

**NOTE:** This In-Tank Kit can be used with any EFI system, or with the proper low pressure bypass style external regulator, it can also be used in carbureted installations.

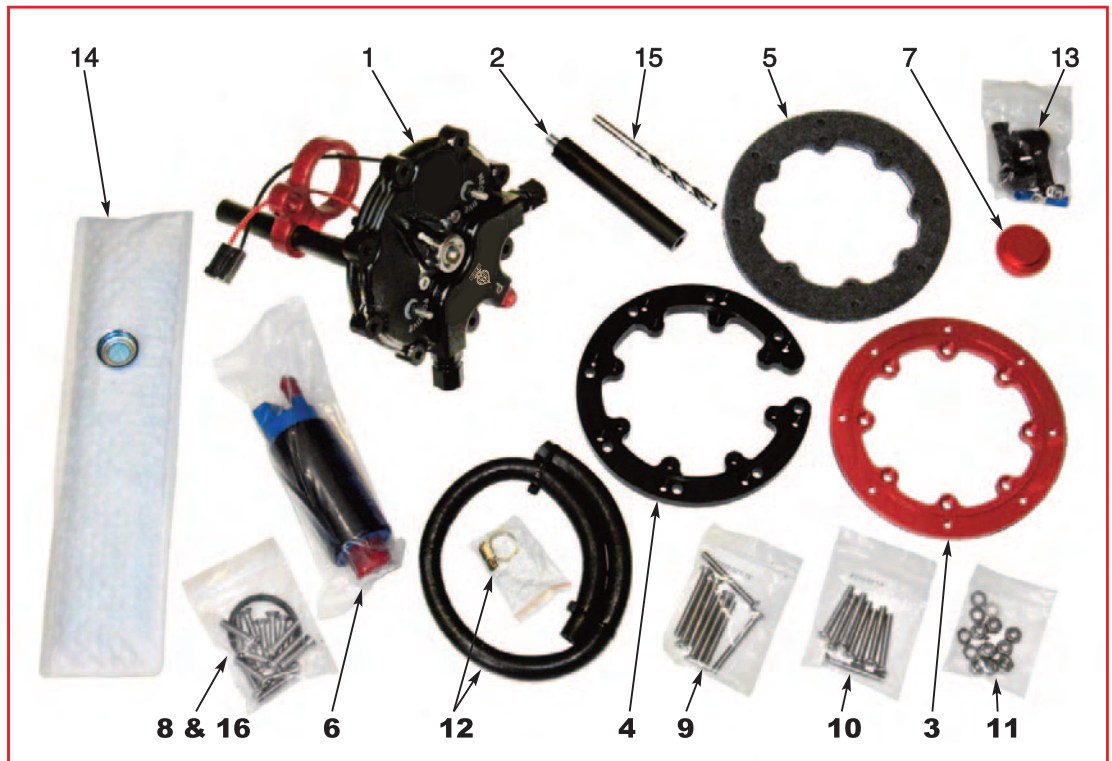
**Warning:** Caution must be observed when installing any product involving fuel system parts or gas tank modifications. Work in a well-ventilated area with an approved fire extinguisher readily available. Eye protection and other safety apparel should be worn to protect against debris and sprayed gasoline. We recommend having this installation performed by an experienced, qualified, and Aces approved automotive technician. The finished installation must be thoroughly checked for any fuel system leaks. The fuel system is under pressure, so be sure to relieve the pressure before opening the fuel system. All safety precautions must be observed when working with fuel.

**Caution:** Before starting this installation, be sure the negative terminal is disconnected from the battery, you have proper eye protection, a fire extinguisher handy, and that you are working with a clean and free of combustible fumes fuel tank. The installation of fuel-related components should be done in a well-ventilated area free of any possible fire hazards. Gasoline fumes are toxic and highly flammable. Drilling and grinding can be a potential ignition source. Smoking is prohibited, and extinguish any open flames. Start with a new fuel tank or have the fuel tank professionally cleaned for the safest install. Failure to comply with these warnings could result in injury or death.

This quick start manual is designed to get you up and running with your In-Tank Retrofit Kit. The In-Tank Retrofit Kit is the industry's most innovative fuel delivery system. Please read the full instruction manual before beginning your installation.

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

### Unpack the AF4019 Aces Kit

Carefully unpack the components of your kit. Lay the components out on a table and compare to the illustration above and parts list and confirm that you have all the parts. Take the (#5) Foam Gasket and punch out all of the holes. The holes are already die cut but must be punched out with a small Phillips screwdriver or dowel rod.

