# CMX
# Input Output Multiplexing System

## Technical Manual


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| Manual | **Hardware Installation** |
| Section | 3 |

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# 1 Introduction

## 1.1 Scope of this document

This document describes the Cerberus Dati's CMX Input Output Multiplexing System. CMX is a system, composed by a set of components, that will allow your LMS or CMS system to manage digital I/O signals. Using the CMX you can interface existing old security panels or technological devices. You can collect from them digital inputs (dry contact or open collector signals) and send to them digital outputs (relays or open collector outputs). CMX system is composed by electronic boards and by mounting devices that allow you to install it easily and quickly.
In this manual you will find:

- an overview of the system architecture;
- a description of system components and how to configure them;
- notes about the installation of hardware, using the mounting accessories supplied by Cerberus Dati;
- power requirements and connections, to properly supply the CMX boards;
- information about connections characteristics e.g. cable dimensions and maximum lengths;
- external I/O connections characteristics;
- how to detect malfunctioning and problems during board operations.

## 1.2 Related publications

This manual contains all the information needed to understand the principle of operation and to install CMX. However, if you wish to understand how the CMX is related to other components of the LMS/CMS system architecture the following Cerberus Dati documents could be useful:

- LMS modular Installation Manual e1116
- LMS modular Configuration Manual e1108
- LMS modular User Manual e1109
- CMS Installation Manual CDI-10-003-E
- CMS Configuration Manual CDI-10-006-E
- CMS User Manual CDI-10-005-E
- GW-00 Technical Manual e1114
- GW-01 Technical Manual e1112

# 2 System description

The CMX systems is composed of

- active components
  electronic boards CMX-24I, CMX-24O, CMX-16/8
  communication interface IC-2
  relay output CMX-RB
- passive components
  accessories for board mounting: CMX-SB, CMX-MB, CMX-RM, CMX-BP

The network architecture that follows apply only to the active components; both active and passive components will be described in the following paragraphs, from 2.2 to 2.9.
The CMX in the LMS/CMS network architecture is at the same level as CZ10 or CZ12 control panels. It interacts directly with the field devices and transmits upward the messages using a high-level protocol.
Like CZ10 and CZ12, the CMX communicates with LMS/CMS through the gateway, a dedicated piece of hardware manufactured by Cerberus Dati that manages the communications to and from the control panels and the computer-based supervising system (LMS or CMS) (see Fig. 2.1)
The CMX system architecture is different than those of CZ10 or CZ12. The CZxx panels can be connected to the gateway only in a point-to-point configuration: CMX can be connected in a multidrop configuration.
The Gateway communicates using a 3-wire RS-232 serial protocol. The CMX communicate using a 2-wire RS485 serial protocol, that allows longer distances without modems.
The IC-2 communication interface is the first device that constitutes any CMX network. It is connected on one side to the Gateway GW-00 Subsystem Pad or to the GW-01 asynchronous board and on the other side it communicates with the CMX boards. Due to RS-232 limitations, the IC-2 is usually located near the Gateway; you will find detailed information about cables and connectors in Section 3.2.
The CMX are connected to the IC-2 in a multidrop configuration: on each line (i.e. to each IC-2) up to 16 CMXs can be linked. The connection among the CMX in the multidrop configuration guarantees the electrical continuity even if one of the CMX stops operating. No line breakdown can occur in most cases of CMX board failure.
The maximum distance between the IC-2 and a CMX board is up to 1200 meters at 9600 baud. The boards can be powered using different power supply units, located near them.
To CMX-24O can be connected up to 3 CMX-RB relay output boards and to CMX-16/8 up to 1 CMX-RB can be connected. The connection is implemented using a flat cable supplied with CMX-RB.

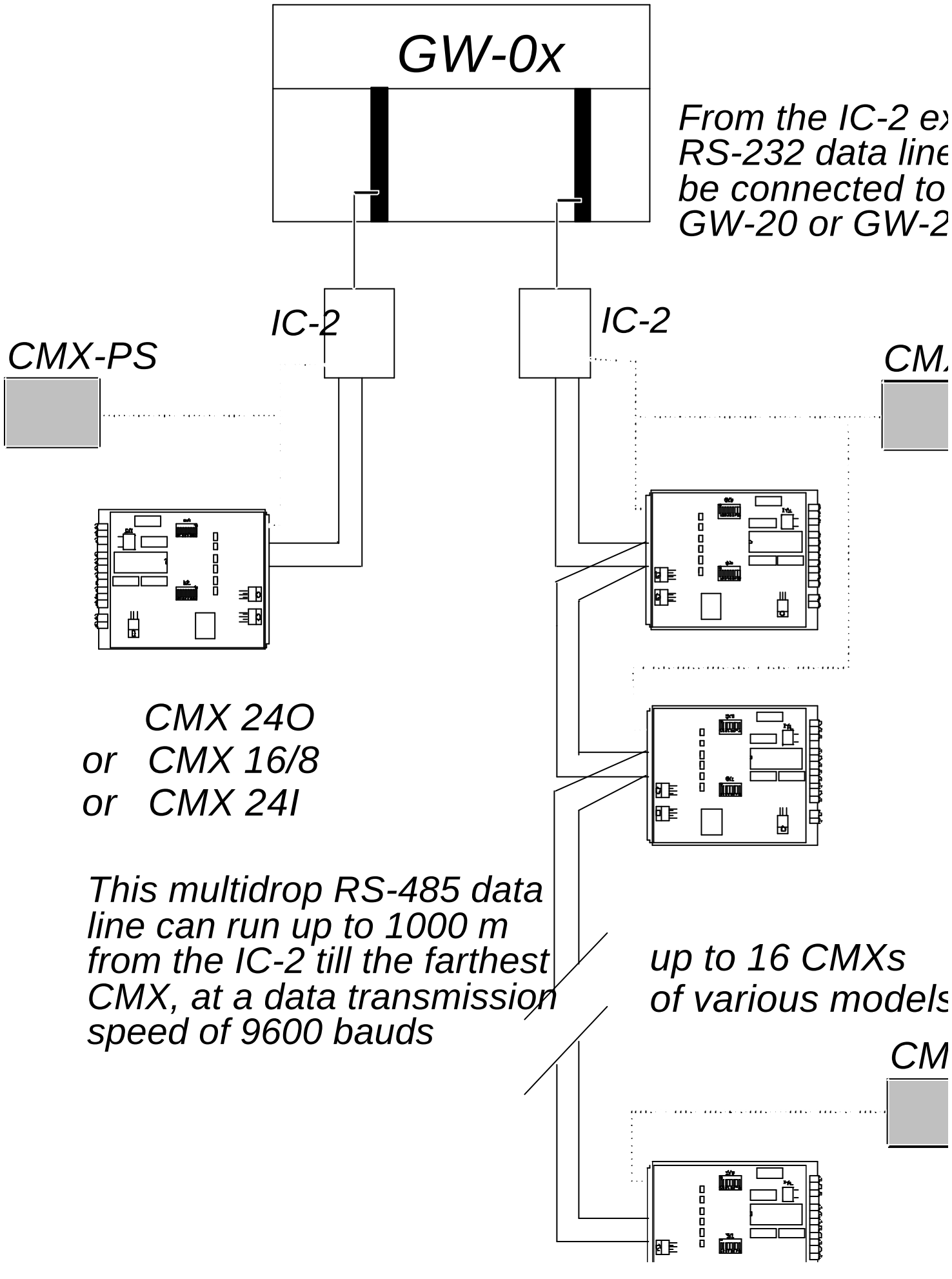

GW-0x
From the IC-2 ex
RS-232 data line
be connected to
GW-20 or GW-2
IC-2
IC-2
CMX-PS
CM
CMX 24O
or CMX 16/8
or CMX 24I
This multidrop RS-485 data line can run up to 1000 m from the IC-2 till the farthest CMX, at a data transmission speed of 9600 bauds
up to 16 CMXs of various models
CM

Fig. 2.1

# 3 The IC-2 Communication interface

The IC-2 appears as a small plastic box that contains the electronics. A green LED on the front panel is lighted when the power is on.
The box can be opened exerting pulling the upper side from the lower side; there are no blocking screws.

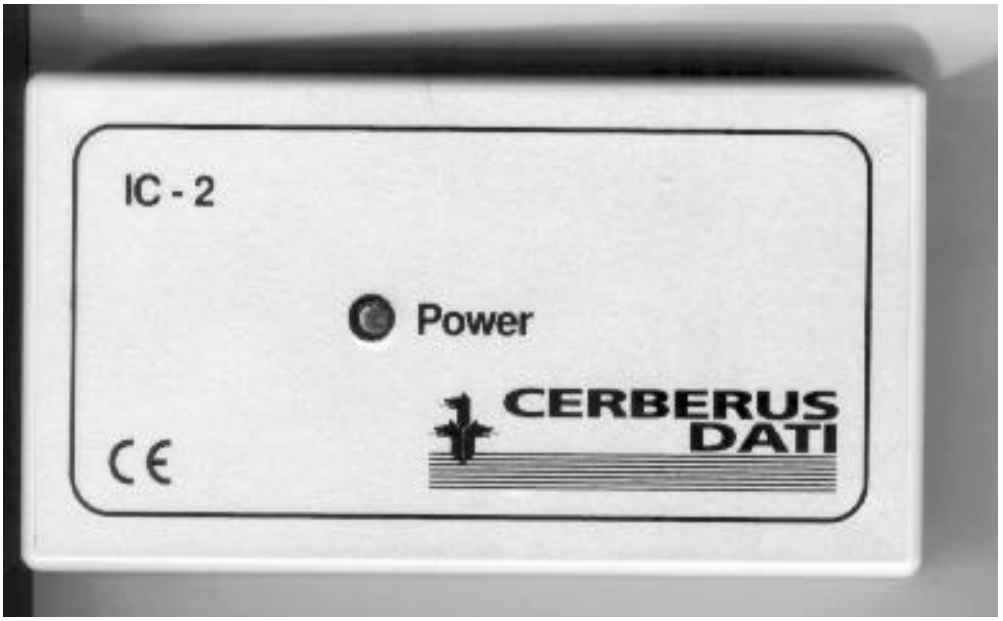



Fig. 3.1

Inside, the printed circuit board is marked CD95204/B; the only features relevant to the installer are the connector's block and the jumpers (see Fig. 3.2).
The following connections are provided:

- RS485 communication line (towards CMX,Westinghouse 422)
- IC-2 power supply
- RS232 communication line (towards Gateway)

The jumpers let you set:

- Baud rate: jumpers A, B, C, D, E, F - refer to Table 3.1.

The RS-232 communication line toward the gateway is a 3-wire connection.

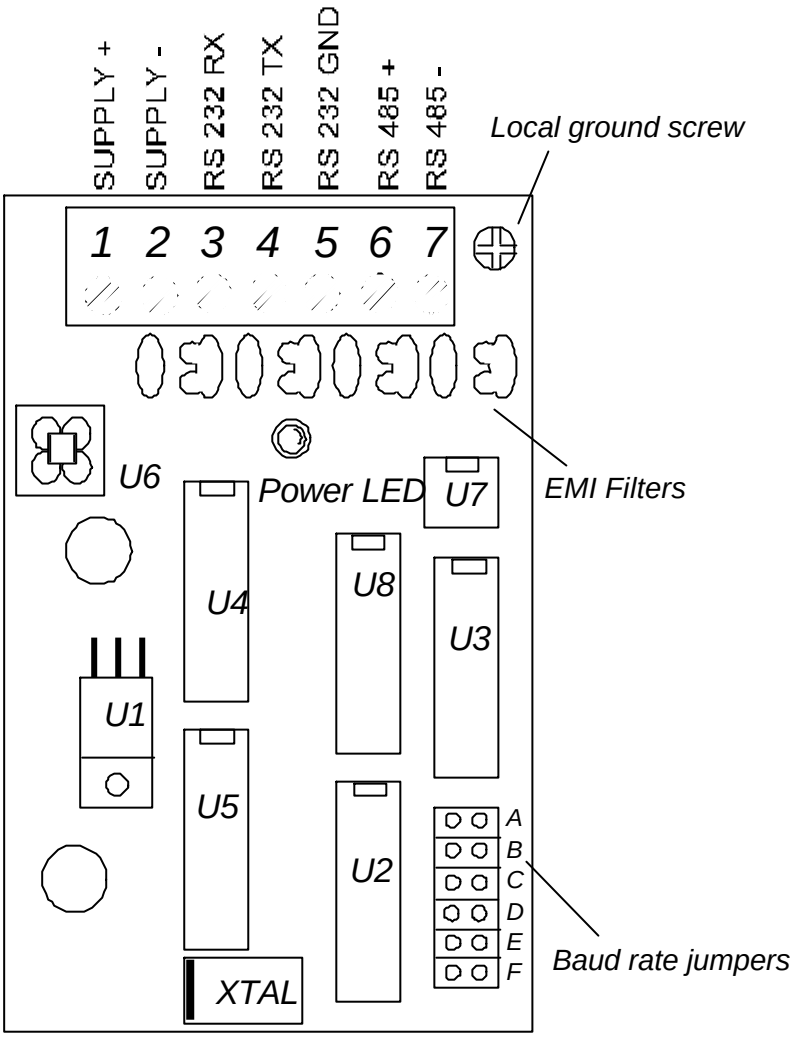



Fig. 3.2

| BAUD RATE | Jumper |
|---|---|
| 300 | A |
| 600 | B |
| 1200 | C |
| 2400 | D |
| 4800 | E |
| 9600 | F |

Table 3.1 - IC-2 baud rate settings

The baud rate set on the IC-2 must be the same set on the CMX and on the Gateway's Subsystem Pad. Should they be different, the **system will not operate**.

