MEASURING UNIT

MX48

COMMISSIONING, OPERATING AND MAINTENANCE MANUAL

Made in France

INDUSTRIAL SCIENTIFIC

Ref : NP48UGB

INDUSTRIAL SCIENTIFIC

GAS DETECTION

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GUARANTEE

2 years guarantee in normal conditions of use on parts and technical labour, return in our workshops, excluding consumables (sensors, filters, etc.)

CONTENTS

1. DESCRIPTION

1.1. *General*

The MX48 measuring and alarm unit can be fitted with between one and 16 independent channels.

Each channel is connected to one or more detectors installed in the locations to be monitored.

The measurement that is output from the detector is displayed on the MX48 unit and compared with alarm thresholds. If thresholds are exceeded, the unit actuates relays which can be used to control external devices.

REMARK

The equipment of the MX48 unit comprises 1 or 2 PCBs (option), each equipped with 4 channels. However, each channel is independent and can be connected to any type of INDUSTRIAL SCIENTIFIC detector provided that the PCB is suitably programmed.

MAIN CHARACTERISTICS

- Wall-mounted box (500 x 340 x 89)
- AC or DC power supply
- 4 or 8 measuring inputs for detectors
- Display of measurement on a plasma display panel (2 lines - 16 characters)
- One keypad with four keys on the front panel for the user
- One keypad with four keys for maintenance (on the display unit card, accessible only by opening the front panel)
- One "CALIBRATION" key and one "PROGRAMMING" key for maintenance (on the display unit card, accessible only by opening the front panel)
- **3 gas alarms per channel**
  - Two instantaneous rising or falling thresholds, manual or automatic clearing, with "extractor control logic (tunnel parking application)"
  - One rising or falling threshold, automatic clearing, triggering by time delay or average

Relaying

Total of 10 or 18 relays distributed as follows:

- Two relays per channel, with positive or negative safety, contacts open or closed at rest for the first two thresholds
- One relay common to channels for third thresholds or for all alarms (buzzer transmission), with positive or negative safety, contacts opened or closed at rest
- One relay common to channels for faults and failures, constant positive safety mode, contacts open or closed at rest.

- Current output (4-20 mA) per measuring channel.
- Common audio alarm that can be acknowledged in the case of occurrence of gas alarms.

1.2. *the wall-mounted box*

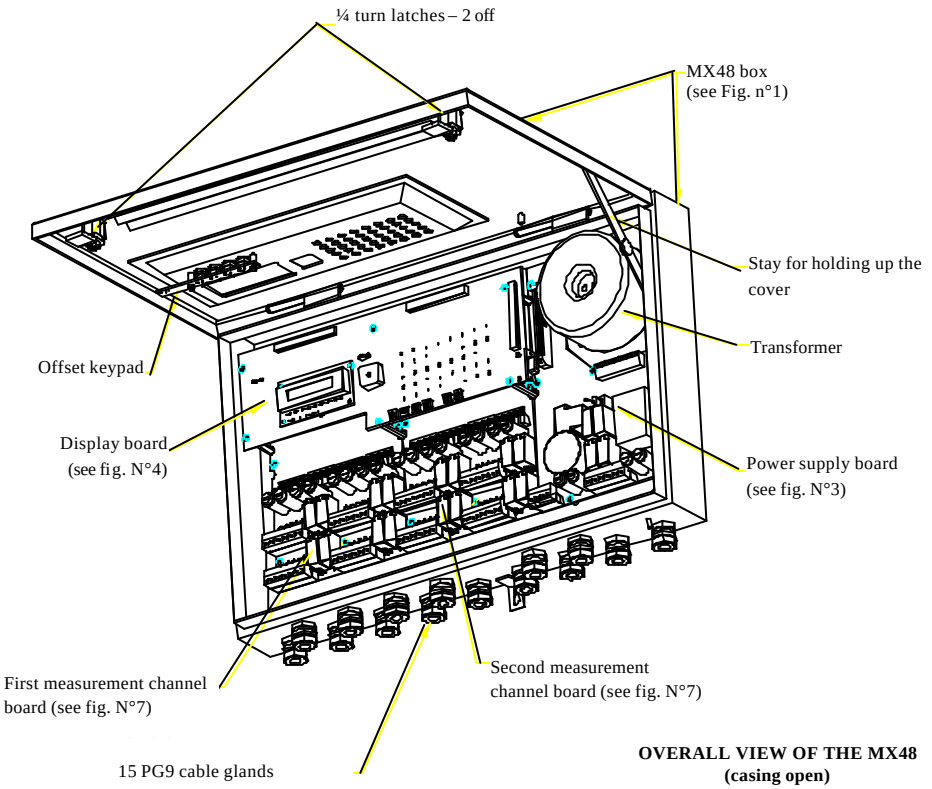
The housing of the MX48 is a wall-mounted box consisting of a back casin and a cover which can be pivoted.

- Dimensions: Fig. 1 (end of this manual)
- Overall view, casing open : Fig. 2

1.3. *The various printed circuit boards*

- Overall view: Fig. 2
- Power supply board : Fig. 3
- Measuring channel board: Fig. 7
- Front link board : Fig. 4
  (Comprising the display, the micro part, the DB9 RS223 and RS485 connector and the keypads).

FIGURE 2 : COMPLETE SET OF BOARDS



OVERALL VIEW OF THE MX48 (casing open)
FIGURE 2

2. INSTALLATION AND CONNECTIONS

Please ensure you read the paragraph: Special Specifications for use in Potentially Explosive Atmospheres in Accordance with European Directive ATEX 94/9/EC

2.1. *Installation: recommendations*

The MX48 unit can be installed in any premises without an explosive atmosphere. They should preferably be placed in a ventilated and monitored location (guardhouse, control room, instrumentation room, etc.).

Attachment is to be ensured in accordance with the dimensions in Figure 1 (3 attachment points).

REMARK

In order to permit the swivelling front panel of the unit to be opened completely, allowance must be made for opening by rotation through 90° downwards (see fig 2 – end of this manual)

Before making any connections, the unit should be switched off using the main On/Off switch below and to the left of the FRONT circuit (see Figures 3 rep A).

2.2. *Electrical connections of the MX48 Unit (Fig. 8)*

The MX48 unit is equipped with a pulse automatic device which enables to connect 24 V DC voltage in a lack of 220 V AC voltage so we can use no expansive save power supply.

2.2.1. Alternative power supply

- Voltage: 230 V AC (207 to 244 V) 50/60 Hz
- Maximum power: 200 VA
- Maximum current in cable: 1 A
- Cable: 3 x 1.5 mm² (including earth)
- Location of connection terminal blocks: Fig. 8,
- Protection: the phase and neutral wires are protected by time-delayed 2 A fuses located at the rear of the power module (fig3).
- Voltage: 103 to 122 V AC - 50/60 Hz on option

CAUTION

It is mandatory that the appliance must be earthed. A terminal is reserved for this purpose at the back of the power module: see Fig. 5. This connection is required in order to ensure correct operation of the following:

- mains power interference filter,
- protective devices against electromagnetic interference.

2.2.2. DC power supply

- Voltage: 21 to 30 V continue. The "⏚" from continue power supply is linked to earth (and earth being linked to frame).
- Maximum power: 150 W
- Maximum current in cable: 6.3 A
- Cable: 2 x 2.5 mm²
- Location of terminal block: see Fig. 8, item D
- Protection: by two fuses located at the back of the power module (Fig. 3)

2.3. *Detectors (Figure 12)*

REMARK

- The detectors are linked by SHIELDED cables.
- The utilization of shielded cables is MANDATORY
- The earth braid of shielded cables must be connected to the earth at one end only.

CAUTION
Each channel is configured in the factory for a given type of detector (explosive gas, toxic gas, fire or flame). If two different types of detector are interchanged, this may result in the destruction of the central unit or of the detector.

2.3.1. Explosimetric detectors of PONT type

Three connecting wires for a shielded cable.

Resistance of detector / unit cable: 16 ohms maximum per wire, i.e. 32 ohms in loop (1 km for cable 3 x 1.5 mm²).

Connection on MX48 unit: see Fig. 10 – Example 1

2.3.2. 3-wire detectors 4-20 mA: 3 connecting wires for shielded cable

- Resistance of detector / unit cable: 16 ohms maximum per wire, i.e. 32 ohms in loop (1 km for cable 3 x 1.5 mm²).
- Connection on MX48 unit: see Fig. 10. – Example 2

2.3.3. 2-wire detectors 4-20 mA: 2 connecting wires for shielded cable

- Resistance of detector / unit cable: 32 ohms maximum per wire, i.e. 64 ohms in loop (2 km for cable 2 x 1.5 mm²).

- Connection on MX48 unit: see Fig. 11. – Example 2

2.3.4. FIRE detectors: 2 connecting wires for shielded cable

The current commercial designations are as follows:

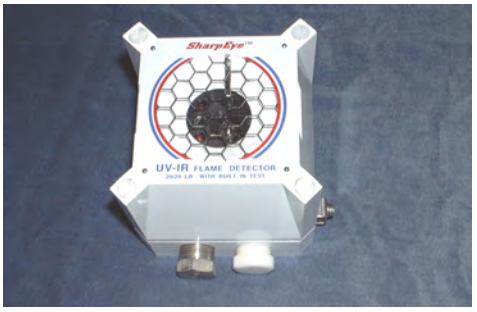
- "Thermovelo" detectors of type EC 11 (sensitive to temperature variations)
- Ionic detectors of type EI 1 100 (sensitive to smoke)
- Optical detectors of type EO 1 100 (sensitive to smoke)

- Resistance of detector / unit cable: 28 ohms maximum per wire, i.e. 56 ohms in loop (2 km for cable 2 x 1.5 mm²)

- Fire detectors can be detected in parallel to a maximum of five. The end-of-loop resistor (2.7 K) is to be placed at the end of the line on the last detector.

- Connection on MX48 unit: see Fig. 11. – example 1

2.3.5. FLAME detectors: 2, 3 or 4 connecting wires for shielded cable depending on utilization



REMARK

The detectors can be supplied with power either via the MX48 unit or by an auxiliary 24 V DC source.

These detectors can operate in standalone mode:

> 24 V DC power supply and direct utilization of relay contacts in accordance with the technical specification corresponding to the detector used.

The current commercial designations are as follows:

- model 20/20 U - analog - type UV - 752002 (sensitive to UV radiation)
- model 20/20 UC - analog - type UV (sensitive to UV radiation)
- model 20/20 UB - µP technology - type UV - 772002 (sensitive to UV radiation)
- model 20/20 UBC - µP technology - type UV (sensitive to UV radiation)
- model 20/20 LC - analog - type UV/IR (pyroelectric, combination of UV and IR detectors)
- model 20/20 LBC - µP technology - type UV/IR (pyroelectric, combination of UV and IR detectors)
- model 20/20 I - µP technology - triple IR detector - 780002 (pyroelectric, sensitive to IR radiation)

These detectors are equipped with various types of terminal block (see table below).

Model	20/20 U	20/20 UC	20/20 UB	20/20 LC	20/20 UNC	20/20 LBC	20/20 I
Type of terminal block	B	C	A	C	C	C	A

- Resistance of cable / unit
  - In the case of local 24 V DC power supply:
    8.5 ohms maximum per wire, i.e. 17 ohms in loop
  - In the case of power supply via the MX48 unit:
    3 ohms maximum per wire, i.e. 6 ohms * in loop

∗ 4 ohms for detector 20/20 I (IR3)

- Connection on MX48 unit (ONE detector per measuring channel ONLY):

  - detector equipped with a terminal block of type A: see Fig. 13
  - detector equipped with a terminal block of type B: see Fig. 14
  - detector equipped with a terminal block of type C: see Fig. 15

Example of the utilization of the 4-20 mA signal from flame detectors equipped with connectors of type A or C: see Fig. 16.

Example of the utilization of detectors equipped with connectors of either type A or type B and with auxiliary power supply. The auxiliary power supply must be able to supply power to the number of detectors planned in the measuring loop (see Fig. 17).

REMARK

In the case of this application, the maximum of five flame detectors can be connected in the measuring loop.

Example of the utilization of IR3 or UV/IR detectors equipped with connectors of type A with a local junction box and galvanic insulation (see Fig. 18).

2.3.6. CO2 detector of type "Ventostat VT"

- Connection on MX48 unit: see Fig. 20.
- Resistance of detector/unit power cable: 12 ohms maximum per wire, i.e. 24 ohms in loop.
- 4-20 mA output: maximum load = 280 ohms (whole loop)

2.3.7. Specific case of intrinsic safety detectors

Two types of intrinsic safety barrier can be used: Z787 / EX and MTL787S+.

PRECAUTIONS

Before connecting the barrier to the unit, check that the voltage is < 25 V DC.

- A short circuit in the electrical connections will result in destruction of the barrier.
- Perform wiring in the DE-ENERGIZED state.
- The electrical link between the MX48 unit and the clipper is made using a screened cable with two active conductors with a maximum resistance of 12 ohms each.

REMARK
In classified areas, the installation must comply with the standards in force.

- Connections on MX48 unit: see Fig. 21.

IMPORTANT
All intrinsic safety installations must be APPROVED as a whole assembly by an approved organization (DRIRE, etc.).

INDUSTRIAL SCIENTIFIC "INTRINSIC SAFETY" BARRIERS

Type of IS barrier	Reference	Specific features	INDUSTRIAL SCIENTIFIC box reference	
Z787 / EX	6184703	To be fitted on DIN RAIL		
MTL787S+	6797100	To be fitted in an approved box: MANDATORY	For 2 clippers	6797192
			For 5 clippers	6797547
			For 12 clippers	6797101

2.3.8. Other detectors with standardized current output

Any detector (with 2 wires or 3 wires) that can be supplied with power between 19 V DC and 32 V DC and that supplies a standardized current (signal) of between 4 and 20 mA can be connected to the MX48 unit.

The connection requirements are identical to those for the corresponding INDUSTRIAL SCIENTIFIC detectors (see Fig. 22).

2.3.9. Parking application

CTX300 "Co parking" toxic gas detectors can be fitted in parallel when a mean gas concentration is to be obtained. The detectors must, imperatively, be located in the same area. In this case, a maximum of five detectors can be connected (see Fig. 23).

2.4. *Connecting the unit to external devices*

2.4.1. Slaving controls

The 8 measuring channels of the MX48 unit are each equipped with two relays which can be used to control external devices: sirens, solenoid valves, extractors, telephone calls, etc..

For each measuring channel, the relays are distributed in the following manner (see Fig. 7):

- a relay associated with the triggering of alarm 1 (fig 7),
- a relay associated with the triggering of alarm 2 (fig 7),
- use of open or closed contacts selected with a jumper (see Fig. 7 – item A),
- use of positive or negative safety selected by programming (see the CHANNEL programming menu),
- contact outputs on the back of the measuring board (see Fig. 12).

- An example of connection is given in Fig. 24:
  - a siren connected to relay AL1 will be actuated as soon as alarm 1 is triggered,
  - a solenoid valve connected to relay AL2 will be actuated as soon as alarm 2 is triggered.

For all channels:

- A common relay associated with the triggering of alarm 3 for the 8channels (fig 3).

  By programming, this common relay can also be used for the remote transmission of the audio warning signal. (This relay will then be associated with all the unit's alarms).

- A **fault** relay associated with the triggering of channel faults (detector failures, electrical connections, excessively negative zero, etc.). This relay will always be in positive safety mode (see Fig. 3).

- The use of open or closed contacts is selected by programming on common board (see Fig. 3).

- Common relay contact outputs on the back of the power module: Fig. 8.

REMARK

Owing to the breaking capacity of the MX48 unit's relays which is limited to 2 A / 250 V AC or 30 V DC, external intermediate relays must be used if the devices to be controlled require high power levels.

The relay contacts are indicated : unit switched off

2.4.2. 4-20 mA current outputs (Fig. 12)

For each measuring channel, the MX48 unit is equipped with a 4-20 mA output that can be used to retransmit measurements to a recorder or an external PLC. The maximum resistance in loop mode is 600 ohms. The earth connections for the 4-20 mA outputs are common and the unit. The 4-20 mA lines are not galvanically insulated one from the other. The current output varies according to the measurement and has several states, as follows:

- On starting up the unit: I < 1 mA
- With FAULT: I < 1 mA
- In MAINTENANCE mode: I = 2 mA
- ZERO MEASUREMENT: I = 4 mA
- Full scale: I = 20 mA
- Out of range or "in doubt": I > 23.2 mA

An example of the connection of a multi-channel recorder is given in Fig. 25.

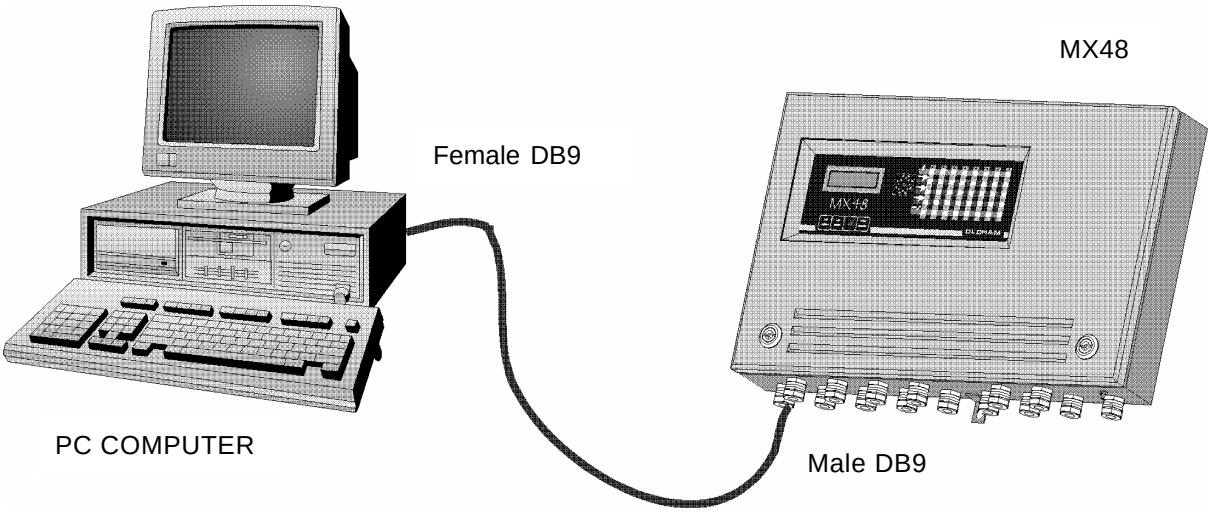
2.4.3. RS 232 and RS 485 outputs

RS232 OUTPUT

A computer can be connected on a female sub.D/DB9 type connector located on the back of the micro board (fig 4 repA). The MX48 programming, from outside, will be possible thanks to this connection.

RS 232 OUTPUT USING

- Remove the DB9 connector (plug with an internal strap)
- Connect a link cable ref.6315831 which will link the monitor to the computer on the MX48 available female connector DB9 (Fig 6)



- when the using is stopped : no connect the cable and put the male DB9 "plug" again.

RS 485 OUTPUT (PINABLE ON FIG 8)

Several MX48 units can be linked to a single computer, which is the "master" of the network. In this case, a "SLAVE NUMBER" (by programming/unit) is asigned to each MX48 unit.

This RS 485 output can be galvanically insulated as an option.

1st case : no galvanic insulation

- no mounted insulation component
- 2 polarization electrical resistances are welded and programmed with J103 and J104 pins

2nd case : with galvanic insulation

- mounted and welded insulation component
- no programmed polarization electrical resistance for "plus" (+ 5V) (J104 programming pins)

  a) with RS 485 shielded

  - no programmed polarization resistor for "moins" (GND) (J103 programming pins)

  b) without RS485 shielded

  - programmed polarization resistor for "moins" (GND) (J103 programming pins)

End loop resistor

It is located on the MX48 micro board and must be programmed **with the last MX48 unit of the loop** (by pins) with a 120 Ohms value.

The MX stored data are some instantaneous values

The RS485 output is a half duplex type.

RS 485 OUTPUT USING

- No change the sub D/DB9 "plug" connector (fig 4 – item A)

- Connect the screwed connector terminals 3, 4 and 5, located on the power supply board of the MX48 unit. See connection details fig 8.

- Owing to mounted wires or not (following the mounting and the equipment linked or not on the earth…).

IMPORTANT

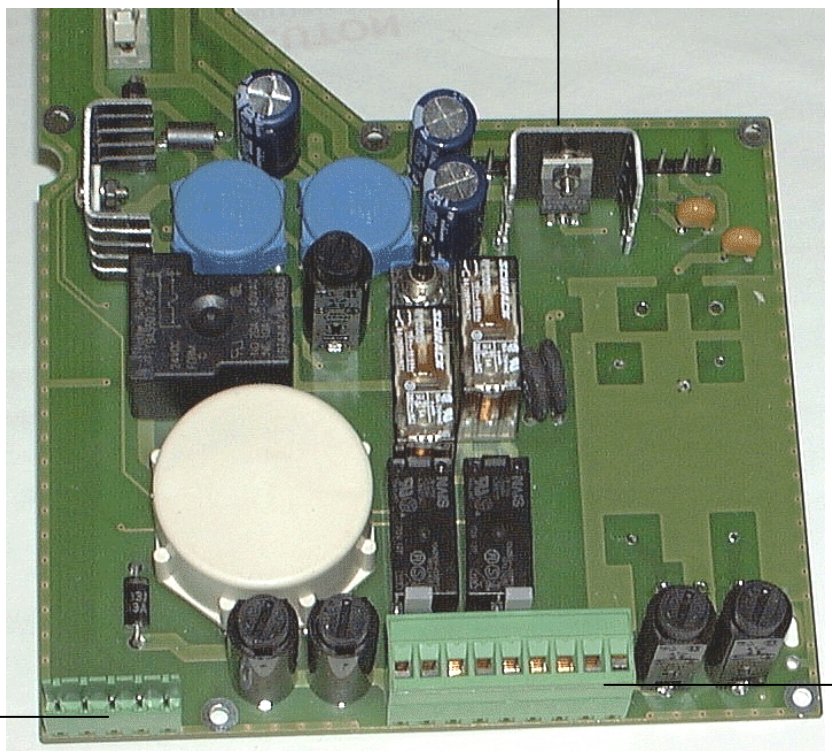
All details regarding the RS 485 complete description (Modbus / Jbus format, structures, adresses aso…) are developped in a leaflet ref. D 813 577.

