

Supplemental Information - Connect Tubing to Unit Cooler Drain Line

The unit cooler drain line exits out the rear wall of the chamber. Connect the supplied white plastic tubing to this drain line and direct to an appropriate drain or drain pan.



Supplemental Information – LED Fixtures

Three (3) SciWhite® LED tiles per tier are provided which contain dimmable white and red LEDs capable of producing *up to 800 $\mu\text{mol}/\text{m}^2/\text{sec}$ at 6" / 15 cm from the fixture at 25°C.*

***Please Note:** Temperatures above 40° C may significantly dim the LEDs. It is recommend that you verify the light intensity using an independent sensor.*

Supplemental Information - Closed Loop Dimmable Lighting w/ Light Sensor

System Capabilities:

Maximum lighting level set point: 800 $\mu\text{mol}/\text{m}^2/\text{sec}$ *

Minimum lighting level set point: 80 $\mu\text{mol}/\text{m}^2/\text{sec}$ *

*** - Maximum achievable lighting level will depend on sensor placement and may not reach the maximum set point. Minimum achievable lighting level will depend on LED driver capabilities and may not reach the minimum set point.**

NOTE: All $\mu\text{mol}/\text{m}^2/\text{sec}$ values published for Percival Scientific controlled environment chambers are measured at six inches from the light source!

Components:

Light sensor (Apogee SQ-100X-SS)
Logic relay
Expansion Module with output channels
IntellusUltra Controller

Configuration:

Light sensor located inside chamber (typically on bracket)
One logic relay
One Expansion Module

Dimmable Lighting Process:

Light dimming in this configuration is accomplished in a “closed loop” configuration, where set points are entered into the auxiliary channel (named LS1) on the IntellusUltra controller as UML ($\mu\text{mol}/\text{m}^2/\text{sec}$). Based on the input from the light sensor, the controller will scale its output voltage to the LEDs to correspond with the set point.

Example: If an experiment requires a light intensity of $50 \mu\text{mol}/\text{m}^2/\text{sec}$, then a set point of $50 \mu\text{mol}/\text{m}^2/\text{sec}$ should be entered into the controller.

The LEDs utilized in this chamber are unable to effectively control lighting below a certain percentage of their maximum output. Therefore, the system has been set up so that any set point value below $25 \mu\text{mol}/\text{m}^2/\text{sec}$ will deactivate the fluorescent lights or LED tubes. To turn off the LEDs in program mode or manual mode, simply change the set point in the controller for any value below the threshold listed above.

IntellusUltra Display and Setup:

The dimmable lighting system may have been disabled when the chamber is shipped from our factory. To enable the dimmable lighting system, press the **INPUTS** key on the IntellusUltra controller and use the arrow keys as necessary to select “LS1”. Next, press the **ENTER** key to enter the menu and use the down arrow key as necessary to select “Enable Channel A”. Press the **ENTER** key and use the arrow keys to change this setting to “Yes”. Press the **ENTER** key to accept the change. The dimmable lighting system will now be activated as necessary. Press the **INPUTS** key to return to the main display.

When running manual settings, lighting levels are input as $\mu\text{mol}/\text{m}^2/\text{sec}$, and are set on the IntellusUltra Controller in the Inputs-LS1 menu. To enter the Inputs-

LS1 menu so that the lighting set point can be changed, press the **INPUTS** key on the IntellusUltra controller and use the arrow keys as necessary to select “LS1”. Press the **ENTER** key to enter the menu. To change the lighting set point (Manual Setpoint), press the **ENTER** key and use the arrow keys as necessary to change the setting. Press the **ENTER** key a second time to accept the changed setting. To exit the Inputs menu, and return to the main menu, press the **INPUTS** key.

Lighting levels can be programmed using the programming features of the IntellusUltra controller. For more information on using the IntellusUltra controller to program the lighting levels, please refer to the attached *IntellusUltra Controller Manual*.

On the main display, the lighting level will be displayed on the lower right hand side as a value with units of UML. This value corresponds to the **measured** lighting level within the chamber and not the set point.

Service and Maintenance:

LED modules not working:

- ✓ **Power plugs:** Check to ensure that the power plugs for the fixture are securely installed in their receptacles.
- ✓ Refer to the electrical diagram provided in the *Associated Diagrams, Schematics, and Miscellaneous Information* section of this manual. Check the DC power supplies for the LED modules. A green LED illuminates on each power supply when the LED modules are programmed on. Each power supply is powered with 115V power and output a signal of 24VDC between each V+ and V- terminal.
- ✓ If other troubleshooting steps do not correct the issue, replace LED interface board.

