ENGINE GOVERNING SYSTEMS

EC 1-10251 CONTROLLER

General

The EC-1-10251 controller for the ECO-D actuators is an all solid-state design which results in a fast, stable engine response to speed or load changes. The controller measures *proportional* (amount of offspeed), *integral* (time of offspeed) and *derivate* (rate of change of offspeed) to ensure optimum performance.This feature allows for very stable engine operation at various load levels.

The controller electronics are conformally coated to provide resistance against, water y dust. Mounting holes are provided on the control board ease of panel installation. Set up of the controller is very simple since these are only speed and gain adjustments.

Standard Features

- All electric
- Mounts in any position
- Hight reliability
- Temperature stable
- Compatible with gas or diesel engines

Failsafe

The ECO-D Governor has an internal FAILSAFE circuit that instantly reacts to:

- Interruption of the DC power to spring return actuator to minimum fuel position.
- Loss of speed reference signal to spring return the actuator to minimum fuel position.

Speed Sensing

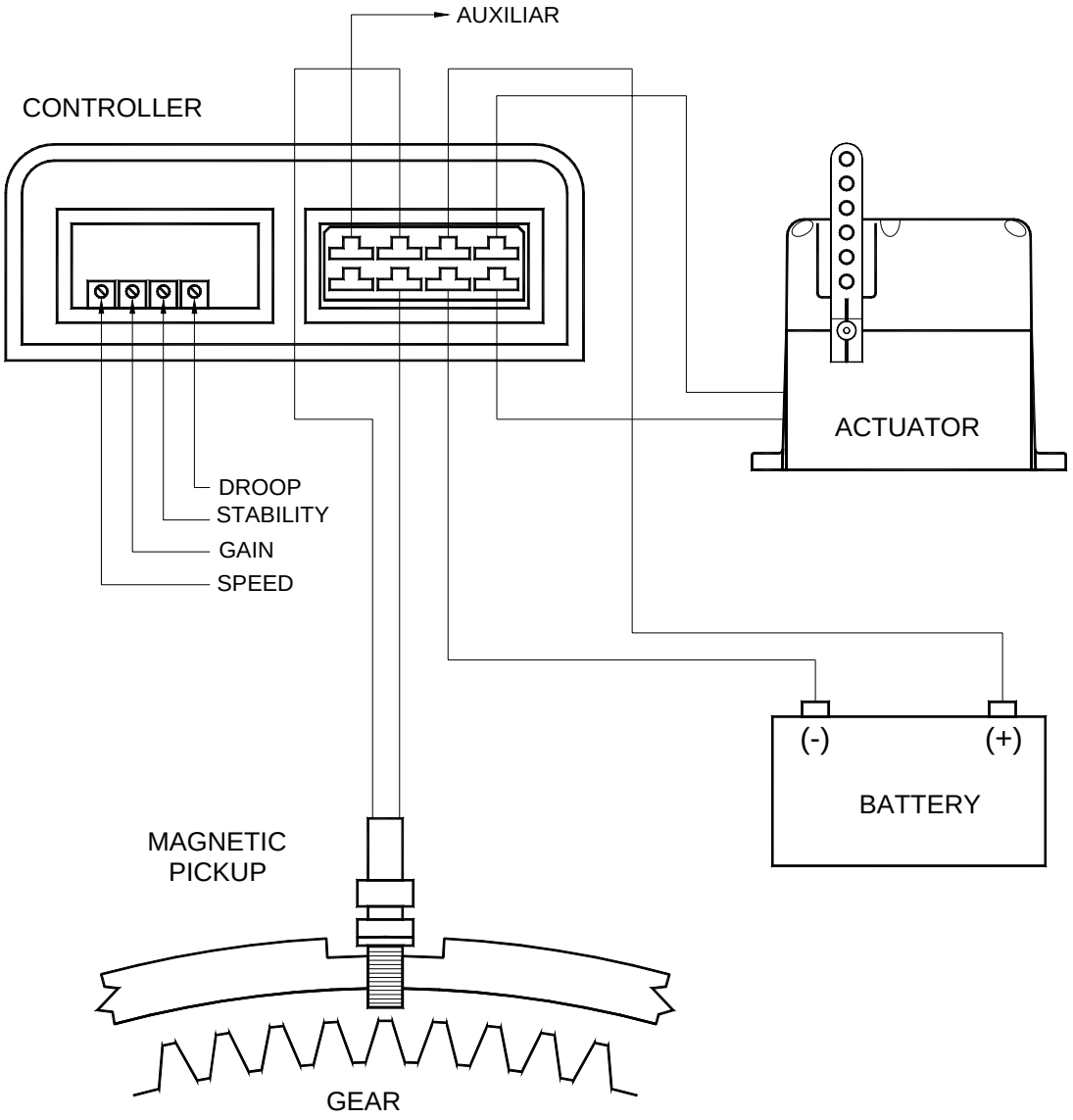
The ECO-D all-electric governor requires a frequency signal to read engine speed. Typically, a hole is drilled and tapped in the flywheel housing perpendicular to the crankshaft. A magnetic pickup is inserted into the flywheel housing for sensing the teeth on the ring gear.

