

LICORbio Atlas™ Imager

Operator's Manual



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阿特拉斯成像仪 LICORbio Atlas Imager										
部件名称 Part Name	有毒有害物质或元素 Toxic and Hazardous Substances or Elements									
	铅 (PB)	汞 (Hg)	镉 (Cd)	六价铬 (Cr(VI))	多溴联苯 (PBB)	多溴二苯 醚 (PBDE)	邻苯二甲酸二(2-乙 基己基)酯 (DEHP)	邻苯二甲 酸丁苯酯 (BBP)	邻苯二甲 酸二丁酯 (DBP)	邻苯二甲 酸二异丁 酯 (DIBP)
印刷电路板 (PCBs)	X	O	O	O	O	O	O	O	O	O
机电配件 (Electromechanical Parts)	X	O	O	O	O	O	O	O	O	O
光学 (Optics)	X	O	X	O	O	O	O	O	O	O
电缆和电线 (Cables and Wires)	O	O	O	O	O	O	O	O	O	O
金属部件 (Metal Parts)	X	O	O	O	O	O	O	O	O	O
塑料零件 (Plastic Parts)	X	O	O	O	O	O	O	O	O	O
电池 (Batteries)	O	O	O	O	O	O	O	O	O	O

本表格依据 SJ/T 11364 的规定编制

O = 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

indicates that the content of the toxic and hazardous substance in all the Homogeneous Materials of the part is below the concentration limit requirement as described in GB/T 26572

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

indicates that the content of the toxic and hazardous substance in at least one Homogeneous Material of the part exceeds the concentration limit requirement as described in GB/T 26572



Notes on Safety

LICORbio products have been designed to be safe when operated in the manner described in this manual. The safety of this product cannot be guaranteed if the product is used in any other way than is specified in this manual. LICORbio Atlas Imager is intended to be used by qualified personnel. Read this entire manual before using the LICORbio Atlas Imager.

Equipment Markings:



The product is marked with this symbol when it is necessary for you to refer to the manual or accompanying documents in order to protect against damage to the product.



The product is marked with this symbol when a hazardous voltage may be present.

Manual Markings:

WARNING	Warnings must be followed carefully to avoid bodily injury.
CAUTION	Cautions must be observed to avoid damaging your equipment.
NOTE	Notes contain additional information and useful tips.
IMPORTANT	Information of importance to prevent procedural mistakes in the operation of the equipment or related software. Failure to comply may result in a poor experimental outcome but will not cause bodily injury or equipment damage.

Federal Communications Commission Radio Frequency Interference Statement

WARNING: This equipment generates, uses, and can radiate radio frequency energy and if not installed in accordance with the instruction manual, may cause interference to radio communications. It has been tested and found to comply with the limits for a Class A computing device pursuant to Subpart J of Part 15 of FCC rules, which are designed to provide a reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference in which case the user, at his own expense, will be required to take whatever measures may be required to correct the interference.

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Chapter 1: Installation and Safety Information

Safety Considerations

Intended Use of the LICORbio Atlas Imager

The LICORbio Atlas Imager provides reliable data for biological imaging and quantitative plate-based assays. The LICORbio Atlas Imager is versatile and can capture assays in 30 channels, including brightfield, luminescence, and fluorescence (ultraviolet, visible, and near-infrared).

Laser Safety

The Center for Devices and Radiological Health (CDRH) was established in October 1982, by the U.S. Food and Drug Administration (FDA) to protect the public health in the fields of medical devices and radiological health.

Manufacturers of products subject to performance standards under the Radiation Control for Health and Safety Act of 1968 are required to furnish various reports to the CDRH.

The LICORbio Atlas Imager is certified as a Class I laser product. This means that hazardous laser radiation is not emitted outside the instrument. Radiation emitted inside the LICORbio Atlas Imager is confined within protective housing and external covers. A series of safety interlocks ensures that the laser beam cannot escape during any phase of user operation.

The CDRH implemented regulations for laser products on August 1, 1976 (CDRH radiation performance standard 21, Code of Federal Regulations Chapter 1, Subchapter J). Compliance for products marketed in the United States is mandatory. The label that must be attached to laser products marketed in the United States is illustrated in  and is located on the rear panel of the LICORbio Atlas Imager, indicating compliance with CDRH regulations.

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

AVERTISSEMENT: L'utilisation des commandes ou le réglage ou la performance des procédures autrement qu'il a été indiqué dans le présent texte peut résulter en de dangereuses expositions aux radiations.

The manufacturer label is illustrated in Figure 1-2 and is also on the rear panel of the instrument.

The LICORbio Atlas™ Imaging System six lasers; emitting at 375 nm, 488 nm, 520 nm, 640 nm, 685 nm, and 785 nm. The lasers emit visible and invisible laser radiation - **avoid eye or skin exposure to direct or scattered radiation**. Laser radiation is emitted out of the top of the LICORbio Atlas Imager microscope, up through the scan glass. Because the microscope moves in both planes relative to the glass scanning surface, laser radiation could be focused at any position on this scanning surface. Safety interlocks (described below) automatically turn the lasers off when the LICORbio

Atlas Imager lids are opened. The laser light is never directed at the scan surface when the instrument is in the parked position.

Labels

The labels shown in Figure 1-1 and Figure 1-2 are affixed to the LICORbio Atlas Imager case.



Figure 1-1. Laser radiation danger label.



Figure 1-2. Label with CDRH compliance statement.

Imager Label Locations



Figure 1-3. The label affixed to the rear panel of the imager contains ETL, CDRH regulation compliance, and manufacturer information.



Figure 1-4. A laser safety label is visible on the front panel of the imager with the Tray Holder removed.



Figure 1-5. There is a laser safety label on the bottom panel of the imager.

Safety Interlocks

The LICORbio Atlas Imager has safety interlocks that prevent access to the lasers, LEDs, and moving parts, by disabling these hazards when the front or rear lid is opened.



Do not attempt to defeat these interlocks.

Placement in the Laboratory

The LICORbio Atlas Imager weighs 121 lbs (55 kg). The imager should be placed on a laboratory bench that is level and sufficiently sturdy to bear the imager's weight. The bench should also be able to bear the weight of the computer if the computer will be installed beside the LICORbio Atlas Imager.

The LICORbio Atlas Imager is intended for indoor use only.

Ambient Laboratory Conditions

Place the LICORbio Atlas Imager away from external heat sources (furnaces, windows, etc.).

Additional heating can cause high temperatures within the enclosure. Place the instrument away from sinks or other sources of water that pose a shock hazard. Recommended operating conditions are 15 - 30 °C and a dew point not greater than 22 °C to prevent condensation on the laser/microscope assembly during operation. Allow the instrument to adjust to the temperature and humidity of the room before powering it on to avoid damaging the instrument. It may be necessary to allow up to a day in the new location in cases of extreme temperature and/or humidity change.

