

# Multichannel m o n i t o r - t r a n s m i t t e r **MLM** series

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INSTRUCTION MANUAL

MIU.MLM-3/94.11/E

COD J30-MIU-MLM - ING



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# 1. GENERAL DESCRIPTION

The monitors of the **MLM** series are microprocessor based instruments.

A single **MLM** instrument allows for simultaneous control of up to 8 control channels, each one independent from the others and freely configurable.

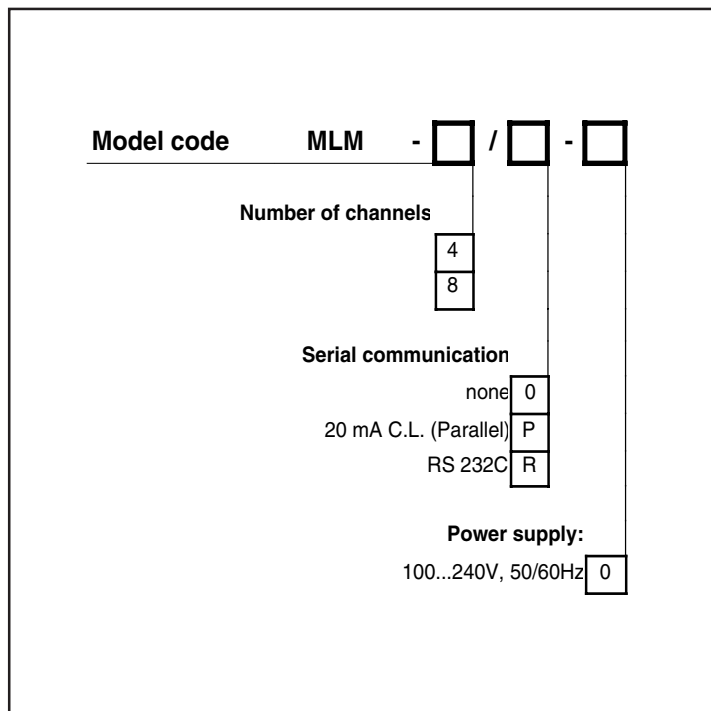
The type of input and alarm modes can be selected and configured for each channel. The possibility of dialoguing with a computer is a motive for increased appreciation in the use of this monitor.

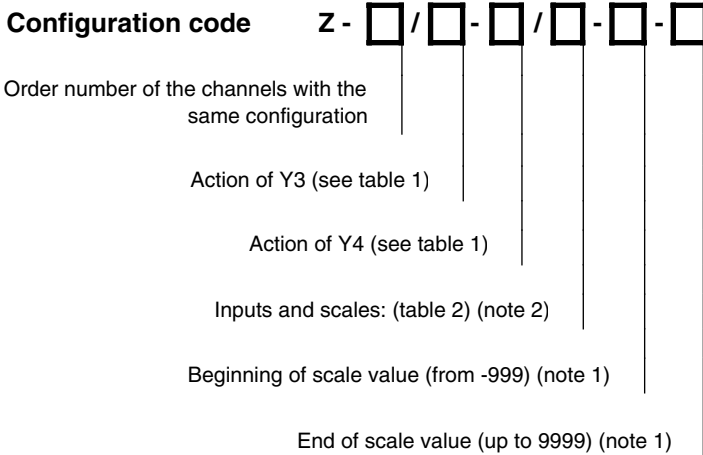
The operating features of this instrument are configurable; the monitor is supplied "configured" according to ordering specifications.

However, it may be reconfigured by following the procedures described in chapter 4.4.

The model and configuration are identifiable from the side plate references.

## 1.1 MODEL REFERENCE





**Note 1)**

The beginning and end of scale value should only be specified for current or voltage input; the difference must be as wide as possible and not less than 100 steps. It is also possible to configure the position of the decimal point on: xxx.x xx.x or x.xxx.

codes MIN 1 (channels from 1 to 4) and MIN2 (channels from 5 to 8). 8 connectors are found on the lower and upper edges of these two cards: (Jumpers have to be inserted in each connector according to the configuration table 4):

**Note 2)**

The input circuit must be adequately preset in relation to the choice of scale:

The eight input circuits (one for every channel) are contained in the two cards of the instrument deeper inside, respectively identified with

- SW1A-SW1B = Channel 1
- SW5A-SW5B = Channel 5
- SW2A-SW2B = Channel 2
- SW6A-SW6B = Channel 6
- SW3A-SW3B = Channel 3
- SW7A-SW7B = Channel 7
- SW4A-SW4B = Channel 4
- SW8A-SW8B = Channel 8

## 1.2 CONFIGURATION TABLES

Table 1  
configuration of alarms

Code	Alarm type
2	minimum (active high)
3	maximum (active low)
9	non active

**Table 2**  
**Standard scale configuration**

Input	Ord. Code	Scale	Conf. code	Jumpers
Thermocouple Fe-Cost (DIN)	F3	0...600° C	0	1B - 8B
Thermocouple K(NiCr-Ni)	K2	0...1200° C	1	5B - 8B
Thermocouple J(Fe-Cost)	J1	0... 600° C	2	1B - 8B
Thermocouple S(Pt10% Rh-Pt)	S2	0...1600° C	3	2B
RTD Pt 100	P27	-99.9...200.0° C	4	1A-2A-4B-7B-8B
RTD Pt 100	P9	-200...600 ° C	5	1A-2A-3B-7B
Linear in current	AX	configur. integral	6	note 1 and 2
Linear in current	AX	configur. 1 decimal	7	
Linear in current	AX	configur. 2 decimal	8	
Linear in current	AX	configur. 3 decimal	9	
Linear in voltage	VX	configur. integral	10	
Linear in voltage	VX	configur. 1 decimal	11	
Linear in voltage	VX	configur. 2 decimal	12	
Linear in voltage	VX	configur. 3 decimal	13	

**Table 3 Position of Jumpers for voltage or current input**

Order code	Input	Jumpers
A4	0...20mA	3A - 3B
A5	4...20mA	3A - 3B
V4	0...200mV	3B
V7	0...1 V	6B
V9	0...10V	3B - 4A

**Note 1**

The software configuration code only selects current input (AX) or voltage input (VX) and the decimal point position. Use table 3 to select the required A/V input.

