



DRY-O-TRON **Dectron**



DRY-O-TRON[®]

Indoor Pool
Design Guide
Design &
Dehumidification

Index

DECTRON, a Leading Manufacturer of Energy Recycling Dehumidifiers and Pool Water Heaters. Creators of Engineered Environments for Indoor Pools and Whirlpools.	Overview	03
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HyPoxy® Coated Coils
DRY-O-TRON® Quality

DRY-O-TRON® for the ultimate indoor pool environment



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Overview

Congratulations!

With Dectron's Indoor Pool Design and Dehumidification brochure, you have taken the first step towards creating a state-of-the-art indoor pool environment.

Dectron, a HVAC industry leader, has been manufacturing innovative dehumidification equipment that recycles energy and conserves pool water for nearly 25 years. Saving costs and protecting the environment have been Dectron's guiding philosophies from the day the first DRY-O-TRON®, the original energy recycling dehumidifier, was designed.

A True Leader

Dectron has been pioneering advances in natatorium design and dehumidification since its first installation in 1977. The company's direct involvement with the engineering community through ASHRAE (American Society of Heating, Refrigeration and Air Conditioning Engineers) has led to major upgrades in ASHRAE natatorium design guidelines. In fact, Evaporation Rates are now calculated based on the model developed by Dectron. The company has also worked to help develop an industry standard for dehumidifier performance.

This brochure contains valuable design guidelines based on Dectron's extensive knowledge and experience in solving humidity control problems in over 10,000 indoor pool installations. Dectron Inc., the company that invented the DRY-O-TRON®, is dedicated to providing state-of-the-art design, engineering and quality products.

Quality Control

Dectron has set the industry's Quality Control standard. Every DRY-O-TRON® is fully tested in one of the company's four test chambers, which can generate the same amount of moisture as any pool environment. Under these full load conditions, the units are performance tested and adjusted to operate at the exact conditions of your facility. No other manufacturer in the industry can give you this assurance and peace of mind. Furthermore, a copy of each test report is available for review by the customer at any time. In fact, Dectron welcomes visits from customers interested in witnessing the testing of their unit.

All Solutions

Dectron has long established itself as the company that can do it all. Their ability to offer the widest selection of unit sizes and configurations in the industry explains why the DRY-O-TRON® brand name has become synonymous with quality, reliability and energy savings. All other manufacturers combined do not offer the selection available from Dectron.

The DRY-O-TRON® is only one of several key components in the natatorium environment control system. In order for a pool enclosure to be comfortable and condensation free, the following areas must be addressed by the owners, together with the contractor, engineer and architectural design team:

- Humidity Control
- Indoor Air Quality
- Air Distribution
- Duct Design
- Outdoor Air Requirements
- Exhaust Air Requirements
- Heating Requirements
- Cooling Requirements
- Condensation Protection
- Pool Water Chemistry

A dehumidifier alone isn't enough!

The DRY-O-TRON® line of products encompasses an extensive array of standard systems for industrial, commercial and residential applications. Dectron also offers the services of its skilled sales, engineering, manufacturing and technical staff for custom-engineered projects.

All Dectron indoor pool products incorporate the company's latest high-tech advances, such as microprocessor control, specially painted enclosures and HyPoxy® coated coils.

DRY-O-TRON®'s special HyPoxy® coated coils accelerate the draining process of entrained moisture and also act as a protective barrier for the finned surface. The HyPoxy® coating also enhances performance and extends coil longevity.

25 Years Old and Still Going Strong*

Reinhold Kittler (left), inventor of the DRY-O-TRON®, has reason to smile with home owner Michel Rheume. Rheume owns Dectron's first DRY-O-TRON® dehumidifier, which is still running after over 220,000 hours of continuous operation.

"All I've had to do over the past 25 years is to change the filters and belts. It is an amazing piece of equipment," stated a pleased Rheume when receiving an award commemorating the event.



* Story appeared in Air Conditioning, Heating & Refrigeration News, HVAC/Refrigeration Edition and NOW Publications.

Why Do It Right?

For nearly a quarter of a century Dectron has been involved in all aspects of indoor pool design. An indoor pool is truly a unique facility in that its level of end-user satisfaction is inversely proportional to the number of compromises made in the design. A good design will have better overall performance and lower operating costs over the facility's lifecycle.

Why do it right?

Simple. It is the most cost conscientious method of pool design and the only way to ensure 100% customer satisfaction. To do this, the following issues must be addressed by the design team:

- Air Quality
- Comfort
- Mold, Mildew and Corrosion
- Operating Costs

Indoor air quality is affected by several key factors including relative humidity, air distribution, outdoor air and water chemistry. The type of building being designed to house the pool will have an impact on each of these factors.

The relationship between relative humidity and indoor air quality is well documented. High relative humidity levels inside a building are well-known for their destructive effects on building components and can pose serious health concerns. They facilitate the growth of mold and mildew which, in addition to being unsightly, can attack wall, floor and ceiling coverings, while their spores can adversely impact the air quality. Condensation can also degrade many building materials.

Human comfort levels are very sensitive to relative humidity. Fluctuation of relative humidity outside the 40%-60% range can result in increased levels of bacteria, viruses, fungi and other factors that reduce air quality and lead to respiratory problems. (See 'Health Factors Vary with Relative Humidity' chart on this page).

The consequences of high humidity in indoor pools can be catastrophic. Besides being detrimental to health, there are many incidents on record of major damage, including roof collapse, as a result of the corrosive effects of water condensing within a building's support structure.

The operating costs of an indoor pool facility are most impacted by three factors:

- Operating Temperatures
- Building Construction
- Air Velocity on the Pool Water

The water temperature, air temperature and relative humidity desired by an owner will determine the size of the DRY-O-TRON® and the heating/cooling needs of the facility. A typical indoor pool is kept warmer than a regular room. Consequently the heating requirements are greater than average while the cooling requirements are slightly less.

The type of building chosen to house the pool will significantly impact the cost of the mechanical system. An all-glass structure is the most expensive to heat and cool due to the poor insulation characteristics of glass, while a windowless room is cheaper. Additionally, a large number of windows requires great care in the air distribution system to keep them condensation-free in cold weather.

The relationship between air velocity and the evaporation rate varies. The air velocity at the pool water surface increases the evaporation rate. A balance must be established in order to maintain desirable air quality at the water's surface while not generating too much load for the dehumidification system.

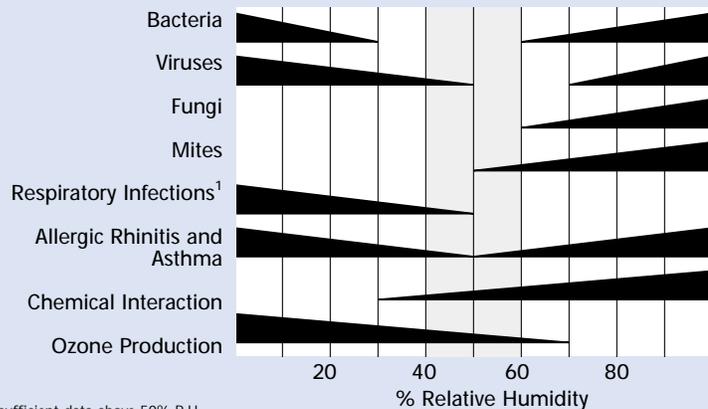
One of the best solutions is to use the DRY-O-TRON® Environment Control System, in which the specialized mechanical dehumidification system is tailored to the specific application.

A well-designed dehumidification system will not only control humidity, but will recycle energy efficiently. Every DRY-O-TRON® features patented energy recycling, which provides simultaneous and continuous energy recovery and energy recycling for pool water and air heating.

Health Factors Vary with Relative Humidity

Decrease in bar width indicates decrease in effect

Optimum Zone



¹ Insufficient data above 50% R.H.

Study by Theodore Sterling Ltd., A. Arundel Research Associates and Simon Fraser University



Frequently Asked Questions

Suspended Ceilings

Why are suspended ceilings not recommended?

They create an unconditioned space that is prone to condensation and corrosion problems.

Pools with suspended ceilings are notorious for corroded hardware ('T' bars and hangers) and condensation soaked tiles falling into the pool.

Skylights

Why are skylights not recommended?

They are prone to condensation problems in colder weather.

The quantity of supply air (3-5 CFM per ft² or 15-25 l/s per m² of glass) required for condensation control must be sufficient to blanket the entire skylight. Visible ductwork is required to supply this air to the skylight and can cause concerns about aesthetics with the owner.

Duct Design

How important is duct layout?

It is absolutely vital. The total quantity of supply air must be sufficient to provide four to eight air changes per hour (as recommended by ASHRAE) to prevent stagnation and air stratification. Care must be taken to ensure the entire space receives the required amount of air flow and to prevent supply air from short-circuiting to the return inlet.

Heating Whirlpools

Can a DRY-O-TRON® be used to heat a whirlpool?

The economics of this option make it a good investment, but only for larger whirlpools. A suitable whirlpool is one that represents more than 25 percent of the total evaporation from all pools.

Swim Meets

What special design concerns must be addressed?

A pool that will host swim meets has essentially two modes of operation: normal and swim meets.

A swim meet generally has a very large spectator load while the pool swimmer density is less than during normal operations. The Activity Factor for a swim meet should be 0.65 whereas in normal operation it would be 0.8-1.0, (as per the "Activity Factor" table on page 17).

The designer should review computer models of each mode to ensure that the size of the selected unit is appropriate for both.

Pool Covers

Are they recommended for daily use?

Experience shows that unless a pool cover is automatic, it will not be routinely used. A pool cover is important to have at a facility in the event of a power failure when the DRY-O-TRON® is not able to run.

The use of a pool cover however, does not affect the size of the DRY-O-TRON® required since it is sized for the load presented by the pool when in use.

Condensate

What should be done with the condensate that comes from the unit?

The amount of condensate a DRY-O-TRON® recovers in a year is approximately the equivalent of one entire pool fill. The condensate from our HyPoxy® coated coils is drinking water quality and can be returned to the pool where local codes permit. It is usually reintroduced upstream of the filter or into the skimmer.

Cooling

What if more cooling is required than the unit can provide?

If the DRY-O-TRON® selected has a capacity close to the minimum required, a unit one size larger would be the most cost effective solution.

If the cooling requirement is significantly more than the selected DRY-O-TRON® supplies, the difference can be made up by a separate cooling circuit added either to the DRY-O-TRON® or in the duct.

Air Direction

Should air blow at the water surface?

Air movement at the water surface increases the evaporation rate. The U.S. Olympic Committee (USOC) does however recommend some air movement at the water surface for its facilities because a slightly higher concentration of chlorine (compared to the rest of the space) tends to remain there. The USOC also likes air to be supplied to the water surface to help improve the air quality where the swimmers breathe.

Return Air

Should the return air inlet be near the spa?

This is not recommended. The air around the spa has the highest concentration of chloramines and is the most corrosive air in the space. This could reduce the lifespan of the ductwork and equipment. An exhaust fan near the spa is recommended.

Wet Deck

Why use wet deck area in lieu of total deck area to calculate the outdoor air requirement?

The purpose of outdoor air is to dilute the chemicals evaporating from the pool water. A section of deck that will never get wet does not contribute to air quality issues. As outdoor air is expensive to heat, cool and dehumidify, designing the outdoor air requirement to match the wet areas is a means of reducing the operating costs of the facility.

Duct Material

What duct material is recommended?

The recommended duct material is standard galvanized sheet metal, aluminum, 316-grade stainless steel or fabric duct. Painted galvanized spiral ductwork is popular when the duct is exposed. The entire ductwork system must be designed to be dry at all times, and all seams must be sealed with an approved duct sealant.

If a below-grade duct system is used, non-metallic or PVC-coated round metal ductwork should be used.

Duct Insulation

Is it required?

If the ductwork is located in unconditioned areas (normal temperatures are 65°F-90°F (10°C-32°C)), it should be insulated with at least two-inch (5 cm) fiberglass duct wrap on the outside of the duct. This will prevent condensation and heat gain/loss.

