

*Preinstallation Manual
Coherent Legend Elite HE+ and
Legend Elite Duo HE+
Ultrafast Amplifier Laser Systems*

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Telephone coverage is available Monday through Friday (except U.S. holidays and company shutdowns). Inquiries received outside normal office hours will be documented by our automatic answering system and will be promptly returned the next business day.

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If you are located outside the U.S., please visit www.Coherent.com for technical assistance, or phone our local Service Representative. Service Representative phone numbers and addresses can be found on the Coherent web site.

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Signal Words and Symbols in this Manual

This documentation may contain sections in which particular hazards are defined or special attention is drawn to particular conditions. These sections are indicated with signal words in accordance with ANSI Z-535.6 and safety symbols (pictorial hazard alerts) in accordance with ANSI Z-535.3 and ISO 7010.

Signal Words

Four signal words are used in this documentation: **DANGER**, **WARNING**, **CAUTION** and **NOTICE**.

The signal words **DANGER**, **WARNING** and **CAUTION** designate the degree or level of hazard when there is the risk of injury:

DANGER!

Indicates a hazardous situation that, if not avoided, will result in death or serious injury. This signal word is to be limited to the most extreme situations.

WARNING!

Indicates a hazardous situation that, if not avoided, could result in death or serious injury.

CAUTION!

Indicates a hazardous situation that, if not avoided, could result in minor or moderate injury.

The signal word “**NOTICE**” is used when there is the risk of property damage:

NOTICE!

Indicates information considered important, but not hazard-related.

Messages relating to hazards that could result in both personal injury and property damage are considered safety messages and not property damage messages.

Symbols

The signal words **DANGER**, **WARNING**, and **CAUTION** are always emphasized with a safety symbol that indicates a special hazard, regardless of the hazard level:



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.



This symbol is intended to alert the operator to the danger of Electro-Static Discharge (ESD) susceptibility.



This symbol is intended to alert the operator to the danger of crushing injury.



This symbol is intended to alert the operator to the danger of a lifting hazard.

Preface

This document contains user information for the Coherent Legend Elite, an ultrafast Titanium:Sapphire Laser Amplifier System.



Read the Operator's Manual carefully before operating the laser for the first time. Special attention must be given to the material in Section One: Laser Safety.



Use of controls or adjustments or performance of procedures other than those specified in this Operator's 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 Inc. to comply strictly with U.S. export control laws.

Export and re-export of lasers manufactured by Coherent Inc. 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 Inc. or an appropriate U.S. Government agency.

SECTION ONE: LASER SAFETY



NOTICE!

This user information is in compliance with section 1040.10 of the CDRH Performance Standards for Laser Products from the Health and Safety Act of 1968.



NOTICE!

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

This laser safety section must be thoroughly reviewed prior to operation of the Legend Elite laser system. Safety instructions presented throughout this manual must be followed carefully.

Hazards

Hazards associated with lasers generally fall into the following categories:

- Exposure to laser radiation that may damage the eyes or skin
- Electrical hazards generated in the laser power supply or associated circuits
- Chemical hazards resulting from contact of the laser beam with volatile or flammable substances, or released as a result of laser material processing

The above list is not intended to be exhaustive. Anyone operating the laser must consider the interaction of the laser system with its specific working environment to identify any potential hazards.

Optical Safety

Laser light, because of its special qualities, poses safety hazards not associated with light from conventional sources. The safe use of lasers requires all operators, and everyone near the laser system, to be aware of the dangers involved. Users must be familiar with the instrument and the properties of coherent, intense beams of light.

The safety precautions listed below are to be read and observed by anyone working with or near the laser. At all times, ensure that all personnel who operate, maintain or service the laser are protected from accidental or unnecessary exposure to laser radiation exceeding the accessible emission limits listed in 'Performance Standards for Laser Products,' *United States Code of Federal Regulations*, 21CFR1040 10(d).



WARNING!

Direct eye contact with the output beam from the laser will cause serious damage and possible blindness.

The greatest concern when using a laser is eye safety. In addition to the main beam, there are often secondary beams present at various angles near the laser system. These beams are formed by specular reflections of the main beam at polished surfaces such as lenses or beam splitters. While weaker than the main beam, such beams may still carry sufficient intensity to cause eye damage.

Laser beams are powerful enough to burn skin, clothing or paint even at some distance. They can ignite volatile substances such as alcohol, gasoline, ether and other solvents, and can damage light-sensitive elements in video cameras, photomultipliers and photodiodes. The user is advised to follow the precautions below.

**Recommended
Precautions and
Guidelines**

1. Observe all safety precautions in the preinstallation and/or Operator's Manuals.
2. All personnel should wear laser safety glasses rated to protect against the specific wavelengths being generated. Protective eye wear vendors are listed in the *Laser Focus World*, *Lasers and Optronics*, and *Photonics Spectra* buyer's guides. Consult the ANSI, ACGIH, or OSHA standards listed at the end of this section for guidance.
3. Avoid wearing watches, jewelry, or other objects that may reflect or scatter the laser beam.
4. Stay aware of the laser beam path, particularly when external optics are used to steer the beam.
5. Provide enclosures for beam paths whenever possible.
6. Use appropriate energy-absorbing targets for beam blocking.
7. Block the beam before applying tools such as Allen wrenches or ball drivers to external optics.

8. Limit access to the laser to qualified users who are familiar with laser safety practices. When not in use, lasers should be shut down completely and made off-limits to unauthorized personnel.
9. Use the laser in an enclosed room. Laser light may remain collimated over long distances and therefore presents a potential hazard if not confined. It is good practice to operate the laser in a room with controlled access.
10. Post warning signs in the area of the laser beam to alert those present.
11. Exercise extreme caution when using solvents in the area of the laser.
12. Never look directly into the laser light source or at scattered laser light from any reflective surface. Never sight down the beam.
13. Set up the laser so that the beam height is either well below or well above eye level.
14. Avoid direct exposure to the laser light. Laser beams can easily cause flesh burns or ignite clothing.
15. Advise all those working with or near the laser of these precautions.



NOTICE!

Laser safety glasses protect the user from eye damage by blocking light at the laser wavelengths. However, this also prevents the operator from seeing the beam. Use extreme caution even while wearing safety glasses.

Electrical Safety

The Legend Elite uses AC and DC voltages in the laser head and controller. All units are designed to be operated with protective covers in place. Certain procedures in this manual require removal of the protective covers. These procedures shall be used by a qualified trained service personnel. Safety information contained in the procedures must be strictly observed by anyone using the procedures.

The Legend Elite controller should be connected to the AC input using a certified 3 conductor power cord, < 10 ft length, rated for at least 10 A operation, with a 16 AWG conductor. The power cord provided in the ship kit is rated for 1625 W.



DANGER!

Normal operation of the Legend Elite does not require access to dangerous electrical voltage. Removing the Pockels cell covers will expose the user to electrical hazards. These covers are labeled with the electrical hazard symbol shown to the left.

**Recommended
Precautions and
Guidelines**

The following precautions must be observed by anyone working with potentially hazardous electrical circuitry:

1. Disconnect main power lines before working on any electrical equipment when it is not necessary for the equipment to be operating.
2. Do not short or ground the power supply output. Protection against possible hazards requires proper connection of the ground (earth) terminal on the power cable, and an adequate external ground. Check these connections at the time of installation, and periodically thereafter.
3. Never work on electrical equipment unless there is another person nearby who is familiar with the operation and hazards of the equipment, and who is competent to administer first aid.
4. When possible, keep one hand away from the equipment to reduce the danger of current flowing through the body if a live circuit is touched accidentally.
5. Always use approved, insulated tools.
6. Special measurement techniques are required for this system. A technician who has a complete understanding of the system operation and associated electronics must select ground references.

**Component
Lasers**

The Legend Elite system incorporates a Coherent Evolution™ and Coherent Vitara laser as components, or other compatible lasers. The beams from these lasers are hazardous. Refer to the Evolution, Vitara, or respective other Operator's Manual for additional safety information.

Designated Use

The Legend Elite system has been built in accordance with state-of-the-art standards and recognized safety rules. Nevertheless, its use may constitute a risk to life and limb of the user or of third parties or cause damage to other material property.

The laser system shall only be used within its designated use and the instructions set out in this manual, and only by safety conscious persons who are fully aware of the risks involved in operating the laser system. Any functional disorders, especially those affecting the safety of the laser system, should therefore be rectified immediately.

The Legend Elite system is a mode-locked ultrafast laser amplifier designed for use in scientific applications and environments. Using the laser system for purposes other than those mentioned above is considered contrary to its designated use. The manufacturer/supplier cannot be held liable for any damage resulting from such use. The risk of such misuse lies entirely with the user.

Operating the laser system within the limits of its designated use also involves observing the instructions set out in this manual and complying with the inspection and maintenance directives.

Maximum Accessible Radiation Level

The Legend Elite produces visible and invisible radiation over a wavelength range of 700 to 900 nm, with a maximum energy of 15 mJ per < 40 fs pulse [CFR 1040.10 (h)(2)/ EN 60825-1/ IEC 608225-1, Clause 6]. Refer to the pump and seed laser Operator's Manuals for maximum radiation levels from these lasers.

Safety Features and Compliance with Government Requirements

The following features are incorporated into the instrument to conform to several government requirements. The applicable United States Government requirements are contained in 21 CFR, Subchapter J, part 1040 administered by the Center for Devices and Radiological Health (CDRH). The European Community requirements for product safety are specified in the Low Voltage Directive (LVD) (published in 73/23/EEC and amended in 93/68/EEC). The Low Voltage Directive requires that lasers comply with the standard EN 61010-1/IEC 61010-1 "Safety Requirements For Electrical Equipment For Measurement, Control and Laboratory Use" and EN 60825-1/IEC 60825-1 "Safety of Laser Products". Compliance of this laser with the LVD requirements is certified by the CE mark.



NOTICE!

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

Laser Classification

Governmental standards and requirements specify that the laser must be classified according to the output power or energy and the laser wavelength. The Legend Elite is classified as Class IV based on 21 CFR, Subchapter J, part 1040, section 1040.10 (d). According to the European Community standards, Legend Elite lasers are classified as Class 4 based on EN 60825-1/IEC 60825-1, clause 9. In this manual, the classification will be referred to as Class 4.

Protective Housing

The laser head is enclosed in a protective housing that prevents human access to radiation in excess of the limits of Class I radiation as specified in the 21CFR, Part 1040 Section 1040.10 (f)(1) and Table 1-A/EN 60825-1/IEC 60825-1 clause 4.2 except for the output beam, which is Class 4.

Safety Interlocks

The system incorporates multiple safety interlocks which activate when the top cover(s) of the laser head is removed. An interlock fault initiation will terminate the pump laser by activating a shutter mechanism as well as removing power from the infrared diodes in the pump laser power supply. While active, the interlock defeats are directly visible by anyone near the laser. It is not possible to replace the laser cover while the interlocks are active.

The laser interlocks should be defeated only for the purpose of maintenance and service by trained personnel. Extreme caution must always be observed when operating the laser with its covers removed [CFR 1040.10 (f)(2)/ EN 60825-1/IEC 60825-1, Clause 4.3].

Operating Controls

The laser controls are positioned so that the operator is not exposed to laser emission while manipulating the controls [CFR 1040.10(f)(7)/EN 60825-1/IEC 60825-1, clause 4.8].

Display Screen

The display screen on the operating computer may be viewed without exposing the operator to laser emission [CFR 1040.10(f)(8)/EN 60825-1/IEC 60825-1, clause 4.9].

Location of Safety Labels

Refer to Figure 1-6 for the location of all safety labels. These include warning labels indicating removable or displaceable protective housings, apertures through which laser radiation is emitted, and labels of certification and identification [CFR 1040.10(g), CFR 1040.2, and CFR 1010.3/ EN 60825-1/IEC 60825-1, Clause 5].

Electromagnetic Compatibility

The European requirements for Electromagnetic Compliance (EMC) are specified in the EMC Directive (published in 89/336/EEC).

Conformance to the EMC requirements is achieved through compliance with the harmonized standard EN61326-1.

Compliance of this laser with the EMC requirements is certified by the CE mark.

Environmental Compliance

RoHS Compliance

The RoHS directive restricts the use of certain hazardous substances in electrical and electronic equipment. All components of the Legend Elite system are RoHS compliant.

China-RoHS Compliance

The China-RoHS directive restricts the use of certain hazardous substances in electrical and electronic equipment. Refer to the figures below for product components that are China-RoHS compliant.

