DeltaVision™ OMX SR

Addendum to Getting Started Guide

Environmental Controller Option

DeltaVision™ OMX SR Environmental Controller Option

- *Describes the Environmental Controller and its purpose*
- *Provides a brief synopsis of the unit's temperature and gas mixing features*
- *Describes how to use the Environmental Controller on the DeltaVision OMX SR*
- *Illustrates the procedures for using the Environmental Controller software*

Purpose of the *Environmental Controller Addendum*

The purpose of this addendum is to provide you with the information and instructions necessary to use the DeltaVision OMX SR Imaging System in a safe manner. Refer to the complete safety instructions in the *DeltaVision OMX SR Getting Started Guide* prior to using the imaging system.

What is the Environmental Controller?

Live cell imaging is a critical part of Cell Biology research. The ability to image events over time within an individual cell or group of cells gives deeper insight into dynamic biological processes and interactions within the cell. Keeping the cells alive and physiologically

stable during the imaging process, however, can be challenging. To enable this, the environmental controller is available as an option/upgrade for DeltaVision OMX SR.

The environmental controller is configured to control temperature and gas delivered to the a small chamber (cell box) located in the microscope sample area. The resistive-based objective heater mounts to the objective with a hook and loop style objective collar. The lid cover and sample carrier are heated internally. A fourth heater port is provided for the humidifier heater. The gas is supplied through a port on the side of the lid cover.

The gas mixing setup is available in two different configurations:

- CO_2 only (5 - 30%) - With this configuration, the user is able to provide Clean Dry Air (CDA) and 100% CO_2.

or

- CO_2 (5 - 30%) and O_2 (0 - 20% using N2 as a buffer and assuming CDA has 21% O_2).

It is required that each CO_2 and N_2 gas supply be regulated to 30 psi ± 1 psi. The unit provides an internal regulator for CDA, set to 30 psi for this purpose.

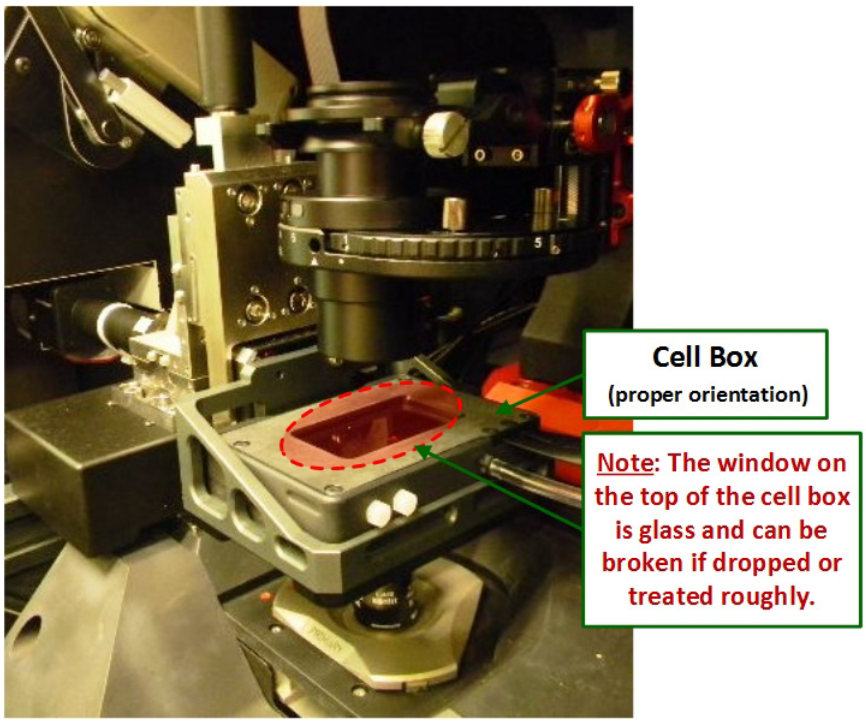
The bubbler system is used in-line to provide sufficient humidity during operation. A humidity sensor is mounted inside the lid for low-humidity alerts and data logging purposes.

The DeltaVision OMX SR Workstation communicates with the module and sends commands to enable or disable heaters, send configuration parameters and target set-points, receive real-time data, select between operating in normal or calibration mode (for use by authorized GE service personnel only), and for some other miscellaneous commands.

