GMI

PS1

hydrogen sulphide

USER HANDBOOK

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MODIFICATION NOTICES

GMI aim to notify customers of relevant changes in the product operation and maintain this manual up to date. In view of the policy of continuous product improvement there may be operational differences between the latest product and this manual.

This Handbook is part of the PS1 product. Although every care is taken in the preparation of this Handbook it does not constitute a specification for the instrument.

SOFTWARE

Software supplied for use in a particular product, may only be used in that product and may not be copied without the written permission of GMI. Reproduction or disassembly of such embodied programmes or algorithms is prohibited. Ownership of such software is not transferable and GMI does not warrant that the operation of the software will be error free or that the software will meet the customer's requirements.

DISPOSAL ADVICE

When no longer in use, dispose of the instrument carefully and with respect for the environment. GMI will dispose of the instrument without charge if returned to the factory.

SAFETY

- The instrument should be periodically tested, in a safe area, using a known gas concentration.
- Only GMI replacement parts should be used.
- If the instrument detects gas, follow your own organisation's procedures and operational guidelines.
- PS1 instruments are certified as:

  ATEX ⟨Ex⟩ II 1 G Ex ia IIC T4   IECEx Ex ia IIC T4 Ga (Ta = -20°C to +50°C)

  (UL) UL 913 Class I, Div 1 Groups A, B, C and D   (SP) Class I, Div 1 Groups A, B, C and D

  (MED) MED, for oxygen instruments only. Refer to MED Declaration of Conformity for details

- 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

WARNING 1:   DO NOT USE INSTRUMENT IN OXYGEN ENRICHED ATMOSPHERES.

WARNING 2:   SUBSTITUTION OF COMPONENTS MAY IMPAIR INTRINSIC SAFETY.

WARNING 3:   TO PREVENT IGNITION OF FLAMMABLE OR COMBUSTIBLE ATMOSPHERES, DISCONNECT POWER BEFORE SERVICING.

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

AREAS OF USE

Do not use instrument in potentially hazardous atmospheres containing greater than 21% Oxygen. The enclosure material is polycarbonate / ABS and must not be exposed to environments which are liable to result in mechanical or thermal degradation or to damage caused by contact with aggressive substances. Additional protection may be required in environments where the instrument enclosure is liable to damage.

STORAGE, HANDLING AND TRANSIT

The instrument is designed to handle harsh environments and to meet *IP67. If not subjected to misuse or malicious damage, the instrument will provide several years of reliable service.

The instrument contains electrochemical sensors with a minimum life of two (2) years. The PS1 instrument should only be stored for a maximum of one (1) month from the date of manufacture (as indicated on instrument batch label). Storage in excess of this will affect the instrument warranty. The sensor contains potentially corrosive liquid and care should be taken when handling or disposing of the sensor, particularly when a leak is suspected.

* Note: IP rating is not verified by UL.

WARRANTY

The PS1 has a 2 year warranty against faulty goods or workmanship for the lifetime of the instrument. Consumable and Mechanical parts are not included in this. These are covered under GMI standard warranty conditions. For further details, please contact GMI.

The 2 year lifetime warranty is based on the following instrument use:

- Instrument switched on, for no more than 2 years

- Alarm duration, of no more than 1 minute per day

- IrDA communication, for no more than 2 minutes per day

Important: Significant alarm and communication usage will reduce the lifetime of the instrument, i.e. the instrument is unlikely to reach a lifetime of 2 years.

CONTENTS

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1. INTRODUCTION

The GMI PS1 instrument combines quality, ruggedness and advanced technology in a user friendly, portable gas detector. Small and lightweight, it is suitably certified to recognised International Standards.

The PS1 is a personal safety device that warns when toxic gas or oxygen deficiency exceeds the alarm set-points. (Refer to Chapter 3 for factory set defaults). Its high intensity audible, bright visual and vibrating alarms provide early warning of dangerous gas levels. It is the responsibility of the user to respond properly to the alarms.

The instrument is operated via a single push button providing the user with a simple to use gas detector.

Fig. 1-1 PS1 Instrument

1.1 INSTRUMENT PART NUMBER / GAS TYPE

62403 / 63324:	0 to 100 ppm Hydrogen Sulphide (H_2S)
63002:	0 to 25% Oxygen (O_2)
62404 / 63424:	0 to 500 ppm Carbon Monoxide (CO)
62405 / 63524:	0 to 20 ppm Sulphur Dioxide (SO_2)

1.2 INSTRUMENT FEATURES

The main features of the PS1 range of instruments are:

- Integral impact resistant housing.
- Single button user operation.
- Clear display with screen light.
- High intensity audible and visual alarms. Also includes a vibrating alarm.
- Instrument protected to IP67 rating, making the instrument suitable for outdoor use.
- A comprehensive range of accessories including: Automatic Bump / Calibration Station.
- Alligator Clip.

