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Preinstallation Manual
INNOVA® 90C FRED™ Ion Laser

Coherent Laser Group
5100 Patrick Henry Drive
Santa Clara, California 95054

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When communicating with our Technical Support Group, always have the model and serial number of your laser available.

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Preface



Read the operator's manual carefully before operating the laser for the first time. Give special attention to the material in Chapter Two, Laser Safety, of the operator's manual which describes the safety features built into the INNOVA 90C FRED Ion Laser.



Use of controls or adjustments or performance of procedures other than those specified in this manual may result in hazardous radiation exposure.



Use of the system in a manner other than that described herein may impair the protection provided by the system.

U.S. Export Control Laws Compliance

It is the policy of Coherent to comply strictly with U.S. export control laws.

Export and re-export of lasers manufactured by Coherent are subject to U.S. Export Administration Regulations, which are administered by the Commerce Department. In addition, shipments of certain components are regulated by the State Department under the International Traffic in Arms Regulations.

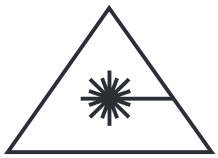
The applicable restrictions vary depending on the specific product involved and its destination. In some cases, U.S. law requires that U.S. Government approval be obtained prior to resale, export or re-export of certain articles. When there is uncertainty about the obligations imposed by U.S. law, clarification should be obtained from Coherent or an appropriate U.S. Government agency.

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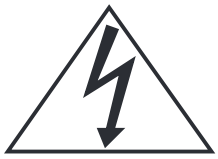
Symbols Used in This Manual and on the Laser System



This symbol is intended to alert the operator to the presence of important operating and maintenance instructions.



This symbol is intended to alert the operator to the danger of exposure to hazardous visible and invisible laser radiation.



This symbol is intended to alert the operator to the presence of dangerous voltages within the product enclosure that may be of sufficient magnitude to constitute a risk of electric shock.



3 PHASE ALTERNATING CURRENT.



ALTERNATING CURRENT.



DIRECT CURRENT.

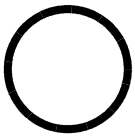
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Utility Requirements

The INNOVA 90C FRED ion laser requires electrical power for the power supply, as well as a supply of water to cool both the laser head and the power supply. In addition, when the laser is operated in SHG mode, a supply of dry Nitrogen is required to keep the intracavity space clean.

Please have your plant engineer read this section to ensure the optimal working conditions for your new laser.

Electrical Service

The AC electrical service for the INNOVA 90C FRED ion laser power supply must meet the specifications listed in Table 1.

Attached to the power supply is a ten-foot power cable without a connector attached to the free end. The cable is Type <HAR>, four wires, 16 mm^2 each. The green/yellow wire has to be connected to the building ground. You must provide the hardware necessary to connect this cable to your electrical service. Consult applicable electrical codes for your area to select this hardware. For safety reasons as well as performance reasons, the electrical service has to be established such that all three phases are symmetric to building ground (e.g., WYE connection with center tap to building ground). The voltage measured between phases should be 208 VAC. The voltage between each phase and building ground should be 120 VAC.

The service should have a main power disconnect switch located in close proximity to the laser. It shall be clearly marked as the disconnecting device for the laser, and shall be within easy reach of the operator.

Cooling Water

The INNOVA 90C FRED ion laser requires a flow of cooling water for the laser head as well as for electrical components inside the power supply. Because properties of the cooling water are of critical importance to the performance of the laser, make certain that the cooling water in your work area conforms to the specifications listed in Table 1 at all times.



Check local and state regulations which may control use of city water for cooling. For instance, some regulatory codes will not allow the discharge of cooling water into the sewer system.

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The cooling water temperature must not fall below the ambient dew point. If this does occur, condensation will form inside the power supply and may cause catastrophic damage. In some situations it may be necessary to provide humidity control for the laser environment.

Closed-Loop Cooling System

If your cooling water does not meet specifications, you may wish to install a closed-loop heat exchanger to obtain optimum performance from your laser. Should you decide to use a closed-loop cooling system[1], ensure that it has sufficient capacity to handle the heat loads listed in Table 1.

If your application demands critical beam pointing stability, power stability, or frequency stability, the use of pressure and temperature regulators on the cooling water system may also be advantageous.

Nitrogen Purge

A steady flow of 0.5-1.0 SCFH (Standard Cubic Feet/Hour) of dry Nitrogen is required in order to keep proper intracavity space conditions. The Nitrogen supply used must be clean, dry and oil-free. In general, most common sources of compressed Nitrogen are not suitable for this application since pump oil can easily get into the gas cylinders or pressure lines. Similarly, any gas regulators or hoses which have been used with contaminated gas should not be used with the INNOVA 90C FRED. If bottled compressed gas is used, specify a purity of grade 5 (99.999%) or better. A high purity "boil off" nitrogen source may be used as an alternative. Make sure that all regulators and lines are clean and the filter is installed properly.

The INNOVA 90C FRED is supplied with 25 feet of flexible teflon tubing, a filter and an adjustable flow regulator. Nitrogen must be flowing all the time during SHG operation as well as 10 minutes before and after the laser is run in SHG configuration. Refer to Chapter Five, Daily Operation, and to Chapter Six, Optics and Alignment, for a detailed description of the BBO crystal handling and storing requirements.

