



# Central Chillers TC Series

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Revolutionary design dramatically reduces energy consumption and maintenance costs.



# Advanced compressor technology provides revolutionary results in chiller efficiency

## Now get even more with Thermal Care TC Series Central Chillers built with revolutionary, oil-free compressors.

Once again, Thermal Care is at the leading edge of process cooling technology. Our most recent line of central chillers utilizes **frictionless, magnetic-bearing compressors** to deliver optimum chiller performance and part load efficiencies.

## TC Series Chillers are the most energy efficient.

Recent advances in compressor technology have allowed Thermal Care to design a central chiller that is inherently efficient. The combination of magnetic, frictionless shaft bearings (*that require only two amps to levitate and start rotation of the compressor shaft*) and a **built-in variable speed drive** help save additional energy by eliminating inefficient compressor cycling.

Electronic expansion valves and electronic condenser water regulating valves both make automatic adjustments to help the compressor run at its most efficient level.

Oil-free operation, variable speed control and low compression ratios combine to provide unparalleled operational savings when compared to process

chillers using more traditional type compressors. The TC Series Chiller saves 40% (or more) – with energy efficiencies of 0.3 kW/ton (or lower) – when compared to chillers with screw-type compressors, depending on the actual load profiles and site location. That's an estimated savings of \$17,000 per year for a 120 ton chiller operating continuously at \$.07 per kWh.

## TC Series Chillers are the most reliable.

Compressors used in TC Series Chillers have only **one major moving part** — the compressor shaft. Frictionless bearings hold the shaft in place and allow it to levitate or rotate on a magnetic cushion. This advanced compressor technology has proven success in the aerospace industry and in gas transmission pump applications.

## TC Series Chillers are the most environmentally friendly.

The **oil-free design** of a frictionless compressor eliminates the need for an oil management system and any related costs. Also eliminated are potential problems that result from the inefficient operation of a compressor. This **unique compressor design** provides a full load **sound level of 71 dBA** (per compressor) compared to sound levels of 80 dBA or more from chillers using less sophisticated

compressor technology. No special sound deadening or mechanical room modifications are needed. Plus, every TC Series Chiller uses R-134a refrigerant, which is an environmentally responsible alternative to HCFC refrigerants.

