

ENGINE GOVERNING SYSTEMS

103 Series Integral Electric Actuator for the Delphi DPG / DP210G Pumps



- A Low Cost Integral Actuator.
- Proven Electromechanical Design with High Reliability.
- Easy Installation with Minimal Setup Time.
- Fast Response (< 45msec).
- Environmentally Sealed, All Metal Design.
- Increased Operational Integrity and Security.

Introduction

The 103 Series Integral Actuator is a field-proven proportional actuator designed to mount directly to the Delphi DPG/DP210 Pump. No external linkage or brackets are required to install this actuator. When de-energized the 103 Series electric actuator provides the function of the fuel-shutoff solenoid. This is accomplished by an internal spring that returns the fuel-metering valve linkage to the no fuel position when the actuator is de-energized.

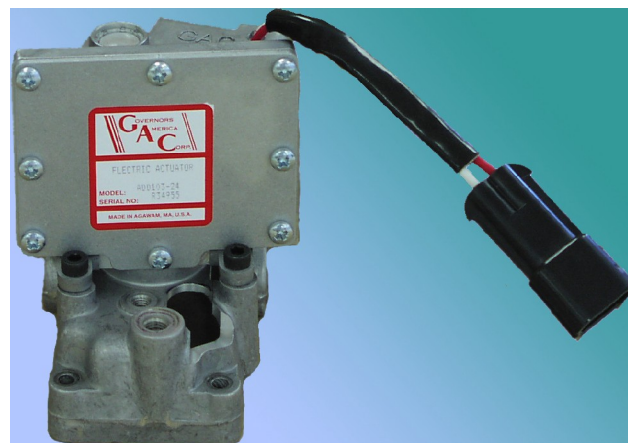
Installing the 103 Series actuator does not defeat the engine's mechanical governor operation. During the installation process, the mechanical governor must be set to a higher speed than the electric governor's operating speed. In this configuration the mechanical governor acts as a speed limiter, but does not interfere with the operation of the actuator.

System Description

This integral actuator is an electromagnetic servo device which, when installed becomes part of a closed loop fuel control system. This system can be described as follows: Electrical pulses, generated by the magnetic speed sensor, are directly proportional to the engine speed. These pulses are transmitted to the speed control unit, which will compare the real-time pulses to the preset engine speed setting. If the real-time pulses differ from the preset speed setting, the speed control unit will deviate the current to the electric actuator in an amount proportional to the difference. This deviation in current will cause the actuator shaft to rotate thus adjusting engine speed to match the preset engine speed setting. Since there are no sliding parts in the 103 Series electric actuator and the unit is sealed, outstanding reliability and no maintenance are the resulting qualities.

Wiring

The 103 Series Electric Actuator is designed in either a 12Vdc or 24Vdc version. These actuator models are identified in Chart A. You must be sure that the actuator voltage matches the battery supply voltage when ordering.



An actuator cable harness is used to connect the 103 Series actuator to the selected GAC speed control unit. There are no polarity connections from the speed control unit to the actuator which need to be observed. For more information on additional wiring, see literature specific to the speed control unit being used.

Chart A

Actuator Model #	12 Volt	24 Volt	w/ Mating Connector	w/ Cable Harness
ADD103-12	X		X	
ADD103-24		X	X	
ADE103-12	X			X
ADE103-24		X		X

Compatible GAC Controls

Analog	Digital
ESD2244 Series	SDG Series
ESD5120	IGC Series
ESD5520E	
ESD5522E	
ESD5570	