Imager Ventilation

The instrument enclosure and circuit boards are cooled with multiple internal fans. The fan on the rear of the instrument serves as an exhaust port, so the fan shrouds are not filtered, and the cover serves only as an exhaust outlet. There are no restrictions regarding placement of the instrument as spacers on the rear of the instrument ensure sufficient airflow for the exhaust port. However, it is important to not allow any objects (e.g., paper or a cover) to block airflow from the exhaust port while the instrument is on.

Space Requirements

The LICORbio Atlas Imager requires an area approximately 24" width × 30" depth × 15" height (61 cm width × 76 cm depth × 38 cm height). With the lid fully open, the LICORbio Atlas Imager has a height of 28" (71 cm).

Moving the Imager

LICORbio recommends that you **do not** move your imager. Instead, please contact LICORbio Technical Support for options.



LICORbio cannot be held responsible for any damage incurred while moving, transporting, or shipping the LICORbio Atlas Imager, even if an existing warranty and/or service contract applies. LICORbio cannot be held responsible for any injury incurred while moving, transporting, or shipping the LICORbio Atlas Imager.

Leveling the Imager

Leveling the imager is important for many reasons, including to maintain the same level of liquid on cell culture plates and dishes.

The imager sits on three feet. The two front feet can be used to raise or lower the front corners of the imager. The back foot cannot be adjusted.

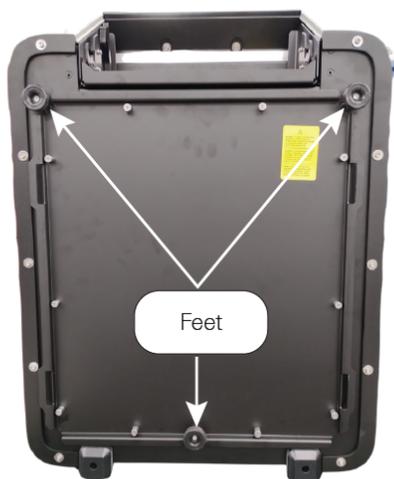


Figure 1-6.

Follow these steps to level the imager:

1. Place a circular bubble level on the center of the Scan Surface.



Figure 1-7.

Use the bubble level to determine if the imager is level or which adjustments might be needed to level the imager.

2. Slightly raise the front of the imager to remove pressure from the foot you want to adjust.
3. Turn the screw on the foot *clockwise* to *lower* the corner or *counterclockwise* to *raise* the corner.

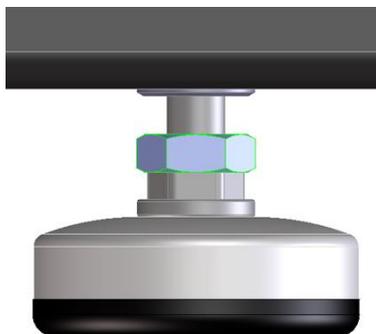


Figure 1-8. Turn the metal inserts on the feet to adjust the height.

Chemical Safety

LICORbio recommends that all biochemicals be handled carefully, and that safe laboratory procedures be followed at all times. Be aware of the hazards associated with any chemical before you begin work.

The LICORbio Atlas Imager should not be used with any radioactive materials.

Electrical Considerations

Power Cords

The LICORbio Atlas Imager is provided with a power supply that converts wall voltage to 24 V DC. Use only the provided power supply cord to connect the LICORbio Atlas Imager to the wall outlet.

- The plug will only fit into a grounding-type outlet. This is a necessary safety feature. If you are unable to insert the plug into the outlet, you will need to replace the outlet. **Do not defeat the purpose of the grounding-type plug.**
- Do not place the LICORbio Atlas Imager where the power cord will be walked on, exposed to water or chemical spills.
- The LICORbio Atlas Imager draws < 3 Amps at 120V. If an extension cord is used, make sure the total of the ampere ratings on the instruments plugged into the extension cord does not exceed the extension cord ampere rating. Also make sure the total amperage of instruments plugged into the wall outlet does not exceed the amperage capacity for the outlet (usually 15 or 20 amperes in the United States).
- For information about disconnecting power, see *Disconnecting the Power* on page 41.

Fuse Information

There are no user-serviceable fuses. If the imager does not power on, please contact LICORbio or a LICORbio representative.

Routine Maintenance

LICORbio highly recommends performing annual preventative maintenance on the LICORbio Atlas Imager. For more information, contact biohelp@licorbio.com.

As with any equipment utilizing electrical voltages, there is a danger of fire or electrical shock if the equipment is not properly maintained.

LICORbio recommends that you routinely inspect the system and the Scan Surface. The following are some general maintenance guidelines.

Inspect Cables and Cords

Inspect all cables and power cords for evidence of fraying, exposed wire, or loose connections.

Maintain Scan Surface

- Remove all chemical spills from the Scan Surface to prevent damage to the surface coating.
- Clean the Scan Surface according to instructions in *Clean the LICORbio Atlas Imager Scan Surface* on page 43.
- Prevent organic solvents from pooling on the imager's Scan Surface and keep the Scan Surface from contacting other combustibles.

Maintain Imager Exterior

- Remove all chemical spills from the imager exterior to prevent damage to the imager exterior.
- Clean the exterior case parts with warm water and a damp cloth.



Do not use scouring compounds or solvents (e.g., acetone, benzene, carbon tetrachlorides, lacquer thinner, or alcohol) to clean the case.

Clean or Replace Fan Filter

The fan filter behind the Tray Holder should be inspected and cleaned at least once a year, but more frequent cleaning may be necessary depending on the cleanliness of the imager's surroundings.

If the fan filter becomes damaged, contact LICORbio for a replacement.

Follow this procedure when you need to inspect or clean the fan filter:

1. Open and remove the Tray Holder (see *Remove Tray Holder* on page 33).
2. Remove the screw holding the retaining plate in place using a No. 2 screwdriver.



Figure 1-9. Exploded view of the fan filter assembly

3. Remove the retaining plate and the fan filter.
4. To clean the fan filter, flush it with water. If flushing the filter with water does not adequately remove oil and trapped particles, you can immerse the filter in hot water and detergent.
5. When the fan filter is clean, you can bring it out to remove most of the water. Wait for the fan filter to dry completely.
6. Once the fan filter is completely dry, place the fan filter, retaining plate, and Tray Holder back on the imager (see *Install Tray Holder* on page 36).

Networking Cables

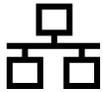


Figure 1-10. Networking port label.

A Category 6 network cable is provided with the LICORbio Atlas Imager. The networking port is on the back panel of the imager and is marked with the symbol in Figure 1-10.

Chapter 2: System Overview

External Panels and Controls

Front Panel and Scan Surface



Figure 2-1. Front panel features and power button on the LICORbio Atlas Imager.

