



SmartSafe CNC-605A Injector Cleaner and Tester User Manual

[Home](#) » [SmartSafe](#) » SmartSafe CNC-605A Injector Cleaner and Tester User Manual 

Contents

- [1 CNC-605A Injector Cleaner and Tester](#)
- [2 CNC-605A Injector Cleaner & Tester](#)
- [3 Safety Precautions:](#)
- [4 Product Usage:](#)
- [5 Introduction](#)
- [6 Functions](#)
- [7 Specifications](#)
- [8 Structure](#)
- [9 Cleaning & testing sequences](#)
- [10 Operation](#)
- [11 Transporting and Storing](#)
- [12 Troubleshooting & Precautions](#)
- [13 Documents / Resources](#)
- [14 Related Posts](#)



CNC-605A Injector Cleaner and Tester



CNC-605A Injector Cleaner & Tester

The CNC-605A Injector Cleaner & Tester is a specialized machine designed for individuals with technical expertise and certifications. The machine is designed to clean and test fuel injectors in gasoline engines.

Safety Precautions:

- Read all service procedures, precautions, installation instructions, and equipment operating manuals thoroughly.
- Never allow improperly trained personnel to perform procedures or operate the equipment.
- Do not operate equipment with a damaged cord or if the equipment has been dropped or damaged until it has been examined by qualified service personnel.
- Avoid contact between cords and hot manifolds or moving fan blades.
- Use an extension cord with a rated current equal to or greater than that of the equipment.
- Unplug equipment from electrical outlet when not in use. Never pull the cord when unplugging from the outlet.
- Do not operate the equipment near open containers of flammable liquids (gasoline).
- Ensure that the unit is in a well-ventilated area when operating the fuel engine.
- Avoid exposing the unit to rain or damp areas to prevent electric shock.
- Operate the unit according to the operation procedures in the manual.
- Do not switch on the ultrasonic system when there is no ultrasonic detergent in the ultrasonic cleaning chamber.
- Always wear safety goggles to protect against eye injury.
- When disconnecting any connector of the pressurized fuel hose, wrap the connector with a towel to prevent

fuel from spurting out.

Product Usage:

1. Read the operating instructions before attempting to operate the unit.
2. Ensure that the unit is placed in a well-ventilated area before starting the fuel engine.
3. Connect the fuel injector to the machine according to the instructions provided in the manual.
4. Add the specified ultrasonic detergent to the ultrasonic cleaning chamber before switching on the ultrasonic system. Do not switch on the ultrasonic system when there is no ultrasonic detergent in the ultrasonic cleaning chamber.
5. Operate the unit according to the operation procedures specified in the manual. Only use the accessories recommended by the manufacturer.
6. When disconnecting any connector of the pressurized fuel hose, wrap the connector with a towel to prevent fuel from spurting out.
7. Test liquid is used by the main unit. Detergent is used for on-vehicle cleaning.

Note: The manufacturer reserves the right to modify this manual and the machine itself with no prior notice. All information, illustrations, and specifications contained in this manual are based on the latest information available at the time of publication.

General Notice

Other product names used herein are for identification purposes only and may be trademarks of their respective owners. We disclaims any and all rights in those marks.

Disclaimer

To take full advantage of the unit, you should be familiar with the engine.

All information, illustrations, and specifications contained in this manual are based on the latest information available at the time of publication. The manufacturer resume the right of modify this manual and the machine itself with no prior notice.

This unit is made for the purpose of persons who have special techniques and certifications.

Safety Precautions

Read all service procedures and precautions, installation instructions and equipment operating manuals thoroughly. Failure to observe these precautions, or the improper use of equipment, could result in property damage, serious injury or death. Never allow improperly trained personnel to perform these procedures or operate the equipment.

- Read the operating instructions before attempting to operate the unit. Keep this manual with the unit at all times.
- Do not operate equipment with a damaged cord or if the equipment has been dropped or damaged until it has been examined by qualified service personnel.
- Do not hang cords over the edge of the table, bench or counter, or come in contact with hot manifolds or moving fan blades.
- If an extension cord is needed, a cord with a rated current equal to or greater than that of the equipment should be used. Cords rated for lower current than that of the equipment may overheat.
- Always unplug equipment from electrical outlet when the machine is not in use. Never pull the cord when unplugging from the outlet.
- To protect against risk of fire, do not operate the equipment in the vicinity of open container containing

flammable liquid (gasoline).

- Make sure that the unit is in the well-ventilation area when operating the fuel engine.
- Keep lighted cigarettes, sparks, flames or other ignition sources away from fuel systems at all times.
- In order to avoid electric shock, keep away from the damp part of a working unit and avoid exposing it to the rain.
- Please operate the unit according to the operation procedures in the manual. Only use the accessories recommended by the manufacturer.
- Do not switch on the ultrasonic system when there is no ultrasonic detergent in the ultrasonic cleaning chamber. Otherwise, damage to the ultrasonic cleaner can be resulted.
- Keep the unit well grounded.
- ALWAYS WEAR SAFETY GOGGLES. Common used glasses are NOT safety glasses.
- When disconnecting any connector of the pressurized fuel hose, wrap the connector with towel to prevent the fuel from spurting out. Spurred fuel may cause personal injury or fire.
- Test liquid is used by the main unit. Detergent is used for on-vehicle cleaning. The ultrasonic cleaning uses specified ultrasonic detergent (It can be replaced by detergent provided together with the unit).

Note: Specifying operations that require attention when operating the equipment.

