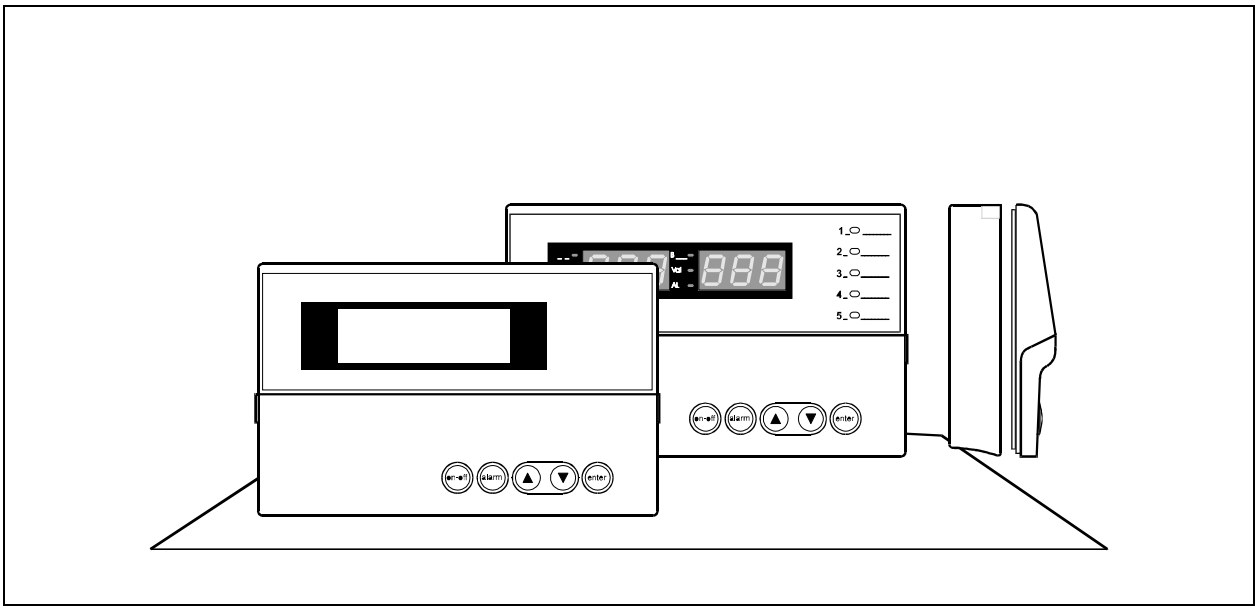
Application program for pCO Graphic



Standard Air-Conditioning units with humidifier Graphic display

Manual version: 1.0 - 2/4/97

Program code: **EPSTDECG0A**

CAREL

Technology & Evolution

Rif.: 98**EM**

MICROPROCESSOR REGULATION AND CONTROL SYSTEM FOR AIR CONDITIONING UNITS:

Introduction to the regulation system:
This system can be installed directly on the air handling and conditioning units.

SYSTEM FEATURES

- Temperature and relative humidity regulation.

- Control and signal of the condition of all components in the system

- Possibility of selecting and modifying regulation parameters.

- Signal of any anomaly of controlled devices through acoustic (BUZZER) and visual (ALARM MASK) warning.

- Communication interface USER - MACHINE (KEYPAD- DISPLAY)

- Possibility of connecting to a remote supervisor through serial communication RS422.

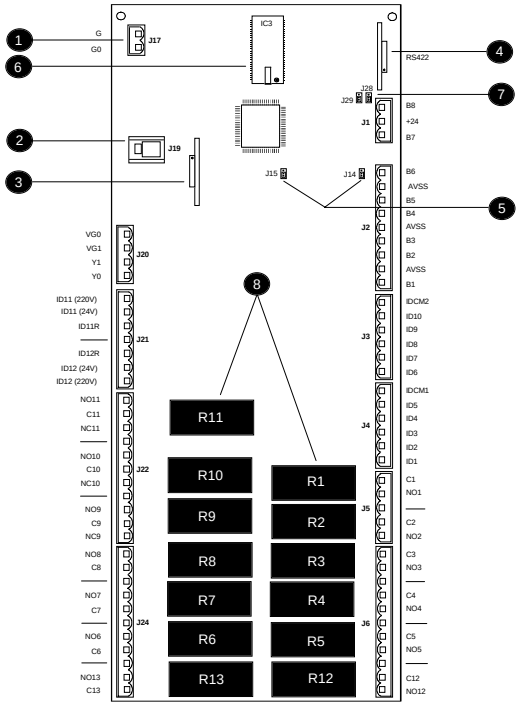
DOCUMENTATION INDEX:

1 - INSTALLATION GUIDE

1.1-DESCRIPTION OF THE CONTROLLER AND ITS COMPONENTS

- CONTROL BOARD

The main board is the core of the controller.
It is made of
a section which includes the microprocessor and the memory for the machine control algorithm;
an I/O section which allows interfacing with controlled devices by means of a plug-in terminal.
a section devised for interfacing with supervisory network and terminal which can be installed in a remote position.
The control board represents the core of the system as it contains the microprocessor which performs the control algorithm and the user interface management. This board is connected to a pCO terminal and to any options.



- List of components:

(1) 24 Vac supply cable
(2) Telephone cable connector for terminal connection (RS485) or for local network connection
(3) Optional Clock board
(4) Optoisolated RS422 board for serial line connection for supervision and telemaintenance
(5) Pin strip to select B5 and B6 voltage or current inputs
(6) Eprom with the programme
(7) Pin strip to select B28 and B29 voltage or current inputs
(8) Relay outputs

Rxx: Connectors for digital relay outputs
No: Normally open contact
Nc: Normally close contact
C : Common reference for contacts

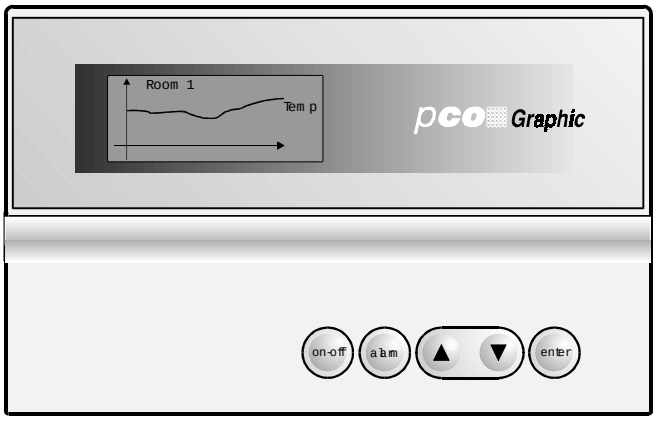
ID :	Digital inputs
IDCM:	Common reference for digital inputs
Bx :	Analogue input
AVSS:	Reference for analogue outputs
Yx:	Analogue outputs
VG1/0:	24V A.C. Analogue outputs power supply

- USER INTERFACE

GENERAL REMARKS

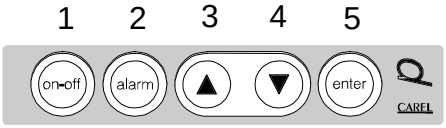
The pCO terminals with graphic display devices are available in three different models and all of them operate with a main board of the PCOB000A21 and PCOB000B21 type, each one provided with the PCOADR**** addressing card. The backlighting of every display allows to read them even with a faint lighting.
The programmability of the device through the EasyTools package permits the realization of customized programs both for the air conditioning and the commercial refrigeration.

Terminal on standard pCO (cod.PCOT00PGH0)



Display:	LED backlighting display Dot number : 128 x 64 Wide range of temperature
Buttons: of translucid	no. 10 mechanical buttons protected by polycarbonate + no. 5 buttons made silicone rubber
LEDs:	no. 13 signaling LEDs
Case:	The same plastic case as for the standard pCO terminal Panel/wall mounting (See pCOUser Guide for details)

The terminal allows exchange of information by means of a LCD which displays the values of all controlled parameters, selected set-points, alarm thresholds and in general all data concerning the controlled variables in the specified formats. Moreover, the display will show particular messages any time an alarm condition occurs. A keypad allows the setting of configuration parameters such as set-points, alarm thresholds, alarm activation delays, etc. ...
The visible rubber keys, which can be seen and pressed even when the front door is closed, are the most important and the most used ones, above all when the machine is ON.The above quoted keys are the following: *-1-* ON/OFF key; *-2-* Buzzer silencing and alarm deactivating key; *-3-* UP key; *-4-* DOWN key; *-5-* ENTER key.



Main terminal board

The board supports the microprocessor, memories and the eprom containing the management application program of the display and keyboard. It also includes the optional serial-card connector for printer control (Carel code PCOSERPRN0) and the one for the card containing the clock and the 32K of EEPROM.

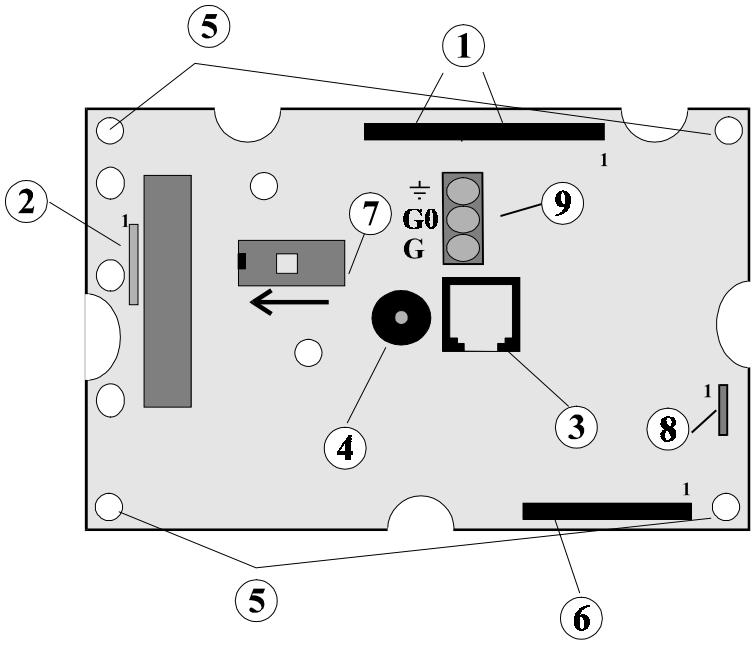


Figure 1

1: Connector to the inverter and signal-control card for the display
2: Connector for optional printer-card
3: Telephone-connector for terminal connection to the pCO main board (PCOB*21) or to the T-connector TCONN6J000 if the connection is in the pLAN local area network (see pLAN UserGuie0
4: Alarm acoustic-signaling buzzer
5: Metalized fastening holes
6: Connector for connection to the additional printer card
7: Eprom program and mounting direction/sense
8: Connector for EEprom card,dip-switch, clock
9: Power supply connector

MOUNTING OF THE TERMINAL

The model equipped with plastic container (cod. PCOT00PGH0) has been designed for the panel and wall mounting. The drilling template, in the case of panel mounting , must have the following dimensions: 167x108mm. For the installation, comply the following instructions:

