

Important WARNINGS, Instructions, and Hints for use of the Tritech Research DigiTherm™ CO₂ Incubator (v2.0)

WARNINGS AND DISCLAIMERS!!!!

NEVER USE ELECTRICAL APPLIANCES IN A WET ENVIRONMENT OR SPILL WATER OR SOLUTIONS ON THEM! IF WATER SPILLS ON THE FLOOR, DO NOT STEP IN IT. UNPLUG UNIT IMMEDIATELY UNTIL THE SPILL IS CLEANED UP! DO NOT TUG, PULL, OR PUT A CONTINUOUS STRETCHING FORCE ON CORDS! IF CORDS BECOME DAMAGED OR FRAYED, THEY MUST BE REPLACED IMMEDIATELY! NEVER RESTRICT AIRFLOW FROM FAN OR CONTROL UNIT BECAUSE THIS MAY CAUSE ELECTRONICS TO OVERHEAT OR PREVENT THE INCUBATOR FROM REACHING THE DESIRED TEMPERATURE!!! BE SURE THE THERMAL SENSOR INSIDE THE INCUBATOR IS INTACT AND NOT INSULATED FROM THE AIRFLOW, OR ELSE THERMAL REGULATION WILL NOT OCCUR!!! ARRANGING SAMPLES SO AS NOT TO RESTRICT AIRFLOW WILL RESULT IN IMPROVED ENERGY EFFICIENCY AND THERMAL UNIFORMITY. **POSSIBLE FAILURE MODES OF THIS INCUBATOR INCLUDE OVERHEATING, OVERCOOLING, AND HIGH OR LOW CO₂ – ALWAYS KEEP A BACKUP COPY OF PRECIOUS SAMPLES ELSEWHERE.**

THE DIGITHERM™ INCUBATOR IS FOR RESEARCH USE ONLY. IT IS NOT A CONSUMER ITEM. IT MUST BE USED WITH CAUTION. IF SET UP AND USED CORRECTLY, THE DIGITHERM INCUBATOR CAN PROVIDE AN ACCURATE MEANS FOR CONTROLLING THE ENVIRONMENT OF SAMPLES PLACED IN IT; HOWEVER TRITECH RESEARCH, INC. DOES NOT WARRANT THAT THE SYSTEM OR DOCUMENTATION IS ERROR-FREE OR 100% RELIABLE. IN NO EVENT SHALL TRITECH RESEARCH BE LIABLE FOR DIRECT, INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES, INCLUDING, BUT NOT LIMITED TO: CLAIMS FOR LOSS OF SAMPLE MATERIAL, LOSS OF USE, LOSS OF TIME, LOSS OF REVENUES, DAMAGE TO ITEMS PLACED IN THE INCUBATOR, ELECTROCUTION, OR ELECTRICALLY STARTED FIRES. IN NO EVENT SHALL TRITECH RESEARCH BE LIABLE FOR ANY AMOUNT GREATER THAN THE PURCHASE PRICE OF THE UNIT. IT IS VERY IMPORTANT TO FOLLOW THE ACCOMPANYING INSTRUCTIONS AND HEED ACCOMPANYING WARNINGS IN ORDER TO MINIMIZE THE CHANCES OF SUCH OCCURRENCES. IF ANY PART OR STATEMENT IN THE WARRANTY OR DISCLAIMER IS UNLAWFUL, THE REMAINING PARTS SHALL CONTINUE TO BE IN FULL EFFECT. IF YOU DO NOT AGREE TO FOLLOW THE WARNINGS AND ACCEPT THE DISCLAIMERS, PLEASE RETURN YOUR UNIT TO TRITECH RESEARCH, WITHIN 30 DAYS, IN ORIGINAL CONDITION, FOR A FULL REFUND.

SETTING UP:

Congratulations on your purchase. The DigiTherm™ CO₂ Incubator is an accurate, precise, easy to use, and extremely reliable temperature and CO₂ controlled heating and cooling incubator that lasts for years, if set up and maintained properly. It uses a thermoelectric heat pump rather than a Freon compressor, so it is safe for the environment and very energy efficient for near-ambient temperature incubations. Actually, there is almost nothing to set up. Just find a level place on or under the bench for it (with adequate ventilation, and access to a CO₂ tank with a regulator set at 30 psi). Plug the incubator into a 115VAC outlet, attach the clear tube to the CO₂ valve output from the regulator, and attach the valve control cord to the metal terminals coming from the valve (polarity is not important). Just follow the simple instructions below.

