

# ADB120E4 Series Integral Electric Actuator with Fuel Metering Valve

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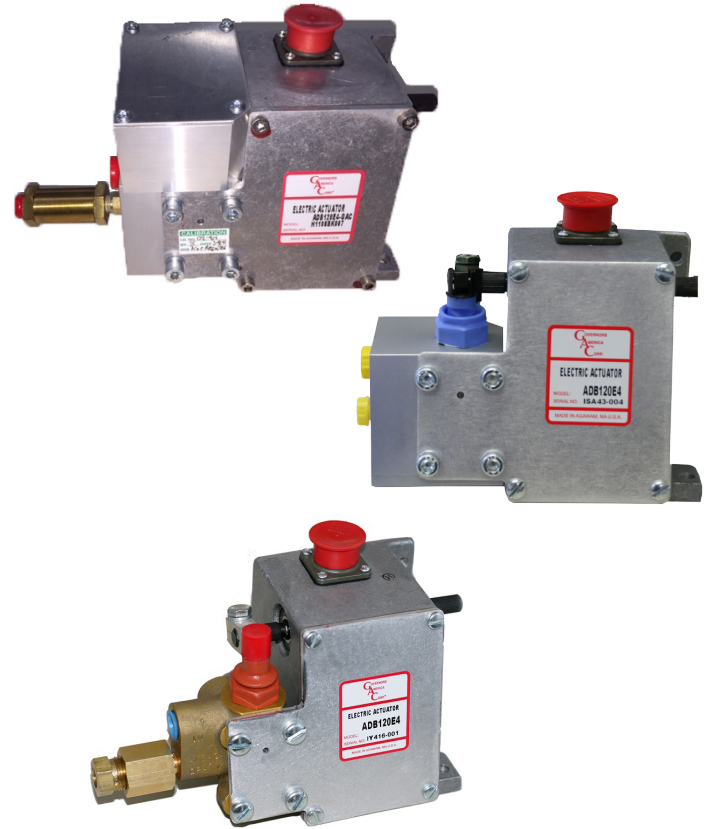
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## 1 INTRODUCTION

The ADB120E4 actuator controls a fuel metering valve for precise flow control and engine speed governing for the Cummins PT fuel system.

The proportional electric fuel metering servo actuator is energized by signals from a speed control unit and can deliver fuel at rates up to 1700 lb / hr. The actuator's proportional fuel valve improves steady state and transient response.

- Multi-V DC
- Military-style connector without mating connector
- Easy installation
- Maintenance-free
- Proven reliability
- Compact size
- Precise engine speed control
- Enhances engine performance
- Rapid response to transient conditions
- Available with or without stop lever
- Use with engine mounting bracket (BK114) as required



## 2 SPECIFICATIONS

### PERFORMANCE

Torque	1.1 lb-ft [1.49 N·m]
Operating Stroke	25 ° ± 1 °
Response Time (10 - 90 % 2 - 19 mm)	30 ms

### POWER INPUT

Operating Voltage	12, 24, 32, or 76 V DC
Normal Operating Current	2.0 A at 12 V DC 1.0 A at 24 V DC
Maximum Current (Continuously Rated)	6.0 A at 12 V DC 3.0 A at 24 V DC

### ENVIRONMENT

Operating Temperature Range	-40 to +200 °F [-40 to +95 °C]
Relative Humidity	up to 100 %
Vibration	Up to 20 g, 50 - 500 Hz
All Surface Finishes	Fungus Proof and Corrosion Resistant

### PHYSICAL

Dimensions	See Section 4 Outline Drawing
Weight	4.75 lbf [2.2 kgf]
Mounting	Vertical/Electrical Connector on Top
Fuel Flow (0.8 A)	80 ml/min (± 25 % )
(1.5 A)	2000 ml/min (± 25 % )