CAUTION

A computer or a printer management interface must be used in order to printout the data stored by the MX48 unit. See details and possibilities in a leaflet ref. 8 813 571.

2.4.4. Remote acknowledgement

It is possible to allow remote acknowledgement by connecting on terminals clear 1 and clear 2 (loop = 16 mA), of the connector located on the power supply board : see fig 8.
Maximum load impedance : 1 K?
Remark : several MX48 units can be connected to the same remote acknowledgement system provided that the polarities are respected.



3. STARTING UP

3.1. *Checking the installation*

It is checked that, at least, all connections have been made and that the complete installation complies with current standards in force.

CAUTION
INDUSTRIAL SCIENTIFIC is not responsible for the compliance of the complete electrical safety system.

The MX48 unit is switched on by means of circuit breakers * provided for that purpose and which ensure protection of the mains power unit.

* The circuit breakers are to be selected according to the power consumption levels specified by the manufacturer and the length of the electric cables.

3.2. *Switching on the unit*

CAUTION
The handling operations and adjustments described in these paragraphs are strictly reserved for authorized personnel as they are liable to affect detection safety.

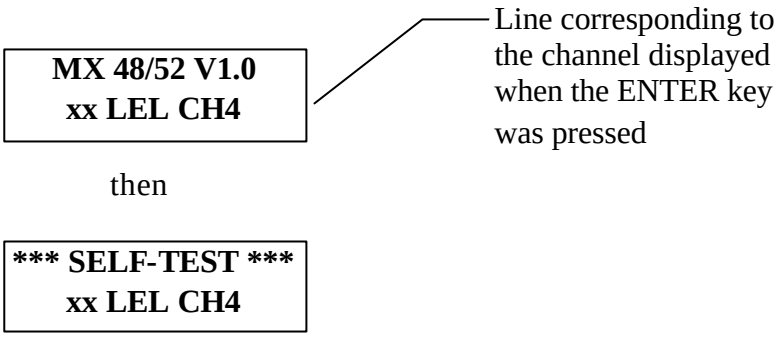
To start up the MX48 unit, you must:

- swivel the front panel,
- press the ON/OFF button located to the bottom left-hand side of the FRONT circuit: see Figures 3 (item A).
- The display panel then shows, for example:

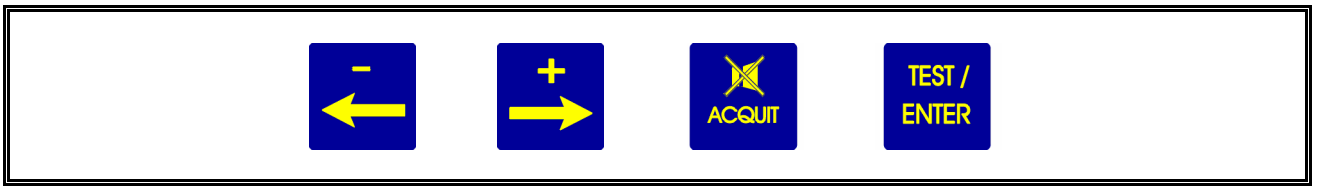
MX 48/52 V1.0

The unit then goes into INITIALIZATION mode for one minute. Consequently, all the alarms are inhibited and the current outputs are 1 mA for the channels in service. The unit then performs a self-test * on its buzzer and all its night-emitting diodes. At the end of this one-minute period, the channels in service return to normal operation and the corresponding alarms and relays are enabled.

* The user can carry out a “manual-self test” by pressing the test key at any time (see Fig. 26). This self-test lasts 20 seconds and the display panel may show the following displays one after the other, for example:



The user can interrupt the self-test cycle before it is completed by pressing the ACKNOWLEDGEMENT key of the front panel keypad.



3.3. *Operating modes*

3.3.1. Audio warning device (buzzer)

In normal operation, the audio warning device is triggered whenever a fault or an alarm appears. The audio warning device can be stopped by pressing the ACKNOWLEDGEMENT key or by remote acknowledgement. The buzzer makes a continuous or discontinuous sound (according to the programming of the unit) if an alarm threshold is exceeded.

3.3.2. Light-emitting diodes (LED) (Fig. 1 and fig 4)

Each channel is equipped with five LEDs (visible and identified on the FRONT panel).

LED	Extinguished	Illuminated in steady mode	Flashing
GREEN	Channel not in service	Channel in service	Threshold AL1 exceeded (manual clearing) and not acknowledged
1st red	AL1 not triggered	Threshold AL1 exceeded (automatic clearing)	Threshold AL2 exceeded (manual clearing) and not acknowledged
2nd red	AL2 not triggered	Threshold AL2 exceeded (automatic clearing)	
3rd red	AL3 not triggered	Threshold AL3 exceeded by mean or time (automatic clearing)	
Yellow	No fault	Fault on channel	-Channel being calibrated or programmed - Detector being calibrated

3.3.3. Alarm thresholds

Each of the three alarm thresholds can be programmed independently for each channel. (See the "Channel programming" menu).

In normal operation, a gas alarm is only triggered after a preprogrammed time delay in order to avoid spurious alarms.

Alarm thresholds can be processed in the following manners:

- in normal cycle with manual clearing: block diagram 1,
- in normal cycle with automatic clearing: block diagram 2,
- in parking cycle: block diagram 3.

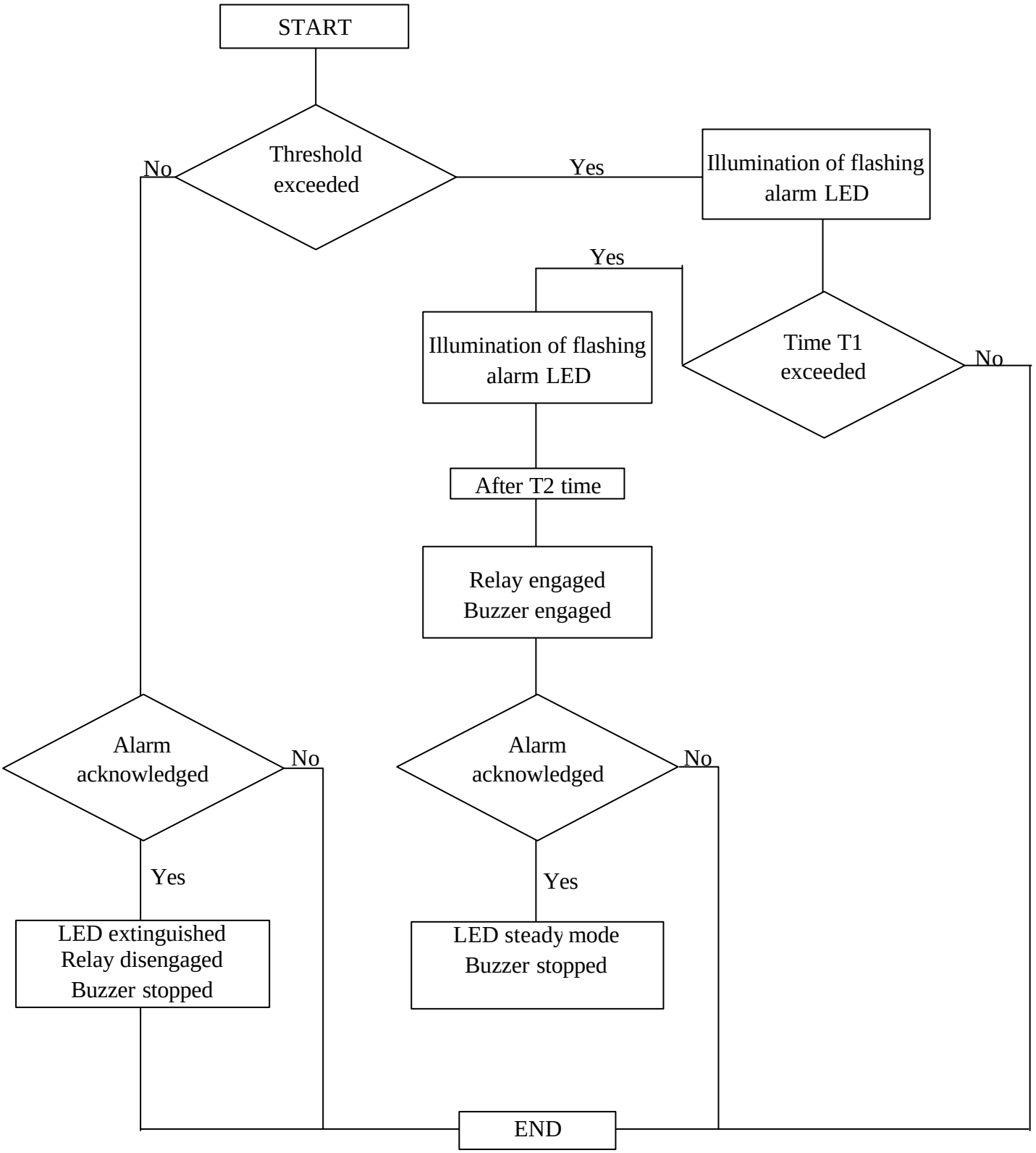
The alarm thresholds are to be selected according to the gases detected and the corresponding standards in force.

Special case: A channel connected to a fire detector

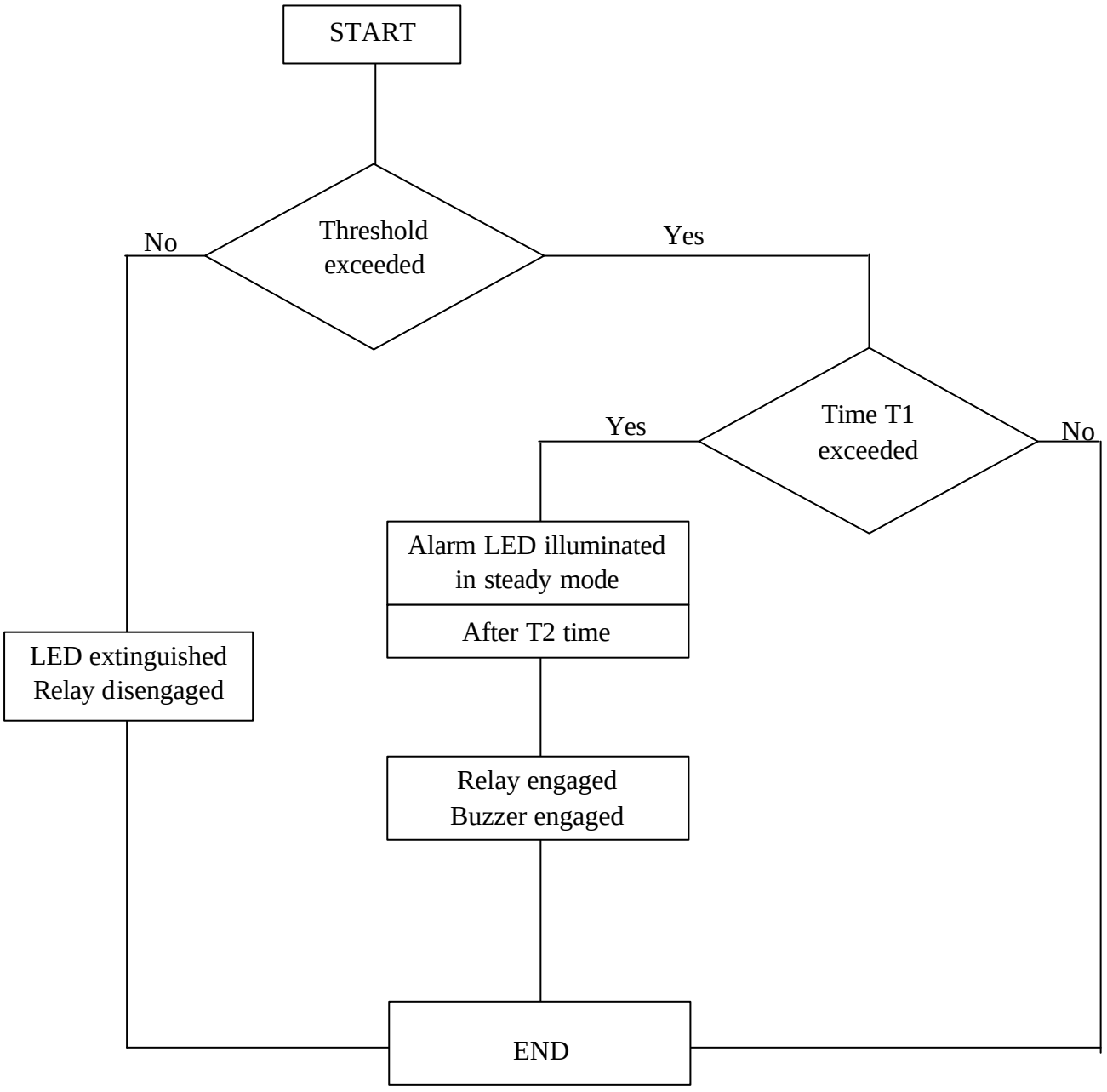
- It is MANDATORY to select the scale with 100 divisions.
- It is MANDATORY to select the alarm threshold with 60 divisions.

(Owing to the end-of-loop resistor of 2.7 kΩ, the fire detector outputs 4 mA when no fire is detected and 20 mA if a fire is detected).

BLOCK DIAGRAM 1
NORMAL CYCLE WITH MANUAL CLEARING



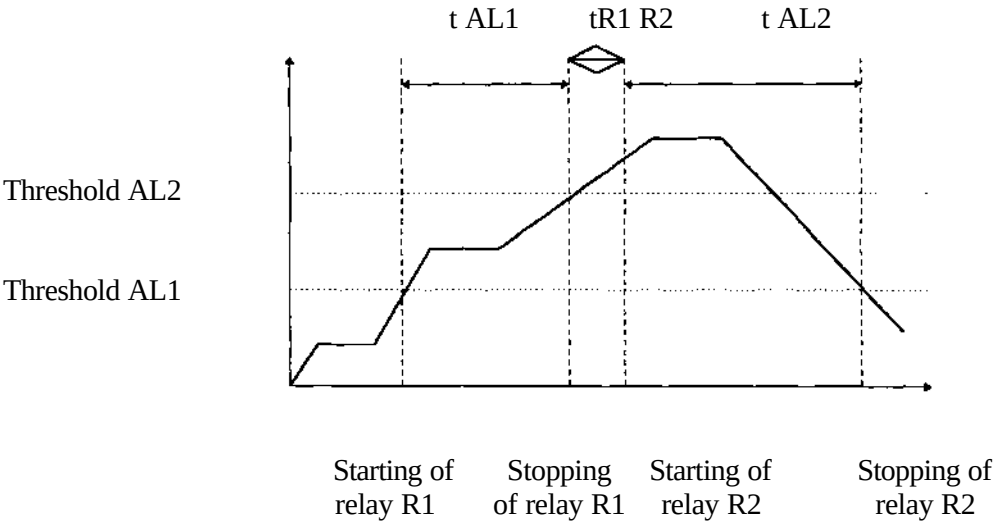
BLOCK DIAGRAM 2
NORMAL CYCLE WITH AUTOMATIC CLEARING



BLOCK DIAGRAM 3
PARKING CYCLE

Alarm 3 operates in the same way as the normal cycle.

The times defined for alarms 1 and 2 (time delays) are, in this case, used to define the minimum operating time for each relay.



		min.
t_{AL1}	Min. operating time for alarm 1 (defined for each channel)	t_1
t_{AL2}	Min. operating time for alarm 2 (defined for each channel)	t_2
$t_{R1\ R2}$	Switching time from relay 1 to relay 2 (defined for the whole unit)	$t_{R1\ \&\ R2}$

3.3.4. Fault thresholds

Processing of detector faults

Each channel detects the following faults.

For toxic and explosive gas detectors:

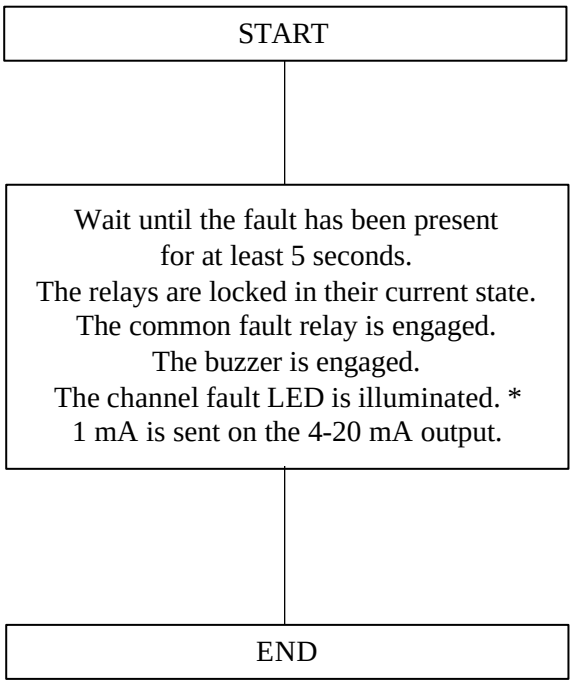
- line interrupted (0 mA),
- line short-circuited or excessive consumption,
- negative offset (more than 20% of measuring scale),
- line in calibration mode (2 mA) (if confirmed by programming).

For detectors of the explosive gas type (4-20 mA and 340 mA) in normal mode and if the measurement is greater than 100% of the measuring scale, there are the following immediate results:

- Display: SUP
- The relays are actuated if the thresholds are reached.
- The general fault relay is actuated.
- The 4-20 mA output of the channel is greater than 20 mA.
- All these states are memorized and the only way of acknowledging them is to switch off the channel and then restart it.

Faults are valid after a preprogrammed time (in the same way as alarms).

FAULT BLOCK DIAGRAM



* The LED is extinguished as soon a the fault disappears.

3.3.5. Measuring unit

One minute after starting up, and if no test action is performed on the keypad, the unit successively scans all the channels in service and displays the measured values.

Examples of display

Channel 1 **x x LEL CH4**

OR

Channel 2 **x x x ppm CO**

- Each channel is interrogated for 10 seconds.
- The user can interrogate a channel manually by selecting that channel with the + and - keys to obtain a manual display for one minute.
- The user can return to normal cyclic scanning during that one-minute period by simultaneously pressing the + and - keys. The display panel then shows alternating displays, three times in succession:

For example:

Channel 5 **x x x ppm CO**

then

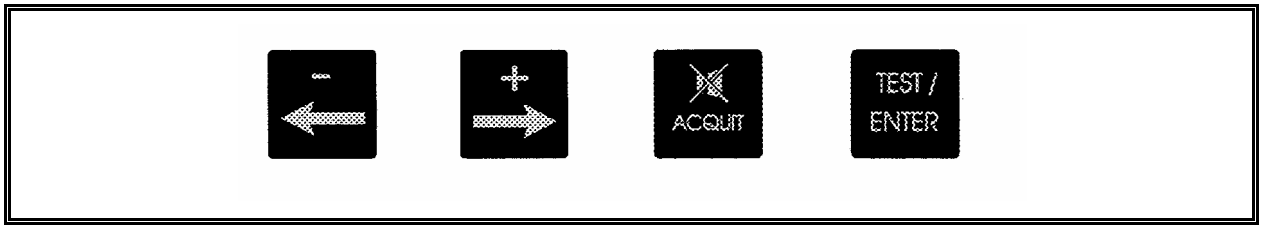
normal scan **x x x ppm CO**

4. UTILIZATION

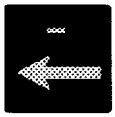
4.1. *List and functions of the various items of "USER" equipment for programming and calibration of the unit*

4.1.1. Keypads

The first is equipped with four touch keys accessible without opening and swivelling the MX48 unit's FRONT panel, the second is equipped with the same keys accessible by opening and swivelling the FRONT panel for maintenance (Fig 4 rep B).



NORMAL MODE



- Manual display of previous channel
- Combined with the "PLUS" key to restart the channels automatic display cycle.

MAINTENANCE MODE

- Manual display of previous channel
- Decrease value, threshold, etc.
- Display of previous choice (on←off, etc.)
- NO

NORMAL MODE

- Manual display of next channel
- Combined with the "MINUS" key to restart the channels automatic display cycle.

MAINTENANCE MODE

- Manual display of next menu
- Increase value, threshold, etc
- Display of next chooice (on←off, etc)
- YES

- "Audio and visual" or "audio" clearing of an alarm
- Exit from a current menu

- Start a self-test manually
- VALIDATE

4.1.2. Maintenance keys

PROGRAMMING key (Fig 4 item D): accessible after opening and swivelling the front panel.

- Combined with the "-" key to go back in a menu.
- To quit normal display mode and access the various menus (see block diagram of the various menus).
- To scroll through a menu.

CALIBRATION key (Fig 4 item C) : accessible after opening and swivelling the front panel.

- To set a channel to CALIBRATION mode.
- To quit that mode.

4.1.3. Potentiometers

Each measuring channel has 5 potentiometers. These are accessible by opening and swivelling the FRONT panel of the MX48 unit and are laid out as follows (see Fig. 5):

1 detector ZERO potentiometer 1 detector sensitivity potentiometer
1 potentiometer 4 mA / current output 1 potentiometer 20 mA / current output (for full scale)
1 potentiometer filaments power supply (340 mA)

4.2. *Menus*

4.2.1. The various menus and their functions

The MX48 unit has five menus that are accessed by pressing the “Programming” key (item D, Fig. 4).