Individual LED module not working:

- ✓ Replace module with a known working module. If the known working module does not work, check wiring from fixture receptacle to LED module located inside fixture.

Supplemental Information – Ultrasonic Humidification System

 **WARNING**

Do not enable humidification in the Intellus controller until water is supplied to the humidifier. Failure to supply water before operation may damage the humidifier.

Note: It is required that de-mineralized water (water that has been treated to remove nearly all minerals and sodium that occur naturally in water) be used for humidification.

System Overview

Humidification in this chamber is accomplished with an ultrasonic humidifier. The humidifier has a water reservoir which maintains a specific water level with a float switch. Located inside the reservoir are a series of transducers which vibrate at very high frequencies. The specific frequency and vibration amplitude cause the water in the reservoir to atomize into very tiny droplets.

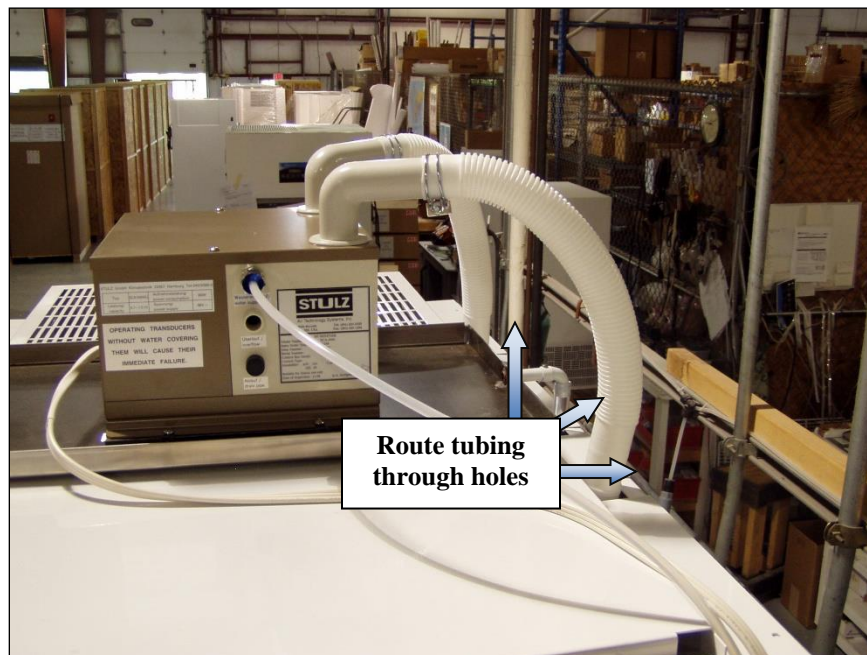
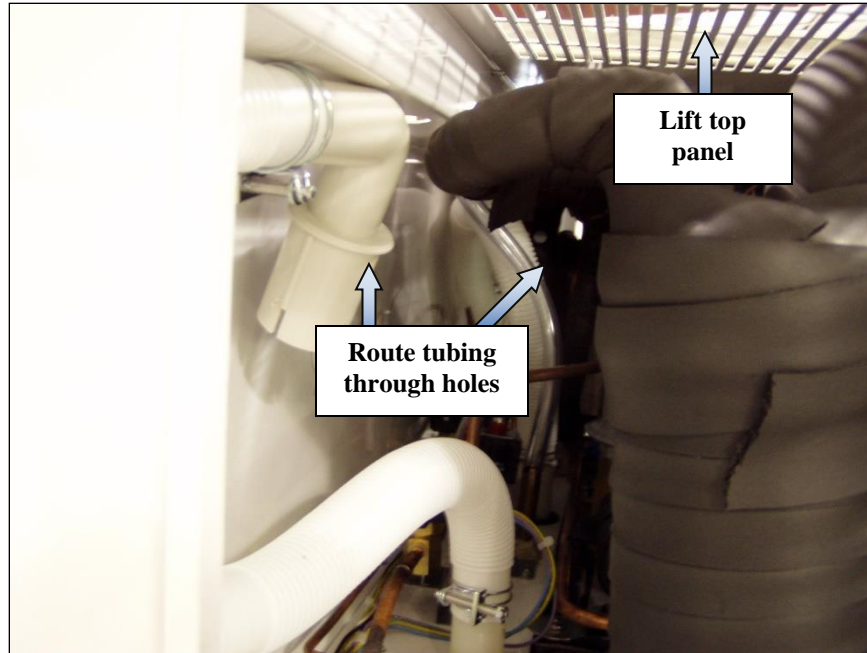
All humidity settings are controlled with the Intellus controller. Please refer to the attached *Intellus Controller Manual* for programming information.

