

OS7000S

OptiSaber™ Laser Cleaver
User's Guide



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OptiSaber™ Laser Cleaver OS7000S

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Welcome

Congratulations on selecting the OptiSaber™ OS7000S designed for laser cleaving of single optical fibers assembled in various connector types such as LC, SC, SMA, FC and ST.

This User's Guide will assist you in the setup, operation, and maintenance of the OS7000S laser cleaver to maximize the use and life of the equipment.

Overview

The OptiSaber™ Laser Cleaving System is designed to address the need to efficiently cleave a large volume of connectors while reducing operating time, costs, and increasing yield. Eliminates cracking or chipping associated with mechanical cleaving.

The OptiSaber™ OS7000S allows you to laser cleave single fiber connectors fast and accurately while saving critical floor space. Operators can initiate the cleave cycle by using a hand or foot switch for easy activation.

Our quick change adapter inserts all provide accurate orientation from the ferrule to the end face for easy and precise loading. The OptiSaber™ includes a removable thumbwheel to set cleave length in increments of approximately 10 microns for accurate cleaving.

Safety & Environmental Effects

Safety

Laser Safety

The machine operates as a Class 1 (i.e. inherently safe) laser product system. Although incorporating a Class 4 laser, the machine is rendered inherently safe by the whole system design that is protected by access restrictions and mechanical interlocks. It is built to meet requirements of 21 CFR 1040. 10 and EN 60825-1 provided safety interlocks are not defeated.



Under no circumstances should the machine be operated with safety interlocks over-ridden unless under the supervision of a responsible person suitably qualified in laser safety.

The warning signs that are used on the system are shown in the Safety Warning labels section of this User's Guide.

Safety Warning and Identification Labels

The OptiSaber™ is a Class 1 laser system but incorporates a Class 4 laser from which the user is protected by a light-tight protective housing.



Mechanical Safety

There are no user accessible moving parts.



Under no circumstances should the machine be operated with safety interlocks over-ridden unless under the supervision of a responsible person suitably qualified in laser safety.

The machine includes low power moving parts required for scanning the laser beam during processing. These parts are located within the protective housing and therefore not accessible during normal operations.

Electrical safety

The machine complies with all relevant American, UK and European electrical safety standards. All external panels require a tool for removal. Main voltage components are further shielded once external panels are removed. There are no High Voltage circuits accessible in the laser unit protective housing. The machine is fully EMC tested and certified. This includes testing at light industrial levels for emissions, and at industrial levels for susceptibility.

Fume & Extract

Laser processing of materials generates fine dust and vapor particles. The nature, composition and volume of these debris will be dependent on the material being processed and the laser parameters being used. The machine is intended for processing silica and epoxy adhesive associated with fiber optical connectors, but Domaille does not have control over what materials are introduced into the laser unit. Consequently, Domaille cannot take responsibility for the fumes and particulates produced. It is the responsibility of the customer to

ensure that adequate measures are taken to ensure the safe handling of fumes and particulates. To comply with safety regulations the extraction unit used with the machine must be operating correctly and connected with the supplied flexible hose to the extract hose connection.



The machine should not be operated without a suitable and correctly functioning extract unit attached. It is the responsibility of the user to ensure that the extracted fumes and debris are handled safely and responsibly, and that the suitable safety documentation is prepared, in accordance with local legislation and regulations.

Domaille takes no responsibility for the collection or treatment of the processing fumes, or for the subsequent exhaust of the processed fume. Domaille shall not be responsible for damage or failure due to build-up of contamination caused by inadequate extraction or operation without a correctly operating extract unit.

Environmental Effects

It is Domaille's policy to produce machines that have a positive overall environmental effect. In the case of the OptiSaber™, positive effects will result from subsequent improvements in performance and yield of the ultimate fiber optical product that this laser unit will allow. Negative environmental effects could result from machining of hazardous or toxic materials and it is strongly recommended that the user ensure that the handling of any process by-products be controlled to minimize any negative effect on the environment as a whole.

