UNIPHOS-250(PM)

FumiSense Pro

INSTRUCTION MANUAL

Uniphos Envirotronic Pvt. Ltd.
Readymoney Terrace, 167,
Dr. Annie Besant Road,
Worli, Mumbai – 400018, India.
Tel: (91-22) 2493 0681, Fax: 2493 8826
Email: gasdetection@uniphos.com

Dear Customer,

Congratulations on your purchase of UNIPHOS-250(PM) FumiSense Pro. This monitor has been produced using the state of the art Technology by our company Uniphos Envirotronic Pvt. Ltd. at Vapi, to provide you an instrument with the best of features and yet at a moderate cost. It represents the high degree of craftsmanship and reliability that has made **UNIPHOS a leader in the field of gas detection.**

Please read the instruction manual carefully. It gives a brief description of the instrument and the full details of operation for measurement, calibration, parameter setting etc. To ensure a long trouble free performance, please take due care and ensure proper maintenance of your monitor as recommended in this Instruction manual.

Please do not attempt to use any other accessories and other components other than **UNIPHOS**. Also do not attempt to open the instrument at site, as it would lead to termination of warranty for your instrument. If you have any queries regarding the operation or maintenance of your **UNIPHOS** monitor, please do feel free to consult our factory at the address on the front cover or contact the service representative for your area and we will be happy to help you.

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1. Introduction

Fumigation of stored products as a pest control measure is widely practiced all over the world. Phosphine, Methyl Bromide (MBr) and Sulfuryl Fluoride (SO_2F_2) are some of the commonly used fumigants.

Phosphine (PH_3) in particular is a highly specific fumigant used to control number of pests in a wide range of agricultural and horticultural crops and in wood products. Its primary application is for quarantine treatment, soil fumigation and post harvest protection.

Fumigation is generally carried out by covering the commodities with a leak proof enclosure and applying PH_3 of necessary concentration. Effective and scientifically carried out fumigation procedure demands monitoring of the fumigation process during the entire period of fumigation. For this application, UNIPHOS-250(PM) FumiSense Pro is suitable.

This manual gives the full description of the UNIPHOS-250(PM) FumiSense Pro, its operation, calibration, maintenance and the other relevant information.

1.1 Working Principle

The UNIPHOS-250(PM) FumiSense Pro uses an electrochemical sensor for the detection of Phosphine. When sensor encounters a target gas, current is generated in proportion to the gas concentration. This current is converted into a voltage signal; it is digitized and displayed on the instrument's OLED display. This being a microprocessor-based instrument, it can continuously monitor the Phosphine gas concentration and can store this data in its memory, which can be later downloaded on a computer.

The instrument is powered by a 7.4 V Li-ion rechargeable battery.

2. Instrument Description

UNIPHOS-250(PM) FumiSense Pro is a microprocessor based instrument for the measurement of Phosphine. Fig. 1 shows the front panel, Fig. 2 shows the right hand side panel and Fig. 3 bottom panel of the instrument. The instrument has following important parts namely sensor, signal conditioning electronics, alphanumeric OLED Display, a sample draw pump and a battery pack.

Being a microprocessor based unit, it has data logging facility and can store the data with a real time clock into the memory. There is also a provision to download the stored data on the computer.

2.1 Front Panel

Fig. 1 Front Panel

The front panel of the instrument has

    A. Four membrane keys, viz. UP ▲ , DN ▼ ,   SET ● & ENTER ↵
    B. Two Light Emitting Diodes (LED) namely, POWER and SAMPLING
    C. And a Liquid Crystal Display (LCD/ OLED)

These are described as follows:

1. POWER LED**:**

    This green LED glows, when the instrument is turned ON.

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2. SAMPLING LED:

The sampling LED glows, when the instrument is in measurement mode.

3. UP KEY:

a) Menu page: Press this key to enter into the Sampling/Purging mode (either Batch or continuous).
b) Parameter Set Mode: In this mode, the key is used to increase the value of the digit below which the cursor is placed.
c) Calibration Mode: In this mode, the key is used as increment key.
d) Data downloading mode: Press this key to download all the stored data/records to the PC.

