AUTO TEST Products Pty Ltd

User Manual
Version 1.45

AutoTest AutoGas®

Four or Five Gas Analyser

AUSTRALIAN MADE AND OWNED

Licence ID number: 10242

AUTO TEST Products Pty Ltd

E7474 CE UKCA RoHS COMPLIANT 2002 / 95 / EC AUSTRALIAN MADE AND OWNED Licence ID 10242

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We, Auto Test Products Pty Ltd. declare under our sole responsibility that the product AutoGas 4/5 Gas Analyser is in conformity with the provisions of the following Council Directive: 1999/5/EC.
A copy of the Declaration of Conformity is available from http://www.autotest.net.au

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1. FOR YOUR SAFETY

Read these simple guidelines. Not following them may be dangerous. Read the complete user guide. Further detailed information is given in this manual.

SWITCH ON SAFELY

Do not switch the device on when wireless device use is prohibited or when it may cause interference or danger.

INTERFERENCE

All wireless devices may be susceptible to interference, which could affect performance.

SWITCH OFF WHEN REFUELING

Do not use the device at a refuelling point. Do not use near fuel or chemicals.

USE SENSIBLY

Use only in the positions as explained in the product documentation.

QUALIFIED SERVICE

Only qualified personnel may install or repair this product.

WATER-RESISTANCE

Your device is not water-resistant. Keep it dry.

CONNECTING TO OTHER DEVICES

When connecting to any other device, read its user's guide for detailed safety instructions. Do not connect incompatible products.

BE MINDFUL OF HOT SURFACES

Watch out for hot temperatures zones of vehicles particularly engine head, exhaust pipe, and radiator hoses.

BE MINDFUL OF MOVING PARTS

Watch out for engine cooling fan. Watch out for any moving parts of a running engine.

RISK OF FUMES INHALATION

Inhalation of fuel and exhaust fumes is harmful to health. Never start vehicles in a closed area. Always work in a well-ventilated area.

RISK OF DAMAGE TO EYES

Wear safety goggles when operating near vehicle battery as Battery acid, fumes, oil and dust particles might cause damage to the eyes.

2. ACRONYMS

AC	Alternate Current – Mains supply
AFR	Air to Fuel Ratio
BET	Basic Emission Test
CC	Cubic Centimetre
CO	Carbon Monoxide
CO_2	Carbon Dioxide
DC	Direct Current – Battery supply
DSM	Diesel Smoke Meter
ECU	Engine Control Unit
EGA	Exhaust Gas Analyser
HC	Hydro Carbon
HT cable	High Tension cable – Spark-plug cable
KM	Kilometre
Lambda (λ)	Engine efficiency
MOT	Ministry of Transport
NO_x	Nitrogen-Oxides
O_2	Oxygen
PC	Personal Computer – Desktop or a Laptop computer
PEF	Propane/hexane Equivalency Factor
PPM	Parts per million
RPM	Revolution Per Second – Engine speed
SPI	Serial Peripheral Interface Bus

3. UNPACKING AND FIRST TIME USE

Congratulations on your choice of AUTO*TEST*™ AutoGas. Please take the time to read this document before using AutoGas Analyser in the field. Incorrect or inappropriate use of this instrument may void the warranty. Please retain the packing materials for future shipping and transport of the unit for periodic calibration.

Please complete the warranty registration card and post it to AUTO*TEST* Products Pty Ltd, alternatively visit our website www.autotest.net.au and complete your warranty registration online. Your warranty registration ensures that you are kept up-to-date on any software or hardware changes to your AUTOTEST™ AutoGas Analyser. It also helps us to provide you with faster services.

4. PRODUCT DESCRIPTION

AUTO*TEST*™ 4/5 Gas Analyser (AutoGas) analyses the contents of exhaust gas. The analysis of exhaust gas describes the degree of efficiency of a vehicle's engine in reducing the amount of pollutant gases being released into the atmosphere. AutoGas can measure the contents of five gases (CO, HC, CO_2, O_2, and NOx). The measurement of the fifth gas (NOx) is optional and depends on the presence of a NOx sensor. AutoGas can also calculate Lambda (λ) and Air-to-Fuel Ratio (AFR) using the measured values of CO, HC, CO_2 and O_2 gases.

Non-Dispersive Infra-Red (NDIR) sensing technology is used to measure the contents of the input gas (CO, CO_2, HC). While the gas flows through the gas bench, a light source emits lights of different frequencies and then measures the amount of light that has been received at the opposite end by a detector. The signal received at the detector informs the gas bench about the concentration of each gas. The measurement of O2 and NOx gases is taken from two electro-chemical sensors (O_2 Sensor and NO_X Sensor).

AutoGas is capable of measuring engine oil temperature as well as the engine speed using the supplied probes. It allows a number of methods that can be used to measure the engine speed. The methods available for measuring the engine speed are listed below:

No	RPM Measurement Type	Description	Probe / Sensor
1	Battery sense method	Measures engine RPM by monitoring the fluctuations in the vehicle battery voltage	Battery / DC cable
2	Inductive pick-up (HT cable)	Picks up ignition signal in a HT (high tension) cable using a inductive pick-up clamp	Inductive Pick-up clamp
3	Accelerometer	Monitors the mechanical vibration of an engine	Accelerometer sensor

For vehicles that support OBD-II, AutoGas can wirelessly obtain engine oil temperature and engine speed from the vehicle's ECU using the supplied Bluetooth OBD-II reader.
AutoGas can be used on vehicles that run on Petrol, LPG, or CNG. Its lightweight and portable characteristics make it useful to carry out roadside emissions test. It is capable of carrying out standalone emissions test using the MOT Exhaust Emissions - Spark Ignition test procedure. A database of vehicles along with their emission limits is included in the meter. A built-in printer allows users to print test and calibration reports instantly.

AutoGas can perform electronic leak test to ensure no gas, other than the exhaust gas, is sampled and measured by the meter. A leakage in the input stage of the sample will cause erroneous measurement. The leak check is required once every 24-hour or whenever the meter is power-up. During a leak test, AutoGas creates a vacuum in the gas bench and then measures the vacuum pressure. The fluctuations in the vacuum pressure inform the meter about the presence of a leakage.

- For vehicles that operate on diesel fuel, AutoGas can be used in conjunction with AUTO*TEST*™ Opacity Meter (Auto Smoke) via a wireless interface to carry out a series of Free Acceleration Smoke (FAS) trials according to the MOT Diesel Smoke Test procedure (Exhaust Emissions - Compression Ignition).

4.1 Measurement System Overview

The measurement of the exhaust gas requires the gas to flow from the sampling probe into the gas bench, where the contents of the input gas are analysed. Figure 1 illustrates an overview layout of exhaust gas flow.

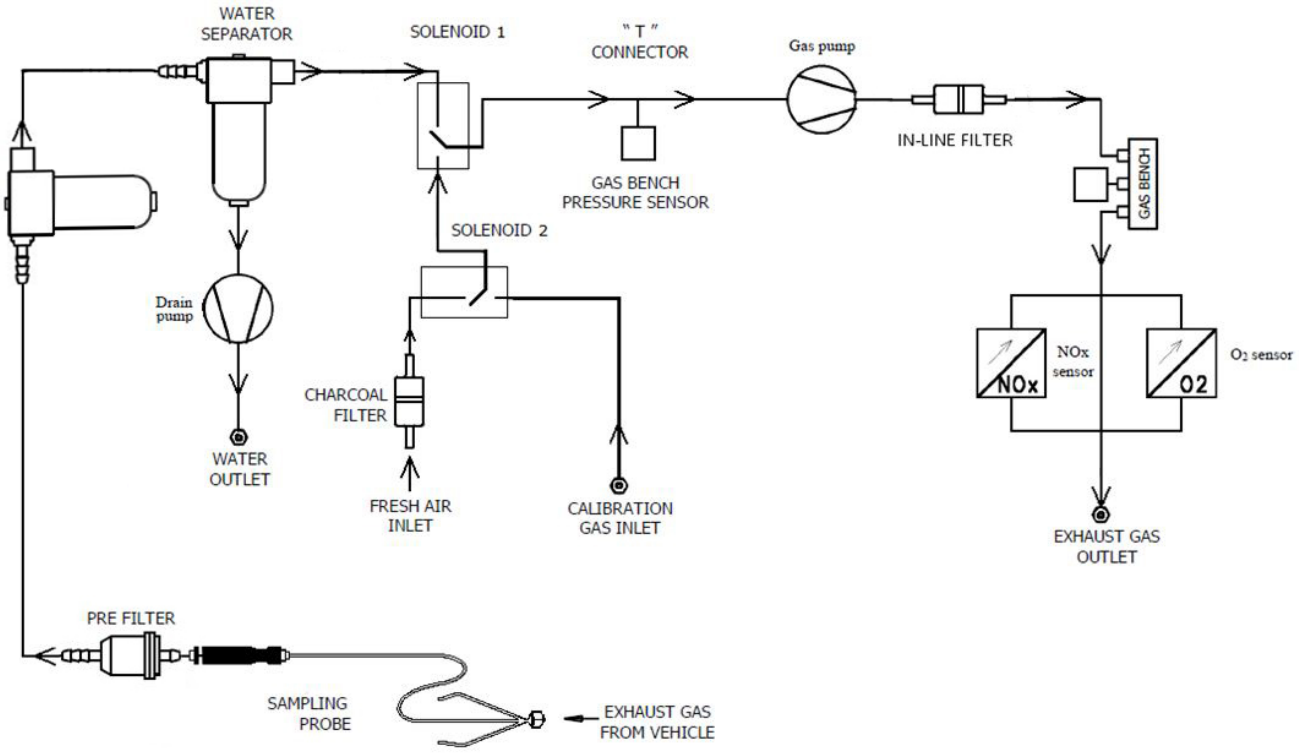


Figure 1. Gas flow diagram of AutoGas

AutoGas has a dual head diaphragm pump. The first head of the pump circulates the input exhaust gas through a set of filters into bench board, where the contents of the sampled gas are analysed. The second head of the pump circulates any water particles trapped in the water separator filter.

The use of filters prevents any exhaust contaminants from reaching the gas bench. The exhaust gas flows through the Pre-filter, which filter out any particle. After the pre-filter, exhaust gas flows through two water separators, which filters out the moisture or water droplet. After the water separator filter, a pre-pump filter is used to filter out any particle in the micrometre scale. After the pre-pump filter, the gas flows through another filter called in-line filter. The in-line filter

further filters out any micron scale filters. After the in-line filter, the gas flows through the gas bench where the contents of the input gas are analysed. The gas bench analyses CO, CO2 and HC gases. After the gas bench, the exhaust gas flows through two electrochemical sensors: O2 sensor and NOx sensor. The O2 sensor measures the concentration of O2 gas in the exhaust gas, whereas the NOx sensor measures the NOx level in the exhaust gas.

When zero calibration is performed, solenoid 1 is activated to block the input gas. The pump then circulates the fresh air (ambient air) through a charcoal filter. The fresh air then flows through the in-line filter and into the gas bench, where the zero calibration is performed.

During calibration, solenoid 1 is activated to block the input gas while the solenoid 2 is also activated to block the zero gas. The calibration gas then flows through the in-line filter and then into the gas bench, where the calibration gas is analysed, and the gas bench is calibrated.

The temperature of the gas bench is maintained from 40 to 45°C to prevent condensation building up inside the gas bench tube. The gas bench includes two pressure transducers for measuring gas pressure and vacuum pressure.

4.2 Components of AutoGas

AutoGas comes with necessary probes, some spare filters and paper rolls, and a Bluetooth OBD-II reader.

No	Component	Description
1	Gas Bench	Gas content measurement system located inside the device body
2	Display Panel	Displays gas readings and instructions for carrying out an emissions test
3	Keypad	Keypad consisting of six buttons. It monitors user inputs users
4	Printer	Prints out test and calibration reports
5	Gas Filters	Filters are used to filter out dust and contaminant particles before gas reaches the gas bench chamber
6	Gas Sampling Probe	Sampling probe is inserted into a vehicle's exhaust pipe to collect exhaust gas for analysis
7	Oil Temperature Probe	Oil temperature probe is used to measure the temperature of the vehicle engine oil
8	Battery/DC cable	Battery cable is used to power the meter through a vehicle's battery. The battery cable is also used to sense engine speed.
9	OBD-II Reader	Obtains engine speed and engine oil temperature data from the vehicle via OBD-II interface
10	Accelerometer Sensor	Measures engine speed (RPM) based on the mechanical vibration of an engine
11	Inductive (HT) probe	Measures engine speed (RPM) based on the inductive probe

4.2.1 Front view of AutoGas

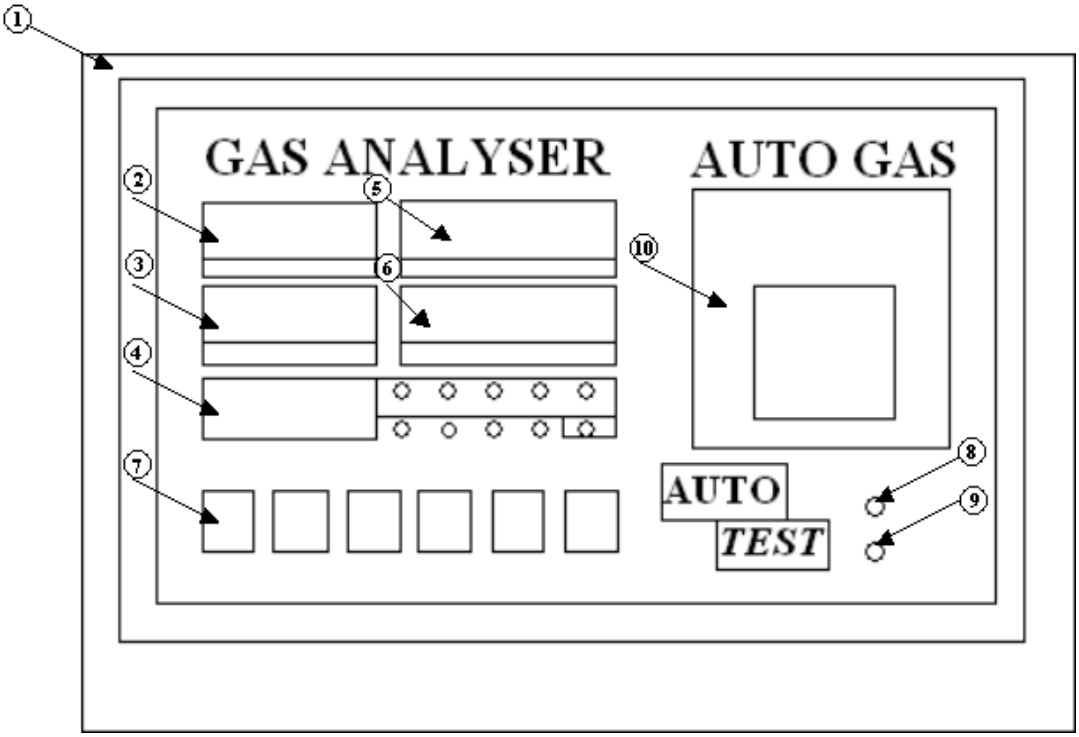


Figure 2. Front View of AutoGas

Number	Description	Number	Description
1	Case	6	HC display
2	CO_2 display	7	Membrane keypad
3	O_2 display	8	Power indicator
4	Variable display	9	Low pressure indicator
5	CO display	10	Printer

4.2.2 Rear View of AutoGas

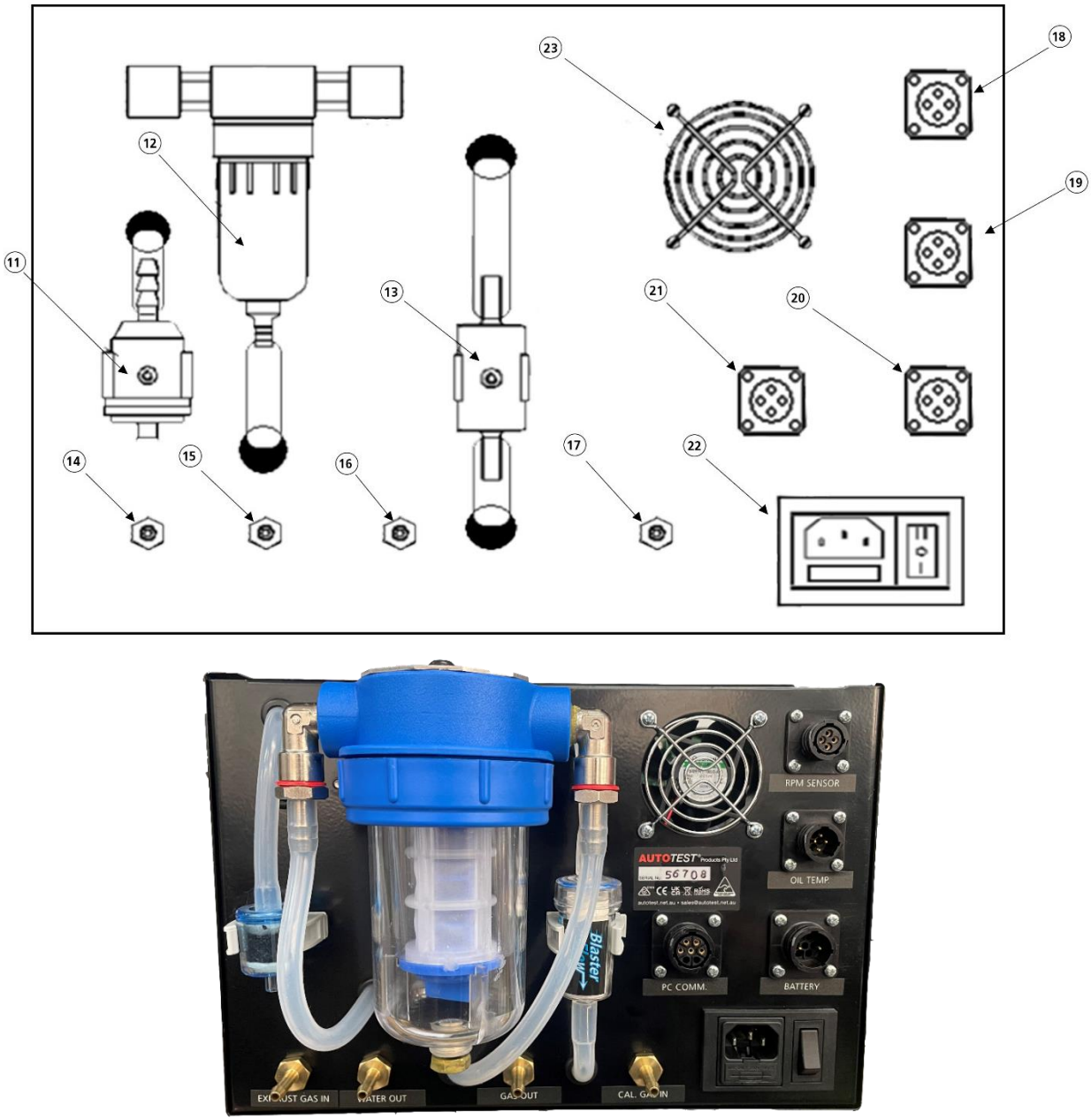


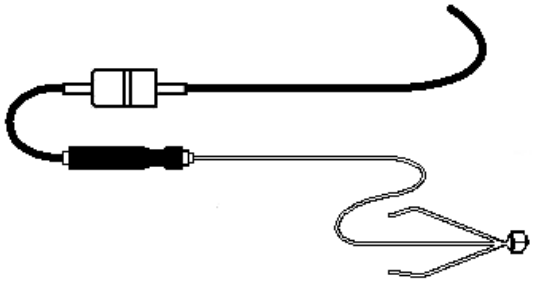
Figure 3. Rear View of AutoGas

Number	Description	Number	Description
11	Charcoal Filter	18	Inductive and Accelerometer Sensor Connector
12	Water Separator	19	Oil Temperature Sensor Connector
13	Pump Pre-filter	20	Vehicle Battery Connector
14	Exhaust Gas Inlet	21	PC RS-232 Connector
15	Water Outlet	22	AC Power Connector
16	Gas Outlet	23	Cooling Fan
17	Calibration Gas Inlet		

4.2.3 Standard Accessories

The following items are provided with the AutoGas as standard accessories.

Sampling Probe
with Pre-filter
(Code: 917829)



Oil Temperature Probe
(Code: 917830)

Battery Cable
(Code: 917831)

AC Power Cable
(Code: 104089)

Bluetooth OBD-II Reader
(Code: 917447)

4.3 Optional Accessories

The following listed accessories that can be provided as optional extras (at an additional cost).

NO_x Sensor
(Code: 917568)

Inductive Pick-up Probe
(HT cable probe)
(Code: 917671)

Accelerometer Sensor
(Code: 917670)

RS232 Serial Cable
(Code: 917832)

USB-to-Serial Adapter
(Code:916391)

4.4 Standard Consumables

The following listed consumables are available

Prefilter (Pack of 10)
(Code: 917686)

In-line Disposable Filter
(Pack of 5)
(Code: 917683)

Oxygen Sensor
(Code: 917684)

5. TURNING ON THE DEVICE

AUTO*TEST*™ AutoGas can be powered up using AC power supply (AC mains, wall socket) or through vehicle's 12V battery (DC power supply).

5.1 Using AC Mains

When powering AutoGas using AC mains, please ensure that the AC supply meets the following conditions:

230 – 265 V_{AC} single phase at 50-60 Hz

Ensure the live phase is on the right side of wall socket. Phase to Neutral voltage should be 230V_{AC} and Phase to Earth should be 230 V_{AC}.

5.2 Using Vehicle Battery (DC power supply)

AutoGas can be powered using the vehicle's battery. Please ensure the battery rating of the vehicle's battery is over 60 AH. The battery voltage must not exceed the maximum rated voltage.

Please ensure that the battery has enough charge to conduct a test.

To power AutoGas using vehicle's 12V_{DC} battery, connect one end of the supplied battery cable (21) to the device and connect the other end, which contains two clamps, to the terminals of the vehicle's battery. Please ensure that the red clamp connects to the positive (+) terminal of the battery, and the black clamp connects to the negative (-) terminal.

Once the battery cable is connected, the device will turn on by itself automatically.

6. INITIALISATION AND SELF-CHECK

6.1 Self-Check

Each time AutoGas Analyser is powered up, it will perform a self-test operation to ensure all hardware components and sensors are functioning correctly. All light segments off the display panel should turn ON during this time. If one or more of the lights or LED segments are not lit, then that LED is faulty and needs to be checked or replaced.

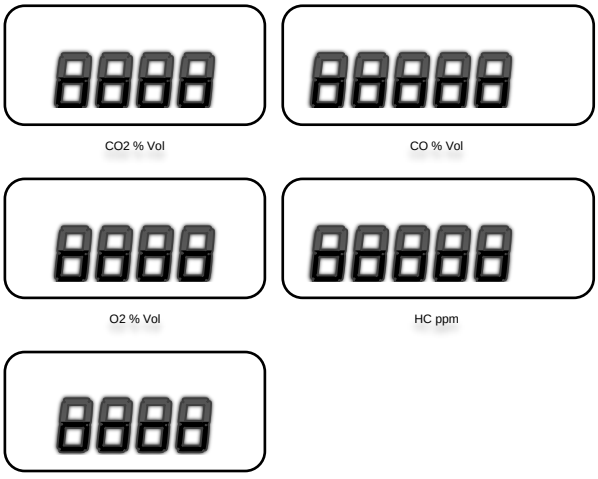


Figure 4 - Display panel during start-up check.

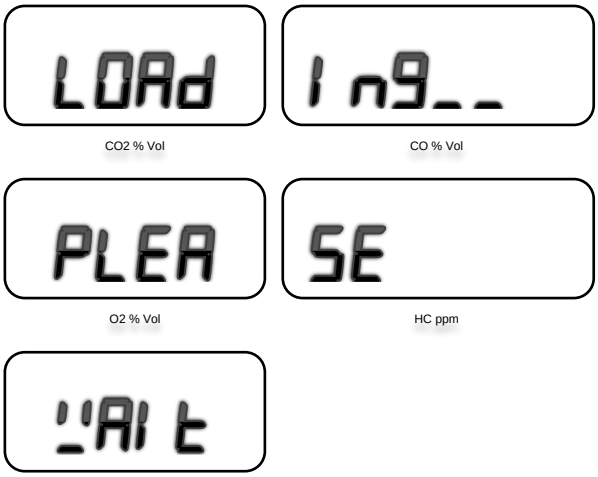


Figure 5 - Display panel while initialising hardware, reads "Loading… Please wait".

Figure 6 - Product name displayed at start-up, reads "AutoTest Gas Analyser".

Once basic hardware check is complete, the display panel will display the firmware version number of the current program stored in the device.

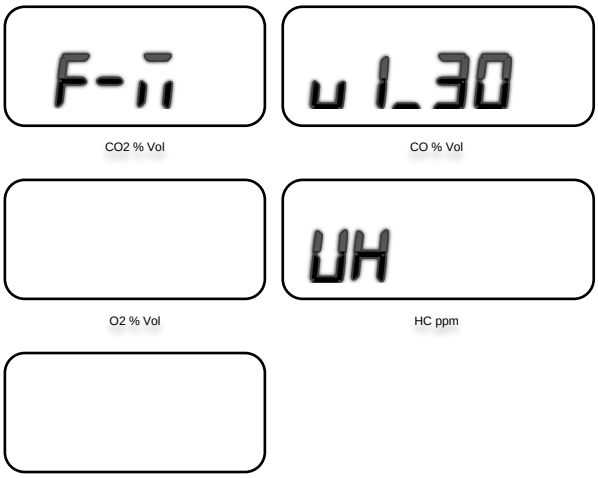


Figure 7 - Firmware version no. displayed at start-up, reads "F-M v1.23".

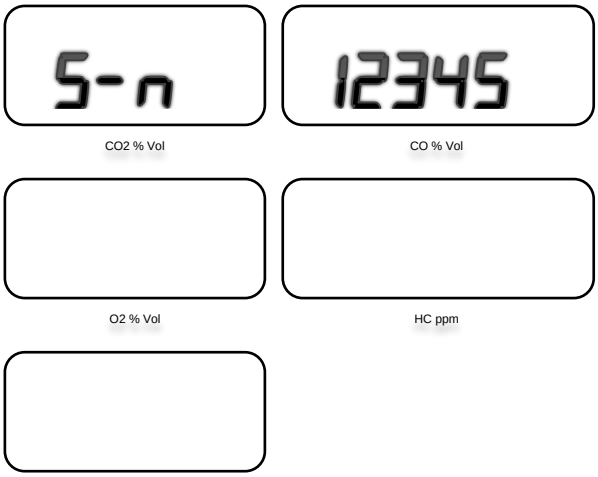


Figure 8 - Device serial no. shown at start-up, reads "S-N 12345".

6.2 Initial Warm-up

Once the initial hardware check is completed, the device will perform the warm-up operation. During the warm-up operation, the built-in heating system will heat up the gas bench chamber to the required operating temperature. Warm-up progress is displayed in the last field of the front display panel (bottom-left corner), for example, in this case "0 P" corresponds for 0% and "99 P" for 99%.

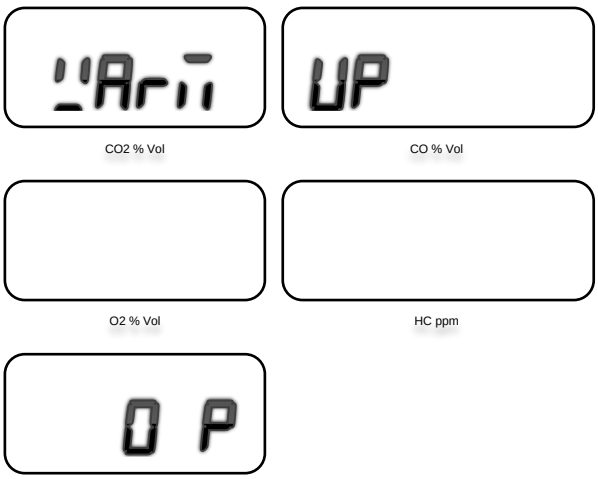


Figure 9 - Initial warm-up screen, reads "warm-up in progress 0%".

The duration of the initial warm-up process depends on the ambient temperature. If the device is operated at room temperature (around 25 °C) the warm-up time can take about 3 minutes to complete. But if the machine is operated outside during a cold day (around 0 °C), the warm-up time can take as long as 10 minutes to complete. Once the built-in heater has warmed up the gas bench to 100% of its required temperature, the AutoGas Analyser will continue to the next phase.