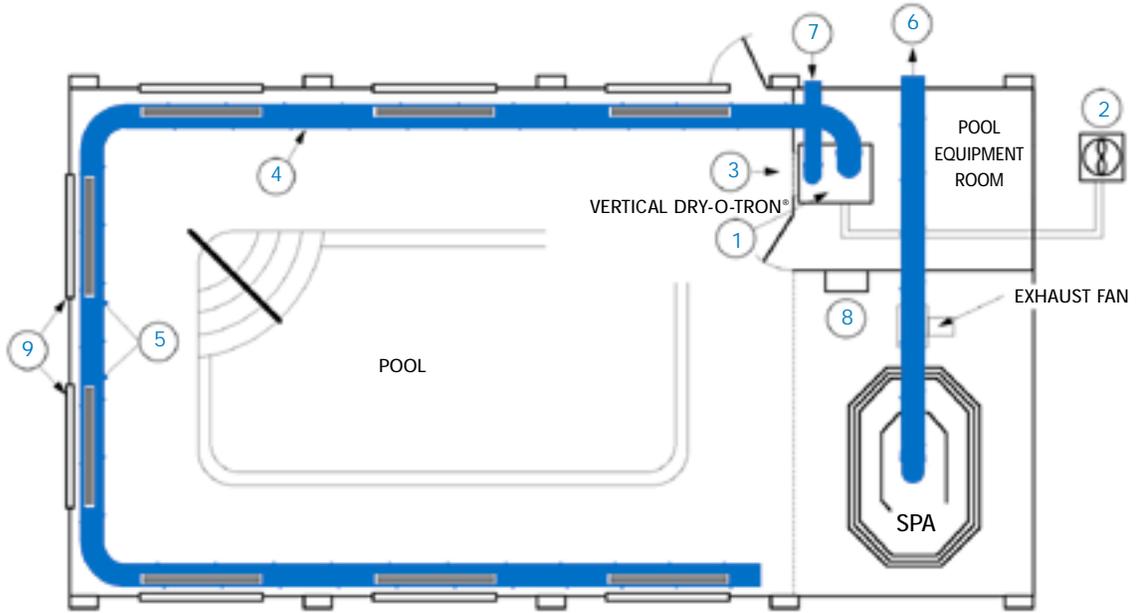
Small Rooms

What is recommended for a room with only a therapy pool or whirlpool?

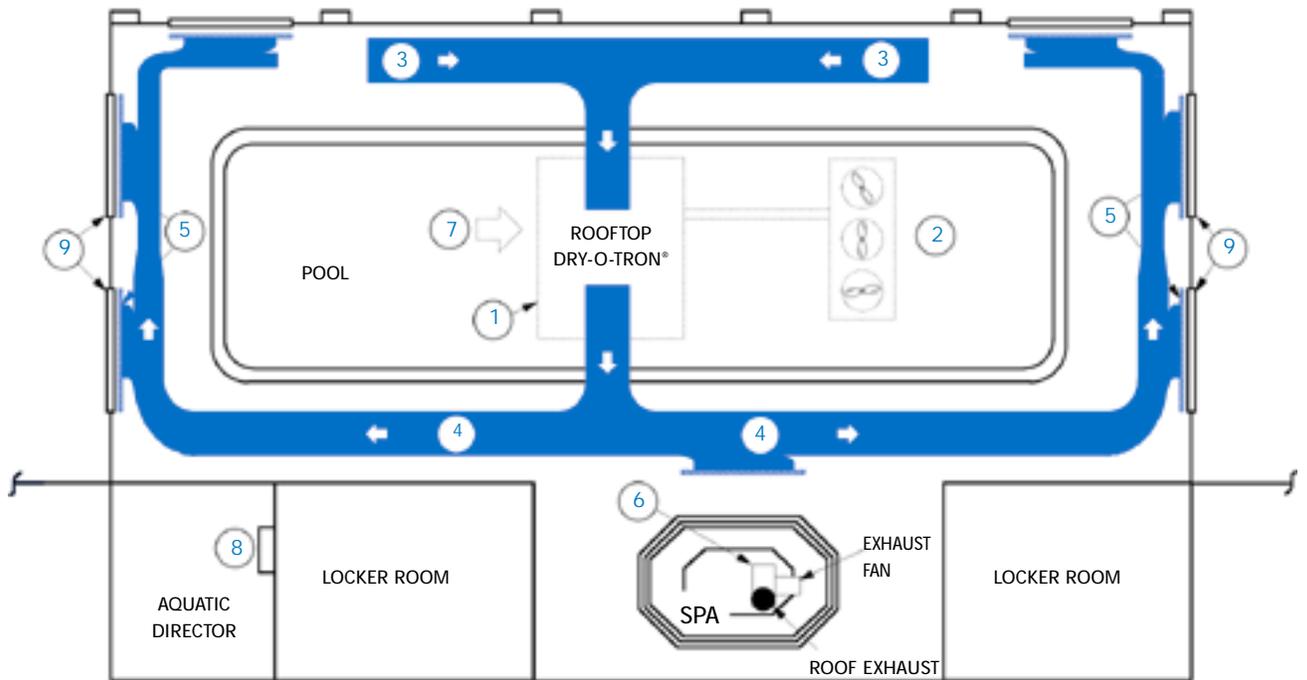
These smaller rooms are common in hotels and physical therapy clinics. The small dehumidification load and lower air flow requirement is an ideal application for Dectron's MAM Series. Contact your local representative for additional information.

Air Distribution & Design

Typical Hotel/Residential Installation



Typical Institutional Rooftop Installation



Proper air distribution in a natatorium is critical to ensuring proper system performance and space conditions.

Key to page 6

1. DRY-O-TRON®

Good air starts here. Proper selection and location of the DRY-O-TRON® ensures ideal system performance. There are many styles and options to choose from in order to allow the designer the best solution for the facility's specific needs.

2. Outdoor Condenser

The condenser should be located as close as possible to the DRY-O-TRON®. Water-cooled and glycol-cooled configurations are also available to reduce total system refrigerant charge.

3. Return Air

The location of the return air grille should optimize the overall air flow pattern of the facility. The goal is to ensure all areas receive enough air movement.

4. Supply Duct

Air distribution must be arranged to ensure all areas of the room receive proper air turnover. If overhead ductwork is used, ensure the air reaches the deck level to avoid stratification. All exterior glass must be fully covered by supply air.

5. Linear Diffusers

Supply air should be focused on exterior surfaces prone to condensation. 3 - 5 CFM per ft² (15 - 25 1/s per m²) of exterior glass is a good rule of thumb. The diffuser should be designed to fully cover the entire surface of all exterior windows.

6. Exhaust Fan

The location of the exhaust fan is flexible. It can be mounted in the DRY-O-TRON® or in the space. However, when the space has a spa or whirlpool, the exhaust fan should be located directly above it. This expels the most chlorine-laden air before it can diffuse into the space and negatively impact the room air quality. There are two types of exhaust: minimum exhaust and purge exhaust.

7. Outdoor Air

The DRY-O-TRON® is configured to have outdoor air introduced at a factory-supplied opening. Units can have an outdoor air opening with a filter and balancing damper. Motorized dampers and time clocks are available to control damper operation.

8. Microprocessor

The remote operator panel should be located where the operator has easy access to the DRY-O-TRON®'s brain. The panel can either be mounted in the pool room or anywhere else that the operator prefers.

9. Exterior Windows

Windows and glass doors on an indoor pool's exterior walls present a special challenge to the natatorium designer. Exterior glass is especially susceptible to condensation when the outdoor temperature is low (see pages 12 & 15).

Dectron

Creating the Rules of Pool Design

Dehumidification Load

Water temperature, room temperature, relative humidity, activity level, spectator numbers and outdoor air dictate the load.

Exhaust Air

ASHRAE recommends the room be maintained at 0.05-0.15" WC (13-37 Pa) negative pressure relative to surrounding rooms. Ten percent more exhaust air than outdoor air is a good rule of thumb.

Cooling & Heating

Outdoor air must be included in these load calculations.

Total Supply Air

ASHRAE recommends 4-6 air changes per hour for non-spectator pools and 6-8 air changes per hour for spectator facilities.

Required Access Space

Mechanical room access is critical for proper maintenance, service and duct design.

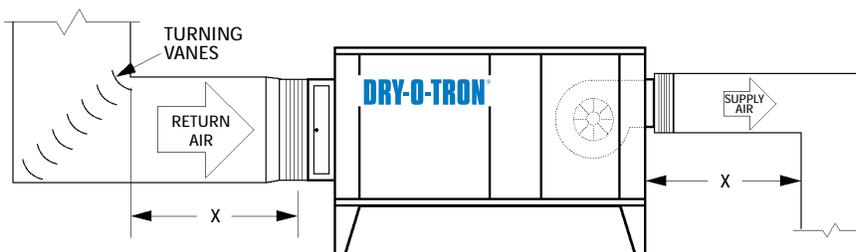
Outdoor Air

ASHRAE Standard 62-1999 recommends 0.5 CFM/ft² (2.5 1/s per m²) of pool and (wet) deck area and 15 CFM (7 1/s) per spectator. Dectron recommends that the larger of the two be used.

No Condensation Allowed

Proper air distribution and vapor retarder installation are crucial.

Duct Connections to DRY-O-TRON®



Note: Never compromise the return air duct connection as it negatively affects the performance of the entire unit. The supply air duct connection affects the performance of the blower. (See Industrial Ventilation, American Conference of Governmental Industrial Hygienists, section: Fans-systems effects.)

Model	X (ft)	X (m)
010-060	3	1
080-282	5	1.5
362-562	7	2.2

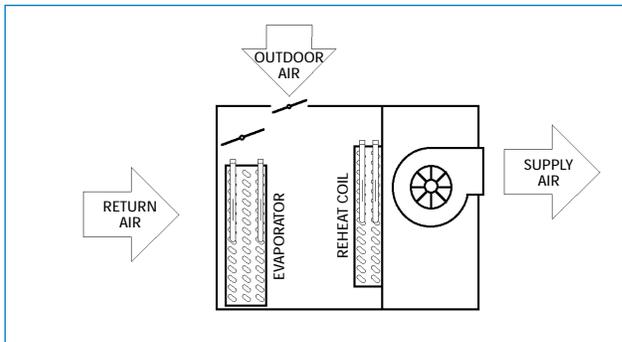
Note: Top or bottom air discharge is also available on all units.

Unit Configurations

State-of-the-Art Configurations for All Facilities

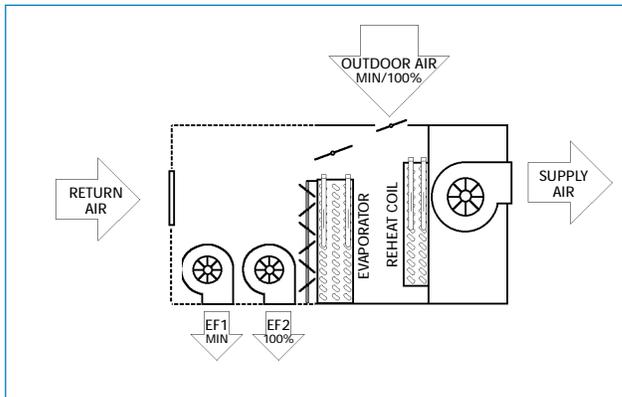
DRY-O-TRON® Feature Chart				
Configuration	Exhaust Air	Outdoor Air	Heat Recovery	Initial Cost
Conventional	Remote	Minimum	Compressor	Lowest
Purge	Min./100%	Min./100%	Compressor	Medium
Econosaver	Minimum	Minimum	Compressor	Medium
Economizer	Min./100%	Min./100%	Compressor	High
Smart Saver	Minimum	Minimum	Coils & Compressor	High

CONVENTIONAL UNIT



1. Ideal for hotels, therapy pools and residential pools.
2. Outdoor air opening sized for minimum code requirement. Filter and manual balancing dampers standard, with optional motorized dampers and 7-day time clock available (size: 040 and up).
3. Remote exhaust fan (over whirlpool, where applicable).

