

ECODRY

THE MOST EFFICIENT ADIABATIC COOLER



INNOVATION - PERFORMANCE - SUSTAINABILITY

ECODRY - 3DK

Water Conservation is a **MUST**



The growing global scarcity of water has inspired us to design ECODRY: the most efficient Adiabatic Cooler available today. In fact, extremely large amounts of fresh water are consumed every day caused by “evaporative” heat rejection of cooling towers and similar devices. The use of this new technology may save up to 95% of it. Water cost is also increasingly becoming an important economic factor when operating traditional evaporative systems, but is not the only one. A large list of advantages makes this new technology an unbeatable alternative to them.

The Most Efficient Adiabatic Cooler



up to
95%
of water saved
compared to
cooling tower



8000 installations worldwide

in all climate conditions
even in extreme ambient temperatures
from -40°C to +50°C (-40°F to +120°F)



Better cooling performance

with increased heat transfer efficiency



Outstanding operating cost savings

resulting in a low Total Cost of Ownership



New standards in terms of environmental impact

from both water footprint and total emissions

Applications

- ⊙ Plastics
- ⊙ Food and beverage
- ⊙ Wineries and distilleries
- ⊙ Metal processing
- ⊙ Foundries and Die Casting
- ⊙ Data center
- ⊙ Power generation
- ⊙ Pharmaceutical
- ⊙ Ceramics
- ⊙ Chemical and petrochemical
- ⊙ Machine tooling
- ⊙ Paper printing
- ⊙ HVAC

