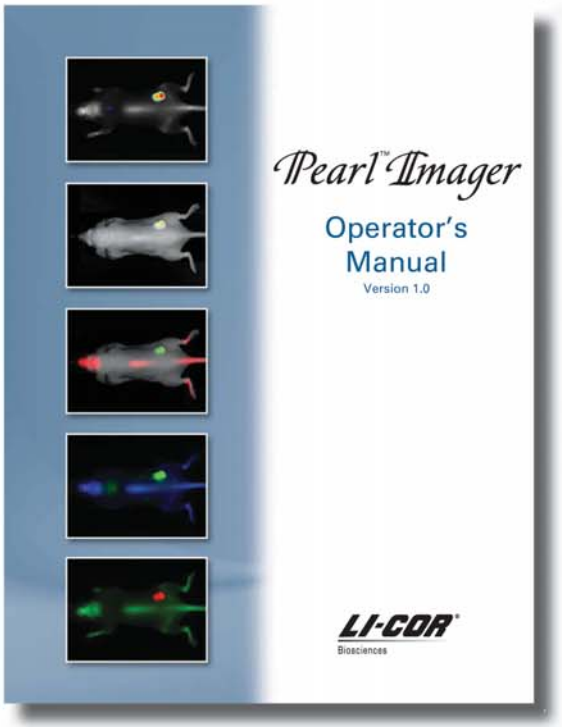

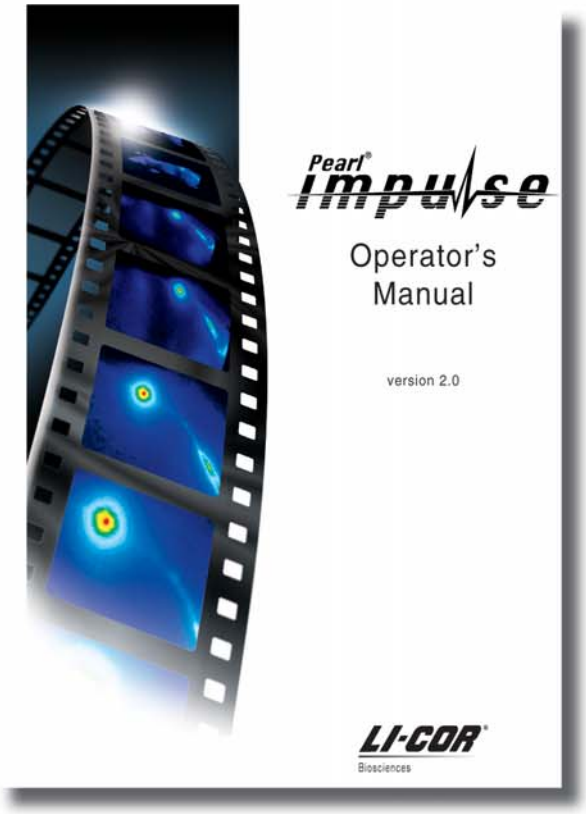

Pearl® Accessories

9300-020 Pearl® Docking Station

9300-022 Pearl® Clean Box

Version 1.3

LI-COR®
Biosciences

LI-COR®
Biosciences

LI-COR, inc.
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Declaration of Conformity

Manufacturer's Name: LI-COR, Inc.

Manufacturer's Address: 4647 Superior Street
Lincoln, Nebraska USA 68504

declares that the product

Product Name: Pearl Docking Station

Model Number(s): 5700-DS

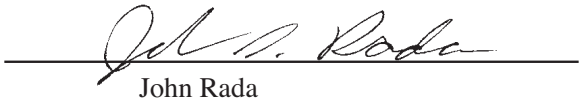
Product Options: All

conforms to the following Product Specifications:

EMC: FCC 47 CFR Part 15.109 Radiated Emissions, Class A
FCC 47 CFR Part 15.107 Conducted Emissions, Class A
EN 55011 : 1998 : Radiated Emissions, Class A, A1 : 1999, A2 : 2002
EN 55011 : 1998 : Conductive Emissions, Class A, A1 : 1999, A2 : 2002
IEC 61000-4-2 : 1999 : ESD, 4KV/8KV Contact/Air
IEC 61000-4-3 : 2002 : Radiative RF Immunity, 3V/m
IEC 61000-4-4 : 2004 : EFT/Burst 1KV
IEC 61000-4-5 : 1995 : Surge 0.5KV
IEC 61000-4-6 : 2004 : Conductive RF Immunity
IEC 61000-4-11 : 2004 : Voltage Dips

Supplementary Information:

The product herewith complies with the requirements of EMC Directive 2004/108/EC (formerly 89/336/EEC).



January 1, 2009
Document #53-10950

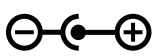
John Rada
Director of Engineering

Notes on Safety

LI-COR products have been designed to be safe when operated in the manner described in this manual. The safety of this product can not be guaranteed if the product is used in any other way than is specified in this manual. The Pearl Docking Station was intended to be used by qualified personnel. Read this entire manual before using the Pearl Docking Station.

