User Manual

INNOVA 3000

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The INNOVA 3000 is manufactured by TEN and conforms to requirements of, and in accordance with the EMC directive 89/336/EC.

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1 Introduction

Thank you for choosing to purchase the INNOVA 3000 Exhaust Emissions Analyser manufactured by TEN Automotive. Please take a few minutes to read this User Manual carefully!

The INNOVA 3000 is designed to comply with the highest technical and accuracy requirements of modern day, mandatory vehicle testing, worldwide. The flexibility and smart design of the INNOVA 3000 facilitates a wide range of options for testing and measuring exhaust emissions of vehicles with Petrol, Diesel, LPG and CNG engines.

The INNOVA 3000 boasts the achievement of gaining MID Type Approval, meeting the demands and technical specification required for Government vehicle testing throughout Europe. The non dispersive, fully digital infrared gas bench incorporates the component quality and technology required for high accuracy emissions testing, with the minimum of maintenance. The gas processing system is protected from moisture and contamination by the combined automatic drain and filtration system.

The heart of the INNOVA 3000 comprises of a powerful personal computer controlling the software processes and program routines resulting in a clear, high resolution visual display presentation on the full colour flat panel monitor. With data entry and software program control via the QWERTY keyboard and mouse, the INNOVA 3000 performs easy, step by step test routines, with the minimum of effort. Test results can be stored on PC as well as printed on the A4 colour printer.

For quick and comprehensive diagnosis the INNOVA 3000 is fitted with RPM and OIL/Engine Temperature measurement capability with a range of accessories and adaptors to keep up with advances in motor vehicle technology. These range from inductive RPM Clamps, Pulse Sensors and Oil Temperature Transducers to "Bluetooth connectivity" Data interface devices such as OUBT, CobraScan and EDA2 "Compact" portable smokemeter. Please contact your supplier for further information and available options.

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2 Front Screen and Connection Panel
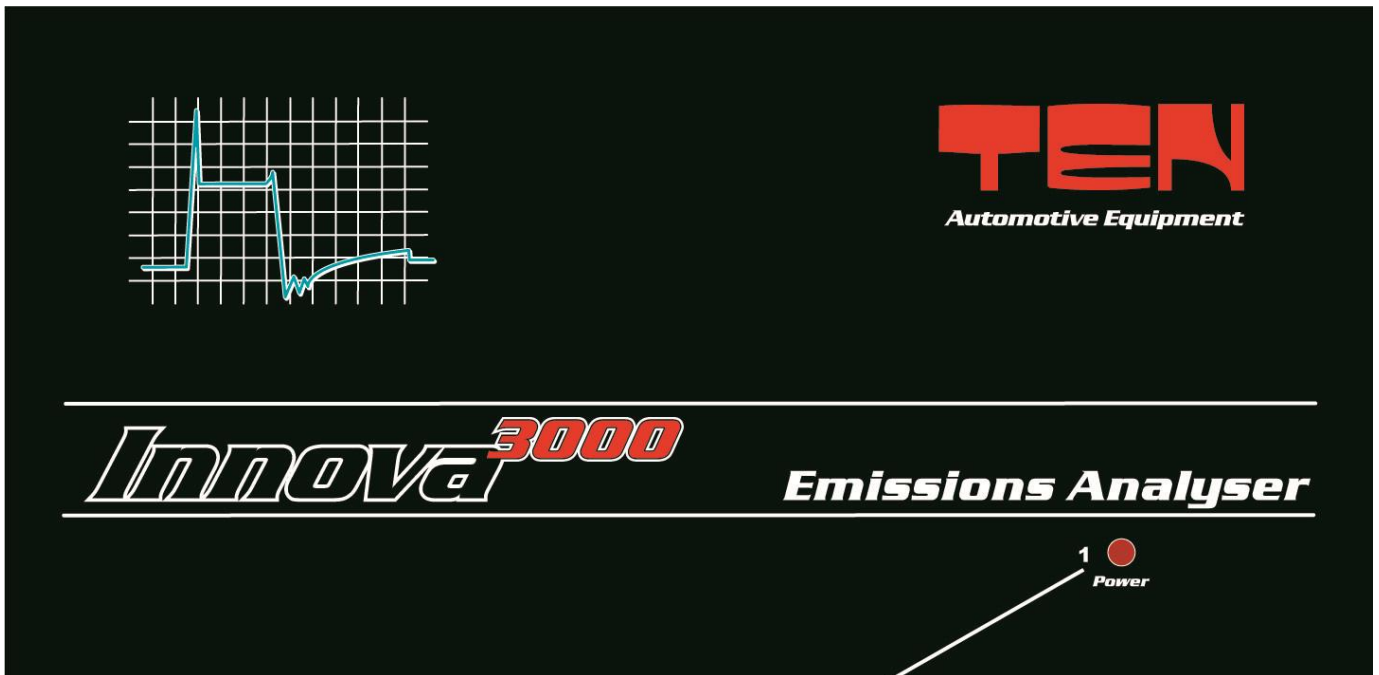

Figure 1: Front Screen of the INNOVA 3000

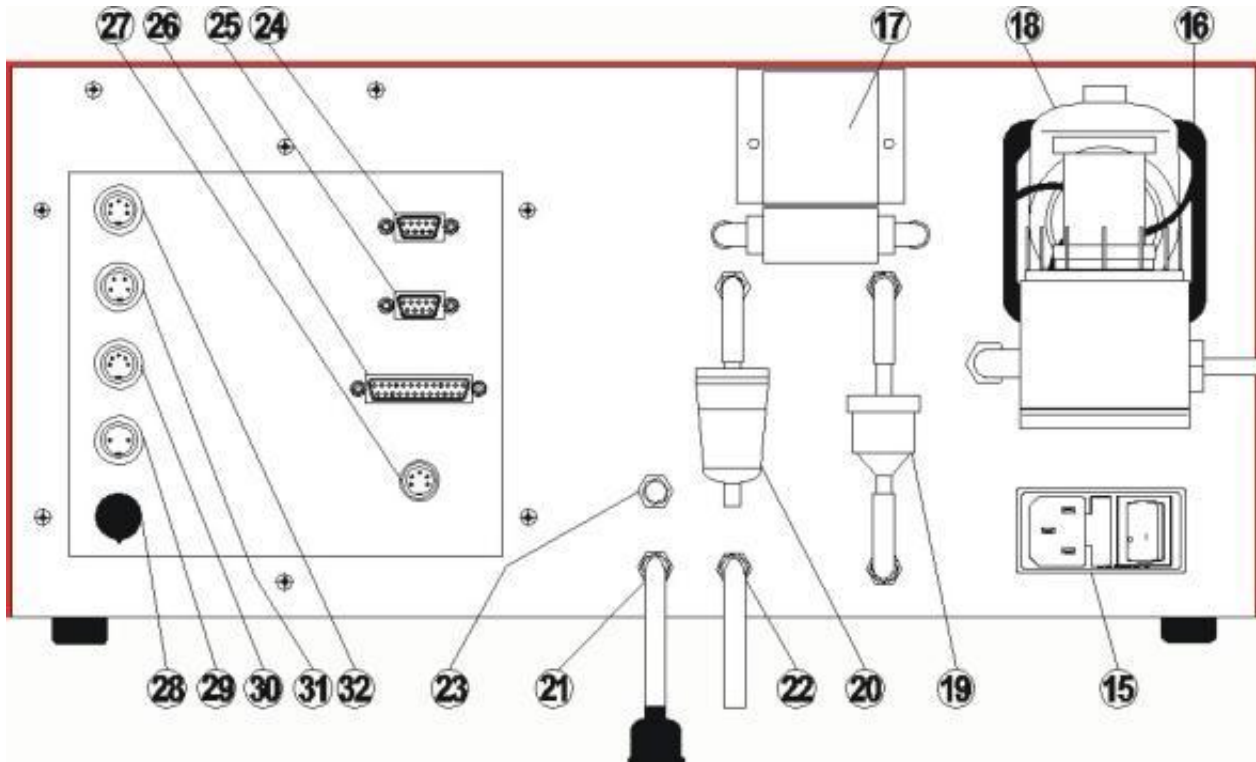1:   LED indication power on/off.

Figure 2. Connection Panel of the INNOVA 3000

15.   Mains voltage input with main switch and fuses (2x2AT).
16.   Fan.
17.   Oxygen Sensor.
18.   Drain separator with integrated pre-filter, fine filter and connection for sample probe
19.   Inline filter (water drain system).
20.   Carbon filter.
21.   Gas outlet with leak check adapter.
22.   Water outlet, (water drain system).
23.   Calibration gas inlet.
24.   COM 1, RS 232 communication port INNOVA 3000 to smoke meter
25.   COM 2, RS 232 communication port INNOVA 3000 to PC.
26.   Not used.
27.   Not used.
28.   Not used.
29.   Connection for the inductive RPM clamp.
30.   Connection for the Piëzo or optional RPM Pulse adapter.
31.   Connection for the Oil temperature probe.
32.   Connection for the Multi meter cable

3 Specifications of the INNOVA 3000

POWER SUPPLY

Voltage	220/240 Volt AC
Frequency	50 Hz
Power	60 Watt max.