Panel mounting

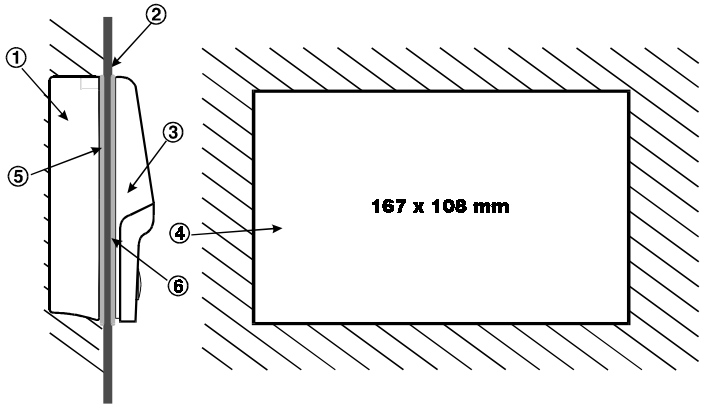


Figure references on the side

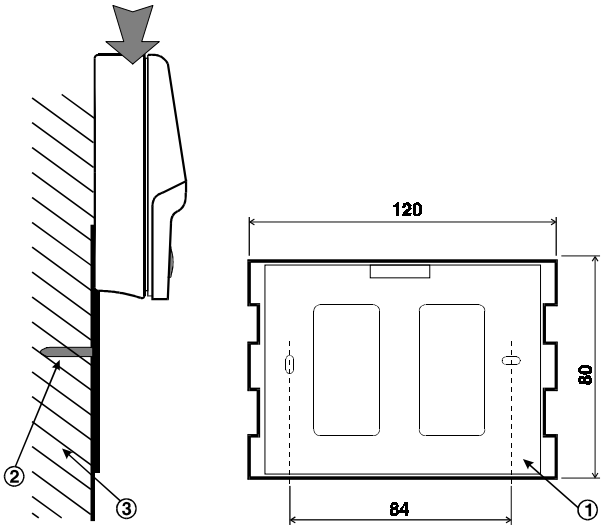
1. Back cover
2. Panel
3. Front cover
4. Drilling templates (window tolerance: -0.5÷+3mm relating to the dimensions shown in the figure)
5. Gasket for the front cover
6. Gasket for the back cover

Panel maximum thicknessis 6mm.

- unscrew the two screws placed on the terminal back cover and remove the cover
- lean the front on the panel frontal part
- Fit in the cover from behind carefully matching the two holes in the back cover with the two holes of the frontal cover
- Screw again the screws

Finally carry out the necessary electrical connections

Wall mounting



Wall mouting involves the use of an appropriate fastening stirrup and of a 3-module standard switch wall-box in order to allow the cable passage.
Fasten the stirrup (1) to the wall (3) by means of the screw (2); fit in the back of the instrument into the stirrup.
Finallly carry out the required electrical connections.

Electrical connection

Connect the telephone cable (cod. S90CONN00*) coming from the power card (cod..PCOB000*21) to the appropriate socket; DO NOT connect any power supply to the screw terminal block indicated at the point 9 of the Figure 1.
Directly from the keypad it is possible to gain access to the main parameters or to some parameters loops.
The " AL " message, on the upper right corner of the display, indicates an alarm condition and allows the access to the masks where the exact type of alarm is identified (for further information see below - ALARM key*)*
All reading and setting values are displayed according to a “tree” structure the user can enter by means of the controller keypad.

PROGRAM EPROM INSTALLATION

All information on the graphic display (character fonts, graphs, diagrams and various symbols to be displayed) are produced by an application program contained in the eprom, to be positioned as shown at point 7 of the Figure 1.

To install the eprom,

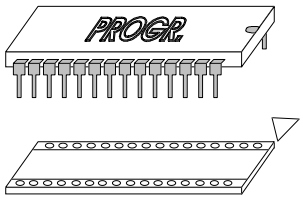
- turn the power supply OFF
- remove the screen card (see previous page) or the serial printer optional card (if present), by unscrewing the respective screws;
- mount the eprom, **being careful to place the reference notch in the same direction as that one indicated by the serigraph** (see point 2 **Errore. L'origine riferimento non è stata trovata.**) **infact wrong connections destroy the eprom.**

Maximum care is required when handling the eprom:

- do not bent the pins and insert them carefully into the appropriate socket located on the main board, handling the component on the areas where they are not present
- before touching the eprom, touch a grounding in order to discharge the possibly accumulated electostatic energy (do not touch other devices supplied with power)
- to remove the component from the socket, use a small screwdriver, avoiding to damage the printed circuit tracks or some other adjacent components.
- once the eprom has been inserted, mount the card that serves as a screen or the possible printer optional card before placing the cover and operate again the terminal.

Socket connection and disconnection of the eprom must always be carried out with the terminal not being power supplied. .

With reference to the picture :

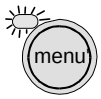


- pCO KEYPAD

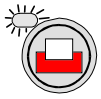
GENERAL FUNCTIONING:

The first 10 keys, the ones which disappear when closing the front door, are meant to allow the user to perform any kind of procedures from programming to parameters simple display. The blue and red keys have not been used.
Their function is ***to select*** the required loop (or chain of masks). The 5 rubber keys are used for programming and for parameters display. Once completed the procedures in a loop, which has been selected by pressing a key, the user only has to press another key to go at once to another loop.
The keys share the following peculiar features :

-1- A green ***led*** next to each key indicates which key has been selected. The led remains ON as long as that loop of masks is being used. The led is important in case the user does not remember which loop has been selected. It is important to point out that only one out of the 8 grey keys can be ON, therefore activation of one automatically deactivates the others. Moreover, the user must remember that the leds will never be all OFF, because the mask menu is always on display; therefore, the led next to the menu key is ON even if no procedure is being performed or after a RESET due to a blackout:



-2- In the programme itself there is an automatic function which brings back on display the menu mask and, as a consequence, the led next to the menu key will be turned ON again.
If, for example, the last procedure has been the setting of the printer parameters, for some seconds the last selected mask will remain on display and the led next to the printer key will remain ON:



Once the selected time has elapsed, the led next to the printer key will be turned OFF, the one next to the menu key will be turned ON and the temperature and humidity values will be displayed.

-3- Each loop of masks follows an order. This means that by pressing a key the ***first*** mask of the corresponding loop will be displayed. If the user then moves to other masks of the loop and by chance presses again the same key, the first mask will be displayed again.

MENU KEY

Gives information on the temperature and humidity values measured by the selected probes (the temperature probe is the only one to be always present and not selectable).
The procedure to be followed is:
- press the MENU key once
Result of procedure:
- the display will show the mask which indicates ambient temperature, ambient humidity, time, date and condition of the machine.
Procedure to be followed:
- press the **Up** and **Down** keys
Result of procedure:
- cyclic visualisation of the loop of probe reading masks.

MAINTENANCE KEY

Allows visualisation and clearing of the total functioning hours of the main devices.
Procedure to be followed:
- press the **Maintenance** key once
Result of procedure:
- the display will show the working hours of the first three selected devices.
Procedure to be followed:
- press the **Up** and **Down** keys
Result of procedure:

- cyclic visualisation of the masks which indicate for each device (heaters excluded) the activity hours and the setting of threshold hours and hour clearing .

N.B. ***Reset of functioning hours: it is necessary to press ENTER to move the cursor to the "NO" sign. To reset the machine it is necessary to keep the Up or the Down key pressed for a couple of seconds until the "YES" sign appears. At this point wait for the "NO" sign to be displayed again.***

PRINTER KEY

Allows the user to manage the printer and to select its required parameters.
Procedure to be followed:
- press the **Printer** key once.
Result of procedure:
- the display will show a mask for the immediate setting of printing by simply pressing Enter.
Procedure to be followed:
- press the **Up** and **Down** keys.
Result of procedure:
- activates the cyclic repetition of masks for immediate printing setting, for cyclic printing and, if the latter has been activated, of masks for the setting of cyclic printing interval.

INPUT/OUTPUT KEY

Allows visualisation of the status of interface board inputs/outputs.
Procedure to be followed:
- press the **Input/Output** key once.
Result of procedure:
- the display will show the status of all digital inputs.
Procedure to be followed:
- press the **Up** and **Down** keys.
Result of procedure:
- activates the repetition of masks which indicate the status of digital outputs, analogue outputs and of digital inputs. Analogue inputs are already read in the Menu branch, therefore they are not visualised here.

N.B. Since digital inputs 7- 8- 9- 10 can manage different devices according to the settings effected in the manufacturer branch, I/O masks will indicate the selected device next to the output number in question.

CLOCK/TIME ZONES KEY

Allows the setting of time and date as well as the management of time zones.
Procedure to be followed:
- press the **Clock** key once.
Result of procedure:
- the display will show a mask for the setting of the date (day, month, year).
Procedure to be followed:
- press the **Up** and **Down** keys.
Result of procedure:
- repetition of the masks for the management of time, for the setting of the password to gain access to the time zones branch, and again for the setting of the date.

Procedure to be followed:
- press the **Enter** key when the display shows the Password selecting mask.

Result of procedure:
- access to the field where the correct password (which is the same as the user password, that is 1234) is to be selected. If the password has been correctly selected, by pressing Enter you will move to the time zones branch, otherwise you will return to the clock loop.

Only for Time Zones setting

Once the above quoted procedures have been followed, you reach a mask asking if you want to select the time zones: if so, the following masks will be used to select times and set-points for temperature and humidity, otherwise you will go back to the first mask of the clock branch.

SET KEY

Allows the setting of set-points for ambient temperature and humidity regulation.

Procedure to be followed:

- press the **Set** key once.

Result of procedure:
- the display will show the mask for temperature set-point setting.

Procedure to be followed:
- press the **Up** and **Down** keys.

Result of procedure:
- visualisation of the mask for humidity set-point setting.

PROGRAMMING KEY

Allows access to system parameters programming masks in all those functions the user need to personalise regulation.

Procedure to be followed:
- press the **Prog** key once.

Result of procedure:
- the display will show the user password (1234) selecting mask. If the password has been correctly selected, by pressing Enter you will reach the user branch; otherwise, you will remain in this mask.

Procedure to be followed:
- press the **Up** and **Down** key more than once.

Result of procedure:
- visualisation of a series of masks for the setting of all values necessary to humidity and temperature control and for the setting of set-points and differentials of connected devices.

? INFO KEY

Allows visualisation of the software version.

Procedure to be followed:
- press the **Info** key once.

Result of procedure:
- the display will show the software version.

MANUFACTURER KEYS

Allow access to the manufacturer password selecting mask which, if correctly selected (0123), enables entering the branch for activation of probes, connected devices and their main functions, and for default configuration set-up (standard values).

Procedure to be followed :

- press at the same time the **Programming** and the **Menu** keys for a couple of seconds.

Result of procedure:

- the display will show a mask for password setting. If the password has been correctly selected, by pressing the **Enter** key you will gain access to said branch, otherwise you will remain in the password selecting mask.

ON/OFF KEY

Allows machine turning ON and OFF.

Procedure to be followed:

- press the **On/Off** key once.

Result of procedure:

-the led indicator under the **On/Off** key turns on **:** Unit ON.
-the led indicator under the **On/Off** key turns off **:** Unit OFF.

ALARM KEY

Allows **silencing** of the buzzer which has been activated in case of alarm and **resetting** of alarms as soon as the reasons that caused them disappeared.

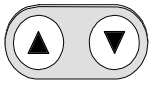
Procedure to be followed:

- press the **Alarm** key once.

