Unity Lab Services
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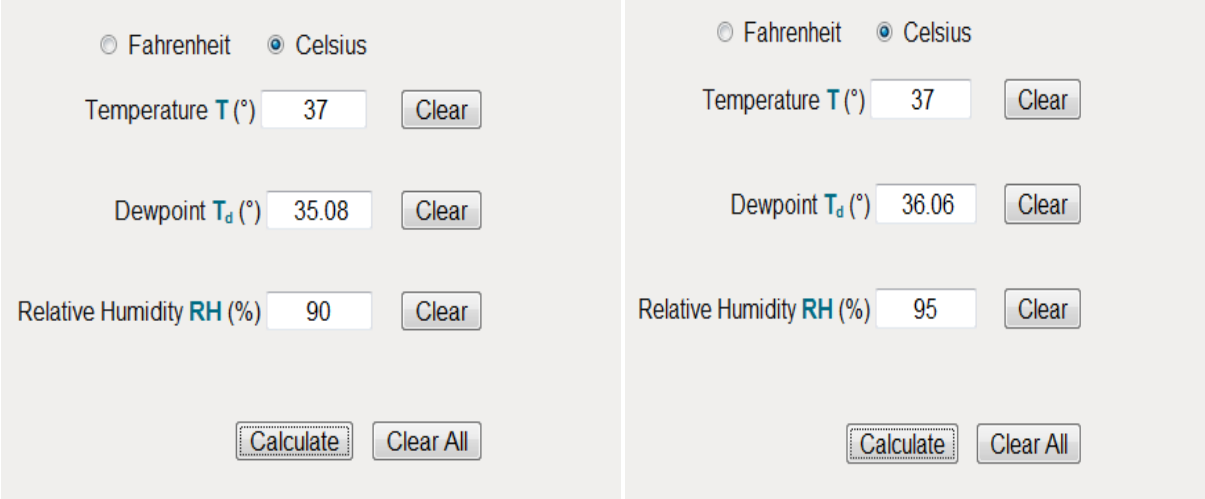
3110 Series CO2 Incubator Condensation Issues

This document provides a description of how condensation is developed, issues that may contribute to its development, and potential locations of condensation. Basic guidelines are provided to help the operator identify common causes of condensation in this model.

3110 Series Water-Jacketed CO2 Incubators
Revision Date: October 22, 2014
Condensation Issues

Condensation in 3110 Series CO2 Incubators

- Condensation is undesirable in CO2 incubators because it provides a potential location for contamination to develop and to grow.
- Condensation may develop when the relative humidity inside the chamber is elevated beyond normal levels of 90-95% or when surface temperatures within the chamber are cooled to the **dew point temperature** due to the introduction of cooler air.
- The 3110 series CO2 incubators normally operate at **90-95% RH (Relative Humidity).**
- The **dew point** is the saturation temperature for water in air. Relative humidity of 100% indicates that the dew point is equal to the current temperature (and the air is maximally saturated with water).
- The dew point is associated with relative humidity. **A high relative humidity indicates that the dew point is closer to the current air temperature.**
- Note from the calculations below that if the air temperature is held constant and the RH percentage is increased; the dew point temperature gets **closer** to the air temperature value.
- Therefore in high RH environments very little variation in temperature will cause condensation to develop. If any surface within the chamber reaches the dew point temperature, then condensation will develop on this surface.



Condensation can develop in a variety of locations:

Internal to chamber:

- Interior overhead area near blower motor.
- Interior chamber walls.
- Interior surface of inner glass door.

External to chamber:

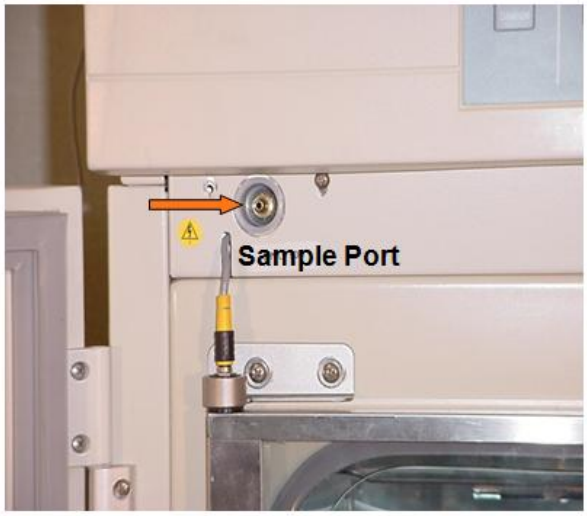
- Collar or face frame around inner glass door.
- Inside surface of outer door.

The following are some **common causes** of condensation:

- Sample port capped.
- Access port plugged with a solid stopper.
- Blower motor inoperative or improperly installed.
- Inoperative inner door heater.
- Any deformation or void in inner or outer door gaskets.
- Air circulation restricted due to heavy product loading.
- Added heat load and obstructed air circulation due to the installation of accessory running inside unit. (i.e. small shaker, lab rotator, bottle roller, etc.)

Sample port should be **UNCAPPED** unless unit is being used to control N2 (reduced O2).

Insure sample port HEPA filter is installed and tubing is not kinked.



