

# ACE295 Series

## Integrated Pump Mounted Electric Actuator

### 1 INTRODUCTION

The GAC ACE295 Series Electric Actuator is designed to mount directly on Bosch 'P' 9000 and 10000 series fuel injection pumps in place of the mechanical governor. The 295 Series actuators provide a high performance integrated control system with no external linkages or brackets.

The actuator is designed with two isolated chambers that eliminates the possibility of any magnetic particles collecting and jamming the actuator. One chamber contains the oil and houses the actuator linkage while the second chamber houses the electromagnetic components.

The 295 Series typically outlasts the life of a diesel engine. Camshaft bearing retainer kits and position feedback sensor equipped versions are also available.

Installation kits KT295 and KT296 for P9 and P10 pumps linkage installation and mounting are included with the actuator. Wiring harnesses are not included.

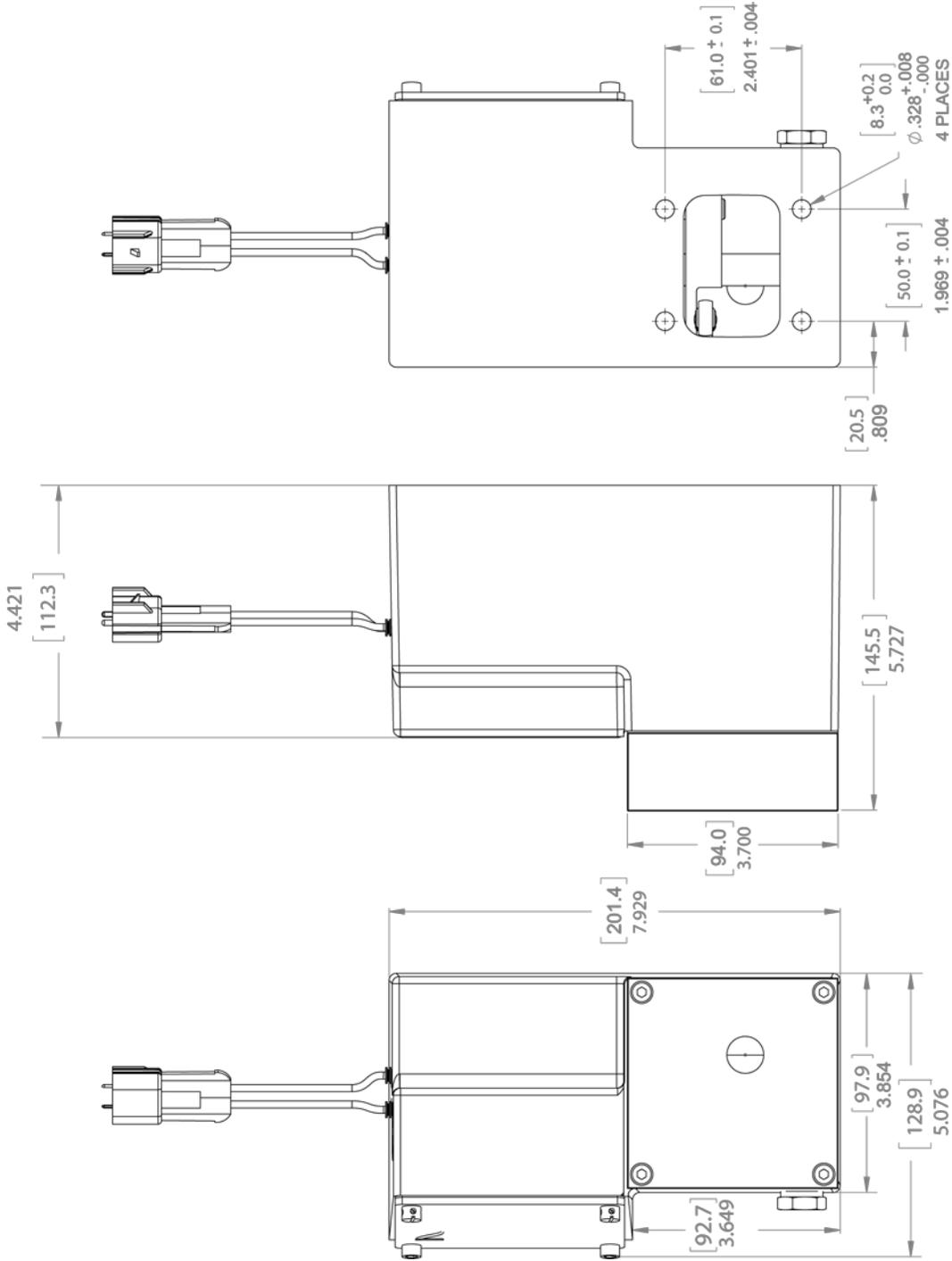


### 2 SPECIFICATIONS

PERFORMANCE	
Force	13.2 lbf (58.7 N·m)
Operating Stroke	0.79 in ± 0.04 in [20 mm +/- 1 mm]
POWER INPUT	
Operating Voltage	24 V DC
Normal Operating Current	2.4 A
