



ACESEFI



Tank Conversion Pump Module with Internal Regulator

Installation Guide

Overview

The purpose of this manual is to guide you through the installation of the Aces Tank Conversion Pump Module with Internal Regulator. The system is designed to provide an in-tank fuel pump compatible with almost any fuel tank, suitable for engines producing up to 800 horsepower.

Critical Warnings

 **WARNING:** Failure to follow these instructions may result in an improper installation, which could cause serious injury, death, or property damage. Improper installation or misuse of this Aces product will void all warranties.

 **WARNING:** Installation, adjustment, and repair should only be performed by a trained mechanic with adequate experience in fuel and automotive electrical systems.

 **WARNING:** Aces EFI systems consist of multiple sophisticated components. Failure of a single component does not justify a warranty claim for the entire system. Individual components are available for warranty replacement.

 **WARNING:** To preserve the warranty, these installation instructions must be read and followed thoroughly. Failure to follow instructions can void the warranty and may result in serious injury or property damage.

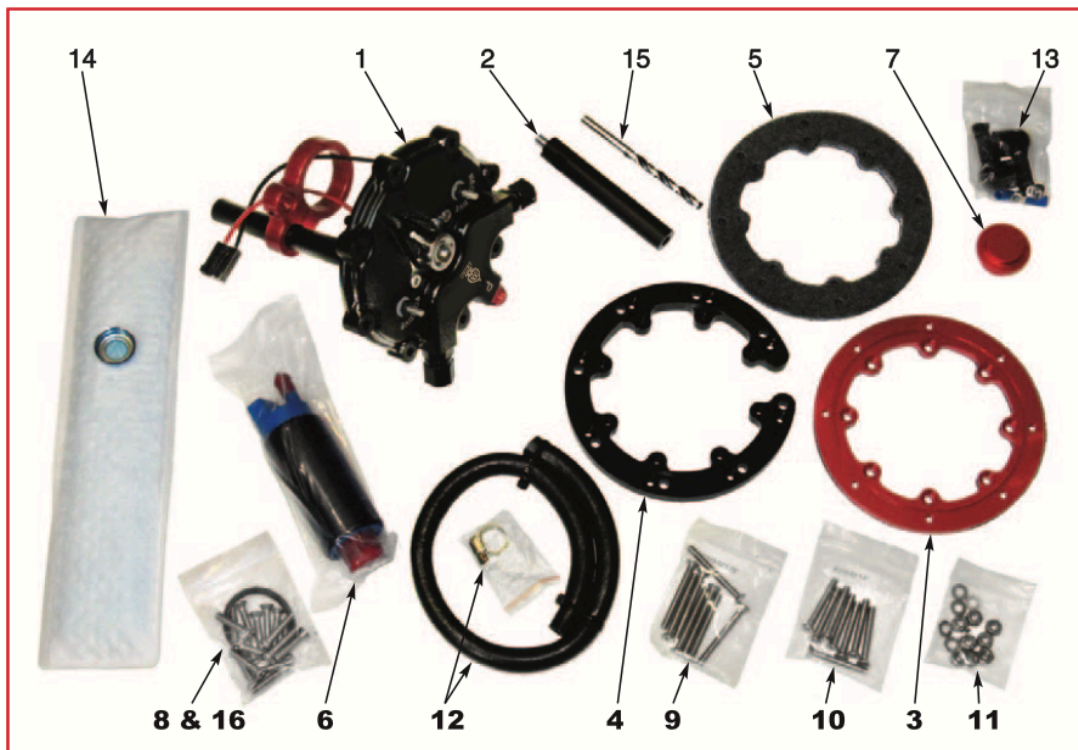
 **WARNING:** Fuel vapors are heavier than air and can accumulate in low areas, where they may be ignited by sparks or flames, resulting in property damage, injury, or death. Always prevent fuel spills to eliminate this risk.

 **WARNING:** Work must be performed in a well-ventilated area. Do not smoke or have open flames nearby, as gasoline vapors are highly flammable and can cause explosions.

 **WARNING:** Aces EFI systems offer extensive adjustability, and proper setup and calibration are essential for safe operation. If you are not comfortable with engine fundamentals and EFI tuning, we recommend having the system installed and calibrated by an Aces authorized installer or qualified tuning shop. Our technical support team is also available at acesefi.com or +1 (423) 590-2237 to help answer basic installation, setup, and troubleshooting questions.