>Ecodry

The replacement for evaporative cooling towers

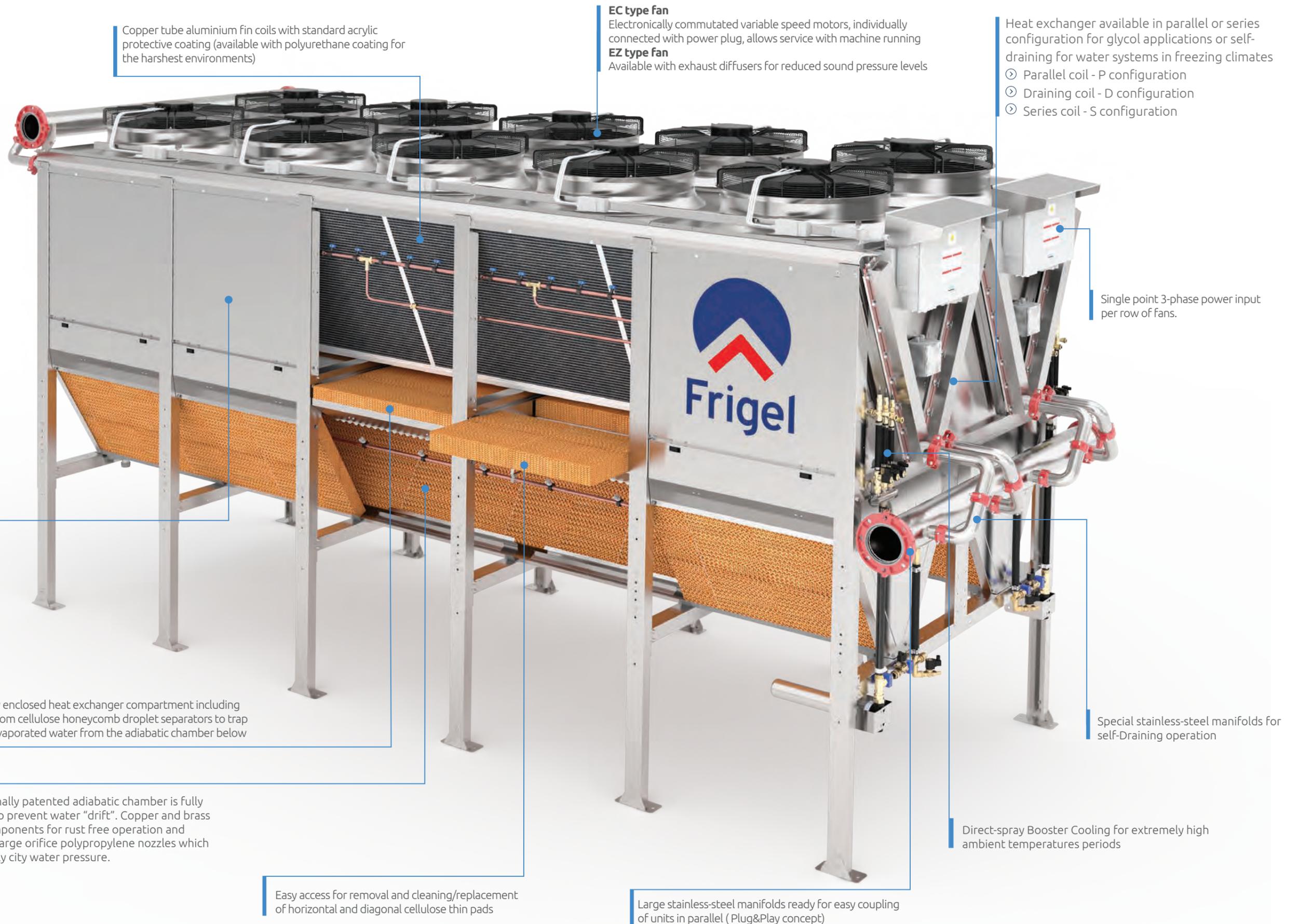
The Cooling Tower	Old vs. New	The Adiabatic Cooler
<p>High water consumption Uses water evaporation as cooling source throughout the year. Also dumps high volumes of water to reduce salt concentration caused by evaporation.</p>		<p>Almost no water consumption Only uses water evaporation at peak ambient conditions. Otherwise, it works completely dry, reducing water consumption up to 95%.</p>
<p>Contaminated water to process Permanently contaminates water (physically, chemically and biologically) with the pollution taken from the surroundings air.</p>		<p>Always clean water to process Close loop circuit and no stagnant water grants that pre-treated water will be kept perfectly clean and uncontaminated.</p>
<p>Causes machine overheating Permanent fouling and scaling dramatically decreases machine heat exchanger efficiencies.</p>		<p>Constant efficiency heat transfer Assures always constant heat transfer with no fouling or scaling of surfaces.</p>
<p>Requires permanent chemical treatment Requires specialized ongoing water treatment with chemical additives, permanent filtration and automatic purging, resulting in high consumption of additives.</p>		<p>No ongoing chemical treatment needed Process water only needs a chemical pre-treatment and periodic monitoring. No consumption or bleed-off of chemicals.</p>
<p>Expensive maintenance Requires periodic cleaning of machine heat exchanger surfaces and filtering systems. Also permanent monitoring of water quality, conductivity, pH, biological growth, etc.</p>		<p>Low maintenance costs Does not require any periodic maintenance for cleaning of heat exchanger surfaces. Only a periodic monitoring of water quality is suggested.</p>
<p>Risk of bacterial diseases It may be the source of dangerous bacterial diseases (Legionella) grown in the water and spread by drift.</p>		<p>No risk of Legionella System runs completely dry at least once a day, for several hours. Not enough time to develop any kind of organic growth.</p>

Reduced costs
Total savings may be estimated in 80 to 95%.



Ecodry is an Adiabatic Cooler that is installed outdoors in order to reject to ambient the heat extracted from processes, providing precise cooling conditions even in extreme ambient temperatures from -40°C to +50°C (-40°F to +120°F), delivering clean water at the right temperature year round, with unbeatable efficiency.

The Most Proven Adiabatic Cooler



Copper tube aluminium fin coils with standard acrylic protective coating (available with polyurethane coating for the harshest environments)

EC type fan
Electronically commutated variable speed motors, individually connected with power plug, allows service with machine running

EZ type fan
Available with exhaust diffusers for reduced sound pressure levels

Heat exchanger available in parallel or series configuration for glycol applications or self-draining for water systems in freezing climates

- ⊗ Parallel coil - P configuration
- ⊗ Draining coil - D configuration
- ⊗ Series coil - S configuration

Single point 3-phase power input per row of fans.

Rugged non-ferrous construction including stainless steel structure and aluminium panels

Fully enclosed heat exchanger compartment including bottom cellulose honeycomb droplet separators to trap unevaporated water from the adiabatic chamber below

Special stainless-steel manifolds for self-Draining operation

Internationally patented adiabatic chamber is fully enclosed to prevent water "drift". Copper and brass piping components for rust free operation and cleanable large orifice polypropylene nozzles which require only city water pressure.

