# Pre-Installation Guide
# For
# IceFyre Laser Systems


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# INTRODUCTION

Congratulations on your purchase of a Spectra-Physics laser system. The purpose of this guide is to assist the user in establishing a suitable location and operating environment for optimum performance of the IceFyre laser system.

A checklist of pre-installation considerations is provided in this guide. You are responsible for meeting these requirements prior to installation, with consideration given to all applicable building and safety codes.

Proper power and ambient environment controls are required for each system. You are responsible for meeting these requirements prior to installation, with consideration given to all applicable building and safety codes.

When the laser system is installed into a tool. The tool manufacturer is responsible for maintaining a stable operating environment that does not exceed the operating temperature requirements of the system. The tool manufacturer is also responsible for meeting all safety requirements.

We at Spectra-Physics intend to provide you with responsive support so that you can derive great satisfaction and value in using our systems for your applications. We available to you at 1-800-456-2552.

# When Your System Arrives

When the system arrives inspect the shipping containers for signs of rough handling or damage. Indicate any such signs on the bill of lading. Report any damage immediately to the shipping carrier and to a Spectra-Physics Customer Service Representative.

Retain the shipping containers. The containers will be required if the system is returned to the factory for service. The containers may also be needed to support a shipping damage claim.

The packing list identifies all items that have been ordered. Check each item received against the packing list, open all packages, and inspect them for any shipping damage. Make sure that each system has a User's Packet, which contains a USB stick. The USB stick contains the ship report, a USB Driver for the GUI, the system GUI, User's Manual, and other documentation.

Note: All the technical information contained within this document can be found in the User's Manual.

Note: That some items may have been installed at the factory. Report any missing or damaged items to a Spectra-Physics Customer Service Representative.

# Pre-Installation Considerations

## Location and Environment

The location of the system and environment of your lab, or tool should meet the following requirements:

- Adequate planning for mounting the laser into the tool. STP files are available upon request from your local Spectra-Physics sales rep.
- System Specifications, Outline drawings (on the downloadable data sheet) and STEP files can be found on the Spectra-Physics website. IceFyre® Picosecond Lasers (spectra-physics.com).
- For bench top operation a safe location that meets all applicable building codes and local safety requirements. Please note that the laser head is very heavy and requires a sturdy and stable optical table Optical tables can be found on the Newport web site. www.newport.com.
- When the laser is mounted into a tool as stable mount is required.
- Cable strain relief and bend radius should be considered when the laser is installed into a tool. Avoid routing the laser interface cables near high electrical noise sources. See Environmental Controls.
- Easy access with adequate clearance around the laser system that allows of maintenance of the system when it is installed into a tool. You need to be able to remove the cover. Shutter, User replaceable window, and cover 7 inches or 17.78 cm.
- Maintaining as stable operating environment is critical for maintaining stable and repeatable performance of the laser.
- Air ducts should not blow directly onto the laser or optical beam path.
- For UV applications the optical beam path should be enclosed and purged with low pressure clean dry air. 1 SCFH (Standard Cubic Foot per Hour), or .4719 Liters per minute
- There should be no vibration on the laser when it is mounted in a tool.

# Pre-Installation Considerations (Continued)

## Maximum Emission Levels

Always wear protective eyewear. Eyewear selection depends on the wavelength and intensity of the radiation, the conditions of use, and the visual function required.

The maximum emission levels possible for the IceFyre laser systems are listed in below. Use this information to select laser safety eyewear and to implement appropriate safety procedures. These values do not imply actual system power or specifications!

Maximum emission level

| Model | Emission Wavelength | Maximum Power | CW Power |
|---|---|---|---|
| IR50 | 1064 nm non-AOM model | 60 W, pulsed | 60 W |
| IR-50A | 1064 nm AOM model | 49.9 W, pulsed | <100 mW |
| UV30 | 355 nm | 35.0 W, pulsed | < 100 mW |
| UV-U30 | 355 nm | 29.9 W, pulsed | < 100 mW |
| GR50 | 532 nm | 60.0 W, pulsed | < 100 mW |
| UV50 | 355 nm | 60 W, pulsed | < 100 mW |

## Environmental Control

The IceFyre system requires cooling fluid to remove heat and to stabilize the temperature of various system components. A closed-loop chiller is used for this purpose. The recirculating, temperature-controlled fluid flows to the laser head to remove excess heat.