## Instruction Contents:

Kit Contents	1
Recommended Tools Special	1
Instructions Features	2
Drilling The Hole	2
Black Ring Installation Black	2
& Red Ring Installation	3
Assembling the Pump	3, 4
Installing the Pump Assembly	4
Running a Return Assembly	4
Illustrations Plumbing	5
Schematics	5, 6
Fuel Pressure Regulator	6
Warranty	6

## Special Instructions:

- For extended fuel pump life never let car go below 1/8th tank of gas.
- If using hard fuel lines make sure to use high pressure EFI rated lines and flared fittings.
- Make sure that you remove ALL low pressure flex joints on factory fuel lines and replace them with EFI rated fuel hose and use proper flared connections and clamps. Be careful not to mix 45° SAE fitting and 37° AN fittings, they look similar but will not work together 45°SAE fittings usually come from a hardware store or auto parts store while 37° AN fittings are the ones supplied by Aces and most speed shops.
- If using a return line use at least a 3/8" line.
- Aces does not recommend aluminum fuel lines at all. Use EFI high pressure fuel hose on any plumbing in your system where high pressure is present.
- If using Push-Lok style hose and fittings in your fuel system, make sure all parts come from the same manufacturer. Mixing brands of hose ends and hose could cause leaks.
- Best to use unleaded pump gas up to 15% ethanol content.
- Relieve the pressure from within the system before opening the fuel system.

**Very important note: Your fuel tank must have a vent or use a vented cap to prevent pressure building up inside the tank**

## Features

The Aces In-Tank Retrofit Kit is designed for almost any fuel tank. With the included adjustable fuel pump mount, it can be installed in tanks ranging from 6 to 14 inches in depth. If the tank is deeper than 14 inches, additional fuel pump mounts and longer hose are available from the Aces website. The Aces low design allows for maximum clearance from the floorpan of the vehicle. The system also uses a unique 360-degree o-ring mounting flange for easy removal, servicing, and re-use. The Aces In-Tank Retrofit Kit contains a built-in regulator and block-off plate so it can run returnless or return style. The system comes with a high-quality 340 LPH fuel pump for engines producing up to 800HP naturally aspirated. It also comes with a 35 square inch OEM style sock filter to ensure clean fuel, extended fuel pump life, and a steady pickup to the pump. If necessary, replacement parts are available from AcesEFI.com.

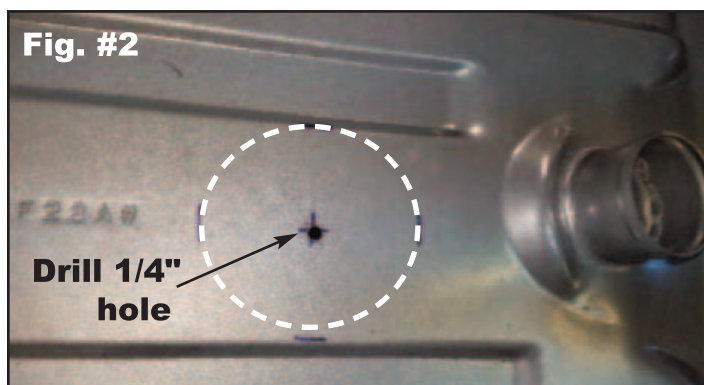
## Drilling the hole:

**Caution: Wear eye protection and ensure tank is free of com-bustible fumes!! Have a radiator shop boil out the tank.**

1. The kit assembly must be installed into the fuel tank.
2. Before beginning to cut the 4-1/2" diameter hole, align the red retaining ring (#3) in a central position on the fuel tank positioned far enough from edge of tank for clearance for the filter sock (#14). Try to find a flat area of the tank to make the 4-1/2" diameter hole. If this is not possible due to ribs in the tank, the supplied thick foam gasket will allow installation over ribbed areas.
3. In selecting your hole location, be sure to avoid the stock fuel level sending unit assembly and stock fuel pump pickup. See Figure 1.
4. With the red ring in position, mark a spot in the center of the ring. Using a scribe, you can scribe a circle around the outside of the red ring and then measure from the scribed line to find the center.
5. Now, you are ready to begin your cut, drill a 1/4" pilot hole in the center of the X spot. Use supplied drill bit (#15). See Figure #2.



