

OptiSplice™ one

Fusion Splice System for Applications in FTTx and LAN Environments

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Issue 2



CORNING

OptiSplice one Basic Unit

The OptiSplice one fusion splice system is a compact and handy splice unit which is used in local (LAN) and Fiber-To-The-x- (FTTx) networks for permanent connection of optical fibers.

Due to its low weight and compact design it is ideal for applications where space and tight working conditions are a concern. With the ergonomic layout of the operating elements as well as with the adaptation to short fiber lengths the unit is predestined for this application.

Description

The OptiSplice one fusion splice unit is equipped with fixed V-grooves for a passive fiber positioning on outer fiber contour. It is therefore perfectly suitable for multimode and single-mode applications with average requirements for attenuation. The unit is ideal for wiring with short distances (private networks, FTTx access cabling) where the splice loss budget is less critical than in long-haul networks. The positioning with the fixed V-grooves allows for good splice results with all common fiber qualities (high core-cladding concentricity). This is supported by the self-centering effect. The self-centering effect means that the optical fiber – due to the surface tension of the melted glass – tends to build up a homogeneous and offset-free as possible compound. Thanks to this elemental tendency of the fibers, the fusion splice units with fixed V-grooves at a low core eccentricity of the fibers ($< 0,4 \mu\text{m}$) may attain an average attenuation of less than 0,04 dB. The fixed V-grooves, a splice time of less than 11 seconds, reliable loss evaluation and a most easy handling stand for optimum efficiency.

The three-dimensional fiber position evaluation guarantees that possibly soiled V-grooves are securely detected and the end-face quality of fibers is evaluated correctly so that both do not have a negative impact on the splice result. The user may define the zone of acceptance by pre-selectable limits. The large and very bright illumination of the fiber insertion area facilitates easy operation even in badly illuminated environments.

The unit is equipped with a set of fiber holders for fibers with coatings from $250 \mu\text{m}$ to $900 \mu\text{m}$ in diameter. The fiber holders may be taken out for an easier insertion, but may equally remain in the unit as fiber guides. The magnet-supported snap-on of the fiber holders within the unit allows for simple and productive working without re-adjusting.

The completely covering wind protection permits undisturbed operation during impacts of wind (f. ex. on traffic routes and railways as well as with aerial cable assembling).

The transfective screen with environmentally dependent backlighting offers an excellent contrast in dark environments as well as with direct sunlight. During transportation the screen is protected by a covering which serves at the same time as a splice tray holder for all common splice trays and as a carrying handle. For applications directly at the closure or in the cabinet where fibers of very short lengths must be worked with, the tray holder can be put off easily without tools.

The rugged design with rubber bumpers makes operation possible even in rough environments and protects the unit reliably. The components of a possible cleaning or exchange can be removed without tools (spares are included in the kit). There is no need for adjustments during the mounting; easy and quick cleaning and maintenance is possible at any moment.

The OptiSplice one is fully compliant with the requirements of the European Union according to 2002/95/EC (RoHS compatibility) and to 2002/96/EC (WEEE) as well as CE conformity according to 89/336/EEC (electro magnetic compatibility) and 73/23/EEC (requirements on low voltage devices).



OptiSplice one operational in Transport / Workstation case

Features of the OptiSplice one

- Perfectly attuned to FTTx and LAN requirements
- Quick splicing
- Compact, rugged and handy design
- High-precision fixed V-grooves
- Fully automatic splice process
- Splice process control with high-resolution video image evaluation system L-PAS™ for fast pre-alignment, evaluation of fiber position and end-face, contamination detection and splice loss estimation
- 100x magnification
- Most easy operation by fully automatic splice control
- Preset programs for standard single-mode and multimode fibers as well as for NZDS fibers
- Graphical interface with intuitive menu-drive
- Typical splice loss < 0,04 dB with standard single-mode fibers of common quality
- Three-dimensional fiber position evaluation with two cameras and fiber display in two views
- Ergonomic layout of all components for easy handling and optimum operation
- Fiber holders to be used in or, for easy insertion of the fiber, out of the unit
- User-definable x / y-offset limiting value
- Tensile test facility
- Alarm limit with warning message when exceeding user-defined target values
- Real-time clock with time and date (both stored in the splice memory)
- Transflective 3.5 " display (QVGA resolution) with environmentally dependent backlighting
- Up to 50 user-defined programs
- Splice data storage for up to 10,000 data records
- High-performance 7,200 mAh Lithium-Ion battery permits mains-independently typically 100 splices with and 200 without heat-shrink oven operation
- Altitude compensation from -2,000 m up to 4,000 m above sea level
- Energy-saving function in battery operation
- Internal heat-shrink oven control with different heat-shrink programs for RapidoShrink
- USB port for software upgrade and data transfer to a PC (USB device)
- Long-life rugged housing with impact protection
- Small weight of only 1.5 kg (basic unit without battery) or 2 kg (with battery)
- Transport case available as working station for desktop and aerial cable applications
- Hand loops for one-hand operation available



