

**IRIS**<sup>™</sup>  
Incovers Real-time Imaging System

# USER MANUAL

V1.3.3



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## 1 | Delivery

### 1.1 COMPONENTS

Components delivered	Quantity
Incubator system	1
Shelving parts	2
Water bath tray	1
Power cable	1
User Manual	1

### 1.2 INSPECTION

Once you have received your device, inspect that all contents are present and undamaged.

**\*If damages are detected or any components missing, please contact us immediately.**

## 2 | Device Installation

### 2.1 PLACEMENT

To ensure proper functioning and long-term use of the device, it must only be operated in ambient working conditions including:

- Dry location;
  - A level, solid surface capable of sustaining the weight of the device;
- An ambient temperature-regulated room with a range of 18 °C to 35°C;
- Maximum relative humidity of 80%;
  - Avoid direct exposure to sunlight;
  - Devices that produce excessive heat or cooling should not be used near the IRIS.

It is important to note that this product can consistently release N<sub>2</sub>, Air, and CO<sub>2</sub> to maintain proper cell culture conditions. As such, do not install this incubator in a

room without proper ventilation as required by the ZH 1/119 (Guidelines for laboratories).

## 2.2 TRANSPORT

**\*IMPORTANT:** Do not lift the device using the door or any external component (e.g. hose connectors or LCD display) attached to the device

To transport, lift from underneath in an upright position and avoid abrupt shaking.

## 2.3 STACKING

The IRIS system is fully self-stackable. It is not recommended that you stack more than 2 IRIS systems at a time. Additionally, the movement or disruption of one could interfere with the image capture process of the other. During image acquisition, the incubator should not be disturbed.

# 3 | DESCRIPTION OF THE DEVICE

## 3.1 INCUBATOR ATMOSPHERE

The working area within the incubator replicates the physiological conditions needed for the preparation and cultivation of cells and tissue culture. This atmosphere is regulated by three factors:

- Temperature;
- Humidity;
- CO<sub>2</sub> concentration;
- O<sub>2</sub> concentration.

**Temperature:** To ensure a sustained operating condition, ambient temperature within the room must be at least 18°C and below the desired temperature of incubation.

**Humidity:** The water tray for the incubator chamber holds up to 2L of diH<sub>2</sub>O or dH<sub>2</sub>O processed water. The heating of the working area within the incubator causes evaporation of the water, creating constant humidity within the incubator. Under working conditions of 37°C, a constant relative humidity of 95% can be achieved. The water bath tray should be checked every week to ensure the presence of water.

**\*IMPORTANT:** DO NOT USE regular tap or bottled water to refill the water tray

For humidification of the incubator, the following water quality is required:

- dH<sub>2</sub>O - Distilled water and autoclaved for sterilization

- diH<sub>2</sub>O- Deionized water and autoclaved for sterilization

**CO<sub>2</sub> concentration:** The CO<sub>2</sub> of the working atmosphere within the incubator can be regulated between 0-20%. The CO<sub>2</sub> gas supply must be of 99.5% purity or medical grade.

**O<sub>2</sub> Concentration:** The O<sub>2</sub> of the working atmosphere within the incubator can be regulated between 0.5-21%. The N<sub>2</sub> gas supply must be of 99.5% purity or medical grade.

**\*IMPORTANT:** When connecting the CO<sub>2</sub> / N<sub>2</sub> tubing to the supply valve, ensure that the pressure does not exceed 10 psi or inner component pressure may burst.