Cell Box

The cell box is a small chamber designed to rest on the stage over the microscope sample area. This box contains the specified environmental gas mixture. The proper position for use is shown in Figure 1 below. When not in use, the cell box generally rests on the optics block.

Figure 1. Cell Box in position over the sample area



WARNING! The window on the top of the cell box is made of glass and can be broken if handled inappropriately, causing risk of personal injury.

Software

The software for the Environmental Controller communicates to the DeltaVision OMX SR Workstation through a Serial Port. A Serial to USB adapter is used for the connection to the computer.

Temperature

The Environmental Controller provides connections for four heaters and a sensor port. The Environmental Controller Software typically uses one of the heater ports as its real-time feedback which is displayed and logged in the GUI. The additional sensor port can be used by authorized service personnel to calibrate the system.

Each heating channel has the ability to heat up to 20°C beyond ambient temperature (for example, 38°C at 18°C ambient). Temperatures are stable and accurate to ± 0.5°C over 1 hour. The temperature ramps to the target set point and settles within 30 minutes.

Each heater port is calibrated independently. The ports are configured as follows:

1. Lid
2. Objective heater
3. Heated carrier

4. Humidifier bottle heater

Gas Mixing

The Environmental Controller has 3 input and 1 output connections for gas. The input gases are CO_2, N_2 (used to down-regulate O_2), and CDA. The user specifies a mix through the GUI and the Environmental Controller uses internal CO_2 and O_2 sensors to achieve that mix. There is also a humidity sensor which can be used to give feedback on the sample environment under the lid.

Gas mixtures ramp to the target set point and settle within 30 minutes. The mixture is stable and accurate to ± 0.5% over at least 1 hour.

📖 **Note** An internal error handler exists to monitor each gas and heater port and provide detailed errors during operation (such as runaway temperature conditions, any leaks that may be occurring, or sensor failures). These errors are reported to the user, if they occur, along with detailed steps on how to resolve them.

Using the Environmental Controller

On the DeltaVision OMX SR Workstation, you can access the operational GUI for the Environmental Controller through either the AcquireSR software or directly from its own icon on the Desktop. The GUI communicates with the Environmental Controller and asks for temperature, humidity, and gas percentage data which is displayed via numerical indicators and real-time plots. You also have the option to log data.

📖 **Note** Calibration mode exists for installation purposes, which requires an authorized operator to plug in a thermistor to the CAL channel and insert it into their sample. This feature is for use by authorized GE Healthcare service personnel only.

An alert buzzer sounds when the temperature or gas is out of range, when humidity is less than the warning level set in **Setpoint Settings** (which prompts you to add water to the bubbler), or if any general system errors occur during operation.

The software for the Environmental Controller is divided into six main windows.

- **Initial Window - Holder Selection**
- **Main Status Window**
- **Settings Menu**
- **Setpoint Menu**
- **Plot Window**
- **Select Time Scale Menu**

Starting the Environmental Controller Software

Before you start the environmental controller software, ensure that the objective heater is installed, the cell box is in place in its proper orientation, and that the gas supply is flowing.

To start the Environmental Controller software:

➢ From the Main AcquireSR menu, select **Instrument | Env Control...**

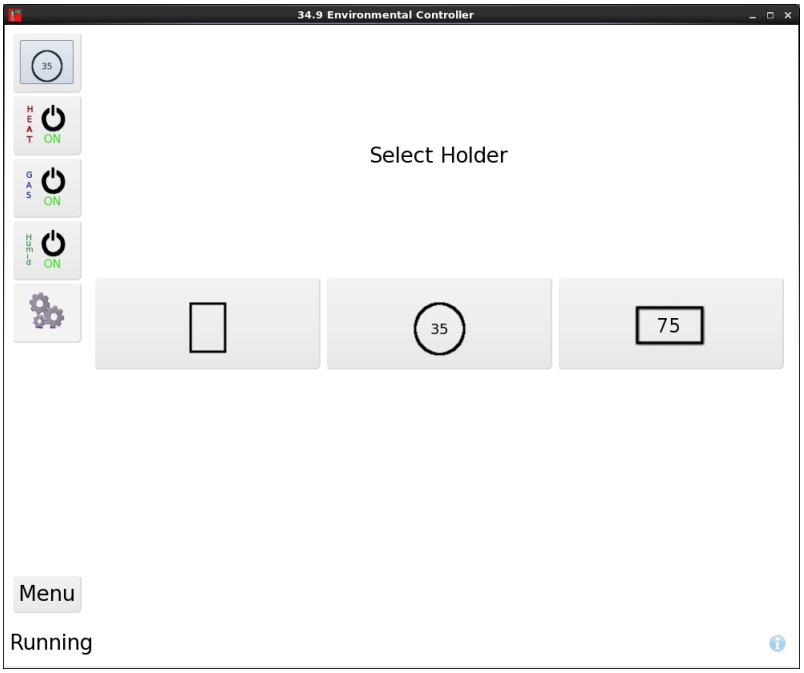
or from the Desktop, double-click the **Environmental Controller**  icon.