OptiSplice one unit with accessories

Technical Data OptiSplice one

Suitable fibers	Single and multimode optical fibers with cladding diameter of 125 µm and coating diameters of 250 µm to 900 µm
Fiber clamping	On 125 µm cladding glass
Splice loss (with identical fibers)	<ul style="list-style-type: none"> Multimode fibers: typically < 0.01 dB Standard single-mode fibers: typically < 0.04 dB NZDS fibers: typically < 0.15 dB
Optical return loss	> 60 dB
Accuracy of splice loss measurement	In video mode typical deviations < 0.05 dB
Splicing operation	Fully automatic
Splice process control system	Positioning, fiber evaluation and fusion by three-dimensional video image evaluation system L-PAS™
Fiber alignment	Pre-alignment in z-direction with stepper motors
Splice analysis	Splice loss measurement, tensile test
End-face evaluation	Cleave angle detection, end-face quality evaluation, fiber position evaluation, contamination detection
Fiber display	Transflective 3.5" color QVGA monitor, automatically controlled and environmentally dependent brightness
Splice cycle time	< 11 s
Parameter optimization	Automatic mains optimization by parameter optimization function
Wind protection	At least up to wind speeds of 15 m/s, independent of direction
Splice protection	Heat-shrink splice protection or crimp splice protection
Additional software functions	<ul style="list-style-type: none"> Fixed programs for three different fiber types (single- and multimode fibers and NZDS) 50 user-definable programs per fiber type Splice data memory for 10,000 data sets Automatic compensation for poor cleave angle up to 2.5° Alarm limit with warning message when exceeding user-defined splice loss target values Compensation of altitude from - 2,000 m up to 4,500 m above sea level Automatic energy-saving function in battery operation Automatic initial self-test and status report Operating hours and total splice counters Electrode replacement and cleaning display in programmable intervals Internal control for fast heat-shrink oven RapidoShrink
Interfaces	Mini USB (USB device), USB cable included in kit, for software upgrade and data transfer to a PC
Operating temperature	- 15 °C to + 50 °C
Storage temperature	- 40 °C to + 80 °C
Relative humidity	To a maximum of 95 %, not condensing
Dimensions	155 mm x 140 mm x 185 mm (L x W x H)
Weight	1.5 kg without and 2.0 kg with battery
Power supply options	<ul style="list-style-type: none"> External 12 V DC from vehicle wiring system or generator Internal DC voltage of 10.8 V Lithium-Ion battery with 7.2 Ah Mains voltage 90 V to 240 V AC, 50 Hz to 60 Hz, by tabletop power supply unit

OptiSplice one Fusion Splicer Kit

The OptiSplice one unit is available in two different kits which differ in being equipped with either the fast heat-shrink oven RapidoShrink or the crimp device RapidoCrimp. In addition to the basic kit, the OptiSplice one unit is accompanied by the cleaver, a Lithium-Ion battery with high capacity and a loading tray with power supply unit, splice protection device (alternatively RapidoShrink or RapidoCrimp), power supply unit and mains cable with EU connector, a USB cable for software upgrading and data transfer to a PC, a tool set and a transport case. Apart from being a secure transport packing of the unit and its accessories, the transport case serves as well as a working station in desktop applications. With the use of separately available belts, the case may as well be used as a working station in aerial cable applications or can be mounted at the distribution block. The kit furthermore includes wearing parts (a pair of spare electrodes, three spare protection glasses) so that maintenance operations can be done directly in the field.

