EasySplicer mk2

USERS MANUAL

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Introduction

The EasySplicer mk2 incorporates all the best a “Made in Sweden” Fusion splicer can offer.

NOTE: EasySplicer mk2 is a high precision instrument and should always be handled with care!

Disclaimer

SB Scandinavia AB reserves the right to modify the product in any way without prior customer notification or any other form of notice.

In no event, shall SB Scandinavia AB be liable for any damages of any type, incidental, indirect, consequential or other, originating from or relating to this manual or the information contained herein. While SB Scandinavia AB tries to make the user manual complete and accurate, it may contain mistakes, and the user uses it solely at his or her own risk.

Application

Splicing and protection of most common types of SMF and MMF.

EasySplicer mk2 components

The following components are included and standard for splicing in the field:

Item	Description	Quantity
1	EasySplicer mk2	1
2	Power supply	1
3	Fiber cleaver	1
4	Fiber holders 250µm (**black**)	1 pair
5	Fiber holders 900µm (**blue**)	1 pair
6	Fiber holders Loose tube (**red**)	1 pair
7	Stripper	1
8	Carrying bag	1

Basics

NOTE: The EasySplicer mk2 is a rugged field instrument designed to withstand field environment. However, to ensure best performance, it is important to keep maintenance as described later in this manual.

Quick Start!

Turn on the EasySplicer mk2

If available, connect the splicer to a power source.
- The splicer will also start automatically if the power-supply is connected. Simply press any button to leave charging-mode.

* Make sure that that unit is properly charged if operated by the internal battery-pack. Charge the unit at least 6-8 hours before using it the first time.
  - Turn on the EasySplicer mk2 by pressing down the “ON”-button (large button below the display).
  The splicer starts in “ready-mode” after a few seconds.

* Before beginning to splice it is important to verify that the electrodes are in good (operational) condition. The electrodes are quite easily oxidized due to environmental conditions (like dirt in the air and/or moisture). The splicer has probably been stored for a while and lately in transport.
  Such oxide can be cleaned (burned off) by using the “CLEAN ELECTRODES” function (see also page 21).

Start with a Calibration!

Begin all work with a “Calibrate”. This is needed to adapt the splicer to its present environment (adapt to temperature, moisture etc.).

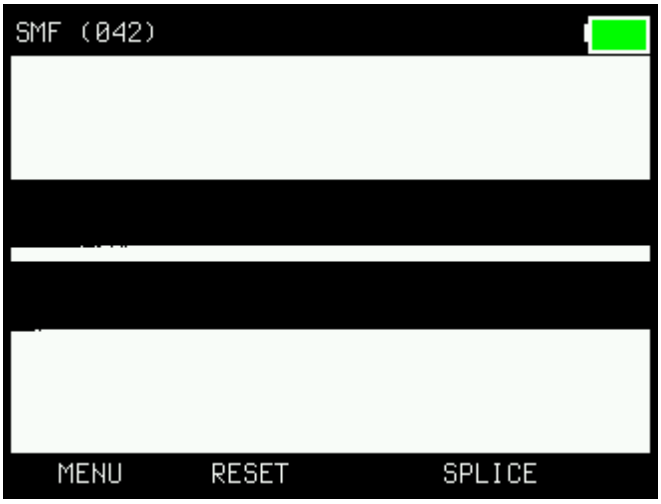
Singlemode or Multimode*?*

It´s very important to setup the correct fiber-type in the splicer before doing the calibration. For ex. Select Singlemode fiber in the “Menu” if You are using a Singlemode fiber.

- Press the “Menu-button”. Step with the “down-arrow” to “SETUP” and select it by pressing the large button (SELECT).
- Step with the “down-arrow” to “FIBER TYPE” and select it.
- Chose SINGLEMODE, MULTIMODE or OM1 fiber-type.

Doing the Calibration!

- Strip one fiber which You are about to splice (strip it some 5-6cm).
- Clean the fiber with alcohol, isopropyl or similar. Make sure not to touch the fiber with anything after cleaning as it will become dirty.
Place the stripped and cleaned fiber across the v-groove (see picture below).

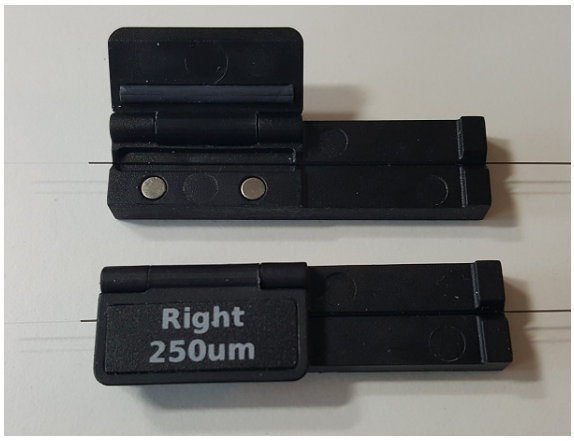


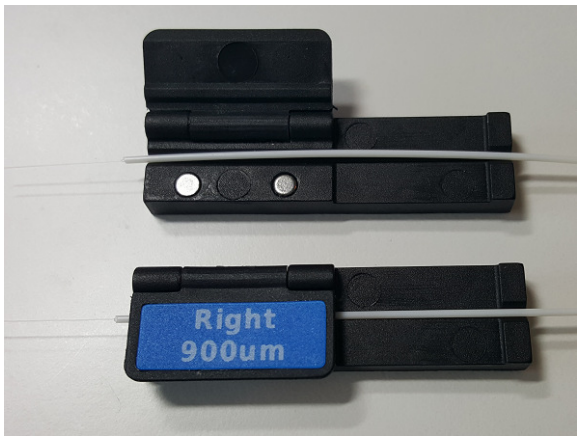
You can see how the calibration should be done in our Video to be found at:
https://www.dropbox.com/sh/t1bwwrk0i9str6a/AAAKnje_Mvc-_SeXVUH1v0Jva?dl=0