AF4019 Kit Contents

1. Pump Main Assembly (Includes 58 PSI Fuel Regulator)
2. Extension Shaft
3. Outer Ring (Red)
4. Inner Ring (Black)
5. Foam Gasket
6. 340 LPH Fuel Pump
7. Regulator Block-off Plug
8. (16) #10-32 x 1" long. Flat-Head Machine Screws
9. (8) #10-32 x 1.75" long. Flat Head Machine Screws
10. (8) #10-32 x 1.5" long Flat Head Machine Screws
11. (8) #10-32 Lock Nuts and #10 Flat Washers
12. 5/16" Return Hose and (1) Hose Clamps
13. (2) Electrical Connectors, Nuts, Washers and Rubber Boots
14. Filter Sock.
15. 1/4" Drill Bit.
16. O-Ring



Recommended Tools

- Slow speed Drill Motor
- 4-1/2" diameter hole saw
- Round fine file
- Shop vacuum
- Screwdriver: Phillips
- Screwdriver: Small Flathead
- 3/8" Socket and 1/4" Drive ratchet
- 5/16" Diameter Drill Bit (Optional)

Special Instructions

 **WARNING:** Before beginning installation, disconnect the negative battery terminal. Wear proper eye protection and keep a fire extinguisher nearby. Work only with a clean fuel tank, free of combustible fumes, in a well-ventilated area clear of fire hazards. Gasoline fumes are toxic and highly flammable; drilling and grinding are potential ignition sources. For the safest installation, use a new fuel tank or have the existing tank professionally cleaned. Failure to follow these warnings may result in injury or death.

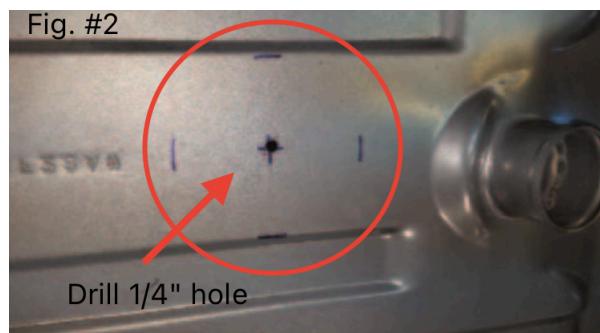
- To maximize the service life of your pump, keep the fuel tank filled above 1/8 capacity at all times during use.
- If using hard fuel lines, ensure they are high-pressure EFI rated and equipped with flared fittings.
- Ensure all low pressure flex joints on factory fuel lines are replaced with EFI rated fuel hoses and use proper flared connections and clamps.
- Be careful not to mix 45° SAE fitting and 37° AN fittings, as they are not cross-compatible.
- If using a return line, ensure it is at least 3/8".
- Aces does not recommend the use of aluminum fuel lines, which are typically not manufactured at the required 3/8" diameter.
- Ensure that all hoses and fittings are produced by the same manufacturer. Hoses and fittings from different manufacturers are typically not cross-compatible and could cause leaks.
- Aces recommends using unleaded gasoline with no greater than 15% ethanol content.
- Relieve the pressure from within the system before opening the fuel system.
- **NOTE:** Your fuel tank **must** have a vent or use a vented cap to prevent pressure building up inside the tank.

Installation Instructions

⚠ WARNING: Wear eye protection and ensure the tank is free of combustible fumes while drilling. Have a professional boil out the tank to eliminate the risk of an explosion.

Cut your fuel tank and install the rings prior to assembling the Pump Unit. This is necessary because the Pump Unit's length must be adjusted to accommodate the final tank depth, including the thickness of the installed rings and gasket.

1. Before cutting the 4-1/2" diameter hole, position the red retaining ring (#3) centrally on a flat area of the fuel tank, ensuring adequate clearance from the tank edge for the filter sock (#14). If a flat area is unavailable due to tank ribs, the supplied thick foam gasket will allow installation over the uneven surface.
2. When selecting your hole location, be sure to avoid the stock fuel level sending unit assembly and stock fuel pump pickup. See Figure 1.