## TC Series Chiller features

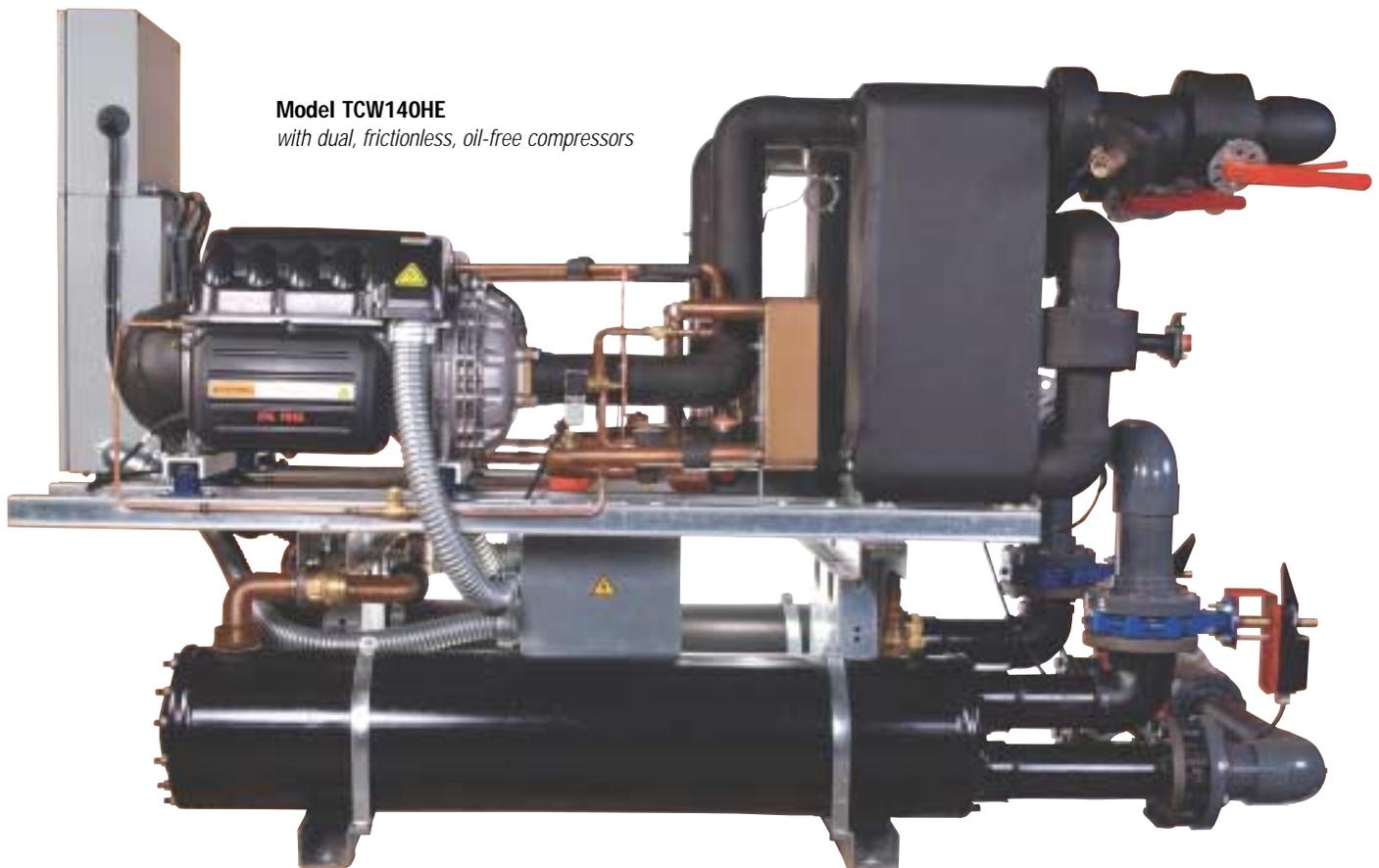
### Centrifugal compressor design

- Only one major moving part — the compressor shaft — is used to compress gas.
- Provides the industry's highest full load efficiency.
- Operates at compression ratios as low as 1.2 (*discharge pressure/suction pressure*) compared to 1.8 or higher for other types of compressors. Lower compression ratios mean less energy use.

### Integrated variable speed drive motor control

- Enhances temperature control capability for partial load performance.
- Soft-start control reduces peak energy demand and extends motor life by lowering initial current inrush at start-up.
- Reduces speed of the compressor to match capacity required by the application.
- As speed is reduced, required energy is reduced exponentially.

**Model TCW140HE**  
with dual, frictionless, oil-free compressors



# Efficiency, reliability and environmental friendliness.

## Integrated computer control

- TC Series premium control interface has 79 points of diagnostic information.
- Provides extensive sensing capabilities and monitors compressor bearing and shaft positions six million times per minute.
- Digitally controls the electronic expansion valves and electronic condenser water regulating valves.
- Electronic expansion valves improve efficiency by allowing chiller to operate at a lower discharge pressure. This cannot be done with mechanical valves, as they require a minimum pressure to be effective.
- Adaptive control maximizes operational performance and running time.
- Built-in 24 VDC control circuitry.

## Magnetic "friction-free" bearings

- Equipment life is extended since there is no contact with surfaces as the shaft rotates.
- Compressor senses a power failure as a normal chiller shutdown. Internal capacitors and rotational energy allow the motor to become a generator and provide a fail-safe shutdown.
- When compressor is not running, the shaft rests on a graphite-lined touchdown bearing.

## Oil-free operation

- Eliminates oil management system and all related maintenance costs.
- No potential oil contamination of refrigerant.
- No compressor failure due to oil contamination.
- Eliminates "evaporator oil films" shown by ASHRAE studies to increase energy costs as much as 8% annually.

## Lowest noise level

- Whisper-quiet sound levels with 71 dBA (per compressor) and virtually no structure-borne vibration.

## Choice of circuit arrangement

- Models are available with single or completely independent dual refrigeration circuits.

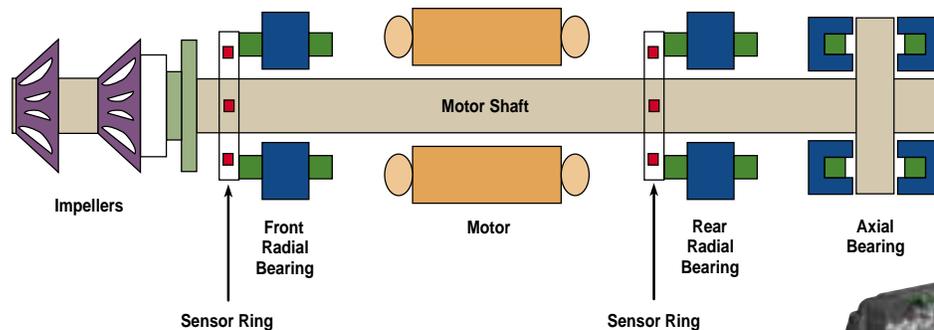
## Options available

- Condenser manifolds with service valves (*dual circuit only*).
- Nonferrous wetted construction on process circuit.
- Remote 24 VDC control panel.
- NFPA 79 construction.
- UL-listed control panel.
- Electric load balance valve (*for applications below 20% of full load conditions*).