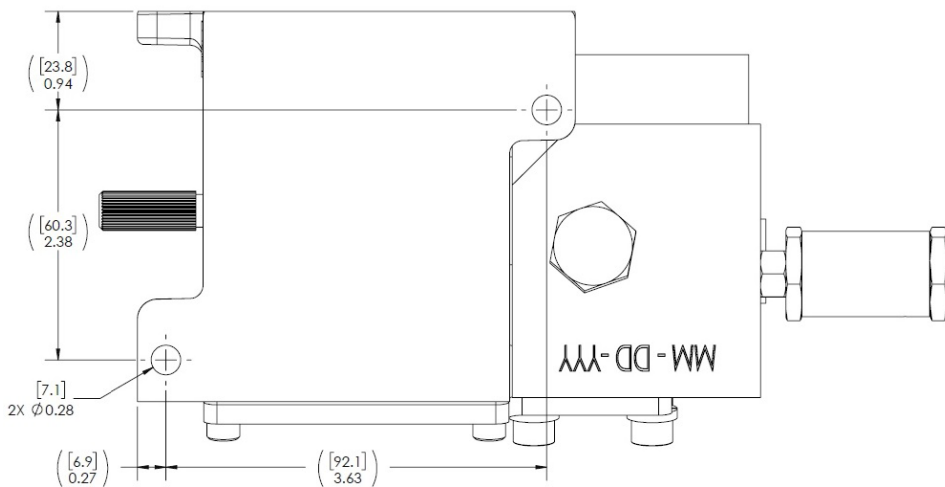
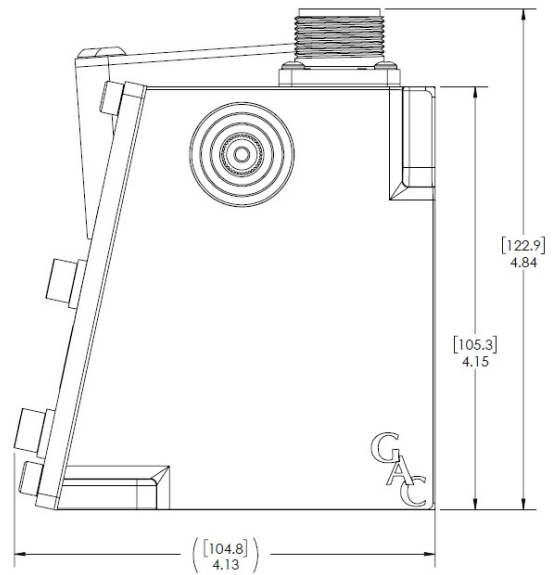
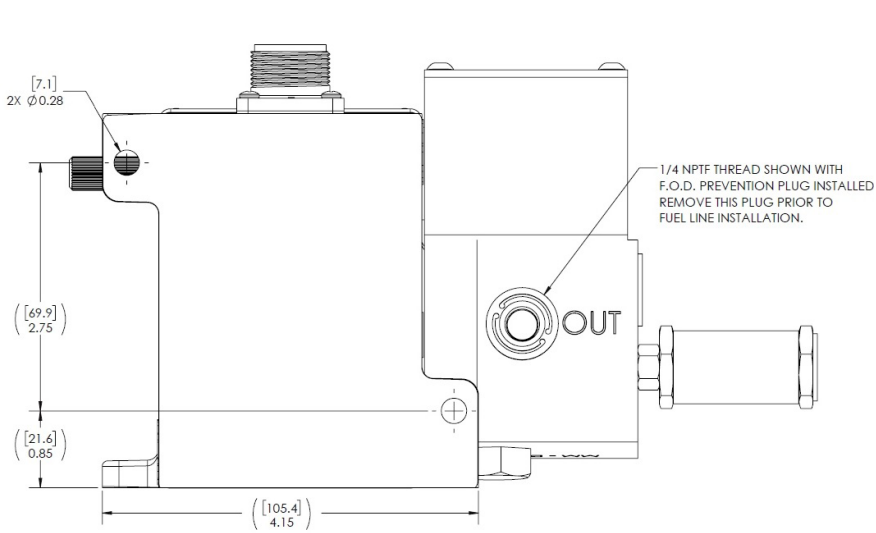
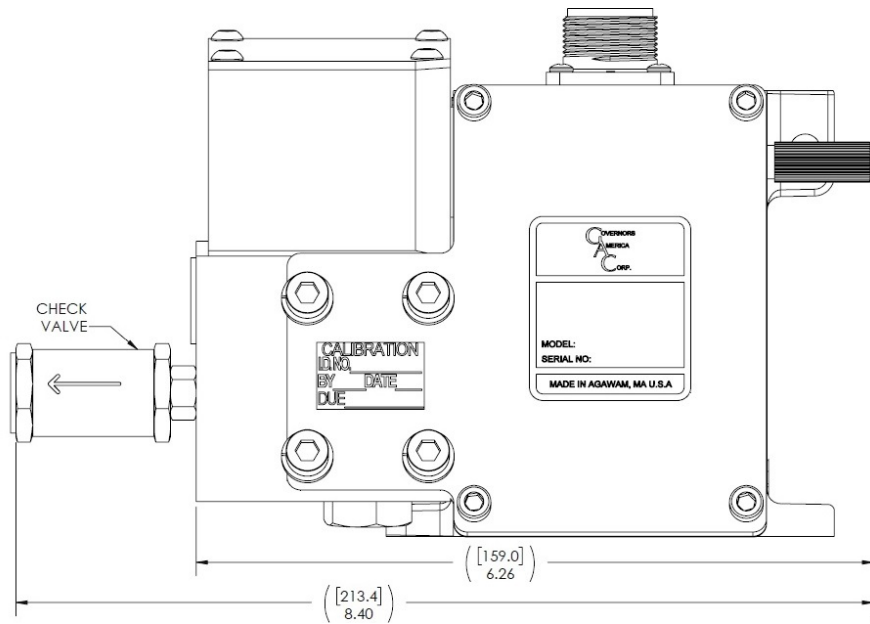