Power Button

Briefly press the Power button to turn the imager on and off when the imager is not connected to Image Studio™ Software.

- When the imager is powered on, the power button will be illuminated solid blue.
- During the process of powering on or powering off, the power button will flash blue.

Display Panel

The front display panel shows the following:

- The username chosen in Image Studio when the LICORbio Atlas Imager was connected to Image Studio.
- If the lid is open.
- The time remaining in a scan.
- During a scan, the type of scan will be shown.

Front Panel Indicator Light

An indicator light is located on the front panel. In most circumstances, the color of the light mirrors the status indicated in Image Studio.



Figure 2-2.

Indicator Light State	Meaning
Off	No connection to Image Studio
Green	Ready or Done
Yellow/Orange	Scanning or Lid Open
Red	An error has occurred. Check Image Studio for more information.

Scan Surface

Gently lift the handle on the front edge of the lid to access the Scan Surface. Instructions for acquiring images are provided in Operation.

Gently press down on the lid when you are ready to close it. There will be slight upward resistance when the lid is nearly in the close position to help prevent the lid from closing with excessive force.

During imaging, the Scan Surface will automatically move to the rear portion of the imager to place the samples in the appropriate location relative to components of the optical system. When the scan is complete, the Scan Surface will return to the front of the imager.



Figure 2-3.

Scan Surface Position

The correct Scan Surface position is shown in Figure 2-3. The label visible in Figure 2-4 appears only in the incorrect Scan Surface position .

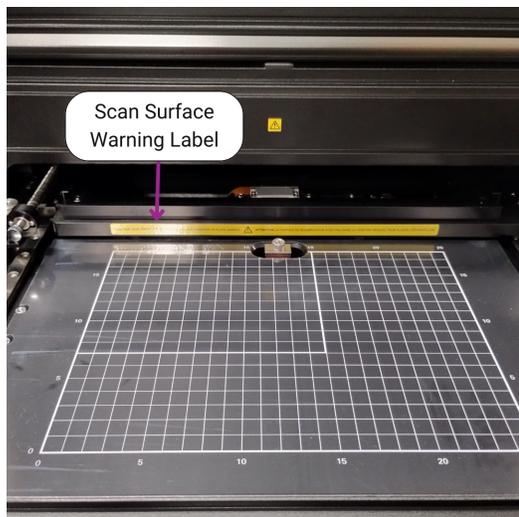


Figure 2-4. This image shows the Scan Surface in a retracted position. Do not attempt to place a sample on the Scan Surface if the Scan Surface is in this position. If your LICORbio Atlas Imager has a Scan Surface warning label, it will appear in the location shown when the Scan Surface is in a retracted position.



Caution: If the Scan Surface warning label is visible or you otherwise notice that the Scan Surface is not correctly positioned, do not place a sample on the Scan Surface. **Do not use the LICORbio Atlas Imager until the problem is addressed and the Scan Surface is positioned correctly.** Trying to perform a scan while the Scan Surface is not correctly positioned can cause damage to the LICORbio Atlas Imager.

CAUTION SCAN SURFACE IS NOT IN THE REQUIRED POSITION TO PLACE SAMPLE.  **ATTENTION** LA SURFACE DE NUMÉRISATION N'EST PAS DANS LA POSITION REQUISE POUR PLACER L'ÉCHANTILLON.

Figure 2-5. Scan Surface Warning Label

Addressing a Scan Surface Position Problem

If you notice that the Scan Surface is not positioned correctly, the following steps are a good procedure to start with to try to solve the problem.

1. Ensure that there are no loose objects on or around the Scan Surface.
2. Close the Rear Lid and Front Lid. It is best to also have the door to the Tray Holder closed.
3. Press the Power button on the front panel to power off the LICORbio Atlas Imager.
4. Press the Power button to power on the LICORbio Atlas Imager.

Contact LICORbio Support if this procedure does not solve the problem or if you have questions.

Move Scan Surface

Use the following instructions to move the Scan Surface to the rear of the imager. You may need to do this, for example, to clean the grid pattern below the Scan Surface (see *Clean the Grid Below the Scan Surface* on page 27).

- 1) Press the Power button to power on the imager.

Wait for the Power button to become solid blue before continuing.

- 2) Open the front lid.
- 3) Briefly press the Power button.
- 4) Close the front lid **within 5 seconds** while the Power button is still flashing.

If you close the front lid **within 5 seconds**, the Scan Surface will move to a position in the rear portion of the imager.

While the Scan Surface is moving, the Power button will continue to flash blue and the lid will remain locked. Once in position, the Power button light will turn off and the lid will unlock.



If you leave the front lid open for **longer than 5 seconds**, the imager will power down without moving the Scan Surface.

Manually Move Scan Surface

If there is a power outage during a scan, the Scan Surface will not move forward normally. If the Scan Surface is in the rear portion of the imager and is not moving forward normally, you may need to move the Scan Surface forward manually by following these steps.

- 1) Ensure power to the imager is disconnected (see *Disconnecting the Power* on page 41).
- 2) Open the front lid.
- 3) Pull upward on the Sample Enclosure to remove it.



Figure 2-6.

- 4) With the Sample Enclosure removed, a thumb screw will be visible.

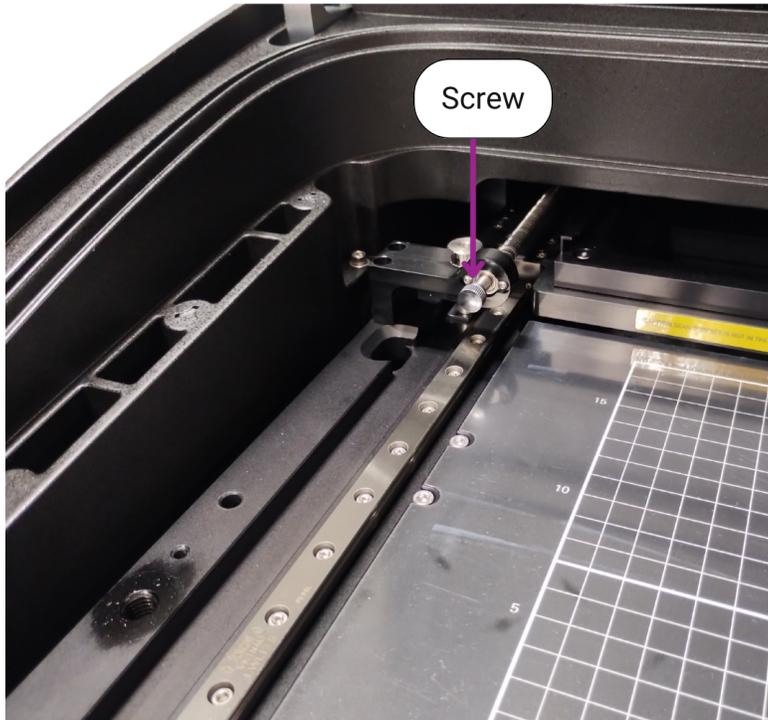


Figure 2-7.

