

# PRO-FLO<sup>®</sup> *A*

**ELECTRONIC  
FUEL INJECTION**

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**E-Tuner Manual &  
Definitions**



E-Tuner User's Manual and Definitions

# Edelbrock<sup>®</sup>

## **GENERAL ANDROID DEVICE RECOMMENDATIONS**

The Edelbrock EFI E-Tuner app is compatible with most Android based Smartphones and tablets operating on Android 5.0 and later. However, due to slight variations in device specifications and operating systems, some devices may work better than others, and in rare cases, some devices may not function at all. If an Android device is being supplied separately, it is highly recommended to read the following guidelines for the best performance and user experience. Any device that is known to be “incompatible” or “problematic” will either be specified on the Google Play Store app page or will fail to download.

**NOTE:** All information in this guide is also available in app by pressing the  icon in the upper right hand corner.

### **- Android Device Types:**

- Smartphones (5” – 6”) or Tablets (7” – 8”)
- Screen Resolution should be at minimum 1024 x 600 pixels.

**NOTE:** *Screens sizes in the 3” - 4” or 10” - 12” range, or screens with lower resolutions are supported but not recommended for the E-Tuner App.*

### **- Android Operating System**

- Edelbrock's E-Tuner Android app is optimized for Android 5.0 and newer.

### **- Bluetooth**

- It is recommended that the Android device has at least Bluetooth 2.0 or higher.

**NOTE:** *Not all devices with Bluetooth may communicate properly with the Edelbrock ECU.*

### **- WI-FI / Data (3G/4G)**

- Wi-Fi or a Data Plan will be necessary for downloading the E-Tuner app from the Google Play store and for downloading any updates that may be released.

### **- To Download or Update the App**

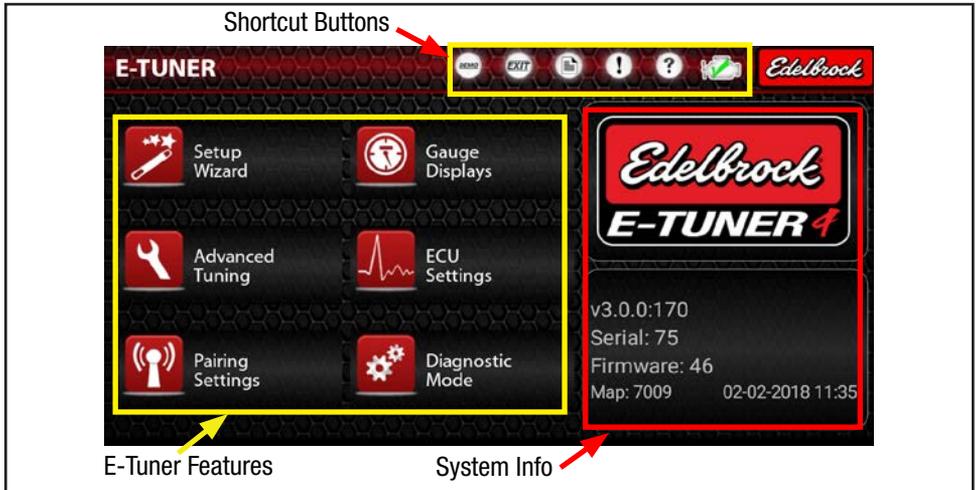
- Open the Google Play Store and search for "Edelbrock E-Tuner PF4". This will require a Google Account, if one is not set up, follow the on-screen tutorial to do so.
- Edelbrock may periodically push out updates to the app. It is highly recommend to download these updates as they will include vital improvements as well as bug fixes.
- To check for updates, go to the Google Play Store or the Edelbrock website.

### **Starting the Edelbrock E-Tuner App:**

From the Android Home Screen, find the Edelbrock E-Tuner icon  and select it. The icon may be on a different part of the home screen, or select the “All Apps” icon  and find it in that menu.

## E-Tuner Home Menu Overview

The E Tuner APP and Tablet are for setting up, tuning and troubleshooting the PF4 EFI system. The Tablet does not have to be permanently used for the EFI system to operate.



All of the E-Tuner's functions can be conveniently accessed directly from the main menu.

### 1. E-Tuner Features

- a. **Setup Wizard** - Initiates E-Tuner's step-by-step guide to selecting & loading a proper base calibration for your specific engine combination.
- b. **Advanced Tuning** - Provided to make modifications beyond the basic settings that were configured during the initial setup of the Pro-Flo 4.
- c. **Pairing Settings** - Use this menu to pair an Android device with the Pro-Flo 4 ECU.
- d. **Gauge Displays** - Displays essential parameters to monitor proper Pro-Flo 4 performance.
- e. **ECU Settings** - Contains all the functions related to saving and restoring the ECU's map and firmware settings.
- f. **Diagnostic Mode** - Diagnostic Mode can be used to help determine if a sensor is unplugged, damaged or otherwise reading outside of its expected range. If the vehicle runs poorly, check the status of each of the parameters on this page.
- g. **Demo Mode** - Use to preview the main E-Tuner app features without being connected to the ECU. Press the Checkmark at the top right hand corner to enable Demo Mode.

2. **System Info** - This screen will display the system info when connected to an ECU (Serial #, ECU Firmware, Map, EFI System, and App Version).

