

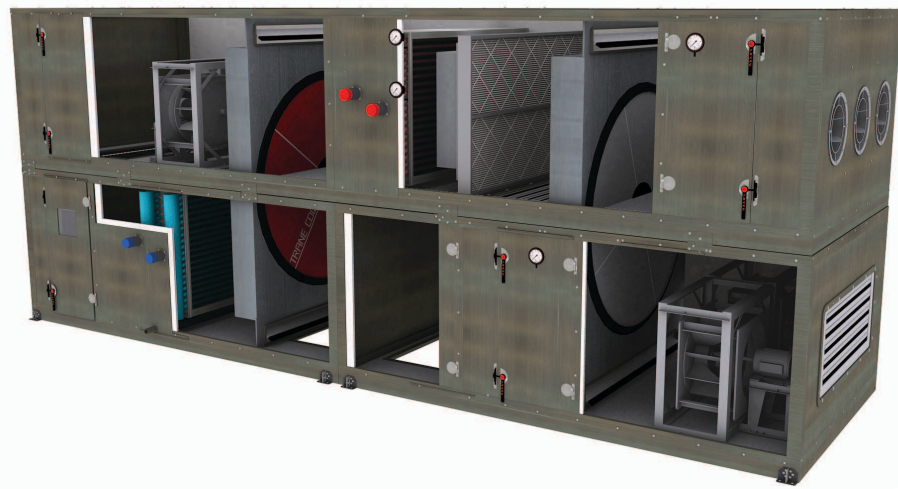


Dehumidification solutions

Effective moisture removal for indoor environments



Managing building moisture protects your biggest investment



Trane Performance Climate Changer™ air handlers are central to many energy-efficient dehumidification solutions. They are available with both a CDQ desiccant dehumidification wheel and an energy recovery wheel.

Quality HVAC systems that deliver consistent cooling and precision control are essential to the overall operations and health of most commercial facilities. Today, engineers and building owners increasingly consider the need for dehumidification a key design aspect of the HVAC system. The benefits are clear: moisture removal can improve indoor air quality (IAQ) and occupant comfort, while supporting facility operations and maximizing the life of your building, furnishings and equipment.

Trane dehumidification options help significantly reduce moisture-related damage and degradation to the facility and other assets, preventing peeling paint, odor problems and loss of structural integrity. From the moderate dehumidification requirements of typical office environments, to moisture-sensitive museums,

printing plants and surgical suites, our comprehensive approach offers solutions that are right for your facility and budget.

The challenge of removing moisture: humidity control vs. energy usage

Insufficient dehumidification can impact working conditions and contribute to serious moisture-related problems in virtually any building, regardless of the climate or location. The challenge is to control humidity, without driving up energy costs. The ideal dehumidification solution depends on a variety of factors. The building's function and occupant density determine target humidity levels and control requirements necessary to optimize operation and preservation of the building.

Maintaining relative humidity (RH) near 50 percent may be entirely sufficient for comfort cooling in a typical office environment. A surgical suite, in contrast, may require you to maintain around-the-clock RH levels at or below 50 percent, and at much lower temperatures.

Trane applies a variety of energy efficiency strategies ranging from affordable hot gas reheat, to variable-air-volume (VAV) dehumidification, to dedicated outdoor air systems to deliver precise humidity control.

Integrated solutions provide excellent environmental control

HVAC equipment selection should be based on your comfort and IAQ requirements, as well as first cost, energy usage and total operating costs. Dehumidification requirements should also factor into the design specifications for equipment and how the equipment is controlled. For example, a Tracer Summit™ building automation system may be specified to maintain different conditions in various spaces within your building. It can also provide trending data to track and document humidity levels over time.

