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User's Guide

Fiber Optic Source

MPS-8012/24



ILX Lightwave
Photonic Test & Measurement Instrumentation

ILX Lightwave Corporation · P. O. Box 6310 · Bozeman, MT, U.S.A. 59771 · U.S. & Canada: **1-800-459-9459** · International Inquiries: 406-586-1244 · Fax 406-586-9405
E-mail: support@ilxlightwave.com
www.ilxlightwave.com

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SAFETY AND WARRANTY INFORMATION

The Safety and Warranty Information section provides details about cautionary symbols used in the manual, safety markings used on the instrument, and information about the Warranty including Customer Service contact information.

Safety Information and the Manual

Throughout this manual, you will see the words *Caution* and *Warning* indicating potentially dangerous or hazardous situations which, if not avoided, could result in death, serious or minor injury, or damage to the product. Specifically:



Caution indicates a potentially hazardous situation which can result in minor or moderate injury or damage to the product or equipment.



Warning indicates a potentially dangerous situation which can result in serious injury or death.



Visible and/or invisible laser radiation. Avoid direct exposure to the beam.

General Safety Considerations

If any of the following conditions exist, or are even suspected, do not use the instrument until safe operation can be verified by trained service personnel:

- Visible damage
- Severe transport stress
- Prolonged storage under adverse conditions
- Failure to perform intended measurements or functions

If necessary, return the instrument to ILX Lightwave, or authorized local ILX Lightwave distributor, for service or repair to ensure that safety features are maintained (see the contact information on page vi).

All instruments returned to ILX Lightwave are required to have a Return Authorization Number assigned by an official representative of ILX Lightwave Corporation. See Returning an Instrument on page v for more information.

SAFETY SYMBOLS

This section describes the safety symbols and classifications.

Technical specifications including electrical ratings and weight are included within the manual. See the Table of Contents to locate the specifications and other product information. The following classifications are standard across all ILX Lightwave products:

- Indoor use only
- Ordinary Protection: This product is NOT protected against the harmful ingress of moisture.
- Class I Equipment (grounded type)
- Mains supply voltage fluctuations are not to exceed ±10% of the nominal supply voltage.
- Pollution Degree II
- Installation (overvoltage) Category II for transient overvoltages
- Maximum Relative Humidity: <80% RH, non-condensing
- Operating temperature range of 0 °C to 40 °C
- Storage and transportation temperature of –40 °C to 70 °C
- Maximum altitude: 3000 m (9843 ft)
- This equipment is suitable for continuous operation.

Safety Marking Symbols

This section provides a description of the safety marking symbols that appear on the instrument. These symbols provide information about potentially dangerous situations which can result in death, injury, or damage to the instrument and other components.

 Caution, refer to manual	 Earth ground Terminal	 Alternating current	 Visible and/or invisible laser radiation
 Caution, risk of electric shock	 Protective Conductor Terminal	 Caution, hot surface	 Frame or chassis Terminal
 or (I) On: In position of a bistable push control. The slash (I) only denotes that mains are on.		 or (O) Off: Out position of a bistable push control. The circle (O) only denotes that mains are off.	

WARRANTY

ILX LIGHTWAVE CORPORATION warrants this instrument to be free from defects in material and workmanship for a period of one year from date of shipment. During the warranty period, ILX will repair or replace the unit, at our option, without charge.

Limitations

This warranty does not apply to fuses, lamps, defects caused by abuse, modifications, or to use of the product for which it was not intended.

This warranty is in lieu of all other warranties, expressed or implied, including any implied warranty of merchantability or fitness for any particular purpose. ILX Lightwave Corporation shall not be liable for any incidental, special, or consequential damages.

If a problem occurs, please contact ILX Lightwave Corporation with the instrument's serial number, and thoroughly describe the nature of the problem.

Returning an Instrument

If an instrument is to be shipped to ILX Lightwave for repair or service, be sure to:

1. Obtain a Return Authorization number (RA) from ILX Customer Service.
2. Attach a tag to the instrument identifying the owner and indicating the required service or repair. Include the instrument serial number from the rear panel of the instrument.
3. Attach the anti-static protective caps that were shipped with the instrument and place the instrument in a protective anti-static bag.
4. Place the instrument in the original packing container with at least 3 inches (7.5 cm) of compressible packaging material. **Shipping damage is not covered by this warranty.**
5. Secure the packing box with fiber reinforced strapping tape or metal bands.
6. Send the instrument, transportation pre-paid, to ILX Lightwave. Clearly write the return authorization number on the outside of the box and on the shipping paperwork. ILX Lightwave recommends you insure the shipment.

