CRYOTECH — breakthrough technology - minimum environmental impact —

SINGLE- AND MULTI-TEMPERATURE CYOTECH REFRIGERATION SOLUTIONS FOR TRUCK & TRAILER
Cryotech refrigeration

Precise temperature control

Breakthrough technology - minimum environmental impact

Today’s producers, retailers, consumers and legislators rightly demand the highest standards of product quality. However, they also require that their refrigerated transport operation have the lowest possible impact on the environment. We can no longer continue to depend on fossil fuels and fluorinated refrigerants. Cooling units must be extremely quiet to operate in noise sensitive areas, round the clock, and they must meet increasingly stringent emissions standards to protect the quality of the air we breathe.

Thermo King’s breakthrough CryoTech refrigeration technology can now provide a no-compromise solution using a recycled natural refrigerant in a simple, robust system to eliminate both noise and emissions, while at the same time enabling the fastest pull-down on the market and the most accurate temperature control due to the all-new SR-3 CryoTech controller.

CryoTech units are available for single and multi temperature applications. Discover the range.

Available models:
- CT-10 Truck
- CT-10 Spectrum Truck
- CT-15 Trailer
- CT-15 Spectrum Trailer

Precise temperature control

Breakthrough technology
The CryoTech commitment

Reduced carbon footprint
The refrigerant chosen for the CryoTech system, liquid carbon dioxide (CO₂ or R-744), is sourced from recycled waste gas captured during the production of fertiliser, bio-ethanol and other chemical compounds. It is commonly used for carbonating soft drinks, food processing and water treatment.

Because this refrigerant is a by-product that would otherwise be released into the atmosphere, there is no cumulative global warming effect caused by its use in a CryoTech system. Small amounts of greenhouse gases are created due to the consumption of electricity during the liquefaction of carbon dioxide, but this is significantly less than for similar systems running on nitrogen or indeed in the refining and use of conventional fossil fuels.

The total carbon footprint for the use of a CryoTech system is 75% less than a conventional diesel system and 68% less than a nitrogen cryogenic system.

PIEK certified
The CryoTech system uses very few moving parts. Therefore, the extremely low operating noise ensures that both truck and trailer systems meet the demanding Piek standard. The Piek regulations were established in the Netherlands and enforce a 60dB(a) limit during nighttime deliveries in urban areas.

Not only will inner-city residents take positive notice of whisper-quiet CryoTech vehicles, but the comfort of drivers and others who work with the vehicles will be much improved.

Sound pressure (dBA) - values at typical listening distances

- Plane: 120
- Truck: 90
- Lawnmower: 85
- Telephone: 85
- Talking: 65
- PIEK Noise Limit: 60
- CryoTech system: 49 to 58
- Computer: 40

Lowest environmental impact
The CryoTech commitment

Faster temperature pulldown and recovery
CryoTech systems have been designed for the most demanding retail and distribution operations. The unique nature of the technology delivers cooling capacity which remains unaffected by ambient temperature. Performance is substantially superior to conventional units, as demonstrated in the accompanying chart.

Greater load capacity and vehicle fuel efficiency
The compact size and reduced number of components in a CryoTech system results in reduced refrigeration system weight on every vehicle. This means greater payload capacity, improved vehicle fuel efficiency and better axleweight distribution for the operator.

High quality insulation in the carbon dioxide tank is required to guarantee minimum leakage and maximum uptime. Due to its vacuum technology, high performance economizer and carbon dioxide level indicators, the CryoTech optimises carbon dioxide consumption, reducing operating costs and downtime.

The compact CryoTech electronic module is easily installed on any size of vehicle in any compartment configuration.

Ease and safety of operation
A first-time operator will need a brief introduction to optimise their use of the CryoTech system, but the same “good practice” that applies to conventional systems also applies to CryoTech. The local Thermo King dealer will provide the right tools to ensure that maximum benefit is extracted from the system.

Filling stations are fully automated and have patented quick-connect couplings with automatic cut-offs to prevent leakage even when accidentally damaged. Unlike some cryogenic systems, CryoTech units do not exhaust their coolant into the load space, thus protecting the operator and avoiding complex safety procedures.

Increased shelf-life
Even small variations in temperature can significantly affect the shelf-life of sensitive produce. For example, a difference of 1°C can reduce the shelf-life of lettuce by over a day. Grapes deteriorate more in ten minutes at 35°C than in 16 hours at 20°C. Hence the faster initial pull-down and temperature recovery on CryoTech also mean that shelf-life is extended and product spoilage is reduced. This results in efficiency gains and cost saving.

