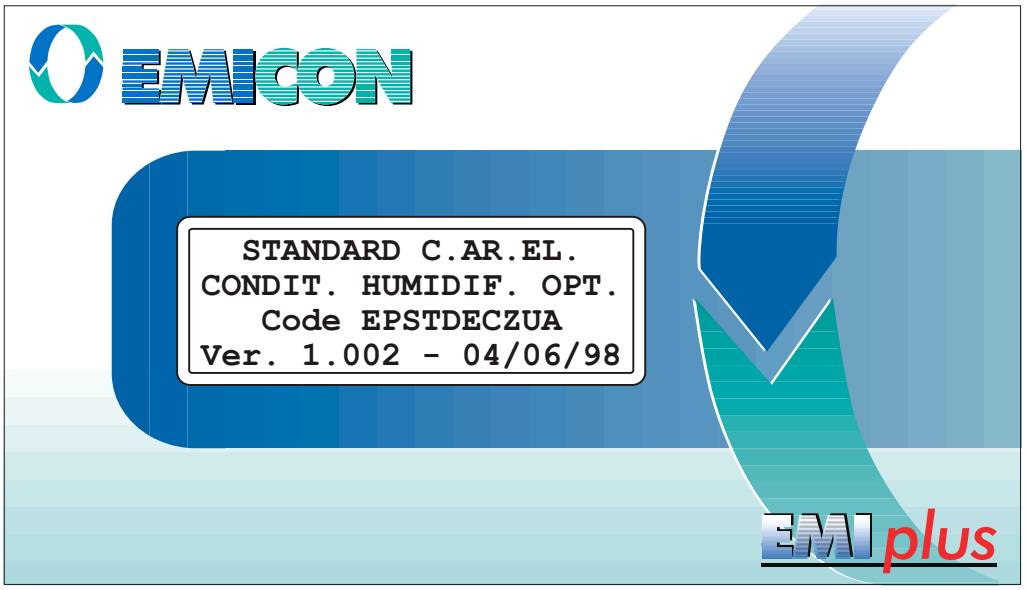
EMICON
HIGH-TECH AIR CONDITIONING AND REFRIGERATION

CE

OPERATION AND MAINTENANCE MANUAL



MICROPROCESSOR

EMIplus

CONTENTS

1 - GENERAL FEATURES

EMIplus is an electronic controller system which provides advanced microprocessor management of air-treatment and air-conditioning units.

1.1 Functions carried out by the system

- Temperature and relative humidity regulation.
- Control and signalling of the status of all the components in the plant.
- Possibility to set and modify the regulation parameters.
- Signalling of possible anomalies of the devices controlled by means of acoustic (BUZZER) and visual (ALARM MASK) signals.
- USER - MACHINE (KEYPAD- DISPLAY) communication interface.
- Possibility of connection to remote supervisor through RS4485 and RS422 serial communication.
- Possibility of connection up to 8 EMIplus units in pLAN with STAND-BY management.
- Possibility to control all EMIplus units, using just 1 DISPLAY.

1.2.Hardware being utilised

- 8-Analog input EMIplus board.
- 4x20 LCD EMIplus terminal.
- Clock board with address (Only for EMIplus board n.1).
- Address board for the other EMIplus boards.

2 - EMIPLUS OPERATOR INTERFACE

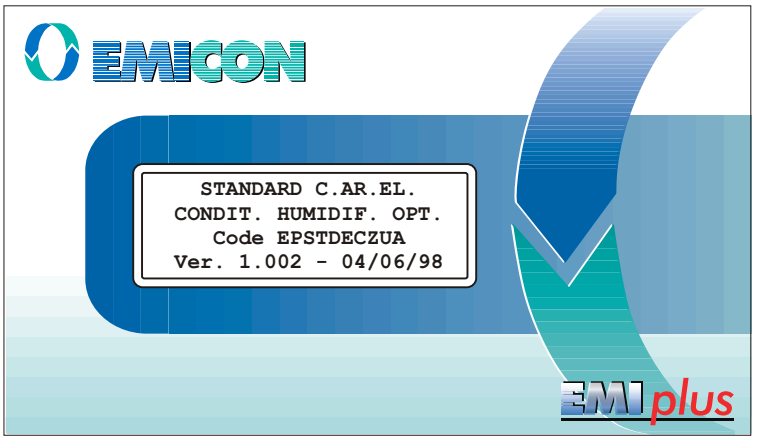
The EMIplus microprocessor control kit is made of the display, the keypad, the Led and the power board.

2.1 The display

All operating information are supplied by means of the terminal through the LCD display where it is shown all values of the quantities controlled, the set-points, the alarm thresholds and also all other general information regarding the variables controlled and their specific configuration.
Special messages appear on the LCD display any time an alarm condition is present.

The display also shows all data detected by the probes, the operating parameters and all other information needed for a complete and accurate regulation.

During normal machine operation the display shows room temperature, room humidity, time and date, if the clock option is present.
All values, either for reading and for setting purpose, are displayed according a tree structure, which can be scrolled by means of the keypad situated on the front side of the user interface.



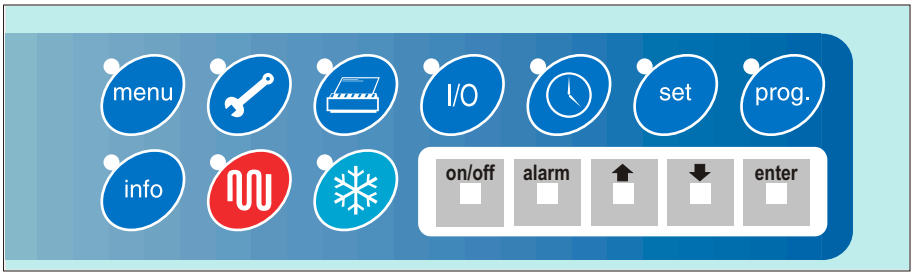
Picture 1

2.2 The keypad

The EMIplus is equipped with a 15-button keypad that along with the display represents the interface between the operator and the system.

The keypad allows the selection and configuration of the set-point limits, alarm thresholds, intervention delays of the alarms etc.

It allows also to scroll the masks and to move inside each of them and select desired values.



Picture 2

The buttons must be pressed with the machine on. The keypad provides the operator with the following functions:

ON / OFF button 

Energises and de-energizes the unit. The unit has to be switched on by this button in order to carry out any control, verification or operation (See Regulation ON/OFF).

ALARM button 

The pressure of this button displays the first active alarm window and simultaneously it switches off the buzzer. A second pressure of this button reactivates the alarm or the active alarm. The display of several alarm masks can be obtained by pressing the arrow buttons 

If there are no active alarms in storage, by pressing this button you go to the window NO ACTIVE ALARM. (See the regulation of the Alarms).

INCREASE button 

DECREASE buttone 

1) Scrolling of the mask branches; when the cursor is on the upper left.
2) Increasing and decreasing the parameters or changing the values, when the cursor is at the beginning of the parameter.

ENTER button 

In the value pre-setting masks, by pressing the button the first time, the cursor goes to the first parameter of the window. When pressing again, the selected parameter is confirmed and the cursor moves to the following parameter. Afterwards, from the last parameter you return to the position on the upper left (cursor in the 0.0 position of the display).

MENU button		Go to the MAIN_MASK window.
INFO button		Go to the M_VERSION window.
MANUT button		Go to the M_VIS_TIMER1 window.
PRINT button		Usable in the version with printer.
I/O button		Go to the M_SYNOPTIC1 window.
CLOCK button		Go to the M_REG_CLOCK window.
SET button		Go to the M_CALC_SETP window.
PROG button		The password is requested. If properly introduced, you move to the M_PARAM_USER13 window.
MENU+PROG button	 	The buttons must be pressed and released simultaneously. The password is requested. If properly introduced, you move to the M_MANUF_PASS window.

Even if the machine has been switched off from the keypad, the electrical board results still powered. Open the main general switch and turn it to 0 position in order to completely isolate the electrical board.

2.3 The led

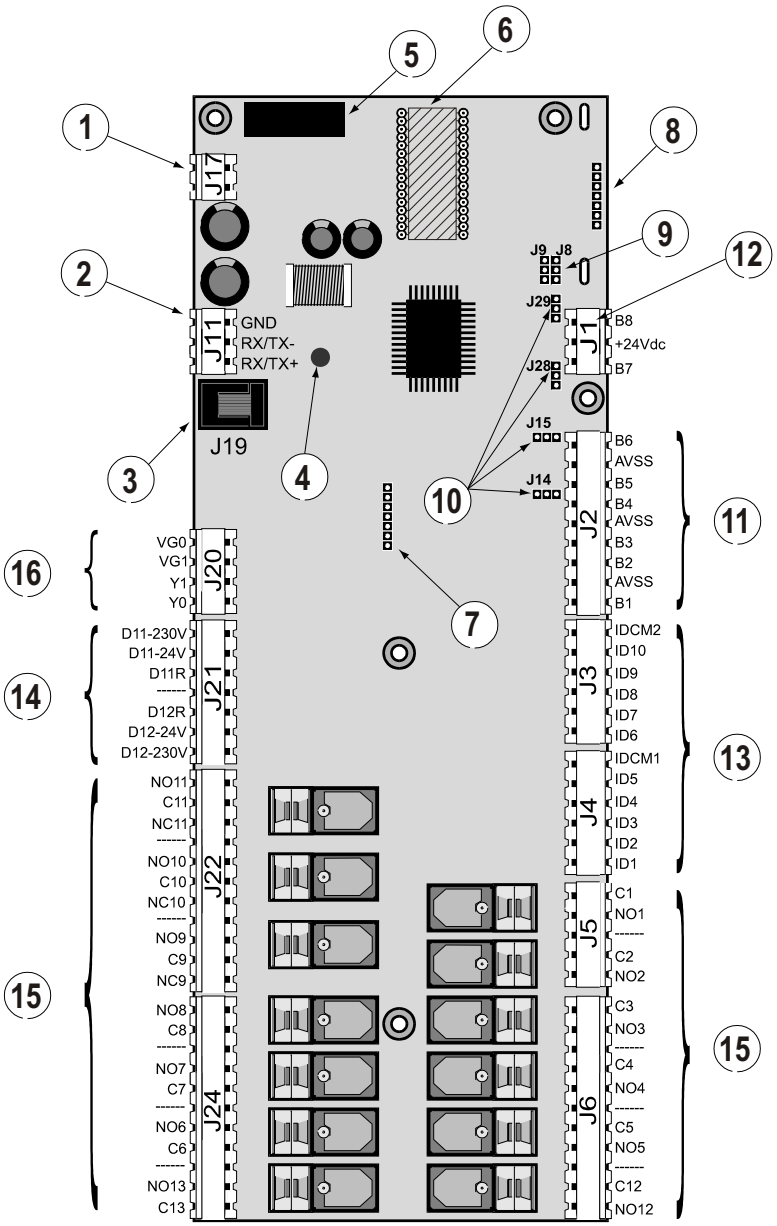
At the side of each button a green LED is found which lights up when the associated button is being pressed and indicates in which group of masks the user is situated.

Three other LED are placed under the rubber buttons and indicate respectively:

ON / OFF button	green LED indicates that the instrument is ON and operating.
ALARM button	red LED indicates the presence of an alarm condition.
ENTER button	yellow LED Indicates that the instrument is properly supplied.

2.4 The EMIplus board

The control board represents the heart of the system, as it contains the microprocessor that executes the control algorithm.



Picture 3

1) Power supply connector 24 Vac 50/60 Hz 15 VA or 24 Vdc, 10 W.

2) EMIplus LAN connector.

3) Telephone-type connector for connection to the User terminal unit (MMI, Man Machine Interface) or to local network.

4) Yellow LED indicating the mains power present.

5) `250 Vac, 2A slow-blow fuse (2TA).

6) EPROM containing the application program.

7) Address/real time clock board (optional).

8) RS422 or RS485 card for connection to serial line for CAREL supervisor and/or telemaintenance network.

9) Jumpers to select the local network communication mode:
- J8 at position 1-2 allows you to connect the board to a terminal unit or, possibly, to the supervisory PC; at position 2-3 allows you to connect the board to the local network;
- J9 at position 1-2 allows the supervisory PC to reset the pCO; at position 2-3 prevents the supervisory PC from resetting the pCO.