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 bodily injury or damage to the product.



The product is marked with this symbol to indicate that the input power plug required is a center positive plug. When supplying power to this device, a center positive plug must be used.

The product is marked with this symbol to indicate that a Direct Current Voltage is needed for the product to perform properly.

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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Pearl® Accessories

Chapter 1 9300-020 Pearl Docking Station

Description

The Pearl Docking Station is an external platform that duplicates many of the features of the Pearl imaging drawer. The main features and functions of the Pearl Docking Station are listed below.

- Duplicates the docking hardware in the Pearl imaging drawer, allowing an accessory imaging bed to be locked in place on the docking station similar to the Pearl drawer.
- Provides temperature and anesthesia gas control to a Pearl accessory imaging bed outside of the Pearl instrument, allowing animals to be prepared for imaging at an external station.
- Warms the heater plate in any of the Pearl accessory imaging beds (when docked) to 38°C so that animals can be placed on warm imaging beds before transfer to the Pearl.
- Provides a rotameter, isoflurane scrubber, and anesthesia gas flow system similar to the Pearl instrument when an accessory imaging bed is locked in place on the docking station.

Figure 1-1. Pearl Docking Station (left) with optional Pearl Clean Box (mounted).

This chapter provides information on assembly and operation of the Pearl Docking Station only. The remaining chapters provide specific operational details on each of the accessory imaging beds. Information on the standard 9300-021 Pearl Imaging Bed is not provided in this manual since it can be found throughout the Pearl Operator's Manual.

Assembling the Pearl Docking Station

WARNING: Isoflurane gas can leak in the amount supplied to the Pearl Docking Station if the product is not used properly. Carefully follow the instructions in this chapter to ensure that the scavenging charcoal filter and user-supplied anesthesia system are properly connected, and that the nose cone on the imaging bed has a nose cone plug inserted when not in use.

AVERTISSEMENT:
L'anesthésie d'isoflurane peut fuir dans la quantité fournie à la station d'amarrage de Pearl si le produit n'est pas employé correctement. Suivez soigneusement les instructions dans ce chapitre pour vous assurer que le port d'échappement est relié à un filtre à charbon, que le système d'anesthésie fourni par l'utilisateur est correctement relié, et que le cone de nez est équipé d'un bouchon inséré.

1) Unpack the 9300-020 Pearl Docking Station and any other accessory imaging beds, such as the 9300-022 Pearl Clean Box, so all parts are available for assembly.
2) Loosen the thumb nuts on the back of the rotameter stand. Orient the rotameter with tubing to the back of the stand as shown below. Connect the rotameter to the rotameter stand by sliding the rotameter over the mounting studs (similar to the Pearl instrument) and tightening the thumb nuts.

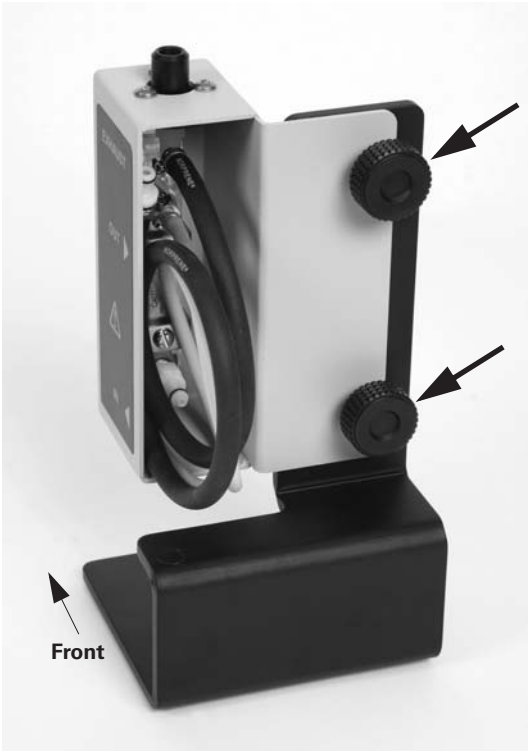


Figure 1-2. Docking station rotameter connects to the stand via two thumb nuts with the rotameter oriented to the front of the stand.

3) Connect the tube from the port labeled “OUT” on the rotameter to the port labeled “IN” on the back of the docking station. The gender of the connector prevents connection to the wrong port.

