ENGINE GOVERNING SYSTEM

ALR190-M Series
Electric Linear Actuators for MITSUBISHI L&S Series Engines

GOVERNORS AMERICA CORP.

- **Low-Cost, Compact Design**
- **Fast Response**
- **Linear Ball Bearings**
- **Precise Repeatability**
- **Spring Return to Minimum Fuel**
- **Maintenance Free**
- **Small Size**

INTRODUCTION

The **ALR190-M Series Electric Linear Integral Actuators** are designed to mount directly to the engine's fuel pump in place of the electric stop solenoids for **MITSUBISHI L & S Series Engines** (see **Table 1.**). The **ALR Series Electric Linear Actuators** exhibit high quality construction and are designed for high temperature operation. **GAC's** unique linear electromechanical technology provides proportional actuator movement, based on actuator coil current. **GAC** utilizes precision linear ball bearings, instead of bushings, and a minimum number of moving parts to improve response, repeatability and reliability.

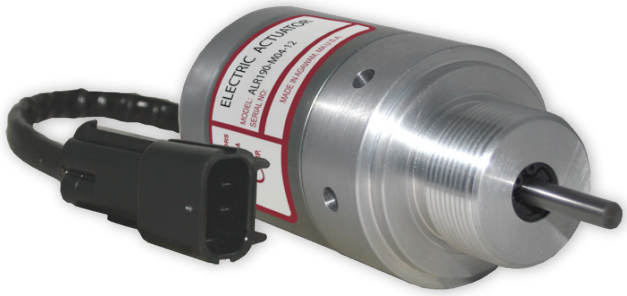
These unique, optimum fuel control, actuating devices will outperform externally mounted types of electric actuators. An integral high performance speed control system results when the **ALR Series Electric Linear Actuator** is installed on the engine and electrically connected to complementing governor system components. No external linkages or brackets are required and no extra engine manufacturer parts are needed. In addition, when the governor system is de-energized, the **ALR Series** actuators perform as fuel shut off solenoids.

The **ALR Series Electric Linear Actuators** are simple to install and are ideal for variable and constant speed engine governing applications (e.g., Compressors, Generator Sets, Pumps, Welders, etc.).

The **ALR Series** actuators are electromagnetic devices which move fuel system control racks with high accuracy and precise positioning. The actuator's output shaft retracts as power is increased and varies proportionally to input current to control the engine. They can be integrated in closed loop speed control systems. These actuators are compatible with **GAC** speed control units suitable for low current applications (**ESD2244, ESD2402, ESD5120,** and **ESD5520**). For more information on these controls visit the **GAC** website or call us at **Governors America Corp.**

DESCRIPTION

A basic engine speed control system is described as follows: The magnetic speed sensor generates an electrical signal that is proportional to engine speed. The signal is sent to the electronic speed control unit, which compares it to a preset engine speed setting. If the engine speed and the preset engine speed settings



are not equal, the speed control unit changes the actuator current which alters the actuator's magnetic force. The actuator's output shaft position is proportional to the magnetic force generated and is counter-balanced by an internal return spring. The motion of the actuator shaft against the fuel rack of the engine causes a change in fuel delivery until the engine speed equals the speed control unit preset engine speed setting.

Installation of **ALR Series** actuators does not defeat the engine's mechanical governor operation. During the installation process, the mechanical governor is set to a higher speed than the electric governor operating speed. In this configuration the mechanical governor acts as a speed limiter.

The integral return spring designed into an **ALR Series** actuator provides a fail-safe feature to ensure that when system power is switched off, or when battery power is lost, the output shaft is extended to its zero fuel position, which counteracts the engine's internal fuel rack spring, which can stop fuel delivery. The standard engine fuel shut off lever also remains functional and is not affected by the actuator installation.

WIRING

The **ALR190-M Series Electric Actuator** is pre-wired (see **Table 2.**) for either 12 or 24VDC operation.

Engine should be equipped with an independent shut down device to prevent overspeed, which can cause equipment damage or personal injury.

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EGSA Electrical Generating Systems Association

Diagram 1.

