ENMET **Corporation**
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ENGUARD MX48 CONTROL
Operation and Maintenance Manual

Manual Part Number
80003-048
MCN-359, 06/15/07

Table of Contents

List of Illustrations

1.0 Introduction

The **MX48 CONTROL** can include from 1 to 8 independent channels.

Each channel is connected to one or more 4-20 mA sensor/transmitters installed in the locations to be monitored.

The output from each sensor/transmitter (S/T) is displayed on the **MX48 CONTROL** and compared with alarm thresholds. If thresholds are exceeded, the control actuates relays that can be used to control external devices.

Each of the two Channel Boards installed in the **MX48 CONTROL** is equipped with circuits for four independent channels.

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

1.1 Unpack

Unpack the **MX48 CONTROL** and examine it for shipping damage. If such damage is observed, notify both ***ENMET*** customer service personnel and the commercial carrier involved immediately.

Regarding Damaged Shipments

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

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

Regarding Shortages

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

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

1.2 Check Order

Check, the contents of the shipment against the purchase order. Verify that the **MX48 CONTROL** is received as ordered. If there are accessories on the order, ascertain that they are present. Check the contents of calibration kits. Notify ***ENMET*** customer service personnel of any discrepancy immediately.

1.3 Serial Numbers

Each **MX48 CONTROL** is serialized. These numbers are on tags on the equipment and are on record in an ***ENMET*** database.

2.0 Features

2.1 The wall-mounted enclosure

The enclosure of the **MX48 CONTROL** is a wall-mounted box consisting of a case and a cover that can be pivoted up to access the interior.

For overall dimensions see section 3 installation, Figure 2 exterior view.

For over view of interior see Figure 1 interior view.

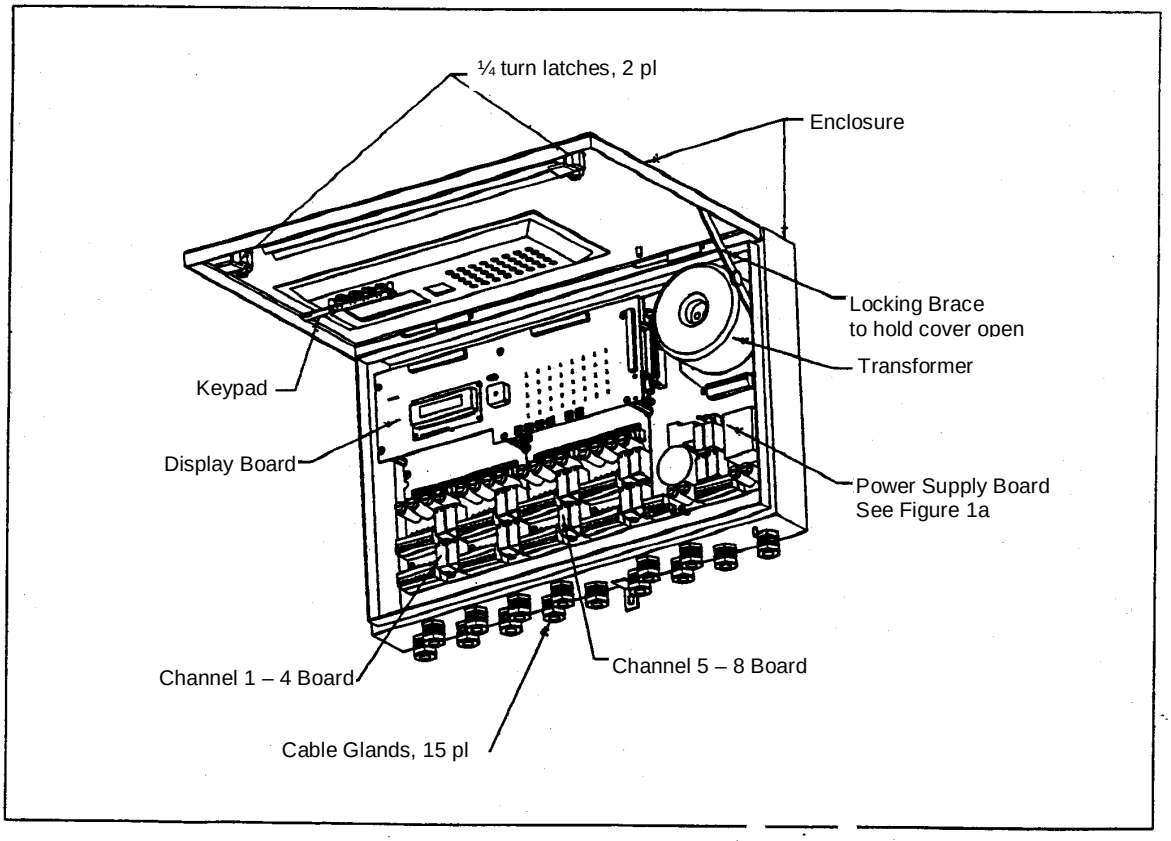


Figure 1: Interior View of MX48 CONTROL

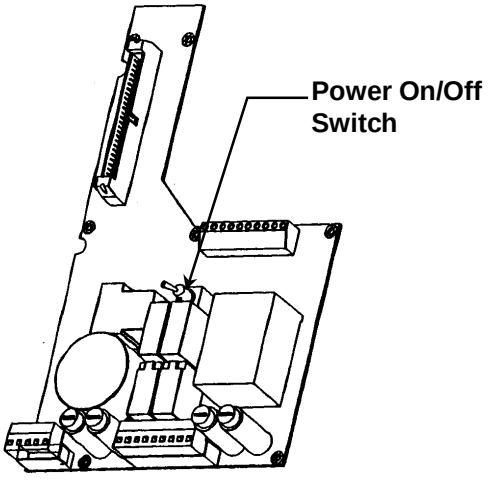


Figure 1a: On/Off Switch Power Supply Board

3.0 Installation

3.1 Installation Recommendations

The **MX48 CONTROL** can be installed anywhere away from an explosive atmosphere. It should preferably be located in a ventilated area under surveillance such as a, guard post, control room, instrumentation room, etc.

NOTE: To be able to fully open the hinged front cover of the **MX48 CONTROL**, allow space for opening by rotating the cover 90 degrees upwards see Figure 1.

The **MX48 CONTROL** is mounted on the wall with one bracket attached to the wall and the mating bracket is on the back of the enclosure. See Figure 2

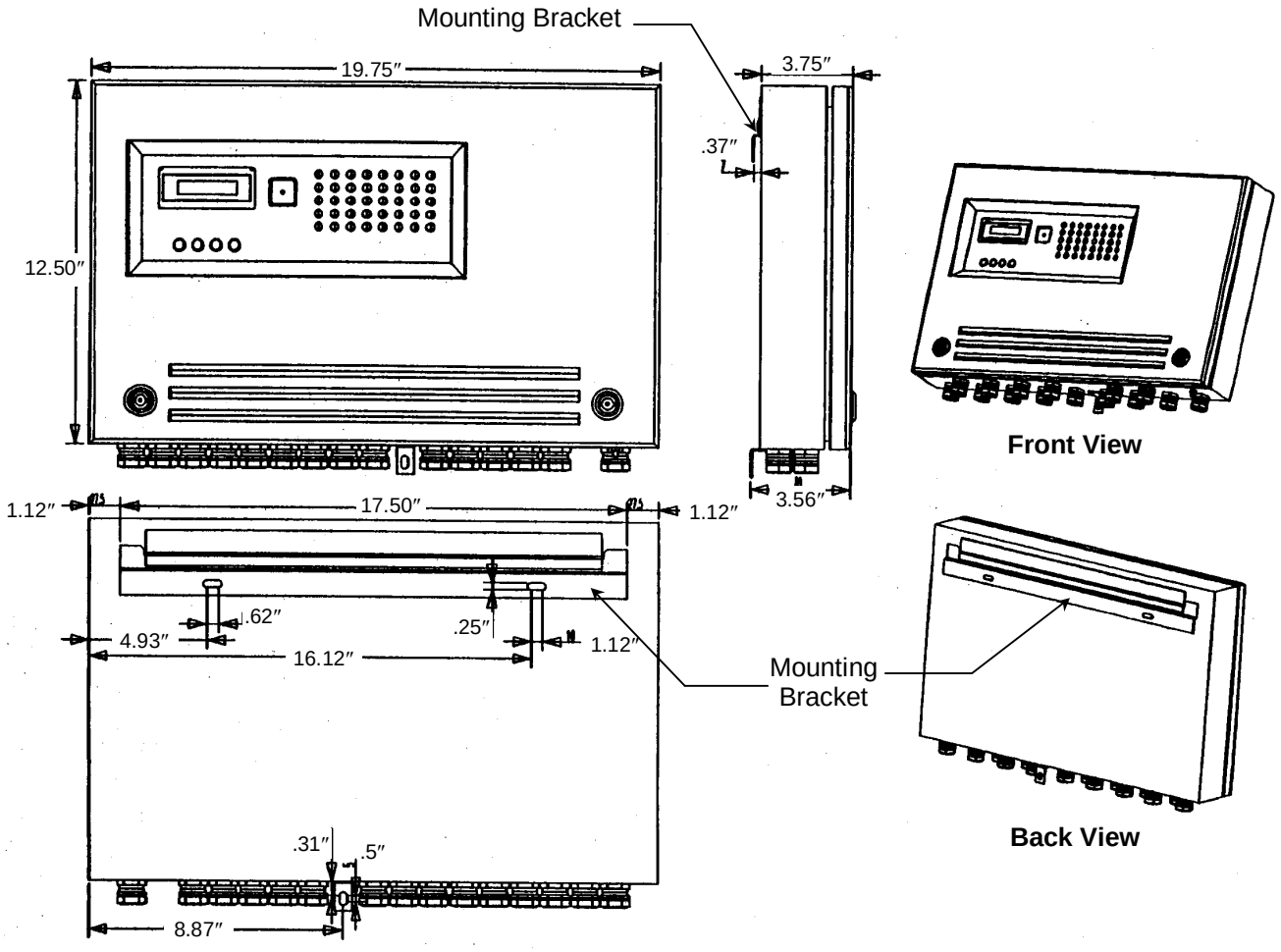


Figure 2: Mounting MX48 CONTROL

3.2 Electrical Connection of the MX48 CONTROL

To make electrical connections, turn off the control using the general ON/OFF switch located on the power supply board, see Figure 1a for location of ON/OFF switch.

