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1. Introduction

Along with the application of modern technology in car industry,the structure of car engine becomes more and more complicated and metering control becomes more and more accurate .A higher request to the condition of control and execute components has been put forward. There appeared a lot of high precision components in car engine in order to meet this requirement.The condition of these components can affect engine performance dirctly.

The condition of fuel injector is the key factor which has significant influnce for car engine performance,especially the condition of electronic fuel injector in the advanced electronic fuel injection engine.Therefore,it is becoming ever more crucial on fuel injectors test, maintenance and fault diagnosis.

Fuel injectors can cause a whole host of problems that can lead to major engine damage if not diagnosed and replaced or repaired as soon as possible.Dirty fuel injectors can cause clogging, which leads to a wide variety of engine problems. These problems include a drop in fuel economy, worse performance or even dirty emissions.

Fuel injectors are a key component to your vehicle's fuel system. It is important to maintain, clean and replace fuel injectors as needed. Performance fuel injectors can take your car to the next level with more horsepower, better fuel efficiency and an overall better running engine.

Mutlifunctional Fuel Injector Cleaning & Diagnostic Testing Bench is specifically designed for servicing and maintenance of fuel injectorsThis equipment enables you to diagnose the working conditions of fuel injectors correctly and maintain the fuel injectors in perfect conditions.

2.Safety precautions

2.1 Please read this instruction manual carefully before the equipment is installed and in operation

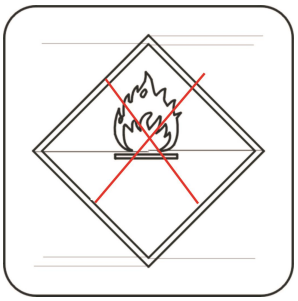
2.2Appropriate fire extinguishing equipments must be clearly marked and closed at hand, keep the testing liquid away from flame and smoke, and worksite in good air ventilation. After operation, switch off the power supply and clean the machine.

2.3 Do not turn on and off the unit frequently, waiting for 5 minutes before restart the unit .

2.4 In order to avoid the aging of the rubber parts, do not expose the equipment under sunshine or in a damp environments.Store in a dry place with good ventilation.This equipment complete with various accessories that should be managed by designated personnel.

2.5 This equipment complete with mirco-processor. All persons involved with the maintenance and repair of the equipment must be suitably qualified.This equipment has been examined strictly before leaving factory.Using properly,the equipment will repay you by giving you constant operational readiness for many years to come.If for some reason the unit needs repair,contact your local distributors or service offices.

2.6 While working, sparks, smoke and fire are strictly prohibited in worksite.



2.7 The operator must wear safety glasses with side shield or face shield to prevent the fluid splash into eyes.

2.8 Avoid fuel and cleaning fluid spatter into electronic components.

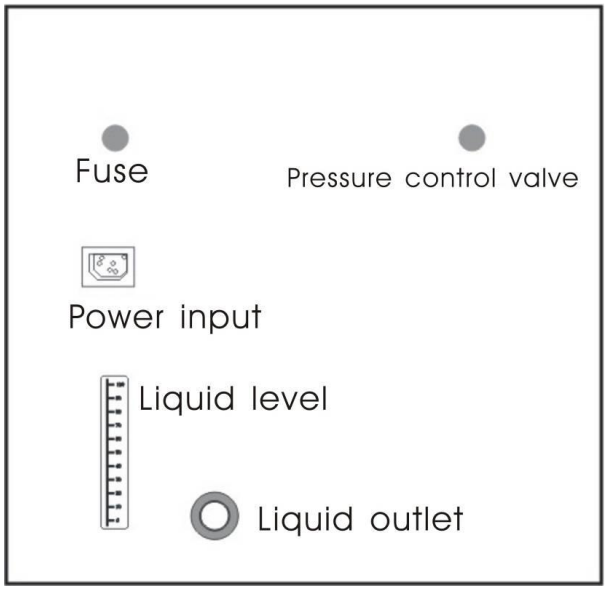
2.9 Use only manufacturer's suggested testing and cleaning fluid for testing and cleaning.

2.10 After finishing testing and cleaning process, always adjust the Pressure Value to min. position and switch off power supply.

2.11Do not make any alterations,installations or modifications to the equipment without first obtaining permission from the manufacturer.If you have any inquiries, please contact your local distributors or service offices.

