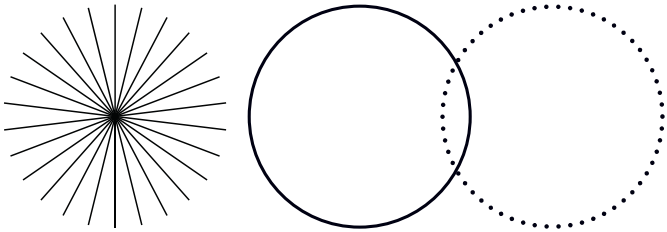
CellX Laser System

Installation and Quickstart Guide



INNOVATIONS THAT RESONATE

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1.0 About This Guide

This guide provides an introduction to the CellX™ laser system, and includes the following sections:

- Safety information, including signal words and symbols that you need to know before you begin operating the laser.
- A brief introduction to the CellX laser system.
- Installation instructions to set up the CellX Developer's Kit.

For complete information, refer to the *CellX Operator's Manual* (P/N 1319147), available in PDF format at:

www.coherent.com

2.0 Product Introduction

CellX is a low-cost, multi-wavelength laser system in a single, compact module. Features include:

- Up to four wavelengths. Refer to the CellX product datasheet for wavelength and power options.
- Common power, control, and I/O interfaces
- User-adjustable beam steering and telescopes to optimize the beam
- OBIS laser technology with best-in-class optical performance and reliability

This platform consolidates control, thermal management, and packaging to reduce the complexity when integrating multiple separate lasers. The output at each laser wavelength can be individually controlled using an RS-232 or USB computer interface, or analog and digital control lines. CellX offers savings of time and money for application development.

3.0 Safety Warnings

This safety section must be read and understood prior to set-up and operation of the CellX laser system. For set-up, go to page 9.

The following sections identify where particular hazards may occur 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.

3.1 Signal Words

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

These signal words designate the degree or level of hazard when there is the risk of injury, as described in Table 1:

Table 1. Signal Words and Definitions

Signal Word	Description
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*.
NOTICE	Indicates information considered important, but not hazard-related. The signal word 'NOTICE' is used when there is the risk of property damage.

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

3.2 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 danger of susceptibility to Electrostatic Discharge (ESD).

3.3 Laser Safety

Because of its optical qualities, laser light poses safety hazards not associated with light from conventional light sources.

DANGER!

Laser Radiation! Avoid eye or skin exposure to direct or scattered radiation. Direct and indirect eye contact with the output beam from the laser will cause serious injury to the eyes and possible blindness. Laser beams can ignite volatile substances such as alcohol, gasoline, ether and other solvents. Laser beams can also damage light-sensitive elements in video cameras, photomultipliers, and photo diodes. Laser beams can easily cause flesh burns or ignite clothing.

Safety precautions must be observed at all times by anyone working with or near the laser system.

CAUTION!

The CellX laser system does not conform to the United States Government requirements for laser safety. This laser system is intended to be integrated into a laser product with appropriate end-user safety mechanisms.

Because this system is not intended for a stand-alone application, the CellX device does not fully comply with requirements for certified laser products as defined in the US FDA CFR 21, section 1040.10 and 1040.11, or the IEC 60825-1:2007 standard.

In the United States, it is the responsibility of the manufacturer of the complete system that the product sold to the end user complies with all laser safety requirements prior to resale.

Ensure that all personnel who operate, maintain or service the laser are protected from accidental or unnecessary exposure to laser radiation. The safe use of the laser depends upon users being familiar with the instrument and the properties of coherent, intense beams of light.

See the *CellX Operator's Manual* for more information about laser safety and compliance.

3.4 Optical Safety

Avoid direct exposure to the laser light, and follow these control measures:

- Always wear appropriate laser safety eyewear for protection against the specific wavelengths and laser energy being generated.
- Never look directly into the laser light source or at scattered laser light from any reflective surface, even when wearing laser eyewear.
- Never sight down the beam into the source.
- Maintain experimental set-ups at low heights to prevent an inadvertent encounter with the laser beam at eye level.
- Use the laser in only an enclosed room. Laser light remains collimated over long distances and therefore presents a potential hazard if not confined. Post warning signs in the area of the laser beam to alert any individuals present.

- Avoid wearing watches, jewelry, or other objects that may reflect or scatter the laser beam. See the *CellX Operator's Manual* for information about how to avoid beam reflection and potential damage to the laser.
- Terminate the laser beam with a light-absorbing material, and use energy-absorbing targets for beam blocking.

