Omitec

OmiSmoke

Operating Instructions

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Introduction

The OmiSmoke diesel smoke meter (DSM) is an exhaust smoke analyser for diesel vehicles and is available as both a stand-alone and PC-based unit. It is an opacimeter device working on the partial flow principle.

The OmiSmoke is approved by the Vehicle Inspectorate Executive Agency for MOT testing on the following classes of vehicle:

- Category A - Cars and Light Commercial Vehicles (MOT classes 4 and 7)
- Category B - Public Service Vehicles, Private Buses and Heavy Goods Vehicles (MOT Class 5 and 6)

OM0378

OmiSmoke consists of two portable units; the smokemeter, which contains the measurement electronics, and the handset, which is equipped with a 4 button keypad, LCD display and a printer. The two units are connected by a single 7 meter cable.

The smokemeter is designed to run for intermittent operation on an internal 12V 200W battery, or using the AC adapter if prolonged supply operation is required. The smokemeter can be charged when not in use by leaving the AC adapter connected.

OmiSmoke Components

Handset

The handset displays the results from each test on the LCD. Progress through the tests is indicated on the LCD, while the 4 buttons allow for menu navigation and option selection.

OM0381

1. Test results printer
2. LCD
3. 'Up' Navigation button
4. 'Down' navigation button
5. 'Accept' button
6. 'Reject' button

There are 5 connectors located on the sides of the handset:

OM0379

1. Engine oil temperature sensor connector
2. Engine RPM sensor (OmiSpeed) BNC connector
3. 9-pin D type VI Card reader input

OM0380

1. Smokemeter 5-pin XLR connector
2. USB port

Smokemeter

The smokemeter houses the measurement components of OmiSmoke.

OM0382
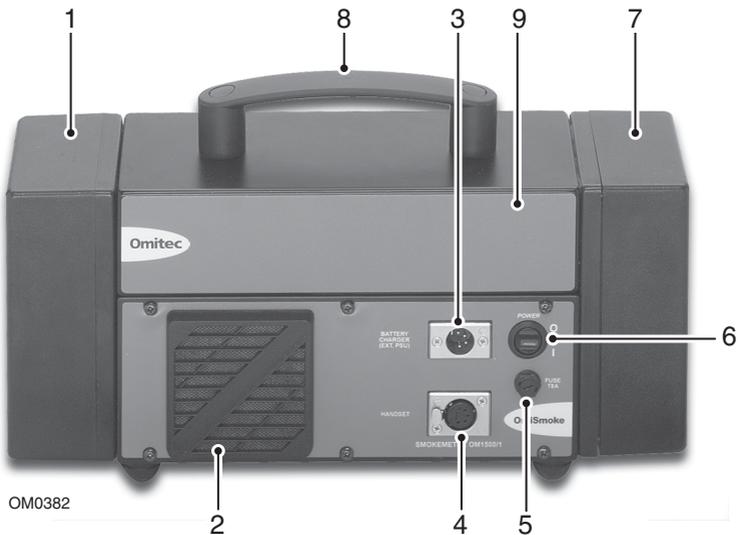
1. Receiver optics cover
2. Air intake
3. 4-pin XLR power connector
4. 5-pin XLR handset connector
5. Fuse
6. Power switch
7. Transmitter optics cover
8. Carry handle
9. Exhaust measuring chamber

OM0383
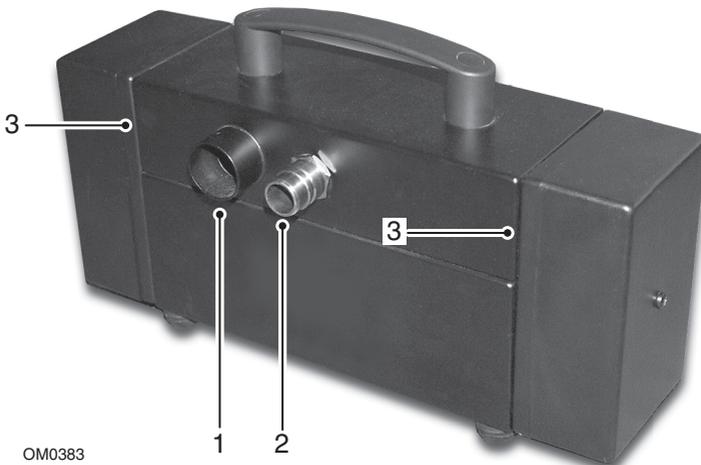
1. Exhaust smoke outlet

2. Exhaust sample probe input

3. Air knife vents

⚠ *Do not obstruct the air knife vents whilst running the OmiSmoke smokemeter.*

Note: The battery access cover is located on the underside of the smokemeter.

Sample hose

OM0384

The exhaust probe collects gas samples from the test vehicle exhaust, which are then analysed by OmiSmoke.

⚠ *Take care to avoid contact with the exhaust system when inserting or removing the sample hose. The exhaust system will be hot and severe burns could occur.*

Inserting sample hose probe

Place the probe into the exhaust following the quick guide below:
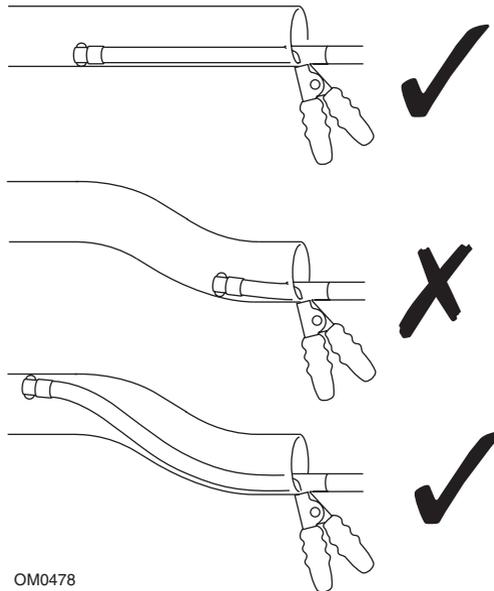
OM0478

The probe should never be placed directly behind a bend in the exhaust pipe or close to the silencer or expansion box. It should attach using the securing clamp, which will ensure a minimum insertion.