Connection to Utilities & Environment

The laser unit is designed to operate in a clean environment, free from substantial sources of vibration and shock.

Safety Systems & Radiation

This section covers the specific safety systems incorporated into this laser unit that are designed to protect the user from harmful radiation. This radiation, its paths and levels of intensity are described in detail along with all protective housings and interlock devices.



There is no human access to laser radiation during normal operation or maintenance of the machine.

Radiation Fields & Path

Protective housings and interlocks completely cover and protect humans from the laser beam in normal operation and maintenance. The beams are only accessible with the covers removed and/or the interlocks defeated. No beam attenuators or scanners are present.

Levels of Radiation

The laser sources are described in the table below. The beam described is only accessible with the covers open while servicing the machine.

Parameter	CO2 Laser (IR)
Wavelength	10.55-10.63μm
Average Power	<50W
Output Power Stability	<5%
Operating Frequency & Duty Cycle	0-25kHz & 0-100%

The parameters listed in the table are the maximum values that are possible for the laser to produce, even under fault conditions.

Collateral Radiation

Collateral radiation generated by the process is minimized to very safe levels. Significant collateral radiation is not normally produced from this machine during operation or maintenance. Measurements of collateral radiation are described below. The interlocked protective housing meets Class 1 laser safety standards. It was constructed light tight with material which is opaque to the laser radiation and capable of withstanding this radiation for an indefinite period.

- **In operation:** No collateral radiation is present in normal operation. If the laser is triggered when there is no connector in the tooling to be machined, the maximum collateral radiation measured at the loading port is six times below the MPE/AEL limit.
- **In maintenance:** No collateral radiation is present.

Protective Housing

The protective housing is an integral part of the laser unit and its operation, serving to prevent unnecessary human access to laser radiation.

The housing completely protects the user from laser beam access. There are no user serviceable parts in this machine.

Safety Interlocks

Mechanical safety interlocks are an integral part of the machine design. They have been installed in the appropriate places to ensure that no human access to the laser beam is possible during operation and maintenance.