10) Jumpers for selecting the analogue inputs: J14=B5; J15=B6; J28=B7; J29=B8.

11) Analogue inputs:
B(n): Analogue input 1÷6 (8 for boards with 8 analogue inputs, code PCOB000**1)
AVSS: Common reference for analogue inputs B(n).
From B1 to B4 preset to accept Carel NTC probes. B5 and B6 can be selected to accept either 0÷1 Vdc or 4÷20 mA signals (see point 10).

12) Additional analogue inputs no.7 and no.8 (only in the boards with 8 analogue inputs) can be selected to accept either 420mA or 01VDC signals.

13) Digital inputs, 24 Vac (10 mA):
ID(n): Digital inputs 1÷10;
IDCM1: Common reference for digital inputs 1÷5;
IDCM2: Common reference for digital inputs 6÷10.

14) Digital inputs available at 230 Vac or 24VAC (10 mA):
ID11-230 Vac, ID12-230 Vac: Digital inputs 11 and 12 for signals at 230 Vac;
ID11-24 Vac, ID12-24 Vac: Digital inputs 11 and 12 for signals at 24 Vac;
ID11R, ID12R: common reference for, respectively, digital inputs ID11 and ID12.

230 VAC signals must not be connected to 24 VAC terminals, as this will damage the board itself.

15) Digital outputs (commutable power 2500 VA, 10A/250 Vac):
NO(n): Normally open contact output(n);
NC(n): Normally closed contact output(n);
C(n): Common contact output(n).

16) Analogue outputs, 0÷10 Vdc:
Y(n): Analogue outputs (0 and 1), 10 mA max;
VG1: External power for analogue outputs (24 Vac or 24 Vdc);
VG0: Reference for power and for the analogue output signal Y0 and Y1.

The "Reference" column indicates the contacts on the EMIlus board.

Table 1 - Input and output I/O

Digital Inputs

REFERENCE	DIGITAL INPUT
ID1 - IDCM1	COMPRESSOR 1 GENERAL ALARM (HIGH PRESSURE OR THERMAL)
ID2 - IDCM1	COMPRESSOR 2 GENERAL ALARM (HIGH PRESSURE OR THERMAL)
ID3 - IDCM1	COMPRESSOR 1 LOW PRESSURE
ID4 - IDCM1	COMPRESSOR 2 LOW PRESSURE
ID5 - IDCM1	DIRTY FILTER SIGNALLING
ID6 - IDCM2	FAN THERMAL
ID7 - IDCM2	AIR FLOW CONTROLLER
ID8 - IDCM2	REMOTE ON / OFF
ID9 - IDCM2	THERMAL RESISTANCE 1
ID10 - IDCM2	THERMAL RESISTANCE 2
ID11 - ID11R	HUMIDIFIER LEVEL CONTACT
ID12 - ID12R	PRESENCE OF FIRE

Analog Inputs

REFERENCE	ANALOG INPUT
B1 - AVSS	AMBIENT TEMPERATURE PROBE
B2 - AVSS	AIR THROW TEMPERATURE PROBE
B3 - AVSS	OUTLET WATER TEMPERATURE PROBE
B4 - AVSS	EXTERNAL AIR / INLET WATER TEMPERATURE PROBE
B5 - AVSS	AMBIENT HUMIDITY PROBE
B7 - AVSS	CURRENT MEASUREMENT PROBE IN THE HUMIDIFIER
B8 - AVSS	HUMIDIFIER INLET-WATER CONDUCTIVITY PROBE

Digital Outputs

REFERENCE	DIGITAL OUTPUT
C1-NO1	DEHUMIDIFICATION
C2-NO2	MAIN FAN - (ACTIVE UNIT)
C3-NO3	ENERGY SAVING VALVE
C4-NO4	HUMIDIFICATION / HUMIDIFIER POWER REMOTE-CONTROL SWITCH
C5-NO5	COMPRESSOR 1 CAPACITY CONTROL / HUMIDIF. WATER-LOAD
C6-NO6	COMPRESSOR 2 CAPACITY CONTROL / HUMID. WATER-DRAIN
C-7-NO7	3 POINT COLD VALVE OPENING / COMPRESSOR 1
C-8-NO8	3 POINT COLD VALVE CLOSING / COMPRESSOR 2
C-9-NO9 or C9-NA9	3 POINT WARM VALVE OPENING / RESISTANCE 1
C10-NO10 or C10-NA10	3 POINT WARM VALVE CLOSING / RESISTANCE 2
C11-NO11 or C11-NA11	GENERIC ALARM SITUATION

Analog Outputs

REFERENCE	ANALOG OUTPUT
VG0 - Y0	COLD WATER RAMP
VG0 - Y1	WARM WATER RAMP

3 - PARAMETERS CONFIGURATION AND MODIFICATION

The parameters are divided into four levels:

A **USER** part, not protected by password, which allows monitoring the quantities being regulated, selecting the set-point of principal control, displaying the active alarms and the stored alarms.

A **USER** part, protected by password, which allows selecting all the control parameters of the various functions and processes managed by the program. Only the parameters regarding functions enabled under manufacturer's password will be displayed and consequently selectable.

A **MAINTENANCE** part, protected by password, intended for the maintenance service, for the hour counter management of the compressors and machine, for the calibration of the connected probes and for forcing of the relay outputs.

A **MANUFACTURER** part, protected by Password, enables the configuration of the system with the selection and activation of the functions of the devices to be controlled.

A wrong configuration of the parameters protected by password can cause damages, also very serious, to the machine and can also generate hazardous situations for persons and properties. For this reason, the configuration of these parameters must be done only by trained and qualified personnel authorised by the manufacturer.

3.1 Parameters configuration

The first 10 buttons of the keypad allow the user to carry out every type of operation, ranging from configuration to simple check of the parameters. The blue and red buttons are not employed. Their function is to select the desired loop (or the chain of masks).
The 5 grey rubber buttons are utilised for configuration or for parameters control. When the operations inside a loop, selected by pressing a button, are completed the simple pressure of another button immediately allow the user to move to another loop of masks.

Some features are common to all of them:

1) A green led next to every button lights up when the button is pressed. The led remains lighted as long as operations are done inside the same loop of masks. The led is essential in case the user forget which loop of masks were initially selected. It is important to note that only one, out of 8 led of the blue buttons, can remain lighted; one lighted led automatically switches the other off. Moreover, the user must remember that it will never happen to have all led switched off, even if no operation is done or even if the machine has just reset from a black-out, the menu mask is always present on the display and therefore it is lighted the led next to the Menu button 

2) The automatic return to the menu mask display and the automatic re-light of the led next to the Menu button are both implemented in the program.
If, for example, the last operation was Printer parameters configuration, the mask employed by the user remains displayed for some minutes and also the Print button  led remains lighted.

Expired the set up time, automatically the led next to the Print button switches off and the one next to the Menu button lights up and the display shows temperature and humidity values.

3) Every loop of masks is structured. This means that pressing a button it is always displayed the first mask of the relevant loop. If the user then moves among the other masks of the loop and for any reasons presses the same button again, the display will shows again the first mask.

MENU BUTTON 

This button allows the display of the values detected from the selected probes (the temperature probe is the only one always present and not selectable).

The operation is:
- press the MENU button once.

Result of the operation:
- the display shows the mask indicating temperature, room humidity, hour, date and status of the machine.

The operation is:
- press the Increase/ Decrease button

Result of the operation:
- cyclical display of the masks of the loop for probes reading.

MAINTENANCE BUTTON 

This button enables to display the zero setting of the total operation hours of the main devices.

The operation is:
-press the Maintenance button once.

Result of the operation:
- the display of the operation hours of the first three selected devices.

The operation is:
-press the Increase/Decrease button.

Result of the operation:
- cyclical display of the masks indicating, for every device (heating elements excluded): hours of operation, thresholds pre-setting and zero setting hours.

Reset of the operation hours: it is necessary to press ENTER in order to reach with the cursor the word "NO". In order to perform the reset operation keep the Increase/Decrease button pressed for few seconds until YES appear. Then release the button and wait for the word NO to appear again.

PRINT BUTTON 

This button enables the printer to work and to select desired parameters.

The operation is:
- press the Print button once.

Result of the operation:
- the display shows a mask for the selection of immediate print. Just press ENTER button to print.

The operation is:
-press the Increase/Decrease button

Result of the operation:
- cyclic repetition of the masks for the selection of immediate print, cyclic print, and the mask for cyclic print break setting.

INPUT / OUTPUT BUTTON 

This button displays the interface card inputs and outputs status.
The operation is:
-press the Input/Output button once.
Result of the operation:
- the display shows the status of all digital inputs.

The operation is:
- press the Increase/Decrease button
Result of the operation:
- the repetition of the masks indicating the status of the digital outputs, analog outputs and digital inputs.
The analog inputs are already read in the Menu branch, therefore they do not appear here in this branch.

Since the digital outputs 7 - 8 - 9 - 10 can manage different devices, according to the selections carried out in the manufacturer branch, the masks I/O will show the name of the device beside the number of its output.

CLOCK / TIMEBANDS BUTTON 

This button allows setting of hour, month, year and time bands.

The operation is:
-press the clock button once.
Result of the operation:
- it appear the mask for setting of the date(day, month, year).

The operation is:
-press the Increase/Decrease button.
Result of the operation:
- the repetition of the masks for time setting, for password configuration to restrict access to the time bands branch, and again date setting.

The operation is:
- press the Enter button once, when in the Password configuration mask .
Result of the operation:
- the display shows the field in which the password must be set. If the password is correctly set, by pressing Enter button time bands branch will show, otherwise it returns to the clock loop.

Time bands pre-setting:
After above operations are done, it will appear a mask asking for time bands activation: in case the answer is Yes, the further masks displayed enable setting of time and set-points for temperature and humidity; while if the answer is No, the first mask of the clock branch will be displayed.

SET BUTTON set

This button allows the configuration of the set-points for room temperature and room humidity regulation.
The operation is:
-press the Set button once.
Result of the operation:
-the display shows the mask for the temperature set-point selection.

The operation is:
-press the Increase/Decrease button.
Result of the operation:
-the display shows the mask for the humidity set-point selection.

PROG BUTTON prog.

This button enables to open the masks where configuring Parameters of the system are operated by the user in order to customise the regulation.

The operation is:
- press the PROG button once.
Result of the operation:
- it is displayed the mask for user password configuration. If the password is correctly set, by pressing Enter button the user branch appear, otherwise the present mask remains.

The operation is:
-press more times Increase/Decrease button.
Result of the operation:
- the display shows a series of masks dedicated to the pre-setting of all the necessary values which control temperature and humidity and to the pre-setting of set-points and differentials for the devices present in the machine.

INFO BUTTON info

The button allows the display of the software version.

The operation is:
-press the Info button once.
Result of the operation:
- the display shows the version of the software.
It enables to switch, in sequence, to the different units, when more than one unit is present in the network.

MANUFACTURER BUTTONS menu prog.

These are the buttons that allow to show the mask for the manufacturer password configuration. If the password is correctly set, it enables to enter the probes activation branch for the connected devices, their main functions and their default pre-setting (standard values).

The operation is:
-press both PROG button and Menu button at the same time for few seconds .
Result of the operation:
- the display shows a mask for the password configuration. If the password is correctly set, by pressing Enter button it enables to enter the probes activation branch, otherwise the password configuration mask will appear.

MANUAL BUTTONS

These buttons pressed together for 3 seconds enable to enter the manual activation of the devices loop.

The operation is:

- press the Menu and Set buttons together for few seconds.

Result of the operation:

- the display shows a mask asking to proceed or not with the manual activation of the devices. If the answer is Yes, it appears a loop of masks that offers the possibility to activate all the devices. These masks can be reached by pressing Increase/Decrease button.

ON/OFF BUTTON

This button allows the machine switch on and switch off.

The operation is:

-press the ON/OFF button once.

Result of the operation:

- the led placed under the button ON/OFF is lighted up: unit switched on (ON);
- the led placed under the button ON/OFF is turned off: unit switched off (OFF).

Even if the unit is switched off from the keypad, the electrical board remains under tension. In order to isolate the electrical board, it is necessary to open the main general switch and rotate it to 0 position.

