

# Variable Speed Drives Retrofits for Chillers, Fans, and Pumps

*Carrier*<sup>®</sup>

turn to the experts™





# Variable Speed Drives

## A Way Out of the Energy Dilemma

### Advantages of Variable Speed Drives

#### Variable Speed Technology Applied

Operating HVAC equipment doesn't have to be a trade-off between energy efficiency and comfort. Variable speed technology allows equipment to respond more precisely to building load, varying motor speed to match changing requirements. Chillers typically run 90 percent of the time at part load, and adjusting cooling delivery to actual building conditions will provide both efficiency and comfort gains. And since chillers are the single largest electrical load in most commercial buildings, efficiency improvements can yield considerable savings — especially in facilities with multiple shifts or round-the-clock operation.

VSDs can be installed on induction motors throughout your HVAC system, on chillers as well as pumps, cooling towers, air handlers and more. Carrier's Building Systems and Services specialists will analyze your building to pinpoint the locations that, together, will deliver maximum cost-saving benefits. At the same time, we can evaluate your controls system. Combining a VSD retrofit with an upgrade to microprocessor-based controls will multiply your efficiency gains and can be accomplished in one installation for minimal downtime.

#### Save Energy Dollars and More

With variable speed operation, current to your motors is limited. This can reduce your utility demand charge, which lowers your monthly bill even further. In addition to cutting energy costs, VSDs deliver several other benefits to improve your bottom line. Local power companies are increasingly rewarding energy-conserving solutions, and a VSD installation often qualifies for a utility rebate. With gentle, "soft" starts and gradual, controlled acceleration, VSDs eliminate much of the normal electrical and mechanical start-up stress on motor insulation, belts, pulleys, gear boxes and other components. This greatly reduces typical wear and tear, enhancing reliability, and extending motor and system life. An added benefit is the quieter operation slower motor speeds provide at part-load operation. VSDs also protect against the harmful and potentially costly effects of power surges and fluctuations, as well as electrical power line disturbances. When applied to air handlers, VSDs provide more precise airflow control for improved efficiency and comfort.

From a financial perspective, VSDs are a great investment, with rapid payback — as little as two-to-three years on a chiller motor, depending on energy costs and chiller hours of operation. Carrier's financing\* options make this an even more attractive energy management strategy. And to ensure ongoing savings and optimal performance, we offer predictive maintenance programs and preventive maintenance and service choices.

\*Financing is provided through independently owned financial groups and is not affiliated with or part of Carrier Corporation.



**Power crunch.  
Energy crisis.  
Escalating utility costs.  
Sound familiar?**

The current climate of energy uncertainties and spiraling expenses can create anxiety for even the most experienced and competent building owners and managers. Increasingly, your facility decisions must be based on efficiency gains and long-term operating cost control. You need to plan effectively for future price increases — and also address the reality of today's high utility bills and continually increasing energy costs. What can you do to trim energy costs?

In most facilities, there is substantial room for improvement. But it takes expert analysis to identify the opportunities, and well-engineered solutions to make an ongoing difference in your energy outlook. Research by the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) shows that approximately 40 percent of all energy used in a typical building is for heating, ventilation and air conditioning operation. Carrier's Building Systems and Services team has the expertise and technology to help you meet your energy management challenges with high efficiency systems and cost-cutting strategies.

The motors on your chillers, pumps, cooling towers and fans account for a significant portion of the energy your HVAC system consumes. One of the most effective technologies applied in recent years is the use of retrofit variable speed drives, or VSDs, on HVAC system induction motors. These drives prevent wasted energy by precisely matching motor speed with cooling demand, and can dramatically cut power usage. In addition, they reduce mechanical stress and motor wear, requiring less maintenance and prolonging system life.

VSDs are one of the most cost-effective ways to maximize efficiency and reduce operating costs. The savings are immediately realized, going straight to your bottom line.

