Professional Products®

FUELONDEMAND

Fuel Pump Controller with Returnless Feature*
For both Carbureted or Injected Fuel Pumps

*Carbureted mode operates with or without a return line.

The FuelOnDemand Kit is a unique product that controls the speed of your electric fuel pump to constantly maintain your desired fuel pressure. Modulating the pump speed allows you to run a high voume pump suitable for supplying enough fuel at wide open throttle for high horsepower engines. But slows the pump down at idle and light throttle periods when high volume is not needed. This saves wear and tear on the pump, keeps the fuel cooler, and reduces pump noise.The FuelOnDemand comes with two preset pressures; 7 PSI for carbureted applications or 45 PSI for injected setups. You can program it for any fuel pressure desired or even provide increased pressure under boost on supercharged applications.

IMPORTANT! Please read these instructions before attempting to connect your FuelOnDemand.

Warning: Before attempting to install the FuelOnDemand, you must disconnect the negative battery cable.

Mounting the Controller

The FuelOnDemand Controller can be mounted to any flat surface using #10 screws. The controller is very rugged and resistant to water, heat and vibration. It can be mounted in any position and location, including the engine bay or underbody. Keep the FOD at least 18" away from the exhaust system. Avoid mounting it close to an unshielded exhaust header or pipe. Use the drill template provided in this instruction manual to locate and drill the mounting holes.

Mounting the Fuel Pump & Supply System

Mount the fuel pump as close to the fuel tank as possible. It is important to mount the fuel pump below the fuel tank for the pump to prime properly. For best results use a bottom feed sump with baffles to ensure that fuel is always present at the pump. The fuel tank must be vented for proper operation of the system. It is recommended to locate the pump and all fuel lines away from any high heat sources, including any unshielded parts of the exhaust system. Use the drill template provided in this instruction manual to locate and drill the mounting holes. Always use manufacture's instructions for non Professional Products fuel pumps.

Parts List
1 - FuelOnDemand Controller
1 - Magnet
1 - User Side Main Harness
1 - Fuel Pressure Sensor
1 - Install Disc

Fuel Pump Supply Line Tank to Pump: Before the fuel pump, the fuel lines from the tank to the pump pre-filter (if fitted) and the pump, can be standard fuel line and should be at least 3/8" ID or -6 AN. Any smaller line will not be adequate. Higher volume pumps will require a larger supply line per their instructions.

Fuel Filter: Mount the in-line fuel filter after the fuel pump.

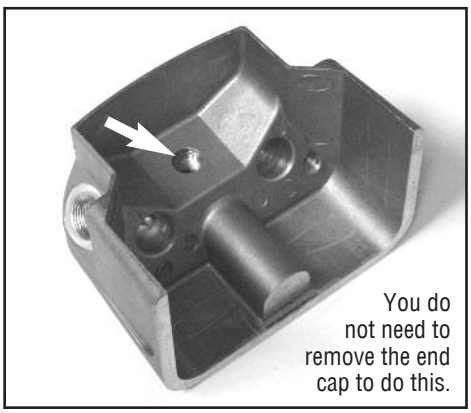
Fuel Supply Lines: After the fuel pump, fuel lines are recommended

to be made from steel. Any flexible lines must be high pressure hose intended for fuel injection applications. Fuel supply lines must be at least 5/16" (8mm) ID on engines up to 400 horsepower and 3/8" (10mm) ID on engines over 400 horsepower. It is recommended to locate all fuel lines away from any high heat sources, including any unshielded parts of the exhaust system. On carbureted applications consult the carburetor manufacturer for proper line size.

Installing the Fuel Pressure Sensor

The fuel pressure sensor must be installed in the fuel line between the fuel pump and fuel injectors. The sensor has a 1/8" NPT male thread (similar to typical fuel pressure gauges). If your fuel system does not have a suitable port for the sensor, it will be necessary to install a T-fitting or similar in your fuel line. It is better to locate the sensor nearer the injectors than the pump. See Diagram.