Controller Specifications

Max. Ouput Current In Amperes @ 12 VDC		6.0
Max. Ouput Current In Amperes @ 24 VDC		5.0
Weight	**Pounds**	0.320
	Kilograms	0.145
Operating Voltage		12 / 24 VDC ± 20%
Ambient Operating Temperature		-40° to + 180° F (-40° to + 85° C)
Sealing		Oil, water and dust resistant
Connections		¼ faston male
Imput Signal Frequency from Magnetic Pickup		Input Signal Frequency in Hertz = Engine RPM x Number of gear teeth on flywheel / 60
Imput Signal Voltage from Magnetic Pickup		2.5 VAC RMS minimum during cranking
Steady State Speed Band		± 0.25%
Controller Adjustaments		Gain, Droop, Stability and Speed.

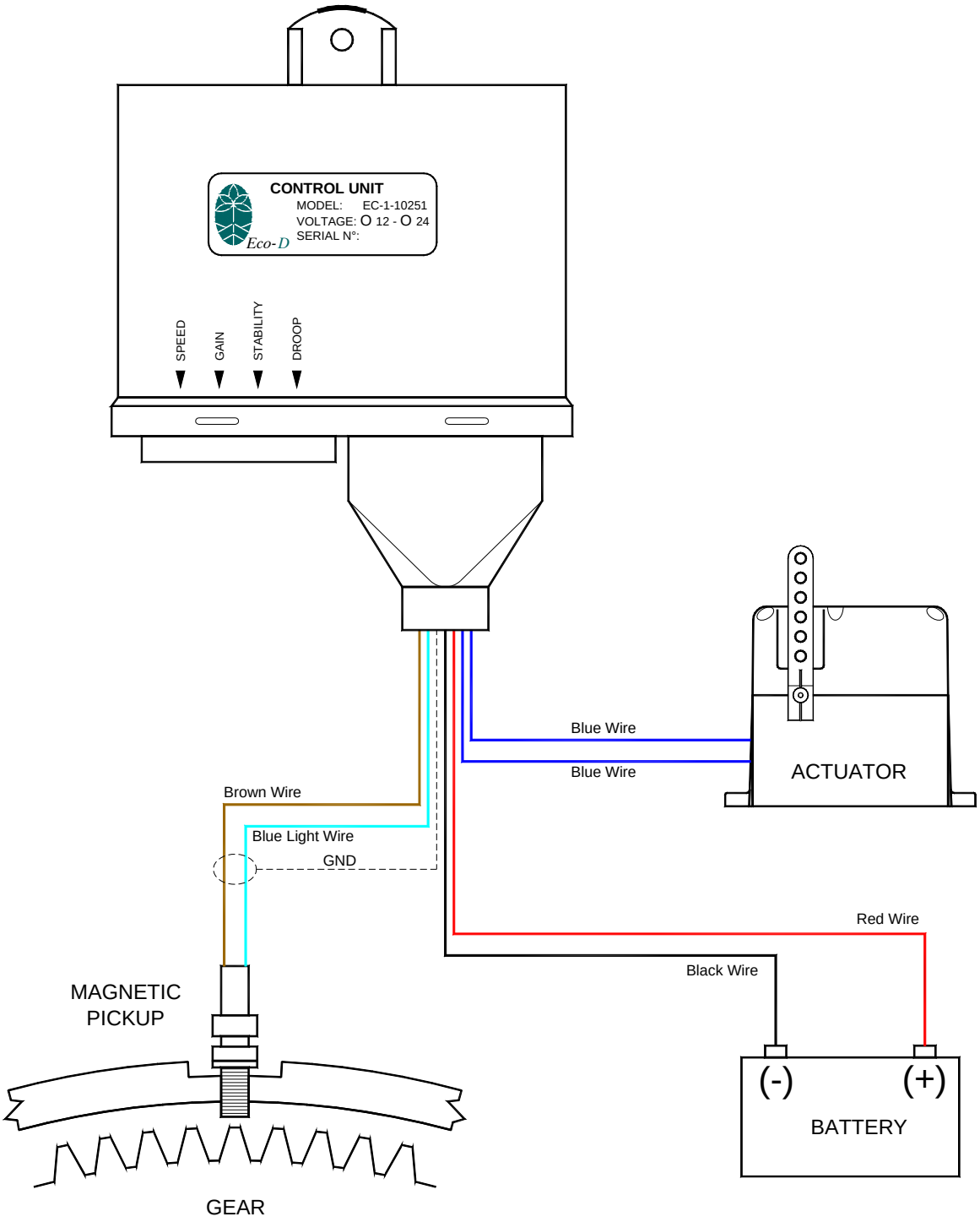
Typical Wiring Diagram

EC 1-10251 D CONTROLLER



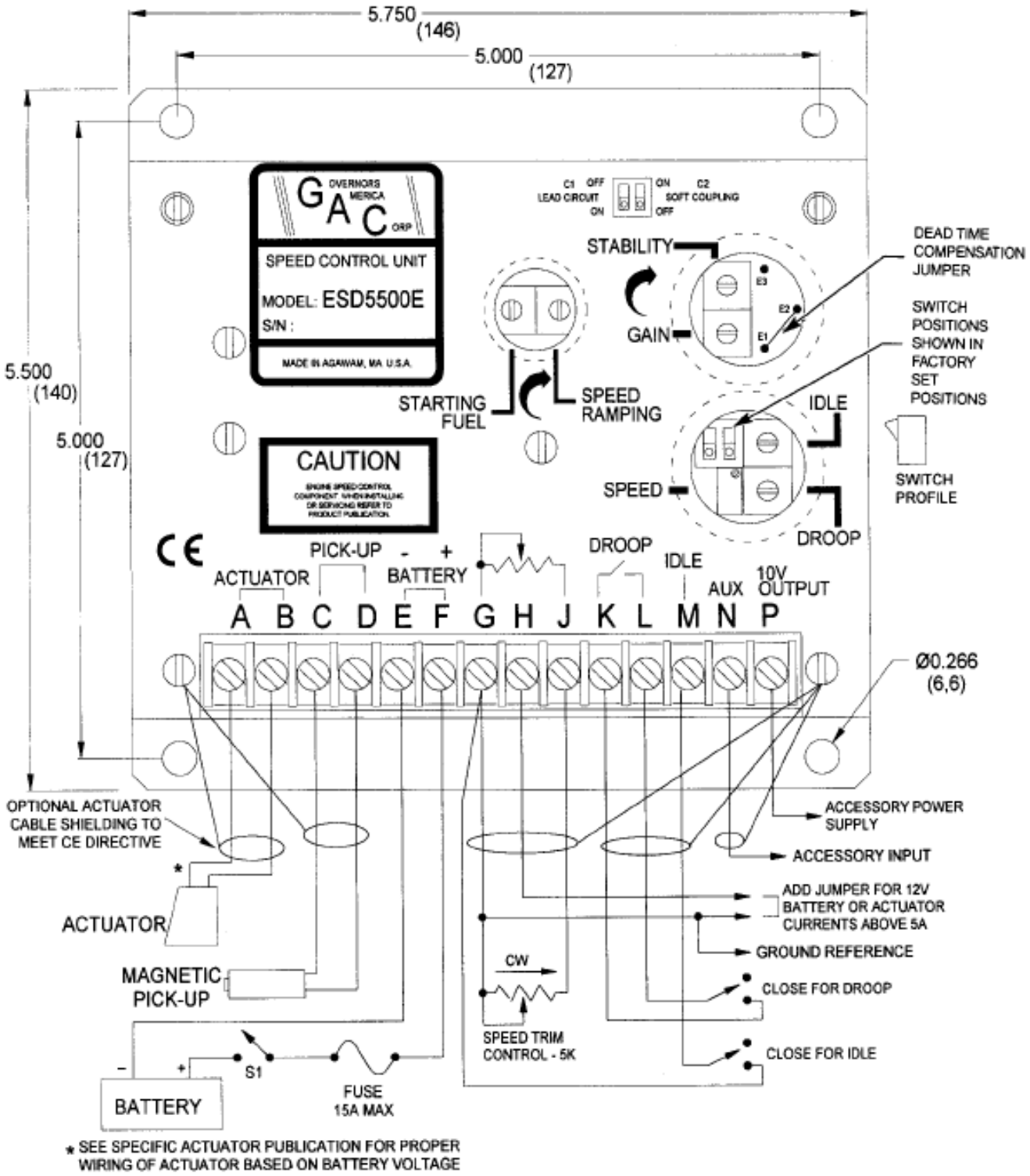
Typical Wiring Diagram

EC 1-10251 Z CONTROLLER



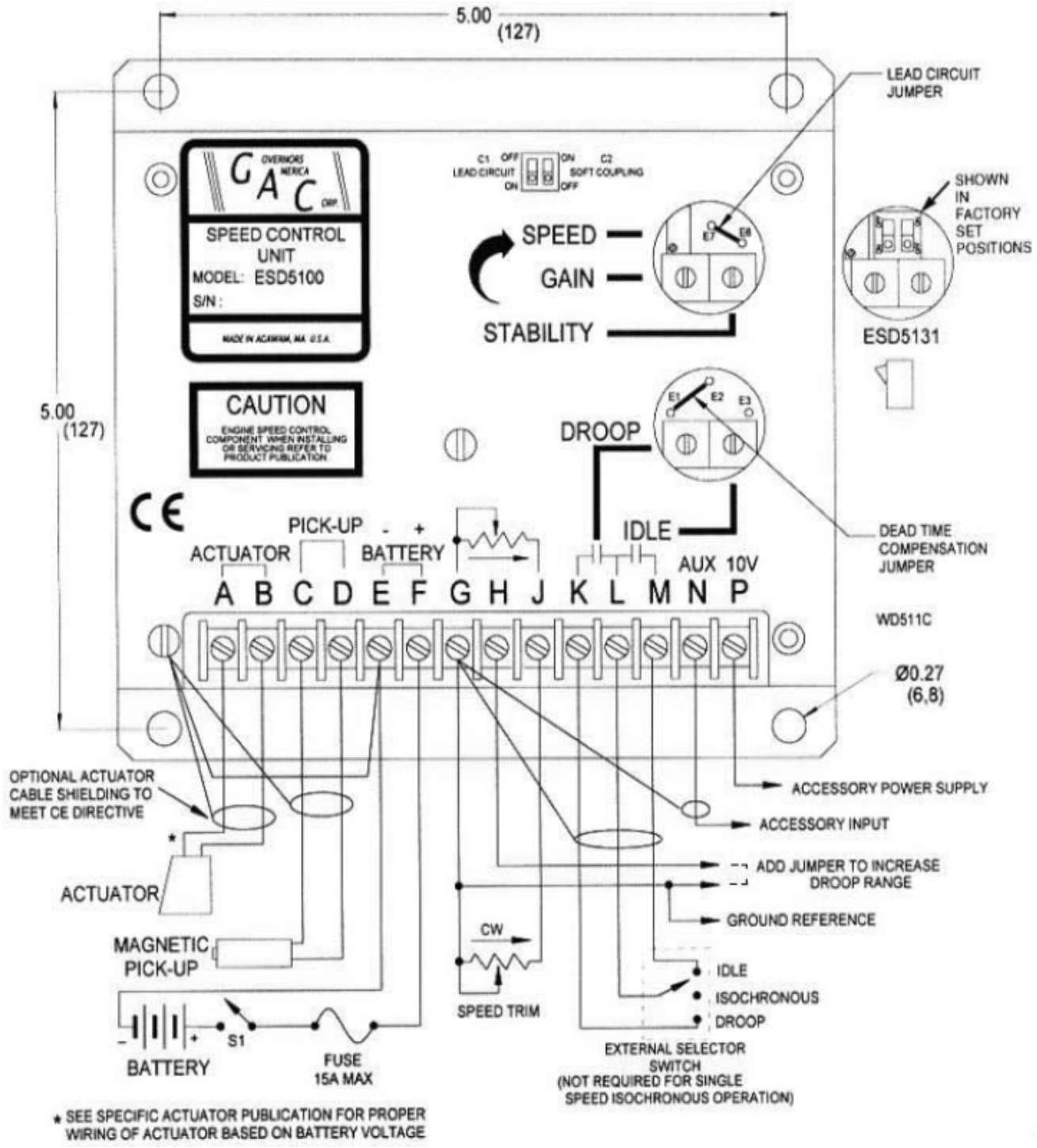
Typical Wiring Diagram

ESD5500E CONTROLLER



Typical Wiring Diagram

ESD5100 CONTROLLER



ECO-D 250 SERIES
