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Operating Instructions for Fusion Splicer X77

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Subject to availability and to technical change without notice.

Issued by
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Note:

Please read these operating instructions carefully to ensure that your splicer functions perfectly to your full expectations. Carry out the necessary service and maintenance work on your splicer regularly with the help of this manual. You should exercise the greatest care in order to prevent damage.

If you have any queries whatsoever, please contact the service center responsible where there are trained experts who know the equipment best.

Inexpert and inadequate maintenance can impair the operating characteristics of your fusion splicer.

The warranty obligations of the manufacturer of the splicer are invalidated in the event of tampering by unauthorized persons.

NOTE

For reasons of clarity these Operating Instructions do not provide detailed information for all versions of the product and cannot, therefore, take account of every possible installation, operation or maintenance situation. If you require further information or if particular problems arise which are not covered in enough detail in the Operating Instructions, do not hesitate to contact the RXS Equipment Service department for the necessary information. We should also like to point out that the content of these Operating Instructions does not form part of a previous or existing agreement, commitment or legal relationship, nor is it intended to modify any such arrangement. All obligations on the part of RXS arise exclusively from the relevant sales contract which also contains the only valid and comprehensive warranty conditions. The Operating Instructions neither extend nor limit the contractual warranty conditions.

Addresses

If your fusion splicer needs servicing, send it to:

Siemens AG
AUT 5 PGM 1/Gerätteservice
Warenannahme
Rupert-Mayer Straße 44
81359 Müinchen
Tel. (089) 722-22068
Fax (089) 722-48324

Please inform RXS under one of the telephone numbers below if you send your fusion splicer direct to the service center.

If you have any technical questions or queries about our training program, please contact:

RXS Kabelgarnituren GmbH
Abteilung VT TU
Profilstraße 4
58093 Hagen
Tel. (02331) 357-145 or 357-146
Fax (02331) 357-309

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Definition of terms used in warning notices

The list below defines the terms used in the warning notices:

Danger

In these Operating Instructions and the warning notices on the products themselves, this term means that death, serious injury or major material damage will result if the relevant precautions are not observed.

Warning

In these Operating Instructions and the warning notices on the products themselves, this term means that death, serious injury or major material damage can result if the relevant precautions are not observed.

Caution

In these Operating Instructions and the warning notices on the products themselves, this term means that slight injury or damage may result if the relevant precautions are not observed.

Note

In these Operating Instructions, this term indicates important information about the product or the relevant part of the Operating Instructions to which particular attention must be paid.

Qualified Personnel

In these Operating Instructions and the warning notices on the products themselves, qualified personnel means persons who are familiar with commissioning, operating and maintaining electrical equipment and who are suitably qualified for the work they perform.

DANGER When electrical equipment is in operation, certain parts of such equipment are bound to reach hazardous voltage levels. If the warning notices are not observed, serious injuries or damage may occur. Only suitably qualified personnel should work on this equipment or in its vicinity. This personnel must be fully conversant with all the warnings and maintenance procedures covered in these Operating Instructions. The troublefree and safe operation of this equipment requires proper arrangements to be made for its shipping, correct storage, setting up and assembly as well as careful use and maintenance.

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Password Request

Activating the password request

The splicer must be open in order to activate or deactivate the password request.

DANGER

The fusion splicer or electrically operated accessories must not be opened except by suitably qualified personnel.
Switch off splicer and disconnect from the power supply (power supply plug and 12V lead).

Two cross-recess screws are located on the left of the housing and two on the right. These must be removed in order to open the housing. The switch for activating and deactivating password request is on the printed circuit board visible once the housing has been opened (switch in ON position: password request activated).

If password request is deactivated, the stored password is deleted when the splicer is switched on again. However, if you subsequently reactivate the password request without switching the splicer on and off previously, the old password is retained.

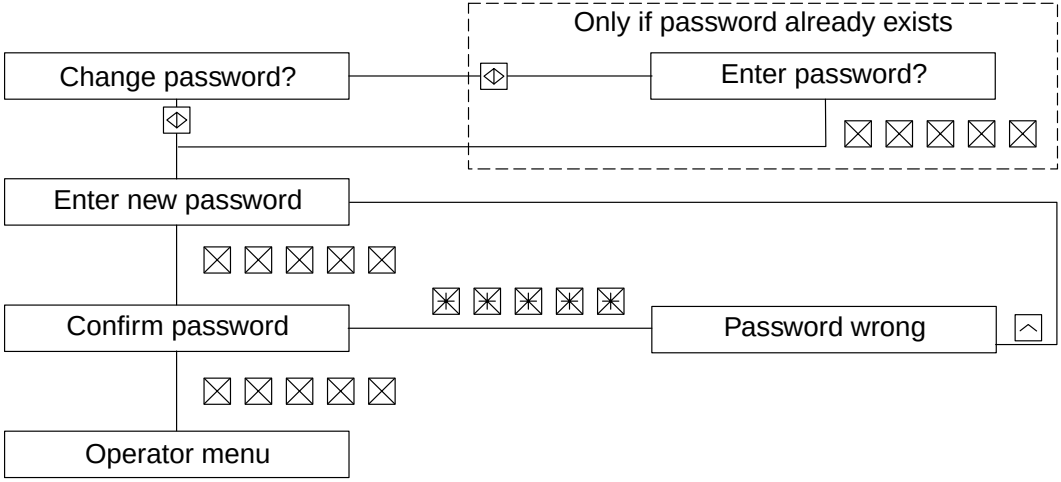
No password is stored when request is reactivated. A new password must therefore be defined first.

Entering the password

A password consists of an arbitrary sequence of five input keys. If you try to change a parameter when the password request is activated, the message “Enter password” appears. If an incorrect password is then entered, the change of parameter is rejected. This also applies to a change of password, i.e. a new password cannot be defined unless

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the current password is known. To redefine the password, select the parameter “Password” and proceed according to the following flow diagram.



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1 Overview of the X77 Fusion Splicer

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General

The X77 fusion splicer is used for reliable, low-loss joining of optical fibers. It is designed for all commonly used single-mode and multimode fibers with the standard glass diameter of 125 µm.

Automatic fiber positioning

Automatic fiber positioning guarantees consistently good splice results regardless of the operator. The 1300 nm-LID system (*LID = Local Injection and Detection)* permits precision core-to-core alignment of the fibers. Any core eccentricity is automatically taken into account during loss evaluation via the video system.

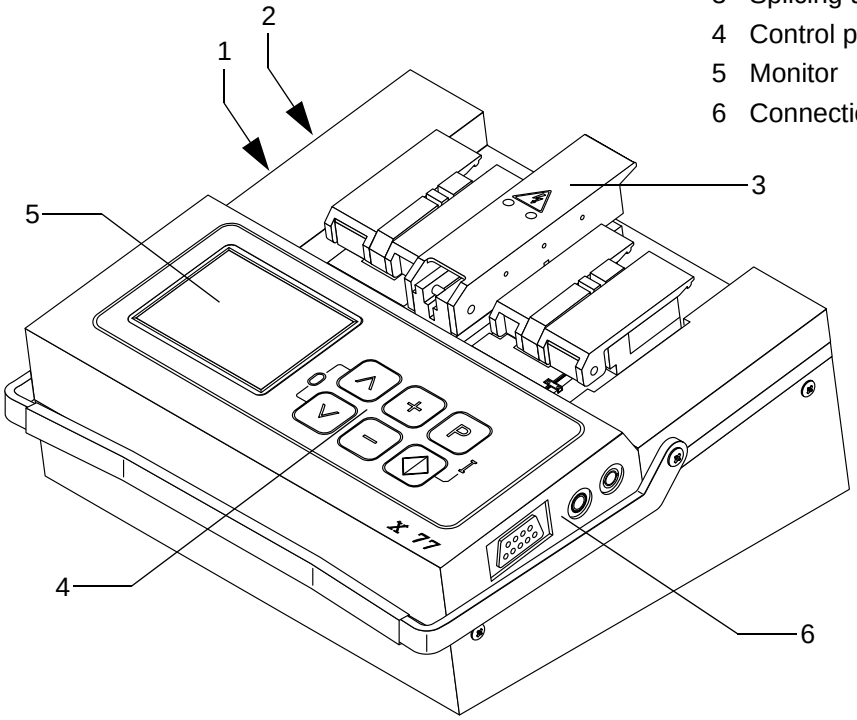
Automatic fusion time control

The LID system optimizes the fusion time for each individual splice automatically. Thus, the best possible splice loss is obtained, even under difficult conditions.

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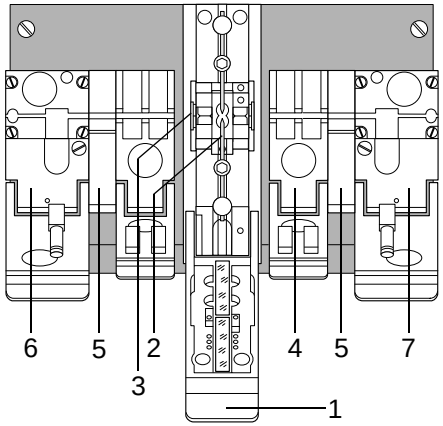
Equipment Overview

1 Power supply socket
2 Heat-shrink oven socket
3 Splicing unit with LID system
4 Control panel
5 Monitor
6 Connections for addition. functions



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Splicing unit



1 Electrode flap
2 Electrodes
3 Fiber guides
4 Fiber holder
5 Clamping jaws
6 LID transmitter
7 LID receiver

LID system

The LID system is used for core-to-core alignment of the fibers and for automatic fusion time control. In the LID transmitter and receiver the fibers are slightly bent so that light can be injected and detected in the fibers.

The LID system of this splicer operates without index-matching gel.

Fiber diameter

NOTE	The LID system is suitable only for fibers with a coating diameter of max. 250 µm.

Fibers with larger coating diameters can be spliced using a program in the program group “Fixed Parameters - Video” without using the LID system.

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Pigtail adapter — For splicing pigtails to fibers there is a pigtail adapter which enables the LID system to be used. See "Pigtails" on Page 2-10.

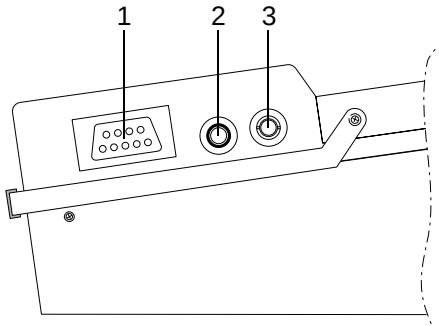
Monitor — The fiber ends are displayed in two views from the direction of the X-axis and the Y-axis.

Control panel — The control panel comprises 6 keys which have the following functions:

- Enter key: The operation indicated is executed or the previously entered value is confirmed.
- Scroll back: The operation indicated is not executed
- Scroll forward: The operation indicated is skipped.
- P — Call up/exit parameter menu.
- \+ — Increment indicated value.
- − — Decrement indicated value.

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Connections for additional functions



1 Serial interface
2 External video output
3 Connecting socket for pigtail adapter

Serial interface

You can output the splicing parameters or the contents of the splice memory to a printer or a computer via the serial interface.

External video output

You can connect a European standard monitor (CCIR, 625 lines) with an input impedance of 75 Ω or higher. Use an ordinary coaxial cable with Cinch plug for this.

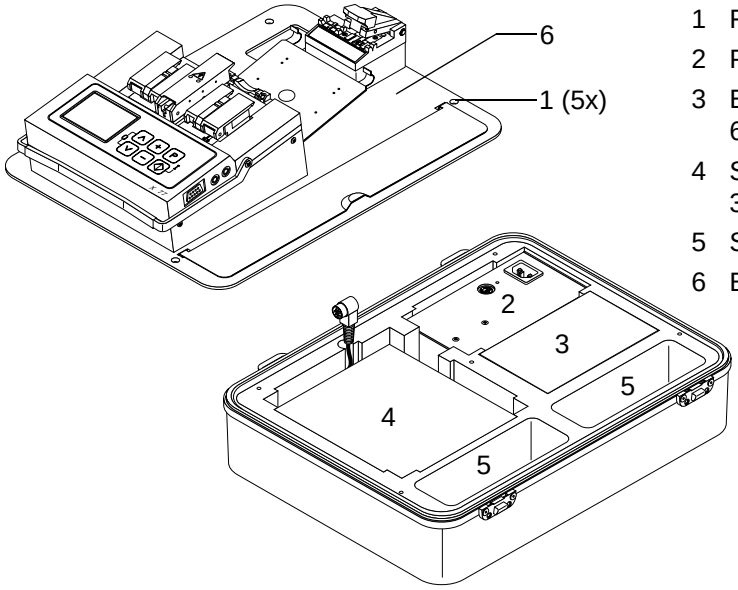
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Installing the Splicer in the Case

A transport case is available under order no. S46999-M7-V7. This holds the splicer, power supply unit, battery and base plate on which accessories such as cleaver A8, splice cassette holder or the crimping tool or heat-shrink oven can be secured.

