Carrier

United Technologies

CONTROL MANUAL

Electronic control

30PA/PH/PAC/PHC

Original document

30PA/PH control

Contents

1. General description

Electronic module by microprocessor designed for controlling and supervising of air-cooled scroll chillers and heat pumps of 1 cooling circuit with 1 or 2 compressors.

This control is basically comprised of a µPC SMALL control board, a pGD1 graphic terminal, a TCO user terminal (optional) and sensors.

The **30PA/PH control** allows the connection to a centralised technical management system by using a specific BMS card for some of the following communication protocols: Carel, Modbus, LonWorks®, BACnet™ MSTP, Konnex, Modbus TCP/IP, BACnet™ Ethernet, TCP/IP, SNMP V1-2-3, FTP and HTTP.

Main functions:

- Control in COOLING / HEATING modes.
- Selecction of inlet water temperature setpoints for COOLING / HEATING modes.
- Permanent control and optimization of the operating parameters.
- Safety management.
- Timing of the compressors.
- Defrosting management (heat pumps).
- Control of condensation and evaporation pressures.
- Control of the water outlet temperature.
- Control of the circulation pump.
- Compensation of the setpoint based on the outdoor temperature.
- Timer and weekly programming.
- Failure diagnosis and main alarm.

Optional functions:

- Control of an electrical tank heater (connected by the installer).
- Control of outdoor electronic plug-fan.
- Connection to a centralised technical management system (BMS).

1.1. µPC SAMLL 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 pGD1 terminal.
- Connection to a TCO user terminal (optional).
- RS485 serial supervisory through an optional card.
- Plastic base for installation on a DIN rack.

1.2. pGD1 terminal

This graphic terminal, installed on the electric panel of the machine, allows:

- The initial programming of the unit and modification of operating parameters.
- Unit ON / OFF.
- Selection of the operating mode and setting of setpoints.
- On-screen display of controlled variables and sensor values measured.
- On-screen display of active alarms and historical record of alarms.

1.3. TCO user terminal (optional)

The TCO user terminal, for remote control, allows:

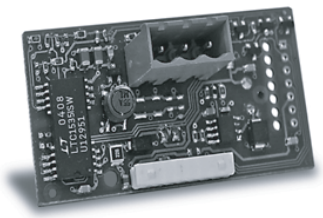
- Modification of some operating parameters.
- Unit ON / OFF.
- Selection of the operating mode and setting of setpoints.
- On-screen display some controlled variables and probe values.
- On-screen display of alarms codes.

1.4. Comunications

This control allows the connection to a centralised technical management system by using a specific BMS card for some of the following communication protocols:

Carel y Modbus

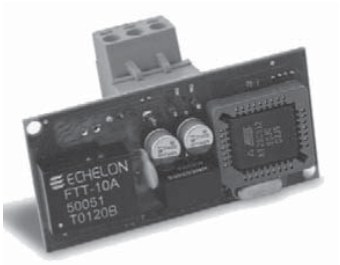
One RS485 serial card is connected for the supervisory network with both Carel and Modbus protocol.



LonWorks®

To establish communication with a network with the LonWorks® protocol, is needed a FTT RS485 serial card.

The supervisory program is stored in flash memory and can be programmed directly from the LonWorks® network by using tools such as LonMaker®.

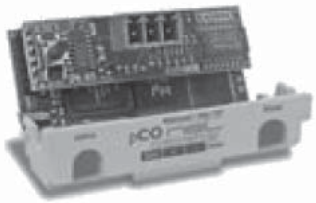


BACnet™

To establish communication with a network with the BACnet™ MSTP protocol is needed a BACnet™ RS485 serial card.

This open standard, developed by ASHRAE, enables air conditioning and heating systems for homes and buildings to be connected for the sole purpose of performing intelligent energy management.

Configuration by the integrator.

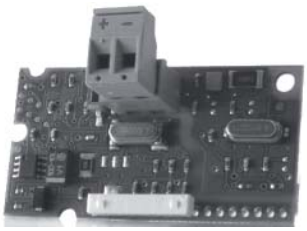


Konnex (KNX)

A network with the Konnex protocol needs a Konnex serial card.

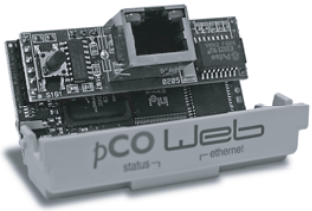
This open standard enables the connection and integration of devices in building automation applications both at the commercial and at the residential level.

Configuration by the integrator.



Ethernet pCO Web

The Ethernet pCO Web card allows the network communication with the protocols Modbus TCP/IP, BACnet™ Ethernet, TCP/IP, SNMP V1-2-3, FTP y HTTP.



BACnet™ Ethernet: *Configuration by the integrator.*

1.5. Supervision solutions

pCO Web

It is the solution for the management and supervision of a single unit if it incorporates the Ethernet pCO Web card.

PlantWatchPRO3

It is a solution designed for the monitoring of installations of medium - small dimensions, with ability to manage up to 30 units. Suitable for technical environments, it has no parts in movement. It's available in two versions: panel and wall.

Includes: 7 " touch display, buzzer for notifications, 1 USB port and 1 SD card slot for downloading reports, charge devices models and applying service packs.

In this case, each unit needs one RS485 Carel / Modbus board.

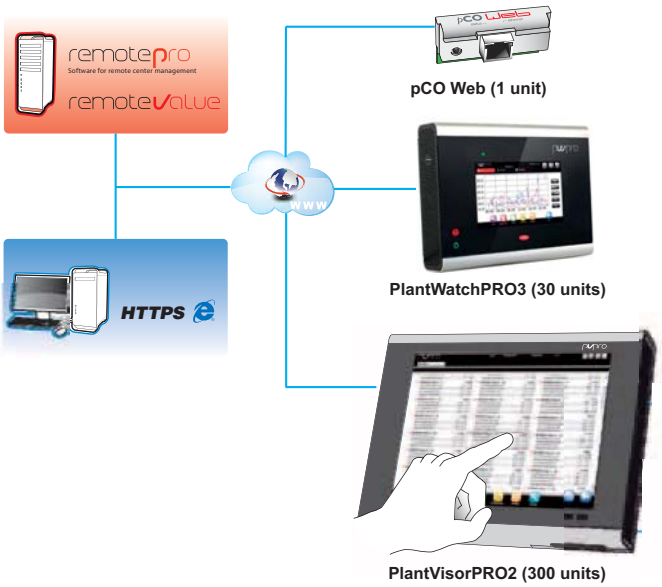
PlantVisorPRO2

This is the solution for the management and supervision of air-conditioning installations with up to 300 units. It performs advanced monitoring and maintenance functions and enables creating areas and groups which simplify the management of the installation.

PlantVisorPRO2 is available in two versions:

- **Box:** comprised of the CPU unit and, optionally, monitor and keyboard.
- **Touch:** this includes the CPU and the touchscreen in the one device.

In this case, each unit needs one RS485 Carel / Modbus board.



These systems allow the installation in remote management. Through a single connection to the Internet is accessed the information system. The Web interface, which is available for the local user, allows the monitoring and the complete configuration of the installation: from the office or any other user's current location.

For remote control of multiple sites, there are dedicated tools for centralized management as RemotePRO and RemoteValue.

2. INTERFACES WITH THE USER

2.1. pGD1 terminal (standard)

Keys and combinations (quick guide)

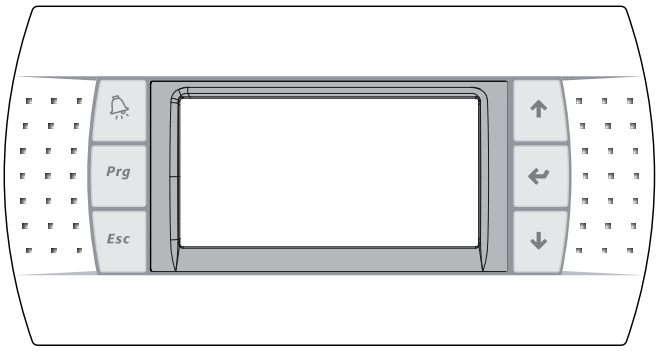
Key		Function
	Alarm	There is/are active alarm(s) if the key is illuminated red. By pressing the key once, the description of the first alarm will be shown. By using the up/down keys, the other alarms stored in the memory can be consulted. By pressing this key for a second time, the alarm(s) will be reset. If no alarm is active, the message “No alarm active" appears.
Prg	**Prg**	This allows the MAIN MENU display to be accessed to select the operating mode, setpoints, off/on, inputs/outputs and schedule programming (no password required). The key will light up in orange.
Esc	**Esc**	To exit any display, pressing this key returns the user to the start display of the previous menu. From the main display, if keeping this key pressed for a few seconds, access is given to a group of help displays with information on the key or key combination that enable performing the most important control functions.
↑ ↓	**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 at the same time, direct access is gained to the group of input/output displays (belonging to the MAIN MENU).
↵	**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	**Prg + Esc**	By pressing both keys simultaneously for a few seconds on the main display of the MAIN MENU, access is given to the TECHNICAL MENU for the parametrisation and maintenance displays of the unit, to which only the fitter and/or engineer should have access (password required).
Prg ↵	**Prg + Enter**	The unit is switched off/on by pressing both these keys at the same time for a few seconds. This action is equivalent to off/on from the main menu display.
Prg ↑	**Prg + Up**	HEATING mode (winter) is selected by pressing both these keys at the same time for a few seconds.
Prg ↓	**Prg + Down**	COOLING mode (summer) is selected by pressing both these keys at the same time for a few seconds
Prg	**Alarm + Prg**	The display contrast (LCD with a resolution of 133 x 64 pixels) can be set by pressing these keys at the same time + up or down.
↓	**Alarm + Down**	The lenguage of the displays is selected by pressing both these keys at the same time for a few seconds
↵	**Alarm + Enter**	By pressing both keys simultaneously it is possible to access to information about the firmware and software of the board.

Configuration

To ensure communication between the pGD1 terminal and the µPC SMALL 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:

1) Simultaneously press the ↑ + ↓ + ↵ keys.

2) On the display accessed, set address 16 in `“Display address setting”`.



Display

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

When the pGD1 terminal is connected, access is given to a general information display for the unit, which indicates: current inlet water temperature, outdoor air temperature, 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.

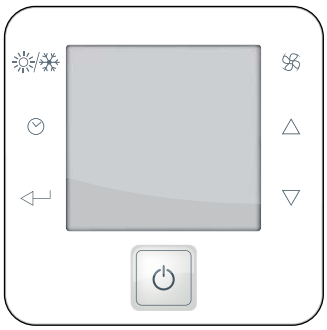
From the main terminal display (*MANDO_1*), by pressing the Prg key, the Main Menu is accessed (no password required). This menu allows to view the setpoints, inputs/outputs and schedule programming.

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.

2.2. TCO user terminal (optional)

With this terminal, the user can select the operating mode, the scheduled programming and the temperature setpoints.

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

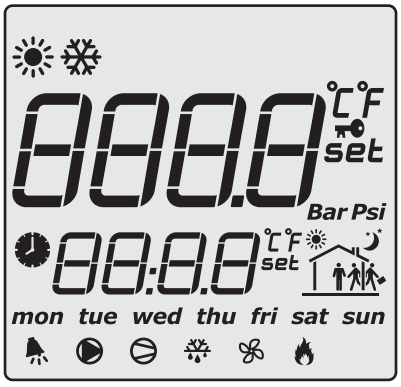


Keys and combinations (quick guide)

Key		*Function*
	Mode of operation	Allows the operating mode to be selected: HEATING / COOLING (if parameter U035=0)
	Fan	Unused
	Programme schedule	Short press: allows the programme schedule to activate. 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. It also allows the set of values to be seen on the display (temperature, temperature setpoint from active mode (COOLING or HEATING, outdoor temperature, outdoor coil pressure, outlet water temperature, anti-freeze refrigerant 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.

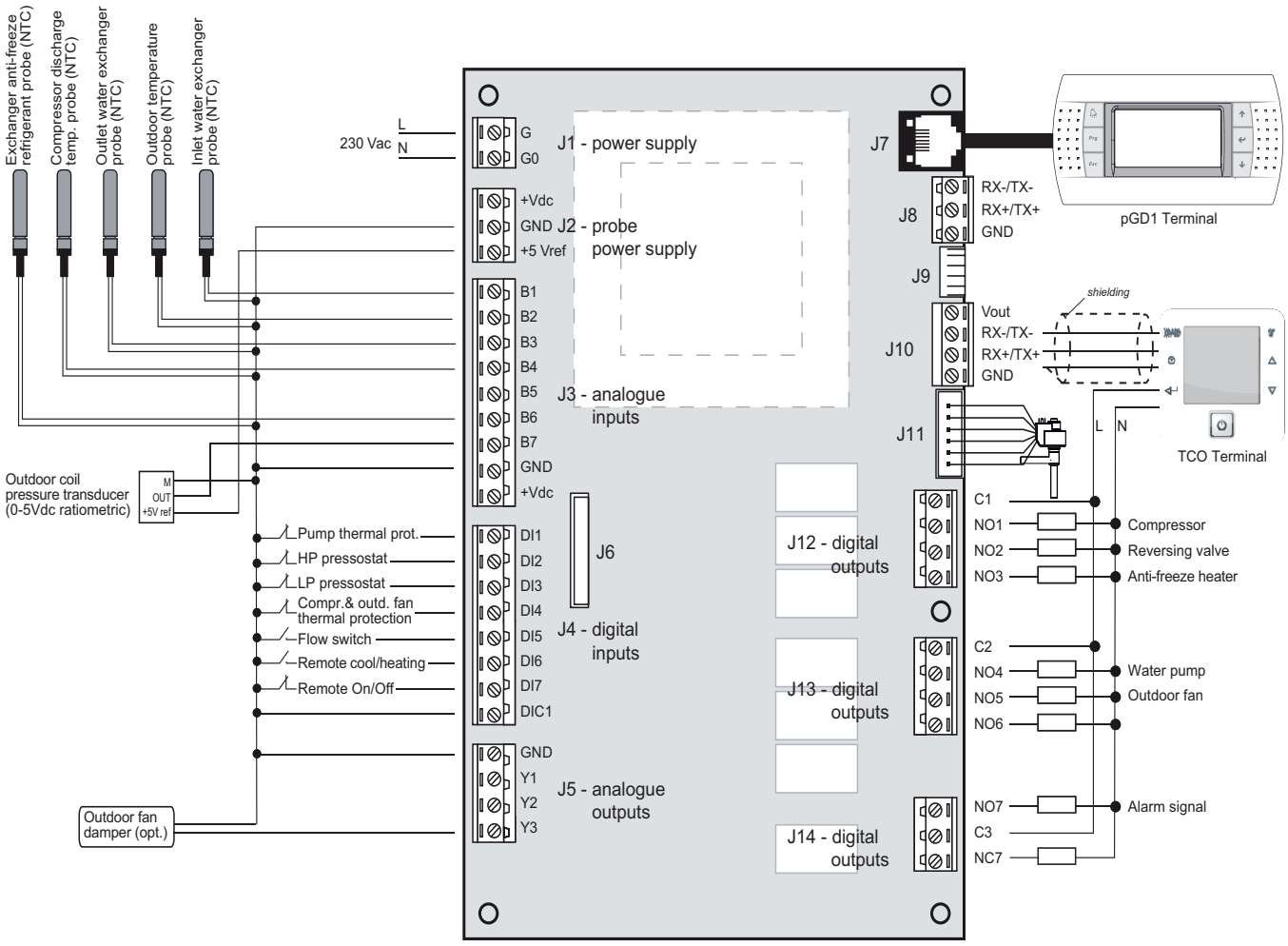
Display

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)
	Main indicator of: - Temperature (ºC or ºF) - Activated block key (key) - Setpoint (set) - Pressure (bar)
	Secondary indicator of: - Temperature (ºC or ºF) - Setpoint (set) - Hour and minute
	Alarm indicator
	Pump in operation
	Compressor in operation
	Defrosting indicator
	Outdoor fan in operation
	Electrical tank heater in operation
	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)

3. WIRING OF THE CONTROL BOARD



Analogue inputs (B1 to B7)

B1: Inlet water exchanger probe (J3)

