

Astrella Ultrafast Amplifier Laser System

Preinstallation Manual

Preinstallation Manual
Astrella Ultrafast Amplifier
Laser System



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Santa Clara, CA 95054

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Should you experience any difficulties with your laser or need any technical information, please go to our web site www.Coherent.com. Should you need further assistance, please contact Coherent Technical Support by e-mail Product.Support@Coherent.com or telephone, 1-800-367-7890 (1-408-764-4557 outside the U.S.). Please be prepared to supply the model and laser head serial number of your laser system also the description of the problem and any attempted corrective steps to the Product Support Engineer responding to your request.

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

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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 Astrella modelocked Ti:Sapphire laser.



NOTICE!

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



WARNING!

Use of controls or adjustments or performance of procedures other than those specified in this Operator's Manual may result in hazardous radiation exposure.



WARNING!

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

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 must be obtained from Coherent or an appropriate U.S. Government agency.

Products manufactured in the European Union, Singapore, Malaysia, Thailand: These commodities, technology, or software are subject to local export regulations and local laws. Diversion contrary to local law is prohibited. The use, sale, re-export, or re-transfer directly or indirectly in any prohibited activities are strictly prohibited.

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 Astrella laser system. Safety instructions presented throughout this manual must be followed carefully.

Hazards

Hazards associated with lasers generally fall into the following categories:

- Biological hazards from 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 optical qualities, poses safety hazards not associated with light from conventional light 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 defined in the laser safety standards.



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 operator's manuals.
2. Always wear appropriate eyewear for protection against the specific wavelengths and laser energy being generated. See "Laser Safety Eyewear" on page 1-4. for additional information.
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 trained and 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. Terminate the laser beam with a light-absorbing material. Laser light can remain collimated over long distances and therefore presents a potential hazard if not confined. It is good practice to operate the laser in an enclosed room.
10. Post laser 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, even when wearing laser safety eyewear. 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.



CAUTION!

Laser safety eyewear protects the user from accidental exposure to laser radiation by blocking light at the laser wavelengths. However, laser safety eyewear may also prevent the operator from seeing the beam or the beam spot. Exercise extreme caution even while wearing safety glasses.

Laser Safety Eyewear

Always wear appropriate laser safety eyewear for protection against the specific wavelengths and laser energy being generated. The appropriate eye protection can be calculated as defined in the “EN 207 Personal eye protection equipment - Filters and eye-protectors against laser radiation (laser eye-protectors)”, in other national or international standards (e.g. ANSI, ACGIH, or OSHA) or as defined in national safety requirements.



CAUTION!

Laser safety eyewear protects the user from accidental exposure to laser radiation by blocking light at the laser wavelengths. However, laser safety eyewear may also prevent the operator from seeing the beam or the beam spot. Exercise extreme caution even while wearing safety glasses.

Electrical Safety

The Astrella 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 Astrella 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 Astrella 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:



DANGER!

When working with electrical power systems, the rules for electrical safety must be strictly followed. Failure to do so could result in the exposure to lethal levels of electricity.

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

Designated Use

The Astrella 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 Astrella 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 Astrella 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 60825-1, 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 Astrella is classified as Class IV based on 21 CFR, Subchapter J, part 1040, section 1040.10 (d). According to the European Community standards, Astrella 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 608225-1, 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 1-1 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

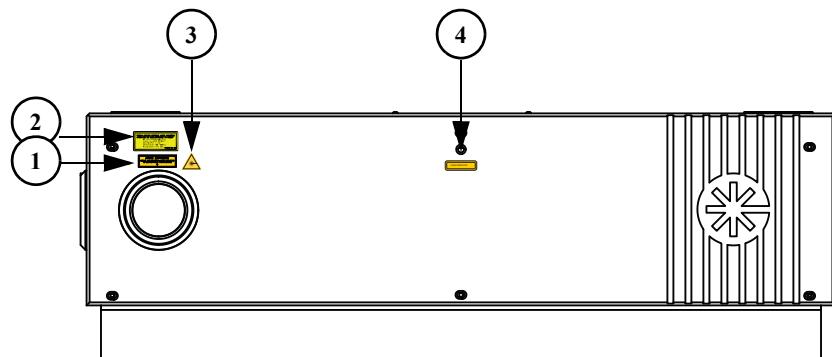
The RoHS directive restricts the use of certain hazardous substances in electrical and electronic equipment. All components of the Astrella system are RoHS compliant.

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.

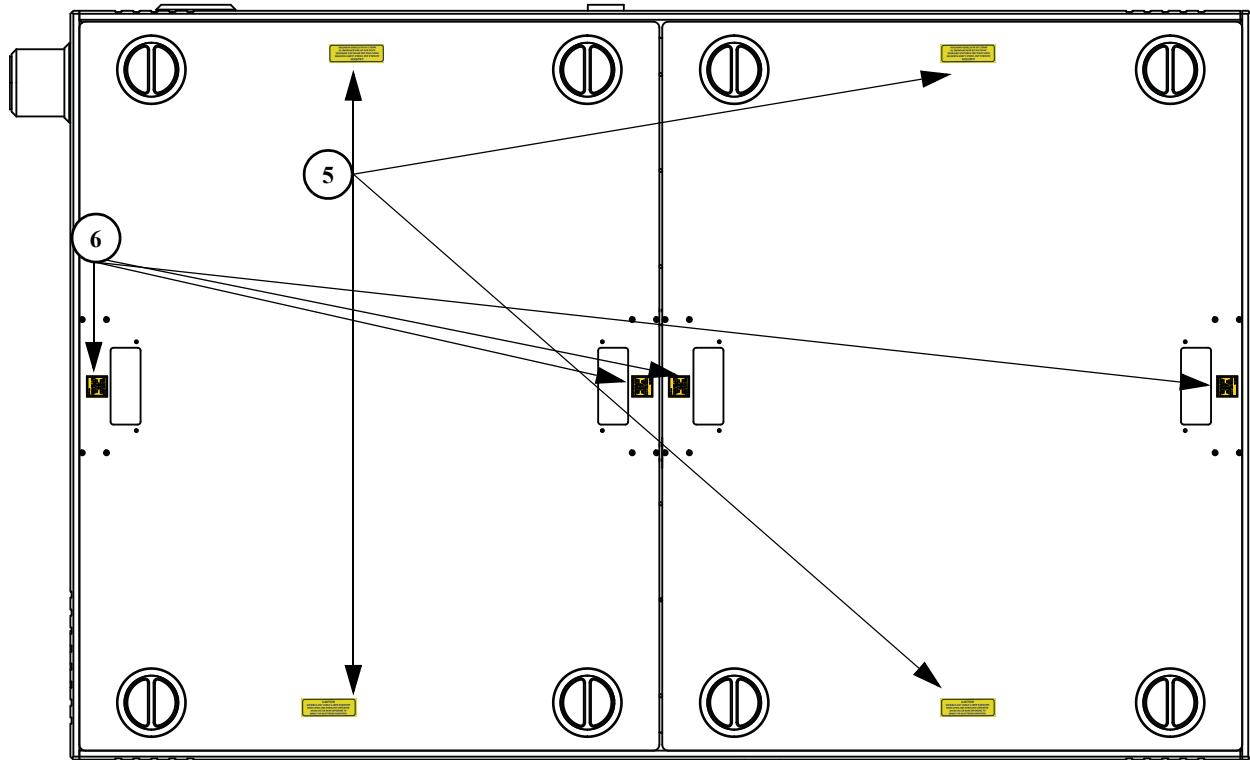
Waste Electrical and Electronic Equipment (WEEE, 2002)