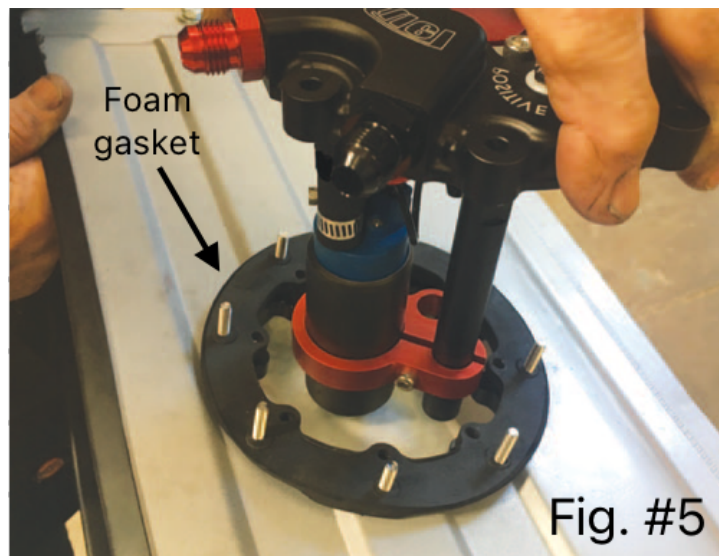
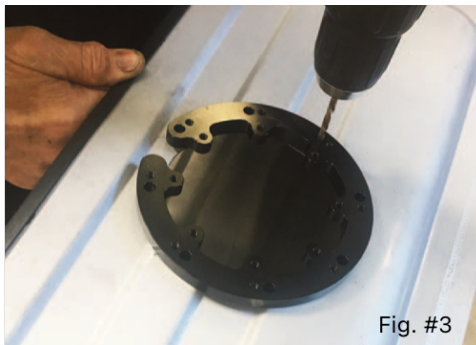
3. With the red ring in position, mark a spot in the center of the ring. To ensure accuracy, scribe a circle around the outside of the red ring and then measure from the scribed line to find the center.
4. Drill a 1/4" pilot hole on the marked point. Use supplied drill bit (#15). See Figure #2.

5. Using a slow speed drill with a 4-1/2" hole saw, cut a hole in the tank. See Figure #2.
6. Use a file to deburr the sharp edges.
7. Thoroughly clean the tank to remove all of the metal chips and debris inside and outside of the tank. **Do not continue with installation until the tank is entirely clean.**

Installing the Mounting Ring(s)

Note that this AF4019 In-Tank Pump is designed to be installed in one of two ways as follows:

1. **Using only the Black Ring (#4) inside the tank:** This configuration results in a lower profile above the tank's top. However, the Foam Gasket (#5) must be replaced each time the Pump Assembly is removed from the tank. Replacement gaskets can be purchased at [aceseffi.com](http://acesefi.com).
2. **Utilize both the Black Ring (#4) and the Red Ring (#3):** This combination increases the overall height by approximately 1/4", but it permits the installation of a supplied O-ring between the Pump Assembly (#1) and the Red Ring (#3). This configuration allows the pump to be repeatedly removed and reinstalled without requiring a new gasket for each cycle.



