



# Cummins P.T. Fuel Systems Actuator Installation Procedures

## 1 INTRODUCTION

The Cummins P.T. fuel system is controlled with either a mechanical governor or Normally Open or Normally Closed Electronic Fuel Control (EFC) with its actuator integrated in the P.T. pump. GAC has actuator / governor solutions for each control system offering Isochronous, Droop and Variable Speed operation.

Cummins P.T. Governor System Options:

- Mechanical Governor with Universal / External GAC actuator
- EFC - Internal P.T. pump actuator with GAC Governor (Normally Open or Normally Closed)
- GAC integrated metering valve / actuator with GAC Governor, replacing Cummins control system.

The Electronic Fuel Control (EFC) system controls fuel delivery by metering the amount of fuel fed to the mechanical unit injectors through a common distribution rail. The actuator, in the EFC pump, controls the amount of fuel going into the rail, controlling the rail pressure. The quantity of fuel delivered to the combustion chamber is the result of the rail pressure level and the speed dependant time for that pressure to fill the injectors pumping chamber. This means of control is also known as the Cummins PT (Pressure/Time) fuel system.

## 2 MECHANICAL GOVERNOR / EXTERNAL OPTION

The **ADC225JS-12/24** is the recommended universal actuator to control a P.T. pump with a mechanical governor. The ADC225JS-12/24 has a higher rate internal return spring for optimum RPM stability, commercial connectors, lever assembly and 7 foot (2131mm) mating harness. The actuator must be rigidly mounted as close as possible to the P.T. pump.



### Compatible Speed Controllers Include:

EEG6500, EDG6000, ESD2210, ESD5111, ESD5500E, ESD5500-II, or the ESD5550

### Optional components are available for the linkage assembly.

Bearing Rod Ends:

BR200 = 1/4" I.D. end and 1/4-28 UNF thread

BR300 = M5 I.D. end and thread

BR400 = M6 I.D. end and thread



Threaded Rod:

RD102 = 1/4-28 Precut to 1.0 ft. (0.3m), Zinc Plated

RD233 = M6 Thread Precut to 8.75 in. (222mm), Zinc Plated

## 3 EFC / PT SYSTEM - IDENTIFY THE ACTUATOR

PT fuel systems use both NORMALLY OPEN and NORMALLY CLOSED integrated actuators. You must identify which type of actuator you have to pick the correct speed controller. PT pump actuators often have the letter 'C', for NORMALLY CLOSED, stamped between its terminals or the letter 'O' for NORMALLY OPEN.



Governor Part Number	Normally Closed / Forward Acting EFC Actuator	Normally Open / Reverse Acting EFC Actuator
EEG6500	X	
ESD5522E	X	
ESD5120	X	
ESD5119		X
ESD5160		X

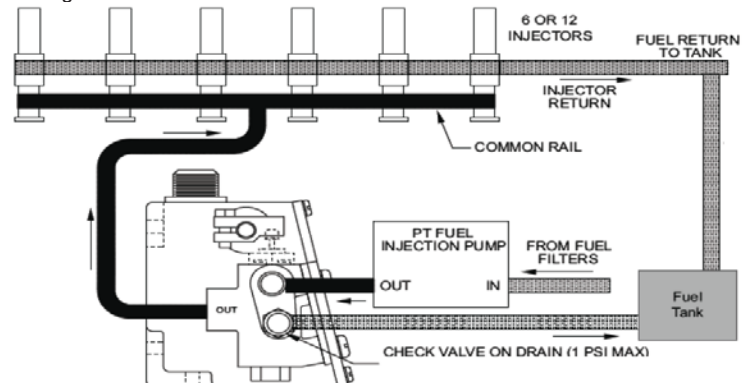
If the actuator is not externally identified, you can momentarily disconnect one terminal while the engine is idling, if the engine stalls the actuator is a normally closed, forward acting valve. If the engine accelerates it's a normally open, reverse acting valve. PT pump actuator terminals are connected directly to the governor.



## 4 REPLACING THE PT PUMP ACTUATOR

GAC part number ADB120E4 is an integrated metering valve / actuator assembly that replaces the PT pump actuator and can be installed on any Cummins engine with the optional BK114 mounting bracket.

