

English

MX2100

OPERATING AND MAINTENANCE MANUAL



CE
Fabrication
française

OLDHAM
Group

OLDHAM S.A.

GAS DETECTION *GAS and DUST* EMISSION ANALYSIS

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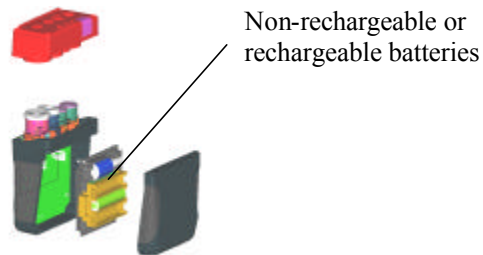
I. INTRODUCTION

- The MX 2100 is a portable gas detector that can be used in explosive atmospheres in surface industries (Group II) and in mines containing firedamp (Group I).
- Its basic function is the simultaneous detection of **four gases** present in the air and this can be extended to **six gases**.
- These gases can be explosive, toxic or oxygen.

1. POWER SUPPLIES

1.1. General power supply

The MX 2100 is power-supplied by a rechargeable battery pack (NiMH) or non-rechargeable AAA alkaline batteries. In normal service conditions, operating autonomy varies according to the configuration (cells) and the power supply (rechargeable or non-rechargeable batteries) with a standard autonomy of 14 hours.



1.1.1. Recharging of the battery pack

With an intelligent battery charger integrated in the appliance (see the section on CHARGERS).



Average charging time: 2 hours 30 minutes

1.2. Memory saving

A second lithium battery ensures the storage of the MX 2100's specific data, such as when the main battery set is completely discharged. This lithium battery has an average service life of five years.

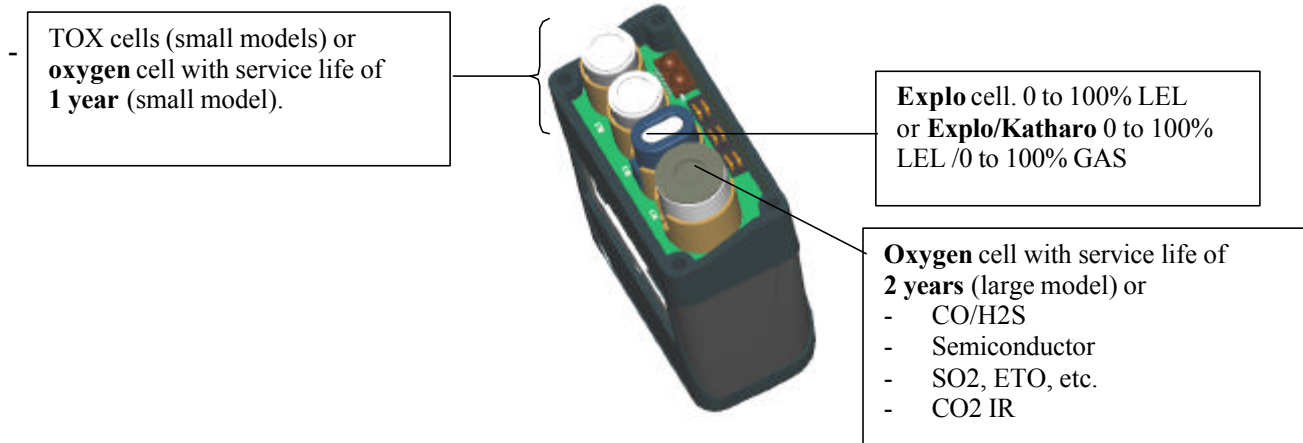
IMPORTANT: The appliance is certified for utilization in explosive atmospheres in Groups I and II, and only when it is equipped with non-rechargeable or rechargeable batteries of a type recommended by the manufacturer.

2. MEASURING CELLS

IMPORTANT: The intelligent cell units shall be:

- connected before switching on the MX 2100
- interchangeable outside area.

2.1. Layout of cells on top of appliance: examples of configuration



2.2. Explosimetric cell

This removable, interchangeable and intelligent cell unit can detect explosive gases in the range 0 to 100% LEL and/or 0 to 100% by volume, as applicable.

It is equipped with a cell body and filaments, and **must** be positioned in the MX 2100 as indicated above.

2.3. Toxic gas and oxygen metering cells

These removable, interchangeable and intelligent cell units are fitted with an electrochemical cell and electronic components, including an EEPROM memory in which OLDHAM has stored the cell's specific characteristics (measuring range, various correction coefficients, STEL and TWA alarms, date of manufacture, serial number, etc.). Another item of data called the "wear rate" is used by the MX 2100 to automatically determine the optimal time to replace the cell.

These types of cell unit are therefore also referred to as "intelligent units". They are positioned as indicated above (see section 2.1).

3. DISPLAY UNIT

This is an LCD type display unit which lights up automatically in backlit mode in case of alarm or fault.

It is also a graphic display unit so as to optimize the readability of measurements.

Its displays measurements:

- 5 measurements with units and types of gas,
- indication of the channel to be calibrated, where applicable.

It also displays parameters:

- date and time,
- minimum – maximum,
- mean STEL and TWA values,
- remaining autonomy (by bar graph),
- roundsman (name).

4. VISUAL INDICATIONS

A set of indicator lights installed on the top of the appliance indicates alarms which can be seen from every direction, whatever the working environment.

5. AUDIO ALARMS

The user is also warned by a built-in buzzer when an alarm is triggered.

N.B. On option, the MX 2100 can be equipped with a vibrator.

6. REMOTE SAMPLING

The MX 2100 can be equipped with a sampling system to measure gas concentrations either in normally inaccessible locations or before entering places which may be contaminated by gas (such as tanks, sewers or tunnels).

6.1. Electric pumping system BP2100

The snap-in pump unit is fitted to the top of the appliance, like the charger unit.



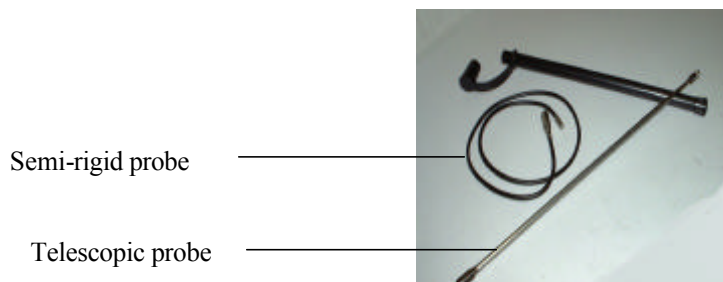
6.2. Manual pumping system



By using the charge unit equipped with an air inlet (olive), it is also possible to connect up a manual pumping system (tube/bulb/probe).

6.3. The various probes

The "manual" or "electric" sampling systems can be equipped with various probes.



CAUTION: The semi-rigid sensor cannot be used in explosive atmospheres as it may generate sparks by electrostatic discharges.

7. CARRYING THE MX 2100: OPTIONS

7.1 Positioning the appliance

The person carrying the appliance can:

- either go about his or her work, leaving the MX 2100 to monitor the atmosphere (MX 2100 used as beacon),
- or take measurements at various locations with a sampling system (MX 2100 on shoulder strap).

In order to be able to carry out the measurements correctly, the MX 2100 cells must always be unobstructed. If this is not the case, gas contents could be underestimated and this could be fatal to the user.

7.2 MX 2100 as beacon

The MX 2100 must be placed in the vertical position.

According to the type of gas to be detected or liable to be present, the appliance should be placed:

- on the ground in order to detect heavy gases (H₂S),
- at mid-height (about one meter above the ground) or at the outlet of a ventilation port for general detection of a maximum gas level or monitoring of oxygen,
- in a high position for the detection of light gases (hydrogen).

7.3 MX 2100 on shoulder strap

The MX 2100 can be used fitted with a clip, a belt clip, a harness, a case or a bag.

These accessories avoid the cells being placed against clothing, so that the gas exchange openings are unobstructed.

8. COMMUNICATION SOFTWARE COM 2100

This software is used to supervise and maintain the MX 2100:

- display, in uncoded mode, of measurements and parameters on channels,
- diagnostic assistance in case of failure,
- programming of the appliance and measuring channels,
- management of options,
- calibration of channels by automated dropdown menu,
- output of status and check sheet,
- management, display and printout of events and measurements stored,
- protection by password.

The MX 2100 can be connected to a computer via a cable equipped with an infrared port which is plugged into the charger module.