The **MX48 CONTROL** is equipped with an automatic switching circuit to connect to 24VDC power should the 110VAC power fail. Hence, it is possible to use inexpensive backup power supplies.

***WARNING*: Continuous gas detection and alarm systems (110VAC/220VAC / 24VDC/12VDC powered) become inoperative upon loss of primary power. Contact factory for specifications and pricing of backup battery systems.**

3.2.1 AC power supply

Voltage:	110 VAC (103 to 122 V) 50/60 Hz
Maximum power:	120 VAC
Maximum input current	2Amp
Cable	3×1.5 mm^2 (earth included)
Location of connection terminals:	See Figure 3
Protection:	the phase and neutral wires are protected by time-delay 2A fuses located on the power supply board
Optional Voltage:	220 VAC (207 to 244 V) 50/60 Hz (optional, must specify when ordering)

CAUTION: It is absolutely essential for the **MX48 CONTROL** to be connected to earth ground. Connection is provided within and outside the enclosure. This connection is necessary to ensure the proper operation of

- the main power interference suppression filter
- the components for protection against electromagnetic interference

3.2.2 DC Supply Input

Voltage:	21 to 30 VDC The "minus" of the DC supply is ground and connected to the chassis.
Maximum power:	150 W
Maximum input current	6.3 Amp
Cable	2 x2.5 mm^2
Location of connection terminals:	See Figure 3
Protection:	There are 2 fuses, (6.3 A) situated on the power supply board

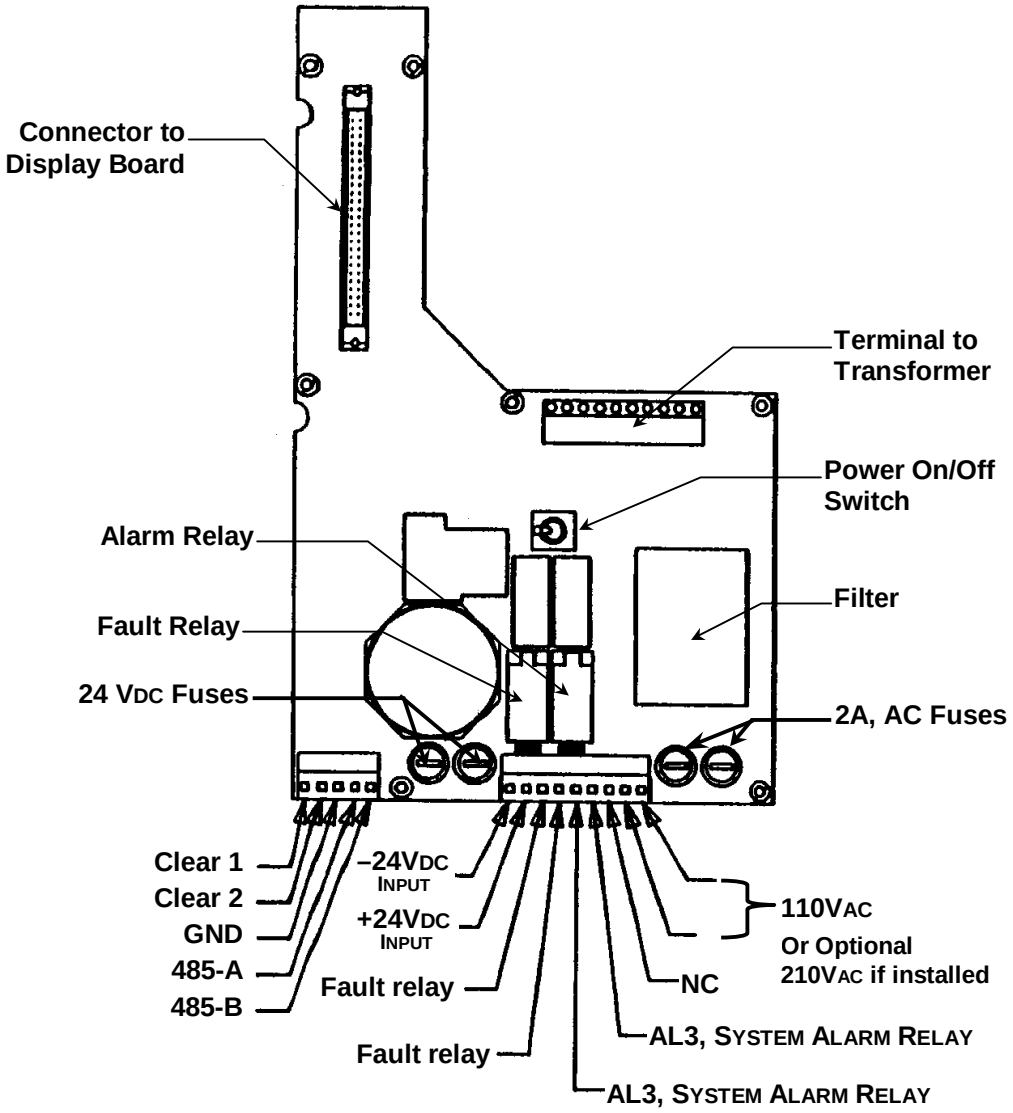


Figure 3: Power Supply Board Connections

***WARNING*: Each channel of the MX48 CONTROL has a terminal strip to which all wiring for that channel is connected. A typical four-channel circuit board is shown in Figure 3a and wiring for this terminal is shown in Table 3.**

3.2.3 4-20 Sensor/Transmitter

Sensor/Transmitters are connected to positions C1, C2 and C3 on each channel terminal strip. Connections are shown in Table 1 for two wire S/T and Table 2 for three wire S/T. See Figure 3a for location of channel terminal strips.

Table 1: Wiring for a Two Wire S/T

Two Wire Sensor/Transmitter	
C1	Signal minus (**–**)
C2	Not used
C3	Signal plus, +24VDC power

Table 2: Wiring for a Three Wire S/T

Three wire Sensor/Transmitter	
C1	Signal
C2	Ground
C3	+24VDC power

4-20mA Output Signal

The (+ 4/20 -) positions in each channel terminal is the 4-20mA output from the Control. The plus and minus sides of the loop are indicated on the terminal strip. See Figure 3a and Table 3.

3.2.4 Relay Contacts

Auxiliary alarms should be powered from an independent power source separate form the instrument power to avoid alarm failure due to controller malfunction.

MX48 CONTROL relay contacts for the first two alarm levels are on the RL, 1, RL and 2 (reference # 6 – 9) positions of each channel terminal strip, as indicated in Figure 3a and Table 3. There are 3-pin headers located to the right of the channel terminals for setting relays to normally open or normally closed operation. To set relays place jumpers in the position indicated in Figure 3a. These relays have a maximum capacity of 2 Amp at 230 Volts, and are programmed as described in Section 5.

The system alarm relay contacts AL3 are on the power supply board, as shown in Figure 3.

3.2.5 Wiring Requirements

Sensor/Transmitters: Wiring to the Sensor/Transmitters should be by two or three wire shielded cable. The recommended cable is 18 gauge three wire, ***ENMET*** part number 66017-006, Alpha-1747C or equivalent.

Output Loop: Wiring to output loop should be similar two wire shielded cable.

Relay: Relay wiring can be suitable insulated wire.