Engine oil temperature sensor probe

OM0373

Category A tests prefer the measurement of the test vehicle's engine temperature.

The engine temperature sensor probe measures engine oil temperature in the sump of the test vehicle, providing an accurate reading of the temperature of the engine.

The probe connects to the OmiSmoke handset using the Oil Temperature Probe socket.

To monitor the engine temperature of the vehicle after it's warm-up period, prior to an emissions test, the sensor probe must be inserted into the engine oil dipstick aperture. First remove and clean the engine oil dipstick of the vehicle.

⚠️ *NEVER insert the probe into the dipstick aperture without first setting the depth gauge, and take care not to insert the probe any further than the gauge allows. Serious damage to the engine could result.*

Setting the sensor probe depth gauge

OM0375
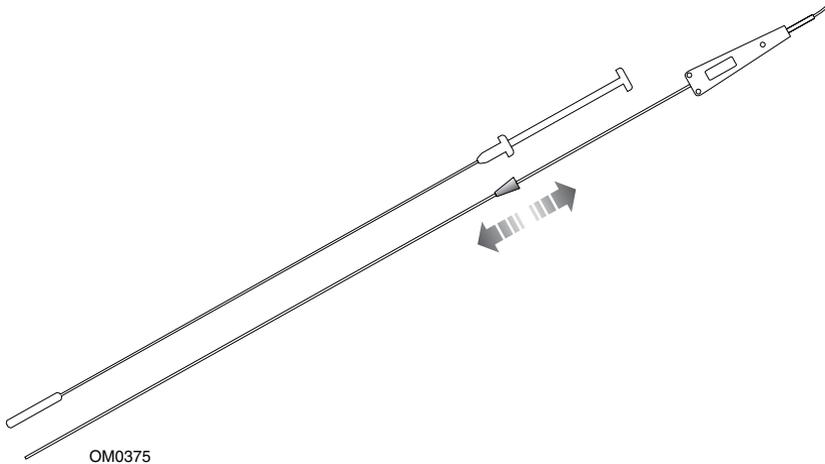
The sensor probe is fitted with a depth gauge to prevent the probe from being inserted too far (which could cause serious damage to the engine). Move the rubber sleeve on the probe, so that the distance between it and the end of the probe, is equal to the length of the dipstick (see illustration). Insert the probe (up to the depth gauge) into the dipstick aperture.

⚠ *Do not attempt to insert the engine temperature probe while the engine is running. Moving engine parts may cause personal injury or come in contact with the probe, or its cable, resulting in damage to the probe and to the engine.*

⚠ *Take care not to come into contact with hot engine parts when inserting or removing the engine temperature probe from the engine oil dipstick aperture - serious burns may occur.*

⚠ *Take care when removing the engine temperature probe after an emissions test. The probe may be extremely hot and could cause serious burns.*

⚠ *Remove the oil temperature probe prior to carrying out an emission test.*

⚠ *Do not rev/accelerate the engine with the temperature probe inserted into sump. Increased vibration may cause it to move and cause damage.*

NOTE: Always clean the probe after use and clean the dipstick before re-inserting into the engine.

Safety Precautions

⚠️ *Exhaust gases are poisonous and contain carbon monoxide, which can cause unconsciousness and can be fatal - NEVER start or leave the test vehicle engine running in an unventilated area.*

- *DO NOT handle the OmiSmoke exhaust probe tip, or place the exhaust probe on plastic or combustible surfaces after the test procedure. The probe may become extremely hot during the test and could cause burns and a risk of fire.*

- *Take care when handling the Oil Temperature probe after the test procedure. The probe's metal sheath may become extremely hot during the test and could cause burns.*

- *Prolonged contact with engine oil may cause serious skin disorders, including dermatitis and cancer of the skin. Avoid unnecessary contact with engine oil and wash thoroughly after contact.*

- *When fitting or removing the engine speed measuring device, ensure that the engine is switched off and allow the engine to cool. Be aware that on some vehicle's the engine cooling fan may commence operating AFTER the engine has been switched off.*

- *Ensure that any test leads will not foul any moving part of the engine. Also keep leads away from engine cooling fans and any hot engine components.*

- *Take care with the vehicle electric systems when using an Ignition Pulse Speed measurement probe, as many modern high energy ignition systems are potentially dangerous.*

PC Based Systems

System requirements

The minimum PC system requirements to load the OmiGas/OmiSmoke Techcenter software are:

- Windows 98, ME, 2000 or XP
- Pentium 133 processor or higher
- 32 MB RAM
- 10 MB of free disk space
- 1024 X 768 minimum screen resolution
- CD ROM drive
- Serial com port capable of 115200 baud rate
- USB 1.1 or later

Loading software

Full instructions on loading the software are included with the software CD.

To load the software onto your machine, first insert the CD into the drive. The program should then auto-run. If it doesn't, select 'Run' from the 'Start' menu and browse to the appropriate CD drive and select the file 'Setup.exe' to start the installation process. Follow the on-screen instructions to complete the loading sequence, then reboot when prompted.

Battery Charging

The smokemeter is designed to run for intermittent operation on an internal 12V 200W battery, or using the AC adapter if prolonged supply operation is required. The smokemeter can be charged when not in use by leaving the AC adapter (battery charger) connected.

1. Ensure charger is switched off before connection to the smokemeter.
2. Connect the charger power lead to the battery charger XLR socket.
3. Connect the charger to the mains supply and switch on.
4. After charging, ensure the battery charger is switched off before disconnecting.

Note: The battery charger is designed to revert to a 'trickle' charge mode after the battery has been fully charged. It is safe, therefore to leave the charger attached during a normal working day.

⚠ *Do not leave the AC adapter/ battery charger connected for prolonged periods.*

Emissions Testing Using the Handset

OmiSmoke emissions testing can be undertaken by using the handset or a PC (using the OmiGas/OmiSmoke Techcenter software).


```
        MAIN MENU
>  MOT FAS Test
   Peak Test
   Continuous Test  √
```
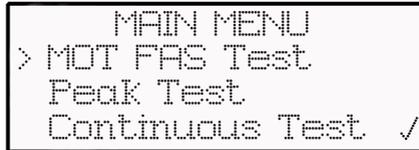
OM0413

Navigation through the emissions test software using the handset is assisted by the on-screen information and prompts which are displayed throughout the testing procedure. To scroll up and down through the menus press the 'Up and 'Down' buttons until the required option is highlighted. To select the highlighted option, press the 'Tick' button, or to reject press the 'Cross' button. Each successive menu displayed on the handset will provide a number of options from which the technician may choose.

