Gas Measurement Instruments Ltd

PS500

User Handbook

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LIABILITY

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MODIFICATION NOTICES

In view of the policy of continuous product improvement there may be operational differences between the latest product and this handbook.
Go to, www.gmiuk.com/customer-support/manuals-handbooks/, to access the latest issue.

SOFTWARE

Software supplied, may only be used with the ***PS500*** and may not be copied without the written permission of GMI. Reproduction or disassembly of such software is prohibited. Ownership of software is not transferable and GMI does not guarantee that the software operation will be error free or meet the customer's requirements.

DISPOSAL ADVICE

When no longer in use, dispose of the instrument carefully and with respect for the environment. Refer to WEEE directive statement, such as: In compliance with the WEEE directive, GMI will dispose of the instrument, without charge, if returned to GMI.

SAFETY

- The instrument must be regularly serviced and calibrated by fully trained personnel in a safe area.
- **Batteries:** Alkaline batteries or *Rechargeable battery pack must be exchanged (*and recharged) in a safe area and fitted correctly before use. Never use damaged batteries or expose to extreme heat. *See "4.3 BATTERY PACKS" on page 4-8.*
- Only GMI replacement parts should be used.

- If the instrument detects gas, follow your own organisation's procedures and operational guidelines.
- Gas can be dangerous and care should be taken in its use.
- This equipment is designed and manufactured to protect against other hazards as defined in paragraph 1.2.7 of Annex II of the ATEX Directive 94/9/EC.

Any right of claim relating to product liability or consequential damage to any third party against GMI is removed if the above warnings are not observed.

AREAS OF USE

Exposure to certain chemicals can result in a loss of sensitivity of the flammable sensor. Where such environments are known or suspected it is recommended that more frequent response checks are carried out. The chemical compounds that can cause loss of sensitivity include Silicones, Lead, Halogens and Sulphur. Do not use instrument in potentially hazardous atmospheres containing greater than 21% Oxygen.

STORAGE, HANDLING AND TRANSIT

The batteries in the rechargeable pack contain considerable energy and care should be taken in their handling and disposal.

The instrument is designed to handle harsh environments. The instrument is sealed to IP65 and the sensing elements, sample inlet sealed to IP54. If not subject to misuse or malicious damage, the instrument will provide many years of reliable service.

The instrument can contain electrochemical sensors. Under conditions of prolonged storage these sensors should be removed. The sensor contains potentially corrosive liquid and care should be taken when handling or disposing of the sensor, particularly when a leak is suspected.

There are no special precautions to be taken when the instrument is in transit.

WARRANTY

The ***PS500*** instrument has a warranty against faulty goods or workmanship of 2 years. Consumable parts are not included in this. These are covered under GMI standard warranty conditions. For details, please contact GMI.

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1

INTRODUCTION

1.1 GENERAL DESCRIPTION

The ***PS500*** combines quality and ruggedness in a user friendly, portable gas detector. Small and lightweight, it is suitably certified to recognised International Standards.

Fig. 1.1 PS500 Instrument

The ***PS500*** is used for confined space applications, for example, in sewers, underground piping or within tanks, and other personal monitoring applications. Its high intensity audible and bright visual alarms provide early warning of dangerous gas levels.

The instrument is operated by two buttons providing the user with a simple to use gas detector.

Up to five gases can be monitored from the following list:

- 0 to 100% LEL Hydrocarbons
- 0 to 25% Oxygen (O_2)
- 0 to 100 ppm Hydrogen Sulphide (H_2S)
- 0 to 1000 ppm Carbon Monoxide (CO)
- Dual Sensor - Hydrogen Sulphide (H_2S) / Carbon Monoxide (CO).
- 0 to 30 ppm Sulphur Dioxide (SO_2)
- 0 to 100 ppm Sulphur Dioxide (SO_2)
- 0 to 10 ppm Chlorine (Cl_2)
- 0 to 20 ppm Nitrogen Dioxide (NO_2)
- 0 to 100 ppm Ammonia (NH_3)
- 0 to 300 ppm Nitric Oxide (NO)
- 0 to 5% Carbon Dioxide (CO_2)
- 0 to 100 ppm Phosphine* (PH_3)
- 0 to 20 ppm Benzene* (C_6H_6)
- Volatile Organic Compounds* (VOC)
  - » Range = 0 to 100 ppm or 0 to 1000 ppm
  - » Resolution = 0.1 ppm or 1 ppm

Note*: The Photo Ionisation Detector (PID) type sensor is used for detection of PH_3, C_6H_6 and VOC gases.

For further details of PID sensors, *see "PID SENSORS" on page A-1.*

The instrument display identifies the gas(es) the instrument is monitoring. A five gas instrument display is shown in Fig. 1.2:

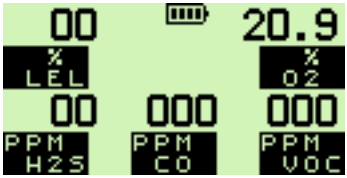


Fig. 1.2 (5-Gas) Display Example

Note: This Handbook describes the operation of a typical five gas instrument. Configurable options are detailed in *italic text*.

1.2 FEATURES

The main features of the instrument are:

- Integral impact resistant housing.
- Two button user operation.
- Up to five gases detected simultaneously.
- Alphanumeric display with backlight.
- High intensity audible and visual alarms.
- Confidence signal (green LED's and/or sounder).
- Self test.
- Built-in electric pump (optional).
- Automatic & manual data logging.
- Three types of battery pack: Long Duration, Fast Charge, and Alkaline. For operational lifetime, *see "Table 4.1 Battery Life" on page 4-8*.

1.3 DATA LOGGING

Data logging allows gas values, summary logs and calibration details to be logged at regular intervals and later downloaded.

1.3.1 Viewing Data Logged Readings

Data logged readings can be downloaded from the instrument, to a PC, using GMI software and communication adaptor. Contact our Sales Department at GMI for further details.

1.4 HYDROPHOBIC FILTER(S)

Filter(s), if fitted, should be checked regularly and replaced if contaminated. *See "4.2 FILTER REPLACEMENT" on page 4-1.*

1.5 CONSTRUCTION

The instrument is housed in a tough, impact resistant moulded case. The instrument is sealed to IP65 and the sensing elements, sample inlet and charging socket sealed to IP54. The instrument withstands physical impact testing to EN 61779.

1.6 IDENTIFICATION LABEL

The label on the rear of the instrument contains the serial number and certification details (this serial number also appears on the instrument display after switch on, during warm-up).

1.7 CERTIFICATION

The ***PS500*** instrument is certified as follows:

ATEX ⟨Ex⟩ II 1 G EEx ia IIB T3

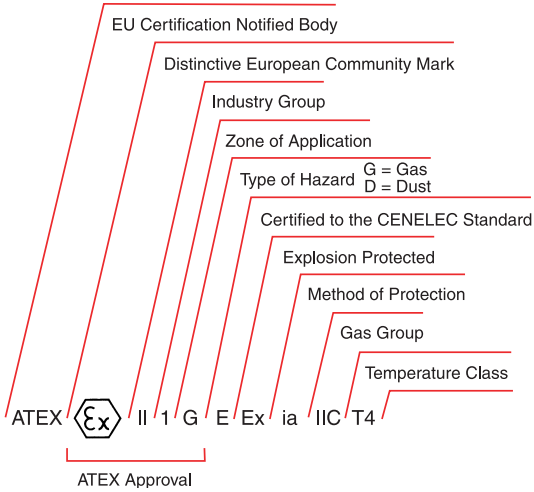
or

ATEX ⟨Ex⟩ II 2 G EEx ia d IIC T3

or

ATEX ⟨Ex⟩ II 2 G EEx ia d IIC T4

1.7.1 Identification of Symbols



Certification No. DEMKO03 ATEX 133803X
EEx ia IIB T3

Sira 05 ATEX 2295
EEx ia d IIC T3 or EEx ia d IIC T4


0038/YY Marine Equipment Directive (Module B&E)


(European mark of Conformity)

*UL 913 Class I, Div 1 Groups A, B, C, D

Note*: Excludes NDIR sensor option.

1.7.2 Performance

This apparatus conforms to standard EN 50104.

Complies with:

EN 61779 (Flammable)

EN 45544 (Toxic)

Classified as to intrinsic safety only:

WARNING

The instrument is not for use in Oxygen enriched atmospheres.