3.5 Location of Safety Labels

A laser radiation warning label is incorporated into the product data label located on the side of the CellX unit. The yellow section of the label lists the Class of laser as well as compliance information, as shown in the example in Figure 1.

Figure 1. Example: Laser Radiation Safety Label

Note that information on this label varies, depending on the product configuration. Each label is unique.

The safety indicator for the laser aperture includes a white directional arrow with text printed on the top cover of the unit, shown in Figure 2:

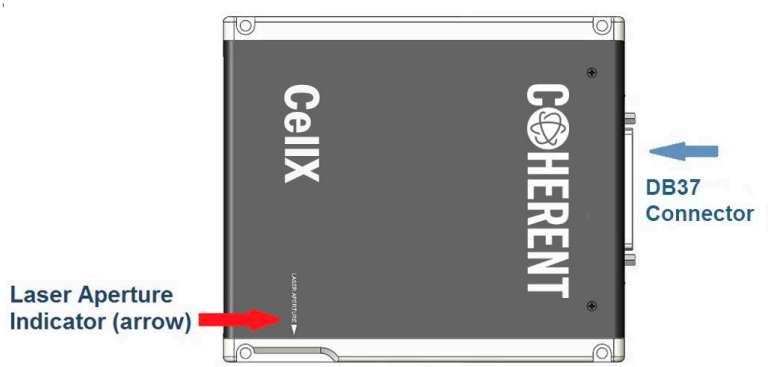

Figure 2. CellX Laser Aperture Indicator

WARNING!

There is no laser emission shutter on the CellX unit. **Avoid any possibility of viewing either a direct or reflected beam. Always wear appropriate safety glasses for the specific wavelengths.**

The indicator shown in Figure 3 points to the location of the output beam on the product on the side of the CellX unit:

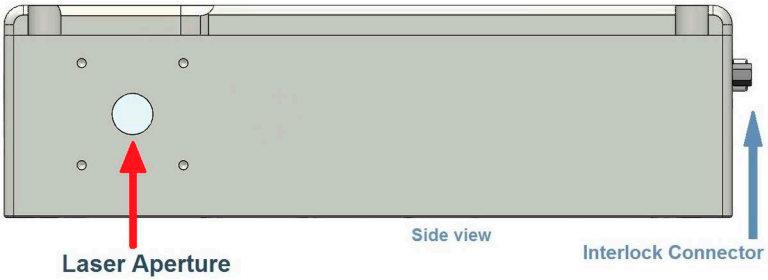

Figure 3. Laser Aperture on Side of Unit

3.6 ESD Protection

The most common ESD damage occurs when handling the device during installation or use.

WARNING!

Damage can occur to the electronics features of the CellX system from Electrostatic Discharge (ESD).

Electrostatic charges easily collect on the human body, equipment, and facilities, and can discharge without detection. Dry air and carpet create a higher potential for Electrostatic Discharge (ESD).

Take necessary precautions or shielding to protect the system from ESD to prevent performance degradation or damage to the system.

3.7 Electrical Safety

The CellX laser system does not have dangerous voltages. For more information, see the *CellX Operator's Manual*

NOTICE

The CellX laser system is designed to be operated as assembled; there are no user-serviceable components in the device. DO NOT disassemble the enclosure.

The Warranty is void if the enclosure is disassembled!

3.8 China-RoHS Compliance

This section gives compliance details with the China-RoHS (Restriction of Hazardous Substances) Directive SJ/T 11364-2014.

The China-RoHS Directive SJ/T 11364-2014 restricts the use of certain hazardous substances in electrical and electronic equipment. This Directive applies to the production, sale, and import of products into the Peoples Republic of China.

Any hazardous substances in the CellX laser system are on the label, shown in Figure 4.

产品中有害物质的名称及含量							
部件名称 Part Name	有害物质 Hazardous Substances						
	铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 (Cr(VI))	多溴联苯 (PBB)	多溴二苯醚 (PBDE)	
印刷电路板组装 Printed Circuit Board Assembly	X	○	○	○	○	○	
本表格依据 SJ/T 11364 的规定编制 ○: 表示该有害物质在该部件所有均质材料中的含量均在 GB/T 26572 规定的限量要求以下。 X: 表示该有害物质至少在该部件的某一均质材料中的含量超出 GB/T 26572 规定的限量要求。							

Figure 4. China RoHS List of Restricted Hazardous Substances

The table shows that Lead (Pb) may be found in the CellX laser system and that the environmental-friendly use period is 20 years, indicated by the number 20 inside the circle.