Warning: Specifying a possible hazard that could result in damage to the machine or personal injury.

Introduction

Thank you for purchasing the Injector Cleaner & Tester with the technology of ultrasonic cleaning and fuel pressure control, this equipment is an advanced electromechanical product, which can clean and test injectors by simulating engine working conditions. It can also perform cleaning on the injectors and fuel supply system on vehicle.

Functions

- **Ultrasonic cleaning:**

To clean injectors to remove the carbon deposition on them completely.

- **Uniformity / Separability test:**

To test the uniformity of injecting amount of each injector, and to monitor the spraying status of each injector with the help of backlight.

- **Leakage test:**

To test the sealing and dribbling conditions of injectors under system pressure.

- **Injecting Volume test:**

To check the injecting amount of the injector in 15 seconds of constant injection.

- **Auto. test:**

To test injectors by preset program conditions.

- **On-vehicle cleaning:**

On-vehicle cleaning to remove the carbon deposition on vehicle.

- **Setting:**

To set the system language.

- **Inquire:**

To check the equipment usage information.

- **Information:**

To check the hardware and software version.

Features

- Adopting the powerful ultrasonic cleaning technology, the equipment offers complete cleaning to the injectors/pump.
- It offers stable testing pressure and large adjustable range controlled through microcomputer.
- Automatic fuel draining through preset programs for some test items.
- Adopting humanization design can make the system pressure fast restored to the default values.
- LCD display to show the operation details.
- Touch button.

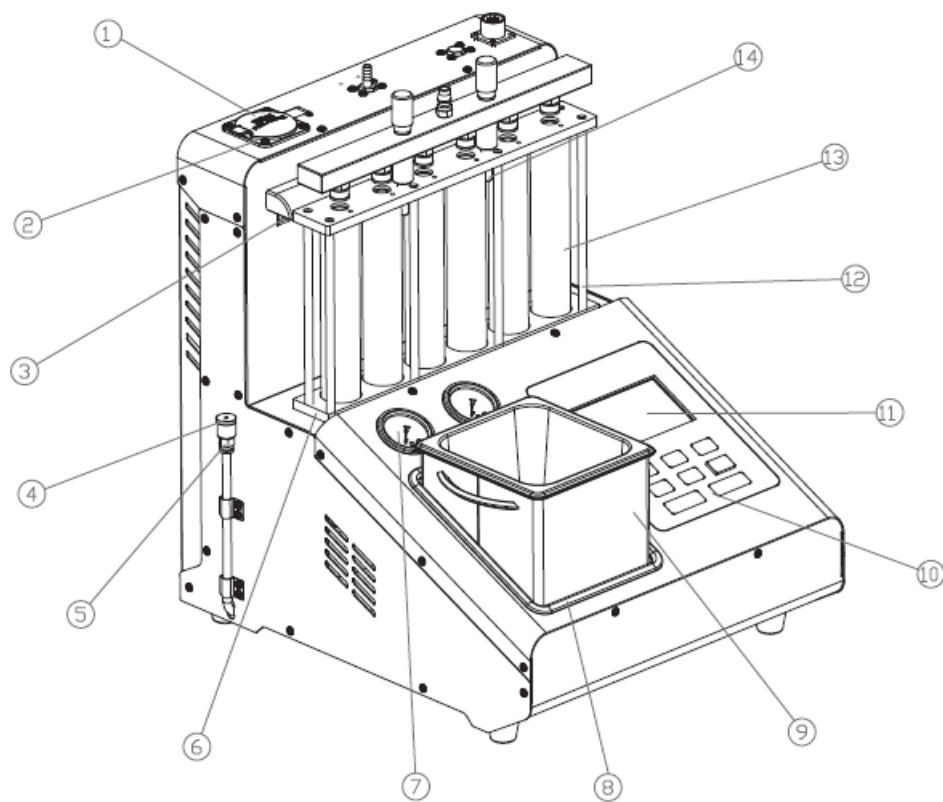
Specifications

Working conditions:

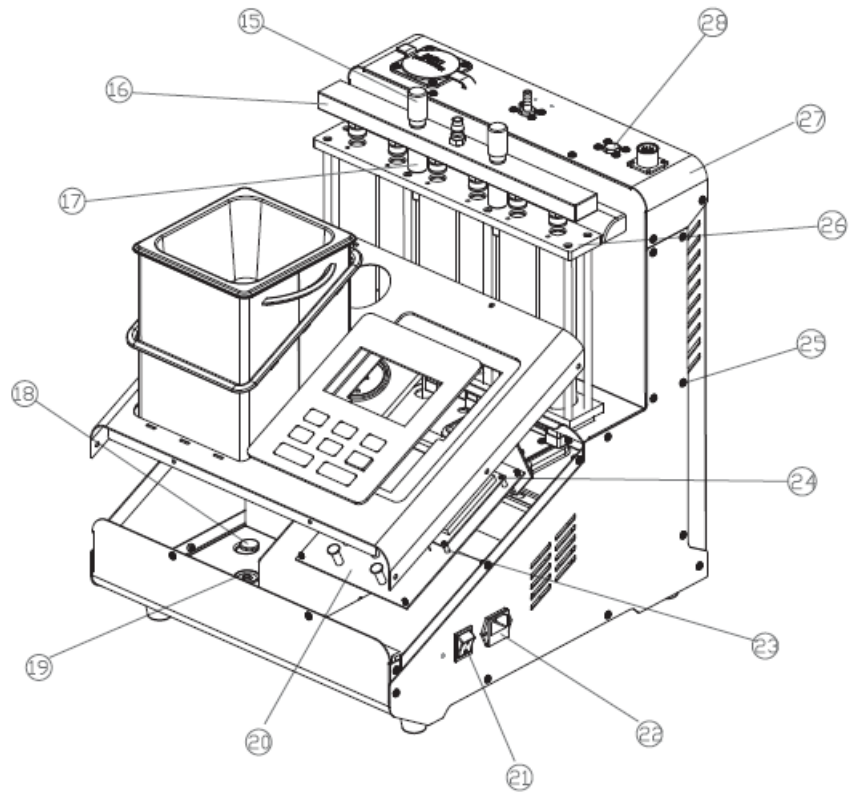
- Temperature: -10~+40°C Relative humidity: 85%
- Intensity of outer magnetic field: 400A/m
- No naked flame within 2m.
- Main unit power supply:
 - AC220V~50/60Hz
 - AC110V~60Hz
- Ultrasonic cleaner power: 60W
- Fuel pressure: 0.1-10bar
- Air inlet: 5-8bar

