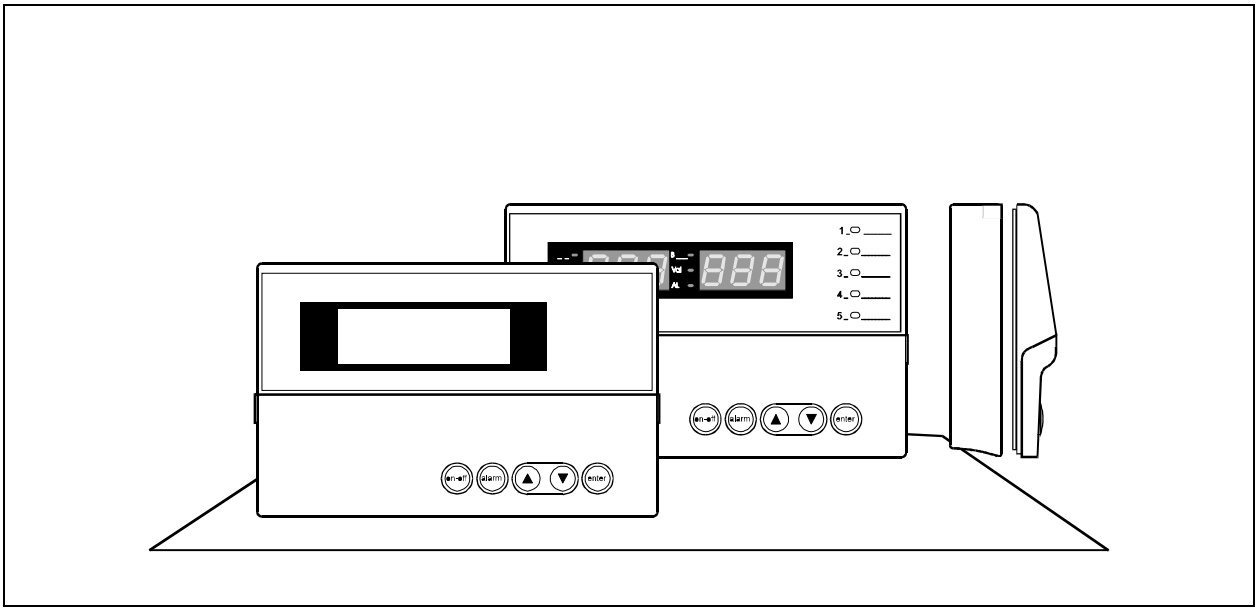
Application program for pCO



Standard 1/2 compressor roof-top

Manual version: 3.0 - 30/06/95

Program code: **EPSTDERT0A**

CAREL
Technology & Evolution

Rif.: 77 **EM**

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Introduction

This programme for Pco manages a ROOF-TOP conditioning unit composed of two compressors, an external damper, a heating valve. The regulation of recirculated ambient air can be effected on the base of both temperature and humidity values; some Energy Saving functions are available:

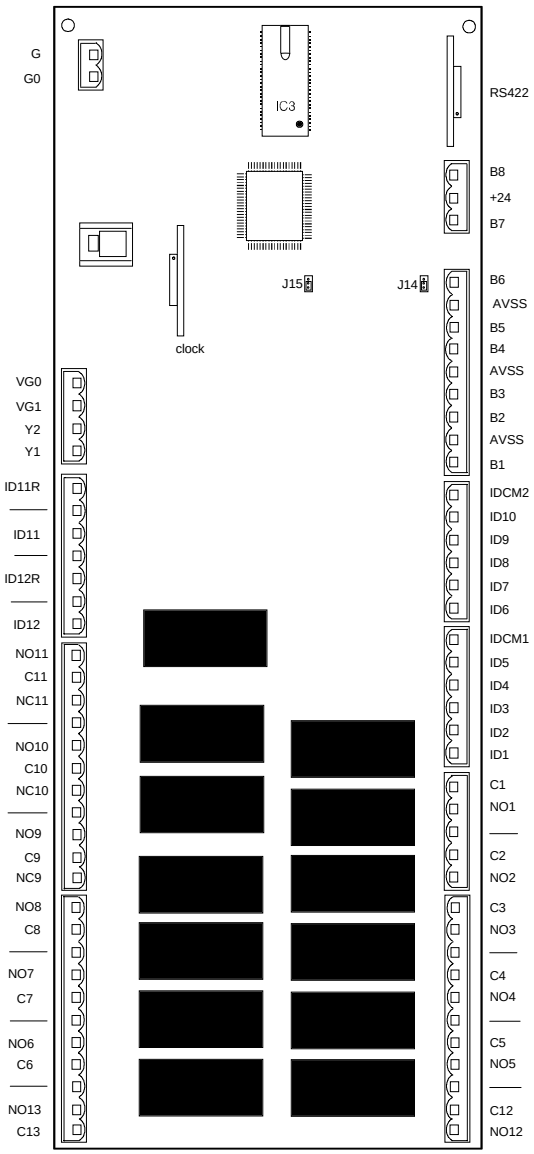
summer freecooling
winter freecooling
winter freeheating

these functions work on dampers, controlling the external air flow with favourable conditions of external temperature/enthalpy.
As regards heating, two auxiliary heaters are available which are controlled through user parameters.
In the Pco interface version with 8 analogue inputs it is possible to connect a temperature probe for outlet air temperature control. The control consists of a lower limit which closes the external damper and deactivates the compressors (function selectable through manufacturer parameters).
Pco manages the main roof-top system alarms such as anti-freeze, general interblock, dirty filters and all alarms of the refrigerating group such as compressor overload, high/low pressure pressostat.

Hardware

The picture below shows all indispensable and optional components which compose the Pco control kit.

Main board



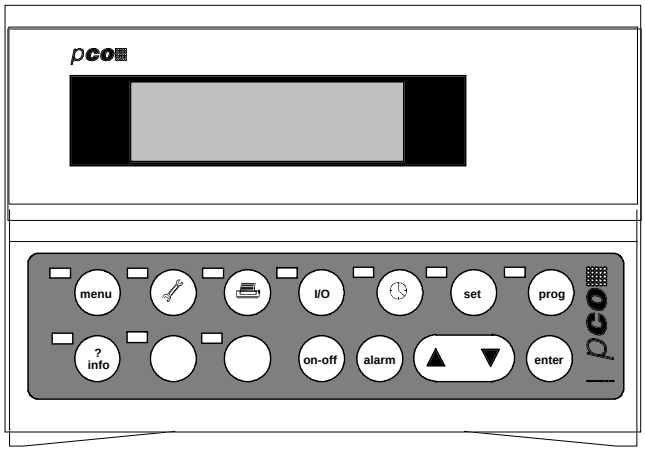
The microprocessor *main board* has been devised for the regulation programme management, equipped with the set of terminals necessary to the controlled devices connection (for ex.: valves, compressors, fans). The software is memorised on Eprom whereas selected parameters are permanently memorised on EEprom, preserving them even in case of power failure: since such parameters memorisation does not require any batteries, it is not limited in time.

The *main board* also allows connection to the serial supervisory/telemaintenance line according to Carel RS422 standard and communication protocol.

Terminal

The *terminal,* which is run by a microprocessor, is equipped with display, keypad and led to allow the user to set control parameters (set-points, differential, alarm thresholds) and to manage fundamental procedures. The connection of the *terminal* to the *main board* is not necessary for the controller normal functioning, but it can be used only for fundamental parameters initial setting.
The user terminal allows :

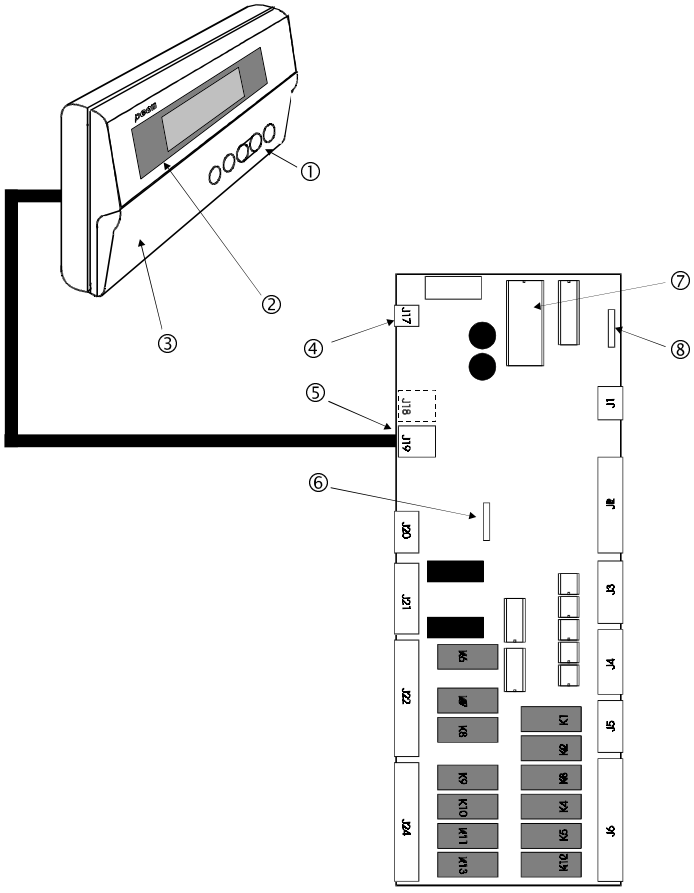
- the unit initial setting with password so as to prevent unauthorised access to the data
- run-time modification of main working parameters
- visualisation on display of detected alarms and acoustic warning through a 'buzzer'
- visualisation of all measured parameters



terminal with open front door

pCO Configuration

The picture below shows pCO hardware architecture



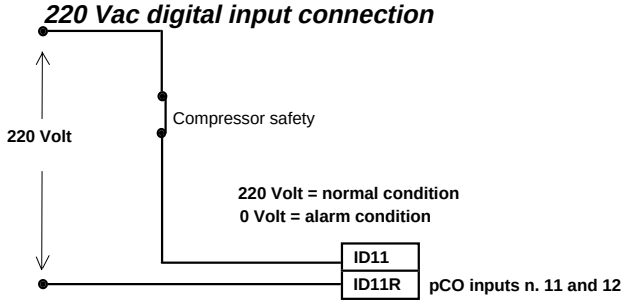
Description of Components

1. Rubber keypad
2. 4 x 20 LCD display
3. Polycarbonate keypad front door
4. Connector for 24 Vac 50/60 Hz 15 VA or 24 Vdc 10 W (J17) power supply
5. Telephone cable connector for connection to terminal (J19)
6. Optional clock board
7. Eprom with the programme
8. RS422 board for connection to serial supervisory/telemaintenance line

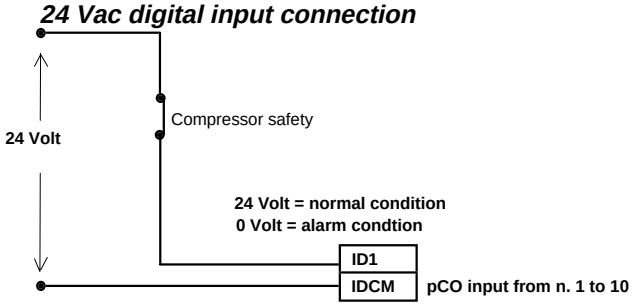
Hardware Description of Standard pCO Inputs/Outputs

Inputs :
12 digital voltage inputs (10 with 24Vac 50/60 Hz and 2 with 250 Vac 50/60 Hz)
4 analogue inputs for NTC [passive] probes (the first 4)
2 analogue voltage (-1V/+1V) or current (4-20 mA) inputs selectable from jumper

220 Vac digital input connection

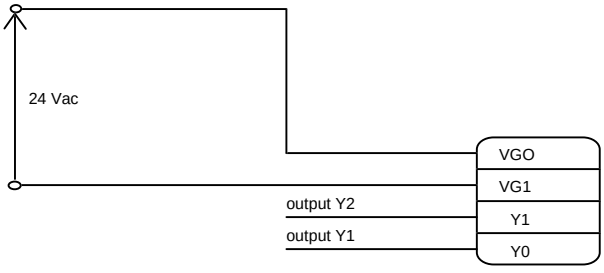


24 Vac digital input connection



Outputs :
11 Relay digital outputs - 8 SPST and 3 SPDT
2 Optoisolated analogue 0-10 V (n.b. they need 24 Vac power supply); instead of these two analogue outputs 2 relay outputs can be chosen.

Analogiue outputs power supply/connection



Selection of 0/1 V. or 4/20 mA Active Probes

For 5 and 6 humidity probes inputs there are two possibilities: either connecting 0/1V active probes or connecting 4/20 mA active probes selecting a Jumper and a parameter.

INPUT	*JUMPER*	*4/20 mA*	*0/1 V*
5	J14	1-2	2-3
6	J15	1-2	2-3

Inputs/Outputs Description

Analogue Inputs

TERMINAL	N°	DESCRIPTION
J2 - 1	B1	Recirculated Air Temperature
J2 - 2	B2	External Air Temperature
J2 - 3	B3	Defrost Temperature Circuit 1
J2 - 4	B4	Defrost Temperature Circuit 2
J2 - 5	B5	Recirculated Air Relative Humidity (0/1 V. 0 4/20 ,mA)
J2 - 6	B6	External Air Relative Humidity (0/1 V. 0 4/20 ,mA)
J1 - 7	B7	Outlet Air Temperature (only 8 inputs version) Only 4/20 mA probes

Digital Inputs

TERMINAL	N°	DESCRIPTION
J4 - 1	ID1	Anti-freeze Alarm
J4 - 2	ID2	Clogged Filter Alarm
J4 - 3	ID3	Summer/Winter Selection
J4 - 4	ID4	Main Fan Overload/General Interblock
J4 - 5	ID5	Start/stop Remote Command
J4 - 6	IDCM1	Common
J3 - 1	ID6	Heaters Overload (1,2)
J3 - 2	ID7	Low Pressure Pressostat Circuit 1
J3 - 3	ID8	Compressor Overload Circuit 1
J3 - 4	ID9	Low Pressure Pressostat Circuit 2
J3 - 5	ID10	Compressor Overload Circuit 2
J3 - 6	IDCM2	Common
J21 - 1	ID11	High Pressure Pressostat Circuit 1
J21 - 3		
J21 - 5	ID12	High Pressure Pressostat Circuit 2
J21 - 7		

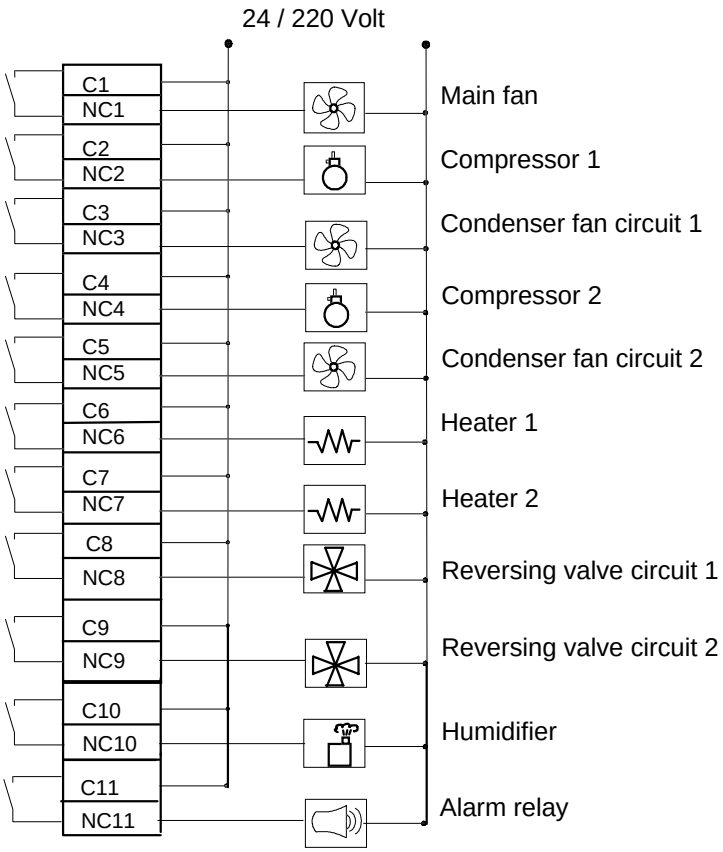
Digital Outputs

TERMINAL	N°	DESCRIPTION
J5 - 4 / J5 - 5	NO1/C1	Main Fan
J5 - 1 / J5 - 2	NO2/C2	Compressor 1
J6 - 10 / J6 - 11	NO3/C3	Condensing Fan Circuit 1
J6 - 7 / J6 - 8	NO4/C4	Compressor 2
J6 - 4 / J6 - 5	NO5/C5	Condensing Fan Circuit 2
J24 - 7 / J24 - 8	NO6/C6	Heater 1/Partializ.compressore.1
J24 - 4 / J24 - 5	NO7/C7	Heater 2/Partializ.compressore 2
J24 - 1 / J22 - 2	NO8/C8	Reversing Cycle Valve Circuit 1
J22 - (9,10,11)	NO9/C9/ NC9	Reversing Cycle Valve Circuit 2
J22 - (5,6,7)	NO10/C10/ NC10	Humidifying Command
J22 - (1,2,3)	NO11/C11/ NC11	General Alarm

Analogue Outputs

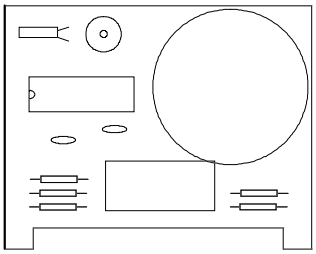
TERMINAL	N°	DESCRIPTION
J20 - 3	Y1	Recirculated Air Damper
J20 - 4	Y2	Heating Valve

Digital Outputs: Wiring Diagram



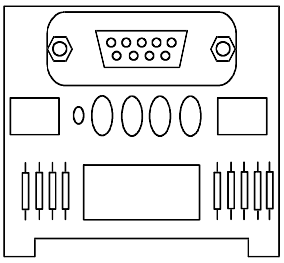
Optional Boards and Eprom Installation

Clock



This is a board which must be fitted directly on the main board with a plug-in connector. It allows visualisation of current date and time. This board is indispensable in case of use of time-zones. In case of power supply failure a lithium rechargeable battery keeps the clock board active for more than a month.
To fit this board on the main board see picture on page. 4.
Cod. : MNEWCLOCK0

Serial Board RS422



This serial board RS422 allows pCO network connection. This makes local and remote telemaintenance/supervision services available.
to fit it on the main board see picture on page. 4.
Cod. : PCOSER0000

Eprom Installation

The programme is on a eprom which is separately supplied.