PURGE MODE

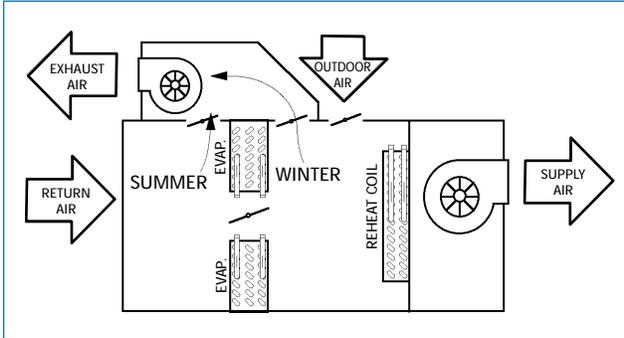


1. Ideal for facilities requiring frequent water shocking (superchlorination).
 2. Exhaust fans can be unit mounted or remote.
- | 3. Mode | EF1 | EF2 | OA | Face & Bypass |
|---------|-----|-----|------|---------------|
| Normal | On | Off | Min. | Open |
| Purge | On | On | 100% | Closed |
4. Motorized control of outdoor air, and face and bypass dampers.



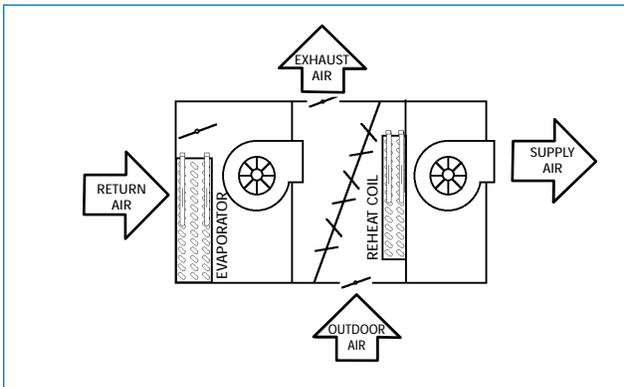
State-of-the-Art Configurations for All Facilities

ECONOSAVER



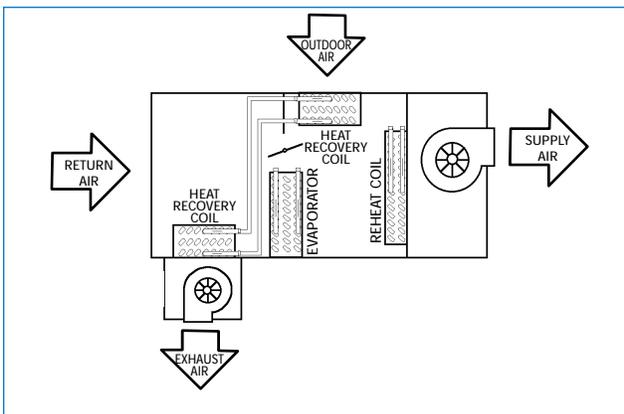
1. Ideal for systems requiring unit mounted air exhaust.
2. Heat recovery is accomplished with a compressor. Air is exhausted before or after the evaporator as seasonally appropriate.

ECONOMIZER



1. Ideal for areas with weather mild enough for Economizer operation.
2. Unit has ability for full purge mode.
3. Standard 7-day time clock, exhaust damper, mixed air damper and return air damper.

SMART SAVER



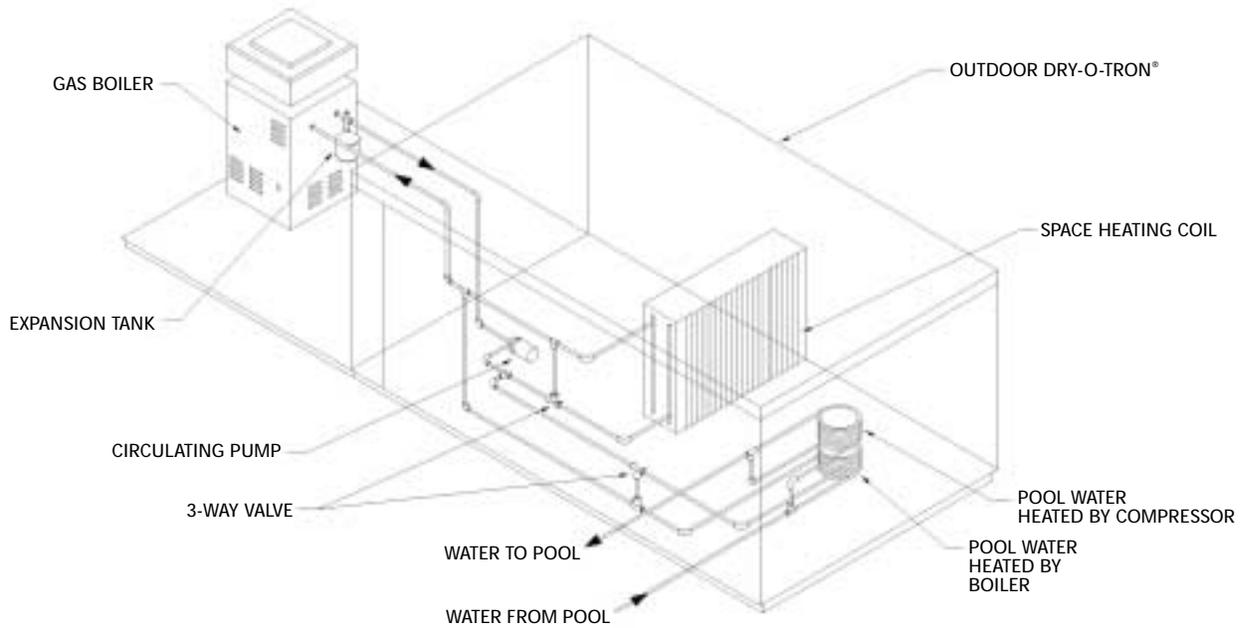
1. Ideal for colder climates where significant reduction in space heating is realized from heat recovery option.
2. Passive heat recovery device. Ideal for the harsh pool environment.
3. Recovers heat even when compressor is off.
4. Can be combined with purge mode.

Unit Configurations

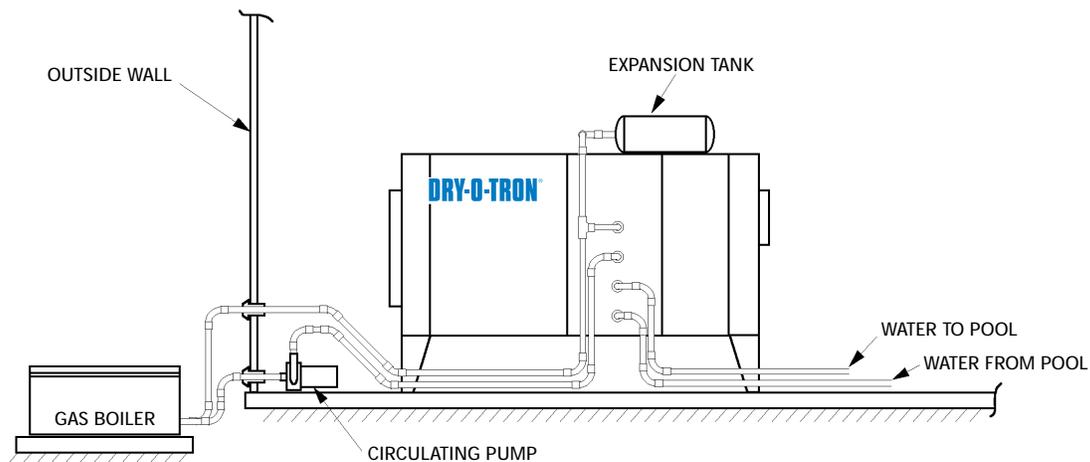
Gas Boiler Package for Space and Water Heating

Dectron has the industry's best solution for gas heating in a natatorium. The boiler package ensures absolute protection from cross-contamination and corrosion from flue gases. The boiler heats a secondary fluid circuit which circulates to a unit-mounted space heating coil and/or the auxiliary pool water heater resulting in a complete packaged environmental control solution.

OUTDOOR CONFIGURATION DRY-O-TRON®



SPLIT/INDOOR CONFIGURATION DRY-O-TRON®



Pool Water Chemistry

Pool water quality concerns not only human health and comfort, but also affects the space air quality and performance of the mechanical equipment.

The owner/operator of the natatorium is responsible for maintaining proper pool water chemistry.

Failure to maintain proper pool water chemistry will result in several on-site problems:

- Air Quality Complaints
- Corrosion
- Costly Maintenance
- Reduced Equipment Life

Codes require that a separate, ventilated space **MUST** be provided to store pool chemicals. **DO NOT STORE POOL CHEMICALS IN THE MECHANICAL EQUIPMENT ROOM!**

Foul Odors in the Pool Area

The powerful, stinging smell that is often associated with indoor pools is not the smell of excess chlorine in the water, but of chloramines. They are a product of insufficient chlorine and can result in high levels of bacteria, fungi, viruses, etc. in the pool.

Maintaining proper chlorine levels and constant pH levels will eliminate the foul odors.

Airborne chloramines also have a strong affinity to pure water such as condensate. Stagnant condensate in walls and on windows can accumulate considerable amounts of chloramines, which can make the condensate acidic and corrosive. The prevention of condensate coupled with proper pool water treatment will reduce this problem.

pH Levels

High pH levels (alkaline range) encourage scale formation, which damages pool water heaters. With low pH levels, the water is acidic and corrosive, and may damage the metal parts in pumps and water heaters.

Maintaining pH levels between 7.2 and 7.6 will ensure a long life for your pool equipment.

Water Exchange Rates

Adequate water exchange rates are necessary to prevent the buildup of bio-wastes and their oxidation products. High concentrations of dissolved solids in water have been shown to directly contribute to high combined chlorine (chloramine) levels.

Pool water test kits must be able to accurately monitor:

- pH Levels
- Total Alkalinity
- Free Chlorine
- Combined Chlorine
- Dissolved Solids
- Total Hardness

Corrosion

Unbalanced pool water chemistry leads to health problems and the deterioration of the pool building and equipment. Conversely, a well maintained pool with proper water treatment and sufficient make-up air offers a healthy environment that will not cause damage to the users, mechanical equipment or the structure.

Although it stands to reason that every pool operator does the utmost to create and maintain an optimum environment for patrons and equipment, mishaps do occur. Both swimmers and equipment have been endangered by exposure to abnormal chemical levels as a result of inaccurate pool chemical treatment or chemical spills.

Dectron has taken all possible commercially feasible precautions to protect its DRY-O-TRON® units against the corrosion caused by accidentally high chemical levels. This means that the equipment is resistant to unbalanced pool water (high or low pH levels) and airborne oxidizing agents, such as chloramines, for a short period of time.

Major corrosion protection features include:

- Vented cupro-nickel heat exchanger water heater circuit
- HyPoxy® coated fins on dehumidifying and reheat coils
- Coating of exposed copper tubing and steel parts, such as the blower shaft
- Use of plastic, cadmium-plated steel, brass and/or stainless steel hardware wherever possible
- High-quality painted cabinet

Pool Water Chemistry Parameters Suggested by NSPI*

	Pools		Whirlpools	
	Desirable Range	Action Level	Desirable Range	Action Level
pH	7.4 - 7.6	N/A	7.4 - 7.6	N/A
Alkalinity	80 - 100 PPM	N/A	80 - 100 PPM	N/A
Free Chlorine	2.0 - 3.0 PPM	N/A	3.0 - 4.0 PPM	N/A
Combined Chlorine	0 PPM	0.1	0 PPM	0.1
Dissolved Solids	100 - 300 PPM	1500	100 - 300 PPM	1500
Total Hardness	225 - 250 PPM	N/A	175 - 275 PPM	N/A

* National Spa and Pool Institute

Condensation & Building Damage

The architect and contractor must coordinate with each other to make certain the building is appropriate to enclose an indoor pool. Suitable materials and construction are crucial to ensuring the building envelope will perform properly.

