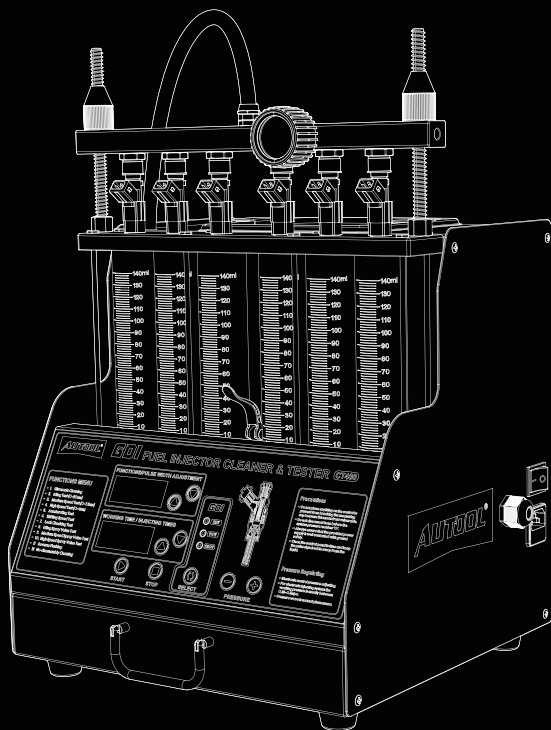


# **AUTOOL CT400**

## **Injector Cleaner & Tester**

### **User Manual**



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## **Overview**

### **1.1 Functions and features**

This GDI Fuel Injector 6-cylinder Cleaner and Tester is a great upgrade, which adapts the latest GDI design. It not only can be used to clean and test the standard injectors, of note that it can carry out GDI injectors cleaning and tesst. It comes with multi voltages available for GDI injectors, which enables to adapt for different types of injector testing. The machine is the necessary and preferred equipment for the automotive serving and maintenance, research, and teaching training departments.

#### **Functions**

- Ultrasonic cleaning: To perform simultaneous cleaning on one or several injectors and to remove the carbon deposits on the injector completely.
- Uniformity test: To test the uniformity of injecting amount of each injector.
- Sprayability test: To monitor the spraying status of each injector with the help of a backlight.
- Leakage test: To test the sealing and dribbling conditions of injectors under system pressure.
- Injecting flow test: To check the injecting amount of the injector under specific working parameters (e.g. same time, same number of times).
- Automatic test: Under specific working parameters, test injectors by simulating different working conditions.
- Adopted with the latest unique GDI fuel injector driving software, which can drive 12V, 70V, 120V high-pressure fuel injectors.

#### **Features**

- Adopting the powerful ultrasonic cleaning technology, the equipment offers complete cleaning to the injectors.
- Fuel pressure control through microcomputer offers stable pressure control and large adjustable range.
- Adopting high-definition digital control panel display, it makes the operation simple and easy to learn.
- Test liquid level can be displayed visually. It can also be recovered for recycling use.
- With the help of the bright background light of the LED, it is possible to clearly observe the various working conditions of the injectors.
- Replaceable composite coupling with patented and suitable for many models.
- The test time, operating frequency, number of injecting, and minimum switching pulse width of the injector can be adjusted freely within the allowed adjustment range.

## **1.2 Working environment and technical parameters**

### **Working environment**

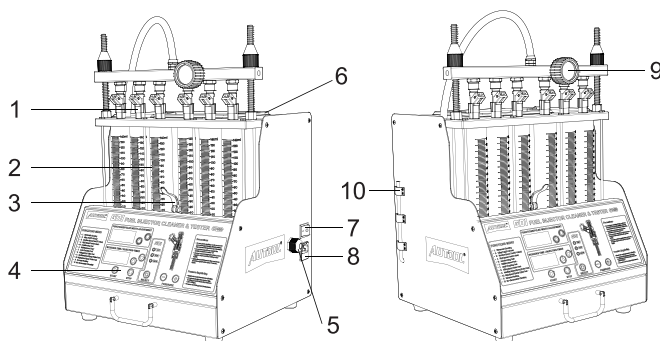
- Power supply: AC 110/220V  $\pm 10\%$
- Frequency: 50-60HZ $\pm 0.5$
- Relative humidity: <85%
- Ambient temperature: 0 °C  $\sim$  +40 °C
- External magnetic field strength: <400A/m
- No open flames are allowed around

