

175 Series Electrical Actuator

1 INTRODUCTION

GAC's 175 Series Integrated Pump Mounted Actuators are field proven proportional actuators designed to mount directly to fuel injection pumps in place of a mechanical governor to achieve an integrated proportional servo fuel package. The versatile design offers numerous options and mounting kits. Its fast response time of less than 35 ms (10 % - 90 %) also offers adjustable fuel limits.

Built with sealed components and no sliding parts, the design demonstrates outstanding reliability with no maintenance required. The 175 series supports Bosch-style P pump and BYC ASIMCO pumps designs.

- Connects directly to fuel rack in place of mechanical governor
- Analog or digital governors available
- Manual shut-off mechanism
- Fast response; < 35 ms (10 – 90 %)
- Right-hand rack



2 SELECTION CHART

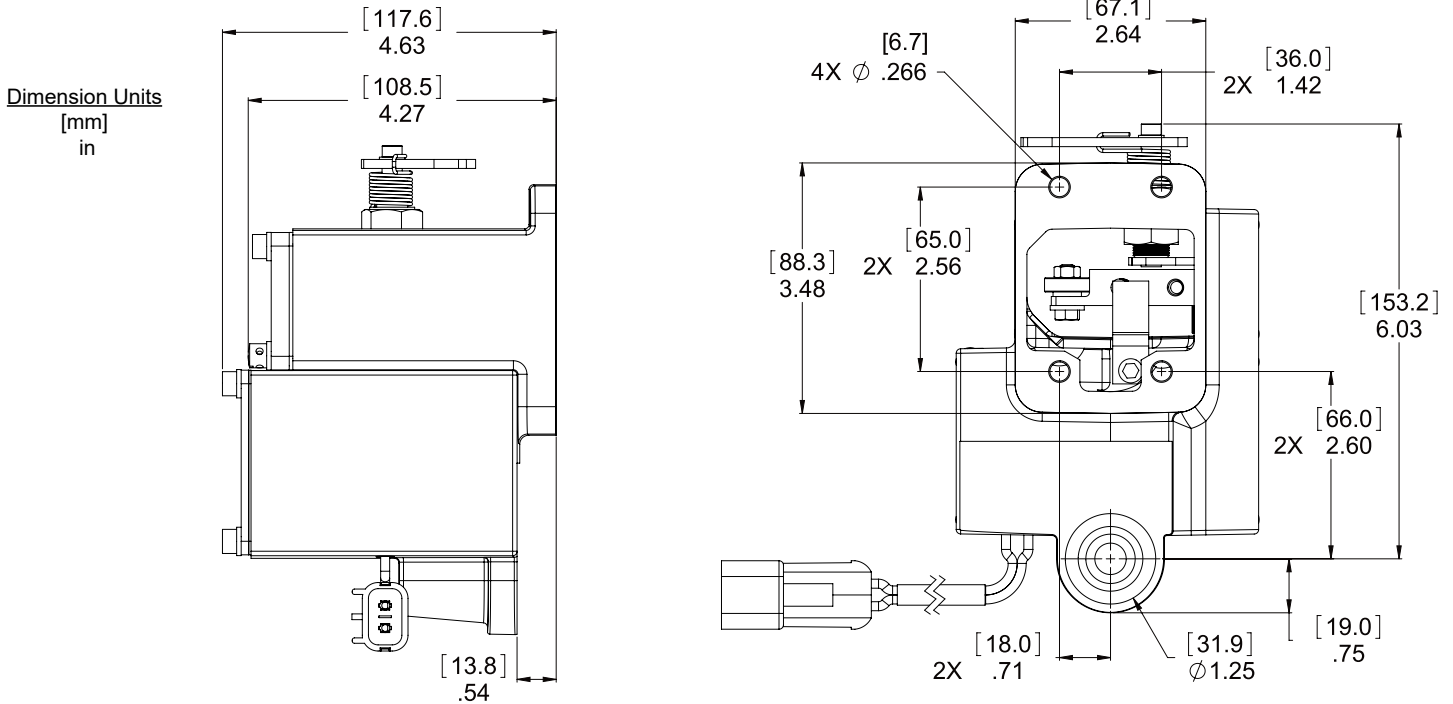
PART NUMBER	DESCRIPTION	MANUAL SHUT OFF	FEED-BACK SENSOR	RETURN SPRING	BYC COMPATIBLE
ACD175A-12, -24	12 or 24 V DC with Packard Connector without Mating Connector / Double Rack Bearing / BYC ASIMCO installation kit KT283 included				
ADD175A-12, -24	12 or 24 V DC with Packard Connector without Mating Connector / Single / Bosch installation kit KT289 included				
ADD175SA-24	24 V DC with Packard Connector without Mating Connector / Single / Generic installation kit KT270 included				
ADD175F-12, -24	12 or 24 V DC with Packard Connector without Mating Connector / Single Rack Bearing / Bosch installation kit KT289 Included / Novotechnik Position Feedback Sensor (Mating Connector EC1523 Not included)				