2.12 This machine is equipped with automatic temperature protection/control system, when the working temperature is over rated value, the machine will stop automatically and the alarm will ring, when the temperature gets normal, the machine will resume to normal condition.The level of testing liquid must reach or over the standard line.

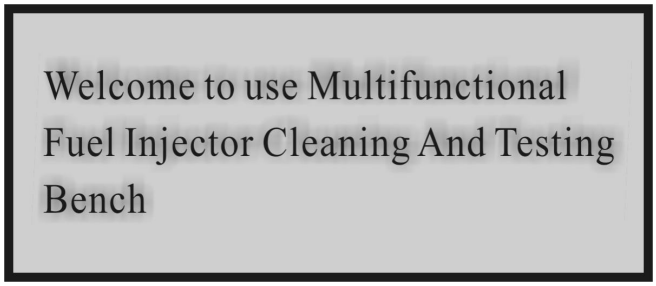
Rear of unit



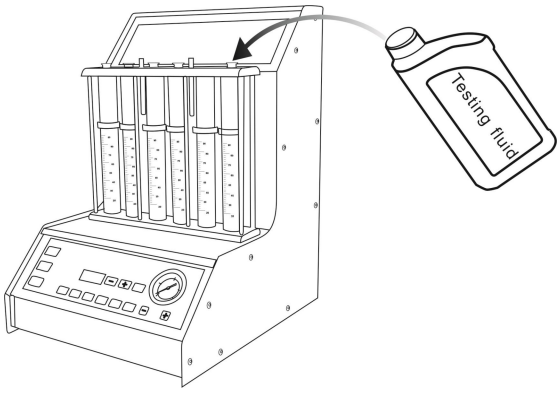
3.Preparation

1.Make ready for the worksite.

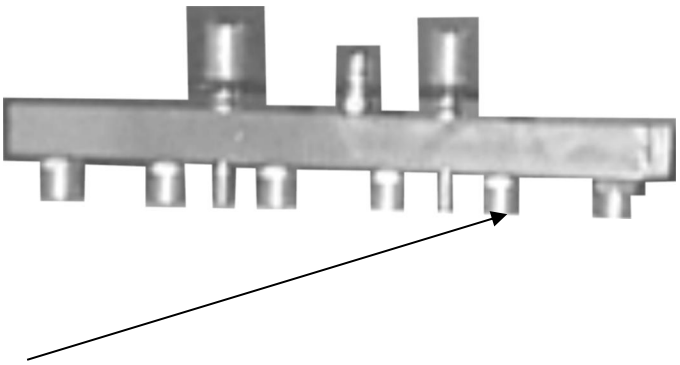
2.Connect the unit to power supply AC-220V, turn on the power switch..When "Welcome to use Multifunctional Fuel Injector Cleaner And Tester Bench" appeared on the LCD screen, the unit is ready to work:.



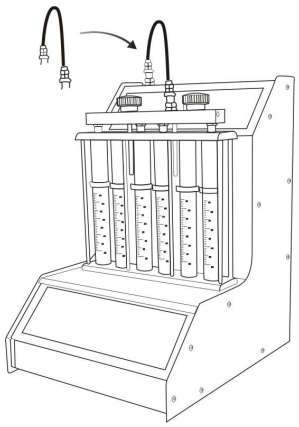
3.Pour suitable quantity of testing fluid into the machine from glass tube or liquid inlet. Press the button "Drain" to transfer testing fluid to the built-in oil tank.Use the fluid which specially designed for testing only



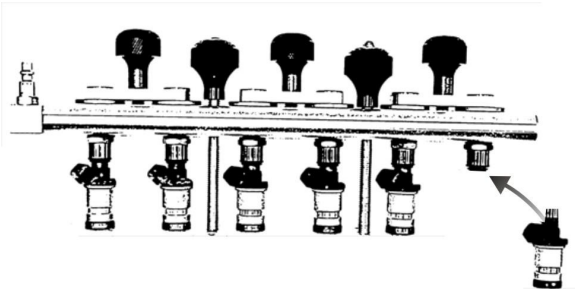
4.Select the suitable adapters for the fuel injectors and connect them with the fuel stage. Optional special type adapters are. available.



