

MOTORVAC[®]

CarbonClean[®] Dual

Complete Fuel System Cleaning Center

Part No. 500-0352



USER MANUAL

**ISO 9001
CERTIFIED**

Introduction

Congratulations on your selection of the CARBONCLEAN® DUAL SYSTEM. By choosing this product, you are acquiring the most technologically advanced method available for cleaning harmful fuel system contaminants from gasoline & diesel engines.

The MCS 352 is a self-contained cleaning system, designed to connect to any gasoline or diesel engine (up to 7.3L). Once the unit is connected, it temporarily replaces the regular fuel supply with a mixture of fuel and the specially formulated CarbonClean® Cleaning Detergent.

With the engine idling, the unit pumps the fuel/detergent mixture through the vehicle's fuel system. As the mixture passes through the fuel system, it loosens and dissolves accumulated deposits, which then pass harmlessly out through the exhaust system or are removed by the unit's fuel filter. Removing contaminants from the combustion chamber creates a more even burn of fuel, which improves horsepower, increases fuel economy, and reduces exhaust emissions.

Please refer to the chart below for the recommended service intervals:

| RECOMMENDED SERVICE INTERVALS | |
|---|---|
| Type of Vehicle | Mileage |
| Automotive - Gasoline | 12,000 - 15,000 miles or 19,000 - 24,000 kilometers or once a year |
| Automotive - Diesel Light-Duty Trucks | 12,000 - 15,000 miles or 19,000 - 24,000 kilometers or once a year |
| Automotive - Diesel Medium to Heavy Trucks | 60,000 - 100,000 miles or 97,000 - 161,000 kilometers or 1600 to 1800 hours of operation |

IMPORTANT

The MCS 352 Fuel System Machines are designed to work
EXCLUSIVELY

With CarbonClean® Cleaning Detergents.

Use of any other chemicals during this process may cause
operational failure

of the MCS 352 and voids the manufacturer's warranty.

See warranty card for details.



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Getting to Know the CarbonClean® Dual



Front Features

Control panel – All of the electronic and fluid controls are located here

Gasoline/Petrol Side – All of the controls, hoses, tank and filter are located on the left side of the machine.

Diesel Side – All of the controls, hoses, tank and filter are located on the right side of the machine.

Adapter Storage



Rear Features

Power Cable – Connect to vehicle's battery to power the machine

Gasoline/Petrol Side – Gasoline/Petrol tank and spin on filter

Diesel Side – Diesel tank and spin on filter

Control Panel Features and Functions



| | |
|----------|--|
| A | Gasoline/Petrol pressure control - Always start the machine with the regulator turned counter clockwise. Do not exceed 100psi. |
| B | Diesel pressure control - Always start the machine with the regulator turned counter clockwise. Do not exceed 100psi. |
| C | On/Off switch – Turn on or off main power to the unit. Amber light is illuminated when on. |
| D | Start button - Press and hold to begin a service cycle. Pressure must be greater than 5 psi to perform a service. Green light illuminates when the pump is on. |
| E | Service Selector button – Press to the left before performing a gasoline/petrol service or press to the right before performing a diesel service. |
| F | Service timer – The timer must be set before beginning a service, the timer can be set between 1-60 minutes. Typical service time 30 mins. |
| G | Alarm – The alarm sounds when the unit is turned on and pressure is less than 5psi or the timer has expired. |
| H | Circuit breaker. |

Safety Information

Please become familiar with all safety procedures described in this chapter.

IMPORTANT

Failure to observe these precautions, or the improper use of equipment, could result in property damage or serious injury. Follow the safety procedures in this chapter each time the unit is used

When using chemicals always refer to the MSDS sheets and manufacturer's instructions for the proper procedure for emergency medical treatment, cleanup, handling and storage requirements.

Safety Before Starting

Follow these safety procedures before starting any service with the unit.

Ventilate the Work Area.

To avoid breathing harmful fumes and exhaust, make sure the unit is always used in a well ventilated area, away from all flames, sparks, and other ignition sources.

Keep a Fire Extinguisher On Hand.

Keep an approved fire extinguisher within easy reach.

Check Oil and Coolant Levels.

Check engine oil and coolant levels and add oil or coolant if necessary.

Check Polarity.

Always use proper polarity on battery posts. When connecting the unit to a battery, connect the positive (red) battery lead to the positive (+) battery terminal. Connect the negative (black) lead to the negative (-) battery terminal (11-15 VOLTS DC).

Avoid Open Flames and Sparks.

Keep lighted cigarettes, open flames, or other ignition sources away from the battery.

Use Caution at All Times.

Use safety goggles and keep hands, hair, loose clothing, and jewelry away from the battery, fan blades, belts, and other moving parts of the vehicle engine.

Ensure Vehicle is safe

Before beginning a service ensure the vehicle is in satisfactory condition (i.e. broken or loose fuel lines, ignition wires, battery cables, electrical wires, fuses and relays.)

Safety When Connecting/Disconnecting Hoses

Fuel systems maintain residual pressure in fuel lines even after the engine has been turned off.

Use caution when opening any fuel line.

Avoid Spills.

To avoid fuel spills, wrap a clean shop cloth around fittings when connecting or disconnecting any hoses or adapters.

Remove Ignition Sources.

Remove all ignition sources such as lit cigarettes, matches, etc., when working with fuels and detergents.

Safety During Service

Follow these safety instructions whenever the unit is being operated.

Consult Manufacturers Service Manual

Use manufacturer's service manual for test procedures and fuel system specifications (i.e. fuel pressure).

Clean Spills Immediately.

Clean up all gasoline or detergent spills immediately and make sure to use a proper container for disposal.

Check All Fittings.

Check all fittings and fuel lines for leaks before, during, and after performing a cleaning service.

Secure Fuel Lines.

Keep fuel lines away from hot manifolds and all moving components.

WARNING



Flammable Liquid can squirt out of pressurized lines when connecting or disconnecting.
Verify that engine and machine are both off before connecting or disconnecting fuel lines or adapters.
Wear safety goggles.
Wear chemical resistant gloves when connecting or disconnecting fittings and adapters.
Wrap a shop towel around pressure fittings and adapters when disconnecting.
Avoid exposure to flames, sparks, hot engine parts, and other ignition sources.
Explosion or flame or exposure to flammable liquid and vapors can cause injury.