RANGES

Carbon monoxide CO	0-10 % vol
Carbon dioxide CO_2	0-20 % vol
Hydrocarbons HC	0-10000 ppm vol
Oxygen O_2	0-25 % vol
Lambda	0.000-9.999
RPM	400- 10000 1/min
Oil temperature	0-150 °C
Multi meter	0-2, 0-10, 0-100 volt dc

RESOLUTIONS

Carbon monoxide CO	0.01 % vol
Carbon dioxide CO_2	0.1 % vol
Hydrocarbons HC	1 ppm vol
Oxygen O_2	0.01% vol ($O_2 < 4$ % vol)
	0.1 % vol ($O_2 \geq 4$ % vol)
Lambda	0.001
RPM	10 1/min
Oil temperature	1 °C
Multi meter	0.1, 0.1, 1 volt dc

REMAINING PARAMETERS

Warm-up time	10 minutes
Response time	12 seconds
Nominal sample flow	300 litres per hour
Ambient temperature	5 - 40 °C
Storage temperature	5 - 60 °C

4 Principle and operation

The fundamental principle of the Gasbench, where the exhaust gas is guided through for measurement, is based on non dispersive infrared absorption, also known as NDIR. While the Gasbench emits infrared light through the measuring chamber, certain gasses are absorbing the light. This level of absorption gives a direct lead of the gas concentration in the measuring chamber. Every gas absorbs the infrared light at a different frequency area. The Gasbench is fully digital and with its own microcontroller it calculates, compensates and linearizes every gas value.

The following gas components are found in the exhaust emissions of motor vehicles equipped with an electrical ignition. The INNOVA 3000 provides simultaneous measurements of:

- CO carbon monoxide
- CO_2 carbon dioxide
- HC hydro carbons
- O_2 oxygen

In addition to the infrared gasbench the INNOVA 3000 is also equipped with an electro-chemical sensor which measures the oxygen concentration in the sampled exhaust gas. With the data from both the oxygen and infrared Gasbench readings, a lambda calculation is made. This so called lambda value gives an indication about the efficiency of the combustion, i.e. if the engine is running too rich or too lean.

The RPM meter of the INNOVA 3000 is interrupt triggered and, as a result, is very accurate. After intricate filtering of disturbances and interference the pulse or signal is directed to the microcontroller which calculates the pulse into a numeric value. This technique offers a smart solution to easily select the RPM sensor used and appropriate division factor.

The Oil temperature probe is equipped with a heat sensing semiconducting resistor. As the temperature of the sensor changes, also the resistor value of the sensor changes so every change in Oil temperature can be determined.

5 User information

Using the sample probe

For sampling the exhaust gas the INNOVA 3000 is equipped with a 7 metre long hose fitted with a stainless steel 'flexible tip' exhaust sample probe. Insert the sample probe at least 30 centimetres into the exhaust tailpipe of the vehicle. Clasp the spring of the probe around the tailpipe if possible.

Although the probe is flexible, never bend the probe excessively as this may cause leakage. Ensure that the exhaust extraction system does not influence the sample system of the analyser.

IMPORTANT!: Take care when removing the sample probe after measurement as the probe can reach temperatures in excess of 100 ºC due to hot exhaust gasses. Always grip the handle of the probe and if necessary use gloves.

Using the inductive clamp

The inductive clamp is used to record the engine speed of vehicles with a petrol engine. Position the inductive clamp around one of the spark plug leads. Take care that this lead isn't bundled with other leads as this can create noise signals on the clamp and therefore results in an incorrect RPM measurement. Take care that the direction of the arrow on the clamp points towards the spark plug.

Please note it is possible to adjust the division ratio of the RPM signal for a correct RPM measurement (for example; on DIS systems or coil output lead).

Using the Oil temperature probe

The Oil temperature probe monitors the actual temperature of the engine. Please ensure the engine is turned off. Remove the vehicle's dipstick and adjust the length of the temperature probe to the length of the dipstick. Place the Oil temperature probe into the dipstick-hole, to the predetermined length, and start the engine.

IMPORTANT!: Be sure the length of the probe is adjusted correctly otherwise serious damage may occur, to the engine or the probe itself. Caution is advised when working on or near to a vehicle's engine. Be aware of moving belts and pulleys and there is a burn hazard as some parts of the engine and exhaust system can have extreme high temperatures.

After completing the test, switch the engine off. Remove the Oil temperature sensor and replace the vehicle's dipstick.

Conditions of operation

The Innova must be connected to a proper mains power outlet with the correct output power rating and a protective earth contact. Use of an extension reel or lead is not recommended.

Avoid working with hydrocarbons (and oil based products) in the direct area of the analyser. The residual vapour may affect the test results and cause 'HC hang-up'. Always use the gas analyser in a well ventilated area.

Operation temperature of the Innova must be between +5 and +40 [°C] and relative humidity must not exceed 90 [%]. If these limits are exceeded the measurement accuracy can no longer be guaranteed. At this point any legal measurement is not allowed.

IMPORTANT! Do not allow the operational or storage temperature of the Innova to fall below +5°C as freezing may occur in the water drain system and cause subsequent damage. Damage may also occur to the PC if subject to freezing conditions.

IMPORTANT! Always use good extraction facilities in the workshop. Vehicle exhaust emissions contain gaseous toxic components like carbon monoxide that can be fatal, or seriously harm your health.

6 Using the INNOVA 3000

The INNOVA 3000 is delivered complete, assembled, installed with software and is ready to use. Please note the INNOVA 3000 contains a PC computer which is located in the cabinet. Ensure the PC is switched on when operating.

The INNOVA 3000 program runs on a 'Windows' operating system. Please take care you shut down the program and computer properly, otherwise system errors may occur. Switch the INNOVA 3000 on with the main switch on the connection panel at the rear. The front screen 'power' indicator will illuminate.

Ensure the printer contains enough paper and the printer power is switched on. Fill the paper tray/feed if required.

After performing the power-up sequence the Innova 3000 test program will automatically start. Please note there is an approximate 10 minute warm-up period before exhaust gas measurement can be performed.

Operating the INNOVA 3000
Operation and presentation of the Innova program is done by the PC computer. The computer is supplied with a colour flat panel monitor, keyboard and a mouse.

The monitor
At the front of the flat panel monitor there are some control buttons and a power switch to switch the monitor on/off. We advise that this is left switched on all the time as the monitor will automatically go into 'standby mode' as soon as the computer is shut down and will power up when the computer is switched on again. Please refer to the manual, supplied with the monitor, if necessary.

Keyboard and Mouse
During operation of the INNOVA 3000 program, the keyboard is used to make function selections and data entry. After power-up of the computer the 'num lock' led should illuminate on the keyboard indicating it is ready for use. In addition to the keyboard, the Innova is also equipped with a mouse. You can move the pointer and use the select to activate program functions. Data or text input is not possible with the mouse.

Operating the INNOVA 3000 program
The INNOVA 3000 software program is menu driven. After power-up the Innova program performs an automatic system self check before the 'Main menu' is initialised. At this point a message will be displayed if an error is detected. From the 'Main menu' a number of sub-menus can be selected, for example 'Petrol menu' or 'Diesel menu'. This form of menu structuring allows the Innova to be operated very easily. In most menus the function keys (F1, F2 etc.) are active and its function is represented in the "F" key list at the bottom of the Innova screen. The "Tab" key or "Shift + Tab" key allows you to toggle between different groups or columns, for example menu items or keys in the "F" key list. Within a group or column individual items can be highlighted with the arrow keys and selected with the Enter key.

The mouse can also be used to select an item. Move the pointer to the item and click the left mouse button to confirm the choice.

Basic keyboard and mouse functions for the INNOVA 3000 program are typical for any 'Windows based' program. It is advisable to use the function keys on the keyboard when operating the Innova program. Mouse control is not normally required.

7 Periodic Checks

As mentioned previously, the INNOVA 3000 executes some internal self checks during start up. In addition, the INNOVA 3000 performs periodic control checks to ensure the integrity of the sampling and measurement system. These checks include the Leak check test, the HC residue check and Gas calibration.

The Leak check test
This test is performed weekly (or daily). The INNOVA checks for leaks within the exhaust gas sampling system. Follow the software prompts carefully ensuring a good "airtight" connection seal between the sample probe and the Leak check adapter. Press the Enter key, the program will perform a leak check automatically.

If the test fails, the Official and Standard test will be blocked. You can repeat the leak check by selecting the following sequence: Main menu -> Petrol menu -> System diagnosis -> Leak check

The HC residue check
The HC residue check is automatically performed before a measurement. During this test it is determined how many hydrocarbons are present in the current ambient air or if there is any HC residue left from a previous measurement. EU Regulations state that this amount must not exceed 20 ppm. If the concentration is higher than 20 the Official and Standard test will be blocked. If this occurs the HC residue check should be started over again by selecting the following sequence: Main menu -> Petrol menu -> System diagnosis -> HC-residue check. Please note that during this test, the sample probe must not be positioned in or near the exhaust tailpipe. Fuel vapour, brake cleaner, oil or other hydrocarbons may also influence the test.

Gas calibration

The INNOVA 3000 requires calibration every twelve months to ensure accuracy of measurement. Only qualified service personnel should perform this task as a special composite calibration gas is required and applied during a "controlled" calibration procedure.

