Bosch VP44 Info & Installation

Fuel Injection Pumps for Cummins 5.9L

VP44 Pump General Information

The fuel injection pump (VP44) is an electronic rotary distributor pump. The pump performs four basic functions:

1. Producing the high fuel pressure required for injection
2. Metering the exact amount of fuel for each injection cycle
3. Distributing the high-pressure, metered fuel to each cylinder at the precise time
4. Varying the timing relative to engine speed.

A cam ring with three plungers, a rotor, and an electronically controlled fueling solenoid valve is used to develop and distribute the high pressure required for injection.

A worn or damaged internal transfer pump, plunger, or fueling valve can affect the pressure and amount of fuel injected, thus reducing the power from the engine. Generally, if the fuel injection pump is injecting fuel from one outlet, it will deliver from all outlets.

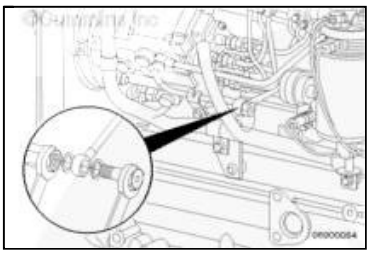
VP44 Timing Principles

Timing in the VP44 is controlled by an internal timing piston coupled to a cam ring inside the pump. The timing piston is moved by fuel pressure. The amount of fuel pressure in the timing piston assembly housing is controlled by an internal transfer pump and a pulsating timing solenoid valve.

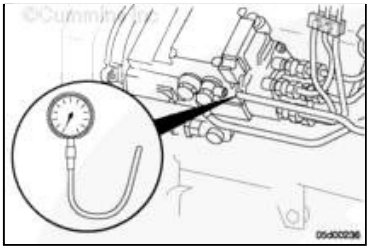
As pump speed increases, the fuel pressure to the timing piston assembly also increases. Based on the inputs from the fuel pump control module (FPCM), the timing solenoid valve pulses to vary the pressure to move the timing piston, which results in the cam ring moving to the desired position to achieve the commanded timing.

The more pressure created by the internal transfer pump and timing solenoid valve, the more the timing will advance; therefore, timing range capability is increased at higher rpms.

VP44 Pump Initial Check



Disconnect the VP44 fuel pump drain line from the T-fitting and plug it.



•Disconnect the vacuum gauge plastic tubing from the cylinder head's drain line and connect it to the VP44 fuel pump inlet line.

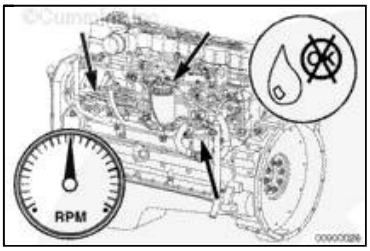
NOTE: All fuel must be drained from all fuel lines, if observed.

•Apply the vacuum test to the fuel system and check the vacuum gauge. The vacuum can **not** exceed 381 to 508 mm Hg [15 to 20 in Hg].

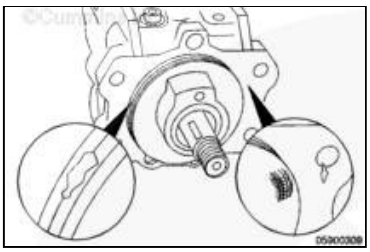
•If the system holds the vacuum (if the reading on the gauge does **not** reduce, the vacuum should **not** drop more than 2.54 mm Hg [0.1 in Hg] in a minute), then there is no leak in the fuel system.

NOTE: The vacuum test is completed if the fuel system holds vacuum for at least 5 minutes.

•If the system does **not** hold vacuum (the reading on the gauge does **not** hold and reduce to 0 mm Hg [0 in Hg], then there is a leak in the fuel system.



If the system does **not** hold a vacuum, check for leaks at the VP44 fuel pump.

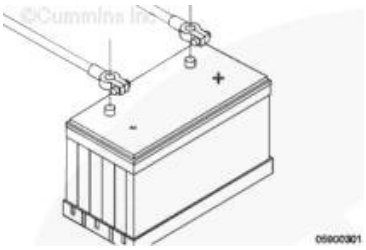


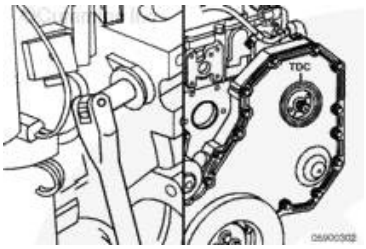
•Inspect the lines, fittings, washers, and VP44 fuel pump for any damage. Replace and install parts that are damaged.

•Contact an Authorized Cummins Repair Facility (MWFI) for replacement and installation of the VP44 fuel pump, if required.

