American Public Power Association's 2011 DEED Energy Innovator Award

Omaha Public Power District, Nebraska
OPPD Digital Roof Top Unit Pilot Project

The award was given based on the completion of two pilot projects by OPPD (Omaha Public Power District) in which the Digital Roof Top Unit (Digi-RTU™) was installed into Rooftop Air Conditioners. The typical HVAC roof top system consumes 30% - 40% more energy than needed and is generally equipped with a constant speed compressor and an oversized fan system. By adding a Digi-RTU™, the kW savings per air conditioning unit ranged from 25% - 60% while the compressor cycling diminished by up to 70% and occupant comfort was maintained.

By adding a Digi-RTU™, the kW savings per air conditioning unit ranged from 25% – 60% while compressor cycling diminished by up to 70%. Occupant comfort was also maintained.

2014 Study - California Utility's Emerging Technologies Coordinating Council

http://www.bes-tech.net/wp-content/uploads/2015/06/ETTC-CA-variable_speed_controller_dxhvacunits.pdf

FAQs

1. **What is a Digi-RTU™?** A Digi-RTU™ is an aftermarket control kit designed to improve the energy efficiency of a rooftop air conditioning unit.
2. **What are the benefits of using a Digi-RTU™?** Reduced electricity energy consumption up to 60%. Reduced electricity peak demand up to 60%. Reduced compressor cycling frequency. Maintenance of room temperature and humidity levels. Reduced noise.
3. **What is the typical payback for a Digi-RTU™?** The typical payback period is 2-4 years depending on utility rates, climate zones, rooftop unit capacities, and incentives and rebates from utility companies
4. **How does a Digi-RTU™ work?** The Digi-RTU™ modulates the capacity of a rooftop air conditioning unit to match the cooling or heating loads by regulating both the supply air fan (VAF) and compressor speed (VRF).
5. **Can Digi-RTU's™ be installed in any rooftop unit?** The Digi-RTU™ can be installed on any rooftop unit.
6. **Is the Digi-RTU™ sized according to the roof top unit?** Yes, the Digi-RTU™ is sized based on the rooftop unit.
7. **How long does it take to install a Digi-RTU™?** It takes about 4-5 hours to install and test a Digi-RTU™.
8. **What is the communication protocol that comes with the Digi-RTU™?** It is suitable for direct t-stat connections and can communicate with any BAS system

4640 South 59th Street
Omaha, Nebraska 68117
402.502.2340
info@bes-tech.net
bes-tech.net

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Digi-RTU™

Reducing Peak Demand and Energy Consumption
of Rooftop Units

The Digi-RTU™

The Digi-RTU™ modulates the rooftop unit and the capacity of the air and water source heat pumps to match the dynamic nature of building cooling or heating loads. As a result, energy waste is minimized and indoor comfort is improved. Because of its unique operating principles, the Digi-RTU™ achieves greater savings than any other product on the market.

- **Existing Building Automation System (BAS), Thermostat & HVAC controllers remain**
- **Reduces total electrical consumption & peak demand by up to 60%**
- **Reduces gas consumption by 10-15%**
- **Better maintains the room temperature set-point and humidity**
- **Reduces compressor cycling**
- **Reduces operating and maintenance costs**

Digi-RTU™ Advance Controls

- Variable Refrigerant Flow; compressor optimization
- Variable Air Flow; fan speed control
- Integrates with the existing economizer
- Regulates the indoor air CO_2 level
- Fault Detection & Diagnostics
- Demand Response Functionality; load limit capable
- Remote Monitoring

Digi-RTU™ Applications

- Package rooftop units, water and air source heat-pumps, split units
- Installed on HVAC rooftop units between 3-50 tons
- Up to 4 cooling and 2 heating stages
- Integrates with any existing thermostat or BMS
- Demand Control Ventilation CO_2 satisfies ASHRAE 62.1 & CA Title 24 Requirements
- Economizer Integration
- Demand Response (DR) signal enabled

Fault Detection & Diagnostics

- Space temperature and humidity outside of set-point
- Fault detection; fan mode, room temperature set-point, and operations schedule
- Loose fan belt
- Duct blockage and dirty filter
- Low or high compressor refrigerant charge
- Outside air damper failure
- Heater Failure

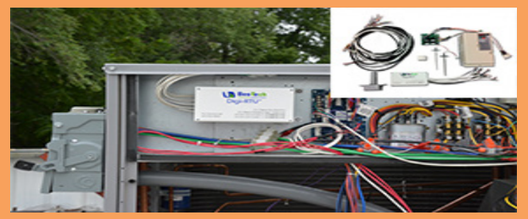
Demand Response

- Digi-RTU™ responds to all space heating/ cooling calls according to established set-points
- Prior notice of a Demand Event, the Digi-RTU™ can "pre-cool" the space and then maintain established space temperature according to set-points established by the BMS
- A Load Limit factor for the rooftop unit is sent through the BAS to the Digi-RTU™, and can range from 50-100%, thereby limiting the speed of the rooftop unit

Remote Monitoring & Control

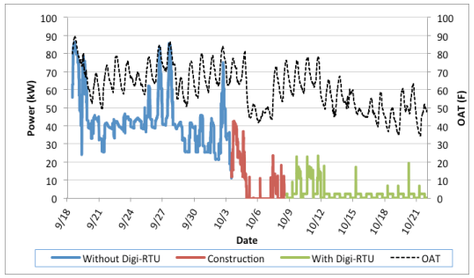
- kWh consumption
- kW
- Temperature and Set-point
- VFD speed
- Damper position
- Space CO_2 level
- Anytime measurement periods
- HVAC unit OFF

Digi-RTU™ : 4-5 Hour Install

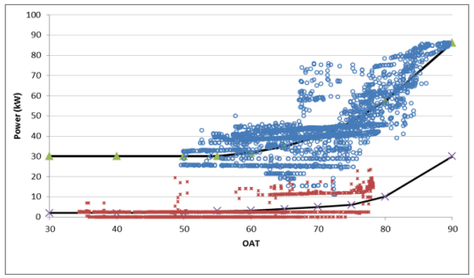


Case Studies - HVAC Roof Top

DISTRIBUTION CENTER



71% kW Decrease



85% kWh Decrease

Water Source Heat Pumps

PUBLIC SCHOOL

- Consumption: **45% kWh Decrease**
- Peak Demand: **40% kW Decrease**