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Installation Instructions for Water Methanol Stage 3

Installation- Mechanical:

Step 1 Reservoir Install

Install 1/8" NPT – ¼" OD elbow into 3/8-1/8 NPT reducer bushing using GOOP sealant. Install this assembled fitting with GOOP sealant into the bottom of the reservoir. Note location options for the included low level warning light sensor. The nozzle, not the reservoir, should be the highest point in the system.

Optional: The factory windshield washer reservoir can be used as the reservoir for your system, using optional part number 15050.

- Drill 9/16" hole in desired bulkhead location.
- Remove one nut from bulkhead and turn the remaining nut until it is at the very end.
- Feed red tubing through the drilled hole and up and out of the top of the reservoir.
- Attach tubing to the bulkhead on the side opposite the nut.
- Pull the tubing through the bulkhead hole until the bulkhead seats against the inside of the reservoir.
- Apply GOOP sealant (included) around bulkhead.
- Slide the nut you had previously removed up onto the tube and thread onto bulkhead.
- While pulling firmly on the red tubing, tighten the outer nut using a 17mm socket (only needs to be hand tight). A ratchet is not needed.
- Once sealant has set, fill reservoir with water and check for leaks.

Step 2 Pump Install



Mount the pump so the inlet is positioned at the lowest point of the reservoir or lower. Pump can be mounted horizontally or vertically using the supplied screws and washers. Ensure that no sharp bends in the high pressure tube occur near the pump. Sharp bends can cause stress on the inlet and outlet ports of the pump, causing leaks. Trim tube with a utility knife or razor blade, making sure to eliminate any burrs or kinks on the end. Insert firmly into the pump about ½ inch through the light grey locking collar. Note the arrows indicating flow direction on the top of the pump. To remove the hose, gently and evenly push the light grey locking collar into the head unit of the pump, then pull on the hose gently.

Measure the distance from the reservoir outlet to the pump inlet. Cut the ¼" red tubing using utility knife. Make cuts are as square as possible.

Ensure there are no kinks in the tubing and insert tubing into quick disconnects at pump and reservoir until fully seated. Keep the pump within 2 feet of the reservoir.

Step 3 Nozzle Selection

Nozzle sizing is a function of horsepower, which approximates the engine airflow, and boost, which approximates intake charge heat.

Recommended starting points:

250 - 350 RWHP:	175 ml/min nozzle.
350 - 475 RWHP:	375 ml/min nozzle
475 - 600 RWHP	625 ml/min nozzle

TECH TIP: Seal the nozzle into the nozzle holder using the included GOOP sealant. Using a sealant that is not permanent will allow for nozzle changes during tuning. Simply remove the nozzle, clean the threads, and reinstall using sealant.

Assemble desired nozzle into nozzle holder using GOOP sealant. The end of the nozzle with the fine mesh screen is to be inserted into the nozzle holder. Torque 1/2 turn past finger tight. Do not use Teflon sealants on NX fittings.



Correct



Incorrect

NOTE: If nozzle is mounted lower than the reservoir, a Solenoid Upgrade (#15055) must be used to prevent draining.

Step 4 Nozzle Mounting

The nozzle assembly should be installed 90° to the direction of airflow. On round intake tubes, this is 360° around the tube meaning the nozzle can be mounted in any direction. This will ensure maximum cooling as the nozzle sprays in a cone pattern. Be sure that the nozzle tip is flush with the inside wall of the tube, or even projecting into it slightly to ensure no interference in the spray pattern. Make sure the nozzle is the highest point in the system as well.

Drill and tap (11/32” pre-drill, 1/8”-27 NPT tap) air inlet tube as close as possible to throttle body/throttle plate.



The nozzle is mounted using its external 1/8 NPT threads. Tighten the nozzle and nozzle holder assembly one half turn past finger tight using GOOP to seal the threads.

Carb Plates are available for 4150 and 4500 style carburetors.

