



682 EMISSIONS ANALYSER

OPERATING INSTRUCTIONS

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Important Information

Every reasonable effort has been made to ensure that information within these Operating Instructions is correct at the time of release, but we cannot accept responsibility for any errors that may occur.

The information in these Operating Instructions is subject to change without notice and does not represent a commitment on our part.

Service & Warranty

The reliability of this equipment is fully supported by our service agents, with repair workshops and field service engineers to provide a full range of After-Sales Care, including installation, contract maintenance, factory overhaul and emergency repairs on site. Please refer to the page at the end of this manual for full details.

Note: If a service engineer is called out under service warranty where, upon inspection and test the equipment is found to be in full working order and no fault found, the user is liable to be charged the cost incurred for this call out. Before calling out an engineer, ensure your equipment is faulty by checking its operation, particularly mains supply and fault codes/self test if applicable.

Software Licence

Further to our general Terms & Conditions of Sale, the software described in these Operating

Instructions is furnished under the following Software Licence Agreement:

1. Licence: You may use the program on the machine provided. You may not copy, duplicate or transmit the program in any form, in whole or in part, without the express prior written permission of the owner.
2. Term: The licence is effective until terminated. You may terminate the licence by destroying the program together with all copies, or returning the program to the manufacturer.
3. We do not warrant that the program will meet your requirements or that its operation will be uninterrupted or error free.
4. In no event will we be liable to you for any incidental or consequential damages, including lost profits, business operation and the like, arising out of the use or inability to use this program.

You acknowledge that you have read this Agreement, understand it, and agree to be bound by its provisions.

WARNING: Do not attempt to operate this equipment unless you have read and understood these instructions.

Important Information

Safety Precautions

1. The equipment is not weatherproof and should not be used outside in rain or snow.
2. The internal circuits and components of the analyser should not be tampered with. No internal parts are operator serviceable.
3. Operators should exercise due caution with regard to the engine fan and associated belts.
4. Always provide ventilation by using an exhaust gas extraction system or by having an adequate supply of fresh air.

WARNING: Carbon Monoxide is a highly poisonous gas. If breathed in, it is absorbed by the blood and will result in greatly slowed reactions and if absorbed in sufficient quantity can be fatal. Published figures show that a concentration of 0.3% CO in the air can be fatal if inhaled for 30 minutes.

5. Before starting an engine, ensure that the gear selector is in neutral or park.
6. Care should be taken with regard to scalding from the cooling system, burns from the exhaust system and electric shocks from the ignition HT system.
7. When disconnecting the fuel system of a hot engine beware of the fire hazard caused by petrol spilling onto manifolds, ignition distributor, etc.
8. Position the mains cable and sampler pipe in such a manner that they do not present a hazard to anyone.

Electrical Safety Precautions



During operation the unit must be earthed.

- Any power or extension cord must have an earth conductor which SHOULD ALWAYS be connected to a good electrical point
- When replacing fuse make sure the correct type and rating is used
- see Technical Specifications (page 28)
- Any adjustment, maintenance or repair must be carried out by an approved service engineer

Introduction

The 682 series Analyser is a fully microprocessor controlled exhaust gas analyser employing Non-Dispersive Infra-Red (NDIR) Techniques. The unit measures carbon monoxide, carbon dioxide and hydrocarbons. A further channel is provided employing Electrochemical measurement of Oxygen. Periodically the analyser will automatically carry out a zero check to maintain measurement integrity however, if desired a zero check can be commanded at any time by the operator.

Important Note: It is not recommended that the 682 is left for extended periods of non-use. This will result in the battery which supports the Real Time Clock of the unit completely discharging and may lead to operational problems, requiring an expensive service visit. To avoid this, power the unit up for at least 1 hour approximately once a month.

Extremes of Weather Conditions

Extremes in weather conditions can give very low temperatures. In such weather conditions and where temperatures are likely to fall below freezing, we recommend that you leave the unit switched on at all times.

This will reduce any effect of Temperature Cycling or dampness and assists in preventing any incidence of ice forming within the collection bowl / filter pipes or pump.

This is particularly beneficial if there is no background heating in your garage, or if there are high levels of cold through draft in low overnight temperatures.

Please note that the operating temperature range of this equipment is +5 to +40°C.

Reception

Reception

The 682 will operate on an A.C. mains supply voltage of 100 to 240 volts, 50/60 Hz.

There is no requirement to adjust the unit for supply voltages within this range

NOTE: The mains connection MUST include a good earth bond.

Unpack all items and examine for any damage. Check contents against the packing list enclosed for any loss or discrepancy. Report any breakage, loss or discrepancy to the supplier immediately.

Analyser Set Up

Set up the analyser as follows.

1. Connect sample probe hose to sample inlet port.
2. If not already fitted, remove the oxygen sensor from its packaging, screw into the housing and fit electrical connector.
3. The Analyser is available with an Engine Speed Adapter CDSS6 and an Oil Temperature probe DX211-11 + DX210-26



