ENMET **Corporation**
PO Box 979
Ann Arbor, MI 48106-0979

OMNI – 4000
S/N 6705 and Above
Operation and Maintenance
Manual

80006-019
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List of Illustrations

Introduction

This manual has been written to facilitate the rapid and effective use of the OMNI-4000 gas detector.

Organization of the Manual

This manual describes all the operations for which the **OMNI-4000** can be used. They have been grouped in four sections:

- Section One: The physical description of the instrument
- Section Two: Description of the use of the **OMNI-4000** in the field
- Section Three: Maintenance, adjustment, replacement of sensors, & calibration, etc.
- Section Four: Detailed description of the technical characteristics of the **OMNI-4000**

Using the Manual

We recommend that the complete manual be read by the user. This manual has been written to provide information which is essential to each phase of use.

To Use the Instrument Immediately

We recommend that the manual be read in its' entirety, prior to activation of the **OMNI-4000**. If so desired, to activate the **OMNI-4000** immediately, activate it in conjunction with this manual, refer to pages 4 to 8. This will enable you to become familiar with the device and the features before actual use in the field.

Do Not Neglect To Read The Complete Manual Before Engaging In Field Use Of This Instrument.

Illustrations

The illustrations within this manual are intended to familiarize the user with the features of the **OMNI-4000** and to provide the user with the knowledge to operate the device in a safe environment.

NOTE: *All specifications stated in this manual may change without notice.*

Upon Receipt, Unpack

Unpack the **OMNI-4000** and examine it for shipping damage. If such damage is observed, notify both ***ENMET*** customer service personnel and the commercial carrier involved immediately.

Regarding Damaged Shipments

NOTE: **It is your responsibility to follow these instructions. If they are not followed, the carrier will not honor any claims for damage.**

- ❑ This shipment was carefully inspected, verified and properly packaged at our company and delivered to the carrier in good condition.
- ❑ When it was picked up by the carrier at ***ENMET***, it legally became your company's property.
- ❑ If your shipment arrives damaged:
  - Keep the items, packing material, and carton "As Is." Within 5 days of receipt, notify the carrier's local office and request immediate inspection of the carton and the contents.
  - After the inspection and after you have received written acknowledgment of the damage from the carrier, contact ***ENMET*** Customer Service for return authorization and further instructions. Have your Purchase Order and Sales Order numbers available.
- ❑ ***ENMET*** either repairs or replaces damaged equipment and invoices the carrier to the extent of the liability coverage, usually $100.00. Repair or replacement charges above that value are your company's responsibility.
- ❑ The shipping company may offer optional insurance coverage. ***ENMET*** only insures shipments with the shipping company when asked to do so in writing by our customer. If you need your shipments insured, please forward a written request to ***ENMET*** Customer Service.

Regarding Shortages

If there are any shortages or questions regarding this shipment, please notify ***ENMET*** Customer Service within 5 days of receipt at the following address:

ENMET Corporation
680 Fairfield Court
Ann Arbor, MI 48108
734-761-1270 734-761-3220 Fax

Check Order

Check, the contents of the shipment against the purchase order. Verify that the **OMNI-4000** is received as ordered. Each **OMNI-4000** is labeled with its target gas. If there are accessories on the order, ascertain that they are present. Check the contents of calibration kits. Notify ***ENMET*** customer service personnel of any discrepancy immediately.

Serial Numbers

Each **OMNI-4000** is serialized. These numbers are on tags on the equipment and are on record in an ***ENMET*** database.

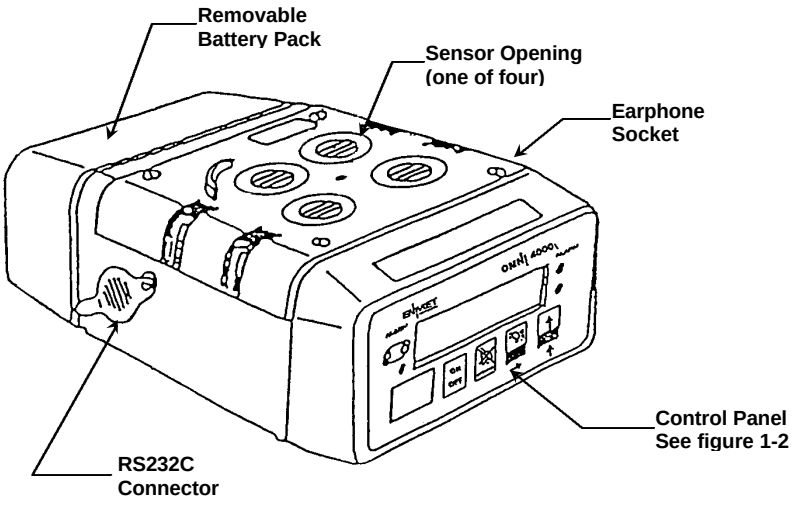


Figure 1-1: Exterior Features of OMNI-4000

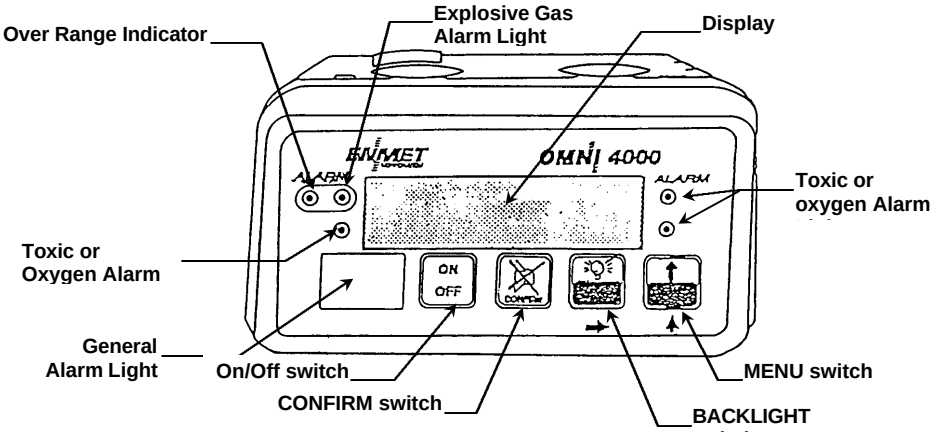


Figure 1-2: Features of the OMNI-4000 Control Panel

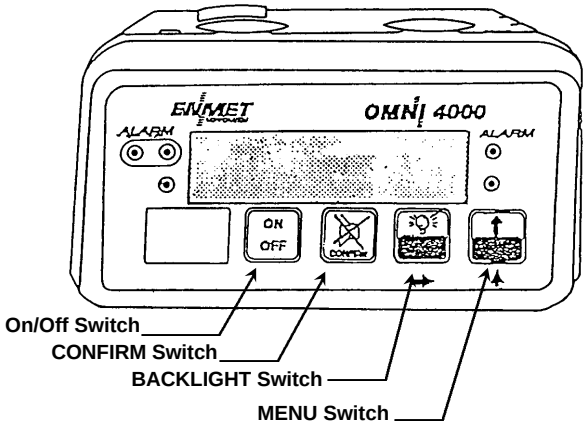


Figure 1-3: Switches for Operation and Programming

1.0 General Description

OVERVIEW: In this section the OMNI-4000 and its components are described by means of a number of diagrams.

The **OMNI-4000:** The **OMNI-4000** is a portable multi-gas detector. It can simultaneously detect the presence of up to four gases by means of special sensors for each type of gas to be detected. Included are explosive gases (methane, propane, butane, etc.), toxic gases (carbon monoxide, hydrogen sulfide, chlorine, etc.), and the oxygen content of the air.

1.1 General Characteristics

These are presented below. Complete specifications and sensor characteristics are presented in Section 4.

- Simultaneous detection of up to 4 gases
- Interchangeable factory-set sensors
- Automatic switchover between "explosive gas %" and "volume %" scales, optional
- Storage of events
- Instantaneous STEL and TWA alarms
- RS232C port for direct connection to a serial printer or compatible personal computer
- Intrinsic Safety Approval

1.2 Main Components

These are those operated by the user. They are shown in Figures 1-1, 1-2, and 1-3. A detailed description of each main component is given in the next chapter.

OPERATION OF THE DEVICE

The **OMNI-4000** is a gas detector which can be used with up to four sensors, each one for a different type of gas. Thus, depending on the number and type of sensors installed, the **OMNI-4000** detects the presence of the corresponding gases in the immediate environment. Sensors can be easily removed and replaced by other available sensors for different gases.

When fitted with a pump system and a calibration cover, the **OMNI-4000** can be used to measure the concentrations of gases in difficult-to-reach areas or before entry into confined spaces.

When the instrument is on and not in alarm, a confidence beep is emitted and the general alarm indicator light blinks every 30 seconds, showing that the device is operating correctly. The **OMNI-4000** has received intrinsic safety approval for the European equivalent of Class 1, Div. I, Groups A, B, C and D hazardous areas.

1.3 Operating the OMNI-4000: In the Field

Control is by means of the four touch-sensitive switches on the front panel. See Figure 1-3 in which these switches are named. These switches are used:

- To turn the device on and off
- To acknowledge the gas audio alarm
- To turn on the backlighting system for the LCD display, which automatically turns off after approximately 15 seconds
- To select the menus during operation

1.4 Programming

Access for programming is obtained by inserting the programming plug into the appropriate socket or after opening the instrument. The same touch sensitive switches on the **OMNI-4000**, shown in Figure 1-3, then enable:

- The device to be turned on and off
- The programming choice to be entered
- Scrolling in a menu
- The selection of a menu

The names associated with the operational mode of these switches are also used for the programming mode. The programming functions of the BACKLIGHT and MENU switches are indicated by arrows on the control panel, which are used in certain statements on the display.

1.5 Gas Detection

The **OMNI-4000** can be fitted with four of many available gas sensors. See Figure 1-4. Channel No. 1 is reserved for a sensor for the detection of explosive gases. If an infrared CO2 smart block is used, it must be installed in Channel No. 2 Channels No. 2, 3 and 4 can be a selection of smart block sensor assemblies which are sensitive to oxygen or specific toxic gases, such as CO, H_2S, HCL, Cl_2, etc. Sensor characteristics are given in Figure 4-1.

A channel can be programmed as "Enabled" or "Disabled" as desired by means of the keys on the device.

There is an option which allows the automatic changeover from the explosive gas measurement in the "0-100% LEL" range to the "0-100% Gas" by volume range. This option can be implemented only when that the device has both an explosive gas sensor and an oxygen sensor.

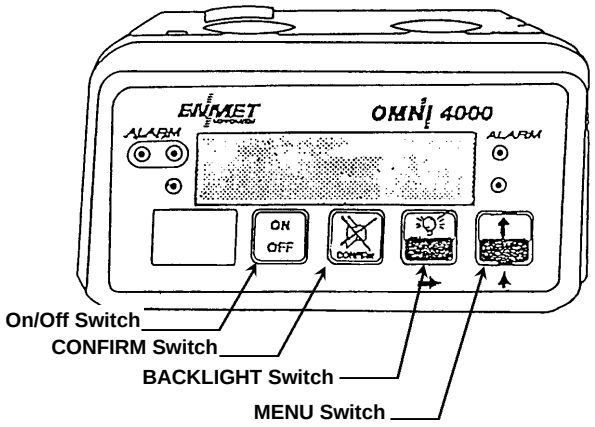


Figure 1-3: Switches for Operation and Programming

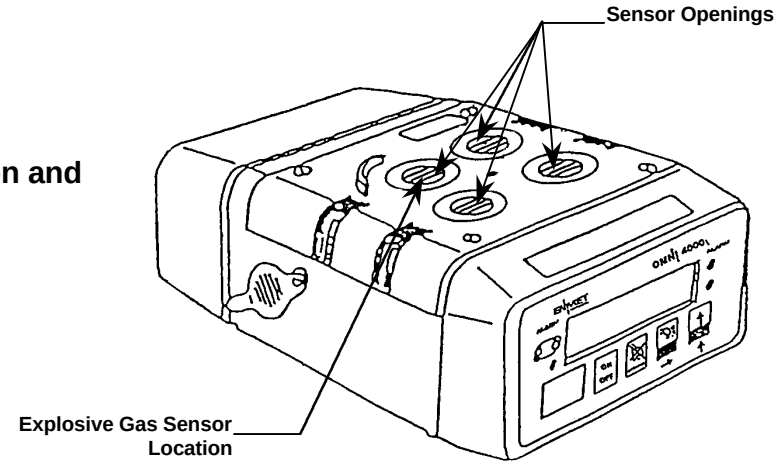


Figure 1-4: Location of Openings for Gas Sensors

1.6 Sensor Readings

Instantaneous Readings

The gas content measured by each of the enabled sensors can be seen on the alphanumeric display. This is divided into four independent quadrants, each corresponding to a sensor or "Channel." See Figure 1-5.

It is therefore possible to see a maximum of four readings at the same time. The amount of available useful data is greater than the display capacity of each quadrant, so the measurements are displayed alternately as follows:

- Reading: Sensor gas
- Reading: Unit of measurement

Thus the operator alternately sees displayed:

- The quantity and chemical description of the gases that can be detected
- The quantity and unit of measurement of the gases that can be detected

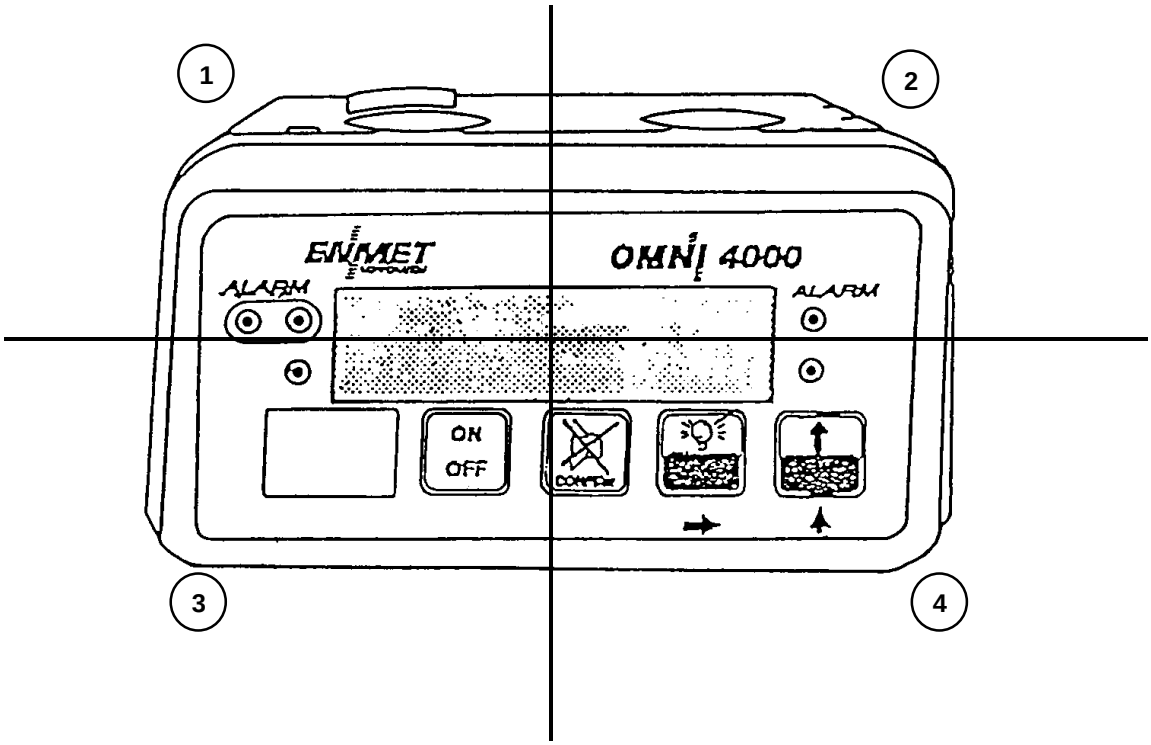


Figure 1-5: Channel Information Quadrants

Type of gas – unit of measurement, showing the alternation information displayed to the operator.

For example: The values for the concentration of methane gas (0% LEL CH_4), of CO (10 ppm CO), of NO_2 (0.0 ppm NO_2). *example:* of oxygen (20.9% O_2) are clearly visible.

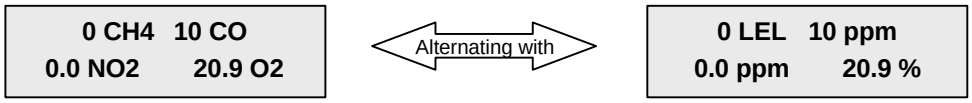


Figure 1-6: Example of Alternating Display

1.6.1 Enabled and Disabled Channels

The enabled channels and those disabled, either by programming or because a sensor is not installed in a channel, are clearly displayed, as in the following example:

The top section of Figure 1-7 shows an **OMNI-4000** with an explosive gas sensor installed; the other three channels are either disabled or without sensors. The bottom section of Figure 1-7 shows an **OMNI-4000** with three toxic gas sensors installed, and with the explosive gas channel disabled or without a sensor.

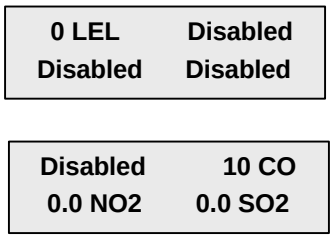


Figure 1-7: Examples of Display with Disabled Channels

1.6.2 Memorized Readings

When in use the **OMNI-4000** continually stores the readings. These can then be displayed later as histograms of the stored readings. Data obtained during operations is stored when the device is turned off.

1.7 Alarms

These are both visual (indicator lamps and display) and audible alarms. See Figure 1-8.