You can mount the nozzle in a plastic or rubber air inlet tube using a Nozzle Mounting Adapter (#15056). Weld-in aluminum (#15057) and steel (#15058) bungs are also available.

TECH TIP: The recommended nozzle mounting point is before the throttle body/ throttle plate. If you mount the nozzle after the throttle body/throttle plate (including use of a carb spacer plate) or below the reservoir, a Solenoid Upgrade (#15055) must be used to prevent siphoning at idle or gravity feed.

Step 5 Nozzle Connection

Measure the distance from the pump outlet to the nozzle holder. Cut the ¼" tubing using utility knife. Make cuts are as square as possible.

Ensure there are no kinks in the tubing and insert tubing into quick disconnects until fully seated. Gently pull on tubing to ensure a good connection.



Use tie wraps to help route tubing and to ensure it doesn't contact moving or hot parts in the engine compartment. Have tubing connect to quick connect fittings at shallow angles. Having an immediate sharp bend may unseat the tubing from the internal o-ring and create a leak.

Continual insertion and removal from quick connect fittings will mar the end of the tubing. Over time the internal gripping teeth may lose their hold of the tubing which may create a leak. If this occurs simply remove the tubing and make a fresh cut using a razor blade.

Installation – Electrical
Variable Controller Installation



The Stage 3 controller has an integrated wiring harness for ease of install and a clean appearance. Refer to the main wiring diagram (pg.7) and listing below for installation.

CAUTION: Disconnect the negative battery terminal while connecting wires to prevent electrical fire or damage to controller.

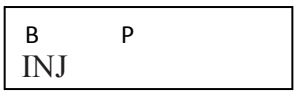
- Connect BLACK wire to a good ground location.
- Tie GREEN wire out of the way.
- Connect RED wire to a 12 volt key on power source. When selecting a power source look for a dedicated circuit that you can tie into before the fuse. The controller is internally fused. A good source is the cigarette lighter. Use the provided rocker switch, which is numbered, position 1 is 12VDC key on source, position 2 is power to controller, position 3 is bronze is a ground.
- Connect the two BLUE wires to the two wires leading to a fuel injector using the provided wire splices, DO NOT SOLDER THESE CONNECTIONS. Any injector will suffice, so choose one that is easy to access. In carbureted applications, these leads can simply tied out of the way.
- Connect the clear tubing to the black silicone line. This line can be 'T'ed into any accurate manifold boost pressure source. A boost gauge line that is tapped into the intake manifold is ideal. In naturally aspirated applications, this can simply be tied out of the way.
- Connect the WHITE wire to the red power wire of the pump. The BLACK wire on the pump goes to a good chassis ground.

Always have a good electrical ground connection. Poor ground will result in erratic operation of controller or damage. Make sure boost connection is AFTER the throttle body.
Tuning the Stage 3 System

The Stage 3 system allows for a large range of tuning on any EFI or forced induction vehicle. It can reference fuel injector pulse-width, boost, or both simultaneously. The boost and EFI data are displayed on the LCD screen, along with the systems output as a percentage of pump capability.

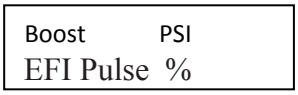
All functions of the controller are accessed using the two push buttons to the left and right of the LCD screen. Pressing button 1 will scroll between screens, while pressing button 2 will affect whatever setting is on the screen.

Display Screens:



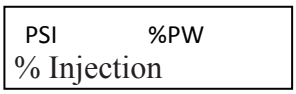
Screen 1

This is a display only screen. It displays boost, fuel injector pulse-width (PW), and injection as independent bar graphs.



Screen 2

This display screen shows boost in psi and injector pulse-width (PW) as a percentage.



Screen 3

This screen displays boost in psi, while pulse-width (PW) and injection are shown as a percentage.