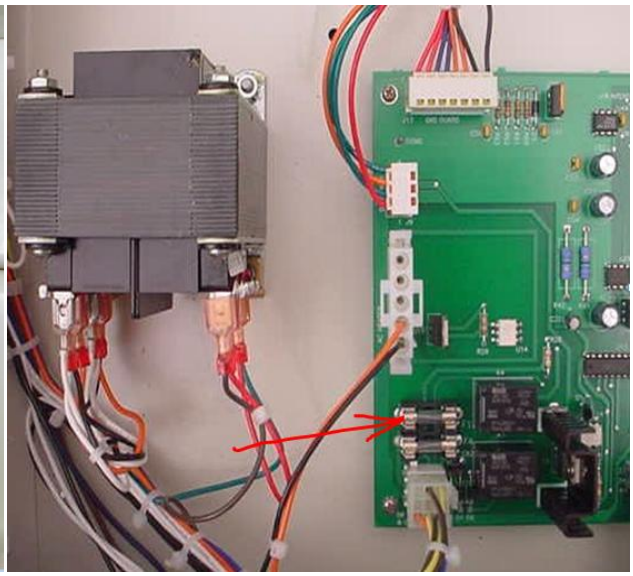
Access port should be fitted with an **Access Port Filter Assembly** and not a solid stopper. Part number **(190985).**

If it is necessary to route instrumentation into chamber, modify existing access port plug with a small notch or hole to accommodate this wiring.

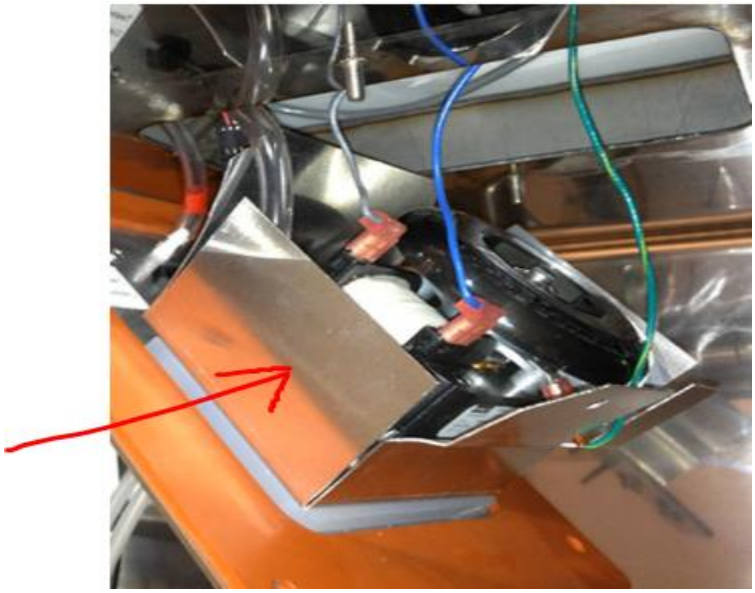
Inspect both the **inner and outer door gaskets** for proper seal. Insure no deformation, voids, tears, gaps, especially near seam areas.

Repair small gap at seam with gray silicon RTV if necessary.

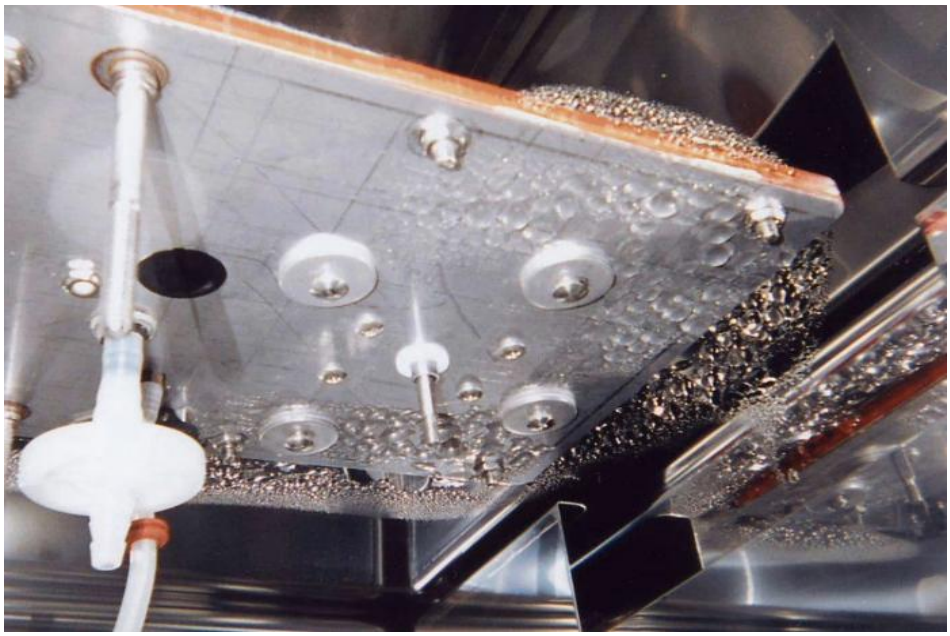
Inoperative inner door heater. This can be caused by a poor or broken connection at door heater harness connection or blown door heater fuse on main pcb. Fuse (F1) 3.5A



When replacing the blower motor, insure that the metal shield is reinstalled as shown here:



A unit without a metal shield will result in condensation forming on the chamber ceiling. This is due to the blower wheel forcing cooler air down onto the chamber ceiling. This will create a “cool” spot and condensation will develop in a high RH environment.



Condensation on interior walls:

- Air circulation restricted due to heavy product loading.
- Added heat load and obstructed air circulation due to the installation of accessory running inside unit. i.e. small shaker, lab rotator, bottle roller, etc.

- Air Flow
  - Counterclockwise
  - Fastest RH recovery
    - Place RH pan in left side duct on floor