

AUTO*Test*® AutoGas 4

Gas Analyser



AUSTRALIAN MADE
AND OWNED

License ID number: 10242



DECLARATION OF CONFORMITY

We, AutoTest Products Pty Ltd. declare under our sole responsibility that the product AutoTest® AutoGas 4 is in conformity with the provisions of the following Council Directive: 1999/5/EC.

For a copy of the Declaration of Conformity, please contact sales@autotest.net.au or refer to the document found in your product packaging.

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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 instrument on when wireless device use is prohibited or when it may cause interference or danger.



FOLLOW INSTRUCTIONS

To ensure accurate results and safety, please use this product in accordance with the user manual, otherwise warranty may not be provided if the product is damaged.



USE SENSIBLY

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



CLEAN AFTER USE

Clean the housing using a damp cloth or a mild soap solution. Avoid the use of abrasives, alcohol, or solvents when cleaning the instrument.



FLAMMABLE ENVIRONMENTS

Please do not use this product in flammable, explosive, humid or corrosive environments.



DAMAGE

To prevent inaccurate measurements, discontinue use if the product is damaged, or has been dropped.



CORRECT SETTINGS

Please use the correct emissivity to obtain accurate temperature readings.



QUALIFIED SERVICE

Only qualified personnel may install or repair this product.



ACCESSORIES AND BATTERIES

Use only approved accessories and batteries. Do not connect incompatible products.



WATER-RESISTANCE

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



CONNECTING TO OTHER DEVICES

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



WARM UP BEFORE USE

To ensure the measurement accuracy, please warm up the instrument for 10 minutes before measuring if the product has not been used for a long time.

**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.

⚠ DANGER**BE 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.

TABLE OF CONTENTS

1	SCOPE.....	10
1.1	Instrument Purpose & Technology.....	10
1.2	Applicable standards	11
1.3	Regulatory Compliance	11
1.4	Personnel Training Frameworks	11
2	UNPACKING AND FIRST TIME USE	11
3	ACRONYM KEY.....	12
4	APPLICATION INFORMATION	13
4.1	Application	13
4.2	Instrument Layout and Overview	15
4.2.1	<i>Front view of AutoGas</i>	15
4.2.2	<i>Rear View of AutoGas</i>	16
4.2.3	<i>Using the Keypad</i>	17
4.2.4	<i>Printer</i>	18
4.2.5	<i>Internal Layout</i>	19
4.3	Maintenance	20
4.4	Accessories	21
4.4.1	<i>Optional Accessories</i>	21
4.4.2	<i>Standard Consumables</i>	23
 5	TURNING ON THE AUTOGAS.....	24
 6	START-UP, CALIBRATION AND SYSTEM CHECKS.....	25
6.1	Self-Check	25
6.2	Initial Warm-up	27
6.3	Automatic Zero Calibration	27
6.4	Air Leak Test	28
6.4.1	<i>Troubleshooting a Failed Air Leak Test</i>	30

6.5	HC Test	30
6.5.1	Automatic RPM sensor calibration	31
7	DISPLAY PANEL AND MENUS	32
 7.1	Display Panel's Main Screen	32
 7.2	Device Configuration Menus	33
 7.3	Test Functions	39
 7.4	RPM Measurement	41
7.4.1	RPM using OBD-II interface	41
7.4.2	RPM using Battery Cable	42
7.4.3	RPM using optional Accelerometer Sensor	43
7.4.4	RPM using optional inductive pick-up sensor	45
 7.5	Changing Instrument Time	46
 8	LIVE GAS READINGS (NON-TEST MODE)	47
 9	REQUIRED PRE-TEST CHECKS	48
 10	RUNNING A TEST	49
10.1	Preliminary checks.....	49
10.2	Equipment Setup	50
10.3	Starting a test	50
10.4	Self-Check	51
10.5	New/repeat test	51
10.5.1	Entering Vehicle Information	51
10.5.2	Engine up to Temperature	54
10.5.3	Idle Speed Check	55
10.5.4	Result of the Test	55
10.5.5	Printing Report	56
10.5.6	Reading the Test Report	57
10.6	Erasing Old Tests	58
10.7	PEF, AFR and Lambda (λ) calculation.....	59

10.8	RPM Measurement	60
11	USING PC SOFTWARE (OPTIONAL)	66
11.1	Software Installation	67
11.2	Licence activation	67
12	CONNECTING AUTOGAS TO PC	69
12.1	Connection via Serial Cable	69
12.2	Connection via Wi-Fi.....	70
12.2.1	<i>Direct Connection – Wi-Fi</i>	<i>71</i>
12.2.2	<i>Connection via a standalone Router</i>	<i>74</i>
12.2.3	<i>Connection via the Company Router</i>	<i>81</i>
12.3	Live gas reading's view	82
12.4	Downloading Test Data	82
12.5	Viewing Test Results on PC.....	83
12.6	Running a PC based Test	84
12.7	Settings	91
12.7.1	<i>General settings</i>	<i>91</i>
12.7.2	<i>Web Camera Option</i>	<i>92</i>
12.7.3	<i>Vehicle Test Station Information</i>	<i>92</i>
12.7.4	<i>Test Parameters</i>	<i>94</i>
12.7.5	<i>Vehicle types</i>	<i>95</i>
12.7.6	<i>Examiners</i>	<i>96</i>
12.7.7	<i>Report Settings</i>	<i>97</i>
13	SPECIFICATIONS	98
13.1	Technical Specifications.....	98
13.2	Electrical Specification	99
13.3	General Specifications.....	99
13.4	Thermal Printer	100
13.5	Communication Interfaces.....	100
14	TROUBLESHOOTING.....	101

15	SERVICE AND REPAIR	103
15.1	Replacing O2 Sensor	103
15.2	Packaging.....	104
15.3	Shipping.....	104
16	WARRANTY.....	105
16.1	Application of these Conditions	105
16.2	Inconsistencies	105
16.3	Warranty Terms and Conditions	105

Table of Figures

Fig. 1	Built-in Thermal Printer	18
Fig. 2	AutoGas' internal layout	19
Fig. 3	Display Panel during start-up check.....	25
Fig. 4	Display Panel while initialising hardware - "Loading... Please wait"	25
Fig. 5	Product name displayed at start-up - "AutoTest Gas Analyser"	26
Fig. 6	Firmware version no. displayed at start-up. For example, "F-M v1.30"	26
Fig. 7	AutoGas serial no. shown at start-up - "S-N 12345"	26
Fig. 8	Initial warm-up screen - "Warm-up in progress 0%"	27
Fig. 9	Automatic zeroing screen - "ZERO GAS"	28
Fig. 10	Leak test splash screen - "Leak test"	28
Fig. 11	Leak test shut probe screen - "Shut Probe In"	29
Fig. 12	Hold sampling probe shut for 10 seconds	29
Fig. 13	HC test screen	30
Fig. 14	RPM calibration screen - "RPM Calib, Stop Engine"	31
Fig. 15	Display Panel showing current gas readings.....	32
Fig. 16	Accelerometer placement	44
Fig. 17	Screen for setting the hour	46
Fig. 18	Screen for setting the minute.....	46
Fig. 19	Time is set after pressing OK.....	46
Fig. 20	Live gas readings	47
Fig. 21	Test method.....	49
Fig. 22	Screen for choosing test type	50

Fig. 23 Screen for entering vehicle registration number.....	51
Fig. 24 Screen for entering vehicle year	52
Fig. 25 Screen for entering odometer reading	52
Fig. 26 Screen for entering Engine CC	53
Fig. 27 Screen for entering no. of cylinders	53
Fig. 28 Screen for entering examiner ID.....	54
Fig. 29 Screen asking to run engine.....	54
Fig. 30 Screen to set RPM at fast idle.....	55
Fig. 31 Screen to set RPM at idle.....	55
Fig. 32 Print test report prompt, reads “Print Report?”	56
Fig. 33 Printed test report	57
Fig. 34 Screen “Test Menu - Clear ALL”	58
Fig. 35 Screen “Del All Test Data?”	58
Fig. 36 Screen “Memory Empty”	59
Fig. 37 Screen “Can engine RPM be measured”	61
Fig. 38 Screen asking to use vehicle tachometer	62
Fig. 39 Screen to enter RPM source.....	62
Fig. 40 Screen asking to connect RPM probe	63
Fig. 41 Screen for entering no. of cylinders.....	63
Fig. 42 Screen asking to switch off engine	64
Fig. 43 Screen for RPM calibration	64
Fig. 44 Screen asking to run engine.....	65
Fig. 45 AutoGas Instrument Activation Window	68
Fig. 46 Connection Page - USB	69
Fig. 47 Network diagram for wireless connection between AutoGas and PC.....	71
Fig. 48 Connection Page	72
Fig. 49 Network icon and selection in Windows	73
Fig. 50 Wi-Fi network name selection	73
Fig. 51 Network diagram for wireless connection between AutoGas and PC via standalone router.....	74
Fig. 52 How Wi-Fi router listed on Windows.....	75
Fig. 53 Properties of Wi-Fi network.....	76
Fig. 54 Standalone router’s IP settings	76
Fig. 55 Network and Sharing Center.....	77
Fig. 56 Network Connection Details	78
Fig. 57 Wi-Fi Configurations	79
Fig. 58 Connection via the standalone router	80
Fig. 59 Network icon on the far left	80

Fig. 60 Network diagram for wireless connection between AutoGas and PC via company router.....	81
Fig. 61 “Test downloading - synchronisation”	83
Fig. 62 “Test report filter option”	84
Fig. 63 Test Page.....	85
Fig. 64 With ‘New Test’ selected, select Examiner and Vehicle Type	85
Fig. 65 Select Test Type.....	86
Fig. 66 Select Fuel Type	86
Fig. 67 Select RPM Source	87
Fig. 68 Vehicle Details	87
Fig. 69 Test Procedure	88
Fig. 70 Test Report sample	90
Fig. 71 General Settings	91
Fig. 72 Web Camera Settings	92
Fig. 73 Vehicle Test Station Settings	93
Fig. 74 Test Parameters Settings	94
Fig. 75 Vehicle Types Settings	95
Fig. 76 Examiner Settings.....	96
Fig. 77 Report Settings.....	97
Fig. 78 O2 sensor inside the unit	103

1 SCOPE

This manual provides an instructional guide for use of the product and defines the operational parameters and compliance frameworks for the installation and use of the AutoTest[®] AutoGas 4 (AutoGas).

1.1 Instrument Purpose & Technology

This instrument measures vehicle exhaust gases to assess emissions and engine performance. The results can be used to support engine tuning, including performance tuning applications, and to assist occupational health and safety checks by identifying potentially harmful gases in the surrounding work area. The instrument also automatically calculates the Lambda and hydrocarbon based on the fuel type selected and its propane equivalence factor (PEF).

1.2 Applicable standards

Operation and deployment of this product strictly comply with all relevant directives and is in conformity with the applicable requirements of the following documents:

- AS/NZS 1425:2013
- AS/NZS 4251.1:1999
- ADR 114/00
- ADR 37
- ADR 26
- ADR 27
- ADR 79
- ADR 80
- UN R83/04-06
- IEC 61000-6-2 Generic immunity standard – Industrial environments
- IEC 61000-6-4 Generic emission standard – Industrial environments
- 2014/30/EU – EMC Directive
- 2006/51/EC – EMC Directive
- DVSA In Service Exhaust Emission Standards for Road Vehicles – Nineteenth Edition (2017)
- OIML R 99 Class 1
- VPB/07/24/20 - UK MOT

1.3 Regulatory Compliance

Please refer to your local government regulator to confirm applicable certification.

1.4 Personnel Training Frameworks

Refer to local regulations as accredited training may be required.

2 UNPACKING AND FIRST TIME USE

Congratulations on your choice of an AutoTest[®] AutoGas 4. Please take the time to read this User's Manual before using AutoTest[®] AutoGas 4 in the field. Incorrect or inappropriate use of this instrument may void the warranty. 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 AutoTest 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 4.

The packing box of your AutoGas 4 should contain the following:

- AutoGas 4
- Sampling Probe with in-line filter
- AC Power Cable
- QR Code Card linking to manual and other materials

The current optional accessories are as follows:

- Oil Temperature Sensor
- Battery Cable
- OBD-II Reader
- Inductive Pick-up Probe
- Magnetic Accelerometer
- PC Software
- USB Cable
- RS232/Serial Cable

Please refer to section 4.4 for accessories.

3 ACRONYM KEY

AC	Alternate Current – Mains supply
AFR	Air to Fuel Ratio
BET	Basic Emission Test
CC	Cubic Centimeter
CO	Carbon Monoxide
CO2	Carbon Dioxide
DC	Direct Current – Battery supply
DSM	Diesel Smoke Meter
ECU	Engine Control Unit
EGA	Exhaust Gas Analyser

HC	Hydrocarbon
HT cable	High Tension cable – Spark-plug cable
KM	Kilometer
Lambda (λ)	Engine efficiency
MOT	Ministry of Transport
NOx	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

4 APPLICATION INFORMATION

4.1 Application

The AutoGas 4 is a gas analyser designed to analyse the composition of vehicle exhaust gases. This analysis provides an indication of how efficiently a vehicle's engine is operating, particularly in terms of reducing harmful pollutant emissions released into the atmosphere. AutoGas 4 measures five gases - CO, HC, CO₂, O₂, and optionally NOx, depending on whether a NOx sensor is installed. Using the measured values of CO, HC, CO₂, and O₂, the unit can also calculate Lambda (λ) and Air-to-Fuel Ratio (AFR) which are key indicators of combustion efficiency.

The unit uses Non-Dispersive Infrared (NDIR) sensing technology is used to measure the contents of the input gas (CO, CO₂, HC). While exhaust gas passes 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. Oxygen (O₂) is measured separately using a dedicated electro-chemical sensor.

In addition to gas analysis, AutoGas is capable of measuring engine oil temperature and engine speed (RPM) using supplied probes. Engine speed can be determined using multiple methods, listed below:

RPM Measurement Type	Description	Probe/Sensor
Battery-sense method	Measures engine RPM by monitoring the fluctuations in the vehicle battery voltage	Battery / DC cable
Inductive pick-up (HT cable)	Picks up ignition signal in a HT (high tension) cable using an inductive pick-up clamp	Inductive pick-up clamp
Accelerometer	Monitors the mechanical vibration of an engine	Accelerometer sensor
OBD-II (optional)	Obtains engine RPM and oil temperature from vehicle's ECU	Bluetooth OBD-II reader

For vehicles equipped with OBD-II, the unit can also wirelessly retrieve engine speed and oil temperature directly from the vehicle's ECU using a Bluetooth OBD-II reader (an optional accessory).

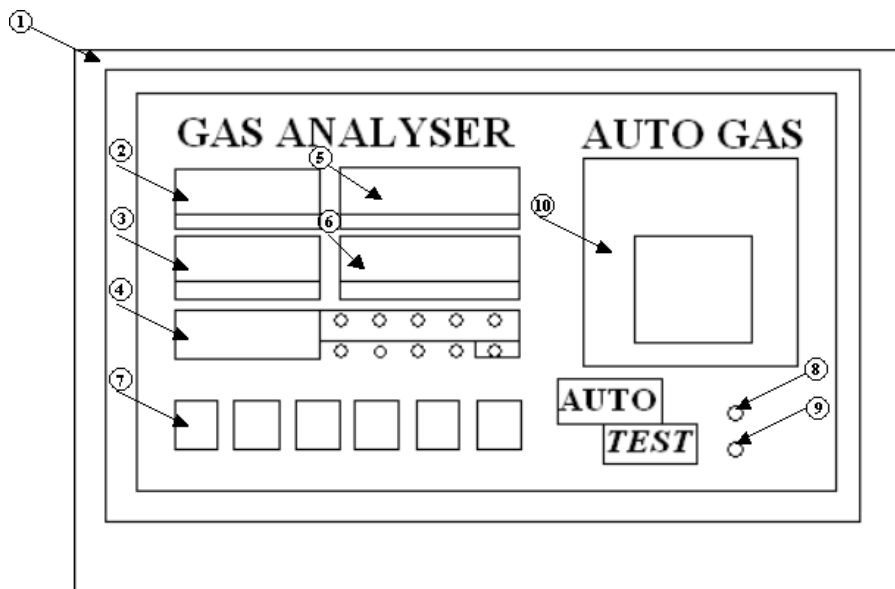
AutoGas is suitable for use vehicles that run on petrol, LPG, and CNG. Its lightweight and portable design make it well suited for both workshop use and roadside emissions testing. The instrument can perform standalone emissions tests based on standard procedures. It also includes a built-in database of over 60 vehicle models and their respective emission limits for quick reference, along with an integrated printer that allows users to generate test and calibration reports instantly.

To ensure accurate measurements, AutoGas includes an electronic leak detection function that verifies the integrity of the sampling system. The unit performs a leak check at least once every 24 hours or whenever it is powered on. During this process, a vacuum is created within the gas bench, and any fluctuations in pressure are monitored to detect leaks that could otherwise result in incorrect readings

For diesel vehicles, AutoGas can be used in combination with the *AutoSmoke*® Opacity Meter via a wireless connection.