Use an overspeed shutdown device, independent of the governor system, to prevent loss of engine control which may cause personal injury or equipment damage. Do not rely exclusively on the governor system actuator to prevent overspeed. A secondary shutoff device, such as a fuel solenoid must be used.

### 3 OUTLINE DIAGRAMS

#### ADB120E4-GAC

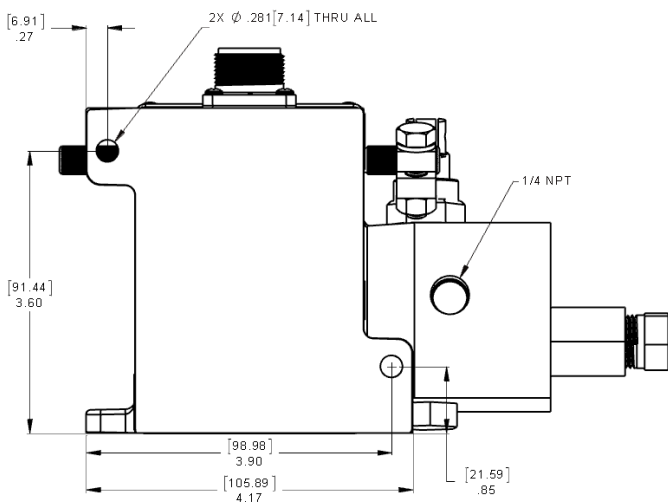
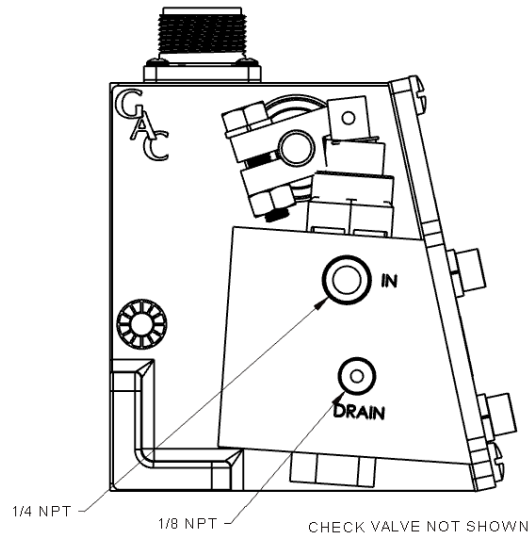
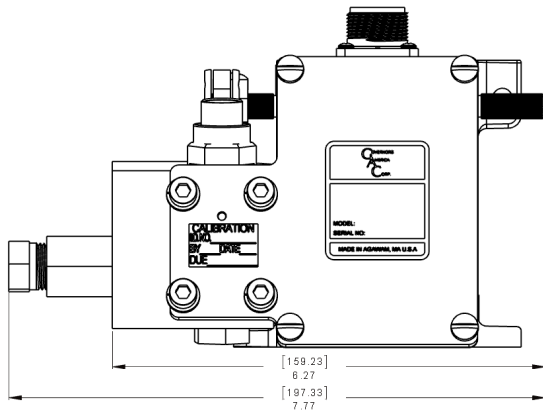
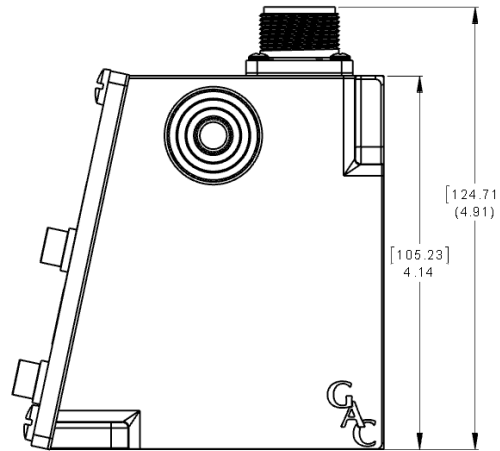
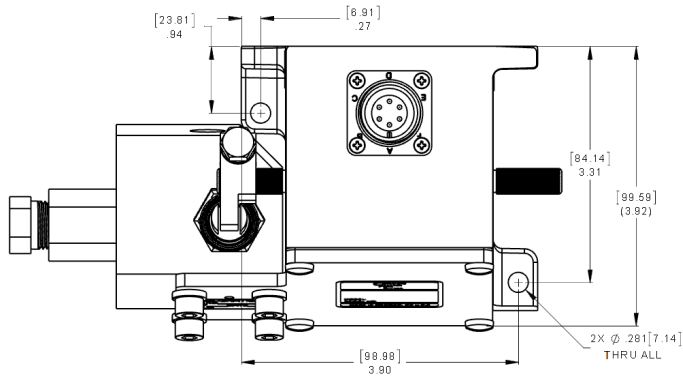
Dimension Units  
[mm]  
in