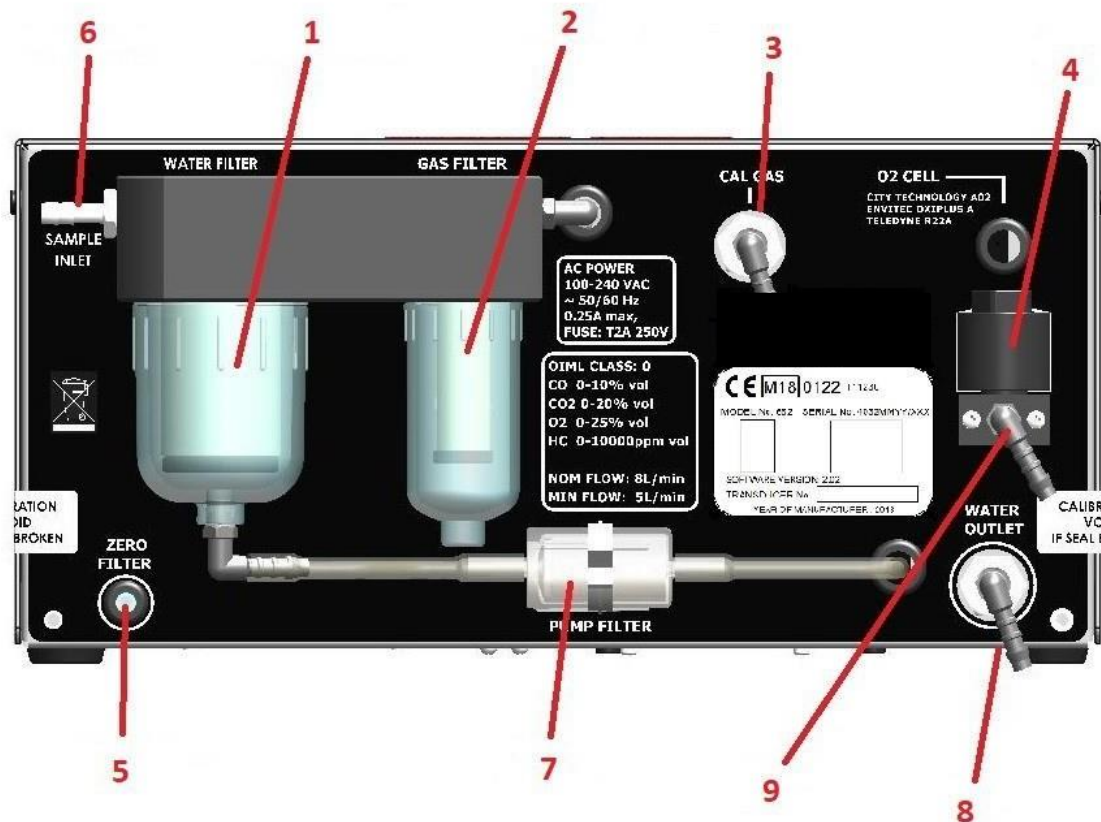
Engine Speed Adapter



Oil Temperature Probe

External Connections

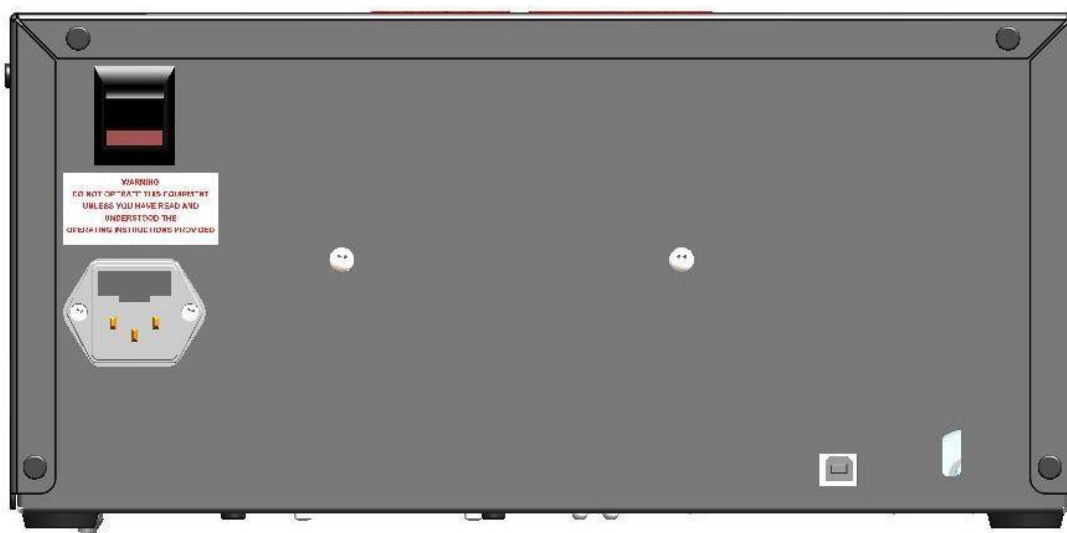
Filter Panel



1. Water Trap and Primary Filter
2. Gas Filter
3. Calibration Gas Port
4. Oxygen Cell
5. HC absorbent Zero Filter
6. Sample Gas inlet
7. Pump filter
8. Water Exhaust
9. Sample Exhaust

External Connectors

Mains Switch



1. Mains ON/OFF Switch
2. Fused Mains Inlet Socket
3. PC Communications USB

Desktop

Connect the unit to the supply and switch on. The PC will boot up and display the 'Desktop'.