Ambient Temperature

The room in which your laser is located should be maintained at a temperature of 10°C to 40°C (50°F to 104°F).

1. Further information about the use of closed-loop cooling systems, and the Coherent manufactured LaserPure™ Heat Exchangers, is available from Coherent Technical Support at 800-367-7890.

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Table 1. Utility Requirements

POWER REQUIREMENTS	
208 VAC +10% [1], 3-phase with ground, no neutral, WYE configuration, 50 or 60 Hz. Phase balance <3% between phases Maximum current consumption (typical): 50 Amps per phase at 208 VAC [2]	
COOLING WATER REQUIREMENTS	
Flow rate, minimum	9.5 liters (2.5 US gallons) per minute
Recommended maximum flow rate	11.5 liters (3.0 US gallons) per minute
Static pressure [3]	Max: 620 kPa (90 psi)
Pressure Delta range [4]	170-415 kPa (25 to 60 psi) 240-415 kPa (35 to 60 psi)
Inlet temperature	10-35°C (50 to 95°F)
Temperature stability	±1°C (1.8°F)
Resistivity	5.0 KΩ-cm to 2.0 MΩ-cm
pH	6 to 8
Hardness	<100 mg/l (5.9 grains/gal) or 100 parts/million of calcium
Particulate size	<200 microns in diameter. [5]
Maximum heat load	20 kW @ 230 VAC 18 kW @ 208 VAC
NITROGEN PURGE	
Recommended flow rate	0.5 to 1.0 SCFH

Note: These figures include the two 7.6 meter (25 ft.) lengths of 16 mm (5/8 inch) I.D. hose which are supplied with each laser.

These figures do not include a 60 micron water filter. A new 60 micron water filter introduces a 5 kPa (0.75 psi) pressure delta at 22.7 liters (6 gallons) per minute or a 2 kPa (0.30 psi) pressure delta at 8.5 liters (2.2 gallons) per minute.

1. The laser system will operate properly within the line voltage tolerance provided that the voltage between each pair of phases is within 3% of each other. Power companies almost always provide balanced 3-phase power, but if a heavy load is connected asymmetrically, the line balance can be disturbed. This results in excessive ripple current through the capacitors of the DC filter. This ripple current degrades the noise performance of the laser and shortens the lifetime of the filter capacitors.
2. Consult applicable electrical codes for your area to select appropriate electrical service hardware. Power supply is fused at 80 amps.
3. Static pressure is the inlet pressure measured under conditions of zero flow.
4. Pressure Delta is the pressure differential between inlet and drain.
5. Coherent supplies a 60 micron water filter with the system.

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Site Preparation

Planning the Workspace

To assist you in planning sufficient workspace for the INNOVA 90C FRED, dimensions of the laser system are given in Figure 1-3a and Figure 1-3b, Chapter One. Enough space should be left around the laser head so that the components inside can be reached easily for alignment and maintenance.

Umbilical Cord

The laser head and power supply are connected through an eight-foot umbilical cord. This cord must not be crimped or bent sharply. To avoid crimping, use a bend radius of at least 30 cm (12 inches) for the umbilical cord. The umbilical cord may be configured to exit the laser head either horizontally on the table surface or vertically straight downward at the table edge.

Work Surface

The INNOVA 90C FRED ion laser is a precision instrument whose performance depends on its environment. Vibrations can be transmitted to the laser head from the surface on which it rests, causing beam pointing instability and beam amplitude fluctuations. To minimize vibrations, the laser head should be placed on a stabilized optical table and isolated from mechanical contact with other equipment.

Unpacking the System

The INNOVA 90C FRED ion laser is shipped in two crates: one contains the power supply, the other the laser head. Accessories, including the remote control module, are packed in separate boxes. A packing list, which details all the ordered items, is included in the shipment. Please check items received against this packing list.



Please advise your receiving department to perform the damage inspection procedure prior to signing the bill of lading.

Damage Inspection

Carefully inspect each crate and note any damage. All INNOVA 90C FRED ion laser crates are shipped with rough handling indicators affixed to their front and back. Examine these indicators upon

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receipt. If the indicator bar is red, the crate has received handling which may have damaged the contents. Indicate any such signs on the bill of lading.

Report any damage immediately to the shipping carrier and to the Coherent Order Administration Department, 800-438-6323.

Uncrating

To minimize the risk of functional or cosmetic damage to your laser system, uncrate the laser head and power supply at the installation site.



To prevent serious damage, care must be taken when cutting wrapping materials from any of the items contained in the crates, particularly around the laser head and the umbilical cord. This warning also applies to opening accessory boxes and the unpacking of their contents

Keep all shipping containers. If you file a claim for shipping damage, the containers may be needed to support the claim. In addition, if you return the laser system to Coherent for service, these containers will best protect your system in shipment. See below for storage information.

Laser Head

Loosen the retaining clips and remove the cover of the box containing the laser head.

1. Remove the accessory boxes from the head crate.
2. Carefully remove the umbilical cord from the crate.
3. Remove the laser head from the crate and set it on the work bench (two people required).
4. Remove the plastic wrapping from the umbilical cord at the rear end of the laser head.
5. Remove the water and power connectors from their plastic bags and protective foam padding.



