



MX43 Central Digital and Analog Measurement Unit

User Manual

P/N : NPM43GB

Revision : F

OLDHAM
An Industrial Scientific Company
The Fixed Gas Detection People

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English version

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The information contained in this manual is accurate to our knowledge.

As a result of continuous research and development, the specifications of this product may be modified at any time without prior notice.

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Chapter 1 | General Information

User Manual

The instructions given in this manual must be read thoroughly before installation and start-up, particularly those concerning the points related to the safety of the end-user. This user manual must be made available to every person involved in the activation, use, maintenance, and repair of the unit.







The information, technical data, and diagrams contained in this manual are based on the information that is available at a given time. In case of doubt, contact *Industrial Scientific Oldham* for additional information.

The aim of this manual is to supply simple and accurate information to the user. *Industrial Scientific Oldham* cannot be held liable for any misinterpretations in the reading of this manual. In spite of our efforts to produce an error-free manual, it may nonetheless contain some unintentional technical inaccuracies.

In the client's interest, *Industrial Scientific Oldham* reserves the right to modify the technical characteristics of its equipment to increase their performance without prior notice.

The present instructions and their content are the inalienable property of *Industrial Scientific Oldham*.

Symbols used

Icon	Significance
	This symbol indicates useful additional information.
	This symbol indicates: This equipment must be connected to ground.
	This symbol denotes: Protective earth terminal. A cable of the adequate diameter must be connected to ground and to the terminal having this symbol.
	This symbol denotes: Attention! In the present mode of use, failure to adhere to the instructions preceded by this symbol can result in a risk of electric shock and/or death.
	This symbol indicates: You must refer to the instructions.
	European Union (and EEA) only. This symbol indicates that this product must not be discarded with household waste, as per the EEA directive (2002/96/CE) and the regulations of your respective country. It must be disposed of at a collection point that is reserved for this purpose, for example, an official site for the collection of electrical and electronic equipment (EEE) in view of their recycling, or a point of exchange for authorized products that is accessible when you acquire a new product of the same type.

Any deviation as regards these recommendations for the disposal of this type of waste can have negative effects on the environment and public health, as these electric and electronic products generally contain substances that can be dangerous. Your full cooperation in the proper disposal of this product promotes a better use of natural resources.

Safety Instructions

Labels intended to remind you of the principal precautions of use have been placed on the unit in the form of pictograms. These labels are considered an integral part of the unit. If a label falls off or becomes illegible, see to it that it is replaced. The significance of the labels is detailed below.



The installation and electrical connections must be carried out by qualified personnel according to the instructions of the manufacturer and the standards of the authorities competent in the field.

Failure to adhere to the instructions can have serious consequences on the safety of persons. Absolute strictness is required above all as regards electricity and assembly (coupling, network connections).

Important Information

The modification of the material and the use of parts of an unspecified origin shall entail the cancellation of any form of warranty.

The use of the unit has been projected for the applications specified in the technical characteristics. Exceeding the indicated values cannot in any case be authorized.

Liability Limits

Neither *Industrial Scientific Oldham* nor any other associated company under any circumstances can be held liable for any damage, including, without limitations, damages for loss or interruption of manufacture, loss of information, defect of the MX43 central unit, injuries, loss of time, financial or material loss, or any direct or indirect consequence of loss occurring in the context of the use or impossibility of use of the product, even in the event that *Industrial Scientific Oldham* has been informed of such damage.

Chapter 2 | General Introduction

Purpose of the MX43 Central Measurement Unit

This central unit is intended for the continuous measurement and control of the gases present in the atmosphere.



Wall-mounted MX43

Rack-mounted MX43

8-relay modules and 4 4-20 mA output modules

Figure 1: Wall-mounted MX43 and examples of the modules.

The system primarily comprises:

- a wall-mounted MX43 (4 or 8 lines) or rack-mounted MX43 (8 lines);
- different modules (detector with digital or analog output, logic inputs, analog inputs, relay outputs, and analog outputs).

The MX43 instantly handles the measurements of detectors and input modules. As soon as the measurements reach the programmed limit, a sound and visual alarm are given. At the same time, the corresponding relay or relays are activated, in turn controlling the additional internal or external actions envisaged by the user.

The measurement unit is programmed by using the COM43 application.

Figure 2 presents a configuration example.

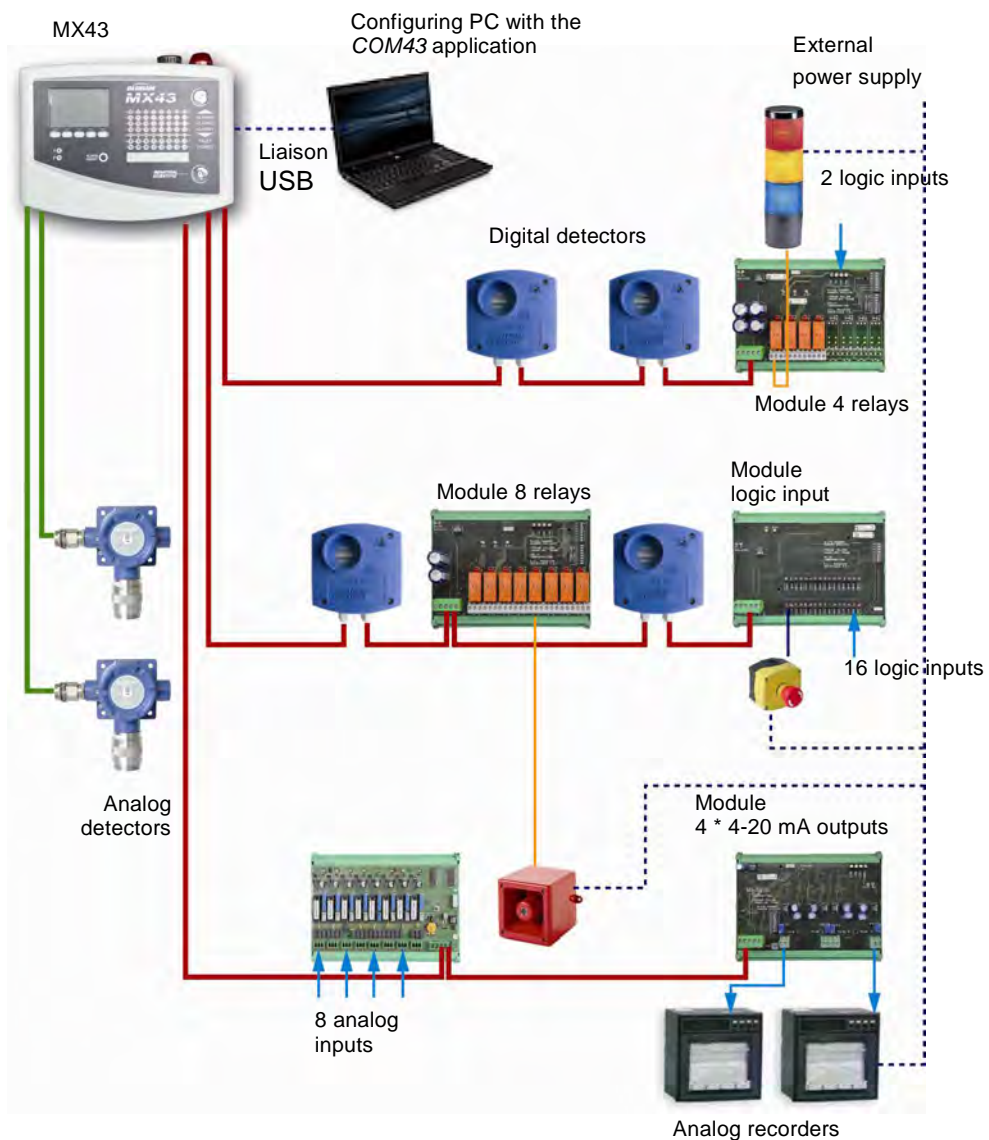


Figure 2: Example of an MX43 configuration using different analog and digital detectors as well as digital modules.

The MX43 Central Measurement Unit

Versions

The MX43 central measurement unit is available in 3 versions:

- Wall version 4 lines.
- Wall version 8 lines.
- Rack version 8 lines.



Figure 3: Wall mounted version MX43 (left illustration) or Rack mounted version (right illustration).

The following table details the possibilities of configuration, depending on the type of unit. On each line, it is possible to connect a 4-20mA analog detector or one, or several, digitally addressable modules.

Versions	Maximum number of				
	Modules (1)	Detectors	External relays	Logic inputs	Analog outputs
4 lines	16	16	8	16	16
8 lines	32	32	24	32	32

(1) Gas detectors, 4 or 8-analog output modules, and 16-logic input modules.

Table 1: Summary of the maximum configurations as per the central unit.

The COM43 Application

This is intended for setting the MX43 parameters from a PC in the Windows® environment. The operation and use of this application is the subject of a specific training course.

Chapter 3 | Mechanical Installation

This chapter details the mechanical installation of MX 43 and the digital modules.

MX 43 Central Measurement Unit

Location

The MX43 shall be installed in premises without explosive atmospheres, away from direct sunlight exposure, and protected from humidity, dust, and temperature variations. It shall preferably be located in a place under supervision (guardhouse, control room, or instrument room, for example).

Attachment of the wall enclosure

Access to the central unit must be ensured in the front in order to facilitate adjustments, monitoring, and cabling. A space of 400 mm is necessary in front of the MX43 for opening the door.



(*) rear fixing legs included.

Figure 4: Size of the wall version.

Use 2 fixing screws 4x25 mm for fixing the support of the case.



Figure 5: Fixing of the wall mounted version MX43 with a support plate.

Setting-up of a 19" Rack – 4 U

Access to the unit must be ensured in order to facilitate adjustments and monitoring, and likewise in the back in order to allow easy access to the different connectors at the rear.

This rack is built into a bay or a standard 19" cabinet. A free space of $\frac{1}{2}$ U (22 mm) shall be provided for above and below the rack so as to assure the proper ventilation of the MX43.

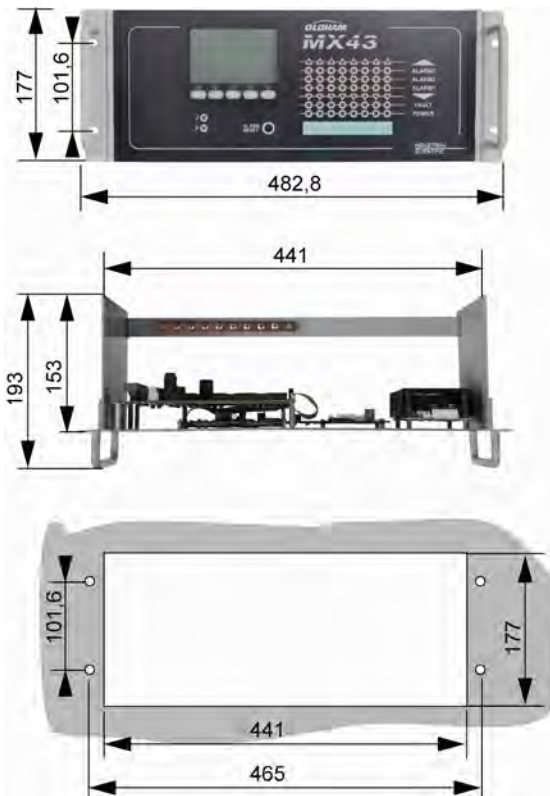


Figure 6: Size of the rack version.

Digital Modules



The cabling is the subject of the paragraph *Connection of digital modules* on page 26.

Gas detectors



Refer to the manual supplied with each detector.

Location

Each detector is positioned at the ground level, on the ceiling, at the height of the respiratory tract, or near air extraction ducts, depending on the density of the gas to be detected or applied. Heavy gases are detected close to the ground, while lighter gases are present along the ceiling. If necessary, contact *Industrial Scientific Oldham* for any questions regarding proper detector positioning.

Fixing

The detectors shall preferably be positioned in an accessible place to facilitate the operations of inspection and maintenance as well as the absolute safety of the operators. The detectors must not be obstructed by anything that will prevent them from measuring the ambient environment to be checked.

If mounting an OLCT10N on a vertical surface, position the cable gland downwards.

Other models

Location

The relay modules, logic outputs, analog outputs, and analog inputs are positioned depending on the installation layout, mandatorily in places free from explosive atmospheres, protected from humidity, dust, and temperature variations; for example in technical cabinets.

Fixing

These modules shall be mounted on a DIN rail in a cabinet or in an electrical cabinet.

For relay modules connected to low voltage electrical parts, the installation is carried out per the standards in force.