Having placed the fiber in the v-groove enter the “Menu” again and step with “down-arrow” to CALIBRATE.
Select it (large button) and the splicer will perform a calibration.
This is seen on the display as the splicer will ignite the spark and shine through the fiber with various strength.
The operation is finished after some 5 seconds and the display will show “OK” if the Calibration was done properly.
If not, the display will show the text: “CALIBRATE AGAIN”.

Time to splice!

- Place fiber in the fiber holders (250 fibers in the **black holders** and 900 fibers/pigtails in the **blue holders**). The fiber should “stick-out” some 3-4cm.





- Don´t forget to put on a shrink-tube (sleeve) over one of the fiber-ends before You start!

Strip and clean the fiber.

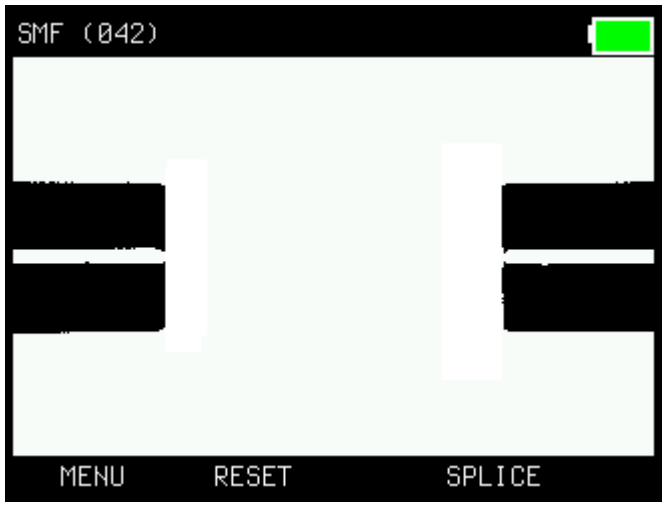
- **Cleave** the fiber.
- **Place** the fiber holders in the splicer. Push down the bracket which holds the fibers in place in the v-groove

- See the operation of the above at page 13-15 and/or watch our Video at:

https://www.dropbox.com/sh/t1bwwrk0i9str6a/AAAKnje_Mvc-_SeXVUH1v0Jva?dl=0

- If needed, press “RESET”.

The fiber ends should be seen in the display, a bit like this when ready for splicing:

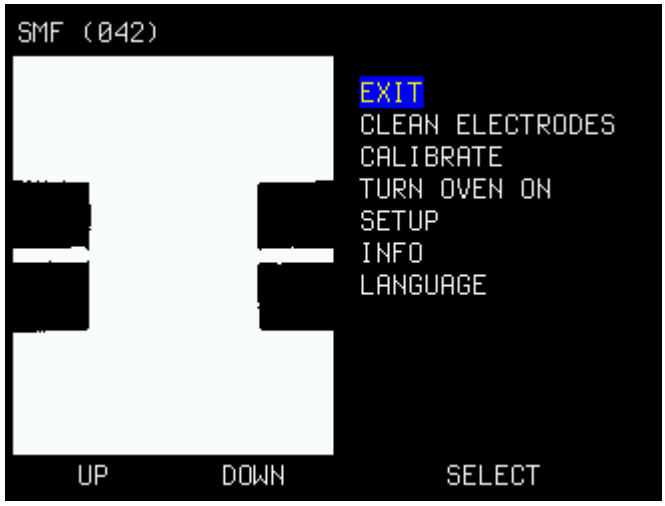


- Press the “SPLICE”-button (large button). The fibers will move together and spliced. The whole process will be shown in the display and take less than 10 sec.
  An automatic pull-test will be performed after the splicing.
- Finally, the splicer will show the estimated splice loss (in dB and in green color) or, if the process failed, “Bad splice” (if so, re-do the operation from “strip and cleave” above).

Oven operation – sleeve protection!

- Open up the oven (with the little arm on the left hand side of the oven).
- Lift up the bracket over the v-groove and then open up both fiber-holders.
- Push the shrink-tube over the spliced part and place the fiber/tube in the center of the oven. Lock the fiber (and close the oven-lid) with the oven-arm.
- Start the oven by pressing the “OVEN”-button. The oven is preset for a 45sek operation but can be set in many combinations (see in the Menu-system).
- The splicer is ready for another splice while the oven is in operation (start from above again). Press “RESET” if the oven-operation is not needed.

Main menu



Step up/down with the small buttons (UP/DOWN). Select Your choice with the SELECT-button.

EXIT

Exit from this Menu (back to Splice-mode).

CLEAN ELECTRODES

Run the “CLEAN ELECTRODES”-program to remove dirt/oxide on the electrodes.
Running this program will ignite an extra powerful spark which will burn the electrodes clean.

The “CLEAN ELECTRODES” will also be shown automatically in the display every 10 splices.