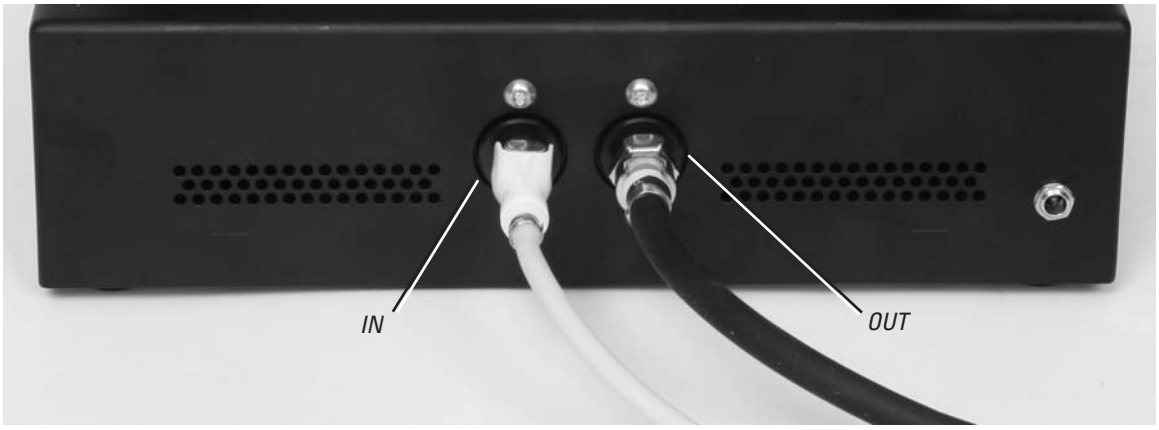


Figure 1-3. Docking station back panel.

4) Connect the tube from the port labeled “EXHAUST” on the rotameter to the port labeled “OUT” on the back of the docking station.

5) If using the 9300-022 Pearl Clean Box, connect one of the provided HEPA filter assemblies (LI-COR, P/N 9300-821, packaged with the Clean Box) to the port labeled “IN” on the rotameter. The gender of the connector assures the filter will be plugged-in in the correct orientation.

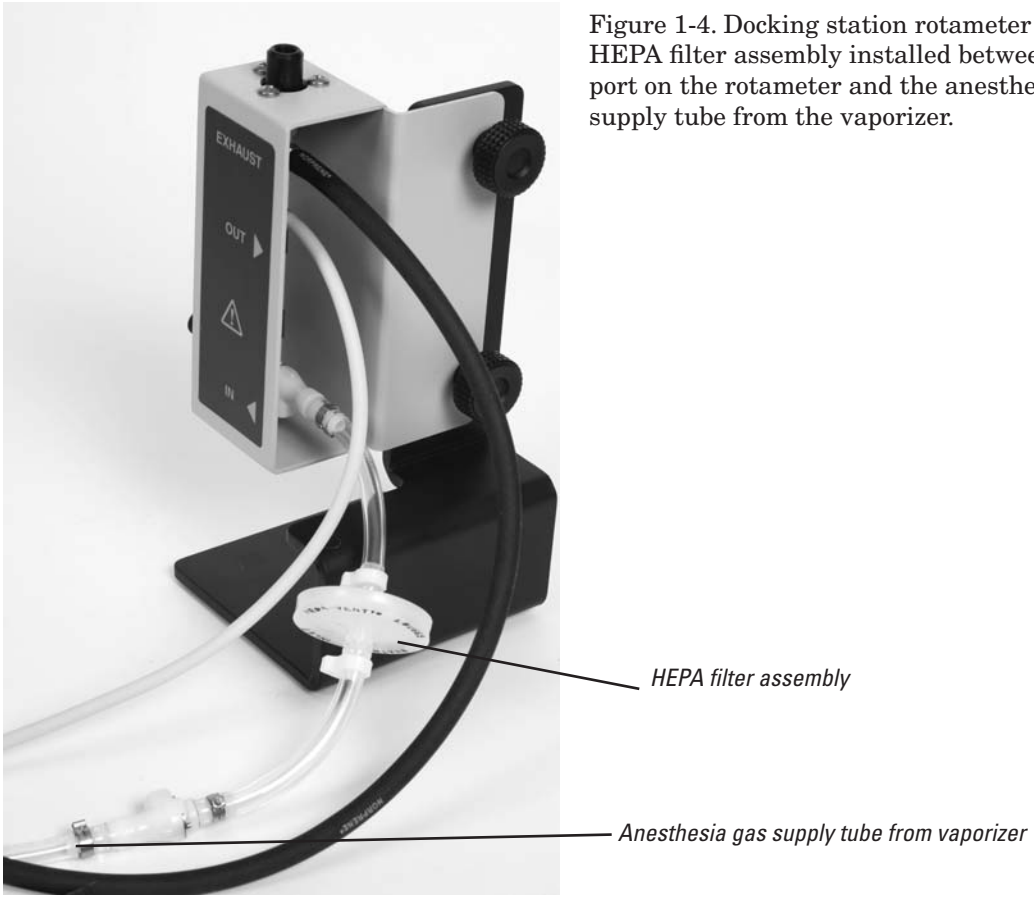


Figure 1-4. Docking station rotameter with HEPA filter assembly installed between the IN port on the rotameter and the anesthesia gas supply tube from the vaporizer.

6) Connect the opposite end of the HEPA filter assembly to the provided anesthesia gas supply tube and then connect the other end of the anesthesia gas supply tube to one of the output connectors on the SmartFlow Anesthesia System (LI-COR, P/N 9000-101, 9000-102), or equivalent (Fig. 1-5).