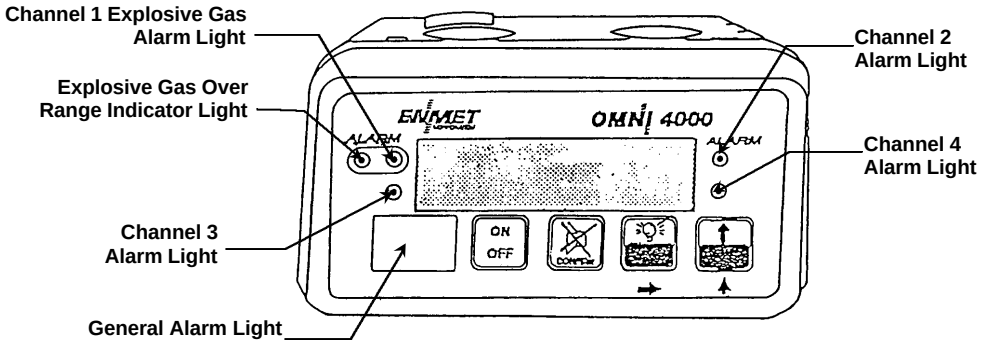


Figure 1-8: Alarm Light Locations

1.7.1 Gas Alarms

According to the programming and the type of gas, the gas alarms can be triggered when a value is exceeded:

- Instantaneous value, on all four channels
- Both deficiency and enrichment values on an oxygen channel
- Short Term Exposure Limit (STEL), corresponding to a sliding mean over 15 minutes, for each channel with a toxic sensor installed
- Time Weighted Average (TWA), corresponding to a sliding mean over 8 hours, for each channel with a toxic sensor installed

As soon as at least one channel exceeds one of these preset alarm thresholds, the **OMNI-4000** emits a shrill intermittent audible signal, and the general alarm lights blinks. At the same time, the indicator lamp for the involved channel blinks and an alarm message appears on the display (ALARM, TWA, STEL, Min, etc.), alternately with the readings in the active quadrants.

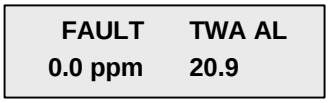


Figure 1-9: Examples of FAULT and a TWA Alarm Display

1.7.2 Fault Alarms

There are two categories of faults:

- Those concerning the sensors (Over Range, Sensor used, New calibration requested - after a major divergence during the self-adjustment). These generate individual messages which are displayed in the appropriate quadrant of the display, as well as visual and audible alarm signals. See Figure 1-10, top.
- Faults affecting the device itself, such as low batteries or an electronic failure. The corresponding fault message appears on the display. It has priority over all other messages concerning the sensors. See Figure 1-10, bottom.

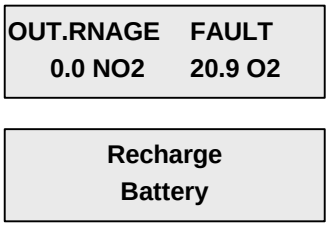


Figure 1-10: Examples Of Fault Information.

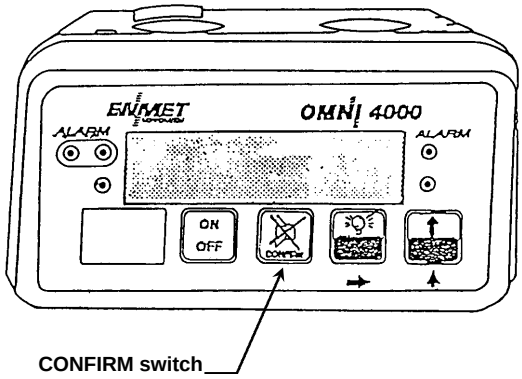


Figure 1-11: Confirm Switch, Used to Acknowledge an Audio Alarm

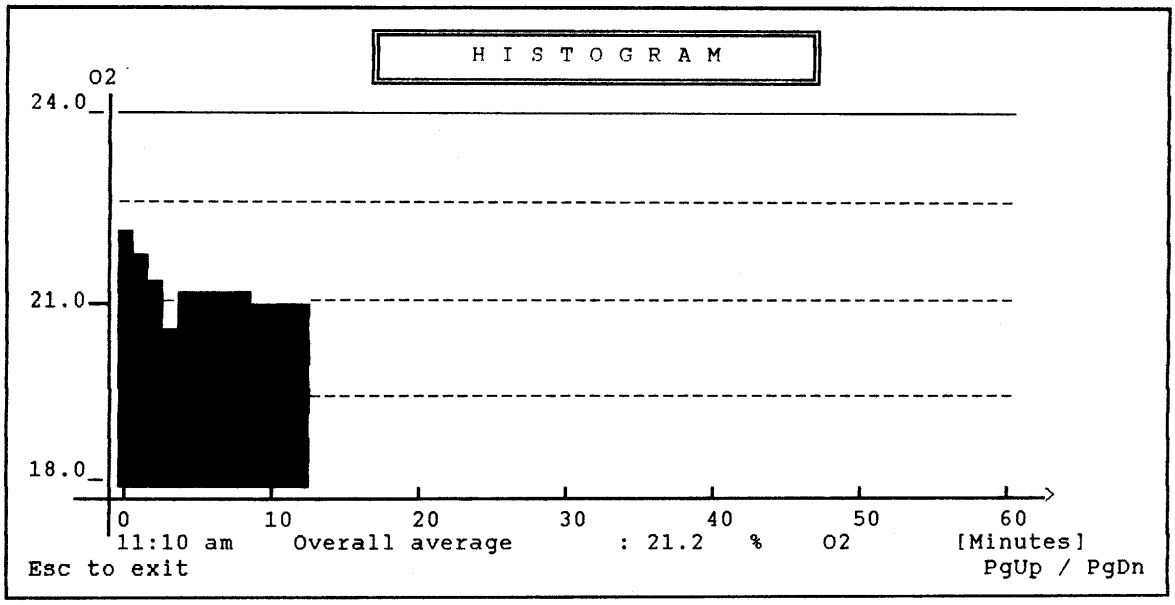


Figure 1-12: Example of a Histogram

1.7.3 Acknowledging Alarms

Acknowledging Gas Alarms

- This means canceling only the audio alarm, not the entire gas alarm. When a channel is in alarm and the CONFIRM switch shown in Fig. 1-11 is pressed, the audio alarm stops, but the both the general and channel alarm lamps continue blinking until the reading is below the programmed alarm threshold level. As soon as the reading is within the preset limits, the alarm lamps automatically go out. This applies equally for the instantaneous alarms and the TWA and STEL alarms.

Acknowledging Fault Alarms

- A fault alarm can be acknowledged only after the fault has been cleared from the channel.

1.8 Memorization of Readings-Histograms

The **OMNI-4000** can store the readings taken for later printout or display on a computer screen, in the form of histograms. See Figure 1-12.

The histogram function enables the printout and/or display on a personal computer or work-station of the readings and events stored in the **OMNI-4000** during the period of operation.

Clearing the memory can only be performed during the printout procedure. The **OMNI-4000** can be turned off without affecting the data stored in it.

Operating Principles

In order to make maximum use of the data printed out as charts, the principles underlying the memorization of data are described below.

1.9 Data Stored

The **OMNI-4000** stores groups of data as soon as it is switched on and then cyclically. Each of these groups has the same structure and content:

- The average reading of concentrations for each enabled sensor over a period of one minute, at a rate of one sampling operation per second
- The events on each channel:
  - Resetting
  - Faults
  - Instantaneous and average alarms
  - Types of maintenance requested (programming, calibration, sensor replacement)
  - The date and time
  - The low battery condition
  - The self-adjustment request
  - The maintenance function request

1.9.1 Memory Capacity

The number of readings which can be stored is limited by the size of the memory of the **OMNI-4000**. The recording capacity is 48 hours, with a limit of 8 events per channel per each 24 hours.

If the quantity of data to be stored exceeds the storage capacity of the **OMNI-4000**, the oldest data are lost (FIFO - First In, First Out - procedure). The lost data are replaced by the new data.

1.9.2 Data Available

The device computes, for each channel in use and at a rate of once per second, an average on a period of one minute. The averaged data is stored in the memory. The following data can be read from the **OMNI-4000** serial port:

- A personal computer with the COM4000 Communications software can be used to display the average readings per minute.
- A serial printer can be used to printout the data relating to the average for each quarter of an hour. Thus, a print-out shows the average reading over a period of 15 minutes; this new average is calculated by the **OMNI-4000** during the printing.

1.9.3 Length of Data Storage

The data stored by the **OMNI-4000** are held even if the device is left unused for a long period. The storage duration is 3 to 5 years and is dependent on the life of the internal lithium battery.

1.9.4 Clearing the Stored Data

To clear the data, touch the CONFIRM switch; to retain the data, touch the BACKLIGHT switch.

This is performed by means of a request on the display after the printout of the stored data. Displayed alternately are:

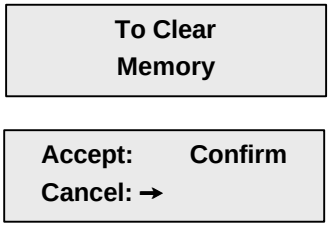


Figure 1-13. Display of the Clear Data Request Following Printout

1.10 Printer or Computer Connection

These must be PC compatible and fitted with a serial RS 232C interface. See Figure 1-14. It is configured as follows:

- 9600 bauds
- 8 bits
- Even parity
- 1 Stop bit
- XON/XOFF protocol
- IBM Emulation

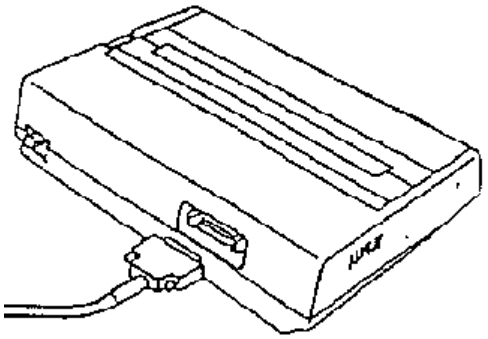


Figure 1-14: PC Compatible Serial Printer, Used for Printing the Histograms

1.11 Batteries

The **OMNI-4000** is fitted with two batteries:

- One NI-CAD battery pack, rechargeable. See Figure 1-15. The operating life depends upon the use and ambient temperature. CO2 and BRH smart blocks reduce operation life. Operating life with versions pump and smart block combinations is given in Table 4-2, in section 4 appendix.
- A lithium battery, non-rechargeable, for the storage of the data in the **OMNI-4000**, in particular while the **OMNI-4000** is non-operational. The life of this battery is between 3 and 5 years. See Figure 1-16 for the location of the lithium battery.

***WARNING*: Substitution of batteries or other components may compromise the intrinsic safety of the instrument.**

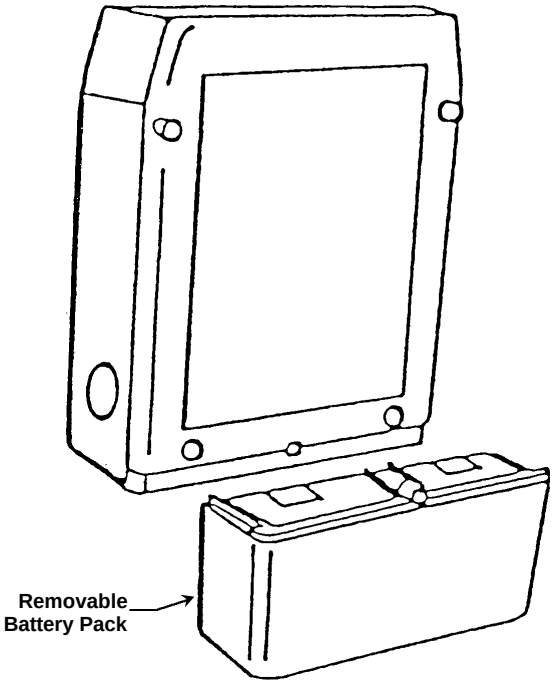


Figure 1-15: The removable Ni-Cad Battery Pack

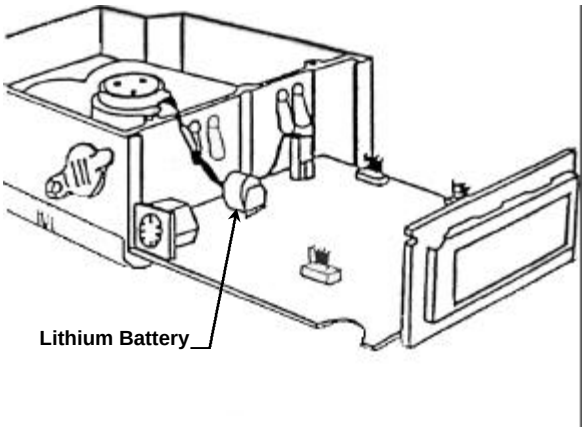


Figure 1-16: The Lithium Battery Location Inside the Instrument

1.12 Smart Block Sensor Assemblies

These sensor assemblies for the **OMNI-4000** must be handled with extreme care. Impact, excess temperatures or penetration of water can negatively affect the readings or in extreme cases destroy the sensors. See Figure 1-17 for sensor locations.

The toxic, CO2, BRH and oxygen smart block sensor assemblies contain electronic components. One of these components is a memory (EEPROM) in which the manufacturer has stored the characteristics of the sensor: reading range, sundry corrective coefficients, TWA and STEL alarms, date of manufacture, serial number, etc. Also, "rate of wear" information enables the **OMNI-4000** to automatically signal the optimum moment for the replacement of a sensor assembly.

No calibration adjustments are necessary to enact a change of smart block sensors from one gas to another. In the interest of safety, we recommend a test with gas to check its correct operation - it is possible that the sensor was damaged in transit and is not sensitive enough, and this can only be assessed with a gas check.

1.13 Intrinsic Safety

The **OMNI-4000** has been tested and approved for intrinsic safety, which allows it to be used in hazardous atmospheres. Opening of the instrument enclosure in a hazardous area is not allowed. The **OMNI-4000** has been passed EEX ia llc T4.

The **OMNI-4000** has also been tested and certified by the Canadian Standards Association to CSA Standard C22.2 No. 152-M1984, Combustible Gas Detection Instruments. Under this standard, the performance of the combustible gas detection channel, only is evaluated.

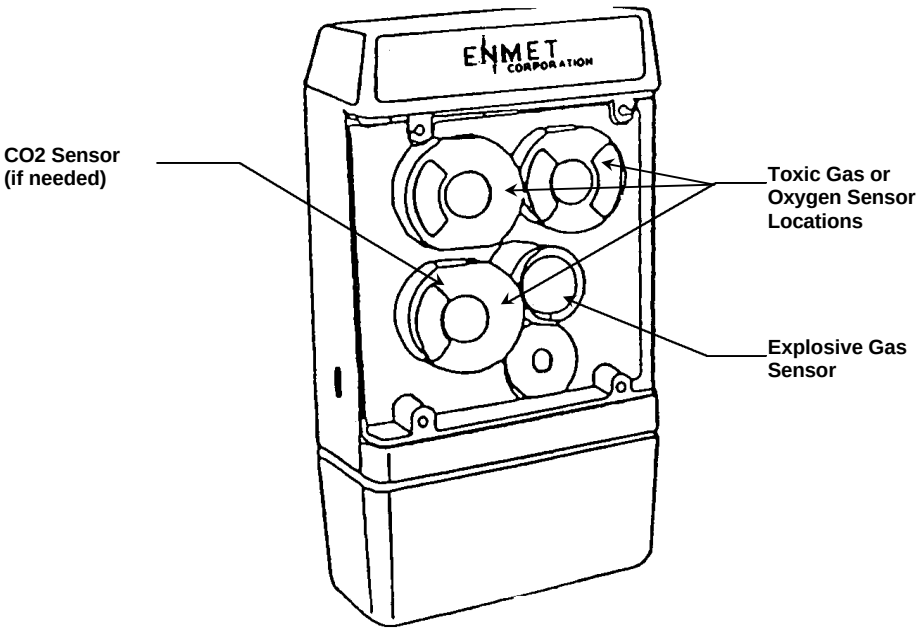


Figure 1-17 Sensor locations Inside the Instrument

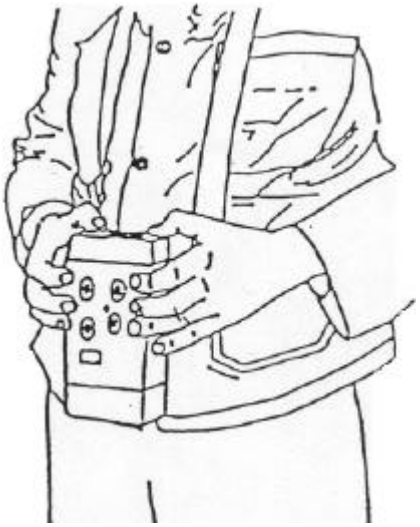


Figure 2-1: OMNI-4000 On a Shoulder Strap

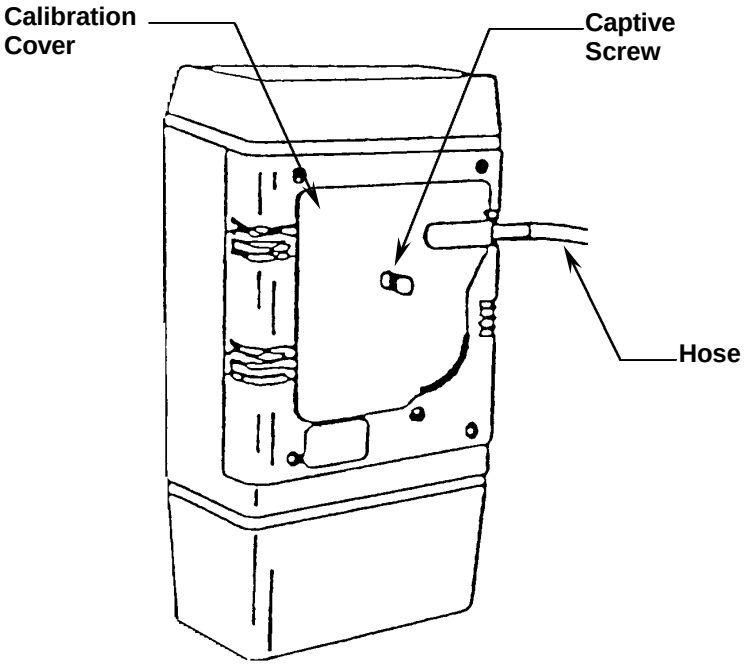


Figure 2-2: Attachments for Remote Sampling

2.0 Operation

2.1 Using the OMNI-4000

This Chapter deals with the positioning of the **OMNI-4000** for taking readings and the use of the remote sampling system.