- 5) Rotate the thumb screw by hand clockwise to move the Scan Surface forward.



If the Scan Surface does not move, please contact LICORbio Technical Support. Do not attempt to move the Scan Surface by applying force to it.

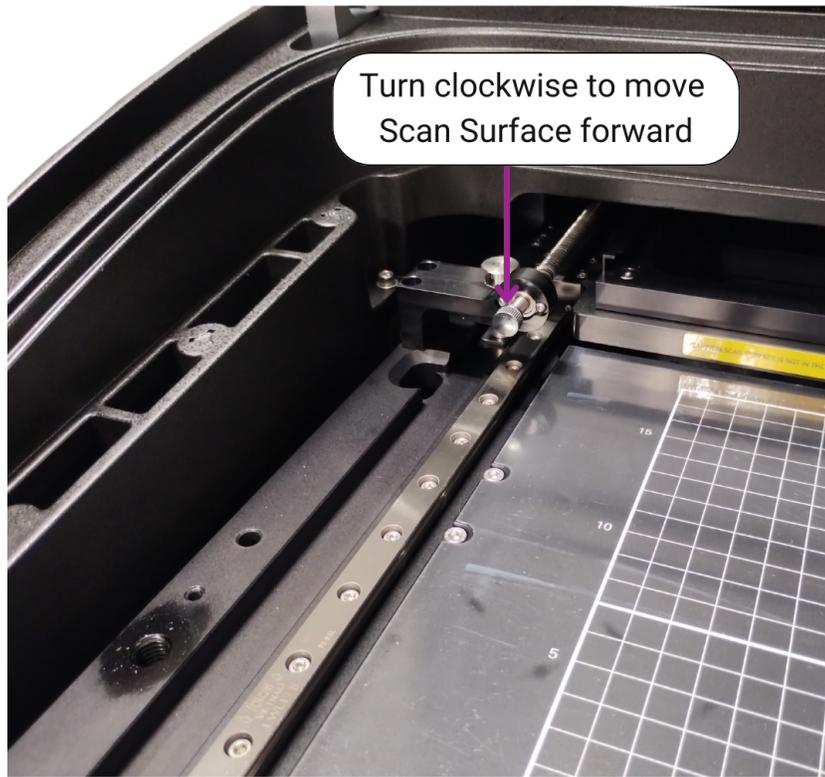


Figure 2-8.

Clean Front Panel

To clean the front panel, use mild soap and water. Do not allow soap or water to enter the imager.

Remove any debris from the electromagnets on the front two corners of the front lid.



Figure 2-9.

Clean the Grid Below the Scan Surface

Cleaning the grid pattern beneath the Scan Surface is not part of regular maintenance. The grid does not need to be cleaned routinely. Over time, depending on lab conditions, the grid may need to be cleaned.

If the grid does need to be cleaned, first gain access to the grid by using the automated Scan Surface moving procedure (see *Move Scan Surface* on page 22) to move the Scan Surface to the rear of the imager.

- If possible, use a microfiber cloth to gently wipe the grid clean.
- If necessary, use mild soap and water.



Do not allow soap or water to enter the imager.



Do not allow soap to get on the greased bearings adjacent to the grid.

Clean Underside of Scan Surface

Cleaning the underside of the Scan Surface is not part of regular maintenance. The underside of the Scan Surface does not need to be cleaned routinely. Over time, depending on lab conditions, the underside may need to be cleaned. The following instructions show how the Scan Surface can be removed to clean the underside.

1. Gently open the front lid.
2. Remove the Sample Enclosure (see *Sample Enclosure* on page 31).

3. Loosen the three sets of screws on the frame of the Scan Surface using a 5/64" hex allen wrench. Ensure the screw, washer, spring, and ball are loosened on every set. The hardware is captive with the sample glass frame.



Figure 2-10.

4. Pull the Scan Surface frame straight up. If it does not come up, ensure the screws are loosened.
5. Flip over the Scan Surface.



Do not remove the glass from the frame!

6. Thoroughly clean the glass Scan Surface with ultrapure water and wipe with a lint-free tissue.



Do **not** use scouring compounds or abrasive scouring pads. The glass can scratch, which can affect the scanned image.

7. Repeat the wash with 70% ethanol to remove any visible smears. Use methanol to remove any remaining residues.
8. Reinstall the Scan Surface by aligning balls on the glass frame with their sockets on the Y-stage and tighten screws (torque not to exceed 8 in-lbs).

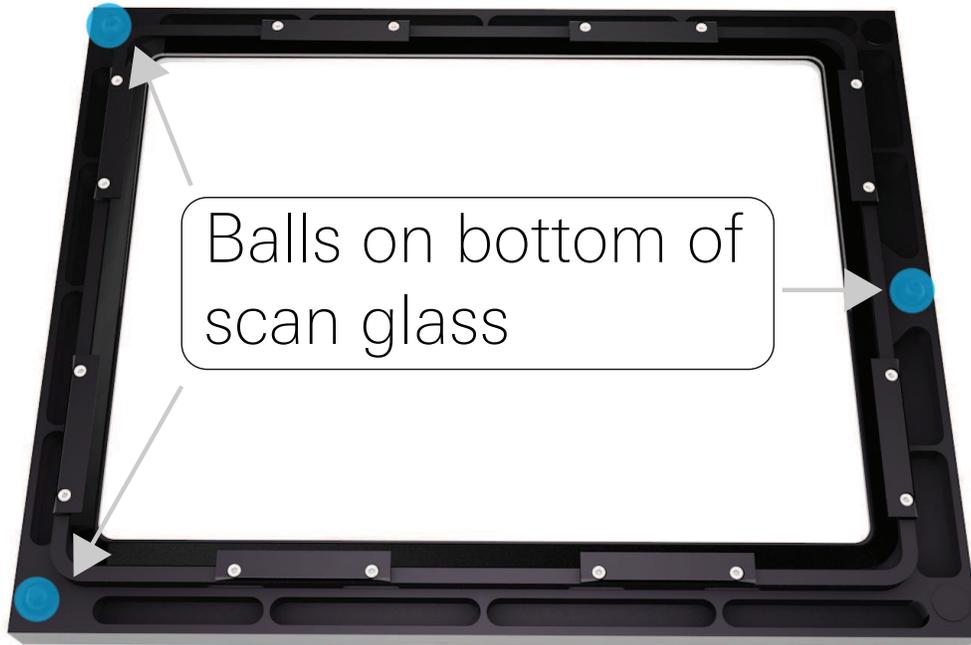


Figure 2-11. Balls on bottom of glass frame



Figure 2-12. Y-Stage sockets

Alignment Guides

It is important that the different alignment guides are correctly set on the instrument. The slides and plates should be fully seated in the guides, as even a slight tilt can cause significant artifacts in the images.

