# Universal Microgrid Controller®

Microgrids are the building blocks of the electric utility of the future. They allow for maximum use of renewable energy, reduce our dependence on fossil fuels, and increase community resiliency. Renewable energy microgrids are also the only environmentally acceptable answer to desperately needed electrification in the developing world.

The Universal Microgrid Controller® is a supervisory control system designed to meet the needs of a wide spectrum of microgrid applications and architectures. It monitors and controls the operation of all microgrid system components, providing high power quality and reliability, maximum renewable energy utilization, and minimum fossil fuel consumption. At the core of the UMC is a real-time optimization engine that dispatches the various microgrid assets to achieve the lowest possible overall cost of energy while still providing energy security.

The UMC is an easy-to-install industrial control cabinet designed to operate reliably for the life of the project and is a fully integrated control system that virtually eliminates the need for any control system integration engineering on the part of the project developer/installer.
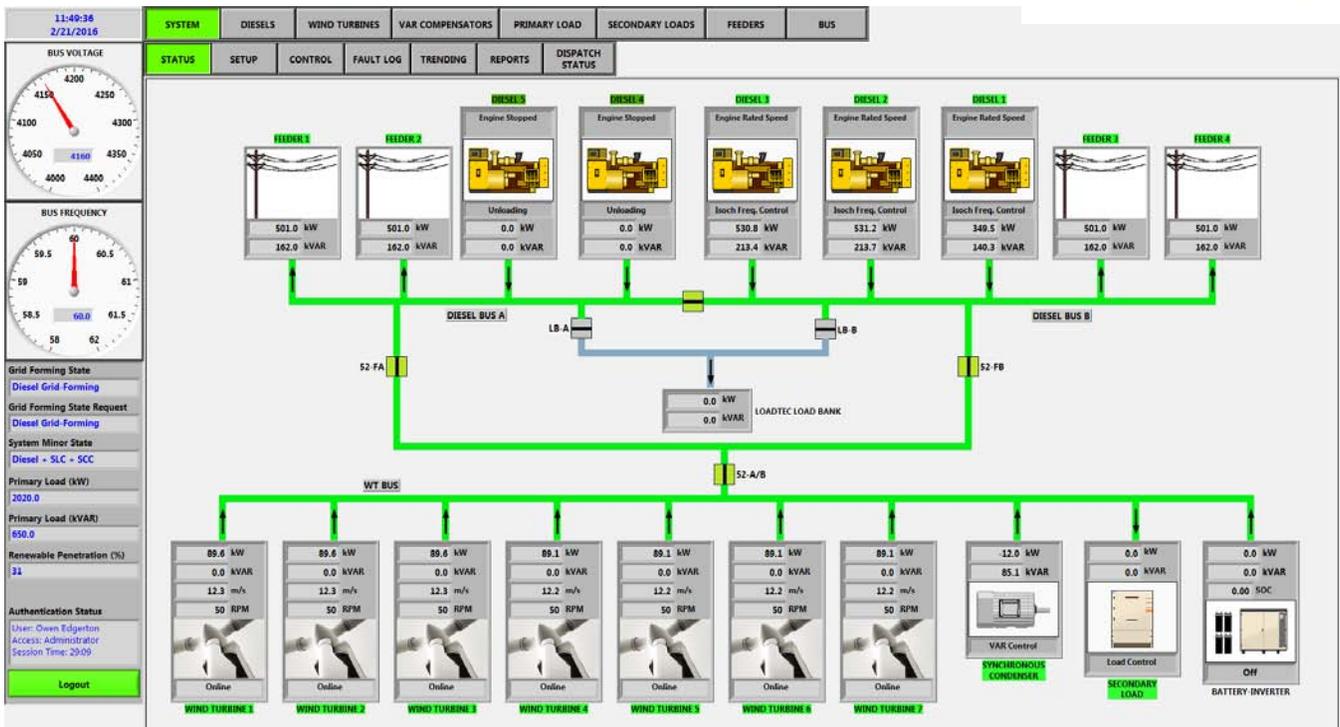
Specifications

SUPPORTED MICROGRID COMPONENTS

Grid Intertie
- IEEE 1547 protective relays
- controllable circuit breakers

Feeders
- Power monitors and protective relays
- Controllable circuit breakers

Dispatchable Generators
- Diesel generators
- Natural gas generators
- CHP Units
- Microturbines

Renewable Generators
- Wind turbines
- PV Inverters
- PV battery chargers
- Micro-hydro turbines

Electric Energy Storage
- Batteries
- Ultra-capacitors
- Flywheels
- Thermal storage

Secondary (Controllable) Loads
- Electric boilers
- Electric thermal storage units
- Ice energy storage units
- Water pumps
- Desalination systems

MAJOR CONTROL FUNCTIONS

- Optimal diesel generator dispatch, including diesel-off operation when feasible
- Prioritization of loads, with ability to designate critical and non-priority loads. Automatic load shedding as necessary to avoid system overload
- Limit wind power output as necessary using selective enable or power limit set point
- Limit solar power output as necessary using selective enable or power limit set point
- SOC management of energy storage systems
- Control multiple secondary loads to maximize renewable energy utilization and minimize storage requirement
- Seamless transition between diesel-on and diesel-off modes of operation
- Seamless transition between grid-connected and islanded operation
- Detection and automatic adaptation to bus configuration in multi-bus microgrids
- Control microgrid assets to meet grid-facing objectives:
  - demand limiting
  - export limiting
  - load shifting
  - ramp rate limiting
  - automated demand response

OPERATOR INTERFACE

- Real-time display of all power system components
- Overview screen shows full system operation at a glance
- Component screens display detailed status and operation
- Setup screens allowed extensive customization of microgrid operation
- All faults annunciated on the appropriate component screens A fault log provides fault chronology and historical record.
- Real time and historical trending of all power flows.
- 4 levels of password-protected operator access: Operator, Technician, Engineer, Administrator
- Secure remote access to the UMC operator interface via the Internet

DATA LOGGING AND REPORTING

- Extensive data logging on all system components to on-board database to support local supply of trending, fault logs, event logs, etc.
- All logged data pushed to central data server in the cloud for subsequent analysis and report generation.

CONTROL PLATFORM

- Embedded fanless and diskless industrial computers
- 23" color touch screen high resolution operator interface
- Optional multi-monitor control console
- Proprietary software keyed to hardware and licensed for specific system configuration.
- Pay only for value received

MICROGRID CONTROL NETWORK

- Integrated gateway/firewall provides Internet connectivity while ensuring cybersecurity
- Managed switches optimize communications traffic flow and enhance network security
- Component Communication Protocols: Modbus TCP, Modbus RTU, CAN Bus
- Utility Communication Protocols: IEEE 2030.5

ENCLOSURE

- NEMA 12 (IP65), free-standing enclosure
- Dimensions: 32"W x 21"D x 79"H
- Weight: 370 lbs. (approx.)
- Locking door handle
- Passive convective cooling

POWER SUPPLY

- Input Power: 120/240 VAC 50/60 Hz or 24VDC
- Redundant power supplies for reliability
- Integral battery backup for black start capability
- External DC battery backup optional

Specifications subject to change without notice.