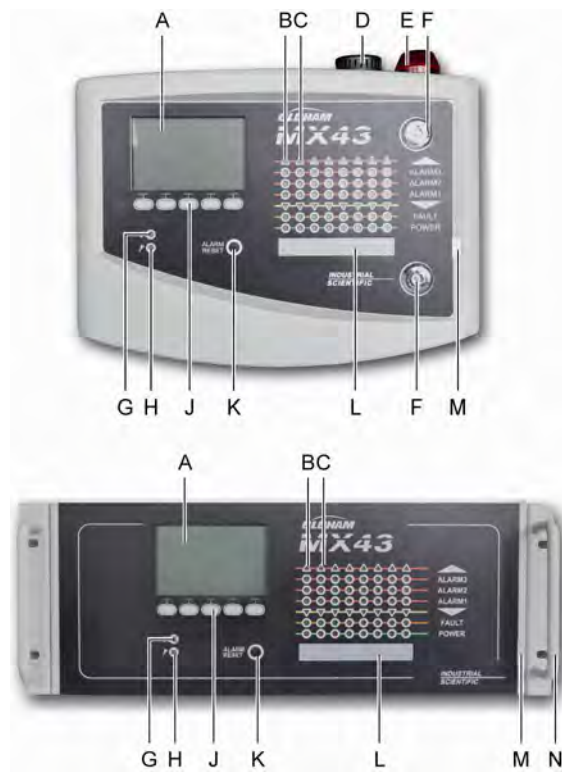


Figure 7: Fixing of a module (relay, logic outputs, or analog outputs or inputs) on a DIN rail.

Chapter 4 | The MX43 Central Unit

Overview of the Unit

External view



Rep.	Function
A.	Monochromatic, backlit graphic display
B.	Zone 1 status indicator
C.	Zone 2 status indicator
D.	Integrated siren (option)
E.	Integrated flash (optional)
F.	Lock
G.	Start/Stop indicator

Rep.	Function
H.	Failure/maintenance indicator
J.	Contextual soft keys
K.	Alarm release key
L.	Free identification of zones
M.	Strip for locating zones
N.	Handle

Figure 8: External view of the wall-mounted and rack-mounted versions.

Internal motherboard view

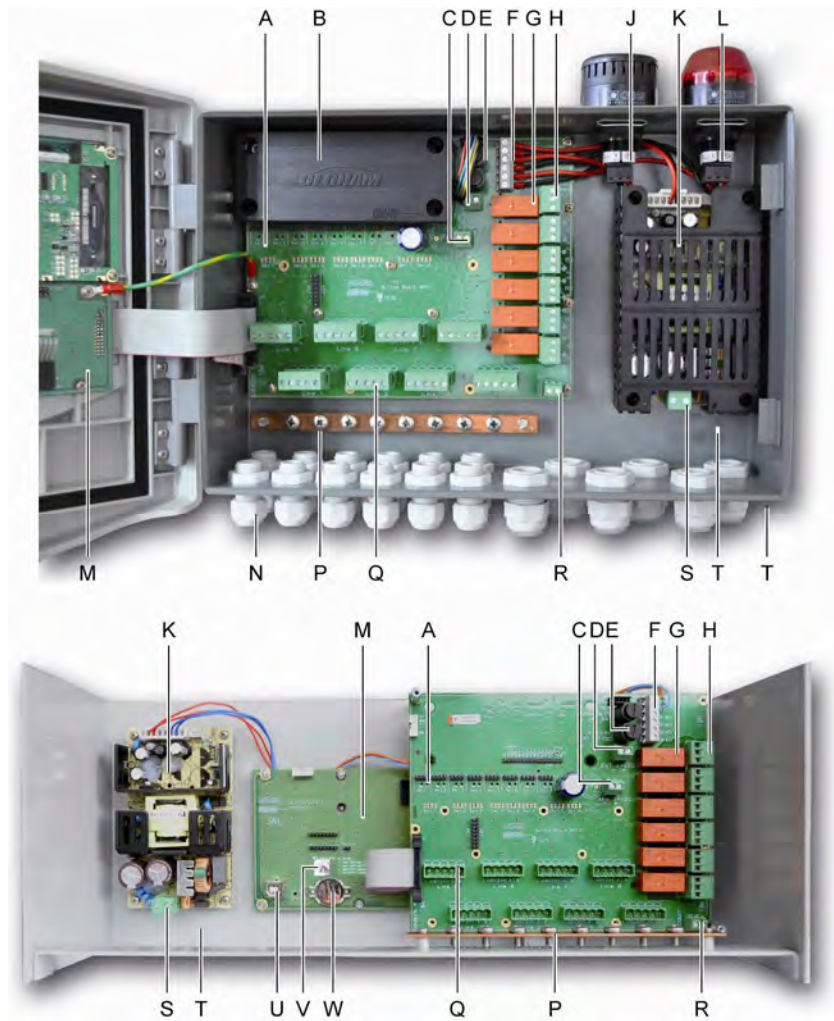
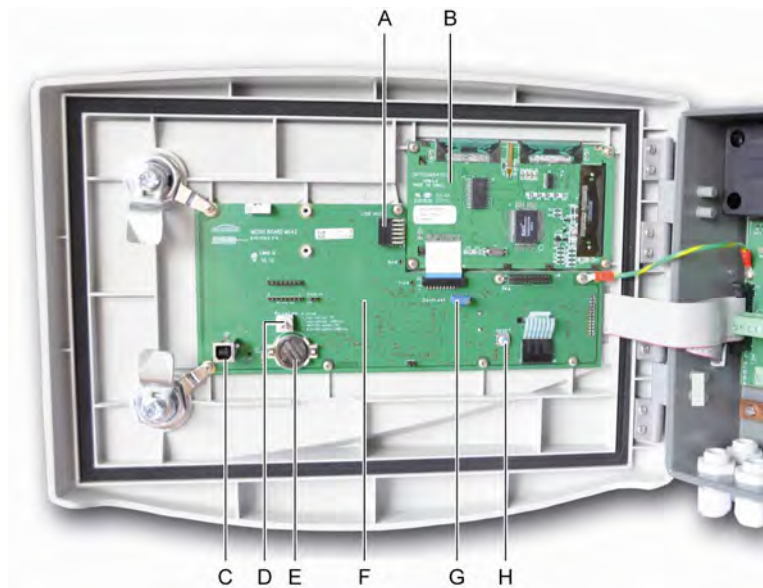


Figure 9: Internal view of the wall-mounted version (top) and rack mounted version (bottom).

Ref.	Function																	
A.	<p>LED digital communication status indicators.</p> <p>The information displayed by each red-green diode pair of a line is interpreted as follows:</p> <table border="1"> <thead> <tr> <th colspan="2">LED Status</th> <th rowspan="2">Significance</th> </tr> <tr> <th>Red</th> <th>Green</th> </tr> </thead> <tbody> <tr> <td>Fast blinking</td> <td>Fast blinking</td> <td>Normal functioning of the line - Tx communication request - Rx: response of digital module(s).</td> </tr> <tr> <td>Irregular blinking</td> <td>Irregular blinking</td> <td>Bad communication quality with at least one module.</td> </tr> <tr> <td>Blinks 1X/sec</td> <td>Off</td> <td>Communication failure. Absence or failure of line modules. A communication failure is signaled by the activation of the internal buzzer, the presence of the orange <i>failure</i> indicator and via the default relay.</td> </tr> <tr> <td>Off</td> <td>Off</td> <td>No digital module active on the line.</td> </tr> </tbody> </table>	LED Status		Significance	Red	Green	Fast blinking	Fast blinking	Normal functioning of the line - Tx communication request - Rx: response of digital module(s).	Irregular blinking	Irregular blinking	Bad communication quality with at least one module.	Blinks 1X/sec	Off	Communication failure. Absence or failure of line modules. A communication failure is signaled by the activation of the internal buzzer, the presence of the orange <i>failure</i> indicator and via the default relay.	Off	Off	No digital module active on the line.
LED Status		Significance																
Red	Green																	
Fast blinking	Fast blinking	Normal functioning of the line - Tx communication request - Rx: response of digital module(s).																
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Off	Off	No digital module active on the line.																

B.	Optional 24 VDX NiMH battery pack.
C.	Terminal block for the analog card power supply.
D.	Connector for the direct current external supply.
E.	Battery fuse (4A) and external power supply (21 to 28 VDC, 3.2 to 4 A max.).
F.	Connector for -- Internal siren 24 VDC – 19mA max. Sounder+ and Sounder- terminals - Internal flash 24 VDC – 40 mA max. Flash+ and Flash- terminals
G.	<p>Relays of alarms, from high to low Failure, R5, R4, R3, R2, R1.</p> <ul style="list-style-type: none"> - Failure: Non configurable failure relay - R1 to R5: Configurable alarm relays - Corresponding LED indicator: Lit when relay is under voltage. <p>Setting of alarm limits</p> <p>The alarm limits governing relays R1 to R5 can only be set via the COM43 application. The silkscreen image represents relays offline.</p> <p>Relays R1 to R5 can be configured in positive or negative safety. Programming via COM43 in:</p> <ul style="list-style-type: none"> -Normal mode: Operation of the relay as per the normal alarm management (the relay is rel -Buzzer mode: The same as as in normal operation, with, in addition, the possibility of releasing the buzzer relay even if the event is still present. The time delays are: <ul style="list-style-type: none"> .Duration of maintenance: Minimum time of activation, adjustable from 0 to 900 seconds. .Automatic release: Time adjustable between 15 and 900 seconds, beyond which the buzze .Reactivation: Time adjustable between 15 and 900 seconds, beyond which the buzzer relay is reactivated. <p>Alarm Relay Controls</p> <ul style="list-style-type: none"> -Logic equations of up to 4 levels of parentheses by the logic operators OR-AND, NOR-NAND. The result of the equation controls the relay. -Polling Operations (x over y): There must be at least “x” events over the total of “y” to activate the relay. Optionally, the user may define whether a failure is considered an event in the same category as an alarm.
H.	Alarm relay terminal block. CRT contacts, 250 V AC – 2A or 30 V DC – 2 A.
J.	Integrated siren (optional).
K.	Power supply sector block.
L.	Integrated flash (optional).
M.	Microcontroller PCB.
N.	Area of 12 + 6 cable glands (connections towards the exterior).
P.	Ground rod and bundle of shielded cables for digital and analog connections.
Q.	Terminal block for lines 1 to 8 (or 1 to 4 as per version). Refer to the Digital lines paragraph on page 37.
R.	Connector for the connection of a remote release (dry contact NO.)
S.	Power supply sector input.
T.	Protective secondary ground connection.
U.	USB connector for connection with the PC supporting COM43 application.
V.	Programming switch.
W.	CR2032 lithium battery.

Wall-mounted version - View of a microcontroller PCB



Rep.	Function
A.	Connector for USB key (future function). Allows the loading of data from the MX43 to the PC (values measured, history, etc.) or from the PC to the MX43 (transfer of settings, updating of software loaded in MX43, storage of measurements).
B.	LCD graphic display card.
C.	USB port for programming MX43.
D.	Program (or modes) selector 0. Normal operation of MX43. 1. Transfer of settings information from PC to MX43. 2. Transfer of settings information from USB port to MX43. 3. Updating of the internal software of MX43 from a PC. MX43 restarts automatically. 4. Updating of the internal software of MX43 from a USB port. MX43 restarts automatically.
 Once the parameter setting or the update of the central unit is completed, always reposition the selector to position "0".	
E.	CR2032 lithium battery. Safeguards the preservation of the records and real time clock in case of total power failure. Autonomy of approx. 450 days with the power off. At each battery change, power the MX43.
F.	Microcontroller PCB.
G.	Regulating LCD contrast.
H.	Microcontroller zero reset button. Press this button to reset the central unit.



Figure 10: Internal view of the wall-mounted version - microcontroller PCB and display.

Front Face

This has the following aspect:

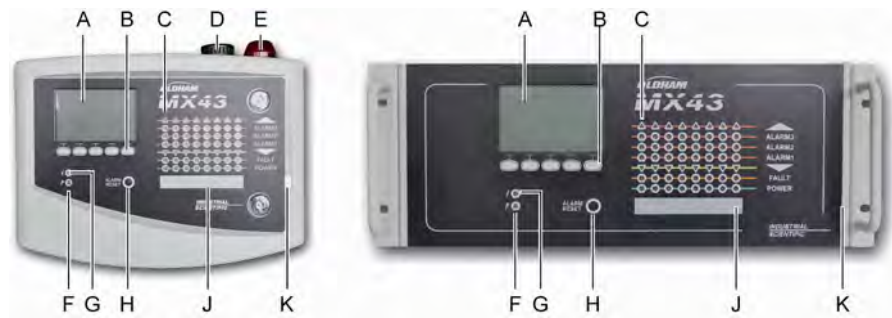


Figure 11: Front face of the MX43 in wall-mounted and rack-mounted versions.