**Note 2**

Scales are linear with free configuration and the scale beginning and end values (expressed in steps, apart from the position of the decimal point) are only subject to being contained within the interval -999...+9999, and presenting a minimum of 100 steps between beginning and end.

**Table 4**  
**Non standard scale configuration**

Inputs	Order code	Scale	Config. code	Jumpers
Thermocouple R (Pt-Pt13% Rh)	R2	0...1600°C	0	2B
Thermocouple T (Cu-Cost)	T1	-200...300°C	0	1B-5B-7B
Thermoresistor Pt100	P12	0.0...200.0°C	0	1B-2A-5B-8B
Current or voltage	RAX - RVX	Sq.root	0	see table 3

**Note:**

unless otherwise specified, all non-standard scales have configuration code = 0



## 2. INSTALLATION

### 2.1 OVERALL DIMENSIONS AND PANEL CUT-OUT (CONTROLLER)

Instrument designed for fitting in a control panel.

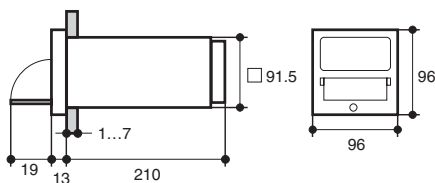
Dust and splashproof front panel.

Acceptable room temperature: 0 to 50° C.

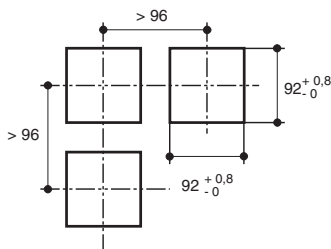
In order to ensure correct operation of the controller, it is advisable to:

- avoid dust, corrosive gases and humidity
- keep away from heat sources
- comply with the recommendations for wiring

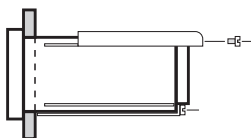
Dimensions (in mm.)



Panel cutout (in mm.)



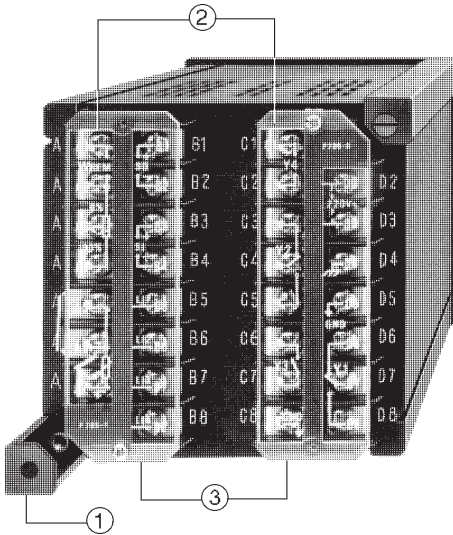
Assembly



The controller is inserted frontwise in the appropriate cutout and held in the relative grooves by means of two stay rods

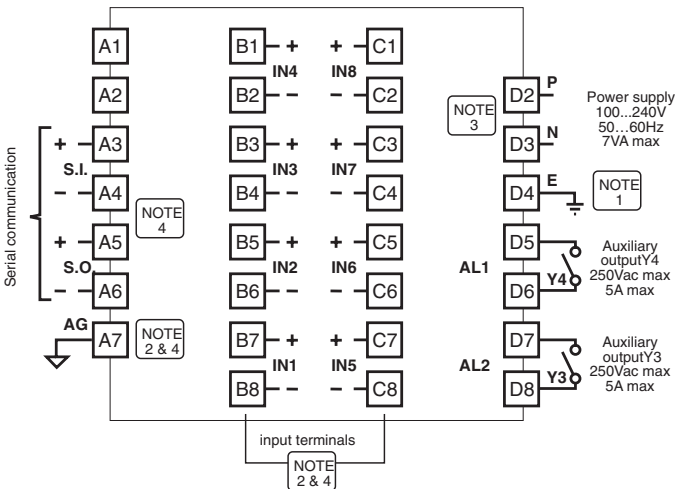
## 2.2 ELECTRICAL CONNECTIONS

View of rear terminal board



- 1 Stay rods
- 2 Two terminal strips for screw (mm. 3.5x6) or faston (6.35) connection
- 3 Transparent protection plates with wiring diagrams

Electrical connections

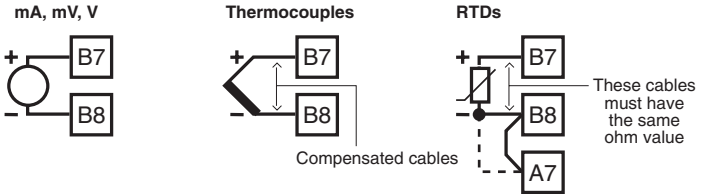


**Note 1**

# Earth (to be connected to a good earth to increase immunity to electrical interferences)

**Note 2**

Input connections (channel 1 connection diagram)



Common A7 to be used for RTD 3-wire connection

**Note 3**

Provide a sectioning device and a fuse protection for the instrument section

- Do not use the instrument supply terminals (D2...D4) to connect other instruments, relays, contactors, solenoid valves etc.
- If there is considerable interference in the supply voltage due to thyristor power units or the presence of motors, supply power to the instrument by means of an isolation transformer with screen connected to earth.
- In the vicinity of HF generators, use suitable network filters (example: Schaffner FN332-1-05).
- If the line voltage is very irregular, supply the instrument with a sinusoidal wave stabilizer.