3. **Main Menu Shortcut Buttons** - Exit, Installation Documents, Warnings, Help, and Connection Status.

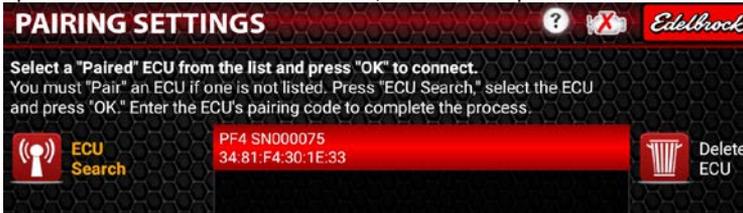


The HELP icon provides detailed information regarding the selected menu page currently in use.

**NOTE:** Edelbrock pairs each ECU and Tablet before shipping them. If you purchased a Pro Flo 4 kit that came with a Tablet, it will already be paired and you can skip the steps below and go to Connecting to ECU After Pairing. If you did not purchase a Pro Flo 4 kit with tablet, proceed to the next step.

## Pairing Settings:

The ECU must be paired to an Android device and powered ON before attempting to connect. All ECU connections can be managed from the E-Tuner's Pairing Settings menu. If the Pro-Flo 4 EFI system was purchased without an Android tablet, one must be paired to the ECU first.



## Bluetooth Pairing:

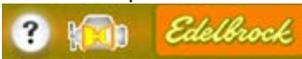
When using an Android device that was not supplied with the Pro-Flo 4 EFI kit, follow the pairing instructions below. E-Tuner will search for a Pro-Flo 4 ECU that is within a “discoverable” range. This discovery range should be as close as possible, within 10-15 feet of the ECU for best results. However, this can vary between different smartphones, tablets, and vehicles. The chances of successfully pairing will decrease if the Android device is too far away from the ECU or if the signal is too weak.

### To Pair with an ECU:

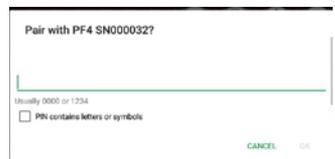
1. Turn the ignition to the ON position to power on the ECU.
2. Press ECU Search.
3. Select an ECU from the list. (A selected ECU is highlighted in RED).
4. Press “OK” to start connecting.



5. The top of the screen will flash yellow and the hourglass icon will spin while the app tries to connect.



6. Wait 10-30 seconds until the app asks for a Pairing Code.



The pairing code can be found in several places: On the back of the ECU, on the back of the tablet (if purchased with the Pro-Flo 4 kit), or on the front of the installation manual. This code will be the same as the ECU Serial Number.

*Example: If the ECU's serial number is SN123456 then its pairing code will be 123456.*

7. If the pairing and connection are successful, the app will show a green check mark icon. Once connected, the Setup Wizard (see Quick Reference Guide) can be used to configure the ECU, watch the Gauge Displays to monitor the system, or change settings in the Advanced Tuning Section.



**After pairing is complete, please follow Connecting to The ECU below.**

## **Connecting to the ECU, After Pairing:**

It should not be necessary to repeat the pairing procedure once the pairing code has been entered and the Android device and the ECU are connected. **NOTE:** *If the ECU is deleted or unpaired, it will be required to revisit the Pairing Procedure menu before any further communications can be made.*

The **Connection Button** can be used to quickly start or stop an ECU Connection when key on power is present. This is shown in the upper right-hand corner of the menu, next to the Edelbrock Logo.

**Connection Button** →  The image shows a red rectangular button with a white car engine icon and a green checkmark, followed by the Edelbrock logo in white script on a red background.

**To Start Connecting to an ECU:** Key ignition power on and press the connection button while a "Red X" icon is shown. This icon will turn into a rotating hourglass and a yellow bar will flash at the top of the screen until E-Tuner is connected. This icon will turn into a green check mark when E-Tuner is connected with the ECU.   

**To Stop a Bluetooth Connection:** Press the "Green Check Mark" icon. The icon will return to a "Red X." This may take a few seconds to disconnect.

Bluetooth connection will also be stopped each time the app is closed. If the flashing yellow bar is active on the menu, the Connection Button can be pressed to open a popup with quick access to the **Pairing Settings Menu**.

Notes on how the E-Tuner connects to the ECU:

- During a key OFF event, the ECU requires 10 seconds to fully shut down and display the RED X.
- If the ECU was connected and the E-Tuner app is closed, the app will try to reconnect the next time that the app is resumed.
- If the app is having a hard time connecting, the best recommendation is to turn the ignition off for 10 seconds until the RED X appears and then back on.
- If the ECU is power-cycled while the app is connected, E-Tuner may take a little longer to re-synchronize and connect.

## **ADVANCED TUNING MENUS**

### **Air Fuel Ratios**

Specifies the AFR set points at Idle, Cruise, and WOT conditions.

- Idle is applied for RPM's less than 1400 (Default AFR: 13.4)
- Cruise is applied for RPM greater than 1400 and TPS less than 50% (Default AFR: 13.9)
- WOT is applied for RPM greater than 1400 and TPS greater than 50% (Default AFR: 12. 8)

### **Set Self Learn Speed**

Learn Speed determines how fast the Self Learn function operates based on the Closed Loop feedback from the vehicles O2 sensor. It is advised to initially set to Fast (default). After the vehicle has been driven for some time under various operating conditions, is running satisfactorily, and the AFR correction values are consistently below 5%, it is advised to slow learn to Medium or Slow.