Gas (Petrol) Service

First Time Operation

The following process is used to flush factory testing fluids out of your new machine, and is only necessary before the first time you use the unit.

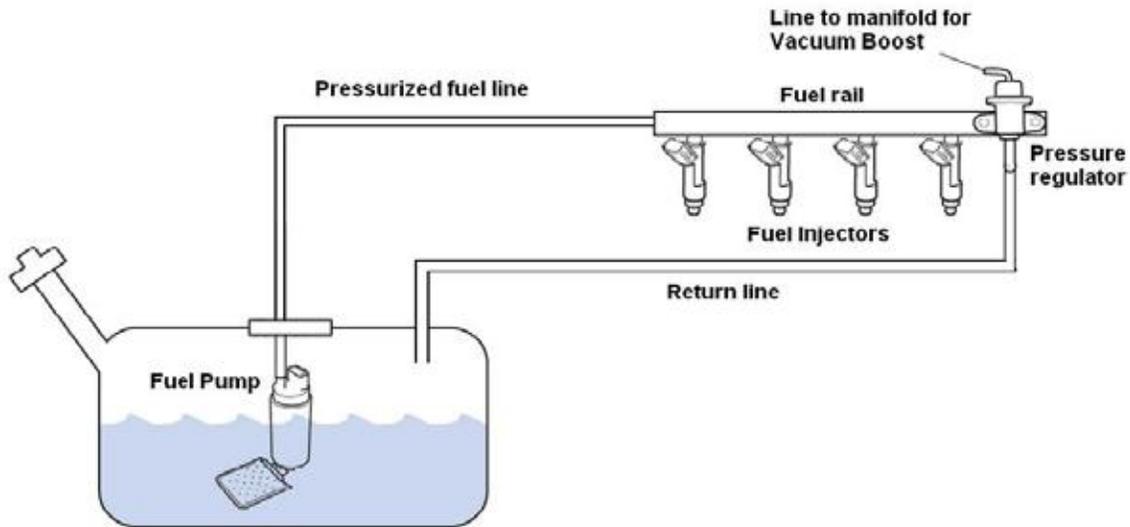
1. Remove the filter from below the Gasoline (Petrol) tank and fill it completely with fuel and replace it on the unit
2. Turn the Gas (Petrol) PRESSURE REGULATOR on the unit's control panel counterclockwise until it is completely open.
3. Attach the unit to the vehicle's battery by connecting the red battery clip to the positive (+) battery terminal and the black battery clip to a solid ground point as far from the battery as possible.
4. Fill the reservoir on the Gas (Petrol) side (LHS when facing the front of the machine) with clean gasoline (petrol) until the tank level indicates 1/4 tank. See notes on page 8 for alternate filling procedure.
5. Connect the output (red) hose and return (black) hose together by any 2 mating adapters.
6. Press the SERVICE SELECTOR switch to the left to select Gasoline (Petrol) FUEL SYSTEM SERVICE.
7. Set the TIMER knob for five minutes (the pump will not run unless the timer is on)
8. Press the ON/OFF switch to the ON position. NOTE: Alarm will sound continually until pump starts.
9. Press and hold the START switch for a minute.
10. Release the START switch and turn the ON/OFF switch to the OFF position.
11. Disconnect the output and return lines.
12. To drain the Gas (Petrol) disconnect the adapter from the return (black) hose.
13. Direct the adapter on the end of the output (red) hose to an appropriate reservoir.
14. Turn ON/OFF switch to ON position and press and hold START switch. When all the gas is pumped out release the START switch and turn the ON/OFF switch to the OFF position.
15. Dispose of the fuel in an environmentally approved method.

Gas (Petrol) Service

Fuel System Types

Before beginning a service determine if the vehicle being serviced has a return or returnless fuel system.

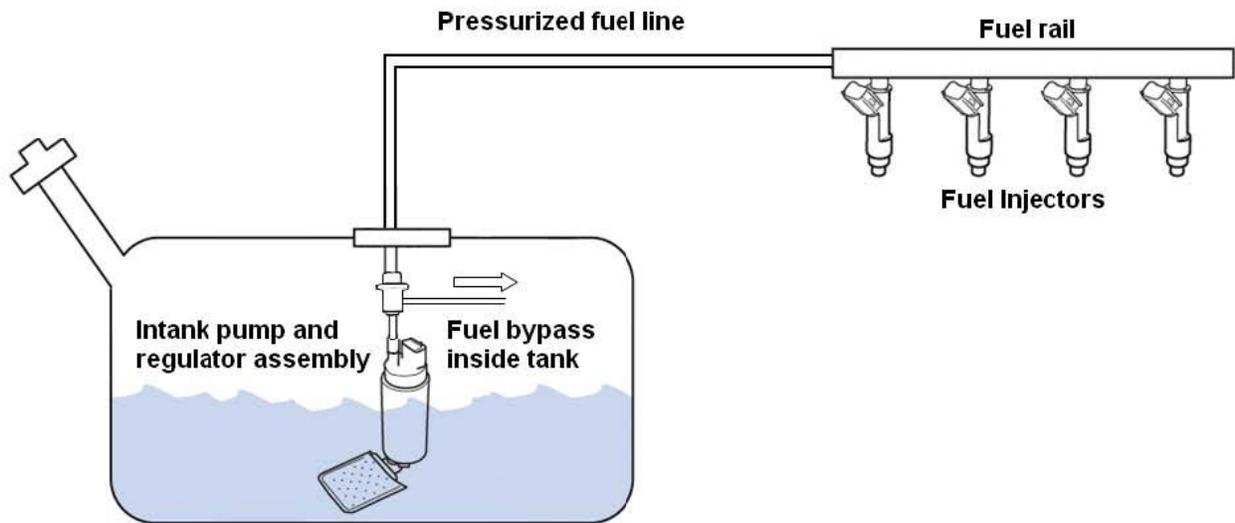
Return Fuel System



A return system has 2 fuel lines, one from the fuel tank to the fuel rail and one returning to the fuel tank. A regulator maintains the correct fuel rail pressure by returning any excess fuel back to the tank. These systems work by having a pressure regulator at the end of the fuel rail that returns any excess flow back to the tank. The regulator has a connection to the intake manifold to allow for a slight boost of pressure as the throttle is opened. It is never recommended to deadhead a pump on a vehicle with a return fuel system.