**Note 4**

Low level connections

- Analogic inputs (terminals B1...C8 - A7)
- Serial communication ports (terminals A3...A6)

**Precautions:**

- **Keep the low level wires physically separated from supply wires, alarm wires and power connections present on the system, such as motor controls, rectifiers, power units...**
- **For connections, use braided and possibly screened cables for low level signals. In this case, the screen should be connected to earth at a single point.**



## 3. TECHNICAL DATA

(The following applies to each one of the eight channels)

### 3.1 INPUT (X)

#### Common features

- Linearization of thermo-elements: 64 segments.
- Differential inputs: they permit applying signals non isolated between them, provided they are contained in a  $\pm 12V$  band as regards terminal A7.
- Safety: failure or short-circuit on the input line is detected and signalled by means of dashes on the display.
- For variations of the power supply within rating limits, the measuring error is irrelevant.

#### Thermocouples

- Internal cold junction compensation
- Line resistance: 150 ohms max.
- Accuracy:  $\pm 0.25\% \pm 1^\circ C$  to  $25^\circ C$  room temperature
- Measurement drift:
  - $\leq 3\mu V/^\circ C$  room temperature drift
  - $\leq 5\mu V/10\Omega$  line resistance drift

#### R.T.D.

- 2 or 3 wire connection
- Line resistance for 3 wire connection:  $20\Omega$  max.
- Measurement accuracy:  $\pm 0.2\%$  at  $25^\circ C$  room temperature
- Measurement drift:
  - $< 0.1^\circ C/10^\circ C$  room temp.
  - $< 0.5^\circ C/10\Omega$  line resistance (3 wires)

#### D.C. current and voltage

- Input resistance:
  - with current input: 10 ohms
  - with voltage input: 12 Mohms
- Accuracy:
  - $\pm 0.2\%$  at  $25^\circ C$  room temperature
- Measurement drift:  $\leq 0.1\%/20^\circ C$  room temp.

#### Square root extraction

- For flow measurement  $Q=k * \text{SQRT}(P)$
- On the input signal (expressed in %), coming from the differential pressure transmitter, the square root is extracted to obtain the measure X in %; the value is:  
 $X = 10 \text{SQRT}(1)$ .
- Square root extraction accuracy:
  - $\leq 2\%$  for  $1 < 1\%$
  - $\leq 0.4\%$  for  $1\% < 1 < 2\%$
  - negligible for  $1 > 2\%$

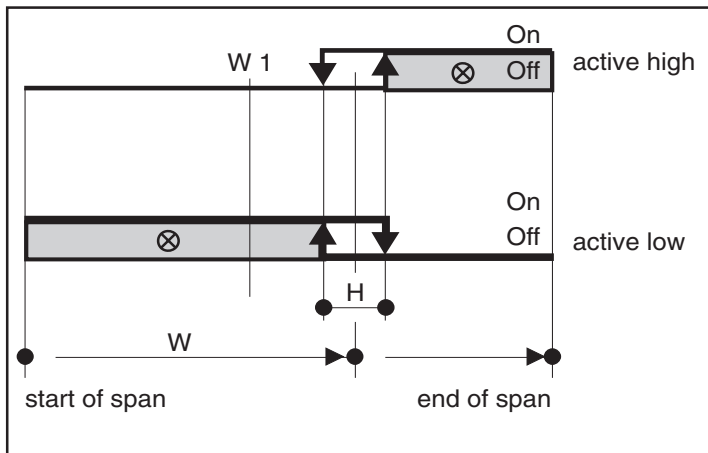
## 3.2 AUXILIARY OUTPUTS Y3, Y4

The two auxiliary outputs (Y3 and Y4) are energized in OR by all the channels.

Two output relays with NO contacts of 5A/250 V ac, free from tension.

**Note:**

*The setting range of the Set points is limited by the scale span.*



**Action**

The operation mode may be configured:

active High or active Low (i.e. relay energized above or below the threshold)

**Common features**

- Hysteresis (H): 0.1 to 10.0% of the scale span

## 3.3 SERIAL COMMUNICATION

- Interface: RS232-C (non-isolated) or 20 mA Current Loop (isolated) with asynchronous and conversational dialogue.
- Message length: 5 characters in transmission and 6 characters in reception
- Character length: 10 bits
- Baud rate: 300, 600, 1200, 2400 or 4800 bit/s
- Parity: even, odd (7 bit ASCII code) or excluded (8 bit ASCII code)
- 2 or 4 wire connection
- Address: every channel is identified by an address character: the code character (hexadecimal) 41(A), 49(I), 51(Q), 59(Y), 61(a), 69(i), 71(q) or 79(y) may be assigned to the first channel as an address; the other channels will assume the characters in sequential order as addresses.