### **Technical parameter**

- Fuel tank capacity: 1500 ml
- Test tube amount: 140 ml
- RPM range: 0 $\sim$ 7500 r/min
- Time range: 0 $\sim$ 9900 times
- PWM pulse width: 0 $\sim$ 20.0 ms
- System pressure: 0 $\sim$ 0.55Mpa (adjustable)
- Timing: 0 $\sim$ 20 minutes adjustable
- Ultrasonic cleaning power: 60W (intermittent work)
- Ultrasonic cleaning frequency: 28 KHZ $\pm 0.5$  KHZ
- Dimensions: 390mm (length)  $\times$  410mm (width)  $\times$  430 mm (height)
- Weight: 16.6KG

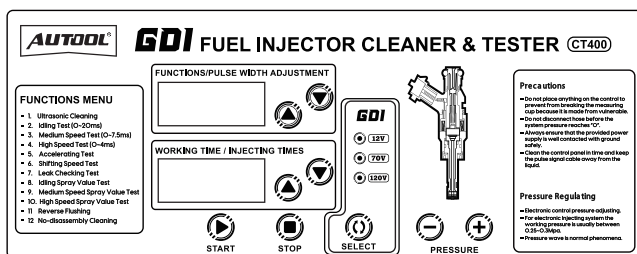
## Structure

### 2.1 Overview structure



- 1- Filling inlet; 2- Test tube; 3- Drain button; 4- Control panel;  
5- Pulse signal cable; 6- Ultrasonic cleaning bath; 7- Power switch;  
8- Power socket; 9- Pressure gauge; 10- Test liquid drain valve;

### 2.2 Control panel



- Pulse width display: function options and pulse width adjustment.
- Display of working hours/injecting times: display the working hours and injecting times of the injectors.
  - Start key: press to execute the selected work item.
  - Function menu selection buttons.
  - Pause key: Press it to temporarily stop the selected work item.
  - Time and frequency adjustment button: adjust the working time and spray frequency of the fuel injector.
    - Stop key: stop the selected work item and return to the selected work item.
    - Pressure decrease adjustment button.

- Pressure increase adjustment button.
- Text description of function menu.

### **How to use the drain button**

When performing work items 8, 9, and 10, press the button to close the drain valve. Then the oil injected by the fuel injectors is closed in the glass tube, so as to compare the amount of oil injected by each fuel injector. After the observation, open the oil drain valve and return the test liquid to the oil tank.

## **Operation Procedures**

### **3.1 Ultrasonic cleaning**

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

#### **Preparation:**

- Remove the injector from the vehicle engine to check the rubber seals inside for damage. Replace the damaged rubber seals with another same type of rubber seal to avoid leakage during testing. Put the outside of injectors in gasoline or detergent, and wipe them with a soft cloth after cleaning the outside oil sludge carefully.
- Turn on the power (Note: There will be a delay of several seconds when this device is restarted after a long power disconnection).
- Take out the cleaning bracket from the accessory box, then put it into the ultrasonic bath, and put the clean fuel injector in the positioning hole of the cleaning bracket in the ultrasonic bath.

### **3.1.2 Operation steps**

#### **Ultrasonic Cleaning:**

- Add appropriate injector cleaning liquid into the ultrasonic bath, which slightly immerses over the cleaning bracket will be fine.
- Turn on the ultrasonic switch on the right side of the main unit to start ultrasonic cleaning.
- During the ultrasonic cleaning process, pulse signals can be input to the fuel injector.

#### **Steps:**

- Plug the injector pulse signal wires into injectors respectively in turn. (Special injectors need to be connected with adapter wires).
- Press the item selection up and down keys to select the "01 Ultrasonic Cleaning" item, and then press the working time up and down keys to set the

time. (The system defaults to 10 minutes, if you need to modify the time, you can change it with the up and down keys)

- Press the run key, and the system starts to input pulse signals.

When finished cleaning, take out the injectors from the ultrasonic tank. Wipe off the cleaning liquid with a soft cloth and prepare for the next operation.

**Notes:**

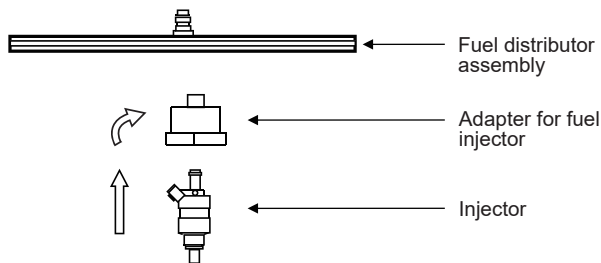
- During the cleaning process, you can hear the intermittent vibration when you take the fuel injector out and put it near your ear, which can determine whether the injector has a pulse signal.
- Before the injector detergent is added into the ultrasonic cleaner, do not turn on the ultrasonic cleaner. Otherwise, damage may be incurred.
- Only the ultrasonic cleaning liquid matched with the machine can be added to the ultrasonic tank, and other cleaning liquid can not be used instead, otherwise, the surface coating of the equipment and the mask will peel off, which will not be covered by the warranty.