4. DOWN KEY:

a) Menu page: Press this key to enter into calibration mode.
b) Parameter Set Mode: In this mode, the key is used to move the cursor horizontally over different digits.
c) Calibration Mode: In this mode, the key is used to shift the cursor.
d) Data downloading mode: In this mode, if DOWN key is pressed, all the stored data will be deleted from the instrument's memory.

Δ **CAUTION**: One should be careful before pressing DOWN key in the Data Downloading Mode, as the data logged so far into the internal memory of the instrument will be lost permanently.

5. SET KEY:

a) Menu page: Press this key to enter into the Parameter Set Mode and to turn OFF the instrument.
b) All other modes: Press this key to escape from the current page and to move over to the next page.

6. ENTER KEY:

a) Menu page: Press this key to enter into the data downloading mode.
b) All other modes: To confirm the selection of mode and value of the parameter chosen or to confirm the desired / selected operation.

7. OLED DISPLAY:

It is a 20 X 4 alphanumeric OLED display, which indicates
- Various prompts during initialization process, immediately after turning ON the unit.
- Gas concentration in the Measurement mode.
- User settable parameters during Parameter Set mode.
- Calibration data viz. zero – span counts during Calibration mode.
- User friendly prompts during Sampling, Calibration, Data Downloading and other Functions.

2.2   Left hand side panel
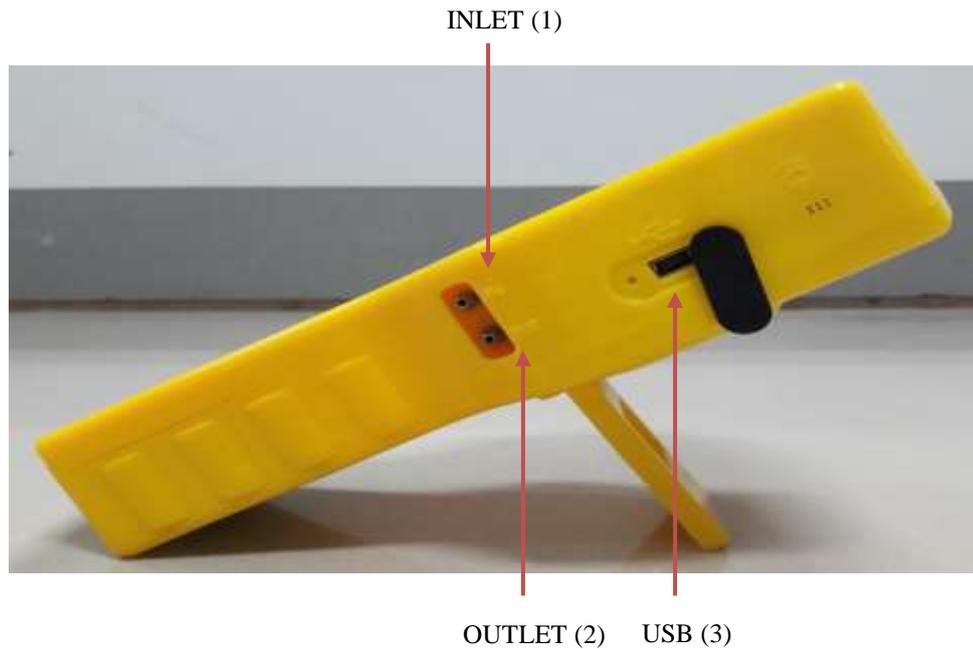
INLET (1)

OUTLET (2)   USB (3)

Fig. 2: Left hand side panel

The left hand side of the instrument contains a charging socket, a USB socket and two ports, namely, Gas inlet nozzle & Gas outlet nozzle for sampling. These are marked on the instrument for the identification. (Refer Fig. 2)

1. USB socket:

    This socket is to interface the instrument with the computer. Monitor can be interfaced with the PC for easy downloading of the data stored in the data logger. The other end is to be connected to the COM port of the PC. The settings required for data downloading are described in point 4.4 Data Downloading mode.