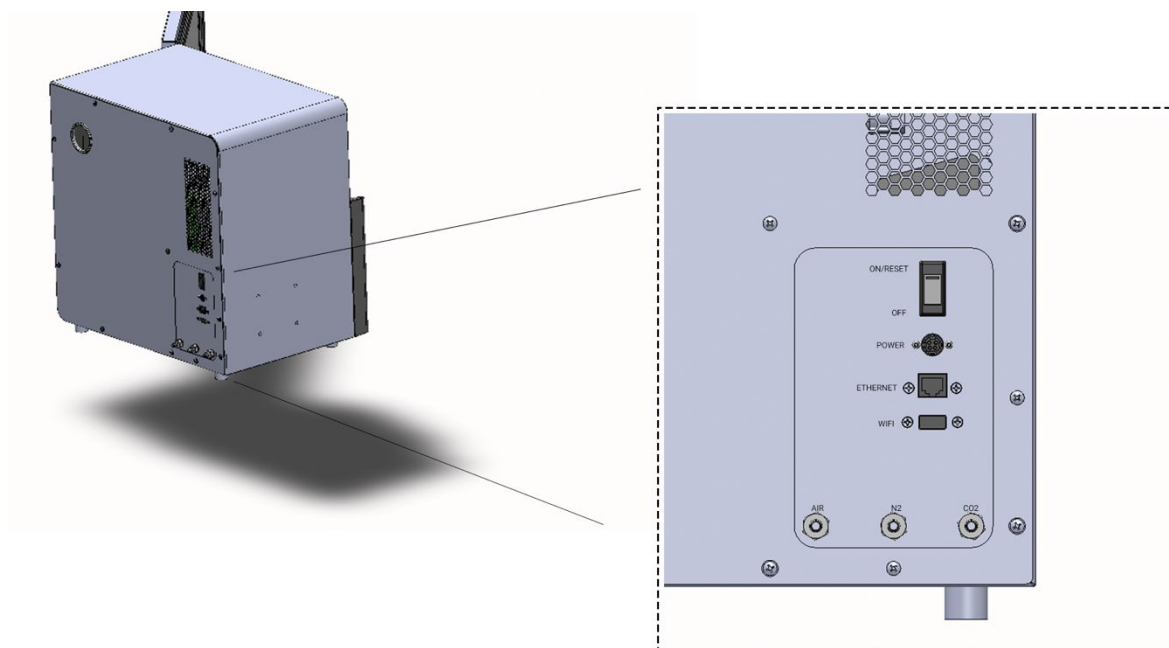
### 3.2 SUPPLY CONNECTIONS

All supply connections are installed at the rear of the incubator.

**Gas connection:** The gas supply line between the tank and the incubator is connected using a ¼" NTP connecting valve as shown in Figure 1.

**\*IMPORTANT:** When connecting the N<sub>2</sub>/CO<sub>2</sub>/Air tubing to the supply valve, ensure that the pressure does not exceed 10 psi or inner component pressure may burst.

**Electrical Connection:** The incubator is powered by a 12v, 10A power supply that connects into the power jack shown in Figure 1.



**Figure 1.** The rear of the incubator, where the power jack and power switch are located at the bottom right corner.

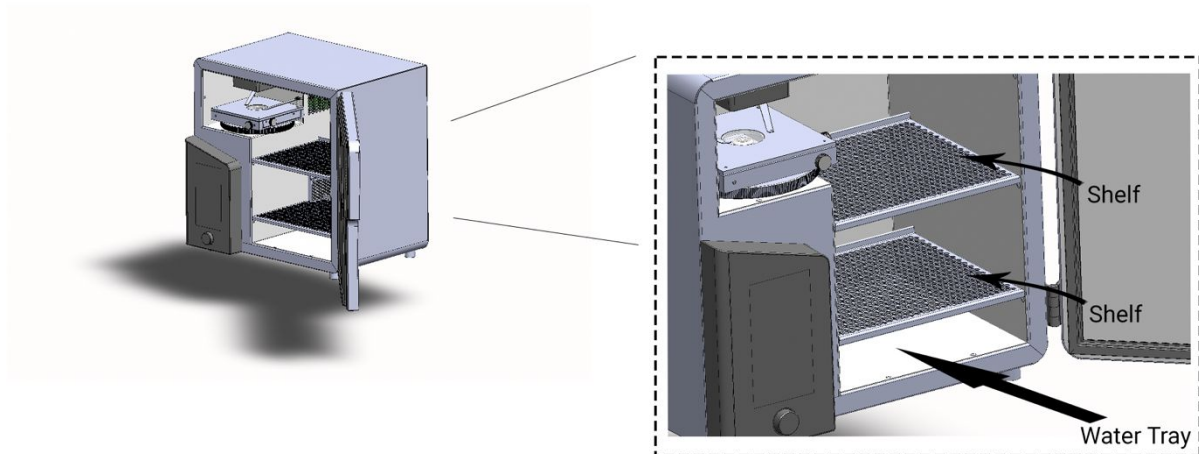
### 3.3 INTERNAL WORKING AREA

The inner chamber of the incubator is a fully enclosed stainless-steel body.

**\*IMPORTANT:** Certain internal components of the incubator may be sensitive to strong acids/base. Do not use bleach-based cleaning products with a concentration above 10%. We recommend cleaning the incubator with 70% ethanol and wiping down with a paper towel.

