

Standard air-conditioning units

Manual version: 1.0 - 14/09/97

Program code: **EPSTDECZUA**

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REGULATION AND MICROPROCESSOR-CONTROL MANUAL FOR AIR-CONDITIONING UNITS:

1. INTRODUCTION TO THE REGULATION:

The system 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 RS422 serial communication.*

1.2. HARDWARE BEING UTILISED

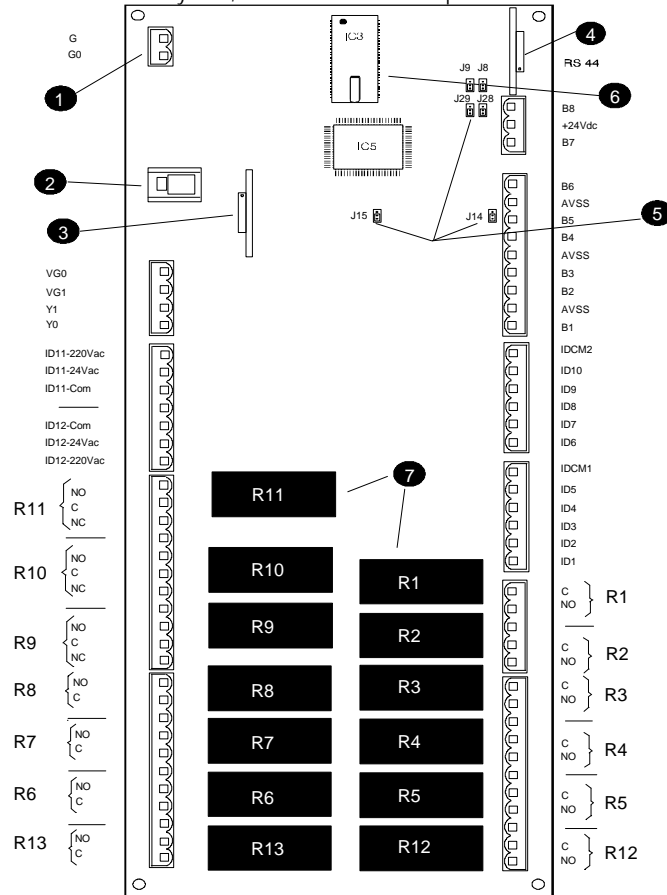
1. 6-input (without integrated-humidifier option) or 8-input (integrated humidifier option) pCO card
2. 4x20 LCD pCO terminal

EPROM codes

Italian version: EPSTDICZUA
English version: EPSTDECZUA
French version: EPSTDFCZUA
German version: EPSTDDCZUA

2. INPUT/OUTPUT DESCRIPTION

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



-List of components:

- (1) 24 Vac power-supply connector
- (2) Telephone-type connector for connection to a terminal (RS485) or for connection to a local network
- (3) Optional clock card
- (4) Optoisolated RS422 card for connection to a supervisory/teleassistance serial line
- (5) Pin strip to select current or voltage inputs for B5 and B6
- (6) program EPROM
- (7) Output relay

- Rxx: Connectors for relay digital outputs
- No: Normally open contact
- Nc: Normally closed contact
- C : Common reference for the contacts
- ID : Digital inputs
- IDCM: Com. reference for digital inputs
- Bx : Analog input
- AVSS: Analog-input references
- Yx: Analog outputs
- VG1/0: 24V a.c. analog outputs

The "Reference" column indicates the contacts on the pCO card.

2.1. 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

2.2. 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

2.3. 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 OPENING / COMPRESSOR
C-9-NO9 or C9-NA9	3 POINT WARM VALVE OPENING / RESISTANCE 1
C10-NO10 or C10-NA10	3 POINT WARM VALVE OPENING / RESISTANCE 2
C11-NO11 or C11-NA11	GENERIC ALARM SITUATION

2.4. ANALOG OUTPUTS

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

3. INITIAL INSTALLATION OR UPDATING THE EPROM

The initial installation can be divided into three parts:

a) Hardware connection

AFTER MAKING SURE THAT THE MATERIAL RECEIVED CORRESPONDS EXACTLY TO THAT ORDERED, BEGIN UNPACKING AND CONNECT THE INDIVIDUAL PARTS TO ASSEMBLE THE CONTROLLER.

The sequence of the operations is as follows:

- connect the telephone cable between the user terminal and the relay board.
insert the program eprom into the special socket .

BE CAREFUL TO INSERT THE EPROM IN THE CORRECT DIRECTION

connect the probes and devices to the relay card, as per the input/output table on page 1

connect the power supply to the interface

b) Software initialisation

SOFTWARE INITIALISATION INVOLVES SETTING THE FOLLOWING:

- the control parameters (set-points, alarm thresholds, etc.)
- the type of control (proportional; proportional +integral; compressor rotation, etc.)
- the available devices (compressors; valves; etc.)
- ALL THE SELECTED DATA IS STORED IN THE PERMANENT MEMORY SO AS TO AVOID IT BEING LOST WHEN THE UNIT IS CLEARED.

c) Updating the EPROM program

Every time the eprom is changed, the unit must be reprogrammed. To carry out this operation select the parameter found in the "M_DEFAULT" window in "UNIT INSTALLATION ", protected by manufacturer's password.

4. REGULATION STRATEGIES

The temperature control can be of the proportional or proportional + integral type; selection is possible in the M_MANUF_PARAM2 window, "Unit configuration under manufacturer's word" branch.

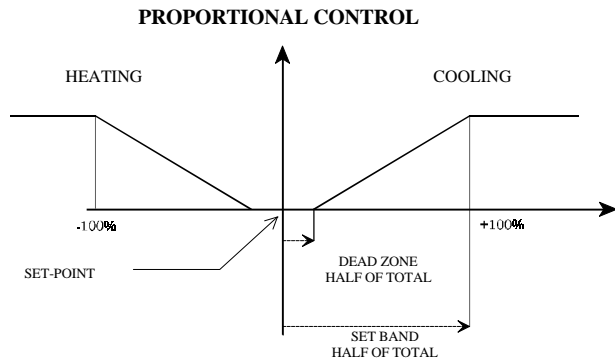
The proportional control operates according to the difference between the temperature or humidity requested (SET POINT) and the value actually being measured, consequently real;

The P+I regulation depends on the difference between the requested temperature and the temperature being measured and on the permanence time (the integration constant is selectable at the M_MANUF_TIME2 window).