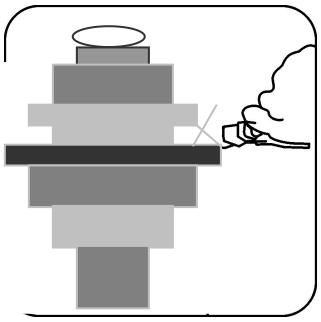
5. Connect a fuel hose between oil outlet and collar of fuel stage



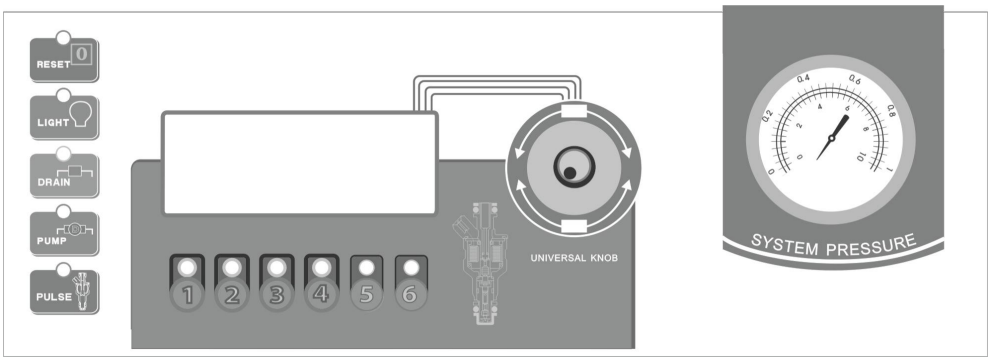
6..Mount the injectors to the fuel stage.



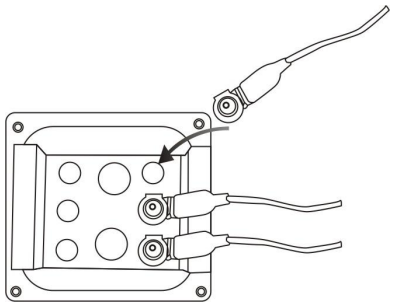
7..Please plug the pulse wire with the injector socket in sequence according to the numbers on the pulse wires



8.Starting up the fuel pump, turning the functional knob clockwise to adjust the pressure. If there is any leakage on the connection, please find out the reason and reinstall.



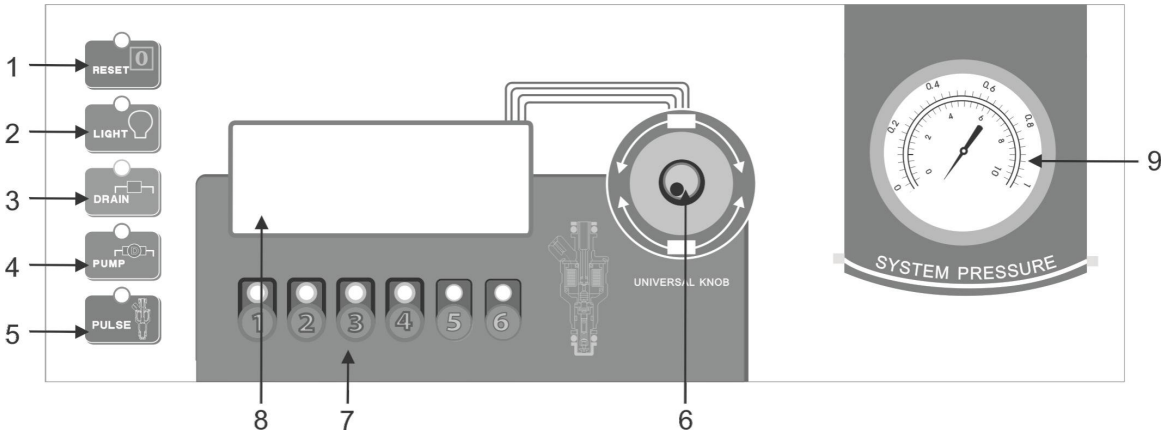
9.Connect ultrasonic bath with power.Pour suitable quantity of cleaning fluid into the bath.Turn on the unit.In normal working state,you can see the vibration of fluid in the bath.(Do not switch on the unit if there is no fluid in the bath)



4. Specifications

1.Packing Size: 56x56x75CM
2.N.W./G.W.：60/75KGS
3.Power：AC220V 50/60Hz 360W
4. Pressure Range：0~ 90PSI (6.4KG/C ㎡)
5. Work Temp.：-20˚C~38˚C
6. Injectors.No.：2-6 (Min. 2 injectors cleaning in one time)
7. Injector Pulse (COUNT)：0-9950 pulses；variable in 50 pulses.
8. Injector Operating Frequency (RPM)：0-9950 rpm, variable in 50rpm
9. Injector Pulse Width (PMW)：0-20 ms in 0.1ms increments

5.Control Panel



1.RESET: Press this key to return to original working position for reseting. If the system halted, press this key to recover.