# 4 The CMX-24I board

The CMX-24I is the CMX board with 24 inputs and no outputs. The CMX-24I is composed of a CPU board (marked CD91201) and an I/O board (marked CD91200), connected together (see Fig. 4.1) for board layout and assembly). The important features to be detected on the CPU board are:

- the reset pushbutton
- the switch block marked SW1
- the switch block marked SW2

Although the CPU board layout is the same for all the CMX models, the boards are configured and operate differently in the three CMX models. The CPU board contains all the hardware and software needed for communications and interfacing. You can easily recognize the big CPU chip, and next to it the quartz crystal (XTAL) in its metal case. If you look at the board with the CPU chip at right, you can detect at the right of the quartz a small black pushbutton. This is the reset pushbutton, that starts the CMX diagnostics routines and reset the field status. This pushbutton has to pressed only when the CMX needs a full restart. When it is pressed, the status of all inputs is re-read.

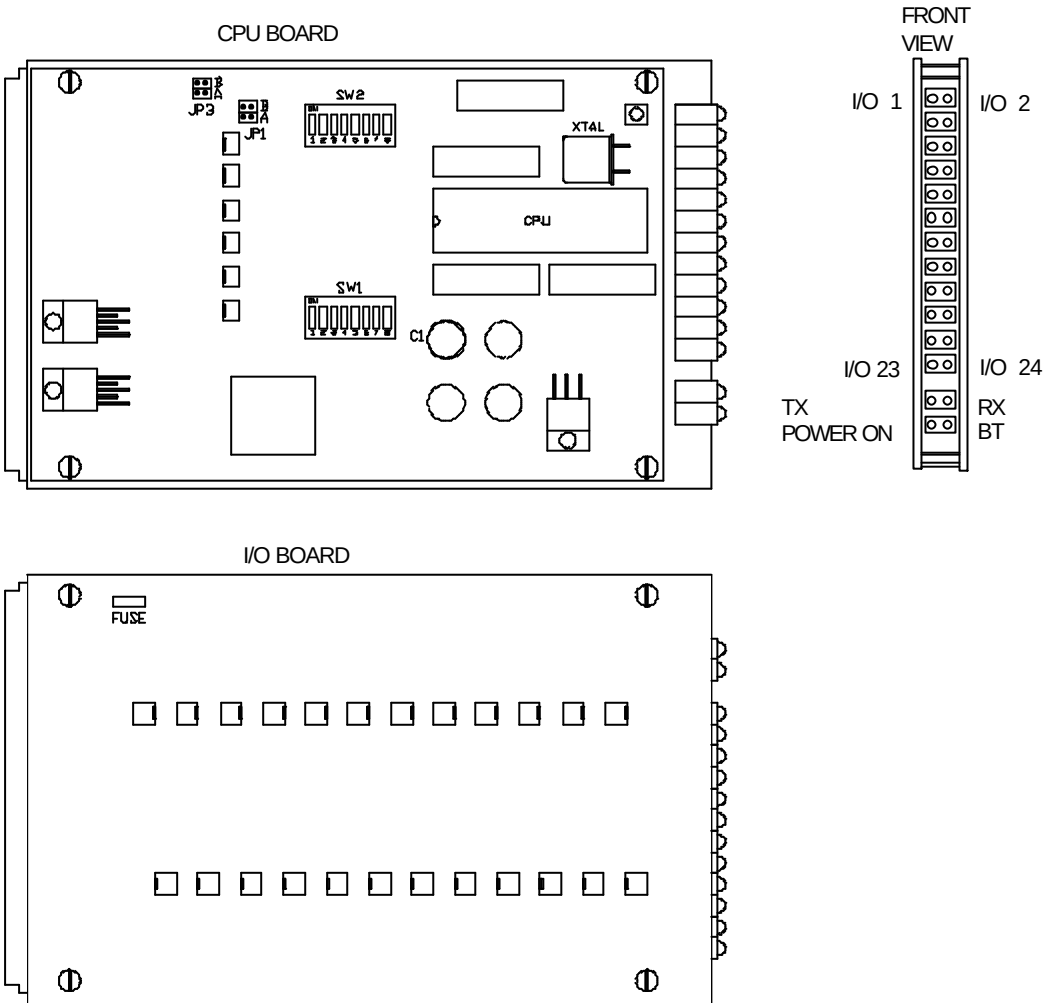



Fig. 4.1

At the right of the CPU chip, at the upper and lower side, there are two switch block, used to set:

- the baud rate (SW2-6, SW2-7, SW2-8) : see Annex A, Table A.1;
- the I/O status (normal/inverted) (SW2-1, SW2-2, SW2-3): see Annex A, Table A.2;
- the board network address (SW1-4, SW1-5, SW1-6, SW1-7, SW1-8) : see Annex A, Table A.3;
- the board type (SW1-1, SW1-2, SW1-3): see Table 4.1.

Five switches on the SW1 are used to set the board address (see Annex A, Table A.3). Five binary switches allow $2^5$ = 32 addresses, but remember that only 16 CMX can actually be addressed on a single communication line. Never use addresses above 15 (0F Hex); the **SW1-4 setting must be always ON**.

The switches SW1-1, SW1-2 and SW1-3 are used to define the board type. For the CMX-24I they must have the setting shown in Table 4.1.

| | |
|---|---|
| SW1-1 | ON |
| SW1-2 | ON |
| SW1-3 | ON |

Table 4.1 - Board type

The switches SW2-1, SW2-2 and SW2-3 are used to define the meaning that the CMX firmware assign to the input status. The meaning is assigned to the inputs in groups of eight, and so 3 switches are enough to define the meaning of 24 inputs. If the switch is set OFF, the eight inputs corresponding to it are evaluated active when they are closed (this condition is stated as "normally open" in Table A.2 in Annex A). If the switch is set ON, the inputs are complemented, i.e. their active status corresponds to the open state (this condition is stated as "normally closed" in Table A.2 in Annex A).
In the upper left part of board there are two double jumpers, marked JP1 and JP3. Each one has a "A" jumper and a "B" jumper. Their setting is as follows and **must not be changed**:

| | **JP1** | **JP3** |
|---|---|---|
| A | OFF | ON |
| B | ON | OFF |

Table 4.2 - JP1 and JP3 settings

The I/O board (CD 91200) of the CMX-24I is able to accept up to 24 inputs. On the board it is easy to recognize the two rows of twelve photocouplers each, the small blocks with four pins, the two LEDS blocks of 24 and 4 LEDs respectively, on the left board side and the DIN 64-pins connector on the right side.
The 24 LEDs are linked to the I/O port. When a LED is ON this means that the input is closed at the corresponding input port. Note that the LED signifies only a physical condition (i.e. current flowing through the diode), while the logical meaning of the input is assigned by the switch setting (see Table A.2).
Looking frontally to the LEDs rows, the four lower LEDs have the following meaning (Fig. 4.1):

- the upper left is the RS-485 line **TX monitor**: during normal operation it blinks according to the signals transmitted.
- the upper right is the RS-485 line **RX monitor**: during normal operation it blinks according to the signals received.
- the lower left is the **power supply monitor**: it must be steady ON when the CMX is properly powered.
- the lower right is the low **voltage monitor**: during normal operation it is OFF. It lights on when the power supply voltage drops below the lower limit of 11.4 V.

The board layout is common with the other CMX models (CMX-24O and CMX-16/8). The CMX-24I however lacks the three IC marked on the PCB as U1, U2 and U3, as well as the related jumpers marked W25, W26 and W27.
The only feature that can require a maintenance intervention is the fuse on the I/O board. The fuse is soldered to the board and it is intended for board protection and **not for field protection**. If the fuse blows out, probably there is something wrong with the board. Send it back to Cerberus Dati for maintenance.

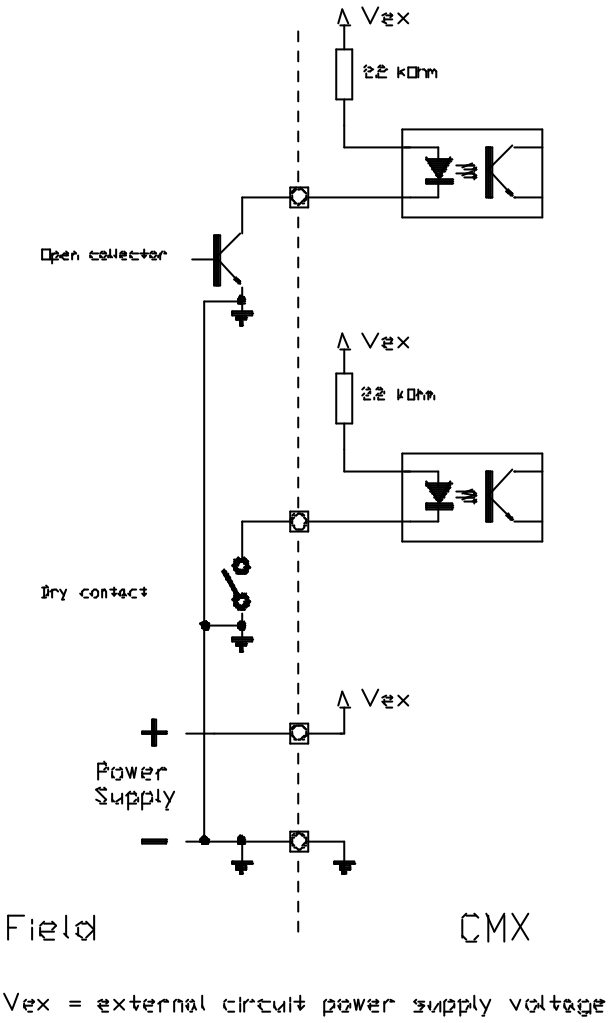



Fig. 4.2

Refer to Chapters 8 and 9 of this manual for actual connections of the board to external devices.
The power supply must have the characteristics shown in Table 4.3.

| Feature | Value | Unit |
|---|---|---|
| Voltage - min | 12 | V |
| Voltage - max | 28 | V |
| Current - idle | 80 @12 V | mA |
| | 60 @28 V | mA |
| Current - max | 360 @13.8 V | mA |
| | 420 @27 V | mA |

Table 4.3 - Power supply characteristics

The inputs can be :

- Open collector
- Dry contacts

Fig. 4.2 shows two of the possible input configurations. Table 4.4 shows the input electrical characteristics.

| Feature | Value | Unit |
|---|---|---|
| Voltage - min | 12 | V |
| Voltage - max | 28 | V |
| Maximum internal resistance | 2.2 | kOhm |
| Current - min | 6 @12 V | mA |
| | 12 @28 V | mA |

Table 4.4 - Input electrical characteristics

The internal resistance can be used to evaluate the current that will flow in the external circuit. The value must be higher than the minimum current value stated in Table 4.4 to let the CMX detect the input status change. Moreover, the external device must be able to withstand that current without damage.

