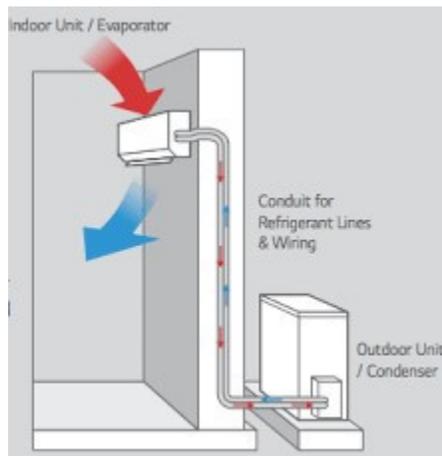


DX with Standalone Dehumidification



Pros



Low cost.



Smaller size (split units) common.
Installation requirements well understood.



Common, don't require significant building alterations.



Short lead times.



Cons



Lower life expectancy (3-10 years depending on selection) as they are designed for light commercial or residential vs industrial applications.



Higher maintenance costs as they are not intended for heavy duty operation.



Temperature and humidity fluctuations due to staged on/off operation and tendency for the DX units and DHU to "fight" each other and operate independently.



Usually less energy efficient than other options.



Many points of electrical connection required.



Electrical infrastructure costs may be greater due to large HVAC loads being spread throughout the building as opposed to being centralized at the plant.



Limited free cooling or economization options.



Requires additional standalone dehumidifiers.

2-Pipe Chilled Water aka hydronic cooling and dehumidification



Pros



Flexible air handling options (ducted, ductless, multiple sizes and configurations available).



Minimal indoor space requirements.



Usually results in lower overall electrical infrastructure than DX units.



Flexible air handling options can result in better room air homogenization.



N+1 redundancy possible at a minimal cost addition.



Ability to easily expand operations if phasing plan is identified ahead of time.



Flexible tonnage.



Share equipment between rooms without sharing air between rooms (great for flips).



Lower ongoing maintenance.



High longevity (~20+ years).



Significant economization (free cooling) options.



Cons



Initial expense can be slightly higher than packaged DX or split units.



More engineering work is required to design the water piping loop properly than simpler systems.



More complicated to install than most DX systems.

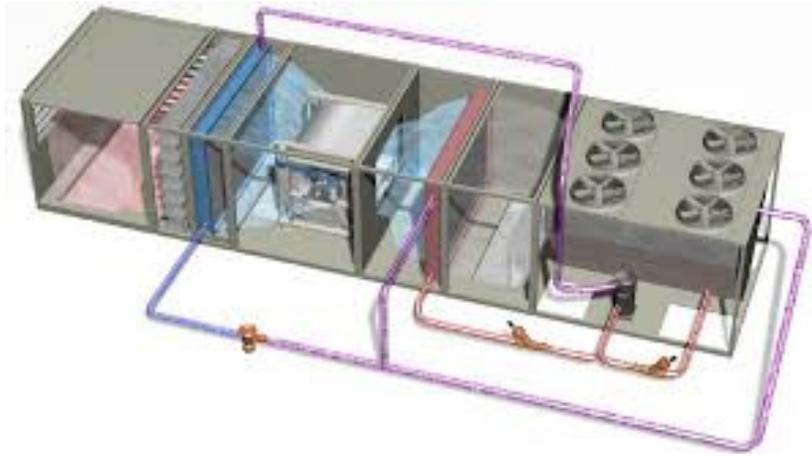


Requires a mechanical room in the building (small).



Standalone dehumidifiers are required.

Modulating Hot Gas Reheat



Pros



Doesn't use indoor space.



Easy to install.



Usually among the most energy efficient options.



Unit arrives packaged and ready to go with controls so it is "plug and play".



Supplemental standalone dehumidifiers not required.



Greater precision of climate parameters over standalone systems when modulating option is selected.



Cons



Highest equipment cost per ton (although overall installation costs may be less expensive than a chilled water system).



Requires duct work in grow space.



Lower life expectancy compared to other designs, 5-10 years in most applications.



Requires air to go outside of grow spaces which can pose an odor control or biological concern, or loss of CO₂.



Redundancy and its associated electrical infrastructure will be required to oversize every room's tonnage (as opposed to a chiller system that can provide similar redundancy at a lower overall tonnage).



Lacks ability to economize for energy as compressor cannot be turned off when it's cold outside.



Cannot benefit from flipped loads.



Lack of flexibility. If grow conditions change in the future, you "have what you have" and would need to purchase more equipment to accommodate the growth.



Can require specialized techs for maintenance.

4-Pipe Chilled Water



Pros



When connected to a heat recovery chiller plant, can recover heat from that process, rather than generating new heat through the consumption of electricity or natural gas.



Usually results in lower overall electrical infrastructure than DX units due to ability to share loads between rooms without sharing air between rooms.



Usually among the most energy efficient options.



Flexible air handling options (ducted/ductless, with multiple sizes and configurations available).



Long life expectancy if maintained properly (over 20 years).



Flexible biosecurity options (MERV/HEPA/UV/PCO).



Ability to economize via a dry cooler in colder climates saving significant amounts of energy by turning off the compressors in the system.



When controls are properly applied, flexibility to adjust to changing room parameters and insight into system operation (perfecting operation and troubleshooting where required) are unmatched.



Strongest precision of all options in varying conditions.



Cons



Controls and installation are more complex than other systems and may increase first cost.



Longer lead times for engineering and equipment production due to the complexity and custom nature of the design and machines themselves.



Not as common as DX units (usually utilized in true industrial applications).