

# Simple Control for Single-Phase AC Induction Motors in HVAC Systems

## IMPACTS

### New Motor Controller Provides Noise Reduction and Increases Efficiency

A new approach to electric motor control removes the need for complex, high-frequency, high-voltage digital controllers that are motor and application specific. With the help of a grant from the Inventions and Innovation Program, Opto Generic Devices, Inc., developed an optical programmable encoder and controller combination that offers continually adaptive/variable speed, optimized commutation, dynamic vector control, real-time feedback, application tuning, and signal enhancement for operating AC motors. Based on this technology, OGD's subsidiary, OGD V-HVAC, Inc., has developed a new technology, with the Adaptive Climate Controller (ACC), using optical programming, that controls single-phase motors. While this controller has many uses with small motors, its most popular applications address the need to provide climate control and healthy indoor air quality with energy efficiency, noise reduction, relative humidity control, and moisture control for mold abatement. Air filtration systems function more effectively with gradually changing airflow than with abrupt off-on fan cycling that accelerates harmful particles and organisms through mechanical and electronic filters.

In addition to providing a second, analog input for low DC voltage, the factory-supplied temperature sensor provides feedback for the controller to maintain temperature in the human comfort zone by gently mixing room air to avoid the extremes of cold air near the floor and warm air near the ceiling. If the comfort demands suddenly change, such as when many persons enter a classroom or conference room, the ACC ramps up airflow as the mechanical system supplies heated or chilled air at temperatures above or below the human comfort zone, responding quickly to the changing room needs. Gradually ramping up fan speeds, instead of turning fans on full blast whenever the thermostat calls for heated or chilled air, conserves energy by using only the electrical and thermal energy necessary to satisfy the demand. In systems such as fan coils where thermal energy is transferred from heated or chilled coils into the air, the ACC enhances thermal energy exchange from the coils as it gradually ramps down fan speed in response to the actual supply air temperature as it settles into the setpoint temperature even after the thermostat has closed the valve that brings in heated or chilled water. Thus, the coil thermal energy transfer with the room continues even after the water valve has closed, allowing for additional electrical savings in chillers and fuel savings in boilers.

### Benefits

#### Ease of Installation

Control upgrades are easily installed on existing systems within minutes.

#### Energy Savings

Adaptively varies airflow to only what is needed.

#### Product Quality

Reduces noise for sleeping hospital patients and hotel guests and provides quieter conditions for classrooms and conference rooms.

### Overview

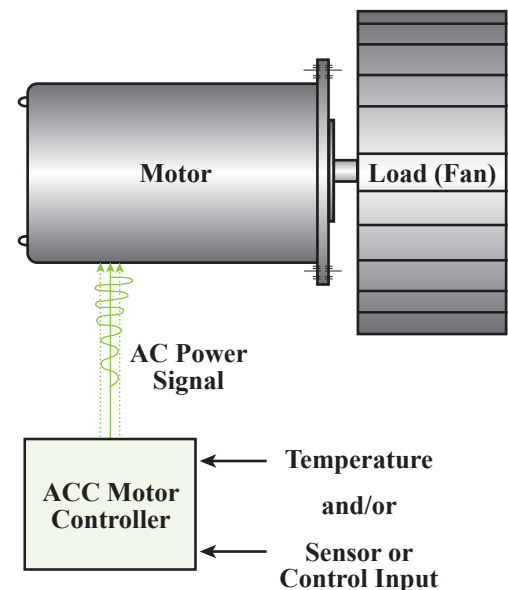
- ◆ Developed by Opto Generic Devices, Inc.
- ◆ Commercialized in 2005

### Applications

Controls small single-phase motors up to 240 VAC and 12 amps full load, including HVAC system fans found in hospitals, residences, hotels, nursing homes, schools, and other institutions. Other HVAC components controlled include fan coils, unit ventilators, and exhaust fans.

### Capabilities

- ◆ Accepts one or two analog inputs, including temperature and low DC voltage from a sensor or building management system.
- ◆ Adaptively varies the airflow across fan coils to control indoor climate.
- ◆ Reduces noise of system.



*OGD Electric Motor Control*