**Fig. #1**



**Fig. #2**

6. Then using a slow speed drill with a 4-1/2" hole saw, cut a hole in the tank. See Figure #2.

**Caution edges will be sharp once hole is cut through the fuel tank.**

7. Remove the cut piece and use a file to deburr the sharp edges. See Figure #3 on next page.
8. Thoroughly clean the tank to remove all of the metal chips and debris inside and outside of the tank. Prior to final installation, it is important that the inside of the tank is totally clean.

## Installing the Mounting Ring(s)

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



**Fig. #3**

A. Using the Black Ring (#4) only inside the tank: This version provides a lower profile above the top of the tank than if the Red Ring (#3) is also used. The disadvantage is that any time the Pump Assembly is removed from the tank, a new Foam Gasket (#5) needs to be used. A replacement Gasket is available from Aces.

B. Using both the Black Ring (#4) and the Red Ring (#3): This increases the height by about 1/4 inch but allows the use of an O-ring (supplied) between the Pump Assembly (#1) and the Red Ring (#3). With this arrangement, the pump can be removed and replaced without having to utilize a new gasket each time.

#### Black Ring Only Installation

1. 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 #9 on page 5.

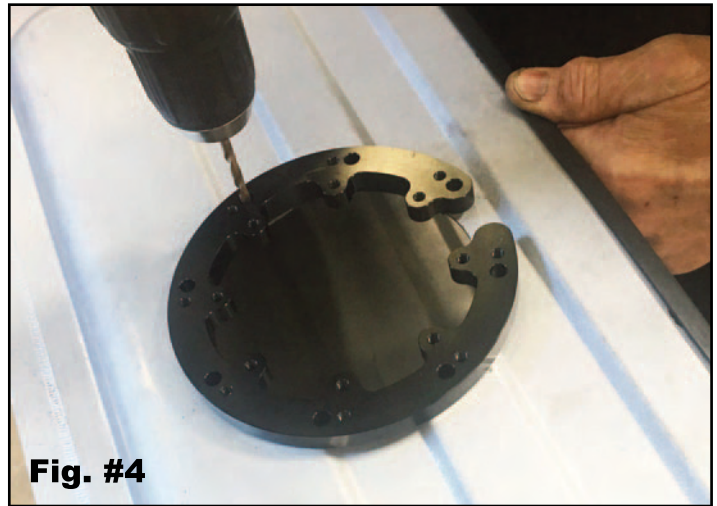
2. The next step is to drill the (8) holes in the tank using the Black Ring as a template. The Black Ring has a pilot diameter that will fit into the 4-1/2" hole and using the ring as a template on top of the tank, mark the (8) holes. The Black Ring has two sets of holes on the outer diameter. One set is straight through holes and the other set is countersunk and also tapped. Take into consideration the clock-ing position of the holes so that when the Pump Assembly (#1) is installed, the outlet port (red fitting) is pointing in the direction you want. Due to the number of holes, you will have eight different posi-tions that it can point, so determining the correct clocking position is not difficult.

3. Using the Black Ring as a drill guide, drill the (8) holes with the supplied 1/4" drill bit (#15) through the larger set of holes in the Black Ring. See Figure #4

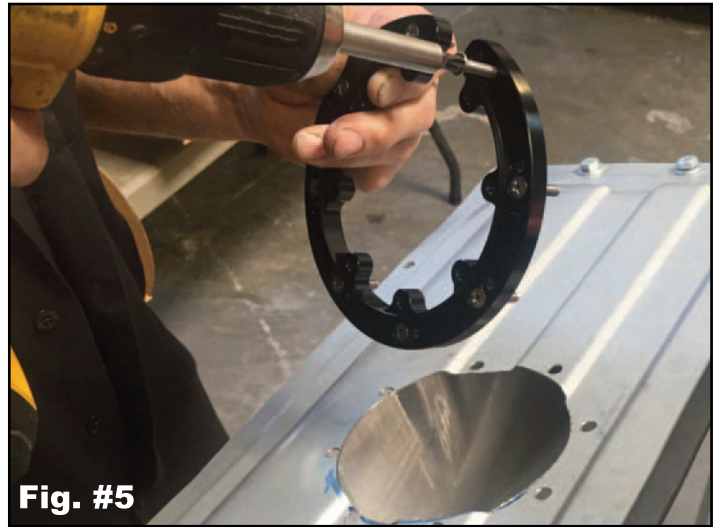
4. Once you drill the holes the component is no longer clockable.  
 5. Use a shop vacuum to clean up the leftover debris. Again, make sure that the inside of the tank is completely free of chips and any other debris. Wash out with soap and water if necessary.  
 6. Now thread the #10-32 x 1.5" long flat head machine screws (#10) (if mounting on a flat surface of the fuel tank) or the #10-32 x 1.75" 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 #5. These holes are tapped so tighten the screws down snugly. 7. Insert the Black Ring inside the tank (upside down from the posi-tion you used it as a drill template) and then push the (8) extended machine screws up through the (8) drilled holes in the tank. Holding the Black Ring in place, push the #5 Foam Gasket down over the (8) machine screws. See Figure #6.