Black Ring Only Installation

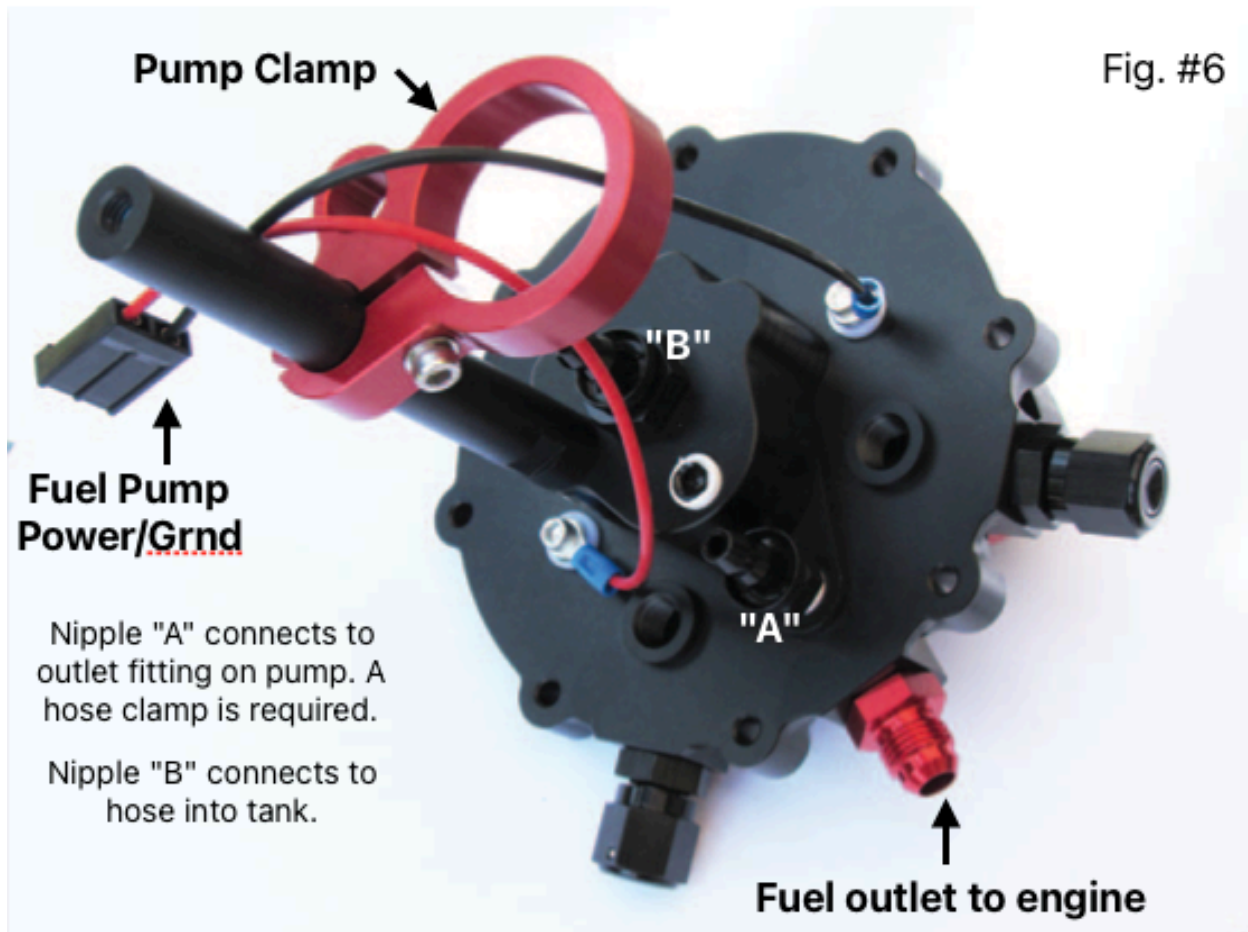
Note that in this installation, the Black Ring (#4) goes on the inside of the tank. Then the Foam Gasket (#5) goes on the top of the tank and the Pump Assembly goes on top of the Foam Gasket. See Figure #8.

1. The Black Ring has a pilot diameter designed to fit into the existing 4-1/2" hole. Place the ring on top of the tank and use it to mark the eight hole locations. Note that the Black Ring has two sets of holes on its outer diameter: one set consists of straight-through holes, and the other set is both countersunk and tapped.
2. Carefully consider the rotational alignment (clocking position) of the holes so that when the Pump Assembly (#1) is installed, the red outlet port fitting is oriented in the desired direction.
3. Using the Black Ring as a drill guide, drill the eight holes with the supplied 1/4" drill bit (#15) through the larger set of holes in the Black Ring. See Figure #3. Once drilled, the component is no longer clockable.
4. Clean up any leftover debris. Ensure that the inside of the tank is completely free of chips, shavings, and dust. Wash out with soap and water if necessary.
5. Thread the #10-32x1.5" long flat head machine screws (#10) (if mounting on a flat surface of the fuel tank) or the #10-32x1.75" long flat head machine screws (#9) (if mounting on a ribbed surface of the tank) through the countersunk holes in the Black Ring. See Figure #4. These holes are tapped, so ensure the screws are snugly tightened.
6. Insert the Black Ring inside the tank (upside down from the position you used it as a drill template) and then push the eight extended machine screws up through the eight drilled holes in the tank. Holding the Black Ring in place, push the #5 Foam Gasket down over the eight machine screws. See Figure #5.
7. Assemble the Pump Unit. Refer to the "Assembling the Pump Unit" section below.
8. Now carefully insert the Pump Unit through the hole thread-ing the Filter Sock (#14) at an angle. See Figure #5. Drop the Pump Unit down over the eight machine screws sticking up through the Foam Gasket. Place the eight #10 Washers and #10-32 Lock Nuts (#11) onto the machine screws and tighten securely in a cross pattern to tighten them down equally. See Figure #8.

Black and Red Ring Installation

The holes drilled for this installation are identical to the Black Ring Only installation. No additional drilling is required.