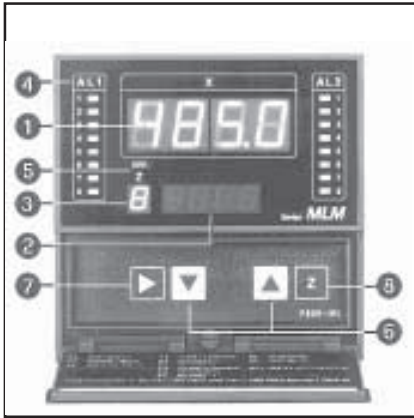
## 3.4 GENERAL DATA

### MLM Monitor

- Power supply: 100...240V 50/60Hz - 250 Vac max consumption 7 VA
- Isolation type: for IEC-348 and group C VDE 0110
- Climatic group: KWF (according to DIN 40040)
- Ambient temperature: 0...50°
- Protection (according to DIN 40050)  
front panel: IP 53  
cover box: IP 20  
self-extinguishing material: 94V1
- Weight: about 1.1 kg
- Dimensions: 96x96x210 mm.



# 4. OPERATING INSTRUCTIONS



## Numerical displays

**1 Four digit display X:** permanently dedicated to process variable (X), expressed in engineering units.

During the programming stage, the parameter values are sequentially displayed.

**2 Four digit display :** it displays the mnemonic code of the parameter



with value showing in display X.


**3 One digit display Z** indicates the sequence number (from 1 to 8) of one of the control channels and precisely the channel to which the indications of displays X and W/Y and led MAN refer.

**4 the leds AL1** (ref output Y4) and **AL2** (ref output Y3), indicate which channels are determining the alarm condition..


**8 The ERR led:** indicates that the instrument is not operating correctly for unwanted data alteration in the memory; the presetting must be accurately verified and the instrument recalibrated.

## KEYS

**6 Keys**  and  : are respectively used to decrease and increase the parameter value with mnemonic code appearing in display

**7 Key**  : allows entering the parameter programming stage and advancing from one parameter to the next.  
Programming is subdivided into three blocks:

parameters  
configuration  
calibration


**8 Key**  : is used to increase the number appearing in display Z which indicates the control channel on which the keyboard oper-


ates and to which the data on displays and the MAN led is referring.

Number 0 may be set between number 8 (8th channel) and number 1 (first channel), allowing for cyclic display of the information on every channel sequentially, for about 2 seconds each, while all the other keys remain disabled.

## 4.1 INTRODUCTION OF THE NUMERICAL VALUES (GENERAL NOTE)

The digit values shown on the displays are modified from the keyboard, with unit steps or gradually increasing steps according to the case.

In the latter case, by pressing key  and keeping it pressed, the figure farthest to the right starts increasing; after 9 it returns to 0 and remains on this figure while the next digit to the left starts to increase, and so on.

Similarly, pressing key  and keeping it pressed, the figure farthest to the right starts decreasing; after 0 it returns to 9 and remains on this digit while the next digit to the left starts decreasing, and so on.

This process starts again every time that the key is released, and pressed again.

The procedure advised is therefore the following:

- Press the adequate key and keep it pressed until the required value of the digit to be modified farthest to the left is obtained; release the key and press it again to obtain the required value of the digit to be modified farthest to the left, and so on, working from left to right, until the required number is obtained.

Example: to modify the value from 1109 to 1368

- increase to 1300
- release
- increase to 1360
- release
- increase to 1368.

The running speed of the figures decrease from the one farthest to the right to the one farthest to the left.

The value of the parameters is memorized and becomes effective upon its disappearance from the display or because the keyboard

is used to pass to another parameter or because (in many cases) the programming stage ends spontaneously about 5 seconds after final release of the keys.

## 4.2 ACCESSIBILITY TO PROGRAMMING, CONFIGURATION AND CALIBRATION

In order to prevent tampering on the part of unauthorized staff and to facilitate maintenance, setting operations and regular plant management, this instrument offers a protection/access system divided into homogeneous groups.

Password: allows parameter access to authorized staff only.

Permitted accesses	P A S S W O R D			
	7777	3333	1111	1000
Programming	YES	YES	YES	see table 6
Configuration	YES	YES	NO	NO
Calibration	YES	NO	NO	NO

In order to facilitate the work of specialized staff, it is possible to exclude the password protection system by removing the jumper "S2" on card "MREG".

### Access table for "PASSWORD 1000"

When the introduced Password is the most restrictive one (1000), the access code defines which moves are permitted and which are not. The code to be introduced is the arithmetic sum of several addends, each one opening a definite possibility. See table 6 (the code is introduced in configuration with index "P E r").