Gas (Petrol) Service

Returnless Fuel System



The main advantage of this type of system is a reduction in evaporative emissions as excess fuel does not get heated and returned to the tank. There are 2 sub categories of returnless fuel systems. Mechanically controlled and electronically controlled.

Returnless (pressure controlled mechanically)

This is a typical returnless system seen on most vehicles since the late 90s. In this type of fuel system the pressure regulator is part of the pump module, and all excess fuel bleeds off internally within the tank. It is completely safe to 'dead head' the pump when connecting at the fuel rail because the connection is after the regulator. This is essentially how the fuel system functions with the fuel rail being a dead end that only uses a small amount of fuel under conditions such as idling.

Returnless (electronically controlled)

This type of system has pressure sensors at the fuel rail that feed back information to the PCM (power-train control module). The PCM controls the pump speed with pulse width modulation to supply more fuel when it is needed and less when it is not. The pressure is not constant in these fuel systems as the pressure target changes based on engine speed, throttle position and ambient conditions. There is still a mechanical relief in the fuel pump module but it will be set at the peak system pressure. Deadheading the pump on a vehicle like this will not damage the pump but will likely result in unexpected behaviour from the vehicle as the PCM will modulate the speed of the pump and not see the pressure it expects. It is never recommended to dead head a pump in this type of system.

Gas (Petrol) Service

Filling and Mixture Setup

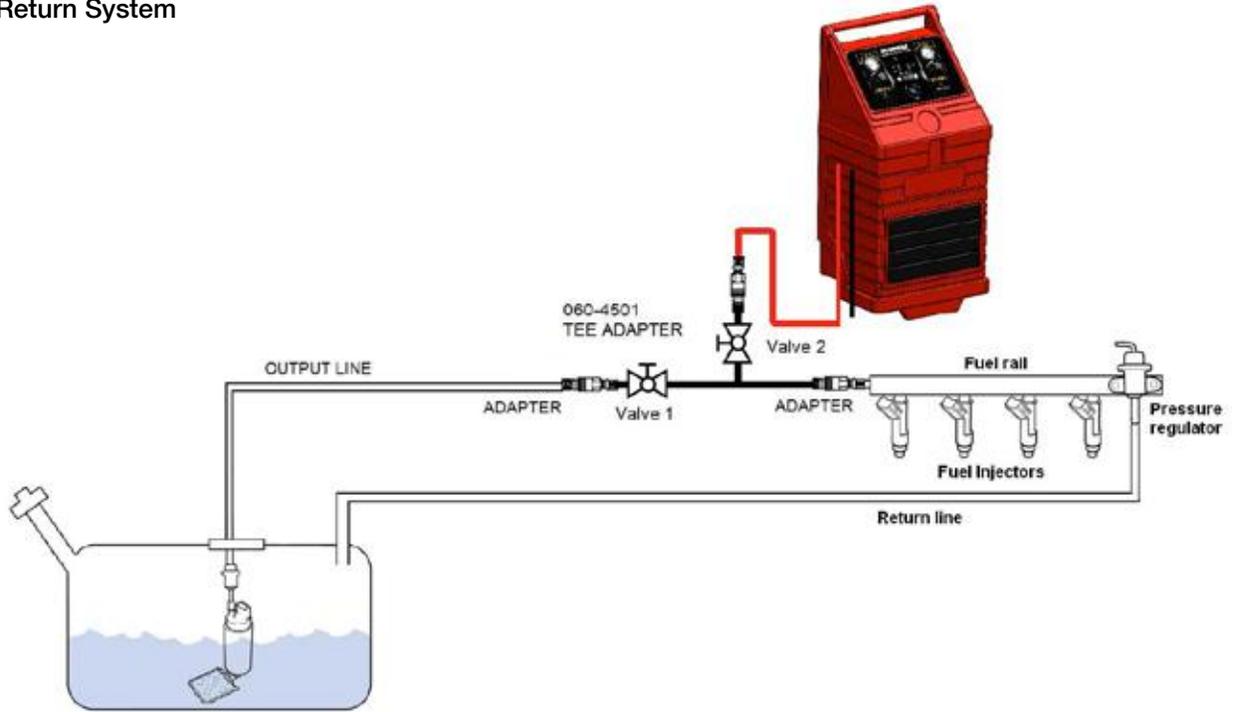
The proper ratio of Detergent : Gasoline (Petrol) is 1:3

Gasoline can be with poured into the Carbon Clean Dual's tank or extracted from the vehicle being serviced. The following steps show how to extract Gasoline (Petrol) from the vehicle to mix in the ratio listed above.