During a test procedure, the handset will display screens which inform the technician what the OmiSmoke analyser is currently doing. These screens do not provide options for the technician to select and are simply a commentary on the procedure.

Emissions Testing Using the PC

OmiSmoke emissions testing can be undertaken by using a PC (using the OmiGas/OmiSmoke Techcenter software) or the handset.

OmiSmoke can be added to the PC based OmiGas/OmiTechcenter system at any time, simply by connecting the 'combo' cable (OM1500/10) between the OmiSmoke handset socket and the auxiliary serial interface socket on the rear of the OmiGas unit (OM4500/1).
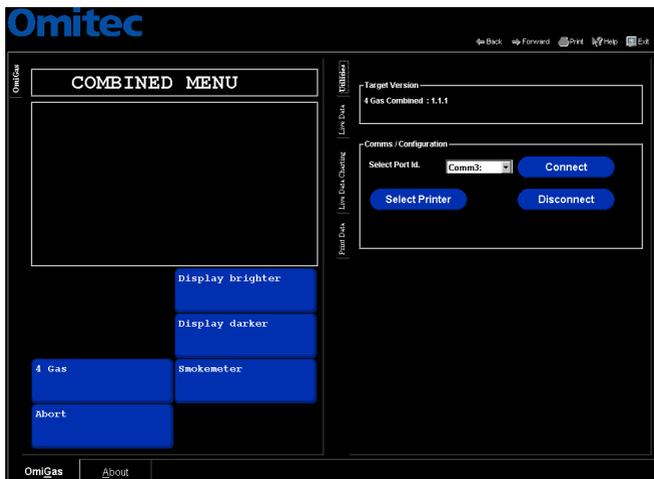
The PC system will need to recognise new hardware for the OmiSmoke. To achieve this, return to the main menu and select 'ABORT'. The software will then re-establish communication and the message 'Configuring Analyser - Please Wait' will appear. This will then bring up the new 'Combined Menu', where the Smokemeter button will be added.

OM0484

Navigation through the emissions test software using the PC, is assisted by the on-screen information and prompts which are displayed throughout the testing procedure. Each successive menu displayed on the PC will provide a number of options from which the technician may choose, using the 'virtual' buttons on the screen. Selecting an option is achieved by pointing to the relevant button with the mouse cursor and pressing the left hand mouse button to select.

During a test procedure, the PC will display screens which inform the technician what the OmiSmoke analyser is currently doing. These screens do not provide options for the technician to select and are simply a commentary on the procedure.

OmiSmoke Main Menu

OM0385
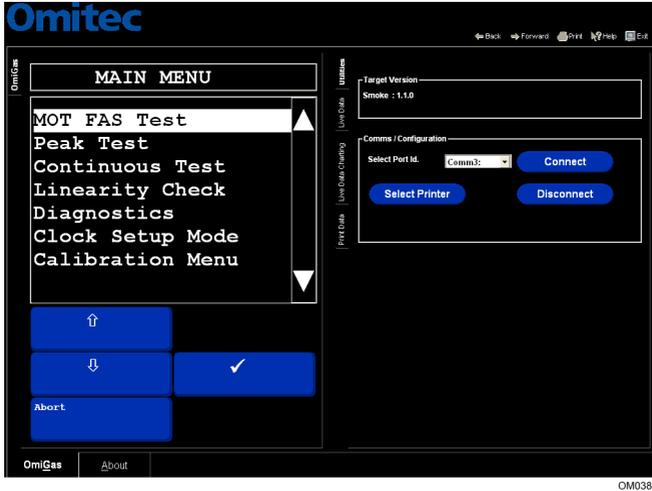
PC Navigation Short-cut Buttons

In the top right of the PC display, there are five short-cut buttons to aid the technician with software navigation. These buttons function as follows:

← Back   Select to view the screen last displayed.

→ Forward   Select to return to the current screen if you have used the 'back' button to view a previous screen.

🖨 Print   Select to print the data for the current emissions test.

💬 Help   Select to access the OmiSmoke help files, if you need assistance or clarification during an emissions test.

🖥 Exit   Select to close the OmiSmoke Techcenter program. An emissions test can still be carried out, but only by using the handset.

Preparation of Vehicle Prior to Tests

This is a guidance note, similar to that which will be found in the Vehicle and Operator Services Agency (VOSA) inspection manual.

Checks on Vehicle Before Tests

As a general precaution, check:

1. That the vehicle has enough engine oil.

2. The coolant level is correctly topped up.

3. There is sufficient fuel to carry out the test.

4. There are NO defects or suspected faults. It is advised to seek advice from a qualified automotive service engineer and have them rectify any faults in advance of the test.

5. Confirm the engine is at normal operating temperature.

   For cars and light commercial vehicles (Category A) it is preferred to use an oil temperature probe inserted into the dipstick tube of the engine.

6. There are no obvious signs that the fuel injection pump governor has been tampered with (e.g. seals are in place).

7. The condition of the camshaft belt (where visible).

8. Raise engine to around 2500 rpm or half the maximum engine speed, if it is lower. Hold it steady for 30 seconds to ensure the system is properly purged.

9. Raise engine speed slowly to establish operation of governor, by monitoring engine speed and its stabilised maximum.

Visual Test

Applies to all cars and light commercial vehicles up to and including 3500 Kg, first used before 1st August 1979 (Category A).

The test will be a visual one, it does not require a diesel smoke meter test. Follow the visual inspection outlined in the VOSA inspection manual.

Metered Smoke Test

Applies to all cars and light commercial vehicles up to and including 3500 Kg, first used after 1st August 1979 (Category A). This also applies to all heavy goods vehicles and large passenger vehicles.

The vehicle must be tested using a metered smoke test.