B2: Outdoor temperature probe (J3)

B3: Oulet water exchanger probe (J3)

B4: Compressor discharge temperature probe (J3)

B5: Unused

B6: Exchanger anti-freeze refrigerant probe (J3)

B7: Outdoor coil pressure transducer (J3)

Analogues outputs (Y1 to Y3)

Y1: Unused

Y2: Unused

Y3: Proportional control for centrifugal fan damper or outdoor plug-fan (both optionals) (J5)

Digital inputs (DI1 to DI7)

DI1: Pump thermal protection (J4)

DI2: High pressure pressostat (J4)

DI3: Low pressure pressostat (J4)

DI4: Thermal protection for compressor and outdoor fan (J4)

DI5: Flow controller (J4)

DI6: Remote COOLING / HEATING (J4) *(parameter U035=1)*

DI7: Remote OFF / ON (J4)

Digital outputs (NO1 to NO7)

NO1: Compressor (J12)

NO2: Reversible valve (J12)

NO3: Electrical tank heater (to be connected by the installer) (J12)

NO4: Water pump (J13)

NO5: Outdoor fan (J13)

NO6: Unused

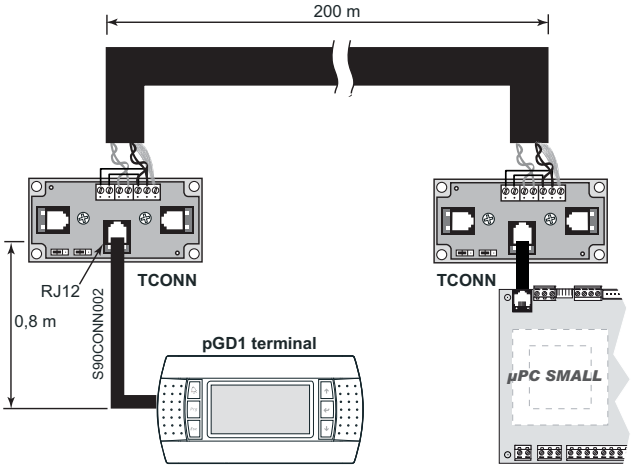
NO7-NC7: Alarm signal (J14)

3.1. Wiring of terminals

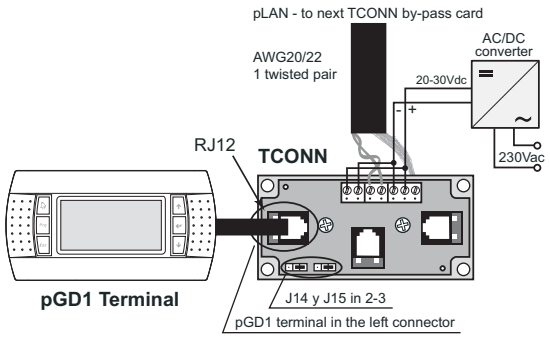
pPD1 terminal (standard)

This terminal is installed, by default, on the machine, but it can be used for remote control.

- Up to 50 metres, it can be connected directly with standard telephone cable 6-wires (RJ12 connector).
- From 50 to 200 metres, it is necessary to use the TCONN bypass cards and AWG 20/22 shielded cable with 2 twisted pairs.



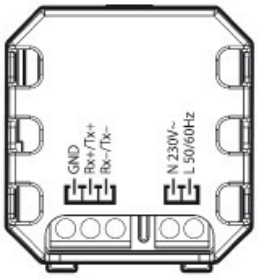
- From 200 to 500 metres, it is necessary to use the TCONN bypass cards, AWG 20/22 shielded cable with 1 twisted pair and external 20...30Vdc (150 mA) power supply.



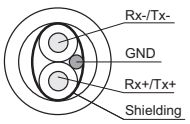
TCO terminal (optional)

Terminal for remote control that can be installed at a maximum distance of 100 metres from the control board.

- Power supply (the same as the control board) at 230Vac 50/60Hz (L and N): 2 wires (section 0.5 at 1.5 mm²).
- 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).

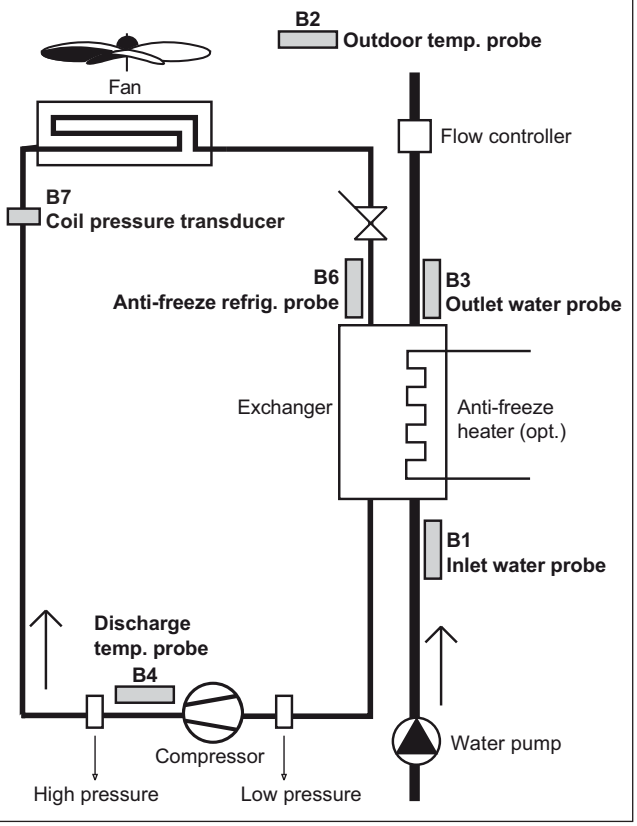


Cable of Belden 7703NH type

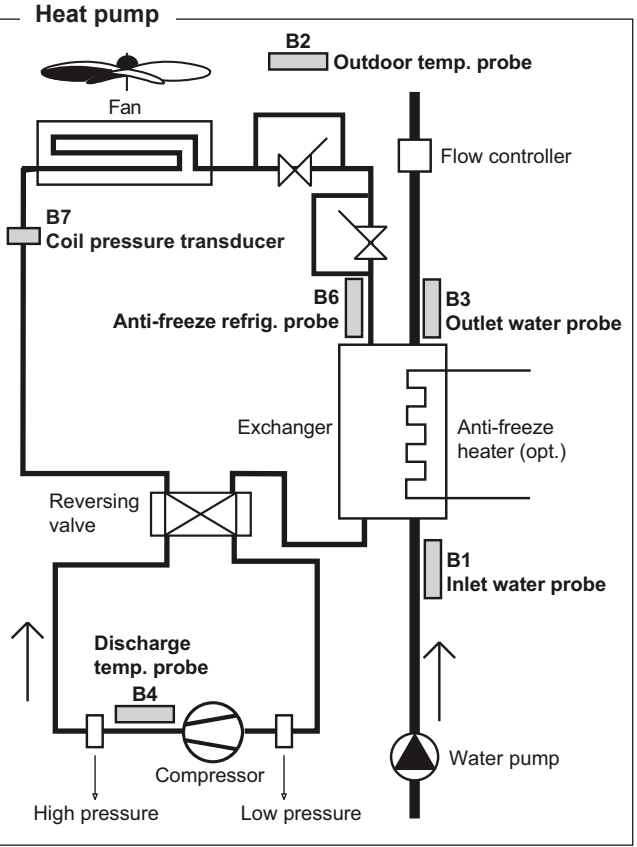


3.2. Position of sensors on the machine

Chiller



Heat pump



4. Stopping/starting the unit

There are different procedures for stopping/starting:

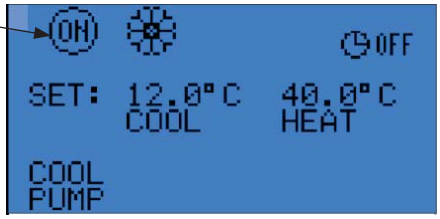
- **By terminal:**

  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 **pGD1 terminal** from the *MANDO_2* display for information on the unit state.

Current state of the unit



MANDO_2

  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.

  - on the **TCO terminal** by pressing the key ⏻.

  When the unit is OFF, the display will only show the date, time and the OFF symbol.

Note: 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.

5. 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:

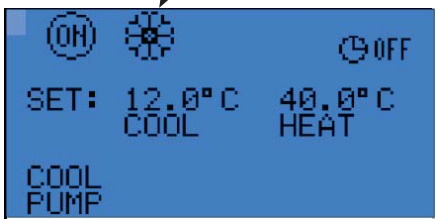
  - on the **pGD1 terminal** from the *MANDO_2* display.

Current operating mode

Available modes:

HEATING

COOLING



MANDO_2

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

  - on the **TCO terminal** by pressing the key ☀/❄.

  With each press, the icon corresponding to the operating mode selected will be lit up.

  The available modes are: HEATING ☀ and COOLING ❄.

- **Remote mode:**

  The selection of the operating mode is performed via a switch connected to digital input DI6 of connector J4, if parameter U035=1:

  - open contact: HEATING mode
  - closed contact: COOLING mode

6. Selection of the setpoints

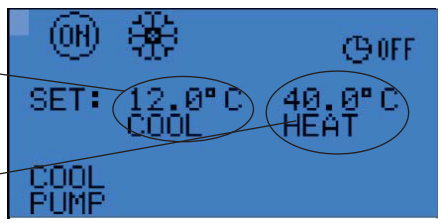
The program lets have two setpoints: one for operation in COOLING mode (summer) and another for operation in HEATING mode (winter).

The selection of the inlet water temperature setpoints can be carried out:

- on the **pGD1 terminal** from the *MANDO_2* display.

COOLING setpoint

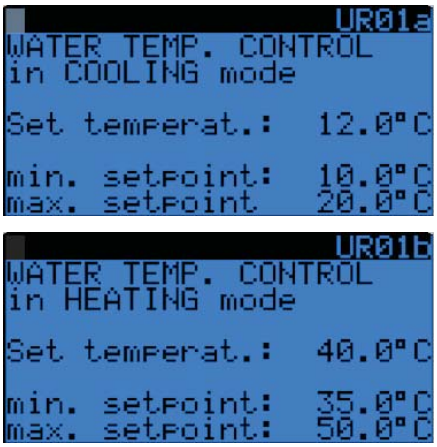
HEATING setpoint



MANDO_2

With the cursor placed next to the SET symbol, the setpoint values for COOLING and HEATING modes can be changed, using the ↑ ↓ keys.

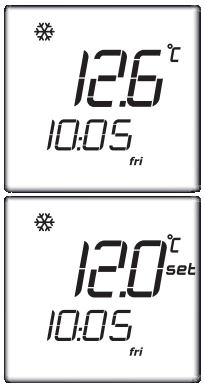
The setpoint values can be changed within these limits:



- on the **TCO terminal**, when the unit is ON, the current inlet water temperature 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 from active mode (COOLING or HEATING) will appear next to the text **set**.



7. Temperature control

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 (by default).

8. Operating modes

8.1. COOLING 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 inlet water temperature probe with the value set for the setpoint and with the value of the control band.

When the time set for the anti-short-cycle has gone (180 seconds) the outdoor fan will start-up and after 10 seconds, the compressor will be the one that starts. This anti-short-cycle time is counted from the compressor stop or when the unit is under voltage.

When the COOLING demand concludes, the control will stop the compressor, while the circulation pump and the outdoor fan will continue in operation for 60 seconds after the unit stop.

8.2. HEATING mode

If there is demand of HEATING mode operation the control will change the reversible valve and when the anti-short-cycle time has gone, the outdoor fan will start-up and after 10 seconds, the compressor will be the one that starts.

If there is an electrical tank heater (connected by the installer), it will be activated if these two conditions are met: the outdoor temperature is lower than 20ºC and the inlet water temperature is 5ºC lower than the setpoint (offset).

When the HEATING demand concludes, the control will stop the compressor, while the circulation pump and the outdoor fan will continue in operation for 60 seconds after the unit stop.

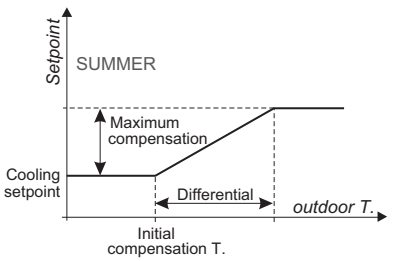
9. Outdoor temp. compensation

This function allows the setpoint temperature to vary in accordance with the temperature measured by the outdoor air probe. 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.

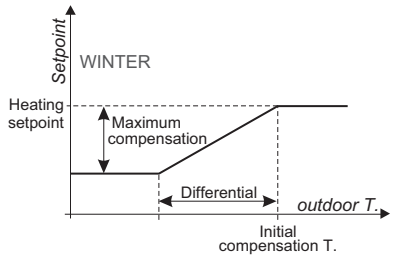
COOLING mode

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



HEATING mode

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



10. Component management

10.1. Four-way valve

Heat pump units have a four-way valve 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. Compressor

All compressors shall observe the following timings:

- **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 compressor to limit the simultaneous start-up.

- **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 anti-short-cycle time (t_3=180s)**

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

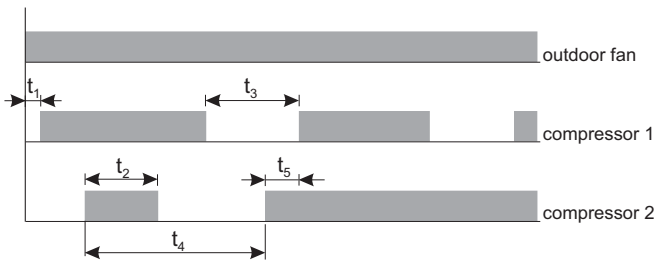
- **Time between start-ups of the same compressor (t_4=300s)**

  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.

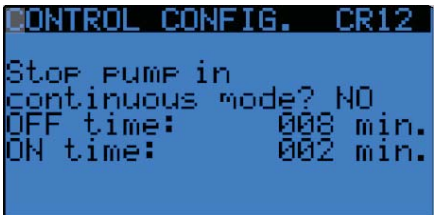
Note: on a pGD1 display it is possible to see the remaining time until completing t_3 and t_4. These times can also be cancelled for maintenance operations.



10.3. Circulation pump

During unit operation the pump will be always working and will be stopped 60 seconds after the unit stop.

When the unit is started but there isn't demand of working, if the CONTINUOS operation of the pump has been selected, this pump could work in a 2-minute interval and stop during 8 minutes (CR12 display).



10.4. Outdoor circuit fan

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 (35.0 bar) and will disconnect if the pressure drops below the OFF value (33.0 bar).

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

The control allows different types of fan to be managed:

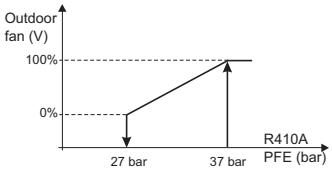
- 1-speed axial fan.
- 2-speed axial fan. Start-up must always be done at maximum speed, and after 120 sec. (modifiable by parameter), it can be changed to the minimum speed based on the pressure measured by the transducer. This change will be timed as 1 sec. (modifiable by parameter).
- Electronic axial fan. In this case, the maximum speed of the outdoor fan can be controlled, via parameters, in COOLING mode (to prevent water droplets) 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	Condensation	Evaporation
Start pressure (R410A)	34.0 bar	8.0 bar
End pressure (R410A)	27.0 bar	10.0 bar

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

Condensation control of the outdoor fan (COOLING mode)

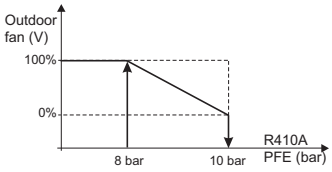
- *Standard outdoor fan (1 speed):*
  * VEXT=OFF, PFE < 19.0 bar
  * VEXT=ON, PFE > 27.0 bar
  * Timing for start, 120 seconds
- *Electronic outdoor fan or centrifugal with damper:*
  * Initial ramp parameter, PFE = 27.0 bar
  * Final ramp parameter, PFE = 37.0 bar



  * Timing for start to maximum speed, 30 seconds.