ALARM BUTTON

This button switches off the buzzer activated by an alarm state and cancels the alarms after the cause that generated it has been removed.

The operation is:

- press the Alarm button once.

Result of the operation:

- If before performing this operation there is no active alarm (led under the Alarm button switched off, buzzer off, and no alarm messages present on the display), the display shows a mask informing about absence of alarms.
The mask disappears when pressing any other button.

- If before performing this operation there is at least one active alarm (led under the Alarm button lighted, buzzer on, and display showing an alarm message), the pressure of the Alarm button switches the buzzer off and let appear on the display the exact alarm message, which can be the only one or the first of a series. At this point it is possible to check if there is more than one active alarm and find which alarm occurs, press the Increase/Decrease button to do that. In case there is more than one active alarm, a list of alarm messages is shown.

- If before carrying out this operation a buzzer switch off has been performed and the display shows an alarm mask, two possibility occurs: if the causes that had generated the alarms are removed the led under the Alarm button switches off and the automatic return to the menu mask is executed (this operation is called Clear); if the causes that had generated the alarms have not been removed yet the buzzer activates.

- If before carrying out this operation a buzzer switch off has been performed and the display shows any mask (not an alarm mask), an immediate jump to the alarm branch occurs, where it is possible to proceed with the Clear operation.

INCREASE / DECREASE BUTTON

This button allows to move among the masks which make up the loop.
If employed after having pressed the Enter button, it enables to set the parameters values.

1) If a loop is made up of masks 1, 2, 3, 4 and 5 and mask 1 is displayed, by pressing more times the Increase button the scrolling of the masks according the order: 1, 2, 3, 4, 5, 1 etc… is shown.
The scrolling of the masks according the order: 1, 5, 4, 3, 2, 1 etc…is shown instead by pressing more times the Decrease button.

2) Referring to the above example, if mask 3 is displayed and the Enter button is pressed, the jump of the cursor from position 0,0 to the numerical field occurs. Push the Increase button to increase the value of the number. Push the Decrease button to decrease the value of the number.

ENTER BUTTON

This button allows to set up values (by means of the Increase/Decrease button) and permit to confirm the data after that they have been inserted.
For example, if a mask like "Pre-setting of temperature set-point" is displayed, by pressing the Enter button the cursor moves from position 0,0 to the numerical field where a figure type 020,0 (20 °C) is present.
The value of this data can be changed by pressing Increase/Decrease button. Pushing the Enter button again the cursor goes back to 0,0 position and at the same time the modified value is stored.

4 - TREE OF THE MASKS

START

```
-WAIT PLEASE-
READING INPUTS
```

Appears when the pCO is switched on. Remains visible for about 5 seconds and is used as a warning to wait for the machine to be initialised.

INFO BUTTON - M_VERSION

```
STANDARD C.AR.EL.
CONDIT. HUMIDIF. OPT.
Code EPSTDECZUA
Ver. 1.002 - 04/06/98
```

Current version of the software.

MENU BUTTON - MAIN_MASK

```
00:00 00/00/00 Unit1
Room temp.    00.0°C
Room humid    00.0%
```

Displays the current working modes of temperature and humidity.

WORK_MODE

```
Working mode
■Cooling ■Heating
■Humid   ■Dehumid
```

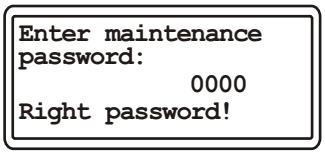
Displays the current working mode. The blackened box means that the specific function at issue is now activated.

MAINTENANCE BUTTON - M_VIS TIMER1

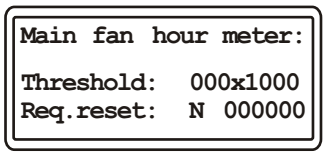
```
Operating hours:
Main fan      000000
Compressor 1  000000
Compressor 2  000000
```

Shows the operating time of the equipment/s.

M_MAINT_PASS

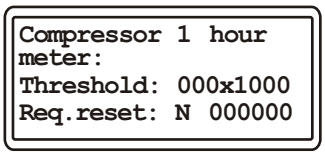


M_SEL_TIMER1



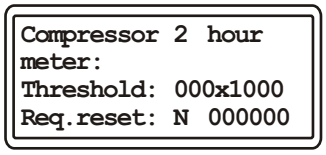
Pre-setting of the fan time operating time established before the maintenance.

M_SEL_TIMER2



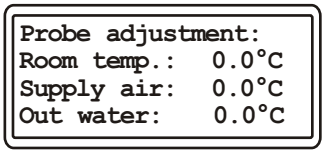
Pre-setting of the fan time operating time established before the maintenance.

M_SEL_TIMER3



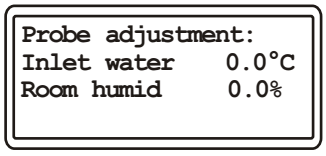
Pre-setting of the fan time operating time established before the maintenance.

M_CALIBRATION1



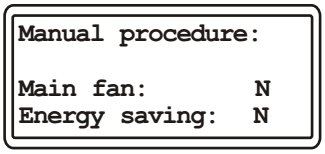
Probe calibration window no. 1.

M_CALIBRATION2



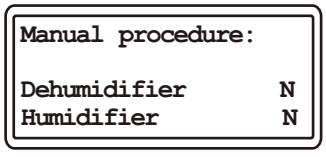
Probe calibration window no. 2.

M_MANUAL1



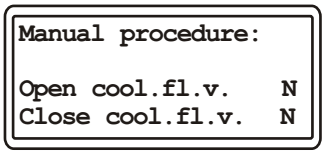
Manual activation of the devices.

M_MANUAL2



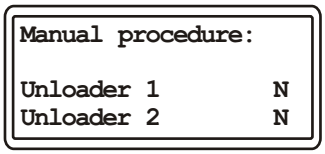
Manual activation of the devices.

M_MANUAL3



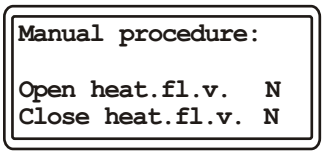
Manual activation of the devices.

M_MANUAL4



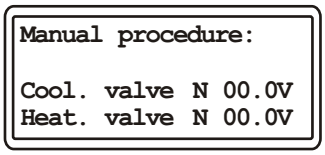
Manual activation of the devices.

M_MANUAL5



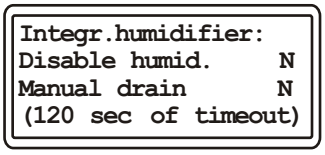
Manual activation of the devices.

M_MANUAL6



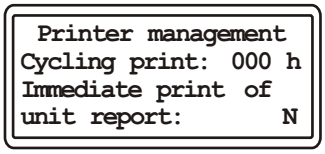
Manual activation of the devices.

M_DISABLE_HUMID



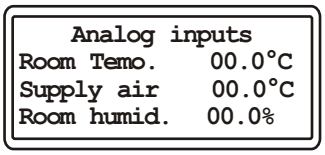
Integrated humidifier disabling. Manual drainage activation (maximum 120 sec.).

PRINTER BUTTON - M_PRINTER



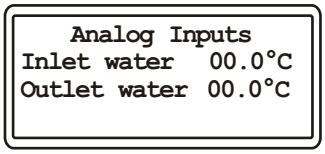
Time interval for the cyclic print. Activation / forcing of a print.

I/O BUTTON - M_SYNOPTIC1



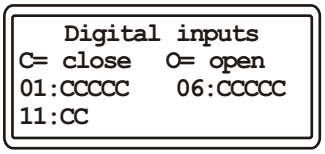
Displays the state of the analog inputs and outputs.
It is displayed with the I/O button.

M_SYNOPTIC2



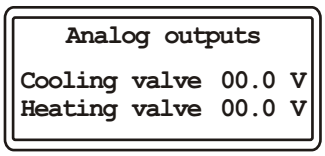
Displays the state of the analog inputs and outputs.
It is displayed with the I/O button.

M_SYNOPTIC3



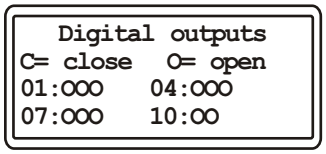
Displays the state of the analog inputs and outputs.
It is displayed with the I/O button.

M_SYNOPTIC4



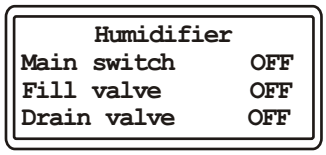
Displays the state of the analog inputs and outputs.
It is displayed with the I/O button.

M_SYNOPTIC5



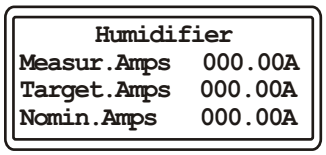
Displays the state of the analog inputs and outputs.
It is displayed with the I/O button.

M_SYNOPTIC6



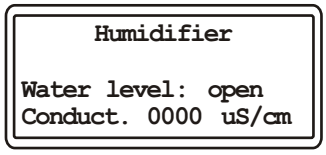
Displays the state of the analog inputs and outputs.
It is displayed with the I/O button.

M_SYNOPTIC7



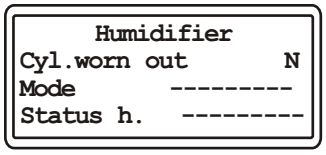
Current absorbed by the humidifier.
Current to be maintained.
Maximum current allowed by the cylinder.

M_SYNOPTIC8



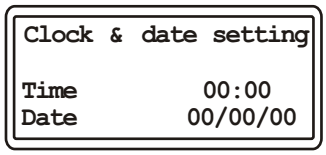
Current absorbed by the humidifier.
Current to be maintained.
Maximum current allowed by the cylinder.

M_SYNOPTIC9



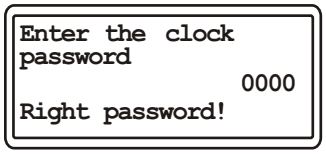
Current absorbed by the humidifier.
Current to be maintained.
Maximum current allowed by the cylinder.

CLOCK BUTTON - M_REG_CLOCK

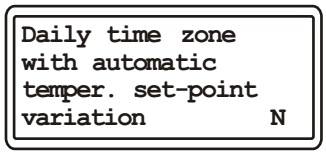


Regulation of the internal clock (it is necessary to mount the watch card).

M_CLOCK_PASS

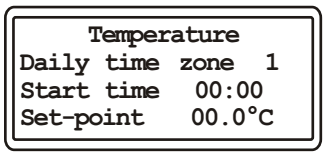


M_DAILY_TEMP



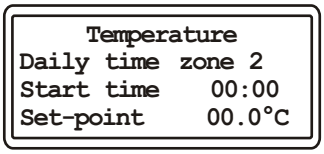
Enabling of the automatic operation with change of the temperature set-point.

M_DAILY1_TEMP



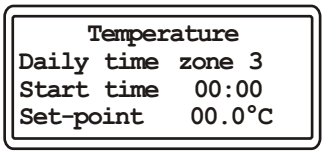
Pre-setting of the time band no. 1.
The time band starting hour and the relevant temperature set-point will be selected.
The time band ending will be the beginning of the following one.

M_DAILY2_TEMP



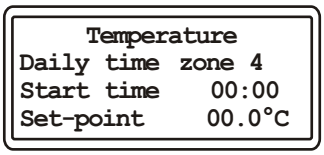
Pre-setting of the time band no. 2.
The time band starting hour and the relevant temperature set-point will be selected.
The time band ending will be the beginning of the following one.

M_DAILY3_TEMP



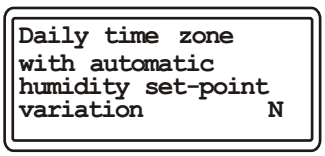
Pre-setting of the time band no. 3.
The time band starting hour and the relevant temperature set-point will be selected.
The time band ending will be the beginning of the following one.

M_DAILY4_TEMP



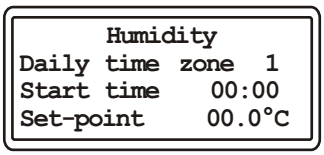
Pre-setting of the time band no. 4.
The time band starting hour and the relevant temperature set-point will be selected.
The time band ending will be the beginning of the following one.

