Air-air and water-air units

CONTROL BROCHURE

**NA 11.24 D** 02 - 2013

## Electronic control

# AVANT / AVANT+

# Contents

## 1. General description

Electronic module by microprocessor designed for controlling and supervising Air-Air and Water-Air units with 1 or 2 cooling circuits and 1 to 4 control stages. Two versions available:

- AVANT version: 1 cooling circuit with 1 or 2 compressors.
- AVANT+ version: 2 cooling circuits with 2 or 4 compressors.

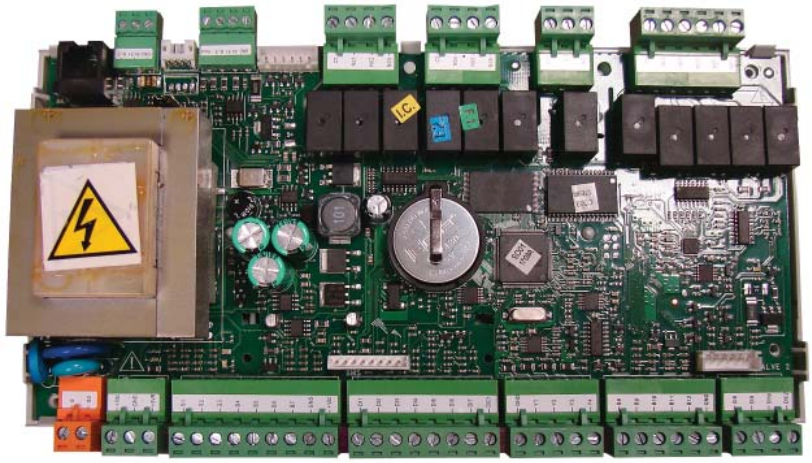
### Main functions:

- Control in COOLING, HEATING, AUTOMATIC, FAN and DEHUMIDIFICATION modes and modification of the setpoint.
- Permanent control of the operating parameters.
- Timing of the compressors
- Defrosting management (air-air heat pumps).
- Condensation and evaporation pressure control.
- Control of the outlet temperature.
- Compensation of the setpoint based on the outdoor temperature.
- Anti-fire safety.
- Timer and weekly programming.
- Failure diagnosis and main alarm.

### Optional functions:

- Humidity control.
- Thermal free-cooling with return (or ambient) air and outdoor temperature probes.
- Enthalpic free-cooling with return air and outdoor air relative humidity probes *(only with the AVANT+ version)*.
- Control of the minimum opening of the outdoor air damper.
- On/off or proportional control of the auxiliary electrical heaters.
- On/off or proportional control of a hot water auxiliary coil.
- Control of electronic fans.
- Detection of clogged filters.
- Condensate pump alarm management.
- Connection to a centralised technical management system (BMS) with the Carel or Modbus communication protocol via an RS485 serial communication card on each of the devices and a USB converter for connection to a PC. It is also possible to use Lonworks, Bacnet, Konnex and Ethernet communication protocols with their respective serial cards.





# 2. SET-UP

## 2.1. microPC control board

Main CPU board installed in the unit's electric panel, which allows data to be input, treated by the microcontroller and the operation of the unit to be managed completely.

The program and the parameters are stored in non-volatile memory, there by ensuring their storage even in the case of a power failure (without needing an auxiliary coil). The program can be loaded through the PC or from a program key.

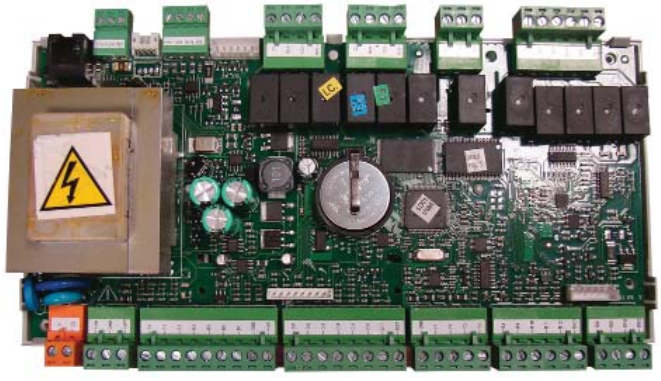
This board has the following main characteristics:

- Removable connectors.
- Built-in clock.
- Power supply voltage 230 Vac.
- Connection to a TCO user terminal.
- Connection to a pGD1 maintenance terminal.
- RS485 serial supervisory through an optional card.
- Plastic base for installation on a DIN rack.

There are two versions:

- AVANT (SMALL board): 10 DIN modules (175 mm x 113 mm).
- AVANT+ (MEDIUM board): 13 DIN modules (228 mm x 113 mm).

**AVANT version**



**AVANT+ version**

## 2.2. TCO user terminal

The TCO user terminal allows:

- Regulation of the setpoint.
- The selection of the operating mode.
- The display of controlled variables and probe values.
- On-screen display of alarms.

This terminal has an ambient temperature probe by standard (optionally may be replaced by a return air probe connected in the control board).

Available in two configurations:

**Surface terminal**

Dimensions:
Length: 142 mm *
Width: 86 mm *
Depth: 23 mm
* Interchangeable

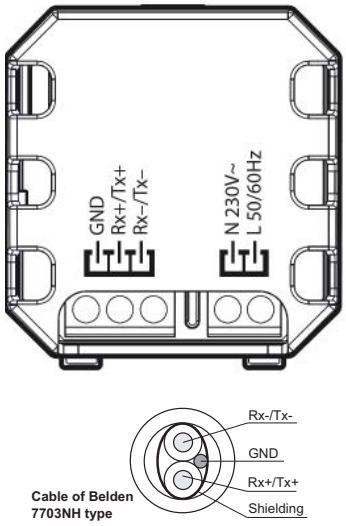
**Terminal to fit**

Dimensions:
Length: 86 mm
Width: 86 mm
Depth: 51 mm

**Terminal connection:**

The terminal can be installed at a maximum distance of 100 metres from the microPC control board. The connection requires the following:

- Power supply (the same as the control board) at 230Vac 50/60Hz (L and N): 2 wires (section 0.5 at 1.5 $mm^2$).
- Communication with the board (RX+/TX+ & RX-/TX-): shielded cable type AWG20 or AWG22 with 1 braided pair + drainwire + shielding (e.g., model BELDEN 7703NH).



## 2.3. pGD1 maintenance terminal

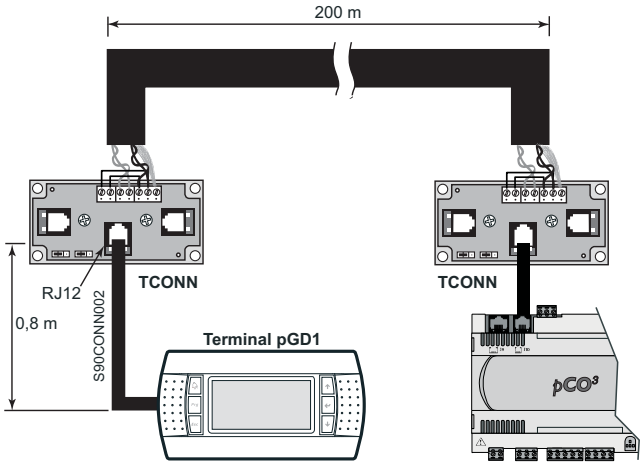
The pGD1 terminal for maintaining the unit enables:

- The initial programming of the unit.
- Regulation of the setpoints.
- The selection of the operating mode.
- The display of controlled variables and probe values.
- On-screen display of alarms.
- The modification of operating parameters.

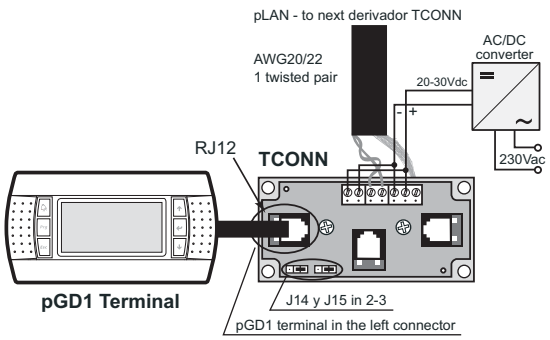

**Terminal connection:**

The terminal can be installed at a maximum distance of 500 metres from the microPC control board.

- Up to 50 metres, it can be connected directly with telephone wire.
- From 50 to 200 metres, it is necessary to use the TCONN bypass cards and AWG 20/22 shielded cable with 2 twisted pairs.



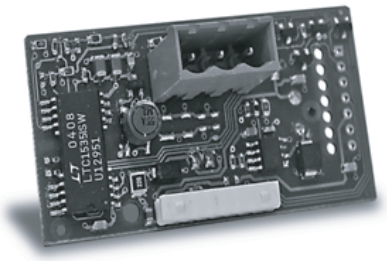

- From 200 to 500 metres, it is necessary to use the TCONN bypass cards, AWG 20/22 shielded cable with 1 twisted pair and external 20...30Vdc (150 mA) power supply.




## 2.4. RS485 serial card (optional)

The RS485 serial card enables connecting the microPC board to an RS485 network.

This ensures connection to a remote support and remote and/or local supervisory service.



## 2.5. Temperature, pressure and humidity probes

The standard probes included in the control are:

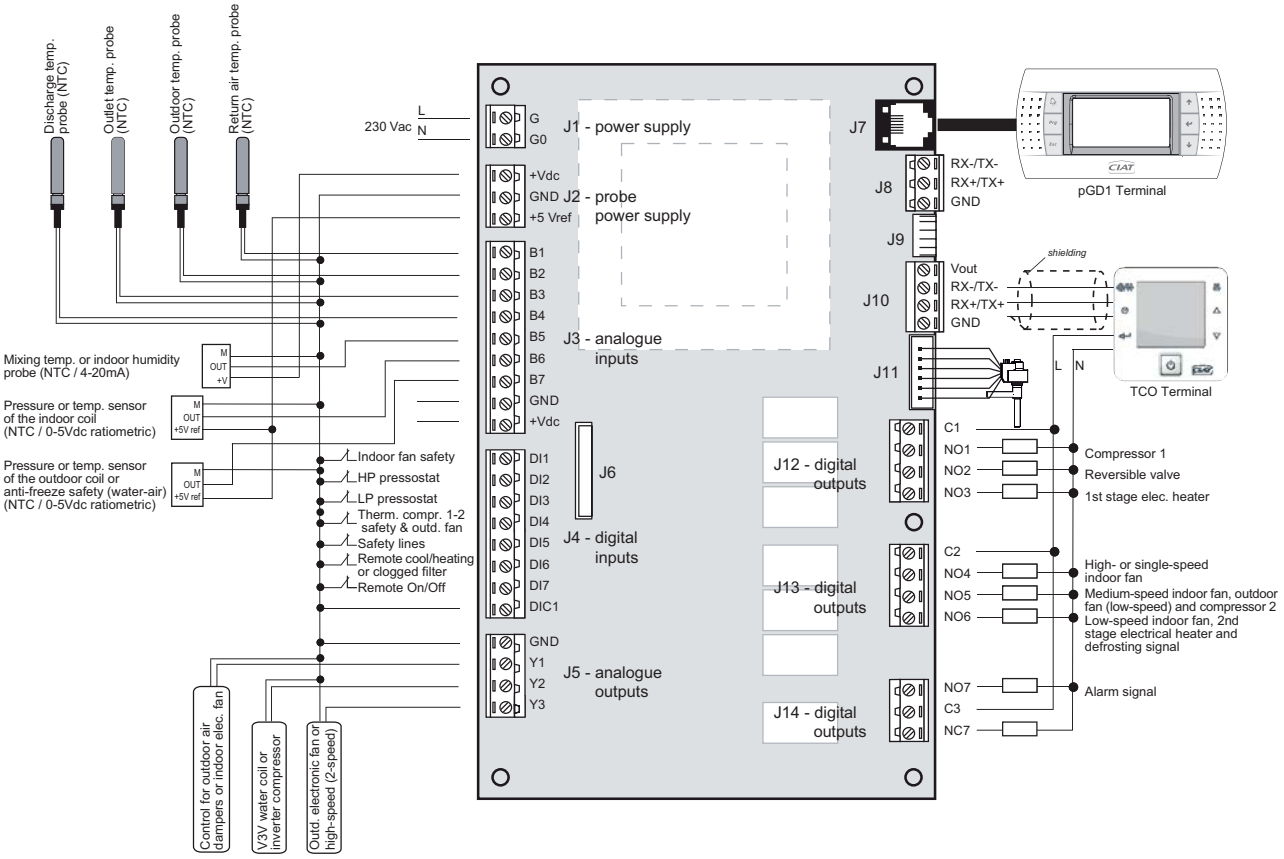
- Ambient temperature probe (included in the TCO user thermostat).
- Pressure transducers in outdoor coils 1 and 2 (defrosting, condensation control in COOLING and evaporation control in HEATING). For water-air units, these are required as a safety device for anti-freezing. Note: It is possible to include temperature probes instead of transducers.
- Temperature probe for the discharge from the compressors (in units with compressors without klixon discharge).
- Outlet air temperature probe: required for all the thermal and enthalpic free-cooling options and to control the outlet temperature.
- Outdoor air temperature probe: standard in air-air units and optional in water-air units. It's required in order to defrost and compensate the setpoint depending on the outdoor temperature and for the thermal and enthalpic free-cooling options.

Optional probes:

- Temperature of the return air: probe connected in the board instead of the ambient temperature probe in the TCO user terminal. If the unit only has the pGD1 maintenance terminal this probe, or an ambient probe connected to the board, is obligatory. This probe is necesary for the anti-fire safety.
- Relative humidity of the return necessary for controlling dehumidification by humidity and/or for the enthalpic free-cooling option.
- Relative humidity of the outdoor air necessary for the enthalpic free-cooling option *(only in the AVANT+ version)*.
- Mixing temperature: necessary for the thermal and enthalpic free-cooling options.
- Pressure / temperature in the indoor coils: necessary for the refrigerant shortage safety device, evaporation control in COOLING mode and condensation control in HEATING mode.

# 3. MAIN microPC BOARD

## 3.1. AVANT version (1 circuit and 1 or 2 compressors)




**Analogue inputs (B1 to B7)**

B1: Return temperature probe (optional)

B2: Outdoor temperature probe (in water-air only units with free-cooling)

B3: Outlet air probe

B4: Temperature probe for compressor(s) discharge

B5: Temperature probe of mixed air or return air humidity probe

B6: Temperature / pressure probe for the indoor coil

B7: Pressure / temperature outdoor coil (air-air) or anti-freeze safety (water-air)

**Digital inputs (DI1 to DI7)**

DI1: Indoor fan safety device

DI2: High pressure pressostat

DI3: Low pressure pressostat

DI4: Thermal safety device for compressors 1-2 and outdoor fan

DI5: Safety device for electrical heaters, anti-freeze of the hot water auxiliary coil, condensate pump, defrosting signal or flow switch (in air-water units)

DI6: Remote COOLING/HEATING or clogged filter

DI7: Remote OFF/ON

Note: Simultaneous opening DI3 and DI4, klixon compressor discharge safety device (in units with klixon).

**Analogues outputs (Y1 to Y3)**

Y1: Control of the free-cooling dampers or electronic indoor fan

Y2: 3-way valve control for the hot water auxiliary coil (or a proportional electrical heater stage)

Y3: Electronic outdoor fan or high-speed (in 2-speed outdoor fan) or 3-way valve (in water-air units)

**Digital outputs (NO1 to NO7)**

NO1: Compressor 1

NO2: Reversible valve 1

NO3: 1st electrical heater stage (or on/off hot water coil)

NO4: High-speed (V3) or single-speed indoor fan

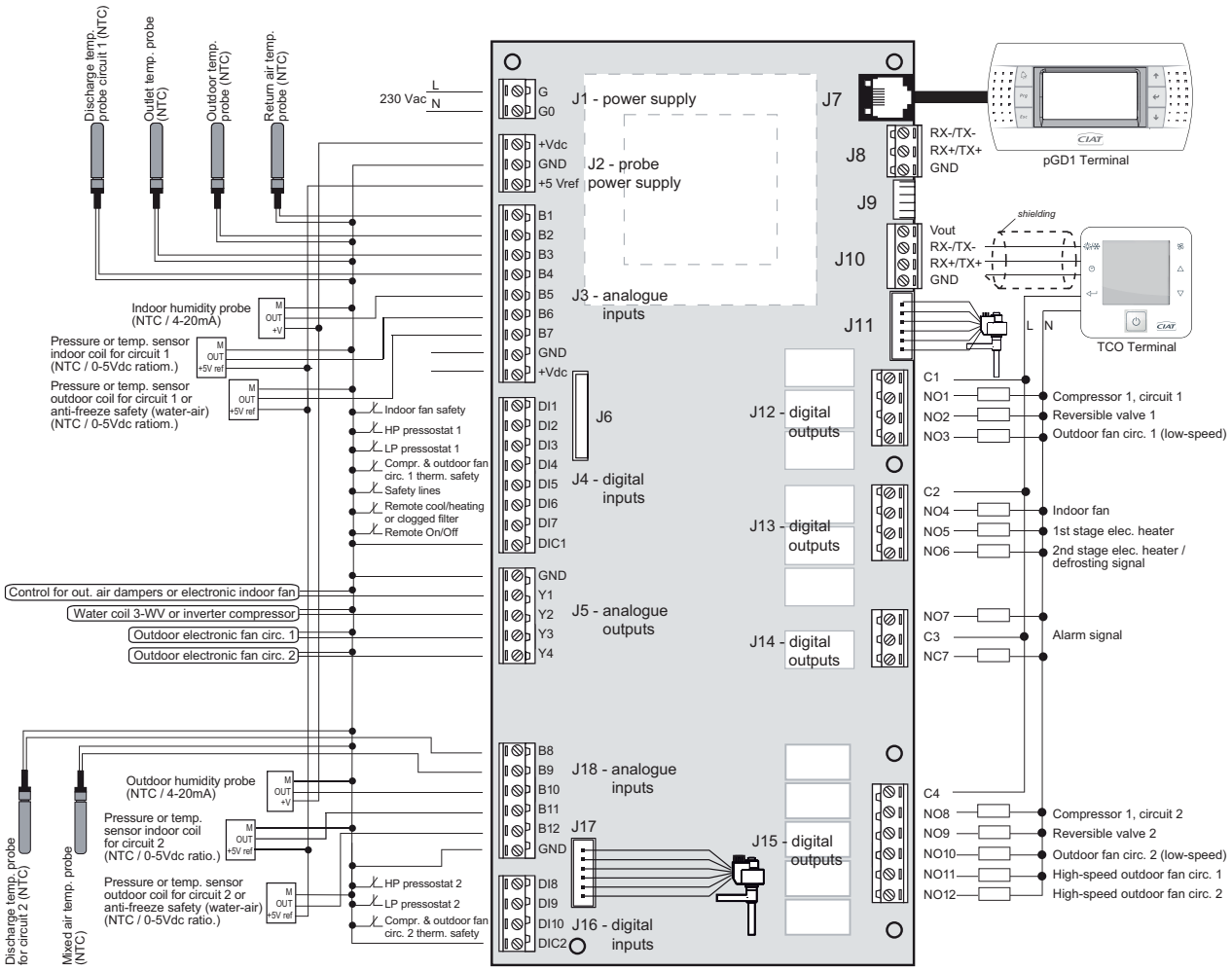
NO5: Medium-speed indoor fan (V2). Compressor 2. Low-speed (in 2-speed outdoor fan).

NO6: Low-speed indoor fan (V1). 2nd stage electrical heater Defrosting signal

NO7-NC7: Alarm signal

Note: In units with 1 circuit with version AVANT+, the description and position of inputs and outputs coincides with that described here for the AVANT version except for the mixing temperature probe with enthalpic free-cooling that will be connected in B9.

## 3.2. AVANT+ version (2 circuits and 2 compressors)




**Analogue inputs (B1 to B12)**

B1: Return temperature probe (optional)

B2: Outdoor temperature probe (in water-air only units with free-cooling)

B3: Outlet air probe

B4: Temperature probe for compressor(s) discharge for circuit 1

B5: Return humidity probe

B6: Temperature/pressure probe for the indoor coil for circuit 1

B7: Pressure / temperature probe for outdoor coil circuit 1 (air-air) or anti-freeze safety (water-air)

B8: Temperature probe for compressor(s) discharge for circuit 2

B9: Mixing air temperature probe

B10: Outdoor humidity probe

B11: Temperature/pressure probe for the indoor coil for circuit 2

B12: Pressure / temperature probe for outdoor coil circuit 2 (air-air) or anti-freeze safety (water-air)

**Digital inputs (DI1 to DI10)**

DI1: Indoor fan safety device

DI2: High pressure pressostat for circuit 1

DI3: Low pressure pressostat for circuit 1

DI4: Thermal safety device(s) for compressor(s) and outdoor fan for circuit 1

DI5: Safety device for electrical heaters, anti-freeze of the hot water auxiliary coil, condensate pump, defrosting signal or flow switch (in air-water units).

DI6: Remote COOLING/HEATING or clogged filter

DI7: Remote OFF/ON

DI8: High pressure pressostat for circuit 2

DI9: Low pressure pressostat for circuit 2

DI10: Thermal safety device(s) for compressor(s) and outdoor fan for circuit 2

Note: Simultaneous opening DI3 - DI4 or DI9 - DI10, klixon compressor discharge safety device for circuit 1 or circuit 2 (in units with klixon).

**Analogues outputs (Y1 to Y4)**

Y1: Control of the free-cooling dampers or electronic indoor fan

Y2: 3-way valve control for the hot water auxiliary coil (or a proportional electrical heater stage)

Y3: Electronic outdoor fan circuit 1 (air-air) or 3-way valve circuit 1 (water-air)

Y4: Electronic outdoor fan circuit 2 (air-air) or 3-way valve circuit 2 (water-air)

**Digital outputs (NO1 to NO12)**

NO1: Compressor 1, circuit 1

NO2: Reversible valve for circuit 1

NO3: Outdoor fan circuit 1 (at low speed in 2-speed fan)

NO4: Indoor fan

NO5: 1st electrical heater stage (or on/off hot water coil)

NO6: 2nd stage electrical heater. Defrosting signal

NO7-NC7: Alarm signal

NO8: Compressor 1, circuit 2

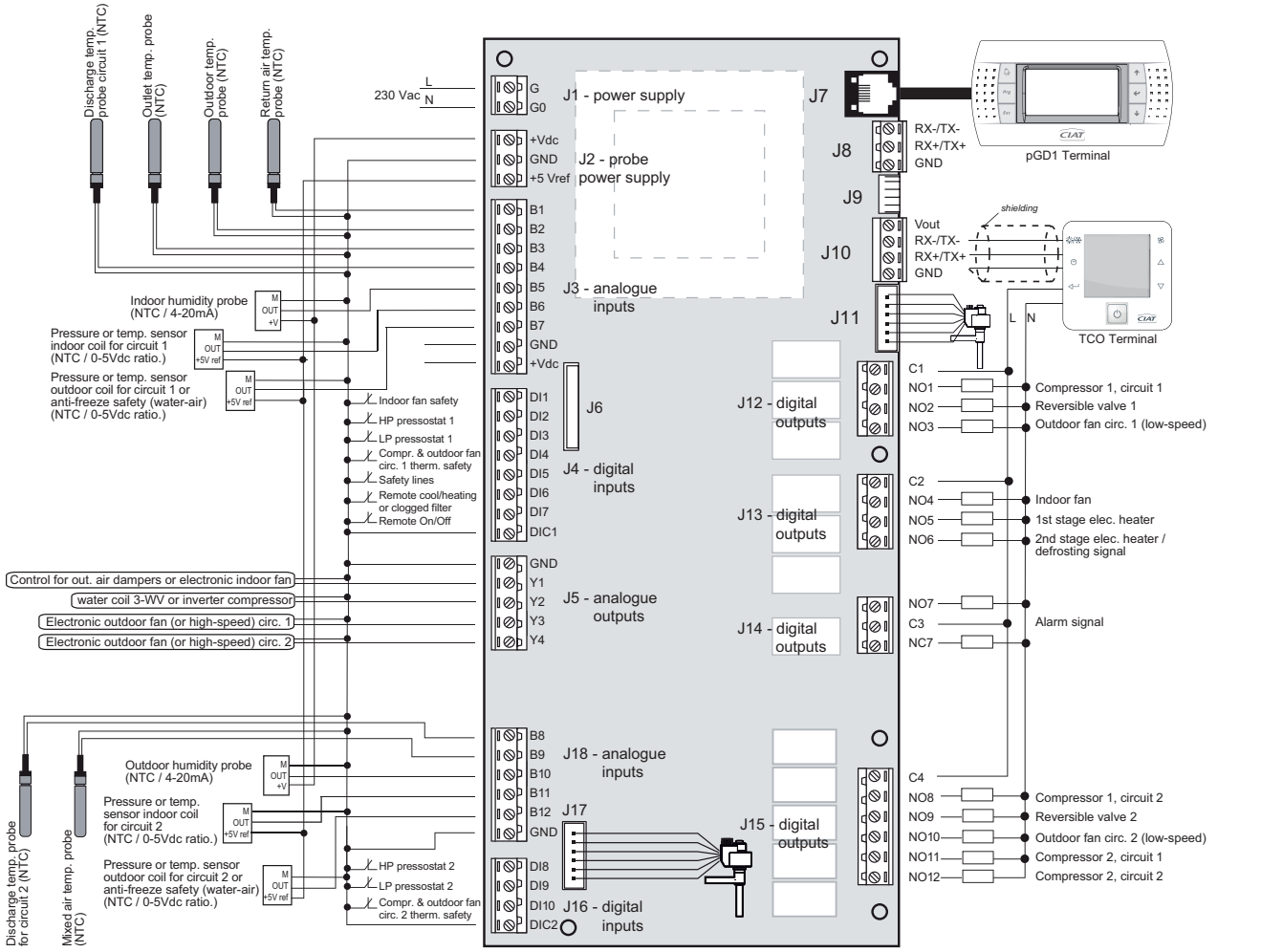
NO9: Reversible valve for circuit 2

NO10: Outdoor fan circuit 2 (at low speed in 2-speed fan)

NO11: High speed outdoor fan circuit 1 (in 2-speed fan)

NO12: High speed outdoor fan circuit 2 (in 2-speed fan)

## 3.3. AVANT+ version (2 circuits and 4 compressors)




**Analogue inputs (B1 to B12)**

B1: Return temperature probe (optional)

B2: Outdoor temperature probe (in water-air only units with free-cooling)

B3: Outlet air probe

B4: Temperature probe for compressor(s) discharge for circuit 1

B5: Return humidity probe

B6: Temperature/pressure probe for the indoor coil for circuit 1

B7: Pressure / temperature probe for outdoor coil circuit 1 (air-air) or anti-freeze safety (water-air)

B8: Temperature probe for compressor(s) discharge for circuit 2

B9: Mixing air temperature probe

B10: Outdoor humidity probe

B11: Temperature/pressure probe for the indoor coil for circuit 2

B12: Pressure / temperature probe for outdoor coil circuit 2 (air-air) or anti-freeze safety (water-air)

**Digital inputs (DI1 to DI10)**

DI1: Indoor fan safety device

DI2: High pressure pressostat for circuit 1

DI3: Low pressure pressostat for circuit 1

DI4: Thermal safety device(s) for compressor(s) and outdoor fan for circuit 1

DI5: Safety device for electrical heaters, anti-freeze of the hot water auxiliary coil, condensate pump, defrosting signal or flow switch (in air-water units)

DI6: Remote COOLING/HEATING or clogged filter

DI7: Remote OFF/ON

DI8: High pressure pressostat for circuit 2

DI9: Low pressure pressostat for circuit 2

DI10: Thermal safety device(s) for compressor(s) and outdoor fan for circ. 2 2

Note: Simultaneous opening DI3 - DI4 or DI9 - DI10, klixon compressor discharge safety device for circuit 1 or circuit 2 (in units with klixon).

**Analogues outputs (Y1 to Y4)**

Y1: Control of the free-cooling dampers or electronic indoor fan

Y2: 3-way valve control for the hot water auxiliary coil (or a proportional electrical heater stage)

Y3: Electronic outdoor fan circuit 1 or high speed (in 2-speed outdoor fan) (air-air) or 3-way valve circuit 1 (water-air)

Y4: Electronic outdoor fan circuit 2 or high speed (in 2-speed outdoor fan) (air-air) or 3-way valve circuit 2 (water-air)

**Digital outputs (NO1 to NO12)**

NO1: Compressor 1, circuit 1

NO2: Reversible valve for circuit 1

NO3: Outdoor fan circuit 1 (at low speed in 2-speed fan)

NO4: Indoor fan

NO5: 1st electrical heater stage (or on/off hot water coil)

NO6: 2nd stage electrical heater Defrosting signal

NO7-NC7: Alarm signal

NO8: Compressor 1, circuit 2

NO9: Reversible valve for circuit 2

NO10: Outdoor fan circuit 2 (at low speed in 2-speed fan)

NO11: Compressor 2, circuit 1

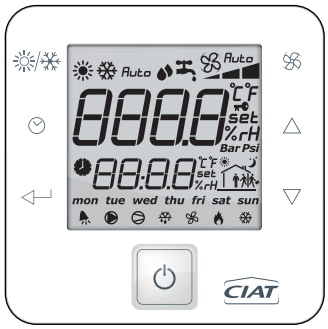
NO12: Compressor 2, circuit 2

# 4. TCO USER TERMINAL

## 4.1. Description

With this terminal, the user can select the operating mode, the scheduled programming and the temperature or humidity setpoint.

The installer can also modify some operation parameters and view the values measured by the probes.

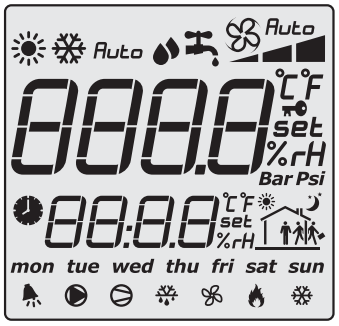



## 4.2. Keys and combinations (quick guide)

| *Key* | | *Function* |
|---|---|---|
| | **Mode of operation** | Allows the operating mode to be selected: HEATING, COOLING, AUTO, DEHUMIDIFICATION, FAN |
| | **Fan** | Short press: allows the speed of the indoor fan to be selected *(only in the AVANT version)*.<br>Long press (3 secs): allows AUTO or CONTINUOUS operation of the indoor fan to be selected. |
| | **Programme schedule** | Short press: allows the programme schedule to activate.<br>Long press (3 secs): allows the time and the programme schedule to be modified. |
| | **Up/ Down** | These keys allow the user to go forward and backward to consult the information found on the display. They can also modify values. |
| | **Enter** | This enables confirming the modified values.<br>It also allows the set of values to be seen on the display (temperature, temperature setpoint, humidity, humidity setpoint, outdoor temperature, pressure circuit 1, pressure circuit 2 and outlet air temperature). |
| | **Off/ on** | Allows the unit to be turned OFF/ON. |
| | **Fan + Off/ on** | Long press (3 seconds), to access the PARAMETERS display, for configuring and maintaining the unit. These are only accessed with different passwords. |
| | **Mode + Clock** | When the alarm icon is pressed on the display, access is given to the ALARM code display by pressing these keys for a long time (3 seconds). |
| | **Mode + Fan** | A 3-second press causes all terminal key presses to be blocked. To unblock, these keys must be pressed again for 3 sec. |

## 4.3. Display

The terminal has an LCD display, backlit in blue, to show the information of the unit and to interact with the user.




| *Symbol* | *Meaning* |
|---|---|
| | Selection of HEATING mode (winter) |
| | Selection of COOLING mode (summer) |
| Auto | Selection of AUTOMATIC mode |
| | Selection of DEHUMIDIFICATION mode |
| Auto | Selection of FAN mode<br>- Indoor fan speed -> 3-speed (according to model)<br>- Operation of the fan: AUTO or CONTINUOUS |
| °C °F set %rH Bar Psi | Main indicator of:<br>- Temperature (ºC or ºF)<br>- Activated block key (key)<br>- Setpoint (set)<br>- Relative humidity (%RH)<br>- Pressure (bar) |
| °C °F set %rH | Secondary indicator of:<br>- Temperature (ºC or ºF)<br>- Setpoint (set)<br>- Hour and minute<br>- Relative humidity (%RH) |
| | Alarm indicator |
| | Compressor in operation |
| | Defrosting indicator |
| | Indoor fan on |
| | Active support in heating |
| | Operation in cooling mode (in AUTO mode it makes known whether the unit is operating in COOLING or HEATING) |
| | Selection of the type of scheduled programming: 6 possible phases. |
| | Activation indicator of the timer programming |
| ***mon tue wed thu fri sat sun*** | Indicators of the days of the week (Monday to Sunday) |

## 4.4. Main functions

### Stopping/starting the unit

By pressing the button, the unit is turned off/on. When the unit is off, the display will only show the date, time and the OFF symbol.


Note: If the unit is stopped from the terminal, it cannot be started using any of the other operations (see Chapter 6).

### Modification of the setpoint

When the unit is on, the current ambient or return air temperature (whichever has been selected) is shown on the main display.


To modify the setpoint, i.e., the desired temperature for comfort, it is necessary to press only the △ or ▽ keys.


At that time, the display will light up and the current setpoint value will appear next to the text **set**.

### Selection of the operating mode

By pressing the key, the operating mode of the unit can be selected.

With each press, the icon corresponding to the operating mode selected will be lit up, except in FAN mode, where no icon will appear.

The available modes are: HEATING - COOLING - AUTO Auto - DEHUMIDIFICATION and FAN (without icon).

### Selection of the indoor fan speed

By pressing the key for a short while, the speed of the indoor fan can be selected (for 3-speed fans).

The icon of the selected speed will be illuminated on this display:

Low: - Medium: - High:

### Selection of the fan mode

If the unit has an ambient air probe in the TCO terminal, the AUTOMATIC mode of operation can be selected from the indoor fan (see Section 9.3).

To active it, it is necessary to press the key for a long time.

The Auto symbol will light up on the display: Auto

### View of the values measured by the probes

In addition to view in the ambient (or return) air temperature on the main display, it is possible to view other values through the set that is activated by pressing the key.

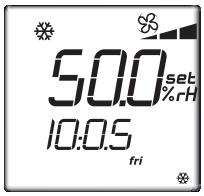
The following values will be shown with each press:

***1) Ambient temperature***


***2) Setpoint temp.***


***3) Ambient RH (opt)***


***4) Setpoint RH (opt)***




***5) Outdoor temp.***


***6) Outd. coil probe 1***


***7) Out. coil probe 2 (opt)***


***8) Outlet temperature***


***1) Ambient temp.***


### Terminal block

The TCO terminal block is done by simultaneously pressing the and keys for a few seconds.

At that moment, the symbol will light up on the main display to indicate that the terminal has been blocked.

The terminal is blocked by pressing these keys again.

### Indication of the type of alarm with codes

If there are active alarms, the icon appears on the TCO terminal display. By simultaneously pressing the and keys for a few seconds, these alarms can be seen and reset (see Chapter 15).


### Timer programming

By pressing the for a short time, the schedule programming can be activated or deactivated. For a detailed description of how this programming is established, consult Chapter 16.

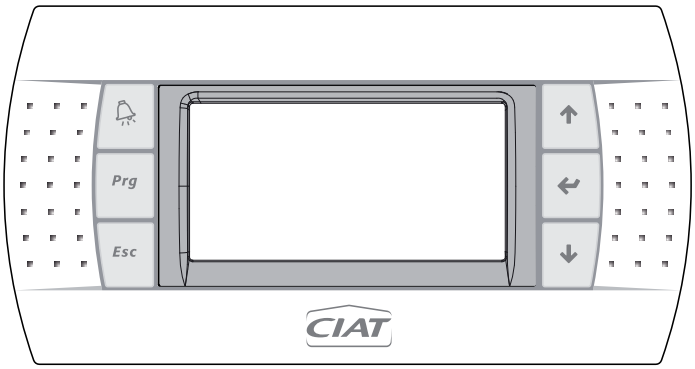
# 5. pGD1 MAINTENANCE TERMINAL

## 5.1. Configuration

This terminal has an LCD display, and via texts, the installer can view the operating state, the unit configuration and the alarms produced. The control parameters can also be modified.

To ensure communication between the pGD1 terminal and the board, the terminal must be configured with address 16. In the event of a terminal supplied separately, this is not sent addressed and the following procedure must be carried out:

Simultaneously press the ↑ + ↓ + ↵ keys. On the display accessed, set address 16 in "Display address setting".