WARNING

Rechargeable battery pack must be recharged and replaced in a non-hazardous area.

WARNING

To prevent ignition of flammable or combustible atmospheres, disconnect power (i.e. remove battery pack) before servicing.

WARNING

Replace battery pack only with GMI Part No. 66701, 66702 or 66703.

WARNING

Do not mix new batteries with used batteries, or mix batteries from different manufacturers.

2

OPERATION

2.1 OPERATING PROCEDURE

Before use, check the following:

- The instrument is clean and in good condition.
- The battery pack is in good condition, fully charged and fitted correctly.
- The hydrophobic filter is clean and in good condition.
- The sample line and any other accessories are in good condition and leak-free.
- All gas ranges are operational and the instrument is zeroed.
- The instrument is within the calibration period.

Each time you use the instrument, carry out the following procedure:

- Switch instrument on in fresh air and check that the battery pack is charged.
- Check there are no faults.
- Attach optional accessories, as required.
- If oxygen sensor is fitted, check oxygen readings to ensure correct operation. The oxygen sensor responds to the user breathing on the instrument front grille by displaying a decreased value, i.e. below 20.9%.
- Switch the instrument off, in fresh air, after use.

2.2 SWITCHING THE INSTRUMENT ON

Press and hold the ⏻ button for one second to switch the instrument on.

Fig. 2.1 PS500 Button Operation

The instrument begins its warm-up routine, a countdown timer appears in the top centre of the display.

Note: The display backlight illuminates during warm-up. When warm-up is completed, the backlight automatically switches off.

2.2.1 Instrument Identification

During warm-up, the instrument display identifies the model, serial number, software version, datalogging option and battery status information as shown in Fig. 2.2.

Fig. 2.2 Instrument Identification

2.2.2 Time and Date

The time and date is displayed on the screen during warm-up, as shown in Fig. 2.3.

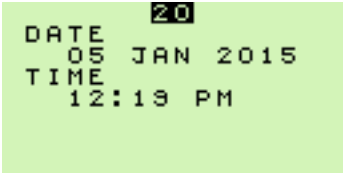


Fig. 2.3 Time and Date

2.2.3 Calibration Due Date

The calibration due date appears on the display, as shown in Fig. 2.4.

A configurable option is available not to display this screen.

Fig. 2.4 Calibration Due Date

If the Calibration Due Date has expired, the audible and visual alarms activate and Fig. 2.5 is displayed during warm-up.

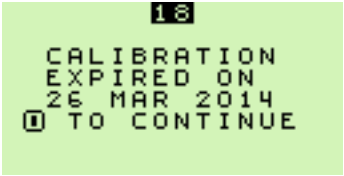


Fig. 2.5 Calibration Expired

Press the ⏻ button to cancel the audible / visual alarm, and continue to the next display.

A configurable option is available to force the user to switch off the instrument.

2.2.4 Select Calibration Gas

This configurable option is available to allow the user to select a different flammable gas from that which was originally used to calibrate the instrument.

When this option is displayed, as shown in Fig. 2.6, the gas that was originally used to calibrate the instrument is identified between two arrowheads.

Note: The instrument calibration certificate also identifies the original calibration gas type.

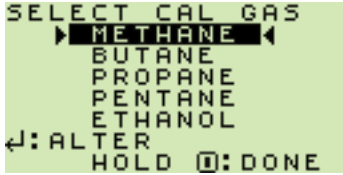


Fig. 2.6 Cal Gas Selection

To select a different gas type, press the ↵ button to scroll through the available options.

When the required option is highlighted, press and hold the ⓘ button to select.

Note: Accuracy for the re-selected gas type is ± 20%.

2.2.5 Select VOC Target Gas

This configurable option is available to allow the user to select a different VOC gas from that which was originally used to calibrate the instrument.

When this option is displayed, as shown in Fig. 2.7, the VOC gas that was originally used to calibrate the instrument is identified between two arrowheads.

Note: The instrument calibration certificate also identifies the original calibration gas type.

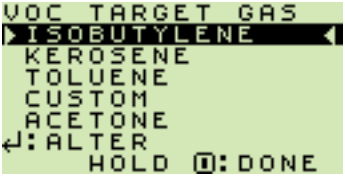


Fig. 2.7 VOC Gas Selection

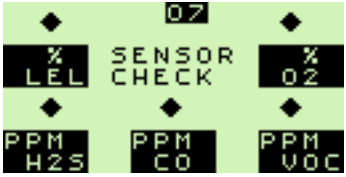
To select a different VOC gas, press the ↵ button to scroll through the available options.

When the required option is highlighted, press and hold the ⓘ button to select.

Note: Accuracy for the re-selected gas type is ± 20%.

2.2.6 Sensor Confirmation Check

The symbol ◆ appears above each sensor type to confirm that the sensor has been recognised and is being zeroed. When sensors are zeroed correctly, a ✓ symbol appears above each sensor, as shown in Fig 2.8.



Followed by

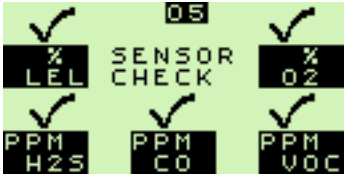


Fig. 2.8 Sensor Check Displays

If sensor(s) fail the zero check at the end of warm-up, the audible and visual alarms activate and the instrument display will show a spanner symbol and pause, as shown in Fig. 2.9.

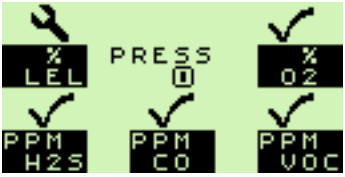
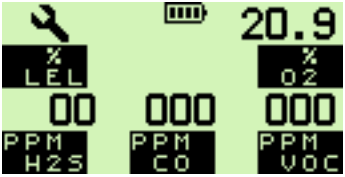


Fig. 2.9 Failed Sensor

To acknowledge the alarm, press the ① button. This will clear the audible / visual alarms and display a flashing spanner symbol, *alternating with the faulty sensor zero reading (*LEL sensor only), as shown in Fig. 2.10.



Alternating with

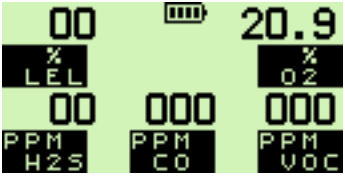


Fig. 2.10 Acknowledge Alarm

A configurable option is available to force the user to switch the instrument off if a zero fault is detected, as shown in Fig. 2.11:

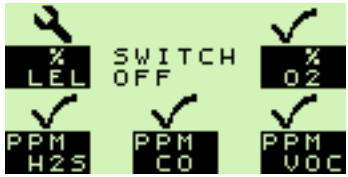


Fig. 2.11 Switch OFF

Note: If a sensor fault is detected during normal operation, an audible / visual alarm is activated immediately and a spanner symbol is shown above the faulty sensor type.

2.2.7 Normal Operating Display

When warm-up is completed successfully, the display backlight switches off and the normal operating display is shown.

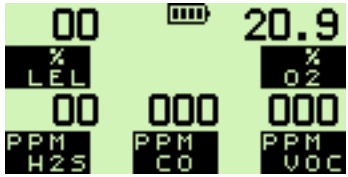


Fig. 2.12 Normal Operating Display

Note: The instrument display varies depending on the number of sensors fitted.

2.3 SWITCHING THE DISPLAY BACKLIGHT ON / OFF

Press the ① button once to switch the display backlight on. It remains on for 20 seconds and then automatically switches off.

2.4 VIEWING THE MAXIMUM AND MINIMUM RECORDED VALUES SINCE SWITCH ON

The instrument records the maximum and minimum gas values for each sensor, since switch-on.

To view MAX / MIN values, proceed as follows:

1. From the normal operating display, shown in Fig. 2.13, press the ① button to switch the instrument backlight on.

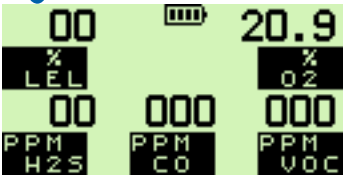


Fig. 2.13 Normal Operating Display

Press the ① button again, while the backlight is on, to view the maximum gas values stored in the instrument.