6.3 Automatic Zero Calibration

The automatic zero calibration is used to reset the gas sensor reading to zero by adjusting the bias offset in the sensor readings. Zeroing is performed upon start-up, soon after the initial warm-up is completed. This is also performed before each test.

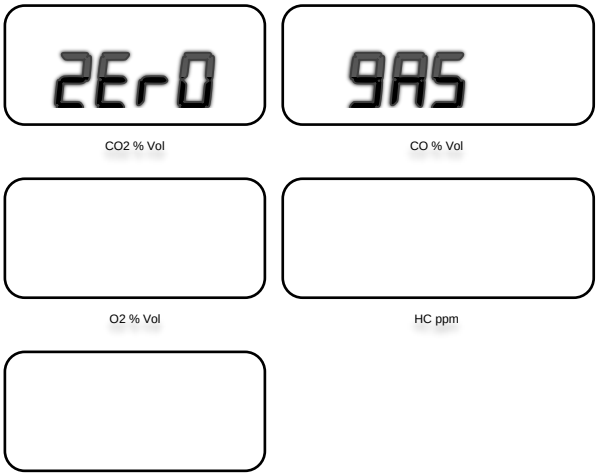


Figure 10 - Automatic zeroing screen, reads "ZERO GAS".

6.4 Air Leak Test

AutoGas performs an electronic air leak check at start-up. The gas analyser will prompt the user to carry out a leak test once every 24 hours. The purpose of conducting a leak test is to ensure there are no leaks in the gas in-intake assembly. A leak in the in-take assembly can introduce O_2 gas from the atmosphere, which can significantly increase error in the gas measurement results.

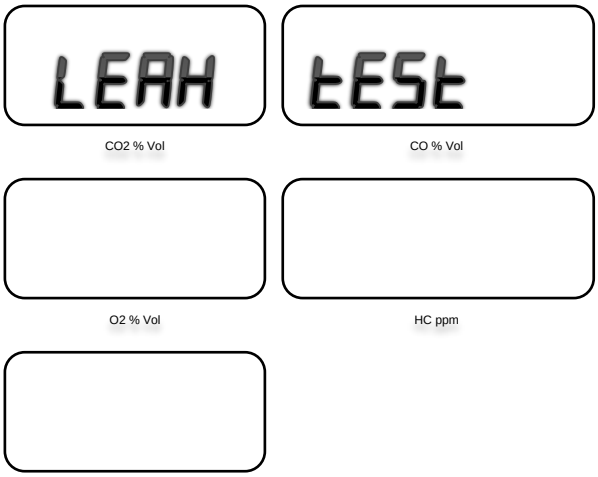


Figure 11 - Leak test splash screen, reads "Leak test".

To perform a leak test, first connect the supplied input gas-sampling probe to the back of the gas analyser. Cover the sampling probe input with the stopper-cover to block any input gas from flowing through the tube. During the leak check, AutoGas will continuously monitor the vacuum pressure until it reaches to a certain pressure. When AutoGas senses that the input has been blocked, it will wait for a short time to make sure the input pressure does not change much over a period of 10 seconds.

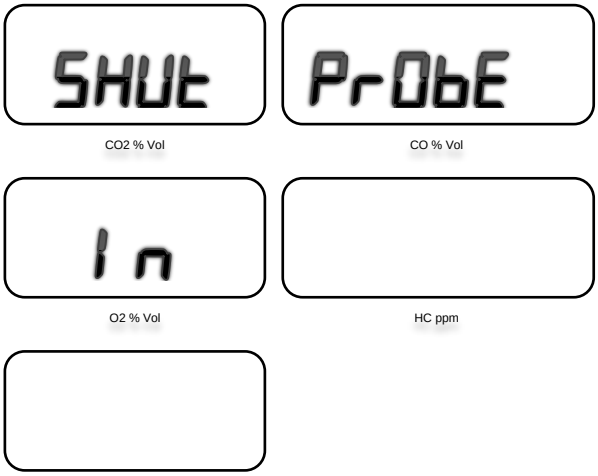


Figure 12 - Leak test shut probe screen, reads "Shut Probe In".

Figure 13 - Hold sampling probe shut for 10 sec.

If the air leak test fails, the user will have to investigate whether the leak is located in the sampling probe or the leaking occurs in the filtering stage.

To check if a leak exists in the input sampling probe, remove the pneumatic tube of the input sampling probe from the back of the gas analyser and block it with a finger. If the leak test passes then the leak exists in the sampling probe (possibly in the stopper-cover). Otherwise, the leak exists in the filtering assembly possibly due to a loose connection.

Apart from the initial leak test conducted at start-up, users can perform a leak test at any time once the device has completed its initialisation and the device is operating in the main screen. To perform a leak test, press MENU from the main screen then use the UP or DOWN buttons until “LEAK TEST” appears on the screen. Then press OK to perform the leak test.

When the leak test has passed successfully, please remove the stopper-cover from the input sampling probe to resume input gas flow.

If the leak test is not desired then it can be cancelled by pressing the CANCEL button on the front keypad.

6.5 HC Test

AutoGas performs a HC check (residue check) at start-up.

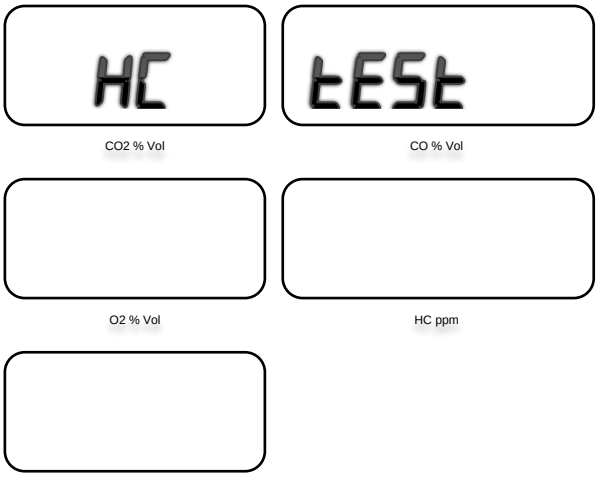


Figure 14 – HC test screen

Monitoring Live Gas Reading
In live gas readings mode, the gas analyser samples and continuously displays gas measurements in real-time. Live gas reading mode can be used to quickly monitor gas contents without performing an actual gas test.

1. Warm-up the vehicle to normal operating temperature, then turn off the vehicle engine.
2. Insert sampling probe into exhaust pipe, making sure the stopper cap has been removed.
3. When device is operating in standby mode, press OK. The internal pump will turn on.
4. Turn on the vehicle. The exhaust emission will be sampled, and the gas measurement will be displayed on the gas analyser.
5. Press OK again, or press CANCEL to stop internal pump.
6. Switch off the vehicle engine.
7. Remove sampling probe from the exhaust pipe and keep it away from the exhaust pipe.
8. Press OK again to turn ON the internal pump. This will clear any gas residue from probes and the gas bench and fill them will ambient air.
9. Press CANCEL to stop the internal pump.

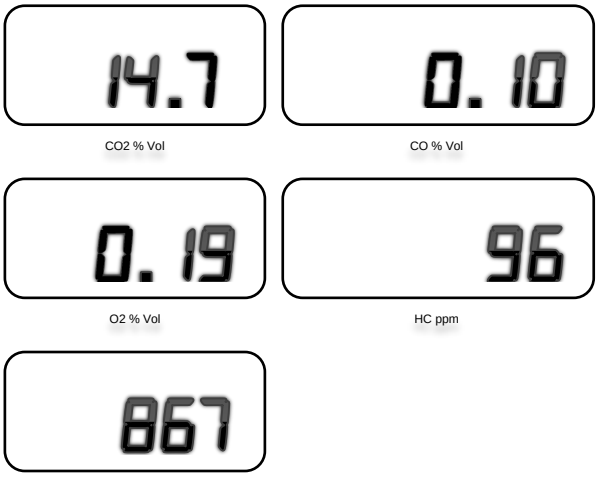


Figure 15 – Live gas readings

Note: Gas readings can be printed out at any time using the built-in thermal printer. To print the current gas readings, press MENU, when "PRINT" appears on the screen then press OK. A printout of the current gas readings will be printed out.

6.6 Automatic RPM sensor calibration

RPM calibration is performed to monitor electrical noise in the RPM channel and then compensate for it. It is important to keep the vehicle engine OFF during RPM calibration. When the following screen appears, press "OK" to begin RPM calibration.

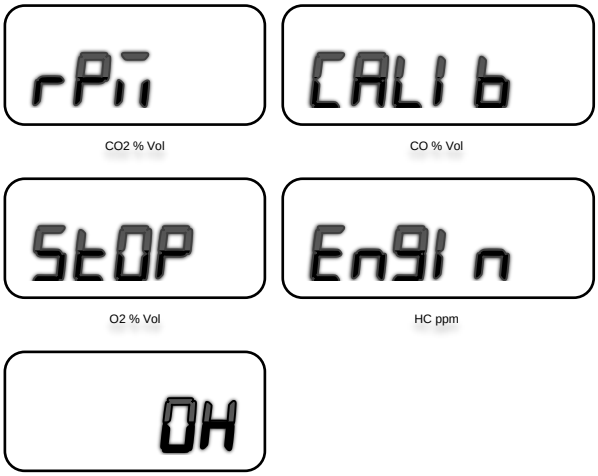


Figure 16 – RPM calibration screen, reads "RPM Calib, Stop Engine".

It can take up to 30 seconds to perform RPM calibration. A countdown value will be displayed on the screen in the last field.

Note:
If RPM calibration at start-up is not desired, then it can be cancelled by pressing CANCEL button from the front keypad.

Please note: On some vehicles, it might be necessary to carry out the RPM calibration procedure while the vehicle engine is running, rather than when the engine is OFF as indicated above. To obtain the correct RPM on such vehicles, carry out the RPM calibration procedure by turning ON the engine and revving it to around 4000 RPM. Once the engine speed is steady around 4000 RPM, press OK to begin the 25-second calibration process. It is important not to let the engine speed fall below 3500 RPM during the 30-second calibration process.

6.7 Using the keypad

The front panel of the AutoGas contains six buttons.

Button	Description
TEST	Opens the test menu
MENU	Opens the configuration menu
UP	Scrolls through options. Opens the next page
DOWN	Scrolls through options. Opens the previous page
OK	Sets the selected option. Acts like an Enter button
CANCEL	Cancels the current operation. Goes back to the previous menu.

The front panel's keypad can also be used to enter alpha-numeric inputs such as the registration number, manufacturer's name, VIN etc.

When entering a text using the keypad, us the UP and DOWN buttons to scroll through alphabets and numbers to select a particular character. The MENU button increments the cursor position to the next letter. The CANCEL button shifts back the cursor position (much like a backspace). The TEST button aborts the input and returns back to the previous screen. Use OK button to complete and accept the entry and return to the previous screen.

The following table lists various characters and how they will appear on the seven-segment display.

A	A	I	I	Q	q	Y	y	6	6
B	b	J	J	R	r	Z	2	7	7
C	C	K	H	S	S	0	0	8	8
D	d	L	L	T	t	1	1	9	9
E	E	M	n	U	U	2	2	SPACE	SPACE
F	F	N	n	V	u	3	3	_	_
G	g	O	0	W	u	4	4	:	=
H	H	P	P	X	H	5	5	?	?

6.8 Installing printer paper roll

AutoGas has a built-in thermal printer, which provides convenience when printing Test and Calibration Reports.
To open the paper housing, lift the lever located on the printer cover. When the lever is lifted up, gently tilt pull down the printer cover. Insert the new paper roll into the paper roll housing. The glossy surface of the paper roll should face inward.

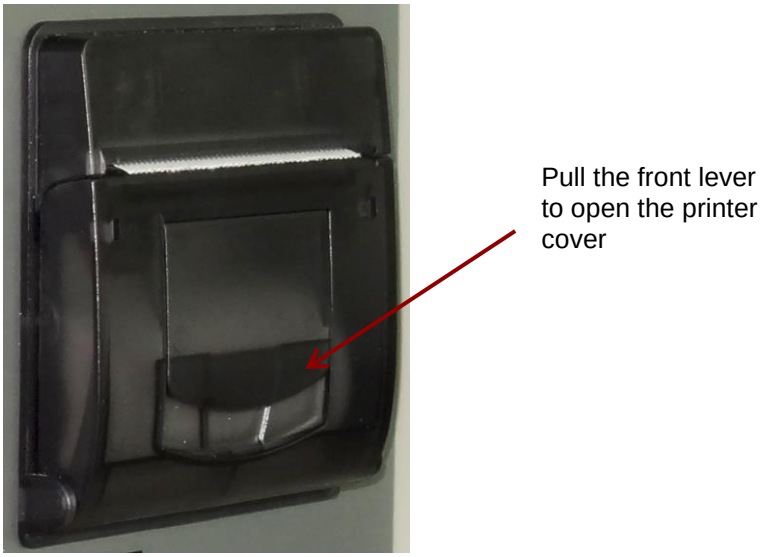


Figure 17 – Built-in Thermal Printer in AutoGas

The thermal paper roll should meet the following specifications:

Paper Type:	Thermal paper
Dimensions:	57 x 38 x 11.5mm

7. DEVICE CONFIGURATION

7.1 Main Screen

Once the device is fully initialised, the front display panel will show gas readings. The top four windows will display current gas readings the CO_2, CO, O_2, HC. The fifth window located in the bottom-left hand corner displays those values selected on the right side of the window by the user using UP and DOWN buttons. By pressing UP and DOWN buttons, a user can scroll through a number of readings such as PEF, RPM, Lambda (λ), AFR, NO_X and OIL Temperature.

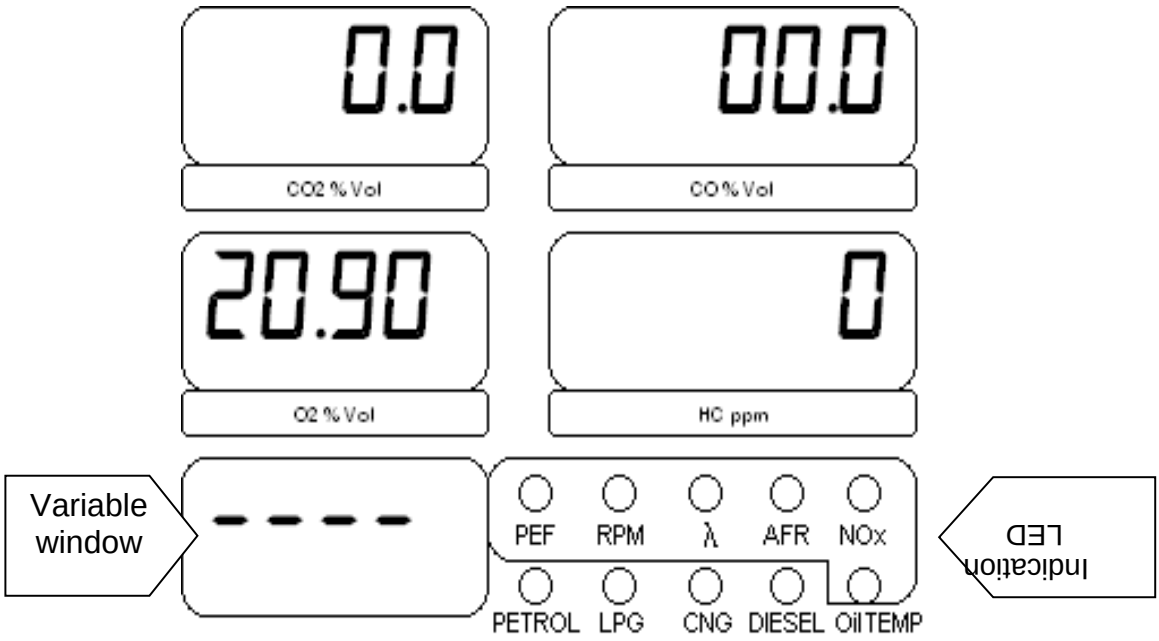


Figure 18 – Main screen showing current gas readings.

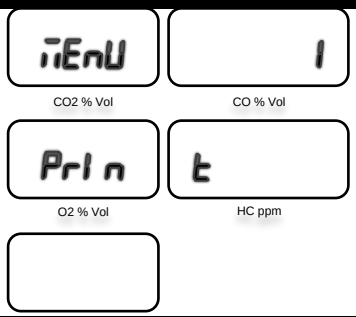
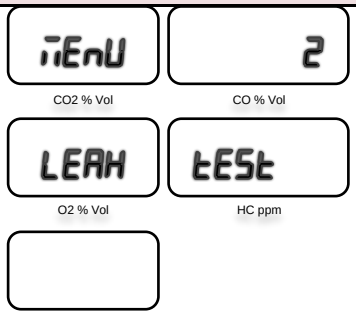
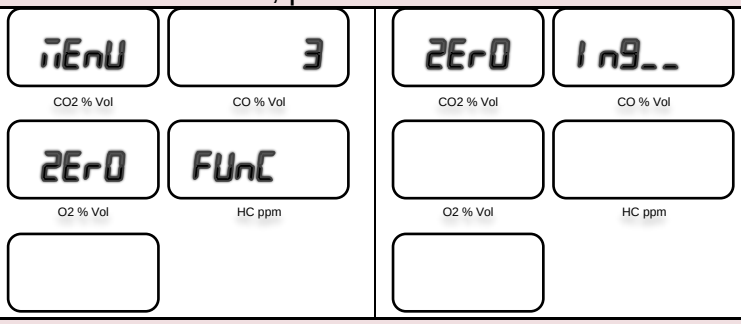
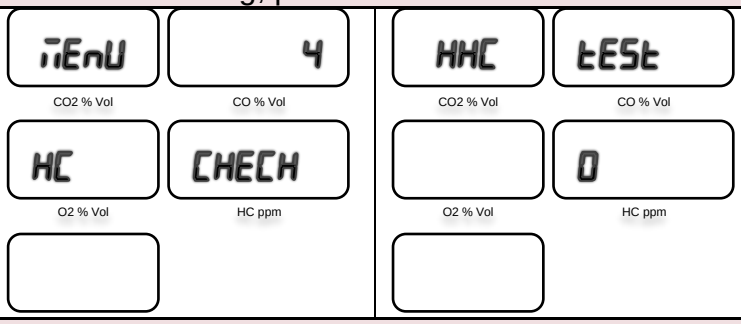
When the gas analyser first starts, the gas readings indicated on the front panel will not change because the pump that circulates input gas through gas pump will be OFF at start-up. By pressing OK and CANCEL buttons, the internal pump can be switched ON and OFF.

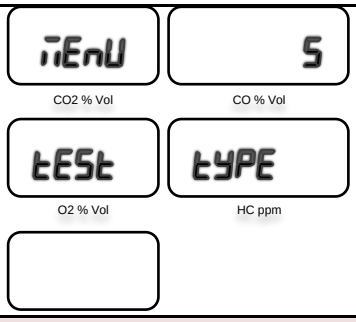
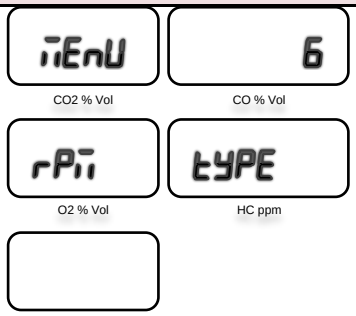
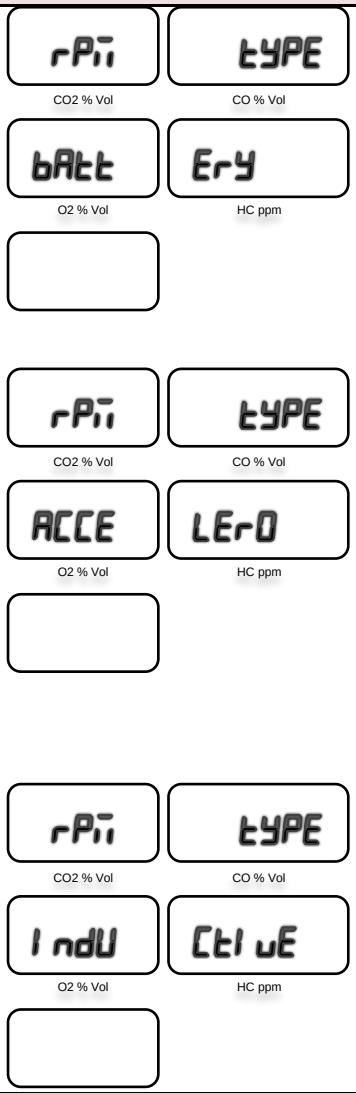
Please note: if the intake-sampling probe is blocked with the stopper-cover, the pump will automatically stop after running for a few seconds until there is no obstruction in the flow of input gas.

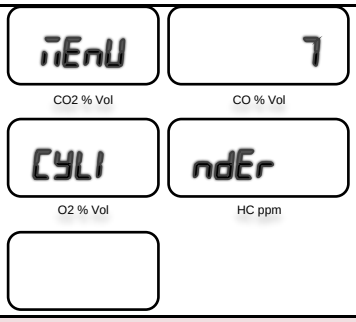
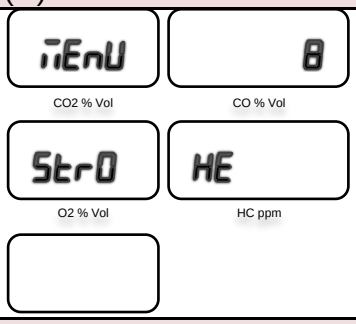
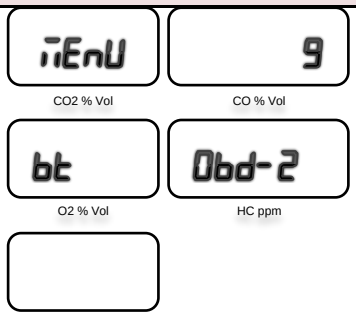
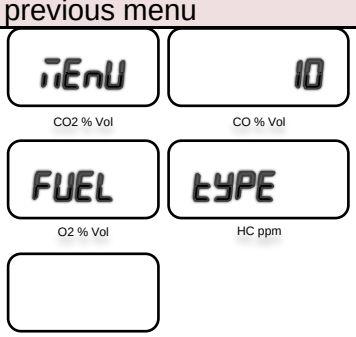
When the diesel LED is lit, the value displayed on the variable window will indicate the opacity readings from the smoke meter. If the smoke meter is not available or the gas analyser is not able to communicate with the smoke meter, the variable window will display "----". The unit of the smoke opacity displayed in the variable window will be the default unit selected for smoke readings in the setup menu.

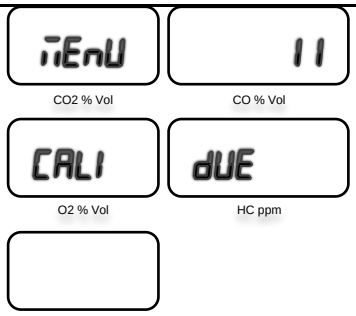
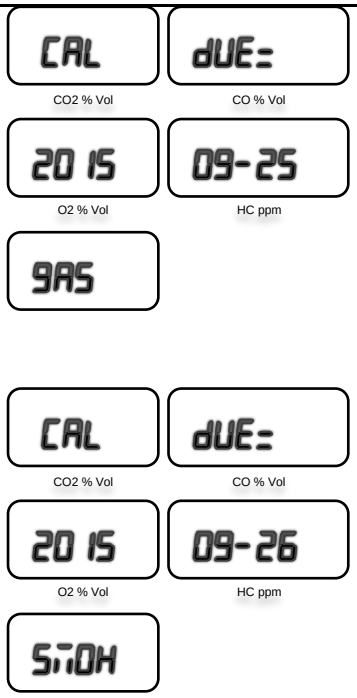
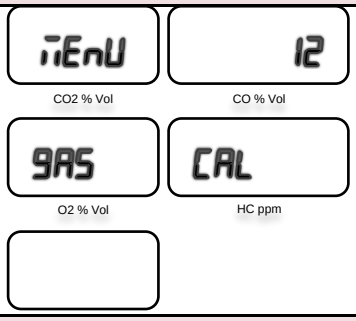
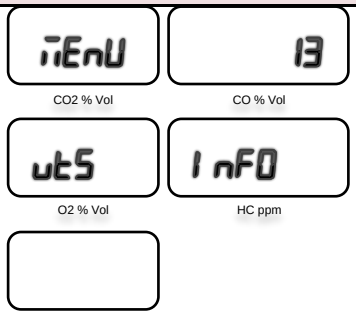
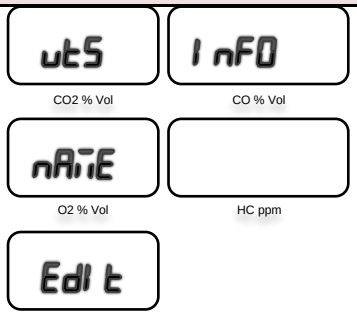
7.2 Setup Menu

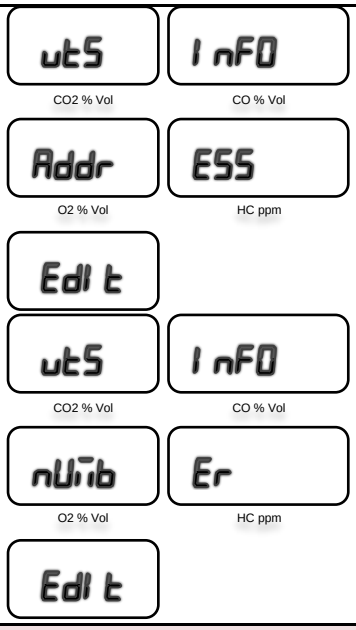
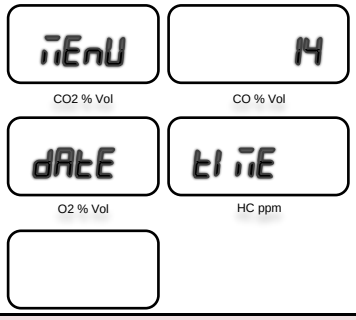
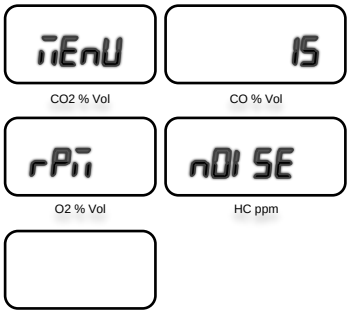
The Device configuration menu or setup menu can be accessed on the main screen by pressing on the MENU button. When the setup menu appears, use the UP and DOWN buttons to navigate through each menu option. Use OK button to select and configure a particular menu option. To return to main screen, press CANCEL button.

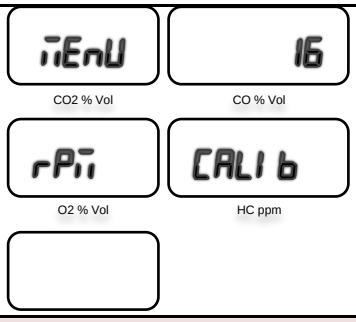
Function	Menu Screen	Sub-Menu Screen	Description
Print			Prints current gas readings using built-in printer
	Press OK. The device will quickly print all current gas readings.		
Leak Test			Performs leak test
	Press OK and follow instructions described in section 6.4. To cancel leak test, press CANCEL		
Zero Function			Performs Zeroing operation
	Press OK and device will automatically perform zeroing operation. To cancel zeroing, press CANCEL.		
HC Check			Performs HC Check (Residue check)
	Press OK and device will automatically perform HC check.		

Test Type			Change the active test type
	Press OK and use UP and DOWN buttons to change the active test type.		
RPM			Allows RPM source to be changed to one of the following modes: Battery mode for measuring RPM through battery cable Accelerometer mode for measuring RPM using an accelerometer sensor. Inductive pick-up mode for measuring RPM using an inductive pick-up clamp
	Use the UP and DOWN buttons to scroll through the menu. Press OK when the desired RPM measurement method appears on the screen. For detailed information, see section 7.4 RPM Measurement (**) ** Note: after setting RPM related parameters, the gas analyser will prompt for RPM calibration. Use the CANCEL button to cancel RPM calibration if RPM calibration is not desired.		