Result of procedure:

- if before following this procedure there are no active alarms (led under **Alarm** key OFF, buzzer OFF, no alarm messages on display), the display will show a mask informing of the absence of any alarms.
The mask will disappear if another key is pressed.
- if before following this procedure there is at least one active alarm (led under the **Alarm** key ON, buzzer ON, alarm message on display), the pressing of the **Alarm** key silences the buzzer and on display appears the exact message of the alarm which can be the only one or the first of a series. At this point, it is possible to check if there are more than one active alarms and in that case which kind of alarms have been activated. It is sufficient to press the **Up** or the **Down** keys. In this case if there are more than one active alarms a list of alarm messages will be displayed.
- if before following this procedure the buzzer has been **silenced** and the display shows an alarm mask, two are the possibilities: if the reasons which caused the alarms have disappeared, the led indicator under the Alarm key will turn OFF and the programme will automatically return to the menu mask (this function is called **Clear**); if the reasons which caused the alarms have not disappeared the buzzer will be reactivated.
- if before following this procedure the buzzer has been **silenced** and the display shows any masks except an alarm one, the programme will automatically enter the alarm branch where it is possible to select the **Clear** function.

UP/DOWN KEYS



Allow to move upwards or downwards in the masks of the loop. If used after pressing the **Enter** key, they allow selection of the parameter values.

(1) If a loop is composed of masks 1, 2, 3, 4, and 5 and mask 1 is on display, by pressing the **Up** key more than once the masks will scroll following the order: 1, 2, 3, 4, 5, 1 etc... By pressing the **Down** key more than once the masks will scroll following the order: 1, 5, 4, 3, 2, 1 etc...
(2) If, with reference to the same example, mask 3 is on display and the Enter key is pressed, the cursor will jump from position 0,0 to the numeric field. By pressing the **Up** key the number will increase; by pressing the **Down** key the number will decrease.

ENTER KEY

Allows parameter setting (through the Up and Down keys) and is used to confirm data after setting. (1) If, for example, the display shows a mask with the message: “Temperature Set-point Setting”, by pressing Enter the cursor will go from 0,0 position to the numeric field where a digit like 020.0 (20 ºC) is displayed. By means of the Up and Down key it is possible to modify this value. (2) By pressing Enter again the cursor will go back to 0,0 and at the same time the modified value will be memorised.\

- WHAT TO DO IF

THE UNIT DOES NOT START

Led of the ON/OFF key is turned OFF, the display is OFF, other leds turned OFF.

Check :

a. that power supply is present
b. that there are 24 VAC of power supply voltage at the secondary coil transformer (220 - 24 VAC)
c. the correct insertion of 24 VAC power supply connector in the proper socket.

WHEN TURNING ON THE INSTRUMENT YOU FIND:

alarm led indicator ON ,
display with no or random messages
buzzer ON.

Check :

a. that the Eprom has been inserted with the correct polarity
b. that the Eprom pins have not been bent on inserting the Eprom itself
c. that the microprocessor chip has not been damaged: in that case contact the assistance.

WRONG INPUT SIGNALS READING

Check:

a. that the connection of probes cables is in accordance with instructions
b. that probe signals pass on cables installed at a sufficient distance from possible excessively disturbing sources (power cables, contactors, high-voltage cables and cables with high inrush ampere consumption connected devices)
c. connections between interfaces and controller (flat cables)
d. correct power supply of interfaces and probes

DAMAGED EPROM ALARM

a. Contact the assistance

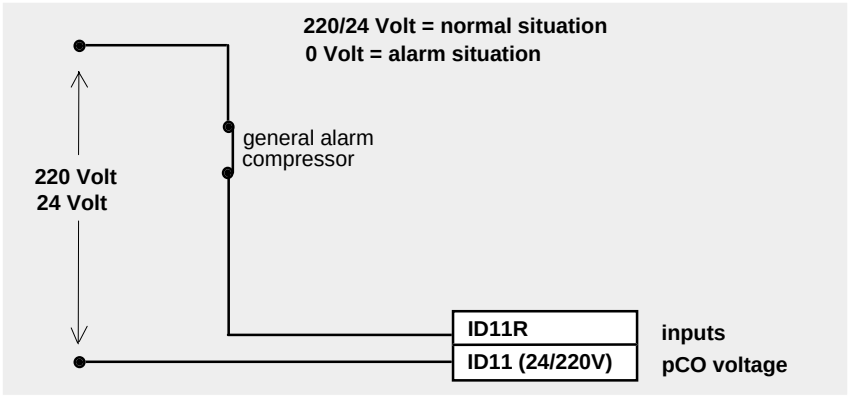
THE CONTROLLER ACTIVATES THE WATCH-DOG FUNCTION, THAT IS IT TURNS ON AND OFF AS FOR A POWER SUPPLY FAILURE OR ACTIVATES SOME OUTPUTS AT RANDOM (DIGITAL AND/OR ANALOGUE)

Check :

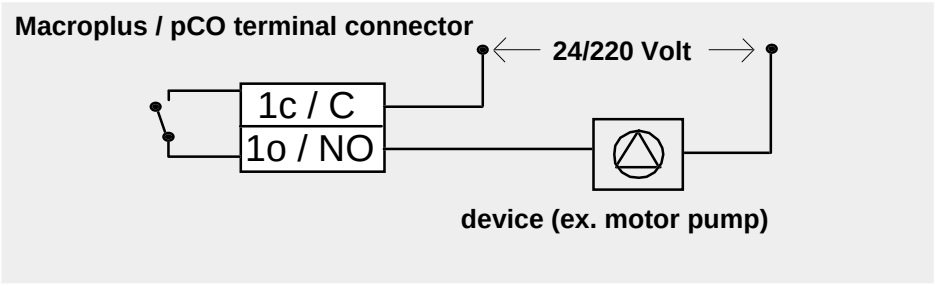
a. the connections between controller and interfaces
b. that power cables do not pass near interfaces and control board microprocessors.

- DIGITAL VOLTAGE INPUTS CONNECTION (220 Volt ac; 24 Volt ac)

The pCO controller allows voltage digital inputs to be connected with terminals ID11 - ID11R and ID12 - ID12R as shown in the picture below.
When the general alarm input is open, the high pressure alarm on pCO input will be detected.
Connections must be done as follows:
Digital Input 11: connection between **ID11R** (common) and **ID11 (24V)** if 24V are applied, or between **ID11R** (common) and **ID11 (220V)** if 220V are applied.
Digital Input 12: connection between **ID12R** (common) and **ID12 (24V)** if 24V are applied, or between **ID12R** (common) and **ID12 (220V)** if 220V are applied.
N.B. Do not apply 220V to the terminals ID11 (24V) and ID12 (24V.



- DIGITAL OUTPUTS CONNECTION



1.2- HARDWARE: USER INTERFACE

The user interface comprises all those components, such as keypad, display and led indicators, which are necessary for the exchange of information between the user who needs air conditioning and the microprocessor devised by CAREL for the managing of this operation.

- POWER SUPPLY

Connect the 24 V secondary of the network transformer to inputs G0-G placed on the controller.

- INPUTS/OUTPUTS

The “Reference” column indicates the contacts on the board shown on page 3.

DIGITAL INPUTS

REFERENCE	DIGITAL INPUT
ID1 - IDCM1	LEVEL HUMIDIFIER SENSOR
ID2 - IDCM1	ALARM FIRE
ID3 - IDCM1	COMPRESSOR 1 LOW PRESSURE
ID4 - IDCM1	COMPRESSOR 2 LOW PRESSURE
ID5 - IDCM1	CLOGGED FILTER
ID6 - IDCM2	FAN OVERLOAD
ID7 - IDCM2	AIR FLOW DETECTOR
ID8 - IDCM2	REMOTE ON / OFF
ID9 - IDCM2	COMPRESSOR 1 GENERAL ALARM (HIGH PRESSURE OR OVERLOAD)
ID10 - IDCM2	COMPRESSOR 2 GENERAL ALARM (HIGH PRESSURE OR OVERLOAD)
ID11 - ID11R	HEATER 1 OVERLOAD
ID12 - ID12R	HEATER 2 OVERLOAD

ANALOGUE INPUTS

REFERENCE	ANALOGUE INPUT
B1 - AVSS	AMBIENT TEMPERATURE PROBE
B2 - AVSS	OUTLET AIR TEMPERATURE PROBE
B3 - AVSS	OUTLET WATER TEMPERATURE PROBE
B4 - AVSS	OUTSIDE AIR/ INLET WATER TEMPERATURE PROBE
B5 - AVSS	AMBIENT HUMIDITY PROBE
B6- AVSS	not utilized
B7- AVSS	TAM input (0..1V)
B8- AVSS	CONDUCTIVITYinput (0..1 V)

DIGITAL OUTPUTS

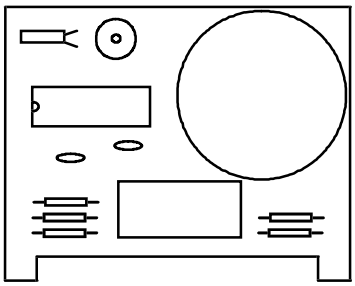
REFERENCE	DIGITAL OUTPUT
R1	PARTIALISATION /REDUCTION FAN SPEED VALVE
R2	MAIN FAN - (SYSTEM ON)
R3	ENERGY SAVING VALVE
R4	**HUMIDIFICATION POWER**
R5	**FILL WATER VALVE**
R6	**DRAIN WATER VALVE**
R7	OPENING COLD WATER THREE-POINT VALVE/COMPRESSOR 1
R8	OPENING COLD WATER THREE-POINT VALVE/COMPRESSOR 2
R9	OPENING HOT WATER THREE-POINT VALVE/HEATER 1
R10	OPENING HOT WATER THREE-POINT VALVE/HEATER 2
R11	GENERAL ALARM SITUATION

ANALOGUE OUTPUTS

REFERENCE	ANALOGUE OUTPUT

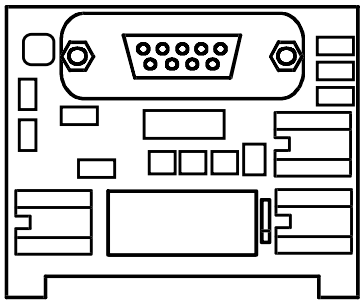
VG0 - Y0	COLD WATER VALVE
VG0 - Y1	HOT WATER VALVE

- pCO OPTIONAL BOARDS INSTALLATION



Clock board
This board allows to display date and time as well as the management of time-zones. To use this board connect it to the connector (3) shown in the picture on page 3.

Cod. PCOCLKMEM0



Serial optoisolated board RS422
This serial board RS422 allows pCO network connection. This enhances remote and local telemaintenance and supervisory systems.
To use this board connect it to the connector (4) shown in the picture on page 3.

Cod. PCOSER0000
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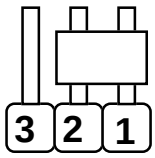
- JUMPER SETTING FOR 4-20 mA PROBES



N.B.
Remember to place the jumper of J14 (analogue input n.5), J15 (analogue input n.6), J28 (analogue input n.7) and J29 (analogue input n.8) in the position shown in the picture in order to configure the pressure transducer reading into the 4-20 mA mode.