## **Self Learn Min RPM and Closed Loop Min RPM**

The Self Learn Min and Closed Loop Min RPM values adjust the minimum RPM that these functions will operate. It is advised to leave these settings at 400 RPM (default). Adjustment to these parameters should not be necessary and are provided primarily for troubleshooting purposes. Contact an Edelbrock technical agent for further assistance.

## **Acceleration Fuel**

Acceleration fuel adjustments provide for more or less fuel during quick accelerations and throttle openings. Values adjust the amount of fuel (%) and the duration (seconds) applied. If the engine stumbles or hesitates on accelerations, this menu can help troubleshoot and fine-tune those conditions.

## **The ADVANCED tab opens a page of options provided for further calibrating the Acceleration Fuel.**

## **Acceleration Fuel vs Water Temperature**

This advanced functions adjust the additional fuel contribution during hard acceleration at various water temperatures during warm up. A larger value increases acceleration fuel, a smaller value will decrease the acceleration fuel. An indicator light will illuminate during warm up indicating the Coolant Temperature range currently active. For adjustment of Acceleration Fuel above 165F degrees Coolant Temperature use standard Acceleration Fuel page.

Edelbrock recommends not adjusting the Acceleration Fuel vs Water temperature values until the ECU has had sufficient time to Learn and the standard Acceleration Fuel values and Cold Start enrichment have been adjusted sufficiently.

## **Fan Controls**

The two Fan Controls can be adjusted by setting the desired “Fan-ON” temperature for each fan. The ECU will switch the fans off, when coolant temp drops 10° below the set “Fan-ON” temperature. Please refer to the Pro-Flo 4 install manual to properly connect the fan controls. Fan Triggers are low current ground outputs that must be wired to trigger fan relays. Relays **MUST** be used to power fans.

## **Idle Tuning**

The idle control function will assist the Idle Speed Screw (on the throttle valve) to maintain a constant idle speed in and out of gear. Adjustments to the Idle RPM target can only be done once the engine is properly warmed up. (165 degrees coolant temp)

Once the engine is up to operating temperature the Idle Speed Control can be setup.

Idle Tuning procedures are set during the Setup Wizard procedure and can also be re-adjusted from the Advance Tuning\_Idle Tuning page. The Idle Target value will remain blank until the Coolant Temperature reaches 165 degrees F. Set the Idle Target Value to desired Idle Speed, now adjust the idle speed screw on the throttle body until the IAC% is 5% to 15% in neutral. Opening throttle blades reduces IAC %, closing throttle blades increases IAC %. Note that if you open the throttle blades such that the TPS value exceeds 1% you will have to turn ignition key power OFF for 10 seconds so the system can re-learn the new TPS position. **TPS % MUST be 0% for idle control to be active.**

## Cold Start Enrichment

For cold conditions or when the engine coolant temp is below 165°F, the amount of fuel delivered can be adjusted to help the engine start and remain running during warm up. This modifier has no effect once the engine is warmed up. Necessary adjustments should be minimal.

## The **ADVANCED** tab opens a page of options provided for further calibrating the Cold Start Enrichment

### Cold Start vs Water Temperature

This advanced function adjusts the additional fuel contribution required at various water temperatures during warm up for overall performance. A larger value increases cold start fuel, a smaller value will decrease the cold start fuel. An indicator light will illuminate during warm up indicating the Coolant Temperature range currently active. For adjustment of Cold Start Fuel above 165 degrees Coolant Temperature use standard Cold start page.

Edelbrock recommends not adjusting the Cold Start vs Water temperature values until the ECU has had sufficient time to Learn and the standard Cold start Fuel values have been adjusted sufficiently.

### On/Off

Provides control for several ECU Functions:

- **Idle Control:** Turning this off will pause the Idle Air Control motor at its current position until enabled again.
  - **Self-Learning:** This option will enable or disable the Self Learn function. Learn should be enabled when engine is first started to help adapt base calibration, with Self-Learn Off Closed Loop will still function but corrections will not be applied or stored.
  - **Closed Loop:** This option will enable or disable Closed Loop correction. With this option OFF the engine will run on the base calibration with no instantaneous corrections or learn function.
  - **Fuel Sump PWM:** This option should be ON if using the Edelbrock Fuel Sump and OFF for all other fuel systems.
- **The ON/OFF options are provided primarily for troubleshooting purposes.**

### Rev-Limiter

The Rev Limiter acts as a fuel-cut off limiter to protect the engine from accidental over-revs. This limiter can be adjusted between 3000-8000 RPM. This value also sets the Redline displayed on the digital tachometer.

### Fuel Modifiers

This feature allows modifications to the base fuel map previously loaded by the setup wizard. Modifications to the fuel modifiers should not be necessary for most applications. In some situations, underlying differences to certain engine components may restrict the self-learning feature from properly adjusting the base fuel calibration. In these cases, this feature allows manual adjustments to be made by the user to reduce self-learn corrections and further assist the self-learn process to help meet AFR set points.

## **Crank Fuel**

The Crank Fuel modifier will set the amount of extra fuel that is sprayed while the engine is trying to start (cranking mode). This function takes affect during both warm & cold starting conditions.