If the original shipping container is not available, place your instrument in a container with at least 3 inches (7.5 cm) of compressible packaging material on all sides.

Repairs are made and the instrument returned transportation pre-paid. Repairs are warranted for the remainder of the original warranty or for 90 days, whichever is greater.

Claims for Shipping Damage

When you receive the instrument, inspect it immediately for any damage or shortages on the packing list. If the instrument is damaged, file a claim with the carrier. The factory will supply you with a quotation for estimated costs of repair. You must negotiate and settle with the carrier for the amount of damage.

Comments, Suggestions, and Problems

To ensure that you get the most out of your ILX Lightwave product, we ask that you direct any product operation or service related questions or comments to ILX Lightwave Customer Support. You may contact us in whatever way is most convenient:

Phone . . . . . (800) 459-9459 or (406) 586-1244

Fax . . . . . (406) 586-9405

On the web at: . . . . . ilx.custhelp.com

Or mail to:

ILX Lightwave Corporation
P. O. Box 6310
Bozeman, Montana, U.S.A 59771
www.ilxlightwave.com

When you contact us, please have the following information:

Model Number: _____

Serial Number: _____

End-user Name: _____

Company: _____

Phone: _____

Fax: _____

Description of what is connected to the ILX Lightwave instrument: _____

Description of the problem: _____

If ILX Lightwave determines that a return to the factory is necessary, you are issued a Return Authorization (RA) number. Please mark this number on the outside of the shipping box.

You or your shipping service are responsible for any shipping damage when returning the instrument to ILX Lightwave; ILX recommends you insure the shipment. If the original shipping container is not available, place your instrument in a container with at least 3 inches (7.5 cm) of compressible packaging material on all sides.

CHAPTER 1

GENERAL INFORMATION

Introduction

This manual contains operation and maintenance information for the MPS-8012 and MPS-8024 Fiber Optic Source.

Product Overview

The MPS-8012 and MPS-8024 are fiber optic sources which operate in continuous wave mode. The MPS-8012 contains one fiber coupled source. The MPS-8024 contains two fiber coupled sources which operate simultaneously and independently.

The instrument does not allow user adjustment of wavelength or output power. Table 1.1 on page *3* lists the factory installed lasers and LED's which are available to meet various spectral requirements. Fiber optic connector options include FC/PC, FC/APC, SC/PC, SC/APC, and ST.

Feedback and control insures output power stability. Photodiode current provides feedback for the laser devices. Drive current provides feedback for the LED devices.

Standard sources are coupled to 9/125 micron fiber. The fiber optic bulkhead may be removed and tilted out to allow for fiber optic connector maintenance.

The maximum current allowed through each device is hardware limited. The hardware also protects the sources from electrical transients.

Safety Considerations

The MPS-8012 and MPS-8024 are Class 1 laser products. There are safety considerations related to the lasers and LED's, as well as electrical safety considerations.

Laser and LED Safety Considerations

The high brightness, sometimes invisible light output of laser diodes and other laser sources poses a definite eye hazard. Direct viewing of the laser output can produce retinal or corneal damage. Absorption of the laser light by the eye causes localized heating and denaturing of tissue proteins.

The ANSI publication Z-136.1, “The Safe Use of Lasers”, lists Maximum Permissible Exposure (MPE) levels for direct, or intrabeam viewing of laser beams. From the MPE levels, a “hazard zone” may be computed for a particular laser and exposure time. For more information concerning lasers and laser diode safety, contact the Center for Devices and Radiological Health or ILX Lightwave.



WARNING

Visible and/or invisible laser radiation. Avoid direct exposure to the beam.

Electrical Safety Considerations

The operating line voltage of the MPS-8012 and the MPS-8024 is set at the factory. The voltage setting is marked on the back panel. Changing the line voltage setting requires removal of the back panel. In addition to voiding the warranty, removing the back panel may expose the user to the risk of electrical shock.



WARNING

Risk of Electrical Shock. Do Not Open.

The fuse for the MPS-8012 and the MPS-8024 is user accessible. A 1/8 Amp, 3AG, 250V SLO-BLO fuse is used for all line voltage settings.



CAUTION

For continued protection, replace fuse only with specified type and rating.

Specifications

Power stability is specified after a one hour warm up. Long term power stability is specified at a temperature of 25 °C, with variations of no more than ±1 °C. Short term power stability specified at a constant temperature of 25 °C.