INSTRUCTIONS:

- 1) The DigiTherm™ Incubator has special non-volatile memory that remembers the parameters set previously. This means that as soon as you turn on the incubator, or when power returns after a power failure, that the incubator will load the last stored values, and begin to run, automatically. When you turn on the incubator the first time, it will load some parameters set in the factory, and begin to run.
- 2) To examine or change the parameters, push the MENU button. Each time you push it, the display advances to show the next parameter. After the last menu item, it cycles back to show the current temperature and CO₂ inside the incubator.
- 3) Parameters can be changed by pressing the + or – buttons, while they are displayed in menu-mode. Pressing and holding the button changes the value rapidly. This is good for making big changes quickly. Pressing the button briefly changes the value by one unit. This is good for fine control when you are near the value you want to set. In order for the new parameter to apply, first, it must be saved, manually.
- 4) To save a parameter that you have updated, press the MENU button again. The display will reply, "Press + to save!". If you press the + button, the new value will be saved. If you press the – button or the MENU button, the new value will not be saved, and the previous value will be retained. Also, if you press no buttons, while in any part of the menu-mode, after about 20 seconds, menu-mode times out (self-cancels) and the previous value will be retained.
- 5) Menu Parameters: Definitions and Values
 - Temp: The temperature you want inside the incubator. The incubator allows you to set values from 0°C to 65°C. However, realistically, you can expect the incubator to be able to achieve temperatures 40°C above the outside temperature and 15°C below the outside temperature. For example, in a room that is 25°C, the incubator can maintain temperatures from 10-65°C, but will probably not cool all the way to 0°C. For lower temperature incubations, place the entire incubator in a cold room.
 - HiTemp: The temperature, above which, an alarm sounds, and the heat pump shuts off.
 - LoTemp: The temperature, below which, an alarm sounds, and the heat pump shuts off.
 - T Time: The number of minutes that the incubator must remain out of the range set by HiTemp and LoTemp before the alarm actually sounds, and the heat pump actually shuts off.
 - T-Calib: An offset that you can set to calibrate the incubator's temperature sensor (and the digital display) to get it to agree with your own reference thermometer. If the display shows 40°C and your reference thermometer shows 39.6°C, then set T-Calib to -0.4 to calibrate the incubator.
 - CO₂: The amount of carbon dioxide you want inside the incubator. The incubator allows you to set values from 0.0% to 10.0% CO₂. Keep in mind that CO₂ is regulated by injecting pure CO₂ into the incubator, and mixing it with the ambient gas mixture in there (air). Air contains between 0.0% and 0.1% CO₂, so it is not possible to get below that value. Furthermore, if you want to change the setting for a lower amount of CO₂ in the incubator (i.e. changing from 7% to 5%), after setting the new, lower value, you should open the door briefly, since the incubator has no way to get rid of the excess CO₂, other than slow diffusion.
 - HiCO₂: The CO₂ percentage, above which, an alarm sounds, and the valve is disabled.
 - LoCO₂: The CO₂ percentage, below which, an alarm sounds.
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- C Time: The number of minutes that the incubator must remain out of the range set by HiCO₂ and LoCO₂ before the alarm actually sounds, and the valve is actually disabled.

6) Fuzzy Logic – How your Incubator Learns

To get the most accurate temperature control and the longest life out of your incubator, the control box has a microprocessor in it that learns just exactly how much power is required to keep the incubator at the desired temperature, and it delivers just enough power to accomplish that, continuously. When you first power up the incubator, it will fluctuate between minimum and maximum power, so you may notice the temperature fluctuating a few degrees back and forth, as the incubator learns. Once locked on, the incubator can still compensate for changing room temperature by slowly changing its power setting. If the incubator is unable to compensate for the temperature by reducing power to the heat pump for about 5 minutes, it will automatically switch between heating and cooling modes.

Most samples are water-based, and have more heat capacity than the air in the incubator, so they will tend to average any fluctuations you see on the display. Nevertheless, you may want to let the incubator stabilize for a few hours after power up, before putting in your samples.

Once the incubator locks on to the right power setting for the temperature you set, it is slow to change it. Therefore, if you decide to make a significant change to the temperature setting of the incubator, it is a good idea to turn the incubator off and back on again after you make the change in the menu. This erases the learning, and lets the incubator reach and learn the new temperature more quickly.

7) Alarms – Setting and Interpreting

There are lots of settings for alarms to inform you if your incubator has trouble doing what you set it to do. There are three settings that together constitute the temperature alarm: HiTemp, LoTemp, and T Time. Set HiTemp to a temperature above your desired temperature, and LoTemp to a temperature below it. If the incubator's temperature stays out of the range between HiTemp and LoTemp for T Time minutes, three things will happen: On the display, instead of showing the temperature, the word "HI" or "LOW" will be there to indicate which problem it was, a high-pitched, audible alarm will sound, and the heat pump will be disabled, causing the incubator to coast toward ambient temperature.

You can set analogous CO₂ alarms with HiCO₂, LoCO₂, and C Time. If the CO₂ stays out of the range between Hi CO₂ and LoCO₂ for C Time minutes, three things will happen: On the display, instead of showing the %CO₂, the word "HI" or "LOW" will be there to indicate which problem it was, a high-pitched, audible alarm will sound, if the CO₂ was too high, the CO₂ valve is disabled. LoCO₂ may indicate your tank is empty, or the valve is stuck closed. HiCO₂ may mean the valve is stuck open. Both of these situations require your personal attention to remedy. Another alarm condition is ERRCO₂, if the CO₂ sensor is removed, jostled, damaged or wears out. The CO₂ sensor should be changed, or at least recalibrated, every 2 years of operation. Contact us for service.

Pushing any of the buttons on the panel, during an alarm, resets the alarm conditions. If the fault conditions are not cleared up, the alarm will trigger again.