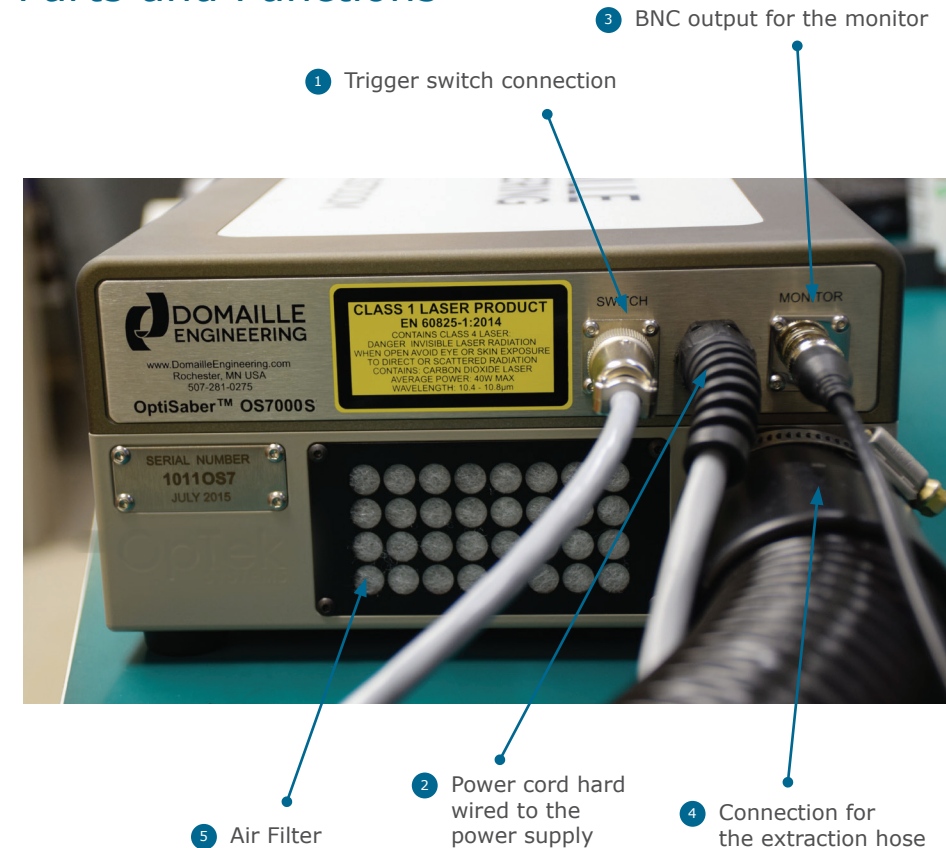
Getting Started

Unpacking & Setup

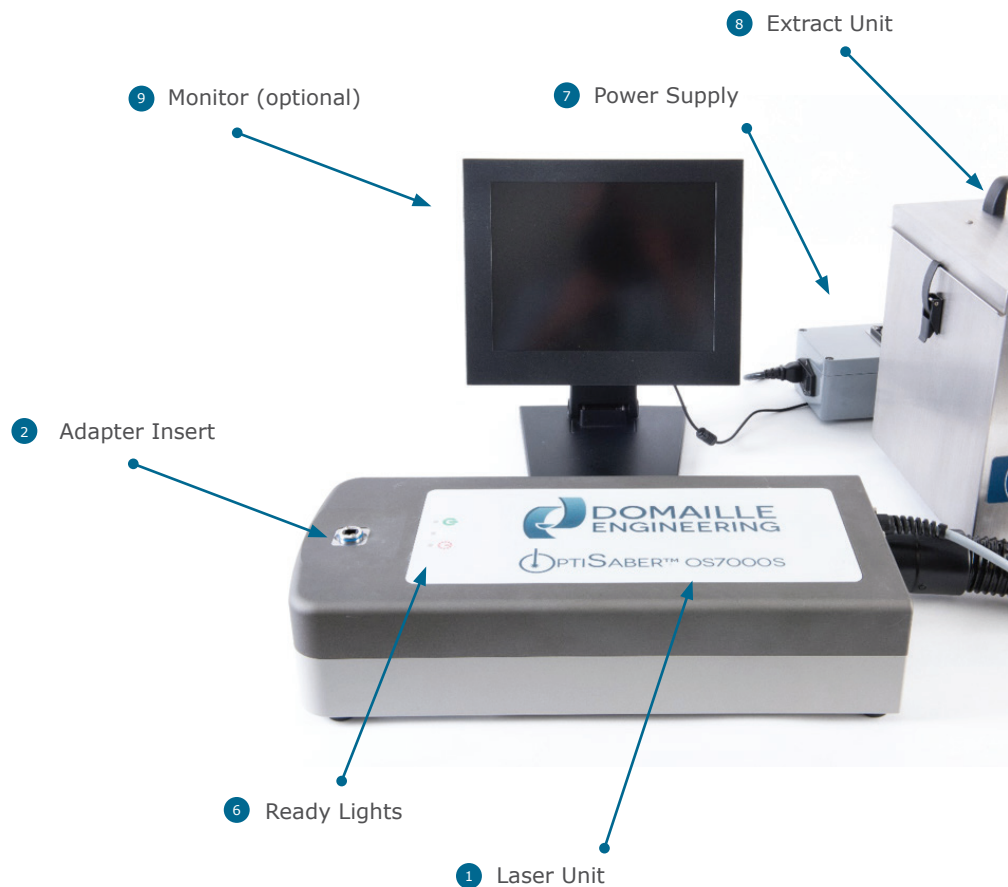
NOTE: Your OptiSaber™ Laser will arrive in a shipping case while the Extract Unit and accessories will ship in a separate box.

