

MicroCoil

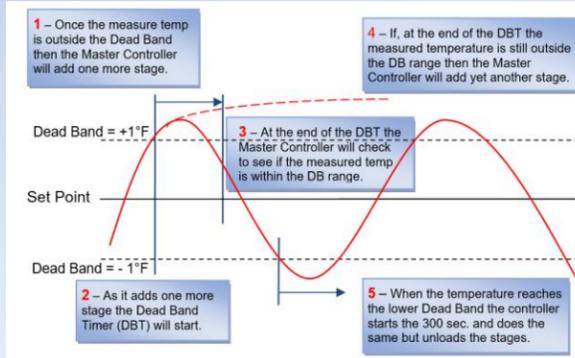


- The individual MicroCoil is equipped with a system specific Dehumidification coil and Re-Heat coil.
- Both coils are installed with modulating 3-way valves.
- The flow of cold and hot fluid through the respective coils are constantly modulating to maintain the desired temperature and RH.
- Each MicroCoil is equipped with a controller and temp/RH sensor, which in turn generates the modulation signal to the 3-way valve actuators.
- The set-point can be varied through communication with the main control system. This allows for adjustable conditions during the grow cycle following the individual grow recipes.
- Each MicroCoil is equipped with an EC Variable Speed Blower allowing for a full range of air flow conditions.
- One MicroCoil is used for each row in the AMPL grow platform.

MODULAR CHILLER



- The chiller is designed for staging and redundancy. Multiple individual compressors on dedicated circuits operate as one large chiller by the Master controller.
- For redundancy, one or two extra circuits can be added to the assembly. If one circuit is down for service, the Master controller will simply lock out this circuit and stage the remaining circuits.
- Service of a circuit can be done while the main chiller assembly is operational. So, no down time is experienced.
- Multiple stages allow for large down turn in the system capacity, while maintaining temperature control.



PUMP SKID



- The Pump Skid is equipped with two centrifugal pumps complete with TEFC motors assembled on a common pipe manifold.
- The pumps are set up as Duty/Standby and will automatically switch over in case of an alarm.
- Included are isolation valve, check valves, suction diffusers, expansion tank, air separator, air vent valve and glycol make up tank.
- Built in controller and flow switches, low pressure switch, pressure relief valve, temp sensors

FLUID COOLER



- The Fluid Cooler is modular and multiple units can be used for N+1 redundancy.
- Each Fluid cooler comes equipped with:
 - Tube and finned fluid coils.
 - Variable speed fans for temperature control.
 - 3-Way modulating valves for low ambient temperature operation.
 - Microcontroller, complete with required sensors.



MicroCoil HVAC SYSTEM



AMPL Platform

AgricUltra's AMPL Platform is a multilayered system is designed for high production growth. Maintaining proper HVAC conditions is critical.

In a strategic partnership between AgricUltra, and Transom, the AMPL Platform now has a dedicated MicroCoil for each row which conditions the temperature and RH of the air for each layer.

The MicroCoil is equipped with dehumidification and reheat coils, modulating control valves, variable speed blower, controller and sensors.

The MicroCoils are designed for each specific application. Optimized for the Latent load. By designing for the Latent load the total capacity will more than cover the Sensible load.

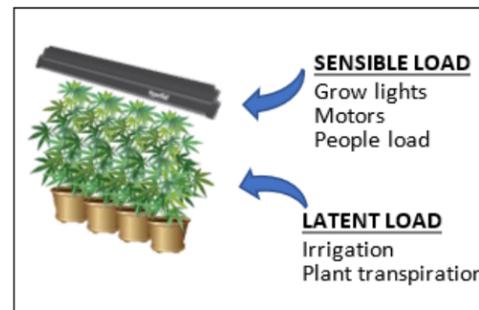
HOW TO SIZE THE HVAC SYSTEM

The two loads generated in the room are the **SENSIBLE** load and the **LATENT** load. Of the two loads, the **LATENT** load (humidity control) is the larger load.

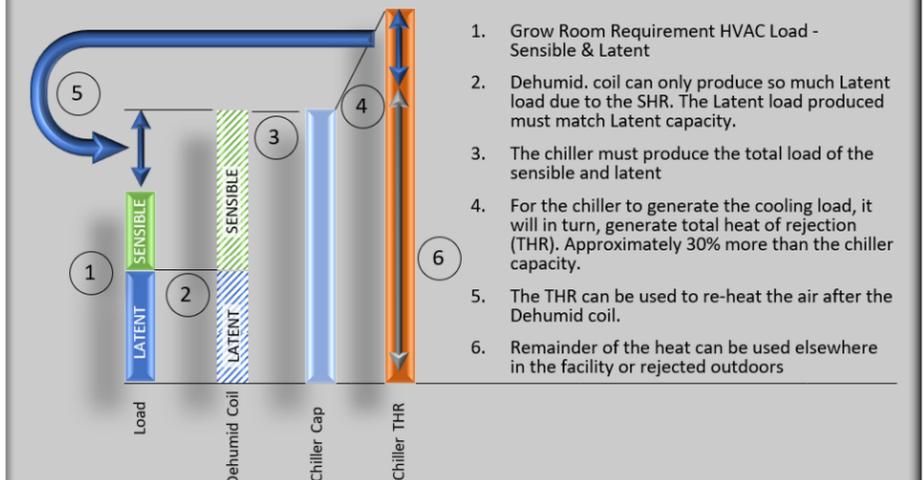
To extract the moisture out of the air, the dew point must be reached. The coil, chiller and circulation system must be sized for this.

