

Cummins PT Fuel Pump Diagnostic

No Start, with no smoke

1. This could be caused by the fuel pump not turning or a seized gear pump.
Remove the fuel supply hose and the fuel inlet fitting from the gear pump. Check the gear pump while cranking the engine. The gear pump gears **must** turn.



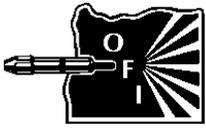
2. If the gear pump gears do **not** turn, remove the fuel pump.
3. Crank the engine and check the air compressor or the accessory drive shaft for rotation. If the shaft turns, the fuel pump is damaged and must be replaced or repaired.
4. Fuel shutoff valve(s) closed
5. Fuel filter or fuel suction line is restricted
6. Fuel connections on the suction side of the pump are loose
7. Fuel drain line restriction
8. Fuel suction standpipe in the fuel tank is broken

No Start Pressure Check

1. Loosen the fuel line at the shutoff valve while the engine is cranking. If fuel does **not** come out of the connection, the pump **must** be primed.
2. Connect a pressure gauge to the quick disconnect fitting of the fuel pump. Start cranking the engine and observe the cranking fuel pressure. Minimum cranking pressure should be 25psi.
3. If the fuel pressure is below the specification, check to be sure there is a fuel supply to the pump and that it is not restricted. Prime the fuel pump if necessary.

Hard Start, No Start with smoke out stack

1. Engine cranking speed is too slow
2. Cranking fuel pressure at the fuel pump is below specification
3. Fuel grade is not correct or fuel quality is poor
4. Fuel supply line restriction between the fuel pump and the injectors
5. Air in the fuel system
6. Air intake system restriction
7. PT fuel pump AFC operation is malfunctioning or no air setting on the fuel pump is not set correctly



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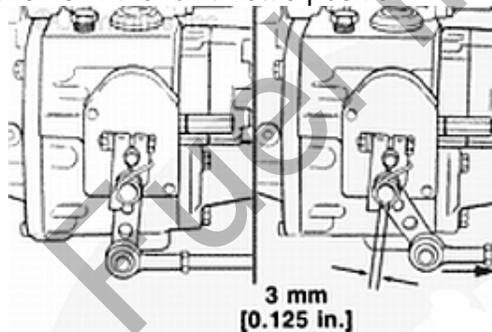
8. Overhead adjustments are not correct
9. Injector o-rings are damaged or missing
10. Injector is malfunctioning

Starts and Dies

1. Engine idle speed is set too low
2. Idle shutdown or PTO shutdown features are activated
3. Air in the fuel system
4. Engine-driven units are engaged
5. Fuel inlet restriction
6. Fuel shutoff valve is closed
7. Fuel grade is not correct or the fuel quality is poor
8. Fuel pump is malfunctioning
9. Engine brake adjustment is not correct

Low Power

1. Throttle linkage out of adjustment, not getting full throttle travel. Make sure the throttle linkage is adjusted so the throttle lever breaks over 3.0 to 6.0 mm [0.12 to 0.24 in] when the lever is in the full throttle position.



NOTE: The throttle lever stop must contact the rear throttle stop screw.

2. Fuel grade is not correct or the fuel quality is poor
3. Air intake or exhaust leaks
4. Air intake system restriction
5. Charge air cooler is restricted or leaking
6. Intake manifold pressure (boost) is below specification
7. Turbocharger problem
8. Crankcase pressure is excessive
9. Overhead adjustments are not correct
10. AFC signal line is restricted or leaking or AFC vent line (if equipped) is plugged
11. Injector calibration is not correct or the fuel supply to the injector is restricted
12. Fuel pump code (calibration) does not match engine (CPL) build.

Slow to Decelerate

1. Throttle linkage or return spring is binding
2. Fuel drain line restriction

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3. Fuel tank vents are plugged or damaged
4. Overhead fuel tank check valve is restricted or is **not** opening
5. Fuel pump pulsation damper is cracked
6. PT fuel pump throttle leakage is excessive
7. Injector check ball is **not** seating correctly or is missing
8. Injector is malfunctioning

Slow Acceleration or Response

1. Fuel inlet restriction
2. Fuel drain line restriction
3. Intake manifold pressure (boost) is too low
4. Throttle linkage adjustment is not correct
5. Air intake system restriction
6. Exhaust system restriction
7. Air intake or exhaust leaks
8. Air in the fuel system
9. Fuel grade is not correct or the fuel quality is poor
10. Fuel supply line restriction between the fuel pump and the injectors
11. PT fuel pump AFC operation is malfunctioning or pump is not operating correctly
12. Fuel pump code (calibration) does not match engine (CPL) build.
13. Injector calibration is not correct or does not match (CPL) build list

Surges at Idle or Hi-Idle

1. Check for air, see air in system section.
2. Fuel inlet restriction
3. Idle speed is set too low
4. Fuel pump pulsation damper is cracked
5. Fuel drain line restriction
6. Overhead adjustments are not correct
7. Injector not working properly
8. Automotive and variable speed (VS) governor idle speeds are set too close
9. Throttle linkage adjustment is **not** correct
10. PT fuel pump calibration is **not** correct
11. PT fuel pump is **not** assembled correctly, or mismatched parts
12. Camshaft end clearance is excessive

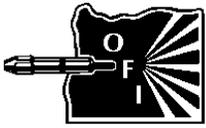
Surges under load

1. Fuel inlet restriction
2. Air in the fuel system
3. Fuel drain line restriction
4. Injector is malfunctioning
5. Fuel pump pulsation damper is cracked
6. Automotive and variable speed (VS) governor idle speeds are set too close
7. PT fuel pump calibration is not correct
8. PT fuel pump is not assembled correctly or has mismatched parts