To insert the eprom on the socket, it is necessary to pay great attention to the eprom correct polarity; on inserting the eprom, the notch should coincide with the reference on the printed circuit.
Great attention also should be paid on insertion phase so as to avoid bending or breaking the component pins.

Ambient Air Temperature Regulation

Introduction:
Ambient air temperature regulation is effected through activation of devices connected to pCO outputs (compressors, heaters, valves and dampers). The user can set two regulation set-points, one for summer functioning mode and one for winter functioning mode. For compressors stages activation two types of controls have been devised :

- proportional control (P)
- proportional + integral control (P+I).

Set-point Regulation (Summer/Winter)

It regulates the passage from summer functioning mode to winter functioning mode and viceversa.

Used Inputs:

- Ambient Air Temperature Probe
- Summer/Winter Commutator

Used Devices:

- (The working of all devices is automatically influenced by this function)

Used Parameters:

- Summer Regulation Set-point (MASK_SETPOINT1)
- Winter Regulation Set-point (MASK_SETPOINT1)
- Selection of Commutation Type Summ/Win (CONFIG_COS3)

Functioning Description:
The passage from summer functioning mode to winter functioning mode (or viceversa) can be effected in three ways :
1) From pCO front panel through the Summer and Winter keys
2) From external contact through digital input
3) Automatically according to ambient air temperature
These three ways are selected under manufacturer password, machine configuration branch, mask CONFIG_COS3.
The difference between the summer functioning mode and the winter functioning mode is given by the regulation set-point which is different according to the two functioning modes.
Control Panel Mode: To select the required functioning mode you must press the relative key;
Digital Input Mode: According to the logic state (01) of the digital input (WINTER/SUMMER) the controller works either in Winter mode or in Summer mode.
open contact: Winter functioning mode
close contact: Summer functioning mode
Automatic Mode: The machine goes from summer functioning mode to winter functioning mode or viceversa according to ambient air temperature variation: if ambient air temperature exceeds the selected summer regulation set-point, the machine will turn to summer functioning mode, whereas if ambient air temperature decreases below the selected winter set-point, the machine will turn to winter functioning mode.
(The set-point has been called "selected" since time-zones might have been selected and then selected set-points will be no more the selected ones in the MASK_SETPOINT1 mask, but the activated ones according to the correct time-zone)

On/Off Regulation

It regulates the machine turning on/off (Unit On / Unit Off), and all different conditions of the machine

Used Inputs:
- Remote On/off Digital Input
- Anti-freeze Digital Input
- Main Fan Overload Digital Input

Used Devices:
- (The working of all devices is automatically influenced by this function)

Used Parameters:
- Enabling of Automatic Reset after a Black-out (PARAMETRI_UT18)
- Enabling Weekly Time-zones (FASCE_SETT_UT)
- Enabling of Remote On/Off (PARAMETRI_UT18)
- Enabling of Supervisor (CONFIG_COS2)

Description of functioning:
The Unit can be turned On or Off through:
1) front panel through On/Off key
2) Remote On/Off digital input
3) On/Off weekly time-zones
4) Supervisor On/Off

Front panel through ON/OFF key: this procedure is always enabled.
By pressing the rubber ON/OFF key in the front panel, the unit can be activated/deactivated. If the unit has been deactivated through the front panel, it will not be possible to activate it through any other on/off procedure.
If the machine is on "Unit Off" position, all functions and all machine regulators are deactivated and no procedure can be activated.

Remote On/Off: This procedure must be enabled under User password in the PARAMETRI_UT18 mask.
- If the machine has been turned on through the front panel
- If the digital input contact is closed

Then the machine will turn to the "Unit On" status.
- If the machine has been turned on through the front panel
- If the digital input contact is open

Then the machine will turn to the "Remote Off" status, which means that all functions are deactivated and the machine is in stand-by owing to the remote On/Off digital input. Warning: in this "Remote Off " status it is not possible to turn the machine on through front panel, time-zones or supervisor procedures, but only through the remote On/Off digital input the machine can be turned to the "Unit On" status.

Time-zones On/Off: This procedure must be enabled under the clock branch, FASCE_SETT_UT mask.
- If the machine has been turned on through the front panel
- If the time-zones procedure allows it

Then the machine will turn to the "Unit On" status.

- If the machine has been turned on through the front panel
- If the time-zones procedure does not allow it

Then the machine will turn to the "Zones Off" which means that all functions are deactivated and the machine is in stand-by owing to time-zones.

Warning: in this "Zones Off" status it is not possible to turn the machine on through front panel, time-zones or supervisory system. Only through the time-zones permission the machine can be turned to the "Unit On" status.
If the two procedures Remote On/Off and Time-zones are selected at the same time:
- the machine will turn to the “Unit On” status only if there are both permissions
- the machine will turn to the “stand-by” status if even only one permission is lacking

Supervisor On/Off: So as to activate this procedure the supervisor connection must be enabled under manufacturer password (CONFIG_COS2) and the peripheral address must be inserted in the mask under

user password PARAMETRI_UT25. There are two variables for the supervisor management of machine turning on/off:
Digital Variable Address 65: Employed to turn the machine on/off.
Digital Variable Address 74: Visualisation of the machine status only.

- If the machine has been turned on through the front panel
(Automatically dig. var. 65 too will be on high logic state)
- If you want to turn the machine off through supervisor procedure, you only have to bring the variable 65 to low logic state
- If you want to turn on the machine again, you only have to bring the variable 65 to high logic state

(If the machine has been turned off through supervisor procedure, it can be restarted through the front panel)

The machine is brought to the "Unit Off" status whenever the following system alarms are activated:
- Interblock Alarm
- Faulty Ambient Temperature Probe Alarm
- Summer Set-point < Winter Set-point Alarm

Compressors Stages Regulation

It regulates the request of turning on/off the compressors contactors

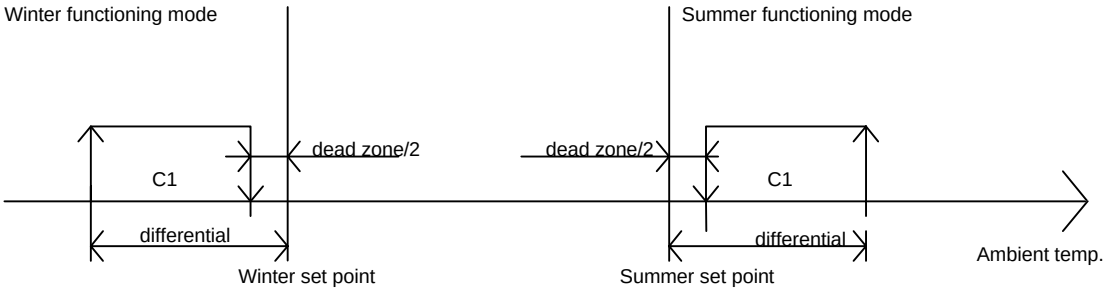
Employed Inputs:
- Analogue Input n.1 Recirculated Air Temperature Probe

Employed Devices:

Employed Parameters :
Summer Regulation Set-point M_SETPOINT1
Winter Regulation Set-point M_SETPOINT1
Summer Regulation Band PARAMETRI_UT2
Winter Regulation Band PARAMETRI_UT2
Summer Regulation Dead Zone PARAMETRI _UT3
Number of Selected Compressors CONFIG_COS4
Enabling of Heatpump CONFIG_COS1
Selection of Prop. / Prop. + Integ. Control PARAMETRI_COS1
. Integration Time PARAMETRI_COS1

Description of functioning:
The driving of compressors on/off is function of recirculated ambient air.
To enable this regulator the compressors number should be set under manufacturer password CONFIG_COS4.
Two set-points, two regulation bands and a dead-zone are set on ambient temperature.

Functioning with 1 selected Compressor:



Example:

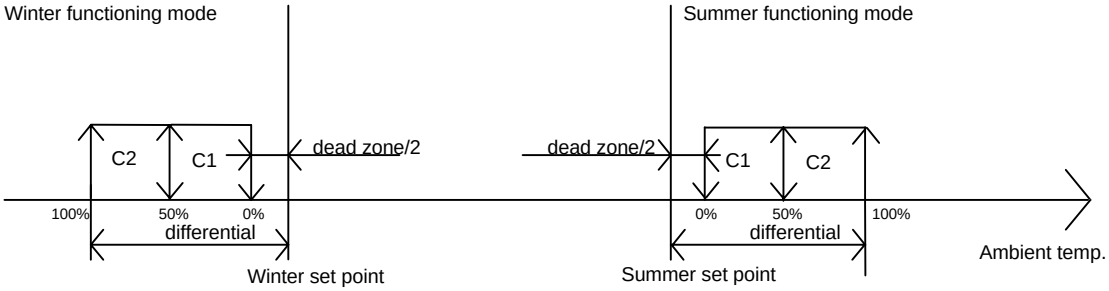
- Summer Functioning Mode
- Summer Set-point = 25.0 C
- Regulation Band = 3.0 C
- Dead Zone = 0 C

With temperature below 25.0 C the compressor is off; if temperature starts to increase and exceeds 28.0 C, the compressor will be activated and will remain activated until temperature decreases under 25.0 C.

- Winter Functioning Mode
- Winter Set-point = 21.0 C
- Regulation Band = 3.0 C
- Dead Zone = 0 C

With temperature above 21.0 C the compressor is off; if temperature starts to decrease below 21.0 C, the compressor will be activated and will remain activated until temperature exceeds 21.0 C.

Functioning with 2 selected Compressors:



Example:

- Summer Functioning Mode
- Summer Set-point = 25.0 C
- Regulation Band = 3.0 C
- Dead Zone = 0 C

With temperature below 25.0 C the stages are deactivated; if temperature starts to increase and exceeds 26.5 C, stage n.1 will be activated; if temperature should further increase and exceed 28.0 C, the second stage too will be activated and they will remain activated as far as temperature remains above 26.5 C. Then, if temperature decreases below 26.5, the second stage will be deactivated and if temperature should further decrease and reach values below 25.0 C, the first stage too will be deactivated.

- Winter Functioning Mode
- Summer Set-point = 21.0 C
- Regulation Band = 3.0 C
- Dead Zone = 0 C

With temperature above 21.0 C the stages are deactivated; if temperature starts to decrease below 19.5 C, stage n.1 will be activated; if temperature should further decrease and reach values below 18.0 C, the second stage too will be activated and they will remain activated as far as temperature remains below 18.5 C. Then, if temperature exceeds 18.5, the second stage will be deactivated and if temperature should further increase and exceed 21.0 C, the first stage too will be deactivated.

(Warning: for winter functioning mode the Heatpump should be enabled under manufacturer password CONFIG_COS1 so as to make compressors work)

Activation of stages in Proportional or Proportional + Integral mode :

Proportional:

Proportional + Integral:

Compressors Rotation Regulation

It manages compressors according to the number of activated or required stages.
It has been devised to prolong compressors lifetime and therefore to avoid most of interventions on the systems. It allows to select the compressors automatic rotation so as to obtain the same number of working hours and, most of all, the same number of starts - stops.

Employed Inputs:

Employed Devices:

- Digital Input n.2 Compressor Contactor n.1
- Digital Output n.4 Compressor Contactor n.2

Employed Parameters:

- Number of Selected Compressors (CONFIG_COS4)
- Enabling of Compressor Rotation (COMPRESSOR_COS3)

Description of functioning mode:
This function is enabled under manufacturer password, COMPRESSOR_COS3 mask.
Rotation is effected following a F.I.F.O. logic, that means that the first compressor to be activated will be the first to be deactivated.
The conditions to be followed in case the activation of a compressor should be required are the following:
- the compressor with a longer off-time will be activated;
- the first compressor to be activated will be the first to be deactivated;
- a compressor will be activated again only after all other compressors have been activated.

Example:
The machine is OFF with all devices and regulators deactivated.
The machine is turned ON and the activation of 2 stages is required.
The regulator will first start the first compressor and then, after the time set between the starts of different compressors has elapsed, the second one.
After some time the temperature regulator will require the deactivation of one stage, therefore the first compressor will be deactivated, because it has been working longer than the others.
After some time the regulator will require the deactivation of another stage, therefore the second compressor will be deactivated.
After some time the temperature regulator will require the activation of one stage, therefore the first compressor will be activated, since it has been off longer than the others.

(Warning: After a black-out the times memorised by the machine to identify which compressor has the longer off-time/on-time are automatically reset)

Defrost Regulation

It regulates all procedures for Heatpump defrosting

Employed Inputs:
- Analogue Input n.5 Defrost Probe n.1
- Analogue Input n.6 Defrost Probe n.2

Employed Devices:
- Reversing Cycle Valve n.1
- Reversing Cycle Valve n.2

Employed Parameters:
- Defrost Start Set-point (PARAMETRI_UT15)
- Defrost End Set-point (PARAMETRI_UT15)
- Defrost Start Delay Time (PARAMETRI_UT16)
- Maximum Duration of Defrost (PARAMETRI_UT16)
- Stop Main Fan (PARAMETRI_UT17)
- Simultaneous Defrost of Circuits (PARAMETRI_UT17)
- Selection of Simultaneous Defrost Stop Mode (PARAMETRI_UT171)

Description of functioning mode:
Non Simultaneous Defrosting:
Defrosting of the 2 circuits will never be carried out simultaneously.
If there is a request for defrosting of both, the first will defrost and the other will [be kept waiting].
The condition to effect defrosting is that the temperature probe reading is lower than defrost start set-point (PARAMETRI_UT15) for a selected cumulative time "defrost delay time" (PARAMETRI_UT16). Defrosting will be deactivated either according to temperature, when temperature is lower than the defrost end set-point (PARAMETRI_UT15), or because the selected time limit has been reached “maximum time for defrosting” (PARAMETRI_UT16).
Of course, defrosting is enabled only during winter functioning mode.
All defrosting selections are in the masks PARAMETRI_UT15 ,PARAMETRI_UT16 ,PARAMETRI_UT17.
Defrosting will start when reversing cycle valves excitate.
Simultaneous Defrosting:
When simultaneous defrosting has been enabled, the lower value of the two probes is employed to start defrosting, and this way the two circuits start defrosting simultaneously. As regards defrost end, instead, it is possible that each circuit follows either its probe values or the lower of the two probes values. The employed parameter to select the defrost end mode with simultaneous defrosting is in the mask PARAMETRI_UT171.

Conditions and procedures are the same as the non simultaneous defrosting ones described above.

NB.: in case of defrosting the main fan stop can be selected.

Compressors Timing Regulation

This regulator controls all compressor timings, for example activation delays as regards the main fan or after a power failure.

Employed Inputs :

Employed Devices:

- Digital Output 2 Compressor Contactor n.1
- Digital Output 4 Compressor Contactor n.2

Employed Parameters:

- Minimum time compressor Off (COMPRESSOR_COS1)
- Minimum time compressor On (COMPRESSOR_COS1)
- Time between Two Compressor Start-ups (COMPRESSOR_COS2)
- Time between Starts of Different Compressors (COMPRESSOR_COS2)
- Compressors Start-up Delay as to Main Fan (PARAMETRI_COS2)

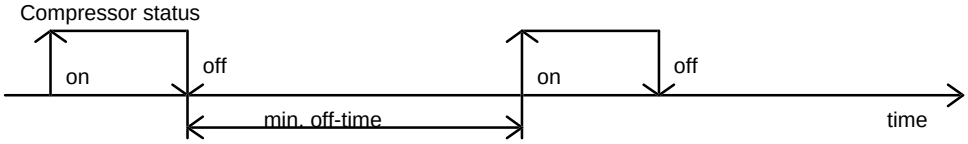
Description of functioning mode:

- Compressors start-up delay as regards to main fan:

When the machine is turned on (from Unit Off to Unit On) the main fan is activated; after a previously set delay the compressors are activated too.

