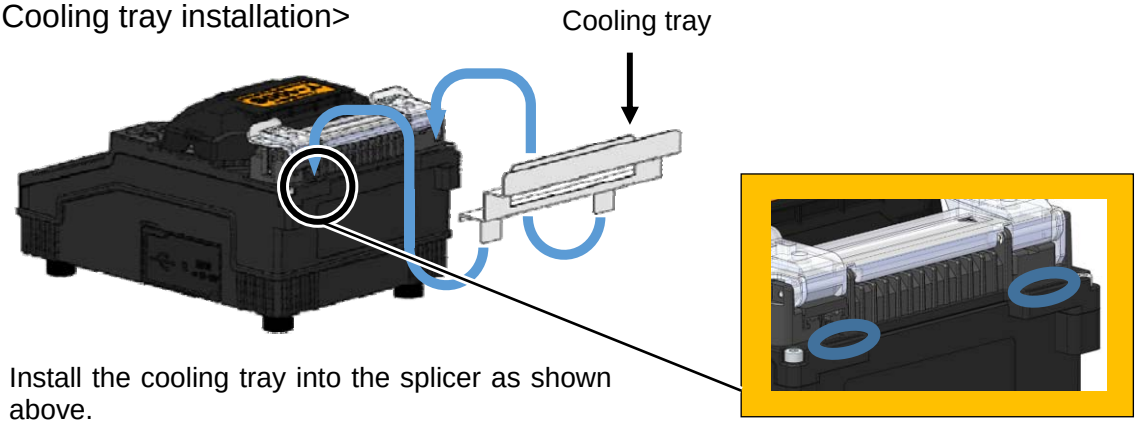
5: The splicer gives a beep sound indicating completion of the heating process. Take out the sleeve from the heat shrink oven after a beep sound is heard.

6: Place the protection sleeve onto the cooling tray.

Caution

A protection sleeve can be taken out from the heat shrink oven after a beep sound is heard. The LED on the Heater key which went off also indicates completion of the heating process. If the sleeve is taken out from the oven before the process is completed, splice loss may increase because insufficient cooling causes the fiber to get bent or twisted. Please wait until the process is completely finished.

<Cooling tray installation>



Install the cooling tray into the splicer as shown above.

Caution

After the heat cycle is complete, the fiber protection sleeve may be hot. Handle with care.
Never touch the surface of the heating plate during the heating operation. Doing so may cause personal injury and damage to the heat shrink oven.

Evaluating protection sleeve

NG

1: The shrinking sleeve is not centered over the splice.

2: Bend in bare fiber

3: Incompletely shrunk (trumpet end)

4: Bubbles on bare fiber

Drop cable splicing

Applicable cable

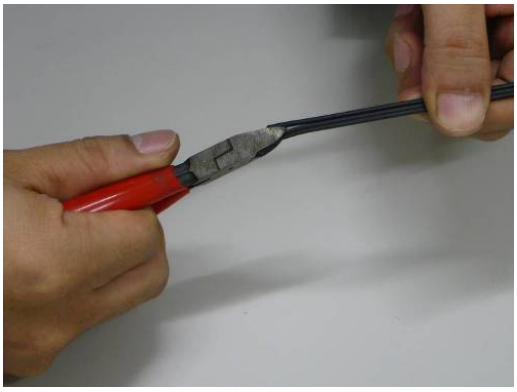
▪ Tight buffer type single fiber drop cable.

Required items

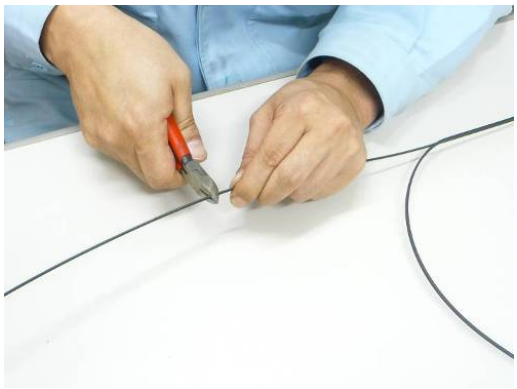
▪ Fusion splicer (T-400S)
▪ Nippers
▪ Jacket remover
▪ Fiber cleaver

Removing cable sheath

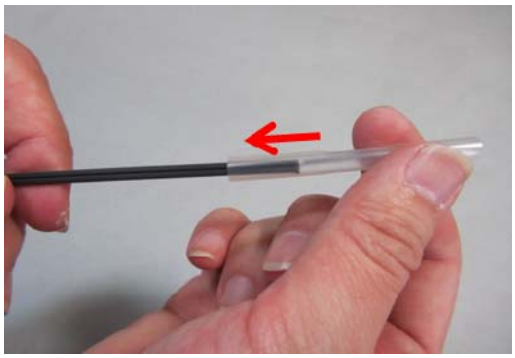
Clean the cable sheath thoroughly to remove cable gel or other stains.



1. Separate the steel wire from the cable using nippers.

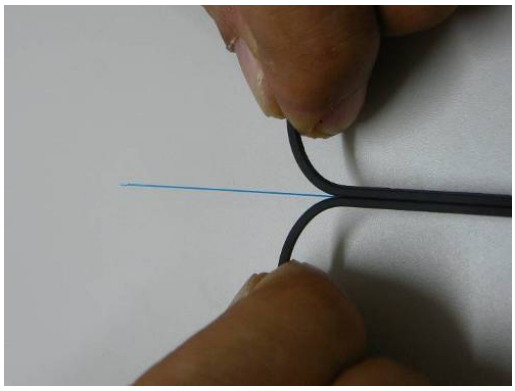


2. Cut the steel wire to a desired length.



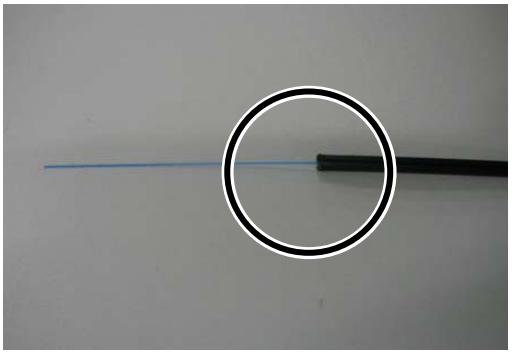
3. Insert a protection sleeve over the cable.

4. Make a slit along the groove of the cable sheath using nippers.



5. Split the cable sheath to expose 30~40mm of optical fiber. Cut off the split cable sheath.

Point! Cut off the split cable sheaths at the same length.

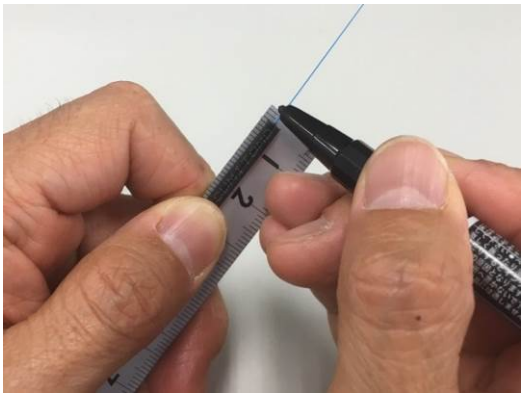


6. The cable sheath is removed. Repeat step 1 to 5 for the other cable.

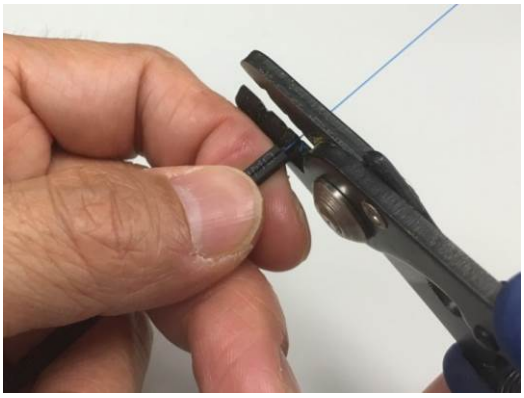
Caution Take care not to damage the optical fiber when cutting the cable sheath.

Fiber preparation (with FC-5S)

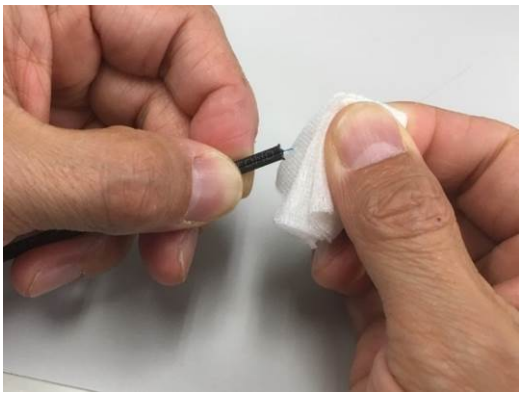
This section describes fiber preparation procedures in using a fiber cleaver with a single fiber adapter (FC-5S).



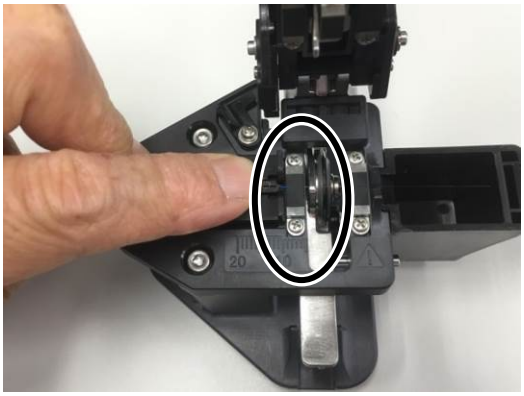
1. Put a mark at 3mm (for use of 40mm sleeve) or 10mm (for use of 60mm sleeve) away from the cable end.



2. Remove the fiber coating from the mark using a jacket remover.



3. Clean the bare fiber from the end of the fiber coating with a gauze pad moistened with pure alcohol. Pull the bare fiber through the gauze pad and rotate the fiber to remove any coating residue.



4. Place the drop cable into the adapter.

<u>For use of 40mm sleeve</u>
Place the end of the cable sheath with the edge of the adapter and hold the adapter.

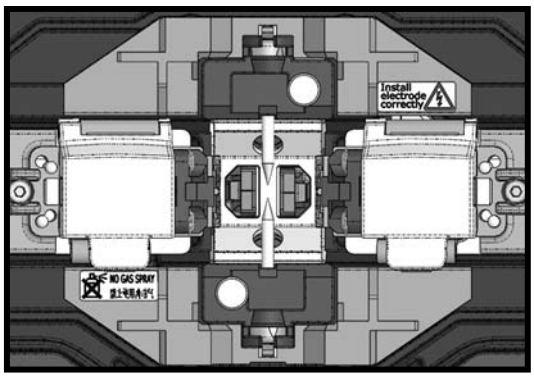
<u>For use of 60mm sleeve</u>
Place the end of the cable sheath at 20mm mark on the cleaver.

*Cleave the fiber in a correct way as a cleaver manual describes.

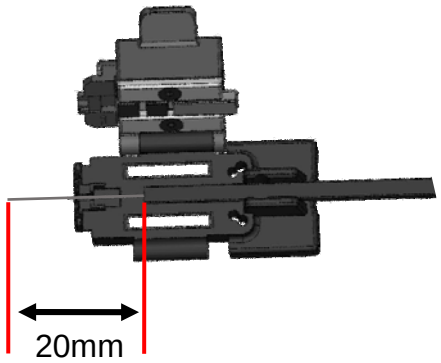
Inserting the fiber into the splicer

1. Open the hood.

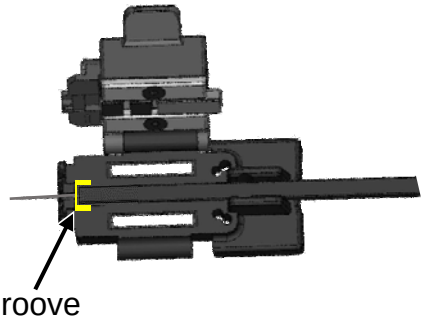
2. Load prepared drop cable in the splicer as shown in the picture below.



For use of 60mm sleeve



For use of 40mm sleeve



3. Make sure that the fiber sits in the V-groove correctly.

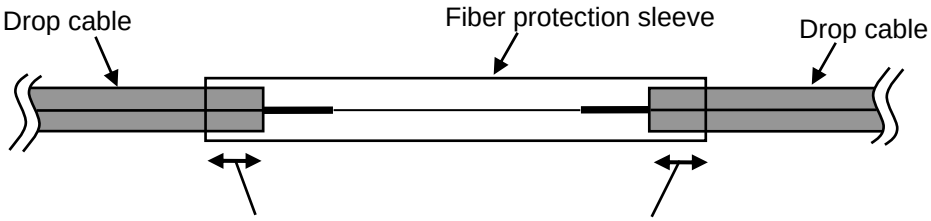
4. Close the hood.

5. Start the splicing process.
   (Note: Perform an arc test before splicing.)

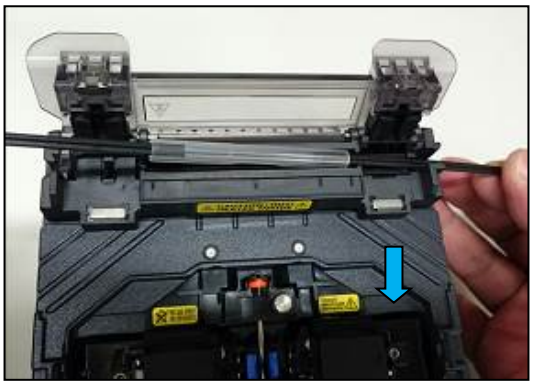
Splice protection

1. Open the oven lid.

2. Take out the cable and slide the fiber protection sleeve onto the fiber. Make sure that the protection sleeve is centered over the splice and at least 5mm of the sleeve overlaps the cable sheath at each end of the splice.



At least 5mm of the sleeve must overlap the cable sheath at each end of the splice.



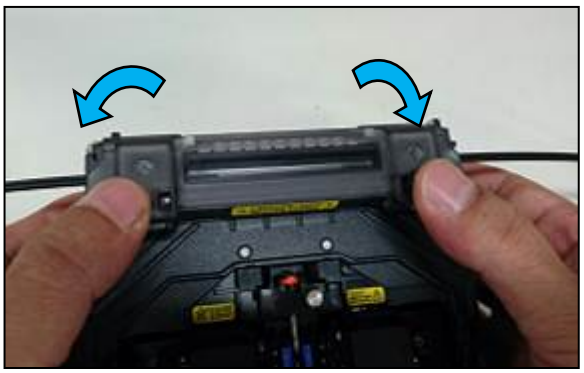
3. While maintaining a slight tension on both cable ends, move the cable to the heat shrink oven. Lower the right portion of the cable.