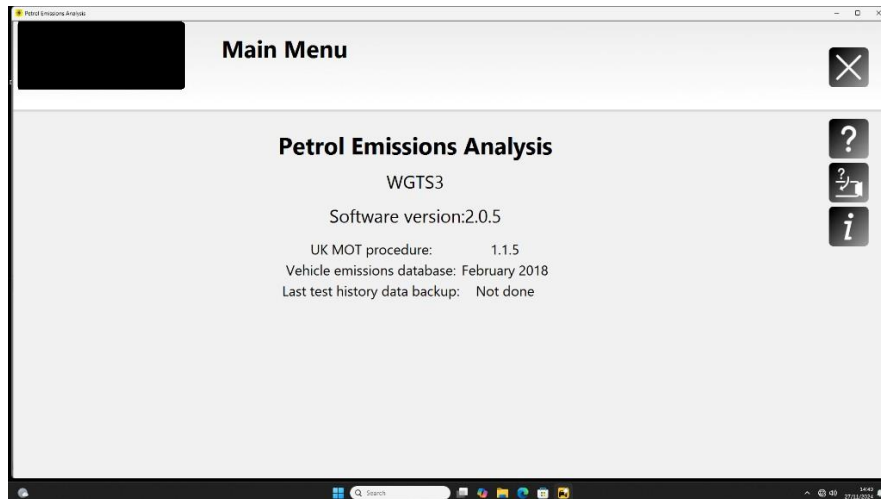
The Gas Analyser application is started by 'double clicking' the WGTS3 icon on the desktop. The unit will then perform an autozero. After the autozero the analyser will display the main menu screen as shown below. If the analyser is being switched on for the first time that day, a leak test will be required. Please refer to the next section 'Performing a Leak test'.

The analyser is controlled by means of the icons displayed down the right hand side of the screen.

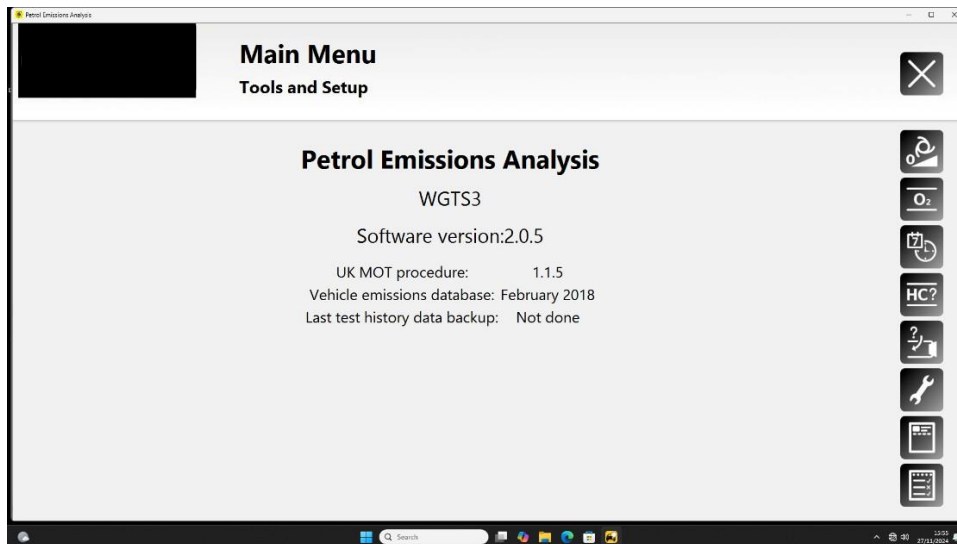
Note: Autozero's will be carried out by the analyser as and when necessary to maintain measurement integrity.

Controls And Operation

Main Menu



Tools & setup Menu



Icons Symbols

The icon functions are as follows:



Exit from program or current



Display context sensitive help.



Starts the MOT procedure.



Calls up a live display of gases, engine speed, oil temperature and calculated Lambda for test and repair operations



Information page. Contains data regarding software versions, serial numbers, PEFS, calibration dates.



Selects the next menu



Returns to previous menu



Next/continue.



Back/return



Accept



Cancel



Repeat



Print

Controls And Operation



Edit personal/garage header



Add/delete testers



Set/adjust time and date



Autozero



Check/replace Oxygen Cell



HC Residue test



Leak test



Service Mode



RPM set up



Oil temperature set up

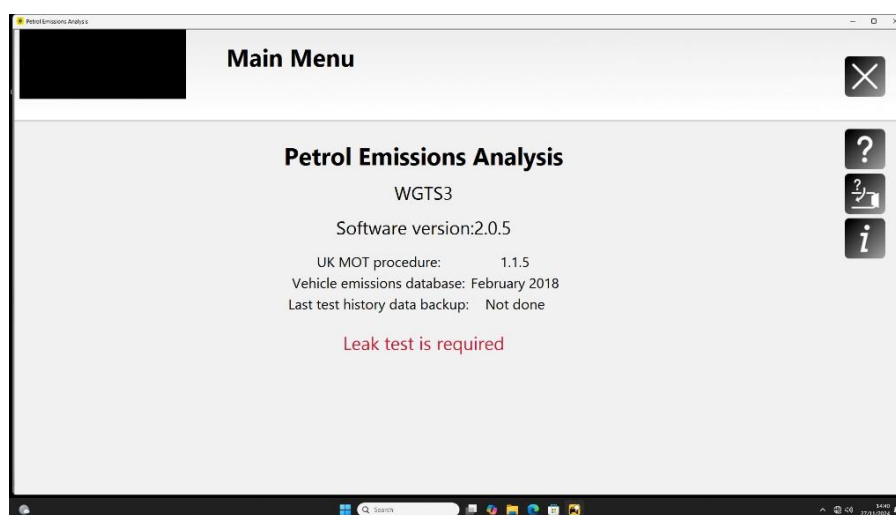


Pump on/off switch

Performing A Leak Test



At the start of each day, the analyser will force a leak test to be performed. The following screen will be displayed:



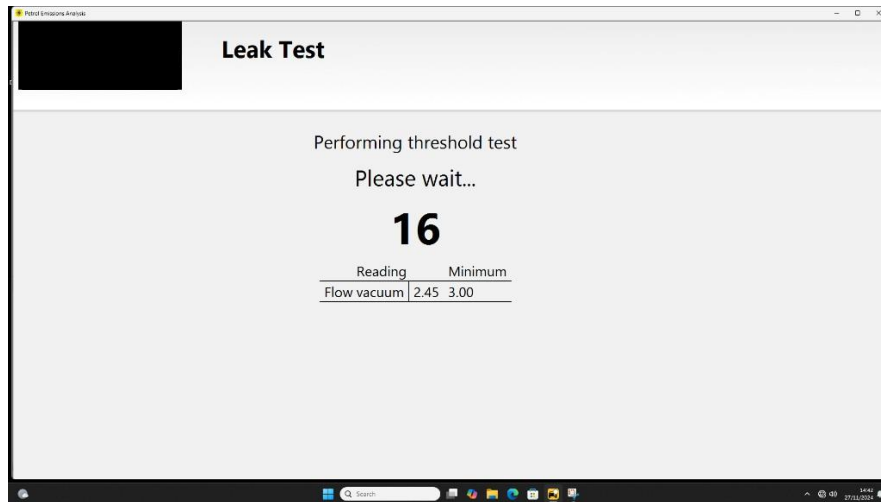
Click on the Leak Test icon and block off the end of the sample probe using the silicone adapter provided. Ensure that the adapter fully covers the holes in the probe end as shown.



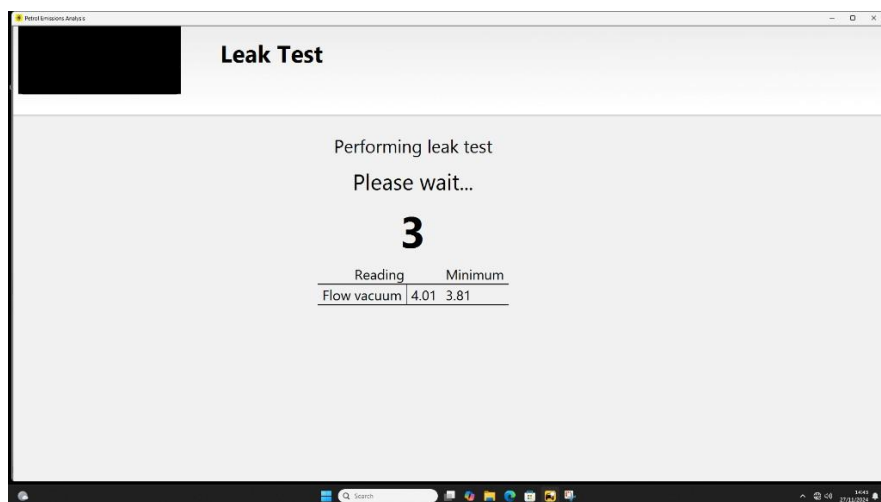
*Block Sample
Probe*

The analyser will then perform a threshold test. This is to ensure that the pump is operating correctly.

Controls And Operation



The flow vacuum must reach a minimum of 3.00 to pass this stage of the test This will be followed by the performing leak test screen.



The pump will turn off. The flow vacuum reading must stay above the minimum limit shown in green. This is an active limit and will vary depending on the overall vacuum reading at the end of the threshold test.



Live Readings

Connections to a vehicle

Sample Probe

Carefully insert the sample probe into the vehicle exhaust noting that it is not necessary to insert the whole length of the flexible section. Do not allow the flexible steel probe end to become kinked. Use the adjustable clip to secure the probe to the exhaust. Do not force the probe into the exhaust - some vehicles have very short tail pipe sections and it is possible to damage the probe and the exhaust itself.

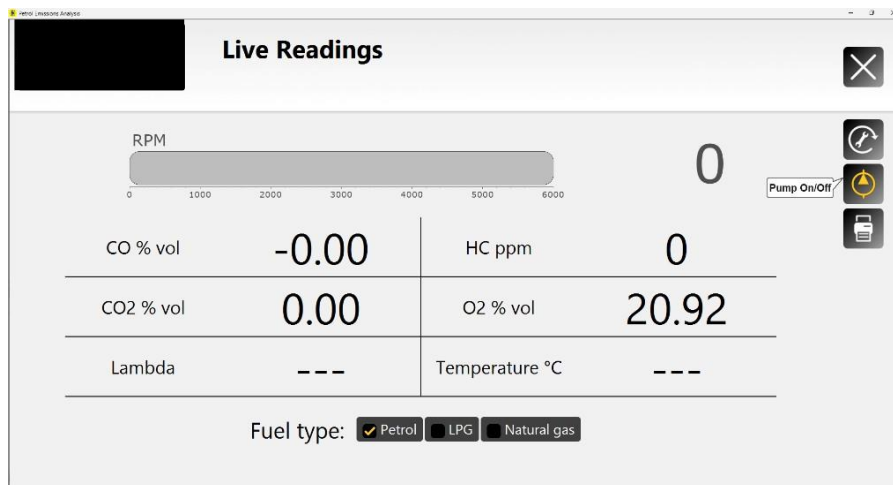
Take care when removing the probe from the exhaust at the end of the test. Do not roll up the sample pipe whilst it is still connected to the analyser as excessive amounts of water may enter the filter unit.

Obtaining Correct Measurement Results

To ensure that exhaust gas test results are correct it is vital that the following points are noted while performing the test.