2.LIGHT:For back ground light on/off

3.DRAIN: Press this key for testing fluid returning to built-in tank. Press it again to stop draining.

4.PUMP: Press this key to start the pump. Press it again to stop.

5.ULTRASONIC :Press this key for entering ultrasonic cleaning process

6.FUNCTIONAL KEY : for main menu and confirmation.Press this key for going to main menue from idle mode.It is also available for pause,start and pressure adjustment.

7.PULSE:To pause or start the test for injectors when testing is being performed

8.LCD SCREEN:To display the data.

9.PRESSURE GAUGE:Showing the pressure of fluid supply(unit:KG/CM)

6. Main Menu

Press functional key to enter main menu mode from idle mode.The functions of main menu:

1.Automatic testing

2.Speed change testing

3. Spray angle testing

4. Fuel delivery volumn testing

5. Leakage testing

6. Spray cleaning

7. Reversal cleaning

8.Ultrasonic testing

9.Manual testing

10. Manual testing

11. Manual testing

12. Manual testing

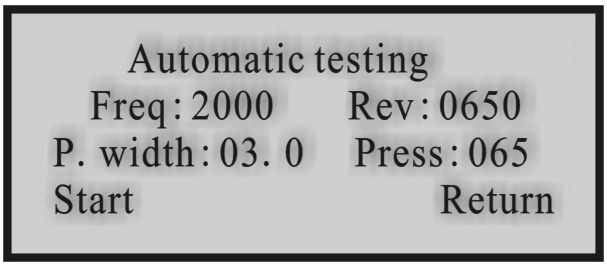
13. Manual testing

7.Operation

To mount fuel injectors to the fuel stage according to Section 3 “Preparation”.
In idle mode,press “Functional key”to check each injector’s ohm resistance.The resistance value of each injector can not exceed by 1 Ω .If the resistance value is above 1 Ω , the injector must be replaced.

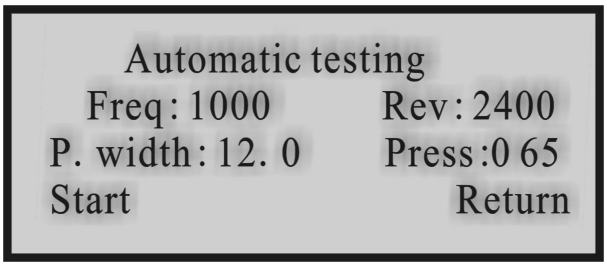
1）Automatic Testing

From main menu goes to this programme,press the key“Start”to start the procedure.
Programme 1.
Injection pulse procedure is proceed as follow:



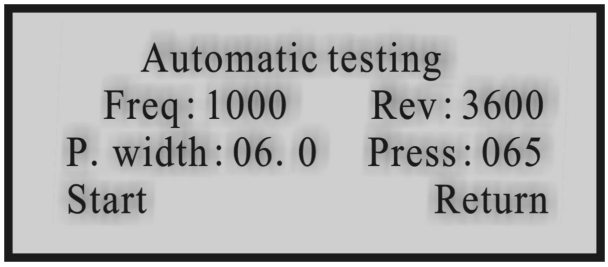
Examining visually after the end of programme

This programme is for examining the injectors in idling process.The programme will go to load testing and high speed testing automatically.
Programme 2(simulating heavy load):
Injection pulse procedure is proceed as follow:



Examining visually after the end of programme

This programme is for examining the injectors in maximum load process.The injectors are qualified if there is no significant change in the evenness of fuel distribution,usually no more than 12% in evenness difference.It is necessary to clean or replace the injectors if their distribution evenness had evident difference. The procedure will go to the next programme automatically after the end of this programme..
Programme 2(simulating high speed):
Injection pulse procedure is proceed as follow:



Examining visually after the end of programme

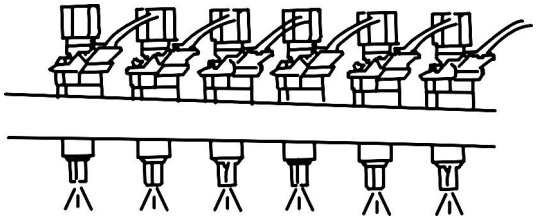
This programme is for examining the injectors in high speed process and measuring the fuel delivery volume. Drain valve will close after the fluid drains off and runs down to the tank in 45 seconds.Programme stops.

