

**ENGINE
GOVERNING
SYSTEMS**

**180 SERIES
INTEGRAL ACTUATOR
for
DEUTZ 1013/2012 and VOLVO 520/720 ENGINES**



INTRODUCTION

The 180 SERIES Integral Actuator is designed to mount directly to Deutz 1013/2012 and Volvo 520/720 engines. The existing mechanical governor is removed from the engine and the 180 SERIES integral actuator is mounted in its place. The actuator exhibits high quality construction and is designed for high temperature operation. GAC's unique electromechanical technology provides proportional actuator movement, based on actuator coil current.

This unique, optimized fuel control will out-perform externally mounted electric actuators. An integral high performance speed control system results when the 180 SERIES electric actuator is installed on the engine and electrically connected to compatible GAC governor system components. No external linkage or brackets are required.

The 180 SERIES actuator is an electromagnetic device, which moves the fuel system control rack. It can be integrated into a closed loop speed control system.

SYSTEM DESCRIPTION

A basic engine speed control system is described as follows: The magnetic speed sensor generates an electrical signal that is proportional to engine speed. This signal is sent to the electronic speed control unit, which compares it to a preset engine speed setting. If the engine speed and the preset engine speed are not equal, the speed control unit adjusts the actuator current, which adjusts the actuator's magnetic force. The actuator's internal output lever position is proportional to the magnetic force generated and is counterbalanced by an internal return spring.

INSTALLATION

Installing the 180 SERIES actuator involves removing the engine's mechanical governor. Therefore, engine shut-down is achieved by switching off the power supply to the electronic governor speed control unit. The actuator return spring counteracts the engine's internal fuel rack spring by forcing the rack to zero fuel.

Since the design incorporates precision parts of superior quality and is sealed from the environment, outstanding reliability results. No maintenance is required.



PREPARING THE ENGINE

Verify that the actuator voltage rating matches the battery voltage (See part number label).

WARNING: Remove the battery negative connection before proceeding.

Before removing the engine's mechanical governor and replacing it with the 180 Series electric actuator, it is important that the surrounding area be clean. Remove any dirt using compressed air or a suitable cleaning solvent. Prevent any contaminants from entering the engine. If a solvent is used, place a suitable container underneath the mechanical governor to collect the waste solvent and dirt. Dispose of the waste solvent by an environmentally accepted method.

Unbolt the engine's mechanical governor. Engine lubrication fluid will be present inside the mechanical governor.

INSTALLING THE FREEZE PLUG

The supplied Freeze Plug (Item 2) must be installed to seal off the area that allowed flow of lubrication fluid to the mechanical governor. The 180 SERIES electric actuator does not require lubrication from the engine. Installing this Freeze



Plug will insure that sufficient lube oil pressure will be maintained in the engine.

1. Once the mechanical governor has been removed from the engine, make sure the mounting surface and the inner bore are sufficiently cleaned. See Figure 1

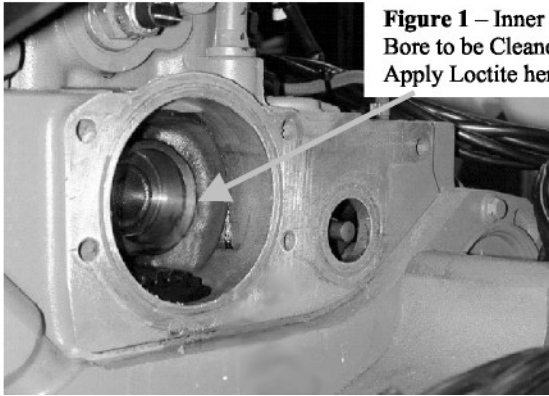


Figure 1 – Inner Bore to be Cleaned. Apply Loctite here.

2. The inner bore is where the Freeze Plug (2) will be pressed into to maintain engine oil pressure. Make sure that the outer surface of the Freeze Plug is clean and free of any nicks or burrs. See Figure 2.

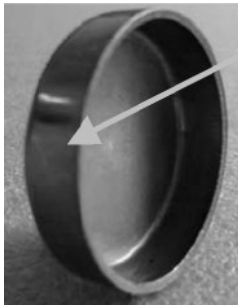


Figure 2 - Freeze Plug. Make sure this surface is clean and free of nicks. Apply Loctite here.

3. Apply Loctite 638 (per Loctite instructions) to the outer surface of the Freeze Plug and to the mating surface of the inner bore. See Figures 1 & 2.
4. As stated earlier, the Freeze Plug must be pressed into the engine bore. Use a length of steel pipe with a 38mm diameter to hold the Freeze Plug in place. See Figures 3 and 4.