Table 3: Typical Channel terminal strip connections

Reference: #	Labeled	Connection
1	**C1**	Signal
2	**C2**	Ground
3	**C3**	+24VDC
4	**+**	+4-20mA output
5	**–**	–4-20mA output (Ground)
6	**RL**	Alarm 1 relay
7	**1**	Alarm 1 relay
8	**RL**	Alarm 2 relay
9	**2**	Alarm 2 relay

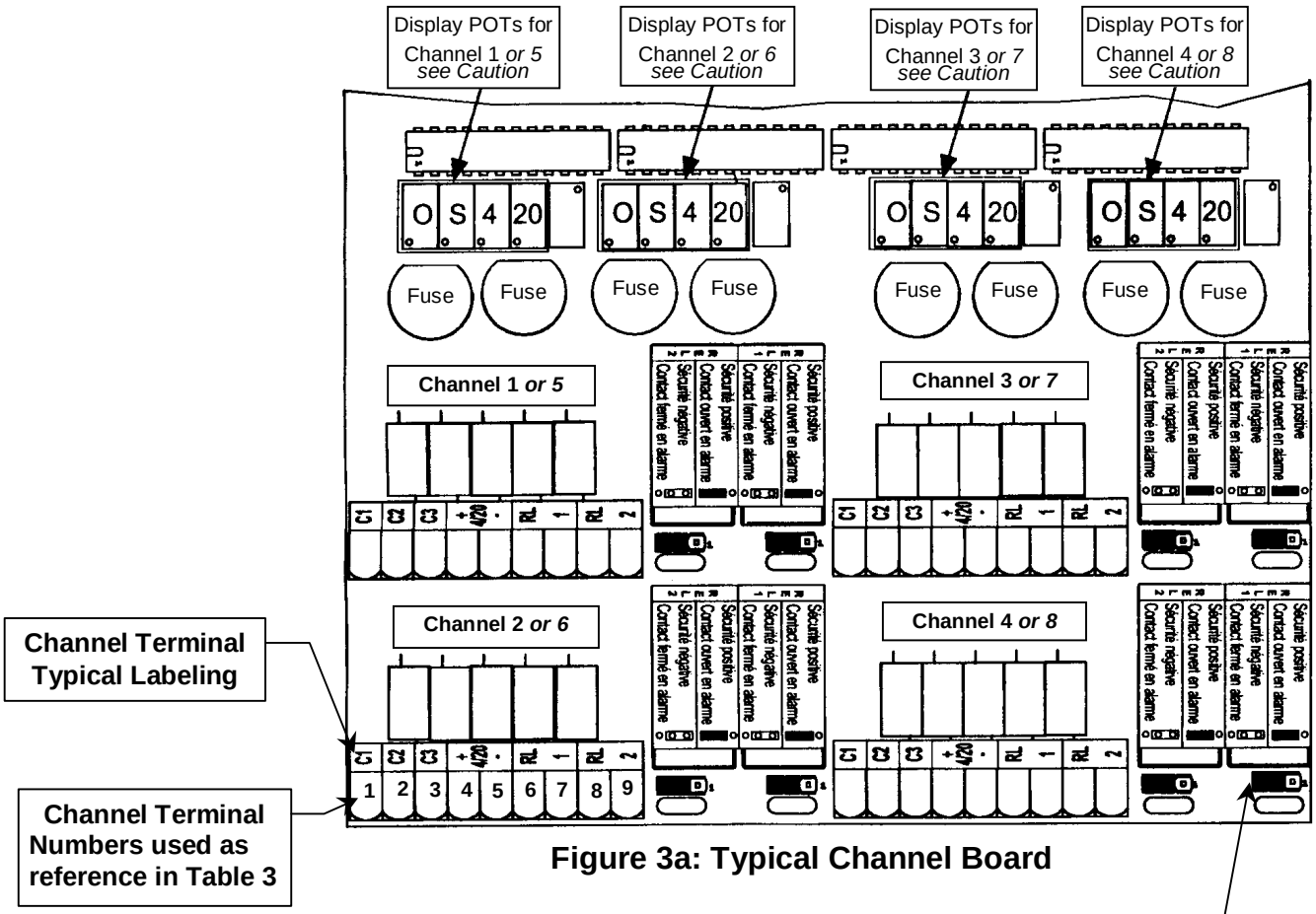


Figure 3a: Typical Channel Board

See Figure 1 for location of Channel Boards within **MX48 CONTROL** enclosure.

For channels 5 through 8 on second Channel Board:

- Channel 1 = Channel 5
- Channel 2 = Channel 6
- Channel 3 = Channel 7
- Channel 4 = Channel 8

Channel Alarm Relays Jumper Positions

[1] Jumper position on pins 1 & 2 for NC contact (factory setting)

[1] Jumper position on pins 2 & 3 for NO contact

Display Potentiometers

Caution: *Each channel display is adjusted at the factory and should not need to be readjusted. Any alignment should be adjusted at the sensor/transmitter. Table 4 provides the function of* ***MX48 CONTROL*** *potentiometers if adjusted by mistake.*

Table 4: Potentiometers per Channel

Left /2	**O =**	Control display ZERO potentiometer
	S =	Control display span potentiometer
Right /2	**4 =**	potentiometer 4 mA / current output
	20 =	potentiometer 20 mA / current output (for full scale)

4.0 Operation

4.1 Checking the Installation

The electrical installation should conform to appropriate electrical codes, such as the National Electrical Code in the United States.

***WARNING*: The compliance of the installation to appropriate codes is not *ENMET*'s responsibility.**

The **MX48 CONTROL** should be powered through circuit breakers provided for this purpose.

2.2 Turning On the Control

CAUTION: The procedures and adjustments described in the following sections must be performed by authorized personal. Failure to follow instructions may jeopardize accurate measurements.

The **MX48 CONTROL** is tuned on by:

- Opening the front cover
- Switching the power ON/OFF switch, located on the power supply board, to the ON position, see Figure 1a.

ENMET Corp MX48/52 V2.0r12

Example: SETUP Display

The **MX48 CONTROL** then goes into the SETUP mode for 1 minute. Hence, for those channels which are active all alarms are disabled and the output currents are 1 mA. The **MX48 CONTROL** also performs a auto-test of its buzzer and all the LEDs. After the minute has elapsed, the active channels go into normal operation and the associated alarms and relays become effective.

At any time, a manual auto-test can be preformed by pressing the ENTER/TEST button on the keypad located on the front panel.

This auto-test lasts 30 seconds and the following displays appear alternately:

ENMET Corp MX48/52 V2.0r12	Then	*** AUTO TEST*** MX48/52 V2.0r12

Example: Alternating Auto-test Displays

The auto-test cycle can be interrupted by pressing the CLEAR button on the keypad located on the front panel.

4.3 Operating Modes

4.3.1 Buzzer:

During normal operation, whenever there is a fault or an alarm, the buzzer is triggered. The buzzer is stopped by pressing the CLEAR button or by clearing remotely. The buzzer emits a continuous sound when an alarm threshold is exceeded.

4.3.2 Light-emitting Diodes (LED)

Each channel has 5 LEDs that are visible and labeled on the FRONT panel. See Figure 4.

Table 5: Front Panel LED Indications

LED	Not Lighted	Lighted	Flashing
Green	Channel not in service	Channel in service	
Upper Red	AL1 not triggered	AL1 threshold exceeded, with automatic cancellation	AL1 threshold exceeded, with manual cancellation, and not cleared
Center Red	AL2 not triggered	AL2 threshold exceeded, with automatic cancellation	AL2 threshold exceeded, with manual cancellation, and not cleared
Lower Red	AL3 not triggered	AL3 threshold exceeded on average or lag, with automatic cancellation	
Yellow	No fault	Channel faulty	▪ Channel being calibrated or programmed ▪ 4-20mA open (disconnected)

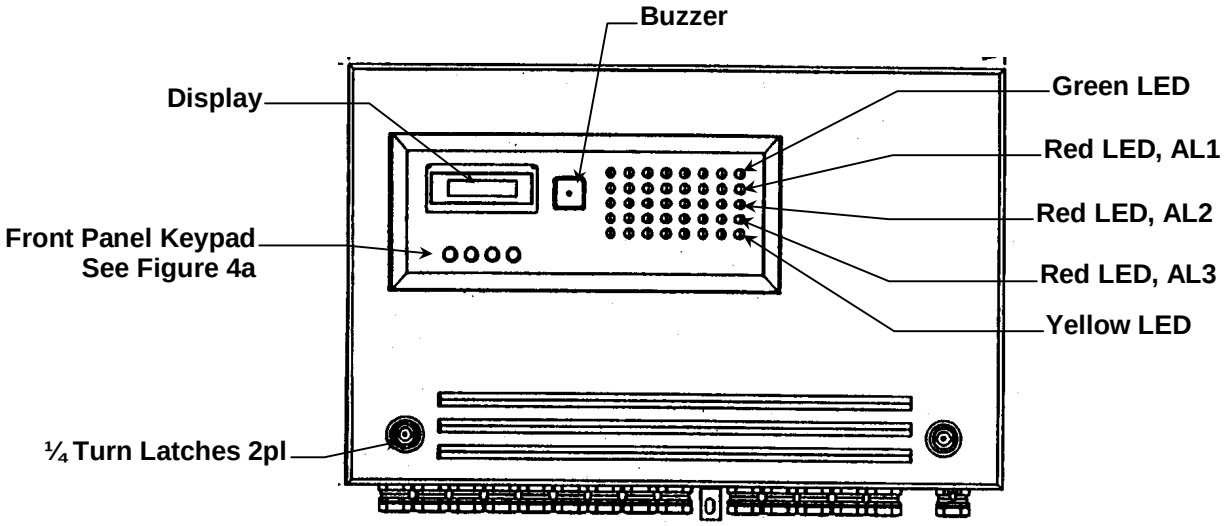


Figure 4: MX48 CONTROL Front Panel

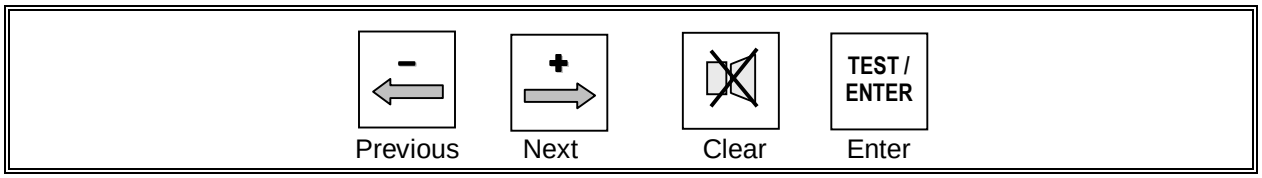


Figure 4a: Front Panel Keypad Buttons

NOTE: In some applications, slight electronic noise between the Sensor/Transmitter and the Control can cause fluctuations in the display reading. These minor fluctuations are considered to be insignificant in terms of the range, detection limit and alarm values of the gas being monitored.

