

275 Series Integrated Pump Mounted Electric Actuator

1 SELECTION CHART

Product No.	SYSTEM VOLTAGE		CONNECTOR				MODIFICATIONS				CAMSHAFT BEARING RETAINER KITS	
	24 VDC	Multi VDC	MIL	Packard	Heavy Duty Bearing Retention	Position Feedback Sensor	Oil Drain Fitting	Extended Travel	Longbeng BH6PZ	Injection Pump	Kit Number	
ACB275										Bosch P3000 Pump	KT275	
ACB275C										Bosch P7000 Pump	KT276	
ACE275E-24										Optional installation kit for Bosch RP21 Pump with RB adapter plate	KT278	
ACB275H										Optional installation kit for Bosch RP21 Pump with adapter plate	KT278-1	
ACB275H-S1										Installation kit for Longbeng BH6PZ Pump	KT275-L	
ACE275H-24										Installation kit for MTU P3000	KT3000-MT	
ACE275HD-24										Installation kit for MTU P7000	KT7001-MT	
ACE275HDM-24												
ACE275J-24												
ACE275K												

ADDITIONAL NOTES

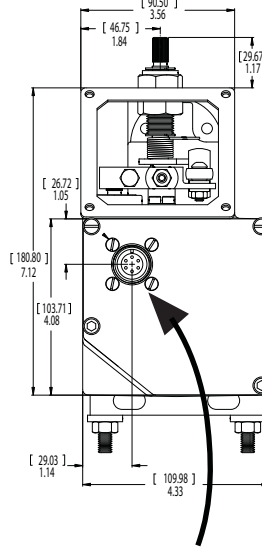
ACB275C	Designed specifically for MTU, sand cast housing and aluminum cover.
ACE275J-24	Features a compression style oil drain fitting for a 10 mm diameter tube, for Deutz 1015 / 2015 engines with high crankcase pressure.
ACE275E-24	Actuator with extended, 25mm travel
ACB275H-S1	Features a barbed oil drain fitting for a 10mm I.D. hose connection for Deutz 616 series engines
ACE275HDM-24	Designed specifically for Longbeng BH6PZ / 13038049 pump family

2 SPECIFICATIONS

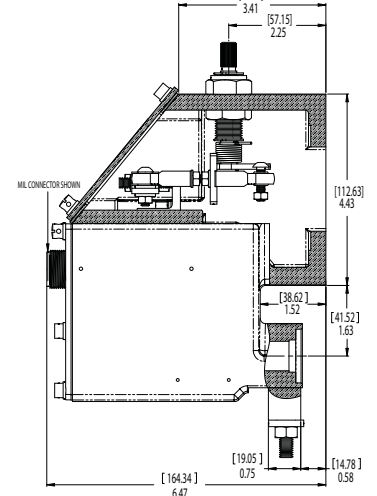
PERFORMANCE	
Force	13.2 lbf. Max (58.7 N)
Operating Stroke	0.79 in. Nominal (20mm) (0.984 in. / 25mm, for ACE275E)
ELECTRICAL POWER INPUT	
Operating Voltage	12 or 24 VDC
Normal Operating Current	3.0 Amps @ 12 VDC 1.5 Amps @ 24 VDC
Maximum Current (Continuous)	9.0 Amps @ 12 VDC 4.5 Amps @ 24 VDC
ENVIRONMENT	
Operating Temperature Range	-40°F to 257°F (-40°C to +125°C)
Relative Humidity	Up to 100%
Vibration	HD Models: Random vibration: 31 g _{rms} vertical, 17 g _{rms} transversal, 12 g _{rms} longitudinal at 20-2000 Hz Other Models: 21g peak at 100-2000 Hz
Shock	20g at 11 msec
All Surface Finishes	Fungus Proof and Corrosion Resistant
PHYSICAL	
Dimensions	See Outline & Dimensions
Appx. Weight	12 lb (5.4 kg)
Mounting	Directly on 'RP', 'P' 3000 and 'P' 7000 Bosch fuel injection pumps in place of the mechanical governor. Requires camshaft bearing retainer kit. See section 4 for more info.
RELIABILITY	
Testing Agency	CE, RoHS, BV, Lloyd's Register, DNV/GL