Order Numbers and Scope of Delivery of the Fusion Splicer Kit OptiSplice one

OS-ONEKST-1	OS-ONEKCT-1	Description	Order number
		OptiSplice one Fusion Splicer Kit, version with heat-shrink oven and accessories	OS-ONEKST-1
		OptiSplice one Fusion Splicer Kit, version with crimp device and accessories	OS-ONEKCT-1
1	1	OptiSplice one Basic kit with set of handling adapters 250 µm	OS-ONEUNIT-1
1	1	Cleaver FBC-006	CLV-FBC006-1
1		RapidoShrink heat-shrink oven without cable	OS-RPD SHRINK-2
	1	RapidoCrimp crimp device without lateral fiber bearing	OS-RPD CRIMP-1
1	1	OptiSplice one transport case	OS-ONECASE-1
1	1	Set of handling adapters 900 µm	OS-ADAPT900-1
1	1	Fusion splice desktop power supply unit and cable with EU connector	OS-PWRSUPPLY-1
1	1	Lithium-Ion battery 7,2 Ah	OS-BATT-1
1	1	Battery loading tray with power supply unit and cable with EU connector	OS-BATTCHARG-1
1	1	Short printed manual plus manual on CD	OS-ONEMANDGB-1
1	1	USB cable	OS-USBCABLE-1
1	1	Spare protection glasses (3 pieces)	OS-PROTGLASS-1
1	1	Spare electrodes (1 pair)	OS-ELECTRODE-1
1	1	Tool kit	OS-TOOLKIT-1
		Two hand loops with screws (optional)	OS-KHNDLOOP-1

FBC-006 Cleaver

The FBC-006 cleaver is suitable for all OptiSplice single fiber fusion splicers. The simple operation and maintenance of the FBC-006, combined with its excellent cleaving quality and attractive pricing, makes it the perfect choice.

The FBC-006 cleaver is fully compliant with the RoHS requirements of the European Union (according to 2002/95/EC).

Applications

- Cleaving of all common single- and multimode fibers plus special fiber types (LS, DS and NZDS fibers such as TrueWave™ and LEAF™) with a cladding diameter of 80 µm to 125 µm
- For single fibers with a coating diameter of 250 µm to 900 µm (cleaver is equipped with universal fiber guide as standard)
- Further fiber guides and special versions upon request

Features

- Average cleave angle deviation with standard single-mode fiber: 0.35°
- Simple, fast operation: Fiber clamping, bending, scribing and breaking at just one touch of the finger
- Diamond cleave blade for high cleave quality and long life-span
- Diamond cleave blade easily replaceable in the field
- Exchangeable fiber guides (accessories)
- Low susceptibility to contaminations and simple cleaning



Cleaver FBC-006

Order Numbers for A8 Cleaver

Description	Order number
FBC-006 cleaver	CLV-FBC006-1
Spare diamond blade	CLV-FBC6BLADE-1

Scope of Delivery

The FBC-006 cleaver is delivered in a plastic transport case with detailed operating instructions, 25 cleaning strips and an Allen wrench for changing the fiber guide and diamond blade. There is space provided for the cleaver in the deluxe transport case.

Splice Protection Process with Heat-shrink Splice Protector

The first step when splicing optical glass fibers is to gain access to the cladding by removing the coating. After splicing, this unprotected area must once again be protected against environmental influences and mechanical damage. Aside from the crimp splice protector, the most common protectors are heat-shrink splice protectors.

Heat-shrink splice protectors comprise an inner EVA (ethylene vinyl acetate) tube, a reinforcement element and an outer polyolefin heat-shrink splice tube. The splice protector is slipped over the splice area and the heat then shrinks it over the splice. During this process the EVA tube melts and adheres to the cladding surface and to the coating which is also securely enveloped. The optical fiber is hermetically enveloped and protected against environmental influences and mechanical damage. Heat-shrink ovens are used to feed the heat to the splice protector.

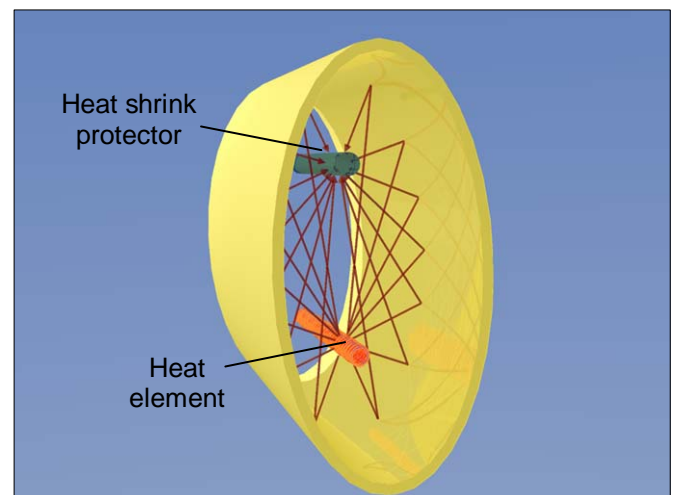
Principle of Conventional Heat-shrink Ovens

Normally the splice protector is inserted in a U-shaped groove which is heated by an electric heating element. The disadvantage of this technology is that both the heating element and the U-groove have to be heated before the U-groove heats the splice protector itself. In actuality, only a small portion of the U-groove touches the surface of the cylindrical splice protector. The majority of the U-groove heats the air in the oven compartment and this heated air in turn heats the splice protector. This approach costs both much time as well as energy.