ELECTRIC ACTUATOR

INTRODUCTION

The Eco-D 250 series actuator is a rotary output, linear torque, computer designed, proportional servo, to provide improved engine perfomance and quick response for engine governing system.
The speed of operation of the actuator is faster than competitive units
This rotary throttle positioning device is an ideal choice for engines typically up to a 500 horsepower rating. Applications include most block pumps, with or without mechanical governors, distributor type pumps or medium sized carburated engines.
The actuator was designed for failsafe operation. An internal spring returns the throttle to shutoff position when the actuator is de-energized.
This design combines fast operation, wider rotation angles and reliability.
The actuator can operate from 12, 24 or 32 volt battery supplies.

DESCRIPTION

The actuator is an electromagnetic servo device . An AC frequency signal is generated by an magnetic speed sensor, which is proportional to engine speed. This signal is sent to the electronic speed control unit and compared with the preset engine speed setting.
If the both signals do not remain identical, a change in current from the speed control unit changes the magnetic force in the actuator which, in turn, , causes angular rotation of the actuator shaft, adjusting the fuel to the engine and cause the engine speed to be equal to the preset engine speed setting.
Shaft rotation is proportional to the amount of the actuator current counterbalanced by the internal spring.
The actuator housing is designed to protect it against engine environment. No maintenance is neccesary.

INSTALLATION

The actuator must be rigidly mounted as close as possible to the throttle lever on the engine. Vibration from the engine do not affect the operation of the actuator.
Low friction is mandatory and light weight linkage should be used to provide optimum control and fastest speed of response conditions.
High quality rod end bearings should be used. High friction couls cause instability and require servicing.
A proper linkage arrangement will allow the actuator to control the fuel control lever at minimum throtlle and at maximum throttle with some excess travel beyond these positions for shutoff and full fuel respectivelly.
For operation with linear control system, it is importain to obtain a linear relationship betwen actuator stroke and fuel delivery. The lever on the actuator should be nearly parallel to the pump lever at the mid fuel position (see fig 1).
For operation with non-linear fuel control, such as carburated, PT Pumps(Cummins), it is desirable to obtain a non-linear relationship betwen actuator stroke and fuel delivery. A non-linear fuel system results when more engine power is developed for a given stroke at position of low fuel settings than at hight fuel settings. In this case, the levers should be parallel at full load (see fig 2).