Cell Culture Alignment Guide

Use the Cell Culture Alignment Guide (926-72400) to precisely position cell culture dishes during imaging. The Cell Culture Alignment Guide is held in position by magnets.

Plate Alignment Guide

Use the Plate Alignment Guide (926-18972) to precisely position multiwell plates during imaging. The Plate Alignment Guide is held in position by magnets.



Figure 2-13.

Slide Alignment Guide

Use the Slide Alignment Guide (PN 926-18971) to precisely position microscope slides during imaging. The Slide Alignment Guide is held in position by magnets.



Figure 2-14.

Sample Enclosure

The Sample Enclosure is the frame surrounding the Scan Surface. The Sample Enclosure is held in place by magnets and needs to be removed in some circumstances.

Remove the Sample Enclosure

Pull upward on the Sample Enclosure to remove it. The Sample Enclosure must be removed, for example, to manually move the Scan Surface (see *Manually Move Scan Surface* on page 23) or to clean the underside of the Scan Surface (see *Clean Underside of Scan Surface* on page 27). The Sample Enclosure must be removed to access the shipping locks.



Figure 2-15.

Installing the Sample Enclosure

Lower the Sample Enclosure into place. The magnets will attract and pull the Sample Enclosure into position.

Tray Holder

The Tray Holder is used to store the following accessories: the Plate Alignment Guide and the Cell Culture Alignment Guide. The Slide Alignment Guide comes separately with the instrument. These accessories fit in individual slots within the Tray Holder.

- To **open** the Tray Holder, gently push the door of the Tray Holder, then release. The door will pivot open, allowing access to the accessories inside. Slide the accessories out of their slots when you need to use them or slide them back into their slots to store them in the Tray Holder.
- To **close** the Tray Holder, gently push the front of the door of the Tray Holder into the imager until it latches.



Figure 2-16. This side view shows how the Alignment Guides and Silicone Mat fit into the Tray Holder.

Remove Tray Holder

The Tray Holder on the front of the imager can be removed for certain maintenance tasks, such as cleaning the fan filter (see *Clean or Replace Fan Filter* on page 16). For more information about the Tray Holder, see *Tray Holder* on page 32.

To remove the Tray Holder:

- 1) Gently push the door of the Tray Holder, then release. The door will pivot open.



Figure 2-17.

- 2) Remove everything inside the Tray Holder.
- 3) With the door open, push the front of the Tray Holder into the imager. It will move into the imager about 0.5 in.



Figure 2-18.

- 4) Push up the holding lever until it stops and hold the lever in that position.



Figure 2-19.

- 5) Support the Tray Holder with your hand while allowing it to rotate forward out of the imager.



Figure 2-20.

- 6) Pull the Tray Holder up and away from the base of the imager. The roller pins on the Tray Holder will detach from the hooks on the imager.



Figure 2-21.

Install Tray Holder

- 1) Position the lower roller pins on the left and right sides of the Tray Holder into their corresponding hooks.



Figure 2-22.

- 2) Rotate the Tray Holder to the closed position. The Stop Lever will reset itself when the Tray Holder is closed.



Figure 2-23.

Serial Number

The serial number for your LICORbio Atlas Imager is located inside the Tray Holder near the top. The serial number is in this format: AT1-XXXX (AT1- followed by four numbers).



Figure 2-24. This image shows the location of the serial number label within the Tray Holder. The Tray Holder has been removed in this photo.

Rear Panel

This is the Rear Panel of the LICORbio Atlas Imager.

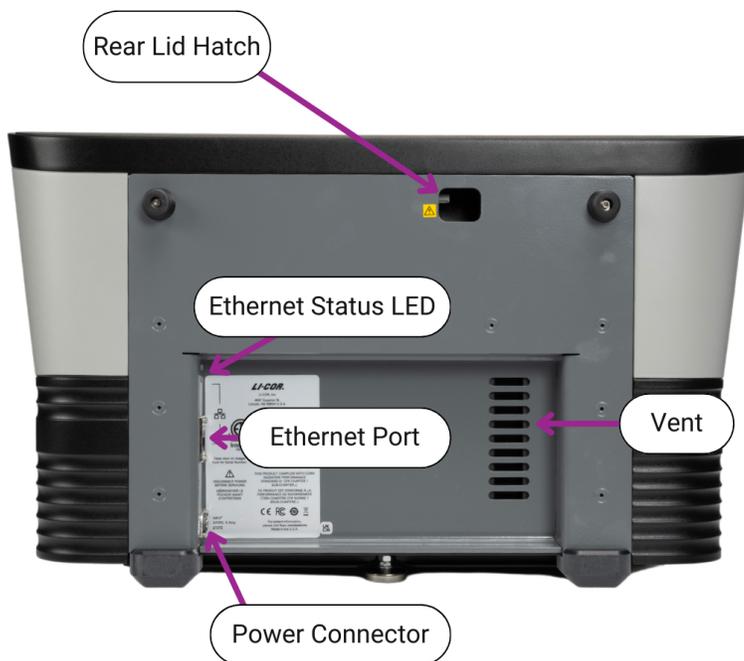


Figure 2-25. Closeup of the LICORbio Atlas Imager rear panel showing the power receptacle and LAN port (use only the supplied networking cable). Note: The appearance of your instrument's back panel may vary slightly from the one shown.

- **Rear Lid Latch Access Hole:** A switch inside this hole allows you to unlatch the rear lid. Do not attempt to open the rear lid without reading instructions in the Rear Lid section "Rear Lid" below carefully.

The rear lid is safety interlocked. Removing the lid removes power to the illumination sources and the motors.

- **Ethernet Status:** Two LED status indicators show if the Ethernet connection is transmitting or receiving information.
- **Exhaust:** The slotted openings help ventilate air through the imager.
- **Power IN:** Plug the DC power plug part of the LICORbio provided power adapter into this port.

Rear Lid

The rear lid of the imager can be removed, **if necessary**, to retrieve samples (see *Retrieve Samples* on page 40).



Figure 2-26. This is the imager with the rear lid removed.

Remove Rear Lid

If you need to retrieve a sample the rear lid can be removed using the following procedure.

The rear lid is safety interlocked. Removing the lid removes power to the illumination sources and the motors.

1. Exit Image Studio .
2. Turn off the LICORbio Atlas Imager by pressing the Power button on the front panel.
3. Disconnect the power cord. See "Disconnecting the Power" on page 41 for more information about disconnecting power.
4. On the rear panel, locate the latch access hole (see Figure 2-25).
5. Inside the latch hole, press the switch to the left to release the latch. The rear lid will pop up slightly.
6. Lift the rear lid up slightly (about 10 - 20 degrees).
7. Grab the rear lid and gently slide it toward the rear of the imager. Pulling the rear lid slightly will allow the two connectors on the front side of the lid to be removed from their sockets, and the

rear lid can then be separated from the imager and set aside.