Caution

Pay attention not to bend and flex the cable. Failure to do so can cause the splice to break.

4. While maintaining a slight tension on both cable ends, lower the left portion of the cable and push the entire cable down.

5. Close the oven lid completely and start the heating process.



Point!

While maintaining a slight tension on the cable ends, close the oven lid.

3. Daily cleaning and checking up

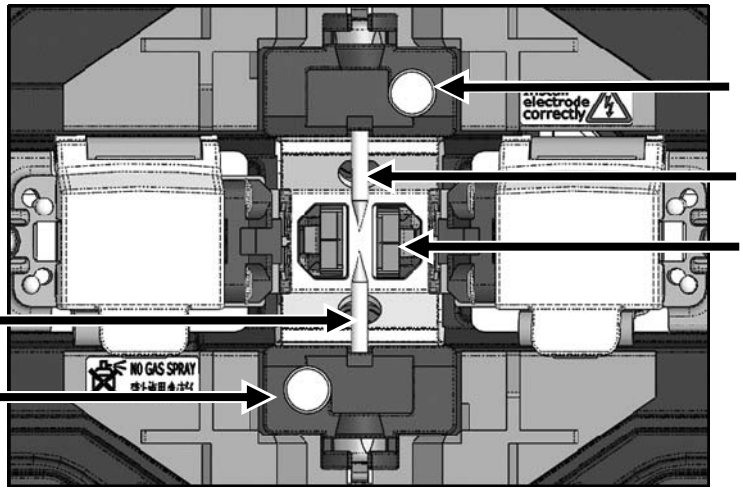
To keep excellent splice quality, regular cleaning and inspection are required. Especially cleaning should be performed before and after each use. We recommend your splicer to be checked through our maintenance service once a year.

> Warning
>
> Turn off the T-400S before maintenance work. Failure to do so may cause electric shock.

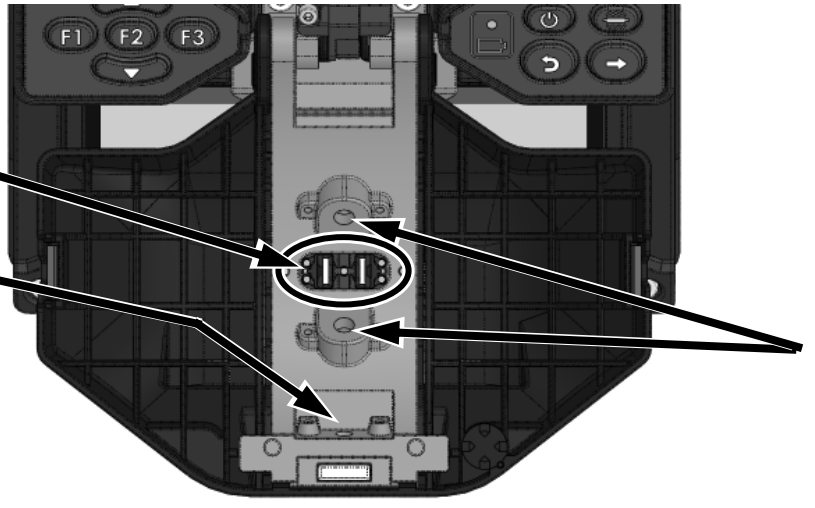
Cleaning

Clean each part with a cotton swab. Please bear in mind that daily cleaning can maintain splicer performance. Clean components before and after use.

Names of components



<Inside of wind hood>

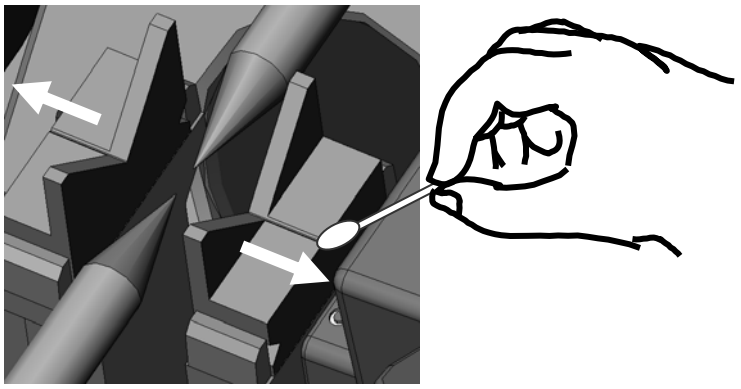


Cleaning V-grooves

Even tiny bits of dust or dirt in the V-grooves might cause the fiber to be offset. To avoid offset, carefully clean the V-grooves with a cotton swab moistened with alcohol.

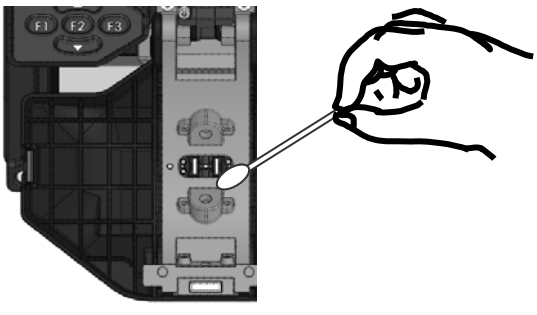
1: Prepare a cotton swab moistened with alcohol.

2: Brush the surface of the V-grooves in the direction indicated by the arrow.



Cleaning LEDs

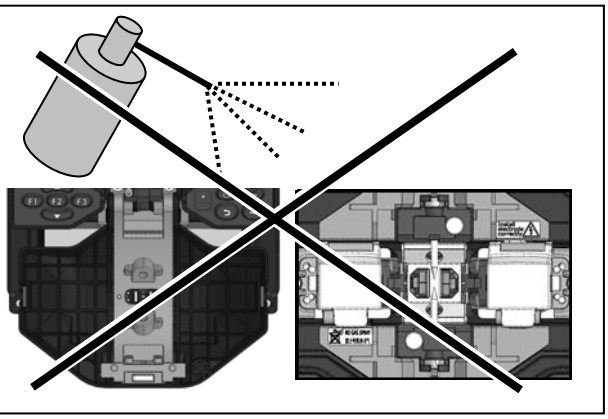
When a LED surface dirty, a fiber image is unclear, resulting in imperfect image processing. If the display is uneven or LED error occurs, clean them with a cotton swab moistened with alcohol.



1: Prepare a cotton swab moistened with alcohol and wipe the surface of LED lightly.

2: Use a dry cotton swab to wipe off any excess alcohol.

Point! Do not apply too much force when cleaning.

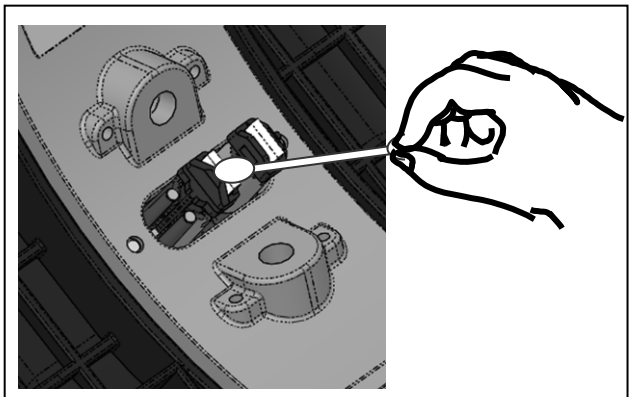


Prohibition

Do not use a canned air for cleaning. Chemical reaction may deteriorate the microscope lens, resulting in a loss of splicing capability.

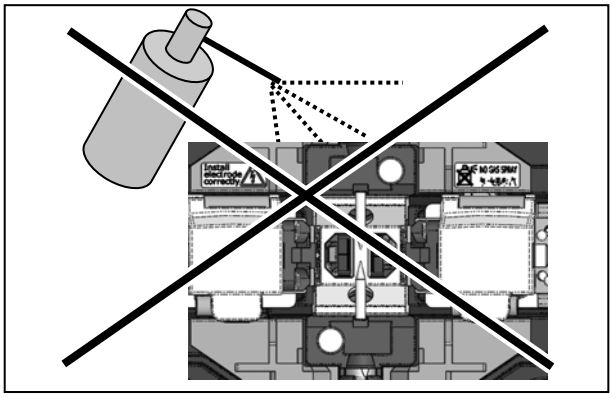
Cleaning bare fiber pads

Dirt on a bare fiber pad will also cause the fiber to be offset. When fiber offset occurs, clean the bare fiber pad.



1: Prepare a cotton swab moistened with alcohol and wipe the surface of bare fiber pads.
2: Use a dry cotton swab to wipe off any excess alcohol.

Point! Do not apply too much force when cleaning.

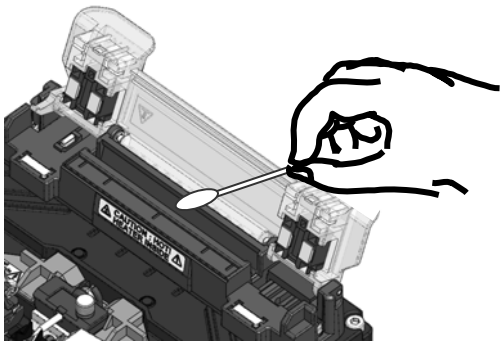


Prohibition

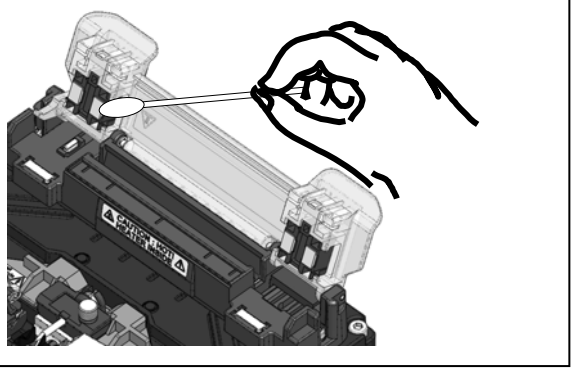
Do not use a canned air for cleaning. Chemical reaction may deteriorate the lens protection glass, resulting in a loss of splicing

Cleaning heat shrink oven

Dirt and dust can accumulate in the heat shrink oven easily. Clean the heating plate regularly with a dry cotton swab.



Clean the heating plate with a dry cotton swab.



Clean the clamps of the heat shrink oven with a cotton swab moistened with alcohol.

Caution

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

Replacing electrodes

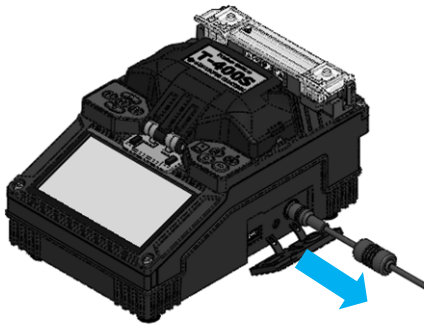
Electrodes are worn out or contaminated due to silica glass evaporated during arc, and the electrode condition changes day by day. To achieve a continuously stable arc for excellent quality splicing, electrodes should be replaced periodically. Continuing to use the same electrodes without replacement may result in high splice losses and poor splice strength.

On the T-400S, electrodes typically need replacing after approximately 6,000 arc discharges.
If the number of arc discharge exceeds 5,000, Arc Count on the screen will be highlighted in yellow for warning, with a message “Electrodes need changing soon”.
If the number exceeds 6,000 times, a warning message appears every time the splicer is powered on and until you replace electrodes according to the replacement procedures described in the next page.

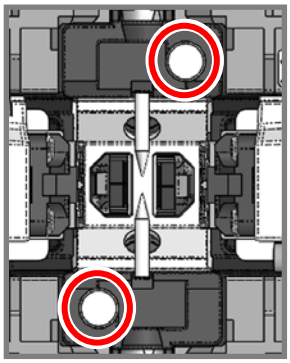
Always replace with Sumitomo genuine electrodes in pair at a time. Failure to do so can cause the splicer not to maximize its ability.

Electrode replacement procedures

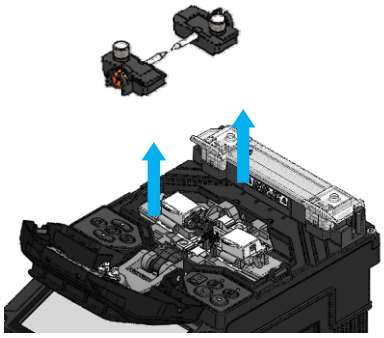
Please replace electrodes to maintain the performance of T-400S at about 6,000 discharges. The tip of the electrode is very sharp shape. Please take great care when handling it.



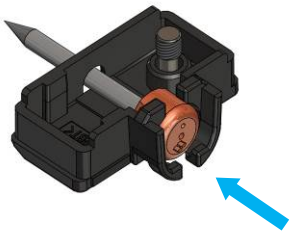
1: Turn off the splicer and unplug the power cord. Remove the battery. (Refer to Page2-3.)



2: Using your fingers, loosen the thumbscrews.

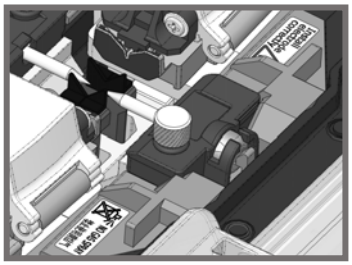


3: Lift up the electrode cover plate as shown in the picture above and remove the electrode.



4: Install a new electrode correctly in the cover plate.

*Make sure the “collar (plastic button)” of the electrode passes the latch of the cover plate and is fully inserted all the way in.



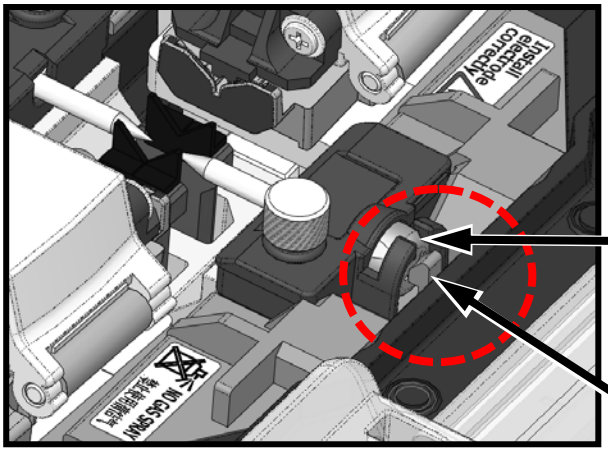
5: Tighten the thumbscrew while pressing the electrode below at each electrode cover plate.

