E³ Rich Burn Control
with StableSense* Technology

Applications

Woodward's E³ Rich Burn control provides highly stable, closed-loop control of air-fuel ratio on engines using three-way catalysts, to help engine owners meet regulated emission levels without operator adjustment. The exclusive StableSense* technology maintains uptime and catalyst performance by using the only industrial-gas-engine-specific O₂ sensor.

The E³ Rich Burn control is designed for use on stoichiometric, spark-ignited natural-gas engines used in gas compression, power generation, pumping, and other stationary applications ranging from under 300 kW (400 hp) to over 2 MW (2700 hp).

The E³ Rich Burn control is part of the Woodward line of E³ All-Encompassing Engine and Emissions controls designed to meet the performance and reliability needs of gas engine manufacturers, owners and operators.

Control Overview

The E³ Rich Burn control is a fully integrated engine control solution. It can be used as a stand-alone air/fuel ratio controller or as a complete gas engine emissions and engine control. The control features exclusive StableSense technology, to optimize the amount of time the engine remains in compliance. The StableSense technology contains special software and uses an industrial natural gas O₂ sensor that is unaffected by engine exhaust methane and hydrogen.

The E³ Rich Burn control has full authority over spark, fuel, and air. Additionally, diagnostics such as misfire detection as well as other health monitoring and engine protection are integrated into the control.

E³—A fully integrated control for increased reliability:
- Air-fuel ratio control (base control)
- Integrated speed/load control (optional)
- Ignition control (optional)
- Engine protection
  - Full misfire detection for increased catalyst life and engine diagnostics
  - Overspeed monitoring for immediate engine shutdown
- Start fuel limiting for easier, more consistent starting
- Scalable from small mono- to large stereo-fuel systems

The E³ Rich Burn control works in conjunction with Woodward's full range of gas engine components:
- Woodward Integrated fuel valves and engine throttle bodies, from 16 mm to 180 mm
- Fixed-venturi mixers
- Ignition systems (Woodward IC-920 or IC-922)

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

*Trademark of Woodard, Inc. **—Trademark of Schneider Automation Inc.

Relevant Item Numbers

| Control - E3 Rich Burn AFR Only | 8280-1104 | StableSense Mating Connector | 8928-7363 |
| Control - E3 Rich Burn Speed Control | 8280-1105 | L-Series AFR Trim Valve | Per Catalog |
| Pickup – Magnetic (.625-18,1680-622 P.U.) | 5430-929 | L-Series AFR Connector Kit | 8928-396 |
| KIT - E3 - Mono AFR Sensor | 8928-7264 | F-Series AFR Trim Valve | Per Catalog |
| KIT - E3 - Stereo AFR Sensor | 8928-7265 | F-Series AFR Connector Kit | 8923-1312 |
| StableSense Sensor | 1689-1197 | E3 Rich Burn Control Manual | 26473 |

- Greatly reduced out-of-compliance downtime
- Exclusive StableSense* technology
- Engine and catalyst health monitoring and alarming
- Consistent engine starting over a wide range of conditions
- Integrated engine protection and diagnostics to ensure safe engine operation
- Works with both single- and dual-bank engines
- Improved engine performance with automatic on-line cylinder bank balancing on dual-bank engines
- Integrated approach improves reliability and reduces overall cost
- Scalable to meet the entire range of customer needs
- Supports RS-485 serial Modbus** slave multi-drop communications up to 115 kBaud
Typical Configurations

The E³ Rich Burn control can be applied in a number of configurations, including mono and stereo fuel supply, air-fuel only or air-fuel plus speed control variations, as well as high-energy ignition control options.

Mono-supply, Air-Fuel-Ratio (AFR) Control

Mono-supply, Air-Fuel-Ratio (AFR) + Speed Control

Stereo systems are dual-bank engine configurations that have two separate fuel-supply systems and two separate exhaust manifolds with one pre-catalyst HEGO sensor for each bank.

Environmental Specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
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<tbody>
<tr>
<td>Operating Temperature:</td>
<td>–40 °C to +85 °C (–40 °F to +185 °F)</td>
</tr>
<tr>
<td>Storage Temperature:</td>
<td>–40 °C to +105 °C (–40 °F to +221 °F)</td>
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<tr>
<td>Mechanical Vibration:</td>
<td>Woodward Vibration Test RV2 (Procedure 3-04-6231): 0.1 G²/Hz, 10 Hz to 2000 Hz, 12.8 Grms, 3 h/axis w/vibration isolation dampeners</td>
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<tr>
<td>Mechanical Shock:</td>
<td>50 G, 11 ms, half-sine wave, 4 shocks in each direction (24 total shocks)</td>
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Regulatory Compliance

European Compliance for CE Marking—These listings are limited only to those units bearing the CE Marking.


North American Compliance—These listings are limited only to those units bearing the CSA agency identification.

CSA: CSA Certified for Class I, Division 2, Groups A, B, C, D, T4 at 85 °C ambient.