Installing power supply unit or battery in the case

- First unscrew the 5 fixing screws (1) from the base plate.
- Then lift off the base plate (6).



1 Fixing screws
2 Power supply unit
3 External battery 12 V 6.5 Ah (optional)
4 Splicer (option. with 12V 3 Ah attachment battery)
5 Storage compartments
6 Base plate

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Technical Data

Fiber prerequisites:	Glass diameter: 125 µm Coating diameter: 250, 500, 900 µm
Fiber viewing:	LCD monitor
Magnification:	approx. 50 x
Fiber positioning:	Fully automatic in x, y, z axis
Mean splice loss for identical standard single-mode fibers:	< 0.03 dB
Tensile test:	yes
Number of splice programs:	15 for single-mode fibers 10 for multimode fibers (5 for 50 µm and 5 for 62 µm core diameters)
LID system:	1300 nm
Video output:	CCIR output (75 Ω)
Working temperature:	-5°C to 45°C
Storage temperature:	-20°C to 70°C
Dimensions (LxWxH):	173x185x90/65 mm (with/without attachment battery)
Weight:	1.7 kg

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2 Preparations

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Putting the Splicer into Operation

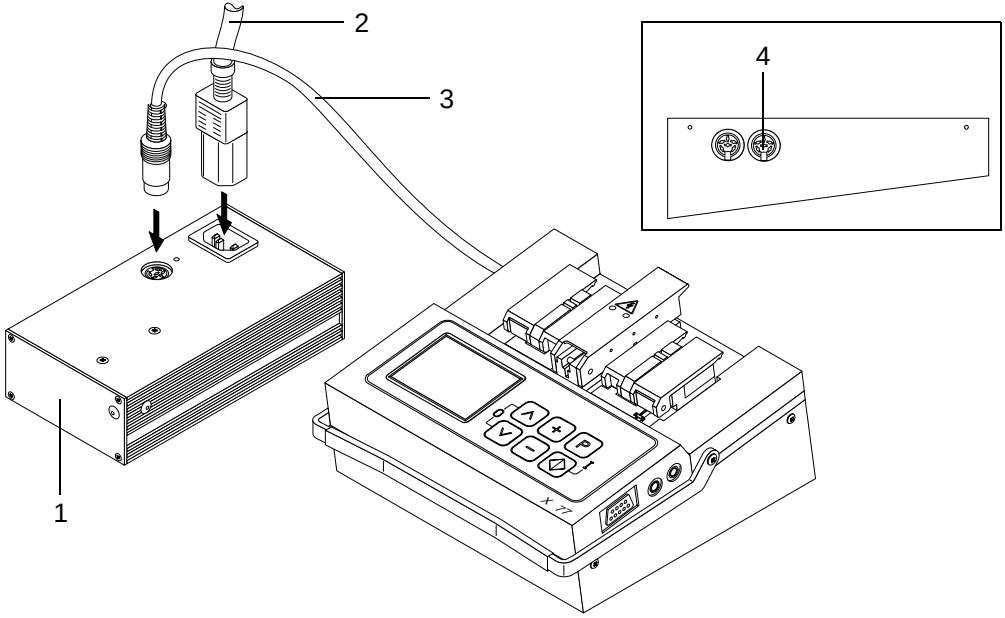
WARNING	To ensure the equipment operates safely it must be assembled and put into operation by qualified personnel in the proper manner and with due regard for the warning notices in these Operating Instructions. The consequence of not observing this may be death, serious injury or considerable damage.

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AC power connection

- Connect the power supply unit (1) to the AC power supply with the power cable (2).
- Now connect one end of the supplied cable (3) to the power supply unit (1) and the other end to the connection socket (4) of the fusion splicer.

  When the 6.5 Ah rechargeable battery is used, connect this instead of the power supply unit to the fusion splicer. If you are using the 3 Ah attachment battery no additional connections are required.



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Switching on the fusion splicer

- Press key ⏻.
- After switching on, the software version installed in the splicer is displayed on the monitor and a self-test is performed. The electrodes are automatically cleaned in a burnout which takes place with the electrode flap closed.

DANGER

Before switching on, make sure that both electrodes are correctly seated. Never switch on the splicer if the electrodes are not correctly seated, as damage to the splicer would inevitably result.

- The preset site altitude above sea level is displayed on the monitor.
- The positioning slides are then moved automatically to the insertion position.
- In battery mode the charge level of the battery is indicated in %.
  If the charge level is too low for operating the splicer, the message “battery empty” appears on the monitor and the splicer switches off automatically. In this case charge the battery (see "Charging the battery" on Page 7-6)

NOTE

You should only run the splicer from the battery if the battery charge level exceeds 30%. Never stow away the splicer with the battery discharged. Recharge the battery at the end of every working day.

NOTE

The splicer switches off automatically in AC power and battery operation if no key has been actuated for a certain time. Press the ⏻ key in order to switch the splicer back on again.

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Checking the electrodes

- Make sure that no fiber is inserted.
- Initiate the fusion process (see section 4).

The electrodes are fully functional if

- they are not whitened or distorted,
- no loud hissing noises can be heard during fusion and
- the arc is uniform.

Electrodes which are not functioning properly should be cleaned or replaced (see "Replacing/ cleaning the electrodes" on Page 6-21).

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Preparing the Optical Fibers

NOTE	Minimum splice losses can only be achieved if the fiber ends are prepared carefully.

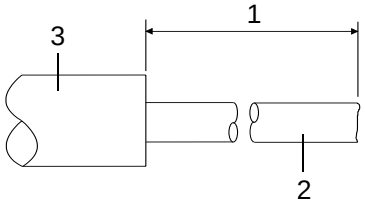
The work for preparing the fibers includes:

- Stripping the coating
- Cleaning the fibers
- Cleaving the fibers using fiber cleaver S46999-M9-A8
- Assessing the fiber end faces (monitor)

Please refer to the operating instructions for your cleaver.

Stripping the coating

Remove the coating at the end of the fiber for a length of about 50 mm.



1 Cleaving length (approx. 50 mm)
2 Uncoated fiber
3 Coating

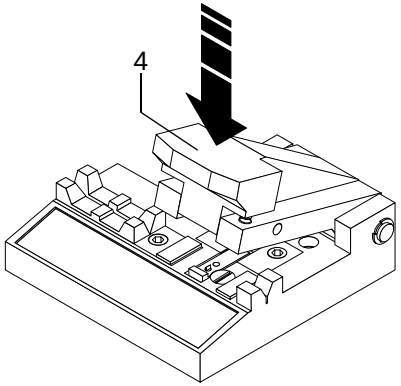
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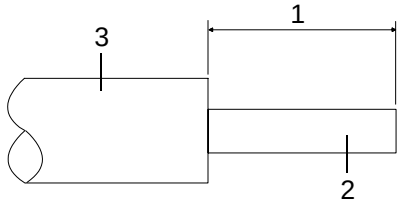
Cleaning Clean the fiber ends over a length of approx. 100 mm (coating and uncoated fiber) with a lint-free paper cloth soaked in alcohol.

DANGER There is a risk of fire if solvents are spilled.

Cleaving Use cleaver S46999-M9-A8 for cutting the fiber. Select the correct fiber guides for the cleaver (universal guide for 250 to 900 µm coating diameter).

- Open the flap (4) of the cleaver and place the fiber in the cleaver so that the end of the coating aligns with the “10 mm” mark.





1 Cleaving length (10 mm)
2 Uncoated fiber
3 Coating

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- Close the flap (4) of the cleaver and press it down carefully. Open the flap before you remove the cleaved fiber in order to avoid damaging the fiber end face.

NOTE	If you press the flap down too quickly, you will obtain a poor quality fiber end face and the diamond may be damaged.

Inserting the Fibers

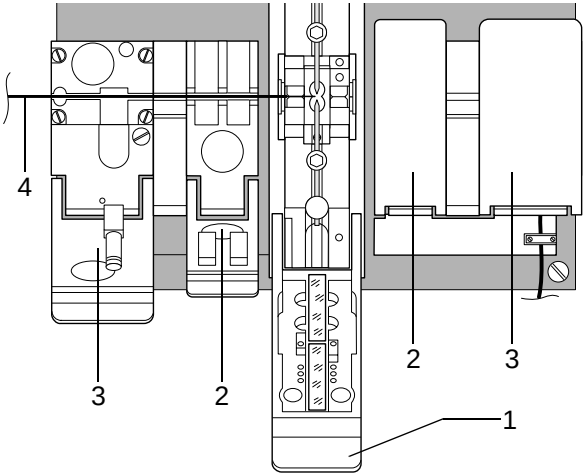
250 µm coating

- Open the electrode flap (1), the flaps of the fiber holder (2) and the LID flaps (3).
- Place the fiber (4) in the V-groove of the slide so that the end of the fiber lies between the electrode tips.

NOTE	Ensure that, after the fiber end has been inserted, it is visible on the monitor. Otherwise the splice results may be poor or there may not be enough travel on the positioning elements.

- First close the flap of the fiber holder (2).
- Hold the fiber straight to ensure that it lies in the groove of the LID system. Then close the LID flap (3).
- Now close the electrode flap (1).

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1 Electrode flap
2 Fiber holder
3 LID flaps
4 Fiber

250 µm coating

Other coating diameters

Note that you cannot use the LID system to fuse fibers with a coating diameter > 250 µm. Insert these fibers in the fiber holder in the usual way. Partly close the LID flaps (3), but not so far as to press the coated fiber into the LID system. In this way you can perform a tensile test.

NOTE

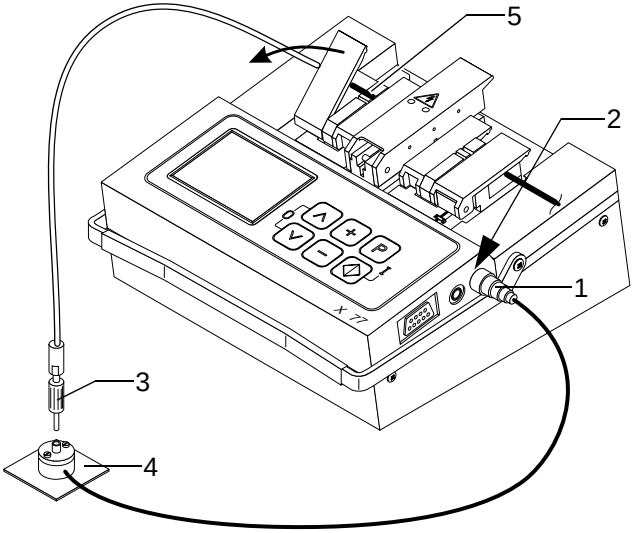
Note that the coating diameter must be set in the parameter menu, see ""“Program selection (single-mode/multimode)” menu" on Page 3-9.

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Pigtails

The pigtail adapter S46999-M7-S336 available as an accessory enables the LID system to be used for fusing preconnectorized pigtails to fibers with 250 µm coating.

The following pigtail plugs can be used: D4 / ST-II / SC / DIN / FC plugs.



1 3.5 mm plug
2 3.5 mm socket
3 Pigtail plug
4 Pigtail socket
5 Clamping jaw

- Insert the connector (1) of the pigtail adapter into the socket (2) of the fusion splicer.
- Insert the pigtail plug (3) into the pigtail socket (4) of the adapter.
- Prepare the pigtail fiber end in the usual way and insert it in the **left-hand** fiber holder.