Leave the ESD (ElectroStatic Discharge) protective foam padding on the umbilical power connector until ready to connect it to the power supply.

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Accessories

The laser head crate contains the boxes used to ship various accessories: maintenance kit, crystal storage container and flexible tubing for the Nitrogen purge. The maintenance case is also used to store most of the optical components and options. The standard optical components are:

- Single-line and multiline visible high reflector mirror holders.
- Visible and SHG output mirrors.
- Visible and SHG mirror folding boards.
- Visible and SHG light pick-offs.
- BBO crystal assembly.
- Dummy crystal assembly.

Other parts contained in the maintenance kit case are:

- External interlock connector.
- Head Interlock defeats.
- Nitrogen flow regulator.
- All the parts necessary for ordinary maintenance of the laser system.

The system is shipped configured for single-line visible operation at 488.0 nm. All the optical components required for this mode of operation (visible mirrors and light pick-off, dummy crystal assembly) are already installed on the laser head. The SHG and any optional optics are shipped in the maintenance kit.

Power Supply

Loosen the retaining clips and remove the cover of the box containing the power supply.

1. Remove the foam padding from the top of the power supply.
2. Lift the power supply out of the crate and carefully set it on a flat, stable surface (two people required).
3. Remove the plastic bag affixed to the top of the power supply.
4. Take the key out of the accessory box and insert it into the lock on the front of the power supply.

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Shipping Crates

The shipping crates are specially designed to protect your laser system during transit. It is important, therefore, that these crates be undamaged and stored for future use. For storage information, the dimensions and approximate weight of the boxes/crates are listed in Table 2.

Table 2. Dimensions and Weights of Empty Shipping Crates

	POWER SUPPLY	LASER HEAD
/ (1* 7+	90.2 cm (35.5 in)	219 cm (86 in)
: ,' 7+	67.3 cm (26.5 in)	56 cm (22 in)
+ (,* + 7	40.6 cm (16.0 in)	56 cm (22 in)
: (,* + 7	15.9 kg (35.0 lbs)	68 kg (150 lbs)

Installation

The INNOVA 90C FRED ion laser is designed to be installed by the user. Follow the procedures detailed in this chapter to ensure proper installation of your system.

Otherwise, after completing the unpacking procedures, call Coherent Customer Service at one of the phone numbers listed at the front of this manual to schedule installation.

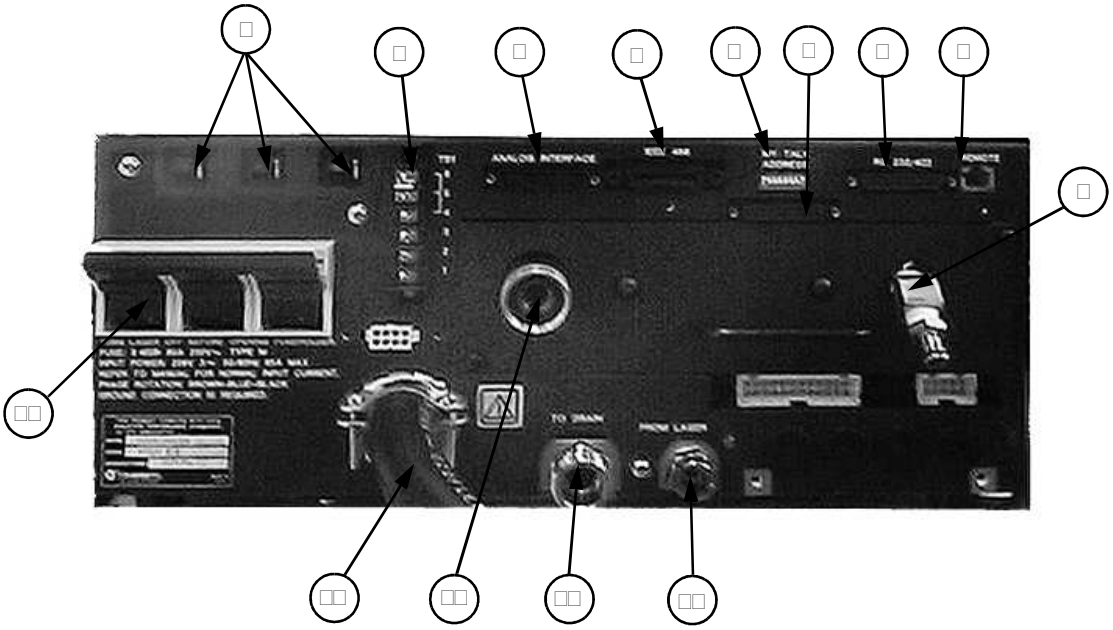
Preparing the Laser Head for Installation

1. Take off the top cover of the laser head by removing the two cover screws.
2. Remove the plastic safety cover inside the laser head by removing the screws on top of the plastic cover.
3. Inspect the laser head for damage.

Power Supply Installation

Refer to Figure 1 and Figure 2.