Waste Electrical and Electronic Equipment (WEEE, 2002)

The European Waste Electrical and Electronic Equipment (WEEE) Directive (2002/96/EC) is represented by a crossed-out garbage container label and is part of the China-RoHS label. The purpose of this directive is to minimize the disposal of WEEE as unsorted municipal waste and to facilitate its separate collection.

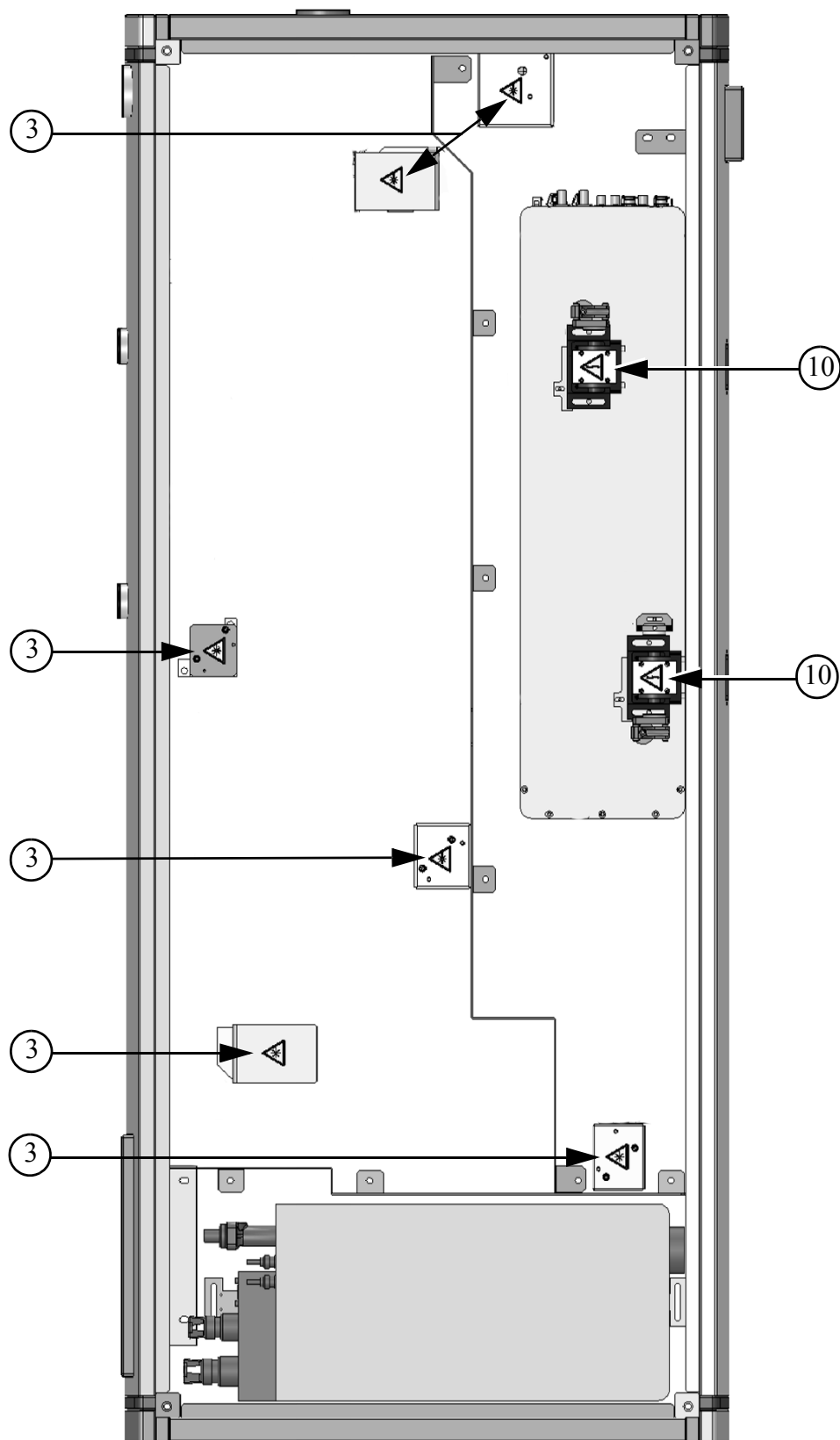


Figure 1-1. Legend Elite HE+ Femto/Pico Safety Labels (Covers Removed)

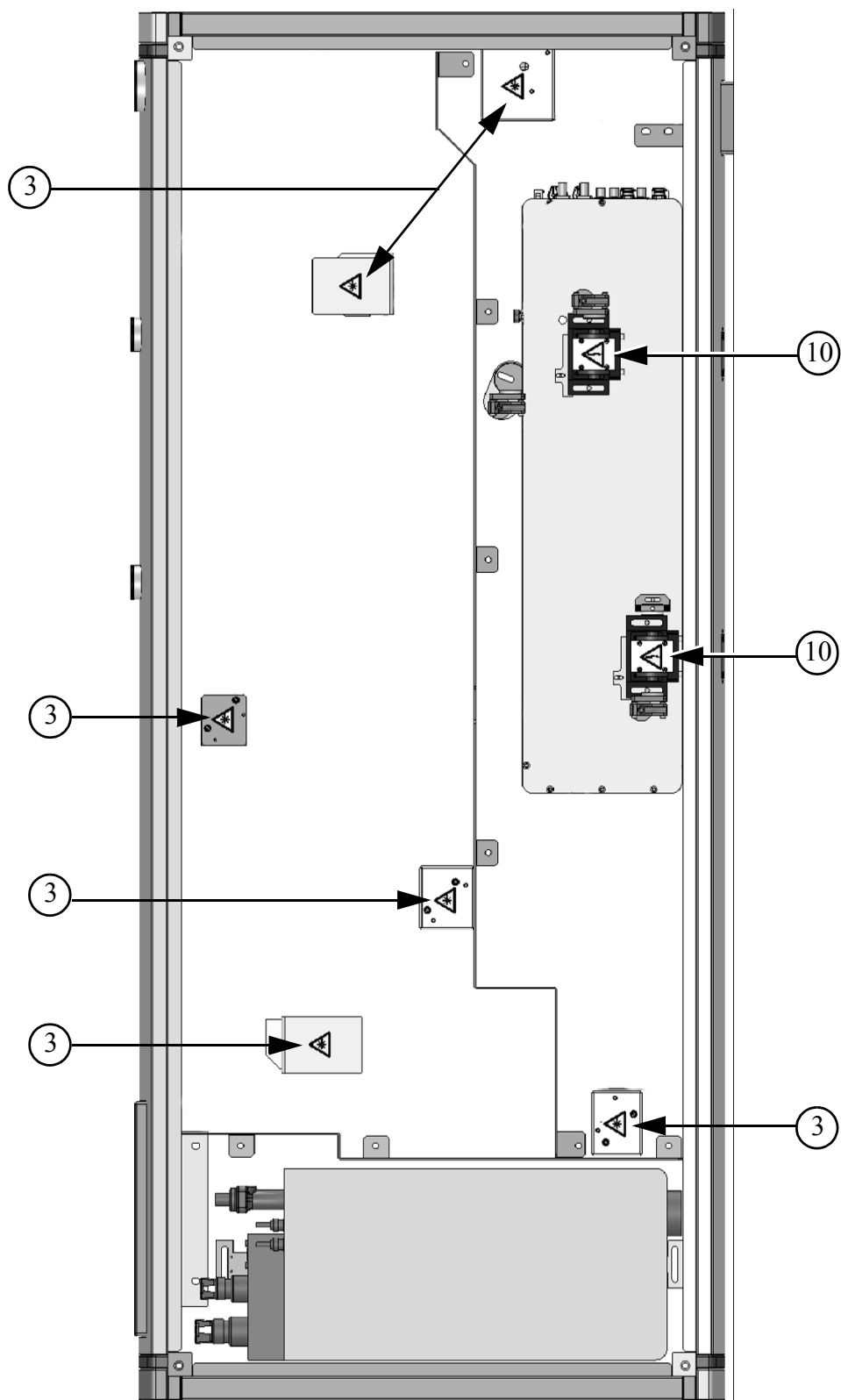


Figure 1-2. Legend Elite HE+ USP Safety Labels (Covers Removed)

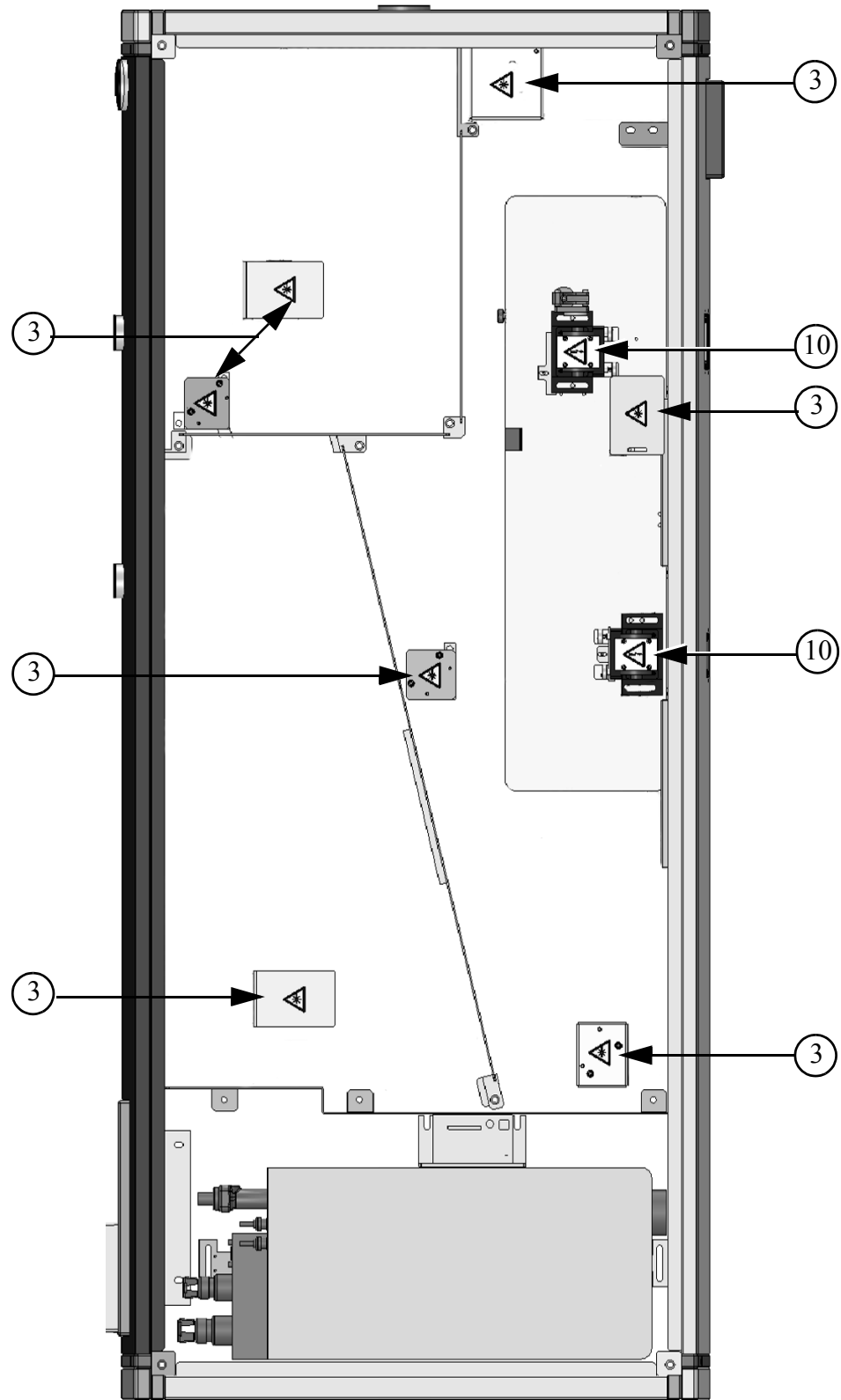


Figure 1-3. Legend Elite HE+ USX Safety Labels (Covers Removed)

