

# BOOST COOLER™

**INSTALLATION INSTRUCTIONS  
FOR PART #45005  
DIESEL STAGE 3 MPG-MAX™  
WATER / METHANOL INJECTION  
SYSTEM  
Volkswagen/Audi TDI**



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## Kit Contents

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### Parts

- 2.5 Gallon Reservoir with Mounting Straps.
- UHO Pump (Ultra High Output)
- 24 ft High Pressure Tubing
- 3 ft Black Wire Loom
- 18" 1/8" Silicone Tubing

### Electrical Packet

- 2 Blue Butt Connectors
- 3 Small Eyehooks
- 1 Male Connector
- 3 Female Connectors
- 10 Tie Wraps
- 1 Arm Switch
- 1 Brass Hose Barb
- 5" Double Sided Adhesive
- Diesel Stage 3 MPG Max Controller
- 20 amp fuse
- Fuse holder

### Mechanical Packets

- 1 Nozzle Holder
- 4 #8x1&1/2" Screws
- 4 #8 Washers
- 1 Dual Nozzle Upgrade
- 2 Solenoid Upgrade
- 2.5 Gallon Fitting Set
  - 90° Elbow
  - 3/8" - 1/8" Reducer
- 1 E-6000® (GOOP)
- 1 60ml/min Nozzle
- 1 100ml/min Nozzle
- 1 175ml/min Nozzle

### Upgrades

- Hose Adaptor or Bung
- Boost Juice
- Level Switch

### Required Tools

- Electric Drill w/ Drill Bits
  - Utility Knife
  - Screwdriver – Phillips
  - Assorted Wrenches
  - 1/8" -27 NPT Tap
  - 1/8" brass hose barb for certain applications
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**NOTE:** The shielded 2 wire harness can be tied out of the way. It allows the MPG-MAX controller to display EGT data when it is connected to an EGT probe. This is optional, and not needed for the system to work properly.

## Installation - Mechanical

### Step 1 Reservoir Install



2.5 Gallon Tank Mounted in Trunk

- Install white reducer bushing into reservoir outlet. Use a small amount of E6000® sealant on the threads. Do not use Teflon sealants on Snow Performance fittings. Using a small amount of E6000® sealant, install the 90 degree elbow into the reducer bushing. Turn approximately ½ turn past finger tight.
- Test fit reservoir in desired mounting location. Note the locations of the bolt holes on the mounting straps. Avoid the spare tire well as a mounting point as much as possible. Note that the straps can be bent to fit as desired.
- Check the area under the floor pan near the desired mounting location. Note the location of fuel tanks, fuel lines, and wiring.
- Mark the location of the four aluminum mounting strap tab bolt holes.
- Drill through floor with appropriately sized drill bit. **USE CAUTION WHILE DRILLING.** Note that in many models the mounting hardware will need to go through the removable carpet/floor parts.

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- Mount reservoir with aluminum mounting straps using appropriate hardware.

## Caution\*\*\*\*\*

To avoid gravity feeding of fluid with rear mount reservoirs, it is essential to use a solenoid in-line between the reservoir and pump. **Do not operate** your rear mount equipped vehicle without a solenoid installed.

### Step 2 Pump Install

Mount the pump so the inlet is positioned lower than the reservoir, or on the floor next to the reservoir. 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.



Pump Mounted below trunk opening.

Pump can be mounted directly below trunk opening if desired (as seen above). This does require routing the tube through the plastic panel in

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order to have shallow connection angles from the tube to the pump. The pump can also be mounted on the floor near the pump as well.

Measure the tube from the reservoir outlet to the pump inlet, and cut neatly with a sharp utility knife or razor blade.

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## Caution\*\*\*\*\*

Pump must be shielded from road debris and tire wash. Failure to do so will result in pump failure

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### 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 for TDIs:

HP	MPG MAX	POWER MODE
Stock	60 ml/min	175 ml/min
150 - 200 WHP	60 ml/min	225 m/min

**TECH TIP** Seal the nozzle into the nozzle holder using 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 E6000® 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 Snow Performance fittings.



Correct



Incorrect

### Step 4 Nozzle Mounting

The nozzle assembly should be installed 90° to the direction of airflow. On rounded 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. Choose and mark mounting location on air intake for nozzle placement.



**Nozzle mounted to charge pipe before EGR plate assembly. This view is from underneath the car, on the driver side.**

An ideal location for the nozzles is on the hard plastic intercooler charge pipe before the inlet to the intake manifold, as shown above. Drill and tap (1 1/32" pre-drill, 1/8"-27 NPT tap) for two nozzles. Tap carefully, test fitting the nozzles to ensure a snug fit. The nozzles can be placed virtually anywhere between the intercooler outlet and the intake inlet as long as they have a clear spray pattern. Be sure the nozzle tip is flush or protruding from the inside wall of the charge pipe. Be sure to remove all shavings from the charge pipe after drilling and tapping.

The nozzle is mounted into the intake using its external 1/8 NPT threads. Tighten the nozzle and nozzle holder assembly 1/4 to 1/2 turn past hand tight using E6000® sealant to seal the threads.