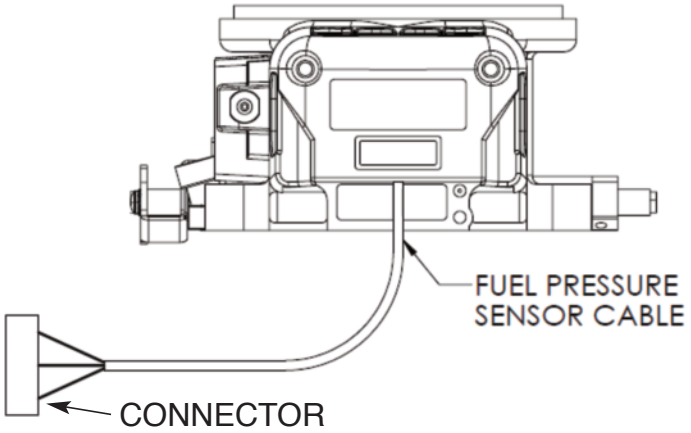
If your engine has a Professional Products Powerjection I system, you can use the fuel pressure sensor built into the throttle body. If your engine has a Professional Products Powerjection II system, then install the pressure sensor in an available port in one of the fuel rails. If your engine has a Professional Products Powerjection III system, install the pressure sensor in the fuel line with a T-fitting. Or can be threaded into the 1/8-NPT port that is in the underside of the front end cap of the Powerjection III Throttle Body. Remove the pipe plug and thread in the fuel pressure sensor.



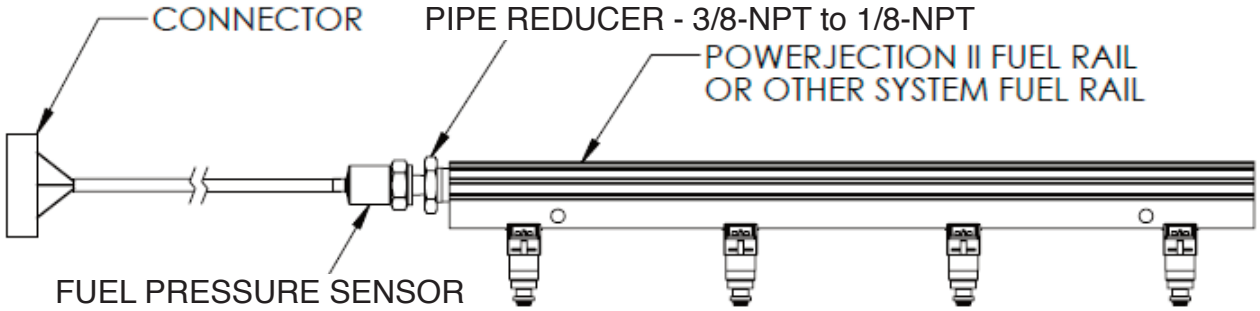
You do not need to remove the end cap to do this.

Arrow points to 1/8-NPT pipe port that is in the front end cap of all Powerjection III throttle bodies. Remove the pipe plug that is in this port and thread in your Fuel Pressure Sensor. Do not use Teflon tape on any pipe thread connection. Use Loctite Blue Thread Locking Sealant.

Fuel Pressure Sensor Connection on Professional Products Powerjection I



Fuel Pressure Sensor Connection on Professional Products Powerjection III or on Carburetors



Fuel Pressure Sensor Connection on Professional Products Powerjection II

or any EFI system equipped with fuel rails with an unused pipe port.

Connecting the Manifold Vacuum Sensor - If your engine EFI system has the fuel injectors located in the manifold after the throttle butterfly, or if your engine is boosted, then it is necessary to sense the manifold vacuum. The FuelOnDemand Controller has a MAP (Manifold Absolute Pressure) sensor built into it. Connect the MAP port on the side of the controller to a vacuum port on your throttle body or manifold using 5/32 I.D. vacuum hose. See "Injector Location Notes" on page 4.