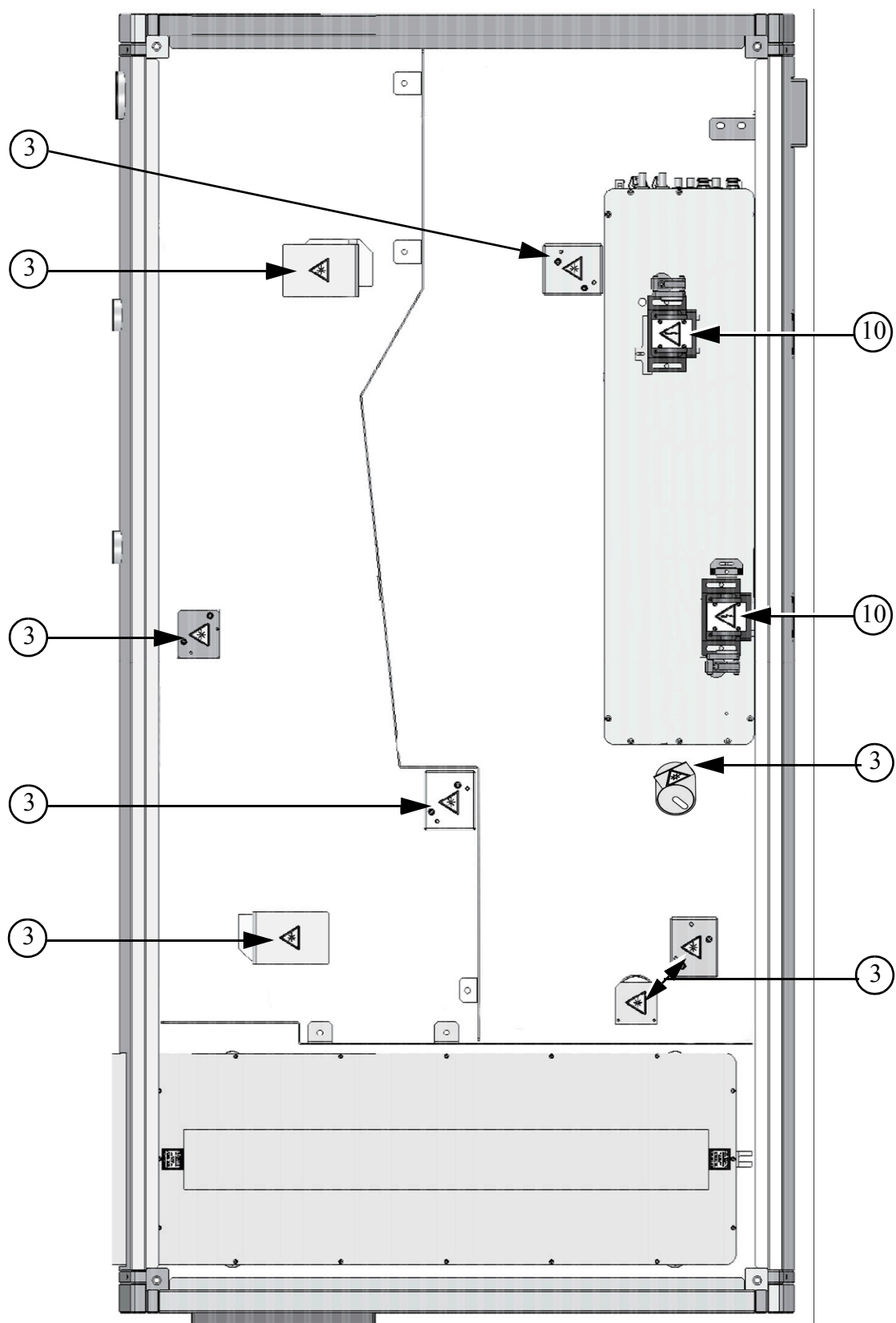


Figure 1-4. Legend Elite Duo HE+ Femto/Pico Safety Labels (Covers Removed)

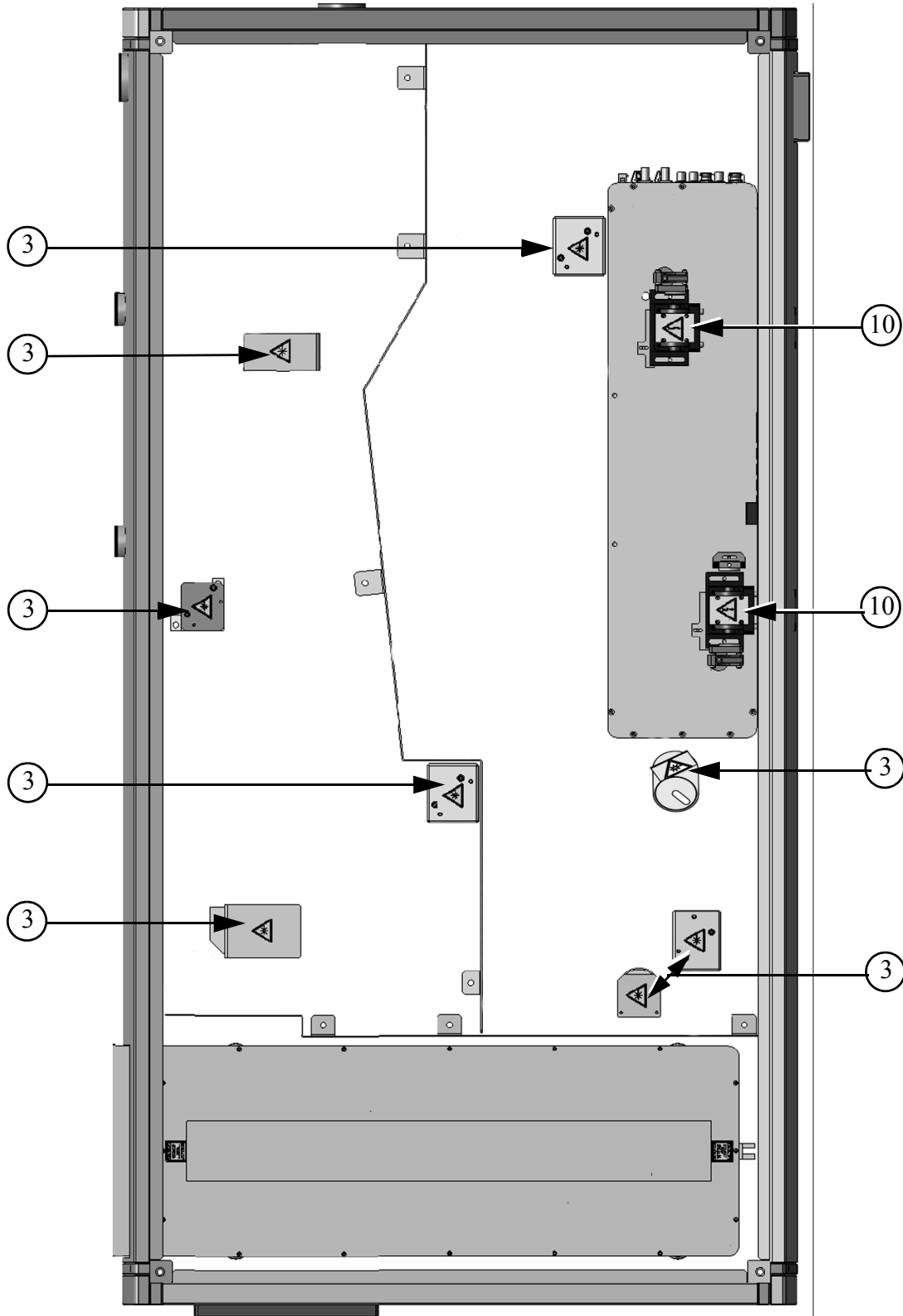
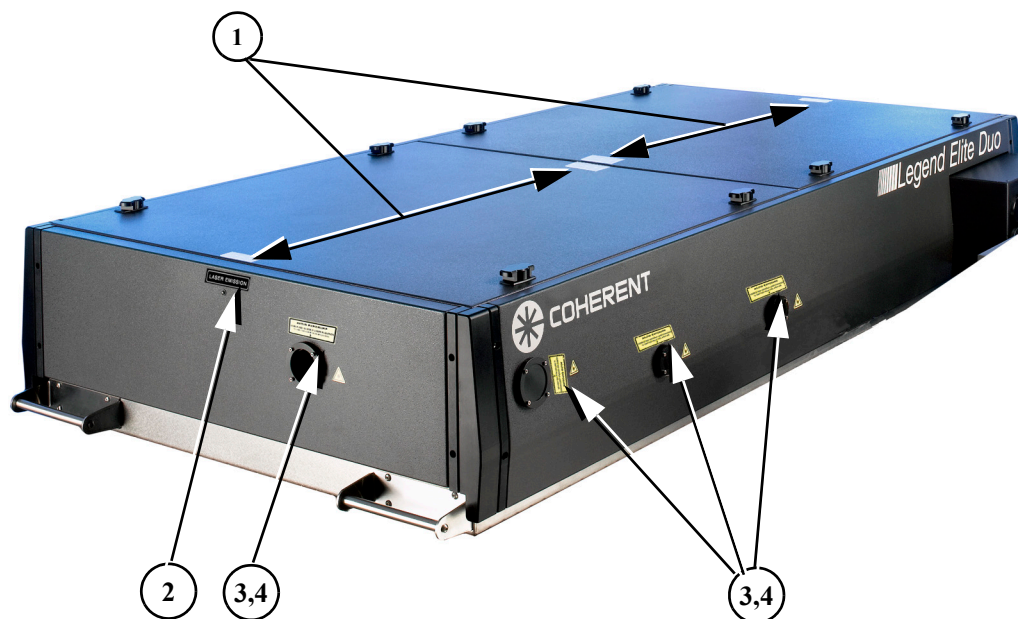
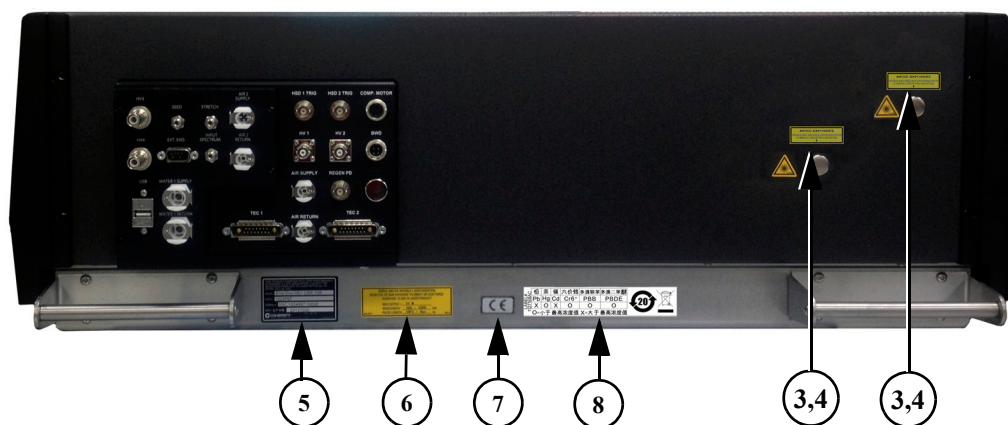


Figure 1-5. Legend Elite Duo HE+ USP/USX Safety Labels (Covers Removed)



LEGEND ELITE OPTICAL BENCH ASSEMBLY

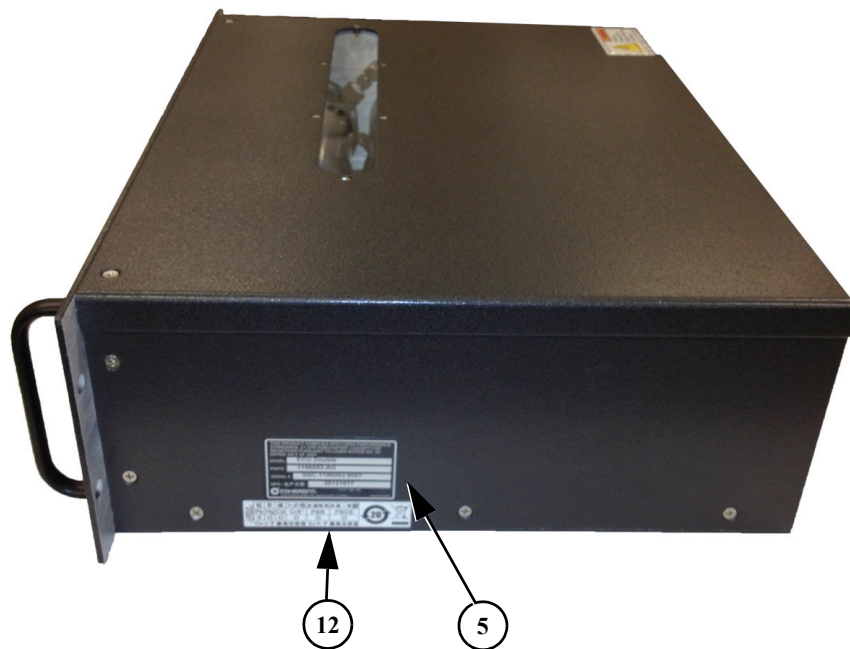


LEGEND ELITE OPTICAL BENCH ASSEMBLY REAR PANEL

Figure 1-6. Legend Elite HE+ Safety Labels (Sheet 1 of 4)