Evaporation control of the outdoor fan (HEATING mode)

- *Standard outdoor fan (1 speed):*
  * VEXT=OFF, PFE > 12.0 bar
  * VEXT=ON, PFE < 10.0 bar
  * Timing for start, 120 seconds
- *Electronic outdoor fan or centrifugal with damper:*
  * Initial ramp parameter, PFE = 10 bar
  * Final ramp parameter, PFE = 8 bar



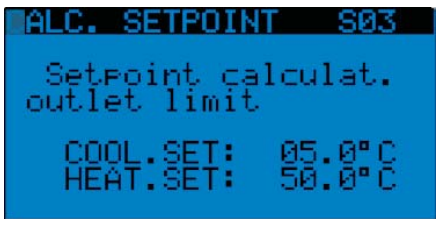
  * Timing for start to maximum speed, 30 seconds.

11. Outlet water temp. control

The control of the outlet water temperature prevents the operation outside the limit. 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 water temperature drops below 5ºC, the compressor(s) will disconnect to avoid an excessively low outlet water temperature.

If, during the operation of the unit in HEATING mode, the outlet water temperature rises above 50ºC, the compressor(s) will disconnect, until arriving at 45°C. An excessively high outlet water temperature is thereby avoided.

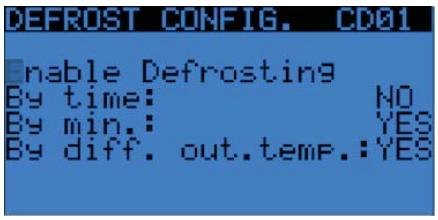


12. Defrosting function

In HEATING mode, the defrosting of the outdoor coil is performed by cycle inversion in order to remove any ice which has accumulated on it.

12.1. Types of defrosting

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



Note: this display and all those relating to the defrosting are incluides in a group “Defrosting config” within the “Manufacturer menu”.

Defrosting by minimum pressure

This type of defrosting is selected by default.

The defrosting function is activated if the evaporation pressure measured by the transducer of the outdoor coil goes below the setpoint set by parameter (2.5 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 sensor and the evaporation temperature measured in the outdoor coil exceeds the value set by parameter (by default 16ºC).

In addition to this condition, it has to be done whenever the pressure measured in the outdoor coil 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 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 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).

12.2. 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.
- Compressor(s) in operation.
- The pressure measured by the outdoor coil probe is lower than that at the start of defrosting (5.6 bar).
- Outdoor temperature < 10ºC.

If these conditions are met, once the delay has elapsed at the start of defrosting, the compressor 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 compressor(s) are stopped, the regimen will be changed, giving power to the 4-way valve (adjustable by parameter).

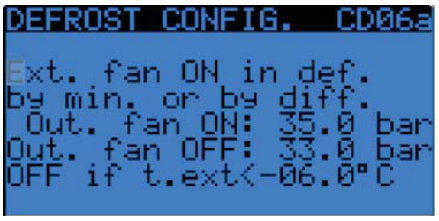
After 30 seconds, the compressor will be started up so that they can perform the defrosting procedure.

Note: Stopping compressor 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:

- If there is an electrical tank heater (connected by the installer), it can be enabled by parameter.
- The status of the outdoor fan will depend on the type of defrosting procedure activated:
  - by time: they will remain stopped.
  - by minimum pressure or by difference with the outdoor temperature: when an ON pressure value is exceeded, if the outdoor temperature is higher than -5ºC, the outdoor fan 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.



Ending defrosting

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

- By pressure, when the measurement from the outdoor coil probe is greater than the value at the end of defrosting (33.0 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. 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 fan when the compressor function.
- Deactivation of the electrical tank heater (connected by the installer) 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.

13. 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:

13.1. Pump thermal protection (AL 01)

Performed through digital input DI1 (J4). Its actuation is only effective when the unit is in operation, causing them to stop.

This safety device is reset manually.

13.2. Compressor & outdoor fan thermal (AL 03)

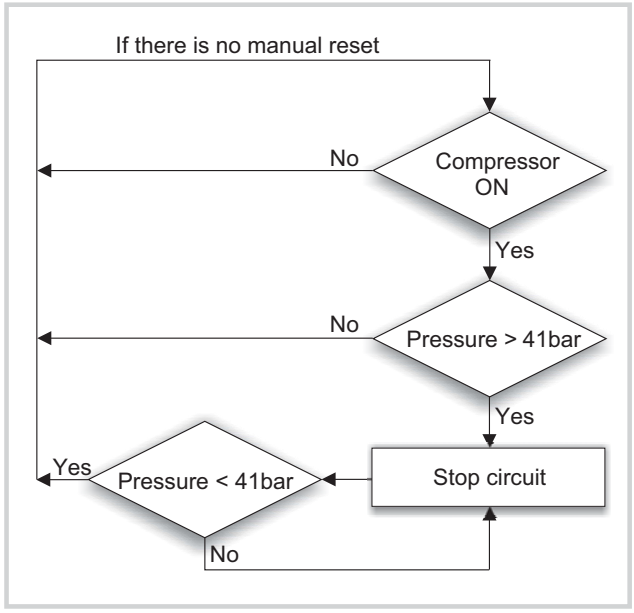
It is performed through digital input DI4 (J4). Its actuation causes the stopping of compressor and outdoor fan.

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

13.3. High pressure safety device (AL 04)

This safety is carried out in the following manner:

- Digital input DI2 (J4): 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 B7 (J3): with the pressure transducer in the outdoor coil and the unit operating in COOLING mode. Actuation according to the chart.



The actuation of the high pressure safety device causes the compressor(s) and outdoor fan 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.

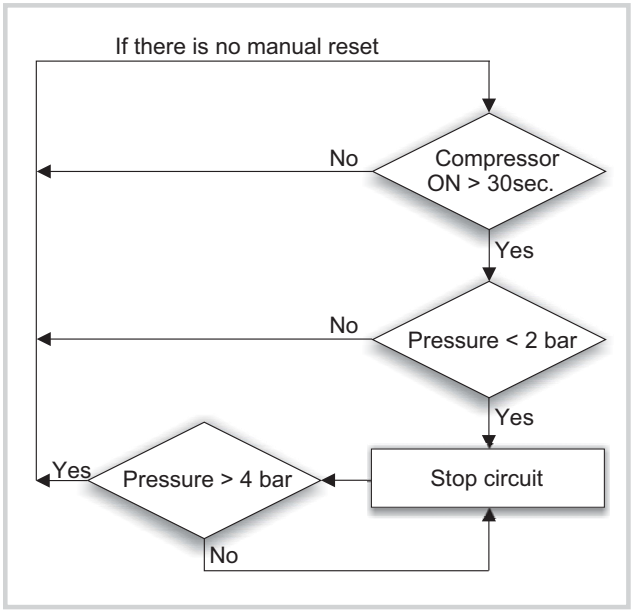
This safety device is reset automatically, going on to manual resetting when 4 alarms occur in less than 30 minutes (adjustable by parameters).

Alarm start value	41,0 bar
Alarm end value	30,0 bar

13.4. Low pressure safety device (AL 05)

This safety is carried out in the following manner:

- Digital input DI3 (J4). The low pressure pressostat is connected in this input.
- Analogue input B7 (J3), with pressure transducer on the outdoor coil and the unit operating in HEATING mode. Actuation according to the chart.



Start COOLING alarm	2.0 bar
End COOLING alarm	4.0 bar
Start HEATING alarm	2.0 bar
End HEATING alarm	4.0 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 and outdoor fan stoppage. During the defrosting procedure can be inhibited via a parameter.

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” 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 alarm will be reset manually.

13.5. Anti-freeze water safety (AL 27)

It is performed through analogue input B3 (J3). This fault is produced when the water outlet temperature is lower than 4ºC. The compressor is stopped and the electrical tank heater (connected by the installer) and the circulation pump are connected.

The reset is produced when the water outlet temperature is is greater than 7ºC (4ºC + 3ºC differential).

13.6. Flow controller (AL 31)

This is performed through digital input DI5 (J4). Its actuation is taken into account only in COOLING mode when the circulation pump 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.

This safety device is reset automatically.

13.7. Anti-freeze refrigerant safety (AL 84)

It is performed through analogue input B6 (J3). This safety device is started if, after 120 seconds of operation by the compressor working in COOLING mode, the refrigerant temperature is lower than -2ºC (early alarm). If this temperature does not exceed -1ºC after 90 seconds the compressor is stopped and the electrical tank heater connected (optional to be connected by the installer) .

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.

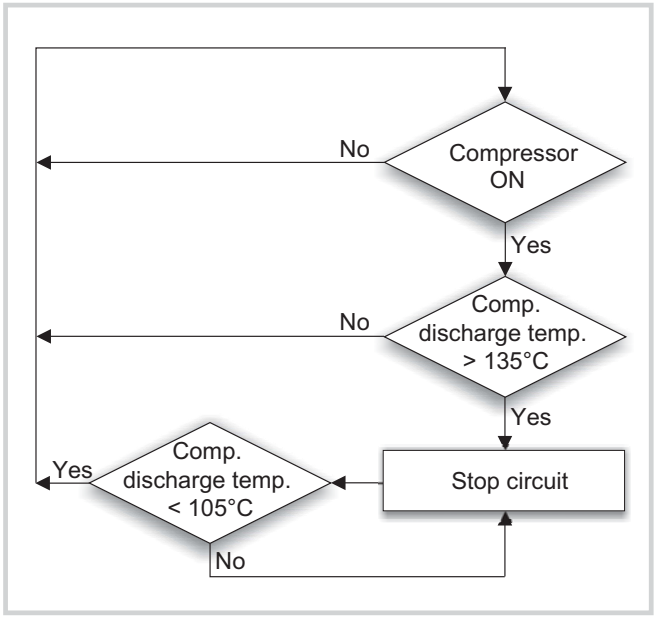
If the refrigerant temperature is less than -5ºC after the compressor has been operating for 120 seconds, the compressor is stopped and directly, and without delay, the refrigerant anti-freeze alarm is considered.

If 10 early anti-freeze alarms (T < -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 unit is blocked by the anti-freeze alarm. The resetting of this safety device can only be performed from the pDG1 terminal or through a supervisory variable **(AL 86)**.

13.8. High discharge T of compressor (AL 35)

It is performed through analogue input B4 (J3). A temperature probe is connected, whose actuation will be done graphically.



Alarm start value	135ºC
Alarm end value	105ºC

Its actuation causes the compressor(s) and outdoor fan to be stopped. With the unit operating in HEATING mode, the electrical tank heater (connected by the installer) will be connected.

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

This safety device is reset automatically.

13.9. Alarm for high or low outdoor air temp. (AL 79, 80)

This is done through analogue input B2 (J3).

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.

This safety device is reset automatically.

13.10. Sensors failure (AL 17, 20, 22, 24, 43, 44)

Opening or short-circuiting of any sensor causes the unit stoppage.

It resets automatically.

In the case of the outdoor air temperature probe, its actuation causes only signalling.

14. 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	Pump thermal	Manual	5 sec.
AL 03	Compressor and fan thermal	Auto/ Man.	
AL 04	High pressure alarm	Auto/ Man.	
AL 05	Low pressure alarm	Auto/ Man.	15 sec.
AL 17	Broken or disconnected outlet water probe	Auto	
AL 20	Broken or disconnected outdoor coil probe	Auto	
AL 22	Broken or disconnected indoor exchanger probe	Auto	
AL 24	Broken or disconnected inlet water probe	Auto	
AL 27	Anti-freeze alarm of water	Manual	
AL 31	Open flow controller alarm	Auto	5 sec.
AL 35	Discharge limit of compressor exceeded	Auto	
AL 43	Broken or disconnected outdoor air temperature probe	Auto	
AL 44	Broken or disconnected discharge temperature probe	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 84	Anti-freeze alarm of refrigerant	Auto	90 sec.
AL 86	Unit blocking due to anti-freeze alarm	Manual	

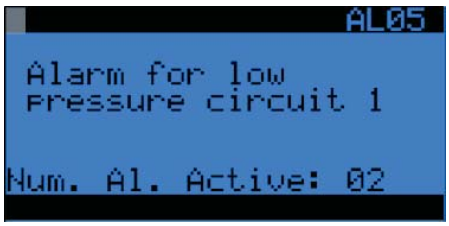
The control board has a digital output NO7-NC7 (J14) that can activate a remote relay when any alarm among those selected by parameter from the previous list.

View of the alarms in the 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 (in this example there are two active alarms).

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.

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.

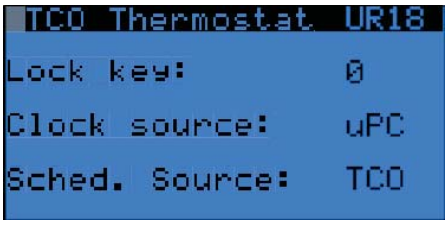
With the keys, the rest of the alarms stored in memory can be queried.

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:

15. SCHEDULE PROGRAMMING

The 30PA/PH control has a schedule programmer in each of the terminals. The scheduler source, pGD1 (uPC) or TCO, will be selected on the UR18 display of the USER MENU.



15.1. Programming with pGD1 terminal

The pGD1 terminal includes up to 3 programs with 3 daily time slots per program and allows the selection of one of these 3 programs for each day of the week (PH01 to PH15 displays).

Daily programming

In each of the three daily programs, it is possible to establish a maximum of three time slots during which the unit will be connected.

For example:

Program 1: from 6:30 to 11:00 (1st slot)
from 11:30 to 13:30 (2nd slot)
from 15:00 to 18:00 (3rd slot)

Parameters used	
Schedule program no. 1 (3 connection slots)	PH04
Schedule program no. 2 (3 connection slots)	PH05
Schedule program no. 3 (3 connection slots)	PH06

Start type

The start type and the condition of the unit outside of the schedule program will be selected on the PH03 display:

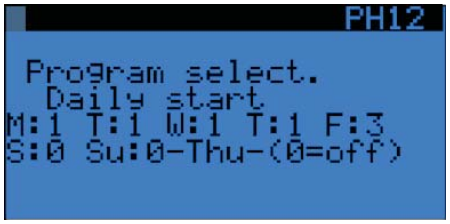
- **ON/OFF schedule:** within the program the unit will operate with the setpoint established on the displays PH07 and PH08, whilst outside the schedule it will be stopped.
- **Schedule only setpoint change:** two control setpoint temperatures will be set on displays PH07 and PH08: one, during the program slots and another outside the program.
- **ON/OFF schedule with ON limit SET:** outside the schedule program the unit is off, however a start safety device is established when the temperature goes above or below the limit setpoints introduced in PH09, PH10 and PH11.
- **3 setpoint schedule + OFF of the unit:** outside the schedule program the unit is off, inside the schedule 3 setpoints can be established: CONFORT: standard setpoint, ECONOMY: setpoint more removed from the comfort point, used at times with low occupancy of the building y PROTECTION: setpoint of building protection, usually used at night, when the building is empty. This schedule is programmed in displays PH13, PH14 and PH15.
- **Forced:** for an occasional start or stop of the unit without modifying the set schedule program. When it ends, the unit goes back to the start-up type that was set.

Parameters used	
Start type	PH03
On time with forced start	PH03
Setpoint during COOLING schedule program	PH07
Setpoint outside COOLING schedule program	PH07
Setpoint during HEATING schedule program	PH08
Setpoint outside HEATING schedule program	PH08
Setpoint due to limit COOLING schedule program	PH09
Setpoint due to limit outside COOLING schedule program	PH09
Setpoint due to limit HEATING schedule program	PH10
Setpoint due to limit outside HEATING schedule program	PH10
Differential due to limit COOLING schedule program	PH11
Differential due to limit HEATING schedule program	PH11
Setpoints CONFORT, ECONOMY, PROTECTION in COOLING	PH14
Differential of PROTECTION mode in COOLING	PH14
Setpoints CONFORT, ECONOMY, PROTECTION in HEATING	PH15
Differential of PROTECTION mode in HEATING	PH15

Weekly programming

The control verifies each day of the week during which the operation of the unit is authorised on the PH12 display. If this is the case, the schedule program established for this day will be followed.

Parameters used	
Selection of the program each day of the week	PH12

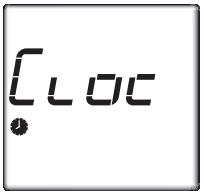


15.2. Schedule programming with TCO terminal

The TCO terminal 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.