For more information about compliance, refer to the *CellX Operator's Manual* (P/N 1319147).

4.0 Setup and Installation

This section gives the basic installation and set-up for the CellX with the Developer's Kit (P/N 1323532) for operation with flow cytometry.

Users that purchased a fiber-ready configuration for operation with a beam aligner and external fiber must refer to the *CellX Operator's Manual* (P/N 1319147) for installation and alignment.

For information about features, system specifications, installation of the software, to make adjustments to the lasers, and general operations, see the CellX data sheet and the *CellX Operator's Manual*. These are available at www.coherent.com.

4.1 Prepare for Setup

Before work is started, collect the tools and equipment necessary to set up the system. This procedure must be done in a clean environment (such as a lab) at normal humidity and temperature conditions.

CAUTION!
Use of controls or adjustments or performance of procedures other than those specified can result in hazardous radiation exposure.

4.1.1 Required Parts

This section supplies all the parts necessary to make a working system for flow cytometry. A developer's kit is available for evaluation purposes. It includes a variety of control boards, heat sinks, and objective lenses. For a full list of components in the Developer's Kit, see the *CellX Operator's Manual* (P/N 1319147). Parts can also be ordered individually.

At a minimum, users must have the parts shown in Figure 5 to follow the setup instructions in this guide.

Table 2 shows the components used in these set-up instructions.

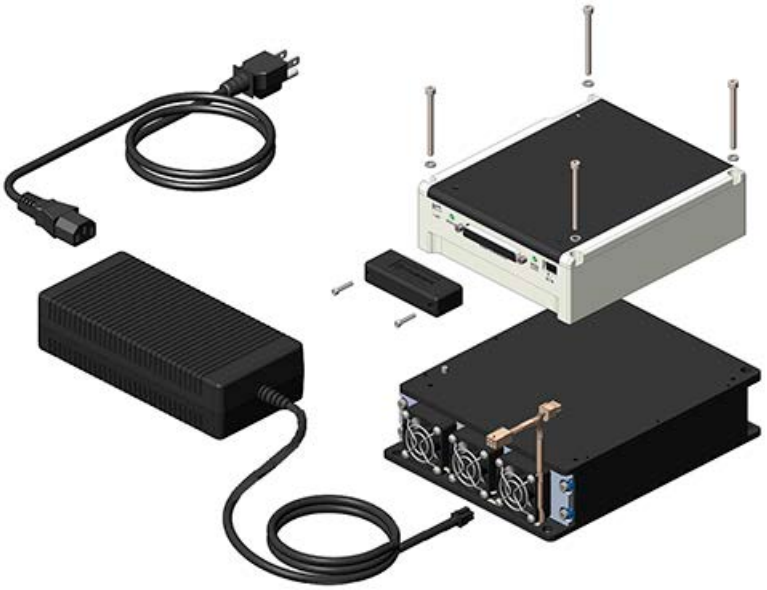

Figure 5. Equipment Required for Set-Up

Table 2. Components for Set-Up

P/N	Description
varies	**CellX Laser System** (4x100mW lasers, including 405 nm, 488 nm, 561 nm, and 637 nm)
varies	**Heat Sink**, Fan-cooled with or without stage platform extension
1321203	**Accessory Kit** for CellX, that includes: • Interlock Plug, DB37, with screws • Tools and hardware (see next section)
1211389	**Power Supply Assembly** Is shipped with a Type B 3-pin grounded power cord.

For Original Equipment Manufacturer (OEM) development projects that ordered only a CellX laser system and not the full Developer's Kit, users can order individual parts from Coherent or build their own. See the *CellX Operator's Manual* for available options.

4.1.2 Accessory Kit

To set up the CellX laser system, use the parts, tools, and hardware from the Accessory Kit:

Tools

- Hex wrenches: 0.050 in., 5/64 in., and 3 mm
- Cross-head screwdriver P0, 5.3 in. L

Hardware

To connect the CellX laser system to the heat sink:

- Socket-head Screw (4 each), M4 x 50 mm L, Stainless Steel
- Washer (4 each), Flat #8, Stainless Steel 18-8

To connect the Interlock Plug to the CellX system:

- Socket-head Screw (2 each), 4-40 x 0.625 in. L, Stainless Steel

4.2 Set Up the System

4.2.1 Unpack and Examine

Carefully unpack the components of the CellX laser system. Examine the parts for completeness and for damage.

