Application software for pCO² - pCOXS

Standard
Air Handling Units

Program code: **FLSTDMAHUA**

LEGGI E CONSERVA QUESTE ISTRUZIONI

READ AND SAVE THESE INSTRUCTIONS

CAREL

Tecnologia ed Evoluzione

LEGGI E CONSERVA QUESTE ISTRUZIONI

READ AND SAVE THESE INSTRUCTIONS

We wish to save you time and money!

We can assure you that the thorough reading of this manual will guarantee correct installation and safe use of the product described.

IMPORTANT WARNINGS

BEFORE INSTALLING OR HANDLING THE APPLIANCE PLEASE CAREFULLY READ AND FOLLOW THE INSTRUCTIONS DESCRIBED IN THIS MANUAL.

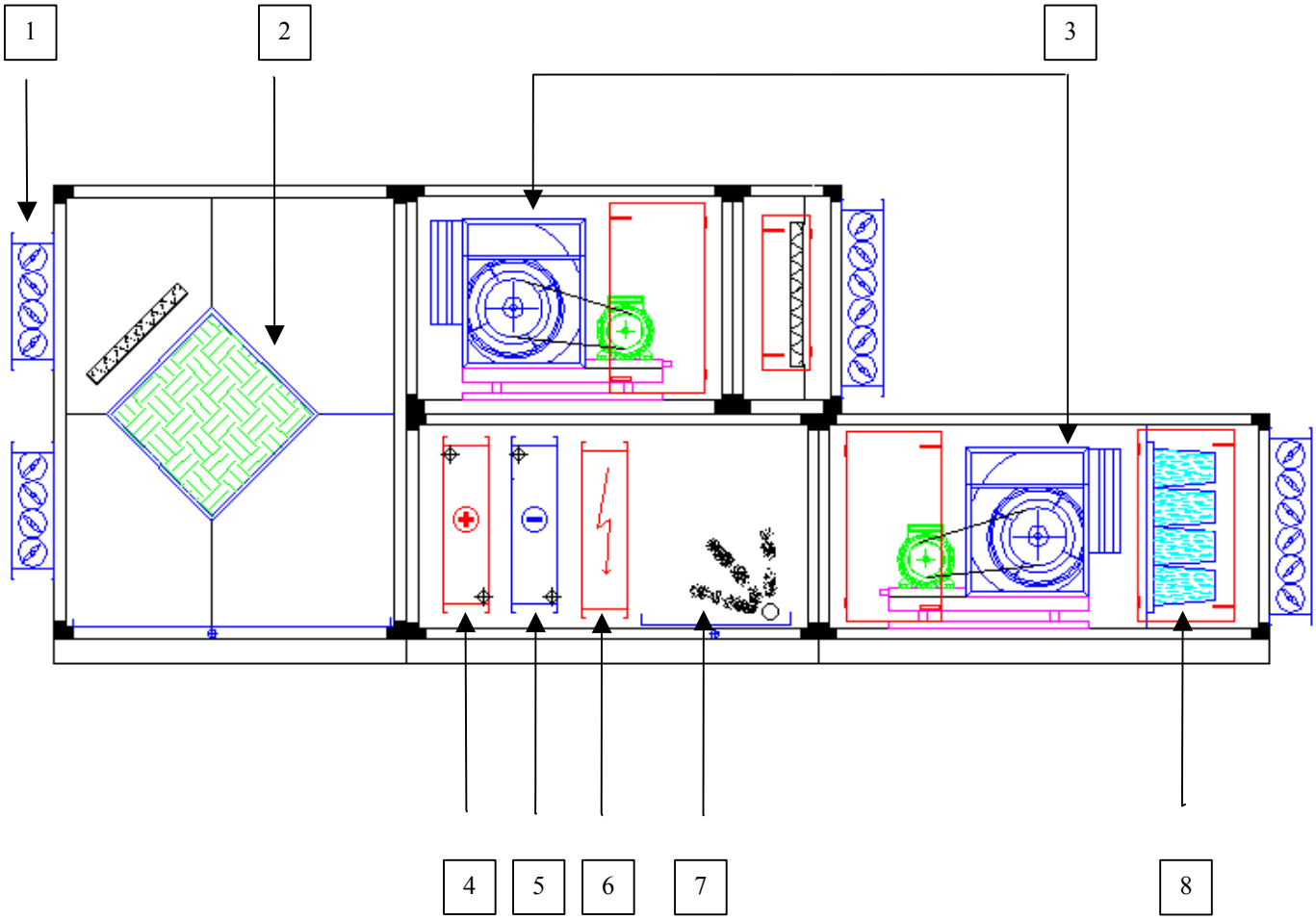
The appliance that this software is dedicated to has been developed to operate risk-free and for a specific purpose, as long as:

- the software is installed, programmed, run and maintained according to the instructions in this manual and by qualified personnel;
- all the conditions prescribed in the installation and user manual of the appliance in question are respected.

All other uses and modifications made to the device that are not authorised by the manufacturer are considered incorrect. Liability for injury or damage caused by the incorrect use of the device lies exclusively with the user.

Contents

1 STRUCTURE OF THE AIR HANDLING UNIT



1: Outside air damper
2: Heat recovery unit
3: Fans
4: Heating coil
5: Cooling Coil
6: Post-heating coil
7: Humidifier
8: Filter

2 INTRODUCTION

The "Standard air handling unit" program can be used with CAREL pCO² (small, medium, large) and pCO^{XS} boards.
The configurable analogue and digital inputs / outputs, and the different pre-configured models of unit make it possible to select the best type of control for the application in question.
The terminal with LCD can be used to display and/or modify the following data at any time:

- Readings of the probes connected, as well as calibration of the probes
- Unit on/off
- Alarms
- Configuration parameters and operating parameters with password-protected access
- Clock and time band settings (no password is required to access the clock branch)
- Select one of the different languages available: English, Italian, French, German

WARNING: to avoid tampering during operation, only qualified personnel must know the password.

2.1 Supervision

pCO^{XS} and pCO² can be connected to a PC running PlantVisor local or remote, using a GSM or traditional modem, and to the most commonly-used BMS (via Modbus). To use the various functions listed, special optional cards (RS485, RS232) or Gateways (instruments that interpret different communication protocols) are required.

2.1.1 CAREL supervisor

The local connection between the pCO board (pCO^{XS} or pCO²) and a supervisor PC (PlantVisor or MODBUS) requires the additional RS485 card (pCO²: PCO2004850; pCO^{XS}: PCO1004850) to be fitted in the "Serial card" slot. For connection to the PC, connect the additional card to the RS485/RS232 converter via a 3-wire RS485 line.
The RS485/RS232 converter is supplied by CAREL (PC485KIT00).
If the supervisor is remote, with the supervisor PC connected via telephone line, simply insert the optional RS232 card (pCO²: PCO200MDM0; pCO^{XS}: PCO100MDM0) and connect it to a traditional modem (not GSM).

2.2 Uploading the program

2.2.1 Uploading the program using the hardware key

The hardware key available for all the versions of pCO² (code PCO201KEY0 1Mbyte version - PCO202KEY0 2Mbyte version) and pCO^{1} medium and small (code PCO100KEY0) creates exact copies of the software on a master pCO²- pCO^{1}. It is normally used on the production line for programming a series of pCO²- pCO^{1} or for programming in the field, where it would be more complicated to upgrade the software via PC.
For further information, refer to the instruction sheet included with hardware key.

WARNING: Starting from version 1.6, this application software does not work with BIOS versions prior to 3.57.

Important: The pCO^{XS} can not be upgraded using the programming key, but only via PC.

2.2.2 Uploading the program from a computer

Using the kit code PC485KIT00 (232-485 converter) and the WinLOAD 32 program, the software files can be uploaded to the pCO², pCO^{1} and pCO^{XS}.
For further information on installing and using Winload 32, contact CAREL.

3 THE PROGRAM

3.1 General description

The application software, using the pCO²/pCO^{XS} platform, provides a complete and flexible solution for managing the most common configurations of air handling units.
One of the main characteristics of this application is the possibility to configure, on the user terminal, all the parameters corresponding to the position of the inputs/outputs, making the wiring of the unit extremely flexible and guaranteeing maximum adaptability to all installations.
The input/output configuration procedure has been protected to prevent unwanted tampering, so as to be defined by the manufacturer and not by the end user.
There are 24 pre-configured models of systems, described in chapter "3.4.1 Diagrams of the models", which allow the rapid configuration of all the parameters and the positions of the inputs and outputs.
Once having chosen the model considered most suitable, further modifications can be made manually to the configuration (on the user terminal) so as to guarantee compatibility between the software and the installation being managed.

3.2 Installing the default values

The default values are assigned by CAREL to the main operating parameters of the application software, that is, the times, set points, differentials etc.
After having installed the default values, the parameters can be modified, within the allowed range of values. The default values can be installed manually by the user, at any time, on the external or built-in terminal.
Operations to be performed to manually install the default values for the parameters;

1. Press the MENU + PROG (ESC or MENU) buttons and enter the Manufacturer password (1234), then press Enter
2. Choose the "INITIALISATION" item and press Enter;
3. Display the default value installation screen (V6) and enter the model of the unit to be initialised, then confirm by pressing Enter;
4. **WARNING:** this operation must be performed with care, as it deletes all the parameters installed from the memory and replaces them with the default values; the previous values cannot be recovered after the operation;
5. After having pressed ENTER, the message "PLEASE WAIT…" will be displayed for a few seconds.

3.3 Selecting the language

The software interface is available in the following languages: English, Italian, French and German.
To modify the language of the user interface, proceed as follows:

1. Press the  (service) button on the terminal;
2. Screen A0 will be displayed. Press the Enter button to move the cursor to the parameter for selecting the language;
3. Select the language required with the Up or Down buttons;
4. Press the Enter button to confirm.

Screen (V5) features a parameter for enabling the select language screen when starting the unit, so that when the board is powered up the desired language can be selected by pressing the ENTER button.

3.4 Configuring the inputs/outputs

The input/output configuration screens are located in the password-protected manufacturer branch; to access this, proceed as follows:

1. Press the MENU button from the main screen "M0"
2. From the menu select MANUFACTURER SETUP and press ENTER
3. Enter the password and press ENTER, if the password is correct the screen "Z1" will be displayed
4. Select the item required and make the necessary configuration.

If using a standard PCOT external terminal, screen "Z1" can be accessed directly by pressing MENU+PROG together.

Digital inputs

Scroll the Manufacturer menu on screen "Z1" until reaching the item "DIGITAL I." and confirm by pressing ENTER.
Screens "D0-D9" are used to associate the digital inputs with the connected devices.
The software automatically searches for the first free digital input; the user can also select the desired position by scrolling, using the UP-DOWN buttons, the list of free digital inputs.
Screens "Da-Db" are used to set the operating logic (N.O.-N.C.) of digital inputs 1…18:

- N.O. = Normally open
- N.C. = Normally closed

Analogue inputs

Scroll the Manufacturer menu on screen "Z1" until reaching the item "ANALOGUE I." and confirm by pressing ENTER.
Each analogue input requires three setting parameters, shown on the screens (E0-Eu):

- Position occupied by the probe on the pCO board.
- Type of probe used to read the value in question
- Operating limits of the probe (where envisaged)

If the terminal number of an analogue input is set to 0, the further configuration screens for that input will not be displayed (probe type and limits).

Digital outputs

Scroll the Manufacturer menu on screen "Z1" until reaching the item "DIGITAL O." and confirm by pressing ENTER.
Screens "J0-Je" are used to associate the relays on the board with the connected devices.

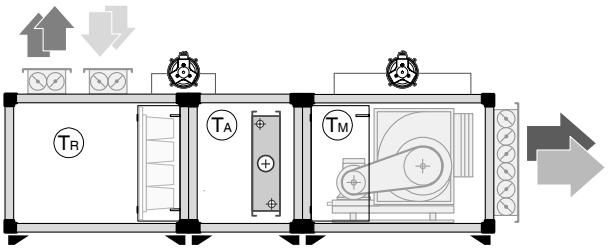
Analogue outputs

Scroll the Manufacturer menu on screen "Z1" until reaching the item "ANALOGUE O." and confirm by pressing ENTER.
Screens "L0-L7" are used to associate the outputs on the board with the connected devices.

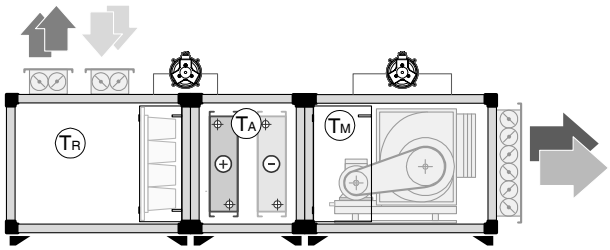
Table of compatibility between the analogue inputs – probe type

Analogue inputs	Probe type					
	0 to 20 mA	4 to 20 mA	NTC	PT1000	0 to 1 V	0 to 10 V
Outlet pressure	x	x			x	x
Intake pressure	x	x			x	x
Room temperature	x	x	x	x	x	x
Outlet temperature	x	x	x	x	x	x
Outside temperature	x	x	x	x	x	x
Discharge temperature	x	x	x	x	x	x
Intake humidity	x	x			x	x
Outlet humidity	x	x			x	x
Outside humidity	x	x			x	x
VOC air quality	x	x				x
CO2 air quality						x
Compensation set point			x	x		
Antifreeze temperature	x	x	x	x	x	x
Post-heating	x	x	x	x	x	x
Defrost	x	x	x	x	x	x

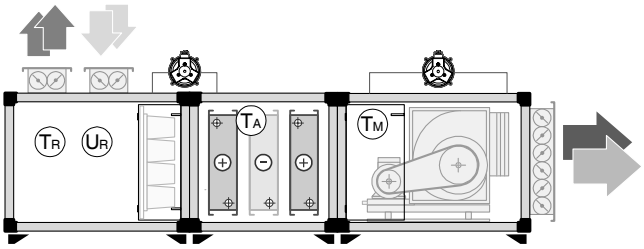
3.4.1 Diagrams of the models



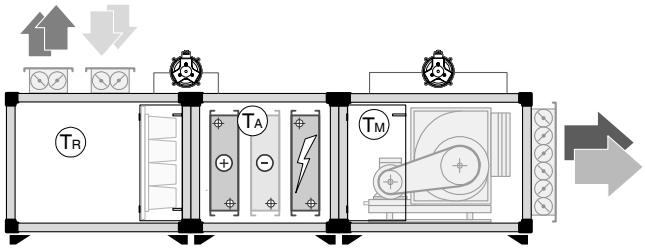
Model 1



Model 2



Model 3



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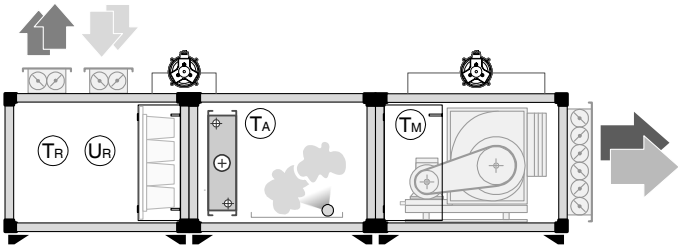
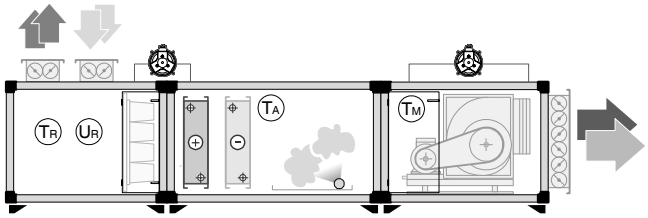
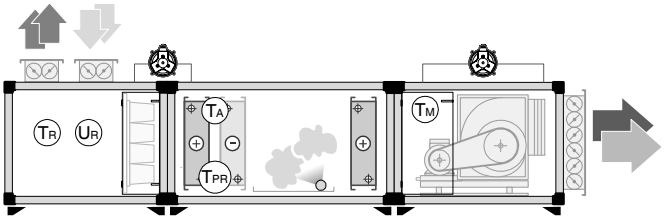


Model 5



Model 6



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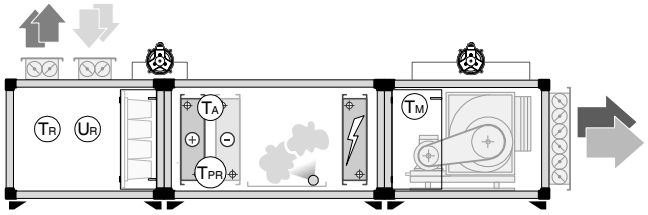

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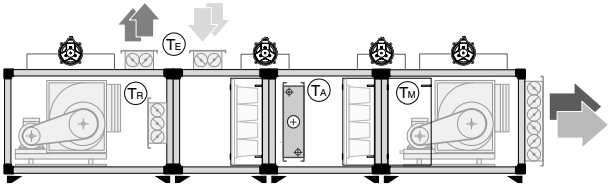

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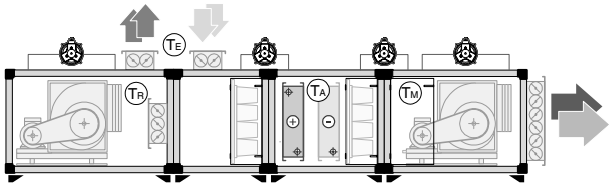

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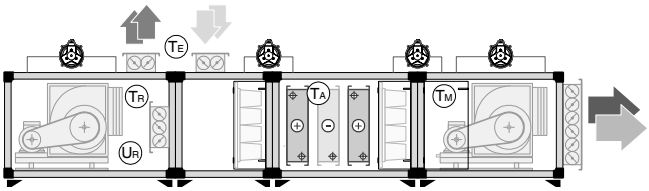

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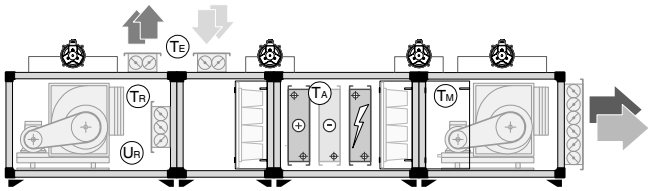
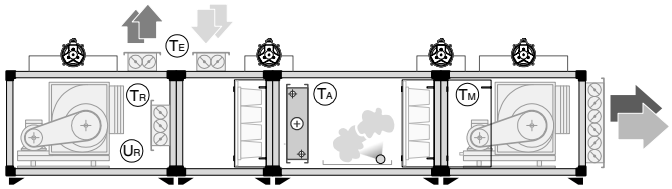


Model 12



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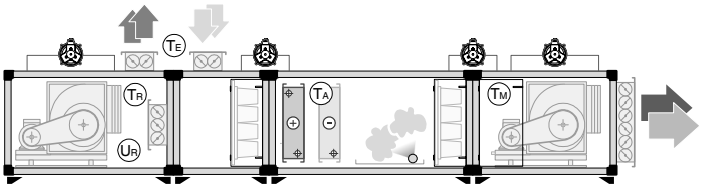

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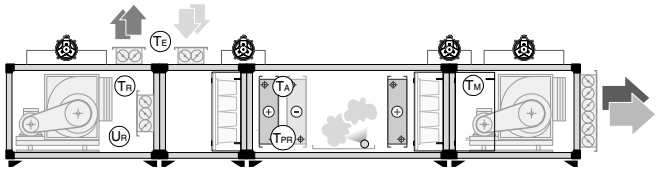
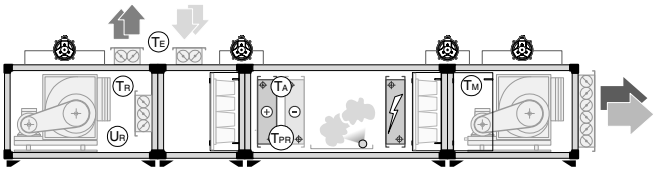
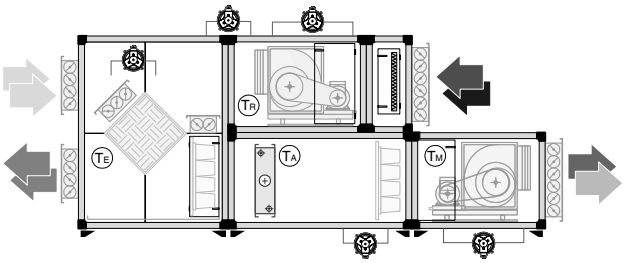


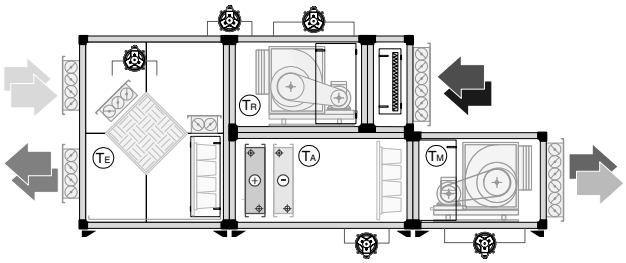
Model 15



Model 16



Model 17



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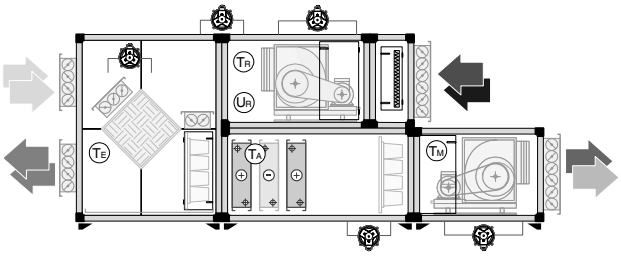
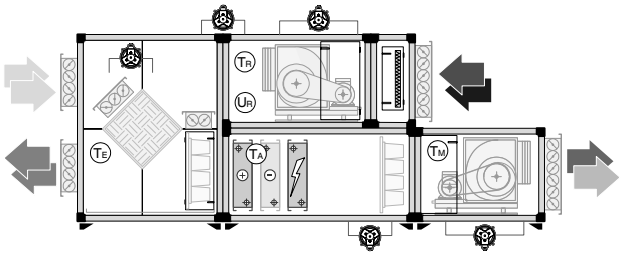
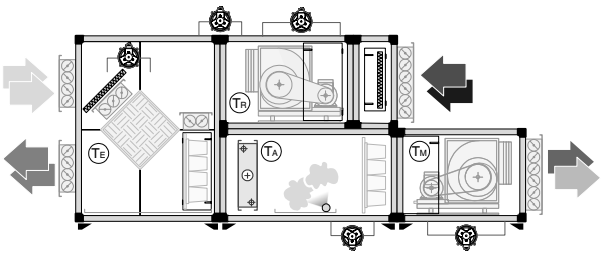


Model 19



Model 20



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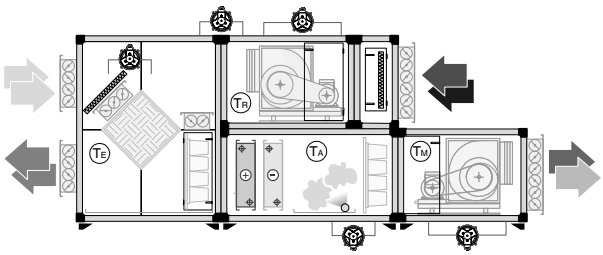

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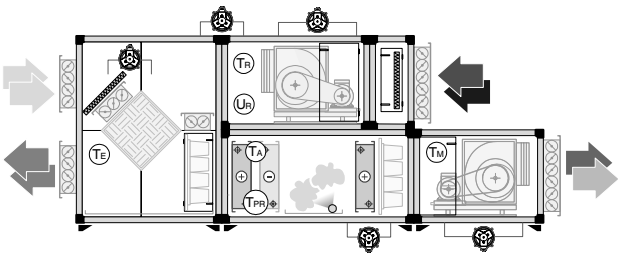
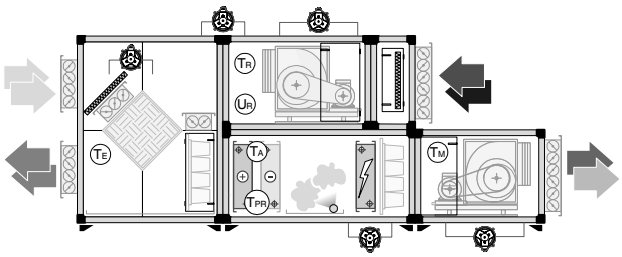


Model 23



Model 24

Analogue input configuration table models 1 to 8

In	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
B1	Intake air temperature	Intake air temperature	Intake air temperature	Intake air temperature	Intake air temperature	Intake air temperature	Intake air temperature	Intake air temperature
B2	Outlet air temperature	Outlet air temperature	Outlet air temperature	Outlet air temperature	Outlet air temperature	Outlet air temperature	Outlet air temperature	Outlet air temperature
B3	Antifreeze temperature	Antifreeze temperature	Intake humidity	Intake humidity	Intake humidity	Intake humidity	Intake humidity	Intake humidity
B4			Antifreeze temperature	Antifreeze temperature	Antifreeze temperature	Antifreeze temperature	Antifreeze temperature	Antifreeze temperature
B5							Preheating temperature	Preheating temperature

Digital input configuration table models 1 to 8

In	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
DI1	Outlet fan cutout	Outlet fan cutout	Outlet fan cutout	Outlet fan cutout	Outlet fan cutout	Outlet fan cutout	Outlet fan cutout	Outlet fan cutout
DI3	Intake air filter differential pressure switch	Intake air filter differential pressure switch	Intake air filter differential pressure switch	Intake air filter differential pressure switch	Intake air filter differential pressure switch	Intake air filter differential pressure switch	Intake air filter differential pressure switch	Intake air filter differential pressure switch
DI4	Outlet air flow switch	Outlet air flow switch	Outlet air flow switch	Outlet air flow switch	Antifreeze thermostat	Antifreeze thermostat	Antifreeze thermostat	Antifreeze thermostat
DI5				Heater cutout	Outlet air flow switch	Outlet air flow switch	Outlet air flow switch	Outlet air flow switch
DI6					Humidifier alarm	Humidifier alarm	Humidifier alarm	Humidifier alarm
DI7								Heater cutout

Digital output configuration table models 1 to 8

Out	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
DO1	Outlet fan	Outlet fan	Outlet fan	Outlet fan	Outlet fan	Outlet fan	Outlet fan	Outlet fan
DO3	ON/OFF outside air damper	ON/OFF outside air damper	ON/OFF outside air damper	ON/OFF outside air damper	ON/OFF outside air damper	ON/OFF outside air damper	ON/OFF outside air damper	ON/OFF outside air damper
DO4				Heater 1	Humidifier	Humidifier	Humidifier	Humidifier
DO5				Heater 2				Heater 1
DO6				Heater 3				Heater 2
DO7								Heater 3

Analogue output configuration table models 1 to 8

Out	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
Y2	Modulating valve in heating	Modulating valve in heating	Modulating valve in heating	Modulating valve in heating	Modulating valve in heating	Modulating valve in heating	Modulating valve in heating	Modulating valve in heating
Y3		Modulating valve in cooling	Modulating valve in cooling	Modulating valve in cooling		Modulating valve in cooling	Modulating valve in cooling	Modulating valve in cooling
Y4			Modulating valve in post-heating				Modulating valve in post-heating	

Analogue input configuration table models 9 to 16

In	Model 9	Model 10	Model 11	Model 12	Model 13	Model 14	Model 15	Model 16
B1	Intake air temperature	Intake air temperature	Intake humidity	Intake humidity	Intake humidity	Intake humidity	Intake humidity	Intake humidity
B2	Outlet air temperature	Outlet air temperature	Outlet air pressure	Outlet air pressure	Intake air temperature	Intake air temperature	Intake air temperature	Intake air temperature
B3	Antifreeze temperature	Antifreeze temperature	Outlet air temperature	Outlet air temperature	Outlet air temperature	Outlet air temperature	Outlet air temperature	Outlet air temperature
B4	Outside air temperature	Outside air temperature	Antifreeze temperature	Antifreeze temperature	Antifreeze temperature	Antifreeze temperature	Antifreeze temperature	Antifreeze temperature
B5			Intake air temperature	Intake air temperature	Outside air temperature	Outside air temperature	Outside air temperature	Outside air temperature
B6			Outside air temperature	Outside air temperature	Preheating air temperature.	Preheating air temperature.	Preheating air temperature.	Preheating air temperature.