6: Repeat step 2 to 5 for the other electrode. Always replace both electrodes at a time.

Caution

When handling the electrodes, avoid touching the electrode tips with anything.

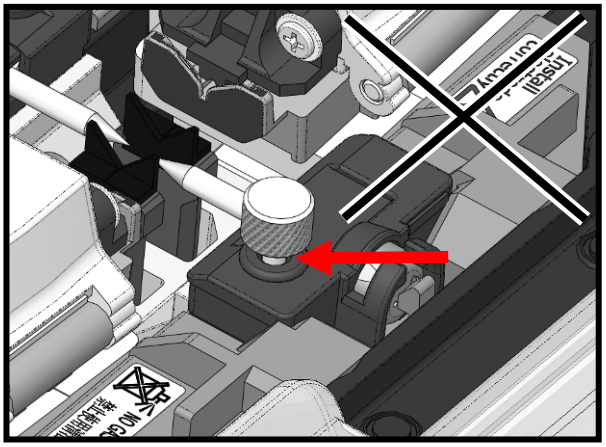
7: Plug the power cord into the power module and turn on the power to condition the electrodes. After conditioning the electrodes, the Arc count is automatically reset.



Caution

Please make sure the plastic button of the electrode is fully pushed by the protrusion.

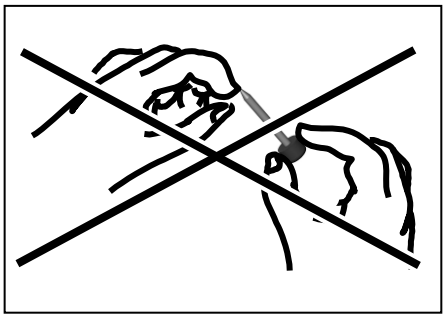
<NG! – Thumbscrew is not tightened completely>



Caution

Make sure the thumbscrew is tightened completely.

Splice performance will not be stable or the splicer will be partly damaged if an electrode is not installed in place.



Caution

An electrode tip is extremely sharp. Handle with care.

Caution

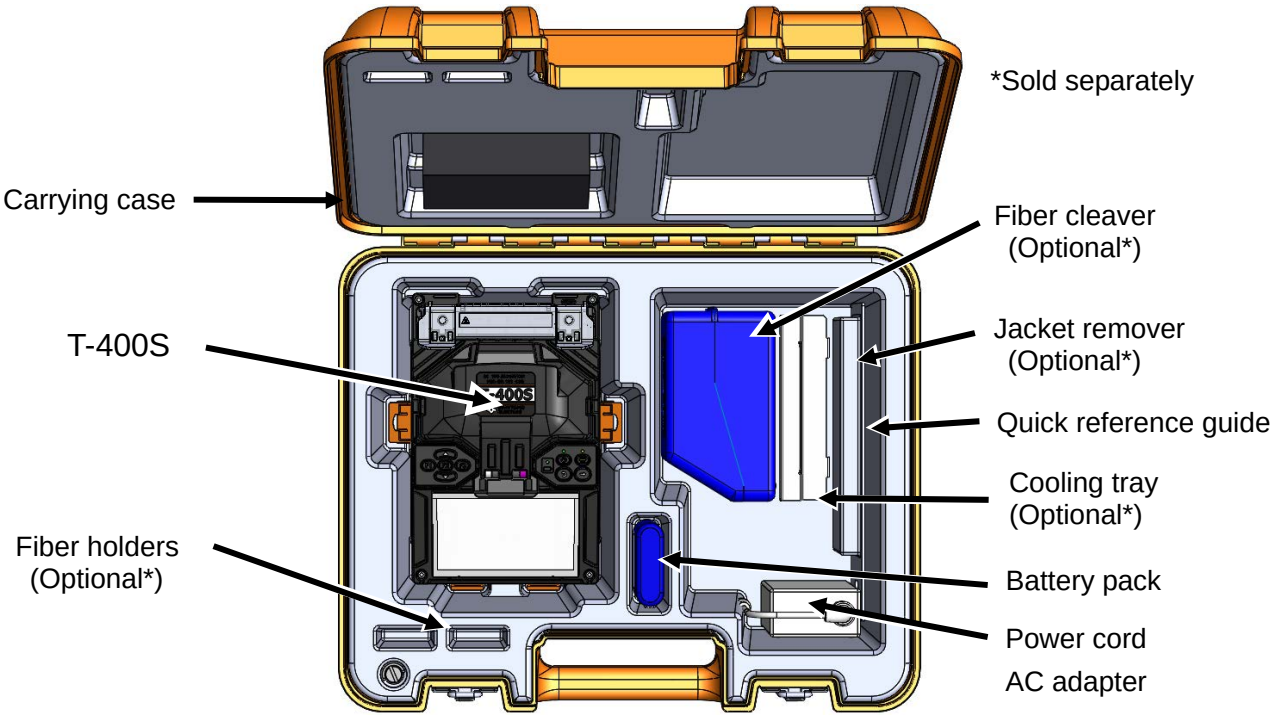
- Be sure to turn off the splicer and unplug the power cord or remove the battery pack before replacing the electrodes.
- Discard the old electrodes properly.

Caution

- Do not clean the electrode. Doing so may cause unstable arcing performance.

Packing and storage instructions

- Store the T-400S and its accessories in a designated place in the case referring to the photo below.
- Store the T-400S in the direction shown in the photo below.
- The T-400S with a cooling tray cannot be stored in the case. Remove the cooling tray from the splicer and store it in the pocket.



The T-400S fusion splicer is a precision instrument. Its rugged shipping case is custom designed to protect it from impact, dust, dirt, and moisture. Always store and transport the machine in its case. Observe the following instructions.

- Clean the T-400S and all accessories before storing them.
- Be sure to remove the battery pack from the T-400S and store it in a given place.

> Warning
>
> Keeping the battery in the T-400S may cause the battery terminal to be damaged or deteriorated, resulting in fire.

- Discard the liquid solvent properly, or lock the dispenser completely and put it in a plastic bag before packing the dispenser in the case.

Warning

Take extreme care of the handling of alcohol.

• Before storing the fiber cleaver, dispose of the fiber fragments collected in the off-cut collector in a proper way.

Caution

Glass fiber fragments are extremely sharp. Handle with care.

•Close the carrying case completely and latch it before transportation.

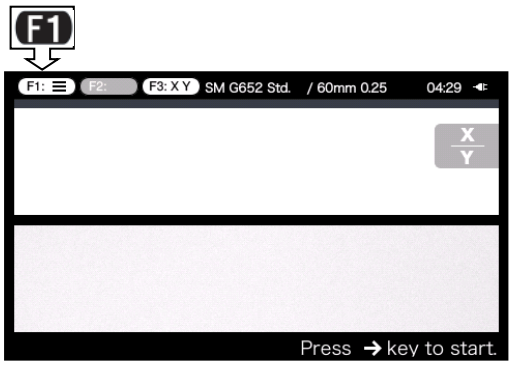
•Pay attention to storage temperature and dew condensation when storing the splicer. The battery is self-discharged during storage. Perform temperature control and charge and discharge the battery once every 6 months.

Storage temperature -20°C ~ +50°C (if stored for less than 1 month)
-20°C ~ +40°C (if stored for less than 3 months)
-20°C ~ +20°C (if stored for less than 1 year)

4. Functions

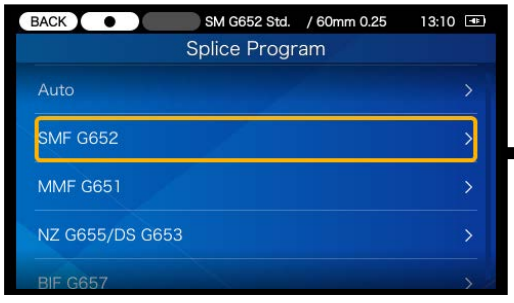
Splice and heater programs setting

<Splice program setting>



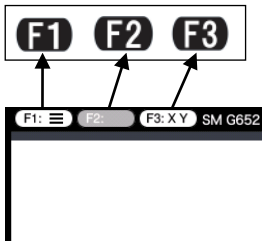
1) Select F1: ☰ icon (press F1 key) to open the setup pane.

2) Move the cursor "□" using ▼▲ keys, select splice program and press F2 key.

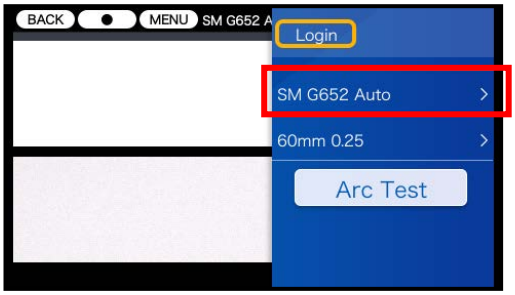


3) Select fiber profile category and press F2 key.

Point! The Function keys correspond to the icons located on the left upper corner of the screen.



4) Move the cursor "□" to the splice program you would like to use and press F2 key.



5) The selected splice program has been set.

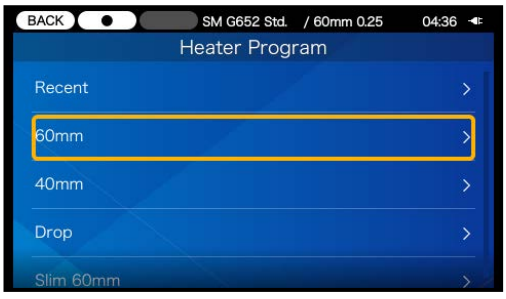
6) Select BACK (press F1 key) to go back to the Ready screen.

For the details of splice programs, refer to page 4-3.
If you would like to change splice program parameters, refer to page 4-5.

<Heater program setting>

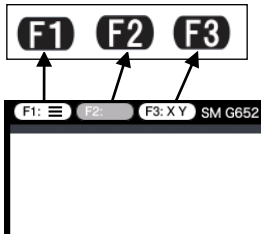
1) Select F1: ☰ icon (press F1 key) to open the setup pane.

2) Move the cursor "□" using ▼▲ keys, select heater program and press F2 key.



3) Select protection sleeve type category and press F2 key.

Point! The Function keys correspond to the icons located on the left upper corner of the screen.



4) Move the cursor "□" to the heater program you would like to use and press F2 key.

5) The selected heater program has been set.

6) Select BACK (press F1 key) to go back to the Ready screen.

For the details of heater programs, refer to page 4-4.
If you would like to change heater program parameters, refer to page 4-6.

Splice programs

<Auto mode>

Category	Splice Program	Details
Auto	SM G652 Auto	Can be used for splicing identical SMF (ITU-T G.652).
	MM G651 Auto	Can be used for splicing identical MMF (ITU-T G.651).
	NZ G655 Auto	Can be used for splicing identical NZDSF (ITU-T G.655) or identical DSF (ITU-T G.653)
	BIF G657 Auto	Can be used for splicing identical BIF (ITU-T G.657).

About Auto Arc Power

In Auto mode, the T-400S has the function to analyze an arc and calibrate the arc condition automatically at each splice. Therefore, most of times, an arc test is not needed in Auto mode.

Perform an arc test in the following situations to calibrate the arc power and position.

- Poor splice performance (high or inconsistent splice losses, poor splice strength)
- After electrode replacement
- Extreme changes in temperatures, humidity or air pressure

Please perform an arc test before splicing on all splice programs except Auto mode.

<Other splice programs>

Category	Splice Program	Details
Recent	—	The splice program selected recently is listed.
SMF G652	SM G652 Std.	Can be used for splicing identical standard SMF (ITU-T G.652).
	SM G652 Quick	Can be used for splicing identical standard SMF (ITU-T G.652) and making a faster splice.
	E-SC Fusion	Can be used for splicing Sumitomo E-SC Fusion Connector.
	SM G652 Drop	Can be used for splicing rectangular drop cable. A proof test is started automatically after splicing. Re-arc function is not available.
MMF G651	MM G651 Std.	Can be used for splicing identical standard MMF (ITU-T G.651).
	MM G651 Quick	Can be used for splicing identical standard MMF (ITU-T G.651) and making a faster splice.
NZ G655/ DS G653	NZ G655 Typ.	Can be used for splicing identical standard NZDSF (ITU-T G.655) or identical standard DSF (ITU-T G.653)
	NZ G655 Quick	Can be used for splicing identical standard NZDSF (ITU-T G.655) or identical standard DSF (ITU-T G.653) and making a faster splice.

Heater programs

The heater programs are optimized for Sumitomo protection sleeves. Select an appropriate heater program for the protection sleeve you use.

Category	Heater program	Details
Recent	ー	The heater program selected recently is listed.
60mm	60mm 0.25	Can be used for heat shrinking 60mm protection sleeves for single fiber with 0.25mm coating, for example, Sumitomo FPS-1.
	60mm 0.9	Can be used for heat shrinking 60mm protection sleeves for single fiber with 0.9mm coating, for example, Sumitomo FPS-1.
40mm	40mm 0.25	Can be used for heat shrinking 40mm protection sleeves for single fiber with 0.25mm coating, for example, Sumitomo FPS-40.
	40mm 0.9	Can be used for heat shrinking 40mm protection sleeves for single fiber with 0.9mm coating, for example, Sumitomo FPS-40.
Drop	60mm Drop	Can be used for heat shrinking 60mm protection sleeves for drop cable splice, for example, Sumitomo FPS-D60.
	40mm Drop	Can be used for heat shrinking 40mm protection sleeves for drop cable splice.
Slim 60mm	S60mm 0.25	Can be used for heat shrinking 60mm semi-shrunk protection sleeves for single fiber, for example, FPS-61-2.6.
Slim 40mm	S40mm 0.25	Can be used for heat shrinking 40mm semi-shrunk protection sleeves for single fiber, for example, FPS-40-2.6.
Lynx	LYNX	Can be used for heat shrinking protection sleeves for 10mm cleaved Sumitomo's splice-on-connector "Lynx-CustomFit™".
	E-SC Fusion	Can be used for heat shrinking protection sleeves dedicated for Sumitomo E-SC Fusion Connector.
SPS	25mm 0.9	Can be used for heat shrinking 25mm protection sleeves of Nano Sleeves N9 series, for example, Sumitomo FPS-N9-25.
	20mm 0.9	Can be used for heat shrinking 20mm protection sleeves of Nano Sleeves N9 series, for example, Sumitomo FPS-N9-20.