1. Hold the Red Ring with the O-ring groove facing down. Thread eight of the #10-32 x 1.0" long flat head machine screws through the countersunk holes in the Red Ring. Tighten securely.
2. Insert the Black Ring inside the tank and hold in position with one hand. Flip the Red Ring over so the O-ring groove is facing up. Now place the #10-32 x 1.75" long flat head machine screws into the countersunk holes in the Red Ring. With the Foam Gasket sandwiched between the top of the tank and the Red Ring, thread the eight screws into the black ring. Tighten the eight screws using a cross pattern so that the Red Ring tightens down evenly. See Figure #9.

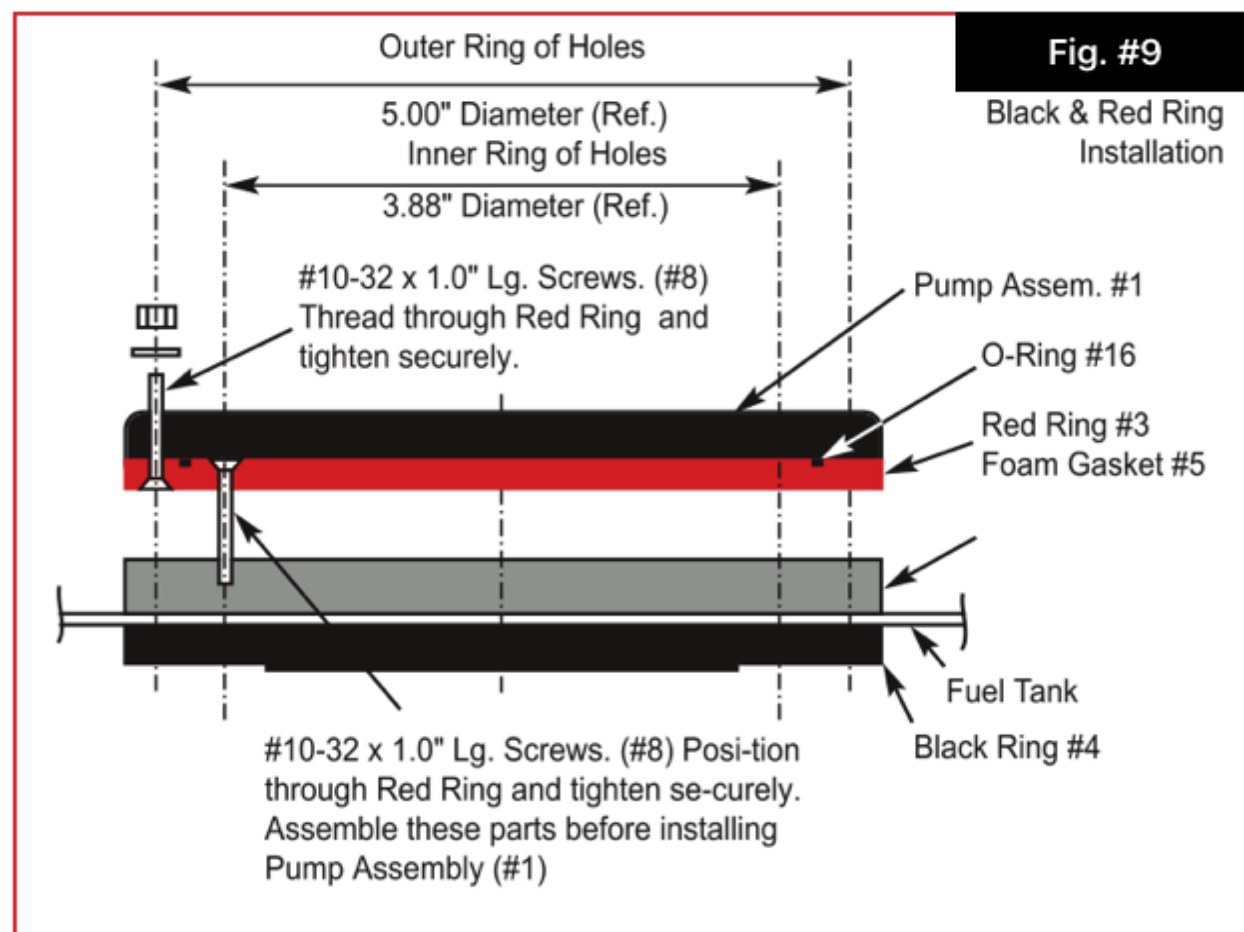
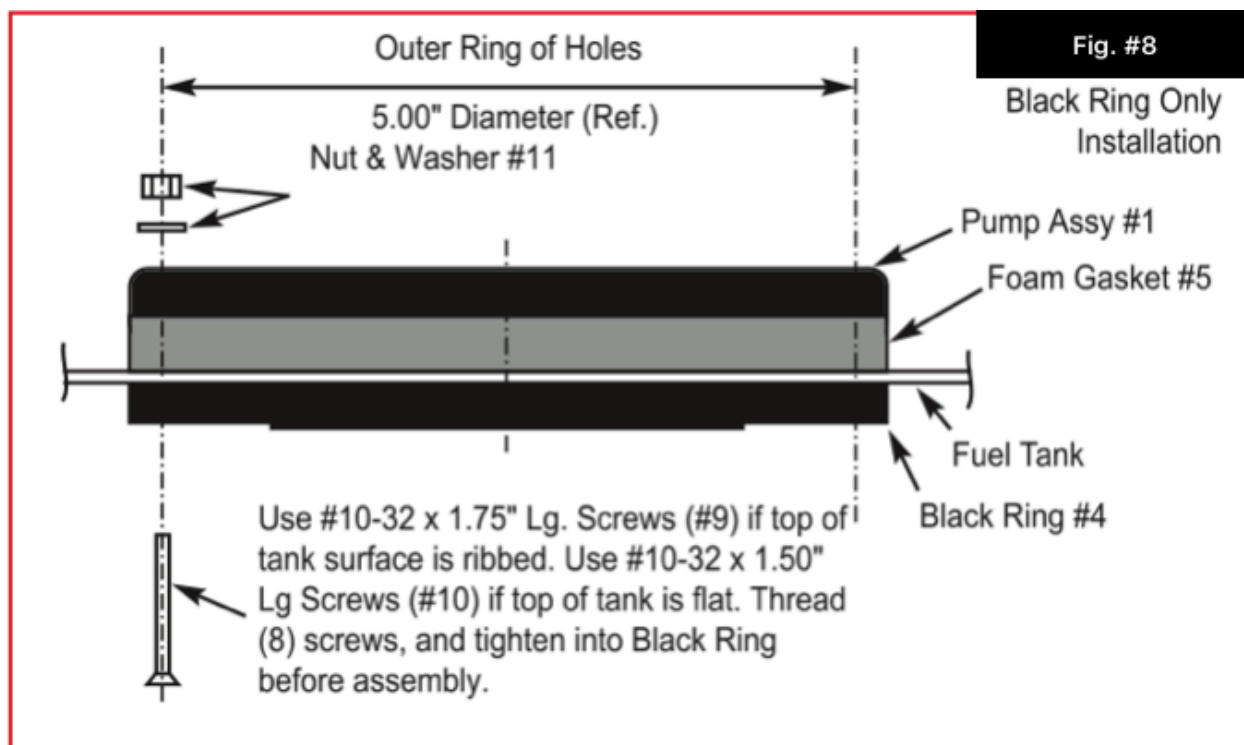