The pool enclosure must be suitable for year round operation at 50% to 60% relative humidity and built as per the latest building codes.

Check the pool enclosure design (exterior walls and ceilings) for the proper vapor retarder location.

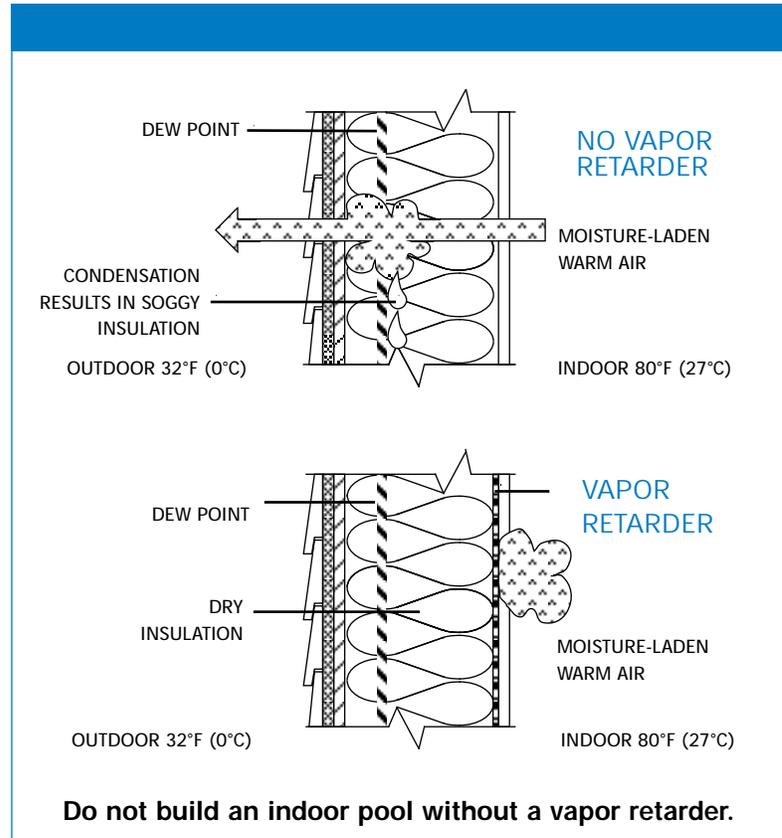
Dew Point Temperature

The designer must establish the space dew point temperature to know where to locate the vapor retarder in the wall.

From the table below one can see that a typical pool design of 82°F (28°C) 50% RH has a dew point of 61°F (16°C). This means any surface with a temperature BELOW 61°F (16°C) will condense moisture (e.g. condensation forms on a can of soda because the can's surface temperature is below the air's dew point).

Vapor Retarder

The purpose of vapor retarder is to block moisture from penetrating into a wall or ceiling where it will encounter a temperature below the dew point temperature and condense. The vapor retarder is the most important component in protecting a building from moisture damage. Failure to install the vapor retarder at the proper locations will result in condensation forming in the structure and all its consequential damage, including the possibility of structural decay and roof collapse. The vapor retarder must be sealed (taped) at all its seams and



around all electrical outlets. We also recommend eliminating all electrical outlets on exterior walls.

Window Design

Special attention should also be paid to exterior-glass components such as windows and patio doors. Due to their low insulation values, windows are usually the building element with the lowest inside surface temperature. Even a triple pane window can have an inside surface temperature below the room's dew point. Supply air must be used for condensation control.

Thermal Bridging

All other building elements that create thermal bridges must be avoided or be blanketed with warm supply air to prevent condensation damage. Skylights are especially vulnerable to condensation because direct air supply to them is very difficult to achieve. Window frames and fire doors are also subject to thermal bridging.

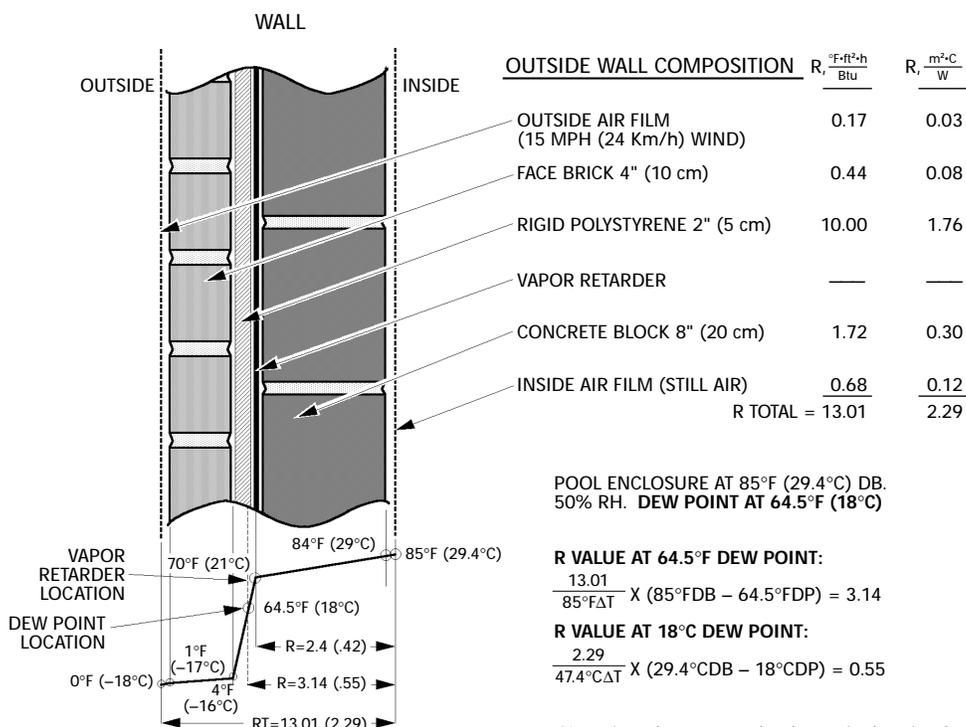
Dew Point Temperatures at Various Room Conditions *														
Relative Humidity %	74°F (23°C)	76°F (24°C)	78°F (26°C)	80°F (27°C)	82°F (28°C)	84°F (29°C)	86°F (30°C)							
40	48 (9)	50 (10)	52 (11)	54 (12)	55 (13)	57 (14)	59 (15)							
50	54 (12)	56 (13)	58 (14)	60 (16)	61 (16)	63 (17)	65 (18)							
60	59 (15)	61 (16)	63 (17)	65 (18)	67 (19)	68 (20)	70 (21)							

* It is recommended that space surface temperatures should never be allowed to approach to within 5°F (3°C) of the dew point.

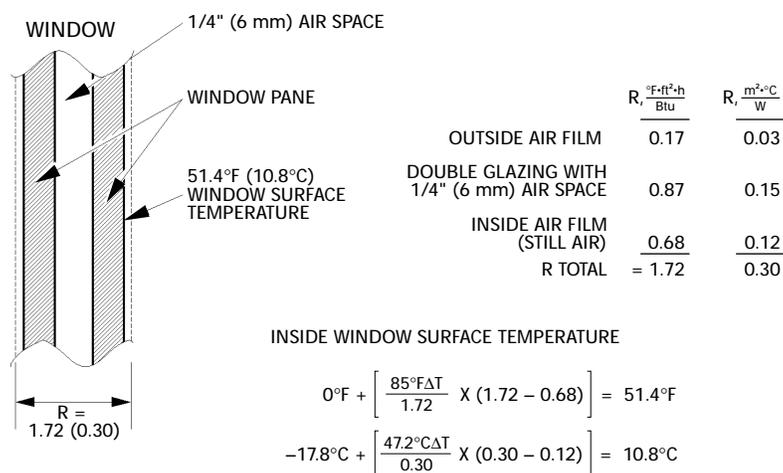


Dew Point: The designer must know where it can occur

The Vapor Retarder must be installed on the warm side of the dew point temperature.



Condensation will occur on glass unless warm air is blown against it.



Note: 51.4°F (10.8°C) is well below the room dew point of 64.5°F (18°C).
Provide warm and dry supply air on inside window surface to prevent condensation.

Controlling the Natatorium Environment

A Thermal Flywheel occurs when the energy lost through evaporation is returned back into the pool water.

The energy a pool loses through evaporation represents approximately 95% of its annual water heating requirement. The DRY-O-TRON® captures this heat as a by-product of the dehumidification process.

Use the DRY-O-TRON® to heat your pool water whenever possible. It's free heat!

Two unit configurations are available:

- DS series has a pool water heater
- DA5 series rejects heat only to the air

Both units consume the same amount of electricity annually to control space conditions. Consequently, it makes good economic sense to recycle the heat from pool water evaporation and return it to the water when feasible.

Occasionally there are job site restrictions that make a water pipe connection to the unit impractical. The DA5 series is ideal for these types of applications. Whenever possible however, it makes sense to heat the pool water with the DRY-O-TRON® DS series. The payback period for piping, pumps and associated work is typically 2 to 3 years - an excellent investment.

How the DRY-O-TRON® Works

All DRY-O-TRON® units have been specifically designed to offer an all-round solution for natatorium environment control. They use a mechanical refrigeration system to dehumidify the moist air. This results in:

- Comfortable, dry supply air
- Energy savings in water heating. (An auxiliary pool water heater is otherwise required)
- Energy savings in space heating. (A space heating coil is required to maintain the space temperature)

- Condensate is returned to the pool (when allowed), reducing make-up water requirements.

This process's energy cycle is 100% efficient since all the moisture is converted into sensible heat for recycling. Furthermore, the electrical energy required to operate the system is also converted into sensible heat and contributes to space heating. The whole system's energy is recycled!

In the DRY-O-TRON®, warm humid air passes through the dehumidifying coil and is cooled to below its dew point, thereby condensing moisture. The heat captured by this process is combined with the heat generated by the compressor's power consumption. These two forms of recovered heat are then available for recycling.

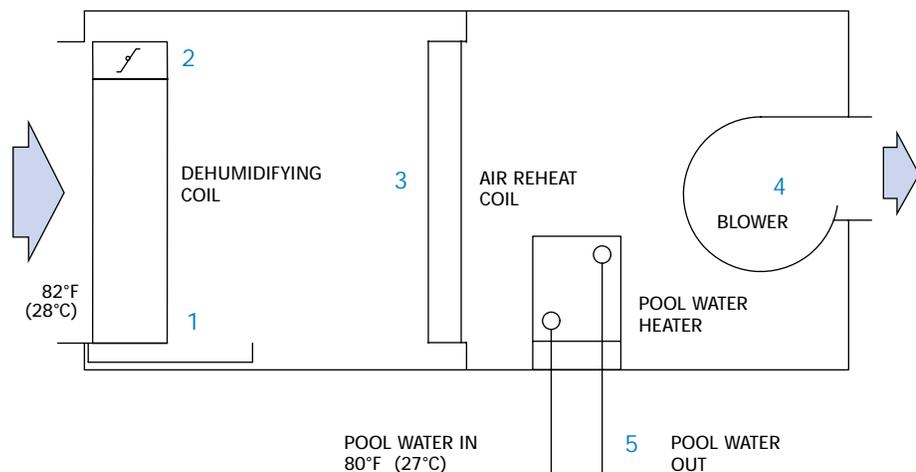
The DRY-O-TRON® has the capability of simultaneously and continuously recycling heat to air and water. This ensures that a more stable natatorium environment is maintained.