Easy access for removal and cleaning/replacement of horizontal and diagonal cellulose thin pads

Direct-spray Booster Cooling for extremely high ambient temperatures periods

Large stainless-steel manifolds ready for easy coupling of units in parallel (Plug&Play concept)

Intelligent Process Cooling

DRY MODE

During most of the year, the unit operates like a conventional finned dry cooler.

- Heat is dissipated to the ambient air via convection.
- The speed control of EC fans motors keeps water at a preprogrammed minimum setpoint, saving energy.
- During long winter periods, closing carters may be taken out in order to improve air flow and reduce even more the energy consumption of fans.

"On Demand" Intelligent Control System

- PLC hardware base for digital control and managing of the entire system from a single location.
- Fan speed management: system always delivers the minimum air flow required, according to real load demand and actual ambient temperature.
- Dry – Adiabatic – Booster switch: system automatically commutates from one mode to the other according to real load demand and actual ambient temperature.
- Water consumption management: In Adiabatic Mode, system controls the minimum water flow to be sprayed in order to keep temperature set point according to the ambient temperature and the desired water temperature.
- Process pump management: System automatically controls the inverter driven process pumps in order to minimize pumping energy according to the real demand of process water flow.

ADIABATIC MODE

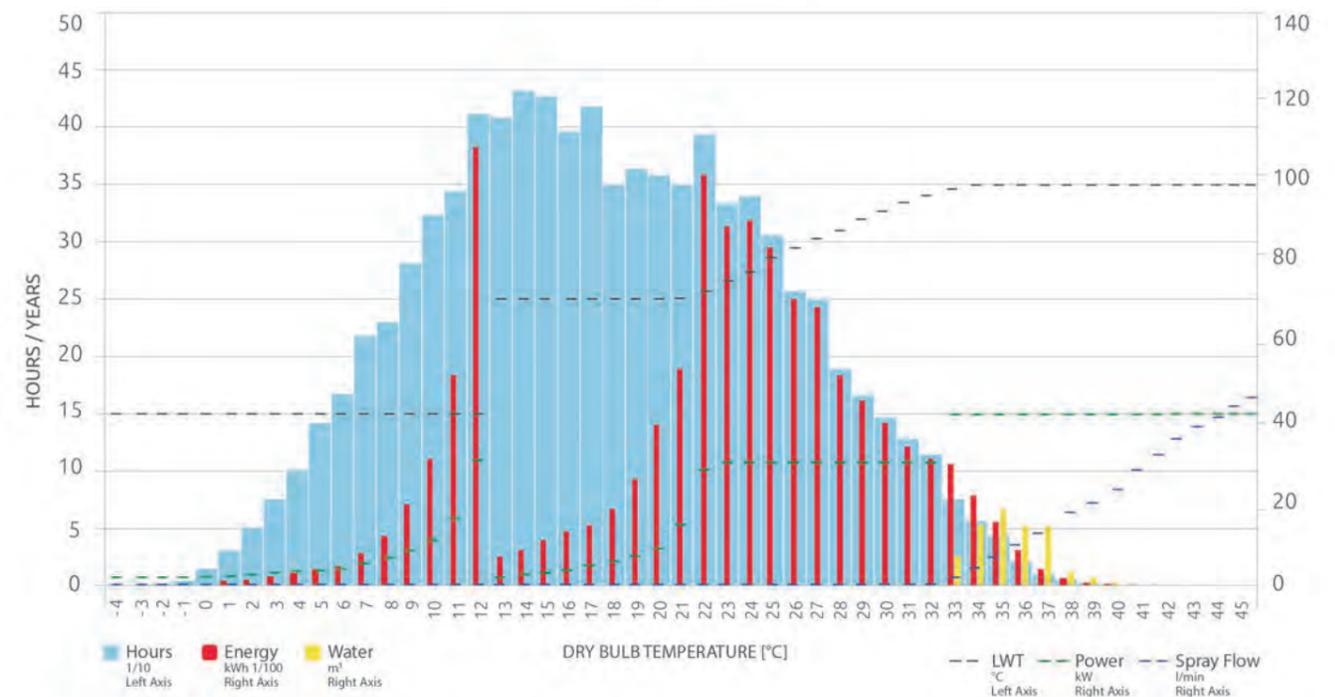
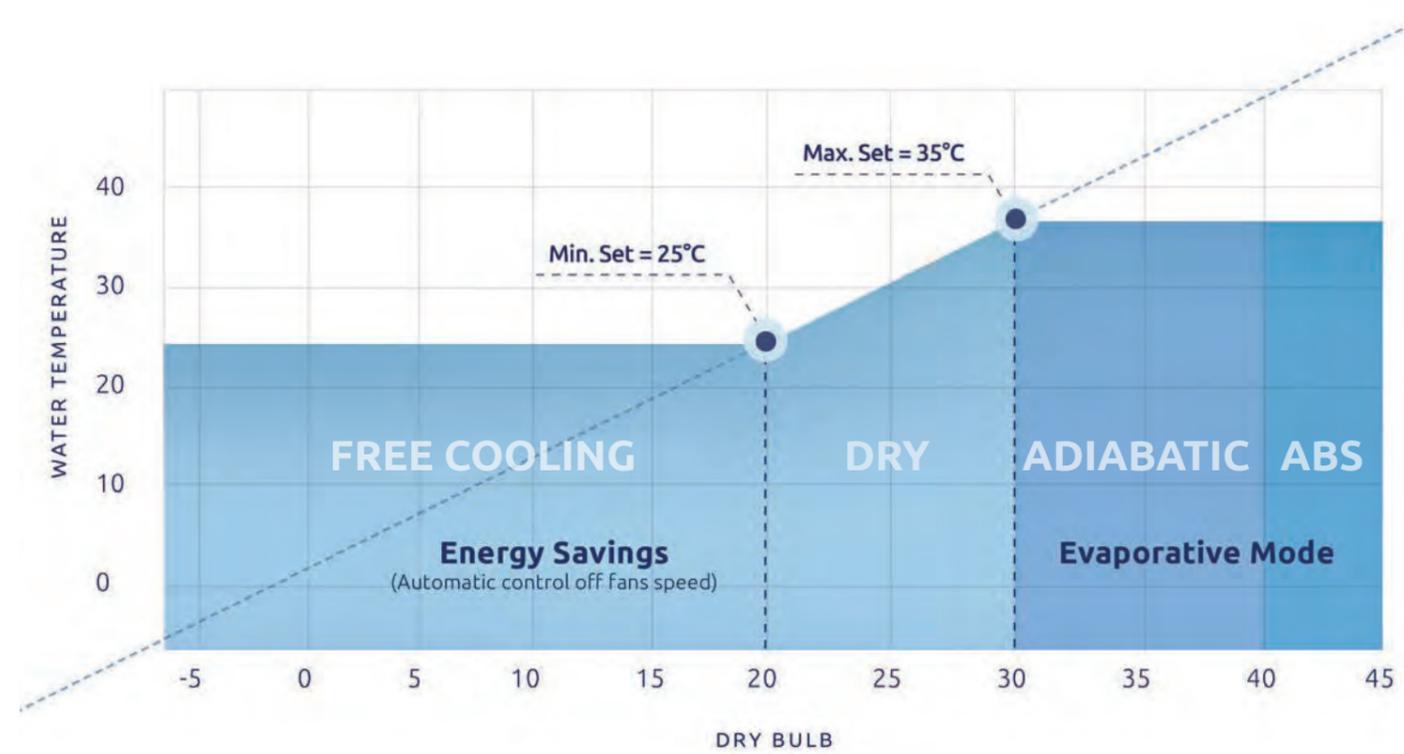
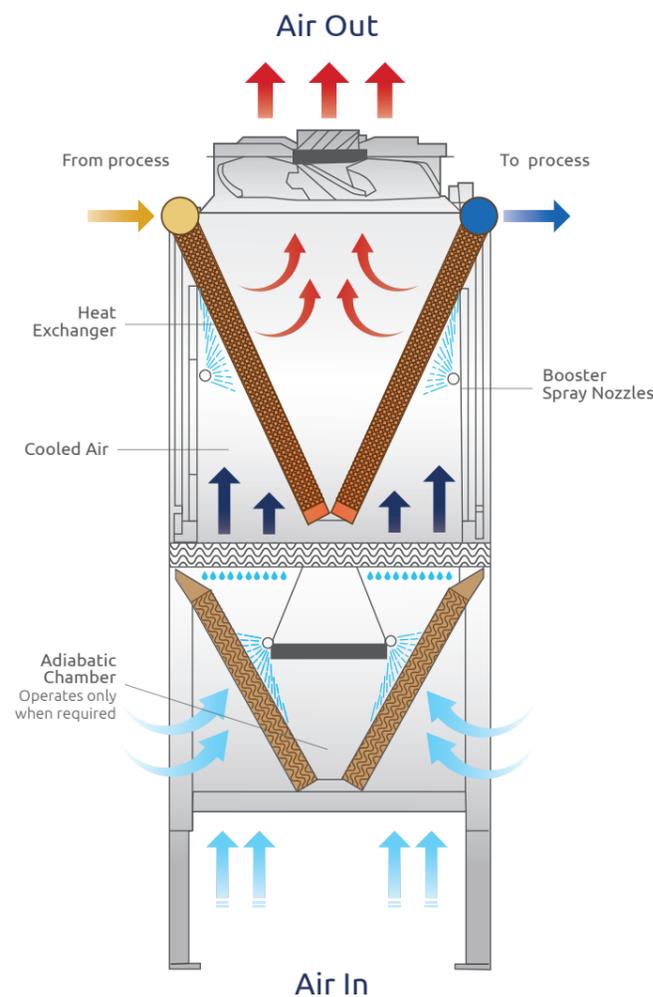
During periods of high ambient temperature and only when Dry Mode is not enough to keep the leaving water temperature within a preprogrammed maximum setpoint, the Adiabatic Mode is automatically switched on.