8. Now carefully insert the Pump Assembly through the hole thread-ing the Filter Sock (#14) in at an angle. See Figure #6. Drop the Pump Assembly down over the (8) machine screws sticking up through

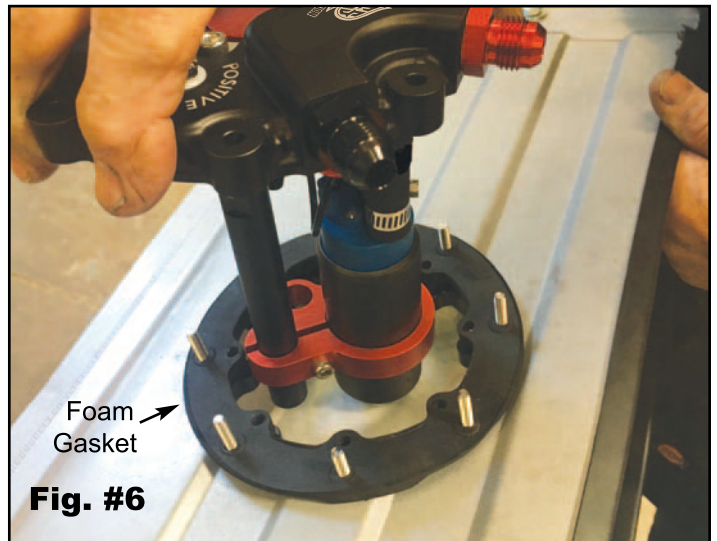
**STOP - Refer to "Assembling the Pump Unit on Page 4**



**Fig. #4**



**Fig. #5**



**Fig. #6**

the Foam Gasket. Place the (8) #10 Washers and #10-32 Lock Nuts (#11) onto the machine screws and tighten securely in a cross pat-tern to tighten them down equally. See Figure #9.

#### Black and Red Ring Installation

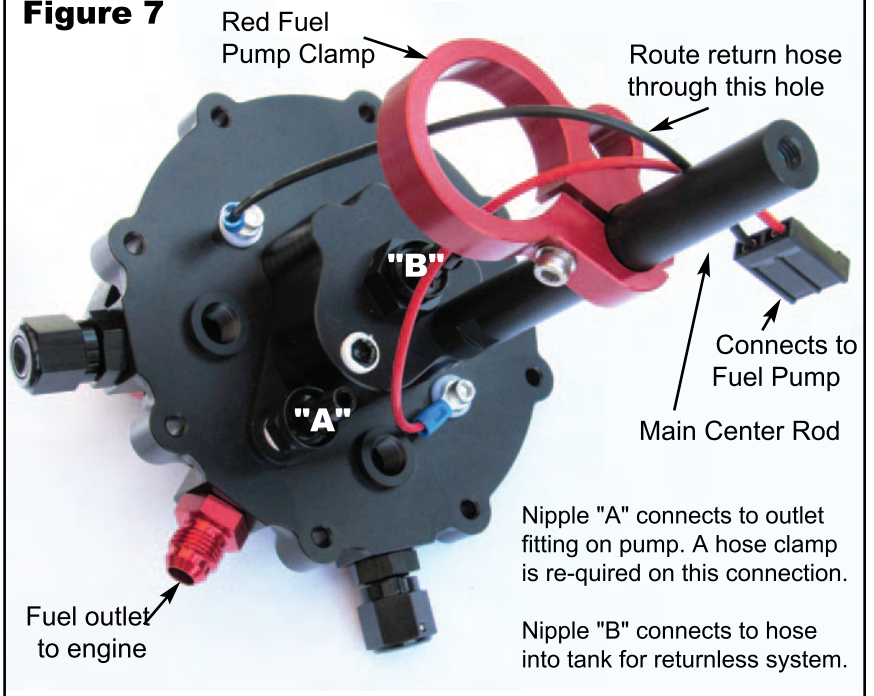
1.No additional holes are drilled in the tank for this installa-tion be-yond the holes drilled for the Black Ring only installation.  
 2.Hold the Red Ring with the O-ring groove facing down. Thread (8) of the #10-32 x 1.0" long flat head machine screws through the countersunk holes in the Red Ring. Tighten securely.

