

## 1 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.

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.

- ◆ 12 or 24 V DC
- ◆ Mounts directly to Delphi DPG/DP210 Pump
- ◆ No external linkages or brackets required
- ◆ Fast response; < 45 ms
- ◆ Functions as a fuel shutoff solenoid when governor system is de-energized



The following installation kits are needed when installing these actuators on a Delphi DPG, DP210G, or DPGE:

- ADD103B-12 12 V DC / Packard Connector with Mating Connector Kit EC1300 / With Installation Kit KT292 (O-Ring, Bolts)
- ADD103B-24 24 V DC / Packard Connector with Mating Connector Kit EC1300 / With Installation Kit KT292 (O-Ring, Bolts)

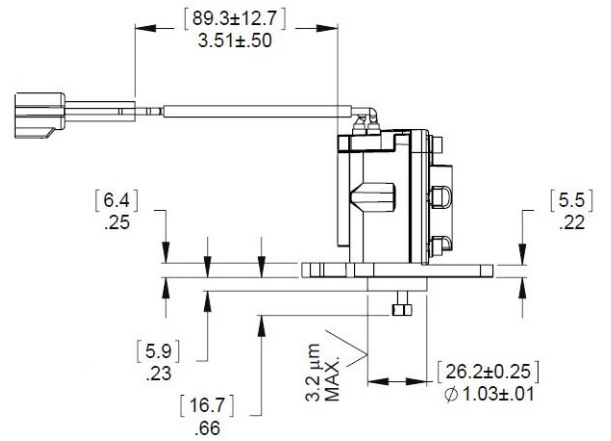
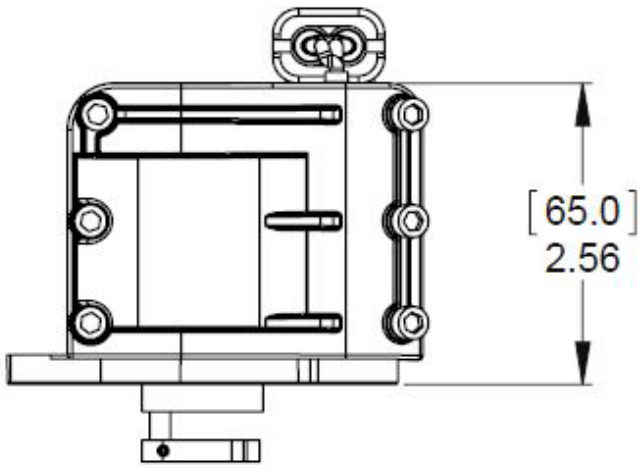
## 2 SPECIFICATIONS

POWER INPUT	
Operating Voltage (B-Series) (L-Series)	12 or 24 V DC Available 12 V DC
Normal Operating Current (B-Series) (L-Series)	1.9 A at 12 V DC 1.5 A at 24 V DC 1.3 A at 12 V DC
Maximum Current (B-Series) (L-Series)	2.7 A at 12 V DC 1.9 A at 24 V DC 1.8 A at 12 V DC
ENVIRONMENT	
Operating Temperature Range	-40° to +180 °F [-40 ° to +83 °C]
Relative Humidity	up to 100 %
Shock	20G, 11 ms
Vibration	± 4g, 25 - 100 Hz
Agency	RoHS Compliant