- The ambient air at high temperature passes through the "adiabatic chamber".
- In the chamber, spray nozzles create a thin mist of water that comes from an external source.
- The humidification precools the air flow before it reaches the coils.
- The Intelligent Control System continuously adjusts the minimum amount of nebulized water required to keep set point.
- Chamber design avoids water drift outside the chamber preventing heat exchanger scaling.

BOOSTER MODE

Only in extremely high weather conditions, when Adiabatic Mode is not enough to keep the leaving water temperature within a preprogrammed maximum setpoint, the Booster Mode is automatically switched on.

- Spray nozzles soak part of finned coils with water that comes from an external source (typically city water).
- The Intelligent Control System manages the step control of water spraying required to keep set point.
- Excess of water is dropped into the Adiabatic Chamber and eventually collected to be reused with the "Water Recovery Kit".
- This excess water is then pumped back into the adiabatic chamber connection to be completely evaporated.
- Any remaining water in the system is automatically sent to drain. There is never any stagnant water in the system.



Highlights

01 Proven Performance

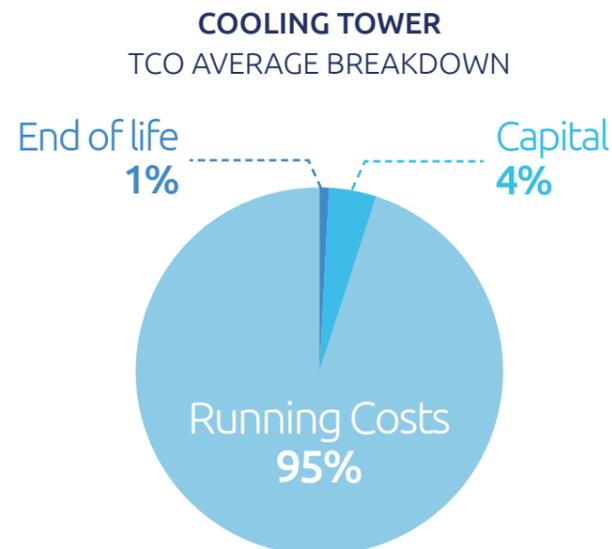


8000+
Installations
GLOBALLY

With more than 8000 systems installed and running in all climate conditions and in a vast range of process applications, Ecodyr is, by far, the most proven Adiabatic Cooler worldwide.