1.3 INSTRUMENT IDENTIFICATION

There are four PS1 gas models available. The model is clearly indentified on the front housing of the instrument. The part number and corresponding gas type can be found in section 1.1 of this chapter.

1.4 INSTRUMENT DISPLAY

The PS1 display details the current gas readings and life remaining.

1.5 CONSTRUCTION

The PS1 instrument is housed in a tough, impact resistant moulded case. The instrument is sealed to IP67. The instrument is designed with louver to protect against rain and to withstand physical impact testing.

The instrument has two buttons:

- The RH button 🔵 is blue (with white print of standard ON symbol).

- The LH button ⚫ is black.

A robust alligator clip is provided on the back face for attaching instrument to user's clothing.

2. OPERATION

Before operation of the PS1, check that the instrument is clean and in good condition.

Each time you use the PS1 instrument, perform the following operations:

1) Switch instrument ON in fresh air and check the life remaining.
2) Check there are no faults.
3) Attach optional accessories, as required.
4) Perform self-test by a press and hold of the black LH button.
5) Switch the instrument OFF, in fresh air, after use.

Note 1: You can leave the Instrument ON permanently if required. Switching OFF will reset the Max (Min) value to 0 (20.9).

Note 2: A reset feature is available that allows a re-start of the instrument to overcome a stall in operation (typically, this is indicated by an empty battery symbol). The instrument configuration is retained. To reset the instrument, press and hold the RH button for 15 seconds, then press the ON button to re-start the instrument and begin the warm-up routine as detailed in section 2.1.

PS1

2.1 SWITCHING THE INSTRUMENT ON

Press and hold the RH button 🔵 for one second to switch the instrument on. The instrument begins its warm-up routine. First, all display segments are briefly shown, the LED's will flash, the buzzer beeps, and the vibrator will vibrate.

An example of an initial screen display is shown in Fig 2.1.

During the warm-up cycle, a countdown timer is displayed at the bottom / centre of the screen.

Fig. 2-1 Initial Screen Display

Next, the software version is displayed, as shown in Fig. 2-2.

Fig. 2-2 Software Version

The next screen displays the target gas.

The target gas in the example shown, Fig. 2-3, is Hydrogen Sulphide.

Fig. 2-3 Target Gas

PS1

Next, the different alarm level values are shown. See Figures 2-4 to 2-7.

Note 1: If any particular alarm is disabled, the screen will show 'dis.' (disabled).

The 'L' and 'NL' symbols, at the bottom left hand and bottom right hand corner of display, indicate alarms as either 'Latching' or 'Non-Latching' (default).

Refer to Chapter 3 'ALARMS' for explanation of Latching and Non-Latching alarms.

Fig. 2-4 Hi Alarm Level

Fig. 2-5 HiHi Alarm Level

Fig. 2-6 STEL Alarm Level

Fig. 2-7 LTEL Alarm Level

Finally, the six digits of the instrument serial number are displayed:

- First two digits - small font size, bottom of display

- Last four digits - large font size, centre of display

In the example shown in Fig. 2-8, the serial number is 120136.

Fig. 2-8 Instrument Serial Number

2.2 NORMAL OPERATING DISPLAY

When warm-up is completed successfully, the normal operating display is shown, as in example Fig. 2-9, with the gas value and the remaining life of the instrument shown in the display.

2.2.1. Life Remaining

Initially the display will show the life remaining, at the bottom of the screen. The time remaining (in months) reduces until 1 month remains, and is then displayed in days, as shown in Fig. 2-10.

Note: Remaining months / days may be reduced when significant alarm exposures take place.

2.2.2. Battery Low / Exhausted

If the battery is low or exhausted, the instruments audible, visual and vibrating alarms will activate once every two seconds. This will continue until either:

The user presses any button to mute the instrument, or,

After one hour has elapsed, the instrument will shut down and not restart.

Fig. 2-9 Normal Operating Display

Fig. 2-10 Life Remaining

2.3 SWITCHING DISPLAY BACKLIGHT ON

The display screen light can be manually switched on when surveying in poor lighting conditions.