8. You can then proceed with sample retrieval instructions (see *Retrieve Samples* below) or instructions for cleaning the glass covering of the chemi module (see *Luminescence Module Glass* below).
9. To attach the rear lid back to the imager, slide the rear lid at a slight angle to the back of the imager to reengage the connectors. Press firmly down in the middle of the back edge to reengage the latch.

Retrieve Samples

As described in *Scan Surface* on page 21, the Scan Surface automatically moves to the optical system in the rear of the imager during a scan. If a power failure occurs during the scan when the Scan Surface is in the rear of the imager, the Scan Surface will not be able to return to the front area normally.

If the Scan Surface does not return to the front area normally and you need to access samples within the imager, first try to move the Scan Surface forward manually using the procedure in *Manually Move Scan Surface* on page 23. If the Scan Surface cannot be moved forward manually, follow instructions for removing the rear lid (see *Remove Rear Lid* on the previous page).

With the lid removed, look for the samples. If there is a clear, unobstructed path that can be used to safely remove the samples without impacting internal components of the imager, then carefully remove the samples.

Luminescence Module Glass

Do not attempt to clean this glass covering. If you believe the glass covering has become contaminated (for example, something has been spilled on it), contact LICORbio Technical Support for assistance.

General Description of Scanning

Scans are initiated using Image Studio .

Continuous Operation

The LICORbio Atlas Imager is designed to operate continuously. During idle times, the LICORbio Atlas Imager can remain powered on or be powered off at your discretion. LICORbio recommends keeping the instrument powered on, as it requires a warm-up period after power up before it is ready for use. See "Imaging System Specifications" on page 49 for more information about how much current the LICORbio Atlas Imager draws. For information about disconnecting the power, see "Disconnecting the Power" on the facing page.

Disconnecting the Power



Do not press the power button or unplug the power cable while the system is scanning, except for an emergency situation.

1. Exit Image Studio.
2. Briefly press the Power button on the front panel to power off the LICORbio Atlas Imager.
3. Unplug the power supply from the wall outlet. You can then unplug the power supply from the back of the LICORbio Atlas Imager.

Optical System Description

Brief Description of Illumination Sources

Laser

Lasers are narrow wavelength, high intensity light. Lasers are used as an excitation source for substances that emit light at specific wavelengths after being excited by light of a particular wavelength. This process of light excitation and emission is known as fluorescence. The benefit of using lasers to induce fluorescence is that specific structures (those excited by the wavelength of the incident laser) will be excited, while the rest of the sample remains unexcited and non-fluorescent. Fluorescence enables specific targeting and imaging. Fluorescence is the preferred method when accurate quantification of samples is required.

Examples

- Fluorescent Reporter Assays.
- 2D and 3D cell fluorescent imaging.
- Live/Dead Nuclear Staining.

Transillumination (Transmitted Light)

Transillumination involves transmitting visible light (or in some cases UV light) through your sample. The light is attenuated in the sample via absorption (which generates contrast) and the transmitted light is recorded. Transillumination creates even illumination of the sample to observe highly contrasted, stained, or naturally pigmented samples. The illumination wavelength (and emission filter) are selected based on the spectral characteristics of the sample to generate the best contrast. Images in the RGB (red, green, blue) format, also called "true color" images, are a composite of three independent grayscale images that correspond to the intensity of red, green, and blue light transmitted by the sample. The RGB images are in a non-linear, standard colorspace (sRGB). **Note:** Quantification is not available for sRGB images.

Examples

- 2D and 3D cell culture imaging.
- Spheroid/Organoid growth monitoring.
- H&E stained tissue sections.

Epi-Illumination (Reflected Light)

Method of choice for imaging samples that are not translucent or transparent. In epi-illumination, the recorded light is reflected from the sample with absorption and diffraction of the reflected light by the sample resulting in discernible variations in the image, from black through various shades of gray, or color if the sample is colored. Epi-illumination creates even illumination of the sample to observe highly contrasted, stained or naturally pigmented samples. For grayscale images the illumination wavelength (and emission filter) are selected based on the spectral characteristics of the sample to generate the best contrast. Images in the RGB (red, green, blue) format, also called "true color" images, are a composite of three independent grayscale images that correspond to the intensity of red, green, and blue light transmitted by the sample.

Examples

- Immunocytochemistry using colorimetric substrates.

Computer Connections and Networking

Note: Use only the supplied Category 6 network cable to connect the LICORbio Atlas Imager and computer.

When Image Studio starts, it searches for and discovers any LICORbio Atlas Imager automatically. If only one imager is found, Image Studio establishes communication. If more than one imager is found, you will be able to choose which imager you want to connect to on the Image Studio **Connect** page.

If you do not see your imager in the list, click the link on the Connect page that says **My imager is not in the list** to view troubleshooting steps. For information about contacting Technical Support and locating Image Studio log files, see *Obtaining Technical Support* on page 47.

Chapter 3: Operation

Before You Begin

Gently clean the Scan Surface as needed, especially when using samples that might make the glass dirty.

It is very important that the glass is free of smudges, dust, and dye before placing plates or dishes onto the LICORbio Atlas Imager. Samples in contact with the scan surface may contaminate it, causing blotches and streaks that can be difficult to remove.

Clean the LICORbio Atlas Imager Scan Surface

- 1) When cleaning the Scan Surface, leave the Sample Enclosure in place on the Scan Surface.



Figure 3-1.

- 2) Thoroughly clean the glass Scan Surface and the metal frame surrounding the Scan Surface with ultrapure water and wipe with a lint-free tissue.



Figure 3-2.



Do **not** use scouring compounds or abrasive scouring pads. The glass can scratch, which can affect the scanned image.

- 3) Repeat the wash with 70% ethanol to remove any visible smears. Use methanol to remove any remaining residues.



Do not get ethanol or methanol on the Sample Enclosure or on the outside of the imager.

Scanning 3D Objects

LICORbio Atlas Imager can image 3D samples such as spheroids and organoids grown in multiwell plates and microphysiological systems (MPS).

When using multiwell plates, e.g., to perform single well imaging of spheroids, follow the instructions in the section *Scanning Multiwell Plates* on page 45.

When using MPS, choose one of the following options:

1. If you are using an MPS that conforms to plate size standards (such as AIM Biotech), use a **Plate Scan Preset** that uses the **Plate Holder** type. For more information, please follow the instructions in *Scanning Multiwell Plates* on page 45.
2. If you are using an MPS adaptor that does not follow plate size standards or if you are using individual MPS without adaptors, then place your sample on the scan surface using one of the following options:
 - The Cell Culture Alignment Guide (926-72400), or
 - No alignment (place the sample directly on the scan surface).

