103 Series
Integral Electric Actuator

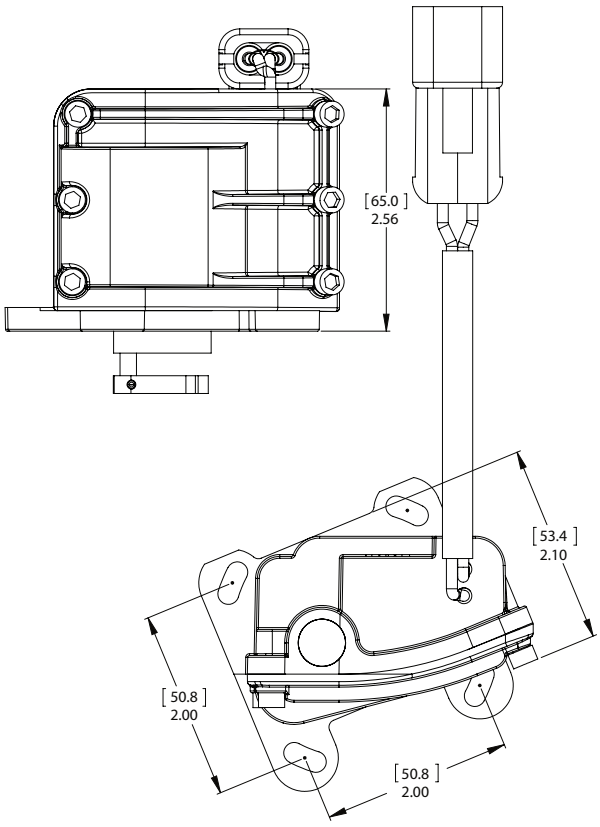
1 INTRODUCTION

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.

2 SPECIFICATIONS

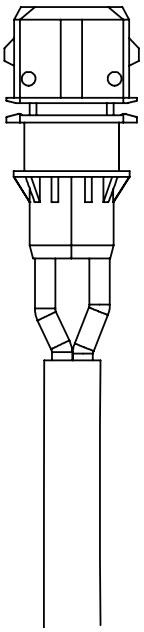
POWER INPUT	
Operating Voltage (B-Series) (L-Series)	12 or 24 VDC Available 12 VDC
Normal Operating Current (B-Series) (L-Series)	1.9 A at 12 VDC 1.5 A at 24 VDC 1.3 A at 12 VDC
Maximum Current (B-Series) (L-Series)	2.7 A at 12 VDC 1.9 A at 24 VDC 1.8 A at 12 VDC
ENVIRONMENT	
Operating Temperature Range	-40°F to +180°F (-40°C to +83°C)
Relative Humidity	up to 100%
Shock	20G, 11msec
Vibration	± 4G, 25 - 100 Hz
Agency	RoHS Compliant
PHYSICAL	
Dimensions	See Section 8 Outline Drawing
Weight	1.0 lb
Mounting (B-Series) (L-Series)	Directly to Delphi Type DPG / DP-210G/310G Customer Specific Pump
MATING HARDWARE	
All Models	Come with mounting hardware and O-ring
ADD103B ADD103L	Packard Mating Connector Customer Specific JD Mating Connector
ADE Models	Come with cable harness already installed to mating connector

3 OUTLINE DIAGRAM



L-Version

Customer Specific JD Mating Connector



4 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.

1. Remove the plug in the Access port.

CAUTION Once the plug is removed, make sure no contamination or fragments can get into the fuel pump.

2. Liberally 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

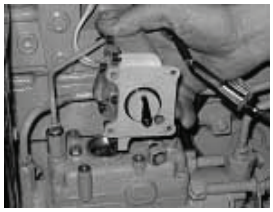


Figure 3

NOTE You must keep the actuator energized with the battery volt age until the installation is completed.

3. 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.

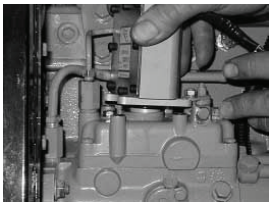


Figure 4

Figure 5

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

4. 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 above.

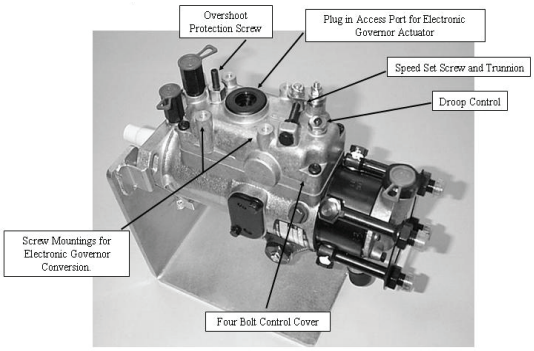
5. You can now check that the actuator is functioning properly by turning the DC power off and on. You should hear a clicking sound, which is the coil armature inside the actuator striking its zero-fuel position stop.

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

7. Reconnect the starter-motor to the battery.

5 WIRING

The 103 Series Electric Actuator is designed in either a 12 VDC or 24 VDC fo the B Series and he L Series only comes in a 12 VDC 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.



WARNING An overspeed shutdown device, independent of the governor system, should be provided to prevent loss of engine control, which may cause personal injury.

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.

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.

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 one and half turns and tighten lock nut.

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.

6 TROUBLESHOOTING

If the electronic governor system fails to operate and the actuator is suspected, the following tests can determin 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:

B-SERIES	L-SERIES
2.3 ohms 12 VDC 7.8 ohms 24 VDC	5.3 ohms 12 VDC

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

1. Remove the actuator from the pump.

2. Hold the actuator with the lever side down.

3. Manually move the actuator's shaft through its entire range of motion by depressing the actuator lever.

4. You should NOT feel any binding or sticking.

5. Energize the actuator to full fuel (follow steps in speed control publication) while observing the movement of the lever.

6. The actuator should operate smoothly throughout its entire stroke without any interruptions in motion.

7. If the 103 Series actuator passes these tests, the problem is likely elsewhere in the speed control unit, speed sensor or fuel system. Refer to the speed control unit troubleshooting publication or fuel pump information.