4.3.3 Alarm Thresholds

Each of the 3 alarm thresholds can be programmed independently for each channel (see "Channel programming" menu).

During normal operation a gas alarm is triggered only after a preprogrammed lag time, so as to avoid untimely alarms.

The alarm thresholds can be dealt with in the following ways:

- during a normal cycle with manual cancellation
- during a normal cycle with automatic cancellation
- during a parking cycle

The alarm thresholds are selected based on the detected gases and the corresponding standards in force.

4.3.4 Normal Non-alarm Operation

One minute after turning on and if no test action is performed on the keypad, the control scans all the active channels in succession and displays the values measured.

Example: Normal Operating Display

- Each channel is displayed for 10 seconds.
- A channel can be displayed *manually* by selecting the channel with the + and – buttons. The manual display lasts for 1 minute.
- The Display can return to normal cyclic scanning during this minute, by pressing the + and - buttons simultaneously. The display then indicates, alternately and 3 times in succession:

Example: Normal Operating Display

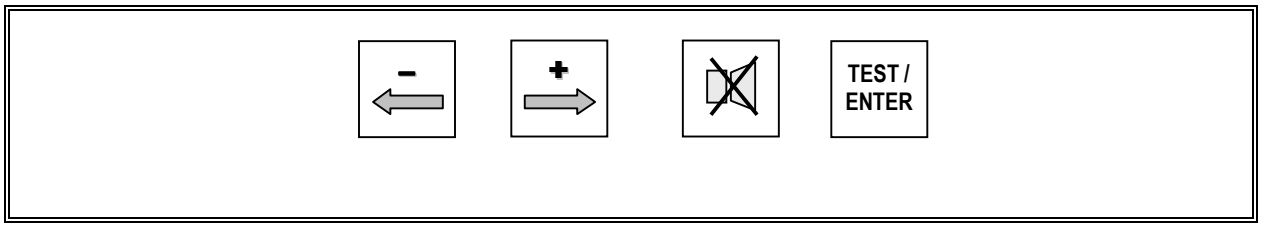
NOTE: In some applications, slight electronic noise between the Sensor/Transmitter and the Control can cause fluctuations in the display reading. These minor fluctuations are considered to be insignificant in terms of the range, detection limit and alarm values of the gas being monitored.

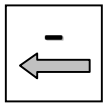
5.0 Programming

Functions of Switches and Menus for Programming and Calibration

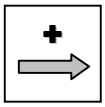
5.1 Front Panel Keypad

The keypad is has four pressure switches (buttons) on the **MX48 CONTROL** FRONT panel.

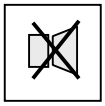




- Manual display of previous channel
- Manual display of previous menu
- Decrease value, threshold, etc.
- Display of previous choice (on ← off, etc.)
- NO
- Combined with the "PLUS" switch to restart the channel's automatic display cycle.



- Manual display of next channel
- Manual display of next menu
- Increase value, threshold, etc.
- Display of next choice (on ← off, etc.)
- YES
- Combined with the "MINUS" switch to restart the channel's automatic display cycle.



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

- Start an auto-test manually
- VALIDATE, Enter

5.2 Maintenance Switches

PROGRAMMING switch: accessible after opening and swiveling the front panel.

- Combined with the "–" switch 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 switch: accessible after opening and swiveling the front panel.

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

See section 5.3.2 for a detailed description of the use for each switch while programming.

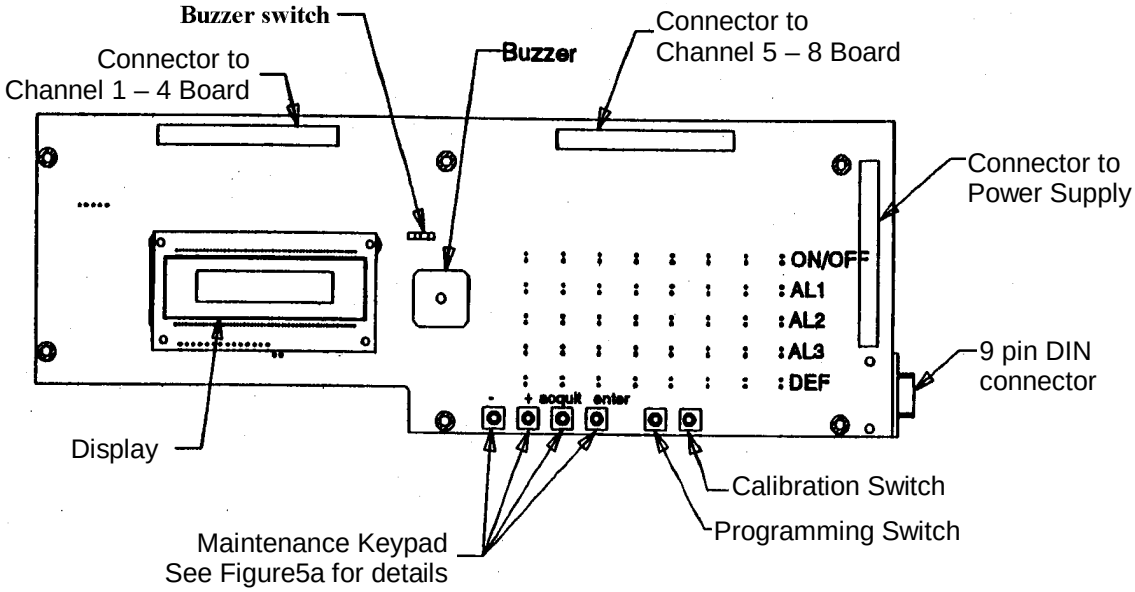


Figure 5: Display Board

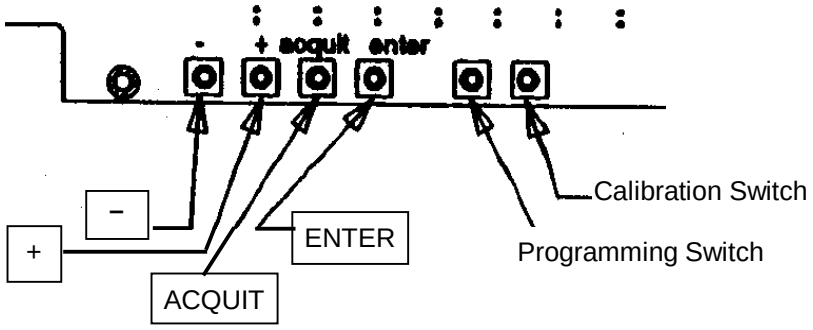


Figure 5a: Maintenance Keypad Switches

5.3 Menus

5.3.1 Menus and their Functions

The **MX48 CONTROL** has five menus that are accessed by pressing the "Programming" switch.

These five menus are as follows:

Table 6: Programming Functions

DESIGNATION	FUNCTION
"CHANNEL" programming	- To program the whole configuration of a 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)
"CONTROL UNIT" programming	- To program the whole configuration of the **MX48 CONTROL** (language, slave number, etc.).
"REPROGRAMMING" programming	- To transfer data, measurements and events, etc., from the unit to a computer via the **MX48 CONTROL** RS 485 / J BUS output.

The block diagrams for each of these menus are shown in section 5.4.

