

BRUSHLESS ELECTRIC IN-TANK FUEL PUMP INSTALLATION INSTRUCTIONS

Pump must be used with a BLDC - Brushless Pump Controller (Not Supplied).

The fuel pump must be driven with a sensorless 6 step commutation method (trapezoidal control) or other suitable method – Sinusoidal or Field Oriented Control (FOC) for example

PRECAUTIONS FOR FUEL SYSTEM SERVICE

TO REDUCE THE RISK OF FIRE AND PERSONAL INJURY, IT IS NECESSARY TO OBSERVE THE FOLLOWING PRECAUTIONS:

- Perform this repair **ONLY** in a properly equipped service facility.
- Position the vehicle in a clear, level, well-ventilated work area.
- Make sure there are no sources of spark or combustion near the work area.
- Perform work in a no-smoking area, or post no-smoking signs in the area selected.
- Have readily available a fully functional Class B fire extinguisher of adequate size (such as a 5 pound CO-2 as a minimum).
- Disconnect the ground cable from the vehicle's battery before performing any operation involving gasoline, gasoline tanks or gasoline lines.
- Allow the vehicle to cool before performing any operation which could possibly expose gasoline or gasoline vapors to hot parts such as catalytic converters, hot light bulbs, or similar components.
- Avoid using extension cords or lights which might overheat or cause sparks.
- Avoid inhaling gasoline fumes and prolonged skin contact with gasoline. Promptly wash any body areas which have been in contact with gasoline.
- Wear approved safety glasses while performing any repairs.
- When raising the vehicle to perform under-vehicle services, use proper hoisting or jacking equipment along with approved safety supports.
- When removing the gasoline from a fuel tank, use an OSHA approved pump which is specifically designed for handling gasoline. **DO NOT USE** any other type of pump. Gasoline removed from a fuel tank must be stored in approved gasoline containers.

In addition to the safety concerns listed, please carefully evaluate the hazards involved in such a service procedure and take whatever further precautions may be necessary.

PRECAUTIONARY STATEMENT

This pump is used in modified vehicles **ONLY** and to be installed by an automotive service professional. This brushless electric in-tank fuel pump must be used with pump controller. Vehicles in which this pump is to be installed should have the following upgrades performed prior to pump installation:

- Upgraded fuel pressure regulator
- Larger fuel supply and return lines
- 12 gauge or larger pump wiring
- Minimum 25 amp fuse
- 40 amp relay

Failure to follow the above noted requirements while using this pump in a stock factory fuel system may cause severe drivability issues and could lead to damage of the vehicle's fuel system.

PERSONAL INJURY, AND/OR PROPERTY DAMAGE HAZARD

Failure to carefully read and follow this warning could result in equipment malfunction, property damage, personal injury and/or death. Installation or repairs made by unqualified persons could result in vehicle malfunction, property damage, personal injury and/or death. The information contained in this installation instruction sheet is intended for use by a qualified service technician familiar with safety procedures and equipped with proper tools and gauges.

WARNING: This brushless electric in-tank fuel pump **WILL NOT** work on carbureted fuel systems. It is for electronic fuel injection only.

CAUTION: Read these instructions thoroughly from start to finish before attempting to replace the fuel pump.

MINIMUM TOOL REQUIREMENTS:

- Hoist or end lift jack
 - OSHA approved safety stands
 - OSHA approved fuel transfer pump
 - OSHA approved fuel storage containers
 - Variety of mechanics hand tools
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FUEL PUMP REPLACEMENT INSTRUCTIONS

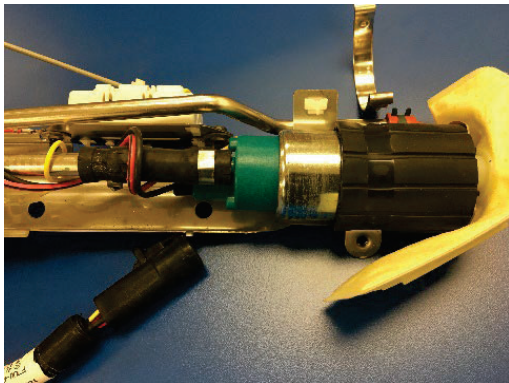
NOTE: The words "pump bracket" used throughout these instructions mean fuel pump mounting bracket and fuel level sender assembly. The word "module" refers to fuel pump module.

PREPARATIONS

- Relieve fuel system pressure (**This procedure is necessary since the fuel system can retain gasoline under pressure for a considerable period of time. Opening a pressurized line could spray fuel creating a risk of fire and/or personal injury.**)
 - Start the engine.
 - Remove the fuel pump relay allowing the engine to run until it quits. When the engine quits, the fuel system pressure has been relieved. Turn the ignition switch off.
 - Remove the battery ground (-) cable for safety.
 - Reinstall the fuel pump relay.

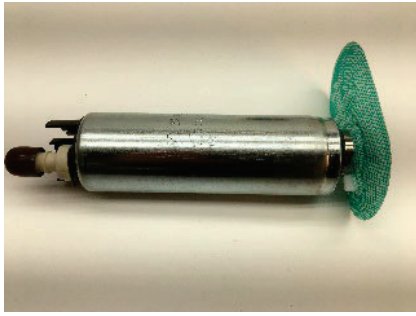
INSTALLATION

- **Locate Fuel Pump Bracket or Module in the Fuel Tank**
 - Some vehicles will require raising the vehicle to remove the fuel tank. Some vehicles will require removal of the rear seat, an access panel, and possibly the trunk liner in order to get to the fuel pump bracket or module. Refer to the vehicle's service manual for specific instructions.
- **Disconnect Electrical Connections**
 - If not done previously, disconnect electrical connections from the pump bracket.
- **Disconnect Fuel Line Connections**
 - **CAUTION:** Fuel lines may still be under slight pressure. Place a rag or shop towel around the fuel line connection to avoid excess fuel spillage.
- **Remove Pump Bracket or Module from the Fuel Tank**
 - Many vehicle fuel pump brackets are L-shaped and attach to the main bracket with a screw and a lock washer. Loosening the screw and removing the L-shaped bracket allows an easier method of removing the hose from the pump and the pump from the bracket. If there is not an L-shaped bracket, cut the hose, remove the clamps, hose pieces and fuel pump from the larger bracket and discard.