- FIRST INSTALLATION

There are two phases:
a) Hardware connection
AFTER HAVING CHECKED THAT THE MATERIAL RECEIVED IS EXACTLY THE ONE YOU REQUESTED, UNPACK IT AND CONNECT THE SINGLE PARTS TO ASSEMBLE THE CONTROLLER AS DESCRIBED BELOW:

- connect the telephone cable between the Interface and the pCO controller.
- insert the Eprom with the programme in the proper socket

*** WARNING: INSERT THE EPROM IN THE RIGHT WAY ***

- connect all probes and devices to the controller, following the indications of the inputs/outputs table
- connect power supply with interface

b) Software initialisation
Software initialization means to **correctely set-up all the parameters in order to allow the unit to work**.
The machine will thouroughly meet the costumer's requirements, only if all the selected parameters (contained in the following branches: Programming, Manufacturer, and Maintenance) take into account the type of plant, present devices, and control parameters (setpoints, threshold alarms, etc).
All the selected parameters are contained in the **buffer storage** (a memory that maintain the selected values also in the absence of voltage).

When the machine is first installed, the stored parameters are the parameters established by Carel (Default values) which ensure a standard working of the machine but not really meet the costumer's requirements.
To modify the parameters the operator must enter the branches of interest and change the incorrect parameters. All the modified parameters are stored again.
On page 20 a complete list of the default values is shown.

On certain circumstances the machine could present some parameters no more answering the needs of the user (following a test or change of the equipment to be controlled, etc), and their recovery would involve an excessive expenditure of time.
In this case it is advisable to recover the default values established by Carel and afterwards to change the ones tha are not in a accordance with the equipment.
To do this the following operations are needed:
Keep pressed for more than 2 seconds the **Menu + Prog** keys;

- due to the previous action you are now in the Manufacturer Password. Now it is necessary to correctly select the Manufacturer Password.
Two different passwords are available:
- hardaware " 0123 " password that must be known only by the assistance technician or qualified personnel.
It is used during the preliminary operations, and whenever it is impossible to have access to the branch MASTER password (because the memory has been "spoiled").
- MASTER password: the value of this password is selected in the password set mask. It must be used during the normal working of the machine;
- having correctly selected the password, press **Enter**; you reach the mask indicating the branch "Special Procedures";
- you are now in the INSCONFIG mask which permit the erasure and the installation of the default values in the buffer storage; pressing once **UP** or **DOWN** allows to change the answer to the question from NOT to YES. **Do not do any operation and wait until the text becomes again No.**
Now the installation of the default values is completed.

2. - CONFIGURATION GUIDE

2.1 SET-POINT - DIFFERENTIAL - DEAD ZONE

Temperature control may be based on a proportional or proportional + integral regulation that can be selected by entering the GTEMP2 mask, the branch is named "Temperature Management" under password “service”.
The proportional control works in a proportional way in function of the difference between the required temperature or humidity value (**SET-POINT**) and the actual value.
The P+I regulation is based on the error between the required temperature and the measured temperature in relation to the moment in which the difference between the two values persists (the integration constant can be selected in the GTEMP5 mask).

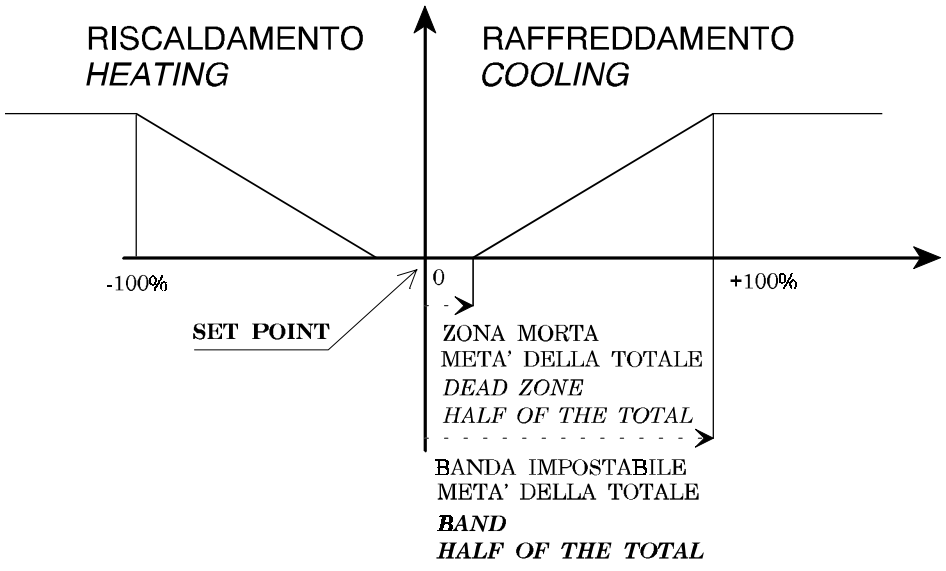
The humidity control is a proportional control; the humidifier is activated when the relative humidity value is lower than the "set-point-differential".

The **PROPORTIONAL BAND** defines the temperature/humidity control area. The more the value differs from the selected Set-point the greater is the control effect.

-The selected differential is half of the total differential: for temperature control, the 3 Centigrade Degrees selected as default values are to be intended above and below the set-point; in case there are 3 heaters and 2 compressors, the latter will turn ON when the set-point is 23 degrees (default) + differential (3 degrees), whereas all heaters will be active at 20 degrees.

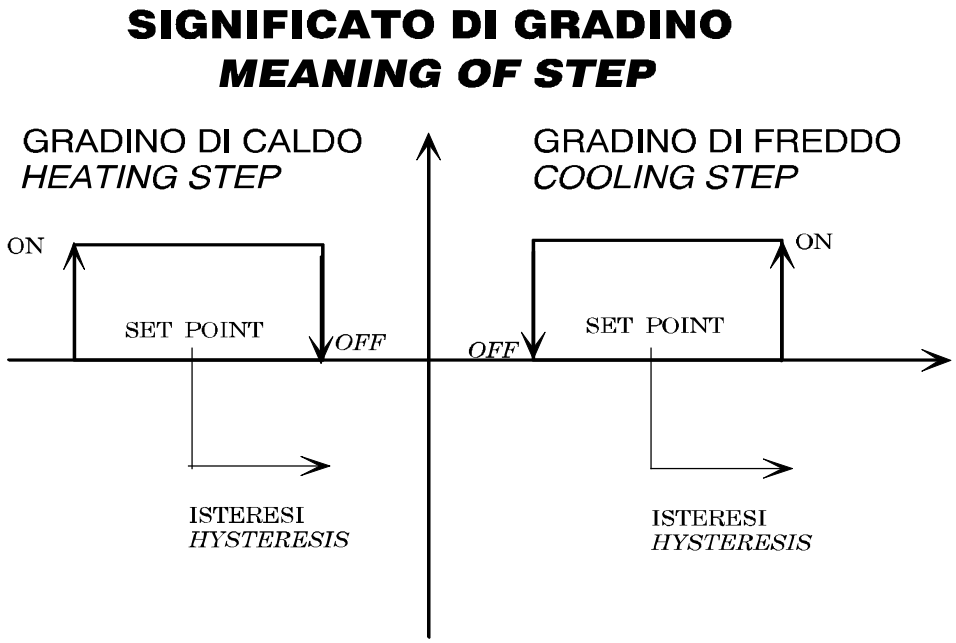
- The selected **DEAD ZONE** corresponds to a half of the total dead zone; the dead zone prevents the control action when the temperature values are near the set-point.

REGOLAZIONE PROPORZIONALE
PROPORTIONAL REGULATION



2.2 STEP

For each step it is possible to select the following:
- the set-point of the step itself (% value of the regulation differential)
- the hysteresis, that is half of the step dimension and a % value of the differential



Each step is connected to a device:

Cold step -------> Compressor
Hot step -------> Heater

2.3 DEFAULT VALUES

The factory-set configuration provides for the following devices:

- ambient temperature probe
- ambient relative humidity probe
- outside air temperature probe
- water temperature probe
- cold water valve
- hot water valve
- all heaters enabled (n.2)
- both compressors enabled
- external humidifier

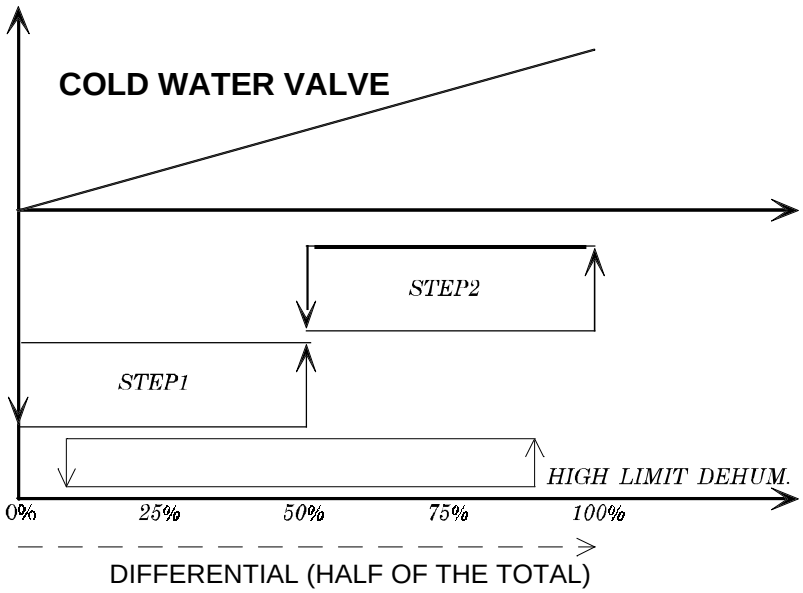
Here is the list of the default values the controller accepts as machine parameters whenever the user answers affirmatively to the mask successive to that of back-up memory deletion in the "special procedures" branch.

SELECTABLE PARAMETERS	RANGE	PRE-SET
Temperature set-point	15÷30	23.0º
Temperature differential	1÷10	3º
High temperature threshold	10÷50	30º
Low temperature threshold	0÷30	10º
Integration constant	0.999	600 sec
Only 1 compressor enabled;		
Set-point compressor 1 in CW	0÷100%	50%
Hysteresis compressor 1 in CW	0÷100%	50%
or;		
Set-point compressor 1 in ES	0÷100%	66%
Hysteresis compressor 1 in ES	0÷100%	33%
Both compressors enabled;		
Set-point compressor 1 in CW	0÷100%	25%
Hysteresis compressor 1 in CW	0÷100%	25%
Set-point compressor 2 in CW	0÷100%	75%
Hysteresis compressor 2 in CW	0÷100%	25%
or;		
Set-point compressor 1 in ES	0÷100%	49%
Hysteresis compressor 1 in ES	0÷100%	16%
Set-point compressor 2 in ES	0÷100%	82%
Hysteresis compressor 2 in ES	0÷100%	16%
1 heater enabled;		
Set-point	0÷100%	25%
Hysteresis	0÷100%	25%
2 heaters enabled;		
Set-point heater 1	0÷100%	25%
Hysteresis heater 1	0÷100%	25%
Set-point heater 2	0÷100%	75%
Hysteresis heater 2	0÷100%	25%