3 SPECIFICATIONS

PERFORMANCE		ENVIRONMENTAL	
Force	6.2 lbf-ft [27.5 N·m]	Operating Temperature	-40 to 200° F [-40 to 95° C]
Operating Stroke	0.80 in [21 mm]	Relative Humidity	Up to 100 %
Response Time (10-90%, 2-19 mm)	35 ms	Vibration	20 g @ 20 to 500Hz
Internal Sealing Pressure	2 bar (29 psi)	Shock	20 g @ 11 ms
ELECTRICAL POWER INPUT \ OUTPUT		All Surface Finishes	Fungus Proof and Corrosion Resistant
Operating Voltage	12 V DC or 24 V DC	PHYSICAL	
Nominal Operating Current	4.0 A (12 V DC) 2.0 A (24 V DC)	Dimensions	Approx 4.25 x 4.63 x 6.77 in [106.0 x 117.6 x 171.9 mm] See Section 4, Installation
MAX Continuous Current	5.8 A (12 V DC) 3.1 A (24 VDC)	Weight	4.75 lb [2.2 kg]
Nominal Coil Resistance	2.1 Ω Nominal (12 V) 7.1 Ω Nominal (24 V)		
Internal Sealing Pressure	2.0 bar (29.0 psi)		

[ES1078 REV A 3-2025]

4 DIMENSIONS



5 ADAPTER KITS

The following adapter kits are available in addition to those included with the actuator. See the [175 Series kit installation](#) document for a complete list of parts and instructions. These kits include the necessary adapters, plates, and mounting hardware for the specified pump. See your GAC representative for more details, information on your specific pump, or more about installation.

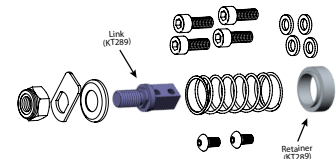
PUMP MOUNTING - ADAPTER KITS			Included with Actuator
PART NUMBER	PUMP TYPE	DESCRIPTION	
KT153	Motorpal Mi	Motorpal Mi Series - PPxM10P1i Fuel Injection Pumps - Plate, Linkage, and Mounting Hardware	
KT175-RS-R	Bosch RS/RSV	Bosch RS/RSV Governor / Right Hand Rack / Mounts Actuator Directly to Intermediary Mechanical Governor Housing - Adapter Plate, Linkage, Gasket, Hardware	
KT175-RS-R-ZEXEL	Zexel RS/RSV	Zexel RS/RSV Governor / Right Hand Rack / Mounts Actuator Directly to Intermediary Mechanical Governor Housing - Adapter Plate, Linkage, Gaskets (Governor Housing and Actuator), Hardware	
KT175A-R	Bosch A Pump	Bosch A Pump / Right Hand Rack - Includes Adapter Plate, Bearing Retainer (KT176A), Spring, Gaskets, Linkage, Hardware	
KT197	Bosch EDC	Bosch EDC Governor - Mounting Plate, Linkage, Gasket, Hardware	
KT275	Bosch P3000	Bosch P Pump 3000 Bearing Retainer Kit - Mounting Plate, Gasket, Shims, Hardware	
KT276	Bosch P7000	Bosch P Pump 7000 Bearing Retainer Kit - Mounting Plate, Gasket, Shims, Hardware	
KT283*	BYC 'P' Pump	Spare (Included with Actuator) - Hardware, Gasket, Shutoff Plate, Spring, Retainer, Linkage	
KT289*	BYC 'P' Pump	Spare (Included with Actuator) - Hardware, Gasket, Shutoff Plate, Spring, Retainer, Linkage [Note - KT289 includes contents of KT283]	
KT-BYC	BYC 'P' Pump	BYC ASIMCO Pumps - A, AD, P, P7100, PB197 - Adapter Plate, Gasket and Seal	