ENVIRONMENTAL CONTROL UNIT (ECU) REAR PANEL



ECU SIDE PANEL



1. HEAD COVER WARNING LABEL

Figure 1-6. Legend Elite HE+ Safety Labels (Sheet 2 of 4)



2. LASER EMISSION POSSIBLE INDICATOR LABEL



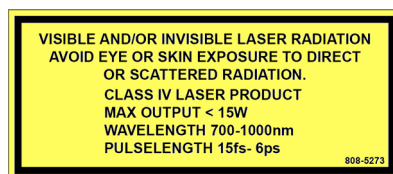
3. RADIATION EXPOSURE WARNING LABEL



4. EXIT APERTURE WARNING LABEL



5. SERIAL NUMBER LABEL



6. MAXIMUM RADIATION LABEL



7. CE LABEL

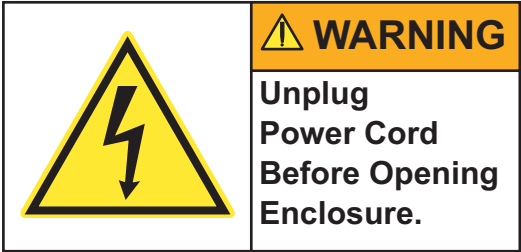
Figure 1-6. Legend Elite HE+ Safety Labels (Sheet 3 of 4)

1127166AC	铅	汞	镉	六价铬	多溴联苯	多溴二苯醚
	Pb	Hg	Cd	Cr6 ⁺	PBB	PBDE
	X	O	X	O	O	O

O=小于最高浓度值 X=大于最高浓度值



8. CHINA ROHS LABEL, LASER HEAD



9. UNPLUG POWER CORD ELECTRICAL WARNING LABEL



10. ELECTRICAL EXPOSURE WARNING LABEL



11. IMPORTANT WARNING LABEL

LABEL # 1127166AC	铅	汞	镉	六价铬	多溴联苯	多溴二苯醚
	Pb	Hg	Cd	Cr6 ⁺	PBB	PBDE
	X	O	O	O	O	O

O=小于最高浓度值 X=大于最高浓度值



12. CHINA ROHS LABEL, ECU

Figure 1-6. Legend Elite HE+ Safety Labels (Sheet 4 of 4)

Sources of Additional Information

The following are sources for additional information on laser safety standards and safety equipment and training.

Laser Safety Standards

Safe Use of Lasers (Z136.1)
American National Standards
Institute (ANSI)
1430 Broadway
New York, NY 10018
Tel: (212) 354-3300

*Occupational Safety and Health
Administration* (OSHA)
U.S. Department of Labor
200 Constitution Avenue N.W.
Washington, DC 20210

A Guide for Control of Laser Hazards
American Conference of Governmental
and Industrial Hygienists (ACGIH)
6500 Glenway Avenue, Bldg. D-7
Cincinnati, OH 45211
Tel: (513) 661-7881

Laser Safety Guide
Laser Institute of America
12424 Research Parkway, Suite 130
Orlando, FL 32826
Tel: (407) 380-1553

Equipment and Training

Laser Focus Buyer's Guide
Laser Focus World
One Technology Park Drive
P.O. Box 989
Westford, MA 01886-9938
Tel: (508) 692-0700

Photonics Spectra Buyer's Guide
Photonics Spectra
Berkshire Common
Pittsfield, MA 01202-4949
Tel: (413) 499-0514

Lasers and Optronics Buyer's Guide
Lasers and Optronics
301 Gibraltar Dr.
P.O. Box 650
Morris Plains, NJ 07950-0650
Tel: (210) 292-5100

SECTION TWO: DESCRIPTION AND DIMENSIONS

Legend Elite Family of Amplifiers

Coherent Legend Elite HE+ and Legend Elite Duo HE+ amplifiers represent the forefront of commercial ultrafast pulse generation. Efficient amplification, short pulse duration, and excellent stability are achieved through a combination of proprietary Coherent technologies.

The Chirped Pulse Amplification scheme of the Coherent Legend™ series has led the field of kilohertz regenerative amplification for more than ten years. The Legend Elite builds on this technology to enhance performance and reliability, while making the system easier to install and maintain.

A key feature of the Legend Elite is the incorporation of the Coherent Evolution™ pump laser into one box with the stretcher, regenerative amplifier, and compressor. This enhances pulse stability and saves space.



Figure 2-1. Legend Elite HE+ & DUO HE+ Laser Head with Seed

Legend Elite HE+ The Legend Elite HE+ amplifier offers the highest power available from a regenerative amplifier. The laser now offers power (up to > 6 W) from a regen-only ultrafast amplifier using thermo-electric cooling of the proprietary laser rod design. All Legend Elite HE+ lasers use a single Coherent Evolution pump laser.

Legend Elite Duo HE+ Legend Elite DUO HE+ models achieve power levels previously available only through cryogenic cooling. A single-pass amplifier (SPA) stage is added between the regen and compressor, and the two Titanium:Sapphire crystals are thermo-electrically cooled. A single Coherent Evolution-HE (High-Energy) laser provides the pump energy for most Legend Elite DUO HE+ systems. An additional pump laser is configured for power and energy-hungry applications.

Legend Elite Pulse Width & RepRate Options All Legend Elite lasers are available in 4 different pulse width configurations - P (500 to 1500 fs), F (< 130 fs), USP (< 35 fs), and USX (< 25 fs). See data sheet specifications for details. USX models extend Legend Elite performance to shorter pulse widths using proprietary components included in the stretcher, amplifier, and compressor; and software is provided for spectral analysis of the increased bandwidth of these systems.

All Legend Elite lasers are also available in multiple kilo-hertz repetition rates. See data sheet specifications for details.

Fiber Optic Spectrometer (USX Models) Legend Elite USX systems include a spectrometer and three individual fibers inside the optical bench assembly. An optical fiber “jumper” on the side panel allows selection of the seed laser spectrum, the stretched spectrum, or the amplified spectrum before compression.

Flipper Mirror SM14 This optic provides for convenient monitoring of the stretched spectrum before amplification. To view the stretched spectrum, move SM14 into the beam. For normal operation, verify that SM14 is out of the beam.

System Specifications The Legend Elite is available in a number of models which offer distinct energy levels, pulse widths, and repetition rates. A complete list of specifications for all Coherent products may be found at www.Coherent.com.

Primary System Components

A complete Legend Elite system includes the following major subassemblies:

- Legend Elite optical bench assembly, including an integrated Coherent Evolution pump laser
- Evolution power supply
- Closed-loop water chiller for seed and pump laser
- Synchronization & Delay Generator (SDG)
- Environmental Control Unit (ECU) for systems with more than 30 W of Evolution pump power. See “Crystal Housing and Environmental Control Unit (ECU)” below.
- Laptop computer and control software
- An external seed laser, most commonly the Coherent Vitara.
- External, additional Evolution pump laser for specific Legend Elite DUO HE+ models.

Additional Documentation

Preinstallation manuals or operator manuals are available for all of major subassemblies. Refer to the respective subassembly documentation for additional information. Dimensional drawings are shown in this preinstallation manual for the Evolution power supply, SDG, ECU, and Vitara seed laser.

Crystal Housing and Environmental Control Unit (ECU)

In Legend Elite systems with more than 30 W of pump power, and even some systems with 30 W or less, the regen laser crystal is held at low temperature to maintain excellent mode quality at elevated pump power. This in turn requires a dry environment to prevent condensation and/or ice formation on the crystal surface. For these reasons the crystal is mounted on a thermoelectric cooler (TEC) and enclosed in a sealed housing. The ECU monitors and controls the temperature of the TEC, and conditions the air flow through the crystal assembly in a closed loop. The design includes a fault notification for high humidity inside the housing.

Legend Elite DUO HE+ models include a second ECU which applies the same features to both the regen and single-pass-amplifier laser crystals.



WARNING!

NEVER remove the ECU unit covers if the power cord is plugged into the wall outlet. Switching the unit off is **NOT** sufficient and hazardous voltages may still be present in the unit.

Laptop Computer and Control Software

Each Legend Elite is shipped with a stand-alone computer including all control software. Coherent strongly recommends that the computer remain solely dedicated to operation of the Legend Elite.

Dimensions

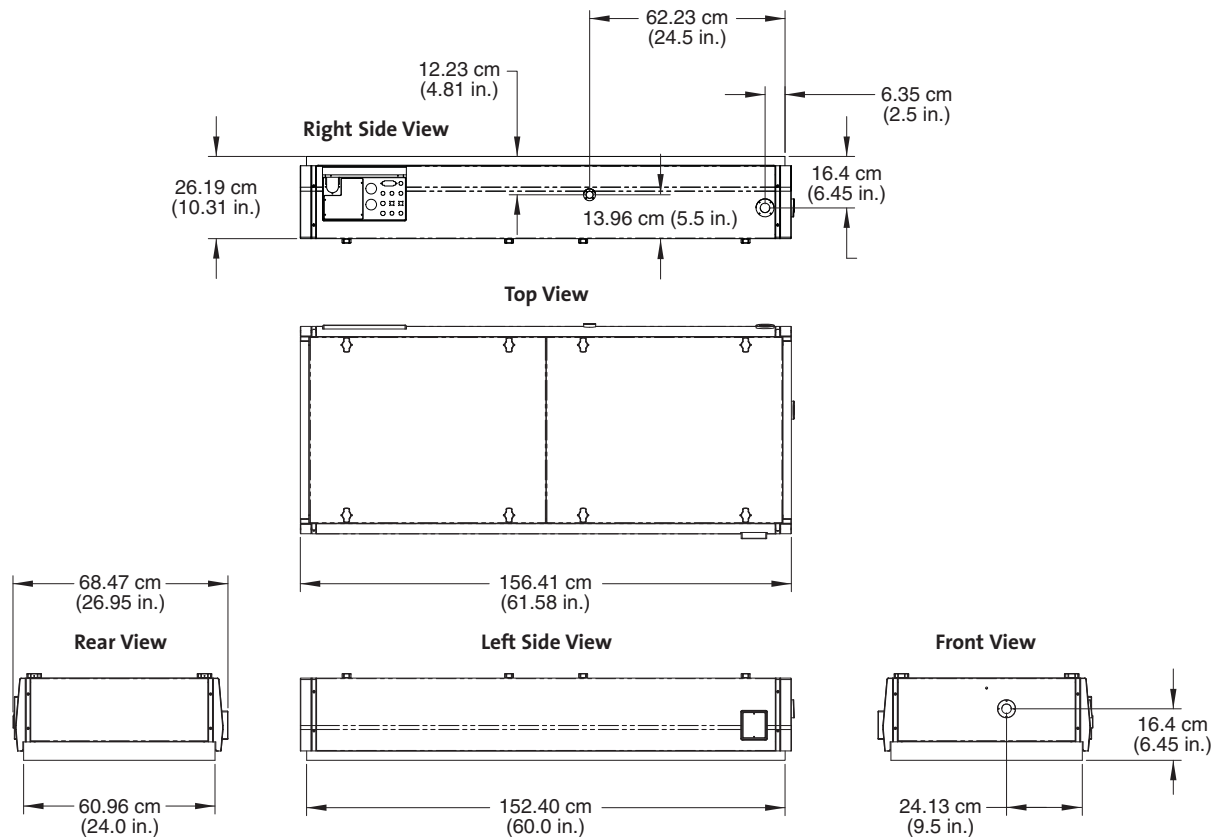
Figure 2-2 provides the dimensions of the Legend Elite HE+ optical bench assembly, while Figure 2-3 shows the Legend Elite DUO HE+. See the subsequent figures below also show the Vitara laser head, Evolution power supply/controller, SDG, and ECU. See the respective operator manuals or preinstallation manuals for full system dimensions including the chiller. All ECU documentation will be included in the Legend Elite manuals.