These five menus are as follows:

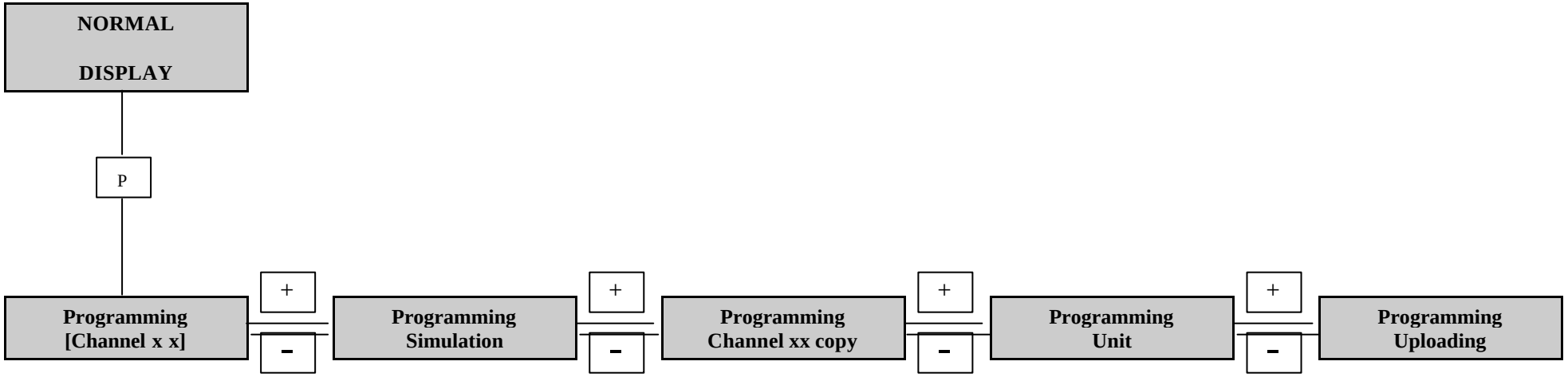
DESIGNATION	FUNCTION
“CHANNEL” programming	- To program the whole configuration of a measuring channel (ON/OFF, range, alarm thresholds, etc.)
“SIMULATION” programming	- To artificially vary a channel measurement on: - the display panel, - the 4-20 mA current output. - To trigger the alarms (LED and relays) at the same time.
“CHANNEL COPY” programming	- To copy the complete programming from one channel to another (time saving)
“UNIT” programming “UPLOADING” programming	- To program the whole configuration of the MX48 unit (language, slave number, etc.). Do not use this mode (re-programming of the MX48 unit).

4.2.2. Block diagram of the scrolling of the various menus

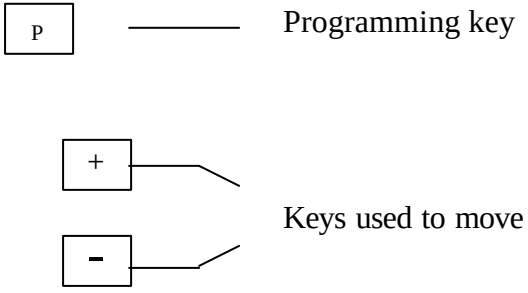
It is easy to use these various menus by means of the keys on the keypad and the “Programming” key (Fig 4).

Detailed flow diagrams of the menu scrolling function and of each menu are given on the following pages.

SCROLLING OF THE VARIOUS MENUS



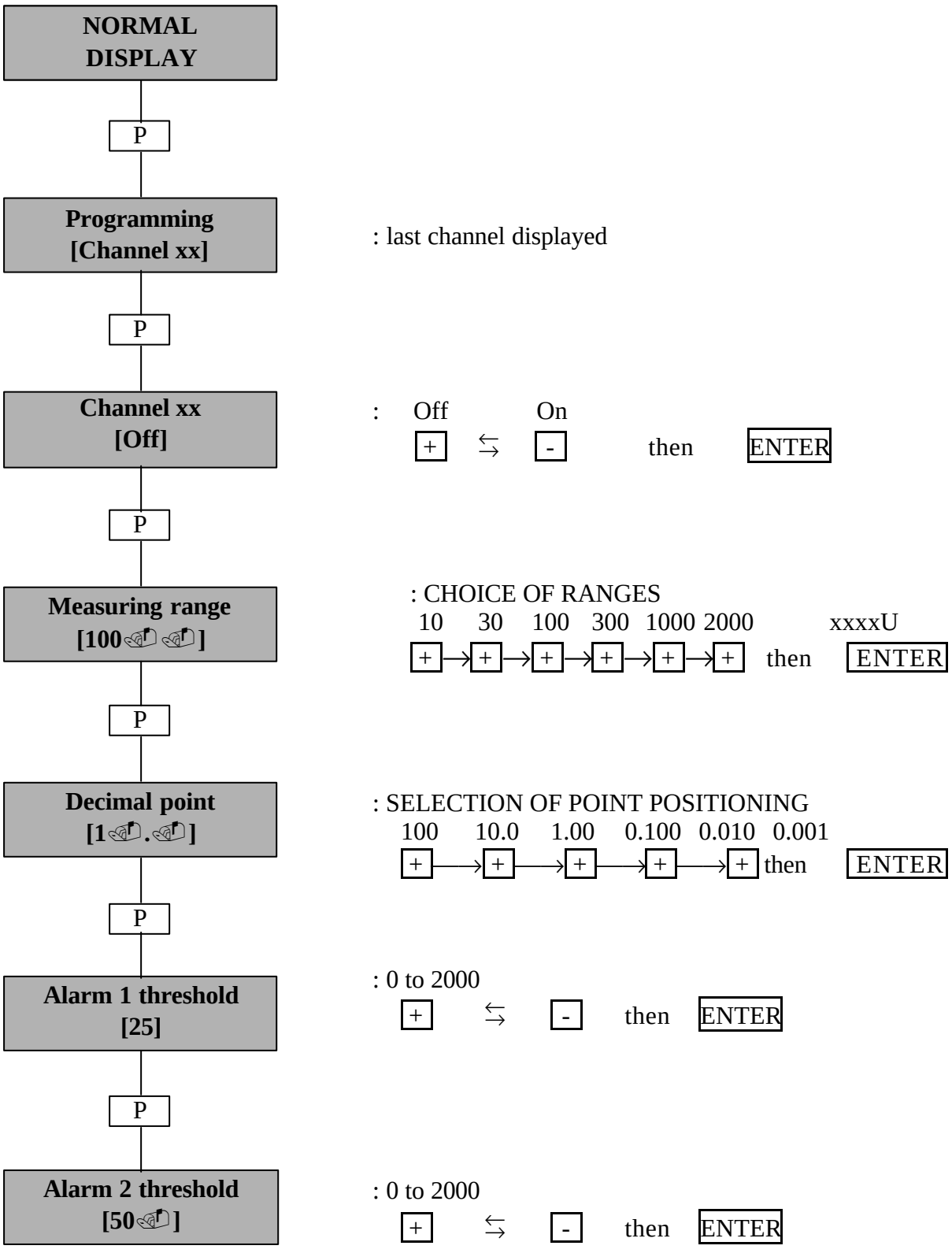
REMINDER

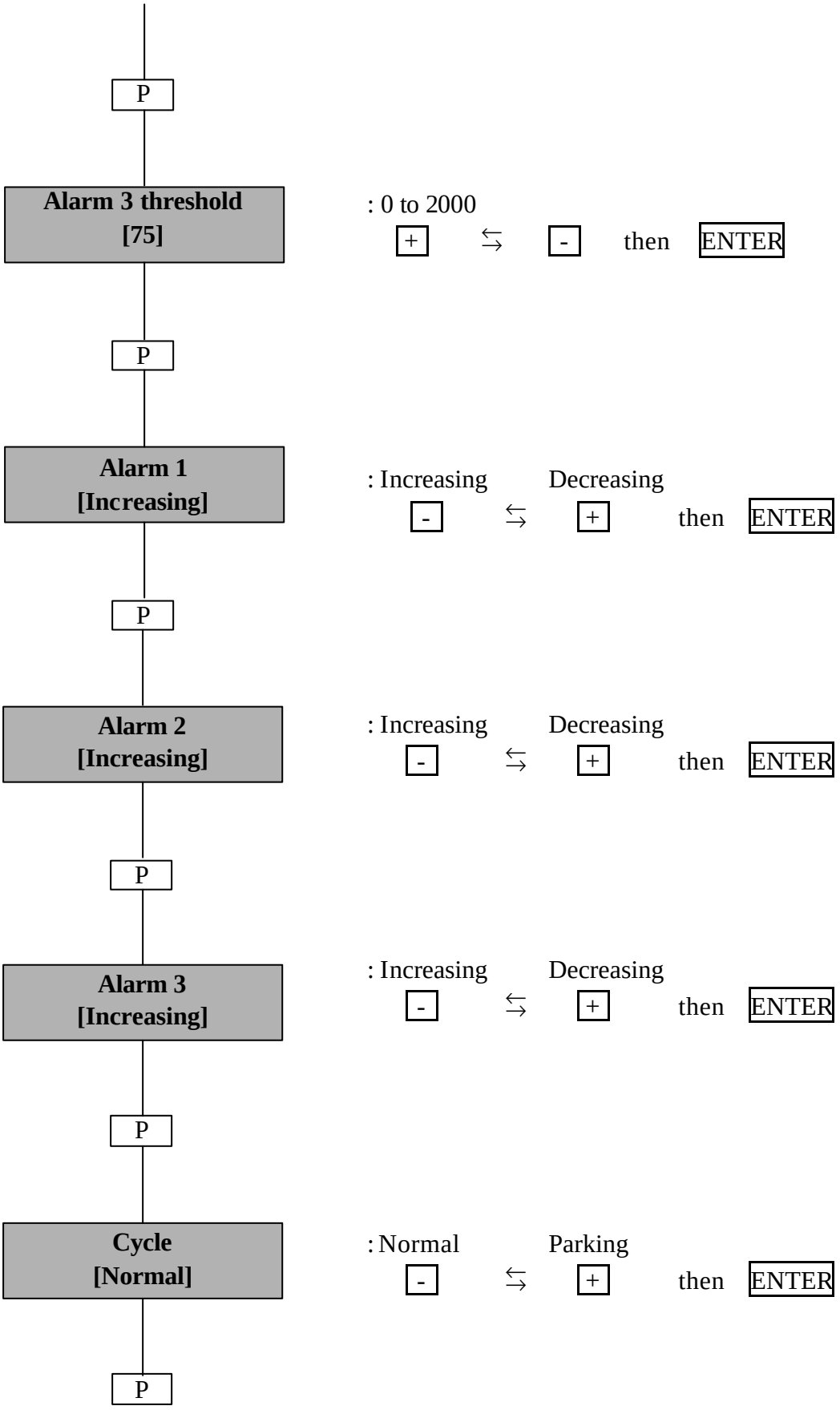


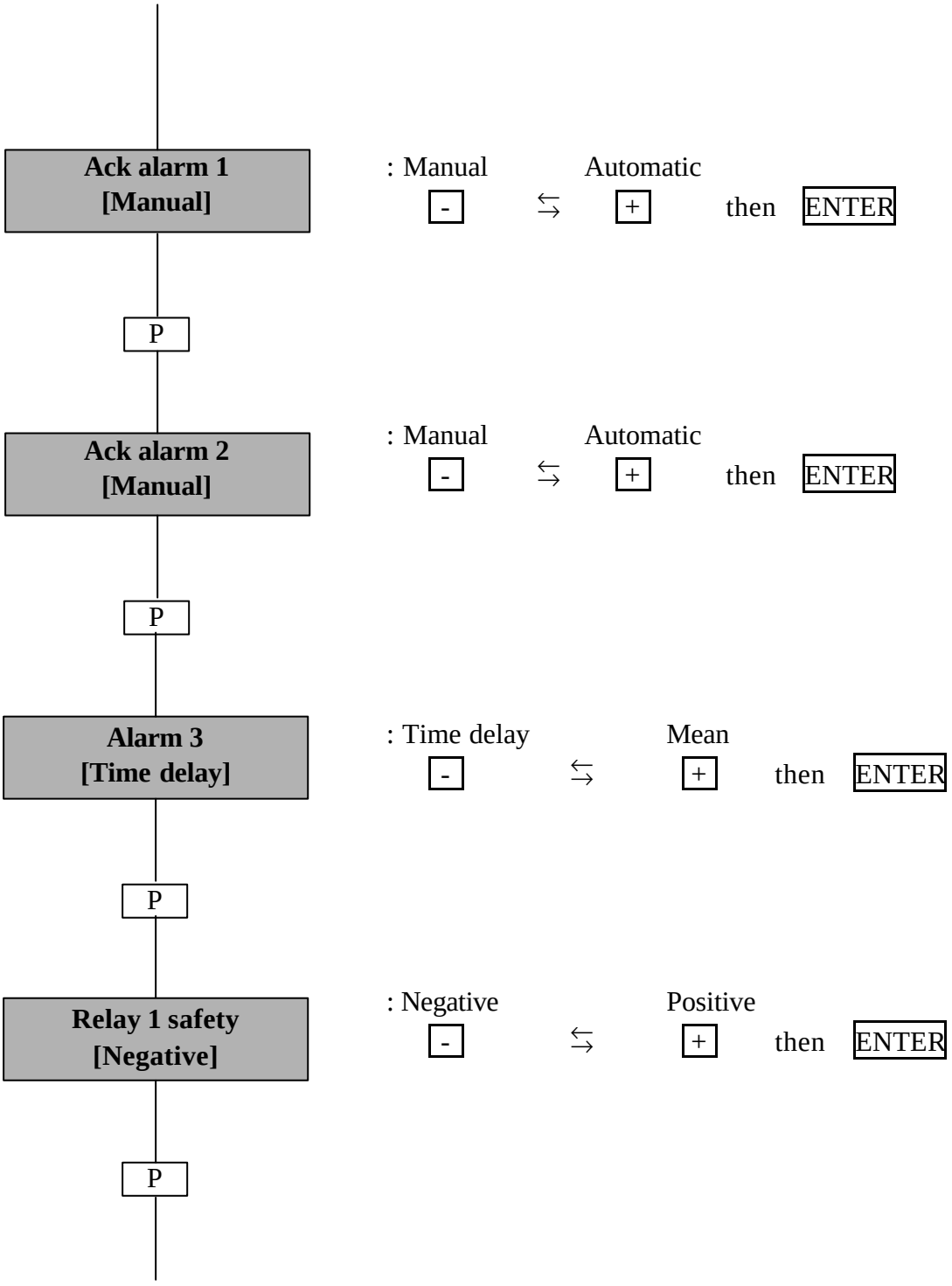
4.2.3. Detailed flow diagrams of each menu

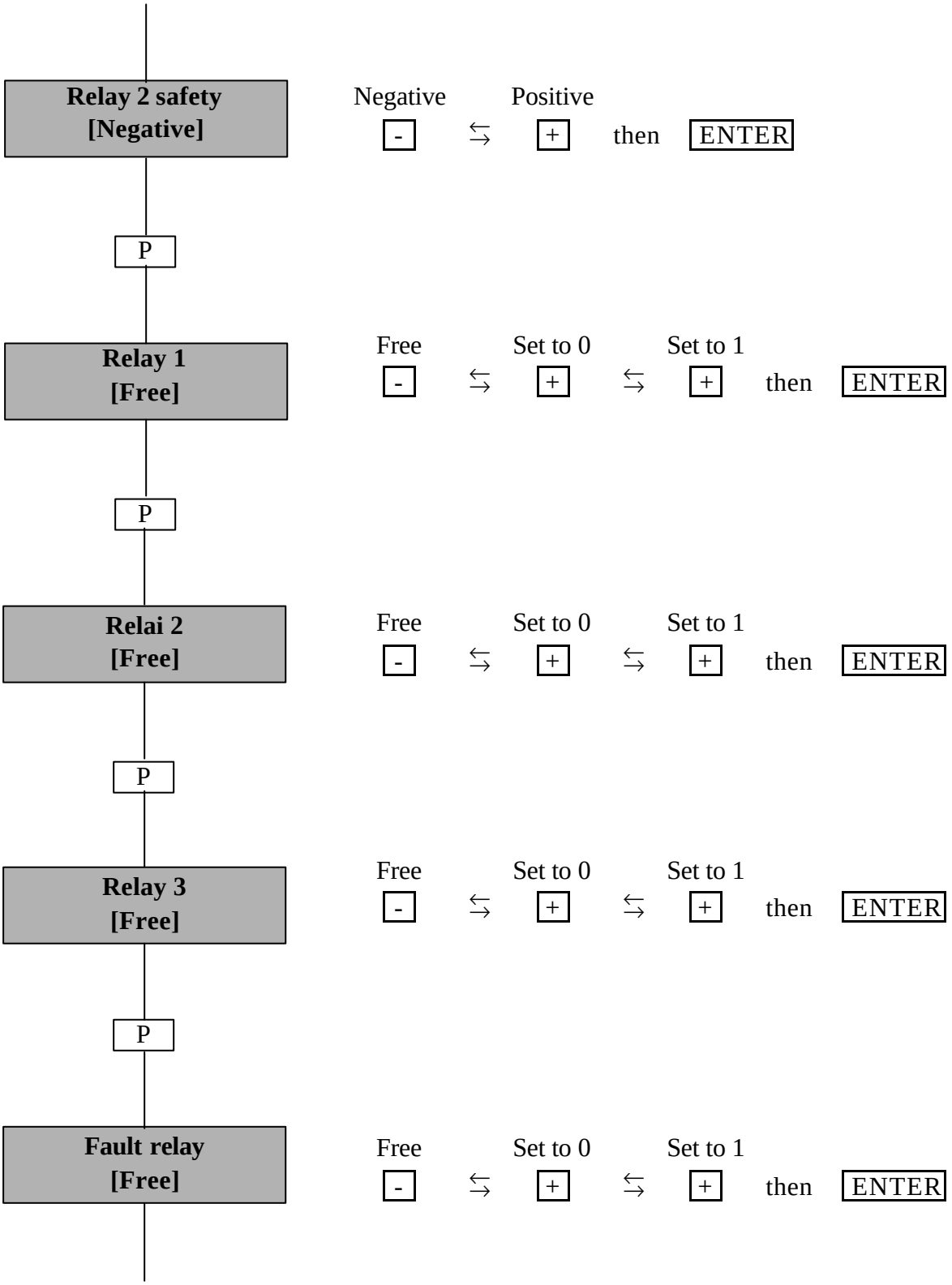
CHANNEL PROGRAMMING

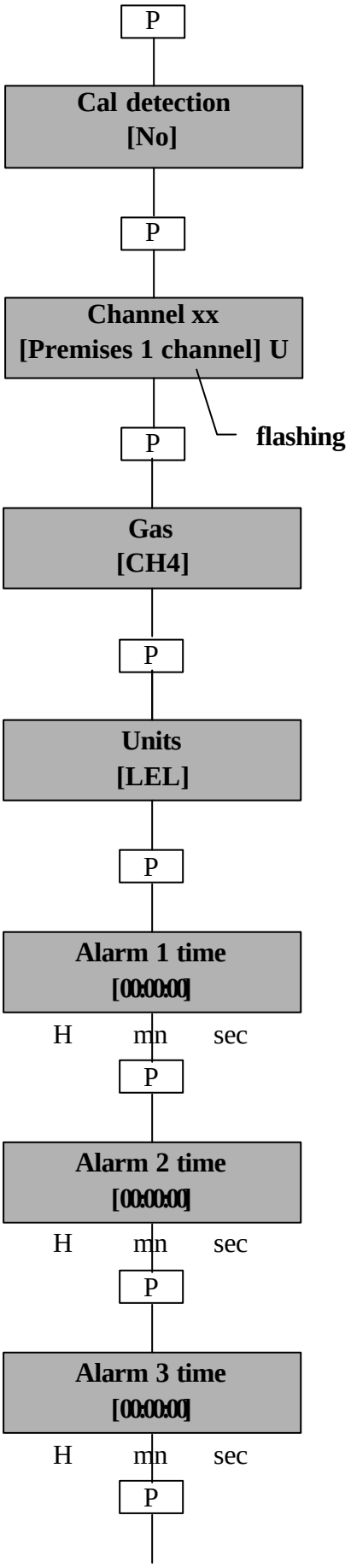
Remove on the programming socket before entering into programming




P
Alarm 3 threshold
[75]
: 0 to 2000
+ ⇆ - then ENTER
P
Alarm 1
[Increasing]
: Increasing Decreasing
- ⇆ + then ENTER
P
Alarm 2
[Increasing]
: Increasing Decreasing
- ⇆ + then ENTER
P
Alarm 3
[Increasing]
: Increasing Decreasing
- ⇆ + then ENTER
P
Cycle
[Normal]
: Normal Parking
- ⇆ + then ENTER
P


Ack alarm 1
[Manual]
: Manual
Automatic
-
+
then
ENTER
P
Ack alarm 2
[Manual]
: Manual
Automatic
-
+
then
ENTER
P
Alarm 3
[Time delay]
: Time delay
Mean
-
+
then
ENTER
P
Relay 1 safety
[Negative]
: Negative
Positive
-
+
then
ENTER
P


Relay 2 safety
[Negative]
Negative
Positive
-
+
then
ENTER
P
Relay 1
[Free]
Free
Set to 0
Set to 1
-
+
+
then
ENTER
P
Relai 2
[Free]
Free
Set to 0
Set to 1
-
+
+
then
ENTER
P
Relay 3
[Free]
Free
Set to 0
Set to 1
-
+
+
then
ENTER
P
Fault relay
[Free]
Free
Set to 0
Set to 1
-
+
+
then
ENTER



The MX48 unit can detect and indicatez (with a flashing yellow LED) that a line has-been placed in CALIBRATION mode on the detector.

No Yes
[-] ⇆ [+] then [ENTER]

Free display: A channel heading can be programmed (in 13 characters maximum). By default, the channel number is displayed in this area.