LCD

The display shows the measurements or the menus of the parameter setting, and an inverse video display indicates that the module that is currently displayed has an active alarm.

The details of the displays are the subject of the chapter *Menus* on page 44.

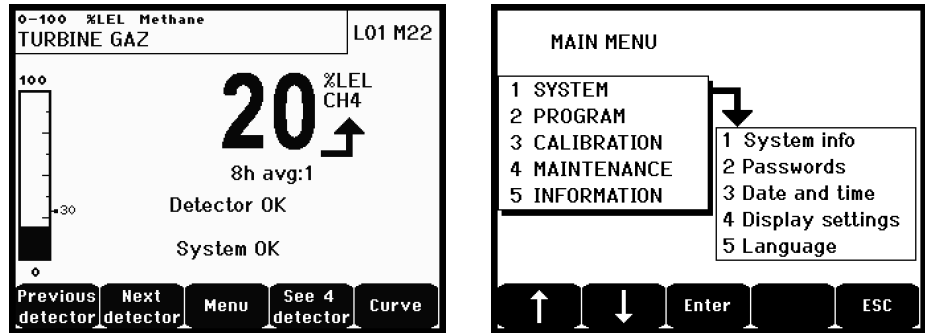


Figure 12: Example of a measurement display (screen) or parameter setting display (menu on the left).

Refer to the paragraph *Display in normal mode* on page 45 for information about what may be displayed on the screen.

Contextual Keys (B)

The function of each of the 5 keys indicated in the lower part of the display changes depending on the page displayed.

Zone Status Indicators (C)

Eight bars of 7 indicators each are displayed on the central unit.

The 4 bars to the right are not operative on a 4-line MX43.



Each bar represents a geographic area of the complete installation and not the 4 or 8 lines of the MX43.

Each bar displays the status of the group of detectors of the pertinent zone as follows:

Icon	Function
▲	<p>Orange indicator of high-range excess (OVS: overscale, high-range excess). This value is adjustable up to 110% of the range.</p> <ul style="list-style-type: none"> - Off: The measurement is lower than the OVS value programmed. - Lit: The measurement is higher than the OVS value programmed. The alarm relays are activated in accordance with the program. In parallel, the display indicates « > ». <p>OVS resetting is done manually and is only possible if the value measured drops below the programmed value.</p> <p>Management of « Clear doubt »</p> <p>The <i>Clear doubt alarm</i> is only applicable to the detection of explosive gases in a range of 0-100%LEL, and is subject to the decision of the operator. Upon the detection of a concentration of gas higher than 100% LEL, the LCD indicates a measurement blocked at 100% LEL and the message > 100% LEL. The message <i>Strong concentration Resetting by a person authorized in the maintenance menu</i> is displayed. The OVS and FAILURE indicators are activated. The alarm can only be deactivated by stopping the detector via the maintenance menu once the gas level decreases below this limit.</p>
ALARM 3	Red indicators of alarm status:
ALARM 2	- Off: Measurement lower than the threshold defined.
ALARM 1	<ul style="list-style-type: none"> - Fixed light: At least one of the gas detectors has an active alarm. The release is programmed in automatic mode or has already been requested by pressing the <i>Alarm reset</i> key on the front face. - Blinking light: At least one of the gas detectors has an active alarm. The release is programmed in manual mode. <p>The alarm relays are activated in accordance with the programming.</p>
▼	<p>Orange indicator of low- range excess (UDS: Under scale, low-range excess). This value is adjustable from 0-10% of the range.</p> <ul style="list-style-type: none"> - Off: The measurement is higher than the UDS value programmed. - Lit: The measurement is lower than the UDS value programmed. The alarms of the relays are activated in accordance with the programming. In parallel, the display indicates « < ». <p>UDS resetting is automatic once the failure disappears.</p>
FAULT	<p>Orange failure indicator</p> <ul style="list-style-type: none"> - Off: No failing module or detector. - Fixed light: Communication problem with one of the modules or invalid detector measurement, that is to say either below -10% of the range or above 110% of the range. - Blinking light: Central unit in <i>maintenance</i> mode (test, calibration). <p>The Failure reset is automatic once the failure disappears.</p>
POWER	<p>Green start/stop indicator for the detectors/modules of the zone.</p> <ul style="list-style-type: none"> - Off: All the detectors of the zone are stopped. - Fixed light: At least one of the detectors of the zone is working. - Blinking: The information details of one of the detectors/modules of the zone are actually displayed on the LCD screen.

Flash and siren (D and E)

Siren (Figure 11, D)



Located in the upper portion of the box, the siren is optionally available solely in the wall-mounted version. It is always discontinuous and is configured via the COM43 application.

Flash (Figure 11, E)

Located in the upper portion of the box, the Flash is optionally available solely in the wall-mounted version. It is configured via the COM43 application.

The technical indicators (F and G)

These two indicators reflect the status of the MX43.

Icon	Function
	<p>Green general start/stop indicator denoting the power supply status</p> <ul style="list-style-type: none">- Fixed: Correct power supply.- Off: No power supply.- Blinking: Power supply problem (absence of power in the sector or problems in the internal battery pack).
	<p>Failure/maintenance orange indicator</p> <ul style="list-style-type: none">- Off: No failure detected.- Fixed light: Presence of some failure (central unit, detector, communication, memory). The alarm goes off automatically on the clearing of the failure.- Blinking light: MX43 in maintenance mode (test, calibration).

Alarm reset Key (H)

Pressing this key has the effect of releasing the internal buzzer and the alarms that it enables. This key has the same function as the remote release key that is possibly connected; see paragraph on the *Remote release connector* on page 39.

Zone Identification (J and K)

Draw the tab (Figure 11, K) to enable the input (Figure 11, in J) of terms for the zones.



Figure 13: Drawing of the tab.

Alarm and Relay Thresholds

Alarm thresholds, relay programming, the management of time delays, and methods of release are controlled over the COM43 application.

Note: It is possible to modify an alarm limit via the *Programming* menu of *MX43*.

Parameters of Detector alarms

It is possible to program the following for each detector:

- 3 alarm thresholds.
- Each value is configurable in increasing or decreasing values.
- Each alarm is configurable as an instantaneous and/or average alarm of 15 to 480 minutes.
- Each alarm has an adjustable lag of 0 to +3% (or -3% for a negative alarm) for the value of the range of measurement, by pitch steps of 1%.
- A high-range excess alarm (OVS: *over scale*).
- A UDS low-range excess alarm (UDS: *underscale*).
- A “clear doubt” alarm (in the case of explosive gas detectors).

The alarms may be programmed for automatic or manual release (except OVS, UDS, and clear doubt).

Automatic deletion of alarms

The release (resetting) of alarms does not require any intervention. The management of alarms (relays, indicators, buzzer) is carried out according to the following table:

Event	Message screen	Alarm relay (normal)	Alarm Relay (buzzer)	LED alarm	Internal buzzer
Appearance	AL (1,2,3) and inverse video of the detector	Activated	Activated	Fixed light:	Activated
Press <i>alarm reset</i>	AL (1,2,3) and inverse video of the detector	Activated	Deactivated	Fixed light:	Deactivated
Disappearance	Normal display	Deactivated	Deactivated	Off:	(a)

(a): Manual release compulsory to stop the internal buzzer.

(b): Automatic deactivation upon the disappearance of an alarm, even if no release has been requested before the disappearance of the alarm.

(c): If programmed

Table 2: Automatic deletion of alarms.

Manual deletion of alarms

Release (resetting) by the operator is compulsory. The management of alarms

(relay, indicator, buzzer) is carried out per the following table:

Event	Message screen	Alarm relay (normal)	Alarm relay (buzzer) Alarm relay (normal)	LED alarm	Internal buzzer
Appearance	AL(1,2,3) and inverse video of detector	Activated	Activated	Blinking light	Activated
Release activated	AL(1,2,3) and inverse video of the detector	Activated in the presence of an event	Deactivated	Fixed light if an event is present	Deactivated
	AL(1,2,3) and inverse video of the detector	Deactivated if the event disappears	Deactivated	Off if an event disappears	
Disappearance	Normal display	Deactivated (1)	Deactivated	Off (1)	Deactivated (1)

(1): compulsory after manual release.

Table 3: Manual alarm deletion.

Internal relays and buzzers

The operating mode of relays and optional visual and sound alarms (Figure 9, F and G) is configured over the COM43 application.

- Relays: 5 alarm relays (R1 to R5) are common to all the lines.
- The internal buzzer is common to all the alarms of all the lines: it is activated on the appearance of an event (failure or alarm). The common failure relay is active in parallel. The sound frequency of the internal buzzer differs in accordance with the alarm threshold. High alarm thresholds have a faster sound frequency, thus making it possible to distinguish the alarm level. The internal buzzer can be deactivated by the internal programming menu or the COM43 application.

Note: The failure relay cannot be programmed via the COM43 application, but is activated on the occurrence of a failure.

Name Plate

The name plate is attached on the right side of the MX43. It contains the following information:

- Function and type of equipment.
- Precautions of use.
- Alternative voltage supply, frequency, rating of protective fuse, nominal power.
- Continuous voltage supply, frequency, rating of protective fuse, nominal power.
- Symbol of destruction and danger.
- Product reference and serial number, manufacturer logo.
- Version: 4 or 8 lines.

Communication

A digital RS485 Modbus output is available. The manual is pending. Please contact Oldham at info@oldhamgas.com for further information

Chapter 5 | Digital Modules

This chapter presents the digital modules that may be installed on the lines of MX43.



The details of module connection are given on page 26.
Digital modules are configured via the COM43 application.

Addressable Digital Modules

These modules are connected on each of the available 4 or 8 lines of the MX43, up to a limit of 32 modules on a version of 8-lines or 16 modules on a 4-line version. The following table regroupes the available modules:







Type of module	Illustration	Page
Digital gas detector (OLCT10N, OLCT80...).		-
Output module, 4 relays with 2 additional logic inputs		24
Output module, 8 relays with 2 additional logic inputs		24
Module with 8 analog inputs		26
Module with 16 logic inputs		25
Module with 4 analog 4-20mA outputs and 2 additional logic inputs		27

Table 4: Addressable digital modules.

RS485 Transmission

General Topology of RS 485 Network

The digital modules are linked by 2 twisted cable pairs of 4 x 0.22 mm² minimum, type MPI-22A, nominal resistance of 120 Ohms. This cable carries the RS485 (A and B) signal on one pair and the power supply of the modules (0–24 VDC) connected to the line on the other pair. Shielding necessarily links all the modules to the terminal block of MX43.

The + 24 VDC, 0V, A, B terminals are respectively connected to +24VDC, 0V, A, B terminals of the other modules on the line and then to the connector of the corresponding line on the central unit. The cable shielding must be connected to the grounding rod of the MX43.

At the end of the busbar, the 120-Ohm end of line resistor (EOL RESISTOR/RESISTANCE F.D.L) must be activated (whatever the last module).



No portion of the bare end of the terminal wires should be visible. For protection against any electromagnetic disturbances, the data as well as screen wires (or braids) must be cut as short as possible.

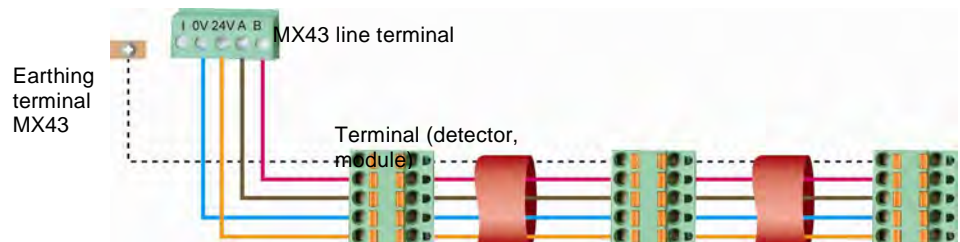


Figure 14: Principle of connecting modules to a MX43 line.



An incorrect installation of the cables or cable glands can cause measurement errors or a malfunctioning of the system. Do not lay the cables close to equipment such as engines, transformers, or lines generating important magnetic fields. It is recommendable to always ensure a distinct separation between these cables and the cables of other circuits.

Configuration of Communication

Module Address

All the digital modules on a line must be identified by a unique address.

Switches 1 to 5 of the configuration block of each module make it possible to establish an address number (1 to 32) in binary mode.

In the illustration to the right, the address 9 (10010) has been defined.

The *Addressing Table* below lists the possible combinations.