2.1.1 Positioning the Instrument

The operator can:

- Work while the **OMNI-4000** monitors the atmosphere
- Or, take readings using a sampling system

In order to monitor the atmosphere correctly, the openings for the sensors of the OMNI-4000 must always be unrestricted. A blocked sensor opening results in a reduced evaluation of the gas concentration, which may prove fatal for the operator.

Carrying the **OMNI-4000** with a Shoulder Strap

A shoulder strap allows the OMNI-4000 to be carried by the operator. See Figure 2-1. The device is designed so that the sensors are facing away from the clothing. Thus, the gas exchange openings can be seen, and are unrestricted in use, and the display can be clearly seen.

2.1.2 Use With a Sampling Probe

The **OMNI-4000** can be connected to a sampling system, enabling readings to be taken in inaccessible areas or prior to entering a confined space.

Setting-Up the Sampling System

- Position the calibration cover on the **OMNI-4000** body. See Figure 2-2. Fasten it in place with the captive screw.
- Connect the vinyl hose between the cover nipple and the inlet to the squeeze pump or to the motorized sampling pump.
- Ensure that pumping direction is correct by checking the flow of air into the sensors during pumping.

Pumping and Readings

- When using the squeeze bulb, squeeze the bulb rapidly and continuously for 2 seconds for each foot of hose before looking at the reading.
- Wait until the readings have stabilized before confirming them. They may be over estimated (explosive gases) or under estimated (oxygen) during pumping as a result of the movement of air.

Dismantling the Pumping System

- **Always remove the calibration cover after using the probe. Failure to do so may lead to an underestimation in the readings which may be fatal for the operator.**

2.1.3 Use with an Integral Sampling Pump

The instrument may be purchased with an integral sampling pump, the BP-4000, or such a pump may be added in the field. The pump replaces the instrument battery pack, and includes a battery pack of larger capacity, sufficient to power both the instrument and the pump. The integral pump adds about 2 inches to the length of the instrument. Note that the instrument battery pack and the integral pump battery pack require two different chargers. See battery life table 4-2 in section 4.

To Replace the Instrument Battery Pack with the Integral Pump and Battery Pack

- Release the instrument battery pack captive screw. See Figure 2-2.
- Push the battery pack out with your hand. It comes out on the circuit board side, opposite the gas sensor openings.
- Push the integral pump and battery pack in from the circuit board side.
- Tighten the captive screw, securing the integral pump and battery pack into place.

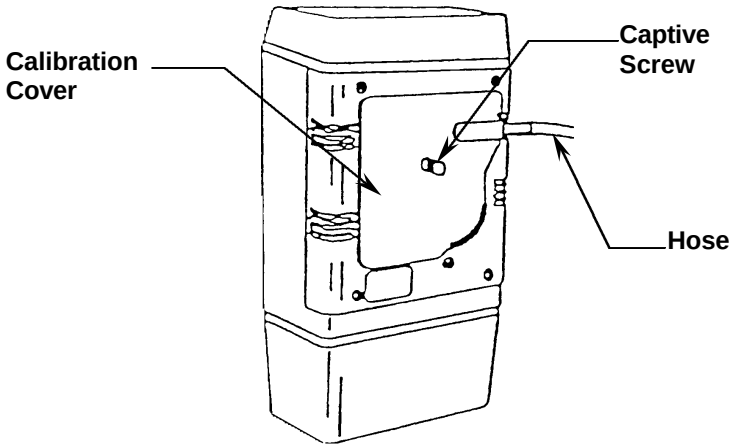


Figure 2-2: Attachments for Remote Sampling

To Use the Pump

Connect the sample tubing, or wand to the pump inlet. Use the small length of special pipe to connect the pump outlet to the inlet of the calibration cover, which is positioned on the **OMNI-4000** chassis as in Figure 2-2A. Turn on the pump by means of the pump switch. If the flow rate decreases below a specified level, the instrument common alarm activates and a message is displayed.

Caution: The pump on/off switch does not turn off the instrument and the instrument on/off switch does not turn off the pump. *Failure to turn off both sections can damage the battery pack.*

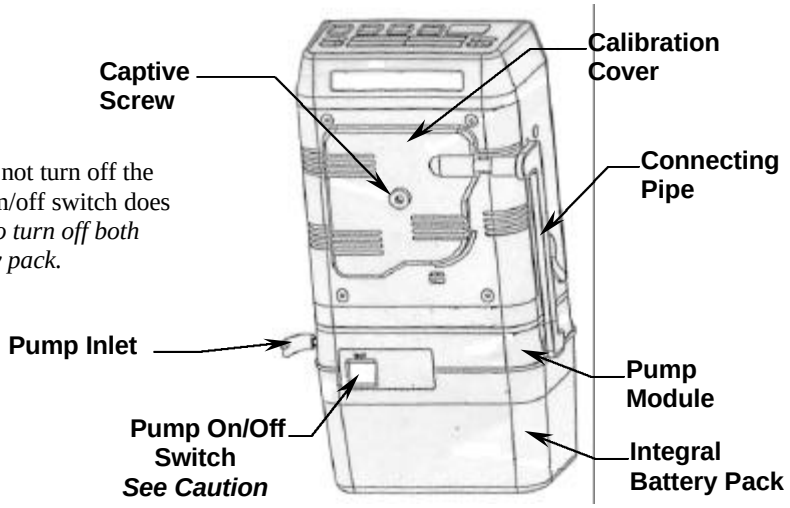


Figure 2-2A: OMNI-4000 with BP-4000 Pump and Battery Pack

2.1.4 Use the OMNI-4000 as a Hand-Held or Stationary Beacon

The location of the instrument may be changed to detect various gases. When used as a stationary beacon, the **OMNI-4000** should be vertical with the battery pack acting as the base. See Figure 2-3. Depending on the type of gas to be detected or liable to be present, the device is located:

- At ground level for heavy gases, such as H_2S
- At mid-height (approximately 1.5 meter) or at the outlet of an air vent for the general detection of gases and the monitoring of the oxygen and CO
- At height for the detection of light gases, such as methane, hydrogen, or ammonia

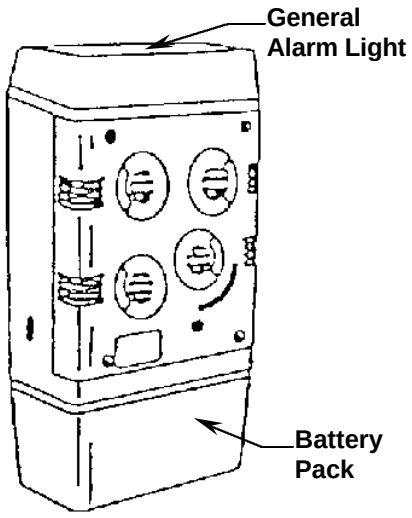


Figure 2-3: Position of OMNI-4000 in Stationary Beacon Mode

Although there is an audio alarm, it is essential that the operator must be able to see the general alarm indicator lamp in a noisy environment. See Figure 2-4. There is an earphone socket on the device.

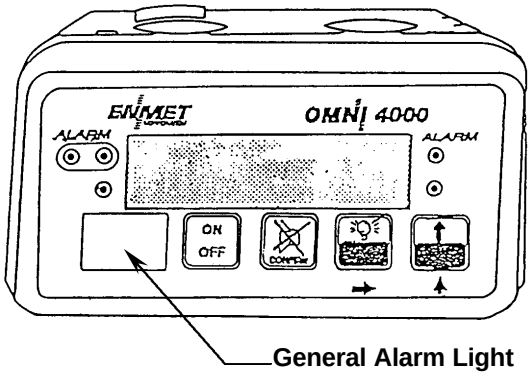


Figure 2-4: Location of General Alarm Light

2.2 Starting Up

There is a choice of three procedures when the device is turned on:

- A standard procedure, suitable for most cases
- A procedure enabling the choice of the reference explosive gas, useful when searching for a known specific explosive gas
- A procedure known as "self-adjustment" which allows the automatic reset of the explosive gas sensor and the toxic gas sensors to zero and the setting of the oxygen sensor to 20.9%. This procedure must be used regularly.

2.2.1 Standard Start-Up

- Press the ON/OFF switch lightly
- The device performs a series of tests for a number seconds, displaying:

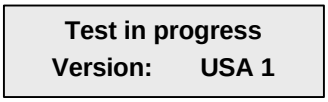
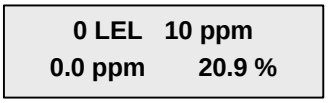


Figure 2-5: Start-up Display

- If the internal battery, sensor, electronics, etc. tests are successful, the readings from the sensors are displayed.

Example:



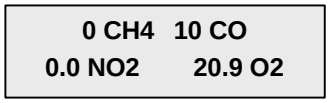


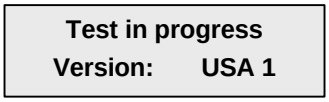
Figure 2-6: Gas Symbols alternation with Units of Measure (% or ppm)

- If the tests are incorrect, the device triggers an alarm (rapid beeping, general alarm and affected channel alarm indicator lamps blink). Refer to the section on "Alarms.

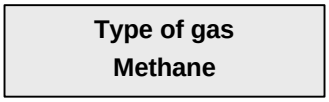
2.2.2 Start-Up with Selection of Reference Explosive Gas or Vapor

Selection of mode

- Hold down the BACKLIGHT switch, and
- Turn on the device by pressing ON/OFF switch
- Release both switches
- The display shows:



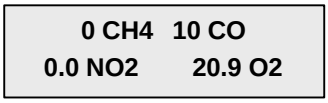
- Then:



2.2.3 Selection of Reference Explosive Gas or Vapor

- A different reference gas is displayed each time the MENU switch is pressed. There are twenty-seven (27) preset reference gases, in the "0-100% LEL" range. A twenty-eighth (28) choice allows the selection of an "Other" gas corresponding to a special need; the data for this gas must be input, as explained in Section 3. The display starts with the gas currently selected.
- Confirming the choice: When the desired gas is displayed, press the CONFIRM switch. The display reads: "Test in progress," prior to beginning the working phase. The reference explosive gas is now the selected gas.
- Aborting the procedure: Press the BACKLIGHT switch or the ON/OFF switch. The reference gas remains the same as when the device was turned on. NOTE: If the operator does not enter any data for a period of approximately 10 seconds, the OMNI-4000 goes into test mode and normal reading mode without changing the reference gas, the same as aborting the procedure.
- If the tests are invalid, the device triggers an alarm (rapid beeping and blinking of the alarm indicator lamp).

The device is now ready for use.



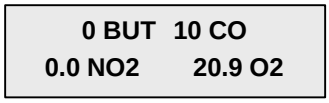


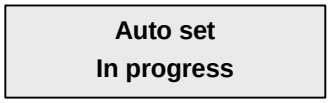
Figure 2-7: Example of Changing Reference Gas,
%LEL CH4 (top) to, %LEL Butane (bottom)

2.2.4 Start-Up with Auto Set

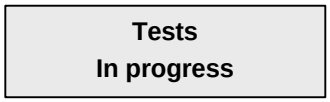
Selecting the Mode

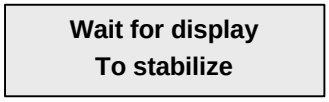
- Make sure that the device is in an area where there is no explosive or toxic gas, and with a normal oxygen concentration, such as a well-ventilated or outside area.
- Hold down the CONFIRM switch
- Turn the device on by pressing the ON/OFF switch
- Release both switches

The display shows:

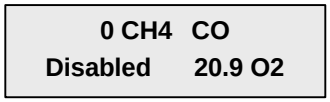


Then:





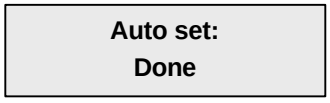
Prior to displaying the actual reading for each operational sensor, for instance:



- When the readings have stabilized, press CONFIRM.

If the auto set procedure has been satisfactorily performed, the display shows:

- Press CONFIRM again, and the following is displayed momentarily:



Auto Set Not Possible

If the ambient temperature is below 0°C or above 45°C or if the batteries are too low, the self-adjustment procedure cannot be performed. The display shows:

Auto set
Not possible

Auto Set Performed

- With the exception of the oxygen reading set at 20.9%, the other readings are automatically set at a useful value:

0 LEL	**0 ppm**
0 ppm	**20.9**

- If the tests are negative, the device triggers an alarm, the rapid beeping and blinking of alarm indicator lamps.

Otherwise, the device is ready for use.

NOTE: The auto set procedure is not time limited, i.e. the operator must exit it, one way or the other.

2.2.5 Readings

This paragraph describes the operations performed in the gas reading mode.

2.3 Lighting

Reading in poorly lit areas is facilitated by pressing the BACKLIGHT switch. The backlighting of the display allows the data to be seen clearly. It is automatically turned off after fifteen (15) seconds.

The backlight can be used in hazardous environments, those containing explosive gases, as the OMNI-4000 has the required Intrinsic Safety Approval.

2.3.1 Displaying the Instantaneous Readings

In automatic operation, all instantaneous readings concerning the gases are constantly displayed.

The display is divided into four independent quadrants, each of which corresponds to a sensor or "channel."

Quadrant no. 1
Channel no. 1 **1**

Quadrant no. 2
Channel no. 2 **2**

Quadrant no. 3
Channel no. 3 **3**

Quadrant no. 4
Channel no. 4 **4**

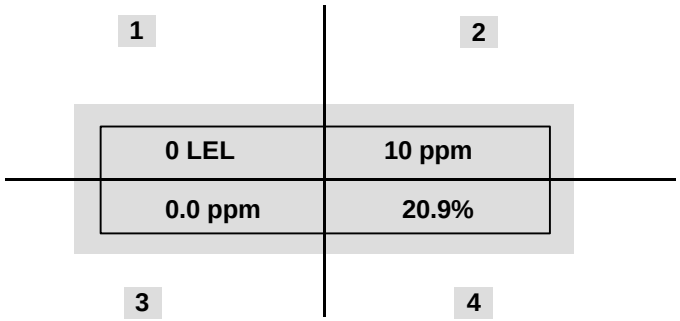


Figure 2-8: The Quadrants of the Display, Corresponding with Four Channels of Gas Detection

The display capacity is limited in each quadrant, therefore the readings are displayed alternately as follows:

- Reading: Sensor gas symbol
- Reading: Unit of measurement

Thus the operator sees alternately displayed:

- The quantity and chemical description of the gases that can be detected
- The quantity and unit of measurement of the gases that can be detected

0 CH4	10 CO
0.0 NO2	20.9 O2

0 LEL	10 ppm
0.0 ppm	20.9%

Figure 2-9: Example of Alternating Display
Showing the Display of usnits of Measurement and th Type of Sensors connected

2.3.2 Automatic Switching to the "0-100% GAS" Range

An option allows the automatic switching from the measurement of explosive gas in the "0-100% LEL" range to the "0-100% GAS" by volume range whenever the reading is above 100% LEL of the selected reference gas. This reading can only be taken with a device which has both an explosive gas sensor and an oxygen sensor installed. If the instrument is equipped with explosive gas sensor and an oxygen sensor from the factory, the option is active.

During an actual reading the orange Over Range indictor lamp lights. See Figure 2-11. The reading is displayed alternately as follows:

25%	0 ppm
0.0 ppm	15.6%

25 gas	0 CO
0.0 NO2	15.6 O2

Figure 2-10: The 0 – 100% GAS by volume option for the Explosive Gas Channel

The display shows, for channel no. 1, alternately the symbol "%" and then the word "GAS." The Over Range indicator lamp lights.

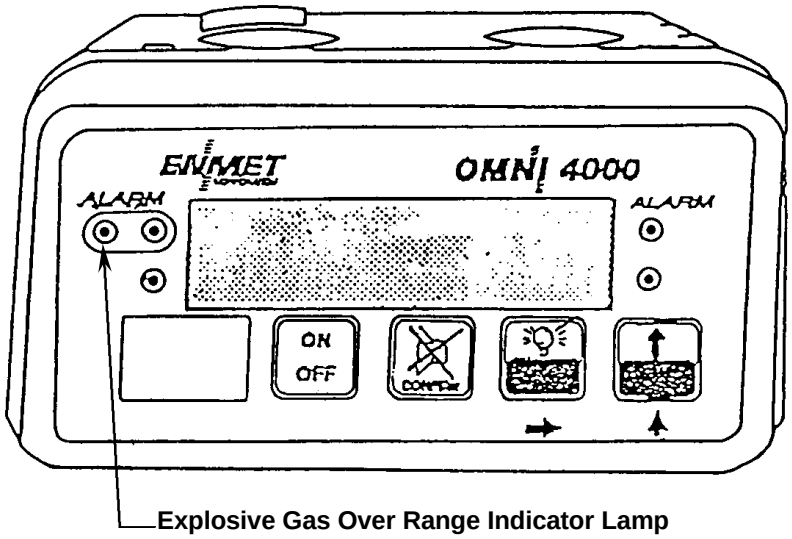


Figure 2-11: Location of Over Range Indicator Lamp

2.4 Display of Supplementary Data

When the device is operating normally, the operator can access a variety of information concerning gases and a number of internal variables of the instrument (battery voltage, date and time).

