Advantages of MagnaDRY® Technology

Coleman has a complete hot gas dehumidification product offering from 3 to 25-tons. MagnaDRY units have the ability to provide the temperature and humidity levels you need with a simple, competitive, energy efficient and reliable design. The Coleman MagnaDRY system combines a high efficiency heating/cooling unit with a “state-of-the-art” dehumidification system to:

- Provide superior dehumidification at wide range of OD temperatures
- Provides comfort by providing cooling and/or dehumidification when needed
- Does not overcool the space
- Reduce refrigerant transient time to less than 30 seconds with the MagnaDRY design
- Achieve steady state capacity and efficiency very quickly (competition up to 1 hr or longer)

Apex MagnaDRY 15-25 tons
Apex MagnaDRY 3-6 tons
Outfitter MagnaDRY 7.5-12.5 tons

Purpose of this document is to provide a sell story on the MagnaDRY product family. Use this document for the following:
1. The MagnaDRY selling story.
2. Technological advantages with the 3-6 ton MagnaDry system
3. Technological advantages with the 7.5-25 ton MagnaDry system

1. The MagnaDRY Selling Story:
For many facility owners, a conventional air-conditioning system creates a dilemma – you either get the temperature or the humidity level you want, but not both. Coleman now has a solution to this situation. The MagnaDRY system from Coleman uses proven technology to provide the temperature and humidity levels concurrently in one energy-efficient design.
Try to imagine the conditions of a cave. Cold and damp. A cave may be a nice place to visit, however, you would not want to live there. Neither would your customers. Conventional air conditioning systems are not designed to handle conditions when the temperate is moderate, but the humidity is high. In these cave-like conditions, users have only two options, and both are bad. They can either endure uncomfortably high humidity levels with a moderate room temperature, or they can lower the humidity level with the unwanted side effect of the space getting too cold.

The MagnaDRY Series units provide the answer for both issues. Instead of either-or, now you can meet temperature and humidity requirements with the MagnaDRY reheat series packaged units. Superior to conventional air-conditioning dehumidification, MagnaDRY units remove moisture and use a reheat mode of operation that doesn’t rely on expensive electric heat or natural gas. Because MagnaDRY can remove moisture without increasing sensible cooling, you can maintain temperatures and humidity within the comfort zone without significant added energy cost.

Conventional dehumidification systems reheat with natural gas or electricity, methods that aren’t acceptable under ASHRAE 90.1 energy standards. But thanks to innovative dehumidification technology, the MagnaDRY design meets the ASHRAE 90.1 energy standard. It’s the one specification that solves the temperature/humidity problem with an efficient, energy-saving design for a wide range of applications.

The key to utilizing the MagnaDRY reheat series units effectively is to understand the applications that best apply to the MagnaDRY. Two hurdles you will face include finding the right application and situation for applying the MagnaDRY unit, and second, how to sell the contractor or end user on why they should pay more for a MagnaDry unit, versus buying a conventional RTU. Let’s start by looking at the applications and situations that are perfect for applying this unit. The key will be to identify the situations while you’re in the field talking with customers or searching for new business.

**APPLICATION & SITUATION**

**Supermarket:** Cold case door fogs up when a customer opens the display door. A customer cannot see the food behind the door. The negative impact to sales is similar to what would be experienced if curtains were hung in front of all the items in the canned goods isles. Grocery store patrons will not buy what they cannot see. Additionally, the customer may keep the door open while making a buying decision, which wastes energy. In either event, the customer could limit their time in the frozen food section, resulting in lower frozen food sales.

**Dentist/Doctor’s Office:** Often times a large number of patients are in a small waiting room and it is creating uncomfortable high humidity levels and possibly causing window condensation and creating an atmosphere conducive to mold growth. The patients become irritable, and this only increases the tension in a room full of people who would rather be somewhere else. This ultimately makes the doctor or dentist’s job more challenging when dealing with irritable patients. The only solution the doctor/dentist has is to turn up the air conditioning, thereby decreasing the room temperature.
Printing Facility: Production lines slow down because the high humidity levels are causing the paper to stick together. The high humidity levels may prevent the ink on the paper from drying properly reducing the quality of the print. Downtime or reprinting is very expensive.

Art Gallery/Museum: A curator may be concerned that high humidity levels will damage valuable artwork, artifacts, and other valuable objects that may be sensitive to high humidity levels. The Art Gallery/Museum has a lot of money at risk and the humidity levels, with comfortable temperatures, are vital to the success of that establishment.

Fitness/Recreation Center: Excess humidity caused by body heat is causing the front windows and mirrors to fog up. Odor levels, mold, and bacteria growth increase with the increase in humidity, which makes for a very uncomfortable and uninviting place for patrons to work out. This may decrease the participation at the fitness/recreation center.

Locker Room: Showers and saunas increase humidity levels as well as create a damp feeling in the locker room. These hot, humid, and damp conditions are also perfect for mold and bacteria growth. Mirrors will also fog if the humidity levels are not dealt with properly. Patrons may find it hard to completely dry off before putting on their street clothes.

Food Production Line: An owner may have trouble with dry food products clumping in machinery due to high humidity levels. A donut production line applying glazing to the donut may have trouble packaging the donuts if the glazing does not dry properly. High humidity levels could also promote or increase mold or bacteria growth in food production facilities. This can be a costly problem that would be difficult for a conventional RTU to handle effectively.