During power-up the INNOVA 3000 monitors the date of the last successful calibration and displays a 'calibration due' message if the Innova is within 14 days of the calibration due date. Failure to calibrate before the calibration due date will result in exhaust gas measurement being blocked.

8 Messages

While using the INNOVA 3000 certain graphical screens or messages may appear to notify, or prompt the User of an event or a fault. Some of these messages will be displayed with additional text.

Warm up
This message is displayed if the INNOVA 3000 gas bench is in the warm-up phase and may take up to a maximum of 10 minutes to complete. The INNOVA 3000 will not allow exhaust gas measurement during this warm-up phase.
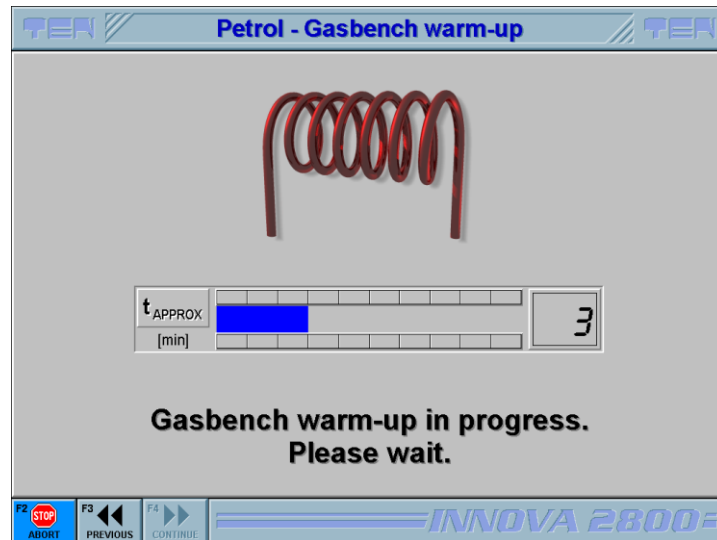

Zero calibration
Zero calibration is required frequently, at a number of stages in the program, to ensure that changes in ambient temperature do not affect the accuracy of measurement. During this process, measurements are prevented and a symbol is displayed.
During Standard test measurement, a Zero calibration is necessary every 30 minutes or, it can be activated or 'forced' using the special Zero function key. This will allow ambient air to flow through the carbon filter and gas bench, to ensure the zero reference settings are correct.
Please note at this point the exhaust sample probe does not need to be removed from the tailpipe of the vehicle.
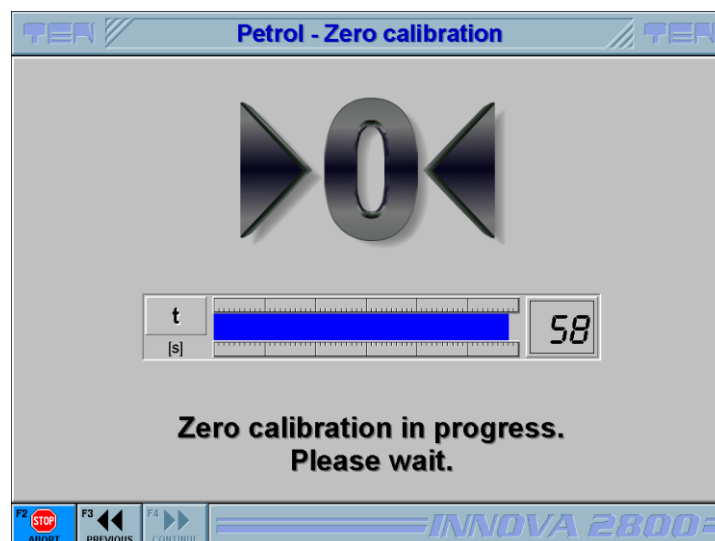
Low-flow detection

The INNOVA 3000 will continuously monitor the flow of exhaust gas through the sample system. If the flow is restricted and below an acceptable limit, exhaust gas measurements are prevented and a warning symbol is displayed. Gas flow problems usually occur when the exhaust sample hose, sample probe or filters are blocked or contaminated. If this message occurs, we advise to check the filters for contamination and if necessary, replace the filters. If there is a blockage, remove the blockage or clean the specific parts to continue testing. The low flow message will disappear automatically if the sample flow is within limits. If problems persist then contact your service agent.
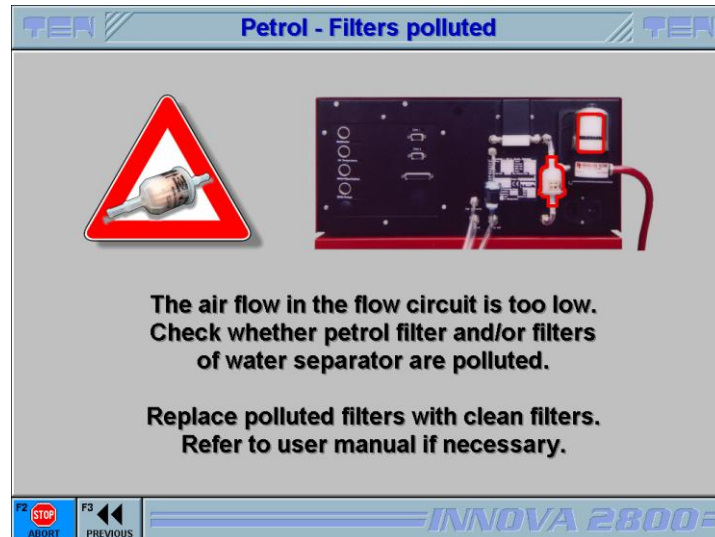

Drain check / Water detected

During combustion, large amounts of water can be produced and collect in the vehicle's exhaust system. The INNOVA 3000 is designed and equipped with an auto drain system that removes the excessive water while sampling the vehicle exhaust.

Under normal conditions the filtration system will drain the water coming out of the exhaust of the vehicle and discharge through the INNOVA 3000 'water out' pipe.

If the amount of water is excessive or the gas sampling system is blocked, the INNOVA 3000 automatically prevents measurements, displays a warning symbol and drains for at least 1 minute before measurements commence again. This sequence is repeated until the water or blockage is cleared or removed.
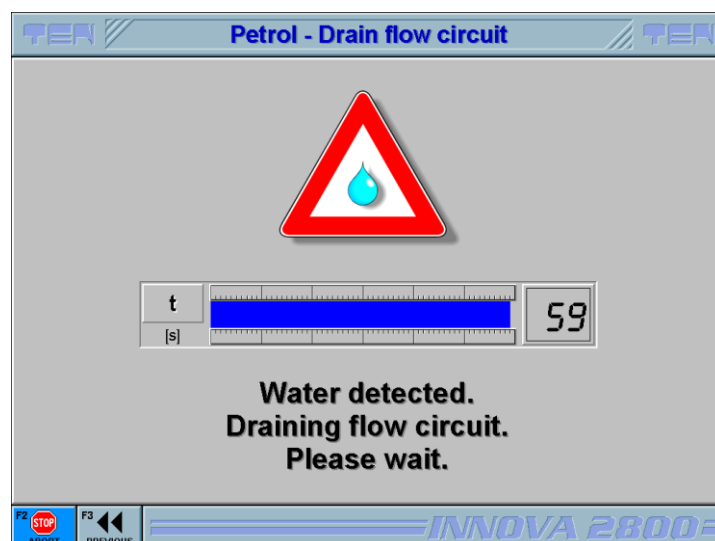

The INNOVA 3000 will automatically return to the measuring program if the gas sampling system is operating correctly and within limits. If the above warning occurs frequently then please check the exhaust probe, sample hose and filters. Clean filters, replace or clear blockage if necessary.