This information can be displayed by repeatedly pressing the MENU switch. The data stored in the device is then displayed. Starting from the display of instantaneous readings,

2.4.1 Date and Time

This information is shown as "DD-MM-YY" (day-month-year) and "hr-min-sec (hours-minutes-seconds).

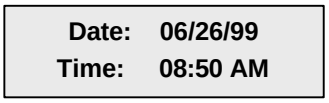


Figure 2-12: Example of Date and Time Display

2.4.2 Battery Charge Condition

This is in volts (Figure 2-13, left) and by bargraph. A gradual reduction in available energy ultimately leads to the message in Figure 2-13, right. Voltage below 6.4 V automatically disconnects the battery and the display goes off.

Figure 2-13: Example of the Battery Voltage Level and Warning Display

2.4.3 Minimum-Maximum

General information concerning each channel (unit of measurement, type of gas and the min. and max. values) is then displayed. Each time the MENU switch is pressed, the data for the next operational channel is displayed.

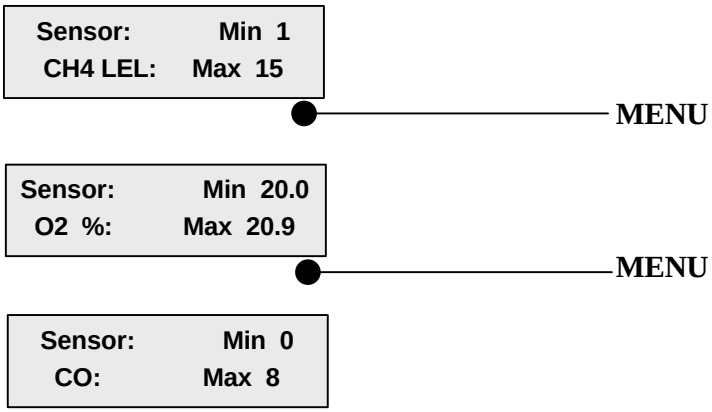


Figure 2-14: Example Minimum – Maximum Menu

The information is displayed in turn as the MENU switch is pressed.

The Min and Max values are those encountered during the last time period that the instrument has been on. If a channel is disabled, it is so indicated.

2.4.5 STEL and TWA

This information, programmed by the manufacturer and contained in the internal memory of the sensor and the instrument, is available whenever at least one toxic sensor is connected and operational, and the instrument is ON:

- The STEL data (Short Term Exposure Limit) for each toxic channel (STEL symbol, type of gas, reading and unit of measurement) is displayed each time the MENU switch is pressed. Press it again to display the next operational channel. The STEL values are only displayed after the device has been on for at least fifteen minutes.
- The TWA (Time Weighted Average) for each toxic channel (TWA symbol, type of gas, reading and unit of measurement) is displayed each time the MENU switch is pressed. Press it again to display the next operational channel. The TWA values are only displayed after the device has been on for at least two minutes.

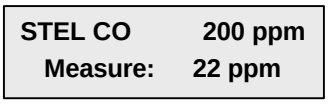


Figure 2-15: Example of Display of the STEL

The procedure is identical to the Min/Max procedure.

2.4.6 Returning to the Operational Mode

This occurs immediately after the last information on the STEL/TWA values on an OMNI-4000 with at least one toxic sensor installed, or after the min.-max. values for an OMNI with no toxic sensor installed.

Return to the instantaneous readings at any time can be obtained:

- Immediately, by pressing the BACKLIGHT switch
- Automatically after a 30 second delay

NOTE: Other displays are also available with this procedure. However, they can only be accessed after connection of a printer or computer.

2.5 Alarms

To warn the operator of a hazard, such as the presence of gas, lack of oxygen, STEL/TWA thresholds exceeded and/or internal faults, the OMNI-4000 triggers:

- An audible alarm consisting of a rapid intermittent sound, the gas alarm, or continuous sound, the battery alarm
- A visual alarm consisting of the general alarm indicator lamp and the indicator lamp for the appropriate channel
- The display of information messages concerning the alarm

As the operator becomes aware of the alarm through the audible and visual alarm signals, the exact type of alarm is indicated on the display.

2.5.1 Continuous Sound Alarm

Cause - This occurs when:

- The OMNI-4000 battery is low, and
- At least one reading has exceeded the maximum permissible value.

Alarms Triggered

- Continuous sound alarm,
- general alarm indicator lamp and appropriate channel indicator lamp lit. See Figure 2-16.
- Display of one of the following messages:
  - "Battery low"
  - "> 100 LEL"
  - "Over range"
  - "New Cal."

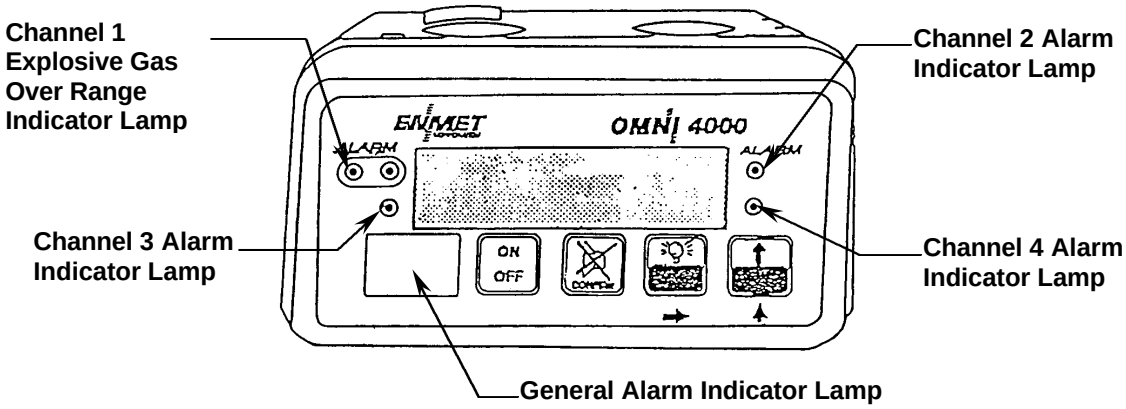


Figure 2-16: Location of Alarm Indicator Lights

The action to be taken depends upon the MESSAGE displayed.

MESSAGE: Battery low	▪ Recharge the batteries ▪ There is approximately 20 minutes of operating time left, after which the device stops operating. ▪ This alarm cannot be acknowledged; pressing CONFIRM has no effect.
MESSAGE: >100LEL	▪ Only concerns the explosive gas channel ▪ Effect: ▪ Latching of the display quadrant concerned ▪ Continuous audible alarm which cannot be acknowledged ▪ Explosive gas channel and general alarm indicator lamps are lit ▪ Return to normal operation by turning OFF and restarting the OMNI-4000 ▪ Proceed with care in the area as there is a concentration of explosive gas above the LEL
NOTE: This alarm occurs only when the "0-100% GAS" option has not been selected. If the OMNI-4000 is programmed with this option, the reading goes directly to the "0-100% GAS" range; an instrument programmed with this option must include an oxygen sensor to be operational.	
MESSAGE: Over range	▪ Only concerns the toxic gas channels ▪ Effect: ▪ Continuous audible alarm which cannot be acknowledged ▪ Toxic channel and general alarm indicator lamps are lit ▪ Leave the area immediately as there is an excessive concentration of toxic gas
MESSAGE: New Cal	▪ Automatic zero reset (auto set) cannot be performed because, for instance, there is an excessive drift from zero of a sensor ▪ Replace the affected sensor. See Section 3.

2.5.2 Intermittent Audio Alarm

Cause

- The alarm threshold of at least one operational channel has been exceeded.

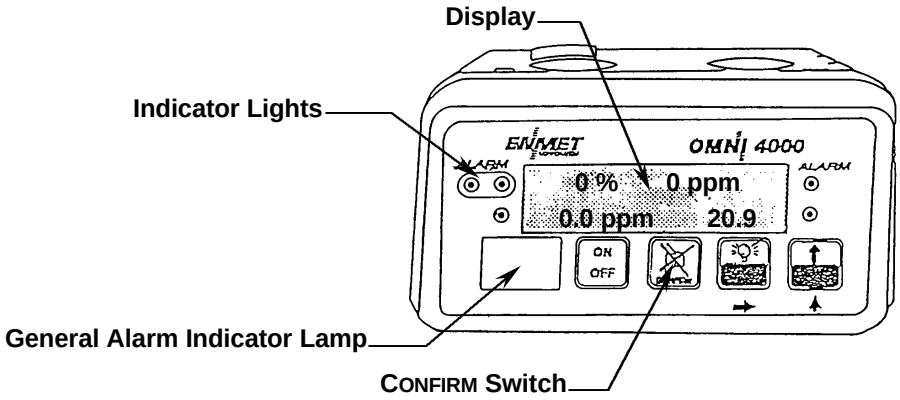


Figure 2-17: Explosive Gas Alarm Features

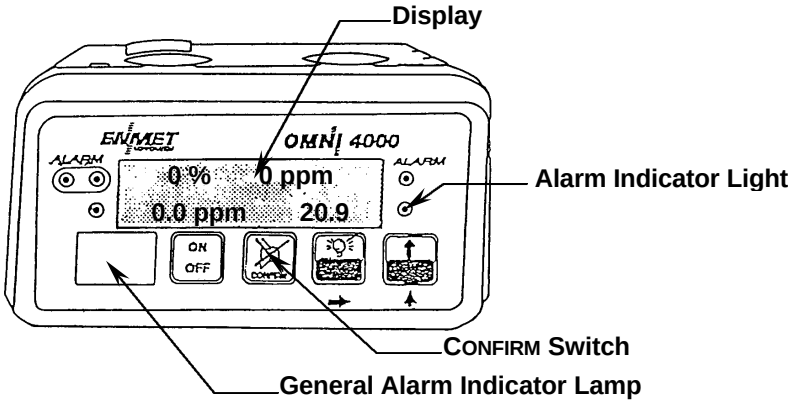


Figure 2-18: Oxygen Alarm Features

Channel 4 Shown as an Oxygen Channel

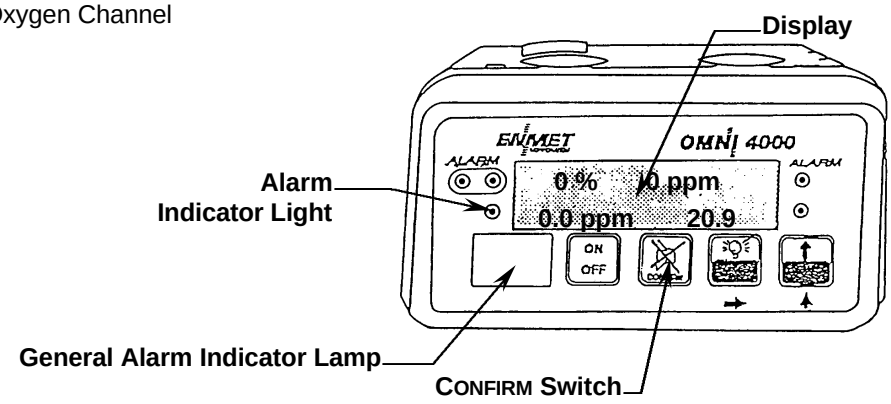


Figure 2-19: Toxic Gas Alarm Features

Channels 2 and 3 are Toxic Gas Channels

Alarms Triggered

- Intermittent audible alarm
- General alarm indicator lamp blinking
- One or more alarm indicator lamps blinking
- Display of an explanatory message in the appropriate display quadrant
- The reading of the channel in alarm is frozen at the maximum recorded value

Action

- Find out which channel or channels are in alarm by means of the channel alarm indicator lamps. See Figures 2-17, 2-18, and 2-19. The corresponding quadrant alternately displays "ALARM", the reading and the type of gas.
- Refer to the paragraph below concerning the type of gas:
  - "LEL Alarm" paragraph for an explosive gas channel (%LEL)
  - "Oxygen Alarm" paragraph for an oxygen channel
  - "Toxic Gas Alarm" paragraph for a toxic gas channel

LEL ALARM (Figure 2-17)

OMNI-4000 without oxygen sensor

- Be careful, explosive gas present
- Press CONFIRM to acknowledge the buzzer and reactivate the display

OMNI-4000 with oxygen sensor and Over Range option

- Be careful, explosive gas present
- Press CONFIRM to:
  - Attempt to acknowledge the buzzer. Acknowledgement is possible if
  - he reading is below 10%LEL.
  - And reactivate the display

OXYGEN ALARM (Figure 2-18)

The oxygen reading must be between the two thresholds for oxygen abundance and oxygen deficiency. The alarm is triggered whenever the reading is not between the High Alarm and Low Alarm thresholds.

- Leave the area as quickly as possible. Excess and lack of oxygen are both dangerous
- Press CONFIRM to acknowledge the buzzer and reactivate the display

TOXIC GAS ALARM (Figure 2-19)

Three types of reading can trigger the toxic gas alarm:

- Exceeding of the maximum instantaneous permissible value
- Exceeding of the permissible TWA (Time Weighted Average)
- Exceeding of the permissible STEL (Short Term Exposure Limit)

In each of these cases, a specific message cyclically replaces the reading in the appropriate channel:

- "ALARM" whenever the maximum permissible instantaneous value has been exceeded. The reading is frozen in order that the operator can see the maximum value recorded.
- "STEL AL" when the Short Term Exposure Limit has been exceeded (sliding mean of 15 minutes)
- "TWA AL" when the Time Weighted Average has been exceeded (sliding mean over 8 hours)

Proceed as follows:

- Leave the area as quickly as possible. High instantaneous or accumulated excesses (STEL or TWA) are equally dangerous
- Press CONFIRM to acknowledge the buzzer and reactivate the display

2.6 Turning the OMNI-4000 Off

To turn the OMNI-4000 off, press the ON/OFF switch for three seconds. The display shows the countdown as follows before turning off:

Example of Display countdown:

When the device is turned off, the stored values (sensor setting values, alarm thresholds, histograms, etc.) are not lost. The data can be stored for between 3 and 5 years, depending on the life of the lithium battery.

When the device is returned from the field, the batteries may be recharged and the exposure histograms printed, as explained below.

2.7 Recharging the Battery

The following applies to both the standard OMNI-4000 instrument and the OMNI-4000 with the BP-4000 pump. See section 4, table 4-2 for expected battery life.

The battery can be charged either while attached to or removed from the instrument. To remove the battery pack, release the captive screw; see figure 2-20. Push the pack out; it slides toward the circuit board side, opposite the gas sensor openings.

Two different chargers are available. One is a standard single rate charger; the other is a dual rate charger.

To charge with the standard single rate charger:

- Plug the charger into 110 vac.
- Plug the charger into the battery pack. The connectors are polarized.
- The red charge indication lamp lights.
- Leave the battery on charge for 12-14 hours. Never charge longer than 72 hours with the standard charger

Fully charged instruments without BRH Smart blocks should not be left idle longer than one months without recharge; those with BRH Smart blocks should be recharged every week when not in use, when using the standard charger.

CAUTION: *Failure to do so can damage the battery pack*

To charge with the dual rate charger:

- Plug the charger into 110 vac.
- Plug the charger into the battery pack. The connectors are polarized.
- There is a pre-charge interval of from 3 - 23 minutes; the battery is trickle charged while the charger microprocessor acquires and evaluates the battery. During this time the green charge light is on and may flash.
- The battery is then charged at full rate for 5 to 6 hours
- When the battery is fully charged, the green light flashes. The battery is ready for use.
- Leave the battery on charge when not in use. The green light is on and flashing, indicating a periodic trickle charge.

When an instrument battery is discharged to the low battery alarm point, discontinue use and charge the battery as soon as possible. When the instrument is idle for a period, continuously charge the battery with the dual rate charger. The battery is periodically trickle charged to compensate for leakage and passive use. This is particularly important with instruments which have BRH Smartblocks aboard.

When a battery is discharged to the low battery condition or beyond, the dual rate charger microprocessor may have difficulty acquiring the battery, and the full rate charge cycle is not initiated. In this case, the charger indicates a false full charge, with the green light continuing to flash. After the 23 minute maximum acquisition time, disconnect the charger from the battery for a minute and then reconnect it.