2. GAS INLET PORT:

    Sampling tube is provided with the instrument to draw the gas from fumigation area. One end the flexible tube is to be connected at the IN nozzle and other end to be inserted in the fumigation area.

3. GAS OUTLET PORT:

    One more flexible tube will be connected at the OUT nozzle to leave the sampled gas back into the fumigation chamber.

2.3 Bottom panel

BATTERY CHARGER SOCKET:

This socket is provided for charging the instrument. Plug the charger to 110V/230VAC, 50-60Hz power outlet and the other end to the instrument and turn it ON. Charge the battery for 3 - 4 hours. The Battery charge status can be viewed on the LCD/ OLED display in the download page.

3. Instrument Operation

Press and hold the SET Key for 3-4 seconds to turn ON the instrument. A green LED marked POWER on the front panel of the Instrument glows, confirming the same. Instrument can be turned OFF by pressing set and confirming the turn OFF by ENTER key.

Note: Fully charge the unit before use. *Charge the unit till RED Led on charger turns GREEN, before using it for measurement.*

3.1 INITIALIZATION

Once instrument is turned ON, it goes into the initialization and following prompts will appear in the sequence on the display.

```
INSTRUMENT STARTS
        IN
    3 .. 2 .. 1 .. 0
```

(Instrument Turn ON)

```
UNIPHOS-250
FUMISENSE PRO
SERIAL NUMBER
A-XXXX(PM)
```

(Instrument Model and Serial number)

```
SOFTWARE VERSION:

X.XX.XXX
```

(Instrument software version)

```
RANGE: 0 - XXXX PPM
RESO. : XXX PPM
DATE: DD/MM/YY
TIME: HH:MM:SS
```

(Range and Resolution, Current date and time)

```
LAST CALIBRATION

DATE: DD/MM/YY
```

(Last calibration date)

```
UP  – SAMPLING
DN  – CALIBRATE
SET – SETTINGS
ENT – DWNLD/RST
```

(Menu Page)

At the end of the initialization, instrument moves to the menu page.

The menu page gives information on the operating mode selection for the specific key activation as follows:

1. "UP" key ▲ Monitoring mode i.e. Start sampling (continuous/batch sampling).
2. "DN" key ▼ Switch to Calibration mode.
3. "SET" key ● Enter into parameter setting and to proceed for Instrument OFF page
4. "ENTER" key ↵ Access to data logger

4. Operations in Various Modes

4.1 PARAMETER SETTING MODE:

While in the menu page, press the **SET** Key ● to enter into the parameter set mode.
After successful authentication (Password - 123), user has an access to the following parameters in this mode.

To change parameter value, follow below procedure.

1. The cursor will blink below the first digit of the Parameter. Use the DOWN Key ▼ to move the cursor horizontally over different digits (i.e. to change cursor position).
2. If any digit is to be changed, move the cursor under the digit and press the UP Key ▲.
   Using the UP Key ▲ , the digits can be changed from 0 to 9.
3. Press the ENTER Key ↵ to confirm the changed digit and to switch over to the next parameter.
4. If the displayed parameter is not to be changed, press the SET Key ● to switch over to the next parameter.

4.1.1 Select Sampling Type & Sampling Time:
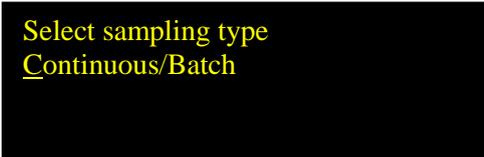
```
Select sampling type
Continuous/Batch
```

1. In this screen, the cursor will blink below "C" of Continuous sampling type. Pressing the DOWN Key, the cursor will toggle between "Continuous" and "Batch" sampling type. Select the desired type. Press ENTER key to confirm the type and to move to the next page.

2. In sampling time setting, the cursor will blink below the first digit of sampling time(only for BATCH sampling)
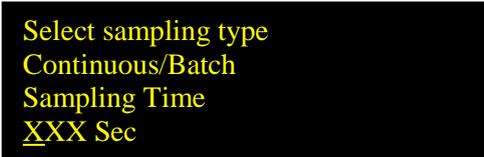
```
Select sampling type
Continuous/Batch
Sampling Time
XXX Sec
```

As explained above in 4.1, user can input any desired sampling time (between 001-999) by using UP/DN key and confirm the new value by pressing ENTER key.