### 3 OUTLINE DIAGRAMS (CONTINUED)

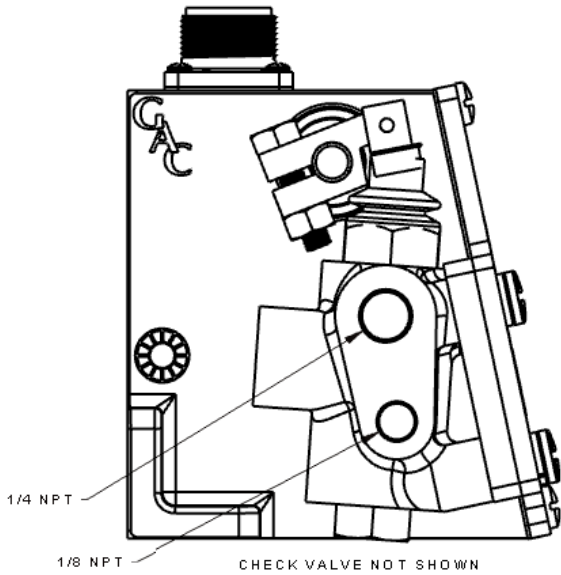
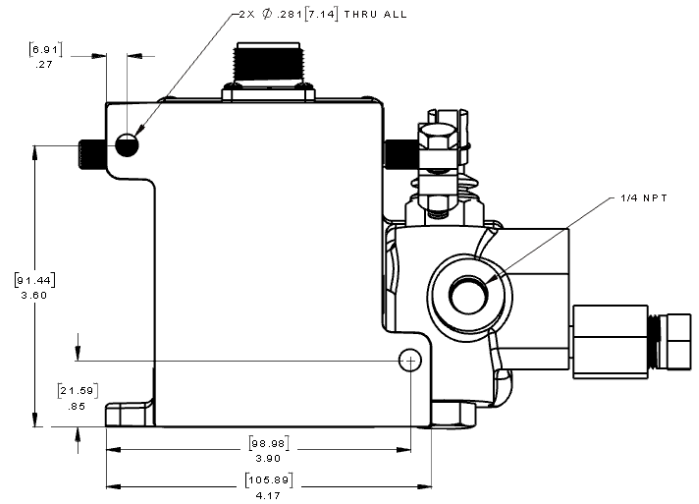
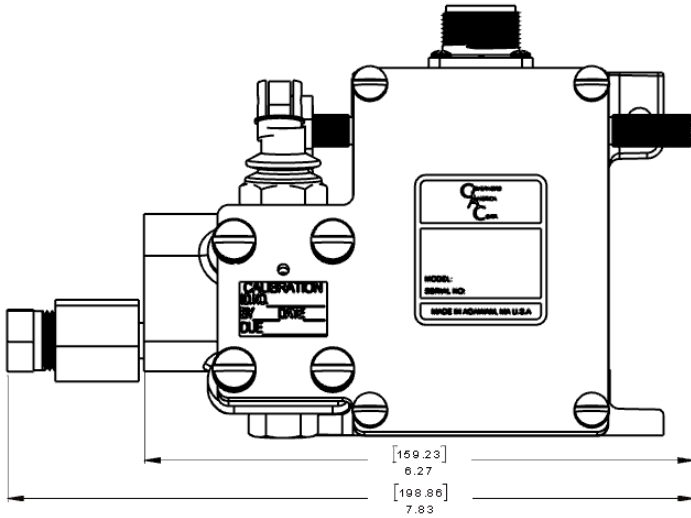
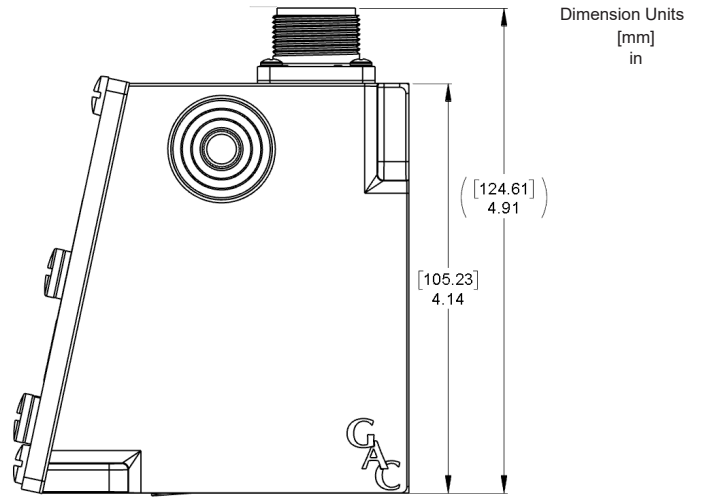
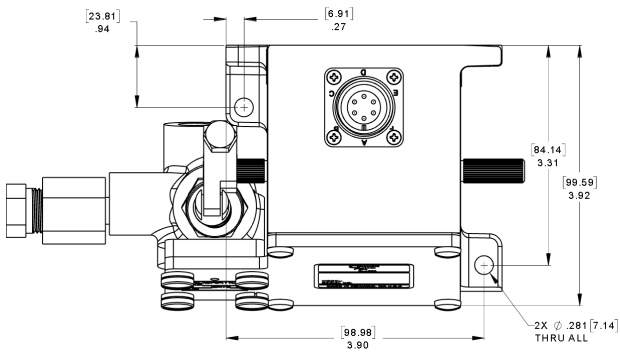
#### ADB120E4-HT

Dimension Units  
[mm]  
in



### 3 OUTLINE DIAGRAMS (CONTINUED)

#### ADB120E4



## 4 INSTALLATION

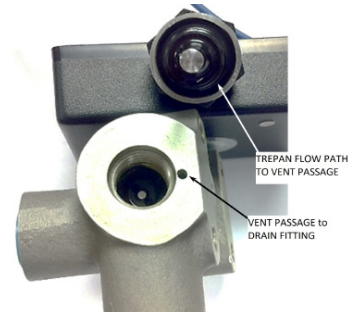
The actuator must be rigidly mounted as close as possible to the outlet of the PT pump. GAC's optional bracket BK114 is designed to fit the ADB120E4 to all Cummins engines.