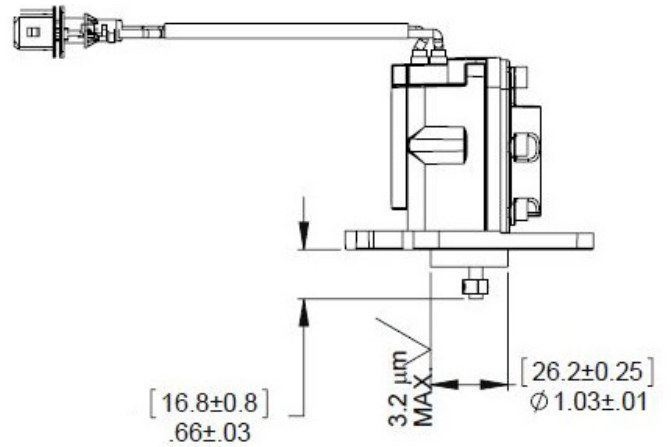
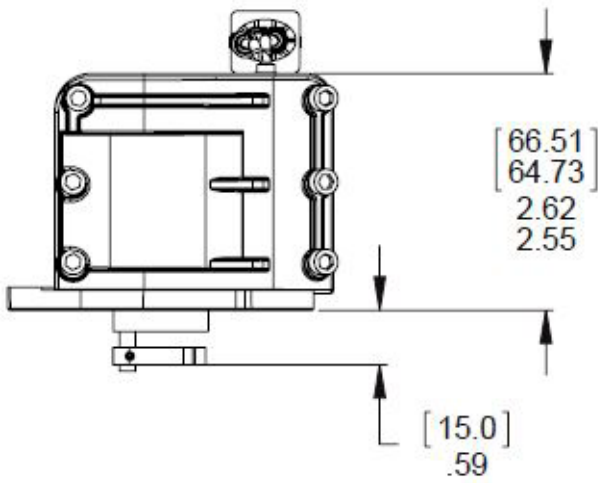
PHYSICAL	
Dimensions	See <a href="#">Section 3 Outline Drawing</a>
Weight	1.0 lbf
Mounting (B-Series) (L-Series)	Directly to Delphi Type DPG / DP210G/310G Customer Specific Pump
MATING HARDWARE	
All Models	Includes mounting hardware and o-ring
ADD103B ADD103L	Packard Mating Connector Customer Specific JD Mating Connector
ADE Models	Includes cable harness installed to mating connector

### 3 OUTLINE DIAGRAMS

#### ADD103 B-SERIES



#### ADD103 L-SERIES



## 4 INSTALLATION



- Use an overspeed shutdown device, independent of the governor system, to prevent loss of engine control which may cause personal injury or equipment damage.
- Do not rely exclusively on the governor system electric actuator to prevent overspeed. A secondary shutoff device, such as a fuel solenoid must be used.



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.

### NOTE

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

1. Remove the plug in the access port (Figure 1).



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

2. Apply clean diesel fuel to the o-ring (Figure 2) included with the actuator. This allows the actuator to slide easily into position on the pump and protects the o-ring.
3. 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. Placing the actuator in the full fuel position ensures the lever properly engages the pump's fuel-metering valve linkage.
4. See Figure 3 (before energizing actuator) and Figure 4 (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.
5. With the engine stopped, place the fuel-metering valve linkage in the fuel pump in full fuel position (Figure 5).

Figure 1

ACCESS PORT PLUG



Figure 2

ACTUATOR LEADS

SCREW MOUNTING HOLES

O-RING

VALVE LINKAGE

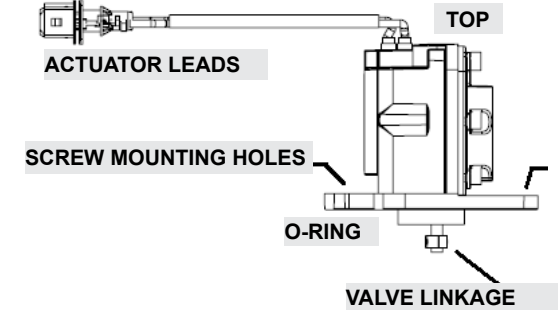
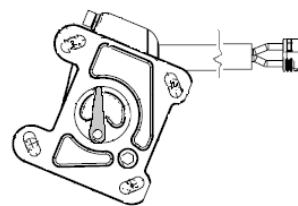
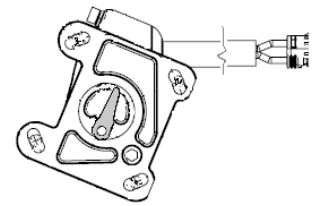


Figure 3



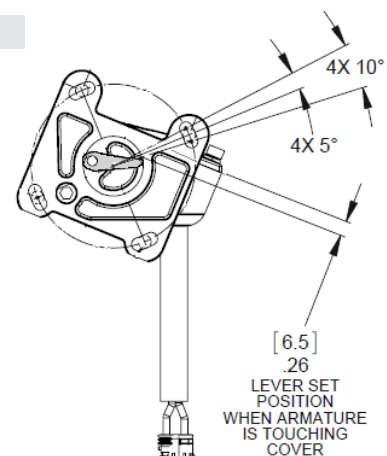
BEFORE  
ENERGIZING ACTUATOR

Figure 4



ACTUATOR ENERGIZED


Figure 5



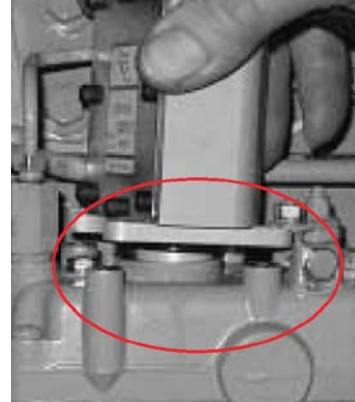
Do not force the actuator into position. If you feel any obstruction, simply rotate the actuator further counter clockwise while inserting it into pump.