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1. Circuit breakers (3), 12 A, 250 V
2. Terminal strip, TB1-1 through TB1-6 (see below for definitions)
3. Analog Interface (remote computer interface)
4. IEEE 488 (remote computer interface)
5. My Talk Address (dip switches)
6. Head Control (DB25)
7. RS-232/422 (DB25 remote computer interface)
8. Remote (remote control module)
9. To Laser (water)
10. From Laser (water)
11. To Drain (water)
12. Water In (water from source)
13. 208 VAC, 3-phase, 60 A, 50/60 Hz (power from source)
14. Fuse holder

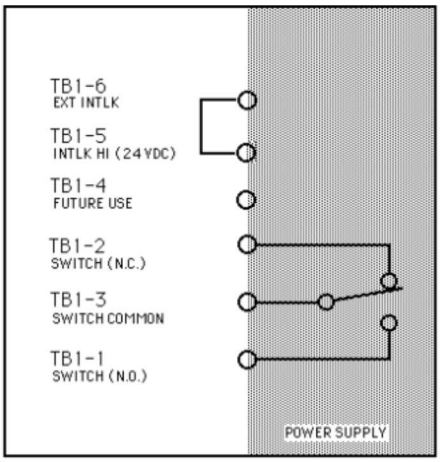


Figure 1. INNOVA 90C F5(D Ion Laser, Power Supply, Rear Panel

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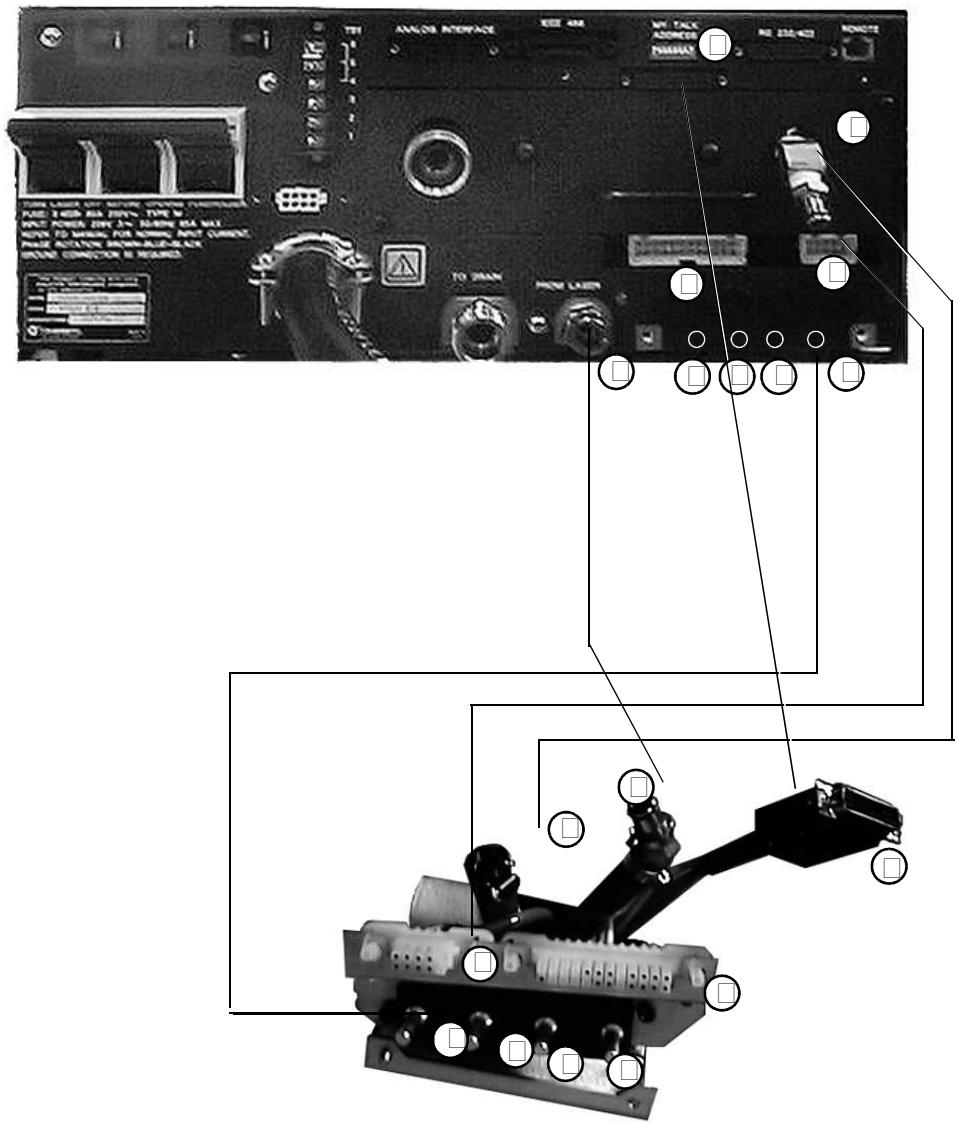
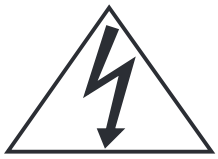


Figure 2. Umbilical Connections

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Connection of the power supply utilities should be carried out only by a qualified technician. Any adjustments or repairs to the power supply carried out by anyone other than a qualified technician, or an operator working under direct consultation with a Coherent qualified technician, will void the warranty agreement.

If you have any questions regarding utility connections, or any other installation procedure, contact Coherent Technical Support.