9. "TWINCALL" CALIBRATION STATION

Checking and maintenance of the MX 2100 can be performed using a calibration station. This station consists of an automatic gas injection system managed by a computer and connected to control devices via the COM 2100 software.

This station can be equipped with one or two gas cylinders depending on the appliance's configuration.

10. "TWINCALL" TESTBENCH

Checking of the MX 2100 can be performed using a testbench which delivers test gases to the MX 2100 in order to place the channels in alarm status.

The MX 2100 detects the presence of the bench and indicates, on the display unit, the faulty channel or channels where alarms were not triggered.

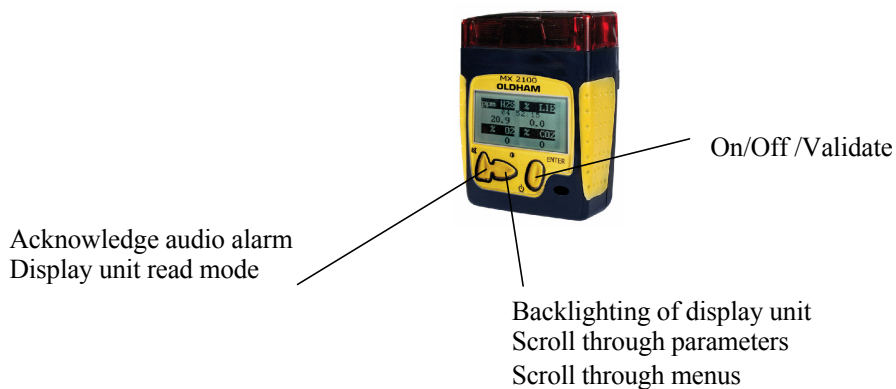
This testbench can be equipped with one or two gas cylinders depending on the appliance's configuration.

II. UTILIZATION

1. FUNCTIONS of keys: accessible below the display unit on the appliance's front panel



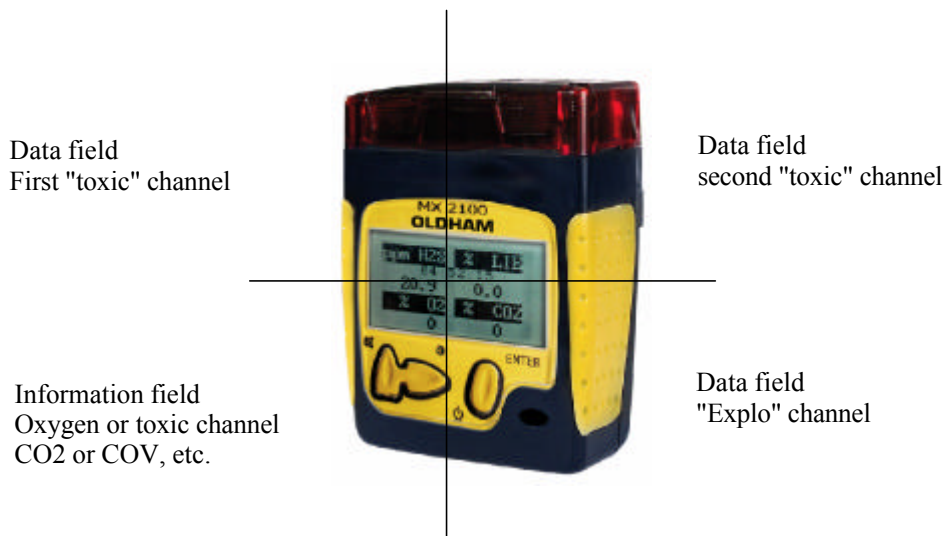
- Switch the appliance ON or OFF.
- Read mode on display unit.
- Acknowledge the gas audio alarm.
- Backlighting of display unit (extinguished automatically after about 15 seconds).
- Scroll through parameters.
- Select menus during utilization phase.
- Access the Maintenance level.
- Validate.



2. READING MEASUREMENTS

The gas content measured by each of the cells "in service" can be consulted on the alphanumeric display unit. This is divided into four separate areas, each one corresponding to a "measuring channel".

Example:



- A maximum of four measurements can be displayed simultaneously.

In each field, the measurement is displayed as follows:

- Measurement, measuring unit and gas symbol

The time is also shown at the bottom of the display unit.

Remark: The display unit can be manually programmed for reading from the front or from the top, depending on how the appliance is carried by the user (on belt, in pocket, etc.).

This operation is performed by holding down the "acknowledge audio alarm" key for 3 seconds.

If five channels are used, the display in the last position will alternate.

If there are no toxic cells, the Oxygen and Explo. measurements will be displayed at the top of the dial.

3. SWITCHING ON

REMINDER: Before switching on the MX 2100, check that the necessary cells are connected.

When you switch the appliance on, you have a choice of two procedures:

- a standard procedure adopted in most cases,
- a procedure allowing you to select a reference explosive gas, this procedure being useful when checking for a specific gas (town gas, methane, etc.).

3.1. Switching on in standard mode

- Briefly press the "On/Off/Enter" key.



- The appliance carries out a visual and audio test phase for a few seconds and indicates:
 - the Oldham logo,
 - the version of the "appliance" software, date, code and serial number (according to the product version selected by the customer),
 - the preprogrammed values of the alarm thresholds for each measuring channel (according to the product version selected by the customer),
 - measurements currently performed.

Note: When the appliance is operating, a visual and audio signal indicates that the MX 2100 is operating correctly. This signal can be cancelled or the interval between each signal can be modified, as required.

3.2. Switching on with choice of reference explosive gas

- Hold down the "lighting" or "acknowledge" key.
- Switch on the appliance by pressing the "On/Off/Enter" key.
- Release the key on the two fields.
- The display unit shows the Oldham logo for a few seconds while it performs its self-tests.
- It then displays the list of preprogrammed gases, with the currently selected gas in the dark field.



Choosing a new reference gas:

- Each time you press the "Acknowledge" key, the list scrolls downwards and, each time you press the "Lighting" key, the list scrolls upwards. Thirty-one reference gases are preprogrammed in the range 0-100% LEL (or 0-5% volume CH₄). A thirty-second (32) "Autre" (Other) lets you select a gas according to your specific requirements. The data specific to that gas are entered in the workshop.
- Accept the choice: when the chosen gas is displayed, press the "ENTER" key.

The appliance switches to "Testing" mode, as described in the previous section, before going on to the working phase. The reference explosive gas is now the gas that was selected.

If you do not validate any gas, after a certain time, the MX 2100 switches to the test phase and to the normal scanning phase without changing the reference gas, so that the procedure is aborted.

- If the tests are unsatisfactory, the appliance switches to alarm mode (rapid discontinuous audio signal and flashing alarm light).

The appliance is ready to use.

4. SWITCHING OFF

The appliance is switched off by holding down the "On/Off" key for three seconds.



During this time, the countdown "Arrêt 3,2,1" (Stop, 3, 2, 1) is displayed on the display unit, at the bottom of the dial, before it is switched off.

When the appliance is switched off, the memorized values (cell adjustment data, alarm thresholds, histogram, etc.) are not lost.

The theoretical storage time for these values is two years (provided that the main batteries are never discharged).

When the appliance is returned to the workshop, it is useful to recharge the batteries or to print out the exposure histograms.

5. DISPLAY UNIT LIGHTING

Measurements can be read in dark places by pressing the "Lighting" key.



The display unit is then lit up in backlighting mode so the data can be read easily. This lighting is automatically deactivated after 30 seconds.

The lighting function can be used in dangerous environments, i.e. containing explosive gases as the MX 2100 guarantees intrinsic safety.

The display unit backlighting is automatically activated in case of alarm or fault.

6. SCROLLING THROUGH MEMORIZED PARAMETERS

When the appliance is in normal operating mode, you can consult a series of data on gas measurements and also the appliance's internal data (battery voltage, date and time).

With the appliance in normal operating mode, press the "lighting" key repeatedly to scroll through the parameters for each measuring channel.



- Display unit backlighting and date display
- Current location: name (currently used) and time. This line is displayed if the appliance is equipped with the "roundsman" option. (See section 6.1.)
- Remaining autonomy
- Time
- Indication of minimums detected by each cell
- Indication of maximums detected by each cell
- STEL of each "toxic" channel
- TWA of each "toxic" channel
- The message stating "Entrez le code de maintenance" (Enter maintenance code): to access maintenance menus, specify the four-figure code with the "Acknowledge" and "Lighting" keys.