<Modify splice program parameter>

1) In the fiber profile category screen (page 4-1), move the cursor "□" to the one where you would like to modify splice program settings and press F2 key.

2) Select the setup mode icon ⚙. (Press F3 key.)

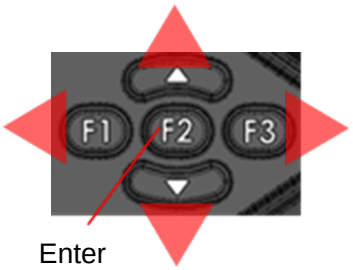
3) Move the cursor "□" to the splice program where you would like to modify the settings and select ✎ (press F2 key).

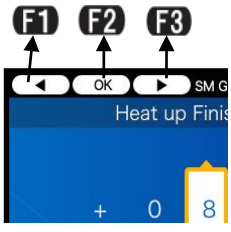
4) Move the cursor "□" to the item you would like to modify and press F2 key.

5) Adjust the value using ▼▲ keys. Move the cursor "□" to left and right using F1 and F3 keys.
After adjustment, move the cursor to Complete icon and press F2 or SET↵ key.

note

The left-hand keys are sometimes used to move the cursor "□" up and down, and to left and right. F2 key is pressed to enter the selected item.

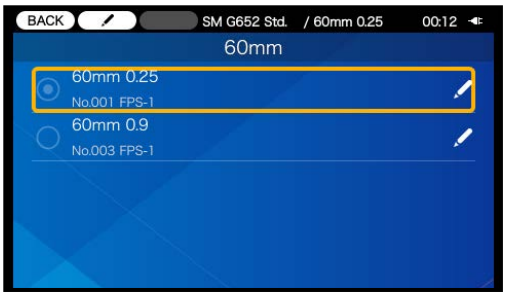




<Modify heater program parameter>

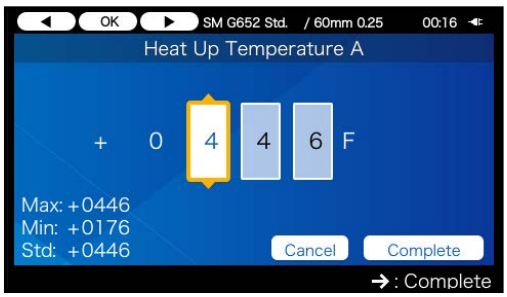
1) In the protection sleeve type category screen (page 4-2), move the cursor "□" to the one where you would like to modify heater program settings and press F2 key.

2) Select the setup mode icon ⚙. (Press F3 key.)



3) Move the cursor "□" to the heater program where you would like to modify the settings and select ✎ (press F2 key).

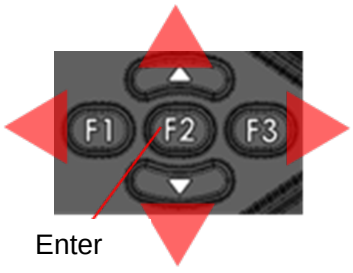
4) Move the cursor "□" to the item you would like to modify and press F2 key.

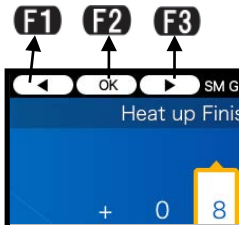


5) Adjust the value using ▼▲ keys. Move the cursor "□" to left and right using F1 and F3 keys.
After adjustment, move the cursor to Complete icon and press F2 or SET ➡ key.

note

The left-hand keys are sometimes used to move the cursor "□" up and down, and to left and right. F2 key is pressed to enter the selected item.





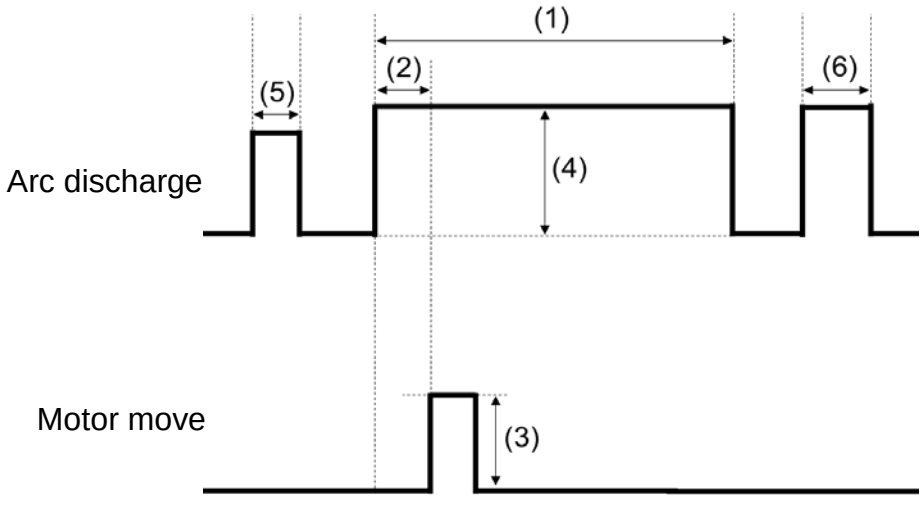
<Splice program settings>

Item	Details
Name	Allows to edit splice program name.
Abbreviated name	Allows to edit splice program name which is displayed on the main splice screen.
Template	Allows to choose splice program as a template when new splice program is created.
Note	Allows to add a note to the selected splice program (up to 21 characters).
Arc Power	Allows to manually adjust the arc power for fusion splicing. Since an arc test automatically optimizes the power, it is not necessary to adjust it manually under normal use. If the level of an arc needs changing, the arc power should be adjusted manually.
Gapset Position	Allows to manually adjust the fiber position for fusion splicing. Since an arc test automatically optimizes the position, it is not necessary to adjust it manually under normal use. If the position needs changing, it should be adjusted manually.
Cleaning Arc Time	Sets the cleaning arc time to remove dust from optical fiber.
Cleaning Arc Power	Allows to adjust power for cleaning arc based on the standard arc power.
Cleave Angle Limit	Sets the threshold of cleave angle. If a reading exceeds the threshold, the splicer will give an error.
Arc Time	Sets the arc fusion time.
Est. Loss Limit	Sets the threshold of estimated loss. If a reading exceeds the threshold, the splicer will give an error.

note

The item with an arrow can only be edited.
All items can be edited in Administrator mode.

<How an arc discharges and motors run during the splicing process>

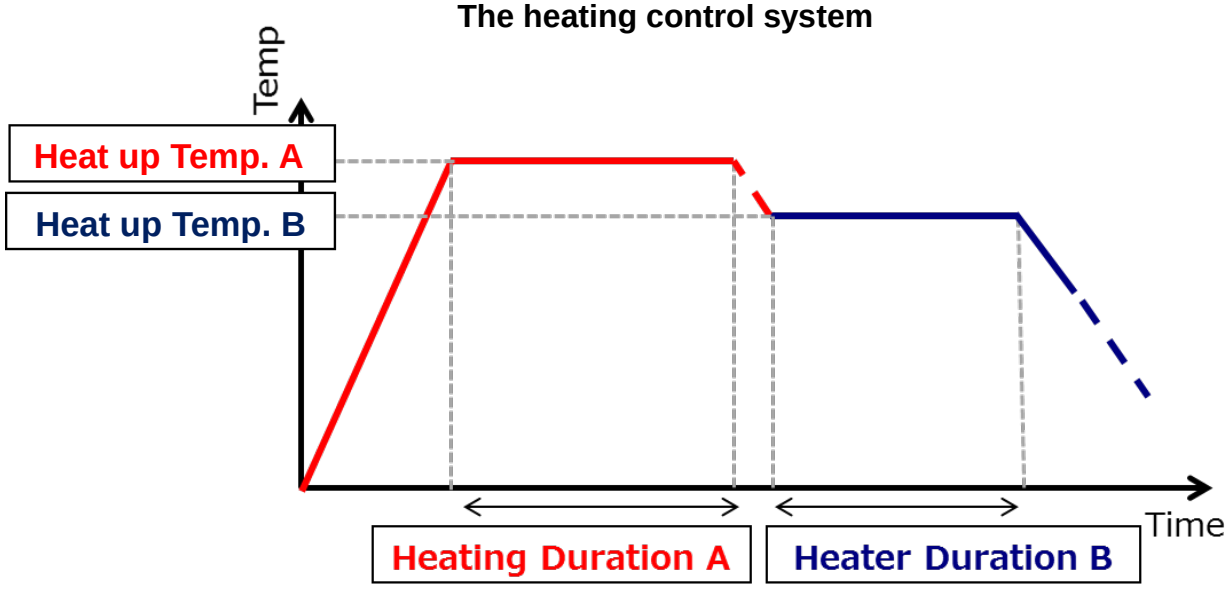


(1) Arc time
(2) Prefuse time
(3) Overlap
(4) Arc Power
(5) Cleaning Arc Time
(6) Rearc Time

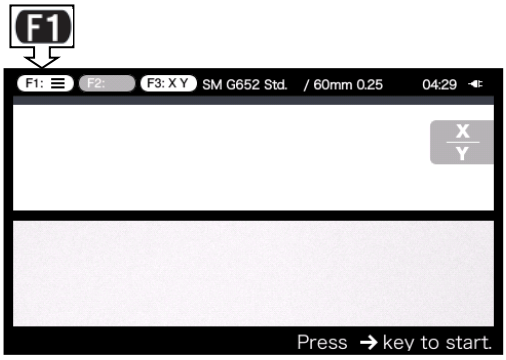
<Heater program settings>

Item	Details
Name	Allows to edit heater program name.
Abbreviated name	Allows to edit heater program name which is displayed on the main splice screen.
Sleeve ID Name	Allows to edit protection sleeve name.
Template	Allows to choose heater program as a template when new heater program is created.
Note	Allows to add a note to the selected heater program (up to 21 characters)
Heat up Temp. A	Heating element rises up to the set temperature in the first term of a heating cycle. (Numerical input)
Heating Duration A	Duration of the first term of heating cycle. (Numerical input)
Heat up Temp. B	Heating element rises up to the set temperature in the middle term of a heating cycle. (Numerical input)
Heating Duration B	Duration of the middle term of the heating cycle. (Numerical input)

The heating control system



<Change operation settings>



1) Select F1: ☰ (press F1 key) to open the setup pane.

2) Select MENU (press F3 key) to display the Menu screen.

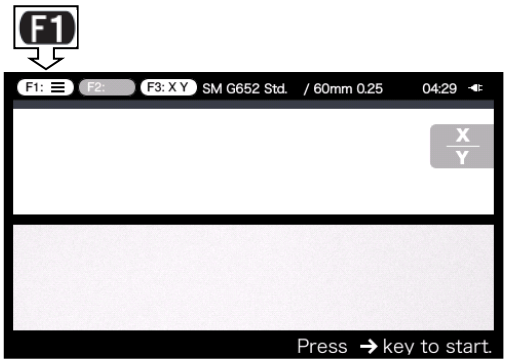
3) Select the Operation Settings and press F2 key.

4) Move the cursor "□" to the item where you would like to change the setting and press F2 key. ON⇔OFF are switched.

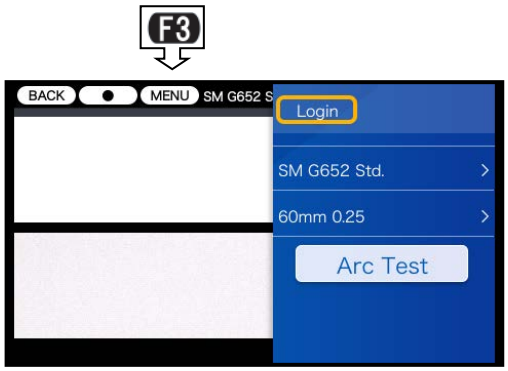
For more details on the Operation setting items, please refer to page 4-11.

Operation Settings	Details
Arc Pause	Stops the splicing process temporarily before arcing. If you would like to check fiber offset and fiber end faces during the process, set this function to ON.
Re-align After Arc Pause	Fibers are aligned again prior to splicing after Arc Pause.
Auto Start	Automatically starts the splicing process when the fiber is inserted in the splicer and the hood is closed.
Heater Auto Start	Automatically starts the heating process when the fiber is placed into the heat shrink oven.
Add Arc	Additional arc is available by setting this function to ON. If an arc is insufficient, an additional arc should be performed.
Add Arc Setting	Allows to adjust the arc power for additional arc.

<Change function settings>



1) Select F1: ☰ (press F1 key) to open the setup pane.



2) Select MENU (press F3 key) to display the Menu screen.

3) Select the Function Settings and press F2 key.

4) Move the cursor "□" to the item where you would like to change the setting and press F2 key.

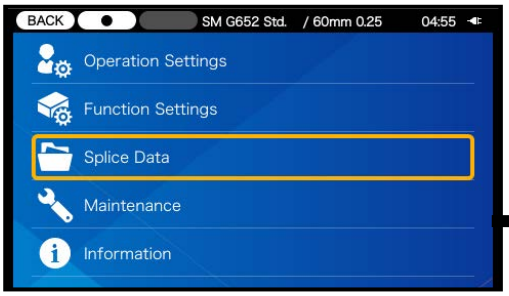
5) Move the cursor to select ON⇔ OFF and press F2 key.

For more details on the Function setting items, please refer to page the page 4-13.