- a. Before testing a vehicle ensure that:
 - The engine is up to normal operating temperature.
 - There are no leaks in the exhaust system.
 - The tachometer is set for the correct number of cylinders so that engine speed is correctly displayed, and that the engine is running at the required speed.
 - The exhaust sample probe is fully inserted.
 - The analyser is set for the correct fuel type for the vehicle under test - this ensures that the lambda calculation is accurate.
- b. The analyser will automatically perform an Auto Zero whilst warming up, and at intervals during use. Any internal errors will also be indicated and testing halted.
- c. The analyser will display error messages if faults are detected. These error messages fall into two categories:
 - Messages such as 'Failed leak test' and 'Restricted gas flow' are covered in other sections of this manual and can normally be fixed by the operator.
 - Error messages that indicate an internal fault can only be fixed by an Authorised Service Agent. The screen will explain the particular error.
- d. The measured results are presented on the screen as shown below and do not normally need any interpretation. Provided that the correct fuel type is selected the Lambda calculation will be correct. The engine should be run in a stable state for at least 20 seconds to allow gas readings to stabilise before results are recorded.

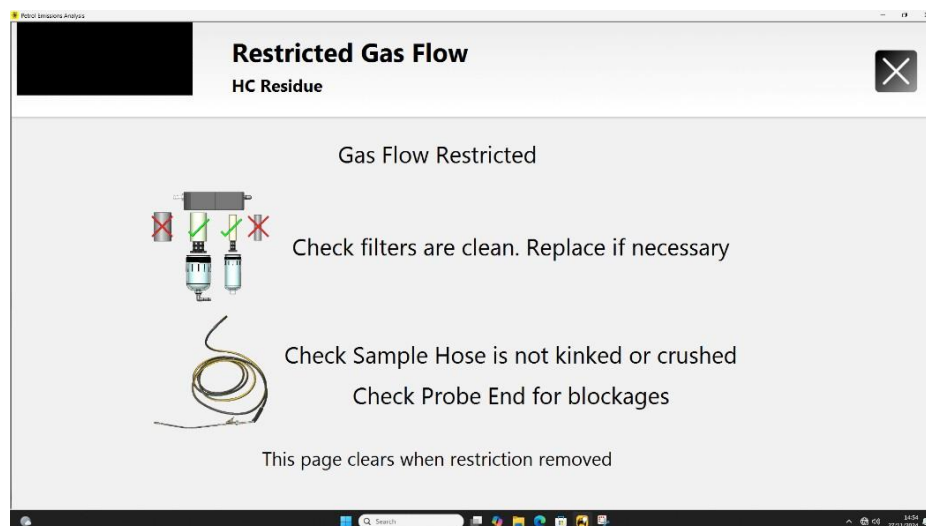
Controls And Operation



If there is no engine speed adapter fitted or it is not connected to an engine, the RPM reading will be 'greyed out'.

Selection of the different fuel types is made by clicking on the respective 'radio' button on the screen. The analyser will always default to Petrol.

Note: Should the filters become excessively contaminated, the sample probe become blocked or the sample pipe kinked or crushed, the following screen will be displayed.



For further information, please refer to the 'Troubleshooting' section of this manual

Controls And Operation

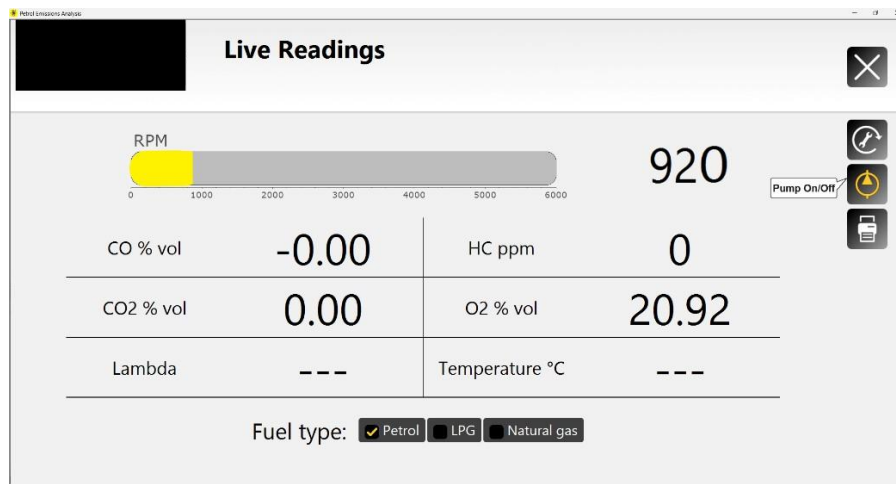
Oil Temperature Probe

CAUTION: Great care must be taken when performing the test to ensure that no damage to the oil temperature probe and/or engine is incurred by contact with moving engine parts.



Remove the dipstick from the engine and check that the oil is at the correct level. Compare the temperature probe to the dipstick and adjust the rubber bung so that the length of probe inserted into the engine is approximately 10mm shorter than that of the dipstick. Insert the probe into the engine via the dipstick hole. **DO NOT ALLOW PROBE TO COME INTO CONTACT WITH THE CRANKSHAFT.** The oil temperature will be displayed in steps of one degree on the Live Readings screen.

Engine Speed Adapter



Start the engine, turn on the vehicle lights, and allow engine to idle. Ensure all other vehicle accessories; internal blower, screen heater etc. are off. Attach the CDSS6 clips to the battery noting the correct polarity (or use the optional Accessory Socket lead). When prompted by the analyser program, set the correct number of cylinders of the vehicle engine. **BEWARE OF ROTATING PARTS.**

Allow the engine to idle while the CDSS6 initialises (this may take up to 15 seconds). When complete the unit will indicate the engine speed on the console screen.

Controls And Operation

If the indicated speed appears to be incorrect, reset the CDSS6 by disconnecting and then reconnecting one of the battery leads.