Table 6

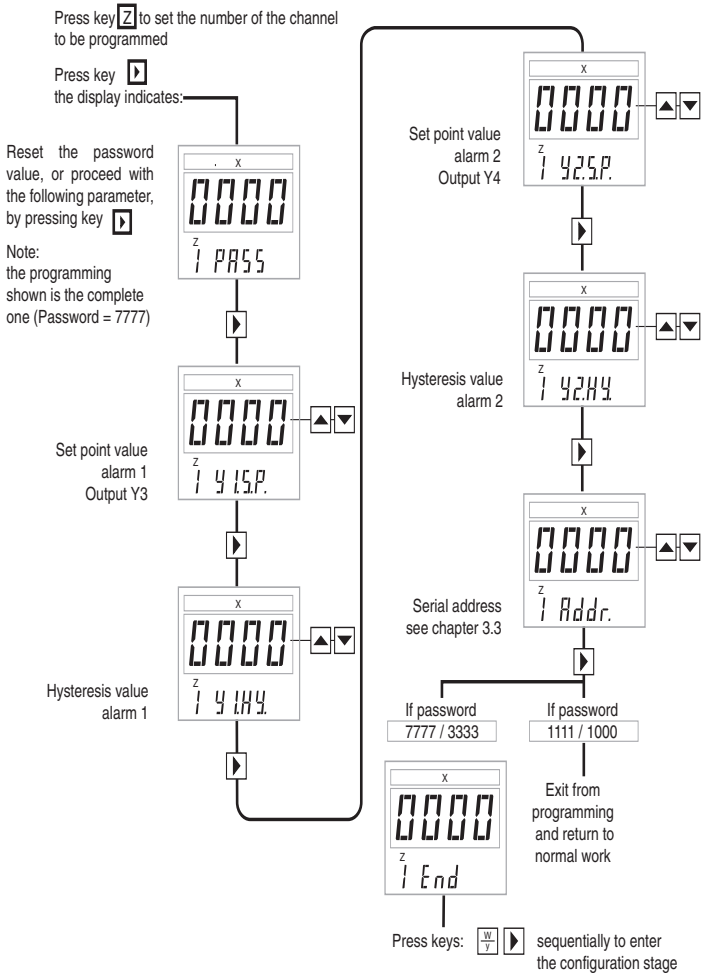
Parameter access		P E r code
mnemonic	operation	
Y1. S.P.	Reading of value Set Point 1 output y3	16
Y1. Hy	Reading of hysteresis value A.P1	
Y2. S.P.	Reading of value Set Point 2 outputs y4	
Y2. Ny	Reading of hysteresis value SP2	
A D D R	Reading of serial address	64
Y1. S.P.	Writing of value SetPoint 1 output Y3	32
Y1. Hy	Writing of hysteresis value S.P1	
Y2. S.P.	Writing of value Set Point 2 outputs Y4	
Y2. Hy	Writing of hysteresis value S.P2	
A D D R	Writing of serial address	128

Example:

Wanting to read but not to write the Set point values and the serial address, the value will be:  $16+64=80$

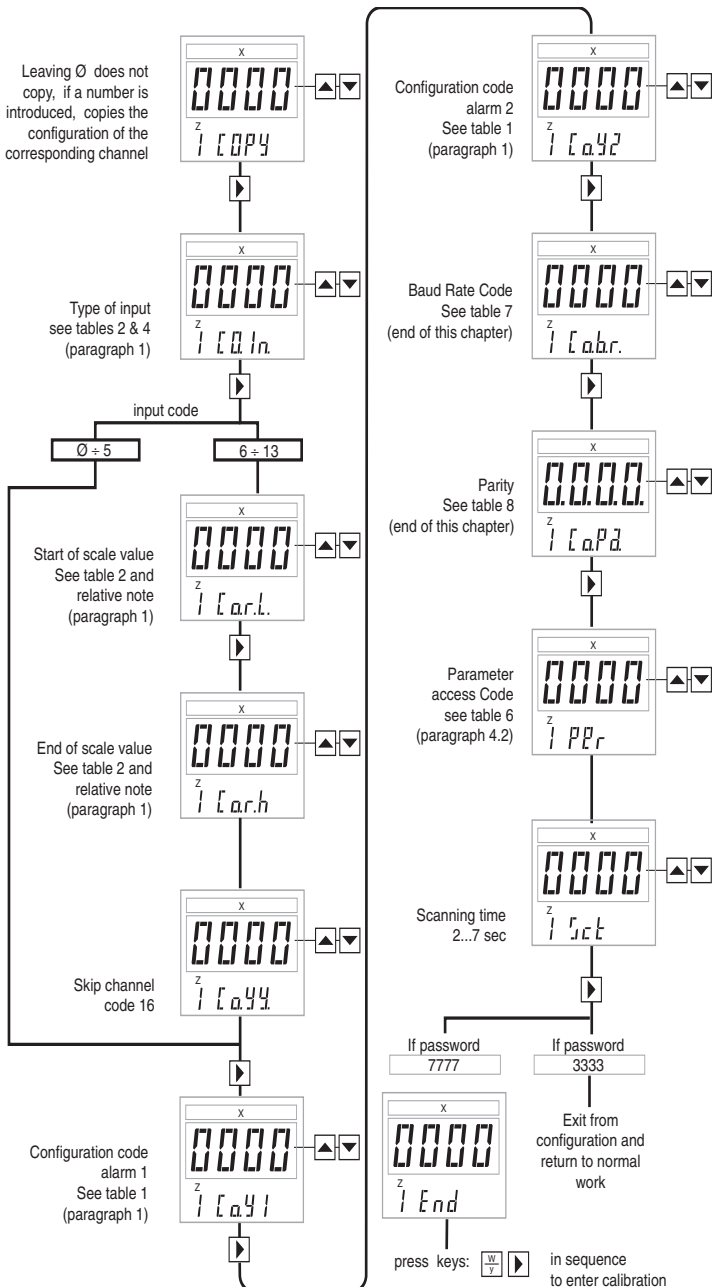
### 4.3 PROGRAMMING OF PARAMETERS

The programming is only valid for the channel with sequential number appearing permanently on display Z; however, some parameters are valid for the whole instrument and may be programmed from any channel or only the first one ( $Z=1$ ), according to operating suitability.



The numerical values introduced are automatically compared with the limits imposed on them by the configuration or other programming stages: the values exceeding these limits are limited before being accepted.