- If the code validated is incorrect: return to normal display.
- To quit the list before the end: press the "Acknowledge" key.

6.1. "Roundsmen" function

If the appliance is equipped with the "Roundsmen" function (which is optional), a list of names can be preprogrammed using the COM 2100 software and it can be consulted manually via the keypad.

In the list of parameters, when you display "Localisation courante" (Current location) and the name used, you can then validate another name, as follows:

- Current location / name,
- Enter,
- Scrolling through preprogrammed list downwards or upwards with keys:



- Enter (to validate the new name),
- Acknowledge (to return to normal mode).

7. ALARMS

- Visual alarms: messages in uncoded mode on the display unit, indicator lights
- Audio alarms: buzzer and vibrator (optional)

Common indicators for
gas alarms and faults



Types of alarms:

Alarm 1:	two-tone slow
Alarm 2:	two-tone fast
Fault:	single-tone

7.1 "Gas" alarms

Depending on the programming used and the type of gas, the "gas alarms" can be triggered on exceeding a preset value:

- 2 instantaneous thresholds per channel for Explo, Tox or Oxygen,
- High and low thresholds on Oxygen channel (2 low thresholds on option),
- 1 instantaneous threshold on the katharometric channel,
- Exposure limit (STEL) corresponding to a sliding average over 15 minutes (depending on the country) for each channel equipped with a toxic gas cell,
- Mean exposure (TWA) corresponding to a sliding average over eight hours for each channel equipped with a toxic gas cell.

In this way, as soon as the predefined alarm thresholds are exceeded on at least one channel, the MX 2100 triggers an audio and light signal. The alarm message or messages (FAULT, ALARM, TWA, STEL, min., etc.) and the measurement value in the corresponding field appear on the display unit.

7.2 Fault alarms

Faults can be classified into two categories:

- Faults concerning cells: out of range, worn cell, request for calibration in case of a major deviation during auto-adjustment. These faults generate individual messages displayed on the relevant quadrant of the display unit, a visual alarm and a continuous audio alarm.
- Faults concerning the appliance itself (discharged batteries or electronic fault). The corresponding fault message appears at the bottom of the display unit. It takes priority over all other messages concerning the cells.

Examples of information which may be brought to the user's attention

❖ "Flat batteries"

- The batteries must be charged.
- The remaining autonomy is about 20 minutes after which the appliance will automatically shut down.

This alarm cannot be acknowledged, only the audio signal can be cancelled.

❖ "> 100% LEL: outside range"

- This concerns only the explosimetric channel.
- In this case:
 - The display in the quadrant concerned is frozen,
 - it is impossible to acknowledge the continuous audio signal,
 - the general alarm indicator lights come on in steady mode.
- Normal operating conditions can be restored by stopping and restarting the MX 2100.
- Caution must be exercised in the area owing to the presence of explosive gases exceeding LEL.

❖ "Outside range"

- Scale exceeded by 20% in negative direction, with display of negative.
- Scale exceeded by 120% for toxic gas and oxygen.

❖ "New calibration"

- Automatic adjustment of the zero is impossible owing to, for example, excessive deviation of the zero on the cell.
- Replace the cell concerned.

7.3 Acknowledging alarms

7.3.1. Acknowledging gas alarms

This does not cancel the gas alarm but only the fast audio signal. When the "Acknowledge" key is pressed:



The fast audio alarm is stopped but the alarm indicator light continues flashing until the measurement is lower than the programmed alarm threshold. The visual signal is automatically extinguished as soon as the measurement returns within the defined limits.

A function automatically resetting the audio alarms after a given time if presence of gas persists is available on option.

7.3.2. Acknowledging fault alarms

It is impossible to acknowledge a fault alarm.

Fault alarms are cleared automatically as soon as the fault has disappeared.

8. MEASUREMENTS

8.1. Display of instantaneous measurements

8.1.1. In "natural diffusion" mode

All the instantaneous measurements regarding gases is displayed in continuous mode.

The display unit is divided into four separate fields (quadrants).

The following information can be read:

- measurement which is displayed continuously,
- the measuring unit preceding the gas symbol.

8.1.2. With electric pumping systems

- Before taking a reading, wait for the measurements to stabilize. They will be either overestimated (explosive gases) or underestimated (oxygen) during pumping owing to the movement of air.
- When an electric pump is used, wait a few seconds before reading the measurement. Any fault on the pumping system will be indicated by an audio alarm and the display unit.



8.1.3. With manual pumping systems

Before taking a reading, wait for the measurements to stabilize. They will be either overestimated (explosive gases) or underestimated (oxygen) during manual pumping (with bulb) owing to the movement of air and the bleeding of the system.

8.2. Automatic switching to "0-100% GAS" range

An option provides for automatic switching from the measurement of explosive gases in the "0-100% LEL" range to the "0-100% GAS" range when the measurement exceeds 100% LEL for the selected reference gas. This measurement can only be used on an appliance equipped with a "Explo/Katharo" cell.

8.3. Memorizing histogram measurements

Depending on the version, the MX 2100 can memorize measurements so they can be restored later on a computer.

The "Histogrammes" (Histograms) function can be used to output values and events memorized by MX 2100 during its operating period to a computer (a workstation, for example). Resetting of the data contained in the histogram memory can only be performed with a computer. Switching off the MX 2100 has no effect on memorized data.

8.3.1. Operating principle

To make the best possible use of the data output when histograms are printed, you must understand the operating principle of data memorization.

Items memorized:

The MX 2100 stores sets of data when it is switched on and then in cyclic mode. Each of these data sets has the same structure and contains the following:

- the mean measurement of concentrations on each sensor in operation over a preprogrammed duration (one sampling operation per second);
- the events on each channel:
 - resetting,
 - fault,
 - instantaneous or mean alarms,
 - types of maintenance requested (programming, calibration, cell replacement),
 - date and time,
 - battery in discharged state,
 - auto-adjustment request,
 - maintenance function request.

Memory capacity:

As the physical memory of the MX 2100 is limited, the number of measurements that can be stored is also limited and, therefore, so is the operating time.

If the quantity of data to be memorized exceeds the MX 2100 storage capacity, the oldest data are lost. In other words, the memory freed is used to memorize new data.

Readable items

The appliance calculates a mean value over a one-minute period for each channel in service and for each second. These averaged data are stored in memory. The MX 2100 serial port can be used to connect:

- a PC type computer to read the measurement mean values.

Data storage time

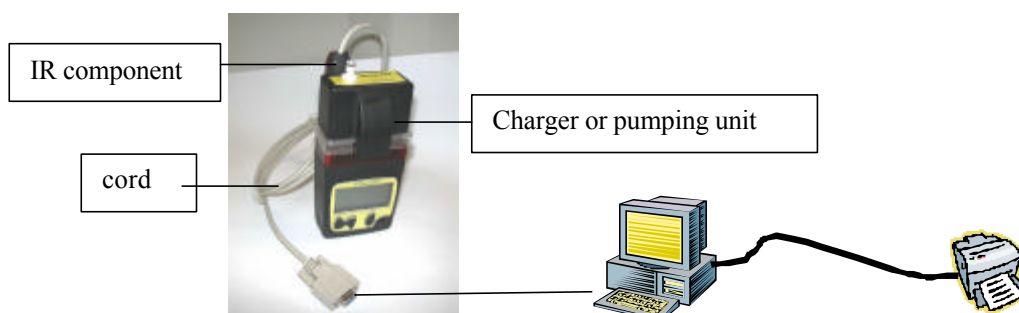
The data stored by the MX 2100 are stored even if the appliance is not used for a long time (out of service).

9. PRINTING DATA (VIA COM 2100)

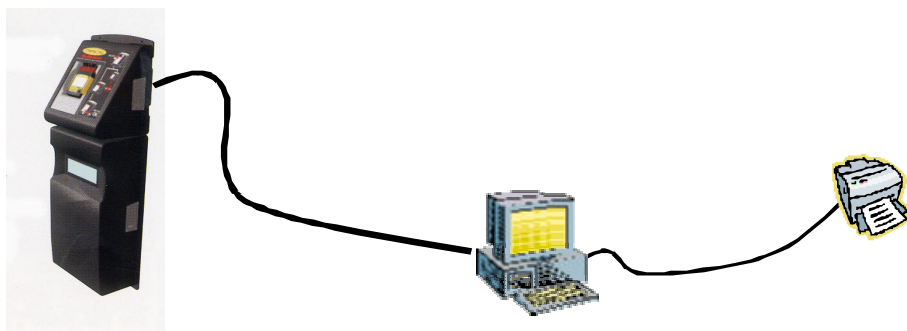
The data stored in memory can be printed on a printer connected to a computer.