Digital input configuration table models 9 to 16

In	Model 9	Model 10	Model 11	Model 12	Model 13	Model 14	Model 15	Model 16
DI1	Outlet fan cutout	Outlet fan cutout	Outlet fan cutout	Outlet fan cutout	Outlet fan cutout	Outlet fan cutout	Outlet fan cutout	Outlet fan cutout
DI2	Intake fan cutout	Intake fan cutout	Intake fan cutout	Intake fan cutout	Intake fan cutout	Intake fan cutout	Intake fan cutout	Intake fan cutout
DI3	Intake air filter differential pressure switch	Intake air filter differential pressure switch	Intake air filter differential pressure switch	Intake air filter differential pressure switch	Intake air filter differential pressure switch	Intake air filter differential pressure switch	Intake air filter differential pressure switch	Intake air filter differential pressure switch
DI4	Outlet air filter differential pressure switch	Outlet air filter differential pressure switch	Outlet air filter differential pressure switch	Outlet air filter differential pressure switch	Outlet air filter differential pressure switch	Outlet air filter differential pressure switch	Outlet air filter differential pressure switch	Outlet air filter differential pressure switch
DI5	Outlet air flow switch	Outlet air flow switch	Outlet air flow switch	Outlet air flow switch	Outlet air flow switch	Outlet air flow switch	Outlet air flow switch	Outlet air flow switch
DI6	Intake air flow switch	Intake air flow switch	Intake air flow switch	Intake air flow switch	Intake air flow switch	Intake air flow switch	Intake air flow switch	Intake air flow switch

In	Model 9	Model 10	Model 11	Model 12	Model 13	Model 14	Model 15	Model 16
DI7	Antifreeze thermostat	Antifreeze thermostat	Antifreeze thermostat	Heater cutout	Humidifier alarm	Humidifier alarm	Humidifier alarm	Humidifier alarm
DI8				Antifreeze thermostat				Heater cutout

Digital output configuration table models 9 to 16

Out	Model 9	Model 10	Model 11	Model 12	Model 13	Model 14	Model 15	Model 16
DO1	Outlet fan	Outlet fan	Outlet fan	Outlet fan	Outlet fan	Outlet fan	Outlet fan	Outlet fan
DO2	Intake fan	Intake fan	Intake fan	Intake fan	Intake fan	Intake fan	Intake fan	Intake fan
DO3	Filter blocked	Filter blocked	Filter blocked	Filter blocked	Filter blocked	Filter blocked	Filter blocked	Filter blocked
DO4				Heater 1				Heater 1
DO5				Heater 2				Heater 2
DO6				Heater 3				Heater 3

Analogue output configuration table models 9 to 16

Out	Model 9	Model 10	Model 11	Model 12	Model 13	Model 14	Model 15	Model 16
Y1	Mod. outside air dampers	Mod. outside air dampers	Mod. outside air dampers	Mod. outside air dampers	Mod. outside air dampers	Mod. outside air dampers	Mod. outside air dampers	Mod. outside air dampers
Y2	Modulating valve in heating	Modulating valve in heating	Modulating valve in heating	Modulating valve in heating	Modulating valve in heating	Modulating valve in heating	Modulating valve in heating	Modulating valve in heating
Y3		Modulating valve in cooling	Modulating valve in cooling	Modulating valve in cooling	Humidifier	Modulating valve in cooling	Modulating valve in cooling	Modulating valve in cooling
Y4			Valve in post-heating.	Valve in post-heating.		Humidifier	Valve in post-heating.	Humidifier
Y5			Outlet fan inverter	Outlet fan inverter			Humidifier	

Analogue input configuration table models 17 to 24

In	Model 17	Model 18	Model 19	Model 20	Model 21	Model 22	Model 23	Model 24
B1	Outlet air pressure	Outlet air pressure	Intake air humidity	Intake air humidity	Intake air humidity	Intake air humidity	Intake air humidity	Intake air humidity
B2	Outlet air temperature	Intake air temperature	Outlet air pressure	Outlet air pressure	Outlet air pressure	Outlet air pressure	Intake air temperature	Intake air temperature
B3	Outside air temperature	Outlet air temperature	Intake air pressure	Intake air pressure	Intake air temperature	Intake air temperature	Outlet air temperature	Outlet air temperature
B4	Discharge air temperature	Outside air temperature	Intake air temperature	Intake air temperature	Outlet air temperature	Outlet air temperature	Outside air temperature	Outside air temperature
B5		Antifreeze temperature	Outlet air temperature	Outlet air temperature	Outside air temperature	Outside air temperature	Discharge air temperature	Antifreeze temperature
B6		Discharge air temperature	Outside air temperature	Outside air temperature	Discharge air temperature	Discharge air temperature	Antifreeze temperature	Discharge air temperature
B7			Antifreeze temperature	Antifreeze temperature	Antifreeze temperature	Antifreeze temperature		
B8			Discharge air temperature	Discharge air temperature				

Digital input configuration table models 17 to 24

In	Model 17	Model 18	Model 19	Model 20	Model 21	Model 22	Model 23	Model 24
DI1	Outlet fan cutout	Outlet fan cutout	Outlet fan cutout	Outlet fan cutout	Outlet fan cutout	Outlet fan cutout	Outlet fan cutout	Outlet fan cutout
DI2	Intake fan cutout	Intake fan cutout	Intake fan cutout	Intake fan cutout	Intake fan cutout	Intake fan cutout	Intake fan cutout	Intake fan cutout
DI3	Intake air filter differential pressure switch	Intake air filter differential pressure switch	Intake air filter differential pressure switch	Intake air filter differential pressure switch	Intake air filter differential pressure switch-	Intake air filter differential pressure switch	Intake air filter differential pressure switch	Intake air filter differential pressure switch
DI4	Pump cutout in heating	Pump cutout in heating	Pump cutout in heating	Pump cutout in heating	Pump cutout in heating	Pump cutout in heating	Pump cutout in heating	Pump cutout in heating
DI5	Outlet air filter differential pressure switch	Pump cutout in cooling	Pump cutout in cooling	Pump cutout in cooling	Outlet air filter differential pressure switch	Pump cutout in cooling	Pump cutout in cooling	Pump cutout in cooling
DI6	Heat recovery differential pressure switch	Outlet air filter differential pressure switch	Outlet air filter differential pressure switch	Outlet air filter differential pressure switch	Heat recovery differential pressure switch	Outlet air filter differential pressure switch	Outlet air filter differential pressure switch	Outlet air filter differential pressure switch
DI7	Intake air flow switch	Heat recovery differential pressure switch	Heat recovery differential pressure switch	Heat recovery differential pressure switch	Intake air flow switch	Heat recovery differential pressure switch	Heat recovery differential pressure switch	Heat recovery differential pressure switch
DI8	Outlet air flow switch	Intake air flow switch	Intake air flow switch	Intake air flow switch	Outlet air flow switch	Intake air flow switch	Intake air flow switch	Intake air flow switch
DI9	Antifreeze	Outlet air	Outlet air	Outlet air	Antifreeze	Outlet air	Outlet air	Outlet air

In	Model 17	Model 18	Model 19	Model 20	Model 21	Model 22	Model 23	Model 24
	thermostat	flow switch	flow switch	flow switch	thermostat	flow switch	flow switch	flow switch
DI10		Antifreeze thermostat	Antifreeze thermostat	Antifreeze thermostat		Antifreeze thermostat	Antifreeze thermostat	Antifreeze thermostat
DI11				Heater cutout				Heater cutout

Digital output configuration table models 17 to 24

Out	Model 17	Model 18	Model 19	Model 20	Model 21	Model 22	Model 23	Model 24
DO1	Outlet fan	Outlet fan	Outlet fan	Outlet fan	Outlet fan	Outlet fan	Outlet fan	Outlet fan
DO2	Intake fan	Intake fan	Intake fan	Intake fan	Intake fan	Intake fan	Intake fan	Intake fan
DO4	Pump/solenoid valve in heating	Pump/solenoid valve in heating	Pump/solenoid valve in heating	Pump/solenoid valve in heating	Pump/solenoid valve in heating	Pump/solenoid valve in heating	Pump/solenoid valve in heating	Pump/solenoid valve in heating
DO6	Filter blocked	Filter blocked	Filter blocked	Filter blocked	Filter blocked	Filter blocked	Filter blocked	Filter blocked
DO7				Heater 1				Heater 1
DO8				Heater 2				Heater 2
DO9				Heater 3				Heater 3

Analogue output configuration table models 17 to 24

Out	Model 17	Model 18	Model 19	Model 20	Model 21	Model 22	Model 23	Model 24
Y1	Mod. outside air dampers	Mod. outside air dampers	Mod. outside air dampers	Mod. outside air dampers	Mod. outside air dampers	Mod. outside air dampers	Mod. outside air dampers	Mod. outside air dampers
Y2	Modulating valve in heating	Modulating valve in heating	Modulating valve in heating	Modulating valve in heating	Modulating valve in heating	Modulating valve in heating	Modulating valve in heating	Modulating valve in heating
Y3	Outlet fan inverter	Modulating valve in cooling	Modulating valve in cooling	Modulating valve in cooling	Humidifier	Modulating valve in cooling	Modulating valve in cooling	Modulating valve in cooling
Y4	Bypass damper	Outlet fan inverter	Modulating valve in post-heating	Bypass damper	Bypass damper	Humidifier	Humidifier	Humidifier
Y5		Bypass damper	Bypass damper		Outlet fan inverter	Bypass damper	Bypass damper	Bypass damper
Y6						Outlet fan inverter	Modulating valve in post-heating	

3.5 Switching the unit ON/OFF

3.5.1 Description of operation

The unit can be switched on/off using the following utilities:

1. Keypad on the user terminal
2. Time bands
3. Digital input
4. Supervisor.

The highest priority is given to the ON/OFF from the keypad, and therefore if the unit is switched OFF from the keypad, it cannot be switched on from any other source. The conditions such as OFF from digital input, OFF from time bands and OFF from the supervisor are only active if the unit is switched ON from the keypad.

The main screen ("M0") displays the unit operating status:

1.	COMFORT	Unit in operation
2.	OFF FROM ALARM	Unit OFF from alarm
3.	OFF FROM THE SUPERVISOR	Unit OFF from the supervisor
4.	OFF FROM TIME BAND	Unit OFF from time bands
5.	OFF FROM REMOTE DI	Unit OFF remote digital input
6.	UNIT OFF	Unit OFF from the keypad

The procedure for switching the terminal on changes according to the terminal used:

- External terminal with 15 buttons, pCO1 or pCOT series: the unit is switched ON/OFF directly using the ON/OFF button.
- Built-In or pGD series terminal: the unit is switched ON/OFF as follows:
  - from the main screen "M0", press the down arrow button to move to screen "M1";
  - from screen "M1", set the unit status from "unit OFF" to "comfort" or vice-versa.

4 CONTROL

4.1 Fixed point control

Inputs used
Position of the outlet and intake temperature probes (E4)
Position of the preheating probe (El)
Parameters used
Select the type of control (C0)
Select the control probe for the preheating coil (Ch)
Select the control probe for the cooling coil (Ck)
Select the control probe for the post-heating coil (Cn)

Description of operation
With this type of control, each coil on the unit works in independently and is controlled by a defined probe, without the software intervening automatically.
The probe that controls the coil must be selected according to the constructional characteristics of the installation.
Below is a summary table:

DEVICE	CONTROL PROBE
HEATING COIL	Intake temperature
	Outlet temperature
	Preheating temperature
COOLING COIL	Intake temperature
	Outlet temperature
POST-HEATING COIL	Intake temperature
	Outlet temperature
	Preheating temperature

After having selected the probes, set the corresponding control parameters (Set point, Differential and Dead zone) in the screens under the set point menu.

4.2 Automatic control

This type of control involves the automatic operation of the software, in the cases listed below, to control the heating (preheating), cooling and post-heating coils, and ensuring optimised management of the air handling unit and greater comfort in the rooms controlled.
The software acts automatically on the following devices:

1. Heating coil;
2. Dehumidification and cooling coil;
3. Post-heating coil;

HEATING COIL:
This is managed only is the humidifier is enabled, and in this case it can also work as a preheating coil

Humidifier	Humidity request	Heating coil
Enabled	Not active	Controlled by the pre-defined control probe
Enabled	Active	Controlled by the preheating probe according to the corresponding Set point and Differential

DEHUMIDIFICATION AND POST-HEATING:

For these two functions, priority must be given either to temperature or humidity.
Based on this fundamental selection, the software will manage the heating and cooling coils as a consequence.
Post-heating, on the other hand, can be applied to compensate for the lowering of the temperature due to the dehumidification function, or alternatively to supplement the main heating coil.

TEMPERATURE PRIORITY				
Dehumidification phase	**Heating phase**	**Cooling coil**	**Post-heating coil for compensation only**	**Post-heating coil Comp.+Supp.**
Not active	Active	Not active	Not active	Active if necessary to supplement main coil and managed by control probe
Active	Active	Wait for the heating phase to end	Wait for the heating phase to end	Active if necessary to supplement main coil and managed by control probe
Active	Not active	Controlled by the intake humidity probe	Controlled by the outlet probe	Controlled by supply probe to compensate

HUMIDITY PRIORITY				
Dehumidification phase	**Heating phase**	**Cooling coil**	**Post-heating coil for compensation only**	**Post-heating coil Comp.+Supp.**
Not active	Active	Not active	Not active	Active if necessary to supplement main coil and managed by control probe
Active	Active	Controlled by the intake humidity probe	Controlled by the outlet probe	Controlled by supply probe for compensation
Active	Not active	Controlled by the intake humidity probe	Controlled by the outlet probe	Controlled by supply probe for compensation

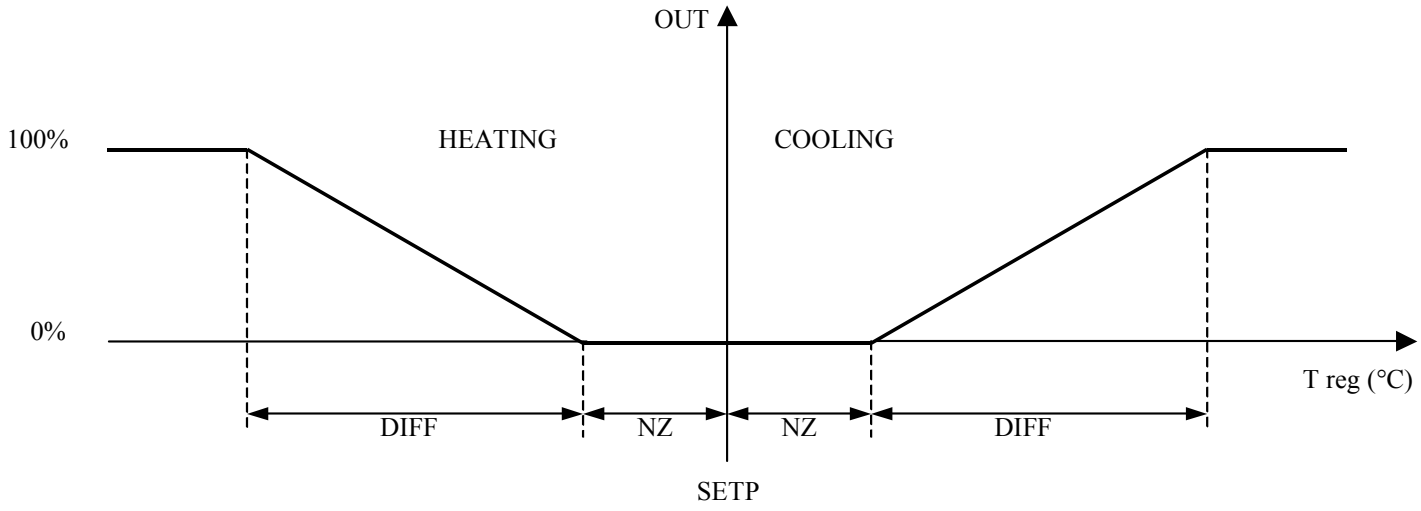
4.3 Temperature control

Inputs used
Position of the outlet temperature probe (E4).
Position of the intake temperature probe (E4).
Position of the outside temperature probe (E8).
Position of the preheating probe (El).

Parameters used
Select the control probe (C0).
Display the current set point (S0).
Intake control: set point, differential, dead zone (S1).
Outlet control: set point, differential, dead zone (S2).
Set point for selecting the operating mode, heating/cooling, according to the outside temperature (S9).
Select heating/cooling from: Out. temp., control temp., from the keypad, from digital input (C3).
Manual selection of the operating logic: Heating/cooling (C3).
Integration time for PI control with intake temperature control (G4).
Integration time for PI control with outlet temperature control (G4).

Description of operation
The software manages the typical control functions of the air handling unit.
The main control function acts on the intake or outlet air temperature so as to ensure comfort at all times, by cooling or heating the air.

Graph of temperature control



SETP	Temperature control set point
DIFF	Temperature control differential
NZ	Dead zone
T reg	Control temperature
OUT	Temperature control request

Screen C0 is used to select the temperature control probe:
- Outlet temperature probe
- Intake temperature probe
- Control by external thermostat

In the event of control with outlet probe or intake probe, refer to the graph shown above (Graph of temperature control)
If the unit is off the temperature control requests are ignored and all control functions are deactivated.
The software can manage the following types of control:
- P - Proportional
- P+I - Proportional + integral

The following parameters are required for performing intake temperature control:
- Intake temperature set point
- Intake temperature differential
- Intake temperature dead zone
- Intake temperature control integration time

The following parameters are required for performing outlet temperature control:
- Outlet temperature set point
- Outlet temperature differential
- Outlet temperature dead zone
- Outlet temperature control integration time

4.3.1 Changing the set point from digital input

Inputs used
Position of the digital input to change the set point (D9)

Parameters used
Enable change set point from digital input (Pp)
Enable outlet and intake set point from digital input (Sb)

Description of operation
By enabling this function on screen Pp, the control set points (outlet and intake) can be replaced with two set points on screen Sb, when the status of the digital input set changes.

4.3.2 Changing the operating mode (heating/cooling)

Inputs used
Position of the digital input to change the operating mode (D7).

Parameters used
Select the type of change operating mode (C3).
Select the probe to change operating mode (C0).
Set point to change mode (heating/cooling) from outside temperature (Sa).
Select the operating mode from the keypad (C3).

Description of operation
The operating mode (heating/cooling) can be changed in the following ways:
- Outside temperature
- Keypad/digital input
- Control probe (change mode probe)

If changing mode based on the outside temperature, the controller automatically selects the operating mode (heating/cooling) by comparing the value measured by the outside temperature probe against the set point on screen Sa.
The mode is changed using the keypad by accessing the parameter on screen C3, visible only when this mode is set for changing operation.
The mode is changed from digital input by configuring the desired input on screen D7.
The mode is changed using the control probe by selecting the probe to be used and comparing the values read by this probe against the control set point (S0)
For both types of control, AUTOMATIC and FIXED POINT, the software needs to know which probe is the control probe, as this is essential for changing the operating mode.
With FIXED POINT control, on screen C0 the message "change mode using" replaces the message "control probe", displayed if AUTOMATIC control is selected.

4.3.3 Managing the external thermostat
Control with external thermostat requires this to be interfaced with the pCO board as follows:
Heating and cooling signals: The heating/cooling analogue outputs from the external thermostat can be connected to the 0 to 10 V analogue inputs on the controller, which will use these signals to activate the corresponding heating and cooling devices. The configuration is performed in the manufacturer menu, choosing the position of the inputs for the two signals from the thermostat in the ANALOGUE I. section.
Heating/cooling selection: If the thermostat has a heating/cooling digital output, this can be connected to a digital input on the controller.
3 fan speeds: The digital outputs on the thermostat used to control the three fan speeds fan can be connected to the digital inputs on the controller, which then directly manages the fans, with the corresponding alarms and priorities.

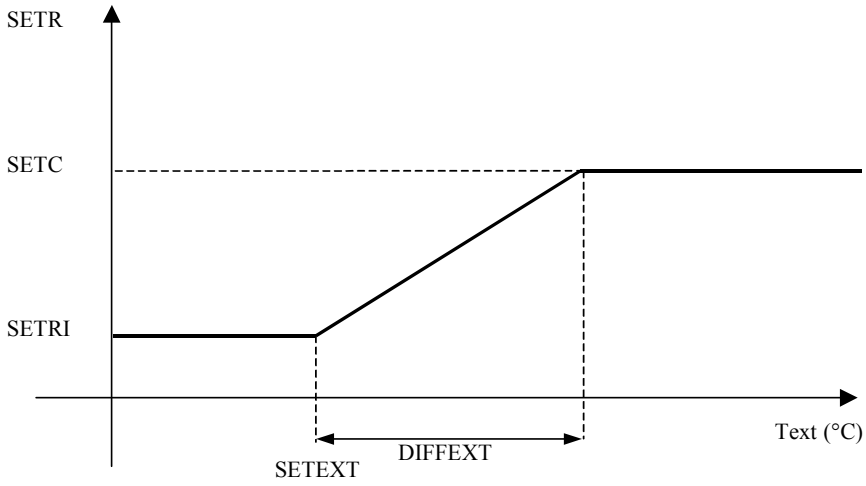
4.3.4 Control set point compensation
Set point compensation allows energy savings when the values of the control temperature (or the outside temperature) differ significantly from the needs of the controlled environment.

Inputs used:
Position of the intake temperature probe (E4)
Position of the outlet temperature probe (E4)
Position of the outside temperature probe (E8)
Position of the compensation probe (El)

Parameters used
Enable compensation of the set point (Ph)
Select the type of probe for compensating the set point (Ph)
Select the temperature control set point (intake or outlet) to be compensated (Ph)
Outside temperature set point for activating the compensation function (Pi)
Outside temperature differential for compensation (Pi)
Maximum value of set point compensation (Pi)

Description of operation
The compensation function adds a "delta" value to the control set point, outlet or intake (Ph). The value depends on the temperature probe used to performs the compensation (the compensated set point increases if the temperature read by the compensation probe increases). The graph below shows the curve achieved by compensating the control set point (intake or outlet) with the outside temperature probe.

Graph of the activation of set point compensation



SETR	Control set point
SETC	Set point with maximum compensation
SETRI	Control set point
SETEXT	Outside temperature set point to activate compensation
DIFFEXT	Outside temperature differential to activate compensation
Text	Outside temperature

5 PROCESSES MANAGED BY AN AIR HANDLING UNIT

5.1 Cooling and dehumidification

Inputs used
Position of the outlet temperature probe (E4)
Position of the intake temperature probe (E4)
Position of the intake humidity probe (Ec)

Parameters used
Set point, differential and working dead zone for intake humidity control (S3)
Enable the dehumidification process (C8)
Select the priority (temp. or humidity) during dehumidification (C8)

Description of operation
In an air handling system, the cooling coil is used to satisfy two possible requests:
- Cooling temperature control
- Dehumidification

If dehumidification is requested, the coil in question is activated according to the set priority:
- Priority to temperature
- Priority to dehumidification

In the first case, the coil operates for dehumidification only when the temperature control request (heating) is satisfied.
In the second case, the coil operates for dehumidification even when the temperature control request (heating) is yet to be satisfied.
Three types of cooling coil are possible:
- cooling coil with modulating valve
- cooling coil with 3-position valve
- direct expansion cooling coil

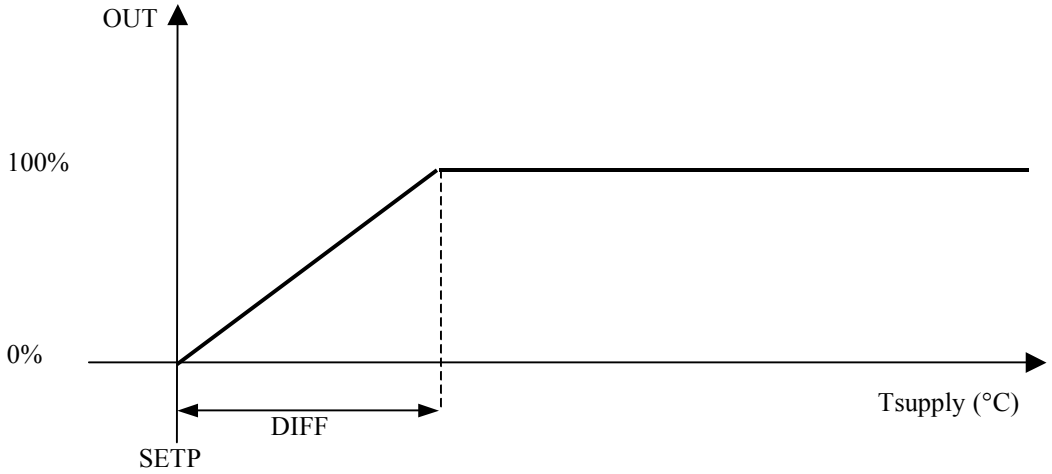
5.1.1 Cooling coil with modulating valve

Devices used
Analogue output of the modulating valve in cooling (L4)

Parameters used
Enable the modulating valve in cooling (Cj)

Description of operation
The control function, once the control probe has been selected, adjusts the position of the valve in cooling proportionally to the 0…10V output signal.
If the outlet probe is installed, the minimum outlet limit can be set to avoid the formation of condensate in the duct and the introduction of excessively cold air into the room. If the outlet air temperature reaches this limit, the controller reduces the contribution of cold water by closing the modulating valve proportionally.

Graph of the activation of cooling coil with modulating valve



SETP	Cooling set point with modulating valve control
DIFF	Cooling differential with modulating valve control
Tsupply	Outlet air temperature
OUT	Modulating valve output

5.1.2 Cooling coil with 3-position valve

Devices used
Position of the 3-position valve opening contact in cooling (Jb)
Position of the 3-position valve closing contact in cooling (Jb)

Parameters used
Valve opening time in cooling (T8)

Description of operation
When a request is active, either opening or closing, the corresponding contact remains energised for a time proportional to the request.
A valve opening time is envisaged, expressed in seconds.
If the request in progress is between 10 and 90%, the opening or contact closing will remain energised for the value of the request as a percentage of the total set energising time.
If the request is between 90% and 100%, or between 0% and 10%, the opening and closing time is no longer proportional to the request.
Example
The example describes the case where the opening request is equal to 50%, with a total opening time set to 180 seconds.
The opening contact remains energised for 90 seconds (50% of 180 seconds)
The preheating coil is forced to the maximum opening for a time that can be set if the winter starter function is enabled.