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- Close the left-hand LID flap only so far that:
  1. The left clamping jaw (5) is closed (tensile test).
  2. The fiber (with 900 µm coating) is not pressed into the internal LID transmitter (for 250 µm coating).
- Also prepare the fibers to be spliced on and then place them in the fiber holder on the right-hand side and in the LID receiver.

NOTE	Note that the correct coating diameter must be set for both sides in the parameter menu, see »“Program selection (single-mode/multimode)” menu« on page 3-9.

Setting Monitor Brightness

NOTE	The monitor brightness can be changed only in the main menu.

- Press the [+] or the [−] key until the desired brightness is obtained.
  Increase monitor brightness with: [+] key.
  Decrease monitor brightness with: [−] key.

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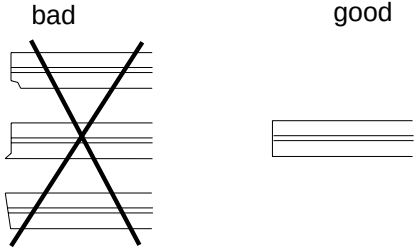
Checking Fiber End Faces

NOTE	Good splice results can only be obtained with good end face quality.

After you have inserted the fibers in the splicer, select the menu item “Search fibers?” or “Fully automatic” or “Automatic“. The fiber ends are moved to the center of the monitor.

The fiber ends must be:

- clean
- free of protrusions and indentations
- flat
- and square to the fiber axis



- If the quality of the end face is poor, the fiber end must be prepared again.

NOTE	If you are in the “Fully automatic” or “Automatic” mode and notice poor end face quality, you can abort the positioning by pressing key ^ .

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3 Parameters and Programs

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Parameter Menu

General

In the Parameter menu the parameters can be matched to the fiber type used. The Parameter menu is subdivided into “Options/Language“, “Splice parameters” and “Data output“.

Determining the optimum parameters

- Use the default parameters for your initial attempts.
- If the results are not satisfactory, see "Optimizing Parameters for Single-Mode Fibers" on Page 3-16 or see "Optimizing Parameters for Multimode Fibers" on Page 3-21.

Callup

Pressing the [P] key allows you to access the Parameter menu with the electrode flap closed. Press the [P] key in the Parameter menu to return to normal operator control.

[P]	Enter/exit Parameter menu.
[◇]	Save value.
[∧]	Scroll back, move to previous line.
[∨]	Scroll forward, move to next line.
[+]	Increment value.
[−]	Decrement value.

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Selecting the Parameter

NOTE	Good splice results can only be obtained with well prepared fiber ends, the correct parameter settings and properly functioning electrodes.

General

The X77 fusion splicer allows all programs/parameter sets to be protected against unauthorized access by means of a password. More detailed information about this can be found on the red page “Password request“.

Resetting the parameters

The parameters of all programs are reset to their default values by pressing keys P and ◈ simultaneously when switching on.

NOTE	This is only possible if the password is disabled.

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Default parameters

	Single-mode fibers	Multimode fibers
Language:	English	English
Program:	“Auto. fusion time”	“Fixed parameter video”
Cleaning current:	14.5 mA	14.5 mA
Cleaning time:	0.1 s	0.1 s
Prefusion current:	14.0 mA	12.5 mA
Prefusion time:	0.25 s	0.5 s
Fusion current:	14.0 mA	13.0 mA
Fusion time with video program:	2.0 s	5.0 s
Fusion-time range for “Automatic fusion time”	min. 1.0 s max. 10.0 s	-
Z-gap:	7.0 µm	7.0 µm
Autofeed:	7.0 µm	5.0 µm
Coating diameter:	250 µm	250 µm
Tensile test:	on	on
Splice memory:	automatic	automatic

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The parameter values have been optimized during final testing of the splicer and may therefore be slightly different.

Setting language

- Change to the Parameter menu with the P key.
- Select the line “Options/language” with the ^ key.
- Press the ◇ key.
- Select the desired language with + or − and confirm with key ◇ .

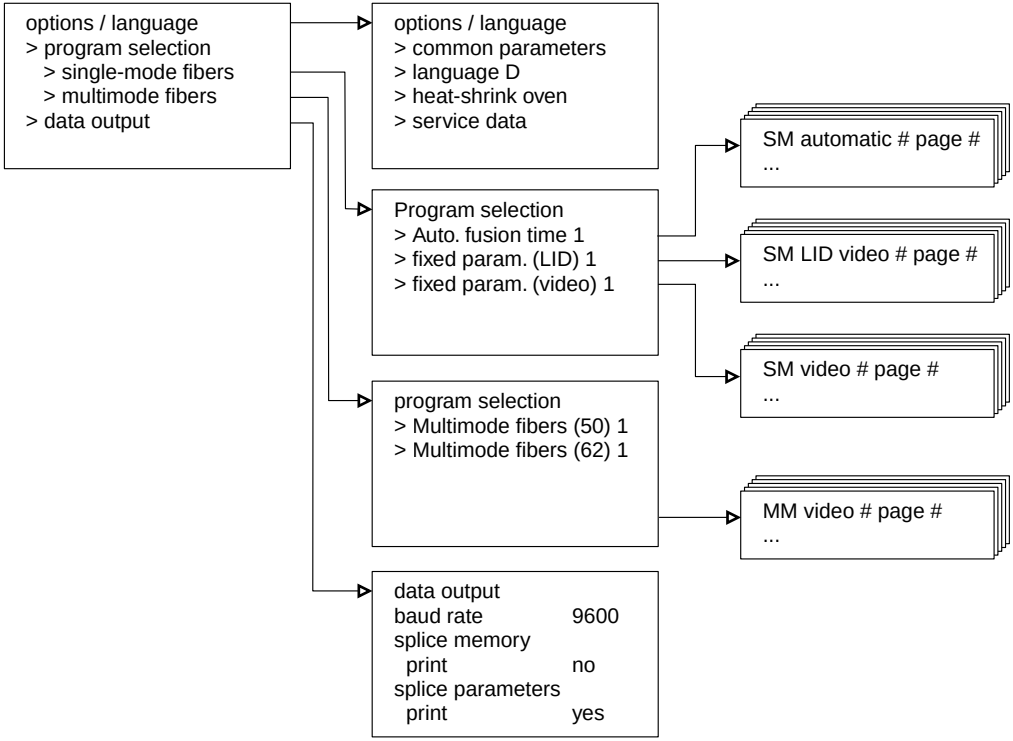
D	German
GB	English
F	French
E	Spanish
I	Italian
NL	Dutch

DK	Danish
H	Hungarian
PL	Polish
CZ	Czech
C	Chinese
GUS	Russian

The available languages depend on the software version installed.

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Program Overview



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Description of the Programs

Automatic fusion time

You will obtain the very best splicing results for single-mode fibers using this standard program. You should therefore always use this program if the coating properties allow the use of the LID system.

The fiber cores are aligned with each other with the aid of the LID system. The LID level is measured during the fusion process and fusion is terminated as soon as optimum attenuation is achieved.

The fusion time can vary in the range 0.8 to 10 seconds. The recommended minimum fusion time is 1,0 s.

Fixed parameters (LID)

This program is intended primarily for test purposes. The fiber cores are aligned via the LID system.

Fixed parameter (Video)

This program is intended for those applications in which the LID system cannot be used. The video system is used for positioning and loss evaluation. Precondition for perfect splices is a good fiber quality with low core eccentricity.

Multimode fibers

Multimode fibers are always positioned and fused without using the LID system.

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Description of the Parameters

“Program selection (single-mode/multi-mode)” menu

Menu callup: → Parameter menu → Program selection (single-mode/multimode fibers) → Program selection.

There are 5 sets of parameters available for each program type. These can be matched individually in each case for a particular fiber type.

Parameter	Effect	Setting range
Prefusion current	Temperature of the arc during prefusion.	10.0 to 20.0 mA
Prefusion time	Time between ignition of arc and starting total feed.	0.0 to 1.0 s
Fusion current	Temperature of the arc during main fusion.	10.0 to 20.0 mA
Fusion time	Ignition time during main fusion.	0.0 to 10.0 s
min. fusion time	Min. ignition time during main fusion with SM automatic programs.	0.0 to 4.0 s
max. fusion time	Max. ignition time during main fusion with SM automatic programs.	From “min. fusion time” to 20 s
Z-gap	Distance between fiber ends before splicing.	4.0 to 10.0 µm
Autofeed	Pushing fiber ends together beyond touching.	0.0 to 10 µm

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Parameter	Effect	Setting range
Tensile test	A tensile force of about 2.5 N is applied after the fusion process.	yes/no
Coating diameter	Changing the insertion position.	250/500/900 µm

"Common parameters" menu

Menu callup: → Parameter menu → Options/Language → Common parameters.

Parameter	Effect	Setting range
Code:	Disabling parameter sets	-
Splice memory:	Storing of max. 250 splice loss values	off/auto/manual/delete
Cleaning current:	Temperature of the arc during cleaning	10.0 to 16.0 mA
Cleaning time:	Ignition time during cleaning	0.05 to 0.30 s
Battery disconnection time	-	2 to 60 min
Height above sea level	-	0 to 4000 min

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“Language” menu

Menu callup: → Parameter menu → Options/Language → Language.

Parameter	Effect	Setting range
Language:	Setting the language, see "Setting language" on Page 3-6.	D/GB/ ...

“Heat-shrink oven” menu

Menu callup: → Parameter menu → Options/Language → Heat-shrink oven.

Parameter	Effect	Setting range
Heat shrink parameters internal:	The shrinking time and temperature selected on the fusion splicer are used.	-
Shrinking time:	-	10 to 250 s, in 10 s steps
Temperature:	-	80 to 150 °C
Heat shrink parameters external:	The shrinking time and temperature set on the splicer are used.	-

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“Service data” menu

Menu callup: → Parameter menu → Options/Language → Service data.

Parameter	Effect	Display/setting range
Operating hours:	Total number of operating hours.	
Splices:	Total number of splices.	
Interval for electrode		
- cleaning:	Number of splices before reminder is given to clean electrodes.	50 to 700, in steps of 10
counter=XX reset:	Resetting “Cleaning electrode” counter reading to 0.	yes/no
- replacement:	Number of splices before reminder is given to replace electrodes.	700 to 7000, in steps of 100
counter=XXX reset	Resetting “Replace electrode” counter reading to 0.	yes/no

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“Data output” menu

Menu callup: → Parameter menu → Data output.

Parameter	Effect	Setting range
Baud rate:	Data transfer rate at the RS232 interface.	150/300/600/1200/ 2400/4800/9600 baud
Print splice memory	-	yes/no
Print splice parameters	-	yes/no

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Adjusting the Splicing Parameters

Using the default parameters

The default parameters (see "Default parameters" on Page 3-5) are so selected that they match all current fiber types. When using automatic fusion time control the parameter setting is relatively uncritical anyway since badly set parameters and other interference effects are compensated to a very large extent.

Under extreme environmental conditions or if you are not using automatic fusion time control it may, however, be necessary to adjust the parameters, for example if:

- special fiber types with very different fiber characteristics or high core eccentricity are to be fused.
- working at an altitude of considerably more than 1000 m above sea level.
- the ambient temperature is considerably higher or lower than 20 °C.

Air pressure or altitude

The default parameters include a preset for an altitude of 550 meters above sea level. In order to obtain splices of uniformly good quality, the altitude setting must approximate to the true site altitude (see ""Common parameters" menu" on Page 3-10).

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Temperature

The default parameters apply for an ambient temperature of 22°C. If the ambient temperature differs considerably from this value, the cleaning current, prefusion current and fusion current must be adjusted.

Above 22°C the currents must be *reduced* by 0.4 mA per 10°C.
Below 22°C the currents must be *increased* by 0.4 mA per 10°C.

Matching to special fiber types

If you wish to splice special fiber types you should start first of all with the default parameters. If you do not achieve good results the parameters must be optimized as described on the following pages.

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Optimizing Parameters for Single-Mode Fibers

NOTE	The parameters can only be optimized if the electrodes are in perfect condition. Therefore check the electrodes first (see "Checking the electrodes" on Page 2-5).