The Utility Module (UM) is air-cooled by fans inside. Provide at least 15 cm (6 in.) of unobstructed space around the front panel and 20.32 cm (8 in.) of space around the rear panel of the Utility Module to allow cooling air to enter the front and heated air to exhaust from the back. The UM draws 100 CFM of air flow. The minimum bend radius for the umbilical is 11.4 cm (4.5 in.).

The UM contains a closed-loop active laser purification system (ALPS) that circulates clean, dry air through the laser head to remove humidity, airborne particles, and volatile organic compounds.

# Pre-Installation Considerations (Continued)

## Environmental Specifications

The environmental conditions under which the laser system function is listed at http://www.spectra-physics.com/products/ultrafast-lasers/icefyre

The specifications in Table reflect indoor use and operating conditions.

| Feature | Specification |
|---|---|
| Altitude | Up to 3000 m |
| Temperatures | 15 to 30°C |
| Maximum relative humidity | 10 to 90% non-condensing |
| Mains supply voltage | Do not exceed ± 10% of the nominal voltage |
| Insulation category | II |
| Pollution degree | 2 |

## Utilities and Power Requirements

| | Specifications |
|---|---|
| AC Power Input | 100 to 240 VAC, 50 or 60 Hz |
| Maximum Power Consumption (Absolute) | 1000 Watts (IR50, UV30, GR50)<br>2000 Watts (UV50) |

## AC Mains Fuse Requirements

The UM incorporates double-pole neutral fusing for operation from 100 to 240 VAC.

| Laser System | Circuit Breaker |
|---|---|
| IR50, IR-50A, UV30, UV-U30, and GR50 | 10 Amp Minimum |
| UV50 | 15 Amp Minimum |
| Chiller | |
| SP Provided Chiller (on a separate circuit breaker) | 20 Amp Minimum |

# Pre-Installation Considerations (Continued)

## Chiller Requirements

Maximum waste heat occurs at the end of life of the laser. The chiller selected must be able to dissipate 1000 for the IR50, IR-50A, UV30, UV-U30, and GR50, or 2000 watts for the UV50, and maintain a regulated coolant temperature of 20°C +/-1.0°C stable to +/-0.5°C, under all operating conditions for ambient temperature, humidity, and altitude.

When power (AC rocker switch is ON) is applied to the laser head, a flow of water is required for component cooling, even if no laser beam is being emitted.

Water flow direction is important, and the laser head water connections are marked WATER IN and WATER OUT.

Chiller requirements

| Feature | Required |
|---|---|
| Coolant temperature | 20°C +/-1.0°C stable to +/-0.5°C |
| Required flow at the inlet to the laser head | 1.8 GPM / 6.8 LPM |
| Pressure at the inlet to the laser head (see Note below table) | 40.0 psi / 275.8 kPa |

**Note** *The required pressure from the chiller is 45 psi / 310.2 kPa. This ensures that there is sufficient pressure at the inlet of the laser to provide adequate flow and cooling.*

If your chiller was not ordered from Spectra-Physics, obtain a chiller that meets these requirements. The chiller comes with a Do It Yourself (DIY) AC power cord. It is the responsibility of the user to safety install an appropriate plug on the three-conductor unterminated end.
When selecting your own chiller make sure that all wetted surfaces are either stainless steel, copper, nickel, silicone, or Teflon. Also make sure that the coolant is filtered through a 5 micron, pleated, absolute particle size filter on the return side of the chiller. Volumetric filters are NOT acceptable. We highly recommend that you speak with a Spectra-Physics representative about your chiller's design and capabilities.

Spectra-Physics offers the following items for connecting your chiller to the laser:
Hose ASSY, 3/8", 5-meter kit SP Part # 90080403
Water fittings kit, 3/8, BRASS SP Part # 90080404
SMC is an alternative chiller vendor. SMC- Thermo-chiller (smcworld.com)

# Pre-Installation Considerations (Continued)

## Lifting Requirements

IR50

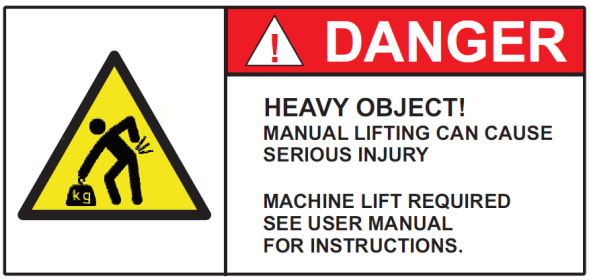
Spectra-Physics has specifically designed two lifting handles to assist in moving the laser. Ensure that all the lifting hardware is tight before moving the laser. 2 people are required to move the laser.