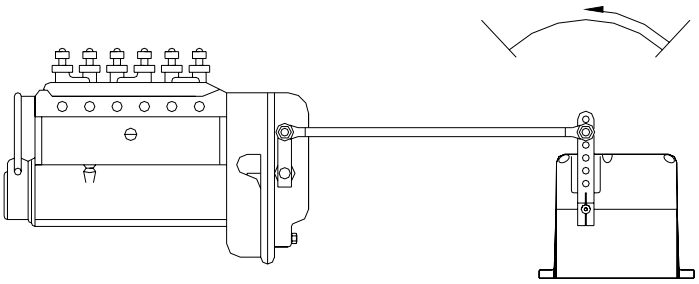


Fig.1

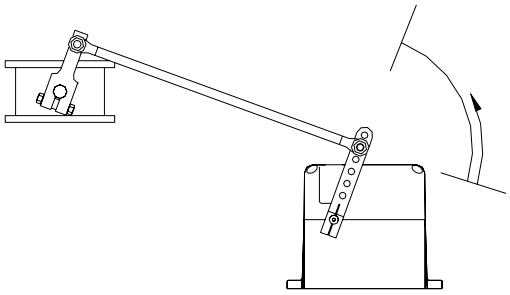


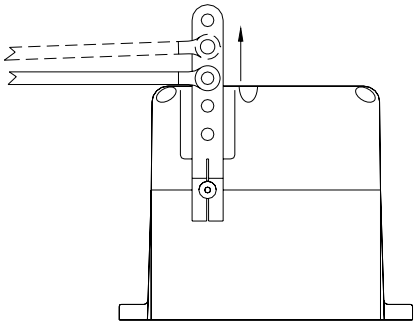
Fig.2

ADJUSTMENTS

Reconfirm manually that the linkage is not binding and that friction is minimal. Before starting the engine, push the throttle to the full fuel position and release. It should return instantly to the shutoff position freely and re-check the installation to insure that all linkage and levers are securely fastened.
After the engine has been started, the linkage can be optimized by measuring the voltage across the actuator, at full load and at no load (suggested voltage values are swoun in the table below).

Current and Voltages Máx. Range		
	Actuator 12V	**Actuator 24V**
Full Load	**4,5 A / 5 V**	**2,5 A / 13 V**

Warning:
If the measured voltage is over the indicated in our chart, you must change the linkage lever position , moving the end rod bearing toward the following hole far from the actuator axe, on this way you can reduce the actuator voltage.