The procedure described in the following sections for optimizing the parameters is suitable for all current single-mode fibers.

Accessories required

A device for measuring the attenuation (e.g. an OTDR - Optical Time Domain Reflectometer) should be used if possible to optimize the parameters for single-mode fibers.

If an external attenuation test set is not available, it is also possible to optimize the parameters without an external attenuation measurement in the “Automatic fusion time” program. Checking the attenuations obtained with an external attenuation test set is recommended in this case but is not absolutely necessary.

NOTE	The attenuation display of the fusion splicer will only supply correct results if the parameters are correctly set. It can therefore only be used to optimize parameters to a limited extent. Therefore if possible always use an external attenuation test set (e.g. OTDR - Optical Time Domain Reflectometer) to check the attenuation results.

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General rules

The following rules apply for practically all single-mode fibers. Deviations from these rules are only necessary in the case of very few special fibers, for example if bubbles are formed.

- The standard parameters are always used for Z-gap, autofeed and prefusion time.
- Prefusion current and fusion current are always set to the same value.

If bubbles should form during splicing, see "Bubble formation" on Page 3-21. The remedial measures described there are also suitable for single-mode fibers.

Thus the only parameters remaining to be optimized are the current (for prefusion and fusion) and the fusion time.

Fusion current and fusion time

Fusion current and fusion time have to a certain extent the same effect on the splice result: Increasing the current has approximately the same effect as lengthening the time, i.e. the same result can be achieved with different current/time combinations.

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Automatic fusion time control

Set the default parameters for fusion current and minimum or maximum fusion time for the first attempt and carry out several splices.

Fusion current is correct if the average fusion time is between 2 and 5 seconds. Shorter fusion times indicate that the fusion current is too high, while longer fusion times indicate that the current setting is too low.

Adjust the current (fusion current and prefusion current) in steps of 0,5 mA until fusion time is within the specified range.

NOTE

If the fusion time obtained with automatic fusion time control is frequently only slightly longer than the set minimum fusion time, this may be caused by incorrect prefusion parameters or the minimum fusion time being too short.

For fine optimization, measure the attenuation again with an external attenuation test set if possible. If the splice parameters are suitable and with identical single-mode fibers of good quality, the attenuation achieved must be significantly below 0.05 dB. If this value is not attained, although the fusion time is within the specified range, it may be necessary to adjust the prefusion parameters slightly again.

Fixed parameter (LID)

Perform the parameter optimization in the “Automatic fusion time” program as described in the preceding section. Then set the same currents in the program with fixed parameters. As fusion time use the average value of the fusion time from 10 splices.

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Fixed parameter (Video)

An external attenuation test set is required for this procedure.

First of all carry out splices with default values for fusion current and fusion time, leaving the LID flaps open. Do **not** remove the splice from the fusion splicer and do **not** start the tensile test. Measure the attenuation with the attenuation test set.

- Press the ⌃ key and initiate with ◈ “Fuse again“.
- Measure the attenuation again.

The parameters are correctly set if attenuation is slightly worse (by 0.01 to 0.03 dB) than the first measurement. If there is no change in attenuation the setting for fusion current or fusion time is too low. A significant increase in attenuation indicates that the setting for fusion current or fusion time is too high. Change either the current (prefusion current and fusion current) in steps of 0.5 mA or the time in steps of 0.5 s.

Set the current so that the fusion time is in the range from 3 to 5 seconds.

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Fibers with high core eccentricity

For fibers having a high core eccentricity you should preferably use the “Automatic fusion time” program. To prevent core disadjustment during the fusion process it is necessary to reduce the prefusion current, fusion current and autofeed. Use the following parameters for your first tests:

Parameter	Value
Prefusion current:	13.5 mA
Prefusion time:	0.25 s
Fusion current:	13.0 mA
Fusion time:	min. 1.0 s max. 5.0 s
Z-gap:	7 µm
Autofeed:	4.5 µm

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Optimizing Parameters for Multimode Fibers

In the case of multimode fibers optimizing the parameters with respect to the attenuation is largely uncritical. As opposed to single-mode fibers it can be assumed that the splice attenuation is always OK if the appearance of the splice is in order. An attenuation test set is therefore not required for optimization either.

With multimode fibers the prefusion current is normally lower than the fusion current. The prefusion time is also longer than with single-mode fibers.

The following problems can occur during fusion:

Problem	Description	Remedy
Bubble formation	The splice is severely enlarged and uneven. The splice breaks extremely easily. This problem occurs mainly with fibers with a high core refractive index (e.g. 50 µm core diameter).	Increase the prefusion time in steps of 0.1 s. At the same time reduce the prefusion current in steps of 0.5 mA. If this is not sufficient, reduce the fusion current in steps of 0.5 mA.
Incompletely fused splices	The bright line in the center of the fiber is interrupted at the splice	If you are able to obtain an improvement by “Fuse again“, increase the fusion time, otherwise increase the fusion current.
Constriction	The fiber appears thinner in the center of the monitor than at the sides.	Reduce the prefusion current in steps of 0.5 mA.

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4 Splicing

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General

Note	Ensure that all preparations for splicing have been performed correctly and completely. Otherwise perform the necessary preparations on the splicer and optical fibers (see sections 2 and 3).

Selecting the Fusion Program

The various splicing programs and parameter sets are listed in section »3 Parameters and Programs«. With this information you should now be able to specify and activate the required program.

Now activate the required program in the Parameter menu and return with the P key.

Fusion program groups

The splicer features the following progam groups:

1. Automatic fusion time for single-mode fibers
2. Fixed parameters (LID) for single-mode fibers
3. Fixed parameters (Video) for single-mode fibers
4. Fixed parameters (Video) for multimode fibers

Each of these program groups contains 5 parameter sets whose parameters can be set individually.

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Selecting the Splicing Sequence

Each splicing sequence consists of:

- Cleaning
- Positioning (X/Y-axis, Z-axis)
- Fusion, with feed in Z direction
- Assessment of splice (only with fully automatic and automatic modes)

You can run the splicing sequence in one of the following modes:

Fully automatic

You will normally use the fully automatic splicing sequence. The selected fusion program runs automatically.

Automatic

If visible signs of dirt remain on the fiber after automatic cleaning, terminate the operation with [^] and select automatic mode.

You can clean as often as necessary during this process. If the fiber ends are still not clean after five cleaning cycles, they must be stripped and cut again.

Semi-automatic

For test purposes, select the semi-automatic splicing sequence. In this mode you have to initiate cleaning and positioning in the X/Y-axis or Z-axis individually.

Manual fiber positioning

For special purposes you can position the optical fibers manually using keys [+] and [−] .

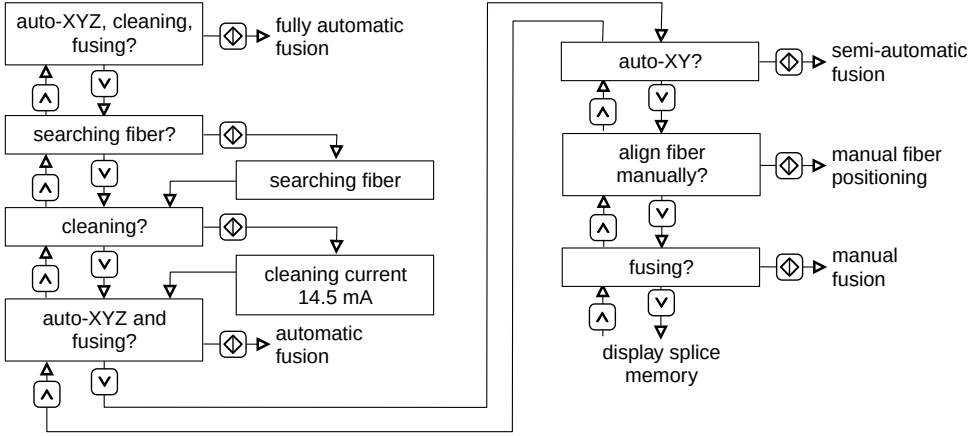
The fibers must be positioned so that the distance between the fiber ends is approximately equivalent to the value set in the parameter menu. The fiber ends must be aligned (Video programs) so that the indicated LID level is at the maximum (LID programs).

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Manual

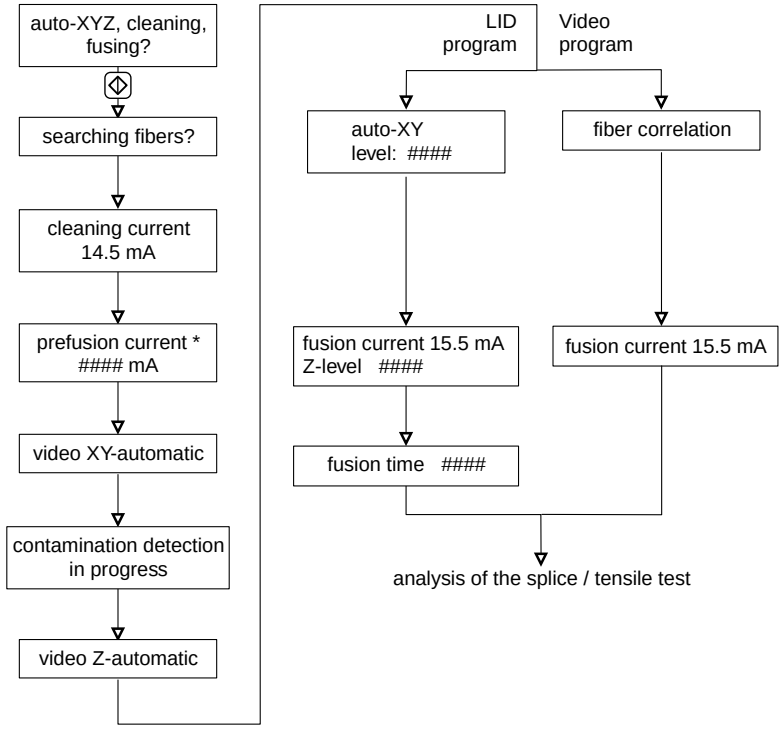
In the manual splicing sequence all steps are initiated individually.

Flow chart: Selecting the splicing sequence



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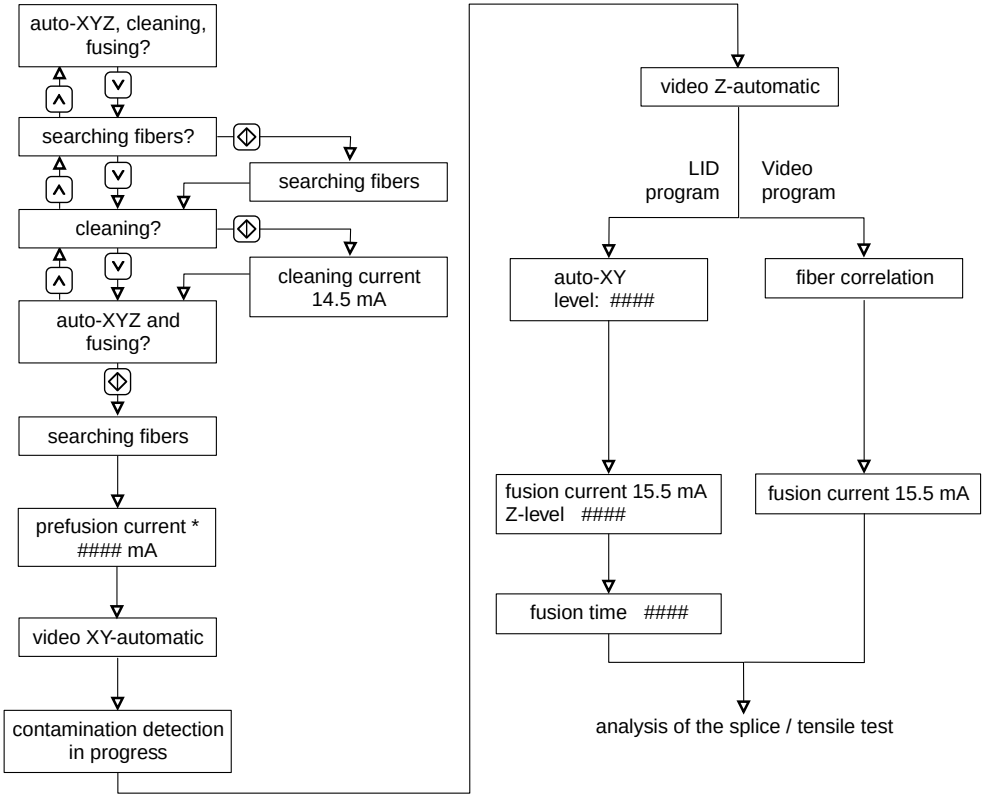
Fully automatic splicing sequence