MOT FAS Test Procedure

⚠️ *Before carrying out a MOT FAS test or any other FAS test, the engine must first be verified safe and sound to proceed, and be running at normal operating temperature. See section 'Preparation of Vehicle Prior to Tests' for suggested full checks.*

The MOT FAS TEST is a procedure that follows the statutory requirements of the Diesel Exhaust emission test as described in the current Vehicle and Operator Services Agency Inspection Manual, and is approved for testing the following:

(a)	Car and Light Commercial Vehicle testing (Class II, IV & VII)	CAT A
(b)	Private bus testing (Class V)	CAT B
(c)	Public Service Vehicle (Class VI)	CAT B
(d)	Heavy Goods Vehicle	CAT B
(e)	Single Vehicle approval	CAT A

The MOT FAS test also offers Reduced Pollution Certificate (RPC) testing within the Category B menu.

The OmiSmoke will measure the Free Acceleration Smoke (FAS) output over the whole speed range of an engine (no load from idle up to cut-off speed) where the engine is accelerated against its own inertia.

A schedule of up to 6 accelerations will be prompted, leaving a gap of 10 seconds between each. The engine should be at idle before the start of each test.

The OmiSmoke will automatically calculate a Pass or a Fail and print the result.


```
           MAIN MENU
>MOT FAS Test
 Peak Test
 Continuous Test      ✓
```
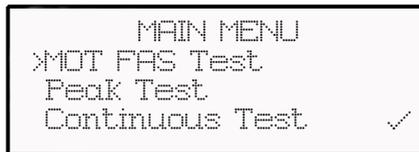
OM0449

From the Main Menu, the operator can select which test is required, by scrolling down the menu using the up and down buttons, and confirming the selection by pressing the tick key.

Category of Vehicle

```
        CATEGORY MENU
      >Category A
       Category B
                          ✓
```
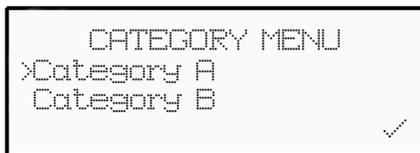
OM0450

Select Category A for the following vehicle types:

• Car or light commercial (Inc. MOT class IV, VII and single approval scheme vehicles).

Select category B for the following vehicle types:

• Public service vehicles

• Private bus (Inc. MOT class V and VI).

• Heavy Goods Vehicle of which Reduced Pollution Certificate (RPC) testing is also available.

RPM Probe

An RPM probe (analyser) can be used to establish engine speed and recognise a FAS test in progress. This is normally optional but may be necessary in some testing. OmiSpeed, part no. OM1600 is available from Omitec.

Select from the following menu:

```
       RPM PROBE CHECK
      Connect RPM Probe

      X-No Probe    ✓- OK  X
```

OM0451

Smart Card

VI INTERFACE   RPM   OIL PROBE

OM0479   9 pin D type
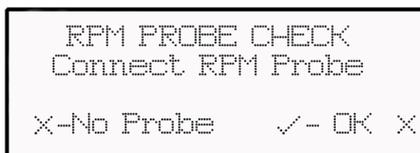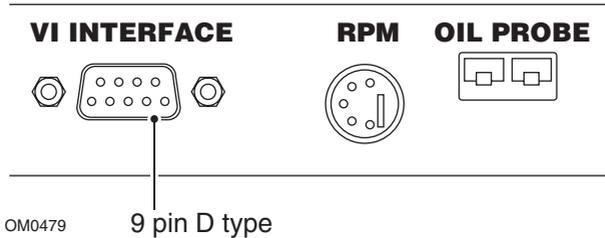
The introduction of MOT computerisation requires the use of a Smart Card to pass data to the OmiSmoke. A Smart Card reader is connected to the socket on the side of the handset, market 'VI Interface'(9 pin D type).

SMART CARD
Insert Smart Card

✗- No Card ✓-OK   ✓

OM0489

On the 'Insert Smart Card' screen, press the tick key to confirm. Data will then be read from the smart card to the OmiSmoke.

Press the cross key if a smart card is not used. If 'No Card' is selected move on to 'Test Type' section.

SMART CARD
Enter VRM or
Test Number
[   ]

OM0471
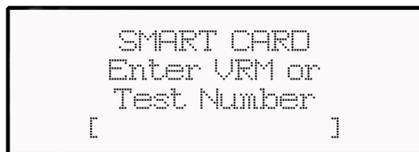
'Enter VRM or Test Number' will appear on the screen.

VRM = Vehicle Registration Number

Test number = MOT test number

Using the up and down buttons start by scrolling through to find the character required for the first position.

This will scroll 0-10 followed by A-Z with the up button or the reverse with the down button.

Fill the entire fieldbox '[ ]' to progress. Press the tick key to enter a blank. Spaces can be entered by also pressing the tick key.

The data will be confirmed 'Reading vehicle data - Please wait'. The display will then prompt the user to 'KEEP TEST TYPE' followed by 'Turbo' or 'Non Turbo'.

Press the tick key for YES or the cross key for change.

```
      SMART CARD
    Keep Test Type?
       Non-Turbo
  x - No        ✓ -Yes
```
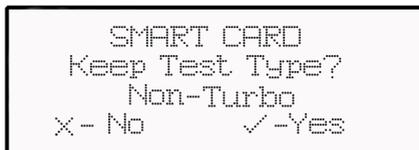
OM0472

Test Type

Select 'Turbo' or 'Non Turbo' as required for vehicle under test.

```
      TEST TYPE MENU
  >Non-Turbo
   Turbo
                      ✓
```
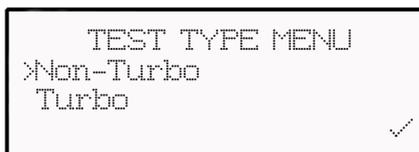
OM0452

Reduced Pollution Certificate (RPC) - (Category B only)

The RPC menu is only shown if category B has been selected previously. Select RPC 1, 2, 3, 4 or No RPC for standard MOT tests. RPC limits for 1, 2, 3 and 4 are explained in relevant RPC test instruction manual.

```
        RPC MENU
>No RPC
 RPC 1
 RPC 2                  ✕
```

OM0475

Oil Temperature Measurement (Category A only)

This selection 'Measure Oil Temp' will only appear on Category A tests. The MOT FAS test prefers that Oil Temperature is measured.

```
OIL TEMP MEASUREMENT
    Measure Oil Temp?

  ✕ - No     ✓-Yes    ✓
```
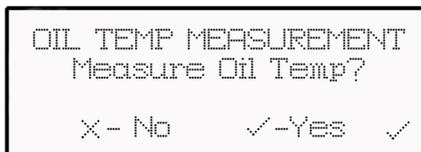
OM0474

Press the tick key for YES.