### Step 5 Nozzle and Solenoid Connection

Refer to the installation diagram.

**The main outlet line coming from the Reservoir connects to the solenoid inlet. The outlet of this solenoid connects to the inlet of the pump. The outlet of the pump connects to the Union "T". One**

**outlet of the tee goes to the small MPG-MAX™ nozzle and the other outlet of the tee connects to the solenoid. The outlet from the solenoid will connect to the POWER MODE nozzle(s).**

Measure the distance from the pump outlet to the injection location. Cut the 1/4" red tubing using utility knife. Make cuts 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.



The factory brackets under the aero-tray on the underside the vehicle are convenient for routing tubes and wires from the back to the front of the vehicle. The solenoid can be mounted under the driver's side headlight in many applications, using the included tie-wraps.

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## Installation - Electrical

### Variable Controller Installation



Attach controller to secure location with easy access in driver's compartment using supplied adhesive strip. Connect black silicone tubing from intake plenum boost line (use included boost 'T') to clear tubing coming from the controller and secure with a tie wrap.

**⚠ 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.
- Connect WHITE wire to Pump RED power wire.
- Connect GREEN wire to one BLACK wire from Power solenoid. Connect solenoid BLACK wire to ground.
- Connect RED wire to +12V key on source with inline switch. Often the auxiliary power port in the center console is an ideal key-on power source.
- The shielded cable can be tied out of the way, or used in conjunction with a standard K-Type temperature probe to monitor EGTs.



**Have a good electrical ground connection. Poor ground will result in erratic operation of controller.**

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## Controller Operation

The controller has an LCD display screen. The display software allows for seven different display modes and three control/setup screens.

To control the screen selection, the unit has two operator buttons; one to the left of the screen (button 1) and one to the right of the screen (button 2). Pressing and releasing button 1 will cause the display to sequence to the next screen. Button 2 is only active in the control/setup screens, and is used to change the current control setting of the setup screen displayed.

The system memory will remember the current display setting even if the unit is turned off. The controller will turn on at the last used display setting.

Additionally, button 2 is used for the "Injection ON/OFF" function.

**Pressing and holding button 2, then pressing button 1, then releasing both buttons simultaneously will change the system to read only without changing the display screen. The pump will not activate in read only. All screen display functions will remain active even when the injection is turned off. To get the controller out of read only mode, just repeat the procedure.**

### Screen 1

P	T
Inj	

This mode displays pressure (P), temperature (T) and injection percentage (Inj) as three independent bar graphs.

### Screen 2

Boost
EGT

This mode displays the boost pressure and EGT temperature in PSI and degrees F.

### Screen 3

Boost
EGT

This mode displays the boost pressure and EGT temperature in BAR and degrees C.

### Screen 4

PSI	DegF	T
	%Inj	

This mode displays the boost, EGT and injection in Standard units.

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### Screen 5

BAR DegC  
%Inj

This mode displays the Boost, EGT and Injection in Metric units

### Screen 6

PSI  
DegF

This display shows both digital and bar graph readings for boost and EGT in Standard units.

### Screen 7

Bar  
DegC

This display shows both digital and bar graph readings for boost and EGT in Metric units.

### Screen 8

Injection Mode  
Change

This is the mode selection screen for the control mode. Pressing the right button (# 2) will toggle the setting between MPG Mode and Tow Mode. TDI's use MPG Mode.

### Screen 8A

MPG Mode Start  
PSI Up

MPG MODE START - UP. Pressing and releasing button 2 will increase the injection activation point. **Set this so that injection starts at boost levels just above normal cruising conditions. Typically this is about 10 PSI**

### Screen 8B

MPG Mode Start  
PSI Down

MPG MODE START - DOWN. Pressing and releasing button 2 will decrease the injection activation point.

### Screen 8C

MPG Mode 100%  
PSI Up

MPG MODE 100% - UP. Pressing and releasing button 2 will increase the maximum injection point. **This should be set at about 20 psi in most applications to ensure a gradual ramp-up in injection. It can be set higher than the actual maximum boost to create a very mild injection curve.**

### Screen 8D

MPG Mode 100%  
PSI Down

MPG MODE 100% - DOWN. Pressing and releasing button 2 will decrease the maximum injection point.

### Screen 9

Boost Range  
Change

This screen is used to select between LOW, MED, and HI boost mode. **This setting will only affect Tow mode and will not appear when the system is set to MPG mode.**

### Screen 10

Inj Gain  
Increase

This screen is used to increase the injection gain setting. Pressing and releasing button 2 will increase the gain setting. **This setting affects the injection volume in Tow mode only. It will not appear when the controller is set to MPG mode.**

### Screen 11

Inj Gain  
Decrease

This screen is used to decrease the injection gain setting. Pressing and releasing button 2 will decrease the gain setting.