3 OUTLINES & DIMENSIONS

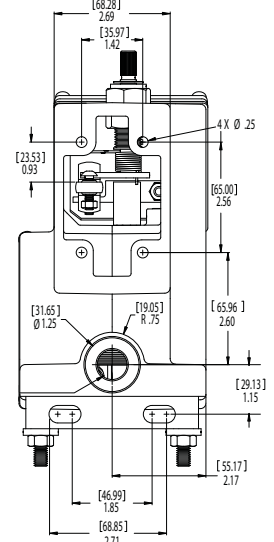
VIEW 1



VIEW 2



VIEW 3



NOTE

Military connector shown. ACE Versions have a 16in [400mm] harness which exits from the bottom of the actuator.

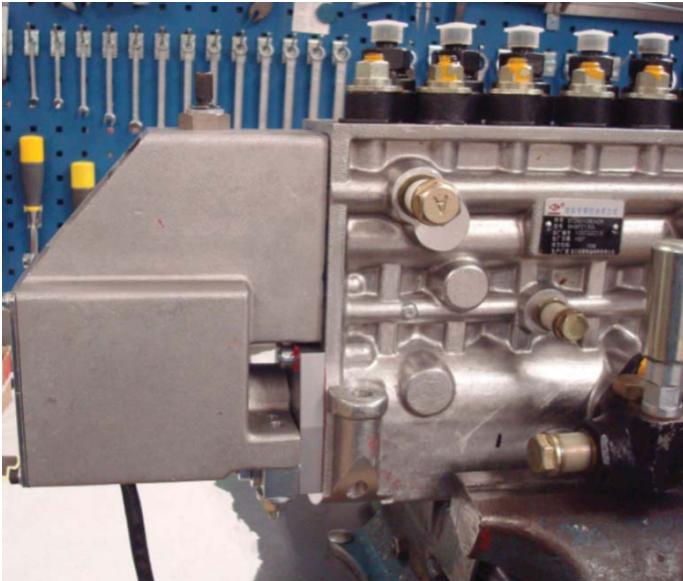
Dimensions: [mm]
in

4 SYSTEM DESCRIPTION

The 275 series actuators are an electromagnetic linear servo device that controls the fuel rack of in-line injection pumps with up to 16 cylinders. The installation of a 275 series actuator with a GAC analog or digital controller and an engine speed sensor provides a high performance, closed loop engine speed control system.

The actuator was designed with two isolated chambers. The upper chamber is wet with oil and contains the linkage assembly. The lower chamber contains the electromagnetic components and is sealed to eliminate the possibility of magnetic particles or foreign material accumulating around the stator that could potentially interfere with the actuators freedom of movement.

These actuators have no sliding parts and are totally sealed. They provide outstanding reliability and require no maintenance.



4 INSTALLATION

WARNING 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. The following steps are a generalized procedure.

PREPARING THE FUEL INJECTION PUMP

1. Remove the rear housing of the 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. Install the appropriate camshaft bearing retainer kit. This kit includes the correct shims to ensure that the retainer plate rests on the bearing and also prevents oil from leaking out around the camshaft. See page one for retainer kits. See PIB2031 for retainer kit installation details.
5. Located on the pump between the fuel rack and the camshaft, the oil hex plug may be removed to allow any oil, leaking from the fuel rack, to drain back into the pump.

NOTE Removal of oil from the mechanical governor is required.

INSTALLING THE ACTUATOR

VIEW 1

1. Remove the four screws that fasten the top cover (with label) to the actuator and expose the linkage used to connect the actuator to the fuel rack.
2. Remove the screw that attaches the ball bearing rod end to the lever. Do not remove or loosen the lever from the actuator shaft.
3. The opposite end of the linkage must be attached to the top of the fuel rack with the screw and lock nut provided. Tighten the screw and nut securely to 4.0 – 4.5 Nm. 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. If linkage length adjustment is needed, consult with GAC or its distributors first.
4. The gasket supplied in the installation parts kit fits between the actuator and pump. Clean the mounting surfaces of the actuator and the pump on one side of the gasket to the actuator. A small amount of gasket sealant, such as RTV silicone, is recommended for the pump side of the gasket.
5. Loosen the two M8 hex nuts that hold the lower mounting bar to the actuator.