**Do not spray directly up to the imaging area. Doing so may cause irreversible damage to the optical components.**

**Water bath tray:** As shown in Figure 2, the water tray is positioned underneath the lower shelving unit. This water tray should be filled at a maximum of 2L and periodically checked to ensure water is always present.



**Figure 2: Right-hand side cross-section of the incubator for movable components positioning**

**Heating system:** Heating elements are located at the back of the incubator behind the protective shield. An internal fan ensures an even and cyclical distribution of heat and humidity within the inner chamber.

## 4 | GETTING STARTED

### 4.1 PREPARING THE INCUBATOR CHAMBER FOR USE: DECONTAMINATION

#### **NOTE!**

Certain internal components of the incubator may be sensitive to strong acids/base. Do not use bleach-based cleaning products with a concentration above 10%. We recommend cleaning the incubator with 70% ethanol and wiping down with a paper towel.

**Do not spray directly into the imaging area. Doing so may cause irreversible damage to the optical components.**

The incubator is not delivered in a sterile state. Before use, the device must be decontaminated. Prior to decontaminating the chamber:

- Remove the inner shelving components and the water bath tray from the incubator. These can be cleaned with 70% ethanol or other non-corrosive cleaning products.

To clean the inner chamber, perform the wipe/spray disinfection protocol as per recommended by your surface cleaner. This is carried out in three stages:

- Pre-disinfection;
- Cleaning;
- Final disinfection.

#### **Pre-disinfection:**

1. Spray disinfectant onto the surfaces of the working area and of the accessories located inside the chamber;
2. Allow disinfectant to react as specified by the disinfectant manufacturer.

#### **NOTE!**

CO<sub>2</sub> / O<sub>2</sub> sensor: Do not spray disinfectant directly into the ventilation areas. Doing so may damage the electronic sensors.

#### **Cleaning:**

1. Thoroughly remove any residues and deposits using a solution of tepid water and dishwashing agents;
2. Wipe surfaces cleaning using a clean cloth;
3. Remove cleaning liquid from water tray and wipe all surfaces of the work area dry;
4. Wipe accessories dry.

**Final disinfection**

1. Re-install shelving system;
2. Spray the disinfectant onto the surfaces of the working area and the shelving once more. Wipe down dry;
3. Allow disinfectant to react as specified by the manufacturer.

**4.2 GAS CONNECTION**

**\*IMPORTANT:** CO<sub>2</sub>/N<sub>2</sub> gas quality must be of 99.5% purity or medical grade.

**\*CAUTION**

**Overpressure:** The operating pressure of the gas supplied to IRIS cannot exceed 10 psi. Over-pressurization may result in regulation failure and bursting. **It is recommended to set the gas supply level to 10 psi before connecting any supply to the device.**

Connecting CO<sub>2</sub> supply:

The CO<sub>2</sub> valve is located at the back of the incubator as shown in Figure 3. Firmly slide your 1/4" tubing over the barbed valve until all barbed edges are within the tube. Lightly pull on the tubing to ensure a tight fit. If tubing appears loose, or unsecure, ensure proper 1/4" PVC sizing and repeat.

Connecting N<sub>2</sub> supply:

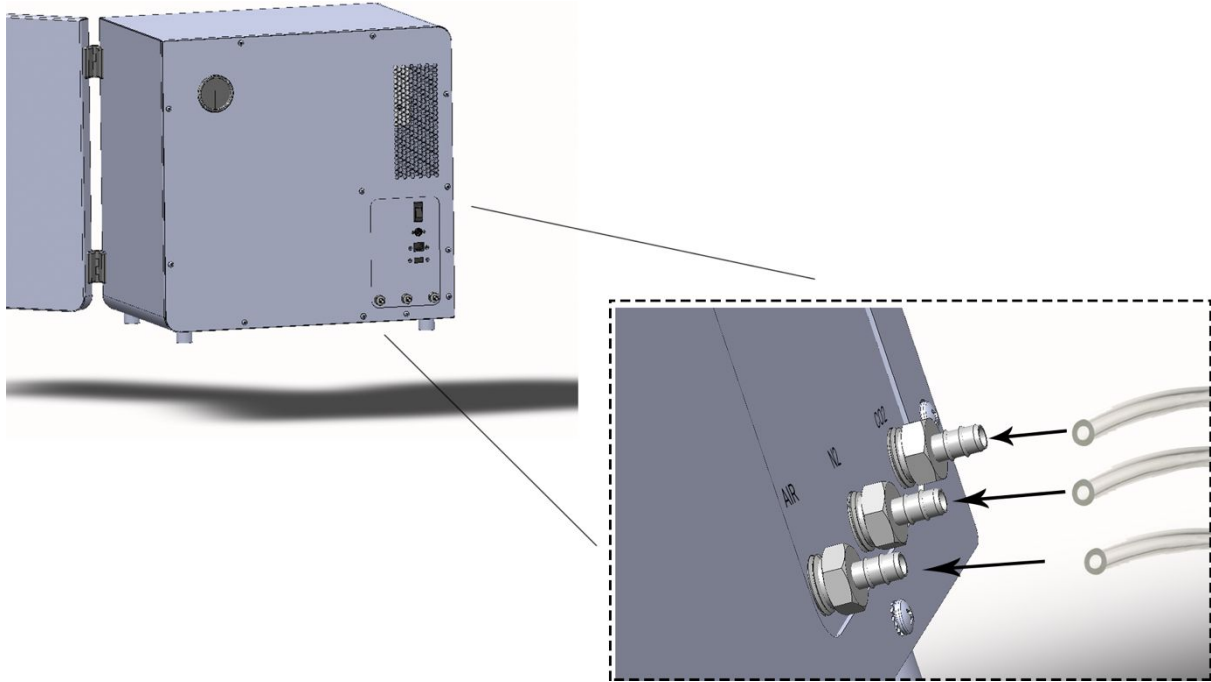
The N<sub>2</sub> valve is located at the back of the incubator as shown in Figure 3. Firmly slide your 1/4" tubing over the barbed valve until all barbed edges are within the tube. Lightly pull on the tubing to ensure a tight fit. If tubing appears loose, or unsecure, ensure proper 1/4" PVC sizing and repeat.

Connecting Air/Additional CO<sub>2</sub> supply:

The air valve is located at the back of the incubator as shown in Figure 3. Firmly slide your 1/4" tubing over the barbed valve until all barbed edges are within the tube.



Lightly pull on the tubing to ensure a tight fit. If tubing appears loose, or unsecure, ensure proper 1/4" PVC sizing and repeat.



**Figure 3: PVC tubing installation at the back of the incubator; air nozzle from left to right is for: AIR, N<sub>2</sub>, and CO<sub>2</sub> supply, respectively.**

### 4.3 POWER SUPPLY CONNECTION

**\*CAUTION:** Contact with current-carrying components may cause lethal electric shock. Before connecting IRIS to the power supply, inspect the plug and connection line for damages. Do not connect or use power supply if damages are found.

Connecting Power supply:

Plug power supply into a voltage appropriate socket. Connect the power jack into the power socket of IRIS as shown in Figure 1. Turn on the device by flipping the power switch located at the back.

## 4.4 SETTING UP IRIS

Please refer to *IRIS Quick Start Up Guide* for detailed installation guide.

## 4.5 CONNECTING IRIS WITH WI-FI

**\*CAUTION:** Eduroam is an international roaming service for users in research sector and higher education, it is widely used in post-secondary institutes. However, Eduroam service possesses credentials that expire over time. These types of networks are not the type that meets the requirements of the IRIS platform since expiring credentials will greatly increase the networking complexity.

For a more stable Wi-Fi connection, **WPA2-Personal** wireless solutions (i.e. **WPA2-PSK**) are highly recommended. WPA2-Enterprise (e.g. WPA2-802.1X) and all WPA3 standards are not supported at the current version.

To connect IRIS with Wi-Fi network, please proceed with the following steps:

**4.5.1 Use the knob to enter the submenu of “Hardware Info”.** Within “Hardware Info”, highlight the tab “hostname” then press the knob. Your hostname should be in the format of “IRIS-XXXX” (where X can be in either digits or alphabets).