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.

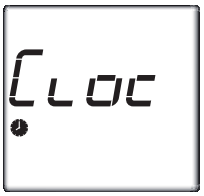


The current time appears intermittently and can be modified with the help of the keys. The new time can be validated with the key. The minutes appear below intermittently. Its value can also be modified with the keys and validated with the key.

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

Creation of a schedule programme

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

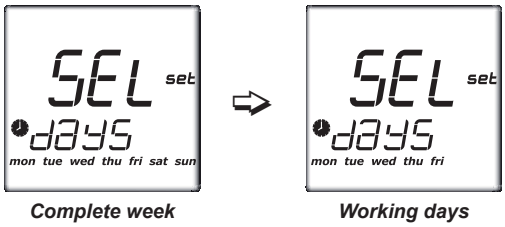


Next, by pressing the key, the terminal changes to the initial schedule programming display (TIME BAND).

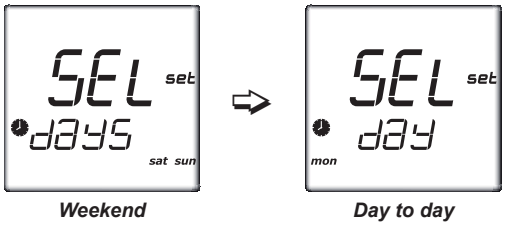
If it desired to abandon the programming, by pressing the key again, the terminal changes to the exit display (ESC), which is exited by pressing .

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*

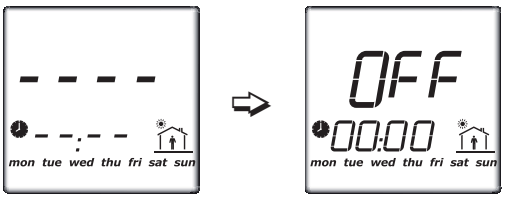


Weekend *Day to day*

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 .

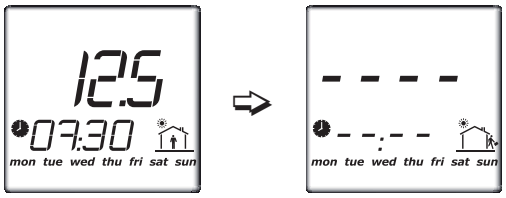
If it is desired to continue with the scheduled programme, the key must be pressed on the display of the days to which it applies in order to access the first time slot. The sequence of these slots is as follows:

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:



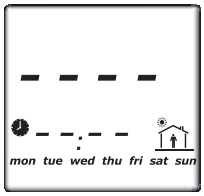
Next, with the key, the activation time of the programming for the selected slot will be set, and then, whether the unit will remain stopped (OFF) or at the setpoint value.

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 schedule 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.

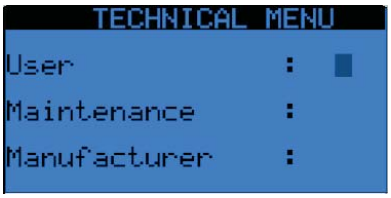
To deactivate the scheduled programme, it is necessary only to press the ⌚ key for a short while.

16. Access to parameters

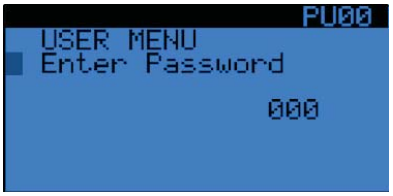
16.1. Access with pGD1 terminal

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:

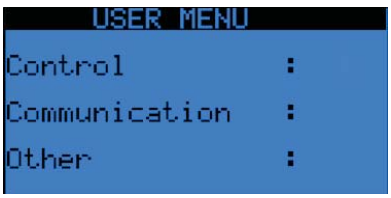
Level 1: Main Menu (no password)

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

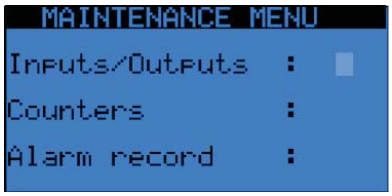
Level 3: Main Menu (no password)
Technical menu: User and Maintenance

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

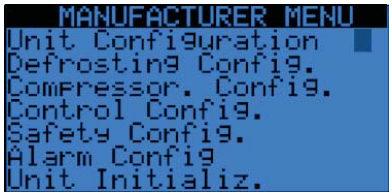
In the **User Menu,** it can be configured the values associated with the setpoints in COOLING and HEATING modes, compensation due to outdoor temperature, communication in a supervision network and the configuration of the terminal.



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.



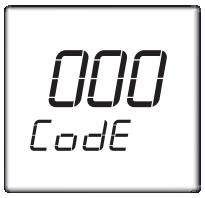
In this displays of the **Manufacturer Menu,** the unit is configured with the selection of the elements that make it up and the options that have to be controlled. This configuration is factory-set and must not be modified unless there is a change in components.



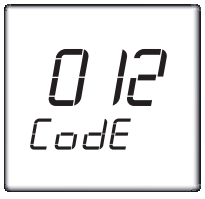
16.2. Access with the TCO terminal

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.



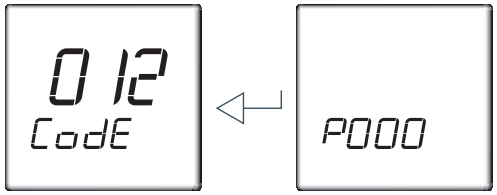
The user will only access level 1 (password = 12). For the rest of the levels, it is necessary to request the access password.



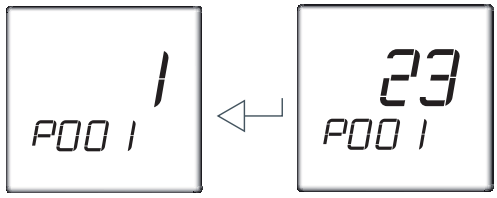
The passwords and menus are as follows:

- 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

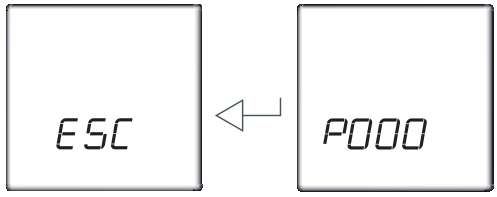
For example, the day, month and year that appears on the terminal can be modified in the general parameters menu. By entering the correct password into CODE with the help of the △ ▽ keys and confirming with the ↵ key, the P000 menu will be accessed:



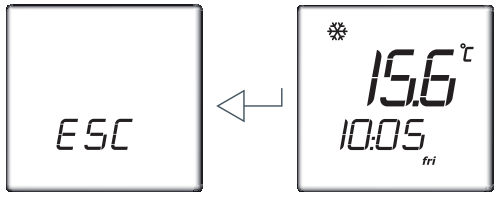
By pressing the ↵ key again, the first parameter P001 is accessed, which coincides with the current day. To modify it, it is necessary to return to pressing ↵. At that time, the day value with flicker. It will be modified with the △ ▽ keys and confirmed with the ↵ key.



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. List of parameters

17.1. Parameters in the P000 menu: Input / output displays

TCO display	pGD1 display	Parameter	Description	Value by default	Units	Min.	Max.	Mask name	Type	R/W	Address
		SET_POINT_TEMP_ AGUA_FRIO	Temperature setpoint of the water in COOLING mode	12,0	ºC	10	20	MANDO_2	Analog	R/W	127
		SET_POINT_TEMP_ AGUA_CALOR	Temperature setpoint of the water in HEATING mode	40,0	ºC	35	55	MANDO_2	Analog	R/W	128
P001		CURRENT_DAY	Current day	----		1	31	MANDO_1	Integer	R/W	18
P002		CURRENT_MONTH	Current month	----		1	12	MANDO_1	Integer	R/W	19
P003		CURRENT_YEAR	Current year	----		0	99	MANDO_1	Integer	R/W	20
P004	ES01	thTune_ED4_1	Digital inputs from 4…1	----		0: N.C 1: N.O.		ENT_SAL_ES01	Digital		
P005	ES01	thTune_ED8_5	Digital inputs from 8…5	----		0: N.C 1: N.O.		ENT_SAL_ES01	Digital		
P007	ES02	thTune_SD4_1	Digital outputs from 4…1	----		0: N.C 1: N.O.		ENT_SAL_ES02	Digital		
P008	ES02	thTune_SD8_5	Digital outputs from 8…5	----		0: N.C 1: N.O.		ENT_SAL_ES02	Digital		
P011	ES03	TEMP_RET	Inlet water temperature	----	ºC	----	----	ENT_SAL_ES03	Analog	R	
P012	ES03	TEMP_EXT	Outdoor temperature	----	ºC	----	----	ENT_SAL_ES03	Analog	R	2
P013	ES03	TEMP_IMP	Outlet water temperature	----	ºC	----	----	ENT_SAL_ES03	Analog	R	7
P019	ES04	TEMP_DES_C1	Discharge temperature	----	ºC	----	----	ENT_SAL_ES04	Analog	R	9
P021	ES06	T_P_BINT_C1	Temperature-pressure indoor exchanger	----	BAR	----	----	ENT_SAL_ES06	Analog	R	11
P022	ES06	TEMP_CAL_BINT_C1	Temperature calculated for the indoor exchanger	----	ºC	----	----	ENT_SAL_ES06	Analog	R	100
P023	ES06	T_P_BEXT_C1	Temperature-pressure outdoor coil	----	BAR	----	----	ENT_SAL_ES06	Analog	R	3
P024	ES06	TEMP_CAL_BEXT_C1	Temperature calculated for the outdoor coil	----	ºC	----	----	ENT_SAL_ES06	Analog	R	98
P030	ES11	AOUT1_VISUALIZADA	Analogue output viewed on display	----	%	----	----	ENT_SAL_ES11	Integer	R	14
P031	ES11	AOUT2_VISUALIZADA	Analogue output viewed on display	----	%	----	----	ENT_SAL_ES11	Integer	R	16
P032	ES12	AOUT3_VISUALIZADA	Analogue output viewed on display	----	%	----	----	ENT_SAL_ES12	Integer	R	18
P034	ES13	INFO_EQUIPO_1	Information on type of unit, machine and electrical tank heater: 8: Air-water COOLING only 9: Air-water COOLING only + heater 10: Air-water HEAT PUMP 11: Air-water HEAT PUMP + heater	----		8	11	M_INFO_EQUIPO_ ES13	Integer	R	58
P035	ES13	INFO_EQUIPO_2	Information on the number of compressors and circuits: 0: 1 comp /1 circ.	0		0	0	M_INFO_EQUIPO_ ES13	Integer	R	59
P036	ES14	VER_SOFTWARE	Software version	2,0		----	----	M_VERSION_ES14	Analog	R	24
P037	ES14	thTune_Term1_Term_ UI_hw	Hardware version for microAT terminal	184		----	----	M_VERSION_ES14	Analog	R	
P038	ES14	thTune_Term1_Term_ UI_fw	Firmware version for microAT terminal	1.0		----	----	M_VERSION_ES14	Analog	R	
P039	S02	SET_POINT_TEMP_CAL	Setpoint calculated based on the compensation of the outdoor temperature	----	ºC	----	----		Analog	R	97
	S03	VAL_INI_LIM_TEMP_ IMP_FRIO	Initial temperature limit value for outlet water in COOLING mode	5.0	ºC	0	30	CONF_CONT_ CR03	Analog	R	
	S03	VAL_INI_LIM_TEMP_ IMP_CALOR	Initial temperature limit value for outlet water in HEATING mode	50.0	ºC	0	60	CONF_CONT_ CR04	Analog	R	

17.2. Parameters of schedule programming

Schedule programming with pGD1 terminal

pGD1 display	Parameter	Description	Value by default	Maximum	Minimum	Unit	Type	R/W	Address
PH03	TIPO_ARR	Start type	3: Manual	0: ON/OFF program 1: Program with setpoint change 2: ON/OFF program (set ON limit) 3: Manual 4: 3 setpoints schedule + OFF unit 5: Forced		---	Integer	R/W	71
PH03	TIME_F_MAN	On time with forced start	2	1	999	h	Integer	R/W	73
PH03	HAB_BLOQ_COMP_ON_ FASE_LIM_FRIO	Disable compressors in summer with scheduling and setpoint limit in summer (night freecooling)	0: no	0: no 1: yes		---	Digital	R/W	72
PH03	HAB_BLOQ_RENOVACION _ON_FASE_LIM	Disable the outdoor air exchange and scheduling limit setpoint (night)	0: no	0: no 1: yes		---	Digital	R/W	73
PH04	H_ARR_1A	Start-up hour of slot 1- program 1	6	0	23	h	Integer	R/W	74
PH04	M_ARR_1A	Start-up minute of slot 1-program 1	30	0	59	min	Integer	R/W	75
PH04	H_PAR_1A	Stop hour of slot 1 - program 1	11	0	23	h	Integer	R/W	76
PH04	M_PAR_1A	Stop minute of slot 1 - program 1	0	0	59	min	Integer	R/W	77
PH04	H_ARR_1B	Start-up hour of slot 2 - program 1	11	0	23	h	Integer	R/W	78
PH04	M_ARR_1B	Start-up minute of slot 2 - program 1	30	0	59	min	Integer	R/W	79
PH04	H_PAR_1B	Stop hour of slot 2 - program 1	13	0	23	h	Integer	R/W	80
PH04	M_PAR_1B	Stop minute of slot 2 - program 1	30	0	59	min	Integer	R/W	81
PH04	H_ARR_1C	Start-up hour of slot 3 - program 1	15	0	23	h	Integer	R/W	82
PH04	M_ARR_1C	Start-up minute of slot 3 - program 1	0	0	59	min	Integer	R/W	83
PH04	H_PAR_1C	Stop hour of slot 3 - program 1	19	0	23	h	Integer	R/W	84
PH04	M_PAR_1C	Stop minute of slot 3 - program 1	0	0	59	min	Integer	R/W	85
PH05	H_ARR_2A	Start-up hour of slot1 - program 2	8	0	23	h	Integer	R/W	86
PH05	M_ARR_2A	Start-up minute of slot 1 - program 2	0	0	59	min	Integer	R/W	87
PH05	H_PAR_2A	Stop hour of slot 1 - program 2	14	0	23	h	Integer	R/W	88
PH05	M_PAR_2A	Stop minute of slot 1 - program 2	0	0	59	min	Integer	R/W	89
PH05	H_ARR_2B	Start-up hour of slot 2 - program 2	17	0	23	h	Integer	R/W	90
PH05	M_ARR_2B	Start-up minute of slot 2 - program 2	0	0	59	min	Integer	R/W	91
PH05	H_PAR_2B	Stop hour of slot 2 - program 2	20	0	23	h	Integer	R/W	92
PH05	M_PAR_2B	Stop minute of slot 2 - program 2	30	0	59	min	Integer	R/W	93
PH05	H_ARR_2C	Start-up hour of slot 3 - program 2	0	0	23	h	Integer	R/W	94
PH05	M_ARR_2C	Start-up minute of slot 3 - program 2	0	0	59	min	Integer	R/W	95
PH05	H_PAR_2C	Stop hour of slot 3 - program 2	0	0	23	h	Integer	R/W	96
PH05	M_PAR_2C	Stop minute of slot 3 - program 2	0	0	59	min	Integer	R/W	97
PH06	H_ARR_3A	Start-up hour of slot 1 - program 3	7	0	23	h	Integer	R/W	98
PH06	M_ARR_3A	Start-up minute of slot 1 - program 3	0	0	59	min	Integer	R/W	99
PH06	H_PAR_3A	Stop hour of slot 1 - program 3	15	0	23	h	Integer	R/W	100
PH06	M_PAR_3A	Stop minute of slot 1 - program 3	0	0	59	min	Integer	R/W	101
PH06	H_ARR_3B	Start-up hour of slot 2 - program 3	0	0	23	h	Integer	R/W	102
PH06	M_ARR_3B	Start-up minute of slot 2 - program 3	0	0	59	min	Integer	R/W	103
PH06	H_PAR_3B	Stop hour of slot 2 - program 3	0	0	23	h	Integer	R/W	104
PH06	M_PAR_3B	Stop minute of slot 2 - program 3	0	0	59	min	Integer	R/W	105
PH06	H_ARR_3C	Start-up hour of slot 3 - program 3	0	0	23	h	Integer	R/W	106