- Minimum time compressor off

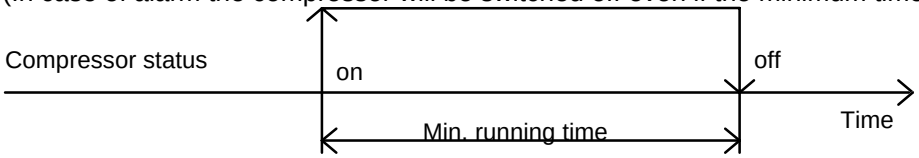
This is the minimum time for which the compressor may remain inactive. The compressor will not be started up if the minimum time selected has not elapsed.



- Minimum compressor on-time:

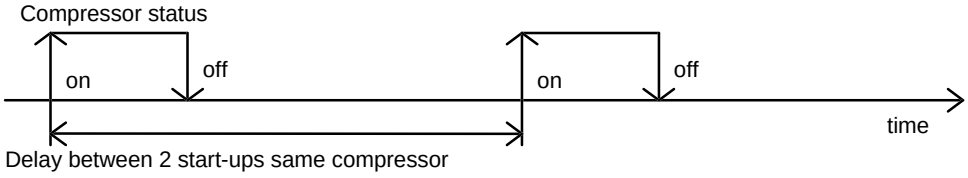
This is the shortest period for which the compressor may operate. The compressor will not be switched off if it has not been active for a time equivalent to the minimum selected.

(In case of alarm the compressor will be switched off even if the minimum time selected has not elapsed)



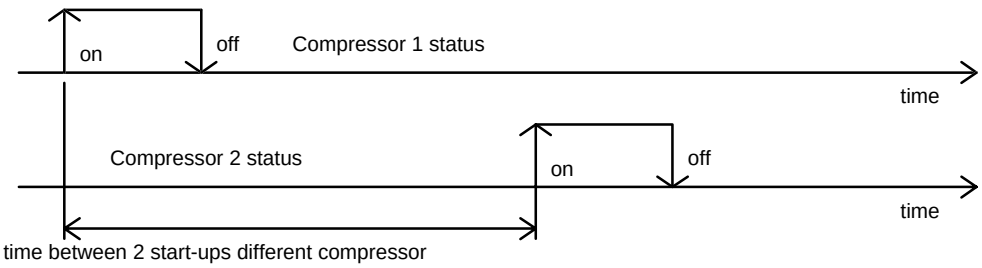
- Time between two compressor start-ups:

This is the time which must elapse between two insertions of the same compressor.



-Time between start-ups of different compressors

This is the time which must elapse between two insertions of different compressors.



Reversing Cycle Valves Regulation

Sets the logic of reversing cycle valves functioning

Employed Inputs:

Employed Devices:
- Reversing Cycle Valve n.1
- Reversing Cycle Valve n.2

Employed Parameters:

Description of functioning mode :
The reversing cycle valves work according to the following logic:

'SUMMER' functioning mode	reversing cycle valves always energised.
'WINTER' functioning mode	reversing cycle valves always de-energised, except in case of defrosting when they are energised.

Main Fan Regulation

Controls all processes which interact with the main fan functioning

Employed Inputs:
- Digital Input Interblock/Main Fan Overload

Employed Devices:
- Digital Output n.1 Main Fan

Employed Parameters
- Main Fan Off Delay (PARAMETRI_COS1)
- Main Fan Stop during Defrost (PARAMETRI_UT17)

The main fan must always be the first device to be switched on after the machine has been turned ON.
After the controller has been turned OFF, the main fan will remain active for a period which can be selected directly by the user (see mask PARAMETRI_COS2).
It is possible to force the main fan switching off during defrost, by selecting a proper parameter in the relative mask (PARAMETRI_UT17).

The main fan may be activated through the output test procedure (mask ASSISTENZA9) if there are no alarms to inhibit it.

The alarms which may cause the main fan switching off are Main fan/Interblock overload, and Anti-freeze.

Condensing Fans Regulation

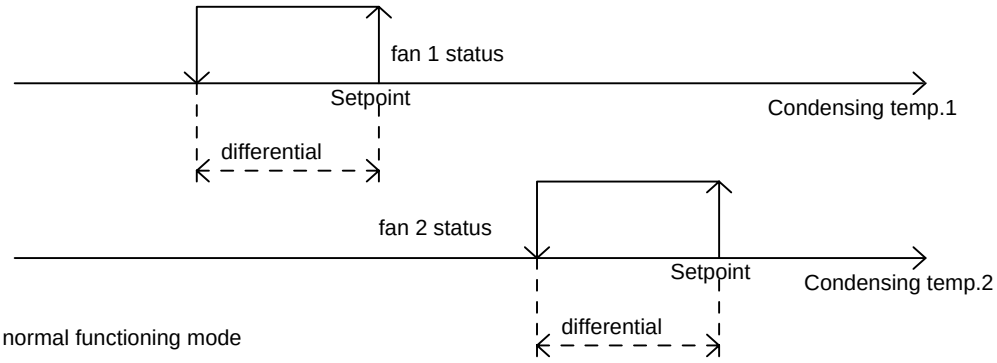
Controls activation/deactivation of compressors condensing fans.

Employed Inputs:
- Analogue Input n.3 Defr./Cond. Temperature Probe 1
- Analogue Input n.4 Defr./Cond. Temperature Probe 2

Employed Devices:
- Digital Output n.3 Condensing Fan n.1
- Digital Output n.5 Condensing Fan n.2

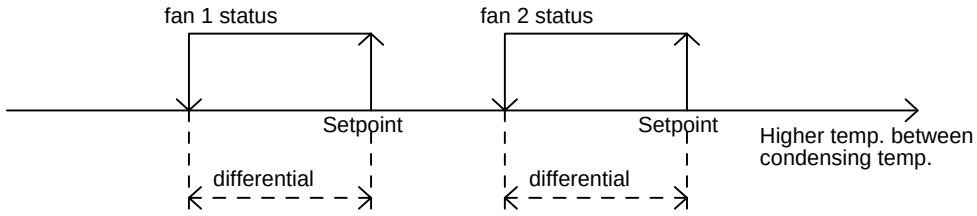
Employed Parameters:
- Enabling of Defrost/Cond. Probe 1 (CONFIG_COS5)
- Enabling of Defrost/Cond. Probe 2 (CONFIG_COS5)
- Fan 1 Condensing Set-point (PARAMETRI_UT29)
- Fan 1 Condensing Differential (PARAMETRI_UT29)
- Fan 2 Condensing Set-point (PARAMETRI_UT30)
- Fan 2 Condensing Differential (PARAMETRI_UT30)
- Fans shared functioning mode (PARAMETRI_UT31)

Description of functioning mode:
If defrost/condensing probes have not been enabled, fans will work as follows:
Compressor On --> Fan On
Compressor Off --> Fan Off
Defrost On --> Fan Off
If defrost/condensing probes have been enabled, fans will be activated according to the condensing temperature, to a set-point and a differential selectable under user password.
The activation/deactivation point is shown in the picture below:



normal functioning mode

Fans working in share functioning mode:
when this functioning mode has been selected, both the two set-points and their relative differentials are set according the higher of the two condensing temperatures read by the probe.



shared functioning mode

Freecooling and Freeheating regulation according to temperature

The machine working in FREECOOLING or FREEHEATING mode allows to exploit the external environmental situation employing as little power as possible, since it avoids turning on heaters and compressors.

The machine working in winter/summer freecooling mode or in winter freeheating mode will be selected under MANUFACTURER password in the mask CONFIG_COS2.

Employed Inputs:
- External Air Temperature Probe
- Recirculated Air Temperature Probe

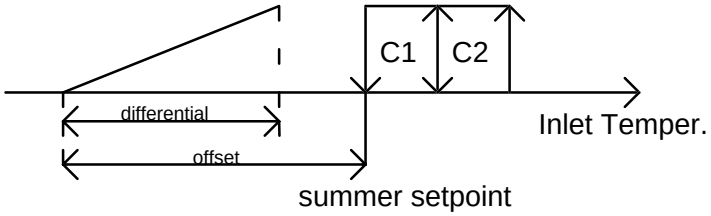
Employed Devices:
- External Damper 0-10 Volt

Employed Parameters :
- Temperature Freecooling/Freeheating Differential (:PARAMETRI_UT7)
- Enthalpy Freecooling/Freeheating Differential (PARAMETRI_UT8)
- Summer Freecooling Offset (PARAMETRI_UT9)
- Summer Freecooling Differential (PARAMETRI_UT9)
- Winter Freeheating Offset (PARAMETRI_UT10)
- Winter Freeheating Differential (PARAMETRI_UT10)
- Temperature Regulation Set
- Temperature Regulation Band

Summer Freecooling:
If this function has been selected in the proper mask (CONFIG_COS2), the external damper opening/closing will be regulated through a particular procedure:

-1) Pco controls the external temperature conditions as compared to the internal temperature and if *(external temperature)* **<** *(internal temperature* **-** *freecooling differential)* the summer freecooling function will be enabled.

-2) Then the damper opening is effected according to a ramp selected on the recirculated air temperature ; closed damper / open damper are detected by an offset (PARAMETRI_UT9) as to the summer set-point and a differential (PARAMETRI_UT9).
(The damper will be opened when the temperature increases)

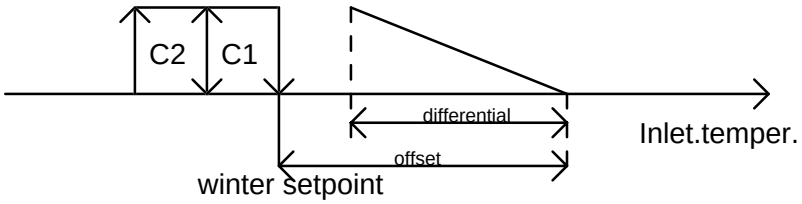


summer freecooling

Winter Freeheating:
If this function has been selected in the proper mask (CONFIG_COS2), the external damper opening/closing will be regulated through a particular procedure:

-1) Pco controls the external temperature conditions as compared to the internal temperature and if *(external temperature) > (internal temperature* **+** *freecooling differential)* the winter freeheating function will be enabled.

-2) Then the damper opening is effected according to a ramp selected on the recirculated air temperature ; closed damper / open damper are detected by an offset (PARAMETRI_UT10) as to the summer set-point and a differential (PARAMETRI_UT10).
(The damper will be opened when the temperature increases)



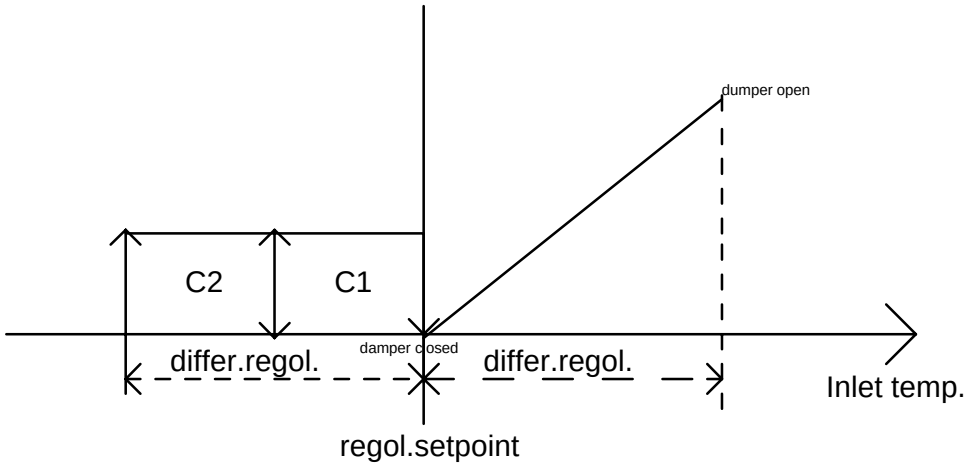
winter freeheating

Winter Freecooling:
(this functioning mode is useful in big-store ; during winter functioning, in fact, they are often overcrowded causing temperature to exceed the selected set-point and making it necessary to effect a cooling action rather than a heating one. Therefore, the controller will exploit external temperature conditions which are almost always favourable for this purpose)

If this function has been selected in the proper mask, the external damper opening/closing will be regulated through a particular procedure:

-1) Pco controls the external temperature conditions as compared to the internal temperature and if *(external temperature) < (internal temperature **+** freecooling differential)* the winter freecooling function will be enabled.

-2) Then the damper opening is regulated by a ramp activated by the temperature regulation set-point (compressors) and by its regulation band; the damper will be closed when recirculated air temperature is equal to or less than the set-point and will start to open until it reaches the maximum opening at *set-point + band.*



winter freecooling

In SUMMER FREECOOLING and WINTER FREEHEATING situations the normally closed external damper starts to mix external with internal air, thus trying to shift the chiller work point as nearer as possible to the set-point, turning off most of devices activated for cooling/heating production.
The ideal condition would be to obtain the desired temperature/enthalpy only by modulating the damper.

It is possible to select the damper minimum opening in case the machine is ON, through the mask PARAMETRI_UT11.
It is possible to select whether at the unit start-up the damper should be completely closed until the temperature set-point PARAMETRI_UT11 is reached.

Heating Valve Regulation

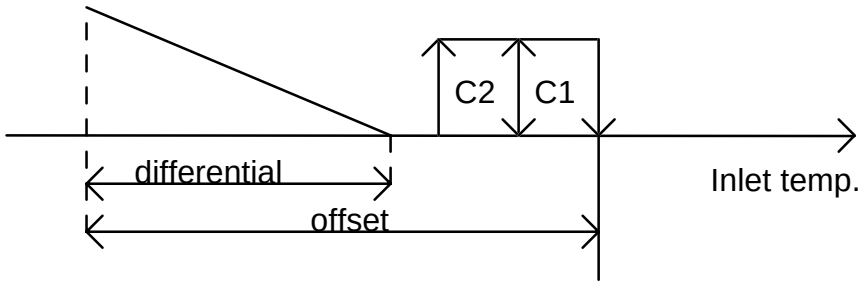
This regulator controls the modulation of the analogue output connected to the heating valve; warning: it is selected only in winter functioning mode.

Employed Inputs:
- Analogue Input n.1 Ambient Temperature Probe

Employed Devices:
- Analogue Output 2 Heating Valve

Employed Parameters:
- Enabling of Heating Valve (CONFIG_COS41)
- Closed Valve Temperature Offset (PARAMETRI_UT28)
- Open Valve Temperature Differential (PARAMETRI_UT28)

Description of functioning mode :
This regulation should be selected in the proper mask (CONFIG_COS41).
The heating valve opening is effected according to a ramp set on ambient temperature;closed valve / open valve are detected by an Offset (PARAMETRI_UT28) and a differential (PARAMETRI_UT28). The valve will be opened as temperature decreases.



Heating Valve winter setpoint

Outlet Air Temperature Minimum Limit Regulation

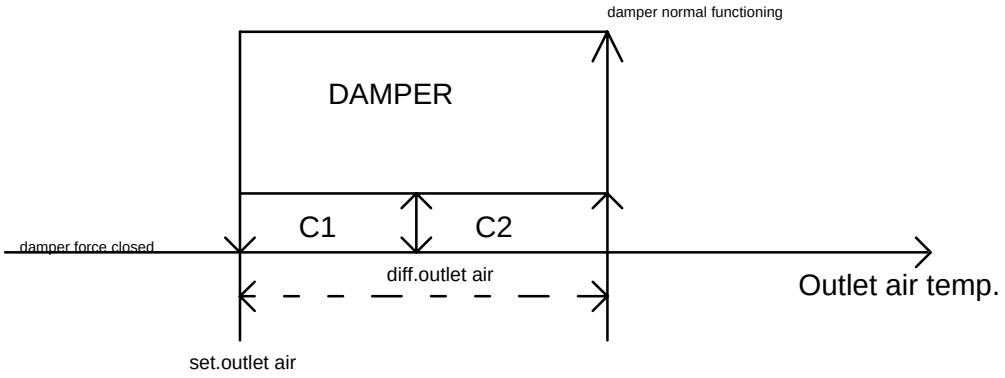
This regulator can force the damper closing or the compressors turn off according to the outlet air temperature; **warning: it can be selected only if a 8-input-board is being used.**

Employed Inputs:
- Outlet Air Temperature Probe

Employed Devices:
- Compressor 1
- Compressor 2
- External Damper

Employed Parameters :
- Enabling of Outlet Air Temperature Probe (CONFIG_COS3)
- Set-point (PARAMETRI_UT12)
- Differential (PARAMETRI_UT12)

Description of functioning mode :
The outlet air temperature minimum limit is activated only during winter functioning. When outlet air temperature decreases below the selected outlet air temperature set, the external air damper will be forced to close and is released when the outlet air temperature increases up to *set + differential*. Compressors functioning is different: when outlet air temperature decreases below *set + diff./2,* the first compressor will be deactivated, and if outlet air temperature decreases again until it reaches the selected outlet air temperature set, the second compressor too will be deactivated.



Warning:
Only one 4/20 mA probe can be connected to input B7; moreover, in the ASSISTENZA7_1 mask under maintenance password, the relative full scale can be selected (default = 0..50.0 C).