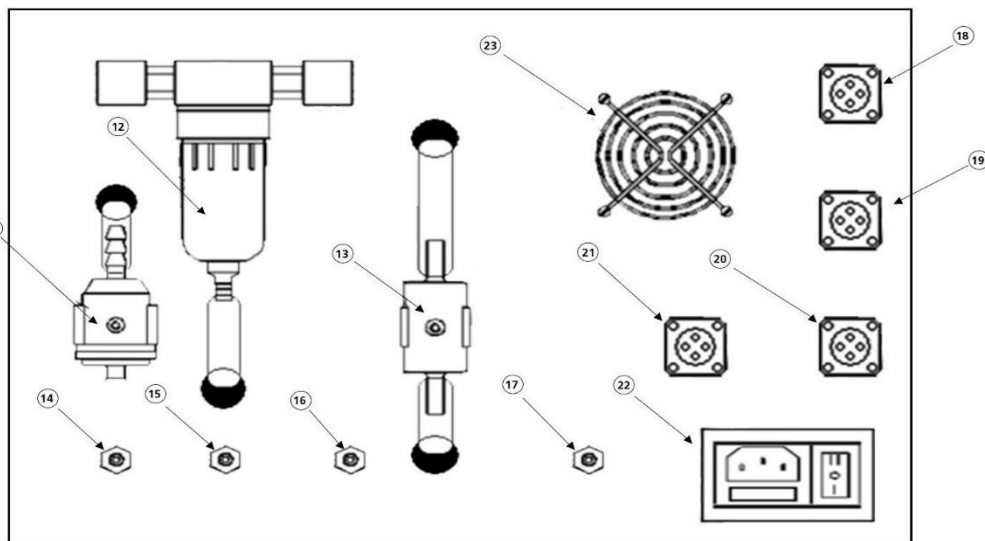
4.2 Instrument Layout and Overview

4.2.1 Front view of AutoGas



Number	Description
1	Case
2	CO ₂ Display
3	O ₂ Display
4	Variable Window
5	CO Display
6	HC Display
7	Membrane keypad
8	Power indicator
9	Low pressure indicator
10	Printer

4.2.2 Rear View of AutoGas



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

4.2.3 Using the Keypad

The front panel of the AutoGas contains six buttons.

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
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, use the  and  buttons to scroll through the alphabet and numbers.

The **MENU** button moves 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 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 LED display.

A	À	I	Ì	Q	Q	Y	Y	6	6
B	À	J	À	R	À	Z	2	7	7
C	À	K	H	S	5	0	0	8	8
D	d	L	L	T	À	1	1	9	9
E	E	M	À	U	U	2	2	SPACE	SPACE
F	F	N	À	V	À	3	3	-	-
G	g	O	0	W	À	4	4	:	:
H	H	P	P	X	H	5	5	?	?

4.2.4 Printer

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.

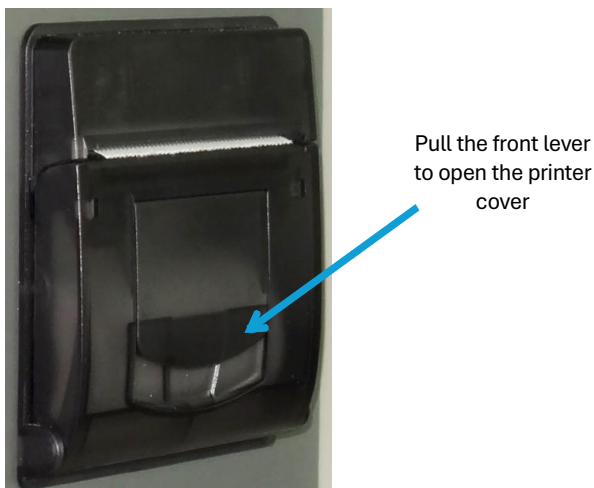


Fig. 1 Built-in Thermal Printer

The thermal paper roll should meet the following specifications:

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

4.2.5 Internal Layout

This section explains how an exhaust gas sample moves through the AutoGas and how the main internal components work together to prepare, filter, and measure the sample. The exhaust gas sample travels from the sampling probe to the gas bench. Inside the gas bench, the AutoGas measures the gases present in the sample. Figure 2 provides a visual overview of this flow path:

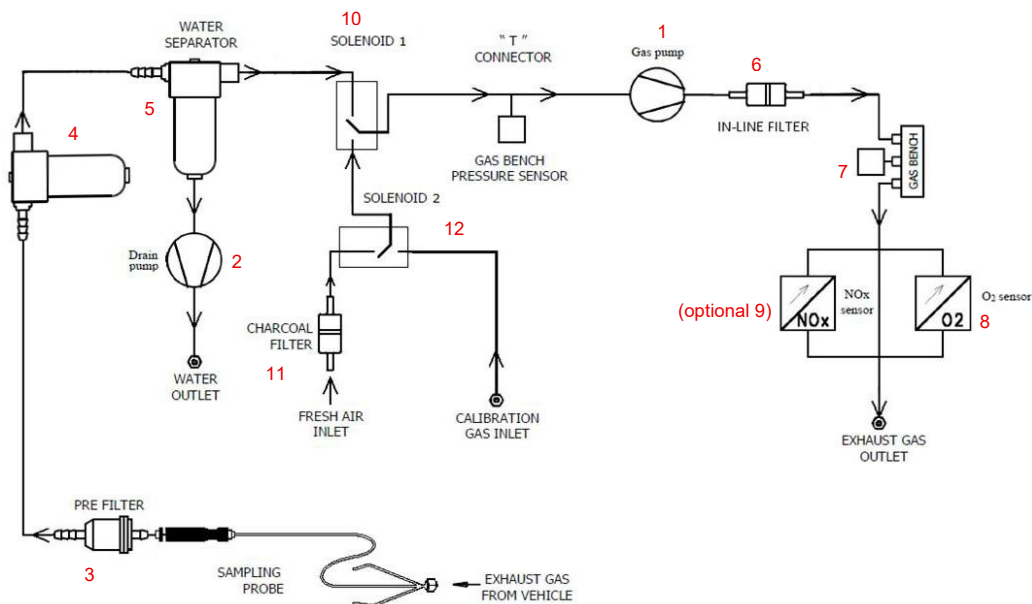


Fig. 2 AutoGas' internal layout

The AutoGas 4 has a dual head diaphragm pump; the first head of the pump [1] circulates the input exhaust gas through a set of filters into the Gas bench, where the contents of the sampled gas are analysed.

The second head of the pump [2] circulate any water particles trapped in the water separator filter and drains via the water outlet.

The use of filters prevents any exhaust contaminants from reaching the gas bench. The exhaust gas flows through the pre-filter [3] to remove any contaminating particles.

After the pre-filter, exhaust gas flows through two water separators [4][5], which filter out the moisture or water droplets.

After the water separators, the gas flows through another filter called the in-line filter [6]; this further removes any micron scale contaminating particles.

After the in-line filter, the gas flows through the gas bench [7] 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 electrochemical sensors; the O₂ sensor [8] measures the concentration of O₂ gas in the exhaust gas, while an optional NO_x sensor [9] would measure the NO_x level in the exhaust gas.

When zero calibration (resetting the instrument's readings back to fresh air) is performed, solenoid 1 [10] is activated to block the input gas. The pump then circulates the fresh air (ambient air) through a charcoal filter [11]. 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 [12] is also activated to block the zero gas. The calibration gas then flows through the in-line filter and then into the gas bench [7], where the calibration gas is analysed, and the gas bench is calibrated.

The temperature of the gas bench is maintained at 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 ambient pressure.

4.3 Maintenance

Do not drop or hit the instrument.

Do not disassemble the instrument as this may damage the delicate electronic circuits, causing instrument failure.

Ensure after use the water traps are emptied.

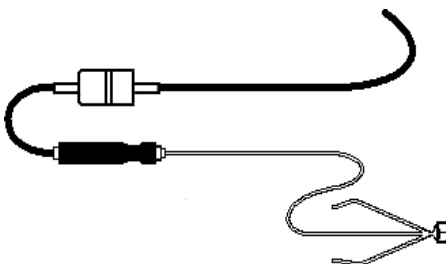
Do not subject the instrument to high temperatures or store the instrument in high temperature, high humidity, flammable, explosive and strong electromagnetic environments.

Clean the instrument with a soft cloth using a small amount of water or neutral detergent to wipe the case. Abrasives and solvents should not be used as they may create corrosion and damage the instrument.

4.4 Accessories

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

Sampling Probe with Pre-filter
(Code: 917829)



AC Power Cable (Code: 104089)

4.4.1 Optional Accessories

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



NO_x Sensor (Code: 917568)



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



USB-to-Serial Adapter (Code: 916391)



Oil Temperature Probe (Code: 917830)



Accelerometer Sensor (Code: 917670)



RS232 Serial Cable (Code: 917832)



Bluetooth OBD-II Reader (Code: 917447)



Battery Cable (Code: 917831)

4.4.2 Standard Consumables

The following listed consumables are available for purchase.



Prefilter (Pack of 10) (Code: 917686)



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



Oxygen Sensor (Code: 917684)

5 TURNING ON THE AUTOGAS

The AutoGas can be powered using either an AC mains supply or a vehicle's 12 VDC battery.

Using AC Mains

When powering the AutoGas from an AC mains supply, ensure the power source meets the following requirements:

- Voltage: 230–265 VAC
- Phase: Single phase
- Frequency: 50–60 Hz

Using a Vehicle Battery (DC Power Supply)

The AutoGas can also be powered using a vehicle's battery.

- Ensure the battery has a minimum capacity of 60 Ah
- Ensure the battery voltage does not exceed the maximum rated voltage
- Confirm the battery is sufficiently charged before conducting a test

Connection Procedure

1. Connect one end of the supplied battery cable to the AutoGas unit.
2. Connect the clamps at the other end to the vehicle battery:
 - Red clamp → Positive (+) terminal
 - Black clamp → Negative (–) terminal
3. Once connected, the instrument will automatically power on.

6 START-UP, CALIBRATION AND SYSTEM CHECKS

This section outlines the AutoGas' start-up sequence, calibration processes, and built-in system checks. These procedures are automatically performed when the instrument is powered on; they are essential to ensure that all components are functioning correctly and that measurement results are accurate and reliable. Users should allow the full start-up process to complete and follow any prompts displayed before proceeding with emissions testing.

6.1 Self-Check

To turn on the AutoGas, flick the switch on the back of the instrument. Each time the instrument is powered up, it will perform a self-test operation to ensure all hardware components and sensors are functioning correctly. All light segments on the Display Panel should turn on during this time. If one or more of the lights or LED segments are not lit, then the LED is faulty and needs to be checked or replaced.

Fig. 3 Display Panel during start-up check

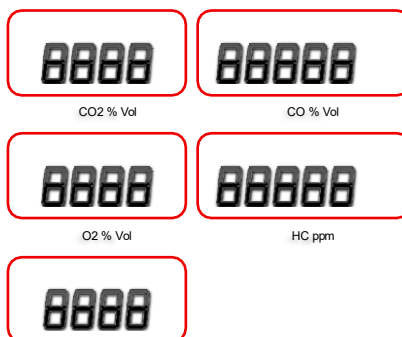


Fig. 4 Display Panel while initialising hardware - "Loading... Please wait"

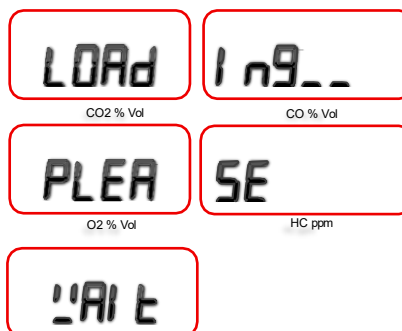


Fig. 5 Product name displayed at start-up - “AutoTest Gas Analyser”



Once basic hardware check is complete, the Display Panel will display the firmware version number of the current program stored in the instrument.

Fig. 6 Firmware version no. displayed at start-up. For example, “F-M v1.30”

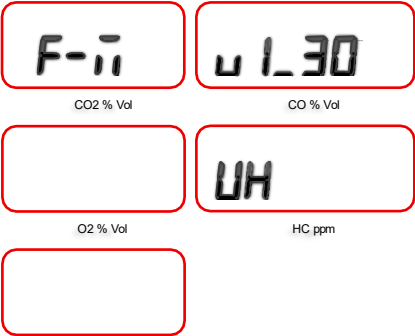
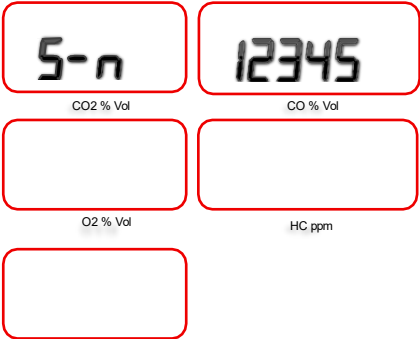


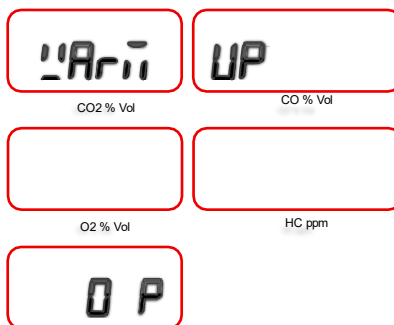
Fig. 7 AutoGas serial no. shown at start-up - “S-N 12345”



6.2 Initial Warm-up

Once the initial hardware check is completed, the instrument 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 front Display Panel's variable window (bottom-left corner), with "0 P" for 0% and "99 P" for 99%.

Fig. 8 Initial warm-up screen - "Warm-up in progress 0%"



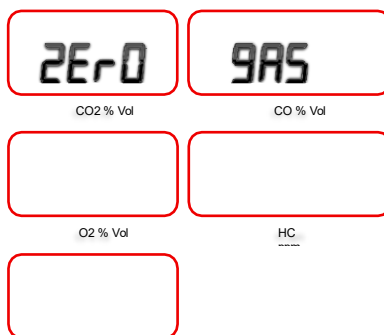
The duration of the initial warm-up process depends on the ambient temperature. For instance, if the instrument is operated at room temperature (around 25 °C), the warm-up time can take approximately 3 minutes to complete.

Alternatively, if the machine is operated outside on 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 will automatically 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 that may have developed over time. Zeroing is performed upon start-up, soon after the initial warm-up is completed. This is also performed before each test.

Fig. 9 Automatic zeroing screen - "ZERO GAS"



6.4 Air Leak Test

AutoGas performs a leak check at start-up. After a successful leak check, the instrument will not automatically prompt the user to perform another leak test for 24 hours.

The purpose of conducting a leak test is to ensure there are no leaks in the gas intake assembly. A leak in the intake assembly can introduce O₂ from the atmosphere, which can significantly increase errors in the gas measurement results.

Fig. 10 Leak test splash screen - "Leak test"



To perform a leak test, connect the supplied gas-sampling probe to the inlet on the back of the AutoGas. Fit the stopper-cover securely over the probe inlet to block airflow through the sampling line.

The instrument will create a vacuum in the gas intake assembly and monitor the pressure for 10 seconds. The leak test passes if the pressure remains stable.

If the pressure rises above the acceptable threshold, the instrument will indicate that a leak has been detected.

Fig. 11 Leak test shut probe screen - "Shut Probe In"

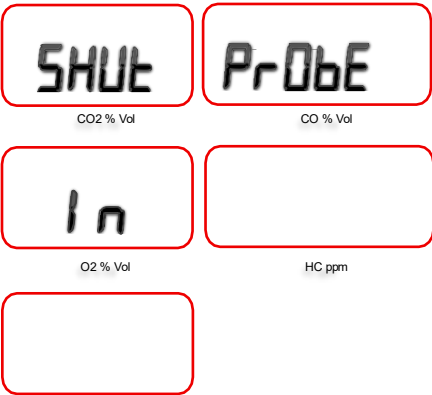


Fig. 12 Hold sampling probe shut for 10 seconds



6.4.1 Troubleshooting a Failed Air Leak Test

If the air leak test fails, identify whether the leak is in the sampling probe assembly or the internal filtering assembly.

1. Disconnect the sampling probe tube from the back of the AutoGas.
2. Block the tube opening with a finger to seal it.
3. Repeat the leak test while keeping the tube sealed.
4. If the test passes, the leak is likely in the sampling probe assembly, possibly the stopper cover.
5. If the test fails, the leak is likely in the filtering assembly, possibly due to a loose connection. In this case, the instrument should be serviced.

Apart from the initial leak test conducted at start-up, users can perform a leak test at any time once the instrument has completed its initialisation; to perform a leak test, enter the Device Configuration Menus by pressing **MENU** on the Display Panel. Use the  or  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 can be cancelled by pressing the **CANCEL** button on the front keypad.

6.5 HC Test

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



Fig. 13 HC test screen

6.5.1 Automatic RPM sensor calibration

RPM calibration is performed to zero 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** button to begin RPM calibration.