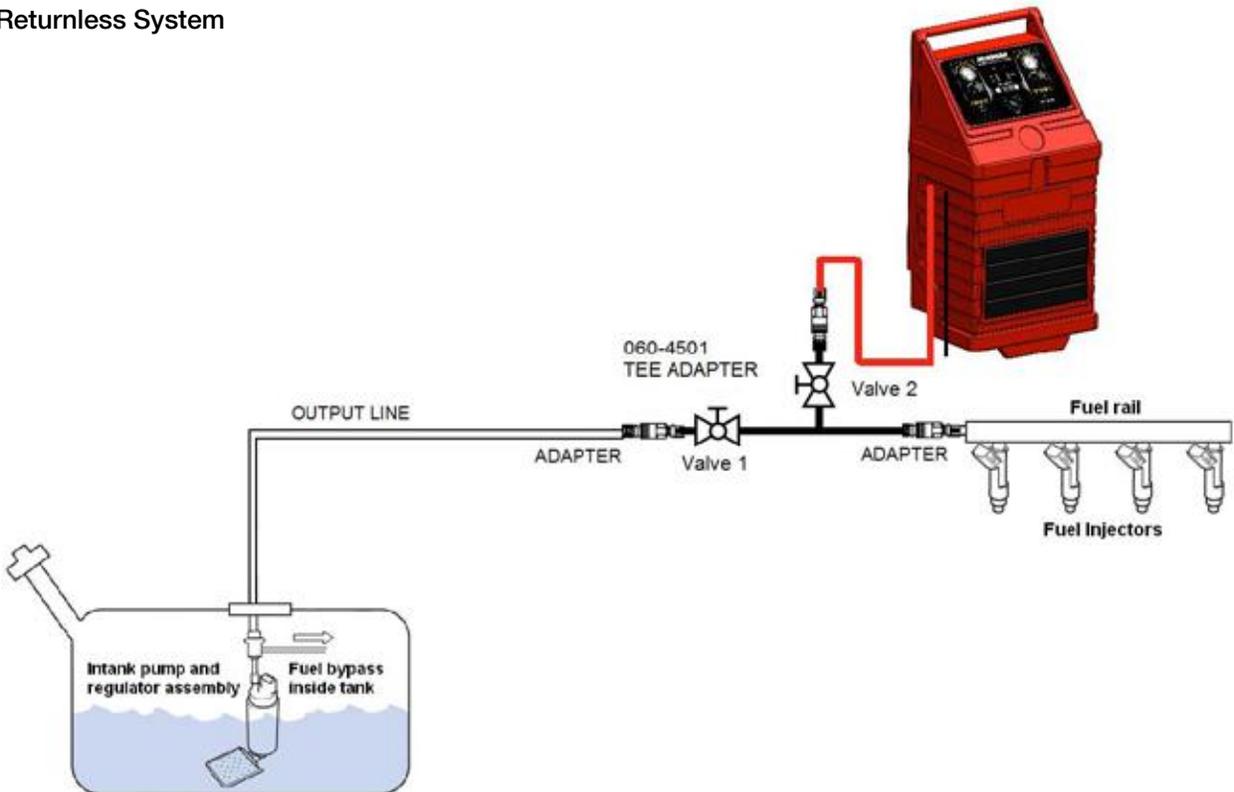
1. Connect appropriate adapters to the fuel rail.
2. Connect TEE adapter 060-4501 to adapters and to outlet hose (red) see pg 8.
3. Turn Gas (Petrol) regulator on control panel fully counter clockwise (open)
4. Open Valve 1 (valve inline with fuel rail)
5. Close the Valve 2 (on TEE where the outlet hose is connected).
6. Turn vehicle on.
7. Partially open Valve 2 to allow Gas (Petrol) into the Carbon Clean Dual tank. If the valve is opened too much vehicle fuel line pressure will drop and the engine will stall.
8. When desired amount of gas has entered the tank, close Valve 2.
9. Turn off vehicle.

Gas (Petrol) Service

Reservoir Filling Connection Return System



Returnless System



Gas (Petrol) Service

WARNING



Flammable Liquid can squirt out of pressurized lines when connecting or disconnecting.
Verify that engine and machine are both off before connecting or disconnecting fuel lines or adapters.

Wear safety goggles.

Wear chemical resistant gloves when connecting or disconnecting fittings and adapters.

Wrap a shop towel around pressure fittings and adapters when disconnecting.

Avoid exposure to flames, sparks, hot engine parts, and other ignition sources.

Explosion or flame or exposure to flammable liquid and vapors can cause injury.

Vehicle Connection Procedure (General)

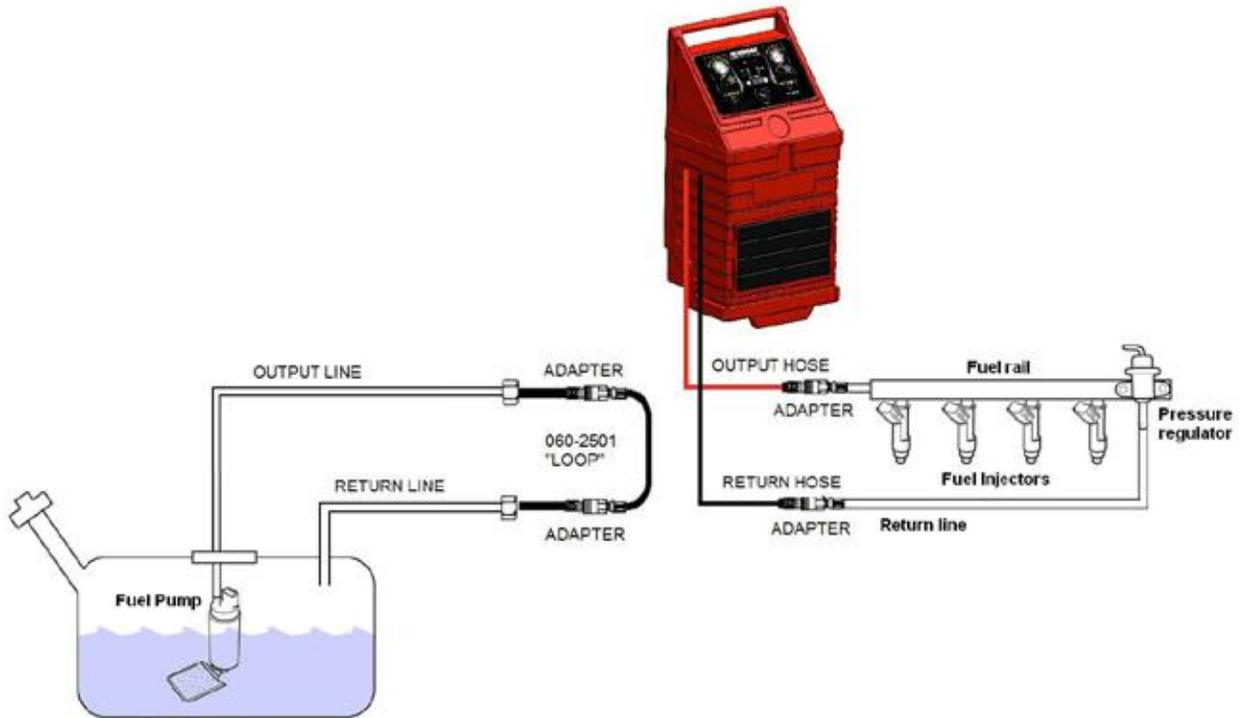
1. For best results ensure vehicle is at operating temperature before performing a service.
2. Turn vehicle off.
3. Fill on board tank with mixed Gas (Petrol) see pg 8 for details.
4. Turn the Gasoline (Petrol) PRESSURE REGULATOR counterclockwise until the regulator is completely open. Verify that the ON/OFF switch is turned off.
5. Attach the unit to the vehicle's battery by connecting the red battery clip to the positive battery terminal and the black battery clip to a solid ground point on the chassis.
6. Press the service selector to the Gas (Petrol) side.
7. Remove the vehicle's gas cap to relieve tank pressure.
8. Connect the Carbon Clean Dual to the vehicle using appropriate adapters.
9. Go to next service procedure step based on connection method