Note: For imaging beds not requiring a HEPA filter, connect the anesthesia gas supply tube directly to the rotameter. For other vaporizers, it may be necessary to remove the connector that connects to the SmartFlow Anesthesia System and replace it with an appropriate fitting.

⚠ **CAUTION:** The Pearl Docking Station is compatible only with anesthesia systems that supply isoflurane gas. The flow rate and pressure into the instrument should not exceed 1 liter per minute and 1 psi, respectively. If the pressure exceeds 5 psi, the rotameter will not accurately show the flow to the nose cone.

ATTENTION:
La station d'amarrage de Pearl n'est compatible qu'avec les systèmes d'anesthésie qui fournissent le gaz isoflurane. Le débit et la pression dans l'instrument ne devraient pas excéder 1 litre par minute et 6.9 kPa, respectivement. Si la pression excède l'estimation de 34.5 kPa, le rotamètre ne montrera pas en juste proportion l'écoulement au cône de nez.

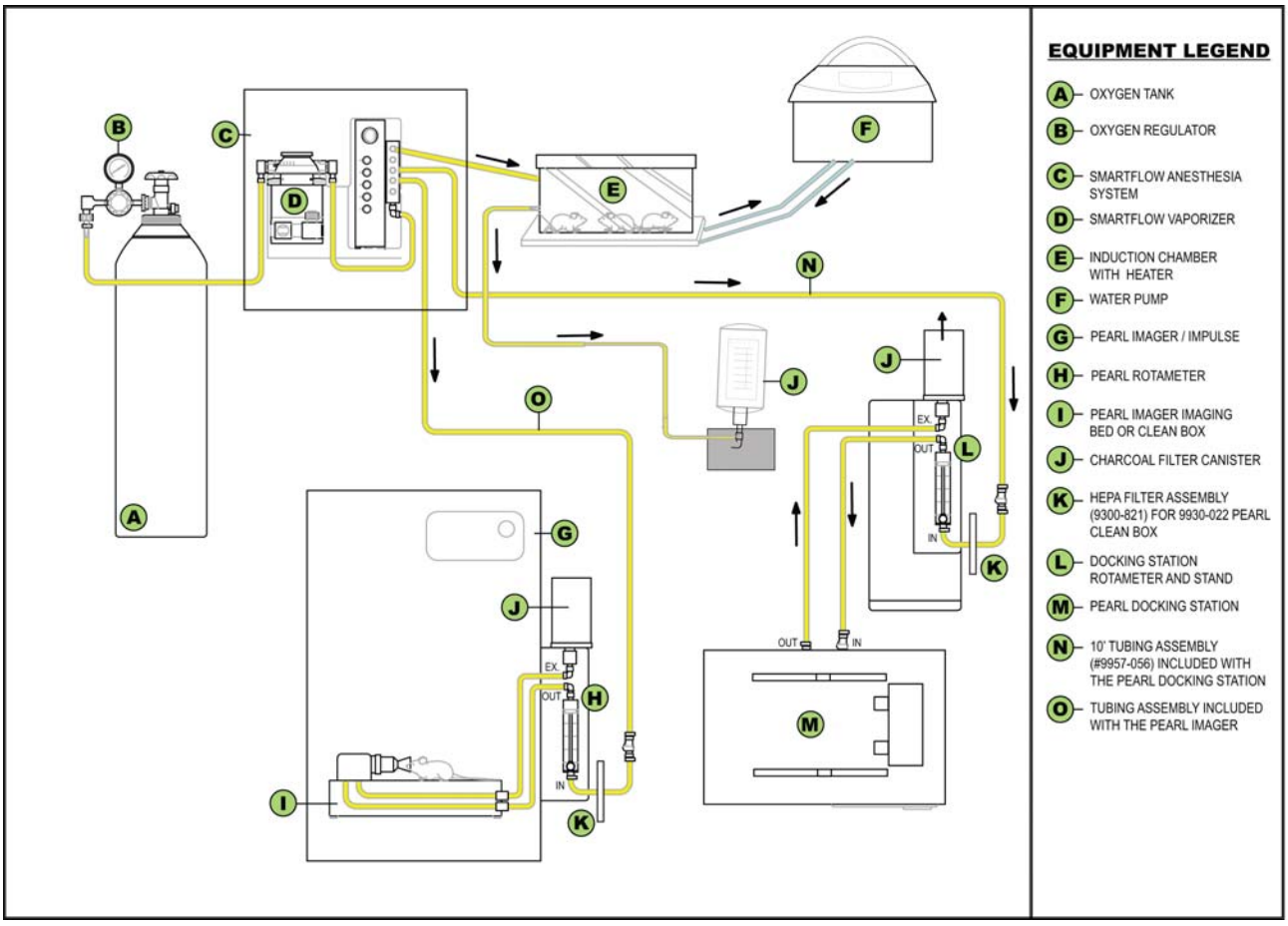


Figure 1-5. General representation of a typical system consisting of the docking station with the Pearl Impulse and SmartFlow Anesthesia System. Docking station rotameter (L) connects to optional HEPA filter assembly (K) and anesthesia gas supply tube (N) before connecting to a port on the SmartFlow Anesthesia System (C).