Auxiliary Heaters Regulation

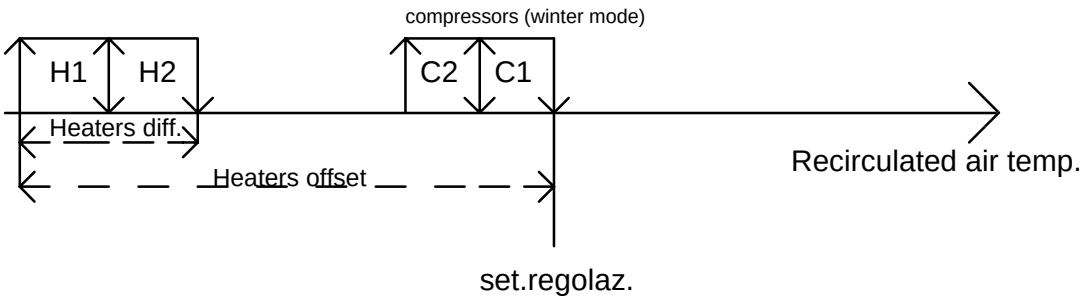
This regulator controls heaters activation/deactivation.

Employed Inputs:
- Recirculated Air Temperature

Employed Devices:
- Heater n.1
- Heater n.2

Employed Parameters:
- Number of Selected Heaters (CONFIG_COS3)
- Heaters Regulation Offset (PARAMETRI_UT20)
- Heaters Regulation Differential (PARAMETRI_UT20)
- Temperature Regulation Set (M_SETPOINT1/2)

Description of functioning mode :
Heaters set-point refers to the winter functioning set-point, as shown in the picture below:



With one selected heater:
When the recirculated air temperature decreases below the selected *regulation set - heater offset,* the heater is activated and it is deactivated when temperature exceeds the value *(regulation set - heater offset) + heater differential*.
If two heaters are selected, two stages are automatically calculated according to the selected heaters differential.

Set point compensation

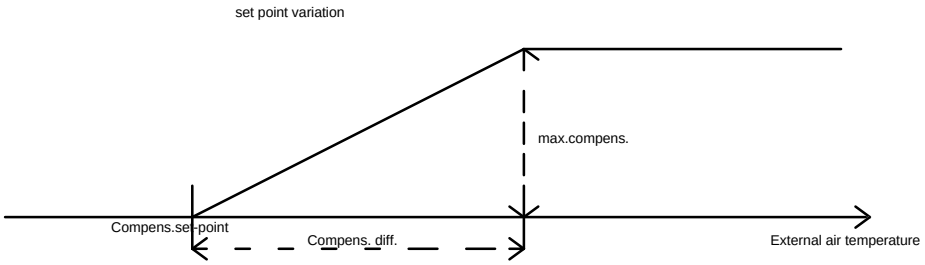
This regulator controls the set-point variation according to external temperature.

Employed Inputs:
- External Air Temperature Probe

Employed Devices:
- Compressor n.1
- Compressor n.2

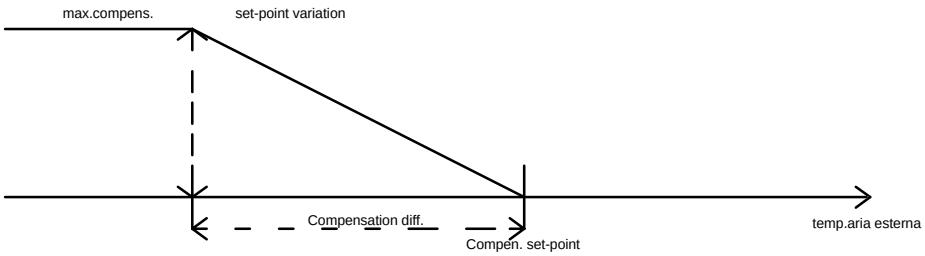
Employed Parameters:
- Enabling of Compensation (CONFIG_COS3)
- Winter Compensation Set on External Temperature (PARAMETRI_UT14)
- Winter Compensation Band on External Temp. (PARAMETRI_UT14)
- Maximum Winter Compensation (PARAMETRI_UT14)
- Summer Compensation Set on External Temp. (PARAMETRI_UT13)
- Summer Compensation Band on External Temp. (PARAMETRI_UT13)
- Maximum Summer Compensation (PARAMETRI_UT13)

Description of functioning mode:
This function allows to save energy if external conditions are particularly critical with respect to the requirements of the place to be controlled.
Summer Compensation
This compensation consists of adding to the selected set-point an external temperature depending value (the more the temperature increases the more this value increases). This delta to be added to the temperature regulation set is "0" when external temperature is equal to/lower than the selected compensation set; it starts to increase when external temperature exceeds the selected compensation set; it reaches the maximum selected value (maximum selected compensation PARAMETRI_UT14) when external temperature is equal to/higher than the selected compensation set + selected compensation differential.



Winter Compensation:

This compensation consists of subtracting to the selected set-point an external temperature depending value (the more the temperature decreases the more this value decreases). This delta to be subtracted to the temperature regulation set is "0" when external temperature is equal to/higher than the selected compensation set; it starts to increase when external temperature decreases below the selected compensation set; it reaches the maximum selected value (maximum selected compensation PARAMETRI_UT14) when external temperature is equal to/lower than the selected compensation set + selected compensation differential.



Ambient Air Humidity Regulation

As for temperature regulation, the user can select humidity set-point and differential which will determine the working area.
(There are a set-point and a differential both for summer functioning mode and for winter functioning mode)

Dehumidifying Regulation

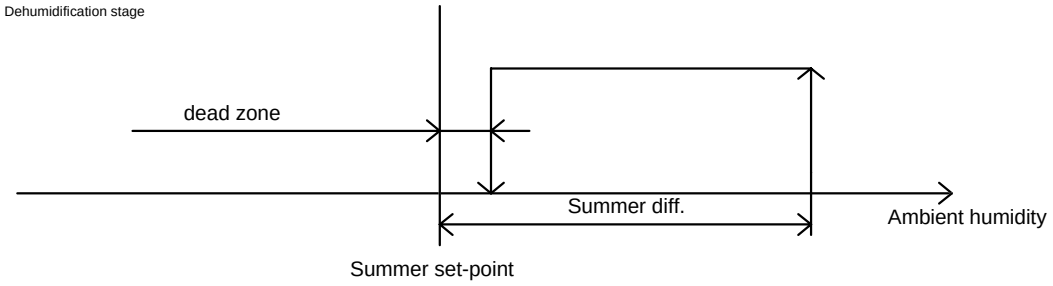
Regulates the compressors activation according to a request for dehumidification.

Employed Inputs:
- Analogue Input n.5 Ambient Humidity

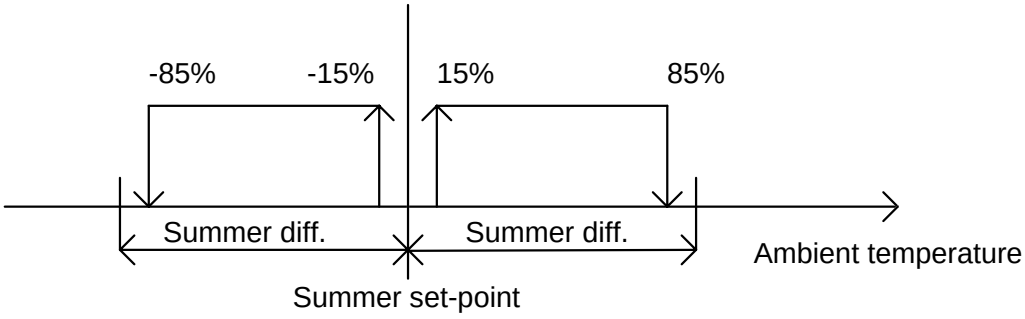
Employed Devices:
- Digital Output n.2 Compressor n.1
- Digital Output n.4 Compressor n.2

Employed Parameters:
- Enabling of Humidity Function (CONFIG_COS1)
- Summer Humidity Set-point (M_SETPOINT2)
- Summer Humidity Regulation Band (PARAMETRI_UT5)
- Humidity Dead Zone (PARAMETRI_UT26)
- Number of Dehumidifying Compressors (PARAMETRI_UT19)

Description of functioning mode:
- This function is activated only during summer functioning
- The number of compressors related to dehumidification stage (1 or 2) is selected
- There is a dehumidification stage detected by humidity set, band and dead zone
- The compressor starts dehumidifying when relative humidity exceeds set + band, and it turns off when the dead zone is reached.



- Compressors can be activated under dehumidifying regulator request if ambient temperature follows the conditions shown in the picture below:



When temperature is within +-15%, compressors can be activated by the dehumidifying regulator; if ambient temperature deviates from the selected set-point until it exceeds +-85%, compressors can not be activated until temperature reaches again values within +-15%.

- In case two dehumidifying compressors have been selected, they will be regulated by the same (above quoted) stage and not by two stages as in temperature regulation.

Humidifying Regulation

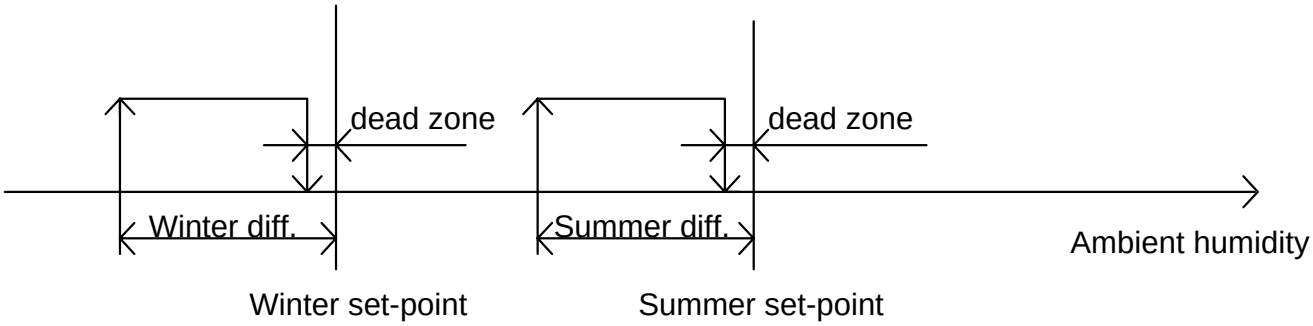
Regulates activation/deactivation of a humidity stage associated to a relay output.

Employed Inputs:
- Analogue Input n.5 Ambient Humidity

Employed Devices:
- Digital Output n.10 Humidity Relay

Employed Parameters:
- Enabling of Humidity Function (CONFIG_COS1)
- Summer Humidity Set-point (M_SETPOINT2)
- Winter Humidity Set-point (M_SETPOINT2)
- Summer Humidity Regulation Band (PARAMETRI_UT5)
- Winter Humidity Regulation Band (PARAMETRI_UT5)
- Humidity Dead Zone (PARAMETRI_UT6)

Description of functioning mode :
- There is a humidifying stage detected by humidity set, band and dead zone
- The relay which controls humidification is excitated when humidity decreases below set-point - band and is de-energised when the dead zone is reached again



Enthalpic Freecooling and Freeheating Regulation

This regulator manages freecooling and freeheating in function of internal/external enthalpy conditions.

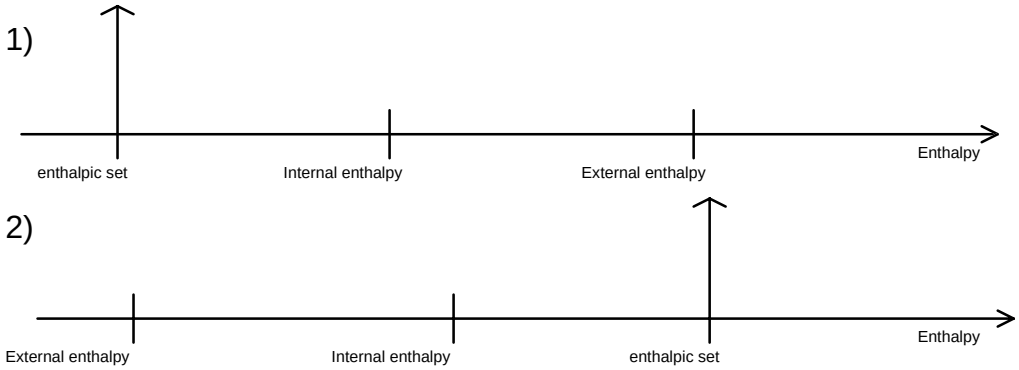
Employed Inputs:
- Recirculated Air Temperature Probe
- External Air Temperature Probe
- Internal Humidity Probe
- External Humidity Probe

Employed Devices:
- External Damper (Analogue Output n.1)

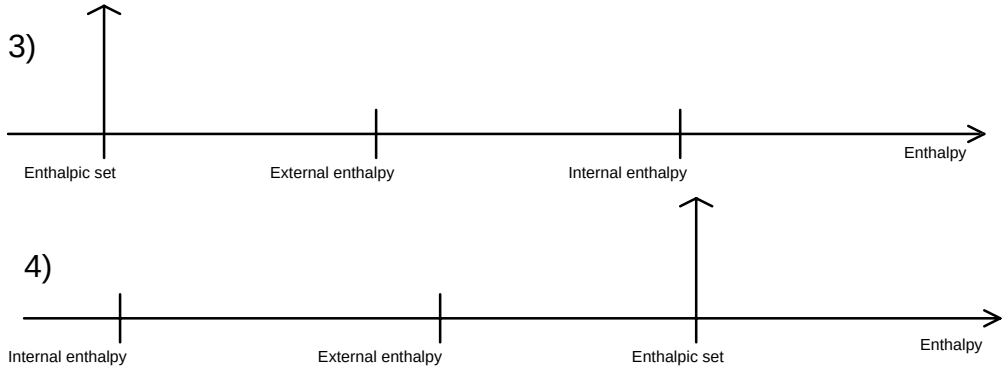
Employed Parameters:
- Enabling of Summer Freecooling (CONFIG_COS2)
- Enabling of Winter Freeheating (CONFIG_COS2)
- Enabling of Humidity Function (CONFIG_COS1)
- Enabling of Freecooling/Freeheating in Enthalpy (PARAMETRI_COS3)
- Active Temperature Regulation Set-point
- Active Humidity Set-point
- Enthalpy Differential (PARAMETRI_UT8)

Description of functioning mode:
To make this regulator work you should enable:
- Humidity Function (CONFIG_COS1)
- Summer Freecooling and Winter Freeheating Functions (CONFIG_COS2)
- Control of Freecooling and Freeheating in Enthalpy (PARAMETRI_COS3)

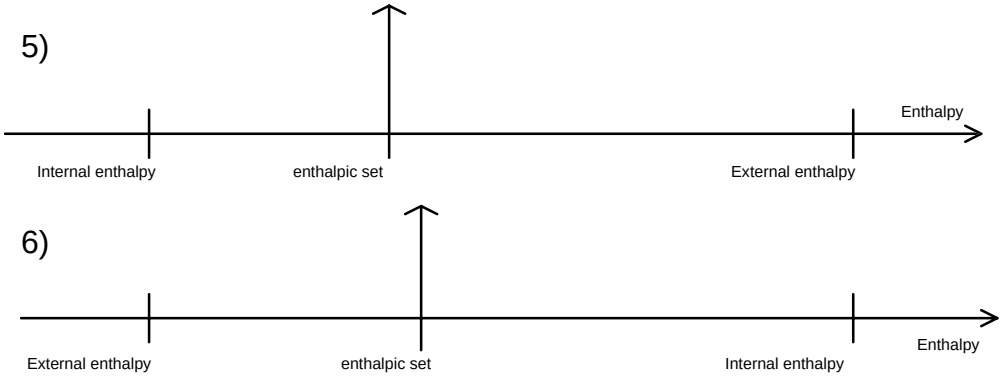
Through recirculated air temperature and humidity the regulator calculates the recirculated air enthalpy.
Through external temperature and humidity the regulator calculates the external enthalpy.
Through the temperature regulation set and through the humidity regulation set the regulator calculates the enthalpic set-point.
Then the aim of the regulator is to keep the enthalpy as near as possible to the Enthalpic Set-point.
The following conditions may occur:



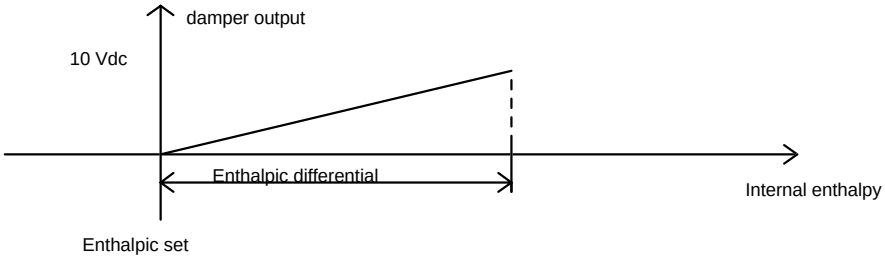
In both conditions (1,2) described in the picture above it will not be [convenient] to open the external damper, since the internal one is nearer to the enthalpic set-point than the external enthalpy.
Also these conditions may occur:



In both conditions (3,4) described in the picture above it will be convenient to open the external damper, since the external enthalpy is nearer to the enthalpic set-point
than the internal enthalpy.
Also these conditions may occur:



In case number 5 described in the picture above, the internal enthalpy is nearer to the set-point than the external one, but in this case it is convenient to open the damper because, with the mixing of the two enthalpies (internal and external), the internal enthalpy will approach the enthalpic set-point.
In case number 6 described in the picture above, the external enthalpy is nearer to the enthalpic set-point than the internal enthalpy, so it is convenient to open the damper because, with the mixing of the two enthalpies (internal and external), the internal enthalpy will anyway approach the enthalpic set-point.
If the cases described in the picture above (3,4,5,6) should occur, the regulator will enable the damper opening, which will be modulated according to a valve selected on internal enthalpy. The valve [estremi] (completely open valve and completely closed valve) are detected by the enthalpic set and by the enthalpic differential.



