



PERFORMANCE ELECTRONICS

Installation Instructions

for P/N 30-3000

Universal Water/Methanol

Injection Kit

Specifications

- 1 Gallon tank with integral level sensor
- 200 PSI injection pump
- Progressive pump controller with “Boost Safe” feature
- 20-amp pump driver with over-current, over-voltage and under-voltage protection
- Error protection output with over-current, over-voltage and over-temperature protection
- System status LED indicator; shows pump duty cycle and system errors
- Pump open and short detection and indication; works even if the pump is off
- Test button that manually triggers pump
- Two dial pump speed control

Parts List:

Quantity	Description
20 ft	High Pressure 1/4" Nylon Hose
1	1 Gallon Tank With Integral Fluid Level Sensor 10"h x 8.5"w x 4.25"d
1	200 PSI Pump With Integral Fittings
1	Progressive Injection Module

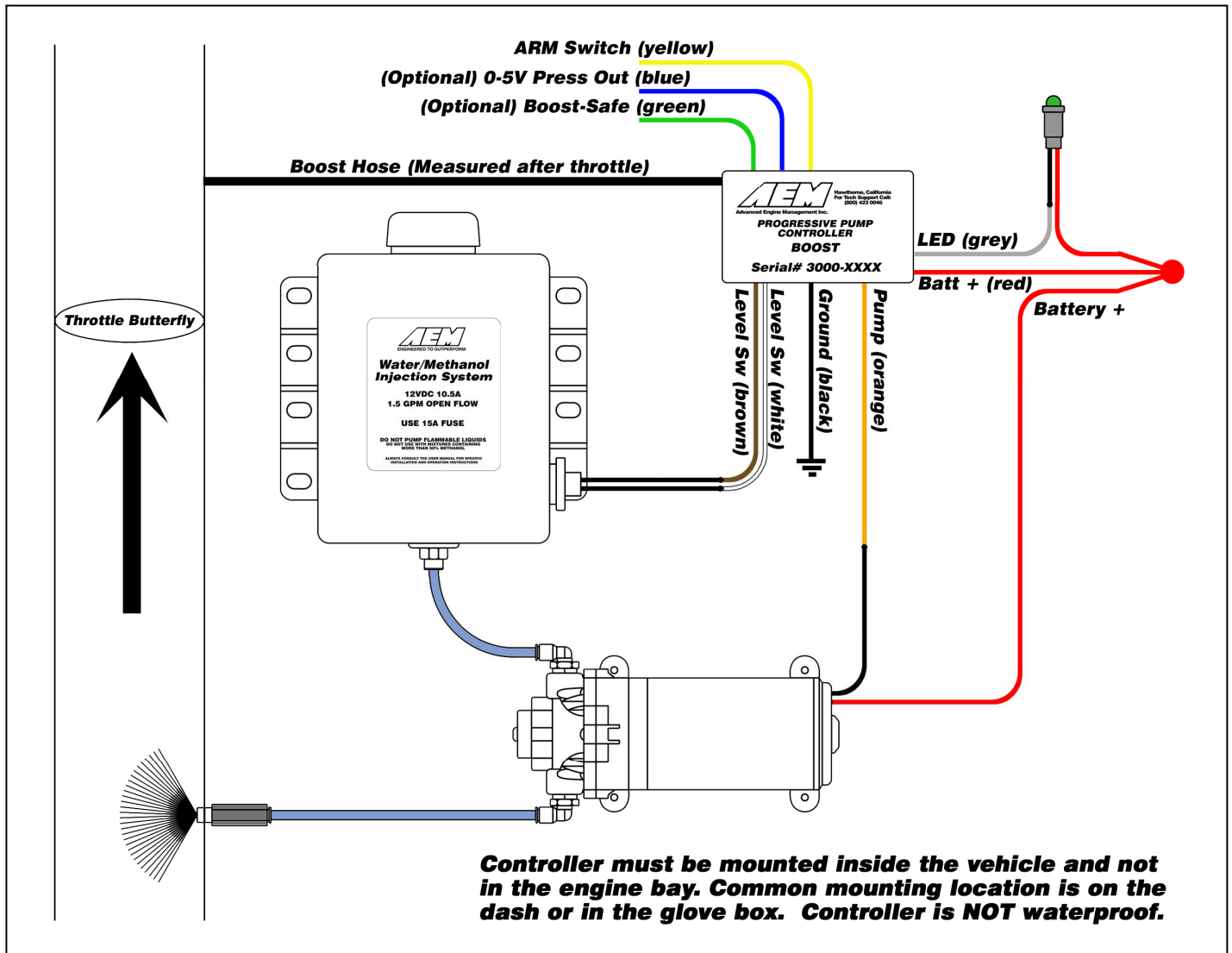
Injector Nozzle Kit:

Quantity	Description
1	Injector Assy w/ Medium (315ml/min) Jet
1	Jet, Large (550ml/min)
1	Nylon Washer

Mechanical Kit:

Quantity	Description
60 in	Vacuum Hose (7/64")
36 in	1/4" High Temp Wire Wrap
6 in	Edge Protector
1	3/16" Tee Fitting
10	6" Zip Tie
4	Bolt, Hex Head, 5/16-18 x 1.25"
4	Bolt, Hex Head, 8-32 x 1.5"
8	Screw, Pan Head #8 x 1.0"
4	Screw, Pan Head #6 x 0.5"
4	Nut, Nylock, 5/16-18
4	Nut, Nylock, 8-32
12	Washer, #8 x 3/4"
4	Washer, #8 x 7/16"
4	Washer, 5/16
4	Washer, Fender, 5/16
1	5mm Cockpit LED
2	Butt Connector, 14-16 AWG (blue)
9	Butt Connector, 18-22 AWG (red)
4	Ring Terminal, 14-16 AWD (blue)
1	1/4" Hose Routing Strip

Installation Diagram

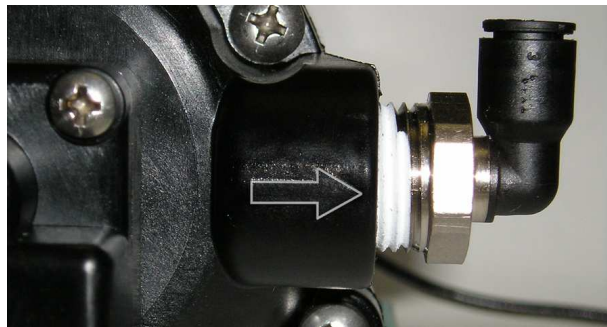


NOTE: THIS KIT INCLUDES NEW STYLE INJECTOR NOZZLES THAT HAVE INTERNAL CHECK VALVES. AN EXTERNAL CHECK IS NO LONGER NEEDED OR INCLUDED IN THIS KIT.

Pump and Tank Install

Find a suitable location to mount the tank and pump. Use 4 of the 8 supplied #8 sheet metal screws along with the 4 large washers or the 5/16-18 bolts and nylock nuts to mount the 1-gallon tank. Note: All tanks are tested for leaks during assembly. A special sealant adhesive is used to bond the plastic tank to the metal fitting. **DO NOT** attempt to tighten the fitting any further!

The pump must be located in the same area as the tank and should be mounted at or below the lowest fluid level height. Take note of the direction of flow, indicated by the arrows on the pump body, when mounting the pump. If the tank is mounted in the back of the vehicle the pump should be mounted in the back of the vehicles as well and **NOT** in the engine bay.



Use four #8 sheet metal screws along with the 4 small washers or the #8-32 bolts and nylock nuts to mount the pump. The pump can be mounted in any position horizontally or vertically. Once the tank and pump are mounted, cut the appropriate length of tubing needed to connect the outlet fitting on the tank to the inlet fitting on the pump. Make sure there are no sharp bends in the tubing. Cut the tubing to length with a clean perpendicular slice using a razor blade, making sure the ends are clean and square. Push in the hose at the tank and pump to install. Make sure they are pushed in all the way and check with a light tug on the hose. There is no need to tighten the pre-installed pump fittings as they have been installed and leak checked at the factory. Secure the hose to the chassis using sections of the supplied hose routing strip or with zip-ties.