Gas (Petrol) Service

Return System Cleaning Service

Follow this procedure if performing a service on a vehicle with a Gas (Petrol) return fuel system

1. Connect as shown in figure below.

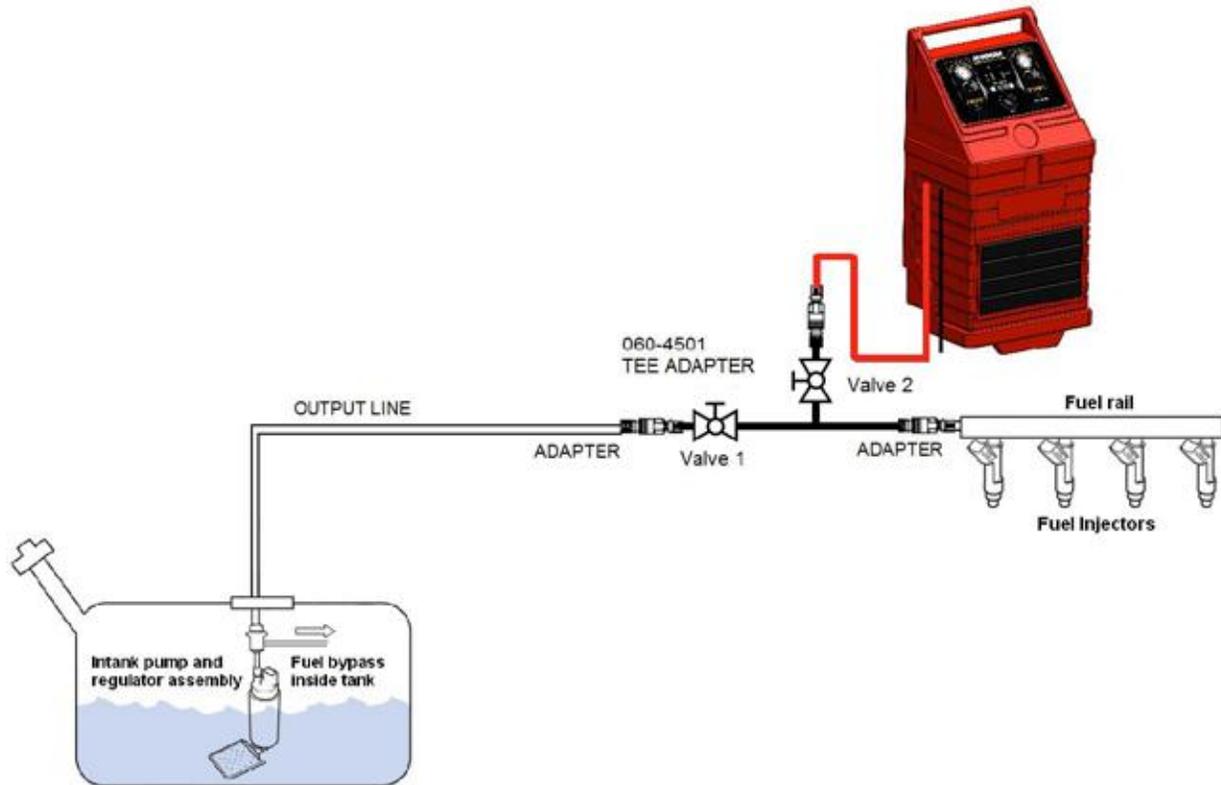


2. Refer to the vehicle's service manual for the manufacturer's recommended pressure.
3. Press the service selector to the Gas (Petrol) side.
4. Adjust timer knob to desired service time. (30 minutes typical)
5. Turn ON/OFF switch to ON position.
6. Press and hold RUN switch. (Switch can be released when pressure > 5psi).
7. Turn pressure regulator clockwise to increase the pressure to the manufacturer's specification. (Note: On a return system the vehicle's regulator will ensure you cannot over pressurize the system).
8. Allow the fuel to circulate through the system to clear any air out. Start the vehicle.
9. When the run time expires, the cleaning is complete. The unit will automatically shut off and the alarm will sound. Switch the ON/OFF switch to the OFF position to silence the alarm.
10. Turn the vehicle off.
11. Turn the Gas (Petrol) pressure regulator counterclockwise on the unit to release any residual pressure.
12. Disconnect the battery leads, hoses, and adaptors. Return the vehicle's fuel system to its normal operating condition by re-connecting the vehicle's fuel lines.
13. Re-install the vehicle's gas cap.
14. Start the vehicle and verify that there are no leaks.

Gas (Petrol) Service

Returnless System Connection

1. Connect as shown in figure below.



2. Refer to the vehicle's service manual for the manufacturer's recommended pressure.
3. Press the service selector to the Gas (Petrol) side.
4. Adjust timer knob to desired service time. (30 minutes typical)
5. Turn ON/OFF switch to ON position.
6. Press and hold RUN switch. (Switch can be released when pressure > 5psi).
7. Turn pressure regulator clockwise to increase the pressure to the manufacturer's specification.
8. Allow the fuel to circulate through the system to clear any air out. Start the vehicle.
9. When the run time expires, the cleaning is complete. The unit will automatically shut off and the alarm will sound. Switch the ON/OFF switch to the OFF position to silence the alarm.
10. Turn the vehicle off.
11. Turn the Gas (Petrol) pressure regulator counterclockwise on the unit to release any residual pressure.
12. Disconnect the battery leads, hoses, and adaptors. Return the vehicle's fuel system to its normal operating condition by re-connecting the vehicle's fuel lines.
13. Re-install the vehicle's gas cap.
14. Start the vehicle and verify that there are no leaks.