Increased shelf life
How does the system work?

Liquid carbon dioxide is held in a refillable tank mounted under the vehicle chassis. When cooling is demanded by the microprocessor controller, valves open to allow the liquid to flow from the tank into the evaporator coils inside the cargo space. Electric fans circulate air through the coils. As the liquid evaporates, it cools the coil and the air passing over it. Cool air is thus circulated through the cargo maintaining the temperature set point. Having cooled the coil and the air, the gas is directed outside the vehicle body into the atmosphere.

Importantly, the gas never enters the cargo space and the load temperature and humidity are controlled by airflow. Other cryogenic systems inject refrigerant gas into the load space creating potential safety hazards and failing to control humidity in fresh produce.

The new SR-3 CryoTech controller provides improved electronic features to ensure tight and accurate temperature control, thus protecting the load, maximising uptime and reducing operating costs. New telematics features support data transfer and management to provide the information needed to ensure optimum use of the CryoTech system.

CryoTech filling stations

Thermo King and its partners have created and are expanding a network of dedicated filling stations where CryoTech units can be refilled. These stations consist of a storage tank refilled by the gas supplier and patented purpose built carbon dioxide dispensers.

In some countries like the Netherlands and Norway a widespread network of stations is already operational. Thermo King is in the process of building new filling stations in several other countries. Visit www.europe.thermoking.com for updates on the filling station network.

Stations are typically publically accessible, like regular petrol stations, but for large fleets a dedicated private station is also possible.

Accurate temperature management and defrost require heating as well as cooling. On trailer applications, it is provided by a small diesel heater. On truck applications, vehicle engine coolant is used to deliver heating on the road, while an electric heater coil is used on electric standby.
**CryoAssist with every CryoTech unit**

**Full service support**
To ensure total customer satisfaction with the ownership and operation of CryoTech equipment, as well as total peace of mind, all CryoTech units are available with a CryoAssist package. With CryoAssist, the local Thermo King dealer takes responsibility for keeping the unit running reliably and efficiently. That means the operator can concentrate on running his business.

**CryoAssist includes:**

**Driver training**
Specific driver training is provided to ensure that operating costs are minimized and uptime is maximized. Training is carried out when units are first put into operation and then on a regular basis for new drivers.
Topics covered include:
- How to operate the unit and filling station
- Best practice in loading and unit operation
- Safety in operation and refueling, including provision of safety equipment for drivers

**Maintenance and service**
To maximize fuel efficiency and minimize downtime, a full preventive maintenance schedule, including interim inspections, is provided under contract by fully trained technicians at the Thermo King dealer. CO₂-tank re-vacuuming is performed as required. Only genuine Thermo King approved replacement parts are used.

**Reduced operational costs**
When using your CryoTech unit, carbon dioxide consumption is influenced by many factors including the insulation of the vehicle body, the ambient temperature, cargo temperature and the Standard Operational Procedures (SOP) in effect. CryoAssist will support you in minimising operational costs by measuring carbon dioxide consumption to highlight opportunities for further economy.

The new introduced SR-3 controller allows us to capture CO₂ consumption of your CryoTech unit, which will help to determine possible high usage of CO₂. As part of CryoAssist, your TK dealer will provide you guidance and feedback on how to reduce the CO₂ consumption on your fleet or on particular units on a regular basis.

*Based on vehicles operated in the Netherlands and Norway.

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**The following offerings are available:**

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<table>
<thead>
<tr>
<th>CRYOASSIST PRODUCT DETAILS</th>
<th>CRYOASSIST</th>
<th>CRYOASSIST PLUS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Service &amp; Support</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maintenance &amp; repairs covered</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Scheduled services reports</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Immediate credit approval for breakdowns</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td><strong>Tracking: remote online asset monitoring system</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Built-in real-time monitoring device (Tracking), activated</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Online tracking fleet monitoring system access for the customer (Tracking)</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td><strong>iKare online access</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Repair and maintenance history</td>
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<td>✓</td>
</tr>
<tr>
<td>Invoice history</td>
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<td>✓</td>
</tr>
<tr>
<td>Management report</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td><strong>Asset management</strong></td>
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<td></td>
</tr>
<tr>
<td>Preventative repair &amp; maintenance history</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Early warning system “end of contract”</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Scheduled services requests</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td><strong>Fleet optimisation</strong></td>
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<td></td>
</tr>
<tr>
<td>Driver &amp; fleet manager operational training (by home dealer)</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Unit consumption report to manage operational costs on CO₂ consumption</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

*Available in some countries*

**CO₂ consumption is a key driver in operational cost. Typical gains of 30% with CryoAssist that include CO₂ monitoring are achievable.**
SR-3 CryoTech controller, the key to total temperature management

Powerful and simple to use, the new SR-3 CryoTech controller makes it easy to accurately manage the temperature in the truck or trailer, no matter where you are or what you are hauling.