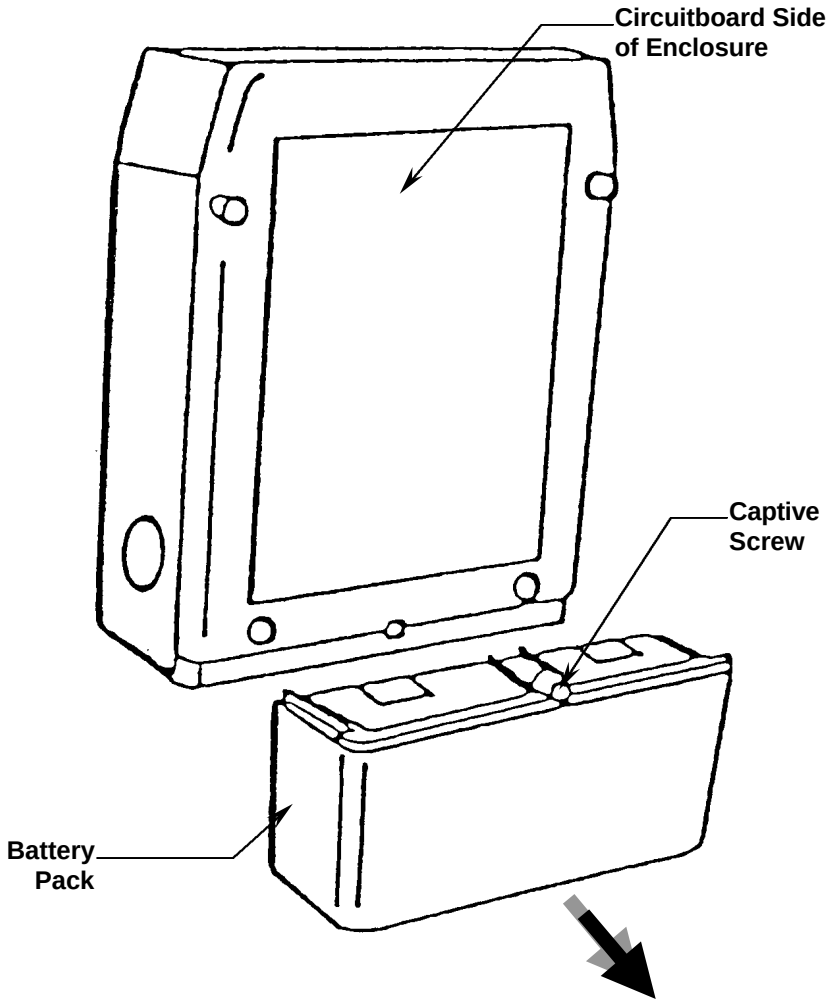


Figure 2-20: Removal of Battery Pack

***WARNING*: Substitution of batteries or other components may compromise the intrinsic safety of the instrument.**

2.8 Printing the Histograms

The Histograms function enables printout or transfer to a personal computer of the values and events stored by the OMNI-4000. This data is stored during the normal operation of the device. Clearing of the information in the memory can be performed only during the printing procedure.

Connection to a Printer

NOTE: This must be PC compatible and fitted with an RS 232C interface configured as follows:

- 9600 bauds
- 8 bits
- Even parity
- 1 Stop bit
- XON/XOFF protocol
- IBM Emulation

The Connecting Cable

This can be supplied as an option. You can also make your own using Figure 2-21. The programming plug, which has pins 2 and 4 connected, can be used as a part of the connecting cable if desired.

Connections

- Connect the DIN plug of the connecting cable, shown on the left side of Figure 2-22, to the OMNI-4000.
- Connect the 25 pin plug of the connecting cable, shown on the right side of Figure 2-22, to the serial port of the printer.
- Check the configuration of the switches in the printer and position the switches on the front of this to "ON" and "ON-LINE." Refer to the printer instruction manual.

Connection to a Compatible Personal Computer

This requires software known as COM4000. Refer to the manual for this software to install it on the PC. The cable is shown schematically in Figure 2-21.

Review of the Histograms

The histograms can only be reviewed only after the OMNI-4000 has been in operation for at least:

- Fifteen minutes for printing
- One minute for display on a PC

Choice of Printing Procedure

- Connect the cable between the OMNI-4000 and the printer or computer. See Figure 2-23
- Turn the OMNI-4000 on by pressing the ON/OFF switch
- Press and release the Menu Selection switch until the display alternately shows:

To print
History

Accept:	**CONFIRM**
Cancel: →	

- Pressing the CONFIRM switch starts the printing
- Pressing any other switch returns the OMNI-4000 to the main menu without altering the data

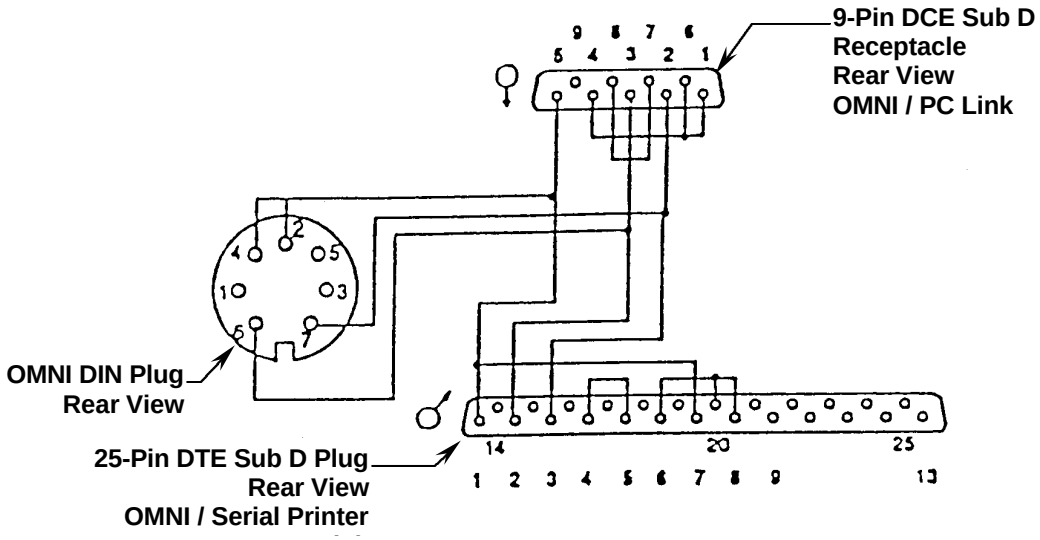


Figure 2-21: Wiring of Connectors for Serial Printer or PC RS 232C Link

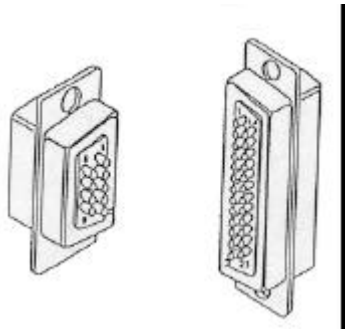


Figure 2-22: 9 Pin Sub D Receptacle, Left 25 Pin Sub D Plug, Right

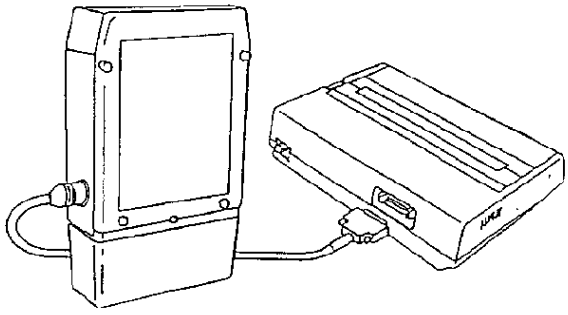


Figure 2-23: Connection to a Serial Printer

Review of Data

This concerns the OMNI-4000 whether connected to a serial printer or the serial port of a compatible personal computer.

During the printing, the OMNI-4000 automatically chooses one of two displays:

- If the data storage time is less than 15 minutes, the data is presented in the form of charts, as in Figure 2-24A.
- If the data storage time is at least 16 minutes, the data is presented in the form of graphs, as in Figure 2-24B.

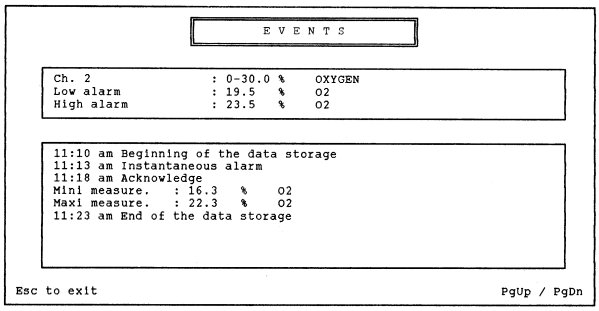


Figure 2-24A: Data Readout, Chart

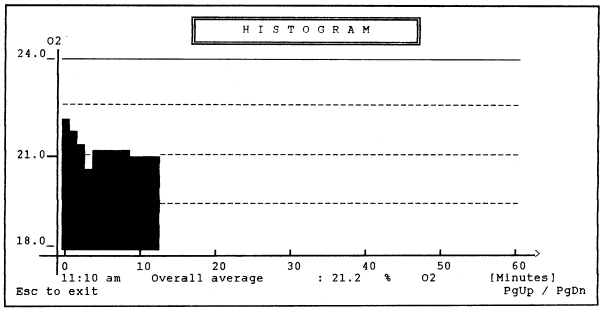


Figure 2-24B: Data Readout, Graph

Optional Clearing of the Memory

At the end of the printing procedure, the display shows:

To clear Memory

Accept: CONFIRM
Cancel: ➔

The operator has the choice of:

- Canceling all the data still stored (clear the memory) and just reviewed, prior to putting the OMNI-4000 back into operation. This choice is implemented by pressing the CONFIRM switch.
- Saving the data and putting the OMNI-4000 back into operation. This choice is implemented by pressing the BACKLIGHT switch.

Return to Normal Mode

This is automatic after pressing a switch, per the above procedure. Remove the printer cable.

2.9 Interference Gas Response

Often electrochemical gas detection cells respond to gases other than those they are designed to be specific to. H_2, for example, commonly causes a response in CO cells. This response is called "interference." In the OMNI-4000, compensating circuitry is employed to null out interference signals. On the whole, this compensating circuitry works well, but it does work better for some combinations of cells than others. The table of Figure 2-25, which is self explanatory, indicates what can be expected from exposure of the instrument to possible interfering gases.

Table 2-1: Compatibility of Smart Block Sensors

Interfering Gas Concentration in ppm

Range in ppm	Channel	O2	CO(25)	H2S(25)	SO2(25)	NO(25)	NO2(10)	H2(1000)	Cl2(10)	HCN(10)	HCl	NH3
	O2	*	*****	*	*	*	*	*	*	*	*	*
1000	**CO**	*		+/–20	+/–5	+/–5	+/–10	+/–200	+/–6	/	*	/
100	**H2S**	*	/		Inter	/	+/–4	/	+/–3	/	*	/
30	**SO2**	*	/	Inter		/	+/–2	/	+/–4	Inter	*	/
300	**NO**	*	/	+/–10	+/–8		+/–2	/	/	/	*	/
30	**NO2**	*	/		/	/		/	Inter	/	*	/
2000	**H2**	*	/	+/–2	/	+/–10	/		/	/	*	/
10	**Cl2**	*	/	+/–2	/	/	Inter	/		/	*	/
30	**HCN**	*	/	Inter	Inter	/	+/–5	/	Inter		*	/
30	**HCl**	*	*	*****	*	*	*	*	*	*		/
100	**NH3**	*	+/–10	+/–10	+/–10	+/–6		Inter	+/–7	+/–4	*	

***** = Not tested

Inter = Unpredictable Interference on the indicated channel

+/–10 = Some Interference on the indicated channel; Maximum range in ppm given

/ = Limited Interference less than 2% of the interfering gas concentration

For example: If 25 ppm SO2 is applied to a CO channel, it will cause a maximum signal equivalent to plus or minus 5 ppm CO.

If the same gas is applied to an H2S channel, it will cause a larger unpredictable interference signal.

If the same gas is applied to a NO2 channel, it will cause a maximum interference signal of 2% of 25 ppm, which is 0.5 ppm.

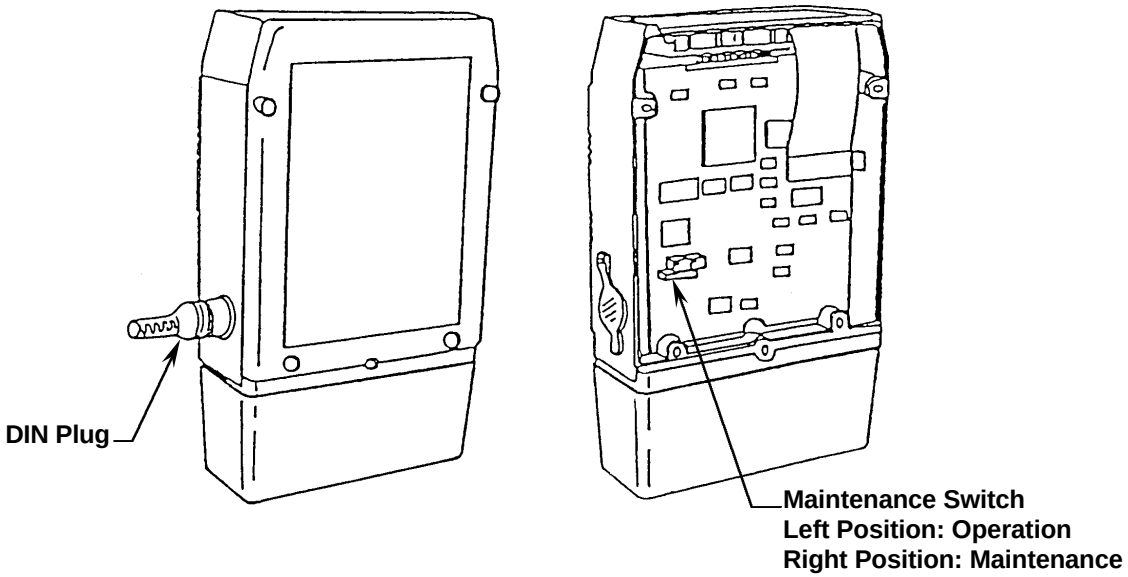


Figure 3-1: Accessing the Maintenance Menu

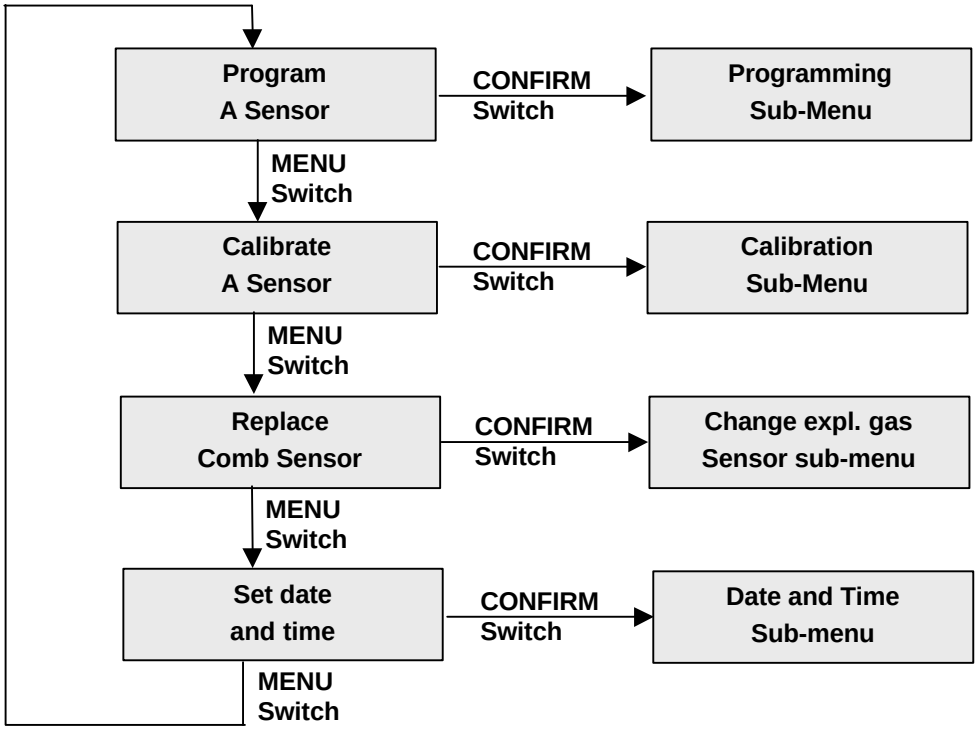


Figure 3-2: Diagram of Maintenance Menu Loop

3.0 Maintenance

3.1 Scheduling OMNI-4000 Maintenance

The sensor responses of an OMNI-4000 should be checked at least every thirty days, by exposing the sensors to appropriate gases and monitoring for expected instrument response. It is recommended that all MOS block and combustible LEL sensors of a ONNI-4000 instrument be completely recalibrated at least every ninety days, and the Smart Block toxic sensors every six months, utilizing the procedures given in this manual. Good practice dictates more frequent checking and calibration under particularly dangerous conditions and conditions of heavy usage. Some instrument users check sensor responses at the beginning of every period of usage, such as every shift. National, state, local, or company specifications may dictate minimum calibration intervals.

3.2 The Maintenance Menu

3.2.1 Accessing the Maintenance Menu

When the device is ON, the main menu can be accessed in either one of two ways:

- After opening the enclosure on the circuit board side and positioning the switch towards the center of the device. See Figure 3-1, right side.
- Without opening the enclosure by inserting the special plug in the DIN socket located on the side of the enclosure. See Figure 3-1, left side.

This description is given for the purposes of information only. It is recommended that the detailed instructions given in the following chapters on maintenance be followed carefully. It is often safer not to open the enclosure and thus to avoid any possibility of incorrectly handling any of the components.

When one of these two actions has been performed, the display shows "Programming a channel" to signal that the Main Maintenance Menu has been accessed.

NOTE: Insufficient battery voltage prevents access to the main menu. The operator is warned with a "Maintenance impossible" message. It is possible to continue by connecting the charger or by changing the battery pack.

Sub-Menus

Once the Maintenance Menu appears, the first of the four menus available is displayed: "Program a sensor." Then, the following menus are available, by using the MENU switch.

- Calibrate a sensor
- Replacing the explosive gas sensor
- Set Date and Time

The structure of the Maintenance Menu as a flow-chart is shown in Figure 3-2. Each time that the MENU switch is pressed, the next item is displayed; this forms a loop. To select a menu, press the CONFIRM switch.

3.2.2 Overview: Program a Sensor Menu

This menu is used for:

- Selecting the channel for programming
- Enabling or disabling the selected channel
- Informing the operator of the sensor type and measurement range
- For an explosive gas channel, selecting the reference gas from amongst the 27 preset gas types or entering the coefficient for a 28nd gas
- For an oxygen channel, programming the low and high alarm thresholds
- For toxic channels, programming the instantaneous alarm levels

3.2.3 Overview: Calibrate a Sensor Menu

This menu is used for:

- Selecting the channel for programming
- Calibrating the zero point and sensitivity of the sensor assemblies using a calibration gas. An oxygen sensor only require its sensitivity to be adjusted using pure air.