* The difference between the KT283 and KT289 is the KT283 does not include components included with the fuel pump.

FUEL INJECTION MOUNTING KITS

KT283 is specific to the BYC (ASIMCO) fuel injection pump where the retainer and link are included with the fuel pump.

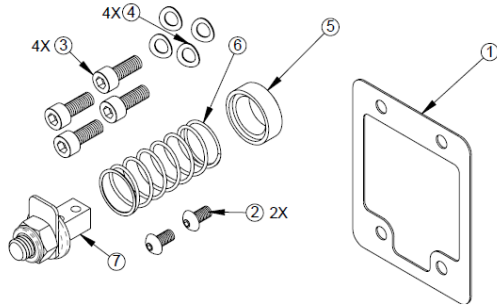
KT289 comes with the retainer and link, giving the customer a choice of whether or not to use the link and retainer included with the pump.



5 ADAPTER KITS (CONTINUED)

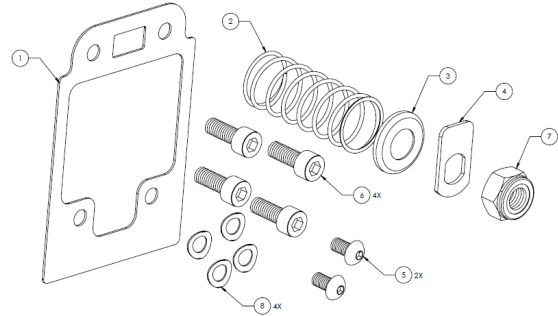
The following are the most commonly purchased adapter kits. Please see your GAC representative for more details on your needs.

KT289 INCLUDED WITH ADD175-XX



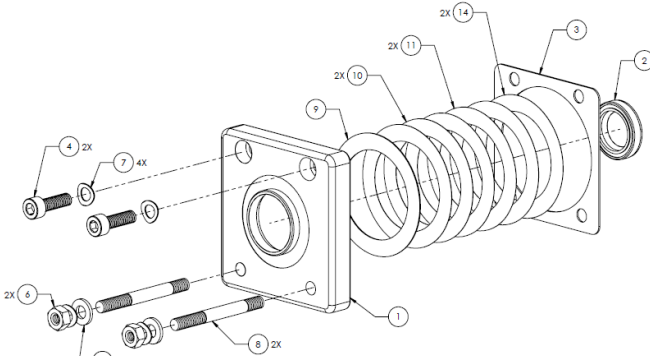
ITEM	PART	DESCRIPTION	QTY
1	GA196	Gasket	1*
2	HW05-550	Button head hex screw M5x10	2
3	HW05-566	Cap screw, M6x16	4
4	HW06-600	Spring washer M6	4
5	RT172	Retainer spring seat	1
6	SP170	Rack return spring	1
7	LKS172	Assembly link - same as KT283 parts • HW07-710 • RT171 • PL171	1

KT283 INCLUDED WITH ACD175-XX



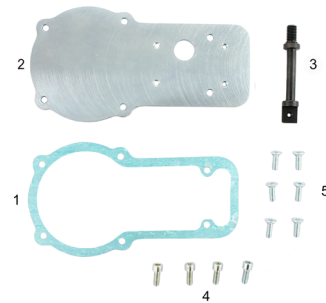
ITEM	PART	DESCRIPTION	QTY
1	GA196	Gasket	1
2	SP170	Rack return spring	1
3	RT171	Retainer spring	1
4	PL171	Shutoff plate	1
5	HW05-550	Button head hex screw M5x10	2
2	HW05-566	Cap screw, M6x16	4
4	HW07-710	Screw, plastic insert	1
7	HW06-600	Spring washer M6	4