Enhanced performance and temperature control
The SR-3 CryoTech controller includes features that enhance unit performance and reduce costs, such as:
• Optimization software especially designed for CryoTech
• Superior temperature control
• EEV (Electronic Expansion Valve)
• Reduced CO₂ consumption

Intuitive interface and ease of operation
The simple and logical menus, easy to read screen and choice of 9 languages make this the interface of choice. This allows quick and easy setup and precise refrigeration adjustments, helping your drivers, your customers and ultimately your business.

Full suite of data recording, management and analysis tools

Data Acquisition System (DAS) and CargoWatch™
The high performance datalogger records up to 6 independent sensors to meet the current regulatory requirements:
• Approved to EN12830, CE mark and IP-65 standards
• Memory storage for over 1 year’s data and internal Real Time Clock
• The DAS (or CargoWatch™ for CT-15 units) connects to the SR-3 CryoTech controller to provide equipment information:
  • Set point, unit sensors temperature and operating mode
  • Carbon dioxide level, battery voltage, door opening and alarms essential for CryoTech operations
• The data stored is easily accessible and exportable to different media:
  • Downloadable to PC via USB and Wintrac
  • Printable via CargoPrint
  • Transferable over the air via TracKing or i-Box

TracKing
This online platform offers the operator visibility of his vehicles and their loads. Benefits include:
• Optimum temperature management via out-of-range alarm
• Unit uptime based on reefer alarm monitoring
• Cargo integrity thanks to 2-way commands with CryoTech reefer
For more information, visit www.tktracking.com

i-Box
The SR-3 CryoTech controller is also compatible with the Thermo King protocol interpreter, i-Box. The i-Box interface allows third party systems to read the CryoTech reefer information.

Improved safety and security
At the end of the day, protecting your load is what matters. The SR-3 makes that job easier and even more effective with a range of enhanced features:
• Keypad with lock-out
• Battery/Electric standby auto switching
• Set point warning
• Password protection
• Data Acquisition System (DAS) and TracKing compatibility

Superior temperature control
Intuitive interface
TracKing compatibility
Making the switch to CryoTech

Businesses are often reluctant to make operational changes. Some delay until their competitors move first. Now, with many hundreds of installed systems and over ten years of experience, Thermo King and their dealer network are perfectly equipped to help companies make the switch.

Not every transport operation is suited to CryoTech technology and the first step in any consultation is an in-depth evaluation of the business application. This will include:
- The daily delivery cycle
- Loading and unloading practices
- Driver training needs
- Fuel supply options: use of existing regional network of filling stations or installation of storage facility on site
- Cost of ownership including operation, maintenance and residual value
- Recalculation of the transport operation’s carbon footprint to determine before and after measures
- Availability of subsidies
- Equipment demonstration
- Meeting existing users of the technology (where feasible)