Follow the instructions given in section 'Engine Oil Temperature Sensor Probe' paying particular attention to the use of the probe and the relevant warnings.

⚠ *WARNING: Incorrect use may result in damage to both user and vehicle.*

The minimum oil temperature required for the test to proceed is 60°C, however the user has the option to wait for a higher temperature before proceeding. Once oil temperature is recorded the user is prompted to remove the probe, replace the dipstick and confirm this before the test will continue.

⚠ *WARNING: Do not rev/accelerate the engine with the temperature probe inserted into sump as increased vibration may cause it to move and cause damage.*

Press the cross key for NO.

By selecting 'NO' the OmiSmoke will impose a 40 second time penalty, showing a clear count down to this on the display.
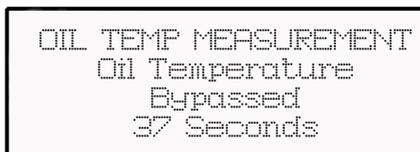
```
OIL TEMP MEASUREMENT
    Oil Temperature
       Bypassed
     37 Seconds
```

OM0473

This period can be used to purge the engine and effectively prepare for the test.

NOTE: By selecting 'NO' the test report will state 'No engine temperature taken'.

The OmiSmoke will now check that the engine is at operating temperature. The user may have to wait for temperature to reach 70°C, check itself for contamination and finally 'ZERO CHECK' the optics.
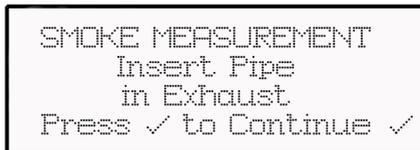
```
SMOKE MEASUREMENT
      Insert Pipe
      in Exhaust
Press ✓ to Continue ✓
```

OM0476

Once ready the user is prompted to 'Insert Pipe into Exhaust'.

Test Procedures

Insert Pipe into Exhaust

Place the probe into the exhaust following the quick guide below:
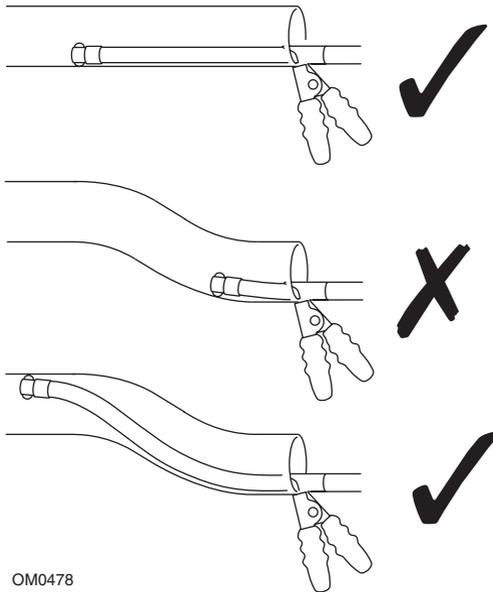
OM0478

The probe should never be placed directly behind a bend in the exhaust pipe or close to the silencer or expansion box. It should attach using the securing clamp, which will ensure a minimum insertion.

FAS Test Procedure

The user will be prompted with the correct FAS test procedure.
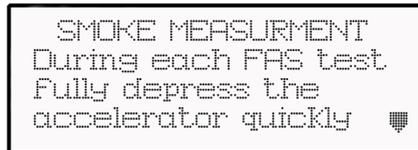
OM0477

During each FAS test fully depress the accelerator quickly but not violently in under one second.

Press the tick key to acknowledge and proceed.

The display will show the smoke measurement and a 10 second count down.

The user should now be seated in the drivers seat with a handset or the PC screen in viewing distance, and follow the automated instructions:

A schedule of up to 6 accelerations is automatically progressed by the OmiSmoke with automatic calculation of pass / fail status. It may also request another repeated acceleration if insufficient data was recorded.

Fast Test (Category A only)

After the 1st acceleration, on category A vehicles only, a reading of less than or equal to the fast pass smoke limit (currently 1.5 K (m^{-1})) will automatically produce a fast pass and as such will terminate the schedule at this point with a pass status. The test results and print out will state 'Fast Pass Result'.

For all other conditions the schedule will continue prompting the user to accelerate and release until the arithmetic mean of the latest 3 readings is within the pass limit. The schedule of tests up to a maximum of 6 will continue automatically.

Results and Print

```
        ZERO CHECK
      Waiting for the
    Smoke to Disperse
       Please Wait…
```

OM0480

Once the OmiSmoke has achieved a result it will inform the user of 'Waiting for smoke to disperse'.

Fail result with oil temp. at >60°C and <80°C

```
      TEST RESULTS
   Engine temperature
    should be raised to
      at least 80°C    ✓
```

OM0481

A fail report after a category A test and an oil temperature of greater than 60°C but less than 80°C, will not be produced and the user will be informed to raise the engine oil temperature to 80°C and a retest will be offered.

Pass or Fail Result

```
      TEST RESULTS
  Oil Temp °C:        87
  Limit:             250
  Test No1 K:        257 ▓
```

OM0482

The display will inform the user of the results. Scroll through with the up and down buttons to check the conclusion (Pass or Fail).

Print

All results must be printed, the user will be prompted to check the printer has paper and proceed. Press the tick key and the display will show 'Printed Results - Please Wait...' The print should take approximately 10-15 seconds. A second set of results will be offered.

```
┌─────────────────────────────┐
│      PRINT RESULTS          │
│                             │
│   Print results again?      │
│   ✗ - No    ✓ -Yes    ✓    │
└─────────────────────────────┘
```
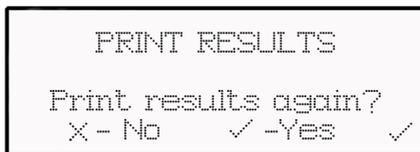
OM0483

The OmiSmoke will return to the main menu once the user has confirmed sufficient prints.