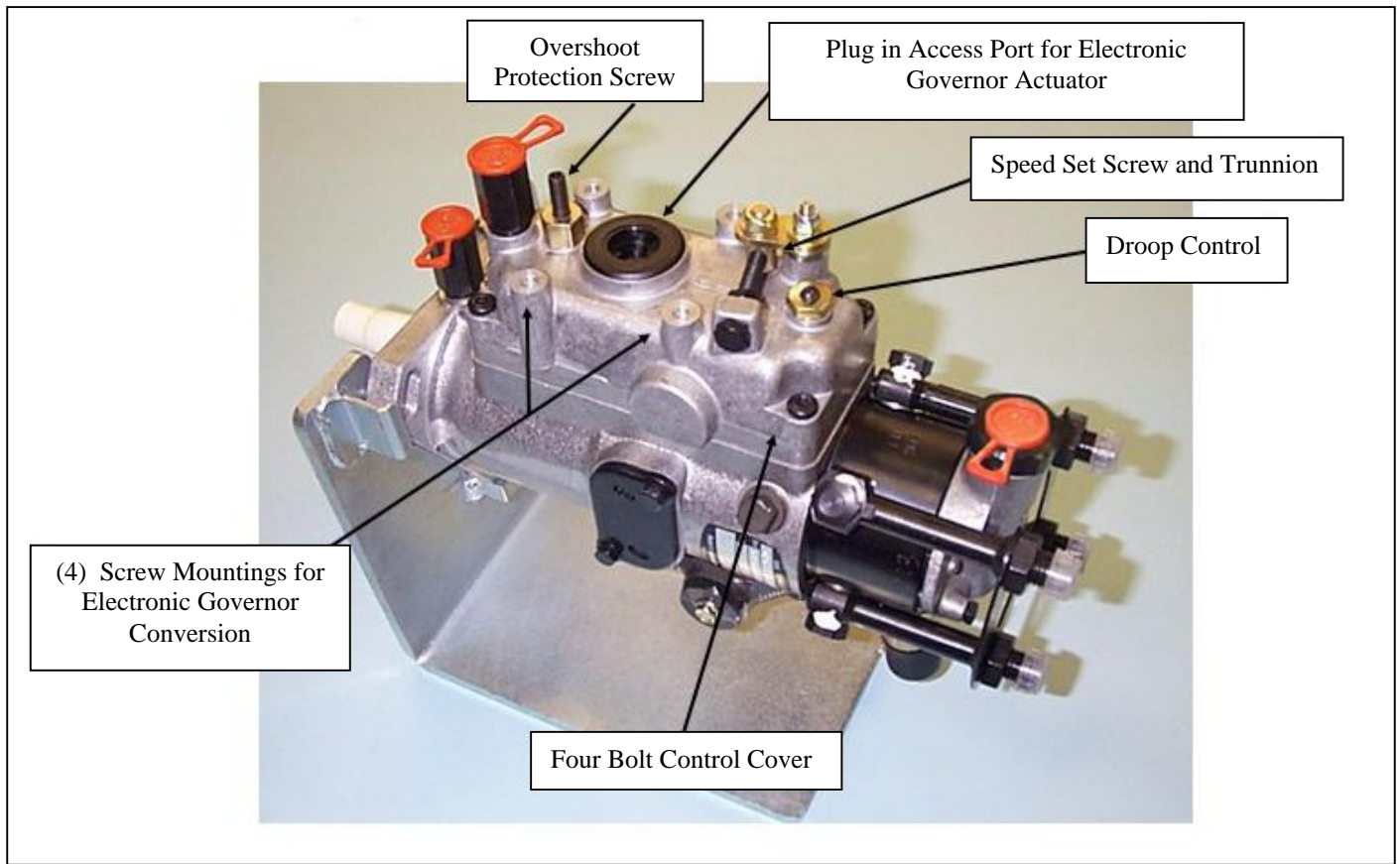
The 103 Series actuator is designed to operate with a wide selection of GAC analog and digital controls.

Warning: An Overspeed shutdown device, independent of the governor system, should be provided to prevent loss of engine control, which may cause personal injury or equipment damage.



Governors America Corp. 720 Silver St. Agawam, MA 01001





Preparing the Fuel Pump

Note: Before starting this procedure, make sure that the upper surface of the pump is clean of all dirt and grime. The following procedure will then assist you with installing your new GAC 103 Series electric actuator.

Step 1

The Overshoot Protection Screw may have to be replaced with a shorter screw. A 10mm M6 screw is recommended. This will provide the adequate clearance needed to install the 103 Series actuator.