Structure

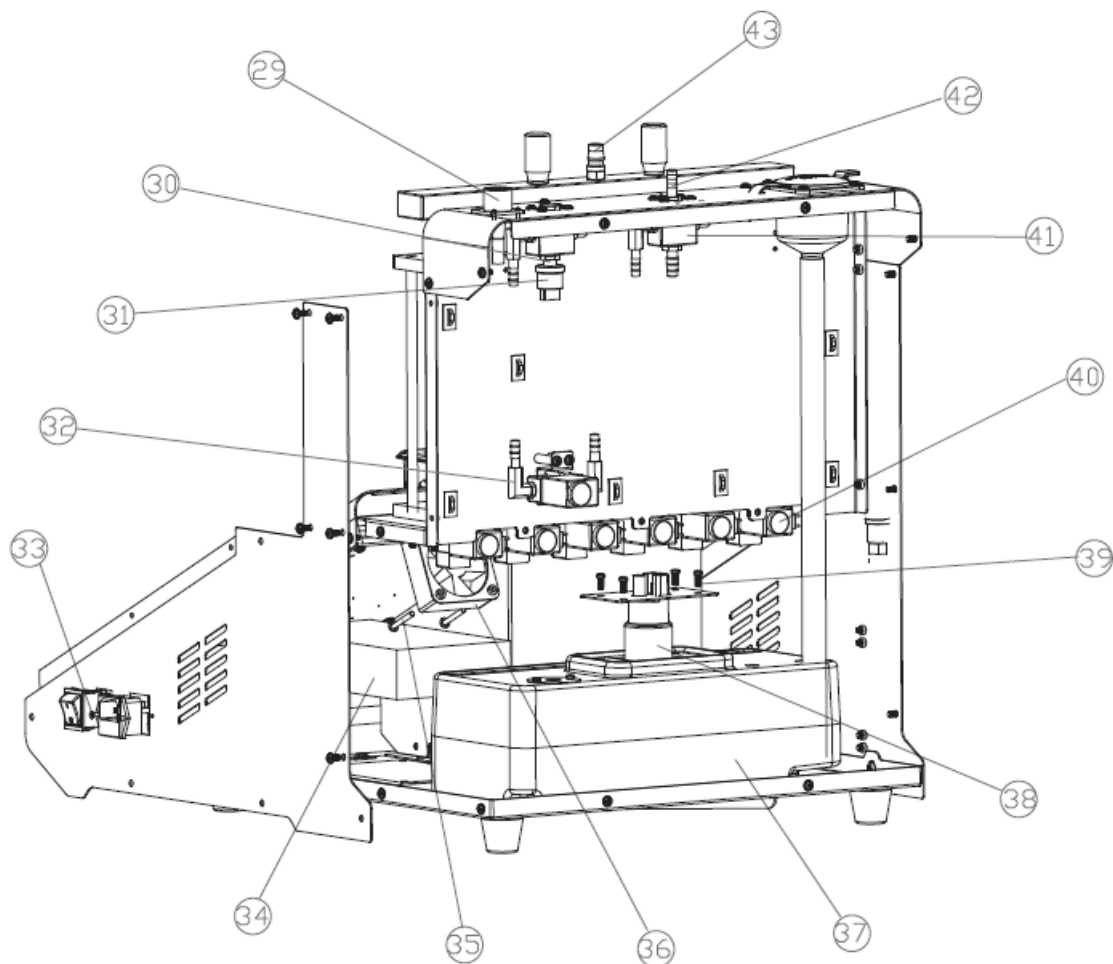
Overview



1. Fill Port Cap
2. Fill Port
3. LED Light Band
4. Liquid Level Pipe Cap
5. Liquid Level Pipe Connector
6. Lower Pressing Plate
7. Pressure Gauge
8. Ultrasonic Cleaner Protective Silicone
9. Ultrasonic Cleaner
10. Glass Panel
11. Monochrome Display Screen
12. Fixed Rod
13. Glass Tube



- 14. Adjusting Screw
- 15. Compression Screw
- 16. Fuel Distributor
- 17. Adjusting Nut
- 18. Door Mat
- 19. Power Supply Base
- 20. Control Board
- 21. Power Switch
- 22. Power Socket & Fuse
- 23. Copper Pillar
- 24. Screw
- 25. Screw
- 26. Upper Pressing Plate
- 27. Cabinet
- 28. Copper Plug



Note: The image in this manual may be different from the actual product!