Table 1.1 Source Option Specifications

Source Option	Description	Typical Output Power	Power Stability 15 min./ 24 hour
013	1310 nm LED ±20 nm	-10.0 dBm/ 100 µW	±0.1 dB/ ±0.5 dB
015	1550 nm LED ±20 nm	-17.0 dBm/ 20 µW	±0.1 dB/ ±0.5 dB
113	1310 nm FP ±20 nm	0.0 dBm/ 1.0 µW	±0.03 dB/ ±0.05 dB
115	1550 nm FP ±20 nm	-3.0 dBm/ 500 µW	±0.05 dB/ ±0.1 dB
213	1310 nm DFB ±20 nm	0.0 dBm/ 1.0 µW	±0.03 dB/ ±0.05 dB

Table 1.2 General Specifications

Fiber Optic Connector:	FC/PC Standard Other options available
Fiber Type:	9/125 Standard
Size: Height Width Length	 2.6”/66 mm 5.6”/142 mm 9.0”/229 mm
Weight: MPS-8012 MPS-8024	 3.25 lb. /1.5 kg typ. 3.50 lb. /1.6 kg typ.
Power Requirements:	100-115 VAC, or 220-240 VAC. 50-60 Hz. 35 Watts MAX.
Temperature:	10 to 40 °C operating. -40 to 70 °C storage.
Humidity:	< 95% relative humidity, non-condensing

CHAPTER 2

OPERATION

This chapter describes how to set up and operate the MPS-8012 and MPS-8024.

Installation

Installation procedures are covered in this section.

AC Power Considerations

The MPS-8012 and MPS-8024 are configured at the factory to operate at a 50 to 60 Hz, AC line voltage, of either 100-115 VAC, or 220-240 VAC. The voltage setting is marked on the back panel.

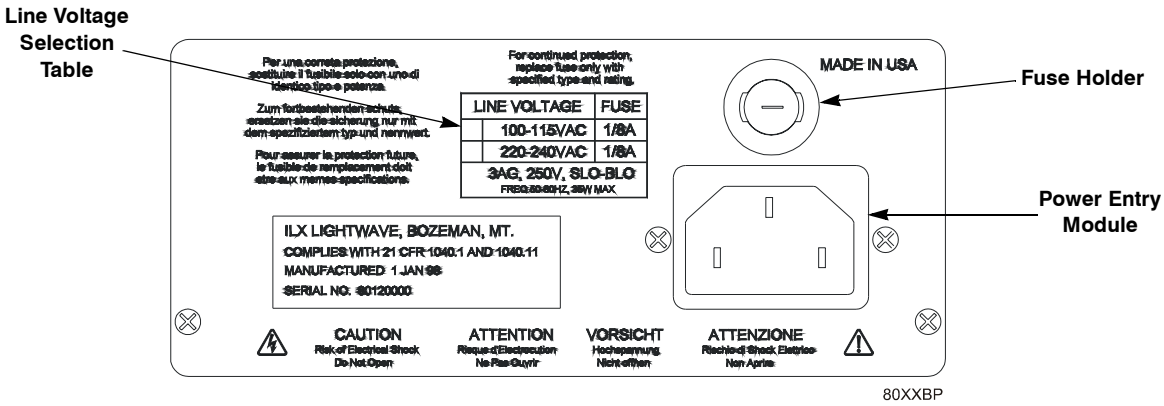


Figure 2.1 MPS-8012/24 Back Panel.

As shown in Figure 2.1 above, an AC line voltage setting of 100 to 115 VAC is indicated by a mark next to that setting on the LINE VOLTAGE table. The AC Line voltage is set internally. Do not remove the back panel to adjust or determine this setting. If the AC line voltage setting is not clearly marked, do not attempt to operate the unit. Contact your ILX Lightwave representative.

WARNING

Risk of Electrical Shock. Do Not Open.

The MPS-8012 and MPS-8024 use a 1/8 Amp, 3AG, 250V, SLO-BLO fuse for either voltage setting.

CAUTION

For continued protection, replace fuse only with specified type and rating.

The unit is provided with a three prong grounded AC line cord.

CAUTION

Connect the instrument to a properly earth grounded, three prong receptacle.

Power-Up and Power-Off

The source type is labeled above the fiber optic bulkhead. The standard MPS-8012/24 uses FC/PC connectors. If the fiber optic bulkhead is not FC/PC compatible, a label indicating the connector type will be located below the fiber optic bulkhead(s).