Figure 3 & 4 – Use a length of 38mm dia. steel pipe to drive the Freeze Plug into the engine's inner bore.



5. Then, using a hammer to tap the steel pipe, drive the Freeze Plug into the inner bore making certain that it goes in straight. Drive the Freeze Plug in until the edge of the Freeze Plug is aligned with the edge of the inner bore. See Figure 5.

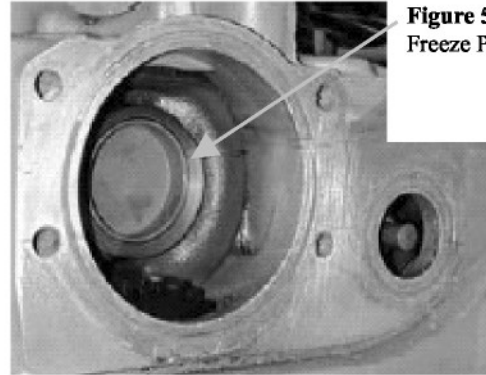


Figure 5 – Align the Freeze Plug to this edge.

INSTALLING THE ACTUATOR

1. Use a small amount of silicone gasket maker to seal the mounting surface of the 180 SERIES electric actuator. A bead of the silicone gasket maker material should be placed in both circular grooves that are located on the actuator's mounting surface on the engine.
2. Mount the actuator using the five M8 bolts (Item 3) that were supplied with the actuator. Once all M8 Bolts are in place and snug, tighten them to 17-20 Nm.
3. The supplied or assembled wiring harness will provide the electrical connections to the selected GAC speed control unit.

WIRING

The 180 SERIES has a dedicated 12 or 24 volt coil. The actuator models are identified in Chart 1. Insure that the actuator voltage matches the battery supply voltage.

Actuator Model	12 Volt	24 Volt	w/ Mating Connector only	w/ Cable Harness, Plug & Bolts
ADD180G-12	X		X	
ADD180G-24		X	X	
ADE180G-12	X			X
ADE180G-24		X		X

Chart 1

An actuator cable harness is used to connect the 180 SERIES actuator to the selected GAC speed control unit. No polarity needs to be observed. The cable harness with mating half connector provides a vibration resistant and environmentally sealed electrical connection. See the specific speed control unit literature for additional wiring information.

TROUBLESHOOTING

If the electric governor system fails to operate, and the actuator is suspected to be the problem, make the following tests.

Measure Coil Resistance (Room Temp.)

- 2.5 ohms (12 V DC Actuators)
- 10.7 ohms (24 V DC Actuators)

Measure Coil Isolation (Each wire to actuator housing)

>1M ohm

Remove the small actuator cover. Manually move the actuator lever through its range of motion. No binding or sticking should occur. Energize the actuator to full fuel (follow the steps in the speed control unit publication). The actuator should operate smoothly throughout its entire stroke without any binding or interruptions in motion.

If the actuator passes these tests, the problem is likely elsewhere in the governor or fuel system. Refer to the speed control unit publication for additional troubleshooting information.

SPECIFICATIONS

POWER INPUT

- Operating Voltage (Dedicated Coil) 12 or 24 V DC available
- Typical Operating Current 3.5A @ 12Vdc
 2-0A @ 24Vdc
- Maximum Current (Continuous) 5-5A @ 12Vdc
 3-0A @ 24Vdc

ENVIROMENTAL

- Operating Temperature Range -40° to 212° F (-40° to 100° C)
- Relative Humidity up to 100%
- All Surface Finishes Fungus Proof and Corrosion Resistant

PHYSICAL

- Dimensions See Outline Diagram
- Weight 6.9 lbs. (3.1 Kg.)
- Mounting Directly on Deutz 1013/2012 & Volvo 520/720 engines

