FUEL INJECTOR TEST DEVICE 12V PETROL

MODEL NO: **VS211.V2**

Thank you for purchasing a Sealey product. Manufactured to a high standard, this product will, if used according to these instructions, and properly maintained, give you years of trouble free performance.

IMPORTANT: PLEASE READ THESE INSTRUCTIONS CAREFULLY. NOTE THE SAFE OPERATIONAL REQUIREMENTS, WARNINGS & CAUTIONS. USE THE PRODUCT CORRECTLY AND WITH CARE FOR THE PURPOSE FOR WHICH IT IS INTENDED. FAILURE TO DO SO MAY CAUSE DAMAGE AND/OR PERSONAL INJURY AND WILL INVALIDATE THE WARRANTY. KEEP THESE INSTRUCTIONS SAFE FOR FUTURE USE.


Refer to instruction manual


Wear eye protection

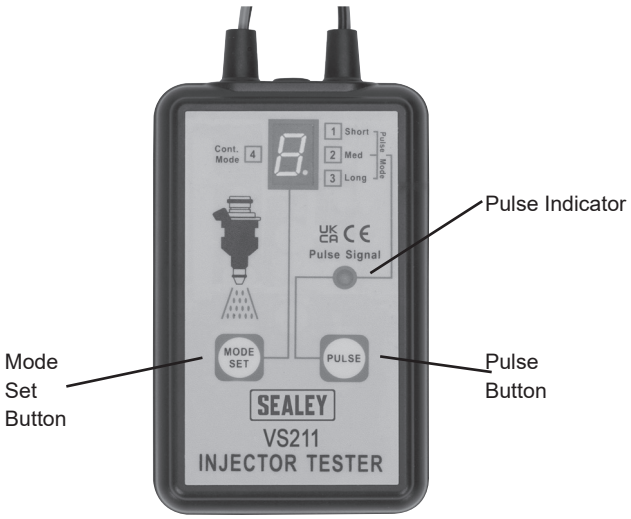

Wear protective gloves

1. SAFETY

- ❑ **WARNING: Not to be used on Diesel engined vehicles.**
- ✓ Wear approved eye protection.
- ✓ Operate the vehicle in a well ventilated area. Do not inhale exhaust gases or fuel vapour.
- ✓ Keep yourself, tools, and test equipment away from all moving or hot engine parts.
- ✓ Ensure the vehicle is in Neutral (manual transmission) or Park (automatic transmission), and that the parking brake is firmly applied. Block the drive wheels.
- ✓ Always keep a fire extinguisher suitable for fuel/electrical/chemical fires close by.
- ✓ Always turn ignition key to 'OFF' when connecting or disconnecting electrical components, unless otherwise instructed, and take extreme caution when touching electrical components.
- ✓ Use a rag to cover fuel line fittings, when connecting or disconnecting fuel lines or gauges. Avoid contact with petrol.
- ✓ Dispose of all rags properly.
- ✓ Clean up all fuel spills immediately.
- ✓ Keep away from engine cooling fan. On some vehicles, the fan may start up unexpectedly.
- ✓ You must follow vehicle service manual cautions when working around the air bag system. If the cautions are not followed the air bag may deploy unexpectedly, resulting in personal injury. Note that the air bag can still deploy several minutes after the ignition key is turned 'OFF' (or even if the battery is disconnected) because of a special energy reserve module.
- ✓ Follow the vehicle manufacturer's warnings, cautions and service procedures.
- ✓ Always relieve fuel pressure before disconnecting fuel lines.
- ✓ The Fuel Injector Tester can be used in conjunction with an optional fuel pressure gauge for fuel injector testing. Always follow all safety guidelines and testing procedures contained in the instruction manual provided with the fuel pressure gauge.
- × Never lay tools on vehicle battery. This may short the terminals together, causing harm to yourself, the tools, or the battery.
- × Never smoke or have open flames near vehicle. Vapours from petrol and charging batteries are highly flammable and explosive.
- × Never leave vehicle unattended whilst running tests.
- × Do not confuse Air Conditioning schrader valves with the fuel rail test port.
- ✓ After testing, ensure all connections are restored.
- ✓ When finished with tester, store it in a safe, dry, childproof location.