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.

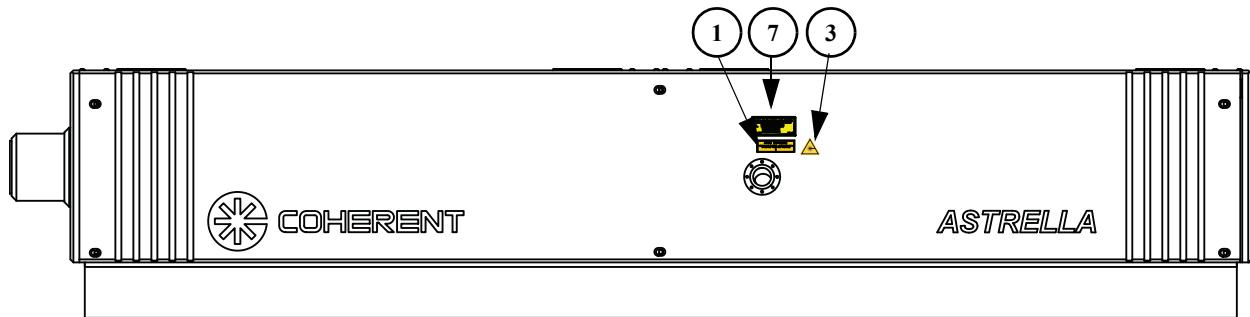


ASTRELLA OPTICAL BENCH ASSEMBLY, FRONT VIEW

Figure 1-1. Astrella Safety Labels (Sheet 1 of 5)

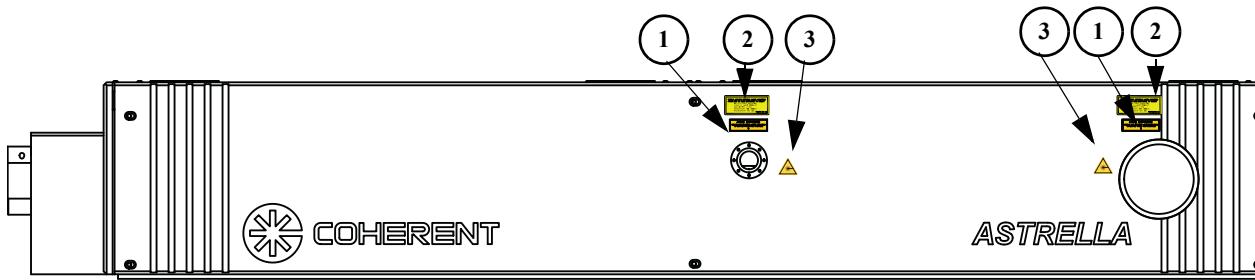


ASTRELLA OPTICAL BENCH ASSEMBLY, TOP-DOWN VIEW

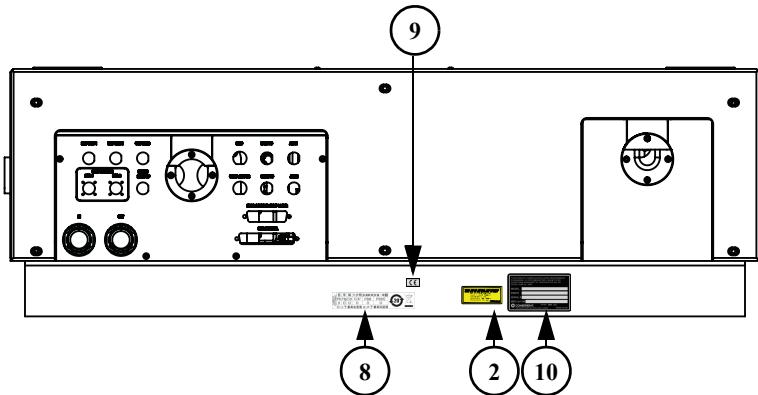


ASTRELLA OPTICAL BENCH ASSEMBLY, LEFT SIDE VIEW

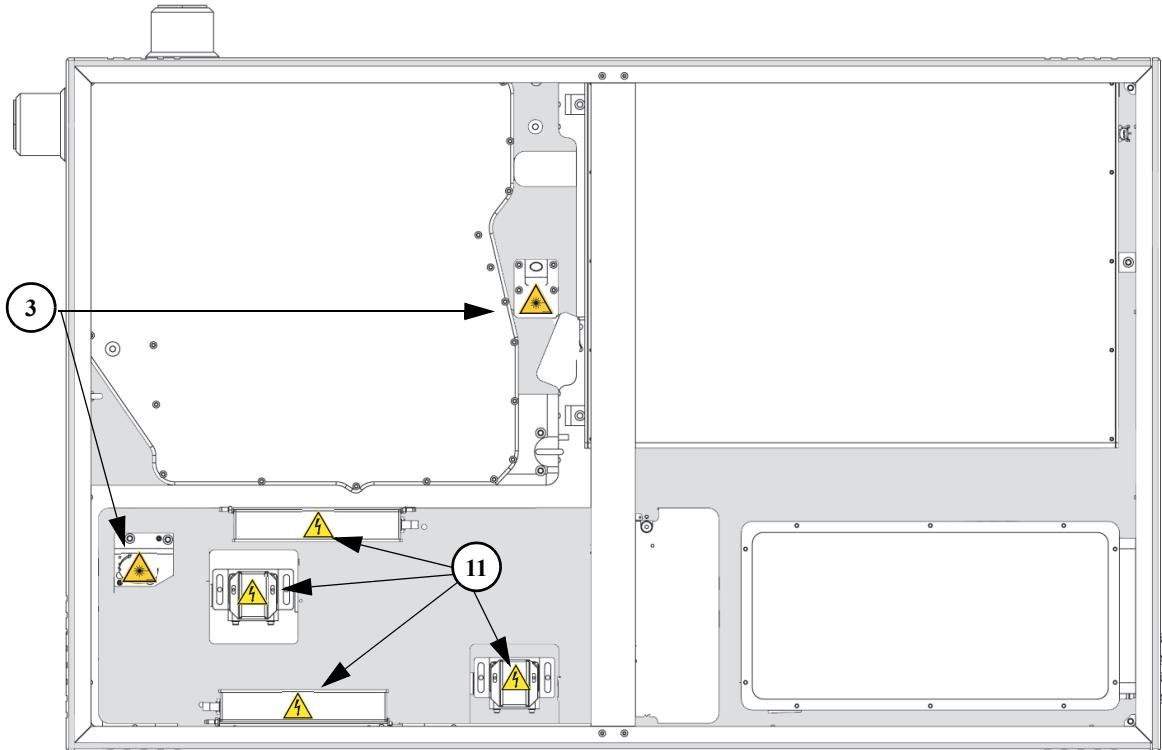
Figure 1-1. Astrella Safety Labels (Sheet 2 of 5)