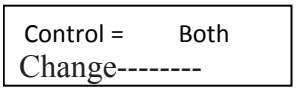


Screen 4

This screen displays boost in psi and pulse-width (PW) as a percentage.

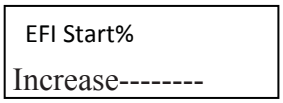
Controller Set Up Screens:

Use button 2 to change settings on each set up screen.



Screen 5

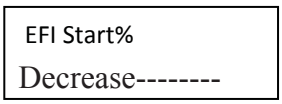
This is the first setup screen. It allows you to select BOOST, EFI, or BOTH, using button number two. If BOOST is selected, then boost alone will determine the injection volume from the nozzle. If EFI is selected, then fuel injector pulse-width (PW) alone will determine injection volume. If BOTH is selected then both inputs will be used simultaneously to control injection.



Screen 6A

EFI START INCREASE

This screen sets the injector PW point when injection will start through the nozzle. Typical start points are in the 35% range.

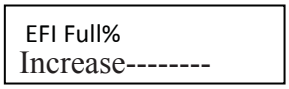


Screen 6B

EFI START DECREASE

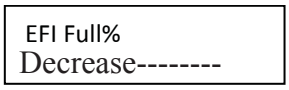
This screen sets the injector PW when injection will start through the nozzle.

Screen 6C
EFI FULL INCREASE



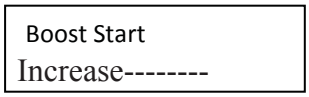
This screen sets the fuel injector PW full point when maximum injection through the nozzle will be reached. Typical EFI full points are 60-80%.

Screen 6D
EFI FULL DECREASE



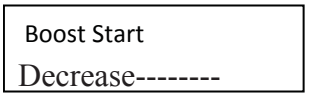
This screen sets the fuel injector PW full point when maximum injection through the nozzle will be reached.

Screen 7A
BOOST START INCREASE



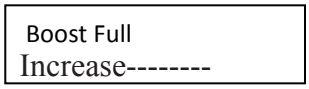
This screen sets the boost pressure required to start injection through the nozzle. This should be set at a boost that just above normal driving. IF you hit 5 psig leaving a stop light normally, set this to 7 psig.

Screen 7B
BOOST START DECREASE



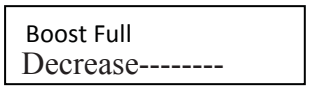
This screen sets the boost required to start injection.

Screen 7C
BOOST FULL INCREASE



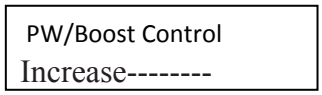
This screen sets the boost full point when maximum injection through the nozzle will be reached. In most applications, this should be set at a boost achieved at WOT in hard driving.

Screen 7D
BOOST FULL DECREASE



This screen sets the boost full point when maximum injection through the nozzle will be reached.

Screen 8A
PW/BOOST CONTROL INC



This screen adjusts the balance between boost and PW based injection. Pressing button 2 will increase the PW importance and decrease the boost importance by 1%. If it is set at 50/50, then PW and boost are weighted equally to determine how much to inject at any given time. The weighting can be adjusted in 1% increments. 50/50 is often a good starting point.

Screen 8B
PW/BOOST CONTROL DEC

PW/Boost Control
Decrease--------

This screen will decrease the importance of PW while increasing the importance of boost in 1% increments as you press button 2. Decreasing the weight of boost is useful for quick spooling turbos or positive displacement superchargers in EFI applications. (See Screen 8A)

