BRUSH VS. BRUSHLESS FUEL PUMPS WHAT'S THE ADVANTAGE?

B rushed DC motors have been around since the late 19th century and brushless motor technology has been around since the advent of solid state electronics in the 1960s. Yet, it wasn't until the development of cheaper and higher powered transistor technology that brushless motors would find regular integration in nearly everything from cordless drills to computer fans. They're also in fuel pumps manufactured by TI Automotive. What is the advantage of a brushless pump over a traditional brushed pump?

Technical Differences

The primary technical difference lies in the name. A traditional DC brush motor contains stationary contacts called "brushes." The brushes, usually made of a soft conductor like graphite, press against the commutator. This direct contact of the brushes against the commutator is what provides the electrical current to the motor windings. Conversely, a brushless motor foregoes those brushes altogether.

Traditional brushed motors are designed with magnets in the stator and coils in the rotor, while the brushless design is effectively inverted (magnets in the rotor and coils in the stator). In a brush design, to energize the coils and turn the rotor, current is transmitted through the brushes to the commutator. The rotating commutator segments switch current to their respective coils. Since the brushes and commutator are removed from the brushless design, something else is needed to perform the commutation. This is where the brushless controller comes in. It contains an array of transistors that switch current to their respective coils to get the rotor turning, just like the brushes and commutator.



Advantage of Brushless Motor Technology in a Fuel Pump

Integrating brushless technology with the latest fuel pump technology brings many advantages over brushed motor fuel pumps, including:

- Reduced noise due to less friction
- Helps provide a longer life due to less internal degradation
- Higher speeds through the use of magnetic induction without the restrictions caused by required direct contact of brushes
- Increased or decreased motor speed based on inputs from controller
- Can be tuned to required application



A controller is required for a brushless motor to function, so it goes without stating that one is required to operate a brushless fuel pump. Basic controllers have functionality for simple plug-and-play, designed for maximum flow at 100 percent duty cycle, while high-end controllers allow for full control with variable pressure ranges and duty cycles. The brushless fuel pump also has the ability to be fully integrated with an OEM or aftermarket Engine Control Unit (ECU). Employing a controller allows for the motor speed to be increased or decreased to the desired flow rate to maintain optimal fuel pressure. Additionally, the fuel pump speed can be turned on and off, as required, for vehicles with stop-start systems.

Furthermore, a brushless fuel pump can last longer than a brushed fuel pump – more no-wear components increase longevity. These no-wear parts lead to less overall heat created by friction achieving greater efficiency with minimal electrical load.

Brushless fuel pumps are capable of full "tune-ability." Through the use of the controller, it's possible to change the fuel demand to a higher flow rate for racing applications with the ability to change it back to a lower flow rate for street use. Unheard of before brushless fuel pumps, this has created an advantage for the weekend racer who commutes with the same car or even just drives back and forth to an event.

Does Your Car Need a Brushless Fuel Pump?

While a brushless fuel pump provides obvious advantages, it may not necessarily provide an advantage to your application. This advanced technology comes with a higher cost for the pump and the needed controller. The advantages of controllability and efficiency throughout its life may outweigh the increased cost. Cars with older fuel injection or carbureted fuel systems may not reap the advantages of a brushless fuel pump, but it may be advantageous to consider it if your plans include upgrading to a more modern and advanced fuel system.

Contact your TI Automotive representative if you have any questions about upgrading to a brushless fuel pump.

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Fluid thinking[™] shapes the mindset of TI Automotive. Global automotive manufacturers turn to TI Automotive to develop and produce industryleading automotive fluid systems technology. Two-thirds of the world's vehicles contain technology from TI Automotive.

With 28,700 employees at more than II4 locations in 28 countries, our strength lies in our ability to creatively meet and exceed the increasing fuel economy and emissions regulations of tomorrow's auto industry.



OUR MICHIGAN MANUFACTURING SITE

The Caro, MI plant is TI Automotive's high-performance and aftermarket fuel pump and module manufacturing site. Our fuel pumps and modules are never manufactured or assembled by a third party or sourced from an outside company.

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