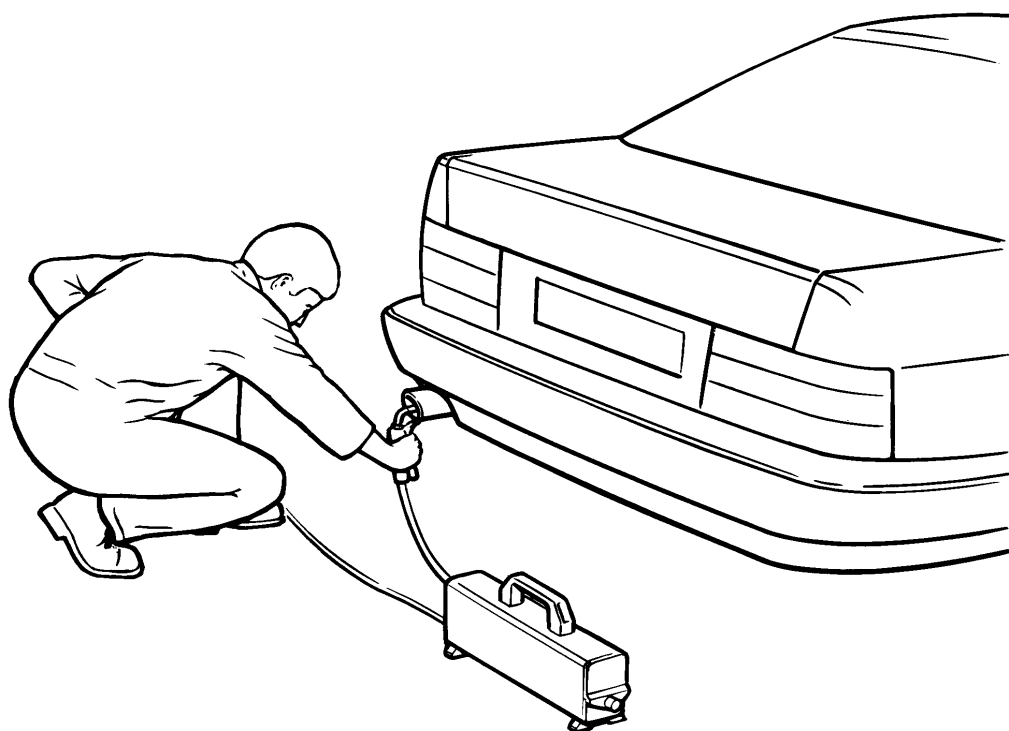


DIESELTUNE

SMOKEMETER DX211/DX211BT



**DX211/DX211BT SMOKEMETER PROGRAM WUKS2
UK MOT/05/01/01**

OPERATING INSTRUCTIONS

**IN2050/D
Nov 2005**

IMPORTANT

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

E. & O. E.

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

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.

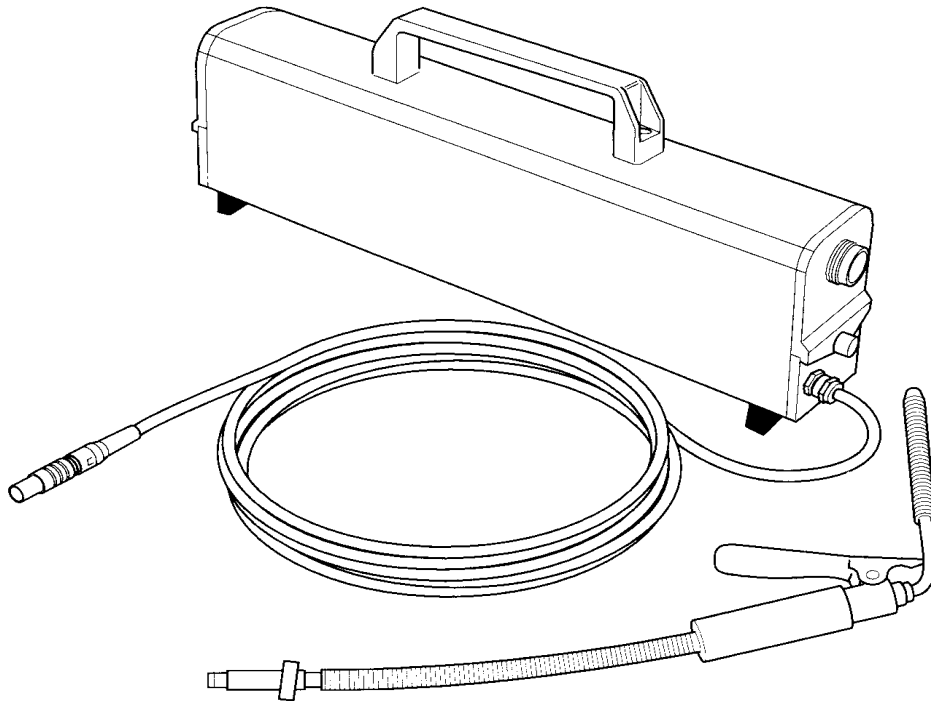
Note:

Your attention is drawn to our Terms & Conditions of Sale. 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.

WARNING:

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

DX211/DX211BT SMOKEMETER



SPECIFICATION

Dieseltune has a programme of continued product development and therefore reserves the right to amend product specifications without prior notice.

While every effort is made to ensure the accuracy of the particulars contained in this instruction book, the Manufacturers and the Authors shall not in any circumstances be held liable for any inaccuracy or the consequences thereof.

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PATENTS

These products are covered by one or more of the following Patents or Patent Applications: GB - 2257515, 2268805. EU - 0521725, 0650586.
US - 5353629, 5596155

M.O.T. TESTING

The DX211/DX211BT Diesel Smokemeter, when used with the software described in this manual, is approved by VOSA for M.O.T. testing of the following classes of vehicle:

Category A Cars, Light Commercial Vehicles and Private Buses
(M.O.T. classes 4, 5 and 7)

Category B Public Service Vehicles, Heavy Goods Vehicles

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NOTE: This manual only describes the software controlled procedures. For all other information please refer to the DX211 Smokemeter 'Operators Manual'.

INTRODUCTION

The WUKS2 program is a Windows® program and uses the normal control methods associated with these programs.

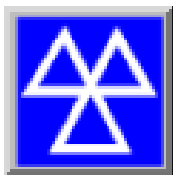
A series of ICONS on the right hand side of the screen indicate what actions are possible. Use the mouse to move the pointer over the required icon and press the left mouse button.

The screen will give instructions and will typically say ' Press  when done', this

indicates that the defined action should be completed before the tick icon is pressed so that the program can proceed knowing what state the system is in.

ICONS

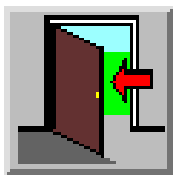
The following ICONS are used in the main menu and the text describes the action/use of each:



MOT test procedure



LIVE READINGS, displays a page of live smoke readings for adjustment purposes.