At a minimum, the parts shown in Figure 5 are necessary to complete the instructions in this guide.

4.2.2 Install CellX on Heat Sink

Refer to 'Laser Safety' on page 4 first to learn about necessary safety precautions when lasers are used.

To set up the CellX laser system:

1. Remove all the parts from the packaging. Keep packaging so it can be used, if necessary, to send back parts/components to Coherent or ship elsewhere.

WARNING!

Follow precautions to prevent damage from Electrostatic Discharge (ESD) to the CellX laser system when equipment is set up.

2. Put the heat sink on a flat, stable surface.

   (Optional) Attach the heat sink to an optical table with mount bolts. The unit aligns with metric (M6) or Imperial (1/4"-20) holes.

3. Put the CellX unit on top of the heat sink, as shown in Figure 6. Both units must poiny in the same direction so that the connector from the heat sink can be connected into the power receptacle on the CellX unit.

NOTICE

For the purpose of illustration, the power connector attached to the heat sink is not shown until page 15.

4. Align the CellX unit. Move the laser system in the direction the dowel pins set in one corner of the heat sink.

Figure 6. CellX on the Fan-Cooled Heat Sink

5. Set a supplied a socket head screw (M4), with a flat washer, into each corner of the CellX unit.Refer to Figure 7.

Figure 7. Align Washers and Screws in Both Units

NOTICE

DO NOT use thermal grease or compound between the CellX and the heat sink or mount surface.
The use of such materials voids the Coherent warranty!

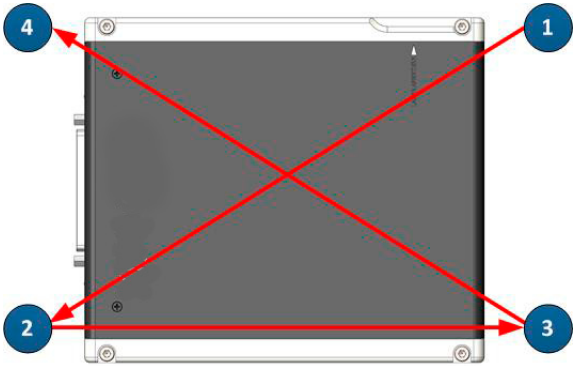

Figure 8. Pattern to Tighten Screws

Figure 9. Tighten CellX to the Heat Sink

The mount screws must then be torqued two times with a 3.0mm hex torque driver.

6. *SECOND*: Torque all of the mount screws to 0.25 N-m (2.2 in-lb) in the same diagonal 1-2-3-4 sequence shown in the step before this
7. *THIRD*: Torque all of the mount screws to 1.13 N-m (10 in-lb) in the same diagonal 1-2-3-4 pattern.
8. *FOURTH*: Torque all of the mount screws to 2.26 N-m (20 in-lb) in the same diagonal 1-2-3-4 pattern.
9. At the end of the two units, connect power from the heat sink to the CellX. (See Figure 10). Do not attach the power supply at this time.

Figure 10. Connect Power - Heat Sink to CellX

4.2.3 Insert the Interlock Accessory

Coherent supplies an interlock plug (see Figure 11) in the Accessory Kit. See the Parts and Accessories appendix in the CellX Operator's Manual for available selections.

The laser cannot be set to ON until a DB37 interlock plug or control board is installed. The interlock plug is used in this guide for Continuous (CW) mode of operation setup. Refer to the CellX Operator's Manual for use of a control board accessory.

Figure 11. DB37 Interlock Plug

1. Find the DB37 connector on the rear the CellX unit. This is identified as the **Laser Control I/O** (see Figure 12).

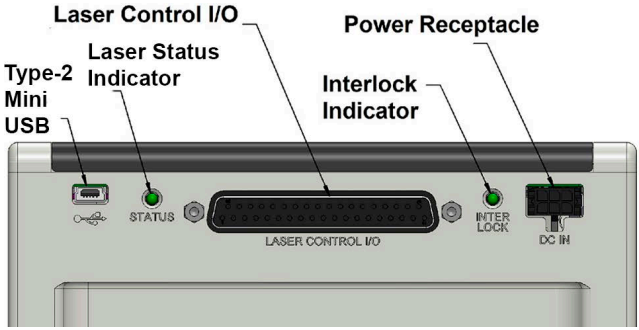

Figure 12. Connectors and Indicators on Rear CellX

2. Set the interlock plug in position to correctly align the shape parallel to the Laser Control I/O connector on the rear the CellX system.