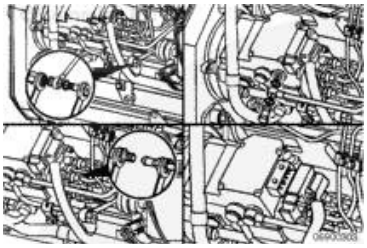
VP44 Pump Removal

Disconnect the battery cables, negative (-) cable first.

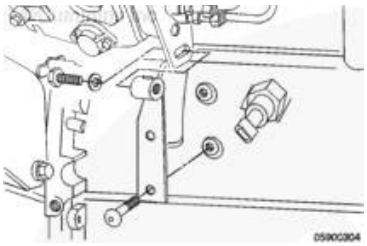




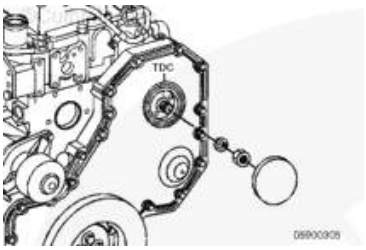
It is recommended to bar the engine over so that the keyway on the gear is at the 12-o'clock position when removing the fuel pump. This position can be found by taking the oil fill or fuel pump gear access cap off, whichever applies, and aligning the keyway in the fuel pump gear to the top dead center (TDC) position on the front cover. In this position the line on the fuel pump gear will approximately be in the 7-o'clock position.
NOTE: Doing the above will help prevent the fuel pump key from falling into the housing if it is loose



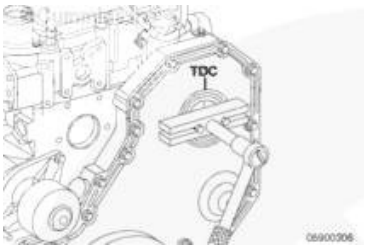
17 mm
Disconnect the fuel return line.
17 mm
Disconnect the fuel pump supply line.
19 mm
Remove the high-pressure lines.
Remove the 9-pin electrical connector from the fuel pump control module (FPCM).



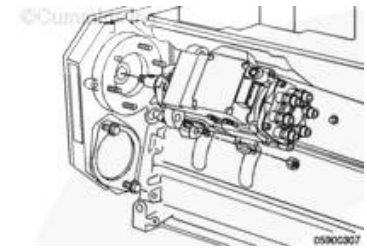
10 mm
Remove the fuel pump support bracket



27 mm
Remove the crankcase breather and gear retaining nut and washer.



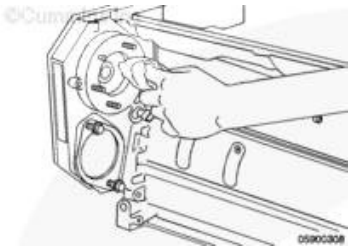
75-mm T-Bar
Pull the fuel injection pump drive gear loose from the pump driveshaft.



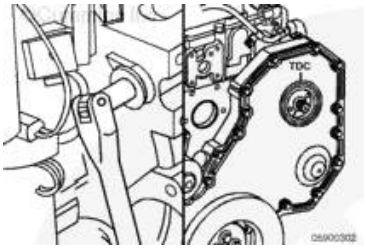
13 mm
NOTE: Do not drop the drive gear key when removing the pump.
Remove the four mounting nuts, and remove the fuel injection pump.

VP44 Pump Cleaning

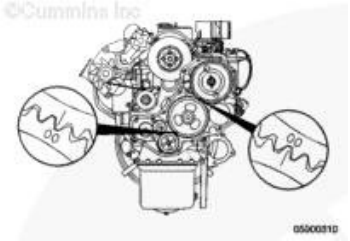
Use a clean, dry cloth to wipe all of the oil off the back of the gear housing mounting surface and pump housing.



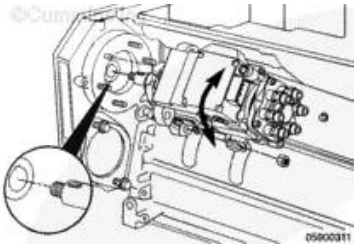
VP44 Pump Installation



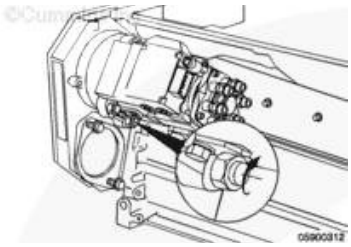
It is recommended to bar the engine over so that the keyway on the gear is at the 12-o'clock position when installing the fuel pump. This position can be found by taking the oil fill or fuel pump gear access cap off, whichever applies, and aligning the keyway in the fuel pump gear to the top dead center (TDC) position on the front cover. In this position the line on the fuel pump gear will approximately be in the 7-o'clock position.
NOTE: Doing the above will help prevent the fuel pump key from falling into the gear housing if it is loose.