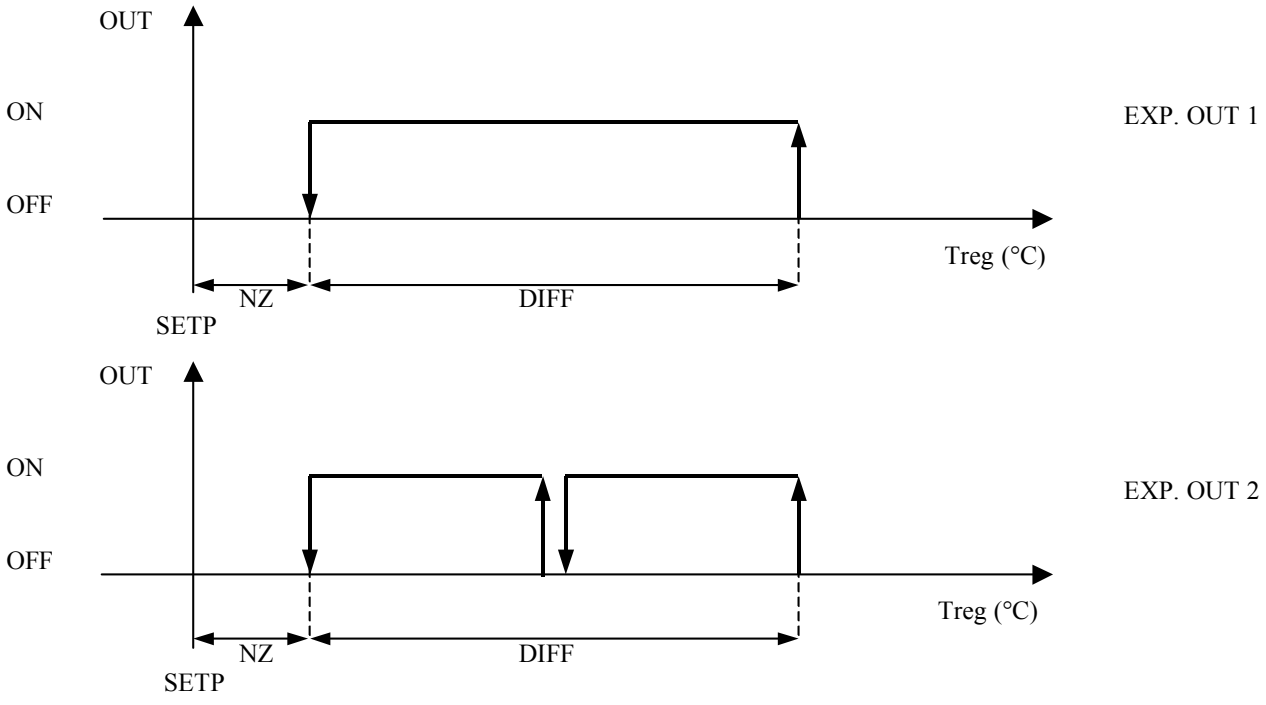
5.1.3 Direct expansion coil

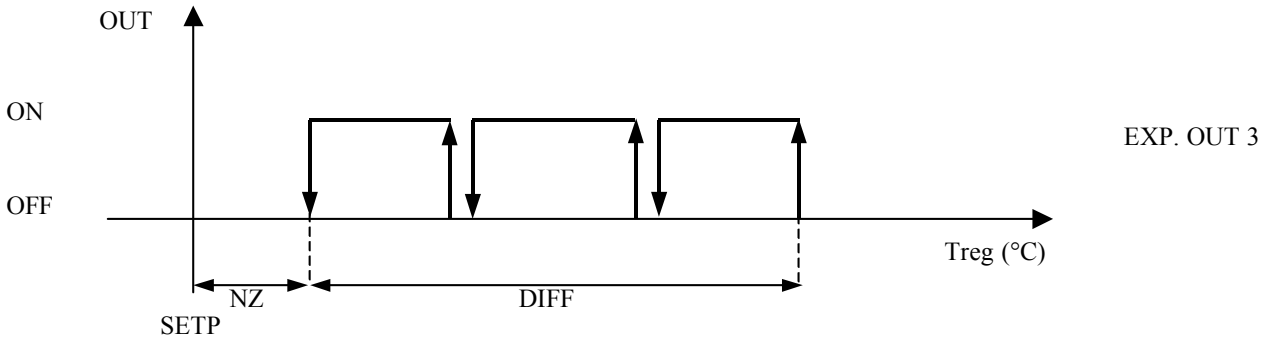
Devices used
Position of the relay step 1, 2, 3 (Ja)

Parameters used
Select the number of direct expansion steps (P4)
Enable modification of direct expansion step set points and differentials (P4)
Set point for the activation of the individual direct expansion steps (P5)
Differential for the activation of the individual direct expansion steps (P6)

Description of operation
The direct expansion cooling coil manages a maximum of three cooling steps. The initialisation procedures enable 3 steps and set the set points and differentials with fixed values, in this way the control band is divided equally based on the number of heaters enabled.
The set point and differential for the activation of each individual step can be set by enabling the parameter on screen P4.
The following graphs show the activation of the direct expansion steps using the default values of the parameters.

Graph of the activation of the direct expansion outputs (1, 2, 3)





SETP	Control set point
DIFF	Control differential
NZ	Control dead zone
Treg	Control temperature
OUT	Status of expansion outputs 1-2-3

5.1.4 Defrost

Inputs used
Position of the defrost probe (Ep)

Parameters used
Defrost control set point (P8)
Defrost control differential (P8)

Outputs used
Defrost relay output (J8)
Enable defrost relay (C9)

Description of operation
The defrost temperature sensor signals the formation of frost. The software has a dedicated digital output for the activation of an external utility for performing the defrost.
If the defrost temperature is less than the Set point – Differential (defrost situation present) the relay is activated;
If the defrost temperature is greater than the Set point + Differential (situation of defrost absent) the relay is deactivated.

5.1.5 Management of the pump in cooling

Parameters used
Enable pump cutout alarm in cooling (Ca)

Outputs used
Position of the pump digital output in cooling (J8)

Description of operation
The controller features a digital output for managing the pump in the cooling coil circuit, if present, in the air handling unit.
If cooling is performed by a mixed coil, the circuit has one valve only that manages the flow of liquid.
The pump is started if the cooling request is present.
In the event of a cooling pump cutout alarm, the controller closes the contact and consequently deactivates the circulating pump.

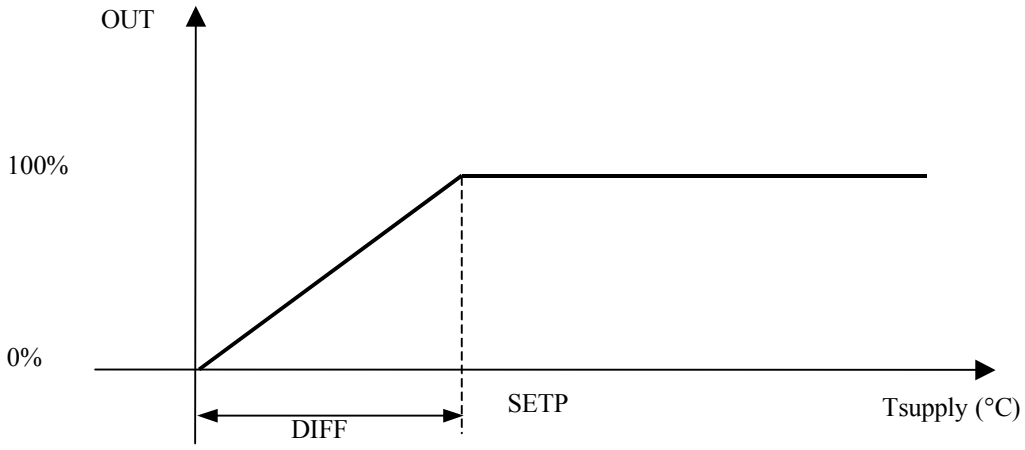
5.1.6 Outlet temperature lower limit

Devices used:
Position of the outlet temperature probe (E4)

Parameters used
Lower limit and differential of the outlet temperature in cooling (Pe)
Enable outlet temperature lower limit (Pe)

Description of operation:
In cooling operation, control can be activated on the outlet temperature to avoid reaching too low temperatures and prevent condensate forming in the ducts of the air handling system.
The graph below should be interpreted considering the outlet temperature as the cooling request from the environment being controlled; when the outlet temperature decreases, the cooling request decreases in turn, proportionally, until reaching zero. This request affects the operating status of the cooling device connected.

Graph of the activation of outlet temperature limit control



OUT	Cooling request value
SETP	Outlet temperature lower limit set point
DIFF	Differential
Tsupply	Outlet air temperature

5.2 Compressors

Inputs used
Position of the outlet temperature probe (E4)
Position of the intake temperature probe (E4)
Position of the intake humidity probe (Ec)

Devices used
Position of the digital output for compressor 1, 2 (J4)

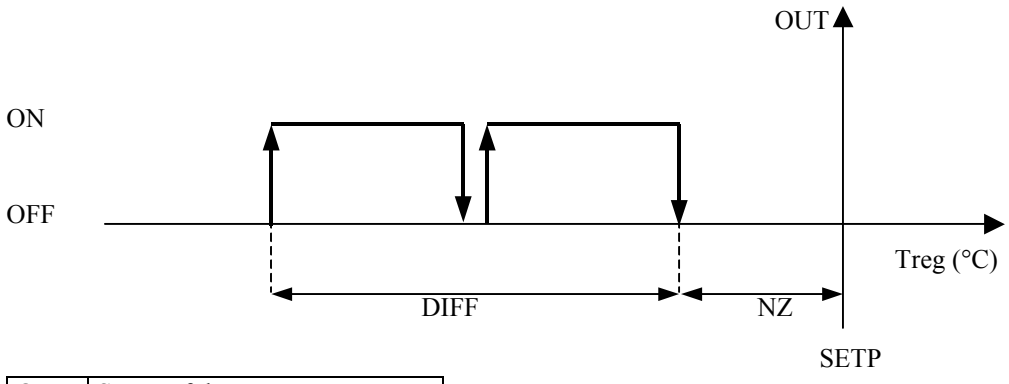
Parameters used
Set point, differential and dead zone for outlet temperature control (S2)
Set point, differential and dead zone for intake temperature control (S1)
Set point and dead zone for intake humidity control (S3)
Enable control in dehumidification mode (C8)
Enable control of the compressors (Ce)
Enable compressor rotation (Ce)

Description of operation
The management of the compressors allows two compressors to be controlled in independent circuits, with the following essential features for these types of application:

- Compressor timers
- Safety protectors for each circuit

The compressors, managed by the control probe, are only activated in the heating phase.

Graph of compressor activation

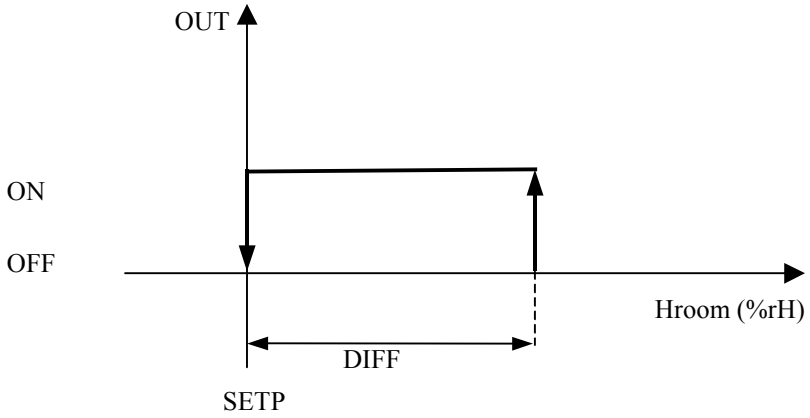


OUT	Status of the compressor

SETP	Control set point
NZ	Compressor control dead zone
DIFF	Compressor control differential
Treg	Control temperature

In the event where dehumidification is enabled, the software forces the activation of the compressors present.

Graph of compressor activation (dehumidification request)



OUT	Status of the compressors
SETP	Humidity control set point
DIFF	Humidity control differential
Hroom	Intake humidity

5.2.1 Times

Parameters used
Minimum compressor on time (T0)
Minimum compressor off time (T0)
Minimum time between starts of different compressors (T1)
Minimum time between starts of the same compressor (T2)

Description of operation
The management of the compressors features the following times:
- Minimum compressor ON time
- Minimum compressor OFF time
- Delay between starts of the same compressor
- Delay between starts of different compressors

5.2.2 Alarms

Inputs used:
Position of compressor 1/2 cutout (D2)
Position of the low pressure switch for compressor 1/2 (D3)
Position of the high pressure switch for compressor 1/2 (D4)

Parameters used
Delay time for the low pressure alarm (T7)
Enable the compressor high/low pressure switch (Cf)
Enable the overload protection input for compressor 1/2 (Ce)

Description of operation
The management of the compressors features the following alarms on each circuit:
- High pressure alarm
- Low pressure alarm
- Compressor cutout alarm

The high pressure and compressor cutout alarms act immediately when generated, immediately switching off the compressor and signalling the alarm situation. This is to prevent serious problems with the installation as well as dangerous situations for the air handling unit. The low pressure alarm, on the other hand, is activated after a set delay time. After this time, during which the problem persists, the controller stops the compressor and signals the alarm situation.

5.3 Heating

Inputs used
Position of the outlet temperature probe (E4)
Position of the intake temperature probe (E4)
Position of the antifreeze temperature probe (Ep)
Position of the antifreeze thermostat digital input (D5)

Devices used
Position of the output for the pump in heating (J8)
Position of the digital output for opening/closing the 3p valve (Jd)
Position of the output for the modulating valve in heating (L4)
Position of the heaters (J5)

Parameters used
Select the function of the heating coil: Heating – Preheating (Cg)
Enable control with device: 3-position valve/modulating valve/heaters (Ci)
Enable the protection contact for the pump in heating (Ca)
Intake control: set point, differential, dead zone (S1)
Outlet control: set point, differential, dead zone (S2)
Comparison set point for the antifreeze alarm from NTC probe (P9)
Enable antifreeze control using: NTC probe/Digital input/both (C9)
Enable winter start-up (Ca)

Description of operation
Heating management is strictly linked to the characteristics of the installation.
Heating refers to the situation in which there is a single coil dedicated to this function; in the other possible cases, with two coils, this function is divided into Preheating and Post-heating. (Cg)
For convenience, Preheating will also be used to describe systems with a single coil, given that the device in question carries out the same function in both types of installation.

5.3.1 Preheating

Description of operation
The preheating function, as well as heating the air introduced into the room, carries out two fundamental functions:

- Prevent the formation of frost on the coils in the installation when the unit is off.
- For adiabatic humidification, it is essential to bring the temperature of the air being humidified to a level such that the absolute humidity can be reached in the humidifier, that is, the g/kg of water vapour.

The preheating probe can be located downstream of the humidifier or downstream of the preheating coil.
Three types of preheating coil are possible:

- Coil with 3-position valve
- Coil with modulating valve
- Heater coil

5.3.2 Preheating coil with 3-position valve

Devices used
Position of the digital output for opening/closing the 3p valve (Jd)

Parameters used
Valve opening time in heating (T8)

Description of operation
When a request is active, either opening or closing, the corresponding contact remains energised for a time that is proportional to the request.
A valve opening time is envisaged, expressed in seconds.
If the request in progress is between 10 and 90%, the opening or closing contact will remain energised for the value of the request as a percentage of the total set energising time.
If the request is between 90% and 100%, or between 0% and 10%, the opening and closing time is no longer proportional to the request.
Example
The example describes the case where the opening request is equal to 50%, with a total opening time set to 180 seconds.
The opening contact remains energised for 90 seconds (50% of 180 seconds)
At power-up the preheating coil is forced on at the maximum opening for a set time if the winter start-up procedure is enabled.

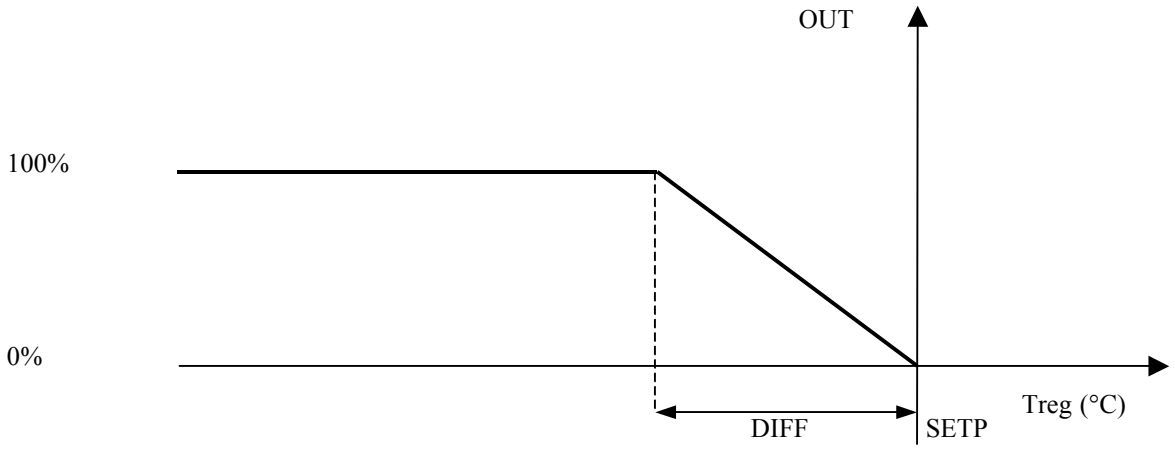
5.3.3 Preheating coil with modulating valve

Devices used:
Position of the modulating valve in heating (L4)

Description of operation.
The signal to enable control on the modulating valve comes from the activation of the fans.
The valve is forced to the maximum opening in the following cases:

- During the winter start-up phase
- In the event where the antifreeze is active (antifreeze probe – thermostat)

Graph of the activation of the coil with modulating valve



SETP	Control set point
DIFF	Control differential
Tsupply	Outlet air temperature
OUT	Modulating valve output

5.3.4 Preheating coil with heaters

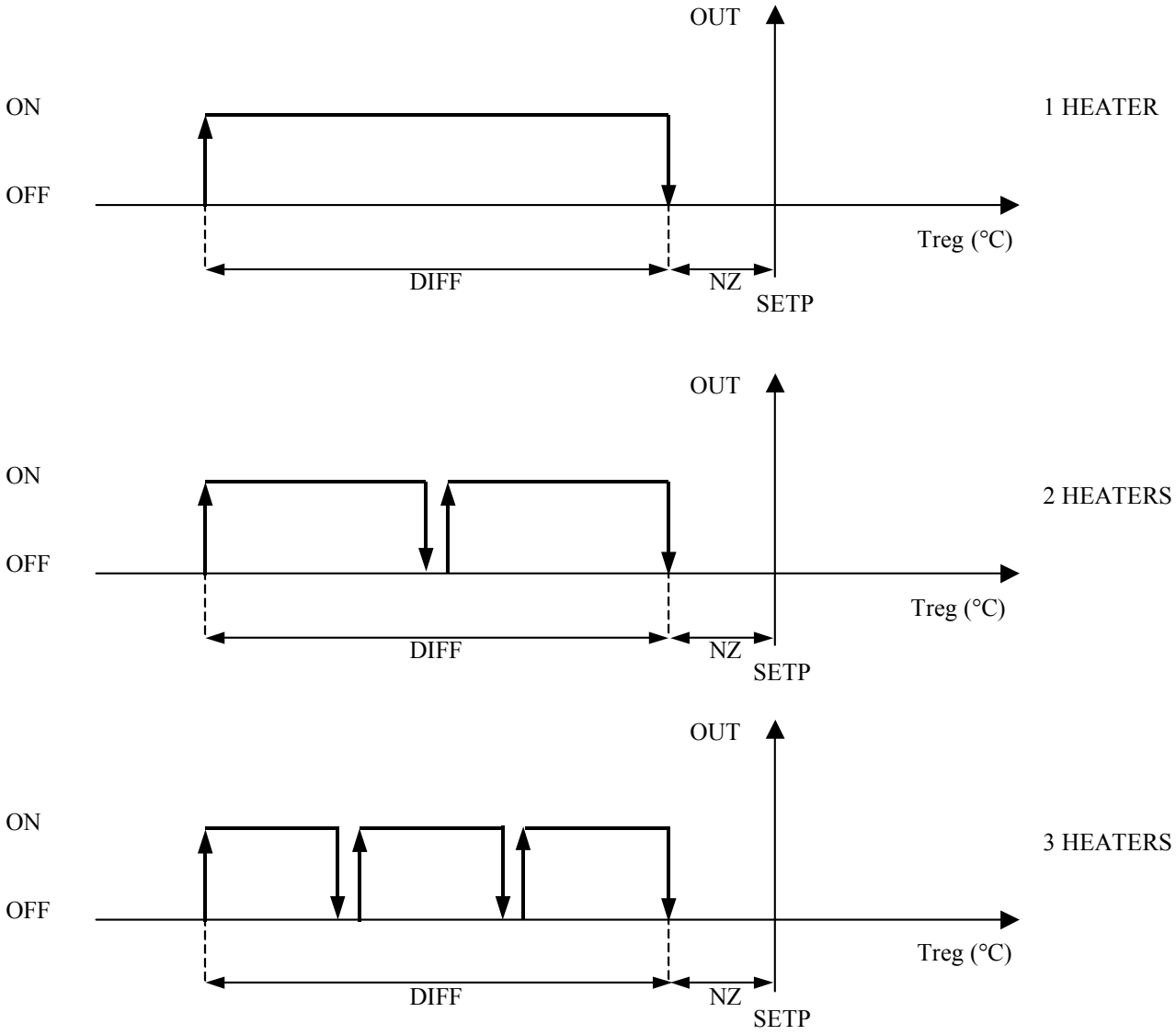
Inputs used
Position of the electric heater protection cutout (D1)

Devices used
Position of heaters 1/2/3

Parameters used
Enable preheating heaters (Ci)
Enable post-heating heaters (Co)
Select the number of heaters enabled (P1)
Enable modification of heater set points and differentials (P1)
Set point for the activation of the individual heaters (P2)
Differential for the activation of the individual heaters (P3)

Description of operation.
The preheating coil with heaters manages a maximum of three heaters, including heaters with different power ratings. The initialisation procedure enables 3 heaters and defines fixed values for the set points and differentials, so as to divide the control band equally based on the number of heaters enabled.
The activation set point and differential for each individual heater can be modified using the parameter on screen P1.
The following graphs show the activation of the heaters.

Graph of the activation of the coil with 1, 2, 3 heaters with default parameter values



SETP	Control set point
DIFF	Control differential
NZ	Control dead zone
Treg	Control temperature
OUT	Status of heaters 1-2-3

The heaters can only be configured once, that is, they can be used either for the heating/preheating coil or the post-heating coil and not both.

5.3.5 Post-heating

Parameters used
Activation delay of the post-heating coil (T6)

Three types of post-heating coil are available:
- Coil with 3-position valve
- Coil with modulating valve
- Heater coil

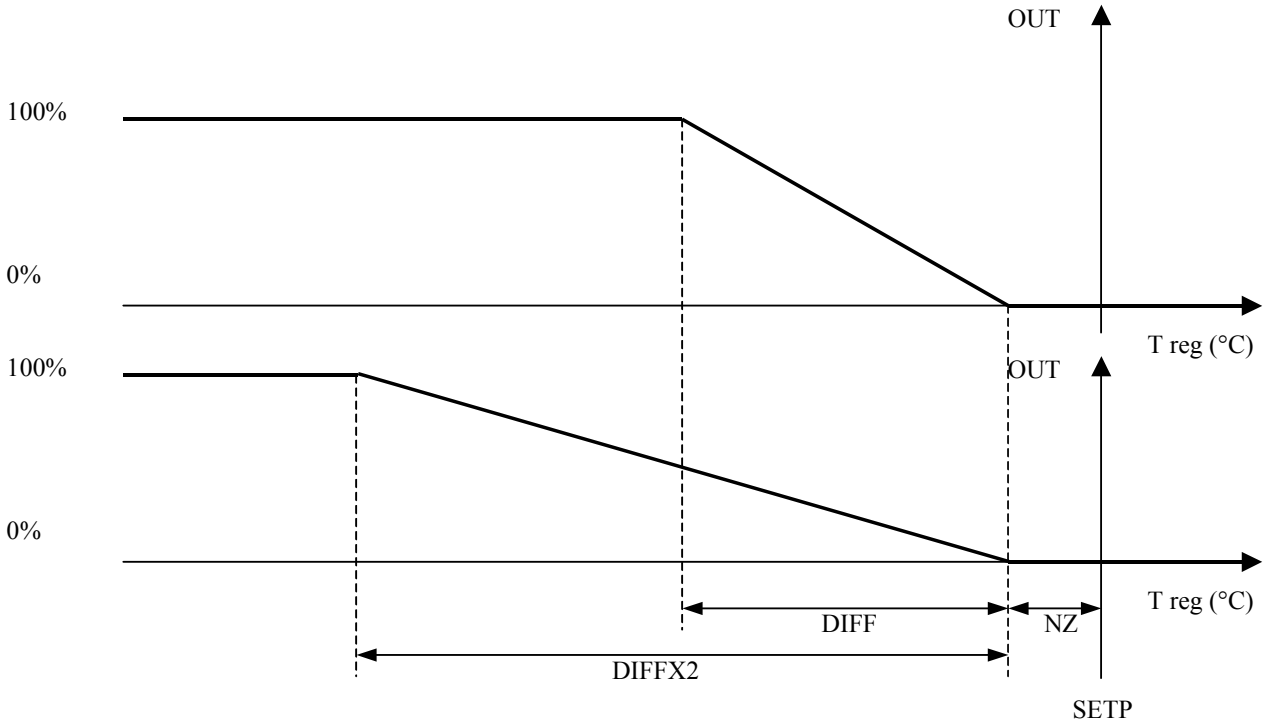
Description of operation
Two types of management are envisaged for the post-heating module:
1. **Heating support**: This function allows the post-heating coil to be used as support to the preheating coil following the request from the control probe.
   The graph of activation applies to any type of device used for the post-heating coil.

Post-heating is activated when the preheating coil is working at 100%, that is, when the temperature is less than the set point–differential. The coil is activated after a set delay (T6) to prevent both coils from working instantly at the maximum output, and thus avoid excessively heating the air.

2. **Compensation in dehumidification**: To ensure a faster response, the coil is controlled by the outlet temperature probe. The post-heating coil is activated to compensate for the lowering of the temperature due to the function of the cooling coil for dehumidification.

The activation of the post-heating coil depends on the type of management selected, automatic or fixed point (C0). This subject is described in detail in the chapter on Control.
The post-heating coil uses a differential that is double the value of the differential set for the heating function; this ensures that the post-heating coil stops operating the before the heating coil as the temperature approaches the set point.

Graph of the activation of the post-heating coil



SETP	Control set point
DIFFX2	Post-heating temperature differential
DIFF	Heating temperature differential
NZ	Temperature control dead zone
T reg	Control temperature
OUT	Modulating heating and post-heating output

5.3.6 Pump management in heating

Parameters used
Enable pump cutout alarm in heating (Ca)

Outputs used
Position of the pump digital output in heating (J8)
Description of operation
The controller features a digital output for managing the pump in the heating coil circuit, if featured, in the air handling unit.
If heating is managed by a mixed coil, the circuit has just one pump that handles the flow of the liquid.
In the event of pump cutout alarms in heating, the controller closes the contact and consequently deactivates the circulating pump.

5.3.7 Mixed valve management

Parameters used
Position of the modulating valve output in heating (L4)

Outputs used
Enable mixed heating/cooling control (Cl)
Enable control of the modulating valve in heating (Ci)
Enable the modulating valve in cooling (Cj)

Description of operation
The management of the mixed valve is only possible if the two coils, cooling coil and heating coil, are fitted with modulating valves. The choice of the type of valve for these two components of the air handling unit is set in screens Ci and Cj.
The status of the mixed valve is displayed on screen Ib.