Controller Install

The progressive controller is **NOT** waterproof and should **NOT** be mounted in the engine bay! Find a convenient location for the controller inside the driver's compartment. The adjustment access holes should remain in an accessible location but still be protected from possible water incursion. If you need to extend the wires to mount the controller use at least 14 AWG wire for the pump and controller ground circuits and 18 AWG for the remainder. The controller is internally fused, no additional fuses are required. Use the 2 supplied #6 screws to mount the controller.

LED Install

Find a suitable location in the driver's line of sight to mount the status LED. Mount the LED and run the wires to the controller. The LED indicates the operation of the controller. If the pump is off and there are no errors the LED will be off. If there are no errors and the pump is on the LED intensity will vary with the pump speed. If there are any errors they will be indicated by flashing the LED.

Boost Pressure Hose

Using the supplied vacuum tee and rubber hose, tap into a manifold pressure (boost) line.

Variable Controller Installation

Fluid Level Switch (The switch has 2 black wires, the polarity is unimportant)

Black wire connects to Controller - Brown wire

Black wire connects to Controller - White wire

LED

Red wire connects to Battery Positive

Black wire connects to Controller - Gray Wire

Pump

Black wire connects to Controller - Orange wire.

Red wire connects to Battery Positive

Variable Pump Controller

Black wire connects to Battery Ground

Red wire connects to Battery Positive

Yellow wire connects to Arm switch or Key On power (+12V power to turn on the system)

Green wire (optional), Boost-Safe output for timing retard or boost dump solenoid; 1.7a Max

Blue wire (optional) 0-5vdc pressure signal for use with data logger or EMS;

.328v = 0psig, 5vdc = 38psig; $PSI=8.1336 \times \text{Volts} - 2.6678$

Pump/Tank Flush

After all wires are hooked up, add water to the tank and with the hose pointed into a container, press and hold the "TEST" push button on the controller module. The flow will start gradually and increase to a steady amount. Repeat until you are sure the system is free of any debris that way have been in the lines or tank. Drain the water out of the tank and refer to the next section on installing the nozzle.

Nozzle Selection and Assembly

This injection kit includes two different sized injection jets that cover a very large range of horsepower levels. Use the following chart to select the appropriate jet for your power level. The kit comes with one medium nozzle already preassembled.

HP	Nozzle Selection
200-350	315 cc/min
350-600	550 cc/min

The nozzles are interchangeable and can be disassembled for cleaning. If you find excessive debris in the screen, check your tank for contamination. When installing the screen it is only necessary to be slightly tighter than finger tight. Do not over-tighten. The nylon washers are reusable but a spare is included.



Nozzle Mounting

Select the location where the nozzle will be installed. Nozzle must be mounted **before** the throttle plate. Nozzle should also be mounted **after** the MAF sensor if present. Nozzle must also be mounted **after** any intercoolers. In most instances, mounting the nozzle 6-8" ahead of the throttle body provides an excellent combination of air charge cooling and combustion control.

In most instances, the air charge piping can be drilled and tapped for 1/8" NPT to directly mount the nozzle. If using thin walled tubing it's suggested that a bung be welded to the piping. Mounting hole should be tapped deep enough to allow the end of the nozzle to be nearly flush with the interior of the intake once the nozzle is fully installed.

Pump/System Check

The "TEST" push button on the controller module can be used to test the system. Press and hold the button to activate the pump. The pump speed will gradually increase from zero to full speed over 6 seconds and then stop. When the button is released the controller will return to normal operation.

Add water to the tank and with the nozzle pointed into a container, press and hold the test button. The flow will start gradually and increase to a steady amount. If this happens then your system is connected properly. Check and repair any leaks. Drain the water out of the tank and install the nozzle.

System Error Checking

Whenever a system error is encountered, the Boost-Safe output is enabled. All errors are indicated by a flashing sequence of the status LED which can be determined by counting flashes. Only one error can be counted with the higher priority at the top of this list:

1. Low Fluid indication

Trigger Condition: The fluid level in the water-methanol tank is below the float level.

The status LED will flash a count of one and repeat. The pump driver will continue to drive the pump. If the level in the tank is enough to supply the pump with fluid, the controller will function normally. Fluid flow may be lost in this condition.