2）Speed change testing

To mount the injectors to the fuel stage according to Section 3 “Preparation”. Press “Functional Key” to go to the second testing programme—Speed change testing. Start up the programme. The spray pattern and fuel delivery can be simultaneously measured and visually examined. The fuel distribution is measured by the length of penetration into the glass tube. The spray pattern and fuel delivery of injectors can be measured and examined more directly by this speed change testing.

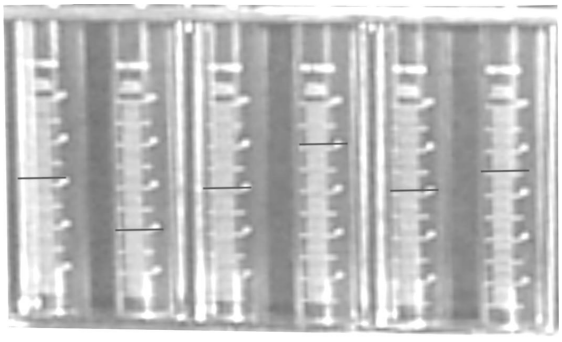
3）Spray angle testing

Enter into this programme according to above procedure. Press the key‘Start” to start the programme. The spray pattern of injectors can be visually examined. The atomisation shall be even and the spray angle shall be uniformity .Otherwise, ultrasonic cleaning is necessary for the injectors.



4）Fuel delivery volume testing

After selecting this programme, set the pressure value to the rated working pressure of injectors by the regulator.After the procedure stopped, the fuel distribution is measured by the length of penetration into the glass tube. The ideal requirement would be that all the penetrations reach the same length, or the difference in length within 10%.A replacement or a cleaning is required for the injectors if the difference in length is more than 10%.



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5) Leakage testing

Press the key “Start’ after selecting this programme. Set the pressure value to the rated working pressure of injectors by the regulator. Visually inspect the fluid dropping from the injectors.If there is more than one drip within one minute, a replacement or a cleaning is required for the injector

6) Spray cleaning

This procedure can be used as a routinely cleaning. The operating procedures are as follows:

1. To mount the injectors onto the fuel stage according to Section 3 “Preparation”.

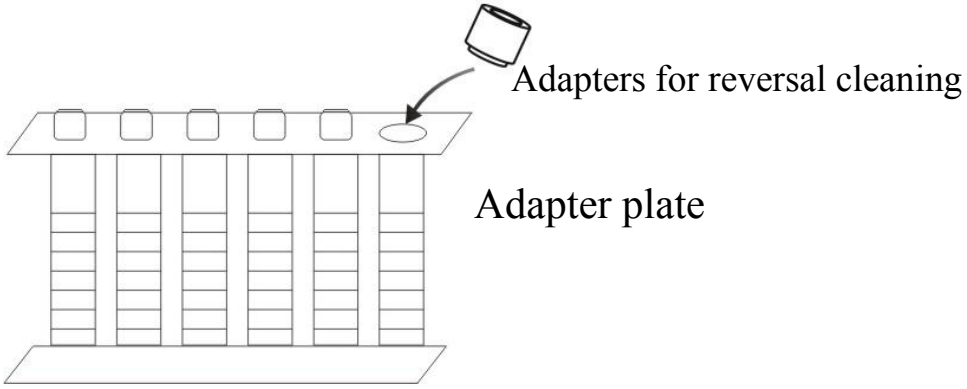
2.Select “Spray cleaning” and press the key “Start”.

3.Visually examine the spray pattern and measure the length of penetration into the glass tube.

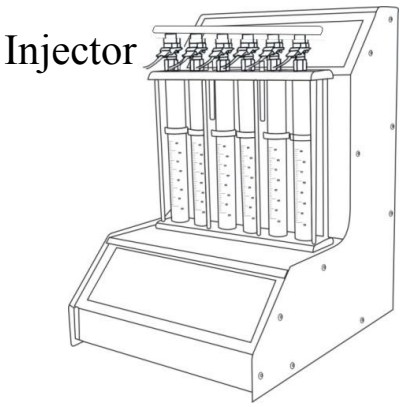
4. Drain valve will close after the fluid drains off and runs down to the tank in 45 seconds. Programme stops.