Pressure in the drain circuit will cause external fuel leakage. Pressures over 1.0 psi [7 kPa] in the drain circuit contribute to external fuel leaks, the lower the drain pressure the better.



The area surrounding the upper stem of the valve has a (trepan) passage that vents fluid from the upper valve stem to the drain circuit. Back pressure / flow restriction limits the amount of venting, forcing the fuel through the upper valve stem.

Connecting the drain fuel from the valve directly to the injector return fuel circuit adds a potential flow restriction and exposes the valve and body to elevated temperatures.



### INSTALLING THE ADB120E4

The ADB120E4 actuator controls a fuel metering valve for precise flow control and engine speed governing for the Cummins PT fuel system. Connect the valve to the fuel system as shown in Figure 1 (ADB120E4-GAC) or Figure 2 (ADB120E4, ADB120E4-HT). Use the following instructions when installing the actuator:



Do not update actuator to valve linkage; it is set at the factory and should not be adjusted.

Do not use thread seal (PTFE, Teflon) tape.

Never remove or paint the Dust Boot, do not disassemble any part of this fuel metering system.

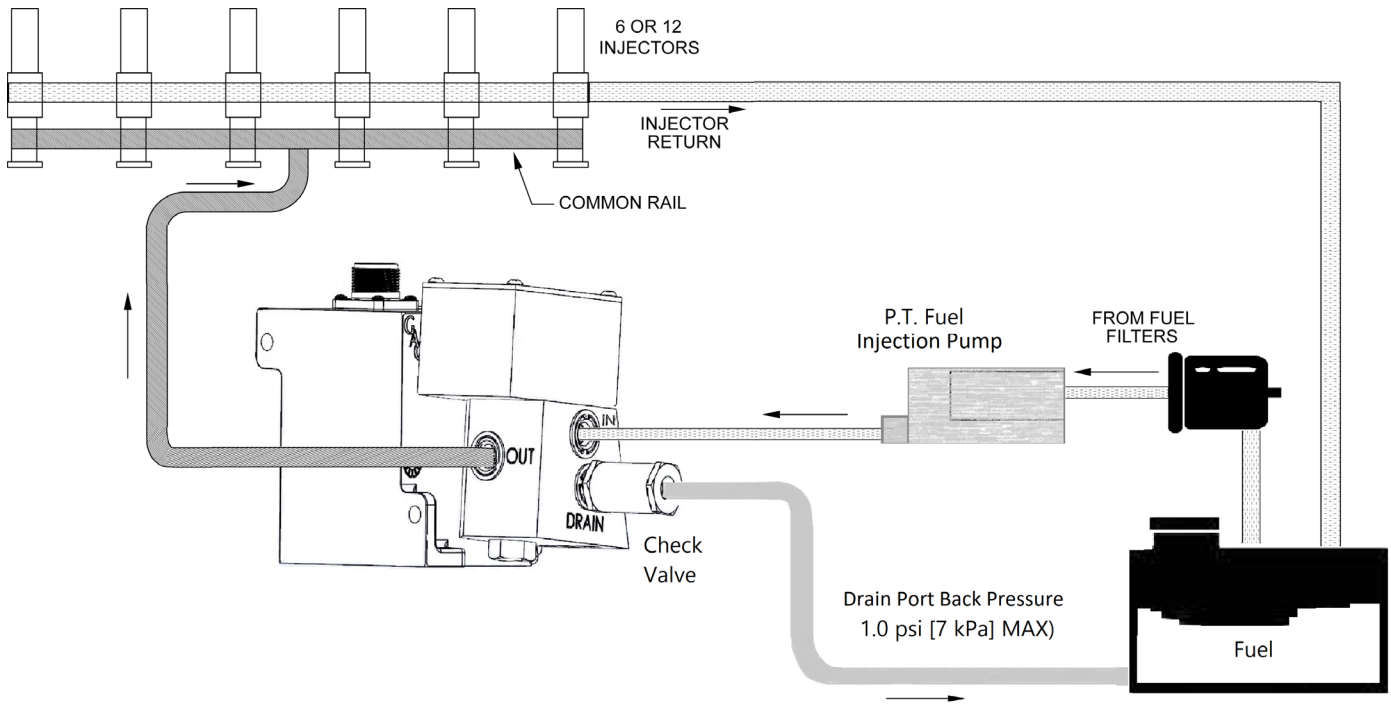
1. Attach the actuator bracket (BK114) to the engine, allowing for the actuator to be rigidly mounted as close as possible to the outlet of the PT pump. GAC's optional bracket BK114 is designed to fit the ADB120E4 to all Cummins engines.
2. Attach the actuator to the bracket using the ¼ - 20 1-in screws washers and nuts (not included).