## **The ADVANCED tab opens a page of options provided for further calibrating the Crank Fuel vs Water Temperature**

### **Crank Fuel vs Water Temperature**

This advanced function adjusts the cranking fuel contribution at various water temperatures. A larger value increases cranking fuel, a smaller value will decrease the cranking fuel. An indicator light will illuminate during key ON indicating the Coolant Temperature range currently active. For adjustment of Crank Fuel above 165 degrees Coolant Temperature use standard Cold start page.

### **Base-Timing (Not for LS Applications)**

This menu features a Base Timing function that is performed during the Setup Wizard procedure and can also be re-adjusted from the Advance Tuning Base Timing Page. This procedure must be performed to synchronize the ECU and the Distributor Ignition Timing. When base timing is active, the ECU demands and holds 12 degrees BTDC so the engine ignition timing can be manually adjusted by turning the distributor to match 12 degrees. This ensures that the actual engine ignition timing matches the ignition timing that the ECU is commanding. Once Base Timing has been set, no further adjustment to the distributor is necessary. The Spark Control menu will be used for all ignition timing modifications.

#### **Base Timing Procedures:**

1. Connect a Timing Light & slightly loosen the Distributor hold-down clamp.
2. Turn Key-On power to the ECU and verify a Bluetooth connection with the ECU.
3. Press the "Set Base Timing" icon. This will lock the Demand Ignition timing to 12° BTDC. Once the engine is running, the ECU will hold the Demand Ignition timing at 12° BTDC.
4. Start the engine. If necessary, adjust the Throttle Body Idle Screw to keep engine running at idle.
5. Rotate the distributor to adjust Engine ignition Timing to 12° BTDC on engine damper pulley with timing light.
6. Make sure the Engine Ignition Timing stays at 12° while slowly opening the throttle to raise the RPM. Re-adjust distributor if necessary.
7. Tighten the Distributor Clamp and remove Timing Light.
8. Press "Unlock Timing" to restore the Ignition Control. This will also apply a standard ignition advance curve from the ECU.
9. The distributor is now properly configured for Ignition Control.
10. To verify or make changes to the Ignition settings, go to the Spark Control menu. If no adjustments are needed, press OK to return to the Advanced Tuning menu.

## Spark Control

Allows adjustments to the ignition advance curve. Adjusting these values have the same effect as changing the weights and springs in a traditional mechanical distributor with vacuum advance.

### Single Coil Distributor applications:

- Default Timing at Idle: 15° at 1200 RPM (Typical Values 15-25)
- Default Total Timing: 36° at 3000 RPM (Typical Values 34-38)
- Default Vacuum Advance: 5° (Typical Values 4-10)

### LS Coil on Plug applications:

- Default Timing at Idle: 12° at 1200 RPM (Typical Values 12 - 17)
- Default Total Timing: 22° at 4500 RPM (Typical Values 20 - 24)
- Default Vacuum Advance: 5° (Typical Values 4-8)

**NOTE:** *It is recommended to check with your engine builder to determine what timing values are best for your application.*

When the engine is in cranking mode, the engine ignition timing will default to 12° BTDC until the engine RPM exceeds 300 RPM.

**Idle Spark (Degrees)** – This is the amount of advance the engine will have during idle, it will maintain this value until engine RPM exceeds the Advance Start RPM value.

**Advance Start (RPM)** – This is the RPM value that the ignition curve will start calculating advance to the Total Spark value at the indicated Total Spark RPM.

**Total Spark (Degrees)** – This is the maximum amount of advance the engine will have at the Total Spark RPM value. The advance will maintain this value unless partial throttle conditions create enough vacuum to calculate vacuum advance values.

**Total Spark (RPM)** – This is the RPM the Total Spark value will be met. The advance curve is calculated from the Advance Start RPM value to the Total Spark RPM value.

**Vacuum Advance** – This value is the maximum amount of additional advance added to the Total Spark value under vacuum conditions.

## **EDELBROCK E-TUNER TUNING:**

### Self-Learn Idle Tuning

If idle quality is not performing as expected, some adjustment to the idle setup may help. All adjustments should be performed at operating temperature only (165° F).

- If Idle quality is excessively poor, first try resetting the self-learn from the ECU settings page.
- Verify the Idle Setup procedure has been followed as outlined in the instructions. Verify that the Idle Speed screw has been set properly. If set properly the system should idle at the target with 5-15% IAC value in neutral when hot.

- Idle Speed portion of fuel calibration may require more time for self learn fuel corrections to adapt. To assist with idle fuel corrections, adjust idle speed up to 1200 rpm slowly in steps with Idle Tuning page, then slowly decrease idle speed to as slow as possible. Observe Short FT correction value for excessive correction. Return Idle set point to desired value when complete.
- Adjust Spark Control Idle Spark for best idle quality.
- Reset Self Learn often between changes until performance is satisfactory.
- Refer to Fuel Modifiers page if AFR Correction is excessive.

## Adjusting Fuel Modifiers

Most applications will not require adjustments to the Fuel Modifiers. This feature has been provided to manually adjust the base fuel map in different sections to reduce the Self-Learn functions when necessary.