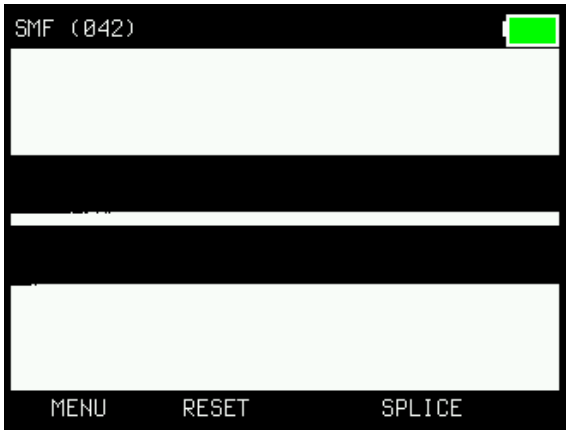
Run the program several times (1-3 times) for best result.
But not more than 5 times in a row. Then the splicer needs to cool for a couple of minutes. If 5 times is not enough the problem is elsewhere.

CALIBRATE

This function shall be used often for automatic environmental compensation.
This should be done every time the environment changes, for ex. when starting a new workday, when coming back after lunch, when changing the type of fiber cable to use.

Performing a **Calibration:**
- Strip one fiber which You are about to splice (strip it some 5-6cm).
- Clean the fiber with alcohol, isopropyl or similar. Make sure not to touch the fiber with anything after cleaning as it will become dirty.

Place the stripped and cleaned fiber across the v-groove (see picture below).



You can see how it is performed in our VIDEO to be found at:
https://www.dropbox.com/sh/t1bwwrk0i9str6a/AAAKnje_Mvc-_SeXVUH1v0Jva?dl=0

Having placed the fiber in the v-groove enter the “Menu” again and step with “down-arrow” to CALIBRATE.
Select it (large button) and the splicer will perform a calibration.

If AUTO MODE is selected the calibration will start automatically when the lid is closed and the splicer sees the fiber going all the way.

This is seen on the display as the splicer will ignite the spark and shine through the fiber with various strength.
The operation is finished after some 10 seconds and the display will show “OK” if the Calibration was done properly.
If not, the display will show the text: “CALIBRATE AGAIN”.

* The splicer will adjust to the performed calibration with small steps at every splice but when changing environment this calibration will be needed (as the Calibration function compensate with many steps up/down if necessary).

TURN OVEN ON

Use this function to manually run the oven program. Normally, when a splice is done the oven program will be executed automatically (see above “Oven operation” page 6).
But under some circumstances You might want to operate the oven manually.
If so, place a fiber with a shrink-tube (sleeve) in the oven compartment and press the OVEN-button. The oven will start and run for as long as the oven time is set (factory preset is 45 sec.)
Change time under “SETUP” and “Oven” below.

SETUP

Takes You to the next sub-level where the following functions can be adjusted (see section below):

* FIBERTYPE
* SET CLOCK
* OVEN
* LANGUAGE
* FIBER POSITION
* ELECTRODES
* DISPLAY
* AUTO MODE
* STARTUP CLEAN
* SPLICE PAUSE
* CALIB VISIBLE/CALIB NOT VISIBLE

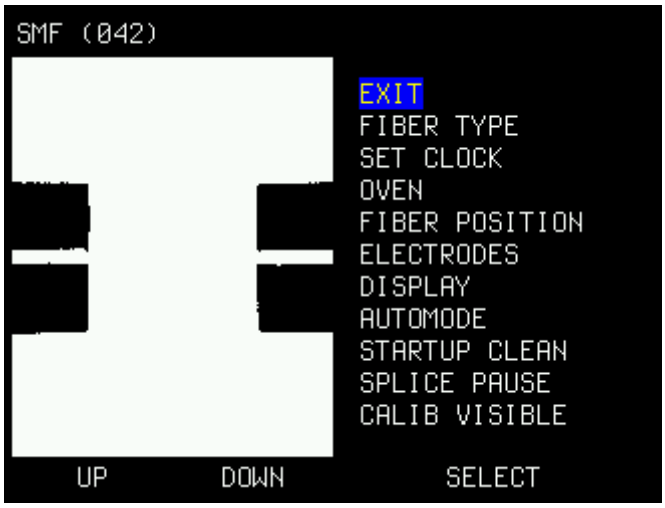
INFO

Shows miscellaneous information of the splicer, like firmware version and number of total splices.

LANGUAGE

Set the language by stepping up/down with the small buttons.
Press the large button (SELECT) for choosing a new language (or go to the top and select EXIT).

SETUP MENU.



EXIT
Exit menu.

FIBER TYPE
Select the correct fiber-type You are about to splice:

- SINGLEMODE
- MULTIMODE
- OM1

SET CLOCK
Set the internal clock by stepping up/down with the small buttons. Save value and move to the next line by pressing the large button (MOVE). Select EXIT for leaving this function.

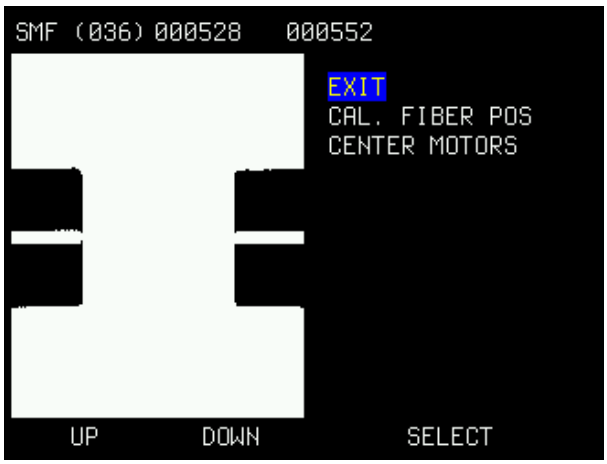
UP
Changes selected items up one step.
DOWN
Changes selected items down one step.
MOVE
Steps to next item.