There are two possible cases, as follows.

- 1) MX 2100 connected directly to a computer by a cord equipped with an infrared link: a "charger or pumping" module can be used to hold the infrared system on the appliance.



- 2) MX 2100 integrated in a "Twincall" calibration station which is, itself, connected to a computer and a printer.



III. SPECIAL INSTRUCTIONS FOR USE IN ATEX EXPLOSIVE ATMOSPHERES

The MX 2100 can be used in explosive atmospheres in Group II surface industries and Group I mines containing firedamp.

Depending on the type of cells used on the appliance, the MX 2100 covers the following categories:

- a) Appliance equipped with any type of cell unit except CO₂ infrared unit and MOS unit
 - Surface industries: Category 1G, utilization in zones 0, 1 or 2
 - Mines containing firedamp: Category M1, utilization for all gas content levels
- b) Appliance equipped with any type of cell unit and CO₂ infrared unit and MOS unit
 - surface industries: Category 2G, utilization in zones 1 or 2
 - Mines containing firedamp: Category M2, utilization below a gas limit value

The following operations are **prohibited** in explosive atmospheres:

- opening of the appliance: cell cover or rear cover,
- replacement or recharging of batteries,
- link-up with a computer.

When the appliance is recharged using a charger other than that supplied by Oldham, its characteristics must be such that it does not exceed a voltage of 30 V DC and a current of 30 A.

Non-rechargeable and rechargeable batteries must be replaced with original parts recommended by the manufacturer.

All servicing, adjustment and maintenance operations must be performed by duly approved personnel.

IV. MAINTENANCE

IMPORTANT:

The MX 2100 is a safety appliance and, therefore, it must be calibrated at least once a year and according to its utilization. The user will automatically receive a maintenance reminder every six months.

These operations, explained in this section, must be performed by authorized, qualified personnel only as they could adversely affect detection safety.

1. Access to maintenance menus on MX 2100

With the appliance in operation, menus can be accessed in the following manner:

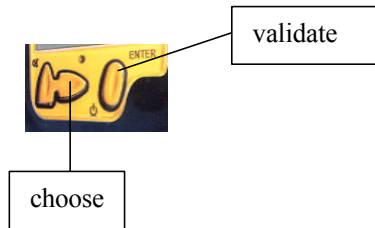


Scroll through the parameters with this key until a request for an access code appears.

The access code is in four figures. Scroll to each figure with the "lighting" key, select the figure with the "Acknowledge" key and then validate the access code (given by Oldham) with the "ENTER" key.

The list of available menus is then displayed:

- programming,
- calibration,
- auto-zero,
- date and time,
- exit.
-



1.1 Channel programming menu

This is used to:

- Select the channel to be programmed.
- Switch the selected channel ON or OFF.
- Inform the operator of the type of cell for the measuring range.
- In the case of an explosimetric cell (1), to select the type of reference gas from 31 preselected gases or to enter the coefficient of a 32nd gas and program instantaneous thresholds.
- When an oxygen cell is used, to program the "min." and "max." alarm thresholds.
- When a toxic gas cell is used, to program instantaneous thresholds.
- When a katharometric cell is used, to program the low instantaneous threshold.

		LEL		UEL	Density	Standard coef.	Range coef., 'All gases'	German standard coef.	German coef., 'All gases'
		LEL France	Germany						
Ethyl acetate	C4H8O2	2.10%	2.20%	11.50%	3	1.70	1.05	1.62	1.00
Acetone	C3H6O	2.15%	2.50%	13%	2.1	0.00	0.00	0.00	1.05
Acetylene	C2H2	1.50%	2.30%	100%	0.9	0.00	0.00	0.95	0.60
Butadiene	C4H6	1.40%	1.40%	16.30%	1.85	0.00	1.00	0.00	1.00
Butane	C4H10	1.50%	1.40%	8.50%	2	1.91	1.20	2.00	1.25
Butanone	C4H8O	1.80%	1.80%	11.50%	2.5	0.00	1.35	0.00	1.40
Cyclohexanone			1.00%			0.00	2.50		
Dimethyl ether	C2H6O	3.00%	2.70%	27.00%	1.6	0.00	0.00	2.10	1.30
Prem.petrol/gasol	Mixture	1.10%	0.60%	? 6 %	3 à 4	3.15	2.00	4.50	2.80
Ethanol	C2H6O	3.30%	3.10%	19.00%	1.6	1.66	1.05	1.77	1.10
Ethylene	C2H4	2.70%	2.30%	34.00%	0.98	0.00	0.80	0.00	0.95
LPG	Prop+But	1.65%	1.65%	? 9.0 %	1.85	2.30	1.45	2.30	1.45
Gas oil	Mixture	0.60%	0.60%	? 6.0 %	> 4	0.00	3.90	5.00	3.10
Natural gas	CH4	5.00%	4.40%	15.00%	0.55	1.05	1.05	1.15	0.75
Hexane	C6H14	1.20%	1.00%	7.40%	3	0.00	0.00	2.50	1.55
Hydrogen+B26	H2	4.00%	4.00%	75.60%	0.069	1.10	0.70	1.10	0.70
Isobutane	C4H10	1.50%	1.30%	? 15 %	2	0.00	1.25	2.25	1.40
Isopropanol	C3H8O	2.15%	2.00%	13.50%	2.1	2.26	1.40	2.40	1.50
Kerosene (JP4)	C10 - C16	0.70%	0.70%	5.00%	> 4	5.00	3.15	5.00	3.15
Methane	CH4	5.00%	4.40%	15.00%	0.55	1.00	1.00	1.14	0.75
Methanol	CH3OH	5.50%	5.50%	44.00%	1.1	1.60	1.00	1.60	1.00
Methyl amine	CH3NH2	4.90%	4.20%	20.70%	1.1	2.00	1.25	2.30	1.45
Octane	C8H18	1.00%	0.80%	6.00%	3.9	2.46	1.55	3.00	1.90
Propylene oxide	C3H6O	2.30%	1.90%	?	2	0.00	0.00	0.00	1.90
Ethylene oxide	C2H4O	2.60%	2.60%	100%	1.5	0.00	1.65	0.00	1.65
Pentane	C5H12	1.40%	1.40%	8.00%	2.5	2.10	1.30	2.10	1.30
Propane	C3H8	2.00%	1.70%	9.50%	1.6	1.57	1.00	1.80	1.15
Propylene	C3H6	2.00%	2.00%	11.70%	1.5	0.00	0.95	0.00	0.95
Toluene	C7H8	1.20%	1.10%	7.00%	3.1	2.47	1.55	2.69	1.70
White spirit	Mixture	1.10%	1.10%	6.50%	> 2	5.00	3.15	5.00	3.15
Xylene	C8H10	1.00%	1.10%	7.60%	3.7	3.00	1.90	2.75	1.75

(1) List of main preprogrammed gases. Coefficients are given with respect to methane.

- If the selected gas is "Autre" (Other), a multiplying coefficient must be entered. (See Table 2).

Table 2 contains the coefficients for gases which do not have their coefficients entered in the appliance on a standard basis.

These coefficients, to be programmed for the "Autres gaz" (Other gases) channel, are calculated with respect to methane, as the appliance systematically recalculates the values of sensitivity coefficients with respect to that gas.

Table 2: Supplementary sensitivity coefficients to be programmed for the MX 2100 "other gases" channel

Gas	Empirical formula	LEL	UEL	Vapour density	Coefficient /CH4
Benzene	C6H6	1.2 %	8.0 %	2.7	2.2
Cyclohexanone	(CH2)5CO	1.3 %	9.4 %	3.4	3.2
Premium petrol	Mixture	1.3 %	6.0 %	> 2	2.1
Ethane	C2H6	3.0 %	15.5 %	1.04	1.0
LPG	Prop+But	1.65 %	~9.0 %	1.85	1.48
Methylamine	CH3NH2	4.9 %	20.7 %	1.1	1.05
Styrene	C8H12	1.1 %	8.0 %	3.6	2.5
Octane				> 2	3.0

Example of use:

Detection of white spirit with an MX 2100 appliance:

- Select "Autre gaz" (Other gas) on the explosimetric channel.
- Program the coefficient = 3.0.
- Select the standard gas. If it is white spirit, select "Autre" (Other) as the standard gas.
- Calibrate the appliance in the normal way, specifying the content for the standard gas used.