Cyclinders			Select the number of cylinders the vehicle contains
	Press OK to select the menu. Then use UP and DOWN buttons to change cylinder number. When the desired no. of cylinders is selected, press OK to save the settings. (**)		
Stokes			Change the stroke value of the vehicle
	Press OK to select the menu. Then use UP and DOWN buttons to change stroke the value. (**)		
OBD-II			Enable RPM and Oil temperature measurement via OBD-II interface.
	Press OK to view the current value. Use UP and DOWN buttons to change the value. Press OK to save settings and return. Press CANCEL to return to previous menu		
Fuel Type			Allows users to select the fuel type
	Press OK to view currently selected fuel type. Use UP and DOWN buttons to change fuel type selection. Press OK to save settings and return. Press CANCEL to return to previous menu		

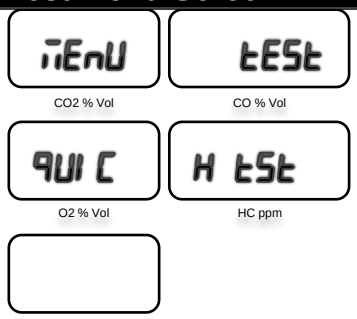
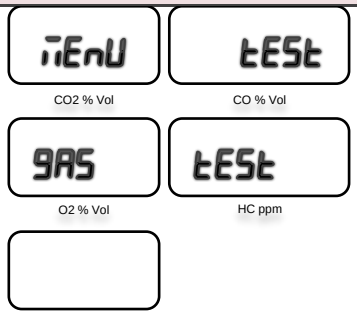
Calibration Due			Allows users to view calibration due date for gas analyser and smoke meter (if connected) The format of the date is: "YYYY-MM-DD" Where, Y – year M – month D – day If no smoke meter is connected, the second screen showing the calibration due date for smoke meter will not be shown.
	Press OK to view calibration due date. Press any key to switch to the next screen. Once the calibration due date is shown on the screen, press OK to print the calibration report.		
Gas Calibration			Initiates Gas Calibration Procedure
	Press OK to start gas calibration. Requires authorisation code.		
Vehicle Test Station Info			Sets vehicle test station information The following fields can be modified: VTS Name VTS Address VTS Number

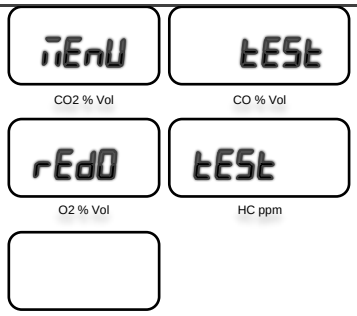
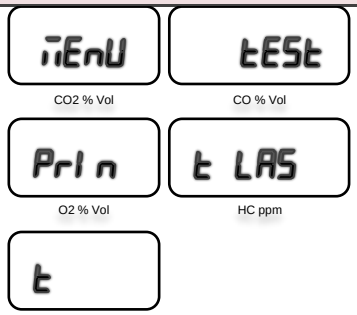
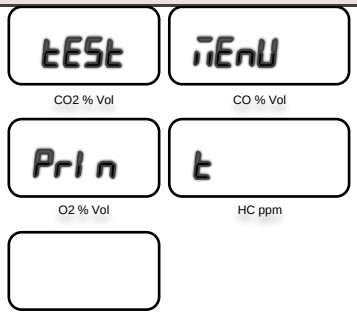
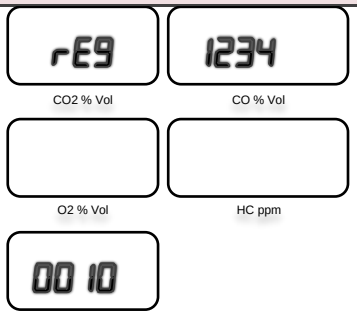
			
	Press OK to view/change the vehicle test station information. Use UP and DOWN buttons to change values.		
Date and Time			Displays the current date and time. Also allows users to change device time.
	Press OK to select the menu. Use UP and DOWN buttons to scroll through the date and time values. See section 0 for more info.		
RPM noise			Displays the current date and time. Also allows users to change device time.
	Press OK to view rpm noise		
RPM calibration			Displays the current date and time. Also allows users to change device time.

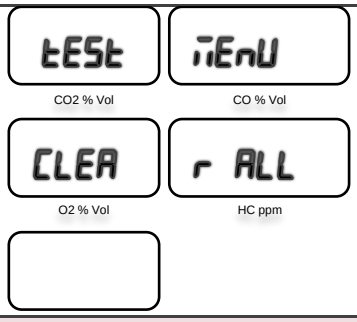
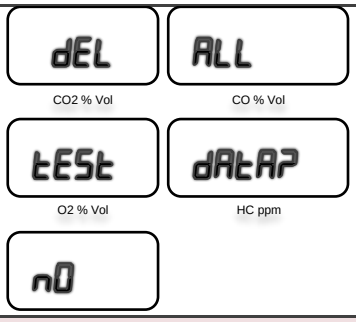
			
	Press OK to start rpm calibration.		

7.3 Test Menu

Gas test related menu can be accessed by pressing the TEST button. This menu contains a list of options ranging from conducting a new test to printing and clearing gas test reports.

Function	Test Menu Screen	Sub-Menu Screen	Description
Quick Test			Starts a quick test
	Press OK to view gas reading in real-time.		
Gas Test			Starts a new gas test
	Press OK and follow test prompts. For further details, read section 9. RUNNING A GAS TEST (UK).		

Redo Test			Starts a new test and automatically loads vehicle information from the previously conducted test.
	Press OK and test will initiate. Follow prompts described in section 9. RUNNING A GAS TEST (UK).		
Print Last			Print the last test.
	Press OK and the device will automatically print the last stored test.		
Print			Displays the print menu, which prompts the user to select a particular test for which the report should be printed. First line of the print menu shows vehicle registration no. The last (fifth) window displays test no. Most recent test will be displayed first.
	Press OK and use UP and DOWN keys to select a particular test. When a desired test is selected, press OK to print its report. Use CANCEL button to go back.		

Clear All			Deletes all stored tests from the internal storage memory.
	Press OK and a message will appear to confirm before deleting data. Use UP and DOWN buttons to select Yes/No then press OK. If YES is selected, all stored tests will be deleted. Press CANCEL to skip deleting and return to previous screen.		

7.4 RPM Measurement

RPM measurement can be performed using one of the following methods:

- Using OBD-II based measurement using a Bluetooth OBD-II reader
- Using battery cable by monitoring fluctuations in battery voltage
- Using accelerometer sensor by monitoring engine vibration
- Using inductive pick-up clamped around a spark plug (HT) cable by monitoring spark plug firing sequence.

Please note: accelerometer, inductive pick-up sensors and OBD-II reader are optional accessories that can be supplied.

7.4.1 RPM using OBD-II interface

Engine RPM and oil temperature can be obtained from the vehicle's engine via the OBD-II interface. If the vehicle does not support the OBD-II interface, the OBD-II scanner cannot be used to measure the RPM.

The OBD-II scanner connects to the vehicle's OBD-II interfacing port and transmits the engine RPM and oil temperature readings of the vehicle to the gas analyser via Bluetooth.

Locate the OBD-II port on the vehicle, which is usually located under the steering wheel or near the fuse box. Once the OBD-II port is located, plug the OBD-II scanner. Make sure the engine is switched off and the key is positioned to the OFF position before plugging in the OBD scanner.

Once the OBD-II is plugged into the vehicle, ensure the Gas Analyser is configured to use the Bluetooth OBD-II scanner.

To check the Bluetooth OBD-II option, following the following steps:

1. Press MENU
2. Select 'BT OBD-II' (#9) and press OK
3. Use the UP and DOWN buttons to select YES and press OK.
4. Once OK is pressed, the Gas Analyser will search for the nearby Bluetooth OBD-II scanner. If the OBD-II device is found, a connection will be established with the vehicle.

Once the BT OBD-II is enabled, the gas analyser will automatically try to connect with the OBD-II interface at the start of each gas test.

Note: If the BT OBD-II is enabled, it might take the gas analyser approximately 20 seconds at the start of the test to scan and connect to the OBD-II scanner device.

Note: If the BT OBD-II is enabled and the variable window displays RPM, the RPM LED will blink to indicate the RPM measurement is being taken from the OBD-II device.

7.4.2 RPM using Battery Cable

To measure engine RPM via the vehicle battery, connect one end of the battery cable to back of the gas analyser and connect the other end to the vehicle's battery. For detailed information on battery connection, see section 5.2.

Use the configuration menu #6 (see section 7.2) to select battery channel for RPM measurement:

1. Press MENU
2. Select RPM TYPE (#6) and press OK
3. Use the UP and DOWN buttons to select Battery.
4. Once battery channel appears on the screen, press the OK button to save it.

Use the configuration menu #7 (see section 7.2) to select the number of cylinders the vehicle contains:

1. Press MENU
2. Select Cylinder (#7) and press OK
3. Use the UP and DOWN buttons to select number of cylinders
4. Once the right cylinder number is selected, press the OK button to save it.

Use the configuration menu #8 (see section 7.2) to select number of strokes the engine uses. Usually, stroke number should be 4-stroke. Set stroke number as described below:

1. Press MENU
2. Select Stroke (#8) and press OK
3. Use the UP and DOWN buttons to select the desired stroke number.
4. Press OK to save and continue.

To view the current RPM reading, first make sure the device is back in the main screen. Use the UP and DOWN keys until RPM LED turns ON. To check the RPM reading, securely park the car and turn the engine ON. The current RPM reading will be displayed on the lower-bottom screen.

If the RPM reading indicated by the gas analyser differs significantly with vehicle's actual RPM at various engine speeds, it might be necessary to carry out the RPM calibration while keeping the vehicle engine running at about 4000 RPM. Please refer to the note on page 23.

7.4.3 RPM using optional Accelerometer Sensor

Connect the accelerometer cable to the back of the gas analyser.

Use the configuration menu #6 (see section 7.2) to select 'Accelero' or accelerometer channel for RPM measurement:

5. Press MENU
6. Select RPM TYPE (#6) and press OK
7. Use the UP and DOWN buttons to select 'Accelero' or accelerometer.
8. Once battery channel appears on the screen, press the OK button to save it.

Use the configuration menu #7 (see section 7.2) to select number of cylinders the vehicle contains:

1. Press MENU
2. Select Cylinder (#7) and press OK
3. Use the UP and DOWN buttons to select number of cylinders
4. Once the right cylinder number is selected, press the OK button to save it.

Use the configuration menu #8 (see section 7.2) to select the number of strokes the engine uses. Usually, the stroke number should be 4-stroke. Set the stroke number as described below:

1. Press MENU
2. Select Stroke (#8) and press OK
3. Use the UP and DOWN buttons to select the desired stroke number.
4. Press OK to save and continue.

To view the current RPM reading, first make sure the device is back in the main screen. Use the UP and DOWN keys until RPM LED turns ON. To the check the RPM reading, securely park the car and turn ON the engine. Place the accelerometer on the engine mount. Try to place accelerometer at various spots on the engine and notice the spot where vertical vibration is greatest. The location where engine vibration is maximum might be the most appropriate location to stick accelerometer. The current RPM reading will be displayed on the lower-bottom screen. Check the RPM reading and compare with the RPM readings indicated in the cluster panel. If the RPM readings measured by the gas analyser vary significantly, try to place the accelerometer in a different location. When the right location is found, firmly stick the accelerometer on the engine mount.

Warning: components of a running engine can cause fatal injuries. Engine head and radiator hosing can get very hot. Make sure the accelerometer remains on the engine mount all the time. A loosely mounted accelerometer can be stuck in moving engine parts, which could cause injury, and badly damage the sensor as well as engine components.

7.4.4 RPM using optional Inductive pick-up Sensor

Connect the inductive pick-up cable to the back of the gas analyser.

Use the configuration menu #6 (see section 7.2) to select 'INDUCTIVE' or inductive sensor channel for RPM measurement:

1. Press MENU
2. Select RPM TYPE (#6) and press OK
3. Use the UP and DOWN buttons to select 'INDUCTIVE' or inductive sensor.

4. Once the battery channel appears on the screen, press the OK button to save it.

Use the configuration menu #7 (see section 7.2) to select the number of cylinders the vehicle contains:

1. Press MENU
2. Select Cylinder (#7) and press OK
3. Use the UP and DOWN buttons to select the number of cylinders
4. Once the right cylinder number is selected, press the OK button to save it.

Use the configuration menu #8 (see section 7.2) to select the number of strokes the engine uses. Usually, stroke number should be 4-stroke. Set stroke number as described below:

1. Press MENU
2. Select Stroke (#8) and press OK
3. Use the UP and DOWN buttons to select the desired stroke number.
4. Press OK to save and continue.

To check RPM, first make sure the vehicle is securely parked and then turn ON the engine. Use the UP and DOWN buttons until RPM LED on the front panel is illuminated. The engine RPM will be displayed on the lower-bottom screen.

Warning: The components of a running engine can cause fatal injuries. The engine head and radiator hosing can get very hot.

7.5 Changing Device Time

To set the time on the device, press MENU from the main screen then use the UP and DOWN buttons to select "Data Time" (#16) and press OK. Use the UP and DOWN buttons to switch to the screen, which shows current time. When the current time of the device appears on the screen, press OK to change time. The gas analyser will prompt for hour and minute values. Use the UP and DOWN buttons to increment or decrement each value. Press OK to set new time values.

Note: AutoGas Analyser date value cannot be changed.

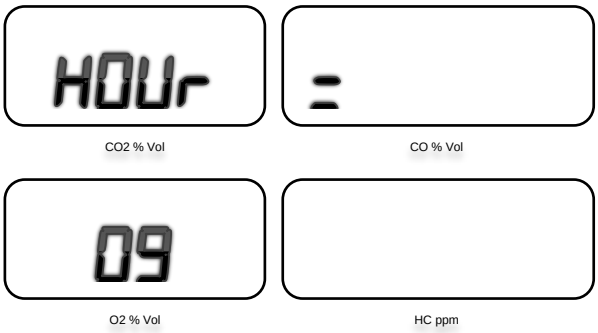


Figure 19 – Screen for setting hour

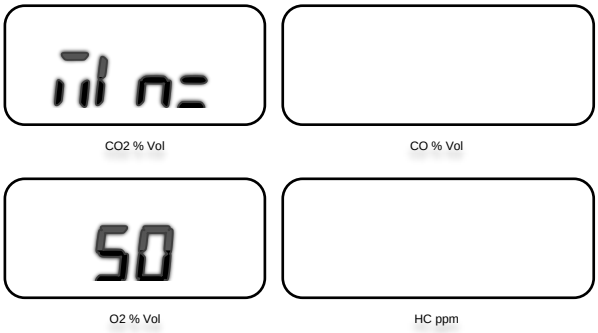


Figure 20 – Screen for setting minute

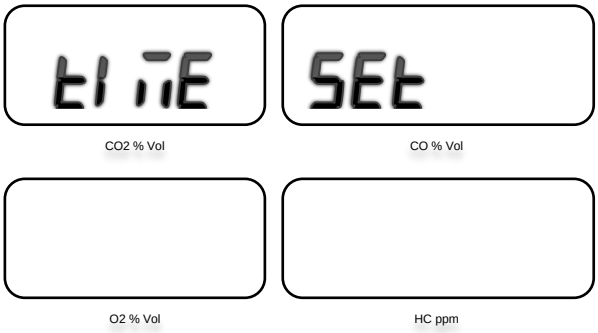


Figure 21 – Time is set after pressing OK

8. PRELIMINARY CHECKS

Before conducting an actual gas test, perform a preliminary check to make sure all sensors are connected properly and functioning correctly.

8.1 Oil temperature measurement

Connect oil temperature probe to the gas analyser. From the home screen, use the UP and DOWN buttons until 'Oil Temp' LED is illuminated. The temperature reading is in the adjacent window (lower-bottom). It should display the current ambient temperature in °C.

Take out the oil dipstick from the vehicle and extent the oil temperature stopper by pressing its lock button until the length of the oil temperature probe equals with the length of the oil dipstick. Insert the temperature probe in place of the oil dipstick until the cable stopper prevents it going deeper any further. Turn ON the vehicle and you will notice the oil temperature value rising as the vehicle heats up.
If the oil dipstick housing tube is wide enough to hold the temperature sensor probe and the dipstick; then insert the oil dipstick over the previously inserted oil temperature probe to prevent any dust entering into the engine compartment.

Note: Always ensure the oil dipstick and oil temperature sensing probe are clean before inserting them into engine housing.

Warning: If the oil temperature probe is longer than the dipstick, it could get in contact with the moving parts of an engine and cause damage to the engine compartment and the temperature-sensing element.

8.2 Sampling Exhaust Gas

Before starting this test, please ensure the vehicle engine is switched OFF.
Connect the tube of the input gas-sampling probe to the back of the gas analyser. Connect the sampling probe at the exhaust pipe. Take care when inserting sampling probe in the exhaust pipe as the exhaust pipe temperature can be very hot. Be mindful of the gas sampling tubing placed on the floor when walking around it, as one can easily trip or pull-down the device if proper care is not taken.

When the sampling probe is connected to the exhaust pipe, turn ON the engine.
Ensure the main screen of the gas analyser is showing gas readings.
Next press the OK button to turn ON the internal pump to circulate exhaust gas through the gas bench. As the pump circulates exhaust gas, the AutoGas Analyser will display the contents of the exhaust gas.

Please note: The response time of the sampled input gas reading is displayed on the screen. It is dependent on the length of the sampling tube and internal filtering assembly.
A typical sampling will take 10-15 seconds to complete.

To end the test, first stop the pump by pressing OK or CANCEL. Turn off the vehicle and let the sampling probe cool down. During the test, the sampling probe is in contact with the exhaust pipe; causing the sampling probe to reach quite high temperatures. When the sampling probe has cooled down, remove the sampling probe, and take it away from the engine.
Turn ON the internal pump for about 20 sec to let it clean the gas bench from the exhaust gas and fill it up with fresh air instead. When 20 seconds has elapsed, turn OFF the internal pump.

9. RUNNING A GAS TEST

AutoGas can be used carry out an emission test according to the procedures defined by VOSA adopted according to NSW vehicle emissions test regulations. For detailed description of the procedure, please refer to "1996 MOT Exhaust Gas Analyser Specification", VPB/07/24/20 (Rev 7.1).

9.1 Preliminary checks

Use the configuration menu and check if the test method is currently set to AUSTRALIA.

Press MENU from the main screen. Use UP and DOWN buttons to scroll to Test Type option and press OK. When Test Method menu appears, use UP and DOWN buttons to select "AUSTRALIA" and then press OK.

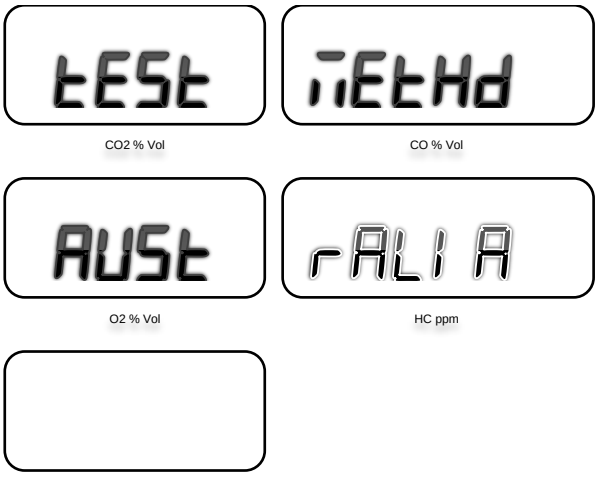


Figure 22 – Test Method

9.2 Equipment Setup

Securely park and connect all necessary accessories to the gas analyser and make sure the vehicle engine is OFF.

If the AutoGas is to be run through the vehicle's battery; connect the battery cable.
AutoGas analyser will automatically turn ON and perform its initialisation process described in section 6.
AutoGas can also be run through AC mains.

When the gas analyser has been successfully initialised and the main screen appears, install the temperature sensor probe as described in section 8.1.

If an accelerometer or an inductive pick-up sensor is to be used, connect it now. Make sure the required RPM measurement method is selected in the configuration menu.

Also check the engine stroke number currently configured in the gas analyser's settings by pressing MENU and scrolling to Stroke.

9.3 Starting a gas test

Do not insert the exhaust gas probe in the tail pipe at the start of the test.

To begin a gas test, press the TEST button on the front panel of the gas analyser. When AutoGas displays the test menu, us the UP and DOWN buttons to scroll down to "GAS TEST", then press OK.
User can opt to cancel or abort the gas test by pressing the CANCEL button at any time while the test is in progress.

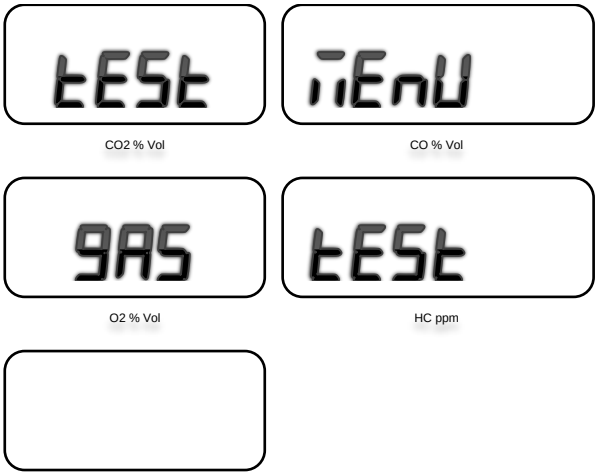


Figure 23 – Screen for choosing test type

Note: *The gas test prompts the user to enter vehicle formation. Please refer to section 6.7 for information on how to enter alphanumeric text using the keypad.*

9.4 Self-Check

When a new gas test starts, AutoGas will first perform a self-check to ensure that it is operating well. The tests included in the self-check are calibration check, daily check (if daily check has not been performed after turning AutoGas on) zeroing and HC check.

New/repeat gas test

Figure 24 – Start a New Test

9.4.1 Entering Vehicle Information

Enter vehicle registration number (or VRM).

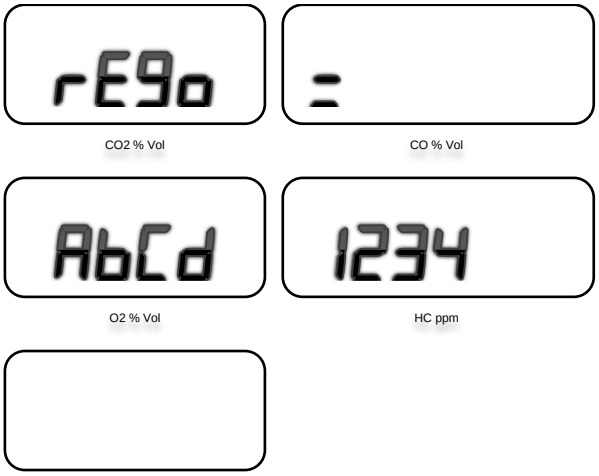


Figure 25 – Screen for entering vehicle rego

Enter the year when the vehicle under test was first used:

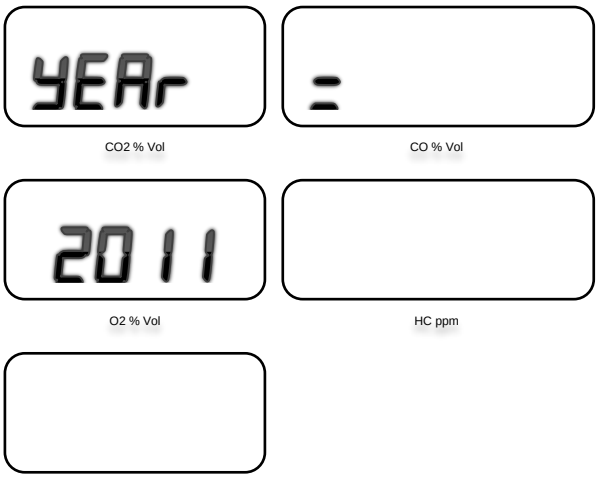


Figure 26 – Screen for entering vehicle year

Enter the current odometer reading of the vehicle.

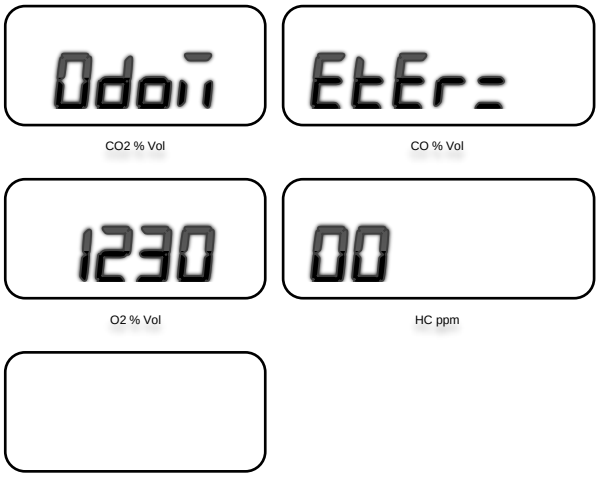


Figure 27 – Screen for entering odometer reading

Enter the capacity of the engine in cubic centimetre (CC) when prompted to enter engine CC or engine size.

A thousand (1000) CC equals 1.000 litres. For example if the engine capacity of a six-cylinder engine is 4.0 L, the engine capacity value in CC will be 4000 CC. Use the UP and DOWN buttons to select the engine size.

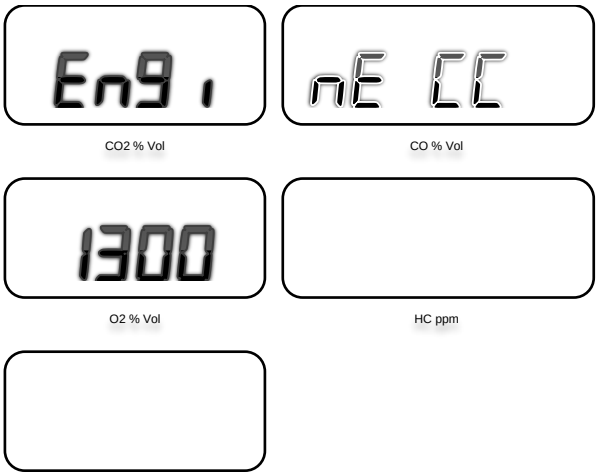


Figure 28 – Screen for entering Engine CC

Enter the number of cylinders.

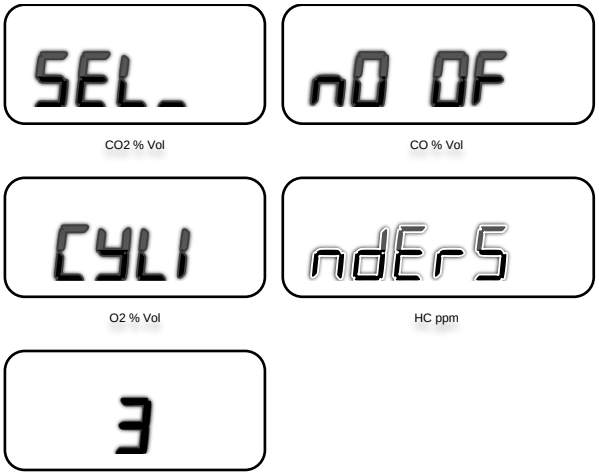


Figure 29 – Screen for entering no. of cylinders

When prompted to select the type of fuel currently used by the vehicle, use the UP and DOWN buttons to select on the following:

1. Petrol (PTRL)
2. LPG
3. CNG

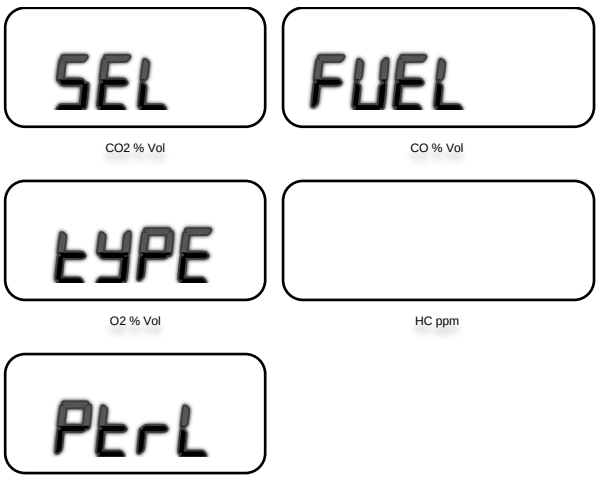


Figure 30 – Screen for entering examiner ID

9.4.2 Engine up to Temperature

Start engine and run it at idle to warm up the vehicle.