EXIT, used to end current activity.



TICK or OK icon, used to accept current selection and continue.



CANCEL, used to reject a setting or continue without a particular function.



HELP, presents a page of help information



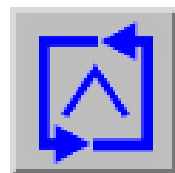
INFO, displays a page of information about the system



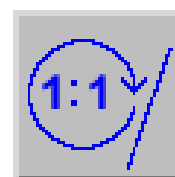
PRINT, press this to operate printer



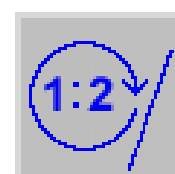
REPEAT, use this to restart a particular procedure



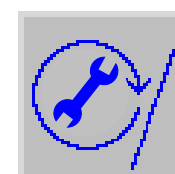
RESET PEAK, in live readings this resets the peak smoke display to zero so another peak can be displayed.



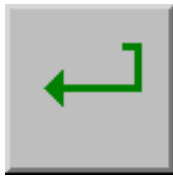
RPM SETTING, used to display RPM reading as it comes from the transducer



RPM SETTING /2, used to display RPM reading at half the value that comes from the transducer



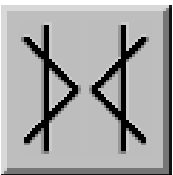
DX211-12 RPM SETTING, used to set the number of cylinders on the vehicle engine



RETURN, used when entering figures or text on the keyboard



TIME DATE, used to adjust clock in smokehead (restrictions apply)



UKAS CALIBRATION, used to start the annual calibration procedure, password protected for use by authorised engineers only.



VTS FORM, used by UKAS engineer to enter garage details



ZERO/SPAN, used to force a zero, span and calibration check – this is automatically performed when required.

OPERATION

Connect equipment as described in the DX211 'Hardware Operators Manual' IN2049.

START UP

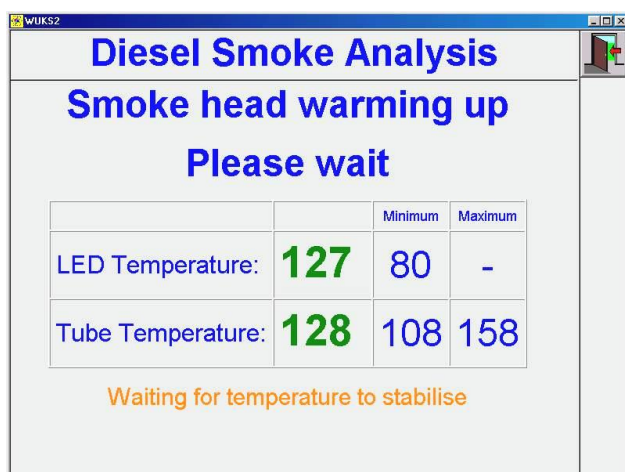
1. To start the Smokemeter programme:

Switch on and wait for the menu system to be displayed.

Select the WUKS2 icon:

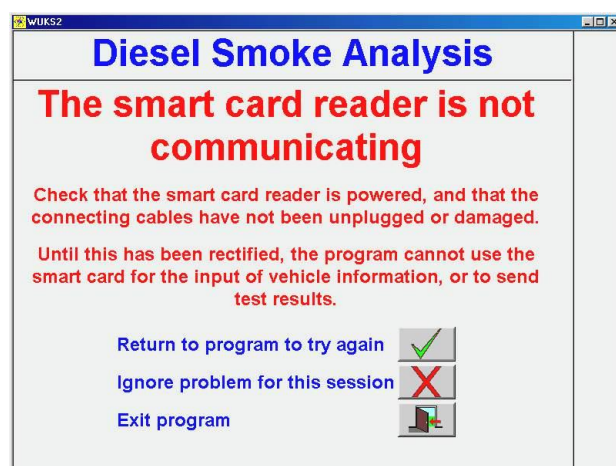


2. The Smokemeter program will start and the warm up screen will be displayed. The first warm up of the day may take some time, possibly up to 15 minutes. Subsequent warm up periods will be approximately 60 seconds.

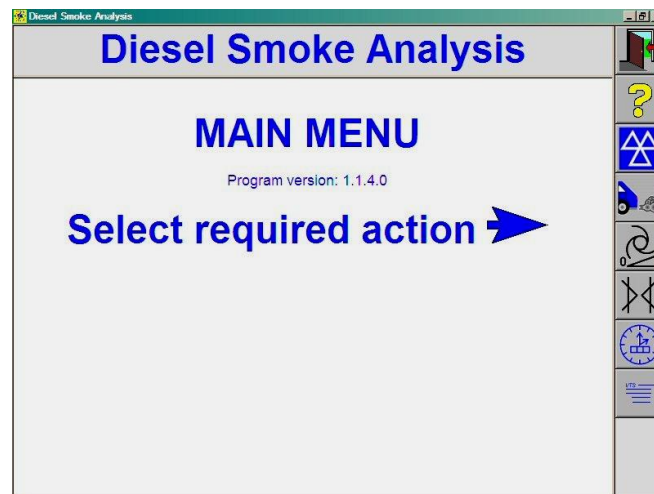


NOTE: The LED and Tube temperatures are displayed in number of counts NOT degrees.

At this stage any communication problem messages displayed if they are appropriate.

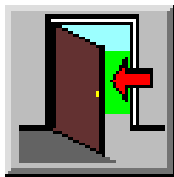


After warm up the WUKS2 main menu will be displayed.



A warning alerting of ancillary equipment that has not been connected will be displayed at this stage

Options available from this menu:



EXIT, Select to exit WUKS2 and return to main menu menu.



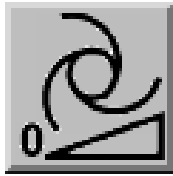
HELP, presents a page of help information



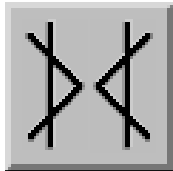
LIVE, displays a page of live smoke readings for testing and adjustment purposes.



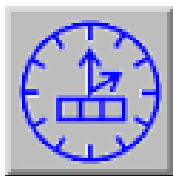
MOT test procedure



ZERO/SPAN, used to force a zero, span and calibration check – this is automatically performed when required.



UKAS CALIBRATION, used to start the annual calibration procedure, password protected for use by authorised engineers only.



TIME DATE, used to adjust clock in smokehead (restrictions apply)



INFO, displays a page of information about the system

SHUT DOWN PROCEDURE

IMPORTANT: Always follow the correct shut down procedure before turning the power off. This prevents the hard disk being filled with unwanted files and causing operational problems at a later date.

EXIT the WUKS2 main menu using the exit icon.

Double click the SHUT DOWN icon from the main menu.

After a short period of time the computer will shut down. It is then safe to turn the power off.

M.O.T. TEST PROCEDURE

The operator's 'smart card' should be inserted into the VI serial communications device before the MOT test type is selected.