Fig. 14 RPM calibration screen - "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.

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

7 DISPLAY PANEL AND MENUS

7.1 Display Panel's Main Screen

Once the instrument is fully initialised, the front Display Panel will show gas readings. The top four windows will display current gas readings of CO₂, CO, O₂, HC. By pressing the  and  buttons, a user can scroll through PEF, RPM, Lambda (λ), AFR and Oil Temperature – these will be indicated through the LED lights, and the variable window at the bottom will display the relevant values.

The Lambda and HC readings are automatically calculated based on the fuel type selected and its propane equivalence factor (PEF).

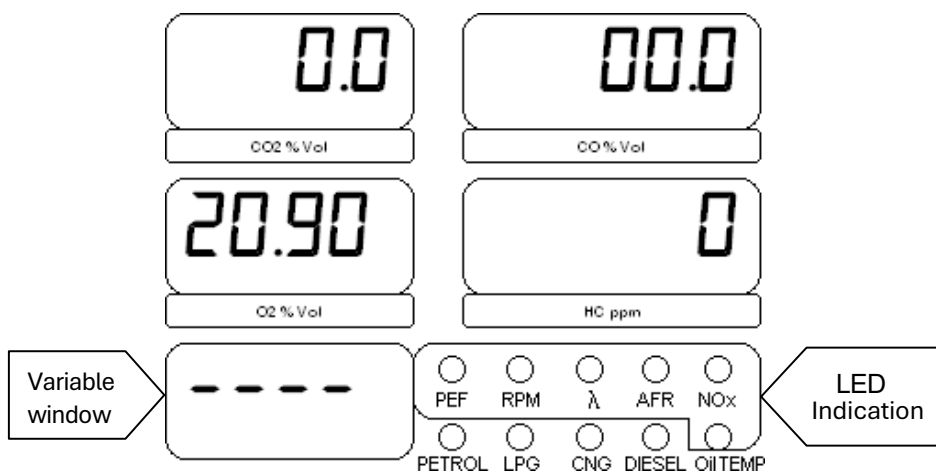


Fig. 15 Display Panel showing current gas readings

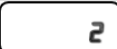
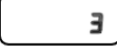
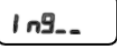
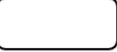
When the AutoGas is first powered on, the gas readings displayed on the front panel will remain unchanged because the internal pump, which circulates the input gas through the gas bench, is initially switched off. The internal pump can be turned on or off by pressing the **OK** and **CANCEL** buttons.

Note! If the intake-sampling probe is blocked with the stopper-cover, the pump will automatically stop after a few seconds; remove stopper-cover to continue the flow of input gas.

7.2 Device Configuration Menus

The Device Configuration Menus can be accessed on the Display Panel by pressing on the **MENU** button.

Use the  and  buttons to navigate through each menu option listed in the following table. Use the **OK** button to select and configure a particular menu option. To close these menus, press **CANCEL** button.

Function	Menu Screen	Sub-Menu Screen	Description
Print	 CO2 % Vol.  CO % Vol.  O2 % Vol.  HC ppm 		Prints current gas readings using the built-in printer
Press OK . The device will quickly print all current gas readings.			
Leak Test	 CO2 % Vol.  CO % Vol.  O2 % Vol.  HC ppm 		Performs leak test
Press OK and follow instructions described in section 6.4. To cancel leak test, press CANCEL .			
Zero Function	 CO2 % Vol.  CO % Vol.  O2 % Vol.  HC ppm 	 CO2 % Vol.  CO % Vol.  	Performs Zeroing operation
Press OK and device will automatically perform zeroing operation. To cancel zeroing, press CANCEL .			

HC Check	HC CO2 % Vol 4 CO % Vol HC CO2 % Vol CHECK HC ppm	HHC CO2 % Vol TEST CO % Vol CO2 % Vol 0 HC ppm	Performs HC Check (Residue check)
Press OK and device will automatically perform HC check.			
Test Type	HC CO2 % Vol 5 CO % Vol TEST CO2 % Vol TYPE HC ppm		Change the active test type
Press OK and use UP and DOWN buttons to change the active test type.			
RPM Type	HC CO2 % Vol 6 CO % Vol rPm CO2 % Vol TYPE HC ppm	rPm CO2 % Vol TYPE CO % Vol bAtt CO2 % Vol ErY HC ppm rPm CO2 % Vol TYPE CO % Vol ACCE CO2 % Vol LErD HC ppm rPm CO2 % Vol TYPE CO % Vol IndU CO2 % Vol Ctl uE HC ppm	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 if RPM calibration is not required.			
Cylinders	 CO2 % Vol  CO2 % Vol 	 CD % Vol  HC ppm 	Add 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 accurate number is selected, press OK to save the settings.			
Stokes	 CO2 % Vol  CO2 % Vol 	 CD % Vol  HC ppm 	Change the stroke value of the vehicle
Press OK to select the menu. Then use UP and DOWN buttons to change the stroke the value.			
OBD-II	 CO2 % Vol  CO2 % Vol 	 CD % Vol  HC ppm 	 CO2 % Vol  CO2 % Vol  CO2 % Vol  HC ppm 
Press OK to view the current value. Use UP and DOWN buttons to change the value. Press OK to save settings. Press CANCEL to return to previous menu.			
Fuel Type	 CO2 % Vol  CO2 % Vol 	 CD % Vol  HC ppm 	Select the fuel type

Press OK to view currently selected fuel type. Use UP and DOWN buttons to change fuel type. Press OK to save settings. Press CANCEL to return to previous menu.			
Calibration Due			Allows users to view the gas analyser and smoke meter's calibration due date. If no smoke meter is connected, the second screen with the due date for smoke meter will not be shown. The format of the date is: "YYYY-MM-DD" Y – year M – month D – day
Press OK to view calibration due date. Press any button to switch to the next screen. Once the calibration due date is shown on the screen, press OK to print the calibration report.			
Vehicle Test Station (VTS) Info			Sets vehicle test station information The following fields can be modified: VTS Name VTS Address VTS Number

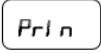
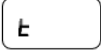
	ut5 CO2 % Vol Info CO % Vol Addr O2 % Vol ESS HC ppm Edit ut5 CO2 % Vol Info CO % Vol nUib O2 % Vol Er HC ppm Edit	
Press OK to view/change the vehicle test station information. Use UP and DOWN buttons to change values.		
Date and time Info CO2 % Vol Info CO % Vol Addr O2 % Vol Info HC ppm		Displays 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 7.5 for more info.		
RPM noise Info CO2 % Vol Info CO % Vol rPi O2 % Vol nU SE HC ppm		Use the UP and DOWN buttons to set the RPM noise threshold from 4 to 20, then press OK to save. This setting defines the minimum signal strength required for RPM detection. The instrument ignores weaker signals and uses the strongest valid RPM signal within the configured frequency range. Increase the threshold to reduce false RPM readings caused by electrical noise, or decrease it to detect weaker RPM signals.
Press OK to view RPM noise		

RPM calibration  CO2 % Vol  CO % Vol  O2 % Vol  HC ppm		When RPM calibration starts, the instrument prompts the user to stop the engine. It then automatically measures the background RPM signal, stores the calibration values, and returns to normal operation. The procedure can be cancelled at any time.
Press OK to start RPM calibration.		

7.3 Test Functions

The Test Functions for the test can be accessed by pressing the **TEST** button. These functions range from conducting a new test to printing and clearing previous test reports.

Function	Test Menu Screen	Sub-Menu Screen	Description
Quick Test	TEST CO2 % Vol. QUIT CO2 % Vol. QUIT HC ppm		A quick test only starts the pump and takes readings. It does not go through the full procedure in the gas testing standards.
Press OK to view gas reading in real-time.			
Gas Test	TEST CO2 % Vol. QUIT CO2 % Vol. QUIT HC ppm		Starts a new gas test.
Press OK and follow test prompts. For further details, read section 10. RUNNING A TEST.			

Redo Last CO2 % Vol.  CO2 % Vol.  O2 % Vol.  HC ppm  		Automatically loads vehicle information from the previously conducted test and starts a new test.
Press OK and test will initiate. Follow prompts described in section 10. RUNNING A TEST.		
Print Last CO2 % Vol.  CO2 % Vol.  O2 % Vol.  HC ppm  		Print the most recent test.
Press OK and the device will automatically print the most recently stored test.		
Print CO2 % Vol.  CO2 % Vol.  O2 % Vol.  HC ppm  	CO2 % Vol.  CO2 % Vol.    O2 % Vol. 	Displays the print menu, which prompts the user to select a particular test to print. The top two windows on the display panel will show the vehicle registration number. The last (fifth) window displays the relevant test number. Most recent test will be displayed first.
Press OK and use UP and DOWN keys to select a particular test; press OK to print its report. Use CANCEL button to return.		

Clear All	TEST CO2 % Vol	NO CO % Vol	DEL CO2 % Vol	ALL CO % Vol	Deletes all stored tests from the internal storage memory.
	CLEAR CO2 % Vol	ALL HC ppm	TEST CO2 % Vol	DELETE HC ppm	
			NO CO2 % Vol		

Press **OK** and a message will appear to confirm before deleting data. Use **UP** and **DOWN** buttons to select “**YES**” or “**NO**” then press **OK**. If **YES** is selected, all stored tests will be deleted. Press **CANCEL** to skip deleting, instead returning to the previous screen.

7.4 RPM Measurement

An RPM measurement can be performed using one of the methods listed below:

- 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 each of the above accessories are available at [Home - AutoTest Products Pty Ltd](#)

7.4.1 RPM using OBD-II interface

Note: If the vehicle does not support the OBD-II interface, the OBD-II scanner cannot be used to measure the RPM.

The OBD-II interface can retrieve engine RPM and oil temperature directly from the vehicle. The OBD-II scanner connects to the vehicle’s OBD-II port and sends this data wirelessly to the AutoGas via Bluetooth.

Before connecting the scanner to your car, ensure the engine is switched off and the key is in the off position. Locate the OBD-II port on the vehicle, typically found beneath the steering wheel or near the fuse box. With the engine off, plug in the OBD-II scanner to the port.

Use the configuration menu > OBD-II (Menu #9) (see section 7.2) to allow the AutoGas and device to communicate:

1. Press **MENU**
2. Use  and  to select **OBD-II** (#9) and press **OK**. “TEMP SRC” will appear
3. To use the scanner, press **OK** once “OBD2” appears
4. To use a probe, press  and “PROBE” will appear; press **OK**

Once the Bluetooth OBD-II function is enabled, the AutoGas will automatically attempt to connect to the OBD-II interface at the start of each test.

Note: When Bluetooth OBD-II is enabled, the AutoGas may take up to approximately 40 seconds at the beginning of the test to scan for and establish a connection with the OBD-II 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 the back of the instrument and the other to the vehicle's battery. For detailed information on battery connection, see section 5.

For an accurate RPM measurement via this method, the unit will need to be connected to AC power in addition to the vehicle battery.

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

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

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

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

Use the configuration menu > Strokes (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. Use  and  to select Stroke (#8) and press **OK**
3. Use the  and  buttons to select the desired stroke number
4. Press **OK** to save and continue.

To view the current **RPM** reading, first make sure the instrument is back in the Device Configuration Menus. Use the  and  buttons 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 AutoGas 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 section 8 Live Gas Readings (non-test mode).

7.4.3 RPM using optional Accelerometer Sensor

Warning! Components of a running engine can cause serious or fatal injuries. The engine head and radiator hoses can become extremely hot during operation. Ensure the accelerometer is securely mounted on the engine at all times. A loosely fitted sensor may become caught in moving parts, potentially causing injury and damaging both the sensor and engine components.

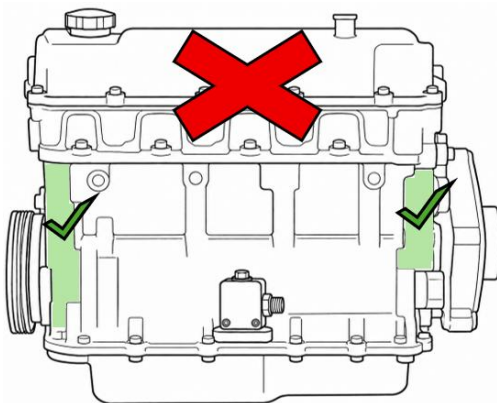


Fig. 16 Accelerometer placement

The best place to position the accelerometer is on the crankshaft bearing, do not place the accelerometer on the cylinder head.

Connect the accelerometer cable to the back of the AutoGas.

Use the configuration menu > accelerometer (Menu #6) (see section 7.2) to select **“Accelero”** or accelerometer channel for RPM measurement:

1. Press **MENU**
 2. Use  and  to select RPM TYPE (#6) and press **OK**
 3. Use the  and  buttons to select **“Accelero”** or accelerometer.
 4. Once **“Accelero”** appears on the screen, press the **OK** button to save
- Use the configuration menu > cylinders (Menu #7) (see section 7.2) to select number of cylinders the vehicle contains:

1. Press **MENU**
2. Use  and  to select Cylinder (#7) and press **OK**
3. Use the  and  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 > strokes (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. Use  and  to select Stroke (#8) and press **OK**
3. Use the  and  buttons to select the desired stroke number.
4. Press **OK** to save and continue.

To view the current **RPM** reading, first make sure the instrument is back in the Device Configuration Menus. Use the  and  buttons until RPM LED turns on. To check the RPM reading, securely park the car and turn on the engine. Place the accelerometer on the engine mount.

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 AutoGas 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.

7.4.4 RPM using optional inductive pick-up sensor

Warning! Components of a running engine can cause serious or fatal injuries. The engine head and radiator hoses can also become extremely hot.

Connect the inductive pick-up cable to the back of the AutoGas.

Use the configuration menu > RPM TYPE (Menu #6) to select “**INDUCTIVE**” or inductive sensor channel for RPM measurement:

1. Press **MENU**
2. Use  and  to select “**RPM TYPE**” (#6) and press **OK**
3. Use the  and  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 > cylinders (Menu #7) (see section 7.2) to select number of cylinders the vehicle contains:

1. Press **MENU**
2. Use  and  to select “**Cylinder**” (#7) and press **OK**
3. Use the  and  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 > strokes (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. Use $\uparrow$ and $\downarrow$ to select “Stroke” (#8) and press **OK**
3. Use the $\uparrow$ and $\downarrow$ 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 $\uparrow$ and $\downarrow$ buttons until RPM LED on the front panel is illuminated. The engine RPM will be displayed on the lower-bottom screen.

7.5 Changing Device Time

Note: AutoGas date cannot be changed

To set the time on the instrument, press **MENU**. Use the $\uparrow$ and $\downarrow$ buttons to select “Data Time” (#16) and press **OK**. Use the $\uparrow$ and $\downarrow$ buttons to switch to the LED screen that show the current time. When the current time appears on the screen, press **OK**. The AutoGas will prompt for hour and minute values. Use the $\uparrow$ and $\downarrow$ buttons to adjust each value. Press **OK** to set new time values.

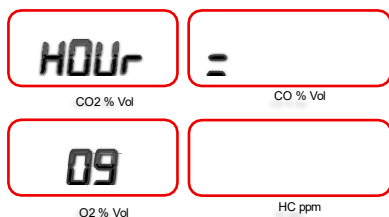


Fig. 17 Screen for setting the hour

Fig. 18 Screen for setting the minute

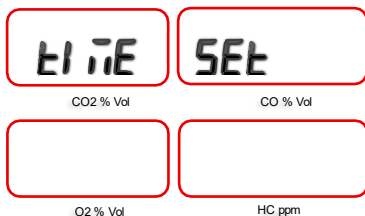
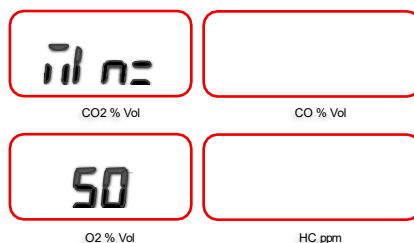


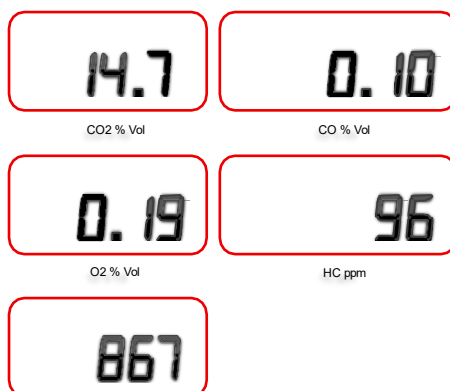
Fig. 19 Time is set after pressing OK

8 LIVE GAS READINGS (NON-TEST MODE)

In live gas readings mode, the AutoGas samples and continuously displays gas measurements in real-time. Live gas reading mode can be used to quickly monitor gas content without performing an actual 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 instrument 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 AutoGas.
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 with ambient air.
9. Press **CANCEL** to stop the internal pump.

