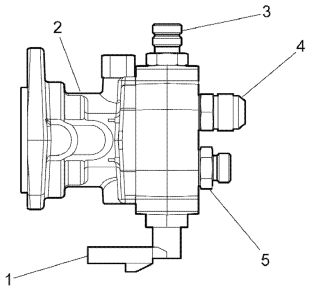
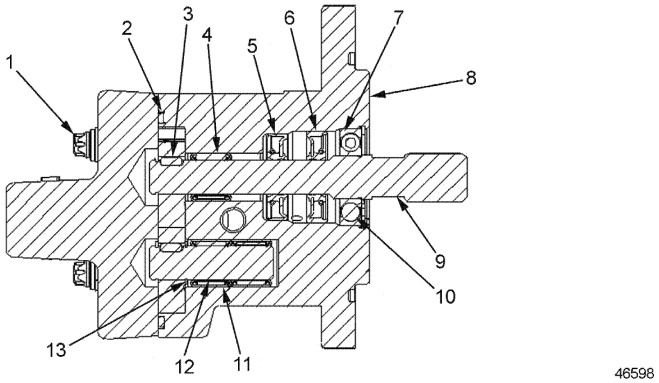
4.5.1 Description and Operation of the Fuel Pump

The fuel pump for the Series 60 will utilize a one piece drive shaft.



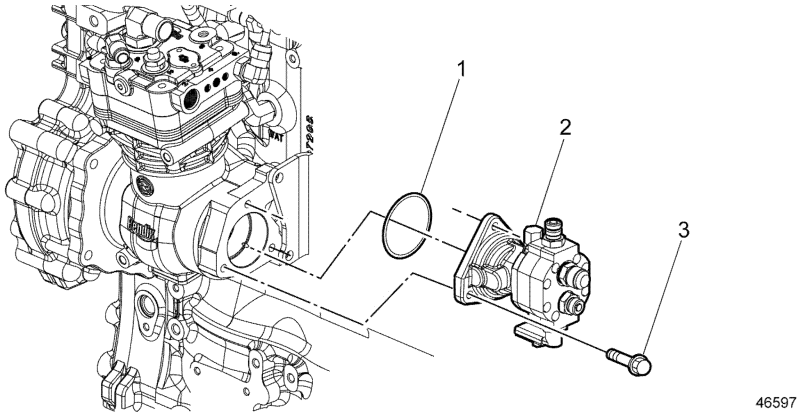
1. Sensor
2. Fuel Pump Assembly
3. Valve
4. Fuel Input Fitting
5. Fuel Output Fitting

Figure 1. Fuel Pump Assembly and Related Parts



1. Screw
2. O-ring
3. Pin
4. Needle Bearing
5. Shaft Seal
6. Dust Seal
7. Ball Bearing
8. Front Housing
9. Drive Shaft
10. Snap Ring
11. Idler Shaft
12. Gear
13. Snap Ring

Figure 2. Cross Section of the Fuel Pump Assembly



1. Seal Ring
2. Fuel Pump
3. Bolt

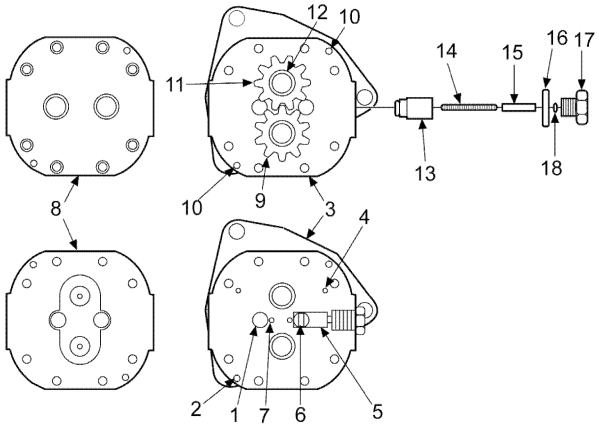
Figure 3. Fuel Pump Assembly and Related Parts

The fuel pump transfers fuel from the supply tank to the fuel injectors. The pump circulates an excess supply of fuel through the injectors, which purges the air from the system and cools the injectors. The unused portion of fuel returns to the fuel tank by means of a fuel return line.

The fuel pump is driven off of the rear of the air compressor.

The fuel pump cover and body are positioned by two dowels. The dowels aid in maintaining alignment between the body, cover and shafts. The mating surfaces of the pump body and cover are perfectly flat ground surfaces. A gasket is used between the cover and body.