In Image Studio set the **Holder Type** to **Manual Scan Areas** and draw a scan area corresponding to the location of the sample you want to image.

In all cases, find the sample focus using the **Select Focus** feature in Image Studio. It is recommended to perform a **Focus Stack** before deciding which focus level will be used for the sample.

When analyzing the 3D sample, Image Studio provides a **Morphology Analysis** tool to determine Area, Perimeter, Equivalent diameter, Compactness, and Eccentricity, etc. The software also allows you to perform z-stack and 2D projections (maximum, mean, median and minimum). For more information on the analysis, refer to Image Studio help documentation.

Scanning Multiwell Plates

1. Ensure the LICORbio Atlas Imager is powered on and connected to Image Studio .
2. Open the lid.
3. For the LICORbio plates (PN 926-19156 and 926-19157) we generally recommend taking the lid off before imaging. You can use plate tape to cover the plate to mitigate evaporation problems.

When scanning live cells, you may need to leave the lid on to prevent contamination.

4. Place the Plate Alignment Guide on the LICORbio Atlas Imager Scan Surface and place multiwell plates in the Plate Alignment Guide.
5. Close the lid.
6. In Image Studio, choose the plate preset for scanning multiwell plates and then choose the acquisition parameters that are necessary for your plate.

Imaging Multiwell Plates

Multiwell plates in 6, 12, 24, 48, 96, and 384 well formats can be scanned on the LICORbio Atlas Imager. Be sure to select multiwell plates that fit the Plate Alignment Guide.



Do not attempt to image plates that have a height greater than 23 mm on the LICORbio Atlas Imager.

Proper selection of multiwell plates significantly affects the results of your analysis, because each plate has its own characteristics including well depth, autofluorescence, and well-to-well signal crossover. Some general considerations for multiwell plate selection are provided here.

- Do not use plates with white walls for fluorescence, because the white surface will create significant background intensity.
- The LICORbio Atlas Imager Scan Surface should be thoroughly cleaned using the procedures described earlier in this chapter. If artifacts are noticed on the image, it may help to clean the bottom of the plate with a moist, lint-free tissue.
- Protect plates from light before imaging to ensure highest sensitivity. When storing plates after imaging, protect plates from light.

- Depending on the plates you choose, lower or higher focus offsets for optimal resolution and detection may be required. An initial optimization scan will be necessary. Scan a plate containing experimental and control samples at a range of focus offsets. You can use the Focus Stack feature in Image Studio. The focus offset range for the LICORbio Atlas Imager is -1.00 mm to 5.00 mm and in 0.01 mm increments.

Scanning Slides

Slides can be scanned on the LICORbio Atlas Imager.

Imaging Slides

1. Ensure the LICORbio Atlas Imager is powered on and connected to Image Studio.
2. Open the lid.
3. Place the Slide Alignment Guide on a clean, solid surface (such as a lab bench) off of the LICORbio Atlas Imager Scan Surface.
4. Before inserting slides into the Slide Alignment Guide, **determine which orientation you should use to load your slides** into the Slide Alignment Guide.

For slides **with a coverslip**, slides should be placed with the coverslip (sample) **facing up**.

For slides **without a coverslip** (such as membrane-coated slides), place the slide sample-side **facing down**.

5. Carefully lower a slide into a slot on the Slide Alignment Guide, starting with the slide at an oblique angle to the slot. Lower the slide slowly until it is flat in the slot and pressed against the pressure clasp. Ensure the slide remains flat against the base of the slot.

Repeat until all slides have been loaded.



Do not place the slide straight down into the slot, or you might break the slide.



6. Carefully lower the Slide Alignment Guide onto the Scan Surface.
7. Close the lid.
8. In Image Studio, connect to the LICORbio Atlas Imager and choose one of the slides presets.

The focus offset is 2.5 mm when you choose Slide (Sample Down) in the Image Studio acquisition ribbon. If you are imaging a non-standard slide, not using the Slide Alignment Guide,

or imaging the slide with the cover slip facing up, you may need to determine the optimal focus offset for your assay. You can set custom focus offsets in the Select Focus parameters in Image Studio and then evaluate the results to determine which focus offset is optimal for your assay.

9. When you are done imaging the slides, open the lid and move the Slide Alignment Guide (with the slides on it) off of the Scan Surface.
10. Remove slides from the Slide Alignment Guide by pulling them from their slots at an oblique angle (i.e., the opposite order of the steps followed to load the slides).

Obtaining Technical Support

To resolve a question about your LICORbio Atlas Imager, contact LICORbio Technical Support at 800-645-4260 (North America) or by email at biohelp@licorbio.com.

To help you, Technical Support may request log files or images from Image Studio™ Software.

Chapter 4: Appendix

Imaging System Specifications

Laser Source

The LICORbio Atlas Imager is a Class 1 laser product.

Laser Source	Maximum Laser Output	Beam Divergence
375 nm	70mW	0.075°
488 nm	30 mW	0.038°
520 nm	55 mW	0.046°
640 nm	210mW	0.075°
685 nmnm	450 mW	0.085°
785 nm	1.2 W	0.060°

Note: The laser beams are approximately collimated.

Note: Actual power output is significantly lower than the maximum power ratings.

Strong Electromagnetic Fields

Operating the LICORbio Atlas Imager in the presence of a strong electromagnetic field in the 100MHz to 400MHz frequency range has been shown to degrade the performance of the luminescent detector. It is possible that some allowable faint bars or striping may be seen at slightly more than the background levels of the camera. When used in the expected environment, this interference should be uncommon.

LED

LED Risk Group: Exempt group in accordance with IEC 62471:2006. The LEDs do not pose any photobiological hazard.

Focus

Focus offset range: -1.00 mm to 5.00 mm, in 0.01 mm increments.

Pixel Resolution

Available imaging resolutions: 5 μm , 10 μm , 20 μm , 50 μm , 100 μm

Maximum Height of Samples

To image an item on the LICORbio Atlas Imager, the item must be 23 mm or less from the Scan Surface to the top of the item. Tall samples could be pushed off the scan surface during imaging and fall into sensitive areas of the instrument that should not come into contact with samples. Special care should be taken with *ex vivo* samples.

Operating Specifications

Operating Conditions

For indoor use only; operating temperature 15 - 30 °C and dew point not greater than 22 °C, non-condensing; altitude not to exceed 2000 m.