The humidity control is only proportional.

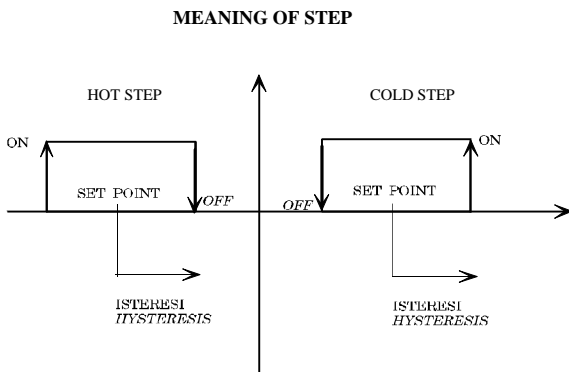
The **PROPORTIONAL BAND** defines the area of the temperature / humidity control. The control effect is proportional to the deviation from the set-point.

The **DEAD ZONE** defines an area near the set-point in which no device is energised.



STEP CONCEPT

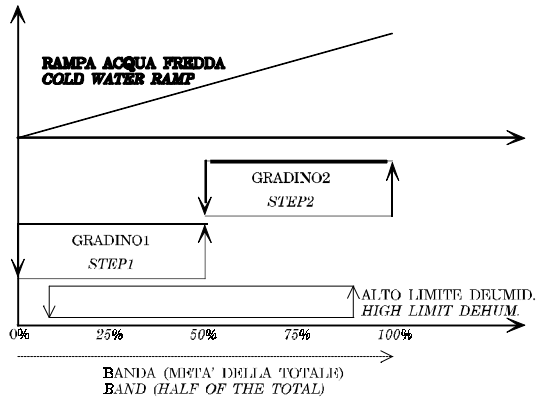
By step is meant an area of the proportional band which defines the values of switching on and off of a device (e.g. compressors; resistance; humidifier; etc.)



- the hysteresis is expressed as half the range between switching on (ON) and switching off (OFF).

5. TEMPERATURE REGULATION DIAGRAMS

5.1. TWO-COMPRESSOR UNIT WITHOUT THE ENERGY-SAVING OPTION



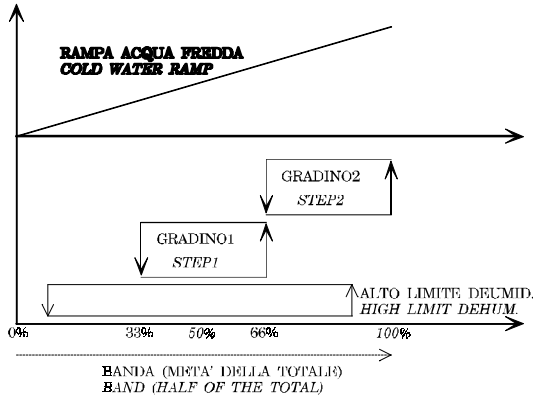
Factory values:

- Compressor1set: 25%
- Compressor2set: 75%

- Compressor1 hysteresis: 25%
- Compressor2 hysteresis: 25%

If factory capacity-controlled compressors are utilised the steps of the compressors and its capacity controls coincide.

5.2. A TWO-COMPRESSOR UNIT WITH THE ENERGY SAVING OPTION



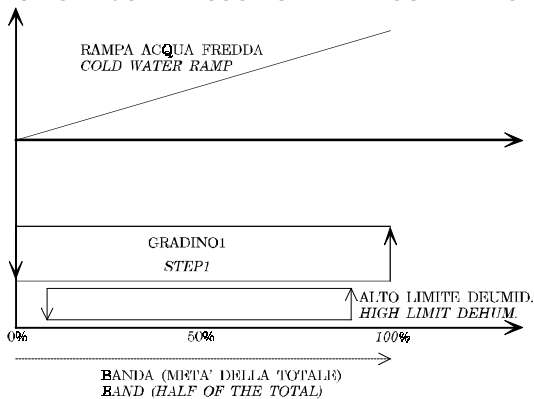
Factory values:

- Compressor1set: 49%
- Compressor2set: 82%

- Compressor1 hysteresis: 16%
- Compressor2 hysteresis: 16%

If factory capacity-controlled compressors are utilised the steps of the compressors and its capacity controls coincide.

5.3. SINGLE-COMPRESSOR UNIT WITHOUT ENERGY SAVING OPTION



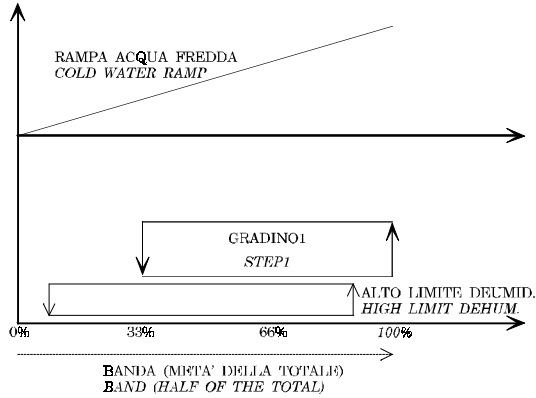
Factory values:

- Compressor set: 50%

- Compressor hysteresis: 50%

If factory capacity-controlled compressors are utilised the step of the compressor and its capacity control coincide.

5.4. SINGLE-COMPRESSOR UNIT WITH THE ENERGY SAVING OPTION

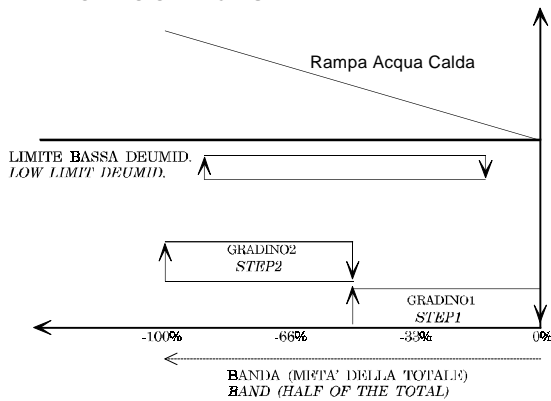


Factory values:

- Compressor1 set: 66% Compressor1 hysteresis: 33%

If factory capacity-controlled compressors are utilised the step of the compressor and its capacity control coincide.