Assembling the Pump Unit

1. The Pump Unit (#1) arrives partially assembled. Determine the depth of your fuel tank. Once the unit is installed you will want the Filter Sock (#14) as close to the bottom of the tank as possible.
2. When determining the assembled length of the unit relative to the tank depth, consider the compressed final thickness of the Foam Gasket (#5). Failure to do so may cause the Filter Sock sitting too high off the bottom of the tank.
3. You will note a red clamp ring (see Figure #6) mounted onto the main center rod of the Pump Assembly. The Fuel Pump (#6) is clamped in this ring. Rotate this ring so the fuel pump outlet nipple lines up with the nipple (A) in the top assembly closest to the red fuel outlet fitting. The ring can be moved up and down the main center rod depending on the depth of the tank. There is also a center rod extension (#2) which can be threaded onto the existing center rod allowing the pump to slide even lower on the rod as necessary for a deeper tank.

4. Once you have determined the location needed for the pump on the center rod, cut a length of the installed nylon hose and fit one end over the outlet nipple of the pump (on the red end) and the other end of the hose over the nipple. Make sure to heat the Nylon tube till soft before pushing the pump nipple onto the nylon tubing. Use the supplied hose clamp (#12) to secure the hose to the pump. See Figure #6.
5. Snap the electrical connector onto the pump terminals.
6. Snap the Filter Sock (#14) onto the bottom of the Fuel Pump (#6).