- 29. Pulse Signal Line Base
- 30. Manifold Block Connector
- 31. Pressure Switch
- 32. Pagoda-Shape Connector
- 33. Screw
- 34. Switch Power
- 35. Screw
- 36. Cool Fan
- 37. Fuel Tank
- 38. Fuel Pump
- 39. Screw
- 40. Draining Solenoid Valve
- 41. Four Way Aluminum Base
- 42. Pagoda-Shape Connector
- 43. Fuel Inlet Port

Control Panel



Installation & Connection

1. Move the machine onto the workbench after unpacking and loosen the strips on the outlet hoses.
2. Take the adjusting bolt out from the kit and install it to the press plate on the top of the glass tube.
3. Take the fuel distributor from the kit and install it on the knurled nuts and tighten them with the pressing nut.
4. Take the power cable out from the kit and insert it into the input socket at the bottom of the unit.

First Use (Or reuse after long time storage)



For the new machine, or reusing after long-time storage, the pipeline of the machine is empty and the fuel pump is not with lubrication. When it starts to work, the fuel pressure may be difficult to establish. Now, you should do as following:

1. Fill enough test liquid into the tank of the machine.
2. Connect the test adaptor to the outlet pipe and insert it into the Fill Port.
3. Power on, select the System Function, and then select the First Use function.
4. Run it.
5. When there have liquid out from the test adaptor, stop it. If not stop, it'll stop automatically after 30s.
6. Now it can use normally.

Note: if there have no liquid out, you can run it again.

Operating Procedures

Preparation

1. Remove the injector from the engine to check the O-rings inside for damage. If it is be damaged need to replace it. Put the outside of injector in gasoline or detergent, and wipe them with soft cloth after cleaning the outside oil sludge carefully.
2. Check the test liquid level to be sure there are enough test liquid inside tank. Pouring test liquid from the port at the top left side of the unit and watch the liquid level in the fuel level viewer. In most cases, filled the liquid up to 1/2 of the tank capacity.
3. Turn on the power switch on the right of the Cabinet.
4. Pour ultrasonic detergent into the ultrasonic cleaning basin so that the needle valve of the injector is covered by the detergent.
5. Connect the injectors with the right couplers.

Cleaning & testing sequences

A complete cleaning and testing sequence shown below should be followed:



Ultrasonic cleaning



Uniformity/Separability test



Leakage test



Injecting volume test



Auto. test



On-vehicle cleaning (for EFI system)

Select the corresponding parameter and set up according for various tests. For detailed operations, please refer to "Operation" part.

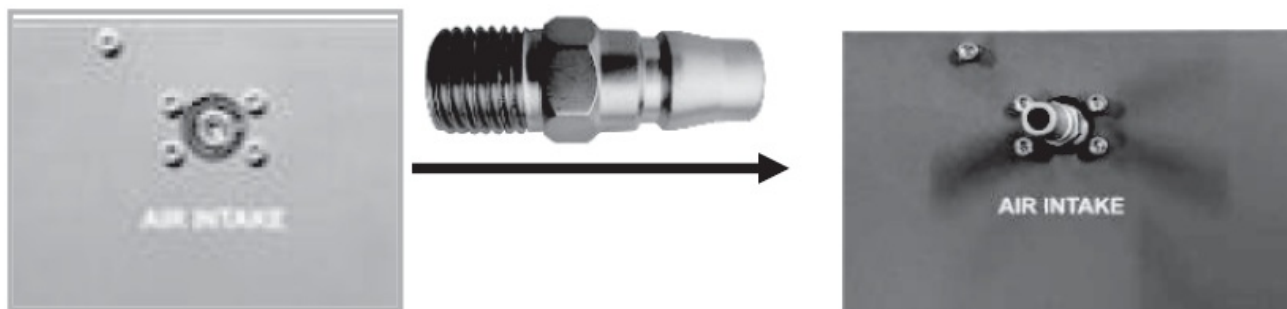
Working with Air

Statement: the equipment can be operated normally without connecting compressed air. This function is only to enhance the test and cleaning effect.

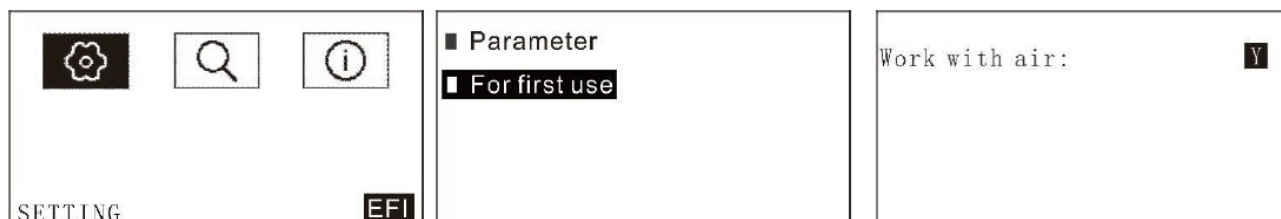
Note: this function is OFF by default.

We specially designed the WORKING WITH AIR mode, which can improve the spray ability and cleaning effect of injector. For some injector with serious blockage, it will take a long time to clean them only with cleaning agent, and the cleaning power can be improved by pulse with pressurized air. At the same time, in the test, it can be more intuitive to observe the spray ability of the injectors.

1. Install the quick male to the air inlet on the top of the device. See following.



2. Select system function, and then select parameter setting. Change the parameter value of WORK WITH AIR to Y and save it.