Maximum Current Continuously Rated	4.5 A
Coil Resistance	4.7 ± 0.2 Ω
ENVIRONMENT	
Operating Temperature Range	-40 to +185 °F [-40 °C to +85 °C]
Relative Humidity	up to 100 %
All Surface Finishes	Fungus Proof and Corrosion Resistant
PHYSICAL	
Dimensions	See Section 3, INSTALLATION DIAGRAM
Weight	11 lb·f (4.9 kg·f )
Mounting	Directly on 'P' 9000 and 'P' 10000 Bosch fuel injection pumps in place of the mechanical governor. Gasket supplied with kit.
MATING HARDWARE	
Wiring Harness - ACE295	CH1215 (Not included)
Wiring Harness - ACE295F-24	CH1515 (Not included)

# 3 INSTALLATION DIAGRAM

Dimensions shown are nominal. Final dimensions may vary



Units	
[X.X] —	[mm]
X.X —	in

## 4

## INSTALLATION



An overspeed shutdown device, independent of the governor system, should be used 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.

### PREPARING THE FUEL PUMP



If the pump is equipped with a mechanical governor, it must be removed. GAC recommends that the modification be done by a qualified fuel injection shop.

#### NOTE

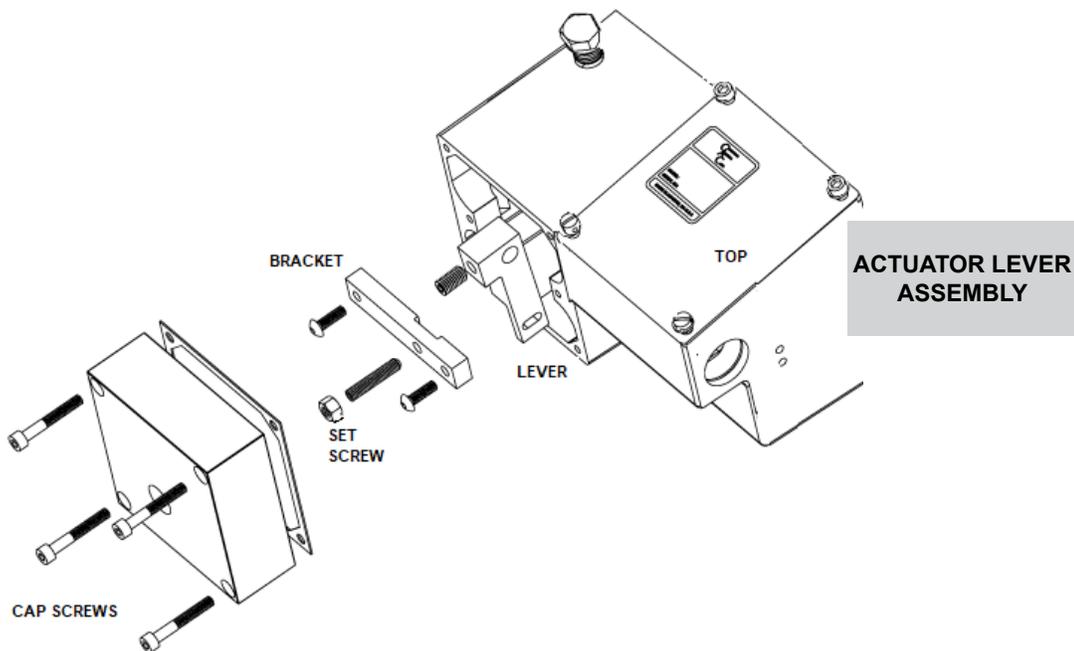
The following are general instructions for removing the existing governor and should not be used without a qualified professional.