The Initial Environmental Controller window is displayed.

Initial Window - Holder Selection

This is the initial screen displayed when opening the software. Selection of the holder begins the process of setting up the Environmental Controller. Whenever the Environmental Controller software is started, this is the first window displayed.

Figure 2. Initial Window - Holder Selection



Note The available holder types will depend on your system configuration.

To select a sample holder:

➢ Click the icon for the type of holder you want to use.

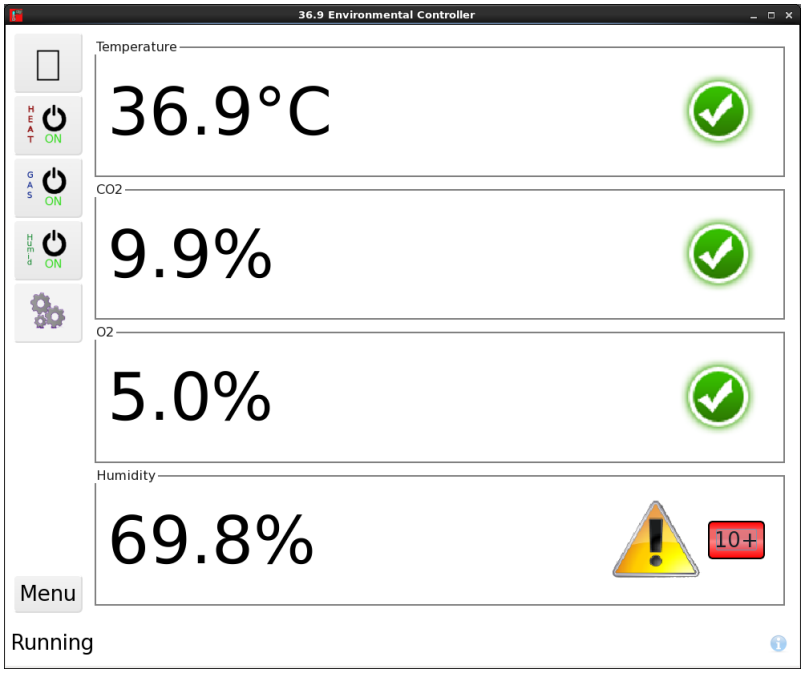
The Main Status window appears with your selection displayed.

Main Status Window

The Main Status window is a digital view of the temperature, gas, and humidity levels. The icons on the right provide a quick system status check.

- - The system environment is stable.
- ? - The value has exceeded the selected threshold.
- - The system is settling to the selected value.
- 04 - The number in the red box indicates the number of current errors. This example indicates that four errors have occurred.
- - The current reading is out of range from the Setpoint menu.

Figure 3. Main Status Window



Use the icons on the left side of the Main Status window to:

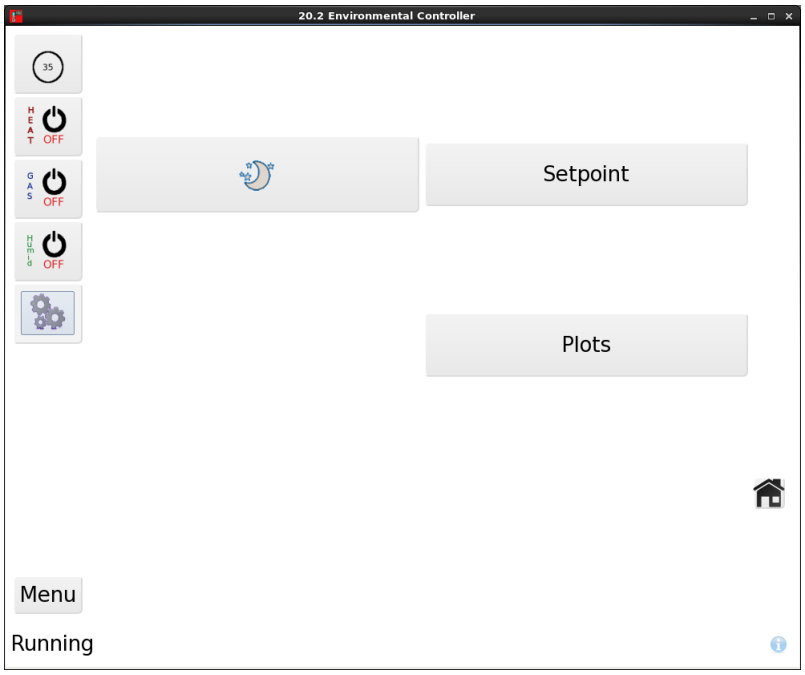
- - change your setup to a different sample holder.
- HEAT ON - turn the heaters OFF or ON.
- GAS OFF - turn the entire gas mixture OFF or ON.
- Humid OFF - turn the humidifier heater OFF or ON.

-  - display the Settings menu.
- Menu - hide or display the left-side menu icons.

Settings Menu

From the Main Status window, select the **Settings**  button to display the Settings menu.

Figure 4. Settings Menu



From the Settings menu, you can change the settings for the temperature and gas mixture, change menu colors, or view graphs to determine real-time temperature and mixture data.

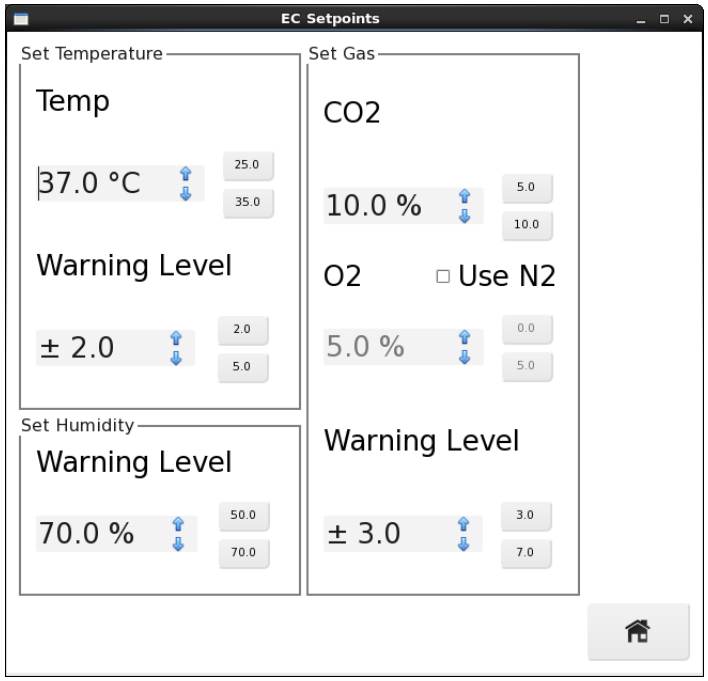
Note The **Set PID** button may or may not be displayed on the Settings menu. Note that this button is for use by authorized GE Healthcare service personnel only.

Setpoint Menu

To set/adjust the settings for Temperature and Gas:

1. From the Settings menu, click the Setpoint button. The Setpoint menu is displayed, similar to the following.

Figure 5. Setpoint Menu



2. Adjust the Temperature and Gas volumes using the up and down arrows in the appropriate fields. Use the **Warning Level** fields on both sides of the menu to set the allowable threshold for temperature and/or gas variation before warning will appear in the software.

   A warning is generated when the difference between the actual value and the Setpoint is larger than the Warning Level selected.

> **Note** You must select the **Use N_2** check box to activate O_2 control.