KT275 BOSCH P PUMP 3000 BEARING RETAINER KIT



ITEM	PART	DESCRIPTION	QTY
1	PL280	Plate	1
2	SE100	Oil Seal	1
3	GA283	Gasket	1
4	HW05-514	Cap screw	2
5	HW06-601	Washer	2
6	HW07-700	Hex Nut	2
7	HW06-600	Washer	4
8	HW05-500	Threaded Stud	2
9-11, 14	SR276-004, 005, 007, -020	Spacers	

KT175-RS-R BOSCH RSV KIT



ITEM	PART	DESCRIPTION	QTY
1	GA126	Gasket	1
2	PL298	Retainer Plate	1
3	LK175	Linkage	1
4	HW05-566	Screw	4
5	HW05-704	Screw	6

6 INSTALLATION PREPARATION



- 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.

BEFORE INSTALLING THE ACTUATOR

- Ensure paint or other debris does not enter the main shaft bore.
- The standard connection includes a bearing link provided in KT289. Two bearings are sometimes needed to accommodate height variances across different fuel pump models.
- Select models have GAC logo embossed on top cover. On some models, lock washers are used in place of flat washers to retain covers. Contact GAC if special accommodation is needed.
- Install any a mounting kit or similar as required to support your pump assembly before installing the actuator. The kits are listed in this manual. Installation instructions for each kit are available on the GAC website or from your local GAC representative.

IF THE FUEL INJECTION PUMP IS EQUIPPED WITH A MECHANICAL GOVERNOR, IT MUST BE REMOVED.

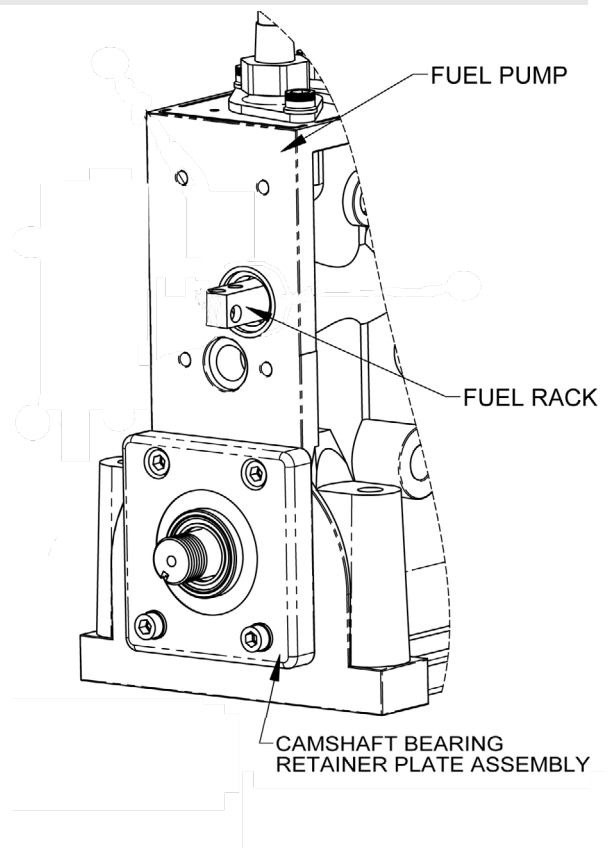
NOTE: GAC recommends mechanical governor removal be performed by a qualified fuel injection service facility.

The following steps are generally required to remove an existing mechanical governor:

1. Preparation for oil leakage in removal area.
2. Remove the rear housing from the mechanical governor and disconnect the governor linkage from the pump fuel rack.
3. Remove the flyweight assembly following Bosch instructions, using specialized Bosch tools (part number KDEP-2998, KDEP-2918). A Bosch KDEP-1068 tappet holding tool is required for reassembly. Obtain Bosch tools from an authorized Bosch service center.
4. Remove the intermediate governor housing. This leaves only the rack and camshaft protruding from the pump.
5. Install the appropriate camshaft bearing retainer or mounting plate as required. See the [Adapter Kits](#) for information on your pump adapter kit. The Camshaft Bearing Retainer Plate Assembly is shown for reference in this installation instruction.