**Danger!** *Use caution when lifting and moving the laser. The laser head weighs 40.8 kg (90 lb.). The Utility Module weighs 6.8 kg (15.0 lb.).*

**Danger!** *The table or transportation cart onto which the laser will be placed must be capable of supporting at least 90.7 kg (200 lb.).*

UV30, UV-U30, and GR50

Per OSHA standards, the use of a mechanical lift is required to remove the laser from the crate, and onto a transportation cart. A mechanical lift is also required to move the laser from the transport cart onto a workbench or into a tool.

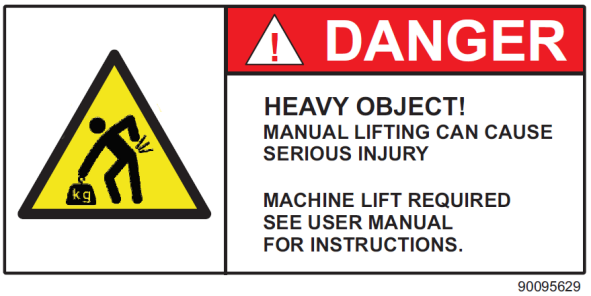



Outside the United States or MKS facilities, local work safety laws should be consulted.
The hoist mechanism attached to the handles is designed to accommodate a locking hook to aid in the laser removal and installation.
The mechanical lift should have a 90.7 kg (200 lb.) minimum lifting capability.

# Pre-Installation Considerations (Continued)

UV50

Per OSHA standards, the use of a mechanical lift is required to remove the laser from the crate, and onto a transportation cart. A mechanical lift is also required to move the laser from the transport cart onto a workbench or into a tool.




Outside the United States or MKS facilities, local work safety laws should be consulted.
The hoist mechanism attached to the handles is designed to accommodate a locking hook to aid in the laser removal and installation.
The mechanical lift should have a 90.7 kg (200 lb.) minimum lifting capability.

**Danger!** *Use caution when moving the laser. The laser head weighs 49 kg (108 lb.).*

**Danger!** *The table or transportation cart onto which the laser will be placed must be capable of supporting at least 90.7 kg (200 lb.).*

# Pre-Installation Considerations (Continued)

## Tool Requirements

- An adjustable wrench to remove the four 5/16-inch bolts
- A 5/32-inch hex ball driver (length ~10-inch)
- Cutters to remove shipping bands.
- Box cutter to open boxes and cut open Mylar bag.

## Unpacking the laser

A forklift or a pallet jack is required to move the laser and chiller crates.

Your IceFyre laser was packed with great care and its container was inspected prior to shipment — it left Spectra-Physics in good condition. Upon receiving your system, immediately inspect the outside of the shipping container. If there is any major damage (holes in the container, crushing, tilt and shock watches tripped, etc.), insist that a representative of the carrier be present when you unpack the contents.

The system is delivered in a single crate (two crates if a chiller is ordered). Ensure that you have enough space in a clean environment to unpack the laser. Save all packaging material so if it becomes necessary to return the laser it can be shipped in the proper container.

- Crate 1: *IceFyre* laser, the Utility Module, with the accessory kit that includes all cables, power cords, keys, interlocks, and any optional items like hoses and fittings. The kit also includes a laser packaging kit. Save this kit for future use.
- Crate 2: Chiller (optional); includes two filters, Nalco, hoses, and chiller AC power cords.

# Pre-Installation Considerations (Continued)

**Accessory Kit Parts List**

A packing slip listing all the parts shipped, and an accessory kit containing the items listed below is shipped along with the laser system. Verify that all items are present. (Spectra-Physics part numbers are listed in “Field Replaceable Units (FRUs).