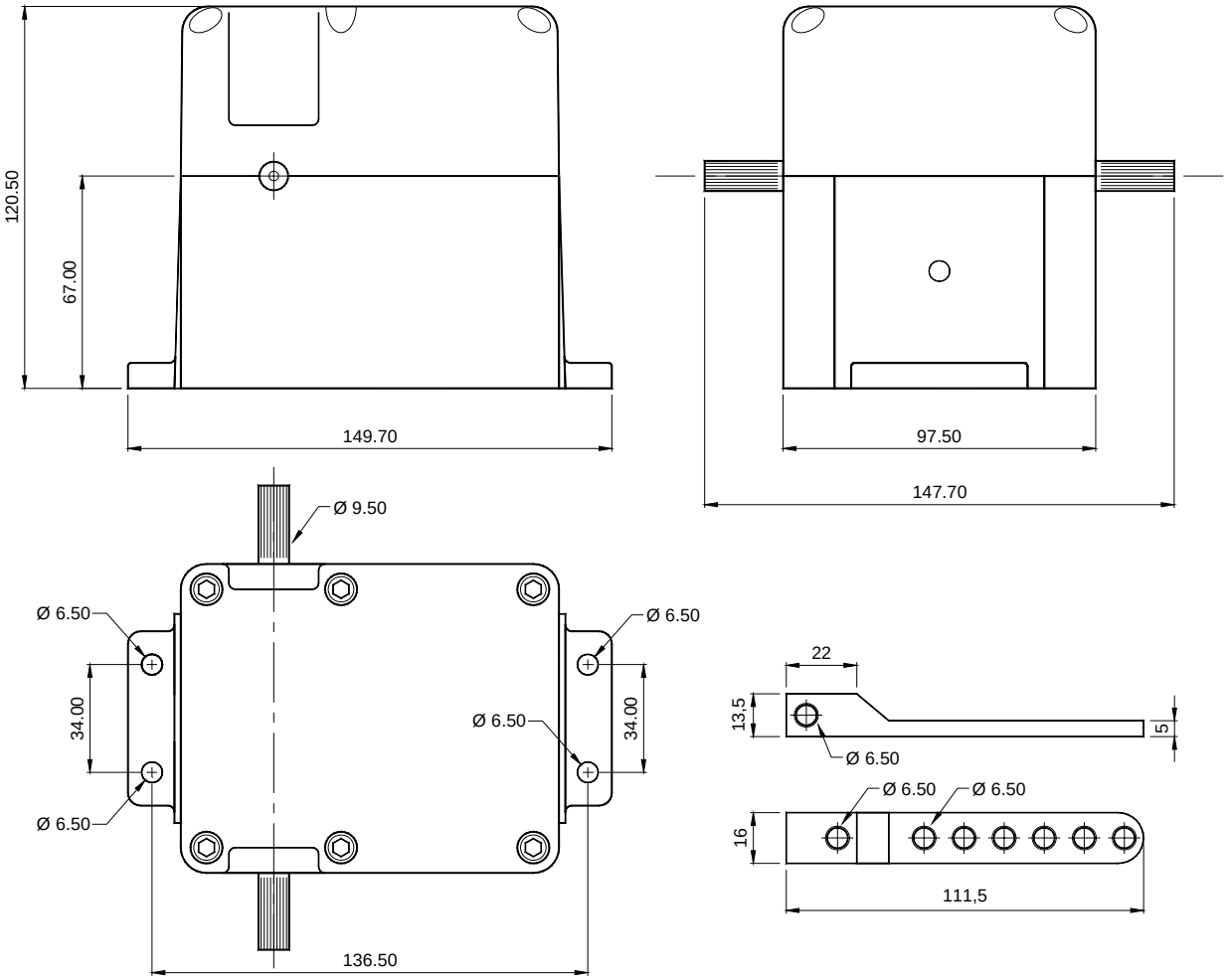
A lower range of actuator voltage can cause instability or poor performance. To increase the range of the actuator voltage, move the linkage to a lower hole on the actuator lever. To increase or decrease the no load voltage adjust the length of the link between the levers.
If the ratio of the actuator lever length to throttle length is to large, there will be very little actuator actuator movement and speed control will tend to be unstable. Smaller angles of actuator travel may improve transient performance ,but will reduce avalaible force at the fuel control lever. Alowing the actuator to operate through at least one half of its stroke will usually provide near optimum response.

WARNING:
The engine should be provided with an independent shutdown mechanism to prevent loss of engine control wich can cause equipment damage or personnel injury.

SPECIFICATIONS

Model:	250 Series
Available Torque:	Max 2.2 lb.ft (2.9 N.m)
Maximum Operating Shaft Angular Travel	25 Degree CW / CCW
Operating Voltajes:	12 / 24 / 32 VDC
Nominal Operating Current:	2.8 A at 12 VDC / 1.4 A at 24 / 32 VDC
Maximum Current:	8.2 A at 12 VDC / 4.1 A at 24 VDC
Polarity:	Case Isolated
Temperature Range:	-70° to + 200° F (-55C° a 100°C)
Relative Humidity:	Up to 100%
Case:	Fungus Proof and Corrosion Resistant
Weight:	7.9 lb (3.6 Kg.)
Mounting:	Any Position
Vibration:	Up to 20 G @ 50 – 500 Hz
Testing	100 % Tested

DIMENSIONES



MAGNETIC PICKUP

ESPECIFICATIONS:

Model:	010 - 601 / 010 - 602
Médium Voltaje @ 1000 RPM *:	4.5 V
DC Resistence @ 25°C (Ohms ±10%):	530 Ohms
Inductance:	200 mH
Thread:	5/8” 18 UNF 2A
Lenght:	45 mm.
Material:	NYLON
Maximun storage temperature:	125°C