Step 2

To adjust the Droop Control, loosen the locking-bolt and turn the Droop Control Allen Screw clockwise, but do not force or over-tighten, until it cannot be turned any further. Then adjust the Allen Screw in a counter-clockwise direction the number of turns as specified in Table 1.

Step 3

Set the no-load engine speed to 1950 RPM by loosening the Trunnion (Locknut) and adjusting the Speed Set Screw. This adjustment requires turning the Speed Set Screw

approximately nine turns clockwise. Once you have the engine running at 1950 RPM, shut the engine down and disconnect the starter-motor from the battery.

Installation

Note: Before installing the actuator to the fuel pump, make sure that the engine can NOT be started. Remove the battery connection from the starter-motor and depress the emergency STOP button.

Step 4

Remove the Access Port Plug Cover (not Pictured) from the top of the fuel injector pump. Then remove the Access Port Plug.

Caution: Once the Access Port Plug is removed, make sure no contamination or fragments can get in to the fuel pump!!

Table 1: Engine Governor Droop Screw Adjustment (Counter-Clockwise)

Engine Model	3.1524 CM	1004G AA & AG	1004TG1 AH	1004TG2 AB & AH	1006TG2A YB	1006TAG YD	1006TAG1 YD
# of Turns	1 Turn	2 Turns	TBA	TBA	0.75 Turns	TBA	TBA

Step 5

Liberal apply clean diesel fuel to the O-Ring on the actuator. This will allow the actuator to slide easily into position on the pump. It will also protect the O-ring. Temporarily connect the actuator's leads to the Battery terminals on the speed control unit. This will energize the actuator and place the actuator's lever at the full-fuel position. This is done so that the lever on the actuator will properly engage the pump's fuel-metering valve linkage. See Figure 2 (before energizing actuator) and Figure 3 (actuator is energized) and notice the positional difference of the lever located on the bottom of the actuator. Battery polarity does not have to be observed with respect to the actuator coil.



Figure 2



Figure 3



Figure 4

Note: You must keep the actuator energized with the battery voltage until the installation is completed.

Step 6

With the engine stopped, the fuel-metering valve linkage in the fuel pump will be in full fuel position. Rotate the actuator slightly CCW (looking down from the top of the actuator) while inserting it into the Fuel Pump housing. Slowly push the actuator into the Access Port of the pump. See Figure 4, notice the actuator is turned slightly CCW and that bolt-holes are slightly misaligned. This is done to make sure that the actuator lever makes proper contact with the fuel mechanism inside the pump.

Caution: Do not force the actuator into position. If you feel any obstruction, simply rotate the actuator further counter-clockwise while inserting it into the pump.

Step 7

Once the actuator is fully inserted into the Access Port, align the Screw Mounting holes, insert and hand-tighten the four Mounting Screws. Tighten all four mounting bolts to approx. 5-6Nm. See Figure 5.



Figure 5

Step 8

You can now check that the actuator is functioning properly by turning the DC power off and on. You should hear a clicking sound, which is the coil armature inside the actuator striking its zero-fuel position stop.

Step 9

Connect the 103 Series actuator to the proper terminals on the speed control unit as described in the speed control unit's literature.

Step 10

Reconnect the starter-motor to the battery.

Troubleshooting

If the electronic governor system fails to operate and the actuator is suspected, you can perform the following tests to check the integrity of the 103 Series actuator.

Measure Coil Resistance (Room Temp.)

Check the resistance of the coil by disconnecting the actuator from the control unit and connecting your meter to the ends of the wires coming from the actuator. This resistance should be approximately:

1.6 ohms	12Vdc
7.2 ohms	24Vdc

Measure Coil Isolation

Check the resistance from one wire to the housing of the actuator, then from the remaining wire to the housing. In both cases you should get a reading: >1M ohm

Checking for Physical Obstruction

Remove the actuator from the pump. Hold the actuator with the lever side down. Manually move the actuator's shaft through its entire range of motion by depressing the actuator lever. You should **NOT** feel any binding or sticking.