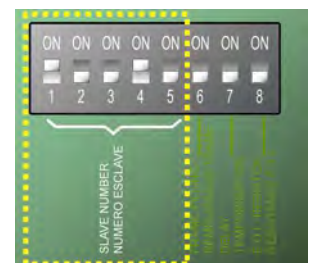


Figure 15: Switches of address configuration.

Module address	Switches (On: 1; OFF: 0)				
	1	2	3	4	5
1	1	0	0	0	0
2	0	1	0	0	0
3	1	1	0	0	0
4	0	0	1	0	0
5	1	0	1	0	0
6	0	1	1	0	0
7	1	1	1	0	0
8	0	0	0	1	0
9	1	0	0	1	0
10	0	1	0	1	0
11	1	1	0	1	0
12	0	0	1	1	0
13	1	0	1	1	0
14	0	1	1	1	0
15	1	1	1	1	0
16	0	0	0	0	1

Module Address	Switches (ON = 1; OFF = 0)				
	1	2	3	4	5
17	1	0	0	0	1
18	0	1	0	0	1
19	1	1	0	0	1
20	0	0	1	0	1
21	1	0	1	0	1
22	0	1	1	0	1
23	1	1	1	0	1
24	0	0	0	1	1
25	1	0	0	1	1
26	0	1	0	1	1
27	1	1	0	1	1
28	0	0	1	1	1
29	1	0	1	1	1
30	0	1	1	1	1
31	1	1	1	1	1
32	0	0	0	0	0

Table 5: Addressing table (address depends on switch positions).

Remarks:

- The physical address of a module (1 to 32) must be identical to the address stated on the configuration program COM43 in the central unit.
- During module replacement, all the configuration switches of a new module must be positioned in the same configuration as those of the the previous module.
- The 6 switch (FRAME FILLING/REMPLEISS TRAME) must be set to OFF and the 7 switch (DELAY/TEMPORISATION) must be set to ON (options unused).
- An analog-input module systematically takes 8 addresses.

End of line Resistor

Solely for the last module of each line, set switch no.8 (EOL RESISTOR/RESISTANCE F.D.L.) to ON or set the jumper of the analog input PCB to *Closed*.

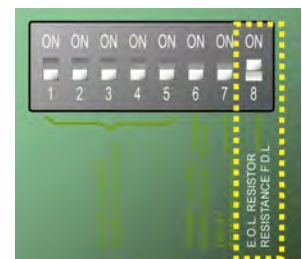


Figure 16: End of line resistor switch in position "ON".

Relay modules

Function

This digital module, available in two versions, allows for the management of:

- 1 to 4 relay outputs;
- Or 1 to 8 relays.

In addition, it has 2 logic inputs.

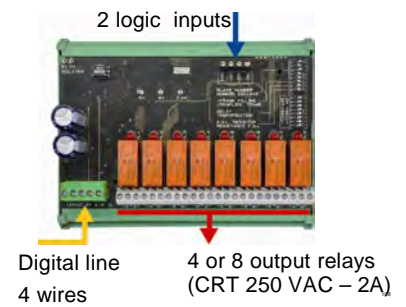


Figure 17: 8-relay module.

Introduction

Ref..	Description
A.	Connector for 2 logic inputs.
B.	Configuration switches of the module (digital address, delay, and end of line resistor).
C.	Switches for relay configuration.
D.	Power supply and digital network connector.
E.	Programmable relay (4 or 8).
F.	Relay status indicator.
G.	Connection terminal.

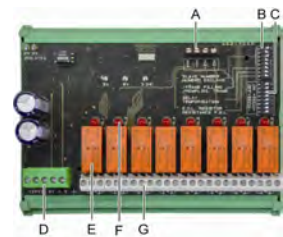


Figure 18: 8-relay module.

A – Logic input connectors

Each of these two terminals (Figure 18 A) may be connected to a voltage-free contact as per Figure 34. There is no alarm when the contact is open.

B – Module configuration switches

These switches are set according to the following table.

Term	Symbol
<i>Slave number</i> Numéro esclave	See details in the paragraph <i>Module Address</i> on page 26.
<i>Frame filling</i> Remplissage de trame	Factory settings. Do not modify.
<i>Delay</i> Temporisation	Factory settings. Do not modify.
<i>E.O.L Resistor</i> Résistance F.D.L.	See details in paragraph <i>End of line Resistor</i> , on page 27.

Table 6: *Relay module configuration switches.*

C: Relay configuration switches

The output status of each relay also depends on the configuration of *Positive/negative safety* set by this switch block (Figure 18, C). Set the switch to ON (positive safety) or OFF (negative safety) according to the safety type desired; each switch acts on the relay having the same number (switch 1 acts on relay 1).

The contacts are represented in silkscreen as voltage-free, with no alarm in positive safety.

For the 4-relay module, only switches 1 to 4 are active.

E – Programmable relays

In its maximum configuration, the MX43 can manage 24 external relays (or 24 modules with 1 stated relay or 3 modules of 8, all stated relays). The relays are programmable individually. The operation of each relay depends on its configuration.

Each of the 6 detector events [AL1 - AL2 - AL3 – High-range excess – Low-range excess – Failure] can control one or several external or internal relays. Several events can be connected to the same relay.

Setting of relay parameters

The alarm limits governing the relays can only be set by the COM43 application.

- **Normal:** Relay operation as per the normal management of an alarm. (The relay is launched only if the event exceeds the duration of time lapse).
- **Buzzer function (releasable relays):** The same as in normal operation, with, in addition, the release of the relay even if the event is still present. The time lapses are:
 - . Duration of maintenance: Minimum time of activation, adjustable from 0 to 900 seconds.
 - . Automatic release: If activated, the time is adjustable between 15 and 900 seconds, beyond which the buzzer relay is automatically released.
 - . Reactivation: If checked, time is adjustable between 15 and 900 seconds, beyond which the buzzer relay is reactivated.

Controls of the alarm relay.

- Logic equations of up to 4 levels of parentheses by the logic operators OR, AND, NOR, and NAND. The result of the equation controls the relay.
- Polling operations (x over y). There must be at least “x” events over the total of “y” to activate the relay. Optionally, the user may define whether a failure is considered an event in the same category as an alarm.

F – Relay status indicator

The status of each relay is visualized by a red LED (Figure 18, F):

- LED off: Coil not powered.
- LED lit: Coil powered.

G – Relay output connectors

The normal resistive load of each contact is 2A / 250 V AC or 2 A / 30 V DC.

Connection

Refer to chapter 6 on page 35.

Configuration

Configured via the COM 43 application.

16-Logic Input Module

Function

This digital module allows the monitoring of 1 to 16 logic inputs by the MX43.

In the 8-line version, the central unit can manage a maximum of 32 logic inputs distributed, for example, either on 32 logic input modules with one input declared per module, or on 2 modules with 16 logic inputs each.

In the 4-line version, the central unit can manage a maximum of 16 logic inputs.

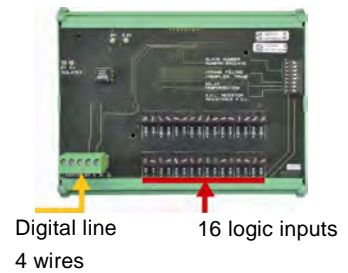


Figure 19: Module with 16 logic inputs.

Introduction

Ref.	Description
A.	Module configuration switches (digital address, delay, and end of line resistor).
B.	Power supply and digital network connector.
C.	Logic inputs 1 to 16.

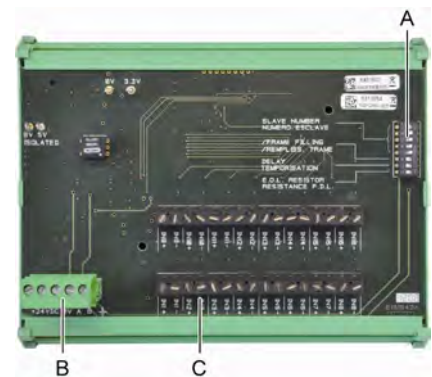


Figure 20: Module of 16 logic inputs.

A – Module configuration switches

These switches are set according to the following table:

Term	Symbol
<i>Slave number</i> Numéro esclave	See details in paragraph <i>Module Address</i> on page 26.
<i>Frame filling</i> Remplissage de trame	Factory settings. Do not modify.
<i>Delay</i> Temporisation	Factory settings. Do not modify.
<i>E.O.L Resistor</i> Résistance F.D.L.	See details in paragraph <i>End of line Resistor</i> on page 27.

Table 7: Configuration switches of the *Logic input module*.

C –Logic input connectors

Each of these 16 inputs can be connected to a voltage-free contact as per Figure 35. Input status is transmitted by the digital line to the MX43. There is no alarm when the contact is closed.

Connection

Refer to chapter 6 on page 35.

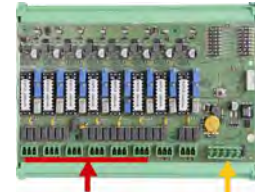
Configuration

Configured via the COM 43 application.

8-Analog Input Module

Function

This digital module enables the monitoring of 8 analog (4-20 mA or Wheatstone bridge) inputs.



8 analog inputs Digital line
4 wires

Figure 21: 8-analog inputs.

Introduction

Ref..	Description
A.	Jumper of configuration 4-20mA or a Wheatstone bridge.
B.	Sensitivity calibration.
C.	Zero calibration.
D.	Measuring point of each line.
E.	Reference 1.2 V for bridge calibration.
F.	Start/stop input switches not used, always in ON position.
G.	Lug 0V for 4-20mA calibration.
H.	PCB configuration switches (digital address, delay).
J.	Inputs no.1 to 8 (4-20mA or Wheatstone bridge as per. A).
K.	Filament current calibration (factory setting).
L.	4-20mA division strap in case of parallel operation of several analog detectors on the same line (application parking).
M.	Power supply and digital network connector.
N.	End of line resistor jumper. (raised position, EOL resistor connected).

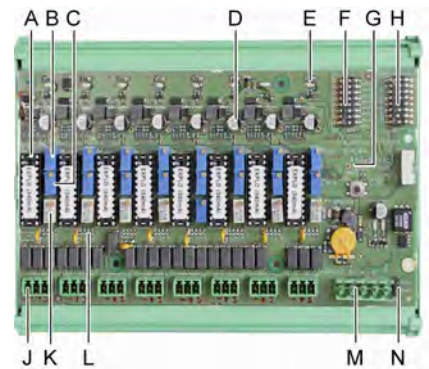


Figure 22: Module of 8-analog inputs.

E – Module configuration switches

These switches are set according to the following table:

Term	Symbol
Slave number Numéro esclave	See details in paragraph <i>Module Address</i> on page 26.
Frame filling Remplissage de trame	Factory settings. Do not modify.
Delay Temporisation	Factory settings. Do not modify.
E.O.L. Resistor Résistance F.D.L.	See details in paragraph <i>End of line Resistor</i> on page 27.

Table 8: Analog input module configuration switches.

Connection

Refer to chapter 6 on page 35.

Configuration

Configured via the COM 43 application.

Note related to manual calibration of the detectors connected to an 8-analog input module.

1. Zero calibration

Inject standard gas to obtain 4 mA. Place the multimeter between points E and D (Figure 22). If the value measured is different from 0 V, adjust C.

2. Sensitivity calibration

After injecting the gas, place the multimeter between points E and D (Figure 22). If the value measured is different from 1.6 V, adjust B.

Should the adjustment value be different, calculate:

$$V = I \text{ (mA)} \times 0.10 \text{ (V/mA)}$$

Example: If the current is 12 mA, "V" must be equal to 0.8 V.

If the point E is not on the module use the G-spot and add 1.2V to the measurement

4-Analog Output Module

Function

This digital module delivers 1 to 4 independent analog values (4-20 mA outputs) opto-isolated from the values given by the MX43, capable of being independently activated or deactivated:

- Activated: The 4-20mA signal varies depending on the input.
- Deactivated: The 4-20mA signal is blocked at 0 mA, whatever the input signal.

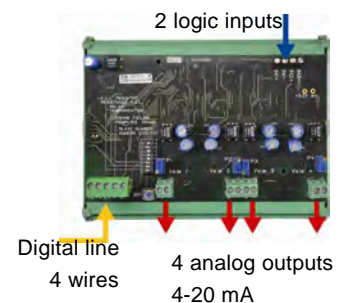


Figure 23: Principle 4-analog output module.

Several analog values may be associated to the same 4-20mA output authorizing the management of minimums, maximums, or averages from a group of detectors This module likewise has 2 logic inputs.

Introduction

Ref.	Description
A.	Connector for 2 logic inputs.
B.	Power supply and digital network connector.
C.	Module configuration switches (digital address, delay, and end of line resistor).
D.	Push-button. Pressing this button generates 20mA current in the output of each line.
E.	(E1 to E4) opto-isolated independent 4-20mA analog outputs.
F.	(F1 to F4) 20mA calibration in line output.