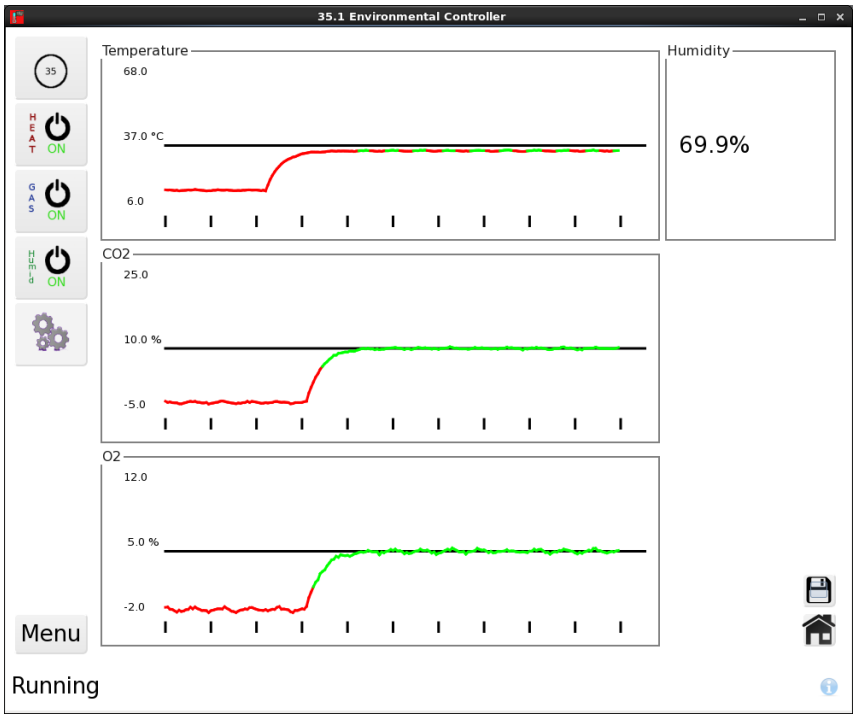
3. Click the **Home** icon on the bottom-right corner of the menu to apply the new setpoints and return to the Main Status window.

Plot Window

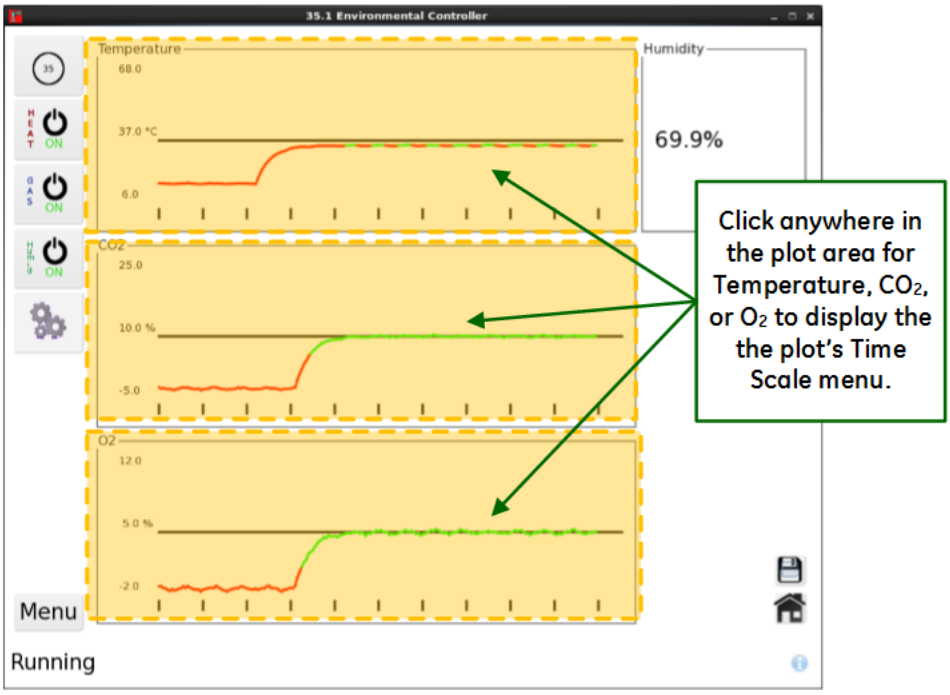
To view dynamic graphic plots for temperature and gas:

1. From the Settings window, click the Plots button. The Plot window is displayed, similar to the following.

Figure 6. Plot Window

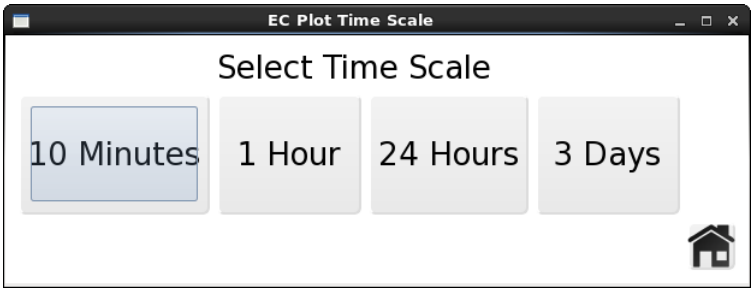


2. From the Plot window, click in a specific plot area to select a time scale for that plot.



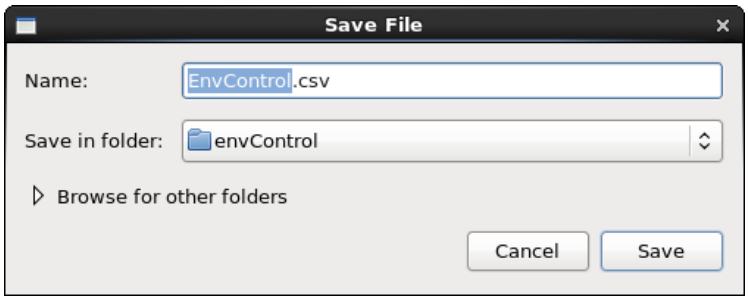
The Time Scale menu is displayed as follows.

Figure 7. Time Scale Menu



3. From the Time Scale menu, select **10 minutes**, **1 hour**, **24 hours, or 3 Days** as an increment by which to scale the plot for the selected plot area.
4. To save the plot data to add to your experiment log files for future reference, click the **Save** button. The Save File window, similar to the following, is displayed.

Figure 8. Save File Window



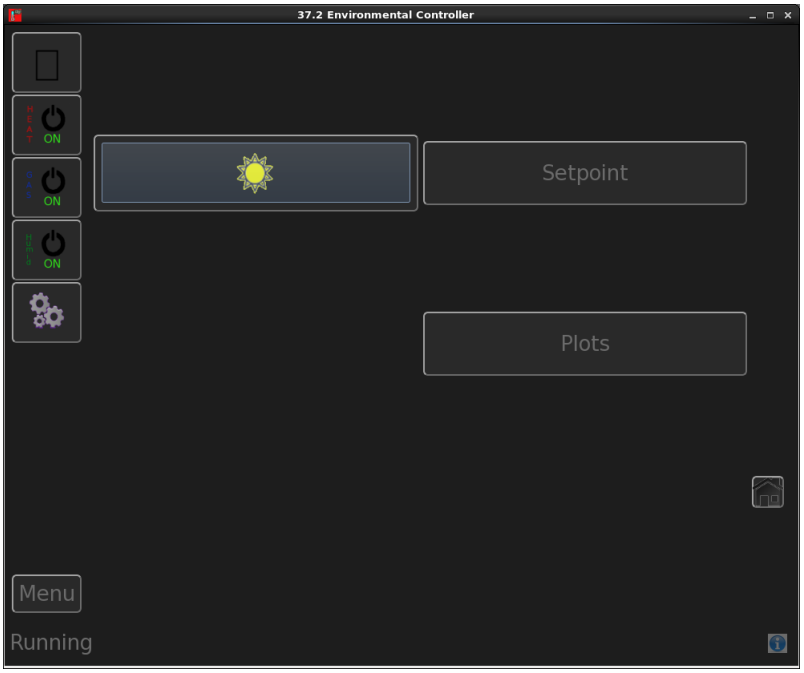
Browse to the appropriate location, name the file, and click the **Save** button in the bottom-right corner of the window.

5. To return to the Main Status window from the Plot window, click the **Home** button on the bottom-right corner.

Change Display Color

To change the color of the displayed characters and their background color, click the button on the Settings menu. In this mode, the background for all windows is dark and the screen characters are light, as shown below.