The engine must be at normal operating temperature before performing the test, either apply the test immediately the vehicle is presented or warm up thoroughly before testing.

WARNINGS:



- If carrying out tests in a workshop the area should be well ventilated. Alternatively, outdoor testing is permissible (see 'Outdoor Testing' in the 'DX211 Operators Manual').
- Ensure that the vehicle is parked on level ground with handbrake applied and gear lever in neutral or park position.
- Turbocharged engines should be allowed to idle for 10 to 15 seconds before switching off to ensure maximum turbocharger life.
- It is recommended that prior to carrying out the M.O.T. test the engine speed governor is checked as follows:
- Fit the engine speed adapter (see section 'Engine Speed Adapters' in the DX211 'Operators Manual').
- SLOWLY raise the engine speed and check that the engine manufacturer's maximum speed cannot be exceeded.

Do not proceed further if the engine speed exceeds the manufacturer's figures.

Select the following Icon to initiate the MOT test:



MOT TEST

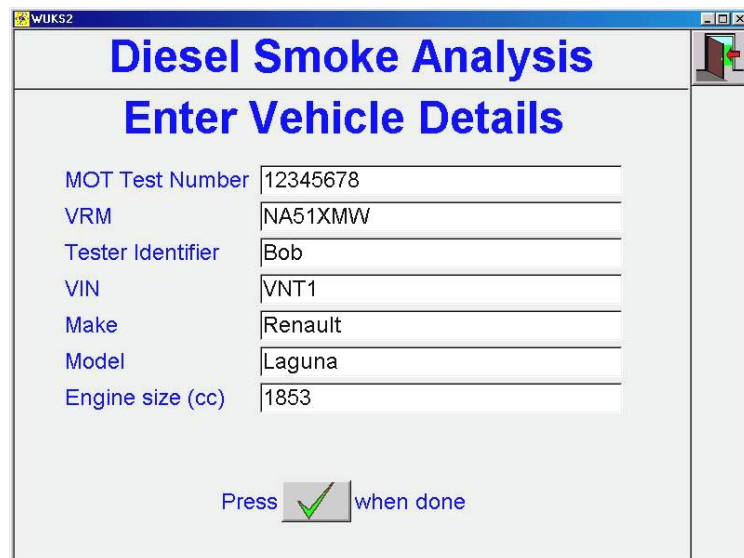
At this stage you will be warned if the VOSA Smartcard Reader has not been connected or successfully initiated. You can choose to bypass this feature for the remainder of this session.

Type the Vehicle Registration Mark or Test Number in the box using the keyboard. Spaces between letters/numbers are not important as they will be ignored.

Ensure the correctly programmed smartcard for the vehicle is inserted in the card reader. Alternatively, the details may be entered manually.

The program will now go and check that the entered registration number matches the details on the smart card and report an error if there is a difference. Other errors will be displayed if the serial communications device cannot be located.

Provided all is well the screen will display the complete test selection to be used for this MOT test. Check the details are correct and click the tick icon to proceed. Clicking the exit icon will ABORT the test back to the main menu.



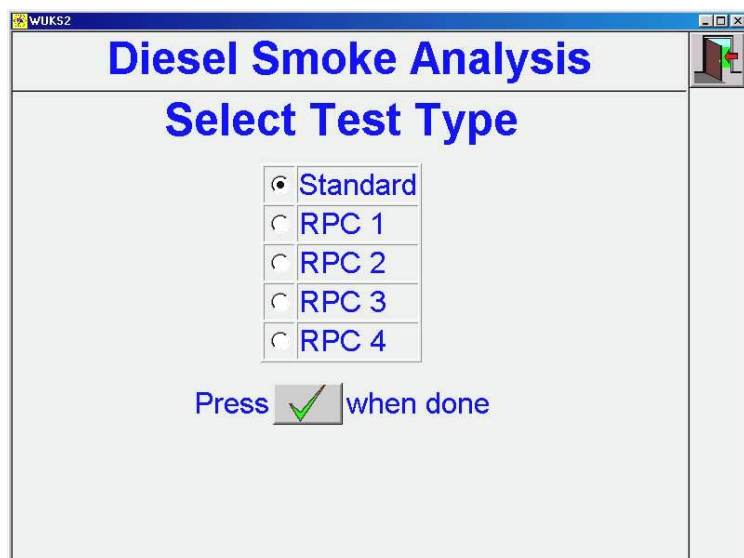
Diesel Smoke Analysis
Enter Vehicle Details

MOT Test Number	12345678
VRM	NA51XMW
Tester Identifier	Bob
VIN	VNT1
Make	Renault
Model	Laguna
Engine size (cc)	1853

Press  when done

Selecting 'Manual data entry' will advance the test without the smartcard and using the Registration Mark as entered. The test type i.e. Turbo/Non Turbo may then be selected and the vehicle tested using the default limits.

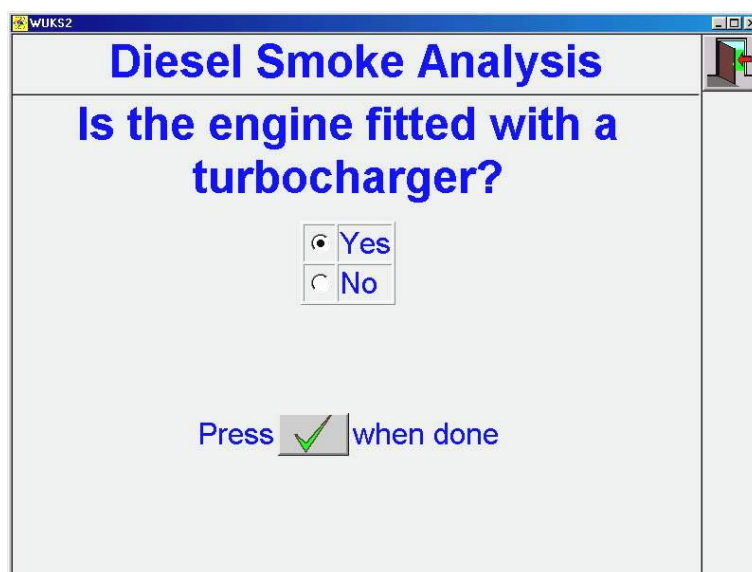
Select the test type then click on the tick icon to proceed.



Diesel Smoke Analysis
Select Test Type

- ☒ Standard
- ☐ RPC 1
- ☐ RPC 2
- ☐ RPC 3
- ☐ RPC 4

Press  when done



Diesel Smoke Analysis

Is the engine fitted with a turbocharger?