1. Remove all loose components from the shipping case.
2. Carefully lift the OptiSaber™ and power supply out of the shipping case on to a robust surface. Remove the plastic bag from around the laser unit.
3. Remove Extract Unit and accessories from the second shipping box.
4. Inspect the laser for any damage that may have occurred in shipping.
5. Start the setup by connecting Extraction Hose to top of Extract Unit by pushing firmly into fitting.
6. Assemble other end of the hose to the back of OptiSaber™. Position hose clamp no more than an half inch from end of hose. Using a slotted screwdriver, tighten hose clamp screw.
7. Attach Activation Switch cable to the port labeled "Switch" located on the back of laser cleaver.
8. Optional monitor may be connected to the port labeled "Monitor".
9. Connect each power cord into the Extract Unit and Power Supply.
10. Lastly, plug the other end of each power cord into the appropriate outlet (120/240 volt).

Parts and Functions



1	Trigger switch connection	Foot or hand switch available, initiates cut cycle
2	Power cord hard wired to the power supply	Power cord provides electricity from power supply to laser unit
3	BNC output for the monitor	BNC port for OPTIONAL monitor
4	Connection for the extraction hose	Interface between laser unit and extract hose
5	Air Filter	Keeps air particles from entering laser



1	Laser Unit	OS7000S laser unit
2	Adapter Insert	Easily change between SC, LC, SMA, FC, ST and ferrule only configurations
3	Thumbwheel	Allows for adjustment of cleave length
4	Access Door	Allows access to cleaning bottom of adapter
5	Locking Screw	Tighten or loosen to adjust thumbwheel
6	Ready Lights	Alerts operator when laser is ready
7	Power Supply	Hardwired to laser
8	Extract Unit	Necessary for operation, removes shards, fumes, and keeps laser unit cool
9	Monitor (optional)	OPTIONAL monitor to provide visual support while laser cleaving

Laser Operation

Standard Startup Procedure

Due to a small amount of laser output on startup it is recommended that no ferrules are loaded in the OptiSaber™ at this point.

IMPORTANT: an Extract Unit must always be connected and working when the module is in use. Failure to do so will void the warranty.

1. The fume Extract Unit must be turned on using the "GREEN" button on unit.
2. To start the laser unit, connect the power cord to the power outlet. If your power cord is equipped with a "YELLOW" GFCI plug, you MUST push the reset button on the plug to supply power to the machine.
3. Turn on the switch on the power supply module.
4. If monitor is being used, plug into power outlet and turn on.

NOTE: Black selector switch located on the back of extract unit must be set to 0.

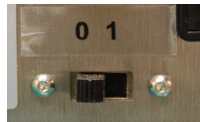
Operating the Laser

To begin operations, set dial on Extract unit between 75% -100% based on ambient temperature.

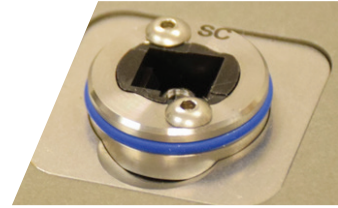
When the machine has been switched on all cycle lights illuminate, then the fault and laser emission LEDs will flash "BLUE" and "WHITE" respectively as the laser warms up. A single "GREEN" LED on the top panel will indicate that the unit is ready.

Cleaving single fiber can be done in a few simple steps.

1. The ferrules must be free of epoxy contamination on the side and excess epoxy on the end.
2. Select desired adapter insert and snap in to position.



3. Insert the connector or ferrule to be cleaved into the adapter.
4. Verify fiber is intact before initiating cycle.
5. Press "RED" button on hand held switch or foot pedal to initiate laser cleaving cycle.
6. Wait for audible chime to signal completion of cycle, approximately 2-3 seconds.
7. Remove the ferrule from the adapter.