Figure 9. Change Display Color Window

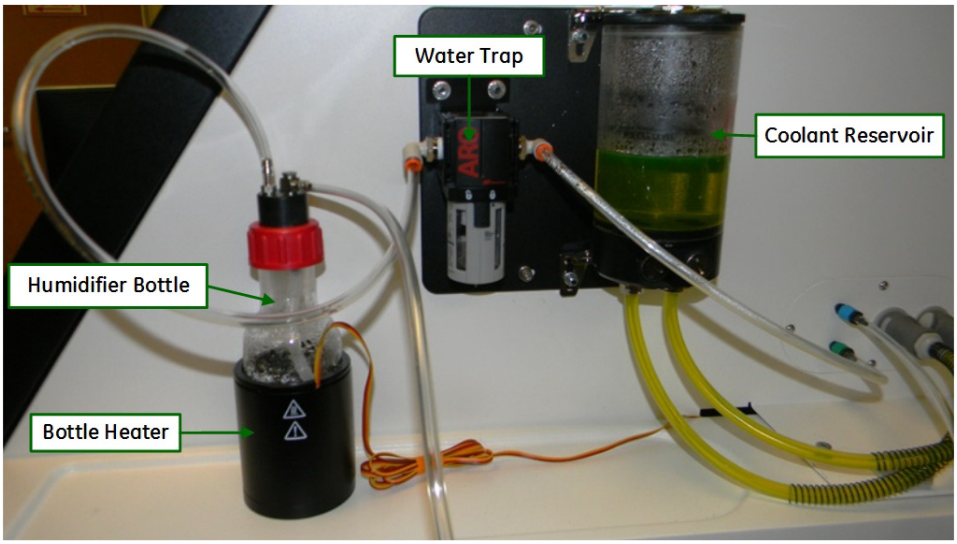


To change the display color back to the light color, simply click the  button on the Settings menu.

Humidifier and Water Trap Maintenance

To gain access to the humidifier bottle and the water trap, open the right-side corner panel of the system. The humidifier bottle, water trap, and coolant reservoir are exposed.

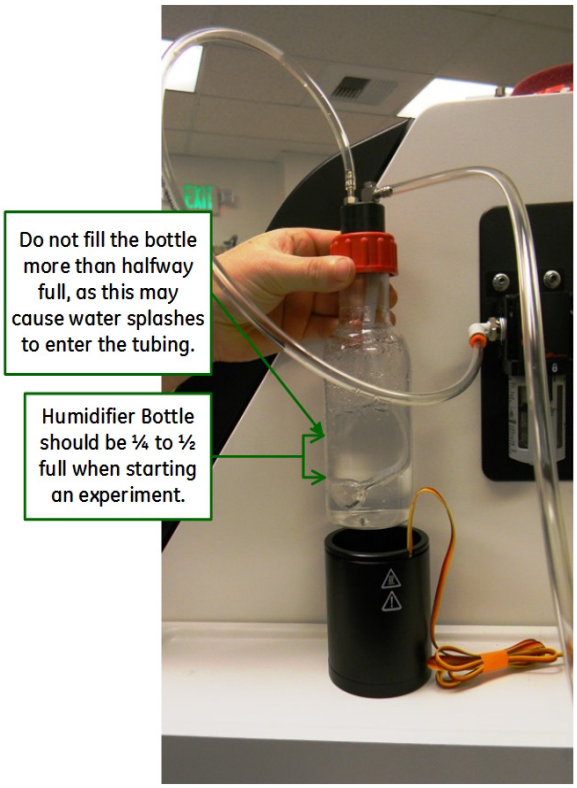
Figure 10. Humidifier and Water Trap (right-side corner panel removed)



Checking and Filling the Humidifier Bottle

The humidifier bottle should always be checked prior to each experiment. The bottle should be 1/4 to 1/2 full at all times.

Figure 11. Filling the Humidifier Bottle



After checking and/or refilling the humidifier bottle, place the bottle back into the bottle heater as shown.

Figure 12. Humidifier Bottle in Bottle Heater

Checking and Emptying the Water Trap

The water trap is designed to prevent moisture from gathering at the sample. The water trap should be checked and emptied at least once every 24 hours the Environmental Controller has been running to ensure is hasn't filled past the **Max Drain Level** line, shown below.