The fuel pump body is recessed to provide running space for the pump gears. Recesses are also provided at the inlet and outlet positions of the gears. The small relief valve vent permits the fuel oil in the inlet side of the pump to lubricate the relief valve at its outer end. This eliminates the possibility of a hydrostatic lock which would render the relief valve inoperative. Pressurized fuel contacts the relief valve through the passage to the head of the relief valve and provides for relief of excess discharge pressures. Fuel re-enters the inlet side of the pump through the passage to the head of the relief valve when the discharge pressure is great enough to move the relief valve back from its seat. Part of the relief valve may be seen through the passage to the head of the relief valve. The gear teeth vent cavity provides escape for the fuel oil that is squeezed out of the gear teeth as they mesh together on the discharge side of the pump. Otherwise, fuel trapped at the root of the teeth would tend to force the gears apart, resulting in undue wear on the gears, shafts, body, and cover.



1. Passage to Head of Relief Valve, Pressure Side
2. Dowel Hole
3. Body
4. Oil Seal Vent to Suction Side
5. Relief Valve Vent to Suction Side
6. Passage to Head of Relief Valve, Suction Side
7. Gear Teeth Vent Cavity
8. Cover
9. Driven Gear
10. Dowel
11. Drive Gear
12. Drive Shaft Gear
13. Relief Valve
14. Spring
15. Pin
16. O-ring
17. Plug
18. Spacer

Figure 4. Fuel Pump

Two oil seals are pressed into the bore in the flanged side of the pump body to retain the fuel oil in the pump and the lubricating oil in the fuel pump drive and gear case. The oil seal vent serves as a vent passageway in the body, between the inner oil seal and the suction side of the pump, which prevents building up any fuel oil pressure around the shaft ahead of the inner seal. The oil seals are installed with the lips of the seals facing each other.

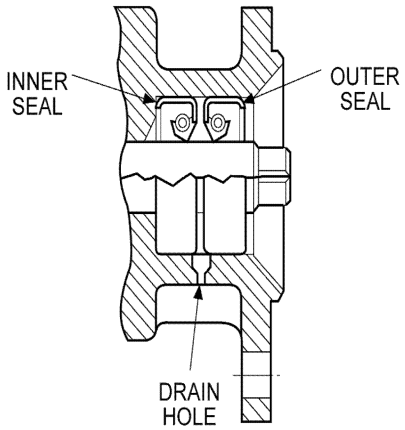


Figure 5. Fuel Pump Oil Seal Arrangement

Some fuel oil seepage by the fuel pump can be expected with a running engine and immediately after an engine has been shut down. This is especially true with a new fuel pump, new pump seals, or both, as the seals have not yet conformed to the pump drive shaft. Fuel pump seals will always allow some seepage. A drain hole in the pump body is provided to prevent fuel oil from being retained between the seals. Excessive fuel retention between the seals could provide enough pressure to cause engine oil dilution by fuel; therefore, drainage of the excess fuel oil is mandatory. However, if leakage exceeds one drop per minute, replace the pump. The drain hole should be checked for plugging at normal scheduled maintenance.

A spring-loaded relief valve incorporated in the pump body normally remains in the closed position, operating only when pressure on the outlet side (to the fuel filter) reaches approximately 689 kPa (100 psi).

In operation, fuel enters the pump on the suction side and fills the space between the gear teeth that are exposed at that instant. The gear teeth then carry fuel oil to the discharge side of the pump and as the gear teeth mesh in the center of the pump, the fuel is forced out the outlet cavity. Since this is a continuous cycle and fuel is continually being forced into the outlet cavity, the fuel flows from the outlet cavity into the fuel lines and through the engine fuel system under pressure.

The pressure relief valve relieves the discharge pressure by bypassing the fuel from the outlet side of the pump to the inlet side when the discharge pressure reaches approximately 689 kPa (100 psi).

The fuel pump should maintain the fuel pressure as listed below.

Series 60 Engine Fuel System Parameter

Fuel System Parameter Limits	Operating Limits at 1800 rpm	Operating Limits at 2100 rpm
Fuel pump suction at pump inlet, maximum - kPa (in. Hg):	-	-
Clean system	20 (6)	20 (6)
Dirty system	41 (12)	41 (12)
Fuel Pressure @ Operating Speed	80 to 94 psi (550 to 650 kPa)	80 to 94 psi (550 to 650 kPa)

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