Oxygen sensor voltage

The oxygen sensor output voltage is monitored frequently for contamination and ageing. This process is automatic and happens during every zero calibration. If the sensor output is getting close to its lower operating limit, the INNOVA 3000 will warn the User that the sensor may soon require replacing. If the sensor is outside the specified limits, the oxygen and lambda readings will be disabled and sensor icon will illuminate on the screen. If this occurs, please contact your service provider for a replacement.
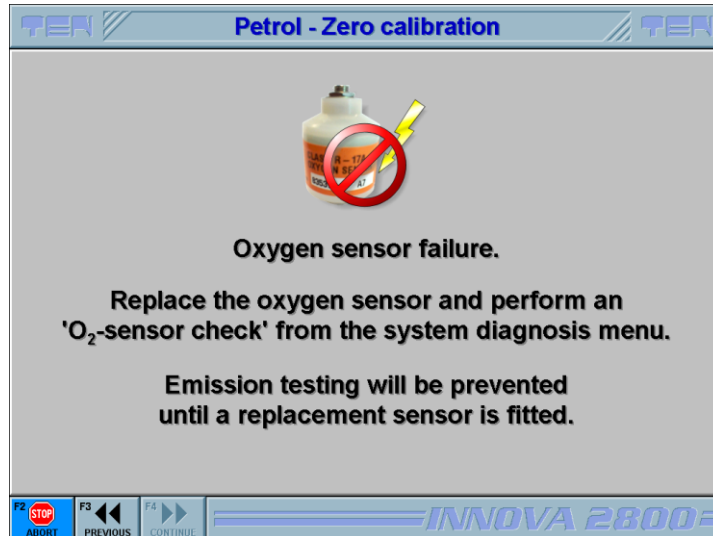
Please note; If this message occurs, the graphical icon of the oxygen sensor 'lights up' and the values of the oxygen channel and lambda are blocked and the readings show (--.— and -.---). If a zero calibration is executed and the oxygen sensor is within limits the message will disappear.
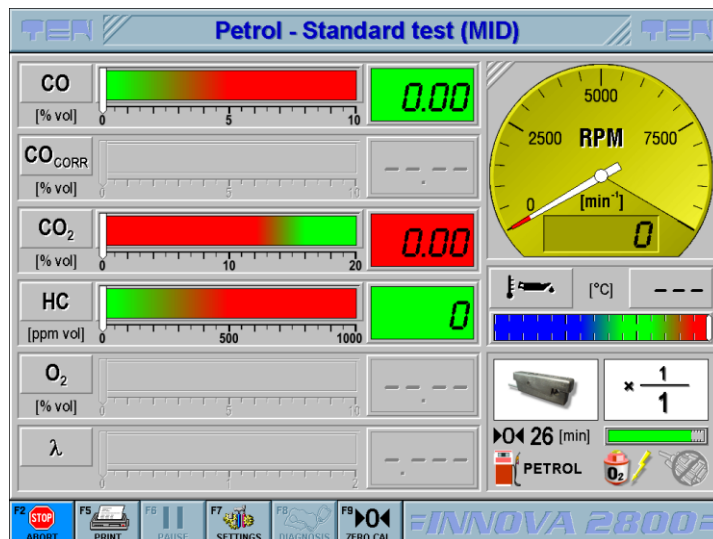
Communication error

The INNOVA 3000 consists of an exhaust gas sampling/measuring unit and a PC for the program operation and presentation. Both these units are connected via a serial communication cable in order that the computer can control the exhaust gas sampling/measuring unit and obtain data for processing and presentation. If the communication fails, the INNOVA 3000 will display an error message on the screen and provide instructions for troubleshooting.

If this occurs check the serial communication cable between the PC and the COM2 port of the sampling/measure unit. In addition, it is a good idea to power down the INNOVA 3000 and power up again (Make sure Windows is shut down first). If this message persists then please contact your service provider.

Other messages
The PC is equipped with a Windows operating system. For a number of reasons error messages may be generated from the operating system. If this is the case, check the message and follow the instructions at the screen. If necessary refer to the manual of the PC manufacturer or contact your supplier.

After a power-up and initialisation, the INNOVA 3000 automatically performs internal self tests and the Gasbench will start its warm-up sequence. After booting the PC the splash screen of the INNOVA 3000 appears.

The screen will display the software version and country to which the software program is applicable.
Press F4 to continue.
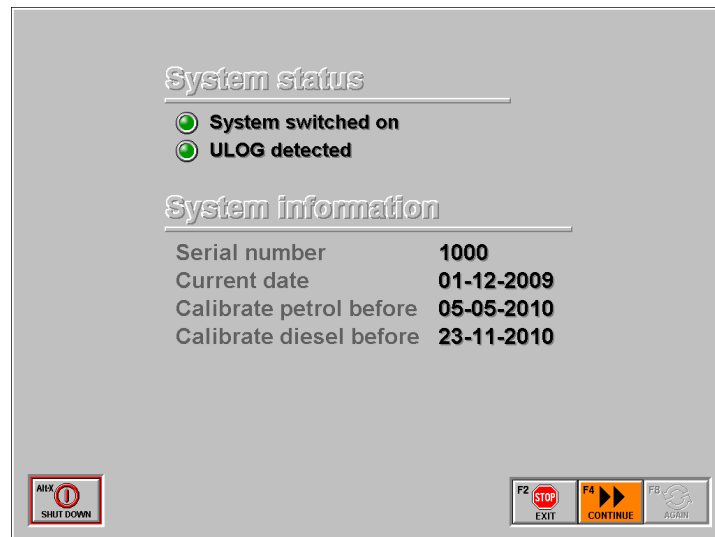
The system status screen displays the information and status of the sampling/measuring. Both indicators should be green when the system is functioning correctly. If indicators are red then a retry can be made by pressing the F8 key.

Please note; there may be a message shown when the INNOVA 3000 have to be calibrated within 14 days. The User may contact their service supplier to arrange calibration.

IMPORTANT!   Failure to calibrate before the calibration due date will result in exhaust gas measurement being blocked.

If the Calibration date has expired the following screen appears.
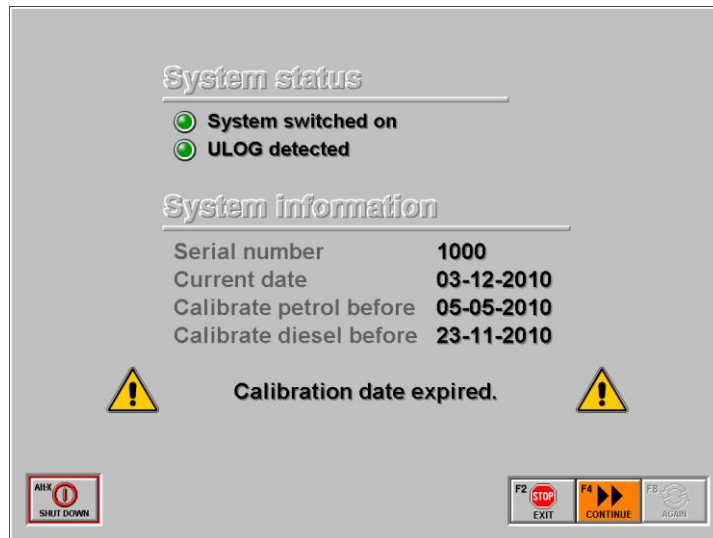
The F4 button will allow the program to proceed but no exhaust emissions measurements can be made. The Main menu screen of the INNOVA 3000 appears which all options and sub-menus can be selected.

If the PC software of the INNOVA 3000 is not correctly configured or the PC does not comply to the required standard a fault screen appears. The Innova program has to be shut down. No measurements can be made until software has been configured correctly.
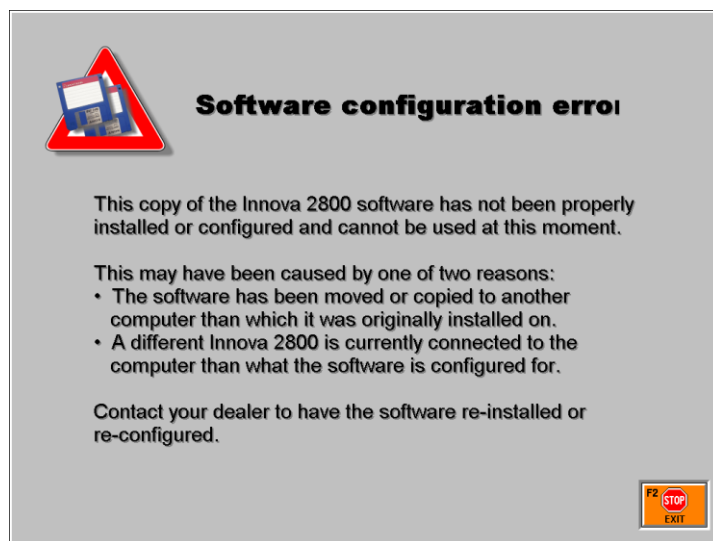
The software of the INNOVA 3000 consists of multiple modules. One essential software module is SSM32.dll. If the SSM32.dll module cannot be loaded, or is not functioning correctly, the following screen will be displayed. This module function is important and necessary for the correct operation of the INNOVA 3000.
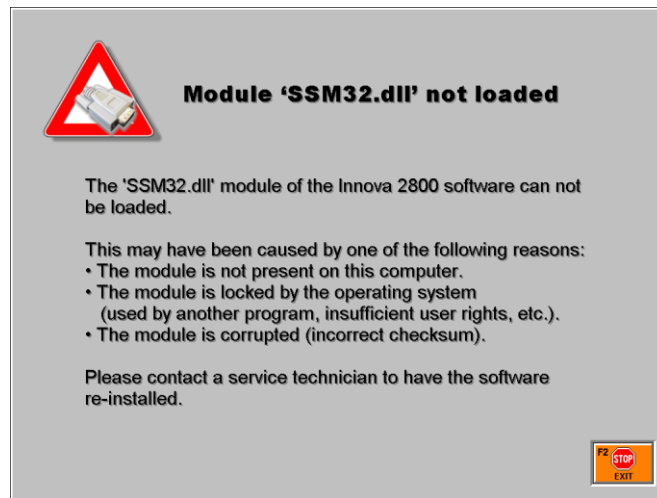
If the software of the INNOVA 3000 is configured correctly the Main menu screen is displayed. From this menu all options and sub-menus may be selected. The main menu contains the following items:

Petrol menu: Program for engine analysis on Petrol and LPG/CNG fuelled vehicles. This part contains the Official test, Standard test, and various system tests.

Diesel menu: Program for engine analysis on Diesel fuelled vehicles. This part contains MOT test, Standard test and some diagnostic tests. For more information please refer to the EDA 3000 User manual

OBD menu: Program area where various EOBD data and parameters can be checked or monitored, such as RPM, temperature, Trouble codes, Readiness code and Lambda sensor signal.