[+] ⇆ [-] then [ENTER]

CH4 CO 2S etc.
[-] ⇆ [+] ⇆ [+] then [ENTER]

LEL % ppm etc.
[-] ⇆ [+] ⇆ [+] then [ENTER]

Time: Time interval between the triggering of the AL LED and of the corresponding relay, or the minimum operating time of the relay in parking mode.

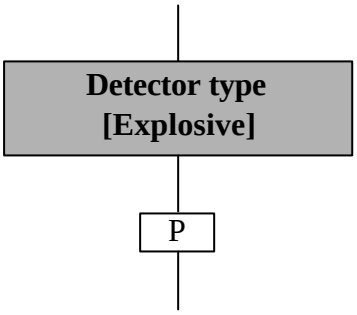
[-] ⇆ [+] then [ENTER]

Display of time by using keys

[-] ⇆ [+] then [ENTER]

Texte

[-] ⇆ [+] then [ENTER]



(Bridge) (4-20 mA) (1) (Fire) (2)

: Explosive Toxic Spec. tox.

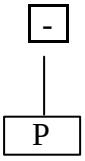
[-] ⇆ [+] ⇆ [+] then [ENTER]

End of menu

(1) in case of "Up" fault : 3 "gas" alarms and fault alarm are triggered.
(2) In case of "Up" fault : only the fault alarm is triggered.

INFORMATION

This key can also be used to exit from the current menu.



When in a menu, you can go back (to make checks or modifications, etc.) by pressing and holding [Programming] key and by successively pressing and releasing the down key [-].

[ ] Parameters specified in square brackets [ ] are the VALID parameters (in memory).

(1) Free This means that the relay can be activated when programming alarm thresholds are triggered.

Set to 0 This means that the relay is not powered supply, and will not be activated by MX48 control unit with alarm..

Set to 1 This means that the relay is always powered supply (by the MX48 control unit), and neither will not be activated by MX48 control unit with alarm. Using of relays will be directly programmed by J-BUS input and "COM52" software.

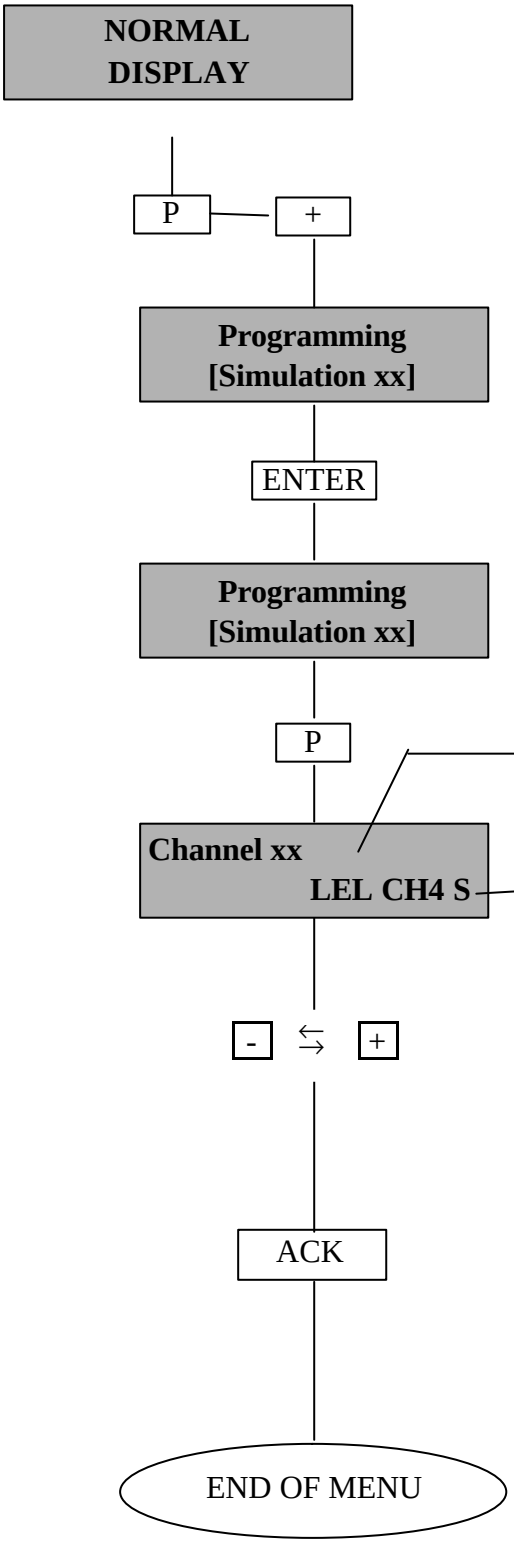
LIST OF UNITS

DESIGNATION	MEANING
LEL	Lower explosive limit
%	Percent
ppm	parts per million
ppb	parts per billion
UEG	Unter Explosion Grenze (= LEL in German)
LEL	Limite inférieure d'explosivité (= LEL in French)
bar	unit of pressure
mb	unit of pressure (millibar)
Rh	relative humidity
m/s	metres per second
mg	unit of weight (milligram)
unit + flashing U	free indication of unit [-] ⇆ [+] then [ENTER]

LIST OF GASES

DESIGNATION	MEANING
CH4	Methane
CO	Carbon monoxide
H2S	Hydrogen sulphide
N	Nitrogen
NO	Nitric oxide
NO2	Nitrogen dioxide
SO2	Sulphur dioxide
CI2	Chlorine
H2	Hydrogen
HCL	Hydrochloric acid
HCN	Hydrocyanic acid
NH3	Ammonia
ETO	Ethylene oxide
PH3	Phosphine
HF	Hydrofluoric acid
CFC	Freons
CO2	Carbon dioxide
ASH	Arsine
SiH4	Silane
BUT	Butane
PRO	Propane
GNT	Natural gas
ETY	Ethylene
PNT	Pentane
HEX	Hexane
PRY	Propylene
ACY	Acetylene
ETA	Ethanol
ACO	Acetone
OPR	Propylene oxide
OET	Ethylene oxide
ISB	Isobutane
DIM	Dichloromethane
AET	Ethyl alcohol
BUN	2-Butanol
ISP	Isopropanol
XYL	Xylene
TOL	Toluene
ESS	Petrol (gasoline)
BUD	Butadiene
HYD	Hydrogen
Gas + flashing U	Free indication of name of gas: [-] ⇆ [+] then [ENTER]

SIMULATION PROGRAMMING MENU



Simulation on previously displayed and [validated] channel

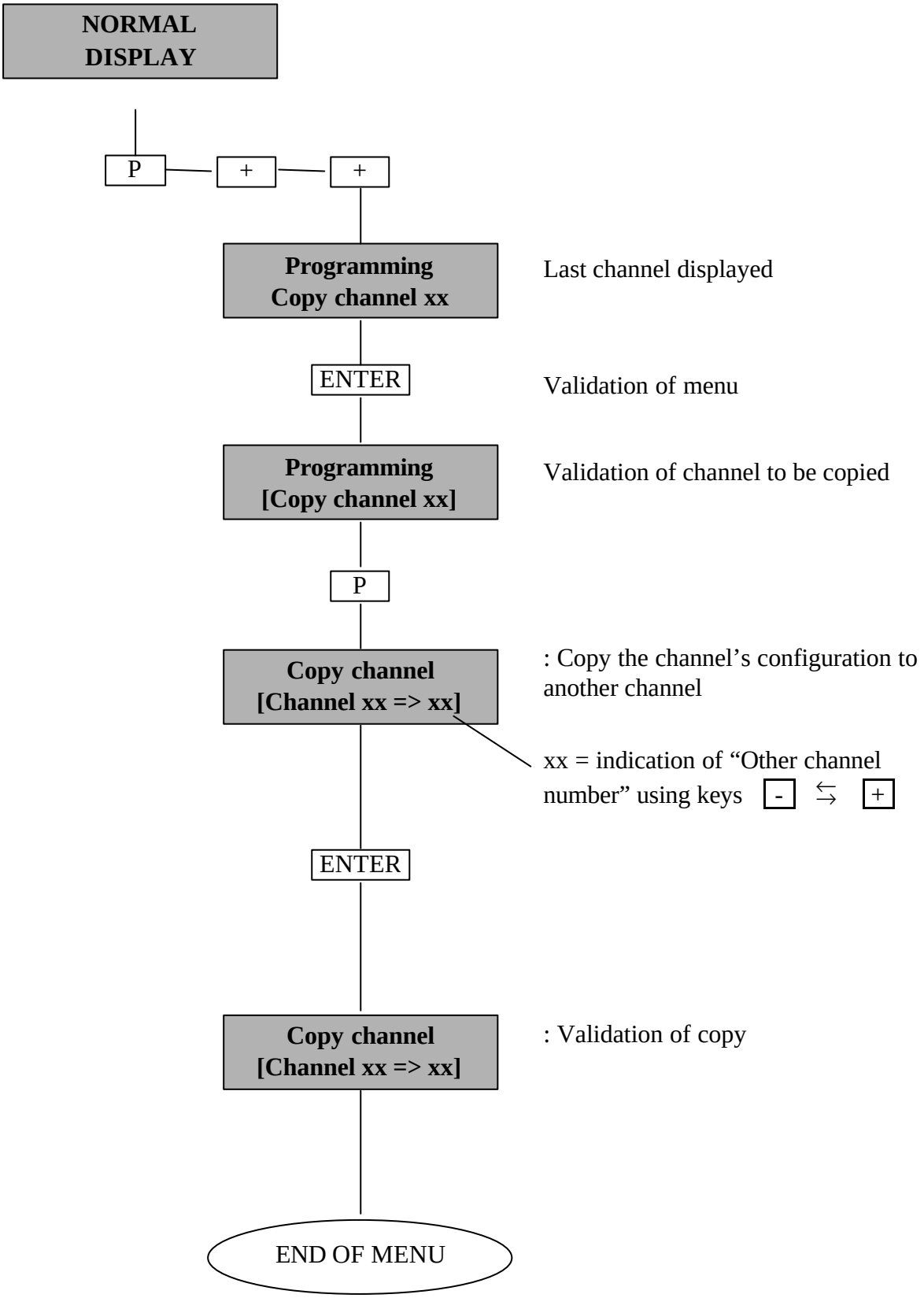
Free labelled area

S = flashing to indicate that this channel is in simulation mode.

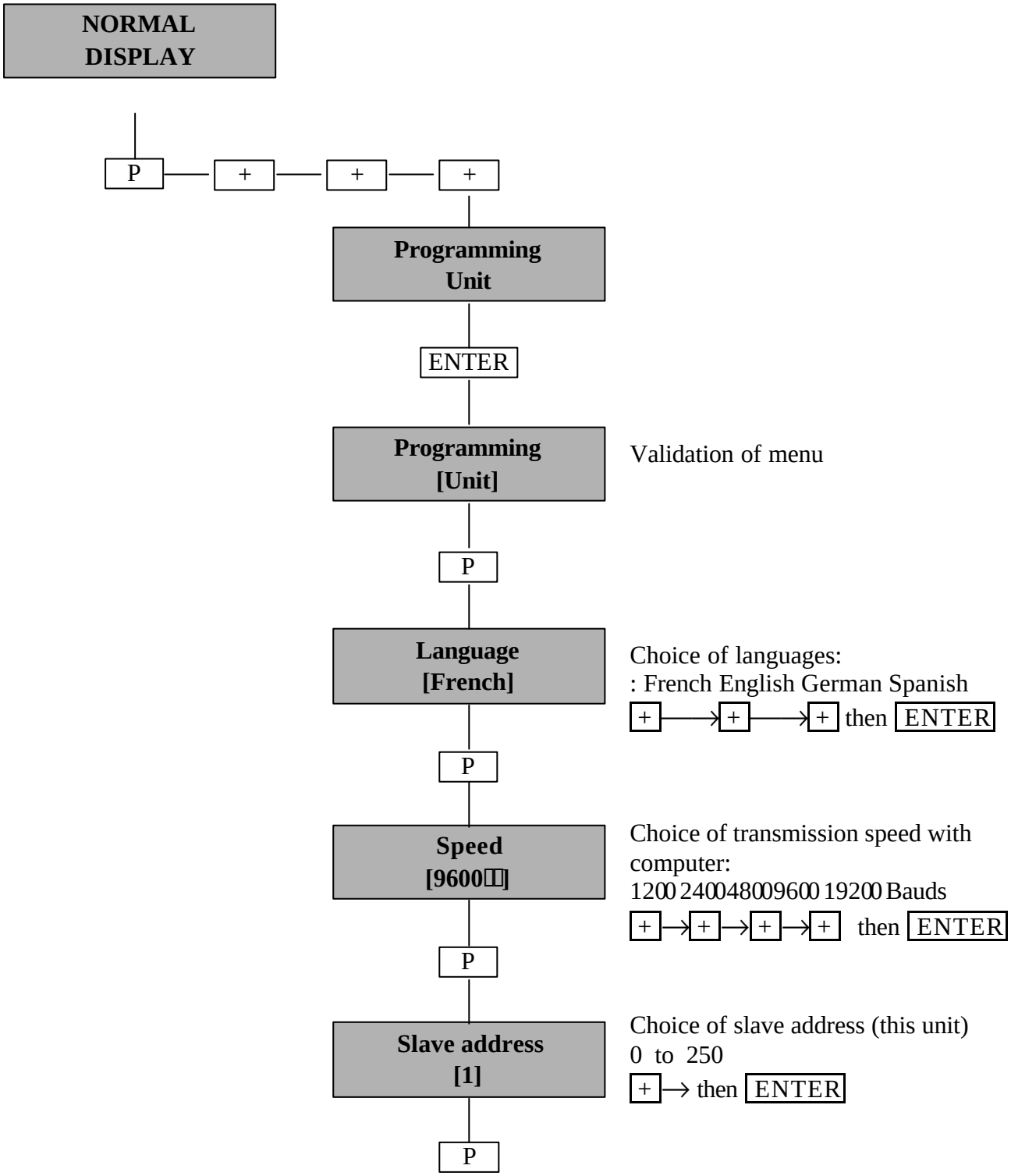
To artificially vary measurement on the display panel, on the 4-20 mA output, and trigger alarms (LED and relays)

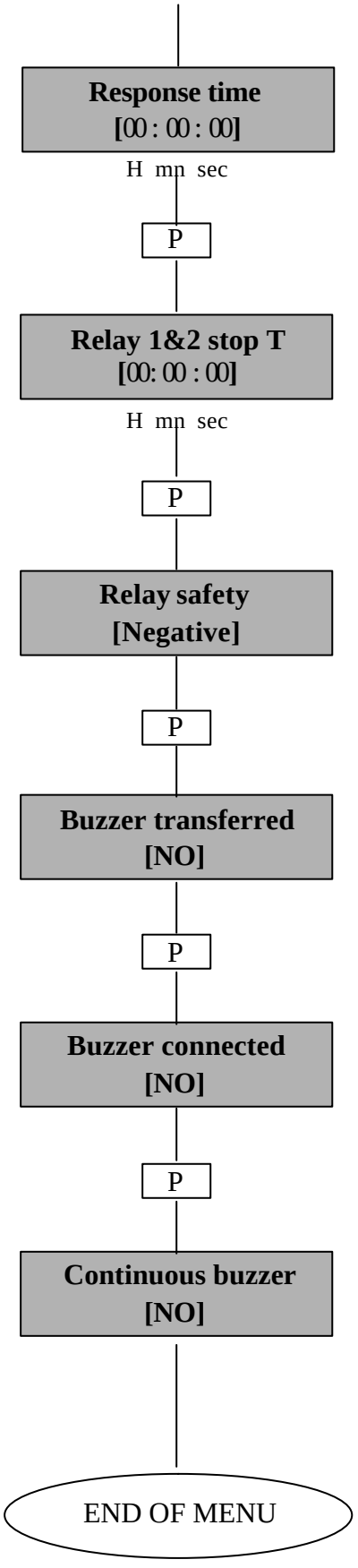
= ESCAPE (ECHAPPE)
To exit from this menu and return to normal operation

COPY PROGRAMMING



UNIT PROGRAMMING





This is the time interval between exceeding of the AL threshold and triggering of the corresponding visual alarm (LED).
Display the time using keys:
[-] ⇆ [+] → then [ENTER]

In "Parking" mode: this is the time interval between stopping of relay 1 and starting up of relay 2.
Display the time using keys:
[-] ⇆ [+] → then [ENTER]

Negative Positive
[-] ⇆ [+] → then [ENTER]

Control of relay 3 (common) by any triggering of buzzer
NO YES
[-] ⇆ [+] → then [ENTER]

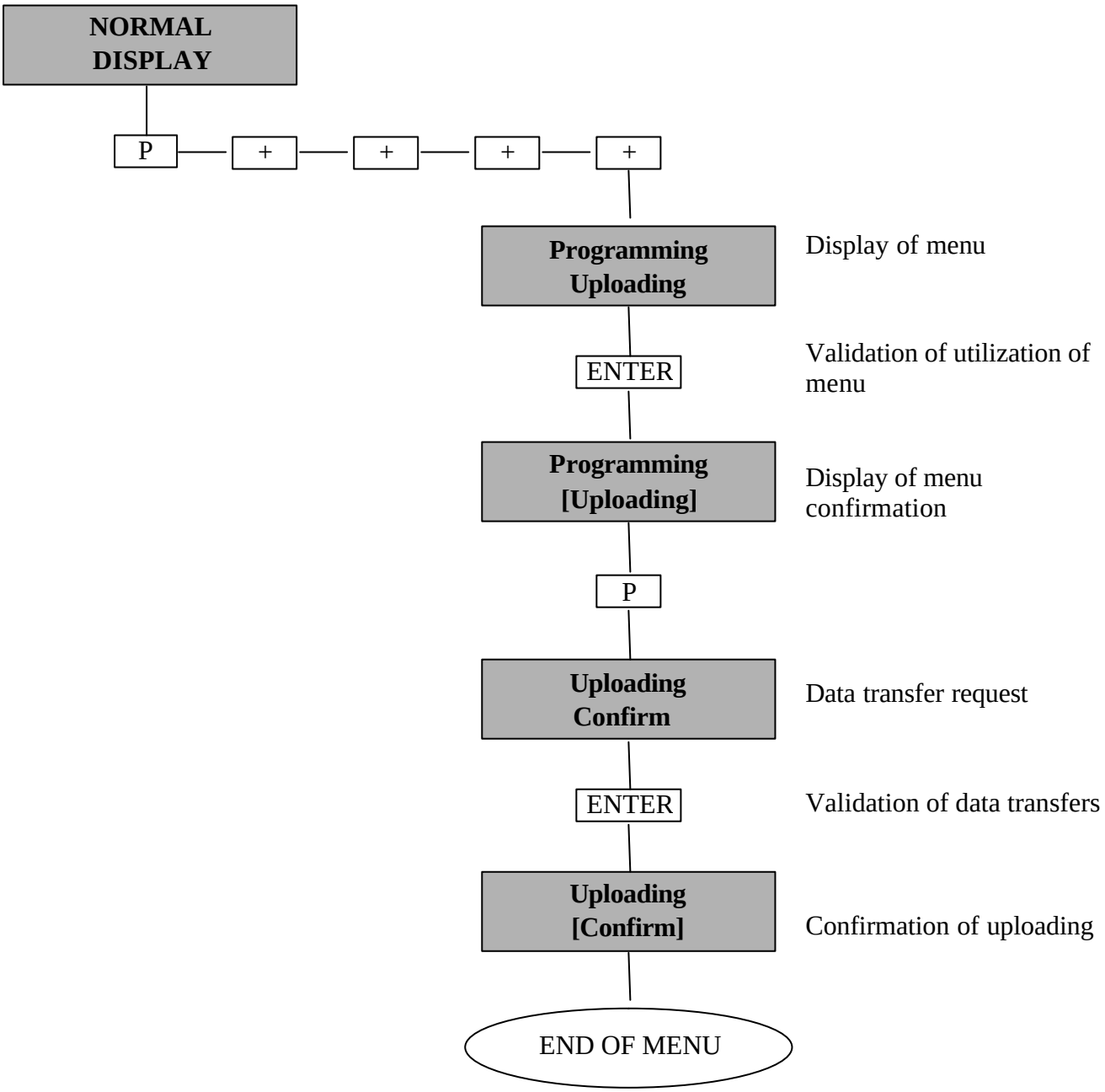
Utilization of common audio alarm (buzzer)?
(Function in series with buzzer jumper)
NO YES
[-] ⇆ [+] → then [ENTER]

YES = If copy of buzzer on alarm 3 and with buzzer option into service : audible alarm will be triggered when there is an alarm.
NO = The common audible alarm (buzzer) will be triggered for a 30 seconds maximum time (even there is an alarm).

[-] ⇆ [+] → then [ENTER]

UPLOADING PROGRAMMING

Only INDUSTRIAL SCIENTIFIC personnel and personnel approved by INDUSTRIAL SCIENTIFIC can be made this operation.



5. SETTING THE MX48 UNIT INTO SERVICE

REMINDER
The handling operations and adjustments described in this chapter must be performed by authorized personnel only, as they are liable to affect detection safety.

Once the measuring unit has been switched on, it can be programmed (1), its measuring channels can be programmed (1) according to the detectors used and calibrations can be made on the unit and detectors.

(1) These programming operations can be carried out directly on the MX48 unit in accordance with the following procedures or using a computer equipped with the "com 52" software.

5.1. *Programming the unit*

To program the MX48 measuring unit, and according to the required specifications, the "Unit programming" menu must be used (see Section IV-2 on Menus) by means of the keypad and the "Programming" key. Then, the instructions in the menu should simply be followed.

CAUTION

If the unit remains in programming mode for more than 30 minutes, it automatically switches to fault mode.

5.2. *Programming the measuring channels*

5.2.1. Programming

To program each measuring channel according to the type of detector used and the required specifications, the "Channel programming" menu must be used (see Section IV-2 on Menus) by means of the keypad and the "Programming" key. Then, the menu instructions should simply be followed.