- Engine must be at or above operating temperature before adjusting Fuel Modifiers.
- Clear the Self-Learn and temporarily disable the Self-Learn BEFORE adjusting the Fuel Modifier values. This will allow more accurate tuning of the fuel trims at IDLE, CRUISE, or WOT conditions. The Fuel Modifier menu provides indicators that illuminate to indicate the different load points of the base fuel calibration that are being calculated while driving.

The Short FT Correction % indicates the amount of Closed Loop Correction currently applied.

If the vehicle is not performing well at a specific condition, note the Short FT Correction and the load condition (Idle, Cruise, or WOT). Increase or Decrease the fuel at the indicated load point with the + or – buttons. Continue driving and allow time for corrections to be made; Short FT Correction value should decrease. Repeated adjustments may be necessary.

### NOTE:

- Fuel modifiers should only be applied if absolutely necessary
- Many instances involving poor performance that indicate adjustment to these modifiers are related to underlying issues related to other component failures or improper installation. Please inspect the EFI system, all related components, and that Setup Wizard information related to the installation was properly selected.
- For Situations involving very poor performance Edelbrock technical assistance is advised.
- Self-Learn and Clear Self-Learn functions are provided for procedures that may be requested when being assisted by Edelbrock technical assistance.

## **ECU SETTINGS MENUS**

### Reset Self-Learn

Clears the self-learning table. Any corrections that were previously learned will be deleted.

**NOTE:** *Driving the vehicle through various loads, speeds, and conditions is recommended if resetting the self-learn.*

- Can be used to correct poor performance issues.

## Reset Modifiers

Restores all default Advanced Tuning modifier values back to the ECU. These values should be applicable for most engine configurations. The Idle Target must be reset after applying. All Advanced Tuning Settings should be verified.

## Save Map/Settings

Saves the current map or settings from the ECU to the Android Device.

- Saving the ECU Settings will store the current Advanced Tuning modifiers and Self-Learn table to the android tablet.

## Restore Map/Settings/Firmware

Manually reload an Edelbrock File (Map, ECU Settings, Firmware) back to the ECU.

### CAUTION!

- The ECU requires 12 seconds to fully shut down during a Key OFF event. During this time, the IAC Valve locates it's home position. If a rapid key OFF-ON is performed the idle speed at startup may be momentarily unstable.
- Never restore/load any files while the engine is running. A built-in safety feature will shut off the engine when doing so.
- Always Power-Cycle the ECU (Key-off 12 seconds, then key-on) after loading a map or Firmware file to apply new changes.
- When flashing Firmware, always make sure the Bluetooth connection is stable and consistent before attempting to load a firmware file. It is recommended to use the E-Tuner app while being as close to the ECU.
- The ECU will automatically restart after loading a new map or firmware. This will prime the pump again.

## Loading/Restoring/Flashing an ECU file:

1. Turn Ignition Key-On, then connect to the ECU.
2. Verify Bluetooth Connection .
  - a. For best results, try to get as close to the ECU as possible while loading a file. This is critical when loading firmware files to minimize potential ECU corruptions.
3. Open the appropriate menu (Map\*, Settings, Firmware\*).
  - a. Select the correct system (Pro-Flo 4).
  - b. The **My Maps** option is used to restore previous maps loaded by the Setup Wizard or Custom Maps.
4. Select the appropriate file name.
5. Press "LOAD" once. The app may take a couple seconds to start loading.
6. It may take up to 2 minutes for a file to complete. For a map or firmware flash, Power-Cycle the ECU (Key-Off 12 seconds, then Key-On) before pressing "FINISH".

## E-TUNER GAUGE DISPLAYS

The E-Tuner app features 3 different gauge displays to monitor live Engine & ECU Sensor data. The displays vary from a more simple display (E-Tuner Display) or more advanced displays (Digital Display and E-Tuner Dashboard). These displays also have Status and Warning Indicators to notify when a function is active or not within operating limits. **NOTE:** *The Android device must be connected to the ECU in order to use these displays.*



**Status Indicators** - The indicator lights on each display menu notifies when a particular function is active (on) or inactive (off). The main indicators to look at are: *Closed Loop, Self-Learning (O2 learn), and Fan1/2.*

If Closed-Loop is ON, the O2 Sensor is working and the Pro-Flo 4 system is actively making AFR Corrections. With Closed-Loop OFF, no AFR Corrections (0%) will be made. The Self-Learn indicator informs when the Pro-Flo 4 is in **Self-Learning** mode and saving Long FT Corrections. The engine must be running in Closed Loop and Coolant Temperature must be above 165°F for Self-Learning to be active. If the Self-Learning (O2 Learn) indicator is not turning ON, check to make sure that **Self-Learn** has been enabled from the **On/Off Menu** under the Advanced Tuning section.

**Warnings Indicators** - Will appear as a RED overlay on top of the gauge if the value exceeds its high or low limit. The red overlay will disappear once the value returns to within normal operating range.

**E-Tuner Display** - Offers a simple layout, monitoring just the basic parameters. The AFR Bar displays current air fuel ratio readings from the O2 sensor output.

AFR S.P. (Setpoint) displays the current AFR target value based on the Idle, Cruise and WOT AFR targets. These targets can be adjusted from the Air Fuel Ratio menu. As the self learn adapts, the AFR and AFR setpoint bars should become more aligned.

On the E-Tuner Display, the indicator lights to the right of the RPM gauge indicates when the system is running in Closed Loop and Self-Learning. The indicators will switch between “GREEN” (ON) and “RED” (OFF).