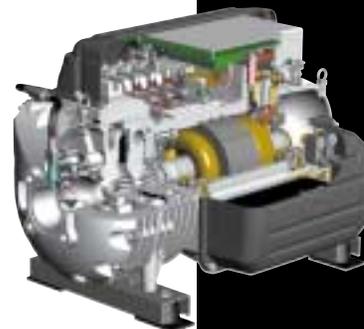
## Option packages available

- Flow and pressure package monitors both process flow and process pressure.
- High efficiency package improves refrigeration cycle efficiency up to 17%.
- Advanced software package allows remote operation or communication with equipment. Regulate temperatures and pressures, check amp draws, or monitor error messages and event logs with a special network/Internet connection feature. Access operational data in-plant or from any location – including online. Remote diagnostics from our staff of skilled customer service technicians is also just a click away with this feature.

## Magnetic bearing compressor technology



Magnetic bearings and sensors keep the shaft properly centered and positioned at all times.



## Here's how magnetic bearing, oil-free compressors work.

*Traditionally, centrifugal compressors use roller or hydrodynamic bearings, which require oil and lubrication systems. Recently introduced ceramic roller bearings eliminated some oil-related issues as the refrigerant itself is used to lubricate the bearings. **Magnetic bearing technology is significantly different** as it replaces lubricated bearings by levitating and rotating the compressor shaft on a magnetic cushion. It's oil-free, frictionless, and self-monitoring. In compressors using this advanced technology, the shaft is held precisely in place by one axial and two radial bearings and is the compressor's only moving part.*

*This advanced compressor technology makes our chillers with these exceptional compressors the quietest, most reliable, and most energy efficient chillers ever built.*

*Magnetic bearings help deliver unprecedented compressor efficiency and reliability because motor shaft rotation is precise and frictionless.*

# Powerful integrated control panel



An advanced PLC control system — with LCD display and 16-button interface — comes standard on every TC Series Central Chiller and provides important new benefits over other less-versatile control systems. Controllers are programmed to optimize chiller operations for your specific applications and the components used to build your chiller.

The PLC control algorithm allows for remarkable temperature accuracy and maintains process temperatures within 0.5 degree of set point. Our advanced control system also improves chiller start-up efficiency and allows for greater flexibility with load limiting operations. Choose the most efficient chillers on the market today — choose TC Series Central Chillers from Thermal Care.

Optional interface capabilities with outside systems can easily be configured. Controller report display screens include

#### Operational display

Users can view system conditions, input operating parameters and make control adjustment from a single interface point. Display any of the 24 report screens (including 11 refrigerant reports) in either metric or English measurements.

#### Report screens include

- Chiller on/off with security interlock
- Process coolant set point
- Actual inlet and outlet process coolant temperature
- Entering condenser water temperature
- Minimum and maximum compressor speed
- Actual demand kW
- Three phase volts
- Three phase amps
- DC bus voltage

#### Alarm display

Every TC Series Chiller comes with 12 adaptive alarm control report screens. Of these screens, 11 have non-critical alarm points where the compressor will automatically adjust motor speed, inlet guide vane, electronic water regulating valves (on water cooled units only), and electronic refrigerant expansion valves — all at the same time. Corrective action is automatically taken before the chiller shuts down.

#### Alarm screens include

- High process supply water temperature
- Low refrigerant suction pressure
- High refrigerant discharge temperature and pressure
- Three phase electrical current trip
- Compressor bearing fault
- Compressor motor fault

#### Electronic expansion valve and electronic condenser water regulating valve displays

- There are nine operational points of information on these reliable and efficient refrigerant metering valves (three on the electronic expansion valve and six on the electronic condenser water regulating valve).

#### Load profile history

- Chiller demand history is displayed on 10 discrete screens from 0 to 10% through 90 to 100% (in hours, minutes, and seconds).

#### Motor profile

- There are six available screens that show motor information from motor amps used to power kW.

#### Optional operational points of information include

- Electronic load balance valve with four data points.
- Analog output available for display of water flow rate or pressure.

## Units come with factory authorized start-up service

Thermal Care TC Series Central Chillers come standard with the industry's best warranties.

- One full year on parts
- One full year on labor
- Three full years on PLC controller and OCS Interface

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Printed in USA Form 3-205.2