Fig. 20 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 the **MENU** button. When “**PRINT**” appears on the screen, press **OK** button.

9 REQUIRED PRE-TEST CHECKS

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

8.1 Oil temperature measurement

Connect oil temperature probe to the AutoGas. From the Display Panel's Main Screen, use the  and  buttons until "Oil Temp" LED is illuminated. The temperature reading appears in the adjacent bottom window and should show the current ambient temperature in °C.

Remove the oil dipstick from the vehicle, then extend the oil temperature probe by pressing its lock button until its length matches that of the dipstick.

Insert the temperature probe into the dipstick tube until the cable stopper prevents it from going further. Do not force the probe deeper, as this may damage the probe or engine components.

Start the vehicle, and the oil temperature reading will gradually increase as the engine warms up.

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

Warning! If the temperature probe is longer than the dipstick, it may come into contact with moving engine components, potentially causing damage to the engine or the probe sensor.

8.2 Sampling Exhaust Gas

Before starting this test, please ensure that the vehicle engine is switched off.

Connect the tube of the input gas-sampling probe to the back of the AutoGas. Then insert the sampling probe into the vehicle's exhaust pipe; take care when doing this as the exhaust pipe temperature may be extremely hot. Also ensure the sampling hose is positioned safely on the ground to avoid tripping or accidentally pulling the instrument.

When the sampling probe is securely in place, turn on the vehicle engine. Ensure the Display Panel is showing gas readings.

Next press the **OK** button to activate the internal pump, which draws exhaust gas through the gas bench. As the gas circulates, the AutoGas will display the contents of the exhaust gas.

Please note: The response time of the sampled input gas reading is displayed on the screen; 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, stop the pump by pressing **OK** or **CANCEL**. During the test, the sampling probe is in contact with the exhaust pipe, which causes the probe to become extremely hot. Turn off the vehicle and let the sampling probe cool down. Once the sampling probe has cooled down, remove the sampling probe, and take it away from the engine.

Turn on the internal pump for approximately 20 seconds by pressing the **OK** button while the gas readings are displayed. This flushes any remaining exhaust gas from the gas bench and replaces it with fresh ambient air. After 20 seconds, press **OK** or **CANCEL** to turn off the internal pump.

10 RUNNING A TEST

10.1 Preliminary checks

Use the Device Configuration Menus and check if the test method is currently set to AUSTRALIA.

Press **MENU** on the Display Panel. Use  and  buttons to scroll to Test Type option and press **OK**. When “Test Method” menu appears, use  and  buttons to select “AUSTRALIA” and then press **OK**.

Fig. 21 Test method



10.2 Equipment Setup

Securely park the vehicle and turn the engine off. If the AutoGas is to be run through the vehicle's battery, connect the battery cable.

The instrument will automatically turn on and perform its initialisation process described in section 6.

When the AutoGas has been successfully initialised and the Display Panel's Main Screen appears, install the oil temperature sensor probe as described in section 8.1.

Make sure the required RPM measurement method is connected to the vehicle and is selected in the Device Configuration Menu.

Check the engine stroke number currently configured in the AutoGas' settings by pressing **MENU** and scrolling to "**Stroke**".

10.3 Starting a test

Note: do not insert the exhaust gas probe in the tail pipe at the start of the test.

To begin a test, press the **TEST** button. When AutoGas displays the Test Functions, use the  and  buttons to scroll down to "**GAS TEST**", then press **OK**.

The test can be cancelled at any time by pressing the **CANCEL** button.



Fig. 22 Screen for choosing test type

Note: The test prompts the user to enter vehicle information. Please refer to section 4.2.3 for information on how to enter text using the keypad.

10.4 Self-Check

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

10.5 New test

Before starting a test, AutoGas will prompt the user to enter several details about the vehicle under test:

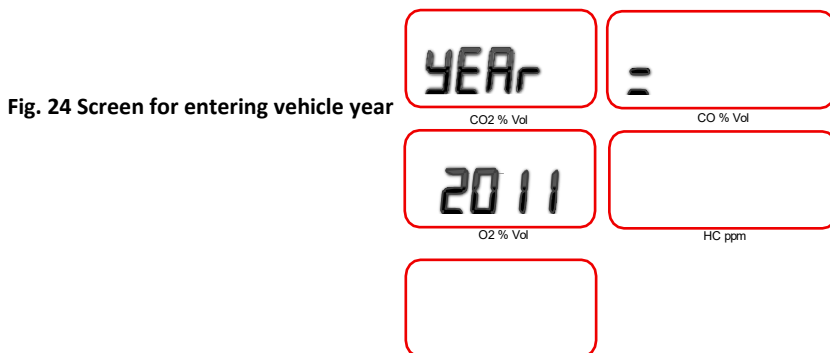
10.5.1 Entering Vehicle Information

Enter vehicle registration number (or VRM).

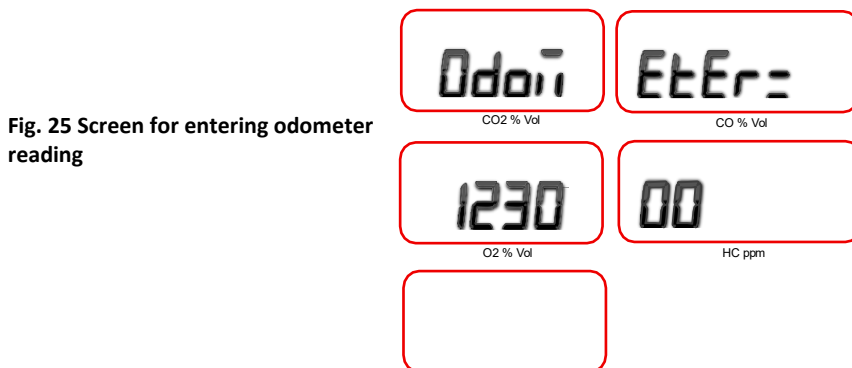
Fig. 23 Screen for entering vehicle registration number

The diagram shows five input fields arranged in a grid. The first row contains two fields: the left one displays 'rE9o' and is labeled 'CO2 % Vol' below it; the right one displays '=' and is labeled 'CO % Vol' below it. The second row contains two fields: the left one displays 'AbCd' and is labeled 'O2 % Vol' below it; the right one displays '1234' and is labeled 'HC ppm' below it. Below these four fields is a fifth, empty input field.

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



Enter the current odometer reading of the vehicle.



Enter the engine capacity in cubic centimetres (CC) when prompted for engine size. 1,000 CC is equal to 1.0 litre. For example, an engine with a capacity of 4.0 litres should be entered as 4,000 CC. Use the  and  buttons to select the correct engine size.

Fig. 26 Screen for entering Engine CC

En9 ,	nE CC
CO2 % Vol	CO % Vol
1300	
O2 % Vol	HC ppm

Enter the number of cylinders.

Fig. 27 Screen for entering no. of cylinders

SEL _	nD OF
CO2 % Vol	CO % Vol
CYLI	ndEr5
O2 % Vol	HC ppm
3	

When prompted to select the type of fuel currently used by the vehicle, use the

↑ and ↓ buttons to select from the following options:

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

Fig. 28 Screen for entering examiner ID

SEL CO2 % Vol	FUEL CO % Vol
TYPE O2 % Vol	HC ppm
Pt r L	

10.5.2 Engine up to Temperature

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

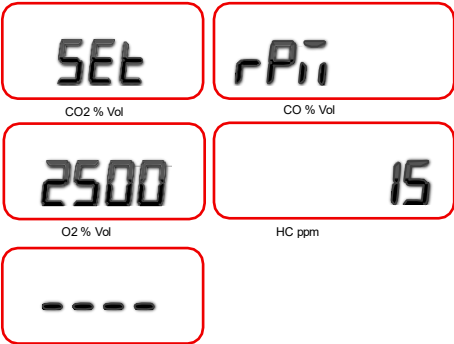
Fig. 29 Screen asking to run engine

rUn CO2 % Vol	Engi n CO % Vol
O2 % Vol	HC ppm

10.5.3 Idle Speed Check

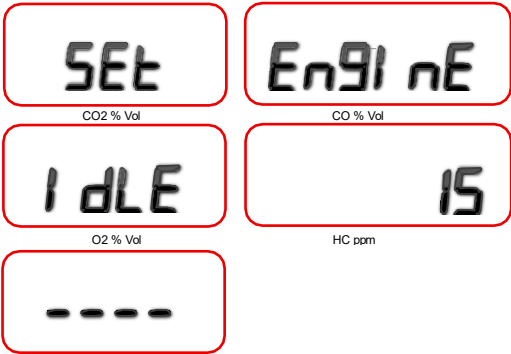
Hold the engine RPM within the specified fast-idle range for 15 seconds.

Fig. 30 Screen to set RPM at fast idle



Set the engine at idle for 15 seconds.

Fig. 31 Screen to set RPM at idle



10.5.4 Result of the Test

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

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

10.5.5 Printing Report

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

Fig. 32 Print test report prompt, reads “Print Report?”



When the print report prompt appears, press **OK** to print. Alternatively, press the **CANCEL** button to skip printing. If no button has been pressed within 20 seconds, the instrument 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 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.

10.5.6 Reading the Test Report

AutoTest Products
4/5 Gas Analyser

Model: AutoGas (Five Gas)
Serial No: 12345
Date: 10/05/2015
Time: 11:32:01

Test Info
Test No: _____
Examiner: _____
Customer: _____

Rego: _____
Fuel: Petrol
Cylinders: 04 (4S)

Duration: 1 minute

Results
Oil Temp: N/A

-- Fast Idle Test --
RPM: 2610
CO: 0.024 %VOL
HC: 24 ppm

NOX: 5 PPM
CO2: 0.00%
O2: 21.05%
Lambda: 1.00 0.970 to 1.030
AFR: 0.000
PEF: 0.554

-- Idle Test --
RPM: 707
CO: 0.000 %VOL <0.500
HC: 24 ppm
NOX: 5 PPM
CO2: 0.00%
O2: 21.05%
Lambda: 1.00
AFR: 0.000

-- Overall Result --
Idle Test: Pass
FastIdle: Pass
Overall: Pass

Print Date: 10/10/2015
Calib Date: 30/09/2015

Signature:

AutoGas
information

Test details

Readings Values;
readings are in the
middle, and limits are in
the right column. For
example, 1.00, and limit
range is 0.970 - 1.030.

Overall result

Fig. 33 Printed test report

10.6 Erasing Old Tests

The AutoGas can hold up to 100 tests.

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

To erase old tests, perform the following steps:

- From the Display Panel's Main Screen, press the **TEST** button
- Use  and  buttons to scroll up and down until "CLEAR ALL" screen appears.
- Press **OK** to clear all stored tests.
- Press **CANCEL** to return to previous menu.

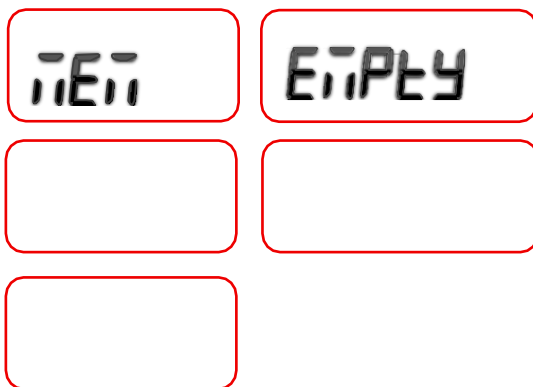
Fig. 34 Screen "Test Menu - Clear ALL"



Fig. 35 Screen "Del All Test Data?"



Fig. 36 Screen “Memory Empty”



10.7 PEF, AFR and Lambda (λ) calculation

Propane Equivalency Factor (PEF) is calculated by the Gas Analyser automatically and is the factor used to convert the Hydrocarbon (HC) reading from the fuel type selected to the Propane Equivalent. For example, if the fuel selected is Petrol (Hexane) then an example PEF of 0.523 and a HC of 1046 ppm. Hexane could be converted to the Propane equivalent by dividing the HC value by the PEF to give a HC value of 2000 ppm Propane which corresponds to the standard calibration gas.

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

$$\lambda = \frac{[CO_2] + \left[\frac{CO}{2}\right] + [O_2] + \left[\frac{NO}{2}\right] + \left(\left(\frac{H_{cv}}{4} \times \frac{3.5}{3.5 + \frac{[CO]}{[CO_2]}} \right) - \frac{O_{cv}}{2} \right) \times ([CO_2] + [CO])}{\left(1 + \frac{H_{cv}}{4} - \frac{O_{cv}}{2} \right) \times ([CO_2] + [CO] + (n \times [HC]))}$$

Where:

[XX] = Gas Concentration in % Volume.

(You have to convert PPM HC to % HC by dividing it by 10,000)

H_{cv} = Atomic ratio of Hydrogen to Carbon in the fuel.

O_{cv} = Atomic ratio of Oxygen to Carbon in the fuel.

n = Number of carbon atoms in a molecule of the selected HC.

n = 6 for Hexane (Gasoline), 3 for Propane (LPG), 1 for Methane (CNG)

Lambda (λ) indicates how efficiently the engine is burning fuel (the combustion or air-to-fuel ratio):

$\lambda < 1.0$ (Rich mixture): Too much fuel, not enough air

$\lambda = 1.0$: Ideal balance of air and fuel (optimal combustion)

$\lambda > 1.0$ (Lean mixture): Too much air, not enough fuel

The Air Fuel Ratio (AFR) is the ratio between the mass of air and the mass of fuel used by the engine when running. The ideal (theoretical) air-fuel ratio for a complete combustion is called the stoichiometric air-fuel ratio. When the AFR is higher than the stoichiometric ratio, the AFR mixture is called 'lean' as there is more air than necessary for perfect combustion. When the AFR is lower than the stoichiometric ratio the AFR mixture is called rich, as there is more fuel. The stoichiometric AFR is different depending on the fuel used, some common stoichiometric AFR's are shown below:

Fuel	Chemical Formula	Stoichiometric AFR
Petrol (Hexane)	C ₆ H ₁₄	14.7
LPG (Propane)	C ₃ H ₈	15.67
CNG (Methane)	CH ₄	17.19
Diesel	C ₁₂ H ₂₄	15.5

Lambda (λ) is a standardised mathematical representation of AFR designed to be more easily comparable between fuel sources and simpler to understand. A Lambda value of 1 indicates perfect stoichiometric fuel ratio. Lambda > 1 represents a Lean mixture, while Lambda < 1 represents a Rich fuel mixture. Lambda is calculated by dividing the observed AFR with the fuels stoichiometric AFR.

10.8 RPM Measurement

Once all the required vehicle information is entered (see section 10.5 Gas Test Inputs) the AutoGas will continue with the test by performing an RPM calibration operation. The instrument 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, the 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 7.4 for more information about the RPM calibration process.

When the AutoGas prompts “Can engine speed be measured?”, give the response using the  and  buttons.

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

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

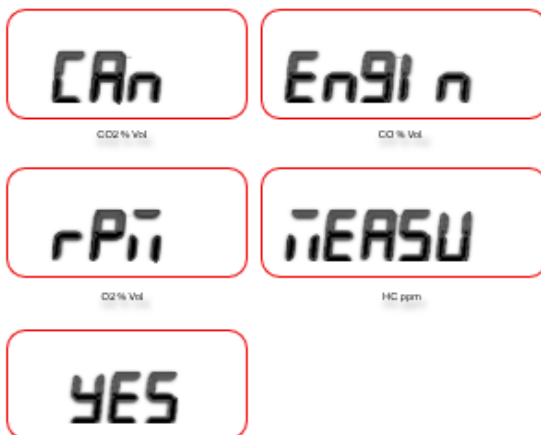


Fig. 37 Screen “Can engine RPM be measured”

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

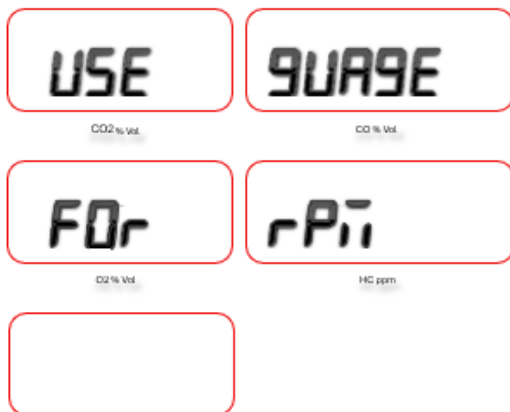


Fig. 38 Screen asking to use vehicle tachometer

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

Use the  and  buttons to select one of the following:

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



Fig. 39 Screen to enter RPM source

When AutoGas prompts “**Connect RPM Probe**”, attach the relevant accessory cables for the selected RPM measurement type.