5.5. TWO-RESISTANCE UNIT

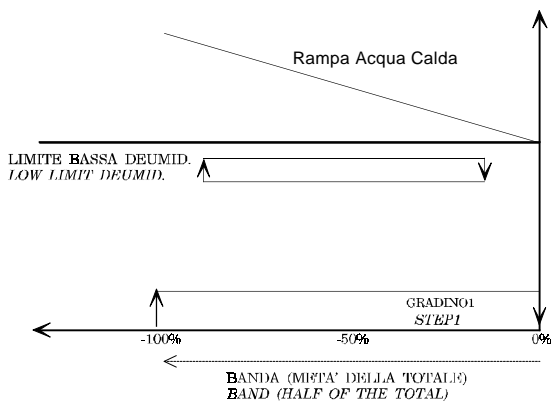


HOT WATER RAMP

Factory values:

- Resistance1 set: 25% Resistance1 hysteresis: 25%
 - Resistance2 set: 75% Resistance 2 hysteresis: 25%

5.6. SINGLE-RESISTANCE UNIT



HOT WATER RAMP

Factory value:

- Resistance set: 50% Resistance hysteresis: 50%

6. DEVICE MANAGEMENT:

6.1. COMPRESSORS

Once started a compressor can not be stopped before 1 min. (factory-made) (MASK-SELECTABLE VALUE).

Once started a compressor can not be stopped before 6 min. (factory-made) (MASK-SELECTABLE VALUE).

The possible starting of the second compressor can not take place within 3 min. from the starting of the first one (factory-made) (MASK-SELECTABLE VALUE).

In the two-compressor configuration the compressor ROTATION can be selected
RESISTANCE

In the 2-resistance configuration the following 2 functions are available:

- STANDARD

during connection:

RESISTANCE1

RESISTANCE1 + RESISTANCE2

during disconnection:

RESISTANCE1 + RESISTANCE2

RESISTANCE1

- BINARY

during insertion

RESISTANCE1

RESISTANCE2

RESISTANCE2 + RESISTANCE1

during connection

RESISTANCE2 + RESISTANCE1

RESISTANCE2

RESISTANCE1

6.2. DEHUMIDIFICATION STOP

The HIGH-LIMIT step operates during the dehumidification as follows:

- when reaching the upper limit of the cold band (85%) the HIGH-LIMIT step is energised and stops the dehumidification.
the step remains energised up to a value of 15% of the warming band, and the dehumidification will start again only if still requested.

6.3. NOTES ON THE ENERGY SAVING

In order to be able to exploit the Energy Saving option the following relationship has to be verified:

$T_{\text{ambient}} - T_{\text{water}} > (\text{SET energy saving} + \text{IST energy saving})$

The value SET ENERGY SAVING is mask-selectable (M_MANUF_PARAM10 window in the "General parameters" branch).

If this situation is verified then the following will occur:

- if in the M_MANUF_PARAM1 window ("Compressors with valve in Energy Saving") you answer yes, then the compressor steps within the band are delayed in reference to the cold-water ramp, but only when the necessary conditions for the energy saving operation occur. In the opposite case, namely energy saving being enabled but in the absence of the functioning conditions, the compressors operate normally.
- if you answer no in this window, then the compressor steps are eliminated and only the ramp in action is maintained in the presence of the conditions which require that energy saving be started. In the opposite case the compressors operate normally.

6.4. MANUAL CONTROL

This part of the program allows you to manually operate the unit's DEVICES, thus excluding the operation of the pCO control, but maintaining the interlock with the protections in order to ensure the security and integrity of the components being utilised.

To enable manual functioning it is necessary to carry out the operations described in the paragraph dedicated to the pCO keypad.

The manual state of the machine is identified by the appearance of the message "Manual procedure" on the last line of the display.

7. HUMIDITY REGULATION GRAPH

Humidity regulation can be selected from the M_MANUF_CONF4 window in UNIT CONFIGURAT., protected by the manufacturer's password.

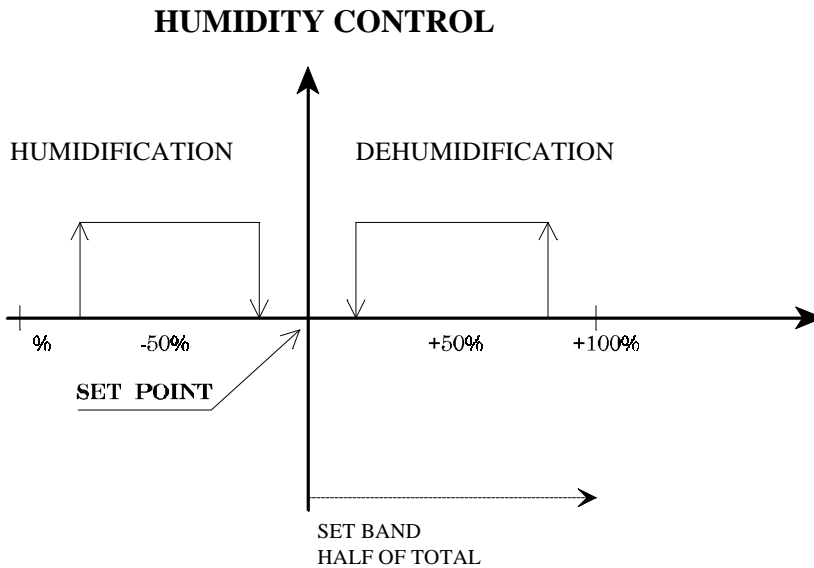
DEHUMIDIFICATION can be carried out:

- by means of the compressor starting (selected in the mask M_MANUF_PARAM2 within the "PARAMETRI GENERAL" branch);
- with capacity control of the cold-water ramp
- through the reduction of the fan speed

- Dehumidification is enabled only if the ambient temperature falls within the alarm limits.

FOR VALUES EXCEEDING THIS TEMPERATURE RANGE DEHUMIDIFICATION IS INHIBITED (see graphs of the temperature control).

Humidification can be carried out through the ON/OFF control as for the dehumidification, described above (that is a humidification step is selected in exactly the same way as for dehumidification) or with the integrated-humidifier control (selectable from M_MANUF_CONF4 mask, under the "Unit configuration" branch, protected by manufacturer's password).