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9. Camshaft end clearance is excessive

Rough run at idle

1. Engine idle speed is set too low
2. Air in the fuel system
3. Fuel pump pulsation damper is cracked
4. Fuel grade is not correct or the fuel quality is poor
5. If white smoke is present – Also see White Smoke, Excessive
6. Engine mounts are worn, damaged, or not correct
7. Overhead adjustments are not correct
8. Injector is malfunctioning
9. STC injector top link is not correct
10. Camshaft end clearance is excessive
11. Cylinder head valve leak
12. Internal engine damage

White Smoke, Excessive

1. Coolant temperature is below specification
2. Fuel grade is not correct or the fuel quality is poor
3. Overhead adjustments are not correct
4. Injector cup is damaged or is not correct
5. Injector is malfunctioning
6. Static injection timing is not correct
7. Coolant is leaking into the combustion chamber
8. Pistons or piston rings are worn, damaged, or not correct

Black Smoke, Excessive

1. Intake manifold pressure (boost) is too low
2. Air intake, charge air cooler or exhaust leaks
3. Fuel drain line restriction
4. Air intake system restriction
5. Exhaust system restriction
6. Fuel grade is not correct or the fuel quality is poor
7. PT fuel pump no-air fuel pressure is above specification. This would be noticeable on snap throttle acceleration or at during initial acceleration
8. Fuel rate is too high, this would be noticed under load, if the fuel pump is over fueled
9. Turbocharger damaged, or incorrect for application
10. Overhead adjustments are not correct
11. Fuel pump code (calibration) does not match engine (CPL) build.
12. Injector cup is damaged or is not correct

Dies on Deceleration

1. Fuel inlet restriction
2. Air in the fuel system
3. Engine idle speed is set too low
4. Air intake system restriction

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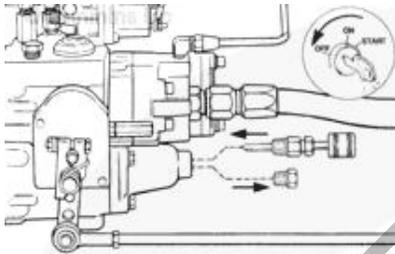
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5. Fuel pump is malfunctioning
6. Fuel grade is not correct or the fuel quality is poor
7. Engine brakes are malfunctioning
8. Injector is malfunctioning
9. Camshaft end clearance is excessive
10. Static injection timing is not correct

Idle speed setting

NOTE: The idle speed can vary on some applications. Refer to the fuel pump code for the specified engine idle speed. Adjust the engine low idle speed between 600 and 800 rpm.

1. Shut the engine OFF.
2. Remove the plug from the spring pack cover.
3. Install the fuel pump idle adjusting tool into the plug hole. Use tool, Part Number 3375981, for holes with pipe threads and tool, Part Number 3823480, for holes with straight threads.



4. Operate the engine for 30 seconds at high idle to remove the air from the fuel system.

NOTE: Make sure the engine is at or above 70°C [160°F].

5. Adjust the idle speed. Turn the tool clockwise to increase the idle speed and counterclockwise to decrease the idle speed.
6. Shut the engine OFF. Remove the tool and install the plug.
7. Start the engine and operate at high idle for 30 seconds until the rpm is constant and all of the air is out of the fuel system.
8. Check the idle speed again.

Injector, Check for Miss or Smoke

To locate a smoking cylinder, use a pyrometer or infrared temperature gun to measure the exhaust manifold surface temperature at each cylinder port.

The maximum exhaust manifold surface temperature at idle is 143°C [290°F].



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A cylinder is smoking if: >> the exhaust manifold surface temperature at that exhaust port exceeds the above specification.> >the exhaust manifold surface temperature at that port is significantly higher than that for the other cylinder ports.> >

NOTE: If this test is inconclusive, tilt back the exhaust manifold to visually locate the smoking cylinder.

Air in system

Air entering the fuel system can cause the engine to surge, run rough, decelerate slowly, or rev up on its own. PT pumps can also suck air into the pump, if they are worn and need repair. Air in the system can cause all of these symptoms. You will need to determine if air is getting into the inlet of the pump or the pump is sucking air.

Follow the steps below to check for air.

1. Remove the fuel suction line and install a sight glass, Part Number 3375362, or a clear line into the pump.
2. Operate the engine at high idle with no load and check for air.

NOTE: A small air leak will have a "milky" appearance. A large air leak will look like bubbles in the fuel.

3. If an air leak is found, inspect the fuel filter, fuel lines, o-rings, and fittings for damage and loose connections.
4. Replace the fuel filter, damaged lines or tighten the loose connections.
5. Operate the engine at high idle with no load and check the sight glass or clear line for air.
6. Check the drop tube in the fuel tank for damage.
7. Replace any damaged components as necessary.
8. If no more air is going into the pump, then remove the sight glass or clear line and tighten the hose connections to the pump.

If the engine still acts like it has air in the system, perform the following tests.

1. Remove the AFC air supply line from the air intake manifold or the compressor air tube and install a plug or a cap in the air manifold hole.
2. Apply 25psi regulated air pressure to the AFC air supply line.
3. Remove the fitting from the side of the fuel shutoff valve.
4. Install a fuel hose with a needle valve in it to the shutoff valve.
5. Close the needle valve and place the end of the hose in a bucket.
6. Operate the engine at high idle with no load.
7. Open the needle valve and allow fuel to drain into the bucket until the engine speed drops to 100 rpm below rated speed.
8. If air is entering the fuel pump, due to worn seals, bubbles will be visible in the line going into the container of fuel.