7) Hold the base of the rotameter stand and press the charcoal filter down onto the port labeled "EXHAUST" on the exterior of the rotameter. Alternatively, connect a user-supplied charcoal filter assembly to the EXHAUST port. Recommendations for monitoring and replacement of the charcoal filter are given in Chapter 3 of the Pearl Operator's Manual.

Figure 1-6. The included charcoal filter or a user-supplied charcoal filter presses onto the external output port on the docking station rotameter.

8) Connect the power supply to a wall outlet and then to the back of the Pearl Docking Station.

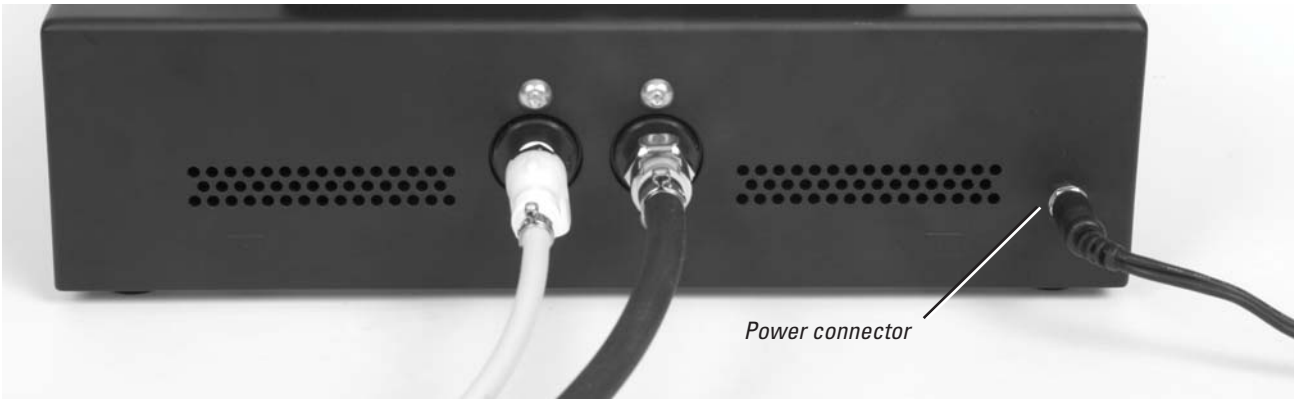


Figure 1-7. Power connector on the docking station back panel.

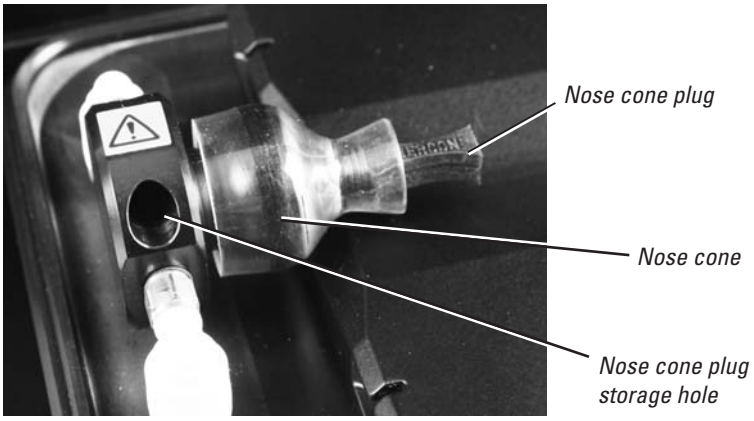
Docking Station Operation

1) Install a nose cone plug in the nose cone of the accessory imaging bed (Figure 1-8) and install the imaging bed on the Pearl Docking Station. Lock the imaging bed in place using the guide pins and locking handle as described in the Pearl Operator's Manual. Consult the appropriate chapter in this manual for any additional instructions for the specific imaging bed you are using.

WARNING: Make sure a black nose cone plug is tightly inserted in the nose cone before turning on the anesthesia gas. Failure to insert a nose cone plug will result in the release of isoflurane gas.

AVERTISSEMENT:
Assurez-vous qu'un bouchon noir pour cone de nez est bien inséré dans chacun des cones de nez avant de brancher le gaz anesthésiant. L'absence de bouchon peut provoquer une décharge de gas

Figure 1-8. Nose cone plug inserted in a nose cone.



2) Press the power button on the docking station front panel (Figure 1-9).

Indicator	Description
(Blue)	ON continuously when the docking station is powered on. OFF when an error condition exists or the power supply is disconnected.
(Green)	Blinks rapidly when heater plate is not within 1.5 °C of the 38 °C set point.
	ON continuously when heater plate is within 1.5 °C of the 38 °C set point.
	OFF when an imaging bed is not installed on the docking station or there is an error condition.
(Red)	ON continuously when the heater plate temperature is greater than 5 °C above set point (38 °C). The heater plate is automatically turned OFF, but the indicator remains on. Disconnect the power supply to turn off the red warning light and reset the temperature controller. Connect the power supply again after the heater plate has cooled.
	Blinks slowly when the current to the heater plate is not correct. This may indicate that the heater plate contact pins are dirty, shorted (bent), or need replacement. See Chapter 5 of the Pearl Imager Operator's Manual for the contact pin replacement procedure. Contact LI-COR if the error condition persists after contact pin replacement.

