This document contains easy formatted text that you can copy/paste for writing offers or specifying Woodward power management products for your project.

Product(s) described:	DSLC-2; Digital Synchronizer and Load Control MSLC-2; Master Synchronizer and Load Control

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General

The power generation system shall be controlled by a microprocessor based power management system consisting of Woodward DSLC-2 & MSLC-2 series controllers. Redundant Ethernet communications shall be used to control multiple generators, breakers and utility feeds. The power management system shall provide synchronization, breaker close and open commands, soft loading and unloading for bumpless transfers, real KW load control, reactive KVAR control, metering, communications and diagnostic features. The system can be configured either in a simple island arrangement or in a complex system with up to 32 generators and 16 utility tie breakers.

Synchronizing

- Independent phase match or slip frequency synchronization with voltage matching for control of multiple circuit breakers on generators, bus segments and utility mains.
- Adjustable phase window, voltage window, dwell time, reclose attempts, and reclose timing
- Dead bus closing logic internal to the controllers.
- Synchronization time out monitoring
- Breaker open/close monitoring
- Independent proportional and integral gain settings for frequency and voltage control.

Real KW Load Control

- True RMS voltage and current sensing for reduced susceptibility to harmonics.
- Speed bias signal to prime mover speed control freely configurable in the range of +/- 20 mA, +/- 10 volts, or 0-10 VDC, 500 Hz PWM, and discrete raise/lower to control prime movers of different types (diesel engine, gaseous or bio-fueled engine, gas turbine, steam turbine, micro-turbine, etc.).
- Configurable load and unload ramp rates for generators, bus segments, or the entire system at the utility ties.
- Proportional load sharing (isochronous or droop) of up to 32 generators, regardless of KW rating.
- Base load control.
- Process control.
- Input/export control at the utility mains breakers.
- Externally adjustable load or process references using analog inputs, Modbus RTU, or Modbus TCP.
- Digital load sharing integral to the controller without external load sharing control modules.

Reactive KVAR Control

- Voltage bias signal to AVR freely configurable in the range of +/- 20 ma, +/- 10 volts, or 0-10 VDC, 500 Hz PWM, and discrete raise/lower.
- Configurable load and unload ramp rates for generators, bus segments, or the entire system at the utility ties
- Proportional VAR sharing on isolated buses regardless of KW rating.
- VAR/PF control during process, base load, or import/export control.
- Externally adjustable VAR or PF references using analog inputs, Modbus RTU, or Modbus TCP.

Metering

- All metering duplicated between generator and mains.
- Voltage—L-N, L-L, per phase and average.
- Current—Line current per phase and average, and unbalanced load.
- Frequency
- Power—VA, VAR , PF, Watts and total KW hours

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Communication

- Dedicated Ethernet network for precise system communications between all power management controllers to reduce system wiring.
- Two Ethernet communication ports.
- Single or Redundant Ethernet communications for enhanced reliability.
    - If one network is compromised, the system automatically switches to the second network.
- System update recognizes the system configuration to allow for adding or removing generator sets.
- Serial Modbus RTU (slave) or Ethernet communication for SCADA annunciation and external control.
- Configuration via PC/laptop with Woodward Toolkit service tool either via RS-232 or Ethernet.
- PLC compatible.
- Multi-level password protection

Diagnostic Features

- Design allows operation with one or more system node failures. The controllers will provide a missing member alarm, which will allow the system, if programmed accordingly, to go from isochronous to droop load sharing for continued operation.
- Phase rotation mismatch
- Network communications error alarm
- Synchronization time out and reclose alarms.
- The Woodward Toolkit software allows graphical overview of generators, generator bus bar and mains parameters with trending.
- All controllers can be programmed from a single connection to the Ethernet network.

Mounting Style

- The back panel mounted controllers shall be encased in a rugged powder coated aluminum chassis for use in harsh environments or confined spaces.

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