

Delphi DPG Medium Duty Diesel Rotary Fuel Pump

Delphi is an industry leader in diesel common rail fuel injection technology. We are actively involved in the development of advanced diesel technology to create fuel injection equipment that continues to help meet stringent emission requirements while enhancing fuel economy and performance. Extensive experience in high-pressure fuel injection technology has helped Delphi develop several innovative design and control strategies to meet customer needs for cost-competitive, high-value fuel injection systems that provide accurate injection over the life of the vehicle, helping minimize emissions while providing robust performance and low noise.

Description – The Delphi DPG medium duty diesel rotary fuel pump is designed to meet the demands of the non-emissions legislated generator set and fixed-speed applications market. The DPG pump includes mechanical governor enhancements, providing durable governor performance to ISO 8528-5 Class G2 standards. The DPG pump is easily adjusted to suit either 50 or 60 Hz operation and can be readily converted to electronic operation using an integrated governor controller and actuator.

Product Design – Based on the highly successful Delphi DPA series of pumps, the main components of the DPG pump are:

- Fuel inlet
- Transfer pump with pressure regulator
- Distributor pumping system with two or four plungers
- Internal cam ring
- Option of advance control
- Driveshaft



- Metering valve with droop control
- Mechanical governor with low friction and wear features
- Governor transient stabilizer
- Electric shut-off

Options include:

- Clockwise or anti-clockwise drive
- Engine transient overspeed limiting
- Component package for low lubricity fuel

Other features include:

- Easy in-service conversion to electronic governing with an integrated governor controller and actuator

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Typical Applications – The Delphi DPG medium duty diesel rotary fuel pump is suitable for generator set or fixed speed applications that fall within the range of these operating parameters:

- Engine speeds to 3000 rpm
- Engine ratings to 24 kW per cylinder
- Peak pumping pressures to 550 bar (injection pressures to 650 bar)
- Three, four, or six cylinders
- ISO 6519 standard 20 mm diameter drive taper
- Gear or hub drive
- 12 V or 24 V electrical supply
- Up to 8° advance travel

DPG Advantages

- *Low wear/friction components*
Improvements to the design of the governor mechanism have been introduced to further improve the wear performance of the governor components. In addition, the introduction of improved knife edge pivots and governor weight design has markedly improved hysteresis performance between governor pull-off and pull-on.
- *Droop control*
The rate of the governor pull-off, or the speed difference percentage between full load and no load is commonly known as droop. Introducing an externally adjustable mechanism that will set the droop to a desired value allows easy conversion from 50 Hz to 60 Hz generator operation within the requirements of ISO 8528-5 Class G2 standards. This feature can also be used for adjustments in service if required.
- *Improved governor features*
A hydraulic damper device fitted to the governor mechanism helps keep alternator set stability within acceptable levels. An adjustable engine overspeed protection feature is also provided.
- *Simple electronic conversion*
A simple conversion to electronic governing with an integrated governor controller and actuator allows in-service upgrades. The integrated design means no separate controller is required, helping minimize wiring harness complexity. Digital control helps provide precise governing with multiple governing strategies, such as isochronous load sharing, 50/60 Hz switching, auxiliary load sharing, etc. The actuator can also be specified as original equipment.

Operating Principle – The basic operating principle of the DPG pump is the same as the DPA range of pumps. Fuel enters the pump and is raised to an intermediate pressure of about 6-7 bar, which is used for control of the pump's mechanisms that regulate fuel quantity and injection timing.

Between injections, fuel is fed into the distributor rotor center through a control (metering) valve. At full fuel, this valve is held wide open and the pump delivers the maximum fuel quantity. This is regulated by the maximum displacement of the pumping plungers and controlled by moveable adjusting plates. At lower engine loads, the flyweight governor controls the fuel by closing the control valve, which throttles the filling of the pump.

During the pumping phase, the roller shoe assemblies, which run inside the internal cam ring, are pushed inward. They bear on the pumping plungers in the rotor, causing an injection pulse to travel from the pump to the injector in the engine cylinder head by way of a pressurizing valve and high-pressure pipe. Timing of the injection event is controlled or altered by rotation of the cam relative to the pumping plungers and drive shaft, and hence the engine.

Adjusting the trunnion throttle (which sets the load in the governor spring) sets the speed at which the governor reaches engine no-load delivery. Adjusting the height of the control (metering) valve sets the droop or governor speed range over which the governor reduces the fuel from the maximum to the minimum quantity. This changes the degree of overlap between the metering valve filling slot and the filling port in the hydraulic head, adjusting the angular rate of change of port area.

The Delphi Advantage – As a global leader in advanced diesel technology, Delphi integrates air and fuel management systems, exhaust aftertreatment, and the associated electronic controls and sensors, helping provide complete end-to-end diesel engine control systems that help meet emission requirements worldwide.

Delphi has two common rail development centers, five diesel applications facilities in Europe, Asia-Pacific, and the United States, and nearly 8,000 employees working to further advance diesel technologies. Delphi has 12 manufacturing facilities that produce diesel systems components in seven countries, enabling exceptional on-time delivery performance.