Figure 1-9. Location and function of front panel indicator lights.

3) Wait for the heater plate to reach the set point (38°C). The green "running" icon blinks rapidly until the set point is reached and then stops blinking and remains on (Figure 1-9).

4) Use the adjustment knob on the rotameter to set the flow rate to 0.5 liters per minute (typical) and start gas flow from isoflurane vaporizer or equivalent. Allow 1 minute to prime the system with isoflurane gas. Observe the safety warnings given in Chapter 1 of the Pearl Operator's Manual concerning use of isoflurane gas and oxygen. Follow the instructions from the manufacturer of the anesthesia system to anesthetize mice.

⚠ **CAUTION:** To prevent pressure build up in the external anesthesia system, don't close the rotameter on the Pearl Docking Station unless the anesthesia system is properly vented.

AVERTISSEMENT:
Pour empêcher l'accumulation de pression dans le système externe d'anesthésie, ne fermez pas le rotamètre sur la station d'amarrage de Pearl à moins que le système d'anesthésie soit correctement aéré.

5) Move the mouse from the induction chamber to the imaging bed, remove the nose cone plug, and slide the muzzle of the mouse into the nose cone. Complete instructions can be found in the Pearl Operator's Manual. Consult the appropriate chapter in this manual for any additional instructions for the specific imaging bed you are using.

6) Lift the locking handle on the accessory imaging bed and remove it from the docking station. Move the imaging bed immediately to the Pearl Impulse for imaging.

   Important: The flow of anesthesia gas stops after the imaging bed is unlocked from the docking station and does not start again until the imaging bed is locked into the Pearl imaging drawer or returned to the docking station and locked in place.

7) After imaging, remove the accessory imaging bed, lock it back on the docking station, remove the mouse to a recovery chamber, and re-insert the nose cone plug to stop the flow of anesthesia gas. Turn off the flow of anesthesia gas after imaging the last mouse.

Routine Maintenance

The Pearl Docking Station requires only minimal maintenance. **Disconnect power before servicing**. Clean the exterior case parts with cloth dampened with warm water. Do not submerge or power wash. Inspect all cables and power cords for evidence of fraying, exposed wire, or loose connections. Periodically inspect external tubing for cracking or damage that could cause leaks.

Docking Station Specifications

Operating Conditions: For Indoor use only; operating temperature 15-35°C, dew point not greater than 20°C, non-condensing. Storage temperature of -20 to 60°C.
Power Requirements: 100-240 VAC; 47-63 Hz; 1 A at 100 VAC.
Power Input Connector: 5.5 x 2.5 mm, center positive.
External Power Supply Input connector: 3 Pin IEC 320 input receptacle.
Temperature Setting: 38°C ± 1°C.
Docking Station Dimensions: 5.0"H x 11.3"W x 9.3"D (12.7 x 28.7 x 23.6 cm).
Docking Station Weight: 5.5 lbs (2.5 kg).

Rotameter Dimensions: 10.3"H x 5.0"W x 6.3"D (26.1 x 12.7 x 16 cm). Height with charcoal filter is 16.5" (41.9 cm).
Rotameter Weight: 2.2 lbs (1.0 kg).

Pearl® Accessories

Chapter 2 9300-022 Pearl Clean Box

Description

Figure 2-1. 9300-022 Pearl Clean Box.

The purpose of the Pearl Clean Box is to provide a HEPA-filtered closed environment for mice requiring added protection from exposure to pathogens.

The lower portion of the Clean Box is an imaging bed with a heater plate similar to the standard Pearl imaging bed. The heater plate can be used to maintain the body temperature of the mouse when the Clean Box is locked in place on either the Pearl instrument or Pearl Docking Station. The handle of the Clean Box is used to lock it in place using the same "rotate down" method as the standard imaging bed. When locked in place, anesthesia gas will be supplied to the mouse via the standard Pearl nose cone. HEPA filters are provided for both the Pearl instrument and the Pearl Docking Station to protect the mouse by filtering the anesthesia gas. When the Clean Box is undocked, the gas ports automatically close.

The Pearl Clean Box window is a specially coated cell cast acrylic window for optimum light transmission and durability. The coating on the exterior surface of the window will help minimize smudging and scratching. The interior surface is coated to minimize scratches.

Important: Do not discard the clear protective cover for the Clean Box during unpacking. The cover protects the imaging window of the Clean Box during storage and transfer from the Docking Station to the Pearl instrument.

Installation

Installation consists of installing HEPA filters and installing a nose cone. The Clean Box should also be sanitized before initial use as described later in this chapter.