Note: On some vehicles readings may be unstable or inaccurate. To minimise the risk of this:-

- *Ensure that the vehicle headlights are switched on. Switch off cabin fan.*
- *Keep the engine speed stable during the initialisation time <17Sec.*
- *If, after initialisation the speed is stable but reading double, the incorrect cylinder setting has been selected on the programme prompt (Settings page) - change the cylinder setting until the correct value appears.*

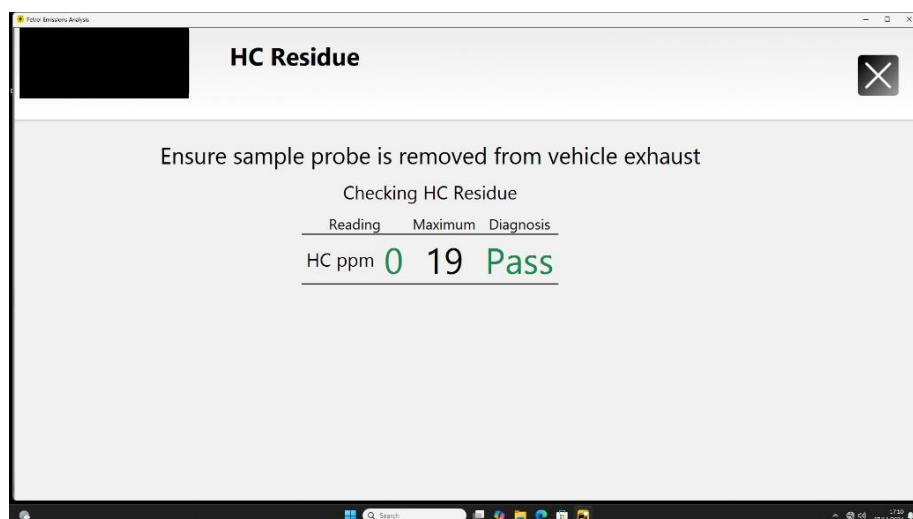
HC Residue Test



A residue test will always be performed immediately prior to taking measurements from a vehicle. Hydrocarbon molecules are extremely 'sticky' and will tend to adhere to all of the surfaces of the sample probe and filtration system. The residue test ensures that there is no 'hang up' of Hydrocarbons within the system which may adversely affect the measurements.

WARNING: It is essential that the sample probe is in free air before performing the test.

The HC reading must be below 20ppm for the duration of the test. If the reading is below 20ppm, the test will automatically exit.



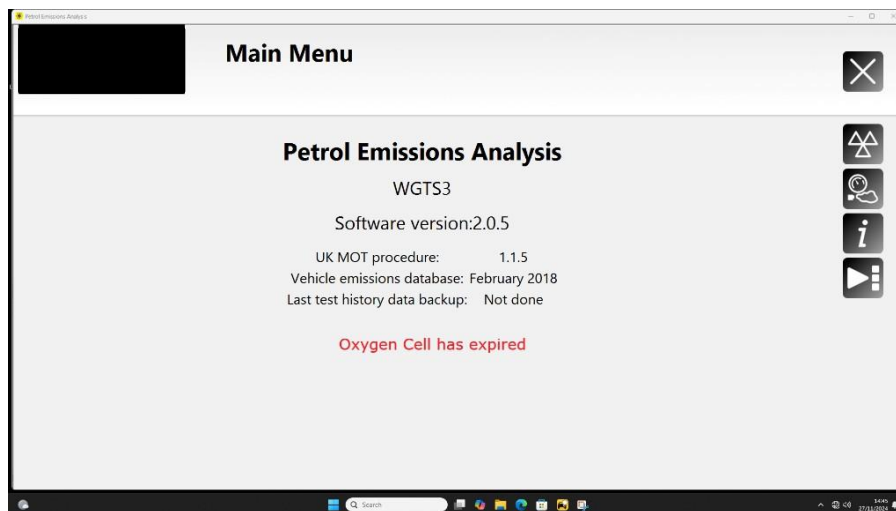
Readings of 20ppm and above will be displayed in red and the test will not exit until less than 20ppm is achieved. **NO ATTEMPT SHOULD BE MADE TO TEST A VEHICLE UNTIL THE HC RESIDUE IS BELOW 20ppm.**

Controls And Operation

Oxygen Cell Diagnostics



The Oxygen cell is a chemical voltaic device similar in many ways to a battery. As such, the cells are prone to wear out periodically. The lifetime of each cell on the usage. It is therefore advisable to always keep a spare cell available as it is extremely difficult to predict when the device may fail. Provided the spare is kept within its sealed packaging, it will have a very long shelf life. The Oxygen cell is tested at the end of the Autozero routine. If it fails, the following screen will be displayed:



To check and, if necessary, replace the cell, select Oxygen Cell Diagnostics.