Oil must be removed from the mechanical governor.

1. Remove the rear housing of the existing mechanical governor and disconnect the governor assembly from the fuel rack.
2. Remove the flyweight assembly.
3. Remove the intermediate governor housing, this leaves only the rack and camshaft protruding from the housing.
4. Remove the oil hex plug located on the pump between the fuel rack and the camshaft to allow any oil which leaks from the fuel rack to drain back into the pump.

### CONNECTING ACTUATOR LINKAGE TO FUEL RACK

1. Remove the four cap screws and carefully remove the gasket from the cover on the actuator to access the lever assembly used to connect the actuator to the fuel rack. Save the screws and gasket.
2. Remove the set screw from the bracket. **DO NOT LOOSEN LEVER OR REMOVE LEVER FROM THE SHAFT.**



## 4 INSTALLATION (CONTINUED)

- From the KT295 kit, select the P9 [15 mm] or P10 [14 mm] fuel rack adapter and the socket head screw.
- Align the fuel rack adapter over the connecting screw hole of the fuel control rack.
- Apply Loctite Thread Retention Compound to the socket head screw. Using the socket head screw, connect adapter to fuel control rack and torque to 5.8 - 6.2 lbf-ft [7.8 - 8.4 N·m].
- Connect the linkage extension from kit KT295 to the end of the fuel rack adapter using the M5-16 hex-head screw and washer, and torque to 3.4 - 3.8 lbf-ft [4.6 - 5.1 N·m].

### NOTE

The linkage is preset to a specific length and locked. Any adjustment of rack travel must be made using the slot on the actuator lever. This is completed after the actuator is mounted to the fuel pump.

- Attach the actuator to the pump by first cleaning the mounting surfaces of the actuator and the pump. Remove the gasket and screws from kit KT296. The gasket fits between the actuator and pump.
- Apply a small amount of high temperature gasket sealant, such as RTV silicone, to the pump side of the gasket. Align the gasket on the pump side to get the most complete coverage.
- Place the rear mounting side of actuator over the pump rack and linkage on the bearing retainer plate. Attach the actuator to the pump using two of the four screws and washers included with KT295, through the upper mounting holes. Tighten screws securely to 6.6 lbf-ft [9 N·m] taking care to compress the gasket evenly.
- Push the lower mounting bar against the bearing retainer plate and tighten the two bottom nuts onto the pump studs to 10 N·m (7.3 lbf-ft).

### NOTE

Make sure the linkage attached to the fuel rack moves freely when moved from shut off to full fuel.

- If necessary for access, loosen the two hex nuts that hold the front set screw bracket to gain access to the lever area.