OVEN
Set the oven time by stepping up/down with the small buttons.
Press the large button (SELECT) for choosing a new value (or go to the top and select EXIT).

LANGUAGE
Set the language by stepping up/down with the small buttons.
Press the large button (SELECT) for choosing a new language (or go to the top and select EXIT).

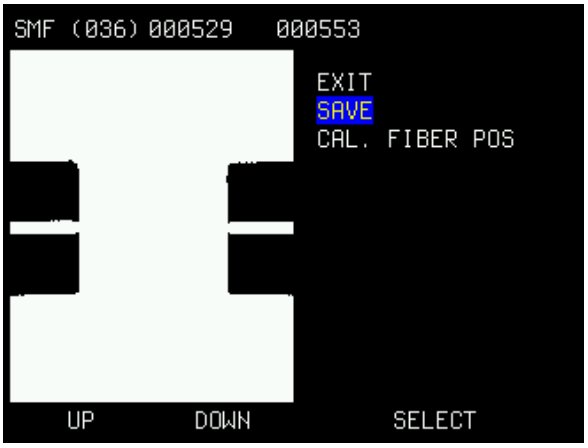
FIBER POSITION
Calibrate fiber position when replacing cleaver (and/or if the fibers -for any reason- are not in the correct position when being placed in the V-grove).

- Put fibers in their holders and place them in the splicer before starting.
Start automatic calibration of fiber zero point setting by pressing the large button (SELECT).



The numbers shown at the top of display (in this picture 528 and 552) shows the motor positions. This position should be between 500 and 750. If not then the small screws in the wagons needs to be adjusted with an 0.9mm Allen key. This can happen if the cleaver is changed. To make this easier to adjust You can select CENTER MOTORS. Motors will then be positioned at 500 and two green squares is shown. The screws should be adjusted so that the fibers are as long as the green box or slightly longer. After this adjustment do a CAL. FIBER POS to let the splicer adjust to the new position and then verify that the motor positions are between 500 and 750.

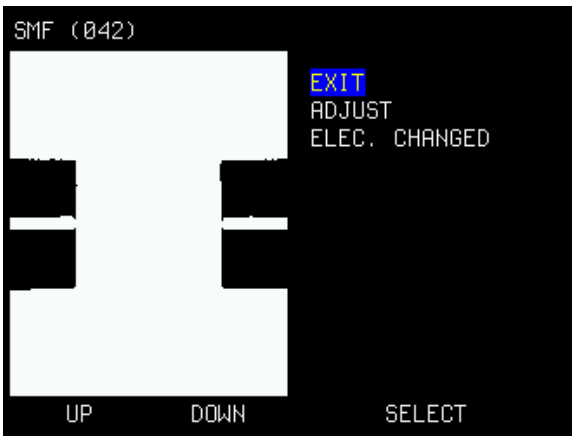
If the fibers are visible and in the correct position like in the picture below then this new position shall be saved.
Save by pressing the large button (SELECT).



ELECTRODES

ADJUST
Automatic guide for adjustment of the electrodes. Please see: Changing and adjusting the electrodes below.

ELEC. CHANGED
Use this function to reset the splice-counter when the electrodes have been replaced. The electrodes are made to last some 4500-5000 splices.

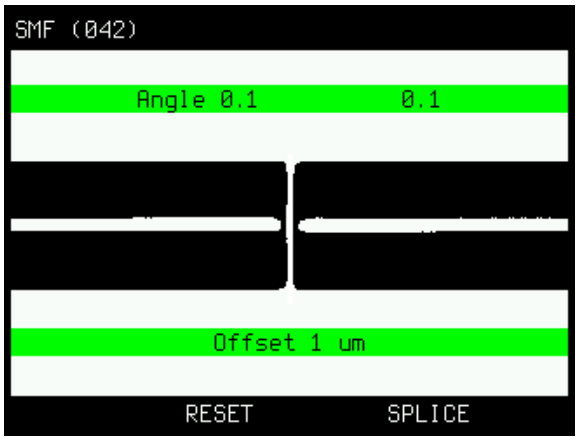


DISPLAY
ONLY IN ENGLISH VERSION !!!
- This function, when enabled, will show all Menus with a larger font.

AUTO MODE
If selected, the splicer will automatically start a splice or a calibrate when the lid is closed if it detects fiber(s) in valid positions.

STARTUP CLEAN
If selected, the splicer will do a clean electrodes every time the splicer is turned on if the lid is closed and there are no fibers in the camera view.

SPLICE PAUSE
If selected, the splicer will pause and wait for a button to be pressed, when the fibers are in position for splicing.



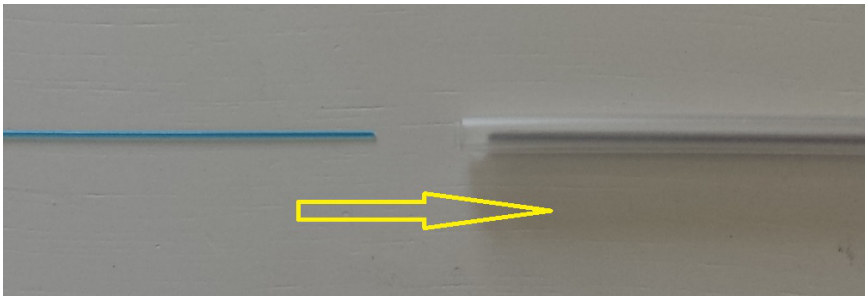
CALIB VISIBLE/CALIB NOT VISIBLE
Select if the calibration process is to be displayed or if an hourglass is showed during calibration.