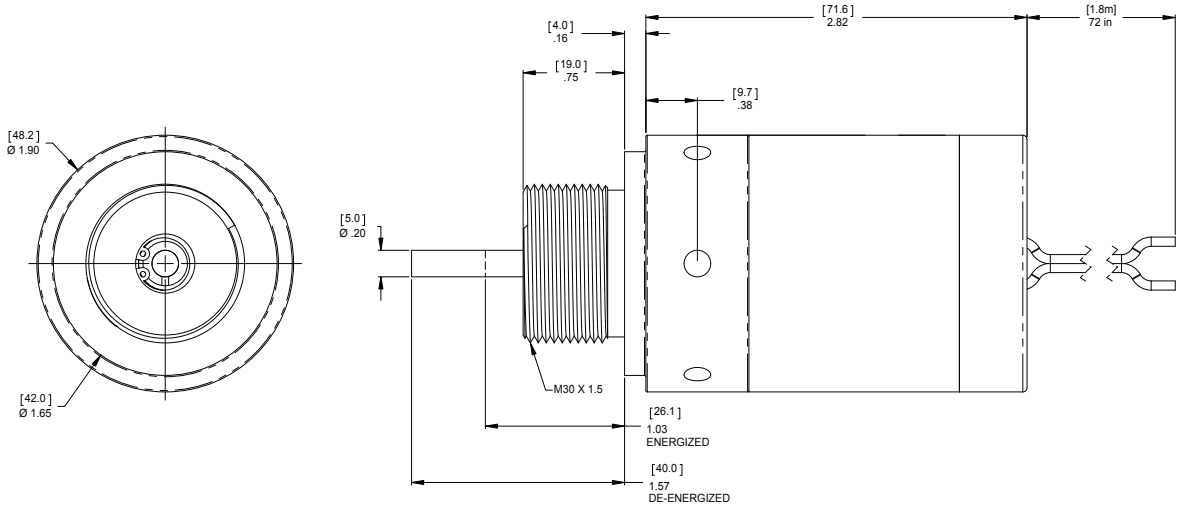

Table 1.

Applicable Engines	
MITSUBISHI	
L2E	**S3L2**
L3E	**S4L**
S3L	**S4L2**

Table 2.

ALR Order Information ALR dddaxy-vv					
MODEL NAME	**DIAMETER (ddd)**	**ENGINE MANUFACTURER (a)**	**ENGINE MODEL OR FAMILY (x)**	**CONNECTOR STYLE (y)**	**OPERATING VOLTAGE (vv)**
ALR	**190**	**M**	**0**		
Actuator, Linear, Reverse Acting	1.9"	Mitsubishi	Standard	**1 = No Connector, 10" Leads**	**12 for 12 VDC**
				2 = Molex	
				3 = Spade	**24 for 24 VDC**
				4 = Packard	
				5 = No Connector, 72" Leads	

SPECIFICATIONS

Performance

Operating Stroke ..... 0.54 in. (13.9mm)
Response Time (10-90%, 1-13mm) ..... 35 msec

Electrical

Operating Voltage (Dedicated Coil) .....12 or 24VDC
Nominal Operating Current ..... 3.2 A @ 12VDC
1.6 A @ 24VDC
Maximum Continuous Current ..... 5.0 A @ 12VDC
2.5 A @ 24VDC
Coil Resistance **ALR190-Mxy-12** .....1.8 ± 0.2 Ohms
ALR190-Mxy-24 ..... 7.2 ± 0.2 Ohms
Connection 16 AWG .....(0.8 mm²) leads

Environmental

Operating Temperature ..... -40 to 200°F (-40 to 95 °C)
Relative Humidity ..... Up to 100%
Vibration .....25 to 100 Hz, +/- 4g
Shock ..... 20 g, 11 msec.
All Surface Finishes ..... Fungus Proof and Corrosion Resistant
Sealing..... Oil, water, and dust resistant

Physical

Dimensions .....See **Diagram 1.**
Weight .....1.3lb (0.59 kg)

This document is subject to change without notice.
Caution: None of GAC products are flight certified controls including this item.