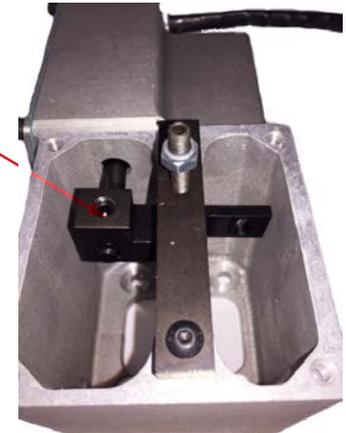
### KT295 CONTENTS



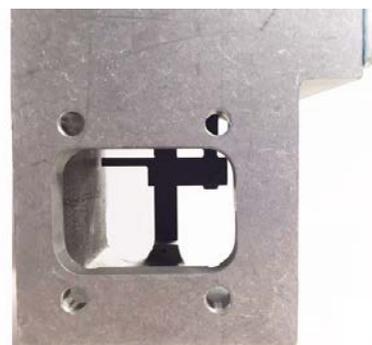
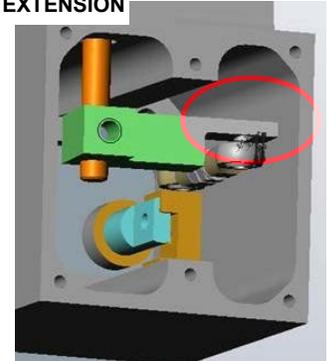
### KT296 CONTENTS



RACK ADAPTER

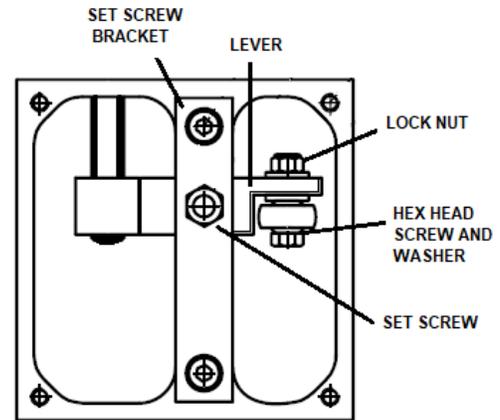


LINKAGE EXTENSION



## 4 INSTALLATION (CONTINUED)

1. Pull the linkage fully away from the pump. Push the linkage 1 mm toward the pump and attach it to the slot on the actuator lever using the M5x20 screw, two flat washers and the locking nut from kit KT295. Torque the lock nut to 3.4 - 3.8 lbf-ft [4.6 - 5.1 N·m].
2. The fuel rack should be 1 mm or less away from its internal physical stop. The zero fuel stop of the system will now be provided by the actuator instead of inside the fuel pump.
3. Manually move the actuator lever and linkage through its full range of motion. No binding should be noticed. The stop plate on the linkage must not contact the inside of the housing.
4. If loosened for access, torque the two screws holding the mounting bar to the actuator to 20 N·m.



1. Use the set screw and nut on the set screw bracket to adjust the maximum fuel position on the actuator lever. The set screw and lock nut is adjusted to limit the travel of the fuel rack.
2. After the maximum fuel delivery has been adjusted reinstall the saved gasket, four cap screws and cover.
3. Access the set screw as required through the actuator cover.



## 5 WIRING

The EC1000 or EC1010 electrical connector that mates with the actuator must be pre-wired in a configuration to match the system voltage. Cable Harnesses CH1215, and CH1515 are available from GAC.

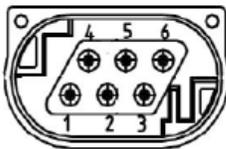
Fabricate a cable harness to connect the speed control unit to the actuator. The recommended wire size of the cable harness is 18 gauge (1 mm<sup>2</sup>) for a 24 V DC system.

Larger gauge wire is necessary for cable lengths greater than 12 ft [4 m].

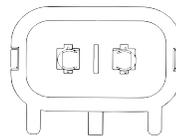
The ACB295F-24 version of the actuator includes a rack position sensor. A GAC speed control unit that includes fuel management electronics is required to interface with this sensor. See your speed controller installation manual for wiring information.

### ACE295F-24

FEEDBACK SENSOR  
(Female Receptacle)



### ACE295-24



HARNESS	
PIN	SIGNAL
1	+ 5 V DC
2	GND
4	OUT

## 6 TROUBLESHOOTING



The engine should be equipped with an independent shut down device to prevent overspeed which can cause equipment damage or personal injury.

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

### TROUBLESHOOTING TEST

1. Energize the actuator to full fuel with the speed controller.
2. Manually move the actuator through its range using the stop lever. No binding or sticking should occur.
3. If the actuator passes these tests, the problem is elsewhere in the system. Refer to the troubleshooting section of the speed control unit's installation manual.