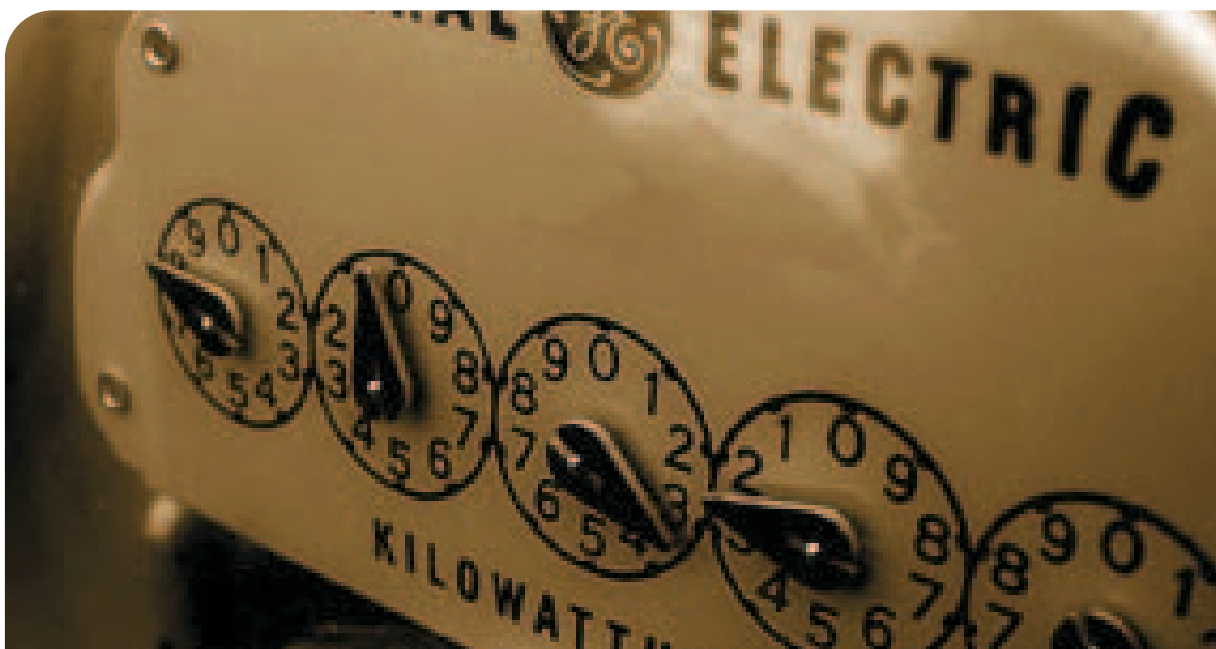
Successful HVAC design or modification considers system and component performance, efficiency, control and management of humidity sources. Dehumidification performance should be considered under both part- and full-load conditions. Even the right HVAC equipment may not be sufficient to maintain your targeted humidity levels. Proper control of the system is needed to achieve its full moisture removal capabilities.

Trane has the expertise to ensure that sensor placement, control sequences and other essential aspects of the design fully support facility requirements.

Address precise moisture-removal needs by applying these key principles:

- Isolate and address problematic moisture sources, such as seepage and/or leakage.
 - With many traditional systems, cooling results in some dehumidification, but humidity could be better controlled with new components and/or design modifications.
 - Basic constant-volume (CV) systems alone may not provide adequate dehumidification. CV systems should be enhanced or variable-air-volume (VAV) systems should be used for proper dehumidification.
- Performance is influenced by climate, building design, moisture-sensitive operations, building integrity and other factors.

Dehumidification consumes more energy than controlling temperature only. Minimize the amount of power used by taking advantage of the many solutions Trane offers for moisture removal. Your local Trane sales engineer can help you select the right option for your application.



Trane has the optimal moisture removal solution for every application



Trane CDQ system delivers breakthrough humidity control and energy efficiency

The Cool Dry Quiet (CDQ™) dehumidification system available in Trane Climate Changer™ air handlers was developed in collaboration with the U.S. Department of Energy (DOE) through the Oak Ridge National Laboratory, the Florida Solar Energy Center and Trane. This system employs a desiccant wheel in addition to direct-expansion (DX) or chilled-water cooling coils. After cooling and initial moisture removal via the coils, supply air is streamed over the desiccant wheel, which attracts and holds water vapor. When the air is regenerated upstream for a second pass over the cooling coil, additional moisture is removed.