ASTRELLA OPTICAL BENCH ASSEMBLY, RIGHT SIDE VIEW



ASTRELLA OPTICAL BENCH ASSEMBLY, REAR PANEL



ASTRELLA WITH TOP-COVERS REMOVED

Figure 1-1. Astrella Safety Labels (Sheet 3 of 5)



1. EXIT APERTURE WARNING LABEL



2. MAXIMUM RADIATION LABEL



3. HAZARDOUS RADIATION EXPOSURE WARNING LABEL



4. LASER EMISSION POSSIBLE INDICATOR LABEL



5. HEAD COVER WARNING LABEL



6. INTERLOCK DEFEAT WARNING LABEL

Figure 1-1. Astrella Safety Labels (Sheet 4 of 5)



7. OPTIONAL GREEN RADIATION LABEL

LABEL#	铅	汞	镉	六价铬	多溴联苯	多溴二苯醚	
127166AC	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							

8. CHINA ROHS LABEL, LASER HEAD



9. CE LABEL



10. SERIAL NUMBER LABEL



11. UNPLUG POWER CORD ELECTRICAL WARNING LABEL

Figure 1-1. Astrella Safety Labels (Sheet 5 of 5)

Sources of Additional Information

Laser Safety Standard

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

Publications and Guidelines

American National Standard for Safe Use of Lasers
ANSI Z136 Series
American National Standards Institute (ANSI)
www.ansi.org

Performance standards for light-emitting products
21 CFR Title 21 Chapter 1, Subchapter J, Part 1040
U.S. Food and Drug Administration
www.fda.gov

Safety of laser products - Part 1: Equipment classification and requirements
IEC 60825-1

Safety of laser products - Part 14: A user's guide (British Standard)
IEC TR 60825-14

Safety Requirements For Electrical Equipment For Measurement, Control and Laboratory Use
IEC 61010-1

International Electrotechnical Commission (IEC)
www.iec.ch

Safety of laser products - Part 1: Equipment classification and requirements
BS EN 60825-1
British Standard Institute
www.bsigroup.com

A Guide for Control of Laser Hazards
American Conference of Governmental and Industrial Hygienists (ACGIH)
www.acgih.org

Laser Safety Guide
Laser Institute of America
www.lia.org

**Equipment and
Training**

Laser Focus Buyer's Guide
Laser Focus World
www.laserfocusworld.com

Photonics Spectra Buyer's Guide
Photonics Spectra
www.photonics.com

Astrella Ultrafast Amplifier Laser System Preinstallation Manual

SECTION TWO: DESCRIPTION AND DIMENSIONS

Astrella Amplifier Laser System

The Astrella is an all-in-one ultrafast oscillator and regenerative amplifier laser system. Solid-state laser technology is incorporated into a compact optical enclosure, providing reliable operation over thousands of hours.

The Astrella laser system consists of six primary components:

- Astrella optical bench assembly
- Synchronization & delay generator (SDG Elite)
- Vitara power supply
- Revolution power supply
- Closed-loop water chiller
- 2 Laptop computers with control software



Figure 2-1. Astrella Optical Bench Assembly

Astrella Optical Bench Assembly

The Astrella optical bench assembly comprises of four modules:

- Vitara seed laser
- Revolution pump laser
- Regenerative amplifier (REGN)
- Stretcher/Compressor

The Coherent Vitara™ serves as the seed laser for the Astrella system. This module includes a modelocked Ti:Sapphire oscillator cavity pumped by the Coherent Verdi™ G-Series, a continuous-wave diode-pumped green laser.

The Revolution is a diode-pumped Q-switched laser with a second-harmonic generator. Operating at 527 nm and a 1-kHz repetition rate, it provides the pump power to the amplifier module. The Vitara and Revolution are described in detail in their respective Operator's Manuals.

The regenerative amplifier is based on the Coherent Legend Elite™ platform. Designed in a compact, enclosed module with active cooling, the amplifier exhibits excellent stability and reduced sensitivity to environmental temperature changes. Included in this design is the Coherent Synchronization and Delay Generator (SDG Elite™).

The stretcher and compressor are sealed and thermally stable for optimum pulse width stability and reliability with no feedback or moving parts required.

Synchronization and Delay Generator (SDG Elite)

The SDG Elite controls the precise timing of the regenerative amplifier's Pockels cells. It also contains high voltage supplies for the Pockels cells as well as a bandwidth detector (BWD) circuit, which serves as an interlock to protect the laser from operation with inappropriate bandwidth from the seed laser.

Power Supplies

The Astrella system includes two individual power supplies for the Vitara and Revolution modules. Refer to the Vitara and Revolution Operator's Manuals for additional information.

Water Chiller

The closed-loop water chiller dissipates the heat generated by the system and stabilizes the Vitara, Revolution, and amplifier cavity. The temperature is set to 20 °C and should not be changed. Refer to the chiller operator's manual for further details.

Laptop Computer

The system is shipped with two individual laptop computers with Windows-based control software for the Vitara and Revolution.

These components may also be controlled remotely through RS-232 serial connections on the Vitara power supply, Revolution power supply, and SDG Elite rear panel.