ADDITIONAL TOOLS

- Review your adapter kit and pump information for details on tools required for your pump.
- Bosch tools: KDEP-2998, KDEP-2918. A Bosch KDEP-1068 tappet holding tool is required for reassembly. Obtain Bosch tools from an authorized Bosch service center.
- M6 ball-end hex wrench, M6 open wrench



7 WIRING

The 175 Series Integral Electric Actuator is prewired for 12 or 24 V DC operation. Use the included cable harness or make up a cable harness to connect the actuator to the speed control unit.



Do not use the 175 Series actuator on a 32-volt system. Contact the GAC for any further assistance.

PACKARD CONNECTORS - CABLE HARNESS

DESCRIPTION	PART NUMBER
Actuator Mating Connector	EC1300
Actuator Mating Cable Harness (6 ft.)	CH1215

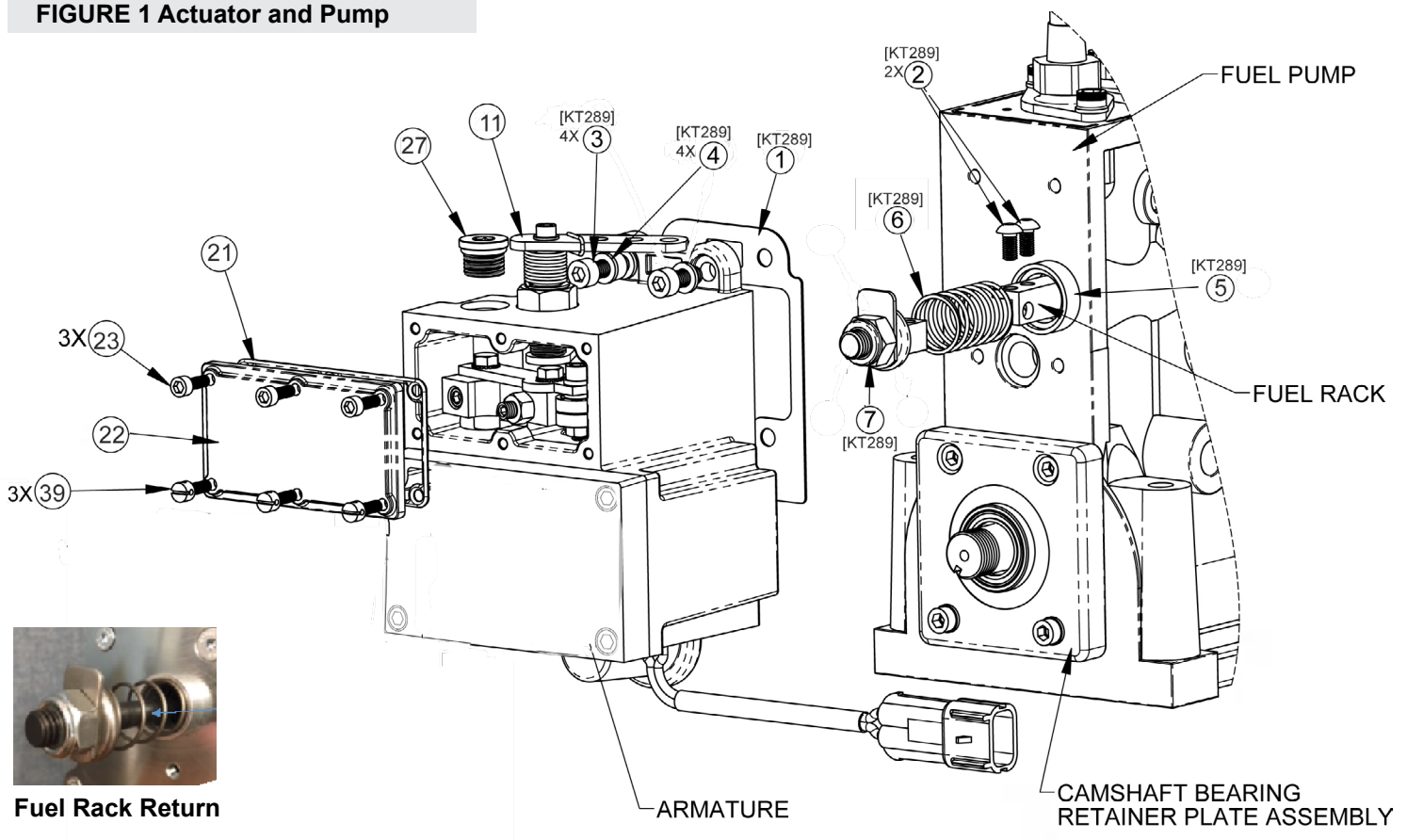
8 INSTALLING THE ACTUATOR

All hardware needed to attach the actuator to the pump is located in either kit KT283 or KT289, which are supplied with their related actuator. Use the following steps and reference Figures. KT289 is referenced in the Figures and steps.

ON THE FUEL PUMP

1. Using your mounting kit (this example uses KT289), place the spring seat [Figure 1(5)] over the fuel rack and slide it onto the body of the fuel pump. Slide the fuel rack return spring (6) over the fuel rack and against the spring seat.
2. Attach the rack connection link assembly (7) to the fuel rack with two M5 X 10 mm long retaining screws (2) coated with Loctite adhesive. GAC recommends using Primer Loctite SF7649 with Loctite 518 for best results .
3. Torque the screws (2) to 3-4 N·m.
4. Remove the upper chamber cover (22) and O-ring seal (21). Retain the cover, seal, and hardware (23,39). Do not remove the lower cover on the actuator.
6. Clean the actuator to the mounting surface on the fuel pump so that it is free of any debris.