Principle of the Heat Radiating Heat-shrink Oven

The basic idea of this innovative heat-shrink oven concept is the reduction of the amount of material to be heated combined with direct transportation of heat to the splice protector. One efficient method of importing heat into objects is to utilize heat radiation. To generate heat radiation efficiently, electricity is transported through an appropriately dimensioned wire. At a suitable amperage the wire begins to glow and radiates heat.

A tube-shaped mirror with an elliptical cross section is an obvious choice to direct the heat radiation generated by the wire onto the cylindrical splice protector. When the wire and the splice protector are in the two focal points of the elliptical cross section of the reflector the mirror directs virtually all of the heat radiation generated by the wire.



Distribution of heat radiation in the mirror ellipse

Concept of Heat Radiation Transmission

This design eliminates virtually all parasitic consumption of energy by heating components such as the U-shaped heating element of traditional heat-shrink ovens and the air in the oven chamber, from which nothing is gained. Only the heating wire has to be heated. Compared to the heating element of conventional ovens however, it possesses very little volume and weight, therefore the concept of heat radiation transmission is extremely energy efficient. Consequently, the new heat-shrink oven concept enables more splices with one battery charge. Since only a small wire has to be heated, the heat-up phase with the new design is extremely fast. As a result, the heat-shrink phase begins sooner and total shrink cycle time is significantly reduced. When the splicing process sequence is optimal, significantly more splices can be produced per hour than with a conventional heat-shrink oven.

RapidoShrink Fast Heat-shrink Oven for OptiSplice Fusion Splicer series

The RapidoShrink fast heat-shrink oven offers innovative technology in line with the two OptiSplice fusion splicers. Its gold coated reflector enables shrink times of less than 20 seconds for 60 mm heat-shrink protectors. There is 50 % less energy consumption with the new concept than with the standard heat-shrink ovens. Until now, the heat-shrink oven was one of the significant energy consumers, therefore this new model greatly extends the operating time of the fusion splicers in the battery mode.

The RapidoShrink heat-shrink oven is available with cables for the OptiSplice fusion splicers and as an autonomous device for operation independent of the

fusion splicer. In combination with the OptiSplice fusion splicers the oven is fastened to the basic unit with a mounting bracket. The oven is powered by the fusion splicer and can be controlled by the fusion splicer software.

As an autonomous device, the oven is mounted on a stand and is programmed with the aid of two rotary switches. The autonomous solution is shipped with a power supply.

The RapidoShrink heat-shrink oven is fully compliant with the RoHS requirements of the European Union (according to 2002/95/EC).

Features

- For fast, defined placement of all common heat-shrink splice protectors on single-fiber or ribbon splices
- Fully automatic control via the units software of the OptiSplice fusion splicer systems
- Manual control with 16 heating power stages and 16 selectable heating times from 15 s to 75 s
- Suitable for common heat-shrink splice protectors
- Heat-up time significantly less than 10 s
- Shrink cycle time less than 20 s for common single-fiber heat-shrink splice protectors
- Low energy consumption
- Status display (heat, cool, remove) by LED



RapidoShrink Fast Heat-shrink Oven

Order Numbers for RapidoShrink

Description	Order number
RapidoShrink fast heat-shrink oven for OptiSplice one fusion splicer without cable	OS-RPD SHRINK-2
RapidoShrink version with stand and desktop power supply	U-RPD SHRINK-3

Scope of Delivery

The RapidoShrink fast heat-shrink oven is delivered with operating instructions and protective shield insert for splice protector lengths of 45 mm and less. The autonomous version includes a mounted stand, desktop power supply with connection cable and power cord with EU connector.

HSP Heat-Shrink Splice Protectors

After the fusion splicing, it is necessary to restore the protection of the uncoated fiber. The heat-shrink splice protector is the method employed most frequently to ensure a reliable protection of a splice. After the protector is aligned over the splice point, it is applied by using the heat-shrink oven. The heat-shrink splice protector adds mechanical stability to the splice and protects it against environmental influences and possible damage during handling and splice storage.