2. INTRODUCTION

Operates injectors individually to diagnose fuel delivery problems on petrol vehicles with electronic fuel injection. Works with engine off and pulse timer may be used with fuel pressure gauge. Powered by vehicle's 12V battery. Can be used to locate fuel system faults such as:• Clogged or leaking fuel injectors.• Sluggish or sticky fuel injectors.• Wiring harness faults.• Fuel injector driver signal faults.



Original Language Version

3. TESTING PROCEDURE

❑ **WARNING! Before using equipment ensure you have read, understood and apply Section 1 safety instructions.**
IMPORTANT: The information in this manual is not a substitute for the procedures outlined in the vehicle service manual and fuel pressure gauge instructions. **ALWAYS** follow manufacturer's instructions and safety precautions when working on fuel systems

3.1. PRE-TEST CHECKS.

3.1.1. Carry out a thorough visual and hands-on inspection of the engine and fuel system. Look for loose or cracked electrical wiring, battery cables, ignition wires, and fuel or vacuum lines.

3.1.2. Verify that the battery is fully charged and fuel tank has adequate fuel.

3.1.3. Verify that the inertia fuel cut-off switch (if fitted) has not been actuated - see vehicle's manual.

3.1.4. Verify that all fuel system fuses are OK.

3.1.5. Verify that the fuel vapour recovery system and filler cap are in good condition.

3.1.6. Verify that the manifold vacuum is within manufacturer's specification (typically 18-20 in.Hg at idle).

3.1.7. Inspect for fuel leaks and wipe up any spilt fuel immediately.

3.1.8. **DO NOT TAKE SHORTCUTS.** Inspect wiring which may be difficult to see because of location beneath air cleaner housings, alternators, etc.

3.1.9. Check electrical connectors for corrosion on pins, Bent or damaged pins. Contacts not properly seated in housing.
Note: Problems with connectors are common in the engine control system - inspect carefully. Note that some connectors use a special grease on the contacts to prevent corrosion. **DO NOT WIPE OFF!** Obtain extra grease, if needed, from your vehicle dealer. It is a special type for this purpose.

3.1.10. Check other vehicle systems: Ignition, for safety reasons, many engine management systems will not deliver fuel without an ignition spark.

3.1.11. Electronic Control Unit (ECU) The engine management system ECU has special drivers which energise the fuel injectors. These drivers are fragile and can easily fail. If an ECU driver problem is suspected, check by replacing the ECU with a known good one and retest.

3.2. Testing Injectors visually when removed.
The tester sends a pulse to the fuel injector which forces a spray of fuel from it. To observe the fuel spray pattern, the fuel injector needs to be removed from the engine either on it's own or all of the injectors with the fuel rail. Please refer to the vehicle a manufacturer's manual for detailed instructions on how to carry this out.

3.2.1. Turn off the vehicle's engine and ensure the ignition key is in the OFF position.

3.2.2. Connect the red clip (positive) to the positive terminal of the vehicle's battery and the black clip (negative) to the negative terminal of the vehicle's battery.

3.2.3. Carefully disconnect wiring harness from fuel injector to be tested. Note: Do not jerk or pull on wires - some harnesses are attached with clips. It is a good idea to test injectors in sequence, beginning with cylinder No.1.

3.2.4. Connect tester to fuel injector. For most injectors it does not matter which wire is connected to which terminal on the injector. Make sure the injector adaptor wires are securely fastened to the fuel injector terminals and that there is no exposed metal between them.

3.2.5. As fuel will be sprayed from the injector and the engine may be hot, it is best to have some form of receptacle to place near the injector to capture the spray, such as a jam jar or similar.

3.2.6. Select one of the tester's modes by pressing the **MODE SET** button, the mode No. will be displayed: Single Pulse test will test for clogged injectors, Multiple Pulse tests will test for sticky or sluggish injectors.
MODE 1 LONG the tester outputs 1 pulse which lasts for approximately 250ms. **MODE 2 MEDIUM** the tester outputs 50 pulses, each pulse lasts for approximately 7ms. **MODE 3 SHORT** the tester outputs 100 pulses, each pulse lasts for approximately 3.5ms. **MODE 4 - CONTINUOUS -** the tester outputs pulses continuously at the approximate rate of 50 pulses per 1450ms, each pulse lasts for approximately 7ms. This mode can be cancelled at any time by pressing the **MODE SET** button again.