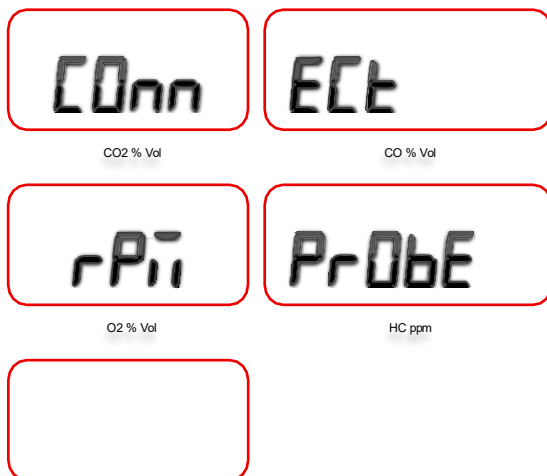


Fig. 40 Screen asking to connect RPM probe

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



Fig. 41 Screen for entering no. of cylinders

Once the AutoGas has enough information about the RPM measurement method, it 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.

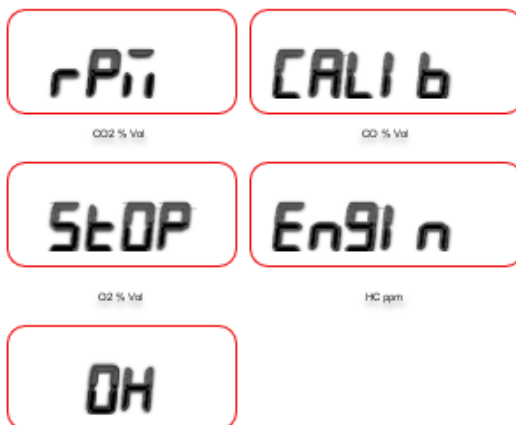


Fig. 42 Screen asking to switch off engine

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 this stage.

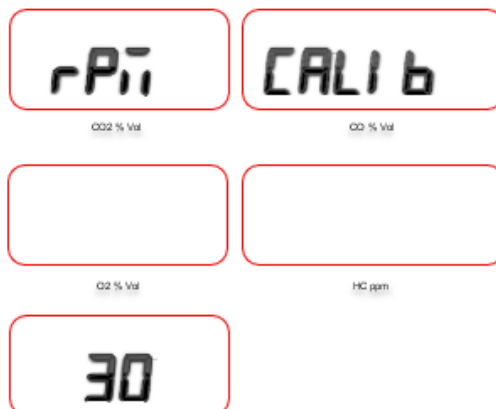


Fig. 43 Screen for RPM calibration

Start the vehicle's engine if the AutoGas displays “**run engine**”.

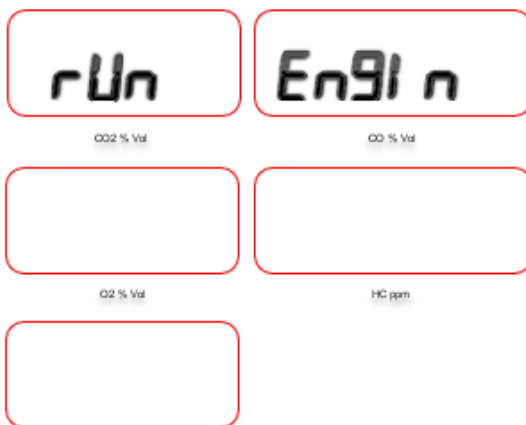


Fig. 44 Screen asking to run engine

Once all required equipment has been connected, press **OK** to begin RPM calibration. Press **CANCEL** to stop the calibration.

After calibration is complete, start the vehicle engine. Ensure the vehicle is securely parked with the parking brake applied. Automatic vehicles should be in Park (P), while manual vehicles should be in Neutral.

11 USING PC SOFTWARE (OPTIONAL)

The AutoTest® Emission Tester PC software enables users to run tests from a PC and download tests stored on the AutoGas.



Connection Live View Run Test View Reports Settings About

Note: Keypad Lock

While the AutoGas is running a test via the PC software, the keypad of the instrument is locked. This is to ensure 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.

11.1 Software Installation

To install the AutoTest® Emission Tester software:

System requirements: Microsoft Windows 2011 or later, a USB port or serial port, and 100 MB of available hard disk space.

1. Follow this link to download the AutoGas5 software: [Shop Consumables - AutoTest Products Pty Ltd.](#)
2. Once paid, a confirmation email with a code will be sent through. Run the install file with the license key supplied in the email.
3. Follow the on-screen prompts to complete the installation.

Once installation is complete, start the PC software.

On the PC, run the AutoGas software. Once the application has started, click on the  “**Connection**” icon to begin.

11.2 Licence activation

A valid license is required for the AutoGas software to connect to the instrument. When prompted, enter the license code supplied with the software, then click “**Activate**”. If the code is valid, the instrument’s serial number will appear in the “**Devices Currently Activated**” list.

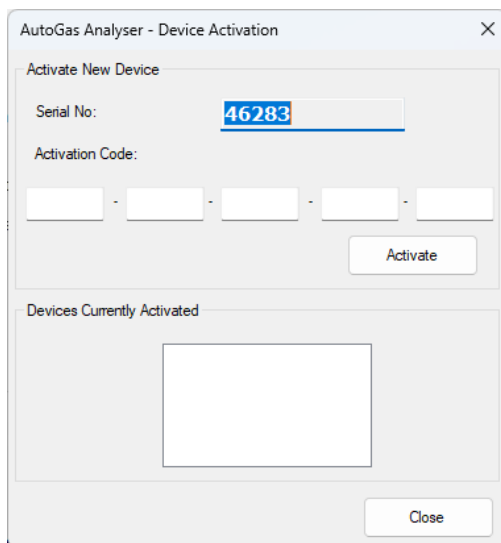


Fig. 45 AutoGas Instrument Activation Window

Note: If the AutoGas software is installed on another computer or under a different user account on the same PC, you may need to purchase a new license code. The license code is a one-time install perpetual license.

12 CONNECTING AUTOGAS TO PC

12.1 Connection via Serial Cable

Connect the AutoGas and PC via the USB to serial cable (optional accessory). If the PC does not support USB connectivity, use the RS232 serial cable (optional accessory).

Turn on the instrument and in the software, click the  “**Connection**” icon to establish connection.

In the software, select the serial COM port connected to the AutoGas. When using the USB-to-serial adapter, use the COM port number shown by the computer when the USB connector is attached; this can also be found in Control Panel > Device Manager > Ports.

For desktop computers with RS232 support, the communication port is usually COM1.

Click ‘**Connect**’.

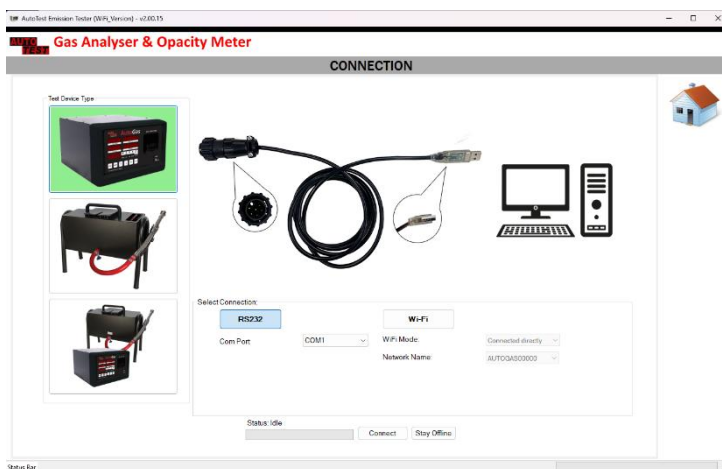


Fig. 46 Connection Page - USB

12.2 Connection via Wi-Fi

The AutoGas can be connected to a PC wirelessly. There are three methods available for establishing a wireless connection between the instrument and a PC.

1. Direct Connection via Wi-Fi (Figure 1)

The AutoGas creates its own Wi-Fi network, allowing the PC to connect directly to the instrument without the need for an external router.

2. Connection via a standalone router (Figure 6)

The AutoGas is connected to a standalone router using an RS232 cable. Once the instrument is configured to use router mode instead of direct Wi-Fi mode, both the analyser and the PC communicate through the router's wireless network.

3. Connection via the company router (Figure 15)

Similar to the standalone router connection, the AutoGas is connected to the company's existing router using an RS232 cable.

All connection to the AutoGas will require the PC to have Wi-Fi connectivity, either in-built or using an external Wi-Fi Dongle.

12.2.1 Direct Connection – Wi-Fi

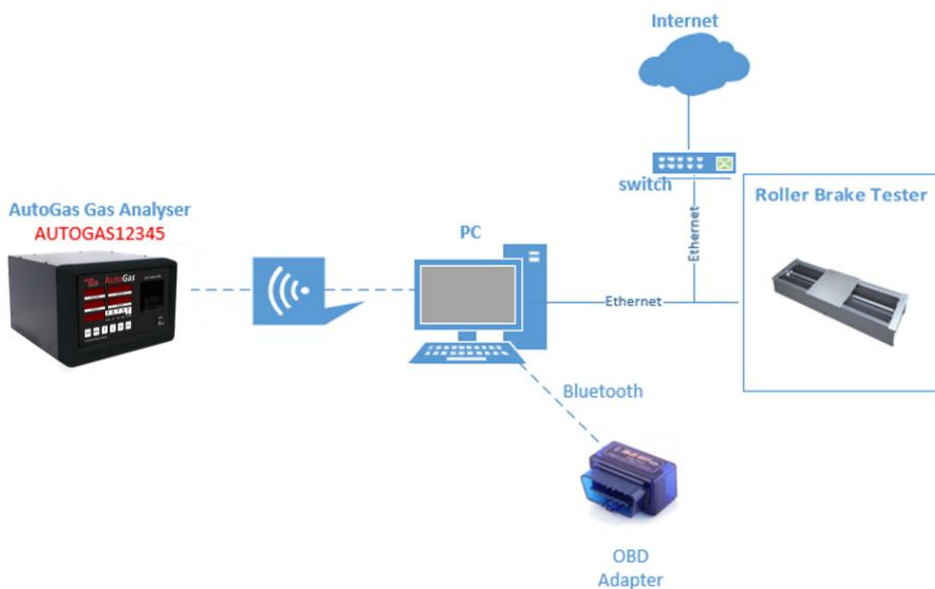


Fig. 47 Network diagram for wireless connection between AutoGas and PC

Wi-Fi will be the AutoGas' default connection type. The LED on the back of the unit should be flashing Green, which indicates that the AutoGas is set to connect via Wi-Fi.

The above figure depicts the network diagram for this Wi-Fi connection type,

In AutoTest Emission Tester software, click on the  **"Connection"** icon on the home page to open the connection page.

Click **“Wi-Fi”** and in the **“Network Name”** dropdown box, select the Wi-Fi network named **“AutoGasXXXXX”**, where XXXXX will be the serial number of the unit.

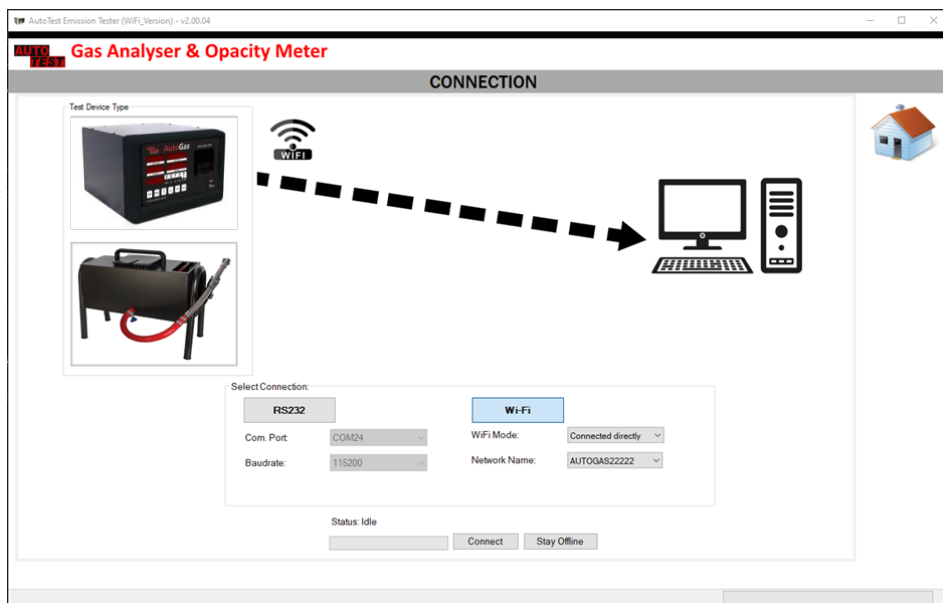


Fig. 48 Connection Page

If no networks are displayed, ensure that the PC has Wi-Fi capability and that the AutoGas is powered on. Refresh the PC's network connection to update the list of available Wi-Fi networks.



Fig. 49 Network icon and selection in Windows

Once the AutoGas' network is connected to the software, the green light on the instrument will flash faster. On the Emissions Software, click **"Connect"**.

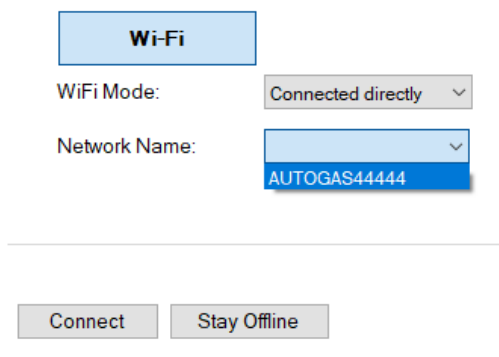


Fig. 50 Wi-Fi network name selection

The green LED should be flashing rapidly when both the PC and Emission Tester Software are connected.

12.2.2 Connection via a standalone Router

(The router IP address used in the example is 192.168.1.1. The subnet mask used is 255.255.255.0)

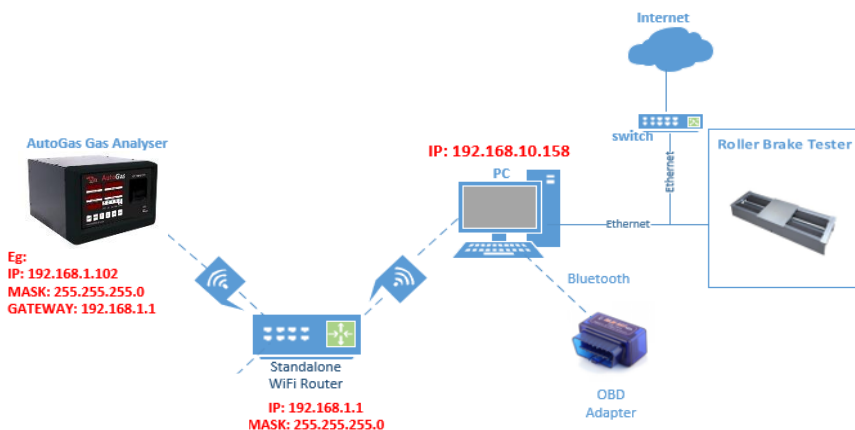


Fig. 51 Network diagram for wireless connection between AutoGas and PC via standalone router

In this setup, the AutoGas connects to a standalone Wi-Fi router. The router is only used to link the instrument to the PC and is not connected to the internet. The PC keeps its internet connection through an Ethernet cable.

To connect to the AutoGas via a standalone router, the user must make sure the settings have already been changed via RS232. To do so:

How to Configure Wi-Fi Settings for Router Mode

Step 1 – Connect to AutoGas via a RS232 cable.

Step 2 – In AutoTest Emission Tester software, click the  “**Settings**” icon and then the “**Wi-Fi Configurations**” tab.

Step 3 – Under “**Wi-Fi Settings**” section, click the “**Wi-Fi Mode**” dropdown and select “**Connected via router**”.

Step 4 – Select or enter Wi-Fi network name from SSID drop-down; if the Wi-Fi router is turned on, it will be automatically listed as a SSID.

Step 5 – Select the security type of the router in use.

Note: You can check the security type of the router by connecting to it via Windows.

Scan the PC’s available networks and click on the Wi-Fi router name. Click “**Connect**”.

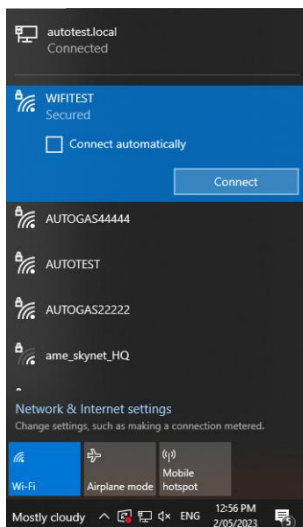


Fig. 52 How Wi-Fi router listed on Windows

Once connected to the router, click “**Properties**” to view the router’s IP settings.

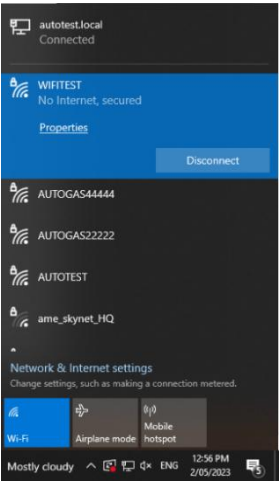


Fig. 53 Properties of Wi-Fi network

Use the value of field “Security Type” (as highlighted). Note that in the software, WPA2 is shown as WPA-P.