Connecting a HEPA Filter to the Docking Station

When using the Pearl Clean Box, one of the included HEPA filter assemblies (LI-COR, P/N 9300-821) should be installed between the anesthesia supply tube and the docking station rotameter as described in Chapter 1 (*Assembling the Pearl Docking Station*, Step #5).

Connecting a HEPA Filter to the Pearl Impulse

Use the procedure below to connect a HEPA filter between the anesthesia gas supply line and the Pearl instrument.

1) If necessary, disconnect the existing anesthesia supply tube from the port labeled “IN” on the rotameter of the Pearl instrument.
2) Connect one of the provided HEPA filter assemblies (LI-COR, P/N 9300-821, packaged with the Pearl Clean Box) to the port labeled “IN” on the Pearl rotameter. The gender of the connector assures the filter will be in the correct orientation after it is plugged in.
3) Connect the opposite end of the HEPA filter assembly to the provided anesthesia supply tube provided with the Pearl Instrument.

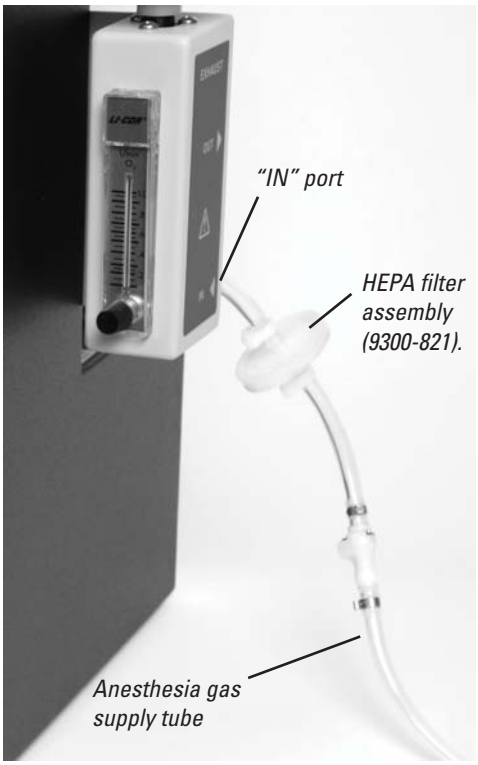


Figure 2-2. HEPA filter connections on the Pearl instrument.

Nose Cone Installation and Replacement

Nose cones are provided in the spare parts kit for the Pearl Clean Box. To install a nose cone, press the new cone on to the black nose cone base (Figure 2-3). To prevent leaks, make sure the new nose cone is fully seated and then install a nose cone plug (Figure 1-8).

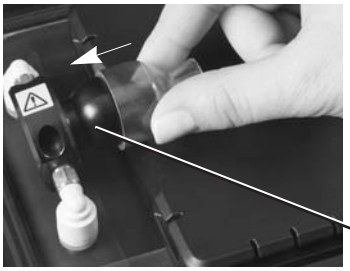


Figure 2-3. Nose cone installation.

The nose cone may need to be replaced occasionally for sanitary or other reasons. New nose cones (pkg. of 3) can be purchased (LI-COR, P/N 9000-803). Remove the nose cone by grasping the tip and pulling it straight off (parallel to the imaging bed surface) until the nose cone slips off its base.

Sanitizing the Pearl Clean Box

CAUTION: Do not sterilize the Pearl Clean Box in an autoclave. Damage will result.

ATTENTION:
Ne stérilisez pas la boîte propre de Pearl dans un autoclave. Des endommages résulteront.

There are two considerations when sanitizing the Pearl Clean Box. The most important is to sanitize the interior of the Clean Box to protect the health of the immunocompromised mouse. The second is to keep the Clean Box window and imaging bed clear of any dirt, smudges, or foreign debris that may be detected during infrared imaging.

Before cleaning, read *Maintenance of the Clean Box Window* below. For the initial cleaning, use Technicloth wipers (LI-COR, P/N 9300-831) with a solution of 0.5% bleach. Clean the imaging bed surface, interior surface of the Clean Box lid, and interior surface of the Clean Box window. Check for smudges on the interior of the window. If necessary, perform a final cleaning using the LI-COR Premium Grade Optical Tissue (LI-COR, P/N 9300-832). Smudges on the window could be visible in all images acquired using the Clean Box, so clean thoroughly and carefully.

With infrared imaging, residue on the imaging bed surface from previous image acquisitions may be visible in new image acquisitions. If necessary, between image acquisitions, clean just the imaging bed surface with 0.5% bleach. Ethanol or isopropanol can also be used as a cleaning solution for applications where bleach is not required. If necessary, clean any fingerprints or smudges from the exterior surface of the window as described in *Maintenance of the Clean Box Window* below.

CAUTION: Strong solvents, including DMSO, will permanently discolor the imaging bed surface. Avoid all contact. In addition, any IRDye® products in DMSO will incorporate into the surface of the imaging bed and will be visible in images.