Power Connection

Attach a properly rated connector (not supplied by Coherent) on the four-wire cable. The green/yellow wire is ground. The remaining three wires go to the three phases. There is a required phase rotation order (brown-blue-black) only if a heat exchanger option has been purchased. There is no neutral connection.



All connectors on the rear of the power supply are clearly labelled. Refer to Figure 1 for labelling of rear panel items. Refer to Figure 2 for umbilical, water, external interlock, and remote control module connections.

Umbilical Connections (Refer to Figure 2)

Ensure the umbilical connections cover and the umbilical holder are in place on the umbilical assembly. Make the umbilical connections as follows:

1. Move the power supply so that the rear panel extends approximately two to three inches beyond the table edge.
2. Remove the umbilical support bracket by loosening the two hex screws (using a 5/32 inch Allen wrench) that secure it to the backside of the power supply.
3. If necessary, disconnect the umbilical water hoses from each other.
4. Align the electrical connectors (Figure 2, items 1 through 6) and insert into the receptacles on the rear of the power supply. Check that all pins are aligned and engaged. Rock and push the connector until it is completely seated in the receptacle. Secure the connector with the two Phillips head screws.

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5. Attach the hose with the female quick-disconnect (7) (red band) to the connector on the rear of the power supply labelled TO LASER (7).
6. Attach the hose with the male quick-disconnect (8) to the connector on the rear of the power supply labelled FROM LASER (8).
7. Attach the DB25 plug (9) to the connector on the rear of the power supply labelled HEAD CONTROL. Secure the mounting screws on the plug with a screwdriver.
8. Replace the umbilical support bracket.
9. Rotate the umbilical holder so that the umbilical will exit the rear of the power supply horizontally or at 45°. Make sure not to crimp or collapse the FROM LASER water hose during orientation.
10. Secure the umbilical holder to the umbilical support bracket with the long screws provided using a 9/64 inch straight ball driver.



Ensure the DB25 umbilical connector is plugged into the connector labelled HEAD CONTROL (located immediately below the MY TALK ADDRESS dip switch panel). Do not plug the DB25 into the RS-232/422 connector (located to the right of the MY TALK ADDRESS dip switch panel).

All connections must be tight due to the large electrical currents involved. Verify that all connectors are fully mated and that no wires have damaged insulation or are crimped or bent sharply.

Water Connections (Refer to Figure 2)

1. Be sure there are hose washers in the water supply and drain connectors.
2. Attach the hose with the female connector to the connector on the rear of the power supply labelled TO DRAIN. Direct the other end to the drain outlet.
3. Attach the water filter provided by Coherent to the cooling water source.
4. Attach the second water hose with the male connector to the water filter and to the coupler on the rear of the power supply labelled WATER IN.
5. Open the drain valve and then slowly open the water inlet valve. Look for leaks in the fittings, head and power supply.

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6. If there are no water leaks, replace the power supply cover, the laser head plastic safety cover and the laser head cover.



Only the magnet water jacket is connected to ground. No part of the tube or reservoir should touch the case.

7. Use a 9/64 inch and a 5/32 inch Allen wrench to remove the two screws from the power supply and the two screws from the umbilical support bracket, respectively, which will hold the umbilical connections cover (1) in place.
8. Slide the umbilical connections cover (1) over the umbilical holder and bracket so that the screw holes on either side of the center opening are aligned with those on either side of the umbilical holder. Secure this assembly using the larger screws provided.
9. Secure the top of the umbilical connections cover (1) to the power supply using the remaining screws removed above.
10. Connect the power supply power cord to the facility power.

External Interlock

The external interlock is located on the rear panel of the INNOVA power supply, as shown in Figure 1. Terminals, 5 and 6, of terminal strip TB1 must be connected for the laser to operate. The factory installed jumper may be replaced with an external interlock circuit.



The External Interlock circuit may be wired to a door switch to shut off the laser when a person enters a designated restricted area.

The external interlock has an open circuit voltage of 20 to 28 VDC and a short circuit current of ≤12.0 mA. Under no circumstances should an external voltage or current source be connected to this circuit.If the external resistance connected between the terminals is less than 10Ω, the laser is functional and will operate from the remote or external computer control. If the resistance is greater than 100,000Ω, the laser is disabled and will not operate. To assure proper functioning of your laser system, design your external interlock circuit to have a resistance less than 10Ω when closed and a resistance greater than 100,000Ω when open. External interlock circuitry should be isolated from all other electrical circuits or grounds.

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If the external interlock is open (jumper not installed or restricted area door open), the laser will not operate. The remote control module display will read: External Interlock.

External Switch

There are two external switches available on TB1 on the rear panel of the INNOVA power supply. One switch, between terminals TB1-1 and TB1-3, is normally open when the laser is off. The other switch, between terminals TB1-2 and TB1-3, is normally closed when the laser is off. Once the main contactor engages, the switch between TB1-1/3 closes and the switch between TB1-2/3 opens. (The main contactor closes 25 seconds after pressing the ON button and remains closed until the plasma tube is de-ionized.) The external switches may be used, for example, to turn on warning lights outside of the lab indicating that the system is ionized and possibly lasing.

This switch is isolated from all other laser circuits. It is rated for 30 VAC, 12 Amps (maximum). It is not internally protected by fuses or other overcurrent protection devices.

Refer to Figure 1 for TB1 pin-outs.