* Multimode fibers only

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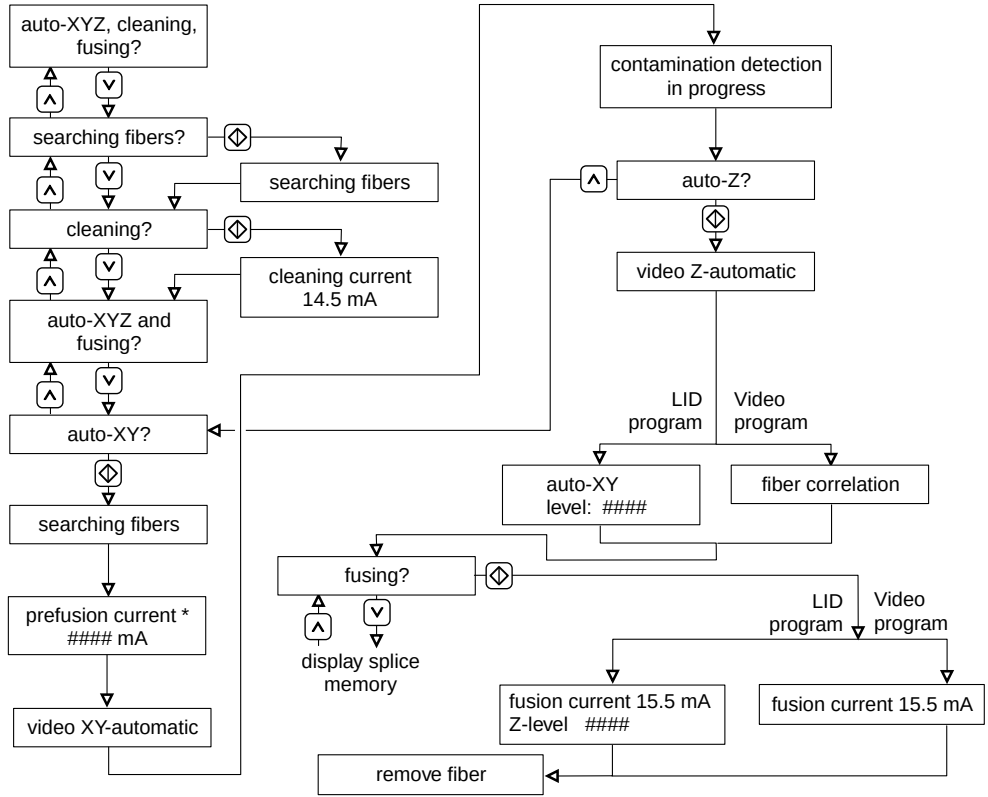
Automatic splicing sequence



* Multimode fibers only

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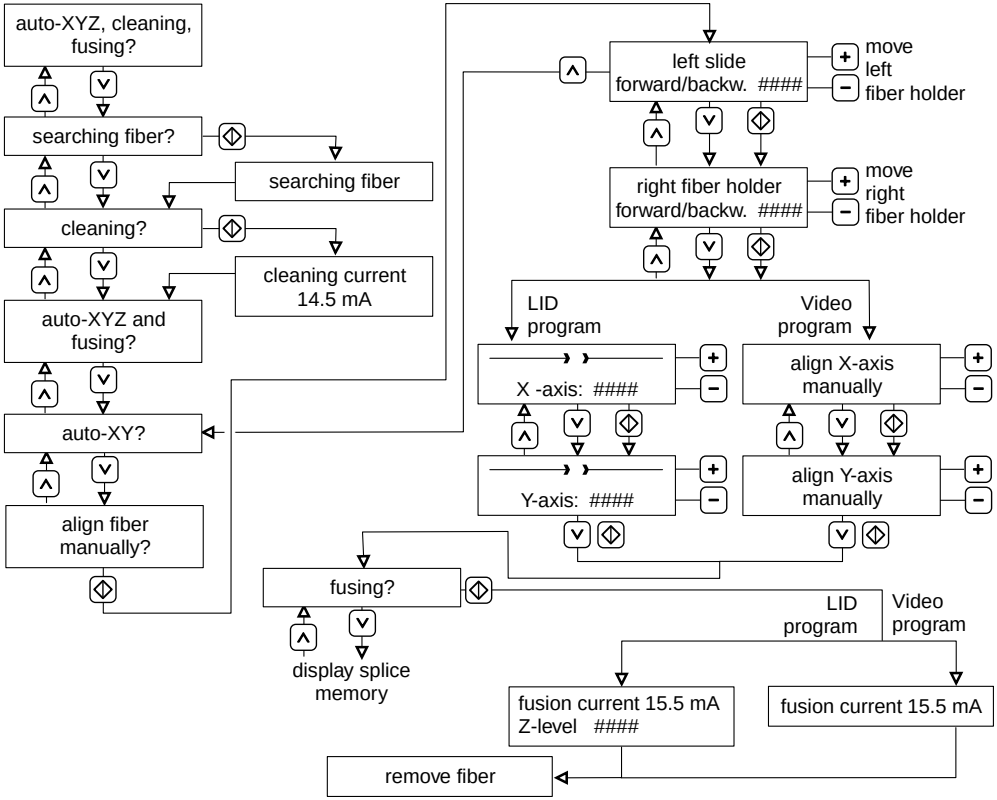
Semi-automatic splicing sequence



* Multimode fibers only

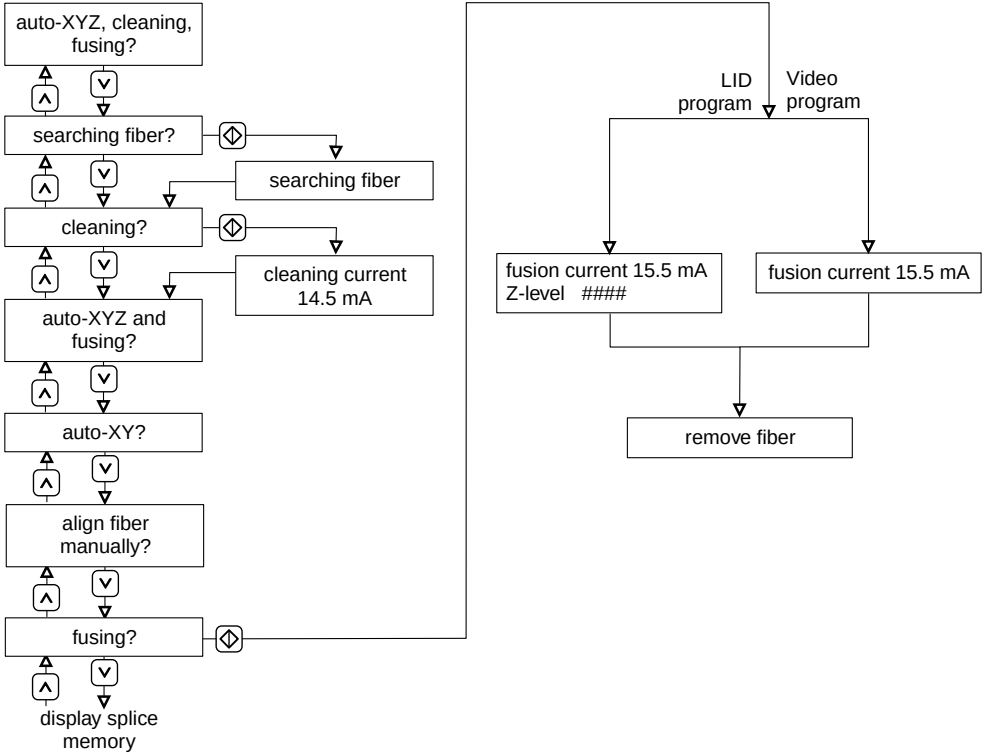
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Manual fiber positioning



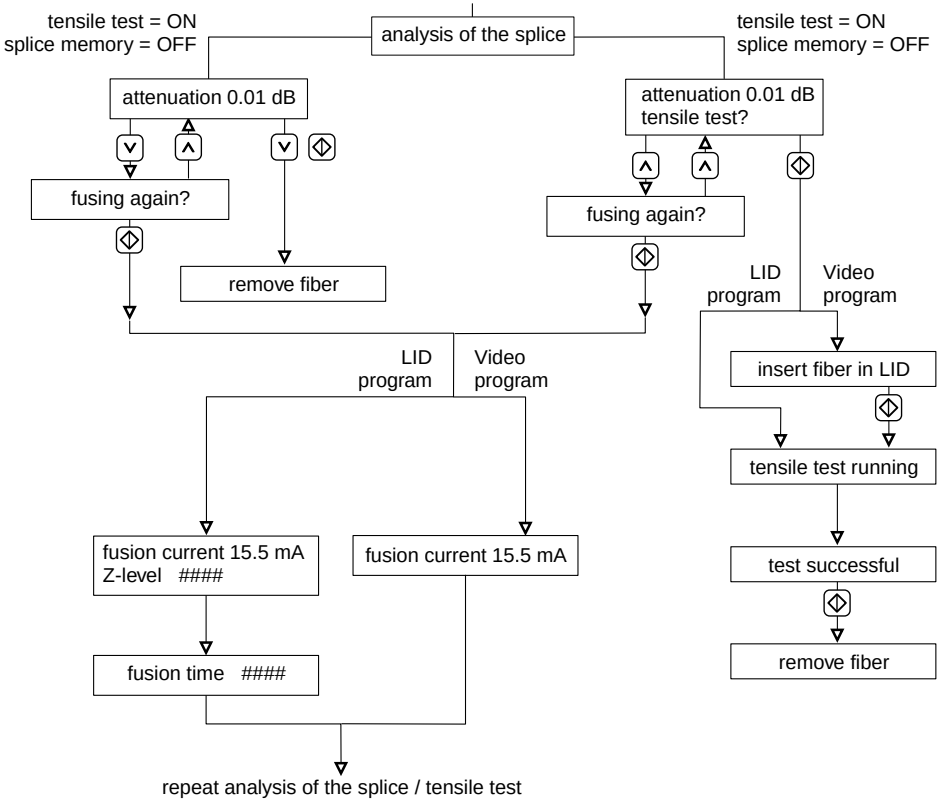
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Manual splicing sequence