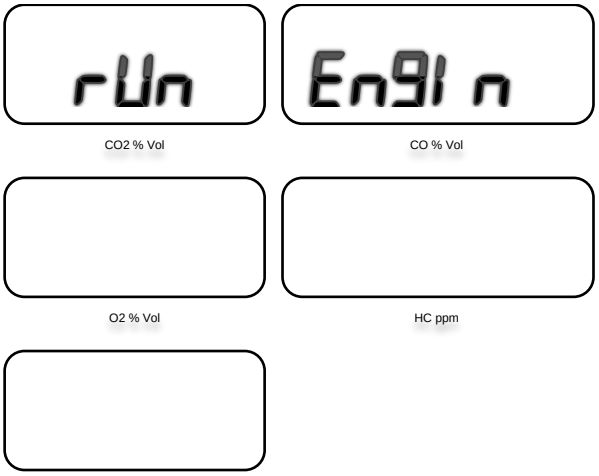


Figure 31 – Screen asking to run engine

9.4.3 Idle Speed Check

Set the RPM at fast idle for 15 seconds.

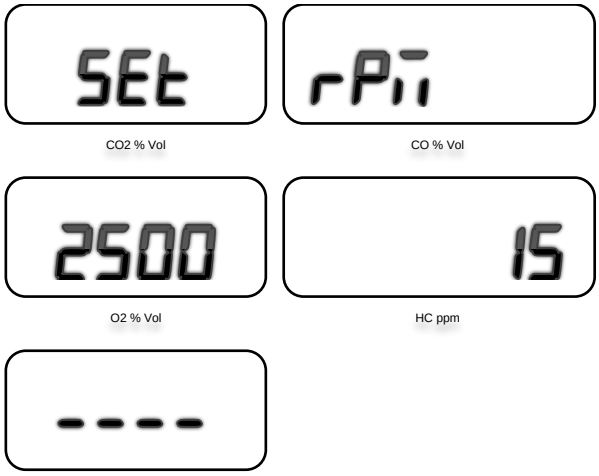


Figure 32 – Screen to set RPM at fast idle

Set the engine at idle for 15 seconds.

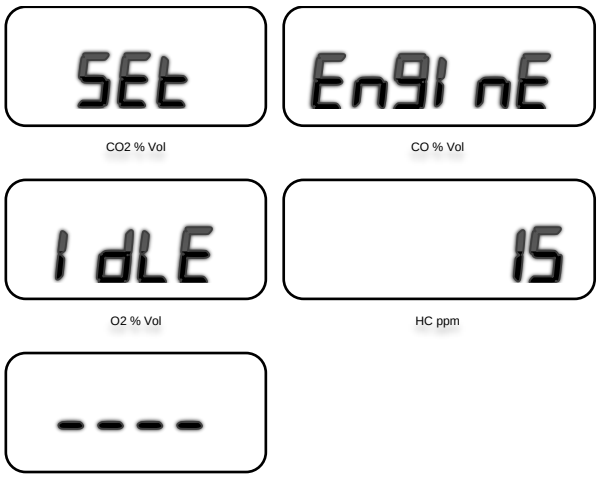


Figure 33 – Screen to set RPM at idle

9.4.4 Result of the Test

Once the test is completed, AutoGas will display the results on the screen. Use UP and DOWN buttons to view the results.

Finally, the test report will be printed using the built-in thermal printer.

9.1 Printing Report

After automatically saving the gas test, AutoGas Analyser will prompt the user to print a test report using the attached thermal printer.

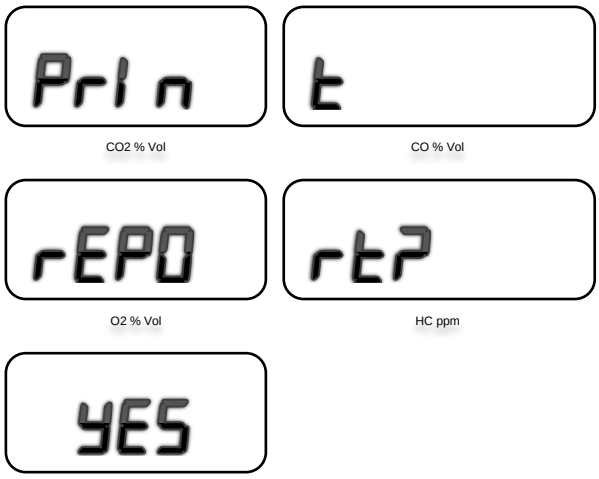


Figure 34 - Print test report prompt, reads "Print Report?".

When the print report prompt appears, press OK to print the report using the attached printer. Alternatively, press the CANCEL button to skip printing. If no button has been pressed within 20 seconds, AutoGas Analyser will automatically skip printing.

Note: If the print report has been skipped, users can still print out a test report using the configuration menu (see section 7.2, menu #1).

A gas test report will contain the date and time of the test, customer and examiner information, vehicle information, gas readings during the Fast Idle Test and Idle Test, and a Pass/Fail result.

9.1.1 Test Report – Gas Test

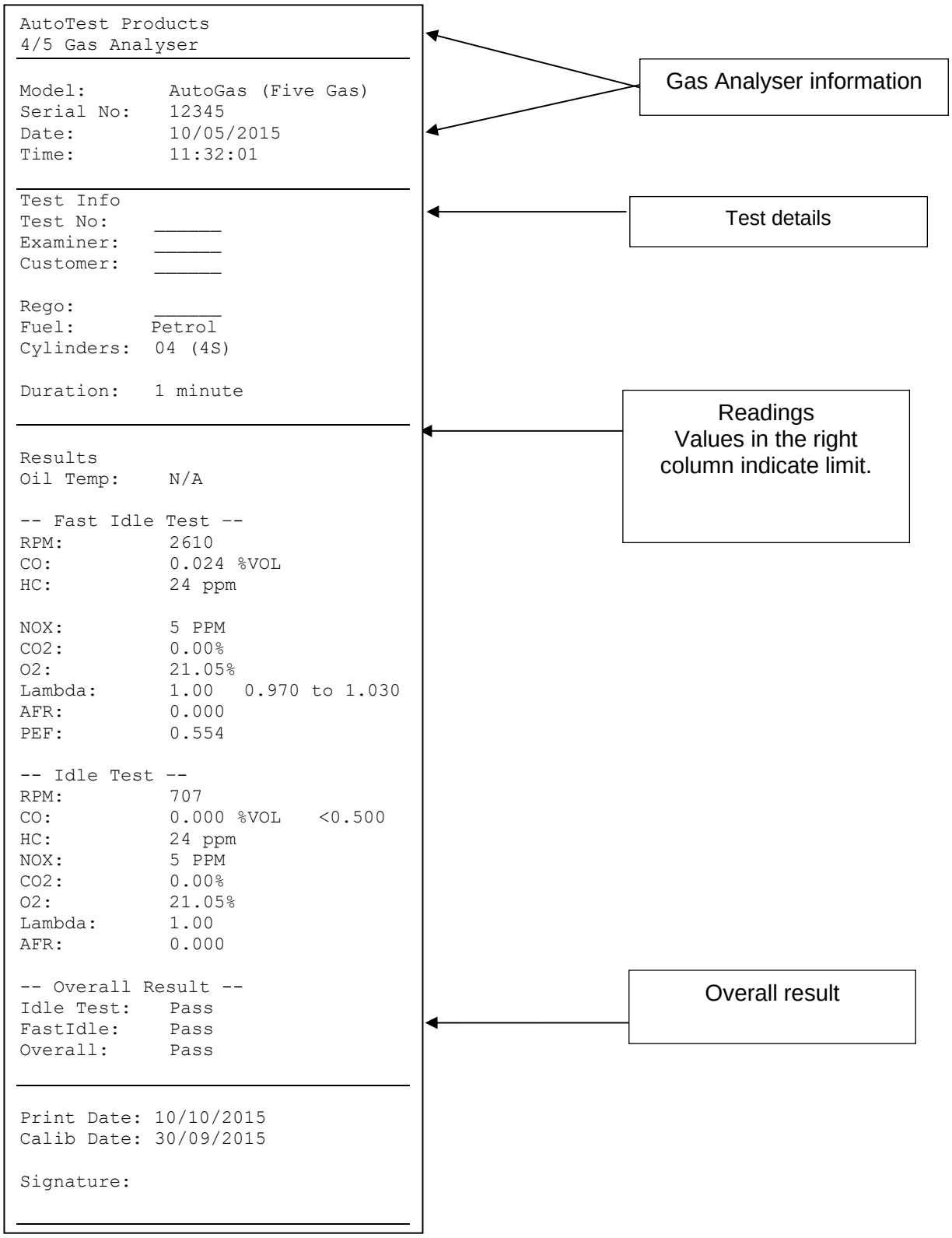


Figure 35 – Print report of a gas test

9.2 Erasing Old Tests

AutoGas can hold up to a hundred gas tests. To erase old gas tests, perform the following steps:

- From the main screen, press TEST button
- Use UP and DOWN buttons to scroll up and down until "CLEAR ALL" screen appears.
- Press OK to clear all stored gas tests.
- Press CANCEL to return to previous menu.

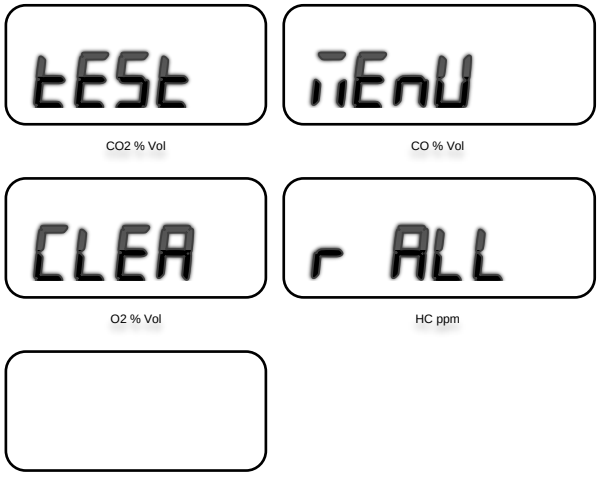


Figure 36 – "Test Menu Clear ALL".

Figure 37 – "Del All Test Data?", select Yes to clear the data or Cancel to go back.

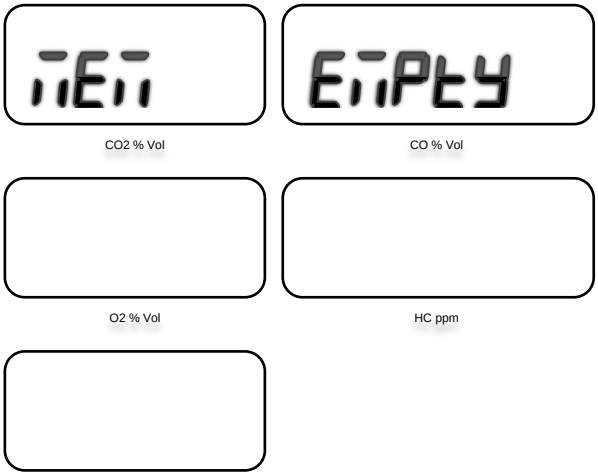


Figure 38 – "Memory Empty".

Note: Once test results have been deleted, they cannot be recovered. Remember to download tests to PC before erasing stored gas tests.

9.3 Lambda (λ) calculation

Lambda (λ) is the combustion efficiency and can be calculated using the following BRETTSCHNEIDER formula:

$$\lambda = \frac{CO_2 + \frac{CO}{2} + O_2 + \left(\frac{1.7261}{4} \times \frac{3.5}{3.5 + \frac{CO}{CO_2}} - 0.0088 \right) \times (CO_2 + CO)}{\left(1 + \frac{1.7261}{4} - 0.0088 \right) \times \left(CO_2 + CO + 6 \times HC \times 10^{-4} \right)}$$

where, CO, CO2, O2 are concentrations in %vol., HC is a Hexane value in ppm vol.

If Lambda (λ) < 1.000: it suggests that the engine is running Rich mixture
If Lambda (λ) > 1.000: it suggests that the engine is running Lean mixture

9.4 RPM Measurement

Once all the required vehicle information is entered, AutoGas will continue with the gas test by performing a RPM calibration operation. AutoGas will first prompt the user to select whether the engine RPM can be measured or not. If the engine RPM is not to be measured, the test procedure will assume that engine Idle and Fast Idle states are indicated by the user's input.

If the RPM of the vehicle engine can be measured, AutoGas will prompt the user to specify the RPM measurement source/sensor. User will also be prompted to enter the number of cylinders there are and the strokes. Please refer to section 0 for more information about the RPM calibration process.

When AutoGas prompts "Can engine speed be measured?" indicate the response using the UP and DOWN buttons.

If the engine RPM cannot be measured, the test procedure will skip RPM calibration.

Note: if AutoGas is already connected to Bluetooth OBD-II reader, the RPM method selection process will be skipped.

Figure 39 – Screen "Can engine rpm measured?"

If the user indicated the RPM cannot be measured, the AutoGas will display the following message:

"Use the vehicles own tachometer to check the engine speed"

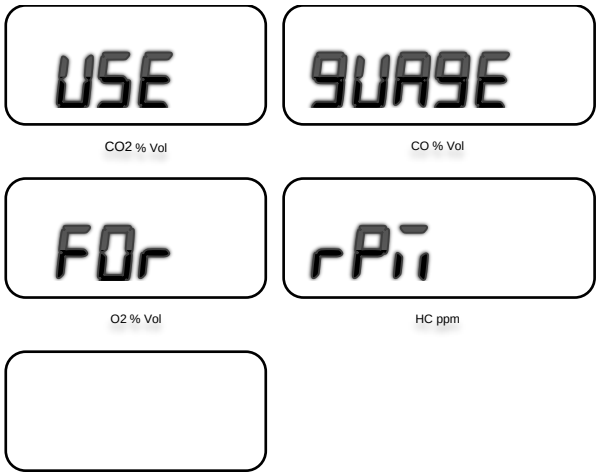


Figure 40 – Screen asking to use vehicle tachometer

If the engine RPM can be measured, the test procedure will ask for the method to be used for sensing the engine RPM.

Use UP and DOWN buttons to select one of the followings:

1. BATTERY (vehicle battery)
2. ACCELERO (Accelerometer)
3. INDUCTIVE (Inductive pickup)

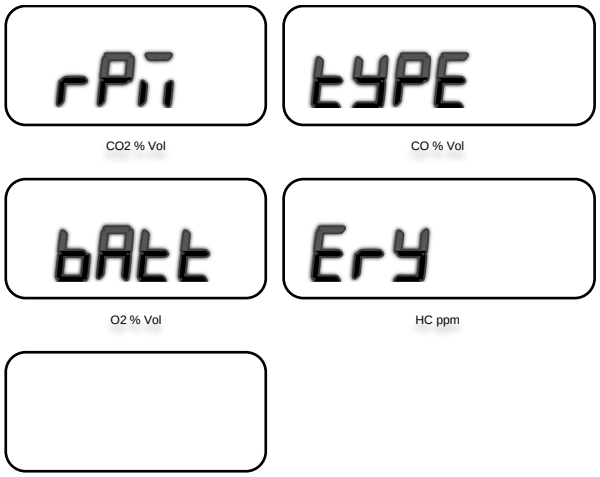


Figure 41 – Screen to enter RPM source

Attach the relevant accessory cables for the selected RPM measurement type when AutoGas prompts "Attach the engine speed measurement device "

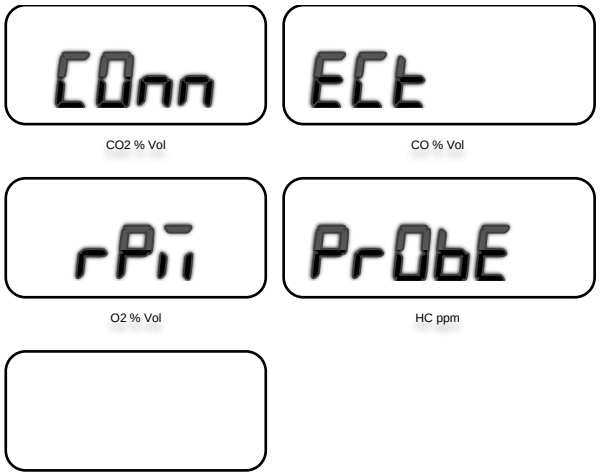


Figure 42 – Screen asking to connect rpm probe

When prompted to select the number of engine cylinders, use the UP and DOWN buttons to set the value.

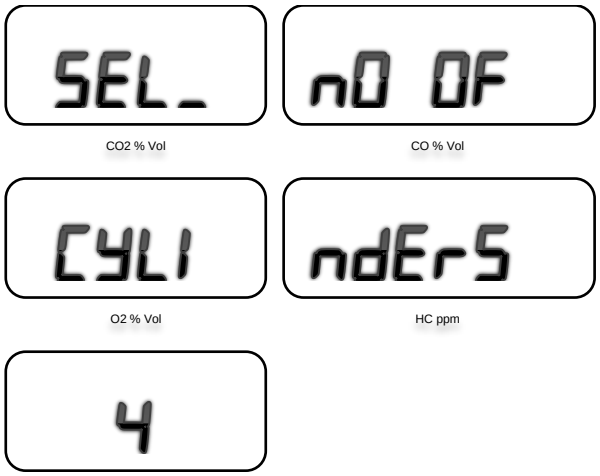


Figure 43 – Screen for entering no. of cylinders

Once AutoGas has enough information about the RPM measurement method, AutoGas will start the RPM calibration process and the following message will appear on the screen: "Starting RPM calib".

Switch off the engine when calibrating RPM.

Press OK when the engine has stopped.

Note: If RPM calibration is not required, press CANCEL button to skip it.

Figure 44 – Screen asking to switch off engine

While the RPM calibration is being performed, the display will show "RPM CALIB" and the variable window will display the number of seconds remaining.

Note: If RPM calibration is not required, press CANCEL button to skip it.

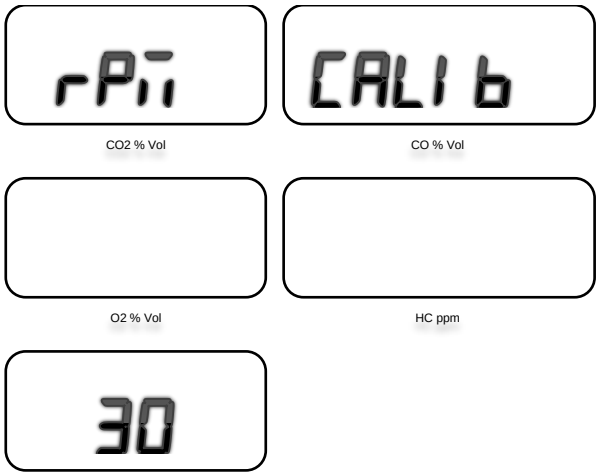


Figure 45 – Screen for rpm calibration

If the AutoGas displays "Turn ON the engine", start the engine.

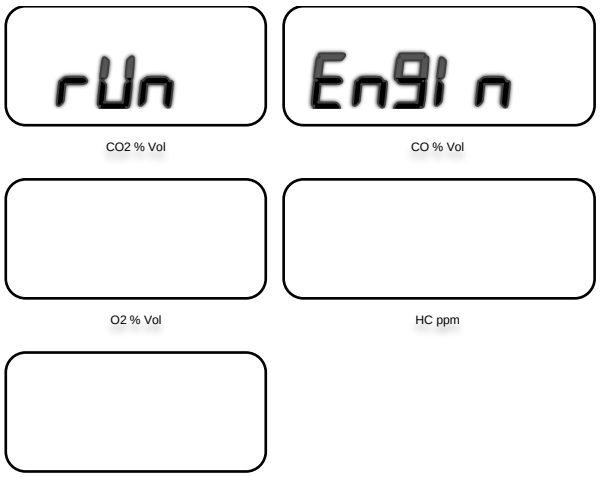


Figure 46 – Screen asking to run engine

When all equipment have been setup, press OK to start RPM calibration. Press CANCEL to abort RPM calibration. Once the RPM calibration process has been completed, turn ON the vehicle engine making sure the vehicle is fully parked with the handbrake fully applied. For automatic vehicles make sure the vehicle is set at Park-gear. For manual vehicles, the gear position should be neutral.

10. USING PC SOFTWARE

AutoGas Analyser PC software allows users to perform a gas test from PC as well as to downloading tests previously stored on the AutoGas Analyser.

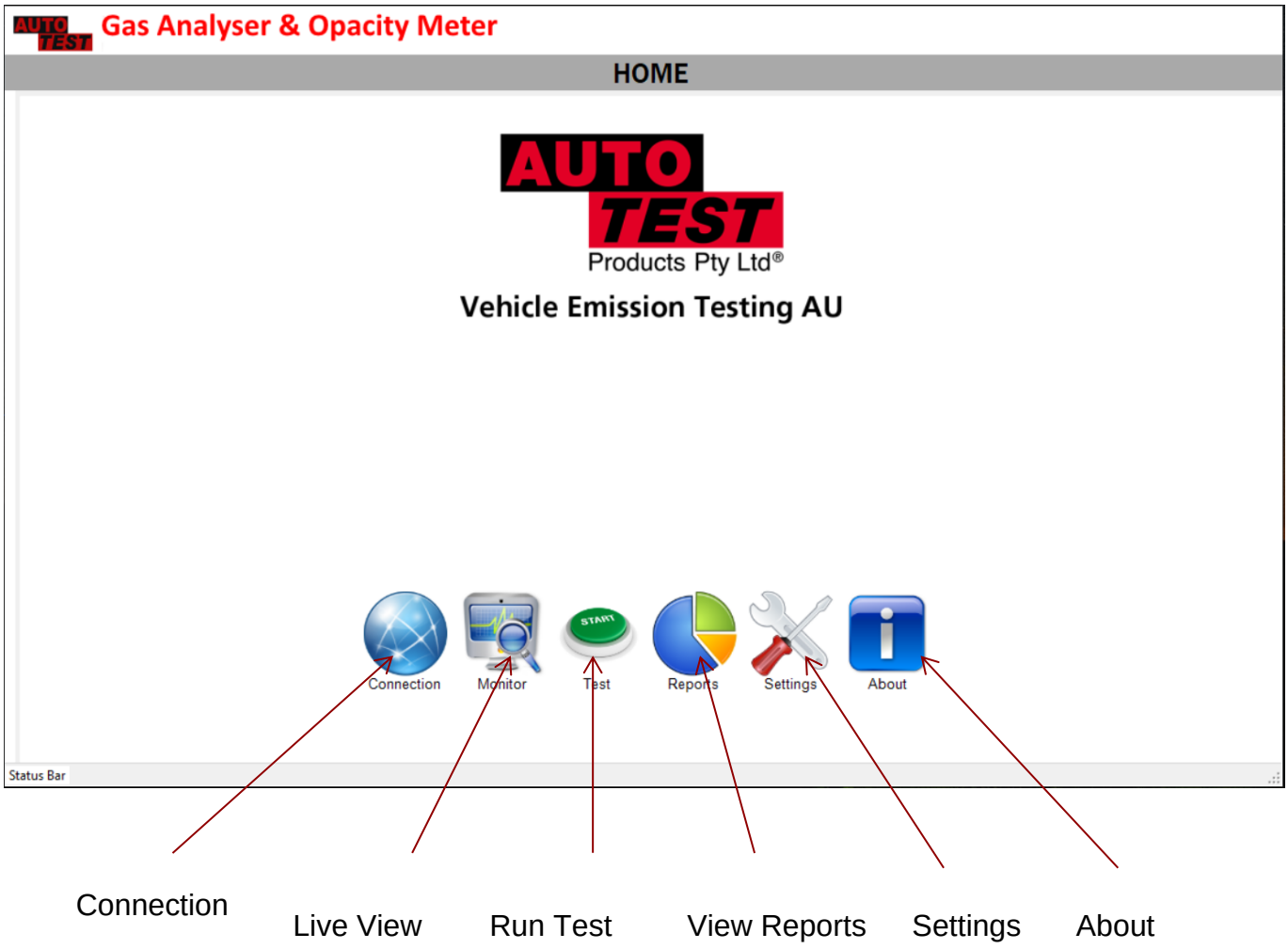


Figure 47 – Home Page

10.1 Software Installation

Installing AutoGas Analyser PC software:
(System Requirements: Microsoft Windows 2000 or greater, one unused USB port, 100 MB of hard disk space)

1. Insert USB flash drive into your computer.
2. Select and run file "*setup.exe*"
3. Follow on-screen prompts to complete installation.

Start the PC software once it has been installed successfully.

10.1.1 Interfacing via USB-to-Serial adapter

Connect one end of the supplied USB-to-Serial adapter to AutoGas Analyser and connect the other end to the PC. If the PC does not support USB connectivity, a RS232 serial cable should be used.

Turn ON AutoGas Analyser. On the PC, run the AutoGas Analyser software.

Once the application is started, click on  connection icon to start the connection.

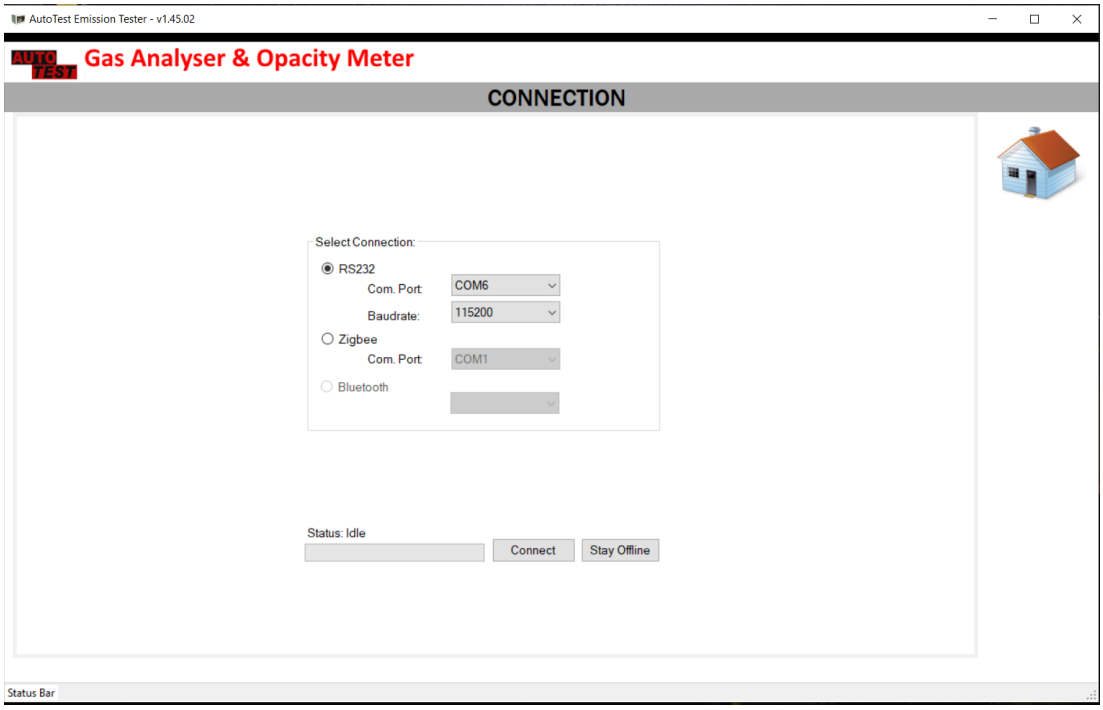


Figure 48 – Connection Page

Select the serial COM port to which AutoGas Analyser is connected. When using the USB-to-serial adapter, enter the communication port number that the computer displays on the lower-right corner of the screen (near clock) when the USB connector is attached to the computer (it can also be found from "Control Panel -> Device Manager -> Ports"). For desktop computers with RS232 support, the communication port is likely to be COM1.

The baudrate should be selected as 115200.

Now, click on the "Connect" button to establish connection.

10.2 Licence activation

AutoGas software requires a valid licence to connect to the gas analyser. When the software prompts to enter a licence code, enter licence code supplied with the software and then click on Activate. If the activation code is valid, the serial number of the gas analyser will appear in "Devices Currently Activated" list.