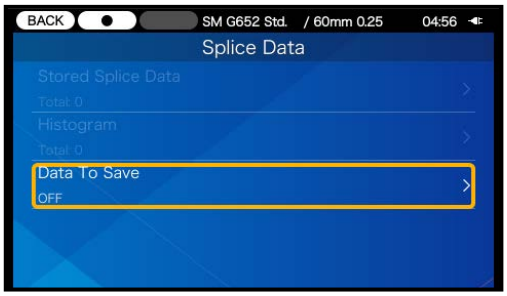
Function Settings	Details
ECO Mode	Saves power consumption by adjusting monitor brightness and heat shrink oven temperature.
Sleep(Battery)	If the splicer is not interrupted on battery operation for a certain period of time, to minimize power consumption, it will go into Sleep mode and the monitor will be turned off. Press any keys except the power key to re-start the splicer.
Auto Power Off(Battery)	If the splicer is in Sleep mode and not interrupted on battery operation for another certain period of time, it will automatically switch off. Switch it back on again.
Sleep(AC)	If the splicer is not interrupted on AC operation for a certain period of time, to minimize power consumption, it will go into Sleep mode and the monitor will be turned off. Press any keys except the power key to re-start the splicer.
Auto Power Off(AC)	If the splicer is in Sleep mode and not interrupted on AC operation for another certain period of time, it will automatically switch off. Switch it back on again.
Date(yyyy/mm/dd hh:mm)	Sets the built-in clock to a local time.
Language	Display language can be selected. (Some languages cannot be selected.)
Buzzer (Key)	A buzzer sound for key pressing is enabled / disabled.
Buzzer (Stop)	A buzzer sound for arc pause is enabled / disabled.
Buzzer (Error)	A buzzer sound for an error detected during the splicing process is enabled / disabled.
Light for v-groove	Sets the V-groove illumination to ON or OFF.

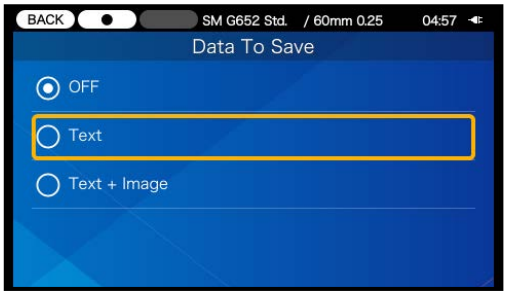
Splice data

1) Select MENU icon (press F3 key) to display the Menu screen.



2) Select the Splice Data icon and press F2 key to go to Splice Data setup screen.



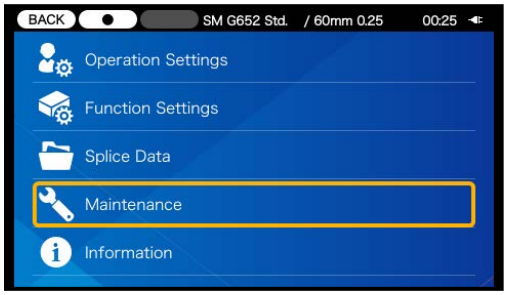


3) Select the item you would like to carry out. For further details, please see below.

Splice Data	Details
Stored Splice Data	Displays stored splice data.
Histogram	Displays a histogram of “Splice losses” and “cleave angles” based on stored splice data.
Data To Save	Allows to select data type to store from “Text + Image”, “Text” and “OFF”.

Maintenance settings

1) Select MENU icon (press F3 key) to display the Menu screen.



2) From the Menu screen, select the Maintenance. Press F2 key to enter the Maintenance screen.

3) Select the item you would like to carry out. For further details, please see below.

Item	Details
Conditioning Arc	After electrodes are replaced, this function is used to condition new electrodes. The number times of conditioning arc is preset. Arc Count is automatically reset after conditioning arc is performed.
Self Inspection	The circuit board, optical unit, motors and heat shrink oven are automatically inspected.
Motor Calibration	The condition of all motors is inspected.

Software download via internet

Access the URL below to get a maintenance application. The application can upgrade your splicer to the latest software via internet. For further information, please visit the URL and refer to its accompanying manual.

http://www.rim-plus.sei.co.jp

Login function

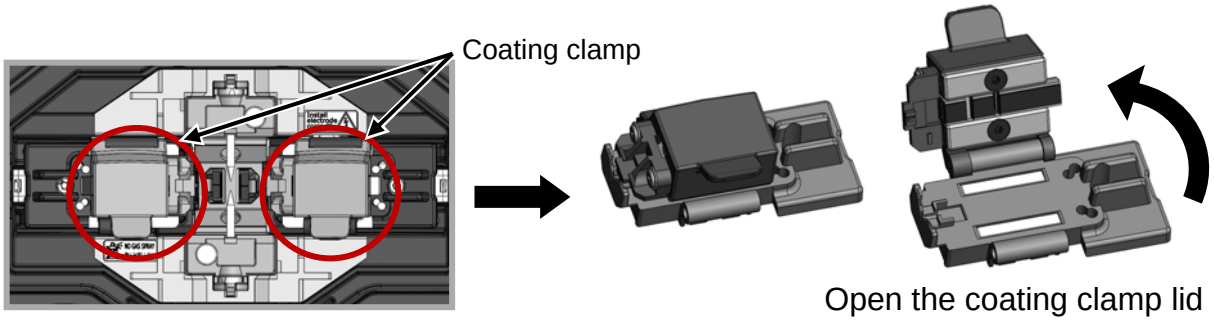
Log in to Administrator mode by entering a pass code to use expanded functions.
Please refer to "Chapter 6: Administrator mode" for details.

5. Other convenient functions

The T-400S is provided with various functions. Set up the functions as necessary.

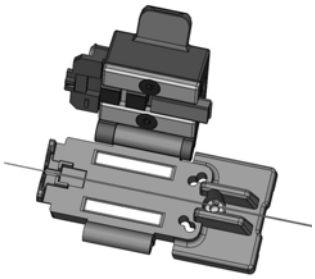
Multi clamp

The T-400S has ability to work with standard fiber coating, drop cable sheath and φ3mm fiber cord sheath under standard specification. Please place fiber in an appropriate position of the coating clamp according to the coating types.



Open the coating clamp lid and place fiber in the clamp.

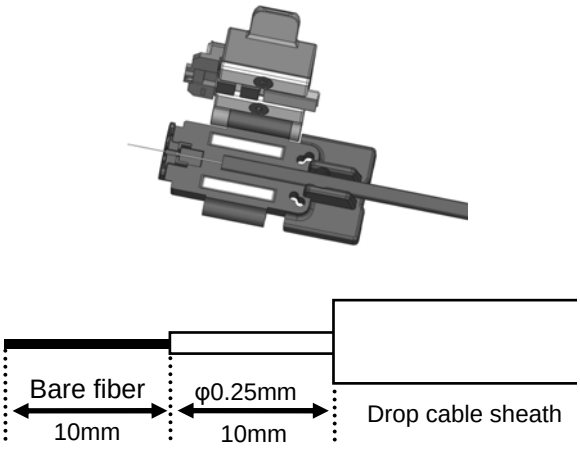
<For standard coating>



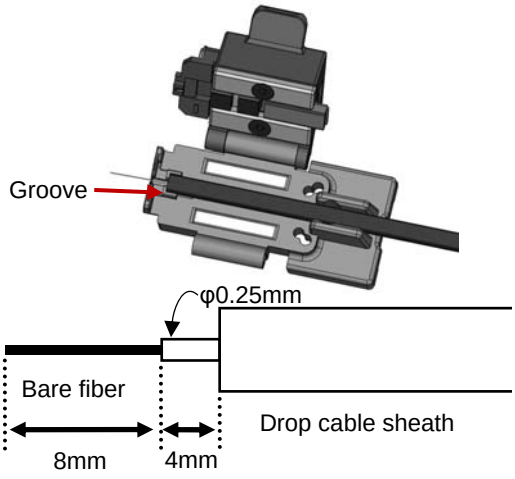
Diameter of fiber coating	Applicable cleave length
250μm	5~16 mm
900μm	8~16 mm

<For drop cable>

For use of 60mm protection sleeve



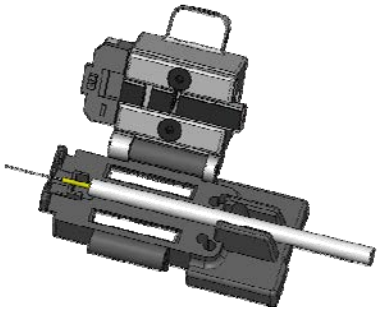
For use of 40mm protection sleeve

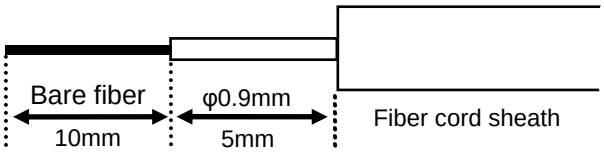


Recommended lengths

Diameter of fiber coating	Cleave length	φ0.25mm coating length
3.0 mm×2.0 mm	10mm（for 60mm sleeve）	10mm（for 60mm sleeve）
	8mm（for 40mm sleeve）	4mm（for 40mm sleeve）

<For fiber cord>



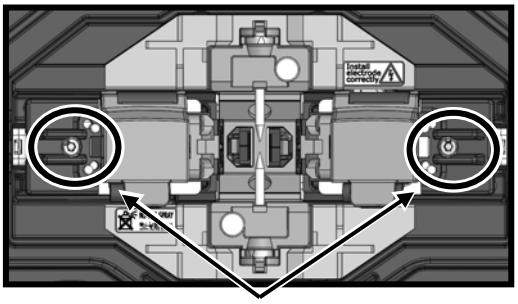


Recommended lengths

Diameter of fiber coating	Cleave length	φ0.9mm coating length
3.0 mm or less	10mm	5mm

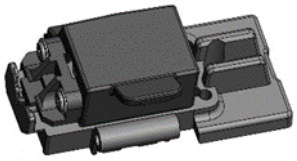
Fiber holder operation

Detaching the coating clamp makes it possible to use fiber holders for single fiber for splicing. Sumitomo fiber holder FHS series can be applied.

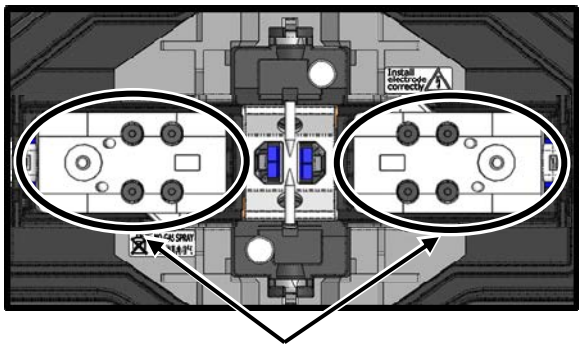


Coating clamp fixing screw

1. Loosen the coating clamp fixing screw to detach the coating clamp.

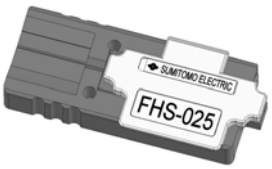


Coating clamp



Holder stage

2. The holder stage is available. Place a fiber holder on the holder stage.



Fiber holder FHS-025

Auto start

The T-400S is provided with Auto start function that automatically starts the splicing process and the heating operation.

Auto start splicing

When the fiber is inserted into the splicer and the hood is closed, the splicing process is automatically started. There's no need to press the SET key.

(See also page 4-11.)

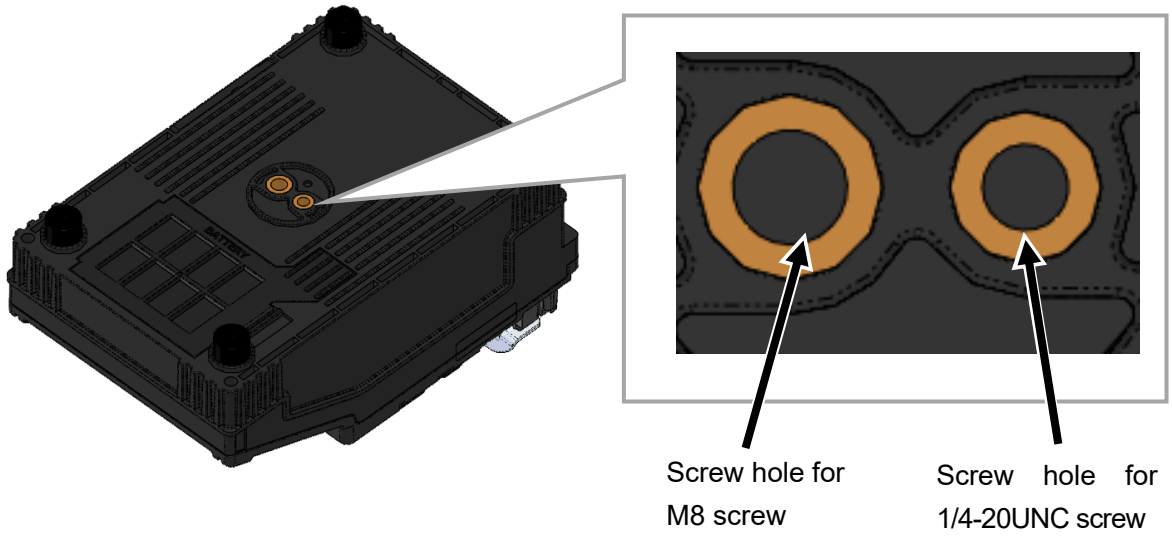
Auto start heating

When the fiber is placed into the heat shrink oven, the heating operation is automatically started. There's no need to press the Heater key.

(See also page 4-11.)

Tripod fixing screws

The T-400S has screw holes for M8 screw and 1/4-20UNC screw. In a high location, fix the splicer to a tripod to prevent it from dropping.



Caution

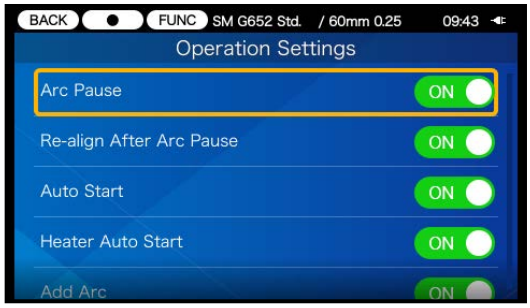
1. In a high location, fix the T-400S to a tripod with the M8 screw or 1/4-20UNC screw on the bottom of the splicer to prevent the splicer from dropping.

2. Do not use a tripod with a thread length of >8mm (5/16"). Doing so can risk damage the fusion splicer.

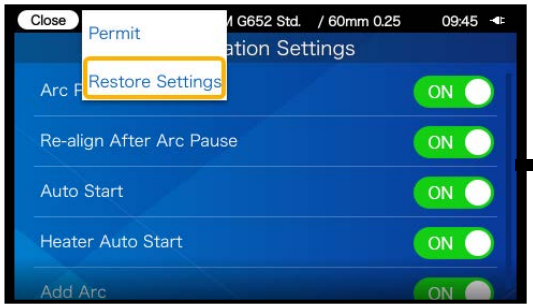
Restoring factory default settings

In Administrator mode, all Operation Settings/Function Settings can be reset to the factory default settings in one go. This page explains as an example how to restore the Operation factory default Settings.
(Please refer to Chapter 6 “Administrator mode” for how to log in to Administrator mode.)