**Digital Display** - A numeric display for monitoring all parameters used by the Pro-Flo 4 System.

On the Digital Display, the indicators will turn “GREEN” when the function is ON, and “GRAY” when the function is OFF.



**EFI-Dashboard Display** - This display offers several different layout options rather than an all-in-one view. All information and data shown is the same as the other display pages. To switch between different layouts, press the “channel” buttons (Ch1, Ch2, Ch3, Ch4).

The indicator icon placed in the top-right corner of the menu is a Bluetooth Connection indicator and can be used to quickly reference if an ECU is connected. This indicator can also be used to Start/Stop a Bluetooth connection to the ECU. This icon will turn **Green** when connected, **Yellow** while trying to connect, and **Red**, when disconnected.



## **EDELBROCK E-TUNER DISPLAY DEFINITIONS:**

**Vacuum:** When a piston moves down the cylinder bore, it creates a vacuum. The average amount of vacuum from all cylinders is measured in the intake manifold. Using atmospheric pressure as a zero baseline, manifold pressure is expressed as a negative value -XX Vacuum. The E-Tuner app displays engine load in terms of inches of Mercury Vacuum. A displayed value of -10.0 means the engine is creating 10.0 inches of vacuum. A value of 0.0 should be expected for most applications under full throttle conditions or when sitting stationary with no RPM. Expected vacuum values for idle can vary depending on camshaft configurations.

**Race Camshaft at idle: -8.0 to -11.0**

**Mild Camshaft at idle: -10 to -16.0**

**Stock Camshaft at idle -15.0 to -20.0**

**RPM (Revolutions Per Minute):** Refers to how “fast” an engine’s Crankshaft is rotating. The Pro-Flo 4 EFI System calculates the RPM (Tach) Signal from the distributor sensor. For LS applications, the Pro Flo 4 EFI system calculates the RPM from the Crankshaft Position Sensor.

**Coolant Temperature:** This sensor is typically mounted in the coolant passage of the intake manifold on the hot side of the coolant thermostat. Many functions of the ECU rely on the Coolant Temperature as an indicator of how warm or cold the engine is. Fuel trims and Idle Control functions rely on Coolant Temperature sensor feedback to calculate fuel trims to improve cold start functions. Typical values should be between 165°F - 210°F.

**Battery Voltage:** This measures the power input being supplied to the ECU from the Battery. It is important to make sure the vehicle's battery is well charged and maintains a steady voltage above 12V at all times. Fluctuating battery voltage can result in poor engine performance and is usually caused by bad grounds, bad battery or alternator. Typical values should be between 12.5 - 14.0 V.

**Throttle (TPS):** The Throttle indicates a percentage of how much the Throttle Blades are open inside the Throttle Body. The TPS (Throttle Position Sensor) is what measures the actual throttle rotation, and is reported from 0 – 100%. For all Pro-Flo 4 applications, the Throttle at Idle must be calibrated to 0%.

**Idle Air Control Percent (IAC %):** The IAC% will indicate how much the Idle Air Control valve is being used to maintain your Idle Speed. The IAC% should be used as a tool for properly adjusting the Idle Screw to set the base Idle Speed for installations using a Pro-Flo 4150 intake manifold with a PWM IAC motor. The Idle Screw should be adjusted so the IAC% is 10-20%.

**Intake Air Temperature (IAT):** This is the temperature of the air as it passes through the throttle body. IAT's can also give a good estimate of the under the hood temperature.

**Fuel Pressure Sensor:** Fuel pressure is an important part of any EFI system. A drop in fuel pressure during hard acceleration may indicate a fuel supply issue. Typical values should be between 39-43 PSI or 58-62 PSI.

**AFR (Air Fuel Ratio):** AFR defines the ratio of the amount of air consumed by the engine compared to the amount of fuel. Larger values are considered "Lean" because there is more air than fuel in the mixture. Lower values are considered "Richer" because the mixture has more fuel than air. Depending on the performance level of the engine Air Fuel Ratios from 12.5 to 14.5 could be expected with the Direct Port EFI System. Typical AFR Setpoint Values:

**Idle: 13.2 to 13.8**

**Cruise: 13.8 to 14.5**

**WOT (Wide Open Throttle): 12.4 to 12.8**

**AFR S.P (Air Fuel Ratio Setpoint):** Air Fuel Ratio setpoint is the Air Fuel Ratio in the tailpipe read by the O2 sensor that the EFI system is working to maintain. This value is determined by the Vacuum, RPM, Throttle position and Air Fuel Ratio Setpoints specified in the Advance Tuning menu / Air Fuel Ratio section of the E-Tuner App.

**Short FT Corr (Air Fuel Ratio Correction):** This is the percentage of fuel that the Closed Loop Correction is adding (+) or subtracting (-) from the Base Fuel Table and Long FT table to maintain the target air/fuel ratio at any specific moment. As the vehicle is driven through various load and RPM conditions, the Self Learn function will apply and save these values to the Long FT and this value will decrease.

**Long FT Corr (Air Fuel Ratio Correction):** This is the percentage of fuel that the Self Learn table has stored and is adding (+) or subtracting (-) to maintain the target air/fuel ratio at any specific moment.

**Injection:** This value is the amount of time, displayed in milliseconds, that the fuel injectors are open to release the correct amount of fuel to maintain a proper air fuel ratio under various load conditions.