Table 2-1. Summary of Dimensions & Weight

SYSTEM COMPONENT	LENGTH	WIDTH	HEIGHT	WEIGHT
LEGEND ELITE HE+	156.41 cm 61.58 in.	60.96 cm 24.0 in.	26.19 cm 10.31 in.	133.58 kg. 294.5 lbs.
LEGEND ELITE DUO HE+	156.41 cm 61.58 in.	94.93 cm 37.37 in.	26.19 cm 10.31 in.	187.11 kg. 412.5 lbs.
VITARA-T & VITARA-S LASER HEAD	60.96 cm 24 in.	42.75 cm 16.83 in.	16.24 cm 6.39 in.	63 kg. 140 lbs.
VITARA-T & VITARA-S CONTROLLER	36.3 cm 14.3 in.	23.4 cm 9.2 in.	13.7 cm 5.4 in.	3.4 (T) / 7.7 (S) kg. 13.2 / 17.0 lbs.
VITARA-T & VITARA-S POWER SUPPLY	36.1 cm 14.2 in.	22.9 cm 9.0 in.	16.0 cm 6.3 in.	6.0 kg. 7.5 lbs.
VITARA-T & VITARA-S CHILLER	27.7 cm 10.9 in.	20.3 cm 8.0 in.	38.6 cm 15.2 in.	8.8 kg. 19.4 lbs.
EVOLUTION POWER SUPPLY	43.68 cm 17.2 in.	21.59 cm 8.5 in.	16.87 cm 6.64 in.	14 kg. 31 lbs.

Table 2-1. Summary of Dimensions & Weight

SYSTEM COMPONENT	LENGTH	WIDTH	HEIGHT	WEIGHT
EVOLUTION 15/30 EXTERNAL LASER HD, (DUO HE+, II & III)	64.29 cm 25.31 in.	21.59 cm 8.5 in.	16.87 cm 6.64 in.	24 kg. 53 lbs.
EVOLUTION 45/HE EXTERNAL LASER HD, (DUO HE+, II & III)	85.25 cm 33.56 in.	25.4 cm 10.0 in.	18.38 cm 7.24 in.	40 kg. 88 lbs.
EVOLUTION CHILLER	70.1 cm 27.6 in.	36.83 cm 14.5 in.	57.4 cm 22.6 in.	74.39 kg. 164 lbs.
SIGNAL DELAY GENERATOR (SDG)	30.48 cm 12.0 in.	48.26 cm 19.0 in.	8.81 cm 3.47 in.	6.3 kg. 14 lbs.
ENVIRONMENTAL CONTROL UNIT (ECU)	33.52 cm 13.2 in.	48.26 cm 19.0 in.	13.25 cm 5.22 in.	9.5 kg. 21 lbs.