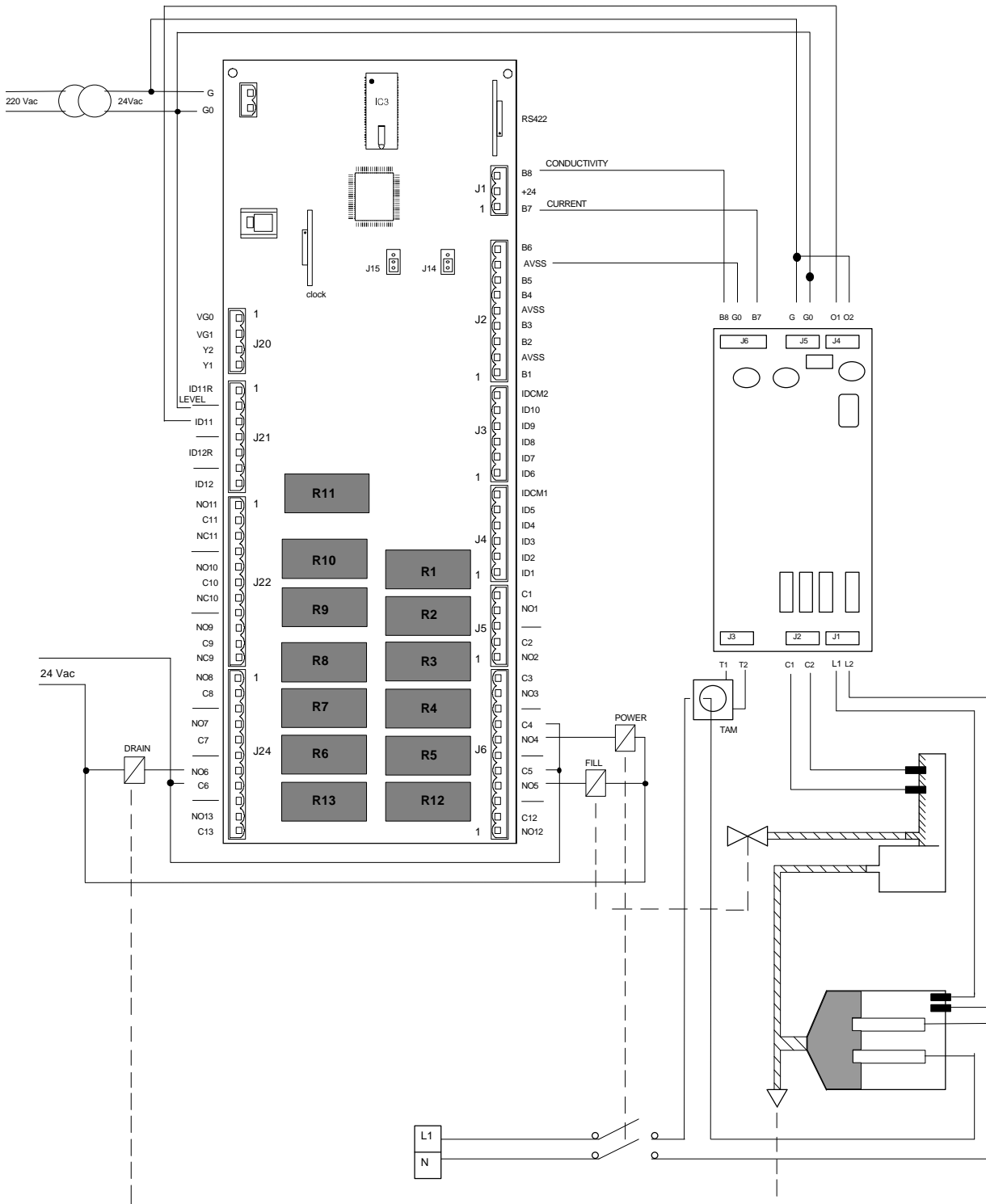


7.1. Integrated humidifier control

The humidifier control standard pCO for air conditioning units manages the immersed-electrode humidifiers (to be paired with the OEM kits) , can control all the humidifiers from 1 to 42Kg/h , three-phase single-phase, with power-supply voltage from 200 to 660 V.(220-240 V or 380-415 V voltages are recommended)

For the regulation an eight analog-input pCO interface is being utilised along with an optional card, so as the pCO interface can read the signal from the TAM current transducer, the conductivity-reading signal and the full sensor. The pCO, in accordance with the current and relative humidity, controls the steam production and the working conditions of the humidifier; it also manages and signals all the states and alarms of the humidifier.

pCOUMID0000 card connection diagram:



Description of the humidifier parameters

To select and control the humidifier it is necessary to properly preset the following parameters:

N.	NAME	DESCRIPTION	U.M.	RANGE.	DEF.
1	Nominal cap.	Cylinder nominal or maximum-output capacity	kg/h	0.42	3
2	Voltage	Supply voltage	Volt	0.660	220
3	Phase no.	Phase no. of the mains	....	1/3	1
4	TAM model	TAM model utilised	.....	50.700	100
5	Preset capacity	Capacity preset as maximum	kg/h	30%Pn.. 100%Pn	3
6	Humidity set-point	Set-point of the humidity regulation	rH%	0.100 rH%	50
7	Humidity differential	Band of the humidity regulation	rH%	0.100 rH%	10
8	High humidity threshold	High humidity alarm threshold	rH%	0.100 rH%	80
9	Low humidity threshold	Low humidity alarm threshold	rH%	0.100 rH%	30
10	C0	Algorithm constant (see the following paragraph)	...	...	93
11	C1	Algorithm constant (see the following paragraph)	...	...	70

Preset tables of the C0-C1 parameters

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

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

	Nominal Capacity 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 F400TA three-phase cylinders with a nominal capacity from 3 to 5 Kg/h :

	Nominal Production in Kg/h			
	3Kg/h		5Kg/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 E400TA three-phase cylinders with a nominal capacity from 8 to 13 Kg/h:

	Nominal Capacity 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 I400TW three-phase cylinders with a nominal capacity from 23 to 42Kg/h

	Nominal Capacity in Kg/h			
	23Kg/h		33Kg/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 Capacity	
	42Kg/h	
	C0	C1
380	23	150
400	21	150
415	20	150
440	19	150
480	18	150
575	15	150

7.2. Programming of the humidifier

Selection of the type of humidifier

To select the type of humidifier to be controlled you must properly preselect 4 parameters in the masks intended for the humidifier under the manufacturer's password:

NOMINAL C. is the nominal steam capacity or maximum cylinder delivery that is available. It is possible to preset values ranging from 1Kg/h to 42 Kg/h.