Installing the Pump Assembly into the Tank

1. Place the green O-Ring (#6) into the groove on the upper face of the Red Ring (#3). Use a small amount of grease to keep the O-ring in position if necessary. See Figure #8.
2. Carefully insert the Pump Assembly through the opening in the Red Ring, threading the Filter Sock in first. See Figure #7. Set the assembly down onto the Red Ring, making sure that the O-ring stays in position while aligning the eight holes in the Pump Assembly with the eight screws sticking up out of the Red Ring. Once seated, place the #10 Flat Washers and #10-32 Locknuts (#11) onto the exposed screws. Tighten securely using a cross pattern to assure even clamping. See Figure #9.

Wiring the In-Tank Retrofit Kit A suggested wiring diagram is shown in Figure #13. Note that a relay is required.

Reinstalling Fuel Tank & Wiring

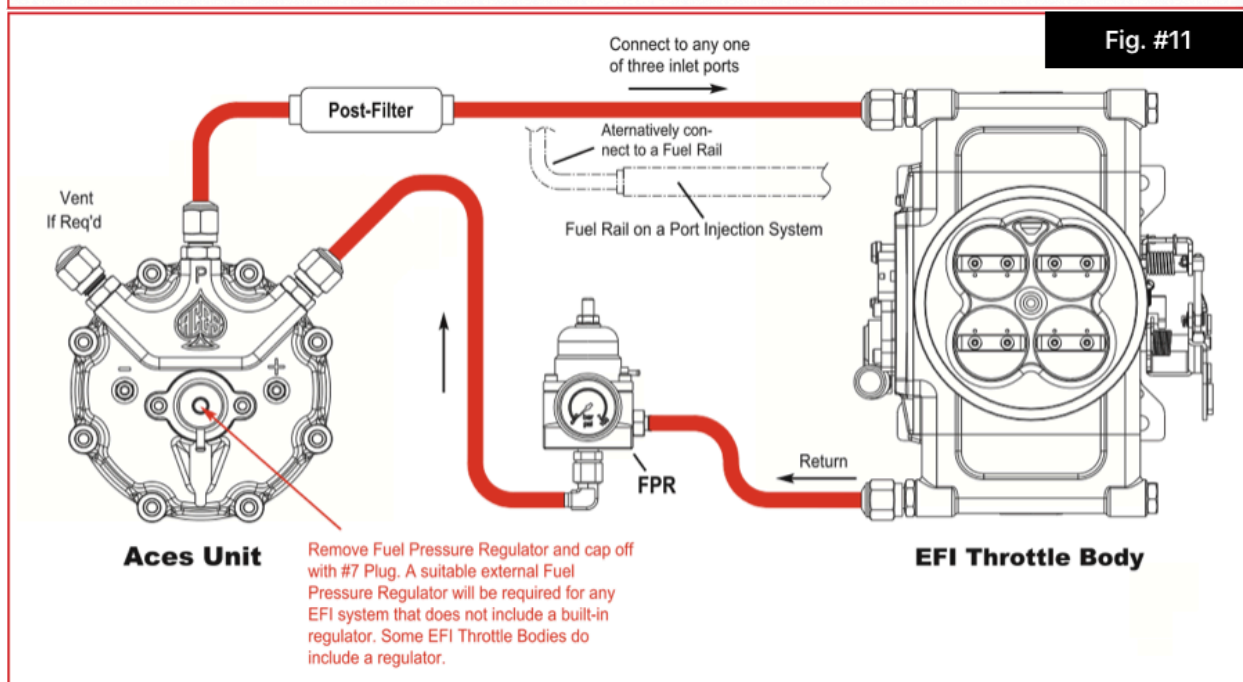
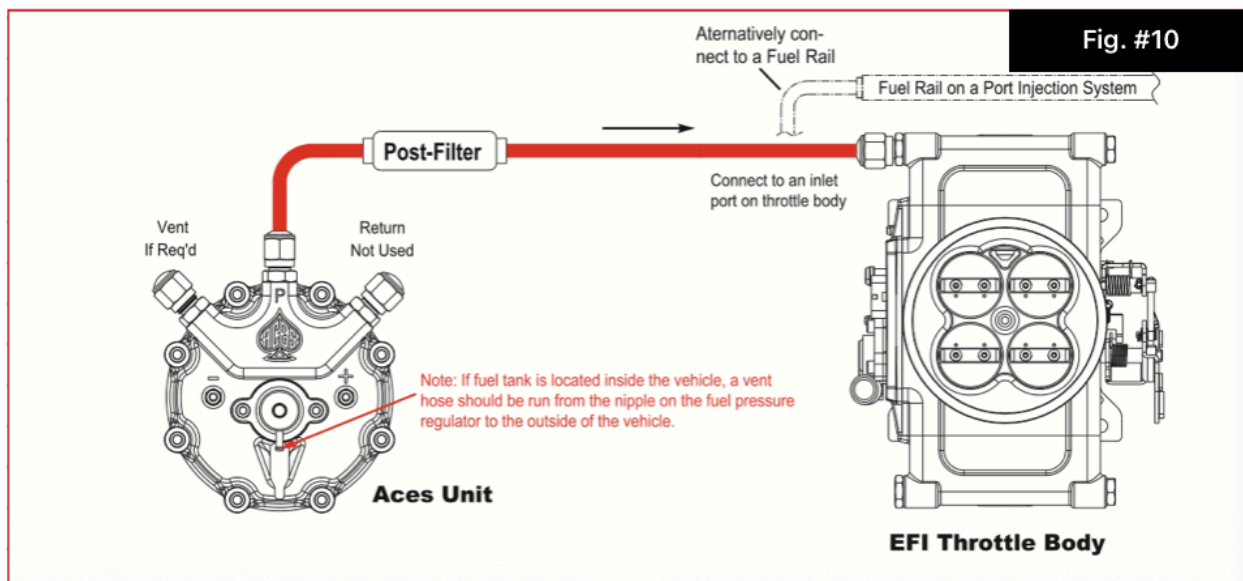
1. Set the fuel tank into the vehicle and attach the fuel lines.
2. Attach the fuel pump power wire to the positive terminal and cover the terminal with the provided installation boot.
3. Attach one side of the ground wire to the negative terminal and the other end to a good ground on the chassis. Make sure the positive terminal has clearance and/or insulation to prevent hitting the bottom of the car floorpan. If necessary, lay a piece of foam over the top of the pump to insure the pump will not short.
4. Run a return line from the return fitting on the throttle body to the return port on the unit if applicable. If running returnless, plumb a -6 fuel line from the unit to an inlet port on the fuel injection system. See Figure #12. See below for more complete information on plumbing return or returnless style systems.
5. Ensure there is gas in the tank.
6. Reconnect the battery.
7. Turn your key to the "On" position, don't crank.
8. Thoroughly check for any leaks.
9. If no leaks are present then you are ready to start your vehicle.