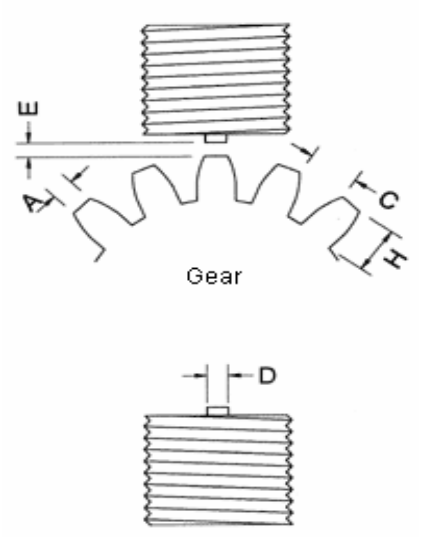
Insulating resistance @300 Vca, ambient temperature 25±5°C>100MW

* Voltage measured with 60 teeth gear, Ø160mm @ 1000 RPM being;
A = 2,54mm, H = 5,4mm, E = 0,5mm, Espesor = 30mm

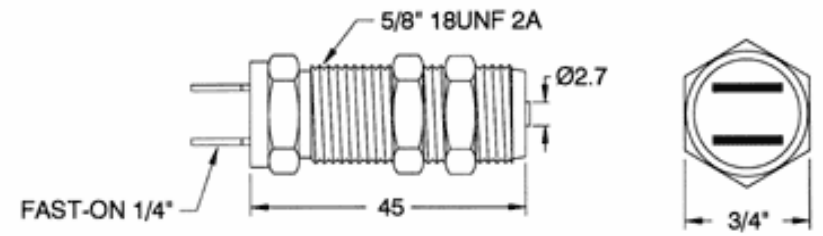
INSTALLATION:

For good results:

1 - A > D
2 - H > D
3 - C > 3 x D
4 - E between 0.1 to 0.5 mm.
5 - Gear tickness > D
6 - Pole piece diameter (D = 2.7 mm.)



DIMENSIONS:



BEARINGS ROD ENDS

SPECIFICATION

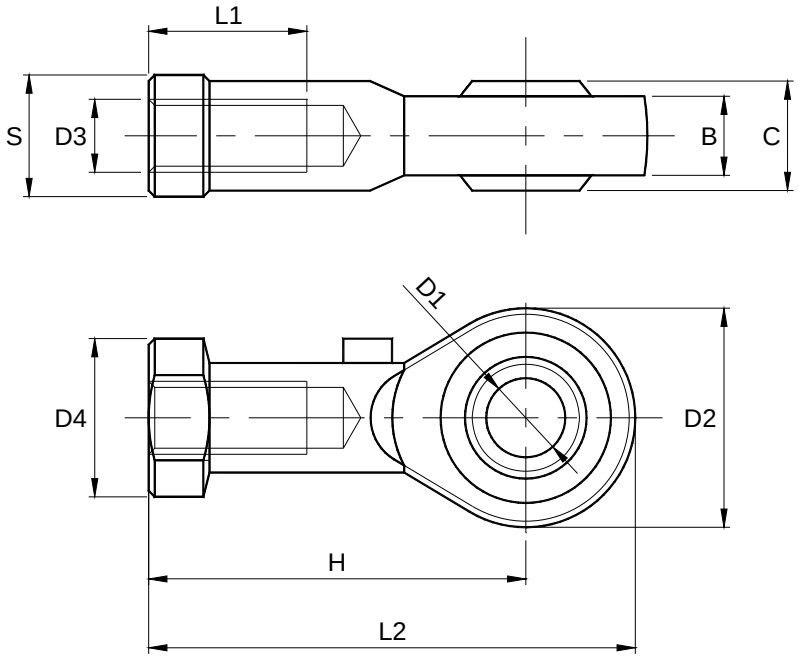
Model: PH6S

Temperature Range: -22° at 65 ° F (-30°C at +180 °C)

Weight: 0.055 lb (0.025 Kg.)

DIMENSIONS

	B	C	D1	D2 Max.	D3	D4	H	L1	L2 Max.	S
Millimeters	6.5	9	6	19	M6X1	13	30	15	40	11



ECO-D Products

ARGENTINA: Tres Arroyos 329
Haedo – Buenos Aires. T.E. (54-11) 4629 – 0600
E-Mail: cram@speedy.com.ar
Web: cramelectro.com