The example shown in Fig. 2.14 illustrates the maximum gas values stored.

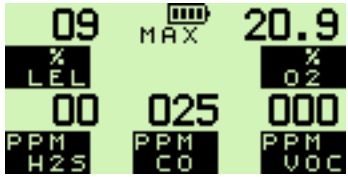


Fig. 2.14 Maximum Gas Values

2. Press the ⏻ button again to view the minimum gas values stored in the instrument.

   Note: This screen is only displayed when an Oxygen sensor is fitted in the instrument.

   The example shown in Fig. 2.15, illustrates the minimum gas values stored.

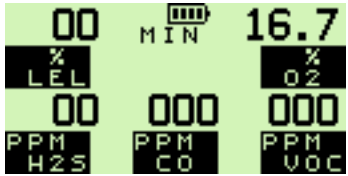


Fig. 2.15 Minimum Gas Values

3. These readings can be reset, by pressing and holding the ⏻ button for two seconds if the instrument is clear of all alarms. This will return the instrument to the normal operating screen.

2.5 MANUAL DATA LOG

A manual data log can be stored at any time during operation, by a press of the ↵ button. Fig. 2.16 illustrates a manual data log being stored.

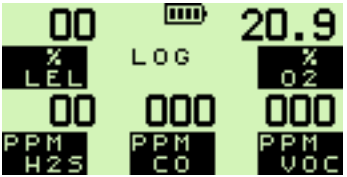


Fig. 2.16 Manual Data log

2.6 SELF TEST

The instrument has the ability to perform a self test at any time during operation. The instrument tests:

- Buzzer
- Alarm LED's
- Displays the flammable calibration gas
- Displays the VOC target gas (if fitted)

To perform a self test, press and hold ↵. Fig 2.17 illustrates a self test in progress.

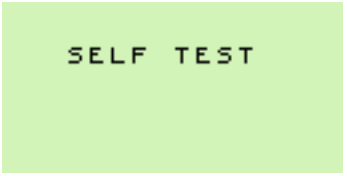


Fig. 2.17 Self Test

2.7 VOC TARGET GAS SELECTION

This configurable option allows the user to select a different VOC gas from that which was originally used to calibrate the instrument.

To select a different VOC gas, press and hold ↵ for 5 seconds until the VOC target gas selection is displayed, as shown in Fig. 2.18.

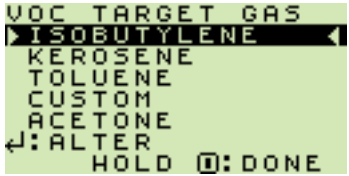


Fig. 2.18 VOC Gas Selection

Isobutylene was originally used to calibrate the instrument, as identified between two arrowheads.

To select a different VOC gas, press the ↵ button to scroll through the available options.

When the required option is highlighted, press and hold the ⓘ button to select.

The 'CUSTOM' option allows the user to name a VOC gas and set a relative sensitivity. See 'CONFIGURATION HANDBOOK' for further details.

Note: Only the most common VOC gases are listed. If the required gas is not listed, response factors can be used to obtain more accurate VOC gas measurements. For further details *see "Response Factors" on page A-2.*

2.8 ALARMS RESET OR ACKNOWLEDGE

When the instrument detects an alarm set point has been reached, the audible and visual alarms will be activated to alert the user.

The alarms are individually programmable to be either:

- Latching - alarms will stay on until the user resets by a press an hold of the ⓘ button, when the gas reading has returned within the pre-set alarm limits.
- Non-Latching - the audible and visual alarms will reset automatically when the reading returns within the pre-set alarm limits.

Caution: The PS500 can be supplied with a flammable gas sensor. This sensor is designed for use in concentrations of gas not exceeding the Lower Explosive Limit (LEL). An inbuilt alarm feature will be activated if the instrument is exposed to high concentrations of flammable gas.
See "3.3 HIGH FLAMMABLE GAS OVER-RANGE ALARM" on page 3-5.

ALARM TYPE	LATCHING Y(es) or N(o)	MUTE Y(es) or N(o)	AUDIBLE INDICATION	VISUAL (RED LED) INDICATION
LEL 1 (Hi)	Disabled	Disabled	High Pitch Tone	All Slow Flashing
LEL 2 (HiHi)	Y	N	Continuous Warble	(2) Inner / Outer Siren Flash
O_2 1 (HiHi)	Y	N	Continuous Warble	(2) Inner / Outer Siren Flash
O_2 2 (Lo)	Disabled	Disabled	High Pitch Tone	All Slow Flashing
O_2 3 (LoLo)	Y	N	Continuous High Pitch Warble	(2) Inner / Outer Siren Flash
Toxic 1 / VOC (Hi)	Disabled	Disabled	High Pitch Tone	All Slow Flashing
Toxic 2 / VOC (HiHi)	Y	N	Continuous High Pitch Warble	(2) Inner / Outer Siren Flash
Toxic 3 / VOC (STEL)	Y	N	Continuous High Pitch Warble	(2) Inner / Outer Siren Flash
Toxic 4 / VOC (LTEL / TWA)	Y	N	Continuous High Pitch Warble	(2) Inner / Outer Siren Flash
Low Battery Fault	N/A	N/A	Low Pitch Tone	All Slow Flashing
Zero Fault	N/A	N/A	Low Pitch Tone	All Slow Flashing
Sensor Fault	N/A	N/A	Low Pitch Tone	All Slow Flashing
Sample Fault (Pumped Instr. Only)	N/A	N/A	Low Pitch Tone	All Slow Flashing
Calibration Expired	N/A	N/A	Low Pitch Tone	All Slow Flashing
Service Required	N/A	N/A	Low Pitch Tone	All Slow Flashing
Over Range (LEL)	Y	N/A	Continuous Wail	All Fast Flashing

N/A = Not Applicable

Table 2.1 PS500 Alarms

2.8.1 Confidence Signal

During normal operation, the instrument sounds a confidence beep and illuminates the green visual alarm briefly every 15 seconds. This function is configurable and informs the user that the instrument is operating correctly.

2.9 SWITCHING THE INSTRUMENT OFF

Press and hold both the ↵ button and the ⏻ button together to switch the instrument Off.

The instrument screen will now start a countdown from three to OFF. Both buttons must be pressed together until the display goes blank.

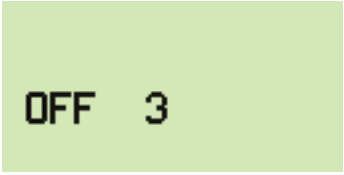


Fig. 2.19 Switch OFF

While both buttons are pressed, the audible alarm sounds every second to alert user that the instrument is switching OFF.

2.10 REMOTE SAMPLING (with pump option)

Warning: When making VOC measurements, only use the Viton sample line as other sample lines may absorb VOC's resulting in incorrect readings.

Remote sensing is performed with the internal electric pump (optional), or by the hand aspirator for non-reactive gases, using the sample connector at the bottom of the instrument and sample tubing supplied with your instrument.

On pumped models the pump is **OFF** after start-up.

Warning: For remote sampling, the internal pump is recommended. If using the hand aspirator:

- **Reading error of + 20% is typical**
- **Maximum sample line is 10 m**
- **Sample time will be extended**

2.10.1 Pump Option

Press and hold the ⏻ button to start or stop the pump. The pump will run at normal speed for remote sampling.

When the pump Is running at normal speed, a pump symbol rotates in the display as shown in Fig. 2.20.

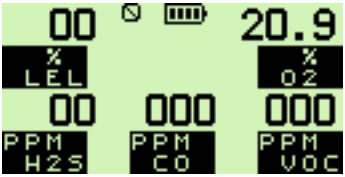


Fig. 2.20 Pump Symbol Displayed

Note: Pump can only be switched ON / OFF when the instrument has no alarms.

2.10.2 Assisted Diffusion Option

If assisted diffusion is configured, after instrument warm-up, the pump remains ON at low speed. *This setting is used for reactive gases.

A press and hold of the ⏻ button re-sets the pump to run at normal speed. When the pump is running at normal speed, a pump symbol rotates in the display as illustrated in Fig.2.20. Press and hold the ⏻ button again to switch the pump OFF. A further press and hold of the ⏻ button re-sets the pump to run at low speed.

Note*: GMI recommend that pumped instruments, measuring reactive gases, use assisted diffusion mode in preference to diffusion mode.