The Thermal Flywheel



Standard Operating Temperatures °F (°C)						
Operating Mode	1	2	3	4		5
				DA5	DS	DS
Dehumidification	50 (10)	82 (28)	66 (19)	102 (39)	95 (35)	84 (29)
Pool Water Heating	47 (8)	82 (28)	65 (18)	N/A	82 (28)	96 (36)
Air Conditioning	50 (10)	82 (28)	66 (19)	67 (20)	67 (20)	84 (29)
A/C plus Pool Heating	47 (8)	82 (28)	65 (18)	N/A	66 (19)	96 (36)

DRY-O-TRON® SIDE VIEW SECTION



Pool water heating by the DRY-O-TRON[®], a huge bonus!

Symbol		Example	
Step 1	T _p	Pool Water Temperature	°F (°C) 80°F (27°C)
Step 2	T _a	Air Temperature	°F (°C) 82°F (28°C)
Step 3	ERF ₆₀	Evaporation Rate Factor, Active Hours (from table on page 17, use 60% RH)	lb/h•ft ² (kg/h•m ²) .036 lb/h•ft ² (0.176)
Step 4	ERF ₅₀	Evaporation Rate Factor, Non-Active Hours (from table on page 17, use 50% RH)	lb/h•ft ² (kg/h•m ²) .048 lb/h•ft ² (0.235)
Step 5	H ₆₀	Number of Active Hours Per Day	h 10 h
Step 6	H ₅₀	Number of Non-Active Hours Per Day 24 - H ₆₀ =	h 14 h
Step 7	AF	Activity Factor (see table on page 17)	0.65
Step 8	ERF _{avg}	Average Evaporation Rate Factor (H ₆₀ × ERF ₆₀ × AF + H ₅₀ × ERF ₅₀ × 0.5) ÷ 24 =	lb/h•ft ² (kg/h•m ²) .024 lb/h•ft ² (.116 kg/h•m ²)
Step 9	A _p	Pool Water Surface Area	ft ² (m ²) 2,250 ft ² (209 m ²)
Step 10	ER	Pool Evaporation Rate A _p × ERF _{avg} =	lb/h (kg/h) 54 lb/h (24.5 kg/h)
Step 11	EC _p	Energy Consumption to Heat Pool Water ER × 8,760 h/yr × 1,100 Btu/lb (.71 kWh/kg)=	Btu/yr (kWh/yr) 520,344,000 Btu/yr (152,460 kWh/yr)
Step 12	\$\$\$	Convert Pool Energy Usage into Annual Heating Cost	
Annual Savings \$300 / HP		Heat Pool Using Gas (@ \$0.50/CCF, \$0.017 kWh) EC _p ÷ 100,000 Btu/Therm ÷ 75% efficiency × \$/CCF = The DRY-O-TRON [®] saves 80% of this cost.	\$/yr \$3,470 per year - \$2,775 !!
Annual Savings \$700 / HP		Heat Pool Using Electricity (@ \$0.06/kWh) EC _p ÷ 3,413 Btu/kWh × \$/kWh = The DRY-O-TRON [®] saves 80% of this cost.	\$/yr \$9,150 per year - \$ 7,320 !!

Thanks to the DRY-O-TRON[®], the annual savings derived from pool water heating are significant.

Estimated Annual Savings From DRY-O-TRON[®]'s Water Heating*

Model	10	15	20	30	40/42	50	60	80	100	120	150	162	182	202	242	282	362	482	562
Nominal Comp. HP	2.0	2.5	3.5	5	7.5 / 7	10	12.5	15	22	30	30	40	44	50	52	60	80	120	140
Gas	\$500	\$750	\$1050	\$1500	\$2250	\$3000	\$3800	\$6000	\$7500	\$9000	\$10500	\$12000	\$15000	\$16500	\$18000	\$21000	\$30000	\$36000	\$42000
Electricity	\$1400	\$1750	\$2450	\$3500	\$5250	\$7000	\$8800	\$14000	\$17500	\$21000	\$24500	\$28000	\$35000	\$38500	\$42000	\$49000	\$70000	\$84000	\$98000

* 75% Eff. gas @ \$0.50/CCF (\$0.017 kWh) and electricity @ \$0.06/kWh

Computerized Model Selection

Dectron has developed the only load calculation program (DOTS) in the industry that can model a system's entire performance. In addition to pool water evaporation, DOTS also includes the impact of spectators and outdoor air on an indoor environment. The DOTS load estimation program incorporates all the key design parameters, including ASHRAE

ventilation requirements, to help guide the designer in meeting the necessary codes.

Simply fill out the data form below and send it to your local Dectron representative. They are eager to show you DOTS's capability and help engineer the system to satisfy your natatorium environmental control needs.



Project Information

Project Name

Project Address

Equipment Tag

Natatorium Data

Indoor Air Design Dry Bulb °F (°C) Electrical Power..... Volts.....Phase, 60 Hz

Indoor Air Design Relative Humidity 50-60% RH Enclosure Volume..... ft³ (m³)

Pool Wet Deck Area ft² (m²) Desired Air Changes/hour 4 6 8

Outdoor Air for VentilationCFM (l/s) Summer Design Dry Bulb°F (°C)

Number of Spectators Summer Design Wet Bulb°F (°C)

Number of Active Hours/day h Winter Design Dry Bulb.....°F (°C)

Pool Data	Pool #1	Pool #2	Pool #3	Pool #4	Pool #5
Pool Surface Area ft ² (m ²)					
Pool Water Temperature °F (°C)					
Type of Pool (private, hotel, whirlpool, etc.)					
Activity Factor					
Water Heated by DRY-O-TRON®?					

Air Conditioning Data

Heating Data

Cooling Load (including Outdoor Air)..... Heating Load (including Outdoor Air)

Air on Condenser/Dry Cooler°F (°C) Voltage Unit Mounted..... Remote Mounted

Distance to Condenser/Dry Cooler

Condenser/Dry Cooler..... Above Below Same Electric..... kW Stages

Water Cooled..... max EWT..... Hot Water Coil EWT LWT GPM(l/s)

Cooling Tower..... Closed Loop

Steam Coil..... psig(kPa)

Gas Boiler Space Heating..... Water Heating

Indoor Unit Outdoor Unit

Purge Mode Economizer.....

Vertical Smart Saver

Exhaust Fan..... Unit Mounted.....Remote

Air Discharge..... TopBottom

Air Return..... TopBottom



Load Calculation

Proper equipment sizing depends on the accuracy of design condition data since water evaporation from the pool surface increases when:

- Pool water temperature increases
- Room air temperature decreases
- Room air relative humidity decreases
- Water agitation and splashing increases
- Wet deck area increases

Proper calculation of the Evaporation Rate depends on the correct evaluation of the Activity Factor. The difference in the rate of evaporation between a private pool and an active public pool is more than 100%.

Through extensive field experience Dectron developed Evaporation Rate tables for various operating conditions. Dectron also invented the Activity Factor table of measurement, which has become the industry standard and has been adopted by all manufacturers in the industry. The Activity Factor is extremely important in determining pool water evaporation as it evaluates the change in evaporation rate due to the activity in and around the pool.

Using the right Activity Factor ensures that a DRY-O-TRON® unit will maintain the humidity level at 50% during non-active periods and will not exceed 60% during active periods. Special purpose projects, such as water slides and wave pools, require careful unit selection. Contact your local Dectron representative for assistance.

Natorium Design Conditions °F (°C)

Activity	Air Temperature	Water Temperature	Relative Humidity
Residential	72~ 85 (22~29)	75~ 90 (24~32)	50 to 60%
Therapeutic	80~ 85 (27~29)	85~ 95 (29~35)	50 to 60%
Competitive Swim	78~ 85 (26~29)	76~ 80 (24~27)	50 to 60%
Whirlpool / Spa	80~ 85 (27~29)	97~104 (36~40)	50 to 60%
Elderly Swimmers	82~ 85 (28~29)	84~ 88 (29~31)	50 to 60%
Aquafit Programs	82~ 85 (28~29)	82~ 86 (28~30)	50 to 60%
Hotels	82~ 85 (28~29)	82~ 86 (28~30)	50 to 60%

Activity Factor (AF)

Type of Pool	Activity Factor
Residential	0.5
Fitness Club/Condominium	0.65
Therapy/Aquafit/Elderly Swim	0.65
Hotel	0.8
Institutional (School)	0.8
Public Pools (with family programs)	1.0
Spas and Whirlpools	1.0
Water Slides, Wave Pools, Water Cannons, Fountains	Contact Dectron Representative

Evaporation Rate Calculation

For Pools and Whirlpools

$$\text{Evaporation Rate (lb/h, kg/h)} = \text{ERF} \times \text{AF} \times \text{Pool Water Surface Area (ft}^2, \text{m}^2)$$

where: ERF = Evaporation Rate Factor (table below)

AF = Activity Factor (table above)

Evaporation Rate Factor (lb/h • sq.ft., kg/h • m²)

Pool Water Temp.	Air Temperature		Relative Humidity 50% / 60%							
	86 °F 30 °C	84 °F 29 °C	82 °F 28 °C	80 °F 27 °C	78 °F 26 °C	76 °F 25 °C	74 °F 23 °C	72 °F 22 °C	70 °F 21 °C	68 °F 20 °C
78 (25.5)	.034/.020	.166/.098	.038/.026	.186/.127	.040/.030	.196/.147	.044/.034	.205/.179	.048/.038	.225/.188
80 (27)	.042/.026	.205/.127	.046/.032	.225/.157	.048/.036	.235/.176	.050/.040	.245/.186	.054/.046	.254/.215
82 (28)	.048/.034	.235/.166	.052/.038	.254/.186	.054/.044	.264/.215	.058/.048	.274/.225	.062/.052	.293/.245
84 (29)	.056/.040	.274/.196	.060/.046	.293/.225	.062/.050	.303/.245	.066/.056	.313/.264	.070/.060	.333/.284
86 (30)	.062/.048	.303/.235	.068/.054	.333/.264	.070/.060	.342/.293	.074/.064	.352/.293	.076/.068	.372/.323
88 (31)	.072/.058	.352/.284	.076/.062	.372/.303	.078/.066	.381/.323	.082/.072	.391/.342	.086/.076	.411/.362
90 (32)	.080/.066	.391/.323	.084/.070	.411/.342	.086/.076	.421/.372	.090/.080	.430/.381	.094/.084	.450/.401
92 (33)	.090/.074	.440/.362	.094/.080	.460/.391	.098/.084	.479/.411	.100/.090	.479/.430	.102/.094	.489/.450
94 (34)	.098/.084	.479/.411	.104/.090	.509/.440	.106/.094	.518/.460	.108/.098	.528/.469	.112/.104	.538/.489
96 (35.5)	.110/.094	.538/.460	.114/.100	.558/.489	.116/.104	.567/.509	.120/.110	.577/.518	.122/.114	.587/.548
98 (37)	.120/.106	.587/.518	.124/.112	.606/.548	.126/.116	.616/.567	.130/.120	.626/.577	.134/.124	.597/.597
100 (38)	.132/.118	.645/.577	.136/.122	.665/.597	.138/.128	.675/.626	.142/.132	.685/.636	.146/.136	.704/.655
102 (39)	.144/.130	.704/.636	.148/.134	.724/.655	.150/.140	.734/.685	.154/.144	.743/.694	.158/.148	.763/.714
104 (40)	.156/.142	.763/.694	.160/.146	.782/.714	.162/.152	.792/.743	.166/.156	.802/.753	.170/.160	.831/.773

Computerized Model Selection

Determining the Evaporation Rate Factor (lb/h·sq.ft., kg/h·m²)



What is the Activity Factor for a pirate ship.....



.....or a rope swing and floating log?

Design Conditions

A designer must understand the operating requirements of the customer to accurately calculate the Activity Factor and Evaporation Rate. These conditions can change drastically based on the intended use of the pool. Therapy and aquafit water temperatures are considerably higher than lap swimming. A pool room's relative humidity level should be 50% - 60%. Air temperatures normally range from 80°F - 85°F (27°C - 29°C). If the pool area serves other purposes (e.g. receptions), there may be a need for cooler air temperatures at these times.