Alarms Regulation

Controls all procedures of each Alarm, delays, resets and relative signalling

When an alarm occurs pCO simultaneously activates buzzer, led, remote relay and relative mask.
To visualise the occurred alarm it is sufficient to press the Alarm key, and with the UP/DOWN keys any other occurred alarm can be visualised.
If you want to reset the stored alarms you must enter the alarm masks and press the Alarm key again.

Alarms are divided into three categories:

	Led Signalling	Mask Signalling	Remote Signalling	Unit OFF	Device OFF
Serious Alarms	yes	yes	yes	yes	yes
Device Alarms	yes	yes	yes	no	yes
Alarms signalling	yes	yes	yes	no	no

Serious Alarms: They turn the machine OFF (Unit Off)
Device Alarms: They deactivate only one refrigerating circuit and do not turn the whole unit OFF.
Only Alarms Signalling: They do not deactivate any device.
The table below explains the alarms controlled by Pco :

	Heaters Off	Circuit 1 Off	Circuit 2 Off	Reset	Intervention Delayed	Notes
Overload Compressor1	no	yes	no	Manual	no	
Overload Compressor2	no	no	yes	Manual	no	
Hp Comp.1	no	yes	no	Manual	no	
Hp Comp.2	no	no	yes	Manual	no	
LP Comp.1	no	yes	no	Manual/ Automatic	yes Selectable	Manual Reset in Summer Automatic in Winter. No Remote Signalling
LP Comp.2	no	no	yes	Manual/ Automatic	yes Selectable	Manual Reset in Summer Automatic in Winter No Remote Signalling
Anti-freeze Alarm	no	no	no	Automatic	yes 2 sec	Winter mode: -close damper -open heating valve Summer mode: -close damper switch-off compressors
High Ambient Temperature	no	no	no	manual	Yes Selectable	Only Signalling
Low Ambient Temperature	no	no	no	manual	Yes Selectable	Only Signalling
Maintenance Compressor 1	no	no	no	manual	no	Only Signalling
Maintenance Compressor 2	no	no	no	manual	no	Only Signalling
Maintenance Machine	no	no	no	manual	no	Only Signalling
Faulty Probe Default 1	no	no	no	manual	no	Only Signalling
Faulty Probe Default 2	no	no	no	manual	no	Only Signalling
Heaters Overload	yes	no	no	manual	no	
Clogged Filter	no	no	no	manual	yes 5 sec	Only Signalling
Fan Overload/ Interblock	yes	yes	yes	manual	yes Selectable	Serious Alarm Whole Unit OFF

Faulty Probe Ambient Temp.	yes	yes	yes	manual	no	Serious Alarm Whole Unit OFF
Faulty Probe External Temp.	no	no	no	manual	no	Only Signalling
Back-up Memory Failure	no	no	no	manual	no	Serious Alarm Only Signalling
Damaged or Absent Clock	no	no	no	manual	no	Only Signalling
Faulty Probe Ambient Humid.	no	no	no	manual	no	Only Signalling
Faulty Probe External Humid.	no	no	no	manual	no	Only Signalling

N.B.

The alarm situation occurs when there is no voltage on the relative terminal, whereas the situation of alarm absence persists as long as there is voltage on the relative terminal.

Assistance

Compressors/Machine Time-counter Regulation

Manages the compressors/machine maintenance alarm.

Employed Inputs:

Employed Devices:

Employed Parameters :

- Working Hours Threshold of Machine Maintenance Alarm (ASSISTENZA1)
- Reset Machine Time-counter (ASSISTENZA1)
- Working Hours Threshold of Compressors Maintenance Alarm (ASSISTENZA2/3)
- Reset Compressor N.1 Time-counter (ASSISTENZA1)
- Reset Compressor n.2 Time-counter (ASSISTENZA2)

Description of functioning mode :
Pco calculates the working hours of Compressors 1,2 and Machine and for each time-counter it up-dates in back-up memory (EEPROM) every 3 hours of continuous working of the relative device. The present working hours are displayed under synoptic branch, mask M_SINOTTICO7 and under Maintenance password, masks ASSISTENZA1,2,3.
When the time-counter of the single device reaches the Alarm threshold selectable in the three masks under maintenance password, the maintenance alarm is activated: it is an only signalling alarm and it does not switch off any device. To reset the memory alarm, the time-counter relative to the device in maintenance alarm should be reset. This function must be selected in the masks under maintenance password (ASSISTENZA1,2,3)

Probes Calibration Regulation

Manages the calibration and the type of connected probes.

Employed Inputs :

- Recirculated Air Temperature
- External Air Temperature
- n.1 Defrosting/Condensing Air Temperature
- n.2 Defrosting/Condensing Air Temperature
- Recirculated Air Relative Humidity
- External Air Relative Humidity
- Outlet Air Temperature

Employed Devices:

Employed Parameters:

- Calibration of Recirculated Air Temperature Probe (ASSISTENZA4)
- Calibration of External Air Temperature Probe (ASSISTENZA4)
- Calibration of Outlet Air Temperature Probe (ASSISTENZA5)
- Calibration of 1 Defr./Cond. Air Temperature Probe (ASSISTENZA6)
- Calibration of 2 Defr./Cond. Air Temperature Probe (ASSISTENZA6)
- Calibration of Recirculated Humidity Probe (ASSISTENZA7)
- Calibration of External Humidity Probe (ASSISTENZA7)
- Selection of Humidity Probes Type (ASSISTENZA72)

Description of functioning mode :

Probes Calibration
With this regulation probes reading can be calibrated: To the value read by input probes will be added a value which has been previously selected in the proper maintenance masks.
Example:
- the ambient probe reads 22.5 C , but actually the real temperature is 23.5 C
- The value + 1.0 C is selected in the mask ASSISTENZA4 and it will be added to the value read by the probe.
- The main mask and the I/O masks will display 23.5 C
- The controller will employ 23.5 C for all regulators

Selection of Humidity Probes Type

With this regulator you can select the type of humidity probe connected to Pco: active probe 0/1 V. or active probe 4/20 mA. This selection can be made in the mask ASSISTENZA72.

Probes Filter Regulation

This regulator is used to make up for any misreading of probes due to strong electromagnetic interference in the electrical panel.

Employed Inputs:
- Recirculated Air Temperature
- External Air Temperature
- n.1 Defrosting/Condensing Air Temperature
- n.2 Defrosting/Condensing Air Temperature
- Recirculated Air Relative Humidity
- External Air Relative Humidity
- Outlet Air Temperature

Employed Devices:

Employed Parameters:
- Enabling of Probes Filter (ASSISTENZA71)
- Delay Time (ASSISTENZA71)
- Differential to Detect the Probe Misreading (ASSISTENZA71)

Description of functioning mode:
This procedure is normally activated by factory-set parameters; it works as follows:
- If the value read by a probe differs from the previously read one as much as the value of a selectable differential (ASSISTENZA71), then a false reading is considered to have been effected.
- As a consequence, the regulator keeps the previously read value.
- The action of this filter ends either because the maximum time has elapsed (selectable in the mask ASSISTENZA71), or because the temperature has returned within the range (defined as *previously read value +/- differential*).

Input/Output Test

This regulator allows a quick test on analogue inputs and on digital outputs.

Employed Inputs :
- All Analogue Inputs

Employed Devices :
- All Digital Outputs

Employed Parameters :
- Reading of mV. Analogue Inputs State (ASSISTENZA8)
- Energising/De-energising of all Relay Outputs (ASSISTENZA9/10)

Description of functioning mode:
- The mask ASSISTENZA8 allows visualisation of analogue inputs as they are read by Pco.
- Masks ASSISTENZA9/10 allow manual activation/deactivation of relay outputs

These three masks can be displayed only if the machine is OFF.

Time Zones

There are two kinds of time zones:
- Weekly time zones
- Daily time zones

Weekly Time Zones

Regulates the unit activation/deactivation during the week, distinguishing the on/off situation according to the day.

Employed Inputs:

Employed Devices:

Employed Parameters:
- Enabling of Clock (CONFIG_COS1)
- Enabling of Weekly Time Zones (FASCE_SETT_UT)
- Unit Activation on Monday (FASCE_SETT_UT1)
- Unit Activation on Tuesday (FASCE_SETT_UT1)
- Unit Activation on Wednesday (FASCE_SETT_UT1)
- Unit Activation on Thursday (FASCE_SETT_UT1)
- Unit Activation on Friday (FASCE_SETT_UT1)
- Unit Activation on Saturday (FASCE_SETT_UT1)
- Unit Activation on Sunday (FASCE_SETT_UT1)

Description of functioning mode:
To be able to use this function, you should insert the optional clock card in the interface board in the proper connector.
- The clock function must be enabled under manufacturer password, mask CONFIG_COS1.
- The function weekly time zones on/off must be enabled under clock branch, mask FASCE_SETT_UT.
- Now the activation of the unit depends on the weekly time zones function.
- Each day of the week the machine will be on either “Unit On” or “Unit Off through time zones” state according to the state of the time zone variables.
- Each day at midnight Pco will check if the variable of that day is on On or on Off state and, as a consequence, it will activate/deactivate the unit.

Example:
- Function weekly time zones Enabled
- Unit Activation on Monday = ON
- Unit Activation on Tuesday = ON
- Unit Activation on Wednesday = ON
- Unit Activation on Thursday = ON
- Unit Activation on Friday = OFF
- Unit Activation on Saturday = OFF
- Unit Activation on Sunday = OFF

With this configuration the unit will be on On state from Monday at 00:00 to Thursday evening at 23:59; it will remain on Off state from Friday at 00:00 to Sunday night at 23:59.

Daily Time Zones

Regulates a daily time zone with varying set-point (both summer and winter).

Employed Inputs:

Employed Devices:

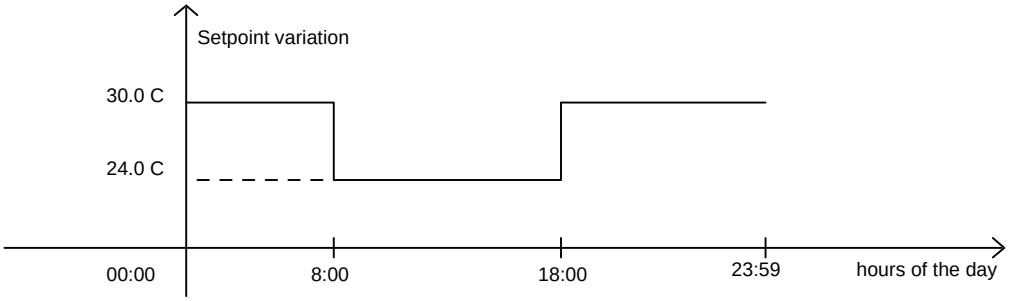
Employed Parameters:

- Enabling of Clock (CONFIG_COS1)
- Enabling of Daily Time Zones (FASCE_GIORN_UT)
- Beginning of Daily Time Zone (FASCE_GIORN_UT1)
- End of Daily Time Zone (FASCE_GIORN_UT1)
- Summer Time Zone: Internal Air Temperature Setpoint (FASCE_GIORN_UT2)
- Summer Time Zone: External Air Temperature Setpoint (FASCE_GIORN_UT2)
- Winter Time Zone: Internal Air Temperature Setpoint (FASCE_GIORN_UT3)
- Winter Time Zone: External Air Temperature Setpoint (FASCE_GIORN_UT3)

Description of functioning mode:
By selecting in the proper mask a time zone beginning/end, a "inside time zone" and a "outside time zone" are automatically set.
Within the time zones the internal set points (summer and winter) will be activated, otherwise the external ones will be used.
Therefore, once the daily time zone function has been enabled, the active set-points for regulation become the internal/external ones according to the current time measured by the clock card.

Example:
- Enabling of Clock = yes
- Enabling of Daily Time Zones = yes
- Time zone Start = 08:00
- Time Zone End = 18:00
- Internal Air Temperature Set Summer Time Zone = 24.0 C
- External Air Temperature Set Summer Time Zone = 30.0 C
- Internal Air Temperature Set Winter Time Zone = 20.0 C
- External Air Temperature Set Winter Time Zone = 14.0 C

The machine works in summer functioning mode.
The temperature regulation set-point will be 24.0 C from 8:00 to 18:00, whereas it will be 30.0 C from 18:01 to 7:59 of the following day.



User Interface

The user interface of this version is divided into four main parts:

- A *part USER, not protected by password*, which allows monitoring of controlled parameters, selecting of main control set-point, visualising of active and memorised alarms.
- *A part USER, protected by password*, which allows to select all the control parameters of the various functions and processes run by the programme: set-point limits, regulation differential, regulation dead zone, freecooling and freeheating parameters, compensation; the only parameters which will be displayed and therefore selectable, will be those concerning functions enabled under manufacturer password
- *A part MAINTENANCE*, *protected by password*, to be used by assistance, for the management of compressors/machine time-counters, for calibration of connected probes and for forcing the relay outputs.
- *A part MANUFACTURER, protected by password*, allows the system configuration with the selection and the activation of the functions of the devices to be controlled.

For each part above described there is a branch of masks and each mask belonging to that branch is characterised by a similar name:

Part User protected by Password:
Masks name: PARAMETRI_UTXX ; XX will be a progressive number from 1 to 26.

Part Maintenance protected by Password:
Masks name: ASSISTENZAXX ; XX will be a progressive number from 1 to 11.

Part Manufacturer protected by Password:
This part contains a 4-choice-menu, therefore there will be 4 sub-branches:
- *Machine Configuration:* name CONFIG_COSXX ; XX from 1 to 5
- *Compressors :* name COMPRESSOR_COSXX ; XX from 1 to 3
- *Global Parameters:* name PARAMETRI_COSXX ; XX from 1 to 4
- *Machine Initialisation*: name INIZIALIZ_COS.

Part User not protected by Password:
This part is composed of more branches, which have been divided according to subjects; as a consequence, there will be different names:

Input/Output Branch	name M_SINOTTICOXX ; X from 1 to 12
Set-point Branch	name M_SETPOINTXX ; X from 1 to 2
Clock Branch	all different names
Main Branch	name PRINCIPALE

Keypad

pCO is equipped with a 15-key-keypad which, together with the display, represents the interface between user and pCO system.
The keypad allows the user several functions, listed here below:

Key ON / OFF	Activates/deactivates the unit; it has the maximum priority over all ON/OFF controllers. It is necessary to activate the unit through this key to be able to effect any control, check or action (See ON/OFF Regulator)
Key ALARM	If there are active or stored alarms, by pressing this key you go to the first active alarm mask and simultaneously you switch off the buzzer. By pressing it a second time within the alarm branch, you effect the reset of active alarm/s. The keys UP/DOWN allow to move upwards or downwards in the sequence of alarm masks. If there are no active alarms stored, by pressing this key you go to the mask NO ALARM PENDING. (See Alarm Regulator)
Keys UP/DOWN	These keys have a double function: 1) They make the branches of masks scroll up/down, when the cursor is in the upper left corner; 2) They increase and decrease the parameters or modify their values, when the cursor is at the beginning of the parameter.
Key ENTER	In the masks for the selection of values, by pressing the key for the first time, the cursor will shift on the first parameter in the mask. By pressing the key again, the

selected parameter is confirmed and the cursor is shifted on the following parameter. From the last parameter, the cursor will return to the upper left position (cursor on 0,0 on display).

Key MENU — Goes to the mask PRINCIPALE

Key INFO — Goes to the mask M_VERSIONE

Key MAINT  — Goes to the mask PASS_ASSIST

Key PRINT  — Can be used in the printer equipped version

Key I/O — Goes to the mask M_SINOTTICO1

Key CLOCK  — Goes to the mask REG_OROLOGIO_UT

Key SET — Goes to the mask M_SETPOINT1

Key PROG — The password is requested. If it has been correctly selected, access is given to the mask PASS_UTENTE

Keys MENU+PROG — The keys must be pressed and left simultaneously. The password is requested. If it has been correctly selected, access is given to the mask PASS_COSTRUT

Led

On one side of each key there is a green led which lights up when the key it represents is being pressed and indicates which group of masks the user is in.

Other three leds have been placed under the rubber keys; they indicate respectively:

1. Key ON / OFF — green led
   indicates that the unit has been switched ON and is functioning.
2. Key ALARM — red led
   indicates the presence of an alarm situation.
3. Key ENTER — yellow led
   Indicates that the instrument is being correctly fed.

Display

The liquid crystal display visualises the values of controlled parameters, the selected set-points, the alarm thresholds and, in general, all information relative to controlled variables in the specified formats. Particular messages are moreover displayed any time an alarm situation occurs.