Screen 9
POWER MODE
Set this screen to Boost

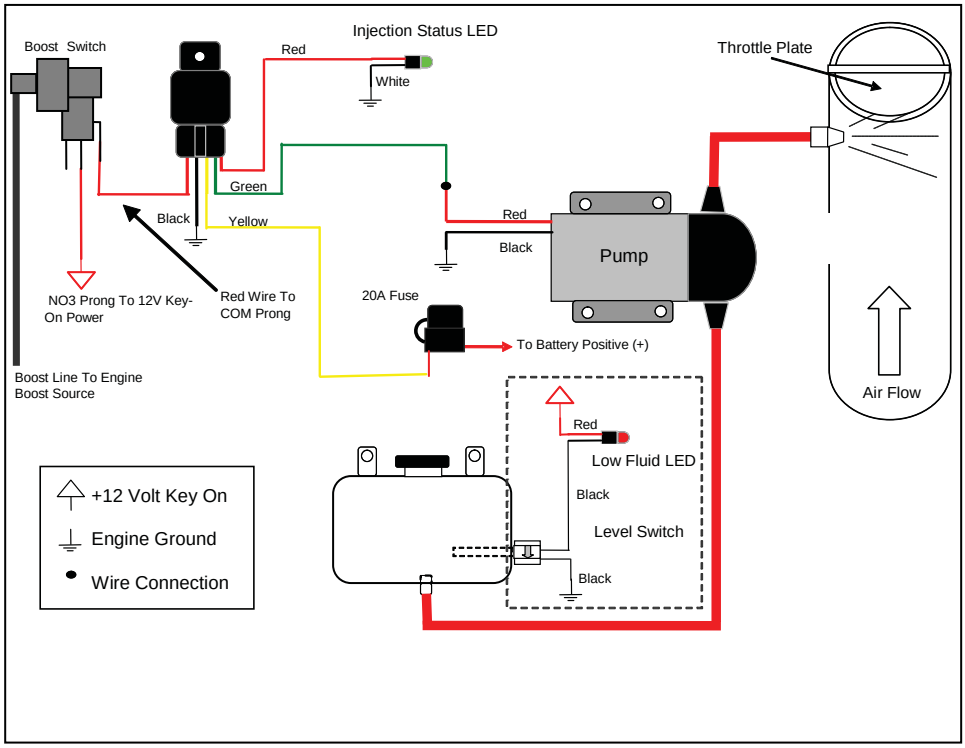
Power Mode Boost
Change--------

Screen 10A/B/C/D
POWER set points

Power Start 100
Increase--------

Note Power Mode is used with MPG-MAX systems only

Nozzle Identification Chart:



Nozzle Number	Nozzle Size	Nozzle Number	Nozzle Size
1	60 ml/min	4	225 ml/min
2	100 ml/min	5	375 ml/min
3	175 ml/min	6	625 ml/min

Tuning Examples:
To properly tune the Stage 3 Controller you must first find your baseline Fuel Injector Pulse Width and Boost Ratings.

For Naturally Aspirated motors:
The injection START point should be approximately 5% higher than your cruising Fuel Injector Pulse Width (PW).

The injection FULL point should be approximately 5% lower than your Wide Open Throttle (WOT) PW.

For Turbo/Supercharged Applications:
The injection START point should be approximately 3-5PSI higher than your cruising or ¼ throttle boost.

The injection FULL point should be at MAX boost pressure.

EXAMPLE:

Cruising P/W: 18% +5% _23%_
WOT P/W: _52%_ -5% _47%_

Cruising-1/4 throttle Boost (PSI) 2PSI . +3 to 5PSI 5 to 7PSI .
MAX Boost (PSI) 18PSI . -3PSI 15PSI .

Tuning Notes:
Cruising P/W: _____ + 5% _____
WOT P/W:_____ -5% _____

Cruising-1/4 throttle Boost (PSI):_____ +3 to 5 PSI _____
Max Boost (PSI):_____ -3 to 5PSI _____

For small Turbos and fast reacting Super Chargers which are also injecting based on Fuel Injector Pulse width you will need to have injection based more on P/W than PSI settings for the controller to inject properly.