3

ALARMS

3.1 GAS ALARMS

Note: Alarms are disabled during warm-up.

If a pre-set alarm level is exceeded, the audible alarm sounds, the LED's flash RED and the gas range in alarm flashes on the display.

All alarms are user configurable to meet the specific needs of different companies.

3.1.1 Flammable LEL Alarm Limit

Up to two alarm levels are programmable, each with different pitch and tone.

3.1.2 Over-Range Flammable Gas Alarm Function

The flammable sensor is designed for use in the LEL range only. Exposure to high concentrations of flammable gas, such as lighter fuel, can damage the flammable sensor. If the flammable gas readings exceed 120% LEL, a safety alarm will be activated. The instrument must be returned to clean air and switched off.

3.1.3 Oxygen (O_2) Alarm Limits

Up to one upper and two lower alarm limits are programmable, each with different pitch and tone.

3.1.4 Toxic Alarm Limits

Each toxic range has 2 instantaneous alarm set points. Additionally, toxic ranges also have user exposure alarms. The instrument calculates the Short Term Exposure Limit (STEL) and Long Term Exposure Limit (LTEL), known as Time Weighted Average (TWA) readings.

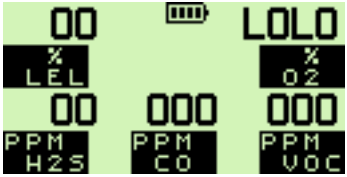
Note: A Time Weighted Average (TWA) value is the mean average gas level over a specific period. The STEL is 15 minutes and the LTEL is 8 hours. This averaging makes the instrument single user applicable. *A option is available to reset the averaging after each instrument switch-off, allowing multiple user use.*

Note: It is important that the user ensures all alarm levels are in accordance with their company's procedures and with regional health and safety legislation.

In the following examples, Fig. 3.1 shows a 'LOLO' Oxygen alarm and Fig. 3.2 shows a 'HIHI' LEL alarm.

If more than one gas alarm level is exceeded, the gas value will flash for each gas type in alarm.

Each alarm can be latching or non-latching.



Toggles to

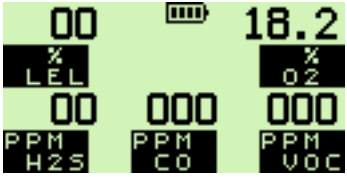
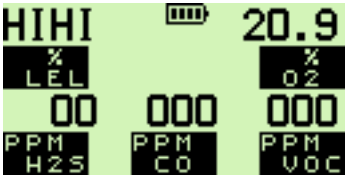


Fig. 3.1 'LOLO' Oxygen Alarm



Toggles to

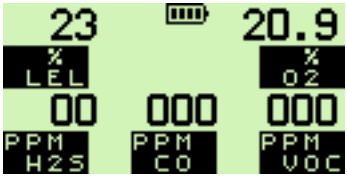


Fig. 3.2 'HIHI' LEL Alarm

3.2 ACKNOWLEDGE GAS ALARMS

Once the gas reading has returned within the pre-set limits, press and hold the ⓘ button to silence the alarm sounder and extinguish the gas LED's.

Alarm Muting:

Mute 'enabled' silences alarm for 60 seconds.

Mute 'disabled' cannot silence the alarm until gas reading returns within the pre-set limits.

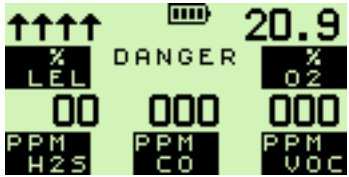
If alarm configuration allows muting of audible alarm, the following applies (*see "Table 2.1 PS500 Alarms" on page 2-15*):

- Non-latching: Once alarm has been muted, the audible alarm is cancelled for a period of 60 seconds, and if gas concentration during that time returns within the pre-set limits, the visual alarm clears automatically.
- Latching: If audible alarm has been muted and if gas concentration during that time returns within the pre-set limits, audible and visual alarms require to be acknowledged to clear, after 60 seconds.

3.3 HIGH FLAMMABLE GAS OVER-RANGE ALARM

Caution: Exposing the LEL sensor to flammable gas above 100% LEL can damage the sensor.

If the LEL gas reading exceeds 120% LEL, the displayed value will change to four rising arrows, the tone of the audible alarm will change, and the visual alarm will flash quickly. The flashing message 'DANGER' alternates with 'OVER RANGE', as shown in Fig. 3.3.



Alternates with

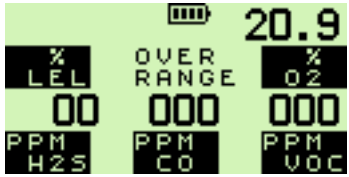


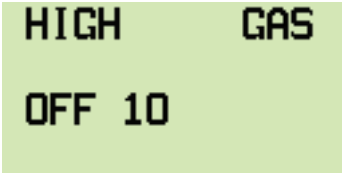
Fig. 3.3 Over Range Alarm

The instrument must be returned to a gas free area.

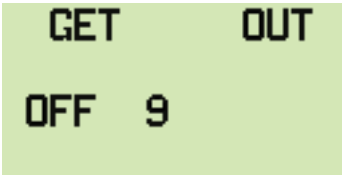
The instrument must now be switched off.

Note: The off cycle is increased to 10 seconds.

A countdown timer, from 10 seconds to zero, will appear on the display together with the message ‘HIGH GAS’ alternating with ‘GET OUT’, as shown below:



then



and so on, until zero is reached.

Fig. 3.4 High Gas / Get Out Timer

3.4 FAULT ALARMS

Refer to "Table 2.1 PS500 Alarms" on page 2-15, to identify the audible / visual indication for the following faults.

3.4.1 Low Battery

The "LOW BATTERY" message is displayed, intermittently on the screen, when the instrument's battery has approximately 30 minutes operating time remaining. The audible alarm sounds every two seconds and the Red LED's flash. Recharge or replace batteries as applicable.

The "BAT FAULT" message shows constantly when approximately three minutes operating time remains. The audible alarm sounds continuously and the Red LED's illuminate constantly. After three minutes the instrument switches off.

3.4.2 Zero Fault

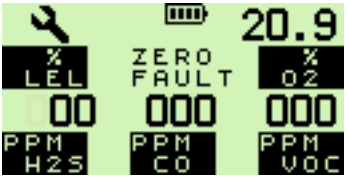
Note: For instruments with a CO2 sensor fitted, refer to section 3.4.3 for details.

A "ZERO FAULT" message and a flashing spanner symbol appears after warm-up if the instrument has been unable to zero all sensors correctly, as shown in Fig. 3-5.

The audible alarm sounds every two seconds and the Red LED's flash.

It is recommended that the instrument is returned to a gas free area. Switch the instrument off and then switch on again. If the fault persists, return the instrument for service.

However, the instrument can still be used to detect and alarm on the other sensors fitted.



Alternating with

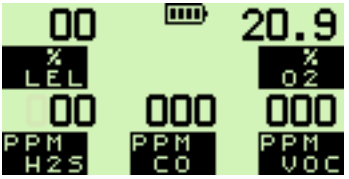


Fig. 3.5 Zero Fault

Note: The flashing spanner symbol will only alternate with the faulty sensor reading in the LEL range. If this occurs, the instructions in *"3.4.4 Sensor Fault" on page 3-10*, paragraphs (1) and (2), should be followed.

3.4.3 Zero Fault - Only applicable to instruments with CO2 sensor fitted

If a CO2 range spanner symbol appears after warm-up, as illustrated in Fig. 3.6, together with the audible alarm sounding every two seconds and the Red LED's flashing, the instrument has been unable to zero the CO2 sensor correctly.

It is recommended the instrument is returned to a gas free area. Switch the instrument off and then switch on again. If this is not possible, the alarm can be acknowledged and the instrument can still be used to detect CO2 gas.

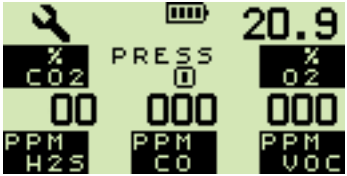
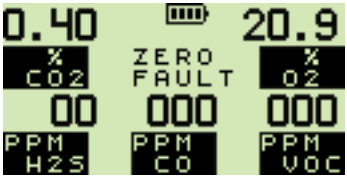


Fig. 3.6 CO2 Sensor - Zero Fault

Press the button to acknowledge CO2 alarm and continue using instrument.