VOLTAGE is the voltage value of the power supply. It is possible to preselect values ranging from 0 to 660 V.

PHASE NUMBER is the phase number of the power supply. It is possible to preset 1 or 3 phases (single-phase or three-phase)

TAM MODEL you select the model of amperometric transformer to be utilised. By presetting 0= TAM 50 , 1=TAM 100 , 2=TAM 150 , 3= TAM 300 , 4=TAM 500 , 5=TAM 700

DRAIN ENABLING WITHOUT VOLTAGE you preset how to carry out the drainage, that is to say with the power remote control switch being connected or disconnected.

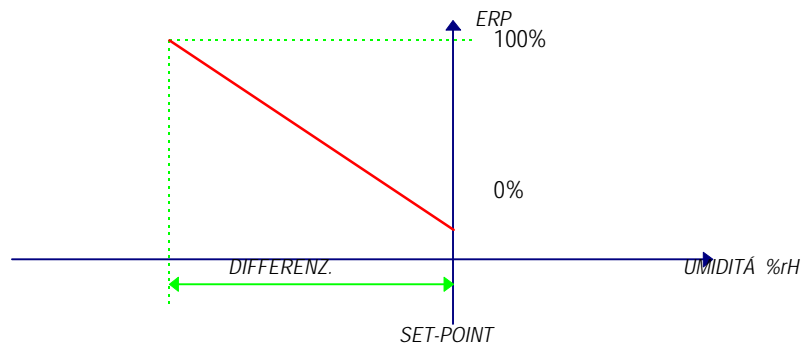
Capacity and humidity regulation

The regulation of the humidifier steam capacity depends on:

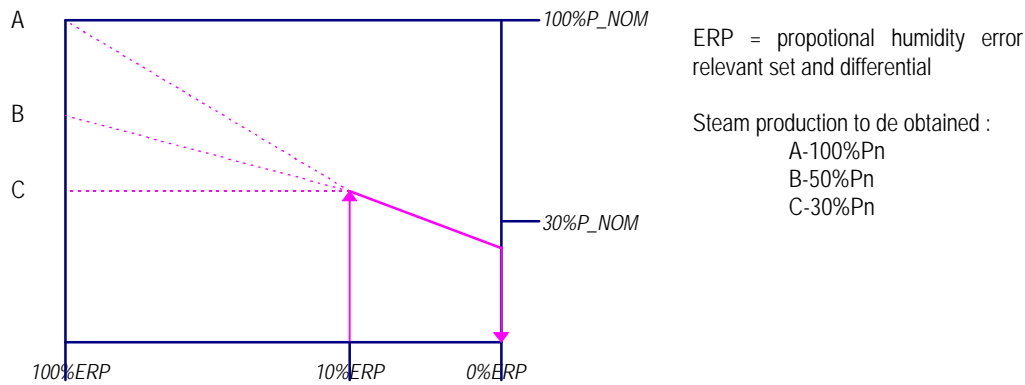
- Humidity Regulation

- Preset capacity CAPACITY (window M_PARAM_USER4 protected by manufacturer's password)

The humidity regulation is carried out by the control based on the reading of the humidity probe at a set-point and a humidity differential. The control calculate a proportional humidity error ERP :



The preset capacity is the maximum required capacity and is a value that can change between the 30% of nominal C. and the 100% of nominal C. According to the nominal capacity, the preset capacity and the ERP proportional humidity error, the following humidifier graph will be obtained :



The humidifier has a minimum capacity equal to the 30% of the nominal C. when the ERP = 0 and increases proportionally to the increase of the preset capacity when the ERP=100%

Monitoring of the steam capacity and of the humidifier characteristic values

The user can verify the instantaneous steam production by checking the value present in the mask group bound to the MENU button. Furthermore, the user will be able to monitor some characteristic values such as the feedwater conductivity, the absorbed current per phase and the different working modes in the group of masks bound to the I/O button.

7.3. Management of the humidifier Alarms

Below the various detectable alarms are listed, together with the detection criterion and the possible corrective operations.

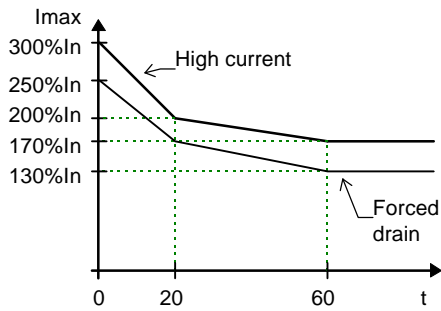
DISPLAY	CRITERIA	OPERATION	RELA Y	SIRENS
Alarm deficiency of current	When the water level reaches the sensor of full and Im <5%In is measured ¹	Turn off the power Empty out the cylinder ²	Yes	Yes
Alarm deficiency of water	Load valve open for more than 20 minutes consecutive	None	Yes	Yes
High or low humidity alarm	Humidity over or below the preset threshold. Signalled only 20 minutes after the pressure of the ON button	None	Yes	Yes
Foam presence indication	Foam has been detected inside the cylinder. The presence of foam is signalled in the "i/o" HUMI_PCO_IO window.	The situation is managed up to its extinction with a special procedure by the control. (temporarily maximum capacity is not guaranteed)	NO	NO
Full cylinder indication	The cylinders saturated with limestone.	(cylinder replacement is suggested)	NO	NO
High current alarm	Current higher than the established limits (see relevant chapter)	Forced drain for 5 seconds. Cut off power.		

High current alarm

To prevent the current from raising over the maximum allowable values, limits have been established. These however are bound to time, since they must allow temporary peaks at the instrument switching on.

¹ In case of current failure neither the control should operate, but if only a phase is absent you could measure no current whereas actually this is above the security threshold

² This to prevent the current, once the alarm has been reset and the power contactor reenergised, from raising quickly beyond the allowed limits.



The forced drain lasts 5 seconds, and is not signalled. The high current alarm causes a 30-second water drainage and stops the humidifier.