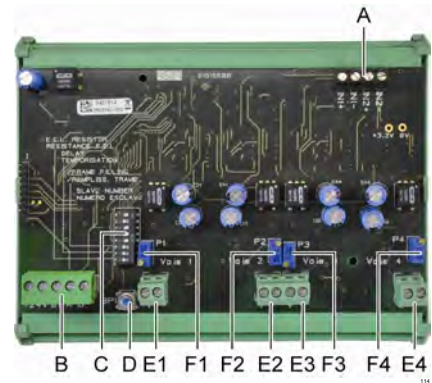


Figure 24: 4-analog output module.

A –Logic input connectors

Each of these two terminal jacks (Figure 24, A) may be connected to a voltage-free contact in accordance with Figure 38. Input status is transmitted by the digital line to the MX43.

C – Module configuration switches

These switches are set according to the following table:

Term	Symbol
<i>Slave number</i> Numéro esclave	See details in paragraph <i>Module Address</i> on page 26.
<i>Frame filling</i> Remplissage de trame	Factory settings. Do not modify.
<i>Delay</i> Temporisation	Factory settings. Do not modify.
<i>E.O.L. Resistor</i> Résistance F.D.L.	See details in paragraph <i>End of line Resistor</i> on page 27.

Table 9: Analog output module configuration switches.

Connection

Refer to chapter 6 on page 35.

Configuration

Configured via the COM 43 application.

Chapter 6 | Wiring and Electrical Connections

This chapter details the electrical connections of all the system components (MX43, modules, additional equipment).

Central Unit Connection

The electrical connections must be carried out by qualified personnel in compliance with the different directives in force in the country of installation.



The MX43 does not have a start/stop switch.

Certain voltage levels are capable of causing serious injuries or even death. It is advised to install the material and cabling before applying live voltage.

As an incorrect or poor installation may cause measurement errors or system failures, it is necessary to strictly follow all the instructions in this manual in order to guarantee the proper operation of the system.

Access to terminal blocks

- **In wall-mounted version:** After unblocking the two locks, swing the front cover towards the left so as to reach the cabling terminal blocks (A).
- **In rack version:** The terminal blocks are cabled from behind the central unit (B).

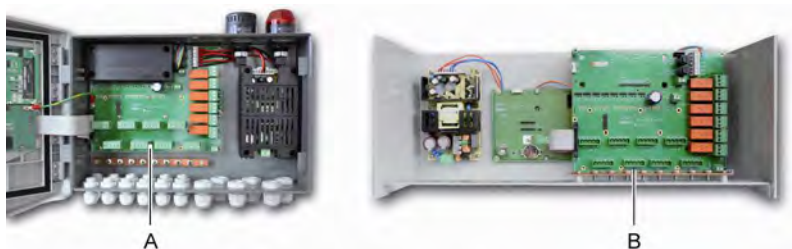


Figure 25: Access in wall-mounted version (left) and rack-mounted version (right).

Sector Power Supply

The MX43 can be powered from a 110-240 V AC source at 50/60 Hz, 1.5 A max.

Check the nature of the current and the network voltage prior to any connection. The electrical connections must be carried out with the equipment disconnected.

The MX43 must be protected upstream by a differential bipolar circuit breaker with a type D response curve, size 4A. This circuit breaker must be included in the

electrical installation of the building, in the immediate proximity of the MX43, and be easily accessible to operators. It shall be marked as the cut-off device of the MX43.

The sector power shall be connected to the terminal block as indicated in Figure 26. The ground conductor shall be connected to the ground terminal (B).

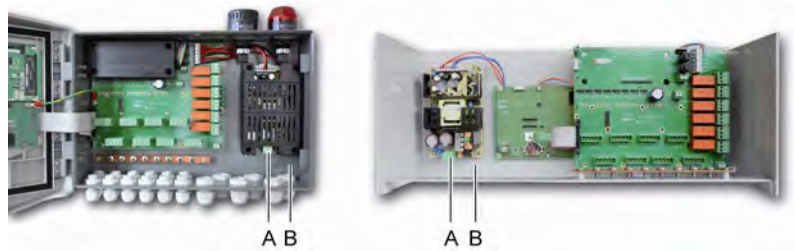


Figure 26: Connection of sector power in wall mounted and rack versions.

External 24V DC Power Supply

The MX43 can be powered from a 22 to 28 V AC source at 50/3.2 A, 1.5 A max. In this case, connect the 24VDC source to the corresponding terminal jack (Figure 26, A) respecting polarities. This jack is protected by Fuse F1.



Figure 27: Connection of 24VDC external power supply (A).

The main power supply charges the internal pack. The external 110-240 VAC, 24 VDC and battery pack sources can be used simultaneously, as there is internal protection installed.

Integrated Backup Power Supply

The MX43 can be equipped with a 24-VDC NiMh battery pack that maintains power to the central in the absence of the sector current or external 24VDC. The batteries are charged by the mains supply (110-240 VAC).

The battery pack requires continuous charging for 7 days before reaching its maximum capacity. Its autonomy depends on the MX43 configuration.

If the battery pack is not installed at delivery, proceed as follows:

1. Position and fix the battery pack (A) at the place indicated using the 4 screws supplied.
2. Connect the battery pack connector to the connector (B) of the PCB. A failsafe slot impedes any connection error.



Figure 28: Positioning the battery pack.

Earthing

The MX43 is intended to be used in the parts of installations corresponding to the category of overvoltage II and pollution degree 2 as per EN/IEC 60947-1. In order to comply with this category of protection, it is absolutely necessary to connect the ground terminal.

(Figure 26. Grounding at site. Moreover, the cable braids of the digital lines shall also be connected to this ground rod. (

Figure 29: Ground connection through the ground rod.

9 A).

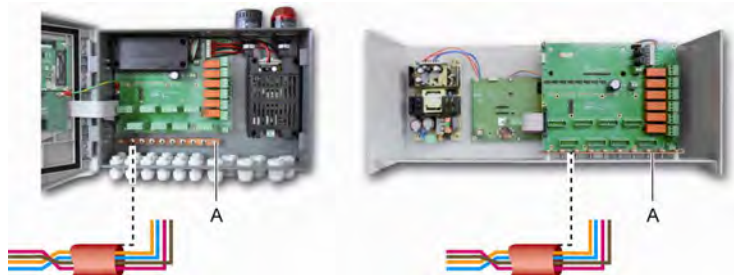


Figure 29: Ground connection through the ground rod.

Digital lines

The cabling of the digital lines connecting the central unit to the different modules deployed along the lines are the subject of the paragraphs *OLCT10N Modules, 4- or 8-relay modules, 16-logic input modules, 8-analog input modules and 4-analog output modules* of this same chapter. It should be remembered that this cable comes in 2 twisted pairs of 4 x 0.22 m² minimum, type MPI-22A, nominal resistance of 120 Ohms.

Analog channels

For an analog 4-20mA detector connected directly on the MX43 channels, please connect the detector like below.

I is the 4-20mA signal, 0 and 24V correspond to the power supply.

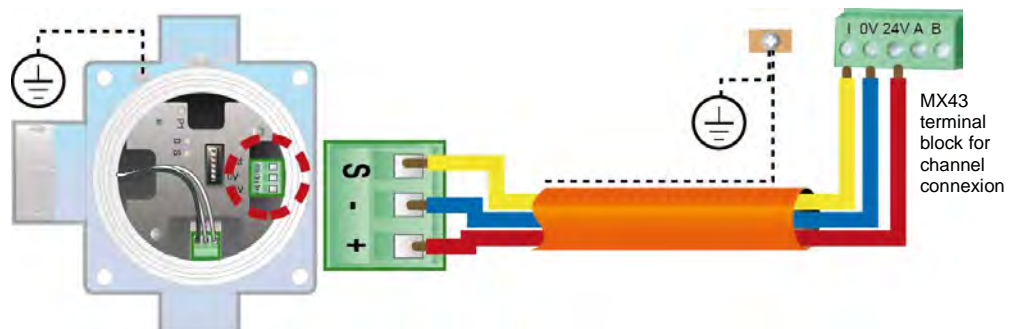


Figure 30 : 4-20mA detector connected directly on the MX43 channels.

Please see below the figure for the motherboard with position for channel connexion and relays.

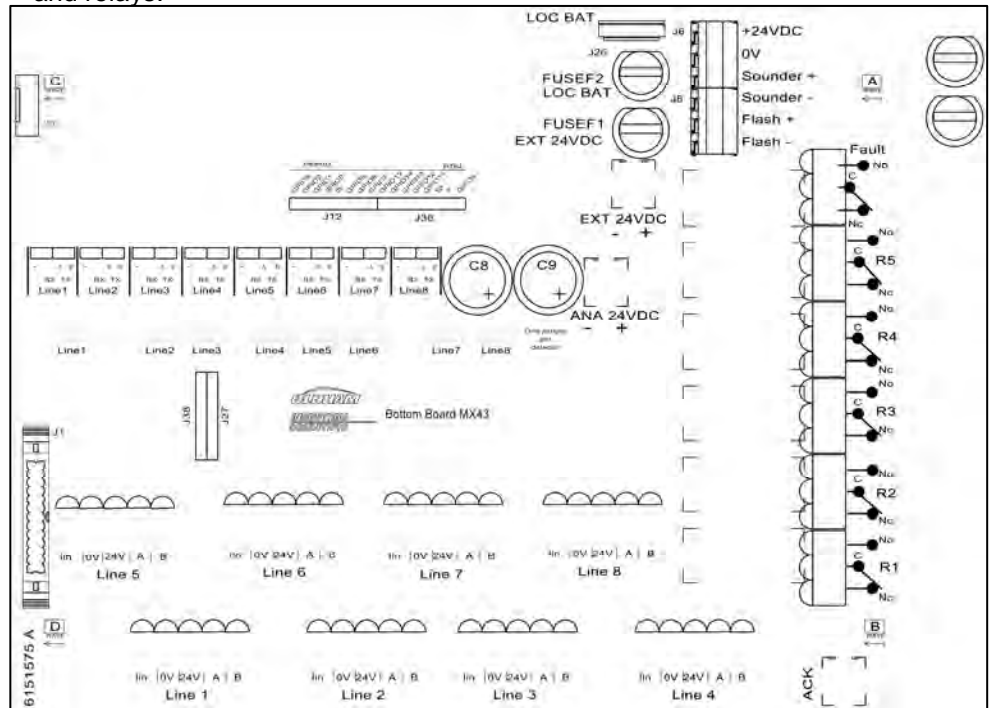


Figure 30 : MX43 Motherboard.

Internal alarm relays

The MX43 has 6 relays of the following internal alarms:

Output	Function
R1	Relay of freely programmable function
R2	Relay of freely programmable function
R3	Relay of freely programmable function
R4	Relay of freely programmable function
R5	Relay of freely programmable function

Failure : Non-programmable common relay in positive safety, activated upon the presence (Default) of a failure in the MX43 (detector and/or module, increased internal temperature, transition to power supply from the backup battery pack, system anomaly, etc). The deletion of this relay is automatic.

Table 10: Internal alarm relays.

The RCT dry contacts (nominal resistive load of 2 A at 250 VAC, and 2 A 30 V DC) of the 6 internal relays R1, R2, R3, R4, R5 and Default are deployed on the backplane board of MX43 on the R1, R2, R3, R4, R5 and Default connectors (Figure 31: Internal alarm relay connectors (A)).

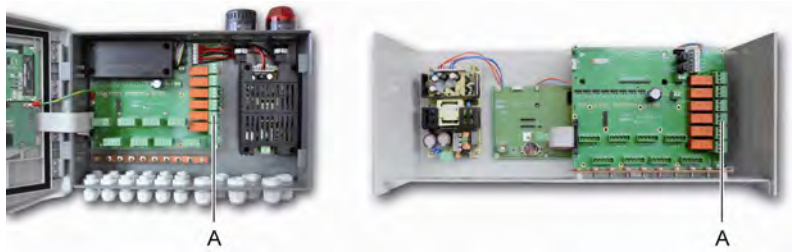


Figure 31: Internal alarm relay connectors (A).

Connect the external equipment to the control on terminal jacks R1 to R5.



The relays are represented as disconnected. The position of the contacts (no alarm) once the MX43 is powered will depend on the purpose of the relay configuration (positive or negative safety). The relays are programmed via the COM 43 application.

Remote Release Connector

If necessary, connect the RELEASE (dry contact NO) terminal to a remote release system.