## 4 INSTALLATION (CONTINUED)

6. Rotate the actuator slightly CCW (Figures 6 and 7) while inserting the actuator into the Fuel Pump housing.
7. Slowly push the actuator into the Access Port of the pump. See Figure 7, notice the actuator is turned slightly CCW and that bolt-holes are slightly misaligned. This ensures the actuator lever makes proper contact with the fuel mechanism inside the pump.
8. 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 5-6 N·m (Figure 8).
9. 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.
10. Connect the 103 Series actuator to the proper terminals on the speed control unit as described in the speed control unit's literature.
11. Reconnect the starter-motor to the battery.

See GACs  **YouTube** video for further help with installation.

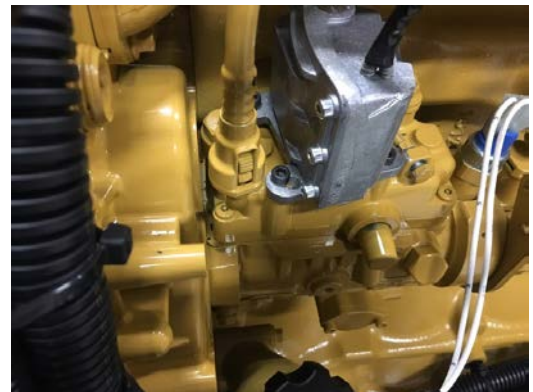
**Figure 6**



**Figure 7**



**Figure 8**



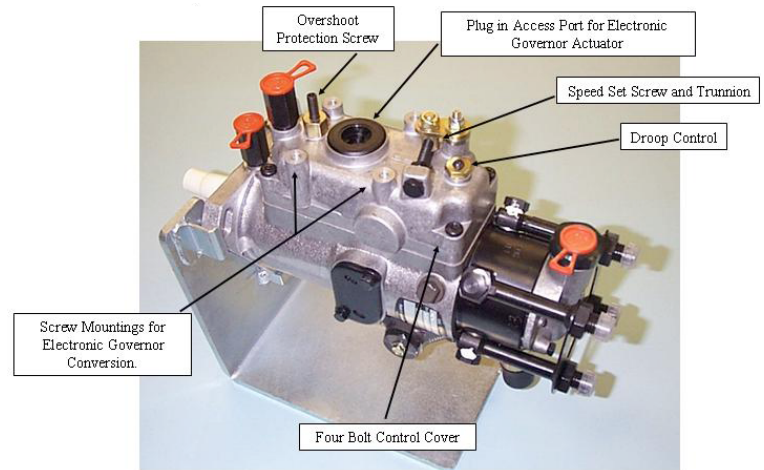
## 5 WIRING

The 103 Series Electric Actuator is designed in both a 12 V DC or 24 V DC (B-Series) and the a 12 V DC L-Series. These actuator models are identified in Chart A. You must be sure that the actuator voltage matches the battery supply voltage when ordering the actuator. 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 your [GAC installation manual](#) for your specific to the speed control unit.

### PREPARING THE FUEL PUMP

Before starting this procedure, make sure that the upper surface of the pump is clean of all dirt and grime. Do not force or over-tighten any connections while completing this procedure.

1. Check the clearance on the Overshoot Protection Screw. This screw may need to be replaced with a shorter screw. A 10 mm M6 screw is recommended. This will provide the adequate clearance needed to install the 103 Series actuator.
2. Adjust droop by loosening the locking-bolt and turn the Droop Control allen screw CW until it cannot be turned any further.
3. Adjust the Allen Screw in a counter-clockwise direction one and half turns and tighten lock nut.
4. 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.
5. 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 determine the integrity of the 103 Series actuator.

### MEASURE COIL RESISTANCE at ROOM TEMPERATURE

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 $\Omega$	12 V DC	5.3 $\Omega$	12 V DC
7.8 $\Omega$	24 V DC		

### 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  $>1M \Omega$

### 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. You should not feel any binding or sticking.
4. Energize the actuator to full fuel (follow steps in speed control publication) while observing the movement of the lever.
5. The actuator should operate smoothly throughout its entire stroke without any interruptions in motion.
6. 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.