8. LIST OF THE PROGRAMMABLE SETS

When the factory values are inserted the machine is configured with the presence of the following devices:

- Outlet water temperature probe
- Internal humidity
- Both the compressors
- Both the resistance
- Warm modulating valve
- Cold modulating valve

Factory values being taken as machine parameters by the pCO if you answer yes to the first window of the "Init. configuration" in the manufacturer's menu:

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

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

SELECTABLE QUANTITIES	LEVEL	RANGE	PRE-SET
End		100%	100%
Cold 3 point valve	general parameters		
Start		0 / 100%	0%
End		0 / 100%	100%
Warm 3 point valve	general parameters		
Start		0 / 100%	0%
End		0 / 100%	100%
Humidification step	general parameters		
Position		0 / 100%	50%
Hysteresis		0 / 100%	50%
Dehumidification step	general parameters		
Position		0 / 100%	50%
Hysteresis		0 / 100%	50%
Low temp. limit (stop dehumidification)	general parameters		
Position		0 / 100%	50%
Hysteresis		0 / 100%	35%
High temp. limit (stop dehumidification)	general parameters		
Position		0 / 100%	50%
Hysteresis		0 / 100%	35%
Humidifier nominal capacity	general parameters	0 / 42	3 kg/h
Humidifier Voltage	general parameters	0 / 660	220V
Humidifier phase No.	general parameters	1 o 3	1
Humidifier TAM model	general parameters	50 / 700	100
Drain enabling without voltage	general parameters		N
C0 parameter		0 / 1000	93
C1 parameter		0 / 1000	75
Fan start delay time	time	0 / 999	10 sec.
Fan stop delay time	time	0 / 999	20 sec.
Integration time	time	0 / 9999	600 sec.
3 point valve opening time	time	0 / 9999	180 sec.
Low pressure alarm delay	time	0 / 9999	180 sec.
Probe alarm delay (temperature, humidity, outlet water)	time	0 / 9999	600 sec.
Air flow controller alarm delay	time	0 / 9999	10 sec.
Delay between 2 capacity controller start	time	0 / 9999	10 sec.
Delay between different resistance start	time	0 / 9999	3 sec.

9. ALARM MANAGEMENT

Every state of alarm is signalled:

- acoustically by the buzzer incorporated into the pCO relay card;
- visually by the LED lighting of the ALARM button

It is possible to recall a message relative to an alarm occurred by pressing the *ALARM* button. *To rearm the alarms merely 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

ALARM	V	C1	C2	R1	R2	V1	V2	V3P1	V3P2	REARM	DELAY	ONLY VIS	HUMID	NOTES
compressor 1 general		yes								man.	imm.			
general compressor 2			yes							man.	imm.			
low pressure 1		yes								man.	imm.			
low pressure 2			yes							man.	imm.			
air flow controller	yes	yes	yes	yes	yes	yes	yes	yes	yes	man.	imm.		yes	
fan general	yes	yes	yes	yes	yes	yes	yes	yes	yes	man.	imm.		yes	
resistance 1 thermal				yes						man.	imm.			
resistance 2 thermal					yes					man.	imm.			
fire / smoke	yes	yes	yes	yes	yes	yes	yes	yes	yes	man.	imm.		yes	
air filter										man.	imm.	yes		
high temperature										man.	imp.	yes		
low temperature										man.	imp.	yes		
high humidity										man.	imp.	yes		
low humidity										man.	imp.	yes		
outlet water high temperature										man.	imp.	yes		
outlet water low temperature										man.	imp.	yes		
comp1 working hours										man.	imm.	yes		
comp2 working hours										man.	imm.	yes		
fan working hours										man.	imm.	yes		
ambient temperature probe out of order										man.	1 MIN.	yes		
outlet water probe out of order										man.	1 MIN.	yes		
inlet water temp. probe or external air out of order										man.	1 MIN.	yes		
delivery air temperature probe out of order										man.	1 MIN.	yes		
humidity probe out of order										man.	imm.	yes		
high curr. in the humidifier										man.	imm.		yes	
absence of water in the humidifier										man.	20 MIN	yes		LOAD
current failure to the humidifier										man.	imm.		yes	UNLOAD
clock card failure										man.	imm.	yes		

10. USER INTERFACE

The user interface of this application is divided into three fundamental parts:

-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: set-point limits, regulation differential, regulation dead zone, compensation.....; only the parameters regarding functions enabled under manufacturer's password will be displayed and consequently selectable.




-An *ASSISTANCE part*, protected by password, intended for the assistance, 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.

10.1. KEYPAD

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

The keypad provides the operator with the following functions:

ON / OFF button		Energises and deenergizes 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 UP / DOWN 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)
▲▼ buttons		These buttons have a double functionality: 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
HOUR 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_USER3 window
MENU+PROG buttons		The buttons must be pressed and released simultaneously. The password is requested. If properly introduced, you move to the M_MANUF_PASS window

PRINTER BUTTON

M_PRINTER

```

E|iiiiiiiiiiiiiiiiiiiiii»
° Printer management °
°Cyclic print 000 h°
°Immediate print of °
°unit report N °
E|iiiiiiiiiiiiiiiiiiiiii¼
    
```

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

I/O BUTTON

M_SYNOPSIS1

```

E|iiiiiiiiiiiiiiiiiiiiii»
° Analog inputs °
°Room Temp. 00.0 S°
°Supply air -00.0 S°
°Room humi d. -00.0 % °
E|iiiiiiiiiiiiiiiiiiiiii¼
    
```

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

M_SYNOPSIS2

```

E|iiiiiiiiiiiiiiiiiiiiii»
° Analog Inputs °
°Inlet water -00.0 S°
°Outlet water-00.0 S°
° °
E|iiiiiiiiiiiiiiiiiiiiii¼
    
```

As above

M_SYNOPSIS3

```

E|iiiiiiiiiiiiiiiiiiiiii»
° Digital inputs °
°C=Close 0=open °
°01: CCCC 06: CCCC °
°11: CC °
E|iiiiiiiiiiiiiiiiiiiiii¼
    
```

As above

M_SYNOPSIS4

```

E|iiiiiiiiiiiiiiiiiiiiii»
° Analog outputs °
° °
°Cooling valve 00.0 V°
°Heating valve 00.0 V°
E|iiiiiiiiiiiiiiiiiiiiii¼
    
```