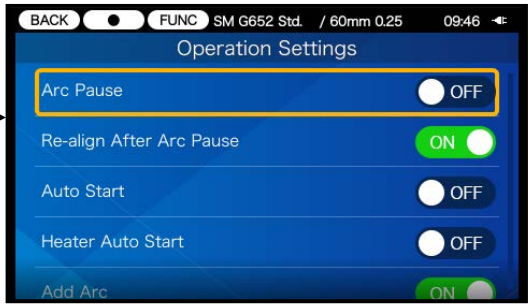
1) Select the Operation Settings and press F2 key to go to set-up screen.



2) Select FUNC icon. (Press F3 key.)



3) Move the cursor to “Restore Settings” in the pulldown menu and press F2 key to reset all the customized settings.

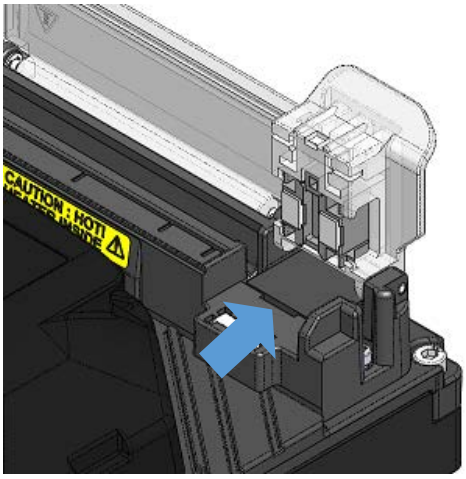


4) The factory default settings are restored.

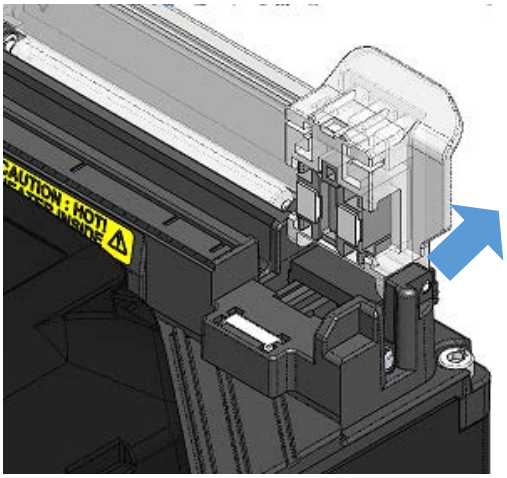
The Function factory default Settings can also be restored in the same way.

Dual purpose clamping system of heat shrink oven

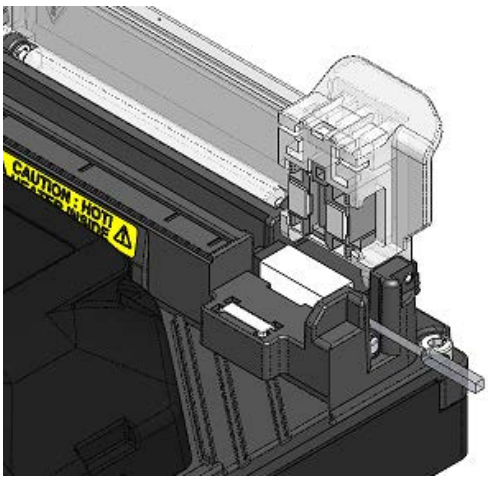
To heat shrink Splice on connecter with the heat shrink oven, push the Slide block from front to back.



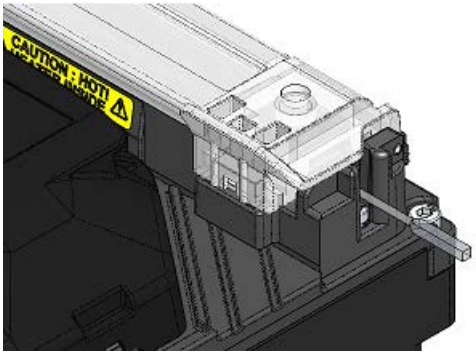
1) Hook your finger to the recessed part of the Slide block.



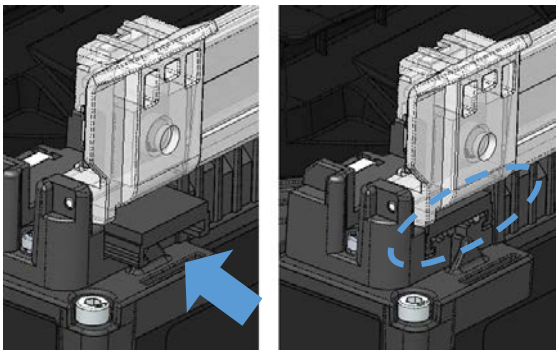
2) Push the Slide block from front to back.



3) Place Splice on connecter therein.



4) Close the lid. Ensure a dedicated oven program is selected and then start the heat shrink process.



5) To return the Slide block to the default position, push it from the back of the heat shrink oven.

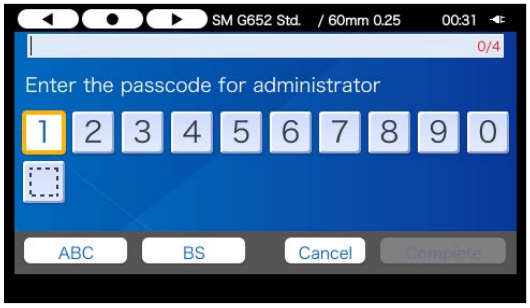
*****For heat protection of **Sumitomo**'s Splice on connecters, the Slide block should be set to the default position.

6. Administrator mode

An administrator can edit splice/heater program parameters and function settings which are not visible in operator mode. The administrator can also setup a passcode to keep operators from accessing functions.

Accessing administrator menu

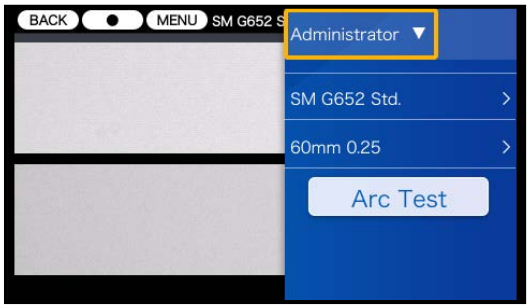
1) Open the setup pane. Move the cursor to “Login” and press F2 key.



Input Pass Code screen

Pass code: 0000

2) Move the cursor “□” using F1 and F3 keys. Enter the default passcode “0000” using F2 key. After the entry, move the cursor to Complete icon and press F2 or SET ➡ key.



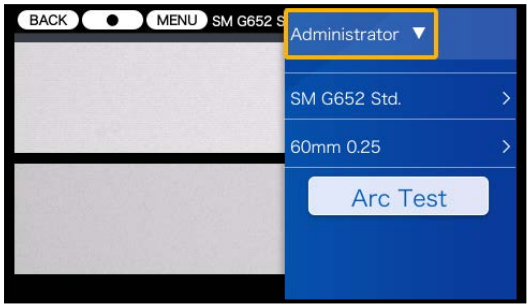
3) After the entered passcode is verified, “Administrator” label is displayed on the setup pane. You are in Administrator mode.

note

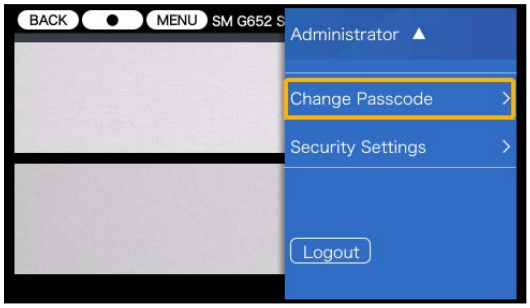
Once you enter the passcode, you can always access Administrator menu without re-entry of the passcode until you turn off the power. If you turn off the power and turn it on again, operator menu is displayed.

Changing administrator passcode

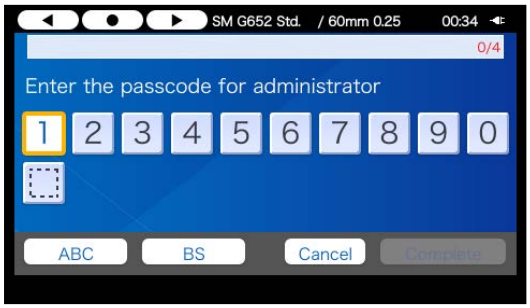
A login passcode can be changed in Administrator mode.



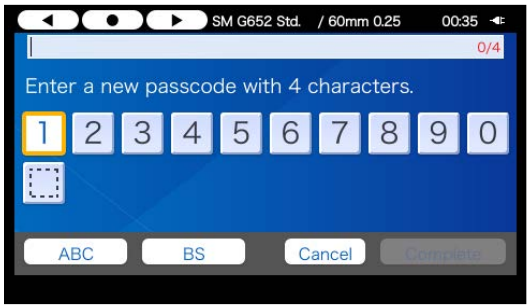
1) Open the setup pane. Move the cursor to "Administrator" and press F2 key.



2) Move the cursor to "Change Passcode" and press F2 key.



3) Enter the current passcode using F2 key. After the entry, move the cursor to Complete icon and press F2 or SET key.



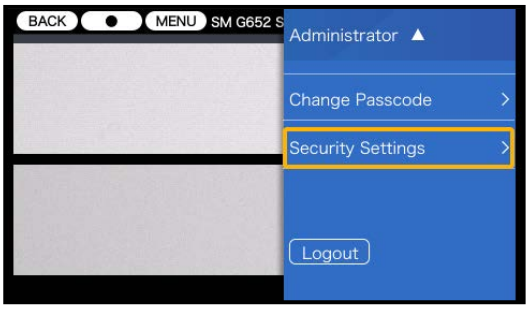
4) The new passcode setup screen is displayed. Enter a 4 digit new passcode.

5) Enter the 4 digit new passcode for confirmation.

If you've forgot the Administrator passcode, you cannot access Administrator mode.
In this case please contact our maintenance service center.

<Startup password protection>

Using a startup password, “Security” function prevents unwanted users from accessing the splicer.

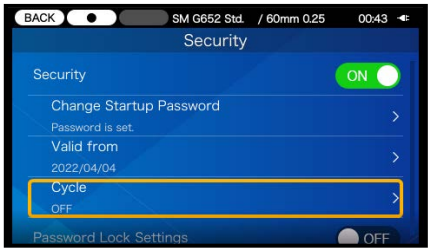


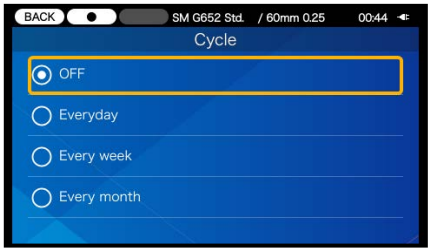
1）Open the Administrator setup pane. Move the cursor to “Security Setting” and press F2 key.

2）Select “Security” and press F2 key.

3）Startup password setup screen is displayed. Set a 4 digit password.

4）Enter a date on which the splicer will request a password entry. Change dates using ▼▲ keys. Move the cursor “ ” using F1 and F3 keys.
After a date entry, move the cursor to Complete icon and press F2 or SET key. Past dates cannot be set.





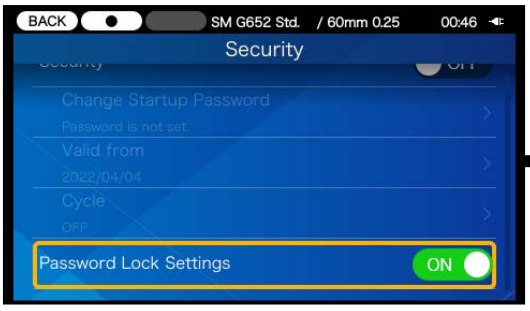
If you enable “Cycle” option, a startup password is requested every certain period of time (everyday/every week/every month) after the date when the startup password is activated passed.

You cannot start the splicer if you’ve forgot the startup password. It should be taken notes of.
Please contact our maintenance service center if you’ve forgot it.

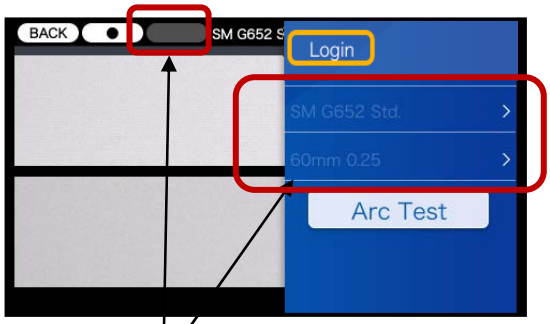
<Lock function 1>

An administrator can lock splice and heater programs so that an operator cannot change them.

1) Open the Administrator setup pane. Move the cursor to "Security Setting" and press F2 key.



2) Select "Password Lock Settings" and press F2 key to set the function to ON.



Unchangeable

3) After you log out from Administrator mode, splice/heater programs and function settings cannot be edited.

4) To make the splice/heater programs changeable again, access Administrator mode by entering the Administrator passcode, and set "Password Lock setting" to OFF.

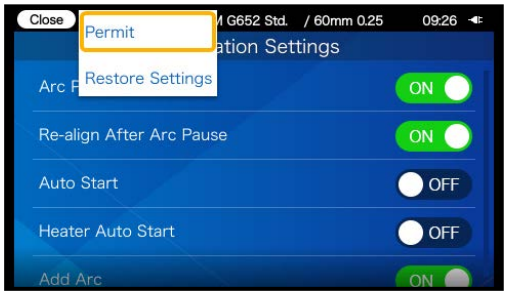
You cannot change the lock settings if you've forgot the Administrator passcode. It should be taken notes of.
Please contact our maintenance service center if you've forgot it.