Specifications

The Customer Data Sheet shipped with each Astrella provides a detailed description of system performance. Specifications for all Coherent products can be found at www.Coherent.com.

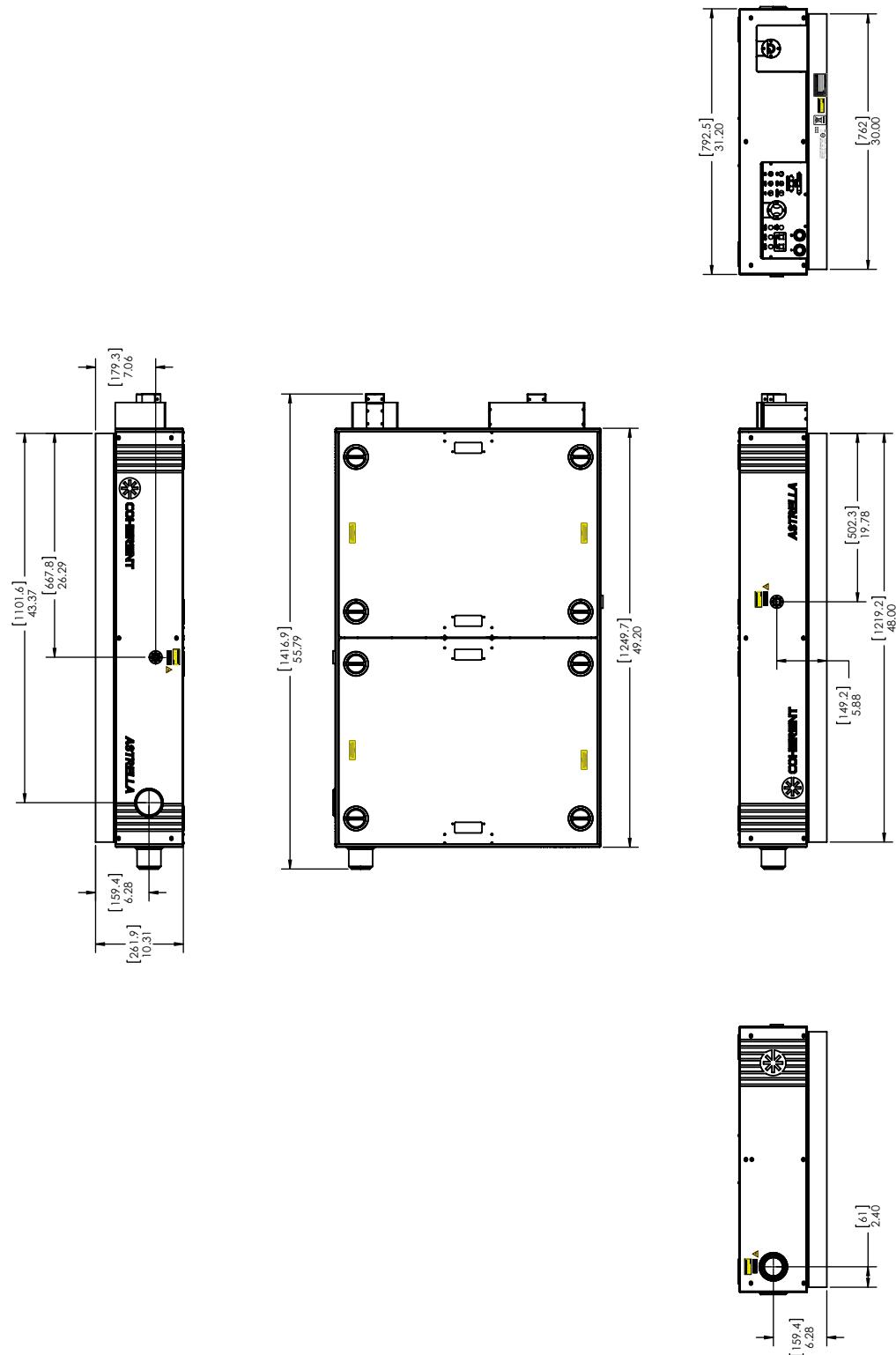
Dimensions and Weight

Figure 2-2 gives the dimensions of the optical bench assembly. Refer to the respective Operator's Manuals for the dimensions of other components.

Table 2-1. Summary of Dimensions & Weight

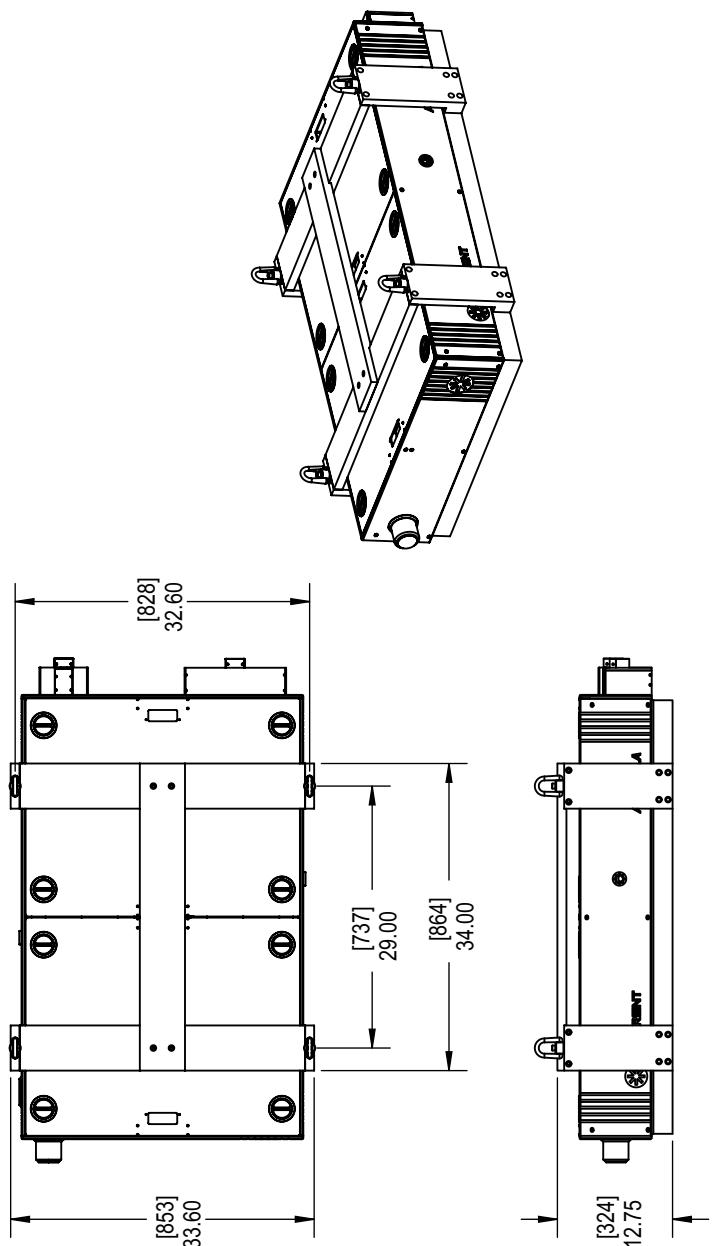
SYSTEM COMPONENT	LENGTH	WIDTH	HEIGHT	WEIGHT
Astrella Amplifier^a	124.97 cm 49.2 in.	79.25 cm 31.2 in.	26.19 cm 6.28 in.	249 kg 550 lbs.
Shipping Frame	86.4 cm 34 in	82.8 cm 32.6 in	32.4 cm 12.75 in	89.8 kg 198 lbs
Vitara-S: Controller	36.3 cm 14.3 in.	23.4 cm 9.2 in.	13.7 cm 5.4 in.	3.4 kg 7.5 lbs.
Vitara-S: Power Supply	36.1 cm 14.2 in.	22.9 cm 9.0 in.	16.0 cm 6.3 in.	6 kg 13.2 lbs.
Revolution Power Supply	43.68 cm 17.2 in.	48.26 cm 19.0 in.	13.25 cm 5.22 in.	14 kg 31 lbs.
Synchronization & Delay Generator	48.26 cm 19.00 in.	30.48 cm 12.0 in.	9.73 cm 3.83 in.	2.2 kg 4.9 lbs.
Chiller	70.1 cm 27.6 in.	36.8 cm 14.5 in.	57.4 cm 22.6 in.	60.8 kg 164 lbs.