3. 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 sand-wiched between the top of the tank and the Red Ring, thread the (8) screws into the black ring. Tighten the (8) screws using a cross pattern so that the Red Ring tightens down equally. See Figure #10.

### Assembling the Pump Unit

1. The Pump Assembly (#1) is partially assembled. The first thing you need to do is determine the depth of your fuel tank. Once the unit is installed you will want the Filter Sock (#14) as close to 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 #5 Foam Gasket. If you do not do this, the Filter Sock can end up too high off the bottom of the tank.
2. You will note a red clamp ring (see Figure 7) 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.
3. 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 (blue end of pump) 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 #7.

**Figure 7**



4. Snap the electrical connector onto the pump terminals.
  5. Snap the #14 Filter Sock onto the bottom of the #6 Fuel Pump.
- Installing the Pump Assembly into the Tank (Black and Red Ring Installation)**

1. Place the #16 green O-Ring into the groove on the upper face of the Red Ring (#3). OK to use a small amount of grease to keep 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 #8. Set the assembly down onto the Red Ring, making sure that the O-ring stays in position while aligning the (8) holes in the Pump Assembly with the (8) 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 #10 on page #5 to view proper assembly proceure.

### Wiring the In-Tank Retrofit Kit

A suggested wiring diagram is shown in Figure #13 on page #6. Note that a relay is required.

### Installing the Fuel Tank back in Vehicle

1. Install 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. Next 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 insula-tion to avoid the possibility of hitting the bottom of the car floorpan. One option is to lay a piece of foam over the top of the pump to insure the pump will not short out against any metal. The foam can be purchased from any home improve-ment store.
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, simply plumb a -6 fuel line from the unit to an inlet port on the fuel injection system. See Figure #12.