<Lock function 2>

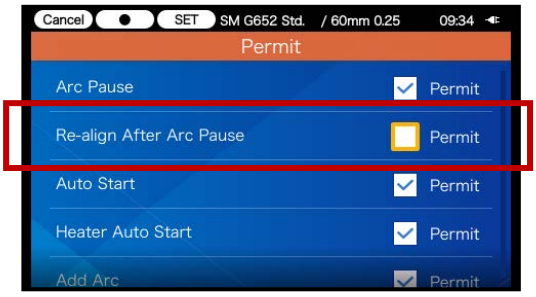
An administrator can lock Operation/Function settings on an item by item basis so that an operator cannot change them.

1）While keeping logging in to Administrator mode, move the cursor to the item you would like to lock and press F2 key.

2）Select FUNC icon. (Press F3 key.)



3）Move the cursor to “Permit” in the pulldown menu and press F2 key.



4）Move the cursor to the item you would like to lock and press F2 key. The checkmark is removed from the Permit box.
Pres F2 key to reflect the change.
In this example the checkmark for “Re-align After Arc Pause” is removed.

5）The lock setting is completed. After you log out from Administrator mode, the item which has been locked becomes hidden.
In this example “Re-align After Arc Pause” is not shown on the Settings screen.

Administrator menu details

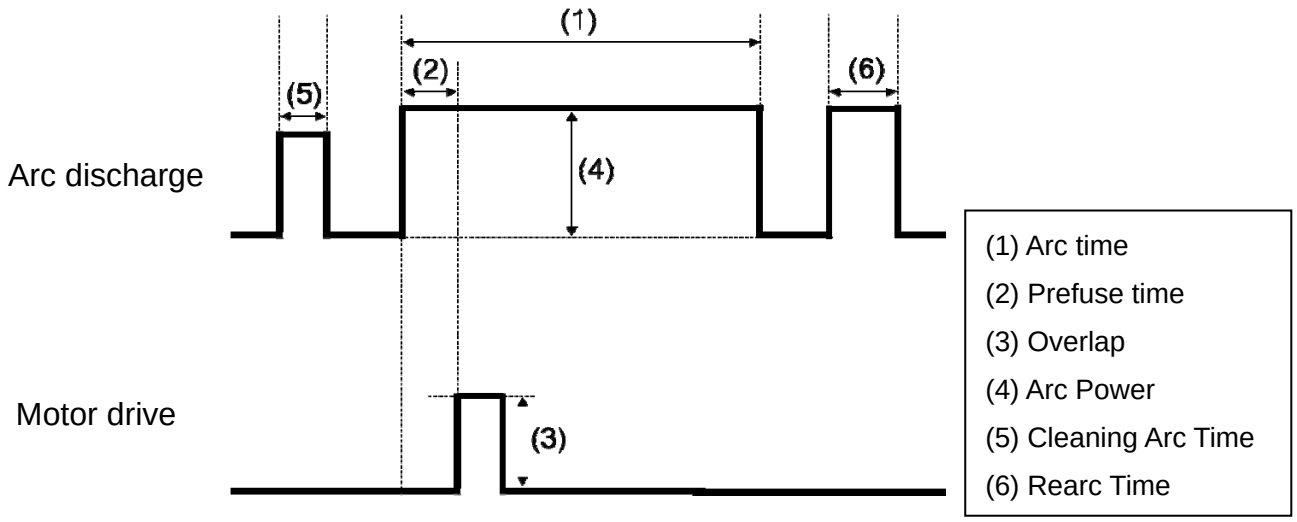
<Splice program settings> (Administrator mode)

Item	Description
Name	Allows to edit splice program name.
Abbreviated name	Allows to edit splice program name which is displayed on the main splice screen.
Template	Allows to choose splice program as a template when new splice program is created.
Note	Allows to add a note to the selected splice program (up to 21 characters).
Arc Power	Allows to manually adjust the arc power for fusion splicing. Since an arc test automatically optimizes the power, it is not necessary to adjust it manually under normal use. If the level of an arc needs changing, the arc power should be adjusted manually.
Gapset Position	Allows to manually adjust the fiber position for fusion splicing. Since an arc test automatically optimizes the position, it is not necessary to adjust it manually under normal use. If the position needs changing, it should be adjusted manually.
Cleaning Arc Time	Sets the cleaning arc time for removing dust from optical fiber.
Cleaning Arc Power	Allows to adjust power for cleaning arc based on the standard arc power.
Gap	Sets the gap between fiber end faces before arc fusion.
Cleave Angle Limit	Sets the threshold of cleave angle. If a reading exceeds the threshold, the splicer will give an error.
Arc Time	Sets the arc fusion time.
Prefuse Time	Sets the time between start of arc fusion and feeding of fibers.
Prefuse Power	Sets the power for pre arc fusion.
Overlap	Sets the distance of feeding fiber.
Fiber Pulling	ON or OFF the action of pulling fiber after overlapping fiber.
Fiber Pulling Start*	Sets the time of pulling fiber.
Fiber Pulling Length*	Sets the distance of pulling fiber.
Fiber Pulling Speed*	Sets the speed of pulling fiber.

*Only visible when “Fiber Pulling” is set to ON.

Item	Description
Wavelength	Sets the wavelength for loss estimation calculation.
MFD-L	Sets the MFD of left-hand optical fiber.
MFD-R	Sets the MFD of right-hand optical fiber.
Minimum Loss	Sets the value to be added to an estimated loss.
Est. Loss Limit	Sets the threshold of estimated loss. If a reading exceeds the threshold, the splicer will give an error.
Rearc Time	Sets the time for additional arc to be conducted after splicing.
Rearc Power	Sets the power for additional arc to be conducted after splicing.
Proof Test	Enables/Disables a proof test to be conducted after the splicing process. There are 2 options: ON/OFF.

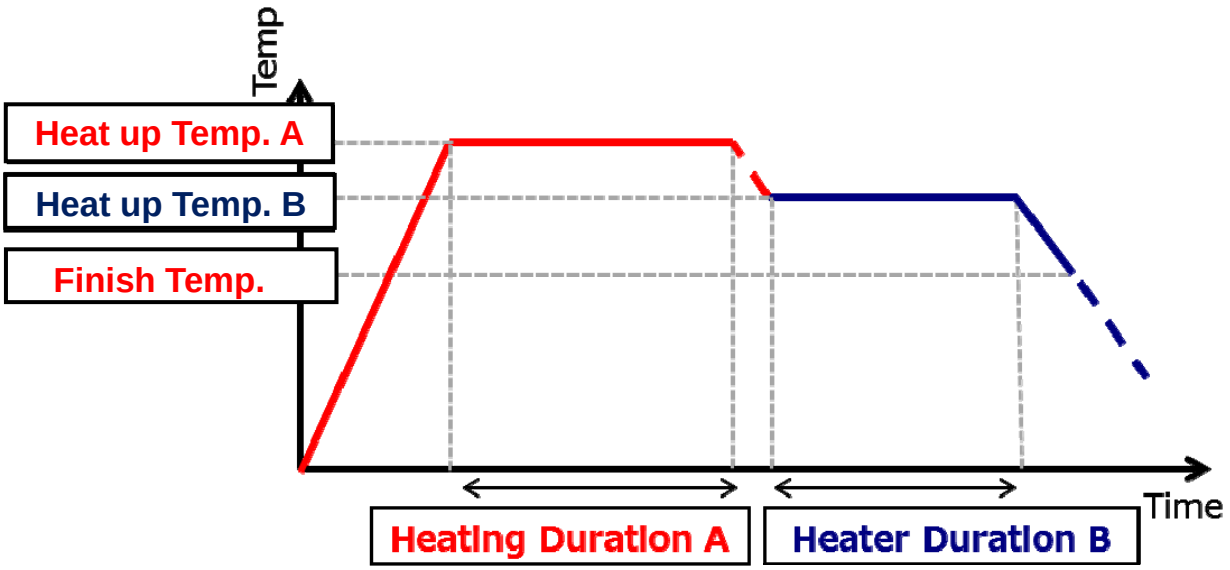
<How an arc discharges and motors run during the splicing process>



<Heater program settings> (Administrator mode)

Item	Description
Name	Allows to edit heater program name.
Abbreviated name	Allows to edit heater program name which is displayed on the main splice screen.
Sleeve ID Name	Allows to edit protection sleeve name.
Template	Allows to choose heater program as a template when new heater program is created.
Note	Allows to add a note to the selected heater program (up to 21 characters)
Heat up Temp. A	Temperature for the first half of the heating cycle. (Numerical input)
Heating Duration A	Duration for maintaining Heat Up Temp.A. (Numerical input)
Heat up Temp. B	Temperature for the latter half of the heating cycle. (Numerical input)
Heating Duration B	Duration for maintaining Heat Up Temp.B. (Numerical input)
Finish Temp.	The cooling process finishes at this temperature. (Numerical input)

The heating control system



<Operation settings> (Administrator mode)

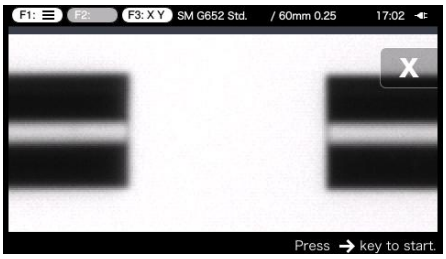
Operation Settings	Details
Arc Pause	Stops the splicing process temporarily before arcing. If you would like to check fiber offset and fiber end faces during the process, set this function to ON.
Re-align After Arc Pause	Fibers are aligned again prior to splicing after Arc Pause.
Auto Start	Automatically starts the splicing process when the fiber is inserted in the splicer and the hood is closed.
Heater Auto Start	Automatically starts the heating process when the fiber is placed into the heat shrink oven.
Add Arc	Additional arc is available by setting this function to ON. If an arc is insufficient, an additional arc should be performed.
Add Arc Setting	Allows to adjust the arc power for additional arc.
Ignore Cleave Angle Limit	If this item is set to ON, the splicer will ignore a result of cleave angle inspection. The default is OFF.
Ignore Cleave Errors	If this item is set to ON, the splicer will ignore a result of cleaving quality inspection. The default is OFF.
Ignore Post-Fusion Check Error	If this item is set to ON, the splicer will ignore a result of post-fusion inspection. The default is OFF.
Fiber Insertion Screen	Single (X or Y) screen type or dual (X and Y) screen type can be selected in each step of the splicing process.→ For further information, please refer to the next page.
Pre-Fusion Screen	
Arc Screen	
Post-Fusion Screen	
Est. Loss Screen	
Postsplice Action (Proof-Reset)	Allows to select an action to be done after splicing, i.e. a proof test is carried out or not, and resetting is automatically performed or not.
Information Dialog Settings	Enables/disables display of a popup information screen.

<Screen indication>

From the Operation Settings, you can choose a view of the fibers for the 5 stages of the splicing process. (See ✱ marks in the picture below.)

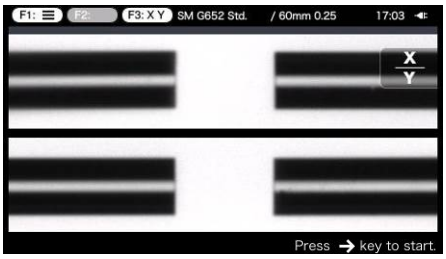
- Fiber Insertion Screen
- Pre-Fusion Screen
- Arc Screen
- Post-Fusion Screen
- Est. Loss Screen

X or Y only



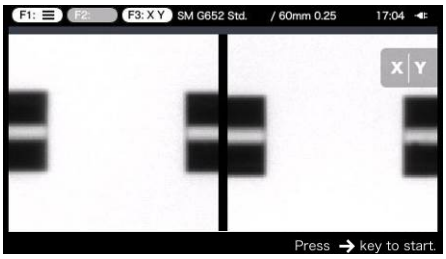
If “X or Y only” is selected, X or Y screen is displayed on the screen.

X above Y



If “X above Y” is selected, X and Y screens are vertically displayed on the screen.

X beside Y



If “X beside Y” is selected, X and Y screens are horizontally displayed on the screen.

<Function settings> (Administrator mode)

Functions	Details
ECO Mode	Saves power consumption by adjusting monitor brightness and heat shrink oven temperature.
Sleep(Battery)	If the splicer is not interrupted on battery operation for a certain period of time, to minimize power consumption, it will go into Sleep mode and the monitor will be turned off. Press any keys except the power key to re-start the splicer.
Auto Power Off(Battery)	If the splicer is in Sleep mode and not interrupted on battery operation for another certain period of time, it will automatically switch off. Switch it back on again.
Sleep(AC)	If the splicer is not interrupted on AC operation for a certain period of time, to minimize power consumption, it will go into Sleep mode and the monitor will be turned off. Press any keys except the power key to re-start the splicer.
Auto Power Off(AC)	If the splicer is in Sleep mode and not interrupted on AC operation for another certain period of time, it will automatically switch off. Switch it back on again.
Date(yyyy/mm/dd hh:mm)	Sets the built-in clock to a local time.
Language	Display language can be selected.
Temperature Unit	This function switches the temperature units.
Buzzer (Key)	A buzzer sound for key pressing is enabled / disabled.
Buzzer (Stop)	A buzzer sound for arc pause is enabled / disabled.
Buzzer (Error)	A buzzer sound for an error detected during the splicing process is enabled / disabled.
Light for V-groove	Sets the V-groove illumination to ON or OFF.
Opening Title1	Allows to create a text to be displayed on a splicer startup screen. Max number of characters: 21
Opening Title2	
Quick Start	Reduces the time taken from power up to display of the initial screen.