Diesel Service

First Time Operation

The unit is tested at the factory with special test fluids then completely drained. These test fluids are compatible with diesel engine systems. Because the unit is dry during shipping, it will be necessary to prime the machine before it is put into service.

1. Remove the filter from below the diesel tank and fill it completely with diesel fuel and replace it on the unit.
2. Connect the red battery clip to the positive (+) battery terminal and connect the black battery clip to a solid chassis ground.
3. Pour 3 bottles of MV3D detergent into the diesel tank on the back right of the machine. See pg 13, for alternate filling procedure.
4. Connect the DIESEL SIDE output (red) hose and the return (black) hose to each other using a matched pair of adapters. This will allow the fuel to circulate and fill the system with solution.
5. Switch the ON/OFF switch to the ON position. NOTE: Alarm will sound continually until pump starts.
6. Press and hold the START switch for 3 minutes to circulate fluid through the machine.
7. Switch ON/OFF to OFF position to silence alarm.
8. Disconnect battery connections if unit is not to put into immediate use.

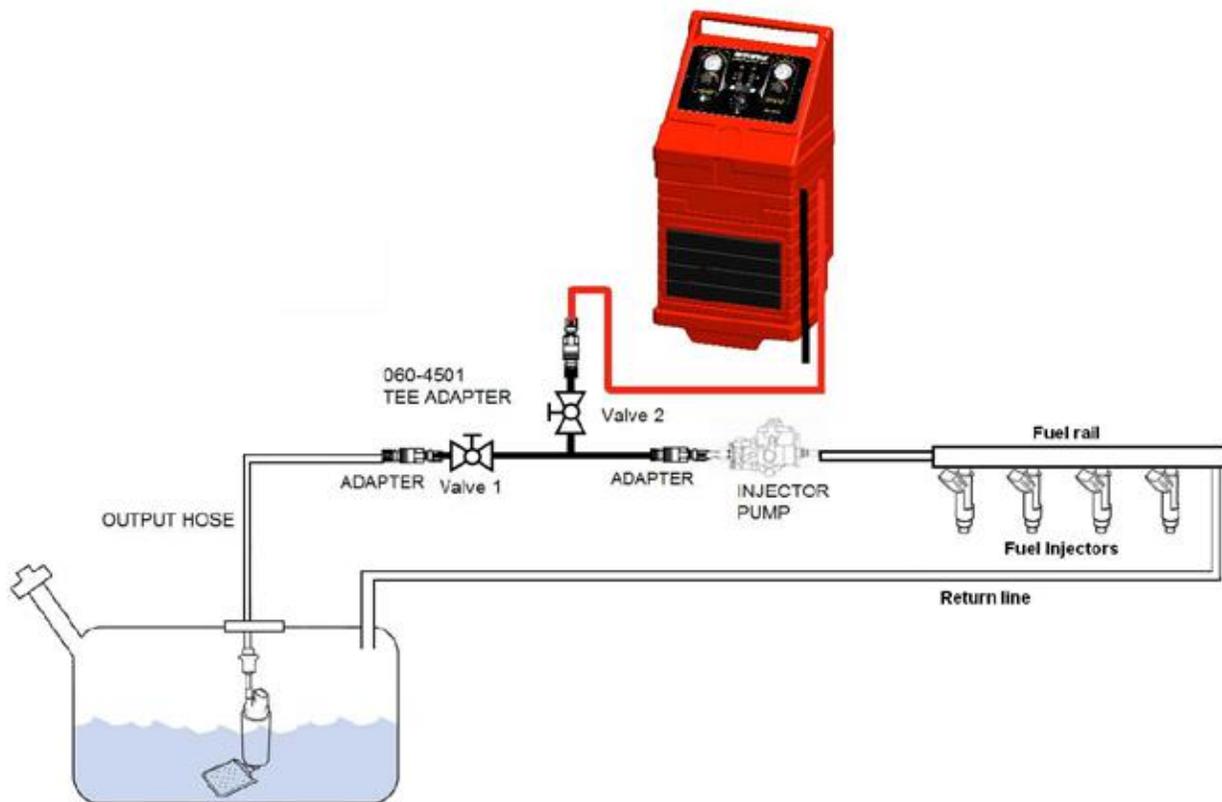
Diesel Service

Filling and Mixture Setup

The desired ratio of MV3D cleaning detergent to diesel fuel is 1:1. This can be done either in a suitable external container that is sealed between uses or in the Carbon Clean Dual's on board diesel tank.

To fill the on board tank with diesel fuel from a vehicle follow the procedure below.