3.2.4 Overview: Replace the Explosive Gas Sensor Menu

This menu is used for:

- Selecting the channel for programming
- Calibrating the zero point and sensitivity of the explosive gas sensor using a calibration mixture (methane)

NOTE: There are not menus for the toxic and oxygen smart block sensors as there are factory set. The data for each of these is contained in the built-in memory of the sensor.

3.2.5 Overview: Set Date and Time Menu

This menu is used to update the internal calendar and clock of the OMNI-4000. This data is used for the time scales, specifically for the printing or down-loading of the stored readings (min, max, STEL, TWA) to an external computer.

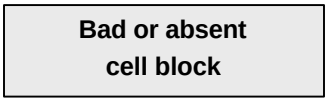
3.2.6 Detail: Program a Sensor Menu

This menu is used for:

- Selecting the channel (sensor) for programming
- Enabling or disabling the selected channel
- Informing the Operator of the sensor type and measurement range,
- For explosive gas sensors, selecting the reference gas from amongst the 27 preset gas types or inputting the coefficient for the 28nd gas
- For an oxygen channel, programming the low and high alarm thresholds.
- For toxic channels, programming the instantaneous alarm levels

Error Display

It is not possible to program a channel without a sensor installed. When the data is entered (erroneous entry), the display momentarily shows the following:



Selecting the Maintenance Menu

After inserting the special plug into the DIN connector located on the side of the enclosure, as shown in Figure 3-3; the display shows "Program a Sensor" to signal access to the main maintenance menu. Press the CONFIRM switch to access the programming menu. The display shows:

Select
Sensor: CH4

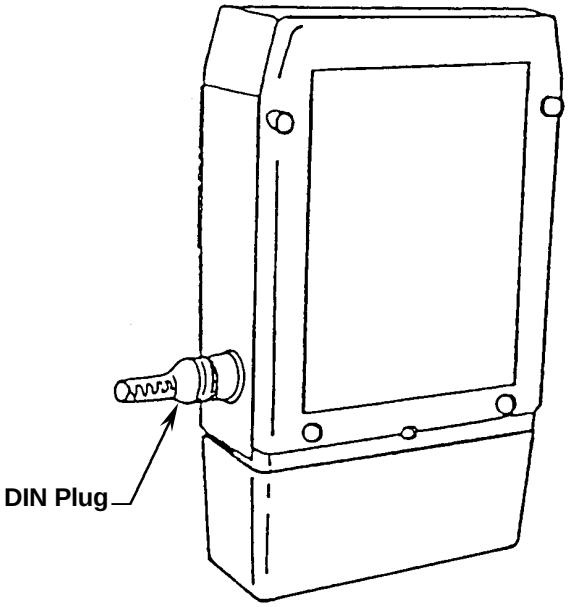


Figure 3-3: Position of DIN Plug

Channel 1 is always the explosive gas channel. *If CO2 smart block is used, it is installed in channel 2 only.* Channels (2, 3 and 4) can be fitted with any other oxygen or toxic gas sensor assembly:

- Press the MENU switch to increment the channels in sequence
- Press the CONFIRM switch to select the desired channel appears

Selecting the Channel Status

A channel can be either enabled or disabled. A channel which is enabled allows the gas readings to be taken with the sensor installed in the channel.

NOTE: When a sensor is removed from a channel, that channel must be disabled.

Proceed as follows given that a channel is selected with the CONFIRM switch, as described above:

- Each time the MENU switch is pressed either "Enabled" or "Disabled" is displayed. Press the CONFIRM switch to select the status of the channel.

Choosing "Disabled" for any channel leads directly to the "Confirming Data" paragraph. Choosing "Enabled" allows the programming to continue as described below.

Selecting the Type of Gas for the Explosive Gas Channel, Channel 1.

Twenty-seven (27) explosive gases are preprogrammed and can be selected and displayed. See the FIGURE 3-4. Also, a gas known as "Other" can be given a multiplier coefficient by the operator. Proceed as follows:

- After Enable is selected, the present gas is displayed
- Press the MENU switch repeatedly to view the list of 27 gases presented one-by-one on the display
- If the desired gas is not the "Other" gas, press the CONFIRM switch to select the gas and go to the "Setting An Alarm Threshold for the Explosive Gas Channel".

Figure 3-4: Table of Gases, Associated Parameters and Coefficients

List of pre-programmed gases and vapors. The coefficients are given relative to methane.

Gas	LEL	UEL	Vapor Density	Coefficient CH4
Ethyl acetate	2.1%	11.5%	3.0	1.35
Acetone	2.15%	13%	2.1	1.25
Acetylene	1.5%	100%	0.9	1.1
Butane	1.5%	8.5%	2.0	1.60
1,3 – Butadiene	1.4%	16.3%	1.85	1.25
2 – Butanone	1.8%	11.5%	2.5	1.5
Dimethylether	3.0%	27.0%	1.6	1.55
Ethanol	3.3%	19.0%	1.6	1.1
Ethylene	2.7%	37.0%	0.98	1.2
Natural gas	5.0%	15.0%	0.55	1.05
Hexane	1.2%	7.4%	3.0	1.6
Hydrogen	4.0%	75.6%	0.069	0.55
Isobutane	1.5%	≅ 1.5%	2.0	1.6
Isopropanol	2.15%	13.5%	2.1	1.6
Methane	5.0%	15.0%	0.55%	1.0
Ethylene oxide	2.6%	100%	1.5	2.1
Propylene oxide	2.3%	?	2.0	2.0
Pentane	1.4%	8.0%	2.5	1.7
Propane	2.0%	9.5%	1.6	1.3
Propylene	2.0%	11.7%	1.5	1.1
Gasoline, 95 octane	1.1%	≅ 6%	3 to 4	2.4
Toluene	1.2%	7.0%	3.1	2.2
Xylene	1.0%	7.6%	3.7	2.6
Diesel	0.6%	≅ 6.0	> 4	5.0
Methanol	5.5%	44.0%	1.1	0.8
Kerosene(JP4)	0.7%	5.0%	> 4	7.5
Octane	1.0%	6.0%	3.9	1.7

- If the chosen gas is the "Other" gas, a multiplier coefficient must be entered. If the coefficient associated with the gas of interest is not known, contact ENMET customer service personnel. Proceed as follows:
  - The displayed message reads:

Coef: Other
0.0

  - Select the coefficient units to display by pressing the MENU switch. When the desired value is reached, press BACKLIGHT switch
  - Select the tenths of a unit by repeatedly pressing the MENU switch. When the desired value is reached, press BACKLIGHT switch
  - Select the hundredths of a unit by repeatedly pressing the MENU switch. When the desired value is reached, press CONFIRM switch

The complete coefficient is then stored. The maximum allowable values for the coefficient are between 0.50 and 9.99.

For an Oxygen Sensor.

When a channel with an oxygen sensor installed is selected, and enabled: the display reads:

Type of gas
OXYGEN

- Press CONFIRM switch to display:

Scale
30.0% O2

Once CONFIRM has been pressed, go to the "Setting an Alarm Threshold" paragraph. The memory of each smart block sensor assembly is factory programmed with the characteristic value of the sensor. The operator cannot modify this data. The OMNI-4000 recognizes automatically the type of sensor connected.

For a Toxic Gas Sensor

The display for an enabled channel reads, for instance:

Type of gas
CARBON MONOXIDE

- Press CONFIRM switch to display:

Scale
1,000 ppm CO

Once CONFIRM has been pressed, go to the "Setting an Alarm Threshold" paragraph. The memory of each smart block sensor assembly is factory programmed with the characteristic values of the sensor. The operator cannot modify this data. The OMNI-4000 automatically recognizes the type of sensor connected.

3.3 Setting an Alarm Threshold

3.3.1 For an Explosive Gas Channel

For all explosive gases except "Methane - Range 0-5%"

- A message is displayed, for instance:

Comb. Alarm:
20LEL CH4

To modify the alarm threshold, proceed as follows: The allowable alarm values are between 0 and 60% LEL:

- Select the tenths by repeatedly pressing the MENU switch. When the desired value is displayed, press BACKLIGHT switch.
- Select the units by repeatedly pressing the MENU switch. When the desired value is displayed, press the CONFIRM switch.

For Methane - Range 0-5% only.

- A message is displayed, for instance:

Comb. Alarm:
1.1% CH4

To modify the alarm threshold, proceed as follows; the allowable alarm values are between 0 and 3.0% CH_4:

- Select the units by repeatedly pressing the MENU switch. When the desired value is displayed, press BACKLIGHT switch.
- Select the tenths by repeatedly pressing the MENU switch. When the desired value is displayed, press the CONFIRM switch.

3.3.2 For an Oxygen Channel:

There are two alarm values to be programmed, the High Alarm and Low Alarm values:

- The maximum permissible high alarm value is the upper value on the sensor measurement scale.
- The minimum permissible low alarm value is the lower value on the sensor measurement scale. The maximum lower alarm value is the high value of the sensor measurement scale.

Entering the High Alarm Value

The device displays, for instance:

Alarm high
23.5% O2

- Press the CONFIRM switch to confirm the choice. Go to the "Confirming Data Entries" paragraph, below.
- Press MENU switch to reset the alarm value to 00.0% O_2.
- Press MENU switch to modify the alarm value displayed, as follows:
  - Select the tens by repeatedly pressing the MENU switch. When the desired value is displayed, press BACKLIGHT switch.
  - Select the units by repeatedly pressing the MENU switch. When the desired value is displayed, press BACKLIGHT switch.
  - Select the tenths by repeatedly pressing the MENU switch key. When the desired value is displayed, press CONFIRM switch and this leads into the data entry procedure for the low alarm value.

Entering the Low Alarm Value

The procedure is the same as for "Entering the High Alarm Value." Pressing the CONFIRM switch completes the process.

3.3.3 For a Toxic Gas Channel

There is only one alarm threshold to program. The display reads, for instance:

Alarm
0030 ppm CO

- Press the CONFIRM switch to confirm the choice. See the "Confirming Data Entries" paragraph.
- Press the MENU switch to reset the alarm value to 0000 ppm.
- Press the MENU switch to modify the alarm value displayed, as follows:
  - Select the value to the far left by repeatedly pressing the MENU switch. When the desired value is displayed, press the BACKLIGHT switch.
  - Continue the procedure until the right-hand numbers are complete. When the desired value is displayed, press the CONFIRM switch and this leads into the data entry confirmation procedure.

NOTE: The number of figures making up the alarm value depends upon the type of sensor. This alarm value can therefore be situated between 1,000 ppm and 0.1 ppm, depending upon the type of sensor installed.

Confirming the Data Entries

The data has been memorized by the OMNI-4000 but not yet confirmed. This procedure enables them to be confirmed. The display reads:

Accept: CONFIRM
Cancel: →

- The above data which was entered is memorized when the CONFIRM switch is pressed, or
- The above data is lost and the data existing prior to this procedure is preserved, when any other switch than CONFIRM is pressed.
- In either case, the main menu is displayed when a switch is pressed.

Return to Operator Mode

- Remove the programming plug
- The OMNI-4000 is now ready for use

3.4 Detail: Calibrate a Sensor Menu

This sub-menu is used after changing a sensor or the appearance of the "OUTSIDE RANGE" message, which signals a significant drift in measurements. It enables:

- The selection of the channel aid program
- The automatic adjustment, without using a screwdriver, of the zero and sensitivity of the selected sensor by means of a calibration gas cylinder. The oxygen sensor only requires adjustment of its sensitivity with pure air.

General

It is not possible to program a channel which does not contain a sensor assembly. When the entered data (erroneous entry) is confirmed, the display momentarily indicates:

Bad or absent
cell block

Selecting the Maintenance Menu

With the device turned on, plug in the DIN plug. See Figure 3-5. The display reads "Program a sensor" signalling access to the main maintenance menu.

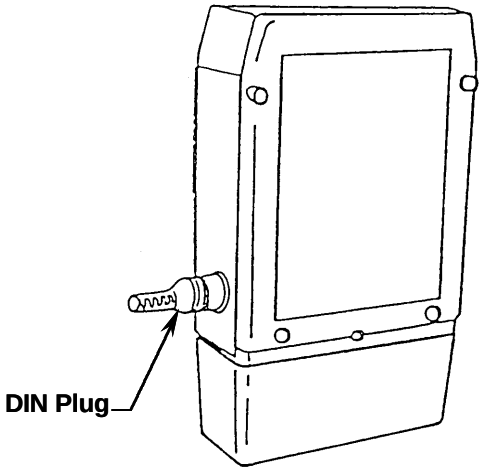


Figure 3-5: Position of DIN Plug

NOTE: Insufficient battery voltage prevents access to the main menu. The operator is warned with a "Maintenance impossible" message. Maintenance operations can be continued either by connecting the charger or by changing the battery pack.

Selecting the Calibration Menu

- The display reads:

Program a sensor

- Press once the MENU switch. The display now reads:

Calibrate a sensor

- Confirm the choice by pressing the CONFIRM switch. The display reads; for example:

Select sensor: H2S

3.5 Selecting the Channel for Calibration

There is a channel for each sensor. Channel 1 is reserved for the explosive gas sensor. If a CO2 smart block is used, it is installed in channel 2.

- To change the channel, press the MENU switch
- To confirm the choice and proceed with the calibration of the displayed channel, press the CONFIRM switch

3.5.1 Calibration of the Explosive Gas Channel

- ❑ The calibration cover
- ❑ A vinyl hose, approximately 1 meter long
- ❑ A cylinder of calibration gas of known content, 20% methane, for example

Preparing the OMNI-4000

- Attach the calibration cover,
- Connect the calibration gas cylinder to the injection cover with the vinyl hose; See Figure 3-6
- The channel has been selected. If not, refer to the "Selecting the Channel for Calibration" paragraph, above.

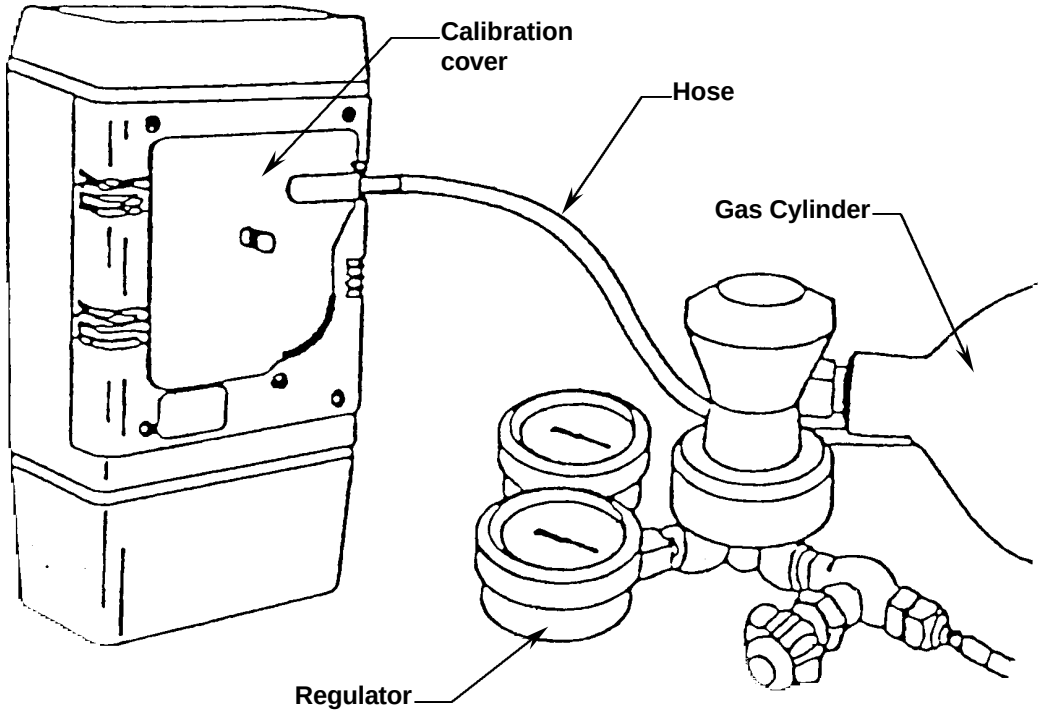


Figure 3-6: Calibration Gas Equipment Arrangement

Inputting the Calibration Gas Value

This procedure defines the content of the calibration gas to be applied to the explosive gas channel sensor. The maximum permissible content is 100% LEL.

The display reads:

Cal gas
100%LEL CH4

To modify this value:

- Select the units by repeatedly pressing the MENU switch. When the desired value appears, press BACKLIGHT switch.
- Select the tenths of a unit by repeatedly pressing the MENU switch. When the desired value appears, press BACKLIGHT switch.
- Select the hundredths of a unit by repeatedly pressing the MENU switch. The units and tenths can be accessed again by pressing the BACKLIGHT switch. When the calibration gas value is complete, press the CONFIRM switch.

The value of the calibration gas to be applied is memorized.

Calibrating the Zero Point

This must be performed in an area which is free of gas contamination. The display reads, for instance:

Zero value
001 LEL CH4

- Press the CONFIRM switch. The zero is set automatically by the OMNI-4000's electronics for future internal calculations.

Calibrating the Sensitivity

The display shows the offset value obtained during the zero calibration phase, for example:

Span value
001 LEL CH4

The value is always stated in % LEL CH_4. Do not press a switch.

- Apply the calibration gas. You must be able to just hear the gas. The flow rate must be approximately 1 l/min.
- When the readings have stabilized, press the CONFIRM switch. The display shows:

Accept: CONFIRM
Cancel: →

Press: • The CONFIRM switch to confirm the reading. The return to the initial "Calibrate a Sensor" menu is automatic unless there is a problem (See "Problems" paragraph). It is now possible to calibrate another channel by pressing CONFIRM. It should be noted that the channel has automatically been incremented. If there are not further channels to calibrate, go to the "Return to The Operator Mode" paragraph.

• Pressing any other switch results in the return to the initial "Calibrate a Sensor" menu without memorizing the value entered during the above calibration procedure.

Problems

As soon as CONFIRM has been pressed after the sensitivity measurement, the display may show:

- "Excessive zero offset": Check the local atmosphere (gas present) and recalibrate. If the fault persists, change the sensor.
- "Scale Exceeded": A discrepancy exists between the injected calibration gas value and that set in the "Inputting the Calibration Gas Value." Perform the calibration procedure again. If the fault persists, change the sensor.
- "Cell used": A possible discrepancy exists between the applied calibration gas values and that set in the "Inputting the Calibration Gas Value," or calibration was attempted without the gas. Perform the whole calibration procedure again. If the fault persists, change the sensor.

3.5.2 Calibration of an Oxygen Channel

Equipment Required: None

Preparing the OMNI-4000

- The OMNI-4000 calibration cover must not be in place. See Figure 3-7.
- The "Oxygen" channel must be selected; if not refer to the "Selecting the Channel for Calibration" paragraph.

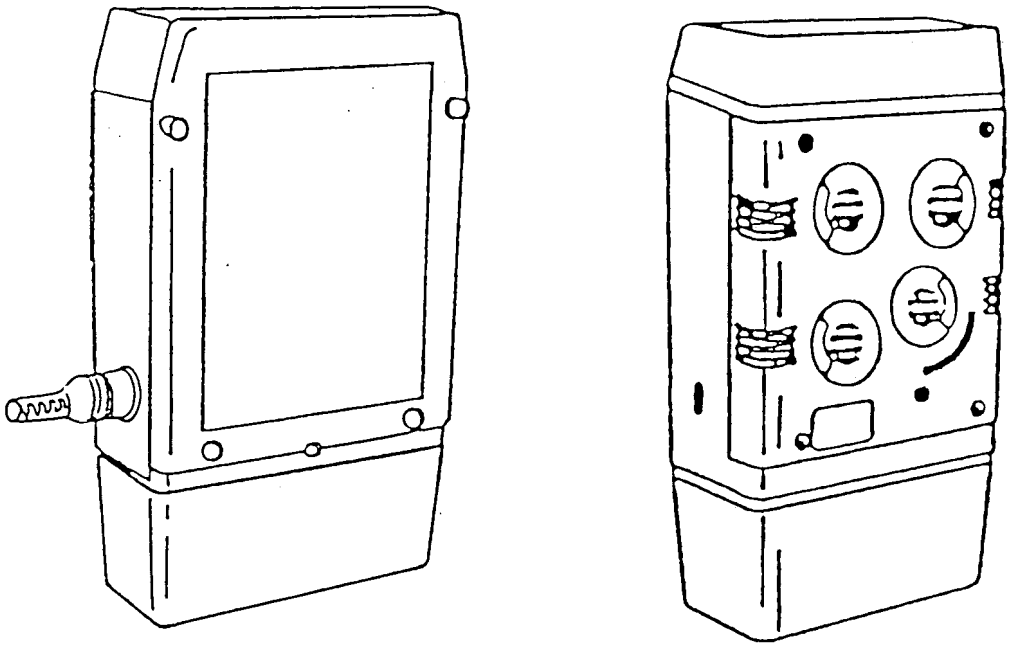


Figure 3-7: Calibration of an Oxygen Cannel

The Injection Cover is Not Required

Calibrating the Sensitivity

The display shows a value, for instance:

Span value:	
20.6%	**O2**

- As soon as the reading has stabilized, press the CONFIRM switch. The OMNI-4000 adjusts the oxygen reading to 20.9% O_2 later. The display shows:

Accept:	**CONFIRM**
Cancel: ➔	

- As soon as CONFIRM has been pressed, the return to the initial menu ("Calibrate a Sensor") is automatic. It is now possible to calibrate another channel by pressing CONFIRM. It should be noted that the channel has automatically been incremented. If there are no further channels to calibrate, go to the "Return to The Operator Mode" paragraph, below.

Problems

As soon as CONFIRM is pressed after the sensitivity measurement, the display may show "Sensor used." The sensor should then be replaced.

3.5.3 Calibration of a Toxic Gas Channel

Equipment Required

- ❑ The calibration cover
- ❑ A vinyl hose, 1 meter long
- ❑ A cylinder of calibration gas with a known content and corresponding to the type of sensor to be calibrated

Preparing the OMNI-4000

- Attach the OMNI-4000 calibration cover. See Figure 3-8
- Connect the calibration gas cylinder to the calibration cover with a vinyl hose
- If the channel has not been selected refer to the "Selecting the Channel for Calibration" paragraph

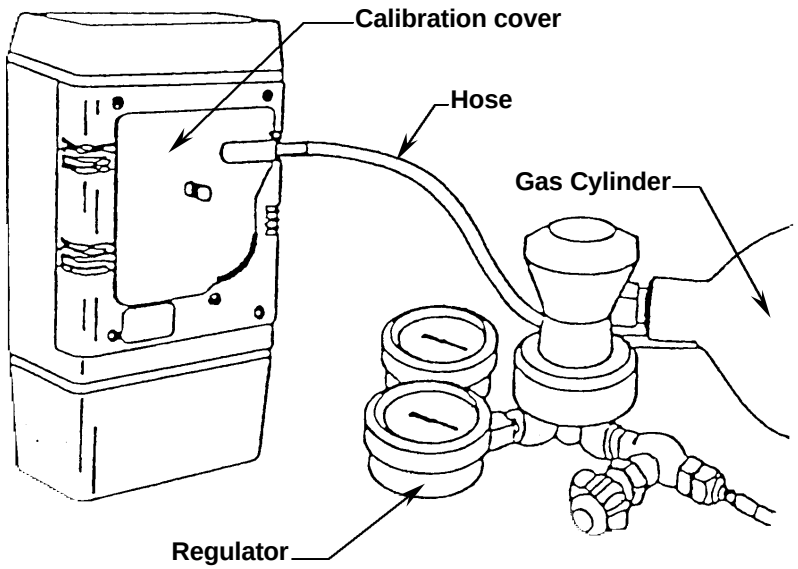


Figure 3-8: Calibration Gas Equipment Arrangement

Inputting the Calibration Value

- This procedure defines the content of the calibration gas which will be applied into the toxic sensor. The maximum permissible content is the maximum value of the sensor range. The display shows a message such as:

Cal gas:
0300 ppm CO

To modify this value:

- Move to the digit to change in the number by repeatedly pressing the BACKLIGHT switch.
- Display the desired number by repeatedly pressing the MENU switch.
- Continue as above until the desired number (calibration gas value) has been obtained, then press the CONFIRM switch. The value of the calibration gas to be used is memorized.

Calibrating Zero

This operation must be carried out in an environment which is free of gas contamination.

The display shows, for example:

Zero
005 ppm CO

- Press CONFIRM. The value is automatically reset to zero by the OMNI-4000.

Calibrating the Sensitivity

The display shows the offset value as memorized when the zero was set. Do not press a switch.

Span Value
005 ppm CO

- Apply the calibration gas. You must be able to just hear the gas. The flow rate must be approximately 1 l/min. **Warning: This operation is performed using a toxic gas!**
- When the reading has stabilized, press CONFIRM. The display shows:

Accept: CONFIRM
Cancel: →

- Press:
- CONFIRM to confirm the data entry and allow the return to the initial "Calibrate a Sensor" menu. It is now possible to calibrate another channel by pressing CONFIRM. It should be noted that the channel number has automatically been incremented. If there are no further channels to calibrate, go to the "Return to the Operator Mode" paragraph.
- Pressing any other switch results in return to the initial "Calibrate a sensor" menu without memorizing the value entered during the above calibration procedure.

Problems

As soon as CONFIRM has been pressed after the sensitivity calibration, the display may show:

- "Excessive zero offset": Check the local atmosphere (gas or cigarette smoke present during calibration of a CO channel) and recalibrate. If the fault persists, change the sensor.
- "Scale Exceeded": A discrepancy exists between the content of the calibration gas and that set in the "Inputting the Calibration Gas Value" procedure. Perform the calibration procedure again. If the fault persists, change the sensor.
- "Sensor used": A possible discrepancy exists between the applied calibration gas value and that set during the "Inputting the Calibration Gas Value" operation, or the calibration was attempted but gas was not used. Perform the calibration procedure again. If the fault persists, change the sensor.

Returning to Operator Mode

- Remove the calibration cover
- Remove the programming plug
- The OMNI-4000 is now ready for use

3.6 Replacing the Explosive Gas Sensor

This sub-menu is used to configure the OMNI-4000 following the installation of a new explosive gas sensor. It also allows the zero point and the sensitivity of the explosive gas sensor to be set by means of a calibration mixture (methane).

CAUTION: **Never start this procedure unless the corresponding cylinder of gas is available.**

Equipment Required

- ❑ A small phillips head screwdriver
- ❑ A new explosive gas sensor
- ❑ The calibration cover
- ❑ A vinyl hose, approximately 1 m.
- ❑ A cylinder of calibration gas of known contents (for instance, or 20% LEL methane)
- ❑ A precision screwdriver

Preparing the OMNI-4000

- Use the screwdriver to remove both covers of the enclosure

Replacing the Explosive Gas Sensor

- Remove the old explosive gas sensor. See Figure 3-9
- Install the new explosive gas sensor. There is a groove to ensure correct positioning.
- Put the cover which protects the sensors back into place and secure it.

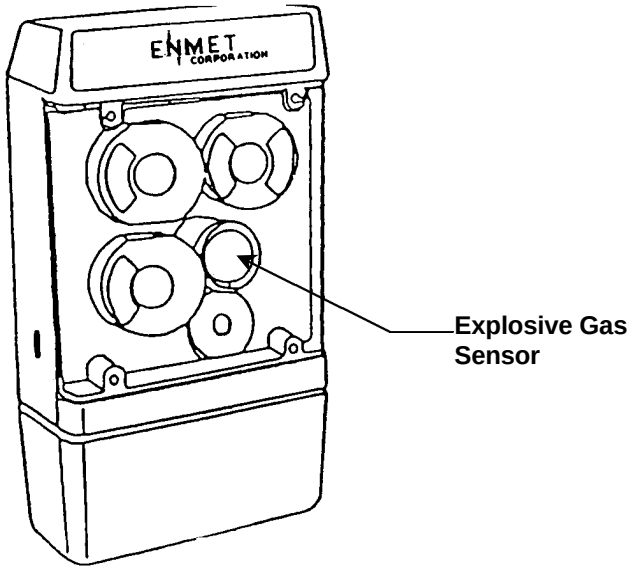


Figure 3-9: Location of the Explosive Gas Sensor

Selecting the Maintenance Menu

Turn the device On and position the maintenance switch towards the center of the instrument. See Figure 3-10.

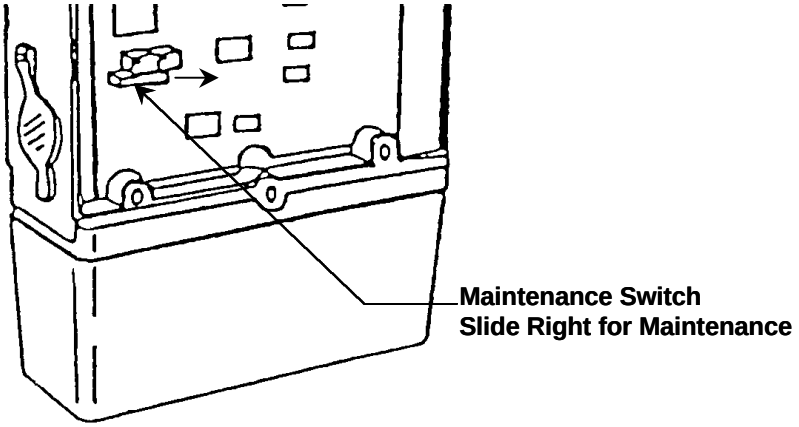


Figure 3-10: Position of Maintenance Switch

Replacement of Explosive Gas Sensor

The display shows: "Program a Sensor" to signal access to the Main Maintenance Menu.

NOTE: Insufficient battery voltage prevents access to the main menu. The operator is warned with a "Maintenance impossible" message. It is possible to continue by connecting the charger or by changing the battery pack.

Selecting The "Replacing an Explosive Gas Sensor" Menu

- The display shows:

Program
a sensor

- Press the MENU switch twice. The display shows:

Change
comb. sensor

- Confirm the selection by pressing CONFIRM. The display shows:

Calibration gas	
20% LEL	**CH4**

Inputting the Calibration Gas Value

This procedure defines the content of the gas to be applied to the sensor during the calibration operation. The maximum permissible concentration is 100% LEL CH_4.

The display currently shows: "Calibration gas." To change the displayed value:

- Select the units by repeatedly pressing the MENU switch. When the desired number is displayed, press BACKLIGHT switch.
- Select the tenths by repeatedly pressing MENU switch. When the desired number is displayed, press BACKLIGHT switch.
- Select the hundredths by repeatedly pressing MENU switch. To return to the units or tenths of a unit, press BACKLIGHT switch. When the complete number is displayed, press CONFIRM.

The value of the calibration gas to be applied is memorized.

Setting the Zero

The display shows alternately:

Please wait for stabilization	⟷	Then set zero

- Press CONFIRM to display the zero value. The display shows, for example:

Zero	
5%LEL	CH4

- Set the zero point using the zero potentiometer; see Figure 3-11. Turn the potentiometer clockwise to increase the displayed value.

The display must show a value close to zero:

Zero	
10.0%	CH4

In case of problems with the setting, replace the sensor.

- Press CONFIRM when the smallest possible value has been obtained.

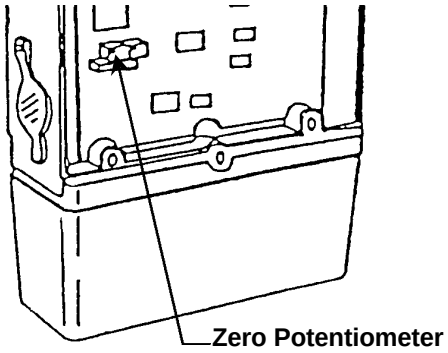


Figure 3-11: Location of Explosive Gas Channel Zero Potentiometer

Setting the Sensitivity

Preparing the Equipment:

- Attach the calibration cover; see Figure 3-12.
- Connect the calibration gas cylinder to the calibration cover using the vinyl hose.

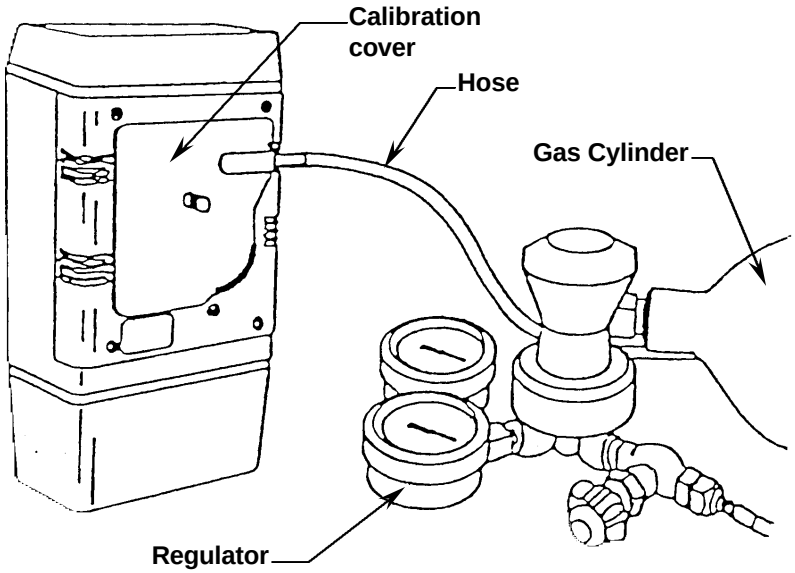


Figure 3.12: Calibration Gas Equipment Arrangement

Starting the Setting Procedure:

The display shows alternately:

Please wait for stabilization	⟷	Then set zero

- Press CONFIRM to display the sensitivity reading. The display shows, for example:

Sensitivity
20%LEL CH4

- Apply the calibration gas. You must just be able to hear the gas. The flow rate must be approximately 1 l/min.
- When the reading has stabilized, adjust the value by turning the sensitivity potentiometer. See Figure 3-13. The value is increased by turning it clockwise.

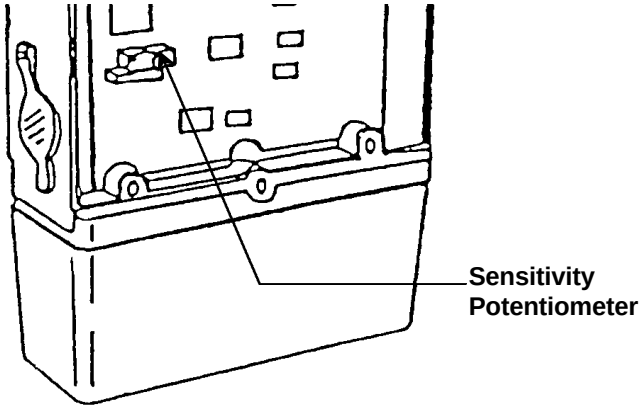


Figure 3-13: Location of Explosive Gas Channel Sensitivity Potentiometer

- When a value corresponding, or as near as possible, to the calibration gas value has been reached, press CONFIRM.