3. When you do the test, please connect the compressed air. The air pressure into the machine should be adjust to 4~6bar (EFI) or 6~8bar (GDI). If the air pressure is lower than 3bar, this mode will not work
4. If you do test with air, please set the test fuel pressure slightly higher than the air pressure. About higher 0.5bar.

Warning: Don't set the fuel pressure lower than the air pressure!

Tidy up after operating

Tidy-up should be done after cleaning and testing is completed:

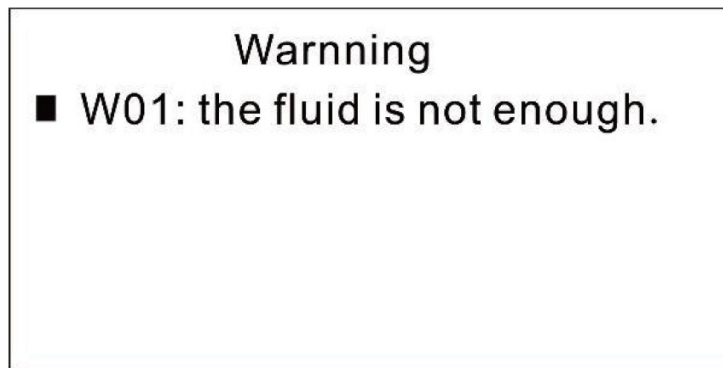
1. Press "Drain" icon to drain the test liquid into fuel tank.
2. Switch off the power and unplug from the socket.
3. Clean the Injector Cleaner & Tester control panel with soft cloth.
4. Drain the test liquid from the tank into a container to avoid volatilization. Store the test liquid in a safe place if it can be used again, or dispose of it in accordance with relevant regulations if it is too dirty.

Operation

First power on

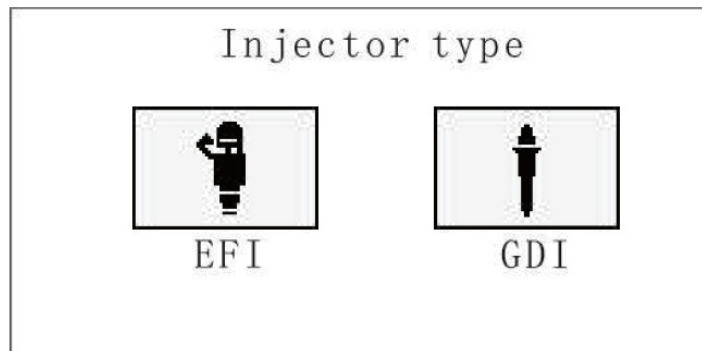


Please set your language.



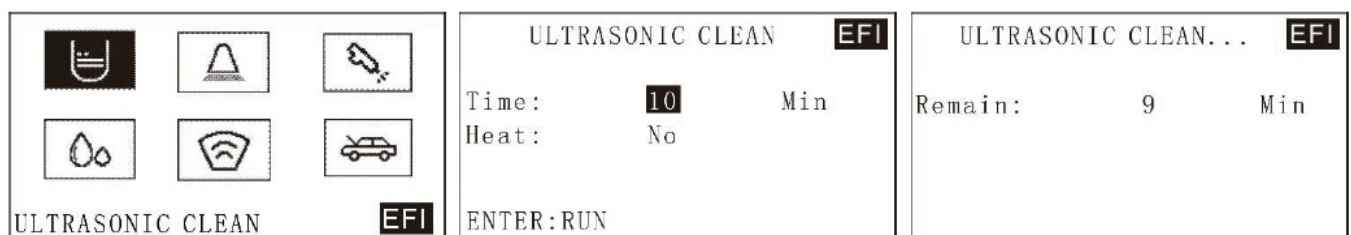
The fuel tank is empty and fill enough test fluid into it.

Select Injector Type



1. The test function can be entered after selecting the type of fuel injection nozzle.
2. Different test joints are required for testing different types of fuel injection nozzles. This equipment only provides basic configuration, more configuration of the connector need to be purchased separately.
3. Due to the difference of internal structure, some types of GDI nozzle cannot be tested temporarily.
4. In addition to cleaning the fuel injection nozzle, ultrasonic device can also clean fuel pump, spark plug, and other small size parts, but pay attention to the selection of appropriate cleaning agent.

Ultrasonic Cleaning



Injector Cleaner takes advantage of the penetrability and cavitation impact wave caused by ultrasonic wave traveling through the medium to provide powerful cleaning on objects with complex shapes, cavities and pores, so that the stubborn carbon deposits can be removed from the injectors.

Procedures

1. Place the injector/pump which has gone through surface cleaning in the launder.
2. Add enough injector detergent into ultrasonic cleaner so that the liquid level is about 20mm above the needle valve of injectors / whole pump.
3. Plug the pulse signal wire to injector / pump respectively.

4. Select ultrasonic cleaning function and then set the time.
5. Press ENTER key to run.
6. When the time is up, it will stop automatically as the beeper rings.
7. Take the injector / pump out of the launder and wipe them with a dry soft cloth. Get ready for next operation.

Note:

Do not let the ultrasonic cleaning running as ultrasonic basin without injector cleaning detergent. Otherwise damage may be incurred.

Do not let the pulse signal cables or plug dip in the injector's body into the detergent.