REMARK

When a channel is switched on, all its relays are in "off" mode and its current output is 1 mA. Then, one minute later, the channel comes into effective operation (relays ready and output of 4-20 mA).

CAUTION

If a channel remains in programming mode for more than 30 minutes, it is automatically switched to fault mode.

5.2.2. Copy

In order to make the programming of ALL CHANNELS less TIME-CONSUMING when the same programming is required for a number of channels, it is recommended that the "COPY" menu should be used (see Section IV-2 on Menus) by means of the keypad and the "Programming" key. Then, the instructions in this menu should simply be followed.

5.3. *Calibrations*

Gas detection instruments are potential life-saving devices. Recognizing this fact, Industrial Scientific Corporation recommends that a functional "bump" test be performed on every fixed gas-monitoring instruments as part of a regular maintenance program. A functional test is defined as a brief exposure of the detector to a concentration of gas(es) in excess of the lowest alarm set-point for each sensor for the purpose of verifying sensor and alarm operation and is not intended to be a measure of the accuracy of the instrument.
Industrial scientific further recommends that a full instrument calibration be performed using a certified concentration(s) of calibration gas(es) quarterly, every 3 months.* Calibrations may be necessary more or less frequently based, for example, on application, field conditions, exposure to gas, sensor technology, and environmental conditions. The frequency of calibration is best determined by company policy or local regulatory agencies.
If an instrument fails to operate properly during any functional "bump" test, a full instrument calibration should be performed successfully prior to use.
These recommendations are based on safe work procedures, industry best practises, and regulatory standards to ensure worker safety. Industrial scientific is not responsible for setting safety practices and policies.

** For new installations it may be prudent to carry out bump tests frequently at first (perhaps weekly), increasing the time intervals (to, perhaps, monthly or more) as confidence grows with experience in the installation concerned, on the basis of the maintenance record.*

Case 1
Measuring channel connected to a detector with no integrated electronics (explosive gas detector).

- Prepare the detector for calibration:
  - Calibration consists in adjusting the detector ZERO in PURE AIR and its sensitivity to the STANDARD GAS.
  - If the detector zero is set with natural diffusion in pure air, the surrounding atmosphere must be calm (wind speed of less than 1 m/s).

REMARK

The authorized wind speed is increased to 4.1 m/s when the detector is fitted with a weather protective device.

- Prepare the measuring channel for calibration:
  - Open and swivel the front panel of the MX48 unit.

- Manually set the channel to be calculated using keys [+] and [-] on the MX48 keypad (item B, Fig. 4).
- Press the CALIBRATION key (item D, Fig. 4).
- At the bottom right-hand side of the display panel, the letter C flashes and the yellow LED for the relevant channel flashes, indicating that the measuring channel is in the "CALIBRATION" position.

REMARK

When a measuring channel is in the CALIBRATION position, all the alarm relays are inhibited (in order to avoid interfering with the slaving control networks) and the corresponding current output is maintained at 2 mA.

- Turn the sensitivity potentiometer five times in the clockwise direction (using a screwdriver).
- Adjust the DETECTOR ZERO.

NOTE

If the ambient air is not pure, inject air using a "synthetic air" cylinder and the gas injection pipe or a remote calibrating fixed device with a flow rate of 60 litres per hour for 25 seconds directly on the detector or a flow rate of 170 litres per hour for 1 min 45 s using a remote calibrating fixed device.

As soon as the signal is stable on the MX48 display panel, adjust the "MEASUREMENT ZERO" by adjusting the ZERO potentiometer (Fig. 5) and corresponding to channel to be set up, so as to read ZERO on the MX48 display panel.

- **Adjust the detector sensitivity:**

- Inject the calibration gas using the gas injection pipe (or a remote calibrating fixed device) in the same conditions as those applicable for the synthetic air (zero adjustment).

When the measurement has stabilized, set the value corresponding to the reference gas concentration on the display panel of the MX48 unit by adjusting the sensitivity potentiometer for the relevant channel (Fig. 5).

NOTE

For this category of explosive gas detectors, the unit's display panel indicates 100 DIVISIONS for 100 LEL of an explosive gas.

Example:

If the reference gas is a 2.5% methane concentration, i.e. 50% LEL of methane, adjust to obtain a display of 50 DIVISIONS.

Formula:

$$\text{Number of divisions to be set} = \frac{\text{Maximum scale} \;/\; \text{100 DIV x n\% LEL of standard gas}}{\text{100\% LEL} \;/\; \text{Maximum LEL}}$$

- Stop the injection of the standard gas, wait for the measurement to return to zero (on the MX48 display panel). Then, press the "CALIBRATION" key (item C, Fig 4). The flashing yellow LED is extinguished and the "C" on the display panel disappears. The measuring channel now operates normally an calibration has been completed.

Case 2
Measuring channel connected to a detector with no integrated electronics and supplying a standardized 4-20 mA current. (CTX50, CTX100, CTX200, CTX870, etc.).

- Prepare the detector for calibration:

  - See the remarks for zero adjustment in pure air and natural diffusion as in case 1.

  - These types of detector (4-20 mA) often have a “CALIBRATION” position (CTX870, CTX100, etc.) or a calibration menu (CTX2042, COX2040, etc.). This position has the effect of transmitting a 2 mA current from the detector to the measuring unit.

  - This prevents the triggering of alarms (and slaving controls) during calibrating operations.

CAUTION
If the detector and the measuring channel are calibrated at the same time, the detector must be left in normal operating mode but the MX48 unit must be set to calibration mode in order to inhibit the relays.

⇒ Consult the technical manual for the detector concerned.

- Open the detector (with integrated electronics) in order to gain access to the 4 mA adjustment and sensitivity (20 mA) potentiometers and to the terminals used to check its 4-20 mA output current.

- With these types of detector, there are two ways of checking the current supplied to the unit:

  - by direct reading on the local display panel (internal to the detector)
  - by measurement of current on the terminals provided for that purpose (see the manual for the detector concerned).

- Prepare the measuring channel for calibration:

- same operations as in case 1.

- **Adjust the detector zero.**

NOTE

If the ambient air is not pure, inject air using a “synthetic air” cylinder and the gas injection pipe or a remote calibrating fixed device with a flow rate of 60 litres per hour for 25 seconds directly on the detector or a flow rate of 170 litres per hour for 1 min 45 s using a remote calibrating fixed device.

As soon as the signal is stable on the local display panel on the detector or with regard to the current output (4-20 mA), adjust the DETECTOR ZERO by adjusting the detector internal ZERO potentiometer (see the manual for the detector concerned).

Then, CONSECUTIVELY, adjust the measurement zero by acting on the ZERO potentiometer for the measuring channel (Fig. 5) so as to read ZERO on the MX48 display panel.

- **Adjust the detector sensitivity:**

  - Inject the calibration gas using the gas injection pipe (or a remote calibrating fixed device) in the same conditions as those applicable for the synthetic air (zero adjustment).

When the measurement has stabilized (on the local display panel or on the detector internal terminals (current measurement)), act on the detector’s internal sensitivity potentiometer (see the manual for the detector concerned) in order to set the value (on the detector display panel) corresponding to the concentration of the reference gas or the corresponding current (terminals). (See the note and examples for case 1).

- Then, CONSECUTIVELY set the value of the standard gas on the MX48 display panel by acting on the measuring channel sensitivity potentiometer (Fig. 5).
- Stop the injection of the standard gas, wait for the measurement to return to zero (on the MX48 display panel). Then, press the “CALIBRATION” key (item C, Fig. 4). The flashing yellow LED is extinguished and the “C” on the display panel disappears. The measuring channel now operates normally and calibration has been completed.

5.4. *4-20 mA output adjustment for a measurement channel*

➢ **4 mA adjustment**

- for a zero display
- check[1] the 4 mA output current and adjust it if necessary using the 4 mA potentiometer : see fig 9.

➢ **20 mA output adjustment**

- following the measurement display and the following formula :

$$I = 4\text{mA (0-DIV)} + 16\text{ mA} \times \frac{\text{Number of divisions set}}{\text{Maximum scale}}$$

100 DIVISIONS

- Check[1] the 4 mA output current and adjust it if necessary using the 20 mA potentiometer : see fig 9

[1] Current reading is possible by connecting directly the corresponding output current (see fig 12) a "continuous" milliammeter.

6. MAINTENANCE

REMINDER
The handling operations and adjustments described in this chapter must be performed by authorized personnel only, as they are liable to affect detection safety.

6.1. *Periodic / preventive maintenance*

6.1.1. On the MX48 unit

The MX48 measuring unit requires practically no surveillance. It is, however, recommended that the facilities available on the MX48 unit should be used to regularly test the appliance's essential functions, as follows:

Use the TEST key to check the correct operation of all the LEDs and the buzzer.

Use the "SIMULATION" menu to check the correct operation of the display panel, the triggering of alarms (LED and relays), the slaving controls and the 4-20 mA current output.

Cause a fault to occur (such as a line fault by disconnecting a detector wire) to check the correct operation of the fault "stages".

6.1.2. On the detectors

The detectors must be calibrated at least twice a year.

Case 1

Detectors without integrated electronics (CAPTEX, CEX800, CEX810, etc.)
With this type of detector, the zero and sensitivity adjustments must be made on the MX48 unit. SEE THE CHAPTER ON CALIBRATIONS (see 5-3, case 1) and carry out the operations specified.

Case 2

Detectors with integrated electronics (CTX50, CTX100, CTX870, etc.)
With this type of detector, and for periodic maintenance, all that is required is action on the detector. SEE THE CHAPTER ON CALIBRATIONS (see 5-3, case 2) and carry out the operations specified.

NOTE

Our company is at your disposal to supply you with standard gas or an annual surveillance contract (preventive maintenance). Under this contract, our specialists guarantee the perfect operation of your installation. No adjustment is to be made between INDUSTRIAL SCIENTIFIC servicing operations. This avoids any additional workload for the user's maintenance services.

6.2. *Failures: causes and remedies*

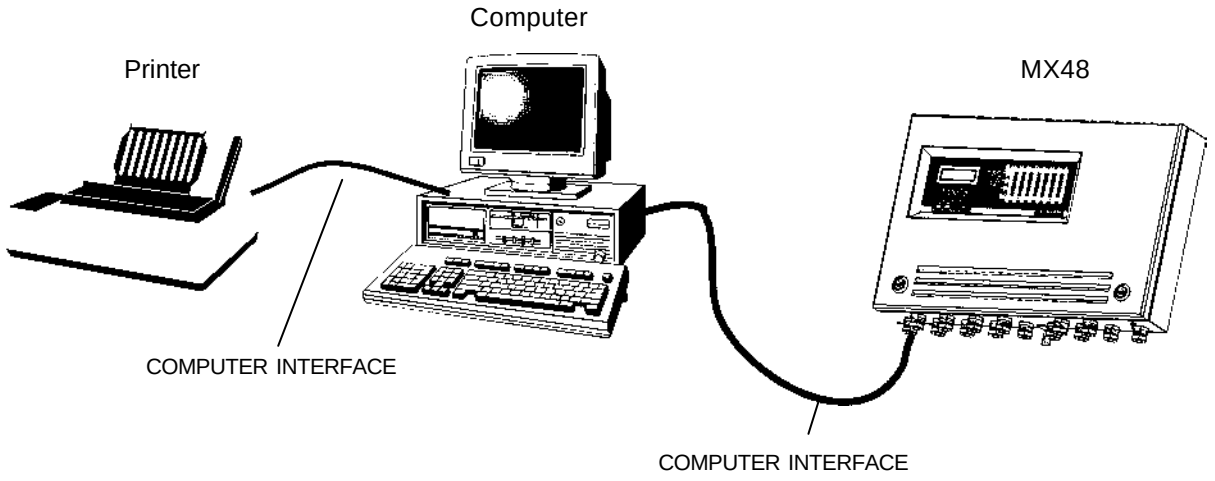
FAILURES	CAUSES	REMEDIES
Display channel not lit up and no indicator light on.	On/Off switch in the Off position.	Set the switch to the On position (item A, Fig. 26).
	Problem with mains power supply or DC power supply (24 V DC).	Check the supply voltages on input to the MX48 unit and, if necessary, check in the electric power supply cabinets.
	Mains fuses blown.	Replace the mains fuses (see item A, Fig. 5).
	DC power (24 V DC) input fuses blown.	Replace the 24 V DC fuses located at the back of the MX48 unit (item B, Fig. 5).
	+24 V DC internal protection fuse blown.	Replace the +24 V DC fuse located on the power board (item C, Fig. 5).
	CAUTION **When replacing a fuse, it is mandatory to comply with the required type and rating.**	
Fault indicator light on (in steady mode).	Faulty electrical connections on the telemetry line (wires and detector).	Check the connections on the MX48 terminal block and the detector terminal block. Check that there is no short circuit or break in the wires on the telemetry cable.
	Faulty detector.	Repair or replace the detector (see internal electronics or cell).
	The type of detector does not match the measuring channel configuration.	Connect the correct type of detector with the corresponding measuring channel. CAUTION The measuring channel or line may be damaged.
	Negative offset too great (more than 20% of measuring scale).	Perform calibration on the detector and, then, on the unit, if necessary. If the problem persists, the cell must be replaced.

	Channel in maintenance mode for more than 30 minutes.	Return the channel to normal operation by pressing the Calibration key (Item C, Fig. 4).
Fault indicator light on (in steady mode) and SUP displayed.	The measurement is higher than 100% of the measuring scale.	To acknowledge the alarm, the measuring channel must be switched off and then switched on again (by programming). If the problem persists and the measurement is not consistent with reality, the detector must be calibrated.
An LED does not light up even though the corresponding threshold is exceeded and the buzzer and relay are actuated.	Faulty LED.	Perform a general test on the LEDs by pressing the TEST key on the keypad and, if the LED still does not light up, the programming must be modified by using the "Unit programming" menu (buzzer connected?).
An alarm is triggered, the LED lights up and the relay is actuated but there is no audio alarm.	The buzzer strap is not correctly positioned.	Fall the buzzer switch (Fig. 4).
	The buzzer is not programmed as "in service".	If the audio alarm is wanted, the programming must be modified by using the "unit programming" menu (buzzer connected?).
The audio alarm stops after 30 s although alarms are still actuated.	The buzzer is programmed to operate for 30 seconds only.	If the buzzer is to be sounded as long as the alarms are actuated, the programming must be modified by using the "Unit programming menu" (continuous buzzer?).
An alarm is triggered but the slaving controls are not actuated.	The relays are faulty.	Short-circuit or open the relay contact (as applicable) on the MX48 terminal block (Fig. 12) and, if the slaving controls operate normally, the corresponding channel board must be repaired by an approved technician.

	Faulty electrical connections.	Short-circuit or open the relay contact (as applicable) on the MX48 terminal block (Fig. 12) and, if the slaving controls still do not work, the connections must be checked on the MX48 connector and on the slaving systems.
An electronic detector is in the "CALIBRATION" position and the corresponding channel of the MX48 unit remains in normal operation: no flashing yellow LED.	The channel is not programmed to detect a detector in "Calibration" mode.	If it is so wished, the programming of this channel can be modified by using the "Channel programming" menu (self-calibration) and choose "CAL detection : YES".
Impossible to upload data from the MX48 to a computer.	Faulty electric connections.	Check the connections on the MX48 unit connector (Fig.8) and the computer. Check that the cable is satisfactory.
	The cable does not match the 2-wire RS485 type of link.	Replace the cable with a suitable one.
Remote acknowledgement is impossible.	Faulty electric connections.	Check the connections on the MX48 unit connector (Fig. 8) and on the punch-type button.
	The punch-type button is faulty.	Replace the punch-type button.

6.2.1. Data printing

EXAMPLE



CAUTION
A computer or a printer management interface must, imperatively, be used to print data.

6.3. *Scrapping of MX48*

Concerning the conservation, of the protection and the improvement of the quality of the environment, as well as for the protection of the health of the persons and the careful and rational use of natural resources, MX48 has to be the object of a selective collection for the electronic equipments and cannot be scrapped with the normal domestic waste. The user thus has the obligation to separate the MX48 of the other waste so as to guarantee that it is recycled in a sure way at the environmental level. For more details of the existing sites of collection, contact the local administration or the distributor of this product.

6.4. *List of spare and replacement parts*

DESIGNATION	REFERENCE
Complete power unit	6451451
Complete measuring four channels board	6451552
Complete main board (FRONT) (micro+display)	6451450
Female connector (5 points)	6152857
Line Female connector (9 points)	6152877
“Measuring channel” fuse, 630 mA, time-delayed	6154627
DC power supply fuse, 12.5 A, time-delayed	6154624
AC power supply fuse, 6.3 A, time-delayed	6154718
Fuse, 125 mA, time-delayed	6154701
Power board relay (DC)	6155745
Common alarm relay	6155752
AC mains relay (110 V AC)	6155761
“Measuring channel” alarm relay	6155752
“Channel actuating” relay	6155744
Lithium battery (on micro board)	6111174
Buzzer	6112214
Toroidal transformer	6111201
Fluorescent display panel	6133521
On/Off switch	6153436
Maintenance screwdriver	6145845
Complete casing MX48	6121547
Complete keyboard (FRONT)	6451453

CAUTION
It is mandatory that replacement parts must be guaranteed INDUSTRIAL SCIENTIFIC original parts as, if this is not the case, the safety of the equipment could be affected.

7. DETAILED TECHNICAL CHARACTERISTICS

MANUFACTURER

INDUSTRIAL SCIENTIFIC
62000 ARRAS - FRANCE

BOX

- Wall-mounted box dimensions : 500 x 340 x 89
- Function: measuring unit
- Capacity: 4 or 16 measuring channel
- Measurement: continuous
- Storage temperature: -20°C to +55°C
- Operating temperature: -10°C to +45°C
- Relative humidity: 0 to 95% humidity, no condensation
- Protection : IP 65
- Weight : 11 kgs

ILLUMINATED INDICATIONS

- Fluorescent display panel, 2 lines of 16 characters
- 40 light-emitting diodes (power on, gas alarms, faults)

POWER SUPPLIES

- 103 to 122 V AC (in option)
- 207 to 244 V AC
- 21 to 31 V DC
- Power consumptions: 200 VA or 150 W

MEASURING INPUTS

- Active 2-wire or 3-wire shielded cables according to type of detectors
- Resistance in loop mode:
    - 3-wire EXPLO: 32 Ω (1,000 m with wire 1.5 mm^2 at 20°C)
    - 4-20 mA, 2-wire: 64 Ω (2,000 m with wire 1.5 mm^2 at 20°C)
    - 4-20 mA, 3-wire: 32 Ω (1,000 m with wire 1.5 mm^2 at 20°C)

RELAY OUTPUTS

- 2 independent measurement alarm relays per channel
- 1 common relay for alarm 3 or audio alarm transfer
- 1 common fault relay

SIGNAL OUTPUTS

- 4-20 mA analog per channel, maximum load resistance = 600 Ω
- Serial: RS 485 / 232 J BUS , common

MISCELLANEOUS OUTPUTS

Alarm remote acknowledgement

STANDARDS

Conformance with European standards CEM, low voltage and ATEX

CE mark

8. Special Specifications for use in Potentially Explosive Atmospheres in accordance with European Directive ATEX 94/9/EC.

The MX48 detection device designed to measure explosive gasses and oxygen complies with the requirements of European Directive ATEX 94/9/EC on potentially explosive atmospheres.

As a result of its metrological performance, as tested by the research and testing organisation INERIS, the MX48 device, is classified as a safety device when used with INDUSTRIAL SCIENTIFIC CEX300 and OLC/OLCT 20, 40, 50 and 60 series detectors. The device may therefore contribute to limiting the risk of explosion as a consequence of the data it supplies to external units.

The information contained in the following paragraphs should be adopted and complied with by the person responsible for the site on which the equipment is installed. Please refer to the provisions of European Directive ATEX 1999/92/EC on improving health and safety conditions for workers exposed to potentially explosive atmospheres.

8.1. *Specifications for mechanical and electrical installation in Classified Areas.*

Installation will comply with all applicable standards, and particularly with EN 60079-14, EN 60079-17 and EN 50281-1-2.

The MX48 device must not be subject to intense mechanical vibration and must be installed in a safe area away from potentially explosive atmospheres.

It is essential to refer to the user and installation manuals for the gas detectors referred to above, particularly the paragraph entitled 'Special Specifications for use in Potentially Explosive Atmospheres in Accordance with European Directive ATEX 94/9/EC'

Where intrinsic safety installations are concerned, it should be borne in mind that the person responsible for IS installation (the "System Designer") must draw up a system document demonstrating that every aspect of the Power Cable Detector system complies with intrinsic safety. Please refer to EN 50039 for group II and EN 50394-1 for group I when drafting this document.

8.2. *Metrological Specifications*

The device complies with the following European standards:

With explosive gas detectors:

- European standards EN 50054 and EN 50057 for Methane (calibration gas), Propane and Hydrogen (gasses following response curves) where the device is used with CEX300 and OLC/OLCT 20, 40, 50 and 60 series gas detectors. Where the device is used with other types of sensor producing an output measurement current of 4/20 mA, these must comply with paragraph 1.5 of Appendix II of the ATEX 94/9/EC Directive and be compatible with their characteristics (cf. device transfer curve).
- European Standard EN 50271

Oxygen detectors:

- European Standard EN 50104 where the device is used with OLCT 20, 40, 50 and 60 gas detectors. Where the device is used with other types of sensor producing an output measurement current of 4/20 mA, they must comply with paragraph 1.5 of Appendix II of the ATEX 94/9/EC Directive and be compatible with their characteristics (cf. device transfer curve).