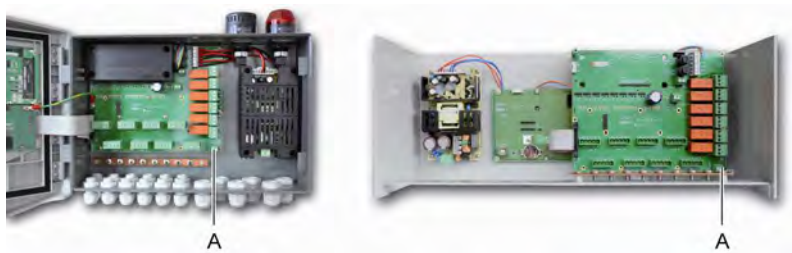


Figure 32: Remote release connection (A).

Flash and Siren Control Connector

This connector, powered at 24VDC by the MX43, allows power supply for a rotating light and a siren optionally available for the MX43 in wall-mounted version. In the rack version, these connectors may be taken over to power a sound alarm (24VDC, 19mA max.) and a visual alarm (24 VDC, 40 mA max.). Ensure to match the polarities.

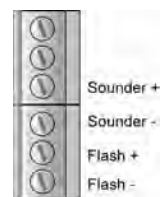


Figure 33: Flash and siren control connector (A).

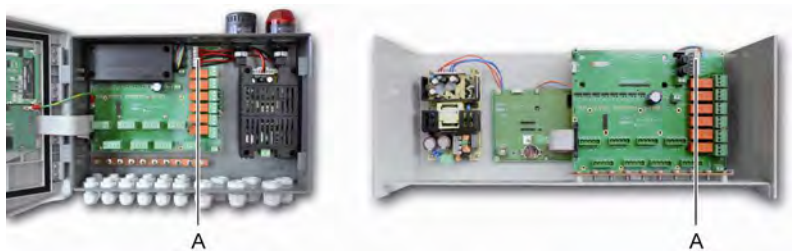


Figure 34 : Location of the flash and siren connector (A).

4- or 8-Relay Modules

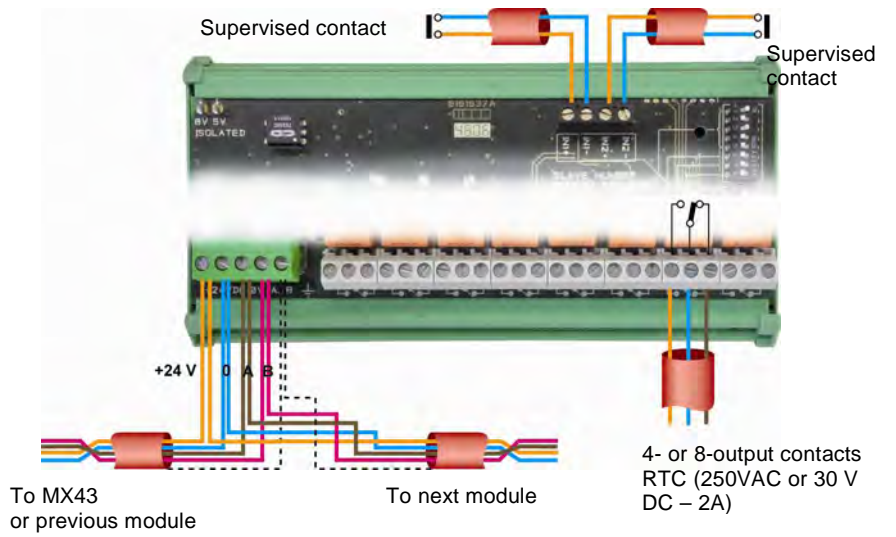


Figure 35: 4- or 8-relay module connections



If this module is the last on the line, do not forget to set the switch marked *EOL resistor/resistance FDL* to ON.

16-Logic Input Module

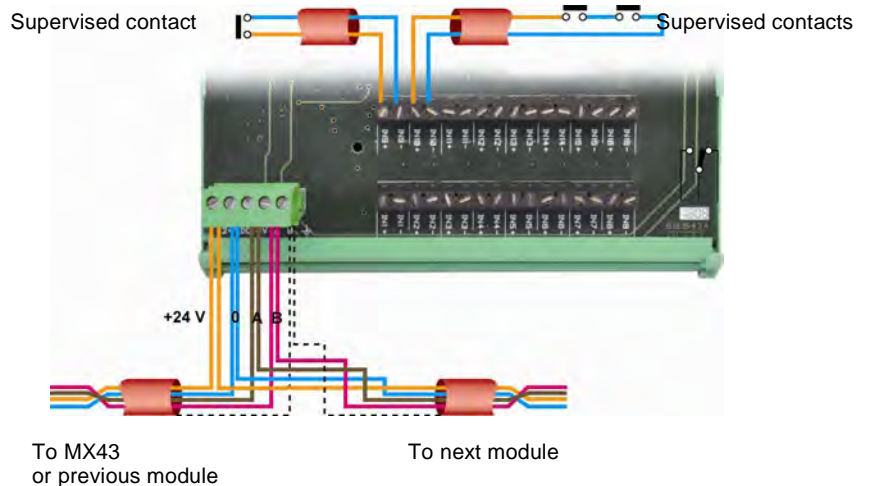


Figure 36: 16-logic input module connections.



If this module is the last on the line, do not forget to set the switch marked *EOL resistor/resistance FDL* to ON.

8-Analog Input Module

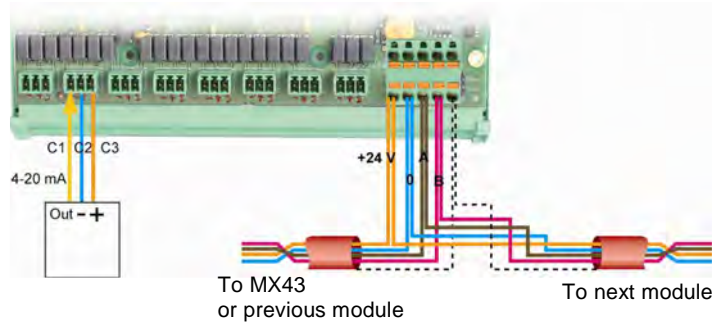


Figure 37: Connections of 8-analog input modules for 1 4-20mA detector with 3 wires (explosive gas, toxicity detection).

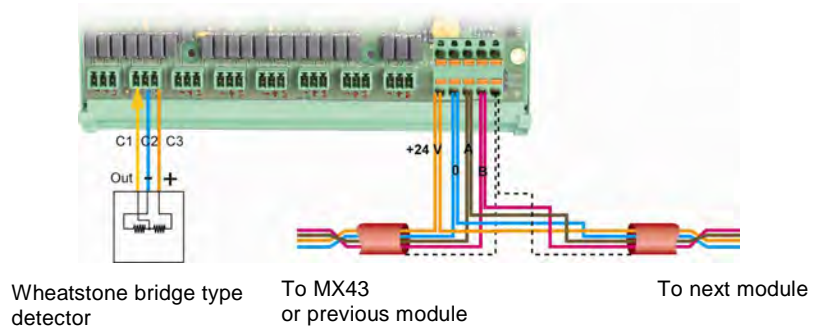


Figure 38: 8-analog input module connections for an explosive gas detection detector of the Wheatstone Bridge CEX300 ou OLC type.



If this module is the last of the line, do not forget to set the jumper marked *EOL Resistor* to *Closed* position.

4-Analog Output Module

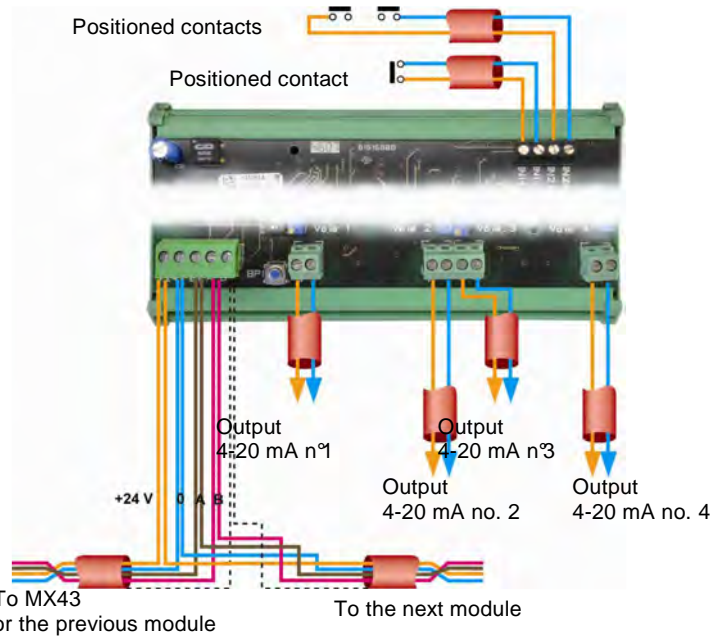


Figure 40: 4 Analog output module connections.

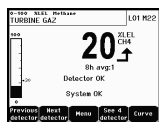


If this module is the last of the line, do not forget to set the jumper switch marked *EOL Resistor/FDL resistance* to the *ON* position.

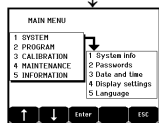
Chapter 7 | Menus

General Menu Tree

The following figure shows the general tree of the group of menus.



See page 44



See page 46

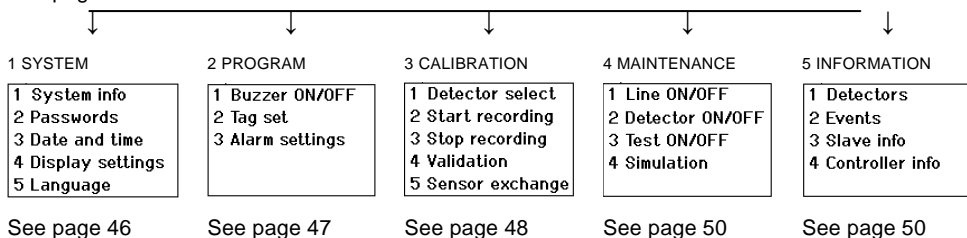


Figure 41: General menu tree of the MX43.

Navigation Key Functions

Key	Function
↑↓	Vertical displacement in the selected menu block.
→←	Horizontal displacement between two menu blocks.
Enter	Validation of the selected line.
Escape	Return to previous screen.

Table 11: Function of the navigation keys.

Display in normal mode

Measurement Display

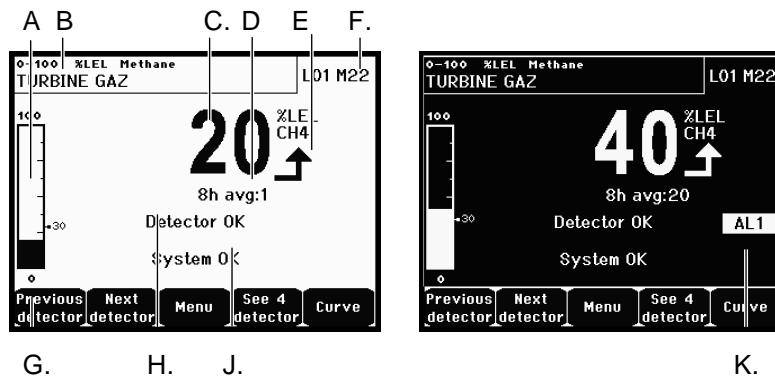




Figure 42: Example of the measurement display in normal mode and in inverse video.

Ref.	Significance
A.	Barograph with an indication of alarm limits.
B.	Measurement range, gas detected, and detector language.
C.	Value of the current measurement with the unit and gas detected.
D.	Value of the average measurement if the programming was carried out via the COM 43 application.
E.	Indicator of measurement trend <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">   </div> <div style="text-align: center;"> <p>Ascending tendency</p> <p>Descending tendency</p> </div> </div>
F.	Address of digital detector on a digital line or channel number for a analog detector
G.	Function keys. <ul style="list-style-type: none"> ■ Previous detector: Display of measurements of previous detector; scanning of all the detectors on all the lines. ■ Next detector: Display of measurements of next detector; scanning of all the detectors on all the lines. ■ Menu: Display of main menu See paragraph "Main menu" on page 46. ■ See 4 Detectors: Display of a group of 4 detectors (detector tag, barograph with indication of alarms, value of current measurement with unit and gas detected). Use the Page down or Page up keys to display all of the next 4 detectors; passage to the next zone is automatic. ■ See 8 Detectors: Display of a group of 8 detectors (detector tag, value of current measurement with unit and gas detected). Other buttons similar to the selection. <i>See 4 detectors.</i> ■ See 16 Detectors: Display of a group of 16 detectors (detector tag, value of current measurement with unit and gas detected). Other buttons similar to the selection. <i>See 4 detectors.</i> ■ See 1 detector: Display in normal mode (Figure 40). ■ Curve: Display of the measurement curves of the last 4 hours (Figure 41). The → and ← keys allow cursor displacement through the time scale. The vertical dotted line displays the concentration and time stamp of the point being considered. Escape: return to display of values.
H.	Information on the detector status.
J.	Information on the MX43 status.
K.	Zone of indication of activated alarms with blinking threshold display. The screen changes to inverse video (Figure 40, screen on the right).