**4.5.2 With your hostname (IRIS.XXXX) ready, key in IRIS.XXXX.local:4000 on Google Chrome.** Under the tab of “Network”, enter your wireless network credentials using the dropdown or “Add Invisible Wi-Fi”

**4.5.3 It might take more than 5 minutes to apply your network setting on IRIS**

**4.5.4 A notification of “Network Setting Complete”/“Connect” will be shown on the screen if IRIS is successfully connected to the network. Reboot IRIS after a successful network setting**

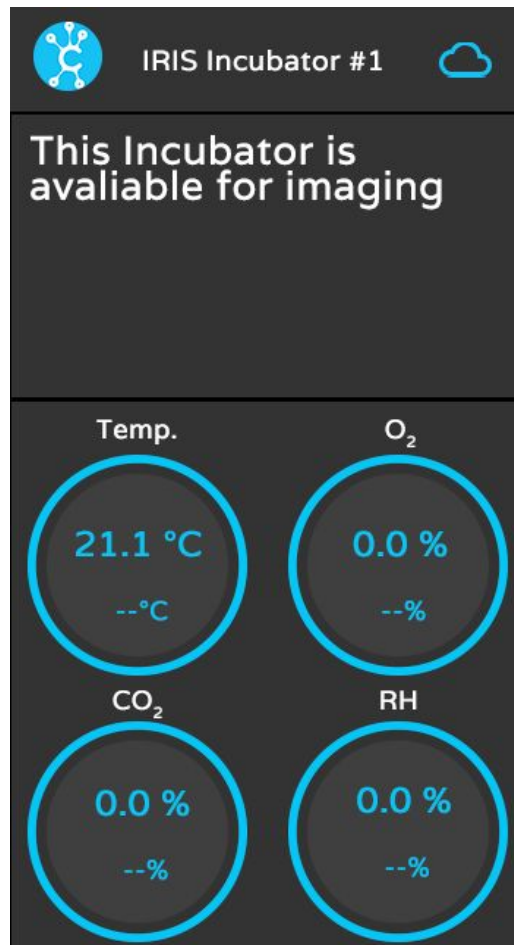
**\*CAUTION:** Wi-Fi setup requires IRIS and the PC that is running the set-up webpage is connected via the same LAN (Local Area Network). Remote Wi-Fi set-up (i.e. using different LAN) is currently unsupported.

For more information about setting up Wi-Fi connection on your IRIS, contact support@incubers.com

## 4.6 WORK WITH KNOB AND DISPLAY

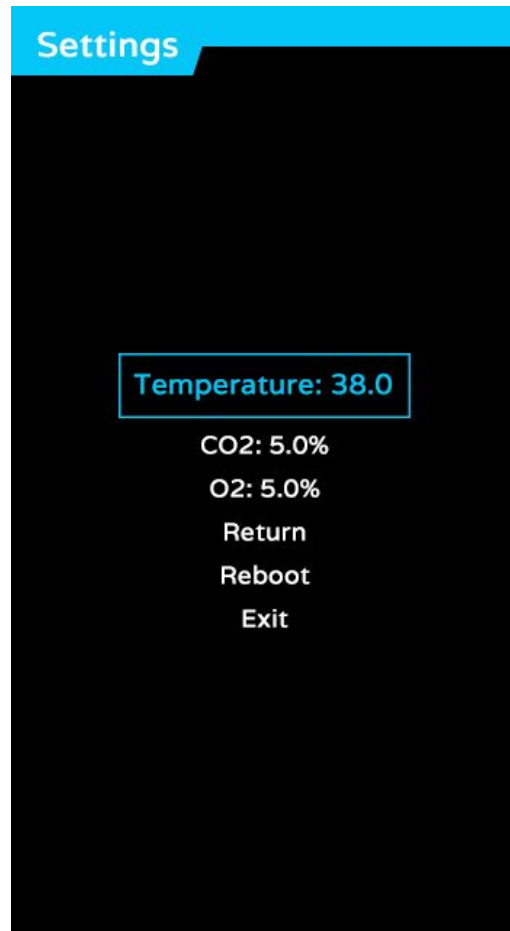
Upon the successful registration of IRIS, the display and knob located at the bottom right corner of the front can be used for setting up and monitoring experiments locally along with adjusting the optical parameters.

On the upper left corner of the screen is where the device image is displayed (Figure 4). if no image has been previously chosen, the default Incubator image will be present until the user uploads a new one on the online console (See [How can I customize my IRIS.](#)) Likewise, users can also customize the default name of their IRIS (See [How can I customize my IRIS.](#))