M_DAILY_HUMID



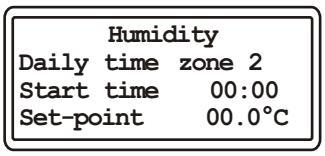
Enabling of the automatic operation with change of the humidity set-point.

M_DAILY_HUMID1



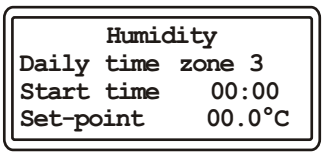
Time band no. 1 pre-setting.
The band hour-start and relevant humidity set-point will be preset. The end of the time band will be the start of the following one.

M_DAILY_HUMID2



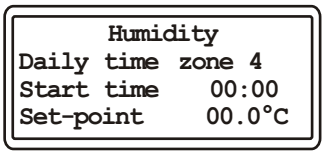
Time band no. 2 pre-setting.
The band hour-start and relevant humidity set-point will be preset. The end of the time band will be the start of the following one.

M_DAILY_HUMID3



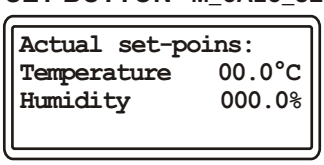
Time band no. 3 pre-setting.
The band hour-start and relevant humidity set-point will be preset. The end of the time band will be the start of the following one.

M_DAILY_HUMID4



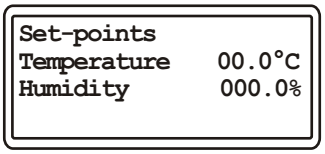
Time band no. 4 pre-setting.
The band hour-start and relevant humidity set-point will be preset. The end of the time band will be the start of the following one.

set **SET BUTTON - M_CALC_SETP**



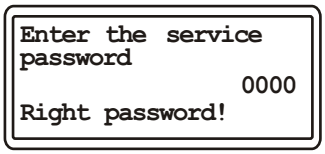
Displays the values of the active set-points (if the functions are active of time and temperature compensation and humidity or compensation).

M_SELECT_SETP

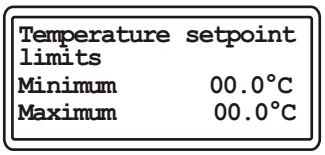


Change of the set-points. The values must be included within the limits being preset in the M_PARAM-USERx masks.

PROG BUTTON - M_SERV_PASS

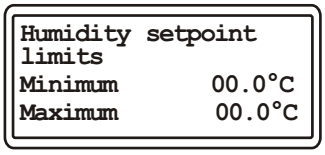


M_PARAM_USER1



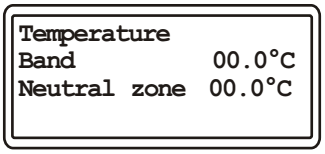
Presetting of the temperature set-point limits.

M_PARAM_USER2



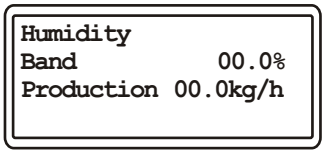
Presetting of the humidity set-point limits.

M_PARAM_USER3



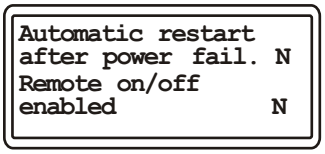
Presetting of the proportional band and of the neutral zone for the temperature regulation.

M_PARAM_USER4



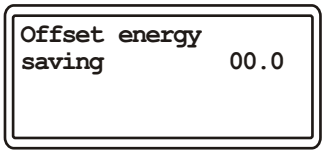
Humidity proportional band.
Maximum preset production.

M_PARAM_USER5



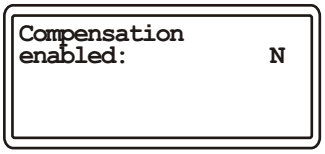
Automatic start enabling after voltage drop.
Enabling / disabling ON/OFF remote (from digital input).

M_PARAM_USER6



Presetting of the offset parameter energy saving.

M_PARAM_USER7



Enabling of the temperature set-point compensation.

M_PARAM_USER8

```
Compensation:
Setpoint      00.0°C
Band          00.0°C
Offset        00.0°C
```

Parameters for the compensation.

M_PARAM_USER9

```
Room temperature
alarms:
Offset low    00.0°C
Offset high   00.0°C
```

Values that limit the temperature range.

Value to be subtracted from the temperature set-point.
Value to be added to the temperature set-point.

M_PARAM_USER10

```
Room humidity
alarms:
Offset low    000.0%
Offset high   000.0%
```

As above for the humidity.

M_PARAM_USER11

```
Outlet water temp.
thresholds alarms
Low           00.0°C
High          00.0°C
```

Values within which the outlet water temperature has to be maintained.

M_PARAM_USER12

```
Identific.address
for supervisor
system network:
                 000
```

Address for the serial connexion to an external supervisory system.

M_PARAM_USER13

```
Enter new service
password
             0000
```

New user password presetting.

menu + prog.

MENU+PROG BUTTON - M_MANUF_PASS

```
Enter manufacturer
password
             0000
Right password!
```

M_MANUF_MENU

```
Unit configuration
General parameters
Timing
Unit initializat.
```

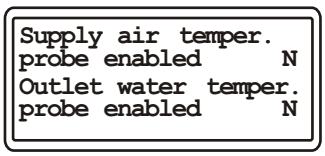
Submenu of the manufacturer's branch.
To preset the item being requested you move downwards with arrow and presetting is made with ENTER.

M_MANUF_CONF1

```
Clock board       N
Printer           N
Supervisor board  N
```

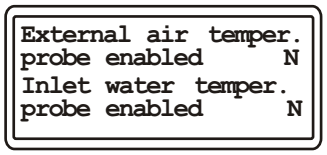
The devices present in the machine are enabled.

M_MANUF_CONF2



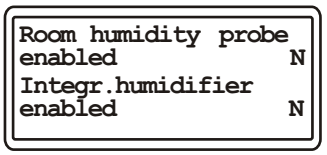
The devices present in the machine are enabled.

M_MANUF_CONF3



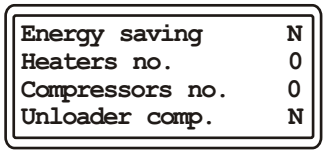
The devices present in the machine are enabled.

M_MANUF_CONF4



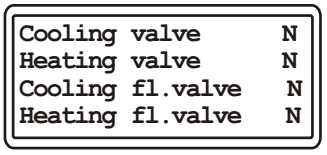
The devices present in the machine are enabled.

M_MANUF_CONF5



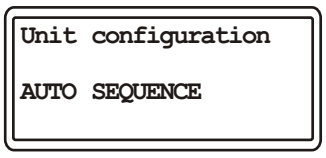
The devices present in the machine are enabled.

M_MANUF_CONF6



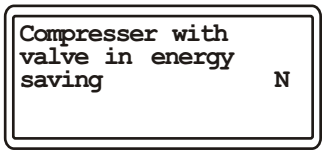
The devices present in the machine are enabled.

M_MANUF_CONF7



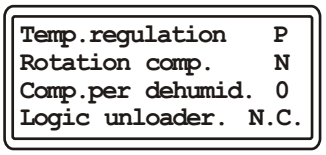
Select if the unit will work in rotation (Auto Sequence) or indipendently (Stand-Alone).

M_MANUF_PARAM1



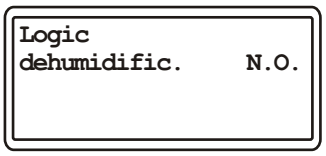
In this window, if at least one compressor is installed, it is specified if the valve will be operating in energy saving with the compressors.

M_MANUF_PARAM2



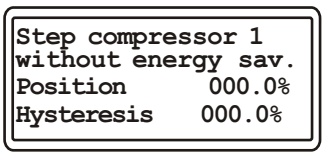
If two compressors are instassed, operation in rotation of the compressors; no. of compressors for the dehumidification; capacity control logic: normally closed or normally open.
The regulation proportional (P) or proportional + integral (P + I).

M_MANUF_PARAM3



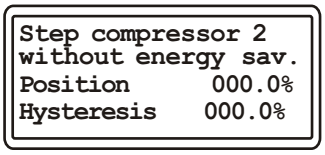
Logic of the dehumidification relay.

M_MANUF_PARAM4



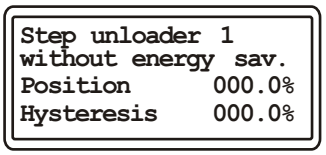
Positioin of the steps with respect to the proportional band. To better understand the function go to the paragraph "Concept of step", see "regulation graphs".

M_MANUF_PARAM5



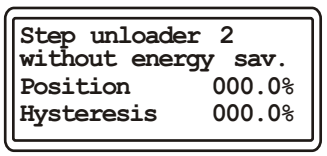
Positioin of the steps with respect to the proportional band. To better understand the function go to the paragraph "Concept of step", see "regulation graphs".

M_MANUF_PARAM6



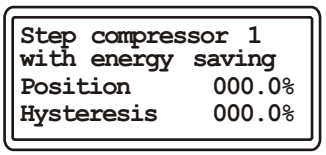
Positioin of the steps with respect to the proportional band. To better understand the function go to the paragraph "Concept of step", see "regulation graphs".

M_MANUF_PARAM7



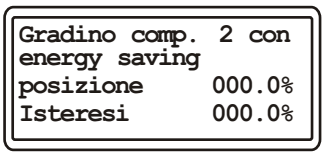
Position of the steps with respect to the proportional band. To better understand the function go to the paragraph "Concept of step", see "regulation graphs".

M_MANUF_PARAM8



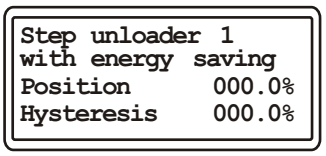
Parameters relevant to the position of the compressors, capacity controls with energy saving. See "Unit with a compressor in energy saving".

M_MANUF_PARAM9



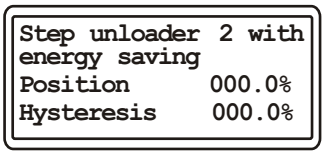
Parameters relevant to the position of the compressors, capacity controls with energy saving. See "Unit with a compressor in energy saving".

M_MANUF_PARAM10



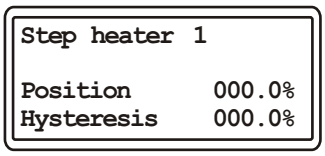
Parameters relevant to the position of the compressors, capacity controls with energy saving. See "Unit with a compressor in energy saving".

M_MANUF_PARAM11



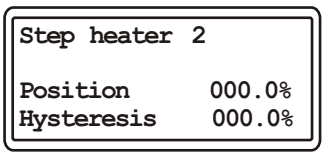
Parameters relevant to the position of the compressors, capacity controls with energy saving. See "Unit with a compressor in energy saving".

M_MANUF_PARAM12



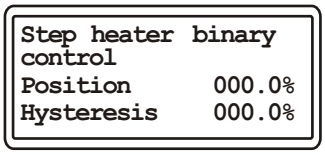
Presetting of the step relevant to the resistance heating. See paragraph "Concept of step".

M_MANUF_PARAM13



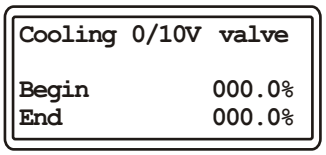
Presetting of the step relevant to the resistance heating. See paragraph "Concept of step".

M_MANUF_PARAM14



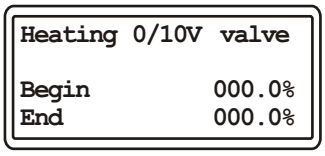
Presetting of the step relevant to the resistance heating. See paragraph "Concept of step".

M_MANUF_PARAM15



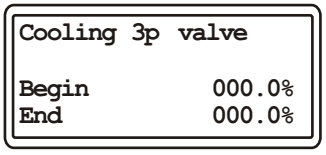
Parameters for the regulation of the 0/10V modulating cooling valve type. The operating features are described in the paragraph "Temperature regulation graphs".

M_MANUF_PARAM16



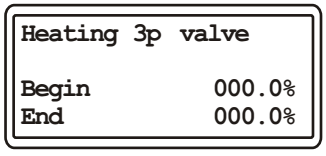
Parameters for the regulation of the 0/10V modulating cooling valve type. The operating features are described in the paragraph "Temperature regulation graphs".