☒ Yes
☐ No

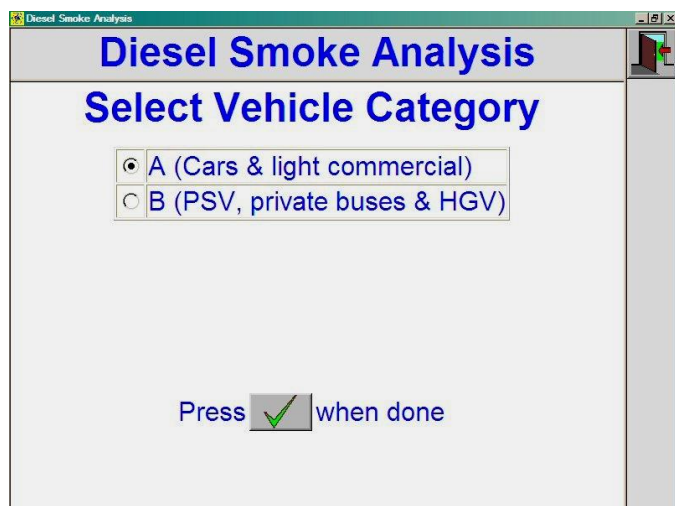
Press  when done

Click on the button to the left of A or B as appropriate to select the category then click the tick icon to proceed.

NOTE: The test can be aborted at any time by clicking on the exit icon.

For HGV/PSV tests select category B.

The test limits will now be displayed.

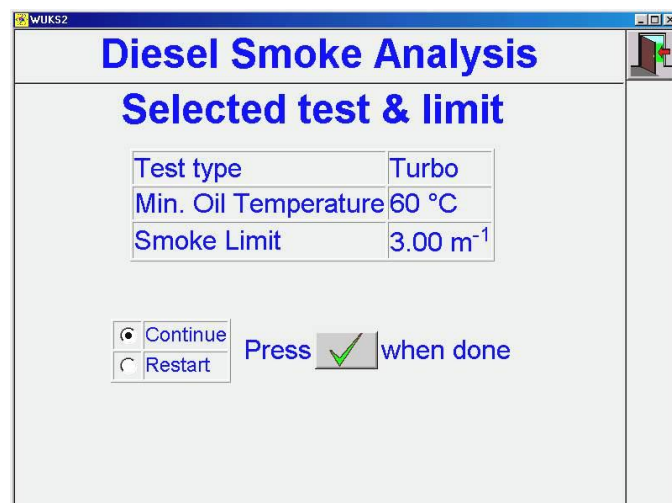


Diesel Smoke Analysis

Select Vehicle Category

☒ A (Cars & light commercial)
☐ B (PSV, private buses & HGV)

Press  when done



Diesel Smoke Analysis

Selected test & limit

Test type	Turbo
Min. Oil Temperature	60 °C
Smoke Limit	3.00 m ⁻¹

☒ Continue
☐ Restart

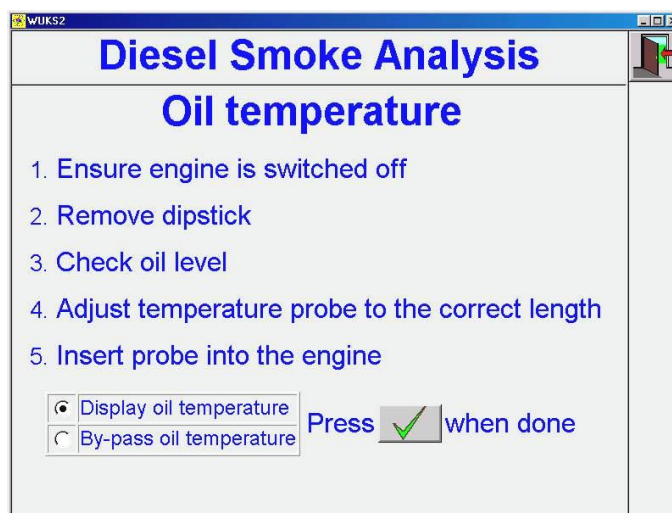
Press  when done

OIL TEMPERATURE – only applicable to classes 4 and 7.

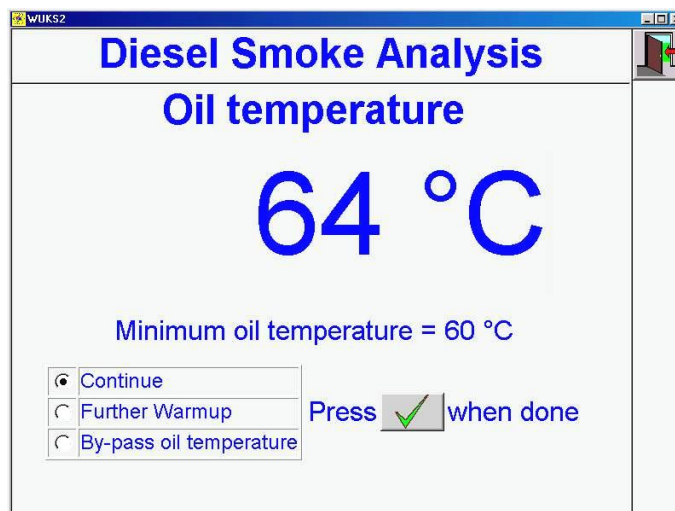
Note that the oil temperature procedure will be automatically bypassed if a temperature probe is not fitted.

WARNING: ENSURE THAT THE OIL TEMPERATURE PROBE IS SET TO THE CORRECT LENGTH BEFORE INSERTING INTO THE ENGINE. FAILURE TO DO SO MAY RESULT IN SERIOUS DAMAGE TO THE PROBE AND/OR ENGINE.

To set the probe length, remove the dipstick from the engine. Offer the probe up to the dipstick and set the moveable stop so that the effective length of probe is approximately 10mm shorter than the dipstick.



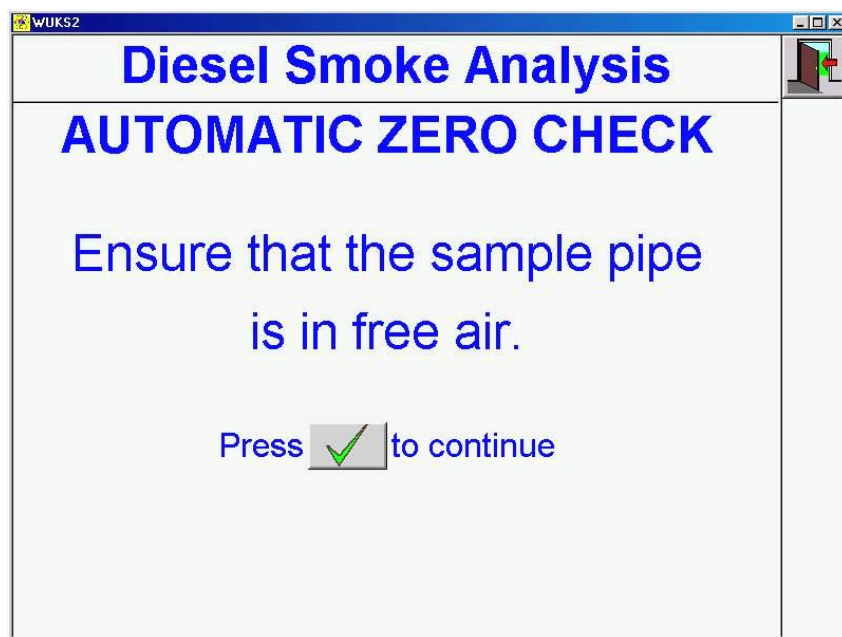
Select 'Display...' or 'Bypass...' then click the tick to continue. The screen will then display the measured oil temperature.