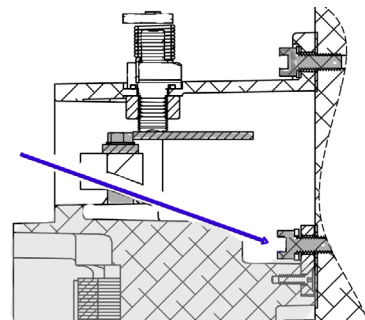
FIGURE 1 Actuator and Pump



ON THE ACTUATOR

8. Insert two M6x16mm long screws from mounting kit [Figure 1 (3,4)] and spring washers (4) through the lower mounting holes [Figure 3] inside the upper actuator cavity. Do not tighten.

FIGURE 3 Lower Cavity Screw Location



ON THE ACTUATOR

9. Align the gasket (1) and install it over the two screws. Apply the gasket (1) to the actuator mounting face [Figure 4].
10. Carefully slip the actuator over the fuel rack assembly until the two lower screws to just meet the fuel pump mounting holes.
11. Attach the lower mounting screws by inserting the ball end hex wrench through the hex key access point [Figures 5 and 6] located under the Adjustment Plate lever [Figure 5(25)].
Hand tighten the **lower left mounting screw** [Figure 6] a few turns. Do not tighten fully.
12. Pull the Adjustment Plate lever [Figure 5(25)] outward and slide the ball end hex wrench into the space between the operating lever and the access point in the housing of the actuator.
Hand tighten the lower **right** mounting screw [Figure 6]. Do not tighten fully.
13. Once the bottom two screws are fully engaged (do not fully tighten) into the pump housing, insert two M6 X 16 mm long screws and spring washers [Figure 1 (3,4)] into the top two mounting holes [Figure 7] of the actuator and thread into the pump housing.
Tighten mounting screws at alternate opposite corners to keep the actuator properly aligned.
14. Torque all four mounting screws to 5-6 N·m.
15. Verify that the fuel rack assembly moves in and out freely inside the upper cavity of the actuator.

FIGURE 4 Actuator to Pump Gasket

APPLY PRESSURE SENSITIVE
ADHESIVE SIDE OF GASKET TO
ACTUATOR MOUNTING FACE.