5.3.8 Outlet temperature upper limit

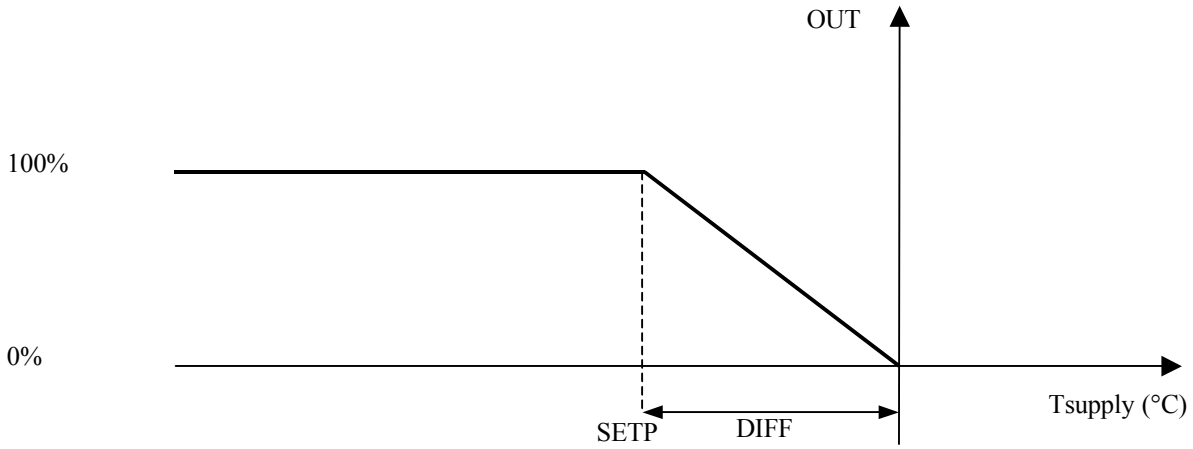
Inputs used
Position of the outlet probe (E4)

Parameters used
Outlet temperature upper limit (Pf)
Outlet limit differential (Pf)
Enable outlet upper limit (Pf)

Description of operation.
In heating operation, control can be activated on the outlet temperature so as to avoid reaching too high temperatures due to excessive request from the intake probe.
The actions performed depend on the control request.

Hot water coil with modulating valve.
The heating limit decreases when the outlet temperature is between the differential and the set point. The heating limit decreases proportionally as the outlet temperature approaches the set point - differential (see graph).

Graph of the activation of outlet temperature limit control



OUT	Heating
SETP	Outlet temperature upper limit set point
DIFF	Limit differential
Tsupply	Outlet air temperature

5.3.9 Antifreeze alarm

Inputs used
Position of the antifreeze thermostat input (D5)
Position of the antifreeze probe (Ep)

Parameters used
Enable antifreeze alarm: from digital input/NTC probe/Both (C9)
Set point for antifreeze control (P9)

Description of operation
The antifreeze temperature is controlled using a temperature probe or alternatively an external thermostat. A reference set point is defined, and as soon as the temperature read by the antifreeze probe is less than the set point, the antifreeze alarm is activated and the following precautionary actions are performed on the system:
1. Instant closing of the outside air damper (Delay = 0 seconds);
2. The heating coil (modulating, 3 position, heaters) is forced to the maximum output;
3. Instant shutdown of the compressors;
4. Deactivation of the cooling coil;
5. Deactivation of humidifier control;
6. The cooling valve is forced to the 25% position;
7. The heat recovery unit is operated so as to provide maximum recovery.

5.3.10 Winter start-up

Inputs used
Position of the outside temperature probe (E8)

Parameters used
Enable winter start-up (Ca)
Outside temperature set point and duration of winter start-up (Pc)

Description of operation
The winter start-up function, if enabled, involves the following actions:
- The damper is closed if during the start-up phase the outside temperature is less than the limit value set
- Heating is activated at maximum output (whatever device is enabled for heating) for the set time.
- The text “Winter start” is shown on screen M0.

5.4 Heat recovery unit

Heat recovery units are exchangers that transfer heat between flows of intake and discharged air. The controller manages 3 types of heat recovery unit:
- **Cross-flow**: The discharged air is sent to the heat exchanger and gives up part of its heat to the flow of colder outside air that also passes through the same exchanger in a cross-flow arrangement
- **Double coil**: The discharged air passes through a first coil (water or gas), giving up part of its heat to the fluid in the coil, which then flows to a second coil where it in turn gives up its heat to the fresh air.
- **Rotary**: In rotary heat recovery units, the heat is exchanged due to the accumulation of heat in the rotor; in fact, while the cylinder turns slowly the discharged air flows through half of the shell and gives up heat to the rotor, where it is accumulated. The fresh air that slows through the other half absorbs the accumulated heat. As the rotation continues, the parts that absorb and give up heat are continuously inverted.

Following is a list of the parameters used that are common to the three types of heat recovery unit.

Inputs used
Position of the outside air temperature probe (E8)
Position of the discharged air temperature probe (E8)
Position of the outlet temperature probe (E4)

Devices used
Position of the input for the pressure switch controlling the heat recovery unit dirty alarm (D6).

Parameters used
Select the type of heat recovery unit (Cc).
Enable the heat recovery unit dirty filter input (Cc).

5.4.1 Management of the cross-flow heat recovery unit (bypass damper)

Devices used
Position of the bypass damper output for the cross-flow heat recovery unit (J6)

Description of operation
The management of the cross-flow heat recovery unit involves the ON/OFF control of the bypass damper on the unit.
In the event where freecooling or freeheating are active, the controller closes the damper, thus deactivating the heat recovery unit.

5.4.2 Management of the double coil heat recovery unit

Devices used
Position of the double coil heat recovery unit (J6)

Parameters used
Set point for comparison with the outside temperature for the activation of the heat recovery unit (S5)

Description of operation.
The function acts on the external pump, managing the circulation between the two coils of the heat recovery unit.
The only control action performed is based on the difference between the temperature of the discharged air and the outside air; if this difference is higher than the set value, the output is active.
Discharge temperature ≥ outside temperature + heat recovery unit set point (S5).
The management of this device does not involve any control based on the outside temperature and the heating request status.

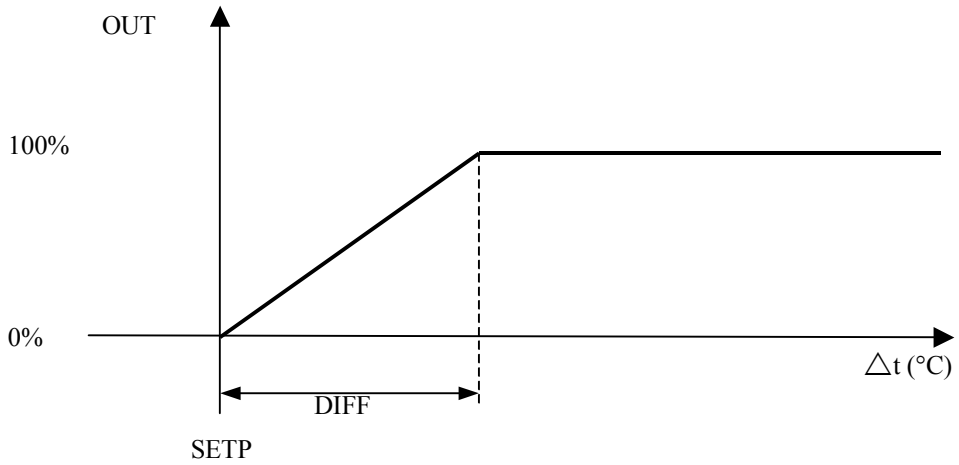
5.4.3 Management of the rotary heat recovery unit

Devices used
Analogue output for controlling the speed of the rotary heat recovery unit (L3)

Parameters used
Set point and control differential of the rotary heat recovery unit (S6)

Description of operation
The control function acts by changing the rotation speed of the heat recovery unit.
The rotation speed is controlled based on the difference between the discharge temperature and the outside temperature, and consequently the heat recovery unit will be off when this difference is equal to the set point, while it will be operating at maximum speed when the difference is equal to the set point + differential.

Graph of the operation of the rotary heat recovery unit



SETP	Heat recovery unit speed control set point
DIFF	Heat recovery unit speed control differential
Δt	Discharge temperature – outside temperature
OUT	Rotary heat recovery unit modulating output

5.4.4 Alarms

The following alarms deactivate the heat recovery unit:

- Antifreeze alarm from digital input
- Antifreeze alarm from analogue input
- Heat recovery unit blocked alarm (enabled only when the fan is on)

5.5 Outlet and intake air filter

Inputs used
Position of the outlet air filter differential pressure switch (D5)
Position of the intake air filter differential pressure switch (D5)

Devices used
Blocked filter signal (J8)

Parameters used
Enable the dirty filter input on the outlet/intake/outlet + intake (C5)
Air flow alarm delay time (T7)

Description of operation
The condition of the filtering system in the unit, in terms of cleaning, is measured by the differential pressure switch located upstream and downstream of the filters.
Which filters are present and the corresponding alarms can be enabled: (C5)

- None (no filter and alarm enabled)
- Outlet (enable the outlet filter + alarm)
- Intake (enable the intake filter + alarm)
- Outlet and Intake (enable both filters + corresponding alarms)

5.6 Outside air damper – freecooling and freeheating

Inputs used
Position of the outlet flow switch (D0)
Position of the intake flow switch (D0)
Position of the outside air temperature probe (E8)
Position of the intake and outside humidity probe (Ec)
Position of the intake temperature probe (E4)

Devices used
Outside air damper control (L1)
ON/OFF control for air damper (J9)

Parameters used
Enable dehumidification control (C8)
Enable the mixture and discharge dampers (C2)
Enable outside air damper control (C1)
Differential for freecooling control (Pk)
Minimum opening of the damper (Pa)
Set point for intake humidity control (S3)
Type of freecooling/freeheating (Pj)
Duration of freecooling/freeheating operation only (Pl)
Enthalpy freecooling/heating offset and differential (Pm)
Atmospheric pressure setting (Pn)

Damper control
The software can manage the outside air damper with the following functions:

- **Freecooling/Freeheating by temperature**
- **Freecooling by enthalpy**
- **Dew point**
- **Air quality**

The dampers can be controlled as follows (C1) :

- Modulating
- ON/OFF (freecooling/freeheating cannot be activated)
- Fixed opening

The dampers on the module can be activated together or separately.
When enabled together all the dampers are activated by the same output.
If enabled separately, the user decides which dampers (discharge and mixture) to enable (C2); consequently, these are then controlled by different outputs. The ON/OFF damper output remains activated in any case.

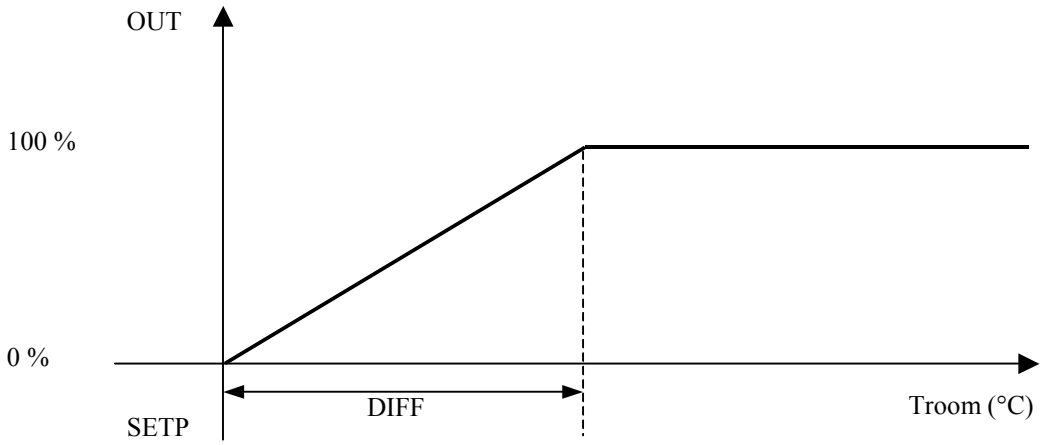
5.6.1 Freecooling

Freecooling, if enabled, is active when the following condition is true:

Intake temperature – Outside temperature > Freecooling differential

Screen Pl includes the parameter for setting the duration of freecooling operation only. After this time, if cooling is still requested, the cooling coil is activated.

Graph of freecooling activation



SETP	Control set point
DIFF	Control differential
Troom	Intake temperature
OUT	Modulating damper output

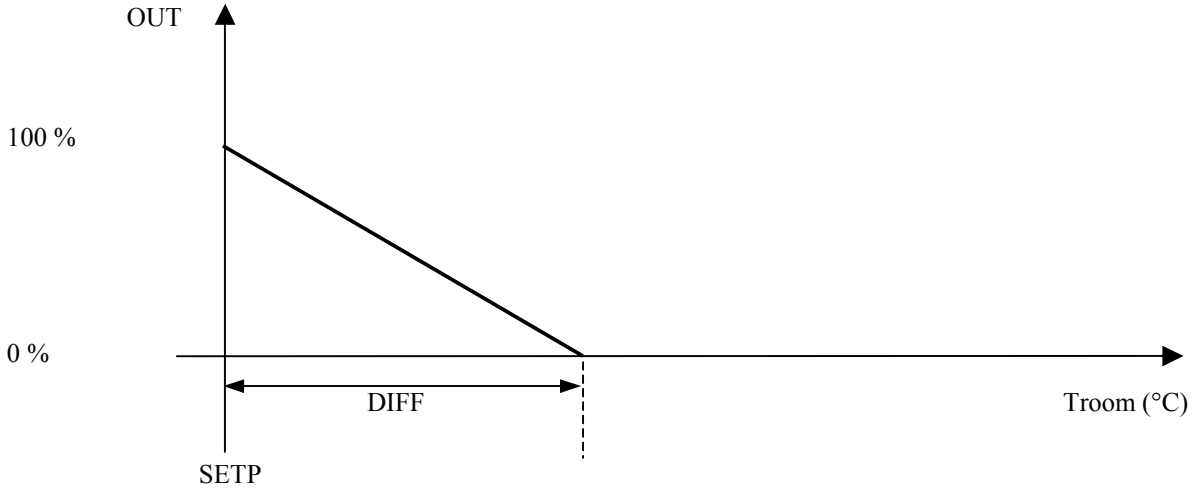
5.6.2 Freeheating

Freeheating, if enabled, is active when the following condition is true:

Outside temperature – Intake temperature > Freeheating differential

Screen Pl includes the parameter for setting the duration of freeheating operation only. After this time, if heating is still requested, the heating coil is activated.

Graph of freeheating activation



SETP	Control set point
DIFF	Control differential
Troom	Intake temperature
OUT	Modulating damper output

5.6.3 Dew point

The dampers are opened for dewpoint control when the following conditions are satisfied:

- Intake humidity ≥ intake humidity set point
- The intake set point dew point ≥ outside dew point

The intake set point dew point is calculated based on the following values:

- Intake humidity set point
- Intake temperature set point

The outside air dew point is calculated based on the following values:
- Outside humidity
- Outside temperature

5.6.4 Freecooling and freeheating control by enthalpy

Freecooling and freeheating control by enthalpy require the following enthalpy values to be calculated:
- Outside enthalpy
- Intake enthalpy
- Enthalpy of the set point

The outside enthalpy is calculated based on the following values:
- Outside temperature
- Outside humidity
- Atmospheric pressure

The intake enthalpy is calculated based on the following values:
- Intake temperature
- Intake humidity
- Atmospheric pressure

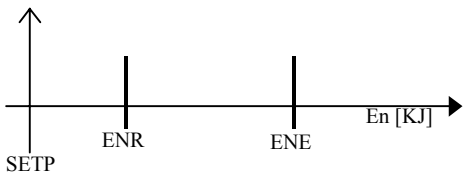
The enthalpy of the set point is calculated based on the following values:
- Active temperature set point
- Intake humidity set point
- Atmospheric pressure

Enthalpy control is OFF when the following conditions are true:
- Outside enthalpy > Intake enthalpy and Intake enthalpy > Enthalpy set point
- Outside enthalpy < Intake enthalpy and Intake enthalpy < Enthalpy set point

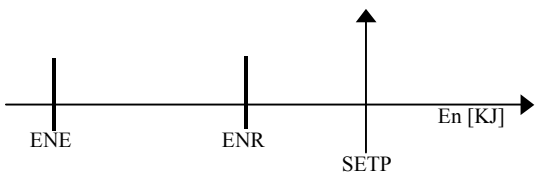
Description of operation
Freecooling and freeheating control by enthalpy is enabled if the following conditions are always true:
- Temperature probes (intake and outside) and humidity probes (intake and outside) enabled;
- Freecooling by enthalpy enabled (Pj);

The controller calculates the intake enthalpy based on the room temperature and the recirculation humidity, and calculates the outside enthalpy based on the outside temperature and humidity. The temperature set point and humidity set point are used to calculate the enthalpy set point.
The purpose of the function is to maintain the intake enthalpy as near as possible to the enthalpy set point.
The following cases are possible:

1)

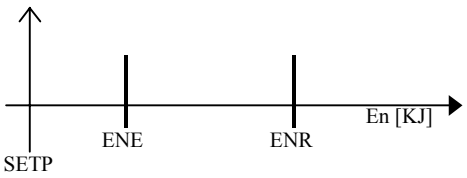


2)

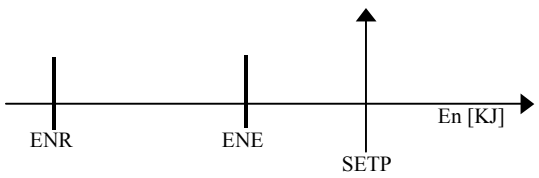


In both the conditions described above in the graphs (1, 2), it is not useful to open the outside damper as the inside enthalpy is closer than the outside enthalpy to the enthalpy set point.

3)

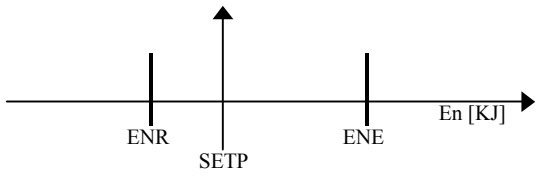


4)

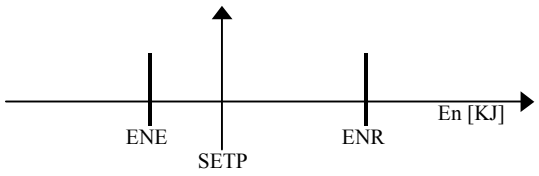


In both the conditions described above in the graphs (3, 4), it is useful to open the damper as the outside enthalpy is closer than the inside enthalpy to the enthalpy set point.

5)



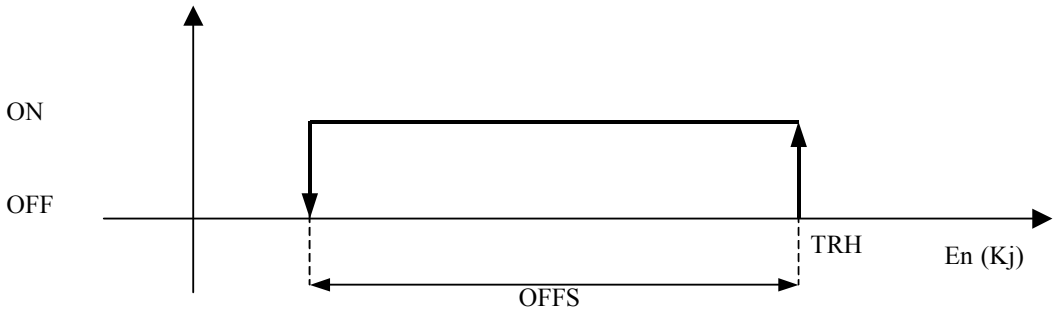
6)



SETP	Enthalpy set point
ENR	Inside enthalpy
ENE	Outside enthalpy

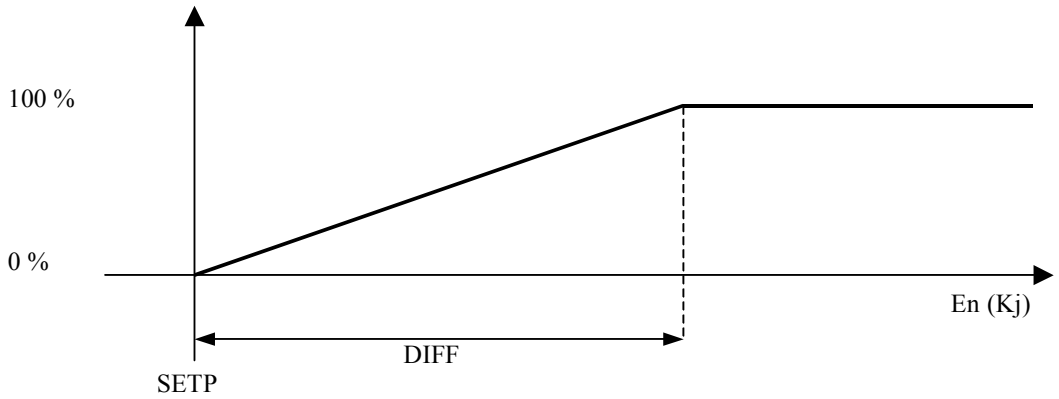
In case number 5 shown in the graph above, the intake enthalpy is closer than the outside enthalpy to the enthalpy set point, however in this case it is useful to open the damper as by mixing the two enthalpies (inside and outside), the inside enthalpy approaches the enthalpy set point.

In case number 6 shown in the graph above, the outside enthalpy is closer than the intake enthalpy to the enthalpy set point, and therefore it is useful to open the damper as by mixing the intake and outside air the inside enthalpy approaches the enthalpy set point.
For all the graphs (1, 2, 3, 4, 5, 6), each threshold is added to an offset shown on screen (Pm) in the user branch, under the item "Offs:".
This parameter has the function of preventing the continuous ON/OFF of the freecooling function near the thresholds. This is shown in the graph below:



TRH	Threshold (ENR or ENE)
OFFS	Safety offset
EN	Ambient enthalpy

If the cases shown above in the graphs (3, 4, 5, 6) arise, the opening of the damper depends on the intake enthalpy, as described in the figure below:



SETP	Enthalpy set point
DIFF	Enthalpy differential
EN	Ambient enthalpy

Interaction between freecooling/freeheating by enthalpy and other functions in the management of the outside damper:
If freecooling/freeheating by enthalpy is enabled, the outside damper cannot be controlled for freecooling/freeheating by temperature or humidity.

The minimum opening set for the damper acts as the lower control limit for freecooling/freeheating management by enthalpy.

Example
- Minimum damper opening = 20%
  Request for freecooling/heating by enthalpy = 15%
  Modulating outside damper output = 20%

- Minimum damper opening = 20%
  Request for freecooling/heating by enthalpy= 25%
  Modulating outside damper output= 25%

5.6.5 Control with air quality probe

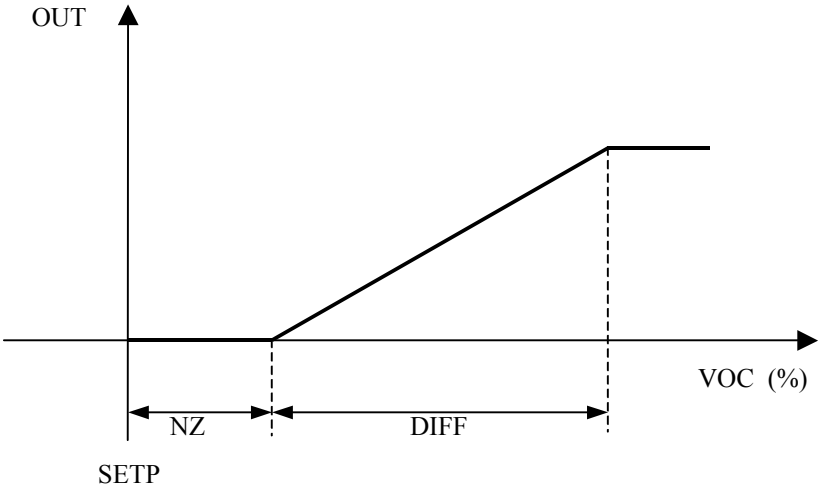
Inputs used
Position of the CO2 air quality probe (Eh)
Position of the VOC air quality probe (Eh)

Devices used
Position of the outside damper (L1)

Parameters used
Enable air quality control (Cb)
Set point, differential and integration time for VOC air quality control (S8)
Set point, differential and integration time for CO2 air quality control (S9)

Description of operation with air quality control
The request for renewal air due to VOC or CO2 control is summed to the temp. control request for the modulation of the outside air dampers for freecooling/freeheating.
This has priority over the temperature difference between the outside air and the inside air. This means that the outside air damper can open even if the outside temperature conditions or enthalpy are not favourable for freecooling/freeheating.
The air will in any case be conditioned before being introduced into the room. The outlet temperature limit is always respected.
If control is enabled using both probes, VOC+CO2, the damper is controlled according to the greater of the two signals measured.

Graph of damper opening with VOC +CO2 control



SETP	Outside air damper control set point
NZ	Outside air damper control dead zone
DIFF	Outside air damper control differential
VOC (%)	Value of VOC (or CO2) present in the room
OUT	Outside air damper modulating output

5.7 Humidifier

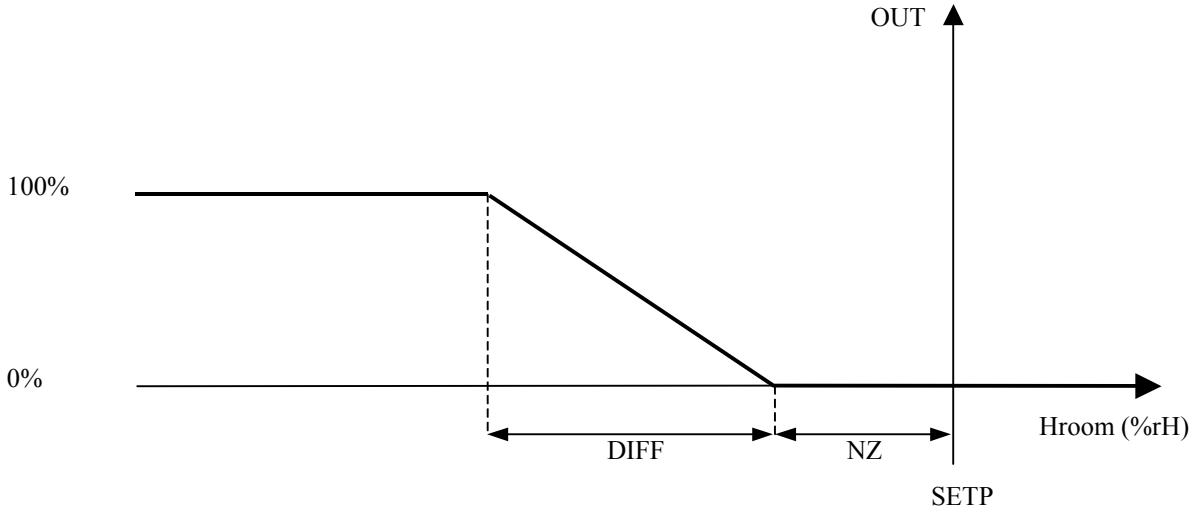
Inputs used
Position of the intake humidity probe (Ec)
Position of the humidifier alarm digital input (D3)

Devices used
Position of the modulating humidifier output (L7)
Position of the ON/OFF humidifier output (J6)

Parameters used
Enable the humidification control (C7)
Select the type of humidification used: Constant temperature, Adiabatic (C7)
Set point, differential and working dead zone for intake humidity control (S3)

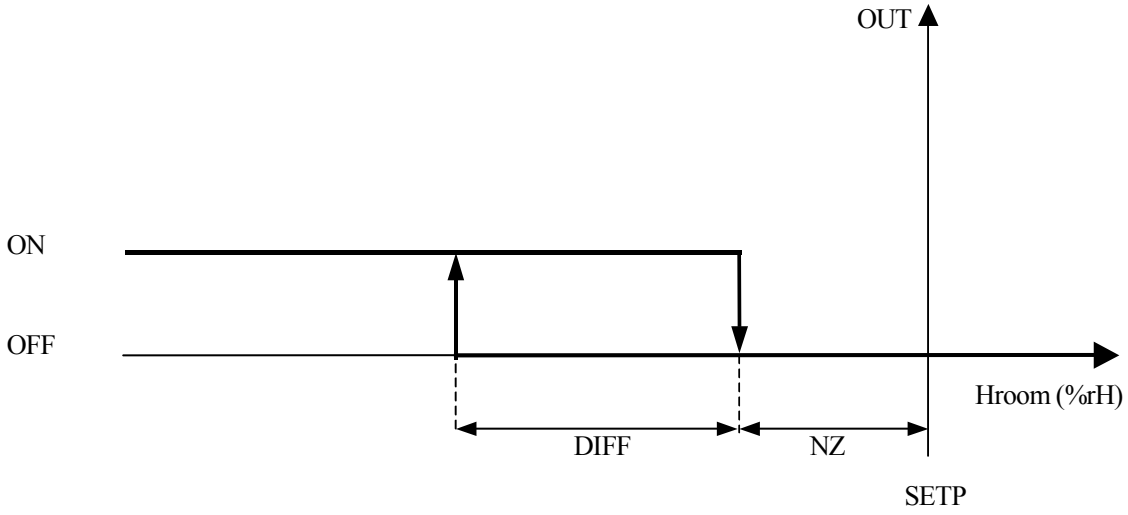
Description of operation
The board has two outputs dedicated to humidifier control, one modulating and one ON/OFF. The user can choose which output to enable by the parameter present on screen C7.