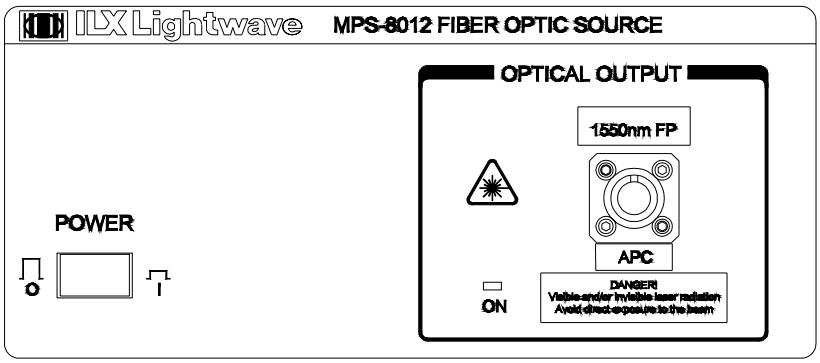


Figure 2.2 MPS-8012/115-FC/APC front panel.

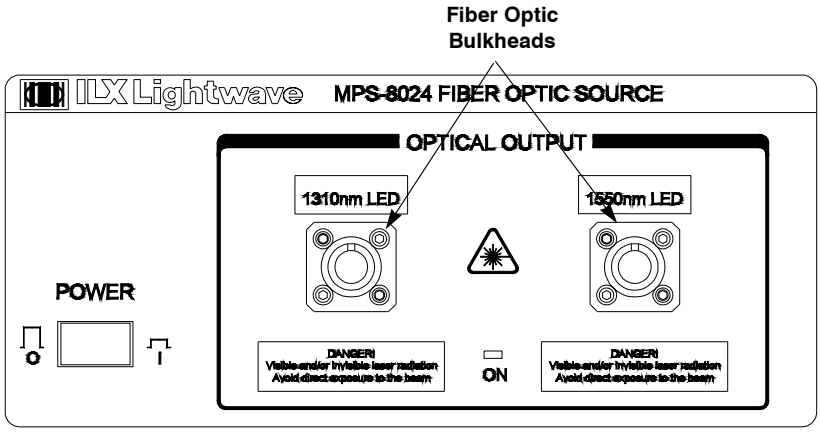


Figure 2.3 MPS-8024/013/015 front panel.

WARNING

The MPS-8012 and MPS-8024 are Class 1 laser products. Do not operate the unit without either a fiber optic patchcord properly attached to the bulkhead, or the bulkhead cap in place. While the unit is on, do not look into the fiber optic bulkhead or into the end of any fiber optic patchcord attached to the unit.

Visible and/or invisible laser radiation. Avoid direct exposure to the beam.

If the condition of the fiber optic connectors in the bulkheads is not known, clean and inspect them before use. Clean, inspect, and attach appropriately terminated fiber optic patchcords to the fiber optic bulkheads. If a source is not to be used, insure that its fiber optic bulkhead is capped.

To turn the output on, depress the power button. The green ON indicator located bottom center of the front panel will come on. In approximately two seconds, the source output will turn on. In the MPS-8024, both sources will operate simultaneously. To guarantee power and wavelength stability, allow the unit to warm up for at least one hour before use. This is particularly necessary with LED sources.

To turn the unit off, press the power button again. The green ON indicator light will go off and the source outputs will turn off.

CHAPTER 3

MAINTENANCE AND TROUBLESHOOTING

This chapter gives the user necessary information to maintain the MPS-8012/24.

Fiber Optic Connector Maintenance

Damage to, or the presence of foreign objects on the end of a fiber optic ferrule will cause significant power loss. For safety reasons, the device must be locked out before inspecting the fiber optic connectors, or serious eye damage can occur. This is best accomplished by removing the power cord from the unit.



WARNING

Visible and/or invisible laser radiation. Avoid direct exposure to the beam.

Before attaching a fiber optic patchcord to the bulkhead, clean and inspect the end of its fiber optic ferrule. When no fiber optic cable is attached to the unit, cover the bulkhead with the endcaps provided. This will prevent damage and the introduction of foreign objects.

To clean and inspect the fiber optic ferrule on the MPS-8012/24, use the following procedure.