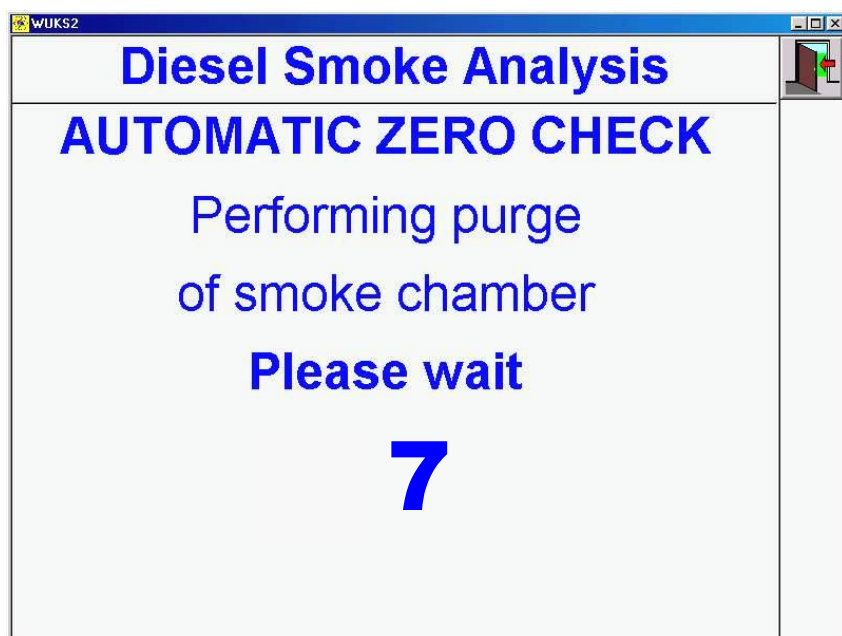
If the oil temperature probe is not used, the measurement may be bypassed. This will force a 40-second countdown before the procedure continues. However, it is imperative that the engine is fully warmed up before proceeding. Selecting further warm up will take the operator to an additional screen displaying engine speed to allow additional warm up of the engine if required.

Ensure dipstick refitted and click tick icon to continue.

The equipment will perform a zero/span check during which, the following screens will be displayed:



Click on the tick icon to continue. The unit will perform a 10 second countdown whilst purging the smoke chamber.



The following measurement and results screens are then displayed.



Zero check complete. Click the tick icon to continue.

If the zero/span check fails, the following screen will be displayed.

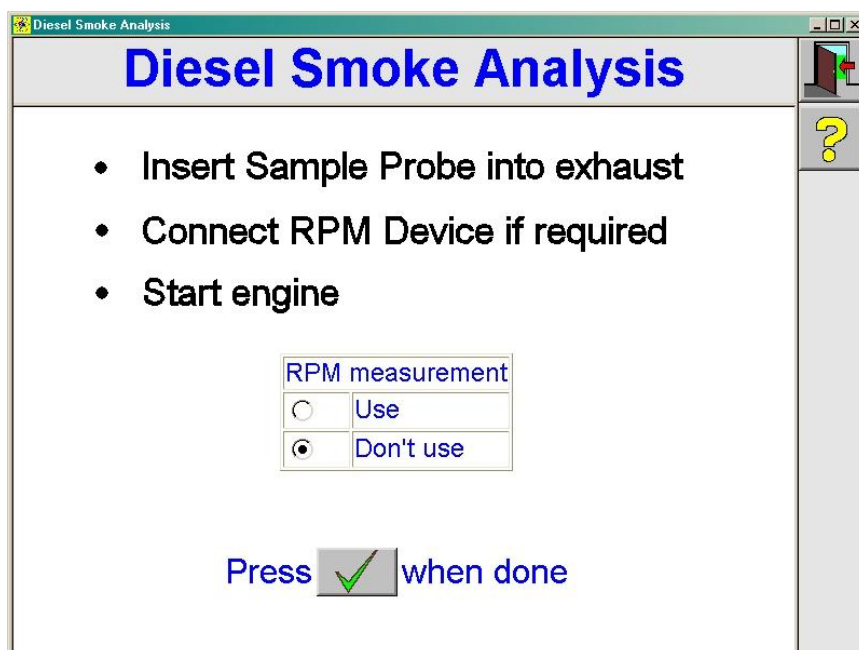


No further testing/readings will be possible until the optics have been cleaned. Please refer to the DX260 Operators manual IN2044 for details of Lens cleaning.

If your equipment is fitted with a remote Indicator Handset you will be asked to activate it at this stage or bypass:

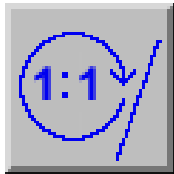


Insert sample probe into exhaust.



Connect the engine speed measurement device and ensure that it has been set up and is reading correctly before continuing. Refer to the on-screen set-up procedure for the appropriate device.

Use these buttons to change the engine speed where necessary.



Selects direct 1:1 reading of engine speed



Divides the engine speed by 2

TACHOMETER SETUP

If the DX211-12 RPM/Tacho Adapter is being used to measure engine speed, proceed as follows:

Ensure the DX211-12 is connected to the Control Console (this is not necessary with the DX211-12BT). Start the engine, allow to idle and turn on the lights. Ensure all other accessories, internal blower, screen heater etc. are off. Attach the DX211-12 clips to the battery noting the correct polarity.

BEWARE ROTATING PARTS.

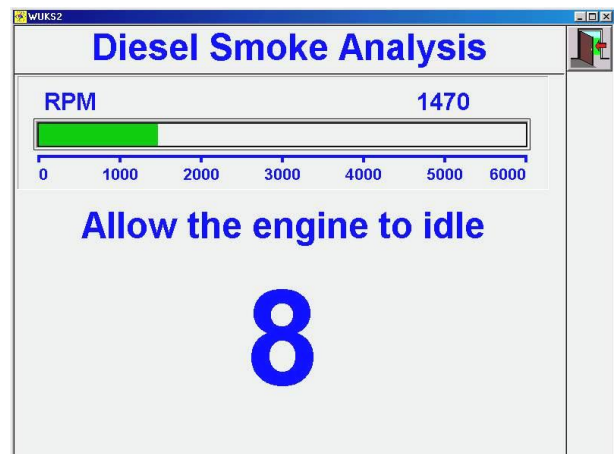
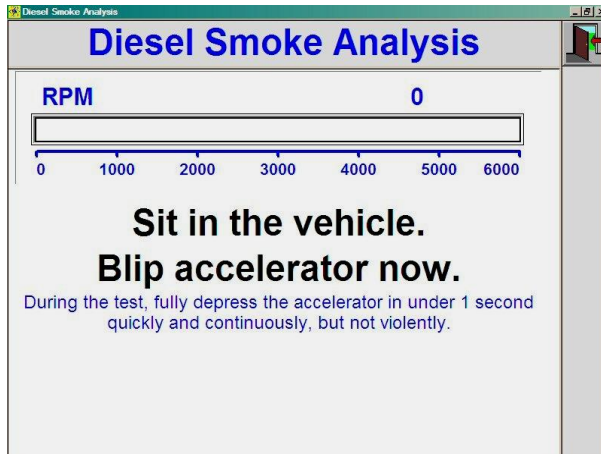
Allow the engine to idle while the DX211-12 initialises, approximately 17 seconds. The Smokemeter programme will ask you to set the correct number of cylinders for the test vehicle. When complete the unit will read engine speed on the bar graph. If the speed appears to be incorrect, reset the DX211-12 by disconnecting and reconnecting one of the leads. Select tick when done.