Under moderately heavy throttle, boost will trigger a small amount of injection for cooling and efficiency. As more boost builds under higher throttle positions, the system will add more injection. In the event that boost reaches higher levels (such as in a race or in a WOT situation on the street) the system will inject very aggressively for maximum octane gain and cooling.

Note that in all of the above examples, all of the data needed in terms of PW and boost can be obtained through the controller display itself. Simply driving under cruising conditions and trying various levels of throttle and boost will allow the user to determine good set points for injection.

Other controller features:

The controller can be put into a “read-only mode” for the purpose of viewing boost and EFI data without injection. To toggle this mode on and off, press and hold button 2 in any display screen. While holding button 2 down, press and hold button 1. After 1 second, release both buttons. The controller will give no indication that it is in read only mode except for the fact that it will not inject under any circumstances.

The controller also has the ability to be programmed and display data in standard or metric units. Holding down button two while powering up the unit will trigger metric units. Pressing and holding button one as power is first applied will select standard units.

Testing the System:
Note: for best results, prime pump before use to clear air from the pump and insure that the system is primed:



- Fill reservoir with water approx ¼ full.
- Remove tubing from nozzle (or solenoid if solenoid used in-line between pump and nozzle) and run tube into separate container.
- Apply 12 VDC to red pump wire for approximately 5 seconds or until fluid flow is consistent.
- Pump is now primed. Reconnect tubing from pump outlet to nozzle (or solenoid).

Step 1 Test Pump and Mechanical System

Turn key to ON position. Bypass the pressure switch by touching a wire between the two poles on the switch. Pump should activate, green LED should go on, and fluid level in tank should go down. It is recommended to also check the nozzle spray pattern while following this procedure. Also check for leaks.

If pump goes on and fluid level doesn't go down, there is an obstruction in the tube or nozzle.

Activation of the pump in 1-5 second intervals will purge air from the system after install. This can be accomplished in initial use.

Step 2 Test LED vs. Pump On

Apply a 12v source to pole #87 of relay (single red wire, not red/green wire). Pump should activate and LED should go on. Check LED ground and wiring if no activation. If wiring and ground check out okay, check LED with 12v source.

Initial Tuning

#20001 Set Boost Switch Activation Point

At the factory setting, the boost switch will start injection at about 10 psig boost. Adjusting the set screw clockwise will increase the boost pressure needed to activate injection. Turning the adjustment screw counter-clockwise will decrease it. 1 full turn counter-clockwise will decrease the injection point by 1-2 psig. Typical injection onset points are at ½ of maximum boost.

TECH TIP: Introducing water/methanol before ½ of maximum boost pressure could result in quenched combustion and engine misfire.

Tuning Quick Reference

The power potential of the system is realized through increased boost and/or timing. The large gains on octane and cooling provided by the system make this possible, even on standard pump fuel.

The Water Methanol system adds an alternate fuel source as well as significantly cools combustion. With the Water Methanol system, one does not need to cool combustion with overly rich air/fuel ratios. To minimize combustion quench, you should start with an air to fuel ratio of 12.0-12.5:1.

Injecting water/methanol lower than 3300-3500 RPM could result in combustion quench. All vehicles are different. If the engine bogs or loses power, then it is coming on too early, the quantity is too much, or there is not enough methanol in the mixture (50/50 water/methanol recommended).

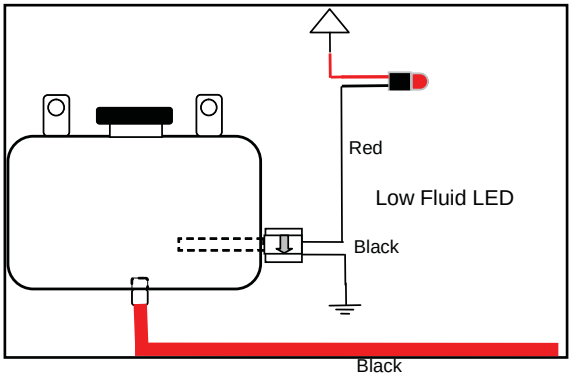
Maintenance – Remove nozzle(s) and clean screen filters once per year using carb cleaner.

