



## **A GUIDE TO CLIMATE CONTROL IN A CLOSED, INDOOR FARMING FACILITY**

Maintaining control over temperature and humidity in a closed indoor cultivating environment is a challenge. Cooling systems are not designed to regulate humidity and traditional dehumidifiers are inefficient in this application. MSP's solution for controlling humidity and temperature in an indoor growing facility is to "divide and conquer" -- Cooling and Heating components regulate temperature, while MSP regulates humidity.

The MSP solution reduces dehumidification operating cost by up to 65%. Airborne pathogens are filtered out, reducing the risk of mold and mildew. Valuable water, condensed in the dehumidifier, may be returned to the plants.

When choosing a dehumidification and cooling system for a growing facility, there are some important considerations:

- 1. Dehumidifiers are not rated equally.** *Dehumidification capacity (Pints/Day) is meaningless without knowing the associated rating conditions (Temperature & Humidity).*

MSP uses standard US rating conditions of 80°F/60% Rh. Different rating conditions can yield very different capacity values. Be sure you are doing a fair comparison. MSP offers unit capacity under specified growing room conditions other than 80° f/60% Rh. The difference between 80°F/60% and 75°F/50% doubles equipment size and increase energy consumption by 20%.

- 2. Operating costs for different solutions vary significantly.** *MSP offers superior return on investment.*

With MSP's pre-cooling feature (Figure 1, Step 1), the first step of dehumidification is free of operating cost, saving 30-65%. With more than 4,000 annual hours of operation, the return on investment using MSP Dehumidification is exceptional.

- 3. MSP dehumidification decreases cooling load and cost of operation.**

MSP Dehumidification Technology delivers air to a cultivating room lower than room temperature (See Figure 1, Step 3) and thus assists in cooling. MSP employs technology that rejects heat outside the growing room. Traditional Dehumidifiers reject heat inside the growing room with "hot-gas" heating that adds undesired temperature in a growing room. Along with lighting heat, this increases an already high cooling load.

- 4. MSP Dehumidification eliminates potential for condensation and humidity spiking.**

The primary purpose of a Climate control system in cultivation environment is to provide the grower with their specified growing conditions (temperature and humidity) in a drip-free and clean environment. The result is a superior crop with minimal waste. MSP's technical strategy is to let the dehumidifier control humidity and the cooling unit control temperature. Other strategies can result in the following hazards:

- a. Ducts and other surfaces below the room dew point will "sweat" and drip unless properly insulated with a moisture barrier. Even then, sweating is likely to occur at the point of cold air entry to the room.
- b. Immediately following "lights out" mode, the cooling system will shut down. If the Dehumidifiers are selected for full capacity, there is no problem. However, when the Dehumidifiers are supplemented by a now inactive cooling system, a spike in room humidity will occur. The result can be unwanted condensation and dripping for an extended period, potentially causing mold and mildew growth.

**CONTINUED**

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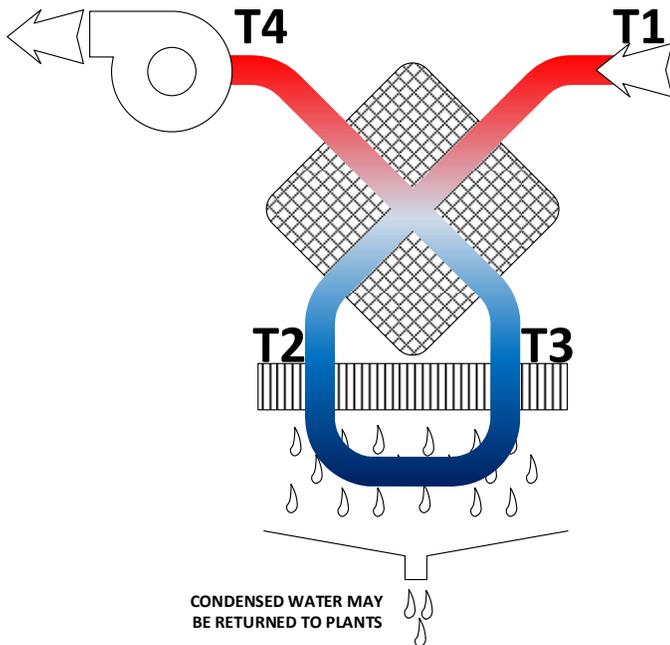
5. “One Size Fits All” -- A comprise with consequences

MSP Dehumidification systems comprise a matched set of components that are tailored to the specified room conditions. There are numerous combinations of Compressors and MSP Dehumidifying Coils, that together result in a properly designed dehumidification system.

MSP Dehumidifiers are packed with heat transfer surface that serves to precool/reheat the air and reduce energy use by up to 65%. With a belt-free fan as the only moving part, the MSP Dehumidifier offers low maintenance, long life, and fast return on investment.

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**FIGURE 1 – MSP® DEHUMIDIFICATION PROCESS**



**STEP 1** Warm, humid incoming air (T1) flows through the first pass of the plate type air-to-air heat exchangers for initial precooling, condensation and dehumidification. This is accomplished by regenerative thermal exchange with the cooler air that is leaving the heat exchanger. (See step 3)

**Advantage:** Precooling, condensation and dehumidification by regenerative thermal exchange are "free" and involve no additional equipment.

**STEP 2** Precooled air (T2) then passes twice over conventional cooling coils for final cooling, condensation and dehumidification.

**Advantage:** Precooling reduces the energy load on the cooling coil so condensation and dehumidification are achieved at a low rate of energy consumption, using smaller compressors that require as little as one-half the power.

**STEP 3** The cool, condensed dehumidified air (T3) is then drawn back through the opposite side of the heat exchanger where it is heated (T4) by transfer with incoming air (see step 1) and continues onto the building's HVAC system.

**Advantage:** No heating coil—and no additional energy—needed to heat the dehumidified air before it enters the conditioned environment. Heating, dehumidification and water generation are accomplished with the lowest possible operating cost.

**MSP DEHUMIDIFICATION TECHNOLOGY**

**Eliminate Humidity Spikes and Condensation / Reduce the Cost of Cooling Equipment**

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