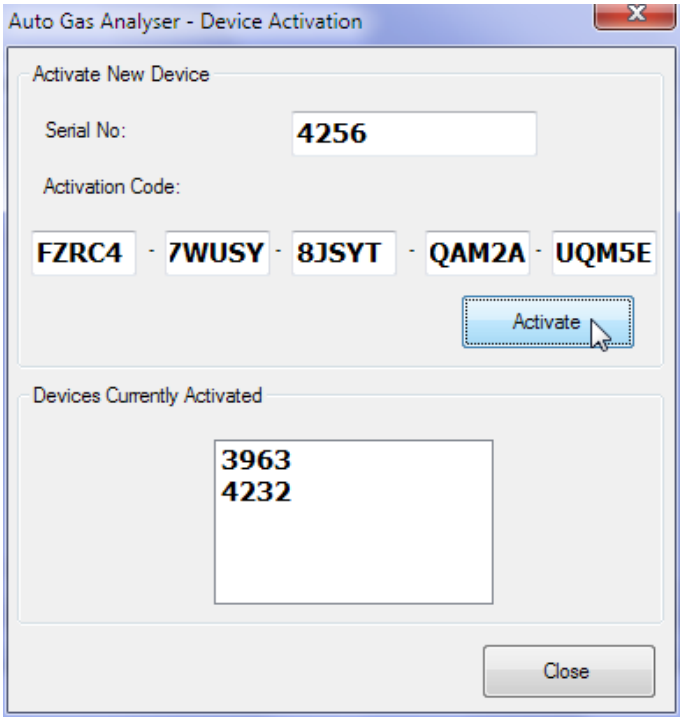


Figure 49 – Gas Analyser Device Activation Window.

Note: If you installed the gas analyser software on another computer or under another user on the same PC, the gas analyser software may ask for the licence code again. It is important that you keep the licence code in a safe place so that you could use it again in the future when needed.

10.3 Live gas reading's view

When the gas analyser is connected to the PC software, click on  "Monitor" icon to view real-time gas readings on the PC screen.

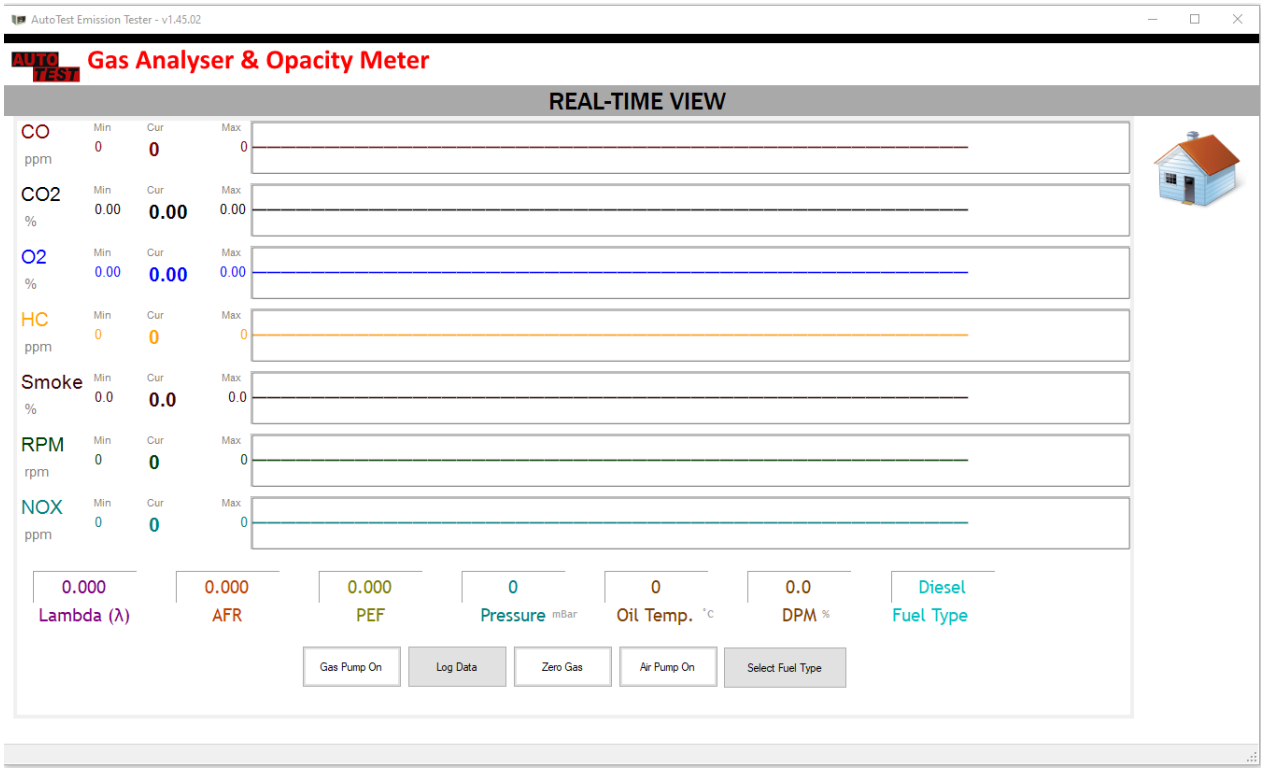


Figure 50 – Live gas reading's page

Click on "Gas Pump On" button start the gas pump to sample gas readings.

Please be noted that the PRM reading comes from the RPM source selected in the last test conducted.

10.4 Downloading Test Data

AutoGas stores all gas tests in its memory. The PC software can retrieve or download stored gas tests from the gas analyser device to PC. The following steps can be performed to synchronise or download gas tests stored on AutoGas:

- Run AutoGas PC software.
- Establish communication using the method described in section 10.
- Once the connection is established, click on  "Reports" icon.
- Click on the 'Synchronise' button to download new gas tests.
- Wait until all new gas tests have been downloaded. Please note, depending on the number of stored tests, the downloading process can take some time to complete.

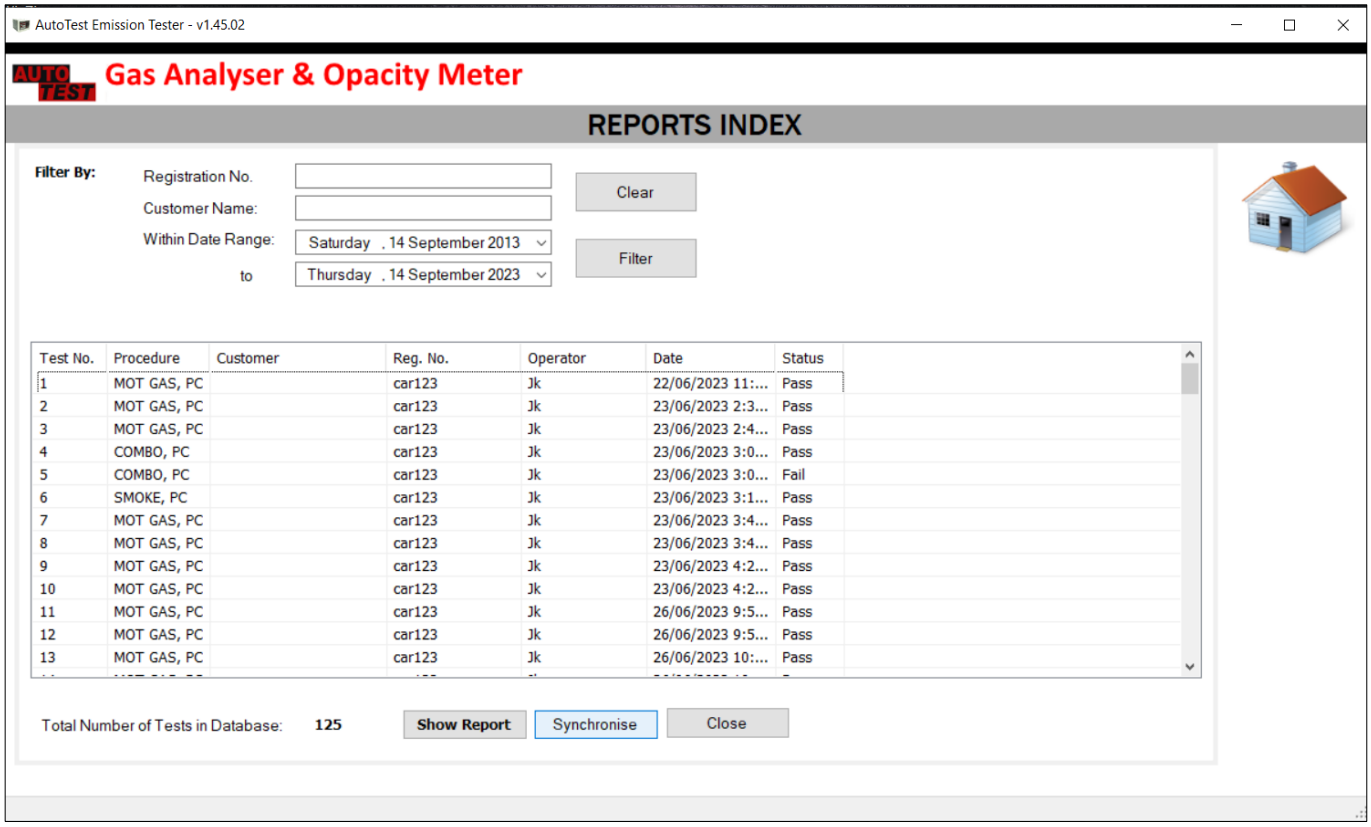


Figure 51 – "Test downloading - synchronisation".

Note: Once stored test results have been successfully uploaded to the PC, users may want to clear/erase stored test results from AutoGas analyser to make room for future tests. Please see section 9.10 for details on how to erase stored gas tests.

10.5 Viewing Test Results on PC

From the "Reports Index" list select a desired test record by clicking on it. Then click on "Show report" to view test information on a new page.

To print report, click on the  (Print) icon. A new window will appear showing the printable test report. To carry on printing to a printer, click on the "Print" icon and follow prompts. To return to the "TEST REPORT" page, just close the "Print Preview" window.

10.6 Filter Test Reports

Test reports can be searched with filter for fast retrieval using vehicle registration number, customer name and/or test date range.

In the "REPORTS INDEX" page, set the values accordingly, and then click on the "Filter" button to launch a new search. Those values can be removed by clicking on the "Clear" button.

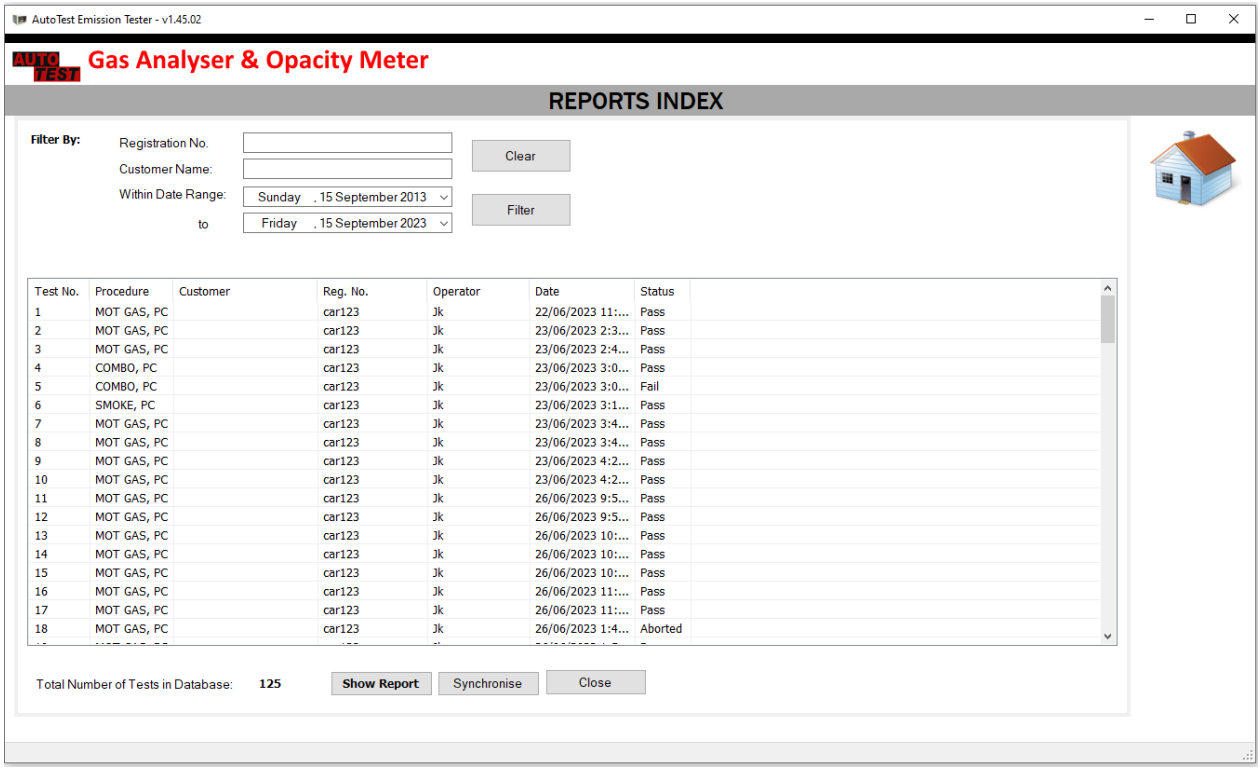


Figure 52 – "Test report filter option".

10.7 Running a PC based Gas Test

AutoGas allows a gas test to be executed from a PC using AutoGas PC software. One major advantage of running a gas test from a PC is that users can monitor gas readings on a computer screen in real-time, as well as view on-screen instructions more clearly.

To start a new gas test from a PC, first establish communication with the gas analyser using one of the methods described in section 10. Once AutoTest® Emission Tester software is connected to AutoGas Analyser, click on the (Test) icon to open the test page.

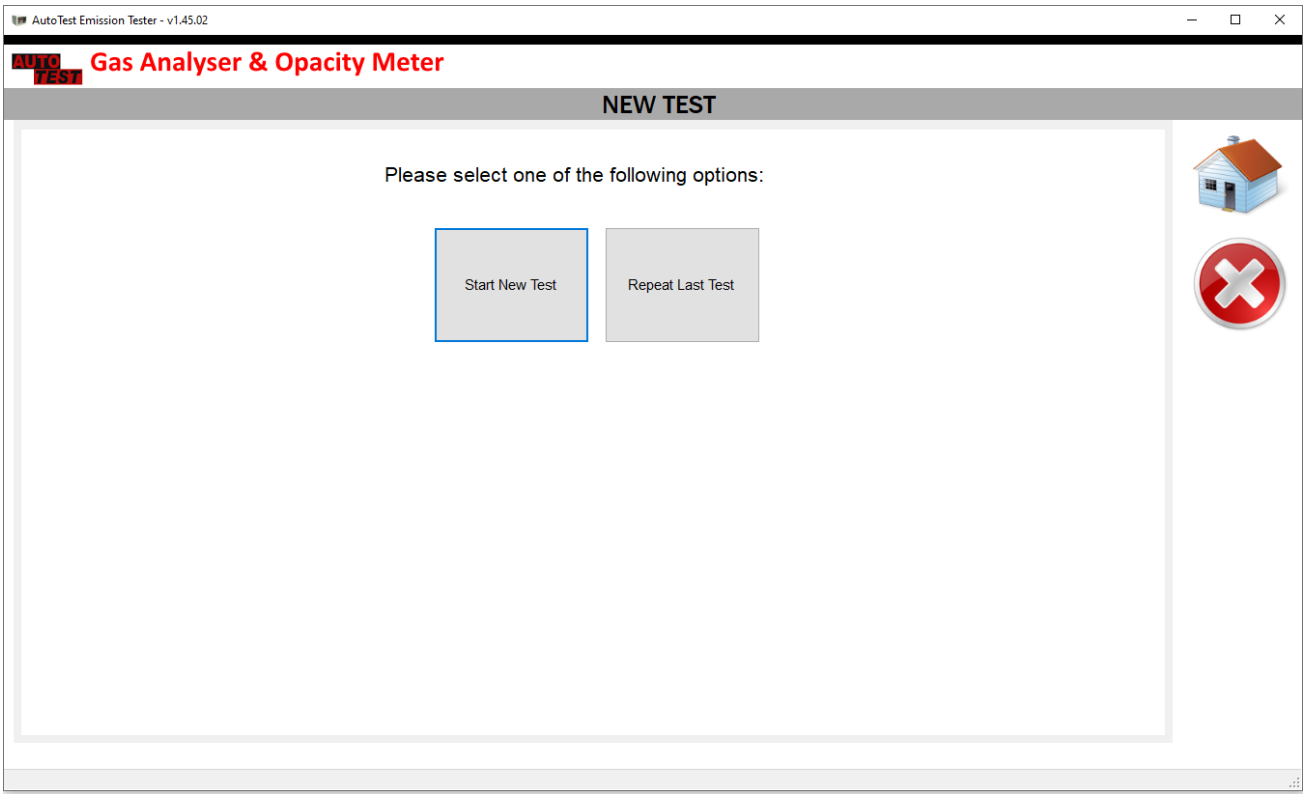


Figure 53 – Test Page

Select "Start a New Test" to start a new test with new vehicle details. Alternatively, you can select "Repeat last test" to reload the last test's information and use that to carry out a new gas test. If a new test is selected, select the examiner information and the vehicle type at the next step. The examiner information can be edited in the settings.

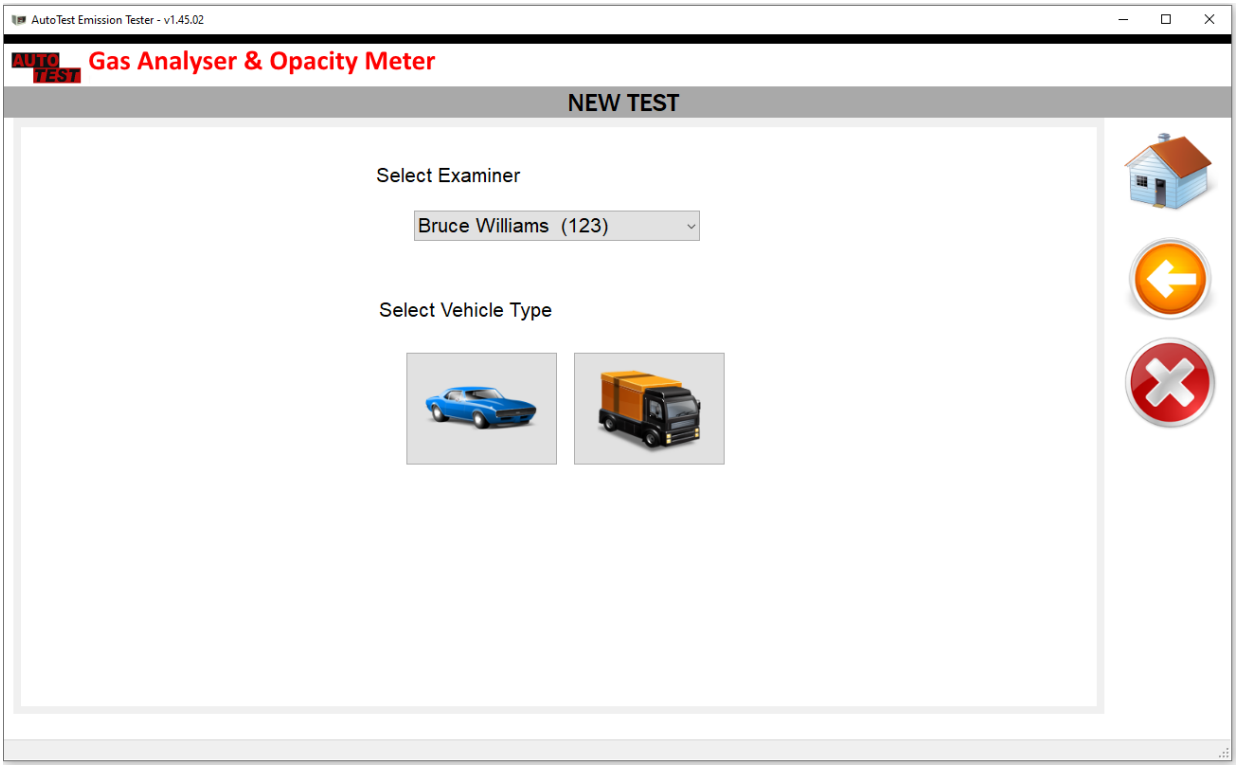


Figure 54 – Select Examiner and Vehicle Type

The next step will prompt for the test type.

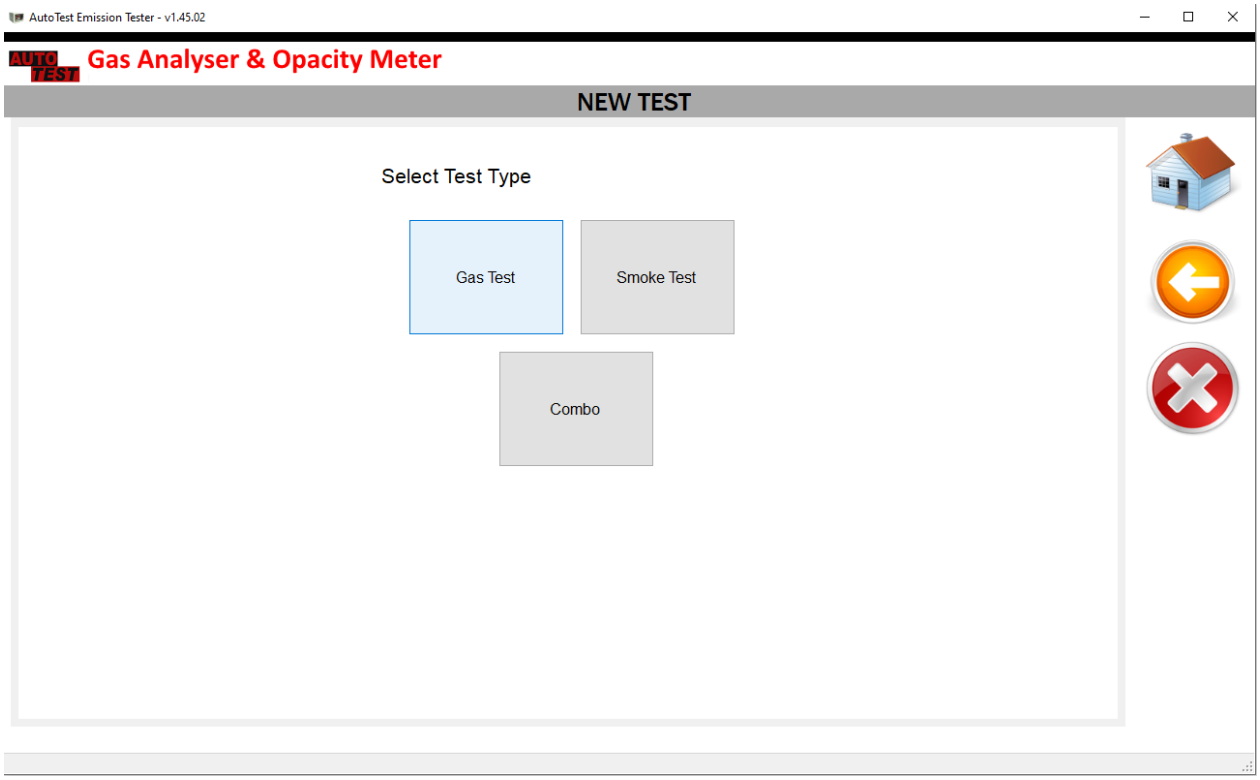


Figure 55 – Select Test Type

The next step will prompt for the fuel type.

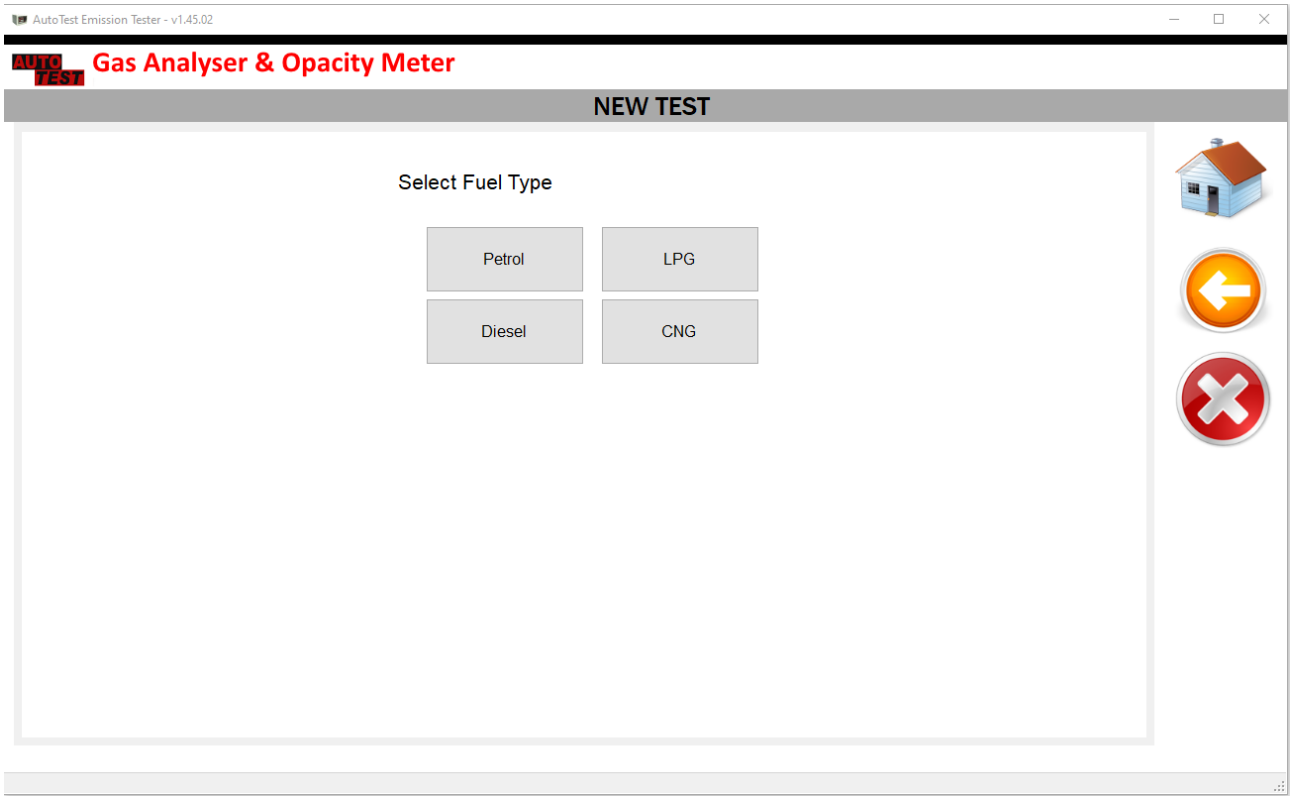


Figure 56 – Select Fuel Type

The next step will prompt for RPM type.

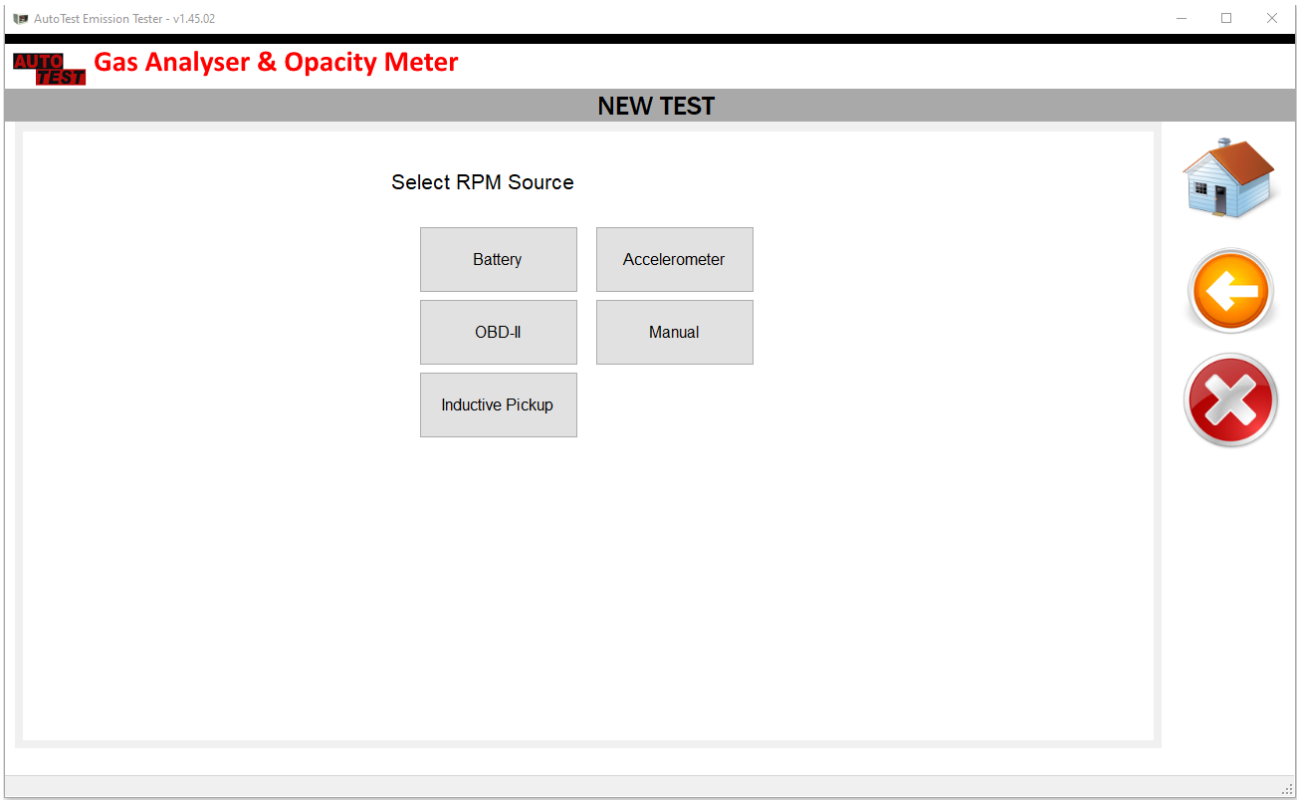


Figure 57 – Select RPM Source

The next step will ask for vehicle details such as registration number, VIN, model, make, cylinders, engine size etc. Once the vehicle details are entered, press Begin Test to start the test.