3.2.7. Press the **PULSE** button to energise fuel injector. The Pulse Indicator will light as injector is energised by the tester.

3.2.8. Observe for correct spray pattern from the injector and also for leaks from the injector. If necessary, repeat the test by pressing the **PULSE** button again.

3.2.9. If the pulse mode needs to be changed after a test, disconnect the unit from the battery and re-connect it, then select the new pulse mode, before continuing with a new test.

3.3. **Testing Injectors in conjunction with a fuel pressure gauge.**
IMPORTANT: Read and follow all pre-test checks, safety instructions, and fuel pressure testing procedures contained in this document and in the vehicle's service manual.

❑ **WARNING! Always use caution when working around fuel systems. The fuel in the fuel rail may be pressurized even if the engine is not running. Use a rag to cover the schrader valve or fitting whenever opening the fuel system to attach gauge. Clean all fuel spills immediately.**

3.3.1. Depressurise the fuel system by following the procedure outlined in the vehicle service manual. On most vehicles, this involves disconnecting or deactivating the electric fuel pump(s) and operating the engine until it stalls. Note: Some vehicles may have more than one fuel pump - deactivate all fuel pumps. Failure to do so can result in personal injury, vehicle damage, spilt fuel, fire or other hazardous conditions.

3.3.2. Connect a fuel pressure gauge to the fuel line. Some vehicles have a schrader valve located on the fuel rail for this purpose. On vehicles without a schrader valve, the fuel line must be opened at the appropriate point to insert a fuel pressure gauge adaptor. Open fuel line at point specified in vehicle service manual. Connect adaptor to fuel line. Attach fuel pressure gauge to adaptor and tighten fitting until finger tight.

3.3.3. Test for fuel system leaks.

3.3.4. Re-pressurise fuel system by cycling vehicle's ignition 'ON' and 'OFF' every ten seconds, until fuel pressure is up to the vehicle manufacturer's specification - check the vehicle's service manual.
Note: Check fuel pressure gauge connection points for leaks. If leak occurs, clean all fuel spills immediately and check all fittings for tightness.

3.3.5. Observe pressure gauge for 10 -15 seconds, looking for pressure drop.

3.3.6. If the pressure does not drop, continue with fuel injector testing. If fuel pressure does drop, continue looking for leaks by blocking off the return line between the fuel pressure regulator and the fuel tank. Re-test as described above.

3.3.7. If the pressure drops again, there may be one or more leaky injectors. Later tests will identify malfunctioning injectors.

IMPORTANT: DO NOT pulse fuel more than once per cylinder. Start and run the engine briefly after pulsing fuel once into all cylinders. This clears excess fuel from the intake ports. Failure to do so could cause difficult starting, severe engine flooding, catalytic converter damage, or fire.

3.3.8. Connect the red clip (positive) to the positive terminal,of the vehicle's battery and the black clip (negative) to the negative terminal of the vehicle's battery.

3.3.9. Carefully disconnect wiring harness from fuel injector to be tested. Note: **DO NOT** jerk or pull on wires - some harnesses are attached with clips. It is a good idea to test injectors in sequence, beginning with cylinder No.1.

3.3.10. Connect tester to fuel injector. For most injectors it does not matter which wire is connected to which terminal on the injector. Make sure the injector adaptor wires are securely fastened to the fuel injector terminals and that there is no exposed metal between them.

3.3.11. Re-pressurise fuel system as described in 3.3.4. Be sure that fuel pressure is stable before continuing. Record this initial fuel pressure for reference.
Note: Fuel system must be re-pressurised to manufacturer's specifications before testing each fuel injector.

3.3.12. Select one of the tester's modes by pressing the **MODE SET** button, the mode No. will be displayed: Single Pulse test will test for clogged injectors, Multiple Pulse tests will test for sticky or sluggish injectors. **MODE 1 LONG** the tester outputs 1 pulse which lasts for approximately 250ms. **MODE 2 MEDIUM** the tester outputs 50 pulses, each pulse lasts for approximately 7ms. **MODE 3 SHORT** the tester outputs 100 pulses, each pulse lasts for approximately 3.5ms. **MODE 4 CONTINUOUS** the tester outputs pulses continuously at the approximate rate of 50 pulses per 1450ms, each pulse lasts for approximately 7ms. This mode can be cancelled at any time by pressing the **MODE SET** button again.