Note: If a "ZERO FAULT" message is displayed together with a flashing spanner symbol on any of the other sensors, follow instructions detailed in section 3.4.2.

The faulty CO2 sensor will cause the instrument to display a flashing 'ZERO FAULT' message alternating with a gas value to warn the user that this sensor is not correctly zeroed, as shown in Fig 3.7.



Alternating with

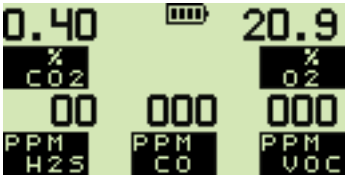
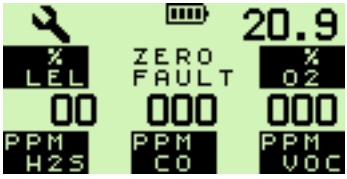


Fig. 3.7 CO2 Sensor - Zero Fault

3.4.4 Sensor Fault

There are three types of sensor fault:

1. If a “ZERO FAULT” message and a flashing spanner symbol appear, alternating with an LEL gas value as shown in Fig. 3.8, leave instrument on for 30 to 60 minutes in clean air, monitoring the reading, then switch instrument Off and On again.



Alternating with

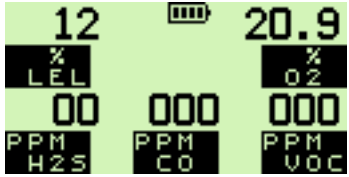
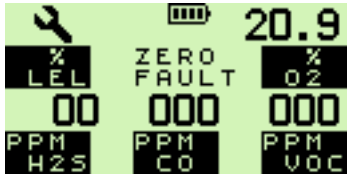


Fig. 3.8 Check Fault

2. If a "ZERO FAULT" message and a flashing spanner symbol appear, alternating with a zero LEL reading as shown in Fig. 3.9, apply test gas to allow the display to show a reading, then switch instrument Off and On again.



Alternating with

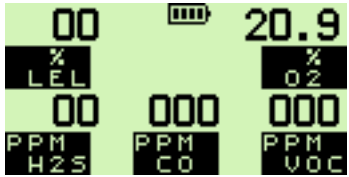


Fig. 3.9 Check Fault

3. If a “ZERO FAULT” message and a spanner symbol (not flashing) appears above gas type, as shown in Fig. 3.10, then the sensor requires replacement or an electrical fault exists.

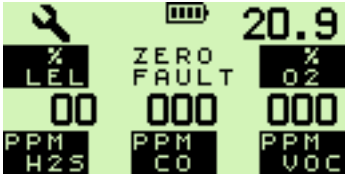


Fig. 3.10 Sensor Fault

Note: If the faults remain, return the instrument to an approved Service / Repair facility.

3.4.5 Sample Fault (Pumped Instruments Only)

If the pump symbol changes to the symbol shown in Fig. 3.11, a “FLOW FAULT” message is displayed and an audible alarm and Red LED’s are activated, then a sample fault or flow fail exists.

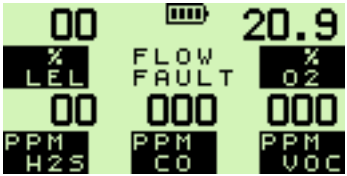


Fig. 3.11 Sample Fault

Check sample line, sample filter or probe for blockage, if applicable. Clear the blockage, then restart the pump by a press and hold of the ⏻ button.

3.4.6 Calibration Expired

During normal operation if the calibration date has expired, a “CAL DUE” warning message will flash on the display every 30 seconds.

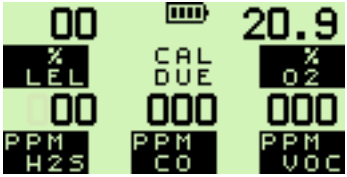


Fig. 3.12 Calibration Expired

3.4.7 Service Required

During warm-up, if the “SERVICE REQUIRED” message is displayed and an audible alarm and Red LED’s are activated, the instrument has detected an internal fault.

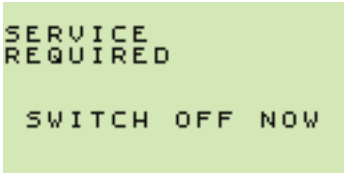


Fig. 3-13 Service Required

The instrument must be switched off.

Follow appropriate action required by your company for service.

4

OPERATOR MAINTENANCE

4.1 CLEANING

Caution: Do not use polishes containing silicon or solvent to clean the instrument as these may damage the flammable gas sensor. Do not use abrasive materials or strong volatile chemical solutions as these could damage the casing.

The outer, impact resistant, rubber casing of the ***PS500*** instrument may be cleaned using a non-abrasive moist cloth.

In extreme cases, a mild soap solution may be used with a non-abrasive cloth to remove more stubborn marks.

4.2 FILTER REPLACEMENT

The instrument has two filters protecting the instrument sensors. The Sensor Grille (Hydrophobic) Filter is located on the front of the instrument and the Sample Inlet (Dust) Filter is located at the bottom of the instrument. The filters should be inspected periodically for signs of damage.

To inspect / replace the filters, proceed as follows:

4.2.1 Sensor Grille Filter

1. Unscrew the captive cover screw, using the hex key (supplied), as illustrated in Fig. 4.1. Remove the cover by sliding it away from the instrument and up towards the display.

Fig. 4.1 Captive Cover Screw

Fig. 4.2 Filter and Cover Removed

2. Fit a new Sensor Grille Filter (Part No. 66083), if required.

   Note: The filter is keyed and can only be fitted in one location.

3. Replace the sensor cover assembly by first positioning the location feet, then pressing the cover down on to the filter.

4. Replace and secure, the cover screw.

Note: Do not over-tighten the screw.

4.2.2 Sample Inlet Filter

1. Using a No.1 Pozidrive® screwdriver, remove the two retaining screws, then remove the sample line connector.

Fig. 4.3 Sample Line Connector

2. Push the sample inlet filter out.
3. Fit a new Sample Inlet Filter (Part No. 66084).
4. Replace the sample line connector. The sample line connector is moulded to fit in one direction only.
5. Replace the two retaining screws.

Note: Do not over-tighten the screws.

Fig. 4.4 Filter and Connector Removed

4.2.3 In-line Hydrophobic Filter (Accessory)

The in-line hydrophobic filter assembly consists of a filter with a luer fitting on one side and a slide-on connection on the other. This is available as an accessory (Part No. 66485). The filter assembly is used to protect the instrument from the ingress of water when sampling in moist conditions.

The filter is located between two lengths of 'Tygon' tubing (Part No. 66118) and attached to the instrument via a Sample Line Connector (Part No. 66045) as illustrated in Fig. 4.5.

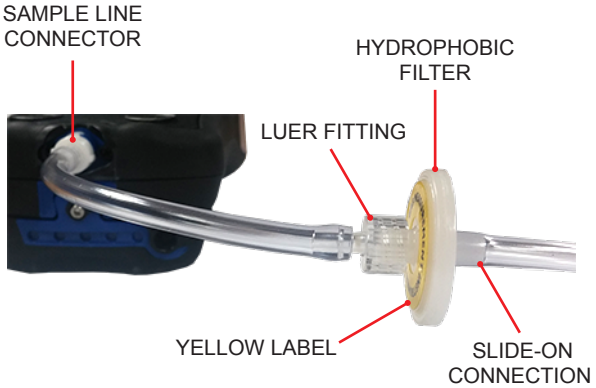


Fig. 4.5 In-line Hydrophobic Filter

To replace the filter, proceed as follows:

1. Unscrew the luer fitting from one side of the filter and detach the tubing from the other side.

   Note: If re-fitting the existing filter, make sure that filter orientation is maintained (yellow label on the filter, is facing the instrument).

2. Fit a new In-line Hydrophobic Filter (Part No. 66484) with the yellow label on the filter, facing the instrument.

3. Attach the luer fitting, with sample line attached to the filter.

4. Attach the sample line to the filter.

4.3 BATTERY PACKS

Three types of battery pack are available:

Long Duration, Fast Charge and Alkaline.

Run times are detailed in Table 4.1.