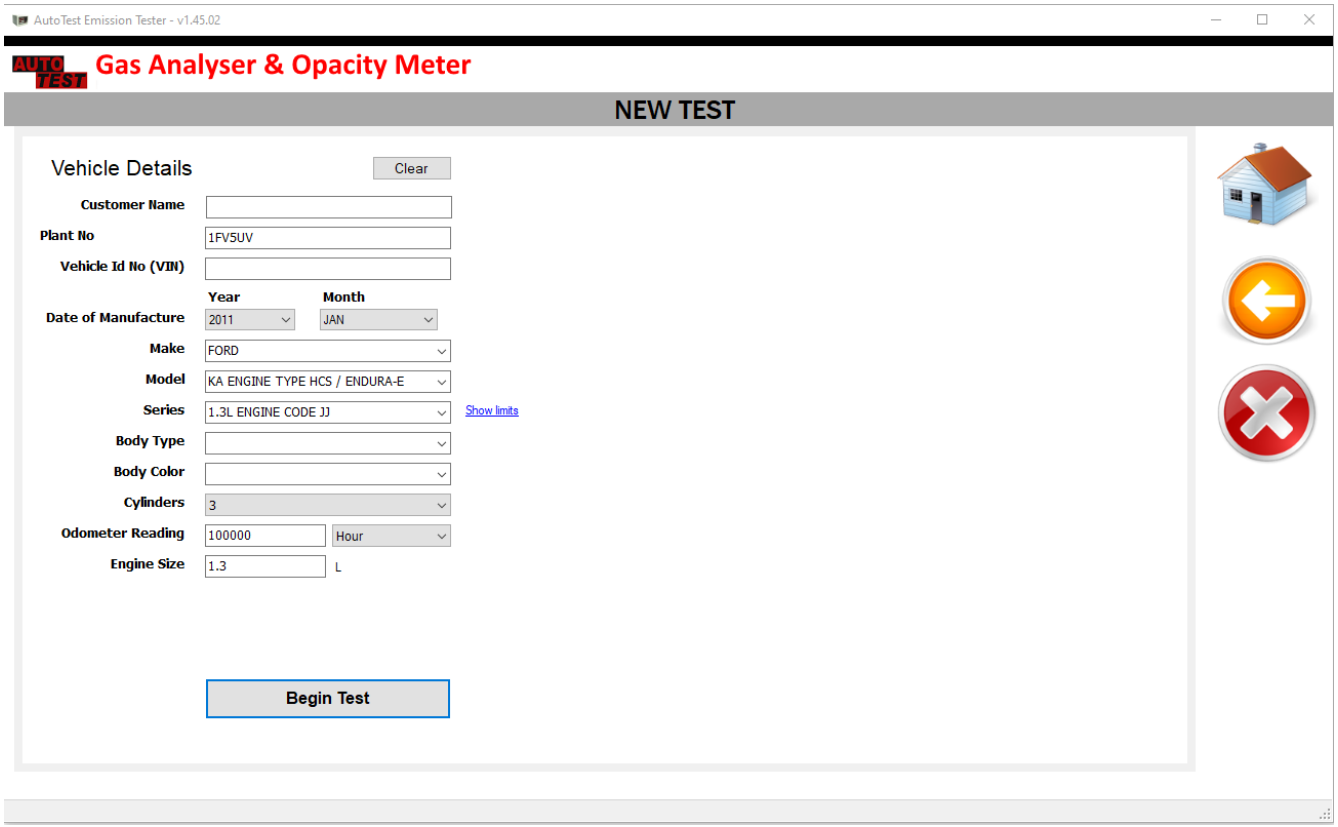


Figure 58 – Vehicle Details

Once the gas emission test is started, the PC software will display step by step instructions on the screen. It will also show a graph of currently sampled gas measurements and the test limit values.

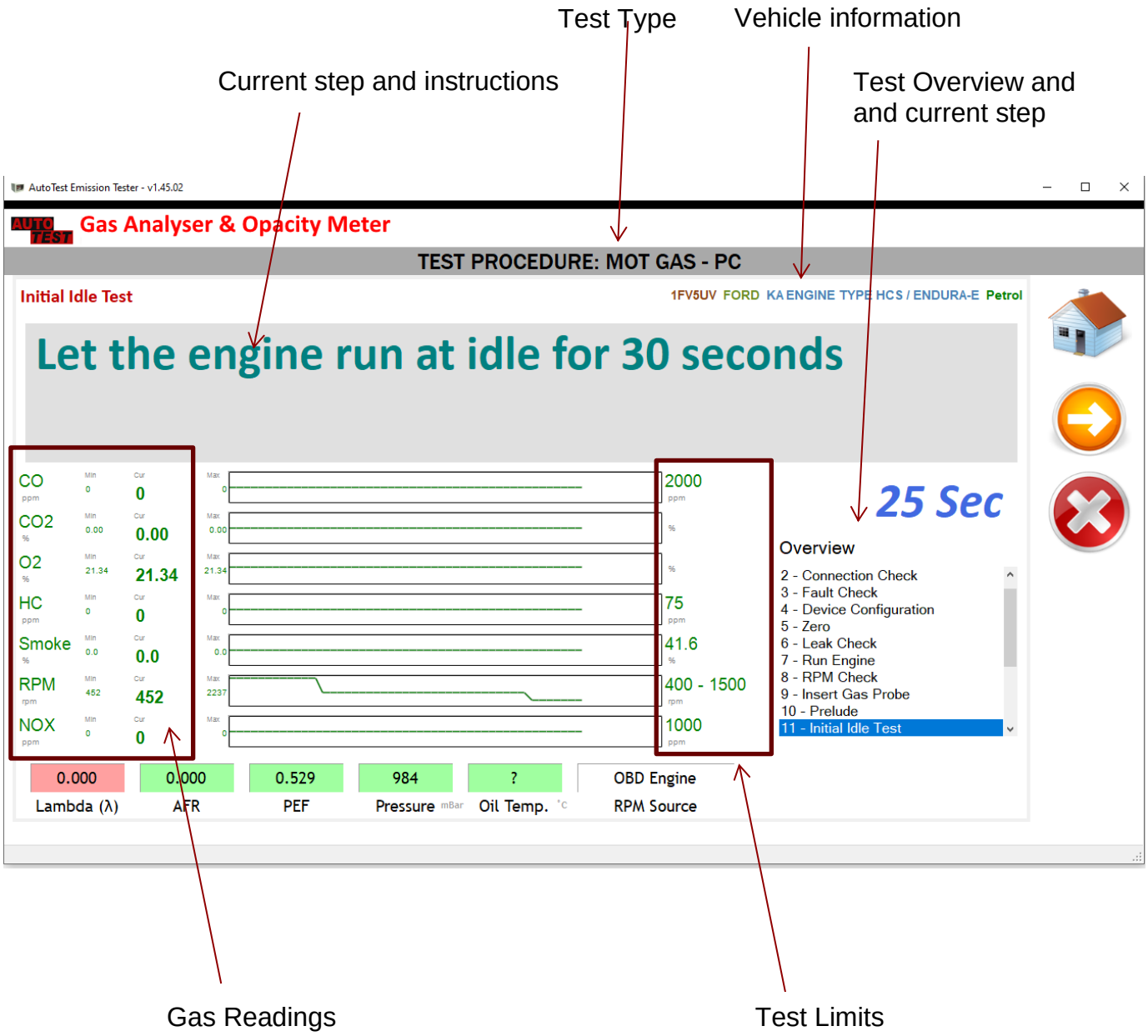
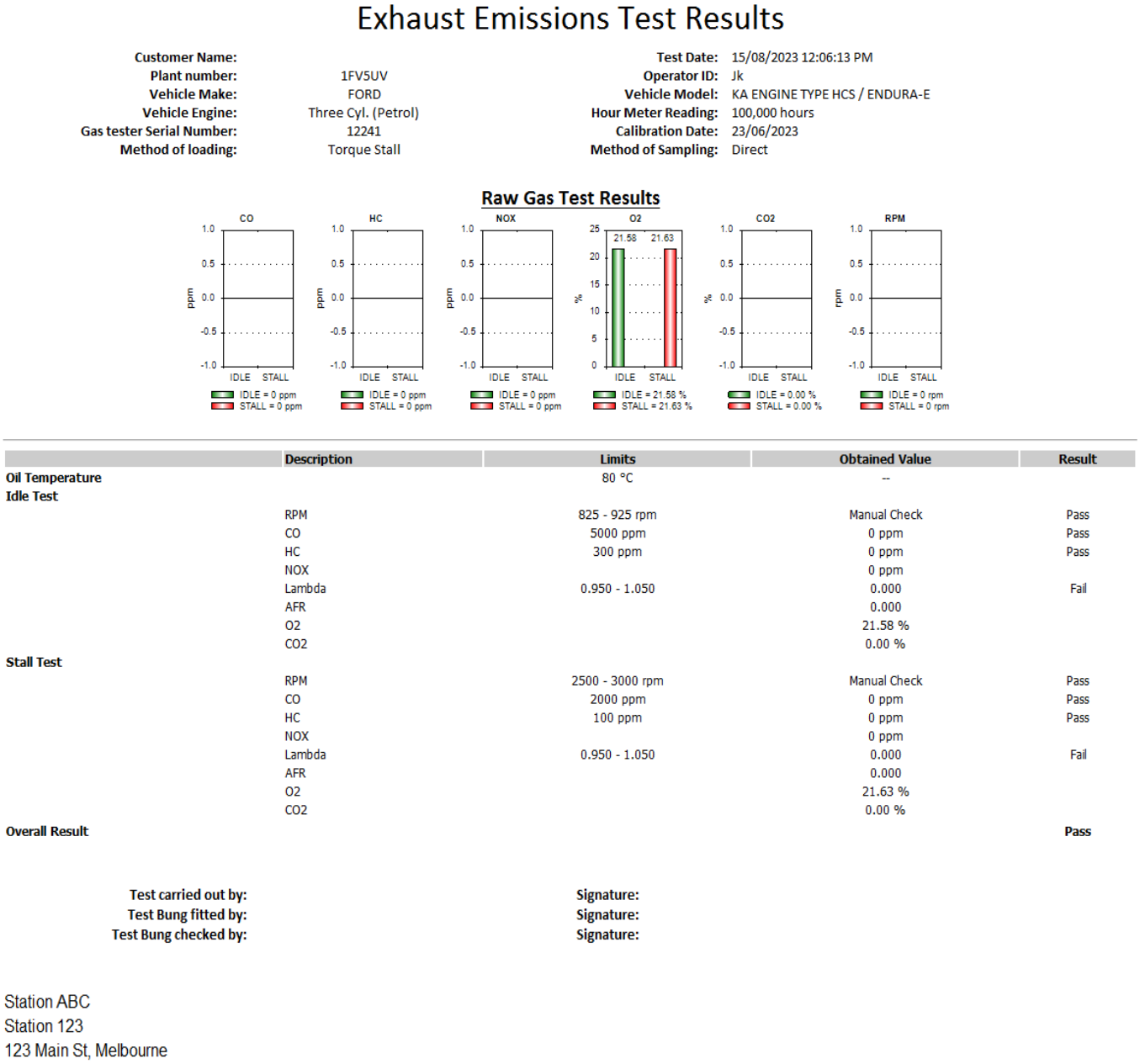


Figure 59 – Test Procedure

User can abort the test at any time by pressing the (stop) icon. At certain stages during a test, user can/needs to press the (next) icon to skip that step or move to the next step.

The following table outlines the test steps involved in a gas test.

No	Step	Description
1	Warmup	Device is being warmed up. Please wait until the warmup is complete.
2	Connection Check	Checks RF connection
3	Fault Check	Checks for any faults in the device
4	Device Configuration	Checks device configurations
5	Zero	Sets the measurement values to zero
6	Leak Check	Check for any leakages
7	Weekly Check	Performs weekly check if required.
8	Run Engine	Prompts the user to start engine and let it run at idle
9	RPM Check	Checks the oil temperature and waits until the temperature is above 60 °C
10	Insert Gas Probe	Prompts user to insert smoke probe into the exhaust tail pipe
11	Prelude	Re-check the connection with smoke meter
12	Fast-idle Test	Asks the user to press accelerator
13	Idle Test	Asks the user to run the engine at idle
14	Calculate	Calculates the test result
15	Save Test	Saves the test data to the database
16	Display Report	Displays the test report



Exhaust Emissions Test Results

Customer Name:		**Test Date:**	15/08/2023 12:06:13 PM
Plant number:	1FV5UV	**Operator ID:**	Jk
Vehicle Make:	FORD	**Vehicle Model:**	KA ENGINE TYPE HCS / ENDURA-E
Vehicle Engine:	Three Cyl. (Petrol)	**Hour Meter Reading:**	100,000 hours
Gas tester Serial Number:	12241	**Calibration Date:**	23/06/2023
Method of loading:	Torque Stall	**Method of Sampling:**	Direct

	Description	Limits	Obtained Value	Result
Oil Temperature		80 °C	--	
Idle Test				
	RPM	825 - 925 rpm	Manual Check	Pass
	CO	5000 ppm	0 ppm	Pass
	HC	300 ppm	0 ppm	Pass
	NOX		0 ppm	
	Lambda	0.950 - 1.050	0.000	Fail
	AFR		0.000	
	O2		21.58 %	
	CO2		0.00 %	
Stall Test				
	RPM	2500 - 3000 rpm	Manual Check	Pass
	CO	2000 ppm	0 ppm	Pass
	HC	100 ppm	0 ppm	Pass
	NOX		0 ppm	
	Lambda	0.950 - 1.050	0.000	Fail
	AFR		0.000	
	O2		21.63 %	
	CO2		0.00 %	
Overall Result				**Pass**

Test carried out by:	**Signature:**
Test Bung fitted by:	**Signature:**
Test Bung checked by:	**Signature:**

Station ABC
Station 123
123 Main St, Melbourne

Figure 60 – Gas Test Report Sample

Keypad Lock

While the Gas Analyser is running a test via the PC software, the keypad of the Gas Analyser is locked. This is to make sure a test is not interrupted during the procedure. Finishing the test or quitting it via the PC software will unlock the keypad. Alternatively, there is a button in the settings to manually unlock it, and it will always be unlocked upon turning the unit on.

10.8 Running a PC based Smoke Test

To start a new smoke test from a PC, first establish communication with the gas analyser using one of the methods described in section 10. Then pair the smoke meter with the gas analyser prior to starting the test.

Click on the "Pair Smoke Meter" button to pair a Diesel Smoke Meter to AutoGas Analyser. The Smoke Meter will turn on its fan once the pairing is successful.

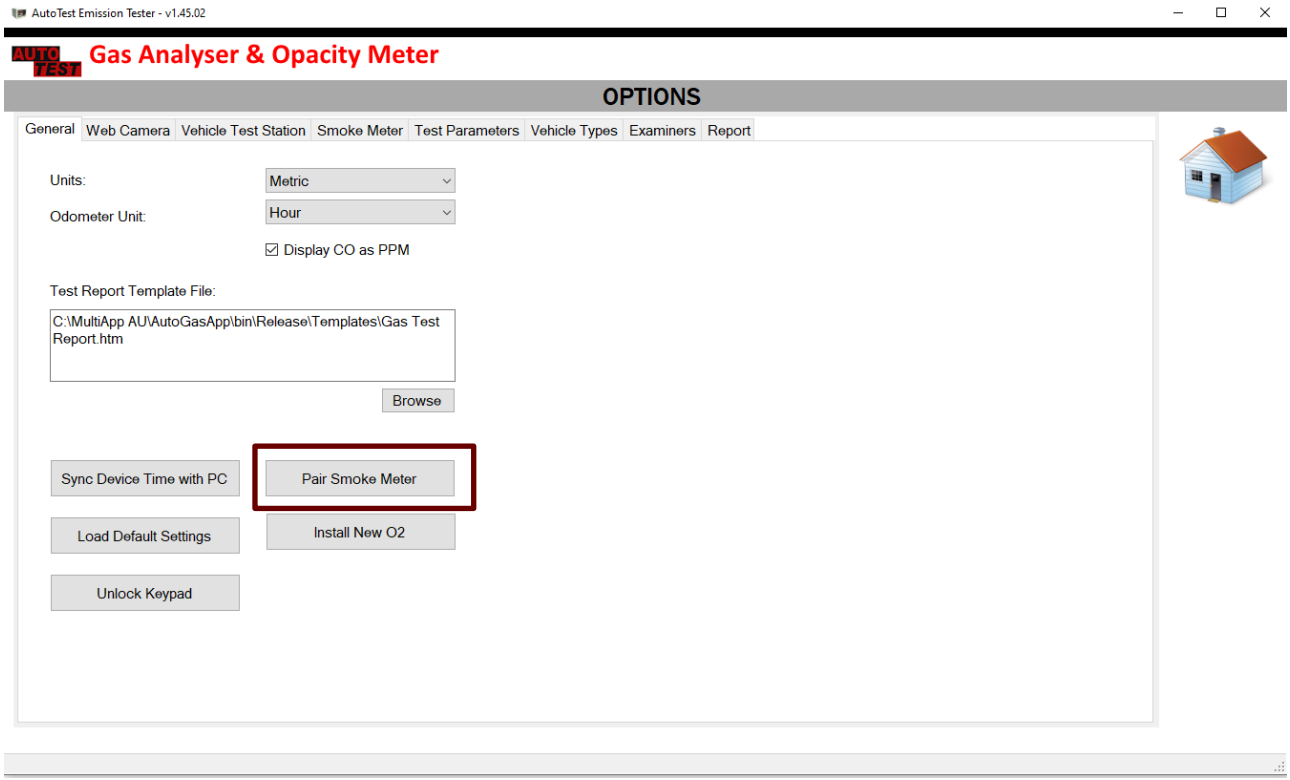


Figure 61 – Pair Smoke Meter to AutoGas analyser

Once AutoTest® Emission Tester software is connected to AutoGas Analyser and paired with the smoke meter, click on the  (Test) icon to open the test page. Follow

The next step will prompt the test page as in ***Figure 53***.

Select "Start a New Test" to start a new test with new vehicle details. Alternatively, you can select "Repeat last test" to reload the last test's information and use that to carry out a new gas test. If a new test is selected, select the examiner information and the vehicle type at the next step. The examiner information can be edited in the settings.

The next step will prompt for examiner details and vehicle type as in ***Figure 54***.

The step after will prompt for the test type.

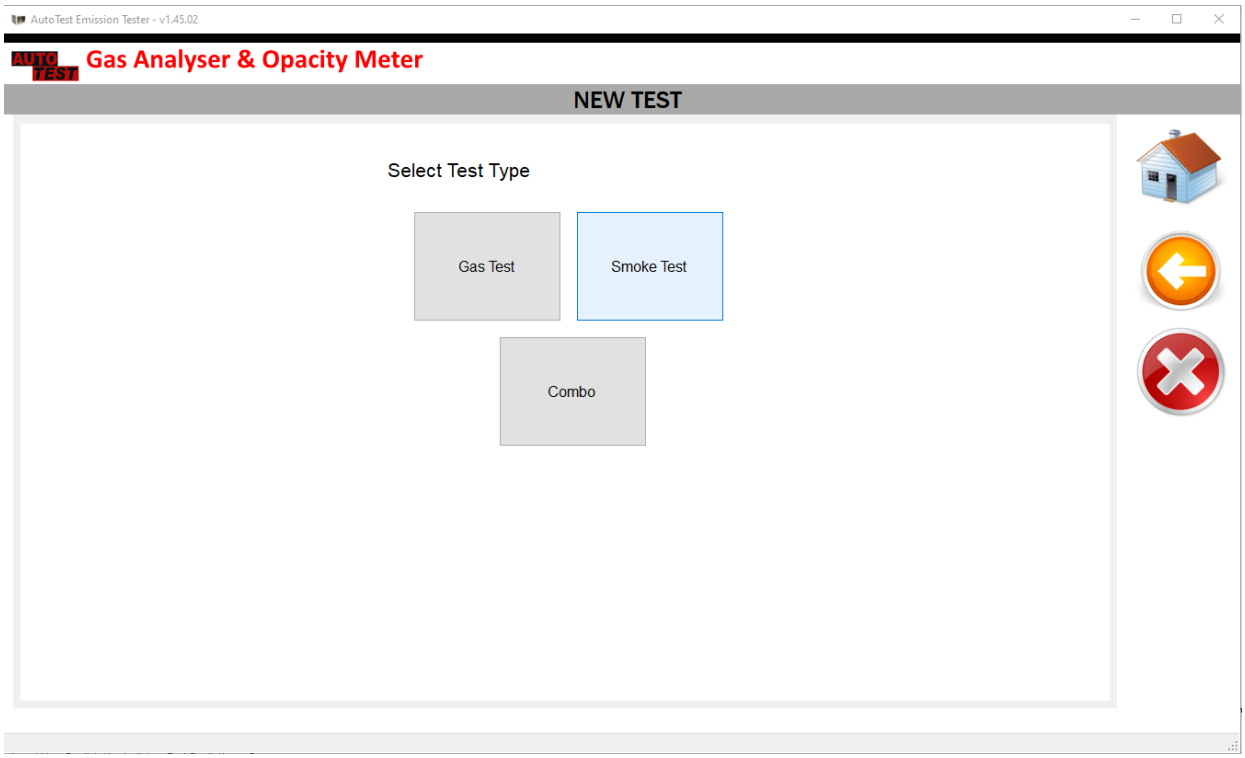


Figure 62 – Select Test Type

The next step will prompt for the fuel type as in ***Figure 55***.

The next step will prompt for the engine type.

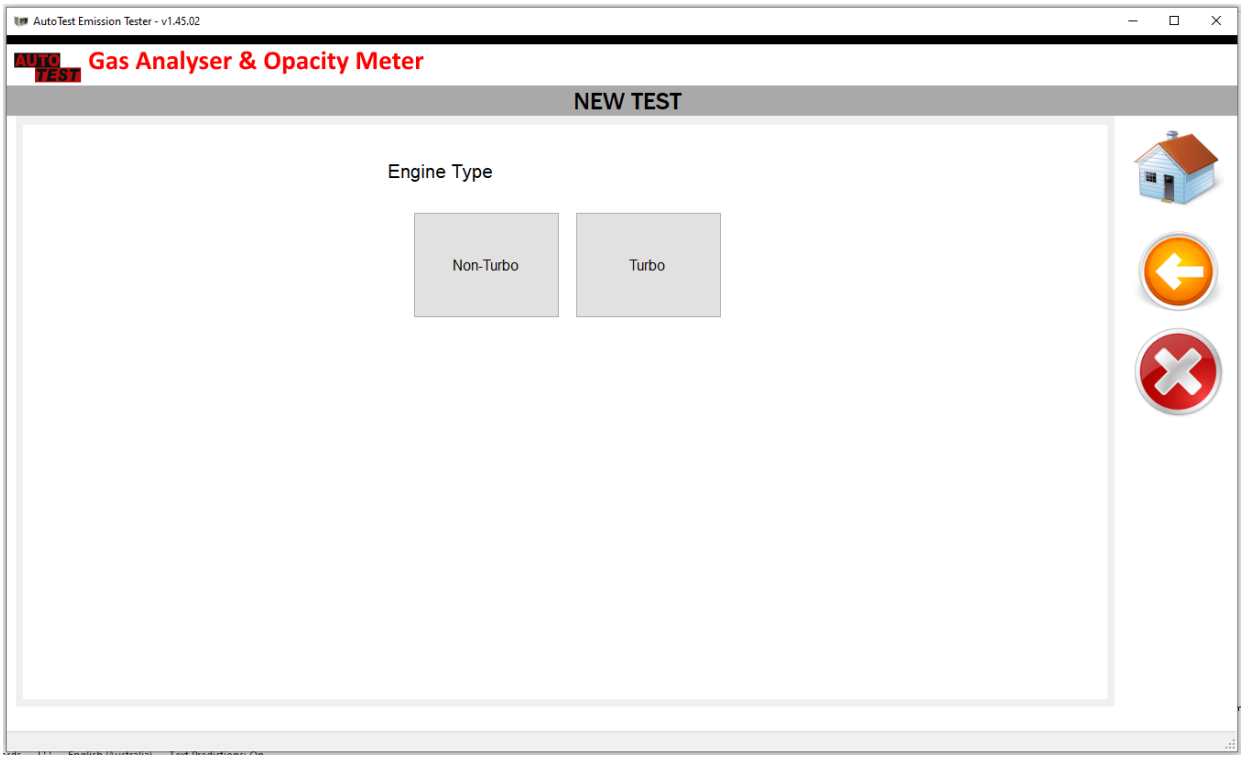


Figure 63 – Select Engine Type

The next step will prompt for RPM type as in ***Figure 56***.

The next step will ask for vehicle details such as registration number, VIN, model, make, cylinders, engine size etc as in ***Figure 57***. Once the vehicle details are entered, press Begin Test to start the test.

Once the smoke test is started, the PC software will display step-by-step instructions on the screen. It will also show a graph of currently sampled gas measurements and the test limit values.

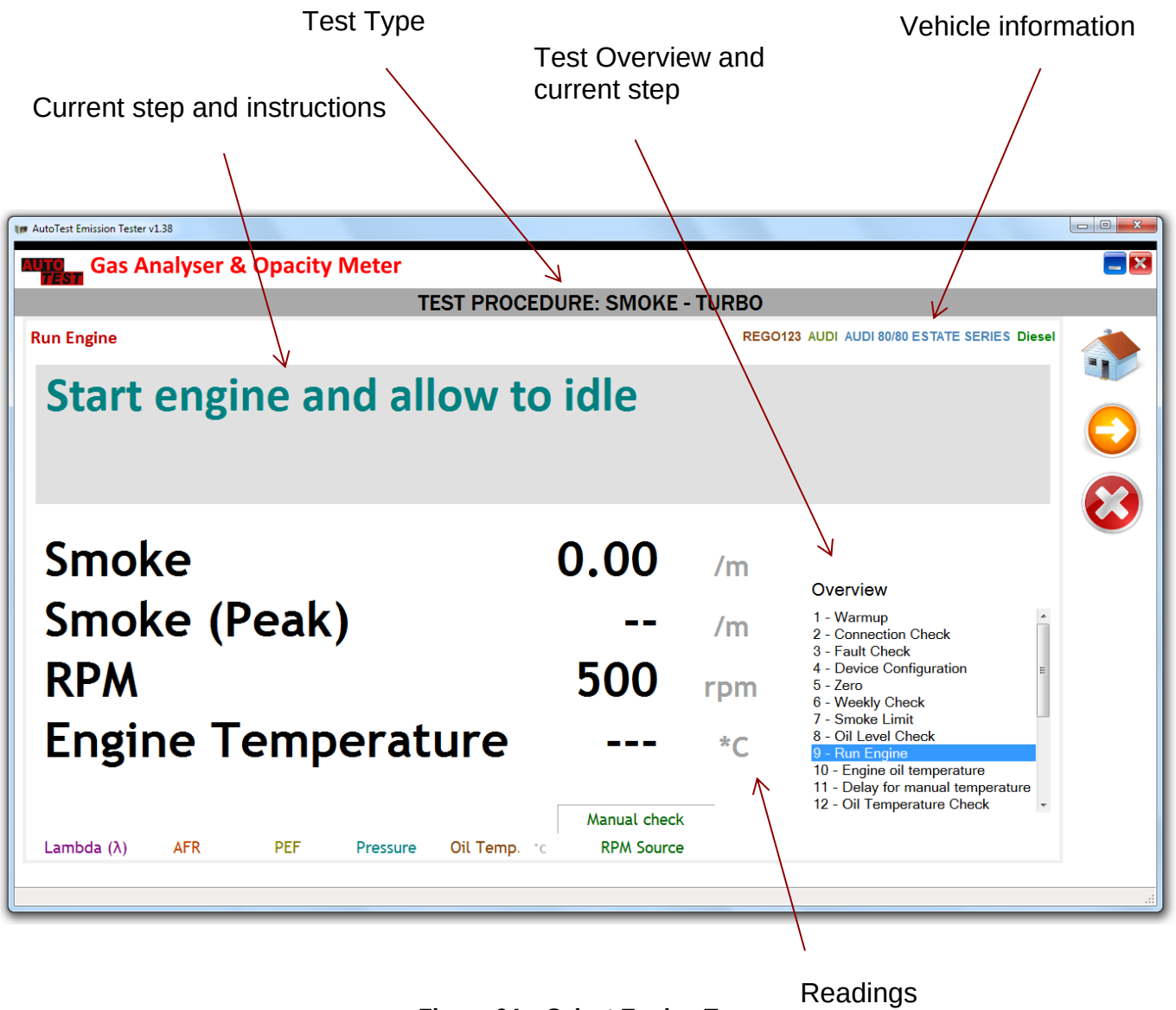


Figure 64 – Select Engine Type

User can abort the test at any time by pressing  icon. At some stages during a test, user can opt to press  to skip that step (not all steps can be skipped).