Private Pools are usually classified as family pools. Desired water temperatures range between 82°F - 85°F (28°C - 29°C) with corresponding air temperatures of 78°F - 80°F (26°C - 27°C). If the pool is used as an exercise or lap pool, the water temperature is usually kept between 76°F (25°C) and 80°F (27°C). The Activity Factor is normally 0.5.

Whirlpools and Spas have water temperatures ranging from 102°F - 104°F (39°C - 40°C) and an Activity Factor of 1.0 due to the agitation caused by the bubblers.

Hotel Pools are used for pleasure swimming. Here the water temperature is usually kept near 84°F (29°C). The air temperature can vary however, since the enclosure may also be used as a lobby, restaurant, bar, etc. The Activity Factor is normally 0.8.

Therapy Pools generally have warm water temperatures to keep the patient from being cold. Water temperatures are typically 88°F - 94°F (31°C - 35°C) with an Activity Factor of 0.65.

Aquafit Programs tend to have warmer water temperatures despite being an exercise application. Water temperatures can range from 84°F - 88°F (29°C - 31°C) with an Activity Factor of 0.65.

Water Slides are usually included as part of an attraction. There are two types (open and covered) and each has the Evaporation Rate calculated in a different manner. Contact the factory for additional help.

Open Slides are calculated based on the wet area, which is generally half the circumference. The Activity Factor is normally 1.5.

Covered Slides or tubes discharge saturated air at a velocity of 500 ft./min (2.54 m/s) from the tube outlet. The load to the space is calculated based on the area of the tube opening.

Water Cannons, Water Fountains, Water Mushrooms and Water Arches are special applications and the factory should be contacted to help calculate their Evaporation Rates.

Water Falls are very popular in hotels and residences. It is important to accurately calculate the total exposed surface area of water (as sometimes both sides are exposed to air). The Activity Factor is normally 1.5.

Wave Pools are another popular pool type, although no published information exists to scientifically establish Evaporation Rates. Fortunately, Dectron's experience will help the designer to develop a load based on previous successful projects.



DRY-O-TRON® Specifications

DRY-O-TRON® – the quality benchmark for energy recycling dehumidifiers and pool water heaters



HyPoxy® Coils DRY-O-TRON® Quality



Dectron uses state-of-the-art computer design and model selection programs that incorporate ASHRAE ventilation requirements, to design the right DRY-O-TRON® system for every application.

Dectron's impressive double-walled enclosures comprise of:

- Welded 'I' beam frame
- Twelve-gauge base and 14-gauge enclosure
- Double-wall construction with a painted inner liner
- Hinged doors
- Double doors on the electrical panel
- Continuous raised compression gasket door seals
- Adjustable tension cam latches
- Leakproof roof with specially designed inverted 'U' channel snap seams
- Completely weatherproof
- Stainless steel hardware
- Two-inch (51 mm) insulation
- Four-coat paint process

Standard Casing

Heaviest gauge satin-coated steel casing construction in the industry. Electrostatically applied baked powder or epoxy paint inside and outside.

Coils

Dectron is the only manufacturer in the dehumidification industry that has its own coil production division, RefPlus®. Its HyPoxy® coils, specifically designed and developed for DRY-O-TRON® units, accelerate the draining of entrained moisture and also act as a protective barrier for the aluminum fin surface. The HyPoxy® coating enhances performance and extends the life of the coils.

Controls

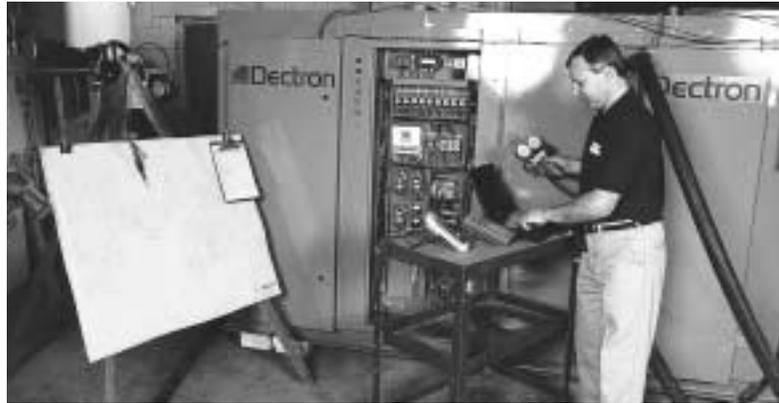
The industry's most sophisticated controls are standard on all DRY-O-TRON® units. Intricate unit-mounted sensors monitor all aspects of unit performance as well as maintain optimum space and water temperatures.

The Features

- Patented simultaneous energy recycling for smooth environment control
- Standard microprocessor control with calibrated and tested unit-mounted sensors
- Guaranteed space and pool temperature conditions - in writing!
- Designed to easily provide make-up air as per ASHRAE Standard 62 -1999
- Self-compensating water heating control, regardless of water flow, complete with high temperature safety interlock
- Remote operator panels
- Man Machine Interface (MMI) with personal computer (optional)
- Fully factory tested at design conditions
- CSA certified and ETL listed
- Self-test diagnostics
- Occupied/unoccupied period program (standard on units with Economizer)
- Corrosion-proof, sanitary drip pan
- Vented pool heater
- Water Smart Design feature

DRY-O-TRON® Specifications

Each DRY-O-TRON® undergoes the most comprehensive quality control tests in the industry. In addition to a full performance test of all components and all modes at design conditions, each unit undergoes a 16-point design review and a 60-point quality control inspection. Dectron's extensive pre-usage testing guarantees that every DRY-O-TRON® functions at optimum conditions throughout the year.



Quality Control Acceptance Report

Operational Data							
NOTE: To Obtain Adequate Readings, a Delay of Ten (10) Minutes is Required Between Every Operation or Adjustment							
For 2 compressor units		A/C & Pool Heating	Dehumidification	Whirlpool Heating	A/C Only	A/C & Pool Heating	Whirlpool Heating
Entering Air Temperature	°F	82	82	82	82	82	82
Leaving Air Temperature	°F	82	95	82	67	66	66
Entering Water Temperature	°F	80	80	80	80	80	102
Leaving Water Temperature	°F	96	85	115	85	96	116
Pool Heater Water Flow	GPM	20	20	20	20	20	20
Whirlpool Heater Water Flow	GPM	8	8	8	8	8	8
Room Relative Humidity	%	50	50	50	50	50	50
High Pressure	PSIG	265	265	265	225	225	225
Suction Pressure	PSIG	60	60	60	60	60	60
Oil Pressure	PSIG	105	105	105	105	105	105
Sight Glass Clear	(Y/N)	Y	Y	Y	Y	Y	Y
Bulb Temperature TX Valve	°F	55	55	55	55	55	55
Compressor Discharge Temp	°F	195	195	195	195	195	195
Air Leaving Evaporator Temp	°F	50	50	50	50	50	50

Dectron's uncompromising quality and performance standards extend to its after-sales service. Its 24-hour Service Support Hotline, together with its North American network of dedicated factory-certified technicians, guarantees immediate solutions to any problems that may arise.



Service Certification Training School

At the industry's first dehumidifier training school, now located in Niagara Falls, NY, DRY-O-TRON® experts hold comprehensive one-day seminars on state-of-the-art design, visual applications and hands-on dehumidifier training. Programs with varying curriculums are tailored to satisfy the specific needs of technical and service people as well as facility managers.



Operating Sequence

Every DRY-O-TRON® has four basic modes of operation:

Dehumidification

Every DRY-O-TRON® unit's compressor automatically starts dehumidification operation when the relative humidity of the space is above the set point. Hot gas from the compressor is directed to the reheat coil unless cooling or water heating are required.

Pool Water Heating (unit with auxiliary pool water heater)

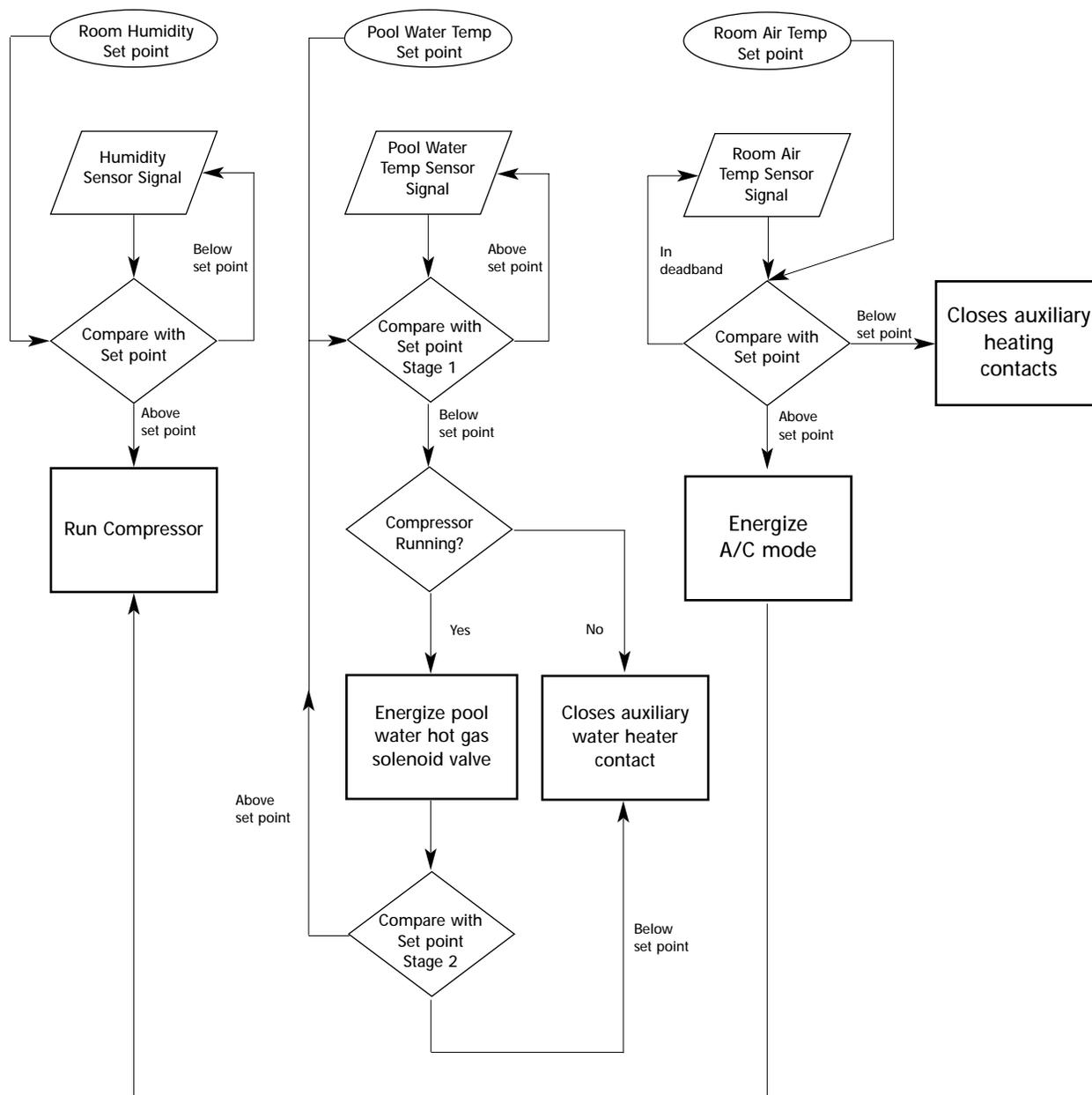
If the compressor is already operating (dehumidification or air conditioning), it's hot gas is directed to the pool water heater. If the space humidity level is BELOW set point, the auxiliary pool water heater is given a signal to maintain the water temperature.

Space Heating

When space heating is required, the DRY-O-TRON®'s proprietary micro-processor engages the space heating system and maintains the space temperature.

