

# EGS Control System

## for Industrial Spark-ignited Engines

### Applications

Woodward's EGS control system controls industrial gas engines used in power generation, pumping, and other stationary applications ranging from 300 kW to 2000 kW (400–2700 hp).

The highly accurate, closed-loop control system helps customers meet regulated emission levels, while maintaining engine performance over a very large range of fuel qualities.

The EGS system is the latest in the Woodward line of engine control systems designed to meet the increasing needs of our customers.

### System Overview

The EGS system is a fully integrated engine control solution.

The Woodward EGS system has full authority over spark, fuel, and air. Additionally, diagnostics such as detonation and misfire as well as other health monitoring are integrated into the system.

This fully integrated approach permits precise governing and air/fuel ratio controls while remaining flexible enough large variations in fuel quality.

The EGS system has two different lean-burn closed-loop algorithms:

- Gas Quality Closed Loop (GQCL) control (patents: US5657732 / EP0727574B1)—Uses engine efficiency and generator load measurement to eliminate the oxygen sensors. The EGS system calculates the amount of fuel required for a given emissions output.

The EGS then commands the TecJet™ fuel control valve to deliver the optimum amount of fuel to the engine. In this manner, only the precise amount of fuel is delivered in order to have the highest achievable fuel economy without putting the engine into detonation or mis-firing conditions.

- UEGO closed-loop control—Uses exhaust oxygen measurement. In this mode, the EGS system operates as a standard Air Fuel Ratio controller.

The EGS system includes Woodward's full range of gas engine components:

- Integrated throttle bodies ranging from 16 mm to 180 mm.
- Three TecJet fuel control valves of varying sizes to meet the application needs.

The EGS delivers ignition energy of up to 360 mJ for optimized combustion stability with complete control of ignition timing and ignition energy.

Engine health and diagnostics are integrated to ensure the engine remains in a safe operating mode.

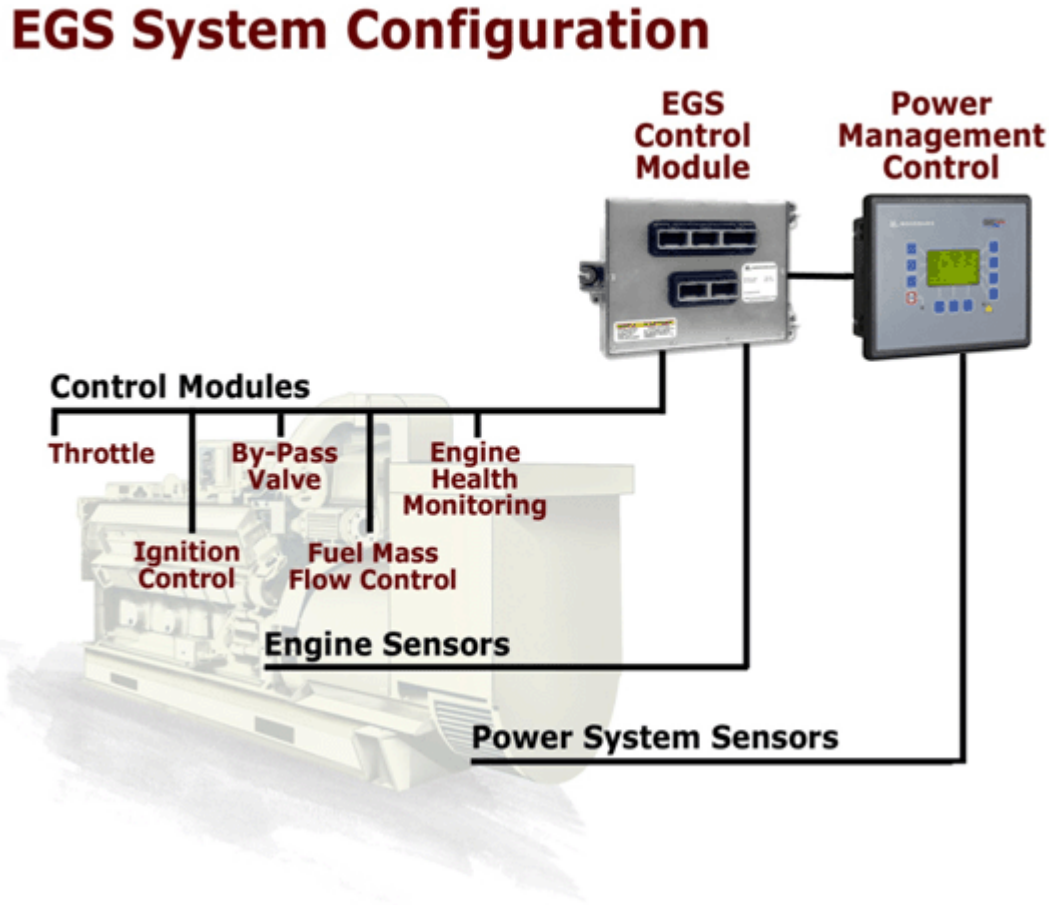


- Allows engine to operate on different fuels while maintaining engine efficiency
- Integrated approach reduces system complexity and reduces overall cost
- Speed-density-based Air Fuel Ratio controller
- Can handle gas quality changes of  $\pm 10\%$  CH<sub>4</sub>
- Can handle gas quality changes between 20–100% CH<sub>4</sub> with use of External Gas Quality Analyzer
- Flexible Programming

The ECU can also expand with the GCP and easYgen™ power management product line. These products can form the gateway to external systems and also display information that is available from the EGS system.

The EGS system is programmed in Woodward's GAP™ software. Multiple password protection and the ability to perform custom software routines in addition to standard Woodward software allow the customer complete authority over the applications.

The following functional diagram shows how all the components are integrated into a system:



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