Note: *At any time, press SET to skip the current data (without saving) and to move to the next screen.*

4.1.2 Set Serial Number:

```
Serial Number
A – XXXX (PM)
```

1. In this screen the display will show the current serial number of the instrument.
2. The cursor will be blinking at the first digit of the "Serial Number", make desire changes and press ENT key to confirm.

4.1.3 Date Time Setting:

```
Set Date:
DD/MM/YY
Set Time:
HH:MM:SS
```

In a similar way, one can change the Date & Time.

Note: *If the displayed date & time or any of the above explained parameters are not to be changed, one can press the SET Key ● to escape without altering the current values.*

4.2 CALIBRATION MODE:

In the menu screen, press the DOWN Key ▼, the instrument moves to the calibration mode. After Successful authentication (Password – 321), the device is ready for calibration.

Calibration of the instrument involves two steps:

1)   Zeroing the instrument in clean air.

Δ **IMPORTANT**: The instrument should be zeroed in clean air. If you are not sure about the air quality, it is recommended to use the air from compressed clean air cylinders available for the purpose.

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2) Applying gas of known concentration, so that the reading matches with the calibration gas concentration.

4.2.1 Calibration Process:

1. In the calibration mode, the first page is the Zero Calibration, **"Apply Zero Gas"** Prompt will be displayed and instrument will take samples from air for 30 seconds, continuously showing counts and remaining sampling time on display.

2. Instrument will be zeroed only if count value is in between **50 to 999.** After zeroing successfully ZERO CAL DONE prompt will appear otherwise ZERO CAL FAIL prompt will be displayed.

3. In case of ZERO CAL FAIL, exit from the calibration mode by pressing SET key. Again re-enter into calibration mode and immediately after "APPLY ZERO GAS" prompt, manually set zero count in between **50 to 999, ideally 500** by adjusting ZERO POT as shown in the image below (within 30 seconds of zero calibration time).

4. After zeroing the instrument, following prompt will be displayed, enter the gas conc. value for which instrument is to be calibrated.

5. Entering the gas value and by pressing enter key, **"Apply Span Gas"** prompt will appear and instrument will take samples of target gas for 120 seconds and will show counts value and remaining sampling time continuously.

   Note: *SPAN GAS VALUE should be equal to or in between 10 % to 80 % of full range of the instrument, otherwise "INVALID SPAN GAS" prompt will appear on screen and instrument will again ask for SPAN GAS VALUE.*

6. Instrument will be calibrated only if counts value for applied span gas is in valid range (i.e. From 2000 to 4030 display counts, ideally 3000).

7. After Span Calibration process, SPAN CAL DONE prompt will be displayed otherwise SPAN CAL FAIL prompt will be displayed.

8. In case of SPAN CAL FAIL, re-enter into the calibration mode, zero the instrument (optional in case of last successful zero calibration & can be skipped by pressing SET key). Follow the same procedure mentioned from point 4 and set counts value between range (as mentioned in point 6 of 4.2.1) by adjusting SPAN POT as shown in the image below (within 120 seconds of span calibration time).
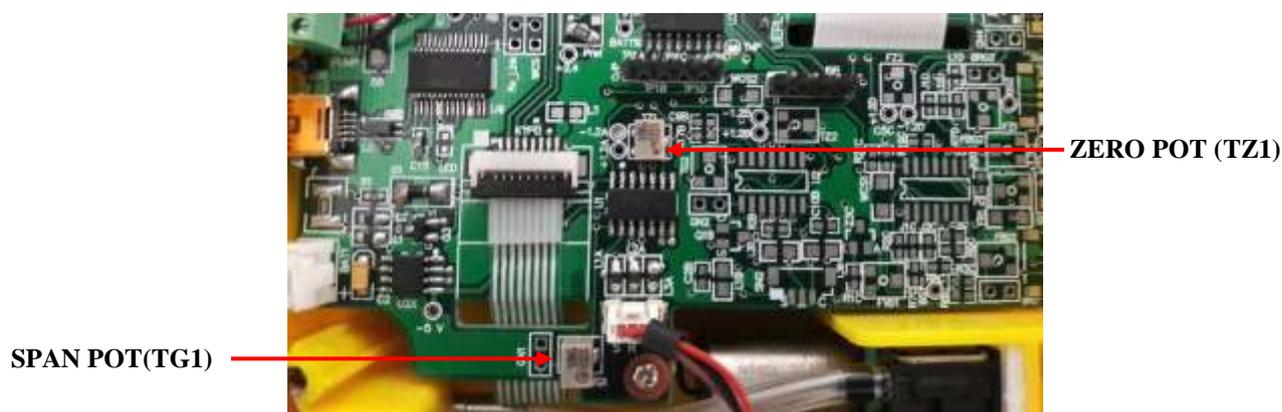