As above

M_SYNOPSIS5

```

E|iiiiiiiiiiiiiiiiiiiiii»
° Digital outputs °
°C=Close 0=open °
°01: 000 04: 000 °
°07: 000 10: 00 °
E|iiiiiiiiiiiiiiiiiiiiii¼
    
```

As above

M_SYNOPSIS6

```

E|iiiiiiiiiiiiiiiiiiiiii»
° Humi di fier °
°Main switch OFF °
°Fill valve OFF °
°Drain valve OFF °
E|iiiiiiiiiiiiiiiiiiiiii¼
    
```

As above

M_SYNOPSIS7

```

E|iiiiiiiiiiiiiiiiiiiiii»
° Humi di fier °
°Measur. Amps 000.00 A°
°Target Amps 000.00 A°
°Nomi n. Amps 000.00 A°
E|iiiiiiiiiiiiiiiiiiiiii¼
    
```

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

M_SYNOPSIS8

```

E|iiiiiiiiiiiiiiiiiiiiii»
° Humi di fier °
° °
°Wat. level open °
°Conduct. 0000 uS/Cm°
E|iiiiiiiiiiiiiiiiiiiiii¼
    
```

As above

M_SYNOPSIS9

```

E|iiiiiiiiiiiiiiiiiiiiii»
° Humi di fier °
°Cyl. worn out N °
°Mode ----- °
°Status h. ----- °
E|iiiiiiiiiiiiiiiiiiiiii¼
    
```

As above


```
M DAILY HUMID4
Eiiiiiiiiiiiiiiiiiiiiii»
° Humidity °
° Humidity °
°Daily time zone 4 °
°Start time 00:00 °
°Set-point 000.0 % °
Eiiiiiiiiiiiiiiiiiiiiii¼
```

As above

```
SET BUTTON
M_CALC_SETP
Eiiiiiiiiiiiiiiiiiiiiii»
°Actual set-points °
°Temperature 00.0 ºC °
°Humidity 000.0 % °
° °
Eiiiiiiiiiiiiiiiiiiiiii¼
```

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
Eiiiiiiiiiiiiiiiiiiiiii»
°Set-points °
°Temperature 00.0 ºC °
°Humidity 000.0 % °
° °
Eiiiiiiiiiiiiiiiiiiiiii¼
```

Change of the set-points. The values must be included within the limits in the M_PARAM_USERx masks

```
PROG BUTTON
M_SERV_PASS
Eiiiiiiiiiiiiiiiiiiiiii»
°Enter the service °
°password °
° 0000 °
°Right password °
Eiiiiiiiiiiiiiiiiiiiiii¼
```

```
M_PARAM_USER1
Eiiiiiiiiiiiiiiiiiiiiii»
°Temperature set-point °
°limits °
°Minimum 00.0 ºC °
°Maximum 00.0 ºC °
Eiiiiiiiiiiiiiiiiiiiiii¼
```

Presetting of the temperature set-point limits.

```
M_PARAM_USER2
Eiiiiiiiiiiiiiiiiiiiiii»
°Humidity set-point °
°limits °
°Minimum 000.0 % °
°Maximum 000.0 % °
Eiiiiiiiiiiiiiiiiiiiiii¼
```

Presetting of the humidity set-point limits

```
M_PARAM_USER3
Eiiiiiiiiiiiiiiiiiiiiii»
°Temperature °
°Band 00.0 ºC °
°Neutral zone 00.0 ºC °
° °
Eiiiiiiiiiiiiiiiiiiiiii¼
```

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

```
M_PARAM_USER4
Eiiiiiiiiiiiiiiiiiiiiii»
° Humidity °
°Band 00.0 % °
°Production 00.0 kg/h °
° °
Eiiiiiiiiiiiiiiiiiiiiii¼
```

Humidity proportional band
Maximum preset production

```
M_PARAM_USER5
Eiiiiiiiiiiiiiiiiiiiiii»
°Automatic restart °
°after power fail. N °
°Remote on/off °
°enabled N °
Eiiiiiiiiiiiiiiiiiiiiii¼
```

Automatic start enabling after voltage drop.

Enabling / disabling On/Off remote (from digital input)

```
M_PARAM_USER6
Eiiiiiiiiiiiiiiiiiiiiii»
°Offset energy °
°saving 00.0 ºC °
° °
° °
Eiiiiiiiiiiiiiiiiiiiiii¼
```

Presetting of the offset parameter energy saving

```
M_PARAM_USER7
Eiiiiiiiiiiiiiiiiiiiiii»
°Compensation °
°enabled N °
° °
° °
Eiiiiiiiiiiiiiiiiiiiiii¼
```

Enabling of the temperature set-point compensation

M MANUF_PARAM20
 EEEEEEEEEEEEEEEEEEE»
 °Step dehumidific. °
 ° °
 °Position 000.0 % °
 °Hysteresis 000.0 % °
 EEEEEEEEEEEEEEEEEEE¼

Humidification step regulation.
 See "HUMIDITY CONTROL GRAPHS"

M MANUF_PARAM21
 EEEEEEEEEEEEEEEEEEE»
 °Low temperature °
 °limit (stop dehum) °
 °Position 000.0 % °
 °Hysteresis 000.0 % °
 EEEEEEEEEEEEEEEEEEE¼

Dehumidification stop step.
 See "HUMIDITY CONTROL GRAPHS"

M MANUF_PARAM22
 EEEEEEEEEEEEEEEEEEE»
 °High temperature °
 °limit (stop dehum) °
 °Position 000.0 % °
 °Hysteresis 000.0 % °
 EEEEEEEEEEEEEEEEEEE¼

Dehumidification stop step.
 See "HUMIDITY CONTROL GRAPHS"

M MANUF_PARAM23
 EEEEEEEEEEEEEEEEEEE»
 °Nomin. prod. 00 kg/h°
 °Voltage 000 V °
 °Phase number 1 °
 °TAM model 050 °
 EEEEEEEEEEEEEEEEEEE¼

Parameters for the identification of
 humidifier type

M MANUF_PARAM24
 EEEEEEEEEEEEEEEEEEE»
 °Enable drain without°
 °voltage N °
 °Parameter C0 0000°

Enabling of the drain without voltage

CAREL PARAMETER 0(see paragraph