Installation

- Ultrasonic humidifier water requirements – Refer to the attached Stulz instruction manual for water requirements. The Stulz manual is located in the **Associated Diagrams, Schematics and Miscellaneous Information** section of this manual. Refer to the chamber equipped list presented in the front of this manual for the appropriate humidifier model equipped on your chamber. It is recommended that the Stulz manual be thoroughly read before operating the chamber to ensure that the humidifier will operate as designed.

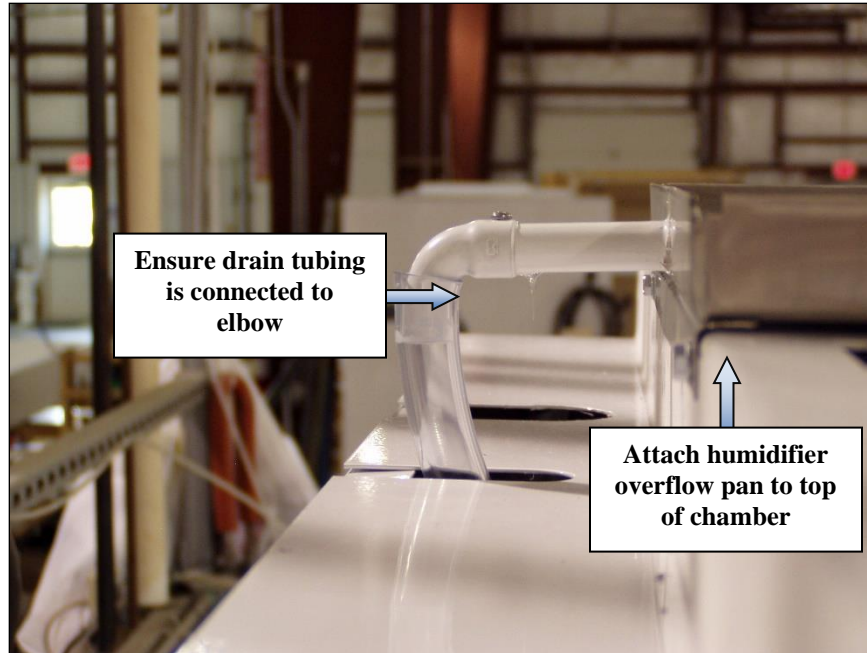
NOTE: For ultrasonic humidifiers it is required that demineralized water is used and the supply meets or exceeds the requirements listed in the attached Stulz manual.

Locate and unpack the ultrasonic humidifier and related components. The tubing that connects from the chamber to the humidifier must be reattached to the humidifier. The tubing is located in the top mechanical compartment of the chamber. Remove the screws that secure the rear of the top panel, lift the rear of the panel and route the tubing through the holes provided in the top panel. A total of three tubes need to be routed through the top. A clear plastic drain tube is used to drain water from the humidifier overflow pan. This tube should be routed through the center hole. Once the tubing has been routed through the holes, reattach the top panel.



Next, install the ultrasonic humidifier and overflow pan on top of the chamber. The humidifier overflow pan should be attached to the top with the screws provided. Holes have been pre-drilled for attaching the overflow pan. Ensure that the humidifier power switch is in the 'On' position.

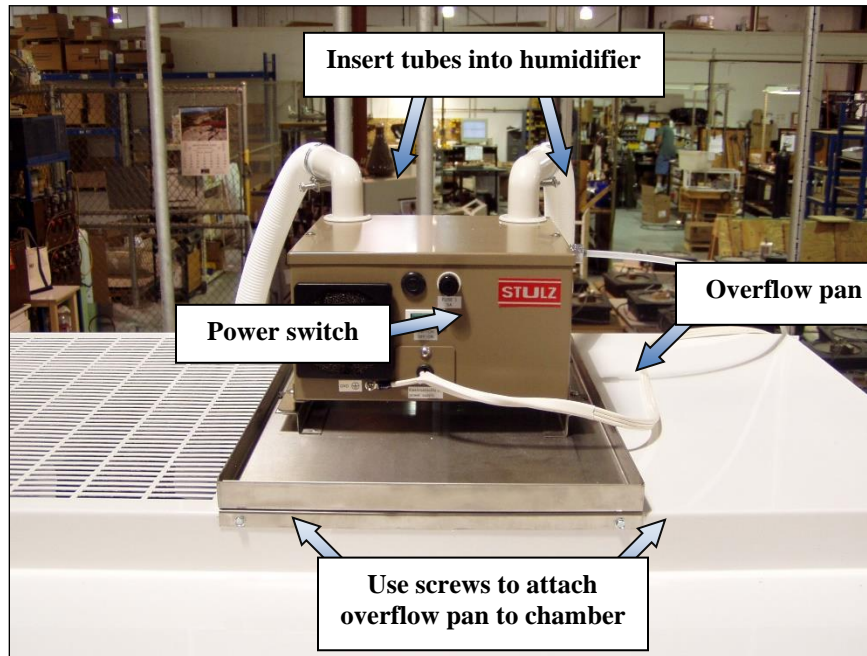
Next, ensure that the clear plastic drain tubing is connected to the humidifier pan overflow drain elbow. If it is not, locate the tubing and connect it to the drain elbow.