Upon successful Span calibration, Last calibration date of instrument will be updated automatically to the current date.

4.3 SAMPLING MODE:

Before entering into the sampling mode, select the sampling type (Continuous/Batch sampling) as described in section 4.1.1. Set the sampling time if batch sampling is selected as the mode of operation.

1. Press UP key in the menu page to enter the sampling mode and following prompt will appear on the screen.
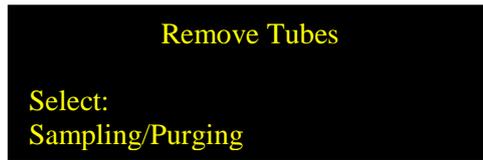
```
          Remove Tubes

Select:
Sampling/Purging
```

2. Select Sampling or Purging as per the requirement using Up/Dn key. If the sampling is selected, instrument will display following prompt.
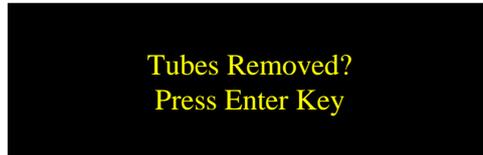
```
          Tubes Removed?
          Press Enter Key
```

3. On pressing Enter Key, instrument will enter in to zero check mode, will display for the zero check and will proceed for sampling.

```
          Zero Check
          Please Wait
```

```
          Connect Tubes
          Press Enter Key
```

4. Connect tubes and press Enter key to enter into the sampling mode.

5. In continuous sampling mode, instrument will start taking sample until the SET key is pressed to stop the sampling.

```
                              CNT
PH3: XXXX PPM

DATE                          TIME
```

Note: In the continuous sampling mode, data can be logged by pressing ENTER key during sampling.

6. In batch sampling mode, instrument will draw gas sample for the time period set in the Sampling Time setting mode and continuously display the gas concentration on display as shown below.

```
                              XXX
PH3: XXXX PPM

DATE                          TIME
```

7. In batch sampling mode, once sampling is over, monitor prompts for data logging mode as shown below.
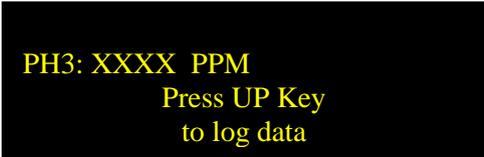
```
PH3: XXXX  PPM
            Press UP Key
            to log data
```

8. Press the UP key and after asking for confirmation, enter site and location value and press ENTER key to log the data in to the instruments memory or press SET key to move to the Purging page without logging / storing the data.
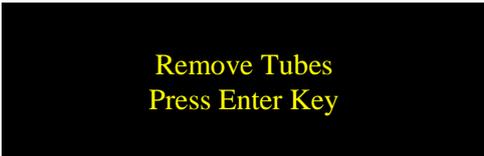
```
        Remove Tubes
        Press Enter Key
```

9. Instrument will enter into main menu page once purging is over.

   Note: *Any time in the menu page, if zero is not in its acceptable range, it will display sensor drift and instrument needs to be calibrated by following procedure described in 4.2.*

```
            Sensor
            Drift
            Please
            Calibrate
```

4.4   DATA DOWNLOADING MODE:

1. In the menu page, when the ENTER key is pressed, instrument will enter into the data downloading mode and the screen will appear as shown below.

```
UP  - Download Data
DN  - Erase Data
SET  - Exit
ENT – Battery status
```
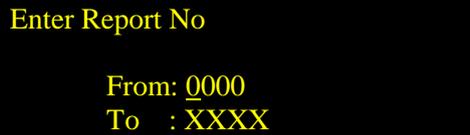
On pressing UP Key, Complete summary or range of reports can be downloaded on computer.