```

Integrated humidifier control)
°Parameter C1 0000°
ÈÏÏÏÏÏÏÏÏÏÏÏÏÏÏÏÏÏÏ¼
M_MANUF_TIME1
ÈÏÏÏÏÏÏÏÏÏÏÏÏÏÏÏÏÏÏ»
°Time delay switching°
°main fan on 000 sec°
°Time delay switching°
°main fan off 000 sec°
ÈÏÏÏÏÏÏÏÏÏÏÏÏÏÏÏÏÏÏ¼
M_MANUF_TIME2
ÈÏÏÏÏÏÏÏÏÏÏÏÏÏÏÏÏÏÏ»
°Integral time °
°(only P+I) 0000 sec°
°Float. valve running°
°time 0000 sec°
ÈÏÏÏÏÏÏÏÏÏÏÏÏÏÏÏÏÏÏ¼
M_MANUF_TIME3
ÈÏÏÏÏÏÏÏÏÏÏÏÏÏÏÏÏÏÏ»
°Low pressure alarm °
°delay time 0000 sec°
°Temperature alarm °
°delay time 0000 sec°
ÈÏÏÏÏÏÏÏÏÏÏÏÏÏÏÏÏÏÏ¼
M_MANUF_TIME4
ÈÏÏÏÏÏÏÏÏÏÏÏÏÏÏÏÏÏÏ»
°Air flow alarm delay°
°time 0000 sec°
° °
° °
ÈÏÏÏÏÏÏÏÏÏÏÏÏÏÏÏÏÏÏ¼
M_MANUF_TIME5
ÈÏÏÏÏÏÏÏÏÏÏÏÏÏÏÏÏÏÏ»
°Minimum compressor °
°off time 0000 sec°
°Minimum compressor °
°on time 0000 sec°
ÈÏÏÏÏÏÏÏÏÏÏÏÏÏÏÏÏÏÏ¼
M_MANUF_TIME6
ÈÏÏÏÏÏÏÏÏÏÏÏÏÏÏÏÏÏÏ»
°Delay between starts°
°same comp. 0000 sec°
°Delay between starts°
°diff. comp. 0000 sec°
ÈÏÏÏÏÏÏÏÏÏÏÏÏÏÏÏÏÏÏ¼
    
```

```

CAREL PARAMETER 1

Fan start time delay»
Fan stop time delay°

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

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

Air flow controller acquisition delay

Compressor timing

As above
    
```


13. DATABASE OF THE SUPERVISOR

The variables reported below will be transmitted between pCO and supervisor only if all the 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 manufacturer'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 equipments have been correctly connected to the network (supervisor and pCO)

13.1. 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
45	Ambient temperature probe failure alarm	Digital	Reading
46	Air supply temperature probe failure alarm	Digital	Reading
47	Outlet water temperature probe failure alarm	Digital	Reading
48	External air temperature probe disconnection alarm	Digital	Reading
49	Humidity probe failure alarm	Digital	Reading
51	E ² PROM failure alarm	Digital	Reading
53	Temperature regulation type	Digital	Writing / Reading
55	Humidity probe enabling	Digital	Writing / Reading
56	Outlet water probe enabling	Digital	Writing / Reading

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

13.2. 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 1 step with energy saving	Whole	Writing / Reading
23	Compressor 1 hysteresis with energy saving	Whole	Writing / Reading
24	Compressor 2 step with energy saving	Whole	Writing / Reading
25	Compressor 2 hysteresis with energy saving	Whole	Writing / Reading
26	Time interval between same compressor switching on	Whole	Writing / Reading
28	Low pressure delay alarm	Whole	Writing / Reading
29	Stop minimum time	Whole	Writing / Reading
30	Time interval between different compressor switching on	Whole	Writing / Reading
31	Resistance no.	Whole	Writing / Reading
32	Compressor no.	Whole	Writing / Reading
33	High / low temperature / humidity alarm delay	Whole	Writing / Reading
34	Resistance switching on time interval	Whole	Writing / Reading
38	Capacity control 1 step without energy saving	Whole	Writing / Reading
39	Capacity control 1 hysteresis without energy saving	Whole	Writing / Reading
40	Capacity control 2 step without energy saving	Whole	Writing / Reading
41	Capacity control 2 hysteresis without energy saving	Whole	Writing / Reading
44	Capacity control 1 step saving	Whole	Writing / Reading
45	Capacity control 1 hysteresis with energy saving	Whole	Writing / Reading
46	Capacity control 2 step with energy saving	Whole	Writing / Reading
47	Capacity control 2 hysteresis with energy saving	Whole	Writing / Reading
48	Integration time	Whole	Writing / Reading
50	Fan operation time limit	Whole	Writing / Reading
51	Compressor 1 operation time limit	Whole	Writing / Reading
52	Compressor 2 operation time limit	Whole	Writing / Reading
54	Cold 3p valve ramp start	Whole	Writing / Reading

Address	Description	Type	Communication type
55	Cold 3p valve ramp end	Whole	Writing / Reading
56	Warm 3p valve start ramp	Whole	Writing / Reading
57	Warm 3p valve end ramp	Whole	Writing / Reading
58	3p valve complete opening time	Whole	Writing / Reading
59	Fan switching on delay	Whole	Writing / Reading
61	Cold valve ramp limit	Whole	Reading
62	Warm valve ramp limit	Whole	Reading
63	Fan operating-hour carried out high part	Whole	Reading
65	Compressor 1 operating-hour carried out high part	Whole	Reading
66	Compressor 2 operating-hour carried out high part	Whole	Reading
67	Fan operating-hour low part	Whole	Reading
68	Compressor 1 operating-hour carried out low part	Whole	Reading
69	Compressor 2 operating-hour carried out low part	Whole	Reading

13.3. 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

14. MATERIALS AND CODES

The Standard pCO for Air-Conditioning units consists of the following devices:

- user interface;

cod. PCOT000CB0 LCD "4X20"

- eeprom;

cod. EPSTD* CZUA
English(E), Italian(I), French(F) and German(D) versions are available I

- pCO pCO relay card:

- extractable terminals

cod. PCOB000A00 / PCOB000A21 / PCOB000B00 / PCOB0000B2

- interface/main board connection cables

cod. S90CONN000/1/2

- probes:

of different type and code according to request.

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CAREL

Technology & Evolution

CAREL srl

Via dell'Industria, 11 - 35020 Brugine - Padova (Italy)

Tel. (+39) 049.9716611 Fax (+39) 049.9716600

<http://www.carel.com> - e-mail: carel@carel.com

Agency: