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:	easYgen-3100/3200 Genset Controllers

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General

The power generation system shall be controlled by a microprocessor based power management system consisting of Woodward easYgen-3100/3200 series controller on each generator source. The generator controllers shall operate in a peer to peer system with up to 32 synchronous or asynchronous generators. This system will provide automatic sequencing of multiple units, synchronization, generator and utility breaker control, soft loading and unloading for bumpless transfers, real KW load control, reactive KVAR or power factor control, metering, communications and diagnostic features. The generator controller shall be a commercially available control and not PLC based, and shall be configured for operation without the need for customized, proprietary programming or software. The system shall be able to be configured either in a simple island arrangement or in a system with up to one utility intertie and multiple generators. Specific requirements are as follows:

Automatic Unit Sequencing

- Automatically starts and stops generator sets upon utility failure or utility restoration.
- Automatically starts and stops generator sets based on plant load to maintain the power interchange at the utility intertie within predetermined limits.
- Automatic generator set loading and unloading for soft transfer
- Automatic load dependent start/stop for improved generator system efficiency with configurable generator priority sequencing based on generator size, service hours, fuel efficiency or fixed sequence.
- Applications with up to 32 generator sets and one utility tie in the system.

Synchronizing

- Independent phase match or slip frequency synchronization with voltage matching for control of generator and mains circuit breakers.
- Adjustable phase and voltage window.
- Dead bus closing logic internal to the controller to ensure multiple units close safely within the synchronization parameters.
- Breaker or contactor control for generators.

Real KW Load Control

- True RMS voltage and current measurement 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, micro-turbine, etc.).
- Configurable load and unload ramp rates for generators or the entire system at the utility tie.
- Proportional load sharing (isochronous or droop) of up to 32 generators, regardless of KW rating.
- Base load control.
- Process control.
- Import/export control at the utility mains breaker.
- Externally adjustable load or process references using analog inputs, Modbus RTU, or CAN open.
- 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.
- VAR sharing on isolated buses using percentage base reactive load sharing
- Configurable load and unload ramp rates for generators, or the entire system at the utility ties.
- VAR/PF control in process, base load, or import/export control.
- Externally adjustable VAR or PF references using analog inputs, Modbus RTU, or CANopen.

Engine-Control/Protection

- Configurable start and stop logic for diesel and gas engines with fully programmable settings.
- CAN SAE J1939 network communication/control to engine ECU.
- Engine overspeed and underspeed (ANSI 12 & 14).
- Engine speed/frequency mismatch detection.
- Cool down timer.
- Customizable protection based upon J1939 or analog inputs.

Generator Protection

- Directional power (ANSI 32) and reverse power (ANSI 32R)
- Unbalanced load (ANSI 46)
- Phase rotation (ANSI 47)
- Phase over current instantaneous (ANSI 50) and time (ANSI 51)
- Phase over current with voltage restraint (ANSI 51V)
- Power Factor (ANSI 55)
- Loss of Excitation (40Q)
- Over/under voltage (ANSI 27/59)
- Over/under frequency (ANSI 81 O/U)

Mains Protection (Generator Decoupling)

- Over/under voltage (ANSI 27/59)
- Phase shift (ANSI 78)
- Phase Sequence (ANSI 47)
- Over/under frequency (ANSI 81O/U)
- Rate of change of frequency (ANSI 81 ROCOF)

Measurement

- True RMS Voltage—L-N, L-L, average; 1-phase or 3-phase generator and mains, 1-phase load bus.
- True RMS Current—Line current and average; 1-phase or 3-phase generator, 1-phase mains
- Frequency
- Power—kVA, kVAR and kW per phase and total; PF per phase and average; total generator kWhr and kVARhr

Communications

- The generator controller shall utilize a CAN bus communication interface which allows control and operation of the complete system.
- CAN SAE J1939 network communications to engine ECU.
- Serial Modbus RTU (slave) communication for SCADA annunciation and external control.
- Connectivity with the Remote Panel for complete annunciation, control and configuration of the generator controllers, over CANopen protocol at up to a distance of 250 meters.
- Configuration via PC/laptop with Woodward Toolkit service tool.
- Multi-level password protection

Diagnostic Features

- Design allows operation with one or more system node failures. Controller 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.
- Configuration Check in Load Dependent Start/Stop
- Phase rotation mismatch
- Network communications error alarm
- Breaker/Contactor synchronization time out and reclose alarms
- Speed/frequency mismatch
- Analog input out of range alarms
- Sequence of events recorder—300 events FIFO with real time clock.
- Graphical overview of generators and mains on easYgen 3200 and RP-3000 Remote Panel.

Mounting Styles

- The door mounted generator controller shall have sealed soft keys and a large, easy-to-read backlit color LCD, with a graphical display and text that can configured in 14 languages.
- The back panel mounted generator controller shall be encased in a rugged aluminum chassis. Back panel mounting decreases wiring to the door, and may eliminate the need for voltage transformers to keep dangerous voltages away from the door.
- The door mounted remote control and annunciation panel can be used with either the back panel mounted generator controller or the door mounted generator controller. The remote panel provides control from the front panel (door), reduces wiring to the door, and keeps high voltage connections on the back panel if used with the back panel mounted controller. Each remote panel communicates with one generator controller.