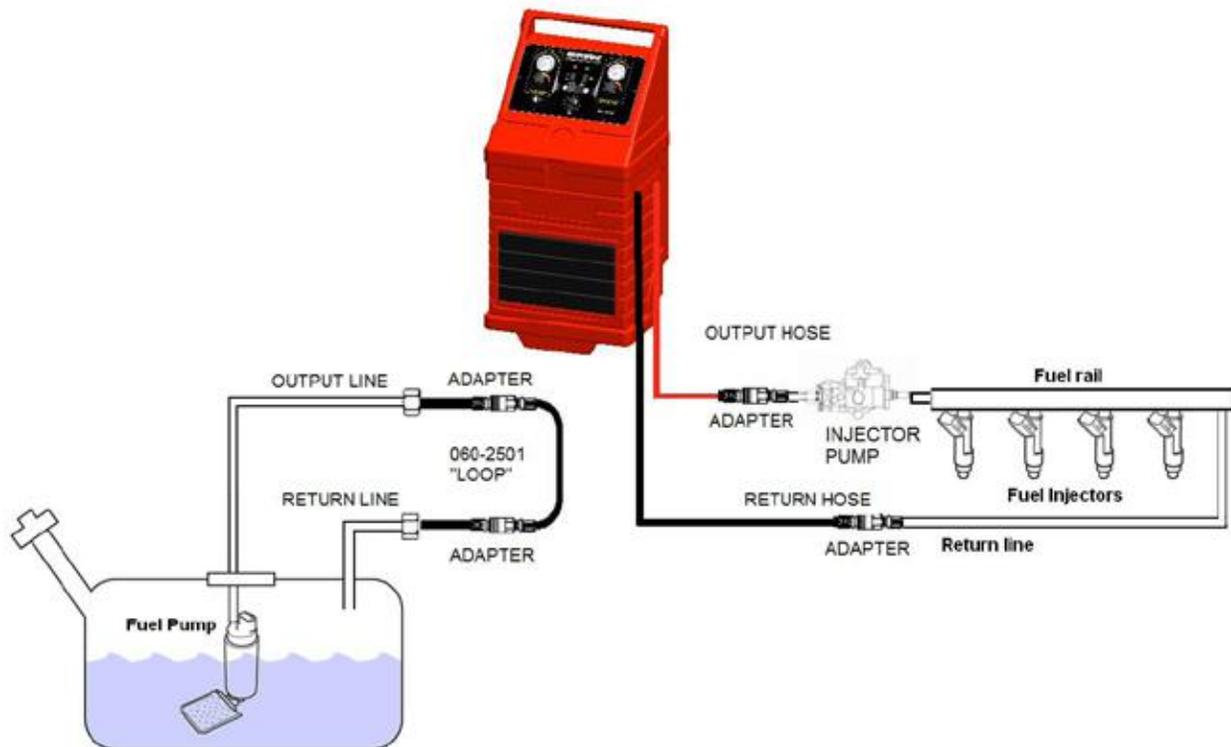
1. Connect appropriate adapters to the fuel rail.
2. Connect TEE adapter 060-4501 to adapters and to outlet hose (red) (see figure below).
3. Turn Gas Diesel regulator on control panel fully counter clockwise (open)
4. Open Valve 1 (valve inline with fuel rail)
5. Close the Valve 2 (on TEE where the outlet hose is connected).
6. Turn vehicle on.
7. Partially open Valve 2 to allow Diesel to enter the Carbon Clean Dual diesel tank. If the valve is opened too much vehicle fuel line pressure will drop and the engine will stall.
8. When desired amount of gas has entered the tank, close Valve 2.
9. Turn off vehicle.



Diesel Service

Service Procedure

1. Connect to the vehicle according to the figure below.
2. Refer to the vehicle's service manual for the manufacturer's recommended pressure.
3. Adjust timer knob to desired service time. (30 minutes typical)
4. Press the service selector to the Diesel side
5. Turn ON/OFF switch to ON position.
6. Press and hold RUN switch. (Switch can be released when pressure > 5psi).
7. Turn pressure regulator clockwise to increase the pressure to the manufacturer's specification.
8. Allow the diesel to circulate through the system to clear any air out. Start the vehicle.
9. When the run time expires, the cleaning is complete. The unit will automatically shut off and the alarm will sound. Switch the ON/OFF switch to the OFF position to silence the alarm.
10. Turn the vehicle off.
11. Turn the Gas (Petrol) pressure regulator counterclockwise on the unit to release any residual pressure.
12. Disconnect the battery leads, hoses, and adaptors. Return the vehicle's fuel system to its normal operating condition by re-connecting the vehicle's fuel lines.
13. Re-install the vehicle's gas cap.
14. Start the vehicle and verify that there are no leaks.