1.2. Cell calibration menu

This menu is used to regularly calibrate the cells connected to the appliance.

Calibration consists in adjusting the zero of the clean air cell (free of gas which may be detected by the MX 2100) and adjusting sensitivity with a standard gas of known characteristics (including content, etc.).

1.3. Auto-zero menu

This menu lets you adjust the "zero" of each cell used in the MX 2100 automatically and simultaneously.

Caution: This menu must be used in clean air only.

1.4. Date and time management menu

This menu is used to update the internal calendar and clock of the MX 2100.

These data are used to define time scales, especially when the measurements stored in memory (min., max., STEL and TWA) are printed out or downloaded to an external microcomputer.

Loss of date and time

The electronic circuits for the date and time are supplied with power by a specific lithium battery when the MX 2100 is switched off. This battery has an estimated service life of 3 to 5 years. It must be replaced when that period of time has passed, if the time-keeping is wrong or if the date cannot be stored in memory.

IMPORTANT: This operation is to be performed by OLDHAM or OLDHAM approved personnel only.

1.5. Exit menu

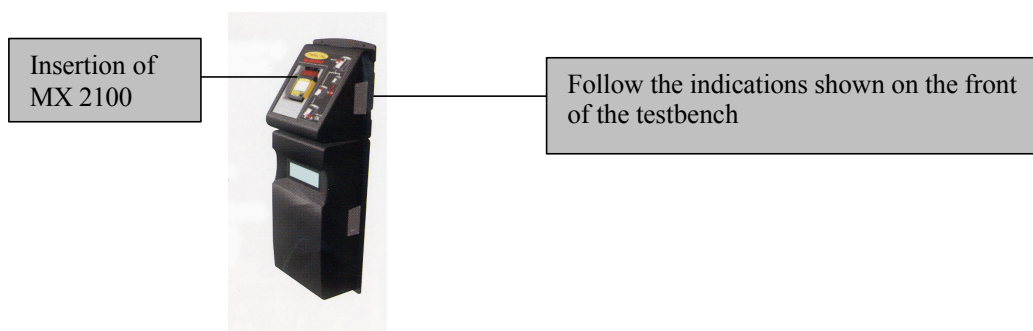
To return to normal user mode.

2. ALARM TEST WITH TESTBENCH

The testbench can be used to regularly check the correct operation of the MX 2100.

This system automatically injects standard gases from two cylinders installed in the testbench in order to trigger the alarms.

The MX 2100 detects the presence of the testbench and indicates the faulty channel or channels according to the test, on the display panel.



3. CALIBRATING CELLS WITH CALIBRATING STATION

Calibration of the MX 2100 cells can also be performed using this automatic gas injection system which is managed by computer and linked to the control devices via the COM2100 software.

Status and check sheets are stored on the computer.

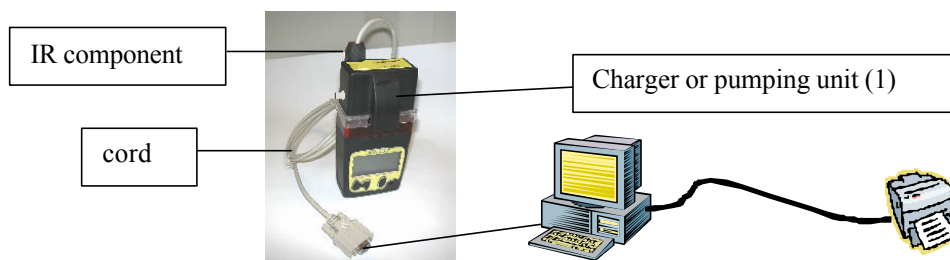
the station is to be used in accordance with the instructions on the front panel (as in the case of the testbench).

V. COM 2100 SOFTWARE

COM2100 software ensures the appliance's supervision and maintenance:

- display, in uncoded mode, of measurements and parameters on channels,
- diagnostic assistance in case of failure,
- programming of appliance and measuring channels,
- management of options,
- calibration of channels using automated scrolling menu,
- output of status and check sheets,
- management, display and printout of stored events and measurements,
- protection by password.

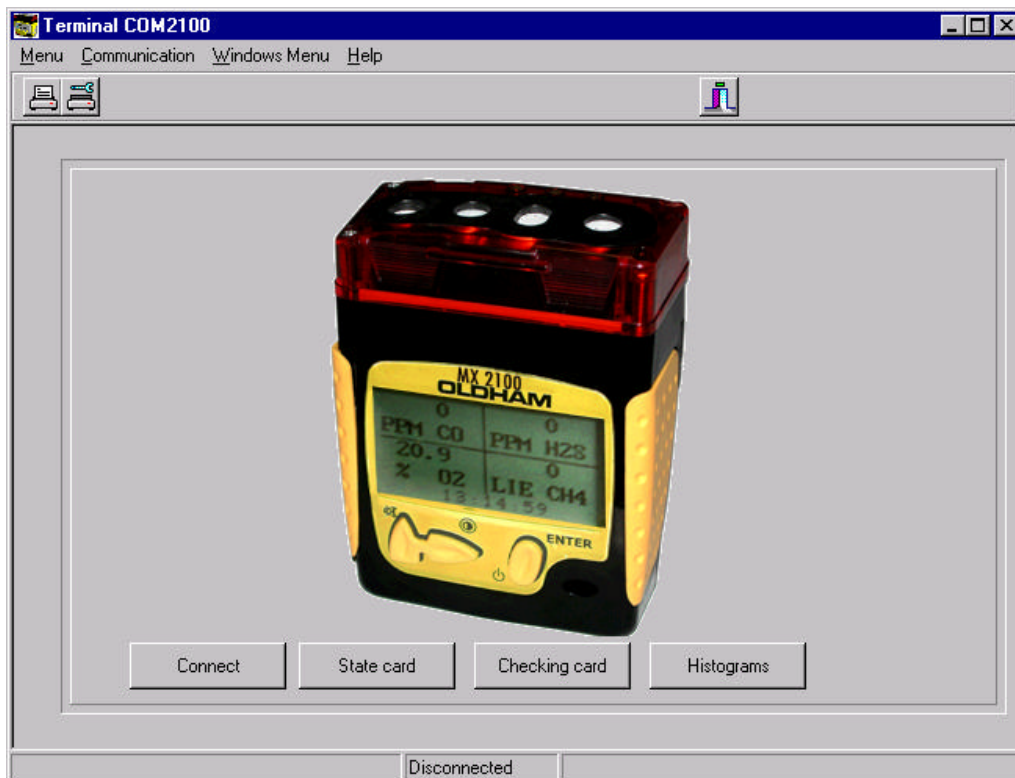
The link between the MX 2100 and the PC is made by an infrared port (cord assembly), as shown opposite:



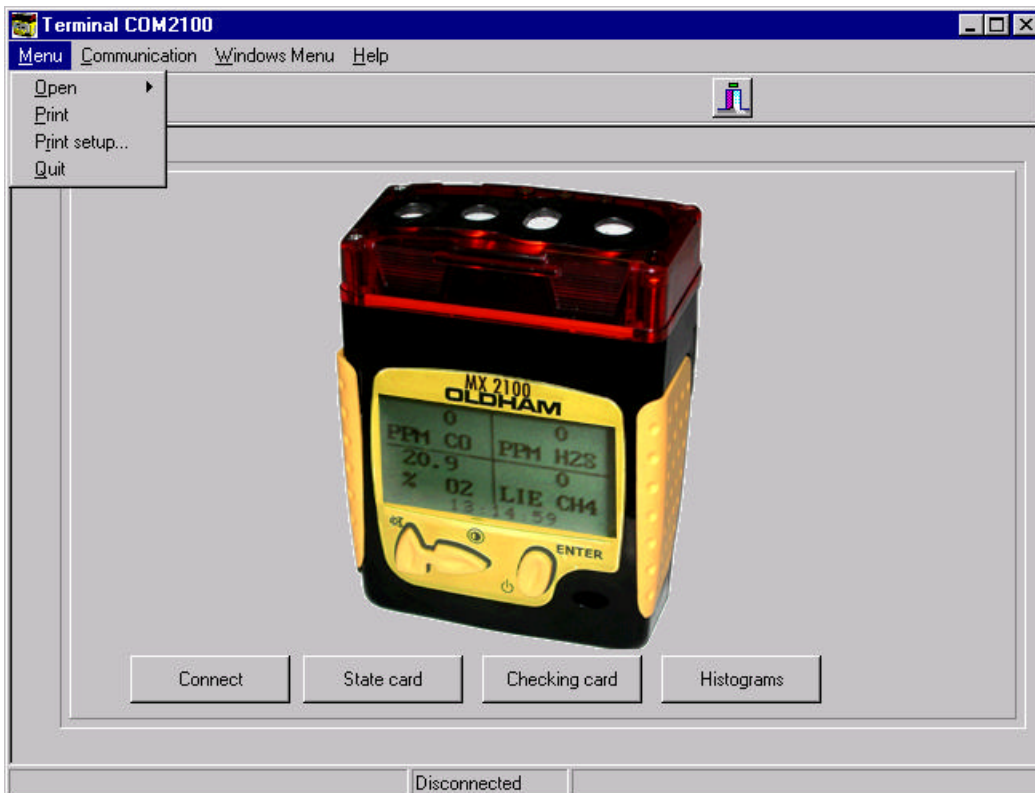
(1) A charger or sampling unit can be used to mechanically hold the IR cord on the appliance.

When the installation operation has been completed and the components are in operation, your working conditions are extremely user-friendly using the available screens. See a few examples below.

Opening screen

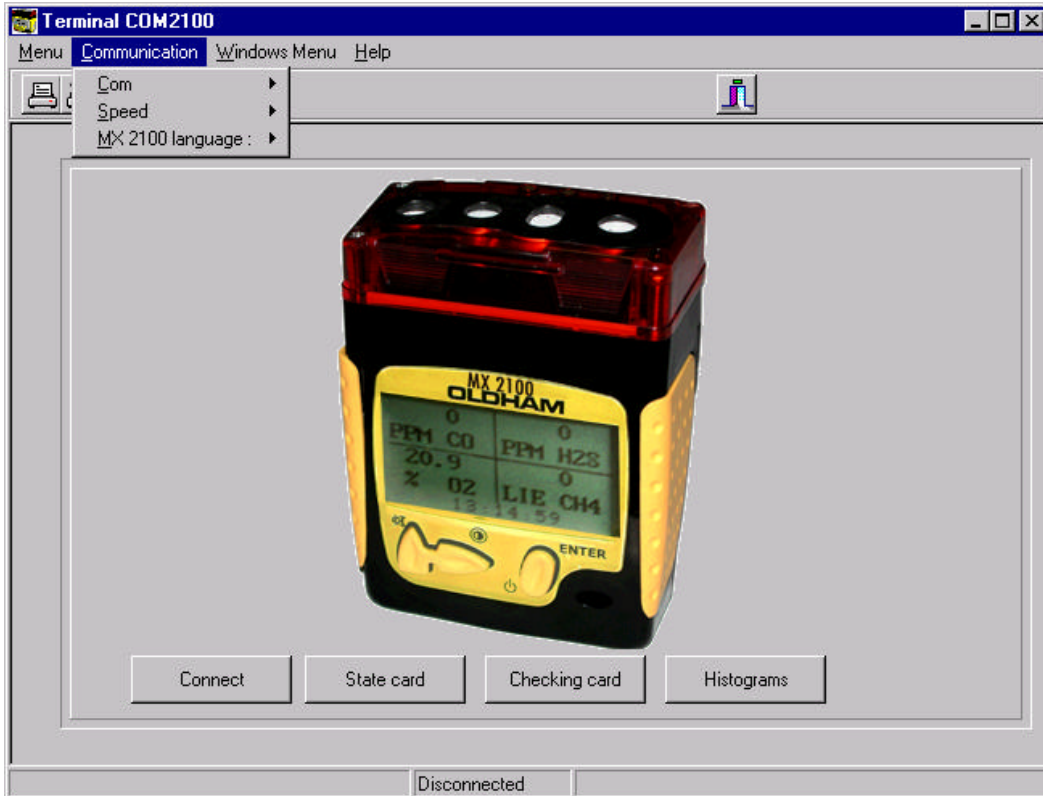


"Fichier" (Menu) screen



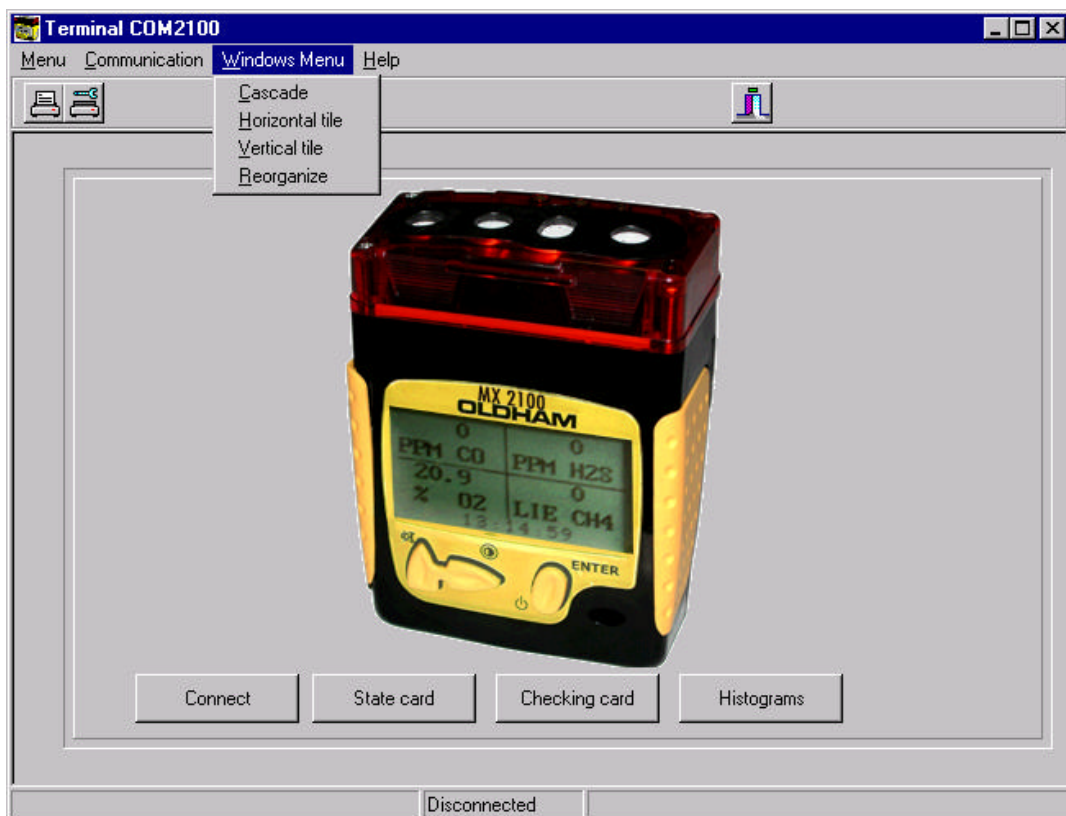
From the "Fichier" (Menu) window, you can open saved files, check and status sheets, and histograms on the computer.