### 3.2 Test functions

This function is to detect the sprayability, dripping, blockage, fuel injecting angle of the fuel injectors and the amount and uniformity of the fuel injection of each fuel injector at different RPM.

#### 3.2.1 Preparation

- Add test liquid. Pour the test liquid from the filling port. (Approximately 1000ML is added, and the liquid level should not be lower than 800ML every time)
- Installation of fuel injectors



Schematic diagram of injector installation

- Install the injector adapter and the plug into the Fuel distributor assembly
- Install the fuel injector in the forward direction (apply a little grease on the "O" ring of the fuel injector)

C. Install the fuel distributor assembly and the fuel injectors on the Top assembly plate and tighten and fix it with a fixed screw nut and a fixed screw sleeve.

Get ready to test.

D. Select 12v/70v/120v according to injector type.

### **3.2.2 Steps:**

#### **Item 02 idle speed test:**

- Connect the quick connector of the black outlet hose on the machine with the male end connector on the fuel distributor assembly, and insert the pulse line of the fuel injector.
- Press the item selection up and down keys to select the "02 Idle Speed Test" item.
- Press the working time up and down keys to set the time. (Normally set to 10 minutes)
- Press the "run" key to start working.
- Rotate the pressure adjustment knob to adjust the pressure to 2-5 kg. (In the electronic spraying system, the oil pressure is generally 2-5 kg).
- Press the up and down keys to select the appropriate pulse width. (The system defaults to 3MS, generally adjusted to 3MS).
- The working time will gradually decrease, and when it reaches 0, the system will stop automatically.

#### **03 middle-speed test:**

- Press the item selection up and down keys to select the "03 middle-speed test" item.
- Press the RUN button.
- The rest of the operation steps are consistent with item 02.

#### **04 High-speed tests:**

- Press the item selection up and down keys to select the "04 High-speed test" item.
- Press the RUN button.
- The rest of the operation steps are consistent with item 02

#### **05 Accelerated test:**

- Press the project selection up and down keys to select the "05 Accelerated test" item.
- Press the RUN button.

#### **Notes:**

1) The fuel pressure, working time and pulse width are automatically set by the system. The time system presets 10s as a loop cycle, which can be set by the user.

2)The system will automatically loop three times in a row to simulate the working conditions and fuel spraying amount of the fuel injectors when the engine is accelerating uniformly at 1,500 -15,000 rpm.

#### **06 Various speed test:**

- Press the item selection up and down keys to select the "06 Various speed test" item.
- Press the RUN button.

#### **Notes :**

- 1)The fuel pressure, working time and pulse width are automatically set by the system. The time system presets 10s as a loop cycle, which can spare the labor of setting by the user.
- 2)The system will automatically loop three times in a row to simulate the working conditions and fuel spraying amount of the fuel injectors when the engine is idling (1,500 rpm), middle-speed (9,000 rpm), and high-speed (15,000 rpm).

#### **07 Leakage test:**

- Press the item selection up and down keys to select the "07 Leakage test" item.
- Press the working time selection keys to set the time. (Generally set to 1 minute)
- The remaining operation steps are consistent with item 02.

#### **Notes :**

- 1)The pulse width system is preset to 3ms, no need to set it again.
- 2)Simulate whether the fuel injectors drip and leak when the oil pressure of the vehicle is 0.3Mpa.

#### **Item 08 Idle fuel injecting amount test:**

- Press the item selection up and down keys to select the "08 Idle fuel injecting amount test" item.
- Press the up and down keys to set the number of times of injection. (Generally set to 2,000 times)
- The remaining operation steps are consistent with item 02.

#### **Notes :**

- 1)Simulates the working condition and injection amount of the engine at idle speed when the injectors work a certain number of times.

#### **09 Middle-speed fuel injecting amount test:**

- Press the item selection up and down keys to select the item "09 Middle-speed fuel injecting amount test".
- The rest of the operation steps are consistent with item 08.