<Maintenance settings> (Administrator mode)

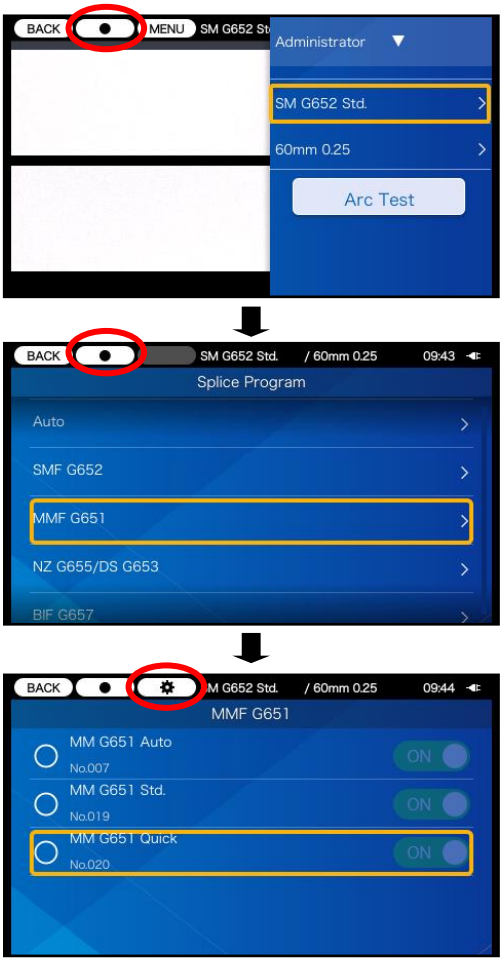
Item	Details
Conditioning Arc	After electrodes are replaced, this function is used to condition new electrodes. The number of times of conditioning arc is pre-set. Arc Count is automatically reset after conditioning arc is performed.
Self Inspection	The circuit board, optical unit, motors and heat shrink oven are automatically inspected.
Motor Calibration	The condition of all motors is inspected.
Caution for Arc Count	Sets an arc count at which a caution for electrode replacement is displayed. For further information, please refer to page3-4.
Warning for Arc Count	Sets an arc count at which a warning for electrode replacement is displayed. For further information, please refer to page x3-4.
Reset Arc Count	Allows to reset the arc count. *Total Arc Count (All Count) cannot be reset.
Restore Data	All parameters except Arc Count and All Count are returned to the factory setting.

Copying splice program/heater program

In Administrator mode, you can create your own new splice program by copying an existing splice program to a blank area of splice programs. After the copy, you can edit the name of the copied program and change the parameter settings.

First, log in to Administrator mode to do this action.

As an example this page describes how to copy splice program.



1) While keeping logging in to Administrator mode, move the cursor to the item you would like to copy, and select ⚙ icon (press F3 key).

2: Select Copy icon (press F3 key) again to copy the selected item.

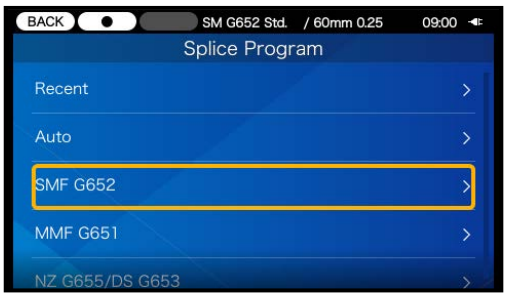
3: Select the number of splice program where you would like to paste the copied program.

4: When copying is done, the copied program details are displayed. An editable mark has a > mark (>) at the rightmost part of the row. For more details, please refer to P.6-6 and P.6-7.

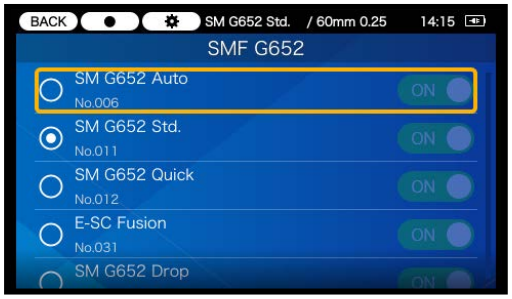
To copy heater program, follow the same procedures as described in this page. For the details of heater programs, please refer to P.6-8.

Registering (showing)/de-registering (hiding) splice program

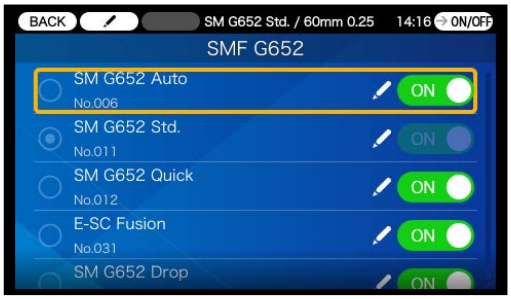
Some splice programs are factory pre-registered in the program menu and if you would like to use a program other than the registered programs, you can register it and show it in the splice program menu.



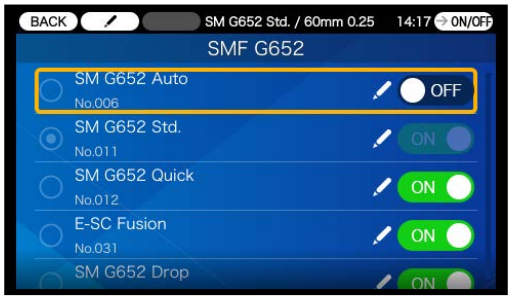
1) Go to Splice Program selection screen. For example, move the cursor to “SMF G652” category and press F2 key.



2) Select icon. (Press F3 key.)



3) Move the cursor to the splice program you would like to register/de-register and press SET key.



4) ON⇔OFF are switched every time key is pressed. In this example the splicer program is de-registered.

The registered splice program is visible in the Operator menu screen and saved after the power is turned off.

note

- In Administrator menu, heater programs can also be registered/de-registered in the same procedures.
- The splice/heater program which is currently selected for use cannot be de-registered. First select other program to make the currently selected program unselected, and then de-register it.

7. Troubleshooting

For repair and technical support, contact maintenance service center address described in the back cover.

Arc problems

The electrodes periodically need replacing. Some common symptoms that indicate the electrodes need replacing are:

- High or inconsistent splice losses
- Bubbles in the fibers after splicing
- Diameter faults
- Fluttering or unstable arc observed on the monitor
- Fiber burned in half
- Sizzling noise while arcing

Refer to page 3-5, “Electrode replacement procedures”.

If an electrode tip touches something, it will be deformed, causing poor arcing problems. Take care of the handling of electrodes.

Fiber breaking

When the splicing process is complete, a proof test may be performed on the fibers while in the fiber chucks. If the fibers are breaking when the proof test is performed, re-do an arc test. If the arc power level is too weak, the splice may be poor, resulting in fiber breaking.

If the fibers are breaking in spite of a good arc test result, clean the V-grooves and the bare fiber pads completely. Deterioration of a jacket remover/fiber cleaver may lead to fiber breaking. Clean the jacket remover/fiber cleaver completely.

Splicer does not power up

If the fusion splicer fails to turn on when the Power key is pressed, check the following:

- Verify that the battery pack is installed in the module bay properly
- Verify that the power plug is seated properly (the power cord is connected to the AC adapter.)
- If using battery operation, ensure that the battery is fully charged.

If the splicer still does not power up after checking the above, contact our maintenance service center.

Splicer is running slow

If the screens are switched frequently, the splicer may run slow. In this case, turn off the splicer and turn it on again. If it still runs slow, please contact our customer service center.

Warranty and repair service

Before requesting a repair, try to locate the problem and identify the cause by referring to “7. Troubleshooting” at page 7-1. If you ensure that your machine is really in need of a repair, contact our maintenance service center.

REGION LIMITATION

This product is sold for the use in a limited sales area (refer to the information which appears on the splicer screen) and the technical support of the product moved out of the said region may be refused or require extra charges.

Warranty period

1. About the warranty period of this product, please ask to the distributor that you purchased the product from.

Services after warranty period

After the warranty period expires, all products may be repaired for a reasonable service charge.

2. The following cases are the exception for repairing and replacing the product free of charge.
   (1) Damage or malfunction caused by misuse, mishandling, non qualified repair, disassembly, modification, or any other irregular execution
   (2) Damage or malfunction caused by drop, fall or any other faulty treatment such as to be explained in precautions on this manual.
   (3) Damage or malfunction caused by actions that are beyond Sumitomo’s control including for example, fire, water flood, earthquake, lightening or similar disaster, or any other accident.
   (4) Damage or malfunction caused by the use of Product in conjunction with accessories, products, or consumables not specified or approved by Sumitomo.
   (5) Replacement of consumables
   (6) Travel expense that is charged if a trip for repair is requested by the customer.
   (7) Damage or malfunction caused by use of batteries and battery chargers not specified or approved by Sumitomo.
   (8) Products founds corroded due to exposure to water or dew condensation, or cracked or deformed circuit board.

3. The customer shall bear the cost of returning the product to Sumitomo.

Error message list

Please contact maintenance service center when it is not recovered if you take the measures below.

Error message	Countermeasure
The fibers are not placed correctly in the splicer.	Make sure that the right and left fibers are placed in the correct position of the splicer. >Refer to page 2-11
The splicer failed to adjust the LED brightness.	Clean the microscope lens protection glass and LEDs. >Refer to page 3-2
The splicer is unable to start splicing because the hood is open.	Close the hood. Very high voltage is generated with the splicing. The splicer never starts splicing with opening hood for safety.
The splicer could not detect the left (right) fiber.	Make sure that the left (right) fiber is placed in the correct position of the splicer. >Refer to page 2-11
The splicer failed to align the left (right) fiber.	Make sure that the left (right) fiber is placed in the correct position of the splicer. >Refer to page 2-11 There is a possibility that dust or dirt is on the V-groove and the fiber clamp when the error occurs repeatedly. Please execute the cleaning. >Refer to page 3-2 and 3-3
The splicer failed to adjust the arc gap of the left (right) fiber.	
The splicer failed to inspect the right and left fibers.	Make sure that the right and left fibers are placed in the correct position of the splicer. >Refer to page 2-11
The cleave angle of the left (right) fiber exceeds the allowable limit.	Cleave the left (right) fiber again. >Refer to page 2-9 If the error occurs repeatedly, the cleaver blade might be deteriorated. Change the blade position or replace the blade. For further information, refer to the operation manual of the cleaver.
A lip is observed on the left (right) fiber end.	
A chip is observed on the left (right) fiber end.	
The splicer failed to adjust the focus.	Make sure that the right and left fibers are placed in the correct position of the splicer. >Refer to page 2-11 Also, please confirm whether dust is on the fiber. There is a possibility that dust or dirt is on the V-groove and the fiber clamp when the error occurs repeatedly. Please execute the cleaning. >Refer to page 3-2 and 3-3
The splicer failed to splice the fibers.	Start the splice again.

[T-400S specifications]

Items		T-400S
Optical fiber requirement	Material	Silica glass
	Fiber count / Profile types	Single / SMF (G.652), MMF (G.651), DSF (G.653), NZDSF (G.655), BIF (G.657)
	Cladding diameter	125 μm
	Fiber coating diameter	Up to 3mm by multi clamp
	Cleave length*1	5 to 16 mm for single fiber
Standard performance	Splice loss(typical)*2	SMF : 0.03dB DSF : 0.05dB MMF : 0.01dB NZDSF : 0.05dB
	Return loss(typical)	60dB or greater
	Splice time(typical)	6 sec (SM G652 Quick Mode)
	Heating time(typical)*3	24sec(FPS-61-2.6 sleeve, S60mm 0.25 Mode)
	Splice & Heat cycles per battery full charge*4	Approx. 200(BU-15)
	Fiber view & magnification	2CMOS cameras observation,200X Max
	Proof test*5	1.96~2.09N
	Applicable protection sleeve	60mm,40mm & Sumitomo Nano sleeves
Programs	Splice programs	Max. 150, 12are pre-optimised,100 editable by user (38 to be pre- optimized)
	Heating programs	Max. 50, 12are pre-optimised,20 editable by user (18 to be pre-optimized)
Functions	Splice image capture	100 images (internal memory only)
	Splice data storage	10,000 splice data(internal memory only)
	Auto-start	Splice / Heating
	Multi clamp	Provided, applicable for 250 & 900μm coated fiber, 2 & 3mm jacket cord and rectangular drop cable
	Heater clamp for splice on connector	Provided
	Automatic arc calibration	Automatically compensates for environmental condition changes
Size / Weight	Size (main body)	129(W)× 195(D) × 99(H)mm (without protrusion)
	Weight	1.2kg (without Battery), 1.3kg (with Battery BU-15)
	Monitor	4.3" color LCD display
Terminals	USB port	USB 2.0 (mini-B type) *6
Power supply	AC input	AC 100-240V , 50/60Hz (ADC-15),1.5A
	DC input	DC 10-15V,5A
	Battery pack	Li-ion 10.8V , 35.64Wh (BU-15)
Operating condition*7		Altitude : 0~5,000m ,Temperature: -10 ~ +50 °C, Humidity : 0~95%RH (non-condensing), Wind velocity : up to 15m/sec
Storage condition *7*8		Temperature: -40 ~ +80 °C, Humidity : 0~95%RH (non-condensing), Battery : -20~+30°C (long term)
Electrode life		6,000 arc discharges*9
Software update		Internet

[Environmental Durability]

Test	Details
Shock resistance	Drop from 76cm on bottom face only*10
Water resistance	Equivalent to IPx1 *11
Dust resistance	Equivalent to IP5x*12

*1 The applicable fiber protection sleeves vary depending on the cleave length.
60mm fiber protection sleeves ••••• Cleave length 5-16mm
40mm fiber protection sleeves ••••• Cleave length 5-10mm

*2 Average value of the final inspection in room temperature with Sumitomo identical fiber. Measured by cut-back method relevant to ITU-T and IEC standards.

*3 With the AC adapter in room temperature (20°C). If the battery pack is used, the heating time varies depending on the temperature and the remaining battery capacity.
With Sumitomo protection sleeve FPS-61-2.6, S60mm 0.25 Mode.

*4 In room temperature (20°C) with a brand-new fully charged battery pack. ECO mode is set to ON. Sleep time is set to 10 seconds. Screen brightness is set to 1. 1 splice cycle (splice + protection) completes in 90 seconds and the cycle shall be repeated.
Splice & heat cycles may vary depending on the battery condition and operational environment.

*5 Performed on the fiber stage after splicing.

*6 The recommended dimensions for USB housing are 9mm x 5mm or smaller.

*7 Non-condensing

*8 The Battery pack storage temperature range: -20°C ~ +50°C (if stored for less than 1 month), -20°C ~ +40°C (if stored for less than 3 months), -20°C ~ +20°C (if stored for less than 1 year).

*9 Electrode life is not guaranteed. Achieved in lab condition. Electrode life may vary depending on the operating environment.

*10 After the splicer is dropped from 76cm on bottom face, it shall work properly. The test is held with the battery operation, carried out by Sumitomo, but does not guarantee that the product is free of faults or damage.

*11 Water resistance: Operates normally after being exposed to vertically dripping water at 1mm/min, for10 min. The test is held with the battery operation, carried out by Sumitomo, but does not guarantee that the product is free of faults or damage.

*12 Dust resistance: Operates normally after 8 hours in a test chamber with circulating dust particles smaller than 75μm. The test is held with the battery operation, carried out by Sumitomo, but does not guarantee that the product is free of faults or damage.

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