M_MANUF_PARAM17



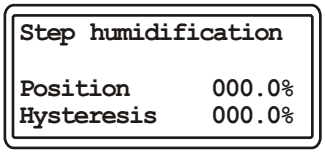
Parameters for the three-point modulating valve. See "Temperature regulation graphs".

M_MANUF_PARAM18



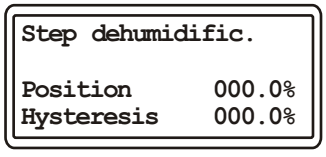
Parameters for the three-point modulating valve. See "Temperature regulation graphs".

M_MANUF_PARAM19



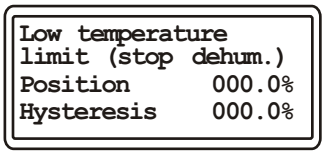
Humidification step regulation.
See "Humidity control graphs".

M_MANUF_PARAM20



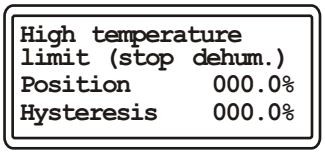
Humidification step regulation. See "Humidity control graphs".

M_MANUF_PARAM21



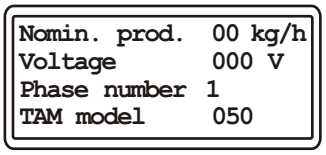
Dehumidification stop step.
See "Humidity control graphs".

M_MANUF_PARAM22



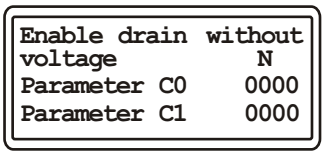
Dehumidification stop step.
See "Humidity control graphs".

M_MANUF_PARAM23



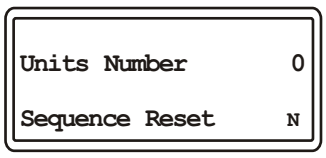
Parameters for the identification of humidifier type.

M_MANUF_PARAM24



Enabling of the drain without voltage.

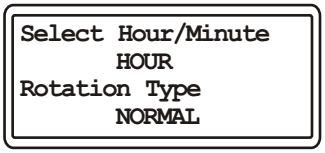
M_MANUF_PARAM25



Select total Unit's number engaged for rotation.

Rotation's Reset and restart.

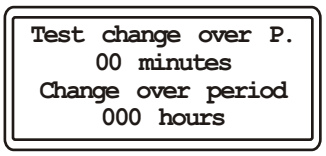
M_MANUF_PARAM26



Select rotation cycle: Hours (normal) or Minutes (test).

Rotation can be cyclic (1, 2, 3, 1, 2...) or depending by the unit who have the major amount of Running Hours.

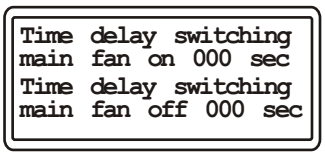
M_MANUF_PARAM27



Select minutes number for Rotation test.

Select Rotation hours.

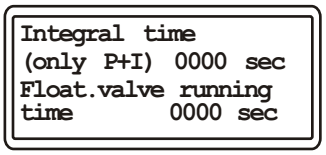
M_MANUF_TIME1



Fan start time delay.

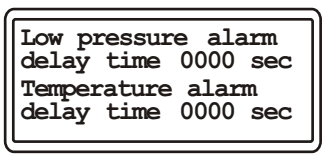
Fan stop time delay.

M_MANUF_TIME2



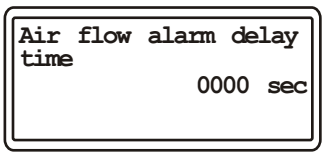
Constant for the temperature control proportional + integral.
Three point modulating valve opening time.

M_MANUF_TIME3



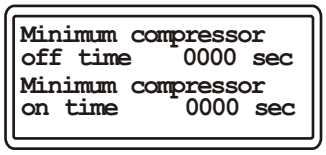
Low pressure alarm delay.
Starts when the compressor starts.
High / low humidity alarm delay.

M_MANUF_TIME4



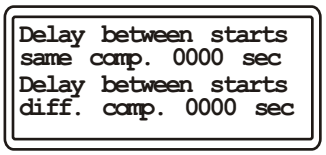
Air flow controller acquisition delay.

M_MANUF_TIME5



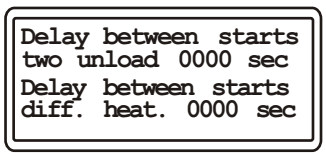
Compressor timing.

M_MANUF_TIME6



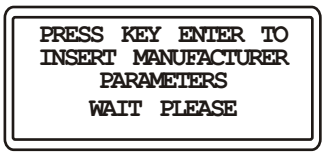
Compressor timing.

M_MANUF_TIME7



Resistance timing.

M_DEFAULT



Storage loading of the factory values.
See table "Programmable sets".

M_PASS_MANUF

5 - ALARMS

The alarm state is shown in all masks where "AL" is found on the upper right corner of the display and enables to see all masks containing news in relation to the occurred fault.

Every state of alarm is signalled:
- acoustically by the buzzer incorporated into the EMIplus relay card;
- visually by the LED lighting of the ALARM button.

It is possible to recall a message relevant to an alarm occurred by pressing the *ALARM* button. To re-set the alarms simply press the ALARM button when an alarm window is displayed.

The alarms are divided into three categories:

	LED signalling	Window signalling	Remote signalling	Stops the unit	Stops the device
Serious alarms	yes	yes	yes	yes	yes
Device alarms	yes	yes	yes	no	no
Signalling alarms	yes	yes	yes	no	no

AL_1

```
AL01  00:00 00/00/00
   Compressor 1
  General Alarm
```

High pressure alarm or thermal of the compressor number 1.

AL_2

```
AL02  00:00 00/00/00
   Compressor 2
  General Alarm
```

High pressure alarm or thermal of the compressor number 1.

AL_3

```
AL03  00:00 00/00/00
   Low pressure
Circuit 1 Pressostat
```

AL_4

```
AL04  00:00 00/00/00
   Low pressure
Circuit 2 Pressostat
```

AL_5

```
AL05  00:00 00/00/00
  Air Flow Alarm
  (serious alarm)
     UNIT OFF
```

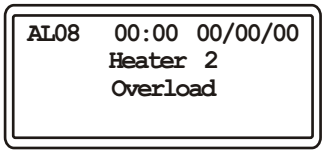
AL_6

```
AL06  00:00 00/00/00
 Main Fan Overload
  (serious alarm)
     UNIT OFF
```

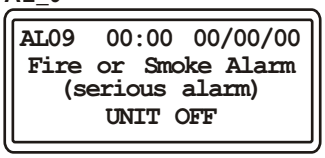
AL_7

```
AL07  00:00 00/00/00
 Heater 1 Overload
```

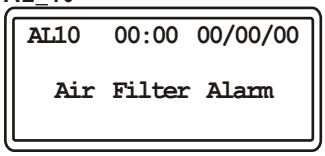
AL_8



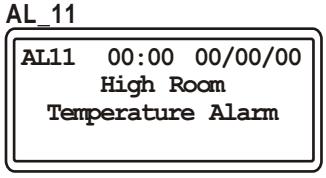
AL_9



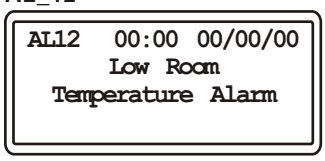
AL_10



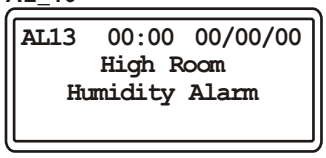
AL_11



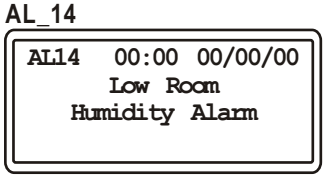
AL_12



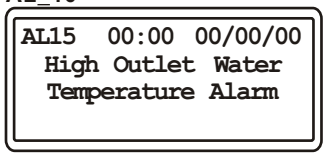
AL_13



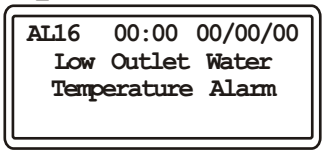
AL_14



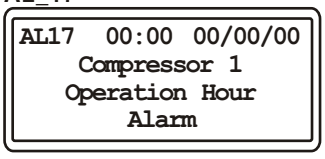
AL_15



AL_16

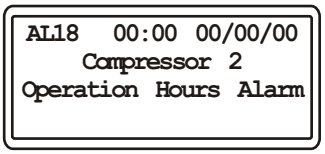


AL_17



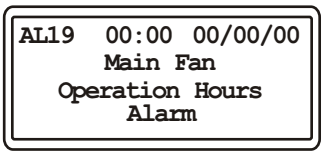
The operating threshold preset in the maintenance branch has been exceeded.

AL_18



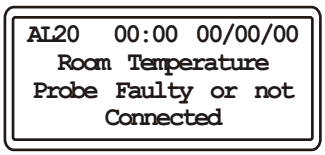
The operating threshold preset in the maintenance branch has been exceeded.

AL_19

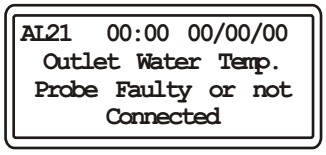


The operating threshold preset in the maintenance branch has been exceeded.

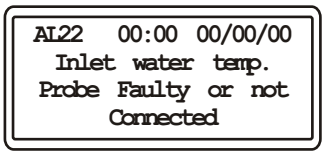
AL_20



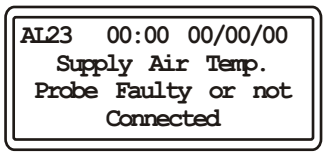
AL_21



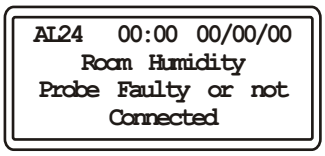
AL_22



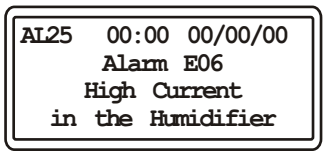
AL_23



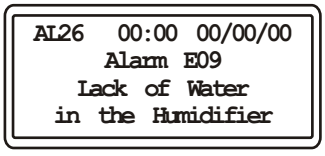
AL_24



AL_25



AL_26



AL_27

```
AL27   00:00 00/00/00
      Alarm E10
   Lack of Current
  in the Humidifier
```

AL_28

```
 AL28   00:00 00/00/00
     Clock Board
    Faulty or not
      Connected
```

AL_29

```
AL29   00:00 00/00/00
    EPROM Faulty
   Call Assistance
```

6 - LIST OF THE PROGRAMMABLE SETS

Following table shows the factory configured value (value column) for all different parameters.

Factory values being taken as machine parameters whenever initialising the unit (M_MANUF_MENU, M_DEFAULT mask), are shown in the PRE-SET column.