**Figure 8**

**See below for more complete information on plumbing return or return-less style system.**

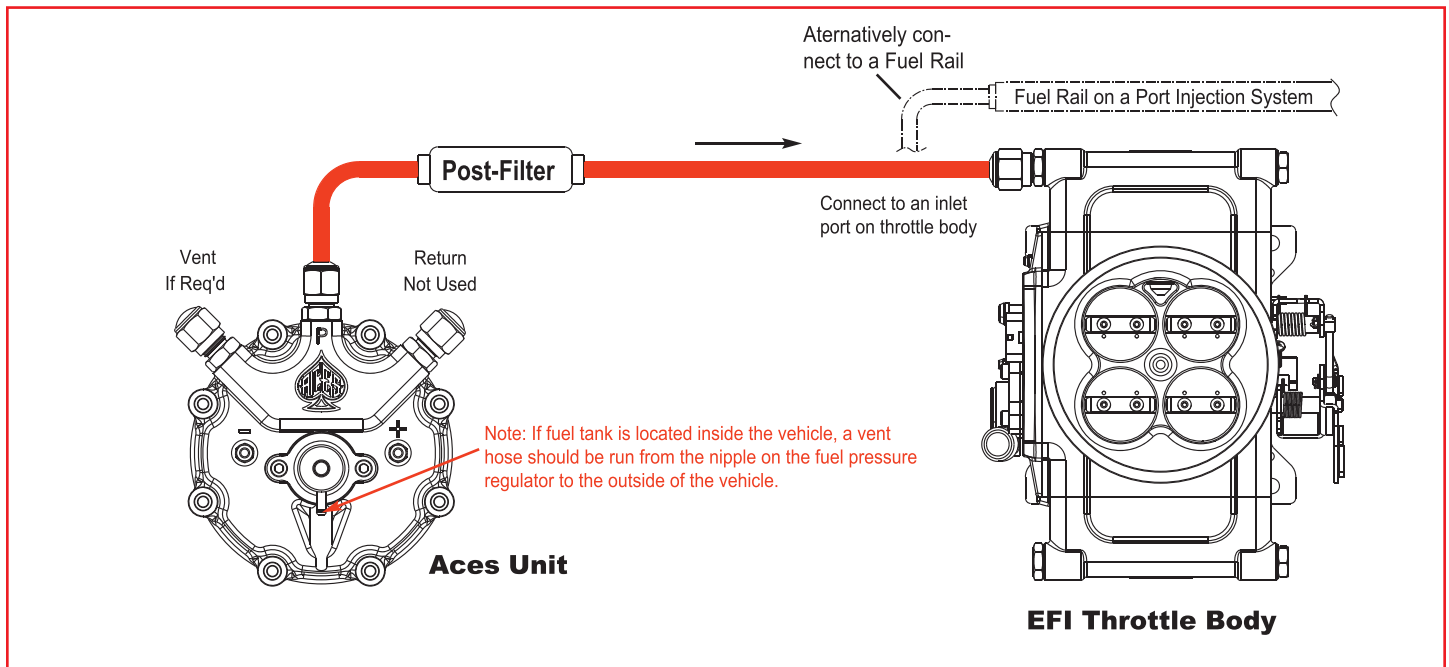
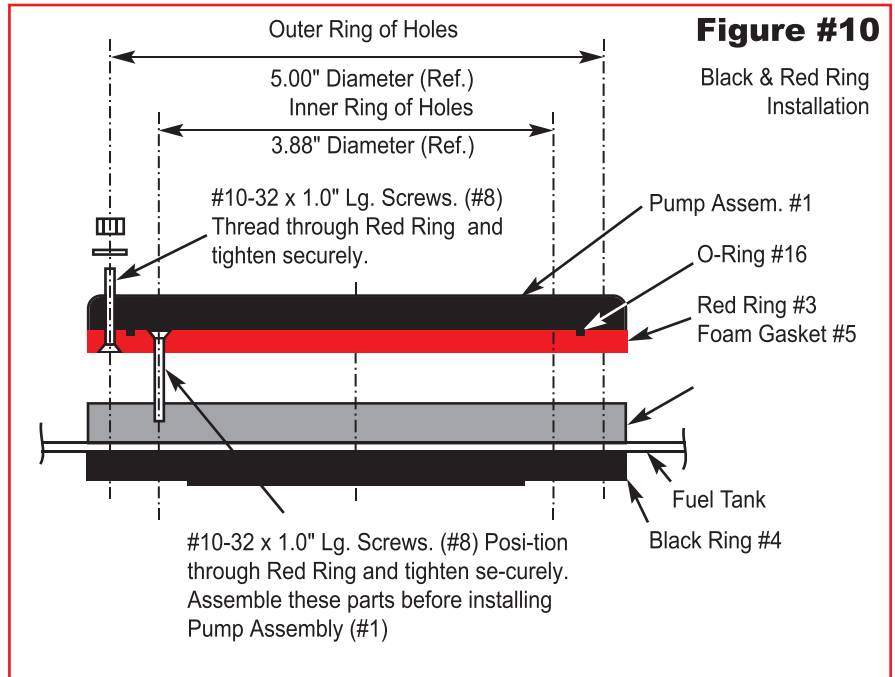
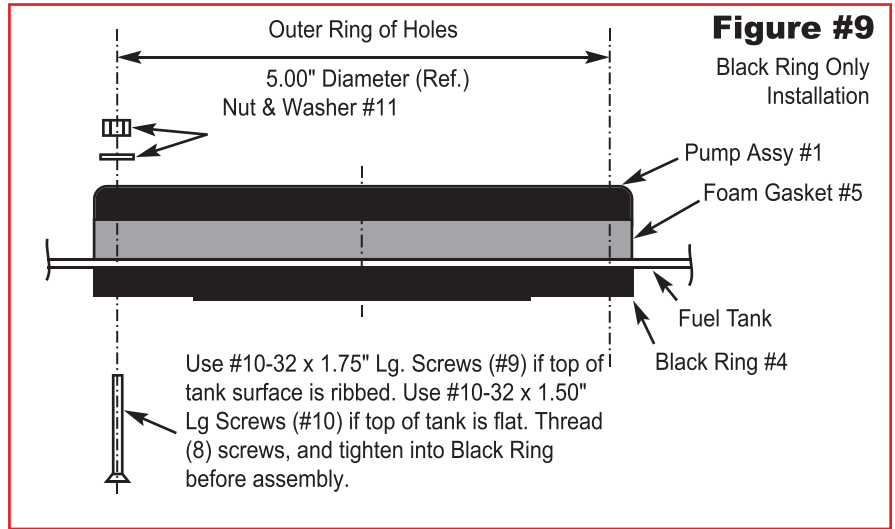
5. Make sure there is gas in the tank.
6. Reconnect your battery.
7. Turn your key to the "On" position, don't crank.
8. Thoroughly check for any leaks.
9. If no leaks are present then you are ready to start your vehicle.