a. Weight without the shipping frame. Weight with shipping frame is 339.3 kg (748 lbs).



ASTRELLA OPTICAL BENCH ASSEMBLY

Figure 2-2. Astrella Optical Bench Assembly & External Component Dimensions



ASTRELLA OPTICAL BENCH ASSEMBLY WITH SHIPPING FRAME

Figure 2-2. Astrella Optical Bench Assembly & External Component Dimensions (Continued)

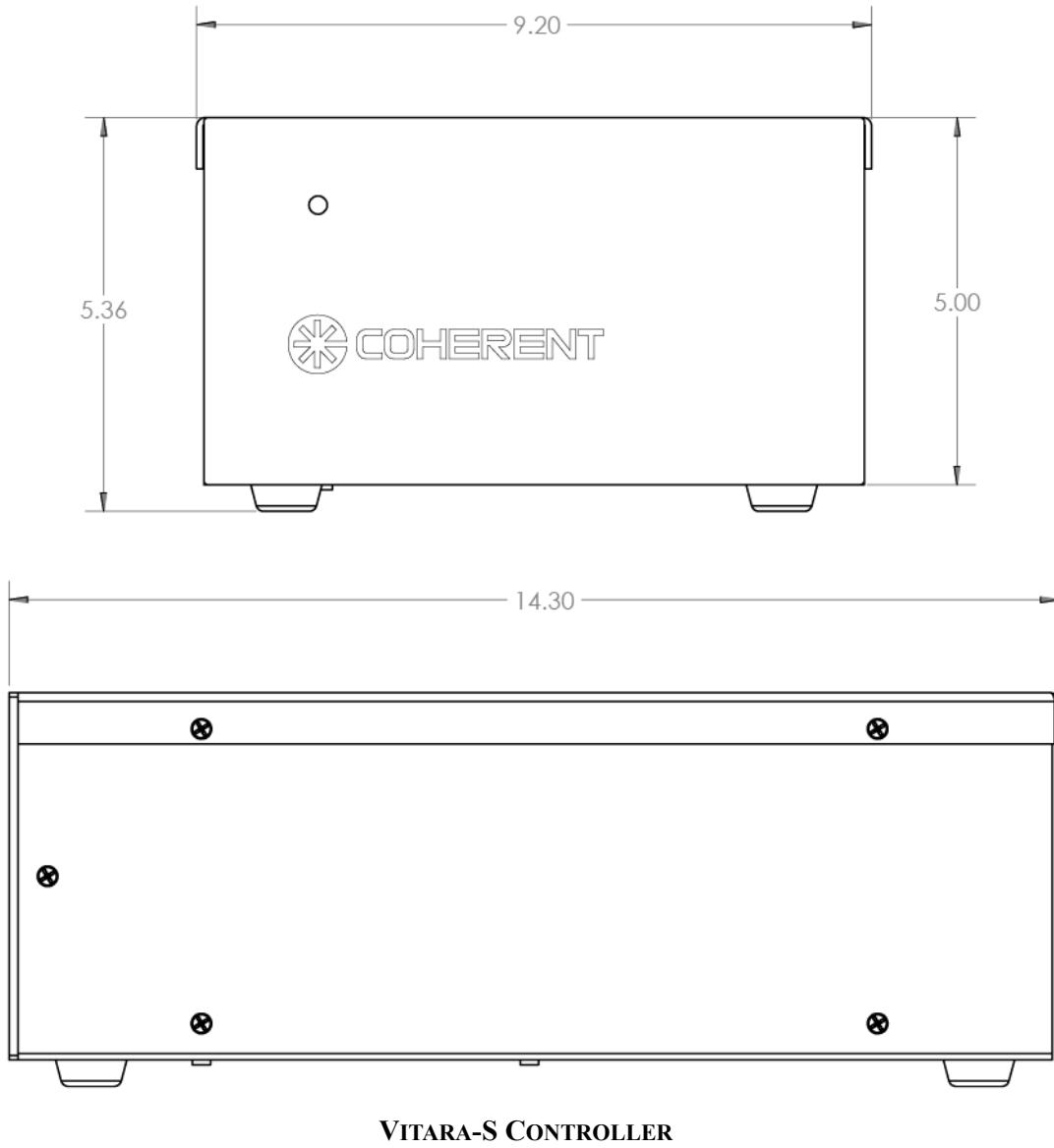


Figure 2-2. Astrella Optical Bench Assembly & External Component Dimensions (Continued)