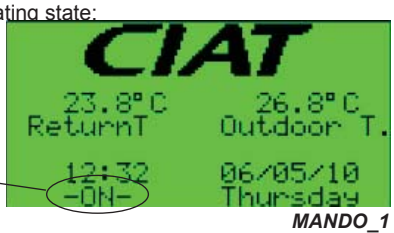

## 5.2. Keys and combinations (quick guide)

| *Key* | | *Function* |
|---|---|---|
| 🔔 | **Alarm** | There is/are active alarm(s) if the key is illuminated red. By pressing the key once, the description of the first alarm will be shown. By using the up/down keys, the other alarms stored in the memory can be consulted. By pressing this key for a second time, they will be reset. If no alarm is active, the message “No alarm active" appears. |
| Prg | **Programming** | This allows the main menu display to be accessed to view the setpoints, inputs/outputs and timer programming (no password required). |
| Esc | **Escape** | To exit any display, pressing this key returns the user to the start display of the previous menu. |
| ↑ ↓ | **Up/down** | These keys enable consulting the information displayed on-display by going forward or back. They can also modify values. By pressing both keys simultaneously, direct access is gained to the group of input/output displays. |
| ↵ | **Enter** | This enables confirming the modified values. By pressing the key once, the cursor is placed on the first display parameter. Pressing the key again confirms the adjusted parameter value and it then proceeds to the next parameter. |
| Prg Esc | **Prog + Escape** | From the main display of the main menu, by pressing both keys, access is given to the technical menu displays for configuring and maintaining the unit to which access is given only through different passwords. |
| 🔔 Prg | **Alarm + Prog** | The display contrast (LCD with a resolution of 133 x 64 pixels) can be set by pressing these keys at the same time + the up or down key. |
| 🔔 ↵ | **Alarm + Enter** | By pressing both keys for approximately 3 seconds, access is gained to the system information display (BOOT and BIOS). |
| 🔔 Esc | **Alarm + Escape** | From the main display of the main menu, by pressing both keys simultaneously, access is given to the DEBUG displays, displays used the software programmer, to which access is given only through different passwords. |

## 5.3. Main functions

### Stopping/starting the unit

When the pGD1 terminal is connected, access is given to a general information display for the unit, which indicates the return air temperature (or humidity), outdoor air temperature (or humidity), date, day, time, and current operating state:




Current state of the unit

***MANDO_1***

Next, pressing the ↑ key gives access to another information display for the unit state *(MANDO_2),* on which it may be turned on or off.

By pressing the ↵ key, the cursor is placed intermittently over each of the icons. The value can be modified with the ↑ ↓ keys. The change is confirmed by pressing the ↵ key again.


Current state of the unit

***MANDO_2***

### Selection of the operating mode

With the cursor placed over the icon for the current operating mode (cooling mode in the example), the value can be changed with the ↑ ↓ keys. The change is confirmed by pressing the ↵ key again.

Available modes:

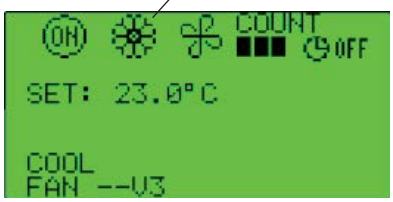
HEATING

COOLING

AUTO AUTO

DEHUMIDIFICATION

FAN

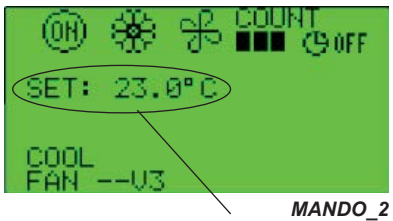



Current operating mode

***MANDO_2***

### Modification of the setpoint

With the cursor placed next to the SET symbol, the setpoint value can be changed with the ↑ ↓ keys (Desired comfort temperature).




***MANDO_2***

Current setpoint

### Selection of the indoor fan speed

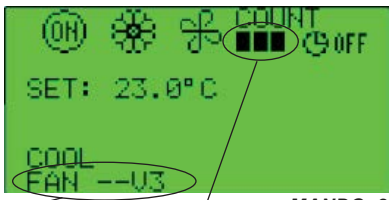
With the cursor placed under the symbol CONT, the speed of the indoor fan can be selected (for 3-speed fans).

The icon of the selected speed will be illuminated on this display:

Low: CONT ■

Medium: CONT ■■

High: CONT ■■■



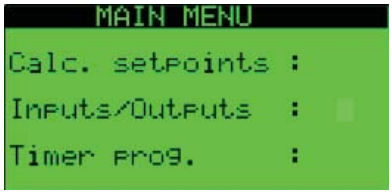

***MANDO_2***

3-speed fan indicator.

Speed selected

### View of the values measured by the probes

By pressing the Prg key from any display, the Main Menu is accessed for viewing the setpoints, inputs/outputs and scheduled programming (no password required).




Pressing the ↵ key with the cursor placed over "INPUTS/OUTPUTS" gives access to the displays for viewing the state of both analogue and digital inputs and outputs. The reading from the analogue inputs corresponds to the values measured by the unit probes.



Note: the "INPUTS/OUTPUTS" menu can be accessed from any display by simultaneously pressing the ↑ ↓ keys.

### View of the alarms

If there are active alarms, the key from the pGD1 terminal will be lit red. Pressing this key gives access to the group of alarm displays, on which all of the active alarms may be seen, as well as allowing them to be reset (see Chapter 14).

### Timer programming

Pressing the Prg key gives access to the main menu of displays for viewing the timer programming. For a detailed description of how this programming is established, consult Chapter 15.

## 6. STOPPING/STARTING THE UNIT

There are different procedures for stopping/starting:

- **By terminal:**

  This operation is always valid. If the unit is stopped from the terminal, it cannot be started using any of the other operations.

  Stopping/starting can be done:

  - on the TCO terminal by pressing the key 
  - on the pGD1 terminal from the *MANDO_2* display for information on the unit state (see the previous chapter).

  If the unit is stopped, all the functions and the different variables are disabled.

- **Remote off/on:**

  This operation should be enabled under password protection on the display of the corresponding user. The "on" option should be selected on the terminal.

  In the digital input ID7 of connector J4:

  - open contact: unit started (ON)
  - closed contact: unit stopped (OFF)

  Note: To activate the remote off/on the bridge made in this input must be eliminated (see wiring diagram).

- **By schedule stage:**

  With timer programming, the unit can be stopped outside of the schedule The "on" option should be selected on the terminal.

  Note: If both the remote On/Off and schedule stage procedures are active at the same time, the unit will only start if both coincide.

## 7. SWITCHING OF THE OPERATING MODE

There are two options for selecting the type of switching:

- **By terminal:**

  The selection of the operating mode can be done:

  - on the TCO terminal by pressing the key 
  - on the pGD1 terminal from the *MANDO_2* display for information on the unit state (see the previous chapter).

  The available modes are: HEATING, COOLING, AUTO, DEHUMIDIFICATION, FAN

- **Remote mode:**

  The selection of the operating mode is performed via a switch connected to digital input DI6 of connector J4:

  - open contact: HEATING MODE
  - closed contact: COOLING MODE

  In this case, only the COOLING and HEATING modes are available.

## 8. TEMPERATURE CONTROL

Control of the ambient temperature is carried out by starting up the unit, compressor(s) and/or the available components (electrical heater, water coil, etc.). The programme has a single setpoint available (desired temperature value) that is used both for functioning in COOLING mode (summer) and for functioning in HEATING mode (winter).

Two types of control can be selected:

- Proportional control (P): the control will try to take the system as close as possible to the setpoint by acting directly proportionally to the difference with regard to it.
- Proportional control - Integral (P+I): in addition to proportional control a time constant is introduced which characterises the response speed (little time implies high speed). This type of control is very useful for offsetting typical oscillations in the proportional control.

## 9. OPERATING MODES

### 9.1. Operation in FAN mode

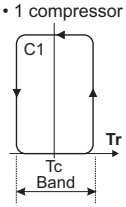
The terminal will order the unit to work in FAN mode. In this mode of operation, the indoor fan will continuously operate independently from the return or ambient air temperature.

### 9.2. COOLING operating mode

The thermostat will command the unit to work in COOLING mode (summer) to maintain the desired comfort level. In order to do so, the control will compare the temperature reading of the ambient (or return) air probe with the value set for the setpoint and with the value of the control band.

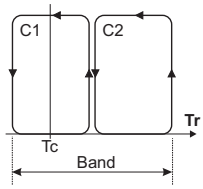
COOLING mode (summer)

• 1 compressor

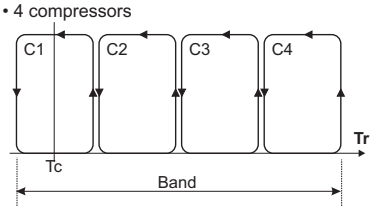



Tr: Return air temperature
Tc: Setpoint temperature
Band: Control band

• 2 compressors




• 4 compressors



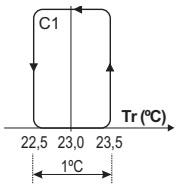

**Illustrative example:**

Setpoint = 23.0ºC

- *Units 1 compressor:*

  Differential band = 1.0ºC (by default)

  When the temperature is below 22.5ºC, the compressor stops. If the temperature starts to rise and exceeds 23.5ºC, the compressor starts and will function until the temperature drops below 22.5ºC.




- *Units 2 compressors:*

  Differential band = 2.0ºC (by default)

  When the temperature is below 22.5ºC, the compressors stop. If the temperature starts to rise and exceeds 23.5ºC, compressor 1 starts. If it continues to rise and exceeds 24.5ºC, compressor C2 is also activated. If the temperature drops below 24.5ºC, compressor C2 stops. If it continues to drop until reaching a value below 22.0ºC, compressor C1 will stop.

- *Units 4 compressors:*

  Differential band = 4.0ºC (by default)

  The control band is divided between 4 compressors, activating respectively at C1: 23.5ºC, C2: 24.5ºC C3: 25.5ºC and C4: 26.5ºC.

Warning: The order for stopping and starting the compressors will depend on whether or not rotation is activated.

## 9.3. HEATING operating mode

The thermostat will command the unit to work in HEATING (winter) mode to maintain the desired comfort level. In order to do so, the control will compare the temperature reading of the ambient (or return) air probe with the value set for the setpoint.

The units may optionally have one- or two-stage electrical heaters (H) and/or a hot water auxiliary coil (V3V).

For control of the hot water coil, the control has a proportional Y2 output (0/10V) which controls the three-way valve. To handle electrical heaters, the control has two on/off outputs NO3-NO6 (version AVANT) or NO5-NO6 (version AVANT+).

The previous configuration is typical for the options however the control can also administer a proportional electrical heater stage in the output Y2 and an on/off water coil in output NO3 (version AVANT) or NO5 (version AVANT+).

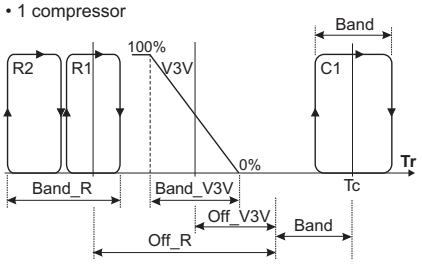
For the input of the compressor phases, the control will use the control band value, whilst for the input of heaters and of the hot water coil, it will take the respective differentials into account.

In the case of electrical heaters, this is defined by parameter that if the outdoor temperature is higher than 20ºC, they cannot be activated (in units with outdoor temperature probe).

The input command of the various phases is the one featured on the following chart:

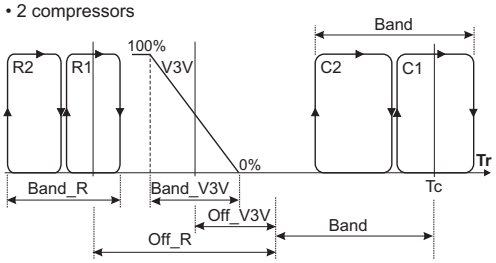
HEATING mode (winter)

• 1 compressor

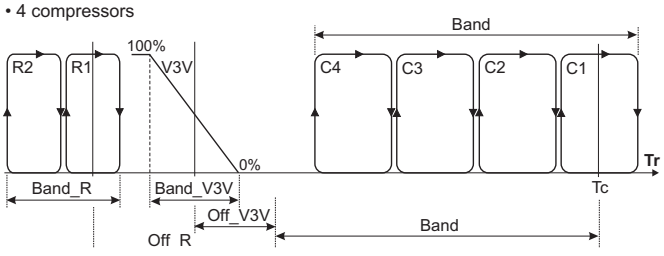



Tr: Return air temperature
Tc: Setpoint temperature
Band: Control band

• 2 compressors




• 4 compressors



The input command for the previous chart can be modified using parameters in order to:

- give priority to the hot water coil.
- activate the electrical heater stage without activating the compressor(s) for cases of compressor breakdown or blocking due to a low outdoor temperature.

By using parameters, it is also possible to disconnect compressor or electrical heater stages. This is useful for reducing electric consumption in time bands when the electric price rate is high.

**Illustrative example:**

Setpoint = 23.0ºC

Enable 3-way valve = yes

Offset for 3-way valve = 0ºC

Control band for 3-way valve = 1.0ºC

Number of heaters: 2

Elec. Heater offset = 1.0ºC

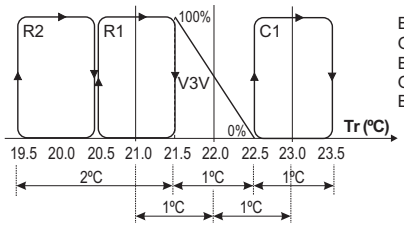
Control band for heaters = 2.0ºC

- *Units 1 compressor:*

  Differential band = 1.0ºC (by default)

  When the return or ambient air temperature is above 23.5ºC, the compressor and heating elements are stopped. If the temperature goes below 22.5ºC, compressor (C1) starts. If it continues to go down, the proportional output of the 3-way valve (V3V) is activated so that at 22.5ºC, the opening is 0%, and at 21.5ºC, the opening is 100%. If the temperature continues to go down and falls below 20.5ºC, the first-stage electrical heater (R1) is connected, and if below 19.5ºC, the second-stage electrical heater (R2) is connected.

  When the return or ambient temperature rises, the various elements will be disconnected in the following order: the 2nd-stage electrical heater, at 20.5°C; the 1st-stage electrical heater, at 21.5°C; the analogue output of the 3-way valve will be put at 0% at 22.5°C and the compressor C1 will be stopped at 23.5°C.




Band = 1ºC
Off_V3V = 0ºC
Band_V3V = 1ºC
Off_R = 1ºC
Band_R = 2ºC

- *Units 2 compressors:*

  Differential band = 2.0ºC (by default)

  When the return or ambient air temperature is above 23.5ºC, the compressor and heating elements stop. If the temperature drops below 22.5°C, the compressor C1 is started. If it continues to go down below 21.5°C, the compressor C2 starts.

  If it continues to go down, the proportional output of the 3-way valve (V3V) is activated so that at 21.5ºC, the opening is 0 %, and at 20.5ºC, the opening is 100%. If the temperature continues to go down and falls below 19.5ºC, the first-stage electrical heater (R1) is connected, and if below 18.5ºC, the second-stage electrical heater (R2) is connected.

  When the return or ambient temperature rises, the various elements will be disconnected in the following order: the 2nd-stage electrical heater, at 19.5°C; the 1st-stage electrical heater, at 20.5°C; the analogue output of the 3-way valve will be put at 0% at 21.5°C, the compressor C2 will be stopped at 22.5°C and the compressor C1 will be stopped at 23.5°C.

- *Units 4 compressors:*

  Differential band = 4.0ºC (by default)

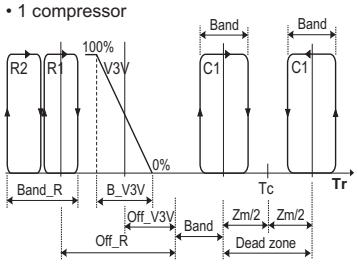
  The operating mode is exactly the same as described above.

Warning: The order for stopping and starting the compressors will depend on whether or not rotation is activated.

## 9.4. AUTO operating mode

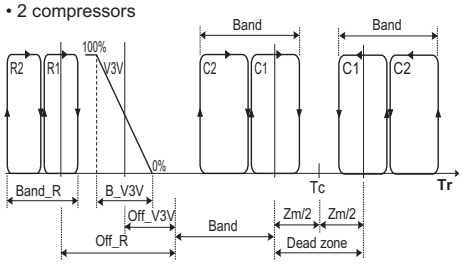
The terminal will order the unit to work in HEATING or COOLING mode based on the temperature measured by the ambient or return air probe, the temperature set as a setpoint and the dead zone.

• 1 compressor

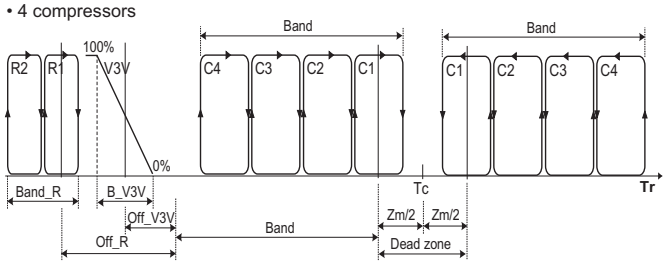



Tr: Return air temperature
Tc: Setpoint temperature
Band: Control band
Zm: Dead zone

• 2 compressors




• 4 compressors



If the ambient or return temperature is greater than the setpoint plus one-half of the dead zone, the unit will operate in COOLING mode, and if it is less than the setpoint minus one-half of the dead zone, it will operate in HEATING mode.

Operation is exactly the same as described previously for COOLING and HEATING modes.

### 9.5. Operation in DEHUMIDIFICATION mode

The terminal will order the unit to work in DEHUMIDIFICATION mode. This control will be done based on the temperature or the humidity (if the unit has that type of probe). The control type is selected per parameter.

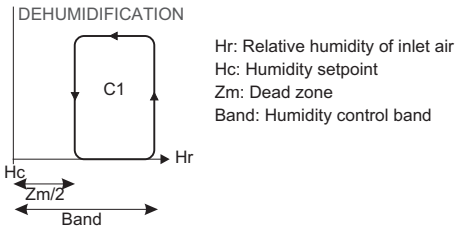
#### Defrosting by temperature

In this mode, the compressor will be started in COOLING mode for a fixed time (calculated based on the dehumidification setpoint temperature) and will be stopped for another period of time, successively, making the operation times shorter and shorter as the return air temperature continues to drop until reaching a fixed value such as the dehumidification setpoint, by default 20ºC. The compressor will not start until this setpoint.

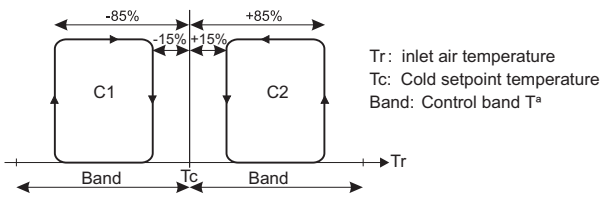
#### Dehumidification by humidity

This function is carried out by starting up the compressors in COOLING mode when the relative humidity of the return air is greater than the humidity setpoint established plus the control band and stops when going below the dead zone.

Note: In the event that two compressors have been selected in dehumidification, these will start or stop through the same dehumidification stage.




To ensure that the compressors can control humidity, the return air must have a temperature ranging between the setpoint ±15% of the temperature differential and the setpoint ±85% of the temperature differential, as indicated in the following chart.




## 10. COMPONENT MANAGEMENT

### 10.1. Four-way valve

Heat pump units have a four-way valve per circuit which allows the COOLING / HEATING operation mode of the unit to be selected.

- Valve with voltage (N.O.): for operating in COOLING mode and during the defrosting process.
- Valve without voltage (N.C.): for operating in HEATING mode.

### 10.2. Compressors

#### Rotation of the compressors

The control allows the rotation of the compressors to equal their number of operating hours. With this function, activated by default, the compressor which starts up first is the one which has the least number of accumulated operating hours. For units with 4 compressors and two circuits, the next compressor to operate will the one in the same circuit.

Note: The control has counters for the number of times each compressor starts and for the cumulative operating time (see maintenance parameters).

#### Compressor timing

All compressors shall observe the following timings:

- **Delay of the start-up of the outdoor fan with regard to the indoor fan ($t_0$=30s)**

  This determines the minimum time that should elapse between the start-up of the indoor fan and the start-up of the the outdoor fan in order to guarantee a stable airflow.

- **Delay of the start-up of the compressor with regard to the outdoor fan ($t_1$=10s)**

  This determines the minimum time that should elapse between the start-up of the outdoor fan and the start-up of the first compressor to to limit the simultaneous start-up. Therefore for the start-up of the first compressor it must pass: $t_0 + t_1$

- **Minimum operation time ($t_2$=120s)**

  This keeps the compressor in operation during the period selected. It is not allowed to be shut down unless there is a failure in the circuit.

- **Minimum shut-down time ($t_3$=180s)**

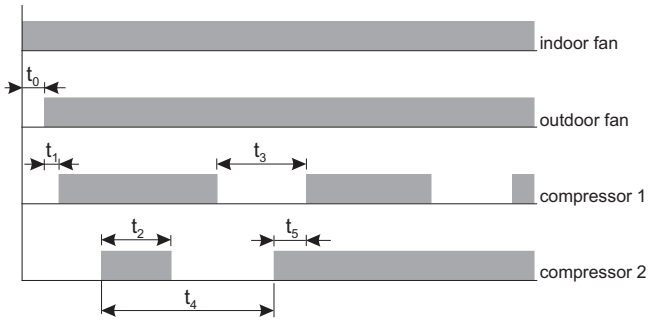
  This determines the time that must elapse from the last shutdown of the compressor before it can start up again.

- **Time between start-ups of the same compressor ($t_4$=300s)**

  This sets the maximum number of compressor start-ups in one hour.

- **Time between start-ups of various compressors ($t_5$=60s)**

  This sets the time that must elapse between the connection of a compressor and the connection of the next one. It limits simultaneous connection and start-up current surges by the unit.




Note: on a display in the maintenance terminal it is possible to see the remaining time until completing $t_3$ and $t_4$ in each compressor. These times can also be cancelled for maintenance operations.

### Blocking the compressors

Blocking the compressors can be enabled when the following conditions are met:

- in HEATING mode, if the outdoor temperature is below the value set in a parameter, the compressors will not be activated. This will result in energy savings. Upon disabling the compressors, both the setpoints and the offset of the support elements will adapt to the absence of the compressors.
- in COOLING mode, if the unit has the free-cooling option and either the outdoor temperature is lower than the value set in a parameter or the difference between the outdoor temperature and the return air temperature is greater than a value set in a parameter, the compressors will not be activated. In this case, free-cooling is sufficient for maintaining the conditions of the ambient air. This will result in energy savings.

## 10.3. Indoor circuit fan

The indoor circuit includes a centrifugal fan that drives the air-conditioned air to the premises through the network of ducts.

If the unit has an ambient air probe in the TCO terminal, two types of operation can be selected: CONTINUOUS or AUTOMATIC. With the return air probe, it is only possible to operate in CONTINUOUS mode.

- AUTOMATIC mode:
  - The fan is in operation only when there is demand from stages.
  - It starts 30 seconds before the compressor starts.
  - Stopping is timed to the stopping of the compressor in 60 seconds both in COOLING mode (to avoid the appearance of humidity on the coil) and HEATING mode (to dissipate the heat of the heaters and the condenser).
- CONTINUOUS mode:
  - Fan is in operation when the control is ON.
  - Stopping is timed to the stopping of the compressor in 60 seconds both in COOLING mode and HEATING mode (to avoid the appearance of humidity on the coil or to dissipate the heat of the heaters and the condenser). Values can be modified by parameters.
  - In HEATING mode, it is possible to perform ON and OFF cycles to avoid the stratification of hot air masses (feeling of COLDNESS).

During defrosting, it is possible to stop the indoor fan if there is no support heat stage in operation.

During maintenance operations, the indoor fan can be started up from a MAINTENANCE display (pGD1 terminal) if no alarm prevents this.

Note: The control has counters for the number of connections from the fan motor and for the number of operating hours (see maintenance parameters).

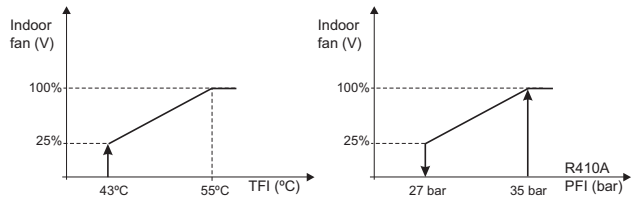
The control allows different types of ventilators to be managed:

- 1-speed fan.
- 3-speed fan (in some units with 1 compressor and single-phase fan).
- Fan with damper.
- Electronic fan. In this case, the maximum speed of the indoor fan can be controlled, via parameters, in COOLING (to prevent formation of drops) and HEATING modes. It is also possible to select the minimum speed before turning the fan OFF both in HEATING mode and in COOLING mode.

The operation of the indoor fan can be enabled based on the pressure/temperature of the refrigerant in the indoor coil (optional):

### Condensation control of the indoor fan (HEATING mode)

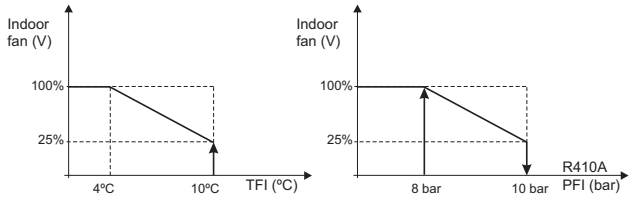
- *Indoor 1-speed fan:*
  - VI=OFF if TFI < 31ºC or PFI < 19 bar
  - VI=ON if TFI > 33ºC or PFI > 27 bar
  - Timing for start, 120 seconds
- *Indoor 3-speed fan:*
  - Initial parameter, TFI = 43ºC or PFI = 27 bar
  - Final parameter, TFI = 31ºC or PFI = 19 bar
  - Timing for start-up to maximum speed = 120 seconds
  - Band 12ºC / 3 speeds = 4ºC, as such the following is obtained:
    - V3 (fast) ON, if TFI > 43ºC
    - V2 (medium) ON, if 39ºC > TFI > 35ºC
    - V1 (slow) ON, if 35ºC > TFI > 31ºC
- *Electronic indoor fan or with damper:*
  - Initial ramp parameter, TFI = 43ºC or PFI = 27 bar
  - Final ramp parameter, TFI = 55ºC or PFI = 35 bar
  - Timing for start-up to maximum speed = 30 seconds




| | Temperature | Pressure R410a | Pressure R407c |
|---|---|---|---|
| **Setpoint** | 43ºC | 27.0 bar | 17.0 bar |
| **Band** | 12ºC | 8.0 bar | 6.5 bar |

### Evaporation control of the indoor fan (COOLING mode)

- *Indoor 1-speed fan:*
  * VI=OFF if TFI > 16ºC or PFI > 12 bar
  * VI=ON if TFI < 14ºC or PFI < 10 bar
  * Timing for start, 120 seconds
- *Indoor 3-speed fan:*
  * Initial parameter, TFI = 100C or PFI = 10 bar
  * Final parameter, TFI = 16ºC or PFI = 12 bar
  * Timing for start, 120 seconds
  * Band: 6ºC / 3 = 2ºC, as such the following is obtained:
    • V1 (slow) ON, if 14ºC < TFI < 16ºC
    • V2 (medium) ON, if 12ºC < TFI < 14ºC
    • V3 (fast) ON, if TFI < 10ºC
- *Electronic indoor fan or with damper:*
  * Initial ramp parameter, TFI = 10ºC or PFI = 10 bar
  * Final ramp parameter, TFI = 4ºC or PFI = 8 bar
  * Timing for start-up to maximum speed = 30 seconds




| | Temperature | Pressure R410a | Pressure R407c |
|---|---|---|---|
| **Setpoint** | 10ºC | 10.0 bar | 5.0 bar |
| **Band** | 6ºC | 2.0 bar | 1.8 bar |

## 10.4. Outdoor circuit fans

For air-air units, the outdoor circuit uses a fan that makes the outdoor air pass over the outdoor coil. Its operation is simultaneous to the operation of the compressor, except in these cases:

* Connection 5 seconds before the compressor.
* Disconnection is timed to the stopping of the compressor in 60 seconds both in COOLING mode (to reduce the condensation pressure) and HEATING mode (to remove ice from the coil).
* Disconnection during defrosting, except when the defrosting is started by low pressure, which will operate if the pressure drops below the ON value and will disconnect if the pressure drops below the OFF value.

| | Pressure R410a | Pressure R407c |
|---|---|---|
| **ON value** | 35.0 bar | 22.0 bar |
| **OFF value** | 33.0 bar | 20.0 bar |

Note: The control has counters for the number of connections from the fan motors and for the number of operating hours (see maintenance parameters).

The control allows different types of ventilators to be managed:

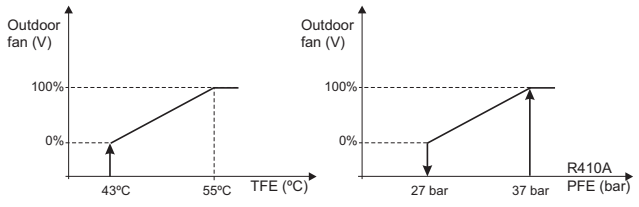
- 1-speed axial fan.
- 2-speed axial fan. For units with a single volume of outdoor air and pressure probe(s) in the outdoor coil, they can act on the speed of the outdoor fan. Start-up must always be done at maximum speed, and after 120 seconds (modifiable by parameter), it can be changed to the minimum speed based on the pressure measured by the probes. This change will be timed as 1 second (modifiable by parameter).
- Electronic axial fan. In this case, the maximum speed of the outdoor fan can be controlled, via parameters, in COOLING mode (to prevent formation of drops*) and in HEATING mode. It is also possible to select the minimum speed before turning the fan OFF both in HEATING mode and in COOLING mode.
- Centrifugal fan with damper.

| Maximum speed | Pressure R410a | Pressure R407c |
|---|---|---|
| **Start in condensation** | 34.0 bar | 21.0 bar |
| **End in condensation** | 27.0 bar | 17.0 bar |
| **Start in evaporation** | 8.0 bar | 3.0 bar |
| **End in evaporation** | 10.0 bar | 5.0 bar |

The operation of the outdoor fan can be enabled based on the pressure/ temperature of the refrigerant in the outdoor coil:

### Condensation control of the outdoor fan (COOLING mode)

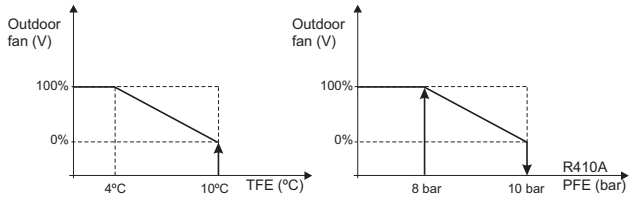
- *Standard outdoor fan (1 speed):*
  * VEXT=OFF, TFE < 31ºC or PFE < 19.0 bar in R410a
  * VEXT=ON, TFE > 33ºC or PFE > 27.0 bar in R410a
  * Timing for start, 120 seconds
- *Electronic outdoor fan or centrifugal with damper:*
  * Initial ramp parameter, TFE = 43ºC or PFE = 27.0 bar in R410a
  * Final ramp parameter, TFE = 55ºC or PFE = 37.0 bar in R410a
  * Timing for start to maximum speed, 30 seconds.




| | Temperature | Pressure R410a | Pressure R407c |
|---|---|---|---|
| **Setpoint** | 43ºC | 27.0 bar | 17.0 bar |
| **Band** | 12ºC | 10.0 bar | 6.5 bar |

### Evaporation control of the outdoor fan (HEATING mode)

- *Standard outdoor fan (1 speed):*
  - * VEXT=OFF, TFE > 16ºC or PFE > 12.0 bar in R410a
  - * VEXT=ON, TFE < 14ºC or PFE < 10.0 bar in R410a
  - * Timing for start, 120 seconds
- *Electronic outdoor fan or centrifugal with damper:*
  - * Initial ramp parameter, TFI = 10ºC or PFI = 10 bar
  - * Final ramp parameter, TFI = 4ºC or PFI = 8 bar
  - * Timing for start to maximum speed, 30 seconds.




| | Temperature | Pressure R410a | Pressure R407c |
|---|---|---|---|
| **Setpoint** | 10ºC | 10.0 bar | 5.0 bar |
| **Band** | 6ºC | 2.0 bar | 1.8 bar |

## 10.5. Outdoor circuit 3-way valve

For water-air units, the outdoor circuit uses a 3-way valve that controls the water circulate by the plates exchanger. Its operation is simultaneous to the operation of the compressor, except in the following cases:

- Connection 70 seconds before the compressor.
- Timed disconnection at 300 seconds. With this, heat can be dissipated in COOLING mode and problems with freezing can be avoided in HEATING mode.

### Condensation pressure control

When the unit operates in COOLING mode the condensation pressure acting on the proportional 3-way valve can be controlled.

It will be regulated depending on the pressure measured by the refrigerant anti-freeze sensor by the signal 0..10Vdc of the analogue outputs Y3 and Y4. The control is similar to that of the electronic outdoor fans.

- * Initial ramp parameter, PFI = 27 bar (R410A)
- * Final ramp parameter, PFI = 34 bar (R410A)
- * Start-up delay to maximum speed, 120 seconds

### Evaporation pressure control

When the unit operates in HEATING mode the condensation pressure acting on the proportional 3-way valve can be controlled. The control is similar to that of the electronic outdoor fans.

- * Initial ramp parameter, PFI = 10 bar (R410A)
- * Final ramp parameter, PFI = 6 bar (R410A)
- * Start-up delay to maximum speed, 120 seconds

## 10.6. Outdoor air damper (optional)

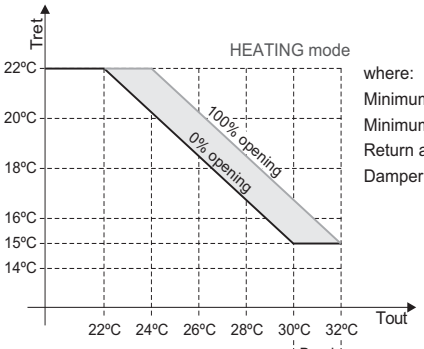
For control of the outdoor air damper, the control has a proportional output 0/10V. This will be activated for the following circumstances:

### Air refreshing

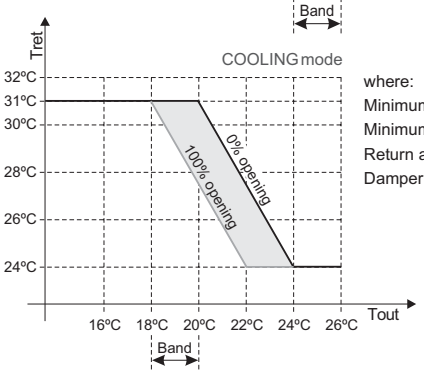
To refresh the air, the control will compare the following percentages, and will establish the instantaneous opening of the outdoor air damper with the minimum value from among them:

- % of air refreshing desired per parameter.
- % of air refreshing allowed based on the temperature of the outlet and return air (or ambient). If the outlet and/or return air temperature conditions are very unfavourable, the command will be given for the closing of the outdoor damper, ignoring the air refreshing, until optimum conditions are reached.

The following chart shows the logic applied by the control with the value obtained for these temperatures:




where:
Minimum outlet air temperature = 30°C
Minimum return air temperature = 15°C
Return air setpoint temperature = 22°C
Damper control band = 2°C




where:
Minimum outlet air temperature = 24°C
Minimum return air temperature = 31°C
Return air setpoint temperature = 24°C
Damper control band = 2°C

- % of air refreshing allowed based on the temperatures of the outdoor and return air (or ambient air) and minimum mixed air temperature:

$$\% \text{ refreshing} = \frac{\text{Return air Temp. - mixed air Temp. (12ºC)}}{\text{Return temperature - Outdoor temperature}} \times 100$$

Next, depending on the air refreshing calculated with the following formula, the opening or the closing of the damper will be ordered:

$$\% \text{ refreshing} = \frac{\text{Return air Temp. - mixed air Temp.}}{\text{Return temperature - Outdoor temperature}} \times 100$$

A maximum variation of the same of 3% for a time period of 60 seconds (values adjustable by parameters) is established for the opening or closing of the damper.

Note: the maximum opening value of the damper can also be blocked by parameter and will take priority over the one previously obtained.

If the outdoor conditions change and the unit starts to request free-cooling, the starting position of the damper will be the one that it had for air refreshing at this time.

The outdoor air damper will remain closed and, therefore, there will be no air refreshing, with the unit stopped during the defrosting operation or due to the anti-freeze thermostat alarm.