Banquet Halls/Buffets: Restaurant owners may have problems with windows fogging due to excessive moisture levels from open food containers and high occupancy loads. Food odors may also linger, which negatively impact the customers experience at the facility.

Laundromat: The combination of heat and moisture from washer and dryers can cause the room to feel muggy and uncomfortable. High or uncontrolled humidity levels can also cause window and mirrors to fog.

Pharmaceutical Company: Production managers can have a difficult time keeping drug ingredients dry without overcooling. If production workers are cold, it could have an adverse affect on worker performance.

Summary: The perfect condition for using MagnaDRY is when the sensible load is low, and the latent load is high, as shown in the examples above. Remember to review the examples, similar to those mentioned above, when visiting your customers, in order to expand opportunities to assist in solving your customers problems.
2. Technological Advantages with the 3 to 6-Ton MagnaDRY system:

Figure 1: Cooling Mode

Figure 1 shows the piping diagram and refrigerant flow in the cooling mode for the 3 to 6-ton MagnaDRY unit. The 3 to 6-ton units utilize one evaporator coil and one condenser coil. In the cooling mode, solenoid valve #1 is closed, and solenoid valve #2 is open. Refrigerant flows from the evaporator coil to the compressor as a low pressure, low temperature vapor. After the compressor, the refrigerant becomes a high pressure, high temperature vapor and flows through the condenser coil. The refrigerant condenses back into a high pressure, liquid and flows between both upper and lower txv valves. The txv valves allow the refrigerant to flash back into a low pressure, low temperature refrigerant as it moves into the evaporator coil. The only difference with this unit and a conventional unit is that this unit has two txv’s versus only one txv. Refer to Figure 2 for the air flow in the cooling mode.
Figure 2: Airflow in the Cooling Mode

Figure 3: Reheat Mode

Figure 3 shows the piping diagram and refrigerant flow in the reheat mode for the 3 to 6-ton MagnaDRY unit. In the reheat mode, solenoid valve #1 opens, and solenoid valve #2 closes and the
upper txv is inoperable. Refrigerant flows from the Evaporator coil to the compressor as a low pressure vapor. After the compressor, the refrigerant becomes a high pressure, high temperature vapor and flows through the condenser coil. The refrigerant then condenses back into a high pressure liquid and flows through the lower txv valve. The txv valve allows the refrigerant to flash back into a low pressure, low temperature liquid as it moves into the evaporator coil. A measured portion of the hot gas flows through solenoid #1 and the top portion of the evaporator coil to equalize the system. In summary, the top portion of the evaporator coil is heated, while the bottom portion of the evaporator coil is overcooled. The hot air and cold air is then mixed by the blower. Refer to Figure 4 for the air flow in the reheat mode.

Questions that may arise:
1. **Will you get stratification?** The answer is no. Stratification will not occur because the air will mix at the blower downstream of the evaporator coil.
2. **Why put the cool part at the bottom of the evaporator coil and not the top part?** Because we ring moisture out of the air stream at the bottom of the coil into the drain pan. This prevents having condensation from running down over the hot portion of the coil.
3. **Will the bottom part of the coil freeze?** The 3 to 6-ton MagnaDry units are no more susceptible to freeze in the reheat mode than the competition.

Advantages with Coleman’s 3 to 6-ton MagnaDRY unit:
1. The performance of the 3 to 6-ton is equal to or better than the competition, but it uses only one coil.
2. Coleman’s Reheat unit has less copper piping, fittings, etc. than the competition which leads to a simpler design.
3. Coleman’s Reheat unit has less air resistance than the competition because it only has one coil versus two coils for the competition. This leads to less energy consumption from the fan because it
does not have to overcome the greater coil resistance. The resistance to air flow of a separate reheat coil is present even if the unit NEVER runs in reheat mode.

3. **Technological Advantages with the 7.5 to 25-Ton MagnaDRY System:**

![Diagram of the 7.5 to 25-ton MagnaDRY System](image)

**Figure 5: Cooling Mode**

Figure 5 shows the piping diagram and refrigerant flow in the cooling mode for the 7.5 to 25-ton MagnaDRY units. The 7.5 to 25-ton units use an evaporator coil, one reheat coil, and one condenser coil and are designed to operate in conjunction with separate AC only cooling system within the same unit. In the cooling mode, solenoid valve #1 opens, and solenoid valve #2 closes. Refrigerant flows from the evaporator coil to the compressor as a low temperature, low pressure vapor. After the compressor, the refrigerant becomes a high pressure, high temperature vapor and flows through the condenser coil. The refrigerant condenses back into a high pressure liquid and flows through the txv valve. The txv valve allows the refrigerant to flash into a low pressure, low temperature refrigerant as it moves into the evaporator coil. Where the cycle is repeated.
Figure 6: Reheat Mode

Figure 6 shows the piping diagram and refrigerant flow in the reheat mode for the 7.5 to 25-ton MagnaDRY unit. In the reheat mode, solenoid valve #1 closes, solenoid valve #2 opens, and the txv is inoperable. Refrigerant from the condenser coil flows back through solenoid #2, through the accumulator to the compressor. The reheat valve switches positions and the refrigerant, as a high pressure, high temperature vapor flows through the reheat coil. The reheat coil now acts as the condenser coil. The refrigerant now flows through the check valve and txv valve. The txv valve allows the low temperature, high pressure vapor to flash into a low pressure, low temperature liquid as it enters the evaporator coil. The change from cooling mode to reheat mode takes only a matter of seconds.