## 4.4 CONFIGURATION

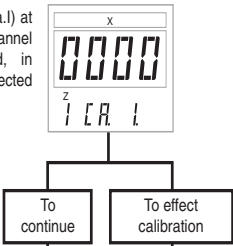


- Access after parameter programming and suitable password (Chapter 4.2)

## 4.5 CALIBRATION

The calibration requires two separate operations:

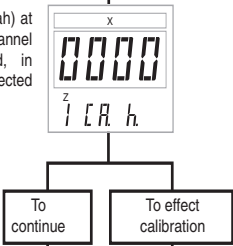
Apply a signal (Ca.I) at the input of the channel to be calibrated, in function of the selected type of input (see table 7)



Reading "X" =  
 $\emptyset \pm 4$  digits

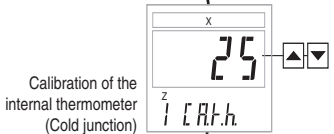
YES NO

Apply a signal (Ca.h) at the input of the channel to be calibrated, in function of the selected type of input. (see table 7)



Reading "X" =  
 $\emptyset \pm 4$  digits

YES NO



Calibration of the internal thermometer (Cold junction)

This calibration is common to all channels and all thermocouples (one calibration is sufficient)

effect calibration

Measure the temperature of input terminals with precision thermometer.

Press the pushbuttons to enter the measured value.

N.B.: the number 25, showing at first, is purely indicative. Therefore, if this value must be entered, increase or decrease in order to read 25 again

To continue

Press key:  $\frac{w}{y}$   
in order to memorize

EXIT

Table 7

VALUES TO BE INTRODUCED		
Scale code	“Ca.l.”	“Ca.h”
F3	- 2,510 mV	36,640 mV
K2	- 1,889 mV	52,399 mV
J1	- 2,431 mV	36,066 mV
S2	- 0,236 mV	17,942 mV
R2	- 0,226 mV	20,215 mV
B1	- 0,291 mV	19,585 mV
E1	- 2,787 mV	76,357 mV
C1	- 6,500 mV	17,920 mV
N1	- 1,900 mV	55,390 mV
T1	- 6,181 mV	17,816 mV
P27	52,110 ohm	183,170 ohm
P9	0,857 ohm	329,510 ohm
P10	52,110 ohm	149,060 ohm
P12	92,160 ohm	183,170 ohm
A4	0,000 mA	20,000 mA
A5	4,000 mA	20,000 mA
V1	0,000 mV	10,000 mV
V7	0,000 V	1,000 V
V9	0,000 V	10,000 V
(R) A4	- 0,160 mA	20,770 mA
(R) A5	3,870 mA	20,610 mA
(R) V9	- 0,080 V	10,380 V

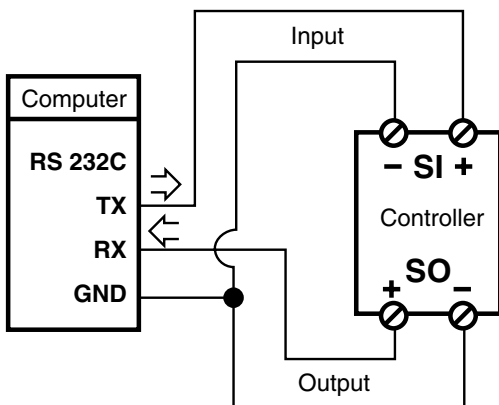
## 5. SERIAL COMMUNICATION

Serial communication allows introducing the **MLM** monitor in a distributed control system. The exchange of data and commands between the instruments and a supervisory unit, whether this is a simple terminal or a processing computer, is simple but effective.

Two “Ports” are available, that is two pairs of terminals known as Serial input (SI) and Serial Output (SO). In the case of a configuration such as 20 mA C.L., serial ports allow access to purely passive interface circuits isolated between them and from the other circuits of the controller.

### 5.1. SERIAL CONNECTIONS

A) The monitor **MLM** - #R# may be directly connected to a serial 3-wire communication line RS232-C.



B) The monitor **MLM** - #P#, together with the AP-ALS traffic concentrator, permit carrying out a data transmission network.

#### ALS Traffic Concentrator

The ALS Traffic Concentrator has been designed for interfacing ASCON Parallel Current Loop (connection of “X”, “Y”, “XE”, “XS” and “ML” series instruments) and/or SC12 (connection for “MS” series) serial lines with interface-to-supervisor standards selected among RS232C, RS422 and RS485. ALS enables connection of 64 instruments distributed along the ASCON lines. An interface-to-supervisor standard can be selected by a set of microswitches when installing. Five readouts on the terminal streep enable checking of proper operation or faulty line.

### 1. Parallel current loop interface

This is the interface implemented on ASCON "X"n "Y", "XE", "XS" and "ML" series instruments. Unlike the Standard Current Loop Interface, it enables disconnection of one more elements without breaking the line. The ALS Adapter enables connection of 64 instruments max with all outputs parallel-connected to terminals 19 (+) and 20 (-) and inputs series-connected to terminals 13...18 in groups of 16 instruments max

### 2. SCI2 interface

This is the interface implemented on ASCON "MS" series controller. The Adapter enables connection of 64 instruments maximum to terminals 9 (+) and 10 (-) through two wires only.

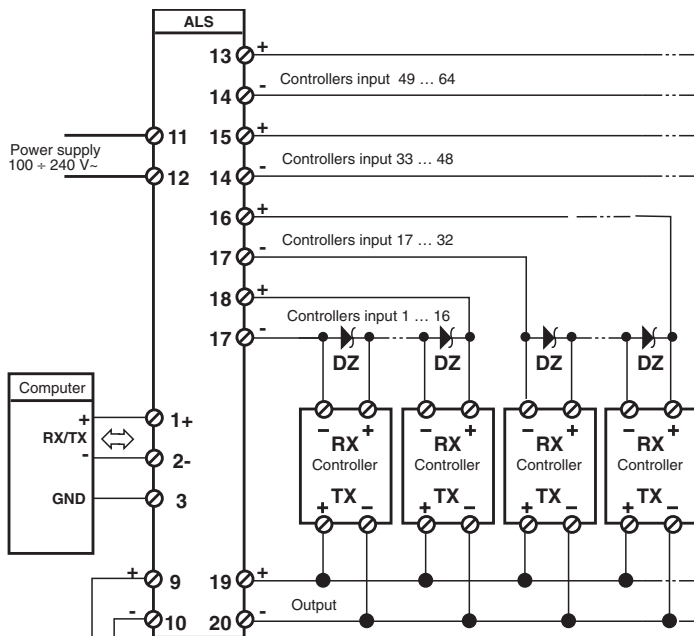
### 3. connection to supervisor

The interface-to-supervisor standard can be selected by a set of incorporated microswitches among:

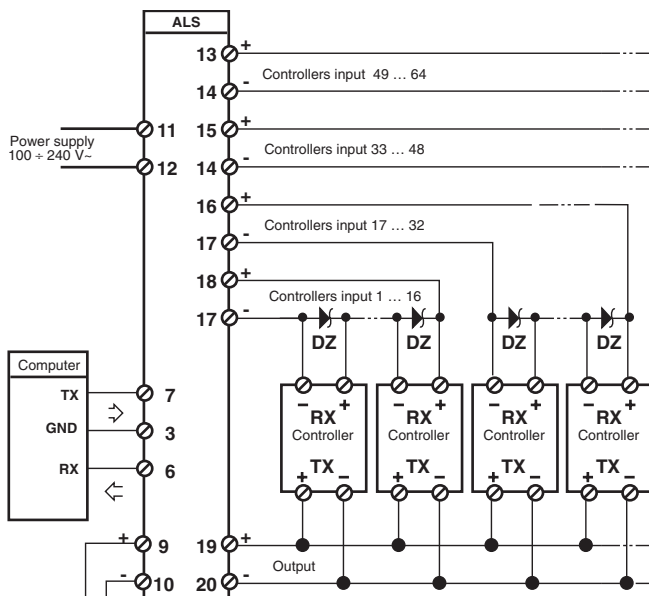
- RS232C
- RS422
- RS485

Also communication rate (not required for RS232C and RS422), line and termination and biasing to rise the noise threshold, can be determined for RS485 through microswitches.

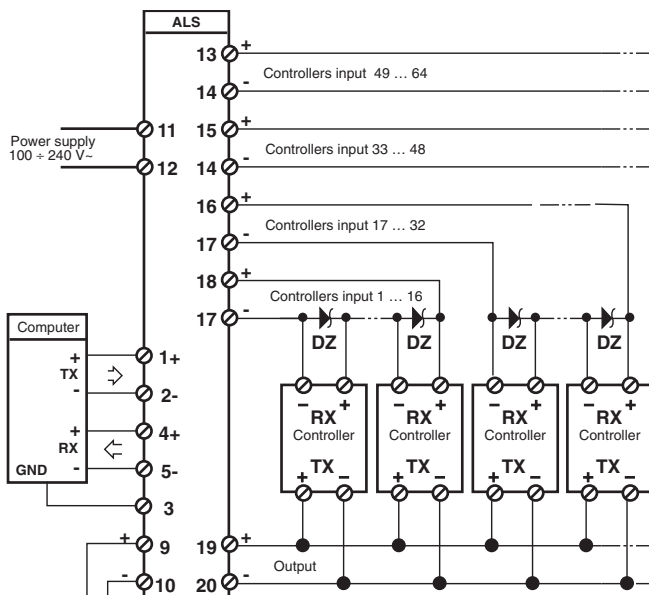
### Connections among ALS interface and Controllers for RS485 serial communication



## Connections among ALS interface and Controllers for RS232-C serial communication



## Connections among ALS interface and Controllers for RS422-A serial communication



### Note:

Every MLM monitor represents one connected monitor, but 8 separate addresses.

## 5.2 COMMUNICATION PROCEDURE

The mode of data exchange is asynchronous and conversational (one character at a time). The signal is of NRZ type and the selectable "Baud Rate" is 300, 600, 1200, 2400 or 4800 bits.

In configuration, the baud-rate is chosen by selecting the index according to table 8.

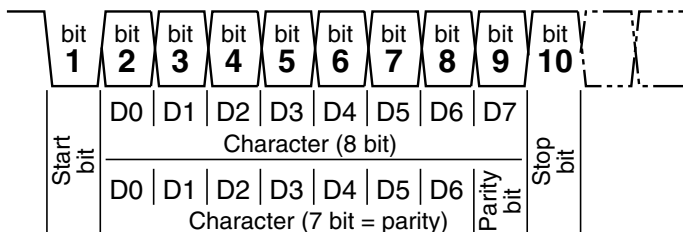
**Table 8**

Index	Baud-Rate
1	300 Bits/s
2	600 Bits/s
3	1200 Bits/s
4	2400 Bits/s
5	4800 Bits/s

Each character requires 10 bits, as follows:

- 1 start bit (Space,0);
- 7 bits representing the character in ASCII code in order from the least significant to the most significant bit.
- 1 parity bit, which may be selected as even, odd, or parity excluded (in which case the bit = 0)
- 1 stop bit (Mark,1).

### Format of the character



In configuration, the format is chosen by selecting the index according to table 9.

**Table 9**

Configuration index	ASCII code	Parity
0	8 bits	none
1	7 bits	odd
2	7 bits	even

Each significant message to a monitor consists in a series of six characters, the first of which corresponds to the address of the instrument to which the message is sent and the last of which is the "Carriage return" character (CR, of hexadecimal code 0D).