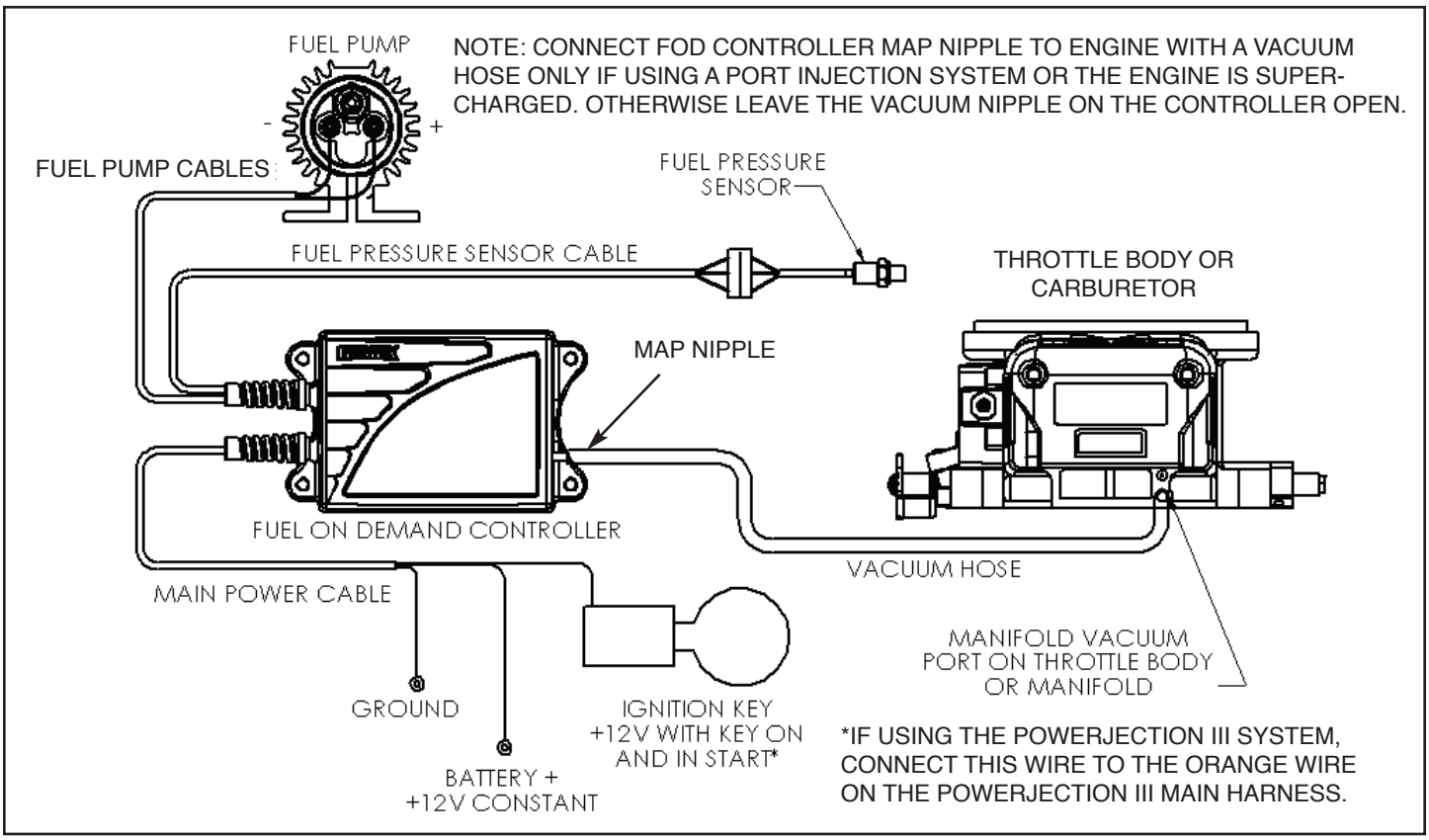
Electrical Connections:

Main Power: The harness from the controller has six wires:

A – Black: Chassis Ground
B – Orange: (+) Power to the fuel pump
C – Purple: (-) Ground to the fuel pump
D – Red: +12 Volt constant power (battery)
E – Yellow: +12 Volt non ballast resisted keyed power (must remain on while cranking) Use a voltmeter to be sure that the power is on constantly when the key is in the start and run positions and that voltage does not drop below 9 volts while cranking. If your vehicle has a Powerjection III system, connect the Yellow FOD wire to the Orange wire on the Powerjection III main harness.
F – Black: Chassis Ground

Fuel Pump: Route the fuel pump cables to the fuel pump:
Orange: Connect to the pump positive (+) terminal
Purple: Connect to the pump negative (–) terminal

Fuel Pressure Sensor: Connect the 3-pin connector to the con nector on the sensor.