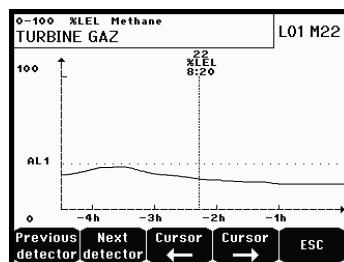


Figure 39: Example of a curve display screen.

Main Menu

This displays all the management menus of MX43.

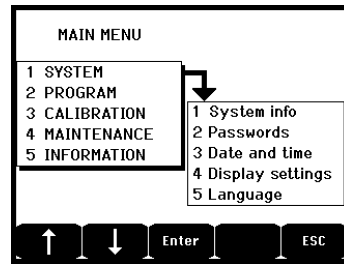


Figure 40: Main menu.

System

■ System Info

Displays the version of the program, the *bootloader* (internal micro-software for loading the program), and the configuration, as well as software application verifications.

■ Passwords

The central unit is protected by two access codes, both set at 1000 by default upon leaving the factory. You can change the passwords in this menu via COM43. The passwords are required each time you enter one of the menus that they protect.

First-level password: Authorizes access to the Calibration menu.

Second-level password: Authorizes access to the Programming, Calibration, and Maintenance menus. This password is also required before menu data are deleted.

■ Date and time

Time stamp settings (year, month, day, hour, minute, second).

■ Display settings

Static: Display frozen on a selected detector.

Cyclic: Examines each of the detectors connected every 2 seconds.

With screensaver: Displays screensaver (logo) after a period of inactivity without key movement.

Without screensaver: Displays the measurements continuously.

■ Language

Selection of the display menu language.

Program

- **Buzzer On/Off** Activates or deactivates the internal buzzer of the MX43.
- **Tag set** Allows for the modification of detector tags previously programmed via COM43.
- **Alarm settings** Allows for the modification of detector alarms previously programmed via COM43.

Calibration



If the measurement cell has changed, it is important to declare this through a menu no. 5 Cell change.

1. Detector select.

This menu enables the selection of detectors to be calibrated (calibration from MX43 or on the detector).

- A. Display of information described by the COM 43 application: i.e., measurement range, gas detected, current detector ID and its type.
- B. Display for the current detector:
 - **Last passed calibration:** Date and time of the last calibration carried out and completed.
 - **Last sensor replacement :** Date and time of last cell change.
 - **Wear rate :** Relation between the value of the standard gas and the value read (sensitivity measurement). A wear rate in excess of 100% entails a sensor replacement.
- C. Display of the address (digital detector) or line number (analog detector) to which the detector is connected.
- D. Selecting the detectors to be calibrated:
 - Select one or several detectors using the **previous detector** or **next detector** keys.
 - On pressing the **Select** key, press **Cal gas** to enter its value by means of the $\uparrow\downarrow$ keys. Validate by pressing **Enter**.

Note: Only analog detectors that are not equipped with a local display can be calibrated from the MX43 central unit. For the other detectors, the menu “Sel. Detector” only makes it possible to put them in calibration mode so that they do not activate alarms during their manual calibration.

- Press **Escape** to launch the procedure of recording the measurements on the detectors to be calibrated. Proceed to paragraph “2 Recording”.
- E. Display the calibration gas.

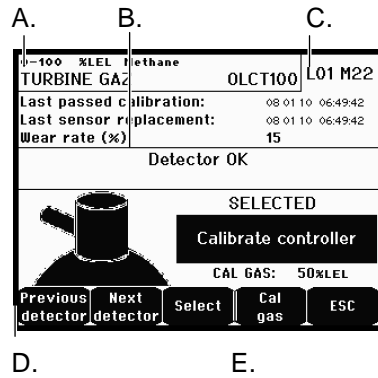


Figure 41: Example of the “Select detectors” screen.

2 Start Recording

- **Yes:** Launches the recording of calibration measurements for the selected detectors. From this moment onwards, all the calibration measurements are recorded for these detectors. “Start recording” is then displayed. The calibration of the detectors with the help of the standard gas can begin.

For a detector in which the cell has been changed, it is important to adjust the detector locally to obtain a 4-20mA output corresponding to the detector range. For detectors connected to the analog input module, perform the adjustments directly on the module (cf page 28).

Attention: During calibration, the standard gas must be injected for at least thirty seconds.

- **No:** Exits the recording procedure.

3. Stop recording

- **Yes:** Detector calibration having finished, this validates the end of calibration measurement recording for the detectors previously selected. From this moment onward, no calibration measurement is recorded. “Stop recording” is then displayed.
- **No:** Exits the end of the recording procedure.

4 Validation

This allows the adjustment and validation of zero and detector sensitivity once calibration is completed.

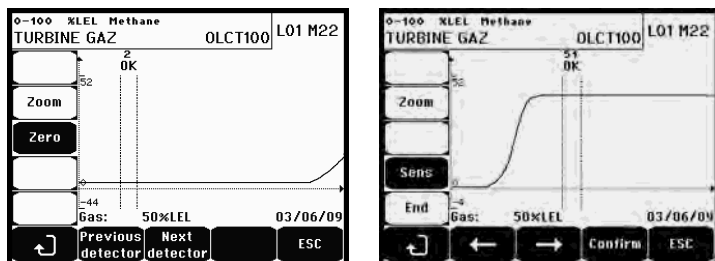


Figure 42: Adjustment of zero (left) and sensitivity (right).

Operating mode

Detector selection

1. Select the detector to be calibrated with the help of the **Previous detector** and **Next detector** keys and press **Validate**.

Zero calibration

1. The **Zoom** command is active.
2. Select the area of interest of the curve with the ← and → keys. Press **Zoom +** up to the activation of the Zero command. Adjust the position of the cursor so as to make the “OK” appear, in turn indicating that the range selected is sufficiently stable.
3. Press ↵ to select the term **Zero**.
4. Confirm the zero calibration by pressing **Validate zero**.
5. The term **Sens** (for sensitivity) is active from now on.

If sensitivity is not to be calibrated, press ↵ and **END**; to the message “Do you only want to calibrate zero for the detector?”, press **Validate calibration**. Only the zero calibration of the detector will have been carried out.

If sensitivity is to be calibrated, proceed directly to the following paragraph.

Sensitivity calibration

1. The **Sens** command is active.
2. Select the area of interest of the curve with the ← and → keys. Press **Zoom +** up to the activation of the command Sens. If applicable, adjust the position of the cursor so as to make the “OK” appear, in turn indicating that the range that has been selected is sufficiently stable.
3. Confirm the sensitivity calibration by pressing **Validate Sens**.

Record the calibration

1. The message “Do you want to validate zero and detector sensitivity?” is displayed. Press **Validate calibration** to confirm the adjustment of zero and sensitivity or **Esc** to exit the procedure.
2. The detector is calibrated.

5 Sensor exchange

This function reboots the parameters (rate of wear, calibration date, internal parameters corresponding to the 4-20mA range, etc.) from the selected detector(s) following or in view of a change of cell.

Detector Selection

1. Select the detector(s) to be rebooted with the help of the **Previous detector**, and **Next detector** keys and press **Selec**.

Detector Rebooting

1. Press Escape to launch the reboot of the selected cells.
2. Proceed next to the changing of the cell and then to a calibration of the corresponding detectors via the menus “1 Sel detectors”, “2 recording”, “End recording” and “4 validation”.

Maintenance

Access

Successively press the keys **Menus** and **Maintenance**.

1 Line On/Off

Sets the line to stop (the line is not powered and the detectors are at stop; no event can be generated from then on).

2 Detector On/Off

Sets the detector to stop (no event can be generated from then on) if it was not issuing an alarm or failure.

3 Test On/Off

Allows for the verification of the proper operation of a detector. In this mode, recordings and alarm relays are suppressed.

4 Simulation

Upon its selection, the message "The central unit no longer ensures detection" is displayed.

- The central unit no longer keeps account of inputs (detectors, logic inputs).
- The simulation measurements/status are initialized to the current measurement/status values. The relays, the internal buzzer, and the analog outputs remain in their current status.
- The screens, management of relays, outputs, etc. are those of Normal operation.
- The internal relay and the common default LED are activated.
- To change the value of a detector, use the ↓↑ keys to increase or decrease the measurement value simulated from -15% to 115%. For a logic input, use the ←→ keys to select the input, ↓↑ to select *Alarm* or *Alarm Off*.
- The banner of alarms does not appear.
- The events log indicates *Begin Simulation* and *End Simulation*.
- Exit the simulation mode by pressing the **End simul** key. Automatic release then occurs and resets the average values to zero. The current measurements are displayed once more.

Information

1 Detectors

This displays the main information on the detector (type, range, detected gas).

2. Events

1. Alarm events

This displays, for each of the detectors concerned: detector ID, alarm type (AL1, AL2, AL3, AL1mean, AL2mean, AL3mean, OVS), status (activated = ON or deactivated = OFF) as well as the date and time of occurrence or of the release.

The letter “S” appears on the line if the events were obtained when the MX43 was in simulation mode

Delete deletes all the data. Up to 512 events can be memorized. Beyond that, the most recent event deletes the oldest.

Previous page, **Next page**, and **Last page** access the corresponding pages of the file.

Alarm events				
TURBINE GAZ	AL1	ON	08 01 10	11:40:01
TURBINE GAZ	AL1	OFF	08 01 10	15:16:40

Previous page Next page Last page Delete ESC

Figure 43: Example of gas alarm files.

Message	Significance
AL1	Detector in level 1 alarm
AL2	Detector in level 2 alarm
AL3	Detector in level 3 alarm
OVS	Detector in OVS alarm
AL1 M	Detector in alarm set to level 1 mean value
AL2 M	Detector in alarm set to level 2 mean value
AL3 M	Detector in alarm set to level 3 mean value

Table 12: Gas alarm file messages.

2. Fault records

This displays, for each detector concerned: event type (UDS = Under-scale), RANGE = measurement out of range, DEF =Failure, DOUBT = clear doubt), status (activated = ON or deactivated = OFF) as well as the date and time of appearance or release. This file cannot be deleted.

Message	Significance
UDS	The measurement is lower or equal to the value of the UDS programmed.
DEF	Detector failure (out of range, line cut, defective cell, etc.)
RANGE	Measurement out of range.
>> LEL	Concentration higher than 100% of LEL.

Table 13: Failure file messages.

3. Inputs and relays records

This displays, for each relay and logic input concerned: activated relay/input ID, type (REL = relay, EL = Logic input), its status (activated = ON, Deactivated = OFF) as well as the date and time of occurrence or release.

Delete allows for the deletion of this entire file. Up to 512 events can be memorized. Beyond that, the most recent event deletes the oldest.

Previous page, Next page, and Last page access the corresponding pages of the file.

Message	Significance
RELAY	Status change of the designated relay.
INPUT	Status change of the designated input.

Table 14: Relay and logic input file messages.

4. Working conditions records

This displays the actions carried out on the MX43 (simulation mode, calibration mode, programming mode, release request, operation on internal battery), as well as the date and time of beginning and end of the event.

Delete allows for the deletion of this entire monitoring file. Up to 512 events can be memorized. Beyond that, the the most recent event deletes the oldest.

Previous page, Next page, and Last page allow access to the corresponding pages of the file; each page can display a maximum of 8 lines.

Message	Significance
Lines On/Off	Start or stop the line
Detectors On/Off	Start or stop the detector
External ack	Press the external acknowledgement button
MX43 ack	Acknowledgement by the acknowledgement button on the front face of MX43
Simulation	Switch to simulation mode
Calibration	At least one of the detectors is selected in calibration mode.
Test detectors	Switch to test mode
Program	Programming done on MX43
Time settings	Time settings on MX43
Line 1 On/Off	Start or stop line 1
Line 2 On/Off	Start or stop line 2
Line 3 On/Off	Start or stop line 3
Line 4 On/Off	Start or stop line 4
Line 5 On/Off	Start or stop line 5
Line 6 On/Off	Start or stop line 6
Line 7 On/Off	Start or stop line 7
Line 8 On/Off	Start or stop line 8

Table 15: Operation monitoring file messages.

5. Hardware troubles records

This displays, for each material incident detected: incident ID, status (activated = ON or deactivated = OFF) as well as the date and time of occurrence or release of the event.

Previous page, Next page, and Last page allow access to the corresponding pages of the file: each page can display a maximum of 8 lines.