### Free-cooling

The operation of the unit in free-cooling allows the outdoor air conditions to be taken advantage of when these are more favourable than those of the return (or ambient) air. As such, this allows the cooling capacity to be reduced under these circumstances. The percentage of air refreshing will range from 0% to 100%.

To check whether or not the conditions of the outdoor air are more favourable than those for the return air, three procedures can be used:

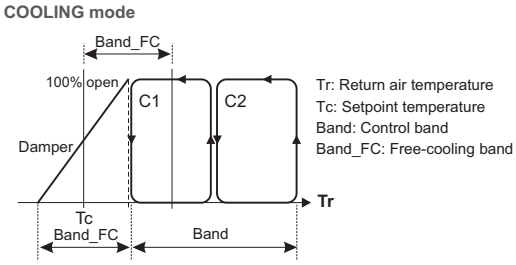
- For **thermal free-cooling,** the opening of the outdoor air damper is ordered when the temperature of the outdoor air is lower than that of the return (or ambient) air plus a differential. In this case, the control uses the outdoor and return (or ambient) air temperature probes.
- For **enthalpic free-cooling,** the opening of the outdoor air damper is ordered when the enthalpy of the outdoor air is lower than that of the return (or ambient) air plus a differential, which allows the outdoor conditions to be taken advantage of in a better manner. In this case, the control uses the outdoor and return (or ambient) air humidity probes *(this option is available only with the AVANT+ version).*

  For **thermal-enthalpic free-cooling,** the opening of the outdoor air damper is performed when the enthalpy of the outdoor air is lower than that of the return (or ambient) air plus a differential and it also meets the condition that the outdoor temperature is lower than that of the return air by 1ºC, which allows the outdoor conditions to be taken advantage of in a better manner. In this case, the control uses the outdoor and return (or ambient) air humidity probes *(this option is available only with the AVANT+ version).*

There are two operating modes:

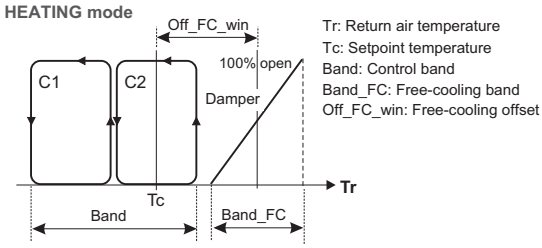
- ***Free-cooling in summer***

  When the unit is working in COOLING mode, if the conditions for the activation of free-cooling are met, the compressor control band is displaced from the setpoint. This displacement will coincide with the free-cooling differential. The control allows the compressors to be disabled if it is considered that the difference between the outdoor and return air temperatures is sufficient with free-cooling (values fixed by parameter).




- ***Free-cooling in winter***

  This free-cooling in winter is useful, for example, in public places such as shopping centres, discos, etc. where during operation in winter, due to overheating, the temperature is greater than the setpoint and cooling has to be initiated instead of heating. When the unit is working in HEATING mode, if the conditions for the activation of free-cooling are met and the outlet temperature is above 7ºC, the operation of the damper will be as follows.




## 10.7. Electrical heater (optional)

To handle electrical heaters, the control has two on/off outputs NO5 and NO6 (except in units with an indoor 3-speed fan). These will be activated under the following circumstances:

- As support in HEATING mode for heat pump units, following the input of all the available compressors and the hot water coil (optional).
- As a heating stage in HEATING mode for cooling-only units.
- In HEATING mode, as a replacement for the compressor stages (very useful in the case of a compressor breakdown).
- During the defrosting operation if selected as support.

Optionally, for the control of the electrical heater the proportional Y2 output can be used which is usually intended for the hot water coil. In this case the control of the coil must be on/off.

Note: The control has counters for the number of connections from the two electrical heater stages and for the number of operating hours (see maintenance parameters).

### 10.8. Water auxiliary coils (optional)

To control the hot water coil, the control has a proportional output Y2 (0/10V) which controls the three-way valve that acts on the coil. This will be activated under the following circumstances:

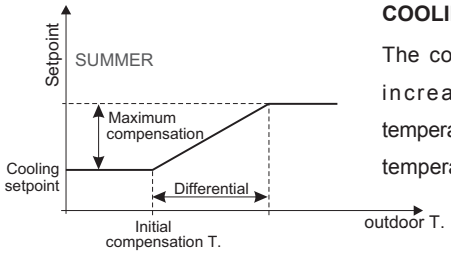
- As support in HEATING mode. Its actuation can be after the input of all the compressors available or prior to the input of the compressors (adjustable through parameters).
- During the defrosting operation, if selected as support through this parameter.
- With the unit running or off if an anti-freeze thermostat alarm is triggered.
- With the unit stopped when the outdoor temperature drops below 4ºC (modifiable by parameter).

If the unit is configured with the proportional electrical heater, for the control of the auxiliary coil the off/on output NO3 (version AVANT) or NO5 (version AVANT+) can be used which is normally used for the first electrical heater stage.

## 11. Outdoor temperature compensation

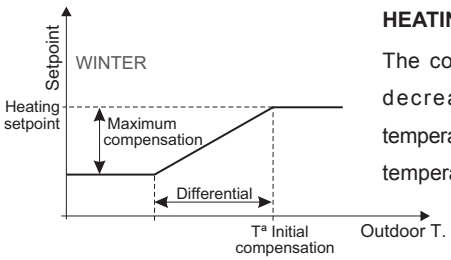
This function allows the setpoint temperature to vary in accordance with the temperature measured by the outdoor air probe (in all air-air units and also water-air with free-cooling control). The outdoor temperature compensation rules are different for HEATING and COOLING mode operation.

The compensation of the setpoint enables thermal "shock" between the inside and outside of the premises to be prevented whilst at the same time providing significant energy savings when the outdoor temperature values are particularly significant for ambient temperature control.




**COOLING mode**

The compensation function increases the setpoint temperature when the outdoor temperature increases.




**HEATING mode**

The compensation function decreases the setpoint temperature when the outdoor temperature decreases.

## 12. Outlet air temperature control

The control of the temperature limit in the outlet air prevents excessively significant drops or rises in the ambient temperature. Two types of control can be selected: Proportional (P) and Proportional - Integral (P+I). The P+I control is used by default, since it is very useful for offsetting typical oscillations in the proportional control.

If, during the operation of the unit in COOLING mode, the outlet air temperature drops below 12ºC (outlet air setpoint of 7ºC with a differential of 5ºC), the compressors will disconnect in succession to avoid an excessively low outlet air temperature.

If, during the operation of the unit in HEATING mode, the outlet air temperature rises above 40ºC (outlet air setpoint of 45ºC with a differential of 5ºC), the compressors will disconnect in succession, first the support stages and then the compressors, until arriving at 45°C. An excessively high outlet air temperature is thereby avoided.

## 13. Defrosting function

For air-air units operating in HEATING mode, the defrosting of the outdoor coils is performed by cycle inversion in order to remove any ice which has accumulated on them.

### 13.1. Types of defrosting

The control enables up to 3 methods for managing the defrosting procedure:

**Defrosting by minimum pressure or temperature**

This type of defrosting is selected by default.

If the evaporation pressure or temperature measured by the probe(s) of the outdoor coil(s) goes below the setpoint set by parameter.

| Temperature | Pressure R410a | Pressure R407c |
|---|---|---|
| -15ºC | 2.5 bar | 1.0 bar |

Note: If the unit tries to perform a 3rd defrosting operation in less than an hour this could be due to a lack of refrigerant which means that the control will trigger a low pressure alarm. This alarm will be reset manually.

**Defrosting by difference with the outdoor temperature**

This type of defrosting is selected by default.

The defrosting function is activated if the difference between the temperature measured by the outdoor probe and the evaporation temperature measured in the outdoor coil(s) exceeds the value set by parameter (by default 16ºC).

In addition to this condition, it has to be done whenever the pressure or temperature measured in the outdoor coil(s) is lower than the initial setpoint for defrosting.

### Defrosting by time

This type of defrosting is not selected by default.

This function, known as intelligent defrosting, optimises this operation by adjusting the time between defrosting operations to the real needs of the unit. The analysis is carried out based on the parameters:

- Number of defrosting operations to start intelligent defrosting.
- Variation in time between defrosting operations.
- Minimum time between defrosting operations.
- Maximum time between defrosting operations.

When starting the unit, the first period between defrosting operations that will be taken into account for the activation of the defrosting function will always be the minimum time between defrosting operations.

The logic of intelligent defrosting is as follows: if the condition of number of defrosting procedures for intelligent defrosting has been fulfilled, whenever the time between defrosting procedures has elapsed, there are two possibilities:

- If the temperature or pressure to start the defrosting procedure has been reached, it is started and the time between defrosting procedures will be diminished in the "variation of time between defrosting procedures" value.
- If the temperature or pressure to start the defrosting procedure has not been reached, the time between defrosting procedures will be increased in the "variation of time between defrosting procedures" value.

Intelligent defrosting is deactivated by setting the same value for minimum and maximum time.

Note: The control has a counter for the number of defrosting procedures performed by the unit and for the duration of the final defrosting procedure (see maintenance parameters).

## 13.2. Independent or simultaneous defrosting

In units with 2 cooling circuits, it is necessary to take into account whether or not the outdoor coils function with a single volume of outdoor air or with two independent volumes of outdoor air.

The handling of the defrosting operation will be different based on its configuration:

- With a single volume of outdoor air, the defrosting procedure will be simultaneous, i.e., the two circuits will perform the defrosting procedure at the same time. To start the defrosting procedure, the lowest value from among the outdoor coil probes will be used. To end the defrosting procedure, the lowest probe value or the value of the probe for each circuit of the coil (selected by parameter) can be used.
- With a double volume of outdoor air, the defrosting procedure will be independent, i.e., the one will not start until the first one finishes. There is one exception, that being low pressure or evaporation temperature. In that case, the circuit in wait will start the defrosting procedure even if the first one has not finished.

Note: In units with a 2x1 configuration (two indoor units with a single outdoor unit), it is necessary to select by parameter which activates the digital output N06 (J14) in order to perform simultaneous defrosting.

## 13.3. Defrosting operation

### Starting defrosting

In order to start, whichever method was selected, in addition to the conditions demanded for each method, the following conditions must be met:

- Unit operating in HEATING mode.
- Compressors in operation (for simultaneous defrosting, at least one must be in operation).
- The temperature or pressure measured by the outdoor coil probe is lower than that at the start of defrosting.

| Temperature | Pressure R410a | Pressure R407c |
|---|---|---|
| -1.5ºC | 5.6 bar | 2.7 bar |

If these conditions are met, once the delay has elapsed at the start of defrosting, the compressor(s) will be turned off.

By parameters it´s possible to adjust the operating of the outdoor fan during the start of the desfrosting, in order that during the stop of the compressor in this maneuver, outdoor air (to higher temperature) continues passing across the coil.

Forty-five seconds after the compressors are stopped, the regimen will be changed, giving power to the 4-way valve (adjustable by parameter).

After 30 seconds, the compressor(s) will be started up so that they can perform the defrosting procedure.

Note: Stopping compressors during defrosting prevents vibrations from being produced in the cycle reversing pipes, and thereby, noises and possible breakage.

During the defrosting operation, the behaviour of the other unit components will be as follows:

- The indoor fan will continue to operate. One can select by parameter that it remain stopped, but only in the case of simultaneous defrosting without an electrical heater.
- One or two electrical heaters (optional) can be enabled by parameter.
- The hot water coil (optional) can be enabled by parameter, furthermore indicating the opening percentage of the valve.
- If it includes an outdoor air damper, this will remain closed.

- The status of the outdoor fans will depend on the type of defrosting procedure activated:
  - by time: they will remain stopped.
  - by minimum pressure / temperature or by difference with the outdoor temperature: when an ON pressure value is exceeded, if the outdoor temperature is higher than -5ºC, the outdoor fans will connect.

    These will not disconnect until this pressure has not dropped below another OFF value, provided that the outdoor temperature does not fall below -6ºC or the maximum connection time is not exceeded. This action enables prolonging the duration of defrosting and, as such, the ice accumulated on the coil is completely removed.

    Note: in the case of temperature probes, the outdoor fans will be connected when the tared pressure from the condensation pressure control pressostat is exceeded.

| | Pressure R410a | Pressure R407c |
|---|---|---|
| **ON value** | 35.0 bar | 22.0 bar |
| **OFF value** | 33.0 bar | 20.0 bar |

### Ending defrosting

The defrosting ends if any of the following conditions are met:

- By pressure/temperature, when the measurement from the outdoor coil probe is greater than the value at the end of defrosting.

| Temperature | Pressure R410a | Pressure R407c |
|---|---|---|
| 18ºC | 33.0 bar | 21.0 bar |

- By maximum time, if the maximum time set for the duration of the defrosting procedure has been exceeded (by default 20 minutes).
- By opening the high pressure pressostat. In this case, the digital output of the control will be disconnected for the compressor(s). This opening will not be signalled as an alarm.

When the defrosting operation finishes, the following actuations will be performed:

- Reversing of the 4-way valve for operating in HEATING mode. By default, this reversing will be done with the anticipated stoppage of the compressor(s), adjustable by parameters.
- Connection of the outdoor fans when the compressor(s) function(s).
- Activation of the indoor fan if it was stopped (for more efficient defrosting, it is advised not to stop the indoor fan).
- Deactivation of the electrical heater that was activated and is not necessary to control the temperature.
- Close of the hot water coil valve that was activated and is not necessary to control the temperature.
- If it includes an outdoor air damper, it will go back to functioning according to the control.

## 14. Safety devices management

To manage the safety devices for the units where this control is going to be installed, it will use the different digital and analogue inputs.

The control board has a digital output NO7-NC7 (J14) that can activate a remote relay when an alarm occurs in the control. Alarms that activate this output are selected by parameter. It is also possible to select that the relay remains permanently active whilst this alarm is indicated in the terminal.

The safety devices that have the control are as follows:

### 14.1. Indoor thermal fan

Performed through digital input DI1 (J4). Its actuation is only effective when the unit is in operation, causing them to stop. Its actuation is timed to 30 seconds (by default) through a parameter, if the unit has an air differential pressostat for controlling the flow. This safety device is reset manually.

### 14.2. Compressor and outdoor fan thermal

It is performed through digital input DI4 (J4) for circuit 1 and through digital input DI10 (J16) for circuit 2. Its actuation causes the compressor(s) and the outdoor fan(s) in the corresponding circuit to stop.

In units with 2 circuits, in case one circuit fails, the other will be connected in replacement. If this circuit was already connected with the unit working in HEATING mode, the heat support can be enabled (first the heating auxiliary coil and then the electrical heaters).

This safety device is reset automatically, going on to manual resetting when 4 alarms occur in less than 30 minutes.

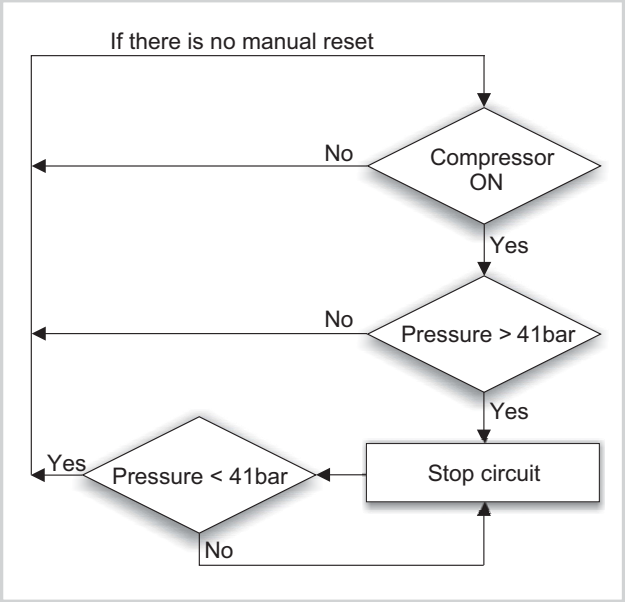
### 14.3. High pressure safety device

The digital and analogue inputs are carried out in the following manner:

- Digital input D12 (J4) for circuit 1 and digital input D18 (J16) for circuit 2. A N.O. auxiliary contact from the compressor contact is connected to this input, since the high pressure pressostat is connected in serial with the compressor contact. Its actuation is inhibited for the first 2 sec. the compressor is in operation.
- Analogue input B (J3) for circuit 1 and analogue input B12 (J18) for circuit 2, with the pressure transducer in the outdoor coil and the unit operating in COOLING mode. Actuation according to the chart.
- Analogue input B6 (J3) for circuit 1 and analogue input B11 (J18) for circuit 2, with the pressure transducer in the indoor coil and the unit operating in HEATING mode. Actuation according to the chart.

Values based on the refrigerant:

| | Pressure R410a | Pressure R407c |
|---|---|---|
| **Alarm start value** | 41,0 bar | 28,0 bar |
| **Alarm end value** | 30,0 bar | 19,0 bar |




- Short-circuiting of the analogue input B7 (J3) for circuit 1 and analogue input B12 (J18) for circuit 2.This option will be used in units where the control is mounted on the outdoor unit in order to limit the number of interconnection wires between the outdoor unit and the indoor unit.

The actuation of the high pressure safety device causes the compressor(s) and outdoor fan(s) of the corresponding circuit to be stopped. During defrosting, its actuation causes the compressor(s) to be stopped and this operation to be finalised, without counting it as a failure.

In case one circuit should fail, the other will be connected in replacement, and if that one should already be connected and the unit was in HEATING mode, the auxiliary heater will be connected (first the heating auxiliary coil and then the electrical heaters). This safety device is reset automatically, going on to manual resetting when 4 alarms occur in less than 30 minutes (adjustable by parameters).

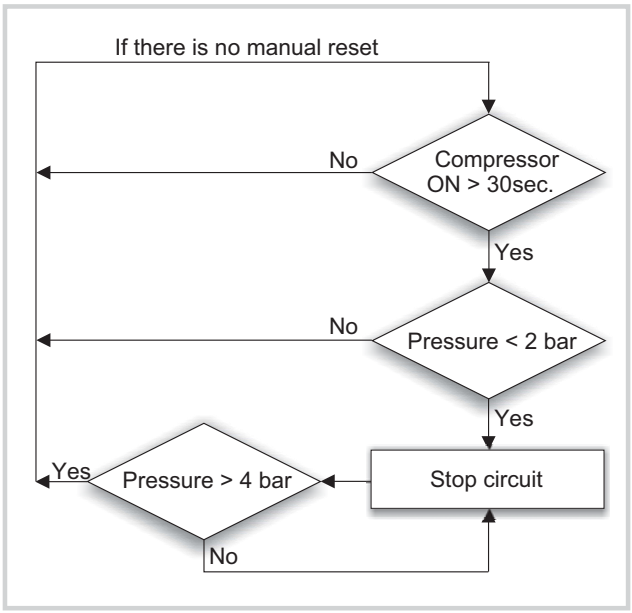
## 14.4. Low pressure safety device

The digital and analogue inputs are carried out in the following manner:

- Digital input DI3 (J4) for circuit 1 and digital input DI9 (J16) for circuit 2. The low pressure pressostat is connected in this input. If the unit does not have a low pressure pressostat, , this input can be cancelled via a parameter.
- Analogue input B6 (J3) for circuit 1 and analogue input B11 (J18) for circuit 2, with temperature or pressure probe in the indoor coil and the unit operating in COOLING mode. Actuation according to the chart.
- Analogue input B7 (J3) for circuit 1 and analogue input B12 (J18) for circuit 2, with temperature or pressure probe in the outdoor coil and the unit operating in HEATING mode. Actuation according to the chart.

Values based on the temperature/pressure and refrigerant:

| | Temperature | Pressure R410a | Pressure R407c |
|---|---|---|---|
| **Start COOLING alarm** | -10ºC | 2.0 bar | 0.5 bar |
| **End COOLING alarm** | 10ºC | 4.0 bar | 5.4 bar |
| **Start HEATING alarm** | -22ºC | 2.0 bar | 0.5 bar |
| **End HEATING alarm** | -15ºC | 4.0 bar | 5.4 bar |




The actuation of the low pressure safety is not taken into account during a period of time since the unit start-up, default 1 second (value adjustable by parameter).

Its actuation causes the compressor(s) and outdoor fan(s) of the corresponding circuit to be stopped.

Its actuation during the defrosting procedure can be inhibited via a parameter.

In case one circuit should fail, the other will be connected in replacement, and if that one should already be connected and the unit was in HEATING mode, the auxiliary heater will be connected (first the heating auxiliary coil and then the electrical heaters).

This safety device is reset automatically, going on to manual resetting when 4 alarms occur in less than 30 minutes (adjustable by parameters).

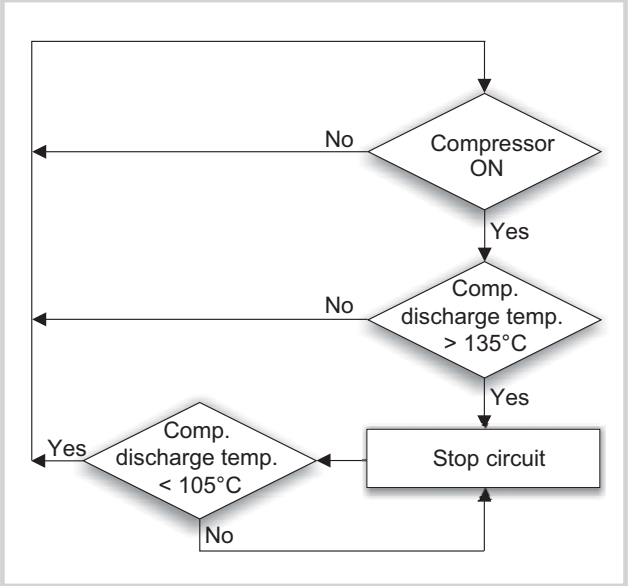
Note: If the unit tries to perform a 3rd defrosting operation due to minimum pressure or temperature in less than an hour this could be due to a lack of refrigerant caused by a small leak or failure in the expansion valve which means that the control will trigger a low pressure alarm.

This safety device is reset manually.

## 14.5. High temperature discharge compressor safety device

The digital and analogue inputs are carried out in the following manner:

- Digital inputs DI3 and DI4 (J4) for circuit 1 and digital inputs DI9 and DI10 (J16) for circuit 2. The discharge klixon for the compressor(s) will be connected to the common terminal for these digital inputs in such a way that its opening would cause the opening of the two digital inputs at the same time.
- Analogue input B4 (J3) for circuit 1 and analogue input B8 (J18) for circuit 2. A temperature probe will be connected, whose actuation will be done graphically.




| | Temperature |
|---|---|
| **Alarm start value** | 135ºC |
| **Alarm end value** | 105ºC |

Its actuation causes the compressor(s) and outdoor fan of the corresponding circuit to be stopped.

In case one circuit should fail, the other will be connected in replacement, and if that one should already be connected and the unit was in heating mode, the auxiliary heater will be connected (first the heating auxiliary coil and then the electrical heaters).

This safety device is reset automatically.

## 14.6. Refrigerant leak safety device

It is performed through analogue input B6 (J3) for circuit 1 and through analogue input B11 (J18) for circuit 2. This safety device will be activated through a parameter as long as the unit is configured with temperature probe in the indoor coil (optional).

This safety device is important in units that do not have a low pressure pressostat.

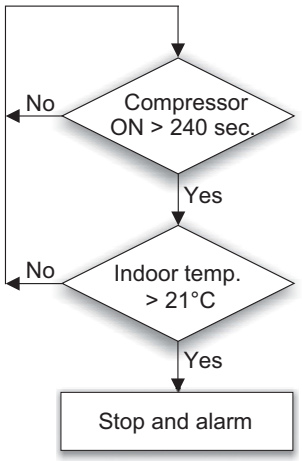
For this safety device to operate better, the condensation and evaporation control must be activated in the indoor unit, since in this case it will stop the indoor fan.

Its actuation is not taken into account until the compressor(s) of the corresponding circuit operate(s) for 240 seconds.

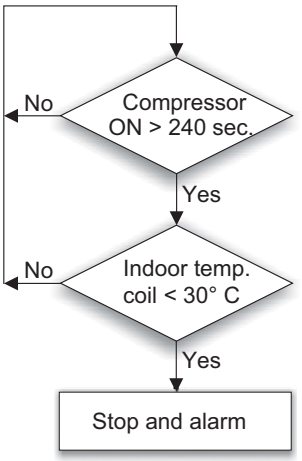
Its actuation causes the compressor(s) and outdoor fan of the corresponding circuit to be stopped.

In case one circuit should fail, the other will be connected in replacement, and if that one should already be connected, with the unit operating in HEATING mode, the auxiliary heater will be connected (first the heating auxiliary coil and then the electrical heaters). This safety device is reset automatically, going on to manual resetting when 4 alarms occur in less than 30 minutes (adjustable by parameters).

**Detection in COOLING mode**



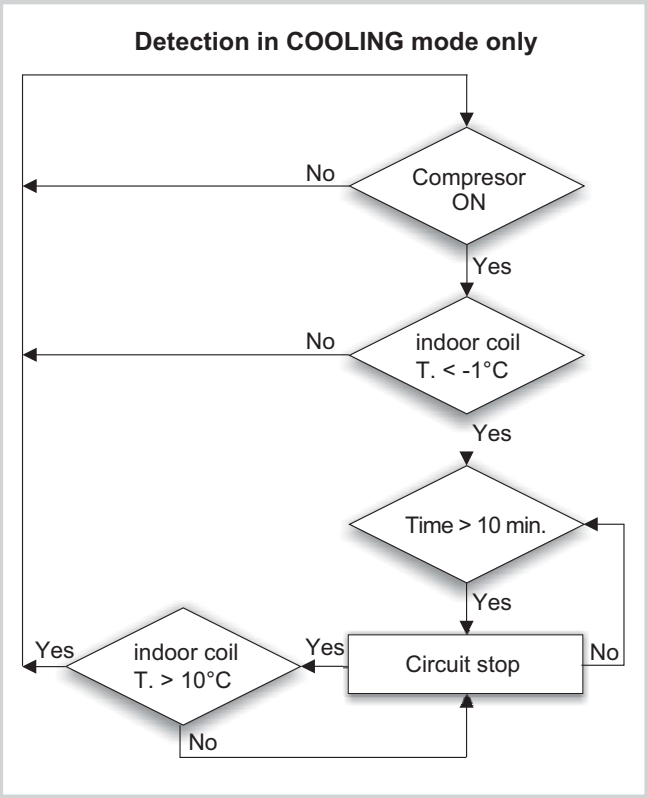

**Detection in HEATING mode**




## 14.7. Anti-freeze safety device

It is performed through analogue input B6 (J3) for circuit 1 and through analogue input B11 (J18) for circuit 2, for units with a temperature or pressure probe in the indoor coil (optional).

| | Temperature | Pressure R410a | Pressure R407c |
|---|---|---|---|
| **Initial alarm value** | -1ºC | 6.7 bar | 3.4 bar |
| **Final alarm value** | 10ºC | 9.8 bar | 5.4 bar |




Its actuation is not taken into account until the compressor(s) of the corresponding circuit operate(s) with a pressure or temperature lower than that of activation of the safety device plus 10 minutes (adjustable by parameters).

Its actuation causes the compressor(s) and outdoor fan(s) of the corresponding circuit to be stopped.

In case one circuit should fail, the other will be connected in replacement, and if that one should already be connected, and with the unit operating in HEATING mode, the auxiliary heater will be connected (first the heating auxiliary coil and then the electrical heaters).

This safety device is reset automatically.

## 14.8. Anti-freeze thermostat of the hot water auxiliary coil

This is performed through digital input DI5 if it has been configured with this option.

Its actuation is taken into account only if a hot water auxiliary coil has been configured, causing the unit to stop, the free-cooling damper to be closed and the hot water coil to be activated.

This safety device is reset manually.

## 14.9. Thermistors of electrical heaters

Its indication in the control is performed through digital input DI5 if it has been configured with this option.

If the unit includes an electrical heater, the safety thermistors directly cut off the supply to the electrical heaters independently of the control. This safety device is reset manually.

## 14.10. Condensate pump

This is performed through digital input DI5 if it has been configured with this option. Its actuation is taken into account only in COOLING mode when the digital input is open for a time longer than 60 sec. (value modifiable by parameters). Its actuation causes the compressor(s) and outdoor fan(s) to be stopped. This safety device is reset automatically.

## 14.11. Pressostat for clogged filters

This is performed through digital input DI6 if it has been configured with this option. Its actuation is only taken into account with the unit in operation (ON), only causing the alarm to be indicated. This safety device is reset automatically.

## 14.12. Anti-freeze safety device in water-air units

This is done through the analogue inputs B7 (circuit 1) and B12 (circuit 2), through the conversion to the measurement temperature taken by the pressure transducer located between the plate exchanger and the cycle reversing valve.

This safety device is started if, after 120 seconds of operation by the compressor working in HEATING mode, the refrigerant temperature is lower than -2ºC (early alarm). If this temperature does not exceed -1ºC after 90 seconds the compressor stops. Once the minimum OFF time of the compressor has elapsed, if the refrigerant temperature is greater than 6ºC (-2ºC + 8ºC differential), the compressor can once again be started. Otherwise, the refrigerant anti-freeze alarm is considered and it will be manually reset.

If the refrigerant temperature is less than -5ºC after the compressor has been operating for 120 seconds, the compressor is stopped and directly, and without delay, the refrigerant anti-freeze alarm is considered.

If 10 early anti-freeze alarms (Tª < -2ºC) are triggered in less than 120 minutes these will also be considered as a refrigerant anti-freeze alarm.

Note: If 10 alarms are triggered in less than 24 hours the water-air unit is blocked by the anti-freeze alarm. The resetting of this safety device can only be performed from the pDG1 maintenance terminal or through a supervisory variable.

## 14.13. Flow switch in the water-air units

This is performed through digital input DI5 if it has been configured with this option. Its actuation is taken into account only in HEATING mode when the circulation pump (which will be connected to the output of the outdoor fan) functions for longer than 60 seconds (value modifiable by parameter) and the digital input is open for more than 5 seconds. Its actuation causes the unit to stop. Automatic reactivation.

## 14.14. Alarm for high or low ambient (or return) air temperature

This is done through analogue input B1 (return air temperature probe) or the ambient air temperature probe of the TCO thermostat. Its actuation is only taken into account with the unit in operation (ON) and timed for 10 minutes (adjustable by parameter). Its actuation only causes the alarm to be indicated. Automatic reactivation.

## 14.15. Alarm for high or low outdoor air temperature

This is done through analogue input B2 (outdoor air temperature probe, in all air-air units and also water-air with free-cooling control) or the ambient air temperature probe of the TCO thermostat. Its actuation is only taken into account with the unit in operation (ON) and timed for 10 minutes (adjustable by parameter). Its actuation only causes the alarm to be indicated. Automatic reactivation.

## 14.16. Anti-fire safety

When the return air temperature exceeds a safety value the anti-fire safety device will be activated (60ºC by default) and the unit will stop. It cannot return to operation until the temperature has dropped to below 40ºC (60ºC setpoint - 20ºC differential).

In units with outdoor air damper it is possible to select the damper position (open or closed) in the event of an anti-fire alarm. This safety device is reset manually.

Note: for this security is needed the return probe (optional).

## 14.17. Safety device for short-circuiting or opening of the analogue inputs

Its actuation depends on the function that the analogue input is performing. The different actuations are detailed below, taking into account the function of the analogue input:

- Opening or short-circuiting of the return or ambient air temperature probe:

  Its actuation causes the unit to stop, except for the indoor fan if it is in continuous mode. It resets automatically.

- Opening or short-circuiting of the outdoor air temperature probe:

  Its actuation causes only signalling and the closing of the outdoor damper if free-cooling has been activated. It resets automatically.

- Opening or short-circuiting of the outlet air temperature probe:

  Its actuation causes the compressor(s) and outdoor fan(s) to be stopped. It resets automatically.

- Opening or short-circuiting of the outlet water temperature probe:

  Its actuation is only taken into account if the unit has been configured as water-air. Its actuation causes the unit to stop. It resets automatically.

- Opening or short-circuiting of the compressor discharge temperature probe:

  Its actuation is taken into account only if the compressor discharge probe has been enabled. Its actuation causes the compressor(s) and outdoor fan(s) to be stopped. It resets automatically.

- Opening or short-circuiting of the pressure transducer or the outdoor coil temperature probe:

  Its actuation causes the compressor(s) and outdoor fan(s) to be stopped. It resets automatically.

- Opening or short-circuiting of the pressure transducer or the temperature probe of the indoor coil (optional):

  Its actuation is taken into account only if the temperature or pressure probe of the indoor coil has been enabled. Its actuation causes the compressor(s) and outdoor fan(s) to be stopped. It resets automatically.

- Opening or short-circuiting of the mixed air temperature probe (optional):

  Its actuation is taken into account only if the free-cooling configuration has been enabled. Its actuation causes the control of the opening/closing of the outdoor damper with the % of air refreshing calculated with the mixed air temperature. It resets automatically.

- Opening or short-circuiting of the return air humidity probe (optional):

  This probe uses the unit with options for enthalpic free-cooling or dehumidification by humidity. Its actuation causes the enthalpic free-cooling and dehumidification by humidity to be disabled. It resets automatically.

- Opening or short-circuiting of the outdoor humidity probe (option only available in the AVANT+ version).

  This probe uses the unit with the option for enthalpic free-cooling. Its actuation causes the free-cooling to be disabled. It resets automatically.

## 15. MANAGEMENT OF THE ALARMS

To manage the alarms, the electronic control has a log of the last 100 alarms produced, along with their time and date. It also counts the number of times that each alarm has occurred (see maintenance parameters).

| Code | Description | Reset | Delay |
|---|---|---|---|
| AL 01 | Indoor thermal fan and/or air flow switch | Manual | 0s (standard) 30s (air flow switch) |
| AL 03 | Compressor and fan thermal for circuit 1 | Auto/Man. | |
| AL 04 | High pressure alarm for circuit 1 | Auto/Man. | |
| AL 05 | Low pressure alarm for circuit 1 | Auto/Man. | 1 second |
| AL 07 | Compressor and fan thermal for circuit 2 | Auto/Man. | |
| AL 08 | High pressure alarm for circuit 2 | Auto/Man. | |
| AL 09 | Low pressure alarm for circuit 2 | Auto/Man. | 1 second |
| AL 10 | Thermistors of electrical heaters | Manual | |
| AL 13 | Anti-freeze alarm for circuit 1 | Auto | 10 minutes |
| AL 14 | Anti-freeze alarm for circuit 2 | Auto | 10 minutes |
| AL 17 | Broken or disconnected outlet air probe | Auto | |
| AL 18 | Condensate pump alarm | Auto | 60 seconds |
| AL 20 | Broken or disconnected outdoor coil probe 1 | Auto | |
| AL 21 | Broken or disconnected outdoor coil probe 2 | Auto | |
| AL 22 | Broken or disconnected indoor coil probe 1 | Auto | |
| AL 23 | Broken or disconnected indoor coil probe 2 | Auto | |
| AL 24 | Broken or disconnected return air probe (board) | Auto | |
| AL 25 | Refrigerant leak in circuit 1 | Auto/Man. | 240 seconds |
| AL 26 | Refrigerant leak in circuit 2 | Auto/Man. | 240 seconds |
| AL 27 | Low temperature of outlet water alarm | Manual | |
| AL 28 | Hot water coil anti-freeze alarm | Manual | |
| AL 29 | Broken ambient probe (thermostat) (*) | Auto | |
| AL 31 | Open flow switch alarm | Auto | 5 seconds |
| AL 33 | Alarm for clogged filters | Auto | |
| AL 35 | Discharge limit of compressor circ. 1 exceeded | Auto | |
| AL 36 | Discharge limit of compressor circ. 2 exceeded | Auto | |
| AL 43 | Broken outdoor air temperature probe (*) | Auto | |
| AL 44 | Broken discharge temperature probe circ. 1 (*) | Auto | |
| AL 45 | Broken discharge temperature probe circ. 2 (*) | Auto | |
| AL 46 | Broken indoor humidity probe (*) | Auto | |
| AL 47 | Broken outdoor humidity probe (*) | Auto | |
| AL 48 | Broken mixed air temperature probe (*) | Auto | |
| AL 77 | Ambient air high temperature setpoint exceeded | Auto | |
| AL 78 | Ambient air low temperature setpoint exceeded | Auto | |
| AL 79 | Outdoor air high temperature setpoint exceeded | Auto | |
| AL 80 | Outdoor air low temperature setpoint exceeded | Auto | |
| AL 81 | Permanently failed memory severe alarm (indication) | Auto | |
| AL 82 | Clock does not work (indication) | Auto | |
| AL 83 | Serious anti-fire safety alarm | Manual | |
| AL 84 | Anti-freeze alarm refrigerant circuit 1 | Auto | 90 seconds |
| AL 85 | Anti-freeze alarm refrigerant circuit 2 | Auto | 90 seconds |
| AL 86 | Unit blocking due to anti-freeze alarm | Manual | |

(*) Broken or disconnected probe

The control board has a digital output NO7-NC7 (J14) that can activate a remote relay when any alarm among those selected by parameter from the previous list.