INSTRUMENT OPERATING MODE	BATTERY TYPE / LIFE (hours)	
	LONG DURATION / FAST CHARGE	ALKALINE
LEL	>16	>16
IR (INFRARED)	>16	>16
PUMP	>16	>16
LEL + IR	12	13
LEL + PUMP	12	13
IR + PUMP	15	>16
LEL +IR + PUMP	9	10
TOXIC SENSOR ONLY	>16	>16
PID	>16	>16
PID + PUMP	>16	>16

Table 4.1 Battery Life

The battery pack should be recharged, or the batteries replaced, in the following situations:

- The 'Low Battery' flag  appears on the display.
- The instrument will not switch On.

4.3.1 Charging (Rechargeable) Battery Pack

There are two types of rechargeable battery pack:

- Long Duration (NiMH) battery pack (Part No. 66701)
- Fast Charge (NiMH) battery pack (Part No. 66703).

Make sure that rechargeable battery packs are recharged using only GMI chargers.

Caution 1: Never attempt to recharge an alkaline battery pack.

Caution 2: Switch the instrument off when charging a battery pack fitted to an instrument.

The following GMI chargers can be used to charge the long duration and / or fast charge battery packs:

- **Standard Charger**
  - » Long duration - can be charged in or out of the instrument.
- **5 or 10 Way Standard Charger**
  - » Long duration - can be charged in or out of the instrument.
- **12V / 24V Vehicle Charger**
  - » Long duration - can be charged in or out of the instrument.
- **Fast Charger**
  - » Long duration - can be charged while removed from the instrument.
  - » Fast charge - can be charged in or out of the instrument.
- **10 Way Fast Charger with (up to 9) slave units**
  - » Long duration - can be charged while removed from the instrument.
  - » Fast charge - can be charged in or out of the instrument.

Standard Charger:

The Long Duration battery pack can be left connected to the standard charger overnight to recharge. This period may vary depending on temperature and the condition of the battery pack.

If the battery pack is fitted to the instrument during charging, the ***PS500*** screen will display a flashing battery symbol. Additionally, two red instrument LED's illuminate for a period of 14 hours, after which time are replaced by the green LED's and the battery symbol will stop flashing.

Note: This is a timer function only, and does not indicate charged condition of battery pack.

Fig. 4.6 Instrument Connected to Standard Charger

5-Way / 10-Way Standard Charger:

This option provides the charging of up to five or ten Long Duration rechargeable battery packs simultaneously using standard charger connections and re-charging from one power outlet socket (5-Way adaptor option illustrated in Fig. 4.7).

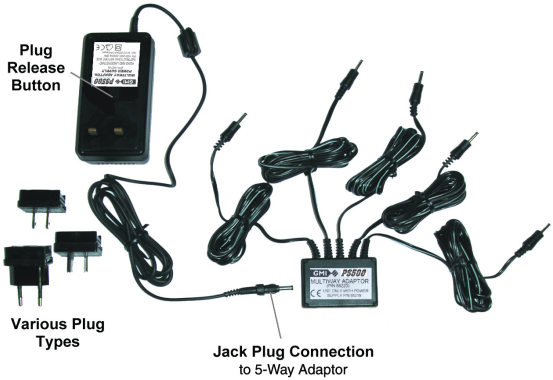


Fig. 4.7 5-Way Charging Adaptor Option

Fast Charger:

The ‘Fast Charge’ or ‘Long Duration’ battery pack can be removed from the instrument and located in the Fast Charger as illustrated in Fig. 4-8. The ‘Fast Charge’ battery pack can also be charged while fitted to the instrument by ‘docking’ the instrument in the Fast Charger as illustrated.

Fig. 4.8 Battery Pack / Instrument ‘Docked’ in Fast Charger

A battery pack will take approximately 3½ hours to charge.

A green LED on the front of the charger indicates ‘charging’. This LED turns off when charging is complete.

10-Way Fast Charger with (up to 9) Slave Unit(s):

The 'Fast Charge' or 'Long Duration' battery pack can be removed from the instrument and located in the Fast Charger master or slave unit. The 'Fast Charge' battery pack can also be charged while fitted to the instrument by 'docking' the instrument in the Fast Charger master or slave unit. It is important that the instrument is switched off when charging a battery pack fitted to the instrument.

A green LED on the front of the charger master or slave indicates 'charging'. Each LED turns off when charging is complete.

Fig. 4.9 Battery Pack / Instrument 'Docked' in Fast Charger / Slave Unit(s)

4.3.2 Removing and Replacing a Battery Pack

Caution 1: Always switch the instrument off before removing the battery pack.

Caution 2: Always replace the protective cap in the Long Duration battery pack charging socket before use.

WARNING

Rechargeable battery pack must be recharged and replaced in a non-hazardous area.

WARNING

Replace alkaline / rechargeable battery pack only with genuine GMI parts.

1. Unscrew the captive screw, using the hex key (supplied), as shown in Fig. 4.10.

Fig. 4.10 Battery Pack Captive Screw

Note: Long Duration battery pack is fitted with a protective cap.

2. Pull the battery pack down from the instrument to disconnect, as shown in Fig. 4.11.

Fig. 4.11 Battery Pack Removed

3. Alkaline Only: Replace alkaline batteries, *see "4.3.3 Replacing Alkaline Batteries" on page 4-16*.
4. Replace battery pack on instrument. Make sure it is correctly aligned then push connector together.
5. Tighten the captive screw.

Note: Do not over-tighten the screw.

---

6. Fit the protective cap in the Long Duration battery pack charging socket before use.

4.3.3 Replacing Alkaline Batteries

Caution: To comply with certification regulations, use only alkaline batteries from the following manufacturers:

- Energizer / Energizer Industrial

- Panasonic

- Sony

The alkaline battery pack (Part No. 66702) allows the instrument to be powered using three LR6 (AA) size batteries.

Always switch the instrument Off before changing the battery pack.

1. Unscrew the cover plate retaining screw, using the hex key (supplied), as shown in Fig. 4.12.

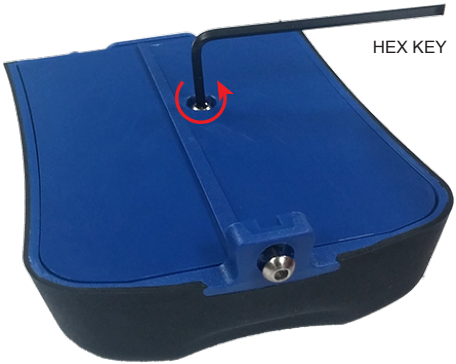


Fig. 4.12 Cover Plate Retaining Screw

2. Replace the three LR6 (AA) size batteries, as shown in Fig. 4.13, observing correct polarity.

Fig. 4.13 Alkaline Batteries Removed

3. Replace the battery cover plate then tighten the retaining screw.

Note: Do not over-tighten the screw.

5

CALIBRATION

5.1 GENERAL DESCRIPTION

The ***PS500*** has been calibrated for particular gases. Where any doubt exists the product should be returned to GMI or an authorised distributor for calibration.

Warning: The instrument must be calibrated and configured by authorised personnel only.

Several methods of calibration are possible:

- The ***PS500*** Automatic Bump / Calibration Station provides controlled delivery of gases allowing you to calibrate in a controlled manner and maintain a record of calibration results on a PC.
- flexiCal Plus software allows the instrument to be linked to a PC running Calibration software and applying gas manually.
- Field Calibration. See 'CONFIGURATION HANDBOOK' for further details.

Note: The calibration methods are manufactured by GMI. For more detail contact GMI or an authorised distributor.

5.2 CALIBRATION VALIDITY

Calibration validity is the responsibility of the user. Under normal operating conditions a 6 month period can be expected. This is no guarantee, however, as the precise application of the product is unknown to GMI. Individual codes of practice may dictate shorter periods.

Regular checking establishes a pattern of reliability and enables the calibration check period to be modified in line with operational experience. The higher the risk, the more frequently calibration should be checked.