7) Reversal cleaning (Black-flushing)

1.Take out the adapters for reversal cleaning from tool box.Put them onto the adapter plate of glass tube,as shown:

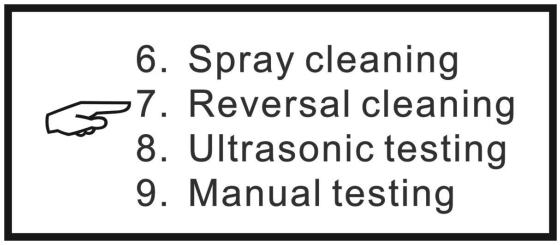


2.Connect injectors with suitable adapters.The injectors should be mounted in up-side-down.

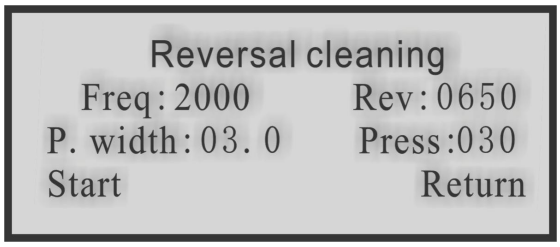


3. Connect a fuel hose between oil outlet and collar of fuel stage

4. Switch on the unit ,and then enter into “Reveral Cleaning” programme from main menue. Usually,the pressure for reversal cleaning should not be exorbitant.



5.Press “Start” key to start the cleaning.The initial data will be shown as follows:



6.Cleaning finished. Drain valve will close after the fluid drains off and runs down to the tank in 45 seconds. Programme stops.

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8）Ultrasonic cleaning

Pour cleaning fluid into ultrasonic cleaning bath to half filled level.Connect injectors with pulse wire and put them in the cleaning tray.Put all of them into cleaning bath. Start up cleaning procedure. Switch on the ultrasonic cleaning bath for entering into ultrasonic cleaning state.Clean for 20-30 minutes ,and then carry out a test.

9） Manual testing

To test the injectors via setting the relevant data manually.

9、Pressure parameters of fuel supply system of common vehicle models

Fuel supply system pressure of various vehicles

Brand	Model	Pressure （KG/CM2）
MAZDA	323	2.0-2.2
	626	2.5-2.9
	929	2.5-2.9
BMW	528	2.7-2.9
VOLVO	VOLVO	2.7-2.9
NISSAN	NISSAN	2.5
	NISSAN	2.5
	300ZX	2.06-2.55
FORD	Tempo2.3L	2.8
	Lincoln City	2.06-3.08
GM	Buick Century	2.9-3.3
	Buick	2.9-3.3
	Cadillac 5.7	2.9-3.3
	Chevrolet	2.3-3.0
	Chevrolet Corsica	2.5-3.0
MITSUBISHI	V6	3.5
VW	Jetta GT	2.7-2.9
VW	Santana 2000	2.2-2.65
DAEWOO	Dawoo	2.8-3.0
HYUNDAI	Sonata	2.65-2.75
TOYOTA	Toyota3.0	2.84
	Toyota	2.7-3.3
	Lexus300 LS400	2.65-3.04
	Camry 3.0	2.65-3.04
	Land Cruiser	3
	Corolla	2.7-3.1
HONDA	Accord 2.0 2.2	2.85
	Civic 1.5L	2.55-2.85
	Legend3.2L	2.7-3.04
CHRYSLER	Beijing Cherokee 213	2.73
	Durango3.3L	3.37
AUDI	6 Cylinders	2.8-3.0
	4 & 5 cylinders	4.5-5.0

10. Operational Process

1、Make ready for testing

↓

2、Connect to power supply and add testing fluid

↓

3、Select suitable adapters and connect with injectors.

↓

4、Make ready of ultrasonic cleaning bath

↓

5、Checking working conditions of the unit

↓

6、Testing/Cleaning is performed.Visualtest of the injectors.

↓

7、Perform ultrasonic cleaning

↓

8、Ultrasonic Cleaning.

↓

9、Perform testing /cleaning producure again

10、After testing/cleaning,replace injectors if necessary

11、All process is finished, turn off the power supply.

12、 Cleaning worksit