3.3.13. Press the **PULSE** button to energise fuel injector. The Pulse Indicator will light as injector is energised by the tester.

3.3.14. Record fuel pressure drop, 2 to 3 seconds after pulse.
Note: Make sure that each injector's pressure drop is recorded after the same elapsed time after the pulse. If this time interval varies, the test results will be inaccurate due to normal fuel system leakdown.

3.3.15. Repeat steps 3.3.9. to 3.3.14. with the next injector, until all injectors have been tested.

3.3.16. After testing all injectors in one position (Single or Multiple), repeat test procedure with a pulse mode in the other position.

3.4. Fuel Injector test results.

3.4.1. Compare the pressure drop values for each injector (recorded at 3.3.14.). Any injector showing a result significantly different (more than ± 2.0 psi) from the others should be retested to be certain that there were no variations in the test procedure. **Single Pulse test:** Clogged injectors will show less pressure drop than healthy injectors. Leaking injectors will show greater pressure drop than healthy injectors.
Multiple Pulse tests: Sticky or sluggish injectors will show less pressure drop than healthy injectors.

3.4.2. Flush or clean any injector which continues to show a variation of more than 2.0 psi when compared to the other injectors.
Note: Be sure to compare readings taken during Single and Multiple pulse testing separately. Pressure drop values for single pulse tests can be very different from values for multiple pulse tests.

3.4.3. Retest and then replace any injector which has not improved after being flushed or cleaned.

3.4.4. When finished testing, disconnect tester leads from the fuel injectors. Note: Always grasp adaptor ends near terminals, when removing from injectors, to prevent damage. **DO NOT TUG** or jerk adaptor wires from terminals.

3.4.5. Remove tester clips from vehicle's battery.

3.4.6. Fully depressurise fuel pressure gauge and fuel system. a) Schrader valve - when removing gauge from schrader valve use a rag to cover the valve in case fuel sprays out. Replace schrader valve cap. Note: Fuel system may still be under pressure, even if the engine is not running. Clean all fuel spills immediately. b) Fuel line adaptors - remove adaptors using tools and procedure as outlined in vehicle service manual. Reconnect all fuel lines. Test for leaks. Clean up all fuel spills immediately.
IMPORTANT: Follow all procedures outlined in the fuel pressure gauge instruction manual for the safe way to remove the gauge from the schrader valve or fuel line adaptor.

3.4.7. If the excess fuel in the intake ports has been purged, by starting the vehicle after each injector test, reconnect all injector wiring harnesses to injectors.
IMPORTANT SAFETY NOTE: If excess fuel has NOT been purged following each injector test, vehicle damage may result when engine is started. To clear excess fuel, disconnect ALL fuel injector harnesses and then crank engine. Engine may start and run roughly, then die. This is normal. Reconnect all injectors.

4. MAINTENANCE

4.1. Keep the tester’s electrical connections clean and free of corrosion.

4.2. If tester face becomes dirty, wipe clean with a damp cloth. **DO NOT** use strong solvents as they may remove face printing.

4.3. Use care to prevent the tester’s wiring insulation from becoming chafed or broken. **DO NOT USE** tester if insulation or wiring is damaged.

4.4. When not in use, store instrument in a safe, dry, childproof location.

WEEE REGULATIONS

Dispose of this product at the end of its working life in compliance with the EU Directive on Waste Electrical and Electronic Equipment (WEEE). When the product is no longer required, it must be disposed of in an environmentally protective way. Contact your local solid waste authority for recycling information.

ENVIRONMENT PROTECTION

Recycle unwanted materials instead of disposing of them as waste. All tools, accessories and packaging should be sorted, taken to a recycling centre and disposed of in a manner which is compatible with the environment. When the product becomes completely unserviceable and requires disposal, drain any fluids (if applicable) into approved containers and dispose of the product and fluids according to local regulations.

Note: It is our policy to continually improve products and as such we reserve the right to alter data, specifications and component parts without prior notice. Please note that other versions of this product are available. If you require documentation for alternative versions, please email or call our technical team on technical@sealey.co.uk or 01284 757505.
Important: No Liability is accepted for incorrect use of this product.
Warranty: Guarantee is 12 months from purchase date, proof of which is required for any claim.

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