Multimeter: Program area for Multimeter functions with numerical and graphic presentation.

User menu: Program area where various data or parameters can be checked, or entered, such as Garage details, Testers names, time and date. Installed software version can also be checked.

Service menu: Program area for authorised service personnel, this may not be accessed by the User. The Service menu is accessed by password and should only be used by authorised technicians.

11 Official (MOT) test

This selection calls up the official (MOT) test procedure for emissions testing on Petrol, LPG and CNG fuelled vehicles. The test procedure and limits are determined by the selected vehicle type and production year. (i.e. catalyst, non-catalyst, visual inspection, etc.).

The test procedure is specified by each different country and the INNOVA 3000 conforms to their Pattern Approval requirements. Please follow the step by step instructions on the screen until the test sequence completes. The program has been designed so that either a Pass, or Fail, result is achieved and the test result is printed automatically.

IMPORTANT! Before every MOT test there is a HC residue check. Please ensure the sample probe is not inserted into the vehicle exhaust before the HC residue check is completed otherwise HC residue "lock up" can occur.

After each MOT test, the vehicle data is also stored into a CTR database, on the Computer, as well as being printed. This database allows the test result data to be rechecked, printed or removed. When F8 Retest is pressed, a new MOT test is started with the same vehicle data as previously entered.
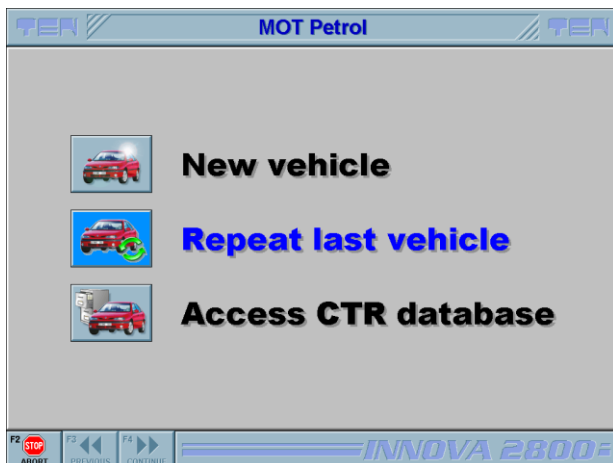
In the MOT Petrol menu it is possible to repeat the vehicle test without re-entering vehicle details.
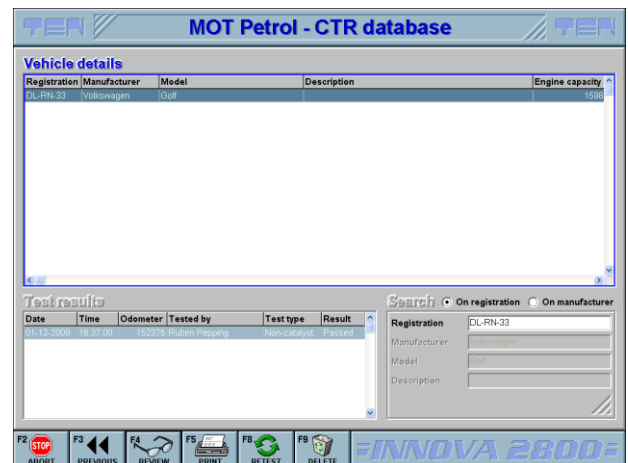
In Access CTR database it is possible to review Vehicles tested, repeat tests or delete test data.
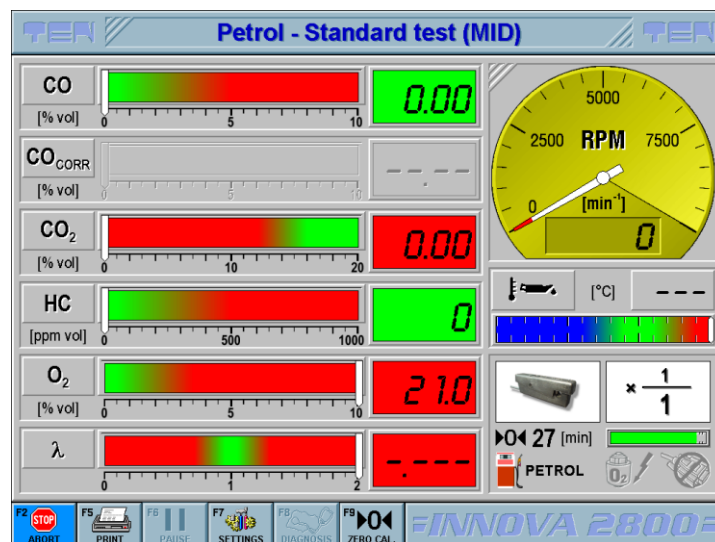
12 Standard test (MID)

From the Petrol menu the Standard test (MID) can be selected. The Standard test provides a complete engine analysis in which different parameters are measured and displayed live, for a quick and accurate diagnosis.

IMPORTANT: Do not enter the Standard test with the sample probe in the vehicle exhaust. When Standard test is selected the INNOVA 3000 automatically performs a zero calibration, if it is required. If a zero calibration is performed INNOVA 3000 will adjust and set the gas measuring zero reference points and the oxygen concentration is calibrated to 20.9% vol. The zero calibration will last 60 seconds.
Following a zero calibration the INNOVA 3000 may perform a HC residue check. This HC residue check will last 20 seconds. The INNOVA 3000 samples the HC levels in the ambient air and residual HC in the gas sampling system. The HC concentration must not exceed 20ppm vol. If after 20 seconds the HC levels are above 20ppm vol. the program will abort back to menu. If the HC levels are below 20ppm vol. the program will continue to the Standard test page.
Ensure the sample probe is <u>NOT</u> in the vehicle exhaust during the HC residue check!

To perform a Standard test, insert the sample probe in the exhaust of the vehicle. During the Standard test all gas concentrations are shown live, simultaneously on the monitor of the INNOVA 3000. In addition to the gas measurements the lambda value ('λ') is calculated. This calculation is made with help of the Brettschneider formula. The value gives an indication to the combustion efficiency of the vehicle.

RPM and Oil temperature is also shown on screen in the Standard test. The measured parameters available during the Standard test are:
- CO   Carbon monoxide   [% vol]
- CO_{corr} Corrected Carbon monoxide   [% vol]
- CO_2 Carbon dioxide   [% vol]
- HC   Hydrocarbons   [ppm vol]
- O_2 Oxygen   [% vol]
- λ   Lambda value
- Oil temperature   [ºC]
- RPM   [min^{-1}]

CO_{corr}, the corrected CO value will only be shown if the CO_2 value is equal or larger then 5 percent volume. This value is calculated as followed: $CO + CO_2 < 15$: $CO_{corr} = (CO \times 15) \div (CO + CO_2)$
$CO + CO_2 \geq 15$: $CO_{corr} = CO$

Other button options are available, at the bottom of the screen, in Standard test.

Settings (F7)
Selecting the Settings (F7) key enables the User to change the default settings for the items shown below: (i.e. fuel type, RPM sensor type and division factor, etc.)
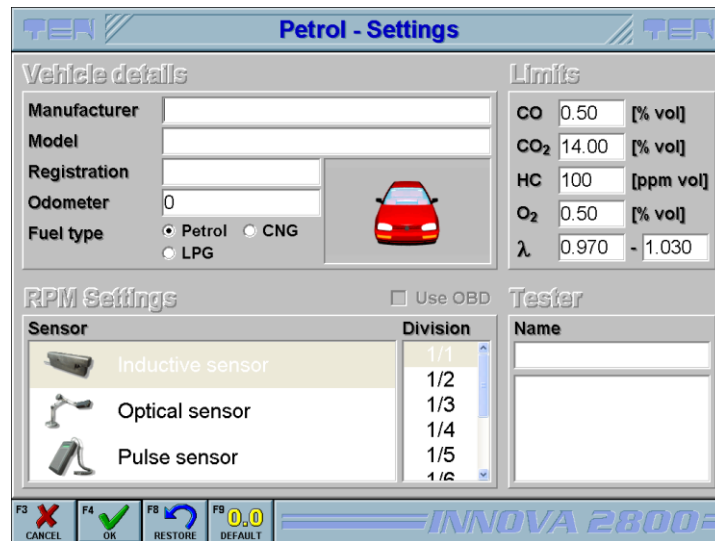
| **Vehicle details** | The vehicle manufacturer, model, registration number and odometer reading may be entered and will appear on the printout. |

Vehicle details   The vehicle manufacturer, model, registration number and odometer reading may be entered and will appear on the printout.