Uniformity/Separability Test

 UNIFORMITY/SPRAY TEST EFI	UNIFORMITY/SPRAY TEST EFI Time: 10 Min ROT: 2000 RPM PWM: 3.0 Ms Cylinder: All ENTER: RUN	UNIFORMITY/SPRAY TEST... EFI Time: 8 Min ROT: 2000 RPM PWM: 3.0 Ms Cylinder: All Pressure: ←→key adust
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Uniformity test is to find out the difference of the injectors injecting at the same working condition. This test can indicate the comprehensive influences on the injector caused by electrical nature, bore variation and clogging. Spray ability test is to inspect the spraying performance by observing the injectors.

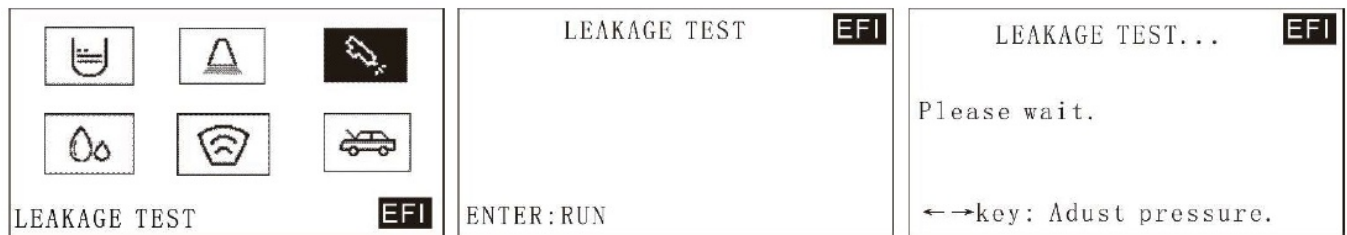
Installing and testing procedures for injectors

1. Choose a proper adaptor according to the injector type and mount it to the fuel distributor.
2. Install the injectors in forward direction (Apply a little lubricating grease on the O-ring.)
3. Install the fuel distributor with injector onto the plate of the test tube.
4. Connect the injector pulse signal wire.
5. Before doing this test, press DRAIN icon to drain the test liquid from the measuring cup if there is any.
6. Select Uniformity/Separability test function, set corresponding parameters (consult the appendix for pressure setting, consult vehicle manuals for other parameters as needed), and then press ENTER key to start the test.
7. When the test is completed, the equipment will auto stop with the ring of the buzzer.

Note:

1. While testing, it can drain fuel by pressing DRAIN icon. At default, solenoid valve is set at the closed state. Uniformity test can be done at this state. When DRAIN icon is pressed, solenoid valve will drain oil.
2. The system pressure can be adjusted by pressing ◀ or ▶ key at testing.
3. During operating, the user can select parameter, such as RPM or PW, and then press ◀ or ▶ key to achieve the status of the simulation.
4. Good injectors may have identical injecting angle, uniform spraying but no jet. Otherwise, replace the injector.
5. In the separability test, a special electrical parameter—the minimum injection pulse width of injector—can be tested, to compare the injectors on the same engine. That is to set cylinder No., start the test from minimum injection pulse width, and then gradually increases the pulse width till the injector starts injection (observed with the help of backlight). The value set at this moment is the minimum injection pulse width, so the difference of minimum injection pulse width among these injectors could be observed.

Leakage Test

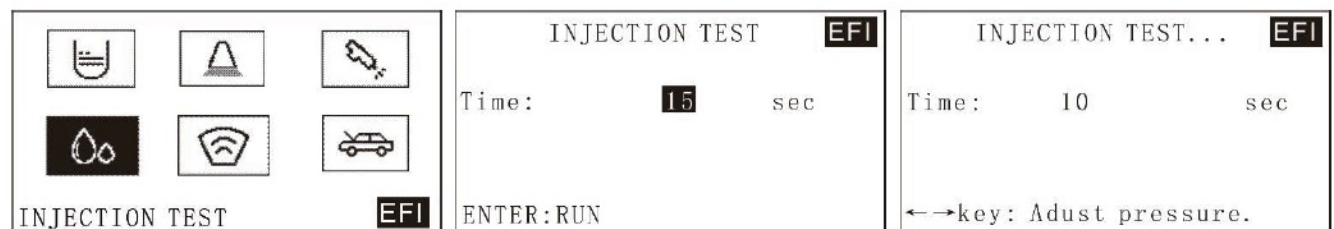


Leakage test is to inspect the sealing conditions of the injector needle valve under system pressure and to find out if the injector is dribbling.

Procedures (Installation refer to Uniformity/ Separability Test):

1. Before doing leakage test, please press DRAIN icon to drain the rudimental residual test liquid from the measuring cup.
2. Select Leakage Test function and press ENTER key to run.
At this time the system pressure can be adjusted by pressing ◀ or ▶ key to observe dribbling from the injector the pressure is adjusted preferably 10% higher than manufacturer's specifications.
3. When the test is over, the equipment will automatically stop and the buzzer will ring simultaneously.
Note: In general the drip of the injector should be less than 1 drop within 1 minute (or in accordance with the specifications). The default time of the system is 1 minute.

Injecting Volume Test

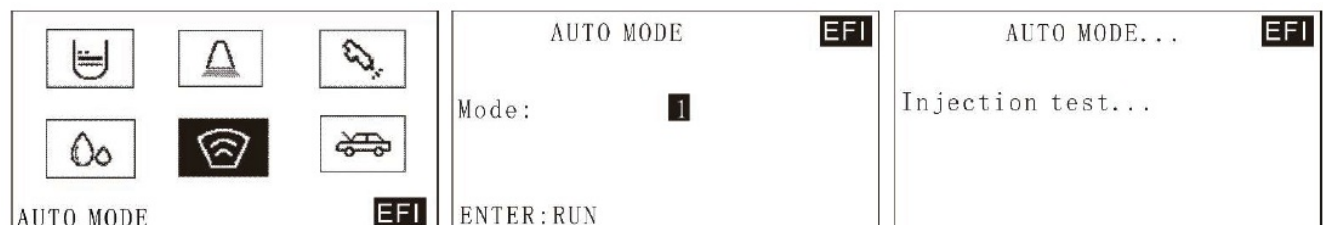


Injecting volume test is to check if the injecting flow in 15 seconds meets the specifications for injecting amount. The deviation reflects the wear or clogging in the injector, instead of electrical parameter variation.

