

# ENGINE GOVERNING SYSTEMS

PRODUCT INFORMATION BULLETIN

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PIP South Hadley

## 225 SERIES ELECTRIC ACTUATOR

### INTRODUCTION

The 225 Series actuator is a rotary output, linear torque proportional electric servo designed for mechanical actuation of fuel system control levers. The actuator is energized by appropriate speed control unit signals, and is capable of 25 degrees rotation.

### INSTALLATION

The actuator must be rigidly mounted as close as possible to the engine throttle lever. When selecting the mounting location, consideration must be given to possible linkage obstructions.

The linkage should be direct, short, and as light as possible. Low friction rod end bearings should be used throughout the linkage system.

The linkage should be adjusted so that the fuel control minimum fuel and maximum fuel stops are used rather than the internal actuator stops.

A. Drill the actuator mounting holes in a pre-fabricated mounting bracket. Mounting hole configuration is illustrated in Diagram 4. The position of the actuator on the mounting bracket should insure minimal misalignment between each end of the governor system linkage. The linkage ball bearing rod ends can tolerate a maximum misalignment of 10 degrees.

B. Affix the actuator bracket to the selected location on engine.

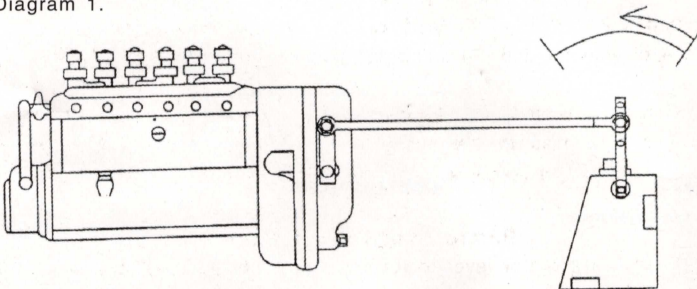
C. Attach the actuator securely to the mounting bracket.

D. Adjust and secure the linkage rod and rod end bearings.

For proportional actuators to operate with linear control systems, it is important to obtain a linear relationship between actuator stroke and fuel delivery.

### Diesel Fuel Systems

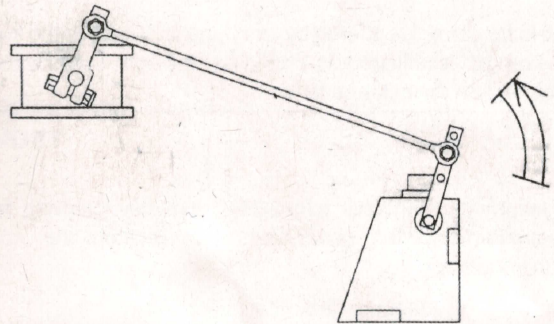
For diesel fuel systems, the linkage configuration is typically linear. The actuator lever should be nearly parallel to the fuel control lever and perpendicular to the linkage rod at the mid fuel position. See Diagram 1.



Fuel Control Lever At Mid Fuel Position  
DIAGRAM 1

### Carbureted Fuel Systems

For carbureted fuel systems, the linkage is typically non-linear. The ideal linkage relationship is for the carburetor butterfly valve lever to be parallel with the actuator lever and the linkage rod to be perpendicular to the actuator lever at maximum fuel position. See Diagram 2.



Carburetor Fuel Valve At Full Fuel Position  
DIAGRAM 2

The actuators with 2 pin connectors are prewired for 12 or 24V. Use the included harness to connect the actuator to the speed control unit.

E. Fabricate a cable harness to connect the speed control unit to the actuator. The recommended wire size of the cable harness is at least # 16 gauge (1.5 mm) for 12 volt systems and # 18 gauge (1.0 mm) for 24 volt systems. The wiring must be capable of handling typical current levels of 8 amps for 12 volt systems and 4 amps for 24 volt systems without experiencing a significant voltage drop. Larger gauge wire will be necessary for cable lengths greater than 10 ft. (3 meters).

If an actuator with a military connector is used, the electrical connector EC 1000 must be prewired in a configuration to match the system voltage supply. See Diagram 3.

### 32 Volt Operation

Wire the actuator electrical connector as illustrated for 24 Volt operation. A 1.5 ohm, 25 Watt resistor must be added in series with pin A of actuator and the output terminal of the speed control unit.

F. Connect A and D of the military connector or the 2 pin connector harness to the speed control unit. Refer to applicable speed control unit literature.