# 5 The CMX-24O board

The CMX-24O is the CMX board with 24 outputs and no inputs. The CMX-24O is composed of a CPU board (marked CD91201) and an I/O board (marked CD91200), connected together (see Fig. 5.1 for board layout and assembly).
The important features to be detected on the CPU board are:

- the reset pushbutton
- the switch block marked SW1
- the switch block marked SW2

Although the CPU board layout is the same for all the CMX models, the boards are configured and operate differently in the three CMX models. The CPU board contains all the hardware and software needed for communications and interfacing. You can easily recognize the big CPU chip, and next to it the quartz crystal (XTAL) in its metal case. I you look at the board with the CPU chip at right, you can detect at the right of the quartz a small black pushbutton.

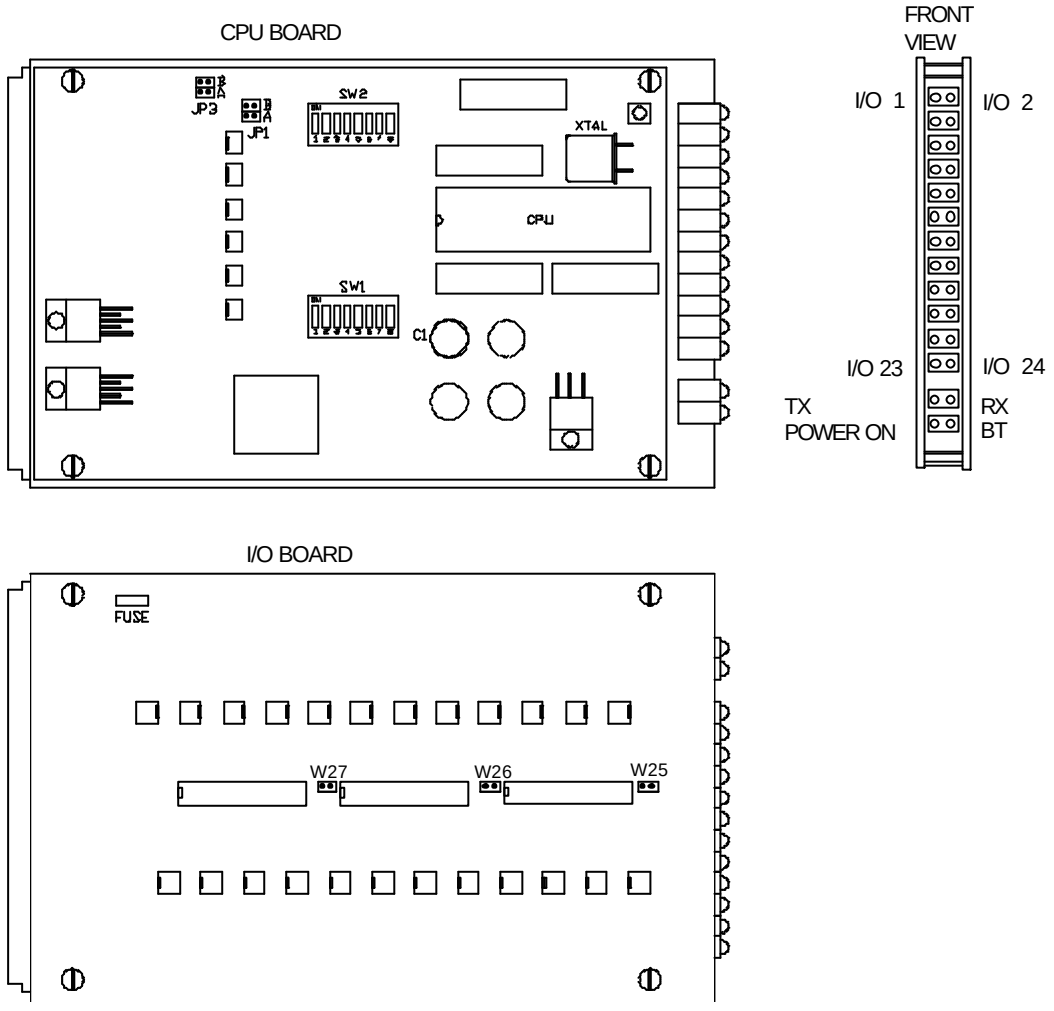



Fig. 5.1

This is the reset pushbutton, that starts the CMX diagnostics routines and reset the field status. This pushbutton has to pressed only when the CMX needs a full restart. Be careful in using the reset pushbutton on the CPU board of CMX-24O: when it is pressed all the outputs are set into a non-active status. **A new command from the supervision center is needed to re-activate them**.
At the right of the CPU chip, at the upper and lower side, there are two switch blocks, used to set:

- the baud rate (SW2-6, SW2-7, SW2-8) : see Annex A, Table A.1;
- the I/O status (normal/inverted) (SW2-1, SW2-2, SW2-3) : see Annex A, Table A.2;
- the board network address (SW1-4, SW1-5, SW1-6, SW1-7, SW1-8) : see Annex A, Table A.3;
- the board type (SW1-1, SW1-2, SW1-3): see Table 5.1.

Five switches on the SW1 are used to set the board address. Five binary switches allow $2^5$=32 addresses, but remember that only 16 CMX can actually be addressed on a single communication line. Never use addresses above 15 (0F Hex); the **SW1-4 setting must be always ON**.
The switches SW1-1, SW1-2 and SW1-3 are used to define the board type. For the CMX-24O they must have the setting shown in Table 5.1.

| | |
|---|---|
| SW1-1 | OFF |
| SW1-2 | OFF |
| SW1-3 | OFF |

Table 5.1 - Board type

The switches SW2-1, SW2-2 and SW2-3 are used to define the meaning that the CMX firmware assigns to the output status. The meaning is assigned to the outputs in groups of eight, and so 3 switches are enough to define the meaning of 24 outputs. If the switch is set OFF, the eight outputs corresponding to it are evaluated active when they are closed ("normal" condition in Table A.2). If the switch is set ON, the outputs are complemented, i.e. their active status corresponds to the open status. Table A.2, in Annex A, summarizes their meaning.
In the upper left part of board there are two double jumpers, marked JP1 and JP3. Each one has a "A" jumper and a "B" jumper. Their setting is as follows and **must not be changed**:

| | **JP1** | **JP3** |
|---|---|---|
| A | OFF | ON |
| B | ON | OFF |

Table 5.2 - JP1 and JP3 settings

The I/O board (CD 91200) of the CMX-24O is able to drive up to 24 outputs. On the board it is easy to recognize the two rows of twelve photocouplers each, the small blocks with four pins, the two LEDS blocks of 24 and 4 LEDs respectively, on the left board side and the 64-pin DIN connector on the right side.
The 24 LEDs are linked to the I/O port. When a LED is ON this means that the output is closed at the corresponding output port. Note that the LED signifies only a physical condition (i.e. current flowing through the diode), while the logical meaning of the output is assigned by the switch setting (see Table A.2).
Looking frontally to the LEDs rows, the four lower LEDs have the following meaning (Fig. 5.1):

- the upper left is the RS-485 line **TX monitor**: during normal operation it blinks according to the signals transmitted.
- the upper right is the RS-485 line **RX monitor**: during normal operation it blinks according to the signals received.
- the lower left is the **power supply monitor**: it must be steady ON when the CMX is properly powered.
- the lower right is the low **voltage monitor**: during normal operation it is OFF. It lights on when the power supply voltage drops below the lower limit of 11.4 V.

The board layout is common with the other CMX models (CMX-24I and CMX-16/8). The CMX-24O however has three IC marked on the PCB as U1, U2 and U3 and the related jumpers marked W25, W26 and W27.
The only feature that can require a maintenance intervention is the fuse on the lower right angle. The fuse is soldered to the board and it is intended for board protection and **not for field protection**. If the fuse blows out, probably there is something wrong with the board. Send it back to Cerberus Dati for maintenance.
Refer to Chapter 8 of this manual for actual connections to external devices.
The power supply must have the characteristics shown in Table 5.3.

| FEATURE | VALUE | UNIT |
|---|---|---|
| Voltage - min | 12 | V |
| Voltage - max | 28 | V |
| Current - idle | 70 @12 V | mA |
| | 60 @28 V | mA |
| Current - max (no output connection) | 240 @12 V | mA |
| | 200 @28 V | mA |
| Current - max (with 24 relay output activated) | 550 @12 V | mA |
| | 470 @28 V | mA |

Table 5.3 - Power supply characteristics

The outputs are optoisolated open-collector type. You can drive by them a relay in order to have a relay output (the standard relay output CMX-RB is described in Chapter 7).
Fig. 5.2 summarize two of the possible output configurations available. In case (a) the relay coil is supplied at the $V_{rl}$ voltage, that could be different from the CMX power supply voltage $V_d$. In (b) the external LED is supplied at the voltage $V_{ld}$: this voltage too could be different from $V_d$. It is however possible to supply both LEDs and relay coils at the same voltage $V_d$ that supplies the CMX. Table 5.4 shows the output electrical characteristics.

| Feature | Value | Unit |
|---|---|---|
| Voltage - max | 30 | V DC |
| Current - max | 100 | mA |

Table 5.4 - Output electrical characteristics

To properly connect the output device, connect the positive polarity to the output device free end; the ground must be common between the output device and the CMX power supply.
If you use a relay, a voltage suppression diode is needed to suppress the opening circuit voltage. The output board is equipped with 24 such diodes. You can use them in groups of eight by setting ON the jumpers marked W25, W26, W27 (see Table 5.5). When you use the internal voltage suppression diodes, the following precautions apply:

- all the pins belonging to the same octet **must be** at the same voltage
- the relay has to be driven at the CMX board power supply voltage
- no external voltage suppression diode is required

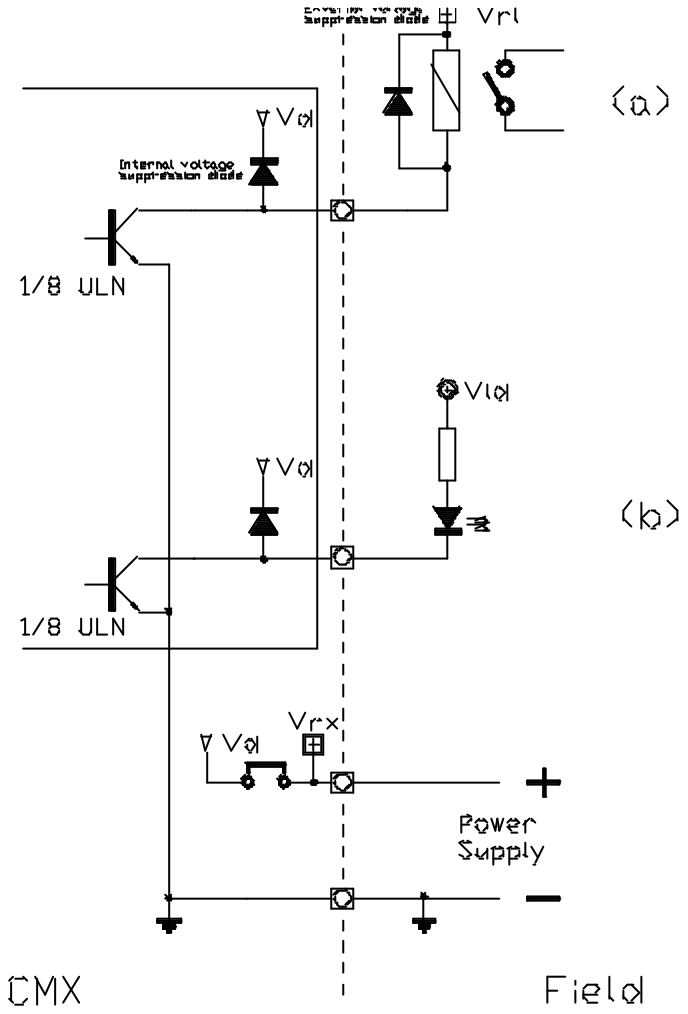



Fig. 5.2

| JUMPER | | | |
|---|---|---|---|
| | 1-8 | 9-16 | 17-24 |
| W25 | ON | - | - |
| W26 | - | ON | - |
| W27 | - | - | ON |

Table 5.5

# 6 The CMX-16/8 board

The CMX-16/8 is a CMX board with 16 inputs and 8 outputs. The CMX-16/8 is composed of a CPU board (marked CD91201) and an I/O board (marked CD91200), connected together (see Fig. 6.1 for board layout and assembly).
The important features to be detected on the CPU board are:

- the reset pushbutton
- the switch block marked SW1
- the switch block marked SW2

Although the CPU board layout is the same for all the CMX models, the boards are configured and operate differently in the three CMX models. The CPU board contains all the hardware and software needed for communications and interfacing. You can easily recognize the big CPU chip, and next to it the quartz crystal (XTAL) in its metal case.
I you look at the board with the CPU chip at right, you can detect at the right of the quartz a small black pushbutton. This is the reset pushbutton, that starts the CMX diagnostics routines and reset the field status. This pushbutton has to pressed only when the CMX needs a full restart. Be careful in using the reset pushbutton on the CPU board of CMX-

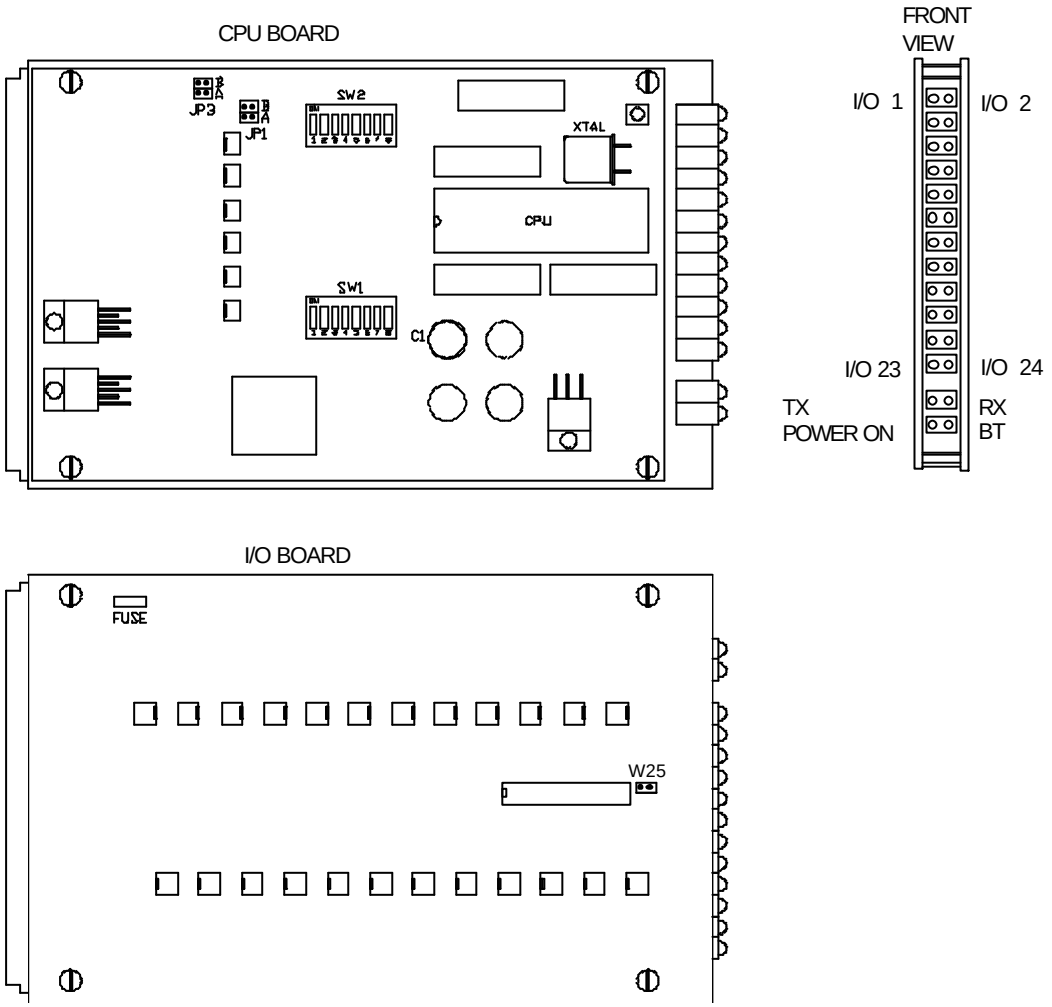



Fig. 6.1

16/8: when it is pressed the inputs are simply re-read, but all the outputs are set into a non-active status. **A new command from the supervision center is needed to re-activate them**.
At the right of the CPU chip, at the upper and lower side, there are two switch blocks, used to set :

- the baud rate (SW2-6, SW2-7, SW2-8) : see Annex A, Table A.1;
- the I/O status (normal/inverted) (SW2-1, SW2-2, SW2-3) : see Annex A, Table A.2;
- the board network address (SW1-4, SW1-5, SW1-6, SW1-7, SW1-8) : see Annex A, Table A.3;
- the board type (SW1-1, SW1-2, SW1-3): see Table 6.1.

Five switches on the SW1 are used to set the board address. Five binary switches allow $2^5$=32 addresses, but remember that only 16 CMX can actually be addressed on a single communication line. Never use addresses above 15 (0F Hex); the **SW1-4 setting must be always ON**.
The switches SW1-1, SW1-2 and SW1-3 are used to define the board type. For the CMX-16/8 they must have the setting shown in Table 6.1.

| | |
|---|---|
| SW1-1 | OFF |
| SW1-2 | ON |
| SW1-3 | ON |

Table 6.1 - Board type

The switches SW2-1, SW2-2 and SW2-3 are used to define the meaning that the CMX firmware assigns to the input/output status. The meaning is assigned to the outputs in groups of eight, and so 3 switches are enough to define the meaning of 24 inputs/outputs. If the switch is set OFF, the eight outputs (or inputs) corresponding to it are evaluated active when they are closed ("normal" condition in Table A.2). If the switch is set ON, the inputs are complemented, i.e. their active status corresponds to the open status. Table A.2, in Annex A, summarize their meaning.
In the upper left part of board there are two double jumpers, marked JP1 and JP3. Each one has a "A" jumper and a "B" jumper. Their setting is as follows and **must not be changed**:

| | **JP1** | **JP3** |
|---|---|---|
| A | OFF | ON |
| B | ON | OFF |

Table 6.2 - JP1 and JP3 settings

The I/O board (CD 91200) of the CMX-16/8 accepts up to 16 inputs and it is able to drive up to 8 outputs. On the board it is easy to recognize the two rows of twelve photocouplers each, the small blocks with four pins, the two LEDS blocks of 24 and 4 LEDs respectively, on the left board side and the 64-pin DIN connector on the right side.
The 24 LEDs are linked to the I/O port. When a LED is ON this means that the input is closed at the corresponding input port. Note that the LED signifies only a physical condition (i.e. current flowing through the diode), while the logical meaning of the input is assigned by the switch setting (see Table A.2).
Looking frontally to the LEDs rows, the four lower LEDs have the following meaning (Fig. 6.1):

- the upper left is the RS-485 line **TX monitor**: during normal operation it blinks according to the signals transmitted.
- the upper right is the RS-485 line **RX monitor**: during normal operation it blinks according to the signals received.
- the lower left is the **power supply monitor**: it must be steady ON when the CMX is properly powered.
- the lower right is the low **voltage monitor**: during normal operation it is OFF. It lights on when the power supply voltage drops below the lower limit of 11.4 V.

The board layout is common with the other CMX models (CMX-24I and CMX-24O). The CMX-16/8 has only one IC marked on the PCB as U3 and only the jumper marked W25 is installed.
The only feature that can require a maintenance intervention is the fuse on the lower right angle. The fuse is soldered to the board and it is intended for board protection and **not for field protection**. If the fuse blows out, probably there is something wrong with the board. Send it back to Cerberus Dati for maintenance.
Refer to Chapter 8 of this manual for actual connections to external devices.
The power supply must have the characteristics shown in Table 6.3.

| Feature | Value | Unit |
|---|---|---|
| Voltage - min | 12 | V |
| Voltage - max | 28 | V |
| Current - idle | 80 @13.8 V | mA |
| | 65 @27 V | mA |
| Current - all inputs and outputs active | 320 @13.8 V | mA |
| | 360 @27 V | mA |
| Current - maximum | 430 @13.8 V | mA |
| | 460 @27 V | mA |

Table 6.3 - Power supply characteristics

Inputs and outputs characteristics are the same already described in previous Chapters 4 and 5. Refer to them for details about the CMX-16/8 I/O characteristics.

# 7 The relays output board CMX-RB

The CMX-RB (CD91205) is a relay output board that converts the CMX open collector output into a relay output. The CMX-RB layout is sketched in Fig. 7.1; the following description assumes you are looking at the board with the orientation of the drawing.
The CMX-RB is mounted on a plastic support that allows you to mount the board on a DIN rail.
The eight black blocks are the relays; the output connections can be done using the connectors. For each relay three screw are provided. For each output the rightmost screw (Fig. 7.1) is the common, the second screw is the normally closed contact and the third screw is the normally open contact. They are marked COM (for the common connection), NC (normally closed contact) and NO (normally open contact).
The CMX-RB could be connected to the CMX-xx using the supplied flat cable, that must be used in conjunction with the CMX-MB mounting bracket (see Chapter 8). The CMX-RB is powered by the CMX-xx.
The jumper marked J1 on the board is used to set the relays operating voltage. When the two rightmost pins are shorted by a jumper (the default condition), the relay board operates at 24 V (rightmost with reference to Fig. 7.1). In this configuration, the voltage regulator circuit in the upper right angle of the board, is active. Should you use a power supply that outputs 12 V max and should you have trouble with the relays, try to short the leftmost pins. In this configuration, the internal voltage regulation is performed and the relays are operated directly by the supply voltage.

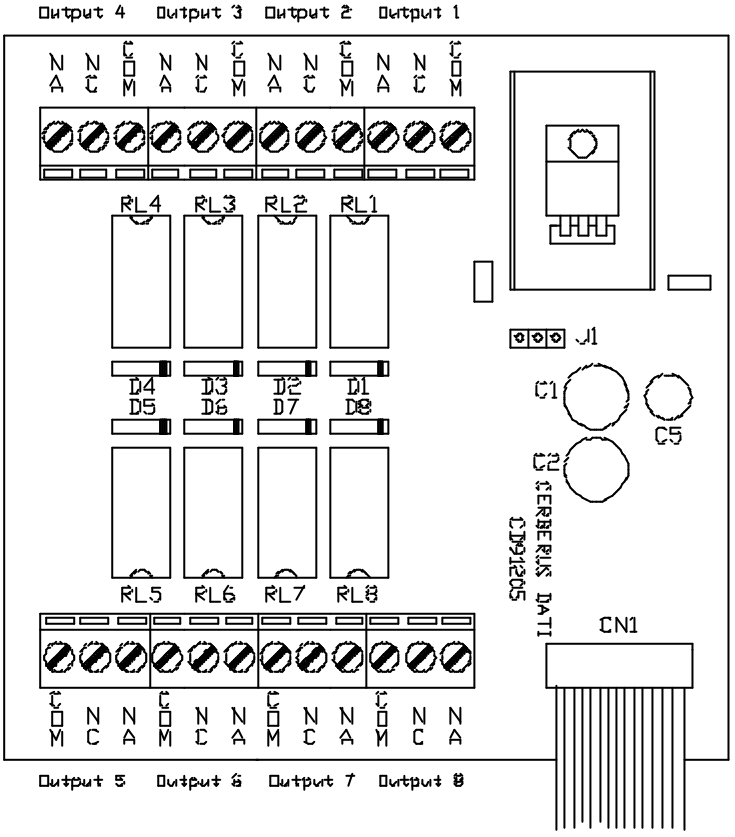



Fig. 7.1

The relay characteristics are listed in Table 7.1.

| FEATURE | | VALUE | UNIT |
|---|---|---|---|
| Contact voltage | max | 48 | V |
| | min | 50 | mV |
| Contact current | max | 1.25 | A |
| | min | 50 | µA |
| Operating temperature | | -30 + 90 | °C |

Table 7.1

# 8 CMX-PS Power supply unit

The CMX-PS is a power supply unit designed to be used with Cerberus Dati CMX units. The CMX-PS is a compact, modular and reliable uninterruptible power supply with two sealed batteries included. CMX-PS switches automatically to battery supply when the main goes off if the front panel switch was set ON. The switch on the front panel enables/ disables battery intervention. The switch must be set OFF when the power supply unit is not operating (e.g. it is kept in stock) to avoid batteries damage.
When battery operation is enabled the front panel LED marked BATTERY ON shows this status. A red LED (marked LOW BATTERY) lights on when the battery level is low. A green LED (marked POWER ON) shows the main (220 V) presence.
A single CMX-PS can power up to 4 CMXs. If more than one CMX-PS is installed, they must be left floating (i.e. not grounded) in order to avoid problems with ground currents.
Both input and output fuses are located on the front panel, for fast maintenance interventions.
The CMX-PS has standard Europe-format dimension and it can be mounted either in the box along with up to 3 CMXs (CMX-RM) or in a standard 19" rack or using the metal housing provided with CMX-PS.