Preparing the fibers and place them in the Fusion splicer !

Often, incorrect handling or preparation causes splice loss. It is crucial to keep tools and fiber clean; the invested time used in fiber and tool handling is more than compensated for in reduced troubleshooting effort.

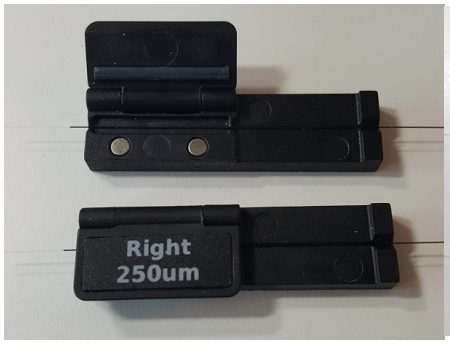
Don´t forget the protective sleeve!

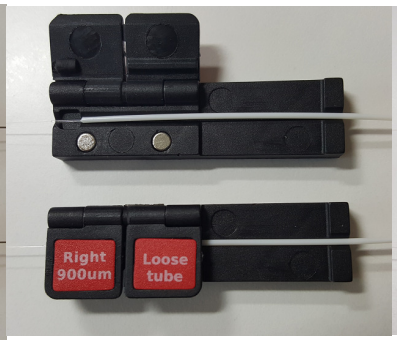
Before preparing the fiber for splicing, make sure to put the protective sleeve in place.

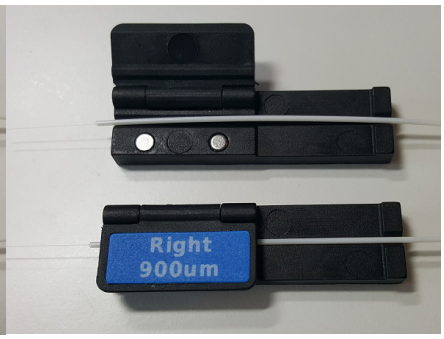


Place fiber in the fiber holders

Place 250 fiber in the **black holders** ,900 fiber/pigtail in the **blue holders** and the 900 loose coat/loose tube in the **red holders**.The fiber should “stick-out” some 3-4cm (as seen in the pictures).







Stripping the fiber

Hold the stripping tool to the edge of the fiber holder. Press the handles together and pull firmly away from the fiber holder to remove the coating (take away some 5-10cm).

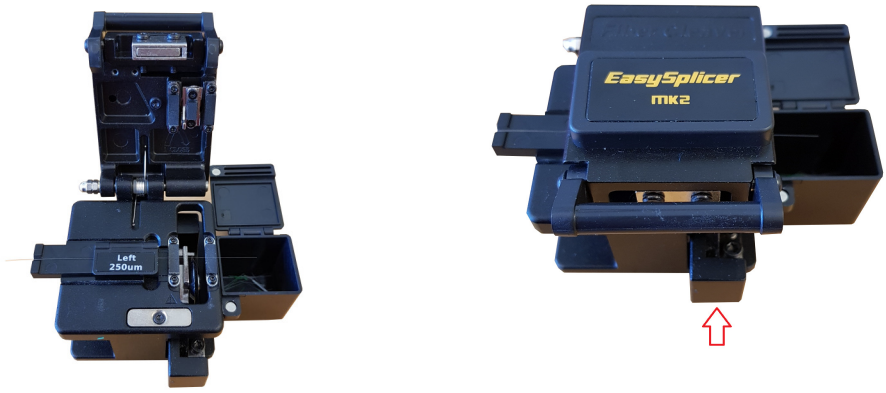
Cleaning the fiber

Use a pair of tweezers equipped with cotton buds (or a similar tool) soaked with alcohol, isopropyl or similar.

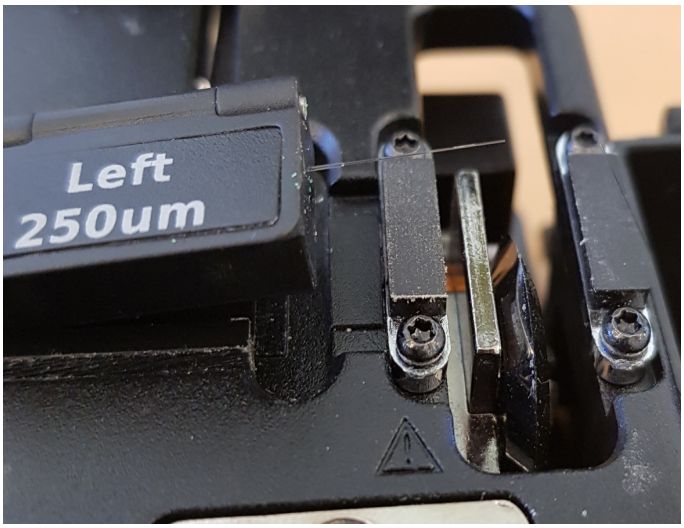
Press the tweezers together and clean the fiber with by moving the tweezers from the fiber holder towards the end of the fiber. Repeat, but rotate the tweezers. A “squeaking” sound indicates that the fiber is clean

Cleaving the fiber

Lift the lid of the cleaver and position the fiber holder in the cleaver. Insert the fiber holder from above, a little from the right-hand side and let in slide back down into position (where the magnets will lock it). The fiber holder must be placed tightly towards its inner position, as far to the right as possible (check by pressing it gently). Magnets will move it in place. See picture below.