Tree of masks

According to the keys which have been pressed, a specific branch will be entered:
Disposition of keys on pco front panel:

MENU	**MAINT.**	**PRINT**	**I/O**	**CLOCK**	**SET**	**PROG**	
VERSION	**WINTER**	**SUMMER**	**ON/OFF**	**ALARM**	**UP**	**DOWN**	**ENTER**

Tree of masks according to the keys which have been pressed:

key MENU
maschere in inglese
applicativo roof-top pCO

Key MENU

```
PRINCIPALE
+--------------------+
¦ 00:00 00/00/00   AL¦   Visualisation of time, date and functioning
¦Inlet Temp.   00.0_C¦   mode (summer/winter)
¦Inlet Humid.  00.0 %¦
¦Unit Off   TIMEFHEAT¦   Visualisation of machine states: Unit Off,
+--------------------+   Unit On, Remote On, Remote Off
                                FHEAT    : winter freeheating in progress
                                FCOOL    : winter/summer freecooling in progress
                                COMP     : summer compensation in progress
                                DEUM     : dehumidification in progress

PRINCIPALE1
+--------------------+
¦ 00:00 00/00/00   AL¦   Active temperature set-point, only visualisation.
¦Current Temperature ¦   This visualisation has been introduced since the
¦Setpoint      00.0_C¦   active set-point, if time-zones or compensation
¦Unit Off   TIMEFHEAT¦   are used, is not the same as the previously
+--------------------+   selected one.
```

Key I/O

```
In this branch of masks all parameters controlled by the system are
visualised, including the state of digital inputs, digital ouputs and
analogue outputs.

M_SINOTTICO1
+--------------------+
¦Inlet Temp.         ¦   Visualisation of recirculated air temperature
¦Probe         00.0_C¦   probe.
¦External Temperature¦
¦Probe         00.0_C¦   Visualisation of external air temperature probe.
+--------------------+

M_SINOTTICO2
+--------------------+
¦Outlet Temperature  ¦   Visualisation of outlet air temperature probe.
¦Probe         00.0_C¦
¦                    ¦
¦                    ¦
+--------------------+

M_SINOTTICO3             Visualisation obtained only if Humidity function
+--------------------+   has been enabled.
¦Inlet Humidity      ¦
¦Probe         00.0 %¦   Visualisation of recirculated air relative humidity
¦External Humidity   ¦   probe.
¦Probe         00.0 %¦   Visualisation of external air relative humidity
+--------------------+   probe.
```

```
M_SINOTTICO4              Visualised only during Winter functioning mode.
+--------------------+
¦Defrost Temp. 1     ¦    Visualisation of defrost temperature probe
¦Probe         00.0_C¦    circuit 1.
¦Defrost Temp. 2     ¦
¦Probe         00.0_C¦    Visualisation of defrost temperature probe
+--------------------+    circuit 2.

M_SINOTTICO41             Visualised only during Summer functioning mode.
+--------------------+
¦Condenser Temp. 1   ¦    Visualisation of condensing temperature probe
¦Probe         00.0_C¦    circuit 1.
¦Condenser Temp. 2   ¦
¦Probe         00.0_C¦    Visualisation of condensing temperature probe
+--------------------+    circuit 2.

M_SINOTTICO5              Visualised only if Enthalpy function has been
+--------------------+    enabled.
¦Internal Enthalpy   ¦
¦Value   00.000 Kc/Kg¦    Visualisation of internal enthalpy.
¦External Enthalpy   ¦
¦Value   00.000 Kc/Kg¦    Visualisation of external enthalpy.
+--------------------+

M_SINOTTICO6
+--------------------+    Visualised only if Enthalpy function has been
¦Enthalpy Setpoint   ¦    enabled.
¦Value   00.000 Kc/Kg¦
¦(Referred to Temp.  ¦    Visualisation of enthalpic set-point.
¦and Humid. Setpoint)¦
+--------------------+

M_SINOTTICO7
+--------------------+
¦Operating Hours     ¦
¦Machine:       00000¦    Visualisation of machine working hours.
¦Compressor 1:  00000¦    Visualisation of compressor n.1 working hours.
¦Compressor 2:  00000¦    Visualisation of compressor n.2 working hours.
+--------------------+

M_SINOTTICO8
+--------------------+    State of Digital Inputs:
¦Digital Inputs      ¦    - when there is voltage on the terminal, “C” will
¦State  (1..12):     ¦      be visualised;
¦CCCCCCCCCCCC        ¦    - when there is no voltage on the terminal, “O”
¦                    ¦      will be visualised.
+--------------------+

M_SINOTTICO9
+--------------------+    State of Digital Outputs:
¦Compressor 1     OFF¦    - ”OFF” = open contact of relative Relay
¦Compressor 2     OFF¦    - ”ON”  = closed contact of relative Relay
¦Heater 1         OFF¦
¦Heater 2         OFF¦
+--------------------+

M_SINOTTICO10
+--------------------+
¦Reverse Valve 1  OFF¦
¦Reverse Valve 2  OFF¦
¦Condenser Fan 1  OFF¦
¦Condenser Fan 2  OFF¦
+--------------------+
```

```
M_SINOTTICO11
+--------------------+
¦Main Fan         OFF¦
¦Humidifier       OFF¦
¦                    ¦
¦                    ¦
+--------------------+

M_SINOTTICO12
+--------------------+   Only Analogue Outputs:
¦Ext. Damper:   000 %¦   - “0%”   corresponds to 0 volts
¦-                   ¦   - “100%” corresponds to 10 volts
¦Hot Wat.Valve: 000 %¦
¦-                   ¦
+--------------------+
```

Key SETPOINT

In this branch of masks the user can select the temperature regulation set-point and the humidity regulation set-point.

```
M_SETPOINT1
+--------------------+
¦Regulation Temp.    ¦
¦Setpoint (by Time-Z)¦   Temperature set-point selectable in summer-like
¦Summer        00.0_C¦   functioning.
¦Winter        00.0_C¦   Temperature set-point selectable in winter-like
+--------------------+   functioning.

M_SETPOINT2              Visualised only if Humidity function has been
+--------------------+   activated.
¦Regulation Humidity ¦
¦Setpoint            ¦   Active humidity set-point in summer-like
¦Summer        00.0 %¦   functioning.
¦Winter        00.0 %¦
+--------------------+   Active humidity set-point in winter-like
                                functioning.
```

Key VERSION

This mask is employed to determine the programme version and date.

```
M_VERSIONE
+--------------------+
¦    ROOF TOP Pco    ¦
¦  C.AR.EL.  s.r.l.  ¦
¦                    ¦
¦ver 1.012   12/04/95¦
+--------------------+
```

Key PROGRAM (User)

This branch is protected by an access key.
The passwords are two: the first is 01234 and it can not be changed (PASSEPARTOUT of all C.AR.EL. machines); the second can be modified
by the user in the last mask of this branch PARAMETRI_UT26.
They are active simultaneously.

```
PASS_UTENTE
+--------------------+   Once the correct password has been introduced,
¦Enter User Password:¦   by pressing the “Down” key all the masks in this
¦                    ¦   branch can be scrolled.
¦               00000¦
¦Wrong Password      ¦
+--------------------+

PARAMETRI_UT1
+--------------------+
¦Temperature Setpoint¦
¦Limit               ¦
¦Maximum       00.0_C¦   Maximum selectable limit of temperature set-point.
¦Minimum       00.0_C¦   Minimum selectable limit of temperature set-point.
+--------------------+
```

PARAMETRI_UT2

Regulation Temp. Differential Summer 00.0_C	Temperature regulation differential in summer.
Winter 00.0_C	Temperature regulation differential in winter.

PARAMETRI_UT3

Dead Zone Adjust Temperature 00.0_C	Dead Zone around temperature regulation set-point.

PARAMETRI_UT4

Humidity Setpoint Limit Maximum 00.0 %	Maximum selectable limit of humidity regulation set-point.
Minimum 00.0 %	Minimum selectable limit of humidity regulation set-point.

Visualised only if Humidity function has been enabled.

PARAMETRI_UT5

Regulation Humidity Differential Summer 00.0 %	Humidity regulation differential in summer.
Winter 00.0 %	Humidity regulation differential in winter.

Visualised only if Humidity function has been enabled.

PARAMETRI_UT6

Dead Zone Adjust Humidity 00.0 %	Dead Zone around humidity regulation set-point.

Visualised only if Humidity function has been enabled.

PARAMETRI_UT7

Free Cool/Heating Temperature Differential (delta) 00.0_C	Temperature delta for freecooling/freeheating selection.

Visualised only if Freecooling/heating functions have been activated.

PARAMETRI_UT8

Free Cool/Heating Enthalpy Differential 00.000 Kc/Kg	Enthalpy delta for enthalpic freecooling/heating selection.

Visualised only if Freecooling and Enthalpy functions have been activated.

PARAMETRI_UT9

Freecooling Damper (summer setpoint) Offset 00.0_C Differ. 00.0_C	Parameters for external damper regulation during summer freecooling: - Offset as regards summer set-point: defines the beginning of the ramp; - Differential as regards offset: defines the end of the ramp.

Visualised only with activated Summer freecooling.

```
PARAMETRI_UT10
+--------------------+
¦Freeheating Damper  ¦
¦(winter setpoint)   ¦
¦Offset        00.0_C¦
¦Differ.       00.0_C¦
+--------------------+
```

Visualised only with activated Winter freeheating.

Parameters for external damper regulation during winter freeheating:

- Offset as regards winter set-point: defines the beginning of the ramp;
- Differential as regards offset: defines the end of the ramp.

```
PARAMETRI_UT11
+--------------------+
¦Minimum Opening     ¦
¦External Damper 00 %¦
¦Enable Warm-up      ¦
¦Procedure:  Normal  ¦
+--------------------+
```

- Minimum opening of external damper even if the total closing has been requested.
- At start-up or after a power failure the external damper can remain completely closed at 0V., until the temperature regulation set-point is reached (only during winter functioning mode)

```
PARAMETRI_UT12
+--------------------+
¦Minimum Value of    ¦
¦Outlet Temperature  ¦
¦Setpoint      00.0_C¦
¦Different.    00.0_C¦
+--------------------+
```

Visualised only if Outlet air temperature probe has been activated and if there is a 8-analogue-input-interface.

```
PARAMETRI_UT13
+--------------------+
¦Summer Compensation ¦
¦Ext. Temp.    00.0_C¦
¦Different.    00.0_C¦
¦Max Comp.     00.0_C¦
+--------------------+
```

Parameters for Compensation during summer functioning mode:

- set-point based on external temperature; if exceeded, compensation will be started;
- compensation differential which determines the set-point variation area;
- maximum compensation allowed.

```
PARAMETRI_UT14
+--------------------+
¦Winter Compensation ¦
¦Ext. Temp.    00.0_C¦
¦Different.    00.0_C¦
¦Max Comp.     00.0_C¦
+--------------------+
```

Parameters for Compensation during winter functioning mode:

- set-point based on external temperature; if exceeded, compensation will be started;
- compensation differential which determines the set-point variation area;
- maximum compensation allowed.

```
PARAMETRI_UT15
+--------------------+
¦Defrost Start       ¦
¦Setpoint      00.0_C¦
¦Defrost End         ¦
¦Setpoint      00.0_C¦
+--------------------+
```

Visualised only if Heatpump function has been activated.

- selection of defrost start set-point
- selection of defrost end set-point

```
PARAMETRI_UT16
+--------------------+
¦Defrost Start       ¦
¦Delay Time   000 min¦
¦Maximum Defrost     ¦
¦Delay Time   000 min¦
+--------------------+
```

Visualised only with activated Heatpump function.

- temperature must remain below the defrost start set-point for this time lapse, before starting defrost (this is a cumulative time)
- if within this time lapse defrost does not end according to temperature, it will be stopped.

```
PARAMETRI_UT17
+--------------------+
¦OFF Main Fan        ¦
¦during Defrost:   N ¦
¦Simultaneous Circuit¦
¦Defrost Cycle:    N ¦
+--------------------+
```

Visualised only with activated Heatpump function.

With this parameter the user can select the possibility of deactivating the main fan during defrost.

Simultaneous defrost cycle is enabled.

```
PARAMETRI_UT171
+--------------------+
¦Simultaneous Defrost¦
¦Stop Defrost with   ¦
¦lowest Temperature  ¦
¦Probe?            N ¦
+--------------------+

PARAMETRI_UT18
+--------------------+
¦Automatic Restart   ¦    - Enabling of automatic restart after a power
¦After Black-Out:  N ¦      failure situation;
¦Enable Remote       ¦    - Enabling of remote control through digital
¦On/Off:           N ¦      input.
+--------------------+

PARAMETRI_UT19
+--------------------+
¦Number of Compr.    ¦   The number of compressors related to the
¦for Dehumid.:     0 ¦   dehumidification stage.
¦                    ¦
¦                    ¦
+--------------------+

PARAMETRI_UT20           Activated only if heaters have been enabled.
+--------------------+
¦Heater Regulation   ¦
¦(winter setpoint)   ¦
¦Offset        00.0_C¦    - Offset as regards winter set-point
¦Differ.       00.0_C¦    - Differential as regards offset
+--------------------+

PARAMETRI_UT21
+--------------------+
¦Inlet Temp.         ¦   Alarm thresholds of high/low recirculated air
¦Threshold Summer    ¦   temperature in summer functioning mode.
¦High          00.0_C¦   These alarms are delayed, see mask PARAMETRI_UT23.
¦Low           00.0_C¦
+--------------------+

PARAMETRI_UT22
+--------------------+
¦Inlet Temp.         ¦   Alarm thresholds of high/low recirculated air
¦Threshold Winter    ¦   temperature in winter functioning mode.
¦High          00.0_C¦  These alarms are delayed, see mask below.
¦Low           00.0_C¦
+--------------------+

PARAMETRI_UT23
+--------------------+
¦Low/High Inlet      ¦   Delayed alarm of high/low recirculated air
¦Temp. Delay Time    ¦   temperature both in winter and in summer
¦Alarm        000 min¦   functioning mode.
¦                    ¦
+--------------------+

PARAMETRI_UT24
+--------------------+
¦Interblock Alarm    ¦   Interblock alarm intervention delayed.
¦Delay Time   000 sec¦
¦                    ¦
¦                    ¦
+--------------------+
```

```
PARAMETRI_UT25
+--------------------+
¦Identification Numb.¦   Unit address as regards a supervisory system
¦for Supervisory     ¦   connected through a serial line.
¦System Network:  00 ¦
¦                    ¦
+--------------------+

PARAMETRI_UT28
+--------------------+   Parameters for Heating valve regulation.
¦Heating Valve Reg.  ¦
¦(Winter Setpoint)   ¦
¦Offset        00.0_C¦   - Offset as regards winter set-point.
¦Differ.       00.0_C¦   - Differential as regards offset.
+--------------------+

PARAMETRI_UT29
+--------------------+   Parameters for fans functioning in summer.
¦Fan Condenser nr. 1 ¦
¦                    ¦
¦Setpoint      00.0_C¦   - Set-point selected on condens. temp.1; Fan start.
¦Different.    00.0_C¦   - Differential for fan stop.
+--------------------+

PARAMETRI_UT30
+--------------------+   Parameters for fans functioning in summer.
¦Fan Condenser nr. 2 ¦
¦                    ¦
¦Setpoint      00.0_C¦   - Set-point selected on condens. temp.2; Fan start.
¦Different.    00.0_C¦   - Differential for fan stop.
+--------------------+

PARAMETRI_UT31
+--------------------+   Parameters for fan functioning in summer.
¦Fans Condenser      ¦
¦Shared?             ¦
¦                  N ¦   - selection of fans shared functioning: see
¦                    ¦     Condensing fans regulator.
+--------------------+

PARAMETRI_UT26
+--------------------+
¦Setting New User    ¦
¦Password            ¦
¦               00000¦
¦                    ¦
+--------------------+
```

Key PRINTER

```
M_STAMPA
+--------------------+
¦Period of Cyclic    ¦
¦Print:          00 h¦
¦Immediate Print of  ¦
¦Report Unity      N ¦
+--------------------+
```

Key CLOCK

This branch of masks can be entered only if clock board has been enabled.

REG_OROLOGIO_UT

```
+--------------------+
¦Clock & Date Setting¦
¦Time:  00:00        ¦   Current hours and minutes are set.
¦Date:  00/00/0000   ¦   Current date is set.
¦                    ¦
+--------------------+
```

FASCE_GIORN_UT

```
+--------------------+
¦Daily Time Zone     ¦   Enabling of daily time-zones function with
¦with Setpoint       ¦   set-point variation.
¦Variation Setting?  ¦
¦                  N ¦
+--------------------+
```

FASCE_GIORN_UT1

```
+--------------------+
¦Daily Time Zone     ¦   Daily time-zone is set.
¦                    ¦   For further information see Time-zones regulator.
¦Start at:      00:00¦
¦End at:        00:00¦
+--------------------+
```

FASCE_GIORN_UT2

```
+--------------------+
¦Daily Time Zone     ¦   Regulation set-points for daily time-zone are set.
¦Summer Working Mode ¦   For further information see Time-zones regulator.
¦Set. Inside   00.0_C¦
¦Set.Outside   00.0_C¦
+--------------------+
```

FASCE_GIORN_UT3

```
+--------------------+
¦Daily Time Zone     ¦   Regulation set-points for daily time-zone are set.
¦Winter Working Mode ¦   For further information see Time-zones regulator.
¦Set. Inside   00.0_C¦
¦Set.Outside   00.0_C¦
+--------------------+
```

FASCE_SETT_UT

```
+--------------------+
¦Weekly Time Zone    ¦   Enabling of weekly time-zones with activation and
¦with Unit ON/OFF    ¦   deactivation of the unit.
¦Enabled?            ¦
¦                  N ¦
+--------------------+
```

FASCE_SETT_UT1

```
+--------------------+
¦Weekly Time Zone    ¦
¦Sun:N  Mon:N        ¦
¦Tue:N  Wed:N        ¦
¦Thu:N  Fri:N  Sat:N ¦
+--------------------+
```

Key PROGRAM+MENU (manufacturer)

This branch is protected by an access key.
There are two passwords: the first is 01234 and can not be changed (PASSEPARTOUT of all C.AR.EL. machines); the second can be modified by the user in the last mask of this branch (PARAMETRI_COS4).
They are active simultaneously.