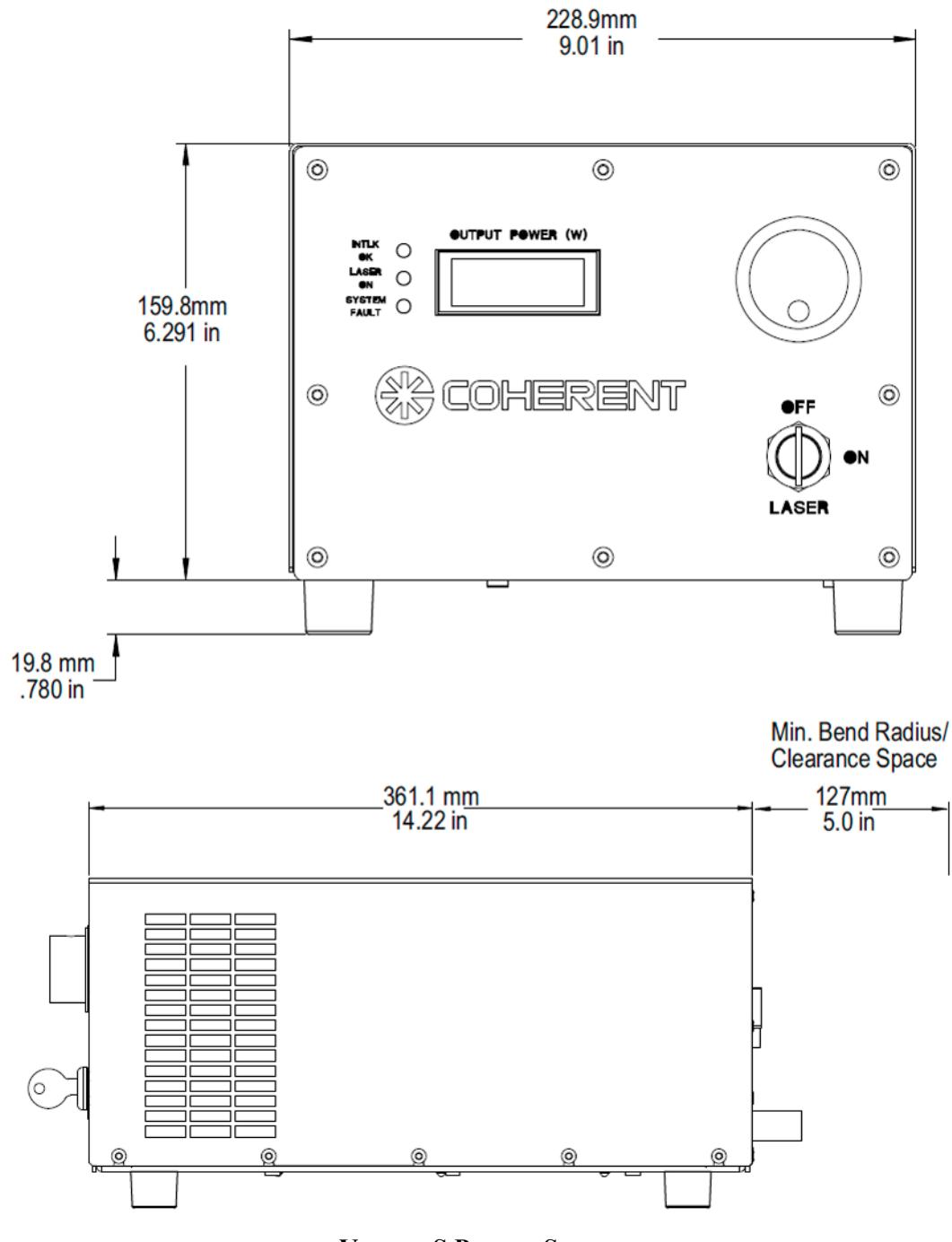
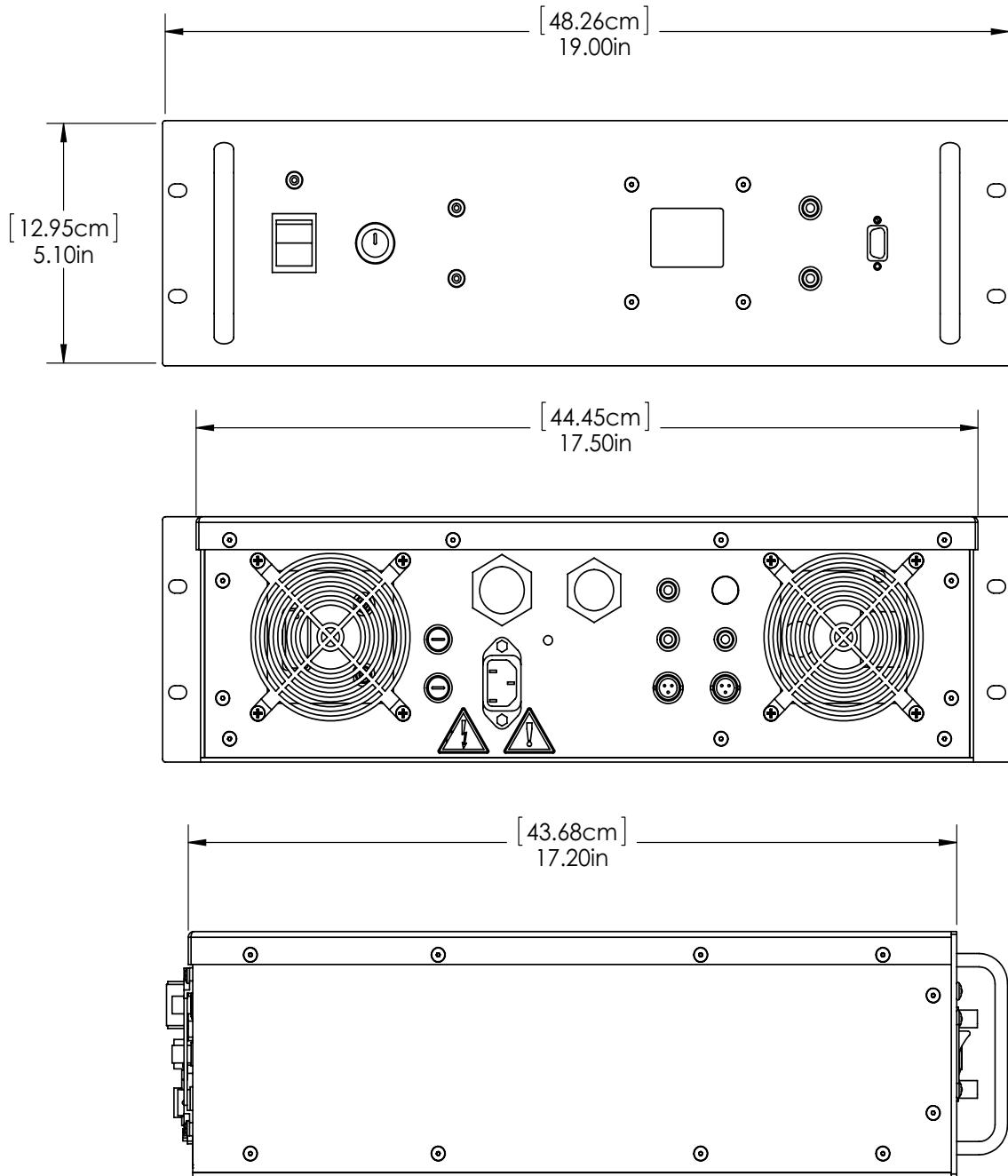