Heat-Shrink Splice Protectors for Single Fibers

The heat-shrink splice protector for single fibers is used to protect single-fiber splices with coatings from 250 µm to 900 µm in diameter.

Features

- Standard length versions: 40 mm, 45 mm and 60 mm
- Available in other lengths upon request (25 mm to 60 mm in 5 mm increments)
- No additional attenuation
- Protects splices with coatings from 250 µm to 900 µm in diameter
- Protects splices with uncoated fiber length up to 40 mm (60 mm version)
- Fast and dependable heat-shrink process (depending on the heat-shrink oven type and its settings) for air-tight enclosure of the splice point
- Pre-shrunk ends for simple and error-free fiber handler
- Stainless steel with rounded ends to eliminate the risk of fiber damage
- Inner EVA tube made of transparent hot-melt adhesive and with an exceptionally smooth inside wall
- Exterior heat-shrink tube, transparent, for easy alignment over the splice point
- Tested against Telcordia (Bellcore) GR-1380-CORE specification
- Fully compliant with the RoHS requirements of the European Union (according to 2002/95/EC)
- Upon request, also available with colored ID stripes (e.g. in Telcordia color scheme)



60 mm and 45 mm Heat-shrink Splice Protectors

Technical Data of the Heat-Shrink Splice Protectors for Single Fibers

	Outer heat-shrink tube	Inner EVA tube	Steel Pin
Length (standard)	40 mm, 45 mm or 60 mm \pm 2 mm	40 mm, 45 mm or 60 mm \pm 2 mm	36 mm, 41 mm or 56 mm \pm 0.5 mm
Material	Polyolefin, transparent, shrink operation temperature-activated	Ethylene Vinyl Acetate (EVA) hot-melt adhesive sleeve, transparent, smooth inner wall surface	Stainless VA steel pin, burr-free, polished, rounded ends
Diameter before shrinking	3.0 mm (Inside diameter)	1.5 mm – 0.15 mm (Inside diameter)	1.0 mm \pm 0.1 mm
Diameter after shrinking	2.6 mm \pm 0,1 mm (Outer diameter)	n/a	1.0 mm \pm 0.1 mm
Temperature	90 °C to 150 °C (Shrinking)	> 75 °C (Melting)	n/a

Order Numbers of Heat-Shrink Splice Protectors

Description	Order number
Heat-Shrink Splice Protector 60 mm, pack with 100 pieces	HSP-60S100-1
Heat-Shrink Splice Protector 45 mm, pack with 100 pieces	HSP-45S100-1
Heat-Shrink Splice Protector 40 mm, pack with 100 pieces	HSP-40S100-1

RapidoCrimp Device for Crimp Splice Protector

By use of the RapidoCrimp device the crimp splice protector is precisely closed over the splice point. The RapidoCrimp device is fully compliant with the RoHS requirements of the European Union (according to 2002/95/EC).

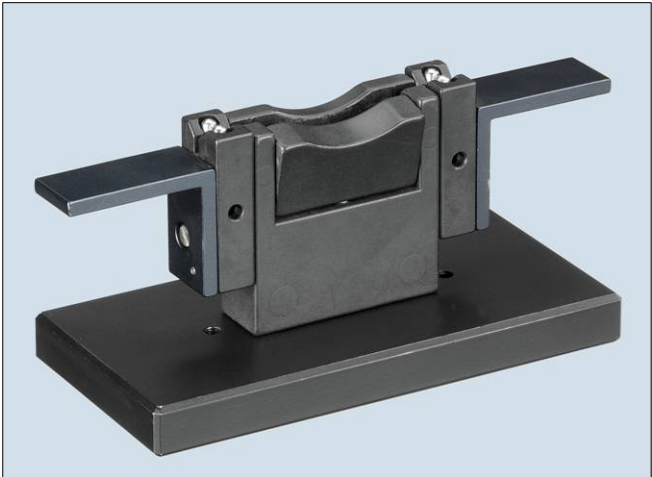
Features

- Easy to operate
- Process with no waiting time
- No electrical power required
- Maintenance-free

The crimp device is available in two versions:

- For installation on the OptiSplice one fusion splicers (crimp device RapidoCrimp)
- With stand for independent use of the fusion splicer

Within the scope of delivery is the mounting bracket for the crimp device which is necessary for the installation on OptiSplice one. The autonomous version is delivered with the mounted stand.