The following table outlines the test steps involved in a smoke test.

No	Step	Description
1	Warmup	Device is being warmed up. Please wait until the warmup is complete.
2	Connection Check	Checks RF connection
3	Fault Check	Checks for any faults in the device
4	Device Configuration	Checks device configurations
5	Zero	Sets the measurement values to zero
6	Weekly Check	Performs weekly check if required.
7	Smoke Limit	Displays the smoke limit value (Pass/Fail Limit)
8	Run Engine	Prompts the user to start engine and let it run at idle
9	Oil Temperature Check	Checks the oil temperature and waits until the temperature is above 60 °C
10	Remove Oil Probe	Prompts to remove the oil temperature probe from the engine
11	Insert Smoke Probe	Prompts user to insert smoke probe into the exhaust tail pipe
12	Connection Re-check	Re-check the connection with smoke meter
13	Acceleration	Asks the user to press accelerator
14	Release Accelerator - sampling	Prompts user to release accelerator, smoke peak monitor & measurement
15	Idle Engine	Asks the user to keep the vehicle running at idle
16	Zero Drift Check	Zero drift check at the end of the test sequences. Asks the user to remove smoke probe from the tail pipe.
17	Calculate	Calculates the test result
18	Save Test	Saves the test data to the database
19	Display Report	Displays the test report

Exhaust Emissions Test Results

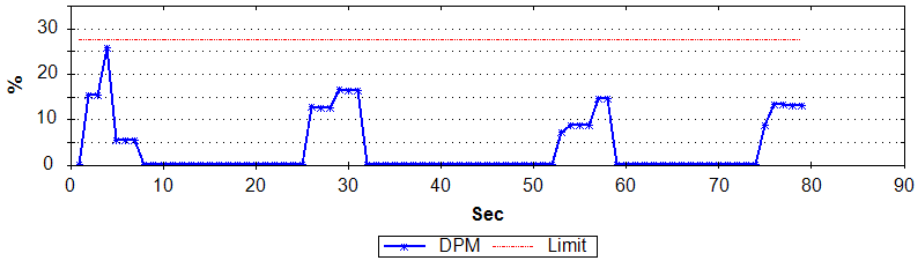
Customer Name:		**Test Date:**	17/07/2023 4:26:14 PM
Plant number:	1FV5UV	**Operator ID:**	Jk
Vehicle Make:		**Vehicle Model:**	
Vehicle Engine:	Three Cyl. (Diesel)	**Hour Meter Reading:**	100,000 hours
Gas tester Serial Number:	12241	**Calibration Date:**	30/12/2023
Method of loading:	Torque Stall	**Method of Sampling:**	Direct

Raw Gas Test Results

Smoke Test *PC*

No engine temperature taken.

Index	Opacity (%)	Limits	Result
1	28.0 %	27.6 %	
2	26.0 %	27.6 %	
3	16.5 %	27.6 %	
4	14.7 %	27.6 %	
5	14.8 %	27.6 %	
Mean value	15.4 %	27.6 %	
Zero Drift	00.0 %		
Overall Result			**Pass**



Test carried out by:	**Signature:**
Test Bung fitted by:	**Signature:**
Test Bung checked by:	**Signature:**

Station ABC
Station 123
123 Main St, Melbourne

Figure 65 – Smoke Test Report Sample

10.9 Running a PC based Combo Test

To start a new combo test from a PC, first establish communication with the gas analyser using one of the methods described in section 10. Then pair the smoke meter with the gas analyser prior to starting the test.

Click on the "Pair Smoke Meter" button to pair a Diesel Smoke Meter to AutoGas Analyser as in ***Figure 61***. The Smoke Meter will turn on its fan once the pairing is successful.

Once AutoTest® Emission Tester software is connected to AutoGas Analyser and paired with the smoke meter, click on the  (Test) icon to open the test page. Follow

The next step will prompt the test page as in ***Figure 53***.

Select "Start a New Test" to start a new test with new vehicle details. Alternatively, you can select "Repeat last test" to reload the last test's information and use that to carry out a new gas test. If a new test is selected, select the examiner information and the vehicle type at the next step. The examiner information can be edited in the settings.

The next step will prompt for examiner details and vehicle type as in ***Figure 54***.

The step after will prompt for the test type.

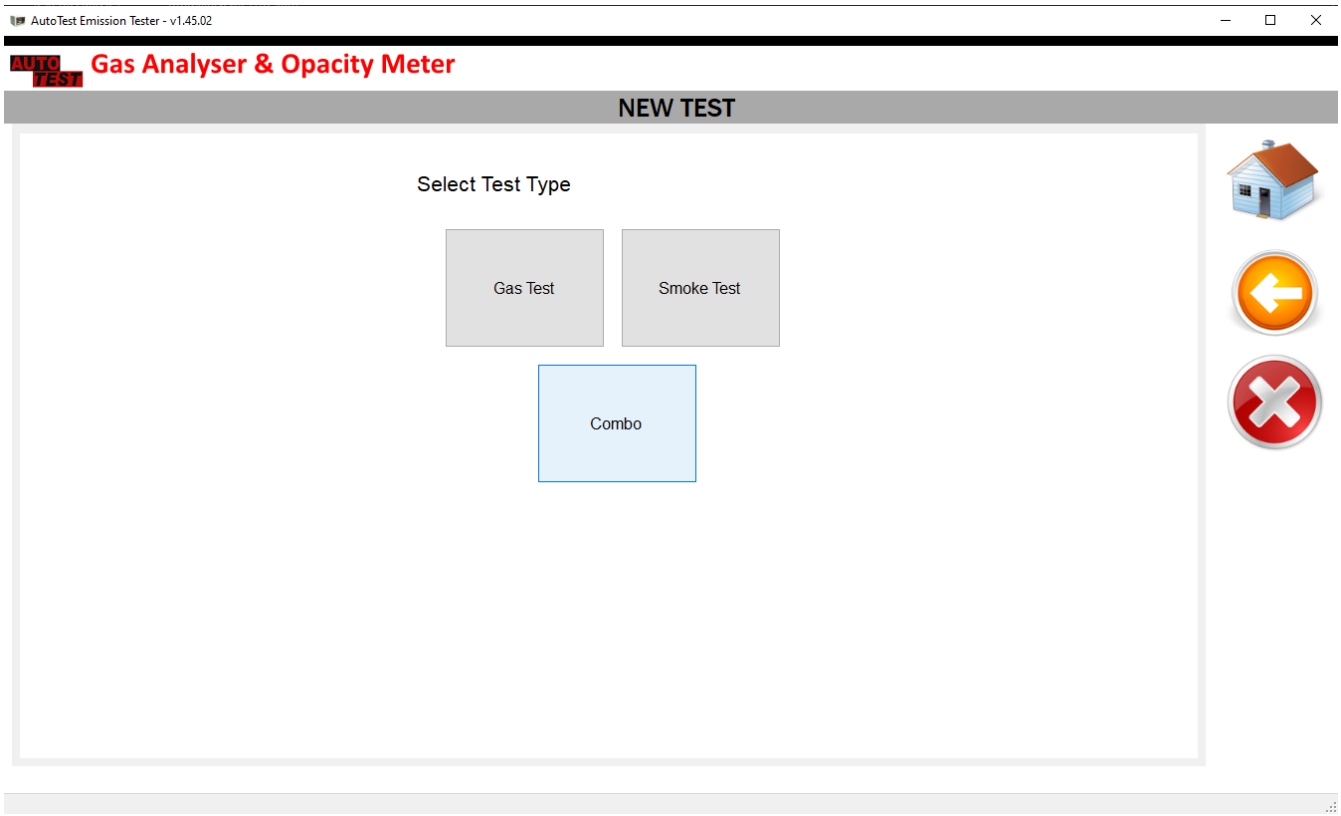


Figure 66 – Select Test Type

The next step will prompt for the fuel type as in ***Figure 56***.

The next step will prompt for the engine type.

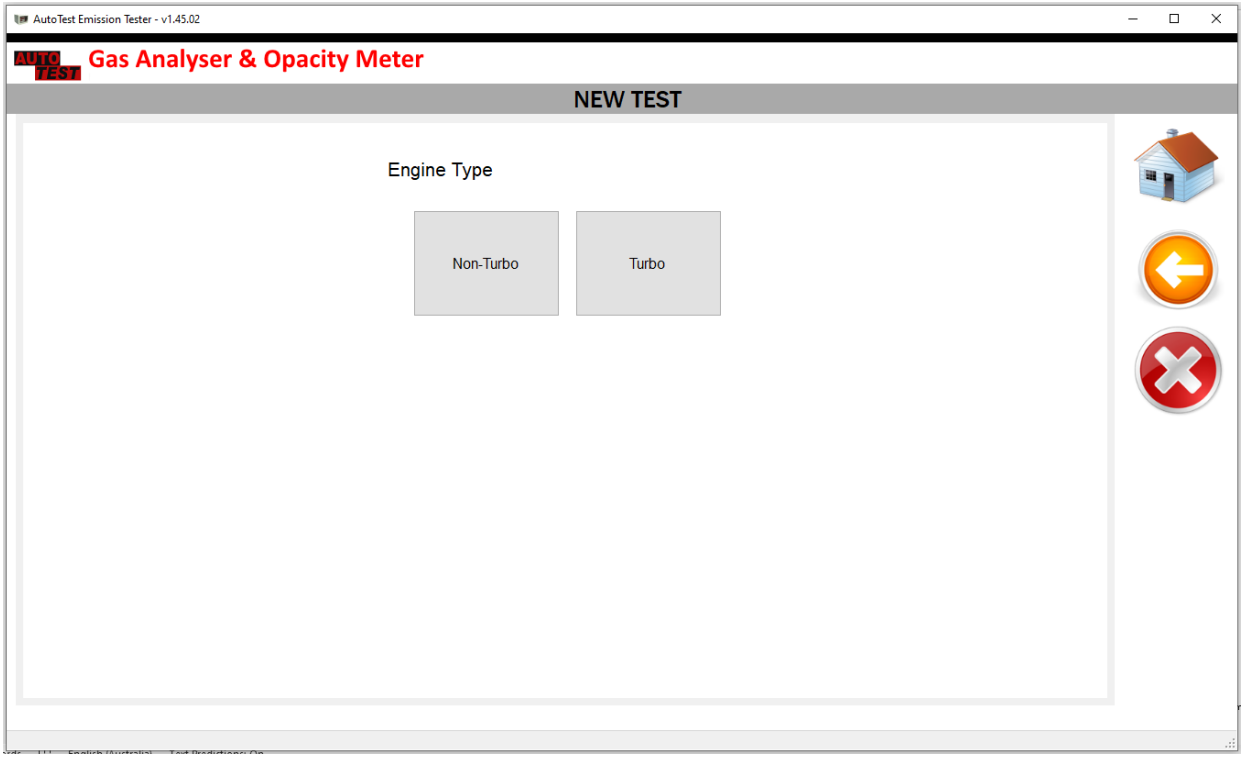


Figure 67 – Select Engine Type

The next step will prompt for RPM type as in ***Figure 57***.

The next step will ask for vehicle details such as registration number, VIN, model, make, cylinders, engine size etc as in ***Figure 58***. Once the vehicle details are entered, press Begin Test to start the test.

Once the combo test is started, the PC software will display step-by-step instructions on the screen as same as for gas test. It will also show a graph of currently sampled gas measurements and the test limit values (***Figure 59***).

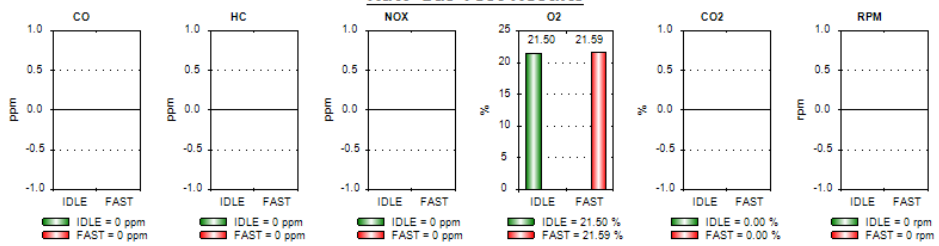
The following table outlines the test steps involved in a combo test.

No	Step	Description
1	Warmup	Device is being warmed up. Please wait until the warmup is complete.
2	Connection Check	Checks RF connection
3	Fault Check	Checks for any faults in the device
4	Device Configuration	Checks device configurations
5	Zero	Sets the measurement values to zero
6	Leak Check	Check for any leakages
7	Weekly Check	Performs weekly check if required.
8	Run Engine	Prompts the user to start engine and let it run at idle
9	RPM Check	Checks the oil temperature and waits until the temperature is above 60 °C
10	Insert Gas Probe	Prompts user to insert smoke probe into the exhaust tail pipe
11	Prelude	Re-check the connection with smoke meter
12	Initial Idle Test	Asks the user to run the engine at idle
13	Fast-idle Test	Asks the user to press accelerator
14	Idle Engine	Asks the user to allow the engine to idle naturally
15	Idle Test	Asks the user to run the engine at idle
16	Calculate	Calculates the test result
17	Save Test	Saves the test data to the database
18	Display Report	Displays the test report

Exhaust Emissions Test Results

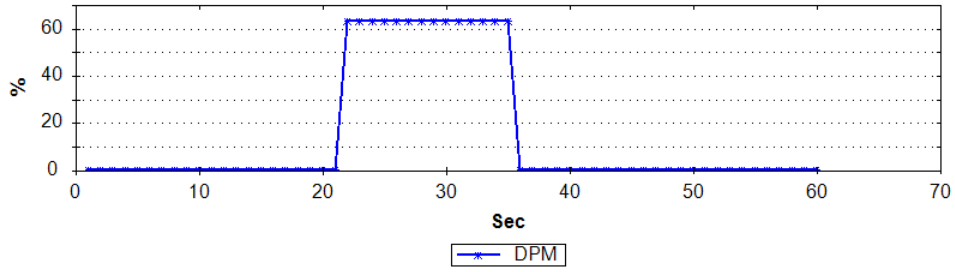
Customer Name:		**Test Date:**	15/08/2023 12:12:36 PM
Plant number:	1FV5UV	**Operator ID:**	Jk
Vehicle Make:	FORD	**Vehicle Model:**	KA ENGINE TYPE HCS / ENDURA-E
Vehicle Engine:	Three Cyl. (Petrol)	**Hour Meter Reading:**	100,000 hours
Gas tester Serial Number:	12241	**Calibration Date:**	23/06/2023
Method of loading:	Torque Stall	**Method of Sampling:**	Direct

Raw Gas Test Results



	Description	Limits	Obtained Value	Result
Oil Temperature		60 °C	--	
Idle Test				
	RPM	400 - 1500 rpm	Manual Check	Pass
	CO	2000 ppm	0 ppm	Pass
	HC	75 ppm	0 ppm	Pass
	NOX	1000 ppm	0 ppm	Pass
	Lambda	0.950 - 1.050	0.000	Fail
	AFR		0.000	
	O2		21.50 %	
	CO2		0.00 %	
Fast Idle Test				
	RPM	2500 - 3000 rpm	Manual Check	Pass
	CO	1000 ppm	0 ppm	Pass
	HC	40 ppm	0 ppm	Pass
	NOX	1000 ppm	0 ppm	Pass
	Lambda	0.950 - 1.050	0.000	Fail
	AFR		0.000	
	O2		21.59 %	
	CO2		0.00 %	
Overall Result				**Pass**

DPM Test Results



	Description	Limits	Obtained Value	Result
Idle Test				
	DPM MAX		63.3 %	
	DPM AVG	41.6	63.3 %	Fail
Fast Idle Test				
	DPM MAX		0.0 %	
	DPM AVG	41.6	0.0 %	Pass
Overall Result				**Pass**

Test carried out by:	**Signature:**
Test Bung fitted by:	**Signature:**
Test Bung checked by:	**Signature:**

Station ABC
Station 123
123 Main St, Melbourne

Figure 68 – Combo Test Report Sample

10.10 Settings

Once AutoTest® Emission Tester software is connected to AutoGas Analyser, click on the  (Settings) icon to open the options page.

10.10.1 General settings

General settings allow the user to

- select the units used by the software to Metric or Imperial
- select the odometer unit to Kilometre, Mile or Hour
- choose to display CO value in the unit of PPM (default is %)

Users can customise test reports by modifying a report template file stored in the "Templates" folder (in the same directory where AutoGas PC software is installed). After modifying the test report template file, update the location of the template file in the "Test Report Template File:" field.

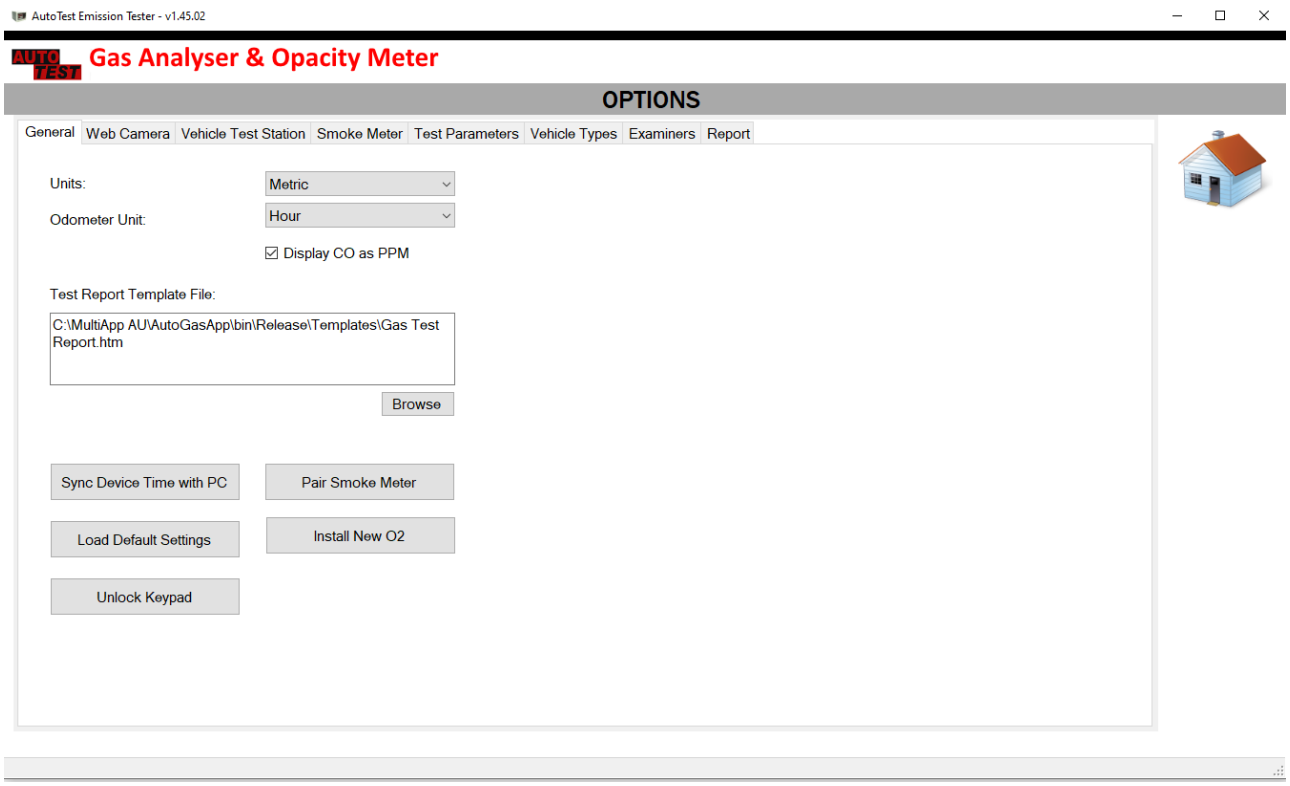


Figure 69 – General Settings

10.10.2 Web Camera Option

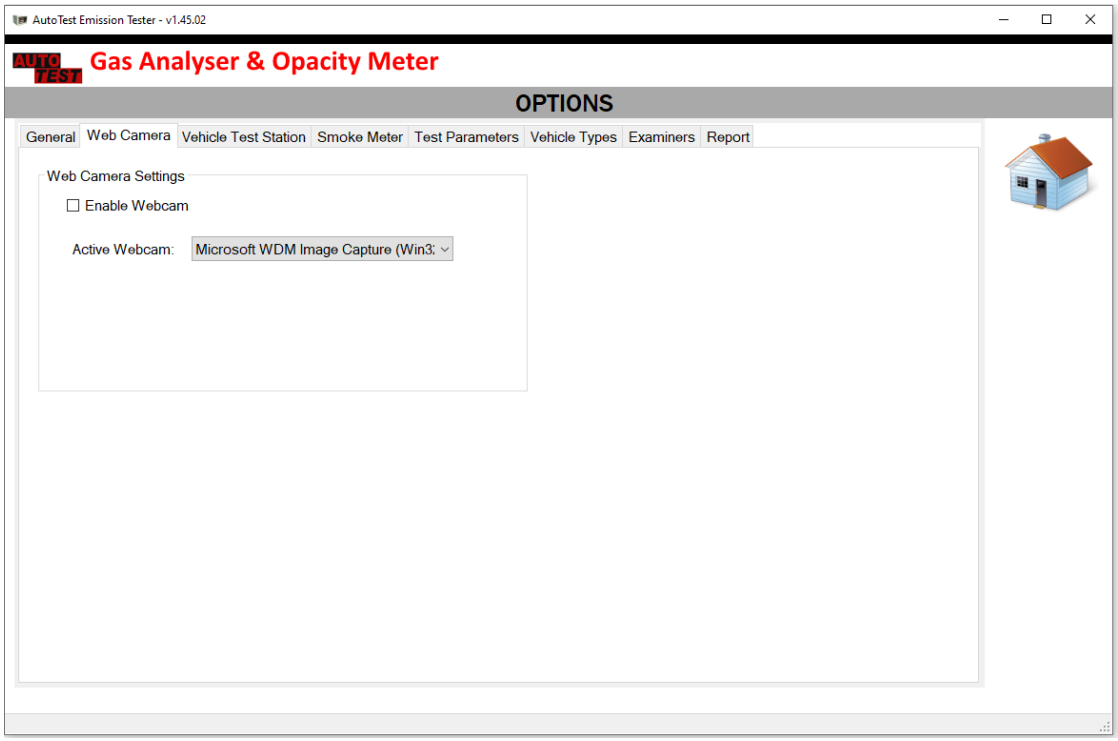


Figure 70 – Web Camera Settings

To enable the Web Camera for the purpose of capturing a vehicle registration number plate during a gas test, check "Enable Webcam" and then select the webcam from the list of available webcams.
Once the webcam is set properly, an image of the vehicle registration number will be captured and saved in the software installation directory along with the test report as "C:\AutoTest\Gas Analyser\Report\vehicle.jpg"

10.10.3 Vehicle Test Station Information

Vehicle test station (VTS) information can be stored on the *Vehicle Test Station* page. If the gas analyser is currently connected to the PC, the PC software will load the VTS information from the gas analyser when the settings dialogue window is opened.

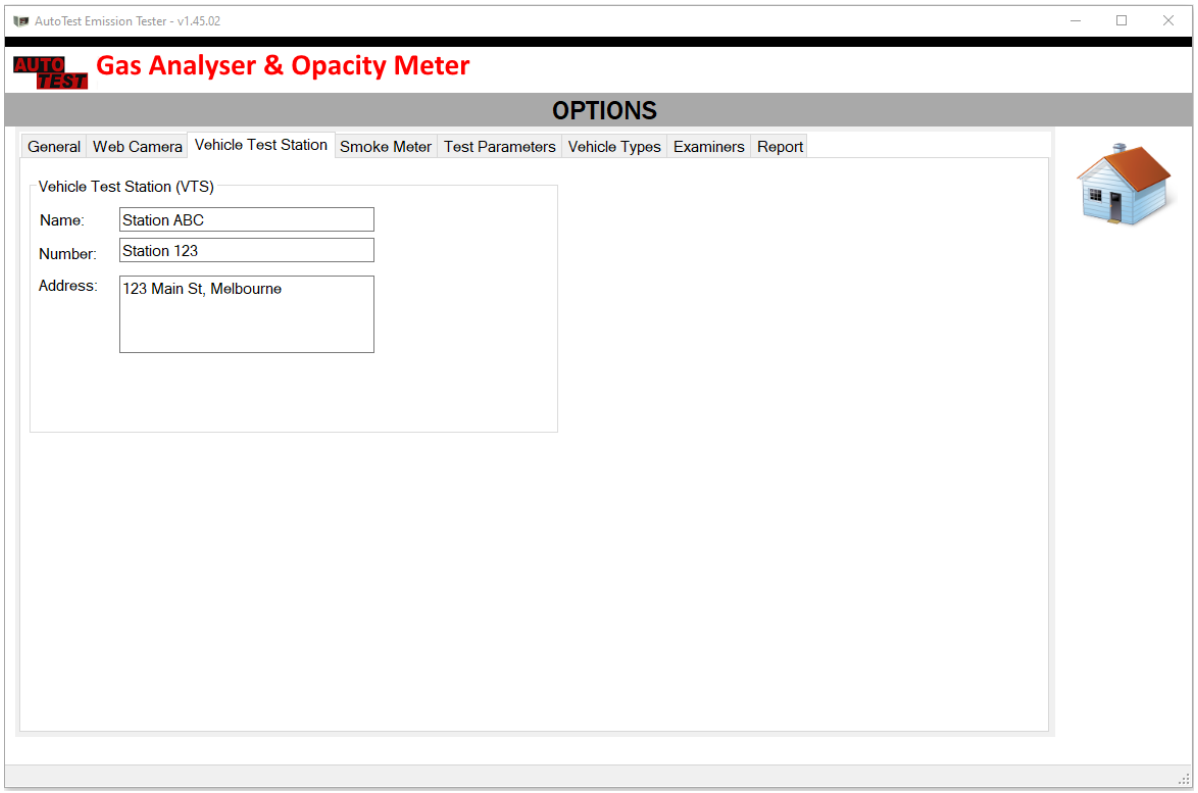


Figure 71 – Vehicle Test Station Settings

User can enter the following information regarding the test station.

Field	Description
Name	The name of the vehicle test station or workshop.
Number	The registration number or reference number of the test station.
Address	The address of the vehicle test station

10.10.4 Smoke Meter Settings

The smoke meter related settings include the unit of opacity and the settings related to weekly smoke meter check.