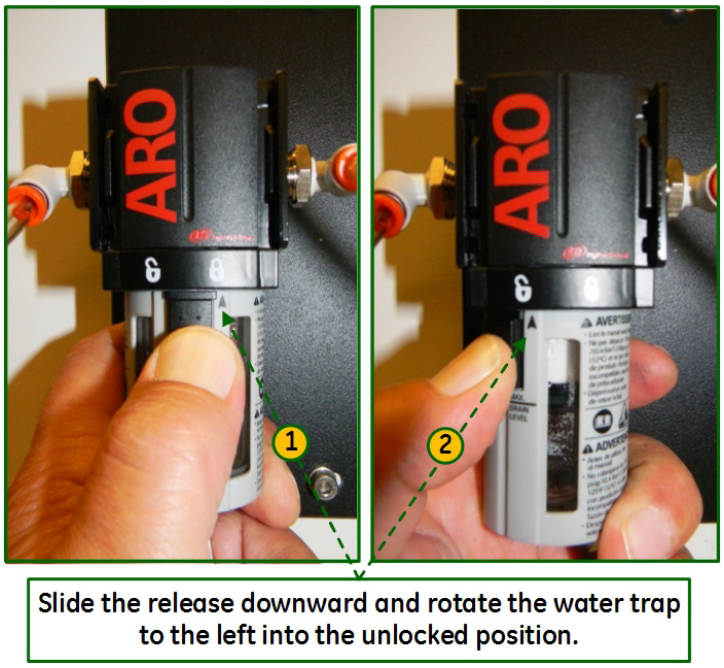
Figure 13. Checking the Trap Water Level

Allowing the water trap to overfill will cause excess moisture to gather in the tubing and may travel to the sample.

To empty the water trap:

1. Push down on the black locking lever and rotate the water trap clockwise to the unlocked position, as shown.

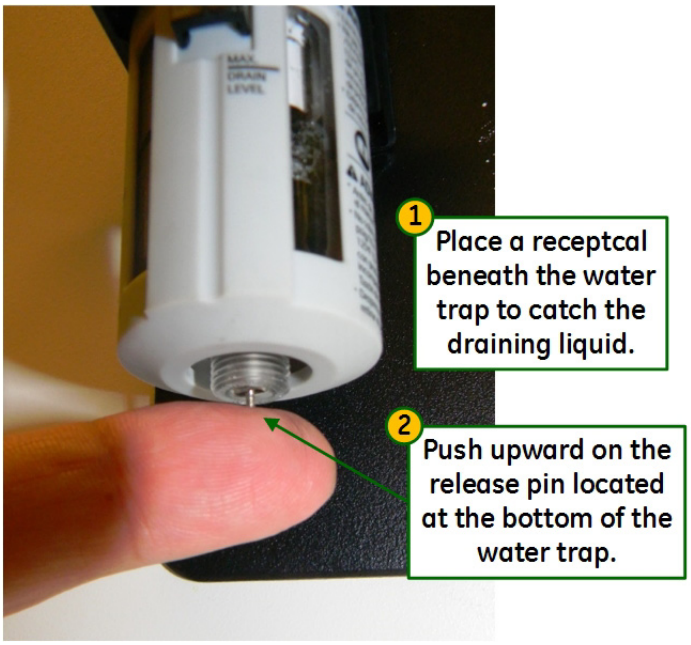
Figure 14. Emptying the Water Trap.



2. Remove the water trap and empty the contents.
3. Replace the water trap and return it to the locked position by sliding the water trap up into the unlocked position, and then rotating to the right while pushing up on the water trap, until the release clicks into place at the locked position.

Alternatively, you can use the release pin on the bottom of the water trap to drain the contents, as shown below.

Figure 15. Emptying the Water Trap (Alternative Method)



Note It is normal for small amounts of condensation to form in the tubing from the water trap to the enclosure bulkhead. You can dry the tubing by disconnecting it at both ends and blowing it out using canned air. Then reconnect the tubing.

Notice to purchaser
DeltaVision OMX Imaging Systems are for research use only – not for use in diagnostic procedures.

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