Air Conditioning (optional)

When the space temperature is above the set point, the compressor operates. The A/C solenoid valve is energized and diverts the hot gas to the outdoor condenser (or cooling tower/fluid cooler). The unit can still heat the pool water in A/C mode.

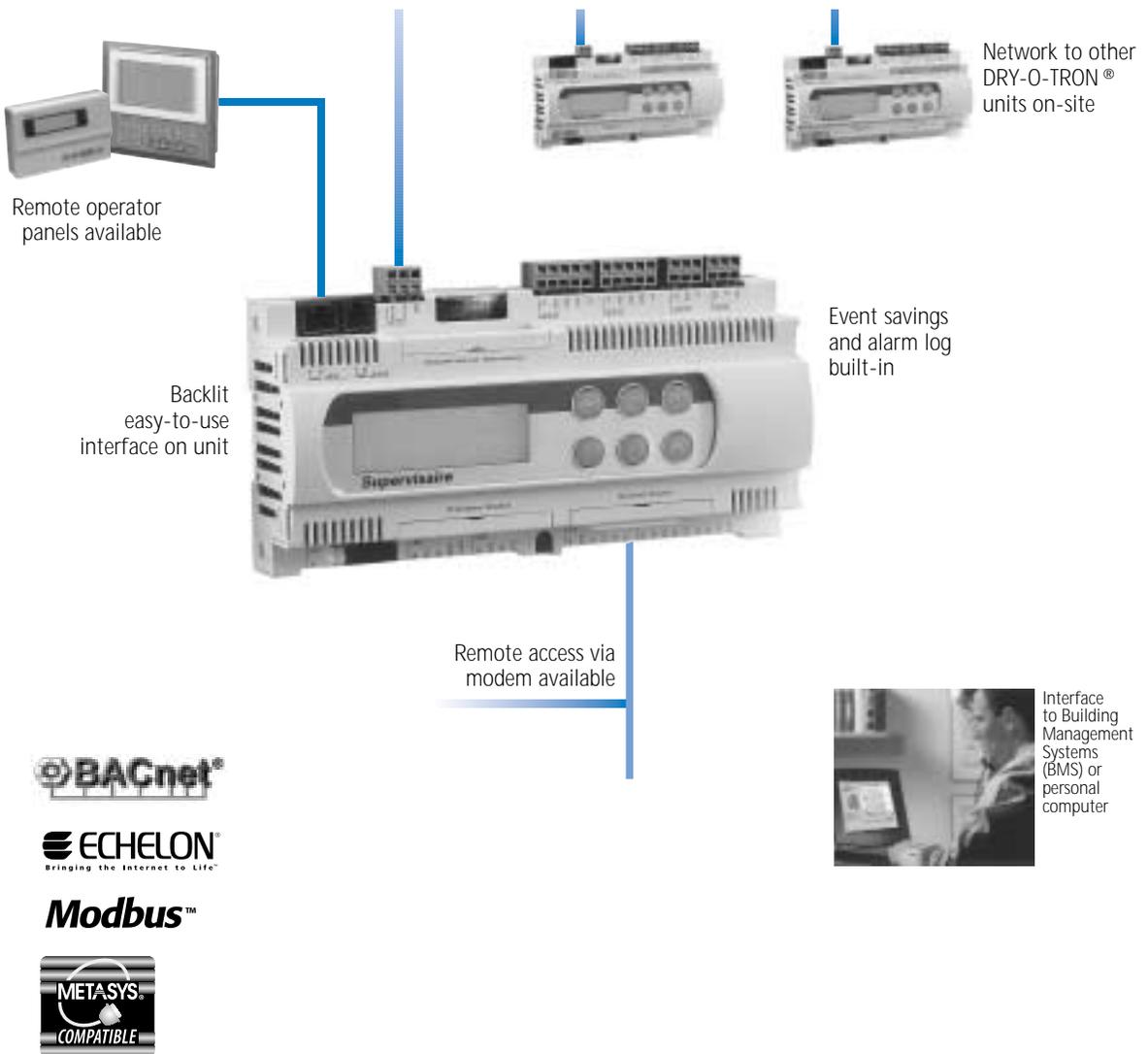


Microprocessors

The brain of every DRY-O-TRON® is a powerful microprocessor

Supervisaire® Controller

- Factory installed and tested, remote operator panels available
- All sensors are factory-installed on the unit
- Backlit user-friendly interface
- Multiple language selection for menus
- BACNET™, ECHELON® and MODBUS™ compatible
- Built-in local area networking capability for multiple unit DRY-O-TRON® installations
- Graphics display optional on remote supervisory panel
- High capacity event savings and alarm log
- Factory programmable for custom applications
- Expandable design can accommodate any requirement
- Built-in diagnostics for easy service
- High program execution speed and efficient real time management
- Password protection provided for security purposes
- Remote modem access to all functions available
- Self-extinguishing plastic case



Note: Other BMS available, contact factory.



HT800 Controller

- Simple installation, no other controls required
- Control panel can be remote mounted up to 1000 feet (300 m) away
- User-friendly with simple 5-key operation
- Highly reliable, precise automatic control
- Built-in diagnostics for easy service
- Controls and monitors humidity, water temperature, air temperature (heating and cooling) and ventilation
- Obtains status of all sensors and safety cut-outs
- Two-stage air flow alarm available
- Unit-mounted sensors



HT800 Controller

Remote access to the DRY-O-TRON® by your service company!

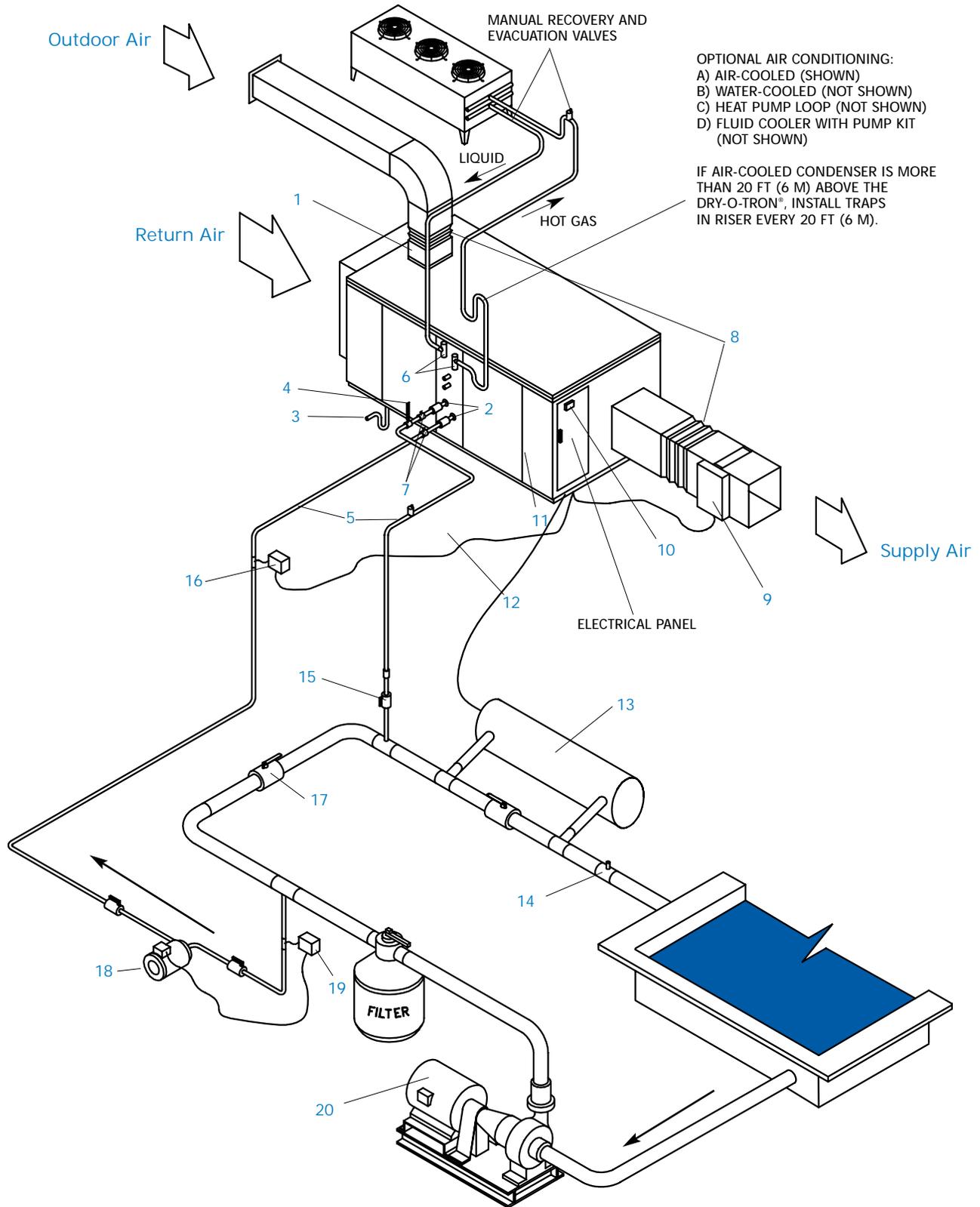
Dectron and its North American network of certified technicians offer you 24-hour-a-day monitoring and service support from their central terminal.



Dectron makes reliable machines. Our first DRY-O-TRON® is still running after 25 years of trouble-free operation!

Installation Tips

DRY-O-TRON® Energy Recycling Indoor Pool Environment Control



1. **Outdoor Air Filter and Manual Damper**
 - Optional motorized damper actuator
 - Optional seven-day time clock
2. **Pool Water Isolation Valves (by others)**
3. **P-Trap and Condensate Return (by others)**
 - Must be installed and filled with water before start-up
 - Condensate to be returned to the pool via the skimmer (consult local codes)
 - Failure to install the P-trap will cause the drip pan to overflow and flood the mechanical room
 - Optional side connection available
4. **Water Flow Meter (by others)**
5. **Pool Water Connection (by others)**
 - Components in water circuit must be of non-corrosive material
 - Pool water piping must be the same size as the connection on the DRY-O-TRON®
 - Increase the pipe size if the DRY-O-TRON® and the bypass (throttling) valve are more than 10 feet (3 m) apart
 - Schedule 40 thermoplastic pipe
6. **Air Conditioning (optional)**
 - Pipe must be the same size as the connection on the DRY-O-TRON®
 - Optional water-cooled or dry cooler heat rejection
7. **Pressure/Temperature Ports (by others)**
 - Ideal for measuring pressure drop across the water heater
 - Remote mount sensors (optional)
8. **Flexible Duct Connection (by others)**
 - For vibration isolation
 - Sound attenuation due to vibration
 - Required on return, supply and outdoor air connections to the DRY-O-TRON®
9. **Duct Heater (by others)**
 - Sized to cover the pool enclosure's heat loss and the outdoor air load
 - Optional unit-mounted hot water, steam or electric coils (size 040 and up)
 - Controlled by the DRY-O-TRON®'s microprocessor
10. **Operator Panel**
 - Mounted on the DRY-O-TRON®'s electrical panel door
 - Optional remote mounting
11. **Refrigerant Access Valves**
 - Service gauge connection
 - Refrigerant charging access
 - Top valve is head pressure
 - Bottom valve is suction pressure
12. **Air Vent (by others)**
 - Must be installed on all high points of the pool water plumbing system
13. **Auxiliary Water Heater (by others)**
 - Controlled by the DRY-O-TRON®
 - Should be located downstream of the DRY-O-TRON® and before the automatic chemical feeder
 - Required when:
 - a) O/A exceeds 15% of unit's nominal air flow
 - b) Water is 5°F (3°C) or more, above air temperature (ie. whirlpools, therapy pools, etc.)
 - c) Water is frequently drained (ie. whirlpools, therapy pools, etc.)
14. **Automatic Chemical Feeder (by others)**
 - Must be located in the main pool return line downstream of all auxiliary equipment to prevent corrosion and equipment deterioration
15. **Throttling Ball Valve (circuit setter, by others)**
 - Assures proper operation of the air vent
 - Install at lowest point in the discharge line
 - Adjust water flow until the outlet water temperature is 14°F to 20°F (8°C to 11°C) above the inlet water temperature during water heating
16. **Water Pressure Switch (unit-mounted in models 080 and larger)**
 - Stops the DRY-O-TRON®
 - During main filter backwash
 - In case of insufficient water flow
17. **Bypass Valve (by others)**
 - Throttle to force water through the DRY-O-TRON® when a secondary circulating pump is not used
18. **Secondary Circulating Pump (by others)**
 - Must be suitable for pool water
 - Must be selected for an OPEN system and:
 - a) DRY-O-TRON® flow rate
 - b) Total pressure drop of the secondary circuit including: friction loss of the DRY-O-TRON® and external piping and valves, valve pressure drop and an elevation difference between the pool water surface and the DRY-O-TRON®
 - Use dielectric couplings for water pump connections when metal pipes are used
 - Pump must stop during backwash
19. **Water Pressure Switch (by others)**
 - Stops the secondary circulating pump
 - a) During main filter backwash
 - b) In case of insufficient water flow
20. **Main Filter Pump (by others)**
 - Usually sized for pool water filtration and sanitation only
 - Caution: A secondary circulating pump is required if the main filter pump cannot assume the additional flow required by the DRY-O-TRON®
 - Pumps on timers: contact the factory for suggested piping details