**View of the alarms in the TCO terminal**


If the icon appears on the TCO terminal display, there is/are active alarm(s).

By simultaneously pressing the and keys for a few seconds, the code of the first alarm will be shown.


With the keys, the rest of the alarms stored in memory can be queried.

The text "RES ALM" appears on the screen below the alarms. Pressing the key will reset inactive alarms and will return to the main display.


To exit without resetting alarms, press the key when the text "RES ALM" appears on the display, then it will change to the text "ESC". By pressing the key, it will return to the main display:


**View of the alarms in the pGD1 terminal**

If the key for terminal pGD1 is lit red, there is/are active alarm(s).

Pressing the key once will show the description of the first alarm.


With the keys, the rest of the alarms stored in the memory can be queried.

Pressing the keys a second time will cause inactive alarms to be reset.

If the unit does not have any alarm, the message "NO ACTIVE ALARM" appears.

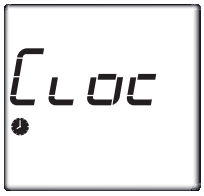
# 16. TIMER PROGRAMMING

The AVANT/AVANT+ control has a schedule programmer that allows 6 time slots to be chosen for each day of the week. A change in the setpoint temperature or the disconnection of the unit can be scheduled in these time slots

## 16.1. Schedule programming with the TCO terminal

### Enter the time for the terminal

By pressing the key for a long time, the terminal changes to the initial clock display (CLOC). From there, by pressing the key, the time update display is accessed.



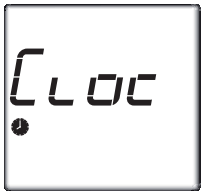

The current time appears intermittently and can be modified with the help of the keys. The new time can be validated with the key. The minutes appear below intermittently. Its value can also be modified with the keys and validated with the key.


There are two ways of returning to the main display: by repeatedly pressing the key or not acting on the terminal for some seconds.

Note: The day of the week cannot be modified, since it depends on the day, months and year entered in the parameters (see Chapter 17).

### Creation of a schedule programme

By pressing the key for a long time, the terminal changes to the initial clock display (CLOC).

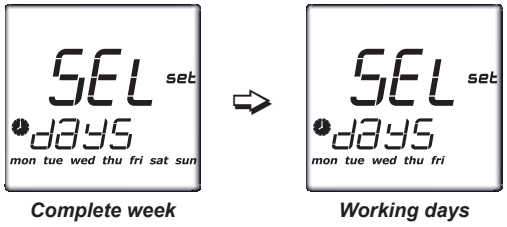



Next, by pressing the key, the terminal changes to the initial schedule programming display (TIME BAND).

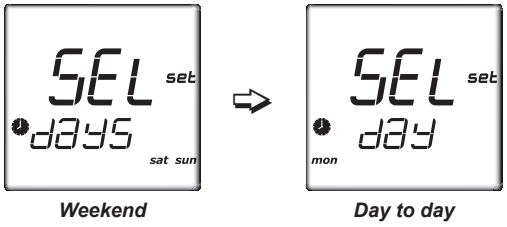

If it desired to abandon the programming, by pressing the key again, the terminal changes to the exit display (ESC), which is exited by pressing .


If it is desired to continue with the scheduled programme, must be pressed with the terminal on the initial programming display (TIME BAND).

The text SEL DAYS will then appear on the display to select the days of the week to which the schedule will apply. With the keys, the following groups can be selected:



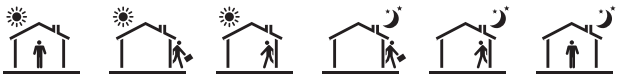

*Complete week* *Working days*



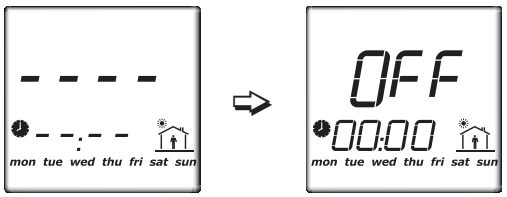

*Weekend* *Day to day*

If it desired to abandon the programming, by pressing the key again, the terminal changes to the exit display (ESC), which is exited by pressing .


If it is desired to continue with the scheduled programme, the key must be pressed on the display of the days to which it applies in order to access the first time slot. The sequence of these slots is as follows:

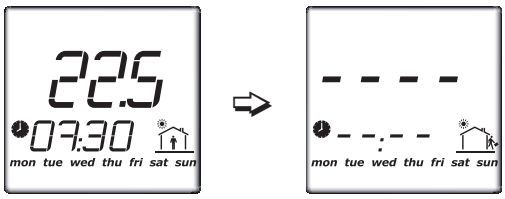


The first time slot will flicker on this display. If it desired to schedule this slot, the key will be pressed and automatically stop flickering, going on to appear as follows:



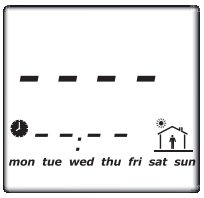

Next, with the key, the activation time of the programming for the selected slot will be set, and then, whether the unit will remain stopped (OFF) or at the setpoint value.

Finally, the schedule slot will cease flickering. By pressing the △ key, the scheduling created will be saved and the terminal will go on to display the next slot.




It will be necessary to define a minimum of two slots for each day, since only the initial time is established is established for each slot, and not the ending time.

To delete the schedule from a time slot, it is necessary to select it with the ◁┘ key, and then, by pressing the △ ▽ keys, the time will be modified until the display returns to show the following:




Note: Before making a new schedule, it must be checked whether there is already one defined. If any schedule is made that may affect another that is already stored, the latter will not be saved.

### Activation of the timer programming

By pressing the ⌚ for a short time, the stored schedule programming corresponding to the activation time is activated.

The symbol 🕒 and the active scheduling slot will always appear on the main display, both on stopped units and units in operation.



With the unit in operation, by pressing the keys △ or ▽ the setpoint for the time slot will be shown.

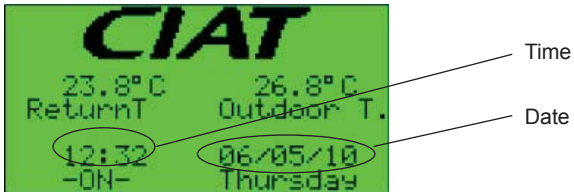
Note: The text **set** will appear next to the setpoint value.


To deactivate the scheduled programme, it is necessary only to press the ⌚ key for a short while. Therefore, if it is not desired for anyone to be able to deactivate the set schedule, the terminal must be blocked by simultaneously pressing the ☼/❄ and keys for a few seconds (in that case, the symbol will be lit on the main display).

## 16.2. Schedule programming with the pGD1 terminal

### Enter the time for the terminal

On the main display of the terminal, by pressing the ↵ key, the cursor is placed intermittently over the time. The value can be modified with the ↑ ↓ keys. The change is confirmed by pressing the ↵ key again. Likewise, the minutes, day, month and year can be modified. The day of the week will be adjusted automatically.




### Creation of a schedule programme

By pressing the Prg key from any display, the Main Menu is accessed for viewing the setpoints, inputs/outputs and scheduled programming (no password required).

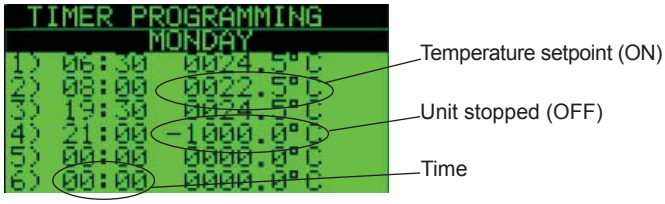
By pressing the ↵ key with the cursor placed over "TIMER PROGRAMMING", the creation and activation displays for the scheduled programming are accessed.


A schedule can be created for each of the 7 days of the week from the pGD1 terminal.

With the ↑ ↓ keys, it will rotate to the display corresponding to each day, and with the ↵ key, the time and setpoint can be saved for each slot of the day (6 slots available).

Note: The value -1000.0°C will be assigned to the setpoint of those slots in which the unit will be stopped (OFF).

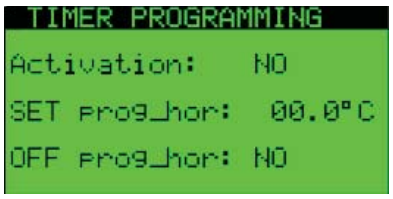
For example, the following display corresponds to a scheduled programming defined for Monday.




Note: The terminal does not allow the schedule to be copied from one day to another.

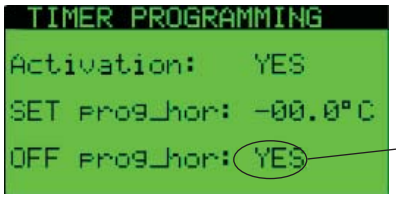
### Activation of the timer programming

To activate the scheduled programming, it is necessary to access the following display from the menu:

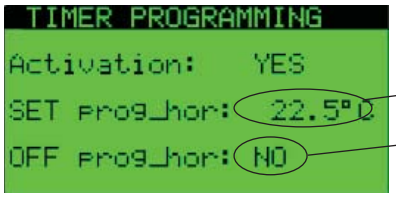



By pressing the ↵ key, the cursor is placed intermittently over "Activation". The value can be modified to "YES" with the ↑ ↓ keys and the schedule stored for the current day of the week will be activated.

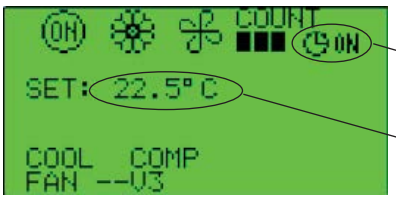
If the unit is scheduled to stop in the current hour (OFF prog_hour = YES), the display will look as follows:




If, on the contrary, the unit will be in operation at the current hour (OFF prog_hor = NO), the display will also show the value of the setpoint set for this time slot:




If the schedule is active, the following symbol will appear on the unit operation information display *(MANDO_2)*:

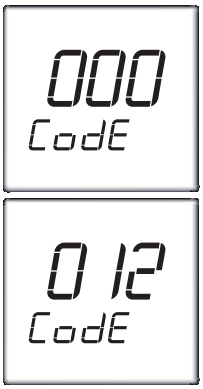



If the schedule is deactivated, the unit operation information display *(MANDO_2)* will show the following symbol:


## 17. SCHEDULING PARAMETERS

### 17.1. Access to parameters with the TCO terminal

By pressing the and keys for a long time (approximately 3 seconds) the Parameter Menu is accessed.



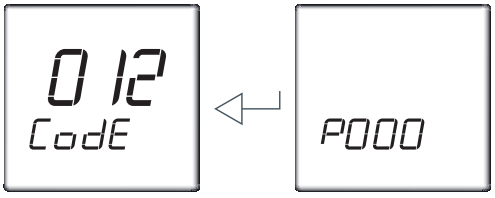

The text CODE appears on the display so that a password may be entered. According to the password entered, it will access a different number of menus. The terminal is configured with 11 menus and 4 access levels.

The user will only access level 1 (password = 12). For the rest of the levels, it is necessary to request the access password.

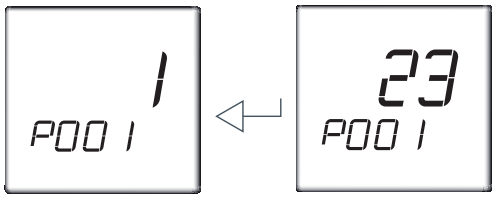
The passwords and menus are as follows:

- Level 1 Menu P000 = general parameters
- Level 2 Menu P000 = general parameters
  Menu U000 = user parameters
- Level 3 Menu P000 = general parameters
  Menu U000 = user parameters
  Menu M000 = Input/output maintenance
  Menu M100 = View of counters
- Level 4 Menu P000 = general parameters
  Menu U000 = user parameters
  Menu M000 = Input/output maintenance
  Menu M100 = View of counters
  Menu C000 = unit configuration
  Menu C100 = defrosting configuration
  Menu C200 = compressor configuration
  Menu C300 = control configuration
  Menu C400 = safety device configuration
  Menu C500 = alarm configuration
  Menu C600 = unit initialisation

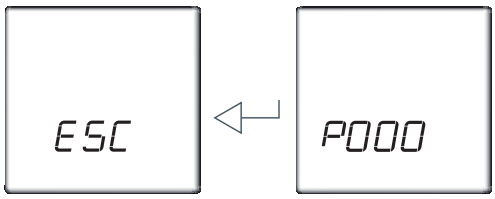
For example, the day, month and year that appears on the terminal can be modified in the general parameters menu. By entering the correct password into CODE with the help of the △ ▽ keys and confirming with the ↵ key, the P000 menu will be accessed:



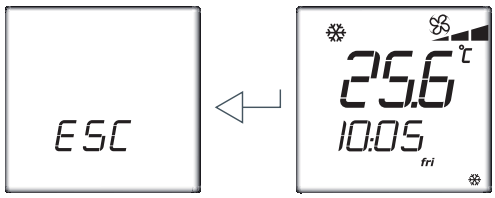
By pressing the ↵ key again, the first parameter P001 is accessed, which coincides with the current day. To modify it, it is necessary to return to pressing ↵. At that time, the day value with flicker. It will be modified with the △ ▽ keys and confirmed with the ↵ key.




At that time, the terminal goes on to show the P002 parameter (month), then P003 parameter (year), and so on, successively, for all the parameters of the P000 menu until reaching a display with the ESC indicator. By pressing the ↵ key, this menu can be exited.




To permanently abandon the parameter displays, it is necessary to look for a display with the ESC indicator and confirm with ↵.



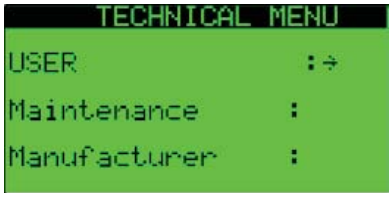

Note: All parameters, as well as their descriptions, can be queried in the following chapter.

Important: After a power failure should take 5 min. in order to access parameters from this terminal.

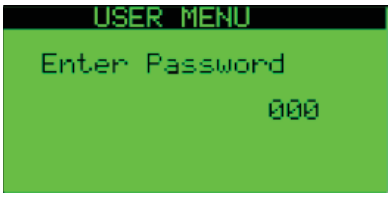
## 17.2. Access to parameters with the pGD1 terminal

From the main terminal display (MANDO_1), by simultaneously pressing the Prg and Esc buttons, the Technical Menu for screens to configure and maintain the unit are accessed, protected by passwords. If it is necessary to know some of these passwords: consult.

All the parameters listed in the following chapter are grouped in the Technical Menu and Main Menu displays.




Once the password has been entered, it is possible to access the other group displays by pressing ↓.




The access level is equivalent to the TCO terminal in such a manner that:

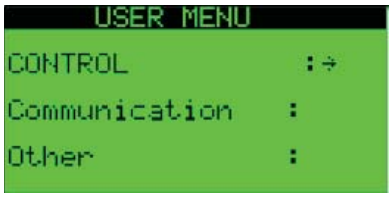
Level 1: Main Menu (no password)

Level 2: Main Menu (no password)
Technical menu: User

Level 3: Main Menu (no password)
Technical menu: User and Maintenance

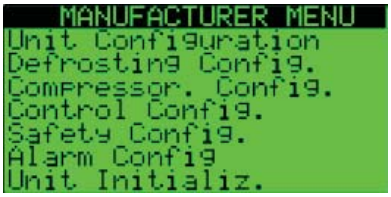
Level 4: Main Menu (no password)
Technical menu: User, Maintenance and Builder

In the **User Menu,** it can be configured whether the unit has a return or ambient air probe, the values associated with the setpoint, compensation due to outdoor temperature, communication in a supervision network and the configuration of the terminal.




The **Maintenance Menu** is reserved for the technical support service (SAT). It is intended for the management of the counters for the number of starts and for the hours of operation of the different elements of the unit, for fast reading of the analogue inputs and outputs measured, for the calibration of the probes connected and for authorising a forced defrosting of the coils.


In this displays of the **Builder Menu,** the unit is configured with the selection of the elements that make it up and the options that have to be controlled. This configuration is factory-set and must not be modified unless there is a change in components.



# 18. List of parameters

## 18.1. Parameters from the main display

| Param. No. | Designation | Description | Value by default | Units | Minimum | Maximum | Possible value | PGD1 Display | Type | Reading/ Writing |
|---|---|---|---|---|---|---|---|---|---|---|
| Main display | MODO_ON_OFF | Select operating mode | 0 | --- | 0 | 1 | 0: Stop<br>1: Operating<br>2: Stop (by schedule) | MANDO_2 | Integer | Writing |
| Main display | MODO_ FUNCIONAMIENTO | Select operating mode | 3 | --- | 0 | 5 | 0: Humidification<br>1: Dehumidification<br>2: Automatic<br>3: Cool<br>4: Heating<br>5: Fan | MANDO_2 | Integer | Writing |
| Main display | MODO_VINT_ AUTO | Enabling operation of indoor fan in AUTO mode | 0 | --- | 0 | 1 | 0: Continuous<br>1: Automatic | MANDO_2 | Digital | Writing |
| Main display | VEL_VENT_INT | Indoor fan speed | 3 | --- | 1 | 3 | 0: Without fan<br>1: 1st speed<br>2: 2nd speed<br>3: 3rd speed | MANDO_2 | Integer | Writing |
| Main display | SET_POINT_TEMP | Temperature setpoint | 23 | °C | MIN_SET_ POINT_TEMP,0 | MAX_SET_ POINT_TEMP,0 | | MANDO_2 | Analogue | Writing |
| Main display | SET_POINT_HUM | Humidity setpoint | 50 | % RH | MIN_SET_ POINT_HUM,0 | MAX_SET_ POINT_HUM,0 | | MANDO_2 | Analogue | Writing |
| Main display | HAB_PROG_ HORARIA | Enable schedule programming | 0 | --- | 0 | 1 | 0: Stop<br>1: On | MANDO_2 | Digital | Writing |
| Main display | NEW_HOUR | | 0 | h | 0 | 23 | | MANDO_1 | Integer | Writing |
| Main display | NEW_MINUTE | | 0 | --- | 0 | 59 | | MANDO_1 | Integer | Writing |

## 18.2. Schedule programming parameters

| Param. No. | Designation | Description | Value by default | Units | Min. | Max. | Possible values | PGD1 Display | Type | Reading/ Writing |
|---|---|---|---|---|---|---|---|---|---|---|
| | HAB_PROG_HORARIA | Enable schedule programming | 0 | --- | 0 | 1 | 0: No<br>1: Yes | PROG_HOR_1 | Digital | Writing |
| | SET_POINT_TEMP_ HORARIO | Temperature setpoint by schedule | 0 | ºC | 0 | 50 | | PROG_HOR_1 | Analogue | Reading |
| | OFF_PROG_HOR | Signal ON-OFF by scheduled programming | 0 | --- | 0 | 1 | 0: No<br>1: Yes | PROG_HOR_1 | Digital | Reading |
| | thTune_Term1_SD1_1_H | | 6 | h | 0 | 24 | | PROG_HOR_2 | Integer | Writing |
| | thTune_Term1_SD1_1_M | | 30 | min | 0 | 60 | | PROG_HOR_2 | Integer | Writing |
| | thTune_Term1_SD1_1_S | | 21 | ºC | -1000 | MAX_SET_POINT_TEMP | | PROG_HOR_2 | Analogue | Writing |
| | ON_DIA1_F1 | Active schedule programming signal | 0 | --- | 0 | 1 | 0: Inactive<br>1: Active | PROG_HOR_2 | Digital | Reading |
| | thTune_Term1_SD1_2_H | | 8 | h | 0 | 24 | | PROG_HOR_2 | Integer | Writing |
| | thTune_Term1_SD1_2_M | | 0 | min | 0 | 60 | | PROG_HOR_2 | Integer | Writing |
| | thTune_Term1_SD1_2_S | | 23 | ºC | -1000 | MAX_SET_POINT_TEMP | | PROG_HOR_2 | Analogue | Writing |
| | ON_DIA1_F2 | Active schedule programming signal | 0 | --- | 0 | 1 | 0: Inactive<br>1: Active | PROG_HOR_2 | Digital | Reading |
| | thTune_Term1_SD1_3_H | | 14 | h | 0 | 24 | | PROG_HOR_2 | Integer | Writing |
| | thTune_Term1_SD1_3_M | | 0 | min | 0 | 60 | | PROG_HOR_2 | Integer | Writing |
| | thTune_Term1_SD1_3_S | | 21 | ºC | -1000 | MAX_SET_POINT_TEMP | | PROG_HOR_2 | Analogue | Writing |
| | ON_DIA1_F3 | Active schedule programming signal | 0 | --- | 0 | 1 | 0: Inactive<br>1: Active | PROG_HOR_2 | Digital | Reading |

| Param. No. | Designation | Description | Value by default | Units | Min. | Max. | Possible values | PGD1 Display | Type | Reading/ Writing |
|---|---|---|---|---|---|---|---|---|---|---|
| | thTune_Term1_SD1_4_H | | 15 | h | 0 | 24 | | PROG_HOR_2 | Integer | Writing |
| | thTune_Term1_SD1_4_M | | 0 | min | 0 | 60 | | PROG_HOR_2 | Integer | Writing |
| | thTune_Term1_SD1_4_S | | 23 | °C | -1000 | MAX_SET_POINT_TEMP | | PROG_HOR_2 | Analogue | Writing |
| | ON_DIA1_F4 | Active schedule programming signal | 0 | --- | 0 | 1 | 0: Inactive 1: Active | PROG_HOR_2 | Digital | Reading |
| | thTune_Term1_SD1_5_H | | 19 | h | 0 | 24 | | PROG_HOR_2 | Integer | Writing |
| | thTune_Term1_SD1_5_M | | 0 | min | 0 | 60 | | PROG_HOR_2 | Integer | Writing |
| | thTune_Term1_SD1_5_S | | 21 | °C | -1000 | MAX_SET_POINT_TEMP | | PROG_HOR_2 | Analogue | Writing |
| | ON_DIA1_F5 | Active schedule programming signal | 0 | --- | 0 | 1 | 0: Inactive 1: Active | PROG_HOR_2 | Digital | Reading |
| | thTune_Term1_SD1_6_H | | 20 | h | 0 | 24 | | PROG_HOR_2 | Integer | Writing |
| | thTune_Term1_SD1_6_M | | 0 | min | 0 | 60 | | PROG_HOR_2 | Integer | Writing |
| | thTune_Term1_SD1_6_S | | -1000 | °C | -1000 | MAX_SET_POINT_TEMP | | PROG_HOR_2 | Analogue | Writing |
| | ON_DIA1_F6 | Active schedule programming signal | 0 | --- | 0 | 1 | 0: Inactive 1: Active | PROG_HOR_2 | Digital | Reading |
| | thTune_Term1_SD2_1_H | | 6 | h | 0 | 24 | | PROG_HOR_3 | Integer | Writing |
| | thTune_Term1_SD2_1_M | | 30 | min | 0 | 60 | | PROG_HOR_3 | Integer | Writing |
| | thTune_Term1_SD2_1_S | | 21 | °C | -1000 | MAX_SET_POINT_TEMP | | PROG_HOR_3 | Analogue | Writing |
| | ON_DIA2_F1 | Active schedule programming signal | 0 | --- | 0 | 1 | 0: Inactive 1: Active | PROG_HOR_3 | Digital | Reading |
| | thTune_Term1_SD2_2_H | | 8 | h | 0 | 24 | | PROG_HOR_3 | Integer | Writing |
| | thTune_Term1_SD2_2_M | | 0 | min | 0 | 60 | | PROG_HOR_3 | Integer | Writing |
| | thTune_Term1_SD2_2_S | | 23 | °C | -1000 | MAX_SET_POINT_TEMP | | PROG_HOR_3 | Analogue | Writing |
| | ON_DIA2_F2 | Active schedule programming signal | 0 | --- | 0 | 1 | 0: Inactive 1: Active | PROG_HOR_3 | Digital | Reading |
| | thTune_Term1_SD2_3_H | | 14 | h | 0 | 24 | | PROG_HOR_3 | Integer | Writing |
| | thTune_Term1_SD2_3_M | | 0 | min | 0 | 60 | | PROG_HOR_3 | Integer | Writing |
| | thTune_Term1_SD2_3_S | | 21 | °C | -1000 | MAX_SET_POINT_TEMP | | PROG_HOR_3 | Analogue | Writing |
| | ON_DIA2_F3 | Active schedule programming signal | 0 | --- | 0 | 1 | 0: Inactive 1: Active | PROG_HOR_3 | Digital | Reading |
| | thTune_Term1_SD2_4_H | | 15 | h | 0 | 24 | | PROG_HOR_3 | Integer | Writing |
| | thTune_Term1_SD2_4_M | | 0 | min | 0 | 60 | | PROG_HOR_3 | Integer | Writing |
| | thTune_Term1_SD2_4_S | | 23 | °C | -1000 | MAX_SET_POINT_TEMP | | PROG_HOR_3 | Analogue | Writing |
| | ON_DIA2_F4 | Active schedule programming signal | 0 | --- | 0 | 1 | 0: Inactive 1: Active | PROG_HOR_3 | Digital | Reading |
| | thTune_Term1_SD2_5_H | | 19 | h | 0 | 24 | | PROG_HOR_3 | Integer | Writing |
| | thTune_Term1_SD2_5_M | | 0 | min | 0 | 60 | | PROG_HOR_3 | Integer | Writing |
| | thTune_Term1_SD2_5_S | | 21 | °C | -1000 | MAX_SET_POINT_TEMP | | PROG_HOR_3 | Analogue | Writing |
| | ON_DIA2_F5 | Active schedule programming signal | 0 | --- | 0 | 1 | 0: Inactive 1: Active | PROG_HOR_3 | Digital | Reading |
| | thTune_Term1_SD2_6_H | | 20 | h | 0 | 24 | | PROG_HOR_3 | Integer | Writing |
| | thTune_Term1_SD2_6_M | | 0 | min | 0 | 60 | | PROG_HOR_3 | Integer | Writing |
| | thTune_Term1_SD2_6_S | | -1000 | °C | -1000 | MAX_SET_POINT_TEMP | | PROG_HOR_3 | Analogue | Writing |
| | ON_DIA2_F6 | Active schedule programming signal | 0 | --- | 0 | 1 | 0: Inactive 1: Active | PROG_HOR_3 | Digital | Reading |
| | thTune_Term1_SD3_1_H | | 6 | h | 0 | 24 | | PROG_HOR_4 | Integer | Writing |
| | thTune_Term1_SD3_1_M | | 30 | min | 0 | 60 | | PROG_HOR_4 | Integer | Writing |
| | thTune_Term1_SD3_1_S | | 21 | °C | -1000 | MAX_SET_POINT_TEMP | | PROG_HOR_4 | Analogue | Writing |
| | ON_DIA3_F1 | Active schedule programming signal | 0 | --- | 0 | 1 | 0: Inactive 1: Active | PROG_HOR_4 | Digital | Reading |

| Param. No. | Designation | Description | Value by default | Units | Min. | Max. | Possible values | PGD1 Display | Type | Reading/ Writing |
|---|---|---|---|---|---|---|---|---|---|---|
| | thTune_Term1_SD3_2_H | | 8 | h | 0 | 24 | | PROG_HOR_4 | Integer | Writing |
| | thTune_Term1_SD3_2_M | | 0 | min | 0 | 60 | | PROG_HOR_4 | Integer | Writing |
| | thTune_Term1_SD3_2_S | | 23 | °C | -1000 | MAX_SET_POINT_TEMP | | PROG_HOR_4 | Analogue | Writing |
| | ON_DIA3_F2 | Active schedule programming signal | 0 | --- | 0 | 1 | 0: Inactive 1: Active | PROG_HOR_4 | Digital | Reading |
| | thTune_Term1_SD3_3_H | | 14 | h | 0 | 24 | | PROG_HOR_4 | Integer | Writing |
| | thTune_Term1_SD3_3_M | | 0 | min | 0 | 60 | | PROG_HOR_4 | Integer | Writing |
| | thTune_Term1_SD3_3_S | | 21 | °C | -1000 | MAX_SET_POINT_TEMP | | PROG_HOR_4 | Analogue | Writing |
| | ON_DIA3_F3 | Active schedule programming signal | 0 | --- | 0 | 1 | 0: Inactive 1: Active | PROG_HOR_4 | Digital | Reading |
| | thTune_Term1_SD3_4_H | | 15 | h | 0 | 24 | | PROG_HOR_4 | Integer | Writing |
| | thTune_Term1_SD3_4_M | | 0 | min | 0 | 60 | | PROG_HOR_4 | Integer | Writing |
| | thTune_Term1_SD3_4_S | | 23 | °C | -1000 | MAX_SET_POINT_TEMP | | PROG_HOR_4 | Analogue | Writing |
| | ON_DIA3_F4 | Active schedule programming signal | 0 | --- | 0 | 1 | 0: Inactive 1: Active | PROG_HOR_4 | Digital | Reading |
| | thTune_Term1_SD3_5_H | | 19 | h | 0 | 24 | | PROG_HOR_4 | Integer | Writing |
| | thTune_Term1_SD3_5_M | | 0 | min | 0 | 60 | | PROG_HOR_4 | Integer | Writing |
| | thTune_Term1_SD3_5_S | | 21 | °C | -1000 | MAX_SET_POINT_TEMP | | PROG_HOR_4 | Analogue | Writing |
| | ON_DIA3_F5 | Active schedule programming signal | 0 | --- | 0 | 1 | 0: Inactive 1: Active | PROG_HOR_4 | Digital | Reading |
| | thTune_Term1_SD3_6_H | | 20 | h | 0 | 24 | | PROG_HOR_4 | Integer | Writing |
| | thTune_Term1_SD3_6_M | | 0 | min | 0 | 60 | | PROG_HOR_4 | Integer | Writing |
| | thTune_Term1_SD3_6_S | | -1000 | °C | -1000 | MAX_SET_POINT_TEMP | | PROG_HOR_4 | Analogue | Writing |
| | ON_DIA3_F6 | Active schedule programming signal | 0 | --- | 0 | 1 | 0: Inactive 1: Active | PROG_HOR_4 | Digital | Reading |
| | thTune_Term1_SD4_1_H | | 6 | h | 0 | 24 | | PROG_HOR_5 | Integer | Writing |
| | thTune_Term1_SD4_1_M | | 30 | min | 0 | 60 | | PROG_HOR_5 | Integer | Writing |
| | thTune_Term1_SD4_1_S | | 21 | °C | -1000 | MAX_SET_POINT_TEMP | | PROG_HOR_5 | Analogue | Writing |
| | ON_DIA4_F1 | Active schedule programming signal | 0 | --- | 0 | 1 | 0: Inactive 1: Active | PROG_HOR_5 | Digital | Reading |
| | thTune_Term1_SD4_2_H | | 8 | h | 0 | 24 | | PROG_HOR_5 | Integer | Writing |
| | thTune_Term1_SD4_2_M | | 0 | min | 0 | 60 | | PROG_HOR_5 | Integer | Writing |
| | thTune_Term1_SD4_2_S | | 23 | °C | -1000 | MAX_SET_POINT_TEMP | | PROG_HOR_5 | Analogue | Writing |
| | ON_DIA4_F2 | Active schedule programming signal | 0 | --- | 0 | 1 | 0: Inactive 1: Active | PROG_HOR_5 | Digital | Reading |
| | thTune_Term1_SD4_3_H | | 14 | h | 0 | 24 | | PROG_HOR_5 | Integer | Writing |
| | thTune_Term1_SD4_3_M | | 0 | min | 0 | 60 | | PROG_HOR_5 | Integer | Writing |
| | thTune_Term1_SD4_3_S | | 21 | °C | -1000 | MAX_SET_POINT_TEMP | | PROG_HOR_5 | Analogue | Writing |
| | ON_DIA4_F3 | Active schedule programming signal | 0 | --- | 0 | 1 | 0: Inactive 1: Active | PROG_HOR_5 | Digital | Reading |
| | thTune_Term1_SD4_4_H | | 15 | h | 0 | 24 | | PROG_HOR_5 | Integer | Writing |
| | thTune_Term1_SD4_4_M | | 0 | min | 0 | 60 | | PROG_HOR_5 | Integer | Writing |
| | thTune_Term1_SD4_4_S | | 23 | °C | -1000 | MAX_SET_POINT_TEMP | | PROG_HOR_5 | Analogue | Writing |
| | ON_DIA4_F4 | Active schedule programming signal | 0 | --- | 0 | 1 | 0: Inactive 1: Active | PROG_HOR_5 | Digital | Reading |
| | thTune_Term1_SD4_5_H | | 19 | h | 0 | 24 | | PROG_HOR_5 | Integer | Writing |
| | thTune_Term1_SD4_5_M | | 0 | min | 0 | 60 | | PROG_HOR_5 | Integer | Writing |
| | thTune_Term1_SD4_5_S | | 21 | °C | -1000 | MAX_SET_POINT_TEMP | | PROG_HOR_5 | Analogue | Writing |
| | ON_DIA4_F5 | Active schedule programming signal | 0 | --- | 0 | 1 | 0: Inactive 1: Active | PROG_HOR_5 | Digital | Reading |

| Param. No. | Designation | Description | Value by default | Units | Min. | Max. | Possible values | PGD1 Display | Type | Reading/ Writing |
|---|---|---|---|---|---|---|---|---|---|---|
| | thTune_Term1_SD4_6_H | | 20 | h | 0 | 24 | | PROG_HOR_5 | Integer | Writing |
| | thTune_Term1_SD4_6_M | | 0 | min | 0 | 60 | | PROG_HOR_5 | Integer | Writing |
| | thTune_Term1_SD4_6_S | | -1000 | ºC | -1000 | MAX_SET_POINT_TEMP | | PROG_HOR_5 | Analogue | Writing |
| | ON_DIA4_F6 | Active schedule programming signal | 0 | --- | 0 | 1 | 0: Inactive 1: Active | PROG_HOR_5 | Digital | Reading |
| | thTune_Term1_SD5_1_H | | 6 | h | 0 | 24 | | PROG_HOR_6 | Integer | Writing |
| | thTune_Term1_SD5_1_M | | 30 | min | 0 | 60 | | PROG_HOR_6 | Integer | Writing |
| | thTune_Term1_SD5_1_S | | 21 | ºC | -1000 | MAX_SET_POINT_TEMP | | PROG_HOR_6 | Analogue | Writing |
| | ON_DIA5_F1 | Active schedule programming signal | 0 | --- | 0 | 1 | 0: Inactive 1: Active | PROG_HOR_6 | Digital | Reading |
| | thTune_Term1_SD5_2_H | | 8 | h | 0 | 24 | | PROG_HOR_6 | Integer | Writing |
| | thTune_Term1_SD5_2_M | | 0 | min | 0 | 60 | | PROG_HOR_6 | Integer | Writing |
| | thTune_Term1_SD5_2_S | | 23 | ºC | -1000 | MAX_SET_POINT_TEMP | | PROG_HOR_6 | Analogue | Writing |
| | ON_DIA5_F2 | Active schedule programming signal | 0 | --- | 0 | 1 | 0: Inactive 1: Active | PROG_HOR_6 | Digital | Reading |
| | thTune_Term1_SD5_3_H | | 14 | h | 0 | 24 | | PROG_HOR_6 | Integer | Writing |
| | thTune_Term1_SD5_3_M | | 0 | min | 0 | 60 | | PROG_HOR_6 | Integer | Writing |
| | thTune_Term1_SD5_3_S | | 21 | ºC | -1000 | MAX_SET_POINT_TEMP | | PROG_HOR_6 | Analogue | Writing |
| | ON_DIA5_F3 | Active schedule programming signal | 0 | --- | 0 | 1 | 0: Inactive 1: Active | PROG_HOR_6 | Digital | Reading |
| | thTune_Term1_SD5_4_H | | 15 | h | 0 | 24 | | PROG_HOR_6 | Integer | Writing |
| | thTune_Term1_SD5_4_M | | 0 | min | 0 | 60 | | PROG_HOR_6 | Integer | Writing |
| | thTune_Term1_SD5_4_S | | 23 | ºC | -1000 | MAX_SET_POINT_TEMP | | PROG_HOR_6 | Analogue | Writing |
| | ON_DIA5_F4 | Active schedule programming signal | 0 | --- | 0 | 1 | 0: Inactive 1: Active | PROG_HOR_6 | Digital | Reading |
| | thTune_Term1_SD5_5_H | | 19 | h | 0 | 24 | | PROG_HOR_6 | Integer | Writing |
| | thTune_Term1_SD5_5_M | | 0 | min | 0 | 60 | | PROG_HOR_6 | Integer | Writing |
| | thTune_Term1_SD5_5_S | | 21 | ºC | -1000 | MAX_SET_POINT_TEMP | | PROG_HOR_6 | Analogue | Writing |
| | ON_DIA5_F5 | Active schedule programming signal | 0 | --- | 0 | 1 | 0: Inactive 1: Active | PROG_HOR_6 | Digital | Reading |
| | thTune_Term1_SD5_6_H | | 20 | h | 0 | 24 | | PROG_HOR_6 | Integer | Writing |
| | thTune_Term1_SD5_6_M | | 0 | min | 0 | 60 | | PROG_HOR_6 | Integer | Writing |
| | thTune_Term1_SD5_6_S | | -1000 | ºC | -1000 | MAX_SET_POINT_TEMP | | PROG_HOR_6 | Analogue | Writing |
| | ON_DIA5_F6 | Active schedule programming signal | 0 | --- | 0 | 1 | 0: Inactive 1: Active | PROG_HOR_6 | Digital | Reading |
| | thTune_Term1_SD6_1_H | | 6 | h | 0 | 24 | | PROG_HOR_7 | Integer | Writing |
| | thTune_Term1_SD6_1_M | | 30 | min | 0 | 60 | | PROG_HOR_7 | Integer | Writing |
| | thTune_Term1_SD6_1_S | | 21 | ºC | -1000 | MAX_SET_POINT_TEMP | | PROG_HOR_7 | Analogue | Writing |
| | ON_DIA6_F1 | Active schedule programming signal | 0 | --- | 0 | 1 | 0: Inactive 1: Active | PROG_HOR_7 | Digital | Reading |
| | thTune_Term1_SD6_2_H | | 8 | h | 0 | 24 | | PROG_HOR_7 | Integer | Writing |
| | thTune_Term1_SD6_2_M | | 0 | min | 0 | 60 | | PROG_HOR_7 | Integer | Writing |
| | thTune_Term1_SD6_2_S | | 23 | ºC | -1000 | MAX_SET_POINT_TEMP | | PROG_HOR_7 | Analogue | Writing |
| | ON_DIA6_F2 | Active schedule programming signal | 0 | --- | 0 | 1 | 0: Inactive 1: Active | PROG_HOR_7 | Digital | Reading |
| | thTune_Term1_SD6_3_H | | 15 | h | 0 | 24 | | PROG_HOR_7 | Integer | Writing |
| | thTune_Term1_SD6_3_M | | 0 | min | 0 | 60 | | PROG_HOR_7 | Integer | Writing |
| | thTune_Term1_SD6_3_S | | -1000 | ºC | -1000 | MAX_SET_POINT_TEMP | | PROG_HOR_7 | Analogue | Writing |
| | ON_DIA6_F3 | Active schedule programming signal | 0 | --- | 0 | 1 | 0: Inactive 1: Active | PROG_HOR_7 | Digital | Reading |