In all climate conditions
from **-40°C** to **+50°C**
(-40°F) (+120°F)

02 Lowest Total Cost of Ownership



Water Savings
Minimized Water Footprint
up to **-95%**

- ⌚ High humidification efficiency of sprayed mist of water in the “adiabatic chamber”
- ⌚ Lower approach to WB of pre-cooled air with less water usage
- ⌚ Proven performance in extreme weather conditions, up to +50°C (+120°F)
- ⌚ Intelligent Management System adjusts the lowest water consumption according to actual conditions.



Energy Savings
Reduced Operating Costs
up to **-40%**

- ⌚ Unbeatable efficiency with Electronically Commutated (EC) fans as standard
- ⌚ Reduced air pressure drops through thin pads design
- ⌚ Reduced power consumption and noise emissions with exhaust diffusers
- ⌚ Easy removal of panels during DRY operation (winter)
- ⌚ Less pumping energy consumption thanks to low coil pressure losses



Maintenance Cost Savings
Chemicals and water treatment
up to **-95%**

- ⌚ Minimal ongoing water treatment required
- ⌚ No risk of coil corrosion and scaling
- ⌚ Extended life of humidifying pads thanks to water nebulization
- ⌚ Extended legs to avoid dust intake
- ⌚ Maintenance free fans motors
- ⌚ Easy access for cleaning of coils and adiabatic chamber

03 Glycol FREE Operation

- ⌚ 100% reliability in extreme weather conditions down to -40°C (-40°F)
- ⌚ Better heat transfer efficiency
- ⌚ Less environmental impact
- ⌚ Less pumping energy consumption





04 Compact Design

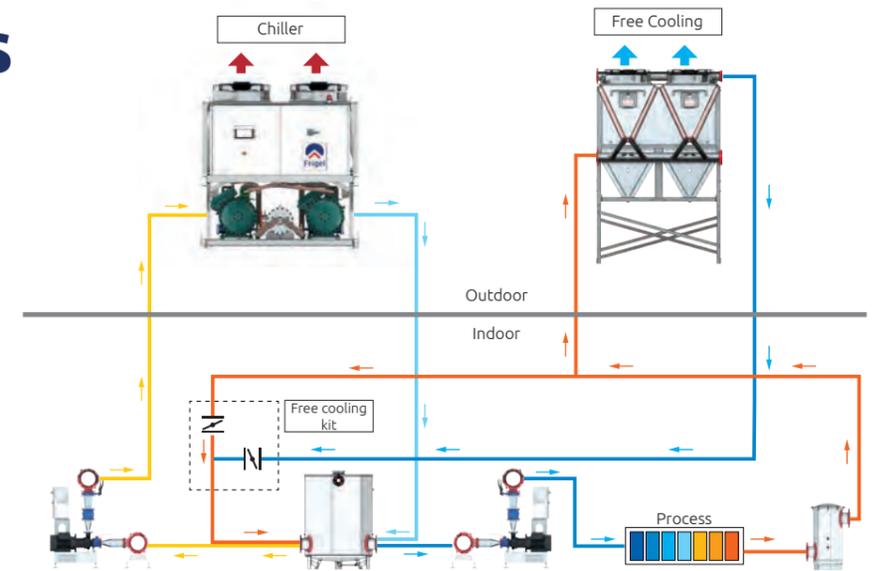
- ③ 35% less footprint requirements than others thanks to air intake from underneath
- ③ No air flow recirculation between units
- ③ Optimized shipping dimensions

05 Clean Water to Processes

- ③ Close loop circuit guarantees constant uncontaminated clean water to process
- ③ No surface fouling, constant efficiency of heat exchange with processes
- ③ Minimal ongoing chemical treatment required

06 Free Cooling Opportunities

The system may have the ability to automatically replace, partially or totally, the thermal loads of existing "mechanical refrigeration systems" operating as a dry-cooler during winter time.



