

# L-Series

## Air/Fuel Ratio Control

### Applications

The L-Series Air/Fuel (A/F) Ratio Control may be used with the LC-50 family of integrated throttles and mixers for engines between 5 and 100 kW (7 and 134 hp). The L-Series A/F Ratio Control provides precise air/fuel ratio control for engines using three-way catalytic converters to reduce exhaust emissions. The L-Series A/F with an LC-50 mixer with standard production (stoichiometric) fuel hole sizes will allow closed-loop stoichiometric operation with gaseous fuels from low-quality pipeline natural gas to HD-5 LPG (propane).

The A/F Ratio Control and standard LC-50 configurations for mixer sizes 25, 30, 36, 43, and 50 will accommodate the full range of fuel types and fuel qualities.

### Description

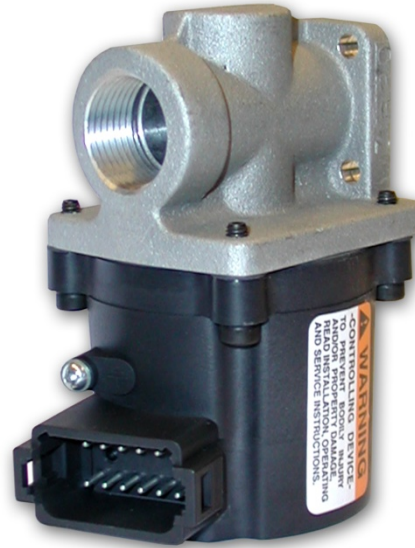
This control is a microprocessor-based air/fuel ratio control for four-stroke, gaseous-fueled engines operating with a near-stoichiometric air/fuel ratio. It is designed to work in conjunction with a three-way catalytic converter to efficiently reduce exhaust emissions. By automatically maintaining an optimum air/fuel mixture, emissions compliance is achieved and catalyst life is maximized without operator supervision.

A catalyst that simultaneously eliminates hydrocarbons (HC), carbon monoxide (CO), and oxides of nitrogen (NO<sub>x</sub>) is referred to as a “three-way” catalyst. The use of a three-way catalyst will reduce the emissions of a stoichiometric engine. However, for these reductions to be reliable and maximized, and to protect the catalyst element from premature aging or damage, a very precisely controlled air/fuel ratio is required.

The heated exhaust gas oxygen sensor (HEGO) will generate a voltage signal that is characteristic of this ideal stoichiometric window. The HEGO sensor operates as a reference-gas sensor, and compares the residual oxygen in the exhaust gas with the oxygen in the reference atmosphere (air circulating inside the sensor). The active sensor ceramic is heated by the internal heating element. Sensor heating reduces the influence of the exhaust gas temperature on the sensor-ceramic temperature and therefore the temperature-dependent sensor functions. The L-Series A/F Ratio Control monitors the system HEGO output and adjusts fuel flow for optimum emissions.

System features include:

- Pre-catalyst, closed-loop, exhaust oxygen feedback control
- Compatible with wide range of fuel qualities: 850 BTU/SCF (34.0 MJ/m<sup>3</sup>) to 2325 BTU/SCF (93 MJ/m<sup>3</sup>)
- “On-the-fly switchable” between two sets of control targets and position limits for bi-fuel operation
- Manually switchable to enable open-loop operation
- LED/Alarm driver to indicate diagnostic states
- Programmable diagnostics including minimum and maximum positions and O<sub>2</sub> sensor voltage
- Configurable fault and security settings
- 0–5 V output for shaft position indication
- Setpoint and open-loop position adjustment using Raise/Lower or Target 1/Target 2 commands
- Bias input with programmable curve for feed-forward position and alternate open-loop position setting



- Fully integrated control and trim valve
- Reduced wiring and installation time
- Compatible with natural gas or propane or both
- Does not use vacuum hoses
- Easy setup and tuning using PC-based service tool
- Tamper resistant
- Discrete output for fault indication
- Voltage output for position indication
- Configurable I/O