Message	Significance
DEAD	Digital module no longer responding (line cut, module failure, wrong address, module absent).
MODUL	Configuration or module address error.
TEMP+	Internal temperature of the MX43 higher than maximum tolerated value.
TEMP-	Internal temperature of the MX43 lower than maximum tolerated value.
BAT	Switching to external power supply.
LINE 1	Incident on line 1 (short-circuit).
LINE 2	Incident on line 2 (short-circuit).
LINE3	Incident on line 3 (short-circuit)
LINE4	Incident on line 4 (short-circuit).
LINE 5	Incident on line 5 (short-circuit).
LINE 6	Incident on line 6 (short-circuit).
LINE7	Incident on line 7 (short-circuit).
LINE 8	Incident on line 8 (short-circuit).
CAL O	Calibration defect (zero shifted).
CAL S	Calibration defect (used cell).
CAL F	Calibration defect (cell oversensitive).
CAL D	Calibration defect (measurement unstable).

Table 16: Material incidents file messages.

6. System troubles records

This displays the events relative to MX43 operation (power failure/fluctuation, On/Off, etc.).

Previous page, Next page, and Last page allow access to the corresponding pages of the file; each page can display a maximum of 8 lines.

Message	Significance
ON	MX43 on live voltage
OFF	MX43 off voltage
Self-testing failure	Failure of internal tests
Other messages	Contact Post-Sales Service

Table 17: System incidents file messages.




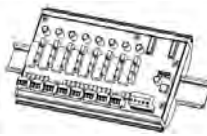
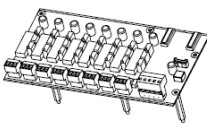
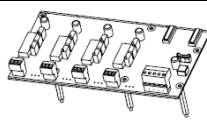


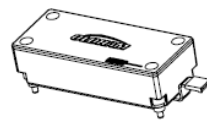
3. Slave info




These data enable maintenance technicians to visualize the communication framework between MX43 and the digital modules.

4. Controller info

These data allow technicians to visualize MX43 counters set to zero since the last zero setting.

Chapter 8 | Main Part number

Description	Reference	Image
MX43 4-line central unit, wall-mounted version	6 514 886	
MX43 8-line central unit, wall-mounted version	6 514 884	
MX43 8-line central unit, rack version	6 514 885	
Module with 8 analog inputs	6 314 061	
Module with 8 analog inputs for Wheatstone bridge or 4-20mA detector	6 314 063	
4-analog input PCB	6 314 085	
Module with 4 analog outputs	6 313 980	
Module with 16 logic inputs	6 313 964	
Battery pack	6 311 104	

Description	Reference	Image
4-relay module	6 313 962	
8-relay module	6 313 963	
Flash and buzzer kit	6 314 066	

Chapter 9 | Certificate of Compliance



DECLARATION DE CONFORMITE CONSTRUCTEUR Manufacturer Declaration of conformity



La Société Industrial Scientific Oldham, ZI Est 62000 Arras France, atteste que le matériel neuf désigné ci-après est conforme aux exigences des Directives Européennes:

(The Company Industrial Scientific Oldham, ZI Est 62000 Arras France, declares that the new material comply with the requirements of the following European Directives :)

CENTRALE DE MESURE MX43

CONTROL UNIT MX43

I) Directive Européenne Basse Tension DBT 2006/95/CE du 26 décembre 2006
The European Directive Low Voltage LVD 2006/95/CE of 26 December 2006

Normes Harmonisées appliquées : **EN 61010-1**
Harmonised applied Standards

II) Directive Européenne CEM Compatibilité Electromagnétique 2004/108/EC
The European Directive EMC Electromagnetic compatibility 2004/108/EC

Normes Harmonisées appliquées : **EN 50270** Type 2 - Industriel
Harmonised applied Standards Type 2 - Industrial

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Program Manager

Chapter 10 | Technical Specifications

MX43 Central Unit

Function	
Function:	Central measurement unit with multiple-channel alarm.
Number of lines:	4 or 8 as per model.
Display and indicators	
Display:	Back-lit graphic LCD
Status indicators:	<ul style="list-style-type: none"> - 7 LEDs for each of the 8 lines, or 56 LEDs. - 1 live voltage indicator for the central unit. - 1 general failure indicator.
Keys	
Selection:	5 multifunction soft-touch keys.
Alarm release:	Dedicated soft-touch key.
Alarms	
Limits:	Parameter setting by COM43 application.
Indicators:	6 status LEDs per line (high- and low-range excess, Alarm 3, Alarm 2, Alarm 1, failure).
Internal relay:	<ul style="list-style-type: none"> - 5 completely programmable relays (configuration in positive safety or normal mode over COM43). - 1 failure relay (non-modifiable). - RCT contact on each relay. Nominal load of contacts: 250 V AC – 2A or 30 V DC – 2 A, resistive load. - Output at screwed terminals Maximum admissible cable diameter 2.5 mm².
Measurement Lines	
Digital lines:	<ul style="list-style-type: none"> - 8 maximum. - RS485 Modbus, 9600 Bauds. - Industrial computer cable, 2 shielded twisted pairs (1 for the line and 1 for communication), adapted to 120 Ohms.
Analog lines:	<ul style="list-style-type: none"> - 8 maximum. - Input range 4 to 20 mA. - Load resistance 120 Ohms. - Analog transmitter cable 2 or 3 shielded wires.
Nominal voltage:	21 to 28 V on external DC.
Maximum current available per line:	500 mA.

Total maximum current for lines:	2.4 A CC or 3.2 A per peak.
Total power available as per temperature:	Room T° ≤ 20°C = 68 W. Room T° 20 to 30°C = 55 W. Room T° 30 to 40°C = 41 W. Room T° 40 to 50°C = 27 W.
Cables outputs:	(only for wall-mounted version) <ul style="list-style-type: none"> ■ 12 PE M16 for cables of 4 to 8 mm². ■ 6 PE M20 for cables of 6 to 12 mm².
Insulation:	1500 V AC (power–digital network).
Output	On screwed terminals. Maximum admissible conductor section 2.5 mm ² .

Electrical characteristics

AC power supply:	<ul style="list-style-type: none"> ■ 100 to 240 V AC, 50/60 Hz. ■ Maximum input current 1.5 A. ■ Maximum consumption: 230 VA.
DC power supply:	<ul style="list-style-type: none"> ■ 21 to 28 V DC. ■ Maximum input current 3.2 A. ■ Maximum consumption: 112 VA.

Mechanical characteristics

Installation:	<ul style="list-style-type: none"> ■ Wall-mounted version: on special screwed support. ■ Rack version: Cut-out of 177 x 437 mm.
Dimensions:	<ul style="list-style-type: none"> ■ Wall-mounted version: 370 x 299 x 109 mm. ■ Rack version: 482.8 x 177 x 192.5 mm (19", 4 U). <p>See Figure 4 and Figure 6.</p>
Weight:	<ul style="list-style-type: none"> ■ Wall-mounted version: 4.0 kg. ■ Rack version: 2.0 kg.
Protection level:	<ul style="list-style-type: none"> ■ Wall-mounted version: IP55. ■ Rack version: IP 31.
Locking:	<ul style="list-style-type: none"> ■ Wall-mounted version: by 2 locks with a key. ■ Rack version: none.

Environmental characteristics

Conditions of use

Temperature of use:	-20 to +50°C. (as per power used; cf. preceding page).
Storage temperature:	-20 to +50°C.
Humidity:	5 to 95% relative humidity.

Standards

Electromagnetic compatibility:	as per EN50270, industrial type 2.
ATEX:	60079-29-1 and EN50271 (current).

Low voltage directive:	as per EN61010.
CSA:	as per C22.2 no.152 (current).

Relay Module

Function	
Function	Management of 4 or 8 relays from the digital signals issued by the MX43.
Number of relays:	<ul style="list-style-type: none"> ■ 4 or 8 relays. ■ CRT outputs
Relay type:	<ul style="list-style-type: none"> ■ Bistable. ■ Configuration in positive or negative safety by mini-switches. ■ Setting of relay parameters by COM43 application.
Nominal load of contacts:	250 V AC – 2 A or 30 V DC – 2A, resistive load.
Consumption:	3.5 mA in normal operation.
Connections:	<ul style="list-style-type: none"> ■ Screwed terminals. ■ Connector detachable without cutting the line. ■ Tightening torque: 0.5-0.6 Nm. ■ Cable: 2.5 mm² maximum.
Logic inputs:	2 additional logic inputs (dry contacts).
Assembly:	Snap-on on DIN rail.
Dimensions:	125 x 165 x 60 mm.

16-Logic Input Module

Function	
Function	Logic input monitoring.
Capacity:	1 to 16 logic inputs (dry contacts).
Connections:	<ul style="list-style-type: none"> ■ Screwed terminals. ■ Connector detachable without cutting the line ■ Tightening torque: 0.5-0.6 Nm. ■ Cable: 2.5 mm² maximum.
Consumption:	2 mA in normal operation.
Assembly:	Snap-on on DIN rail.
Dimensions:	125 x 165 x 60 mm.

8-Analog Input Module

Function	
Function:	4-20mA detector or Wheatstone bridge connections.
Capacity:	1 to 8 independent inputs.

Connections:	<ul style="list-style-type: none"> ■ Screwed terminals. ■ Connector detachable without cutting the line. ■ Tightening torque: 0.5-0.6 Nm. ■ Cable: 2.5 mm² maximum.
Consumption:	53 mA max (detector excluded).
Operating temperature:	<p><i>8 bridges</i></p> <ul style="list-style-type: none"> - 30°C (8 bridges up to 1 km). - 40°C (8 bridges up to 500 m). <p><i>4 bridges</i></p> <ul style="list-style-type: none"> - 45°C (4 bridges up to 1 km). - 50°C (4 bridges up to 500 m).
Assembly:	Snap-on on DIN rail or mounted on the inside of MX43.
Dimensions:	125 x 165 x 60 mm.

4-Analog Output Module

Function	
Function:	Generation of 1 to 4 analog values.
Capacity:	<ul style="list-style-type: none"> ■ 4 independent opto-isolated outputs 4-20mA (recopy detector, minimum, maximum, or average of a detector group). ■ Resistance of maximum load 500 Ω.
Logic inputs:	2 additional logic inputs (dry contacts).
Connections:	<ul style="list-style-type: none"> ■ Screwed terminals. ■ Connector detachable without cutting the line ■ Tightening torque: 0.5-0.6 Nm. ■ Cable: 2.5 mm² maximum.
Consumption:	<ul style="list-style-type: none"> ■ < 5 mA with the 4 lines at stop. ■ < 36 mA for an activated line. ■ < 130 mA for the 4 activated lines.
Assembly:	Snap-on on DIN rail.
Dimensions:	125 x 165 x 60 mm.

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Garanty

1 Plus Points

To respond quickly and efficiently to your consultancy needs or order tracking throughout the world via our customer service department.

To respond as rapidly as possible to all questions of a technical nature.

2 Quality

To assure you of the best quality of our products and service in conformity with the international standards and directives in force.

3 Inspection and Reliability

To provide you with reliable equipment. The quality of our production is an essential condition for this reliability. This is guaranteed by virtue of very strict checks that are carried out when raw materials come in, both during the course of and at the end of manufacture (all equipment that is sent out is configured to your individual requirements).

4 Commissioning

If required, to commission your equipment by our Ism-ATEX qualified specialists.

5 Training

To provide detailed training programs.

6 Project department

Our team will investigate all gas and flame detection projects via on-site investigations or from drawings. We can suggest pre-project studies, design, installation and maintenance of safety systems in ATEX or non-ATEX zones with full respect of all standards in force.

7 Maintenance contract

To suggest rolling maintenance contracts tailored to your needs in order to guarantee you maximum safety:

- One or more annual visits, including consumables
- Renewable by agreement
- Including adjustment of fixed or portable gas detectors, and inspection of control systems.

8 On-site repair

To rapidly send our Service Technicians to you. This is possible on account of our hubs in France and abroad.

9 Factory repair

To deal with any problem that cannot be resolved on-site by dispatching the equipment back to the factory. Teams of technicians will work on repairing your equipment as quickly as possible, thereby reducing the time spent out of commission to a minimum. Cost efficient replacement solutions are available if equipment is deemed not repairable.

For all After Sales Service in France, contact us by email at servicecenter@oldhamgas.com

Or by telephone at + 33 (0)3 21 60 80 80. For locations near you, please visit us at indsci.com and click on the Oldham Division.

OUR MISSION

Preserving human life on, above and below the earth
Delivering highest quality, best customer service...
every transaction, every time.



The Fixed Gas Detection People

EUROPEAN PLANT AND OFFICES

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