Figure 2-2. Astrella Optical Bench Assembly & External Component Dimensions (Continued)



REVOLUTION POWER SUPPLY

Figure 2-2. Astrella Optical Bench Assembly & External Component Dimensions (Continued)

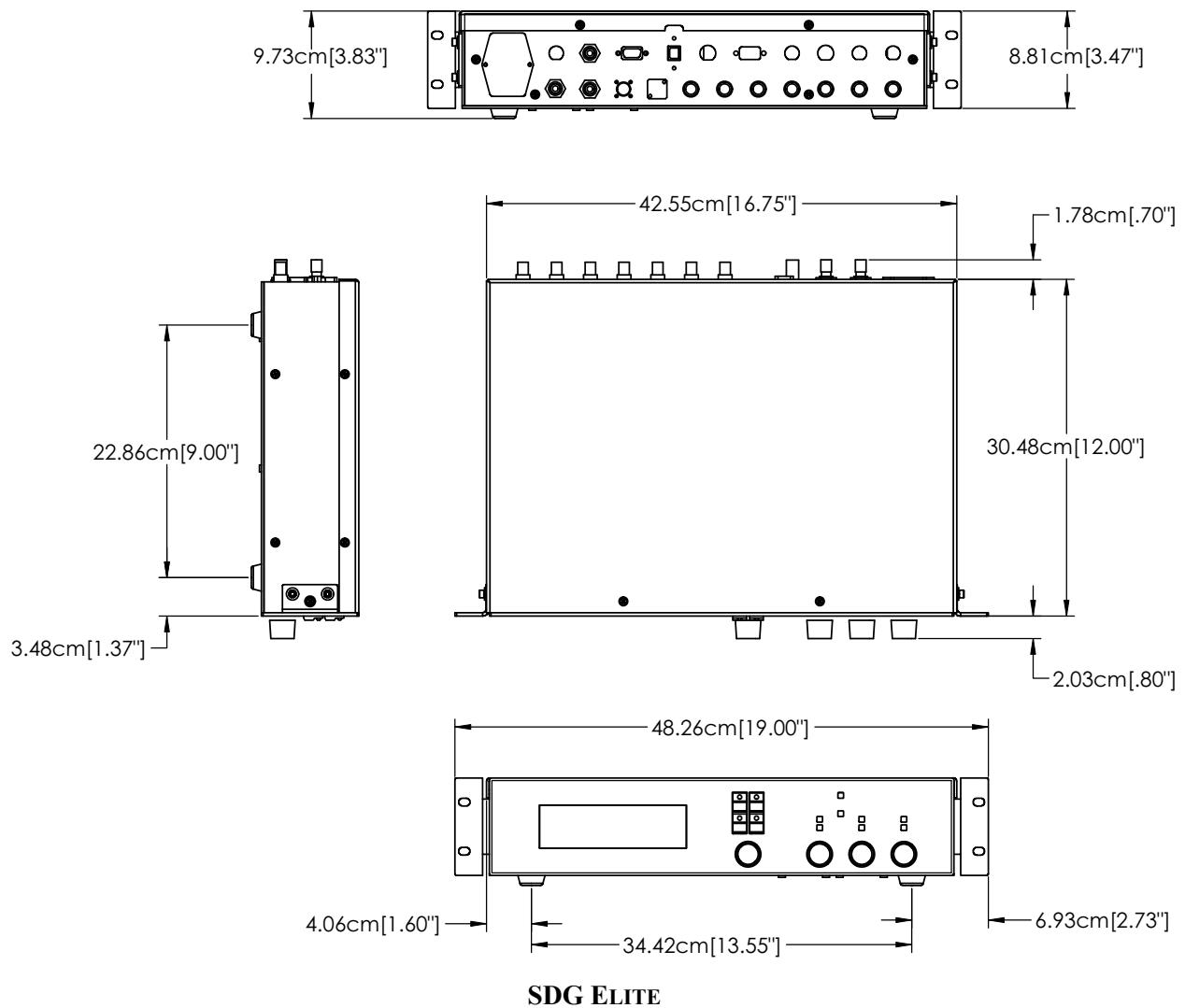


Figure 2-2. Astrella Optical Bench Assembly & External Component Dimensions (Continued)

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SECTION THREE: INSTALLATION

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

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



NOTICE!

Do not try to install the laser without a qualified Coherent service engineer or an authorized representative. Unauthorized installation will void the warranty.

Receiving and Inspection

Inspect the shipping containers for indication of rough handling or damage, and immediately report any damage to the shipping carrier and to Coherent.



NOTICE!

The Astrella must be installed by authorized Coherent personnel.



CAUTION!

The Astrella is heavy and has brackets and eye-bolts to be lifted with a mechanical-lift. A rigging team is recommended to position the laser onto an optical table. See Figure 3-1.



CAUTION!

The Astrella is heavy. Do not put hands or fingers under the laser while the system is suspended or moving.