## Flexible design.

## More intelligent engine control.

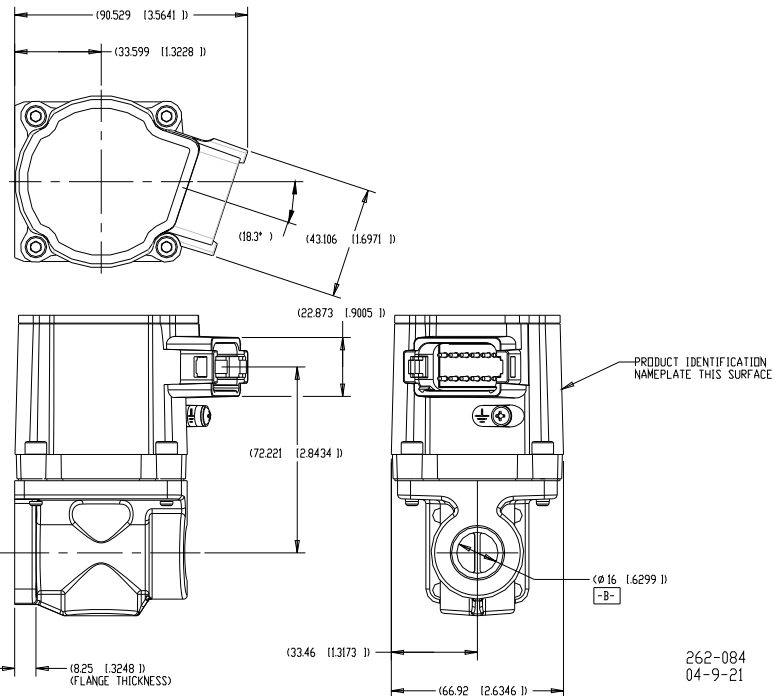
## Streamlines production process.

		<b>Specifications</b>		
Power Supply	12/24 volt system, 10 to 32 Vdc	Dimensions (WxHxL)	75.7 x 88.4 x 111.3 mm	
Power Consumption	Reverse polarity protection, 32 W max		(2.98 x 3.48 x 4.38 in.), excluding valve	
Torque	Nominal: 0.34 N·m (0.25 lb-ft) at 25 °C	Weight	425 g (15 oz), excluding valve	
	Maximum Transient (at 105 °C): 0.20 N·m (0.15 lb-ft)	Connector	12-pin Deutsch connector (DT06-12SA-P012)	
	Minimum Continuous (at 105 °C): 0.14 N·m (0.10 lb-ft)	HEGO Sensor	1680-6005	

		<b>Functions/Auxiliary Inputs</b>
Function Options		Position-based dynamics curve, catalyst perturbation logic, dual target setpoint/position selection, open-loop selection, Raise/Lower setpoint selection
Programming Port I/O		Programmable with Windows GUI software (9927-1222) and harness (8923-1061) 0–5 V position indication Discrete out for fault indication 5 aux inputs, configurable functions

		<b>Environment</b>
Operating Temperature		–40 to +105 °C (–40 to +221 °F)
Storage Temperature		–40 to +125 °C (–40 to +257 °F)
EMC		EN61000-6-2: Immunity for Industrial Environments EN61000-6-4: Emissions for Industrial Environments SAE J1113-21: Radiated Immunity (100 V/m) SAE J1113-11: Conducted Transient Immunity – Pulse 5b, Suppressed Load Dump (45 V)
Humidity		US MIL-STD 810E, Method 507.3, Procedure III
Shock		MS1-40G 11 ms sawtooth
Vibration		Random: 0.3 G <sup>2</sup> /Hz, 10–2000 Hz (22.1 Grms) 3 h/axis Sine: 5 G 2.5 mm peak-to-peak, 5–2000 Hz, 3 h/axis, 90 min dwells, 1 octave/min
Thermal Shock		SAE J1455, Paragraph 4.1.3.2
Fluid Resistance		IP56 per EN60529

		<b>Compliance</b>
CE		Compliant with EMC Directive 89/336/EEC
Other		Compliant as a component with Machinery Directive 98/37/EC
CSA		Class I, Division 2, Groups A, B, C, D T3C
		These listings are limited only to those units bearing the CSA agency identification.

**L-Series A/F Ratio Control Outline Drawing (16 mm)**

(Do not use for construction)

(also available in 22 mm, 25 mm, 30 mm, 36 mm, 43 mm, and 50 mm sizes)



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