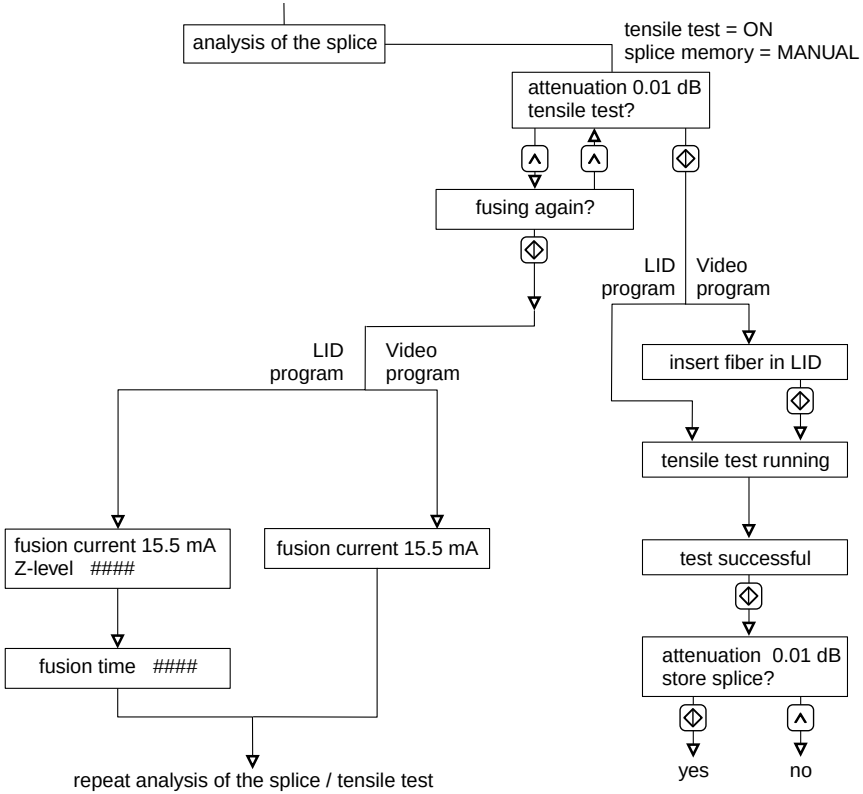


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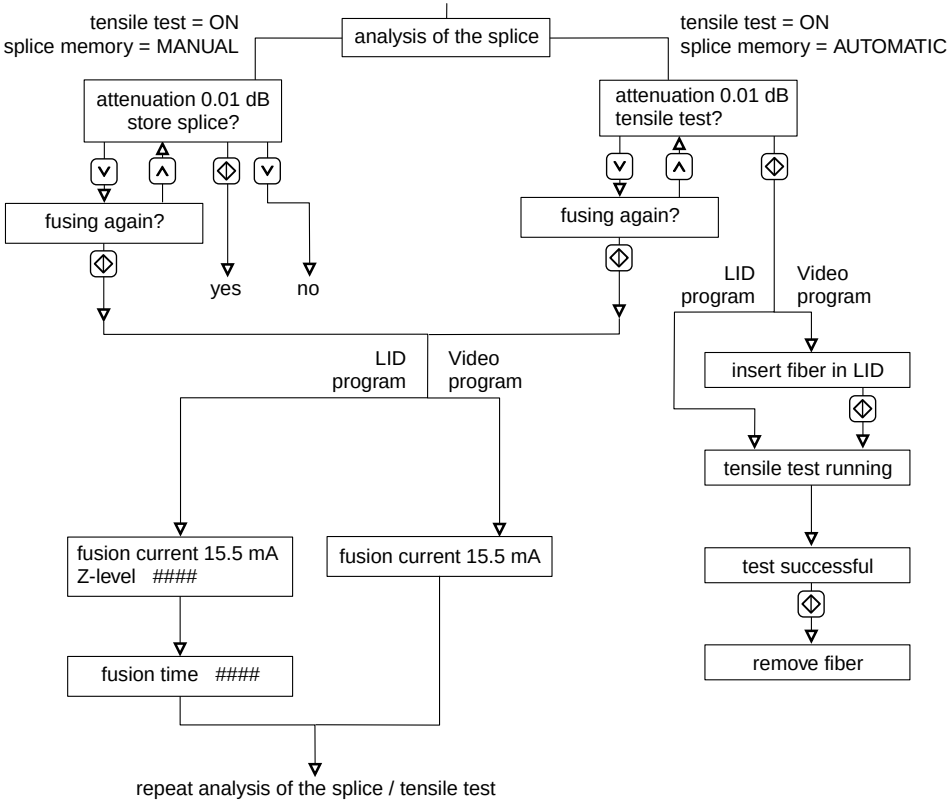
Splice assessment / tensile testing



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Positioning

The following measurements are performed during the positioning process:

- Detection of interfering light
- Assessment of end face quality

Detecting interfering light

Interfering light can cause positioning and measuring errors in the LID programs. It is produced by interference between the LID transmit signal and signals from external devices (e.g. active OTDR).

If interfering light is detected, “Attention interfering light” is displayed on the monitor and the current operation is stopped.

- Reselect the sequence that has been halted by pressing the ^ key.
- Start the selected sequence by pressing the ◇ key.

Assessing the end face quality

This measurement is performed in all programs if the fibers are fused in fully automatic or automatic modes.

If the video system detects dirt or end angle errors totalling in excess of 2.3° the message “fiber dirty or bad endfaces - fusing ?” appears.

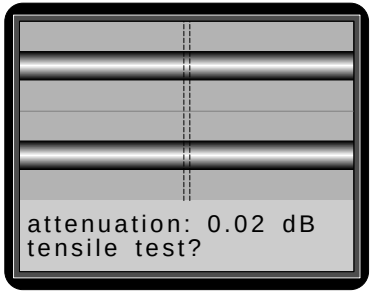
Fiber end faces which are poorly prepared will yield high splice losses and incorrect splice loss estimation.

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Assessing the Splice and Repeat Fusion

Visual splice assessment

The fiber cladding has a smooth surface if the splice is good. The cores are not visible on the monitor, however. The light stripe in the middle of the fiber is the result of light reflecting from the fiber surface. The illustration below shows a good splice.



Automatic splice assessment

The finished splice is analyzed in automatic and fully automatic mode following the fusion process. The splice is examined first for enlargements or constrictions as well as homogeneity and offset. In the event of fault, the monitor displays “Bad splice, fuse again?” and you will be given the opportunity to repeat the fusion process.

- You can fuse again by pressing the ◈ key.

If the splice appears in order, the splice loss is calculated and displayed in dB. The splice loss assessment provides accurate results if the following requirements are satisfied:

- The fusion parameters must be set correctly.
- If the video program is used, the fibers must be of good quality in terms of the eccentricity of the core relative to the outer contour.

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Section 6 provides examples of poor splices, the possible causes and the relevant remedial measures.

Fuse again

Repeat fusion is used to optimize the parameters and to enhance the splicing results if the set fusion time was too short or the fusion current too low.

- When key [^] is pressed the question “Fuse ?” or “Fuse again” appears on the display. This allows you to perform repeat fusion, i.e. to re-ignite the arc. After that the splice loss obtained is displayed again.

Tensile Test

Tensile force

The splicer allows the tensile strength of the splice to be tested with a tensile force of approx. 2.5 N.

Activating the tensile test

You can switch the tensile test on and off in the parameter menu, see ""“Program selection (single-mode/multimode)” menu" on Page 3-9. If the tensile test is switched on, the message “Tensile test with ENTER” appears after the end of the fusion process.

- Press key [◇] in order to start the tensile test.

After completion of the tensile test “Remove fibers” is displayed.

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Splice Memory

Activating the splice memory

The splice memory can be activated under “Options” in the Parameter menu. Up to 250 results can be stored and printed out via the RS 232c serial interface. You can also transfer the results to a computer for further processing using a standard terminal program.

Displaying the splice memory on the monitor

If you “page” right through the splicing sequence by repeatedly depressing the ⌄ key the contents of the splice memory will be displayed on the monitor.

You can scroll backwards and forwards in the memory with keys + and − .

Deleting the last value

If you have to repeat the last splice you made, you can delete the associated loss value from the memory.

- Press the ⌄ key after completion of the fusion process in order to display the contents of the memory.
- Press key ⌄, again so that the last value stored is displayed. You can now delete the displayed value with key −.

Leaving the memory display

- By pressing key ⌄ you return to the operator menu.

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Printing out the splice values

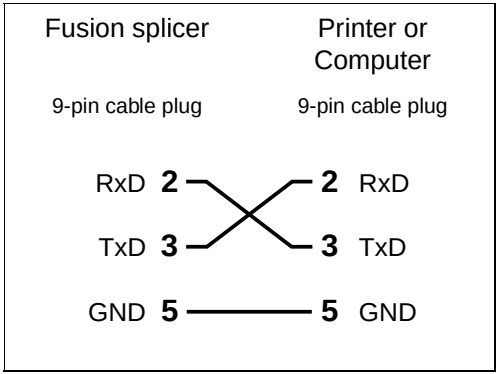
The printer and splicer used must be set to the same data transmission format (see ""Data output" menu" on Page 3-13).
The splicer's serial interface works with the XON/OFF protocol. Data transmission is performed asychronously with a start bit, eight data bits and one stop bit. The parity bit is not used. The baud rate of the splicer can be set to the following values:

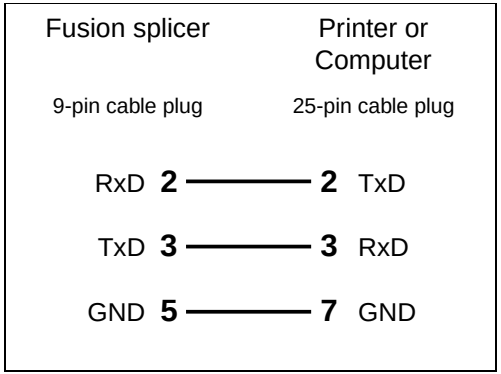
9600, 4800, 2400, 1200, 600, 300 and 150 baud.

The settings are changed by means of the ⊕ and ⊖ keys. The value is confirmed with the ◈ key.

Printer cable

RS 232c cables are available from trade outlets as "computer-computer" connections. The cable used must have the following connections:





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Removing the Splice

Note	Observe the following sequence 1. Open flaps of LID system 2. Open electrode flap 3. Open fiber holder flaps 4. Take out fibers immediately

All flaps must be opened and the fibers removed immediately since the slide moves to the insertion position 5 seconds after the electrode and LID flaps are opened.

Approx. 5 seconds after the flaps are opened the splicer outputs the message “Fully automatic?” to indicate that it is ready to commence splicing again.

Splice Protection

The fiber coating of the optical fiber was removed at the splicing point prior to splicing. This section of the fiber must be protected after splicing by using either a crimp splice protector or a heat-shrink splice protector. These splice protectors give the splice mechanical strength thereby preventing possible damage during subsequent handling.

The crimping device and heat-shrink oven are available as accessories (see section 7).

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5 Ending of Operation

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Switching off Fusion Splicer

- Press keys ^ and v simultaneously

  The slides are then moved automatically to the transport position. The fusion splicer switches off as soon as this occurs.

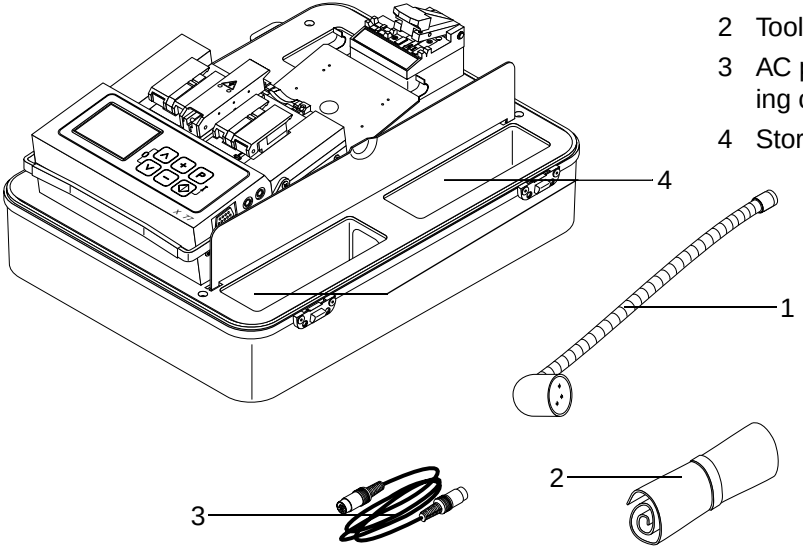
WARNING	Always switch the splicer off via the control panel. If you only pull out the power supply plug the slides are not moved to the transport position. This could result in damage to the splicer during transport.

Packing away Accessories

- Pull the AC power cable out of the power supply unit socket.
- If your splicer is not installed in a case remove the 12 V supply cable and pack it away.
- Remove all dirt and traces of fiber.
- Close all flaps on the splicer.
- Pack away the cables (3), tool set (2) and the work light (1) in the storage compartments (4) of the case.
- Clip in the lid of the case and close the case.

WARNING	Do not use force to close the case. Make sure that all parts of the splicer are in their transport position.