Performance tells the story: a CDQ system improves the dehumidification capacity of standard cooling equipment from 20 to 300 percent, enabling a 5- to 15-degree lower dew

point. Equally important, a CDQ system can reduce energy consumption by up to 60 percent compared to a cooling coil with reheat.

All CDQ units have Trane unit controls and temperature/humidity sensors designed for its specific application. A Traq™ outside-airflow monitoring sensor and fan inlet-airflow measuring system with a piezometer ring are optional. Note: this unit may qualify for LEED® innovation points.

Trane air handlers with CDQ dehumidification and energy recovery wheels save energy, space and costs

Trane air handlers can include both a CDQ desiccant dehumidification wheel and an energy recovery wheel for thermal savings. These units are cataloged 100 percent dedicated outdoor air units or mixed-air units.

Removing moisture from the air before it enters the building improves indoor air quality. It also enables the use of terminal devices, such as variable refrigerant flow heat pumps and chilled beam panels, that are best applied when sensible only cooling is needed in the space.

Note: this unit may qualify for LEED innovation points.

Trane packaged units deliver cost-effective moisture removal

Trane offers solutions for moderate dehumidification needs as well as high-demand applications. The Trane Precedent™ and Voyager™ lines of light commercial units give you reliable dehumidification plus packaged unit convenience and affordability. Sized up to 20 tons, Precedent and Voyager rooftop units provide effective indoor climate control for a broad range of facilities. Equipped with hot-gas reheat, these cost-effective units will also fulfill your dehumidification needs.

Split Dehumidification Units (SDU)

An SDU is a dual-path, return-air-bypass air handler. It consists of two units that are stacked together in a draw-thru arrangement that share one supply fan. All of the ventilation (outdoor) air is ducted to the upper unit where it is dehumidified, typically down to 50°F or lower.

The lower unit is sized to handle the return air needed to achieve the desired air-change rate in the space. The warmer return air in the lower unit mixes with the cooler, air from the upper unit. The resulting mixed air provides humidity control by achieving a sensible heat ratio (SHR) of down to 0.4, yet provides sensible reheat without using any new energy.

Runaround coil loops

Runaround loops are a proven technology that provide some dehumidification with minimal additional energy.



CDQ technology improves the dehumidification capacity of a standard cooling coil from 20 to 300 percent, enabling a 5- to 15-degree lower dew point, and reduces energy.

Trane combines innovation and expertise to provide optimal dehumidification solutions

Trane sales tools such as TOPSS™, Climate Changer Configurator (CCC™), and Trace 700™ allow you to design your HVAC system with specialized components and controls for moisture removal. This strategy may include over-cooling supply air for dehumidification prior to reheating to the target temperature, or the use of active desiccant systems for more demanding applications. A full range of solutions enables you to match performance requirements with first cost and operating costs to achieve your targeted results.

By applying different components and strategies, energy usage can change significantly. Your local Trane sales engineer can help you forecast total energy consumption for all components, including fans and pumps, as well as heating and cooling units. Whether you need an optimal comfort and dehumidification solution for your new facility, or an upgrade to existing system performance, leveraging Trane expertise will help you gain the desired results.

The CDQ system can be applied in applications that require active humidity control. Benefits you can expect to gain over cool-reheat units include:

- Higher latent capacity per ton of total capacity
- Lower achievable supply-air dew point
- Reduced reheat energy
- Quieter operation

Very low humidity controlled spaces

In very low 35- to 45-percent relative humidity applications, the air handler supply-air dew point needs to be in the 25°F to 40°F range. Enhanced CDQ units can achieve these levels without using complex and expensive gas heat regenerated desiccant wheels, glycol chillers or refrigeration defrost DX systems.

Low humidity controlled spaces

In spaces with relative humidity of 55- to 60-percent, the space dew point will be in the 40°F to 57°F dew point range. A CDQ unit, with increased latent capacity and lower SHR, can match sensible and latent output to the space at full- and part-load. The result: tighter humidity control with reduced energy use and less noise.

For more information, contact your local Trane sales engineer, or go to www.trane.com/cdq.