Heat Exchanger Control

On the rear panel of the INNOVA power supply is a plug labeled TO HEAT EXCHANGER. As of the release date of this manual, this feature not yet available. Contact Coherent Technical Support for more information.

Remote Control Module Connection

The remote control module cable has a phone jack connector which plugs into the receptacle labeled REMOTE on the rear panel of the power supply (Figure 3-1, Item 7). Plug in the jack and make sure the connection is secure.

Nitrogen Purge Connection

1. Set the flow regulator to 2 SCFH (Standard Cubic Feet Hour).
2. Connect one end of the supplied teflon tube to the flow regulator.
3. Connect the tubing from the regulator to the Nitrogen filter input side. Connect another length of tubing to the output side of the filter.
4. Flow Nitrogen in the tube for ten minutes to remove dust or residual gases that can be present in the line.
5. Decrease the Nitrogen flow to 0.5 SCHF and connect the line to the barbed brass feed-through on the rear bezel of the laser head.

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6. Readjust, if necessary, the flow to 0.5-1.0 SCFH to compensate for the increased impedance.

BBO Crystal Unpacking

The crystal assembly is shipped enclosed in a plastic container located in the accessory box. The container is partly filled with desiccant. Another container is provided for storing the crystal when not in use. The crystal is already mounted in a special holder that fits into the crystal housing of the laser head. A Lexan cylindrical cover protects the crystal during storage or while the crystal is being moved.



The BBO crystal is very delicate and hygroscopic. Handle it carefully, do not breathe on it, do not expose it to moisture or any solvents, do not try to remove it from the housing and do not attempt to clean it. Do not handle the crystal housing for any extended period of time without wearing dry rubber or surgical gloves. Make sure that the crystal is always in a dry storage container or exposed to a dry Nitrogen flow.

If you are ready to operate the laser in SHG mode, follow the procedure described below:

1. Fill the storage container with some of the desiccant provided in the kit. The desiccant is normally blue; if it has turned pink, it should be replaced. Place a thin film of the provided silicone grease (Lubriseal) around the edge of the plastic storage container to form a seal between the cover and the container.
2. Remove the crystal holder from the shipping container, remove the plastic wrap and the plastic seal. Transfer the crystal holder in the storage container, making sure that a tight seal is formed with the cover. The crystal can be indefinitely stored in this way.
3. When you are ready to install the crystal in the laser, remove the crystal assembly from the storage container. Remove the Lexan cover and place the crystal in the laser. If the crystal is to be inspected, this should be done only in a dry environment, preferably a Nitrogen purge.



Before turning the laser system on, please read Chapter Four, System Controls, and Chapter Five, Daily Operation. Follow the proper start up procedures.

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1. Desiccant
2. Storage container
3. Silicone grease

Figure 3. BBO Crystal Maintenance Kit

Rotating the Umbilical on the Laser Head

To allow versatility in the location of the laser head, the umbilical assembly can be rotated from its normal position so that it hangs straight down from the end of the laser head. To make this change proceed as follows:

1. Shut down the laser and disconnect power.
2. Position the rear of the laser head so that at least six inches protrudes over the edge of the table.
3. Loosen the four screws which retain the umbilical mount to the rear bezel of the laser head.
4. Pull out slightly on the umbilical assembly to release it from its mount, and then push the umbilical downwards.
5. Rotate the bracket to align the four clearance holes on the bottom of the head.
6. Push the assembly firmly upwards until it seats in the new location (Figure 4) and tighten the four retaining screws.
7. Restart the system.

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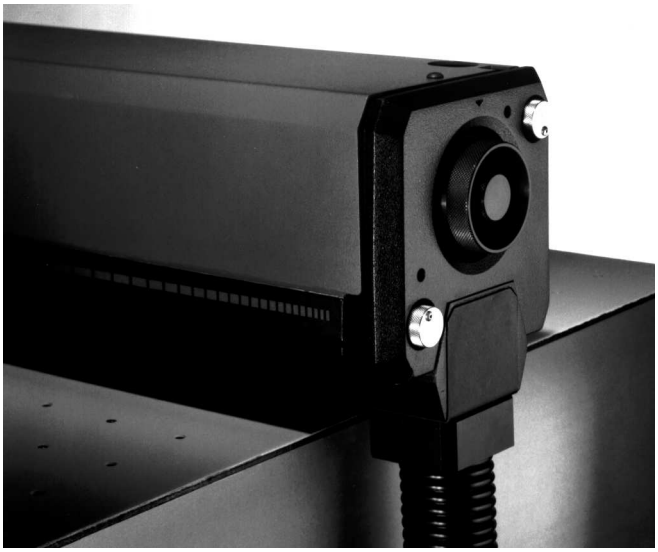


Figure 4. The Laser Head with the Umbilical Rotated to the Vertical Position

Rotating the Umbilical on the Power Supply

Refer to Umbilical Connections steps, for information on adjusting the angle at which the umbilical exits the power supply.

Rack Mount Slide Brackets

The INNOVA 90C FRED ion laser power supply can be mounted into a standard 48.26 cm (19.00 inches) equipment rack.

Rack mount slide brackets for cabinet depths of approximately 76.20 cm (30.00 inches) are available for the power supply. If you order this option, the brackets and associated hardware will be packed in the box that contains the power supply.