SMOKE MEASUREMENT

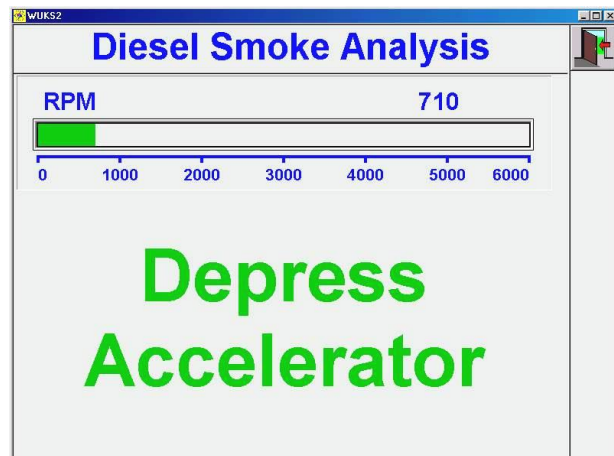
Sit in the vehicle so that the screen is visible and prepare to open the throttle.

'Blip' the throttle briefly and then allow the engine to idle for 10 seconds. A countdown will be displayed during this period.

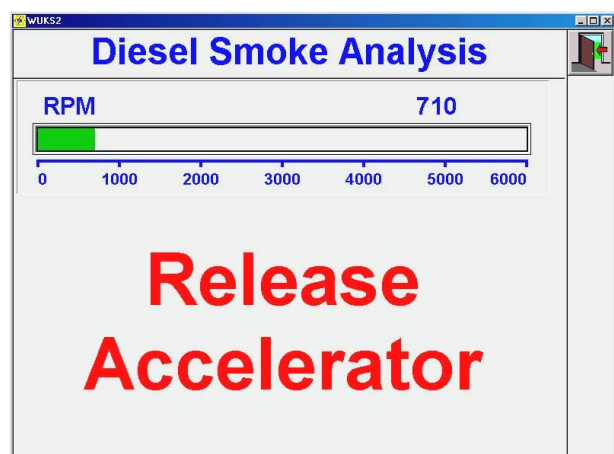
(If you are using the optional remote Indicator Handset you can initiate the procedure using the handset control instead of 'blipping' the engine).



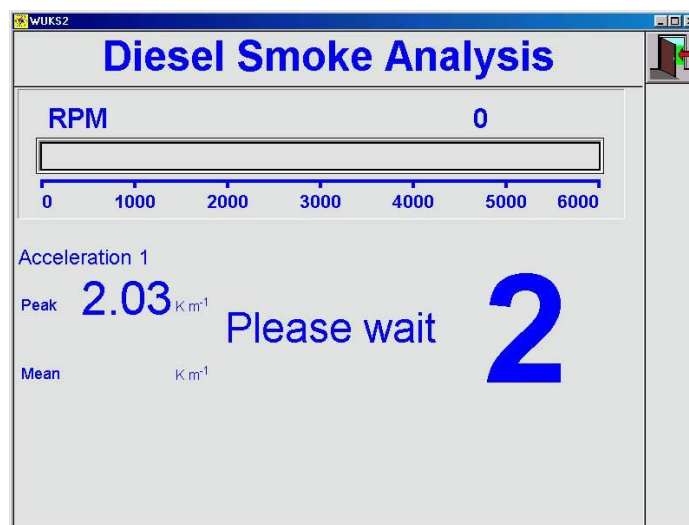
Fully depress the accelerator pedal quickly and smoothly immediately when prompted.



Release the accelerator pedal immediately when instructed and wait.



The result of that free acceleration will be displayed and the engine allowed to idle for 10 seconds.



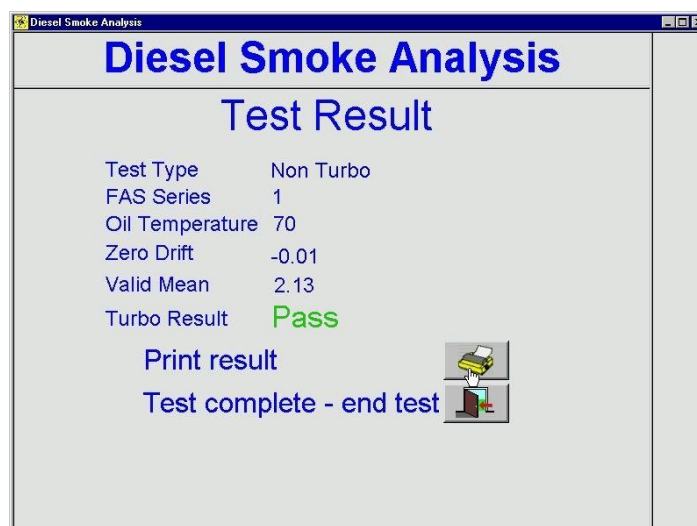
The MOT procedure allows a 'fast pass', the default limit of which is 1.5 m^{-1} . If the vehicle emissions are below this limit on the first free acceleration, the vehicle will be deemed to be a pass and the test will end. However this feature will be disabled if RPC test is selected.

If the vehicle emissions are above the limit, further free accelerations will be prompted up to a maximum of six. The unit will then perform another zero/span check to ensure that the optics of the smokehead have not become contaminated causing inaccurate readings. If the Zero/ Span check has passed, the results will be displayed and printouts may be obtained.

NOTE:

During the zero check, if the drift is positive but less than the allowed limit of $+0.1 \text{ m}^{-1}$ or 5% of arithmetic mean (whichever is greater), it is simply subtracted from the calculated mean. If the drift is above the limit, the results are void and will not be displayed or printed.

The Test Result page is as follows: Click on the printer icon to obtain a printout.