Graph of the modulating humidifier output



SETP	Humidity control set point
DIFF	Humidity differential
NZ	Humidity dead zone
Hroom	Intake humidity
OUT	Modulating humidifier output

Graph of the ON/OFF humidifier output



SETP	Humidity control set point
DIFF	Humidity control differential
NZ	Humidity dead zone
Hroom	Intake humidity
OUT	ON/off humidifier output

5.7.1 Outlet humidity upper limit

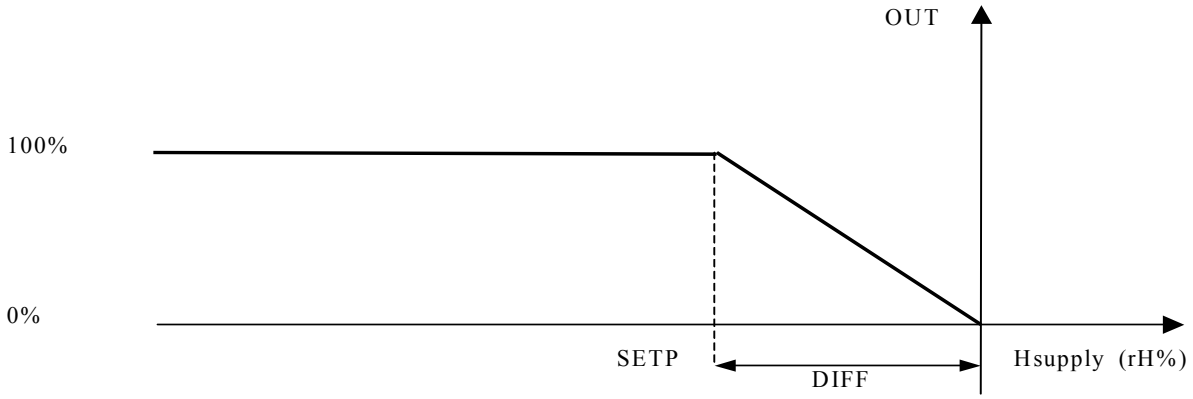
Inputs used
Position of the outlet humidity probe (Ec)

Parameters used
Enable outlet humidity upper limit control (Pg).
Outlet humidity upper limit and differential of (Pg).

Description of operation
The upper limit of the outlet humidity is used to prevent excessive humidity values in the room.
This problem may lead to the formation of condensate in the outlet ducts. The humidity upper limit is controlled in two ways, depending on the type of humidifier used, ON/OFF or modulating.

Modulating humidifier
The humidity upper limit decreases if the value of the outlet humidity is between the limit differential and set point. The graph shows how the limit decreases proportionally as the outlet humidity approaches the set point + differential.

Graph of outlet humidity upper limit (modulating humidifier)

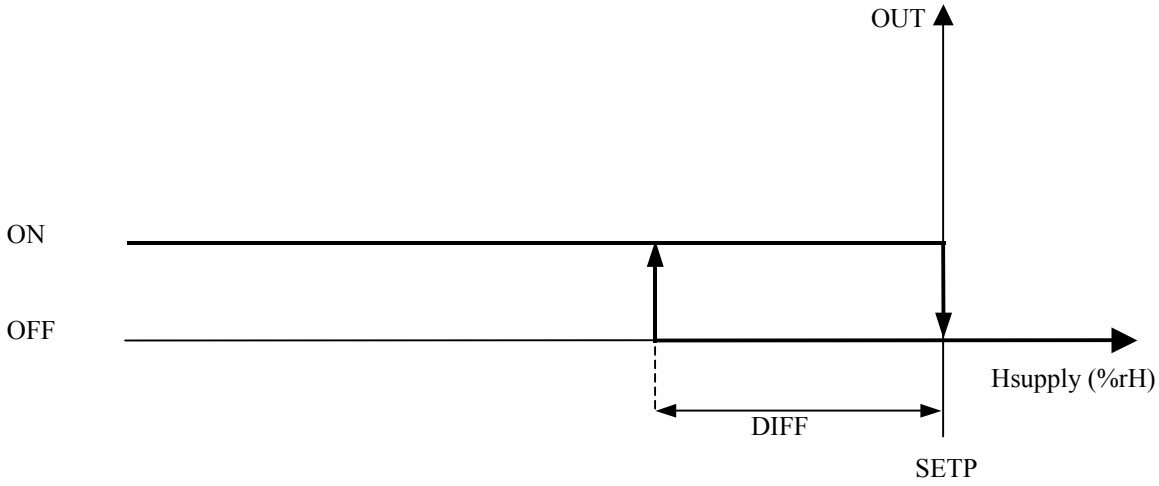


SETP	Outlet humidity limit set point
DIFF	Outlet humidity limit differential
Hsupply	Outlet humidity
OUT	Modulating humidifier output

Humidifier with ON/OFF control.
In the case of humidifiers with ON/OFF control, the upper limit function acts directly on the humidifier enabling signal.
Based on the values of the limit set point and differential (Pg), the outlet humidity control function acts as follows (also see the graph):

Humidity > Set point (set limit) the humidifier signal is set to 0.
Humidity < (Set point - Differential) the humidifier signal is set to 1.

Graph of outlet humidity upper limit (ON/OFF humidifier)



SETP	Humidity control set point
DIFF	Humidity control differential
Hsupply	Intake humidity
OUT	ON/OFF humidifier output

5.8 Fans

Parameters used
Select the operating mode: thermostat, continuous, fan coil, external thermostat (C4)

The intake and outlet fans can operate in the following modes:
- Request from thermostat
- Continuous mode
- Fan coil control
- Control by external thermostat

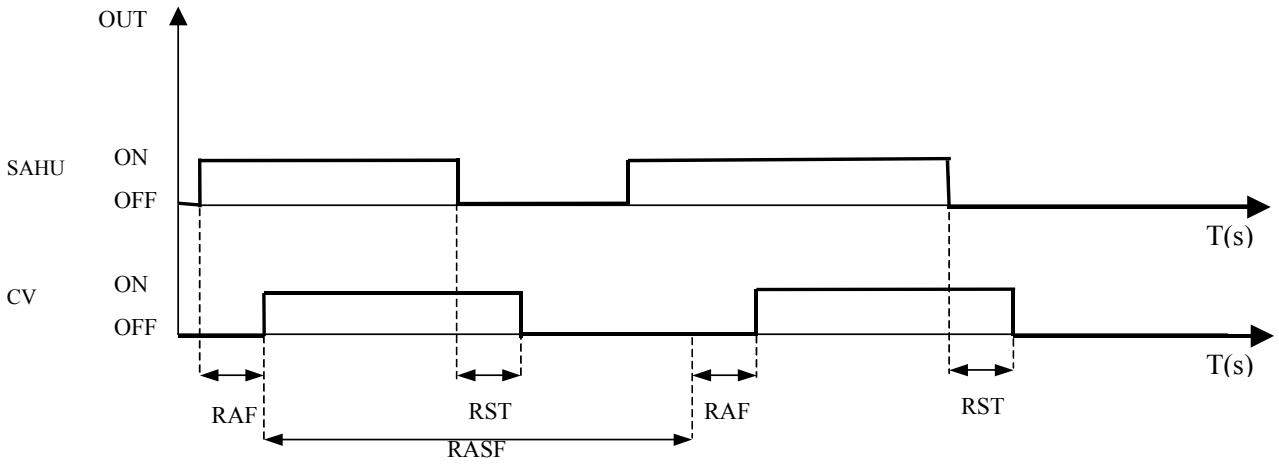
5.8.1 Fan control by thermostat

This type of control activates the fans based on the current request (heating, cooling, humidification, dehumidification).
The fans are only on when there is a request pending; when the set point is reached the fans switch off.

5.8.2 Fan control in continuous mode

Fan control in continuous mode starts and stops the fans (intake and outlet) according to the activation and deactivation of the air handling unit.
In the event of serious alarms, the fans are switched off, irrespective of the status of the unit.

Graph of fan activation in continuous mode



OUT	Status of the air handling unit
CV	Fan contact
SAHU	Status of the air handling unit and fan
RAF	Fan start delay
RASF	Delay between starts of the same fan
RST	Fan stop delay
T(s)	Time expressed in seconds

5.8.3 Fan coil control

Fan coil control based on temperature request

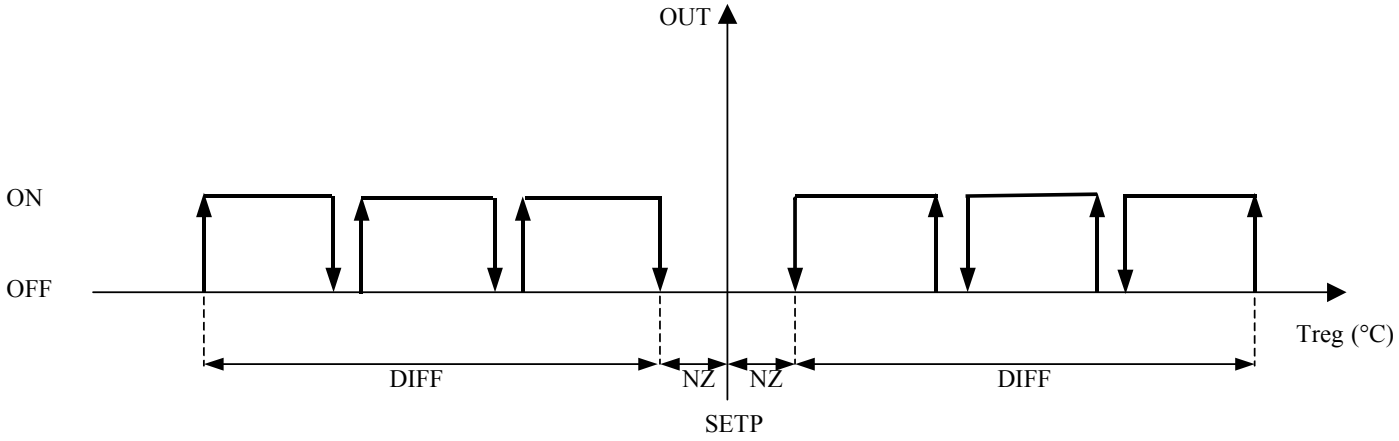
Inputs used
Position of the outlet temperature probe (E4)
Position of the intake temperature probe (E4)

Devices used
Position of the digital output for the 1st, 2nd, 3rd speed (Je)

Parameters used
Select the type of fan coil control: AUTOMATIC (C4)
Speeds enabled: 1, 2, 3 (P7)

Description of operation
Fan coil control is based on the signals from the control probe. The signal from this probe controls the fan speed on the fan coil.

Graph of fan coil activation with request from control probe



OUT	Speed of the fan coil
SETP	Control set point
DIFF	Control differential
NZ	Control dead zone
Treg	Control temperature

Fan coil control by external thermostat
Inputs used
Position of digital inputs 1, 2, 3 for controlling the fan speed by external thermostat (D8)

Devices used
Position of the digital outputs for the 1st, 2nd, 3rd speed (Je)

Parameters used
Number of speeds enabled: 1, 2, 3 (PZ)

Description of operation
Fan coil control by external thermostat features 3 digital inputs to control the fan speed.
The status of these three digital inputs has the meaning listed in the table

DI 1	DI 2	DI 3	Fan speed
ON	OFF	OFF	1st speed
OFF	ON	OFF	2nd speed
OFF	OFF	ON	3rd speed
OFF	OFF	OFF	Fan OFF

Manual fan coil control

Devices used
Position of the digital outputs for the 1st, 2nd, 3rd speed (Je)

Parameters used
Select the type of fan coil control: MANUAL (C4)
Speeds enabled: 1, 2, 3 (P7)
Select fan coil speed: I, II, III (S4)

Description of operation
Manual fan coil control involves the management of the fan speed on the fan coils, with the unit on, by setting the parameter on screen (S4) in the set point branch.

Status of the digital outputs
The digital outputs dedicated to the control of the fan coil speed have the status shown in the table, according to the current speed.

DO 1	DO 2	DO 3	Fan speed
ON	OFF	OFF	1st speed
OFF	ON	OFF	2nd speed
OFF	OFF	ON	3rd speed
OFF	OFF	OFF	Fan OFF

N.B. This is valid for all types of fan coil speed control: automatic, by thermostat and manual.

5.8.4 Types of fan

By setting the operating mode:

- Thermostat
- Continuous

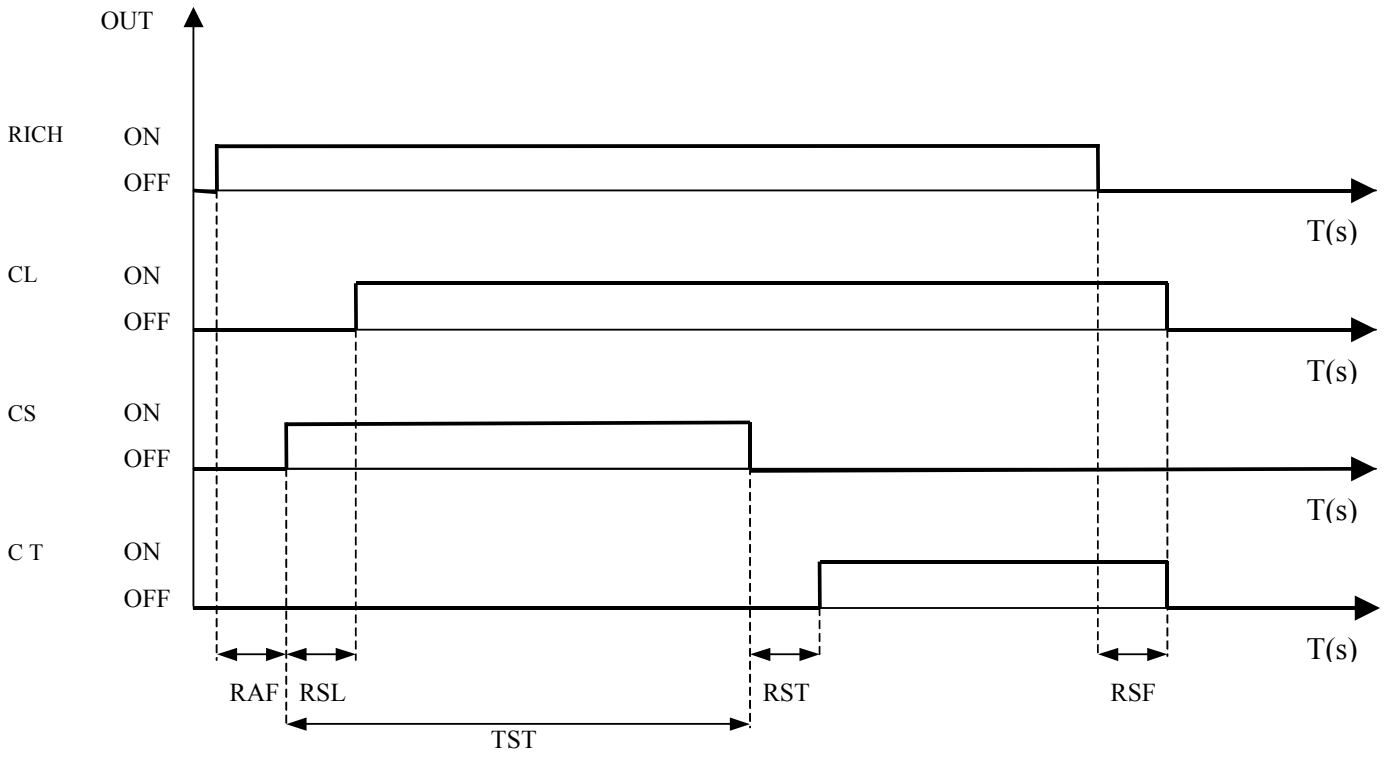
the following types of fans can be selected:

- Fans with star/delta starting
- Fans with direct starting
- Fans with inverter

Fans with star-delta starting
With this type of starting, each fan configured uses three digital outputs.
The digital outputs DO1-DO3 or DO1-DO6 automatically ignore the configuration made on the terminal and take the following meaning:

DO1: Outlet fan line contactor
DO2: Outlet fan delta contactor
DO3: Outlet fan star contactor
DO4-DO5-DO6: Same sequence but for the intake fan.
The contact activation times are set on screen T5.

Graph of fan activation with star-delta starting

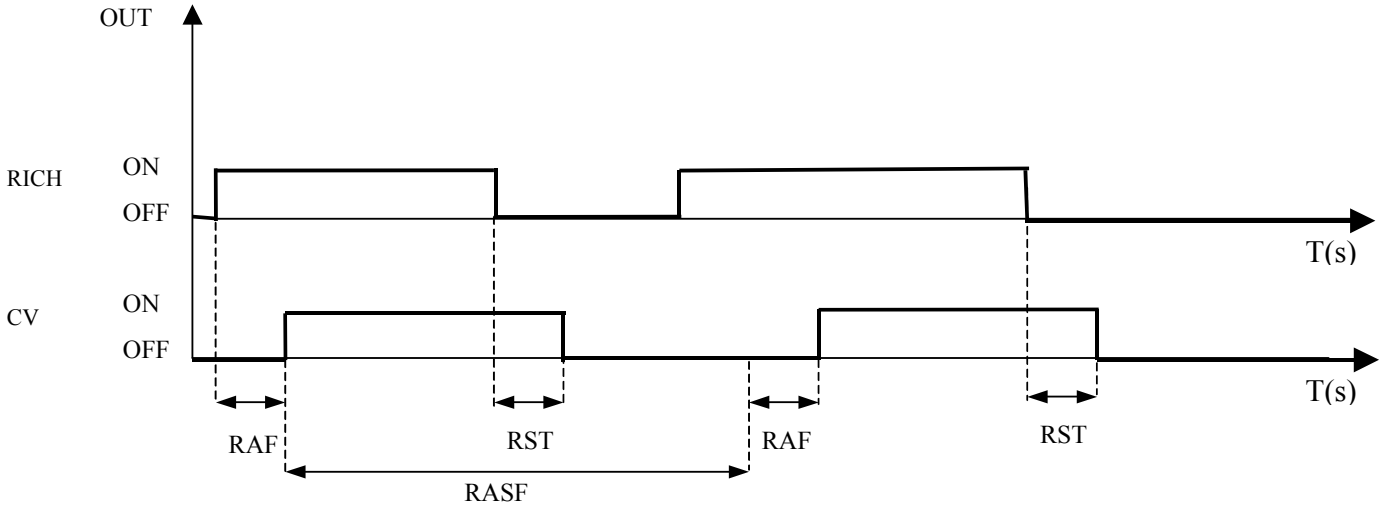


RICH	Fan activation request
CL	Line contact
CS	Star contact
CT	Delta contact
OUT	Request and starter contact status
RAF	Fan start delay

RSL	Delay between star contact and line contact
TST	Duration of star contact
RST	Delay between star contact and delta contact
RSF	Fan stop delay
T(s)	Time expressed in seconds

Fans with direct starting
With this type of starting, each fan configured is activated by one digital output only (this can be configured on the terminal).

Graph of fan activation with direct starting



RICH	Fan activation request
CV	Fan contact
OUT	Request and starter contact status
RAF	Fan start delay
RASF	Delay between starts of same fan
RSF	Fan stop delay
T(s)	Time expressed in seconds

Fans with inverter

Inputs used
Position of the intake pressure probe (E0)
Position of the outlet pressure probe (E0)

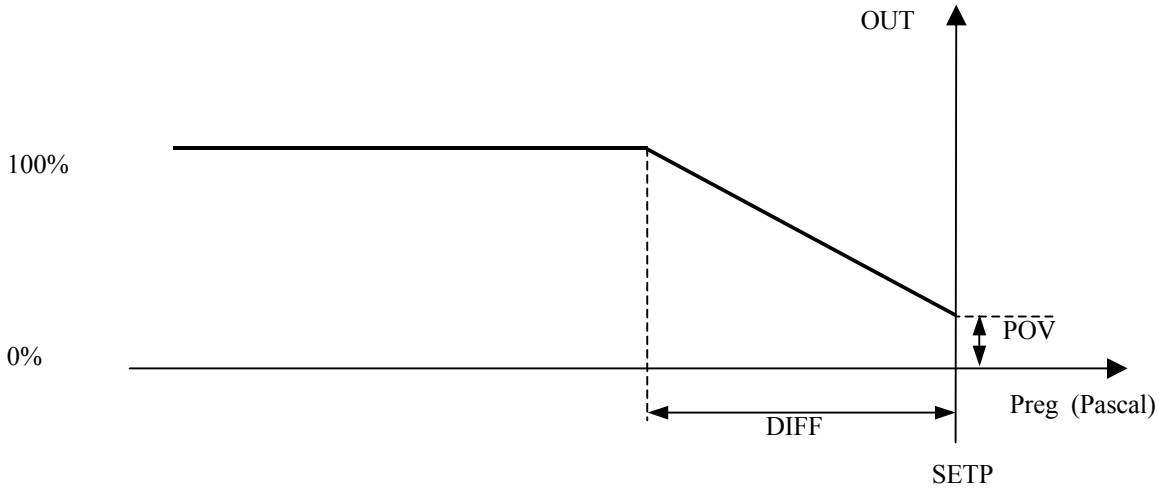
Devices used
Analogue intake fan control (L0)
Analogue outlet fan control (L0)

Parameters used
Outlet fan control set point, differential and offset (G0)
Outlet fan control integration and derivative time (G1)
Intake fan control set point, differential and offset (G2)
Intake fan control integration and derivative time (G3)

Description of operation
Fan control with the analogue output is performed based on the pressure values measured by the probe selected:
- Outlet pressure probe
- Intake pressure probe

PID control is used.
If the integration and derivative times are set to zero, the fan is managed with proportional control.
The fan with inverter is started when the control pressure is less than the set point (G0,G2).
The fans can only be activated if the analogue air flow input is enabled (C6).

Graph of fan activation with inverter and proportional control



OUT	Modulating fan output
POV	Fan output offset
SETP	Fan control set point
DIFF	Differential
Preg	Control pressure

Times
The times concerning both types of start are set on screen T3:
- Delay when starting the fan
- Delay between starts of the same fan
- Delay when stopping the fan

A constant delay time (10 seconds) is set between the start of the outlet fan and the start of the intake fan.

5.8.5 Alarms

Inputs used
Position of the outlet flow switch (D0)
Position of the intake flow switch (D0)
Position of the outlet cutout (D0)
Position of the intake cutout (D1)

Parameters used
Minimum outlet pressure set point for alarm (Pb)
Minimum intake pressure set point for alarm (Pb)
Enable the flow switch contact: none/outlet/intake/both (C6)
Air flow alarm delay time (T7)

Description of operation
The following alarms are used in the management of the fans:
- Outlet/intake air flow switch
- Outlet/intake fan cutout

The flow switch alarm is generated by:
- digital input
- pressure transducer with alarm threshold (settable)

The first possible causes of the outlet/intake air flow switch alarm depends simply on the status of the dedicated digital input. When using the pressure transducer, the controller compares the reading against a set point. If the pressure read is less than the set point for a set time (alarm delay time), the outlet/intake air flow switch alarm is activated.

The outlet/intake fan cutout alarm depends on the status of the dedicated digital input (or digital inputs).

5.9 Communication between the pCO^{XS} and Belimo controllers (MP-BUS protocol)

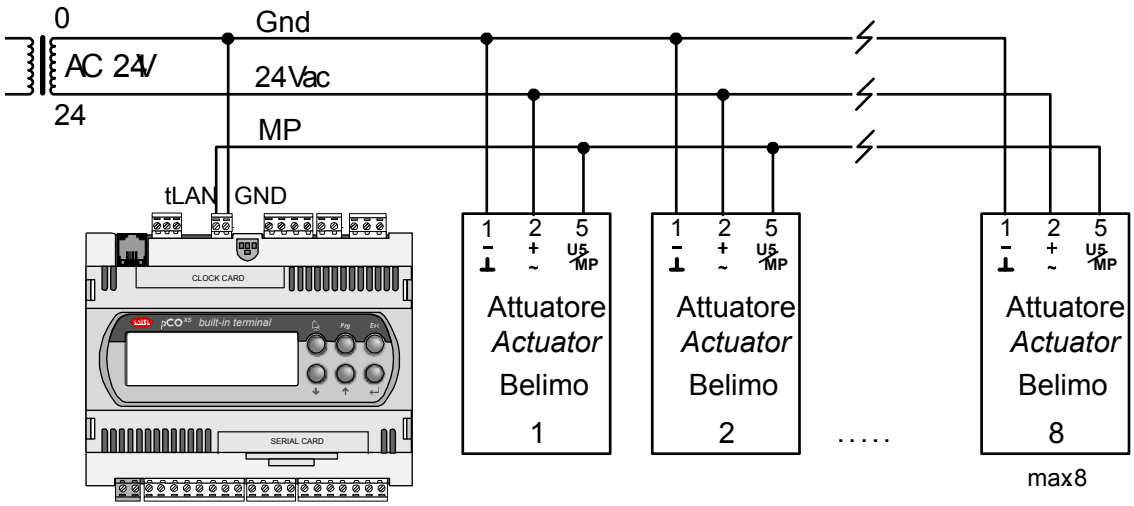
Parameters used
Number of devices present in the MP-BUS network (Cp)
Type of device connected (F1)

Description of operation
The MP-BUS protocol allows the pCO^{XS} to control up to 8 Belimo actuators.
The devices are managed in Master/Slave configuration, where the pCO^{XS} represents the Master, while the Belimo devices are the Slaves.
The following is the procedure for configuring a pCO^{XS}/Belimo network:

- **Identify the number of actuators connected:** Before setting the addresses, the number of devices present in the MP-BUS network must be declared (Cp)
- **Set the address of the devices:** All the devices in the MP-BUS network must be powered and the unit must be off. If the unit is on (COMFORT), the software will automatically shut it down. Pressing the two arrow buttons (UP-DOWN) together accesses the first configuration screen to start the address setting procedure.
  Each of these screens indicates (on the first row) the number of the device, if present, being configured (F1 to F8).
  To assist the procedure, instructions are provided on every screen.
  The addresses are assigned automatically by the pCO^{XS} board in sequence; for example, when configuring the third device, address 5 cannot be assigned, but rather address 3.
  The controller allows the device to be assigned an address that is already used. In this case, the device that previously had that position will lose its setting and be absent in the MP-BUS network.
- **Optional sensor connected to the device:** An optional sensor can be connected to each Belimo actuator:
  - NTC
  - 0 to 10 Volt
  - Digital input (e.g. pressure switch)

Each Belimo device present in the network must have an address, even if this has already been set during previous configurations.

pCO^{XS} – Belimo connection diagram



Alarm management

Three types of alarms are associated to the Belimo devices:

- **LAN:** this occurs when serial communication is absent between the pCO^{XS} and the Belimo devices. After 5 failed attempts by the pCO^{XS} to query one of the Belimo devices, the buzzer sounds (on the standard external LCD terminal) and the alarm screen is displayed.
  The alarm is featured for all the Belimo devices present in the network.