Modes of Operation:

There are three modes in which your FOD system can operate:

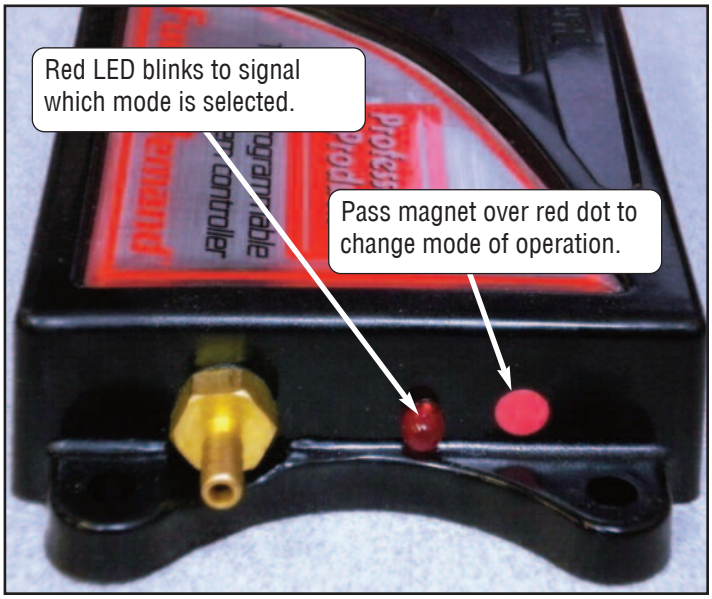
1. Return Style EFI (preset at 45 psi)
2. Returnless Style EFI (Preset at 45 psi)
3. Carburetor (Low pressure / No return - Preset at 7 psi)

The FOD has been programmed with baseline settings for each of these modes and can be changed by swiping the supplied magnet past the red programming dot on the FOD control box.

Once you swipe the magnet past the dot, the FOD indicator light will flash a code for each mode of operation.

1 Flash = Return style EFI
2 Flashes = Returnless style EFI
3 Flashes = Carburetor (Return only)

This and other fuel pressure settings different from factory presets can be changed by using the laptop software.



Setup:

Mode 1: Return Style EFI –
This is the preferred setup over all others. This setup is the best way to prevent vapor lock in the fuel system. The FOD will control the fuel pump speed and line pressure, while the mechanical pressure regulator will bypass a very small amount of fuel back to the fuel tank. In this way if the fuel in the line is overheated, air created can escape through the return line back to the tank.

There are two ways to set up your return style system up:

Manual: Without the use of laptop software, you must ground the fuel pump (-) side temporarily to the frame of the vehicle to run the fuel pump at 100%. This can be done while both of the FOD wires are connected to the pump. Next, while the pump is running, set the mechanical regulator to 3-5 lbs. over the target pressure of the FOD (45psi for EFI, 7 PSI for a carburetor) as indicated by your mechanical fuel pressure gauge.

Using your laptop: Press the fuel pump control button to run the fuel pump at 100% and set the mechanical regulator to 3-5 lbs. over the target pressure of the FOD (45psi) as indicated by the pressure gauge on the software screen.

Mode 2: Returnless:
This is an alternative to a return setup and should only be used when no return line can be fitted. This type of fuel system is not suitable for all applications and is not recommended for use in vehicles that are prone to vapor lock.

Mode 3: Carburetor:
This mode is for use with carburetors to lessen fuel pump noise, heat, and load on your electrical system. It should be used in conjunction with your carb style fuel pressure regulator as a safety backup. In this scenario the FOD does not control line pressure, only pump speed. Your carburetor pressure regulator should be set at 2 lbs. over the FOD target pressure (7psi). To set the regulator to the proper pressure (9psi) you can either ground the fuel pump to the vehicle frame or use the override button in the dashboard software.

Injector location notes:
Why do I need to use a manifold pressure line on my FOD and fuel pressure regulator?

There are two locations to install a fuel injector on an engine. The first and most common is in the intake port below the throttle body (butterfly) as in our Powerjection II. The second is when the injector is placed above the throttle body butterfly as in our Powerjection I and III systems. The job of the fuel pump and regulator/FOD system is to maintain a constant pressure across the injector and to allow the injector to flow at a constant rate of fuel. An injector rated at 30 lbs means that at 45psi (approx) the injector will flow 30lbs of fuel in 1 hour. Now take into account the vacuum created inside your intake manifold, this vacuum is trying to suck additional fuel through the bottom (tip) of the fuel injector and if the pressure is not reduced on top of the injector, it will flow a larger amount of fuel per hour than rated.

