

# Adaptive Frequency™ Drive for chillers



CenTraVac™ Model CVHE/F & CDHF

380V to 480V 50/60 Hz applications



While chiller efficiencies have improved dramatically over the past twenty years, for most commercial buildings the single largest energy user is still the chilled water system. Now there is a way to improve chilled water system efficiency without sacrificing comfort. This can be accomplished by using the Trane Adaptive Frequency Drive (AFD) as your chiller starter option of choice.

The primary purpose of an AFD is to reduce energy consumption by changing the speed of the motor. Other benefits include improved power factor and soft starts.

## Features and benefits

### Energy reduction

Conventional chillers use inlet vanes to provide stable operation at partload conditions. Capacity is reduced by closing the vanes while maintaining a constant motor speed. A variable speed drive maximizes chiller efficiency and reduces power consumption by adapting the compressor motor speed and inlet guide vanes to the chiller operating temperatures.

While AFDs can increase the offdesign efficiency of chillers, adding them for every application may not be the appropriate solution. Intelligent control of the condenser and chilled water temperatures are crucial for AFD savings in chiller system applications.

As with any chiller plant design strategy, it's important to look at various system alternatives and to use evaluation tools such as Trane System Analyzer™ or TRACE™ to determine the best overall chiller plant design strategy.

### Soft starts avoid mechanical stress

Controlled “soft” start with linear acceleration limits the starting current to reduce motor stress and power line disturbance, and provides a lower power demand on start. Reduced motor speed as a result of reduced condensing temperature means less current draw.

### Patented adaptive control

The combination of speed control and inlet guide-vane position is now optimized mathematically and controlled simultaneously to meet the dual requirements of water temperature control and efficiency.

The chiller controller will adjust speed as needed to track changing water-loop conditions. At the same time, it adjusts the inlet guide vanes to prevent the water temperature from deviating from its setpoint.

Tracer AdaptiView™ AFD control gets to the optimum speed faster, responds to changes quicker, and provides improved water temperature stability over previous chiller AFD controls.

Chiller controller reduces speed to the surge boundary based on the current differential operating pressure, making instantaneous corrections to speed and vane settings as conditions change, all while optimizing chiller efficiency.

## Harmonic distortion control

Standard in the design is an integrated active rectification control which assures a 5% or less total demand, harmonic current distortion (TDD) measured at the AFD. With Trane's design, it provides a point-source attenuation that meets IEEE 519.

## Refrigerant-cooled, factory installed

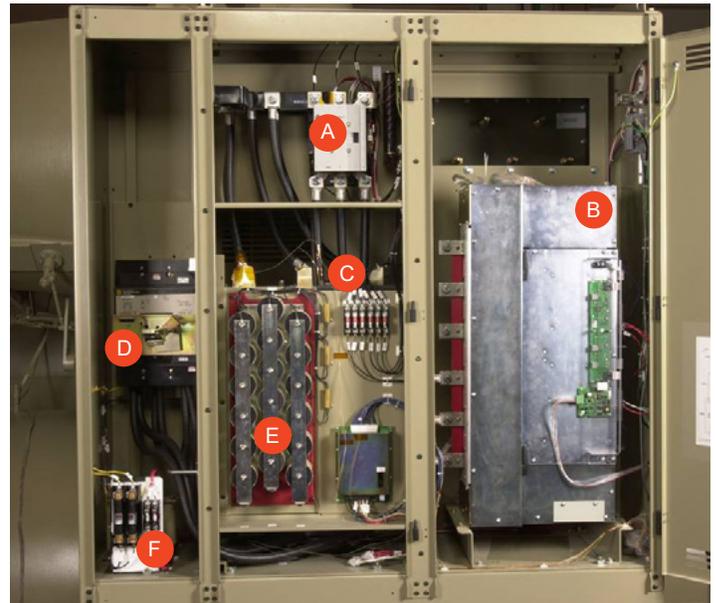
The Trane AFD is a closed-loop, refrigerant-cooled design. It features simple modular construction, and is completely factory installed, wired and tested to reduce complexity and cost.



## Design information

**Tonnage range:** Simplex (120 to 1,500 tons) and Duplex™ (1,300 to 3,000 tons)

**Enclosure:** NEMA1 ventilated enclosure with a tested short circuit withstand rating of 65,000 amps (option to 100,000 amps). It includes a padlockable door-mounted circuit breaker/shunt trip with AIC rating of 65,000 amps. The entire package is UL/CUL listed.



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|--|-------------------------------|
| <b>A</b> Precharge Contactor           | <b>D</b> Circuit Breaker      |
| <b>B</b> AFD with Integrated Rectifier | <b>E</b> Input Capacitor Bank |
| <b>C</b> Inductor (behind panel)       | <b>F</b> Control Transformer  |

**Voltage:** 380V to 480V, 50/60 Hz input power,  $\pm 10\%$ . Full motor voltage is applied regardless of the input voltage.

**Efficiency:** Minimum efficiency of 97% at rated load and 50/60 Hz. Power factor: Active input rectifier will regulate a unity displacement power factor of 0.98 at full load and 0.96 at all other loads.

## Literature

- CTV-PRC007-EN EarthWise™ CenTraVac™ Water-cooled liquid chillers
- CASE-SLX050-EN Hartford Plaza case study
- CASE-SLX094-EN 1700 Seventh Avenue case study



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