**Figure 2-2. Legend Elite HE+ Optical Bench Assembly Dimensions**

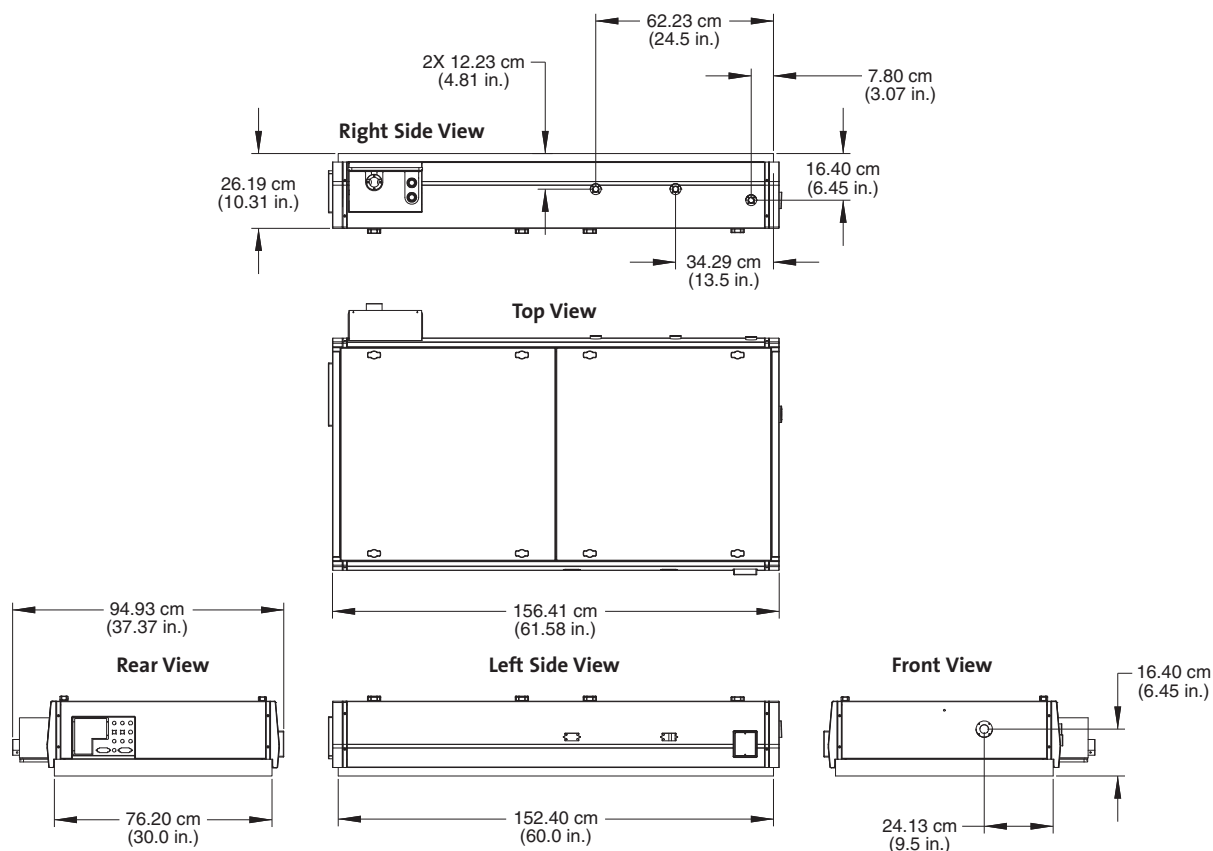


Figure 2-3. Legend Elite Duo HE+ Optical Bench Assembly Dimensions

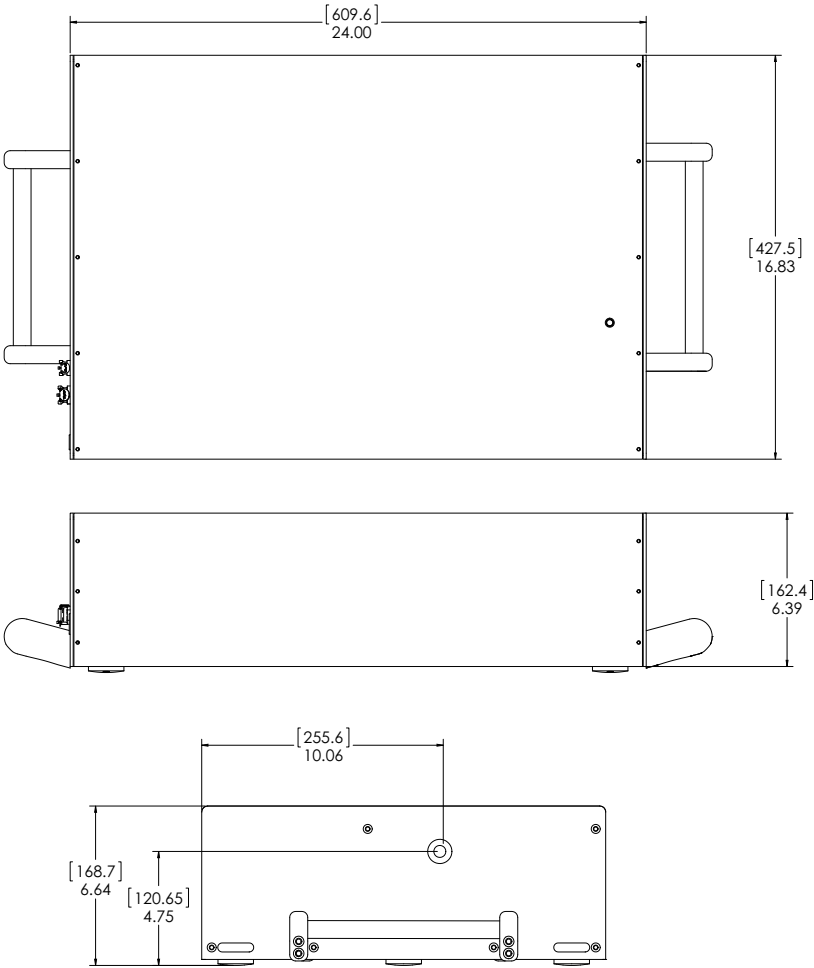


Figure 2-4. Vitara-T & Vitara-S Seed Laser Head Dimensions

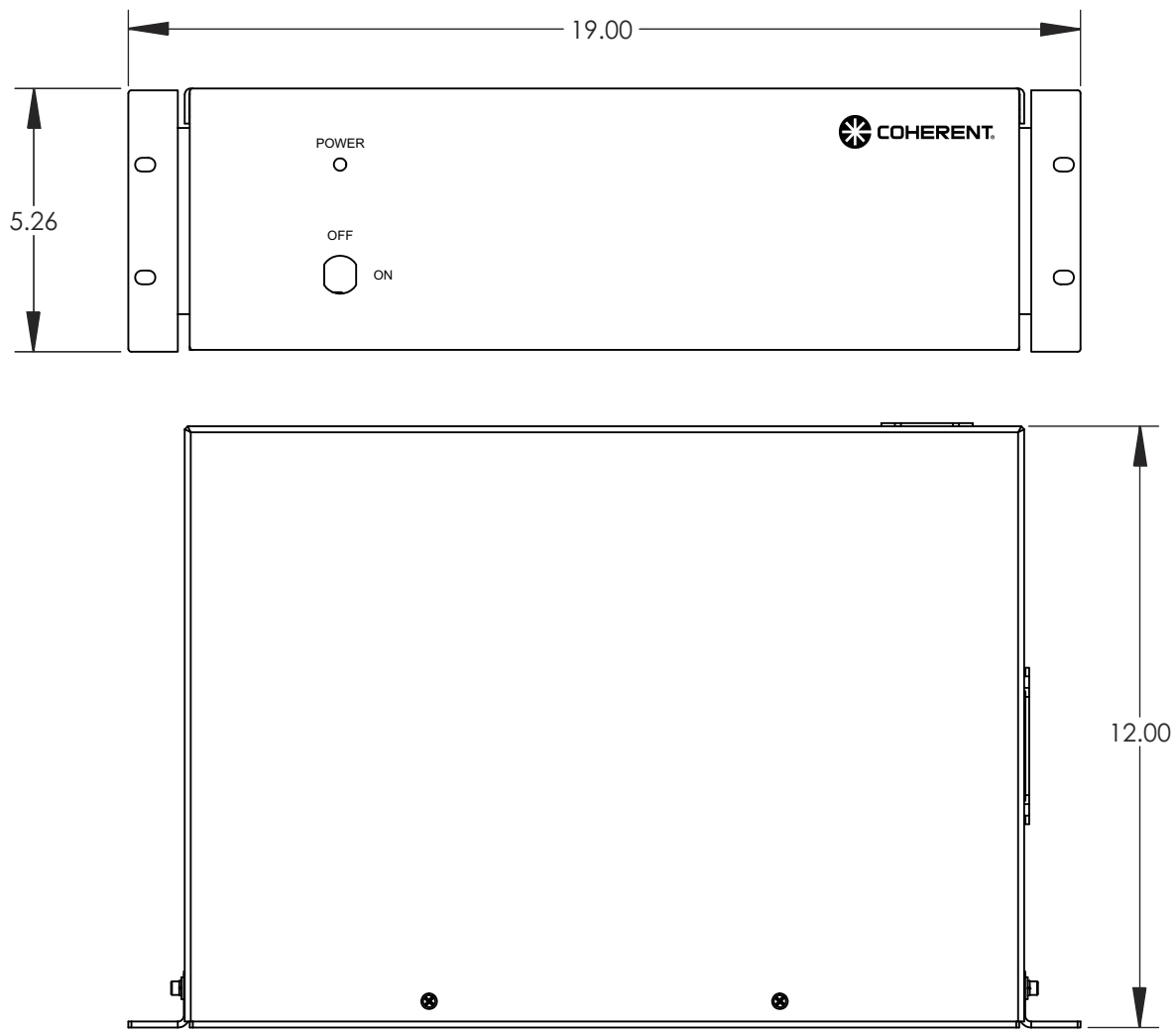


Figure 2-5. Vitara-T & Vitara-S Seed Laser Controller Dimensions

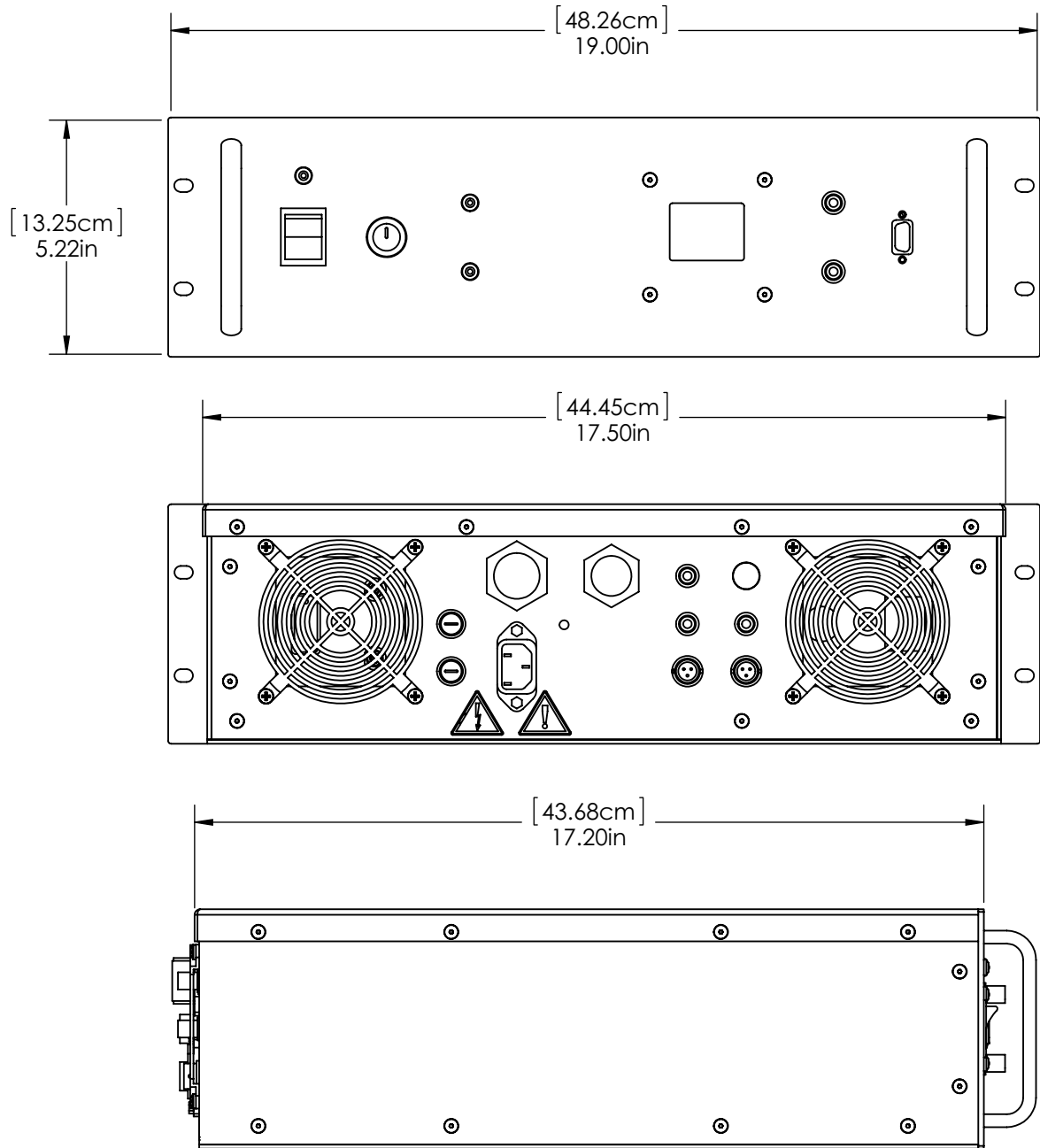


Figure 2-6. Evolution Power Supply/Controller Dimensions

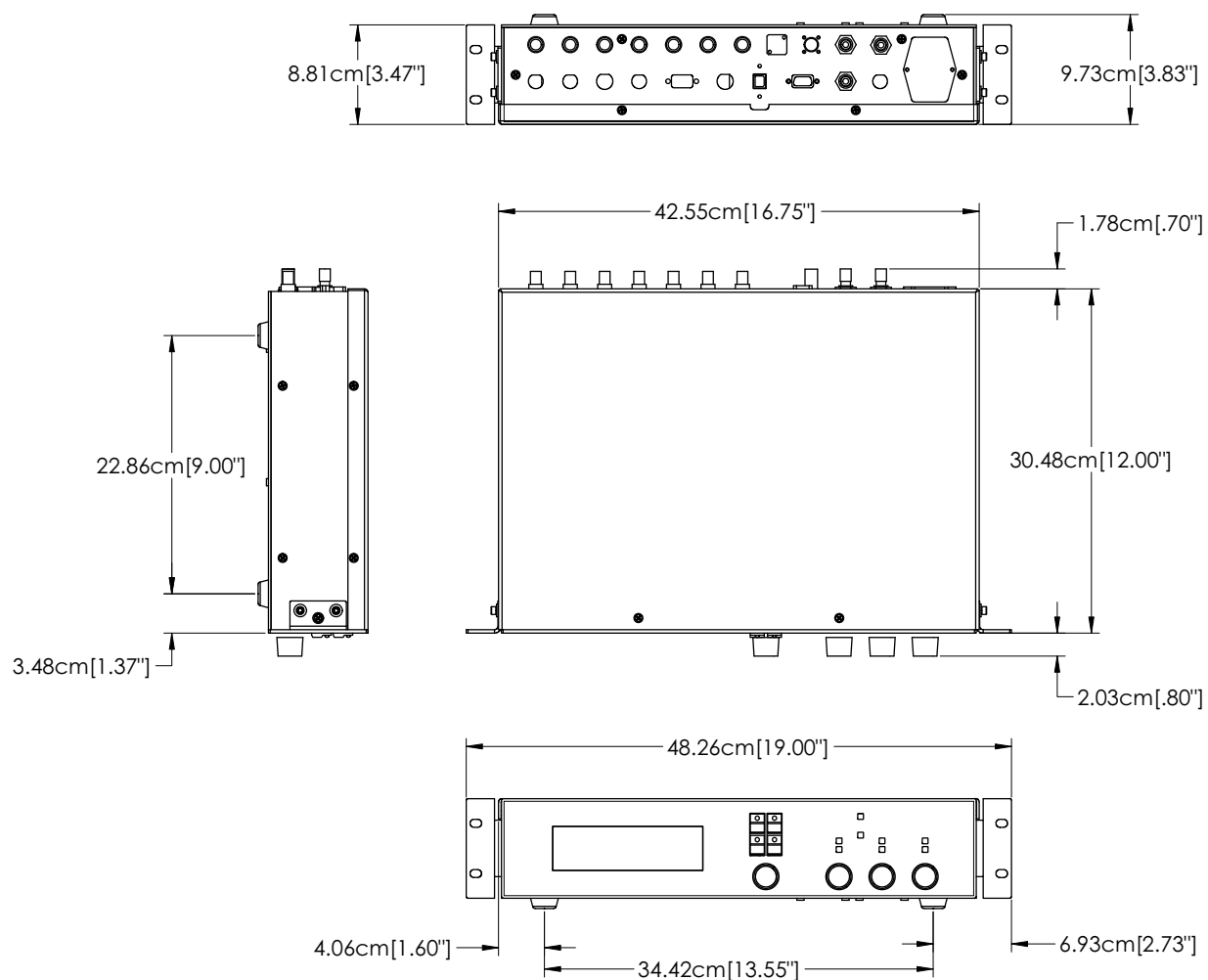


Figure 2-7. Signal Delay Generator (SDG) Dimensions

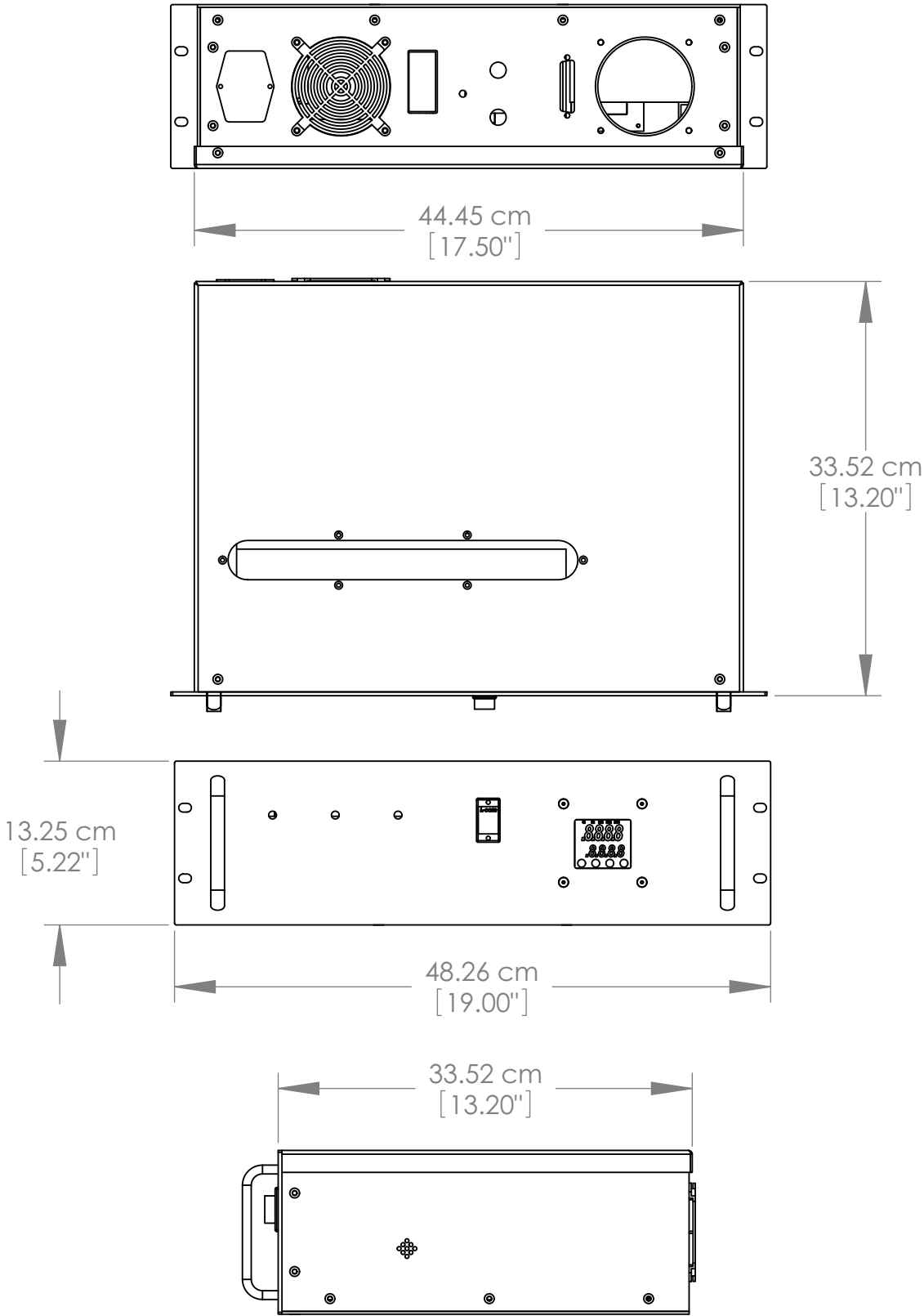


Figure 2-8. Environmental Control Unit (ECU) Dimensions

SECTION THREE: PRE-INSTALLATION & UTILITY REQUIREMENTS

Installation must be performed by a Coherent Field Service Engineer or an authorized representative. Any damage incurred while a Field Service Engineer is not present is not covered under warranty. The customer may, however, unpack and locate the laser in the laboratory where it will be used.

Read this section thoroughly before installation, with particular attention given to the information in Section One: Laser Safety.



NOTICE!

Do not attempt to install the laser without a qualified member of Coherent service or an authorized representative present. Unauthorized installation will void the warranty.

Pump and Seed Lasers

This preinstallation manual offers limited detail on the pump and seed lasers. Refer to the respective Operator's Manual for full details as needed.



NOTICE!

If the pump and seed lasers are not the Coherent Evolution or Vitara, respectively, then the customer must consult with Coherent regarding the required specifications.