This same theory applies for boosted applications but in an opposite effect. The additional pressure in the intake manifold tries to limit the amount of fuel flowing through the injector. To counteract this force the fuel pressure must be raised at least equal to the boost pressure at the tip of the injector. Remember that the goal of your fuel system is to provide a constant flow rate through the injectors. It does this by always keeping a set pressure differential between the top and bottom of the injector which allows the injector flow rate to remain constant.

Vacuum/Boost Rule Of Thumb:
Whatever the tip/outlet of the injector sees or references, then the FOD/regulator must see the same.

Examples:

1. The tip of the injector references Vacuum/Boost: FOD/regulator must reference both.
2. The tip of the injector references Vacuum Only: FOD/regulator must reference Vacuum only.
3. The tip of the injector references Boost only: FOD/regulator must reference Boost only.

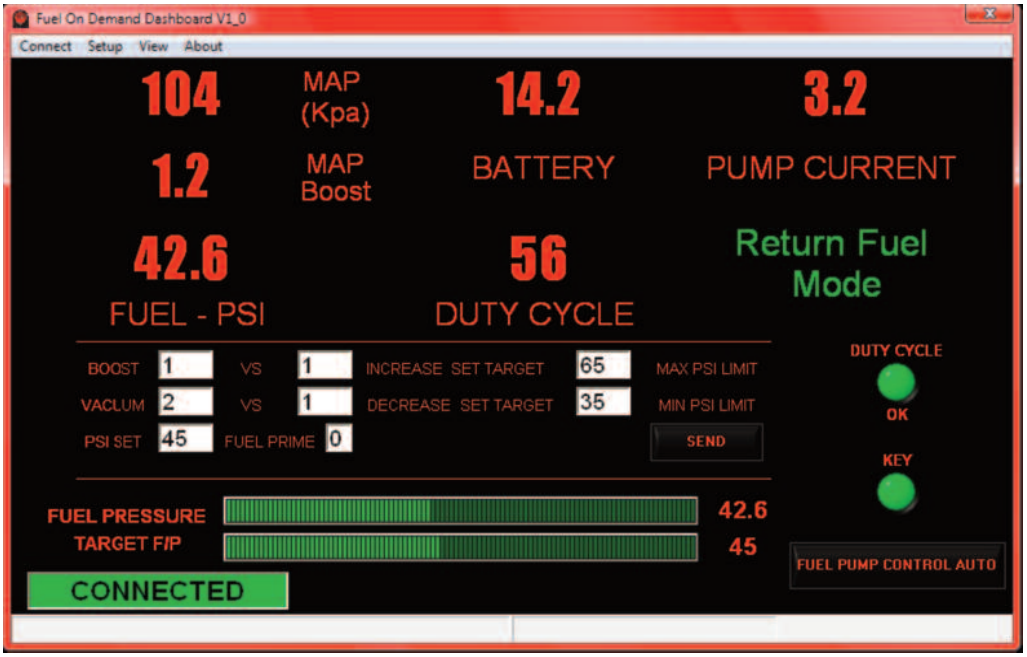
The FOD/ regulator should always see the same as the tip of the injector.

Vacuum/Boost Default settings:
Boost: Fuel pressure set to rise at a 1:1 ratio with boost.
Vacuum: Fuel pressure set to decrease 1 lb. for every 2" of vacuum.

Loading and Installing Software

The software disk that comes with your system will automatically start the install process once inserted into your computer CD drive. Once the installer comes up, follow the on screen instructions to complete the installation. Once the installation is finished there will be a new Fuel On Demand Dashboard V1_0.exe shortcut on your desktop. Note: This supplied software is designed to work with the current version of Windows. If you don't have a laptop with a recent version of Windows you will need to borrow one from a buddy.

Using the Software to Set Up the FuelOnDemand Controller



At left is what you will see on your laptop screen when the FOD software is open. This screen is set up for EFI on the Return Fuel Mode cycle. You can view the following parameters:

MAP (Kpa) Manifold Absolute Pressure, vacuum and boost shown in Kpa.

MAP Boost - Boost shown in PSI.

Battery - Battery voltage read by the FOD.

Pump Current - Current draw of the fuel pump at the present duty cycle.

Duty Cycle - Current duty cycle of the pump. Without the FOD it would be at 100 all the time.

Mode - Return, Returnless or Carburetor will be shown depending on what you have selected.