Press the RH button $\textcircled{0}$ once to switch the screen light on. It remains on for three seconds after the last button press and then automatically switches off.

Note: Backlight will reduce life remaining if it is on repeatedly.

2.4 VIEWING MAXIMUM / MINIMUM VALUES

To view the maximum reading since switch ON, press the RH button $\textcircled{0}$ once to switch ON the backlight.

Press it again to view the maximum value since switch ON as shown in example Fig. 2-11 (press again for minimum O_2).

The reading returns to normal, and the backlight switches off automatically, if no button is pressed for three seconds.

Fig. 2-11 Max / Min Values

2.4.1. Clearing the Max / Min Values

To clear the maximum (or minimum) reading, simply press and hold the RH button ⓞ while viewing the maximum (or minimum). The reading is reset to zero (or 20.9% for O2).

2.5 REMOTE SAMPLING

Warning (Hand Aspirator): The hand aspirator can be used for indicative sampling, but it must be noted that when using a hand aspirator, a reading error in the region of +/- 20% is possible. In addition, the hand aspirator must only be used with up to 10 metres of sample line and the sample time is extended.

Remote sensing is carried out with the hand aspirator for non-reactive gases, using the sample connector and the sample tubing supplied, as shown in Fig. 2-12.

Fig. 2-12 Remote Sampling Set-up

2.6 SWITCHING THE INSTRUMENT OFF

Press and hold both the LH ⬤ and RH ⓪ buttons simultaneously to switch the instrument OFF.

The instrument screen will now start a countdown from three (3) to OFF as shown in Fig. 2-13.

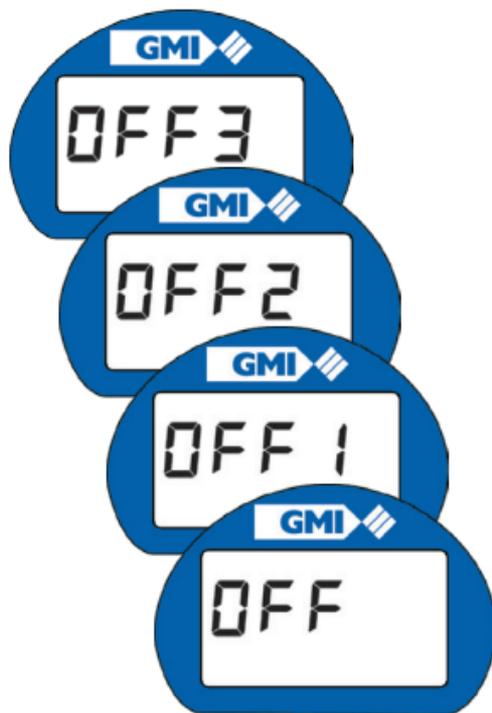The buttons must be pressed until the display shows OFF, then release the buttons.

Fig. 2-13 OFF Sequence

PSI

2.7 OPERATOR MESSAGES / FAULT FLAGS

Fig. 2-14 Fault Indication

• If the sensor or anything else fails, the audible (short beep) and visual (red LED) alarm activate and the instrument display will show 'EEEE' as shown in Fig. 2-14. Switch the instrument OFF then ON again in fresh air.

   If the fault persists, return the instrument for service.

• If, at the end of the warm-up cycle, the instrument audible alarm 'beeps' and the visual alarm flashes, this is an indication that the instrument has been unable to zero the sensor.

   You can either mute the alarm,

   or

   Go to an area where there is fresh air, wait one (1) minute then switch the instrument OFF then ON again.

   If the fault persists, return the instrument for service.

2.8 TEST

A self-test can easily be performed, by simply pressing and holding the LH button ⬤.

Briefly, all elements of the display will be shown. The buzzer will beep, the LED's will flash and the instrument will vibrate. After this, the instrument will return to its normal operation screen.

Note: A self-test can only be performed from the normal operation screen with a safe gas concentration.

3. ALARMS

When the PS1 instrument detects an alarm set-point has been reached, the audible and visual alarm will be activated to alert the user. The instrument will also vibrate in HiHi and LoLo (O_2 only) alarm conditions.

A Non-Latching alarm (default) will reset automatically once the reading returns within the pre-set alarm limits. The alarm will not clear until the reading has returned within the limits for a period of 20 seconds. This prevents the alarm from activating / de-activating regularly when the reading is hovering around the alarm set-point. Alternatively, the alarm can be muted.