RapidoCrimp Device on Stand

Order Numbers for RapidoCrimp Device

Beschreibung	Order number
RapidoCrimp device for OptiSplice one without lateral fiber holders	OS-RPDCRIMP-1
RapidoCrimp device on stand	U-RPDCRIMP-2

CSP-1 Crimp Splice Protector

The crimp splice protector is used to protect single-fiber splices with 250µm primary coated fibers. The uncoated fibers are unprotected at splice point and the protection must therefore be restored after the fusion splicing. The crimp splice protection offers the fastest and easiest solution for guaranteeing the required protection. It lends the splice mechanical stability and protects it from environmental influences and from damage during handling and splice tray storage. The CSP-1 crimp splice protector is fully compliant with the RoHS requirements of the European Union (according to 2002/95/EC).

Features

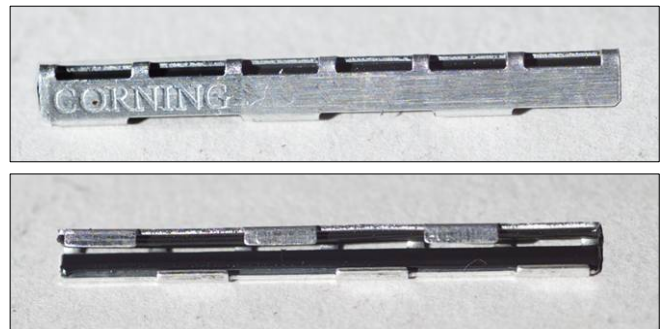
- Easy, safe handling
- Installation time < 5 s
- Compact dimensions 30 mm x 1.3 mm x 3.2 mm
- No electrical energy required
- Million-fold proven technology
- No additional attenuation
- Protects 250 µm splices with uncoated fiber length of up to 22 mm

The v-shaped design enables application after splicing, eliminating threading before fiber preparation. This saves time and eliminates repeated splices resulting from a failure to apply the protector before splicing.

The compact dimensions permit maximum density storage in splice trays or splice support combs.

The v-shaped aluminum carrier is corrosion resistant, offers the required mechanical protection and, due to the precise open angle with tight tolerances, guarantees the precise compatibility with common crimp devices. Protection against environmental influences is ensured by imbedding the splice in a permanently elastic butyl mass.

The protector can be closed manually quickly and easily with a crimp device. When the 1.3 mm crimp width (dictated by the crimp device) is observed, no additional losses or other optical influences will impact the splice. Furthermore, no additional electrical power is drawn from the batteries of the fusion splicer.



CSP-1 Crimp Splice Protector

Technical Data of CSP-1 Crimp Splice Protector

Parameter	Specification
Length	30.0 mm
Width (before closing)	3.2 mm
Width (after closing)	1.3 mm (basic factory setting of Corning crimp devices)
Height	3.2 mm
Opening angle	58 ° +/- 2 °
Aluminum material thickness	0.3 mm
Packaging	10 strips with 15 pieces each (total of 150 pieces) in carton with dimensions 135 mm x 50 mm x 40 mm

Order Number for CSP-1 Crimp Splice Protector

Description	Order number
CSP-1 Crimp Splice Protector, 250 µm, pack with 150 pieces	CSP-1



Packaging of CSP-1 Crimp Splice Protector

Deluxe Transport and Workstation Case

The deluxe transport and workstation case is equipped with wheels and designed for OptiSplice CDS and OptiSplice LID fusion splicers. In addition to the fusion splicer, it can hold various accessories such as the FBC-006 cleaver even in separate transport packaging, the desktop power supply, the charger for lithium ion battery, the USB work lamp, a maintenance tool set and operating instructions. Due to its compact size, the case meets the requirements for airline carry-on luggage. The upper shell may be opened in an angle of more than 180 ° so that the work with the fusion splicer, inserted in its working position inside of the case, may be done in the field. The positions of the cleaver and an optional bottle of fiber cleaning liquid are selected in such a way that an ergonomic work sequence is guaranteed.

Features

- Secure protection of the fusion splicer and the accessories during transport and work in the field (if used as working station)
- Pull-out handle and wheels for maximum transport friendliness
- Two handles
- Waterproof and dustproof
- Valve for automatic pressure equalization
- Lockable with two padlocks (locks not included)
- Carry-on luggage dimensions
- Dimensions: 559 mm x 351 mm x 229 mm (L x W x H)



Deluxe Transport and Workstation Case for OptiSplice CDS and OptiSplice LID

Order Number for Deluxe Transport and Workstation Case

Description	Order number
Deluxe transport and workstation case	OS-ONECASE-1

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