Once desired lot has been laser cleaved, move to polishing operations using Domaille Engineering optical polishing machines and fixtures.

Cut Length Adjustments

The OptiSaber comes pre-set with a long cleave length and will have to be reduced accordingly depending on connector type. Each line graduation on the thumbwheel represents an approximate 10um adjustment.



Adjusting this length can be done in a few simple steps.

1. Loosen the locking screw- located directly above the thumbwheel.
2. Rotate adjustment wheel to achieve desired cleave length. Turning to the left will shorten the fiber length. To achieve a longer cut length, rotate the adjustment wheel to the right.
3. Tighten locking screw to secure thumbwheel.

Laser Shut Down

The following procedure should be used to shut down the OptiSaber™ OS7000S.

1. Turn off power supply module switch.
2. Using green button, turn off Extract Unit.
3. For additional security, unplug electrical cords from power outlets.



Always ensure that any hazard has been removed before the machine is restarted. Staff of a suitable level of responsibility and training should be involved in the decision to restart following emergency shutdown.

Laser Maintenance

Proper care and handling of the laser unit, power supply, and extract unit is critical to maintaining efficient operation. If the laser unit or components are damaged in any way, contact Domaille Engineering.

There are no serviceable parts inside the laser unit. Do not remove sealed screws. Evidence of tampering will void warranty.

Daily or More Often as Required

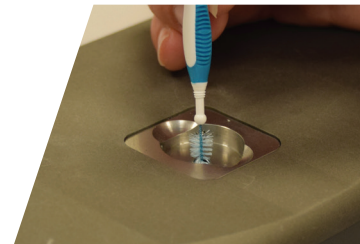
1. Ensure correct operation of the extract and cooling system.
2. Ensure fans on laser, power supply, and extract unit remain unobstructed.
3. Check Extract Unit filter. If cleaning or change is needed, follow instructions in Extract Unit manual.
4. Clean Adapter Unit and adapters as needed following instructions below.

Cleaning Adapter Unit

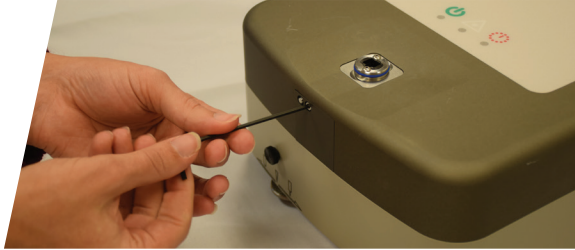
Before any maintenance is to be performed, the OptiSaber™ must be properly powered down and unplugged from all power sources.

1. Throughtout the day clean the adapter by removing if from the adapter unit and cleaing the top and bottom side.
2. While the adapter is out of adapter unit, clean the top side of the adapter by inserting the cleaning brush to clear debris from inside adapter.
3. Occasionally, the bottom of the adapter and the top surface of damage control stop will need to be cleaned.

There is a door on the front of the OptiSaber™ to enable the user to clean the bottom of the adapter. When the door is open, there is a physical block to prevent laser radiation from exiting the machine.



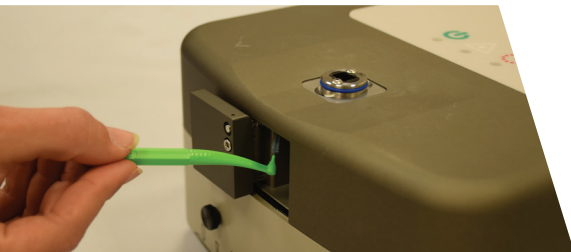
Step 1: Remove the screw for the cleaning door using a 2.5mm Allen wrench.



Step 2: Pull out and rotate the door clockwise to open.



Step 3: Clean bottom of the adapter with a small angled cleaning brush. Replacement brushes can be ordered from Domaille Engineering please contact our customer service.



Monthly

Inspect fan filters on the back of the laser, power supply, and extract unit. Vacuum to clean or remove and clean with compressed air.