The display shows:

Accept: CONFIRM
Cancel: ➔

- If no errors are detected and when CONFIRM is pressed, the display shows:

Program a sensor

Problems

As soon as CONFIRM has been pressed after the sensitivity calibration, the display may show:

- "Zero incorrectly set": Check the local atmosphere (gas present) and recalibrate. If the fault persists, change the sensor.
- "Sensitivity incorrectly set": A discrepancy exists between the injected calibration gas content and that set in the "Inputting the Calibration Gas Value" procedure. Restart the calibration procedure. If the fault persists, change the sensor.

Returning to Operator Mode

- Slide the maintenance switch to the left; refer to Figure 3-10
- Replace the circuit board cover
- Remove the calibration cover

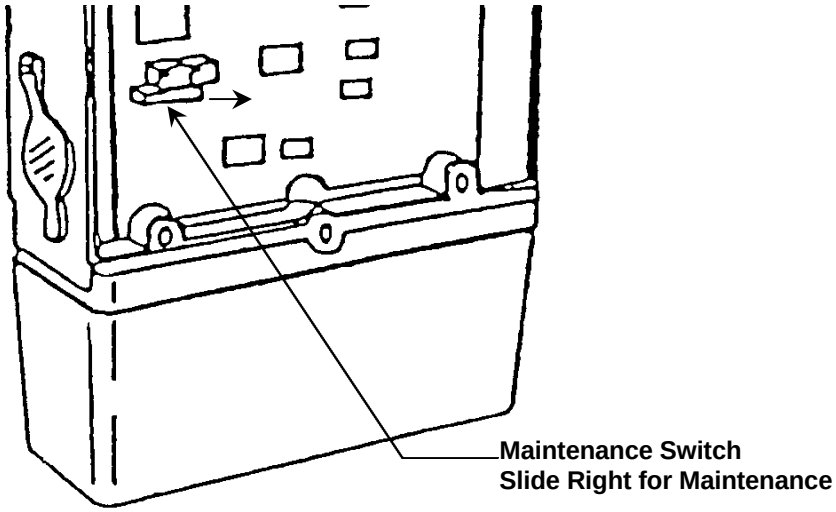


Figure 3-10: Position of Maintenance Switch

Replacement of Explosive Gas Sensor

The OMNI-4000 is now ready for use

3.7 Replacing the Oxygen Sensor

This procedure is used when a new oxygen sensor is installed.

Equipment Required

- ❑ A small phillips head screwdriver
- ❑ A new oxygen sensor

Replacing the Oxygen Sensor

- Use the screwdriver to remove the cover which contains the sensor openings. See Figure 3-14
- Remove the old oxygen sensor
- Install the new sensor. The connector ensures a correct fitting. Be careful not to damage the male part of the connector.
- Put the cover protecting the sensors back into place

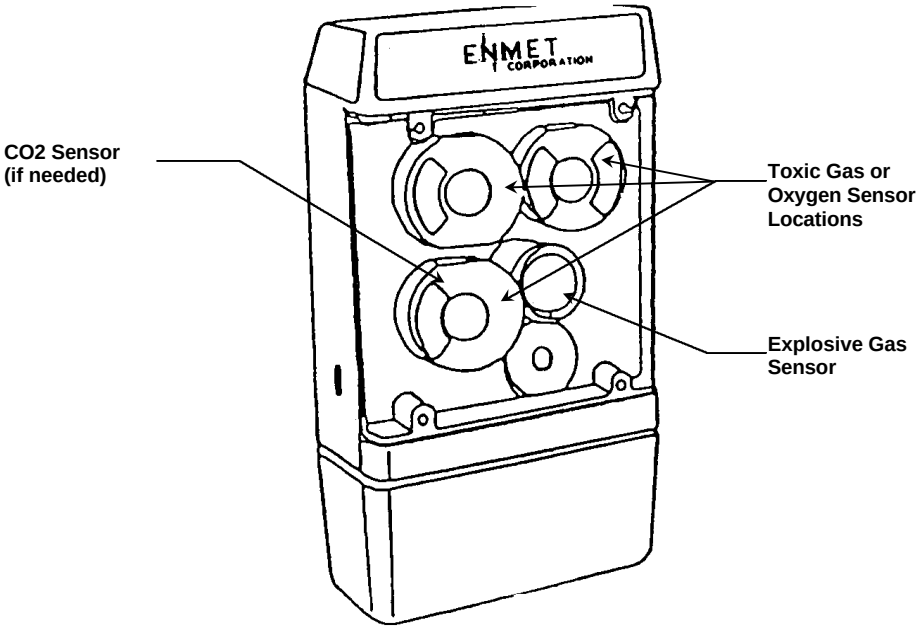


Figure 3-14: Acceptable Locations of Oxygen and Toxic Sensors

Possible locations of the oxygen sensor are channels 2, 3, and 4. See Figure 3-14.

Checking the Oxygen Sensor

In the interests of safety, check the sensor by:

- Pressing the ON/OFF switch
- Checking that the displayed reading is 20.9%, in a normally ventilated environment. If it is not, attempt on auto-zero or calibration. If this doesn't work, replace the sensor.

3.8 Replacing a Toxic Gas Sensor

This procedure is used for the installation of a new toxic gas sensor.

Equipment Required

- ❑ A small phillips head screwdriver
- ❑ A new toxic gas sensor

Replacing the Toxic Gas Sensor

- Use the screwdriver to remove the cover which contains the sensor openings
- Remove the old toxic gas sensor
- Install the new toxic gas sensor. The connector ensures a correct fitting. Be careful not to damage the male part of the connector.
- Put the cover protecting the sensors back into place

Possible locations of toxic sensors are channels 2, 3, and 4. See Figure 3-14.

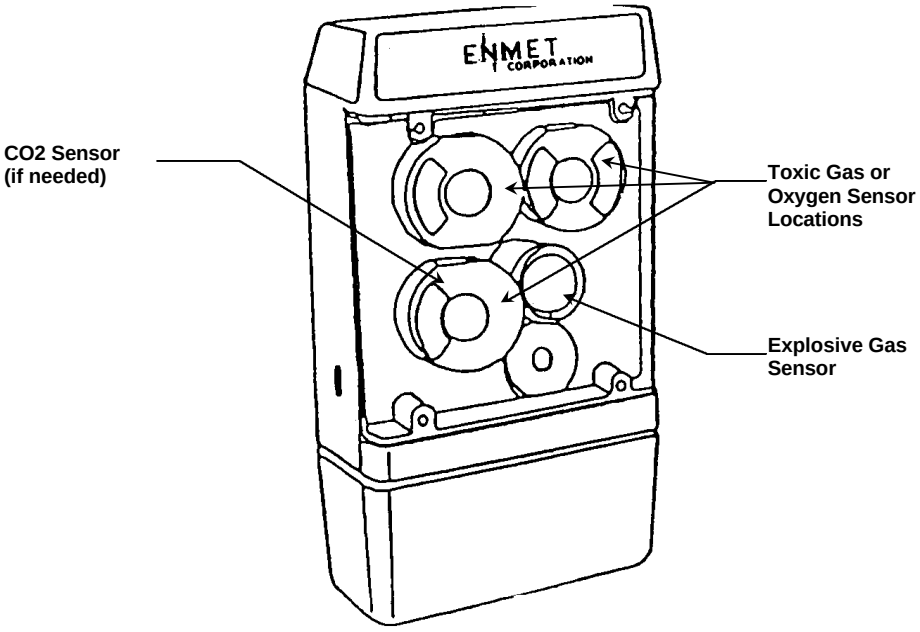


Figure 3-14: Acceptable Locations of Oxygen and Toxic Sensors

Checking the Toxic Gas Sensor

In the interests of safety, check the toxic gas sensor by applying a calibration gas of known contents. To do this:

- Turn the OMNI-4000 on by pressing the ON/OFF switch
- Using the calibration cover, apply the gas as during a calibration
- Check that the concentration of the calibration gas from the cylinder corresponds to the display for the appropriate channel
- Remove the gas and the calibration cover

3.9 Changing the Date and Time

This sub-program is used to update the OMNI-4000's internal calendar and clock. This data is used to define the time scales for the printing and down-loading to a computer of stored data.

Selecting the Maintenance Menu

Turn the instrument ON, and insert the programming plug into the DIN connector located on the side of the unit. See Figure 3-15.

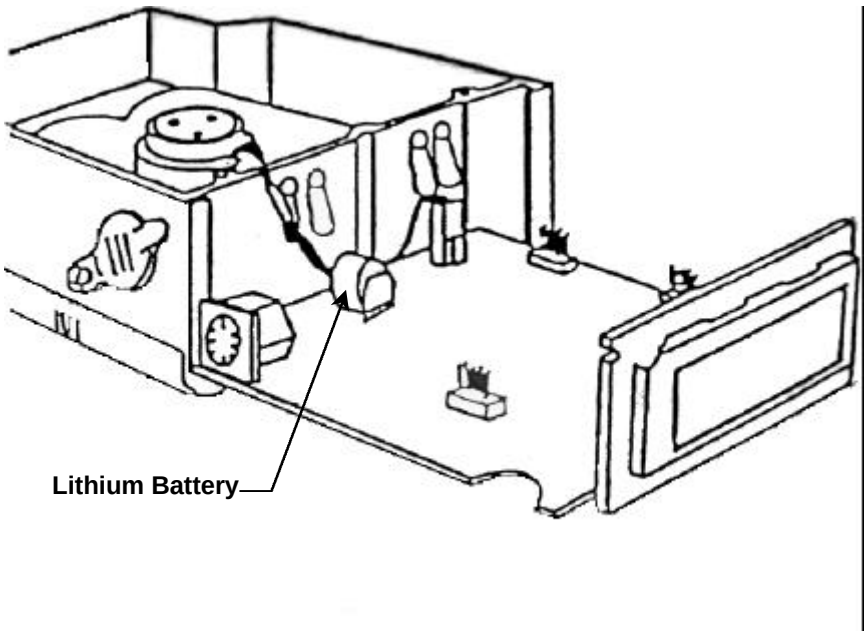


Figure 3-15: Location of Lithium Battery

N.B.: Insufficient battery voltage prevents access to the main menu. The operator is warned with a "Maintenance Impossible" message. It is possible to continue by connecting the charger or by changing the battery pack.

Selecting the "Setting Time and Date" Menu

- The display shows:

Program a sensor

- Press the MENU switch three times. The display shows:

Set Date and time

- Confirm the selection by pressing CONFIRM

Changing the Date

The display reads, for instance:

Date
06:10:99

- Move to the desired position in the date by pressing the BACKLIGHT switch.
- Display the desired value by repeatedly pressing the MENU switch
- Repeat these steps until the date is correct and then press CONFIRM

Changing the Time

The time is not incremented during the display. The display shows, from left to right, hours, minutes and seconds, e.g.:

Time
PM 04:23:03

- Move to the desired time in hours by repeatedly pressing the BACKLIGHT switch
- Display the desired value by repeatedly pressing the MENU switch
- Repeat these steps until the time is correct, and then press CONFIRM

Confirming the Date and Time

The following message is displayed:

Accept: CONFIRM
Cancel: →

- Press:
- CONFIRM to confirm and memorize the data, and to return to the Main Menu
- Any other switch: the data entered during the above operation is lost and the initial values remain. The display returns to the Main Menu.

Returning to the Operator Menu

- Remove the programming plug
- The OMNI-4000 is now ready for use

3.9 Replacing the Lithium Battery

When the OMNI-4000 is turned off, the electronic circuits for the date and time are powered by an independent lithium battery with a life expectancy of 3 to 5 years. The battery must be replaced at the end of this period, or when a drift in time or difficulty in memorizing the date is observed. Proceed as follows:

- Remove the battery pack
- Remove the cover protecting the sensors and remove the sensors
- Remove the second cover over the circuit board
- Remove the flat connector (keyboard-printer circuit board link)
- Remove the screws securing the circuit board
- Carefully remove the circuit board vertically. The lithium battery can now be seen. See Figure 3-15
- Remove the old and insert the new lithium battery: the connections are soldered. Do not attempt to recharge the lithium battery.
- Replace the circuit board, the securing screws, the connector, the sensors, the two covers and put the battery pack back in place.
- Reset the date and time as described in the preceding section

4.0 Appendixes

4.1 Technical Characteristics

NOTE: *All specifications stated in this manual may change without notice.*

Model: OMNI-4000

Configuration: One hot wire explosive gas sensor

One to three other electrochemical, semi-conductor(BRH) or infra-red(CO2) sensors

Gases Detected: See table of characteristics of sensors

Figure 4-1: Characteristics of OMNI-4000 Sensor

	Expl	O2	O3	CL2	CLO2	CO	BRH	H2	H2S	HCL	HCN	NH3	NO	NO2	ETO	SO2	CO2
Standard range (1)	0-100% LEL	0-30%	0-3	0-10	0-3	0-1000	0-500	0-2000	0-100	0-30	0-10	0-100	0-300	0-30	0-30	0-30	0-5%
Response time (5)	< 20	< 20	< 60	< 60	< 60	< 30	< 60	< 70	< 60	< 90	< 60	< 60	< 30	< 30	< 70	< 25	< 30
Temperature range (6)	-20 +75	-10 +40	-10 +40	-10 +40	-10 +40	-10 +40	-10 +40	-10 +40	-10 +40	-10 +40	-10 +40	-10 +40	-10 +40	-10 +40	-10 +40	-10 +40	-10 +40
Sensor life (7)	24	18	18	30	18	30	30	34	30	30	18	18	30	30	24	24	48
Guaranteed (8)	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	

(1) In ppm except for flammable gasses, oxygen and CO2.

(5) In seconds to 90% of final value.

(6) In C (without display).

(7) Average life in months.

(8) In months.

Measurements: Continuous for all operational sensors

Sensors; Electrochemical:

Interchangeable preset units

Automatic recognition by device (EEPROM)

Display: Alphanumeric LCD, 2 lines of 16 characters

Plain messages

Display Backlight: Timed

Optional Switchover of Explosive Gas Detection Ranges:

Automatic for "% Gas" scale to "% Volume" scale; must have an oxygen sensor installed

Sensor Failure Identification by individual indicator lamps

Plain language messages

Corresponding display "frozen." Other channels operational

Continuous audio and general visual alarm

NI-CAD Battery Failure Plain language display

Continuous audio and general visual alarm

Operational Checks Automatic calibration on request (optional)

Self-test on start-up

Audio and visual signals every 30 seconds

Readings displayed plainly

Alarms **Explosive Gas:** One instantaneous threshold adjustable over the 0-50% LEL range.

Oxygen: Two instantaneous thresholds adjustable over the full measurement scale of the sensor (oxygen depletion and abundance)

Toxic (per sensor):

- One instantaneous alarm threshold adjustable over the full measurement scale
- One TWA threshold
- One STEL threshold

Alarm Information	General audio and visual alarm (display, indicator lamp) Individual channel alarms (alarm or fault) Explosive Gas range switchover indicator (% Gas - % Volume) Plain language display on fault or alarm per channel
Outputs	Optional OMNI-4000/serial printer connector. Optional interface for parallel printer OMNI-4000/PC compatible link
Associated Software	Maintenance and monitoring software for LOTUS, EXCEL, etc. data bases
Power Supply	NI-CAD battery pack, replaceable in hazardous atmosphere Lithium battery for data storage
Recharging Time	NI-CAD battery pack only: 12-14 hours with standard charger. 5 -6 hours with dual rate charger.
Tightness:	IP 64
Weight:	Approximately 1 kg
Dimensions:	194 x 119 x 58 mm
Approval:	EEX ia IIC T4 CSA 22.2 152-M1984
Accessories:	110 VAC, 220 VAC, or 12 VDC standard charger 110 VAC dual rate charger Earphones for noisy environments Automatic sampling pump Manual sampling pump Aspirators with and without probe Calibration kits

Table 4-2: OMNI-4000 Battery Life for Configuration

OMNI-4000 Configuration	Battery Life in Hours
Combustible sensor + CO2 + Other toxic sensors	12
Combustible sensor + toxic sensors	45
Combustible sensor + CO2 + BRH + other toxic sensors	8
Combustible sensor + BRH + toxic sensors	16
Combustible sensor + CO2 + other toxic sensors + BP21(pump)	8
Combustible sensor + toxic sensors + BP21(pump)	12
Combustible sensor + CO2 + BRH + toxic sensors + BP21(pump)	6
Combustible sensor + BRH + toxic sensors + BP21(pump)	9

5.0 WARRANTY

ENMET warrants new instruments to be free from defects in workmanship and material under normal use for a period of one year from date of shipment from ***ENMET***. The warranty covers both parts and labor excluding instrument calibration and expendable parts such as calibration gas, filters, batteries, etc... Equipment believed to be defective should be returned to ***ENMET*** within the warranty period (transportation prepaid) for inspection. If the evaluation by ***ENMET*** confirms that the product is defective, it will be repaired or replaced at no charge, within the stated limitations, and returned prepaid to any location in the United States by the most economical means, e.g. Surface UPS/RPS. If an expedient means of transportation is requested during the warranty period, the customer is responsible for the difference between the most economical means and the expedient mode. ***ENMET*** shall not be liable for any loss or damage caused by the improper use of the product. The purchaser indemnifies and saves harmless the company with respect to any loss or damages that may arise through the use by the purchaser or others of this equipment.

This warranty is expressly given in lieu of all other warranties, either expressed or implied, including that of merchantability, and all other obligations or liabilities of ***ENMET***, which may arise in connection with this equipment. ***ENMET*** neither assumes nor authorizes any representative or other person to assume for it any obligation or liability other than that, which is set forth herein.

NOTE: When returning an instrument to the factory for service:

-- Be sure to include paperwork.

--A purchase order, return address and telephone number will assist in the expedient repair and return of your unit.

-- Include any specific instructions.

-- For warranty service, include date of purchase

-- If you require an estimate, please contact ***ENMET*** Corporation.