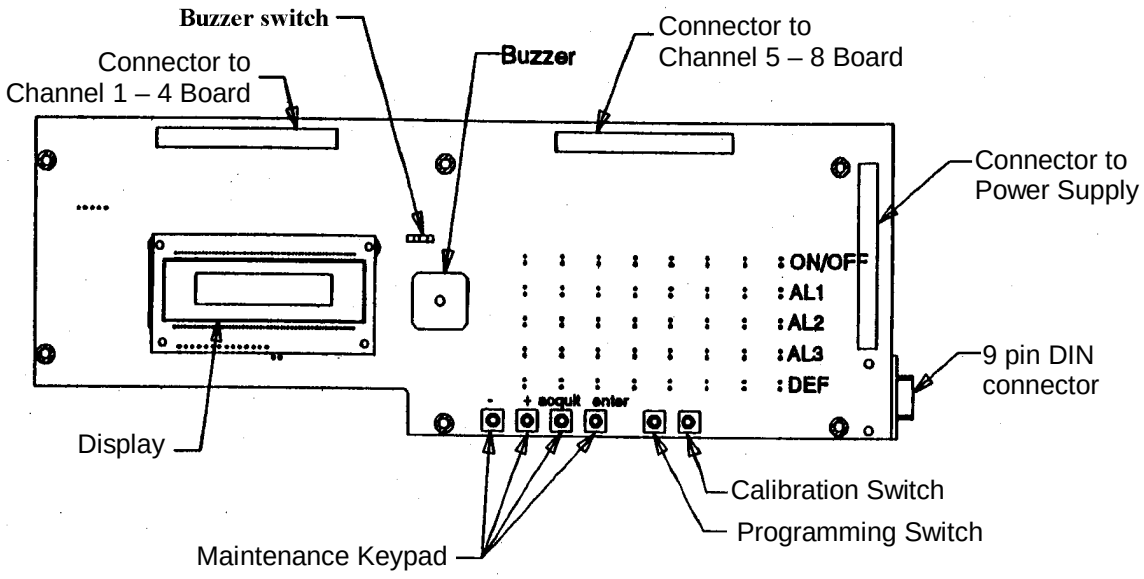


Figure 6: Display Board

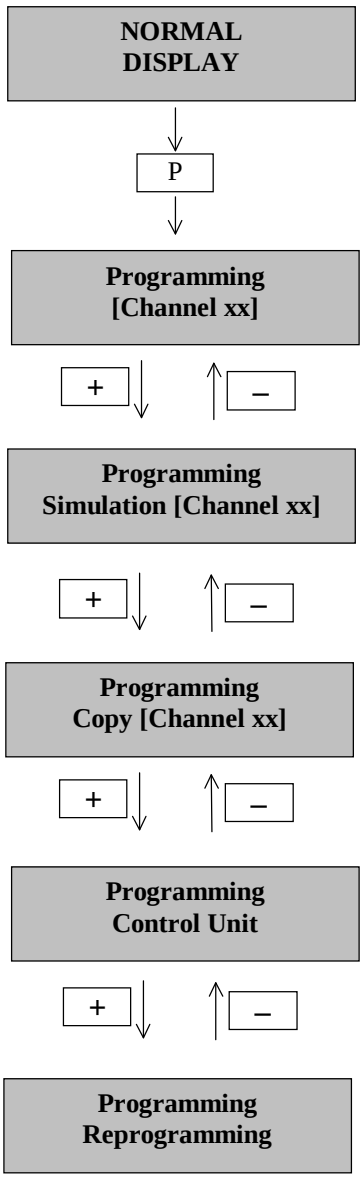
5.3.2 Legend for Block Diagrams of Programming Menus

It is easy to use these various menus by means of the switches on the keypad and the "Programming" switch

Detailed flow diagrams of the menu scrolling function and of each menu are given in the following sections.

P	Programming switch
+	Switch used to move forward
-	Switch used to move in reverse
ENTER	Switch used to enter data
ACQUIT	This switch can also be used to exit from the current menu.
- ↓ P	When in a menu, you can go back (to make checks or modifications, etc...) by pressing and holding down switch [-] and by successively pressing and releasing the Programming switch.
[ ]	Parameters specified in square brackets [ ] are the VALID parameters (in memory).
(1) Free	This means that the relay can be controlled freely in positive or normal safety mode (programming by MX48).
Set to 0 Set to 1	This means that the relay will be controlled, set to 0 or 1, and programmed directly via the J.BUS input and the "COM48" software.

5.4 Bock Diagram of Scrolling Programming Menus



See section 4.3.4

To program the whole configuration of a channel (ON/OFF, range, alarm thresholds, etc...) See section 5.4.1

To artificially vary a channel measurement on:
- the display panel,
- the 4-20 mA current output.

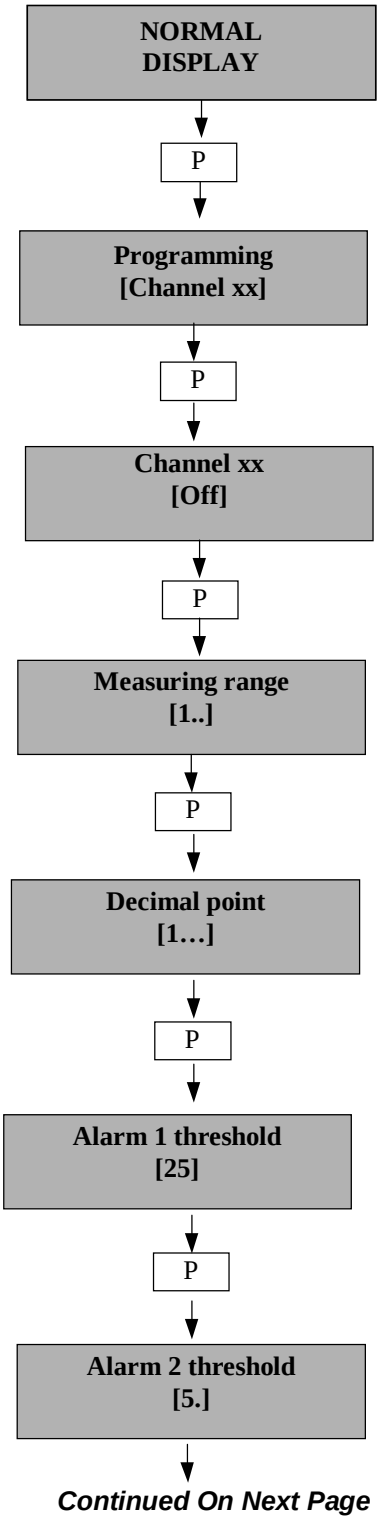
To trigger the alarms (LED and relays) at the same time. See section 5.4.2

To copy the complete programming from one channel to another (time saving) See section 5.4.3

To program the whole configuration of the **MX48 CONTROL** (language, slave number, etc.). See section 5.4.4

To transfer data, measurements and events, etc., from the unit to a computer via the **MX48 CONTROL** RS 485 / J BUS output. See section 5.4.5

5.4.1 Block Diagram of Channel Programming Menu



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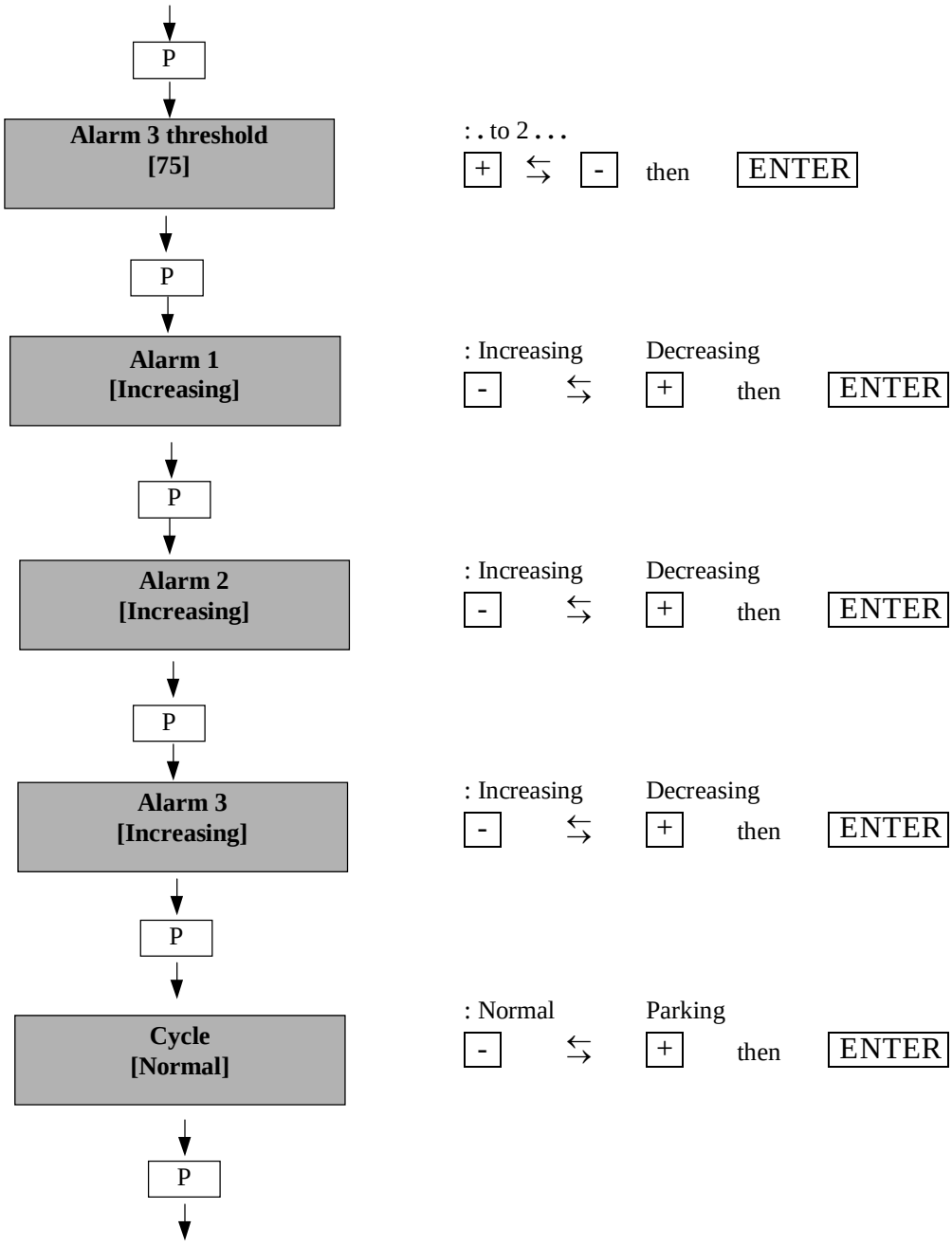