Troubleshooting

A red warning light indicates an operating fault in the laser unit. The user should follow the standard shut down procedure (page 13) to power off the OptiSaber™ and contact Domaille Engineering to report the fault.

Repeating Fault Beep	Repeating Fault Beep	Remedy
1 short	One or both of the two cover switches is open	Check cleaning access door to ensure it is closed
2 short	Laser internal temperature is above 50°C or laser error	Refer to over temperature section below
3 short	Scanner plate is above 50°C	Refer to over temperature section below
4 short	Air Temperature inside the laser unit is above 50°C	Refer to over temperature section below
5 short	Laser voltage error feed-back from laser	Contact Domaille
1 long, 1 short	Start Button Fault	Start button may be stuck, check switch operation
2 long, 1 short	Laser Not Ready	Restart Laser
2 long, 2 short	Opto-sensor not broken by scan arm	Restart laser; Contact Domaille

Over Temperature

The laser can go over temperature when the ambient temperature is above 86°F (30°C). Follow shut-down procedure to allow the laser unit to cool (page 13).

Ensure the vacuum hose seal is tight and properly extracting the warm air from the laser. Increase extraction unit power to 100%.

Ferrule difficult to insert

Most likely the side of the ferrule is contaminated with epoxy or the insert needs cleaning from buildup. Clean insert (page 14) and ensure your ferrules are free from epoxy on the side.

Service & Support

Technical Specifications

Laser Height:	4.7 inches (120 mm)
Laser Width:	8.9 inches (225 mm)
Laser Depth:	21.2 inches (538 mm)
Extract Unit Size:	12.1x11.6x14.4 inches (308x294x366 mm) (L x W x H)
Extract Unit Weight:	37.5 lbs (17 kg)
Power Supply Size:	14.4 x 5 x 3.5 inches (360x127x89mm) (Lx-WxH)
Power Requirements for Laser:	Single Phase, 110-240VAC, 50/60Hz
Power Requirements for Extract Unit:	110-240VAC, 50/60Hz
Laser Cooling:	Air Cooled
Extract Unit Capacity:	Approx. 1 Million Shards
Machine Weight:	33 lbs (15 kg)
Shipping Weights, Laser Unit & Extract Unit:	70 lbs (32 kg) & 40 lbs (19 kg)
Typical Process Time:	2-3 seconds
Temperature Range:	41°F-86°F (5°C-30°C)
Maximum Altitude	6500 feet above sea level (1828M)
Maximum Humidity	20-85% non-condensing
Noise Emission level	Less than 55.0dBA (whole laser system)

In the event of malfunction, or when other maintenance is required beyond the steps documented in this manual, service must be done by a qualified Domaille Engineering technician. There are no user serviceable parts inside the case. Do not remove sealed screws. Evidence of tampering will void warranty. For assistance, contact Domaille Engineering, LLC USA.

Both USA and European Standard power cords sets are available from Domaille Engineering, LLC. Please contact our office if an additional set is needed.

CE Notice (European Union)

Marking by the symbol CE indicates compliance of the OS7000S to the following directives of the European Union:

BS EN 61326:2006 Electrical equipment for measurement, control and laboratory use. EMC requirements. General requirements.

BS EN 60204-1:1998 Safety of machinery-Electrical equipment of machines Part 1. (Complying with the Low voltage directive 2006/95/EC).

BS EN 61010-1:2001 Safety requirements for electrical equipment for measurement, control and laboratory use. General requirements.

BS EN 60825-1:2007 Safety of laser products.