2. Pump Driver Open

Trigger Condition: Open circuit between pump drive and battery voltage.

The status LED will flash a count of two and repeat. The pump driver will continue to drive the pump. If the open is repaired the controller will function normally. Fluid flow may be lost in this condition.

3. Pump Driver Shorted

Trigger Condition: Current exceeding 15A on the driver output.

The status LED will flash a count of three and repeat. The pump driver will turn off to protect itself and automatically retry every second. If the short is removed the controller will function normally. Fluid flow is lost in this condition.

4. Battery Voltage Out Of Range

Trigger Condition: Battery voltage is below 8.5V or above 16V.

The status LED will flash a count of four and repeat. The pump driver will turn off to protect itself and automatically restart when the voltage returns to the normal range. Fluid flow is lost in this condition.

5. Water-Methanol Controller

Trigger Condition: Water-methanol controller no longer functioning

The status LED will flash a count of five and repeat. The pump driver will turn off to protect itself and automatically restart when the water-methanol controller works again. Fluid flow is lost in this condition.

Controller Settings

The controller will monitor the manifold pressure, battery voltage, potentiometer settings, push button and error conditions. Two potentiometers are used to set the pump pulse width modulation (PWM) rate. The “Start PSI” dial has a range from .5 psig (full counterclockwise rotation) to 11 psig (full clockwise rotation). This is the manifold pressure that the pump will start to operate. The “Full PSI” dial has a range of 6 psig (full counterclockwise rotation) to 38 psig (full clockwise rotation). This is the manifold pressure that the pump will be running at full speed. Additionally, the controller will automatically correct for battery voltage variations to give the same flow.



Adjust the “Start PSI” value by setting the dial to approx 25% of the vehicles maximum boost. Adjust the full-in value to your maximum possible boost (up to 38 PSig of boost).

Error LED

The controller has an “ERROR” LED. This will mimic the operation of the cockpit LED. It will flash out error codes as well as illuminate with varying intensity as a function of flow.

Short circuit testing

There are two modes of pump-driver short circuit protection available. One can detect a short at any time but produces a slight buzzing in the pump. This should not be noticeable under most conditions, but can be turned off if it is objectionable. If the less functional mode is chosen, then a short can only be detected when the pump is running. Pressing and holding the “Test” button while applying power toggles the mode. The change is acknowledged by a fast flashing (6 flashes and then repeats) of the status LED output and the on-board status LED. Once the button is released the controller will continue to function normally. You can also tell what mode has been selected by listening for the buzzing sound in the pump. Repeating this operation will toggle between the two modes.

Boost-Safe Output (optional)

The progressive controller includes a Boost-Safe output (grounded when active) that activates whenever the system is armed and runs out of fluid or an error code is flashing. The green wire on the controller is the 1.7 amp switched ground. This wire can be hooked up to a solenoid that will vent waste gate pressure when activated. Apply 12v to the other side of the solenoid (AEM P/N 30-2400 or equivalent). This output can also be used to trigger a timing retard function in a stand alone ECU or a CDI whenever the system runs out of fluid, thus protecting your engine.

Engine Tuning

Water/methanol injection is generally not considered a bolt-on power adder for forced induction gasoline applications. Engine tuning is usually required in order to maximize potential power gain. Water/methanol injection allows for a more aggressive tune to be used while still using pump gas as your base fuel.

Using a 50/50 mix of water/methanol is recommended for the best combination of air charge cooling and detonation control. With conservative boost and timing, establish a base AFR that is one point higher than your final target AFR. For example, if your final target AFR with water/methanol injection is 11.0:1, set your base AFR to 12.0:1. Once the base AFR has been set, start injecting water/methanol and adjust the injection flow rate to achieve your final target AFR. For example, if before injection your base AFR is 12.0:1 and then during injection your AFR drops to 10.5:1, reduce the water/methanol flow rate until your final target AFR is reached. It is generally recommended that the flow rate of the injection system be changed in order to reach your target AFR and **NOT** your primary fueling. Injection flow rate adjustments can be made by changing your nozzle selection or by adjusting the "Start PSI" and "Full PSI" settings.