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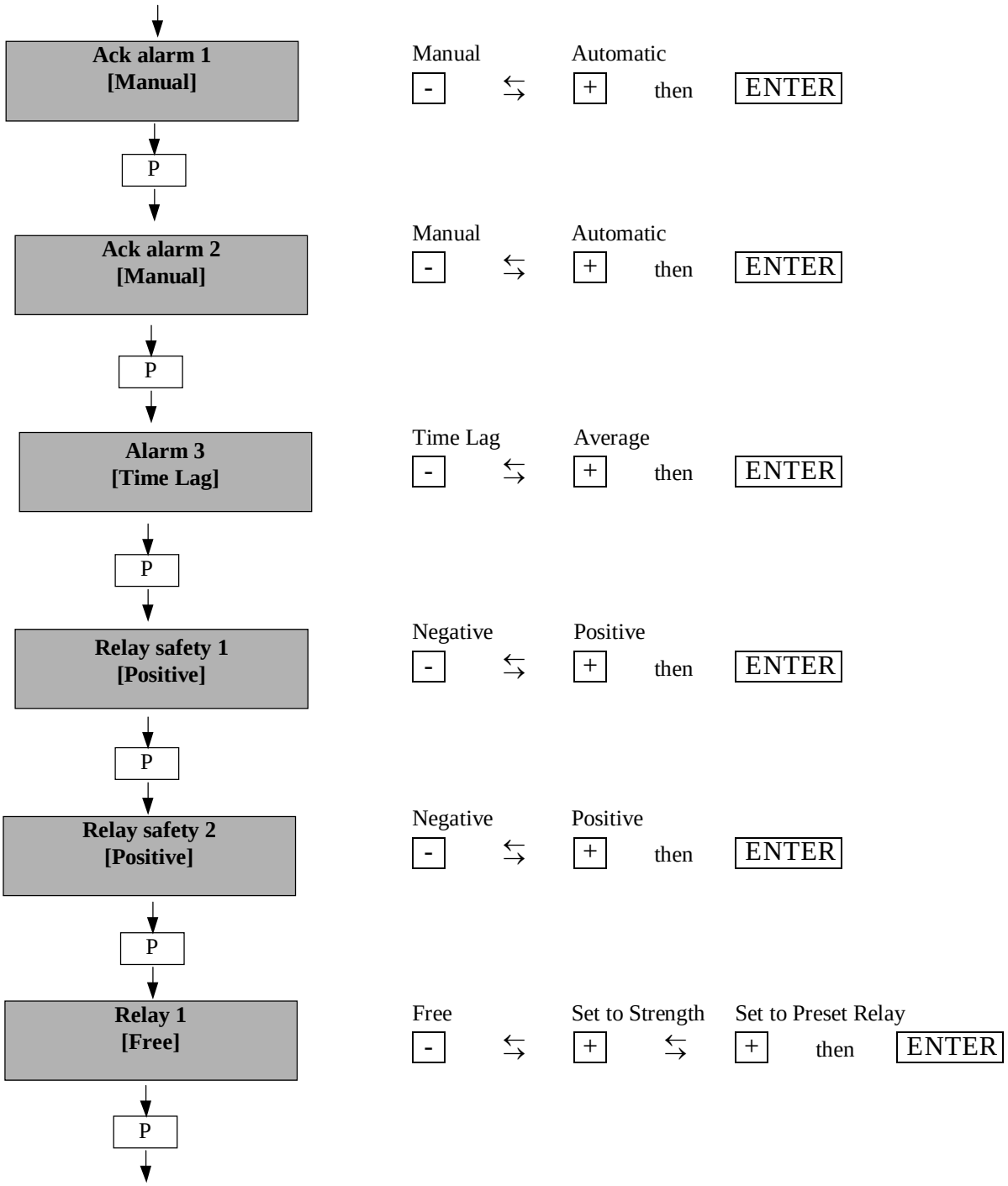

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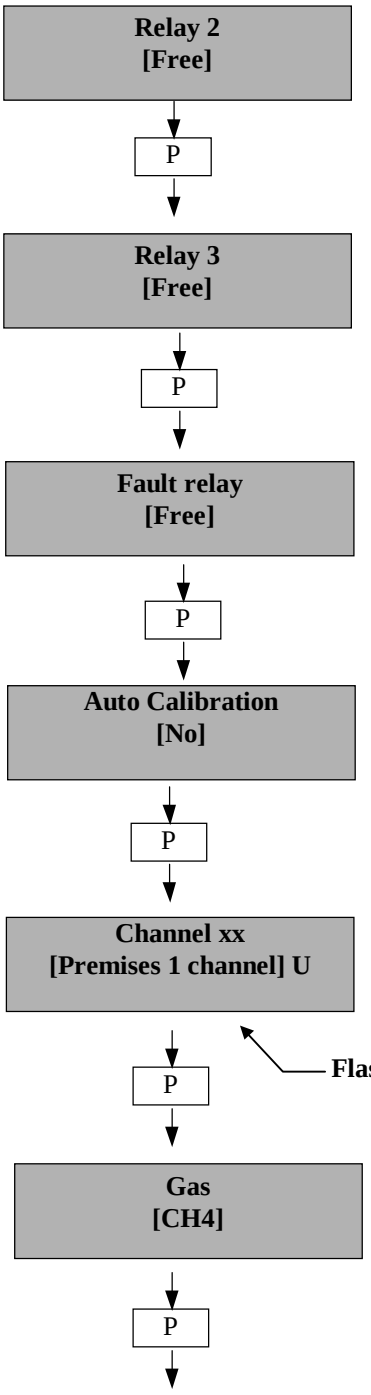

Free Set to Strength Set to Preset Relay

[-] ⇆ [+] ⇆ [+] then [ENTER]

Free Set to Strength Set to Preset Relay

[-] ⇆ [+] ⇆ [+] then [ENTER]

Free Set to Set to 1

[-] ⇆ [+] ⇆ [+] then [ENTER]

The **MX48 CONTROL** can detect and indicate (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]

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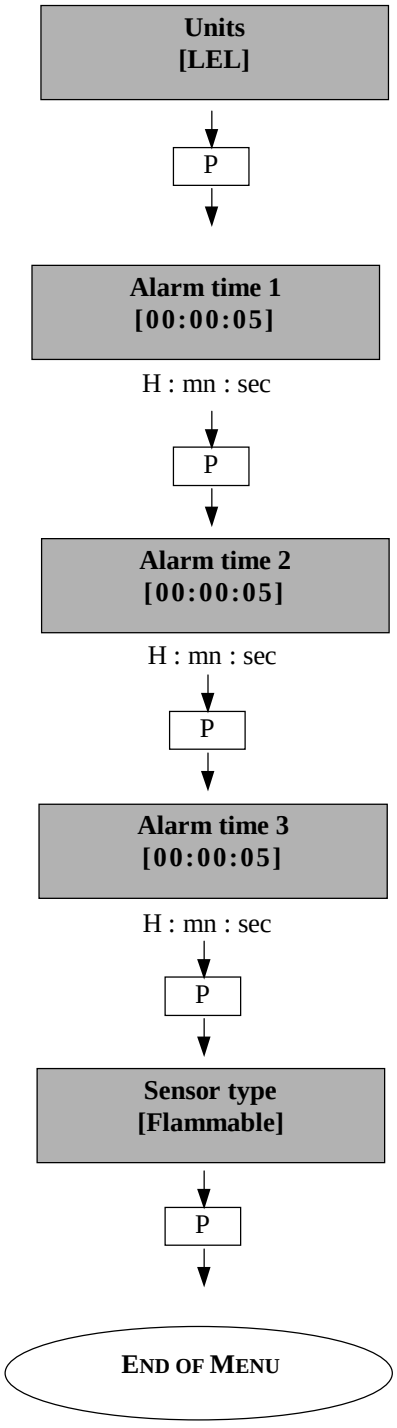


LEL % ppm etc.

[-] ⇆ [+] ⇆ [+] 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]

NOTE: Factory default setting is 5 seconds.

Display of time by using switches

[-] ⇆ [+] then [ENTER]

NOTE: Factory default setting is 5 seconds.

Text

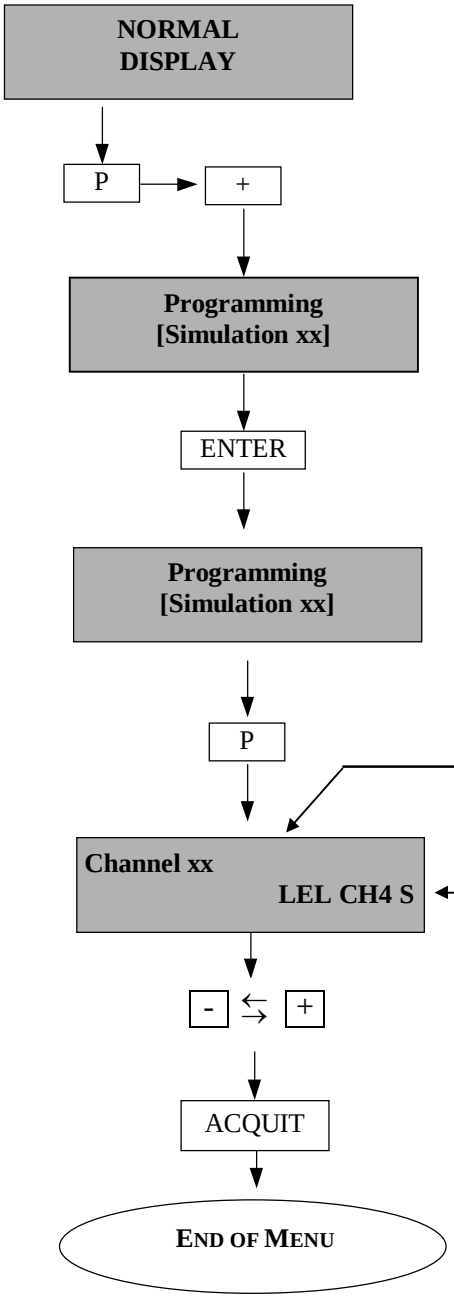
[-] ⇆ [+] then [ENTER]

NOTE: Factory default setting is 5 seconds.