3. The actuator to valve linkage is set at the factory and requires no adjustment.
4. Make all fuel line connections using either steel tubing or wire braided rubber hose. Use 5/16 in ID tubing except for 12 and 16 cylinder engines which require 3/8 in ID tubing.
5. Avoid right angle bends in both the fittings and the inlet and outlet lines.
6. Connect the outlet of the PT fuel pump to the inlet of the actuator valve. The outlet of the valve is connected to the fuel rail that leads to the injectors. The valve inlet and outlet are ¼ in NPTF thread.
7. Hand tighten all fittings to the fuel valve then tighten an additional 1 - 1½ turns with a wrench. Avoid over tightening. A liquid sealant is recommended.
8. Connect the drain on the valve to the fuel injector return line, or plumb directly to the fuel tank through the check valve supplied.
9. Maintain drain pressure under 1.0 psi (7 KPa) using the check valve included with the actuator, (VA410063 for ADB120E4, ADB120E4-HT, VA410065 for ADB120E4-GAC) and to avoid fuel leakage from the fuel control valve stem.
10. Ensure the Dust Boot (included with ADB120E4 and ADB120E4-HT) is in place and properly seated on both the lever assembly and valve/plunger assembly.
11. Re-check that pressure in the drain circuit is less than 1.0 psi [7 kPa] under all operating conditions. Higher back pressures may cause fuel leakage from the valve stem.
12. Use a separate drain line from the valve to the fuel tank to avoid potential flow restrictions and avoid exposing the valve assembly to elevated fuel temperatures.