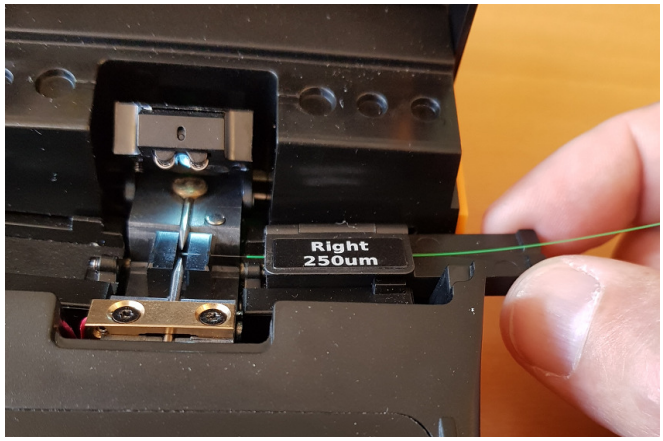
Close the lid of the cleaver and push the sliding part away from you.
The fiber will be cut off (cleaved) and get a very straight 90´ angle
Lift the fiber holder in order to prevent the fiber from getting dirty.



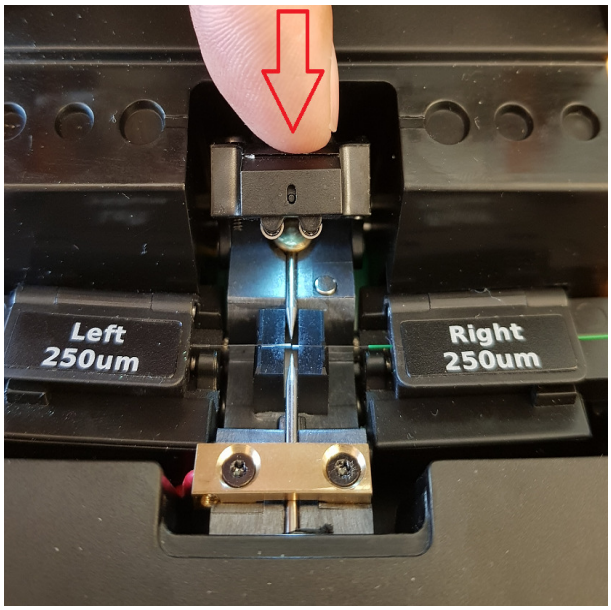
Place the cleaved and ready fibers in the splicer

Open the main lid (on top) of the splicer and lift up the little bracket on top of the v-groove.
Place the fiber holders in their wagons.
- Keep the fiber holder at an angle and move it pass its intended resting place
Lay the holder down and let it slide back into position (where the magnets will lock it).

Don´t try to push them in place from the outer position as it will be very hard to make the fiber fall in place into the v-groove. See picture below and our videos at:
https://www.dropbox.com/sh/t1bwwrk0i9str6a/AAAKnje_Mvc-_SeXVUH1v0Jva?dl=0

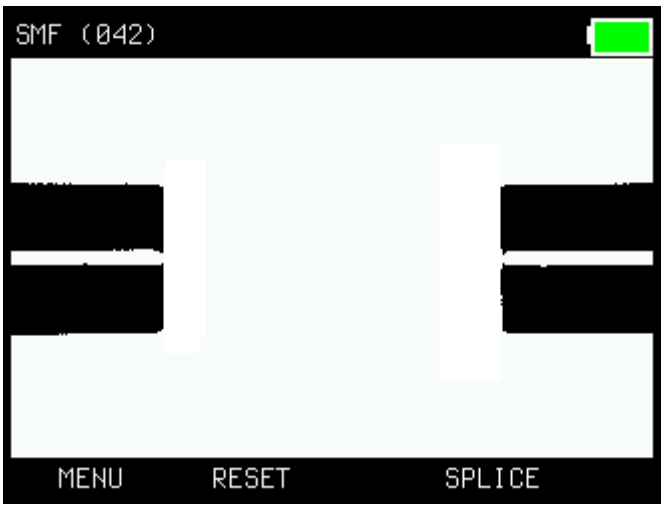


Close the bracket over the v-groove and lock the fibers in position



Close the main lid.

The fiber should now be visible in the monitor like this:



Splicing

Select the proper splice program in the menu (Singlemode- Multimode- or OM1- fiber).

- Make sure a reset has been performed since last splice.

- Make sure that the fibers/ v-groove are clean (if not, see page 13 and 20).

Are the fibers properly aligned (if not, see page 20 below)?

If both fibers look good and clean, Press the SPLICE button and the automatic splice-procedure will take place (moving the fibers together, igniting the spark, melting the glass together, make a pull test and estimate a loss value).

If AUTO MODE is selected the splice will start automatically when the lid is closed and the splicer sees that the fibers are ready to splice.

If estimated loss is larger than 0.1dB the splice is bad and has to be re-spliced.

Cleaning the v-groove of the fusion splicer

The function of the high precision surface of the v-groove is very sensitive and must be kept 100% clean.
It´s quite easy to contaminate it with dirt so cleaning/maintenance should be done on a regular basis.

Whenever there is a consistent problem with fiber offset (display showing OFFSET ERROR) then there is most certainly dirt in the v-groove which You must get rid off.