Schedule programming with pGD1 terminal (...continued)

pGD1 display	Parameter	Description	Value by default	Maximum	Minimum	Unit	Type	R/W	Address
PH06	M_ARR_3C	Start-up minute of slot 3 - program 3	0	0	59	min	Integer	R/W	107
PH06	H_PAR_3C	Stop hour of slot 3 - program 3	0	0	23	h	Integer	R/W	108
PH06	M_PAR_3C	Stop minute of slot 3 - program 3	0	0	59	min	Integer	R/W	109
PH07	SET_INT_FRIO	Setpoint for time slots in summer	26	-99,9	99,9	°C	Analog	R/W	61
PH07	SET_EXT_FRIO	Setpoint out of time slots in summer	28	-99,9	99,9	°C	Analog	R/W	59
PH08	SET_INT_CALOR	Setpoint for time slots in winter	21	-99,9	99,9	°C	Analog	R/W	60
PH08	SET_EXT_CALOR	Setpoint out of time slots in winter	19	-99,9	99,9	°C	Analog	R/W	58
PH09	SET_INT_LIM_FRIO	Setpoint for time slots in summer with "ON-OFF with SET limit of ON"	26	-99,9	99,9	°C	Analog	R/W	79
PH09	SET_EXT_LIM_FRIO	Safety setpoint out of time slots in summer	34	-99,9	99,9	°C	Analog	R/W	77
PH10	SET_INT_LIM_CALOR	Setpoint for time slots in winter with "ON-OFF with SET limit of ON"	21	-99,9	99,9	°C	Analog	R/W	78
PH10	SET_EXT_LIM_CALOR	Safety setpoint out of time slots in winter	13	-99,9	99,9	°C	Analog	R/W	76
PH11	DIF_LIM_CALOR	Differential for Set.Limit in winter with "ON-OFF with SET limit of ON"	1	0	99,9	°C	Analog	R/W	81
PH11	DIF_LIM_FRIO	Differential for Set.Limit in summer with "ON-OFFwith SET limit of ON"	2	0	99,9	°C	Analog	R/W	80
PH12	LUN_A	Monday schedule (0=off; 1=program1; 2=program2; 3=program3)	1	0	3	---	Integer	R/W	110
PH12	MAR_A	Tuesday schedule (0=off; 1=program1; 2=program2; 3=program3)	1	0	3	---	Integer	R/W	111
PH12	MIE_A	Wednesday schedule (0=off; 1=program1; 2=program2; 3=program3)	1	0	3	---	Integer	R/W	112
PH12	JUE_A	Thrusday schedule (0=off; 1=program1; 2=program2; 3=program3)	1	0	3	---	Integer	R/W	113
PH12	VIE_A	Friday schedule (0=off; 1=program1; 2=program2; 3=program3)	3	0	3	---	Integer	R/W	114
PH12	SAB_A	Saturday schedule (0=off; 1=program1; 2=program2; 3=program3)	0	0	3	---	Integer	R/W	115
PH12	DOM_A	Sunday schedule (0=off; 1=program1; 2=program2; 3=program3)	0	0	3	---	Integer	R/W	116
PH13	MOD_SCHED_ GRAHP_CIAT	Selection for each day of the week of setpoint CONFORT, ECONOMY, BUILDING PROTECTION and OFF mode for each half-hour.	---	---	---	---	---	---	---
PH14	SET_INT_FRIO	Setpoint for CONFORT time slots in summer	26	°C	-99,9	99,9	Analog	R/W	61
PH14	SET_EXT_FRIO	Setpoint for ECONOMY time slots in summer	28	°C	-99,9	99,9	Analog	R/W	59
PH14	SET_EXT_LIM_FRIO	Setpoint for BUILDING PROTECTION time slots in summer	34	°C	-99,9	99,9	Analog	R/W	77
PH14	DIF_LIM_FRIO	Differential for the setpoint of BUILDING PROTECTION in summer	2	°C	0	99,9	Analog	R/W	80
PH15	SET_INT_CALOR	Setpoint for CONFORT time slots in winter	21	°C	-99,9	99,9	Analog	R/W	60
PH15	SET_EXT_CALOR	Setpoint for ECONOMY time slots in winter	19	°C	-99,9	99,9	Analog	R/W	58
PH15	SET_EXT_LIM_CALOR	Setpoint for BUILDING PROTECTION time slots in winter	13	°C	-99,9	99,9	Analog	R/W	76
PH15	DIF_LIM_CALOR	Differential for the setpoint of BUILDING PROTECTION in winter	1	°C	0	99,9	Analog	R/W	81

17.3. Parameters in the U000 menu: user displays

TCO display	pGD1 display	Parameter	Description	Value by default	Units	Min.	Max.	Mask name	Type	R/W	Addr.
	UR01a	HAB_TEMP_RET	Enable de inlet water probe as control probe (0=outlet; 1=intet)	1		0: outlet 1: intet		USU_REG_UR01	Analog	R/W	
	UR01a	SET_POINT_TEMP_ AGUA_FRIO	Temperature setpoint of the water in COOLING mode	12,0	ºC	10	20	USU_REG_UR01	Analog	R/W	127
	UR01a	MIN_SET_POINT_TEMP_ AGUA_FRIO	Minimum temperature setpoint of the water in COOLING mode	10,0	ºC	0	50	USU_REG_UR01	Analog	R/W	129
	UR01a	MAX_SET_POINT_TEMP_ AGUA_FRIO	Maximum temperature setpoint of the water in COOLING mode	20,0	ºC	0	50	USU_REG_UR01	Analog	R/W	130
	UR01b	HAB_TEMP_RET	Enable de inlet water probe as control probe (0=outlet; 1=intet)	1		0: outlet 1: intet		USU_REG_UR01	Analog	R/W	
	UR01b	SET_POINT_TEMP_ AGUA_CALOR	Temperature setpoint of the water in HEATING mode	40,0	ºC	35	55	USU_REG_UR01	Analog	R/W	128
	UR01b	MIN_SET_POINT_TEMP_ CALOR	Minimum temperature setpoint of the water in HEATING mode	35,0	ºC	0	50	USU_REG_UR01	Analog	R/W	131
	UR01b	MAX_SET_POINT_TEMP_ CALOR	Maximum temperature setpoint of the water in HEATING mode	50,0	ºC	0	55	USU_REG_UR01	Analog	R/W	132
U005	UR02	BANDA	Control band	1,0	ºC	0	6	USU_REG_UR02	Analog	R/W	27
U020	UR10	BANDA_RES	Heater control band	1,0	ºC	0	6	USU_REG_UR10	Analog	R/W	38
U021	UR10	OFFSET_RES	Displacement of electrical heaters with respect to the setpoint calculated - band	5,0	ºC	0	9,9	USU_REG_UR10	Analog	R/W	39
U024	UR12	HAB_COMPENSACION	Enable compensation of the setpoint based on the outdoor temp.	0: No		0: No # 1: Yes		USU_REG_UR12	Digital	R/W	86
U025	UR13	SET_COMP_EXT_FRIO	Set outdoor temperature for compensation in COOLING	30,0	ºC	20	50	USU_REG_UR12	Analog	R/W	42
U026	UR13	VAL_DIF_COMP_EXT_ FRIO	Outdoor temperature differential for compensation in COOLING	5,0	ºC	0	10	USU_REG_UR13	Analog	R/W	43
U027	UR13	MAX_COMP_EXT_FRIO	Maximum compensation in COOLING	5,0	ºC	0	10	USU_REG_UR13	Analog	R/W	44
U028	UR14	SET_COMP_EXT_CALOR	Set outdoor temperature for compensation in HEATING	0,0	ºC	-10.0	20	USU_REG_UR14	Analog	R/W	45
U029	UR14	VAL_DIF_COMP_EXT_ CALOR	Outdoor temperature differential for compensation in HEATING	5,0	ºC	0	10	USU_REG_UR14	Analog	R/W	46
U030	UR14	MAX_COMP_EXT_ CALOR	Maximum compensation in HEATING	5,0	ºC	0	10	USU_REG_UR14	Analog	R/W	47
U031	UC01	BMS_ADDRESS	Supervisory address	1		0	207	USU_COM_UC01			
U032	UC01	TIPO_PROT_COM	Type of communication protocol	1: CAREL 485		1: CAREL 485 2: CAREL 232 3: MODBUS SL 4: COMMISION 5: LON		USU_COM_UC01			
U033	UC01	BAUDRATE	Communication speed in BMS	4: 19200		0: 1200 1: 2400 2: 4800 3: 9600 4: 19200		USU_COM_UC02			
		PARITY_TYPE_MB	Stop bit numbers (modbus communication)	0: 2bits		0: 2 bits 1: 1 bit		USU_COM_UC02			
		STOP_BITS_NUMBER_ MB	Partity type (modbus communication)	0: No parity		0: No parity 1: Odd parity 2: Even parity		USU_COM_UC02			
U034	UV01	HAB_ONOFF_REMOTO	Enabling remote ON/OFF	1: SI		0: No # 1: Yes		USU_VAR_UV01	Digital	R/W	87
U035	UV01	HAB_CALOR_FRIO_ REMOTO	Enable digital input HEATING/ COOLING	0: NO		0: No # 1: Yes		USU_VAR_UV01	Digital	R/W	88
U036	UV02	TIME_LIGHT_PANT_PGD	Time the PGD1 is lit	30	s	0	999	USU_VAR_UV02			
U037	UV03	HAB_RET_MENÚ_PGD	Enables return to the main display of the PGD1	0: NO		0: No # 1: Yes		USU_VAR_UV03			
U038	UV03	TIME_RET_MENÚ_PGD	Time to return to the main display of the PGD1	120	s	0	999	USU_VAR_UV03			
U039	UR15	DESCONEXION_NUM_ COMPRESORES	Number of compressor stages to disconnect.	0		0	4	USU_REG_UR15	Integer	R/W	94
U040	UR15	DESCONEXION_NUM_ RESISTENCIAS	Number of heater stages to disconnect.	0		0	3	Integer	Integer	R/W	95
	UV01	AUTOSTART	Automatic start after blocking	1: SI		0: No # 1: Yes		USU_VAR_UV01	Digital	R/W	140
U041	UV01	TIME_ON_AUTOSTART	Timing for the automatic start after a power failure.	5	s	5	999	USU_VAR_UV01	Integer	R/W	99
U042	UR10	SET_HAB_RES_TEMP_ EXT	Setpoint for enabling the electrical resistance by the outside temperature	20,0	ºC	-20.0	40	USU_REG_UR10	Analog	R/W	109
U043	UR09	MIN_APERTURA_ COMPUERTA	Minimum opening of the outdoor air damper	0	%	0	100	USU_REG_UR09	Integer	R/W	111
U044	UR09	MAX_APERTURA_ COMPUERTA	Maximum opening of the outdoor air damper	100	%	0	100	USU_REG_UR09	Integer	R/W	96

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

TCO display	pGD1 display	Parameter	Description	Value by default	Units	Min.	Max.	Mask name	Type	R/W	Address
M001	MA01	TAR_AIN1	Analogue input delay 1	0.0		-20.0	20	MANT_ASIST_MA01	Analog	R/W	48
M002	MA01	TAR_AIN2	Analogue input delay 2	0.0		-20.0	20	MANT_ASIST_MA01	Analog	R/W	49
M003	MA01	TAR_AIN3	Analogue input delay 3	0.0		-20.0	20	MANT_ASIST_MA01	Analog	R/W	50
M004	MA01	TAR_AIN4	Analogue input delay 4	0.0		-20.0	20	MANT_ASIST_MA01	Analog	R/W	51
M005	MA01	TAR_AIN5	Analogue input delay 5	0.0		-20.0	20	MANT_ASIST_MA01	Analog	R/W	52
M006	MA01	TAR_AIN6	Analogue input delay 6	0.0		-20.0	20	MANT_ASIST_MA01	Analog	R/W	53
M007	MA02	TAR_AIN7	Analogue input delay 7	0.0		-20.0	20	MANT_ASIST_MA02	Analog	R/W	54
M015	MA03	LIM_MIN_PRES	Minimum pressure signal limit for alarm	0	BAR	-99,9	99,9	MANT_ASIST_MA03	Analog	R/W	62
M016	MA03	LIM_MAX_PRES	Maximum pressure signal limit for alarm	45	BAR	0	99,9	MANT_ASIST_MA03	Analog	R/W	63
M017	MA04	AIN1	Analogue input display 1	----		----	----	MANT_ASIST_MA04			
M018	MA04	AIN2	Analogue input display 2	----		----	----	MANT_ASIST_MA04			
M019	MA04	AIN3	Analogue input display 3	----		----	----	MANT_ASIST_MA04			
M046	MA10	MAN_ DESESCARCHE_1	MANUAL operation of defrosting	0: No		0: No 1: Yes		MANT_ASIST_MA10			
M057	MA13	HAB_FILTRO1	Enable the probe filter	0: No		0: No 1: Yes		MANT_ASIST_MA13	Digital	R/W	89
M058	MA13	TIME_FILTRO1	Timing for the probe filter	1 s	s	0	99	MANT_ASIST_MA13	Integer	R/W	65
M059	MA13	DT_FILTRO1	Difference for the probe filter	1.0		0	9	MANT_ASIST_MA13	Integer	R/W	66

17.5. Parameters in the M000 menu: maintenance displays (counters)

TCO display	pGD1 display	Parameter	Description	Value by default	Units	Min.	Max.	Mask name	Type	R/W	Address
M101	MC01	N_HOR_VINT_H_X	Number of hours of the water pump (high level)	----	h	----	----	MANT_CONT_MC01	Integer	R	35
M102	MC01	N_HOR_VINT_L_X	Number of hours of the water pump (low level)	----	h	----	----	MANT_CONT_MC01	Integer	R	36
M103	MC01	N_HOR_ COMP1_H_X	Number of hours of compressor 1 (high level)	----	h	----	----	MANT_CONT_MC01	Integer	R	37
M104	MC01	N_HOR_ COMP1_L_X	Number of hours of compressor 1 (low level)	----	h	----	----	MANT_CONT_MC01	Integer	R	38
M111	MC01	N_HOR_RES_ ELEC1_H_X	Number of hours of electrical heater 1 (high level)	----	h	----	----	MANT_CONT_MC01	Integer	R	45
M112	MC01	N_HOR_RES_ ELEC1_L_X	Number of hours of electrical heater 1 (low level)	----	h	----	----	MANT_CONT_MC01	Integer	R	46
M115	MC02	N_ARR_VINT_H	Number of starts of the water pump (high level)	----		----	----	MANT_CONT_MC02	Integer	R	21
M116	MC02	N_ARR_VINT_L	Number of starts of the water pump (low level)	----		----	----	MANT_CONT_MC02	Integer	R	22
M117	MC02	N_ARR_COMP1_H	Number of starts of compressor 1 (high level)	----		----	----	MANT_CONT_MC02	Integer	R	23
M118	MC02	N_ARR_COMP1_L	Number of starts of compressor 1 (low level)	----		----	----	MANT_CONT_MC02	Integer	R	24
M165	MC10	RESET_ON_HORAS	Reset the counter for number of hours of operation	0: No		0: No 1: Yes		MANT_CONT_MC10	Digital	R/W	90
M166	MC10	RESET_ON_CONT	Reset the counter of starts of motors and heaters	0: No		0: No 1: Yes		MANT_CONT_MC10	Digital	R/W	91
M167	MC10	RESET_DES_CONT	Reset the counter of defrosting operations	0: No		0: No 1: Yes		MANT_CONT_MC10	Digital	R/W	92
M168	MC10	RESET_ON_CONT_ AL	Reset the counter of alarms	0: No		0: No 1: Yes		MANT_CONT_MC10			