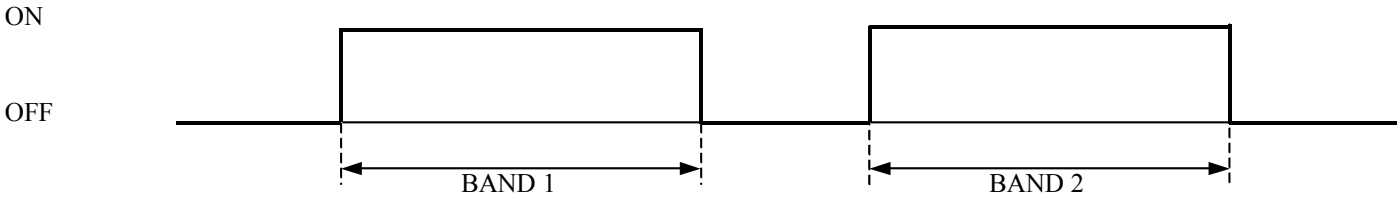
5.10 Time bands

Parameters used:
Time and date setting (K0)
Enable time band management (K1)
ON and off hours and minutes for the first A time band (K2)
Set point for the first A band (K2)
Intake and outlet fan set point for band A1 (K3)
ON and off hours and minutes for the second A time band (K4)
Set point for the second A band (K4)

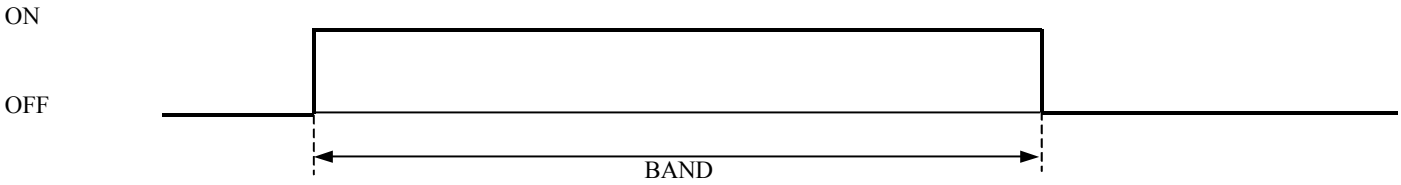
Intake and outlet fan set point for band A2 (K5)
ON and off hours and minutes for time band B (K6)
Set point of the type time band B (K6)
Intake and outlet fan set point for band B (K7)
Select the type of band for the days of the week (K9)

Description of operation
The system features a built-in clock with backup battery (optional on the pCO^{XS} board) that manages the time and date for all functions where these are required. The time and date can be set on screen K0.
Four different types of time bands can be selected:

- **Type A**: Used to set two bands per day with two different set points. Between the bands the unit is off:



- **Type B**: Used to set one band per day with corresponding set point.



- **Type C**: Used to set the unit in continuous operation, effectively meaning there are no time bands.
- **Type D**: Used to set the unit as being always off.

The following set points can be set for each band:
- Temperature control set point.
- Fan speed control set point.

If time band management is enabled, each day of the week must be associated with the type of band required.
The graphs show that the unit is only on for the times included in the interval, with control based on the relative set point, and then switches off in the times that are not within the interval.

5.11 Test devices

Devices used
Enable test devices (R0)
Open the heating valve (R1)
Open the cooling valve (R1)
Open the post-heating valve (R2)
Open the outside air Damper (R3)
Open the mixing air damper (R3)
Start the outlet inverter (R4)
Start the intake inverter (R4)
Start the rotary heat recovery unit (R5)
Start the analogue humidifier (R6)
Status of the digital outputs (R7)

The software features a test procedure for checking the operation of the devices connected.
In the manufacturer branch, selecting the item “TEST DEVICES” accesses a loop of screens (index “R”) showing the analogue and digital outputs that are enabled and managed by the controller.
The first screen displayed (R0) is used to enable the device test procedure; when enabling the procedure, all the digital and analogue outputs are set to 0 so as to allow them to be controlled using the parameters on the test screens.
The test procedure can be terminated as follows:
- Disabling the procedure (R0)
- Returning to the main screen M0 (after 5 minutes without pressing any button on the terminal).

6 ALARMS

The unit manages all the procedures relating to the individual alarms: action, delays, reset and signals. When an alarm is activated, the devices are affected accordingly, where featured, and the following actions are performed simultaneously: LED on, buzzer on (external terminal), screen displayed and saving of the event in the log.
To check which alarm is active, simply press the ALARM button, and use the UP/DOWN buttons to scroll to any other active alarms. To reset the relay and delete the alarms, display the alarm screen and press the ALARM button again.
Also see the ALARM button branch.

6.1 Special alarms

6.1.1 Operating hour alarms

Parameters used:
Reset the operating hours of the intake and outlet fan (A7)
Reset the operating hours of compressor 1-2 (A8)
Alarm threshold for fan operating hours (A5)
Alarm threshold for compressor operating hours (A6)

Description of operation.
This alarm is activated when the operating hours of a device (outlet fan, intake fan and compressors 1-2) exceed the threshold set.
N.B.
If the threshold is set to "0 hours", this function is deactivated and no operating hour alarms are generated.

6.1.2 Door switch alarm

Inputs used:
Position of the door switch (D6)
Parameters used:
Enable door switch protection (Cd)

Description of operation
The door switch alarm is activated when the controller detects the opening of the inspection/service door on the air handling unit.
This alarm acts by immediately switching off the fans and, as a consequence, all the devices on the unit.

6.2 Table of alarms

CODE	DESCRIPTION	DELAY	UNIT OFF	DEVICES OFF
AL01	Outlet flow switch	Settable	Yes	All
AL02	Intake flow switch	Settable	Yes	All
AL03	Dirty outlet air filter	60 seconds (fixed)	No	-
AL04	Dirty intake air filter	60 seconds (fixed)	No	-
AL05	Outlet fan cutout	No	Yes	All
AL06	Intake fan cutout	No	Yes	All
AL07	Compressor 1 cutout	No	No	Stop compressor
AL08	Compressor 2 cutout	No	No	Stop compressor 2
AL09	Pump cutout in heating	No	No	Stop the pump in heating
AL10	Pump cutout in cooling	No	No	Stop pump in cooling
AL11	Electric heater cutout	No	No	Stop compressor 1
AL12	High pressure switch compressor 1	Settable	No	Stop compressor 1
AL13	Low pressure switch compressor 1	No	No	Stop compressor 2
AL14	High pressure switch compressor 2	Settable	No	Stop compressor 2
AL15	Low pressure switch compressor 2	No	No	Stop the electric heaters
AL16	Humidifier alarm	No	No	Stop the humidifier
AL17	Fire/smoke	No	Yes	All
AL18	Heat recovery unit dirty	60 seconds (fixed)	No	-
AL19	Door open	No	Yes	All
AL20	Direct expansion fault	Settable	No	-
AL21	Antifreeze alarm	No	No	See paragraph on antifreeze alarm
AL22	Outlet pressure probe fault	30 seconds (fixed)	No	-
AL23	Intake pressure probe fault	30 seconds (fixed)	No	-
AL24	Outside humidity probe fault	30 seconds (fixed)	No	-
AL25	Outlet temperature probe fault	30 seconds (fixed)	No	-

AL26	Intake temperature probe fault	30 seconds (fixed)	No	-
AL27	Intake humidity probe fault	30 seconds (fixed)	No	-
AL28	Set point compensation probe fault	30 seconds (fixed)	No	-
AL29	Antifreeze temperature probe fault	30 seconds (fixed)	No	-
AL30	Discharge air probe fault	30 seconds (fixed)	No	-
AL31	Outside air temperature probe fault	30 seconds (fixed)	No	-
AL32	VOC air quality probe fault	30 seconds (fixed)	No	-
AL33	VOC+CO2 air quality probe fault	30 seconds (fixed)	No	-
AL34	Preheating probe fault	30 seconds (fixed)	No	-
AL35	Outlet humidity probe fault	30 seconds (fixed)	No	-
AL36	Defrost probe fault	30 seconds (fixed)	No	-
AL37	Compressor 1 maintenance	No	No	-
AL38	Compressor 2 maintenance	No	No	-
AL39	Outlet fan maintenance	No	No	-
AL40	Return fan maintenance	No	No	-
AL41	Clock board fault	No	No	-
AL42	Alarm on Belimo device 1	No	No	-
AL43	Alarm on Belimo device 2	No	No	-
AL44	Alarm on Belimo device 3	No	No	-
AL45	Alarm on Belimo device 4	No	No	-
AL46	Alarm on Belimo device 5	No	No	-
AL47	Alarm on Belimo device 6	No	No	-
AL48	Alarm on Belimo device 7	No	No	-
AL49	Alarm on Belimo device 8	No	No	-
AL50	Alarm from digital input on Belimo device	No	No	-
AL51	Generic filter digital input	No	No	

6.2.1 Alarms with manual reset

The alarms managed by the program protect the devices connected and emit signals if the control parameters deviate from the normal values or the board malfunctions. The alarms may derive from the alarm digital inputs, from the probes and from the board. The effect of the alarms ranges from signal-only to stopping one or more devices or shutting down the unit (OFF). Many alarms have settable delays.

When an alarm arises, the following signals are generated:
- the buzzer on the external terminal sounds (absent on the Built-In terminal and on the PGD external terminal)
- the red LED underneath the ALARM button comes on
- the main screen displays the unit status “AHU ALARM”

Pressing the Alarm button mutes the buzzer and displays the alarm screen. If there is more than one active alarm, once having accessed the alarm menu, simply use the arrow buttons to scroll all the alarms. Pressing any other button exits the alarm screens, however but these remain saved and are displayed again whenever the Alarm button is pressed.
To manually reset the alarms and delete the messages, simply open the alarm screen and press the Alarm button again; if the cause of the alarms are no longer present (digital inputs reset or temperatures returned to normal, etc.) the screens disappear, the red LED goes off and the message “NO ACTIVE ALARM” is displayed.
If the causes of one or more alarm are still present, only the alarms whose causes are no longer present will be cancelled, while the others remain displayed and the buzzer and red LED will come on again.
All the alarms have manual reset, and therefore to reset them the operator must act directly on the terminal of the unit.

6.2.2 Alarm log

Each record represents an event that can be displayed from the list of all the events available in the memory. The log is used to resolve problems and faults as it represents a “snapshot” of the installation at the moment the alarm was activated, and may suggest the possible causes and solutions to the faults.

The significant availability of memory space on the pCO² and pCO^{XS} boards can be used to save the events.
Without the clock card (optional on the pCO^{XS}, built-in on the pCO²), the log is not available.
A maximum of 150 events can be saved, and on reaching the hundred-and-fiftieth, that is, the last space available in the memory, the next alarm will be saved over the oldest alarm (001), which is thus cancelled, and so on for the subsequent events.
The events saved can be deleted by the user via the delete event log parameter on screen AY. The log screen can be accessed by selecting the “ALARM LOG” item in the main menu or by pressing the PRINTER button.

When an alarm is activated, the following data is saved:
- chronological number of the event (0 to 150)
- time
- date
- alarm description

- outlet air temperature
- intake air temperature

The chronological number of the event, in the top right corner, indicates “the age” of the event in the list of 150 records available. The alarm number 001 is the first event saved after the logs were enabled, and thus the oldest.
If the cursor is moved to the chronological number, the alarm log can be scrolled using the arrow buttons, from 1 to 150.
In position 001, pressing the down arrow has no effect.
If 15 alarms have been saved, in position 015, pressing the up arrow has no effect.

7 USER INTERFACE

The user interface of this application is divided into loops (branches) of screens:

- Screens not protected by password: these are found in all loops, except for "**prog**" and "**menu+prog**". They show the values read by the probes, the status of the alarms, the operating hours of the devices, the time and the date; in addition, they are used to set the set point (temperature and humidity) and the clock (these screens are indicated by the "❶"symbol in the list of screens).
- Password-protected **USER** screens (password 1234 - modifiable): these are accessed by pressing the "**prog**" button and are used to set the main functions (set point, differentials) of the devices connected.
  A password-protected **SERVICE section**, reserved for the service department, is used to manage the hour counts of the devices, calibrate the probes connected and manually activate the various devices (these screens are indicated by the "❷"symbol in the list of screens).
- Password-protected **MAINTENANCE** screens (password 1234 - modifiable): these are accessed by pressing the "**maint**" button and are used to periodically check the devices, calibrate the probes connected, modify the operating hours and manually manage the devices (these screens are indicated by the "❸"symbol in the list of screens).
  The first two screens in the maintenance menu (A0, A1) do not require password access, and contain information on the software and the controller board; the following two (again without password) contain information on the operating hours of the following devices: compressors 1-2, intake-outlet fans (these screens are indicated by the "❶" symbol in the list of the screens).
- Password-protected **MANUFACTURER** screens (password 1234 - modifiable): these are accessed by pressing the "**menu+prog**" buttons and are used to configure the unit and enable the main functions (the screens are indicated by the "❹"symbol in the list of screens).

N.B.: The screens that refer to functions that are not available are not displayed.

7.1 List of screens

Following is the list of screens shown on the display. The columns in the table represent the loops of screens, and the first screen (A0, B0…) is the one displayed when pressing the corresponding button; from there, the arrow buttons can be used to scroll to the other screens. The codes (Ax, Bx, C) are displayed in the top right corner of the screens for easy identification.
The meaning of the symbols ❶,❷…is explained in the previous paragraph. The symbol **PSW** indicates the screens that require the password to be entered.

menu		I/O		set	prog	
❶ M0	❶ A0	❶ I0	❶ K0	❶ S0	**PSW** P0	❶ F0
❶ M1	❶ A1	❶ I1	❶ K1	❶ S1	❷ P1	❶ F1
❶ M2	❶ A2	❶ I2	❶ K2	❶ S2	❷ P2	❶ F2
	❶ A3	❶ I3	❶ K3	❶ S3	❷ P3	❶ F3
	PSW A4	❶ I4	❶ K4	❶ S4	❷ P4	❶ F4
	❸ A5	❶ I5	❶ K5	❶ S5	❷ P5	❶ F5
	❸ A6	❶ I6	❶ K6	❶ S6	❷ P6	❶ F6
	❸ A7	❶ I7	❶ K7	❶ S7	❷ P7	❶ F7
	❸ A8	❶ I8	❶ K8	❶ S8	❷ P8	❶ F8
	❸ A9	❶ I9	❶ K9	❶ S9	❷ P9	❶ F9
	❸ Aa	❶ Ia	❶ Ka	❶ Sa	❷ Pa	❶ Fa
	❸ Ab	❶ Ib		❶ Sb	❷ Pb	❶ Fb
	❸ Ac	❶ Ic			❷ Pc	❶ Fc
	❸ Ad	❶ Id			❷ Pb	❶ Fd
	❸ Ae	❶ Ie			❷ Pe	❶ Fe
	❸ Af	❶ If			❷ Pf	❶ Ff
	❸ Ag	❶ Ig			❷ Pg	❶ Fg
	❸ Ah	❶ Ih			❷ Ph	❶ Fh
	❸ Ai				❷ Pi	❶ Fi
	❸ Aj				❷ Pj	❶ Fi
	❸ Ak				❷ Pl	
	❸ Al				❷ Pm	
	❸ Am				❷ Pn	
	❸ An				❷ Po	
	❸ Ap				❷ Pp	
	❸ Aq					
	❸ Ar					
	❸ As					
	❸ At					
	❸ Au					
	❸ Av					
	❸ Ax					
	❸ Ay					

PSW Z0
Conf.
C0
C1
C2
C3
C4
C5
C6
C7
C8
C9
Ca
Cb
Cc
Cd
Ce
Cf
Cg
Ch
Ci
Cj
Ck
Cl
Cm
Cn
Co
Cp

Dig. In
D0
D1
D3
D4
D5
D6
D7
D8
D9
Da
Db

Analog. In
E0
E1
E2
E3
E4
E5
E6
E7
E8
E9
Ea
Eb
Ec
Ed
Ee
Ef
Eg
Eh
Ei
Ej
Ek
El
Em
En
Eo
Ep
Eq
Er
Es
Et
Eu

Dig. Out
J0
J1
J2
J3
J4
J5
J6
J7
J8
J9
Ja
Jb
Jc
Jd
Je

An. Out
L0
L1
L2
L3
L4
L5
L6
L7

Param.
G0
G1
G2
G3
G4

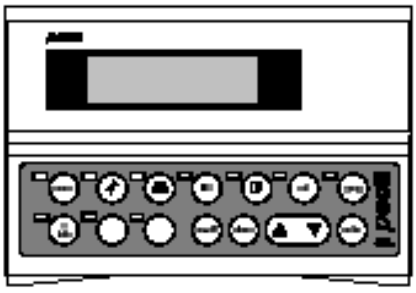
Timers.
T0
T1
T2
T3
T4
T5
T6
T7
T8

Initial.
V0
V1
V2
V3
V4
V5
V6

Test dev..
R0
R1
R2
R3
R4
R5
R6
R7

7.2 Terminals

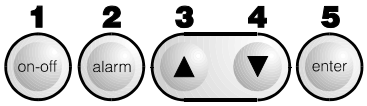
7.2.1 Standard external LCD



	Button	Description
	MENU	Pressed in all loops except for the **manufacturer** loop, returns to main screen in the Menu branch (M0) Pressed in the **manufacturer** loop returns to the manufacturer menu (Z1) Pressed on the main screen (M0) opens the menu of the loops available in the user interface.
	MAINTENANCE	Displays the values corresponding to the maintenance of the devices (operating hours of the device and reset hours, access the manual operation procedure) and the information on the software (+ change language) and the controller
	PRINTER	Accesses the alarm log

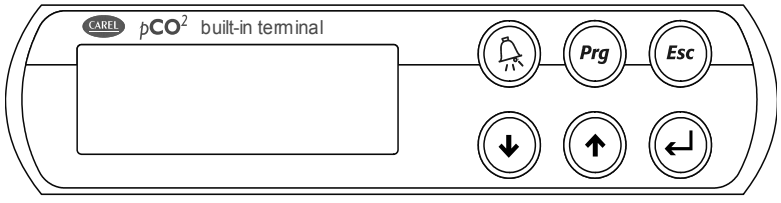
I/O	INPUTS AND OUTPUTS	Displays the status of the digital and analogue inputs and outputs
	CLOCK	Accesses the first screen in the Clock loop (K0) The clock loop is used to display / set the time and date and the on/off, temperature and humidity time bands
set	SET POINT	Used to set the set point and differentials
prog	PROGRAM	Used to set the various operating parameters (thresholds, delays etc.)
menu + prog	MENU+PROG	Accesses (after entering the password) the screens for setting the default values
info ?	INFO	Displays the version of the application software and other information on the unit

Functions of the silicon rubber buttons:



1. **ON/OFF** button: switches the unit on and off.
   -when the LED is off the unit is OFF.
   -when the LED is on (green) the unit is ON.
2. **ALARM** button: used to display the alarms, delete them and mute the alarm buzzer.
3. **UP ARROW:** this has three functions, 1. scroll to the previous screens in the same branch when the cursor is in the home position (top L); 2. increase the value of a setting field when the cursor is inside the field; for selection fields, on the other hand, pressing the arrow button displays the previous option; 3. if pressed on the main screen (M0) displays the unit start-up screen (M1)
4. **DOWN ARROW:** this has three functions, 1. scroll to the next screens in the same branch when the cursor is in the home position (top L); 2. decrease the value of a setting field when the cursor is inside the field; for selection fields, on the other hand, pressing the arrow button displays the next option; 3. if pressed on the main screen (M0) displays the unit start-up screen (M1)
5. **ENTER** button: used to move the cursor between the home position (in the top L) and the setting or selection fields, or to save the values set for the parameters after the cursor has left the setting fields;
6. **UP ARROW + DOWN ARROW:** pressing these together accesses the screen for setting the address of the devices in the MP-BUS network (F0).

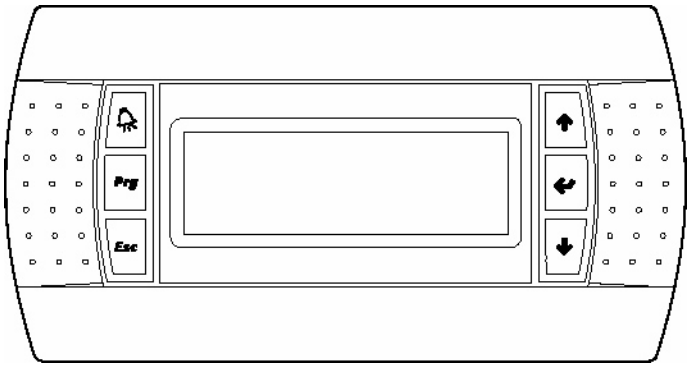
7.2.2 Built-in display



ALARM	**PROG**	**ESC**
UP	**DOWN**	**ENTER**

For the functions of the Alarm, Up arrow, Down arrow and Enter buttons on the Built-in terminal, see the external terminal.
ON/OFF: as there is no ON/OFF button, the unit is switched on or off by accessing the ON/off screen (M1), pressing the **UP ARROW** or **DOWN ARROW** on the main screen (M0).
LOOP OF SCREENS: as there are no buttons that directly enter the loop of screens, simply press the **ESC** button to display the list of the loops, then use the arrow buttons to select the desired loop and confirm by pressing **ENTER**.

7.2.3 pGD DISPLAY



The operation of the PGD0 terminal is very similar to the Built-In terminal (access to the loop of screens, on/off, etc.)
To switch between boards using a shared terminal PGD, access screen M2 by pressing the **UP** or **DOWN** buttons on screen M0 (main screen).

7.3 List of parameters

This table contains the list of all the parameters that appear on the screens, with the corresponding description.
Parameter: text shown on the screen;
Type: read (R), read/write (R/W);
Ref.: index of the screen;
Description: brief description of the parameter;
UOM.: unit of measure;
Range: range of values;
Default: default value set by the manufacturer
Note: column available for the user's notes.

IMPORTANT: <u>Not all the screens listed below will be displayed by scrolling the cursor; enabling a certain type of configuration may mean that the associated screens, previously not present, will now be displayed. This therefore depends on the initial configuration!</u>

Parameter	Type	Ref.	Description	UOM	Range	Default	Note
MAIN SCREEN			**15 button terminal MENU button** **6 button PGD or Built-In terminal ESC button**				
Room Temp.:	R	M0	Temperature measured by the temperature sensor located at the intake	°C	Screen Cc		
Room humi.:	R	M0	Humidity measured by the humidity sensor located at the intake	%	Screen Cd		
Unit status:	R/W	M1	Display the status of the unit		COMFORT/ UNIT OFF		
Switch to unit Address: **Current unit:**	R/W	M2	Switch between boards on the shared terminal (PGD terminals only)		Unit present		
CLOCK			**15 button terminal CLOCK button** **6 button PGD or Built-In terminal PRG and CLOCK button in the menu**				
Clock Hour:	R/W	K0	Set hour, minutes		0 to 23, 0 to 59		
Date:	R/W	K0	Set day, month, year		1 to 31, 1 to 12, 0 to 99		
Day:	R/W	K0	Set the weekday	-			
Enable time Zone:	R/W	K1	Enable time band with set point variation	-	N/Y	N	
Timing zone A-1 1) ON=	R/W	K2	Start hours and minutes for first A time band	h. and min.	0 to 23, 0 to 59		-
Timing zone A-1 OFF=	R/W	K2	End hours and minutes for first A time band	h. and min	0 to 23, 0 to 59		-
Temperature setpoint Timing z.A-1	R/W	K2	Set point relating to the first A time band	°C	Min. lim./ max. lim		-
Timing zone A-1	R/W	K3	Set point relating to the pressure control of the outlet fan in	%	0 to 1000		

Parameter	Type	Ref.	Description	UOM	Range	Default	Note
Setpoint Inverter Supply fan:			band A1				
Return fan:	R/W	K3	Set point relating to the pressure control of the intake fan in band A1	%	0 to 1000		
Timing zone A-2 2) ON=	R/W	K4	Start hours and minutes for second A time band	h. and min	0 to 23, 0 to 59		-
Timing zone A-2 OFF=	R/W	K4	End hours and minutes for second A time band	h. and min	0 to 23, 0 to 59		-
Temperature setpoint Timing z.A-2:	R/W	K4	Set point relating to the second A time band	°C	-200T999		-
Timing zone A-2 Setpoint Inverter Supply fan:	R/W	K5	Set point relating to the pressure control of the outlet fan in band A2	%	0 to 1000		
Return fan:	R/W	K5	Set point relating to the pressure control of the intake fan in band A2	%	0 to 1000		
Timing zone B ON=	R/W	K6	Start hours and minutes for time band B	h. and min	0 to 23, 0 to 59		-
Timing zone B OFF=	R/W	K6	End hours and minutes for time band B	h. and min	0 to 23, 0 to 59		-
Temperature setpoint Timing z. B:	R/W	K6	Set point relating to time band B	°C	Min. lim./ max. lim		-
Timing zone B Setpoint inverter Supply fan:	R/W	K7	Set point relating to the pressure control of the outlet fan in band B	%	0 to 1000		
Return fan:	R/W	K7	Set point relating to the pressure control of the intake fan in band B	%	0 to 1000		
Central Timing Zone C always ON	W	K8		-	-		-
Central Timing Zone D always OFF	W	K8		-	-		-
Weekly timing zone Mon: Tue: Wed:.....	R/W	K9	Select the type of time band for each day of the week	-	A/B/C/D		-
Clock not present	R	Ka					
INPUTS/OUTPUTS			**15 button terminal INPUT/OUTPUT button**	**6 button PGD or Built-In terminal PRG and INPUT/OUTPUT button in the menu**			
Temperature probe Room:	R	I0	Display the temperature read by the intake probe	°C	Probe limits	-	-
Supply:	R	I0	Display the temperature read by the outlet probe	°C	Probe limits	-	-
Temp.Probes External:	R	I1	Display the temperature read by the outside probe	°C	Probe limits		-
Ejection:	R	I1	Display the temperature read by the discharge probe	°C	Probe limits		-
Humidity probes Room:	R	I2	Display the humidity read by the intake probe	%	Probe limits		-
Supply:	R	I2	Display the humidity read by the outlet probe	%	Probe limits		-
External:	R	I2	Display the humidity read by the outside probe	%	Probe limits		
Temp. probes Antifreeze:	R	I3	Display the temperature read by the antifreeze probe	°C	Probe limits		-
Defrost:	R	I3	Display the temperature read by the defrost probe	%	Probe limits		-
Pressure probe Supply:	R	I4	Display the pressure read by the outlet probe	Pa			-
Room:	R	I4	Display the pressure read by the intake probe	Pa	Probe limits		-
Air qualità probes VOC:	R	I5	Display the % of VOC present in the air	Ppm	Probe limits		-
CO2:	R	I5	Display the % of CO2 present in the air	Ppm	Probe limits		-
Probes compensation Setpoint:	R	I6	Display the temperature read by the compensation probe	°C	Probe limits		-
Preheating:	R	I6	Display the preheating temperature	°C	Probe limits		-
Entalpy Internal:	R	I7	Display the inside enthalpy calculated by the pCO	kcal/kg			-
External: expressed in kcal/kg	R	I7	Display the outside enthalpy calculated by the pCO	kcal/kg			