: Flammable Toxic Spec. toxic

[-] ⇆ [+] ⇆ [+] then [ENTER]

5.4.2 Block Diagram of Simulation Programming Menu



Simulation on previously displayed and [validated] channel

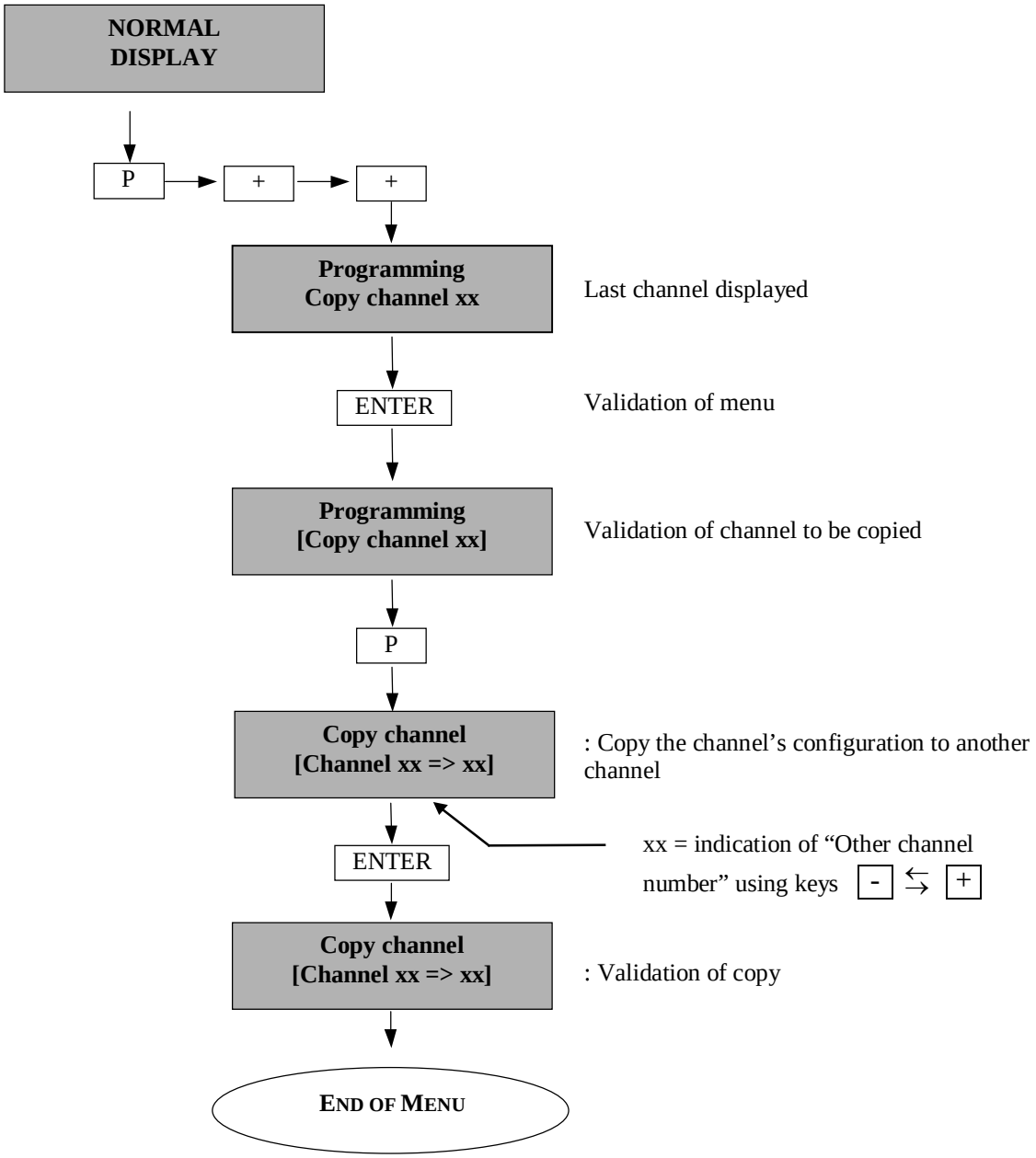
Free labeled area

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

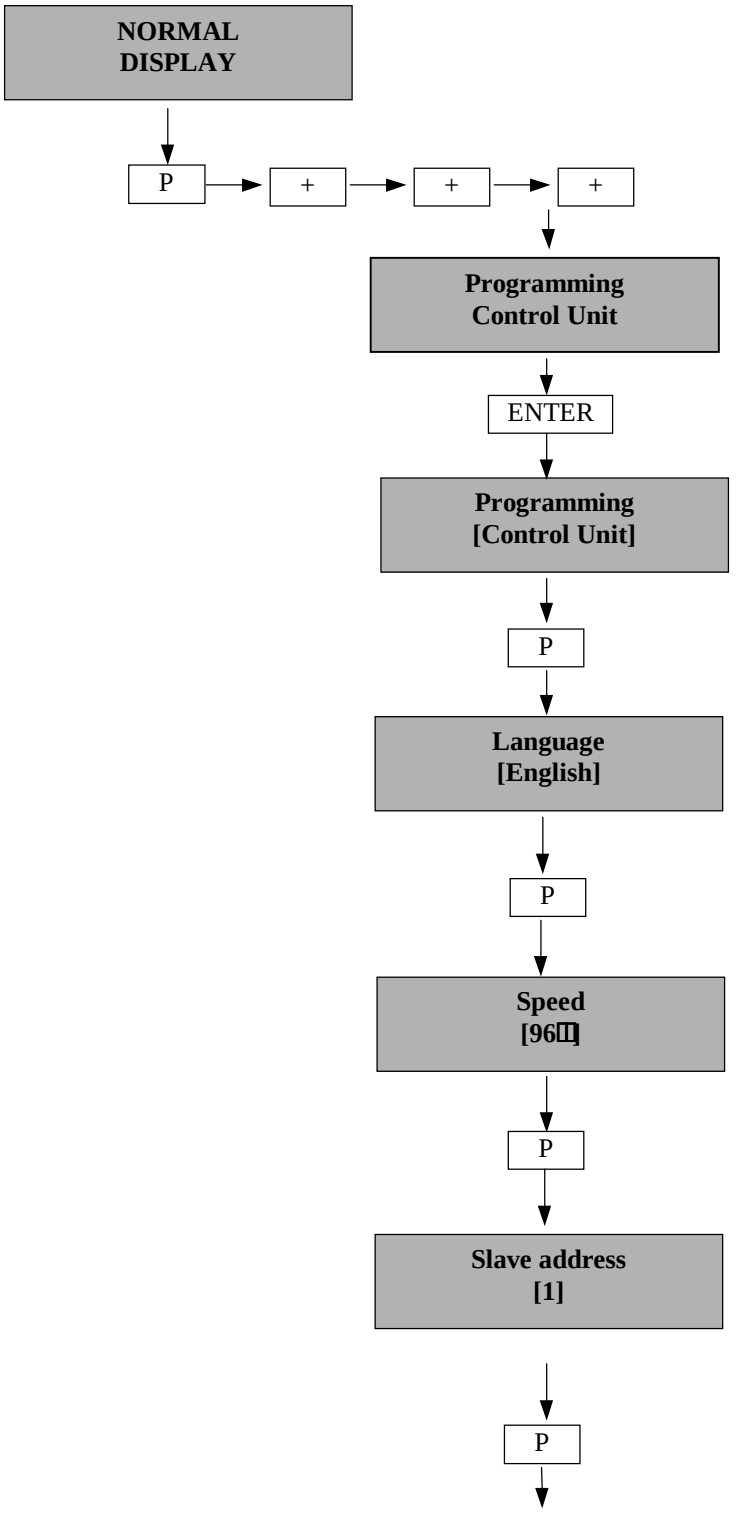
To artificially vary measurement on the display panel, on the 4-20 mA output, and trigger alarms (LED and relays)