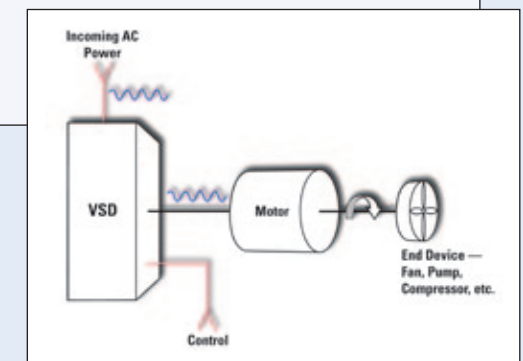
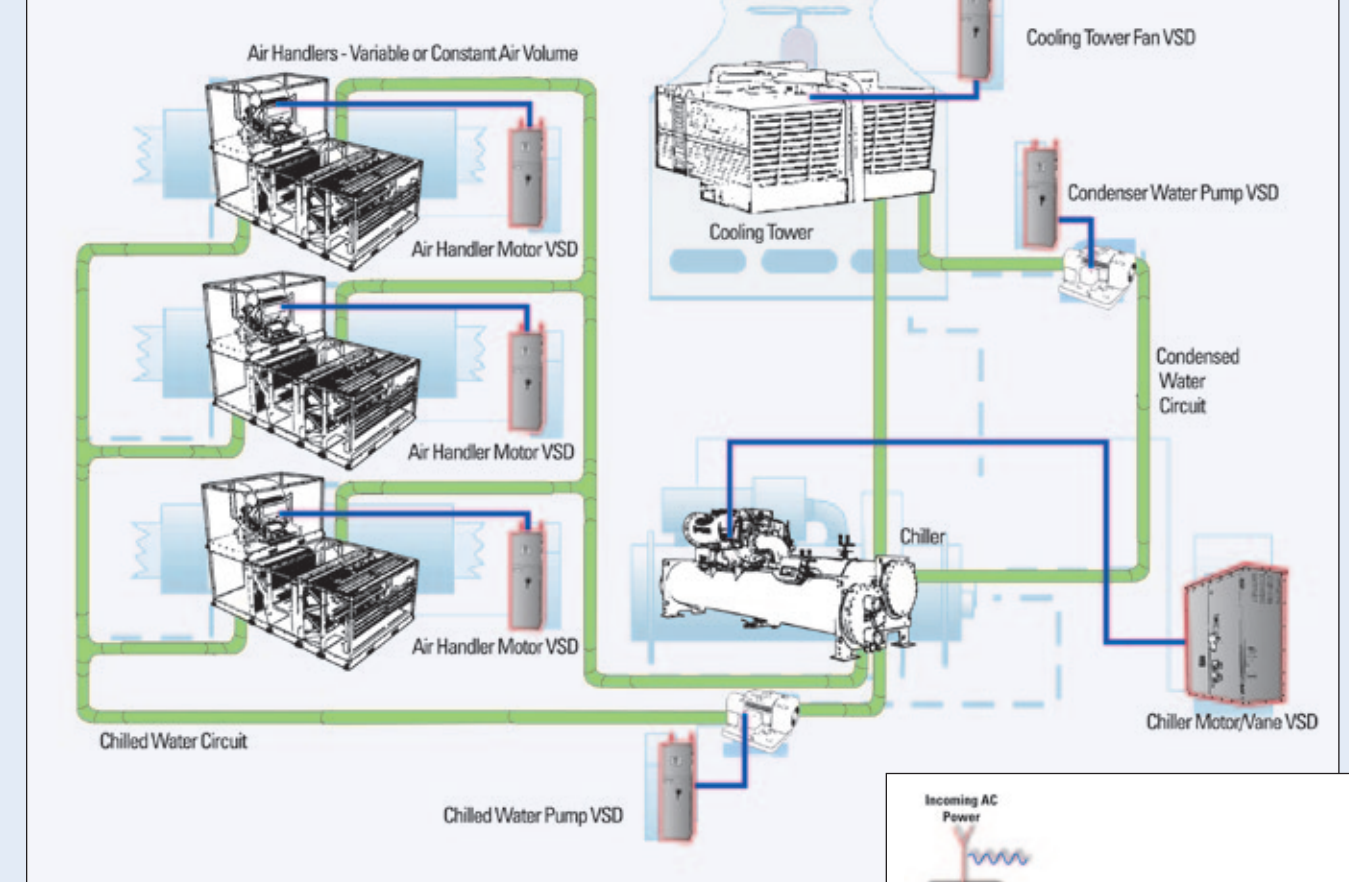
#### Precision Cost Efficiency

- Optimized efficiency at part-load conditions
- Reduced energy consumption
- Equipment operates at lowest possible motor speeds
- Added flexibility for changing building requirements
- Often qualifies for utility rebates

#### Soft Starts With Low In-Rush Current

- In-rush current maintained at or below motor full-load amp (FLA) rating
- Controlled acceleration reduces electrical and mechanical stress
- Reduced motor wear for increased operational life
- Lower maintenance costs
- Can reduce utility demand charges
- Standard VSDs available from 3HP to 5,000HP for chillers, fans, and pumps
- Standard three phase voltages available from 208v, 240v, 575v, 480v, 2400v, and 4160v

#### Applying a Proven Technology



A VSD is a solid state control that varies the speed of an AC induction motor. It converts the three-phase power from fixed voltage/fixed speed to variable voltage/variable speed required to change the motor's speed without losing torque. In each application, operation is optimized by matching the actual cooling needs or process requirements with precise motor speed. The result: energy savings, reduced equipment wear and good reliability.

## Take Control of Your Energy Future

Variable speed drives can be a key strategy in your overall energy management plan. Adding VSDs to your chillers and ancillary equipment is an easy way to reduce your energy overhead, reducing expenses immediately and delivering ongoing cost containment benefits. Carrier Building Systems and Services experts are ready to guide you every step of the way, from building assessment, procurement and installation to project management, service and financing\*.



So take advantage of this cost-effective technology to dramatically change your energy picture. VSDs are a great way to protect yourself from the volatility of the utilities market — and reduce your anxiety in these uncertain times. To learn more, call 1.800.CARRIER or visit our website at [www.carrier.com](http://www.carrier.com).

## Carrier's Building Solutions

VSDs are just one part of the multi-faceted system optimization Carrier can perform for your facility. Carrier Building Systems and Services experts guide you throughout the process, including building assessment; system design; equipment selection; project management; startup and extended warranty; service; and financing.\* Projects can include:

- Chillers
- Cooling towers
- Boilers
- Water treatment
- Controls
- Pumps
- VSDs
- And More...



## Turn to the Experts

From concept to finished product, your local Carrier commercial sales and service representatives walk with you every step of the way. Whether you have one building, multiple sites nationwide or special equipment and facility requirements, Carrier sales and service will recommend a solution that fits your scope and budget. To find a representative near you, call 1-800-CARRIER or visit [www.carrier.com](http://www.carrier.com).

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## The Future of the World Depends on Our Ability... to Sustain it.

As the world's largest provider of heating, cooling and refrigeration systems, we believe that market leadership requires environmental leadership. Carrier sets industry standards for environmentally sound business practices and a commitment to sustainability across its products, services and operations. We demonstrate this commitment by creating environmentally responsible solutions that consume less energy and incorporate innovations that improve the world — indoors and out.



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