NOTE: Failure to use a new filter on the fuel pump inlet will likely result in premature pump failure and will void the pump warranty if applicable.

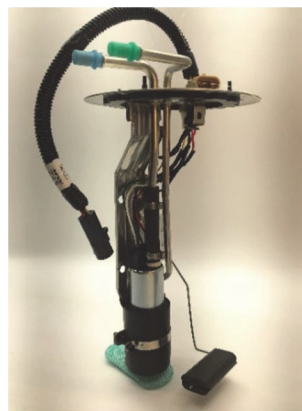
- **Filter Installation**
 - Install the new filter on the new pump inlet. Secure the filter to the pump by pressing the filter onto the inlet hob of the pump. In some applications the filter will be secured to the pump after the pump is placed on the isolator in the fuel pump bracket.



Filter color and size may vary in installation kit.

Install Pump in Bracket or Module

- Install new brushless pump into pump bracket or module. Alterations may be necessary to fit. The pump filter may need to be installed after pump is installed into the pump bracket or module. Make sure pump is secure and filter is attached firmly.
- Three phase DC brushless motor with neodymium magnets
- External controller Required
- In-tank OEM style mounting
- Kit includes pump, filter, wire harness, grommet and instructions.



BLDC Pump Controller Installation

ADVICE! This Fuel Pump is operated by using 3-Phase DC Brushless motor techniques utilizing sensorless drive. Instead of having only two wires exiting fuel pump for constant DC electrical power to be applied, this fuel pump has four wires. Three of which attach directly to the motor's stator windings and one ground wire. This makes an external electronic DC brushless controller **REQUIRED** for operation. TI Automotive BCT1001 controller can operate this model fuel pump and is available for purchase. The use of Initial Position Detection (IPD) to assist in pump start-up is preferred.

• BLDC Controller REQUIRED; NOT SUPPLIED

Determine controller mounting location. Area should be in close proximity to the tank and away from heat and extreme weather conditions. Take note of the 4 wires and phase orientation to be connected to the fuel pump. Make sure mounting location leave enough wire length but not straining the wires. **Minimum pump speed: 2500 rpm - @4 bar or 3500 rpm - @6 bar or greater**
Be sure to mount the unit away from extreme heat and extreme weather. The trunk area is a good location.

• Solder/Crimp on New Terminals

- The brushless electric in-tank fuel pump will have 4 wire leads required to operate the pump (cut to length if required). If replacing a 2-wire brushed pump, the 4 wire leads from the controller will need to be used to operate the pump.
- Some pumps will require cutting the wires near the existing connector or terminals and stripping 1/4" of insulation from the wires. Next, crimp on new terminals or solder connections using the recommended tools. For proper pump performance make sure terminated connections are secure.
- The flange will need 4 electrical pins to terminate the pump (in tank) to the controller (external to tank).

• Connect Wires and Routing

NOTE: Use wire harness provided in kit to assure latest revision for controller connection. The brushless electric in-tank fuel pump may fail to run or run backwards if wired incorrectly.

Take note of the 4 wires and phase orientation to be connected to the fuel pump (Output side). Terminate wire leads accordingly.

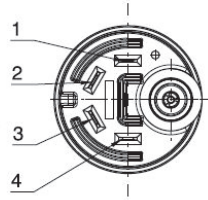
Pump wire harness

Pump Red – Phase 1

Pump White – Phase 2

Pump Green – Phase 3

Pump Black – Ground



- **ECU Command vs. Duty Cycle to Pump (Chart for reference)**

- Variable PMW control will need to be customized to your vehicle. Minimum of 9 volts input and a minimum 45% duty cycle.

Reinstall the Fuel Pump Bracket or Module in Tank

- Using the new or existing tank seal, place the pump and the bracket assembly or module into the fuel tank. Tighten the lock ring or tighten the existing nuts to seal into the tank.

- **Install Fuel Tank in Vehicle**

- Install the fuel tank in the vehicle. Connect the electrical connections and the fuel lines to the proper locations on the fuel pump bracket or module.

- **Check Installation**

- Start the vehicle and check for leaks. Refer to the vehicle service manuals for information on clearing any resultant error codes.

TROUBLE SHOOTING

Should the brushless electric in-tank fuel pump fail to operate, check the pump fuse and pump relay as outlined in the service manual. If the pump has power and proper polarity, check the pump phase wire orientation to the pump controller (refer to wire color controller to brushless electric in-tank fuel pump).

This product is intended for High Performance Use



Additional modifications to the fuel delivery system may be necessary for the vehicle to perform properly once installed. This unit was designed to provide additional fuel flow at the manufacturer's specified operating pressure. A control module re-learn may be necessary once this unit is installed and should be performed by following the manufacturer's guidelines. Highly modified vehicles may require professional tuning of the on-board computer.

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630 Columbia Street, Caro, MI 48723 | (989) 672-8383