| Param. No. | Designation | Description | Value by default | Units | Min. | Max. | Possible values | PGD1 Display | Type | Reading/ Writing |
|---|---|---|---|---|---|---|---|---|---|---|
| | thTune_Term1_SD6_4_H | | 24 | h | 0 | 24 | | PROG_HOR_7 | Integer | Writing |
| | thTune_Term1_SD6_4_M | | 60 | min | 0 | 60 | | PROG_HOR_7 | Integer | Writing |
| | thTune_Term1_SD6_4_S | | -1000 | ºC | -1000 | MAX_SET_POINT_TEMP | | PROG_HOR_7 | Analogue | Writing |
| | ON_DIA6_F4 | Active schedule programming signal | 0 | --- | 0 | 1 | 0: Inactive 1: Active | PROG_HOR_7 | Digital | Reading |
| | thTune_Term1_SD6_5_H | | 24 | h | 0 | 24 | | PROG_HOR_7 | Integer | Writing |
| | thTune_Term1_SD6_5_M | | 60 | min | 0 | 60 | | PROG_HOR_7 | Integer | Writing |
| | thTune_Term1_SD6_5_S | | -1000 | ºC | -1000 | MAX_SET_POINT_TEMP | | PROG_HOR_7 | Analogue | Writing |
| | ON_DIA6_F5 | Active schedule programming signal | 0 | --- | 0 | 1 | 0: Inactive 1: Active | PROG_HOR_7 | Digital | Reading |
| | thTune_Term1_SD6_6_H | | 24 | h | 0 | 24 | | PROG_HOR_7 | Integer | Writing |
| | thTune_Term1_SD6_6_M | | 60 | min | 0 | 60 | | PROG_HOR_7 | Integer | Writing |
| | thTune_Term1_SD6_6_S | | -1000 | ºC | -1000 | MAX_SET_POINT_TEMP | | PROG_HOR_7 | Analogue | Writing |
| | ON_DIA6_F6 | Active schedule programming signal | 0 | --- | 0 | 1 | 0: Inactive 1: Active | PROG_HOR_7 | Digital | Reading |
| | thTune_Term1_SD7_1_H | | 24 | h | 0 | 24 | | PROG_HOR_8 | Integer | Writing |
| | thTune_Term1_SD7_1_M | | 60 | min | 0 | 60 | | PROG_HOR_8 | Integer | Writing |
| | thTune_Term1_SD7_1_S | | -1000 | ºC | -1000 | MAX_SET_POINT_TEMP | | PROG_HOR_8 | Analogue | Writing |
| | ON_DIA7_F1 | Active schedule programming signal | 0 | --- | 0 | 1 | 0: Inactive 1: Active | PROG_HOR_8 | Digital | Reading |
| | thTune_Term1_SD7_2_H | | 24 | h | 0 | 24 | | PROG_HOR_8 | Integer | Writing |
| | thTune_Term1_SD7_2_M | | 60 | min | 0 | 60 | | PROG_HOR_8 | Integer | Writing |
| | thTune_Term1_SD7_2_S | | -1000 | ºC | -1000 | MAX_SET_POINT_TEMP | | PROG_HOR_8 | Analogue | Writing |
| | ON_DIA7_F2 | Active schedule programming signal | 0 | --- | 0 | 1 | 0: Inactive 1: Active | PROG_HOR_8 | Digital | Reading |
| | thTune_Term1_SD7_3_H | | 24 | h | 0 | 24 | | PROG_HOR_8 | Integer | Writing |
| | thTune_Term1_SD7_3_M | | 60 | min | 0 | 60 | | PROG_HOR_8 | Integer | Writing |
| | thTune_Term1_SD7_3_S | | -1000 | ºC | -1000 | MAX_SET_POINT_TEMP | | PROG_HOR_8 | Analogue | Writing |
| | ON_DIA7_F3 | Active schedule programming signal | 0 | --- | 0 | 1 | 0: Inactive 1: Active | PROG_HOR_8 | Digital | Reading |
| | thTune_Term1_SD7_4_H | | 24 | h | 0 | 24 | | PROG_HOR_8 | Integer | Writing |
| | thTune_Term1_SD7_4_M | | 60 | min | 0 | 60 | | PROG_HOR_8 | Integer | Writing |
| | thTune_Term1_SD7_4_S | | -1000 | ºC | -1000 | MAX_SET_POINT_TEMP | | PROG_HOR_8 | Analogue | Writing |
| | ON_DIA7_F4 | Active schedule programming signal | 0 | --- | 0 | 1 | 0: Inactive 1: Active | PROG_HOR_8 | Digital | Reading |
| | thTune_Term1_SD7_5_H | | 24 | h | 0 | 24 | | PROG_HOR_8 | Integer | Writing |
| | thTune_Term1_SD7_5_M | | 60 | min | 0 | 60 | | PROG_HOR_8 | Integer | Writing |
| | thTune_Term1_SD7_5_S | | -1000 | ºC | -1000 | MAX_SET_POINT_TEMP | | PROG_HOR_8 | Analogue | Writing |
| | ON_DIA7_F5 | Active schedule programming signal | 0 | --- | 0 | 1 | 0: Inactive 1: Active | PROG_HOR_8 | Digital | Reading |
| | thTune_Term1_SD7_6_H | | 24 | h | 0 | 24 | | PROG_HOR_8 | Integer | Writing |
| | thTune_Term1_SD7_6_M | | 60 | min | 0 | 60 | | PROG_HOR_8 | Integer | Writing |
| | thTune_Term1_SD7_6_S | | -1000 | ºC | -1000 | MAX_SET_POINT_TEMP | | PROG_HOR_8 | Analogue | Writing |
| | ON_DIA7_F6 | Active schedule programming signal | 0 | --- | 0 | 1 | 0: Inactive 1: Active | PROG_HOR_8 | Digital | Reading |

## 18.3. Parameters in the P000 menu: Input / output displays

| Param. No. | Designation | Description | Value by default | Units | Min. | Max. | Possible value | PGD1 Display | Type | Reading/ Writing |
|---|---|---|---|---|---|---|---|---|---|---|
| P001 | CURRENT_DAY | Current day | 0 | --- | 1 | 31 | | MANDO_1 | Integer | Writeable |
| P002 | CURRENT_MONTH | Current month | 0 | --- | 1 | 12 | | MANDO_1 | Integer | Writeable |
| P003 | CURRENT_YEAR | Current year | 0 | --- | 0 | 99 | | MANDO_1 | Integer | Writeable |
| P004 | thTune_ED4_1 | Digital inputs from 4…1 | 0 | --- | 0 | 1 | 0: Closed<br>1: Open | ENT_SAL_1 | Digital | Readable |
| P005 | thTune_ED8_5 | Digital inputs from 8…5 | 0 | --- | 0 | 1 | 0: Closed<br>1: Open | ENT_SAL_1 | Digital | Readable |
| P006 | thTune_ED12_9 | Digital inputs from 12…9 | 0 | --- | 0 | 1 | 0: Closed<br>1: Open | ENT_SAL_1 | Digital | Readable |
| P007 | thTune_SD4_1 | Digital outputs from 4…1 | 0 | --- | 0 | 1 | 0: Output<br>1: Inlet | ENT_SAL_2 | Digital | Readable |
| P008 | thTune_SD8_5 | Digital outputs from 8…5 | 0 | --- | 0 | 1 | 0: Output<br>1: Inlet | ENT_SAL_2 | Digital | Readable |
| P009 | thTune_SD12_9 | Digital outputs from 12…9 | 0 | --- | 0 | 1 | 0: Output<br>1: Inlet | ENT_SAL_2 | Digital | Readable |
| P010 | TEMP_AMB | Ambient temperature | 0 | ºC | -99 | 99 | | ENT_SAL_3 | Analogue | Readable |
| P011 | TEMP_RET | Return air temperature | 0 | ºC | -99 | 99 | | ENT_SAL_3 | Analogue | Readable |
| P012 | TEMP_EXT | Outdoor temperature | 0 | ºC | -99 | 99 | | ENT_SAL_3 | Analogue | Readable |
| P013 | TEMP_IMP | Outlet air temperature | 0 | ºC | -99,9 | 99 | | ENT_SAL_3 | Analogue | Readable |
| P014 | TEMP_MEZCLA | Mixed air temperature | 0 | ºC | -99 | 99 | | ENT_SAL_3 | Analogue | Readable |
| P015 | HUM_REG | Humidity control | 0 | % RH | -99 | 99 | | ENT_SAL_4 | Analogue | Readable |
| P016 | HUM_EXT | Outdoor humidity | 0 | % RH | -99 | 99 | | ENT_SAL_5 | Analogue | Readable |
| P017 | ENTALPÍA_INT | Indoor enthalpy calculated | 0 | Kcal/kg | -99 | 99 | | ENT_SAL_8 | Analogue | Readable |
| P018 | ENTALPÍA_EXT | Outdoor enthalpy calculated | 0 | Kcal/kg | -99 | 99 | | ENT_SAL_8 | Analogue | Readable |
| P019 | TEMP_DES_C1 | Discharge temperature for circuit 1 | 0 | ºC | -99 | 150 | | ENT_SAL_4 | Analogue | Readable |
| P020 | TEMP_DES_C2 | Discharge temperature for circuit 2 | 0 | ºC | -99 | 150 | | ENT_SAL_5 | Analogue | Readable |
| P021 | T_P_BINT_C1 | Temperature-pressure indoor coil for circuit 1 | 0 | ºC / bar | -99 | 99 | | ENT_SAL_4 | Analogue | Readable |
| P022 | TEMP_CAL_BINT_C1 | Temperature calculated for the indoor coil for circuit 1 | 0 | ºC | -99 | 99 | | ENT_SAL_6 | Analogue | Readable |
| P023 | T_P_BEXT_C1 | Temperature-pressure outdoor coil for circuit 1 | 0 | ºC / bar | -99 | 99 | | ENT_SAL_4 | Analogue | Readable |
| P024 | TEMP_CAL_BEXT_C1 | Temperature calculated for the outdoor coil for circuit 1 | 0 | ºC | -99 | 99 | | ENT_SAL_6 | Analogue | Readable |
| P025 | T_P_BINT_C2 | Temperature-pressure indoor coil for circuit 2 | 0 | ºC / bar | -99 | 99 | | ENT_SAL_5 | Analogue | Readable |
| P026 | TEMP_CAL_BINT_C2 | Temperature calculated for the indoor coil for circuit 2 | 0 | ºC | -99 | 99 | | ENT_SAL_7 | Analogue | Readable |
| P027 | T_P_BEXT_C2 | Temperature-pressure outdoor coil for circuit 2 | 0 | ºC / bar | -99 | 99 | | ENT_SAL_5 | Analogue | Readable |
| P028 | TEMP_CAL_BEXT_C2 | Temperature calculated for the outdoor coil for circuit 2 | 0 | ºC | -99 | 99 | | ENT_SAL_7 | Analogue | Readable |
| P029 | ON_ECONFORT | Ecomfort Activation | 0 | --- | 0 | 1 | 0: No<br>1: Yes | ENT_SAL_9 | Digital | Readable |
| P030 | AOUT1_VISUALIZADA | Analogue output viewed on display | 0 | % | 0 | 99 | | ENT_SAL_11 | Integer | Readable |
| P031 | AOUT2_VISUALIZADA | Analogue output viewed on display | 0 | % | 0 | 99 | | ENT_SAL_11 | Integer | Readable |
| P032 | AOUT3_VISUALIZADA | Analogue output viewed on display | 0 | % | 0 | 99 | | ENT_SAL_12 | Integer | Readable |
| P033 | AOUT4_VISUALIZADA | Analogue output viewed on display | 0 | % | 0 | 99 | | ENT_SAL_12 | Integer | Readable |

| Param. No. | Designation | Description | Value by default | Units | Min. | Max. | Possible value | PGD1 Display | Type | Reading/ Writing |
|---|---|---|---|---|---|---|---|---|---|---|
| P034 | INFO_EQUIPO_1 | Information on type of unit, machine and heaters | 0 | --- | 0 | 99 | 0: Air-Air Cooling<br>1: Air-Air Cooling + Heaters<br>2: Air-Air H.C.<br>3: Air-Air H.C. + Heaters<br>4: Water-Air Cooling<br>5: Water-Air Cooling + Heaters<br>6: Water-Air H.C.<br>7: Air-Air H.C. + Heaters | M_INFO_ EQUIPO | Integer | Readable |
| P035 | INFO_EQUIPO_2 | Information on the number of compressors, circuit, outdoor unit, indoor unit | 0 | --- | 0 | 9 | 0: 1comp / 1circ / Vint-1vel<br>1: 1comp / 1circ / Vint-3vel<br>2: 2comp / 1circ<br>3: 2comp / 2circ / 1vol-ext<br>4: 2comp / 2circ / 2vol-ext<br>5: 4comp / 2circ | M_INFO_ EQUIPO | Integer | Readable |
| P036 | VER_SOFTWARE | Software version | 1.3 | --- | 0 | 99,9 | | M_VERSION | Analogue | Readable |
| P037 | thTune_Term1_ Term_UI_hw | TCO terminal hardware version | 184 | --- | 0 | 999 | | M_VERSION | Integer | Readable |
| P038 | thTune_Term1_ Term_UI_fw | TCO terminal firmware version | 1.0 | --- | 0 | 99,9 | | M_VERSION | Integer | Readable |
| P039 | SET_POINT_ TEMP_CAL | Setpoint calculated based on the compensation of the outdoor temperature | 0,0 | ºC | 0 | 50,0 | | | Analogue | Readable |

## 18.4. Parameters in the U000 menu: user displays

| Param. No. | Designation | Description | Value by default | Units | Min. | Max. | Possible value | PGD1 Display | Type | Reading/ Writing |
|---|---|---|---|---|---|---|---|---|---|---|
| U001 | HAB_TEMP_RET | Enable the return air probe as a control probe | 0 | --- | 0 | 1 | 0: Ambient<br>1: Return | USUARIO_REG_1 | Digital | Writeable |
| U002 | SET_POINT_TEMP | Temperature setpoint | 23 | °C | MIN_ SET_ POINT_ TEMP,0 | MAX_ SET_ POINT_ TEMP,0 | | USUARIO_REG_1 | Analogue | Writeable |
| U003 | MIN_SET_POINT_ TEMP | Minimum temperature setpoint | 15 | °C | 0 | 50 | | USUARIO_REG_1 | Analogue | Writeable |
| U004 | MAX_SET_POINT_ TEMP | Maximum temperature setpoint | 30 | °C | 0 | 50 | | USUARIO_REG_1 | Analogue | Writeable |
| U005 | BANDA | Control band | 1 | °C | 0 | 6 | | USUARIO_REG_2 | Analogue | Writeable |
| U006 | ZONA_MUERTA | Control dead zone (AUTO mode) | 2 | °C | 0,5 | 6 | | USUARIO_REG_2 | Analogue | Writeable |
| U007 | SET_POINT_ TEMP_DESH | Temperature setpoint for dehumidification | 20 | °C | 0 | 50 | | USUARIO_REG_3 | Analogue | Writeable |
| U008 | HAB_HUM_RET | Enabling the return air humidity probe as an indoor humidity probe | 1 | --- | 0 | 1 | 0: Ambient<br>1: Return | USUARIO_REG_4 | Digital | Writeable |
| U009 | SET_POINT_HUM | Humidity setpoint | 50 | % RH | MIN_ SET_ POINT_ HUM,0 | MAX_ SET_ POINT_ HUM,0 | | USUARIO_REG_4 | Analogue | Writeable |
| U010 | MIN_SET_POINT_ HUM | Minimum humidity setpoint | 30 | % RH | 0 | 99,9 | | USUARIO_REG_4 | Analogue | Writeable |
| U011 | MAX_SET_POINT_ HUM | Maximum humidity setpoint | 70 | % RH | 0 | 99,9 | | USUARIO_REG_4 | Analogue | Writeable |
| U012 | BANDA_HUMEDAD | Humidity control band | 5 | % RH | 0 | 10 | | USUARIO_REG_5 | Analogue | Writeable |
| U013 | NUM_COMP_ DESHUM | Number of compressors for dehumidification | 1 | --- | 0 | 2 | | USUARIO_REG_5 | Integer | Writeable |

| Param. No. | Designation | Description | Value by default | Units | Min. | Max. | Possible value | PGD1 Display | Type | Reading/ Writing |
|---|---|---|---|---|---|---|---|---|---|---|
| U014 | BANDA_FCOOL | Band operating in free-cooling | 1 | ºC | 0 | 6 | | USUARIO_REG_6 | Analogue | Writeable |
| U015 | OFFSET_FCOOL_INV | Displacement of winter fcooling input with respect to the calculated setpoint | 2 | ºC | 1 | 9,9 | | USUARIO_REG_6 | Analogue | Writeable |
| U016 | VAL_DIF_FCOOL | Difference between the return air temperature and the outdoor air temperature for allowing the operation of free-cooling | 2 | ºC | 0 | 6 | | USUARIO_REG_7 | Analogue | Writeable |
| U017 | VAL_DIF_FCOOL_ENT | Difference between the return air enthalpy and the outdoor air enthalpy for allowing the operation of free-cooling | 1 | Kcal/kg | 0 | 9,9 | | USUARIO_REG_8 | Analogue | Writeable |
| U018 | MIN_RENOVACION_AIRE | Minimum air refreshing desired. | 20 | % | 0 | 99 | | USUARIO_REG_9 | Integer | Writeable |
| U019 | HAB_OFF_ COMPUERTA_INI_CALOR | Enabling closed damper until the heating setpoint temperature is reached | 0 | ºC | 0 | 1 | 0: Normal 1: Closed | USUARIO_REG_9 | Digital | Writeable |
| U020 | BANDA_RES | Heater control band | 1 | ºC | 0 | 6 | | USUARIO_REG_10 | Analogue | Writeable |
| U021 | OFFSET_RES | Displacement of electrical heaters with respect to the setpoint calculated - band | 1 | ºC | 0 | 9,9 | | USUARIO_REG_10 | Analogue | Writeable |
| U022 | BANDA_BAC | Hot water coil control band | 1 | ºC | 0 | 6 | | USUARIO_REG_11 | Analogue | Writeable |
| U023 | OFFSET_BAC | Displacement of the hot water coil with respect to the setpoint calculated - band | 0 | ºC | 0 | 9,9 | | USUARIO_REG_11 | Analogue | Writeable |
| U024 | HAB_COMPENSACION | Enable compensation of the setpoint based on the outdoor temp. | 0 | --- | 0 | 1 | 0: No 1: Yes | USUARIO_REG_12 | Digital | Writeable |
| U025 | SET_COMP_EXT_FRIO | Set outdoor temperature for compensation in COOLING | 30 | ºC | 20 | 50 | | USUARIO_REG_13 | Analogue | Writeable |
| U026 | VAL_DIF_COMP_EXT_ FRIO | Outdoor temperature differential for compensation in COOLING | 5 | ºC | 0 | 10 | | USUARIO_REG_13 | Analogue | Writeable |
| U027 | MAX_COMP_EXT_FRIO | Maximum compensation in COOLING | 5 | ºC | 0 | 10 | | USUARIO_REG_13 | Analogue | Writeable |
| U028 | SET_COMP_EXT_CALOR | Set outdoor temperature for compensation in HEATING | 0 | ºC | -10 | 20 | | USUARIO_REG_14 | Analogue | Writeable |
| U029 | VAL_DIF_COMP_EXT_ CALOR | Outdoor temperature differential for compensation in HEATING | 5 | ºC | 0 | 10 | | USUARIO_REG_14 | Analogue | Writeable |
| U030 | MAX_COMP_EXT_CALOR | Maximum compensation in HEATING | 5 | ºC | 0 | 10 | | USUARIO_REG_14 | Analogue | Writeable |
| U031 | BMS_ADDRESS | Supervisory address | 1 | --- | 0 | 207 | | USUARIO_COM_1 | Integer | Writeable |
| U032 | TIPO_PROT_COM | Type of communication protocol | 1 | --- | 1 | 4 | 1: Carel 485 2: Carel 232 3: Modbus 4: Commis. 5: Lonworks | USUARIO_COM_1 | Integer | Writeable |
| U033 | BAUDRATE | Communication speed in BMS | 4 | --- | 0 | 4 | 0: 1200 1: 2400 2: 4800 3: 9600 4: 19200 | USUARIO_COM_1 | Integer | Writeable |
| U034 | HAB_ONOFF_REMOTO | Enabling remote ON/OFF | 1 | --- | 0 | 1 | 0: No 1: Yes | USUARIO_VAR_1 | Digital | Writeable |
| U035 | HAB_CALOR_FRIO_ REMOTO | Enable digital input HEATING/ COOLING | 0 | --- | 0 | 1 | 0: No 1: Yes | USUARIO_VAR_1 | Digital | Writeable |
| U036 | TIME_LIGHT_PANT_PGD | Time the PGD1 is lit | 30 | s | 0 | 999 | | USUARIO_VAR_2 | Integer | Writeable |
| U037 | HAB_RET_MENÚ_PGD | Enables return to the main display of the PGD1 | 0 | --- | 0 | 1 | 0: No 1: Yes | USUARIO_VAR_3 | Digital | Writeable |
| U038 | TIME_RET_MENÚ_PGD | Time to return to the main display of the PGD1 | 120 | s | 0 | 999 | | USUARIO_VAR_3 | Integer | Writeable |
| U039 | DESCONEXION_NUM_ COMPRESORES | Number of compressor stages to be disconnected | 0 | --- | 0 | 4 | | USER_REG_15 | Integer | Writeable |
| U040 | DESCONEXION_NUM_ RESISTENCIAS | Number of heater stages to be disconnected | 0 | --- | 0 | 3 | | USER_REG_15 | Integer | Writeable |
| --- | AUTOSTART | Automatic start-up after blocking | 1 | --- | 0 | 1 | 0: No 1: Yes | USUARIO_VAR_1 | Digital | Writeable |
| U041 | TIME_ON_AUTOSTART | Automatic start timing after a power supply cut | 5 | s | 5 | 999 | | USUARIO_VAR_1 | Integer | Writeable |
| U042 | SET_HAB_RES_TEMP_ EXT | Setpoint for enabling the electrical heater due to outdoor temperature | 20 | ºC | -20 | 40 | | USUARIO_REG_10 | Analogue | Writeable |

## 18.5. Parameters in the M000 menu: maintenance displays (inputs / outputs)

| Param. No. | Designation | Description | Value by default | Units | Min. | Max. | Possible value | PGD1 Display | Type | Reading/ Writing |
|---|---|---|---|---|---|---|---|---|---|---|
| M001 | TAR_AIN1 | Analogue input delay 1 | 0 | --- | -20 | 20 | | MANT_ENT_SAL_1 | Analogue | Writeable |
| M002 | TAR_AIN2 | Analogue input delay 2 | 0 | --- | -20 | 20 | | MANT_ENT_SAL_1 | Analogue | Writeable |
| M003 | TAR_AIN3 | Analogue input delay 3 | 0 | --- | -20 | 20 | | MANT_ENT_SAL_1 | Analogue | Writeable |
| M004 | TAR_AIN4 | Analogue input delay 4 | 0 | --- | -20 | 20 | | MANT_ENT_SAL_1 | Analogue | Writeable |
| M005 | TAR_AIN5 | Analogue input delay 5 | 0 | --- | -20 | 20 | | MANT_ENT_SAL_1 | Analogue | Writeable |
| M006 | TAR_AIN6 | Analogue input delay 6 | 0 | --- | -20 | 20 | | MANT_ENT_SAL_1 | Analogue | Writeable |
| M007 | TAR_AIN7 | Analogue input delay 7 | 0 | --- | -20 | 20 | | MANT_ENT_SAL_2 | Analogue | Writeable |
| M008 | TAR_AIN8 | Analogue input delay 8 | 0 | --- | -20 | 20 | | MANT_ENT_SAL_2 | Analogue | Writeable |
| M009 | TAR_AIN9 | Analogue input delay 9 | 0 | --- | -20 | 20 | | MANT_ENT_SAL_2 | Analogue | Writeable |
| M010 | TAR_AIN10 | Analogue input delay 10 | 0 | --- | -20 | 20 | | MANT_ENT_SAL_2 | Analogue | Writeable |
| M011 | TAR_AIN11 | Analogue input delay 11 | 0 | --- | -20 | 20 | | MANT_ENT_SAL_2 | Analogue | Writeable |
| M012 | TAR_AIN12 | Analogue input delay 12 | 0 | --- | -20 | 20 | | MANT_ENT_SAL_2 | Analogue | Writeable |
| M013 | LIM_MIN_HUM | Minimum humidity signal limit for alarm | 0 | % RH | 0 | 100 | | MANT_ENT_SAL_3 | Analogue | Writeable |
| M014 | LIM_MAX_HUM | Maximum humidity signal limit for alarm | 100 | % RH | 0 | 100 | | MANT_ENT_SAL_3 | Analogue | Writeable |
| M015 | LIM_MIN_PRES | Minimum pressure signal limit for alarm | 0 | Bara | -99,9 | 99,9 | | MANT_ENT_SAL_3 | Analogue | Writeable |
| M016 | LIM_MAX_PRES | Maximum pressure signal limit for alarm | 45 | Bara | 0 | 99,9 | | MANT_ENT_SAL_3 | Analogue | Writeable |
| M017 | AIN1 | View analogue input 1 | 0 | --- | 0 | 999,9 | | MANT_ENT_SAL_4 | Analogue | Readable |
| M018 | AIN2 | View analogue input 2 | 0 | --- | 0 | 999 | | MANT_ENT_SAL_4 | Analogue | Readable |
| M019 | AIN3 | View analogue input 3 | 0 | --- | 0 | 999,9 | | MANT_ENT_SAL_4 | Analogue | Readable |
| M020 | AIN4 | View analogue input 4 | 0 | --- | 0 | 999,9 | | MANT_ENT_SAL_4 | Analogue | Readable |
| M021 | AIN5 | View analogue input 5 | 0 | --- | 0 | 999,9 | | MANT_ENT_SAL_4 | Analogue | Readable |
| M022 | AIN6 | View analogue input 6 | 0 | --- | 0 | 999,9 | | MANT_ENT_SAL_4 | Analogue | Readable |
| M023 | AIN7 | View analogue input 7 | 0 | --- | 0 | 999,9 | | MANT_ENT_SAL_5 | Analogue | Readable |
| M024 | AIN8 | View analogue input 8 | 0 | --- | 0 | 999,9 | | MANT_ENT_SAL_5 | Analogue | Readable |
| M025 | AIN9 | View analogue input 9 | 0 | --- | 0 | 999,9 | | MANT_ENT_SAL_5 | Analogue | Readable |
| M026 | AIN10 | View analogue input 10 | 0 | --- | 0 | 999,9 | | MANT_ENT_SAL_5 | Analogue | Readable |
| M027 | AIN11 | View analogue input 11 | 0 | --- | 0 | 999,9 | | MANT_ENT_SAL_5 | Analogue | Readable |
| M028 | AIN12 | View analogue input 12 | 0 | --- | 0 | 999,9 | | MANT_ENT_SAL_5 | Analogue | Readable |
| M029 | AOUT1_VIRT | View analogue output 1 | 0 | --- | 0 | 1000 | | MANT_ENT_SAL_6 | Integer | Readable |
| M030 | AOUT2_VIRT | View analogue output 2 | 0 | --- | 0 | 1000 | | MANT_ENT_SAL_6 | Integer | Readable |
| M031 | AOUT3_VIRT | View analogue output 3 | 0 | --- | 0 | 1000 | | MANT_ENT_SAL_6 | Integer | Readable |
| M032 | AOUT4_VIRT | View analogue output 4 | 0 | --- | 0 | 1000 | | MANT_ENT_SAL_6 | Integer | Readable |
| M033 | MAN_VENT_INT | MANUAL operation of the indoor fan | 0 | --- | 0 | 1 | 0: No<br>1: Yes | MANT_ENT_SAL_7 | Digital | Writeable |
| M034 | MAN_ COMPRESOR_1 | MANUAL operation of compressor 1 from circuit 1 | 0 | --- | 0 | 1 | 0: No<br>1: Yes | MANT_ENT_SAL_7 | Digital | Writeable |
| M035 | MAN_ COMPRESOR_2 | MANUAL operation of compressor 1, circuit 2 (or compressor 2 for one circuit units) | 0 | --- | 0 | 1 | 0: No<br>1: Yes | MANT_ENT_SAL_7 | Digital | Writeable |
| M036 | MAN_ COMPRESOR_3 | MANUAL operation of compressor 2, circuit 1 (or compressor 2 for one circuit units) | 0 | --- | 0 | 1 | 0: No<br>1: Yes | MANT_ENT_SAL_7 | Digital | Writeable |
| M037 | MAN_ COMPRESOR_4 | MANUAL operation of compressor 2 from circuit 2 | 0 | --- | 0 | 1 | 0: No<br>1: Yes | MANT_ENT_SAL_7 | Digital | Writeable |
| M038 | MAN_VIC_1 | MANUAL operation of 4-way valve for circuit 1 | 0 | --- | 0 | 1 | 0: No<br>1: Yes | MANT_ENT_SAL_8 | Digital | Writeable |
| M039 | MAN_VIC_2 | MANUAL operation of 4-way valve for circuit 2 | 0 | --- | 0 | 1 | 0: No<br>1: Yes | MANT_ENT_SAL_8 | Digital | Writeable |

| Param. No. | Designation | Description | Value by default | Units | Min. | Max. | Possible value | PGD1 Display | Type | Reading/ Writing |
|---|---|---|---|---|---|---|---|---|---|---|
| M040 | MAN_RESISTENCIA_1 | MANUAL operation of heater 1 | 0 | --- | 0 | 1 | 0: No 1: Yes | MANT_ENT_SAL_8 | Digital | Writeable |
| M041 | MAN_RESISTENCIA_2 | MANUAL operation of heater 2 | 0 | --- | 0 | 1 | 0: No 1: Yes | MANT_ENT_SAL_8 | Digital | Writeable |
| M042 | MAN_AOUT1 | Manual activation of analogue output 1 | 0 | % | 0 | 100 | | MANT_ENT_SAL_9 | Integer | Writeable |
| M043 | MAN_AOUT2 | Manual activation of analogue output 2 | 0 | % | 0 | 100 | | MANT_ENT_SAL_9 | Integer | Writeable |
| M044 | MAN_AOUT3 | Manual activation of analogue output 3 | 0 | % | 0 | 100 | | MANT_ENT_SAL_9 | Integer | Writeable |
| M045 | MAN_AOUT4 | Manual activation of analogue output 4 | 0 | % | 0 | 100 | | MANT_ENT_SAL_9 | Integer | Writeable |
| M046 | MAN_DESESCARCHE_1 | MANUAL operation of defrosting for circuit 1 | 0 | --- | 0 | 1 | 0: No 1: Yes | MANT_ENT_SAL_10 | Digital | Writeable |
| M047 | MAN_DESESCARCHE_2 | MANUAL operation of defrosting for circuit 1 | 0 | --- | 0 | 1 | 0: No 1: Yes | MANT_ENT_SAL_10 | Digital | Writeable |
| M048 | TIME_PROX_DES_C1 | Timing for next defrosting for circuit 1 (minutes) | 0 | min | 0 | 60 | | MANT_ENT_SAL_12 | Integer | Readable |
| M049 | TIME_PROX_DES_C2 | Timing for next defrosting for circuit 1 (minutes) | 0 | min | 0 | 60 | | MANT_ENT_SAL_12 | Integer | Readable |
| M050 | TIME_ENTRE_DES_C1 | Timing between defrosting operations for circuit 1 (minutes) | 0 | min | 0 | 60 | | MANT_ENT_SAL_12 | Integer | Readable |
| M051 | TIME_ENTRE_DES_C2 | Timing between defrosting operations for circuit 2 (minutes) | 0 | min | 0 | 60 | | MANT_ENT_SAL_12 | Integer | Readable |
| M052 | SET_RENOVACION_AIRE | Setpoint for air refreshing | 0 | --- | 0 | 99 | | MANT_ENT_SAL_13 | Integer | Readable |
| M053 | CAL_RENOVACION_AIRE | Calculation of the refreshing based on the return, outdoor and mixed air | 0 | --- | 0 | 99 | | MANT_ENT_SAL_13 | Integer | Readable |
| M054 | COMPUERTA_APERT_1 | Intermediate value for calculating the opening | 0 | --- | 0 | 100 | | MANT_ENT_SAL_13 | Integer | Readable |
| M055 | TIME_CAL_APERT_ COMP | Time for calculating the opening of the damper | 60 | s | 0 | 99 | | MANT_ENT_SAL_13 | Integer | Writeable |
| M056 | CTE_CAL_APERT_COMP | Constant for calculating the opening of the damper | 3 | % | 0 | 99 | | MANT_ENT_SAL_13 | Integer | Writeable |
| --- | DIF_TEMP_RENOVACION_ CAL | Difference between mixed air temperature and return, and between mixed air temperature and outdoor for refreshing calculation | 2 | ºC | 0 | 99 | | MANT_ENT_SAL_13 | Integer | Writeable |
| M057 | HAB_FILTRO1 | Enable the probe filter | 0 | --- | 0 | 1 | 0: No 1: Yes | MANT_ENT_SAL_14 | Digital | Writeable |
| M058 | TIME_FILTRO1 | Timing for the probe filter | 1 | s | 0 | 99 | | MANT_ENT_SAL_14 | Integer | Writeable |
| M059 | DT_FILTRO1 | Difference for the probe filter | 1 | --- | 0 | 9 | | MANT_ENT_SAL_14 | Analogue | Writeable |