Fuel type   Select the fuel type of the vehicle (Petrol, LPG and CNG). This is important for correct calculation of the Brettschneider formula. There are three options to choose from:

-Petrol
-CNG (Compressed Natural Gas)
-LPG (Liquefied Petroleum Gas)

The lambda value is calculated with help of the Brettschneider formula. Factor K1 is 6

$$\lambda = \frac{CO_2 + \dfrac{CO}{2} + O_2 + \dfrac{NO_X}{2} + \left(\dfrac{H_{CV}}{4} \times \dfrac{3.5}{3.5 + \dfrac{CO}{CO_2}} - \dfrac{O_{CV}}{2} \right) \times \left(CO_2 + CO \right)}{\left(1 + \dfrac{H_{CV}}{4} - \dfrac{O_{CV}}{2} \right) \times \left(CO_2 + CO + K_1 \times HC \right)}$$

The constants of the different fuel types are:

	Petrol	**LPG**	**CNG**
H_{cv}	1.7261	2.525	4.000
O_{cv}	0.0175	0.000	0.000

Sensor   Three different RPM sensor types can be selected in the settings page:
- Inductive RPM clamp.
- Optical RPM sensor.
- Pulse input for other RPM adaptors (like the UBT 1000 option)

Division   Sets the RPM division factor, for example:
- For conventional ignition using the inductive clamp, select ratio 1.
- For DIS or 'wasted spark' ignition systems, select 1/2.
- To pickup from the crown lead of a coil / distributor, select 1/4 for a 4 cylinder engine, etc.

Limits   At the right side of the screen you see the numerical display of the gas concentrations. The background colour of these values, in Standard test, can be programmed to show green or red and the switch point can be set by the User. If the switch point of CO is set at 0.50 [% vol.], lower values will be displayed with a green background and higher values with red. Correct selection of these limits provides a quick and easily recognisable overview that all measured values are within specification, as all values indicate green.

Tester   Pre-defined testers names can be highlighted and selected at this point or alternatively a new name may be entered and the selected name will appear on the printout. Please note that pre-defined testers names can only be changed / replaced in the User menu.

Print   A test report may be printed, on demand, at any point during the Standard test by pressing the 'Print' key (F5 on the keyboard). The printout of the INNOVA 3000 will provide all relevant measured data, including gas values, time, software version etc. on the test report printout. The printer should automatically activate and print.

NOTE: Before printing ensure that the printer power switch is 'on' and the tray / auto feed contains enough paper.

Zero calibration
Zero calibration is required at a number of stages of the program in order to ensure that any changes in ambient temperature do not affect the accuracy of measurement.
A zero calibration will automatically be performed at 30 minute intervals, during the Standard test. The interval time is counting down and displayed at the bottom right corner of the screen. If necessary, the zero calibration can be activated or 'forced' by using the special function key (F9). The interval is then reset to 30 minutes.
Please note that a zero calibration may be performed with the exhaust sample probe in the tailpipe of the vehicle

Aborting the Standard test
Pressing the 'Abort' key (F2 on the keyboard) or Esc key will stop measurement in Standard test, purge the system of residual exhaust gas and hydrocarbons and return to the Petrol menu.

IMPORTANT! Remember to remove the exhaust sample probe before aborting the Standard test. If this has not been done the message 'Remove exhaust probe' appears.
The purge mode usually takes around 15 seconds, unless exhaust gas or an excess of hydrocarbons is present. If so, the INNOVA 3000 will stay in purge mode until the gas sampling system is clear. This is necessary to avoid HC residue "hang-up" problems on subsequent tests.
Pressing the 'Abort' key (F2 on the keyboard) or Escape key again will manually exit the purge.

Please note: During the Standard test (MID), it isn't possible to start any other PC applications!

13 System purge

After selecting the system purge test, the INNOVA 3000 will start the purge of the flow system, it will detect and purge the system of residual exhaust gas and hydrocarbons before returning the to the petrol menu. The purge mode usually takes around 15 seconds unless exhaust gas or an excess of hydrocarbons is present. In this case, the INNOVA 3000 will stay in purge mode until the sample system is clear. This is necessary to avoid HC hang-up problems on subsequent tests.
Pressing the 'Abort' key (F2 on the keyboard) or Esc key will manually exit the purge mode.

IMPORTANT! Remember to remove the exhaust sample probe.
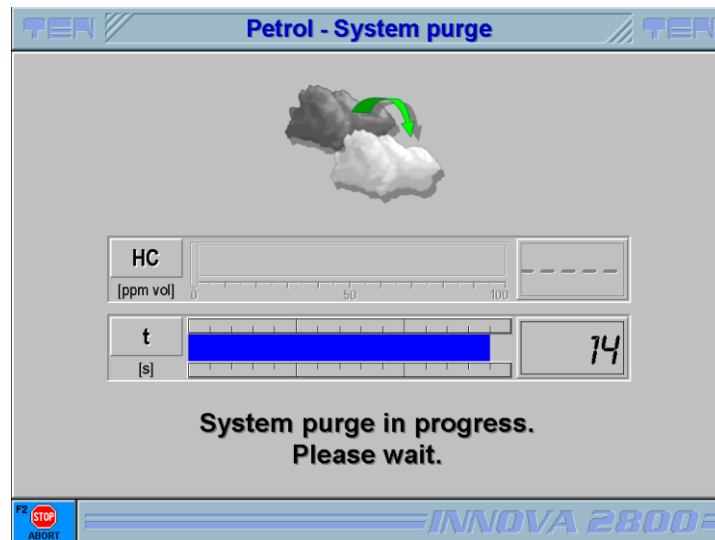
The INNOVA 3000 will stay in purge mode until the sample system is clear, but it is possible to stop the test by pressing the abort key.

By example, you can use the system purge test if the HC residue check failed when the ambient air was clean. High HC residue readings can originate from damp or polluted filters, or contaminated condensation in the gas sampling system. When the System purge is activated, the INNOVA 3000 will purge as long as needed until the pollution or contamination is cleared. The process will complete automatically.

If the process is still purging after quite some time, abort the test and check the filters and sample hose. If necessary, replace the filters and flush out the sample hose with warm soapy water.

IMPORTANT! These problems may occur if the vehicle under test has a faulty cylinder head gasket. Do not try to measure the vehicle emissions if there is an obvious problem with the vehicle. (i.e. if there is thick white or blue smoke being emitted from the vehicle exhaust).

14 System diagnosis

From the Petrol menu you can select the System diagnosis item. This program menu is used for troubleshooting should an error occur in system status or if it's necessary to perform system tests such as O2 sensor check during a replacement cell installation.
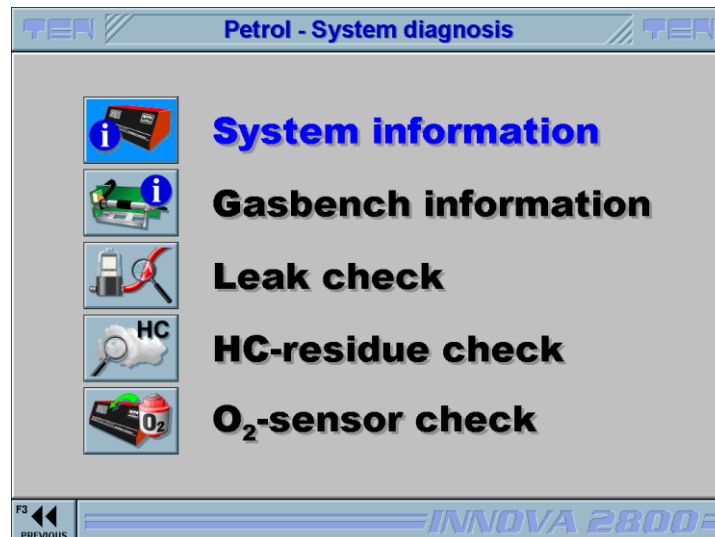

System information
This item shows the status of most systems components and determines whether they are functioning or a gas calibration is required, etc. If an error has occurred and the MOT test or Standard test is blocked, then the system information status check will indicate red where there has been a problem. If necessary, repeat the specific system test as indicated.

Gasbench information
This program displays all relevant information of the installed infrared gas bench, i.e. the revision number, version and PEF. The PEF is necessary for the calculation from propane to hexane during calibration. The PEF of the INNOVA 3000 varies according to the propane value used for calibration. Type in the propane value in the edit box and press the Enter key. The corresponding PEF is immediately displayed on screen. The service counter shows how many times the Innova has been calibrated. This counter is incremented automatically every time the Innova is calibrated and cannot be reset.
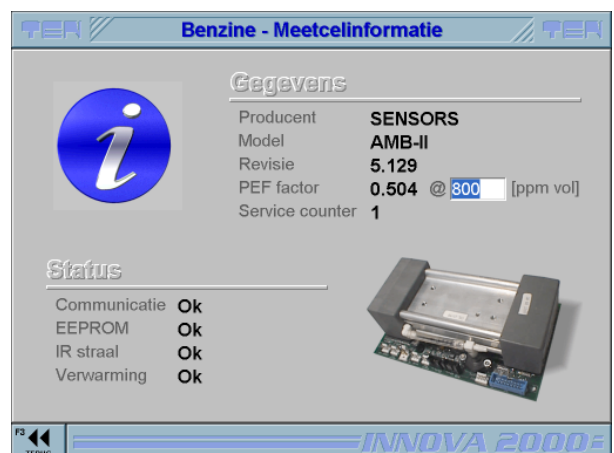
Leak check

During a leak check test, the system checks for leaks within the exhaust gas sampling system. Follow the instructions on screen and connect the sample probe to the leak check adapter, as indicated. This makes a closed loop gas system which enables the complete sampling system to be tested for leaks. After activation, the system will apply a vacuum to the closed loop gas system and check it for vacuum decay. This test must pass in order for the INNOVA 3000 will perform measurements as a leaking gas sampling system will dilute the gas sample and display incorrect readings

To perform a leak check:
- Connect the sample probe to the leak check adapter located on the end of the 'gas out' pipe. Ensure a good seal around this connection.
- Press Enter to start the leak check. The pump will switch on and the pressure in the sampling system will drop. After a certain threshold has been reached, the pump will switch off. At this point the INNOVA 3000 will monitor the drop in pressure for 15 seconds. Any excessive decay will fail the test.
- In the result page, press 'Continue' (F4 on the keyboard) to return to the system diagnosis menu.
- If the leak check failed, press 'Again' (F8 on the keyboard) to repeat the check. Contact your service provider if the check keeps failing.