SELECTABLE QUANTITIES	LEVEL	RANGE	PRE-SET
Fan hour threshold		**0 / 999 (x1000)**	**200h**
Compressor 1 hour threshold		**0 / 999 (x1000)**	**100h**
Compressor 2 hour threshold		**0 / 999 (x1000)**	**100h**
Temperature probe calibration		**-99°C / 99°C**	**0°C**
Delivery air temp. probe calibration		**-99°C / 99°C**	**0°C**
Outlet water probe calibration		**-99°C / 99°C**	**0°C**
External air temp. probe calibration		**-99°C / 99°C**	**0°C**
Manual procedure			
Fan			**N**
Energy saving			**N**
Dehumidifier			**N**
Humidifier			**N**
Compressor 1			**N**
Compressor 2			**N**
Resistance 1			**N**
Resistance 2			**N**
Cold fan		**0 / 10.0V**	**N 0V**
Warm fan		**0 / 10.0V**	**N 0V**
Temperature set-point		**variable**	**23°C**
Humidity set-point		**variable**	**50%**
Temperature minimum set-point limits		**-99.9 / 99.9°C**	**-99.9°C**
Temperature maximum set-point limits		**-99.9 / 99.9°C**	**99.9°C**
Humidity minimum set-point limits set-point		**0%**	**0%**
Humidity minimum set-point limits		**100%**	**100%**
Temperature band		**0 / 99.9°C**	**3°C**
Temperature neutral zone		**0 / 99.9°C**	**0°C**
Humidity band		**0 / 99.9%**	**10%**
Capacity		**variable**	**3 kg/h**
Automatic restart after voltage drop			**N**
Remote ON/OFF enabling			**N**
Compensation enabling			**N**
Compensation set-point		**-99.9 / 99.9**	
Compensation band		**-99.9 / 99.9**	

SELECTABLE QUANTITIES	LEVEL	RANGE	PRE-SET
Compensation offset		**-99.9 / 99.9**	
Temperature alarm			
low offset		**0 / 100°C**	**10°C**
high offset		**0 / 100°C**	**10°C**
Humidity alarm			
low offset		**0 / 100%**	**20%**
high offset		**0 / 100%**	**30%**
Outlet water temperature threshold alarm			
low offset		**-99.9 / 99.9°C**	**2°C**
high offset		**-99.9 / 99.9°C**	**20°C**
Print repetition		**0 / 999h**	**24h**
Temperature set-point automatic variation			**N**
Temperature time band (1-4)			
Start time		**00:00 / 23:59**	**00:00**
Set-point		**variable**	**0°C**
Humidity time band (1-4)			
Start time		**0:00 / 23:59**	**00:00**
Set-point		**variable**	**0%**
(MANUFACTURER'S PARAMETERS)			
Clock card enabling			**N**
Printer enabling			**N**
Supervisory system enabling			**N**
Delivery air probe enabling			**N**
Outlet water probe enabling			**S**
External air probe enabling			**N**
Inlet water probe enabling			**N**
Humidity probe enabling			**S**
Integrated humidifier enabling			**N**
Energy Saving enabling			**N**
No. resistance		**0 / 2**	**2**
No. compressors		**0 / 2**	**2**
Compressor capacity control enabling			**N**
Cold modulating valve enabling			**S**
Warm modulating valve enabling			**S**
Cold 3 point valve enabling			**N**
Warm 3 point valve enabling			**N**
Configuration Unit Type		**Rotation / Stand-Alone**	**Rotation**
Regulation time		**Prop. / Prop.+Integral**	**Prop.**
Dehumidification logic			**Normal - Open**
1/2 compressor step with/without Energy Saving			
Position		**0 / 100 %**	**0%**
Hysteresis		**0 / 100 %**	**100%**
1/2 capacity control step with/without Energy Saving			
Position		**0 / 100 %**	**0%**
Hysteresis		**0 / 100 %**	**100%**
1/2/binary resistance step			
Position		**0 / 100 %**	**0%**
Hysteresis		**0 / 100 %**	**100%**
Cold modulating valve			

SELECTABLE QUANTITIES	LEVEL	RANGE	PRE-SET
Start		0%	0%
End		100%	100%
Warm modulating valve			
Start		0%	0%
End		100%	100%
Colt 3 point valve			
Start		0 / 100%	0%
End		0 / 100%	100%
Warm 3 point valve			
Start		0 / 100%	0%
End		0 / 100%	100%
Humidification step			
Position		0 / 100%	50%
Hysteresis		0 / 100%	50%
Dehumidification step			
Position		0 / 100%	50%
Hysteresis		0 / 100%	50%
Low temp. limit (stop dehumidification)			
Position		0 / 100%	50%
Hysteresis		0 / 100%	35%
High temp. Limit (stop dehumidification)			
Position		0 / 100%	50%
Hysteresis		0 / 100%	35%
Humidifier nominal capacity		0 / 42	3 kg/h
Humidifier Voltage		0 / 660	220V
Humidifier phase No.		1 o 3	1
Humidifier TAM model		50 / 700	100
Drain enabling withour voltage			N
C0 parameter		0 / 1000	93
C1 parameter		0 / 1000	75
Number of units engaged for rotation		1 / 8	0
Rotation's Reset		0 / 1	0
Select Hours / Minutes of rotation		Hours / Minutes	Hours
Rotation's type		Cyclic / Running Hours	Cyclic
Rotation Cycle Test		1 / 10	0
Rotation Cycle Time		1 / 168	0
Fan start delay time		0 / 999	10 sec.
Fan stop delay time		0 / 999	20 sec.
Integration time		0 / 9999	600 sec.
3 point valve opening time		0 / 9999	180 sec.
Low pressure alarm delay		0 / 9999	180 sec.
Probe alarm delay (temperature, humidity, outlet water)		0 / 9999	600 sec.
Air flow controller alarm delay		0 / 9999	10 sec.
Delay between 2 capacity controller start		0 / 9999	10 sec.
Delay between different resistance start		0 / 9999	3 sec.

7 - NETWORK CONNECTION

Every pLAN device must be addressed to be identified by the other ones. In case two or more devices have the same identifying address the network cannot work.
Since the terminals and the boards have the same type of address, it cannot exit the same identifying address assigned to EMIplus board and terminal.
The max address number selectable is in the 1-16 range for the Terminals and 1-16 for the I/O boards.
Because of hardware characteristics it is possible to connect up to 16 addresses.
A example of combinations could be : **8 Terminals + 8 I/O boards**
The terminals are addressed by means of the dip-switch placed on the rear, while for the I/O boards it is the optional pLAN card is necessary.

7.1 I/O Board address

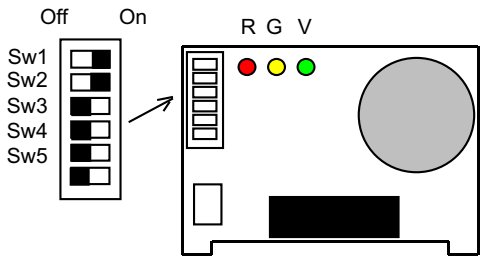
The optional pLAN card is available in two different version:

- dip-switch and led only;
- dip-switch, led and calendar clock;

These cards must be present on every EMIplus I/O board for a correct networking.

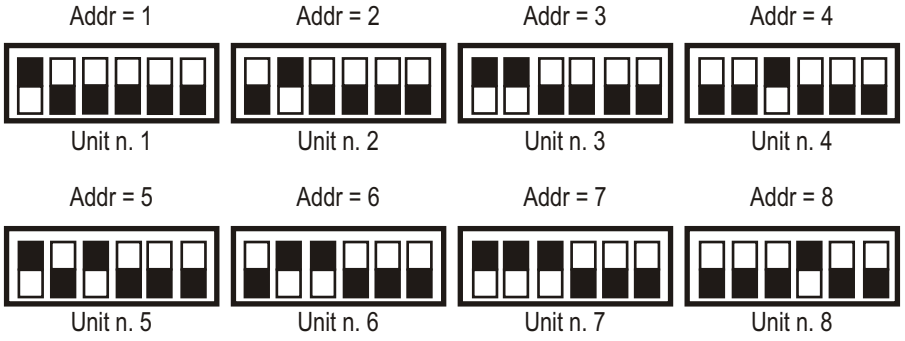
Adr	Sw1	Sw2	Sw3	Sw4
0	not possible			
1	on	off	off	off
2	off	on	off	off
3	on	on	off	off
4	off	off	on	off
....	....	....	....	....
15	off	on	on	on
16	on	on	on	on

	Sw1		Sw2		Sw3		Sw4	
State	off	on	off	on	off	on	off	on
P	0	1	0	2	0	4	0	8
Addr=P(Sw1)+P(Sw2)+P(Sw3)+P(Sw4)								



Picture 4

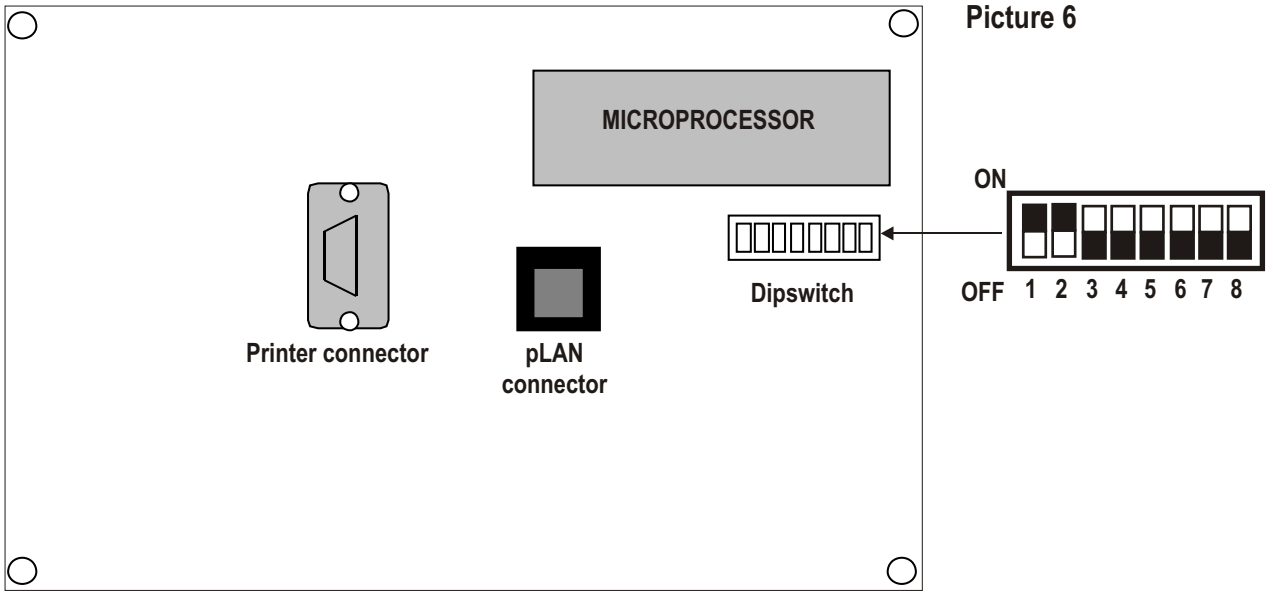
In the application standard air conditioning + humidifier unit, the addresses for the EMIplus board are the following:



Picture 5

7.2 Terminals address selection

Terminal board rear side view.

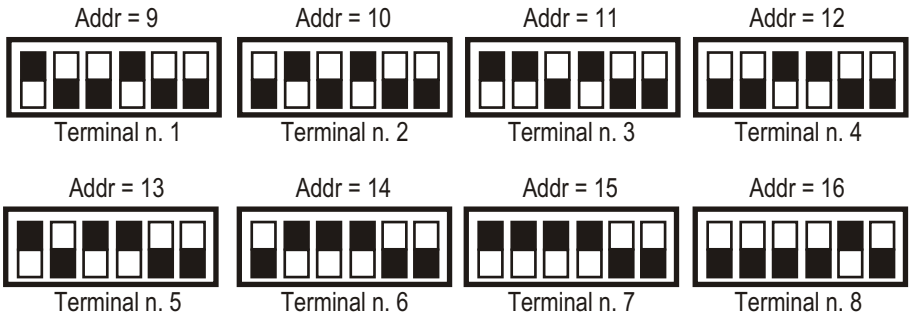


Picture 6

Terminal address is programmed by means of the dip-switches set on the Terminal board rear side.
Terminal address is selectable in the 1-16 range using the 1-5 dip-switch.
Refer to the addressing table below for setting Terminal address (see also previous chapter):

	Sw1		Sw2		Sw3		Sw4		Sw5	
State	off	on	off	on	off	on	off	on	off	on
P	0	1	0	2	0	4	0	8	0	16
Addr=P(Sw1)+P(Sw2)+P(Sw3)+P(Sw4)+P(Sw5)										

In the application standard air conditioning + humidifier unit, the terminals of the 8 EMIplus relay must have address higher than 8:

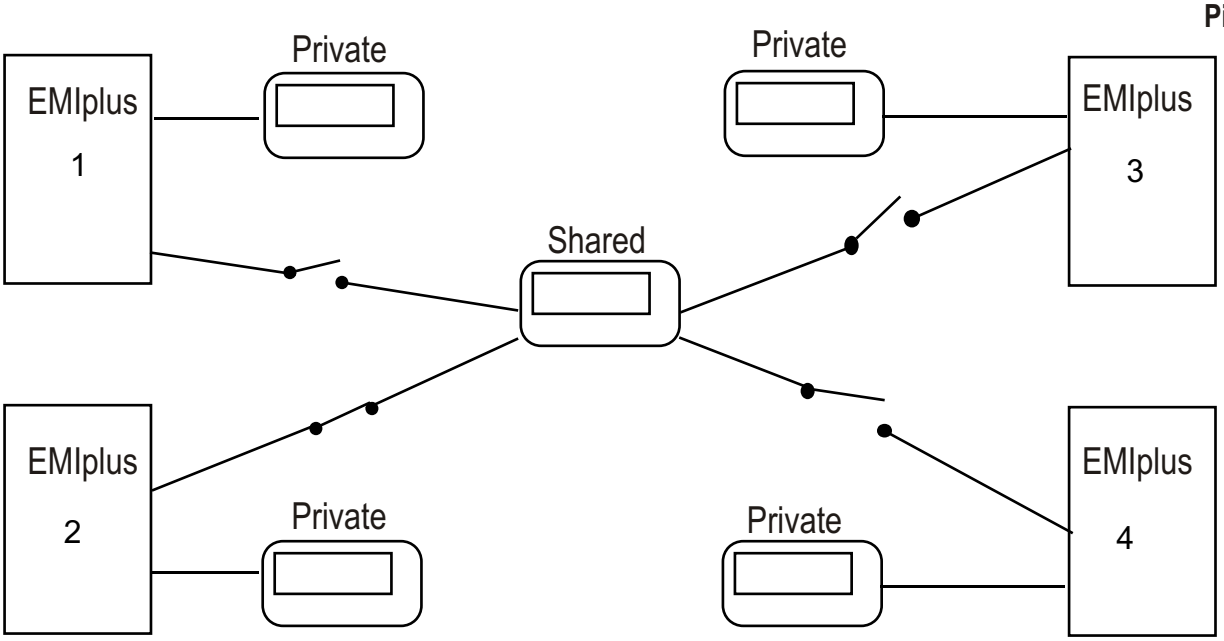


Picture 7

7.3 Terminals management

- A maximum number of three (3) terminals can be software-driven by only one EMIplus board linked to the network. The messages appear on the display simultaneously and not independently; just like keyboards and displays in parallel connexion.
- Every terminal linked to a board can be PRIVATE or SHARED.
- A terminal is PRIVATE if it is dedicated to work with only one I/O board and shows its output.
- A terminal is SHARED, in automatic mode or by keyboard, if it can be associated to more control boards.
- Every EMIplus keeps up to date the PRIVATE terminal display, while if there is a SHARED terminal, this is updated only if the EMIplus actually keeps it under control. The logical point of view is showed in the diagram below:

Picture 8



- In the above example the shared terminal is associated to 4 I/O boards, but only board 2 can display data and receive commands from the keypad. Switching among boards occurs in cyclic sequence (12341...), by pressing the button info
- Switching can also take place automatically upon direct request of the program. For example, a I/O board can demand the control of the shared terminal in order to display alarms or, to the contrary, pass the control over to following card when pre-set time expire(cyclic rotation).

In the standard configuration air conditioners + humidifiers the user can have two possibilities. The first is to have a private terminal for every EMIplus boards. The second is to have only one terminal (number 16) shared among all units. A mixed configuration is also possible, i.e., private terminals plus one shared.

The number and the type of terminals is established during initial network configuration. The relevant data are stored in the EPROM memory of each I/O board.

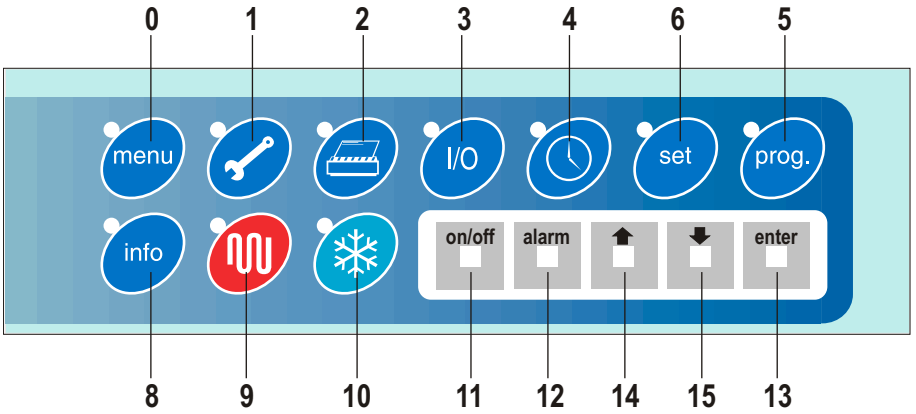
7.4 pLAN configuration procedure

- At start up of a pLAN network or at I/O board replacement the first operation to carry out is to activate the procedure for terminals configuration.
- Before beginning this procedure make sure that to every I/O board and to every terminal have been assigned their correct address established during the planning of the network. It is important to remember that the address set through the dip-switch is stored only if a re-set of the device is carried out. In case of wrong address assignment (more cards with the same address) it is a good practice to carry out a general re-set of all the devices present in the network.
- The configuration procedure must be activated for every I/O board and must involve all terminals of the network. Such procedure can be activated from any terminal, even from a temporary one connected just to carry out the configuration operations and later removed.

The operations to perform are the following:

Stage 1: I/O board selection

- The procedure is activated by pushing simultaneously the keys 0-1-2 for at least 5 seconds (the same function is activated also by the keys 14, 15 and 13):



Picture 9

- This mask appears on the display:

Terminal Adr: nn I/O Board Adr: 01

Terminal Adr is not changeable.
It represents the address set on the dip-switch on the rear side of the Terminal.

I/O Board Adr field shows the EMIplus board address that is connected to the Terminal.
If no EMIplus board is connected with the Terminal a **'--'** is shown.
Push Arrow Keys for changing it.

The value shown during the selection are the addresses of the boards.
If no EMIplus board is active at that moment it is not possible to change the **'--'** displayed .

Enter: Exit from the STAGE 1 procedure. STAGE 2 first mask appears.
The configuration procedure is automatically cleared if no key is pushed within 15 seconds from the former key-stroke.

STAGE 2: Selection of Terminals associated

The masks displayed are:

```
Terminal Config

Press ENTER
to continue
```

Enter

```
P:01  Adr    Priv/Shared
Trm1  09       Pr
Trm2  none      --
Trm3  16       Sh  Ok? No
```

- Enter key allows to move the cursor among the mask fields, while the keys  allow to change the current value of the field. P:01 means in this case, that the selected I/O board has address 1.
- For exiting the procedure and storing changes into memory select the field "OK ? no" and with the cursor let appear "YES", then push ENTER. For exiting without storing changes into memory just wait for 30 seconds without pushing any key.

For standard installation air conditioning + humidifier the terminal with address 16 must be always configured as third terminal in Shared mode. This will give the possibility to operate with the terminal Shared. For first terminal configure instead, progressive addresses from 9 to 16 in Private mode. The relation between I/O Board and Terminal are shown in the table below.

Board	1	2	3	4	5	6	7	8
Terminal	9	10	11	12	13	14	15	16

7.5 Terminal running messages

- If the pCO main board controlling the Terminal is faulty or there is some problem in communication or it was disconnected from the Terminal this message occurs:

```
I/O Board xx fault
```

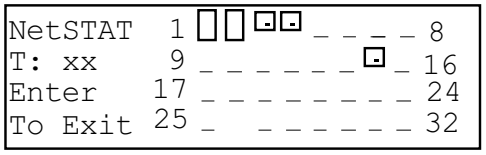
- If the Terminal does not receive any token message (network syncro signal) for at least 10 sec., it cancels completely the display and this message appears:

```
NO LINK
```

- This message corresponds to the Green LED OFF information for the I/O boards.

7.6 Network status display: NetSTAT

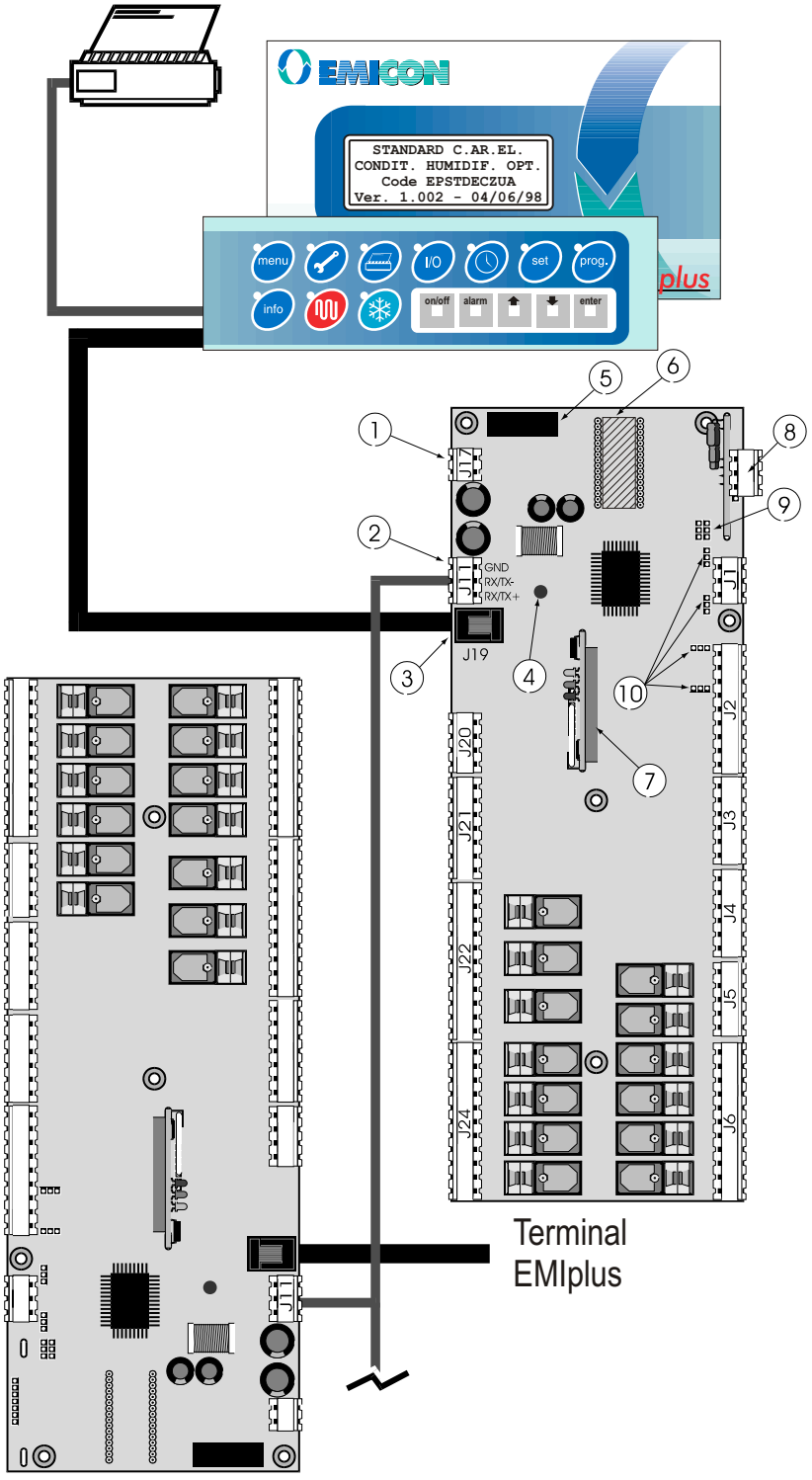
- The program is provided with a procedure that allows to display in real time the status of the currently connected peripheral devices.
- Such procedure is activated by the simultaneous pressure of buttons 0-1-2 (Increase Decrease - Enter) for at least 10 seconds (the terminals configuration procedure is entered after 5 seconds). The displayed mask is the following:



- the number after **T:xx** indicates the terminal address on which the procedure has been activated, the symbols indicate the type of peripheral device (EMIplus , Terminal ⊡) and its relevant address.
- The mask above shows that the network is made up of 2 EMIplus boards with address 1, 2, and of 3 terminals with address 3, 4, 15.