Year of CE Marking: 2015

EU representative:

OpTek,
12-14 Blacklands Way, Abingdon Business Park, Oxford, OX14 1DY,
UK

Limited Warranty

Domaille Engineering, LLC ("Domaille") products are warranted by Domaille to be free from defects in workmanship and materials for a period of one-year from the original purchase date. This warranty covers defects in materials or workmanship only and does not include damage due to abuse, misuse, problems with electrical power, problems with compressed air supply, servicing not authorized by Domaille, failure to properly care for and maintain the products, or normal wear and tear. In addition, use of parts, components, or accessories not supplied or approved by Domaille will void this warranty.

Domaille's sole liability arising from any use of its products and this warranty is limited to repair or, at Domaille's sole discretion, replacement of defective products or defective component parts thereof. To request warranty service, you must contact Domaille at 7100 Dresser Dr. N.E., Rochester, MN 55906, USA. If warranty service is required, Domaille will issue a Return Material Authorization Number (RMA#). You must ship the products back to Domaille in their original or equivalent packaging, pre-pay shipping charges, and insure the shipment or accept the risk of loss or damage during shipment. Along with your RMA # include your name, telephone number, return address, proof of original purchase date, and a description of the claimed defect. If the defect is covered by this limited warranty, Domaille will repair or replace (at its option) the product or the defective component part(s) and ship them freight prepaid to an address in the continental U.S. Shipments to locations outside of the U.S. that are not the original shipped to location will be made freight collect or will be shipped to the original shipped to location, at the discretion of Domaille.

NO WARRANTY OTHER THAN THE ABOVE LIMITED WARRANTY IS MADE, EITHER EXPRESS OR IMPLIED. ALL EXPRESS AND IMPLIED WARRANTIES FOR THE PRODUCT, INCLUDING BUT NOT LIMITED TO ANY IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, ARE LIMITED IN DURATION TO THE ONE YEAR LIMITED WARRANTY PERIOD. DOMAILLE SHALL HAVE NO LIABILITY FOR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES RELATING TO ITS PRODUCTS.

SOME STATES (OR JURISDICTIONS) DO NOT ALLOW LIMITATIONS ON THE DURATION OF IMPLIED WARRANTIES, OR EXCLUSION OR LIMITATION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES FOR CERTAIN PURCHASERS, SO THE ABOVE LIMITATIONS OR EXCLUSIONS MAY NOT APPLY TO YOU. THIS LIMITED WARRANTY GIVES YOU SPECIFIC LEGAL RIGHTS, AND YOU MAY ALSO HAVE OTHER RIGHTS WHICH VARY FROM STATE TO STATE (OR JURISDICTION TO JURISDICTION).

Product Summary

Domaille Engineering's mission is to provide our customer with the highest quality solution through the innovative use of technology that allows our customers to gain a competitive edge. Our core competencies in engineering and precision manufacturing provide OEM's and fiber optic customers effective and cost efficient solutions.

From our world renowned APM-HDC-5300 polishing machine to our patented MT EZ AbraSave® fixtures, Domaille Engineering equipment provides the highest yields and throughput in the fiber optic industry.

The Domaille APM-HDC-5300 interface allows user to program a soft ramp of pressure and speed. This feature along with accurate force, speed, and time enables customers to consistently meet the most demanding fiber optic polishing specifications.

Our patented AbraSave® fixture line utilizes Unique Path Technology which reduces polishing time and polishing film costs. The AbraSave® technology delivers the greatest consistent fiber protrusion for the best polishing results in the fiber optic industry.

The OptiSaber™ laser cleaver family is a Domaille solution addressing process variation associated with cracking, which is typical of mechanical cleaving process. Our OS7000M patent pending MT adapter allows users to cleave both UPC and APC ferrules with a few simple adjustments. The OptiSaber OS7000S single fiber laser cleaver has several different single fiber adapters to choose from depending on connector type.

Domaille Engineering proudly offers our OptiSpec® product line of fiber optic microscopes. Our OptiSpec® microscope line offers customers high quality production fiber optic inspection capabilities for both production and laboratory settings.

View all of our products, including the Universal Cure Oven and Air Cleanse System, at www.DomailleEngineering.com.



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