Once the injection flow rate is set to deliver your desired final AFR, boost and ignition timing can be increased to take advantage of the additional air charge cooling and detonation control. When injecting the correct amount, a 50/50 mix of water/methanol has been shown to provide an effective octane of over 110 when using a base fuel of 91-93 octane pump gas. A properly tuned water/methanol injection system will usually support a typical "race gas" engine tune.

Important Safety Notice Regarding Methanol

AEM *strongly* recommends that users never exceed a 50% methanol concentration when using any AEM Water Methanol system or component.

All AEM water/methanol injection systems and components (pump, lines, fittings, filter, flow sensor, tank, and nozzles) are 100% chemically compatible with methanol. However, for safety reasons we strongly recommend that users never use more than a 50% methanol concentration in our systems.

Methanol is a toxic and highly flammable chemical. 100% Methanol ignites easily and burns vigorously with an almost undetectable flame. Methanol can be absorbed through the skin and even small amounts can cause blindness or even death. Using this fluid at high pressures, without dilution, in an under-hood environment with nylon lines and push-to-connect fittings is very unsafe. The performance advantages of using greater than 50% methanol concentrations are small, if they exist at all. However, the safety issues are very real and far out weigh any perceived benefit of running high concentrations of methanol.

Note: AEM holds no responsibility for any engine damage or personal injury that results from the misuse of this product, including but not limited to injury or death caused by the mishandling of methanol.

Cold Weather Operation

A Water/Methanol mix will also lower the freezing point of the fluid. Below is a chart with freezing points for different percentages of water/methanol mixtures.

Temperature	% of Methanol to Water
20 deg F	13
0 deg F	24
-15 deg F	35
-40 deg F	46

Maintenance

The injector nozzle should be cleaned periodically. Disassemble the nozzle and clean it with a suitable cleaner until all debris is removed. If excessive contamination is found check the rest of the system for the source.

Optional System Upgrades

Water/Methanol Injection Flow Gauge – AEM P/N 30-5141/30-5142



Displays flow rate data on a smooth moving needle-type gauge that allows you to accurately monitor the status of your injection system in real time. Available in max flow rates of 500 cc/min or 1000 cc/min with a black or white face. The AEM water/methanol injection filter is **HIGHLY RECOMMENDED** when using this flow gauge.

Water/Methanol Injection Filter – AEM P/N 30-3003



Inline filter that uses a micron mesh screen to filter out particles as small as 40 microns. Allows a cleaner flow of water/methanol into the injection pump, lines, and nozzles increasing overall system longevity. Injection filter is **HIGHLY RECOMMENDED** when using the AEM water/methanol injection flow gauge.

Additional Nozzle Kit – AEM P/N 30-3012



Includes one nozzle body, all three jet sizes, and the necessary hardware to run a second nozzle in your injection system.

5 Gallon Tank – AEM P/N 30-3010



Upgrade to a 5 gallon tank to maximize your fluid holding capacity. Includes level sensor and mounting hardware.

AEM Electronics warranty

Advanced Engine Management Inc. warrants to the consumer that all AEM High Performance products will be free from defects in material and workmanship for a period of twelve (12) months from date of the original purchase. Products that fail within this 12-month warranty period will be repaired or replaced at AEM's option, when determined by AEM that the product failed due to defects in material or workmanship. This warranty is limited to the repair or replacement of the AEM part. In no event shall this warranty exceed the original purchase price of the AEM part nor shall AEM be responsible for special, incidental or consequential damages or cost incurred due to the failure of this product. Warranty claims to AEM must be transportation prepaid and accompanied with dated proof of purchase. This warranty applies only to the original purchaser of product and is non-transferable. All implied warranties shall be limited in duration to the said 12-month warranty period. Improper use or installation, accident, abuse, unauthorized repairs or alterations voids this warranty. AEM disclaims any liability for consequential damages due to breach of any written or implied warranty on all products manufactured by AEM. Warranty returns will only be accepted by AEM when accompanied by a valid Return Merchandise Authorization (RMA) number. Product must be received by AEM within 30 days of the date the RMA is issued.