Fig. 8.1

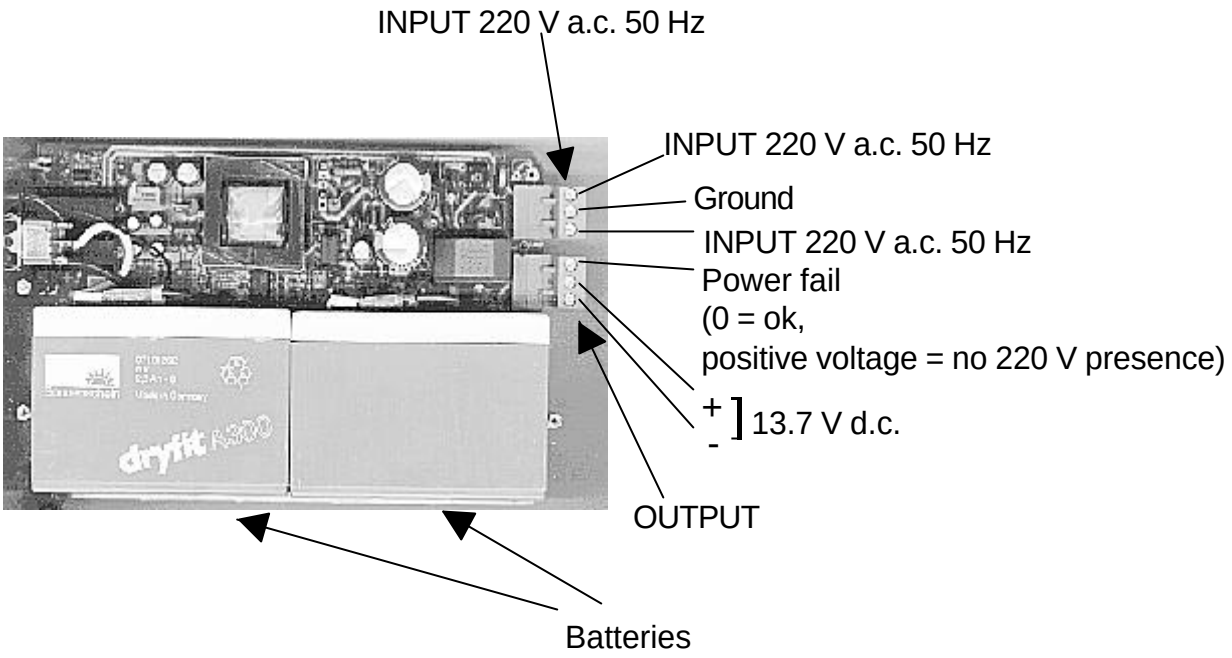



Fig. 8.2

Fig. 8.2 shows in a side view of the CMX-PS the connections on the screw connectors that could be accessed on the back of the device.
Fig. 8.2 is side view of the CMX-PS with the cover removed. You need to remove the cover to access the batteries. To remove the cover, unscrew the three cross-headed screws on the aluminium cover with holes and lift it. You can see the batteries and the electronic circuitry.
The two sealed batteries (6 V-2.0 Ah) are connected in series. one cable runs from one to the other, connecting the positive and negative poles. The negative pole from one battery must be connected to the cable with the BLU band, that is connected to the power supply PCB. The positive pole of the other battery must be connected to the cable with the RED band, that is connected to the front switch. The cables are Faston terminated, so the battery replacement is matter of minutes.

# 9 Accessories

## 9.1 The CMX-MB mounting bracket

The CMX-MB (CD91203/B) is an accessory that allows to mount easily any CMX model inside a cabinet or an existing housing, using the proper screw holes. The serigraphed panel mounted on the bracket shows the connections. The CMX-RB is composed by (see Fig. 9.1 and Fig. 9.2) :

- a plastic bracket with a rail to insert in the CMX board
- a backplane connector that joins the CMX board 64-pin DIN connector
- a screw terminal box, to connect the I/O wires coming from field, the RS485 communication lines and the supply voltage
- three connectors for the CMX-RB flat cables.
- a plastic serigraphed panel that shows the connector layout

The output signals that are available on the screw terminal are the same available on the flat cable connectors. The last allow an easier and faster connection should you use the CMX-RB.
Fig. 9.3 shows the minimum distance between two CMX-RB, while Fig. 9.4 shows the CMX board mounted in the CMX-MB.