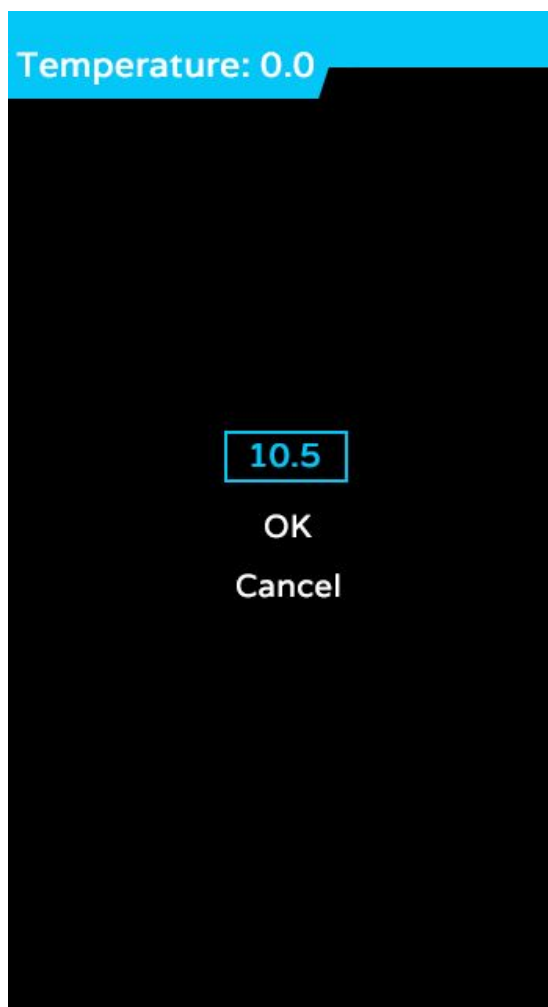
**Figure 4. Incubator UI in Idle State**

Rotary knob is an efficient way of manually setting condition values (i.e. Co<sub>2</sub>, O<sub>2</sub>, and Temperature). When the rotary knob is turned clockwise or counterclockwise, users shall notice it promptly responds to their input.



**Figure 5. System UI under the *Setting* menu**

When rotating the rotary knob, a list of parameters will be shown (Figure 5). Users can choose to adjust the value by first press the rotary knob. Upon pressing the button, the dedicated UI for a particular parameter will be shown (Figure 6). Users can then change the setpoint value by either rotating clockwise or counterclockwise.



**Figure 6. System UI for setting incubation temperature locally with the knob**

Clockwise increments the value and the reverse is true when rotating the knob counterclockwise. Please note that there are upper and lower constraints in terms of setting incubation parameters. The value shown on the display will no longer change despite the rotating knob when the setpoint value met the upper or lower constraint.

**\*CAUTION:** Adjusting the parameter using the rotary knob when an experiment is taking place will cancel the currently running experiment!

## 5 | TROUBLESHOOTING

In Case	Potential Solution
Device does not power on	<ul style="list-style-type: none"> <li>• Ensure all cables are connected properly and there are no obvious signs of cable stress.</li> <li>• Check obvious cable or incubator enclosure damage</li> <li>• Contact <a href="mailto:support@incubers.com">support@incubers.com</a></li> </ul>
Idle state does not appear	<ul style="list-style-type: none"> <li>• double check to ensure that your device has been registered or that someone that has access to the incubator has not performed a factory reset.</li> </ul>
The temperature of the inner chamber has exceeded the inputted value and cannot be auto-corrected over time.	<ul style="list-style-type: none"> <li>• Shut down the system, let cool and restart. If a problem persists, contact service.</li> </ul>
The temperature of the incubator exterior exceeds the tolerance range	<ul style="list-style-type: none"> <li>• Shut down the system, let cool and restart. If a problem persists, shut down immediately, disconnect gas lines, and contact service.</li> </ul>
The CO <sub>2</sub> % has exceeded the inputted value and cannot be auto-corrected over time.	<ul style="list-style-type: none"> <li>• Ensure that the flow rate of the tank has not exceeded 10 psi.</li> <li>• Shut down the system, let cool and restart. If a problem persists, contact service.</li> <li>• Search for a leak in the tubing system.</li> </ul>
Device stuck on offline mode	<ul style="list-style-type: none"> <li>• Most likely cause for the offline status icon to appear is because there is an issue with your internet connection in this case please ensure that your router is configured correctly</li> <li>• If you're unsure of your router's state it may be best to contact a technician who deals with your facilities or your residential Wi-Fi.</li> </ul>

- |  |   |
|--|---|
|  | <ul style="list-style-type: none"><li>• If you have ruled out this external issue, please consider the proximity between the router and the incubator system.</li></ul> |
|--|---|

## 6 | SHUT DOWN

### 6.1 SHUTTING DOWN THE DEVICE

**\*CAUTION:**

**Contamination hazard:** The working area of the chamber is contaminated after use, which may cause bacterial or cellular outgrowth to the surrounding environment of the device.