Beginning cold water valve	0÷100%	0%
End cold water valve	0÷100%	100%
Beginning hot water valve	0÷100%	0%
End hot water valve	0÷100%	100%
Set-point relative humidity	0÷100UR%	50%
Humidity differential	5÷20%UR	10%
High humidity threshold	0÷100%	80%
Low humidity threshold	0÷100%	30%
Set-point dehumidification step	0÷100%	50%
Hysteresis dehumidification step	0÷100%	10%
Logic dehumidification	N.O/N.C.	N.O
Start-up delay	****	15 sec
Threshold working hours compressor 1	1÷4000h	4000h
Threshold working hours compressor 2	1÷4000h	4000h
Threshold working hours humidifier	1÷4000h	4000h
Threshold working hours fan	1÷4000h	4000h
Water high temperature threshold	****	20º
Water low temperature threshold	****	2º
Delay between compressors start-ups	****	360 sec
Min. time compressors ON	****	60 sec
Min. delay for compressors re-start	****	180 sec
Low pressure alarm delay	****	180 sec
Digital inputs detection delay	****	60 sec
High/low temperature alarm delay	****	30 min
Heaters insertion delay	****	3 sec
Time-zone 1 (hs) for temperature	00:00/23:59	6:00
Time-zone 2 (hs) for temperature	00:00/23:59	12:00
Time-zone 3 (hs) for temperature	00:00/23:59	18:00
Time-zone 1 (hours) for humidity	00:00/23:59	6:00
Time-zone 2 (hours) for humidity	00:00/23:59	12:00
Time-zone 3 (hours) for humidity	00:00/23:59	18:00
Temperature set-point 1st zone	****	21º
Temperature set-point 2nd zone	****	21º
Temperature set-point 3rd zone	****	21º
Temperature set-point 4th zone	****	21º
Humidity set-point 1st time-zone	****	50%
Humidity set-point 2nd time-zone	****	50%
Humidity set-point 3rd time-zone	****	50%
Humidity set-point 4th time-zone	****	50%

2.5 TEMPERATURE CONTROL DIAGRAMS

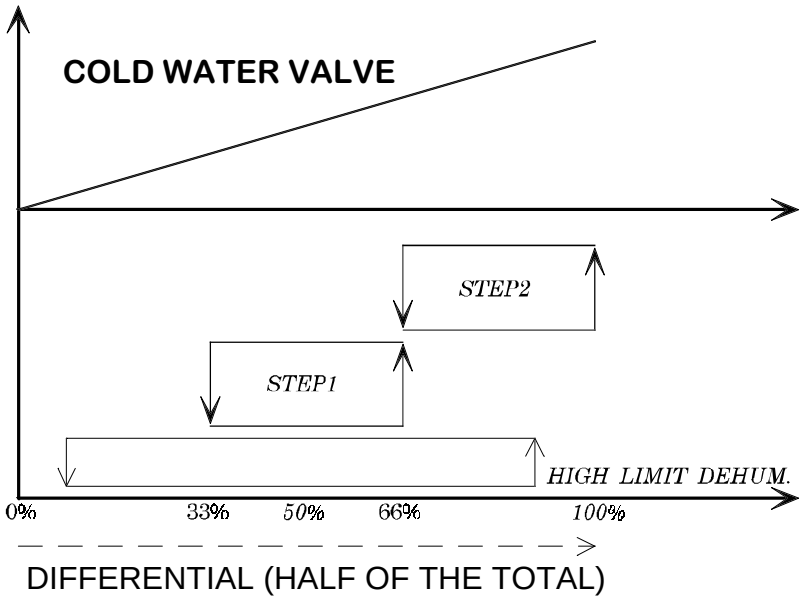
TWO-COMPRESSOR UNIT WITHOUT ENERGY SAVING OPTION



Default values:
- Set-point compressor 1: 25% Hysteresis compressor 1: 25%
- Set-point compressor 2: 75% Hysteresis compressor 2: 25%

In case of use of default partialised compressors, the compressor steps coincide with the relative partialisations.

TWO-COMPRESSOR UNIT WITH ENERGY SAVING OPTION



Default values:

- Set-point compressor 1: 49% Hysteresis compressor 1: 16%
- Set-point compressor 2: 82% Hysteresis compressor 2: 16%

In case of use of default partialised compressors, the compressor steps coincide with the relative partialisations.

-MANAGEMENT OF COMPRESSORS

After the compressor has been turned ON, it must go on working for at least 1 min (default) (VALUE SELECTABLE THROUGH DEDICATED MASK).

After the compressor has been turned OFF, it is necessary to wait for at least 6 min (default) before restarting it (VALUE SELECTABLE THROUGH DEDICATED MASK).

The second compressor can not be turned ON before 3 min. have elapsed from the starting up of the first one (default) (VALUE SELECTABLE THROUGH DEDICATED MASK).

In the 2-compressor configuration it is possible to select the compressor ROTATION option.

The HIGH-LIMIT step activates during dehumidification as follows:

- if within one minute from the indication of higher limit of the cooling differential (85%) the temperature value is not comprised within the regulation differential (85% -15%), the HIGH-LIMIT step is activated and dehumidification stopped.
- the step remains active until 15% of the heating differential is reached, then dehumidification will restart only if required.

-ENERGY SAVING

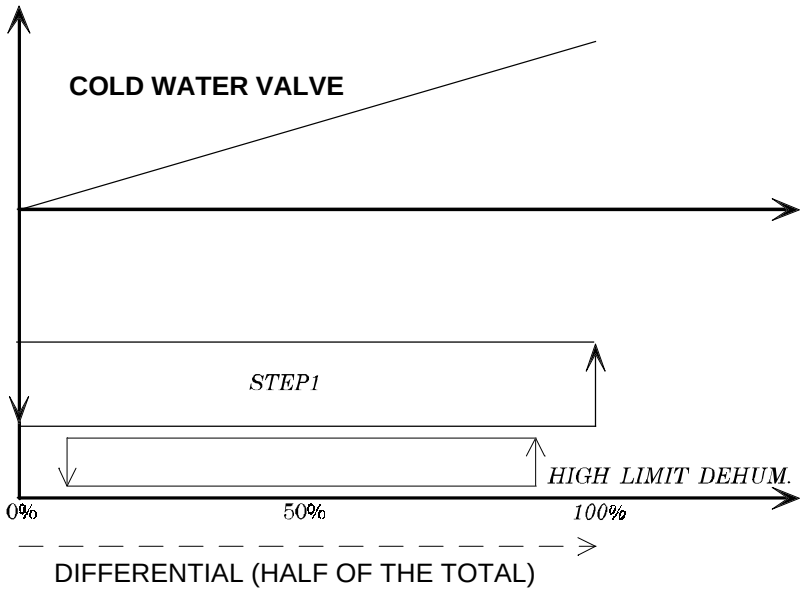
In order to adopt the Energy Saving option check that:

Ambient Temperature - Water Temperature > (SET energy saving + HYST energy saving)

The value of SET ENERGY SAVING can be selected through a dedicated mask (mask GTEMPES in the "Temperature Management" branch).
If this condition occurs:

- by answering affirmatively to the COM-ES mask ("Compressors compatible with the valve in the Energy Saving option"), the compressors steps within the differential will be postponed with respect to the cold water valve, but only when the conditions necessary to the energy saving activation occur. Otherwise, with activated energy saving option but functioning conditions, the compressors will be normally functioning.
- by answering negatively to the COM-ES mask, the compressors steps will be eliminated and only the valve will remain active in case the conditions necessary to the energy saving activation occur. Otherwise, the compressors will be normally functioning.

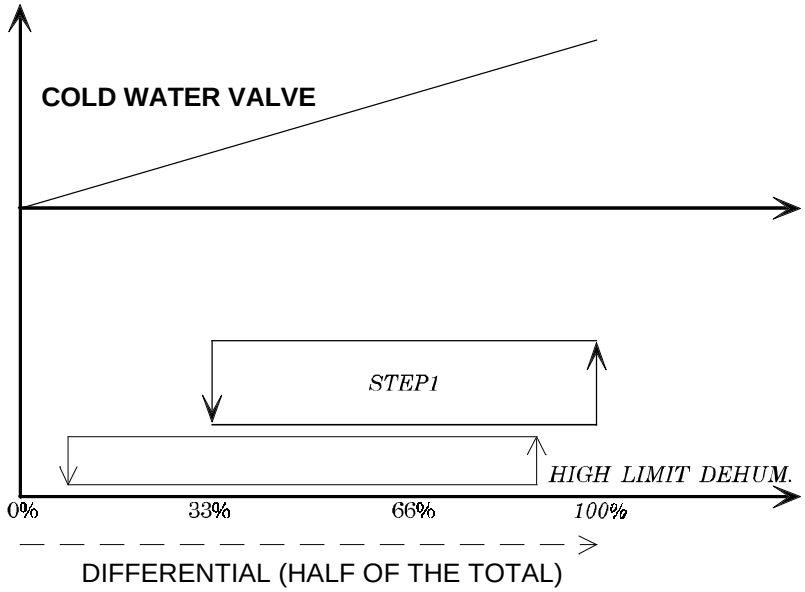
1 COMPRESSOR UNIT WITHOUT ENERGY SAVING OPTION



Default values:
- Set-point compressor: 50% Hysteresis compressor: 50%

In case of use of default partialised compressors, the compressor step coincides with the relative partialisation.

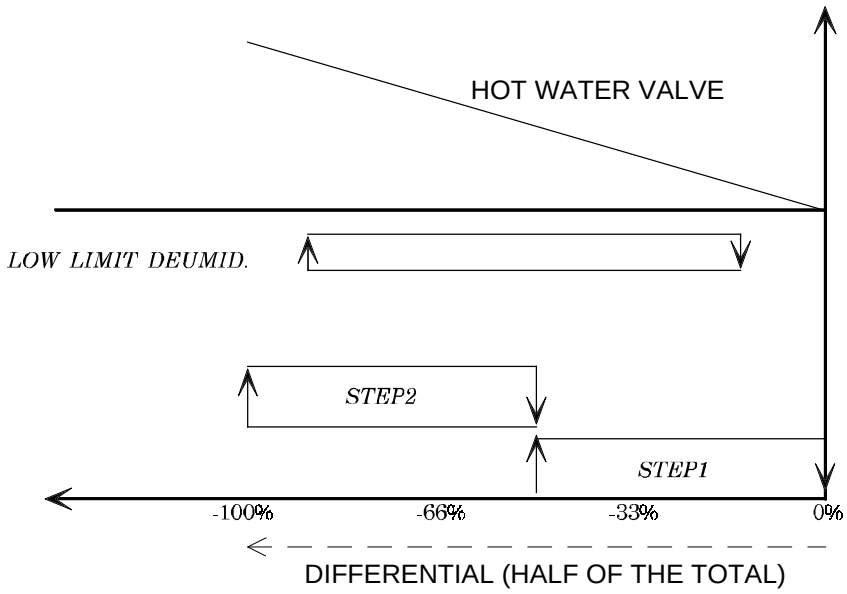
1 COMPRESSOR UNIT WITH ENERGY SAVING OPTION



Default values:
- Set-point compressor 1: 66% Hysteresis compressor 1: 33%

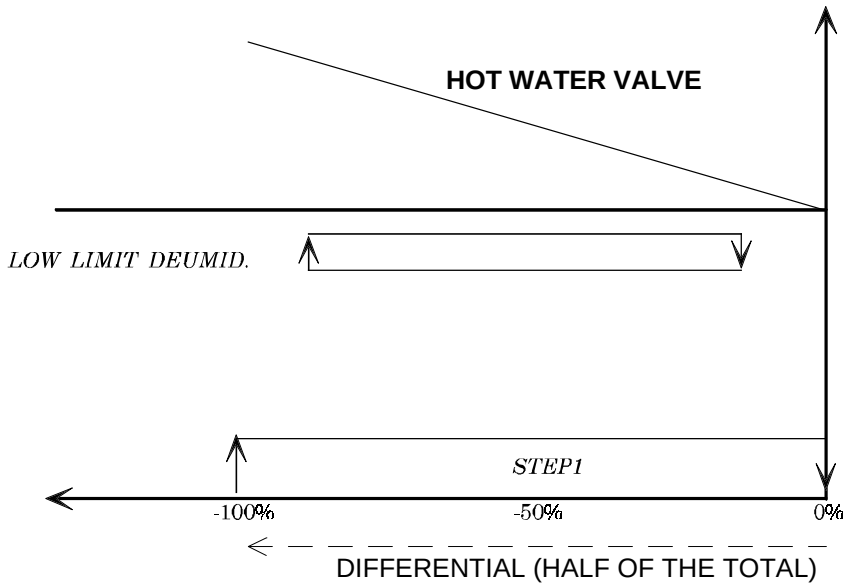
In case of use of default partialised compressors, the compressor step coincides with the relative partialisation.