Dry storage/archives

Spaces used for dry storage and archiving require very little ventilation air to be introduced. The challenge for humidity control is keeping the space humidity at the desired low level. Since the mixed-air relative humidity is low, the CDQ desiccant wheel will be operating at its most efficient conditions to help lower the supply-air dew point. This will raise the required coil temperature and also lower the need for reheat.

Hospital operating rooms

Operating rooms should be at a low relative humidity (35-to 55-percent RH) and cool (60°F- 68°F). This is an excellent application for CDQ units. The improved latent capacity not only reduces the amount of cooling required but the supply-air dew point can eliminate the need for a secondary refrigeration coil or a heat-regenerated active desiccant system. Active desiccant systems provide hot air, which require a significant amount of post-cooling, therefore using a CDQ system can result in significant energy savings.

Laboratories

A CDQ system can help achieve the lower relative humidity levels that are required in many laboratories. Because the exhaust air often contains contaminants, total energy (enthalpy) recovery from the exhaust air is usually not permissible. A CDQ system can improve energy efficiency and latent removal from air to the space without the need for exhaust air stream.

Trane CDQ™ applications

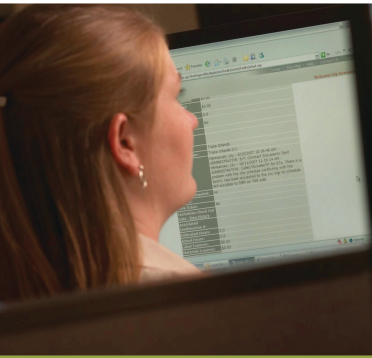
Strict temperature and humidity control is essential for preservation of valuable historical materials. This installation at the Lincoln Library uses Trane CDQ technology to provide precise environmental control. Trane air handlers and controls were selected to maintain consistent, dependable humidity set points throughout the building.



Schools and colleges

Space latent load in classrooms can be high year-round due to high occupancy levels. This results in a lower SHR at part-load conditions. A CDQ air handler can help you achieve the higher latent capacity that is needed in classrooms. The system can be either constant volume or variable air volume (VAV). Humidity levels in schools can elevate when the buildings are unoccupied. The same air handler can be used as a recirculating dehumidifier to keep the humidity levels under control during unoccupied hours.

Trane HVAC equipment and strategies for your moisture removal needs



Trane Climate Changer air handlers provide numerous pre-engineered and tested options for moisture removal needs.

Dedicated outside air units

- Custom Climate Changer™ air handler
 - with CDQ dehumidification wheel
 - with energy recovery wheel
- Performance Climate Changer™ air handler
 - with CDQ dehumidification wheel
 - with energy recovery wheel
 - with CDQ and energy wheels
- T-Series Climate Changer™ air handler
 - with energy recovery wheel
- Commercial self-contained system ventilator
- Vertical and horizontal unit ventilators
- Fan-coil air conditioners
- Blower coil air handler
- Axiom™ water-source heat pumps

Mixed-air cooling units with coincidental dehumidification

Mixed-air cooling units with controlled dehumidification

- Custom Climate Changer air handler
 - with CDQ dehumidification wheel
 - with energy recovery wheel
 - with split dehumidification unit (SDU)
- Performance Climate Changer air handler
 - with CDQ dehumidification wheel
 - with energy recovery wheel
 - with SDU
- T-Series Climate Changer air handler
 - with energy recovery wheel
- Packaged Climate Changer™ air handler
- Precedent™ rooftop unit with reheat
- Voyager™ rooftop unit with reheat
- IntelliPak™ rooftop unit
(sales order special for reheat)
- Performance Climate Changer air handler
 - with CDQ dehumidification wheel
 - with energy recovery wheel
 - with SDU
- T-Series Climate Changer air handler
 - with energy recovery wheel
- Packaged Climate Changer air handler
- Precedent rooftop unit
- Voyager rooftop unit
- IntelliPak rooftop unit
- Commercial self-contained system ventilator
- Vertical and horizontal unit ventilators
- Fan-coil air conditioners



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