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1 Work light
2 Tool set
3 AC power and connecting cable
4 Storage compartment

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6 Troubleshooting and Care/Maintenance

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Basic Procedure

Proceed in the following sequence if the fusion splicer malfunctions or if fault messages are displayed:

- In the case of fault messages which occur once only, repeat the action in question. For example, with the fault message “Bad endfaces” occurs, prepare the fibers again.
- If the same problem occurs repeatedly, make absolutely certain that you are handling the fibers and operating the splicer as set out in the Operating Instructions.
- If you are unable to ascertain the cause of the fault or the fault is repeated, the following subsection provides you with the possible causes of numerous problems and the measures you should adopt to remedy them.
- A number of the remedies set out below require the utmost care and should only be performed by qualified personnel in a clean working environment.
- Under no circumstances should you attempt to perform repair work which, according to the table, may only be carried out at the service center.

NOTE	The manufacturer assumes no liability for damage as a result of the following work being performed incorrectly.

NOTE	An error message is also indicated by a beep tone.

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Fault Messages on the Monitor

The following pages contain explanations of the *fault messages* displayed on the monitor together with notes on remedying the faults. The fault messages are arranged in the order of the operations during which they can occur.

Note that a number of fault messages can have different causes and symptoms and may therefore be listed more than once on the following pages.

Fault messages at switch-on

Fault message	Possible cause	Remedy
Self test *Error 1*	RAM faulty.	Switch off the splicer and switch it back on again. If the fault is repeated, the splicer must be sent to the service center for repair Notify the service center of the error number displayed.
Error 2	Visual storage faulty.	
Error 3	RAM and vis. storage faulty.	
Error4	Digitizing faulty.	
Reference switch *left error* *right error*	Left and/or right-hand reference switch has not been actuated. Switch is faulty or slide does not move.	Press the ◈ key. If the fault persists after this, the splicer must be sent to the service center for repair.

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	Fault message	Possible cause	Remedy
	Battery empty! The splicer switches off	The power supply unit is not connected to the battery - AC power operation is not possible.	Check whether the power supply unit, battery and splicer are connected properly.
		The power supply unit is not functioning. The battery is not being charged. The display appears even though the splicer is being powered from the AC power supply.	Check whether the green charging indicator is lit. If not, check the AC power supply.
		The battery is faulty but AC power operation is possible.	Replace the battery.
General fault messages during operation	*Program status [X]=...*	Processor crash or software error.	Switch the splicer off and then switch it back on again. If the fault persists, the splicer must be sent to the service center for repair. Notify the service center of the fault numbers displayed.

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Fault messages during fiber location and positioning

Fault message	Possible cause	Remedy
z-distance too wide or fibers not detected	Fibers wrongly inserted or wrong cleave length.	Insert the fibers correctly, see »Inserting the Fibers« on Page 2-8. The fibers must be in the center between the electrodes when the fiber holding flaps are closed.
	No fibers present.	Insert fibers.
Fiber input error	The fiber end could not be found during fiber positioning. The fibers overlap too much or or too long or are cut to very different lengths	Insert the fibers correctly, see »Inserting the Fibers« on Page 2-8.

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Fault message	Possible cause	Remedy
Fiber not detected	Dirty optical system.	Remove dirt and coating residues from the protective lens of the optical system, see »Cleaning/replacing protective lens« on Page 6-18.
	Condensation on optical system. The fiber appearance displayed is unclear in one or two axes.	Prevent condensation by placing the splicer prior to use in a room that is not too cold. Leave the electrode flap open for as short a time as possible during fusion.
	Fiber end is no longer detected as such by the video system, i.e. the fiber is either extremely dirty or extremely poorly cleaved.	Clean fiber or prepare fiber again.
Fiber offset error *Offset.. µm* The fiber offset is clearly visible before starting of the positioning.	Fiber dirty or positioned wrongly.	Check whether the fiber is clean and correctly inserted in the guide. If necessary, prepare the fiber again and insert correctly.
	Fiber guides dirty or damaged.	Clean the guides as described further on.

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Fault message	Possible cause	Remedy
fiber dirty or bad end faces - fusing?	The video system has detected that the total end face angle exceeds 2.3° or that the end face is dirty.	Determine on the monitor which fiber end is faulty. Prepare fibers again.
Attention interfering light!	The fiber contains light from a transmission or measuring system.	Switch off external light sources.
	The LID flaps are open.	Close LID flaps.
LID system overflow	The single-mode fiber program has been selected but a multimode fiber has been inserted.	Always use the multimode program for multimode fibers.
Piezo offset error	Fiber dirty or wrongly inserted.	Check whether the fiber is clean and inserted in the fiber guide in the right way. If necessary, prepare fibers again and insert them in the right way.
	Fiber guides dirty or damaged.	Clean the fiber guides (see »Cleaning the fiber guides« on Page 6-21).

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	Fault message	Possible cause	Remedy
	Video digitizer error	Video system electronics not functioning.	Switch off the splicer and switch it back on again. If the fault occurs again, the splicer must be repaired at the service center. You can fuse using manual fiber positioning (with or without LID).
Fault messages during splice analysis	*Fiber not detected*	Dirty optical system.	Remove dirt and coating residues from the protective lens of the optical system, see »Cleaning/replacing protective lens« on Page 6-18.
		Condensation on optical system. The fiber appearance displayed is unclear in one or two axes.	Prevent condensation by placing the splicer prior to use in a room that is not too cold and leave the electrode flap open for as short a time as possible during the fusion process.
		Fiber end is no longer detected as such by the video system (fibers burnt or bubble formation).	Repeat splice.

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	Fault message	Possible cause	Remedy
	bad splice - fuse again? The actual splice loss can still be OK. under some circumstances	Wrong splicing parameters.	Reduce the prefusion current or prefusion time. The time must not be set too low (default setting: 0.25 s).
		Wrong fiber type or different fiber types on both sides.	Use the program “Automatic fusion time control“.
		Dirt in the optical system.	Check the monitor picture for visible signs of dirt with no fibers inserted. Remove dirt and coating residues from the protective lens of the optical system, see »Cleaning/replacing protective lens« on Page 6-18.
Fault messages relating to the splice memory	*No data available*	The splice memory is empty.	Ensure that the splice memory is activated in the parameters. To save a displayed loss value, you have to confirm with ⏎ .

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Fault messages during printing

Fault message	Possible cause	Remedy
Printer not ready!	The printer connected to the serial interface transmits incorrect control characters.	Check the baud rate set at the printer and splicer. Make sure that the printer you are using supports the XON/XOFF protocol and the data format (8 data bits, 1 stop bit, no parity).

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Other faults

The following table sets out explanations for eliminating faults which do not generate fault messages on the monitor.

Symptom	Possible cause	Remedy
Battery mode not possible; AC mode functioning.	The battery is missing or is not connected or the battery fuse is faulty.	Check that the battery has been fitted correctly and that the battery fuse is o.k. Install and correctly connect the battery and/or replace the fuse. If the fault is repeated, the splicer must be sent to the service center for examination.
Arc flickers or hisses.	Electrodes dirty or eroded.	Clean or exchange electrodes.
The fiber does not melt during the fusion process but buckles instead. The splice point barely lights up during splicing.	Fusion current too low	Set correct fusion current.

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Symptom	Possible cause	Remedy
LID level too low	The LID receives no light.	Check that you have inserted the fiber in the LID. If the fault persists, select *Manual fiber adjustment* and check that a minimum level of 1.0 is displayed for fiber without discontinuity. Clean the LID system (see »Cleaning the LID system« on Page 6-20). If the LID level is still not high enough with a continuous fiber, the fiber is not LID-compatible. If this happens remove the color (coating) from the length of fiber inserted in the LID. If the problem persists, the splicer will have to be returned to the service center. However, you can continue working with the video system.

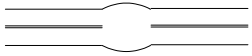
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Symptom	Possible cause	Remedy
The fiber buckles at the start of the fusion process. When automatic fusion time control is used, a more or less usable splice is obtained after a long splice time. If a fixed fusion time is used, high splice losses are obtained.	The prefusion time is too short or the prefusion current too low.	Correct the prefusion parameters. You can use the default values as a starting point.
Fibers burn away.	Prefusion current or prefusion time too high.	Set the parameters (see section 3). Try using the default parameters if necessary.
	Autofeed too small.	
	Fusion current considerably too high.	
	Z-piezo faulty.	Service center.
Charging indicator not lit.	No AC power supply.	Connect the power supply unit to the socket.
	Power supply unit faulty.	Service center

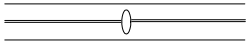
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Symptom	Possible cause	Remedy
The fusion process is usually aborted after 1s if automatic fusion time control is used — bad splice, high splice loss. *The fiber shows irregularities at the fusion point when displayed on the monitor. The splice breaks easily when removed.* Good results can be achieved with “fuse again”.	The minimum fusion time is too short. This causes the automatic fusion time control to terminate fusion before the joint becomes homogeneous.	In most cases you can still “rescue” unsuccessful splices by fusing again (see »Fuse again« on Page 4-16). To prevent the faults occurring in the first place, set the minimum fusion time to 1.5 s. It may help to reduce the autofeed.

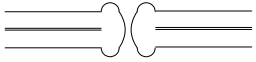
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Symptom	Possible cause	Remedy
Constriction 	Dirty electrodes. The arc burns irregularly.	Clean electrodes.
	Fusion current too high.	Reduce in steps of 0.2 to 0.3 mA.
	Autofeed too small.	Increase in steps of 1 µm
	Prefusion time too long.	Standard value: 0.25 s — change only in exceptional cases. Reduce in steps of 0.05 s.
	Prefusion current too high.	Standard value: 15.5 mA — change only in exceptional cases. Reduce in steps of 0.1 mA
	Z-gap too wide.	Reduce Z-gap in steps of 0.5 µm (do not set below 3 µm).
Enlargement 	Autofeed too large.	Reduce in steps of 1 µm.

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Symptom	Possible cause	Remedy
Not fused through 	Fusion current too low.	Increase in steps of 0.2 to 0.3 mA.
	Prefusion time too short.	Standard value 0.25 s — change only in exceptional cases. Increase in steps of 0.05 s.
Bubble or inclusion 	Dirty end faces before splicing.	Clean end faces before fusion Possibly increase cleaning current by 0.2 to 0.3 mA or increase cleaning time by 0.1 s.
	Bad cleavage	Check cleavage quality before fusion.
	Fusion current too high.	Reduce prefusion and fusion currents.
	Prefusion time/current too low.	Increase prefusion time in steps of 0.1 s.

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Symptom	Possible cause	Remedy
Matchheads 	Electrodes dirty, arc burns irregularly.	Clean electrodes.
	Fusion current is far too high.	Reduce in steps of 0.5 to 1.0 mA.
	Prefusion time is far too long.	Set standard value 0.20.
	Prefusion current is far too high.	Set standard value 14.5 mA.
	Autofeed too small.	Increase autofeed in steps of 1 µm.
	Z-gap too wide.	Reduce Z-gap in steps of 1 µm.

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Care and Maintenance

The splicer must be cleaned regularly and kept clean at all times.

Clean the following parts at the end of every working day or more often if required:

- the LID system
- the fiber guides
- the electrodes
- the fiber cleaver

WARNING	Do not clean the splicer with chemical solvents

Cleaning/replacing protective lens

The protective lens of the optical system is located beneath the electrode tips and must be free of dirt and fiber and coating residues at all times.
A protective lens replacement kit consisting of lens, holder and special tool is available under order number S46999-M7-S418.

Removal

- Switch off the splicer and disconnect it from the power supply.
- Remove both electrodes, see »Replacing/ cleaning the electrodes« on Page 6-21.

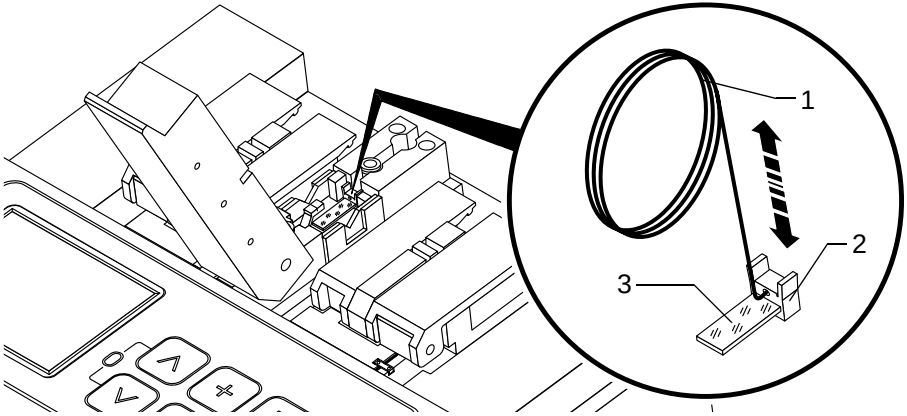
DANGER	Always comply with the warnings relating to changing the electrodes on Page 6-22.