VIEW 2

6. Place the actuator over the rack and linkage. Fit the lower part of the actuator onto the bearing retainer plate. Attach the actuator to the pump with four M5 22mm screws and washers through the upper mounting holes. Tighten these screws securely to 9 Nm so that the gasket is compressed evenly.
7. Push the lower mounting bar against the bearing retainer plate and tighten the two M6 nuts onto the studs that are in the pump to 10 Nm.
8. Tighten the two M8 nuts on the studs that hold the mounting bar onto the actuator to 20 Nm.
9. The linkage attached to the fuel rack must be free when moved from shut off to full fuel. Pull the linkage fully away from the pump. Push the linkage 1mm toward the pump and attach it to the slot in the actuator lever with the M5 screw, two flat washers and locking nut. Tighten securely to 4 Nm. The fuel rack should be 1mm 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.

VIEW 3

10. Manually move the actuator lever and linkage through its full range of motion. No binding should be noticed. The actuator operating lever & assembly must not contact the inside of the housing.
11. A maximum fuel stop adjustment is located on the actuator lever. The set screw and lock nut may be adjusted to limit the travel of the fuel rack.
12. Push the linkage to the full fuel position and operate the manual shut off to insure that the shut off lever correctly contacts the stop plate and forces the linkage to zero fuel.
13. After the maximum fuel delivery has been adjusted on an engine or dynamometer, the top cover may be installed. Place the special sealing screw in the lower left hand corner. Lockwire the two covers together to prevent tampering if available.

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 CH1203, CH1215, & CH1515 are available from GAC. Refer to CONNECTORS & HARNESSES in the Specifications Section.

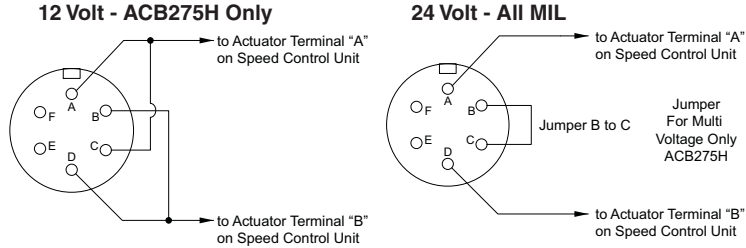
CABLE HARNESS

#16 Gauge (1.5 mm ²)	12 Volt System
#16 Gauge (1.5 mm ²)	24 Volt System

Fabricate a cable harness to connect the speed control unit to the actuator. The recommended wire size of the cable harness is:

NOTE Larger gauge wire will be necessary for cable lengths greater than 12ft. (4m).

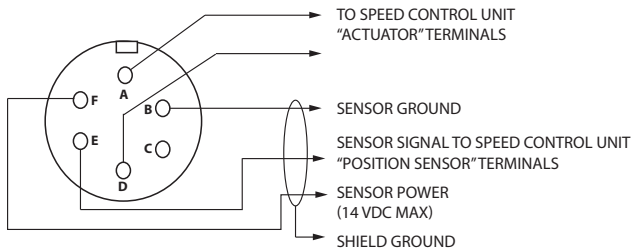
MILITARY CONNECTOR



NOTE For 32 V operation, wire the connector as shown for 24 V operation and add a 1.5 ohm, 25 V resistor in series with pin A of the actuator connector and the corresponding output terminal of the speed control unit.

FEEDBACK SENSOR

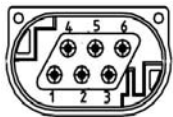
ADB275F / ACB275F WIRING ONLY



ACE275K Only

ACE275K WIRING

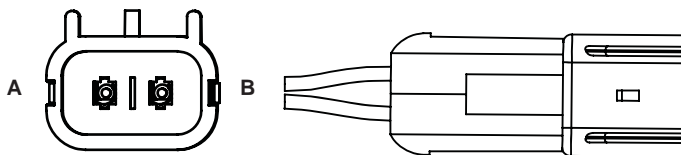
FEEDBACK SENSOR (Female Receptacle)



HARNESS

PIN	SIGNAL
1	+5V INPUT
2	GND
4	OUT (0.5-4.5V)

PACKARD CONNECTOR



6 TROUBLESHOOTING

CAUTION

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

Energize the actuator to full fuel (follow steps in control unit publication and manually move the actuator through its range using the stop lever. No binding or sticking should occur. If the actuator passes three tests, the problem is elsewhere in the system. Refer to the troubleshooting section the speed control unit's literature.