17.6. Parameters in the C000 menu: unit configuration displays

TCO display	pGD1 display	Parameter	Description	Value by default	Units	Min.	Max.	Mask name	Type	R/W	Addr.
C001	CU01	TIPO_EQUIPO	Selection of the unit type	2		2: AIR-WATER		CONFIG_U_CU01	Integer	R/W	3
C002	CU01	TIPO_MAQUINA	Selection of the machine type	1		0: Cooling only 1: Heat pump		CONFIG_U_CU01	Integer	R/W	4
	CU01	NUM_WO_DIG_1	Work Order Number of unit - DIGIT 1	0	---	0	9	CONFIG_U_CU01	Integer	R/W	101
	CU01	NUM_WO_DIG_2	Work Order Number of unit - DIGIT 2	0	---	0	9	CONFIG_U_CU01	Integer	R/W	102
	CU01	NUM_WO_DIG_3	Work Order Number of unit - DIGIT 3	0	---	0	9	CONFIG_U_CU01	Integer	R/W	103
	CU01	NUM_WO_DIG_4	Work Order Number of unit - DIGIT 4	0	---	0	9	CONFIG_U_CU01	Integer	R/W	104
	CU01	NUM_WO_DIG_5	Work Order Number of unit - DIGIT 5	0	---	0	9	CONFIG_U_CU01	Integer	R/W	105
	CU01	NUM_WO_DIG_6	Work Order Number of unit - DIGIT 6	0	---	0	9	CONFIG_U_CU01	Integer	R/W	106
	CU01	NUM_WO_DIG_7	Work Order Number of unit - DIGIT 7	0	---	0	9	CONFIG_U_CU01	Integer	R/W	107
	CU01	NUM_WO_DIG_8	Work Order Number of unit - DIGIT 8	0	---	0	9	CONFIG_U_CU01	Integer	R/W	108
C003	CU02	NUM_CIRCUITOS	Number of circuits installed	1		1	2	CONFIG_U_CU02	Integer	R/W	5
C004	CU02	NUM_COMPRESORES	Number of compressors installed	1		1	4	CONFIG_U_CU02	Integer	R/W	6
C005	CU02	HAB_UNICO_VOL_AIRE_EXT	Selection of the single volume of outdoor air operation	1		1: single		CONFIG_U_CU02	Digital	R/W	45
	CU02	NUM_INTERCAMBIADOR_PLACAS	Nb. of plate exchanger in air-water unit	1		1	2	CONFIG_U_CU02	Integer	R/W	114
C006	CU02	NUM_RESISTENCIAS	Nb of electrical heaters installed	0		0: No # 1: 1 stage		CONFIG_U_CU02	Integer	R/W	7
C007	CU03	TIPO_VENT_INT	Type of pump	2		2: on/off 4: electronic		CONFIG_U_CU03	Integer	R/W	8
C008	CU03	MAX_AOUT_VENT_INT_FRIO	Maximum analogue output for the water pump in COOLING mode	100	%	30	100	CONFIG_U_CU03			
C009	CU03	MAX_AOUT_VENT_INT_CALOR	Maximum analogue output for the water pump in HEATING mode	100	%	30	100	CONFIG_U_CU03			
C010	CU04	TIPO_VENT_EXT	Type of outdoor fan	1		1: centrifugal 2: axial/radial 3: 2 speeds 4: electronic		CONFIG_U_CU04	Integer	R/W	9
C011	CU04	MAX_AOUT_VENT_EXT_FRIO	Maximum analogue output for the outdoor fan in COOLING mode	100	%	30	100	CONFIG_U_CU04			
C012	CU04	MAX_AOUT_VENT_EXT_CALOR	Maximum analogue output for the outdoor fan in HEATING mode	100	%	30	100	CONFIG_U_CU04			
C018	CU06	MIN_AOUT_VENT_INT	Min. analogue output for water pump	0	%	0	100	CONFIG_U_CU06			
C019	CU06	MIN_AOUT_VENT_EXT	Min. analogue output for outdoor fan	0	%	0	100	CONFIG_U_CU06			
C020	CU07b	HAB_COMP_REG_PRES_U_EXT	Enable damper for controlling the pressure of the outdoor unit	0: NO		0: No # 1: Yes		CONFIG_U_CU07b			
C021	CU08	HAB_DIN_PB	Enable low pressure pressostat	1: LP		0: No # 1: LP		CONFIG_U_CU08			
C022	CU09	TIPO_DIN5	Type of digital input 5	2		2: Flow controller		CONFIG_U_CU09	Integer	R/W	67
C023	CU09	TIPO_DIN6	Type of digital input 6	0: C / H		0: Cooling/Heating		CONFIG_U_CU09	Integer	R/W	68
C024	CU10	HAB_TEMP_IMP_AIRE	Enable control of outlet water temp.	1: SI		0: No # 1: Yes		CONFIG_U_CU10			
C025	CU10	HAB_TEMP_EXT	Enable outdoor air probe	1: SI		0: No # 1: Yes		CONFIG_U_CU10			
C027	CU11	HAB_T_P_BAT_INT	Enable indoor coil probe	1: SI		0: No # 1: Yes		CONFIG_U_CU11			
C028	CU11	HAB_TEMP_DES_COMP	Enable compr. discharge T. probe	1: SI		0: No # 1: Yes		CONFIG_U_CU11			
	CU11	HAB_TEMP_ASP_COMP	Enable compr. aspiration T. probe	0: NO		0: No # 1: Yes		CONFIG_U_CU11	Digital	R/W	143
C029	CU12	HAB_TEMP_BINT	Enable indoor coil probe by temp. (remove pressure transducer)	0: SI		0: No # 1: Yes		CONFIG_U_CU12	Digital	R/W	93
C030	CU12	HAB_TEMP_BEXT	Enable outdoor coil probe by Temp. (remove pressure transducer)	0: NO		0: No # 1: Yes		CONFIG_U_CU12	Digital	R/W	94
	CU12	HAB_CONEXION_SONDA_EN_AP_BP	Connecting pressure probes	0: coil		0: coils 1: HP & LP		CONFIG_U_CU12	Digital	R/W	142
C044	CU19	HAB_VIC_ON_CALOR	Enable 4-way valve on HEATING	0: NO		0: No # 1: Yes		CONFIG_U_CU19			
C045	CU19	TIPO_REFRIGERANTE	Type of refrigerant	4		4: R410A		CONFIG_U_CU19	Integer	R/W	69
	CU19	HAB_VALVULA_EXP_ELECTRONICA	Enable of unipolar electronic expansion valve	0: NO		0: No # 1: Yes		CONFIG_U_CU19	Digital	R/W	97
C050	CU02	HAB_RES_SIN_COMPRESOR	Enabling electric heater only for replacing the compressor	0: NO		0: No # 1: Yes		CONFIG_U_CU02	Digital	R/W	123

17.7. Parameters in the C100 menu: defrosting displays

TCO display	pGD1 display	Parameter	Description	Value by default	Units	Min.	Max.	Mask name	Type	R/W	Addr.
C101	CD01	HAB_DES_TIEMPO	Enabling defrosting by time	0: No		0: No 1: Yes		CONF_DES_CD01	Digital	R/W	100
C102	CD01	HAB_DES_MIN	Enable defrosting by minimum temperature or pressure	1: Yes		0: No 1: Yes		CONF_DES_CD01	Digital	R/W	101
C103	CD01	HAB_DES_DIF	Enable defrosting by difference with outdoor temp.	1: Yes		0: No 1: Yes		CONF_DES_CD01	Digital	R/W	102
C104	CD02	TIME_MIN_ENTRE_DES	Minimum timing between defrosting operations (minutes)	20	min	1	60	CONF_DES_CD02			
C105	CD02	TIME_MAX_ENTRE_DES	Maximum timing between defrosting operations (minutes)	40	min	1	60	CONF_DES_CD02			
C106	CD02	TIME_RED_ENTRE_DES	Timing reduction between defrosting operations (minutes)	5	min	1	60	CONF_DES_CD02			
C107	CD02	NUM_DES_INT	Number of defrosting operations for intelligent defrosting	2		1	20	CONF_DES_CD02			
C108	CD03	VAL_DES_MIN	Mandatory value for starting the defrosting by minimum temperature or pressure	2,5	bar	-25,0	50	CONF_DES_CD03	Analog	R/W	72
C109	CD03	TIME_MAX_DUR_DES_ MIN	Maximum time duration for defrosting by minimum pressure or temperature	240	s	60	600	CONF_DES_CD03	Integer	R/W	70
C110	CD04	VAL_DES_DIF	Difference between the outdoor temperature and the evaporation temperature measured to start the defrosting procedure	16,0	ºC	0	20	CONF_DES_CD04	Analog	R/W	73
	CD04	SET_TEMP_EXT_DES	Mandatory value for starting the defrosting by difference with outdoor temperature if the outdoor temp. is lower to this value	10,0	ºC	0	50	CONF_DES_CD04	Analog	R/W	123
C111	CD04	TIME_MAX_DUR_DES_ DIF	Maximum time duration for defrosting by difference with outdoor temperature	90	s	60	600	CONF_DES_CD04	Integer	R/W	71
C113	CD05	TIME_ENTRE_DES_DIF	Min. time between defrosting by difference with outdoor temperature	20	min	0	99	CONF_DES_CD05			
C114	CD06a	VAL_ON_VEXT_DES_OBL	On value of the outdoor fan by defrosting by low pressure	35,0	bar	0	50	CONF_DES_ CD06a	Analog	R/W	74
C115	CD06a	VAL_OFF_VEXT_DES_ OBL	OFF value of the outdoor fan by defrosting by low pressure	33,0	bar	0	50	CONF_DES_ CD06a	Analog	R/W	75
	CD06b	HAB_ON_VEXT_INI_DES	Enabling outdoor fan operation at the beginning of the defrosting	1: SI		0: No 1: Yes		CONF_DES_ CD06b	Digital	R/W	141
	CD06b	TIME_ON_VEXT_INI_DES	Running time outdoor fan at the start of the defrosting	45	s	0	120	CONF_DES_ CD06b	Integer	R/W	100
C116	CD07	VAL_INI_DES	Initial value for defrosting operation	5,6	bar	-10,0	50	CONF_DES_CD07	Analog	R/W	76
C117	CD07	VAL_FIN_DES	Defrosting end setpoint	33.0 bar	bar	0	50	CONF_DES_CD07	Analog	R/W	77
C118	CD08	TIME_RET_INICIO_DES	Time delay for starting defrosting	120	s	0	240	CONF_DES_CD08	Analog	R/W	72
C119	CD08	TIME_MIN_DUR_DES	Minimum timing for duration of defrosting (seconds)	30	s	10	120	CONF_DES_CD08	Integer	R/W	73
C120	CD08	TIME_MAX_DUR_DES	Maximum timing for duration of defrosting (minutes)	10	min	1	20	CONF_DES_CD08	Integer	R/W	74
C121	CD09	HAB_FIN_DES_POR_MIN	End of defrosting by the lowest temp. or pressure (case of single volume of air)	---		0: No 1: Yes		CONF_DES_CD09	Digital	R/W	103
C122	CD09	HAB_OFF_VINT_ DESESCARCHE	Enable water pump stoppage during defrosting	0: NO		0: No 1: Yes		CONF_DES_CD09	Digital	R/W	104
C123	CD10	HAB_RES_ DESESCARCHE	Enable electrical heaters during defrosting	0: NO		0: No 1: Yes		CONF_DES_CD10	Digital	R/W	105
C124	CD10	NUM_RES_ DESESCARCHE	Number of heaters during defrosting	0		0	2	CONF_DES_CD10	Integer	R/W	75
C127	CD12	HAB_DOUT_ DESESCARCHE	Enable unit output signal while defrosting	0: NO		0: No 1: Yes		CONF_DES_CD12			
C128	CD06b	SET_TEXT_VEXT_OFF_ DES	Outdoor temperature setpoint below bellow allowed starting outdoor fan during defrost	-6	ºC	-10,0	10	CONF_DES_ CD06b			

17.8. Parameters in the C200 menu: compressor configuration displays

TCO display	pGD1 display	Parameter	Description	Value by default	Units	Min.	Max.	Mask name	Type	R/W	Addr.
C201	CC01	TIME_MIN_OFF_COMP	Minimum stop time for a compressor	180	s	0	360	CONF_COMP_CC01	Integer	R/W	77
C202	CC01	TIME_MIN_ON_COMP	Minimum operating time for a compressor	120	s	0	360	CONF_COMP_CC01	Integer	R/W	78
C203	CC02	TIME_MIN_ON_ON_COMP	Minimum time between 2 start-ups of the same compressor	300	s	0	360	CONF_COMP_CC02	Integer	R/W	79
C204	CC02	TIME_MIN_ON_ON_ COMP_DIST	Minimum time between 2 start-ups of different compressors	60	s	0	60	CONF_COMP_CC02	Integer	R/W	80
C205	CC03	HAB_ROT_COMP	Enabling of the compressor rotation	1: Yes		0: No 1: Yes		CONF_COMP_CC03	Digital	R/W	107
	CC04	TIME_RET_ON_VINT_ CALOR	Time delay for activation of water pump after activation of heating stage	0	s	0	120	CONF_COMP_CC04			
C206	CC04	TIME_RET_ON_COMP_ ON_VINT	Time delay for activation of compressor after activation of water pump	30	s	0	120	CONF_COMP_CC04	Integer	R/W	81
	CC04	TIME_RET_ON_COMP_ ON_VEXT	Compressors start delay on the outdoor fan	10	s	10	120	CONF_COMP_CC04			
C207	CC05	HAB_OFF_COMPRESOR_ DES	Enable the compressor to be stopped by the defrosting operation	1: Yes		0:No 1:Yes		CONF_COMP_CC04	Digital	R/W	108
C208	CC05	TIME_OFF_COMP_DES	Timing for compressor during defrosting	45	s	0	120	CONF_COMP_CC04			
C209	CC06	TIME_CAMBIO_V4V	Time to change the 4-way valve after stopping the compressor	30	s	0	120	CONF_COMP_CC06			
C210	CC07	HAB_OFF_COMPRESOR_ CAMBIO_F_C	Enable stoppage for the compressor with COOLING/HEATING change	1: Yes		0:No 1:Yes		CONF_COMP_CC07	Digital	R/W	109
C211	CC07	TIME_OFF_COMP_ CAMBIO_F_C	Time stoppage for the compressor by COOLING/HEATING change	180	s	0	360	CONF_COMP_CC07			
C215	CC09	HAB_BLOQ_COMP_INV	Enable block compressor setpoint in winter based on the outdoor temp.	0: NO		0:No 1:Yes		CONF_COMP_CC09	Digital	R/W	110
C216	CC09	SET_BLOQ_COMP_INV	Block compressor setpoint in winter with free-cooling by low outdoor temperature	-10.0	ºC	-20,0	20	CONF_COMP_CC09	Analog	R/W	80

17.9. Parameters in the C300 menu: control configuration displays

TCO display	pGD1 display	Parameter	Description	Value by default	Units	Min.	Max.	Mask name	Type	R/W	Addr.
C301	CR01	CONTROL_P_PI	Type of control: proportional or proportional + integral	0: P		0: P 1: P+I		CONF_CONT_CR01	Digital	R/W	111
C302	CR01	TIME_INTEGRACION	Integration time for P+I control	600	s	0	999	CONF_CONT_CR01	Integer	R/W	83
C303	CR02	CONTROL_P_PI_IMP	Type of control: P or P+I for outlet water	1: P+I		0: P 1: P+I		CONF_CONT_CR02			
C304	CR02	TIME_INTEGRACION_IMP	Integration time P+I control of outlet water	120	s	0	999	CONF_CONT_CR02			
C305	CR03	VAL_INI_LIM_TEMP_IMP_ FRIO	Initial temperature limit value for outlet water in COOLING mode	5.0	ºC	0	30	CONF_CONT_CR03	Analog	R/W	81
C306	CR03	VAL_DIF_LIM_TEMP_IMP_ FRIO	Differential temperature limit value for outlet in COOLING mode	5,0	ºC	0	20	CONF_CONT_CR03	Analog	R/W	82
C307	CR04	VAL_INI_LIM_TEMP_IMP_ CALOR	Initial temperature limit value for outlet water in HEATING mode	50.0	ºC	0	60	CONF_CONT_CR04	Analog	R/W	83
C308	CR04	VAL_DIF_LIM_TEMP_IMP_ CALOR	Differential temperature limit value for outlet in HEATING mode	5,0	ºC	0	20	CONF_CONT_CR04	Analog	R/W	84
C317	CR07	BANDA_C_EVAP_VEXT	Evaporation control band for outdoor fan	2,0	BAR	0	99	CONF_CONT_CR07	Analog	R/W	90
C318	CR08	HAB_C_COND_VENT_EXT	Enable condens. control in outdoor fan	0: No		0:No 1:Yes		CONF_CONT_CR08	Digital	R/W	115
C319	CR08	SET_C_COND_VEXT	Setpoint condens. control for outdoor fan	27,0	BAR	0	99	CONF_CONT_CR08	Analog	R/W	91
C320	CR08	BANDA_C_COND_VEXT	Condens. control band for outdoor fan	8,0	BAR	0	99	CONF_CONT_CR08	Analog	R/W	92
C322	CR09	TIME_VEXT_ON_MAX_ COND	Time for maximum outdoor unit speed before condensation control	120s 30s (electr. / damper)	s	0	240	CONF_CONT_CR09			