"Communication" screen



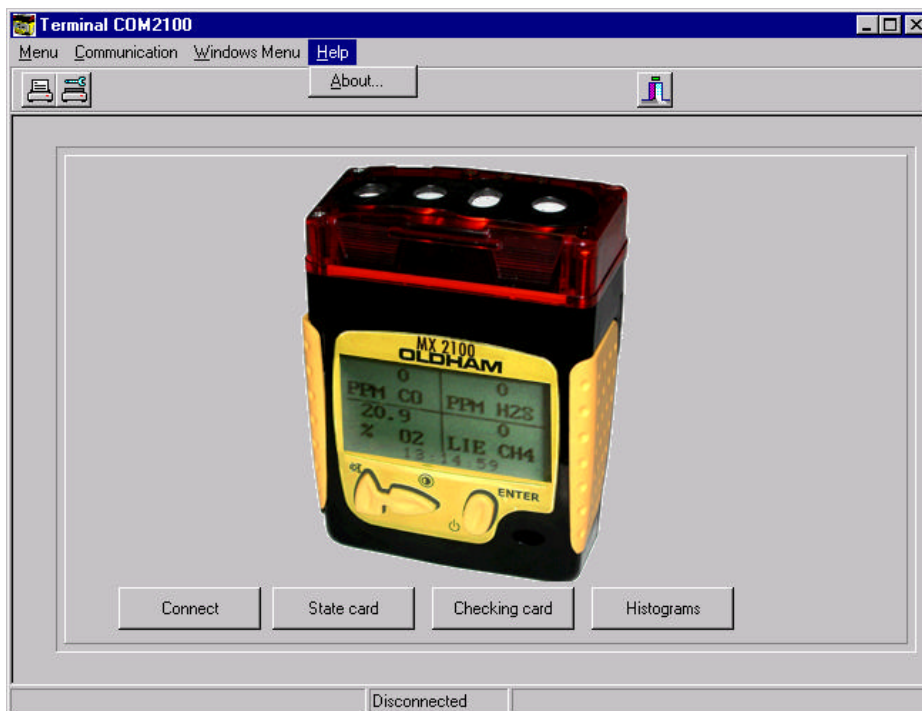
This screen is used to select the port, the communication speed and the language used.

"Fenêtre" (Window) screen



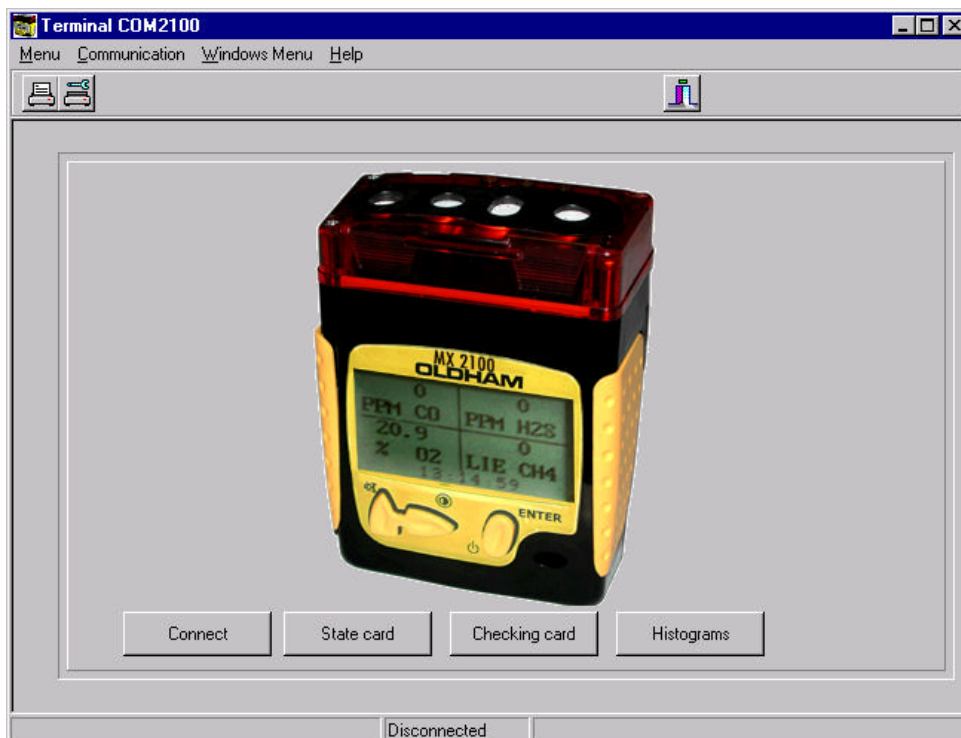
This is used to select the type of screen.

"Aide" (Help) screen



This provides the user with help in the event of problems with operation, consultation or display.

MX 2100 connection



When the MX 2100 is correctly connected to a computer by an infrared cord, this screen can be used to validate communication by looking on the "Connect" window.

- Status sheet: to view and save the configuration of the MX 2100 connected.
- Check sheet: to view and save the status of the connected MX 2100, after tests and adjustments.
- Histories: to view and save measurements made and stored in memory by the MX 2100.

VI. CHARGER MODULE

- Connect the charging module to the top of the appliance as shown in the photo below and charge for at least 2 hours 30 minutes for completely discharged batteries.
- This module can be supplied with power by the 230 V AC mains using an adapter unit or with DC power (12 to 30 V DC).
- Average charging time = 3 hours maximum.



VII. ACCESSORIES

REFERENCE	DESCRIPTION
6121620	Carrying case
6121621	Leather bag
6123597	Protective case
WLOG210	COM 2100 software kit with IR cord
WCE2100	CHARGER supplied with calibrating pipe and power supply unit
6313797	Electric pump module, SI standard
6327918	Sampling kit for electric pump with telescopic probe

VIII. SPARE PARTS

REFERENCE	DESCRIPTION
6111174	Lithium battery
6311081	NiMH rechargeable battery pack
6313787	Co cell
6313788	H2S cell
6313780	O2 cell (2 years)
6313792	Explo. cell, 0-100% LEL
6313817	O2 cell (1 year)
6313818	CO2 cell (0-5%)
6313812	COCL2 cell
6313802	NO cell
6313801	NO2 cell, 30 ppm
6313799	NH3 cell, 100 ppm
6313809	Cl2 cell, 10 ppm
6313804	HCl cell, 30 ppm
6313805	HCN cell, 30 ppm
6313800	NH3 cell, 1,000 ppm
6313807	O3 cell, 1 ppm
6313803	H2 cell
6313806	HF cell
6313615	H2S cell, 30 ppm , special for hydrocarbons
6313808	SiH4 cell
6313810	PH3 cell, 1 ppm
6313811	AsH3 cell, 1 ppm

Note: This list is not exhaustive and may be modified.
Cells must be stored in a cool place (5°C).

IX. TECHNICAL CHARACTERISTICS

1. MX 2100 appliance

Manufacturer: **OLDHAM**

Function: **Multi-risk gas detector**

Type: **MX 2100**

Configuration:

- One to four cells (explosimetric, electrochemical, semiconductor, infrared (CO₂) or katharometric cells)

Gases detected: Explosive gases, toxic gases and oxygen

Measurement: continuous on all cells in operation

Cell:

- Intelligent, precalibrated interchangeable unit
- automatic recognition by the appliance by means of EEPROM

Display unit:

- Graphic LCD
- Messages in uncoded mode, with backlighting

Display lighting: with time switch

Switching of explosimetric ranges

- Automatic, from "% Gas" scale to "% Volume" scale

Cell fault

- Indication by indicator light
- Message in uncoded mode
- Corresponding display "frozen". Other channels operational
- Continuous general audio and visual alarm

Battery fault

- Display in uncoded mode
- Continuous general audio and visual alarm

Operating check

- Automatic calibration on request (optional)
- Self-test on power-up
- Audio and visual signal every 2 minutes (factory)
- Display of measured values in uncoded mode

Alarms

- Explosimetry: 2 adjustable instantaneous thresholds in 0-60 % LEL range
- Oxygen metering: two adjustable instantaneous thresholds over the cell's whole measuring scale (over-oxygenation and under-oxygenation)
- Toxic gas metering (by cell)
- Two adjustable instantaneous thresholds over the whole range:
 - one TWA threshold
 - one STEL threshold

Alarm signals

- General audio and visual alarm (display unit, indicator light)
- Display in uncoded mode of the fault or alarm for the channel concerned

Outputs (optional)

- RS232 link by infrared
- on PC, maintenance and supervision software, EXCEL database

Ancillary software packages

- Maintenance software COM 2100 and 2100S

Power supply

- 3 AAA alkaline batteries
- or coated NiMH rechargeable battery pack

Battery autonomy

- 14 hours in standard operation
- 8 hours with pump

Charging time:

- 3 hours

Sealing: >= IP20 (IP66 following the catalogue)

Weight: 350 g

Dimensions: 110 high, 80 long, 45 deep (mm)

CE marking:

Marking in accordance with Electromagnetic Compatibility Directive 89/336/CEE: compliance with standard EN 50270.