07 Total Modularity, High Reliability

- ③ Easy to expand at any time to meet growing needs
- ③ Reduced installation costs - preassembled stainless steel manifolds for interconnection
- ③ Stainless steel structural frame and aluminium panels
- ③ Electrical redundancy with individual fan power plugs
- ③ Copper coils and aluminium fins with hydrophilic protection
- ③ Rigid structure, resistant to deflection
- ③ High level of static stability

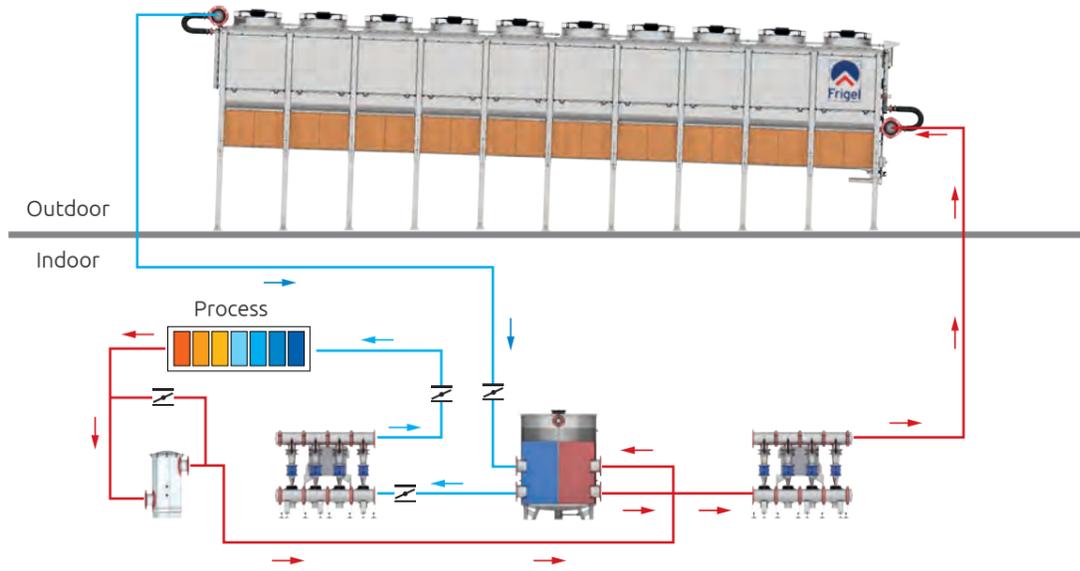
08 Intelligent Control System

- ③ Guarantees an efficient operation and compliance with the predicted coolig load values
- ③ Monitors all the significant parameters and automatically adapts the operating mode to the current system requirements.
- ③ Communication capabilities with building management systems (Industry 4.0).
- ③ Easy to install, supplied ready for connection.
- ③ Easy to manage, adaptable and expandable to unlimited capacity.

Optional Features

Self-Draining Configuration (Glycol-Free Operation)

- ⌚ Automatic self-draining by gravity, no valves or moving parts involved
- ⌚ Complete set of sensors and anti-freezing software
- ⌚ Special anti-freeze stainless steel preassembled manifolds



Extended Legs

- ⌚ Extended legs to raise the units to facilitate air flow from underneath in tight spaces
- ⌚ Simplifies pitched installation for "Self-Draining Configuration"



Special Coils Epoxy Coating

- ⌚ Polyurethane heat exchanger coil coating to provide an even higher level of protection in adverse climatic conditions
- ⌚ Life of these heat exchangers can be significantly increased by using epoxy-coated fins for higher strength and chemical resistance

Roof Panels

- ⌚ Avoids exhaust air from recirculating between units down into the adiabatic chambers
- ⌚ The panels allow multiple units to be positioned closely together



Digital Communication

- ⌚ External communication via Modbus RTU over Ethernet TCP/IP network
- ⌚ Preventative maintenance and failure pinpointing
- ⌚ Remote web monitoring connection allows for service and troubleshooting from locations worldwide
- ⌚ Communication with building management systems
- ⌚ Easy to install, supplied ready for connection
- ⌚ Compact, adaptable and expandable



Fan Exhaust Integral Air Diffusers

- ⌚ Prevents exhaust air flow from being drawn back into the adiabatic chamber at the bottom of the unit
- ⌚ Significantly reduces noise emissions



Integrated Pump Station

- ⌚ Design according to actual requirements and engineered for easy modular growth for future expansions
- ⌚ Preassembled and factory tested before shipping
- ⌚ Stainless steel reservoirs and stainless steel filters





> www.frigel.com