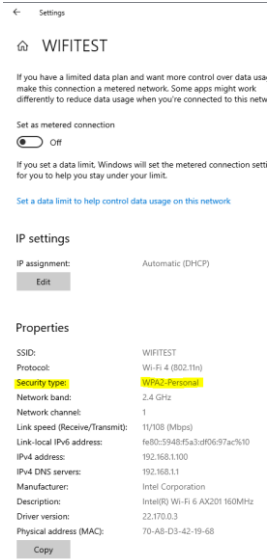


Fig. 54 Standalone router’s IP settings

Step 6 – Back in the AutoTest Emission Tester software, in the “**Wi-Fi Settings**” password field, enter the Wi-Fi password used to connect to the router.

Step 7 – Under the “**TCP/IP Settings**”, start filling in the “**Gateway**” field. Enter the IP address of the Wi-Fi router that the AutoGas will connect to.

Note: You can obtain the IP address of the router in Windows by following the process below:

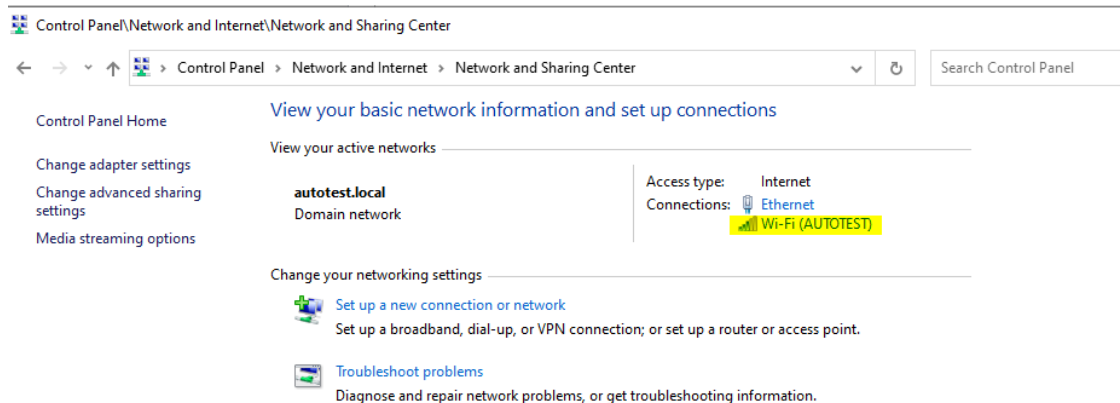


Fig. 55 Network and Sharing Center

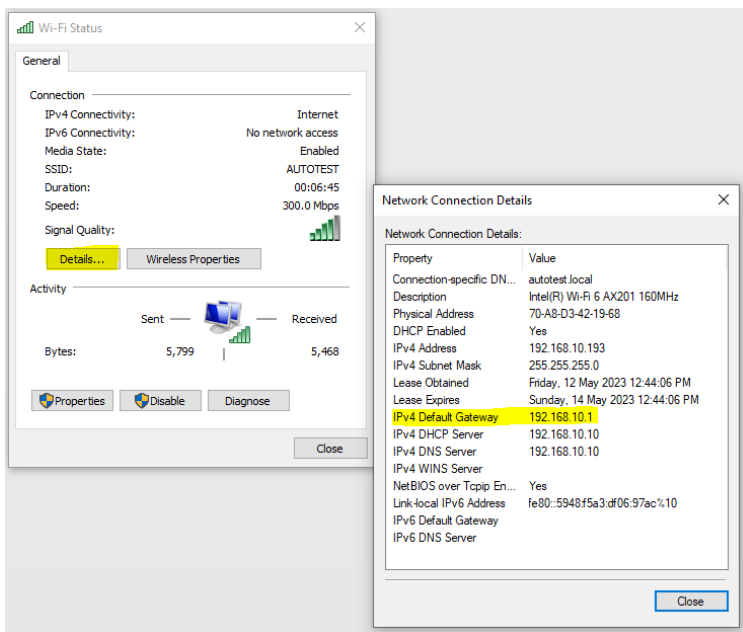


Fig. 56 Network Connection Details

Step 8 – Go back to AutoTest Emission Tester software and enter the relevant subnet mask in the “**Mask**” field. (The default is 255.255.255.0)

Step 9 – Enter the IP address that will be assigned to the AutoGas.

Note: The AutoGas IP address must be on the same network as the router, but it must not be the same as the router’s IP address.

For example:

Wi-Fi router IP address: **192.168.1.1**

AutoGas IP address: **192.168.1.x**

In this example, *x can be any unused value from 2 to 254.*

Therefore, the AutoGas IP address can be any available address in the range **192.168.1.2 to 192.168.1.254**.

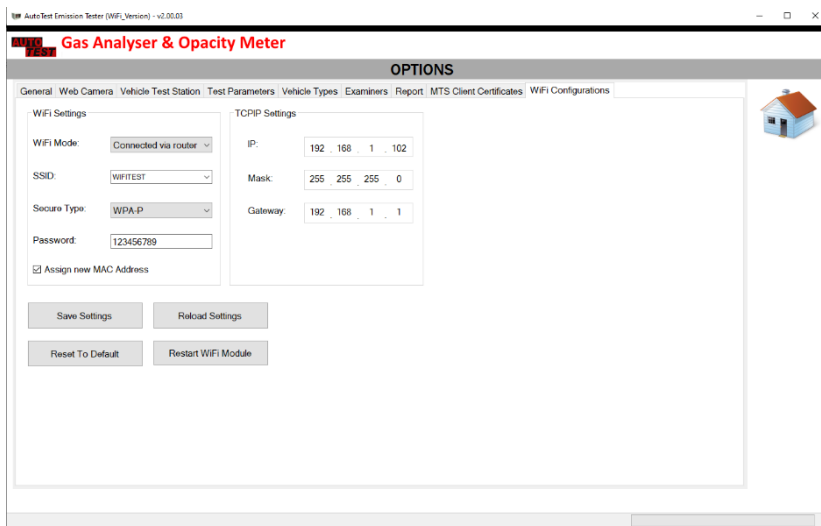


Fig. 57 Wi-Fi Configurations

Step 10 – Click **“Save Settings”**. Three message prompts will appear; click **“OK”** on each.

Step 11 – Wait for 1-2 seconds and then connect to the AutoGas via router from the software’s  **“Connection”** page.

The LED on the back of the unit will start flashing red; this indicates that the instrument is set to ‘Connected via Router’ mode. At this stage, it is ready for the router connection steps, but it has not connected yet:

How to Connect to Router Mode - Connection Page on PC

In the Emissions Software, select the router's Wi-Fi network and enter the IP Address of the AutoGas (setup as shown from page 77 steps 7 to 11).



Wi-Fi

WiFi Mode: Connected via router ▾

Network Name: WIFITEST ▾

IP Address: 192 . 168 . 1 . 102

Connect Stay Offline

Fig. 58 Connection via the standalone router

Before clicking the **“Connect”** button, the PC must be connected to the same Wi-Fi network. If this connection is not already in place, this can be accessed in the bottom right corner of the screen by clicking the Network icon (Figure 58), then click the Network and enter the Password to connect.

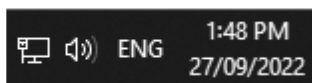


Fig. 59 Network icon on the far left

The red LED flashes slowly when ready to connect, faster when connected to the router, and rapidly when connected to both the router and Emission Tester Software.

If the AutoGas does not connect, check the router settings to confirm that the AutoGas is connected to the router. If it is not connected, connect the AutoGas via RS232 and review the Wi-Fi configuration to confirm the current router settings.

12.2.3 Connection via the Company Router

(The router IP address used in the example is 10.10.0.1. The subnet mask used is 255.255.0.0)

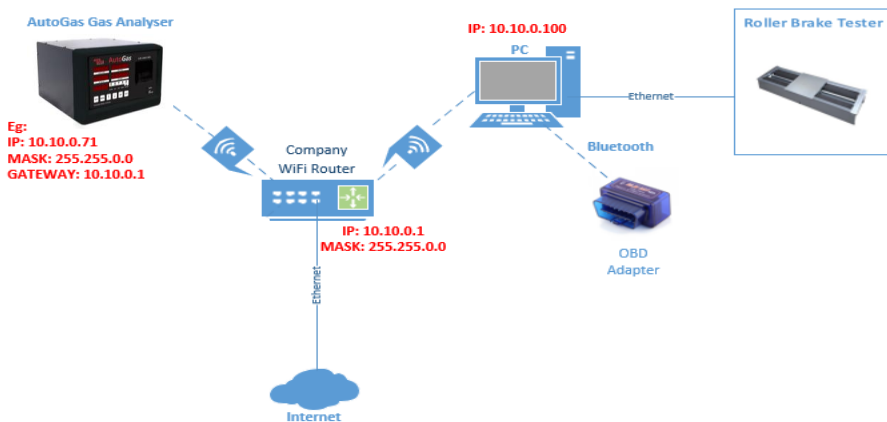


Fig. 60 Network diagram for wireless connection between AutoGas and PC via company router

The process for connection to a company router connection follows the same steps as the individual router.

12.3 Live gas reading's view

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

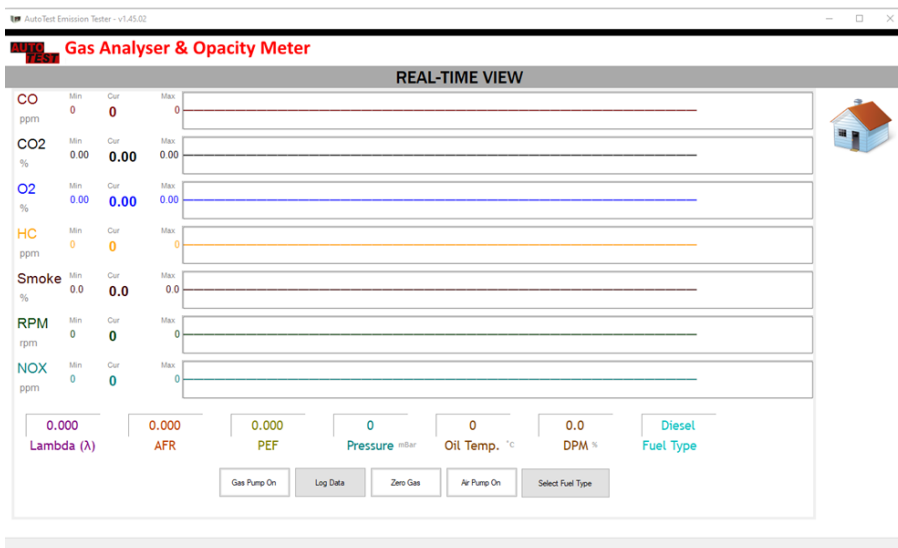


Figure 50 – Live gas reading's page

Click on the **"Gas Pump On"** button to start the gas pump and begin readings.

12.4 Downloading Test Data

AutoGas stores tests in its internal memory. The PC software can retrieve stored tests from the AutoGas and download them to the PC. To synchronise or download stored tests, follow these steps:

- Run AutoGas PC software.
- Once the USB or Wi-fi connection is established, click on the  **"Reports"** icon.
- Click on the **"Synchronise"** button to download new tests.

- Wait until all new tests have been downloaded. Please note, depending on the number of stored tests, the downloading process may take some time to complete.

AutoTest Emission Tester - v1.45.02

Gas Analyser & Opacity Meter

REPORTS INDEX

Filter By: Registration No. Clear

Customer Name:

Within Date Range: Saturday, 14 September 2013 to Thursday, 14 September 2023 Filter

Test No.	Procedure	Customer	Reg. No.	Operator	Date	Status
1	MOT GAS, PC		car123	Jk	22/06/2023 11:...	Pass
2	MOT GAS, PC		car123	Jk	23/06/2023 2:3...	Pass
3	MOT GAS, PC		car123	Jk	23/06/2023 2:4...	Pass
4	COMBO, PC		car123	Jk	23/06/2023 3:0...	Pass
5	COMBO, PC		car123	Jk	23/06/2023 3:0...	Fail
6	SMOKE, PC		car123	Jk	23/06/2023 3:1...	Pass
7	MOT GAS, PC		car123	Jk	23/06/2023 3:4...	Pass
8	MOT GAS, PC		car123	Jk	23/06/2023 3:4...	Pass
9	MOT GAS, PC		car123	Jk	23/06/2023 4:2...	Pass
10	MOT GAS, PC		car123	Jk	23/06/2023 4:2...	Pass
11	MOT GAS, PC		car123	Jk	26/06/2023 9:5...	Pass
12	MOT GAS, PC		car123	Jk	26/06/2023 9:5...	Pass
13	MOT GAS, PC		car123	Jk	26/06/2023 10:...	Pass

Total Number of Tests in Database: 125 Show Report Synchronise Close

Fig. 61 “Test downloading - synchronisation”

Note: see section 10.6 for details on how to erase stored tests on the instrument.

12.5 Viewing Test Results on PC

From the “**Reports Index**” list, select a desired test record. Then click on “**Show Report**” to view test information on a new page.

To print a report, click on the  “**Print**” icon. A new window will appear showing the printable test report. To continue printing reports, click on the  “**Print**” icon again and follow the prompts. Close the “**Print Preview**” window to return to the “**TEST REPORT**” page.

Filter Test Reports

Test reports can be easily retrieved using filters such as vehicle registration number, customer name, and/or a test date range.

On the “**REPORTS INDEX**” page, enter the relevant search criteria and click “**Filter**” to run the search. To remove the applied filters and return to the full list, click “**Clear**”.

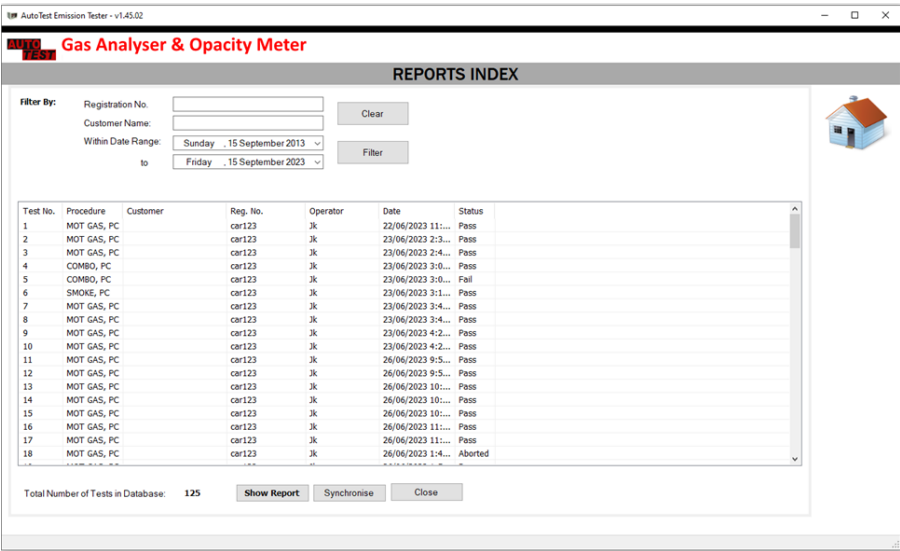


Fig. 62 “Test report filter option”

12.6 Running a PC based Test

AutoTest® Emission Tester software allows a test to be executed from a PC. One major advantage of running a test from a PC is that users monitor live gas readings and follow clearer on-screen instructions.

To start a new test from a PC, first establish communication with the instrument using either USB or Wi-Fi connection. With the AutoTest® Emission Tester software connected to the AutoGas, click on the  “**Test**” icon to open the test page.

Select “**Start a New Test**” to start with new vehicle details.

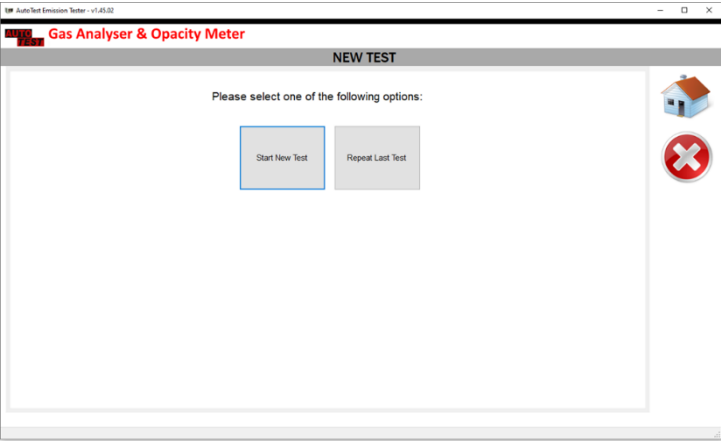


Fig. 63 Test Page

When starting a new test, select the examiner information and the vehicle type. The examiner information can be edited in the settings.