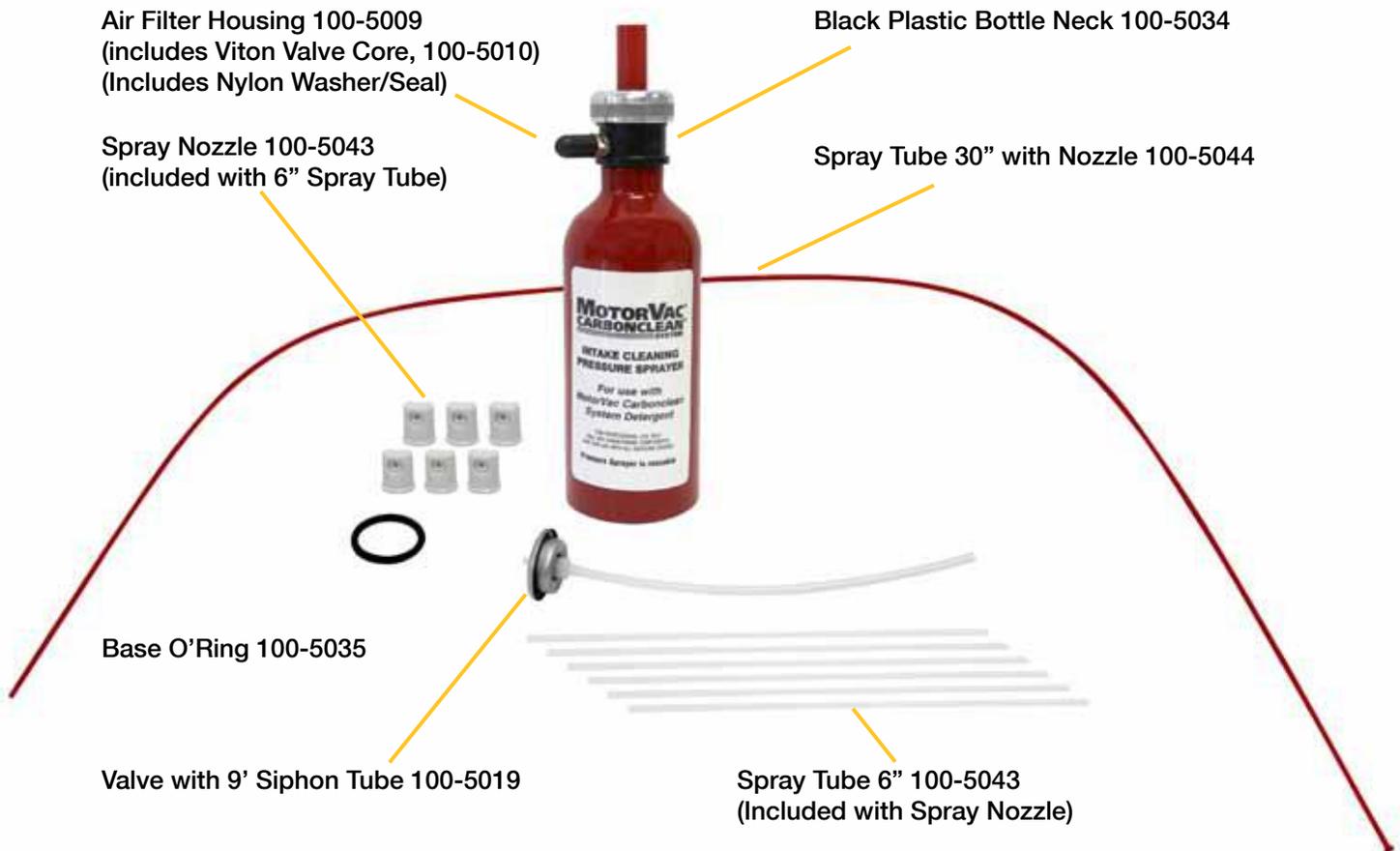
Accessories

See Motorvac.com for full list of adapters

I.C.S. (Intake Cleaning System) Kit

Part Number - (200-8667, Red Bottle)

One Kit Includes All Components Shown Below:



Intake Cleaning Procedure using the ICS Kit Part# 200-8667 and CarbonClean® MV4 Intake System Cleaner Part# 400-0030



CAUTION:

Always wear gloves and safety glasses when performing this service

1. Warm up vehicle to operating temperature.
2. Shut off vehicle.
3. Fill the ICS container with a MAXIMUM of 4 ounces of CarbonClean® MV4 Intake System Cleaning Detergent.
4. Pressurize the container with shop air to a minimum of 80 PSI. Do not exceed 185 PSI.
5. Shake the ICS container to aerate the mixture.

NOTE: If the ICS container has too much cleaner in it, there may not be enough air volume to force the cleaner out with sufficient velocity to contact the intake air plenum walls. Always be sure to maintain at least 80 pounds of pressure in the ICS container.

6. Be certain that the ICS 30-inch spray tube is free from any kinks or bends.
7. Attach the spray tube to the end of the ICS container.
8. Measure the length of the engine air intake manifold by laying the spray tube outside the manifold.
9. At the throttle plate, grip and hold the tube.

Note: This will be the maximum length that the tube may be inserted into the manifold.

CAUTION: CIS FUEL SYSTEMS

Do not open or move sensor plate / air door on the engine when the fuel distributor is pressurized. The CIS system will spray fuel into the engine while it is not running.

10. With the engine off and the engine's air duct removed, open the throttle plate wide open or have someone hold it open.
11. Insert the ICS spray tube into the manifold up to the point measured in step 8 and 9.
12. While holding the container upright, press and hold the nozzle of the ICS container and quickly pull the spray tube to the open end of the manifold near the throttle plate.
13. Release the nozzle once the tip of the spray tube gets near the throttle plate.

Note: Do not spray outside of the throttle bore housing.

14. If the MotorVac CarbonClean® System is in use at the time, press the STOP button or Turn the timer knob to the zero position to depressurize the engine's fuel system.

Warning It is recommended that after each pass with the ICS container, the engine should be "bumped over" using the starter. DO NOT ALLOW THE ENGINE TO START. Premature hydro lock condition may be present if excess fluid is present.

Note: Allow 15 minutes of soak time before starting the vehicle.

15. Quickly turn the ignition to the start position then back to the off position to rotate the engine over slightly.

The continuation of the cleaning service will require the installation of the 6-inch spray tube to clean the Idle Air Control passage while the engine is running.

Note: Disconnecting and grounding the secondary ignition will also keep the engine from starting.

16. Repeat these procedures a maximum of three times
17. After the air intake has been cleaned it will be necessary to start the engine and continue with the cleaning process.

Note: If you do not understand these instructions completely or have any questions contact MotorVac Technical support at 800-841-8810 BEFORE performing this procedure.

I.C.S. Repair Kit available Separately

Part Number - (200-5046)

One Kit Includes All Components Listed Below:

- Valvw with 9' Siphon Tube (100-5019)
- Base O'Ring (100-5035)

Troubleshooting

| Symptom | Solution |
|--|---|
| The MCS 352 is not operational or trips breaker immediately. | Polarity is reversed on vehicle battery connection. Check connections for correct polarity. Check circuit breaker on the side of the cabinet. |
| Pressure Gauge on the MCS 352 displays maximum pressure upon start up. | Output and Return hoses may be reversed. Pressure regulator may be fully closed. Turn pressure regulator counterclockwise, turn timer to zero and check hoses for correct connection. |
| Rapid loss of fuel from the MCS 352 reservoir. | Return hose connection may be incorrect, allowing fuel/detergent to return to the vehicle's fuel tank. |
| Start/Run switch is on but operation does not commence. Check Timer. | If no time is set, then turn the Time knob to set the run time. |
| The MCS 352 performs poorly. | Replace filter. Check all hoses and wires for cuts or frays. |

Parts

Service Parts for the TranTech™ III+ Transmission System.
Please refer to the part numbers below when ordering parts.

| Part # | Description |
|----------|--|
| 010-6060 | Reservoir Cap |
| 020-8043 | Main power wires with battery clips |
| 050-0095 | Filter spin on |
| 050-0043 | Pump (Diesel and Gas/Petrol) |
| 080-0230 | Female Quick Coupler |
| 200-8667 | ICS (Intake System Cleaning) Kit -Complete |
| 050-0016 | Pressure switch |

ORDERING PARTS

Parts for the unit may be ordered by calling MotorVac Customer Service at (800) 841-8810 or (905) 615-8620. Please have your model and serial numbers available.

www.motorvac.com
info@motorvac.com



ZIM15-01131 Rev1