8 - STAND-BY

The connection of the EMIplus boards in a pLAN local network allows them to communicate with one another and exchange variables. The main function of this exchange of variables is to allow all the units to be controlled by one single EMIplus terminal.
In addition, it allows the units to be rotated according to a time schedule, with the possibility to leave one of them in Stand-By, i.e., ready in the case where one of the units in operation malfunctions.
Below is a schematic diagram of the connections which need to be made.



The connection between boards in the pLAN network is made using an AWG20/22 shielded cable, twisted pair + shield. The boards are connected in parallel, using terminal J11 as reference.
WARNING: make sure the order of connection is respected.

Picture 10

The following parameters manage the rotation of the units and are present only in the screen of unit number 1. They are listed and described below.

- screen M_MANUF_PARAM25 (manuf. branch). *Number Units*: indicates the total number of units involved in the scheduled rotation (the number set must also take into account unit number 1).
- screen M_MANUF_PARAM25 (manuf. branch). *Reset Rotation*: if enabled, this parameter resets the rotation; this should be set after having completed the parameter installation procedures.
- screen M_MANUF_PARAM26 (manuf. branch). *Select. Hours/Minutes*: determines if the rotations are performed in minutes (test only) or in hours (normal conditions)
- screen M_MANUF_PARAM26 (manuf. branch). *Type of Rotation*: if Cyclical the units in Stand-By follow the order 1, 2, 3...1, etc...; if Op. Time, at the end of the rotation time the unit with the highest number of operating hours is placed Stand-By (referred to the number of operating hours of the main fan)
- screen M_MANUF_PARAM27 (manuf. branch). *Test Rotation Cycle*: sets the number of minutes for the rotation test
- screen M_MANUF_PARAM27 (manuf. branch). *Rotation Cycle*: sets the number of hours of rotation in normal operation.

One further parameter is however present on all units:

- screen M_MANUF_CONF7 (manuf. branch). *Unit Configuration*: sets if the unit functions alone (INDEPENDENT UNIT), that is without being part of the rotation, or in rotation (UNIT IN ROTATION).
  After all these parameters have been correctly set, the rotation reset should be performed using the Reset Rotation parameter, and then the units should be started.

It is good practice for the units which are part of the rotation to have sequential addresses. If, for example, an installation to be configured with 4 units in rotation and 2 independent units, the first 4 units must have addresses from 1 to 4, and the other 2 must have addresses 5 and 6.

When a critical alarm occurs in one of the units, this unit may continue to function and the stand-by unit is switched on. List of critical alarms :
- compressor high pressure
- compressor low pressure
- electrical element thermal cut-out
- high / low ambient temperature
- high / low water temperature at outlet
- faulty ambient temperature / water outlet / external air / supply air probe
- high current at humidifier
- no current at humidifier
- no water in humidifier
- EPROM malfunction
- interruption to the pLAN local network

When a serious alarm occurs in one of the units, this unit is switched off and the stand-by unit is switched on. List of serious alarms:
- air flowmeter
- main fan thermal cut-out
- fire / smoke
- unit black-out

The clock board installed in unit number 1 allows the cyclical rotation. The timer and the address of the unit in stand-by to be store in the clock's buffer RAM. Following a black-out, the system recommences from the state before the black-out (same unit in stand-by, the cyclical rotation timer does not start from 0 but rather counts the hours already passed).

9 - DATA BASE OF THE SUPERVISOR

The variables listed below will be transmitted between EMIplus and supervisor only, if all following conditions will be met:

- the serial card is inserted into the proper connector that is found on the interface;
- the supervisory function is enabled in the M_MANUF_CONF1 window protected by user's password;
- the address of the unit is properly select with reference to the supervisory network in the M_PARAM_USER12 window protected by user password;
- the equipment have been correctly connected to the network (supervisor and pCO).

9.1 Digital variables

Address	Description	Type	Communication type
1	Compressor 1 general alarm digital input	Digital	Reading
2	Compressor 2 general alarm digital input	Digital	Reading
3	Pressure controller 1 low pressure circuit digital input	Digital	Reading
4	Pressure controller 2 low pressure circuit alarm digital input	Digital	Reading
5	Air filter alarm digital input	Digital	Reading
6	Fan thermal alarm digital input	Digital	Reading
7	Air flow controller alarm digital input	Digital	Reading
8	ON/OFF remote	Digital	Reading
9	Resistance 1 thermal alarm digital input	Digital	Reading
10	Resistance 2 thermal alarm digital input	Digital	Reading
11	fire / smoke alarm digital input	Digital	Reading
12	Dehumidification	Digital	Reading
13	ON /OFF unit	Digital	Reading
14	Energy saving	Digital	Reading
15	Humidification / Humidification power contact	Digital	Reading
16	Compressor 1 capacity control / Integrated humidifier loading	Digital	Reading
17	Compressor 2 capacity control / Integrated humidifier unloading	Digital	Reading
18	3p cold valve opening contact	Digital	Reading
19	3p cold valve closing contact	Digital	Reading
20	3p warm valve opening contact	Digital	Reading
21	3p warm valve closing contact	Digital	Reading
22	General alarm	Digital	Reading
23	Compressor 1 general alarm	Digital	Reading
24	Compressor 2 general alarm	Digital	Reading
25	Circuit 1 low pressure pressure-controller alarm	Digital	Reading
26	Circuit 2 low pressure pressure-controller alarm	Digital	Reading
27	Air flow controller alarm	Digital	Reading
28	Fan thermal alarm	Digital	Reading
29	Resistance 1 thermal alarm	Digital	Reading
30	Resistance 2 thermal alarm	Digital	Reading
31	Fire / smoke alarm	Digital	Reading
32	Air filter alarm	Digital	Reading
33	Ambient high temperature alarm	Digital	Reading
34	Ambient low temperature alarm	Digital	Reading
35	Ambient high humidity alarm	Digital	Reading
36	Ambient low humidity alarm	Digital	Reading
37	Compressor 1 operating time alarm	Digital	Reading
38	Compressor 2 operating time alarm	Digital	Reading
40	Fan operating time alarm	Digital	Reading
43	Outlet water high temperature alarm	Digital	Reading
44	Outlet water low temperature alarm	Digital	Reading

Address	Description	Type	Communication type
45	Air supply temperature probe failure alarm	Digital	Reading
46	Outlet water temperature probe failure alarm	Digital	Reading
47	External air temperature probe disconnection alarm	Digital	Reading
48	Humidity probe failure alarm	Digital	Reading
49	EPROM failure alarm	Digital	Reading
51	Temperature regulation type	Digital	Reading
53	Humidity probe enabling	Digital	Writing/Reading
55	Outlet water probe enabling	Digital	Writing/Reading
56	External water probe enabling	Digital	Writing/Reading
57	Inlet water probe enabling	Digital	Reading
58	Supply air probe enabling	Digital	Writing/Reading
59	Binary combination resistance enabling	Digital	Writing/Reading
60	Cold modulating valve 0/10V enabling	Digital	Reading
61	Energy saving enabling	Digital	Writing/Reading
62	Enabling of simultaneous operation of compressors with 0/10V valve	Digital	Writing/Reading
63	Warm 0/10V modulating valve enabling	Digital	Writing/Reading
64	Capacity control enabling	Digital	Writing/Reading
65	Compressor rotation enabling	Digital	Writing/Reading
66	Compressor 1dehumidification enabling	Digital	Writing/Reading
67	Compressor 2 dehumidification enabling	Digital	Reading
68	Temperature time band enabling	Digital	Reading
71	ON/OFF from supervisor enabling	Digital	Writing/Reading
73	3p cold valve enabling	Digital	Writing/Reading
74	3p warm valve enabling	Digital	Reading
75	Manual procedure enabling	Digital	Reading
76	Alarm-stopped machine alarm	Digital	Reading
77	Humidity time band enabling	Digital	Reading
78	High current in the humidifier alarm	Digital	Writing/Reading
80	Water absence in the humidifier alarm	Digital	Reading
82	No current in the humidifier alarm	Digital	Reading
83	Integrated humidifier enabling	Digital	Reading
90	Supervisor internal variable for version check	Digital	Reading
100	Air supply temperature probe failure alarm	Digital	Reading

9.2 Whole variables

Address	Description	Type	Communication type
10	Cold 0/10V valve ramp start	Whole	Writing/Reading
11	Cold 0/10V valve ramp end	Whole	Writing/Reading
12	Warm 0/10V valve ramp start	Whole	Writing/Reading
13	Warm 0/10V valve ramp end	Whole	Writing/Reading
16	Compressor 1 step without energy saving	Whole	Writing/Reading
17	Compressor 1 hysteresis without energy saving	Whole	Writing/Reading
18	Compressor 2 step without energy saving	Whole	Writing/Reading
19	Compressor 2 hysteresis without energy saving	Whole	Writing/Reading
22	Compressor 2 hysteresis without energy saving	Whole	Writing/Reading
23	Compressor 1 step with energy saving	Whole	Writing/Reading
24	Compressor 1 hysteresis with energy saving	Whole	Writing/Reading
25	Compressor 2 step with energy saving	Whole	Writing/Reading
26	Compressor 2 hysteresis with energy saving	Whole	Writing/Reading
28	Time interval between same compressor switching on	Whole	Writing/Reading
29	Low pressure delay alarm	Whole	Writing/Reading
30	Stop minimum time	Whole	Writing/Reading
31	Time interval between different compressor switching on	Whole	Writing/Reading
32	Resistance no.	Whole	Writing/Reading
33	Compressor no.	Whole	Writing/Reading
34	High / low temperature / humidity alarm delay	Whole	Writing/Reading
38	Resistance switching on time interval	Whole	Writing/Reading
39	Capacity control 1 step without energy saving	Whole	Writing/Reading
40	Capacity control 1 hysteresis without energy saving	Whole	Writing/Reading
41	Capacity control 2 step without energy saving	Whole	Writing/Reading
44	Capacity control 2 hysteresis without energy energy saving	Whole	Writing/Reading
45	Capacity control 1 step saving	Whole	Writing/Reading
46	Capacity control 1 hysteresis with energy saving	Whole	Writing/Reading
47	Capacity control 2 step with energy saving	Whole	Writing/Reading
48	Capacity control 2 hysteresis with energy saving	Whole	Writing/Reading
50	Integration time	Whole	Writing/Reading
51	Fan operation time limit	Whole	Writing/Reading
52	Compressor 1 operation time limit	Whole	Writing/Reading
54	Compressor 2 operation time limit	Whole	Writing/Reading
55	Cold 3p valve ramp start	Whole	Writing/Reading
56	Cold 3p valve ramp end	Whole	Writing/Reading
57	Warm 3p valve start ramp	Whole	Writing/Reading
58	Warm 3p valve end ramp	Whole	Writing/Reading
59	3p valve complete opening time	Whole	Writing/Reading
61	Fan switching on delay	Whole	Reading
62	Cold valve ramp limit	Whole	Reading
63	Warm valve ramp limit	Whole	Reading
65	Fan operating-hour carried out high part	Whole	Reading
66	Compressor 1 operating-hour carried out high part	Whole	Reading
67	Compressor 2 operating-hour carried out high part	Whole	Reading
68	Fan operating-hour low part	Whole	Reading
69	Compressor 1 operating-hour carried out low part	Whole	Reading

9.3 Analog variables

Address	Description	Type	Communication type
1	Ambient temperature	Analog	Reading
2	Ambient humidity	Analog	Reading
3	Outlet water temperature	Analog	Reading
4	External air temperature	Analog	Reading
5	Supply air temperature	Analog	Reading
6	Dead zone in temperature	Analog	Writing/Reading
7	Ambient humidity band	Analog	Writing/Reading
8	Ambient humidity set	Analog	Writing/Reading
9	Low temperature alarm offset	Analog	Writing/Reading
10	High temperature alarm offset	Analog	Writing/Reading
11	Low humidity alarm offset	Analog	Writing/Reading
12	High humidity alarm offset	Analog	Writing/Reading
13	Ambient temperature set	Analog	Writing/Reading
17	Ambient temperature band	Analog	Writing/Reading
18	Water low temperature limit	Analog	Writing/Reading
19	Water high temperature limit	Analog	Writing/Reading