Using the Dashboard Software

Connecting to your FOD controller: The dashboard software will attempt to automatically find the FOD controller when you first open the program searching through 32 comm ports. If the FOD is not found, the dashboard will reattempt the search every 4 seconds. Once you are connected you can view/modify any of the fuel pressure settings and monitor the inputs and outputs of the FOD.

Fuel Pressure Settings:

In a normal application these setting work perfect and will never need to be modified. These settings reflect that of a mechanical fuel pressure regulator where fuel pressure rises at a 1:1 ratio with boost and will decrease 1 lb for every 2" of manifold vacuum. The maximum and minimum fuel pressures are set to be safe with a normal port style fuel injector. Target fuel pressure is set at 45 psi.

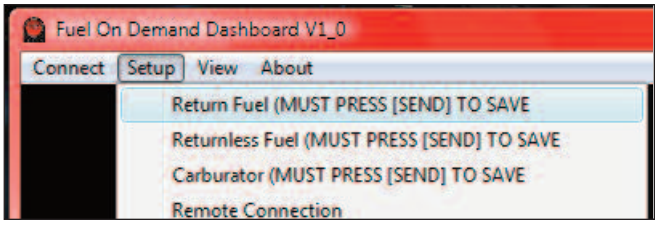
All of these settings can be modified by you for a custom fuel system application. For example, if your injectors are slightly small for your horse power application you can raise the pressure to increase ratio when boost comes on to 1.5:1 or 2:1 and so on. Or, if your injectors are slightly too large for good idle quality you can decrease the fuel pressure further when there is high manifold vacuum.

On the boost ratio side there is a maximum pressure limit that can be set. **Warning!** The maximum pressure that an injector/carb will operate at is different for every injector/carb so be sure to consult the manufacturer of your injectors or carburetor. Applying too much fuel pressure to a carburetor can overcome the needle and seat and cause the bowls to overflow; on the other hand if too much fuel pressure is applied to a fuel injector it can cause the injector to actually flow less fuel because the pintle cannot overcome the increased line pressure. The injectors used in our Powerjection III system will safely operate up to 90 psi which will increase fuel flow by 45% from the standard 43.5 psi.

On the vacuum side there is a minimum line pressure that can be set simply because too low of a fuel pressure will create a poor spray pattern out of the injector.

The target pressure for the FOD is in the bottom left. This is the pressure that the FOD will run the fuel system at normally with no vacuum or boost applied to the MAP sensor. Any time a change is made to the fuel pressure settings you MUST press the "SEND" button at the bottom right for them to take effect. This sends the information entered in the boxes to the FOD controller.

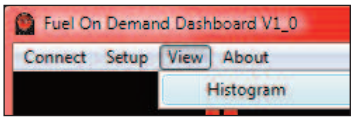
The Setup Menu: The setup menu allows you to quickly change your fuel pressure settings to one of the three fuel modes and allows for a remote connection with a member of the Professional Products Tech support staff. When selecting a fuel mode the send button must be pressed to save your changes. The remote connection will allow a member of tech support to see exactly what your dashboard screen is displaying which can assist with troubleshooting.



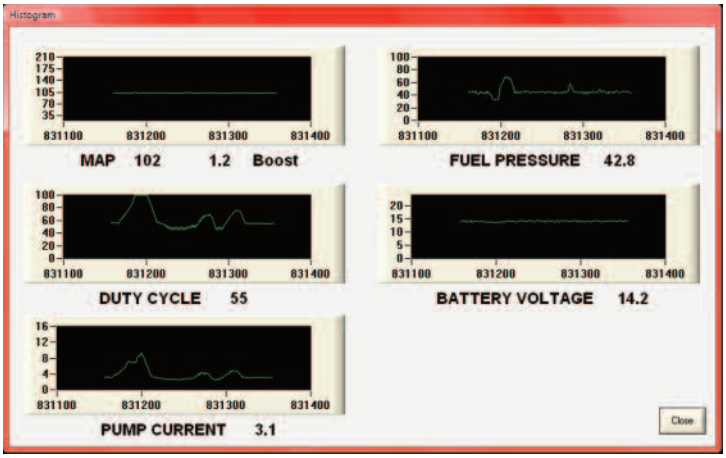
View Menu:

The histogram allows you to see a brief timeline of important parameters that have been recorded by the FOD controller similar to a heartbeat monitor in a hospital. The histogram allows monitoring of several things:

- Vacuum and Boost
- Fuel pressure
- Duty Cycle
- Battery Voltage
- Pump Current

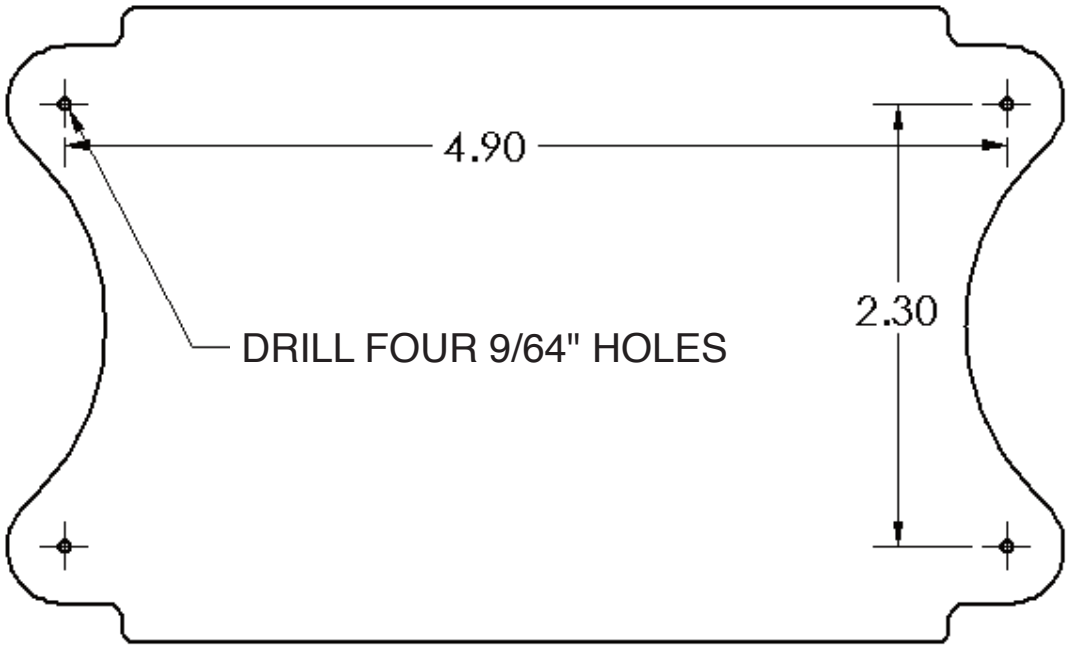


The histogram can be used to simply monitor your FuelOnDemand system or to help troubleshoot an issue you may be having.

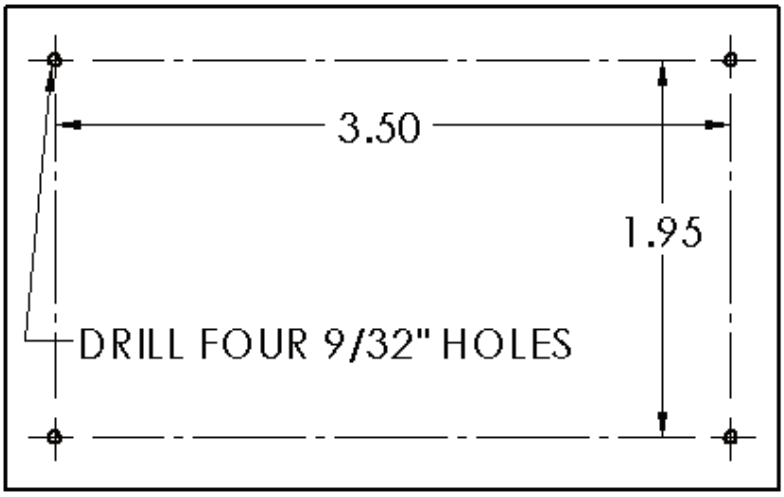


NOTES:

Templates: Use these templates for locating the mounting screw holes for the FuelOnDemand or for the Professional Products EFI pump(if you are using one). Note that these templates are actual size so you can cut the templates out and use them for marking the holes you need to drill for mounting the components in the proper location.



This pattern is for the FuelOnDemand Controller. The 9/64" holes are suitable for #10 sheet metal screws.



This pattern is for any of the Professional Products EFI Fuel Pumps (70150/70151/70152) Use (4) 1/4-inch or M6 bolts.