Procedures (Installation refer to Uniformity / Separability Test):

1. Before this test, press DRAIN icon to drain the test liquid from the measuring cup if there is any.
2. Choose Injecting Volume Test function and press ENTER key to start the test.
Adjust the fuel pressure by pressing ◀ or ▶ key according to the injector specification.
3. When the test is over, the equipment will stop automatically at the ring of the buzzer.

Auto. Test

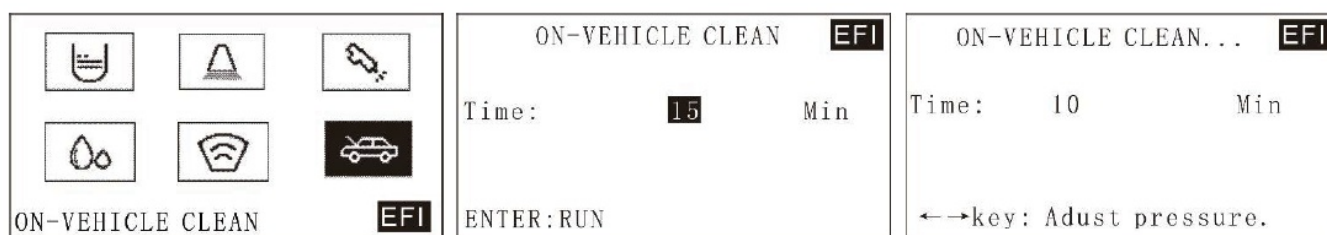


Auto. test contains all above-mentioned tests (15-second injecting test, idle speed, middle speed, high speed, varying acceleration, varying deceleration, changing pulse width test). This function can test more comprehensive performance of injectors by simulating the various engine working conditions.

Procedures (Installation refer to Uniformity / Separability Test):

1. Before the test, press DRAIN icon to drain all the test liquid in the measuring cups if there is any.
2. Select AUTO function and then press ENTER key to start the test.
3. Adjust the fuel pressure by pressing ◀ or ▶ keys.
4. When the test is over, the equipment will auto stop at the ring of the buzzer.

On-vehicle Cleaning



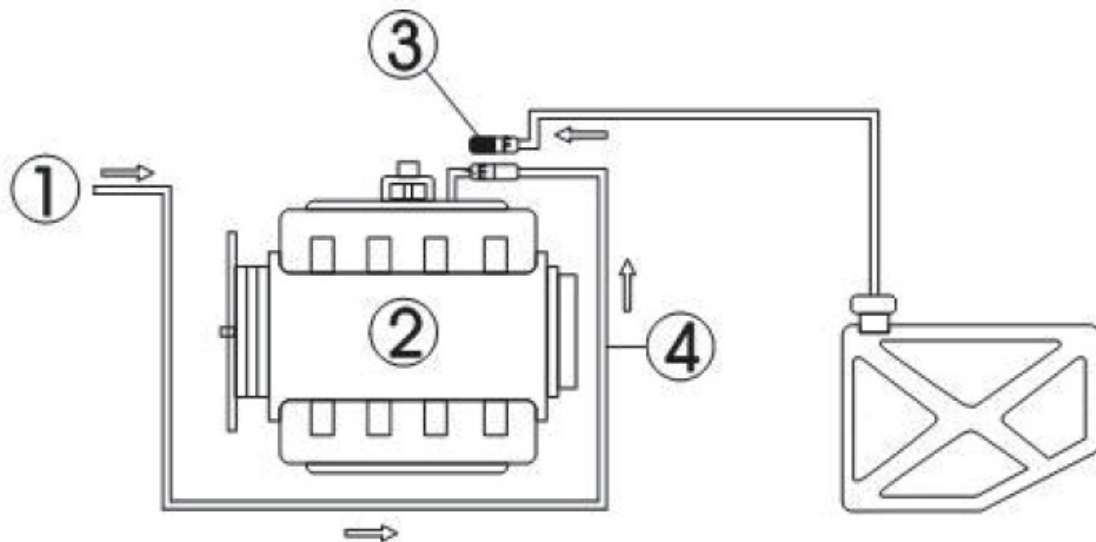
After the engine has been in operation for a period of time, its fuel flow may be blocked or become un-smooth owing to buildup of dust and impurities in fuel channel. In addition, the carbon deposits and gum made by combustion can easily adhere to the injectors, inlet and outlet ports, inlet and outlet hoses, throttle and combustion chamber. So the fuel supply system, combustion chamber and injector of the engine must be cleaned on a timely basis. Combustion Chamber cleaning is a solution that can save your time and labor.

Procedures:

1. Please check if there is test liquid or detergent inside the fuel tank before On-vehicle cleaning. If test liquid is in the tank, replace it with detergent.
2. The connection of engine fuel pipes has been shown in “Connecting” below.
3. Select On-vehicle cleaning function, and set the cleaning time.
4. Press ENTER key to start the function, adjust the fuel pressure by pressing ◀ or ▶ keys.
5. Start the engine to begin cleaning.