**Plumbing for a Return or Return-less System :**

The In-tank Retrofit Kit can be configured for use with either a return or a return-less system. In both configurations, the center -6 ORB fitting (red) is always the pressure out port. In a return-less system using a vented fuel tank, the two side fittings can be blocked off. If the tank is not vented, one of the fittings should be used as a vent. Either port can be utilized as a vent or as a return port. For guidance on plumbing a return-less style system, refer to Figure #11, and for a Return style, see Figure #12.

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.

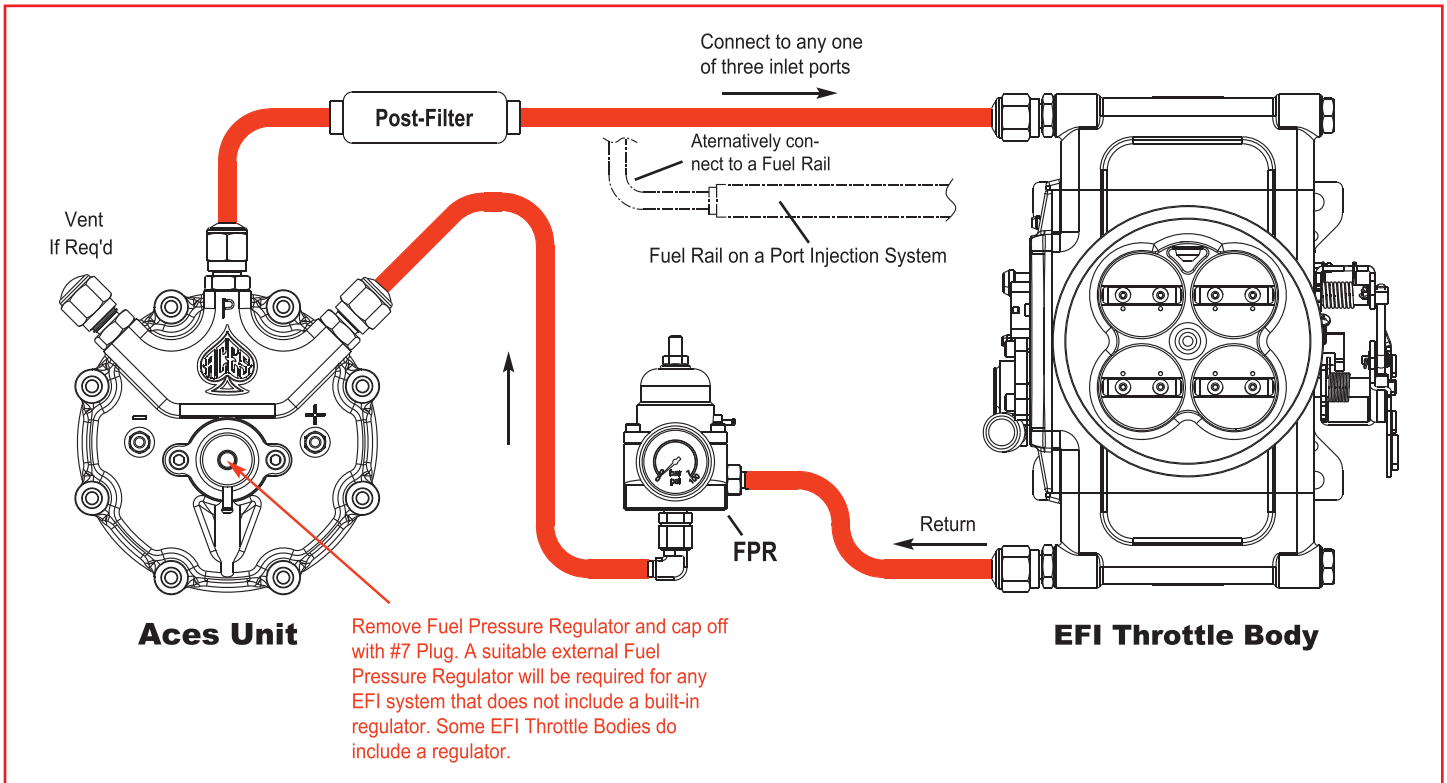
For a returnless system, slide a section of the supplied hose through the hole in the red clamp as shown in Figure #10 and push it onto the barbed fitting marked "B" in Figure 10. A hose clamp is not required. Ensure to route the return hose away from the Filter Sock in the tank.