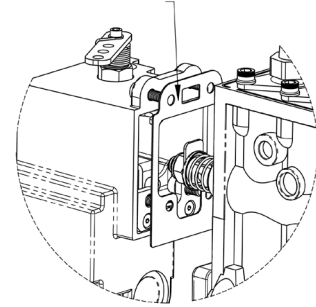


FIGURE 5 HEX Key Access Point

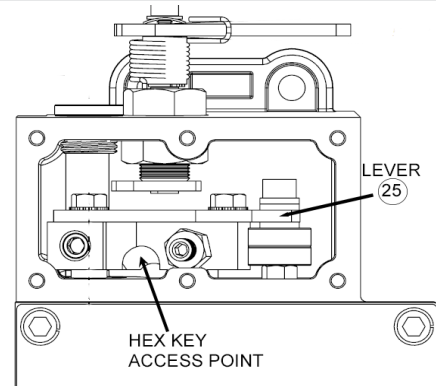


FIGURE 6 Accessing Lower Mounting Screws

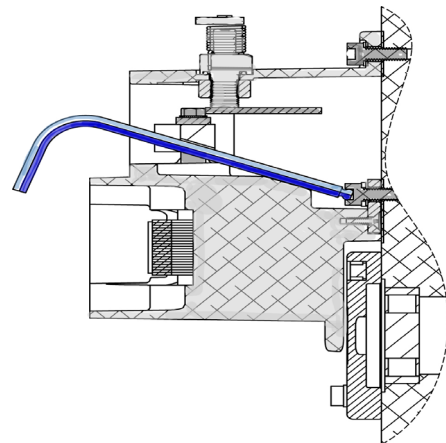
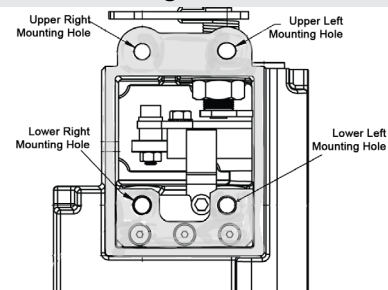


FIGURE 7 Mounting Holes Rear Actuator View

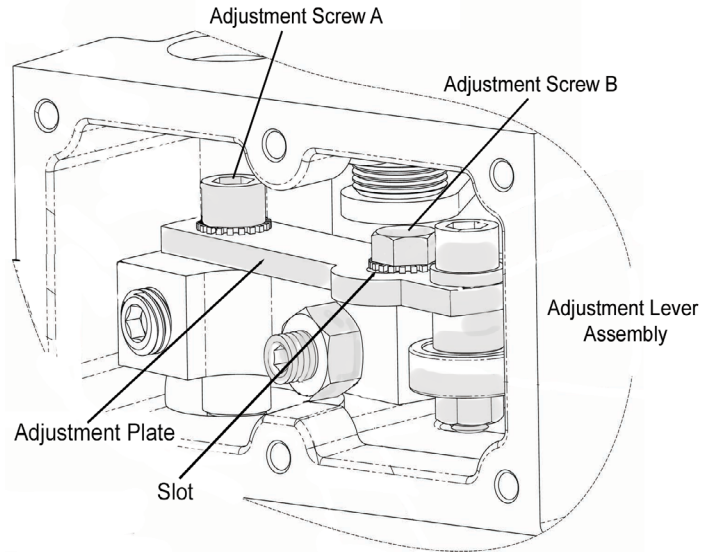


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INSTALLING THE ACTUATOR (CONTINUED)

16. Move the fuel rack as far out of the pump as possible.
17. Carefully loosen adjustment screws [Figure 8(A)] and (B)] of the adjustment plate of the Adjustment Lever Assembly. Using the slot under Adjustment Screw B [Figure 10] move the assembly away from the fuel rack connection link.
18. Rotate the Actuator lever [Figure 1 (11)] out from the actuator until it stops. The armature of the actuator will contact the lower chamber cover. Hold this position.
19. Rotate the adjustment plate and lever bearing assembly [Figure 8] inward towards the fuel rack so that contact is made between the bearing and rack connection link.
17. Continue to push in an additional 1 - 2 mm, and, while holding this position, torque the operating lever assembly Adjustment Screws A and B [Figure 7] to 4-6 N·m.