To clean the v-groove proceed as follows:
Put fibers in the fiber holders, strip clean and cleave them both.
Put them into place in the splicer (like above, page 16) so You see both fiberends in the display.

Gently slide the fiber holders back and forth in the v-groove quite many times.
You can see how it's done at:
https://www.dropbox.com/sh/t1bwwrk0i9str6a/AAAKnje_Mvc-_SeXVUH1v0Jva?dl=0

The fiber ends are so sharp that they will cut the v-groove clean from any dirt which might have fallen into it.
Most likely You will see some very small items (dirt) which will attach to the fiber during this procedure (see dirt on the fiber ends in the picture below).

After finishing don´t use these fiber ends for splicing (as they are worn down).
- Strip, clean, cleave new fibers when ready.

Apart from the method above You can also clean the V-groove with a cotton bud with alcohol/isopropyl. A combination of both methods should be used. First use alcohol to loosen up the dirt and then scrape the v-groove with a newly cleaved fiber.

Cleaning the electrodes

The electrodes of the splicer are sensitive and can get a bit oxidized due to moisture, dirt etc. in the air.

Therefor we recommend that the user always clean the electrodes before starting a new work (before performing a Calibrate). The function is found in the Menu-system; CLEAN ELECTRODES, and it can be run some 2-4 times if the electrodes are very dirty.

The EasySplicer will also, every 10th splice, ask the user to clean the electrodes. This is suggested only as a precaution but running the CLEAN ELECTRODES function will keep the splicer fresh and free from problems.

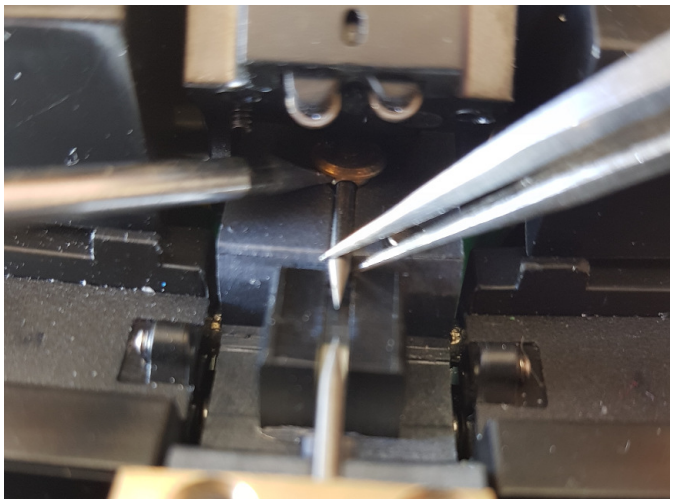
- Under some circumstances, it might be that the electrodes get so oxidized that the CLEAN ELECTRODES function won't be able to fully burn off the oxidation and the problems remain. If so, take for ex a sharp carpet knife or razor-blade and scratch gently on the surface of the electrodes (on the tips). See picture below and our video at: https://www.dropbox.com/sh/t1bwwrk0i9str6a/AAAKnje_Mvc-_SeXVUH1v0Jva?dl=0#

Oven maintenance

The oven has a layer of Teflon so it is non stick. But it should be kept clean with a cotton bud and a small amount of alcohol. See below.

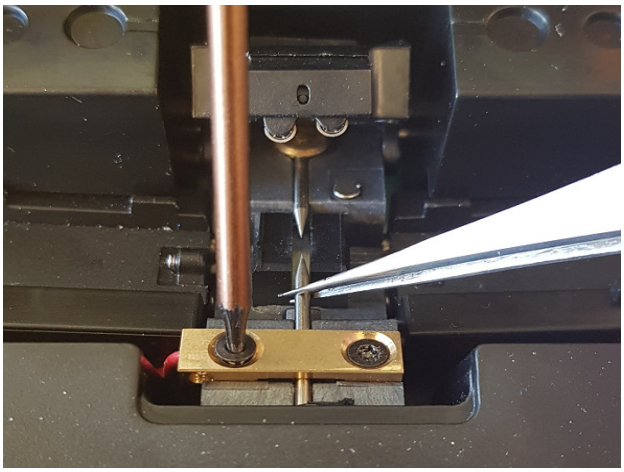
Changing and adjusting the electrodes

STEP 1.



Upper electrode.
Use a small flat screwdriver to lift the electrode lock (the circular brass part).
While lifted use a pincer to carefully remove the old electrode. **No strength is required, be careful.**

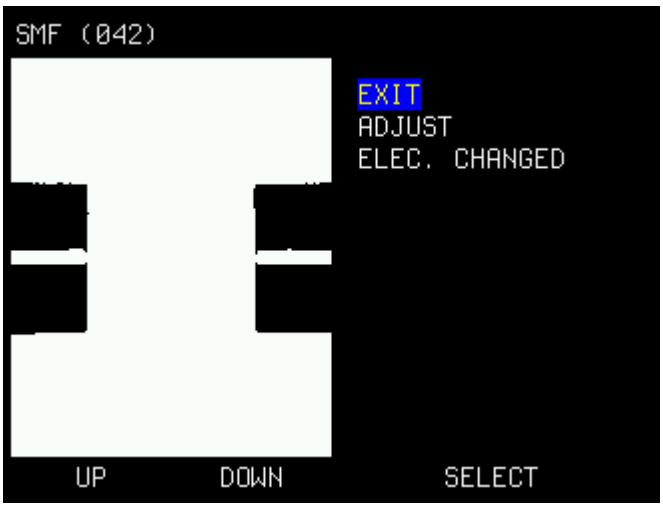
Keep the lock lifted with the screwdriver and insert the new electrode.