PASS_COSTRUT

```
+--------------------+
¦Enter Maintenance   ¦
¦Password:           ¦
¦               00000¦
¦Right Password      ¦
+--------------------+
```

MENU_COSTRUT1

```
+--------------------+
¦Unit Configurat.    ¦
¦Compressors         ¦
¦Global Parameters   ¦
¦Unit Initializ.     ¦
+--------------------+
```

CONFIG_COS1

```
+--------------------+
¦Humidity Proc.    N ¦
¦Heatpump          N ¦
¦Clock Board       N ¦
¦Printer Board     N ¦
+--------------------+
```

CONFIG_COS2

```
+--------------------+
¦Supervisory       N ¦
¦Summer Freecool.  N ¦
¦Winter Freeheat.  N ¦
¦Winter Freecool.  N ¦
+--------------------+
```

CONFIG_COS3

```
+--------------------+
¦Numb. of Heaters  0 ¦
¦Outlet Probe      N ¦
¦Set Compensation  N ¦
¦Sum/Win Select.  pan¦
+--------------------+
```

CONFIG_COS4

```
+--------------------+
¦Number of           ¦
¦Compressors:        ¦
¦                    ¦
¦ ------------------ ¦
+--------------------+
```

CONFIG_COS41

```
+--------------------+
¦Heater Valve     N  ¦
¦                    ¦
¦                    ¦
¦                    ¦
+--------------------+
```

CONFIG_COS5

```
+--------------------+
¦T.Ext. Probe En.  N ¦
¦H.Ext. Probe En.  N ¦
¦Def/Cond.1 Probe  N ¦
¦Def/Cond.2 Probe  N ¦
+--------------------+
```

Compressors timing

```
 COMPRESSOR_COS1
+--------------------+
¦Compressor Turn Off ¦
¦Min. Time   0000 sec¦
¦Compressor Turn On  ¦
¦Min. Time   0000 sec¦
+--------------------+

COMPRESSOR_COS2
+--------------------+
¦Time Between Starts ¦
¦Same Comp.  0000 sec¦
¦Time Between Starts ¦
¦Diff. Comp. 0000 sec¦
+--------------------+

COMPRESSOR_COS3
+--------------------+
¦Low Pressure Alarm  ¦
¦Delay Time  0000 sec¦
¦Rotation Enabled  N ¦
¦                    ¦
+--------------------+

PARAMETRI_COS1
+--------------------+
¦Temperature Control ¦
¦Type:         : P   ¦
¦Integration Time On ¦
¦Control P+I: 000 sec¦
+--------------------+

PARAMETRI_COS2
+--------------------+
¦Principal Fan Off   ¦
¦Delay Time   000 Sec¦
¦Compressor Start    ¦
¦Delay Time   000 sec¦
+--------------------+

PARAMETRI_COS3
+--------------------+
¦Summer Freecoling   ¦
¦Winter Freeheating  ¦
¦Control in:         ¦
¦      Temperat.     ¦
+--------------------+

PARAMETRI_COS4
+--------------------+
¦Setting New         ¦
¦Manufacturer        ¦
¦Password       00000¦
¦                    ¦
+--------------------+
```

Mask for machine initialisation

```
  INIZIALIZ_COS
+--------------------+
¦Erase Back-up       ¦
¦Memory:           N ¦
¦Installed Default   ¦
¦Values:           N ¦
+--------------------+
```

To go back to the mask MENU_COSTRUT1 you have to press the MENU key.

Key MAINTENANCE

This branch is protected by an access key.
There are two passwords: the first is 01234 and can not be changed (PASSEPARTOUT of all C.AR.EL. machines); the second can be modified by the user in the last mask of this branch (ASSISTENZA11).
They are active simultaneously.

PASS_ASSIST

```
+--------------------+
¦Enter Maintenance   ¦   Once the password has been correctly introduced,
¦Password:           ¦   by pressing the “Down” key all the masks in this
¦               00000¦   branch can be scrolled.
¦Wrong Password      ¦
+--------------------+
```

ASSISTENZA1

```
+--------------------+
¦      Machine       ¦
¦Operat. Hours  00000¦   Visualisation of machine time-counter.
¦Hours Thresh.  00000¦   Setting of machine maintenance alarm threshold.
¦Reset Hour Meter  N ¦   Resetting of machine time-counter.
+--------------------+
```

ASSISTENZA2

```
+--------------------+
¦  Compressor nr.1   ¦
¦Operat. Hours  00000¦   Visualisation of compressor n.1 time-counter.
¦Hours Thresh.  00000¦   Setting of compressor1 maintenance alarm threshold.
¦Reset Hour Meter  N ¦   Resetting of compressor n.1 time-counter.
+--------------------+
```

ASSISTENZA3

```
+--------------------+
¦  Compressor nr.2   ¦
¦Operat. Hours  00000¦   Visualisation of compressor n.2 time-counter.
¦Hours Thresh.  00000¦   Setting of compressor2 maintenance alarm threshold.
¦Reset Hour Meter  N ¦   Resetting of compressor n.2 time-counter.
+--------------------+
```

ASSISTENZA4

```
+--------------------+
¦T. Inlet Probe      ¦
¦Adjust        0.0 _C¦   Temperature delta for recirculated air temperature
¦Ext. Air Temperature¦   probe calibration.
¦Adjust        0.0 _C¦   Temperature delta for external air temperature
+--------------------+   probe calibration.
```

ASSISTENZA5

```
+--------------------+
¦Outlet Air Temper.  ¦   Temperature delta for outlet air temperature probe
¦Adjust        0.0 _C¦   calibration.
¦                    ¦
¦                    ¦
+--------------------+
```

ASSISTENZA6 Visualised only with Heatpump enabled.

```
+--------------------+
¦Defrost Temper. 1   ¦
¦Adjust        0.0 _C¦   Temperature delta for defrost probe 1 calibration.
¦Defrost Temper. 2   ¦
¦Adjust        0.0 _C¦   Temperature delta for defrost probe 2 calibration.
+--------------------+
```

ASSISTENZA7 — Visualised only with humidity function enabled.

```
+--------------------+
¦Inlet Hum.Air       ¦
¦Adjust         0.0 %¦
¦External Humidity   ¦
¦Adjust         0.0 %¦
+--------------------+
```

Humidity delta for recirculated air humidity probe calibration.
Humidity delta for external air humidity probe calibration.

ASSISTENZA7_1 — Visualised only if minimum limit outlet air function has been enabled.

```
+--------------------+
¦Configuration Outlet¦
¦Probe Full Scale    ¦
¦Minimum     000.0 _C¦
¦Maximum     000.0 _C¦
+--------------------+
```

Full scale min. value of outlet air probe (= 4mA)
Full scale max. value of outlet air probe (= 20mA)

ASSISTENZA71 — Mask for the setting of software filter parameters against any wrong reading due to electromagnetic interference.

```
+--------------------+
¦Filter Probe:       ¦
¦Enabled       N     ¦
¦Delay Time    00 sec¦
¦Different.    00.0_C¦
+--------------------+
```

- Enabling of the function
- Delay time of spurious reading
- Absolute differential. If exceeded the reading will be considered spurious
- For further information see Appendix C

ASSISTENZA72

```
+--------------------+
¦Setting             ¦
¦Humidity Probe      ¦
¦Type:     0/1 V.    ¦
¦                    ¦
+--------------------+
```

Setting of active humidity probes (either 4/20 mA or 0/1 V.)

ASSISTENZA8

```
+--------------------+
¦Analog In. Test (mV)¦
¦1  00000   4  00000 ¦
¦2  00000   5  00000 ¦
¦3  00000   6  00000 ¦
+--------------------+
```

Visualisation of analogue inputs.

ASSISTENZA9

```
+--------------------+
¦Digital Output Test ¦
¦Principal Fan     N ¦
¦Compress. 1       N ¦
¦Compress. 2       N ¦
+--------------------+
```

With these masks of digital output tests the user can operate directly on digital outputs by closing and opening the relative relays.

ASSISTENZA10

```
+--------------------+
¦Digital Output Test ¦
¦Reverse Valve 1   N ¦
¦Reverse Valve 2   N ¦
¦                    ¦
+--------------------+
```

ASSISTENZA11

```
+--------------------+
¦Setting New         ¦
¦Maintenance Password¦
¦               00000¦
¦                    ¦
+--------------------+
```

Key ALARM

If there is an activated alarm (buzzer activated, active relay, lighted led), by pressing the key ALARM access is gained to the branch of alarm masks; then, by pressing the UP/DOWN keys all stored alarms can be visualised. To reset or clear an alarm from the memory, the key ALARM must be pressed again, but only when you are within the branch of alarm masks; if you press the ALARM key when you are within other masks, instead, you only enter the branch of alarm masks without clearing the alarms from the memory.

AL_1	
Compressor and Fan Overload Circuit 1	The intervention of this alarm causes the turning OFF of compressor and fan of circuit n.1
AL_2	
Compressor and Fan Overload Circuit 2	The intervention of this alarm causes the turning OFF of compressor and fan of circuit n.2
AL_5	
High Pressure Switch Circuit 1	The intervention of this alarm causes the turning OFF of compressor and fan of circuit n.1
AL_6	
High Pressure Switch Circuit 2	The intervention of this alarm causes the turning OFF of compressor and fan of circuit n.2
AL_9	
Anti-freeze Serious Alarm	The intervention of this alarm causes the turning OFF of [?]
AL_10	
Ambient Air High Temper. Threshold Exceeded Alarm	This is an alarm which produces only a signalling and which is delayed at the unit start-up.

AL_11

Ambient Air Low Temper. Threshold Exceeded Alarm	This is an alarm which produces only a signalling and which is delayed at the unit start-up.

AL_12

Low Pressure Switch Circuit 1	The intervention of this alarm causes the turning OFF of circuit n.1 compressor.

AL_13

Low Pressure Switch Circuit 2	The intervention of this alarm causes the turning OFF of circuit n.2 compressor.

AL_14

Low Pressure Switch Circuit 1

AL_15

Low Pressure Switch Circuit 2

AL_16

Compressor 1 Maintenance (show only)	This is an only signalling alarm.

AL_17

Compressor 2 Maintenance (show only)	This is an only signalling alarm.

AL_20

Serious Alarm Principal Fan Overload/Interblock	This alarm intervention causes the whole unit to be turned OFF.

AL_21

Defrost 1 Probe Broken	This is an only signalling alarm.

AL_22

Defrost 2 Probe Broken	This is an only signalling alarm.

AL_23

Dirty Filter Alarm (show only)	This is an only signalling alarm.

AL_24

Heater Overload 1 and 2	This alarm causes heaters 1 and 2 to be turned OFF.

AL_26

Serious Alarm Back-up Memory Broken (show only)	Serious system alarm. Call assistance.

AL_27

Clock Board Broken or not Conn. Alarm	This is an only signalling alarm.

AL_30

Unit Maintenance Alarm (show only)	Only signalling.

AL_31

Inlet Temper. Probe Broken or not Connected Alarm	It turns the whole unit OFF (owing to a failure of regulation probe)

AL_32

External Temperature Probe Broken or not Connected Alarm	Only signalling.

AL_33

Inlet Humidity Probe Broken or not Connected Alarm	Only signalling.

AL_34

External Humidity Probe Broken or not Connected Alarm	Only signalling.

AL_35

Outlet Temperature Probe Broken or not Connected Alarm	Only signalling.

AL_36

Serious Alarm Summer Setpoint is Lower that Winter	It turns the whole unit OFF.

M_NO_ALARM

No Alarm Pending	Appears when the ALARM key has been pressed and there is no activated or stored alarm in that moment.

Appendix A : Default Values

This regulator is used for the machine configuration with factory-set parameters.

Employed Inputs:

Employed Devices:

Employed Parameters:
- Back-up Memory Clearing (INIZIALIZ_COS)
- Installation of Default Values (INIZIALIZ_COS)

Description of functioning mode:
This procedure is automatically effected the first time Pco is switched On (voltage fed), therefore it is not necessary to effect it during the first set-up as in the preceding versions, unless
the manufacturer wants to configure the machine again, because someone has altered the manufacturer parameters or because of a machine programme failure.

To configure the machine with default values you should:
- Enter the manufacturer password menu and choose the message Unit Initialis.
- Once the mask INIZIALIZ_COS1 has been displayed, press the ENTER key so as to make the cursor shift on the message "Erase Back-up Memory"; press either the UP or the DOWN key, the message the cursor is on will turn to YES, wait some seconds until the message will turn back to NO (thus, all machine parameters have been set to zero); now press ENTER again and the cursor will shift to the message "Install Default Values", press either the UP or the DOWN key, the message the cursor is on will turn to YES, wait some seconds until the message turns automatically back to NO (Thus, the machine has been set with default values).

Default parameters are listed in the table below. As you can see, the first column shows the parameter meaning, the second column shows the mask where data are to be selected and the third shows the value given to the parameter in the default values set-up procedure.

MEANING	MASK	VALUE
Maximum selectable temperature set-point limit	PARAMETRI_UT1	35 °C
Minimum selectable temperature set-point limit	PARAMETRI_UT1	5 °C
Summer temperature regulation differential	PARAMETRI_UT2	3 °C
Winter temperature regulation differential	PARAMETRI_UT2	3 °C
Temperature regulation dead zone	PARAMETRI_UT3	0 °C
Maximum selectable humidity set-point limit	PARAMETRI_UT4	80.0%
Minimum selectable humidity set-point limit	PARAMETRI_UT4	25.5%
Summer humidity regulation differential	PARAMETRI_UT5	5 %
Winter humidity regulation differential	PARAMETRI_UT5	5 %
Humidity regulation dead zone	PARAMETRI_UT6	0 %
Freecool/heating temperature differential	PARAMETRI_UT7	3 °C
Freecool/heating enthalpy differential	PARAMETRI_UT8	1 °C
Summer freecooling valve: temperature offset	PARAMETRI_UT9	-2 °C
Summer freecooling valve: temperature differential.	PARAMETRI_UT9	2 °C
Winter freeheating valve: temperature offset	PARAMETRI_UT10	2 °C
Winter freeheating valve: temperature differential	PARAMETRI_UT10	2 °C
Minimum opening external damper	PARAMETRI_UT11	25 %
Position of external damper in warm-up procedure	PARAMETRI_UT11	CLOSED
Outlet air temperature minimum limit: set-point	PARAMETRI_UT12	15 °C
Outlet air temperature minimum limit: differential	PARAMETRI_UT12	3 °C
Summer compensation: set-point	PARAMETRI_UT13	30 °C
Summer compensation: differential	PARAMETRI_UT13	5 °C
Summer compensation: max. allowed compensation	PARAMETRI_UT13	5 °C
Winter compensation: set-point	PARAMETRI_UT14	0 °C
Winter compensation: differential	PARAMETRI_UT14	5 °C
Winter compensation: max. allowed compensation	PARAMETRI_UT14	5 °C
Defrost: start set-point	PARAMETRI_UT15	-2 °C
Defrost: end set-point	PARAMETRI_UT15	14 °C
Defrost: start delay time	PARAMETRI_UT16	30 min
Defrost: maximum duration	PARAMETRI_UT16	5 min
Defrost: main fan Off	PARAMETRI_UT17	YES
Defrost: simultaneous defrost	PARAMETRI_UT17	NO