We highly recommend decontaminating the area before shutting down.

1. Remove culture containers and all accessories from the working area;
  2. Remove the water bath tray;
  3. Clean and decontaminate the working area and wipe dry.
- Shut down the device using the power switch located at the back of the incubator;
  - Close the gas supply valves;
  - Disconnect the gas pressure hose from the barbed valve at the back of the device.

## 7 | PARTS AND ACCESSORIES

Technical Support: [support@incuvers.com](mailto:support@incuvers.com)

When contacting Technical Support for parts and accessories, please have the following information available:

- Model Number;
- Firmware Version.

**\*IMPORTANT:** Only the use of official Incuvers Inc. components can be used to repair any damaged incubator. Contact Incuvers Inc. for the replacement of any components.

**\*IMPORTANT:** Ensure that the PVC tubing is well inserted into the gas nozzles, failure to do so may result in excessive gas release or inefficient gas supply.



## 8 | TECHNICAL DATA

	Description	Imperial unit (US)	Metric unit (Int.)
MECHANICAL	External Dimensions	18.5"x14"x19"	47 cm x 35.6 cm x 48.3 cm
	Internal Dimensions	10"x11"x16"	25.4 cm x 27.9 cm x 40.6 cm
	Chamber Volume	25 L	25 L
	Shelving Space	8' x 11" x 16"	20 cm x 28 cm x 40.6 cm
	Weight (w/ shelving)	50 Lbs	22.7 kg
THERMAL	Temperature control	RT – 113 °F	RT – 45 °C
HUMIDITY	Relative Humidity	~90%	~90%
	Water Quantity	2 L	2 L
GAS SUPPLY	Gas Purity	Medical grade	
	Maximum Tank Pressure	10 psi	
	Control Deviation	0.1%	
	Accuracy	± 70 ppm +5% of reading	
	Measure and Control Range	CO2 (0.1% - 20%) O2 (0.1% - 20%)	
EXTERNAL POWER SUPPLY	Source Voltage	110 – 220 V	
	Rated Frequency	50 - 60 Hz	
	Rated Current	10 A	

	Rated Protection	UL, CSA, FCC	
	Rated Voltage	12 V DC	
IMAGING	Optimal Arrangement	Inverted	
	Field of view	Single	
	Magnification	20 X	
	Imaging	Phase Contrast	
	Fluorescence	GFP 488 nm	
	Local Storage	512 GB	

**All specifications are assuming NTP conditions and fresh air**

## 9 | Appendix

### 9.1 Icon Legend



#### Online mode

Online mode icon is displayed when there is a connection to the internet on a registered device present.



#### Offline mode

Offline mode icon is displayed when there is no connection to the internet, but the incubator is still available in offline mode <see here offline mode>



#### Experiment mode

Experiment mode icon is displayed when there is currently an experiment in progress



#### Wait icon

The wait icon appears when there is an operation in progress similar to a spinning wheel you could find in your browser when a page is loading.

## 9.2 How can i customize my IRIS?

When you wish to change the device image you need to have access to a device that can connect to the internet such as your phone or a computer. Please log into your [online console](#). Now, please click on “details” (Figure i).