Parameter	Type	Ref.	Description	UOM	Range	Default	Note
Entalpy setpoint (Regarding T. andH. setp. in kcal/kg)	R	I8	Display the enthalpy set point	kcal/kg			
Digital Input (C=close O=open) 01: :10 11: :18	R	I9	Status of digital inputs 1 to 18 (C) = closed (O) = open	-	C/O		
Analog output valve Heating:	R	Ia	Display the opening of the valve in heating	%	0 to 100		
Cooling:	R	Ia	Display the opening of the valve in cooling	%	0 to 100		
Analog output Mixing valve:	R	Ib	Display the opening of the mixed valve	%	0 to 100		
Analogs outputs Post-heating valve	R	Ic	Display the opening of the valve in post-heating	%	0 to 100		
Dampers outputs Air External:	R	Id	Display the opening of the outside air damper	%	0 to 100		
Mixing:	R	Id	Display the opening of the mixing air damper	%	0 to 100		
Analog output Fans Supply:	R	Ie	Display the outlet fan speed	%	0 to 100		
Return:	R	Ie	Display the intake fan speed	%	0 to 100		
Analog outputs Rotative heating recovery:	R	If	Display the speed of the rotary heat recovery unit	%	0 to 100		
Analog output Humidifier:	R	Ig	Display the opening of the humidifier output	%	0 to 100		
Digitals outputs (C=Close O=Open) 01: :10 11: :18	R	Ih	Status of digital outputs 1 to 18 (C) = closed (O) = open	-	C/O		
SET POINT			**15 button terminal SET POINT button**	**6 button PGD or Built-In terminal PRG and SET POINT button in the menu**			
Active Temperature Setpoint:	R	S0	Display the set point used for control	°C			
Room regulation Setpoint:	R/W	S1	Set the set point for control with the intake probe	°C	-999T999		
Differen.:	R/W	S1	Set the differential for control with the intake probe	K	-999 to 999		
Neutral Z.:	R/W	S1	Set the dead zone for control with the intake probe	K	-99 to 99		
Supply regulation Setpoint:	R/W	S2	Set the set point for control with the outlet probe	°C	-999T999		
Differen.:	R/W	S2	Set the differential for control with the outlet probe	K	-999 to 999		
Neutral Z.:	R/W	S2	Set the dead zone for control with the outlet probe	K	-99 to 99		
Humid.regulation Room set.:	R/W	S3	Set the set point for control with the intake humidity probe	%rH	-999 to 999		
Differen.:	R/W	S3	Set the differential for control with the intake humidity probe	%rH	-999 to 999		
Neutral Z.:	R/W	S3	Set the dead zone for control with the intake humidity probe	%rH	-99 to 99		
Fan-Coil manual management I speed	R/W	S4	Select the speed of the fan coil controlled with manual management		I, II, III		
Heat recovery Setpoints cross flow:	R/W	S5	Set the set point for the activation of the heat recovery unit a double coil	°C	0T999		
Heating rotative recovery Setpoint:	R/W	S6	Set the set point for the activation of the rotary heat recovery unit expressed by the difference between the outlet temperature and the discharge temperature	K	0 to 999		
Diff.:	R/W	S6	Set the differential for the activation of the rotary heat recovery unit	K	0 to 999		
Reg.pre heating Set point:	R/W	S7	Set the set point for managing preheating	°C	-999T999		
Differen.:	R/W	S7	Set the differential for managing preheating	K	-999 to 999		
Integr.time:	R/W	S7	Set the integration time for managing preheating	s	0 to 999		
Air Qual.Reg. VOC	R/W	S8	Set the set point for managing the outside damper with the	%	0 to 999	30	

Parameter	Type	Ref.	Description	UOM	Range	Default	Note
Setpoint:			VOC air quality probe				
Differen.:	R/W	S8	Set the differential for managing the outside damper with the VOC air quality probe	%	0 to 999	20	
Neutral Z.:	R/W	S8	Set the dead zone for managing the outside damper with the VOC air quality probe	%	0 to 999	0	
Air Qual.Reg. CO2 Setpoint:	R/W	S9	Set the set point for managing the outside damper with the CO2 air quality probe	ppm	0 to 2500	500	
Differen.:	R/W	S9	Set the differential for managing the outside damper with the CO2 air quality probe	ppm	0 to 999	100	
Neutral Z.:	R/W	S9	Set the dead zone for managing the outside damper with the CO2 air quality probe	ppm	0 to 999	0	
Cooling/Heating from external temp. setpoint:	R/W	Sa	Set the set point for changing from heating to cooling and vice-versa based on the temperature read by the outside probe	°C	0T999		
Dig.In Setpoint Room:	R/W	Sb	Set the set point for control with the intake probe selectable by digital input	°C	-999T999		
Supply:	R/W	Sb	Set the set point for control with the outlet probe selectable by digital input	°C	-999T999		
MAINTENANCE			**15 button terminal MAINTENANCE button** **6 button PGD or Built-In terminal PRG and MAINTENANCE button in the menu**				
CAREL S.p.A. FLSTDMAHUA VerX.XXX XX/XX/XX Language:	R/W	A0	Software version screen, contains the code, version and date of the software installed in the board. The "Language" parameter is used to select the language displayed on the user interface.		GERMAN ENGLISH FRENCH ITALIAN		
Bios: Boot: pCO: Manual: +030220261 starting by ver:2.0	R	A1	Screen containing file system information (boot-bios) and the size of the pCO board.				
Working hours Supply fan :	R	A2	Outlet fan operating hours	H			
Return fan :	R	A2	Intake fan operating hours	H			
Working hours Compressor 1:	R	A3	Compressor no 1 operating hours	H			
Compressor 2:	R	A3	Compressor no 2 operating hours	H			
Password Maintenance	R/W	A4	Set the password to enter the maintenance menu				
Fans Working hours Threshold:	R/W	A5	Set the maintenance alarm threshold for the fans	H	1 to 999		
Compressors Working hours Threshold:	R/W	A6	Set the maintenance alarm threshold for the compressors	H	1 to 999		
Reset counter Supply fan:	R/W	A7	Reset the hour counter for the outlet fan				
Return fan:	R/W	A7	Reset the hour counter for the intake fan				
Reset hour count. compressors Compressor 1:	R/W	A8	Reset the hour counter for compressor 1				
Compressor 2:	R/W	A8	Reset the hour counter for compressor 2				
Pressure probe offset Supply:	R/W	A9	Value to be added to or subtracted from the value read by the outlet pressure probe / Value read by the probe	Pascal	-99 to 99		
Room:	R/W	A9	Value to be added to or subtracted from the value read by the intake pressure probe / Value read by the probe	Pascal	-99 to 99		
Temp. probes offset Room:	R/W	Aa	Value to be added to or subtracted from the value read by the intake temperature probe/ Value read by the probe	°C	-99T99		
Supply:	R/W	Aa	Value to be added to or subtracted from the value read by the outlet temperature probe / Value read by the probe	°C	-99T99		
Temp. probes offset Exte.:	R/W	Ab	Value to be added to or subtracted from the value read by the outside temperature probe/ Value read by the probe	°C	-99T99		
Eject.:	R/W	Ab	Value to be added to or subtracted from the value read by the discharge temperature probe / Value read by the probe	°C	-99T99		
Humid.p.offset Room:	R/W	Ac	Value to be added to or subtracted from the value read by the intake humidity probe/ Value read by the probe	%rH	-99 to 99		

Parameter	Type	Ref.	Description	UOM	Range	Default	Note
Suppl:	R/W	Ac	Value to be added to or subtracted from the value read by the outlet humidity probe / Value read by the probe	%rH	-99 to 99		
Exte.:	R/W	Ac	Value to be added to or subtracted from the value read by the outside humidity probe/ Value read by the probe	%rH	-99 to 99		
Air quality probe Offset VOC:	R/W	Ad	Value to be added to or subtracted from the value read by the VOC air quality probe / Value read by the probe	%	-99 to 99		
CO2:	R/W	Ad	Value to be added to or subtracted from the value read by the CO2 air quality probe / Value read by the probe	%	-99 to 99		
Compensat. Probe offset Setp.:	R/W	Ae	Value to be added to or subtracted from the value read by the set point compensation probe / Value read by the probe	°C	-99T99		
Temperature probe offset Antifr:	R/W	Af	Value to be added to or subtracted from the value read by the antifreeze temperature probe / Value read by the probe	°C	-99T99		
Pre-H.:	R/W	Af	Value to be added to or subtracted from the value read by the preheating temperature probe / Value read by the probe	°C	-99T99		
Temperature probes offset Defrost:	R/W	Ag	Value to be added to or subtracted from the value read by the defrost temperature probe / Value read by the probe	°C	-99T99		
Belimo 1/ Serial number(1):	R	Ah	Serial number of the Belimo device configured				
Belimo 1/ Ver.HW	R	Ai	Hardware version of the Belimo device configured				
Ver.BIOS	R	Ai	BIOS version of the Belimo device configured				
Belimo 2/ Serial number (2):	R	Aj	Serial number of the Belimo device configured				
Belimo 2/ Ver.HW	R	Ak	Hardware version of the Belimo device configured				
Ver.BIOS	R	Ak	BIOS version of the Belimo device configured				
Belimo 3/ Serial number (3):	R	Al	Serial number of the Belimo device configured				
Ver.HW	R	Am	Hardware version of the Belimo device configured				
Ver.BIOS	R	Am	BIOS version of the Belimo device configured				
Belimo 4/ Serial number (4):	R	An	Serial number of the Belimo device configured				
Ver.HW	R	Ao	Hardware version of the Belimo device configured				
Ver.BIOS	R	Ao	BIOS version of the Belimo device configured				
Belimo 5/ Serial number (5):	R	Ap	Serial number of the Belimo device configured				
Ver.HW	R	Aq	Hardware version of the Belimo device configured				
Ver.BIOS	R	Aq	BIOS version of the Belimo device configured				
Belimo 6/ Serial number (6):	R	Ar	Serial number of the Belimo device configured				
Ver.HW	R	As	Hardware version of the Belimo device configured				
Ver.BIOS	R	As	BIOS version of the Belimo device configured				
Belimo 7/ Serial number (7):	R	At	Serial number of the Belimo device configured				
Ver.HW	R	Au	Hardware version of the Belimo device configured				
Ver.BIOS	R	Au	BIOS version of the Belimo device configured				
Belimo 8/ Serial number (8):	R	Av	Serial number of the Belimo device configured				
Ver.HW	R	Ax	Hardware version of the Belimo device configured				
Ver.BIOS	R	Ax	BIOS version of the Belimo device configured				
Delete Hystorical Alarms:	R/W	Ay	Delete the memory dedicated to the alarm log				

Parameter	Type	Ref.	Description	UOM	Range	Default	Note
USER			**15 button terminal** **PROG button**	**6 button PGD or Built-In terminal** **PRG and USER button in the menu**			
Password User :	R/W	P0	Enter user password		0 to 9999	0	
Heaters Number:	R/W	P1	Set the number of electric heaters used on the unit		0 to 3		
Modify heaters threshold:	R/W	P1	Enable modification of the activation set point and differentials for each individual heater		Y/N		
Heaters param. Heat.Setp.1: Heat.Setp.2: Heat.Setp.3:	R/W	P2	Set the activation set point for the first, second and third heater. The value is expressed as a percentage of the control differential	%	0 to 100		
Heaters param. Heat.Diff.1: Heat.Diff.2: Heat.Diff.3:	R/W	P3	Set the activation differential for the first, second and third heater, expressed as a percentage of the control differential	%	0 to 49		
Direct expansion number:	R/W	P4	Set the number of direct expansions used on the unit		0 to 3		
Modify direct expansions number:	R/W	P4	Enable modification of the set point and differentials of intervention for each individual step of direct expansion		Y/N		
Direct expansion Setp.1: Setp.2: Setp.3:	R/W	P5	Set the activation set point for the first, second and third direct expansion stage, expressed as a percentage of the control differential	%	0 to 100		
Direct expansion Diff.1: Diff.2: Diff.3:	R/W	P6	Set the activation differential for the first, second and third direct expansion stage, expressed as a percentage of the control differential	%	0 to 49		
Fan speed number enabled:	R/W	P7	Set the number of fan coil speeds enabled		0 to 3		
Defrost relay Configuration Setpoint:	R/W	P8	Activation set point of the defrost digital output	°C	-22T350	50	
Diff.:	R/W	P8	Activation differential of the defrost digital output	K	0 to 100		
Setpoint alarm NTC probe antifreeze	R/W	P9	Set the set point for the antifreeze alarm	°C	-10T100		
Minimum opening damper:	R/W	Pa	Minimum opening of the outside air damper	%	0 to 100		
Fixed opening damper:	R/W	Pa	Fixed opening of the outside air damper	%	0 to 100		
Minimum air flux Supply:	R/W	Pb	Minimum pressure differential allowed for the outlet fan, below this value an alarm is generated	Pascal	0 to 9999		
Room:	R/W	Pb	Minimum pressure differential allowed for the intake fan, below this value an alarm is generated	Pascal	0 to 9999		
Winter starter Setpoint:	R/W	Pc	Set the set point for the activation of winter start-up	°C	-999T999		
Time:	R/W	Pc	Set the duration of the winter start-up	s	0 to 999		
Setpoint stop Recovery external Temperature:	R/W	Pd	Set point to the stop heat recovery unit based on the temperature read by the outside temperature probe	°C	-100T100		
Supply setpoint Low temp.limit:	R/W	Pe	Enable lower limit based on the outlet temperature	-	Y/N		
Supply set.:	R/W	Pe	Set the outlet set point to be used as the lower limit	°C	0T999		
Diff.:	R/W	Pe	Set the outlet differential to be used with the lower limit	K	0 to 999		
High supply temp. limits :	R/W	Pf	Enable upper limit based of the outlet temperature		Y/N		
Supply set.:	R/W	Pf	Outlet set point to be used as the upper limit	°C	0T999		
Diff.:	R/W	Pf	Outlet differential to be used with the upper limit	K	0 to 999		
High supply humidity limit:	R/W	Pg	Enable upper limit based on the outlet humidity		Y/N		
Supply set.:	R/W	Pg	Outlet set point to be used as the upper limit		0 to 999		
Diff.:	R/W	Pg	Outlet differential to be used with the upper limit		0 to 999		
Compensat. set Enable:	R/W	Ph	Type of signal used by the compensation probe		Y/N		

Parameter	Type	Ref.	Description	UOM	Range	Default	Note
Probes:	R/W	Ph	Select the probe used for the compensation of the set point		---/Out Temp./Room Temp./Sens or Comp		
Setpoint:	R/W	Ph	Select the set point to be compensated	°C	---/Room Set./Outlet Set.		
Compensation Set Minimum set:	R/W	Pi	Set the start compensation value	K	0 to 1000		
Maximum set:	R/W	Pi	Set the compensation differential	K	0 to 100		
Comp. diff.:	R/W	Pi	Maximum value that the set point can reach in compensation	K	-100 to 100		
Type free Cooling/heating:	R/W	Pj	Set the type of freecooling and freeheating		Not enabled/ Temperature /Humidity/ Enthalpy		
Delta freecooling freeheating:	R/W	Pk	Set the freecooling and freeheating differential	°C	-99T99		
Freecool/heating working time:	R/W	Pl	Set the duration of freecooling/freeheating operation only	min	0 to 999		
Freecool/Heating enthalpy Delta:	R/W	Pm	Set the delta for freecooling/heating by enthalpy	kcal/kg	-9999 to 9999		
Offs.:	R/W	Pm	Set the differential for freecooling/heating by enthalpy	kcal/kg	-9999 to 9999		
Atmospheric Pressure:	R/W	Pn	Enter the atmospheric pressure value	Pascal	600 to 1100		
Enable restart After black-out :	R/W	Po	Enable restart unit after blackout		Y/N		
Off by remote ID:	R/W	Po	Enable automatic start of the unit after stopping, from remote digital input and from the supervisor		Y/N		
Off by Superv. :	R/W	Po	Enable automatic start of the unit after stopping from the supervisor		Y/N		
Dig.In Setpoint change enable	R/W	Pp	Enable change set point from digital input		Y/N		
MANUFACTURER			**15 button terminal PROG + MENU button**	**6 button PGD or Built-In terminal PRG and MANUFACTURER button in the menu**			
Password Manufacturer	R/W	Z0	Enter manufacturer password		0 to 9999	0	
CONFIGURATION →							
Regulation type:	R/W	C0	Select the control probe		Automatic/ Fixed point		
Mode change with/ Regulation probe:	R/W	C0					
SUPPLY TEMPERATURE, ROOM TEMPERATURE, EXTERNAL THERMOSTAT	R/W	C0	Select the regulation probe		Supply Temperature , Room Temperature , External Thermostat		
Ext.air damper	R/W	C1	Selection type of control for the outside air damper		Analog/ ON/OFF/ Fixed opening		
Damper output:	R/W	C1	Selection type of control of the damper outputs		One Output, Different Output		
Air camper Mixing:	R/W	C2	Enable mixing air damper		Y/N		
Expulsion:	R/W	C2	Enable discharge air damper		Y/N		
Heating/Cooling:	R/W	C3	Select the device to change the operating mode		External Temp./ Keyboard Din/ Regulation probe		

Parameter	Type	Ref.	Description	UOM	Range	Default	Note
	R/W	C3	Select the operating mode from the screen		Cool/heat		
Status:	R	C3	Display the current status		Cool/heat		
Ventilation:	R/W	C4	Select the type of fan operation.		Thermostat/ Continuous/ Fan coil/ Man. External Therm.		
Star-delta	R/W	C4	Select the type of fans controlled		Direct/ Star delta/ Inverter		
Automatic	R/W	C4	Select the type of control for the operation of the fans		Automatic/ Manual		
Thermic fans:	R/W	C5	Enable fan cutout		No Filter ,Supply, Return, Supply+Retur		
Air filter:	R/W	C5	Enable air filter		No Filter, Supply, Return, Supply+Ret		
Flux air controll Din:	R/W	C6	Enable digital control of the air flow		No Flux Air, Supply, Return, Supply+Retur		
Ain:	R/W	C6	Enable analogue control of the air flow		No Flux Air, Supply, Return, Supply+Retur		
Humidific	R/W	C7	Enable and select of the humidifier control output		Disabled/ Digital output/ Analogue output		
Enable Dehumidific:	R/W	C8	Enable dehumidification management		Y/N		
Priority during Dehum.:	R/W	C8	Enable the priority of temperature over humidity during the dehumidification request		Humidity/ Temperature		
Defrost output Relay:	R/W	C9	Enable defrost relay output		Y/N		
Antifreeze :	R/W	C9	Select the type of antifreeze alarm		Not enabled/ NTC probe/ Digital In/ NTC probe+Din		
Winter starter:	R/W	Ca	Enable winter start-up mode		Y/N		
Pump thermic:	R/W	Ca	Enable and select the position of the pump cutout		None/ Cool/ heat/cool + heat		
Clock board Present:	R/W	Cb	Enable the clock card on the pCO^{XS} controller		Y/N		
Enable air quality control:	R/W	Cb	Enable air quality control		Y/N		
Heating recovery:	R/W	Cc	Enable and select the type of heat recovery unit used		Disable/ Cross-Flow/ Double Battery /Rotative		
Filter rec.:	R/W	Cc	Enable the heat recovery unit dirty alarm		Y/N		
By-pass damp.:	R/W	Cc	Enable and select bypass damper control		N/ Digit./ Analogue.		

Parameter	Type	Ref.	Description	UOM	Range	Default	Note
Digital imput Protection: Fire/Smoke :	R/W	Cd	Enable the fire/smoke alarm		Y/N		
Switch door :	R/W	Cd	Enable the inspection door open alarm		Y/N		
Compressor:	R/W	Ce	Enable the compressors		Y/N		
Rotation:	R/W	Ce	Enable rotation of the compressors		Y/N		
Thermic 1:	R/W	Ce	Enable compressor 1 cutout		Y/N		
Thermic 2:	R/W	Ce	Enable compressor 2 cutout		Y/N		
Safety compressors HP 1-2:	R/W	Cf	Enable the high pressure switch alarm for compressors 1-2		Y/N		
LP 1-2:	R/W	Cf	Enable the low pressure switch alarm for compressors 1-2		Y/N		
Heating coil Module:	R/W	Cg	Enable and configure the heating coil		Disable/ Heating / Preheat.		
Heating Regulation probe:	R/W	Ch	Select the device used to control the heating coil		Room temp./ Supply temp./ Saturation Temp.		
Reg.device Heating:	R/W	Ci	Select the device used to control heating		3-points valve/ Modulating valve/ electr. heaters		
Cooling regulation	R/W	Cj	Select the device used to control the cooling coil		Modulating valve/ 3-points valve/ Direct expansion / Not enabled		
Number steps:	R/W	Cj	Number of stages enabled for management of the direct expansion coil		1 to 3		
Cooling Regulation Probe:	R/W	Ck	Select the probe used to control cooling		Room temp/ Supply temp		
Cool/Heat Battery:	R/W	Cl	Enable the mixed heating/cooling valve		Y/N		
Enable Post-Heat:	R/W	Cm	Enable and select of the type of post-heating		Not enabled/ Compen on dehum/ Compen + integration		
Postheating Regulation Probe:	R/W	Cn	Select the post-heating control probe		Room temp/ Supply temp/ Saturation temp		
Reg. device Post-heating	R/W	Co	Select the device used to manage post-heating		3-point valve/ Modulating valve/ electr. heaters		
Number Belimo devices:	R/W	Cp	Set the number of Belimo devices connected to the pCO^{XS}		1 to 8		
Device On-line	R	Cp	Display the Belimo devices on-line				
DIGITAL INPUTS →							
Digital input Supply flow-sw.	R/W	D0	Select the position of the outlet fan flow switch		1 to 18		
Return flow-sw.	R/W	D0	Select the position of the intake fan flow switch		1 to 18		
Therm.supply fan	R/W	D0	Select the position of the outlet fan cutout		1 to 18		
Therm ret.fan	R/W	D1	Select the position of the intake fan cutout		1 to 18		
Therm.heaters	R/W	D1	Select the position of the electric heater cutout		1 to 18		
Therm.H.pump	R/W	D1	Select the position of the pump cutout in heating		1 to 18		

Parameter	Type	Ref.	Description	UOM	Range	Default	Note
Therm.C.pump	R/W	D2	Select the position of the pump cutout in cooling		1 to 18		
Therm.compr.1	R/W	D2	Select the position of the compressor 1 cutout		1 to 18		
Therm.compr.2	R/W	D2	Select the position of the compressor 2 cutout		1 to 18		
Al.Humidifier	R/W	D3	Select the position of the dig. input for the humidifier alarm		1 to 18		
LP Compressor 1	R/W	D3	Select the position of the low pressure switch for compressor 1		1 to 18		
LP Compressor 2	R/W	D3	Select the position of the low pressure switch for compressor 2		1 to 18		
External on/off	R/W	D4	Select the position of the external ON/OFF contact		1 to 18		
HP Compressor 1	R/W	D4	Select the position of the high pressure switch for compressor 1		1 to 18		
HP Compressor 2	R/W	D4	Select the position of the high pressure switch for compressor 2		1 to 18		
Antifreeze	R/W	D5	Select the position of the antifreeze thermostat		1 to 18		
Supply filter	R/W	D5	Select the position of the outlet filter		1 to 18		
Return filter	R/W	D5	Select the position of the intake filter		1 to 18		
Fire/Smoke	R/W	D6	Select the position of the fire/smoke sensor		1 to 18		
Filter HeatR.	R/W	D6	Select the position of the pressure switch for the heat recovery unit dirty alarm		1 to 18		
Door switch	R/W	D6	Select the position of the door open switch		1 to 18		
Cold Ext.prot.	R/W	D7	Select the position of the cold outside temp. protection		1 to 18		
Cold by ID	R/W	D7	Select the position of the heating/cooling input		1 to 18		
Generic filter	R/W	D7	Select the position of the generic filter input		1 to 18		
I.D.Ext.Therm.Fan Input 1	R/W	D8	Select the position of the first input for the control of the 3 fans by an external thermostat		1 to 18		
Input 2	R/W	D8	Select the position of the second input for the control of the 3 fans by an external thermostat		1 to 18		
Input 3	R/W	D8	Select the position of the third input for the control of the 3 fans by an external thermostat		1 to 18		
Change regulation Setpoint by Digital	R/W	D9	Select the position of the digital input to change the control set point		1 to 18		
Dig.Input logic 1……9	R/W	Da	Configure the logic of digital inputs from 1 to 9		1 to 18		
Dig.Input logic 10……18	R/W	Db	Configure the logic of digital inputs from 10 to 18		1 to 18		
ANALOGUE INPUTS →							
Probe position Supply press.:	R/W	E0	Select the position of the outlet pressure probe		1 to 10		
Return press.:	R/W	E0	Select the position of the intake pressure probe		1 to 10		
Probe type Supply press.:	R/W	E1	Type of signal used by the outlet pressure probe		0 to 1V / 0 to 10 V / 0 to 20mA / 4 to 20mA		
Return press.:	R/W	E1	Type of signal used by the intake pressure probe		0 to 1V / 0 to 10 V / 0 to 20mA / 4 to 20mA		
Probes limit Supply pressure Minimum:	R/W	E2	Minimum value read by the outlet pressure probe	Pa			
Maximum:	R/W	E2	Maximum value read by the outlet pressure probe	Pa			
Probes limit Return pressure Minimum:	R/W	E3	Minimum value read by the intake pressure probe	Pa			
Maximum:	R/W	E3	Maximum value read by the intake pressure probe	Pa			
Probe position Room temp. :	R/W	E4	Select the position of the intake temperature probe		1 to 10		
Supply temp.:	R/W	E4	Select the position of the outlet probe		1 to 10		
Probe type Room temp. :	R/W	E5	Type of signal used by the intake probe		PT1000 / NTC / 0 to 20mA / 4 to 20mA / 0 to 1V /		

Parameter	Type	Ref.	Description	UOM	Range	Default	Note
					0 to 10V		
Supply temp.:	R/W	E5	Type of signal used by the outlet probe		PT1000 / NTC / 0 to 20mA / 4 to 20mA / 0 to 1V / 0 to 10V		
Probes limit Return temperature Minimum:	R/W	E6	Minimum value read by the probe	°C			
Maximum:	R/W	E6	Maximum value read by the probe	°C			
Probes limit supply temperature Minimum:	R/W	E7	Minimum value read by the probe	°C			
Maximum:	R/W	E7	Maximum value read by the probe	°C			
Probe position External temp.:	R/W	E8	Select the position of the outside temperature probe		1 to 10		
Ejection temp.:	R/W	E8	Select the position of the discharge temperature probe		1 to 10		
Probe type Exter.temp:	R/W	E9	Type of signal used by the probe		PT1000 / NTC / 0 to 20mA / 4 to 20mA / 0 to 1V / 0 to 10V		
Eject.temp:	R/W	E9	Type of signal used by the probe		PT1000 / NTC / 0 to 20mA / 4 to 20mA / 0 to 1V / 0 to 10V		
Probes limit external temp. Minimum:	R/W	Ea	Minimum value read by the probe	°C			
Maximum:	R/W	Ea	Maximum value read by the probe	°C			
Probes limit Ejection temp. Minimum:	R/W	Eb	Minimum value read by the probe	°C			
Maximum:	R/W	Eb	Maximum value read by the probe	°C			
Position probe Room humid. :	R/W	Ec	Select the position of the intake humidity probe		1 to 10		
Supply humid. :	R/W	Ec	Select the position of the outlet humidity probe		1 to 10		
External humid:	R/W	Ec	Select the position of the outside humidity probe		1 to 10		
Probe type Room humid. :	R/W	Ed	Type of signal used by the probe		0 to 1V / 0 to 10V / 0 to 20mA / 4 to 20mA		
Supply humid.:	R/W	Ed	Type of signal used by the outlet humidity probe		0 to 1V / 0 to 10V / 0 to 20mA / 4 to 20mA		
Extern. humid:	R/W	Ed	Type of signal used by the outside humidity probe		0 to 1V / 0 to 10V / 0 to 20mA / 4 to 20mA		
Probes limit Room humidity Minimum:	R/W	Ee	Minimum value read by the probe	%			
Maximum:	R/W	Ee	Maximum value read by the probe	%			
Probes limit supply humidity Minimum:	R/W	Ef	Minimum value read by the probe	%			
Maximum:	R/W	Ef	Maximum value read by the probe	%			
Probes limit External humidity Minimum:	R/W	Eg	Minimum value read by the probe	%			
Maximum:	R/W	Eg	Maximum value read by the probe	%			