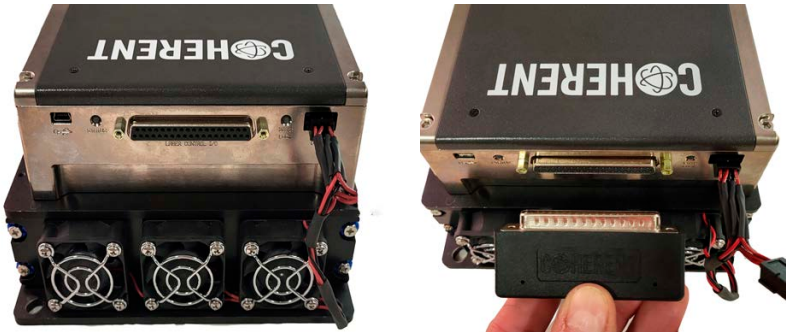

Figure 13. Laser Control I/O Port on CellX and Interlock Plug

NOTICE

Pins in the interlock plug can accidentally make a short circuit if they are put in incorrectly at an angle with the mating connector. Carefully align parts.

3. Carefully put the interlock plug in until it solidly connects with the mating connector on the rear the CellX system.
4. Attach and then tighten the hex screws to the interlock plug, as shown in Figure 14.

Figure 14. Interlock Plug with Hex Screws

Pins 1, 10, and 19 are connected together to make a short circuit in the interlock plug. This makes sure that the interlock is closed. (Pin 37 indicates the last pin on the interlock.)

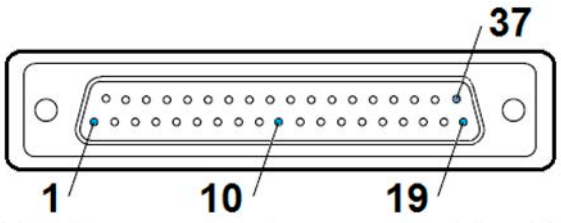

Figure 15. Pins on the Interlock Plug

Table 3 shows these pins. For a full list of pin assignments for the DB37 Connector, see the *CellX Operator's Manual*.

Table 3. Pins on the Interlock Plug

Pin	Name	Description
1	KEYSW_CS	A 20 mA key switch current sink
10	INTLK_P12V	Power input for the key switch and interlock.
19	INTLK_CS	A 20 mA interlock current sink.
37	GND	System Ground. Position is for reference only.

4.2.4 Connect the Power Supply

A power connection is necessary for laser operation.

The top pins of the Molex connector (shown in Figure 16) are positive and the lower pins are negative. A lock clip holds the connector when attached.

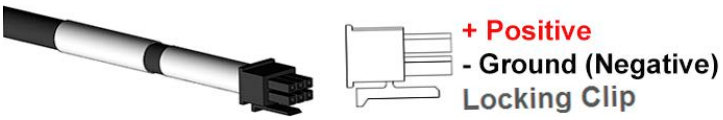

Figure 16. Pins on the Power Supply Connector

Make sure that the toggle switch at the rear the power supply (shown in Figure 17) to is set to OFF before it is attached to the CellX

Figure 17. Power Supply ON/OFF Toggle Switch

A power-on LED indicator on the power supply (shown in Figure 18) displays in green when the power switch is in the ON and position.

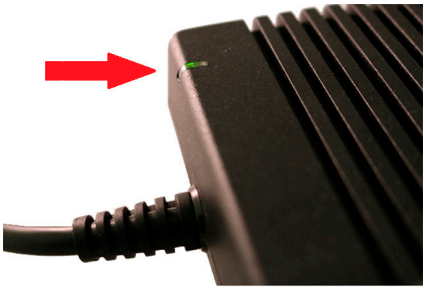

Figure 18. LED Indicator on Power Supply

5. Attach the connector on the power supply into the mating connector from the heat sink to the CellX system (see Figure 19).

Figure 19. Connect Power Supply to Heat Sink Extension

6. Attach the plug on the power supply into a grounded wall receptacle.
7. Set the toggle switch at the rear the power supply (shown in Figure 17) to ON to give 12V power to the CellX .

4.2.5 System Warm-Up Time

After power-up, there is a warm-up period as the components in the system increase to the operating temperature. The warm-up period depends on the surrounding temperature and if power was recently applied.