**Injection Duty:** Injection Duty Cycle is the percentage of time an Injector is open during one cycle (2 revolutions) of the engine. As engine RPM increases, available injection time decreases. A value of 100% indicates no further injection time is available. The injector is being held wide open all

the time.

**Spark Advance:** This value is the final calculated Spark Advance in degrees before TDC being commanded by the ECU. This value and curve can be adjusted in the Advanced Tuning menu/ Spark Control section in the E-Tuner App. At idle, the ECU uses Spark Advance to control idle speed. It is normal to see Spark Advance fluctuate at idle in attempt to maintain idle target speed.

## **EDELBROCK E-TUNER SETUP WIZARD DEFINITIONS:**

**EFI System:** Edelbrock's E-Tuner Android App can support ONLY the Pro-Flo 4 EFI System for v8 engines. Pro-Flo 4 is considered direct port injection.

**Engine Displacement in Cubic Inches (CID):** Also commonly referred to as the size of the engine. The displacement figure represents the total air displaced by the pistons in all of an engine's cylinders and is expressed in cubic inches. This value in the setup wizard helps select the proper base map for the engine configuration.

**Camshaft:** The setup wizard can accept 3 different camshaft profile ranges. This covers stock, mild, and race cams. The amount of lift and duration from the camshaft will determine how much vacuum the engine will pull under various loads, and will affect how much fuel is required to run the engine. If the incorrect camshaft is selected in the wizard, the engine may run very poorly.

**Fuel System:** A 43 or 58 PSI fuel system must be installed to properly run the Pro-Flo 4 EFI system. Any return style fuel system or an Edelbrock Fuel Sump can be used. If an adjustable fuel pressure regulator is used, it must be set to 43 or 58 PSI. Fuel regulator must be vacuum compensated.

**Injectors:** Pro-Flo 4 can support 5 fuel injector options: 26, 29, 35, 42 and 60 lb/hr. The selected option must match the injector rating included with the Pro-Flo 4 kit. The setup wizard will display all available options based on the engine displacement and camshaft profile. For most applications, the 29lb/hr or 35lb/hr option will be ideal. 42lb/hr and 60 lb/hr injectors are reserved for larger engine displacements with race camshafts.

**Ignition Control:** All Pro-Flo 4 EFI systems are configured by default to control the engine's Ignition Timing. Only the distributor included with the Pro-Flo 4 system can be used, and the Base Timing setting must be configured before Ignition Timing can be controlled using E-Tuner.

**Intake Manifold:** Pro-Flo 4 EFI systems are compatible with 2 intake manifold options: Pro-Flo 4150 and Pro-Flo XT. The Pro-Flo 4150 accepts a 4150-flange 4 barrel throttle body, while the Pro-Flo XT uses a 90mm single blade throttle body.

## **EFI COMMON TERM DEFINITIONS:**

**Sequential Port Fuel Injection:** Sequential port fuel injection systems fire each injector individually into each of the cylinders intake ports. This is more efficient because changes to the fuel mixture are instantaneous and provide maximum cylinder distribution. The pulse width or on time of each injector is more precisely timed for improved performance over multiport injection.

**Electronic Control Unit (ECU):** The ECU is an electrical module that receives inputs from sensors and outputs signals to actuators on the Throttle Body. The ECU communicates wirelessly via Bluetooth using the Edelbrock E-Tuner Android app to most Android devices. This allows the adjustment of the ECU Settings and the engine's performance in real-time.

**Wide-Band Oxygen (O<sub>2</sub>) Sensor:** A wideband oxygen sensor allows the air/fuel ratio to be measured over a very broad range (10.2 up to around 21.0). The wide band oxygen sensor used

for Pro-Flo 4 is a Bosch LSU 4.9. The Pro-Flo 4 EFI system has been calibrated specifically for use with a LSU 4.9 sensor, no other oxygen sensor types may be substituted.

**Base Map:** The Base Fuel map is made up of coordinates of RPM (speed) and Vacuum (load) and Injection Time. The idea of the base map is to provide the engine with a general guideline that will let it start and run reasonably well. However, it cannot adjust for all driving conditions and slight variations in engine configurations not covered in the wizard. This is where Closed Loop and Self-Learning come into play to fine-tune the base map.

**Closed Loop:** Air Fuel Ratio feedback from the Wide Band Oxygen Sensor provides the ECU with necessary information to calculate and adjust the Injection Time as necessary to maintain the designated AFR Setpoint under all load conditions. The percentage of Injection Time correction the ECU is calculating is displayed as AFR Correction (AFR Corr).

**Self-Learning:** This feature works side-by-side with Closed Loop control. The ECU reads the AFR Corrections the Closed Loop is calculating and saves them to a self-learn table. The self-learn table and Base Map values are used to calculate the final injection time necessary to maintain a proper Air Fuel Ratio with minimal Closed Loop Corrections. As the vehicle is driven through various loads, speeds, and conditions, the ECU continually updates and saves the self-learn table values. Initially, higher AFR Corrections may be observed as the vehicle is driven. These corrections should be reduced as the self-learn table is populated.