Parameter	Type	Ref.	Description	UOM	Range	Default	Note
Position probe Air quality VOC	R/W	Eh	Type of signal used by the VOC air quality probe		1 to 10		
CO2	R/W	Eh	Select the position of the CO2 air quality probe		1 to 10		
Probe type Air qualità VOC:	R/W	Ei	Type of signal used by the probe		0 to 1V / 0 to 10V / 0 to 20mA / 4 to 20mA		
CO2:	R/W	Ei	Type of signal used by the probe		0 to 1V / 0 to 10V / 0 to 20mA / 4 to 20mA		
Probe limits Air qualità VOC Minimum:	R/W	Ej	Minimum value read by the probe	%			
Maximum:	R/W	Ej	Maximum value read by the probe	%			
Probe limits Air qualità CO2 Minimum:	R/W	Ek	Minimum value read by the probe	%			
Maximum:	R/W	Ek	Maximum value read by the probe	%			
Position probe Compens.setp.:	R/W	El	Select the position of the set point compensation probe		1 to 10		
Pre-heating :	R/W	El	Select the position of the preheating temperature probe		1 to 10		
Probe type Compens.setp.:	R/W	Em	Type of signal used by the probe		PT1000 / NTC / 0 to 20mA / 4 to 20mA / 0 to 1V / 0 to 10V		
Pre-heating. :	R/W	Em	Type of signal used by the probe		PT1000 / NTC / 0 to 20mA / 4 to 20mA / 0 to 1V / 0 to 10V		
Probe limits Setp compensation Minimum:	R/W	En	Minimum value read by the probe	°C			
Maximum:	R/W	En	Maximum value read by the probe	°C			
Probe limits pre-heating temp. Minimum:	R/W	Eo	Minimum value read by the probe	°C			
Maximum:	R/W	Eo	Maximum value read by the probe	°C			
Position probe Antifreeze temp:	R/W	Ep	Select the position of the antifreeze probe		1 to 10		
Defrost probe:	R/W	Ep	Select the position of the defrost probe		1 to 10		
Probe type Antifr. temp.:	R/W	Eq	Type of signal used by the probe		PT1000 / NTC / 0 to 20mA / 4 to 20mA / 0 to 1V / 0 to 10V		
Defrost temp.:	R/W	Eq	Type of signal used by the probe		PT1000 / NTC / 0 to 20mA / 4 to 20mA / 0 to 1V / 0 to 10V		
Probe limits Antifreeze temp. Minimum:	R/W	Er	Minimum value read by the probe	°C			
Maximum:	R/W	Er	Maximum value read by the probe	°C			
Probe limits defrost temperature Minimum:	R/W	Es	Minimum value read by the probe	°C			
Maximum:	R/W	Es	Maximum value read by the probe	°C			

Parameter	Type	Ref.	Description	UOM	Range	Default	Note
Input position Heating by thermostat	R/W	Et	Select the position of the analogue input to receive the signal for the heating ramp from the external thermostat				
Input position Cooling bt thermostat	R/W	Eu	Select the position of the analogue input to receive the signal for the cooling ramp from the external thermostat				
DIGITAL OUTPUTS →							
Digital outputs Fan Supply T1:	R/W	J0	Select the position of the first outlet fan		1 to 18		
Supply T2:	R/W	J0	Select the position of the second outlet fan		1 to 18		
Return T1:	R/W	J1	Select the position of the first intake fan		1 to 18		
Return T2:	R/W	J1	Select the position of the second intake fan		1 to 18		
Supply-Line:	R/W	J2	Position of the line contactor for the outlet fan				
Supply-Delta:	R/W	J2	Position of the delta contactor for the outlet fan				
Supply-Star:	R/W	J2	Position of the star contactor for the outlet fan				
Return-Line:	R/W	J3	Position of the line contactor for the intake fan				
Return-Delta:	R/W	J3	Position of the delta contactor for the intake fan				
Return-Star:	R/W	J3	Position of the star contactor for the intake fan				
Compressor 1:	R/W	J4	Select the position of compressor 1		1 to 18		
Compressor 2:	R/W	J4	Select the position of compressor 2		1 to 18		
Elect. Heater 1:	R/W	J5	Select the position of electric heater 1		1 to 18		
Elect. Heater 2:	R/W	J5	Select the position of electric heater 2		1 to 18		
Elect. Heater 3:	R/W	J5	Select the position of electric heater 3		1 to 18		
Humidifier:	R/W	J6	Select the position of the humidifier		1 to 18		
By pass rec.damp.:	R/W	J6	Select the position of the bypass heat recovery unit		1 to 18		
Doubble batt.rec.:	R/W	J6	Select the position of the double coil heat recovery unit		1 to 18		
General alarm:	R/W	J7	Select the position of the alarm signal device		1 to 18		
Unit status:	R/W	J7	Select the position of the device signalling the status of the unit		1 to 18		
Dirty filter:	R/W	J8	Select the position of the device for blocked filter alarm signal		1 to 18		
Cool pump:	R/W	J8	Select the position of the pump in cooling		1 to 18		
JHeat pump:	R/W	J8	Select the position of the pump in heating		1 to 18		
Cold status:	R/W	J9	Select the position of the cooling status output		1 to 18		
Antifreeze:	R/W	J9	Select the position of the device for signalling the antifreeze alarm		1 to 18		
Digital damper	R/W	J9	Select the position of the discharge damper		1 to 18		
Direct expans. Cold step 1:	R/W	Ja	Select the position of the output for the activation of the first direct expansion cooling step		1 to 18		
Cold step 2:	R/W	Ja	Select the position of the output for the activation of the second direct expansion cooling step		1 to 18		
Cold step 3:	R/W	Ja	Select the position of the output for the activation of the third direct expansion cooling step		1 to 18		
Valve 3p Open cool:	R/W	Jb	Select the position of the output for opening the 3 position valve on the cooling coil		1 to 18		
Close cool:	R/W	Jb	Select the position of the output for closing the 3 position valve on the cooling coil		1 to 18		
Valve 3p Open Post-H:	R/W	Jc	Select the position of the output for opening the 3 position valve on the post-heating coil		1 to 18		
Close Post-H:	R/W	Jc	Select the position of the output for closing the 3 position valve on the post-heating coil		1 to 18		
Valve 3p Open heat:	R/W	Jd	Select the position of the output for opening the 3 position valve on the heating coil		1 to 18		
Close heat:	R/W	Jd	Select the position of the output for closing the 3 position valve on the heating coil		1 to 18		
Step fan 1:	R/W	Je	Select the position of the first fan speed in fan coil mode		1 to 18		
Step fan 2:	R/W	Je	Select the position of the second fan speed in fan coil mode		1 to 18		
Step fan 3:	R/W	Je	Select the position of the third fan speed in fan coil mode		1 to 18		
ANALOGUE OUTPUTS →							
Analog output Fan Return:	R/W	L0	Select the output for the intake fan		1 to 18		

Parameter	Type	Ref.	Description	UOM	Range	Default	Note
Supply:	R/W	L0	Select the output for the outlet fan		1 to 6		
Ext.Damper	R/W	L1	Select the output for the outside air damper		1 to 6		
Mix.Damper	R/W	L1	Select the output for the mixing damper		1 to 6		
Exp.Damper	R/W	L1	Select the output for the discharge damper		1 to 6		
By-pass damper Recovery:	R/W	L2	Select the output for the heat recovery unit bypass damper		1 to 6		
Rotative Heat recovery:	R/W	L3	Select the output for the rotary heat recovery unit		1 to 6		
valve Cooling:	R/W	L4	Select the output for the modulating valve in cooling		1 to 6		
Heating:	R/W	L4	Select the output for the modulating valve in heating		1 to 6		
Mixing valve Cool/heat Battery	R/W	L5	Select the output for the mixed modulating valve		1 to 6		
Modulating valve Post-heating	R/W	L6	Select the output for the post-heating valve		1 to 6		
Humidifier:	R/W	L7	Select the analogue output for humidifier management		1 to 6		
PARAMETERS →							
Fun supply inv. Setpoint:	R/W	G0	Control set point for the outlet fan	Pa			
Diff.:	R/W	G0	Control differential for the outlet fan	Pa			
Offset:	R/W	G0	Control offset for the outlet fan	%			
Supply inverter Int.time:	R/W	G1	Integration time for the outlet fan	s			
Der.time:	R/W	G1	Derivative time for the outlet fan	s			
Return fan inver. Setpoint:	R/W	G2	Control set point for the intake fan	Pa			
Diff.:	R/W	G2	Control differential for the intake fan	Pa			
Offset:	R/W	G2	Control offset for the intake fan	%			
Return inverter Int.time:	R/W	G3	Integration time for the intake fan	s			
Der.time:	R/W	G3	Derivative time for the intake fan	s			
Temperature regulation:	R/W	G4	Select the algorithm to be used for managing the temperature control		P / P+I		
Integrate time R:	R/W	G6	Set the integration constant for intake control	s			
M:	R/W	G6	Set the integration constant for outlet control	s			
TIMES →							
Minimum time compr.ON:	R/W	T0	Minimum time the compressors must remain on for when started	s			
Minimum time compr.OFF:	R/W	T0	Minimum time the compressors must remain off for when stopped	s			
Min. time between Different Compressors Starts:	R/W	T1	Minimum time that must elapse between the starts of two different compressors	s			
Min. time between same compressor starts :	R/W	T2	Minimum time that must elapse between two starts of the same compressor	s			
Fan timing Start delay :	R/W	T3	Delay between unit on and fan on	s			
Del.betw start:	R/W	T3	Delay between compressors starts	s			
Delay to stop:	R/W	T3	Delay between unit off and fan off	s			
Time beetwen Two steps Fans:	R/W	T4	Delay between the first and the second fan step	S			
Star-Delta timing Line-star	R/W	T5	Time that must elapse between the line and the star contactor	ms			
Star	R/W	T5	Duration of the star contactor	ms			
Star-delta	R/W	T5	Time that must elapse between the star and the delta contactor	ms			
Delay between heating coil and post-integr.coil	R/W	T6	Time between the activation of the heating coil and the post-heating coil	min			

Parameter	Type	Ref.	Description	UOM	Range	Default	Note
Alarm delays Flowswitch	R/W	T7	Set the flow switch alarm delay	s			
Low pressure	R/W	T7	Set the low pressure alarm delay	s			
Runnig time 3p valve Cold:	R/W	T8	Set the times for the 3-position valve in cooling	s			
Heat:	R/W	T8	Set the times for the 3-position valve in heating	s			
INITIALISATION →							
Supervisor Communication speed:	R/W	V0	Set the communication speed between the pCO board and the supervisor		1200(RS485 /RS422) / 2400 (RS485/RS4 22) / 4800 (RS485/RS4 22) / 9600 (RS485 ONLY) / 19200 (RS485 ONLY)		
Ident:	R/W	V0	Set the identification number for the pCO² inside the supervisor network				
Protocol type:	R/W	V1	Select the type of communication protocol		NONE / CAREL / REMOTE / MODBUS		
<MODEM> Rings numbers	R/W	V2	Set the number of rings before answering		0/5		
Selection type	R/W	V2	Set the type of dialling used by the modem		TONE / IMPULSES		
Password	R/W	V2	Set the password to access the modem				
telephone number	R/W	V3	Select the telephone number to call				
Dial	R/W	V3	Manual dialling		OFF / ACTIVE		
New Passwords Manufacturer :	R/W	V4	Set the new password to access the manufacturer menu				
User :	R/W	V4	Set the new password to access the installer menu				
Maintenance :	R/W	V4	Set the new password to access the maintenance menu				
Reset lists I/O:	R/W	V5	Delete the values assigned to the input/output configuration parameters				
Start message:	R/W	V5	Display language message at the start-up				
Setting network frequence:	R/W	V5	Sets the mains frequency	Hz	50Hz / 60Hz		
Memory erasing	R/W	V6	Delete the configuration values				
type model:	R/W	V6	Select the model of unit being controlled		1 to 24		

Parameter	Type	Ref.	Description	UOM	Range	Default	Note
MAIN SCREEN			**15 button terminal MENU button** **6 button PGD or Built-In terminal ESC button**				
Devices test enable:	R/W	R0	Enable test procedure on the devices enabled		0 to 1		
Analog outputs Valve Heating:	R/W	R1	Value set for the opening of the valve in heating	%	0 to 100		
Cooling:	R/W	R1	Value set for the opening of the valve in cooling	%	0 to 100		
Analog outputs Post-Heating valve:	R/W	R2	Value set for the opening of the valve in post-heating	%	0 to 100		
Damper outputs external air:	R/W	R3	Value set for the opening of the outside air damper	%	0 to 100		
mixing:	R/W	R3	Value set for the opening of the mixing air damper	%	0 to 100		
Analog outputs Supply fan:	R/W	R4	Value set for the operation of the outlet fan	%	0 to 100		

Parameter	Type	Ref.	Description	UOM	Range	Default	Note
Return fan:	R/W	R4	Value set for the operation of the intake fan	%	0 to 100		
Analog outputs Rotative heating Recovery:	R/W	R5	Value set for the operation of the rotary heat recovery unit	%	0 to 100		
Analog outputs Humidifier:	R/W	R6	Value set for the operation of the humidifier	%	0 to 100		
Digitals outputs C=Close O=Open	R/W	R7	Status of the settable digital outputs		0 to 1		

7.4 Database of supervisor variables

The pCO² can be connected to a local or remote supervisor/telemaintenance system for controlling the unit.
The accessories available for the pCO board² include an optional serial communication card using the RS485 interface.
In this version of the software, the baud rate is set at 19200 bps.

7.4.1 Analogue variables

DESCRIPTION	ADD.	TYPE
Reading of analogue input no. 1	1	R
Reading of analogue input no. 2	2	R
Reading of analogue input no. 3	3	R
Reading of analogue input no. 4	4	R
Reading of analogue input no. 5	5	R
Reading of analogue input no. 6	6	R
Reading of analogue input no. 7	7	R
Reading of analogue input no. 8	8	R
Reading of analogue input no. 9	9	R
Reading of analogue input no. 10	10	R
Differential for defrost control	11	R/W
Differential setting between outlet and intake air for activation of the double coil heat recovery unit	12	R/W
Outside temperature to stop the heat recovery unit	13	R/W
Freecooling/freeheating activation delta	14	R/W
Comparison set point for antifreeze alarm from NTC probe	15	R/W
Minimum opening of the outside damper	16	R/W
Minimum outlet air flow limit	17	R/W
Minimum intake air flow limit	18	R/W
Physical analogue output 1	19	R
Physical analogue output 2	20	R
Physical analogue output 3	21	R
Physical analogue output 4	22	R
Physical analogue output 5	23	R
Physical analogue output 6	24	R
Set point compensation band	25	R/W
Intake control dead zone	26	R/W
Compensation set point	27	R/W
Outlet inverter control set point	28	R/W
Band for outlet lower limit	29	R/W
Band for outlet upper limit	30	R/W
Maximum compensation set point value	31	R/W
Ambient humidity control set point	32	R/W
Outlet temperature control set point	33	R/W
Intake temperature control differential	34	R/W
Outlet temperature control differential	35	R/W
Intake temperature control set point	36	R/W
Outlet inverter control differential	37	R/W
Preheating set point	38	R/W
Preheating differential	39	R/W
Ambient humidity control dead zone	40	R/W
Ambient humidity control differential	41	R/W
Intake inverter control differential	42	R/W
Intake inverter control set point	43	R/W
Winter start-up set point	44	R/W
VOC air quality probe reading	45	R
CO2 air quality probe reading	46	R
Preheating probe reading	47	R
Effective intake control set point	48	R
Humidity probe reading	49	R
Defrost probe reading	50	R
Outside temperature probe reading	51	R
Antifreeze probe reading	52	R
Intake probe reading	53	R
Outlet probe reading	54	R
Outside humidity probe reading	55	R
Inside humidity probe reading	56	R
Outlet pressure probe reading	57	R
Intake pressure probe reading	58	R
Modulating valve opening in cooling	59	R
Modulating humidifier opening	60	R
Outlet inverter opening	61	R
Intake inverter opening	62	R
Modulating outside damper opening	63	R
High outlet humidity limit differential	64	R
Low outlet temperature limit set point	65	R
High outlet temperature limit set point	66	R
High outlet humidity limit set point	67	R
Defrost relay activation set point	68	R
Set point to change operation (cooling-heating) from outside temperature	69	R/W
VOC air quality control differential	70	R/W
VOC air quality control dead zone	71	R/W
VOC air quality control set point	72	R/W
Outlet temperature control dead zone	73	R/W
Outlet inverter control offset	74	R/W
Intake inverter control offset	75	R/W
Set point compensation temperature probe	76	R/W
By-pass modulating damper control	77	R/W
Post-heating coil modulating valve control	78	R/W
Pre-heating request	79	R/W
Post-heating request	80	R/W
Cooling request	81	R/W
Modulating valve opening	82	R/W
Discharge temperatures	83	R/W

7.4.2 Digital variables

DESCRIPTION	ADD.	TYPE
Digital input 1	1	R
Digital input 2	2	R
Digital input 3	3	R
Digital input 4	4	R
Digital input 5	5	R
Digital input 6	6	R
Digital input 7	7	R
Digital input 8	8	R
Digital input 9	9	R
Digital input 10	10	R
Digital input 11	11	R
Digital input 12	12	R
Digital input 13	13	R
Digital input 14	14	R
Digital input 15	15	R
Digital input 16	16	R
Digital input 17	17	R
Digital input 18	18	R
Digital output 1	19	R
Digital output 2	20	R
Digital output 3	21	R
Digital output 4	22	R
Digital output 5	23	R
Digital output 6	24	R
Digital output 7	25	R
Digital output 8	26	R
Digital output 9	27	R
Digital output 10	28	R
Digital output 11	29	R
Digital output 12	30	R
Digital output 13	31	R
Digital output 14	32	R
Digital output 15	33	R
Digital output 16	34	R
Digital output 17	35	R
Digital output 18	36	R
Pump protection alarm in heating	37	R
Low pressure alarm compressor 2	38	R
Outlet fan protection alarm	39	R
Intake fan protection alarm	40	R
Preheating probe alarm	41	R
Outlet filter blocked alarm	42	R
Outlet humidity probe alarm	43	R
General alarm	44	R
Unit on	45	R
Intake filter blocked alarm	46	R
Intake flow switch alarm	47	R
Enable cooling coil with 3-position valve	48	R
Electric heater protection alarm	49	R
Pump protection alarm in cooling	50	R
Built-In terminal present	51	R
Air quality probe alarm (VOC)	52	R
Air quality probe alarm (CO2)	53	R
Outside air humidity alarm	54	R
Intake air humidity alarm	55	R
Outlet flow switch alarm	56	R
Outside air temperature alarm	57	R
Antifreeze alarm	58	R
Intake air temperature alarm	59	R
Outlet temperature alarm	60	R
Discharge temperature alarm	61	R
Defrost temperature probe alarm	62	R
Type of modem operation (tone-pulse)	63	R/W
Enable heating with 3-position valve	64	R/W
Enable outlet flow switch	65	R/W
Enable intake air flow	66	R/W
Enable air quality control	67	R/W
Enable change operation (heating/cooling) on control probe.	68	R/W
Enable control on compressors	69	R/W
Unit on in cooling mode	70	R/W
Direct expansion enabled	71	R/W
Enable dehumidification	72	R/W
Enable door open alarm	73	R/W
Enable electric heater cutout.	74	R/W
Enable dirty filter contact on the outlet	75	R/W
Enable dirty filter contact on the intake.	76	R/W
Enable fire/smoke input	77	R/W
Enable antifreeze control from digital input	78	R/W
Unit on in heating mode	79	R
Enable dirty heat recovery unit input	80	R/W
Enable high compressor pressure switch	81	R/W
Humidifier present	82	R/W
Priority of temperature in dehumidification	83	R/W
Enable low compressor pressure switch	84	R/W
Compressor 1 cutout	85	R/W
Compressor 2 cutout	86	R/W
Enable defrost control	87	R/W
Antifreeze active with NTC probe	88	R/W
Enable remote ON/OFF from digital input	89	R/W
Post-heating enabled	90	R/W
Enable modulating valve in cooling	91	R/W
Enable modulating valve in heating	92	R/W
Outlet pressure control	93	R
Intake pressure control	94	R
Enable winter start-up	95	R/W
Enable outlet fan protection	96	R/W
Select type of compensation probe	97	R/W
Enable outlet lower limit control	98	R/W
Enable outlet upper limit control	99	R/W
Enable outlet upper limit control for humidity	100	R/W
Enable intake fan protection	101	R/W
Reset alarms	102	R/W
Mute buzzer	103	R/W
Status of the inspection door switch	104	R
Outlet filter alarm	105	R
Intake filter alarm	106	R
Status of the fire/smoke contact	107	R
Status of the heat recovery unit flow	108	R
Humidifier alarm	109	R
Start unit from supervisor	110	R
Unit on	111	R
Compressor 1 cutout alarm	112	R/W
Compressor 2 cutout alarm	113	R
Outlet pressure alarm	114	R
Intake pressure alarm	115	R
Evaporator alarm	116	R
Inspection door open alarm	117	R
Fire/smoke alarm	118	R
Antifreeze alarm	119	R
High pressure alarm compressor 1	120	R

High pressure alarm compressor 2	121	R
Heat recovery unit dirty alarm	122	R
Set point compensation probe alarm	123	R
Low pressure alarm compressor 1	124	R
Digital output of the by-pass damper of the heat recovery unit	125	R
Digital damper opening	126	R
Enable antifreeze probe	127	R
Enable defrost temperature probe	128	R
Enable external temperature probe	129	R
Enable external humidity probe	130	R
Enable air probe VOC	131	R
Enable return pressure probe	132	R
Enable inlet humidity probe	133	R
Enable inlet temperature probe	134	R
Enable outlet pressure probe	135	R
Enable outlet humidity probe	136	R
Enable outlet probe	137	R

Humidifier ON	138	R
Inlet fan first step	139	R
First step of direct expansion cooling coil	140	R
First step of electrical heaters heating coil	141	R
First step of outlet fan	142	R
Enable CO2 air probe	143	R
Second step of direct expansion cooling coil	144	R
Third step of direct expansion cooling coil	145	R
Second step of electrical heaters heating coil	146	R
Third step of electrical heaters heating coil	147	R
Second step of outlet fan	148	R
Second step of inlet fan	149	R
Defrost state	150	R
Heating start-up state	151	R
Enable pre-heating temperature probe	152	R
Enable set point compensation probe	153	R
Enable discharge probe	154	R

7.4.3 Integer variables

DESCRIPTION	ADD.	TYPE
Unit status	1	R
Type of probe 1	2	R/W
Type of probe 2	3	R/W
Type of probe 3	4	R/W
Type of probe 4	5	R/W
Type of probe 5	6	R/W
Type of probe 6	7	R/W
Type of probe 7	8	R/W
Type of probe 8	9	R/W
Type of probe 9	10	R/W
Type of probe 10	11	R/W
Differential for the second cooling step	12	R/W
Differential for the third cooling step	13	R/W
First cooling step set point for direct expansion	14	R/W
Second cooling step set point for direct expansion	15	R/W
Third cooling step set point for direct expansion	16	R/W
Air flow alarm delay time	17	R/W
Start hour first band A	18	R/W
Start hour second band A	19	R/W
Start hour band B	20	R/W
Start minutes first band A	21	R/W
Start minutes second band A	22	R/W
Start minutes band B	23	R/W
End hour first band A	24	R/W
End hour second band A	25	R/W
End hour band B	26	R/W
End minutes first band A	27	R/W
End minutes second band A	28	R/W
End minutes band B	29	R/W
Number of heaters enabled	30	R/W
Select compensation probe	31	R/W
Select compensation set point: Intake, Outlet	32	R/W
Duration of winter start-up	33	R/W
Outlet fan start delay	34	R/W
Minimum time between starts of same fan	35	R/W
Minimum fan ON time	36	R/W
First cooling step differential	37	R/W
Low pressure alarm delay	38	R/W
Minimum compressor ON time	39	R/W
Minimum compressor OFF time	40	R/W

Minimum time between starts of same compressor	41	R/W
Number of cooling steps enabled	42	R/W
Minimum OFF time between starts of different compressors	43	R/W
Set point for the first heater	44	R/W
Set point for the second heater	45	R/W
Set point for the third heater	46	R/W
3-position valve opening/closing time in cooling	47	R/W
3-position valve opening/closing time in heating	48	R/W
Number of rings to wait for the modem to answer	49	R/W
Compressor 1 operating hours	50	R
Compressor 2 operating hours	51	R
Outlet fan operating hours	52	R
Intake fan operating hours	53	R
CO2 air quality control differential	54	R/W
CO2 air quality control set point	55	R/W
CO2 air quality control dead zone	56	R/W
Select type of outside air damper	57	R/W
Select type of heat recovery unit	58	R/W
Enable air filter	59	R/W
Enable and select by-pass damper control	60	R/W
Select the device used for the cooling coil management	61	R/W
Select the device used for the heating management	62	R/W
Select the device used for the post-heating management	63	R/W
Humidifier output type	64	R/W
Enable fan overload	65	R/W
Select heating coil function	66	R/W
Select post-heating type: 1, dehumidification compensation - 2, compens.+integration	67	R/W
Air flow switch digital control	68	R/W
Air flow switch analog control	69	R/W
First heater differential	70	R/W
Second heater differential	71	R/W
Third heater differential	72	R/W

8 GLOSSARY

- **Differential:** this defines a temperature zone around the set point within which the system manages the control devices.
- **Built-in:** display housed on the backbone of the pCO board².
- **Buzzer:** audible buzzer fitted on the external terminals; this emits an extended sound in the event of alarms, or a brief sound if the limits for setting the parameters are exceeded. The built-in terminals do not have a buzzer.
- **Default:** this term defines the values, for example the set point and proportional temperature band, that are automatically used by the system if no modifications are made by the user.
- **Freecooling:** action whereby outside air is introduced into the environment by opening a damper, so as to cool the environment and save energy.
- **Freeheating:** action whereby outside air is introduced into the environment by opening a damper, so as to heat the environment and save energy.
- **Step:** this defines an area of the proportional band (temperature or humidity) inside which a device is on, and at the same time also defines the activation and deactivation values of the device.
- **Screen index:** alphanumeric index located in the top right of every screen.
- **Outlet:** the air introduced in the environment.
- **Screen:** the page shown on the display of the terminal.
- **Master:** the Master is the board responsible for controlling the pLAN and consequently all the other boards connected; generally this is the board with address 1, except when this is off or disconnected.
- **MP-BUS:** communication protocol (1200 Baud)
- **Branch – loop:** series of screens that concern the same subject and that can be easily scrolled by pressing the arrow buttons; the branches are accessed by pressing one of the buttons on the terminal, which displays the first screen in the loop.
- **Range:** interval of values allowed for a parameter.
- **Intake:** air drawn in from the outside and introduced into the AHU.
- **R-R/W:** Type of variable (R = read-only, R/W = read and write)
- **Set point:** defines a temperature (or humidity) value to be satisfied; the system activates the heating or cooling devices until the temperature or humidity reach the set point.
- **Buffer (memory):** memory on the board used to save the default values set by CAREL for all the parameters in the software. Permanent memory even without power.
- **VOC:** Volatile Organic Compounds
- **Dead zone:** this defines a very small temperature zone between the set point and the proportional band, inside which the devices are not activated.

<u>Warning</u>: starting from version 1.6, this application software no longer works with BIOS versions prior to 3.57

Notes:

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