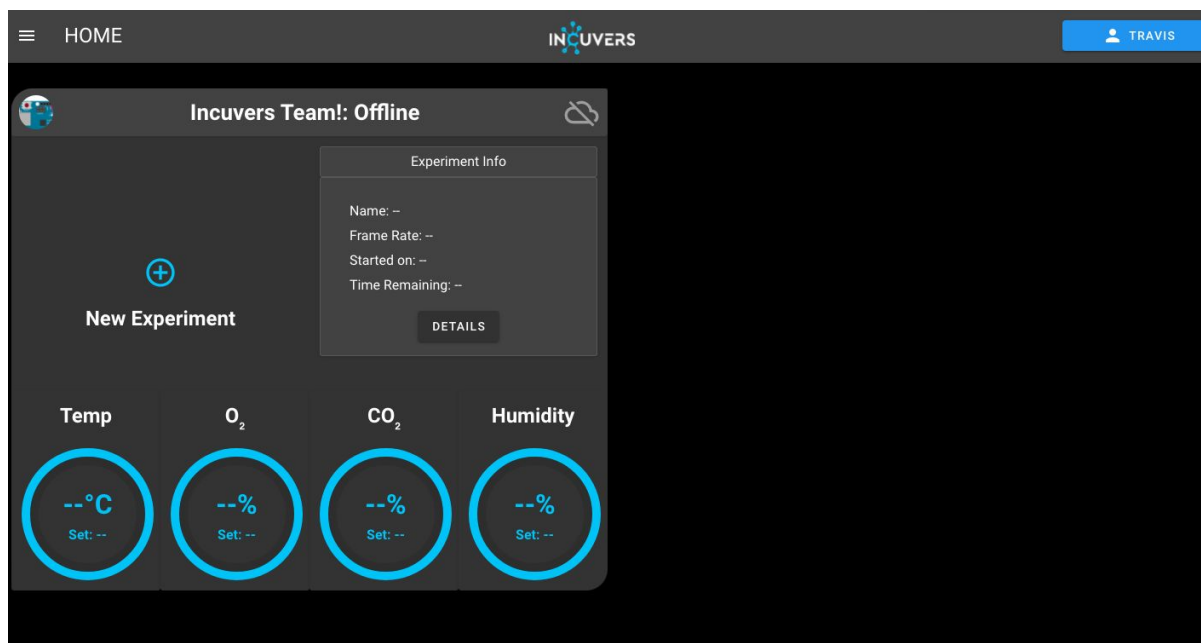


Figure i. The UI of online console ([lab.incuvers.com](http://lab.incuvers.com))

Upon clicking on the details button, a floating window will pop up which allows users to customize the device image and the device name. To change the device name, update the text field with “Incubator Name”.

To change the device image, click “select an image” which shall open the file system, upload the user image from the local file (Figure ii). Upon selecting and resizing the image, it will be updated automatically.

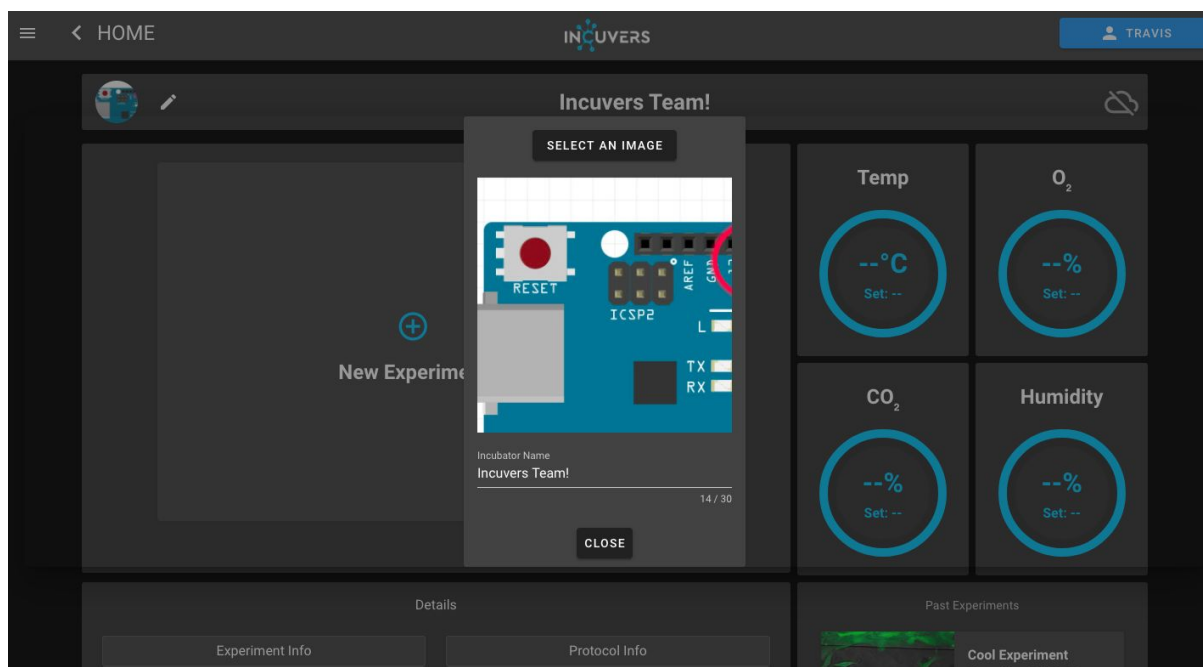


Figure ii. To customize Incubator Name and Avatar ([lab.incuvers.com](http://lab.incuvers.com))



7 Bayview Station Rd, Ottawa, ON, Canada