This is a typical PASS printout:

VTN Name:

VTN Address:

VTN No:

Date:

Time:

Make:

Model:

VRM:

VIN:

Size (cc):

Tester ID:

MOT No:

Dieseltune = Diesel MOT
Smoke Test Program

WUKS2 - Version 1.0.5.0

MOT SMOKE TEST –

RPC 1

Oil Temperature

= No engine temperature taken
Min = 60

Smoke Peak [m^{-1}]

1 = 1.01
2 = 1.01
3 = 1.01
4 = 1.01
5 = 1.01
6 = 1.01

Zero Shift [m^{-1}]

= 0.08 (Max = 2.50) **PASS**

Average [m^{-1}]

= 0.93

MOT Test Result [m^{-1}]

Non Turbo
= 0.93 (Max = 0.20) **PASS**

RPC 1
= 0.93 (Max = 0.20) **FAIL**

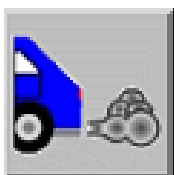
DIESELTUNE

Dieseltune Smoke Analysis

© Dieseltune 2003

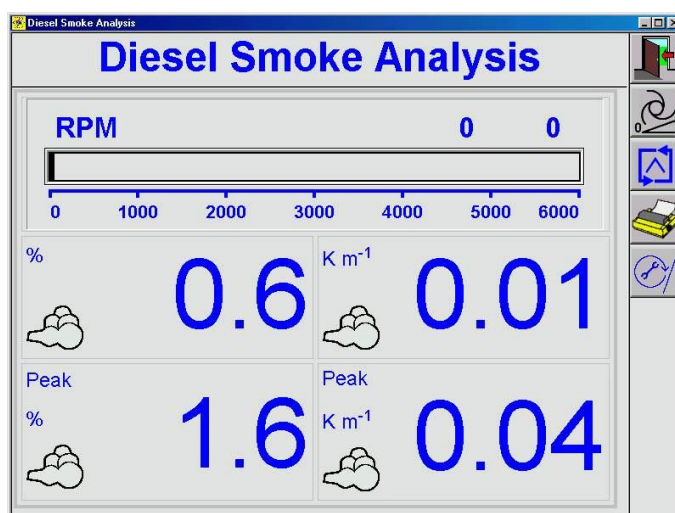
LIVE READINGS

To enter Live Readings, select the following Icon:

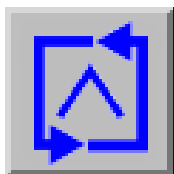


LIVE READINGS

This selects a continuous 'live' and peak readings mode enabling a single free acceleration to be carried out. The unit will perform a zero/span check and then display the live readings screen. A printout of the readings is also available.



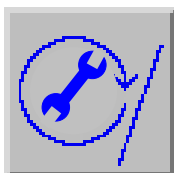
Used to force a zero/span if necessary



Resets the peak value



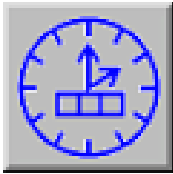
PRINT, press this to operate printer



RPM SETTING.

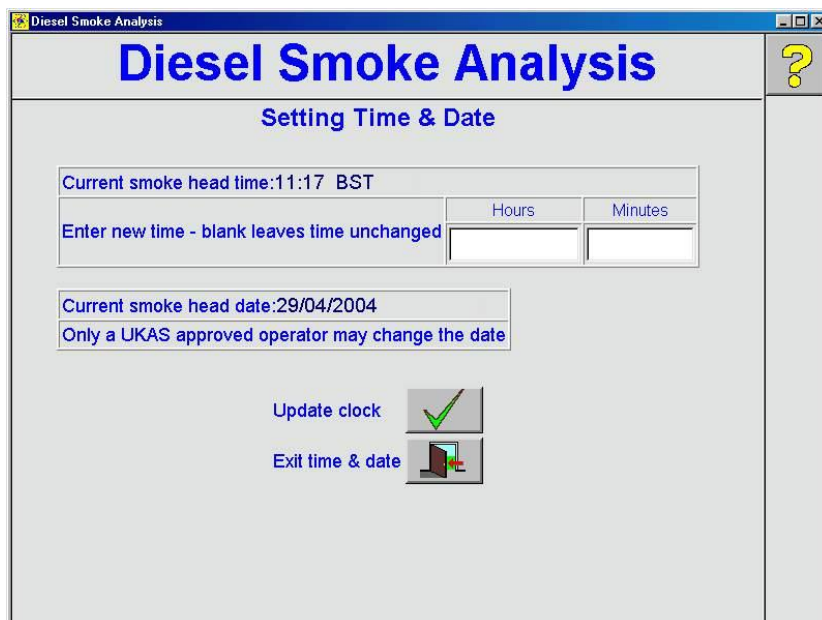
TIME ADJUSTMENT

To alter the time setting, select the following Icon:



TIME DATE

This allows setting of the time only. The Date setting can only be carried out by a UKAS accredited engineer.



Diesel Smoke Analysis

Setting Time & Date

Current smoke head time: 11:17 BST

Enter new time - blank leaves time unchanged

Hours	Minutes

Current smoke head date: 29/04/2004

Only a UKAS approved operator may change the date

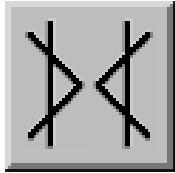
Update clock 

Exit time & date 

The new time must be entered in 24-hour clock format then click on update clock.
To exit without changing the time, click on exit time & date.
The unit will automatically compensate for daylight saving changes between Summer Time and Winter Time.

CALIBRATION

To recalibrate the system, select the following Icon:



CALIBRATION

VOSA Calibration Checks

It is a VOSA requirement that all makes of smokemeter used for M.O.T. testing are calibrated at intervals specified by them. Currently these are:

- A) A check by the operator at least once a week
Because the automatic calibration check described below occurs every time the Smokemeter is switched on there is no requirement for a weekly check.
- B) UKAS calibration once a year
A manual calibration check must be carried out by an approved technician; please contact the manufacturer for this service.

Automatic Calibration Check (electronic method)

The Smokemeter takes its smoke readings on a percentage scale; 0% denotes clean air (i.e. no smoke at all), and 100% denotes total obscuration of the light beam (i.e. totally black smoke). These two values are set automatically; the first by having the light beam in clean air, and the second by switching the beam off so that the sensor sees no light at all.

A calibration check at a light level of 37.5% is then performed (equivalent to $k = 1.88\text{m}^{-1}$). No optical filters are used for this check; the light level is electronically generated by special circuitry (patented).

It is necessary for the calibration to be checked regularly since the 0% point (full light through chamber) can be affected by any soot which may land on the lenses during use. For this reason, the Smokemeter automatically performs a zero/span check at the start of each test or at any time that the Calibrate icon is selected.

The tolerance on the 'mid point' calibration check is 35.9% to 39.0% (equivalent to $k = 1.88 \pm 0.1\text{m}^{-1}$). If it fails outside this limit, a warning is displayed and the 'MOT' test modes will be disabled. If this situation occurs - contact the manufacturer.