### CryoTech advantages

<table>
<thead>
<tr>
<th>FEATURES</th>
<th>OPERATIONAL BENEFITS</th>
<th>ENVIRONMENTAL BENEFITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>EFFECTIVELY SILENT</td>
<td>• Access to inner-city zones for night-time deliveries - increased fleet utilisation, reduced fuel consumption • Compliance with noise and truck engine idling regulations</td>
<td>• Driver and residents comfort • Reduced noise pollution • Less time spent in traffic - lower vehicle emissions</td>
</tr>
<tr>
<td>RAPID PULL DOWN</td>
<td>• Increased vehicle usage • Increased distribution centre productivity</td>
<td>• Lower emissions from vehicle engine</td>
</tr>
<tr>
<td>PRECISE TEMPERATURE CONTROL</td>
<td>• Enhanced temperature control and increased product shelf life • Reduced load loss under extreme conditions • Suitable for semi-live loads due to anti-top-freezing control</td>
<td>• Reduced waste from spoilage</td>
</tr>
<tr>
<td>INNOVATIVE TECHNOLOGY</td>
<td>• Complements an environmentally responsible corporate identity • Life costs compare favourably with conventional technology</td>
<td>• No cumulative global warming effect from refrigeration • Powered by recycled natural refrigerant</td>
</tr>
<tr>
<td>ZERO DIESEL EMISSIONS FROM REFRIGERATION</td>
<td>• Fuel cost largely independent of oil price fluctuation • Compliance with current and future regulations</td>
<td>• Significantly lower carbon footprint</td>
</tr>
<tr>
<td>NO FLUORINATED REFRIGERANT</td>
<td>• Compliance with current and future regulations</td>
<td>• No refrigerants to dispose of • No ozone depletion or increase in greenhouse gas emissions</td>
</tr>
<tr>
<td>HIGHER RELIABILITY</td>
<td>• Lower downtime • Longer service life of unit</td>
<td>• Fewer used parts and no lubricants or other hazardous waste to dispose of</td>
</tr>
<tr>
<td>FLEET MANAGEMENT</td>
<td>• Reduces operating costs • Increases security and reduces insurance risk • Increases truck/trailer asset utilisation</td>
<td>• Reduces vehicle emissions</td>
</tr>
</tbody>
</table>
A complete product range

The CryoTech product range covers all typical distribution vehicle configurations, with both single and multi temperature versions (lanes or compartments, up to three temperatures) for rigid trucks and trailers.

Zone configurations

### TRUCK

<table>
<thead>
<tr>
<th>Zones</th>
<th>ZONE 1</th>
<th>ZONE 2</th>
<th>ZONE 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 ZONES</td>
<td>Evaporator</td>
<td>2 x S-3 CT</td>
<td>17600 W</td>
</tr>
<tr>
<td></td>
<td>Cooling Capacity</td>
<td>17600 W</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total Cooling Capacity</td>
<td>17600 W</td>
<td></td>
</tr>
<tr>
<td>2 ZONES</td>
<td>Evaporator</td>
<td>S-3 CT S-3 CT</td>
<td>8800 W 8800 W</td>
</tr>
<tr>
<td></td>
<td>Cooling Capacity</td>
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</tr>
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<td></td>
<td>Total Cooling Capacity</td>
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<tr>
<td>3 ZONES</td>
<td>Evaporator</td>
<td>S-2 CT S-2 CT S-2 CT</td>
<td>5800 W 5800 W 5800 W</td>
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<tr>
<td></td>
<td>Cooling Capacity</td>
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<tr>
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<td>Total Cooling Capacity</td>
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</table>

### TRAILER

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<th>ZONE 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 ZONES</td>
<td>Evaporator</td>
<td>2 x S-3 CT + 1 x FB*</td>
<td>17600 W</td>
</tr>
<tr>
<td></td>
<td>Cooling Capacity</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>Total Cooling Capacity</td>
<td>17600 W</td>
<td></td>
</tr>
<tr>
<td>2 ZONES</td>
<td>Evaporator</td>
<td>S-3 CT + FB* S-2 CT + FB*</td>
<td>8800 W 5800 W</td>
</tr>
<tr>
<td></td>
<td>Cooling Capacity</td>
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<td>Total Cooling Capacity</td>
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<tr>
<td>3 ZONES</td>
<td>Evaporator</td>
<td>S-3 CT S-3 CT S-3 CT</td>
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<tr>
<td></td>
<td>Cooling Capacity</td>
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</tr>
<tr>
<td></td>
<td>Total Cooling Capacity</td>
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</table>

(*) FB = Fan Banks

Dimensions (in millimetres)

Remote evaporators
Find out how CryoTech can become the future of your business.

Contact your nearest Thermo King dealer.

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**WARRANTY CONDITIONS**

Thermo King warrants the new product delivered will be free of defects in material and workmanship for the period of time specified in the applicable warranties. Specific terms of the Thermo King warranty are available on request.
Thermo King – by Trane Technologies (NYSE: TT), a global climate innovator – is a worldwide leader in sustainable transport temperature control solutions. Thermo King has been providing transport temperature control solutions for a variety of applications, including trailers, truck bodies, buses, air, shipboard containers and railway cars since 1938.

For further information, please contact:
europe.thermoking.com

Find your nearest dealer on
dealers.thermoking.com