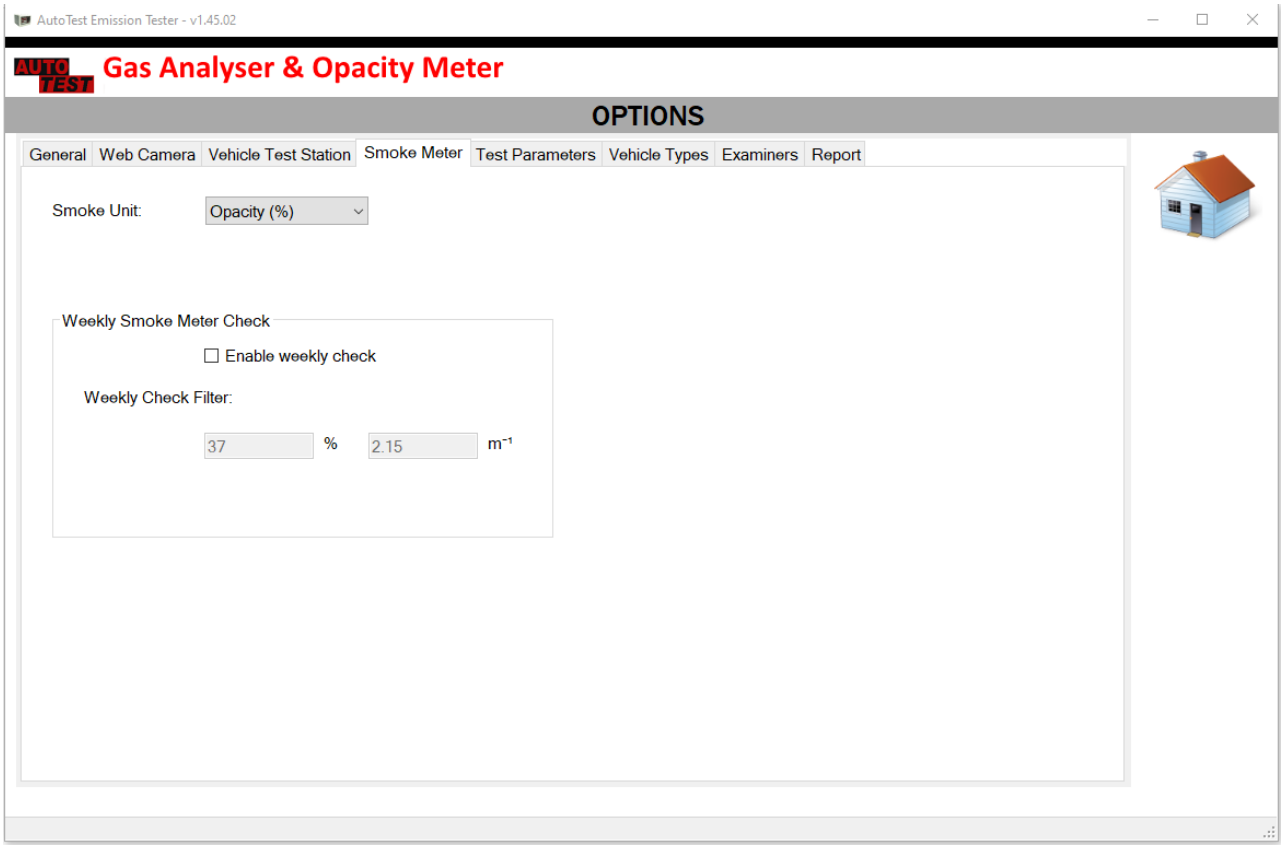


Figure 72 – Smoke meter Settings

10.10.5 Test Parameters

The default test limit values are adjusted on this page. These values will be used when the vehicle make, model and series are not specified.

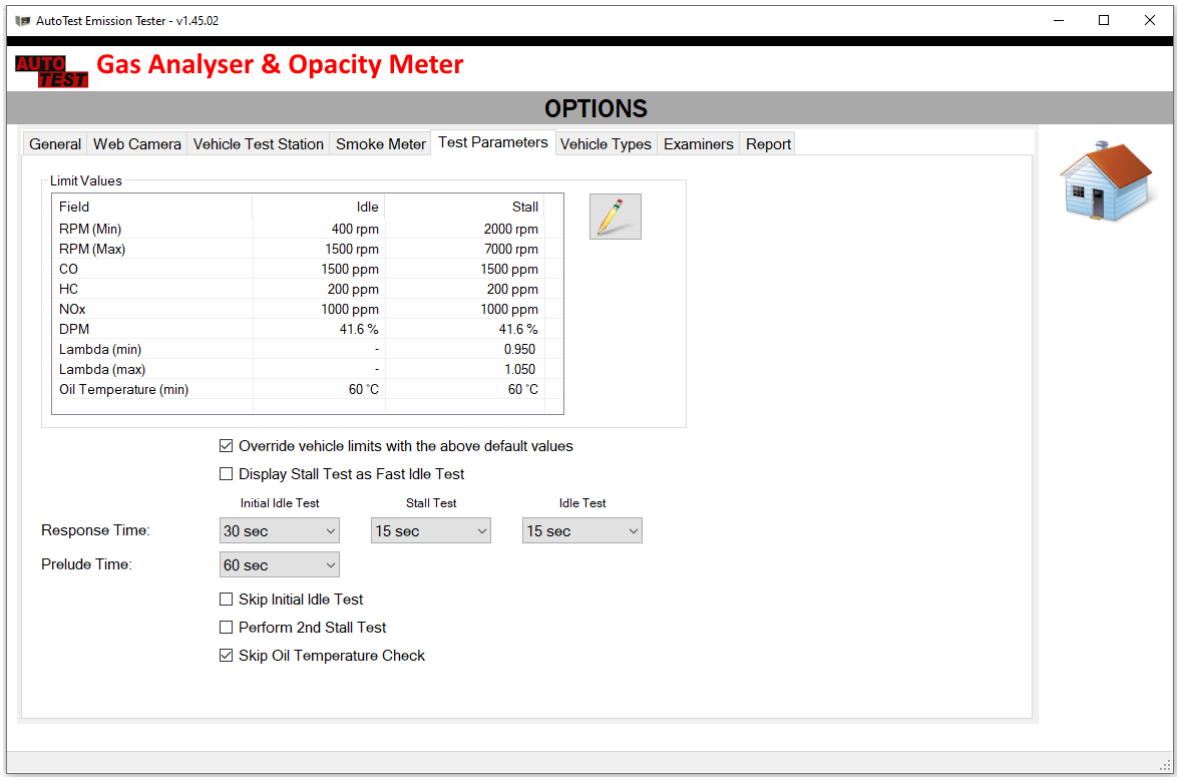


Figure 73 – Test Parameters Settings

10.10.6 Vehicle types (Vehicle Emissions Database)

The vehicle Types tab shows the content of the Vehicle Emission Database and lists down all the vehicle test limit values. These limit values will be used during the test process.

User can use the  (add),  (edit) or  (delete) button to make changes to the list.

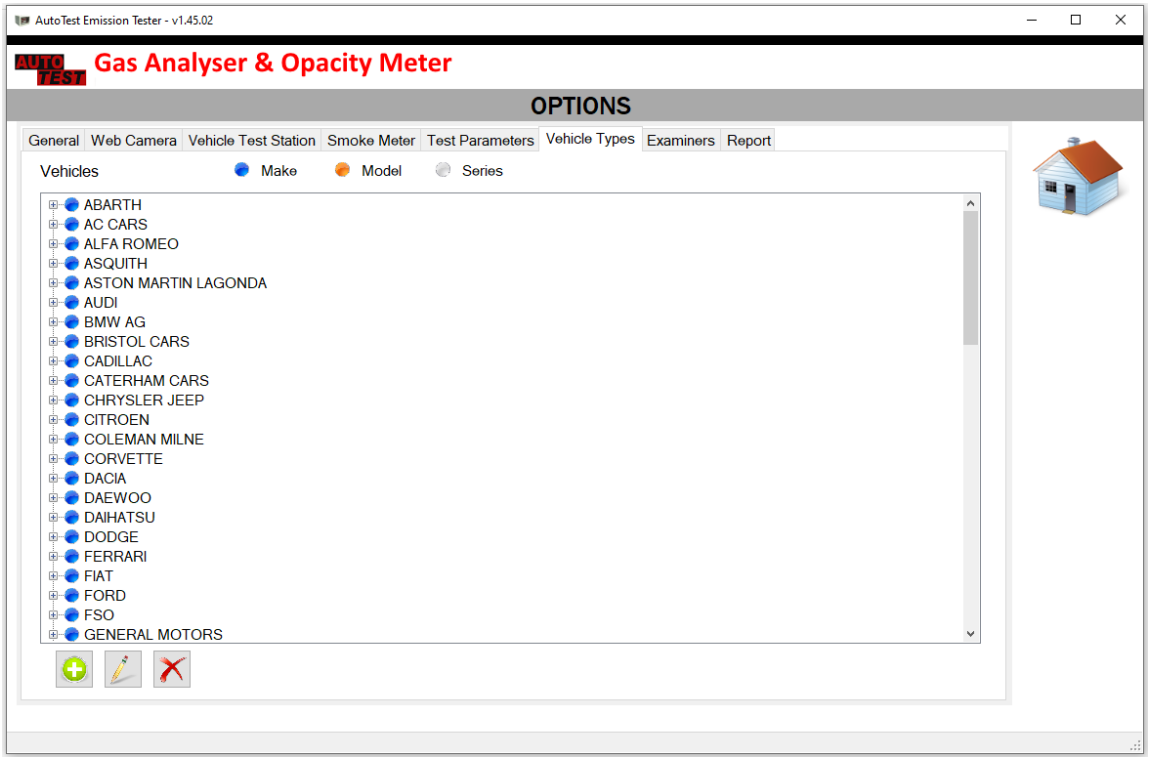


Figure 74 – Vehicle Types Settings

10.10.7 Examiners

The examiners tab allows changing the examiners. The list of added examiners will be displayed at the start of a gas test for the user to choose the current examiner or tester.

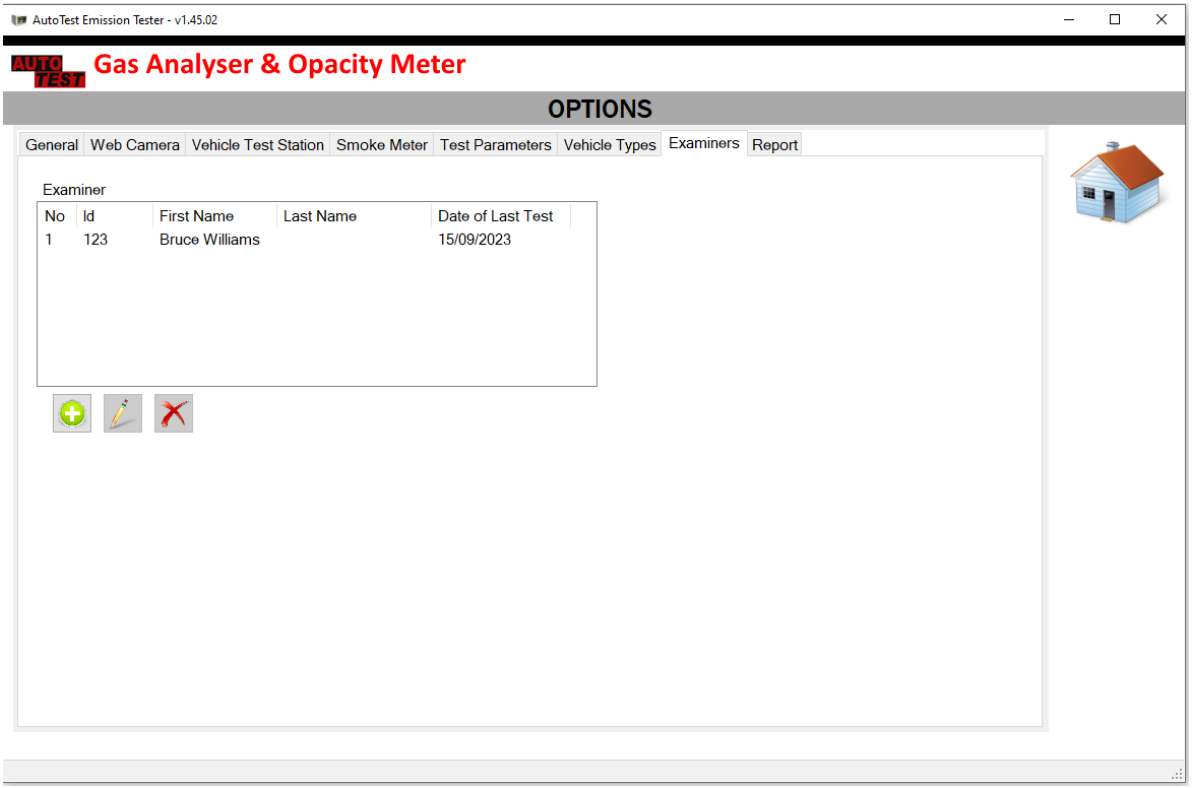


Figure 75 – Examiner Settings

10.10.8 Report Settings

The report configuration page allows users to customise the test report by select what to show on the test report and what not to include in the test report.

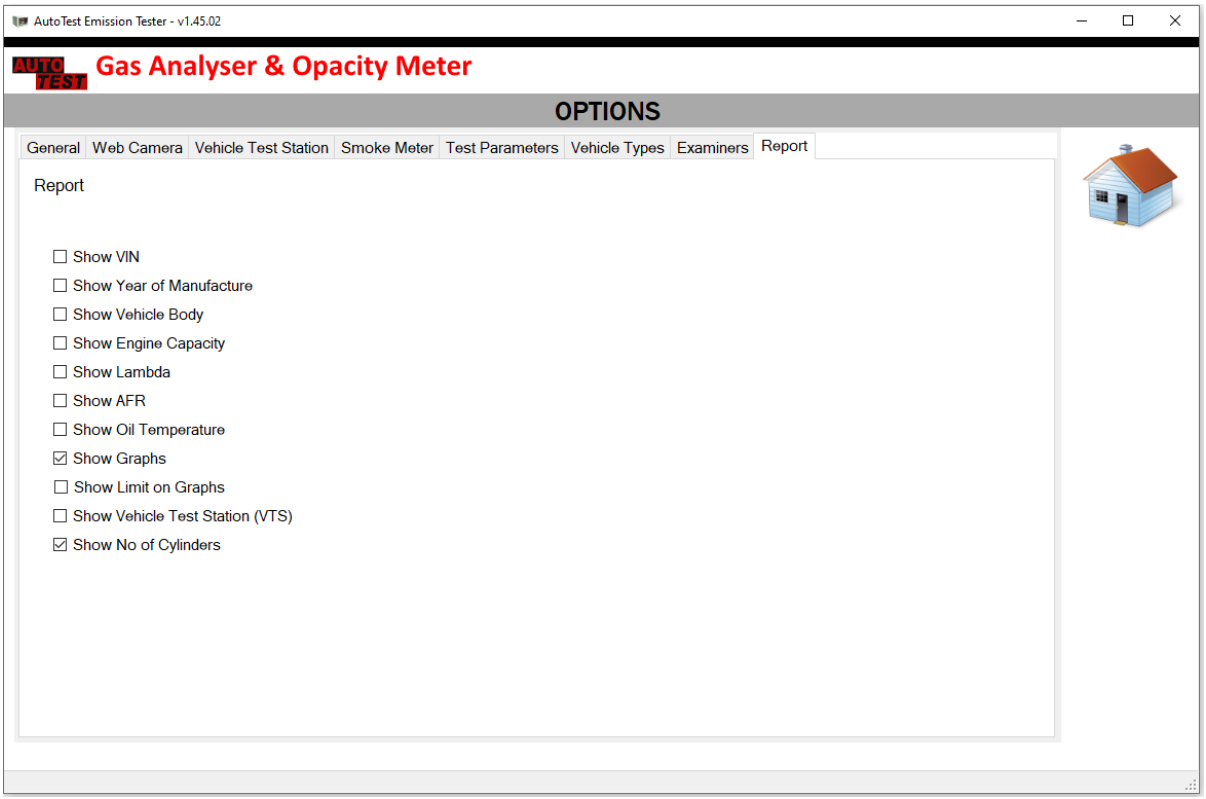


Figure 76 – Report Settings

11. TROUBLESHOOTING

Error Message	Description	Occurrence	Solution
 'Activation Failed"	Meter activation failed	When activating meter.	Check activation code (serial no) and try again.
 "Cal Expired!"	Calibration period expired	At start-up	Need to calibrate device.
 "Cal. Expired"	Calibration has expired.	Before running a test	Need to calibrate
 "Cal. Expr. ## days"	Calibration expires in ### days	At start-up	Need to calibrate device soon.
 "DFFailed"	Internal memory failed.	Internal memory chip is not functioning.	Contact Service Centre.
 "Display board failed"	LED display board failed	Before running a test	Check the connections. Restart the meter.
 "ERR: Clock Fail!"	RTC Clock chip failed	At start-up	Contact Service Centre.
 "ERR: BT RF FAIL"	Bluetooth RF chip failed		Contact Service Centre.
 "Gas Bench Err"	Gas Bench Failed	At start-up	Contact Service Centre.

 "Gas Bench Failed"	Gas bench has failed. Cannot run a test.	Before running a test	Contact Service Centre.
 "Gas Channel failed"	Gas chamber has failed.	Before running a test	Service the gas bench board. Contact Service Centre.
 "Gas memory failed"	EEPROM memory failed on gas bench board.	Before running a test	Service or replace the gas bench board. Contact Service Centre.
 "HWStackOverflow!"	Internal system error.	-	Program crashed. Inform the problem to service. Restart the device.
 "Leak Test Failed"	Air leak test has failed. Cannot run a test.	Before running a test	Ensure stopper-cap on sampling probe is well connected during a leak test. Investigate any loose connector/tubing. Run leak test again.
 "Mem Full"	Device memory is full. Cannot store more tests without clearing memory.	Before running a test	Upload tests to PC, then clear memory.
 "Meter Locked"	Meter is not activated, cannot run a test.	Before running a test	Activate meter using configuration menu.
 "NOx sensor failed"	Nox sensor is expired or not functioning well.	Before running a test	Contact Service Centre.
	O2 sensor is expired or not functioning well.	Before running a test	Contact Service Centre.

"O2 sensor failed"			
PrIntEr FAILEd "Printer Failed"	Printer board failed	At start-up	Check the printer connections. Replace the printer if error persists. Contact Service Centre.
rPi boArd FAILEd "RPM Board Failed"	RPM measurement board failed. Cannot run a test.	At start-up and before running a test	Communication with the RPM board failed. Restart the machine. If error persists, check the I2C communication. Contact Service Centre.
StACK OuErFLO!' "StackOverFlow!"	Internal system error.	-	Program crashed. Inform the problem to service. Restart the device.
S!' StACK OuErFLO!' "SWStackOverflow!"	Internal system error.	-	Program crashed. Inform the problem to service. Restart the device.
tESting mEmOry "Testing Memory ####"	Internal memory check	Only when internal memory is found to be corrupted.	All stored data will be erased. Inform service centre.
Prog mOdE 88888- "Prog Mode888888888888-"	Programming mode	When one of the two programming jumpers are connected on the main board	Switch off the device and remove the two jumpers
!'d CHECH FAILEd "WD Check failed"	Internal system error.	-	Program crashed. Inform the problem to service. Restart the device.
Err= bEnCH nOt On	Gas bench not started	When starting a new test	Contact Service Centre.

"ERR: BENCH NOT ON"			
 "ERR: MEMRY FULL"	Out of space	When creating a file on flash memory	Download all tests to PC then clear the memory.
 "EMIS DB NOT AVAIL"	Vehicle emission database is not found	Start-up	Download the vehicle emission database
 "EMIS DB CORRUPT"	Vehicle emission database is corrupted	Start-up	Download the vehicle emission database to replace the corrupt file.

For other problems, contact Auto Test Products or any Authorised Service Centre in Australia on (613)88403000.
Repairs should only be carried out by an authorised AutoTest service centre, in order to ensure that the gas analyser retains its calibration. Refer to Section 15 regarding warranty. For instructions on returning products for calibration or servicing, see Section12.1.

12. SPECIFICATIONS

12.1 Technical Specifications

	Measurement parameters	Range	Resolution	Accuracy
1	CO (Carbon Monoxide)	0 – 15.5%	0.01%	±0.03% Abs. (or) ±3% Rel.
2	CO_2 (Carbon Dioxide)	0 – 21.0%	0.10%	±0.4% Abs. (or) ±4% Rel.
3	HC (Hydro Carbon)	0 - 20000 PPM	1 PPM	±10 PPM Abs. (or) ±5% Rel.
4	O_2 (Oxygen)	0 - 25%	0.01%	±0.1% Abs. (or) ±3% Rel.
5	NO_x (Optional)	0 - 5000 PPM	1 PPM	±20 PPM Abs. (or) ±4% Rel.
6	Oil Temperature	0 – 130 °C	1°C	±3°C
7	Oil Temperature (via OBD-II)	-40 – 210 °C	1°C	
8	AFR	0 - 30%	0.01%	
9	Lambda	0.200 - 2.000	0.001	
10	Engine Speed	400 - 4000 RPM	10 RPM	
11	Engine Speed (Using OBD-II)	0 - 16383 RPM	1 RPM	
12	Automatic compensation for variations in temperature and pressure			
13	Measuring Gas Intake	3 litres / minute		
14	Leak test	Electronic		
15	Condensate discharge	Automatic		
16	Response time (For Sample probe length of 5m length)	<10 sec.		
17	Warm-up time (for ambient temperature of above 25°C)	< 3 minutes		
18	Zero & RPM calibration	Automatic		

12.2 Electrical Specification

1	AC Power supply	230-265V AC Single phase, 50 Hz
2	DC Power supply	12-16 V DC Battery
3	Power consumption	25 watts

12.3 General Specifications

1	Operating temperature	+2°C to +45°C
2	Storage temperature	-20°C to +70°C
3	Overall machine dimensions-Unpacked (WxDxH)	310 mm x 400 mm x 210 mm
4	Machine weight (Unpacked)	9 kg
5	OIML R99 (ISO 3930) Class 0 specification, ISO3930	

12.4 Thermal Printer

1	Paper type	Thermal Paper
2	Dimensions of Paper roll	57 x 38 x 11.5mm

12.5 Communication Interfaces

1	RS232 Serial interface (PC)	With or without USB-to-Serial adapter
2	ZigBee RF	Communication interface between AutoGas and Auto Smoke meter

13. CALIBRATION PROCEDURE

AutoGas must be re-calibrated at least once a year. The reason for this is to maintain creditability in tests and acceptance of data according to international standards. Each time the results are printed, the printout will include the day and month of the last calibration. There are two ways of calibrating AutoGas - either via your local authorised service centre or by returning the unit to AUTO*TEST* Products (See Section 13.1).

13.1 Returning AutoGas for Calibration

13.1.1 Packaging

Please remember that you are shipping an electronic instrument. Bubble pack or foam should surround the AutoGas, which should be inserted into a sturdy cardboard box.

13.1.2 Shipping

Labelling - A label noting "Electronic Device - Fragile" should be placed on the box.
Freight Carrier – Container should be sent **freight prepaid**. Auto Test Products has no preference on freight carriers. However, we prefer companies such as TNT, IPEC, UPS, or Federal Express to forward units, if a prompt delivery is required.

Ship to the following address:
The Service Department,
AutoTest Products Pty Ltd,
61-63 Parsons St,
Kensington, VIC 3031,
Australia.
Phone: (+61 3) 8840 3000.

Alternatively, you may also contact your nearest service distributor.

13.2 Replacing O2 Sensor

The O_2 sensor is located inside AutoGas analyser and the top cover needs to be removed in order to replace the old O_2 sensor.

Figure 77 – NOx and O2 sensors inside the unit

The following steps guide on how to replace an O_2 sensor.

1. Turn off gas analyser, remove the power cord, and open the top cover.
2. Locate the O_2 sensor (Red sensor) and remove the connector.
3. Once the connector has been removed, unscrew the sensor by rotating it counter-clockwise.
4. Mount the new O_2 sensor in place of the old one and make sure it is firmly screwed in tightly.
5. Plug in the connector clip back on the sensor and make sure it is firmly connected.
6. Close the top lid and put back the screws.
7. Install the new O2 sensor from PC software.
   (Settings-> General Settings->"Install New O2")
8. Turn ON gas analyser and let it perform the initial tests.

14. AUTHORISED SERVICE AGENTS

AUSTRALIA
AutoTest Products
69 Parsons Street, Kensington, Victoria, 3031
PH: (+61) 3 88403016

CHINA
Itach Autotech Corp
Room 703 Building A,Guo Run Commercial Plaza, No.46 West,. Feng Tai District, Beijing 100073
PH: (+_10) 8365 9442

DENMARK
BM Autoteknik A/S
Erhvervsparken 7, 9632 Moldrup,
PH: (+ 45) 8669 2022

FRANCE
Actia Muller Services
Rue Des Tourneballets, Luce,
PH: (+332) 3733 3536

FRENCH POLYNESIA
Cogicat snc.
51 Rue Des Remparts Prolongee, B.P 2828, Papeete, TAHITI, 98 713
PH: (+ 6) 8942 8175

HOLLAND
Stertil B.V
Stokvis Service, Westkern 3, 9288 CA Kootstertille
PH: (+315) 1258 0333

MACEDONIA
Velmar d.o.o.
Gjorce Petrov 10, 1000 Skopje, Makedonija.
PH: (+389) 2204 0288

MALAYSIA
Tritech Safety Sdn Bdn
No38, 2nd Floor, Jalan Pandan Indah, Kawasan Industri Ampang Tambahan, 68000 Ampang, Selangor D.E.
PH: (+603) 4291 0988

NEW ZEALAND
Brake & Transmission NZ
21-27 Omega St., Albany, Auckland
PH: (+ 64) 9414 3205

SOUTH AFRICA
Brakecore Supply Co
5 Oosthuise St, Ermelo, 2350.
PH: (+271) 7819 3412

UNITED KINGDOM
Tecalemit Garage Equip. Co. Ltd
Unit 2,Eagle Road, Langage Bus Pk., Plympton, Plymoth, Devon, PL7 5JY
PH: (+017) 5221 9150

UNITED STATES OF AMERICA
Commercial Vehicle Consultants Inc.
144 Overlook Ave, Staten Island, NEW YORK, 10304.
PH: (+171) 8980 3651

15. WARRANTY

To ensure prompt warranty service should it be required, please complete warranty registration form, and return to Auto*Test* Products Pty Ltd within 10 days of purchase of the product. Auto*Test* Products or an Authorised Service Centre warrants this product against defects in material and workmanship for a period of 12 months from the original date of purchase. This warranty applies only to products and components supplied by Auto*Test* Products which can be identified by the trade name or logo affixed to them or by other documents. Auto*Test* Products does not warrant any products not supplied by Auto*Test* Products. During the warranty period, Auto*Test* Products or an Authorised Service Centre will repair (or at its option replace), any defective component(s) without charge for labour, provided the product is returned in its original or suitable equivalent container, freight prepaid, to an authorised Auto*Test* Service Centre. Transit insurance and return freight will be at the owner's expense.

In order to obtain calibration, warranty or non-warranty service, ship the product, freight and insurance prepaid to your nearest AutoTest Service Centre. Attach to the product your name, address, contact numbers, description of the problem and if a warranty claim, proof of purchase (dated sales receipt or invoice).

Auto*Test* Products or an Authorised Auto*Test* Service Centre reserves the right to refuse warranty repair if accident, abuse, misuse or misapplication has damaged the product in transit or as a result of service or modifications by other than an Authorised Service Centre, nor are any other warranties expressed or implied, including any regarding merchantability or fitness for any other particular purpose. Auto*Test* Products or an Authorised Service Centre is not responsible for incidental or consequential damages resulting from the breach of any express or implied warranty, including damage to property and, to the extent permitted by law, damages for personal injury.

(Express exclusions from warranty) Unless otherwise specified, this warranty does not cover:

a) modified, abused, neglected, accidentally damaged or excessively worn products, or products that have become damaged or defective as a result of improper use;
b) repairs attempted or made by other than our regional repair centre or authorised warranty service centre;
c) conditions or malfunctions caused by the reasonable effects of fair wear and tear or the malfunction of normally wearing parts, which include but are not limited to: Batteries, plugs and leads;
d) consumable items, such as batteries (beyond 6 months from date of purchase);
e) Auto*Test* products that are not distributed through Auto*Test*'s authorised distributors and resellers.

(Warranty non-transferrable) This warranty is not transferrable beyond the original purchaser.

NOTES:

AUTOTEST Products Pty Ltd
69 Parsons St Kensington VIC 3031 Australia
Phone: (+61 3) 8840 3000
Service: (+61 3) 8840 3016 service@autotest.net.au
Sales:(+61 3) 8840 3017 sales@autotest.net.au

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