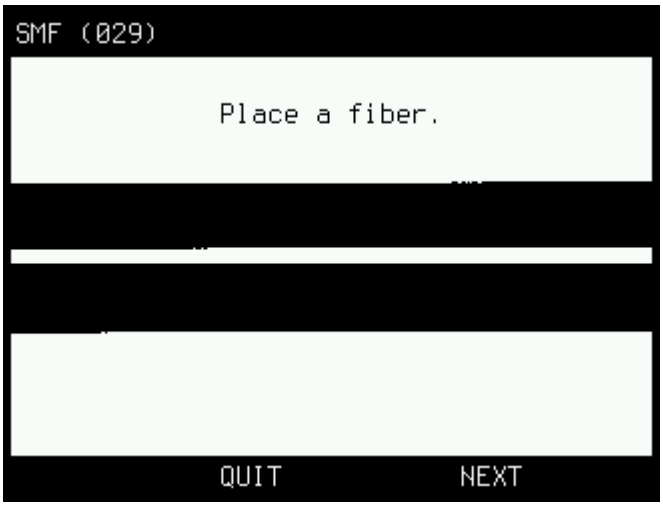
Lower electrode.
Loosen the two screws to loosen the electrode lock.
Replace the electrode with a pincer.

STEP 2.

Adjust the position of both electrodes so that they are a just outside the camera view (not to be seen in the display). Enter the menu system and go to Setup and then to Electrodes. Select Adjust.



First thing to do is to place a fiber in the v-groove. This will guide the splicer to find the exact vertical center of the fiber.



Then press NEXT.

Adjust the upper electrode so that it is within the green area or just outside. But it must not be visible in the red area.

When done, press NEXT and adjust the lower electrode within the green area or just outside. But it must not be visible in the red area.

No strength is required, be careful.

Carefully tighten the two screws to lock the electrode in position.

CAUTION! DO NOT TIGHTEN TOO HARD. Just enough to lock the electrode in place.

Done !!!

Error messages and how to resolve:

Error message:	Action:	Resolve:
Calibrate again.	Calibration failed.	Do a new calibration.
CLEAN ELECTRODES	Calibration failed 3 times.	Clean the electrodes. First use the electronic clean in the menu (up to 4 times). And if that is not sufficient, also clean mechanically with a small knife.
ERROR: CLOSE LID	Lid is open.	Close the lid.
BATTERY EMPTY	Battery empty.	Connect the charger (and continue working/charging).
BAD FIBER	Cannot detect two good looking fibers.	Fiber dirty, broken, faulty.
TOO MUCH OFFSET	v-groove IS dirty.	Clean the v-groove.
Offset over 10um	v-groove is a bit dirty.	Clean the v-groove.
Angle=0.5 Angle=2.5	Cleaver didn't cut correctly.	Too big angle made by a bad cleave. Simply strip and cleave again.
CLEAN V-GROOVE	v-groove IS dirty.	Clean the v-groove.
BAD SPLICE	Auto estimation didn't approve the splice	The splice doesn't look good. Redo the splice (or check with loss meter).
Est. Loss: >0.1dB	The splice failed.	Do a calibrate on a new clean fiber and then redo the splice.
RIGHT FIBER MISSING	Right fiber is missing or poorly placed.	Splicer cannot detect a good looking fiber on the right side. Re-do, re-place.
LEFT FIBER MISSING	Left fiber is missing or poorly placed.	Splicer cannot detect a good looking fiber on the left side. Re-do, re-place.
RIGHT FIBER DIRTY	Right fiber is dirty.	Strip, clean and cleave it again.
LEFT FIBER DIRTY	Left fiber is dirty.	Strip, clean and cleave it again.

Special operations with the buttons:

If the splicer for some reason should stop responding to the buttons, there is a way to **RESET the splicer** (**instead of removing the battery**). Push both up and down buttons at the same time and a hardware reset will occur.

If the middle button is pressed during power on, the splicer will prepare for receiving a new firmware. The white led will be on but the display will be black. This is described in more detail in the upgrade guide. This follows the new firmware.

Technical specification:

Weight:	800g
Dimensions:	230x98x53 mm
Alignment:	Axial: Automatic Radial: Fixed v-groove
Fusion technique:	Arc fusion
Process:	Automatic
Typical Loss:	SMF 0.03dB MMF 0.01dB
Splice Programs:	3 pre-defined: - Singlemode - Multimode - OM1
Fiber handling:	Fiber holders, 3 pairs (250-**BLACK,** 900-**BLUE** and 900-**RED** loose coat/loose tube).
Typical cycle time:	7s + 35s (splice cycle + oven cycle).
Display:	2.8” Color TFT
Magnification:	Camera 140x
Heat oven:	Ceramic heater built in.
Sleeve dimensions:	Max 60mm length, 2-5mm diameter.
Power source:	Battery: 7.4V/3400mAh. Li-Ion type. Built in.
Communication:	USB, mini USB-plug.
Memory:	Internal 1MB, External SD-card up to 32GB, FAT32 file system.
Power supply:	100-240V AC / 6V DC / 1.5A
Operating environment:	Temperature 0˚C to 45˚C Humidity max 95% RH, **non-condensing**
Storage environment:	Temperature -20˚C to 45˚C Humidity max 98% RH, **non-condensing**