Peak Test

The OmiSmoke will make a continuous smoke reading and report the Peak K value. A reset button (X) is offered to reset the peak value during the diagnostic period. This test is useful for engine analysis during service repair or diagnostic work and can be of use prior to the MOT FAS test. The Peak test result will NOT produce the same K value that would be achieved in the MOT FAS test procedure, it is for relative performance use only.

Select 'Peak Test' from the main menu and follow the on-screen instructions.

```
    RPM PROBE CHECK
  Connect RPM Probe

  x - No Probe  ✓-OK  ✓
```
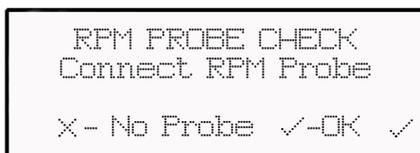
OM0459

On 'RPM Probe Check' menu, confirm you have a RPM probe (OmiSpeed) connected by pressing the tick key. If you do not have a RPM probe, press the cross key.

The OmiSmoke then goes through a warm-up procedure, an automatic contamination check and a zero check before the smoke measurement screen is displayed. Insert the sample probe as requested, start the vehicle and confirm by pressing the tick key.

```
      SMOKE PEAK
   K Peak Value:    001

      x-Reset Peak      ✓
```

OM0461

The 'K Peak Value' is displayed on the 'Smoke Peak' screen. The smoke peak can be reset by simply pressing the cross button. Once the smoke measurement is complete, turn off the vehicle, remove the probe and the press the tick button to confirm. The OmiSmoke performs another zero check and returns to the main menu.

Peak Test Quick Summary of Events

- Connect RPM - yes or no
- Tube warm up to 70°C
- Contamination - bench reset and optic zero check
- Insert pipe into exhaust
- Smoke peak reading given
- Reset peak reading or Finish
- Remove pipe from exhaust
- Smoke disperse and zero check
- Return to main menu

Continuous Test

The OmiSmoke will make a continuous smoke reading and report the K value on a continuous basis. This test is useful for engine analysis during service repair or diagnostic work and can be of use over the whole engine speed range. This test will not hold the peak K value as would the Peak test.

The continuous test result will NOT produce the same K value that would be achieved in the MOT FAS test procedure as it is used for relative performance only.

Select 'Continuous Test' from the main menu and follow the on-screen instructions.

```
   RPM PROBE CHECK
  Connect RPM Probe

 X- No Probe  √- OK √
```
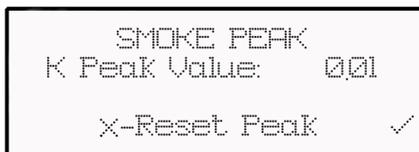
OM0460

On 'RPM Probe Check' menu, confirm you have a RPM probe (OmiSpeed) connected by pressing the tick key. If you do not have a RPM probe, press the cross key.

The OmiSmoke then goes through a warm-up procedure, an automatic contamination check and a zero check before the smoke measurement screen is displayed. Insert the sample probe as requested, start the vehicle and confirm by pressing the tick key.

```
   SMOKE CONTINUOUS
  K Value:       001


                   √
```

OM0462

The 'K Value' is displayed on the 'Smoke Continuous' screen. Once the smoke measurement is complete, turn off the vehicle, remove the probe and the press the tick button to confirm. The OmiSmoke performs another zero check and returns to the main menu.

Continuous Test Quick Summary of Events

- Connect RPM - yes or no
- Tube warm up to 70ºC
- Contamination - bench reset and optic zero check
- Insert pipe into exhaust
- Smoke continuous reading given
- Finish
- remove pipe from exhaust
- Smoke disperse and zero check
- Return to main menu

Linearity Test (Calibration Verification Check)

The 'Calibration Validation Check', known as 'Linearity Check' on the OmiSmoke, needs to be carried out every 7.5 days. The OmiSmoke prompts the user to carry out a 'Linearity Check' when calibration is due, alternatively the user can carry out the check on demand.

Note: If the 'Linearity Check' is carried out on demand by the user, OmiSmoke will automatically calculate a new 7.5 default.

Once 'Linearity Test' is selected from the main menu, The OmiSmoke automatically performs a tube warm up procedure followed by a contamination check and a smoke bench reset before the 'Linearity Check' screen is displayed.

OM0396
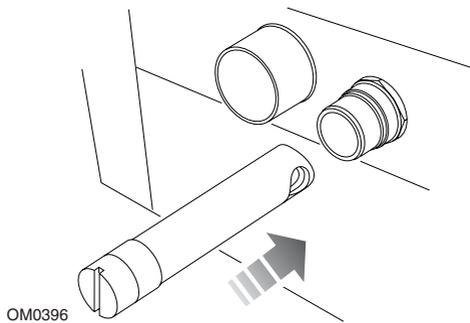
The message 'Please insert filter' appears on the 'Linearity Check' screen. Insert the filter into the sample probe port in the back on the smokemeter, ensuring the filter is inserted fully and in the correct orientation (see illustration).

LINEARITY CHECK
Please Insert Filter
and Press ✓

OM0485

Once the filter is inserted correctly, confirm by pressing the tick key.
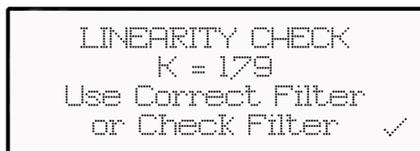
```
 LINEARITY CHECK
      K = 179
 Use Correct Filter
  or Check Filter     ✓
```

OM0486

If the linearity check fails, check the correct filter is being used and is inserted correctly before trying again. If repeat failure occurs, check filter is clean - *See 'Cleaning and Maintenance' section.* Once the linearity check is completed successfully, remove the filter and press the tick key to return to the main menu.