To achieve the proper moisture extraction from the return air it results in overcooling (too much **SENSIBLE** cooling). That is why the MicroCoil is equipped with a reheat coil. **FREE HEAT**

This way the MicroCoil can control to the set point Temp & RH, removing the required **SENSIBLE** and **LATENT** loads.



GROW ROOM HVAC LOAD REQUIREMENTS



COMMON MISTAKE

Sizing the HVAC system on the Sensible load will result in a system not providing enough cooling to remove the moisture in the room. This will result in mold issues and plant growth under performance.

HVAC SYSTEM

In a high density multilayered grow room it is easy to get stratification when using a conventional central HVAC air handler unit. This causes substantial Temp and RH imbalances within the room, causing severe stress on the plants which can stunt growth and mold issues to the point where a complete crop may have to be removed. A common work around is to reduce the number of plants to balance the HVAC conditions.

The AMPL Platform and MicroCoil HVAC system generates a separate HVAC controlled environment on each level, for each row.

Each MicroCoil has a dedicated controller and sensors to continuously modulate the loads to meet the temperature and RH set points.

The overall HVAC system is designed to provide enough chilled and heated fluid to all the MicroCoils. The MicroCoil decides how much fluid flow it needs.

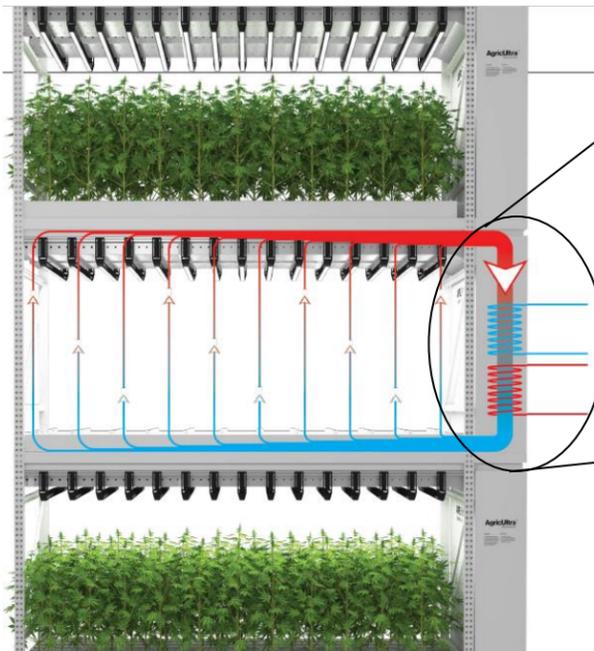
Along with the MicroCoil the system contains modular chillers, factory mounted pump skids and modulating fluid coolers.

All are designed with redundancy (N+1) to maintain up time while allowing for serviceability,

AMPL PLATFORM

The AMPL platform is a multilevel grow platform used to maximize the production per sq ft of production space.

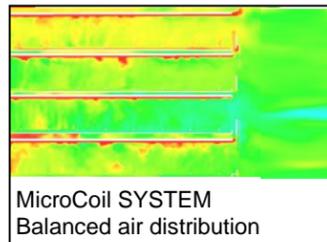
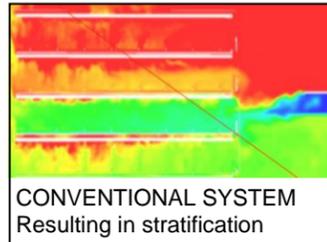
To maintain the proper Temp & RH conditions, each row on each level has its own dedicated air handler MicroCoil.



MICROCOIL

The MicroCoil has a cooling coil and a heating coil. Each coil has a 3-way modulating valve to generate the exact Sensible and Latent loads needed.

CFD MODELING



OPTIONAL
Free heating for
facility heating and
hot water pre-heat

FLUID COOLER

Used to exhaust any excess heat. Variable speed fans used for controlling the condensing temperatures.

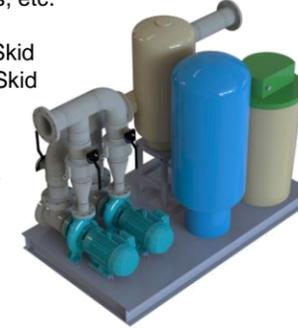
Year round operating conditions can see very low ambient temp using 3-way bypass valve.



PUMP SKID

Prepackaged circulation pumps (Duty/Standby). Complete with headers, valves, expansion tanks, etc.