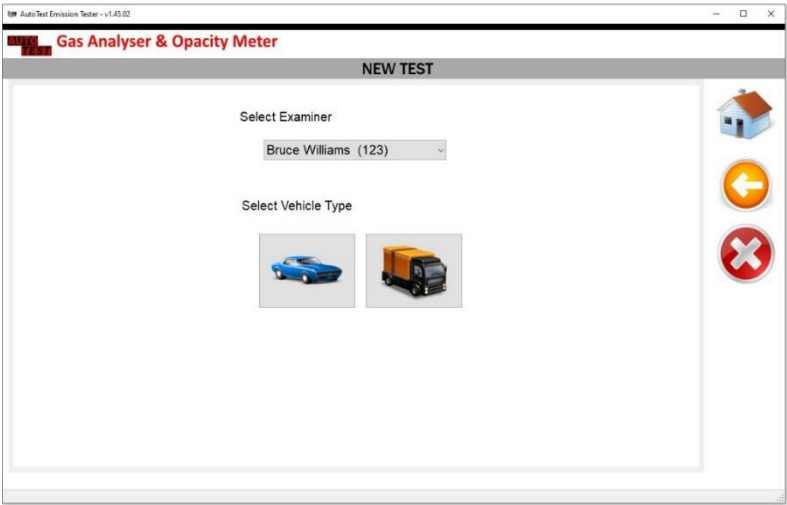


Fig. 64 With 'New Test' selected, select Examiner and Vehicle Type

Select the test “**Gas Test**”.

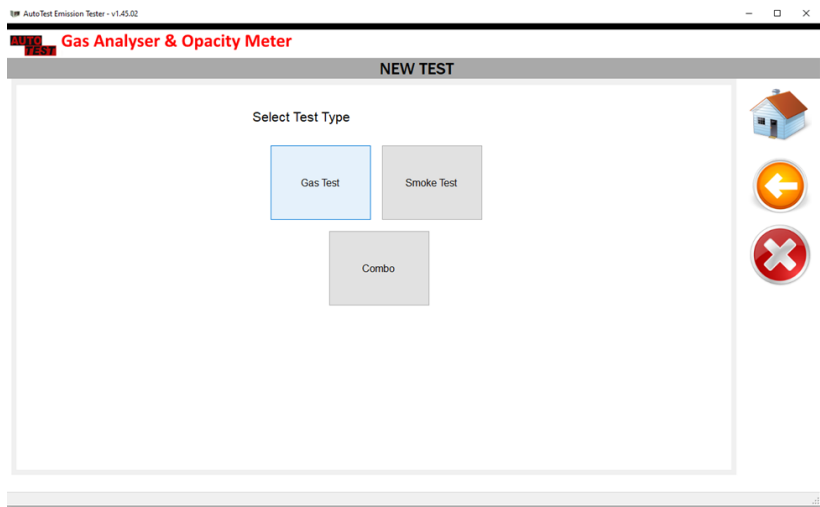


Fig. 65 Select Test Type

The next step will prompt for the fuel type; Petrol, LPG, Diesel or CNG.

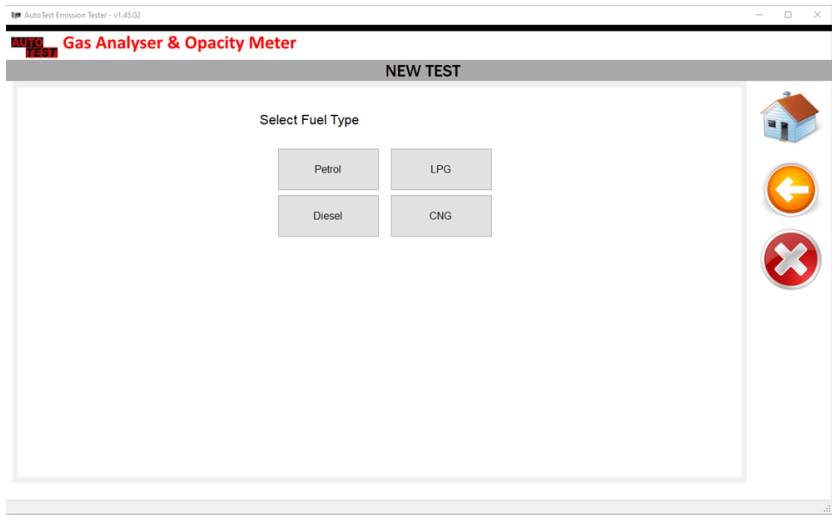


Fig. 66 Select Fuel Type

The next step will prompt for RPM type; Batter, Accelerometer, OBD-II, Manual or Inductive Pickup.

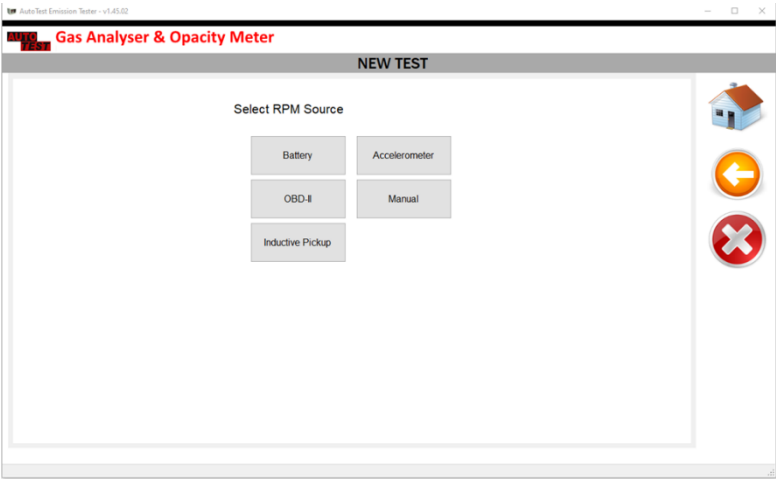


Fig. 67 Select RPM Source

General settings allow users to configure key measurement preferences, including measurement units, odometer units, and the CO display format. Press **“Begin Test”** to start the test.

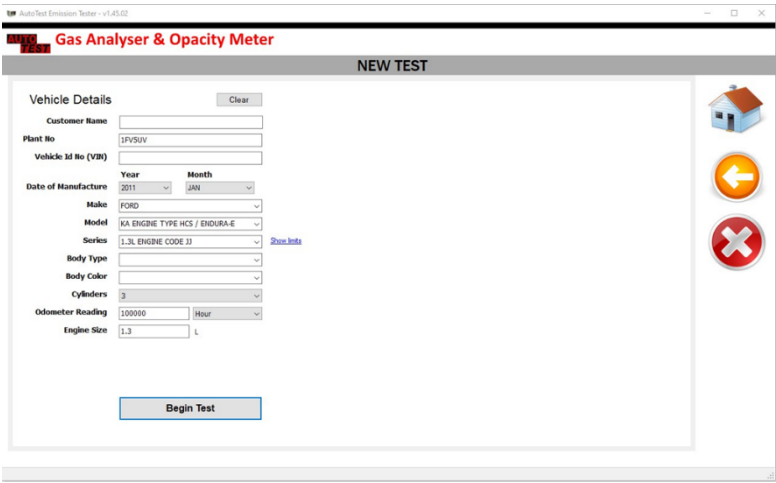


Fig. 68 Vehicle Details

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.

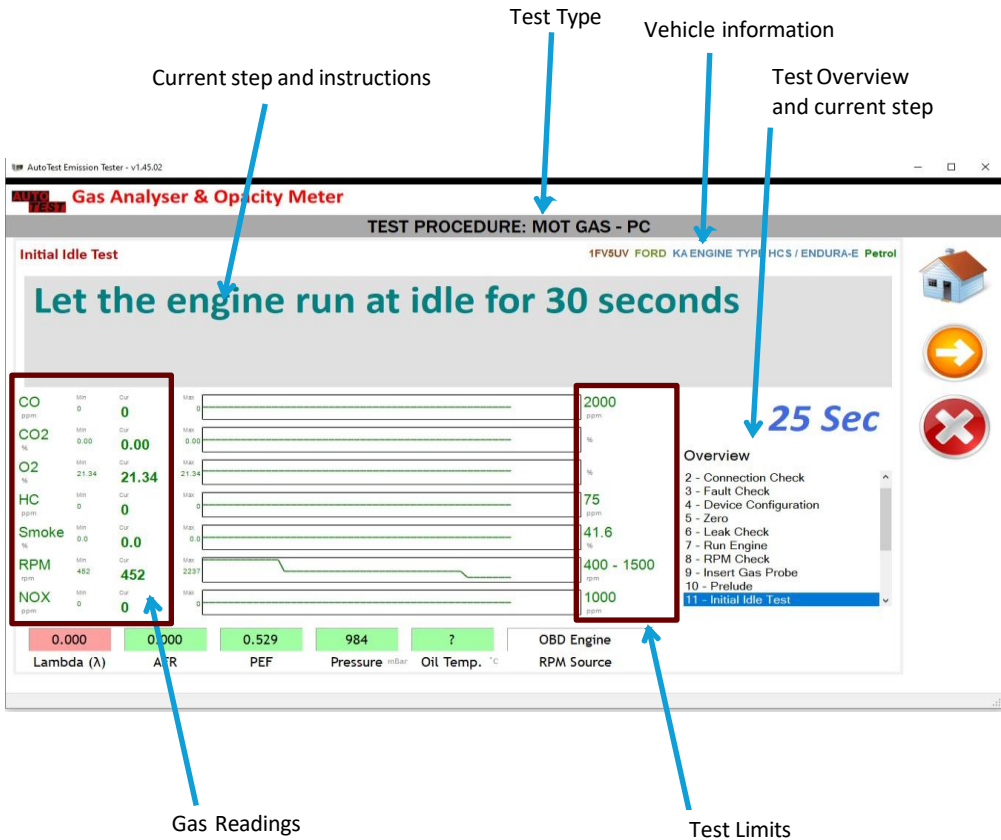


Fig. 69 Test Procedure

The user can stop the test at any time by pressing the  (stop) icon.

At certain stages during a test, the user can/needs to press the  (next) icon to skip that step or move to the next step.

The following table outlines the steps involved in a test:

Step	Description
Warmup	AutoGas is being warmed up. Please wait until the warmup is complete.
Connection Check	Checks RF connection – USB or Wi-Fi
Fault Check	Checks for any faults in the instrument
Device Configuration	Checks instrument configurations
Zero	Sets the measurement values to zero
Leak Check	Checks for any leaks
Run Engine	Prompts the user to start engine and let it run at idle
RPM Check	Checks the oil temperature and waits until the temperature is above 60°C
Insert Gas Probe	Prompts user to insert smoke probe into the exhaust tail pipe
Prelude	Provides time for the user to prepare (i.e. move from PC to vehicle and begin revving)
Fast-idle Test	Asks the user to press the accelerator
Second prelude	Provides additional time for the user. This prelude can be set to 0 seconds if the user wishes to skip it
Idle Test	Asks the user to run the engine at idle
Calculate	Calculates the test results
Save Test	Saves the test data to the database
Display Report	Displays the test report

Exhaust Emissions Test Results

Customer Name:

Plant number:

Vehicle Make:

Vehicle Engine:

Gas tester Serial Number:

Method of loading:

1FV5UV

FORD

Three Cyl. (Petrol)

12241

Torque Stall

Test Date:

Operator ID:

Vehicle Model:

Hour Meter Reading:

Calibration Date:

Method of Sampling:

15/08/2023 12:06:13 PM

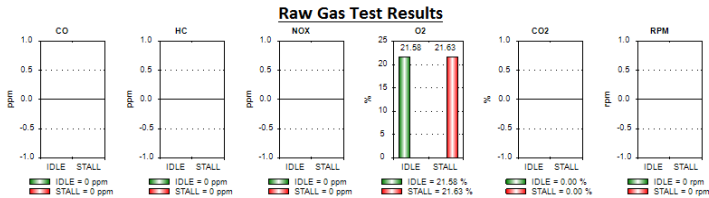
JK

KA ENGINE TYPE HCS / ENDURA-E

100,000 hours

23/06/2023

Direct



	Description	Limits	Obtained Value	Result
Oil Temperature				
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:

Test Bung fitted by:

Test Bung checked by:

Signature:

Signature:

Signature:

Station ABC
Station 123
123 Main St, Melbourne

Fig. 70 Test Report sample

12.7 Settings

Once AutoTest® Emission Tester software is connected to the AutoGas, the user may need to make some edits to the settings systems. To do so, click on the (Settings) icon to open the options page.

12.7.1 General settings

General settings allow the user to select:

- units of measurements – either Metric or Imperial
- odometer unit - Kilometre, Mile or Hour
- choose to display CO value in the unit of PPM (default is %)

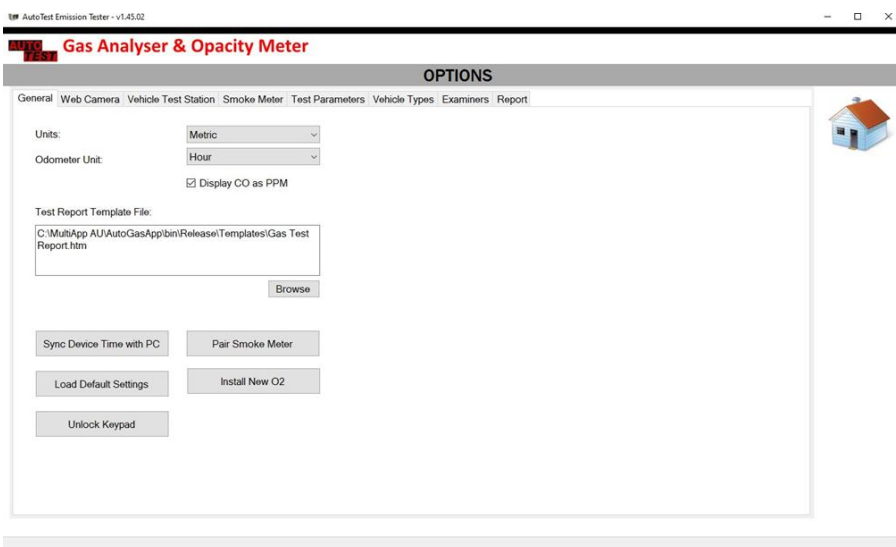


Fig. 71 General Settings

Users can customise test reports by editing the report template file in the Templates folder, located in the same directory as the AutoGas PC software. After editing the template, update the file path in the “**Test Report Template File**” field within the software; click “**Browse**” and then selected updated template.

12.7.2 Web Camera Option

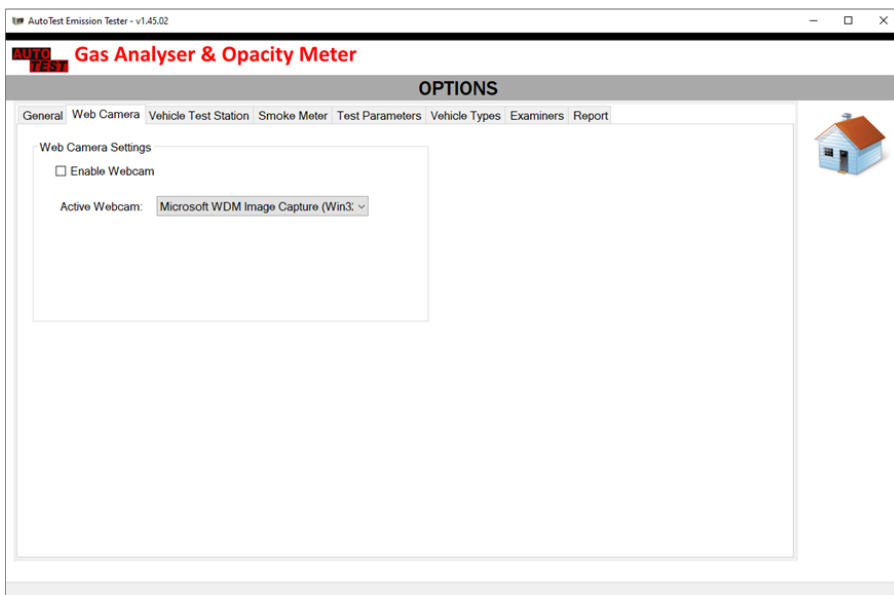


Fig. 72 Web Camera Settings

A web camera can be used to capture the vehicle's registration number plate. To enable the Web Camera, select the "Enable Webcam" tab and then select the relevant camera.

Once the camera is set up, an image of the vehicle registration number can be captured; it will save along with the test report in the installation directory: "C:\AutoTest\Gas Analyser\Report\vehicle.jpg".

12.7.3 Vehicle Test Station Information

Vehicle test station (VTS) information can be stored on the "**Vehicle Test Station**" tab. If the AutoGas is currently connected to the PC, the PC software

will load the VTS information from the instrument when the settings dialogue window is opened.

The screenshot shows the 'Gas Analyser & Opacity Meter' software interface. The title bar indicates the version is 'v1.45.02'. The main menu includes 'General', 'Web Camera', 'Vehicle Test Station', 'Smoke Meter', 'Test Parameters', 'Vehicle Types', 'Examiners', and 'Report'. The 'Vehicle Test Station (VTS)' settings are currently active, showing three input fields: 'Name' (Station ABC), 'Number' (Station 123), and 'Address' (123 Main St, Melbourne). A small house icon is located on the right side of the window.