### Screen 12

Power Mode Start  
Up

POWER MODE START - UP. Pressing and releasing button 2 will increase the Power Mode injection activation point. **Set this at 6-10 psig before maximum boost. Typical Power mode start points are between 15 and 20 psi.**

### Screen 13

Power Mode Start  
Down

POWER MODE START - DOWN. Pressing and releasing button 2 will decrease the Power Mode injection activation point.

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## Variable Controller Tuning

### **MPG Mode**

This the proper mode for TDI applications. It controls injection based on boost pressure, and controls both the small MPG nozzle and the larger Power nozzle.

- Toggle to Screen 8. Set to MPG Mode.
- Toggle to Screen 8A/B. Adjust the start point up or down.  
Typical start points are in the 8-12 psig range.
- Toggle to Screen 8C/D. Adjust the full 100% point up or down.  
Typical 100% points are between 15 and 25 psig.
- Toggle to Screen 12/13. Adjust the POWER MODE activation point up or down. Initially set the POWER MODE start point to activate at 6-10 psig of your maximum boost pressure. If the max boost pressure is 27 set the POWER MODE start point to 20 psig. If the max boost pressure is 23 set the POWER MODE start point to 18 psig.

An application making 23 PSIG and about 150HP should set the MPG Mode Start at 10 PSIG, the MPG 100% at 20 PSIG, and the Power mode at 16 PSIG.

This will result in a very gradual increase in injection between 10 PSIG and 16 PSIG, with a more aggressive increase after that, with maximum injection occurring at 23 PSIG.

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## **ADJUSTING THE CONTROLLER**

The MPG MAX phase of injection is meant to inject a small amount of fluid during moderate load cruising, as in a passing maneuver, normal acceleration from a stop, or on an uphill grade. If combustion quench occurs as evidenced by engine bucking or bogging, too much fluid is being injected too soon. To prevent quench try each of the following:

- Toggle to Screen 8A. Adjust the MPG MODE START point to come on at a higher boost level.
- Set the MPG 100% point higher.
- Set the MPG Start point higher.

If quench occurs when the POWER MODE activates try each of the following:

- Toggle to Screen 12. Adjust the POWER MODE START point to come on at a higher boost level.
- Change out POWER MODE nozzle to the next size smaller.

## **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 is 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).

**If using a solenoid in between the pump and the reservoir:** Remove the solenoid and place a solid piece of tube between the pump and the reservoir and prime the system. Then replace the solenoid in between the pump and reservoir.

### Step 1 Test Pump and Mechanical System

Disconnect pump from controller. Using a 12 volt source, apply power to red wire of pump. Pump should activate and fluid level in tank should go

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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 pump for short periods (2 - 5 sec.) will not cause engine damage.

## Step 2 Test Controller

- With the nozzles removed from the intake, place the controller in MPG mode.
- Disconnect the silicone boost line from the boost 'T' on the intake plenum boost line.
- Using an air compressor, apply 10-20 psig of pressure to the boost line going to the controller.
- Pump should activate, fluid should flow, and tank level should go down.

## Tuning Quick Reference

If combustion quench occurs as evidenced by engine "bucking", reduce the injection quantity. This can be done by:

- Increasing the MPG injection points and the Power mode injection point.
- Use a smaller Power nozzle.

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## Caution\*\*\*\*\*

**Prolonged quench may cause lower engine damage over a period of time.**

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Also, fresh methanol – less than 1 month old when exposed to atmosphere – and using a greater methanol concentration – up to 50% - will reduce combustion quench.

100% water will cool combustion and EGTs and will increase power approx 5-10 HP.

75/25 water/methanol will reduce EGTs and power will increase approximately 10-15 HP.

50/50 water/methanol will reduce EGTs and increase power approximately 15-20 HP.

**Caution:** To avoid "pooling" in the intake it is recommended that:

1. The engine be run without water/methanol for at least 5 minutes after injection before turning the engine off if it has been in a high load state for a long period of time.
2. The "armed switch" is turned to the off position when the engine is off.

**Caution:** Do not attempt to inject water/methanol until the engine has reach operating temperature. A cold engine is more susceptible to quench and poor performance.

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

**The Boost Cooler® has been designed to operate with high concentrations of methanol. Oil or other additives are not required for system lubrication.**

**For best performance, cooling and system life it is recommend that Snow Performance Boost Juice™ (#40008) be the exclusive fluid used in the system.**

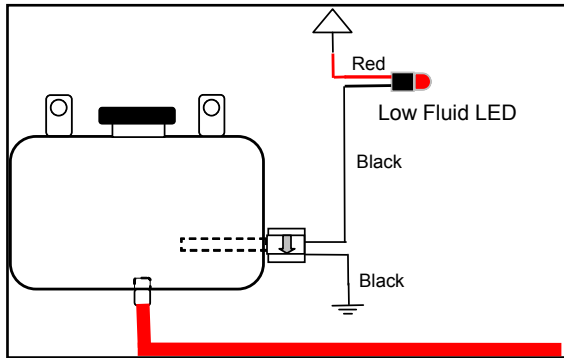
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## Fluid Level Switch (optional)



### 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.