- One 8.2 ft (2.5 m) Do It Yourself (DIY) AC power cord. It is the responsibility of the user to safety install an appropriate plug on the three-conductor unterminated end.
- One 5 m (16 ft.) power umbilical cable
- One laser head parts kit (interlock jumper plug, two keys, connector locks for AC connector, fuses)
- Two purge lines (for GR and UV models)
- One USB memory stick containing the IceFyre GUI software, USB driver software, shipping report, WEEE letter, thank you letter, Customer Feedback form, and the user’s manual.
- One 3 m (10 ft.) Type A-B USB cable (for communications)

Optional chiller:

- One DIY AC power cord
- Two particle filters for the chiller (ships with chiller)
- Two 5 m (16 ft.) water hoses with quick connect connectors, standard.
- Two gallons of Nalco

1. Verify that the tilt and shock watches on the crate are not tripped, indicating that the units were safely shipped. If they are tripped, carefully document any damage caused by the carrier. The watches are on the sides of each crate. If the indicator on either watch shows that the crate has sustained possible damage, follow the instructions printed on the label, and notify the carrier and your Spectra-Physics representative. If they are not tripped, proceed with the next step.


*Banded Crate, front (left) and Side(right)*

# Pre-Installation Considerations (Continued)

2. Open the top of the shipping crate to remove the Utility Module and accessory kit box.
   A. Using metal cutters, cut the shipping bands.
   B. Unfasten the six clamps around the *top* of the crate that secure the cover to the sides of the crate.


*Top Cover Clamps*

   C. Turn the handles counterclockwise and disengage the latch, then carefully remove the crate top cover, and set it to the side.

3. Remove the Utility Module box and set it onto the transportation cart or table.

*Utility Module*

# Pre-Installation Considerations (Continued)

4. Open the Utility Module box and remove the Utility Module from the box. Carefully place the Utility Module onto the transportation cart or a table.

*Unpacking Utility Module*

5. To remove the outer barrier bag, cut open the end of the sealed Mylar bag. Remove the three desiccant packs and the module from the Mylar bag.

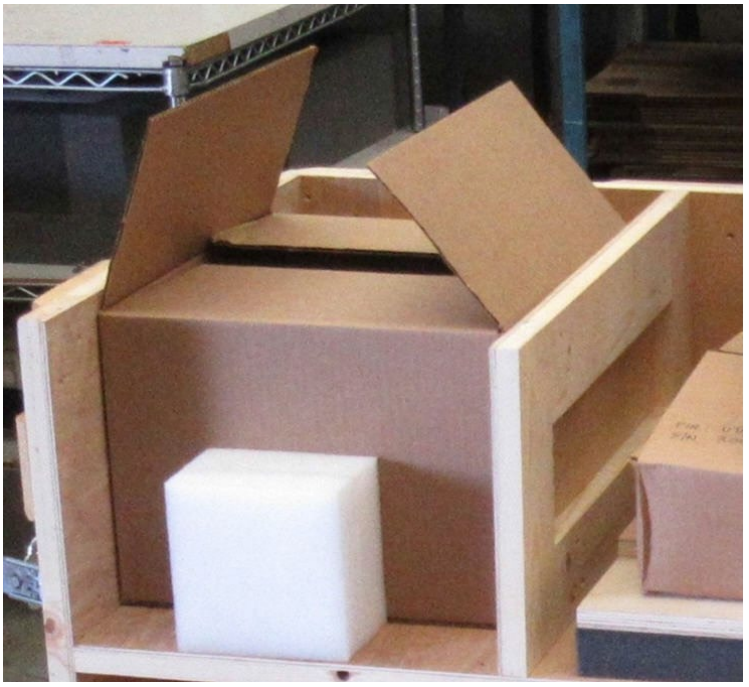
*Mylar bag*

# Pre-Installation Considerations (Continued)

6. Remove the two cardboard supports from the side and remove the Utility Module from the final barrier bag.

*Final barrier bag*

7. Place the Utility Module onto the transportation cart or table.
8. Remove the accessories box and set it onto the transportation cart or table.



*Accessory box*

# Pre-Installation Considerations (Continued)

9. Remove the contents of the accessories box and place them onto the transportation cart or table. No optional accessories are shown.


*Accessories*

10. Unfasten the six clamps around the base of the crate that secures the sides of the crate to the base (three on the front and three on the back).