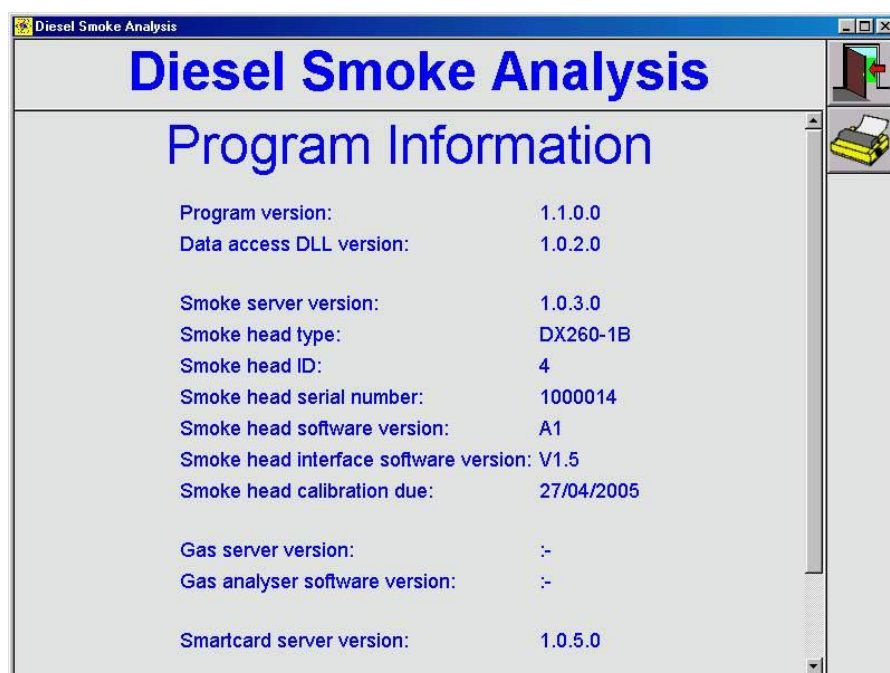
INFORMATION

To request program information select the following Icon:



INFORMATION

Clicking this icon displays a page with system information, including software version numbers. This can be printed and may useful when calling the product helpline should any problems be encountered.



CONVERSION CHART

Conversion chart for k, HSU, FSN and mg/m³.

(Extracted from MIRA Report No. 1965/10, Nuneaton 1965, AG Dodd and Z Holubecki.)

k coefficient of light absorption m ⁻¹	Hartridge Smoke Units HSU	Filter Smoke Number FSN	Mg/m ³	Cal % (*)
0,25	10	1,10	33	6.1
0,27	11	1,20	38	6.5
0,30	12	1,30	42	7.2
0,32	13	1,40	47	7.7
0,35	14	1,48	52	8.4
0,38	15	1,57	57	9.1
0,41	16	1,67	62	9.7
0,43	17	1,75	66	10.2
0,46	18	1,84	71	10.9
0,49	19	1,93	76	11.5
0,52	20	2,02	81	12.2
0,55	21	2,10	86	12.8
0,58	22	2,18	91	13.5
0,61	23	2,26	96	14.1
0,64	24	2,34	101	14.8
0,67	25	2,42	106	15.4
0,70	26	2,50	111	16.1
0,73	27	2,57	117	16.7
0,76	28	2,64	122	17.3
0,80	29	2,71	127	18.1
0,83	30	2,77	133	18.7
0,86	31	2,83	138	19.3
0,90	32	2,89	144	20.1
0,93	33	2,96	150	20.7
0,97	34	3,02	156	21.5
1,00	35	3,08	162	22.1
1,04	36	3,14	168	22.9
1,07	37	3,20	174	23.5
1,11	38	3,26	181	24.2
1,15	39	3,31	187	25.0
1,19	40	3,37	193	25.7
1,23	41	3,42	199	26.5
1,27	42	3,47	206	27.2
1,31	43	3,53	213	27.9
1,35	44	3,59	220	28.6
1,39	45	3,64	227	29.4
1,43	46	3,70	234	30.1
1,48	47	3,75	241	30.9
1,52	48	3,80	248	31.6
1,57	49	3,86	256	32.5

(*) i.e. optical path length, L = 0,25 m

NOTE: For the DX260/DX260BT, all scales except 'Cal %' include compensation for the temperature of the smoke. Hence the Smokemeter's conversion from 'Cal %' to the other units will only follow this table if the smoke temperature is 100°C

CONVERSION CHART

k coefficient of light absorption m-1	Hartridge Smoke Units HSU	Filter Smoke Number FSN	Mg/m ³	Cal % (*)
1,61	50	3,91	264	33.1
1,66	51	3,96	272	34.0
1,71	52	4,01	281	34.8
1,76	53	4,07	290	35.6
1,81	54	4,12	299	36.4
1,86	55	4,17	308	37.2
1,91	56	4,22	317	38.0
1,96	57	4,27	326	38.7
2,02	58	4,32	335	39.6
2,07	59	4,37	345	40.4
2,13	60	4,42	355	41.3
2,19	61	4,47	365	42.2
2,25	62	4,52	375	43.0
2,31	63	4,57	385	43.9
2,38	64	4,62	395	44.8
2,44	65	4,67	406	45.7
2,51	66	4,72	416	46.6
2,58	67	4,76	428	47.5
2,65	68	4,81	439	48.4
2,72	69	4,86	450	49.3
2,80	70	4,91	462	50.3
2,88	71	4,96	475	51.3
2,96	72	5,01	489	52.3
3,04	73	5,07	501	53.2
3,13	74	5,12	514	54.3
3,22	75	5,17	529	55.3
3,32	76	5,23	544	56.4
3,42	77	5,28	559	57.5
3,52	78	5,34	575	58.5
3,63	79	5,40	591	59.6
3,74	80	5,45	609	60.7
3,86	81	5,51	626	61.9
3,99	82	5,57	648	63.1
4,12	83	5,65	669	64.3
4,26	84	5,72	691	65.5
4,41	85	5,80	712	66.8
4,57	86	5,87	737	68.1
4,74	87	5,95	760	69.4
4,93	88	6,04	786	70.8
5,13	89	6,13	815	72.3
5,35	90	6,22	844	73.7

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 our Authorised Agents. Failure to observe these conditions will invalidate the Guarantee.

On-Site Service / Overhaul / Spare Parts

If you require a Service Engineer to attend ON SITE, either due to an equipment fault, or for machine calibration, or if the equipment covered by this manual requires to be sent back for factory overhaul, or if you need spare parts, please contact our Product Support Helpline at the following number.

Tel: 01278 436252 Fax: 01278 450567

Overseas

Service abroad is provided by the agent from whom your equipment was purchased.

Helplines

Dieseltune run an Equipment Helpline during normal office hours.

Tel: 01278 436252 Fax: 01278 450567

email: support@DieseltuneTechnology.com

A fully comprehensive Product Support Contract is also available which provides additional assistance with equipment / technical support. Please contact Product Support on the above Helpline no. for further details.



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