#### **10 High-speed fuel injecting amount test:**



- Press the item selection up and down keys to select the "10 High-speed fuel injecting amount test" item.
- The rest of the operation steps are consistent with item 08.

**Notes :**

1)Uniformity. This is for checking the uniformity carried out at various rpm. When the test liquid level is at 2/3 of the test tube, please pause or stop the machine to observe the uniformity of the injecting amount. Injecting difference of all injectors on one vehicle should be kept within 2%. Or refer to the relevant technical manual of the fuel injector to determine the uniformity of the injecting amount.

2)Observe the shape of the injectors. Observe whether the injecting shapes and angles of all fuel injectors on the same vehicle are identical at various speeds. At the same time, you can adjust the injection pulse width of the fuel injectors to compare whether the minimum injection pulse width among the fuel injectors is consistent.

3) Leakage test. Leakage test is to inspect the sealing conditions of the injector needle valve under system pressure. (Observe the tightness of the fuel injectors, generally, there should be no leakage within one minute)

**11 Reverse Flush Test:**

- Press the item selection up and down keys to select "11 Reverse Flush", and install the injectors in the opposite direction for cleaning.

**12 Fully Automatic Cleaning items:**

- Cleaning time can be set to a maximum of 20 minutes. Please connect to various special parts that can clean the combustion chamber or throttle.

**Maintenance****1. Tidy up**

- Turn off the power and unplug the power plug.
- Put all the connectors back into the accessory box for storage.
- Put the ultrasonic cleaner back into the original bottle and seal it, and wipe the equipment clean with a dry soft cloth.
- If it is not used for a long time, open the test liquid valve and drain the test liquid back into the original bottle for sealed preservation.

**2. Maintenance****Replacement of test liquid**

- Impurities can be built up in the test liquid after being used for a period of time. Do not use contaminated test liquid, otherwise, injector and fuel pumps

can be blocked. Drain the test liquid by removing the level indicator on the left of the main unit. It is better to clean the fuel tank with a little test liquid before the tank is filled in with the new liquid. After cleaning, close the test liquid valve again and pour in new test liquid.

### **Replacement of Fuse**

- There is a square box marked with a fuse at the power socket on the left side of the equipment, and the fuse can be seen by opening the square box. If it is blown, replace it with a new one (5A).

### **Precautions**

- Since the test device is quartz glass, which is easy to be broken, please don't place other objects around the device to avoid breaking by bumping.
- If there is no digital display after power on (there may be a delay of several seconds), please check whether the power supply has electricity; if there is a power failure, please check whether the plug is firmly connected, or check whether the fuse is blown. If there is no break, and the switch is still not working after pressing several times, please contact your local dealer, do not disassemble it by yourself, otherwise our company shall not warranty.
- 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 result.
- It must be emptied completely before adding 1000ml of test liquid for every test liquid change.
- The use of unqualified test liquid will cause corrosion of the pump and oil supply line and failure of the pressure gauge.
- Only the ultrasonic cleaning liquid matched with the machine can be added to the ultrasonic bath, and other cleaning liquid can not be used instead, otherwise, the surface coating of the equipment and the mask will peel off, which will not be covered by the warranty.
- Kerosene, gasoline, pure water and other testing and cleaning solutions are strictly forbidden to be used as the testing and cleaning solution for this equipment. Otherwise, it will damage the "O" ring and rubber parts of the pipeline inside the equipment and cause leakage.
- Do not mix cleaning liquid with testing liquid.
- Please place the machine on a flat surface and use the four feet to support the weight of the machine, otherwise the ultrasonic cleaning bath will be damaged, which is not covered by the warranty.

## **Warranty**

- Thank you for choosing our products, we will provide you with the following services and promises.
- The warranty period of this product is 1 year.
- After the warranty period expires, repairs will be charged for replacement parts.
- After the failure, please contact the manufacturer, we will give you the most complete service in the shortest time.

### **The following items are not covered by the warranty:**

- Vulnerable parts are not covered by the warranty, including: glass tube, signal sire, stickers, connectors pressure gauge, oil outlet pipe.
- When no cleaning agent is added to the ultrasonic tank, turning on the ultrasonic cleaning switch will damage the ultrasonic system, which is not covered by the warranty.
- If the testing agent is not replaced in time after long-term use, the oil pump filter screen is blocked and the oil pump is burned out of the warranty.
- The use of fuel injector cleaning agent as fuel injector testing agent will cause the fuel pump to burn out, which is not covered by the warranty.
- Man-made faults are not covered by the warranty.

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