4.4.1 To download range of reports:

1. In data downloading mode, to print range of reports, select Report using UP/DN and ENTER KEY in the data download page.

```
Download:

Summary/Report
```

```
Enter Report No

    From: 0000
    To  : XXXX
```

2. Press Enter key to print the range of data to be printed.

   Note: *XXXX indicates the maximum no. of data that is present in the memory.*

4.4.2 To Download Summary report:

1. In data downloading mode, to print summary report, select Summary using UP/DN in the data download page.

```
Download:

Summary/Report
```

2. On Confirming through Enter key, instrument will start printing records and will show current record being printed on the display.

```
Downloading …

XXXX
```

3. Instrument will return to main menu page once printing is over.

2. Connect instrument with computer via USB cable supplied for data downloading.

3. Create a New Connection on HyperTerminal

*HyperTerminal is bundled software for serial communication that is included in Microsoft Windows 98™ and higher versions. It can be configured as follows:
1. Click the START button on the PC.
2. Go to Programs-> Accessories -> Communications -> HyperTerminal
3. A "New Connection – HyperTerminal" window will appear on the screen with the "Connection Description" Dialog box.
4. In the "Name" Text Box, enter a name for connection (say ABC).
5. Click the OK Button.
6. After this the "Connect To" Dialog Box will appear on the screen.
7. In the "Connect to" Text Box, select "Direct to COM1/COM2" from the drop down list.
8. Click the OK Button
9. On clicking OK, the "COM1 Properties" Dialog Box will pop up.
10. In the "Port Settings" Tab, set the parameters as given below:
            Bits per second – 9600
            Data Bits   -- 8
            Parity   -- None
            Stop Bits   -- 1
            Flow Control   -- None

11. Click the OK Button. A blinking cursor will now appear on the New Connection (say ABC) Window.

4. Now the data in the memory of the equipment can be downloaded to the PC by pressing UP key. The records will appear on the new connection window.
5. Press the DOWN key if the data from the instrument memory is to be erased.
6. Press SET key to escape from this page and to move to the main menu page

5. How to Monitor Battery Charge Level

The battery charge level can be viewed on the LCD/OLED panel when the instrument is in main Data Downloading page.

The LCD/OLED will indicate the battery charge level in terms of %, below the battery prompt as following.

Battery

XXX %

Battery status can only be monitored when the instrument is in the Data downloading page. When the battery capacity goes below 25%, the LOW BATTERY prompt will be displayed on LCD/OLED and instrument will prompt the menu page only after charging the battery. Battery should be charged for 2 to 3 Hours.

6. Instrument Specifications

Sr. No.	Feature	Description
1	Gas sampling	Sample draw type
2	Display	20 X 4 Alphanumeric LCD/ OLED Display
3	Inbuilt pump	Flow rate: 500 - 1000 ml/min Power: 4.5 V DC, 35 mAH
4	Power supply	Inbuilt 7.4 V Li-Ion rechargeable battery
5	Weight	0.57 Kg (1.256 lb)
6	Construction material	Hi Impact ABS Plastic
7	Standard accessories	Battery Charger, Data downloading cable and dust filter

7. Sensor Specifications

Sr.No.	Feature	Description
1	Gas detected	Phosphine(PH_3)
2	Detection principle	Electrochemical sensor
3	Concentration range	Annexure 1
4	Resolution	Annexure 1
5	Warm up time	Less than 1 min
6	Response time	Typically less than 60 sec
7	Accuracy	Inherently ± 2% (but also depends on the accuracy of the calibrating gas)
8	Drift	Less than 2% of signal per month at constant temperature and pressure.
9	Operating temperature	0 to + 40 ^oC
10	Operating pressure	Ambient ± 10%
11	Operating life of sensor	Expected life 1 – 2 years Warranted for one year.

