



***Installation Instructions for
30-3001
HD Water/Methanol Injection Kit
with 5 Gallon Tank***

WARNING:



Improper installation and/or adjustment of this product can result in major engine/vehicle damage! Use of this injection system requires proper tuning! Use this system with **EXTREME** caution! If you are uncomfortable with anything about this, please refer the installation to an AEM trained tuning shop or call 800-423-0046 for technical assistance. You should also visit the AEM Performance Electronics Forum at <http://www.aempower.com>

NOTE: AEM holds no responsibility for any engine damage that results from the misuse of this product!

This product is legal in California for racing vehicles only and should never be used on public highways.

ADVANCED ENGINE MANAGEMENT INC.
2205 126th Street Unit A, Hawthorne, CA. 90250
Phone: (310) 484-2322 Fax: (310) 484-0152
<http://www.aempower.com>
Instruction Part Number: 10-3001
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Specifications

- 5 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 ¼" Nylon Hose
1	5 Gallon Tank With Integral Fluid Level Sensor (9"h x 21"w x 8"d)
1	200 PSI Pump With Integral Fittings
1	Progressive Injection Module

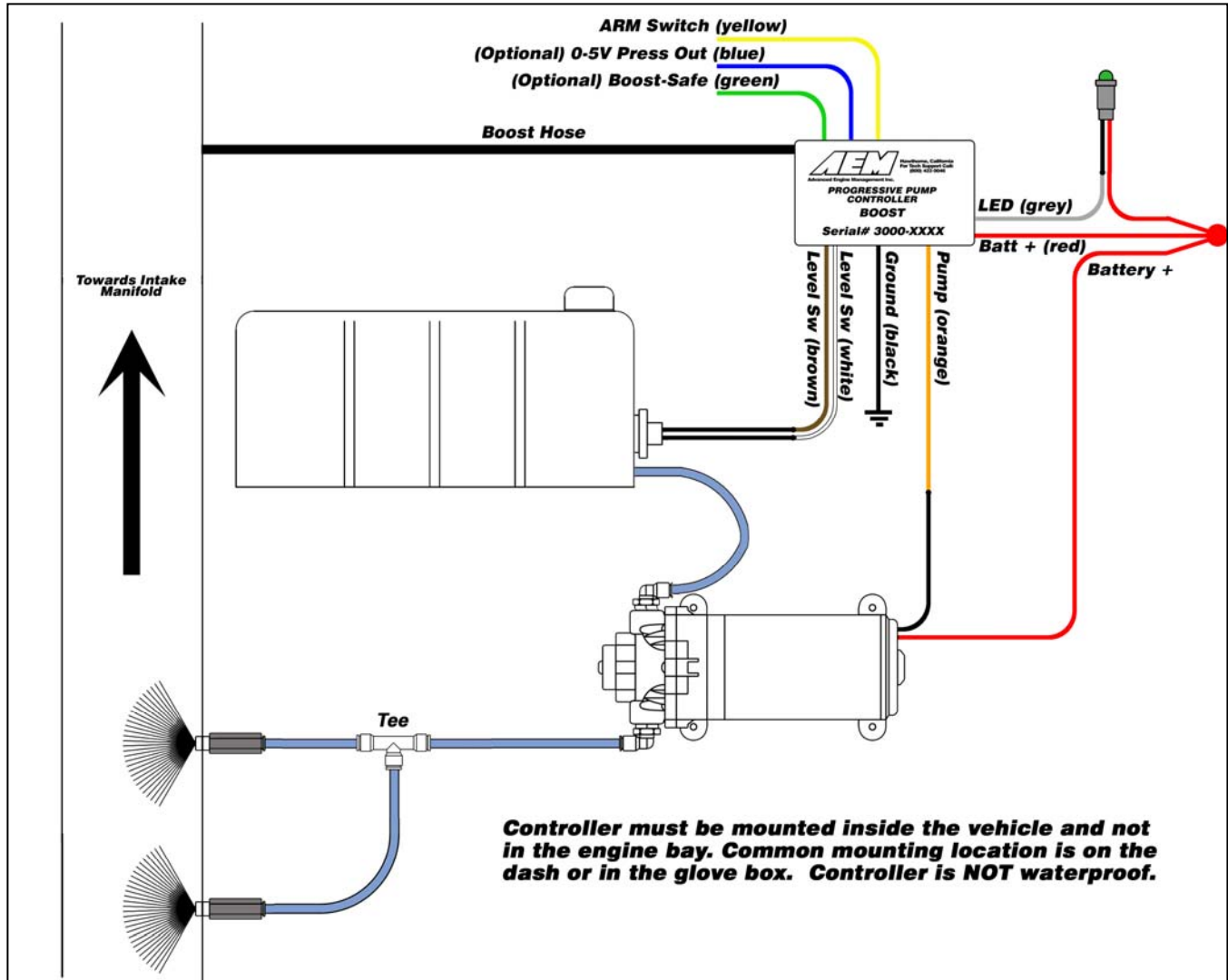
Injector Nozzle Kit

Quantity	Description
1	Injector Assembly with Medium (315ml/min) Jet
1	Injector Assembly with Large (550ml/min) Jet
1	Jet, Large (550ml/min)
1	Nylon Washer
1	Tee Fitting

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

System Diagram



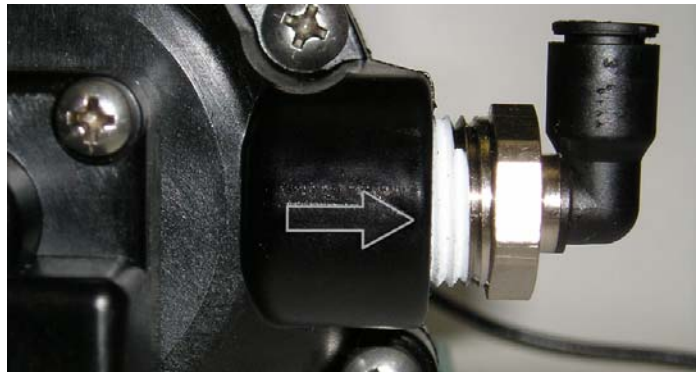
NOTE: THIS KIT INCLUDES NEW STYLE INJECTOR NOZZLES THAT HAVE INTERNAL CHECK VALVES. AN EXTERNAL CHECK IS NO LONGER NEEDED OR INCLUDED IN THIS KIT.

Tank and Pump Install

Before mounting the tank, check the area under the desired mounting location for fuel tanks, fuel lines, or any other obstructions. Mount the tank in an upright level position as shown below. Mark the four mounting points and drill with a 3/8" bit. Use the supplied 5/16-18 bolts, nuts, and large OD flat washers for mounting the tank into your vehicle. **IMPORTANT:** Use the supplied large OD washer to spread the load on the plastic mounting ears of the tank. **DO NOT OVERTIGHTEN!** Nuts should just be snug; they are locking nuts and will not loosen. Overtightening will crack the plastic and cause leaks and void the warranty.