**Operating Temperature:** For the Pro-Flo 4 EFI system, minimum operating temperature is a coolant temperature of 165°F. It is very important that the correct temperature thermostat (180°F), as specified in the instructions manual is installed to ensure the engine meets this operating temperature. An improper thermostat will prolong warm up times and cause poor performance and fuel mileage.

### **Recommended Self-Learning Drive Cycles:**

The following is a guideline to driving procedures that helps assist the self-learning function of the Pro-Flo 4 EFI system. Please note that there is never really a time when the self-learn function is actually complete. The system is always adjusting for various weather, road load and engine functions that may affect engine performance. A good indication of self-learn progress is the amount of Short FT % being applied under various driving conditions. As the self-learn progresses Short FT Corr % should reduce to values near 0%. In order for the self-learn function to actually correct a specific load point the engine must actually drive through that specific point.

*The best procedure for assisting self-learn is to first verify that all functions of the EFI System are properly installed and functioning correctly.*

Warm the vehicle to operating temperature (165 F degrees) and verify that both the O2 learn and Closed Loop indicators are lit. Drive the vehicle in an ordinary manner and observe the Short FT Corr % values. If at any point the vehicle does not run accordingly, observe the Short FT Corr % values. If the value exceeds 10%, try holding the Throttle steady so the vacuum and RPM remain steady at the point of issue. The Short FT Corr % value should reduce and the engine should begin to run better. Try to revisit the Vacuum and RPM points around the point of issue to help

compensate. Try to avoid fast erratic throttle movement when assisting self-learn. If issue is severe and corrections exceed 15% see Fuel Modifiers Page.

Continue driving the vehicle, when road conditions safely permit try running the engine through various load and RPM points. For example:

- Steady Highway driving consistently varying throttle and RPM.
- Low gear light slow acceleration from low to high RPM.
- High gear light acceleration from low to high RPM.
- High gear slow steep hill acceleration.
- Hard acceleration from low to high RPM.

As the vehicle is driven, AFR Corrections should reduce. When performance is acceptable, save the Map and ECU Settings (ECU Settings) and slow the Self Learn setting to medium or slow (Advanced Tuning\_Air Fuel Ratios\_Advanced).

**NOTE:** *Do not make any adjustment to the Acceleration Fuel initially. Allow the self-learn adequate time to apply corrections to the base calibration prior to making any Acceleration Fuel adjustments.*

**WARNING:** *WOT conditions must be performed on a closed track in a controlled environment.*

6	6	6.5	7	7	1	2	3	4	4	4	4
11	13	13.5	14	14	7	8	9	10	11	11	11
13	15	15.5	16	16	8	9	10	11	12	12	12
15	17	17.5	18	18	9	10	11	12	13	13	13
16	18	18.5	19	19	10	11	12	13	14	14	14
17	19	19.5	20	20	11	12	13	14	14	14	14
18	20	20.5	21	21	12	13	14	14	14	14	14
20	22	22.5	23	23	13	14	15	15	15	15	15
21	22	23.5	24	24	14	15	15	16	16	17	17
19	30	30	30	30	17	17	17	19	22	25	27
17	32	32	32	32	17	17	17	19	23	25	28
13	34	34	34	34	17	17	17	19	24	26	29
14	35	36	36	36	17	0	0	0	0	0	0
0	2	3	3.5	4	4	0	0	0	0	0	0
1	4	5	5.5	6	6	1	2	3	4	4	4
4	6	6	6.5	7	7	7	8	9	10	11	11
1	12	13	13.5	14	14	8	9	10	11	12	12
2	14	15	15.5	16	16	9	10	11	12	13	13
4	16	17	17.5	18	18	10	11	12	13	14	14
4	17	18	18.5	19	19	11	12	13	14	14	14
5	18	19	19.5	20	20	12	13	14	14	14	14
16	19	20	20.5	21	21	13	14	15	15	15	15
18	21	22	22.5	23	23	14	15	15	16	16	17
20	22	22	23.5	24	24	17	17	17	19	22	25
19	30	30	30	30	30	17	17	17	19	23	25
17	32	32	32	32	32	17	17	17	19	24	26
12	33	34	34	34	34	17	17	17	19	25	28
13	35	35	36	36	36	17	17	17	19	25	28
13	35	35	36	0	0	0	0	0	0	0	0
2	3.5	4	4	0	0	0	0	0	0	0	0
4	5.5	6	6	1	2	3	4	4	4	4	4
6	6.5	7	7	7	8	9	10	11	11	11	11
2	13.5	14	14	8	9	10	11	12	12	12	12
4	15.5	16	16	9	10	11	12	13	13	13	13
6	17.5	18	18	10	11	12	13	14	14	14	14
7	18.5	19	19	11	12	13	14	14	14	14	14
8	19.5	20	20	12	13	14	14	14	14	14	14
9	20.5	21	21	13	14	15	15	15	15	15	16
1	22.5	23	23	14	15	15	16	16	17	17	18
2	23.5	24	24	17	17	17	19	22	25	27	29
10	30	30	30	17	17	17	19	23	25	28	29
12	32	32	32	17	17	17	19	24	26	29	30
13	34							28	30	31	
16	36							28	30	31	
0	2							0	0	0	
1	4							0	0	0	
4	6							4	4	4	
1	12							10	11	11	
2	14							10	11	11	
4	16	17	17.5	18	18	9	10	11	12	13	13
4	17	18	18.5	19	19	10	11	12	13	14	14



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