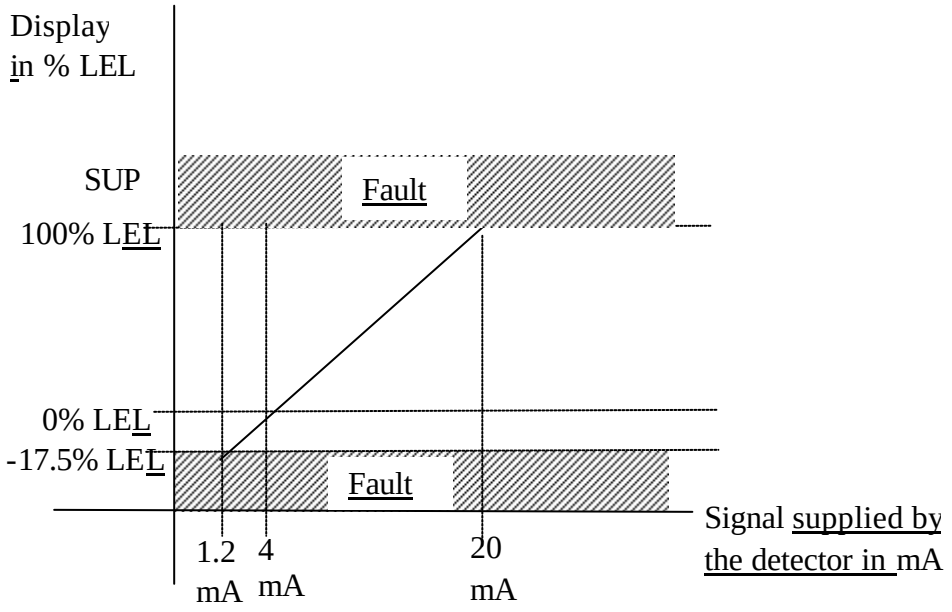
- European Standard EN 50271

8.3. *Connecting detectors other than INDUSTRIAL SCIENTIFIC detectors to the MX48 device*

As previously explained, users wishing to connect detectors other than those manufactured by INDUSTRIAL SCIENTIFIC, must ensure their compatibility with the device in order that the resulting combination may be considered as a safety device.

8.3.1. Device transfer curves in 0% to 100% LEL configuration

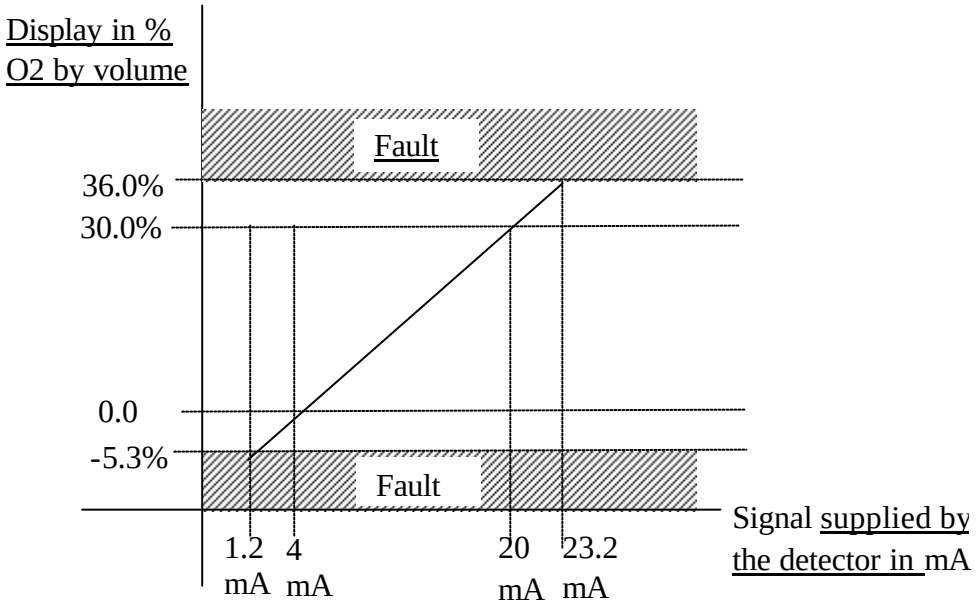
The following curve shows the response of the device in terms of value measured, and fault processing as a function of the input current value supplied by the detector. Where the user connects a brand of detector other than INDUSTRIAL SCIENTIFIC to the MX48 device, he must check carefully that the transfer curve is fully compatible with the device input characteristics, to ensure that the data generated by the detector is correctly interpreted. Equally, the device must supply a suitable power supply voltage, allowing for cable voltage losses.



Please note: When the value measured is >= 100% LEL, the measuring device memorises the fact that the value has exceeded the scale and the channels switch to alarm and fault mode. Resetting these statuses is a manual operation to be performed by the user, who must follow the safety regulations specific to the site. The reset is checked either by turning the device on and off or by a maintenance inspection.

8.3.2. Device transfer curves in 0% to 30.0% OXYGEN configuration

The following curve shows the response of the device in terms of value measured, and fault processing as a function of the input current value supplied by the detector. Where the user connects a brand of detector other than INDUSTRIAL SCIENTIFIC to the MX48 device, he must check carefully that the transfer curve is fully compatible with the device input characteristics, to ensure that the data generated by the detector is correctly interpreted. Equally, the device must supply a suitable power supply voltage, allowing for cable voltage losses.



8.3.3. Power supply and load resistance characteristics

Maximum current available between terminals 2 and 3: 350 mA at 21 V.
Maximum no-load voltage between terminals 2 and 3: 30 V
Load resistance (outside the IS barrier) between terminals 1 and 2: 47 ohms

N.B.: This data applies only where detectors other than INDUSTRIAL SCIENTIFIC are used. Where different types are mixed, please contact INDUSTRIAL SCIENTIFIC to establish the feasibility of the combination.

8.4. *MARKING*

INDUSTRIAL SCIENTIFIC
CE 0080
OLCT50i
Ex II 2 (G)
INERIS 04ATEX0064

INDUSTRIAL SCIENTIFIC

DECLARATION DE CONFORMITE
Declaration of conformity

CE

La **Société OLDHAM S.A.**, ZI Est 62000 Arras France, atteste que le matériel neuf :
*(The **Company OLDHAM S.A.**, ZI Est 62000 Arras France, declares that the following new material:)*

CENTRALE DE MESURE *(control unit)* **MX48**

Reliée aux détecteurs de gaz *(connected to Gas detectors)* type
CEX300 / OLC-OLCT 20 - 40 - 50 - 60

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

I) Directive Européenne ATEX 94/9/CE du 23/03/94 : Atmosphères Explosives
The European Directive ATEX 94/9/CE of 23/03/9: Explosive Atmospheres

Normes harmonisées appliquées : *(Harmonised applied Standards)*	**EN 50054, EN 50057, EN 50104, EN 50271** Performances métrologiques pour la détection des gaz combustibles et de l'oxygène *(Performance requirements for combustible gases and oxygen)*
N° Attestation CE de Type du matériel : *(N° of EC type examination certificate)*	**INERIS 04ATEX0064**
Catégorie *(Category)*:	Ex **II (2) G**
N° de la Notification Assurance Qualité de Production de l'usine de fabrication de Arras : *(N° of the Production Quality Assurance Notification of the Arras factory)*	**INERIS 00ATEXQ403**
Délivrés par l' Organisme notifié sous le numéro 0080: *(Issued by the Notified Body n°0080)*	INERIS, rue Taffanel, 60550 Verneuil en Halatte, France.

II) Directive Européenne CEM 89/336/CEE du 3/05/89 : Compatibilité Electromagnétique
The European Directive EMC 89/336/CEE of 3/05/89: ELECTROMAGNETIC COMPATIBILITY

Normes harmonisées appliquées : *(Harmonised applied Standards)*	**EN 50081–1-2 / EN 50082-1-2**

III) Directive Européenne DBT 73/23/CEE -93/68/CEE du 22/07/93 : Basse Tension
The European Directive LVD 73/23/CEE -93/68/CEE of 22/07/93 Concerning Low Voltage

Normes harmonisées appliquées : *(Harmonised applied Standards)*	**EN 61010-1**

CE/ATEX 117

Arras, le 17/12/04

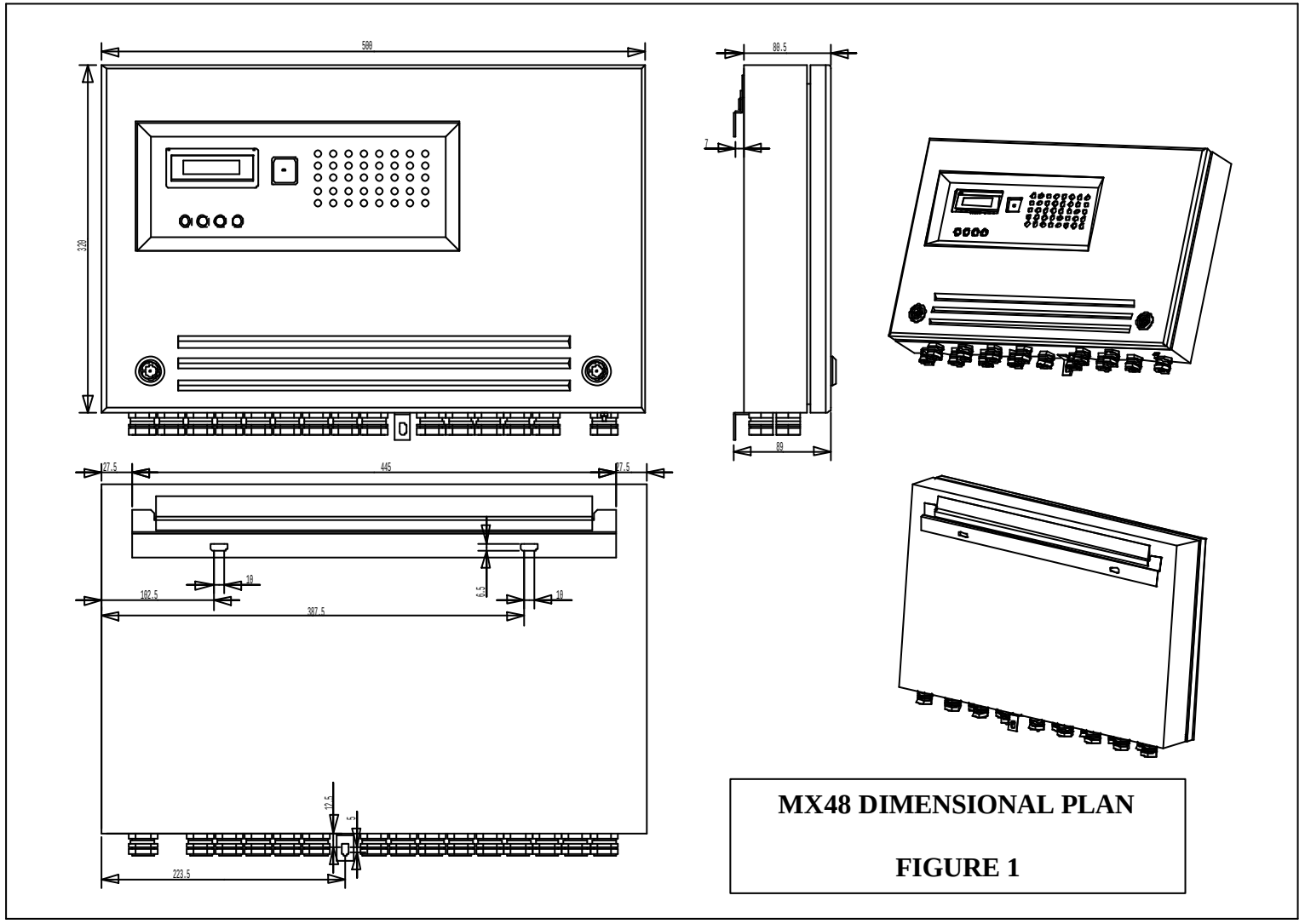
Le Représentant de l'entreprise
On Behalf of the firm

Lionel Witrant

Directeur Technique
Technical Director

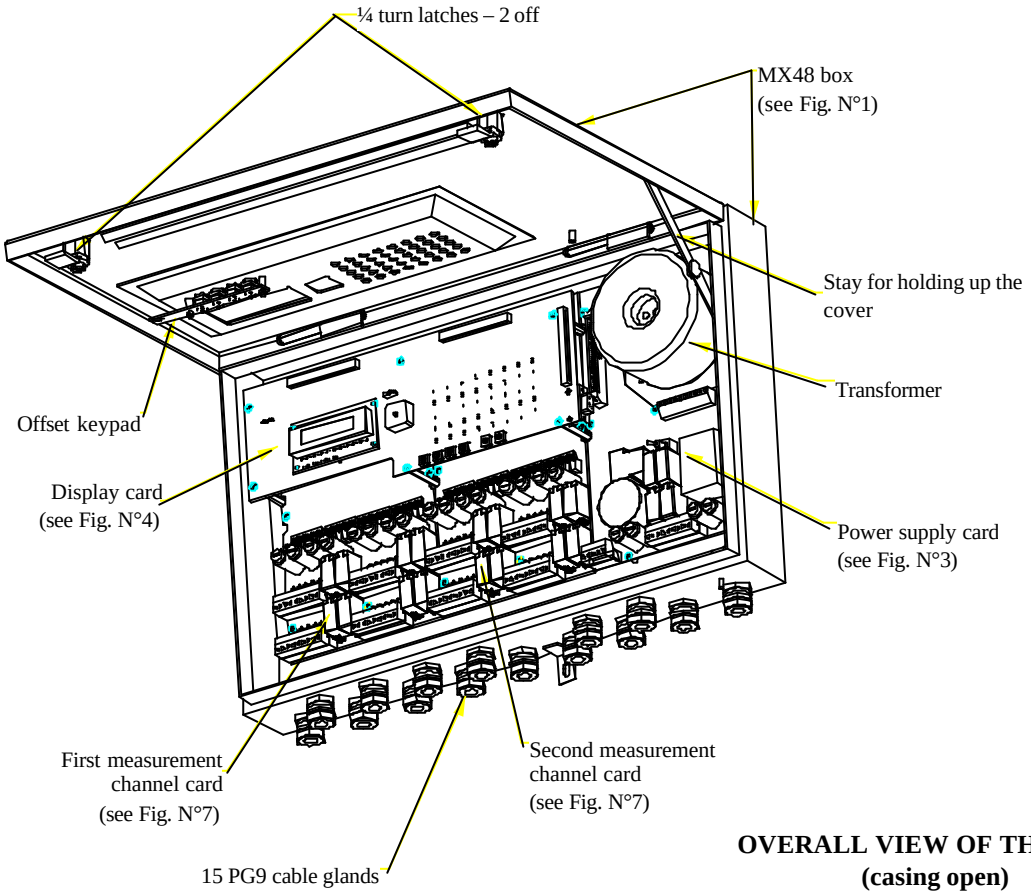
AFAQ ISO 9001

VIEWS SPECIFIED IN THE MANUAL

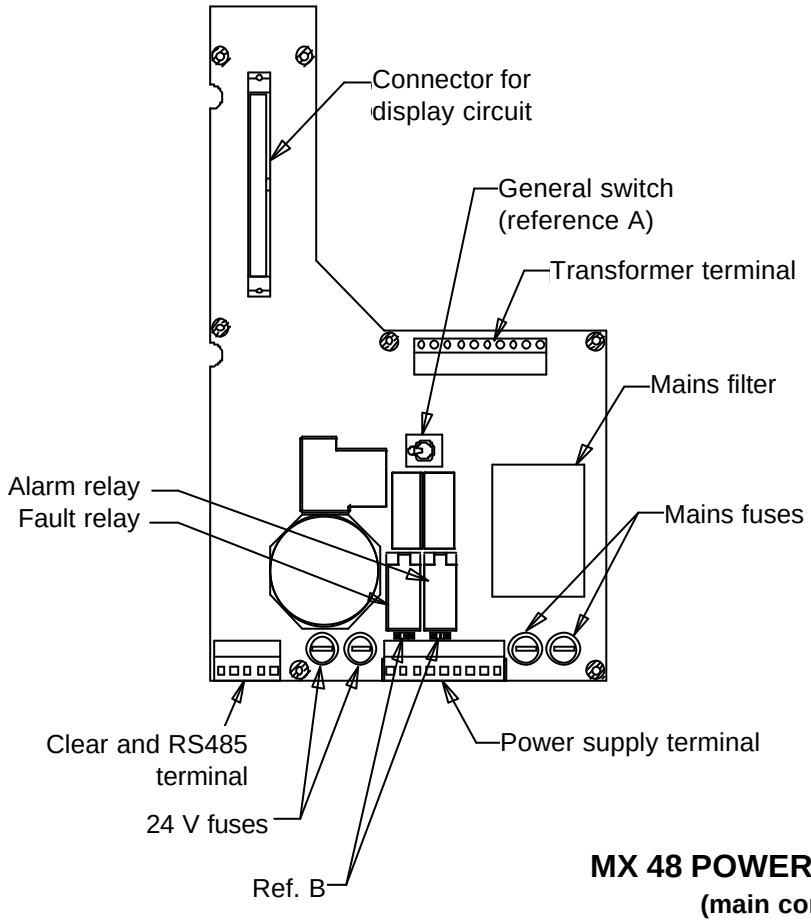


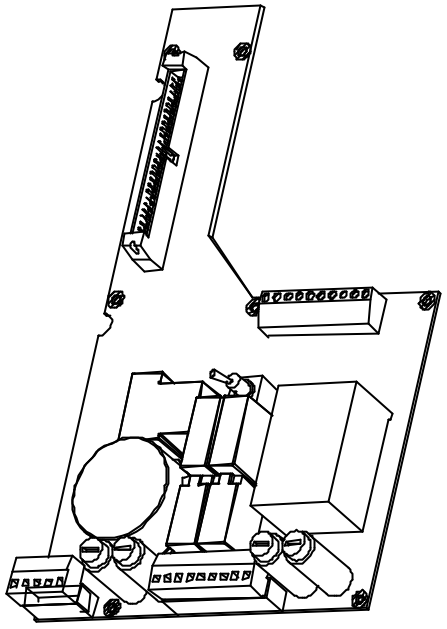
MX48 DIMENSIONAL PLAN

FIGURE 1



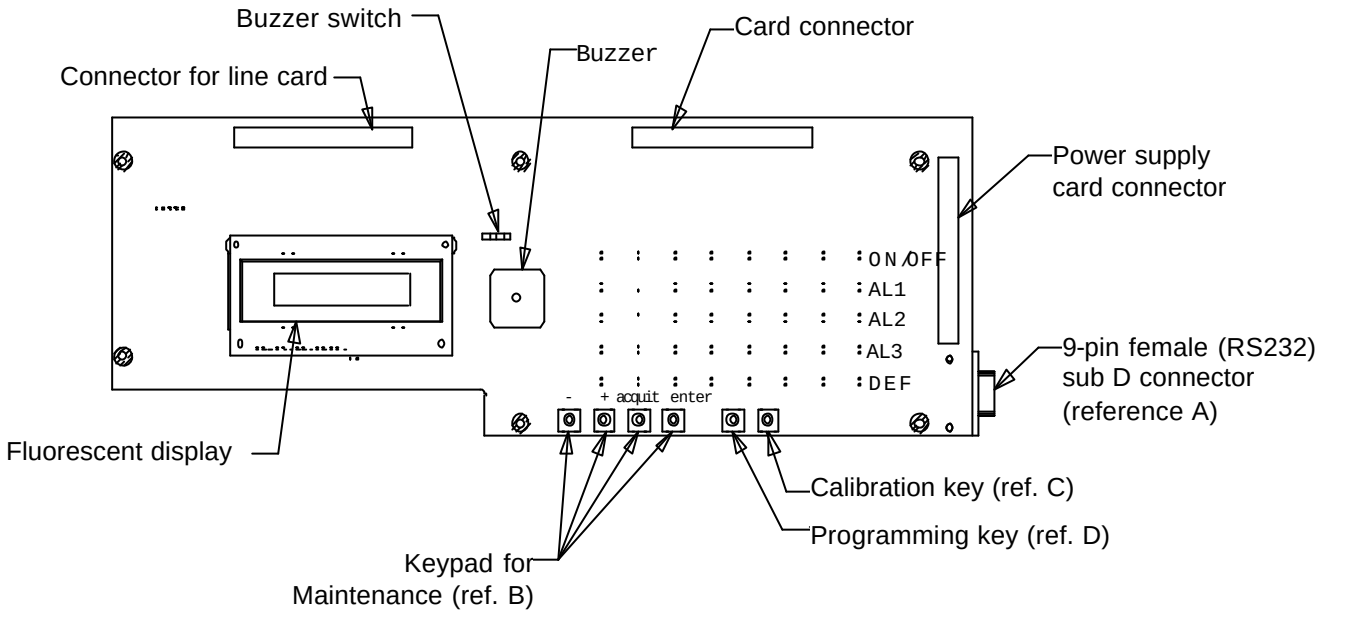
OVERALL VIEW OF THE MX48
(casing open)
FIGURE 2

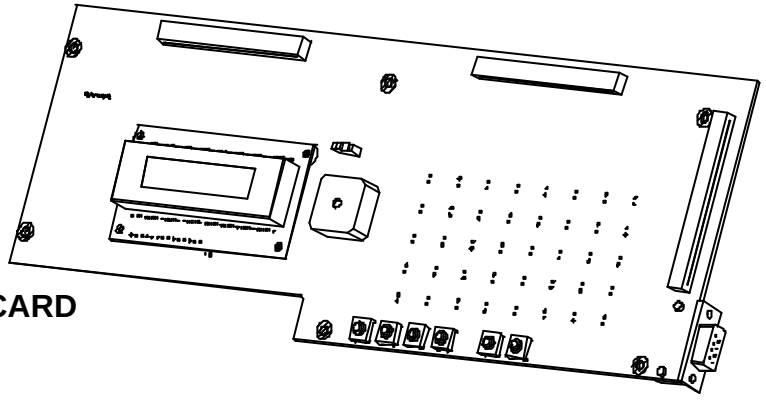




MX 48 POWER SUPPLY CARD
(main components)