1. Turn the MPS-8012/24 off and remove the power cord from the back of the unit.
2. To clean the connector without removing the bulkhead, use a stick type cleaner. Follow the manufacturer's instructions.
3. To inspect and clean a connector, remove the bulkhead. This is accomplished by removing the two cap head screws with a 5/64" Allen wrench.
4. Tip the bulkhead forward. There should be sufficient slack in the fiber optic cable connecting the device to the bulkhead to allow easy removal. Be careful not to stretch or kink the fiber.
5. Unscrew the connector from the back of the bulkhead.
6. The ferrule end may be inspected with the aid of a fiber optic microscope. If the ferrule is damaged, return the unit to the factory for repair. If the ferrule is dirty, the end may be cleaned with the aid of a reel-type ferrule cleaner or by wiping with a Kimwipe or swab

soaked in alcohol.

7 If the end of ferrule is clean and serviceable, re-install the connector to the back of the bulkhead, taking care not to expose the end of the ferrule to dirt or damage.

8 Gently push the fiber back into the unit and re-attach the bulkhead with the 5/64” cap head screws.

Fuse Replacement

To replace the fuse, turn off and unplug the unit. Do not attempt to remove or install a fuse while the unit is plugged in. Remove the fuse by turning the fuse holder cap approximately 1/8 turn CCW. Remove and inspect the fuse. If the fuse is blown, replace with a 1/8 Amp, 3AG, 250V, SLO-BLO fuse. Plug the unit back in and turn it on. If the fuse blows again, contact your ILX Lightwave representative. Do not install a fuse with a different rating.

CAUTION

For continued protection, replace fuse only with specified type and rating.

Miscellaneous

If it is determined that a loose object is inside the unit, contact your ILX Lightwave representative. The fiber optic cable inside the unit is somewhat slack due to the need to tip the connector out for maintenance, and this will make some noise if the unit is tipped or shaken lightly. This is normal and acceptable. Noises indicative of a loose solid object, particularly a conductive or sharp one, are not acceptable.

Avoid getting dirt or dust on the unit. Keep the fiber optic bulkheads capped, especially when cleaning the unit. The unit may be cleaned by wiping with a clean, dry cloth. Do not use liquid cleaners. Do not blow the unit out with compressed air. Avoid getting dirt in the fiber optic bulkhead connectors. If dirt or other contaminants have compromised the interior of the unit, contact your ILX Lightwave representative.

If liquid is spilled on the unit, turn it off and unplug it immediately. This is best done by turning off the AC power to the outlet it is plugged into, using a switch or breaker. After turning off the power, unplug the unit. There will be AC line voltage present inside the unit as long as it is plugged in. Secure the unit so no one else will attempt to use it and let it dry. Do not use compressed air to blow it out. Do not attempt to use the unit after it has dried. The liquid may have damaged components, or left a conductive or corrosive residue. Do not attempt to open the unit. Contact your ILX Lightwave representative.

WARNING

Risk of Electrical Shock. Do Not Open.

Troubleshooting

If you have difficulty operating the MPS-8012/24, refer to the symptoms listed in this section. If additional symptoms persist, contact your ILX LIGHTWAVE representative.

Table 3.1 Troubleshooting Symptoms and Solutions

Symptom	Causes and Corrective Actions
MPS-8012/24 will not power up	• Check the power cord to make sure it is properly connected. • Check the fuse for proper rating and integrity. • Check for tripped circuit breaker or AC outlet function. • Check the line voltage selection.
MPS-8012/24 exhibits a slight difference in expected output power	This is normal. These units are calibrated to give the *nominal* power output listed in Table 1.1 on page *3*. They may vary as much as 10% due to differences in the user's patchcord and power meter.
MPS-8012/24 exhibits grossly incorrect power output from one or both channels	• Fiber optic connector is not tight. • Fiber optic connector is the wrong type. Replace with correct type. • Fiber optic connector is dirty or damaged. See Section 3.2 for cleaning procedure. • Fiber is wrong type. Use 9/125 non-polarizing fiber. • A device attached to MPS-8012/24 is causing feedback. The MPS-8012/24 does not have isolation of the output. Add an isolator externally. • Meter/detector used is not set to the correct wavelength or responsivity, is not the correct type for the wavelength of the source, power from the source is not within the operating range of the detector, or the meter/detector is out of calibration. • Brown out conditions on AC line input.
MPS-8012/24 exhibits unstable power output from one or both channels	• Any of the items listed under low power above. • The unit has not warmed up for one hour. • Room temperature fluctuating by more than $\pm 1^{o}$C. • The AC power is excessively noisy. • Excessive air current on the device. Move device away from heater/air conditioning vents/blowers.

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