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 and is non-polar)

One Black wire connects to Controller - Brown wire

Other 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 x 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" 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 may 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

One medium jet and two large jets are supplied with this kit. This selection of jets has been optimized for use on diesel trucks ranging from stock power levels up to 500+ horsepower. The included jets will also support 600+ hp on forced induction gasoline applications.

Diesel Applications:

HP	Nozzle Selection
<350	Single 550 cc/min nozzle
350-450	315 cc/min nozzle + 550 cc/min nozzle
>450	Dual 550 cc/min nozzles

Gasoline Applications:

HP	Nozzle Selection
<250	Single 315 cc/min nozzle
250-450	Single 550 cc/min nozzle
450-650	315 cc/min nozzle + 550 cc/min nozzle
>650	Dual 550 cc/min nozzles

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.



The kit comes with one medium and one large nozzle already preassembled. Use the above nozzle selection chart to find the appropriate nozzle or combination of nozzles to use. If using two nozzles, split the injection line using the included tee fitting and additional 2 foot long section of tubing as shown in the installation diagram.

Nozzle Mounting

Diesel Applications

Select the location where the nozzle(s) will be installed. In all applications, the nozzle(s) should be mounted after the turbocharger and intercooler and in a position where equal fluid distribution can be achieved. 5.9L Cummins vehicles will normally have the nozzle(s) mounted in the intake elbow. 7.3L Powerstroke vehicles will have the nozzle(s) mounted in the Y-pipe immediately before the main intake manifold. 6.0L Powerstroke vehicles will have the nozzle(s) mounted in the intake elbow at the front of the engine. Ideal nozzle mounting location on 6.6L Duramax vehicles is in the cast aluminum intake after the heater grid if present. Mounting the nozzle ahead of the turbo is **NOT** suggested.