Automatic restart after black-out	PARAMETRI_UT18	YES
Enable remote On/Off	PARAMETRI_UT18	NO
Dehumidification: number of enabled compressors	PARAMETRI_UT19	1
Heaters regulation: Offset	PARAMETRI_UT20	-2 °C
Heaters regulation: differential	PARAMETRI_UT20	2 °C
Recirculated air temperature high threshold: summer	PARAMETRI_UT21	32.0 °C
Recirculated aie temperature low threshold: summer	PARAMETRI_UT21	20.0 °C
Recirculated air temperature high threshold: winter	PARAMETRI_UT22	26.0 °C
Recirculated air temperature low threshold: winter	PARAMETRI_UT22	17.0 °C
Low/high temperature alarm delay	PARAMETRI_UT23	30 min
Interblock alarm delay	PARAMETRI_UT24	0 sec
Identification number for supervisory system network	PARAMETRI_UT25	00
Heating valve regulation: temperature Offset	PARAMETRI_UT28	-2.0 °C
Heating valve regulation: temperature differential	PARAMETRI_UT28	2.0 °C
Fan 1 switch on set-point	PARAMETRI_UT29	35.0 °C
Fan 1 switch off differential	PARAMETRI_UT29	5.0 °C
Fan 2 switch on set-point	PARAMETRI_UT30	40.0 °C
Fan 2 switch off differential	PARAMETRI_UT30	5.0 °C
Fans shared regulation	PARAMETRI_UT31	NO
Setting new user password	PARAMETRI_UT26	01234
Enabling of Humidity management	CONFIG_COS1	NO
Enabling of Heatpump	CONFIG_COS1	NO
Enabling of Clock board	CONFIG_COS1	NO
Enabling of Printer board	CONFIG_COS1	NO
Enabling of Supervisory system network	CONFIG_COS2	NO
Enabling of Summer Freecooling	CONFIG_COS2	NO
Enabling of Winter Freeheating	CONFIG_COS2	NO
Enabling of Winter Freecooling	CONFIG_COS2	YES
Number of enabled heaters	CONFIG_COS3	0
Enabling of outlet air temperature probe	CONFIG_COS3	NO
Enabling of summer compensation	CONFIG_COS3	NO
Enabling of remote On/Off	CONFIG_COS3	NO
Number of enabled compressors	CONFIG_COS4	2
Enabling of heating valve	CONFIG_COS41	NO
Enabling of external air temperature probe	CONFIG_COS5	NO
Enabling of external humidity probe	CONFIG_COS5	NO
Enabling of defrost/cond 1 probe	CONFIG_COS5	NO
Enabling of defrost/cond 2 probe	CONFIG_COS5	NO
Minimum compressor Off-time	COMPRESSOR_COS1	180 sec
Minimum compressor On-time	COMPRESSOR_COS1	60 sec
Time between starts of same compressor	COMPRESSOR_COS2	360 sec
Time between starts of different compressors	COMPRESSOR_COS2	10 sec
Low pressure alarm delay	COMPRESSOR_COS3	120 sec
Enabling of compressors rotation	COMPRESSOR_COS3	YES
Temperature control type	PARAMETRI_COS1	Prop.
Integration time in Proportional+Integral regulation	PARAMETRI_COS1	600 sec
Main fan Off delay	PARAMETRI_COS2	20 sec
Compressor start-up delay as regards main fan	PARAMETRI_COS2	60 sec
Summer freecooling/Winter freeheating control type: Temperature or Enthalpy	PARAMETRI_CO3	Temper.
New manufacturer password setting	PARAMETRI_COS4	01234
Machine working hours threshold	ASSISTENZA1	20000
Compressor 1 working hours threshold	ASSISTENZA2	10000
Compressor 2 working hours threshold	ASSISTENZA3	10000
Recirculated air temperature probe calibration	ASSISTENZA4	0 °C
External air temperature probe calibration	ASSISTENZA4	0 °C
Air temperature Defrost 1 probe calibration	ASSISTENZA6	0 °C
Air temperature Defrost 2 probe calibration	ASSISTENZA6	0 °C
Recirculated air humidity probe calibration	ASSISTENZA7	0 %
External air humidity probe calibration	ASSISTENZA7	0 %

Appendix B : Variables sent to Supervisory system

This regulator controls the variables flow on the serial interface RS422.
This procedure needs optional rs422 serial board.

Employed Inputs:

Employed Devices:
- optional serial board rs422 code PCOSER0000

Employed Parameters:
- Enabling of serial communication function (CONFIG_COS2).
- Unit address as to supervisory network (PARAMETRI_UT25)

Description of functioning mode:
First of all the serial board has to be inserted in the proper connector which is placed on the interface.
Enable the serial communication function in the mask CONFIG_COS2.
Select the unit address as to the supervisory network in the mask PARAMETRI_UT25.
Then on serial interface rs422 the following variables will be sent:

Digital Variables

MEANING	ADDR.	IN/OUT
(Digital inputs group)		
High pressure pressostat compressor 1	1	On display
High pressure pressostat compressor 2	2	On display
Low pressure pressostat compressor 1	3	On display
Low pressure pressostat compressor 2	4	On display
Overload compressor 1	5	On display
Overload compressor 2	6	On display
Heaters overload	7	On display
Remote On/Off	8	On display
Selector Summer/Winter	9	On display
Anti-freeze input	10	On display
Clogged filter input	11	On display
Main fan overload/general interblock input	12	On display
(Digital outputs group)		
Main fan	15	On display
Compressor 1	16	On display
Compressor 2	17	On display
4-way-valve circuit n.1	18	On display
4-way-valve circuit n.2	19	On display
Heater n.1	20	On display
Heater n.2	21	On display
Humidification	22	On display
Fan n.1	23	On display
Fan n.2	24	On display
(Group Alarms)		
General alarm	26	On display
Compressor 1 overload alarm	27	On display
Compressor 2 overload alarm	28	On display
High pressure pressostat circuit n.1 alarm	29	On display
High pressure pressostat circuit n.2 alarm	30	On display
Anti-freeze alarm	31	On display
Damaged eeprom alarm	32	On display
Damaged/disconnected clock alarm	33	On display
Recirculated air temperature high threshold overshot alarm	34	On display
Recirculated air temperature low threshold overshot alarm	35	On display

Compressor 1 maintenance alarm	36	On display
Compressor 2 maintenance alarm	37	On display
Low pressure pressostat circuit n.1 alarm	38	On display
Low pressure pressostat circuit n.2 alarm	39	On display
General interblock alarm	40	On display
Faulty probe defrost 1 alarm	41	On display
Faulty probe defrost 2 alarm	42	On display
Clogged filter alarm	43	On display
Heaters 1 and 2 overload alarm	44	On display
(Digital set-point group)		
Enabling of functioning as heatpump	45	Modifiable
Enabling of clock board	46	Modifiable
Enabling of humidity function	47	Modifiable
Enabling of outlet air temperature probe	48	Modifiable
Enabling of enthalpy freecooling control	49	Modifiable
Enabling of supervisory serial board	50	Modifiable
Enabling of printer	51	Modifiable
Enabling of summer freecooling	52	Modifiable
Enabling of winter freeheating	53	Modifiable
Choice of damper opening at warm-up	54	Modifiable
Enabling of compensation	55	Modifiable
Enabling of main fan Off during defrost	56	Modifiable
Enabling of simultaneous defrost	57	Modifiable
Enabling of automatic restart	58	Modifiable
Enabling of remote On/Off	59	Modifiable
Enabling of weekly time zones	60	Modifiable
Enabling of daily time zones	61	Modifiable
Enabling of winter freecooling	62	Modifiable
Control type (Proportional or Prop.+ Integr.)	63	Modifiable
Enabling of compressors rotation	64	Modifiable
Unit On/Off	65	Modifiable
Weekly time zones : Activation on Sunday	67	Modifiable
Weekly time zones : Activation on Monday	68	Modifiable
Weekly time zones : Activation on Tuesday	69	Modifiable
Weekly time zones : Activation on Wednesday	70	Modifiable
Weekly time zones : Activation on Thursday	71	Modifiable
Weekly time zones : Activation on Friday	72	Modifiable
Weekly time zones : Activation on Saturday	73	Modifiable
Visualisation machine state	74	Modifiable
Enabling of fans shared	75	Modifiable
Enabling of external air temperature probe	76	Modifiable
Enabling of external humidity probe	77	Modifiable
Enabling of Defrost/condens.1 probe	78	Modifiable
Enabling of Defrost/condens.2 probe	79	Modifiable
Enabling of Clock modification: hours	80	Modifiable
Enabling of Clock modification: minutes	81	Modifiable
Enabling of Clock modification: day	82	Modifiable
Enabling of Clock modification: month	83	Modifiable

Analogue Variables

MEANING	ADDR.	IN/OUT
(Inputs/Outputs)		
Recirculated air temperature	1	On display
External air temperature	2	On display
Defrost temperature circuit n.1	3	On display
Defrost temperature circuit n.2	4	On display
Recirculated air relative humidity	5	On display
External air relative humidity	6	On display
outlet air temperature	7	On display
External air damper outlet	10	On display
Heating valve output	11	On display
(analogue set-point)		
Summer recirculated air temperature Set	15	Modifiable
Winter recirculated air temperature Set	16	Modifiable
Summer humidity Set	17	Modifiable
Winter humidity Set	18	Modifiable
Temperature set-point selection higher limit	19	Modifiable
Temperature set-point selection lower limit	20	Modifiable
Summer temperature differential	21	Modifiable
Winter temperature differential	22	Modifiable
Humidity set-point selection higher limit	23	Modifiable
Humidity set-point selection lower limit	24	Modifiable
Summer humidity differential	25	Modifiable
Winter humidity differential	26	Modifiable
Freecooling temperature differential	27	Modifiable
Summer freecooling valve: Offset	28	Modifiable
Summer freecooling valve: differential	29	Modifiable
Winter freeheating valve: Offset	30	Modifiable
Winter freeheating valve: differential	31	Modifiable
Minimum outlet air temperature control set-point	32	Modifiable
Minimum outlet air temperature control differential	33	Modifiable
Summer compensation control set-point	34	Modifiable
Summer compensation control differential	35	Modifiable
Maximum summer compensation	36	Modifiable
Defrost starting Set	37	Modifiable
Defrost stop Set	38	Modifiable
Temperature regulation dead zone	39	Modifiable
Humidity regulation dead zone	40	Modifiable
Summer recirculated air temperature high threshold	41	Modifiable
Summer recirculated air temperature low threshold	42	Modifiable
Winter recirculated air temperature high threshold	43	Modifiable
Winter recirculated air temperature low threshold	44	Modifiable
Recirculated air calibration	45	Modifiable
External air calibration	46	Modifiable
Outlet air calibration	47	Modifiable
Defrost 1 temperature calibration	48	Modifiable
Defrost 2 temperature calibration	49	Modifiable
	...	Modifiable
Heaters regulation Offset	52	Modifiable
Heaters regulation differential	53	Modifiable
Recirculated air humidity calibration	54	Modifiable
External humidity calibration	55	Modifiable
Summer humidity differential	56	Modifiable
Winter humidity differential	57	Modifiable
Regulation set-point for daily time zone n.1	58	Modifiable
Regulation set-point for daily time zone n.2	59	Modifiable

Regulation set-point for daily time zone n.3	60	Modifiable
Regulation set-point for daily time zone n.4	61	Modifiable
Heating valve Offset	62	Modifiable
Heating valve differential	63	Modifiable
External temperature set-point for Winter compensation	64	Modifiable
External temperature differential for Winter compensation	65	Modifiable
Maximum Winter compensation	66	Modifiable
Set-point fan 1: condensing control	67	Modifiable
Set-point fan 2: condensing control	68	Modifiable
Differential Fan 1: condensing control	69	Modifiable
Differential fan 2: condensing control	70	Modifiable

Integer Variables

MEANING	**ADDR.**	**IN/OUT**
Working hours compressor n.1	10	On display
Working hours compressor n.2	11	On display
Internal enthalpy whole part	12	On display
Internal enthalpy decimal part	13	On display
External enthalpy whole part	14	On display
External enthalpy decimal part	15	On display
Enthalpy set-point whole part	16	On display
Enthalpy set-point decimal part	17	On display
(integer set-points)		
Recirculated air high/low temperature alarm delay	19	Modifiable
Low pressure alarm delay	20	Modifiable
Enthalpic differential whole part	21	Modifiable
Enthalpic differential decimal part	22	Modifiable
Number of dehumidifying compressors	23	Modifiable
Main fan Off delay	24	Modifiable
Compressor start-up delay	25	Modifiable
Interblock alarm delay time	26	Modifiable
Minimum compressors Off-time	27	Modifiable
New user password	28	Modifiable
New maintenance password	29	Modifiable
New manufacturer password	30	Modifiable
Minimum time between two start-ups of same compressor	31	Modifiable
Minimum time between two start-ups of different compressors	32	Modifiable
Minimum compressor On-time	33	Modifiable
Defrost activation time	34	Modifiable
Maximum duration of defrost	35	Modifiable
Minimum opening per cent of damper	36	Modifiable
Machine working hours alarm threshold	37	Modifiable
Working hours threshold compressor 1	38	Modifiable
Working hours threshold compressor 2	39	Modifiable
Cyclic print interval (Hours)	40	Modifiable
Number of heaters	41	Modifiable
Integration time for Prop.+ Integr. regulation	42	Modifiable
Daily time zone 1: hour	43	Modifiable
Daily time zone 2: hour	44	Modifiable
Daily time zone 1: minutes	45	Modifiable
Daily time zone 2: minutes	46	Modifiable
Time/date setting: minutes to be modified	47	Modifiable
Time/date setting: hours to be modified	48	Modifiable
Time/date setting: day to be modified	49	Modifiable
Time/date setting: month to be modified	50	Modifiable
Time/date setting: year to be modified	51	Modifiable
Low pressure alarm delay	52	Modifiable

Appendix C: List of codes

Terminal :	
Pco terminal LCD 4x20	PCOTOOOCBO
Interfaces:	
Screw connectors interface	PCOBOOOBOO
Plug-in connectors interface	PCOBOOOAOO
Screw connectors 8-input-interface	PCOBOOOBO1
Plug-in connectors 8-input-interface	PCOBOOOAO1
Connecting cables:	
Telephone cable connector 0,8 mt. long	S90CONNOO2
Telephone cable connector 1.5 mt. long	S90CONNOO0
Telephone cable connector 3.0 mt. long	S90CONNOO1
Optional boards:	
Clock board for time zones	MNEWCLOCKO
Serial board RS422	PCOSEROOOO
Programme ***roof-top Pco standard C.ar.el. :***	
Eprom 128 Kbyte italian	EPSTDIRTOA
Eprom 128 Kbyte france	EPSTDFRTOA
Eprom 128 Kbyte English	EPSTDERTOA
NTC Probes Temperature Range (-30 C / 85 C)	
NTC : IP65 ; Bulb 6x40 ; 1,5 mt.	NTCOOOOOOO
NTC : IP65 ; Bulb 6x40 ; 3,5 mt.	NTC35OOOOO
NTC : IP67 ; Bulb 6x40 ; 1.5 mt.	NTC4OOOOOO
NTC : IP67 ; Bulb 6x40 ; 3.0 mt.	NTC43OOOOO
NTC : IP67 ; Bulb 6x40 ; 6.0 mt.	NTC6OOOOOO
NTC : IP67 ; Bulb 6x180 ; 6,0 mt.	NTC6AOOOOO
NTC : Sensor for wall mounting	SSWNTCOOOO
NTC : Sensor for duct mounting	SSDNTCOOOO
Humidity active probes:	
ambient : 20 at 90%; 4/20 mA	SHW00P0420
ambient : 10 at 100% ; 0/1 V.	SSWOHHOO/1
[Condotta] : 20 at 90% ; 0/1 V.	SSDOMH00/1
[Condotta] : 10 at 100% ; 0/1 V.	SSDOHH00/1
Active humidity and NTC temperature probe:	
Ambient NTC temp.; 0/1 V. Humidity	STHONTCO/1
Active temperature 4/20 mA probe for outlet air temperature probe:	
Room (wall socket) 0..50 C	SSTOOA0420

Appendix D : What to do if

THE UNIT DOES NOT START

Power on led de-energised, Lcd Off, other leds Off.

Check :

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

AT UNIT START-UP OCCURS A SITUATION LIKE THIS:

alarm led On,
lcd with no or random messages
active buzzer.

Check :

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

INPUT SIGNALS WRONG READING

Check :

a. that connections of probes cable are in accordance with instructions
b. that probe signals are transmitted on cables which have been installed at a sufficient distance from any excessively disturbing sources (power cables, contactors, cables with high voltage and with high inrush ampere consumption connected devices)
c. connections between interfaces and controller (flat cables)
d. interfaces and probes correct power supply

DAMAGED EEPROM ALARM

a. Call the assistance

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

Check :

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

Appendix E: Notes

- *Modifications of the 1.102 version of 31/05/1994 :*

1) The regulation of a 0-10V. [modulante] heating valve has been added, by substituting the recirculated air damper control on the second analogue output.

- *Modifications of the 1.202 version of 05/07/1994 :*

1) The manual organisation has been totally revised.

2) The following regulators have been added:

- Automatic Commutation Summer/Winter according to ambient temperature
- Defrost probes in summer functioning mode regulate fans activation
- Compensation has been inserted also in the winter functioning mode
- Software filter on probe reading (against any electromagnetic interference)

3) Activation logic of the following devices have been revised:
- Heating valve
- Damper in Summer freecooling
- Damper in Winter freeheating

4) Some alarms have been added:
- All Faulty Probe alarms
- Incorrect set-point alarm
- Low pressure alarm management has been changed

5) Some default values have been changed

6) The supervisory variables addresses have been changed

- *Modifications of the 2.102 version of 20/10/1994 :*

1) Two parameters have been introduced for the configuration of the outlet air temperature probe connected to input B7 (full scale). They can be selected under MAINTENANCE password.

Modification of the 2.302 version of 24/03/1995:

1)During the daily time zones , the main fan could be switch-off when actual hour and minute are out of the active time zone.

2)The handling of the digital input antifreeze have been changed.
during the winter : close the damper , open heating valve
during the summer: switch-off the compressors , close the damper
3)If the elettric heaters aren't used , the standard roof-top pCO is able to control 1 partialization for each compressor .

4)It is possible to connect 0/1 V probe or 4/20 mA probe to outlet air temperature analog output.