Delphi-TVS STP/SVP Rotary Mechanical Diesel Fuel Injection Pump

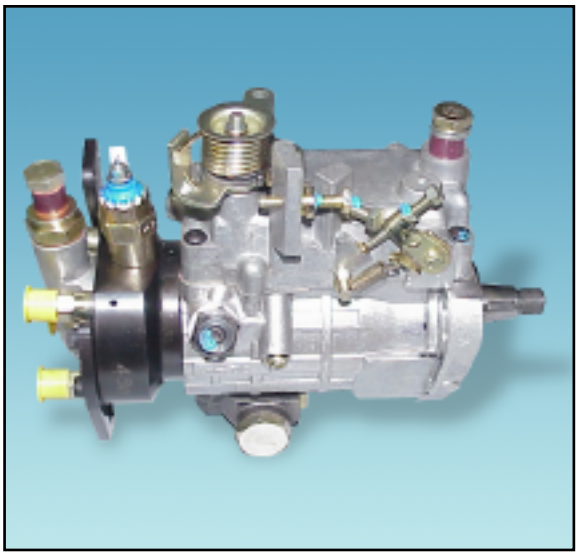
Delphi-TVS is a joint venture between the world's largest automotive Tier 1 supplier and India's largest automotive Tier 1 supplier. Delphi-TVS offers state-of-the-art fuel injection technology. The company conducts research and development to achieve continuous improvement, helping customers achieve cost-competitive, high performance fuel injection systems that are reliable and help meet current and future emission requirements.

Description – The STP/SVP range of rotary mechanical diesel fuel injection pumps is based on the highly successful DPA, DP200, and DPC range of pumps. The main components are:

- Transfer pump with pressure regulator
- Pumping elements (plungers)
- Distributor system
- Internal cam ring
- Advance control
- Drive shaft
- Metering valve
- Mechanical governor
- Electric shut-off

Operating Principle – Filtered fuel enters the pump and is raised to an intermediate speed-dependent pressure which is used for operating the pump's timing control and delivery control mechanisms.

During the filling period, the fuel is fed via the metering valve into the distributing rotor to the space between the plungers. At full load, a pair of



check plates controls the fuel quantity, which determines the maximum displacement of the plungers. At lower loads, a mechanical governor that rotates the metering valve controls the fuel quantity, thereby controlling the filling of the pump.

During the pumping phase, the internal cam ring forces the plungers inward, causing an injection pulse to travel from the pump to the corresponding injector through the high-pressure outlet and the high-pressure pipe.

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The rotation of the cam ring relative to the pumping plungers and drive shaft (and hence relative to the engine) controls the injection timing.

Typical Application – Pumps in the STP/SVP range are available for both on-highway and off-highway applications. They are suitable for three- or four-cylinder engines up to 1.3 liters per cylinder, naturally aspirated and soft-turbocharged. STP/SVP pumps are available with clockwise rotation drive.

Performance Advantages

- High injection pressures: The four radial plungers complement the internal cam lobe arrangement to produce high injection pressures that help meet Tier 1 emission regulations, with the potential of upgrades that can help meet Tier 2 and Euro II emission regulations. Plunger diameter and cam profile are determined by application. The pump's high pressure outlets can be equipped with delivery valves and/or snubber valves, depending on individual customer requirements. The pump delivery curve shape is optimized using these high-pressure features, along with adjustments to the high pressure pipes and injector/nozzle configuration. If necessary, a torque screw can be used to meet specific power and torque targets.
- Advance control adaptability:
  - Progressive light load advance: The pump's timing schedule is matched with the engine's injection timing requirement to help meet emission regulations. An advance control device fitted on the pump can alter the timing with changes in engine load at any engine speed. The advance is servo-controlled to provide accuracy and quick response to changes in engine load and speed as well as repeatability over a long period of life.
  - Speed advance: The differential valve incorporated in the pump is used to set the timing advance as required by the engine for varying speed at full load.
  - Cold advance: A cold advance device actuated by a wax motor is available to improve cold-start performance, help eliminate misfire, and reduce white smoke under cold running conditions.
- Mechanical governor options: Both all-speed governing and minimum/maximum governing types are available to meet specific requirements. The compact design provides stable governing with minimum hysteresis and good repeatability of governor control. In addition, fast idle control can be provided for air-conditioned vehicles.
- Improved timing: The lock shaft method provides a quick and easy way to set pump timing on the engine. The shaft locking orientation is determined dynamically from an injection event, helping provide accurate and consistent pump timing.
- Electric shut-off: A solenoid electric shut-off provides remote key shut-off for all applications.

Features

- ISO 6519 standard 20 mm diameter drive taper
- ISO 7299 flange mounting with optional kidney slots, plain holes, or tapped holes
- Spigot location of 50 mm or 68 mm diameter
- Face sealing ring
- Internal cam pumping
- Maximum instantaneous drive torque of 150 Nm
- Maximum fuel delivery of 105 mm^3/stroke
- Injection pressure up to 650 bar
- Optional torque screw control
- Up to 8° pump advance
- Speed advance and light load advance
- Optional cold advance
- Lock shaft timing
- Mechanical all-speed or minimum/maximum governor
- Optional fast idle control