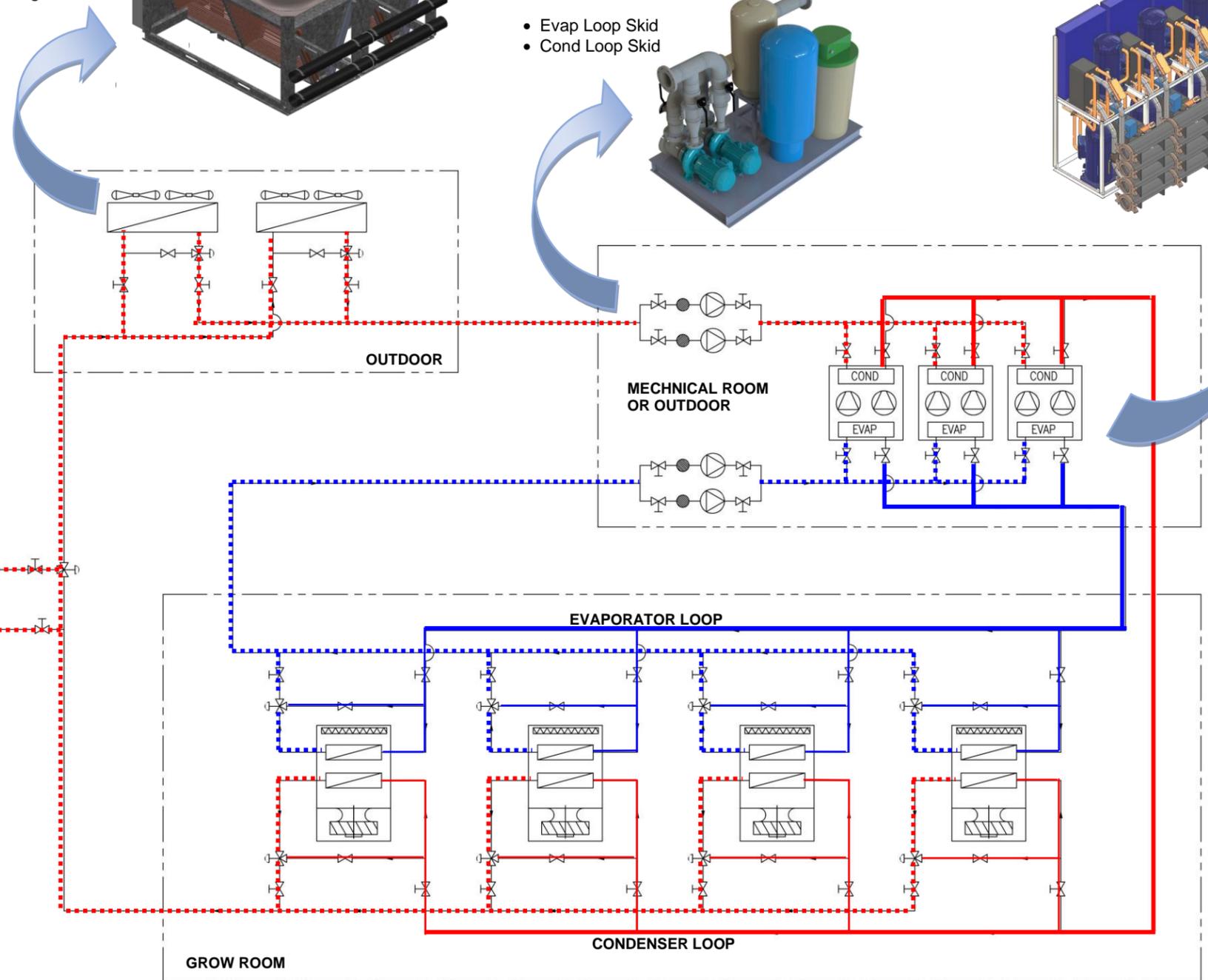
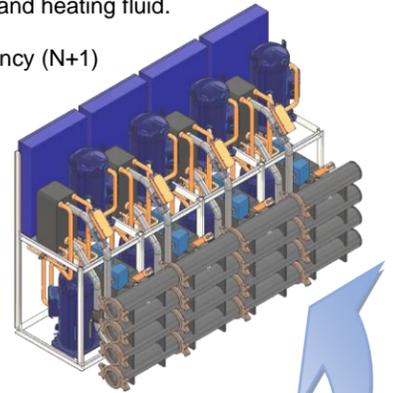
- Evap Loop Skid
- Cond Loop Skid



MODULAR CHILLER

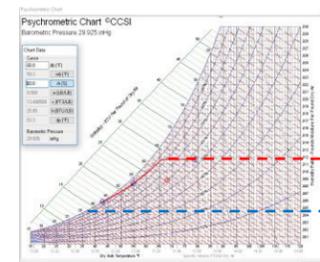
The Chiller system generates the required cooling fluid and heating fluid.

Designed for redundancy (N+1) and down turn.



The built in controller and sensors are constantly modulating to meet the set point.

The controller communicates directly with the main control system allowing for changing set points following the grower's recipe.



Desired temp and RH operating point dictates how hard the chiller has to work to extract the condensate.