A Latching alarm (configurable option) will stay on until the user resets by a press and hold of the RH button Ⓞ once the gas reading has returned within the pre-set alarm limits.

By default, all instrument alarms are non-latching.

Note 1:   Alarm levels are set in accordance with current standards.

Note 2:   Hi and Lo (O_2 only; disabled by default) alarms do not vibrate.

3.1 ALARM DISPLAY

If an alarm occurs, the type of alarm (e.g. HiHi H_2S) is indicated at the top of the screen with the current reading on the display, as shown in Fig. 3-1.

To switch on the backlight during an alarm, simply press the RH button once. It will automatically switch off after three seconds.

Note: When a TWA alarm is active, the actual value is displayed and the alarm type (STEL or LTEL) flashes.

Fig. 3-1 Alarm Display

PS1 Part No.	Gas Type	Hi	HiHi	Lo	LoLo	STEL	LTEL
63324	H_2S	10 ppm	20 ppm	N/A	N/A	10 ppm	5 ppm
62403						20 ppm	10 ppm
63002	O_2	N/A	23.5%	Disabled	19.5%	N/A	N/A
63424	CO	30 ppm	200 ppm	N/A	N/A	200 ppm	30 ppm
62404		35 ppm	50 ppm				35 ppm
63524	SO_2	Disabled	1.0 ppm	N/A	N/A	1.0 ppm	1.0 ppm
62405		Disabled	5.0 ppm			5.0 ppm	5.0 ppm

Fig. 3-2 Alarms Table

Note 1: By default, all instrument alarms are non-latching.

Note 2: Please refer to instrument warm-up sequence for actual configured alarm levels.

3.2 ACKNOWLEDGE ALARM(S)

To acknowledge, i.e. switch off, a latching alarm (configurable option), press and hold the RH button 🔘 when the gas reading has returned within the pre-set alarm limits.

3.3 MUTE ALARM(S)

To mute (i.e. silence) a non-latching alarm, press and hold the RH button 🔘 when the alarm is sounding.

The audible / visual alarm will be silenced / extinguished. If the gas reading has returned within the pre-set alarm limit, the alarm type will disappear from the display automatically.

If the non-latching alarm limit is exceeded again, the audible and visual alarm will be re-activated.

TWA alarms (STEL and LTEL) are non-latching and when the alarm is muted, the audible, visual and vibration will cease. The alarm type will flash until the alarm has cleared, then the alarm indication at the top of the display (STEL or LTEL) will disappear.

4. OPERATOR MAINTENANCE

4.1 CLEANING

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

The outer, impact resistant casing of the PS1 instrument may be cleaned using a non-abrasive moist cloth. Rub the cloth over the outer casing to remove any dirt and grime.

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

5. CALIBRATION

The instrument has been calibrated for a particular gas. 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.

Two methods of calibration are possible:

- The fully automatic, PS1 Auto Bump / Calibration Station (Part No. 63450), provides controlled delivery of gas, allowing you to calibrate in a controlled manner and maintain a record of calibration results on a PC.

- Field Calibration.

Note: The detailed calibration methods, consisting of both hardware and software, are manufactured by GMI. For more detail contact GMI or an authorised distributor.

5.1 CALIBRATION VALIDITY

Calibration validity is the responsibility of the user. Under normal operating conditions a 12 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, by using bump-test procedure, 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. The bump-test procedure details the application of gas, either manually, or automatically using the GMI Bump-Test Station.

Refer to section 5.2 for Bump Test details.

5.2 BUMP TEST

An automatic or manual Bump Test can be performed on the PS1 instrument to test the instrument's sensor response and alarms.

5.2.1 Automatic Bump Test

The PS1 Auto Bump / Calibration Station (GMI Part No. 63450) provides a safe, simple and convenient method of automatically bump testing the instrument. This is the recommended way to bump test a PS1.

Refer to procedure detailed in the PS1 Auto Bump / Calibration Station User Handbook (GMI Part No. 63461) and by using one of the following Auto Bump / Calibration kits:

For H_2S, use kit - GMI Part No. 63140,

For O_2, use kit - GMI Part No. 63141,

For CO, use kit - GMI Part No. 63142,

For SO_2, use kit - GMI Part No. 63143.

Note: The Auto Bump / Calibration kit consists of a gas cylinder, regulator, and tubing.