LICORbio Atlas Imager Operating Limits

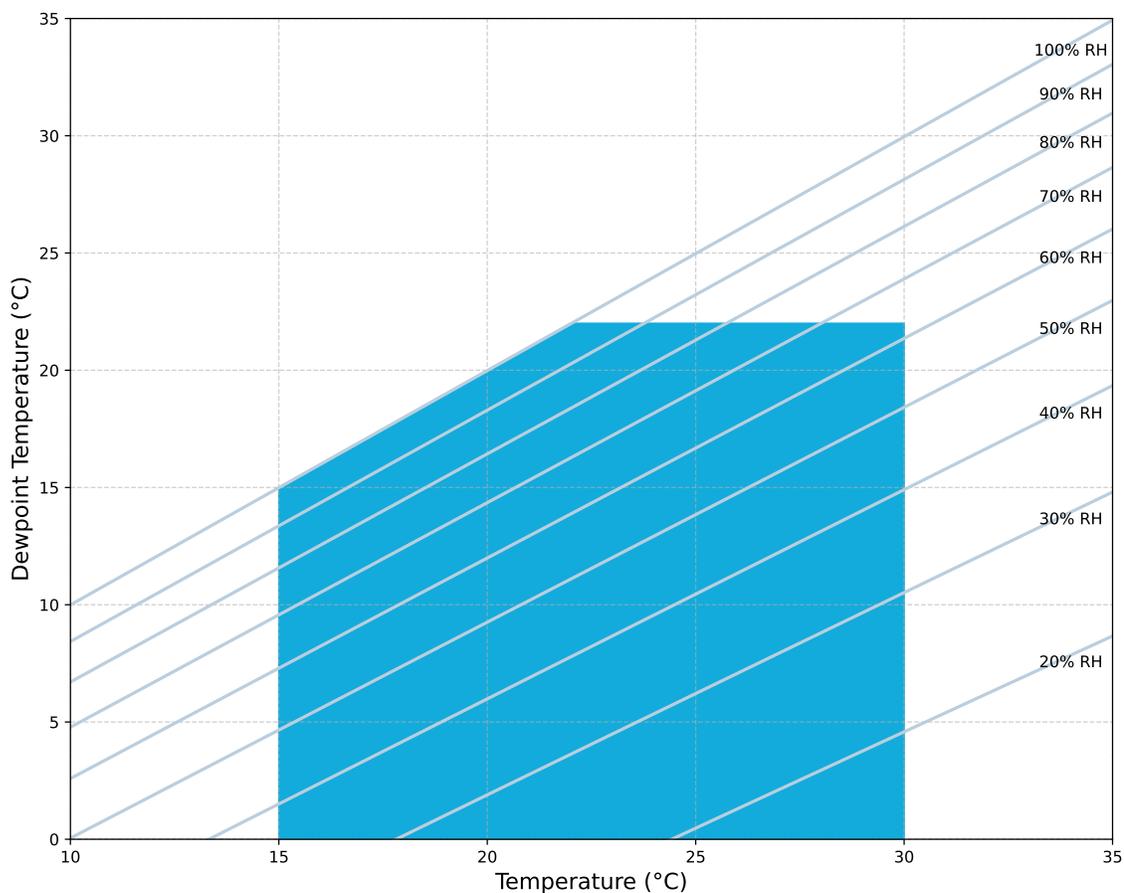


Figure 4-1. The light-blue highlighted area indicates the safe operating range for the instrument.

Transport Conditions

Shipping/transport conditions for the LICORbio Atlas Imager should not exceed -40 °C to 65 °C.

Environmental Conditions

Pollution Degree 2

Power Requirements

- Universal input range is between 100-240 VAC (voltage fluctuations not to exceed 10% of the nominal voltage); < 3 Amp maximum; At 120 V: 0.5 Amp typical when idle; 50-60 Hz.
- Power Supply: One end of the provided power supply connects to a wall outlet and the other end connects to the imager. The power supply converts from wall outlet voltage to 24 VDC (5 Amp). Only use the provided power supply to plug in the imager. If you need another power supply, contact LICORbio.

Dimensions

- 24" width × 30" depth × 15" height (61 cm width × 76 cm depth × 38 cm height)
- Height with lid fully open: 28" (71 cm)

Scan Surface

- Total Scan Area: 25 cm W × D 18 cm (9.8" W × 7.1" D)
- Scan Area of Chemi Region: 15 cm W x 11 D cm (5.9" W × 4.3" D)

Dynamic Range

>6 logs for luminescence and fluorescence. This dynamic range is obtained in a single acquisition and maintained in individual image files.

Weight

- 121 lbs (55 kg)

Network

- Protocol: TCP/IP
- Connection: Use the Category 6 network cable provided with the LICORbio Atlas Imager.

Detectors

- sCMOS image sensor
- Sensor for chemiluminescence: CCD

Light Sources

- RGB LED (trans-illumination)
- RGB LED (reflective illumination)
- Solid-state diode laser at 375 nm
- Solid-state diode laser at 488 nm

- Solid-state diode laser at 520 nm
- Solid-state diode laser at 640 nm
- Solid-state diode laser at 685 nm
- Solid-state diode laser at 785 nm

Optical Information

Laser line-scan imaging module with mirror-based, aberration-corrected optics.

- Numerical aperture (NA): 0.15
- Magnification: 1×

LICORbio Atlas Imager Detection Channel Summary

Excitation / Illumination	Emission Filter	Channel
785 nm	816 - 840 nm	785Ex-820Em
685 nm	721 - 740 nm	685Ex-720Em
685 nm	816 - 840 nm	685Ex-820Em
640 nm	664-704 nm	640Ex-680Em
640 nm	721 - 740 nm	640Ex-720Em
640 nm	816 - 840 nm	520Ex-820Em
520 nm	570 - 610 nm	520Ex-590Em
520 nm	520-704 nm	520Ex-680Em
520 nm	721 - 740 nm	520Ex-720Em
520 nm	816 - 840 nm	520Ex-820Em
488 nm	519 - 543 nm	488Ex-530Em
488 nm	570 - 610 nm	488Ex-590Em
488 nm	520-704 nm	488Ex-680Em
488 nm	721 - 740 nm	488Ex-720Em
488 nm	816 - 840 nm	488Ex-820Em

Excitation / Illumination	Emission Filter	Channel
375 nm	417-477 nm	375Ex-460Em
375 nm	519 - 543 nm	375Ex-530Em
375 nm	570 - 610 nm	375Ex-590Em
375 nm	520-704 nm	375Ex-680Em
375 nm	721 - 740 nm	375Ex-720Em
375 nm	816 - 840 nm	375Ex-820Em
NA	NA	Chemi
470 525 630 Epi	NA	RGBEpi
631 - 659 nm	Clear Window	630Epi
500 - 530 nm	Clear Window	525Epi
447 - 472 nm	Clear Window	470Epi
470 525 630 Trans	NA	RGBTrans
631 - 659 nm	Clear Window	630Trans
500 - 530 nm	Clear Window	525Trans
447 - 472 nm	Clear Window	470Trans

Embedded Firmware Source Code

The embedded firmware running on the LICORbio Atlas Imager (model number 3360) utilizes open source software. To obtain source code or related information, contact LICORbio Support at support@licorbio.com.