Click on



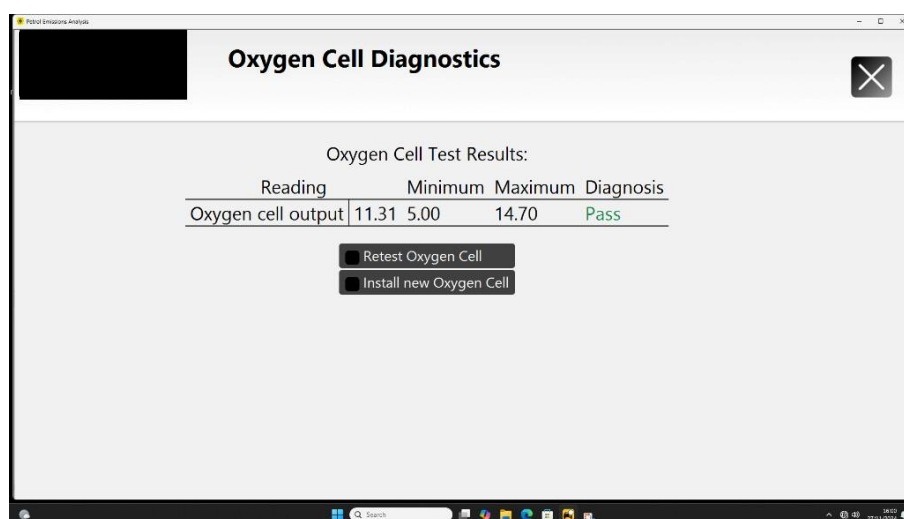
Selects the next menu

then



Check/replace Oxygen Cell

Controls And Operation



The Oxygen cell output is the voltage measured at the last Autozero. In normal operation the output must fall between 5 and 13 millivolts. For installation of a new cell, the software automatically tightens the limits to between 7 and 13 millivolts.

Before replacing the cell, carefully inspect the connector and wiring to ensure that it has not been disconnected or damaged. If it has become unplugged, reconnect and select Re-test.

To replace, carefully disconnect the connector from the top of the cell noting the orientation. Unscrew the existing cell and replace with the new. Reconnect the lead and select Install new cell.

Time/Date



Selecting the time/date icon allows the operator to change the current time. Only Authorised Service Personnel may change the date.

Service Mode



Allows calibration and setup of the analyser. May only be performed by Authorised Service Personnel or an Authorised Service Agent.

Note: There is a calibration timeout built into all legislative analysers, after which the unit will not operate without recalibration. This is currently 6 months in the UK. Other legislative markets may vary.

Controls And Operation

Routine Maintenance

The 682 analyser requires very little maintenance. However, to ensure trouble free operation it is essential to daily:

1. Check the condition of the filters and replace as necessary. Remove any build up of water from the Gas filter bowl.
2. Disconnect the sample hose from the analyser and blow out with an airline. **DO NOT APPLY THE AIRLINE TO THE ANALYSER ITSELF.**
3. Inspect the sample hose and probe for damage. Replace as necessary.

Gas Sampling and Filtration System

A Three stage filtration system is employed to remove carbon particles and moisture from the exhaust gases. No regular emptying of the water trap is required as water is automatically expelled from the system during normal use. However, under conditions of prolonged heavy use some water may find its way into the gas Filter bowl. This should not be allowed to build up to the point where it may enter and damage the analyser

The filtration system comprises a disposable pre-filter (fitted in the sample hose), a disposable water (coalescing) filter and a disposable Gas particulate filter.

Both the Water and Gas filters should be replaced regularly - they should not be allowed to become heavily sooted.

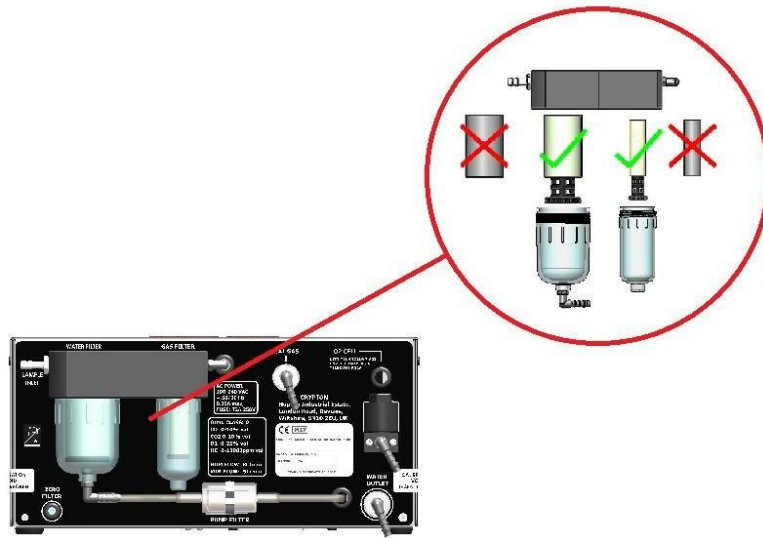
WARNING: A considerable amount of water can accumulate in the sampler pipe during normal use. NEVER roll up the pipe towards the analyser whilst still connected, as this will result in flooding the filters with water blocking the paper filter.

If a blockage occurs in the gas sampling system, the message 'GAS FLOW RESTRICTED' will be displayed. To determine the fault follow the procedure below:

Remove the sample hose. If the fault message clears, the blockage is in the hose or probe. Blow out the hose and probe with an air line (with the hose disconnected from the analyser) or replace faulty part. If the message persists, remove and clean/replace filters.

Controls And Operation

Cleaning/Replacing the Filters



Note orientation of filter bowls. Disconnect pipe from bottom of water trap and carefully unscrew the bowls. The filters can then be removed by unscrewing the retaining thumbwheel at the bottom of each one.

Both water and gas filters should be replaced - see Consumable spares for part numbers.

Note: When reassembling filter components, do not over tighten retaining thumbwheels or filter bowls.

WARNING: When dismantling and reassembling filter bowls, ensure that the O rings do not become damaged or displaced and that the pipework is not kinked or trapped. NEVER CLEAN USING SOLVENTS.