Diagnostics

Diagnostics for the OmiSmoke are provided to help the user check over the status of the equipment as part of routine maintenance or as part of Helpdesk diagnostics should a problem be encountered.

```
    DIAGNOSTIC MENU
>Smoke Head Info
 Smoke Readings
 Smoke Raw Data        ✓
```

OM0463

Smoke Head Info

```
   SMOKE HEAD DETAILS
Serial #        yyyyyy
Customer Code      ff
Parts List Rev     ff ▼
```
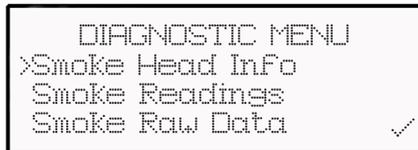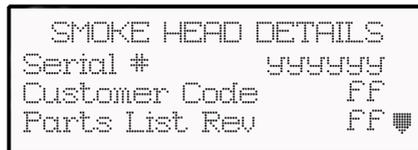
OM0464

The 'Smoke Head Details' screen displays the following information, some of which you may want to record in the user notes section.

Heading	Description	User Notes
Serial #	Serial number of smoke head	
Customer code	Customer code	
Part List Rev.	Build parts list revision (issue number)	
Manufacturer Date	Manufacturer Date	
Program Location	Location of program	
S/Ware #	Software number in smoke head	
S/W rev	Software revision (issue number)	
LIN date	Due linearity check date - every 7.5 days	
CAL date	Due calibration date - every 12 months	

Smoke Readings

```
     SMOKE READINGS
 Calculated K         005
 Opacity %            234
 Accel Detect         000▦
```

OM0465

The 'Smoke Readings' screen displays the calculated K reading, percentage of opacity, acceleration detection, engine speed, battery voltage, tube temperature, heater status and the fan status.

The following information is mainly for use in Helpdesk diagnostic.

Reading	Description	User Notes
Calculated K	K value reading - 0.00 unless filter inserted or fault	
Opacity %	Opacity within sample chamber of Smokemeter	
Accel. Det.	Signal from acoustic sensor in smoke chamber (typ. 0.00 with no signal)	
Engine RPM	Reading from RPM signal input	
Battery V	Battery voltage (Approx. 12V)	
Tube Temperature	Sample chamber tube temperature (80°C max)	
Heater Status	Sample chamber heater status - On or Off	
Fan Status	Purge air fan status. One in each optic box - On or Off	
Oil Temp °C	Reading from oil temperature input	

Smoke Raw Data

```
      SMOKE RAW DATA
Opacity            478
Tube Temp          310
Battery            293 ×
```

OM0466

The 'Smoke Raw Data' screen displays the opacity reading, tube temperature and battery voltage.

Reading	Description	User Notes
Opacity	3 digit number - typically 444 with no filter or fault	
Tube Temp	3 digit number - typically 300 but can vary with tube temperature	
Battery	3 digit number - typically 295 for battery of 12 volt - will vary depending on charge status	

Printer Test


```
        DIAGNOSTIC MENU
   Smoke Readings
   Smoke Raw Data
 >Printer Test            ✓
```
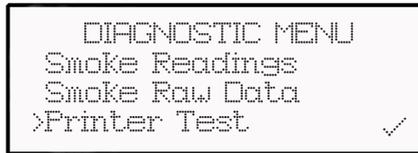
OM0487

The 'Printer Test' screen displays text under the 'Print Data' tab to enable the operator to check the printer for correct operation.

This is automatic on selection and will print out the following as means of checking the operation of the printer.

- Smoke readings
- Customer address
- Model No.

This can be useful for testing after insertion of a new paper roll.

Clock Setup Mode

The Clock Setup Mode allows the user to change the internal clock to the correct time.

Select 'Clock Setup Mode' from the main menu.

```
CLOCK SETTING MODE
    Current Time
       09:38
x- Cancel   ✓ - Change ✓
```

OM0468

The Clock Setting mode displays the current time in the main window. To change the time, press the tick key.

```
CLOCK SETTING MODE
     Set Hours
        09
x- Cancel   ✓ - Accept ✓
```

OM0469

The hour can be set by pressing the up or down arrow to display the correct hour, then confirming by pressing the tick key.

```
CLOCK SETTING MODE
      Minutes
        17
x- Cancel  ✓- Accept ✓
```

OM0488

The minutes can be set by pressing the up or down arrow to display the correct minute then confirming by pressing the tick key.

Note: There is NO adjustment to the date. If the date is incorrect - contact the service help desk.

Calibration

The calibration menu is only available for use by authorised service/calibration engineers.

Cleaning

Cleaning the smokemeter

The smokemeter can be cleaned with a non-aggressive cleaner and a soft cloth.

DO NOT immerse in water or use sprays of any kind.

Ensure that the unit is switched off and disconnected before carrying out any cleaning on the smokemeter.

Cleaning the handset

The handset can be cleaned with a non-aggressive cleaner and a soft cloth.

DO NOT immerse in water or use sprays of any kind.

Ensure that the handset is disconnected before carrying out any cleaning.

Cleaning the linearity check filter

The linearity check filter is a precision reference tool and must be treated with care.

DO NOT touch the glass of the filter. Grease, dirt, oil etc. can render the filter useless.

Clean the filter by wiping gently with clean, dry cotton wool or an optical lens cloth.

DO NOT press on the glass.

Cleaning Optics

Cleaning the optics is a necessary part of periodic routine maintenance. The amount of time between cleaning the optics will depend a lot on how dirty the vehicles under test are and how frequent the OmiSmoke is used. The OmiSmoke will automatically inform the user when the optic signal is below recommended limits which will normally indicate that the optics will need cleaning.

The optics consist of a transmitter LED and a receiver LED, these are mounted on small PCB's within the end covers – *See Introduction section*.

This cleaning procedure is the most critical for your Smoke meter and should be carried out on a clean bench and should be carried out by a competent technician.

1. Remove screws from end face of optics covers – these are usually socket screws of 2 different sizes.
2. Locate the LED mounted in the centre of the PCB facing the smoke chamber – it is situated between 2 hexagonal mounts.

    Note: Be very careful not to knock this assembly as optical alignment is critical for normal operation.
3. Using a cotton bud clean the domed lens of the LED removing black soot. If the surface is particularly contaminated, the cotton bud can be moistened in tap water to remove soot and then dried off with a clean dry cotton bud to finish.