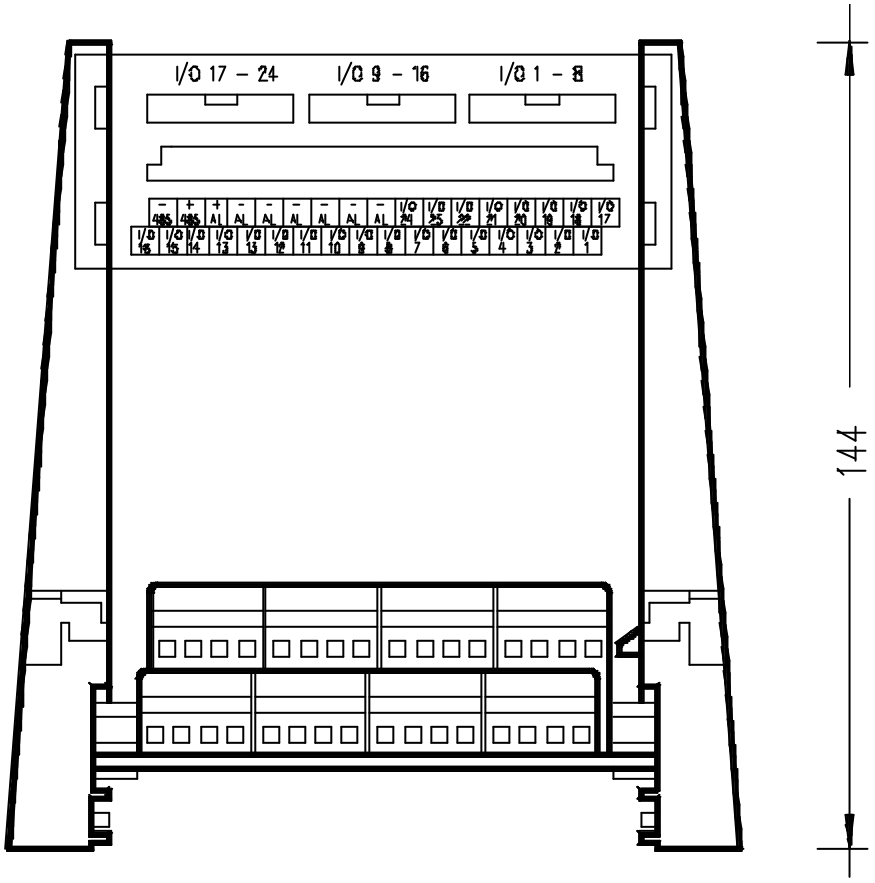



Fig. 9.1

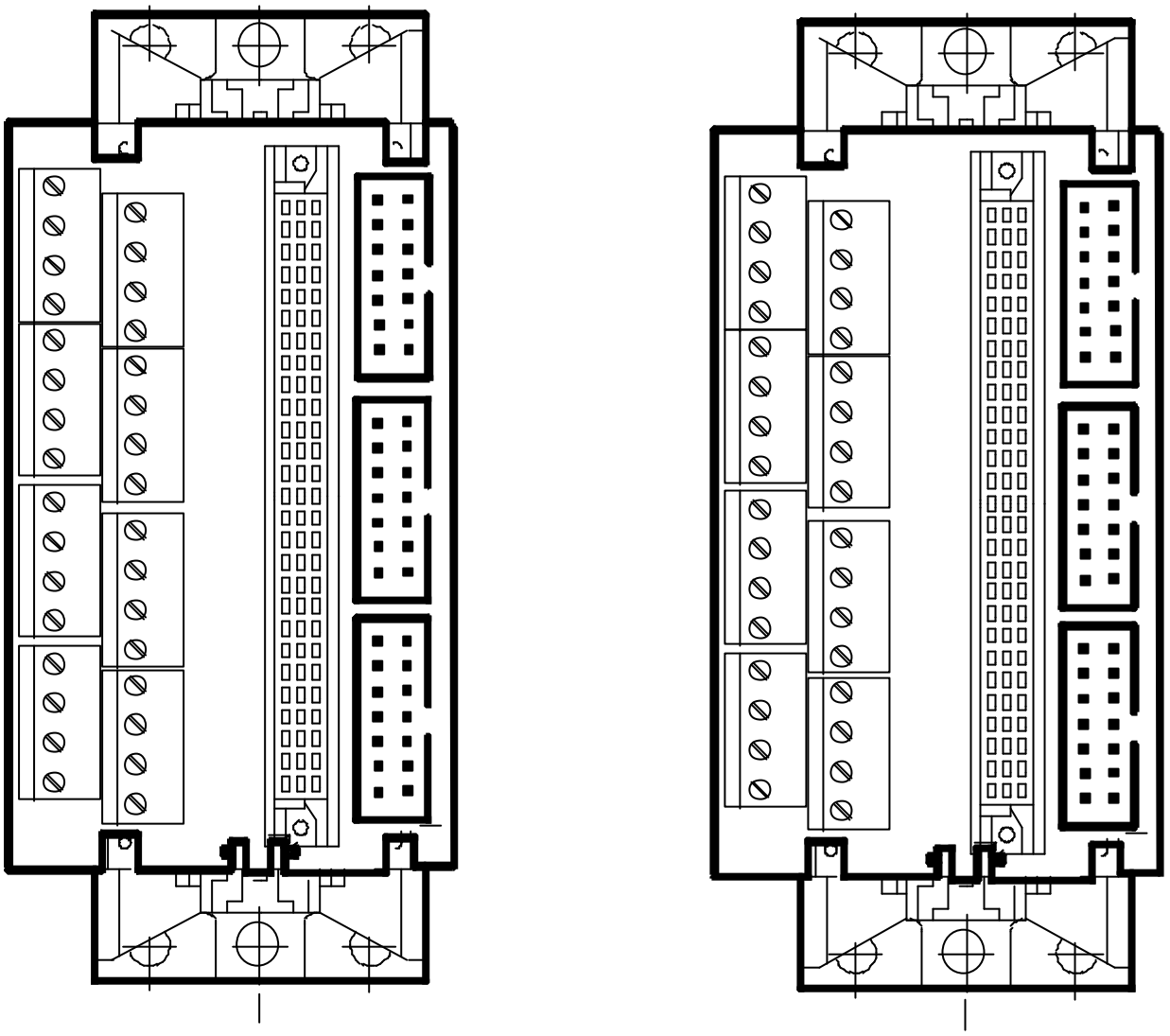



Fig. 9.2

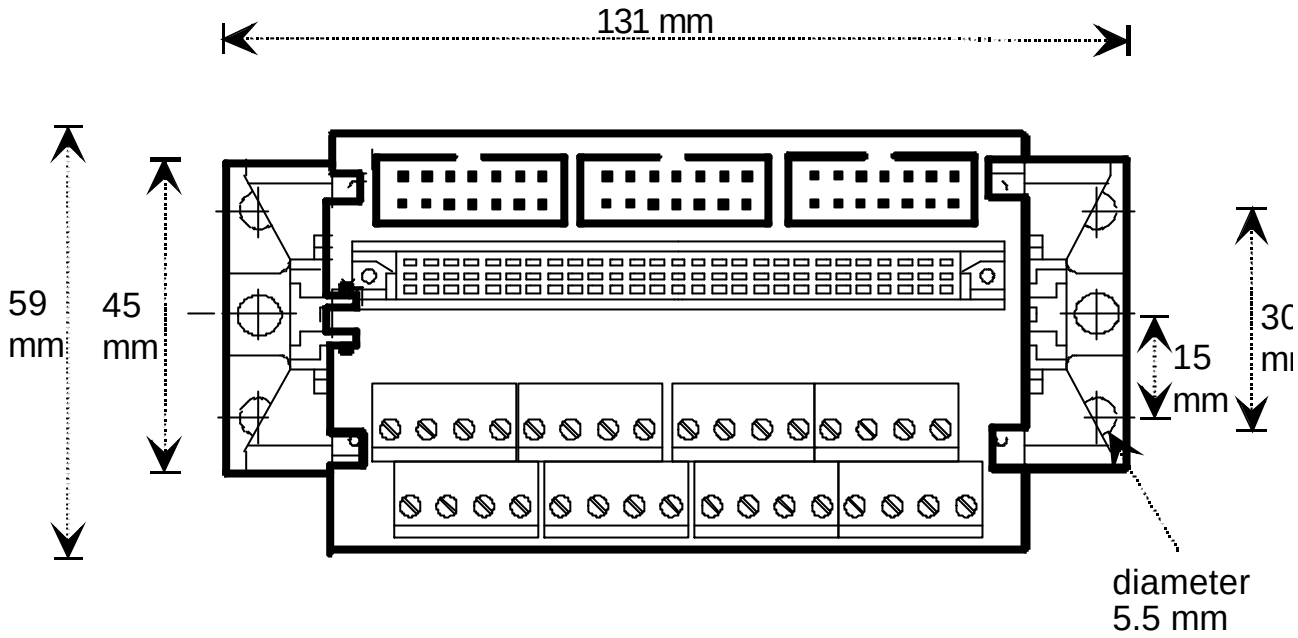



Fig. 9.3

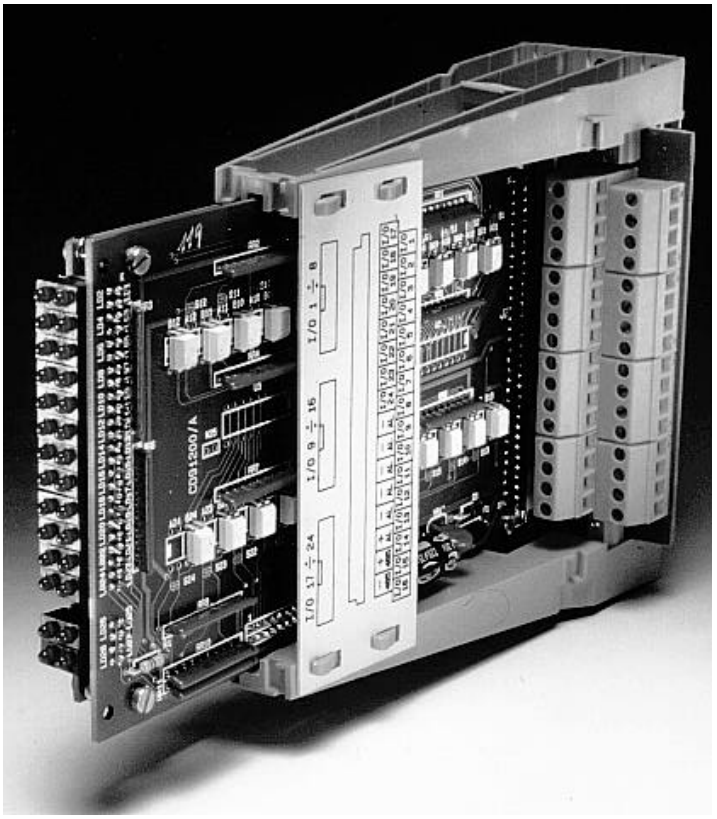


Fig. 9.4

# 9.2 The CMX-BP Connection backplane

The CMX-BP (CD91202) is an accessory that allows to connect the CMX-xx to the I/O wires, the communication lines and the voltage supply. The CMX-BP is composed of a 64-pin DIN connector on one side and two rows of screw connectors on the opposite side. Fig. 9.5 shows the connector layout and the dimensions.
The CMX-BP can be used by itself (it can be mounted on an existing panel by screws) or in the CMX-SB and in the CMX-RM.

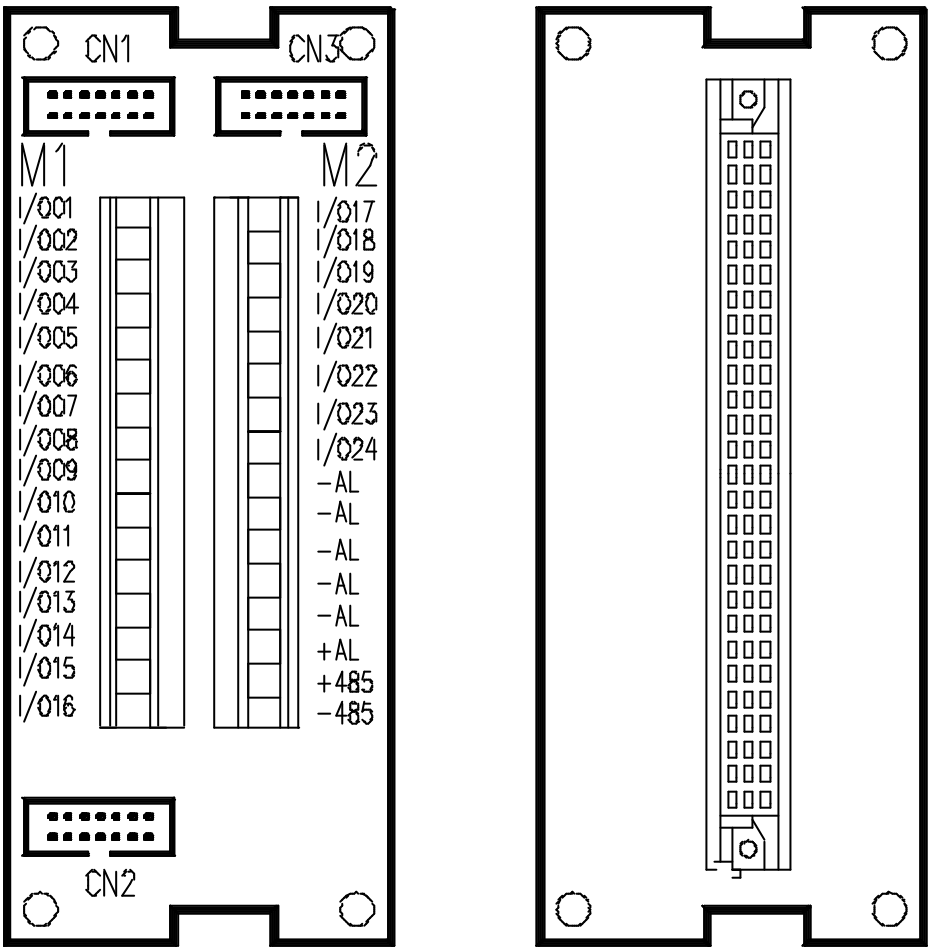
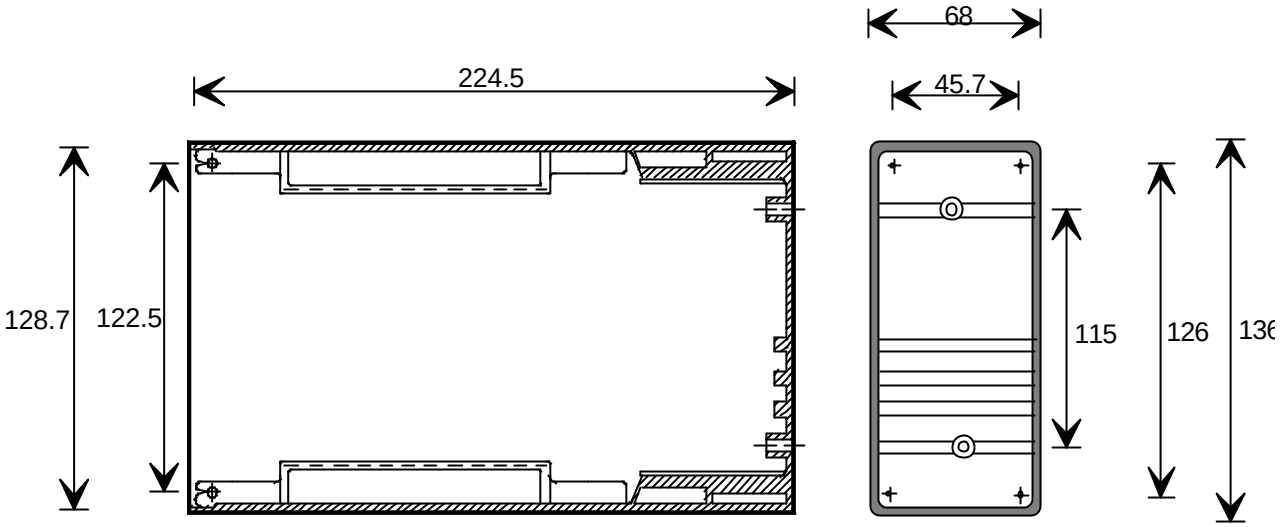



Fig. 9.5

# 9.3 The CMX-SB Single Box

This accessory is a plastic box (see Fig. 9.6 and Fig. 9.7 for the dimensions) that can house one CMX board of any model. The CMX-SB is composed of the box body, a serigraphed aluminium front panel and the box back. Moreover, to properly mount the CMX you need the CMX-BP backplane.
First of all, you have to make a hole in the base for the cables and then to mount it on the wall. Then connect the cables to the backplane connector. Remember that the screw part of the connectors is detachable. Insert the connectors in their place and screw the box body to the box back, using the two internal screws supplied. Insert the CMX board and mount the front panel.




All measures in millimeters

Fig. 9.6

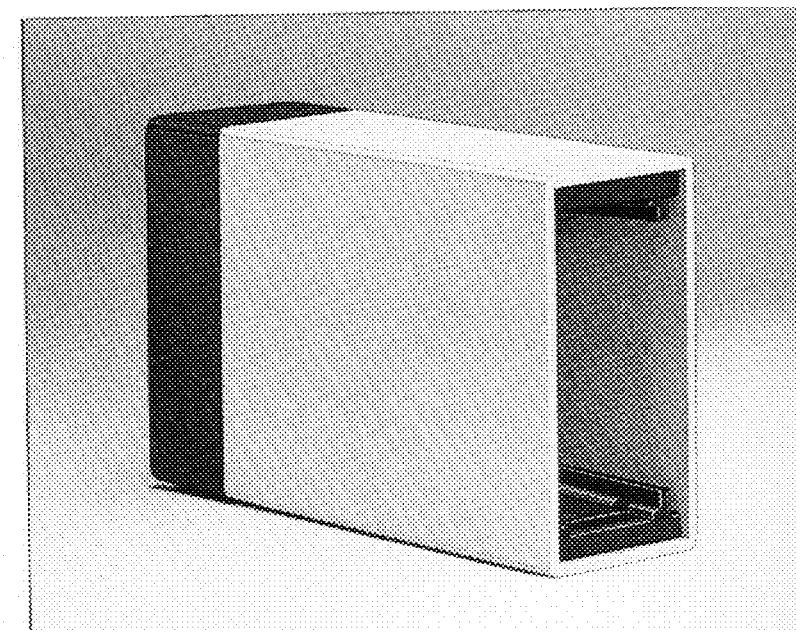


Fig. 9.7

# 9.4 The CMX-RM Rack Mount

This accessory is a plastic box that can house up to four CMX boards of any model. The CMX-RM is composed of the box body that is hinged to the box back and by a serigraphed aluminium front panel. Moreover, to properly mount the CMX you need as many CMX-BP backplanes as CMXs you wish to mount.
To let the box body rotate around the hinges, put the slit of the hinge screw in horizontal position, pull down the hinge in order to free the pivot and then rotate the box. To tighten the box again, repeat the operations in the inverse order.
To mount the CMX-RM, you have to make a hole in the box back for the cables and then to mount it on the wall. Then connect the cables to the backplane connector. Remember that the screw part of the connectors is detachable. Insert the connectors in their place, rotate the box body at its place around the hinges and tighten it. Insert the CMX boards and mount the front panel.