## Fuel Pressure Regulator

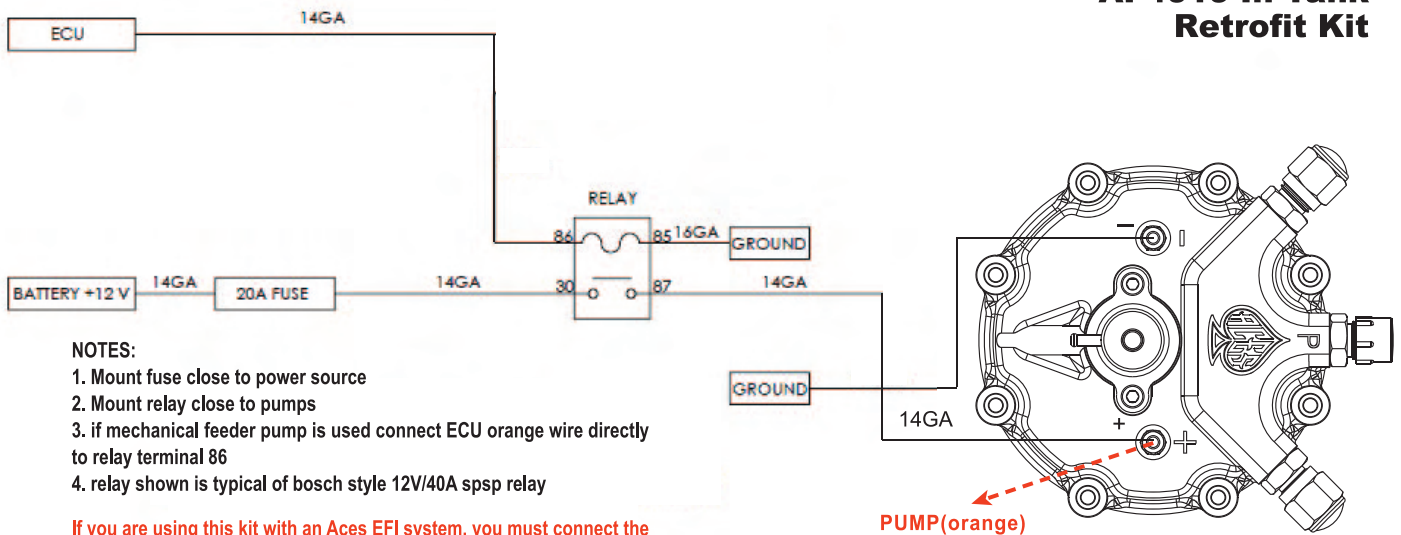
The In-Tank Retrofit Fuel Pump Kit includes a built-in fuel pressure regulator. (See below) When running a forced in-duction system, a vacuum hose should be run from the nipple on the regulator to a nipple port on the intake manifold. If this is im-practical due to the distance from the fuel tank to 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.



**Figure #13**

## Wiring Schematic for AF4019 In-Tank Retrofit Kit



# Aces Warranty

**Limited Warranty:** The Aces warranty is limited to repair or replacement (at our discretion) of any Aces part that fails because of a defect in workmanship or materials.

**Implied warranty:** Any warranties implied by law are limited to the duration of this warranty (except in those states where prohibited by law).

**How Long It Is Covered:** All Aces products are warranted for a period of one year from date delivery.

**Who We Cover:** Aces warranties apply to the original purchasing consumer.

**What We Do Not Cover:** Failure of a product due to misapplication, improper in-stallation or maintenance, misuse, abuse, unauthorized repairs, accidents, or modifications to the original design. Removal or replacement costs, shipping costs, damage to related components, and costs incurred due to downtime of the vehicle. Any product used in marine applications unless specifically stated for marine usage. Any parts used in racing applications or subject to excessive wear.

**Warranty Service Procedure:** In the event a problem develops with one of our products, contact our customer service department at (423) 590-2237. It may be determined that the product will have to be returned for inspection

and/or repair. A Return Merchandise Authorization (RMA) number will be assigned to you by our customer service team. This number must be on the box shipped back to Aces Customer Service. The product must be returned via freight prepaid. It must be accompanied by a clear description of what the problem is with the product. If the product is determined to be defective within the warranty period, Aces will repair, replace, or issue credit to the original consumer at our discretion. Any repaired or replaced product will be returned to the sender via prepaid UPS or other ground carrier.



**California Proposition 65 Warning:**

This product may contain one or more substances or chemicals known to the state of California to cause cancer, birth defects, or other reproductive harm.

[www.P65Warnings.ca.gov](http://www.P65Warnings.ca.gov)

AF4019 Instructions - 01-22-2024

Aces Fuel Injection  
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