Most OEM cast aluminum intakes are thick enough to be drilled and tapped to directly mount the nozzle(s). If installing the nozzle(s) in thin walled aluminum or steel intake piping it's suggested that a bung be welded to the tubing. Threads on nozzle are 1/8" NPT. 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.

If using two nozzles, mount the nozzles within close proximity of each other. The nozzles can be mounted in line with each other or at a different angle around the intake. Use the provided tee fitting to split the injection line as shown in the installation diagram.

If installing this injection system on a later model diesel vehicle that has a DPF system with an air control valve (throttle body), the nozzle(s) **MUST** be mounted **before** the air control valve. During regeneration the air control valve can close and create a substantial vacuum that can draw fluid out of the injection system if the nozzles are mounted after the air control valve.

Gasoline Applications

Select the location where the nozzle(s) will be installed. Nozzle(s) must be mounted **before** the throttle plate. Nozzle(s) should also be mounted **after** the MAF sensor if present. Nozzle(s) must also be mounted **after** any intercoolers. In most instances, mounting the nozzle(s) 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.

If using two nozzles, mount the nozzles within close proximity of each other. The nozzles can be mounted inline with each other or at a different angle around the intake. Use the provided tee fitting to split the injection line as shown in the installation manual.

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:

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.

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.

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.

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 20 psig (full clockwise rotation). This is the manifold pressure that the pump will start to operate. The FULL PSI dial has a range of 15 psig (full counterclockwise rotation) to 40 psig (full clockwise rotation). This is the manifold pressure that the pump will be running at full speed.



Adjust the “Start PSI” value by setting the dial to approximately 25% of the vehicles maximum boost. Adjust the full-in value to your maximum possible boost (up to 40 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. Note: usefulness of Boost-Safe output is somewhat limited on a diesel application. It is more meant to be used on a high output forced induction gasoline application.

Engine Tuning

Diesel Applications

Generally, water/methanol injection can be considered a “bolt-on” power adder for a diesel. Performance benefits can typically be realized without specific engine tuning. Additional power adders that increase the air and fuel flow into the engine typically complement the potential power gains achieved from water/methanol injection. Verify that any chips, tuners, and programmers being used are water/methanol injection compatible.

Using a 50/50 mix of water/methanol is suggested for the best combination of performance gains and exhaust gas temperature (EGT) reductions. A higher concentration of water can be used to help reduce EGTs even further however the potential for engine misfire is increased in low load conditions. Horsepower gained is proportional to the concentration of methanol used up to 50% methanol.

Over injecting water/methanol will cause a “diesel knock” sound as the engine misfires due to too much water being present in the combustion chamber. If this occurs, immediately let off the accelerator pedal and adjust the controller to reduce the flow rate at that boost level. If controller adjustments do not alleviate the over injection condition, step down to the next smaller size nozzle or nozzle combination. Generally, the best performance gains are achieved when the final injection rate is just below the misfire threshold.

Highly modified diesel vehicles (double or triple stacked controllers, larger injectors, etc.) that are significantly overfueled (excessive black exhaust smoke) may need a higher flow rate than recommended in this instruction manual. EGT reductions from water/methanol injection on a diesel engine that is grossly overfueled can be decreased considerably.

Gasoline Applications

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.

Engine Tuning – Gasoline Applications Cont.

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/Meth 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 PN 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 PN 30-3003



Inline filter that uses a micronic 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.

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.

Please note that before AEM can issue an RMA for any electronic product, it is first necessary for the installer or end user to contact the EMS tech line at 1-800-423-0046 to discuss the problem. Most issues can be resolved over the phone. Under no circumstances should a system be returned or a RMA requested before the above process transpires.

AEM will not be responsible for electronic products that are installed incorrectly, installed in a non approved application, misused, or tampered with.

Any AEM electronics product can be returned for repair if it is out of the warranty period. There is a minimum charge of \$50.00 for inspection and diagnosis of AEM electronic parts. Parts used in the repair of AEM electronic components will be extra. AEM will provide an estimate of repairs and receive written or electronic authorization before repairs are made to the product.