Ensure drain tubing is connected to elbow

Attach humidifier overflow pan to top of chamber

Next, insert the humidifier tubes into the top of the humidifier and twist to lock.



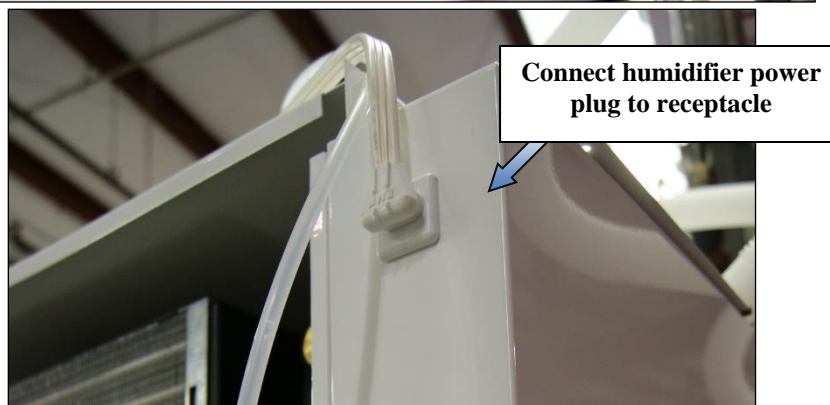
Insert tubes into humidifier

Power switch

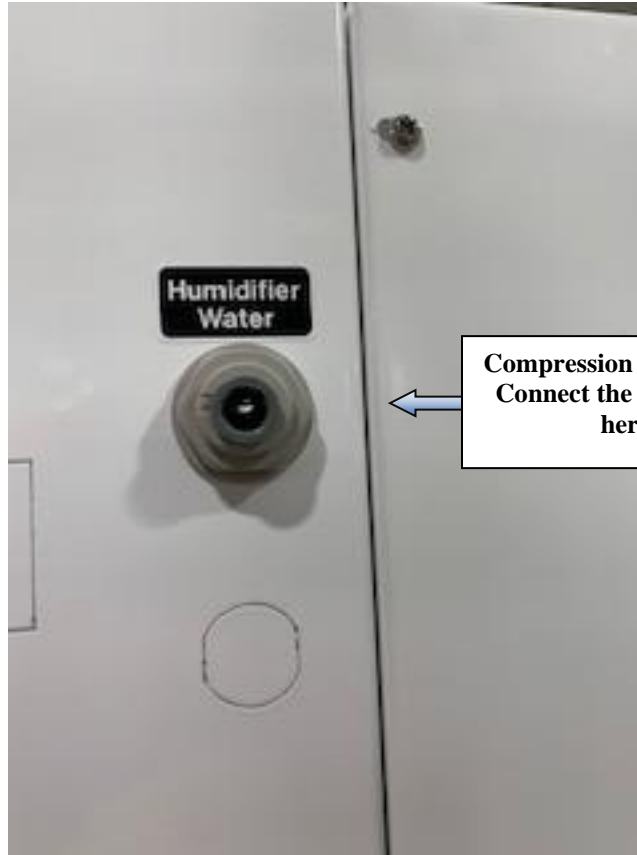
Overflow pan

Use screws to attach overflow pan to chamber

Next, connect the water line to the humidifier and to the water line hand valve. To connect the water line to the hand valve, simply insert the tubing into the compression fitting as far as it will go. If it becomes necessary to remove the tubing, press inward on the ring surrounding the tubing and pull the tubing outward. Next, connect the humidifier power plug to the receptacle located on the side of the chamber.