For additional information on replacement installations for PT Pump with an EFC actuator see the [GAC Application Note](#).

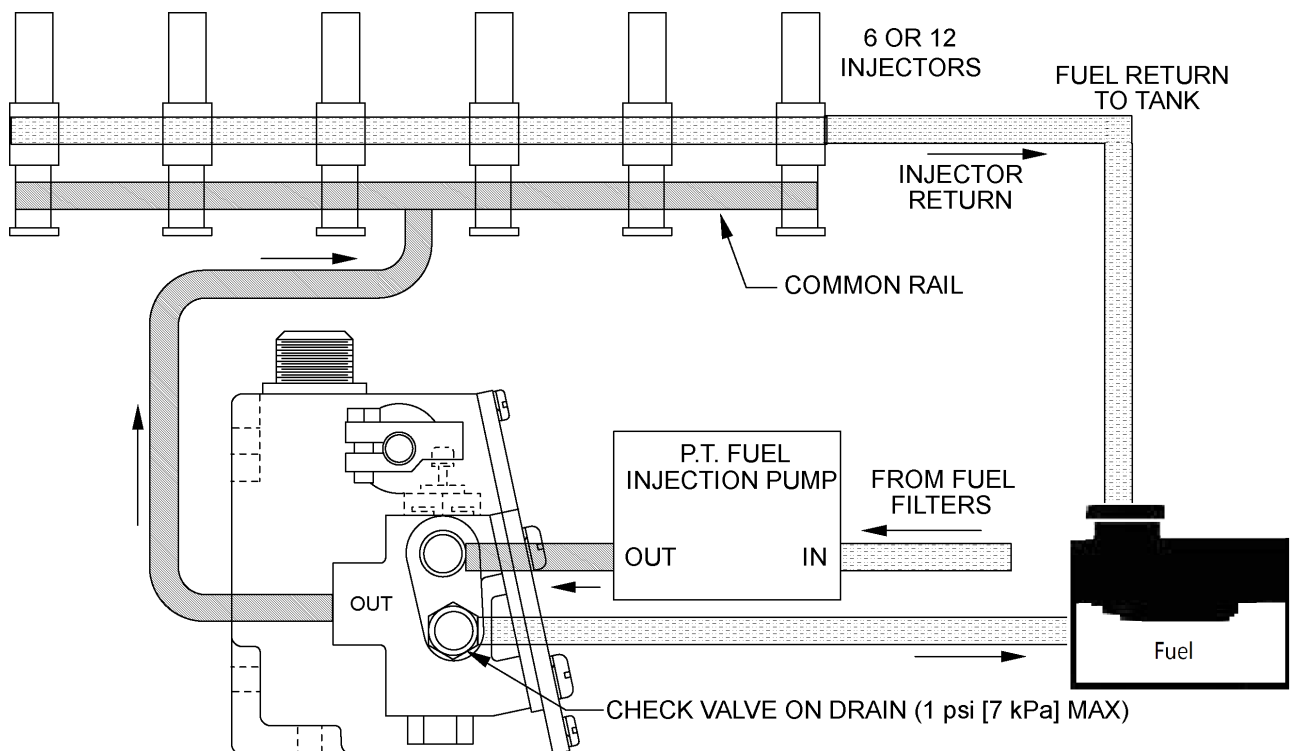
## 4 INSTALLATION (CONTINUED)