Every response message from the monitor called consists in a series of five characters, the last of which is again the "Carriage retrain" (CR); an address character is not included, since a monitor can only send a message as an immediate reply to a message received.

The following tables give a list of the characters and hexadecimal codes corresponding to each of the addresses assignable to a measure channel, the hexadecimal codes of the other characters used in the message and the format of the significant messages used.

**PLEASE NOTE**

*Wait at least 50 mS. after every "carriage return" (CR) before sending a new string.*

**Table 10 ASCII Codes corresponding to the 64 addresses and of some other characters used**

Sr.in.Ad.	Character	Code	Sr.in.Ad.	Character	Code	Sr.in.Ad.	Character	Code
0	A	41	22	W	57	44	m	6D
1	B	42	23	X	58	45	n	6E
2	C	43	24	Y	59	46	o	6F
3	D	44	25	Z	5A	47	p	70
4	E	45	26	[	5B	48	q	71
5	F	46	27	\	5C	49	r	72
6	G	47	28	]	5D	50	s	73
7	H	48	29	^	5E	51	t	74
8	I	49	30	-	5F	52	u	75
9	J	4A	31	'	60	53	v	76
10	K	4B	32	a	61	54	w	77
11	L	4C	33	b	62	55	x	78
12	M	4D	34	c	63	56	y	79
13	N	4E	35	d	64	57	z	7A
14	O	4F	36	e	65	58	{	7B
15	P	50	37	f	66	59		7C
16	Q	51	38	g	67	60	}	7D
17	R	52	39	h	68	61	~	7E
18	S	53	40	i	69	62	DEL	7F
19	T	54	41	j	6A	63	@	40
20	U	55	42	k	6B			
21	V	56	43	l	6C			

**Table 11**  
**Other characters used in the messages**

Description	Character	Code
Space	SP	20
Carr. Return	CR	0D
Less sign	-	2D
Interr. mark	?	3F
Exclam. mark	!	21
Decimal point	.	2E
Asterisk	*	2A
Number	0	30
Number	1	31
Number	2	32
Number	3	33
Number	4	34
Number	5	35
Number	6	36
Number	7	37
Number	8	38
Number	9	39

**Table 12 Format of the messages**

**A) Request**

Operation to be carried out	Computer message						Monitor reply					note
Request measure X value	@	?	X	SP	SP	CR	#	#	#	#	CR	1
Request Set Point value alarm Y1	@	?	S	P	3	CR	#	#	#	#	CR	
Request hysteresis value output Y3	@	?	H	Y	3	CR	#	#	#	#	CR	
Request Set Point value alarms Y2	@	?	S	P	4	CR	#	#	#	#	CR	
Request hysteresis value output Y4	@	?	H	Y	4	CR	#	#	#	#	CR	
Request state of alarms Y3 and Y4	@	?	A	SP	SP	CR	#	#	#	#	CR	2
Request Password	@	?	P	W	D	CR	#	#	#	#	CR	
Identification of model	@	?	M	O	D	CR	M	L	M	SP	CR	
Request input type	@	?	I	N	SP	CR	#	#	#	#	#	
Request start of scale	@	?	R	L	SP	CR	#	#	#	#	#	
Request end of scale	@	?	R	H	SP	CR	#	#	#	#	#	
Request output type Y1	@	?	Y	3	C	CR	#	#	#	#	#	
Request output type Y2	@	?	Y	4	C	CR	#	#	#	#	#	
Request access code	@	?	P	E	R	CR	#	#	#	#	#	

Table 12 continued Format of the messages

**B) Assignments**

Operation to be carried out	Computer message						Monitor reply					note
Set point value alarm 1	@	!	S	P	3	CR						
	@	#	#	#	#	CR	A	K	N	SP	CR	
Set point value alarm 2	@	!	S	P	4	CR						
	@	#	#	#	#	#	A	K	N	SP	CR	
Hysteresis value output Y3	@	!	H	Y	3	CR						
	@	#	#	#	#	CR	A	K	N	SP	CR	
Hysteresis value output Y4	@	!	H	Y	4	CR						
	@	#	#	#	#	CR	A	K	N	SP	CR	
Password	@	!	P	W	D	CR						
	@	#	#	#	#	CR	A	K	N	SP	CR	
Input type	@	!	I	N	SP	CR						
	@	#	#	#	#	CR	A	K	N	SP	CR	
Start of scale value	@	!	R	L	SP	CR						
	@	#	#	#	#	CR	A	K	N	SP	CR	
End of scale value	@	!	R	H	SP	CR						
	@	#	#	#	#	CR	A	K	N	SP	CR	
Output type Y1	@	!	Y	3	C	CR						
	@	#	#	#	#	#	A	K	N	SP	CR	
Output type Y2	@	!	Y	4	C	CR						
	@	#	#	#	#	#	A	K	N	SP	CR	
Access code	@	!	P	E	R	CR						
	@	#	#	#	#	CR	A	K	N	SP	CR	
Scanning time	@	!	S	C	N	CR						
	@	#	#	#	#	CR	A	K	N	SP	CR	

**NOTES**

@ indicates a particular address

SP indicates a new space

#### indicates a number, always 4 characters between -999...9999

1 Request for measure X, in case of positive out-of-scale, the reply is **OVRR(CR)**,  
in case of negative out-of-scale, the reply is **UNDR(CR)**

2 Request for alarm state

0000 none

0001 alarm 1

0002 alarm 2

0003 alarms 1 and 2

## GUARANTEE

The equipment is guaranteed free from manufacturing defects for 1 year after installation, for a maximum of 18 months after delivery.

Faults caused by use other than that described in these operating instructions are excluded from the guarantee.

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