

Fuel Pump Tech

Drag racers have been limited to inline electric and belt driven fuel pumps. Now there is a new option that mounts directly to the block.

The new block mount billet piston pumps are the first completely new fuel pump design in over 50 years. The pumps are fully machined from hard anodized solid aluminum billet and equipped with Teflon seals and stainless steel components to make the impervious to all fuels. They work on engines from 200 to 2,500 horsepower; carburetors or EFI; naturally aspirated, supercharged or turbocharged; with gasoline, methanol or E85. They are the height of simplicity with just one moving part and bolt in the stock location using the stock pushrod and/or eccentric.

Piston pumps are available with two peak pressures, 50 PSI and 150 PSI. Twelve different pressure regulators are available to address everything from carbureted engines on gasoline to turbocharged EFI engines on methanol.

The design is “high pressure, variable displacement”. This design utilizes a pressure regulator, but does not require a return line. The pump adjusts its output to demand. This is much simpler than you might imagine. The engine drives the piston on the inlet stroke while an internal spring drives in on the outlet stroke. As pressure increases between the pump and the regulator, an indication that the engine is using less than the pump can flow, the internal spring is unable to push the piston its full stroke. For example, the pump may be making .300” strokes when the engine is producing 2,500 horsepower. When the throttle is released and the engine is still turning high RPMs but using little fuel, the pressure builds up between the pump and regulator, shortening the piston strokes to as little as .005”. This same pump installed on a street driven vehicle may never make strokes greater than .050”.

Less pressure is placed on the camshaft or eccentric with the 150 PSI version of the piston fuel pump than a 15 PSI diaphragm pump. This is due to the efficiency of the piston design. The area is only .79 square inches, so it takes .79 pounds of force to generate 1 PSI and 79 pounds of force to generate 100 PSI. A typical diaphragm pump has a 3.5” diameter diaphragm, or 9.6 square inches, this requires 9.6 pounds of force to produce 1 PSI and 96 pound of force to produce 10 PSI. Less than ¼ horsepower is consumed by the new pump, less than any previous designs.

The fuel is naturally cooler with the “variable displacement” design because no excess energy is dissipated into the fuel as with electric and belt drive pumps.

Regulators designed for use with the block mount piston pump are hard anodized billet aluminum like the pumps. They feature a lightweight ceramic valve made of the same material as aerospace ball bearings, seating directly against a hard anodized aluminum seat. Traditional regulators use a heavy steel valve against a steel seat. This combination allows the regulator to “flutter” at lower speeds. Fuel pressure is much more stable with the lighter valve and hard anodized aluminum seat. The regulators are available for all applications including simple gasoline carbureted applications, optional idle bleed to prevent vapor lock with methanol, vacuum reference for load sensitive fuel pressure and boost reference for blow through superchargers and turbocharged applications. Two pressure ranges are available, 7-15 PSI for carburetors and 45-75 PSI for EFI applications.

A very nice feature is the ability to upgrade the pumps and regulators. The pressure range of the pumps can altered from 50 PSI to 150 PSI, or vice versa, by simply changing the internal spring which is available for \$10.00. Any of the 12 regulators can be converted to any configuration by the consumer with a \$10.00 kit. If you upgrade from a gasoline/carbureted system to a methanol/turbocharged/EFI system you can upgrade your piston pump and regulator for just \$20.00. This is the last fuel pump and regulator you will ever need.

One moving part makes the piston pumps extremely dependable. An endurance test was conducted simulating 240,000 miles of use with no problems. The piston pumps and matching regulators are manufactured from hard anodized 6061-T6 solid aluminum billet with Teflon seals and stainless steel components. A simple design with premium components makes for outstanding durability.

Most drag racers can use the new block mounted piston fuel pump with a rear mounted fuel tank. Cars quicker than mid 8 seconds in the ¼ mile need a front mounted fuel cell with any engine mounted fuel pump. Accelerating at 1g places a burden on the fuel pump equivalent of standing the car on its rear bumper. This extra work decreases any engine mounted fuel pump’s capacity.

Of course this is not a perfect world, and this is not quite a perfect pump. You must have the mechanical fuel pump mounting boss on your engine to use one. V-8 engines manufactured since the mid ‘90s don’t have this provision. Ford V-8s without the mounting boss can be updated by changing the timing cover. Chevrolet and Chrysler engines can’t be updated.

The new block mounted billet piston pumps are currently available for small and big block Chevy, small block Ford and big block Chrysler. More applications are in development.

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