TWO-HEATER UNIT



Default values:
- Set-point heater 1: 25% Hysteresis heater 1: 25%
- Set-point heater 2: 75% Hysteresis heater 2: 25%

ONE-HEATER UNIT



Default values:
- Set-point heater: 50% Hysteresis heater: 50%

NOTES

The 2-step heating configuration allows setting of the following two alternatives:

- STANDARD

during insertion:
HEATER 1
HEATER 1 + HEATER 2

during disinsertion:
HEATER 1 + HEATER 2
HEATER 1

- BINARY

during insertion:
HEATER 1
HEATER 2
HEATER 2 + HEATER 1

during disinsertion:
HEATER 2 + HEATER 1
HEATER 2
HEATER 1

The LOW-LIMIT step intervenes during dehumidification as follows:

- if within one minute from the indication of lower limit of the heating differential (-85%) the temperature values are not comprised within the regulation differential (-85% _-15%) the LOW-LIMIT step is activated and dehumidification stopped.
- the step remains active up to -15% of the heating differential, then dehumidification will restart only if required.

2.6 HUMIDITY CONTROL DIAGRAMS

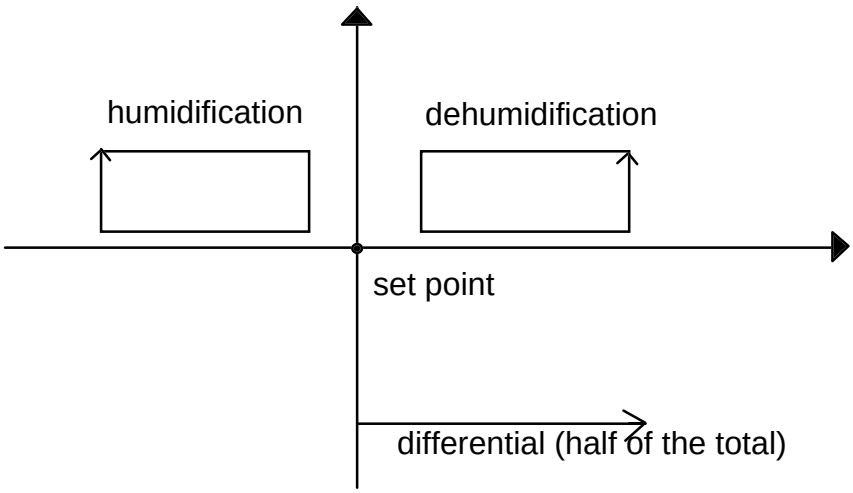
FEATURES:

The type of control can be selected through the dedicated mask (mask SR1U within the "PROBE MANAGEMENT" branch)

DEHUMIDIFICATION can be achieved:
- by starting one compressor (chosen in the DEU mask within the "Compressors Management" branch);
- through partialisation of cold water valve (chosen in the GUMI1DEU mask within the "Compressors Management" branch);
- through fan reduction speed (chosen in the GUMI2DEU mask within the "Compressors Management" branch);

- Dehumidification is enabled only if ambient temperature is within the alarm limits.
IN CASE OF OUT-OF-RANGE TEMPERATURE VALUES DEHUMIDIFICATION IS PREVENTED (see diagrams of temperature control).

HUMIDITY REGOLATION

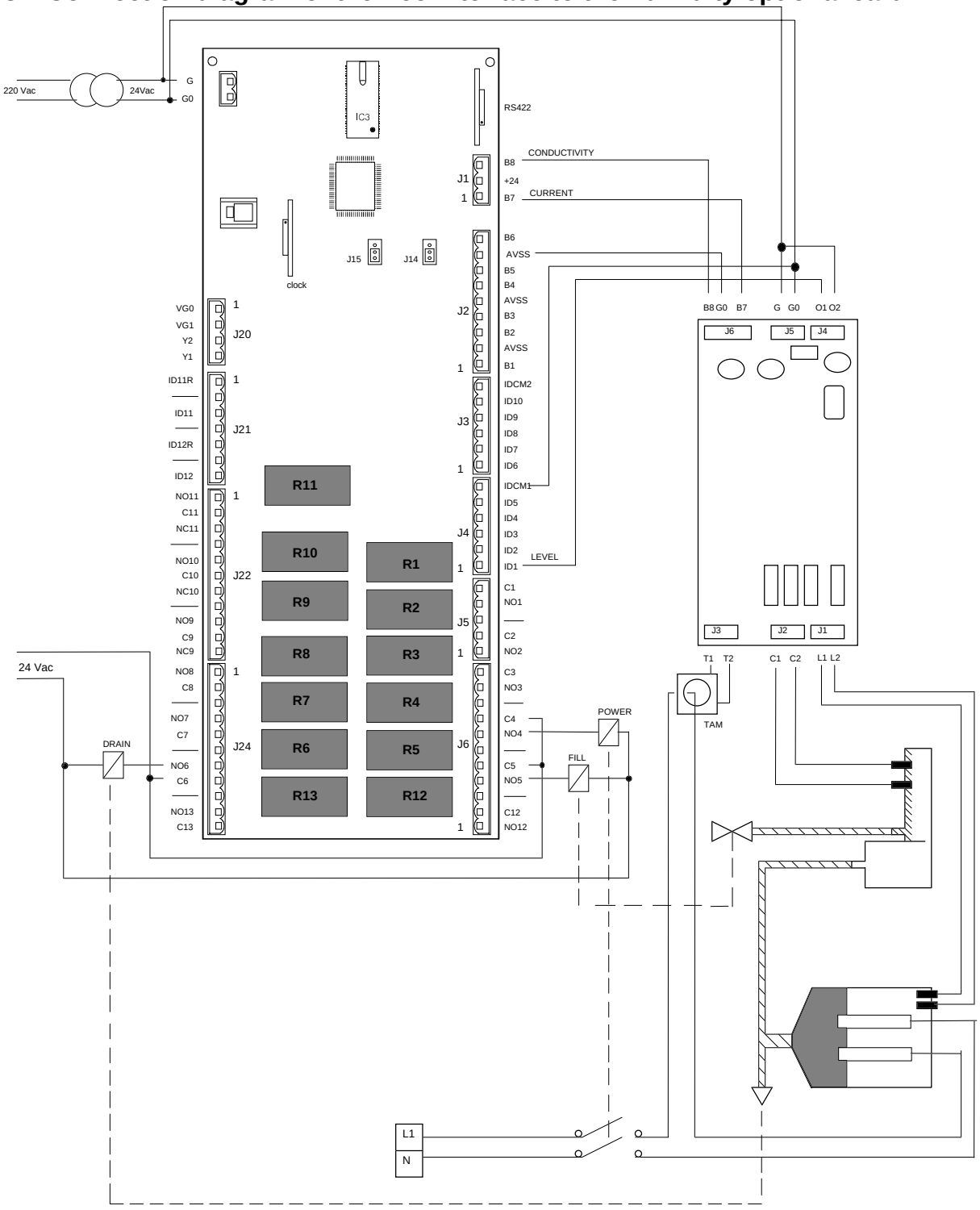


3.Humidifier control

Generalities:

The humidifier control for p*CO* air-conditioner standard manages the immersed-electrode humidifiers (to be coupled with the OEM kits), is able to control all the 1 to 42 Kg/h humidifiers, both three-phase and single-phase, with supply voltages from 200 to 660 V(220-240 V or 380-415 V voltages are suggested).
Regulation is ensured by a *pCO* interface with eight analog inputs and an optional card so as the *pCO* interface can read the signal coming from the TAM current transducer, the conductivity-reading signal and the full load sensor.
In accordance with the current and relative humidity signals, the *pCO* controls steam production and the humidifier working condition; furthermore, it controls and signals all the states and alarms of the humidifier.

3.1 Connection diagram of the Pco interface to the humidity optional card



3.2 Description of humidifier parameters

To select and control the humidifier it is necessary to set out properly the following parameter:

No.	NAME	DESCRIPTION	U.M.	RANGE.	DEF.
1	Nominal p.	Nominal or maximum production that can be supplied by the cylinder	kg/h	0.42	3
2	Voltage	Supply voltage	Volt	0.660	220
3	Phase no.	Phase no. of the power supply	....	1/3	1
4	TAM model	Utilized TAM model	.....	50.700	100
5	Set p.	Production set out as maximum	kg/h	30%Pn. . 100%Pn	3
6	Humidity setpoint	Setpoint of the humidity regulation	Ur%	0.100 Ur%	50
7	Humidity differential	Band of the humidity regulation	Ur%	0.100 Ur%	10
8	High humidity threshold	High humidity alarm threshold	Ur%	0.100 Ur%	80
9	Low humidity threshold	Low humidity alarm threshold	Ur%	0.100 Ur%	30
10	C0	Algorithm constant(see the following paragraph)	...	...	93
11	C1	Algorithm constant (see the following paragraph)	...	...	70
12	C2	Algorithm constant (value for the assistance)	...	...	2
13	C3	Algorithm constant (value for the assistance)	...	...	70
14	C4	Algorithm constant (value for the assistance)	...	...	20
15	C5	Algorithm constant (value for the assistance)	...	...	725
16	C6	Algorithm constant (value for the assistance)	...	...	75
17	C7	Algorithm constant (value for the assistance)	...	...	5
18	C8	Algorithm constant (value for the assistance)	...	...	1

3.3 C0-C1 parameter selection tables

The C0 and C1 constants differ according to the type of humidifier being connected. In the following tables, the C0 and C1 values as a function of the nominal production (columns) and voltage (rows) are shown:
The C0 and C1constants change according to the type of humidifier being connected. In the following tables the C0 and C1 values are shown as a function of the nominal production (columns) and of the voltage (rows) :

C0 and C1 for single-phase cylinders F200MA with a nominal production ranging from 1 to 3Kg/h :

	Nominal Production in Kg/h					
	1 Kg/h		**2** Kg/h		**3** Kg/h	
	C0	C1	C0	C1	C0	C1
208	90	70	96	70	103	70
220	78	70	86	70	93	70
230	72	70	80	70	87	70
240	67	70	74	70	82	70

C0 and C1 for three-phase cylinders F400TA with a nominal production ranging from 3 to 5 Kg/h:

	Nominal Production in Kg/h			
	3 Kg/h		**5** Kg/h	
	C0	C1	C0	C1
208	94	150	100	150
220	84	150	90	150
230	78	150	83	150
240	72	150	77	150
380	34	150	39	150
400	31	150	37	150
415	29	150	35	150
440	27	150	33	150
480	25	150	31	150
575	20	150	26	150

C0 and C1 for three-phase cylinders E400TA with a nominal production ranging from 8 to 13Kg/h:

	Nominal Production in Kg/h			
	8 Kg/h		**13** Kg/h	
	C0	C1	C0	C1
208	95	250	103	250
220	84	250	93	250
230	78	250	85	250
240	72	250	79	250
380	34	250	37	250
400	32	250	34	250
415	30	250	32	250
440	28	250	30	250
480	26	250	27	250
575	21	250	22	250

C0 and C1 for three-phase cylinders I400TW with a nominal production ranging from 23 to 42 Kg/h:

	Nominal Production in Kg/h			
	23 Kg/h		**33** Kg/h	
	C0	C1	C0	C1
208	57	500	59	500
220	52	500	53	500
230	48	500	49	500
240	44	500	46	500
380	20	500	22	500
400	18	500	20	500
415	17	500	19	500
440	16	500	17	500
480	14	500	16	500
575	11	500	13	500

	Nominal Production	
	42 Kg/h	
	C0	C1
380	23	150
400	21	150
415	20	150
440	19	150
480	18	150
575	15	150

3.4 Programming of the humidifier

Selection of the type of humidifier

To select the type of humidifier to be controlled, it is necessary to properly select 4 parameters in the humidifier masks through the manufacturer's password:

- NOMINAL P. is the nominal steam production or maximum deliverable steam from the cylinder that is available. It is possible to select values ranging from 1 kg/h to 42 Kg/h.
- VOLTAGE is the voltage value of the power supply. It possible to select values ranging from 0 to 660 V.
- PHASE No. is the number of phases of the power supply. It is possible to select 1 or 3 phases (single-phase or three-phase)
- TAM MODEL the model of amperometric transformer being utilized is selected, by selecting 0= TAM 50 , 1=TAM 100 , 2=TAM 150 , 3= TAM 300 ,4=TAM 500 , 5=TAM 700
- DRAINAGE ENABL. WITHOUT VOLTAGE the drainage type is selected whether with the power contactor being connected or disconneced.

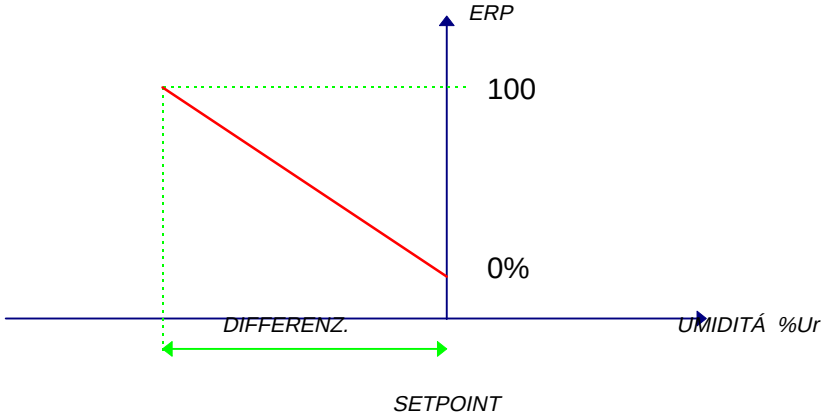
Regulation of humidity and production

The regulation of the humidifier steam production depends on:

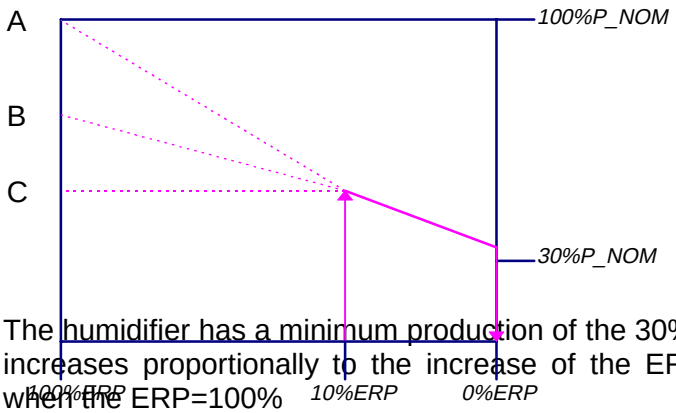
-Humidity regulation

-Set production SELECTED P. (HUMI_PCO_SET1mask SET button)

The humidity regulation is carried out by the control in accordance with the reading of the humidity probe at a setpoint and a humidity differential. The control calculates a proportional humidity error ERP :



- The selected production is the maximum wanted production and is a value that can range between the 30% of nominal P. and the 100% of nominal P.
- Based on the nominal production, the selected production and the proportional humidity error ERP, the graph of the humidifier regulation is obtained:



ERP = errore proporzionale di umidita rispetto set e differenziale

Produzione di vapore desiderata :

A-100%Pn

B-50%Pn

C-30%Pn

- The humidifier has a minimum production of the 30% of the nominal P. when the ERP = 0 and it increases proportionally to the increase of the ERP until it reaches the selected production when the ERP=100%

Activation of the humidifier

The humidifier is ativated when the following conditons occur:

- TheERP > 10 %.
- The air-conditioner standard unit has been activated by an On/Off button or by a remote start/stop digital input.
- The humidifier is enabled to operate in the HUMI_PCO_SET3 mask at the item ENABLING, group of masks associated to the SET button.

Monitoring of the steam production and of the values that typical of the humidifier

- The user will be able to verify the instantaneous production of steam by examining the value occurring in the of masks connected to the MENU button
- The user will also be able to monitor some characterisic values such as the water supply conductivity, the absorbed current per phase and the various operation modes in the group of masks associated to the I/O button.

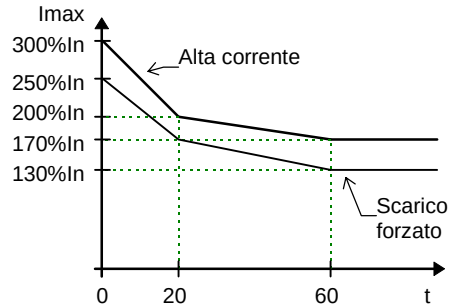
3.5 Management of the humidifier Alarms

The different detectable alarms, with the detection criterion and the possible corrections, are shown below.

DISPLAY	CRITERIA	ACTION	RELAY	SIRENS
Power failure alarm	When the water level reaches the full sensor and Im < 5%In[1] is measured	Cut power Empty the cylinder[2]	Yes	Yes
Lack of water alarm	Load valve open for more than 20 minutes	None	Yes	Yes
High or low humidity alarm	Humidity over or below the established thresholds. Signalled only 20 minutes after the On button has been pressed	None	Yes	Yes
Foam presence indication	Foam has been detected within the cylinder. The presence of foam is signalled in the “i/o” mask HUMI_PCO_IO1.	The situation is managed until its extinction through a special procedure by the control (temporarily maximum production is not ensured)	NO	NO
Full cylinder indication	The cylinder is full of limestone .	(cylinder replacement is suggested)	NO	NO
High current alarm	Current exceding the established limits (see the relevant chapter)	Forced drainage for 5 seconds. Cut power.		

HIGH CURRENT ALARM

Limits have been established in order to prevent the current from exceding the maximum acceptable values. However, they depend on time, as they must allow momentary peaks when the instrument is started.



The forced drainage lasts for 5 seconds and is not signalled. The high current alarm caauses water drainage for 30 seconds and stops the humidifier.

[1] In case of power failure, the control too would not be operating, but in the absence of only one phase, no current could be measured, whereas the last one is exeding the safety threshold.

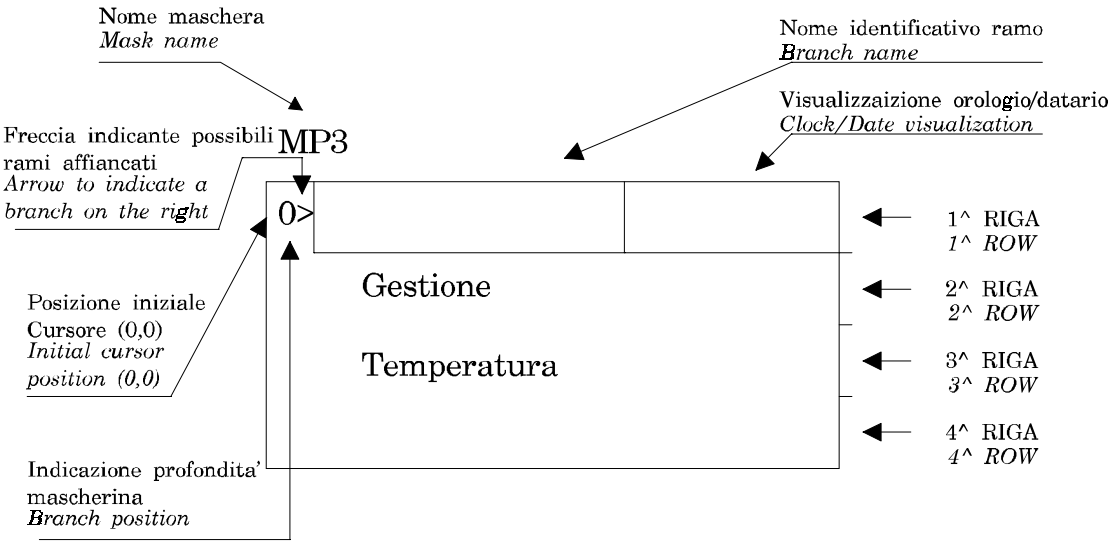
[2] To prevent a rapid current increase beyond the established limits, once the alarm has been reset and the power contactor has been enrgized again.

3. USER GUIDE

The Liquid Crystal Display is the main communicative channel between pCO and user. All information that can be read on display is stored in a series of masks. All masks will be listed below.

3.1 MASK

The typical mask structure is the following (the display has 4 rows x 20 columns):



In case of numeric setting fields, press *ENTER* to move the cursor from the current position (for example 0,0) to the first figure of the first numeric field available; if the current position corresponds to the last possible setting field, by pressing *ENTER* the cursor will return on "home" position - 0,0.

3.2 ALARM MASKS

Each alarm condition is signalled ;

- by the incorporated buzzer;
- by the red led indicator on the front panel of user interface and by the “AL” message which appears on the higher right corner of display.

It is possible to display an alarm message indicating the type of problem occurred by pressing the *ALARM* key. All alarms are subjected to 1 minute delay at the unit start-up, with the exception of high/low temperature & humidity alarms and of damaged probe alarm which are subjected to a delay selectable in the Manufacturer branch.