## 18.6. Parameters in the M100 menu: maintenance displays (counters)

| Param. No. | Designation | Description | Value by default | Units | Min. | Max. | Possible value | PGD1 Display | Type | Reading/ Writing |
|---|---|---|---|---|---|---|---|---|---|---|
| M101 | N_HOR_VINT_H_X | Number of hours of the indoor fan (high level) | 0 | h | 0 | 999 | | MANT_CONT_1 | Integer | Readable |
| M102 | N_HOR_VINT_L_X | Number of hours of the indoor fan (low level) | 0 | h | 0 | 999 | | MANT_CONT_1 | Integer | Readable |
| M103 | N_HOR_COMP1_H_X | Number of hours of compr. 1, circuit 1 (high level) | 0 | h | 0 | 999 | | MANT_CONT_1 | Integer | Readable |
| M104 | N_HOR_COMP1_L_X | Number of hours of compr. 1, circuit 1 (low level) | 0 | h | 0 | 999 | | MANT_CONT_1 | Integer | Readable |
| M105 | N_HOR_COMP2_H_X | Number of hours of compressor 1, circuit 2 (or compressor 2 for one circuit units) (high level) | 0 | h | 0 | 999 | | MANT_CONT_1 | Integer | Readable |
| M106 | N_HOR_COMP2_L_X | Number of hours of compressor 1, circuit 2 (or compressor 2 for one circuit units) (low level) | 0 | h | 0 | 999 | | MANT_CONT_1 | Integer | Readable |
| M107 | N_HOR_COMP3_H_X | Number of hours of compr. 2, circuit 1 (high level) | 0 | h | 0 | 999 | | MANT_CONT_1 | Integer | Readable |
| M108 | N_HOR_COMP3_L_X | Number of hours of compr. 2, circuit 1 (low level) | 0 | h | 0 | 999 | | MANT_CONT_1 | Integer | Readable |
| M109 | N_HOR_COMP4_H_X | Number of hours of compr. 2, circuit 2 (high level) | 0 | h | 0 | 999 | | MANT_CONT_1 | Integer | Readable |
| M110 | N_HOR_COMP4_L_X | Number of hours of compr. 2, circuit 2 (low level) | 0 | h | 0 | 999 | | MANT_CONT_1 | Integer | Readable |
| M111 | N_HOR_RES_ ELEC1_H_X | Number of hours of electrical heater 1 (high level) | 0 | h | 0 | 999 | | MANT_CONT_1 | Integer | Readable |
| M112 | N_HOR_RES_ ELEC1_L_X | Number of hours of electrical heater 1 (low level) | 0 | h | 0 | 999 | | MANT_CONT_1 | Integer | Readable |
| M113 | N_HOR_RES_ ELEC2_H_X | Number of hours of electrical heater 2 (high level) | 0 | h | 0 | 999 | | MANT_CONT_1 | Integer | Readable |
| M114 | N_HOR_RES_ ELEC2_L_X | Number of hours of electrical heater 2 (low level) | 0 | h | 0 | 999 | | MANT_CONT_1 | Integer | Readable |
| M115 | N_ARR_VINT_H | Number of indoor fan starts (high level) | 0 | --- | 0 | 99 | | MANT_CONT_2 | Integer | Readable |
| M116 | N_ARR_VINT_L | Number of indoor fan starts (low level) | 0 | --- | 0 | 9999 | | MANT_CONT_2 | Integer | Readable |
| M117 | N_ARR_COMP1_H | Number of starts compressor 1, circuit 1 (high level) | 0 | --- | 0 | 99 | | MANT_CONT_2 | Integer | Readable |
| M118 | N_ARR_COMP1_L | Number of starts compressor 1, circuit 1 (low level) | 0 | --- | 0 | 9999 | | MANT_CONT_2 | Integer | Readable |
| M119 | N_ARR_COMP2_H | Number of starts compressor 1, circuit 2 (or compressor 2 for one circuit units) (high level) | 0 | --- | 0 | 99 | | MANT_CONT_2 | Integer | Readable |
| M120 | N_ARR_COMP2_L | Number of compressor 1 from circuit 2 (or compressor 2 for one circuit units) starts (low level) | 0 | --- | 0 | 9999 | | MANT_CONT_2 | Integer | Readable |
| M121 | N_ARR_COMP3_H | Number of starts compressor 2, circuit 1 (high level) | 0 | --- | 0 | 99 | | MANT_CONT_2 | Integer | Readable |
| M122 | N_ARR_COMP3_L | Number of starts compressor 2, circuit 1 (low level) | 0 | --- | 0 | 9999 | | MANT_CONT_2 | Integer | Readable |
| M123 | N_ARR_COMP4_H | Number of starts compressor 2, circuit 2 (high level) | 0 | --- | 0 | 99 | | MANT_CONT_2 | Integer | Readable |
| M124 | N_ARR_COMP4_L | Number of starts compressor 2, circuit 2 (low level) | 0 | --- | 0 | 9999 | | MANT_CONT_2 | Integer | Readable |
| M125 | N_ARR_RES1_H | Number of heater 1 starts (high level) | 0 | --- | 0 | 99 | | MANT_CONT_2 | Integer | Readable |
| M126 | N_ARR_RES1_L | Number of heater 1 starts (low level) | 0 | --- | 0 | 9999 | | MANT_CONT_2 | Integer | Readable |
| M127 | N_ARR_RES2_H | Number of heater 2 starts (high level) | 0 | --- | 0 | 99 | | MANT_CONT_2 | Integer | Readable |
| M128 | N_ARR_RES2_L | Number of heater 2 starts (low level) | 0 | --- | 0 | 9999 | | MANT_CONT_2 | Integer | Readable |
| M129 | N_DES_C1_L | Number of defrosting operations for circuit 1 (low level) | 0 | --- | 0 | 9999 | | MANT_CONT_3 | Integer | Readable |
| M130 | N_SEG_ULT_DES_C1 | Number of seconds for final defrosting for circuit 1 | 0 | s | 0 | 999 | | MANT_CONT_3 | Integer | Readable |
| M131 | CONTADOR_TED_C1 | Counter of time between the last two defrosting operations for circuit 1 | | min | 0 | 9999 | | MANT_CONT_4 | Integer | Readable |
| M132 | N_DES_C2_L | Number of defrosting operations for circuit 2 (low level) | 0 | --- | 0 | 9999 | | MANT_CONT_4 | Integer | Readable |
| M133 | N_SEG_ULT_DES_C2 | Number of seconds for final defrosting for circuit 2 | 0 | s | 0 | 999 | | MANT_CONT_4 | Integer | Readable |
| M134 | CONTADOR_TED_C2 | Counter of time between the last two defrosting operations for circuit 2 | | min | 0 | 9999 | | MANT_CONT_4 | Integer | Readable |
| M135 | N_AL_AP1 | Number of high pressure alarms for circuit 1 | 0 | --- | 0 | 9999 | | MANT_CONT_5 | Integer | Readable |
| M136 | N_AL_AP2 | Number of high pressure alarms for circuit 2 | 0 | --- | 0 | 9999 | | MANT_CONT_5 | Integer | Readable |
| M137 | N_AL_BP1 | Number of low pressure alarms for circuit 1 | 0 | --- | 0 | 9999 | | MANT_CONT_5 | Integer | Readable |
| M138 | N_AL_BP2 | Number of low pressure alarms for circuit 2 | 0 | --- | 0 | 9999 | | MANT_CONT_5 | Integer | Readable |

| Param. No. | Designation | Description | Value by default | Units | Min. | Max. | Possible value | PGD1 Display | Type | Reading/ Writing |
|---|---|---|---|---|---|---|---|---|---|---|
| M139 | N_AL_KLD1 | Number of discharge alarms compressor circuit 1 | 0 | --- | 0 | 9999 | | MANT_CONT_5 | Integer | Readable |
| M140 | N_AL_KLD2 | Number of discharge alarms compressor circuit 2 | 0 | --- | 0 | 9999 | | MANT_CONT_5 | Integer | Readable |
| M141 | N_AL_TERM_VENT_INT | Number of indoor fan thermal alarms | 0 | --- | 0 | 9999 | | MANT_CONT_6 | Integer | Readable |
| M142 | N_AL_TERM_RES_ ELECTRICA | Number of alarms for thermistor of the electrical heaters | 0 | --- | 0 | 9999 | | MANT_CONT_6 | Integer | Readable |
| M143 | N_AL_TERM_COMP_ VEXT_1 | Number of alarms for the compressor and outdoor fan thermal of circuit 1 | 0 | --- | 0 | 9999 | | MANT_CONT_6 | Integer | Readable |
| M144 | N_AL_TERM_COMP_ VEXT_2 | Number of alarms for the compressor and outdoor fan thermal of circuit 2 | 0 | --- | 0 | 9999 | | MANT_CONT_6 | Integer | Readable |
| M145 | N_AL_FUGA_REFRIG_C1 | Number of alarms for refrigerant leakage for circuit 1 | 0 | --- | 0 | 9999 | | MANT_CONT_6 | Integer | Readable |
| M146 | N_AL_FUGA_REFRIG_C2 | Number of alarms for refrigerant leakage for circuit 2 | 0 | --- | 0 | 9999 | | MANT_CONT_6 | Integer | Readable |
| M147 | N_AL_ANTIESCARCHE_ C1 | Number of anti-freeze alarms for circuit 1 | 0 | --- | 0 | 9999 | | MANT_CONT_7 | Integer | Readable |
| M148 | N_AL_ANTIESCARCHE_ C2 | Number of anti-freeze alarms for circuit 2 | 0 | --- | 0 | 9999 | | MANT_CONT_7 | Integer | Readable |
| M149 | N_AL_ANTIHIELO_BAC | Number of alarms for anti-freeze thermostat for the hot water coil | 0 | --- | 0 | 9999 | | MANT_CONT_7 | Integer | Readable |
| M150 | N_AL_ANTIHIELO_AGUA | Number of alarms due to low temperature outlet water | 0 | --- | 0 | 9999 | | MANT_CONT_7 | Integer | Readable |
| M151 | N_AL_BOMBA_ CONDENSADOS | Number of alarms for condensate pump | 0 | --- | 0 | 9999 | | MANT_CONT_7 | Integer | Readable |
| M152 | N_AL_CAUDAL_AGUA | Number of alarms for water flow switch | 0 | --- | 0 | 9999 | | MANT_CONT_7 | Integer | Readable |
| M153 | N_AL_T_P_BINT_C1 | Number of alarms for opening or short-circuiting probe | 0 | --- | 0 | 9999 | | MANT_CONT_8 | Integer | Readable |
| M154 | N_AL_T_P_BINT_C2 | Number of alarms for opening or short-circuiting probe | 0 | --- | 0 | 9999 | | MANT_CONT_8 | Integer | Readable |
| M155 | N_AL_T_P_BEXT_C1 | Number of alarms for opening or short-circuiting probe | 0 | --- | 0 | 9999 | | MANT_CONT_8 | Integer | Readable |
| M156 | N_AL_T_P_BEXT_C2 | Number of alarms for opening or short-circuiting probe | 0 | --- | 0 | 9999 | | MANT_CONT_8 | Integer | Readable |
| M157 | N_AL_TEMP_DESC_C2 | Number of alarms for opening or short-circuiting probe | 0 | --- | 0 | 9999 | | MANT_CONT_8 | Integer | Readable |
| M158 | N_AL_TEMP_DESC_C1 | Number of alarms for opening or short-circuiting probe | 0 | --- | 0 | 9999 | | MANT_CONT_8 | Integer | Readable |
| M159 | N_AL_HUM_REG | Number of alarms for opening or short-circuiting probe | 0 | --- | 0 | 9999 | | MANT_CONT_9 | Integer | Readable |
| M160 | N_AL_HUM_EXT | Number of alarms for opening or short-circuiting probe | 0 | --- | 0 | 9999 | | MANT_CONT_9 | Integer | Readable |
| M161 | N_AL_TEMP_REG | Number of alarms for opening or short-circuiting control probe | 0 | --- | 0 | 9999 | | MANT_CONT_9 | Integer | Readable |
| M162 | N_AL_TEMP_EXT | Number of alarms for opening or short-circuiting probe | 0 | --- | 0 | 9999 | | MANT_CONT_9 | Integer | Readable |
| M163 | N_AL_TEMP_IMP | Number of alarms for opening or short-circuiting probe | 0 | --- | 0 | 9999 | | MANT_CONT_9 | Integer | Readable |
| M164 | N_AL_TEMP_MEZCLA | Number of alarms for opening or short-circuiting probe | 0 | --- | 0 | 9999 | | MANT_CONT_9 | Integer | Readable |
| M165 | RESET_ON_HORAS | Reset the counter for number of hours of operation | 0 | --- | 0 | 1 | 0: No 1: Yes | MANT_CONT_10 | Digital | Writeable |
| M166 | RESET_ON_CONT | Reset the counter of starts of motors and heaters | 0 | --- | 0 | 1 | 0: No 1: Yes | MANT_CONT_10 | Digital | Writeable |
| M167 | RESET_DES_CONT | Reset the counter of defrosting operations | 0 | --- | 0 | 1 | 0: No 1: Yes | MANT_CONT_10 | Digital | Writeable |
| M168 | RESET_ON_CONT_AL | Reset the counter of alarms | 0 | --- | 0 | 1 | 0: No 1: Yes | MANT_CONT_10 | Digital | Writeable |
| M169 | N_AL_INCENDIO | Number of serious alarms anti-fire thermostat | 0 | --- | 0 | 9999 | | MANT_CONT_7 | Integer | Readable |
| M170 | N_AL_ANTIHIELO_REF_ C1 | Number of anti-freeze alarms refrigerant circuit 1 | 0 | --- | 0 | 9999 | | MAINT_COUNT_71 | Integer | Readable |
| M171 | N_AL_ANTIHIELO_REF_ C2 | Number of anti-freeze alarms refrigerant circuit 2 | 0 | --- | 0 | 9999 | | MAINT_COUNT_71 | Integer | Readable |
| M172 | N_AL_BQ_ANTIHIELO | Number of unit blocking due to anti-freeze alarm | 0 | --- | 0 | 9999 | | MAINT_COUNT_71 | Integer | Readable |
| M173 | N_JUMP_INICIAL | Number of electrical power supply cuts | 0 | --- | 0 | 9999 | | MAINT_COUNT_71 | Integer | Readable |

## 18.7. Parameters in the C000 menu: unit configuration displays

| Param. No. | Designation | Description | Value by default | Units | Min. | Max. | Possible value | PGD1 Display | Type | Reading/ Writing |
|---|---|---|---|---|---|---|---|---|---|---|
| C001 | TIPO_EQUIPO | Selection of the unit type | 0 | --- | 0 | 1 | 0: Air-Air<br>1: Water-Air | CONF_UNIDAD_1 | Integer | Writeable |
| C002 | TIPO_MAQUINA | Selection of the machine type | 1 | --- | 0 | 1 | 0: Only Cooling<br>1: Rev. Heat pump | CONF_UNIDAD_1 | Integer | Writeable |
| C003 | NUM_CIRCUITOS | Number of circuits installed | 1 | --- | 1 | 2 | | CONF_UNIDAD_2 | Integer | Writeable |
| C004 | NUM_COMPRESORES | Number of compressors installed | 1 | --- | 1 | 4 | | CONF_UNIDAD_2 | Integer | Writeable |
| C005 | HAB_UNICO_VOL_AIRE_EXT | Selection of the single volume of outdoor air operation | 1 | --- | 0 | 1 | 0: Double<br>1: Single | CONF_UNIDAD_2 | Digital | Writeable |
| C006 | NUM_RESISTENCIAS | Number of back-up electrical heaters installed | 0 | --- | 0 | 4 | 0: No<br>1: 1 stage<br>2: 2 stages<br>3: 3 stages<br>4: Proportional | CONF_UNIDAD_2 | Integer | Writeable |
| C007 | TIPO_VENT_INT | Type of indoor fan | 1 | --- | 1 | 4 | 0: ---<br>1: Centrifugal<br>2: Cent. DD / radial<br>3: 3-speed<br>4: Electronic | CONF_UNIDAD_3 | Integer | Writeable |
| C008 | MAX_AOUT_VENT_INT_FRIO | Maximum analogue output for the indoor fan in COOLING mode | 100 | % | 30 | 100 | | CONF_UNIDAD_3 | Analogue | Writeable |
| C009 | MAX_AOUT_VENT_INT_CALOR | Maximum analogue output for the indoor fan in HEATING mode | 100 | % | 30 | 100 | | CONF_UNIDAD_3 | Analogue | Writeable |
| C010 | TIPO_VENT_EXT | Type of outdoor fan | 1 | --- | 1 | 4 | 0: ---<br>1: Centrifugal<br>2: Axial / radial<br>3: 2-speed<br>4: Electronic | CONF_UNIDAD_4 | Integer | Writeable |
| C011 | MAX_AOUT_VENT_EXT_FRIO | Maximum analogue output for the outdoor fan in COOLING mode | 100 | % | 30 | 100 | | CONF_UNIDAD_4 | Analogue | Writeable |
| C012 | MAX_AOUT_VENT_EXT_CALOR | Maximum analogue output for the outdoor fan in HEATING mode | 100 | % | 30 | 100 | | CONF_UNIDAD_4 | Analogue | Writeable |
| C013 | VAL_FIN_VEXT_ALTA_VEL_COND | Final value of the outdoor fan at high speed in condensation | 27 | Bara | 0 | 50 | | CONF_UNIDAD_5 | Analogue | Writeable |
| C014 | VAL_INI_VEXT_ALTA_VEL_COND | Initial value of the outdoor fan at high speed in condensation | 34 | Bara | 0 | 50 | | CONF_UNIDAD_5 | Analogue | Writeable |
| C015 | VAL_FIN_VEXT_ALTA_VEL_EVAP | Final value of the outdoor fan at high speed in evaporation | 9 | Bara | 0 | 50 | | CONF_UNIDAD_5 | Analogue | Writeable |
| C016 | VAL_INI_VEXT_ALTA_VEL_EVAP | Initial value of the outdoor fan at high speed in evaporation | 6 | Bara | 0 | 50 | | CONF_UNIDAD_5 | Analogue | Writeable |
| C017 | TIME_CAMBIO_VEL_VEXT | Timing for changing the speed of the outdoor fan | 1 | s | 1 | 10 | | CONF_UNIDAD_5 | Integer | Writeable |
| C018 | MIN_AOUT_VENT_INT | Minimum analogue output for the indoor fan | 0 | % | 0 | 100 | | CONF_UNIDAD_6 | Analogue | Writeable |
| C019 | MIN_AOUT_VENT_EXT | Minimum analogue output for the outdoor fan | 0 | % | 0 | 100 | | CONF_UNIDAD_6 | Analogue | Writeable |
| C020 | HAB_COMP_REG_PRES_U_EXT | Enable damper for controlling the pressure of the outdoor unit | 0 | --- | 0 | 1 | 0: No<br>1: Yes | CONF_UNIDAD_7 | Digital | Writeable |
| C021 | HAB_DIN_PB | Enable low pressure pressostat | 1 | --- | 0 | 1 | 0: No<br>1: Low press. | CONF_UNIDAD_8 | Digital | Writeable |
| C022 | TIPO_DIN5 | Type of digital input 5 | 0 | --- | 0 | 4 | 0: Therm. Heater<br>1: Defrosting<br>2: Indoor flow<br>3: Cond. pump<br>4: Anti-freeze HWC | CONF_UNIDAD_9 | Integer | Writeable |
| C023 | TIPO_DIN6 | Type of digital input 6 | 1 | --- | 0 | 1 | 0: Cooling/Heating<br>1: Clogged filter | CONF_UNIDAD_9 | Integer | Writeable |
| C024 | HAB_TEMP_IMP | Enable control of outlet air temperature | 1 | --- | 0 | 1 | 0: No<br>1: Yes | CONF_UNIDAD_10 | Digital | Writeable |
| C025 | HAB_TEMP_EXT | Enable outdoor air probe | 1 | --- | 0 | 1 | 0: No<br>1: Yes | CONF_UNIDAD_10 | Digital | Writeable |

| Param. No. | Designation | Description | Value by default | Units | Min. | Max. | Possible value | PGD1 Display | Type | Reading/ Writing |
|---|---|---|---|---|---|---|---|---|---|---|
| C026 | HAB_MEZCLA | Enable mixed air temperature probe | 0 | --- | 0 | 1 | 0: No<br>1: Yes | CONF_UNIDAD_10 | Digital | Readable |
| C027 | HAB_T_P_BAT_INT | Enable indoor coil probe | 0 | --- | 0 | 1 | 0: No<br>1: Yes | CONF_UNIDAD_11 | Digital | Writeable |
| C028 | HAB_TEMP_DES_COMP | Enable compressor discharge temperature probe | 1 | --- | 0 | 1 | 0: No<br>1: Yes | CONF_UNIDAD_11 | Digital | Writeable |
| C029 | HAB_TEMP_BINT | Enable indoor coil probe by temperature (remove pressure transducer) | 1 | --- | 0 | 1 | 0: Pressure<br>1: Temperature | CONF_UNIDAD_12 | Digital | Writeable |
| C030 | HAB_TEMP_BEXT | Enable outdoor coil probe by temperature (remove pressure transducer) | 0 | --- | 0 | 1 | 0: Pressure<br>1: Temperature | CONF_UNIDAD_12 | Digital | Writeable |
| C031 | TIPO_FREECOOLING | Type of free-cooling (thermal or enthalpic) | 0 | --- | 0 | 3 | 0: None<br>1: Thermal<br>2: Enthalpic<br>3: Thermal-enthalpic | CONF_UNIDAD_13 | Integer | Writeable |
| C032 | HAB_FREECOOLING_INV | Enable the unit to operate in free-cooling in winter | 0 | --- | 0 | 1 | 0: No<br>1: Yes | CONF_UNIDAD_13 | Digital | Writeable |
| C033 | SET_IMPULSION_CALOR_APERT_COMP | Outlet air setpoint in HEATING for opening the damper | 30 | °C | 0 | 50 | | CONF_UNIDAD_14 | Analogue | Writeable |
| C034 | SET_RETORNO_CALOR_APERT_COMP | Return air setpoint in HEATING for opening the damper | 15 | °C | 0 | 50 | | CONF_UNIDAD_14 | Analogue | Writeable |
| C035 | BANDA_RETORNO_CALOR_APERT_COMP | Control band of the return air setpoint in HEATING for opening the damper | 2 | °C | 0 | 5 | | CONF_UNIDAD_14 | Analogue | Writeable |
| C036 | SET_IMPULSION_FRIO_APERT_COMP | Outlet air setpoint in COOLING for opening the damper | 20 | °C | 0 | 50 | | CONF_UNIDAD_15 | Analogue | Writeable |
| C037 | SET_RETORNO_FRIO_APERT_COMP | Return air setpoint in COOLING for opening the damper | 31 | °C | 0 | 50 | | CONF_UNIDAD_15 | Analogue | Writeable |
| C038 | BANDA_RETORNO_FRIO_APERT_COMP | Control band of the return air setpoint in COOLING for opening the damper | 2 | °C | 0 | 5 | | CONF_UNIDAD_15 | Analogue | Writeable |
| C039 | SET_MEZCLA | Mixed air temperature setpoint for calculating the maximum refreshing allowed | 12 | °C | 0 | 50 | | CONF_UNIDAD_16 | Analogue | Writeable |
| C040 | HAB_VALVULA_CALOR | Enable hot water coil valve | 0 | --- | 0 | 1 | 0: No<br>1: Yes | CONF_UNIDAD_17 | Digital | Writeable |
| C041 | HAB_VALVULA_CALOR_ON_OFF | Enable hot water coil valve on-off | 0 | --- | 0 | 1 | 0: Proportional<br>1: On/off | CONF_UNIDAD_17 | Digital | Writeable |
| C042 | HAB_PRIORIDAD_BAC | Enable priority for HWC before the compressors operate | 0 | --- | 0 | 1 | | CONF_UNIDAD_17 | Digital | Writeable |
| C043 | SET_BAJ_TEMP_EXT_BAC | Outdoor hot water coil low temperature setpoint | 4 | °C | -10 | 10 | | CONF_UNIDAD_18 | Analogue | Writeable |
| C044 | HAB_VIC_ON_CALOR | Enable 4-way valve setpoint on HEATING | 1 | --- | 0 | 1 | 0: Cool<br>1: Heating | CONF_UNIDAD_19 | Digital | Writeable |
| C045 | TIPO_REFRIGERANTE | Type of refrigerant | 4 | --- | 0 | 4 | 0: R22<br>1: R134A<br>2: R404A<br>3: R407C<br>4: R410A | CONF_UNIDAD_19 | Integer | Writeable |
| C046 | PUNTO_ROCIO_BURBUJA | Value for calculating the temperature (0=dew, 1=boiling) | 0 | --- | 0 | 1 | 0: Dew<br>1: Boiling | CONF_UNIDAD_19 | Digital | Writeable |
| C047 | HAB_ECONFORT | Enable Ecomfort operation | 0 | --- | 0 | 1 | 0: No<br>1: Yes | CONF_UNIDAD_20 | Digital | Writeable |
| C048 | HAB_DESHUM_HUMEDAD | Enable dehumidification by humidity | 0 | --- | 0 | 1 | 0: Temperature<br>1: Humidity | CONF_UNIDAD_20 | Digital | Writeable |
| C049 | HAB_COMP_REG_PRES_U_INT | Enable damper for controlling the pressure of the indoor unit | 0 | --- | 0 | 1 | 0: No<br>1: Yes | CONF_UNIT_71 | Digital | Writeable |
| C050 | HAB_RES_SIN_COMPRESOR | Enable electrical heater instead of the compressor | 0 | --- | 0 | 1 | 0: No<br>1: Yes | CONF_UNIDAD_2 | Digital | Writeable |
| C051 | MAX_APERTURA_COMPUERTA | Maximum opening of the outdoor air damper | 100 | % | 0 | 100 | | CONF_UNIDAD_13 | Analogue | Writeable |

## 18.8. Parameters in the C100 menu: defrosting configuration displays

| Param. No. | Designation | Description | Value by default | Units | Min. | Max. | Possible value | PGD1 Display | Type | Reading/ Writing |
|---|---|---|---|---|---|---|---|---|---|---|
| C101 | HAB_DES_TIEMPO | Enabling defrosting by time | 0 | --- | 0 | 1 | 0: No 1: Yes | CONF_DES_1 | Digital | Writeable |
| C102 | HAB_DES_MIN | Enable defrosting by minimum temperature or pressure | 1 | --- | 0 | 1 | 0: No 1: Yes | CONF_DES_1 | Digital | Writeable |
| C103 | HAB_DES_DIF | Enable defrosting by difference with outdoor temp. | 1 | --- | 0 | 1 | 0: No 1: Yes | CONF_DES_1 | Digital | Writeable |
| C104 | TIME_MIN_ENTRE_DES | Minimum timing between defrosting operations | 20 | min | 1 | 60 | | CONF_DES_2 | Integer | Writeable |
| C105 | TIME_MAX_ENTRE_DES | Maximum timing between defrosting operations | 40 | min | 1 | 60 | | CONF_DES_2 | Integer | Writeable |
| C106 | TIME_RED_ENTRE_DES | Timing reduction between defrosting operations | 5 | min | 1 | 60 | | CONF_DES_2 | Integer | Writeable |
| C107 | NUM_DES_INT | Number of defrosting operations for intelligent defrosting | 2 | --- | 1 | 20 | | CONF_DES_2 | Integer | Writeable |
| C108 | VAL_DES_MIN | Mandatory value for starting the defrosting by minimum temperature or pressure | 2,5 | Bar / ºC | -25 | 50 | | CONF_DES_3 | Analogue | Writeable |
| C109 | TIME_MAX_DUR_DES_ MIN | Maximum time duration for defrosting by minimum pressure or temperature | 240s - fan.out cent 240s - No fan.out. centrifugal | s | 60 | 600 | | CONF_DES_3 | Integer | Writeable |
| C110 | VAL_DES_DIF | Difference value with outdoor temp. for mandatory start of the defrosting | 16 | °C | 0 | 20 | | CONF_DES_4 | Analogue | Writeable |
| C111 | TIME_MAX_DUR_DES_ DIF | Maximum time duration for defrosting by difference with outdoor temperature | 90s - fan.out cent 120s - No fan.out. centrifugal | s | 60 | 600 | | CONF_DES_4 | Integer | Writeable |
| C112 | TIME_DES_C1_2 | Timing between defrosting of circuit 1 and circuit 2 | 90 | s | 0 | 999 | | CONF_DES_5 | Integer | Writeable |
| C113 | TIME_ENTRE_DES_DIF | Time between defrosting operations by difference between outdoor temp. and evaporation temp. | 20 | min | 0 | 99 | | CONF_DES_5 | Integer | Writeable |
| C114 | VAL_ON_VEXT_DES_ OBL | On value of the outdoor fan by defrosting by low pressure | 35 | Bara | 0 | 50 | | CONF_DES_5 | Analogue | Writeable |
| C115 | VAL_OFF_VEXT_DES_ OBL | OFF value of the outdoor fan by defrosting by low pressure | 33 | Bara | 0 | 50 | | CONF_DES_5 | Analogue | Writeable |
| --- | HAB_ON_VEXT_INI_DES | Enabling outdoor fan operation to start the defrosting | 1 | --- | 0 | 1 | 0: No 1: Yes | CONF_DES_6b | Digital | Writeable |
| --- | TIME_ON_VEXT_INI_ DES | Operating time outdoor fan to start the defrosting | 45 | s | 0 | 120 | | CONF_DES_6b | Integer | Writeable |
| C116 | VAL_INI_DES | Initial value for defrosting operation | 5,6 | Bar / ºC | -10 | 50 | | CONF_DES_6 | Analogue | Writeable |
| C117 | VAL_FIN_DES | Final value for defrosting operation | 33 | Bar / ºC | 0 | 50 | | CONF_DES_6 | Analogue | Writeable |
| C118 | TIME_RET_INICIO_DES | Time delay for starting defrosting | 90 | s | 0 | 240 | | CONF_DES_7 | Integer | Writeable |
| C119 | TIME_MIN_DUR_DES | Minimum timing for duration of defrosting | 30 | s | 10 | 120 | | CONF_DES_7 | Integer | Writeable |
| C120 | TIME_MAX_DUR_DES | Maximum timing for duration of defrosting | 10 | min | 1 | 20 | | CONF_DES_7 | Integer | Writeable |
| C121 | HAB_FIN_DES_POR_MIN | End of defrosting by the lowest temp. or pressure (single volume of air) | 0 | --- | 0 | 1 | 0: No 1: Yes | CONF_DES_8 | Digital | Writeable |
| C122 | HAB_OFF_VINT_ DESESCARCHE | Enable indoor fan stoppage during defrosting | 0 | --- | 0 | 1 | 0: No 1: Yes | CONF_DES_8 | Digital | Writeable |
| C123 | HAB_RES_ DESESCARCHE | Enable electrical heaters during defrosting | 0 | --- | 0 | 1 | | CONF_DES_9 | Digital | Writeable |
| C124 | NUM_RES_ DESESCARCHE | Number of heaters during defrosting | 0 | --- | 0 | 2 | | CONF_DES_9 | Integer | Writeable |
| C125 | HAB_BAC_ DESESCARCHE | Enable hot water coil during defrosting | 0 | --- | 0 | 1 | | CONF_DES_10 | Digital | Writeable |
| C126 | VAL_BAC_ DESESCARCHE | Value of the hot water coil valve during defrosting | 100 | % | 0 | 100 | | CONF_DES_10 | Integer | Writeable |
| C127 | HAB_DOUT_ DESESCARCHE | Enable unit output signal while defrosting | 0 | --- | 0 | 1 | 0: No 1: Yes | CONF_DES_11 | Digital | Writeable |
| C128 | SET_TEXT_VEXT_OFF_ DES | Outdoor temp. setpoint below the start of the outdoor fan is not permitted during defrosting | -6 | ºC | -10 | 10 | | CONF_DES_6 | Analogue | Writeable |

## 18.9. Parameters in the C200 menu: compressor configuration displays

| Param. No. | Designation | Description | Value by default | Units | Min. | Max. | Possible value | PGD1 Display | Type | Reading/ Writing |
|---|---|---|---|---|---|---|---|---|---|---|
| C201 | TIME_MIN_OFF_COMP | Minimum stop time for a compressor | 180 | s | 0 | 360 | | CONF_COMP_1 | Integer | Writeable |
| C202 | TIME_MIN_ON_COMP | Minimum operating time for a compressor | 120 | s | 0 | 360 | | CONF_COMP_1 | Integer | Writeable |
| C203 | TIME_MIN_ON_ON_COMP | Minimum time between 2 starts of the compressor | 300 | s | 0 | 360 | | CONF_COMP_2 | Integer | Writeable |
| C204 | TIME_MIN_ON_ON_ COMP_DIST | Minimum time between 2 start-ups of different compressors | 60 | s | 0 | 60 | | CONF_COMP_2 | Integer | Writeable |
| C205 | HAB_ROT_COMP | Enabling of the compressor rotation | 1 | --- | 0 | 1 | 0: No<br>1: Yes | CONF_COMP_3 | Digital | Writeable |
| C206 | TIME_RET_COMP_TRAS_ VINT | Time delay for ON of compressor after ON of indoor fan | 30 | s | 0 | 120 | | CONF_COMP_3 | Integer | Writeable |
| --- | TIME_RET_ON_COMP_ ON_VEXT | Delay of the start-up of the compressors with regard to the outdoor fan | 10 | s | 10 | 120 | | CONF_COMP_3 | Integer | |
| C207 | HAB_OFF_COMPRESOR_ DES | Enable the compressor to be stopped by the defrosting operation | 1 | --- | 0 | 1 | 0: No<br>1: Yes | CONF_COMP_4 | Digital | Writeable |
| C208 | TIME_OFF_COMP_DES | Timing for the compressor during the defrosting | 45 | s | 0 | 120 | | CONF_COMP_4 | Integer | Writeable |
| C209 | TIME_CAMBIO_V4V | Time to change the 4-way valve after stopping the compressor | 30 | s | 0 | 120 | | CONF_COMP_5 | Integer | Writeable |
| C210 | HAB_OFF_COMPRESOR_ CAMBIO_F_C | Enable stoppage for the compressor with COOLING/HEATING change | 1 | --- | 0 | 1 | 0: No<br>1: Yes | CONF_COMP_6 | Digital | Writeable |
| C211 | TIME_OFF_COMP_ CAMBIO_F_C | Time stoppage for the compressor by COOLING/HEATING change | 180 | s | 0 | 360 | | CONF_COMP_6 | Integer | Writeable |
| C212 | TIPO_BLOQ_COMP_VER | Compressor block type in summer with free-cooling | 0 | --- | 0 | 2 | 0: No<br>1: By outdoor setpoint<br>2: By diff. Ret.T-Out. T | CONF_COMP_7 | Integer | Writeable |
| C213 | SET_BLOQ_COMP_VER | Block compressor setpoint in summer with free-cooling with low outdoor temperature | 10 | °C | 0 | 50 | | CONF_COMP_7 | Analogue | Writeable |
| C214 | VAL_DIF_BLOQ_COMP_ VER | Differential between outdoor and return air temps. for blocking compressor in summer by free-cooling | 14 | °C | 0 | 50 | | CONF_COMP_7 | Analogue | Writeable |
| C215 | HAB_BLOQ_COMP_INV | Enable compressor blocking in winter based on the outdoor temperature | 0 | --- | 0 | 1 | 0: No<br>1: Yes | CONF_COMP_8 | Digital | Writeable |
| C216 | SET_BLOQ_COMP_INV | Block compressor setpoint in winter due to low outdoor temperature | -10 | °C | -20 | 20 | | CONF_COMP_8 | Analogue | Writeable |

## 18.10. Parameters in the C300 menu: control configuration displays

| Param. No. | Designation | Description | Value by default | Units | Min. | Max. | Possible value | PGD1 Display | Type | Reading/ Writing |
|---|---|---|---|---|---|---|---|---|---|---|
| C301 | CONTROL_P_PI | Type of control: proportional or proportional + integral | 0 | --- | 0 | 1 | 0: P<br>1: P+I | CONF_CONTROL_1 | Digital | Writeable |
| C302 | TIME_INTEGRACION | Integration time for P+I control | 600 | s | 0 | 999 | | CONF_CONTROL_1 | Integer | Writeable |
| C303 | CONTROL_P_PI_IMP | Type of control: proportional or proportional + integral for outlet air | 1 | --- | 0 | 1 | 0: P<br>1: P+I | CONF_CONTROL_2 | Digital | Writeable |
| C304 | TIME_INTEGRACION_ IMP | Integration time for P+I control for outlet air | 120 | s | 0 | 999 | | CONF_CONTROL_2 | Integer | Writeable |
| C305 | VAL_INI_LIM_TEMP_ IMP_FRIO | Initial temperature limit value for outlet air in COOLING mode | 7 | °C | 0 | 30 | | CONF_CONTROL_3 | Analogue | Writeable |
| C306 | VAL_DIF_LIM_TEMP_ IMP_FRIO | Differential temperature limit value for outlet air in COOLING mode | 5 | °C | 0 | 20 | | CONF_CONTROL_3 | Analogue | Writeable |
| C307 | VAL_INI_LIM_TEMP_ IMP_CALOR | Initial temperature limit value for outlet air in HEATING mode | 45 | °C | 0 | 60 | | CONF_CONTROL_4 | Analogue | Writeable |
| C308 | VAL_DIF_LIM_TEMP_ IMP_CALOR | Differential temperature limit value for outlet air in HEATING mode | 5 | °C | 0 | 20 | | CONF_CONTROL_4 | Analogue | Writeable |
| C309 | HAB_C_EVAP_VENT_ INT | Enable evaporation control in indoor fan | 0 | --- | 0 | 1 | 0: No<br>1: Yes | CONF_CONTROL_5 | Digital | Writeable |