The actuator inlet, outlet, and drain locations differ between actuator styles, however all the installation requirements are the same.

**FIGURE 1 - ADB120E4-GAC RAIL INSTALLATION**



**FIGURE 2 - ADB120E4- AND ADB120E4-HT RAIL INSTALLATION**



# 5 WIRING

Cable harness CH1203 is available from GAC, which is pre-terminated and has 6 ft [1.8 m] of cable attached. The GAC mating connector EC1000 must be wired in a configuration to match the system voltage supply.

To fabricate a cable harness to connect the speed control unit to the actuator. The recommended wire size for the cable harness is at least 16 gauge [1.5 mm<sup>2</sup>] or better for 12 V DC systems or 18 gauge [1.0 mm<sup>2</sup>] or better for 24 V DC systems.

Larger gauge wire is necessary for cable lengths greater than 12 ft [3.7 m].

For 32 V DC operation, wire the connector as shown for 24 V DC operation and add a 1.5 Ω, 25 W resistor in series with pin A of the actuator connector and the corresponding output terminal of the speed control unit. For 76 V DC operation, use a 15 Ω, 150 W resistor.

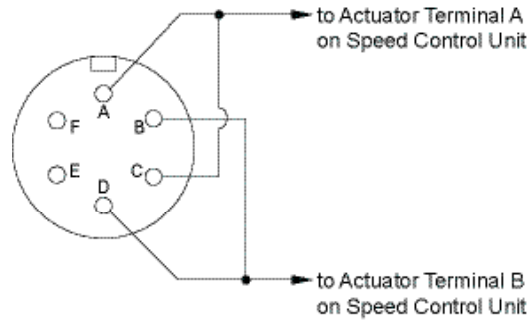
Connect the wires from pins A and D of the actuator connector to the speed control unit .



RESISTANCE	
A TO B	4 Ω
C TO D	4 Ω

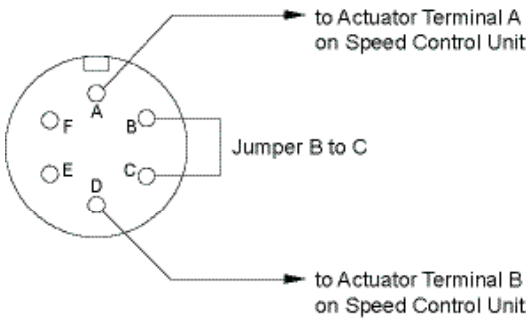
## 12 V DC OPERATION CONNECTOR WIRING

Jumper A to C
Jumper B to D
A and D to Actuator terminals of speed controller



## 24 V DC OPERATION CONNECTOR WIRING

Jumper B to C
A and D to Actuator terminals of speed controller



## 32 AND 76 V DC OPERATION CONNECTOR WIRING

Jumper B to C
A and D to Actuator terminals of speed controller
32 V DC use 1.5 Ω, 25 W resistor in series with pin A
76 V DC add 15 Ω, 150 W resistor in series with pin A

ADD RESISTOR for 32 and 76 V DC OPERATION ONLY