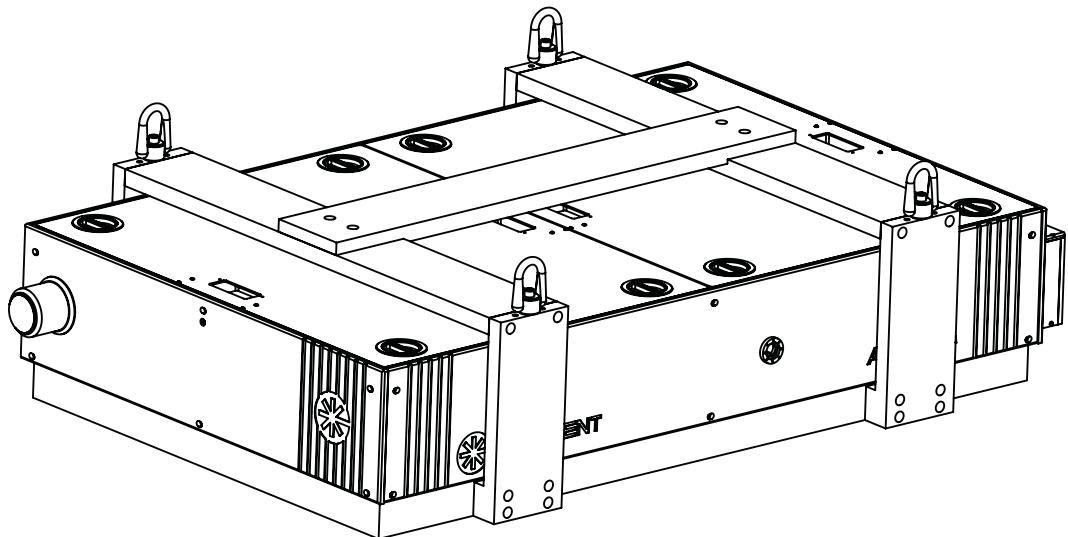


Figure 3-1. Astrella with Shipping Frame for Mechanical Lift

Vitara and Revolution Lasers

Refer to the Vitara and Revolution Operator's Manuals for additional installation information.

Control Computer



NOTICE!

The Astrella was manufactured and tested with the computers and control softwares sent with the laser. Coherent does not support the use of other computers or software to control the Astrella. Use of computers or software different from those sent with the system voids the warranty and can cause damage to the laser.

Installation Requirements

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

Table 3-1. Pre-installation Checklist

ACTIVITY & EQUIPMENT	GENERAL REQUIREMENTS	REFERENCE(S)
Laser Environment	<input type="checkbox"/> Laser area layout planned according to system dimensions. <input type="checkbox"/> No strong air currents directed at the laser. <input type="checkbox"/> No thermal gradients across the length or height of the laser. <input type="checkbox"/> Temperature fluctuations < 2° C.	“Location” on page 3-3 & “Environmental Requirements” on page 3-4
Receive and Inspect	<input type="checkbox"/> Area is clean and large enough to uncrate the laser, power supplies and chiller.	“Receiving and Inspection” on page 3-1
Utility Requirements	<input type="checkbox"/> Seed Laser <input type="checkbox"/> Pump Laser <input type="checkbox"/> Synchronization & Delay Generator (SDG Elite) <input type="checkbox"/> Laptop Computer <input type="checkbox"/> Chiller, Pump Laser	“Astrella Utility Requirements” on page 3-4
Chiller	<input type="checkbox"/> Pump Laser: Premixed Optishield II (1 pint diluted with distilled water).	“Chiller Fluid Requirements” on page 3-5
Laser Safety	<input type="checkbox"/> Laser Safety Officer (LSO) identified (recommended). <input type="checkbox"/> Laser Personnel Safety Training completed. <input type="checkbox"/> Laser controlled area established. <input type="checkbox"/> Personal protective equipment (Laser safety eye wear) available. <input type="checkbox"/> 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 5.	“Laboratory Equipment Requirements” on page 3-5

Location

The Astrella must be on an optical table. Coherent recommends that the Astrella be kept in a laboratory environment. The room must be free of dust, drafts, and large temperature fluctuations. For best system performance, keep the room temperature fluctuations within $\pm 1^{\circ}\text{C}$ while system is in operation.

The Astrella requires a minimum table space of approximately 4 x 3 ft. (1.2 x 0.90 m). The customer has the responsibility to determine the best location for the Astrella. The Astrella must be placed in a position that allows easy access for service-related activities.

Environmental Requirements

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

OPERATIONAL TEMPERATURE	TEMPERATURE STABILITY	HUMIDITY	HUMIDITY STABILITY
23° C ± 5° (73.4° F ± 9°)	± 1° C	45 ± 10 %	± 5 %

Utility Requirements

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

Table 3-3. Astrella Utility Requirements

COMPONENT ¹	OPERATING VOLTAGE	MAX POWER	FUSE RATING 110V/220V	HEAT DISSIPATION
Seed Laser, Vitara-S: Vitara controller Vitara power supply	100-240 VAC, 50-60 Hz 100-240 VAC, 50-60 Hz	100 VA 750 VA	1 A / 0.5 A 8 A / 4 A	120 W 1000 W
Pump Laser, Revolution: Power supply Chiller	220VAC (±10%), 50-60 Hz 220VAC (±10%), 50-60 Hz	1500 VA	15 A / 10 A 12 A	1250 W 2000 W
SDG Elite	100-240 VAC, 50-60 Hz	200 VA	1 A / 0.5 A	50 W
Compressor remote control	negligible	negligible	negligible	negligible
Computer			2 A / 1 A	negligible

¹Refer to the respective operator's manual for full details. Revolution power supply and chiller are not compatible with 110 V operation.

Table 3-4. Astrella Cable & Hose Lengths

MODEL	AC POWER CORD LENGTH	UMBILICAL/WATER LINE LENGTH
Revolution Power Supply	3 m (10 ft.)	3 m (10 ft.)
Revolution Chiller	2.4 m (8 ft.)	3 m (10 ft.)
Vitara-S Power Supply Vitara-S Controller	3 m (10 ft.)	3 m (10 ft.)
SDG Elite	3 m (10 ft.)	N/A

**NOTICE!**

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

Chiller Fluid Requirements

The chiller is a closed-loop system. Use only Optishield II (1 pint) diluted with distilled water (as necessary to fill the chiller tank) only.

Facility Water Requirement¹

Facility water temperature range: 8° C to 30° C.

Minimum facility water pressure 50 PSI; DO NOT exceed maximum pressure 100 PSI flow requirement to get specified cooling capacity: 3GPM typical with 20° C facility water.

Laboratory Equipment Requirements

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

- Safety eyewear 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 Revolution beam)
- A spectrometer with a spectral window of 700 to 900 nm
- 300 MHz or better oscilloscope and BNC cable
- IR viewer

1. The requirement needs to be met only if the water cooled chiller option is purchased.

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- Optic cleaning supplies (lens tissue, hemostats, ultra-pure acetone and methanol, eyedropper)
- Latex or nitrile gloves or finger cots

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