# Electronic control

| Param. No. | Designation | Description | Value by default | Units | Min. | Max. | Possible value | PGD1 Display | Type | Reading/ Writing |
|---|---|---|---|---|---|---|---|---|---|---|
| C310 | VAL_INI_C_EVAP_ VINT | Evaporation control setpoint of the indoor fan | 10.0ºC | bar / ºC | 0 | 99,9 | | CONF_CONTROL_5 | Analogue | Writeable |
| C311 | VAL_FIN_C_EVAP_ VINT | Evaporation control band of the indoor fan | 6.0ºC | bar / ºC | 0 | 99,9 | | CONF_CONTROL_5 | Analogue | Writeable |
| C312 | HAB_C_COND_ VENT_INT | Enable condensation control in indoor fan | 0 | --- | 0 | 1 | 0: No 1: Yes | CONF_CONTROL_6 | Digital | Writeable |
| C313 | VAL_INI_C_COND_ VINT | Condensation control setpoint of the indoor fan | 45.0ºC | bar / ºC | 0 | 99,9 | | CONF_CONTROL_6 | Analogue | Writeable |
| C314 | VAL_FIN_C_COND_ VINT | Condensation control band of the indoor fan | 10.0ºC | bar / ºC | 0 | 99,9 | | CONF_CONTROL_6 | Analogue | Writeable |
| C315 | HAB_C_EVAP_ VENT_EXT | Enable evaporation control in outdoor fan | 0 | --- | 0 | 1 | 0: No 1: Yes | CONF_CONTROL_7 | Digital | Writeable |
| C316 | VAL_INI_C_EVAP_ VEXT | Evaporation control setpoint of the outdoor fan | 10.0 bar | bar / ºC | 0 | 99,9 | | CONF_CONTROL_7 | Analogue | Writeable |
| C317 | VAL_FIN_C_EVAP_ VEXT | Evaporation control setpoint of the outdoor fan | 2.0 bar | bar / ºC | 0 | 99,9 | | CONF_CONTROL_7 | Analogue | Writeable |
| C318 | HAB_C_COND_ VENT_EXT | Enable condensation control in outdoor fan | 0 | --- | 0 | 1 | 0: No 1: Yes | CONF_CONTROL_8 | Digital | Writeable |
| C319 | VAL_INI_C_COND_ VEXT | Condensation control setpoint of the outdoor fan | 27.0 bar | bar / ºC | 0 | 99,9 | | CONF_CONTROL_8 | Analogue | Writeable |
| C320 | VAL_FIN_C_COND_ VEXT | Condensation control band of the outdoor fan | 8.0 bar | bar / ºC | 0 | 99,9 | | CONF_CONTROL_8 | Analogue | Writeable |
| C321 | TIME_VINT_ON_ MAX | Time for maximum fan speed before condensation/evaporation control | 120s 30s (electronic or damper) | s | 0 | 240 | | CONF_CONTROL_9 | Integer | Writeable |
| C322 | TIME_VEXT_ON_ MAX | Time for maximum fan speed before condensation/evaporation control | 120s 30s (electronic or damper) | s | 0 | 240 | | CONF_CONTROL_9 | Integer | Writeable |
| C323 | TIME_OFF_VINT_ FRIO | Time for STOPPING indoor fan in COOLING mode | 10 | s | 0 | 120 | | CONF_CONTROL_10 | Integer | Writeable |
| C324 | TIME_OFF_VINT_ CALOR | Time for STOPPING indoor fan in HEATING mode | 60 | s | 0 | 120 | | CONF_CONTROL_10 | Integer | Writeable |
| C325 | TIME_OFF_VEXT_ FRIO | Time for STOPPING outdoor fan in COOLING mode | 60 | s | 0 | 120 | | CONF_CONTROL_11 | Integer | Writeable |
| C326 | TIME_OFF_VEXT_ CALOR | Time for STOPPING outdoor fan in HEATING mode | 60 | s | 0 | 120 | | CONF_CONTROL_11 | Integer | Writeable |
| C327 | HAB_VINT_CONT_ ON_OFF | Enabling operation of fan in CONTINUOUS mode with ON-OFF cycles | 0 | --- | 0 | 1 | 0: No 1: Yes | CONF_CONTROL_12 | Digital | Writeable |
| C328 | TIME_VINT_CONT_ OFF | Time for indoor fan in continuous mode OFF | 1 | min | 0 | 10 | | CONF_CONTROL_12 | Integer | Writeable |
| C329 | TIME_VINT_CONT_ ON | Time for indoor fan in continuous mode ON | 1 | min | 0 | 10 | | CONF_CONTROL_12 | Integer | Writeable |
| C330 | CONTROL_P_PI_C_ EVAP_VINT | Control type P or P+I for evaporation control indoor unit | 0: P 1: P+I (electron. or damper) | --- | 0 | 1 | 0: P 1: P+I | CONF_CONTROL_5 | Digital | Writeable |
| C331 | TIME_INT_C_EVAP_ VINT | Integration time for PI control for evaporation control indoor unit | 120 s | s | 0 | 999 | | CONF_CONTROL_5 | Integer | Writeable |
| C332 | CONTROL_P_PI_C_ COND_VINT | Control type P or P+I for condensation control indoor unit | 0: P 1: P+I (electron. or damper) | --- | 0 | 1 | 0: P 1: P+I | CONF_CONTROL_6 | Digital | Writeable |
| C333 | TIME_INT_C_ COND_VINT | Integration time for PI control for condensation control indoor unit | 120 s | s | 0 | 999 | | CONF_CONTROL_6 | Integer | Writeable |
| C334 | CONTROL_P_PI_C_ EVAP_VEXT | Control type P or P+I for evaporation control outdoor unit | 0: P 1: P+I (electron. or damper) | --- | 0 | 1 | 0: P 1: P+I | CONF_CONTROL_7 | Digital | Writeable |
| C335 | TIME_INT_C_EVAP_ VEXT | Integration time for PI control for evaporation control outdoor unit | 120 s | s | 0 | 999 | | CONF_CONTROL_7 | Integer | Writeable |
| C336 | CONTROL_P_PI_C_ COND_VEXT | Control type P or P+I for condensation control outdoor unit | 0: P 1: P+I (electron. or damper) | --- | 0 | 1 | 0: P 1: P+I | CONF_CONTROL_8 | Digital | Writeable |
| C337 | TIME_INT_C_ COND_VEXT | Integration time for PI control for condensation control outdoor unit | 120 s | s | 0 | 999 | | CONF_CONTROL_8 | Integer | Writeable |

## 18.11. Parameters in the C400 menu: safety configuration displays

| Param. No. | Designation | Description | Value by default | Units | Min. | Max. | Possible value | PGD1 Display | Type | Reading/ Writing |
|---|---|---|---|---|---|---|---|---|---|---|
| C401 | VAL_INI_AL_BP_FRIO | Initial value of low pressure alarm in COOLING mode | -10 | Bar/ºC | -99 | 99 | | CONF_SEG_1 | Analogue | Writeable |
| C402 | VAL_FIN_AL_BP_FRIO | Final value of low pressure alarm in COOLING mode | 10 | Bar/ºC | -99 | 99 | | CONF_SEG_1 | Analogue | Writeable |
| C403 | VAL_INI_AL_BP_CALOR | Initial value of low pressure alarm in HEATING mode | 2 | Bar/ºC | -99 | 99 | | CONF_SEG_2 | Analogue | Writeable |
| C404 | VAL_FIN_AL_BP_ CALOR | Final value of low pressure alarm in HEATING mode | 4 | Bar/ºC | -99 | 99 | | CONF_SEG_2 | Analogue | Writeable |
| C405 | TIME_RET_AL_BP | Time delay for low pressure alarm | 1 | s | 0 | 240 | | CONF_SEG_3 | Integer | Writeable |
| C406 | DESHAB_AL_PB_DES | Disable low pressure alarm in defrosting | 0 | --- | 0 | 1 | 0: No 1: Yes | CONF_SEG_3 | Digital | Writeable |
| C407 | VAL_INI_AL_AP | Initial value of high pressure alarm | 41 | Bara | 0 | 99,9 | | CONF_SEG_4 | Analogue | Writeable |
| C408 | VAL_FIN_AL_AP | Final value of high pressure alarm | 30 | Bara | 0 | 99,9 | | CONF_SEG_4 | Analogue | Writeable |
| C409 | HAB_AL_FUGA_REFRIG | Enable the refrigerant leak circuit | 0 | --- | 0 | 1 | 0: No 1: Yes | CONF_SEG_5 | Digital | Writeable |
| C410 | VAL_INI_AL_FUG_FRIO | Initial value of the refrigerant leak alarm in COOLING mode | 21 | °C | 0 | 99,9 | | CONF_SEG_5 | Analogue | Writeable |
| C411 | VAL_INI_AL_FUG_ CALOR | Initial value of the refrigerant leak alarm in HEATING mode | 30 | °C | 0 | 99,9 | | CONF_SEG_5 | Analogue | Writeable |
| C412 | VAL_INI_AL_KLD | Initial value of the compressor discharge temperature alarm | 135 | °C | 0 | 200 | | CONF_SEG_6 | Analogue | Writeable |
| C413 | VAL_FIN_AL_KLD | Final value of the compressor discharge temperature alarm | 105 | °C | 0 | 200 | | CONF_SEG_6 | Analogue | Writeable |
| C414 | VAL_INI_AL_ ANTIHIELO | Initial value of the anti-freeze alarm for water-air units | -2 (R410A) -6 (R407C) | °C | -10 | 50 | | CONF_SEG_7 | Analogue | Writeable |
| C415 | VAL_DIF_AL_ ANTIHIELO | Initial value of the anti-freeze alarm for water-air units | 8 | °C | 0 | 50 | | CONF_SEG_7 | Analogue | Writeable |
| C416 | VAL_INI_AL_ ANTIESCARCHE | Initial value of the anti-freeze alarm | -1 | °C | -10 | 50 | | CONF_SEG_8 | Analogue | Writeable |
| C417 | VAL_FIN_AL_ ANTIESCARCHE | Final value of the anti-freeze alarm | 10 | °C | 0 | 50 | | CONF_SEG_8 | Analogue | Writeable |
| C418 | TIME_RET_AL_ ANTIESCARCHE | Time for the anti-freeze alarm | 10 | min | 0 | 60 | | CONF_SEG_8 | Integer | Writeable |
| C419 | TIME_RET_AL_BOMBA_ CONDENSADOS | Time delay for the condensate pump alarm | 60 | s | 0 | 120 | | CONF_SEG_9 | Integer | Writeable |
| C420 | TIME_RET_AL_ CAUDAL_AGUA | Time delay water or air flow alarm (centrifugal fan with electrical heater and pressure control damper) | 30 | s | 0 | 120 | | CONF_SEG_9 | Integer | Writeable |
| C421 | TIME_RET_AL_ TERM_VENT_INT | Time delay for alarm for indoor fan thermal | 0 (standard) 30s (air flow switch) | s | 0 | 60 | | CONF_SEG_9 | Integer | Writeable |
| C422 | SET_BAJ_TEMP | Low temp. setpoint for ambient or return air | 10 | °C | 0 | 60 | | CONF_SEG_10 | Analogue | Writeable |
| C423 | SET_ALT_TEMP | High temp. setpoint for ambient or return air | 50 | °C | 0 | 60 | | CONF_SEG_10 | Analogue | Writeable |
| C424 | SET_BAJ_TEMP_EXT | Low temperature setpoint for outdoor air | -10 | °C | -20 | 60 | | CONF_SEG_11 | Analogue | Writeable |
| C425 | SET_ALT_TEMP_EXT | High temp. setpoint for ambient or return air | 50 | °C | 0 | 60 | | CONF_SEG_11 | Analogue | Writeable |
| C426 | TIME_RET_AL_TEMP | Time delay alarm for high and low temperature | 10 | s | 0 | 99 | | CONF_SEG_12 | Integer | Writeable |
| C427 | VAL_INI_SEG_ ECONFORT_FRIO | Initial safety device value in Ecomfort in COOLING mode | -4 | °C | -9,9 | 9,9 | | CONF_SEG_13 | Analogue | Writeable |
| C428 | VAL_FIN_SEG_ ECONFORT_FRIO | Final safety device value in Ecomfort in COOLING mode | 3,5 | °C | -9,9 | 9,9 | | CONF_SEG_13 | Analogue | Writeable |
| C429 | VAL_INI_SEG_ ECONFORT_CALOR | Initial safety device value in Ecomfort in HEATING mode | 55 | °C | 10 | 70 | | CONF_SEG_14 | Analogue | Writeable |
| C430 | VAL_FIN_SEG_ ECONFORT_CALOR | Final safety device value in Ecomfort in HEATING mode | 40 | °C | 10 | 70 | | CONF_SEG_14 | Analogue | Writeable |
| C431 | TIME_ON_COMP_HAB_ ECO_RES | Time the compressor is on to enable the heaters | 15 | min | 0 | 30 | | CONF_SEG_15 | Integer | Writeable |
| C432 | VAL_INI_SEG_ ECONFORT_RES | Initial safety device value in Ecomfort in HEATING mode + heaters | 47 | °C | 10 | 70 | | CONF_SEG_15 | Analogue | Writeable |
| C433 | VAL_FIN_SEG_ ECONFORT_RES | Final safety device value in Ecomfort in HEATING mode + heaters | 40 | °C | 10 | 70 | | CONF_SEG_15 | Analogue | Writeable |
| C434 | SET_AL_INCENDIO | Fire alarm setpoint (with return probe) | 60.0ºC | °C | 40 | 80 | | CONF_SAFE_16 | | |
| C435 | DIF_AL_INCENDIO | Fire alarm differential (return temperature) | 20.0ºC | °C | 10 | 50 | | CONF_SAFE_16 | | |
| C436 | OFF_COMPUERTA_AL_ INCENDIO | Damper status during the anti-fire alarm | 0 | --- | 0 | 1 | 0:Open 1:Closed | CONF_SAFE_16 | | |

## 18.12. Parameters in the C500 menu: alarm configuration displays

| Param. No. | Designation | Description | Value by default | Units | Min. | Max. | Possible value | PGD1 Display | Type | Reading/ Writing |
|---|---|---|---|---|---|---|---|---|---|---|
| C501 | HAB_RL_AL_VINT | Enable by alarm relay for indoor fan thermal | 1 | --- | 0 | 1 | 0: No 1: Yes | CONF_AL_1 | Digital | Writeable |
| C502 | HAB_RL_AL_AP | Enable by alarm relay due to high pressure failure | 1 | --- | 0 | 1 | 0: No 1: Yes | CONF_AL_1 | Digital | Writeable |
| C503 | HAB_RL_AL_BP | Enable by alarm relay due to low pressure failure | 1 | --- | 0 | 1 | 0: No 1: Yes | CONF_AL_1 | Digital | Writeable |
| C504 | HAB_RL_AL_COMP | Enable the alarm relay by compressor and outdoor fan thermal | 1 | --- | 0 | 1 | 0: No 1: Yes | CONF_AL_1 | Digital | Writeable |
| C505 | HAB_RL_AL_KLD | Enable the alarm relay by discharge temperature of the compressor | 1 | --- | 0 | 1 | 0: No 1: Yes | CONF_AL_1 | Digital | Writeable |
| C506 | HAB_RL_AL_FS | Enable the alarm relay due to clogged filter | 1 | --- | 0 | 1 | 0: No 1: Yes | CONF_AL_1 | Digital | Writeable |
| C507 | HAB_RL_AL_FRE | Enable the alarm relay due to refrigerant leak | 1 | --- | 0 | 1 | 0: No 1: Yes | CONF_AL_2 | Digital | Writeable |
| C508 | HAB_RL_AL_TRE | Enable the alarm relay by electrical heater thermistor | 1 | --- | 0 | 1 | 0: No 1: Yes | CONF_AL_2 | Digital | Writeable |
| C509 | HAB_RL_AL_IC | Enable the alarm relay by flow switch | 1 | --- | 0 | 1 | 0: No 1: Yes | CONF_AL_2 | Digital | Writeable |
| C510 | HAB_RL_AL_BAC | Enable the alarm relay by hot water coil anti-freeze | 1 | --- | 0 | 1 | 0: No 1: Yes | CONF_AL_2 | Digital | Writeable |
| C511 | HAB_RL_AL_AES | Enable the alarm relay due to anti-freeze leak | 1 | --- | 0 | 1 | 0: No 1: Yes | CONF_AL_2 | Digital | Writeable |
| C512 | HAB_RL_AL_AH | Enable the alarm relay by outlet water temperature | 1 | --- | 0 | 1 | 0: No 1: Yes | CONF_AL_2 | Digital | Writeable |
| C513 | HAB_RL_AL_TREG | Enable the alarm relay by high or low control temperature | 1 | --- | 0 | 1 | 0: No 1: Yes | CONF_AL_3 | Digital | Writeable |
| C514 | HAB_RL_AL_TEXT | Enable the alarm relay by high or low control outdoor air temperature | 1 | --- | 0 | 1 | 0: No 1: Yes | CONF_AL_3 | Digital | Writeable |
| C515 | HAB_RL_AL_BC | Enable the alarm relay due to condensate pump failure | 1 | --- | 0 | 1 | 0: No 1: Yes | CONF_AL_3 | Digital | Writeable |
| C516 | HAB_RL_AL_SRG | Enable the alarm relay by opening or short-circuiting control probes | 1 | --- | 0 | 1 | 0: No 1: Yes | CONF_AL_3 | Digital | Writeable |
| C517 | HAB_RL_AL_SCF | Enable the alarm relay by opening or short-circuiting control probes of the cooling circuit | 1 | --- | 0 | 1 | 0: No 1: Yes | CONF_AL_3 | Digital | Writeable |
| C518 | HAB_BQ_AL_AP | Enable high pressure alarm blocking | 1 | --- | 0 | 1 | 0: No 1: Yes | CONF_AL_4 | Digital | Writeable |
| C519 | NUM_VECES_BQ_AL_AP | Number of times to block the unit due to high pressure alarm | 4 | --- | 0 | 20 | | CONF_AL_4 | Integer | Writeable |
| C520 | TIME_BQ_AL_AP | Time in minutes to count the number of times an alarm occurs for blocking due to high pressure | 30 | min | 0 | 1440 | | CONF_AL_4 | Integer | Writeable |
| C521 | HAB_BQ_AL_BP | Enable low pressure alarm blocking | 1 | --- | 0 | 1 | 0: No 1: Yes | CONF_AL_5 | Digital | Writeable |
| C522 | NUM_VECES_BQ_AL_BP | Number of times to block the unit due to low pressure alarm | 4 | --- | 0 | 20 | | CONF_AL_5 | Integer | Writeable |
| C523 | TIME_BQ_AL_BP | Time in minutes to count the number of times an alarm occurs for blocking due to low pressure | 30 | min | 0 | 1440 | | CONF_AL_5 | Integer | Writeable |
| C524 | HAB_BQ_AL_TERM | Enable blocking of thermal alarm | 1 | --- | 0 | 1 | 0: No 1: Yes | CONF_AL_6 | Digital | Writeable |
| C525 | NUM_VECES_BQ_AL_TERM | Number of times to block the unit due to thermal alarm | 4 | --- | 0 | 20 | | CONF_AL_6 | Integer | Writeable |
| C526 | TIME_BQ_AL_TERM | Time in minutes to take into account the number of times an alarm occurs for blocking due to thermal | 30 | min | 0 | 1440 | | CONF_AL_6 | Integer | Writeable |
| C527 | HAB_BQ_AL_FUG | Enable block of refrigerant leak alarm | 1 | --- | 0 | 1 | 0: No 1: Yes | CONF_AL_7 | Digital | Writeable |
| C528 | NUM_VECES_BQ_AL_FUG | Number of times to block the unit due to refrigerant leak alarm | 4 | --- | 0 | 20 | | CONF_AL_7 | Integer | Writeable |
| C529 | TIME_BQ_AL_FUG | Time in minutes to count the number of times an alarm occurs for blocking due to refrigerant leak | 30 | min | 0 | 99 | | CONF_AL_7 | Integer | Writeable |
| C530 | HAB_RELE_ALARMA_POR_MASK | Activation of the relay with the active alarm selected on the display | 1 | --- | 0 | 1 | 0: No 1: Yes | CONF_AL_8 | Digital | Writeable |

## 18.13. Parameters in the C600 menu: unit initialisation displays

| Param. No. | Designation | Description | Value by default | Units | Min. | Max. | Possible value | PGD1 Display | Type | Reading/ Writing |
|---|---|---|---|---|---|---|---|---|---|---|
| C601 | LANGUAGE | Language selection in the PGD1 terminal | 0 | --- | 0 | 3 | 0: Spanish<br>1: French<br>2: English<br>3: Italian | LANGUAGE | Integer | Writeable |
| C602 | TIPO_LOGO | Select the logotype to insert in the main display of the PGD1 | 0 | --- | 0 | 1 | 0: Ciat<br>1: Ciatesa | LANGUAGE | Integer | Writeable |
| C603 | ERASE_PERM_MEM | Erase the permanent memory | 0 | --- | 0 | 1 | 0: No<br>1: Yes | INICIALIZACION | Digital | Writeable |
| C604 | VIRT_PONTE | Manual activation by loading the default values | 0 | --- | 0 | 1 | 0: No<br>1: Yes | INICIALIZACION | Digital | Writeable |
| C605 | RESET_EVENTOS | Reset the alarms log | 0 | --- | 0 | 1 | 0: No<br>1: Yes | RESET_HIST_ALARMAS | Digital | Writeable |
| C606 | VIRT_VAL_ENSAYO | Manual activation by loading the default test values | 0 | --- | 0 | 1 | 0: No<br>1: Yes | ENSAYO_UNIDAD | Digital | Writeable |
| C607 | VIRT_VAL_NORMAL | Manual activation by loading the normal values | 0 | --- | 0 | 1 | 0: No<br>1: Yes | ENSAYO_UNIDAD | Digital | Writeable |

# 19. Carel and Modbus supervisory variables

## 19.1. Equivalence between the Carel and Modbus protocols

| Carel | | Modbus | | Conversion |
|---|---|---|---|---|
| Variable type | Maximum number of addresses | Variable type | Maximum number of addresses | |
| Digital | 1 ... 207 | Digital | 1 ... 207 | Modbus Address = Carel Address |
| Analogue | 1 ... 207 | Word registry | 1 ... 207 | Modbus Address = Carel Address |
| Integer | 1 ... 207 | Word registry | 208 ... 415 | Modbus Address = Carel Address + 208 |

Note: Carel peripherals do not allow the 0 address.

## 19.2. Digital variables

| Carel Address | Designation | Description | Read/Write |
|---|---|---|---|
| 1 | DIN_AP1 | High pressure digital input 1 | Readable |
| 2 | DIN_AP2 | High pressure digital input 2 | Readable |
| 3 | DIN_BP1 | Low pressure digital input 1 | Readable |
| 4 | DIN_BP2 | Low pressure digital input 2 | Readable |
| 5 | DIN_TERM_COMP_VEXT_1 | Digital input for compressors and outdoor fans for circuit 1 | Readable |
| 6 | DIN_TERM_COMP_VEXT_2 | Digital input for compressors and outdoor fans for circuit 2 | Readable |
| 7 | DIN_TERMISTOR_R_ELECTRICA | Digital input for electrical heater thermistors | Readable |
| 8 | DIN_ON_OFF | Digital input ON/OFF | Readable |
| 9 | DIN_CALOR_FRIO | Digital input HEATING / COOLING (0=HEAT, 1=COOL) | Readable |
| 10 | DIN_ANTIHIELO_BAC | Hot water coil anti-freeze digital input | Readable |
| 11 | DIN_FILTRO_SUCIO | Digital input for clogged filter | Readable |
| 12 | DIN_TERM_VENT_INT | Digital input for the indoor fan thermal | Readable |
| 13 | DIN_KLD1 | Digital input klixon for compressor(s) discharge for circuit 1 | Readable |
| 14 | DIN_KLD2 | Digital input klixon for compressor(s) discharge for circuit 2 | Readable |
| 15 | DIN_INT_CAUDAL_AGUA | Digital input water flow switch | Readable |
| 16 | DIN_BOMBA_CONDENSADOS | Digital input for condensate pump failure | Readable |
| 17 | DIN_DESESCARCHE_C1 | Digital input signal for defrosting from another board | Readable |
| 18 | HAB_FRIO | Enable cooling mode | Readable |
| 19 | HAB_CALOR | Enable heating mode | Readable |
| 20 | VENT_INTERIOR_V1 | Output of the indoor fan (speed 1) slow speed | Readable |
| 21 | VENT_INTERIOR_V2 | Output of the indoor fan (speed 2) medium speed | Readable |
| 22 | VENT_INTERIOR_V3 | Output of the indoor fan (speed 3) fast speed or single speed | Readable |
| 23 | COMPRESOR_1 | Output of compressor 1 from circuit 1 | Readable |
| 24 | COMPRESOR_2 | Output of compressor 1 from circuit 2 (or compressor 2 for one circuit units) | Readable |
| 25 | COMPRESOR_3 | Output of compressor 2 from circuit 1 | Readable |
| 26 | COMPRESOR_4 | Output of compressor 2 from circuit 2 | Readable |
| 27 | VIC_1 | Output from the 4-way valve of circuit 1 | Readable |
| 28 | VIC_2 | Output from the 4-way valve of circuit 2 | Readable |
| 29 | VENT_EXTERIOR_1 | Output from the outdoor air fan for circuit 1 | Readable |
| 30 | VENT_EXTERIOR_2 | Output from the outdoor air fan for circuit 2 | Readable |
| 31 | CAL_ELECTRICA_1 | Output from electrical heater 1 | Readable |
| 32 | CAL_ELECTRICA_2 | Output from electrical heater 2 | Readable |
| 33 | SYS_ON | ON mode activated from the command | Writeable |
| 34 | SYS_ON1 | System in ON mode | Readable |
| 35 | UNICO_VOL_AIRE_EXT | Selection of the single volume of outdoor air operation | Writeable |
| 36 | SET_DATE | Change the date and time with the values entered in NEW_YEAR, NEW_MONTH, NEW_DAY, NEW_HOUR, NEW_MINUTE | Writeable |
| 37 | MODO_VENT_AUTO | Enabling operation of the fan in AUTO mode | Writeable |
| 38 | GLOBAL_ALARM | | Readable |

| Carel Address | Designation | Description | Read/Write |
|---|---|---|---|
| 39 | RELE_ALARMA | Output from the alarm relay | Readable |
| 40 | RESET_ALARMS | Reset alarms | Writeable |
| 41 | mAL_TERM_VENT_INT | Indoor fan thermal alarm | Readable |
| 42 | mAL_AP1 | High pressure alarm 1 | Readable |
| 43 | mAL_AP2 | High pressure alarm 2 | Readable |
| 44 | mAL_BP1 | Low pressure alarm 1 | Readable |
| 45 | mAL_BP2 | Low pressure alarm 2 | Readable |
| 46 | mAL_KLD1 | Klixon alarm for discharge compressor(s) for circuit 1 | Readable |
| 47 | mAL_KLD2 | Klixon alarm for discharge compressor(s) for circuit 2 | Readable |
| 48 | mAL_TERM_COMP_VEXT_1 | Alarm for compressors and outdoor fans for circuit 1 | Readable |
| 49 | mAL_TERM_COMP_VEXT_2 | Alarm for compressors and outdoor fans for circuit 2 | Readable |
| 50 | mAL_TERMISTOR_R_ELECTRICA | Alarm for electrical heater thermistors | Readable |
| 51 | mAL_FUGA_REFRIG_C1 | Alarm for refrigerant leak in circuit 1 | Readable |
| 52 | mAL_FUGA_REFRIG_C2 | Alarm for refrigerant leak in circuit 2 | Readable |
| 53 | mAL_ANTIESCARCHE_C1 | Alarm for the anti-freeze safety device in circuit 1 | Readable |
| 54 | mAL_ANTIESCARCHE_C2 | Alarm for the anti-freeze safety device in circuit 2 | Readable |
| 55 | mAL_CAUDAL_AGUA | Water flow switch alarm | Readable |
| 56 | mAL_BAJA_TEMP_IMP_AGUA | Low temperature of water outlet alarm for water-air units | Readable |
| 57 | mAL_BOMBA_CONDENSADOS | Condensate pump failure alarm | Readable |
| 58 | mAL_ANTIHIELO_BAC | Hot water coil anti-freeze alarm | Readable |
| 59 | mAL_TEMP_AMB | Ambient air temperature probe alarm | Readable |
| 60 | mAL_TEMP_RET | Return air temperature probe alarm | Readable |
| 61 | mAL_T_P_BINT_C1 | Alarm for the temperature-pressure probe indoor coil for circuit 1 | Readable |
| 62 | mAL_T_P_BINT_C2 | Alarm for the temperature-pressure probe indoor coil for circuit 2 | Readable |
| 63 | mAL_T_P_BEXT_C1 | Alarm for the temperature-pressure probe outdoor coil for circuit 1 | Readable |
| 64 | mAL_T_P_BEXT_C2 | Alarm for the temperature-pressure probe outdoor coil for circuit 2 | Readable |
| 65 | mAL_TEMP_DES_C1 | Alarm for discharge temperature probe for circuit 1 | Readable |
| 66 | mAL_TEMP_DES_C2 | Alarm for discharge temperature probe for circuit 2 | Readable |
| 67 | mAL_TEMP_EXT | Outdoor air temperature probe alarm | Readable |
| 68 | mAL_TEMP_IMP | Alarm for the outlet air or water temperature probe | Readable |
| 69 | mAL_HUM_INT | Indoor air humidity probe alarm | Readable |
| 70 | mAL_HUM_EXT | Outdoor air humidity probe alarm | Readable |
| 71 | mAL_FILTRO_SUCIO | Clogged filter alarm | Readable |
| 72 | mAL_ALT_TEMP | High temperature alarm for ambient or return air | Readable |
| 73 | mAL_BAJ_TEMP | Low temperature alarm for ambient or return air | Readable |
| 74 | mAL_ALT_TEMP_EXT | High outdoor air temperature alarm | Readable |
| 75 | mAL_BAJ_TEMP_EXT | Low outdoor air temperature alarm | Readable |
| 76 | PERM_MEM_ERROR | Permanent memory failure alarm | Readable |
| 77 | CLOCK_ERROR | Clock failure alarm | Readable |
| 78 | mAL_TEMP_MEZCLA | Mixed air temperature probe alarm | Readable |
| 79 | mAL_TEMP_ECONFORT | Ecomfort signal alarm | Readable |
| 80 | ON_ECONFORT | Signal of active Ecomfort mode | Readable |
| 81 | HAB_PROG_HORARIA | Enable schedule programming | Writeable |
| 82 | OFF_PROG_HOR | Signal ON-OFF by scheduled programming | Readable |
| 83 | HAB_TEMP_RET | Enable the return air probe as a control probe | Writeable |
| 84 | HAB_HUM_RET | Enable the return air humidity probe as an indoor humidity probe | Writeable |
| 85 | HAB_OFF_COMPUERTA_INI_CALOR | Damper closed until the HEATING setpoint temperature is reached | Writeable |
| 86 | HAB_COMPENSACION | Enable compensation of the setpoint based on the outdoor temperature | Writeable |
| 87 | HAB_ONOFF_REMOTO | Enable remote ON/OFF | Writeable |
| 88 | HAB_CALOR_FRIO_REMOTO | Enable digital input for HEATING/COOLING mode | Writeable |
| 89 | HAB_FILTRO1 | Enable the probe filter | Writeable |

| Carel Address | Designation | Description | Read/Write |
|---|---|---|---|
| 90 | RESET_ON_HORAS | Reset the counter for number of hours of operation | Writeable |
| 91 | RESET_ON_CONT | Reset the counter of starts of motors and heaters | Writeable |
| 92 | RESET_DES_CONT | Reset the counter of defrosting operations | Writeable |
| 93 | HAB_TEMP_BINT | Enable indoor coil probe by temperature (remove pressure transducer) | Writeable |
| 94 | HAB_TEMP_BEXT | Enable outdoor coil probe by temperature (remove pressure transducer) | Writeable |
| 95 | HAB_FREECOOLING_INV | Enable the unit to operate in free-cooling in winter | Writeable |
| 96 | HAB_VALVULA_CALOR | Enable hot water coil valve | Writeable |
| 97 | HAB_PRIORIDAD_BAC | Enable priority for HWC before the compressors operate | Writeable |
| 98 | HAB_ECONFORT | Enable Ecomfort operation | Writeable |
| 99 | HAB_DESHUM_HUMEDAD | Enable dehumidification by humidity | Writeable |
| 100 | HAB_DES_TIEMPO | Enabling defrosting by time | Writeable |
| 101 | HAB_DES_MIN | Enable defrosting by minimum temperature or pressure | Writeable |
| 102 | HAB_DES_DIF | Enable defrosting by difference with outdoor temperature | Writeable |
| 103 | HAB_FIN_DES_POR_MIN | End of defrosting by the lowest temp. or pressure (single volume of air) | Writeable |
| 104 | HAB_OFF_VINT_DESESCARCHE | Enable indoor fan stoppage during defrosting | Writeable |
| 105 | HAB_RES_DESESCARCHE | Enable electrical heaters during defrosting | Writeable |
| 106 | HAB_BAC_DESESCARCHE | Enable hot water coil during defrosting | Writeable |
| 107 | HAB_ROT_COMP | Enable rotation of compressors | Writeable |
| 108 | HAB_OFF_COMPRESOR_DES | Enable the compressor to be stopped by the defrosting operation | Writeable |
| 109 | HAB_OFF_COMPRESOR_CAMBIO_F_C | Enable stoppage for the compressor with COOLING / HEATING change | Writeable |
| 110 | HAB_BLOQ_COMP_INV | Enable block compressor setpoint in winter based on the outdoor temp. | Writeable |
| 111 | CONTROL_P_PI | Type of control: proportional or proportional + integral | Writeable |
| 112 | HAB_C_EVAP_VENT_INT | Enable evaporation control in indoor fan | Writeable |
| 113 | HAB_C_COND_VENT_INT | Enable condensation control in indoor fan | Writeable |
| 114 | HAB_C_EVAP_VENT_EXT | Enable evaporation control in outdoor fan | Writeable |
| 115 | HAB_C_COND_VENT_EXT | Enable condensation control in outdoor fan | Writeable |
| 116 | DESHAB_AL_PB_DES | Disable low pressure alarm in defrosting | Writeable |
| 117 | HAB_RELE_ALARMA_POR_MASK | Activation of the relay with the active alarm selected on the display. | Writeable |
| 118 | HAB_COMP_REG_PRES_U_INT | Enable damper for controlling the pressure of the indoor unit | Writeable |
| 119 | CONTROL_P_PI_C_EVAP_VINT | Control type P or P+I for evaporation control indoor unit | Writeable |
| 120 | CONTROL_P_PI_C_COND_VINT | Control type P or P+I for condensation control indoor unit | Writeable |
| 121 | CONTROL_P_PI_C_EVAP_VEXT | Control type P or P+I for evaporation control outdoor unit | Writeable |
| 122 | CONTROL_P_PI_C_COND_VEXT | Control type P or P+I for condensation control outdoor unit | Writeable |
| 123 | HAB_RES_SIN_COMPRESOR | Enable electrical heater only to substitute the compressor | Writeable |
| 124 | OFF_COMPUERTA_AL_INCENDIO | Damper status during the anti-fire alarm | Writeable |
| 125 | FREECOOLING_ON | View of the freecooling in operation | Readable |
| 126 | RESET_TIME_COMPRESOR | Reset of the compressor timers | Writeable |
| 127 | mAL_INCENDIO | Serious anti-fire thermostat alarm | Readable |
| 128 | mAL_ANTIHIELO_REF_C1 | Anti-freeze alarm refrigerant circuit 1 | Readable |
| 129 | mAL_ANTIHIELO_REF_C2 | Anti-freeze alarm refrigerant circuit 2 | Readable |
| 130 | mAL_BQ_ANTIHIELO | Unit blocking due to anti-freeze alarm | Readable |
| 131 | RESET_AL_BQ_ANTIHIELO | Reset of the blocking of the anti-freeze alarm | Writeable |
| 132 | VAR_DIGITAL_AUX_PVPRO_1 | Digital variable reserved for the PVPRO n1 | Writeable |
| 133 | VAR_DIGITAL_AUX_PVPRO_2 | Digital variable reserved for the PVPRO n2 | Writeable |
| 134 | DESESCARCHE_ON | Unit defrosting signal | Readable |
| 135 | VENT_EXTERIOR_1_ALTA | Output from the outdoor air fan for circuit 1 - HIGH SPEED | Readable |
| 136 | VENT_EXTERIOR_2_ALTA | Output from the outdoor air fan for circuit 2 - HIGH SPEED | Readable |
| 137 | COMPRESOR_ON | Compressor status | Readable |
| 138 | RES_ELECTRICA_ON | View of electrical heater operation | Readable |
| 139 | NOT_SYS_ON1 | Unit OFF view | Readable |
| 140 | AUTOSTART | Automatic start after blocking / voltage drop | Writeable |
| 141 | HAB_ON_VEXT_INI_DES | Enabling outdoor fan operation to start the defrosting | Writeable |