17.9. Parameters in the C300 menu: control configuration displays (...continued)

TCO display	pGD1 display	Parameter	Description	Value by default	Units	Min.	Max.	Mask name	Type	R/W	Addr.
C323	CR10	TIME_OFF_VINT_FRIO	Time for stopping water pump in COOLING	60	s	0	120	CONF_CONT_CR10	Integer	R/W	84
C324	CR10	TIME_OFF_VINT_CALOR	Time for stopping water pump in HEATING	60	s	0	120	CONF_CONT_CR10	Integer	R/W	85
C325	CR11	TIME_OFF_VEXT_FRIO	Time for stopping outdoor fan in COOLING	60	s	0	120	CONF_CONT_CR11			
C326	CR11	TIME_OFF_VEXT_CALOR	Time for stopping outdoor fan in HEATING	60	s	0	120	CONF_CONT_CR11			
C327	CR12	HAB_VINT_CONT_ON_OFF	Enabling water pump in CONTINUOUS mode with ON-OFF cycles	0: NO		0: No 1: Yes		CONF_CONT_CR12			
C328	CR12	TIME_VINT_CONT_OFF	Time in continuous mode OFF pump	8	min	0	10	CONF_CONT_CR12			
C329	CR12	TIME_VINT_CONT_ON	Time in continuous mode ON pump	2	min	0	10	CONF_CONT_CR12			
C334	CR07	CONTROL_P_PI_C_EVAP_VEXT	Type of control: proportional or proportional + integral for outdoor unit evaporation control	0: P		0: P 1: P+I		CONF_CONT_CR07	Digital	R/W	121
C335	CR07	TIME_INT_C_EVAP_VEXT	Integration time for proportional + integral control for outdoor unit evaporation control	120	s	0	999	CONF_CONT_CR07	Integer	R/W	92
C336	CR08	CONTROL_P_PI_C_COND_VEXT	Type of control: proportional or proportional + integral for outdoor unit condensation control	0: P		0: P 1: P+I		CONF_CONT_CR08	Digital	R/W	122
C337	CR08	TIME_INT_C_COND_VEXT	Integration time for proportional + integral control for outdoor unit condensation control	120	s	0	999	CONF_CONT_CR08	Integer	R/W	93
C339	CR09	TIME_VEXT_ON_MAX_EVAP	Time for max. outdoor unit speed before condensation/evaporation control	120s 30s (electr. / damper)	s	0	240	CONF_CONT_CR09			

17.10. Parameters in the C400 menu: safety configuration displays

TCO display	pGD1 display	Parameter	Description	Value by default	Units	Min.	Max.	Mask name	Type	R/W	Addr.
C403	CS02	VAL_INI_AL_BP_CALOR	Initial value of LPalarm in HEATING mode	2,0	bar	-99,0	99	CONF_SEG_CS02			
C404	CS02	VAL_FIN_AL_BP_CALOR	Final value of LP alarm in HEATING mode	4,0	bar	-99,0	99	CONF_SEG_CS02			
C405	CS03	TIME_RET_AL_BP	Time delay for low pressure alarm	1	s	0	240	CONF_SEG_CS03	Integer	R/W	86
C406	CS03	DESHAB_AL_PB_DES	Disable low pressure alarm in defrosting	0: NO		0:No 1:Yes		CONF_SEG_CS03	Digital	R/W	116
C407	CS04	VAL_INI_AL_AP	Initial value of high pressure alarm	41,0	bar	0	99	CONF_SEG_CS04			
C408	CS04	VAL_FIN_AL_AP	Final value of high pressure alarm	30,0	bar	0	99	CONF_SEG_CS04			
C412	CS06	VAL_INI_AL_KLD	Initial value compr. discharge T alarm	135,0	ºC	0	200	CONF_SEG_CS06			
C413	CS06	VAL_FIN_AL_KLD	Final value compr. discharge T alarm	105,0	ºC	0	200	CONF_SEG_CS06			
C414	CS07	VAL_INI_AL_ANTIHIELO	Initial value of the anti-freeze alarm for air-water units by refrigerant temperature	-2.0 ºC	ºC	-10,0	50	CONF_SEG_CS07			
C415	CS07	VAL_DIF_AL_ANTIHIELO	Differential value of the anti-freeze alarm for air-water units by refrigerant temp.	8,0	ºC	0,0	50	CONF_SEG_CS07			
	CS07a	VAL_INI_AL_ANTIHIELO_AGUA	Initial value of the anti-freeze alarm for air-water units by water temperature	4,0	ºC	-10,0	50	CONF_SEG_CS07a			
	CS07a	VAL_DIF_AL_ANTIHIELO_AGUA	Initial value of the anti-freeze alarm for air-water units by water temperature	3,0	ºC	0,0	50	CONF_SEG_CS07a			
C420	CS09	TIME_RET_AL_CAUDAL	Time delay for the water flow alarm	30	s	0	120	CONF_SEG_CS09			
C421	CS09	TIME_RET_AL_TERM_VENT_INT	Time delay for alarm for water pump thermal	0 s	s	0	60	CONF_SEG_CS09	Integer	R/W	87
C424	CS11	SET_BAJ_TEMP_EXT	Low temperature setpoint for outdoor air	-10.0	ºC	-20,0	60	CONF_SEG_CS11	Analog	R/W	95
C425	CS11	SET_ALT_TEMP_EXT	High temperature setpoint for outdoor air	50,0	ºC	0	60	CONF_SEG_CS11	Analog	R/W	96
C426	CS12	TIME_RET_AL_TEMP	Time delay alarm for high and low temp.	10	min	0	99	CONF_SEG_CS12	Integer	R/W	88

17.11. Parameters in the C500 menu: alarm configuration displays

TCO display	pGD1 display	Parameter	Description	Value by default	Units	Min.	Max.	Mask name	Type	R/W	Addr.
C501	CA01	HAB_RL_AL_VINT	Enable alarm relay for water pump thermal	1: Yes		0: No # 1: Yes		CONF_ALAR_CA01			
C502	CA01	HAB_RL_AL_AP	Enable alarm relay due to high pressure failure	1: Yes		0: No # 1: Yes		CONF_ALAR_CA01			
C503	CA01	HAB_RL_AL_BP	Enable alarm relay due to low pressure failure	1: Yes		0: No # 1: Yes		CONF_ALAR_CA01			
C504	CA01	HAB_RL_AL_COMP	Enable alarm relay by compressor and outdoor fan thermal	1: Yes		0: No # 1: Yes		CONF_ALAR_CA01			
C505	CA01	HAB_RL_AL_KLD	Enable alarm relay by discharge temperature of the compressor	1: Yes		0: No # 1: Yes		CONF_ALAR_CA01			
C506	CA01	HAB_RL_AL_FS	Enable alarm relay due to clogged filter	1: Yes		0: No # 1: Yes		CONF_ALAR_CA01			
C507	CA02	HAB_RL_AL_FRE	Enable alarm relay due to refrigerant leak	1: Yes		0: No # 1: Yes		CONF_ALAR_CA02			
C509	CA02	HAB_RL_AL_IC	Enable alarm relay by flow interrupter	1: Yes		0: No # 1: Yes		CONF_ALAR_CA02			
C511	CA02	HAB_RL_AL_AES	Enable alarm relay due to anti-freeze leak	1: Yes		0: No # 1: Yes		CONF_ALAR_CA02			
C512	CA02	HAB_RL_AL_AH	Enable alarm relay by outlet water temperature	1: Yes		0: No # 1: Yes		CONF_ALAR_CA02			
C513	CA03	HAB_RL_AL_TREG	Enable alarm relay by high or low control temperature	1: Yes		0: No # 1: Yes		CONF_ALAR_CA03			
C514	CA03	HAB_RL_AL_TEXT	Enable alarm relay by high or low control outdoor air temperature	1: Yes		0: No # 1: Yes		CONF_ALAR_CA03			
C516	CA03	HAB_RL_AL_SRG	Enable alarm relay by opening or short-circuiting control probes	1: Yes		0: No # 1: Yes		CONF_ALAR_CA03			
C517	CA03	HAB_RL_AL_SCF	Enable alarm relay by opening or short-circuiting control probes of the cooling circuit	1: Yes		0: No # 1: Yes		CONF_ALAR_CA03			
C518	CA04	HAB_BQ_AL_AP	Enable high pressure alarm blocking	1: Yes		0: No # 1: Yes		CONF_ALAR_CA04			
C519	CA04	NUM_VECES_BQ_AL_AP	Number of times to block the unit due to high pressure alarm	4		0	20	CONF_ALAR_CA04			
C520	CA04	TIME_BQ_AL_AP	Time in minutes to count the nb. of times an alarm occurs for blocking due to high pressure	30	min	0	1440	CONF_ALAR_CA04			
C521	CA05	HAB_BQ_AL_BP	Enable low pressure alarm blocking	1: Yes		0: No # 1: Yes		CONF_ALAR_CA05			
C522	CA05	NUM_VECES_BQ_AL_BP	Number of times to block the unit due to low pressure alarm	4		0	20	CONF_ALAR_CA05			
C523	CA05	TIME_BQ_AL_BP	Time in min. to count the number of times an alarm occurs for blocking due to low pressure	30	min	0	1440	CONF_ALAR_CA05			
C524	CA06	HAB_BQ_AL_TERM	Enable Thermal Alarm Blocking	1: Yes		0: No # 1: Yes		CONF_ALAR_CA06			
C525	CA06	NUM_VECES_BQ_AL_TERM	Number of times to block the unit due to THERMAL alarm	4		0	20	CONF_ALAR_CA06			
C526	CA06	TIME_BQ_AL_TERM	Time in minutes to count the number of times an alarm occurs for blocking due to thermal	30	min	0	1440	CONF_ALAR_CA06			

17.12. Parameters in the C600 menu: unit initialisation displays

TCO display	pGD1 display	Parameter	Description	Value by default	Units	Min.	Max.	Mask name	Type	R/W	Addr.
C601	IU01	LANGUAGE	Language selection in the PGD1 terminal	0: Spanish		0: Spanish 1: French 2: English 3: Italian		INI_UNIDAD_01	Integer	R/W	89
C602	IU01	TIPO_LOGO	Select the logotype to insert in the main display of the PGD1	1: CARRIER		0	1	INI_UNIDAD_01			
C603	IU02	ERASE_PERM_MEM	Erase the permanent memory	0: No		0: No # 1: Yes		INI_UNIDAD_02			
C604	IU02	VIRT_PONTE	Manual activation by loading the default values	0: No		0: No # 1: Yes		INI_UNIDAD_02			
C605	IU03	RESET_EVENTOS	Reset the alarms log	0: No		0: No # 1: Yes		INI_UNIDAD_03			
C606	IU04	VIRT_VAL_ENSAYO	Manual activation by loading the default test values	0: No		0: No # 1: Yes		INI_UNIDAD_04			
C607	IU04	VIRT_VAL_NORMAL	Manual activation by loading the normal values	0: No		0: No # 1: Yes		INI_UNIDAD_04			

18. Carel and Modbus supervisory variables

18.1. 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.

18.2. Digital variables

Carel Address	Modbus record	Read / Write	Variable	Parameter type	Min. value	Max. value	Description
1	1	R	DIN_AP1	Digital input	0	1	High pressure pressostat
3	3	R	DIN_BP1	Digital input	0	1	Low pressure pressostat
5	5	R	DIN_TERM_COMP_VEXT_1	Digital input	0	1	Thermal of compressor(s) and outdoor fan(s)
7	7	R	DIN_TERMISTOR_R_ ELECTRICA	Digital input	0	1	Electrical heater(s) thermal protection
8	8	R	DIN_ON_OFF	Digital input	0	1	Remote off/on signal (0=off, 1=on)
9	9	R	DIN_CALOR_FRIO	Digital input	0	1	Remote COOLING/HEATING mode signal (0=COOLING, 1=HEATING)
11	11	R	DIN_FILTRO_SUCIO	Digital input	0	1	Clogged filter control signal
12	12	R	DIN_TERM_VENT_INT	Digital input	0	1	Overloading the water pump
13	13	R	DIN_KLD1	Digital input	0	1	Protection of discharge temperature limit of compressor(s)
15	15	R	DIN_INT_CAUDAL_AGUA	Digital input	0	1	Digital input for water flow controller
16	16	R	DIN_BOMBA_CONDENSADOS	Digital input	0	1	Digital input for condensate pump failure
17	17	R	DIN_DESESCARCHE_C1	Digital input	0	1	Digital input for defrosting signal from another board
18	18	R	HAB_FRIO	Status	0	1	COOLING (summer) operation mode
19	19	R	HAB_CALOR	Status	0	1	HEATIING (winter) operation mode
20	20	R	VENT_INTERIOR_V1	Digital output	0	1	Water pump (speed 1 = slow)
21	21	R	VENT_INTERIOR_V2	Digital output	0	1	Water pump (speed 2 = medium)
22	22	R	VENT_INTERIOR_V3	Digital output	0	1	Water pump (speed 3 = fast) or the only speed
23	23	R	COMPRESOR_1	Digital output	0	1	Contact of compressor 1
24	24	R	COMPRESOR_2	Digital output	0	1	Contact of compressor 2
27	27	R	VIC_1	Digital output	0	1	Cycle reversing valve
29	29	R	VENT_EXTERIOR_1	Digital output	0	1	Outdoor fan (low-speed in 2-speed fan)
31	31	R	CAL_ELECTRICA_1	Digital output	0	1	Contact of the 1st electrical heater stage
33	33	R/W	SYS_ON	Comands	0	1	Unit OFF / ON (0: OFF; 1: ON)
34	34	R	SYS_ON1	Status	0	1	Display of OFF / ON unit status (0: OFF; 1: ON)
35	35	R/W OEM	UNICO_VOL_AIRE_EXT	Configuration	0	1	Enabling operation of a single volume of outdoor air (0=double, 1=single)
36	36	R/W	SET_DATE	RTC	0	1	Activate time and date change (0: No; 1: Yes)
37	37	R/W	MODO_VENT_AUTO	Comands	0	1	Enabling operation of the water pump in AUTO mode (0=continuous, 1=automatic)
38	38	R	GLOBAL_ALARM	Alarm	0	1	General alarm
39	39	R	RELE_ALARMA	Digital output	0	1	Alarm relay
40	40	R/W OEM	RESET_ALARMS	Alarm	0	1	Alarms reset (0: No; 1: Yes)