Troubleshooting

Description/error message	Action
The 682 gas Analyser is not communicating	Check communication cable Check Analyser module switched on Check Mains supply OK
Leak Test threshold failed	Check pump running. Disconnect sample hose from analyser, block sample inlet and re-test. If test passes, check sample probe and hose for leaks. If test fails, check filter bowl O rings for
Leak Test failed	Disconnect sample hose from analyser. Block sample inlet and re-test. If test passes, Check sample probe and hose for
HC residue Test failed	Check sample probe is away from fumes such as petrol. Blow out sample probe & pipe assembly. Change gas filters if heavily contaminated. Wash filter
Gas Flow Restricted	Disconnect sample hose from analyser, if condition clears, check probe and hose assembly for blockages. Ensure sample hose not kinked or crushed. Clean/replace filters.





Consumable Spares

Consumable Spares

The following parts can be ordered by contacting your authorised agent.

 CR0135	Sample Hose and Probe A2C87844900
 CR0136	Sample Probe only (flexible) A2C88660300
	Water Filter A2C18394500
 CR0138	Gas Filter A2C18394700
 CR0139	Pre-filter A2C88114200

Consumable Spares

 A red cylindrical oxygen sensor with a yellow label featuring a triangle and some text. The label also has a small logo on the right side.	Oxygen Sensor A2C88396300
 A long, thin metal probe with a small, dark, rectangular sensor head at one end.	Oil temperature Probe A2C89335700
 A black, cylindrical cap with a metal chain attached to it. The chain is coiled and has a small, dark, rectangular sensor head at one end.	Leak Test Cap A2C88984600
 A blue, cylindrical pump filter with a white, pleated filter element inside. It has two metal tubes extending from the ends.	Pump Filter A2C88864000

Technical Specifications

Operating Parameters

Measured Gas

HC	Hydrocarbons
CO	Carbon
CO ₂	Monoxide
O ₂	Carbon Dioxide
	Oxygen

Ranges

CO	0 to 10%
CO ₂	0 to 20%
HC	0 to 10000 ppm
O ₂	0 to 25%

Accuracy/Performance

OIML R99 Class 0

HC	± 10 ppm HC	absolute or 5% of reading, whichever is wider.
CO	±	
0.03% CO		
CO ₂	± 0.50% CO ₂	
O ₂	± 0.10% O ₂	

Resolution

HC	1 ppm
vol. CO	
0.01% vol. CO ₂	
0.01% vol. O ₂	0.01%
vol.	

RPM

0 - 10,000 rpm with DIS/Wankel and 4 stroke selection

Oil Temperature

0 – 120 °C

Technical Specifications

Lambda

Calculated using Brettschneider formula.

Resolution	0.001
Fuel type selection:	Unleaded, L.P.G. or Natural Gas

Environmental

Operating temp.	+5 to +40 °C
Storage temp.	-20 to +55 °C

Relative Humidity

90% non condensing

Warm-up Time

60 Seconds

Response Time

11 seconds to 95% of final reading with 8 metre sample hose

Flow Rate

8 litres/min nominal

5 litres/min minimum

Operating Pressure

750 - 1100 mbar

1000 mbar nominal

Power Requirements

100 - 240V AC, 50 - 60 Hz

Fuse Rating

T2A 250V 20mm Antisurge

Power Consumption

60 watts maximum

Size

343mm (13.5") W x 220mm (8.7") D x 170mm (7") H

Weight

3.7kg

Technical Specifications

LAMBDA Calculation

The analyser calculates lambda using the BRETTSCHEIDER Formula:

Lambda =

$$\lambda = \frac{\left(CO_2 + \frac{CO}{2} + O_2 + \left(\frac{H_{cv}}{4} \times \left[\frac{3.5}{3.5 + \frac{CO}{CO_2}} \right] - \frac{O_{cv}}{2} \right) \times (CO_2 + CO) - \frac{W_{cv}}{2} \right)}{\left(1 + \frac{H_{cv}}{4} - \frac{O_{cv}}{2} \right) \times (CO_2 + CO + [K_1 \times HC])}$$

Where: [...] = concentration in % vol and ppm vol respectively
K₁ = conversion factor for FID (flame ionisation detector) against NDIR (Non Dispersive Infra-Red)
H_{cv} = atomic ratio hydrogen to carbon
O_{cv} = atomic ratio oxygen to carbon
W_{cv} = 0

Constants

H_{cv} = 1,890
O_{cv} = 0.016
K₁ = 6x10⁻⁴
W_{cv} = 0

Disposal of equipment



- Do not dispose of this equipment as miscellaneous solid municipal waste but arrange to have it collected separately.
- The re-use or correct recycling of electronic equipment (EEE) is important in order to protect the environment and the wellbeing of humans.
- In accordance with European Directive WEEE 2002/96/EC, special collection points are available for the delivery of waste electrical and electronic equipment.
- The public administration and producers of electrical and electronic equipment are involved in facilitating the processes of the re-use and recovery of waste electrical and electronic equipment through the organisation of collection activities and the use of appropriate planning arrangements.
- Unauthorised disposal of waste electrical and electronic equipment is punishable by law with appropriate penalties.

Disposal of batteries



- Batteries must be recycled or disposed of properly. Do not throw batteries away as part of normal refuse disposal.
- Do not throw batteries into open flame.

Aftersales

After Sales Service

Apart from the routine maintenance and adjustments stipulated in this manual the equipment must not be tampered with in any way. All further servicing must be carried out only by an engineer from an Authorised Agent. Failure to observe these conditions will invalidate the Guarantee.

Legal notice

The information in this document contains only general technical descriptions and performance characteristics, the applicability of which can depend on further factors in case of actual use. It is not meant or intended to be a specific guarantee of a particular quality or durability. An obligation to provide the respective characteristics shall only exist if expressly agreed in the terms of contract. We reserve the right to make changes in availability as well as technical changes.