The discharge fitting of the PT fuel pump is connected to the inlet of the ADB120E4 valve. The outlet from the valve is connected to the fuel rail that leads to the injectors, inlet and outlet fittings are both 1/4" NPT threads. The drain from the valve must be connected to the injector return line through the check valve, supplied with the assembly. A maximum of 1 PSI (7kPa) back pressure is acceptable. Higher back pressures may cause fuel leakage from the valve stem.



The ADB120E4 metering valve / actuator assembly can be installed on a REVERSE ACTING / NORMALLY OPEN PT system with no fuel pump modifications beyond routing the external plumbing as shown.

The ADB120E4 is compatible with number of GAC speed controllers, the EEG6500, ESD5111 and ESD5500E are commonly used as well as a number of LCC series (Locomotive Controls).

An inoperable forward acting NORMALLY CLOSED PT pump actuator has to be removed from the pump as described in the following section.

## 5 REMOVE A NORMALLY CLOSED PT ACTUATOR

Disconnect the engine starter battery and shut off the fuel supply before the filters.

### Removing the PT Fuel Pump

Disconnect the electrical lines from the stop solenoid. Note the solenoid is polarised and the **top screw** is battery positive.

Once the fuel supply line is closed, remove the fuel inlet and return from the pump.

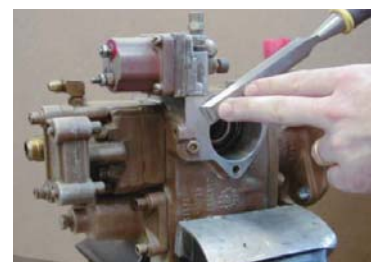
Remove the four flange mounting screws. Note, the pump has no timing device so clocking its radial position to the crank is not necessary.

The pump is fuel lubricated so there should be very little engine oil to spill.

Clamp the pump into a vise and remove the three mounting screws from the EFC actuator.

Pull the EFC actuator out from the PT pump turning it slightly to overcome any resistance from the O-ring adhering to its bore.

Clean the pump's sealing surface making sure no debris particles or contaminants get into the pump.



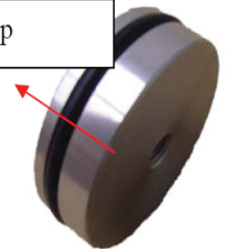
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## PREPARING THE PUMP FOR AN ADB120E4

Lift the gasket off the EFC actuator, it can be reused for the replacement cover.



Facing Pump

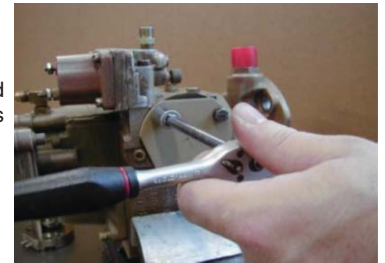


To ensure the PT pump is in the open mode, insert dummy actuator part number PG112 into the actuator bore.

Insert an M5 x 0.8 hex head screw with a lock nut into hole plug part number PG112. Select and adjust its length so the end of the hex head is flush with the cover mounting surface. The screw should just contact the cover plate to retain the hole plug in its position. Place the gasket onto the pump.



Place the cover on the pump and torqued the three screws to 25 in-lbs (2.8Nm)



Once the pump, actuator bracket and actuator are installed, connect the fuel line from the pump to the actuator and the line from the actuator to the rail, and connect the drain from the check valve to the return fuel circuit.

Connect the fuel shut-off solenoid, the top terminal on the solenoid is positive. Open the fuel supply to the filters.



It will be necessary to purge air from the fuel system, cranking may take longer for the first start as the pump, metering valve and fuel lines have to be refilled with a solid column of pressurized fuel. Insure the RPM setting on the speed control is properly set for an initial start, refer to specific literature for the speed controller being used.

The metering valve assembly on the ADB120E4 is serviceable with the KT6724 parts kit that includes a Valve Plunger Assembly, Actuator Lever Assembly, Dust Boot and Seals.

The metering valve assembly can be replaced with kit part number KT6723 that includes the valve assembly, lever assembly and dust boot.

**NOTE:** Repositioning the metering valve assembly on the actuator is required and will change its calibration. Be prepared to reset governor control parameters. All installations must include check valve part number VA410063.