ACCESSORIES

Accessories available for ***PS500*** instrument:

Standard Accessories

Part Number	Description
66123	Hand Aspirator (can be used for non-reactive gases only)
66478	Hand Aspirator (c/w 3.0 metres Tygon Tubing)
66488	Hand Aspirator (c/w 3.0 metres Viton Tubing)
66118	Tygon Sample Line (per metre)
66489	Viton Sample Line (per metre)
66112	Sample Line Extender (to connect sample lines together)
66136	3.0 metres Tubing (c/w sample connector)
66142	3.0 metres Viton Tubing (c/w sample connector)
66930	3.0 metres Reactive Gas (e.g. Cl2,NH3) Tubing Kit (c/w sample connector)
66485	In-line Hydrophobic Filter Assy.
66484	Hydrophobic Filter (use with 66485)
66028	Neck Harness with Clip
66546	Neck & Chest Harness with Clip
66017	Probe Assembly
66545	Ball Float
66349	Carry Case

Part Number	Description
66166	Battery / Sensor Grille Key (2mm. A/F)
66167	T10 Torx Screwdriver
66083	Sensor Hydrophobic Filter
66084	Sample Inlet Filter
66701	Long Duration Rechargeable (NiMH) Battery Pack
66702	Alkaline (Drycell) Battery Pack
66703	Fast Charge Rechargeable (NiMH) Battery Pack

Standard Chargers

Part Number	Description
66140	Std. Charger c/w Universal Plug
66200	5-way Std. Charger c/w Universal Plug
66207	10-way Std. Charger c/w Universal Plug
66206	12v / 24v Vehicle Charger Lead

Fast Chargers

Part Number	Description
66513	Fast Charger c/w Universal Plug
66516	10-way Fast Charger (Master Unit) c/w Universal Plug
66514	10-way Fast Charger (Slave Unit) Maximum 9 units per set-up
66510	Fast Charger c/w Data Download Communications Pack

Communication Options

Part Number	Description
66209	USB Adaptor
61208	Data Downloading Package
61445	Calibration Package

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ADDITIONAL INFORMATION

7.1 TRAINING

Training courses are available on all GMI products. Contact GMI Customer Services Department for further details:

Tel: +44 (0) 141 812 3211

Fax: +44 (0) 141 812 7820

E-mail: customerservice@gmiuk.com

7.2 GMI WEBSITE

Visit the GMI website at: www.gmiuk.com

PID SENSORS

A PID sensor measures volatile organic compounds (VOC's) in the atmosphere by **P**hoto **I**onisation **D**etection. The ***PS500*** instrument uses PID sensor technology to detect VOC's.

What is a Volatile Organic Compound (VOC)?

A VOC, is a chemical compound that is significantly vaporised at ambient temperatures.

How can a VOC be measured?

A lamp, located inside the PID sensor, emits high energy light causing the VOC to break down into positively and negatively charged ions. The negatively charged ions can be measured and are proportional to the concentration of the VOC.

Maintenance and Cleaning of PID sensors

PID sensors require periodic maintenance and will depend on the environment being measured.

When the measured VOC concentrations are low, monthly or even less frequent maintenance maybe adequate.

PID sensor lamps can be cleaned and internal components replaced. Refer to the ***PS500*** Instruction Sheet 'PID sensor - maintenance and cleaning' (Part No. 66582) for details.

A PID sensor must be calibrated after any cleaning or maintenance procedure.

Response Factors

VOC detection by PID is dependent on the PID lamp used. ***PS500*** instruments incorporate a 10.6eV lamp, allowing a large range of VOCs to be detected. However, the output from a PID sensor varies according to the VOC detected and consequently response factors are used to relate the PID response of a particular VOC, to the PID response of a calibration gas. The calibration gas used on ***PS500*** instruments is usually isobutylene.

If the response of a PID to a particular VOC is eight times smaller than it is for the same concentration of isobutylene, then the response factor would be 8. Similarly, if the response factor for a particular VOC is 0.5, the PID response is twice that for isobutylene at the same concentration.

Example:

- A ***PS500*** is calibrated using isobutylene.
- Toluene is known to generate twice the response of isobutylene.
- If the ***PS500*** is exposed to 100ppm toluene, the instrument will read 200ppm.
- To correct the ***PS500*** reading, it is multiplied by the response factor for toluene of 0.5 (see page B-11).
- If you know what VOC you are measuring, then the following table will allow you to calculate the concentration for your specific VOC. Note that these are approximate values and for best accuracy you should calibrate with the relevant VOC.

Gas / VOC	Multiply Reading by:
Acetaldehyde	4.9
Acetic Acid	36.2
Acetic Anhydride	4
Acetone	0.7
Acrolein	4
Acrylic Acid	2.7
Allyl alcohol	2.1
Allyl chloride	4.5
Ammonia	8.5
Amyl acetate, n-	1.8
Amyl alcohol	3.2
Aniline	0.5
Anisole	0.5
Arsine	2.5
Asphalt, petroleum fumes	1
Benzaldehyde	0.9
Benzene	0.5
Benzenethiol	0.7
Benzonitrile	0.7
Benzyl alcohol	1.3
Benzyl chloride	0.6
Benzyl formate	0.8
Biphenyl	0.4
Bis (2,3-epoxypropyl) ether	3
Bromine	20
Bromobenzene	0.7
Bromoethane	5
Bromoethyl methyl ether, 2-	2.5
Bromoform	2.8
Bromopropane,	1.3
Butadiene	0.8
Butadiene diepoxide, 1,3-	4
Butane, n-	46.3
Butanol,	4

Gas / VOC	Multiply Reading by:
Buten-3-ol,	1.2
Butene, 1-	1.3
Butoxyethanol,	1.1
Butyl acetate, n-	2.4
Butyl acrylate, n-	1.5
Butyl lactate	2.5
Butyl mercaptan	0.5
Butylamine, 2-	0.9
Butylamine, n-	1
Camphene	0.5
Carbon disulfide	1.4
Carbon tetrabromide	3
Carvone, R-	1
Chlorine dioxide	1
Chloro-1,3-butadiene, 2-	3.2
Chlorobenzene	0.5
Chloroethanol 2-	10
Chloroethyl methyl ether, 2-	2.6
Chlorotoluene, o-	0.5
Chlorotoluene, p-	0.5
Chlorotrifluoroethylene	1
Citral	1
Citronellol	1
Cresol, m-	1.1
Cresol, o-	1.1
Cresol, p-	1.1
Crotonaldehyde	1
Cumene	0.6
Cyclohexane	1.3
Cyclohexanol	2.9
Cyclohexanone	1.1
Cyclohexene	0.8
Cyclohexylamine	1
Cyclopentane	4

Gas / VOC	Multiply Reading by:
Decane, n-	1
Diacetone alcohol	0.8
Dibenzoyl peroxide	0.8
Dibromochloromethane	10
Dibromoethane 1,2-	2
Dibutyl hydrogen phosphate	4
Dichloro-1-propene, 2,3-	1.4
Dichloroacetylene	5
Dichlorobenzene o-	0.5
Dichloroethene, 1,1-	1
Dichloroethene, cis-1,2-	0.8
Dichloroethene, trans-1,2-	0.7
Dichloroethylene 1,2-	0.8
Dichloromethane	39
Dicyclopentadiene	0.9
Diesel Fuel	0.8
Diethyl ether	0.9
Diethyl maleate	2
Diethyl phthalate	1
Diethyl sulphate	3
Diethyl sulphide	0.6
Diethylamine	1
Diethylaminoethanol, 2-	2.7
Diethylaminopropylamine, 3-	1
Dihydrogen selenide	1
Dihydroxybenzene, 1,2	1
Dihydroxybenzene, 1,3	1
Diisobutylene	0.6
Diisopropyl ether	0.7
Diisopropylamine	0.7
Diketene	2.2
Dimethoxymethane	1.4
Dimethyl cyclohexane, 1,2-	1.1
Dimethyl disulphide	0.2