Connecting

- Disconnect the fuel supply hoses (E, F) of engine fuel system (wrap the connector when disconnecting the connector), and then choose a proper connector and connect it to the E end.
- Stop the other end of the disconnected end (F) with a proper stopper, (use when the fuel pump has the fuel return function only) or remove the fuse of fuel pump or disconnect the power cable of fuel pump.



1-Injector Cleaner & Tester; 2-Engine; 3-stopper; 4- Fuel-inlet hose to engine;

Tidy up after cleaning

- After the cleaning is completed, turn off the Ignition Switches reconstitute the link of the fuel hoses then start and check the leakage of fuel system.
- At last please clean the fuel tank and hose line with test liquid (if there is residual detergent inside fuel tank, please.)
- Tidy up and make preparation for the next cleaning.

Note:

- When cleaning, care must be taken as the detergent is inflammable. Prepare for a fire extinguisher.
- Be sure that all hose lines are well connected and there is no leakage on the hose lines before performing cleaning.

Transporting and Storing

Transporting

- Before being packed, the liquid inside the fuel tank should be drained completely to avoid overflowing as transporting.
- Move only by hand or lift with soft belt.
- No package no lifting tools or long-distance transportation.
- To prevent the unit from shocking and knocking, make sure it is on the base seat and in the packing case during transportation. Firstly pack the unit with the matter similar with plastic strip and add the filling material (such as foam or sponge, etc.) between the unit and packing case to avoid scratching the surface when the unit shakes.
- Make sure that the maximum incline angel does not exceed 45. Do not place the unit up-side-down.

Storing

- Store only in dry area and keep away from water before the unit is unpacked.
- Store the machine in well-ventilated area and do not expose it to direct sun shine or rain.

Installation Environment

- Keep a distance of no less than 200mm between the unit and any wall or other substance. The unit should be put in well-ventilated area. Make sure the temperature is within $-10^{\circ}\text{C}+40^{\circ}\text{C}$.
- The unit has been well grounded for safety operation. Please confirm that the power socket is also well grounded.

Warning!

If an extension cord is used, the rated current should be equal to or greater than that of the equipment.

Troubleshooting & Precautions

Troubleshooting

1. The unit does not correspond when it is switched on.

Check the fuse at lower right side of the unit and replace it (5A) if it is damaged or broken.

2. There is leakage in the fuel distributor coupler.

Check the O-rings and replace it if it is damaged or unfitted. Do not tighten the two raffle screws too tightly; otherwise, it may cause leakage.

3. When running, there is no working pressure.

New machine is first used, or the machine has not been used for a long time, there may be no fuel pressure. At this time, select the First Using function in the System Function, and then operate according to the following:

- According to the instructions, connect the test connector on the fuel outlet pipe and insert it into the Fill Port.
- Then, run the function.
- When there have liquid out from the test adaptor, stop it. If not stop, it'll stop automatically after 30s.
- Now it can use normally.

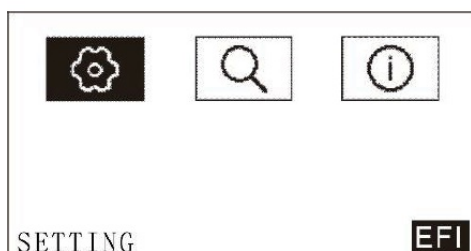
Note: if there have no liquid out, you can run it again.



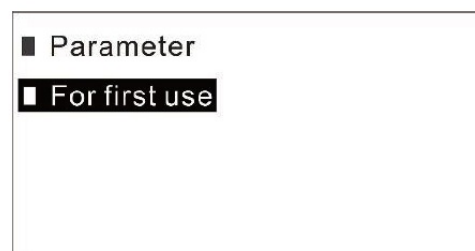
Connect the test adaptor to the outlet pipe



Insert it into the **Fill Port**



Select the **Setting Function**



Select the **First Use** function

4. The buzzer rings continually when there is no fuel pressure.

The machine has fuel-lack warning function and it will ring when the liquid in the fuel tank is lack, and then automatically switch off the fuel pump and injectors and returns to the stop state. Supply the detergent or test

liquid to stop ringing.

5. Draining the test liquid in glass tube thoroughly requires pressing the DRAIN icon more times.

The solenoid valves will stop automatically after 15 seconds and it is necessary to drain more times if there is more liquid.

Precautions

1. Do not place anything on the control panel to prevent from breaking the measuring cup because it is made from vulnerable.
2. Do not disconnect hose before the system pressure reaches “0”.
3. Always ensure that the provided power supply is well contacted with ground safely.
4. The unit is designed with warning function. When the level switch checks the liquid inside the tank less than the lowest line, the unit will utter the warning sound and meanwhile stop the fuel pump and injectors automatically, and then the unit returns to the stop state. The unit will stop warning until the liquid is supplied enough, at this time pressing the ENTER key will run the unit again.
5. Clean the control panel in time and Keep the pulse signal cable away from the liquid.

Warning!

Unauthorized repair may cause the extension of faulty area of the unit, which will bring trouble to general repair. Under the state of turning on the power, the electrical system inside the unit contains the factor causing danger. Failure to comply with these instructions could result in death or serious injury.

Documents / Resources

	SmartSafe CNC-605A Injector Cleaner and Tester [pdf] User Manual CNC-605A Injector Cleaner and Tester, CNC-605A, Injector Cleaner and Tester, Cleaner and Tester, Tester
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