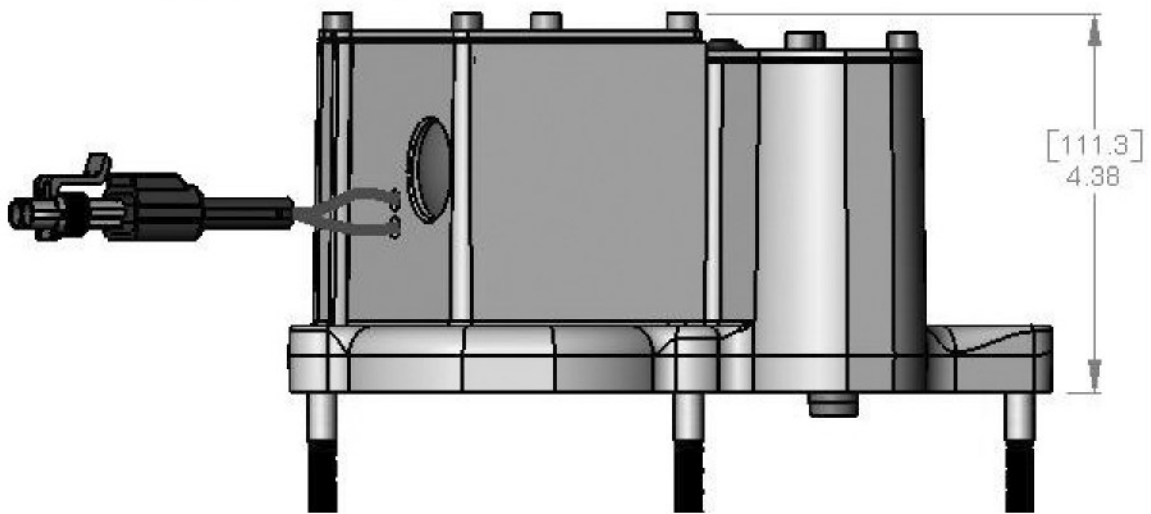
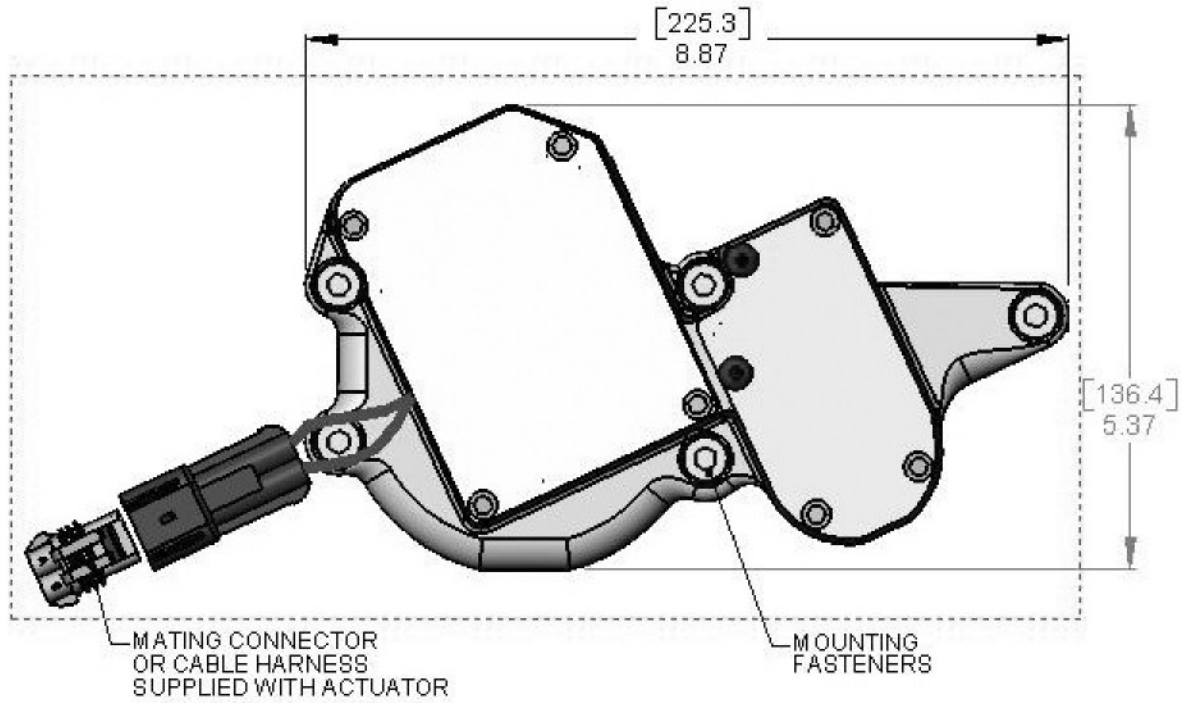
RELIABILITY

- Testing All Units 100% Tested

180 Series Actuator Parts List

Item	Part #	Description	Quantity
1	ADD/ADE 180-(12 or 24)	Actuator	1
2	PG180	Freeze Plug (ADE Models only)	1
3	HW05-592	1.25 x 500mm, M8 Bolt (ADE Models only)	5
4	EC107	Mating Connector (ADD Models only)	1
5	CH112	Cable Harness (ADE Models only)	1

Outline Diagram



PIB2070 Rev. A
MARCH 2006