Gas / VOC	Multiply Reading by:
Dimethyl ether	1.3
Dimethyl phthalate	1
Dimethyl sulphide	0.5
Dimethylacetamide, N,N-	1.3
Dimethylamine	1.4
Dimethylaminoethanol	1.5
Dimethylaniline, NN-	0.6
Dimethylbutyl acetate	1.6
Dimethylethylamine, NN-	0.8
Dimethylformamide	0.9
Dimethylheptan-4-one, 2,6-	0.8
Dimethylhydrazine, 1,1-	1
Dinitrobenzene, m-	3
Dinitrobenzene, p-	5
Dinonyl phthalate	1
Dioxane 1,2-	1.5
Dioxane 1,4-	1.5
Dipentene	0.9
Diphenyl ether	0.8
Disulphur dichloride	3
Di-tert-butyl-p-cresol	1
Divinylbenzene	0.4
Dodecanol	0.9
Epichlorohydrin	8
Epoxypropyl isopropyl ether, 2,3-	1.1
Ethanol	8.7
Ethanolamine	3
Ethoxy-2-propanol, 1-	2
Ethoxyethanol, 2-	29.8
Ethoxyethyl acetate, 2-	3
Ethyl (S)-(-)-lactate	3
Ethyl acetate	3.6
Ethyl acrylate	2
Ethyl amine	1

Gas / VOC	Multiply Reading by:
Ethyl benzene	0.5
Ethyl butyrate	1
Ethyl chloroformate	80
Ethyl cyanoacrylate	1.5
Ethyl decanoate	1.8
Ethyl formate	30
Ethyl hexanoate	2.6
Ethyl hexanol, 2-	1.5
Ethyl hexyl acrylate, 2-	1
Ethyl mercaptan	0.7
Ethyl octanoate	2.3
Ethylene	8
Ethylene glycol	20
Ethylene oxide	15
Ferrocene	0.8
Formamide	2
Furfural	1.4
Furfuryl alcohol	2
Gasoline vapors	1.1
Gasoline vapors	0.8
Gasoline vapors 92 octane	0.8
Germane	10
Glutaraldehyde	0.9
Heptan-2-one	0.7
Heptan-3-one	0.8
Heptane n-	2.1
Hexamethyldisilazane, 1,1,1,3,3,3-	1
Hexamethyldisiloxane.	0.3
Hexan-2-one	0.8
Hexane n-	4.2
Hexene, 1-	0.9
Hydrazine	3
Hydrogen peroxide	4
Hydrogen sulfide	4

Gas / VOC	Multiply Reading by:
Hydroquinone	0.8
Hydroxypropyl acrylate 2-	1.5
Iminodi(ethylamine) 2,2-	0.9
Iminodiethanol 2,2-	1.6
Indene	0.5
Iodine	0.2
Iodoform	1.5
Iodomethane	0.4
Isoamyl acetate	1.6
Isobutane	8
Isobutanol	3.5
Isobutyl acetate	2.3
Isobutyl acrylate	1.3
Isobutylene	1
Isobutyraldehyde	1.2
Isodecanol	0.9
Isononanol	1.5
Isooctane	1.1
Isooctanol	1.7
Isopentane	6
Isophorone	0.8
Isoprene	0.7
Isopropanol	4.4
Isopropyl acetate	2.2
Isopropyl chloroformate	1.6
Jet Fuel JP-4	0.8
Jet Fuel JP-5	0.7
Jet Fuel JP-8	0.7
Kerosene	0.8
Ketene	3
Maleic anhydride	2
Mercaptoacetic acid	1
Mesitylene	0.3
Methacrylic acid	2.3

Gas / VOC	Multiply Reading by:
Methacrylonitrile	5
Methanol	200
Methoxyethanol, 2-	2.7
Methoxyethoxyethanol, 2-	1.4
Methoxymethylethoxy-2propanol	1.3
Methoxypropan-2-ol	3
Methoxypropyl acetate	1.2
Methyl acetate	5.2
Methyl acrylate	3.4
Methyl bromide	1.9
Methyl cyanoacrylate	5
Methyl ethyl ketone	0.8
Methyl ethyl ketone peroxides	0.8
Methyl isobutyl ketone	0.8
Methyl isothiocyanate	0.6
Methyl mercaptan	0.7
Methyl methacrylate	1.6
Methyl propyl ketone	0.8
Methyl salicylate	1.2
Methyl sulphide	0.5
Methyl t-butyl ether	0.8
Methyl-2-propen-1-ol, 2-	1.1
Methyl-2-pyrrolidinone, N-	0.9
Methyl-4,6-dinitrophenol, 2-	3
Methyl-5-hepten-2-one, 6-	0.8
Methylamine	1.4
Methylbutan-1-ol, 3-	3.4
Methylcyclohexane	1.1
Methylcyclohexanol, 4-	2.4
Methylcyclohexanone 2-	1
Methylheptan-3-one, 5-	0.8
Methylhexan-2-one, 5-	0.8
Methylhydrazine	1.3
Methyl-N-2,4, 6-tetranitroaniline, N-	3

Gas / VOC	Multiply Reading by:
Methylpent-3-en-2-one, 4-	0.7
Methylpentan-2-ol, 4-	2.8
Methylpentane-2,4-diol, 2-	4
Methylpropan-2-ol, 2-	3.5
Methylstyrene	0.5
Mineral oil	0.8
Mineral spirits	0.8
Naphthalene	0.4
Nitric oxide	8
Nitroaniline 4-	0.8
Nitrobenzene	1.7
Nitrogen dioxide	10
Nitrogen trichloride	1
Nonane, n-	1.3
Norbornadiene, 2,5-	0.6
Octachloronaphthalene	1
Octane, n-	1.6
Octene, n-	0.7
Oxydiethanol 2,2-	4
Paraffin wax, fume	1
Paraffins, normal	1
Pentacarbonyl iron	1
Pentan-2-one	0.8
Pentan-3-one	0.8
Pentandione, 2,4-	0.8
Pentane, n-	7.9
Peracetic acid	2
Petroleum ether	0.9
Phenol	1.2
Phenyl propene, 2-	0.4
Phenyl-2,3-epoxypropyl ether	0.8
Phenylenediamine, p-	0.6
Phosphine	2
Picoline, 3-	0.9

Gas / VOC	Multiply Reading by:
Pinene, alpha	0.3
Pinene, beta	0.3
Piperidine	0.9
Piperylene	0.7
Prop-2-yn-1-ol	1.3
Propan-1-ol	4.8
Propane-1,2-diol, total	10
Propene	1.4
Propionaldehyde	1.7
Propionic acid	8
Propyl acetate, n-	2.5
Propylene oxide	7
Propyleneimine	1.3
Pyridine	0.8
Pyridylamine 2-	0.8
Styrene	0.4
Terphenyls	0.6
Terpinolene	0.5
Tert-butanol	2.6
Tetrabromoethane, 1,1,2,2-	2
Tetracarbonylnickel	1
Tetrachloroethylene	0.7
Tetrachloronaphthalenes, all isomers	1
Tetraethyl orthosilicate	2
Tetrafluoroethylene	1
Tetrahydrofuran	1.6
Tetramethyl succinonitrile	1
Therminol	1
Toluene	0.5
Toluene-2,4-diisocyanate	1.6
Toluenesulphonyl chloride, p-	3
Toluidine, o-	0.5
Tributyl phosphate	5
Tributylamine	1

Gas / VOC	Multiply Reading by:
Trichlorobenzene 1,2,4-	0.6
Trichloroethylene	0.7
Trichlorophenoxyacetic acid, 2,4,5-	1
Triethylamine	0.9
Trimethylamine	0.5
Trimethylbenzene mixtures	0.3
Trimethylbenzene, 1,3,5-	0.3
Turpentine	0.6
TVOC	1
Undecane, n-	0.9
Vinyl acetate	1.1
Vinyl bromide	1
Vinyl chloride	2.1
Vinyl-2-pyrrolidinone, 1-	0.9
Xylene mixed isomers	0.4
Xylene, m-	0.4
Xylene, o-	0.6
Xylene, p-	0.6
Xylidine, all	0.7

For additional information on VOC correction factors, please refer to www.gmiuk.com/customer-support/

TYPICAL OPERATING PARAMETERS

Physical Properties

Weight: 0.4 kg.
Dimensions: 140 x 85 x 45 mm.

Environment

Temperature Limits: -20°C to +50°C.
Humidity: 0 to 95% R.H. non-condensing.

Typical Flow Rate Information

Pumped Instruments: Nominal pump flow rate is ≥ 0.4 litres per minute. Maximum 30 metres (97ft.) sample line.
Typical flow fail rate is < 0.2 litres per minute.

Warm-up / Stabilization Time

< 40 seconds.

Response Time (T90)

Typical Oxygen (O_2) response time: < 10 seconds.

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Thank you for reading this data sheet.

For pricing or for further information, please contact us at our UK Office, using the details below.

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