MILITARY CONNECTOR

MEASURING THE RESISTANCE

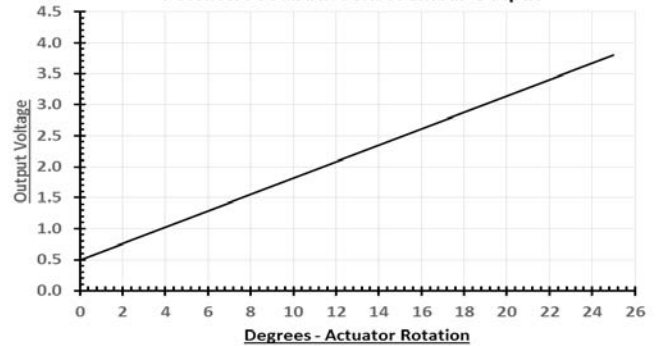
TERMINALS	RESISTANCE
A to C	(12V) 2.5 Ohms
B to D	(12V) 2.5 Ohms
A to D	(24V) 4.7 Ohms
A to Housing	Infinity
C to Housing	Infinity
E to F	Infinity

PACKARD CONNECTOR

MEASURING THE RESISTANCE

TERMINALS	RESISTANCE
A to B (24V)	4.7 Ohms
A to Housing	Infinity
B to Housing	Infinity

Position Feedback Sensor Linear Output

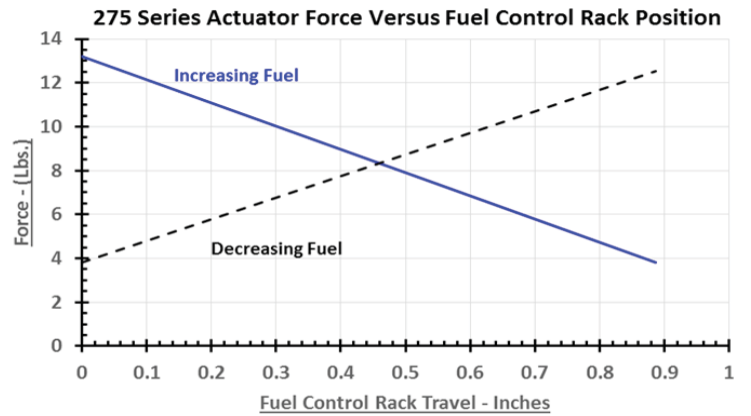
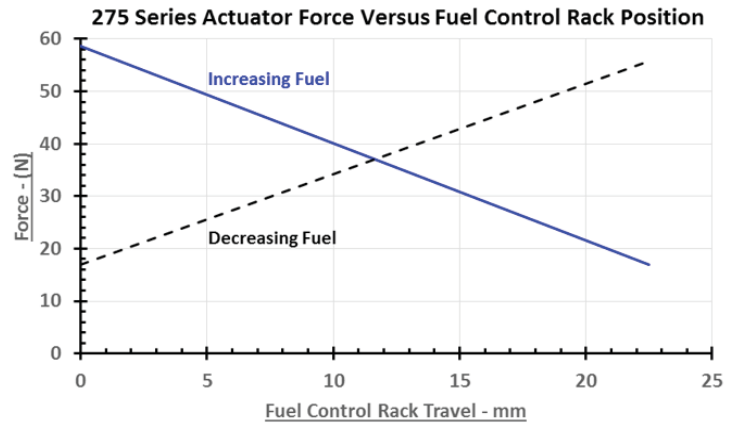
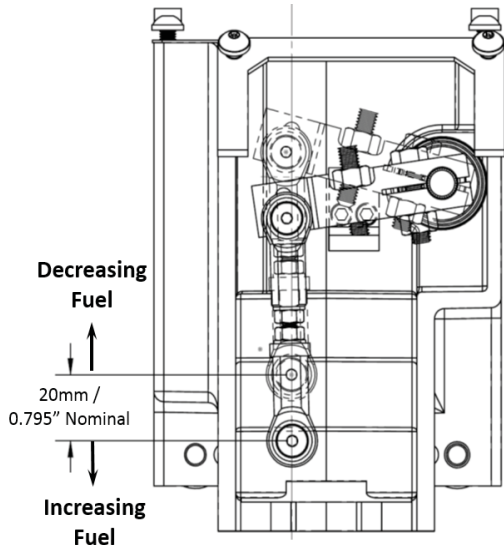


