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12685-E

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Available Technologies

Whole Building Diagnostician

SUMMARY

The Whole Building Diagnostician (WBD) is a software package that provides automated detection and diagnosis of energy performance problems. The WBD provides real-time tracking of energy consumption and utilization in the building.

The WBD consists of two major components: the Whole Building Energy Module (WBE) and the Outdoor Air/Economizer Diagnostic Module (OAE). The WBD tracks overall building energy use, monitors the performance of air-handling units, and detects problems with outside air control. The current WBD is designed to work in commercial buildings larger than 500,000 square feet. Due to the technological advancements and sensors needed to support the WBD, this system requires control systems ten years old or fewer.

Whole Building Energy Module

WBE tracks end use of the total building electrical energy. It provides a graphical record of building performance and usage every day. The history determines constant variables or fluctuations for different times of the year. Over time, the daily performance history allows the user to identify major changes in energy consumption. WBE uses the following variables to predict and diagnose energy consumption: time of day, day of year, day of week, outdoor air temperature, relative humidity and occupancy.

There are two major components of the WBE: a diagnostic tool and a baseline tool. The diagnostic tool creates diagnostic messages based on energy-related computations. The baseline tool provides the system with a mechanism to model and predict building energy uses. The WBE system monitors the following energy consumption: total electric energy, total thermal energy, HVAC energy (other than chiller) and chiller unit energy. The WBE makes its energy usage predictions based on actual conditions and compares them to the past history.

Outdoor Air Economizer

The OAE module monitors the performance of air handling units and detects over 20 different problems with outside air control and economizer operation. The system notifies the operator of potential malfunctions and lists potential causes. The system includes explanations for each proposed correctable action. To work correctly, the OAE needs the following data inputs: maximum possible outside air fraction; minimum acceptable outside air ventilation rate; type of air handling unit; type of economizer control; freeze protection or supply temperature control.

The OAE system determines errors by periodically checking several data points from the economizers and air-handling units. The data points that are required for OAE to function are: outside air temperature, return air temperature, mixed air temperature, heating and cooling status, on/off status of the supply fan, positioning of the damper controls, and relative humidity or dew point temperature (economizers with enthalpy based controls).

The OAE module supports most commercial economizers and constant-air-volume systems and variable-air-volume systems (no volume compensation) air handlers.

Technology Portfolio(s)

- » Building Efficiency
- » Energy Efficiency Solutions

Potential Industry Applications

- » Computers & Electronics

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