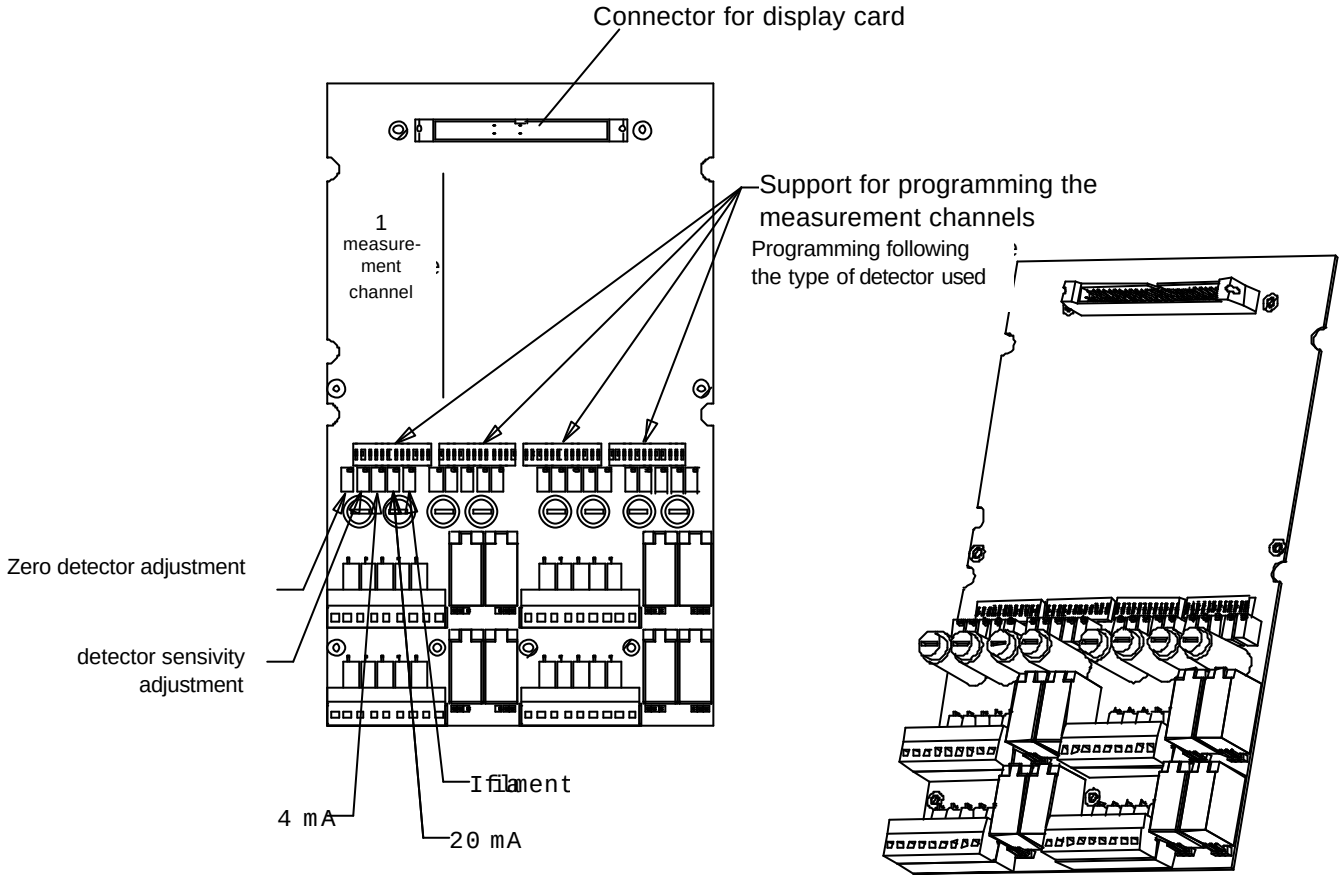
Figure N°3



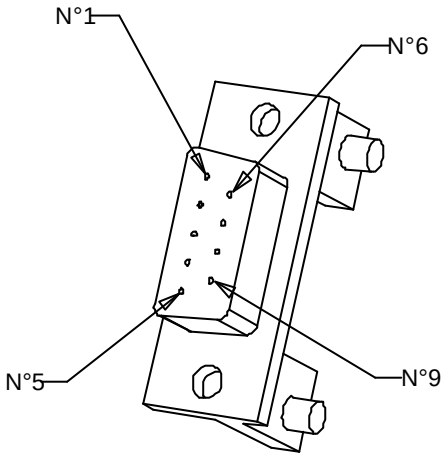


MX 48 FRONT LINKAGE CARD
(display, micro, keypad)

FIGURE n° 4



FUNCTIONS OF THE VARIOUS POTENTIOMETERS
On the MX 48 measurement channels card
FIGURE 5

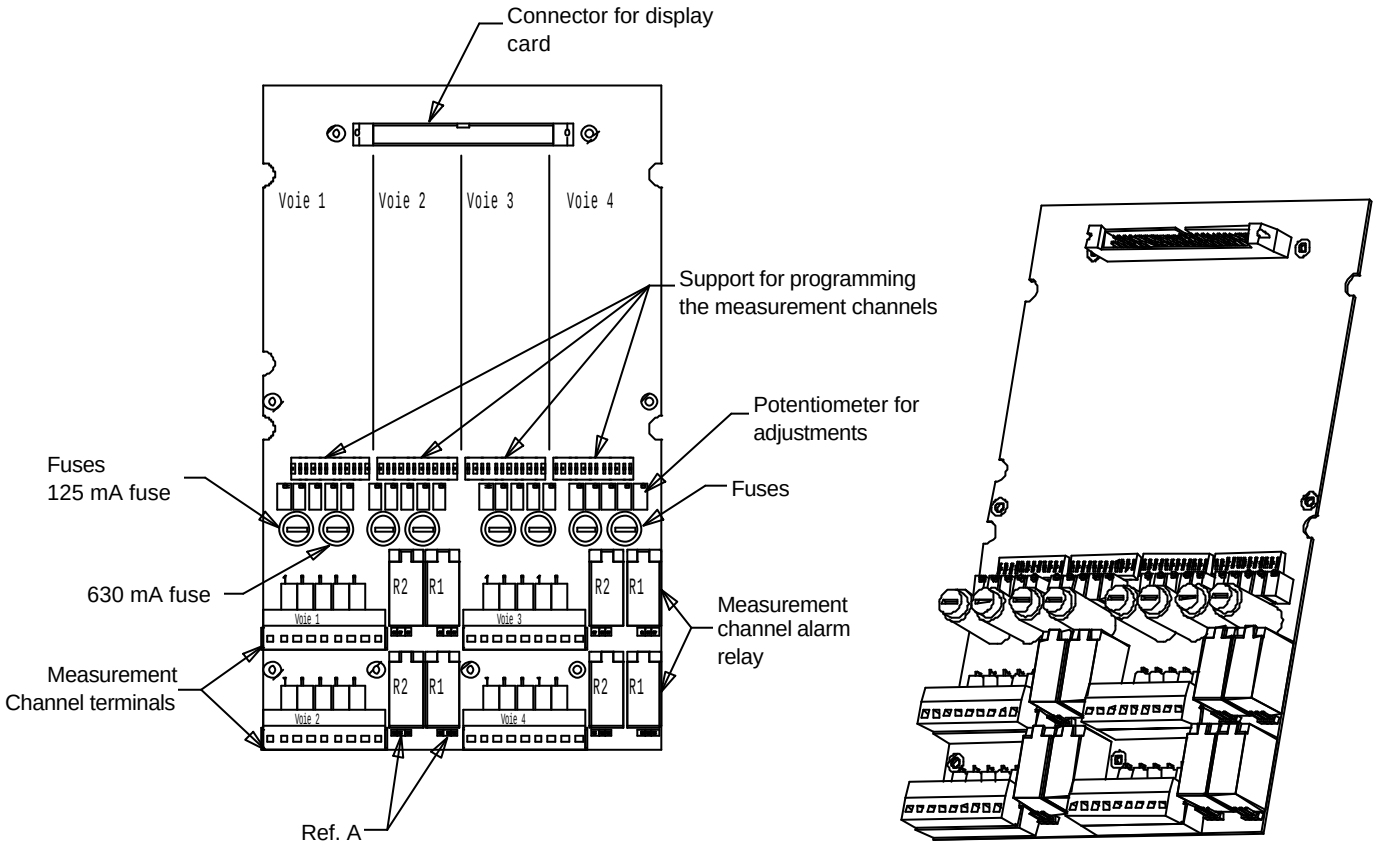


Pin n°
1:
2: TXD RS232 ——— Link RS232
3: RXD RS232 ———
4:
5: GND
6: 485-B (-) ——— Link RS485
7: 485-A (+) ———
8:
9:

If you wish to use the RS485 link, the male DB9 “plug” connector must be connected to the female DB9 connector.
(internal strap between 3 and 4)

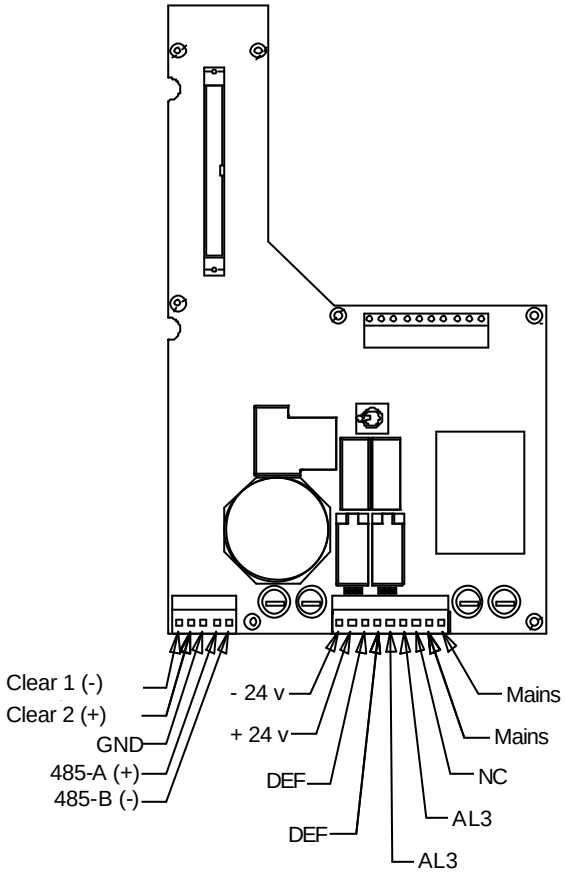
PIN LAYOUT FOR THE RS232 SERIAL LINK CONNECTOR (Item A – Fig N°4)

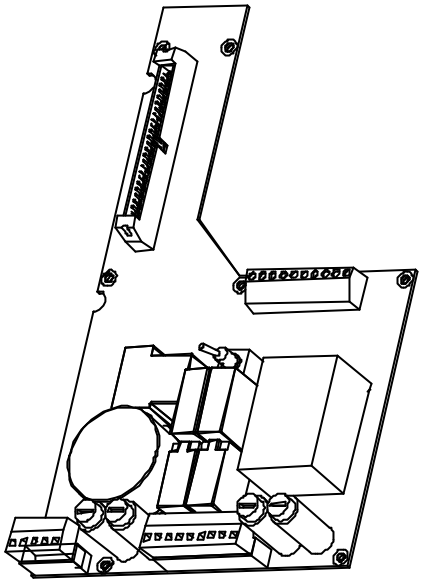
FIGURE N°6



MX 48 MEASUREMENT CHANNELS CARD
(main components)

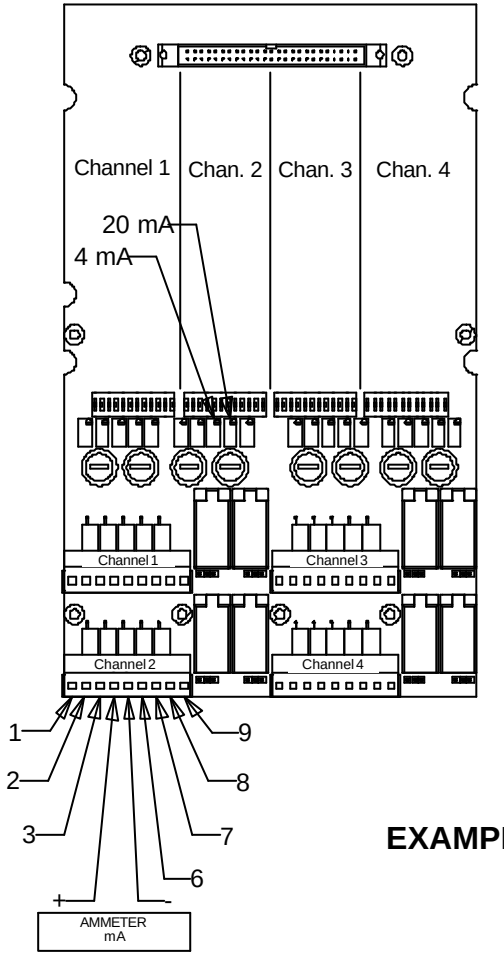
FIGURE N° 7





ELECTRICAL CONNECTIONS TO THE MX48 POWER SUPPLY CARD

FIGURE N° 8



1: signal
2: minus
3: plus
4: +
5: -
6:
7:
8:
9:

detector

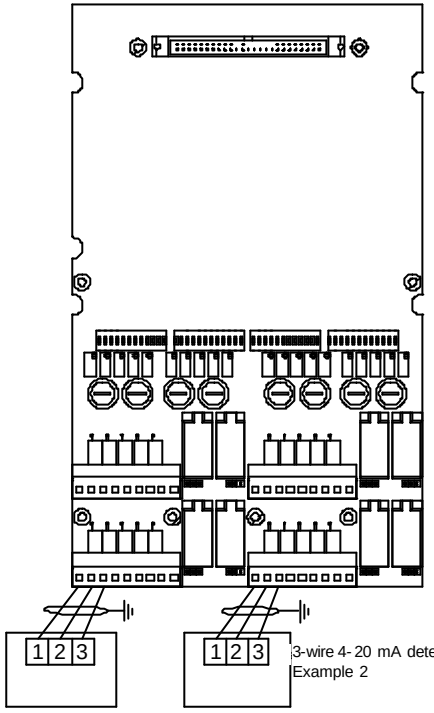
4.20 mA output

Contact REL AL1

Contact REL AL2

EXAMPLE : ADJUSTMENT OF THE 4.20 mA on the Channel 2

FIGURE N° 9

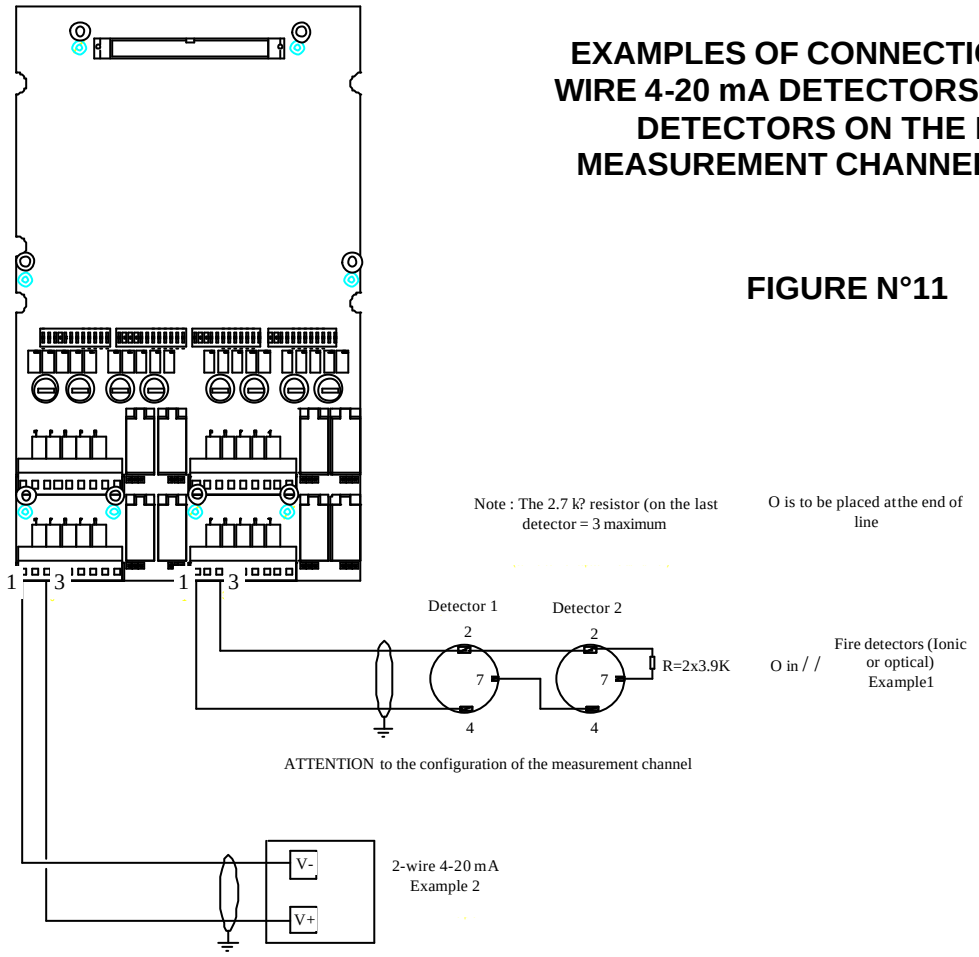


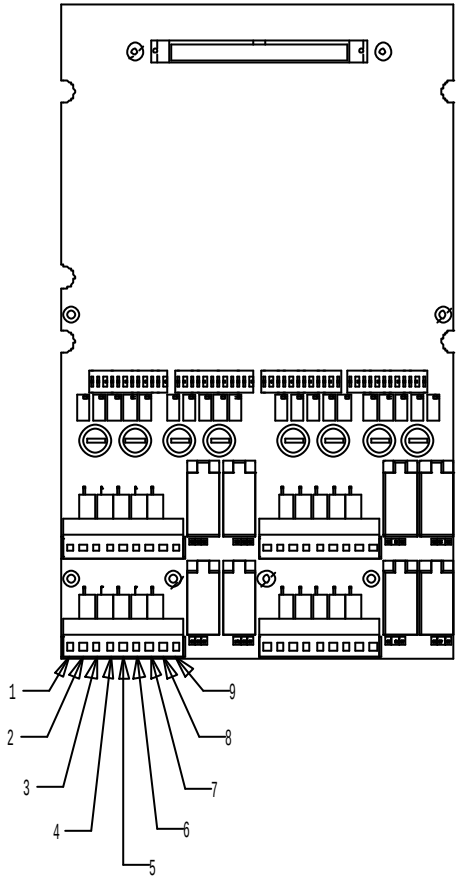
MX48 MEASUREMENT CHANNELS CARD
EXAMPLE OF CONNECTION OF EXPLOSIMETRIC DETECTORS AND 3-WIRE 4-20 mA DETECTORS