Explosive atmospheres ATEX 94/9/CE:

Marking in accordance with Explosive Atmospheres Directive ATEX 94/9/CE:

On MX 2100:

OLDHAM Arras

CE 0080

MX2100



II 1G II 2G I M1 I M2

EEx ia IIC T4 EEx ia I

EEx ia d IIC T4 EEx ia d I

INERIS 03ATEX0216

Do not open in explosive atmosphere

Serial number

Year of manufacture

On pump unit BP2100:

OLDHAM Arras

CE 0080

BP2100



II 1G I M1

EEx ia IIC T4 EEx ia I

INERIS 03ATEX0216

Do not open in explosive atmosphere

Serial number

Year of manufacture



La Société OLDHAM S.A., ZI Est 62000 Arras France, atteste que les matériels neufs destinés à être utilisés en Atmosphères Explosives désignés ci-après:
(The Company OLDHAM S.A., ZI Est 62000 Arras France, declares that the following new material intended for use in Explosive Atmospheres:)

Détecteur de gaz (Gas detector) MX2100
Pompe de prélèvement (sample draw pump) BP2100

sont conformes aux exigences des Directives Européennes suivantes :
(comply with the requirements of the following European Directives :)

I) DIRECTIVE EUROPEENNE 94/9/CE du 23 mars 1994
relative aux Atmosphères Explosives
The European Directive 94/9/CE of 23 march 1994
Concerning the Explosive Atmospheres

Normes harmonisées appliquées : EN 50014, EN 50018, EN 50020, EN 50284, EN 50303
(Harmonised applied Standards)

N° Attestation CE de Type du matériel : INERIS 03ATEX0216
(N° of EC type examination certificate)

Mode de protection : II 1G / I M1 EEx ia IIC T4 / EEx ia I
(Mode of protection) [Avec (with) Module CO2/MOS : II 2G / I M2 EEx ia d IIC T4 / EEx ia d I]

N° de la Notification Assurance Qualité de Production de l'usine de fabrication de Arras : INERIS 00ATEXQ403
(N° of the Production Quality Assurance Notification of the Arras factory)

Délivrés par l' Organisme notifié sous le numéro 0080: INERIS, rue Taffanel, 60550 Verneuil en Halatte, France.
(Issued by the Notified Body n°0080)

II) DIRECTIVE EUROPEENNE 89/336/CEE du 3 mai 1989
relative à la Compatibilité Electromagnétique
The European Directive 89/336/CEE of 3 may 1989
Concerning the ELECTROMAGNETIC COMPATIBILITY

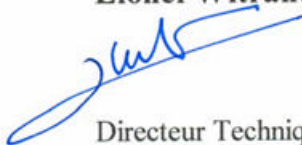
Normes harmonisées appliquées : EN 50270 (00)
(Harmonised applied Standards)

CE/ATEX108

Arras, le 27/11/03

Le Représentant de l'entreprise
On Behalf of the firm

Lionel Witrant



Directeur Technique
Technical Director

2. Measuring cells (non-exhaustive list)

	Explo.	O2 2 yrs	C12	CO	H2	H2S	HCl	HCN	NH3	NO	NO2	SO2	CO2	Katharo.
Standard range (1)	100% LEL	30%	10	1000	2000	100	30	10	100	300	30	30	5%	100% vol
Accuracy (2)	1	0.1	0.03	1	1	1	0.1	0.1	1	1	0.1	1	0.1	1
Repeatability (3)	1	1	2	1	1	1	2	2	2	1	1	1		
Deviation of zero (4)	< 0.5 %	0.5	0.5	0.5	0.5	0.5	0.5	0.5	1	0.5	0.5	0.5		0.5
Response time (5)	< 20	< 20	< 60	< 30	< 70	< 80	< 90	< 60	< 60	< 30	< 30	< 25	< 30	< 20
Temperature (6)	-20+75	-20+40	-20+40	-20+40	-5+40	-20+50	-20+50	-20+50	-30+50	-20+50	-20+50	-20+50	-10+40	10+40
Service life (7)	> 60	28	24	36	24	36	24	24	24	36	24	36	60	60

- 1 - in ppm unless otherwise specified
methane reference gas for Explo.
- 2 - 20% absolute value
(same unit as range)
- 3 - as % of signal read

- 4 - per month as % of scale
- 5 - in seconds at 90% of final value
- 6 - in °C without display unit
- 7 - average noted per month
12-month guarantee

OLDHAM s'engage - OLDHAM undertakes

Parce que la sécurité des hommes et la protection de l'environnement sont notre priorité,
OLDHAM s'engage et définit ses normes qualité :
Because safety for personnel and protection of the environment are our priorities,
OLDHAM gives the following undertakings and defines its quality standards :

1 Les Plus

OLDHAM s'engage au travers de son personnel qualifié, à répondre rapidement et efficacement à vos besoins de conseil, de suivi de commande, et ce, partout dans le monde.

OLDHAM s'engage à répondre dans les plus brefs délais à toutes questions d'ordre technique.

2 Qualité

OLDHAM s'engage à vous assurer une qualité de produits et de services à la hauteur de vos exigences, conformément au cahier des charges de la norme ISO 9001 et ATEX.

3 Fiabilité & Contrôles

OLDHAM s'engage à vous fournir un matériel fiable. La qualité de notre production est une condition essentielle à cette fiabilité. Elle est garantie grâce à des vérifications très strictes réalisées dès l'arrivée des matières premières, en cours et en fin de fabrication (tout matériel expédié est configuré selon vos besoins).

4 Mise en service

OLDHAM s'engage, si vous le désirez, à la mise en service de votre matériel par nos techniciens spécialisés. Un gage de sécurité supplémentaire.

5 Formation

OLDHAM s'engage à faire disposer aux utilisateurs de ses produits, d'un service de formation complet : plusieurs ingénieurs pédagogues, salle de conférences, matériels disponibles pour les manipulations, matériel informatique et de visualisation, etc.

6 Contrat d'entretien

OLDHAM s'engage à vous proposer des contrats d'entretien évolutifs au regard de vos besoins pour vous garantir une parfaite sécurité :

- une ou plusieurs visites par an, garantie totale ou partielle,
- renouvelable par tacite reconduction,
- incluant le réglage des centrales de mesure, l'étalonnage des appareils et le contrôle des asservissements.

7 Dépannage sur site

OLDHAM s'engage à faire intervenir ses techniciens du Service Après Vente rapidement. Ceci est possible grâce à la répartition judicieuse de nos agences en France et de nos agents à l'étranger.

8 Dépannage en usine

OLDHAM s'engage à traiter tout problème qui ne pourrait être résolu sur site par le renvoi du matériel en usine. Des équipes de techniciens spécialisés seront mobilisées pour réparer votre matériel, dans les plus brefs délais, limitant ainsi au maximum la période d'immobilisation.

Pour toute intervention du Service Après Vente en France, un numéro Indigo a été mis en place : le 0 825 842 843

1 Strong points

Through its qualified personnel, OLDHAM undertakes to respond to your needs for advice and order follow-up services wherever in the world you may be.

OLDHAM undertakes to answer all your technical questions as quickly as possible.

2 Quality

OLDHAM undertakes to provide you with products and services of a quality that meets your requirements, in accordance with the specifications of ISO 9001 and ATEX standards.

3 Reliability and inspections

OLDHAM undertakes to supply you with reliable equipment. The quality of our production is essential to achieve reliability. Quality is ensured by extremely strict verifications carried out as soon as raw materials are received, during production and at the end of manufacture (all shipped equipment is configured to meet your requirements).

4 Start-up

OLDHAM undertakes that our expert technicians will start up your equipment, if you so wish. This gives you the guarantee of additional safety.

5 Training

OLDHAM undertakes to provide the users of its products with a complete training service : a number of engineers specialized as instructors, conference rooms, equipment available for practical exercises, computer equipment, display equipment, etc.

6 Maintenance contract

OLDHAM undertakes to offer you open-ended maintenance contracts according to your needs so as to give you the guarantee of complete safety :

- one or more visits a year, comprehensive or partial warranty,
- renewal by tacit agreement,
- including the adjustment of measuring units, the calibration of equipment and the verification of servo-control systems.

7 Field servicing

OLDHAM undertakes to send out its After-Sales Service technicians quickly for servicing on your site. This is made possible by the efficient network of our branches throughout France and other countries.

8 Factory repairs

OLDHAM gives the undertaking that any problem that cannot be solved in the field will be dealt with by the return of the equipment concerned to our factory. Teams of specialized technicians are on hand to ensure the immediate repair of your equipment in the shortest possible time, so keeping downtimes for your equipment to a minimum.

For any specific technical question, please contact our After-Sales Service (M. Miguel RIESGUO) : 00 33 3 21 60 80 80

OLDHAM
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