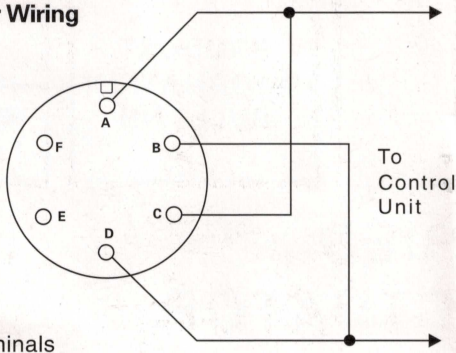
### Before Starting The Engine

G. Push the actuator lever to the maximum full fuel position. Upon release, the linkage should return smoothly to minimum fuel position. Recheck the linkage to insure both the linkage and the levers are securely fastened and that no binding is present.

**DIAGRAM 3**  
**Military Connector Wiring**

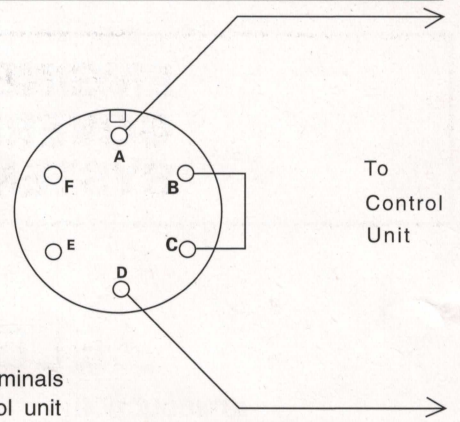
12 Volt Operation

A to C  
B to D  
A & D to output terminals  
of speed control unit



24 Volt Operation

B to C  
A & D to output terminals  
of speed control unit



**LINKAGE ADJUSTMENT**

The linkage can be optimized by adjusting for an actuator current difference from no engine load to full engine load of approximately 2 amps for 12 volt systems or 1 amp for 24 vlot systems.

Smaller angles of actuator travel may improve transient performance, but will reduce the force available at the fuel control lever. Adjusting the actuator to operate through at least one half (12 degrees) of its stroke will provide near optimum response.

The no load current is altered by varying the length of the linkage, and the range is adjusted by changing the hole used by the rod end bearing on the actuator lever.

**TROUBLESHOOTING**

If the governor system fails to operate, make the following tests at the actuator mounted connector while moving the actuator through its stroke.

Measure the Resistance from:

ACB 225/ADB 225

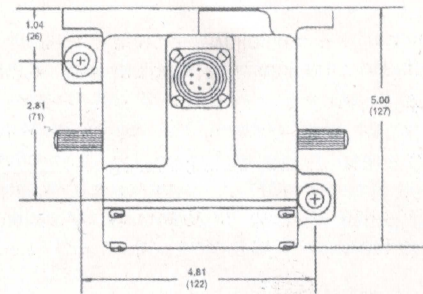
A to B	2.5 ohms
C to D	2.5 ohms
A to C	Infinity
A to Housing	Infinity
C to Housing	Infinity

ADC 225

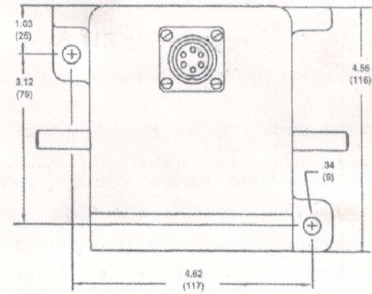
Red to white (12 V)	1.25 ohms
Red to white (24 V)	5.0 ohms
Red to housing	Infinity
White to housing	Infinity

Energize the actuator to full fuel (follow steps in control unit publication) and manually move the actuator through its range. No binding or sticking should occur.

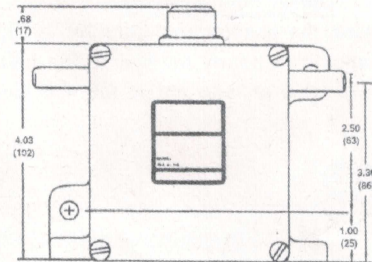
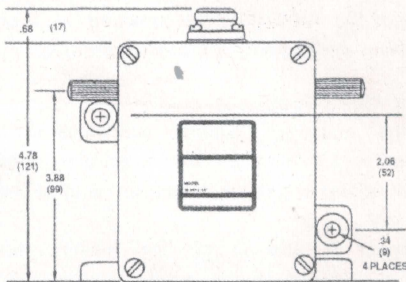
If the actuator passes these tests, the problem is, elsewhere in the system. Refer to the control unit troubleshooting publication.



ACB225



ADB225 and ADC225



**DIAGRAM 4**  
**Actuator Outline Dimenlons**