System Plumbing and Regulation

The Tank Conversion Kit supports configuration for both return and returnless fuel systems. In all configurations, the center -6 ORB fitting (marked in red) serves as the pressure output port.

For a returnless system utilizing a vented fuel tank, the two side fittings can be capped. If the fuel tank is not vented, one of the side fittings must be used as a vent. Either side port may function as a vent or as a fuel return port.

Refer to Figure #10 for guidance on plumbing a returnless system, and Figure #11 for a return system.



If your EFI system includes a built-in fuel pressure regulator, it should be removed. Consult your EFI manufacturer for instructions on plugging the hole. The unit includes a pressure regulator which replaces the one removed from your EFI. Note that most aftermarket EFI systems do not have a built-in regulator. In cases where the pump is mounted inside the vehicle, it is recommended to route a vent

hose from the fuel pressure regulator nipple, venting to the outside of the vehicle. This is to prevent potential fuel leakage inside the vehicle in case of regulator failure. For more detailed information on the Fuel Pressure Regulator, see page 6.

For a returnless system, slide a section of the supplied hose through the hole in the red clamp as shown in Figure #10 and push it onto the barbed fitting marked "B" in Figure 10. A hose clamp is not required. Ensure the hose is routed away from the Filter Sock in the tank.

Fuel Pressure Regulator

The In-Tank Retrofit Fuel Pump Kit includes a built-in fuel pressure regulator. (See below) When running a forced induction system, a vacuum hose should be run from the nipple on the regulator to a nipple port on the intake manifold. If this is impractical due to the distance from the fuel tank to the engine, then remove the two screws holding the fuel pressure regulator to the unit and replace it with the supplied red plug, Item #7. Then use a suitable EFI fuel pressure regulator close to the engine in the line between the unit and the fuel injection system on the engine. Aces offers a line of Fuel Pressure Regulators. Note that the Aces unit can be used with any fuel injection system.

Fig. #12

Wiring Schematic for AF4019 In-Tank Retrofit Kit