FIGURE 8 Loosen Adjustment Screws



NOTE: When installed, the upper chamber cover must not hit the internal operating lever of the maximum fuel adjustment screw.

FIGURE 9 Adjustment Lever Assembly

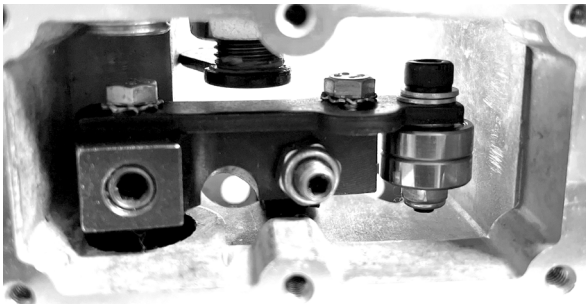
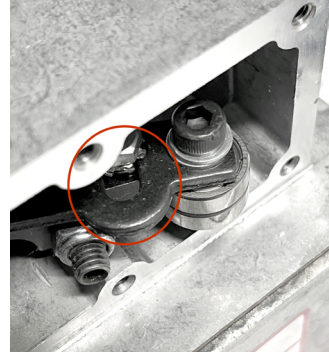


FIGURE 10 Slotted Portion Of Adjustment Plate



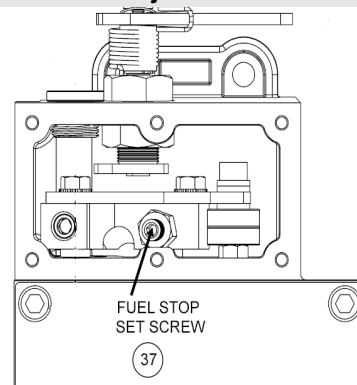
The operating lever has a maximum fuel adjustment set screw [Figure 11 (37)]. Typically no change is needed to this setting, however it can be used to restrict the fuel rack travel.



Setting high fuel levels may cause the Maximum Fuel Stop Set Screws to hit the top cover, which can affect the minimum fuel position. This could lead to a dangerous condition.


When setting fuel levels above 17 mm of actuator lever travel, ensure the Fuel Stop Set adjusting screw does not contact the top cover in the minimum fuel position.

FIGURE 11 Fuel Adjustment Set Screw



8

INSTALLING THE ACTUATOR (CONTINUED)

20. Inspect the assembly to ensure all screws are tight and the fuel rack moves smoothly without any binding.
Push in the fuel rack manually to the full fuel position and rotate the fuel shut off lever [Figure 1(11)] to minimum fuel to confirm that the shut off lever contacts the metal plate [Figure 1 (7)] on the fuel rack connector assembly and forces the fuel rack to minimum position.
 21. The operating lever maximum fuel adjustment set screw [Figure 11 (37)] can be used to restrict the fuel rack travel. Typically no change is needed, however it can be used to restrict the fuel rack travel.
 22. With the fuel pump operating on the engine, the maximum fuel setting screw can be adjusted to provide specific horsepower. Once this setting is made, torque the locknut [Figure 11(37)] on the fuel adjustment screw to 5-6 N·m.
 23. Rotate the manual shut off lever [Figure 1(11)] to the stop position and ensure that the fuel is completely shutoff and the engine stops.
 24. With the engine shut down:
 - a. Apply Loctite 222 to each of the six top cover screws [Figure 1(23, 39)].
 - b. Seat the O-ring [Figure 1(25)] into the upper chamber cover using silicone release compound or a light coating of grease to ensure the seal is fully engaged.
-  **If the O-ring seal is damaged or deformed, discard and replace with a new one (GAC PN SE175).**
- c. Install the upper chamber cover [Figure 1(22)] with O-ring seal (25) ensuring the seal is fully seated in the cover.
 - d. Hand tighten the screws into the housing.
25. Ensure the cover does not hit the internal operating lever or the maximum fuel adjustment screw.
26. Torque cover screws in a criss-cross sequence to 20-22 lb-in [2-2.5 N·m]. Check for any oil leaks.
27. Lock-wire the lower screws for tamper resistance.