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

5.4.3 Block Diagram of Programming Copy Channel



5.4.4 Block Diagram of Programming Control Unit



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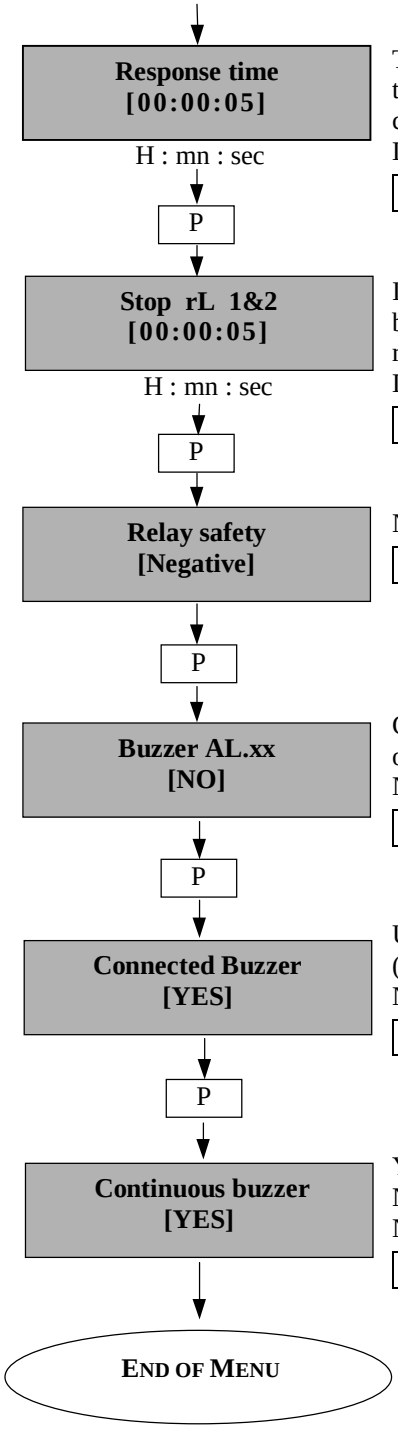


This is the time interval between exceeding of the AL threshold and triggering of the corresponding visual alarm (LED).
Display the time using the switches
[-] ⇆ [+] → then [ENTER]

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

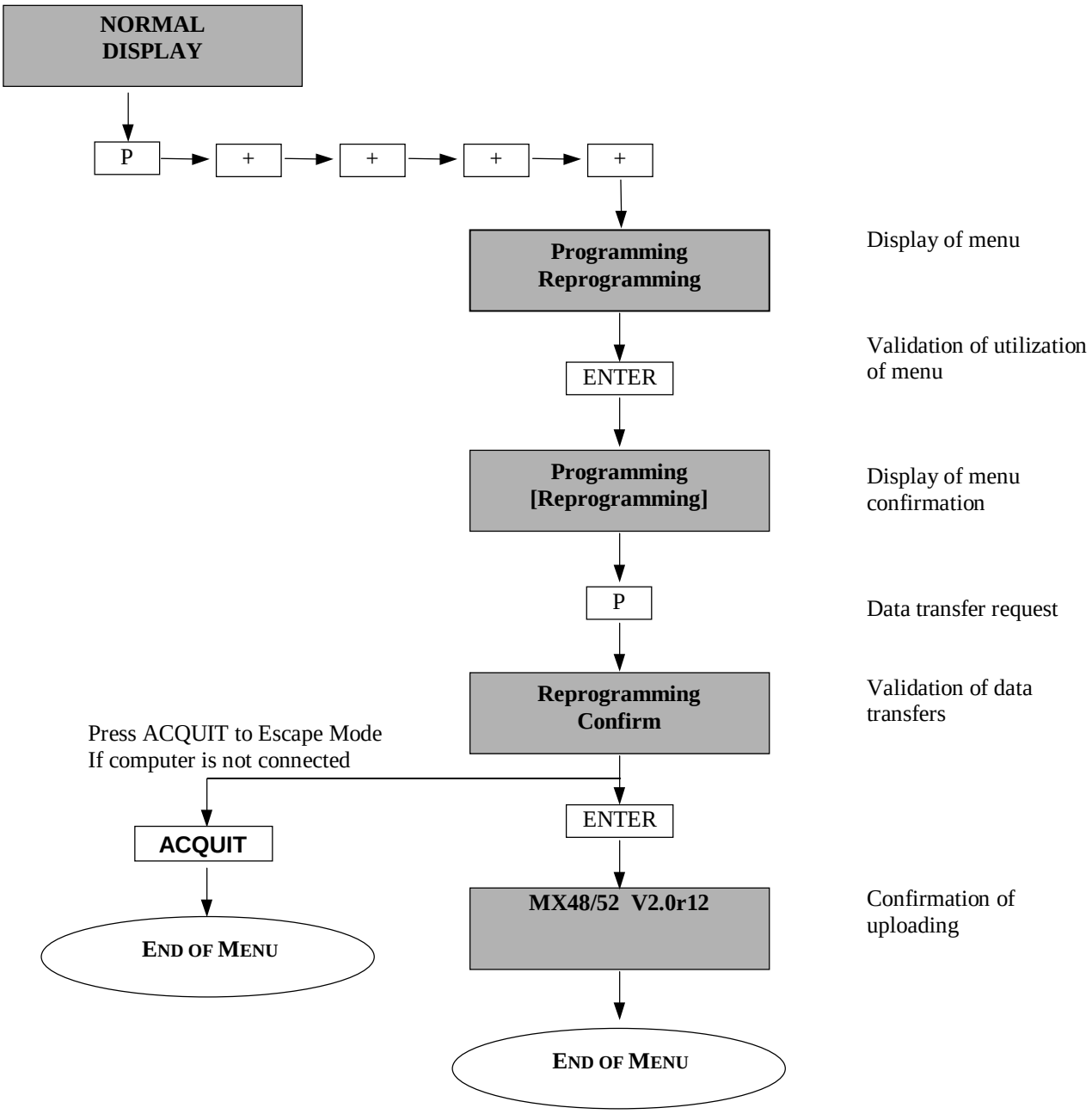
Negative Positive
[-] ⇆ [+] → then [ENTER]

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 = Continuous sound
NO = Discontinuous sound
NO YES
[-] ⇆ [+] → then [ENTER]

5.4.5 Block Diagram of Reprogramming Programming



6.0 WARRANTY

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

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

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

- Be sure to include paperwork.
- A purchase order, return address and telephone number will assist in the expedient repair and return of your unit.
- Include any specific instructions.
- For warranty service, include date of purchase
- If you require an estimate, please contact ***ENMET*** Corporation.

There are Return for Repair Instructions and Form on the last pages of this manual. This Form can be copied or used as needed.

Manual Part Number

80003-048

October 1999
MCN-227, 08/15/00
MCN-286, 12/03/02
MCN-359, 06/15/07

PO Box 979
680 Fairfield Court
Ann Arbor, Michigan 48106-0979
734.761.1270 Fax 734.761.3220

Returning an Instrument for Repair

ENMET instruments may be returned to the factory or any one of our Field Service Centers for regular repair service or calibration. The ***ENMET*** Repair Department and Field Service Centers also perform warranty service work.

When returning an instrument to the factory or service center for service, paperwork must be included which contains the following information:

- A purchase order number or reference number.
- A contact name with return address, telephone and fax numbers
- Specific instructions regarding desired service or description of the problems being encountered.
- Date of original purchase and copy of packing slip or invoice for warranty consideration.
- If a price estimate is required, please note it accordingly *and be sure to include a* ***fax number***.

Providing the above information assists in the expedient repair and return of your unit.

Failure to provide this information can result in processing delays.

ENMET charges a one hour minimum billing for all approved repairs with additional time billed to the closest tenth of an hour. All instruments sent to ***ENMET*** are subject to a minimum evaluation fee, even if returned unrepaired. Unclaimed instruments that ***ENMET*** has received without appropriate paperwork or attempts to advise repair costs that have been unanswered, after a period of 60 days, may be disposed of or returned unrepaired COD with the evaluation fee.

Service centers may have different rates or terms. Be sure to contact them for this information.

Repaired instruments are returned by UPS/FedEx Ground and are <u>not insured</u> unless otherwise specified. If expedited shipping methods or insurance is required, it must be stated in your paperwork.

Note: Warranty of customer installed components.

If a component is purchased and installed in the field, and fails within the warranty term, it can be returned to ***ENMET*** and will be replaced, free of charge, per ***ENMET***'s returned goods procedure.

If the entire instrument is returned to ***ENMET*** Corporation with the defective item installed, the item will be replaced at no cost, but the instrument will be subject to labor charges at half of the standard rate.

Repair Return Form

Mailing Address:
***ENMET* Corporation**
PO Box 979
Ann Arbor, Michigan 48106

Shipping Address:
***ENMET* Corporation**
Attn: Repair Department
680 Fairfield Court
Ann Arbor, Michigan 48108

Phone Number: **734.761.1270**
FAX Number: **734.761.3220**

Your Mailing Address:

_____

_____

_____

_____

Your Shipping Address:

_____

_____

_____

_____

Contact Name: _____ **Your Phone:** _____

Your PO/Reference Number: _____ **Your FAX:** _____

Payment Terms: ❑ ***COD***
(Check one) ❑ ***VISA / MasterCard***_____ _____
Card number Expiration

Return Shipping Method:

❑ UPS: ❑ Ground ❑ 3 Day Select ❑ Next Day Air ❑ ND Air Saver ❑ 2-Day Air

❑ Federal Express: ❑ Ground ❑ Express Saver ❑ P-1 ❑ Standard ❑ 2-Day Air

❑ FedEx Account number: _____

Would you like *ENMET* to insure the return shipment?

❑ No ❑ Yes **Insurance Amount:** $_____