Unpacking and Inspection

The Legend Elite was packed carefully and its containers inspected prior to shipment. Upon receipt of the system, inspect the outside of all containers. Carefully unpack all crates in a clean, dry area and inspect all major components. Notify Coherent and the shipping carrier immediately if there appears to be visible damage.



CAUTION!

At least four people or a mechanical lift is recommended to lift and move the Legend Elite optical bench assembly onto a laser table.



CAUTION!

The Legend Elite HE+ and Duo HE+ amplifier systems are heavy. Avoid placing hands or fingers under the laser while it is suspended or moving.

Installation Requirements

Before installing the Legend Elite, use following checklist as shown in Table 3-1.

Table 3-1. Pre-installation Checklist

ACTIVITY & EQUIPMENT	GENERAL REQUIREMENTS	REFERENCE(S)
Laser Environment	☐ Laser area layout planned according to system dimensions. ☐ No strong air currents directed at the laser. ☐ No thermal gradients across the length or height of the laser. ☐ Temperature fluctuations < 2° C.	“Location and Layout” on page 3-3 & “Environmental Requirements” on page 3-4
Receive and Inspect	☐ Area is clean and large enough to uncrate the laser, power supplies and chiller.	“Unpacking and Inspection” on page 3-1
Utility Requirements	☐ Seed Laser ☐ Chiller, Seed Laser ☐ Pump Laser ☐ Chiller, Pump Laser ☐ Signal Delay Generator (SDG) ☐ Environmental Control Unit (ECU): Units with > 30 Watts ☐ Laptop Computer	“Legend Elite Utility Requirements” on page 3-4 &
Chiller	☐ Pump Laser: Premixed Optishield (1.1 gallons, 4.16 liters). ☐ Seed Laser: Steamed Distilled Water with 10% Isopropyl Alcohol (15 Ounces, 444 ml).	“Chiller Fluid Requirements” on page 3-5

Table 3-1. Pre-installation Checklist

ACTIVITY & EQUIPMENT	GENERAL REQUIREMENTS	REFERENCE(S)
Laser Safety	☐ Laser Safety Officer (LSO) identified (recommended). ☐ Laser Personnel Safety Training completed. ☐ Laser controlled area established. ☐ Personal protective equipment (Laser safety eye wear) available. ☐ External interlock system well thought out (optional)	“Section One: Laser Safety” on page 1-1
Lab Equipment and Cleaning Material	See “Laboratory Equipment Requirements” on page 6.	“Laboratory Equipment Requirements” on page 3-6

Location and Layout

The Legend Elite HE+ requires a minimum table space of approximately 0.6 x 1.2 m (2 x 5 ft.), and high power Legend Elite Duo HE+ systems need 0.76 x 1.2m (2.5 x 5 ft.). Additional space is needed for the seed laser and a possible external pump laser for some Duo pump options. Coherent recommends at least a 1.2 x 2.4 m (4 x 8 ft.) table for a complete system.

Consult with Coherent service to determine the best layout for your lasers. It is the responsibility of the customer to provide a location which allows for safe installation, operation, and maintenance. Figure 3-1 shows a typical arrangement for the Vitara and Legend Elite.

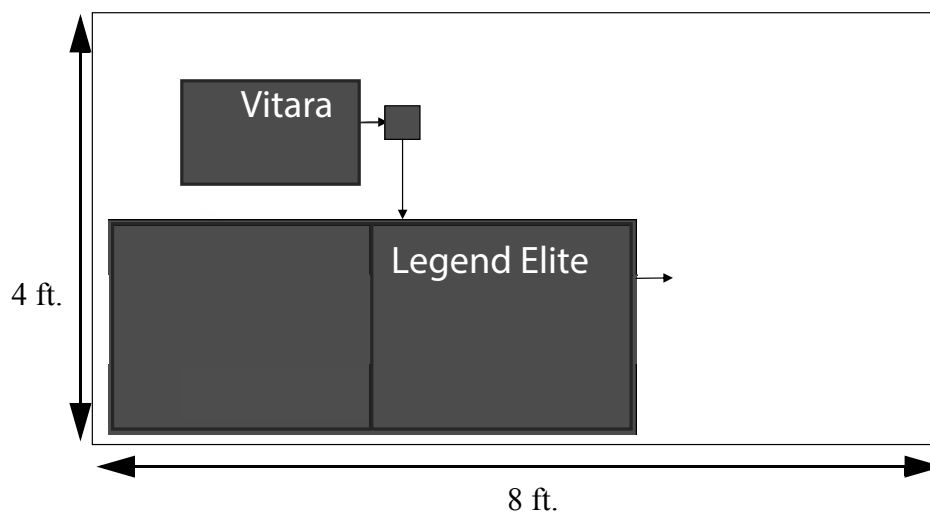


Figure 3-1. Legend Elite with Seed Laser on Recommended 4 ft. by 8 ft. Table

Environmental Requirements

The Legend Elite must rest on an optical table. Coherent highly recommends the system be located in a laboratory environment, which is free of dust and drafts, low in humidity, and stable in temperature. Best performance is realized when temperature fluctuations are $< 2^{\circ}\text{C}$, and there are no air currents directed at the laser or thermal gradients across the length or height of the laser. Use the following table as a seasonal guideline.

Table 3-2. Operation Temperature, Humidity & Stability Guideline

OPERATIONAL TEMPERATURE	TEMPERATURE STABILITY	HUMIDITY	HUMIDITY STABILITY
$22^{\circ}\text{C} \pm 2^{\circ}$ ($71.6^{\circ}\text{F} \pm 2^{\circ}$)	$\pm 1^{\circ}\text{C}$	$45 \pm 10\%$	$\pm 5\%$

Utility Requirements



NOTICE!

Different versions of the Legend Elite have slightly different utility requirements. Consult Coherent Service for additional information.

Table 3-3 lists electrical requirements for and the amount of heat dissipated by a complete Legend Elite system.

Table 3-3. Legend Elite Utility Requirements

COMPONENT ¹	OPERATING VOLTAGE	MAX POWER	FUSE RATING 110 V/220 V
Seed Laser, Vitara-T/S: Vitara controller Vitara power supply Vitara chiller	100-240 VAC, 50-60 Hz 100-240 VAC, 50-60 Hz 90-250VAC, 50-60 Hz	100 VA 750 VA 825 VA	1 A / 0.5 A 8 A / 4 A 10 A / 5 A
Pump Laser, Evolution: 15/30/45 power supply HE power supply Evolution chiller	100-240VAC, 50-60 Hz 200-240VAC, 50-60 Hz 220VAC ($\pm 10\%$), 50-60 Hz	1500 VA	15 A / 10 A 10 A 12 A
Environmental Control Unit Single Duo	100-240 VAC, 50-60 Hz 100-240 VAC, 50-60 Hz	200 VA 400 VA	2 A / 1 A 4 A / 2 A

Table 3-3. Legend Elite Utility Requirements

COMPONENT ¹	OPERATING VOLTAGE	MAX POWER	FUSE RATING 110 V/220 V
SDG Elite	100-240 VAC, 50-60 Hz	200 VA	1 A / 0.5 A
Compressor remote control	negligible	negligible	negligible
Computer			2 A / 1 A
¹ Refer to the respective operator's manual for full details. Some products are not compatible with 110 V operation.			

Table 3-4. Legend Elite Cable & Hose Lengths

MODEL	AC POWER CORD LENGTH	UMBILICAL / WATER LINE LENGTH
Evolution 15/30/45 Power Supply Evolution HE Power Supply	3 m (10 ft.) 2 m (6 ft.)	3 m (10 ft.)
Evolution Chiller	2.4 m (8 ft.)	3 m (10 ft.)
Vitara-T & Vitara-S Power Supply Vitara-T & Vitara-S Controller	3 m (10 ft.)	3 m (10 ft.)
Chiller	2.4 m (8 ft.)	3 m (10 ft.)
SDG Elite	3 m (10 ft.)	N/A
ECU (30 W Pump or More)	2.3 m (7.5 ft.)	3 m (10 ft.)

**NOTICE!**

Consult with the factory for any hoses or cables longer than the standard length. Damage may occur for unauthorized changes.

Chiller Fluid Requirements

Evolution Chiller

The Evolution chiller is a closed loop system that requires premixed Optishield only.

Vitara Chiller

The Vitara chiller is a closed loop system and requires distilled water only.

Laboratory Equipment Requirements

The following equipment is required for installation and daily operation of the Legend Elite:

- Safety glasses rated to protect against wavelengths of 525 to 535 nm, and 700 to 900 nm
- Power meter with 10 W capacity (45 W for entire Evolution beam in High-Energy and Duo systems)
- A spectrometer with a spectral window of 700 to 900 nm
- 300 MHz or better oscilloscope and BNC cable
- IR viewer
- Optic cleaning supplies (lens tissue, hemostats, ultra-pure acetone and methanol, eyedropper)
- Latex or nitrile gloves or finger cots
- External seed routing optics may vary with customer layout as well as the seed laser output characteristics. Consult with Coherent Service before the scheduled installation period.

Subassembly Connection Diagrams

The Legend Elite HE+ and Duo HE+ amplifiers require multiple connections between and among its various components. Figure 3-2 and Figure 3-3 illustrates the Legend Elite HE+ with and without the ECU. Figure 3-4 and Figure 3-5 illustrate the Legend Elite Duo HE+ with different pump laser configurations. All connections and cables are labeled.

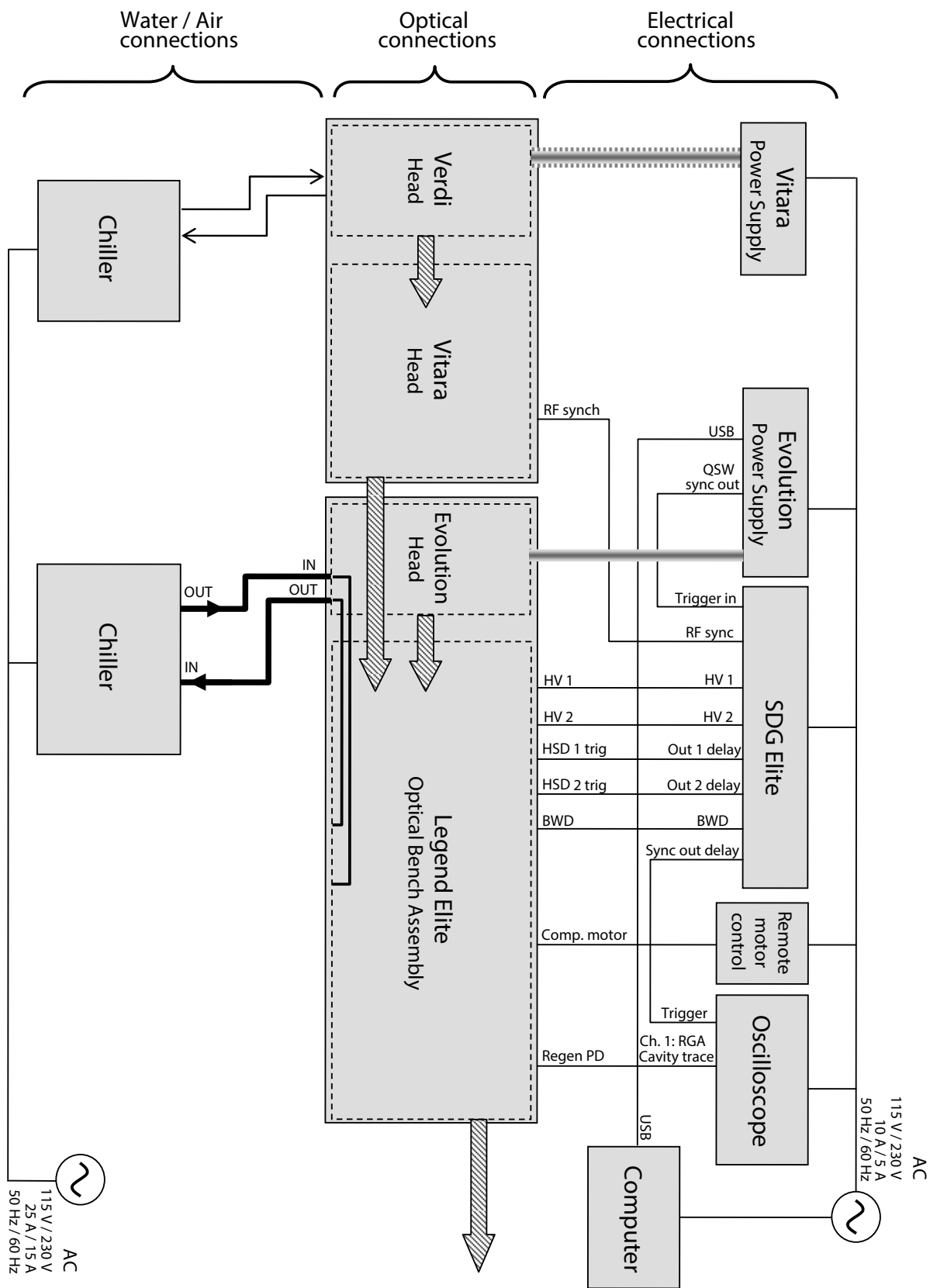


Figure 3-2. Legend Elite HE+ Pump Options I and II (30 Watts Pump or Less) Diagram