NOTE: *PH_3 sensors are warranted for **ONE** year.*

Annexure 1

Sr. No.	Gas Name	Model	Range	Resolution	Response time(T_{90})
1	Phosphine	UNIPHOS-250(PM) FumiSense Pro	0 – 1000 PPM	1 PPM	60 Secs
2			0 – 2000 PPM	1 PPM	60 Secs

8. Maintenance

1. DO a regular battery checkup and recharge it fully before use whenever the battery is low.

2. Perform the calibration check once in a month. Calibration check every month will ensure the accuracy of readings throughout the life of the instrument.

3. NEVER allow the unit to be used in direct sunlight. You may provide the canopy/sun shade while using the instrument on the site.

4. ZERO it in a target gas-free clean air.

5. NEVER expose the sensor to gas concentration higher than its prescribed range.

6. DO NOT expose the monitor to excessive positive or negative pressure. It affects the accuracy of the measurement.

7. Occasionally, the casing of the instrument can be cleaned with a slightly damp lint free cloth. Wipe the instrument thoroughly dry using a fresh lint free cloth. But care should be taken not to allow any water or moisture to enter the instrument.

8. Do not keep the monitor without use, for more than 3 months (from the date of shipment). Li-Ion battery performance may get affected.

9. Troubleshooting

Problem	Possible cause	Solution to the problem
The instrument does not turn ON	Low Battery	Recharge battery
Pump making abnormal noise	There may be blockage in the gas sampling tube or in the nozzles	Clear blockage

10. Calibration Schedule

Instrument No. :
Calibration Gas:

Sr. No.	Date	Standard Gas Conc.	Instrument reading	Remarks	Next Calibration Due Date

Note: *Calibration of the instrument is recommended on quarterly basis.*

11. CONCLUSION/REMARKS

12. NOTES

Inappropriate use, maintenance or servicing may affect the function of the device and thereby seriously compromise the user's life.

The device must be used only in compliance with the applicable regulations, otherwise the safe operation of the instrument is not guaranteed.

After completion of life cycle of this instrument, dispose it in accordance with federal, state and local environmental control regulations.

13. Limitation of Warranty and Liability

The seller warrants that this product, under normal use and service as described in the operator's manual shall be free from defects in workmanship and material for a period of twelve (12) months, or the length of time specified in the operator's manual, from the date of shipment to the customer. This limited warranty is subject to the following exclusion: -

a. Batteries and certain other components when indicated in specifications are warranted for a period of 90 days from the date of shipment to the customer.

b. With respect to any repair services rendered, the seller warrants that the parts repaired or replaced will be free from defects in workmanship and material, under normal use, for a period of 90 days from the date of shipment to the customer

c. The seller does not provide any warranty on finished goods manufactured by others. Only the original manufacturer's warranty applies.

d. Unless specifically authorized in a separate letter by the seller, the seller makes no warranty with respect to and shall have no liability in connection with any goods, which are incorporated into other products or equipment by the Buyer. All goods returned under warranty shall be at the Buyer's risk of loss; shipped to the Seller's factory, freight prepaid, and will be returned at the Seller's risk of loss, to the buyer's premises, freight prepaid.

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Manufactured At

Uniphos Envirotronic Pvt. Ltd.
P. O. Nahuli, Tal. Umbergaon,
Dist. Valsad - 396 108, India
Tel.: +91-9909994042
        +91-7574839945

Marketing Office

Uniphos Envirotronic Pvt. Ltd.
Readymoney Terrace
167, Dr. Annie Besant Road
Worli, Mumbai 400 018, INDIA
TEL: (+91 22) 2493 0681
FAX: (+91 22) 2493 8826

Website   : www.uniphos-she.com
E-Mail   : info@uniphos-envirotronic.com
After Sales support   : service@uniphos-envirotronic.com

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