The keys that can be used within the alarm branch are:

- *UP KEY*
- *DOWN KEY*
- *MENU KEY*

MENU MASK

First mask of synoptic tree.This is the menu mask. Access is gained by pressing the “menu” key

```
Temp.  00.0°C
Humi.  00.0%
```

MAINTENANCE MASKS

First mask of the maintenance branch you reachby pressing the “**Maintenance**” key. This is the mask for the visualisation of fan/2 compressors working hours. By pressing the “**Up**” and the “**Down**” keys you can move upwards and downwards the loop.

```
Operating hours
Main fan   000000
compr.1    000000
compr.2    000000
```

```
Maint.
Password

               00000
```

Mask for Fan Hours Threshold programming and for already calculated hours clearing. For the clearing function it is necessary to keep pressed for a couple of seconds the “Up” or the “Down” key on theNo word. (warning the threshold is multiply by 1000)

```
Fan hours meter
Hours      :000000
Threshold
(x1000)    :000
Reset      :N
```

Mask for Compressor 1 Hours Threshold programming and for already calculated hours clearing.

```
C.1 hours meter
Hours       :000000
Threshold
(x1000)     :000
Reset       :N
```

Mask for Compressor 2 Hours Threshold programming and for already calculated hours clearing.

```
C.2 hours meter
Hours       :000000
Threshold
(x1000)     :000
Reset       :N
```

The following “probe adjust mask” allow you to adjust the value read from the the probe.

```
Probe
adjust

Room temp.      0.0°C
Supply air      0.0°C
Outl.water      0.0°C
```

```
Probe
adjust

Inl. water.     0.0°C
Room hum.       0.0°C
```

the following “manual masks” allow you switch on and switch off the devices without the temperature or humidity regulation

```
Manual
procedure

Main Fan        :N
Energy saving   :N
```

```
Manual
procedure

Dehumidifier    :N
```

```
Manual
procedure

Compressor 1    :N

Compressor 2    :N
```

```
Manual
procedure

Unloader 1      :N

Unloader 2      :N
```

```
Manual
procedure

Heater 1        :N

Heater 2        :N
```

```
Manual
procedure
Cooling
valve        N   00.0
Heating
valve        N   00.0
```

```
Manual
procedure
Disable
humidification N
Manual drain
(120 sec)      N
```

I/O MASK

```
Analog inputs
Room tmp       00.0°C

Supply air
temperat.      00.0°C

Room Hum.      00.0°C
```

```
Analog inputs

Ext.Air        00.0°C

out Water.     00.0°C
```

```
Digital outputs
C=Close  O=Open
Dout 01-03:    CCC
Dout 04-06:    CCC
Dout 07-09:    CCC
Dout 10-11:    CCC
```

```
Analog outputs

Cooling
Valve          00.0 V

Heating
Valve          00.0 V
```

```
Humidifier
Main switch    :OFF
Fill valve     :OFF
Drain valve    :OFF
```

```
Humidif.(Amps.)"

Measured   :000.00 A
Target     :000.00 A
Nominal    :000.00 A
```

```
Humidifier

W. Level:      OPEN

Conductivity
           00000Us/Cm
```

```
Humidifier

Cyl. worn out :    N
Mode  :    --------
Status:    --------
```

TIME ZONES MASKS

This is the first mask of the “Time /Time-zones”branch you can reach by pressing the "**Clock”** key. By pressing the "**Up**" and the "**Down”** keys you can**move within the loop.**This mask allows date and hour setting.

```
CLOCK
Hour
        00:00
Date
        00/00/00
```

```
Clock
Password

            00000
```

First mask of temperature Time Zones which is meant to selectactivation/deactivation of Time Zones.

```
Daily time zone
with automatic
temperature set.
variation     :N
```

Mask for the setting of time and set-point of the first temperature Time Zone.

```
Temperature
Daily time zone1
Start time 00:00
Setpoint   00.0°C
```

Mask for the setting of time and set-point of the second temperature Time Zone.

```
Temperature
Daily time zone2
Start time 00:00
Setpoint   00.0°C
```

Mask for the setting of time and set-point of the third temperature Time Zone.

```
Temperature
Daily time zone3
Start time 00:00
Setpoint   00.0°C
```

Mask for the setting of time and set-point of the fourth temperature Time Zone.

```
Temperature
Daily time zone4
Start time 00:00
Setpoint   00.0°C
```

First mask of humidity Time Zones which is meant to selectactivation/deactivation of Time Zones.

```
Daily time zone
with automatic
humidity setp.
variation     :N
```

Mask for the setting of time and set-point of the first humidity Time Zone.

```
Humidity
Daily time zone1
Start time 00:00
Setpoint   00.0%
```

Mask for the setting of time and set-point of the second humidity Time Zone.

```
Humidity
Daily time zone2
Start time 00:00
Setpoint   00.0%
```

Mask for the setting of time and set-point of the third humidity Time Zone.

```
Humidity
Daily time zone3
Start time 00:00
Setpoint   00.0%
```

Mask for the setting of time and set-point of the fourth humidity Time Zone.

```
Humidity
Daily time zone4
Start time 00:00
Setpoint   00.0%
```

SET MASK

This is the first mask of the set-point branch you can reach by pressing the "**Setpoint**" key. By pressing the "**Up**" and the "**Down**" keys you can move within the loop which is composed of only another mask. This mask allows temperature set-point setting.

```
SET T.
        00.0°C
SET H.
        00.0%
```

USER MASKS

This is the first mask of the user branch you can reach by pressing the "**Prog.**" key. In this mask it is necessary to set the user password correctly to be able to move to the other masks of the branch.

```
Service
Password
            00000
```

This mask allow the setting of temperature and humidity setpoint limits

```
Tmp.setp.limits
Minimum    00.0°C
Maximum    00.0°C
Hum setp.limits
Minimum    00.0%
Maximum    00.0%
```

This mask allow the setting of temperature proportional band and neutral zone

```
Temperature
Band        00.0°C
Neut.zone   00.0°C
Humidity
Band        00.0%
Prod.kg/h   00.0
```

this mask allow the setting of :

- automatic unit switch on after power failure
- Unit switch on and switch off by digital input
- Chinese character in the main mask
- differential of energy saving

```
Autom.restart      N

Remote On/Off      N

Chinese            N

Differential of
En.saving       00.0
```

This mask allow the setting compensation parameter

```
Compensation
procedure          N

Setpoint        00.0°C
Band            00.0°C
Offset          00.0°C
```

This mask allow setting of high/low offset for low/high air temperature/humidity alarms

```
Room tmp.alarms
Offs.low       00.0°C
Offs.high      00.0°C

Room hum alarms
Offs.low       00.0°C
Offs.high      00.0°C
```

This mask allow setting of high/low outlet water temperature alarms

```
Outl.water temp.
threshold alarms
high        00.0°C
low         20.0°C
```

```
New service
password

            00000
```

MANUFCTURER MASKS

```
Manuf
Password

            00000
```

```
Unit config ->

General par ->

Timing      ->

Unit.init.  ->
```

Configuration parameter branch

The following mask allow the configuration of the unit;it is possible select probes devices and regulator

```
Clock board         N
Superv. board       N
Ext.air probe       N
Suppl. air p.       N
Outl.water p.       N
Inl. water p.       N
Room humid.p.       N
```

```
Energy saving       N
Compress. nr.       N
Heaters numb.       N
Cooling valv.       N
Heating valve       N
```

General parameter branch

This mask allow setting the following parameter:

- Kind of temperature regulation proportional or proportional + integral
- Enable or disable rotation of compressors
- Number of compressors call in dehumidification
- Enable or disable compressors in energy saving

```
Tmp.regolat.:P

Rotat.compr.:N
Cmp.for deh.:0

Compr.with
valve in ES :N
```

this mask allow setting of the following parameter:

- Logic of dehumidification relay :normaly oen or normaly closed
- dehumidification step
- temperature step to allow the dehumidification

```
Logic dehumi.  N.O.
Dehum.Pos      00.0%
Dehum.Hys      00.0%
Low T Pos      00.0%
Low T Hys      00.0%
HighT Pos      00.0%
HighT Hys      00.0%
```

This mask allow setting the following parameter:

- temperature steps of compressors in normal function
- temperature steps of compressors in energy saving

C1 Pos	**00.0**%
C1 His	**00.0**%
C1 Pos Es	**00.0**%
C1 Pos Es	**00.0**%
C2 Pos	**00.0**%
C2 His	**00.0**%
C2 Pos Es	**00.0**%
C2 Pos Es	**00.0**%

This mask allow setting the following parameter:

- temperature steps of heaters in normal function

H1 Pos	**00.0**%
H1 His	**00.0**%
H2 Pos	**00.0**%
H2 Pos	**00.0**%

This mask allow setting the following parameter:

- temperature steps of modulating and floating valve in normal function

V c In	**000.0**%
V c End	**000.0**%
V h In	**000.0**%
V h End	**000.0**%

This mask allow setting humidifier parameter:

Voltage	0..660
production	0..42 kg/h
drain without power in the electrode y/n	
C0 C1	they dipends from the boiler
number of phases	they dipends from the boiler
TAM	100..700

```
Voltage     000.0 V
Product     00 kg/h
Drain without
Voltage     N
C0  000     phase   1
C1  000     TAM     100
```

Timing parameter Branch

This mask allow setting the following parameter

Delay fan on	Delay after switch on or power failure
delay fan off	delay after switch off
integr.time	integration time of proprtional+integral temperature regulation
runn time	total running time of floating valve

```
Delay FAN on    000
Del. FAN off    000
Integr.time     000
Runn. time      000
```

This mask allow setting the following parameter

low press...	low pressostat delay after compressor start up
probe alarm...	high and low alarm delay
air flow.....	integration time of proprtional+integral temperature regulation

```
Low press.alarm
delay time:     0000
Probe alarm
delay time:     0000
Air flow alarm
delay time:     0000
```

This mask allow setting the anti-courtcycle timing of compressors

```
Min. COMP. time
OFF        :    0000
ON         :    0000
Delay between
two starts of
same comp.:     0000
diff.comp.:     0000
```

```
Delay between
stars two unl.
            0000sec
Delay between
starts diff.hea.
            0000sec
```

Unit initialization branch

```
Press key ENTER
to insert"
DEFAULT paramet
```

```
Enter new
manufacturer
password
            00000
```

Alarm masks

AL01
Compressor 1
General Alarm

AL02
Compressor 2
General Alarm

AL03
Circuit 1
Low Pressure
Pressostat

AL04
Circuit 2
Low Pressure
Pressostat

AL05
Air Flow Alarm
(serius alarm
UNIT OFF

AL06
Main Fan
overload
(serious alarm)"
UNIT OFF

AL07
Heater 1
overload

AL08
Heater 2
overload

AL09
Fire/Smoke or
Floading alarm
(serious alarm)
UNIT OFF

AL10
Air Filter Alarm

AL11
High Room
Temperat. Alarm

AL12
Low Room
Temperat. Alarm

AL13
High Room
Humidity Alarm

AL14
Low Room
Humidity Alarm

AL15
High Outl. Water
Temperat. Alarm

AL16
Low Outlet Water
Temperat. Alarm

AL17
Compressor 1
Operation Hours
Alarm

AL18
Compressor 2
Operation Hours
Alarm

AL19
Operation Hours
Main Fan Alarm

AL20
Room temperature
Probe Faulty or
not Connected

AL21
Outl.Water temp.
Probe Faulty or
not Connected

AL22
Extern.Air temp.
Probe Faulty or
Not Connected

AL23
Supply Air Temp.
Probe Faulty or
Not Connected

AL24
Room Humidity
Probe Faulty or
not Connected

AL25
Alarm E06
High Current in
the Humidifier

AL26
Alarm E09
Lack of Water in
the Humidifier

AL27
Alarm E10
Lack of Current
in the Humidif.

AL28
Clock Board
Faulty or not
Connected

AL29
EEPROM Faulty
Call Assistance

4. COMPONENTS AND CODES

In the STANDARD A/C UNITS the following devices are available:

- user interface: cod. **PCOT000PGH0** LCD "8X16" graphic

- *eprom*; cod. **EPSTDECG0A**

- *pCO control board*: cod. **PCOB000A21** plug-in connectors
  cod. **PCOB000B21** fixed screw connectors

-*pCO address board* cod.**PCOADR0000**
  cod.**PCOCLKMEM0** with clock function

Derivation box cod.**TCONN6J000**

- *connetting cable interface/main board*:
  cod. **S90CONN002** 0,8 mt.
  cod. **S90CONN000** 1,5 mt.
  cod. **S90CONN001** 3 mt.