5.2.2 Manual Bump Test

The instrument can be manually bump tested by following the procedure below and using one of the following Field Calibration / Bump Test kits:

For H2S, use kit - GMI Part No. 63104,

For O2, use kit - GMI Part No. 63106,

For CO, use kit - GMI Part No. 63105,

For SO2, use kit - GMI Part No. 63107.

Note: The Field Calibration / Bump Test kit consists of gas cylinder, regulator, and tubing complete with connector.

1. Press and hold the LH button ● until the screen indicates "tESt".

2. Apply the gas, at 250 ml/min, via the gas inlet connector on the front of the instrument, just below the diffusion louver.

3. Apply the gas until the instrument display indicates "PASS".
   The instrument will then revert to normal operation and thus will be ready for use.

Note: If the manual bump-test is unsuccessful, the display will indicate "FAIL".
   Follow the above procedure again after allowing time to diffuse the remaining gas from the instrument, or get the instrument re-calibrated by trained personnel.

6. ACCESSORIES

A range of accessories is available for the following list of PS1 series instruments:

Instrument Part No.	Sensor Installed
62403 / 63324	0 to 100 ppm Hydrogen Sulphide (H_2S)
63002	0 to 25% Oxygen (O_2)
62404 / 63424	0 to 500 ppm Carbon Monoxide (CO)
62405 / 63524	0 to 20 ppm Sulphur Dioxide (SO_2)

Accessory Part No.	Description
66485	Hydrophobic Filter Assy. (in-line)
63103	Hand Aspirator c/w 3m Sample Line
66545	Ball Float Assy
66118	Sample Line (per metre)
67071	Gas Bottle Clip (for wall mounting)

Accessory Part No.	Description
63450	Auto Bump / Calibration Station
63140	H_2S Auto Bump / Calibration Kit (gas cylinder, regulator, tubing)
63141	O_2 Auto Bump / Calibration Kit (gas cylinder, regulator, tubing)
63142	CO Auto Bump / Calibration Kit (gas cylinder, regulator, tubing)
63143	SO_2 Auto Bump / Calibration Kit (gas cylinder, regulator, tubing)
63104	H_2S Field Calibration / Bump Test Kit (gas cylinder, regulator, tubing c/w connector)
63105	CO Field Calibration / Bump Test Kit (gas cylinder, regulator, tubing c/w connector)
63106	O_2 Field Calibration / Bump Test Kit (gas cylinder, regulator, tubing c/w connector)
63107	SO_2 Field Calibration / Bump Test Kit (gas cylinder, regulator, tubing c/w connector)
63120	Data Downloading Setup Pack (CD-ROM, interface adaptor, user instructions)

For a comprehensive list of accessories and calibration gases, contact your local Distributor or alternatively, GMI.

7. ADDITIONAL INFORMATION

Training

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

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Fax: +44 (0) 141 812 7820

e-mail: sales@gmiuk.com

World Wide Web

Visit GMI web site at www.gmiuk.com

A. TYPICAL OPERATING PARAMETERS

Typical operating parameters are as follows:

Instrument Part No.	Gas Type	Range	Resolution	T90 Response Time
62403 / 63324	H_2S	0 to 100 ppm	1 ppm	< 30 secs
63002	O_2	0 to 25%	0.1%	< 30 secs
62404 / 63424	CO	0 to 500 ppm	1 ppm	< 30 secs
62405 / 63524	SO_2	0 to 20 ppm	0.1 ppm	< 30 secs

O_2 instruments comply with EN50104

Dimensions (excl. clip): 85mm (H) x 55mm (W) x 29mm (D) ; 3.3in (H) x 2.2in (W) x 1.1in (D)

Weight (incl. battery): 100g (toxic) / 110g (oxygen) ; 3.5oz (toxic) / 3.9oz (oxygen)

Temperature Limits: -20°C to 50°C (-4°F to 122°F).

PSI

Humidity: 0 – 98% R.H. non-condensing.

Construction / Protection Rating: Moulded polycarbonate / ABS case protected to IP67.

Display: LCD with backlighting (Backlighting on demand).

Data Sampling System: Sampling rate - 1 minute interval. Stores (1440) logs over a period of
24 hours operation / then re-writes from longest stored log.
Previous 10 calibration results.
Previous 50 bump-tests.
ON / OFF session logs.

Power Source: Lithium Battery
Battery life - up to 24 months depending on sensor type and usage.

Audible Alarm: 95 dB @ 10 cm. (4 in.)   ;   85 dB @ 30 cm. (12 in.).

Visual Alarm: 2 Red LED's.

INDEX

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