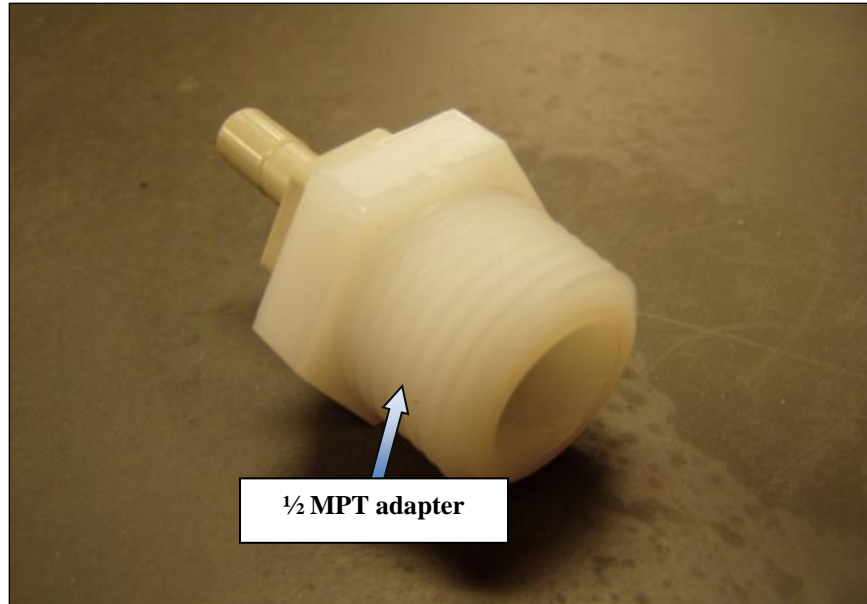
The chamber is equipped with a compression style fitting with a hand valve for the humidifier water. First, connect the supplied hand valve to the compression fitting. Your building water supply should be connected to this hand valve. Either connect ¼" tubing directly to the fitting on the valve or install a ½" MPT adapter. To directly install ¼" tubing simply insert the tubing into the fitting as far as it will go. If it becomes necessary to remove the tubing, push inward on the ring surrounding the tubing and pull the tubing out of the fitting.



**Compression style fitting.
Connect the hand valve
here.**



**Hand valve. Connect
building water supply or
MPT adapter here**



(Optional) 1/2" MPT adapter. Insert into compression fitting and connect water supply with 1/2 FPT fitting

Once the proper water supply connection has been made, turn the water supply source on and open any valves in line with the water line. The humidifier is designed to automatically fill and maintain the proper water level for proper operation.

Intellus Setup:

The humidification system is disabled when the chamber is shipped from our factory. Once the chamber has been fully installed and powered, to enable the humidification system, press the **%RH** key on the Intellus controller and use the arrow keys as necessary to select "Enable Humidify". Press the **ENTER** key and use the arrow keys to change this setting to "Yes". Press the **ENTER** key to accept the change.

Maintenance

For maintenance information, refer to the maintenance section in the ultrasonic humidifier manual provided as well as the information provided below.

Periodically check the discharge from the humidifier (while the Intellus controller is calling for humidity) to verify that the humidified air produced is composed of very fine water droplets. The proper humidity rich air discharged from the ultrasonic humidifier is composed of very small water droplets, and looks like fog or smoke. The production of large water droplets or no water droplets at all could signal a malfunction in the humidifier.

Recommended maintenance schedule: Periodic – at the customer's discretion

Perform proper upkeep on the treated water system used to supply water to the humidifier. Water with improper mineral content can rapidly cause premature problems with the ultrasonic humidifying elements, and lead to malfunction of the humidity system.

Recommended maintenance schedule: As per the manufacturer's requirements

Service Information

Loss of humidity control

- ✓ **Intellus controller:** Check the controller for correct voltage output to the humidification relay. If the controller fails to output the correct voltage (approximately 5VDC), replace the controller.
- ✓ **Signal conditioner and/or sensor failure:** Check the voltage signal from the signal conditioner to the controller. For the HMP60 sensor, the voltage should be more than 0VDC but less than 1VDC. For the HMP110 sensor, the voltage should be more than 0VDC but less than 5VDC. If it is not, the sensor may need to be replaced.
- ✓ **Ultrasonic humidifier:** Check output from humidifier. Refer to the maintenance section for information on checking humidifier. Check voltage to humidifier when the Intellus controller is calling for humidity. The ultrasonic humidifier requires 48VAC. If the voltage is not 48VAC, check humidifier power transformer. Check humidifier relay for proper operation. For more service information, refer to the ultrasonic humidifier manual provided.
- ✓ For more service information on the humidification system, refer to the troubleshooting section in the ultrasonic humidifier manual provided as well as the Service Information section of the **Installation, Operation & Service Manual**.