

Compliance, Performance, Support

The Woodward E3: All-Encompassing Engine And Emissions Control



RETROFIT
GAS ENGINE
CONTROL
SYSTEMS

Overview

E3
RICH-BURN TRIM

E3
LEAN-BURN TRIM

E3
FULL-AUTHORITY

E3
FUEL BLENDING

• ALL-ENCOMPASSING ENGINE & EMISSIONS CONTROL •

E3

WOODWARD E3 SYSTEM

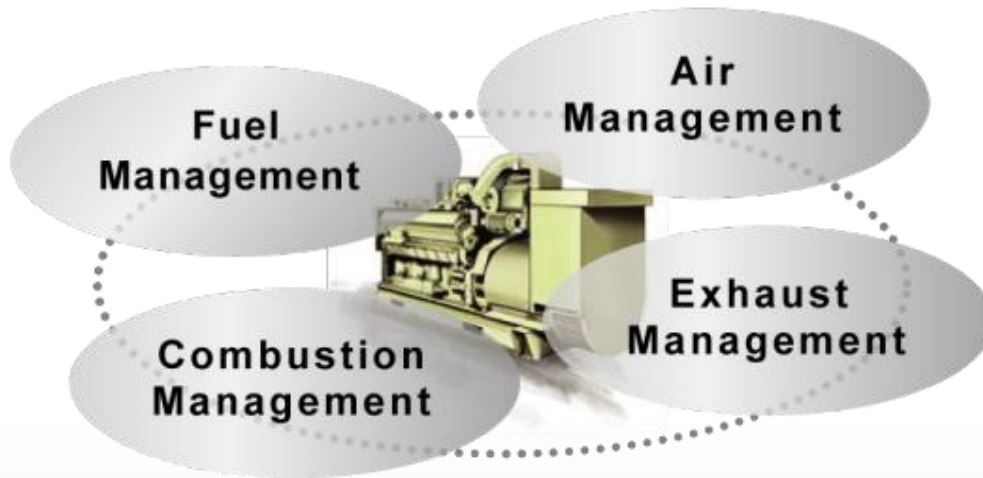


INTRO: RICH-BURN TRIM



The E3 Rich-Burn Trim control system is designed for the most popular engines used in gas compression and many power generation or irrigation pump applications, where the energy quality of the fuel supply is stable.

WHY: RICH-BURN TRIM



Our E3 Rich-Burn Trim system-based solution analyzes and controls all of the functions of your engine and catalyst, and optimizes the amount of time your engine is in compliance. If the engine falls out of compliance the system has the ability to shut down or notify the user of the condition. The integrated solution.

OVERVIEW: RICH-BURN TRIM

- System provides complete misfire detection, speed control, engine protection, and sequencing ignition in addition to AFR Control
- The system is easy to calibrate
- The system is easy to use on a day-to-day basis and will notify the operator if an out of compliance condition may exist
- The system optimizes the amount of time that the engine is in compliance as compared to other products on the market
- Utilizes proved automotive technology to solve the problems of the industrial marketplace

YOUR RER TEAM

- Reduce emissions and maximize fuel economy
- Expand alternate fuel choices
- Improve performance
- Combines globally proven technologies with locally proven application expertise
- Solutions are identically engineered and centrally documented
- Whole system solutions view provides superior advances in engine control
- Not owned by any OEM, Woodward provides comprehensive control systems for every prime mover
- RER partners take responsibility for installing, commissioning, servicing and supporting the complete engine control system

INTRO: LEAN-BURN TRIM

The E3 Lean-Burn Trim control system is designed to control lean-burn industrial gas engines used in many power generation, pumping, and other stationary applications ranging from 300 kW to 2000 kW (400–2700 hp)



WHY: LEAN-BURN TRIM



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.

OVERVIEW: LEAN-BURN TRIM

The E3 Lean-Burn Trim system is a fully integrated engine control solution. The Woodward E3 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 control while remaining flexible enough for large variations in fuel quality.

- Integrated approach reduces system complexity and reduces overall cost
- Scalable to meet entire range of customer needs
- Integrated engine protection and diagnostics to ensure safe engine operation
- Power generation or mechanical drive applications

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INTRO: FULL-AUTHORITY



The E3 Full-Authority system is designed for gas engines used in applications where the energy quality of the fuel supply is variable – such as engines used at landfills, wastewater treatment plants, or bio-gas recovery plants.

WHY: FULL-AUTHORITY



The E3 Full-Authority system is a fully integrated engine control solution that 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.

OVERVIEW: FULL-AUTHORITY

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

- 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 $\pm 10\%$ CH₄
- Can handle gas quality changes between 20–100% CH₄ with use of an External Gas Quality Analyzer
- Flexible Programming

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INTRO: FUEL BLENDING

Designed for gas engines used in applications where the energy quality of the fuel supply is variable, but where the customer wants to be able to supplement the “poor” energy quality fuels with natural gas. The E3 Fuel Blending system blends high quality natural gas with lower quality bio-gas fuels “on the fly” to achieve desired power outputs or when bio-gas is in low supply.



WHY: FUEL BLENDING



The E3 Fuel Blending control system consists of an engine controller that performs speed/load control, air fuel ratio control, ignition control, diagnostics and basic engine protection. These systems are structured so that the customer can implement only what he needs with a sliding price scale.

OVERVIEW: FUEL BLENDING

Woodward can offer an alternative to your competitors to blend fuel for your bio-gas solutions without the high cost of a plant level PLC-based blending system and can keep your engine running on depleted bio-gas sources without you purchasing a new engine that produces less power.



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START