The Water Methanol system has been designed to operate with high concentrations of methanol. Oil or other additives are not required for system lubrication, and can cause damage to the system.

Contaminants in the fluid such as dirt can damage the system. Ensure that dirt and debris do not fall into the tank.

Do not use Teflon tape or paste to seal connections. These sealers are not as effective as the Goop sealant provided and can break down over time, clogging components.

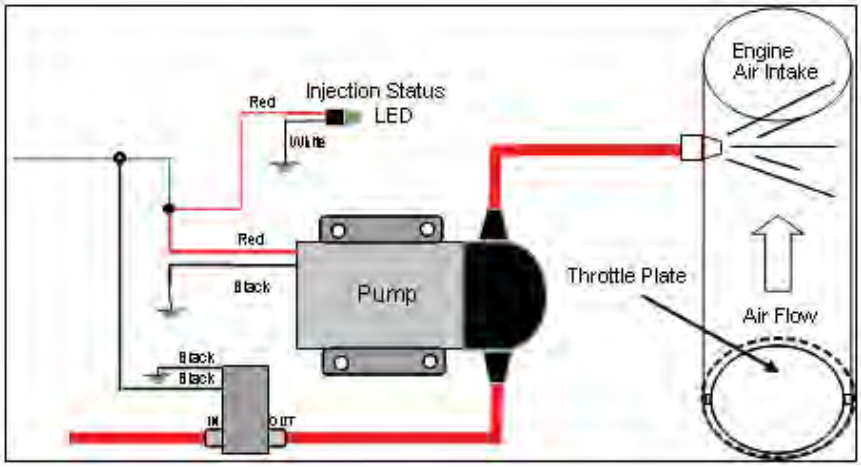
Fluid Level Switch Instructions



- Locate desired level switch mounting position. Suggested placement is 1/5 of max reservoir height.
- Carefully drill side of reservoir using 13/16” bit. A step bit is recommended for best drilling results. Hole must be free of nicks or shavings for proper sealing.
- Remove rubber seal from level switch. Insert seal into reservoir until fully seated. Goop can be used around the edges of the hole.
- Lubricate exterior of level switch with water and insert into seal until fully seated. Position level switch so GT symbol is at six o’clock position.
- Wait 30 minutes for Goop to cure, then test for leaks. With fluid level above level switch, float should be angled up. With fluid level below level switch, float should be in horizontal position.
- Connect one black wire from level switch to ground.
- Connect other black wire from level switch to white wire from LED.
- Connect red wire from LED to +12 volt key on power source.

Solenoid Upgrade (optional)

The optional Solenoid Upgrade (#15055) is required if the nozzle is to be installed after the intake throttle plate (as shown), or the fluid reservoir is mounted higher then the nozzle. It is highly recommended for trunk-mount reservoirs.



Finger thread the two 1/8" NPT quick connect fittings into ports labeled (2 or IN) and (1 or OUT) on the solenoid. Tighten an additional half turn past finger tight.

Note: Solenoid must be installed Pre-pump to ensure correct operation.
Cut high pressure line at location solenoid is to be installed. Insert ends of cut line into quick connect fittings of solenoid. The port labeled (2 or IN) is the inlet and the port labeled (1 or OUT) is the outlet. Gently pull on line to check secure connection. If line pulls out, re-insert farther into fitting to engage locking clips. If high pressure line removal is required, firmly press in metal fitting ring to disengage locking clips while pulling hose from fitting.

Connect one of the BLACK wires from solenoid to the RED positive pump wire or the WHITE wire from the controller. Note that connecting the wire to any other power source other then the pump/controller wire will result in improper operation of solenoid. Connect the second BLACK wire to a secure chassis ground location.

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