ATTENTION:
Les dissolvants forts, y compris DMSO, décoloreront de manière permanente la surface du lit d'image. Évitez tout contact. En outre, tous les produits d'IRDye dans DMSO incorporeront à la surface du lit et seront évidents dans les images.

Whenever possible, inject the animal on a separate surgical bed and clean any exterior dye product on the animal before transferring the animal onto the Pearl Clean Box. In the event that the Clean Box becomes contaminated with dye, clean thoroughly with the Dye Decontamination Kit (LI-COR, P/N 9300-840) immediately and dry before use.

Clean Box Operation

1) Open the Clean Box and clean the imaging bed surface with 0.5% bleach as described above. To open, swing the latch down 90° until horizontal, rotate 180° counter clockwise, and swing the latch up before lifting the Clean Box lid.
2) Close the Clean Box, place the Clean Box on the Pearl Docking Station and lock it in place.
3) Turn on the docking station and wait for the heater plate to reach the temperature set point (green "running" icon is ON constantly).

Note: Alternatively, the heater plate can be warmed by locking the Clean Box in the Pearl imaging drawer until the set point temperature is reached (see the Pearl Manual).

4) Make sure the nose cone plug is in place and start the flow of anesthesia gas as described in Chapter 1 of this manual (Pearl Docking Station) or the Pearl Operator's Manual. Observe all cautions for the use of isoflurane gas. Wait about a minute for the system to be primed with isoflurane gas.

5) Unlatch and open the Clean Box lid, remove the nose cone plug, and place the plug in its holder. Remove the mouse from the anesthesia induction chamber and slide the muzzle of the mouse into the nose cone (see the Pearl Manual). *Make sure the surface is dry before placing a mouse on the imaging bed*.

IMPORTANT: Observe the tail of the mouse and make certain the tail will not be pinched between the Clean Box lid and imaging bed when the lid is closed.

6) Close and latch the Clean Box lid, then install the Clean Box cover on the Clean Box to prevent touching the window or spotting the window with liquids.

7) If using the Pearl Docking Station, undock the Clean Box and move it to the Pearl imaging drawer and lock the Clean Box into the imaging drawer.

IMPORTANT: Move the Clean Box quickly. **Anesthesia gas does not flow while the Clean Box is undocked**.

8) Remove the Clean Box cover to expose the window, close the Pearl imaging drawer, and acquire an image as described in the Pearl Operator's Manual.

9) After acquiring images, open the Pearl imaging drawer, undock the Clean Box and move it back to the mouse holding facility or recovery chamber where the mouse can be removed.

10) When the imaging session is complete, replace the Clean Box cover to protect the Clean Box window during storage.

Maintenance of the Clean Box Window

Proper care and maintenance are important to preserve the optical characteristics of the Pearl Clean Box window. The following instructions are recommended for the proper care of the window.

Scratches

The window top and bottom surfaces are treated with a hard coating that aids in scratch prevention under normal use. However, the window can still be scratched by dirt or other foreign objects. Reasonable care should be taken to avoid scratching the window surfaces. Do not use paper towels or similar products to clean the surfaces. Compressed, clean dry air is the preferred method of removing foreign debris. If compressed air does not remove the debris, a soft lint-free optical cleaning tissue should be used (LI-COR, P/N 9300-832).

Smudging

Due to the light transmission characteristics of the window, it will be very easy to see smudges on the window surfaces. To help prevent smudging, the exterior surface of the window has an anti-smudge coating. For optimal optical performance the interior window surface does not have this coating. Take extra care to avoid contact with the interior surface in order to prolong the lifetime of the window.

Chemicals

Chemicals such as bleach, ethanol, and isopropanol are NOT detrimental to the optical properties of the window. **CAUTION: The window CAN be damaged by chemicals such as toluene, acetone, benzene, ethylene dichloride, and other highly acidic or alkaline reagents.**

Cleaning Procedure

Dust particles are the most common contaminant. Compressed, clean dry air is recommended as a first step in cleaning the Clean Box window since dust particles can become embedded in cleaning cloths and scratch the surface.

Should compressed clean dry air prove insufficient, use LI-COR Premium Grade Optical Tissue (LI-COR, P/N 9300-832) and Formula MC Glass Cleaner (LI-COR, P/N 9300-833). Apply a few drops to an optical tissue and gently clean the window with a circular motion. Follow with a second dry tissue to remove any residual liquid or streaks.

For heavy duty cleaning of the window or entire Clean Box, use durable Technicloth wipers (LI-COR, P/N 9300-831). A final cleaning of the window surface using the LI-COR Premium Grade Optical Tissue, as discussed above, may be required.

Each of the cleaning products mentioned above can be ordered under the stated catalog numbers, or in a cleaning kit (LI-COR, P/N 9300-830).

Replacing Heater Plate Contact Pins

Over time, the heater plate contact pins on the bottom of the imaging bed that mate with the imaging drawer and docking station may wear or become bent and no longer function as intended. Replacement of these pins is described in the Pearl Operator's manual and the contact pins are identified in Figure 5-3 of the Operator's manual.

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