Fig. 9.8

# 10 Hardware installation

## 10.1 Power requirements and connections

To power the CMX you need a power supply with the following characteristics:

| Feature | Value | Unit |
|---|---|---|
| Voltage min | 12 | V |
| max | 28 | V |
| Current - idle | 80 @ 12 V | mA |
| | 60 @ 28 V | mA |
| Current - max | 360 @ 12 V | mA |
| | 420 @ 28 V | mA |

Table 10.1 - CMX-24I power supply data

| Feature | Value | Unit |
|---|---|---|
| Voltage min | 12 | V |
| max | 28 | V |
| Current - idle | 70 @ 12 V | mA |
| | 60 @ 28 V | mA |
| Current - max (no output connection) | 240 @ 12 V | mA |
| | 200 @ 28 V | mA |
| Current - max (with 24 relay outputs activated) | 550 @ 12 V | mA |
| | 470 @ 28 V | mA |

Table 10.2 - CMX-24O power supply data

| Feature | Value | Unit |
|---|---|---|
| Voltage min | 12 | V |
| max | 28 | V |
| Current - idle | 80 @ 12 V | mA |
| | 65 @ 28 V | mA |
| Current - (all inputs and outputs active) | 320 @ 12 V | mA |
| | 360 @ 28 V | mA |
| Current - max (all inputs and relay outputs active) | 430 @ 12 V | mA |
| | 460 @ 28 V | mA |

Table 10.3 - CMX-16/8 power supply data

# 10.2 Network planning

The suggested cable characteristics have to be as follows:

| Type of cable | No of wire | Cross section | Unit |
|---|---|---|---|
| RS 485 cable | 2 | 1.5 | $mm^2$ |
| RS 232 cable | 3 | 0.5 | $mm^2$ |
| I/O wire | 2 (for I/O point) | 1 | $mm^2$ |
| Power supply | 2 | 1.5 (*) | $mm^2$ |

Table 10.4 - CMX-16/8 power supply data

(*) Depends on application and on voltage and cable type. The last device installed must have voltage enough to operate properly.

## 10.2.1 Connection to the Gateway GW-00

To each backplane connector of the Gateway GW-00 up two CM-IC can be connected.

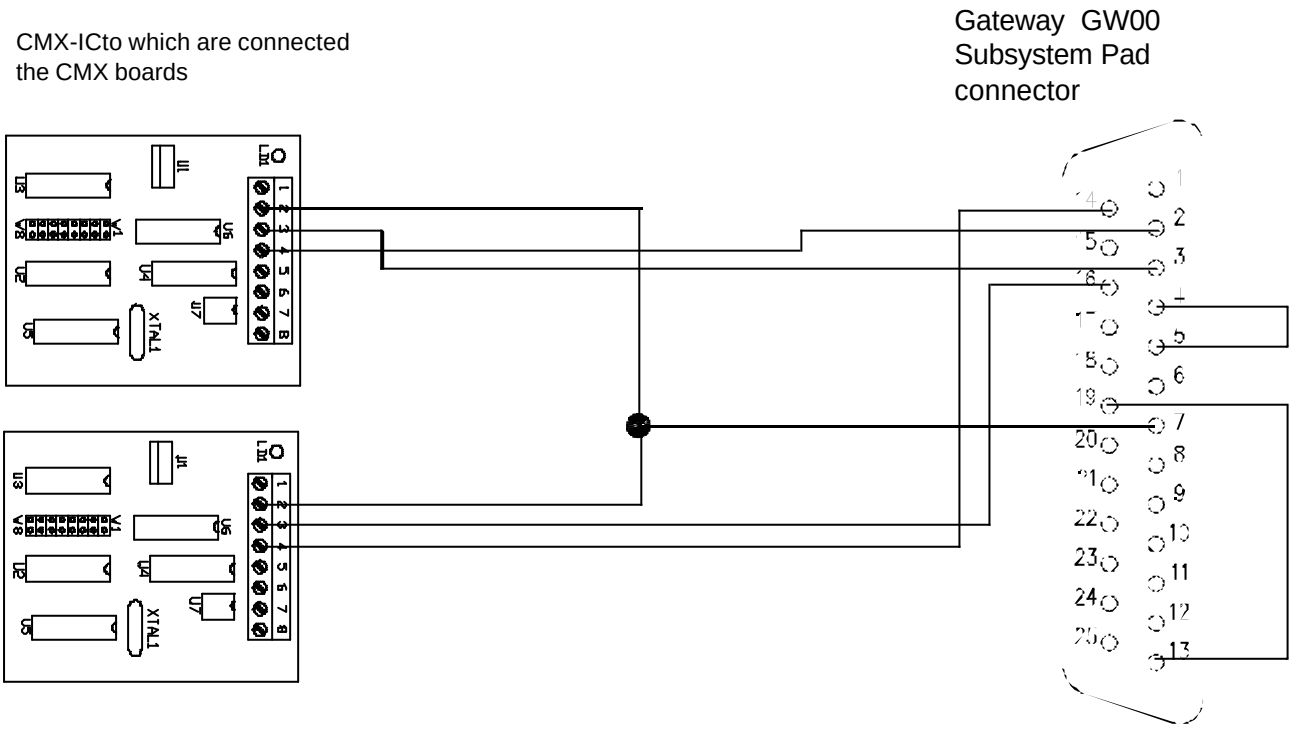



Fig. 10.1

## 10.2.2 Connection to the Gateway GW-01

To an asynchronous board of a Gateway GW-01 up to four IC-2 can be connected.

CMX-IC to which are
connected CMX boards

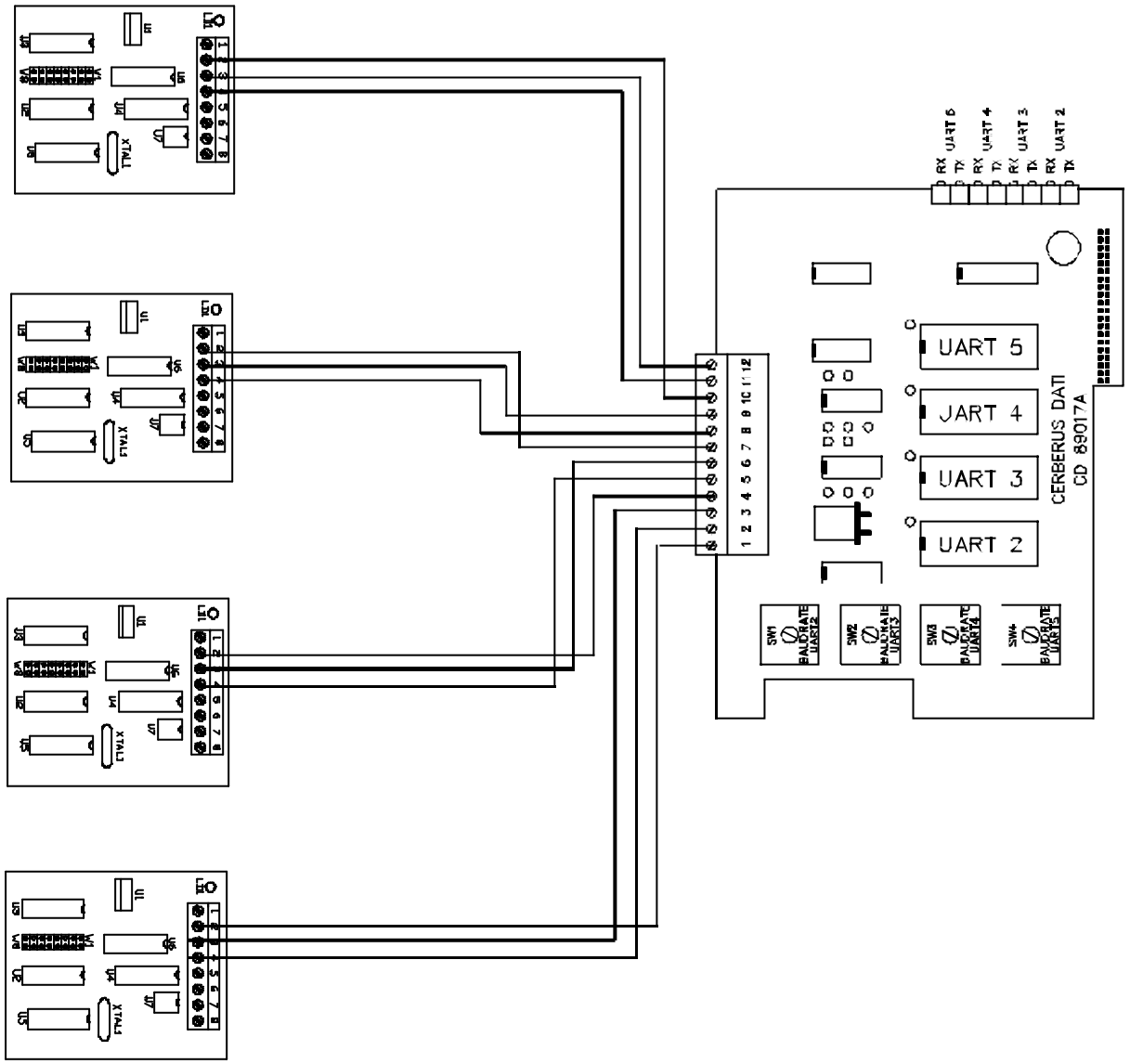



Fig. 10.2

# 10.3 Connection to inputs and outputs

## 10.3.1 Connection to the CMX-24I

Typical inputs are:

- Pushbutton
- Photocoupler
- Relay contact

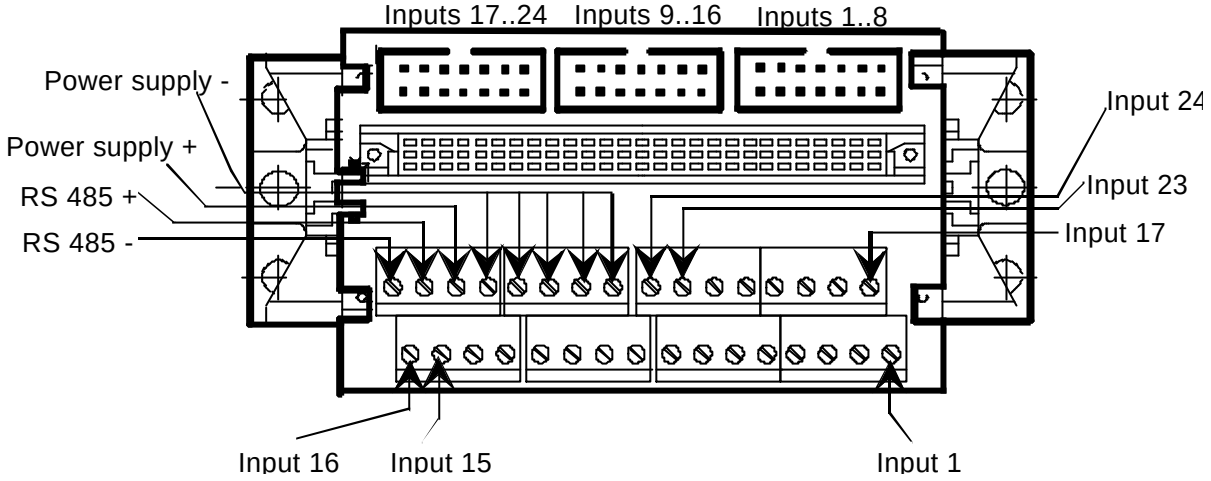



Fig. 10.3

## 10.3.2 Connection to the CMX-24O

Typical outputs are:

LED
Relay coils
Photocoupler
TTL
CMOS

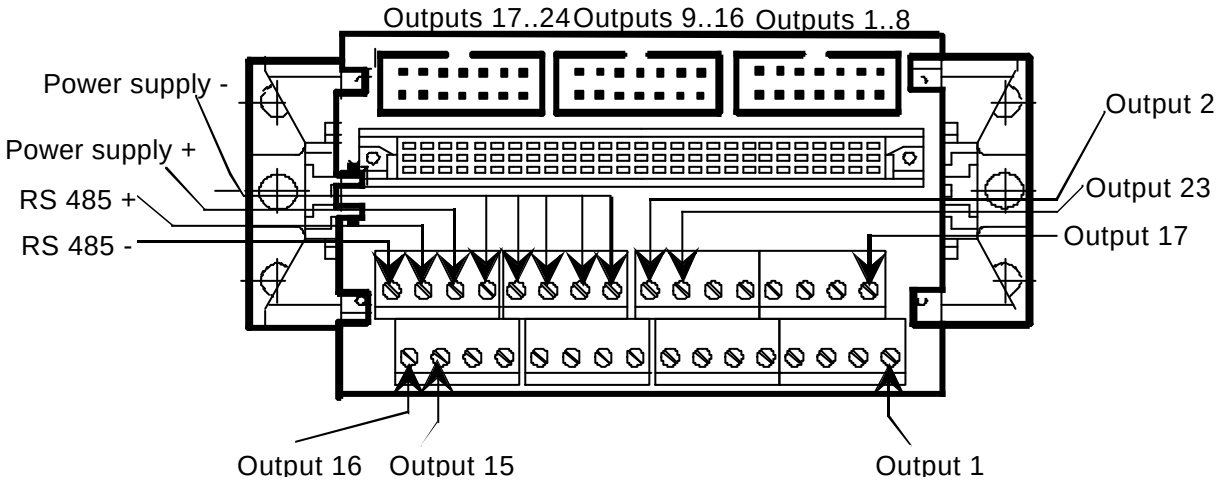



Fig. 10.4

### 10.3.3 Connection to the CMX-16/8

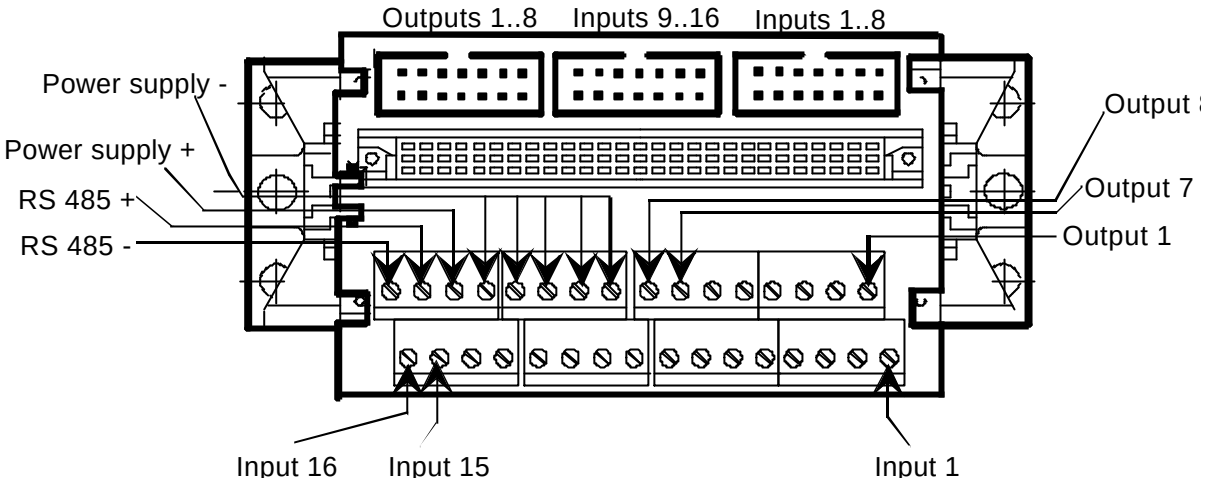



Fig. 10.5

### 10.3.4 Connection to the CMX-RB

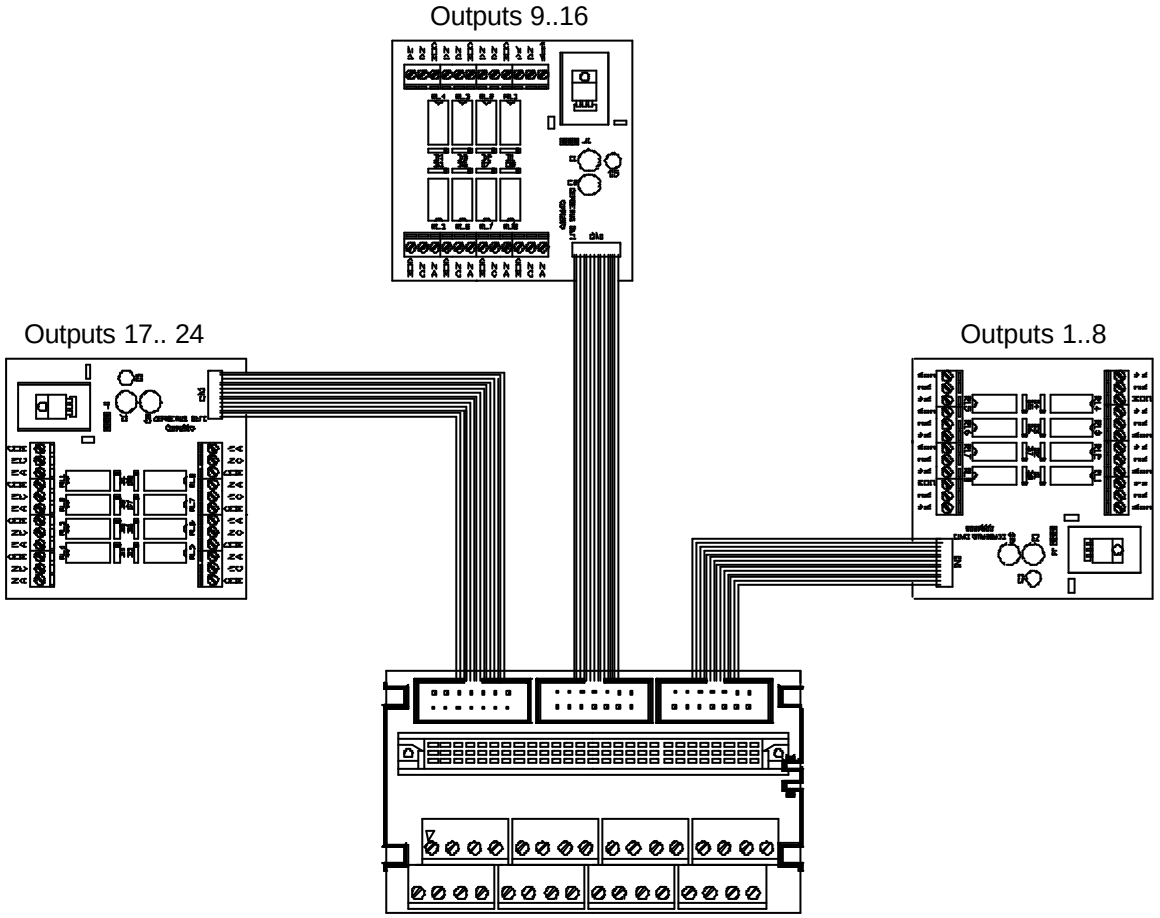



Fig. 10.6

# 11 Troubleshooting

The following hints should help you to identify possible malfunctioning and/or incorrect operation of CMXs. They cannot be considered as exhaustive of all and any operating conditions you may encounter.

### The CMX does not communicate with Supervising center

1. baud rate set to different values on CPU board and IC-2
   **Action:** verify IC-2 jumpers and CPU dip switch settings
2. the line transient suppressor has been blown out
   **Action:** verify the line suppressor integrity
3. CMX board line driver faulty
   **Action:** send the board to CDI for verification and maintenance
4. the fuse is blown out
   **Action:** send the board to CDI for verification and maintenance
5. Power supply is low - the BT LED (see Figs. 4.1, 5.1 and 6.1) is ON and the board is stuck
   **Action:** verify supply voltage

### Irregular or faulty communication

1. line is faulty
   **Action:** verify line integrity
2. Power supply is low - the BT LED (see Figs. 4.1, 5.1 and 6.1) is ON
   **Action:** verify supply voltage

### Line fault

1. the line is interrupted
   **Action:** verify the line integrity
2. at least one of the CMXs has the line driver electrically shorted
   **Action:** send the board to CDI for verification and maintenance

### The board doesn't turn on

1. Power supply voltage absent or too low
   **Action:** verify power supply voltage
2. The voltage polarity is inverted
   **Action:** verify the polarity and exchange the poles as necessary
3. the fuse is blown out
   **Action:** send the board to CDI for verification and maintenance

### The Inputs/Outputs don't operate properly

1. the I/O LED is permanently OFF
   **Action:** the optoisolator can be damaged. Send the board to CDI for verification and maintenance

# 12 Glossary

### CPU
Central Processing Unit; the part of a computer containing the circuits required to interpret and execute the instructions.

### Fuse
An electrical device composed by short metallic wire protected by a glass bulb. The wire melts when the current that flows in it is higher than the fuse limiting value.

### LED
Light Emitting Diode; an electronic device that emits light when powered.

### Multidrop connection
A type of network connection in which there two or more electronic devices (e.g. CMXs) on a single line.

### Open collector
A kind of output that is implemented using a transistor; this output type usually is able to supply a limited amount of current.

### Optoisolator
A coupling device in which a light emitting diode (LED) energized by the input signals is optically coupled to a photodetector such as a light sensitive output diode, transistor or silicon controlled rectifier.

### Pushbutton
A temporary switch used on CMX to reset the CPU and all the I/O ports.

### Relay output
A type of output that can drive high currents and voltages. Can be implemented on CMXs using the CMX-RB optional device or connecting relays to the open collector outputs of a CMX-24O or CMX-16/8.

### RS-232
The interface used in communication between the gateway and the IC-2.

### RS-485
The interface used in communication between the IC-2 and the CMX connected to it.

### Voltage suppression diodes
The diodes to be paralleled to the relay coil to suppress the circuit-opening voltage spike. The CMX is equipped with internal diodes.

# 13 ANNEX A - Board settings

## 13.1 Baud rate

| BAUD RATE | SW2-6 | SW2-7 | SW2-8 |
|---|---|---|---|
| 300 | ON | ON | ON |
| 600 | ON | ON | OFF |
| 1200 | ON | OFF | ON |
| 2400 | ON | OFF | OFF |
| 4800 | OFF | ON | ON |
| 9600 | OFF | ON | OFF |

Table A.1 - Baud rate settings

## 13.2 Input/Outputs default status

| Inputs | NORMALLY OPEN | | |
|---|---|---|---|
| | SW2-1 | SW2-2 | SW2-3 |
| 01...08 | - | - | OFF |
| 09...16 | - | OFF | - |
| 17...24 | OFF | - | - |

Table A.2(a) - Switch settings for normal input

| Inputs | NORMALLY CLOSED | | |
|---|---|---|---|
| | SW2-1 | SW2-2 | SW2-3 |
| 01...08 | - | - | ON |
| 09...16 | - | ON | - |
| 17...24 | ON | - | - |

Table A2(b) - Switch settings for complemented input

## 13.3 address

| ADDRESS (DEC) | ADDRESS (HEX) | SW1-4 | SW1-5 | SW1-6 | SW1-7 | SW1-8 |
|---|---|---|---|---|---|---|
| 0 | 00 | ON | ON | ON | ON | ON |
| 1 | 01 | ON | ON | ON | ON | OFF |
| 2 | 02 | ON | ON | ON | OFF | ON |
| 3 | 03 | ON | ON | ON | OFF | OFF |
| 4 | 04 | ON | ON | OFF | ON | ON |
| 5 | 05 | ON | ON | OFF | ON | OFF |
| 6 | 06 | ON | ON | OFF | OFF | ON |
| 7 | 07 | ON | ON | OFF | OFF | OFF |
| 8 | 08 | ON | OFF | ON | ON | ON |
| 9 | 09 | ON | OFF | ON | ON | OFF |
| 10 | 0A | ON | OFF | ON | OFF | ON |
| 11 | 0B | ON | OFF | ON | OFF | OFF |
| 12 | 0C | ON | OFF | OFF | ON | ON |
| 13 | 0D | ON | OFF | OFF | ON | OFF |
| 14 | 0E | ON | OFF | OFF | OFF | ON |
| 15 | 0F | ON | OFF | OFF | OFF | OFF |

Table A.3 - Network address settings

Never use addresses above 15 (0F hex); the SW1-4 **must always be ON**.

## 13.4 Board type selection

| Board type | SW1-1 | SW1-2 | SW1-3 |
|---|---|---|---|
| CMX-24I | ON | ON | ON |
| CMX-24O | OFF | OFF | OFF |
| CMX-16/8 | OFF | ON | ON |

Table A.4

# 14 Index