- Engage the hook of the special tool (1) in the hole in the holder (2) and carefully lift out the holder.

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Cleaning

- Clean the protective lens (3) with alcohol.
- Replace the protective lens if it is badly dirtied or damaged.



Installation

- Reinstall the cleaned/replacement protective lens with holder.
- Reinstall the electrodes, see »Replacing the electrodes« on Page 6-22.

Changing the battery fuse

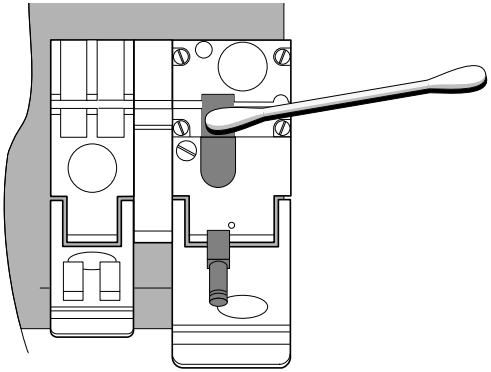
The battery fuse is located in a fuse holder on the outside of the battery. Replace this fuse only with a fuse of the same rating and type after having eliminated the cause of the fault.

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Cleaning the LID system

To clean the LID system you need pure alcohol and cotton wool sticks.

WARNING	The coupling areas of the LID system are made of an elastic material. Never use sharp or pointed objects to clean them.



- Moisten the cotton wool stick with alcohol and use it to clean the coupling areas of LID transmitter and receiver.
- Then clean the metal mandrels of the LID system.

NOTE	The LID system always operates without index-matching gel.

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Cleaning the fiber guides

The fiber guides must be cleaned if the fibers, on insertion, appear to be significantly out of alignment or if the error message “piezo offset error” or “fiber offset error” is displayed.

Clean the fiber guides by blowing them out with compressed air. Obstinate dirt can be removed carefully using a wooden toothpick with its tip slightly moistened in alcohol.

DANGER	After cleaning there must be no alcohol left in the vicinity of the electrodes.

WARNING	Never use hard objects to clean the fiber guides.

Replacing/ cleaning the electrodes

The electrodes become dirty through the fusion process. When they become very dirty they no longer function properly. The electrodes are working properly:

- if the arc burns regularly
- and no hissing sounds are to be heard during the fusion process.

Burning the electrodes clean

Try to burn the electrodes clean before resorting to mechanical means of cleaning.

- Check that there are no fibers inserted.
- In the “Service data” menu, reset the “Electrode cleaning“ counter to 0 (see »“Service data” menu« on Page 3-12). This triggers the burnout process.

Repeat the burnout if the electrodes are still dirty, but not more than twice. If the results are unsatisfactory, clean the electrodes by mechanical means (see »Mechanical cleaning« on Page 6-23) or replace the electrodes.

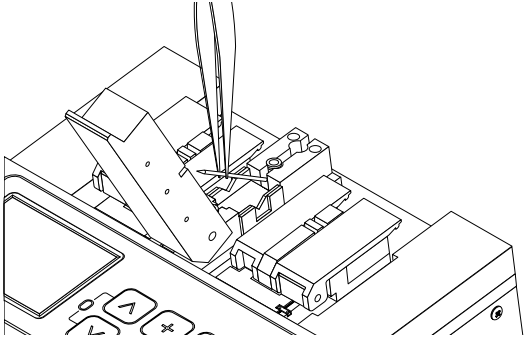
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NOTE	It is important to ensure that the tips are free of contaminating material. The tips must not be bent or broken. The two electrodes are identical.

Replacing the electrodes

- Switch off the splicer and disconnect it from the power supply. The splicer auto-cleans the electrodes with a burnout when it is switched on.

DANGER	Keep the splicer disconnected from the power supply until the two electrodes have been correctly installed. The splicer will be damaged if a burnout is triggered without correctly installed electrodes.



- Open the electrode flap
- Loosen the bolt with the special Allen wrench, size 2.5 (approx. one half turn).
- Pull off the electrode.
- Push the new electrode into the holder up to the stud.

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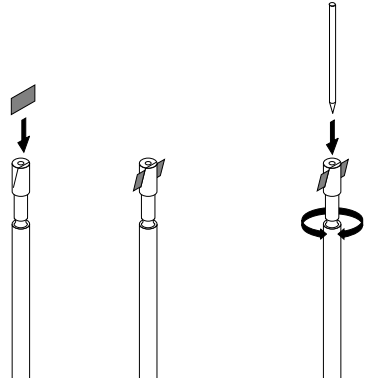
- Clamp the electrode with the Allen screw.

CAUTION	Only use the special wrench supplied in the tool set.

- Change the second electrode in the same way.

Mechanical cleaning

If the electrodes are still not working correctly after burning clean, clean them mechanically. When cleaning the electrodes, only use the swab holder and a piece of emery paper provided in the tool set..



- Place a piece of emery paper (with the rough side inwards) in the notch of the swab holder.
- Remove the electrodes (see »Replacing the electrodes« on Page 6-22).
- Position the swab holder on the electrode tip.
- Carefully turn the swab holder several times.

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- Do not touch the tips of the electrodes with your fingers after cleaning.
- Clean the second electrode in the same way.

If cleaning is not successful or the electrodes are eroded too badly they must be replaced. Use only the electrodes recommended by the manufacturer.

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7 Accessories

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Order Numbers

Accessories

Designation	Order number	Explanation
External battery	S46999-M7-S401	12 V, 6.5 Ah for installation in V7 case, capacity: 90 splices.
Attachment battery	S46999-M7-S400	12 V, 3 Ah for installing on the bottom of the splicer case. Capacity: 45 splices.
Fiber cleaver	S46999-M9-A8	For cutting single-mode and multimode fibers.
Splice cassette holder	S46999-M7-S257	For standard splice cassette 142x92x8.
Heat-shrink oven	S46999-M7-S343	Adjustable, for heat-shrink splice protectors.
Pigtail adapter	S46999-M7-S336	With universal plug adapter. For splicing pigtails with the LID system.
Work light	S46999-M7-S284	

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Accessories

Designation	Order number	Explanation
Plug adapters with mechanical locking for:		For pigtail adapter S46999-M7-S336.
D4 plug	S46999-M7-S337	
SMA plug	S46999-M7-S338	
ST/II plug	S46999-M7-S339	
SC plug	S46999-M7-S340	
DIN plug	S46999-M7-S341	
FC plug	S46999-M7-S342	
Transport case	S46999-M7-V7	For holding all X7... splicers, incl. power supply unit.
Connecting cable	S46999-M7-S274	For connecting power supply unit and splicer, length approx. 2m.
Power supply unit, battery charger	S46999-M7-S399	12V, 70W, for all X7... splicers.
Holding block	S46999-M9-S42	For mounting the cleaver in case S46999-M7-V7.

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Accessories

Designation	Order number	Explanation
Installation bracket	S46999-M7-S276	For attaching the holder for the standard splice cassette.
Crimping device	S46999-M7-S252	For crimping splice protectors for individual fibers.

Spare parts

Designation	Order number	Explanation
Electrodes	S46999-M7-S256	1 set=2 electrodes
Protective lens replacement kit	S46999-M7-S418	Kit consisting of protective lens, holder and special tool.
Swab holder for electrode cleaning	S46999-M7-S144	1 x
Emery paper	S46999-M7-S143	10 x
Universal plug adapter for SC/ST/FC plugs	S46999-M7-S350	

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Expendable materials / Splice organization

Designation	Order number	Explanation
Standard splice cassette	C46197-A7-A66	Pack of 10
Crimp splice protector	S45057-Z1-H590	Pack of 150
Splice organizer	S46197-A7-A69	Pack of 10, for 12 crimp splice protectors each
Heat-shrink splice protector	S46999-A16-A1	Pack of 10
Splice organizer for heat-shrink splice protectors	S46999-Z12-A1	Pack of 10, for 6 heat-shrink splice protectors each.

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Battery

Charging the battery

The optional battery requires no maintenance and has low gas emissions.

NOTE

If the splicer is not used for a long time, fully charge the battery at least every three months.

During AC line operation, the battery is charged automatically if it is connected to the power supply unit directly or via the splicer.

NOTE

If the charging indicator does not light up in AC line operation, locate the cause of the fault (see section 6).

After about 3 hours the empty battery will be fully charged again. The internal charger prevents overcharging.

The splicer can be used during the charging process, but this will increase the charging duration.

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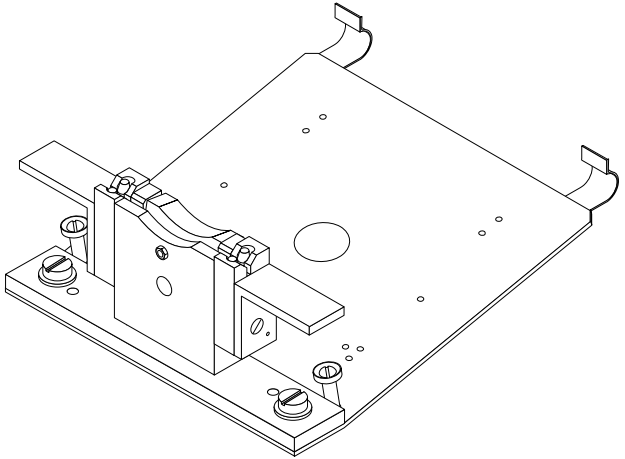
Crimping Device

Characteristics of the crimping device

The crimping device is used to crimp (close) crimp splice protectors. A clamping device ensures that the splice is held in the crimping device taut but not under tension.

Characteristics of the crimp splice protector

The crimp splice protector consists of a V-shaped aluminum section with a soft coating on the inside edges. The splice protector is crimped around the splice after splicing using the RXS crimping device and restores the mechanical strength of the fiber at the splice. The crimp splice protector does not increase slice loss and is corrosion-resistant.



Crimping device with standard splice cassette holder

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Heat-Shrink Oven

Characteristics

The heat-shrink oven is for applying heat-shrink splice protectors to splices.

The adjustable heat-shrink oven features:

- fully automatic heat-shrink process.
- LED indicating operating status.
- adjustable heating time and temperature.
- LED indicating duration of hat-shrink process.

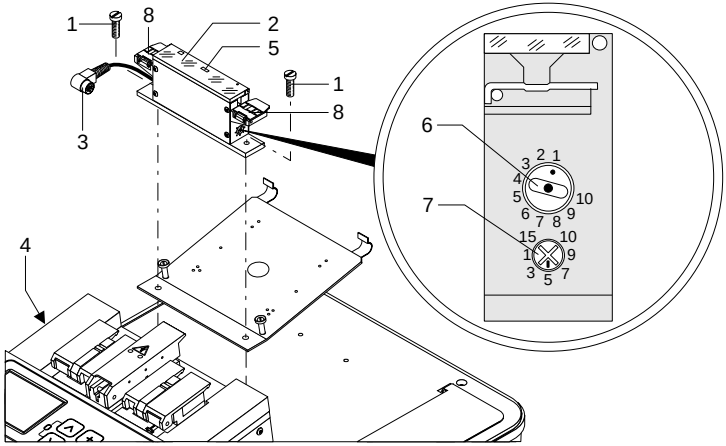
Assembly

- Fix the splice cassette holder complete with the heat-shrink oven to the top panel of the fusion splicer by means of the two screws (1).

NOTE	Other attachments are available on request for X7.. series splicers.

- Make sure that the cover (2) is closed.
- Insert the plug (3) in the socket (4) of the splicer

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Installing heat-shrink oven

Additional information

For more information such as operating instructions and technical data, see the “Adjustable Heat-Shrink Oven” user guide.

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8 Supplement/Amendments

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