Rack Mount Installation

Before commencing this procedure, switch off the laser system and disconnect power at the source. Detach the umbilical connections at the rear of the power supply.

1. Remove the handles on the sides of the power supply by removing the four socket head cap screws (two per handle accessed from outside the power supply) with a 3/16 inch Allen screwdriver.

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2. Each Rack Mount slide bracket assembly is made up of three components: the chassis bracket (smallest), the sliding bracket (the one in the middle), and the rack bracket (the largest). Disassemble the sliding bracket and rack bracket as a unit from the chassis bracket by depressing the lever exposed as the chassis bracket is pulled out from the other two brackets. The chassis bracket, has five mounting holes that match five holes with threaded inserts on each side of the power supply chassis.

3. Using the hardware already installed on the power supply, mount one chassis bracket on each side of the power supply chassis. Mount them so the sliding brackets can be slid onto them and the spring lever is towards the rear of the chassis. Slide the sliding brackets onto the chassis brackets until they lock in place, extended from the rear of the power supply.

4. Mount the rack brackets (Coherent Part Number: 1403-0337) with the extensions (Coherent Part Number: 1403-0338) if needed, onto the equipment rack using the mounting hardware kit (Coherent Part Number: 1403-0340) as shown in Figure 5.

5. Align the power supply and sliding brackets to the rack brackets and slide the unit in as far as it will go. Push in on the spring lever locking mechanisms on the sliding brackets so the unit can be slid all the way in place.

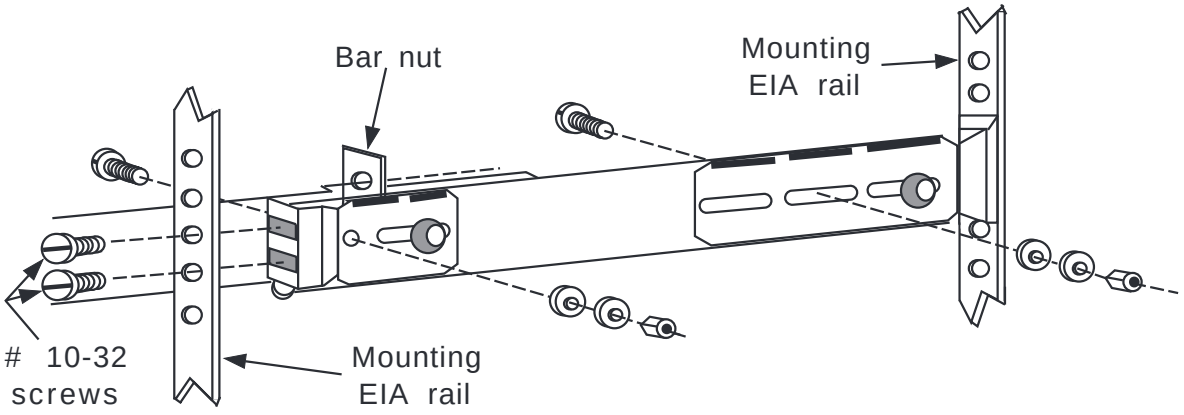


Figure 5. How to Mount Rack Brackets to an Equipment Rack

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The handles provided for the rack mount option are not intended to be used to carry the power supply if the unit is removed from the rack.

6. Mount the handles to the angles using the #8-32 x 5/8 inch flat head screws.
7. Remove the side screws in the front from the top cover of the power supply. Mount the angles to both front sides of the power supply using the #10-32 x 1/2 inch screws so that the handles face forward.



Before turning the laser system on, please read Chapter Four, System Controls, and Chapter Five, Daily Operation. Follow the proper start up procedures.

Test and Maintenance Equipment

In addition to the maintenance kit supplied by Coherent with your INNOVA 90C FRED ion laser, it is recommended that you acquire the items listed below for the general upkeep of your laser.

Output Power Measurements

The INNOVA 90C FRED ion laser has a built-in power monitor which reports the laser output power through the LCD on the remote control module. The power monitor is factory calibrated and requires no further adjustment. The correct wavelength must be selected on the remote control module for proper calibration.

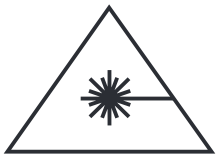
If you wish to have an accessory power meter available, it should be rated for the full power output of the laser. Coherent Power Meters are listed in Table 3.

Output Mode Measurements

When your system is installed, you may verify that the output mode meets specifications.

If an application demands routine examination of the laser mode, several options are available which differ widely in cost and accuracy of measurement. The simplest and most inexpensive device is a mode cup, a short focal length lens or mirror which can be used to project the beam onto a wall or screen for visual inspection.

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Use extreme caution when projecting an expanded laser beam with a mode cup. The expanded beam is sufficiently intense to cause severe eye damage.

For more precise measurements, a beam scanner, spectrum analyzer or M^2 meter such as the Coherent ModeMaster™ Beam Propagation Analyzer can be used. Refer to Chapter Five or contact Coherent Technical Support at 800-367-7890 for more information on how this equipment can be used with your INNOVA 90C FRED ion laser.

