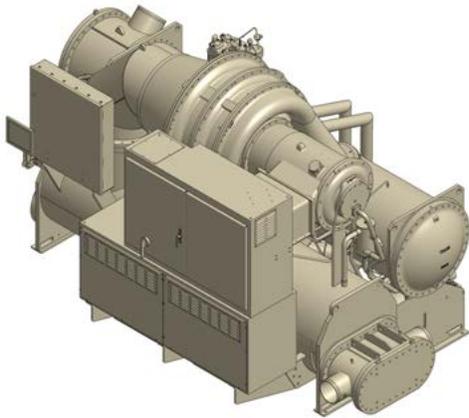


Adaptive Frequency Drive Third Generation, AFD3



CenTraVac Chiller Models CVHE and CVHF 575V
to 600V 60 Hz applications



While chiller efficiencies have improved dramatically over the past twenty years, the single largest energy user for most commercial buildings is still the chilled water system. And with the need to conserve energy, options like variable frequency drives (VFDs) are often considered.

The primary purpose of a VFD is to reduce energy consumption by changing the speed of the motor as load and tower conditions change. But VFDs can also bring other benefits, such as improved power factors and soft starts.

The AFD3 Adaptive Frequency™ Drive is the latest drive solution for CenTraVac™ chillers from Trane. The AFD3 expands voltage options for Canada and the data center market, which often require 575–600V power. Unique in the industry, the AFD3 features a true 24-pulse design for reliable operation and harmonic attenuation.

Features and benefits

Energy reduction

Conventional chillers use inlet guide vanes to provide stable operation at part-load 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 VFDs can increase the off-design efficiency of chillers, adding them for every application may not be the appropriate solution. Intelligent control of the condenser and chilled water temperatures is crucial for energy savings in chiller system applications.

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

Soft starts avoid mechanical stress

A 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 also means less current draw.

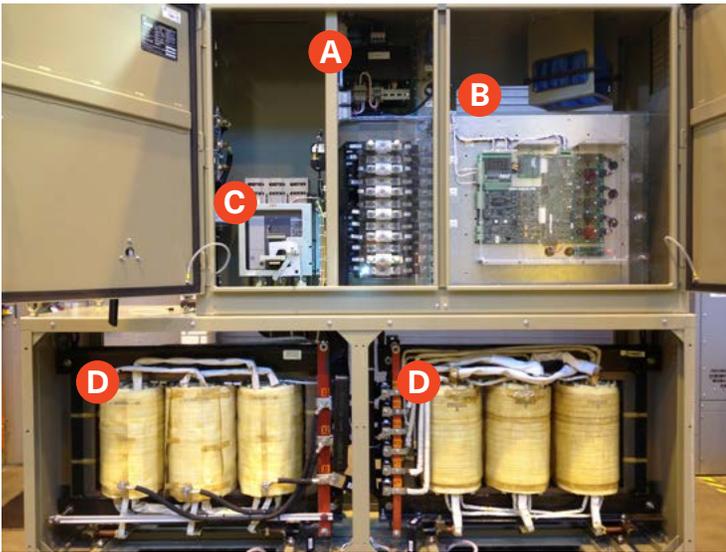
Patented Adaptive Control™

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.

The Tracer AdaptiView™ control gets to the optimum speed faster, responds to changes quicker, and provides improved water temperature stability compared to competitive VFD controls.

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



- A** Control Power Transformer
- B** AFD Rectifier and Inverter
- C** Circuit Breaker
- D** True 24-Pulse Harmonic Filter

Harmonic distortion control

Standard is a true 24-pulse design which assures a 5% or less total demand distortion (TDD) measured at the AFD3. With Trane's design, it provides a point-source attenuation that meets IEEE 519.

Refrigerant-cooled, factory-installed

The Trane AFD3 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: 120 to 850 tons

Voltage: 575V to 600V, 60 Hz input power, $\pm 10\%$. Full motor voltage is applied regardless of the input voltage.

Efficiency: Minimum efficiency of 96% at rated load and 60 Hz.

Power factor: AFD3 will regulate a near-unity displacement power factor of 0.98 at full load and 0.96 at all other loads.

Enclosure: NEMA1 ventilated enclosure with a tested short circuit withstand rating of 65,000 amps (option for 100,000 amps). Includes a lockable door and drive-mounted breaker/shunt trip with AIC rating of 65,000 amps (option for 100,000 amps).

The entire package is UL/CUL listed.

Literature

- CTV-PRC007-EN, CenTraVac chiller product catalog
- CTV-PRB004-EN, CenTraVac chiller starter and drive engineering bulletin

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