CONNECTORS & HARNESSES

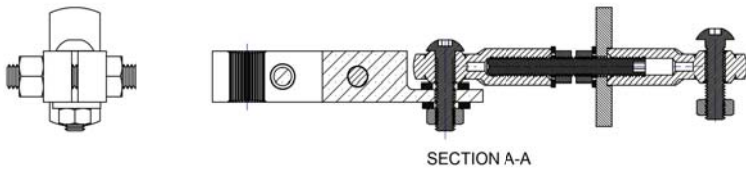
	ACTUATOR TYPE	CONNECTOR	DESCRIPTION
Connectors	ACB, ADB	EC1000	Military - Straight
	ACB, ADB	EC1010	Military -90°
	ADD, ACE	EC1300	Packard Mating Connector
	ADD, ACE	EC1310	Packard Replacement Connector
	ACE275K	EC1515	AB Position Sensor (Requires EC1300)
Harnesses	ACB, ADB	CH1203	Military - Straight 12 ft [3.6m]
	ACB, ADB	CH1210	Military - 90° 12 ft [3.6m]
	ADD	CH1215	Packard 6 ft [1.8m]
	ACE275K	CH1515	AB Position Sensor 6 ft [1.8m]

275 Series Actuator Linkage / Lever Assembly

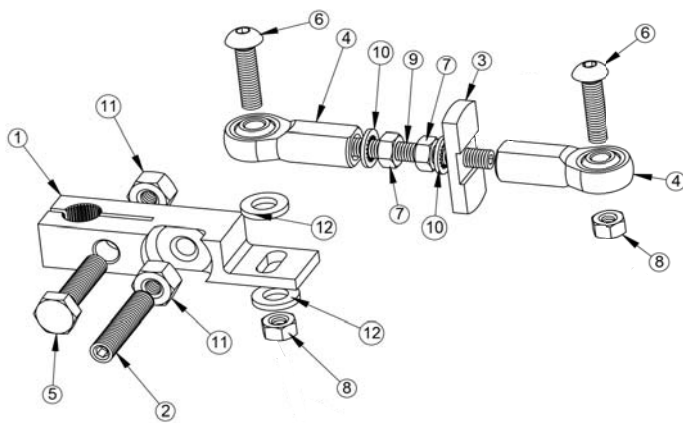
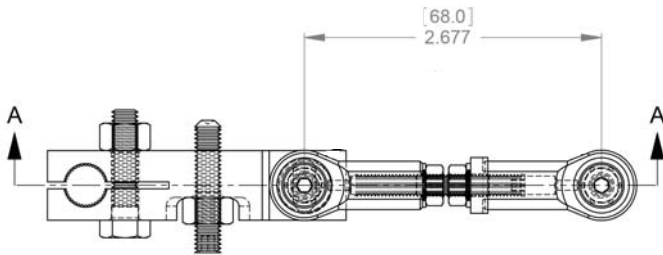
275 Series Actuator Force Versus Rack Travel



LINK ASSEMBLY



SECTION A-A



ITEM	QTY	PART #	DESCRIPTION
1	1	LE132	LEVER
2	1	SC099	SCREW
3	1	PL276	PLATE
4	2	BB111	BEARING - ROD
5	1	HW05-523	HEX BOLT, M6 x 25
6	2	HW05-521	BUTTON SOCKET CAP SCREW, M5 X20
7	2	HW07-706	HEX NUT, M5
8	2	HW07-704	HEX LOCK NUT, M5
9	1	HW05-567	THREADED ROD, M5 X 40
10	2	HW06-610	LOCK WASHER, M5
11	2	HW07-702	LOCK NUT, M6
12	2	HW06-609	FLAT WASHER M6