Installation Tips

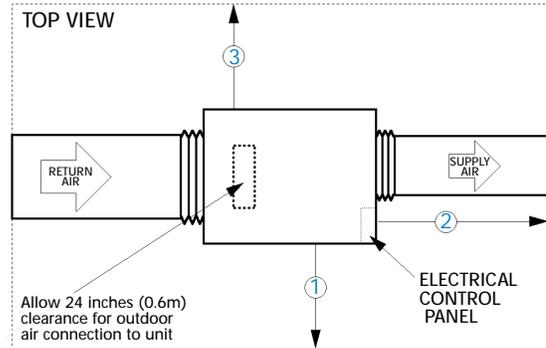
Service Access Horizontal Units

Mechanical room temperature must be 60°F - 90°F (16°C - 32°C) to prevent excessive heat loss or gain. Only rooftop RS and RB units are designed to be located in unheated spaces. Units in attics and unconditioned spaces require extra insulation.

All Models

Service Access	1	2	3
Model 010-030	2ft (0.6 m)	3ft (0.9 m)	2ft (0.6 m)
Model 040-060	3ft (0.9 m)	3ft (0.9 m)	3ft (0.9 m)
Model 080-562	5ft (1.5 m)	3ft (0.9 m)	4ft (1.2 m)

Allow 24 inches (0.6 m) clearance for outdoor air connection to unit

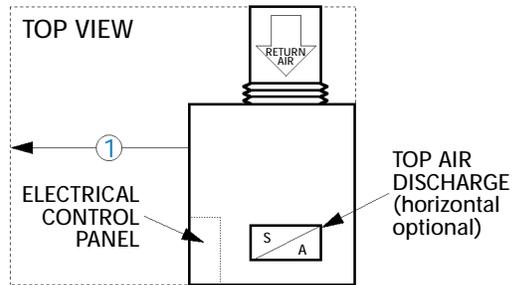


Vertical Units

Single Side Access!

Suitable for Corner Installation

① = 3ft (0.9 m) minimum



Weight and Filter Sizes

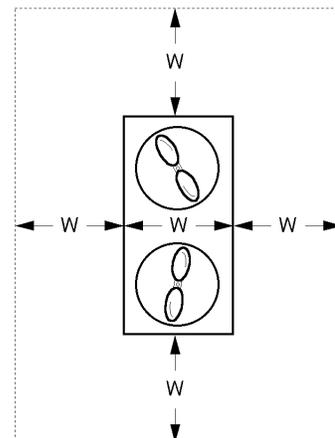
MODEL DS ¹⁾	TOTAL STANDARD UNIT WEIGHT (lb)								
	HORIZONTAL AIR RETURN	RETURN AIR PLENUM	EXHAUST FAN	PURGE	SMART SAVER & PURGE	SMART SAVER	A/C ²⁾	HOT WATER COIL	INTEGRAL CONDENSER
010	670	-	-	-	-	-	190	-	-
015	-	-	-	-	-	-	220	-	-
020	990	-	-	-	-	-	250	-	-
030	1200	-	-	-	-	-	250	-	-
040/042	2300	2800	2900	3300	3700	3200	500	90	1400
050/060	2500	3100	3200	3700	4300	3600	770	100	1570
080	3900	4400	4600	5200	6600	5400	870	160	2000
100/102	4500	5000	5200	5800	7300	6100	1100	160	2200
120/122	5500	6100	6600	7200	8800	7000	1100	210	2500
150/152	5700	6400	6900	7500	9200	7700	1400	230	3100
162	6200	6900	7100	8200	10000	8300	1500	260	3700
182	7800	8700	9000	10300	12600	10300	2280	320	4200
202	8100	9000	9400	10800	13100	10800	2470	320	4700
242	8600	9400	9800	11100	13600	11300	2490	320	4700
282	11300	12800	13300	15000	17700	15100	2530	440	5200
362	11900	13400	13900	15500	18800	15800	2580	500	6400
482	17000	18100	19000	21700	26000	21200	2850	730	9200
562	18500	19500	20500	23200	28100	23000	3370	730	10900

1) For RS Model multiply by 1.15

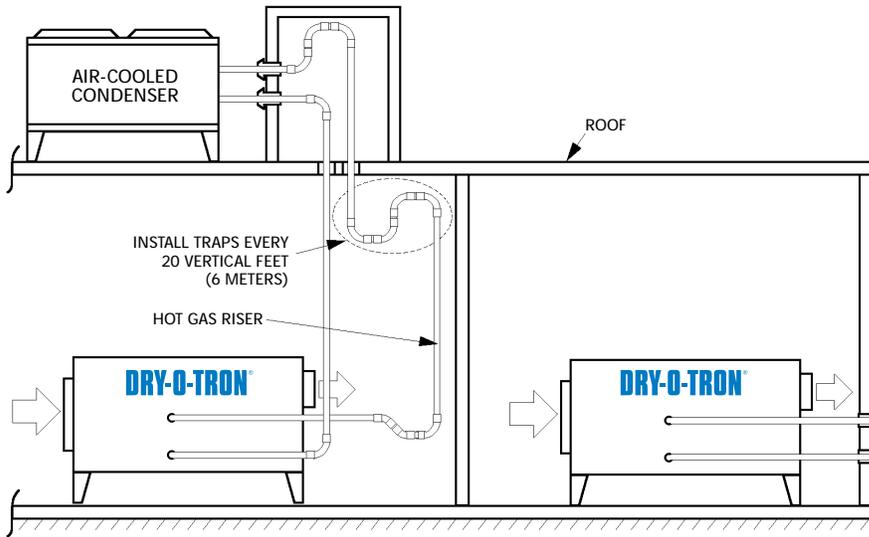
2) A/C weight based on 50 ft. lines

Outdoor
Condensers and
Dry Coolers

Allow the width of the condenser/dry cooler as free area around the entire perimeter of the unit.



Connection to an Outdoor Air-Cooled Condenser



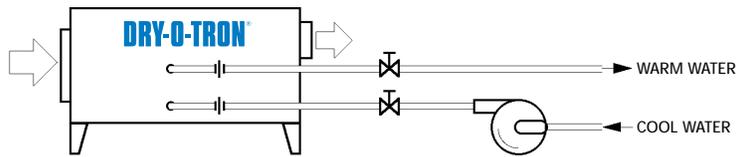
Note:

Line lengths to the condenser should be minimized to reduce system refrigerant charges.

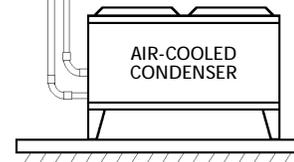
Line lengths over 100 linear feet (30 m) must use the dry cooler configuration (see below)

Connection to a Water Loop

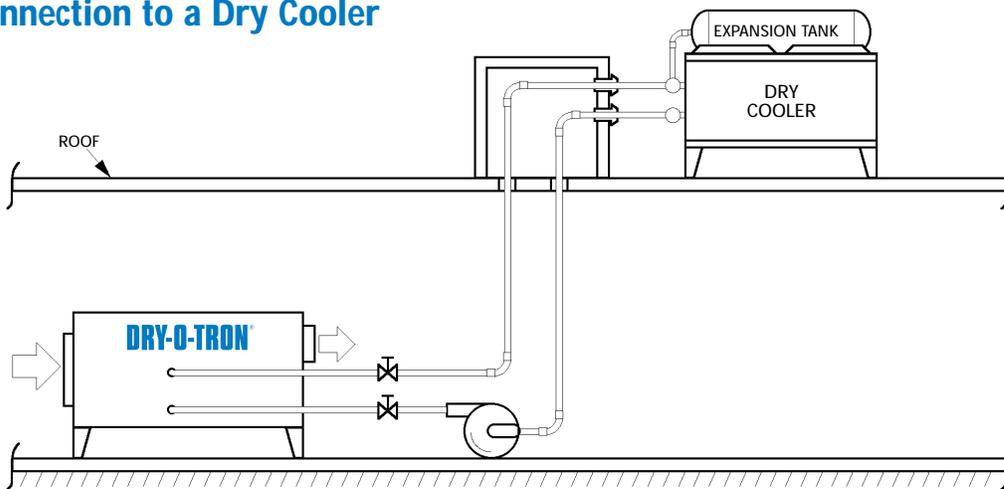
(Cooling Tower, Geothermal, Heat Pump or Chilled Water)

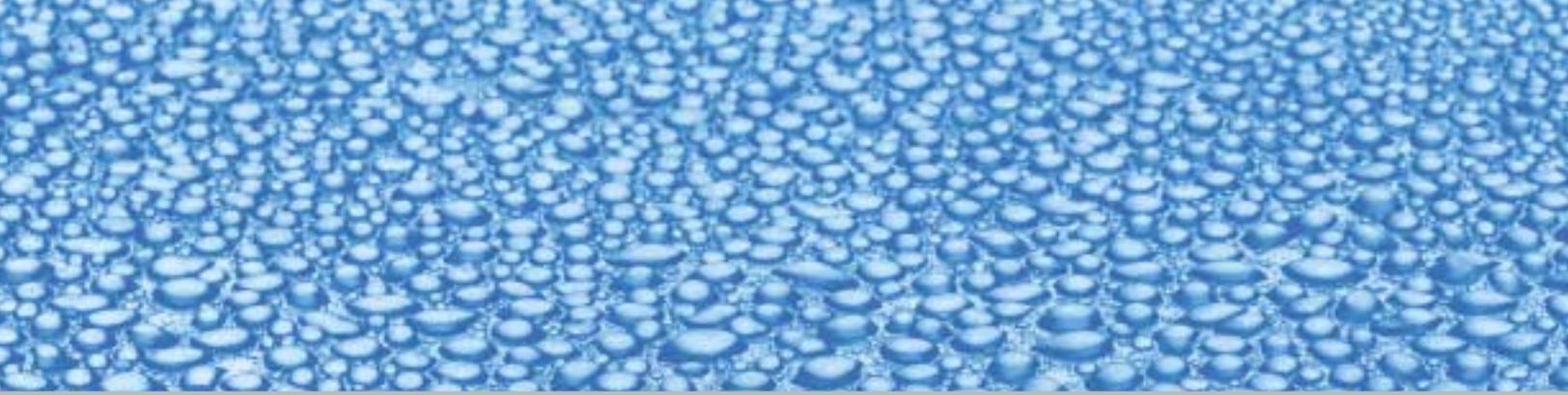


Units can be ordered for constant flow or modulating flow.



Connection to a Dry Cooler





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