NOTE The MOT test and Standard test will be blocked if the above check fails.

To perform a Leak check; connect the Leak check adapter to the sample probe. Press the F4 Continue button; the pump will start and a vacuum is created in the gas sampling system.
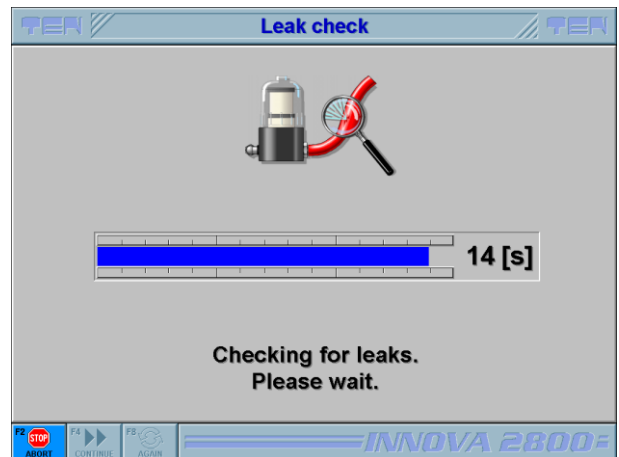
During 15 seconds the INNOVA checks if the flow system has any vacuum decay (or is leaking). After the check the result is shown on the screen.
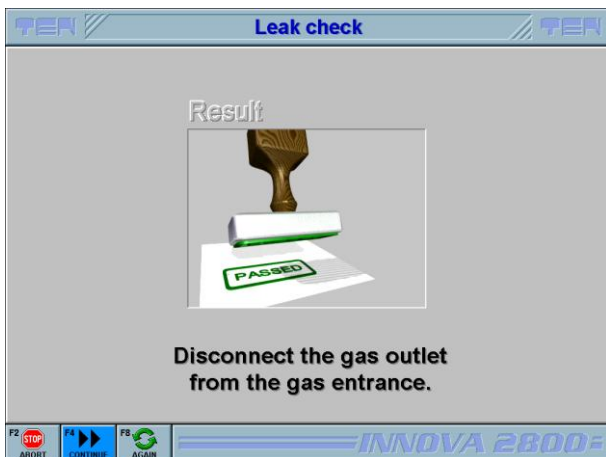

If the result is a FAIL then check all hoses, drain separator and sample probe and leak check adaptor connection. Repeat the test by pressing F8

Please note; after a FAIL it is not possible to perform an emissions test. Contact your Service Agent if necessary.

The INNOVA 3000 will automatically perform a weekly leak check. Always remember to disconnect the leak check adapter, from the sample probe, after a leak check is completed.

HC-residue check

The HC residue check is automatically performed before a measurement. During this test it is determined how many hydrocarbons are present in the current ambient air or if there is any HC residue left from a previous measurement. EU Regulations state that this amount must not exceed 20 ppm. If the concentration is higher than 20 the MOT and Standard test will be blocked. Please note that during this test, the sample probe must not be positioned in or near the exhaust tailpipe. Fuel vapour, brake cleaner, oil or other hydrocarbons may also influence the test.
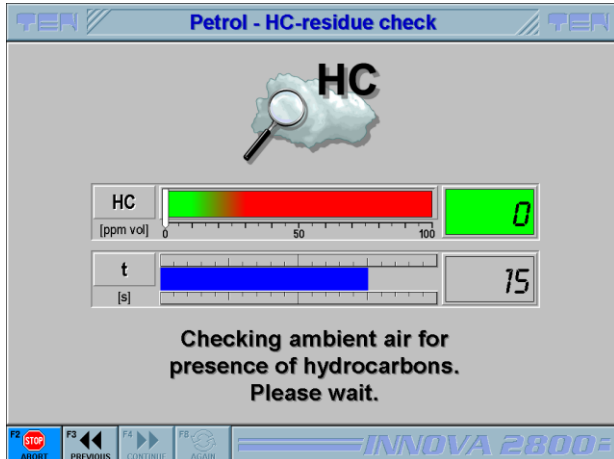
Before entering Standard test a HC check is started, during 20 seconds the INNOVA 3000 samples the HC levels in the ambient air to ensure the concentration does not exceed 20 ppm vol. If after 20 seconds the HC levels are below 20 ppm vol. the test passes and the Standard test will perform measurements. If the HC levels are above 20 ppm vol. the Standard test will lock and the test will abort back to menu.

You can repeat the test, if the test result keeps failing, move the INNOVA to clean ambient air or abort the test and check the filters and sample hose. If necessary, replace the filters and flush out the sample hose with warm soapy water.

O$_2$ sensor check

The O$_2$ sensor is checked frequently to ensure that it is operating within the correct parameters. During the Standard or MOT test a message can appear that the oxygen voltage level is too low. If this message appears please perform the O$_2$ sensor check.

During the O$_2$ sensor check, the system purges with clean ambient air, for 60 seconds and the voltage output of the cell is measured. Typically this voltage should be between 7 and 15 [mV]. If the test result is outside these limits, the cell must be replaced. Check the connection on top of the O$_2$ sensor and repeat the test, Replace the sensor if necessary.

If the O$_2$ sensor is replaced, repeat the test to ensure that the new sensor is within the correct limits and the measurements are unlocked.

Please note; If the O$_2$ sensor check fails, the O$_2$ and lambda readings are blocked and no values will be displayed. The display will show: --.— and -.--- in the relevant boxes on the screen.

IMPORTANT! Do not allow the operational or storage temperature of the Innova to fall below +5°C as cold temperatures can cause the oxygen sensor characteristics to change and not comply to the required limits. In this case move the analyser to a sufficient warm area and let the machine acclimatise. Repeat the O$_2$ sensor check if necessary.
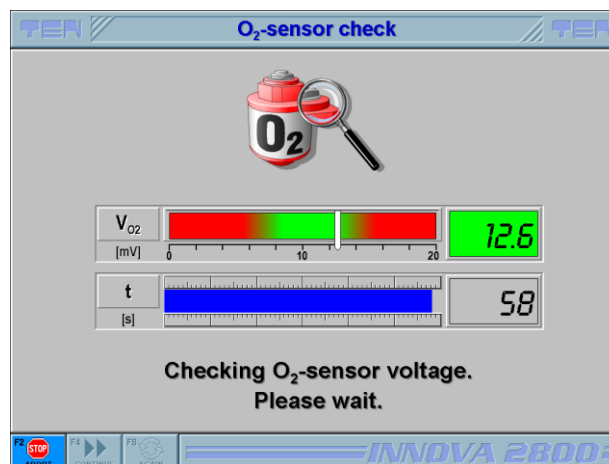
If a new sensor is installed, **always** dispose of the old oxygen appropriately, as hazardous waste.

15 User menu

From the Main menu the User menu can be accessed. In the User menu, the Software version of the INNOVA 3000 can be checked and Garage details.


Software version

In the software version item, the current installed software version of the INNOVA 3000 can be checked. The software installed by the manufacturer or service department is officially registered with the NMi in accordance with the pattern approval. Changing or modification of the software is not allowed.
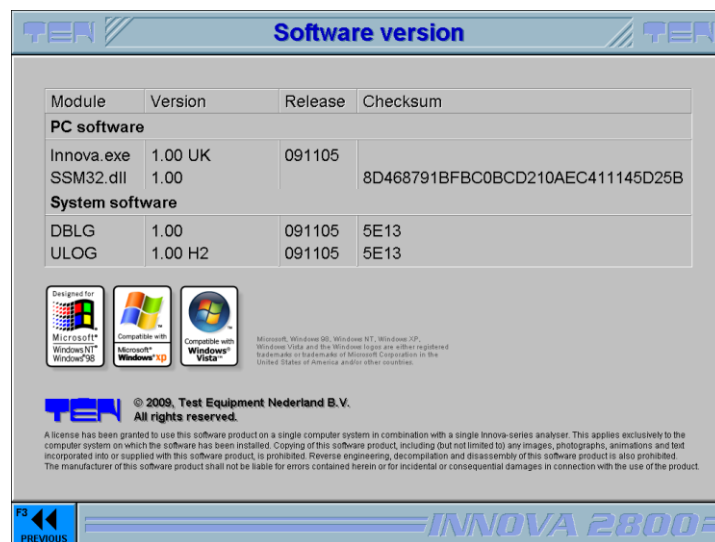
Database information