## 19.3. Analogue variables

| Carel Address | Designation | Description | Read/Write |
|---|---|---|---|
| 1 | TEMP_REG | Temperature control | Readable |
| 2 | TEMP_EXT | Outdoor temperature | Readable |
| 3 | T_P_BEXT_C1 | Temperature-pressure outdoor coil for circuit 1 | Readable |
| 4 | T_P_BEXT_C2 | Temperature-pressure outdoor coil for circuit 2 | Readable |
| 5 | HUM_INT | Indoor humidity | Readable |
| 6 | HUM_EXT | Outdoor humidity | Readable |
| 7 | TEMP_IMP | Outlet air temperature | Readable |
| 8 | TEMP_MEZCLA | Mixed air temperature | Readable |
| 9 | TEMP_DES_C1 | Discharge temperature for circuit 1 | Readable |
| 10 | TEMP_DES_C2 | Discharge temperature for circuit 2 | Readable |
| 11 | T_P_BINT_C1 | Temperature-pressure indoor coil for circuit 1 | Readable |
| 12 | T_P_BINT_C2 | Temperature-pressure indoor coil for circuit 2 | Readable |
| 13 | TEMP_ECONFORT | Ecomfort temperature | Readable |
| 14 | AOUT_COMPUERTA | Analogue output for the outdoor air damper | Readable |
| 15 | AOUT_COMPRESOR_INV | Analogue output of the inverter compressor | Readable |
| 16 | AOUT_VALVULA_BAC | Analogue output of the hot water coil valve | Readable |
| 17 | AOUT_VEN_INT | Analogue output for the indoor fan | Readable |
| 18 | AOUT_VEN_EXT1 | Analogue output for outdoor fan 1 | Readable |
| 19 | AOUT_VEN_EXT2 | Analogue output for outdoor fan 2 | Readable |
| 20 | SET_POINT | Temperature setpoint | Writeable |
| 21 | SET_POINT_TEMP_HORARIO | Temperature setpoint by schedule | Readable |
| 22 | ENTALPIA_INT | Indoor enthalpy calculated | Readable |
| 23 | ENTALPIA_EXT | Outdoor enthalpy calculated | Readable |
| 24 | VER_SOFTWARE | Software version | Readable |
| 25 | MIN_SET_POINT_TEMP | Minimum temperature setpoint | Writeable |
| 26 | MAX_SET_POINT_TEMP | Maximum temperature setpoint | Writeable |
| 27 | BANDA | Control band | Writeable |
| 28 | ZONA_MUERTA | Control dead zone (auto mode) | Writeable |
| 29 | SET_POINT_TEMP_DESH | Temperature setpoint for dehumidification | Writeable |
| 30 | SET_POINT_HUM | Humidity setpoint | Writeable |
| 31 | MIN_SET_POINT_HUM | Minimum humidity setpoint | Writeable |
| 32 | MAX_SET_POINT_HUM | Maximum humidity setpoint | Writeable |
| 33 | BANDA_HUMEDAD | Humidity control band | Writeable |
| 34 | BANDA_FCOOL | Band operating in free-cooling | Writeable |
| 35 | OFFSET_FCOOL_INV | Displacement of winter free-cooling input with respect to the calculated setpoint | Writeable |
| 36 | VAL_DIF_FCOOL | Difference between the return air temperature and the outdoor air temperature for allowing the operation of free-cooling | Writeable |
| 37 | VAL_DIF_FCOOL_ENT | Difference between the return and outdoor enthalpy for allowing the operation of free-cooling | Writeable |
| 38 | BANDA_RES | Heater control band | Writeable |
| 39 | OFFSET_RES | Displacement of electrical heaters with respect to the setpoint calculated - band | Writeable |
| 40 | BANDA_BAC | Hot water coil control band | Writeable |
| 41 | OFFSET_BAC | Displacement of the hot water coil with respect to the setpoint calculated - band | Writeable |
| 42 | SET_COMP_EXT_FRIO | Set outdoor temperature for compensation in COOLING | Writeable |
| 43 | VAL_DIF_COMP_EXT_FRIO | Outdoor temperature differential for compensation in COOLING | Writeable |
| 44 | MAX_COMP_EXT_FRIO | Maximum compensation in COOLING | Writeable |
| 45 | SET_COMP_EXT_CALOR | Set outdoor temperature for compensation in HEATING | Writeable |
| 46 | VAL_DIF_COMP_EXT_CALOR | Outdoor temperature differential for compensation in HEATING | Writeable |
| 47 | MAX_COMP_EXT_CALOR | Maximum compensation in HEATING | Writeable |
| 48 | TAR_AIN1 | Analogue input delay 1 | Writeable |
| 49 | TAR_AIN2 | Analogue input delay 2 | Writeable |
| 50 | TAR_AIN3 | Analogue input delay 3 | Writeable |
| 51 | TAR_AIN4 | Analogue input delay 4 | Writeable |
| 52 | TAR_AIN5 | Analogue input delay 5 | Writeable |

| Carel Address | Designation | Description | Read/Write |
|---|---|---|---|
| 53 | TAR_AIN6 | Analogue input delay 6 | Writeable |
| 54 | TAR_AIN7 | Analogue input delay 7 | Writeable |
| 55 | TAR_AIN8 | Analogue input delay 8 | Writeable |
| 56 | TAR_AIN9 | Analogue input delay 9 | Writeable |
| 57 | TAR_AIN10 | Analogue input delay 10 | Writeable |
| 58 | TAR_AIN11 | Analogue input delay 11 | Writeable |
| 59 | TAR_AIN12 | Analogue input delay 12 | Writeable |
| 60 | LIM_MIN_HUM | Minimum humidity signal limit for alarm | Writeable |
| 61 | LIM_MAX_HUM | Maximum humidity signal limit for alarm | Writeable |
| 62 | LIM_MIN_PRES | Minimum pressure signal limit for alarm | Writeable |
| 63 | LIM_MAX_PRES | Maximum pressure signal limit for alarm | Writeable |
| 64 | SET_IMPULSION_CALOR_APERT_COMP | Outlet air setpoint in HEATING for opening the damper | Writeable |
| 65 | SET_RETORNO_CALOR_APERT_COMP | Return air setpoint in HEATING for opening the damper | Writeable |
| 66 | BANDA_RETORNO_CALOR_APERT_COMP | Control band of the return air setpoint in HEATING for opening the damper | Writeable |
| 67 | SET_IMPULSION_FRIO_APERT_COMP | Outlet air setpoint in COOLING for opening the damper | Writeable |
| 68 | SET_RETORNO_FRIO_APERT_COMP | Return air setpoint in COOLING for opening the damper | Writeable |
| 69 | BANDA_RETORNO_FRIO_APERT_COMP | Control band of the return air setpoint in COOLING for opening the damper | Writeable |
| 70 | SET_MEZCLA | Mixed air temperature setpoint for calculating the maximum refreshing allowed | Writeable |
| 71 | SET_BAJ_TEMP_EXT_BAC | Outdoor hot water coil low temperature setpoint | Writeable |
| 72 | VAL_DES_MIN | Mandatory value for starting the defrosting by minimum temperature or pressure | Writeable |
| 73 | VAL_DES_DIF | Difference value with outdoor temp. for mandatory start of the defrosting | Writeable |
| 74 | VAL_ON_VEXT_DES_OBL | ON value of the outdoor fan by defrosting by low pressure | Writeable |
| 75 | VAL_OFF_VEXT_DES_OBL | OFF value of the outdoor fan by defrosting by low pressure | Writeable |
| 76 | VAL_INI_DES | Initial value for defrosting operation | Writeable |
| 77 | VAL_FIN_DES | Final value for defrosting operation | Writeable |
| 78 | SET_BLOQ_COMP_VER | Block compressor setpoint in summer with free-cooling with low outdoor temp. | Writeable |
| 79 | VAL_DIF_BLOQ_COMP_VER | Differential between outdoor and return air temps. for blocking compressor in summer by FC | Writeable |
| 80 | SET_BLOQ_COMP_INV | Block compressor setpoint in winter with free-cooling by low outdoor temperature | Writeable |
| 81 | VAL_INI_LIM_TEMP_IMP_FRIO | Initial temperature limit value for outlet air in COOLING mode | Writeable |
| 82 | VAL_DIF_LIM_TEMP_IMP_FRIO | Differential temperature limit value for outlet air in COOLING mode | Writeable |
| 83 | VAL_INI_LIM_TEMP_IMP_CALOR | Initial temperature limit value for outlet air in HEATING mode | Writeable |
| 84 | VAL_DIF_LIM_TEMP_IMP_CALOR | Differential temperature limit value for outlet air in HEATING mode | Writeable |
| 85 | VAL_INI_C_EVAP_VINT | Evaporation control setpoint of the indoor fan | Writeable |
| 86 | VAL_FIN_C_EVAP_VINT | Evaporation control band of the indoor fan | Writeable |
| 87 | VAL_INI_C_COND_VINT | Condensation control setpoint of the indoor fan | Writeable |
| 88 | VAL_FIN_C_COND_VINT | Condensation control band of the indoor fan | Writeable |
| 89 | VAL_INI_C_EVAP_VEXT | Evaporation control setpoint of the outdoor fan | Writeable |
| 90 | VAL_FIN_C_EVAP_VEXT | Evaporation control setpoint of the outdoor fan | Writeable |
| 91 | VAL_INI_C_COND_VEXT | Condensation control setpoint of the outdoor fan | Writeable |
| 92 | VAL_FIN_C_COND_VEXT | Condensation control band of the outdoor fan | Writeable |
| 93 | SET_BAJ_TEMP | Low temperature setpoint for ambient or return air | Writeable |
| 94 | SET_ALT_TEMP | High temperature setpoint for ambient or return air | Writeable |
| 95 | SET_BAJ_TEMP_EXT | Low temperature setpoint for outdoor air | Writeable |
| 96 | SET_ALT_TEMP_EXT | High temperature setpoint for ambient or return air | Writeable |
| 97 | SET_POINT_TEMP_CAL | Setpoint calculated based on the compensation of the outdoor temperature | Readable |
| 98 | TEMP_CAL_BEXT_C1 | Temperature calculated for the outdoor coil for circuit 1 | Readable |
| 99 | TEMP_CAL_BEXT_C2 | Temperature calculated for the outdoor coil for circuit 2 | Readable |
| 100 | TEMP_CAL_BINT_C1 | Temperature calculated for the indoor coil for circuit 1 | Readable |
| 101 | TEMP_CAL_BINT_C2 | Temperature calculated for the indoor coil for circuit 2 | Readable |
| 105 | SET_AL_INCENDIO | Fire alarm setpoint (with return probe) | Writeable |
| 106 | DIF_AL_INCENDIO | Fire alarm differential (return temperature) | Writeable |
| 107 | VAR_ANALOGICA_AUX_PVPRO_1 | Analogue variable reserved for the PVPRO n1 | Writeable |
| 108 | VAR_ANALOGICA_AUX_PVPRO_2 | Digital variable reserved for the PVPRO n2 | Writeable |
| 109 | SET_HAB_RES_TEMP_EXT | Setpoint for enabling the electrical heater due to outdoor temperature | Writeable |
| 110 | DIF_TEMP_RENOVACION_CAL | Temperatures differential for refereshing calculated | Writeable |

## 19.4. Integer variables

| Carel Address | Designation | Description | Read/Write |
|---|---|---|---|
| 1 | MODO_FUNCIONAMIENTO | Select operating mode | Writeable |
| 2 | VEL_VENT_INT | Indoor fan speed | Writeable |
| 3 | TIPO_EQUIPO | Selection of the unit type | Writeable |
| 4 | TIPO_MAQUINA | Selection of the machine type | Writeable |
| 5 | NUM_CIRCUITOS | Number of circuits installed | Writeable |
| 6 | NUM_COMPRESORES | Number of compressors installed | Writeable |
| 7 | NUM_RESISTENCIAS | Number of back-up electrical heaters installed | Writeable |
| 8 | TIPO_VENT_INT | Type of indoor fan | Writeable |
| 9 | TIPO_VENT_EXT | Type of outdoor fan | Writeable |
| 10 | TIPO_FREECOOLING | Type of free-cooling (thermal or enthalpic) | Writeable |
| 11 | CURRENT_MINUTE | Current minute | Readable |
| 12 | CURRENT_HOUR | Current hour | Readable |
| 13 | CURRENT_DAY | Current day | Readable |
| 14 | CURRENT_MONTH | Current month | Readable |
| 15 | CURRENT_YEAR | Current year | Readable |
| 16 | NEW_MINUTE | Minute change | Writeable |
| 17 | NEW_HOUR | Hour change | Writeable |
| 18 | NEW_DAY | Day change | Writeable |
| 19 | NEW_MONTH | Month change | Writeable |
| 20 | NEW_YEAR | Year change | Writeable |
| 21 | N_ARR_V_INT_H | Number of starts of the indoor fan (high level) | Readable |
| 22 | N_ARR_V_INT_L | Number of starts of the indoor fan (low level) | Readable |
| 23 | N_ARR_COMP1_H | Number of starts of compressor 1 from circuit 1 (high level) | Readable |
| 24 | N_ARR_COMP1_L | Number of starts of compressor 1 from circuit 1 (low level) | Readable |
| 25 | N_ARR_COMP2_H | Number of starts of compressor 1 from circuit 2 (or compressor 2 for one circuit units) (high level) | Readable |
| 26 | N_ARR_COMP2_L | Number of starts of compressor 1 from circuit 2 (or compressor 2 for one circuit units) (low level) | Readable |
| 27 | N_ARR_COMP3_H | Number of starts of compressor 2 from circuit 1 (high level) | Readable |
| 28 | N_ARR_COMP3_L | Number of starts of compressor 2 from circuit 1 (low level) | Readable |
| 29 | N_ARR_COMP4_H | Number of starts of compressor 2 from circuit 2 (high level) | Readable |
| 30 | N_ARR_COMP4_L | Number of starts of compressor 2 from circuit 2 (low level) | Readable |
| 31 | N_ARR_RES1_H | Number of starts of heater 1 (high level) | Readable |
| 32 | N_ARR_RES1_L | Number of starts of heater 1 (low level) | Readable |
| 33 | N_ARR_RES2_H | Number of starts of heater 2 (high level) | Readable |
| 34 | N_ARR_RES2_L | Number of starts of heater 2 (low level) | Readable |
| 35 | N_HOR_VINT_H_X | Number of hours of the indoor fan (high level) | Readable |
| 36 | N_HOR_VINT_L_X | Number of hours of the indoor fan (low level) | Readable |
| 37 | N_HOR_COMP1_H_X | Number of hours of compressor 1 from circuit 1 (high level) | Readable |
| 38 | N_HOR_COMP1_L_X | Number of hours of compressor 1 from circuit 1 (low level) | Readable |
| 39 | N_HOR_COMP2_H_X | Number of hours of compressor 1 from circuit 2 (or compressor 2 for one circuit units) (high level) | Readable |
| 40 | N_HOR_COMP2_L_X | Number of hours of compressor 1 from circuit 2 (or compressor 2 for one circuit units) (low level) | Readable |
| 41 | N_HOR_COMP3_H_X | Number of hours of compressor 2 from circuit 1 (high level) | Readable |
| 42 | N_HOR_COMP3_L_X | Number of hours of compressor 2 from circuit 1 (low level) | Readable |
| 43 | N_HOR_COMP4_H_X | Number of hours of compressor 2 from circuit 2 (high level) | Readable |
| 44 | N_HOR_COMP4_L_X | Number of hours of compressor 2 from circuit 2 (low level) | Readable |
| 45 | N_HOR_CAL_ELEC1_H_X | Number of hours of electrical heater 1 (high level) | Readable |
| 46 | N_HOR_CAL_ELEC1_L_X | Number of hours of electrical heater 1 (low level) | Readable |
| 47 | N_HOR_CAL_ELEC2_H_X | Number of hours of electrical heater 2 (high level) | Readable |
| 48 | N_HOR_CAL_ELEC2_L_X | Number of hours of electrical heater 2 (low level) | Readable |
| 49 | N_DES_C1_H | Number of defrosting operations for circuit 1 (high level) | Readable |

| Carel Address | Designation | Description | Read/Write |
|---|---|---|---|
| 50 | N_DES_C1_L | Number of defrosting operations for circuit 1 (low level) | Readable |
| 51 | N_DES_C2_H | Number of defrosting operations for circuit 2 (high level) | Readable |
| 52 | N_DES_C2_L | Number of defrosting operations for circuit 2 (low level) | Readable |
| 53 | N_SEG_ULT_DES_C1 | Number of seconds for final defrosting for circuit 1 | Readable |
| 54 | N_SEG_ULT_DES_C2 | Number of seconds for final defrosting for circuit 2 | Readable |
| 55 | MODO_ON_OFF | Select operating mode | Readable |
| 56 | ESTADO_MAQUINA | Indicates the machine state | Readable |
| 57 | NUM_AL | Number of active alarms. | Readable |
| 58 | INFO_EQUIPO_1 | Information on type of unit, machine and heaters | Readable |
| 59 | INFO_EQUIPO_2 | Information on the number of compressors, circuit, outdoor unit, indoor unit | Readable |
| 60 | NUM_COMP_DESHUM | Number of compressors for dehumidification | Writeable |
| 61 | MIN_RENOVACION_AIRE | Minimum air refreshing desired. | Writeable |
| 62 | SET_RENOVACION_AIRE | Setpoint for air refreshing | Readable |
| 63 | CAL_RENOVACION_AIRE | Calculation of the refreshing based on the return, outdoor and mixed air | Readable |
| 64 | COMPUERTA_APERT_1 | Intermediate value for calculating the opening | Readable |
| 65 | TIME_FILTRO1 | Timing for the probe filter | Writeable |
| 66 | DT_FILTRO1 | Difference for the probe filter | Writeable |
| 67 | TIPO_DIN5 | Type of digital input 5 | Writeable |
| 68 | TIPO_DIN6 | Type of digital input 6 | Writeable |
| 69 | TIPO_REFRIGERANTE | Type of refrigerant | Writeable |
| 70 | TIME_MAX_DUR_DES_MIN | Maximum time duration for defrosting by minimum pressure or temperature (min.) | Writeable |
| 71 | TIME_MAX_DUR_DES_DIF | Maximum time duration for defrosting by difference with outdoor temperature (min.) | Writeable |
| 72 | TIME_RET_INICIO_DES | Time delay for starting defrosting | Writeable |
| 73 | TIME_MIN_DUR_DES | Minimum timing for duration of defrosting (seconds) | Writeable |
| 74 | TIME_MAX_DUR_DES | Maximum timing for duration of defrosting (minutes) | Writeable |
| 75 | NUM_RES_DESESCARCHE | Number of heaters during defrosting | Writeable |
| 76 | VAL_BAC_DESESCARCHE | Value of the hot water coil valve during defrosting | Writeable |
| 77 | TIME_MIN_OFF_COMP | Minimum OFF time for a compressor | Writeable |
| 78 | TIME_MIN_ON_COMP | Minimum ON time for a compressor | Writeable |
| 79 | TIME_MIN_ON_ON_COMP | Minimum time between 2 start-ups of the same compressor | Writeable |
| 80 | TIME_MIN_ON_ON_COMP_DIST | Minimum time between 2 start-ups of different compressors | Writeable |
| 81 | TIME_RET_COMP_TRAS_VINT | Time delay for activation of compressor after activation of indoor fan | Writeable |
| 82 | TIPO_BLOQ_COMP_VER | Compressor block type in summer with free-cooling | Writeable |
| 83 | TIME_INTEGRACION | Integration time for P+I control | Writeable |
| 84 | TIME_OFF_VINT_FRIO | Time for stopping indoor fan in COOLING mode | Writeable |
| 85 | TIME_OFF_VINT_CALOR | Time for stopping indoor fan in HEATING mode | Writeable |
| 86 | TIME_RET_AL_BP | Time delay for low pressure alarm | Writeable |
| 87 | TIME_RET_AL_TERM_VENT_INT | Time delay for alarm for indoor fan thermal | Writeable |
| 88 | TIME_RET_AL_TEMP | Time delay alarm for high and low temperature | Writeable |
| 89 | LANGUAGE | Language: Spanish, French or English | Writeable |
| 90 | TIME_INT_C_EVAP_VINT | Integration time for PI control for evaporation control indoor unit | Writeable |
| 91 | TIME_INT_C_COND_VINT | Integration time for PI control for condensation control indoor unit | Writeable |
| 92 | TIME_INT_C_EVAP_VEXT | Integration time for PI control for evaporation control outdoor unit | Writeable |
| 93 | TIME_INT_C_COND_VEXT | Integration time for PI control for condensation control outdoor unit | Writeable |
| 94 | DESCONEXION_NUM_COMPRESORES | Number of compressor stages to be disconnected | Writeable |
| 95 | DESCONEXION_NUM_RESISTENCIAS | Number of heater stages to be disconnected | Writeable |
| 96 | MAX_APERTURA_COMPUERTA | Maximum opening of the outdoor air damper | Writeable |
| 97 | VAR_ENTERA_AUX_PVPRO_1 | Whole variable reserved for the PVPRO n1 | Writeable |
| 98 | VAR_ENTERA_AUX_PVPRO_2 | Whole variable reserved for the PVPRO n2 | Writeable |
| 99 | TIME_ON_AUTOSTART | Time for automatic start-up after blocking | Writeable |
| 100 | TIME_ON_VEXT_INI_DES | Time for operating of outdoor fan to start the defrosting | Writeable |

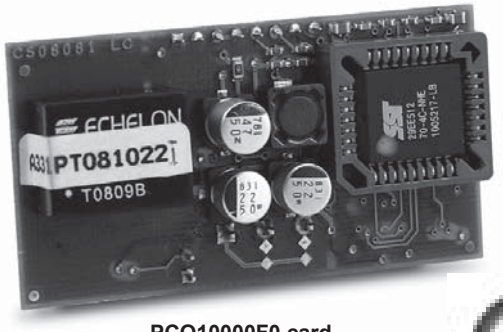
**Note: for Modbus communication it is necessary to add 208 to the Carel address**

## 20. LONWORKS® SUPERVISORY VARIABLES

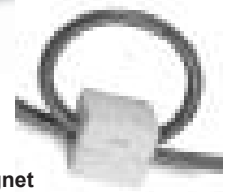
To establish communication with a network with the LonWorks® protocol, each pCO3 board needs a CAREL PCO10000F0 FTT-10A Rev2 (TP/FT-10), FTT-10A 78kbs (TP/FT-10) serial card which is supplied with a magnet to satisfy the required specifications for this component.

The LonWorks® network will be selected from a display on the pGD1 maintenance terminal. This network enables a data transmission rate of 4800 bps.

The supervisory program is stored in flash memory and can be programmed directly from the LonWorks® network by using tools such as LonMaker®. By default, it will be written in the factory with the variables indicated in the following table. It is possible to change these variables, but a maximum of 59 variables can be written.




**PCO10000F0 card**



**magnet**

| Type | microPC index | Description | Name NV | Type NV | Address |
|---|---|---|---|---|---|
| Analogue | 1 | Recirculation air temperature | nvoRoomTemp | 105 | output |
| Analogue | 2 | Outdoor air temperature | nvoOutsideTemp | 105 | output |
| Analogue | 3 | Temperature - pressure outdoor coil for circuit 1 | nvoCoilExtPrTe1 | 105 | output |
| Analogue | 4 | Temperature - pressure outdoor coil for circuit 2 | nvoCoilExtPrTe2 | 105 | output |
| Analogue | 5 | Relative recirculation humidity | nvoRoomHR | 81 | output |
| Analogue | 6 | Outdoor air relative humidity | nvoOutsideHR | 81 | output |
| Analogue | 7 | Outlet temperature | nvoSupTemp | 105 | output |
| Analogue | 8 | Mixing air temperature | nvoMixTemp | 105 | output |
| Analogue | 9 | Discharge temperature of circuit No. 1 | nvoSupCompC1 | 105 | output |
| Analogue | 10 | Discharge temperature of circuit No. 2 | nvoSupCompC2 | 105 | output |
| Analogue | 11 | Temperature - pressure indoor coil for circuit 1 | nvoCoilIntPrTe1 | 105 | output |
| Analogue | 12 | Temperature - pressure indoor coil for circuit 2 | nvoCoilIntPrTe2 | 105 | output |
| Analogue | 14 | Outdoor air damper outlet | nvoFcoolDamp | 105 | output |
| Analogue | 16 | Heat valve outlet | nvoV3VPos | 105 | output |
| Analogue | 18 | Output for outdoor fan 1 | nvoFanExt1 | 105 | output |
| Analogue | 19 | Output for outdoor fan 2 | nvoFanExt2 | 105 | output |
| Analogue | 20 | Temperature setpoint | nviSetTemp | 105 | input |
| Analogue | 20 | Temperature setpoint | nvoSetTemp | 105 | output |
| Analogue | 30 | Relative humidity setpoint | nviSetRH | 81 | input |
| Analogue | 30 | Relative humidity setpoint | nviSetRH | 81 | output |
| Integer | 1 | Operating mode | nviHeatCool | 8 | input |
| Integer | 1 | Operating mode | nvoHeatCool | 8 | output |
| Integer | 36 | Indoor fan operating hours | nvoHourSupFan | 8 | output |
| Integer | 38 | Operating hours of compressor No. 1 | nvoHourComp1 | 8 | output |
| Integer | 40 | Operating hours of compressor No. 2 | nvoHourComp2 | 8 | output |
| Integer | 42 | Operating hours of compressor No. 3 | nvoHourComp1 | 8 | output |
| Integer | 44 | Operating hours of compressor No. 4 | nvoHourComp2 | 8 | output |

# Electronic control

| Type | microPC index | Description | Name NV | Type NV | Address |
|---|---|---|---|---|---|
| Digital | 33 | Unit off / on | nviOnOff | 95 | input |
| Digital | 34 | Machine state view (off/on) | nvoOnOff | 95 | output |
| Digital | 18 | View of machine status in cooling mode | nvoCool | 95 | output |
| Digital | 19 | View of machine status in heating mode | nvoHeat | 95 | output |
| Digital | 22 | Main fan | nvoOnSupFan | 95 | output |
| Digital | 23 | Compressor contact 1 | nvoOnComp1 | 95 | output |
| Digital | 24 | Compressor contact 2 | nvoOnComp2 | 95 | output |
| Digital | 25 | Compressor contact 3 | nvoOnComp3 | 95 | output |
| Digital | 26 | Compressor contact 4 | nvoOnComp4 | 95 | output |
| Digital | 27 | Cycle reversing valve 1 | nvoOnV4v1 | 95 | output |
| Digital | 28 | Cycle reversing valve 2 | nvoOnV4v2 | 95 | output |
| Digital | 29 | Outdoor fan 1 | nvoOnFanExt1 | 95 | output |
| Digital | 30 | Outdoor fan 2 | nvoOnFanExt2 | 95 | output |
| Digital | 31 | Heater contact 1 | nvoOnRes1 | 95 | output |
| Digital | 32 | Heater contact 2 | nvoOnRes2 | 95 | output |
| Digital | 38 | General alarm | nvoAlrGen | 95 | output |
| Digital | 41 | Indoor thermal fan | nvoAlrTermFan | 95 | output |
| Digital | 42 | High pressure 1 | nvoAlrHPC1 | 95 | output |
| Digital | 43 | High pressure 2 | nvoAlrHPC2 | 95 | output |
| Digital | 44 | Low pressure 1 | nvoAlrLPC1 | 95 | output |
| Digital | 45 | Low pressure 2 | nvoAlrLPC2 | 95 | output |
| Digital | 48 | Thermal 1 | nvoAlrTermC1 | 95 | output |
| Digital | 49 | Thermal 2 | nvoAlrTermC2 | 95 | output |
| Digital | 50 | Thermal heater | nvoAlrTermRes | 95 | output |
| Digital | 71 | Clogged filter | nvoAlrDirtFilt | 95 | output |
| Digital | 72 | Overly high return air temperature | nvoAlrRoomHT | 95 | output |
| Digital | 73 | Overly low return air temperature | nvoAlrRoomLT | 95 | output |
| Digital | 76 | Damaged EPROM | novAlrEprom | 95 | output |
| Digital | 81 | Enable schedule phase | nviHabProg | 95 | input |
| Digital | 81 | Enable schedule phase | nvoHabProg | 95 | output |
| Digital | 130 | Anti-freeze water-air unit | nvoAlrIce | 95 | output |
| Digital | 134 | Defrosting | nvoAlrDes | 95 | output |

## 21. TECHNICAL AND ELECTRICAL CHARACTERISTICS

| *microPC board* | |
|---|---|
| **ELECTRICAL FEATURES** | |
| Power supply (controller with terminal connected) | 230 Vac +10/-15% (by default)<br>24 Vac +10/-15% 50/60 Hz and 28 to 36 Vdc +10/-20% (optional) |
| Maximum current with the connected terminal | 25 VA (Vac) |
| Terminal strip | with removable male/female connectors (250 Vac max.)<br>connectors set with screws |
| Isolation between the power supply line and the control | double |
| Data memory | 13 kB at 8 bits (max. limit: 400,000 writes per memory location) |
| Working cycle with applications of average complexity | 0.2 s |
| ***Analogue inputs*** | |
| Analogue conversion | A/D converter to 10-bit integrated in CPU |
| Maximum number | 7 in SMALL boards and 12 in MEDIUM boards |
| Input type: B1, B2, B3, B4, B8 and B9 | low temperature NTC: 10kΩ ± 0.1% to 25°C; -50/90°C<br>high temperature NTC: 50kΩ to 25°C; 0/150°C<br>input: 0/1 Vdc |
| Input type: B5 and B10 | low temperature NTC: 10kΩ to 25°C; -50/90°C<br>high temperature NTC: 50kΩ to 25°C; 0/150°C<br>input: 0/1 Vdc and 4/20 mA |
| Input type: B6, B7, B11 and B12 | low temperature NTC: 10kΩ to 25°C; -50/90°C<br>high temperature NTC: 50kΩ to 25°C; 0/150°C<br>input: 0/1 Vdc<br>radiometric pressure probe |
| Time constant for each input | 0.5 s |
| Input precision | ± 0.3% of the complete scale |
| Classification of the average circuits (IEC EN 61010-1) | Category I |
| ***Digital inputs*** | |
| No. of inputs on SMALL boards | 7 |
| No. of inputs on MEDIUM boards | 10 |
| ***Analogue outputs*** | |
| Maximum number | 3 in SMALL boards and 4 in MEDIUM boards |
| Type | 0 to 10Vdc |
| Precision | ± 3% of the complete scale or ± 5% of the complete scale (maximum load 5mA) |
| Resolution | 8-bit |
| Maximum charge | 2 kΩ (5 mA) |
| ***Digital outputs*** | |
| Composition of groups | SMALL board: Group 1 (1 to 6); Group 2 (7) |
| | MEDIUM board: Group 1 (1 to 6); Group 2 (7); Group 3 (8 to 12) |
| Electrical contacts | SMALL board (relays 1 to 7):<br>EN60730-1: NO 1(1)A 250Vac cos $\varphi$ =0.4; 100,000 $\chi\psi\chi\lambda\varepsilon\sigma$<br>UL-873: NO 1 A resistive 24 Vac, 30 Vdc; 100,000 cycles<br>Test capacity: 24Vac; pulse 15A; continuous 1A 30,000 cycles |
| | MEDIUM board (relays 1 to 12):<br>EN60730-1: NO 1(1)A 250Vac cos $\varphi$ =0.4; 100,000 $\chi\psi\chi\lambda\varepsilon\sigma$<br>UL-873: NO 1 A resistive 24 Vac, 30 Vdc; 100,000 cycles<br>Test capacity: 24Vac; pulse 15A; continuous 1A 30,000 cycles |
| | Note: relays of the same group with basic isolation must have the same power supply (24 Vdc or 230 Vac).<br>Relays of the same group have basic isolation among themselves. The isolation between the various groups is double. |

# Electronic control

| *microPC board* | |
|---|---|
| **TECHNICAL CHARACTERISTICS** | |
| Storage conditions | -20T70 ºC; %RH 90 non-condensation |
| Operating conditions | -10T60 ºC; %RH 90 non-condensation |
| Protection index | IP00 |
| Environmental pollution | normal |
| Classification according to protection against electric shocks | To be incorporated in class I and/or II appliances |
| PTI of the insulating materials | 250V |
| Period of electric stress across the insulating parts | Long |
| Type of relay action | 1C |
| Type of disconnection or microswitching | Micro-switch for all of the relay outlets |
| Category of resistance to heat and fire | Category D (UL94 - V0) |
| Immunity from voltage surge | Category 1 |
| Ageing specifications (operating hours) | 80.000 |
| Number of automatic operating cycles | 100,000 (EN 60730-1); 30,000 (UL 873) |
| Software class and structure | Class A |
| Category of protection against discharges (IEC EN 61000-4-5) | Category III |
| Dimensions: Length x Height x Depth | SMALL board: 175 x 113 x 55 mm (10 DIN modules)<br>MEDIUM board: 228 x 113 x 55 mm (13 DIN modules) |

| *pGD1 Terminal* | |
|---|---|
| **TECHNICAL CHARACTERISTICS OF THE DISPLAY** | |
| Type | FSTN graphic |
| Back-lighting | Blue LED (controlled using software) |
| Resolution | 132 x 64 pixel |
| **TECHNICAL CHARACTERISTICS OF THE POWER SUPPLY** | |
| Voltage | Power supply through the telephone cable or external source 18/30 Vdc protected by an external 250 mAT fuse |
| Maximum power input | 1.2 W |
| **CONNECTION WITH THE microPC BOARD** | |
| Type | asynchronous half duplex, 2 dedicated wires |
| Connector for the terminal | 6-way telephone plug |
| Driver | CMR 7 V (type RS485) balanced differential |
| **GENERAL FEATURES** | |
| Protection index | IP65 for assembly in panel |
| | IP40 for wall assembly |
| UL | type 1 |
| Operating conditions | -20T60 ºC, 90% RH non-condensing |
| Storage conditions | -20T70 ºC, 90% RH non-condensing |
| Software class and structure | A |
| Classification according to protection against electric shocks | To be incorporated in class I or II appliances |
| PTI of the insulating material | 250V |
| Dimensions: Length x Height x Depth | 156 x 82 x 31 mm |

| *TCO Terminal* | |
|---|---|
| **TECHNICAL CHARACTERISTICS OF THE POWER SUPPLY** | |
| Voltage | Power supply 230Vac(+10/-15) 50/60Hz |
| Maximum power | 1 VA |
| **CONNECTION WITH THE microPC BOARD** | |
| Type | AGW20 or AGW22 with 1 braided pair + drainwire + shielding |
| **GENERAL FEATURES** | |
| Protection index | IP20 |
| Operating conditions | -10T60 ºC, 10 to 90% RH non-condensing |
| Storage conditions | -20T70 ºC, 10 to 90% RH non-condensing |
| Software class and structure | A |
| Environmental pollution | 2 |
| Category of resistance to heat and fire | Category D |
| Immunity from voltage surge | Category 2 |
| Classification according to protection against electric shocks | To be incorporated in class I and/or II appliances |
| Electric safety | IEC EN 60730-1, IEC EN 60730-2-9 |
| Electromagnetic compatibility | IEC EN 61000-6-1, IEC 61000-6-3, IEC EN 61000-6-2, IEC EN 61000-6-4 |
| PTI of the insulating material | 275 V |
| Precision of the temperature measurement | 0T40 ºC ± 1% |
| Dimensions: Length x Height x Depth | Model to fit: 86 x 86 x 51 mm<br>Surface model: 86 x 142 x 23 mm or 142 x 86 x 23 mm |