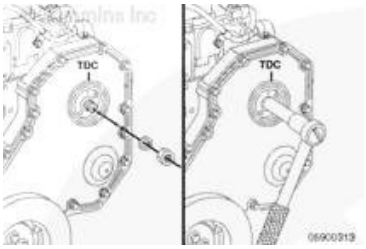
The keyed gear and shaft allow for the fuel injection pump to be installed in any position, as long as the markings on the front gear train align and a gear has **not** slipped.
Use an evaporative cleanser (e.g., brake cleaner, isopropyl alcohol) to clean the pump shaft and gear bore.



NOTE: The fuel injection pump shaft has to be rotated to align with the keyway in the gear.
Install the pump. Make sure the key does **not** fall into the gear housing. Take care **not** to damage the pump mounting o-ring.
NOTE: When installing the fuel pump, the dowel in the back of the gear housing has to line up with the hole in the pump mounting flange, as well as the keyway in the gear.
NOTE: Barring the engine so the keyway is at the 12-o'clock position will aid in aligning the key into the keyway.



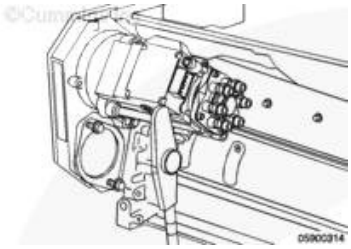
Hand-tighten the four mounting nuts.



24 mm
Install the pump driveshaft nut and spring washer.

Torque Value:	30 n.m	ft-lb [22]

NOTE: Do not over tighten; this is not the final torque.

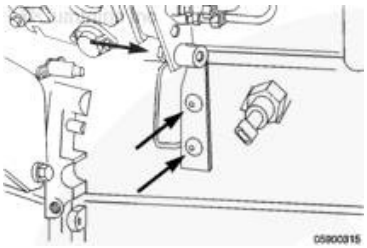


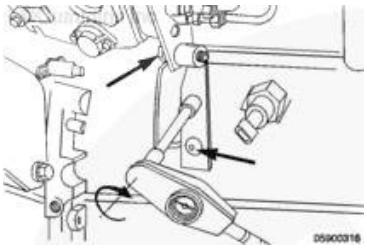
15 mm
Tighten the fuel injection pump mounting nuts.

Torque Value:	n.m 43	ft-lb [32]

Install the injection pump support bracket. Finger-tighten all cap screws before final tightening.
Tighten the brackets in the following sequence:

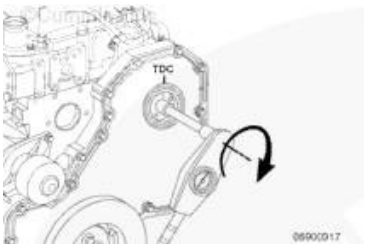
1. Bracket-to-fuel pump cap screws
2. Brace-to-block cap screws
3. Bracket-to-fuel pump brace cap screws





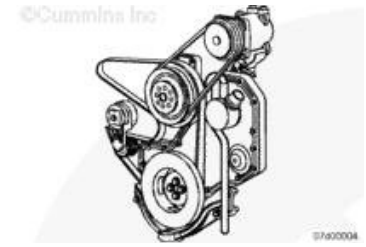
10 mm
Tighten all cap screws on the support bracket.

Torque Value: **nm 24 in-lb] [212**

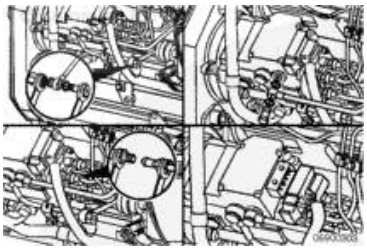


22 mm
Tighten the pump driveshaft retaining nut.

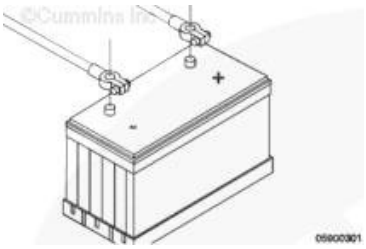
Torque Value: **n.m 170 ft-lb [125]**



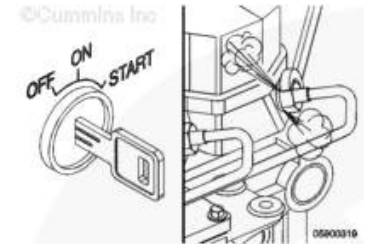
Install the crankcase breather.



17 mm | Install the low-pressure fuel lines.
17 mm | Install the fuel Inlet.
17 mm | Install the fuel return lines.
19 mm | Install the high-pressure line at the fuel pump.
19 mm | Install a high-pressure line at the cylinder head.
Connect the 9-pin connector to the VP44 fuel pump.



Connect the battery cables, negative (-) cable last.



Vent all air from the fuel system, if needed.