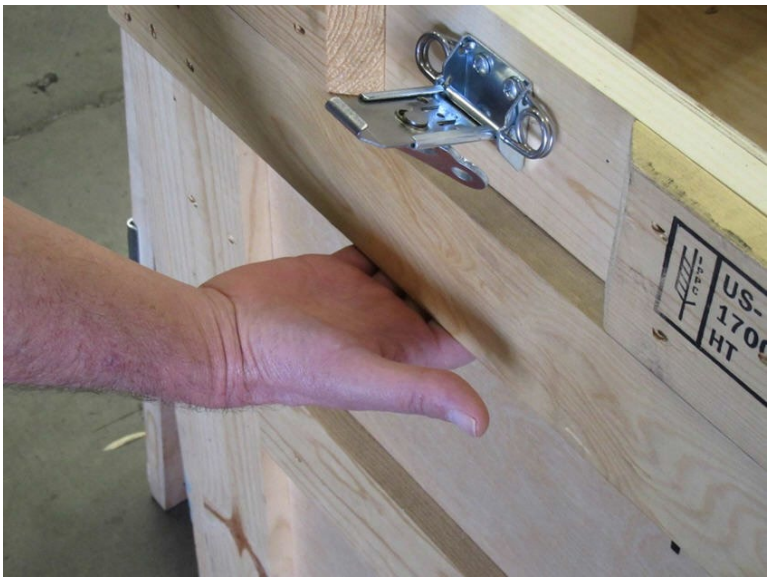

*Base clamps*

# Pre-Installation Considerations (Continued)

11. Unfasten the four clamps on the panel of the crate.

*Panel clamps*

The shipping crate has built-in handles on each side.



*Built-in handles*

# Pre-Installation Considerations (Continued)

12. Two persons are required to slide the three sides of the crate back to expose the laser head. Carefully lift the side and back section of the crate and set it to the rear of the crate base.

*Lifting crate to expose the laser head.*

13. Unbuckle the straps holding the laser head in place.

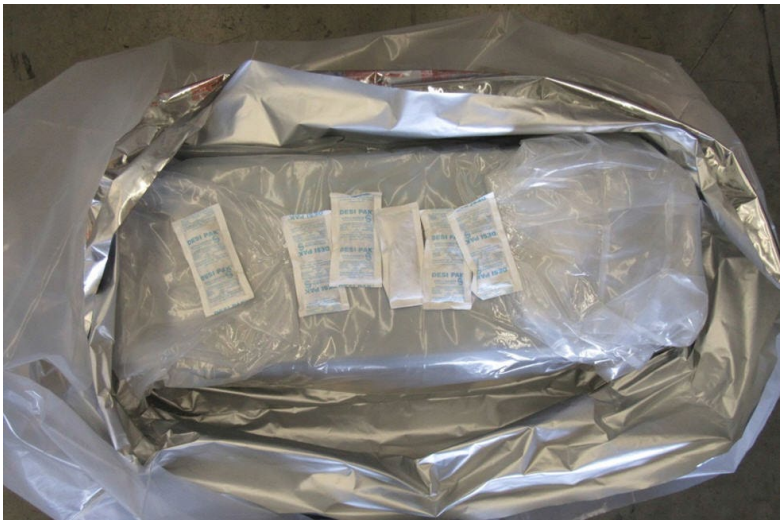
*Laser head strapped to the bottom of the crate.*

# Pre-Installation Considerations (Continued)

14. Unscrew the clamps on the front and back of the laser head using a 1/2 in. wrench, socket, or adjustable wrench. Remove the clamps.


*Clamps*

15. Open the outer two bags to expose the desiccant packets and final barrier bag. Remove the desiccant packets and set them aside.



*Desiccant and final barrier bag*

# Pre-Installation Considerations (Continued)

16. The hoist mechanism is attached to assist with lifting the laser out of the create. The hoist ring is 31.75 mm (1 1/4 in.). The hardware is already attached to the laser while inside the crate, and the final barrier bag needs to be opened to expose the lifting handles.

*Lifting hoist UV30 and GR50*

*Lifting hoist UV50*

## Pre-Installation Considerations (Continued)

17. Use a suitable hoist to remove the laser head from the crate and carefully place it onto the transportation cart. The laser system is now ready to move into a clean room, or to an optical table, or installed into a tool.

On behalf of the team at Spectra-Physics, we would like to thank you for choosing our IceFyre®laser system for your needs.