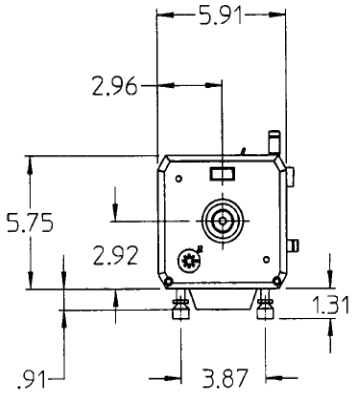
Table 3. Recommended Power Meters

COHERENT POWER METER 0.3 – 10.6 µM FOR ALL INNOVA 90C MODELS	MAXIMUM POWER (IN WATTS)
Model 200/3	3
Model 200/10	10
LabMaster with LM-3 Head	3
LabMaster with LM-10 Head	10
FieldMaster with LM-3 Head	3
FieldMaster with LM-10 Head	10

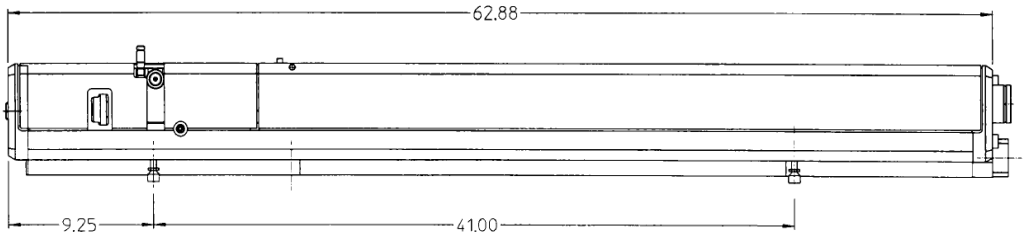
System Dimensions

The dimensions of the INNOVA 90C FRED ion lasers are given in the outline drawings (Figures 6 and 7).

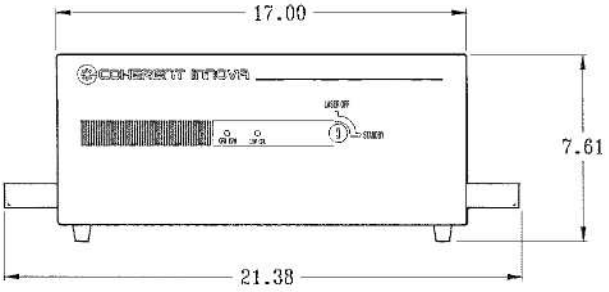
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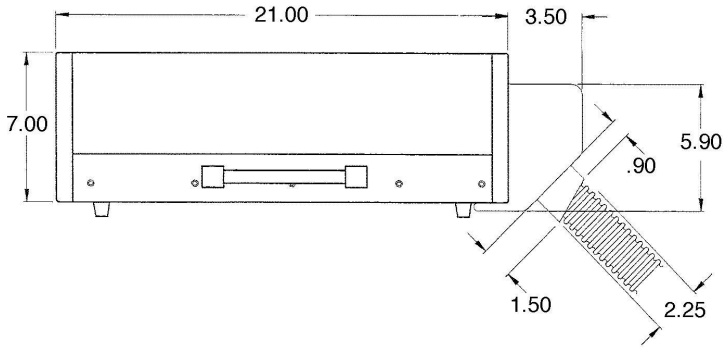
LASER HEAD, FRONT



LASER HEAD, SIDE



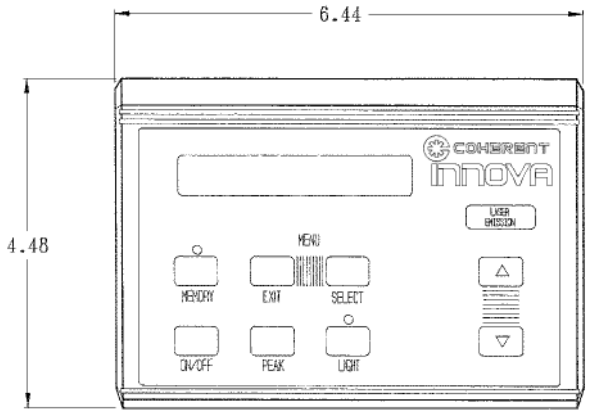
POWER SUPPLY, FRONT



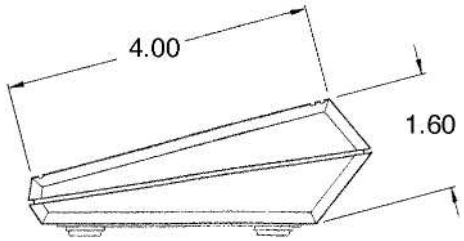
POWER SUPPLY, SIDE

Figure 6. Laser Outline Drawings; Laser Head and Power Supply

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REMOTE CONTROL MODULE, FRONT



REMOTE CONTROL MODULE, SIDE

Figure 7. Laser Outline Drawings; Remote Control Module

Maintenance Kit

All INNOVA 90C FRED ion lasers include a maintenance kit containing tools and supplies used in the normal maintenance of the laser.

Table 4. Shipping Weights

WEIGHT	HEAD	POWER SUPPLY	REMOTE
&5$7('	81 kg (178 lb)	67 kg (147 lb)	— —
81&5$7('	42 kg (92 lb)	39 kg (86 lb)	0.5 kg (1 lb)

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