FIGURE N° 10

EXAMPLES OF CONNECTION OF 2-WIRE 4-20 mA DETECTORS AND FIRE DETECTORS ON THE MX48 MEASUREMENT CHANNELS CARD

FIGURE N°11





1: signal
2: minus
3: plus
— detector

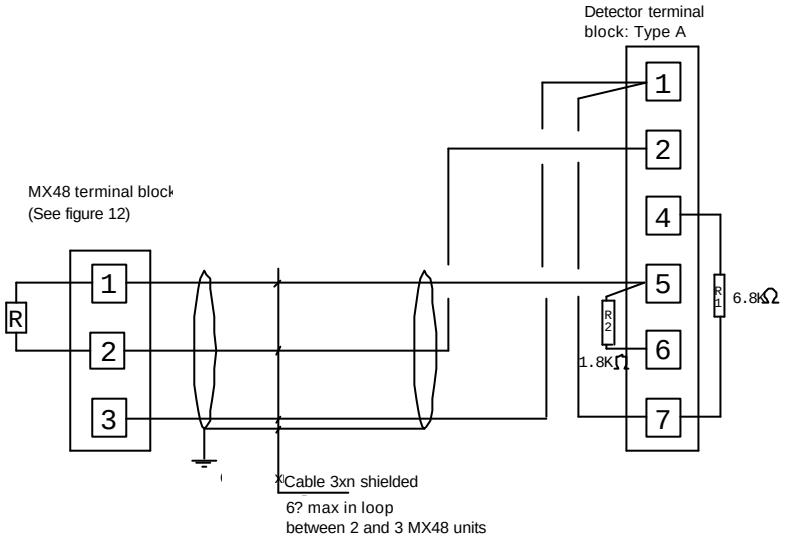
4: +
5: -
— 4-20 mA current output

6:
7:
— Contact REL AL1

8:
9:
— Contact REL AL2

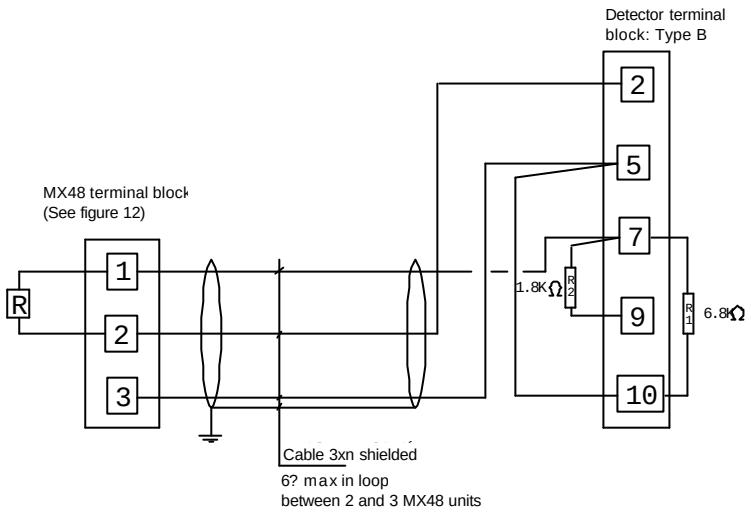
DETAILS OF CONNECTIONS OF A TERMINAL BLOCK TO THE MX48 MEASUREMENT CHANNELS

FIGURE 12



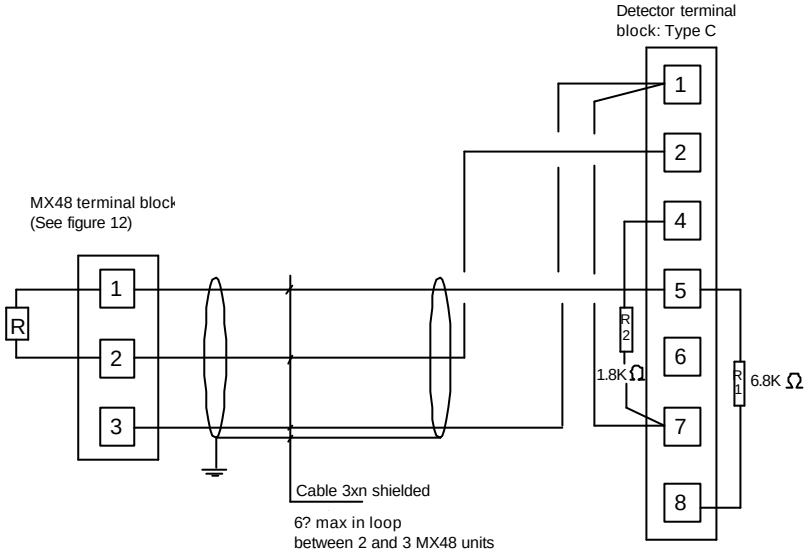
CONNECTION OF A FLAME DETECTOR
EQUIPPED WITH TERMINAL BLOCK OF TYPE A

FIGURE 13



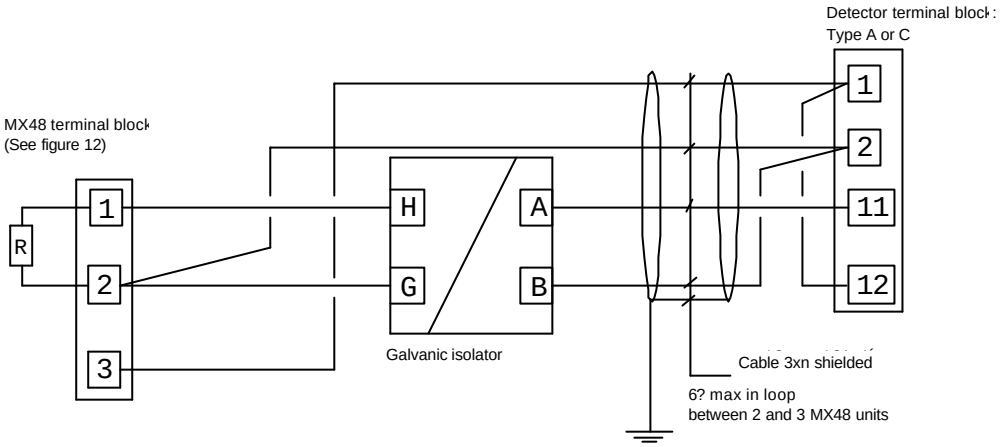
CONNECTION OF A FLAME DETECTOR
EQUIPPED WITH TERMINAL BLOCK OF TYPE B

FIGURE 14



CONNECTION OF A FLAME DETECTOR
EQUIPPED WITH TERMINAL BLOCK OF TYPE C

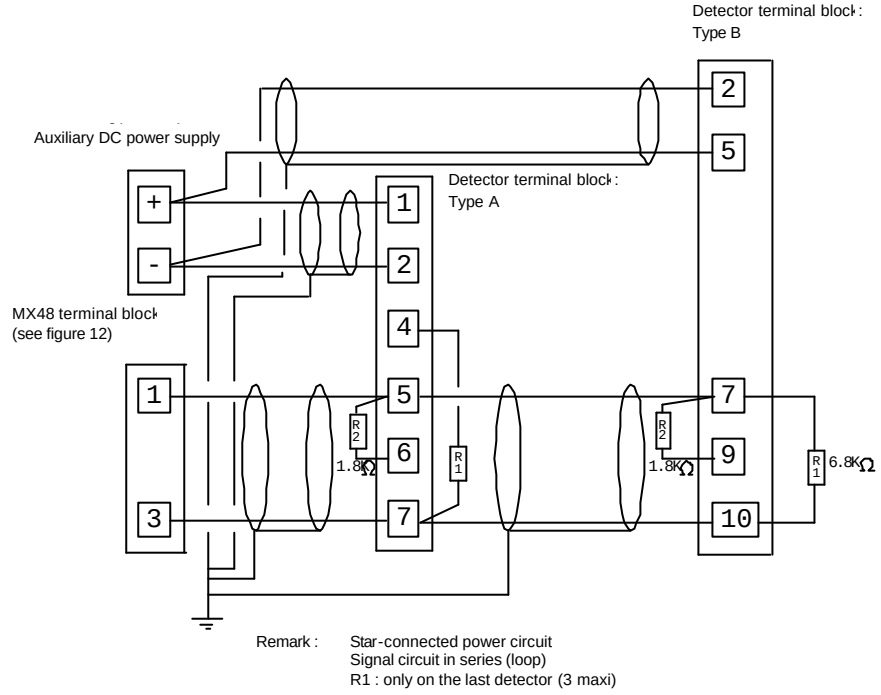
FIGURE 15



Remark: The detector relay can be used in local mode.
The galvanic isolator is located in the immediate vicinity of the MX48 unit.

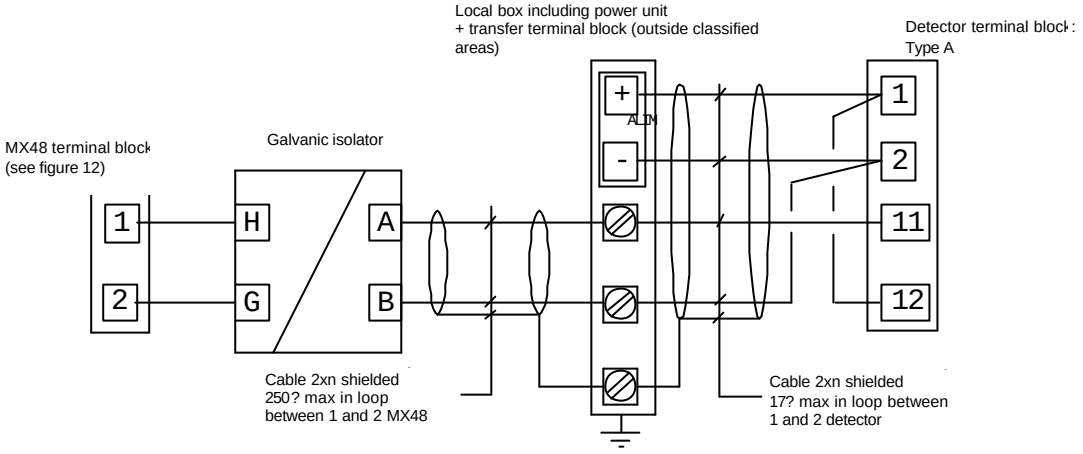
EXAMPLE OF UTILIZATION OF THE 4-20 mA SIGNAL SUPPLIED BY A FLAME DETECTOR (UV/IR OR IR3) EQUIPPED WITH TERMINAL BLOCK TYPE A OR C

FIGURE 16

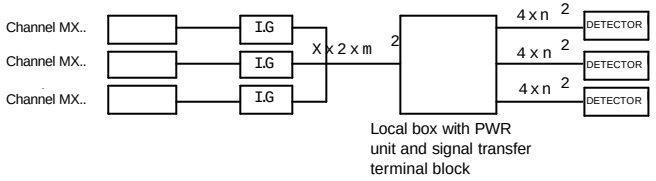


EXAMPLE OF UTILIZATION OF FLAME DETECTORS EQUIPPED WITH EITHER CONNECTOR A OR B AND SUPPLIED WITH AUXILIARY DC POWER

FIGURE 17



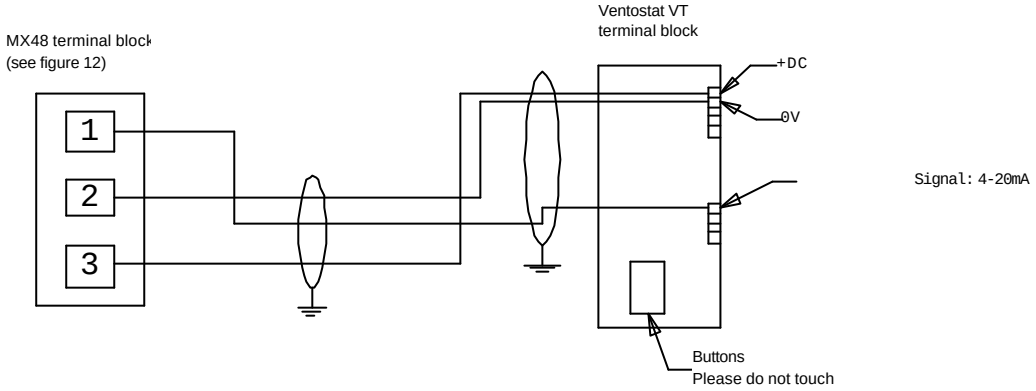
TYPICAL INSTALLATION BLOCK DIAGRAM TO BE MULTIPLIED BY NUMBER OF AREAS IN INSTALLATION



- a single detector per MX48 measuring channel
- the detector rely can be used in local mode.
- The galvanic isolator is located in the immediate vicinity of the MX48 unit.

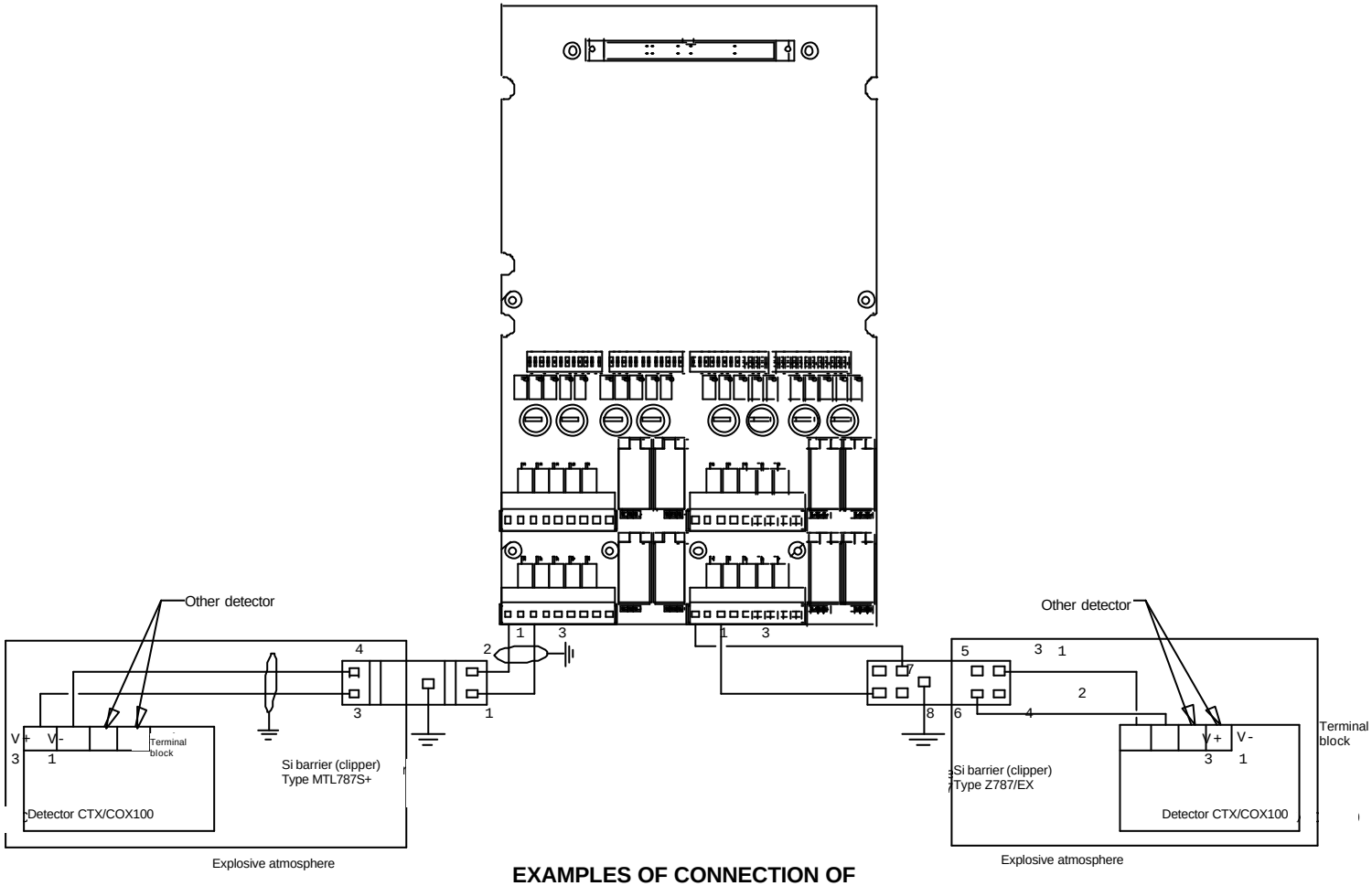
EXAMPLE OF UTILIZATION OF AN INTERCONNECTION BOX AND A GALVANIC ISOLATOR

FIGURE 18



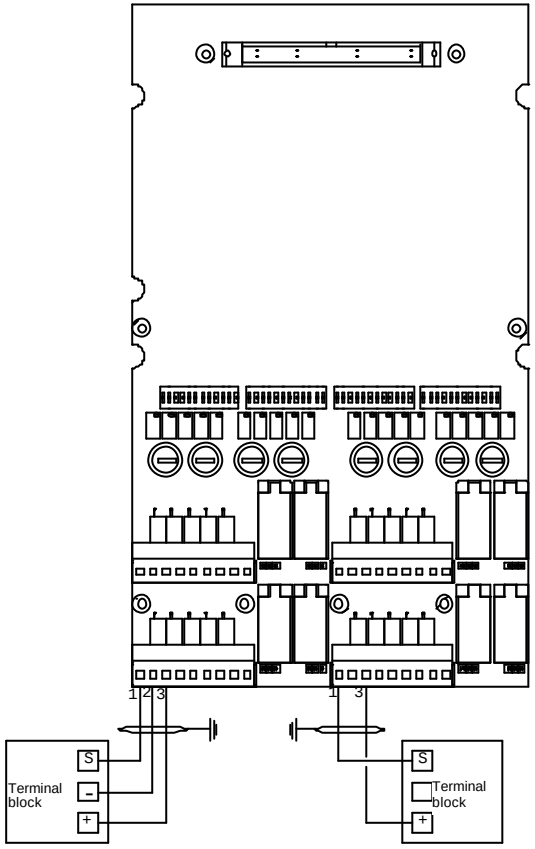
**CONNECTION OF A CO2 DETECTOR
OF VENTOSTAT VT TYPE**

FIGURE 20



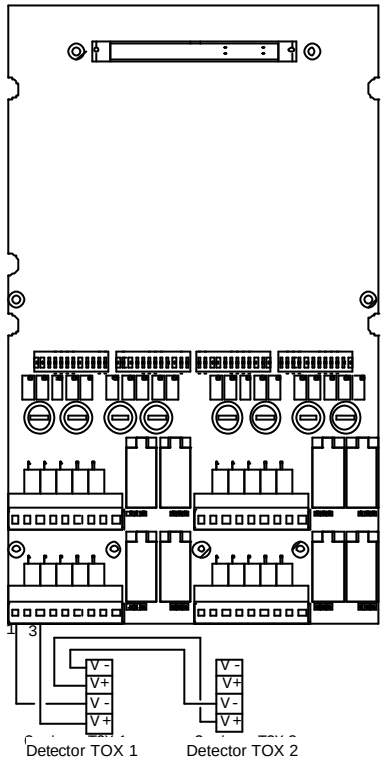
EXAMPLES OF CONNECTION OF DETECTORS WITH Si BARRIERS

FIGURE 21



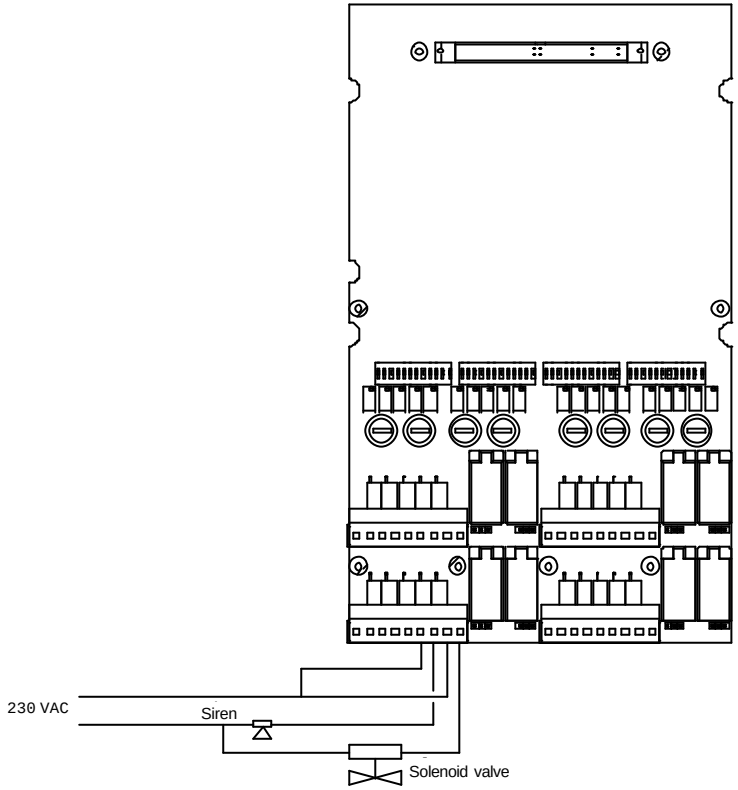
4-20 mA DETECTORS OTHER THAN ISC-OLDHAM MODELS
(Power-supplied by MX48 unit)

FIGURE 22



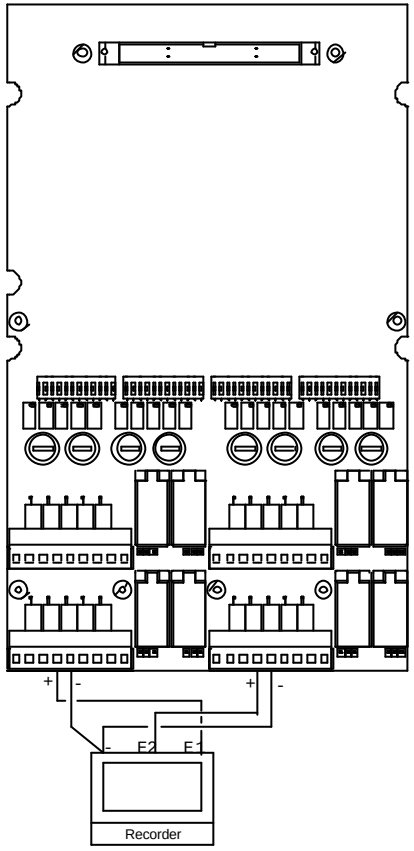
EXAMPLE OF “PARALLEL” WIRING OF 2 DETECTORS OF CTX300 “Co Parking” (5 maximum)

FIGURE 23



EXAMPLE OF CONNECTION OF EXTERNAL DEVICES TO THE ALARM 1 AN 2 RELAY CONTACTS OF A MX48 MEASURING CHANNEL

FIGURE 24



EXAMPLE OF CONNECTION OF A 2 INPUTS RECORDER TO THE 4-20 mA OUTPUT OF TWO MESURING CHANNEL

FIGURE 25

Nous nous engageons – We undertake

1 Les Plus
Au travers de notre service client, à répondre rapidement et efficacement à vos besoins de conseil, de suivi de commande, et ce, partout dans le monde.
A répondre dans les plus brefs délais à toutes questions d'ordre technique.

2 Qualité
A vous assurer la meilleure qualité de produits et de services conformément aux normes et directives internationales en vigueur.

3 Fiabilité & Contrôles
A 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
A mettre en service, sur demande, votre matériel par nos techniciens qualifiés Ism.ATEX. Un gage de securité supplémentaire.

5 Formation
A dispenser des formations ciblées.

6 Contrat d'entretien
A 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 détecteurs de gaz fixes ou portables et le contrôle des asservissements.

7 Dépannage sur site
A faire intervenir nos techniciens du **Service Après Vente** rapidement. Ceci est possible grâce à nos implantations de proximité en France et à l'étranger.

8 Dépannage en usine
A 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 our customer service to respond to your needs for advice and order follow-up services wherever in the world you may be.
To answer all your technical questions as quickly as possible.

2 *Quality*
To provide you with products and services of the best quality, in accordance with current international directives and regulations.

3 *Reliability and inspections*
To supply you with reliable equipments. 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 are configured to meet your requirements).*

4 *Start-up*
That our Ism.ATEX qualified technicians will start up your equipment, if you wish so. This gives you the guarantee of additional safety.

5 *Training*
Will train on risks, on products and on consulting. Highlights that meet your needs.

6 *Maintenance contract*
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 fixed or portable gas detectors, the calibration of equipment and the verification of servo-control systems.*

7 *Field servicing*
*To send out our **After-Sales Service** technicians quickly for servicing on your site. This is made possible by our efficient network in France and other countries.*

8 *Factory repairs*
*We give 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 technical support service : 00 33 3 21 60 80 80

NOTRE MISSION

Protéger l'Homme dans ses activités professionnelles.
Fournir la plus haute qualité et le meilleur service client
à chaque échange, à chaque instant.

OUR MISSION :

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

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