- On initial start-up, the typical power-on time delay is approximately 1 minute, but can be longer (up to 5 minutes) on an initial start.
- Warm-up time is followed by a CDRH delay of approximately 5 seconds. After the CDRH delay, the CellX laser system starts to give laser light.

WARNING!
LASER EMISSION STARTS NOW!
There is no shutter on the CellX system.

The CellX system automatically starts laser emission after power is applied. Precautions must be used to prevent exposure of the eyes or skin to direct or scattered radiation.

Because Auto Start is enabled by default, the CellX of all laser channels automatically starts emission after DC power is connected.

Default settings like Auto Start and the CDRH delay can be changed using Coherent Connection software. See the CellX Operator's Manual (PN 1319147) for more information.

4.2.6 LED Status Indicators

The LED indicators are on the end of the CellX system with the input/output connectors (see Figure 20).

Table 4 shows the LED condition for both the Laser status and Interlock status

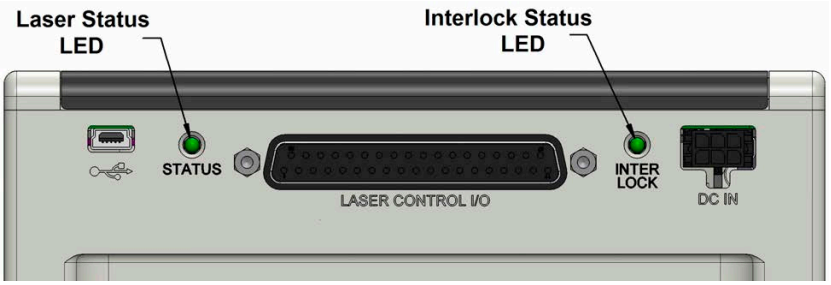

Figure 20. LEDs on the CellX Laser System

Table 4. LED Status

Laser Status LED	
Color	**Notes**
BLUE	Standby[a]
GREEN	Warm-up
RED	Fault[b]
WHITE	Laser emission

Interlock Status LED	
Color	**Notes**
BLUE	Standby
GREEN	Keyswitch ON
RED	Interlock open

a. Light emission starts at the last power set point. If laser emission does not start within 5 minutes and the LED indicator on the CellX displays a solid **Blue**, the Auto Start feature is not activated.

b. The Laser Status LED displays in solid **Red** indicates a fault or error condition such as no communication, thermal, or other hardware issues.

4.3 Next Steps

The basic CellX laser system is now set up and prepared for operation.

Go to the CellX Operator's Manual (P/N 1319147) for information to do the setup:

- Install control boards and/or connect to a PC with RS-232 connection based on on the configuration.
- Install objective lenses with or without a translation stage, based on the configuration.
- Install external fiber aligner and fiber assemblies, based on the configuration (for CellX for Microscopy applications).
- Adjust the internal laser beam or the external fiber, based on the configuration.
- Understand the software, Coherent power measurement tools and more.

For downloads of manuals, guides and software, go to:

https://www.coherent.com/resources

Search for keyword 'CellX'.

5.0 Technical Support, Parts and Accessories

Coherent provides telephone and web-based technical assistance as a service to its customers and assumes no liability thereby for any injury or damage that may occur contemporaneous with such services.

Contact Coherent as follows for technical support or to order any CellX laser system, the Developer's Kit, parts, tools, and accessories.

For detailed information about the Developer's Kit components, parts, and accessories, refer to the *CellX Operator's Manual* (P/N 1319147), available at www.coherent.com/resources.

- Call Coherent Technical Support Hotline at 1.800.367.7890 (or, outside of the USA, call 1-(734)-456-3100.
- Send an email to customer.support@Coherent.com.
- Contact your local Coherent service representative (see www.Coherent.com for a list of worldwide contacts).
- Order products and accessories at: https://coherentinc.my.site.com/Coherent

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INNOVATIONS THAT RESONATE

产品中有害物质的名称及含量						
部件名称 Part Name	有害物质 Hazardous Substances					
	铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 (Cr(VI))	多溴联苯 (PBB)	多溴二苯醚 (PBDE)
印刷电路板组装 Printed Circuit Board Assembly	X	○	○	○	○	○

本表格依据 SJ/T 11364 的规定编制
○: 表示该有害物质在该部件所有均质材料中的含量均在 GB/T 26572 规定的限量要求以下。
X: 表示该有害物质至少在该部件的某一均质材料中的含量超出 GB/T 26572 规定的限量要求。

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1324098 AC

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Part No. 1324098 Rev. AC