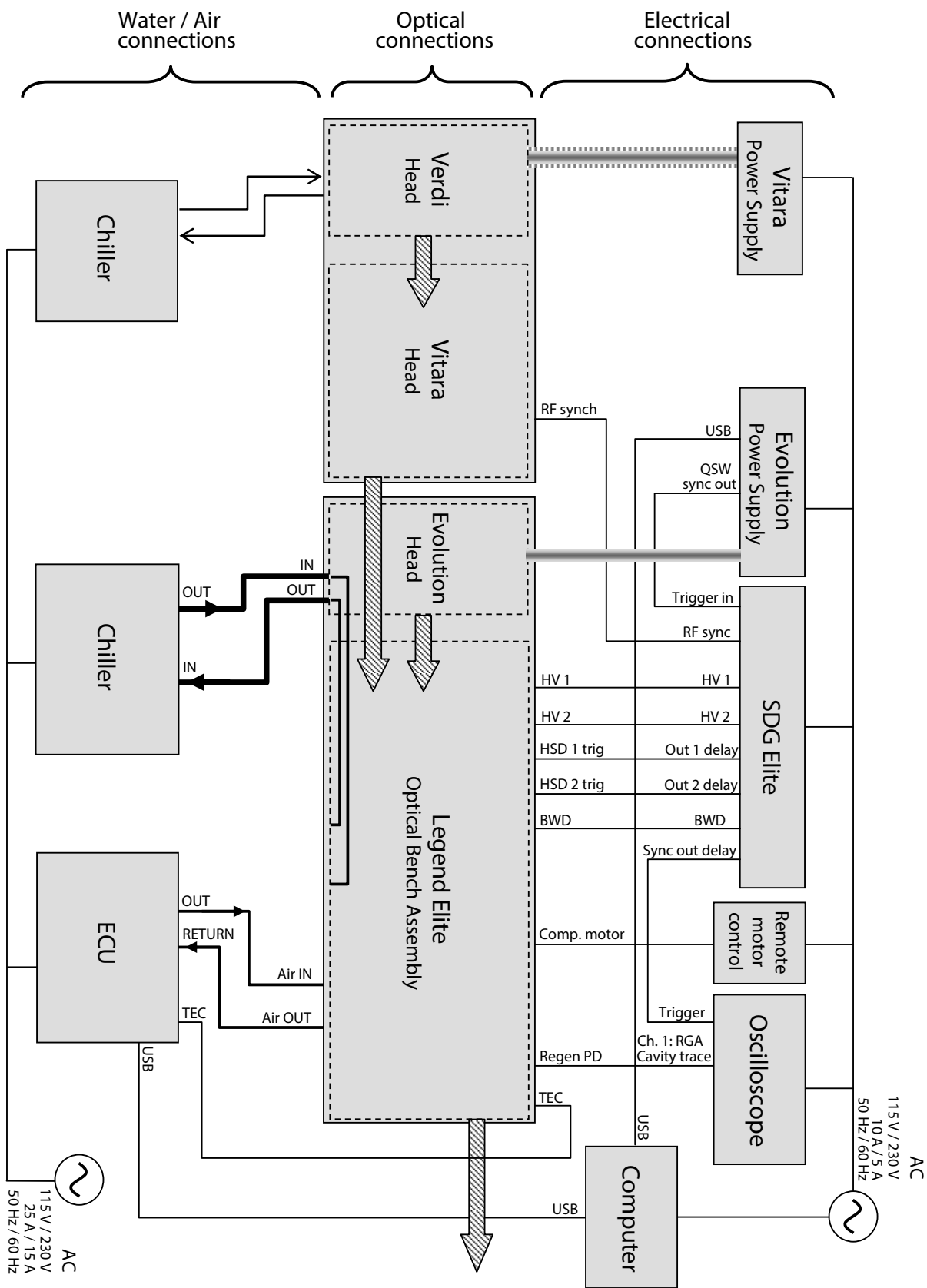


Figure 3-3. Legend Elite HE+ Pump Option III (> 30 Watts Pump) Diagram

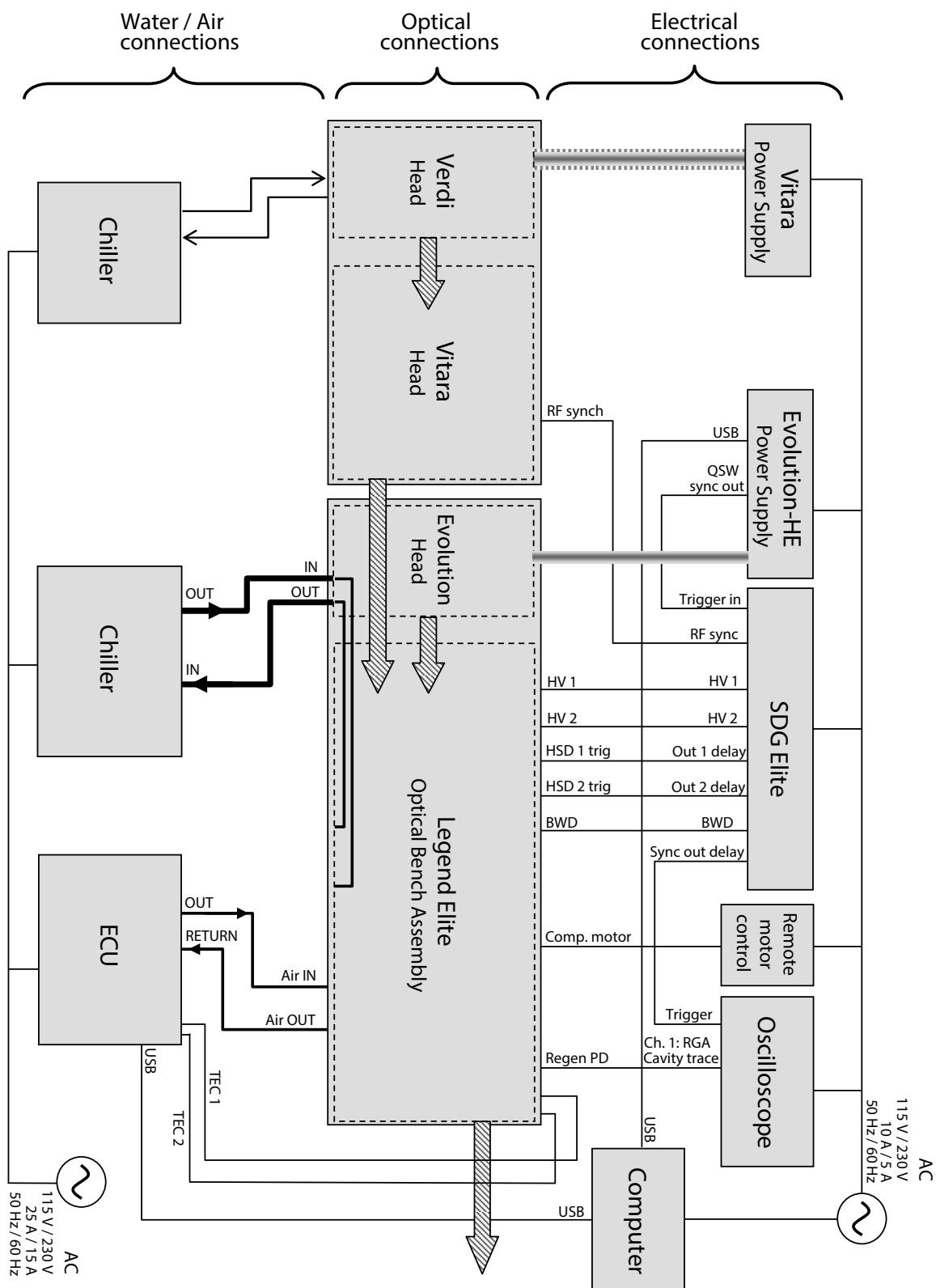


Figure 3-4. Legend Elite Duo HE+ Pump Option 1 Diagram

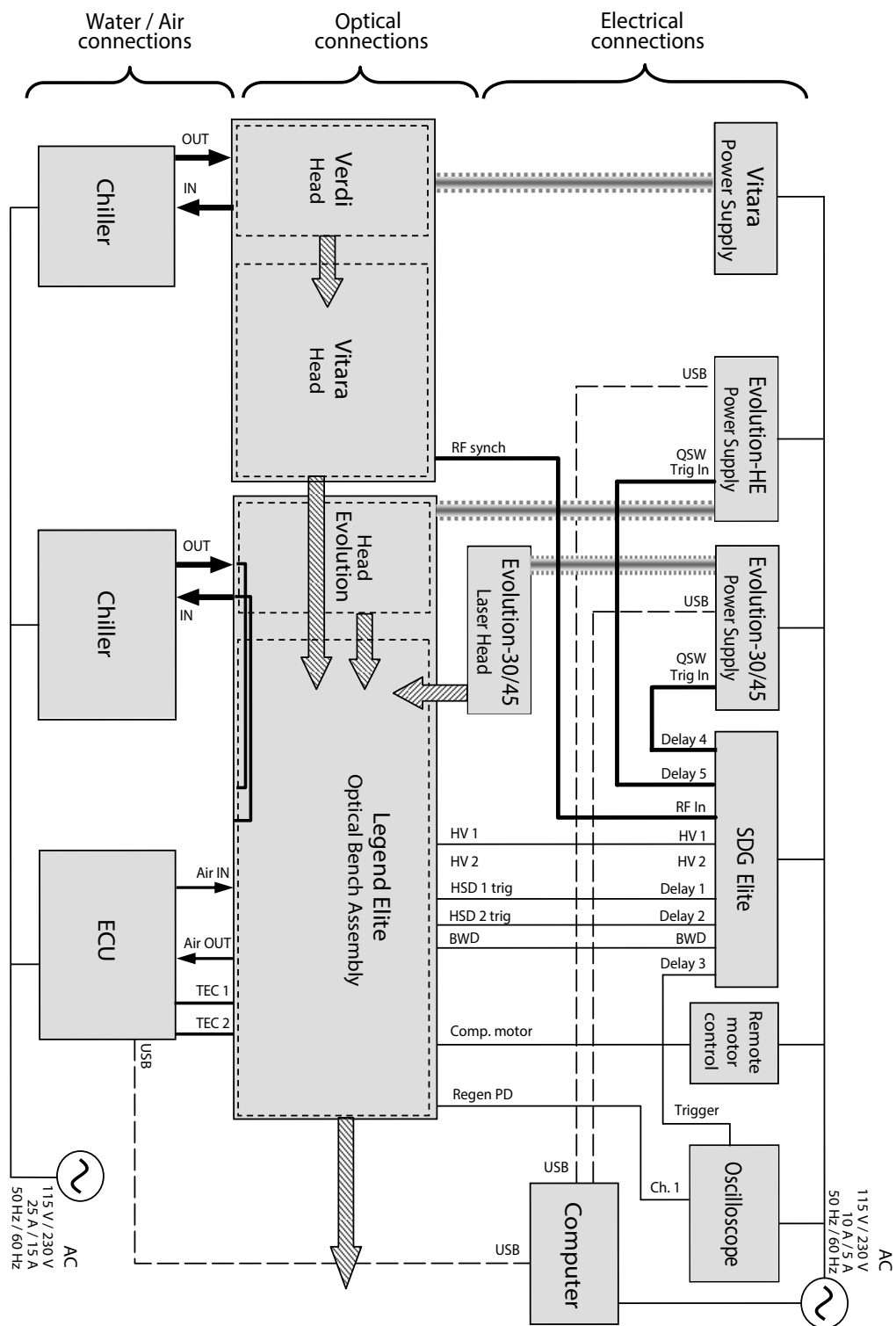


Figure 3-5. Legend Elite Duo HE+, Pump Options II and III Diagram