    Note: DO NOT use solvents to clean LEDs.
4. Before replacing cover, check that the PCB and its mounts have not been knocked or have come loose. If you suspect they have DO NOT tighten the assembly – report to service help desk as these fixings are tightened to a torque limit.
5. Replace cover carefully ensuring seal is in place around perimeter.
6. Tighten fixing screws. Ensure both halves of cover create a good seal to prevent light and water ingress.

Important: It is advised that a linearity test is performed after cleaning optics to ensure operation and calibration are correct.

Maintenance

Calibration

It is a requirement that the OmiSmoke is calibrated once a year, or as directed from time to time by the Vehicle inspectorate Executive Agency in the United Kingdom.

This calibration must be carried out by UKAS approved engineers.

For further information, please contact your supplier or the manufacturer.

Replacing the printer paper

The part number for replacement paper is PE2008A, however the printer paper can be replaced with any thermal printer paper roll which is between 57-58 mm wide and has a maximum diameter of 49.5 mm.

To replace the printer paper:

1. Lift green release clip and open paper compartment lid.
2. Remove old paper cartridge.
3. Insert new paper roll.
4. Feed a short length of paper through and close paper compartment lid.

Replacing the battery

Rechargable batteries have a limited life, and eventually need replacing. If the smokemeter's battery needs replacing follow this procedure:

1. Carefully place the smokemeter on it's back and locate the battery compartment cover on the base of the unit.
2. Remove two screws to release battery compartment.
3. Slide out battery compartment and release battery leads.
4. Remove battery from battery compartment.

   Note: Ensure the battery is disposed of in accordance with current rules and regulations applicable and enforced in your area.

5. Fit new battery in battery compartment and fit battery leads to terminals.

   Note: Ensure the battery leads are fitted to the correct battery terminals.

6. Replace battery compartment and secure with screws.
7. Charge battery (see Information section).

OmiSmoke Error and Warning Messages

Symptom/ Fault	Message	Cause	Action
Blank handset screen	N/A	Battery voltage too low or power not received by handset	Battery may require charging. Attach external power supply/ charger. Check fuse and cable.
Self test fail	WARNING Battery Low. Connect power supply to avoid shutdown.	Batter level below 10.5V	Attach external power supply/ charger.
	Error 1010 Limits not set	Limits are not set up EEPROM	Contact Omitec Helpdesk
	Error 1000 Incorrect Filter Values	Filter values in EEPROM are invalid	Contact Omitec Helpdesk
	Error 1002 Fan Control Returned Error State	Fan control fault	Contact Omitec Helpdesk
Linearity check fail	Use Correct Filter or Check Filter	Failed LIN check	Contact Omitec Helpdesk
Oil probe failure	Remove Oil Probe ✓ -Bypass Oil Temp ✗ - Cancel Test	Oil probe failure during oil temperature measurement	Check oil probe cabling
EEPROM failure	Unable to read/write to the EEPROM. Press ✓ to continue.	Unable to acces the EEPROM	Contact Omitec Helpdesk
Smoke comms. error	No response Received. Check the cable. ✗ - Reset ✓ - Retry	No response came back from the smoke head	Check the handset cable
	Smoke Head reported illegal data value. ✗ - Reset ✓ - Retry	Smoke head received illegal data value	Contact Omitec Helpdesk

Symptom/ Fault	Message	Cause	Action
Smoke comms. error	Smoke Head reported bad command mode. ✗ - Reset ✓ - Retry	Smoke head received bad command	Contact Omitec Helpdesk
	Communications fault with the smoke head. ✗ - Reset ✓ - Retry	Communications problem with the smoke head	Check the handset cable
Fan control error	Fan control returned error state	Fans are not functioning properly	Contact Omitec Helpdesk
Tube heater fault	Tube temperature out of range	Tube temperature sensor is reporting a temperature which is too low/high	Contact Omitec Helpdesk
	Tube NOT warming up	The tube temperature is not increasing when the heater is on. Tube heater may be damaged.	Contact Omitec Helpdesk
Contamination check	Failed check hose or filter is not inserted	Contamination check has failed	Remove hose and filters
	Failed. Please clean optics	After retrying, the contaminatin check has failed again.	Clean optics. (See Maintenance section). If unit continues to fail, contact the Omitec Helpdesk.
Smoke checks	WARNING. Battery Low. Connect power supply to avoid shutdown.	Battery voltage at the start of an MOT test is below 10.5V	Attach external power supply/ charger.
Print results	Printer Error. Print results again? ✗ - No ✓ - Yes	Printer has timed out.	-

Troubleshooting

Symptom/ Fault	Message	Cause	Action
Smart card error	Smart card reader NOT detected. Check connections.	Smart card reader was not detected	Check smart card reader is switched on. Check cable to handset.
	Smart card error. report failure to helpdesk.	Data on the smart card is faulty.	Please contact the smart card/ reader helpdesk.
	Software error. Report failure to meter manufacturer	Smart card received incorrect message from smoke meter	Contact Omitec Helpdesk.
	Check details and that you are logged on correctly	Incorrect VRM or test number used to interrogate smart card	
	Smart card NOT detected. ✗ - Cancel ✓ - Retry	No smart card detected	Insert smart card or check that card reader is powered and correctly connected to handset.

Spares

The OmiSmoke has a number of spare parts and optional extras available from the manufacturer.

Part Description	Part Number
Air Inlet Fan Filter	FL5400A
Battery	BA1003A
Category A Sample Probe and Hose	OM1500/6
Category A Sample Probe Only	PB1007A
Category B Add-On Kit (Includes Extension Hose)	OM1500/9
Category B Sample Probe and Hose	OM1500/9A
Category B Sample Hose (2.5 m extension)	OM1500/9B
Category B Sample Probe Only	PB1106A
Combo Cable (Connection to OmiGas)	OM1500/10
DC Power Up Cable	OM1500/14
Handset Cable (7 m standard)	OM1500/4
Handset Cable (10 m special)	OM1500/15
Handset Cover	OM1500/13
Linearity Check Filter Kit	OM1500/7
Oil Temperature Probe	P308359
Operators Manual	I311592
Power Adapter Kit	OM1500/12
Printer Paper	PE2008A
Wall Bracket	OM1500/3

Option Accessories

Part Description	Part Number
RPM sensor - OmiSpeed (for all engine types)	OM1600
Trolley - houses OmiSmoke and OmiGas	OM2500