This information is only available if a database is installed. The display will show the release date, checksum and number of entries for the Vehicle Make, Info, Model and Limits database tables. This allows the User to easily determine whether the INNOVA 3000 is fitted with the latest version database.
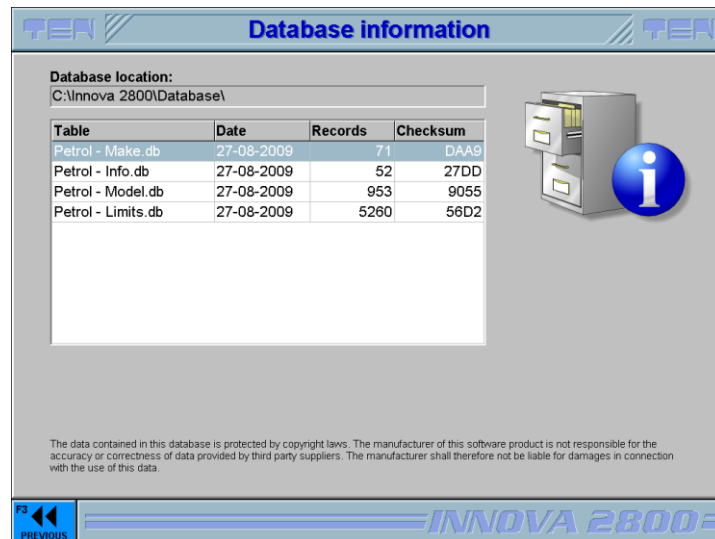
Please note: The above release dates, checksums and number of entries displayed above are for example only and may differ from database that is currently installed on your system.

Garage data

Here the User Company details are stored such as Garage name, Address, Post Code and Vehicle Test Station ID (VTS number). This default information is printed on every test report. Up to four Testers names may also be entered at this point which allows the Tester name to be selected rather than 'typing in' for every MOT test routine.
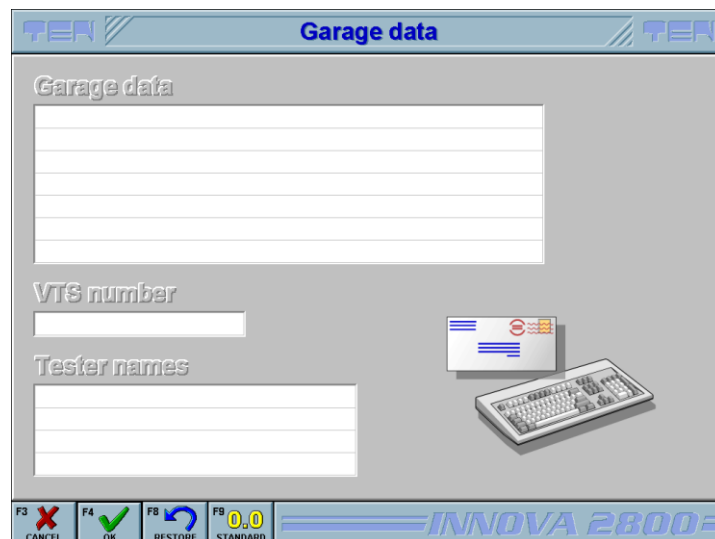
Garage data

The garage name and address may consist of a maximum of 7 lines, each with a maximum of 40 characters (including spaces). Use the Tab key to move to the next line or Shift+Tab to move to the back to the previous line.

VTS number

Enter the Vehicle Test Station ID (VTS number) to be included on every printout.

Tester names

Up to 4 tester names may be entered, each with a maximum of 18 characters (including spaces). Use the Tab key to move to the next name, or Shift+Tab to move to the previous name. Press the 'Ok' key (F4 on the keyboard) to accept the changes or 'Cancel' (F3 on the keyboard) to discard the changes, and return to the User menu.

All stored values will be saved in the memory as long as they are not altered, by the User.

Set date / time
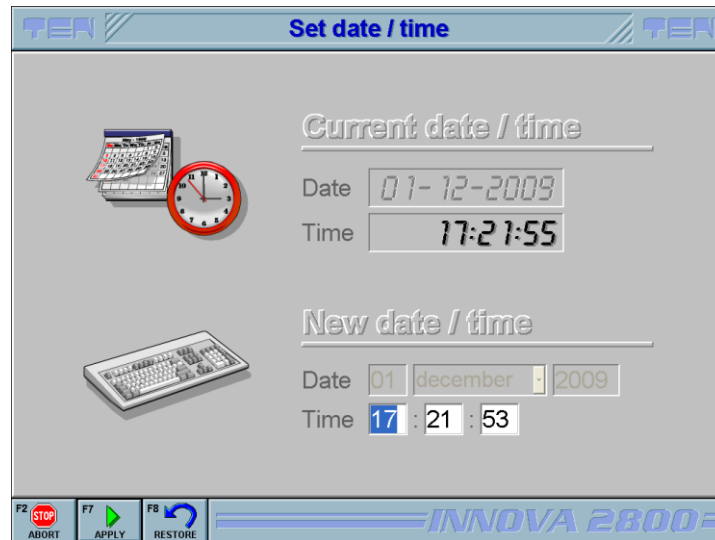
The INNOVA 3000 has its own internal system clock which monitors the calibration interval and endorses test reports with date and time, etc. It is only possible for the User to change the time for "daylight saving" seasonal adjustments. Changes to the system date cannot be implemented at the point.

The actual date and time are continuously displayed at the top of the screen. To change the system time, select the edit boxes at the bottom of the screen by pressing the Tab key. Enter the new time in the form hours : minutes : seconds and press Apply (or F7 on the keyboard) to accept the new time. To restore the time to its previous value, press the 'Restore' key (F8 on the keyboard). After changing the system time, press the 'Abort' key (F2 on the keyboard) to return to the User menu.

Please note that the time set is not the PC time clock but the INNOVA 3000's own internal clock. When you change your PC clock the time of the INNOVA 3000 will not change!

16 Maintenance

The INNOVA 3000 requires very little care and maintenance. It is recommended that surfaces are cleaned periodically with a dry cloth and an automotive polish may be applied to painted surfaces. Use as directed by the manufacturer of the cleaning/polishing agent.

The filters should be cleaned or replaced frequently. With normal to heavy use it is advisable to frequently check or replace the fine filter and wash the pre-filter, in the drain separator.

To clean or replace the filters of the drain separator, please follow these steps:
Remove the transparent part of the drain separator by unscrewing it.
Remove the black plastic upper ring by unscrewing it.
Remove the fine filter (at the top).
Remove the intermediate ring.
Remove the washable pre-filter (at the bottom).
Clean or replace the filters and reassemble the drain separator.
Replace the plastic ring and transparent part of the drain separator by screwing it back on.

IMPORTANT! Filter maintenance should be carried out frequently. Contaminated filters can cause problems with the water drain system and subsequently cause serious damage to the internal Gasbench.

Always use original filters and never use filters which contain metal parts.

It is recommended that the fine filter is replaced when it is a dark grey colour or has become saturated with water. The Pre-filter, In-line filter and Carbon filter should be replaced together, at the same time and depending on usage.

The monitor
Clean the monitor with a soft cloth. If necessary, use a mild spray detergent or glass cleaner. Never use solvents or petrol. Never spray directly on the screen!

The INNOVA 3000 and Cabinet
Clean the cabinet with a soft cloth. Use a mild spray detergent, or household cleaner. Never use solvents, thinners or petrol. Hinges can be lubricated with some drops of oil or grease

The Printer
Clean the printer with a soft cloth. If necessary, use a mild spray detergent or glass cleaner. Never use solvents or petrol. Never spray directly on to the printer! Take care that no dust, dirt, grease or moisture enters the printer. To change the ink, please follow up the printer manufacturer's instructions.

Cables and Sensors
Clean the Cables & Sensors with a soft cloth. If necessary, use a mild spray detergent. Never use solvents or petrol. Frequently clean inside the jaws of the RPM Inductive clamp and check that the ferrite inserts are not cracked or broken. If any cable or sensor is damaged, or broken, contact your supplier for replacement to avoid subsequent damage to the INNOVA 3000.

17 Troubleshooting

If nothing happens after switching the INNOVA 3000 on:

-First, check the power. Is there any power on the wall outlet?

-Is the computer switched on? Press the main switch on the front of the computer inside the cabinet, if required.

-Check the measuring unit is switched on with the main switch at the back, on the connection panel. If the LED in front of the INNOVA does not light then isolate the power from the wall and check the switch fuses and plug fuse, as appropriate and replace if necessary. If the problem persists, please contact your service provider.

If there is a communication fault, check the serial communication cable between the PC and the COM2 port of the sampling/measure unit. In addition, it is a good idea to power down the INNOVA 3000 and power up again (Make sure Windows is shut down first). If this fault persists then please contact your service provider.

DO NOT UNSCREW OR ATTEMPT TO SERVICE THE EQUIPMENT. THIS WILL VOID THE MANUFACTURER'S WARRANTY AND VOID THE CALIBRATION REQUIRED FOR MOT TESTING. SERVICING AND CALIBRATION SHOULD BE CARRIED OUT BY QUALIFIED UKAS ACCREDITED PERSONNEL ONLY.

For service please contact:

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PE30 2JE
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E-mail: info@ten-automotive.co.uk