Fig. 73 Vehicle Test Station Settings

The user can enter the following information regarding the test station:

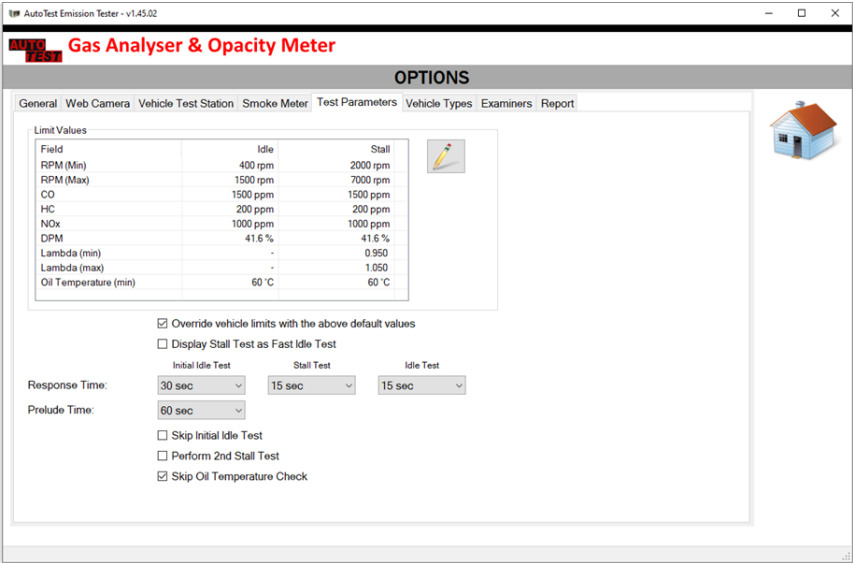
Name: the name of the vehicle test station or workshop.

Number: the registration number or reference number of the test station.

Address: the address of the vehicle test station.

12.7.4 Test Parameters

The default test limit values are adjusted in the “**Test Parameters**” tab. These values will be used when the vehicle’s make, model and series are not



specified.

Fig. 74 Test Parameters Settings

12.7.5 Vehicle types

The vehicle “**Types**” tab shows the content of the Vehicle Emission Database and lists 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.

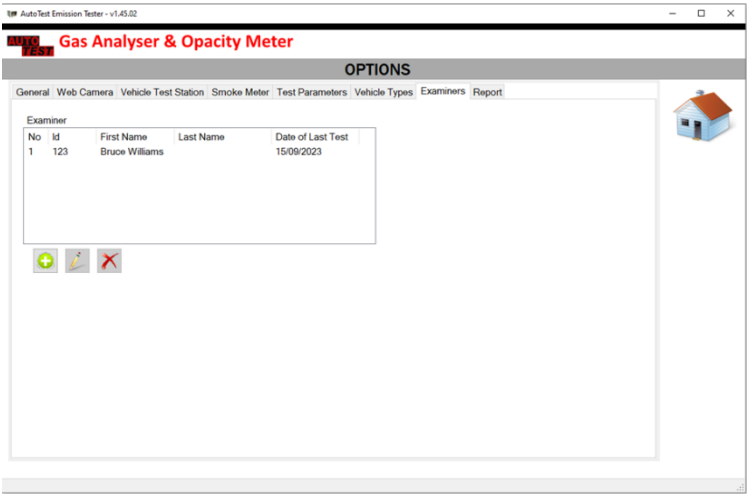


Fig. 75 Vehicle Types Settings

12.7.6 Examiners

The “**Examiners**” tab allows the user to change the examiner; The list of added examiners will be displayed at the start of a test for the user to choose the current examiner or tester.

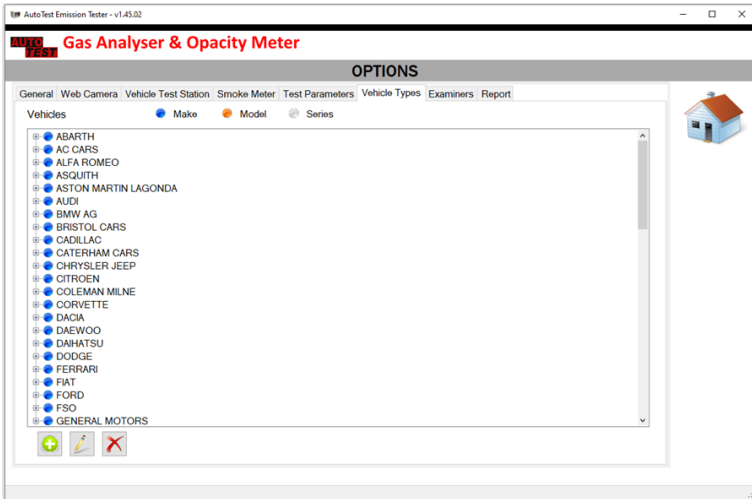


Fig. 76 Examiner Settings

12.7.7 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.

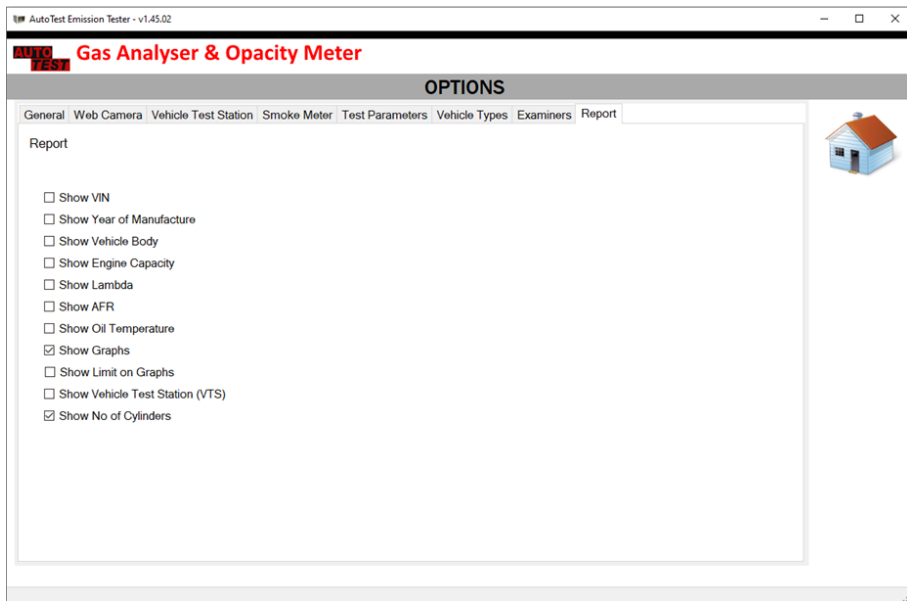


Fig. 77 Report Settings

13 SPECIFICATIONS

13.1 Technical Specifications

Measurement parameters	Range	Resolution	Accuracy
CO (Carbon Monoxide)	0 – 15.5%	0.001%	±0.03% Abs. (or) ±3% Rel.
CO ₂ (Carbon Dioxide)	0 – 21%	0.1%	±0.4% Abs. (or) ±4% Rel.
HC (Hydrocarbon)	0 – 20000 PPM	1 PPM	±10 PPM Abs. (or) ±5% Rel.
O ₂ (Oxygen)	0 – 25%	0.01%	±0.1% Abs. (or) ±3% Rel.
NO _x (Optional)	0 – 5000 PPM	1 PPM	±25 PPM Abs. (or) ±4% Rel.
Oil Temperature	0 – 130 °C	1°C	
Oil Temperature (via OBD-II)	-40 – 210 °C 0 – 120 °C	1°C	
AFR	0 – 30%	0.01%	
Lambda	0 – 9.999	0.001	
Engine Speed	400 – 10000 RPM	10 RPM	
Engine Speed (Using OBD-II)	0 – 16383 RPM	1 RPM	
Automatic compensation for variations in temperature and pressure			
Measuring Gas Intake	3 litres / minute		

Leak test	Electronic
Condensate discharge	Automatic
Response time (For Sample probe length of 5m length)	<10 sec.
Warm-up time (for ambient temperature of above 25°C)	< 3 minutes
Zero & RPM calibration	Automatic

13.2 Electrical Specification

AC Power supply	230-265V AC Single phase, 50/60 Hz
DC Power supply	12-16 V DC Battery
Power consumption	25 watts

13.3 General Specifications

Operating temperature	+2°C to +45°C
Storage temperature	-20°C to +70°C
Overall machine dimensions-Unpacked (W x D x H)	310 mm x 400 mm x 210 mm
Machine weight (Unpacked)	9 kg

13.4 Thermal Printer

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

13.5 Communication Interfaces

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

14 TROUBLESHOOTING

Error Message	Description	Occurrence	Solution
ACTI uACT On FAI LEd "Activation Failed"	Meter activation failed.	When activating meter.	Check activation code (serial no) and try again.
CAL EXPI rEd "Cal Expired!"	Calibration period expired.	At start-up OR Before running a test.	Need to calibrate device.
CAL EXPr 12 dAYS "Cal. Expr. ## days"	Calibration expires in ### days.	At start-up.	Need to calibrate device soon.
Err: dI SP FAI L "ERR: DISPLAY FAIL"	LED display board failed.	Before running a test.	Check the connections. Restart the meter.
Err: bt rF FAI L "ERR: BT RF FAIL"	Bluetooth RF chip failed.	-	Contact distributor.
Err: CLOCk FAI L "ERR: CLOCK FAIL"	RTC Clock chip failed.	At start-up.	Contact distributor.

Err: rPm FAIL "ERR: RPM FAIL"	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, contact distributor.
GAS CHANNEL FAILED "Gas Channel failed"	Gas chamber has failed.	Before running a test.	Service the gas bench board. Contact distributor.
HW STACK OVERFLOW! "HWStackOverflow!"	Internal system error.	-	Program crashed. Restart the device. If error persists, contact distributor.
LEAK TEST FAILED "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 "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 Locked"	Meter is not activated, cannot run a test.	Before running a test.	Activate meter using configuration menu.
Printer FAILED "Printer Failed"	Printer board failed.	At start-up.	Check the printer connections. Replace the printer. If error persists, contact distributor.
WD CHECK FAILED "WD Check failed"	Internal system error.	-	Program crashed. Restart the device. If error persists, contact distributor.
Err: bENCH nOt On "Error Bench Not On"	Gas bench not started	When starting a new test	Contact distributor.
Err: MEMRY FULL "ERR: MEMRY FULL"	Out of space.	When creating a file on flash memory.	Download all tests to PC then clear the memory.

For other problems, please contact [Auto Test Products](#).

Repairs should only be carried out by an authorised AutoTest service centre, in order to ensure that the AutoGas retains its calibration. Refer to Section 16 regarding warranty. For instructions on returning products for calibration or servicing, see Section 15.

15 SERVICE AND REPAIR

The AutoGas 4 must be re-calibrated every 1 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.

15.1 Replacing O2 Sensor

The user can replace the O2 sensor themselves.

The O2 sensor is located inside the AutoGas, and the top cover needs to be removed to replace the old O2 sensor. It is recommended that this sensor is replaced annually.



Fig. 78 O2 sensor inside the unit

The following steps guide on how to replace an O₂ sensor.

1. Turn off the AutoGas, disconnect the power cord, and open the top cover.
2. Locate the O₂ sensor (red sensor) and disconnect the connector.
3. After disconnecting the connector, remove the sensor by turning it counterclockwise.
4. Install the new O₂ sensor in place of the old one, ensuring it is securely tightened.
5. Reconnect the sensor connector and make sure it is firmly attached.
6. Close the AutoGas lid and reinstall the screws.
7. Install the new O₂ sensor via the PC software (Settings → General Settings → Install New O₂).
8. Turn on the AutoGas and allow it to complete its startup tests.

15.2 Packaging

When sending for repair or service, the unit should be packaged in the original shipping container. However, where the container is not available, it is important to remember that you are shipping an electronic instrument. Bubble pack or foam should surround the unit and should be inserted into a sturdy cardboard box. Please ensure that the container is locked or otherwise obviously secured.

15.3 Shipping

Labelling

A label should be placed on the outside of the container noting “Device Fragile”.

Freight Carrier

Container should be sent ‘Freight Prepaid’. AutoTest® has no preference on freight carriers.

Return freight details must be included.

Addressing

Please address to

AutoTest® Products Pty Ltd
Att: Service Department
69 Parsons St
Kensington, VIC 3031 AUSTRALIA
Phone: +61 3 8840 3000
Email: service@autotest.com.au

For international servicing, please contact AutoTest to find your closest distributor.

16 WARRANTY

16.1 Application of these Conditions

These conditions, including any written variations agreed by us, apply to all supplies made by AutoTest® Products Pty Ltd (the Supplier) to the purchaser identified in the relevant invoice or contract. Together with these conditions, as amended from time to time under their terms, the applicable payment terms, invoices, and purchase orders exchanged between the parties form the contract.

16.2 Inconsistencies

Where the supply purports to be made on or subject to terms and conditions other than these conditions, the Purchaser agrees that such other terms and conditions are disregarded and form no part of the Contract unless the Supplier agrees otherwise in writing.

16.3 Warranty Terms and Conditions

When you purchase an AutoTest® Product you are required to complete the warranty registration form and return to AutoTest® Products Pty Ltd within 10 days of purchase of the product.

AutoTest® Products or any Authorised AutoTest® 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 AutoTest® Products which can be identified by the trade name or logo affixed to them or by other documents.

AutoTest® Products does not warrant any products not supplied by AutoTest® Products.

Our goods come with guarantees that cannot be excluded under the Australian Consumer Law.

Subject to section 8.1 within the Standard Terms and Conditions of Contract as well as the terms below; as your Standard Warranty AutoTest® agrees to repair or replace at AutoTest®'s cost the AutoTest® product, and any AutoTest® accessory supplied with the product, purchased by you in Australia from a AutoTest® Authorised Dealer when the product does not perform in accordance with the manufacturer's specifications during the Warranty Term, commencing from the date of purchase. Transit insurance and return freight will be at the owner's expense.

AutoTest® Products or any Authorised AutoTest® 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 modification 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.

Products presented for repair may be replaced by refurbished products of the same type rather than being repaired. Refurbished parts may be used to repair the products. Replacement of the product or a part does not extend or restart the Warranty Term.

The product will be at the owner's risk whilst in transit to and from the AutoTest® Authorised Service Centre.

AutoTest® will bear the expense of transport where transported by AutoTest® or its Authorised representatives. Any other expense of claiming the warranty will be borne by you.

AutoTest® and its Authorised Service Centres may seek reimbursement of any costs incurred by them when the product is found to be in good working order.

AutoTest® Products or an Authorised Service Centre is not responsible for incidental or consequential damage 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.

To the full extent permitted by law, but subject always to 8.1, the Standard Warranty does not cover:

- If the product has not been installed, operated, maintained or used in accordance with the manufacturer's instructions or specifications provided with the product.
- If the factory-applied serial number has been altered or removed from the product.
- To damage, malfunction or failure resulting from alterations, accident, misuse, abuse, fire, liquid spillage, mis-adjustment of customer controls, use on an incorrect voltage, power surges and dips, thunderstorm activity, voltage supply problems, tampering or unauthorised repairs by any persons, use of defective or incompatible accessories, the operation of a computer virus of any kind, exposure to abnormally corrosive conditions or entry by any insect, vermin or foreign object in the product.
- The use of proper paper and stationery is very important to the operation of products with printers. Use of non-standard paper will jam the printer and/or wear the print head. Use of non-standard paper will void the warranty.
- Repairs attempted or made by other than our regional repair centre or authorised warranty service centre.
- To damage arising during transportation, installation or while moving the product, or to any transportation costs of the product or any parts thereof to and from the owner, unless otherwise specified in these Warranty Terms.
- 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.
- To any third-party software or hardware not contained in the product as originally configured by the manufacturer.
- To any failure, to the extent that the failure is not a failure of the product to perform in accordance with its specifications.
- To replacement or repair of any
 - 1) consumables (including cables), paper, ink ribbons or
 - 2) batteries (beyond 3 months from date of purchase), or

- 3) lost parts or accessories.
- To service of any product whilst it is outside Australia.
- To any wear and tear.
- AutoTest® will not be liable for any loss, damage or alterations to
 - 1) third party hardware or software.
 - or
 - 2) programs, data or information stored on any media or any part of the product, no matter how occurring.
 - or
 - 3) for any loss or damage arising from loss of use, loss of profits or revenue, or for any resulting indirect or consequential loss or damage.
- Modified, abused, neglected, accidentally damaged or excessively worn products, or products that have become damaged or defective as a result of improper use.
- AutoTest® products that are not distributed through AutoTest's authorised distributors and resellers.

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

Warranty is subject to AutoTest® Products Standard Terms & Conditions published widely. For more detailed warranty clauses, please visit our website www.autotest.net.au/terms-and-conditions/.



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sales@autotest.net.au