Carel Address	Modbus record	Read / Write	Variable	Parameter type	Min. value	Max. value	Description
41	41	R	mAL_TERM_VENT_INT	Alarm	0	1	Alarm due to water pump thermal
42	42	R	mAL_AP1	Alarm	0	1	Alarm due to high pressure
44	44	R	mAL_BP1	Alarm	0	1	Alarm due to low pressure
46	46	R	mAL_KLD1	Alarm	0	1	Discharge temperature limit of compressor(s) exceeded
48	48	R	mAL_TERM_COMP_VEXT_1	Alarm	0	1	Alarm due to thermal of compressor(s) and outdoor fan(s)
50	50	R	mAL_TERMISTOR_R_ELECTRICA	Alarm	0	1	Alarm due to thermal of electrical heaters
51	51	R	mAL_FUGA_REFRIG_C1	Alarm	0	1	Alarm due to refrigerant leak
53	53	R	mAL_ANTIESCARCHE_C1	Alarm	0	1	Alarm due to anti-freeze safety
55	55	R	mAL_CAUDAL_AGUA	Alarm	0	1	Water flow controller alarm
56	56	R	mAL_BAJA_TEMP_IMP_AGUA	Alarm	0	1	Alarm due to low temperature for outlet water
60	60	R	mAL_TEMP_RET	Alarm	0	1	Alarm due to failure of water inlet temperature probe
61	61	R	mAL_T_P_BINT_C1	Alarm	0	1	Alarm due to failure of indoor temperature/pressure coil sensor
63	63	R	mAL_T_P_BEXT_C1	Alarm	0	1	Alarm due to failure of outdoor temperature/pressure coil sensor
65	65	R	mAL_TEMP_DES_C1	Alarm	0	1	Alarm due to failure of discharge temperature probe
67	67	R	mAL_TEMP_EXT	Alarm	0	1	Alarm due to failure of outdoor temperature probe
68	68	R	mAL_TEMP_IMP	Alarm	0	1	Alarm due to failure of outlet temperature probe
72	72	R	mAL_ALT_TEMP	Alarm	0	1	Alarm due to high temperature of water inlet
73	73	R	mAL_BAJ_TEMP	Alarm	0	1	Alarm due to low temperature of water inlet
74	74	R	mAL_ALT_TEMP_EXT	Alarm	0	1	Alarm due to high outdoor air temperature
75	75	R	mAL_BAJ_TEMP_EXT	Alarm	0	1	Alarm due to low outdoor air temperature
76	76	R	PERM_MEM_ERROR	Alarm	0	1	Error in acquiring data - EEPROM
77	77	R	CLOCK_ERROR	Alarm	0	1	Clock failure
81	81	R/W	HAB_PROG_HORARIA	RTC	0:No; 1:Yes		Enabling schedule programming
82	82	R	OFF_PROG_HOR	Status	0	1	Signalling of the unit OFF by schedule programming
83	83	R/W	HAB_TEMP_RET	Regulation	0	1	Enabling of the inlet water temperature probe
85	85	R/W	HAB_OFF_COMPUERTA_INI_CALOR	Regulation	0	1	Select damper position at start-up (0=normal, 1=closed)
86	86	R/W OEM	HAB_COMPENSACION	Regulation	0:No; 1:Yes		Enable setpoint compensation in accordance with the outdoor temp.
87	87	R/W	HAB_ONOFF_REMOTO	Regulation	0:No; 1:Yes		Enable remote ON / OFF
88	88	R/W	HAB_CALOR_FRIO_REMOTO	Regulation	0:No; 1:Yes		Enable remote HEATING / COOLING mode
89	89	R/W OEM	HAB_FILTRO1	Service	0:No; 1:Yes		Enable the probe filter
90	90	R/W OEM	RESET_ON_HORAS	Service	0:No; 1:Yes		Reset the counter for number of hours of operation
91	91	R/W OEM	RESET_ON_CONT	Service	0:No; 1:Yes		Reset the counter for starts of motors and electrical heaters
92	92	R/W OEM	RESET_DES_CONT	Service	0:No; 1:Yes		Reset the counter for number of defrosting procedures
93	93	R/W OEM	HAB_TEMP_BINT	Configuration	0	1	Indoor coil with temperature probe (eliminates pressure transducer) (0=Pressure, 1=Temperature)
94	94	R/W OEM	HAB_TEMP_BEXT	Configuration	0	1	Outdoor coil with temperature probe (eliminates pressure transducer) (0=Pressure, 1=Temperature)
100	100	R/W OEM	HAB_DES_TIEMPO	Defrost	0:No; 1:Yes		Enabling defrosting procedures by time
101	101	R/W OEM	HAB_DES_MIN	Defrost	0:No; 1:Yes		Enabling defrosting procedures by minimum pressure/temperature
102	102	R/W OEM	HAB_DES_DIF	Defrost	0:No; 1:Yes		Enabling defrosting procedure by difference between evaporation temperature and outdoor temperature
103	103	R/W OEM	HAB_FIN_DES_MIN	Defrost	0:No; 1:Yes		End of defrosting with the lowest pressure or temperature (with single volumen of air)
104	104	R/W OEM	HAB_OFF_VINT_DESESCARCHE	Defrost	0:No; 1:Yes		Stopping the water pump during defrosting

Carel Address	Modbus record	Read / Write	Variable	Parameter type	Min. value	Max. value	Description
105	105	R/W OEM	HAB_RES_DESESCARCHE	Defrost	0:No; 1:Yes		Enabling electrical heaters during defrosting
107	107	R/W OEM	HAB_ROT_COMP	Compressor	0:No; 1:Yes		Enabling of the compressor rotation
108	108	R/W OEM	HAB_OFF_COMPRESOR_DES	Compressor	0:No; 1:Yes		Stopping the compressors before defrosting
109	109	R/W OEM	HAB_OFF_COMPRESOR_CAMBIO_F_C	Compressor	0:No; 1:Yes		Stopping the compressors before a HEATING / COOLING change
110	110	R/W OEM	HAB_BLOQ_COMP_INV	Compressor	0:No; 1:Yes		Disable compressors in HEATING mode (winter) due to a low outdoor T.
111	111	R/W OEM	CONTROL_P_PI	Fan	0	1	Type of temp. control: Proportional (P) or Proportional + Integral (P+)
112	112	R/W OEM	HAB_C_EVAP_VENT_INT	Fan	0:No; 1:Yes		Enabling evaporation control of the water pump
113	113	R/W OEM	HAB_C_COND_VENT_INT	Fan	0:No; 1:Yes		Enabling condensation control of the water pump
114	114	R/W OEM	HAB_C_EVAP_VENT_EXT	Fan	0:No; 1:Yes		Enabling evaporation control of the outdoor fan
115	115	R/W OEM	HAB_C_COND_VENT_EXT	Fan	0:No; 1:Yes		Enabling condensation control of the outdoor fan
116	116	R/W OEM	DESHAB_AL_PB_DES	Alarm	0:No; 1:Yes		Cancel the low pressure pressostat during defrosting procedures
117	117	R/W OEM	HAB_RELE_ALARMA_POR_MASK	Alarm	0:No; 1:Yes		Relay activation with selected active alarms in display
121	121	R/W OEM	CONTROL_P_PI_C_EVAP_VEXT	Fan	0: P; 1: P+I		Type of control: proportional (P) or proportional + integral (P+I) for outdoor unit evaporation control
122	122	R/W OEM	CONTROL_P_PI_C_COND_VEXT	Fan	0: P; 1: P+I		Type of control: proportional (P) or proportional + integral (P+I) for outdoor unit condensation control
123	123	R/W OEM	HAB_RES_SIN_COMPRESOR	Configuration	0:No; 1:Yes		Enabling electric heaters for replacing the compressors
124	124	R/W OEM	OFF_COMPUERTA_AL_INCENDIO	Alarm	0	1	Outdoor damper status with anti-fire alarm (0=opened, 1=closed)
126	126	R/W OEM	RESET_TIME_COMPRESOR	Service	0:No; 1:Yes		Compressors timers reset
127	127	R	mAL_INCENDIO	Alarm	0	1	Serious alarm of the anti-fire thermostat
128	128	R	mAL_ANTIHIELO_REF_C1	Alarm	0	1	Anti-freeze refrigerant alarm
130	130	R	mAL_BQ_ANTIHIELO	Alarm	0	1	Unit blocking due to anti-freeze refrigerant alarm
131	131	R/W OEM	RESET_AL_BQ_ANTIHIELO	Alarm	0:No; 1:Yes		Reset of unit blocking due to anti-freeze refrigerant alarm
132	132	R/W	VAR_DIGITAL_AUX_PVPRO_1	Special	0	1	Digital variable No.1 saved for the PVPRO
133	133	R/W	VAR_DIGITAL_AUX_PVPRO_2	Special	0	1	Digital variable No.2 saved for the PVPRO
134	134	R	DESESCARCHE_ON	Status	0	1	Defrosting operation signal
135	135	R	VENT_EXTERIOR_1_ALTA	Digital output	0	1	High-speed of the outdoor fan
137	137	R	COMPRESOR_ON	Status	0	1	Display of the compressors status
138	138	R	RES_ELECTRICA_ON	Status	0	1	Display of the electrical heaters operation
139	139	R	NOT_SYS_ON1	Status	0	1	Display of the unit OFF
140	140	R/W	AUTOSTART	Regulation	0:No; 1:Yes		Enable automatic start-up after blocking / power cut
141	141	R/W OEM	HAB_ON_VEXT_INI_DES	Defrost	0:No; 1:Yes		Outdoor fan connection in the defrosting start
142	142	R/W	HAB_CONEXION_SONDA_EP_BP	Configuration	0	1	0: coil; 1: HP & LP
143	143	R/W	HAB_TEMP_ASP_COMP	Configuration	0:No; 1:Yes		Enable compressor aspiration temperature probe
144	144	R	mAL_TEMP_ASP_C1	Alarm	0	1	Alarm of temp. probe on the compressor aspiration
146	146	R	mAL_T_P_AP_C1	Alarm	0	1	Alarm of high pressure transducer
147	147	R	mAL_T_P_BP_C1	Alarm	0	1	Alarm of low pressure transducer
150	150	R/W	HAB_VALVULA_EXP_ELECTRONICA	Configuration	0:No; 1:Yes		Enable of the unipolar electronic expansion valve
151	151	R	COMPRESOR_ON_TEMP_SPV	Status	0	1	compressor time delay start signal

18.3. Analogue variables

Carel Addr.	Modbus record	Read / Write	Variable	Parameter type	UOM	Min. value	Max. value	Description
1	1	R	TEMP_REG	Analog input	°C	0	99999	Temperature of the water inlet
2	2	R	TEMP_EXT	Analog input	°C			Outdoor air temperature
3	3	R	T_P_BEXT_C1	Analog input	bar/C			Pressure or temperature of outdoor coil
7	7	R	TEMP_IMP	Analog input	°C			Temperature of the outlet water
9	9	R	TEMP_DES_C1	Analog input	°C			Discharge temperature
11	11	R	T_P_BINT_C1	Analog input	bar/C			Pressure or temperature of indoor coil
14	14	R	AOUT_COMPUERTA	Analog output	%			Outdoor air damper outlet
15	15	R	AOUT_COMPRESOR_INV	Analog output	%			Proportional outlet for compressor inverter
17	17	R	AOUT_VEN_INT	Analog output	%			Proportional outlet for indoor electronic pump
18	18	R	AOUT_VEN_EXT1	Analog output	%			Proportional outlet for outdoor electronic fan
20	20	R/W	SET_POINT_TEMP	Comands	°C	MIN_SET_ POINT_TEMP	MAX_SET_ POINT_TEMP	Temperature setpoint
21	21	R	SET_POINT_TEMP_HORARIO	Status				Temperature setpoint for schedule programming
24	24	R	VER_SOFTWARE	Status				View software version installed on the microPC board
25	25	R/W	MIN_SET_POINT_TEMP	Regulation	°C	0	50.0	Lower temperature setpoint limit
26	26	R/W	MAX_SET_POINT_TEMP	Regulation	°C	0	50.0	Upper temperature setpoint limit
27	27	R/W	BANDA	Regulation	°C	0	60.0	Temperature control band
28	28	R/W	ZONA_MUERTA	Regulation	°C	5.0	60.0	Temperature control dead zone
38	38	R/W	BANDA_RES	Regulation	°C	0	6.0	Control of the electrical heaters: Band
39	39	R/W	OFFSET_RES	Regulation	°C	0	10.0	Control of the electrical heaters: Offset
42	42	R/W	SET_COMP_EXT_FRIO	Regulation	°C	20.0	50.0	Compensation of the setpoint based on the outdoor temperature in COOLING mode (summer): setpoint
43	43	R/W	VAL_DIF_COMP_EXT_FRIO	Regulation	°C	0	10.0	Compensation of the setpoint based on the outdoor temperature in COOLING mode (summer): differential
44	44	R/W	MAX_COMP_EXT_FRIO	Regulation	°C	0	10.0	Maximum compensation of the setpoint based on the outdoor temperature in COOLING mode (summer)
45	45	R/W	SET_COMP_EXT_CALOR	Regulation	°C	0	20.0	Compensation of the setpoint based on the outdoor temperature in HEATING mode (winter): setpoint
46	46	R/W	VAL_DIF_COMP_EXT_CALOR	Regulation	°C	0	10.0	Compensation of the setpoint based on the outdoor temperature in HEATING mode (winter): differential
47	47	R/W	MAX_COMP_EXT_CALOR	Regulation	°C	0	10.0	Maximum compensation of the setpoint based on the outdoor temperature in HEATING mode (winter)
48	48	R/W OEM	TAR_AN1	Service		-20.0	20.0	Calibration probe B1
49	49	R/W OEM	TAR_AN2	Service		-20.0	20.0	Calibration probe B2
50	50	R/W OEM	TAR_AN3	Service		-20.0	20.0	Calibration probe B3
51	51	R/W OEM	TAR_AN4	Service		-20.0	20.0	Calibration probe B4
52	52	R/W OEM	TAR_AN5	Service		-20.0	20.0	Calibration probe B5
53	53	R/W OEM	TAR_AN6	Service		-20.0	20.0	Calibration sensor B6
54	54	R/W OEM	TAR_AN7	Service		-20.0	20.0	Calibration sensor B7
62	62	R/W OEM	LIM_MIN_PRES	Service	bar	-1.0	50.0	Lower limit of the pressure transducer
63	63	R/W OEM	LIM_MAX_PRES	Service	bar	0	50.0	Upper limit of the pressure transducer
64	64	R/W OEM	SET_IMPULSION_CALOR_ APERT_COMP	Configuration	°C	0	50.0	Outlet temperature setpoint in HEATING mode for turning OFF the outdoor air damper
65	65	R/W OEM	SET_RETORNO_CALOR_ APERT_COMP	Configuration	°C	0	50.0	Inlet water temperature setpoint in HEATING mode for turning OFF the outdoor air damper
66	66	R/W OEM	BANDA_RETORNO_CALOR_ APERT_COMP	Configuration	°C	0	50.0	Band of the inlet water setpoint in HEATING mode for turning OFF the outdoor air damper
67	67	R/W OEM	SET_IMPULSION_FRIO_ APERT_COMP	Configuration	°C	0	50.0	Outlet temperature setpoint in COOLING mode for turning OFF the outdoor air damper
68	68	R/W OEM	SET_RETORNO_FRIO_ APERT_COMP	Configuration	°C	0	50.0	Inlet water temperature setpoint in COOLING mode for turning OFF the outdoor air damper
69	69	R/W OEM	BANDA_RETORNO_FRIO_ APERT_COMP	Configuration	°C	0	50.0	Band of the inlet water setpoint in COOLING mode for turning OFF the outdoor air damper

Carel Addr.	Modbus record	Read / Write	Variable	Parameter type	UOM	Min. value	Max. value	Description
72	72	R/W OEM	VAL_DES_MIN	Defrost	bar/C	5.0	50.0	Defrosting setpoint by minimum pressure/temperature
73	73	R/W OEM	VAL_DES_DIF	Defrost	°C	0	20.0	Defrosting setpoint by difference between evaporation temperature and outdoor temperature
74	74	R/W OEM	VAL_ON_VEXT_DES_OBL	Defrost	bar/C	0	50.0	Outdoor fan connection setpoint during the defrosting procedure
75	75	R/W OEM	VAL_OFF_VEXT_DES_OBL	Defrost	bar/C	0	50.0	Outdoor fan stopping setpoint during the defrosting procedure
76	76	R/W OEM	VAL_INI_DES	Defrost	bar/C	-10.0	50.0	Start defrosting setpoint
77	77	R/W OEM	VAL_FIN_DES	Defrost	bar/C	-50	50	End defrosting setpoint
80	80	R/W OEM	SET_BLOQ_COMP_INV	Compressor	°C	0	20.0	Block compressor setpoint in HEATING mode (winter) by outdoor temperature
81	81	R/W OEM	VAL_INI_LIM_TEMP_IMP_FRIO	Fan	°C	0	30.0	Setpoint for control of minimum outlet temperature in COOLING mode (summer)
82	82	R/W OEM	VAL_DIF_LIM_TEMP_IMP_FRIO	Fan	°C	0	20.0	Differential for control of minimum outlet temperature in COOLING mode (summer)
83	83	R/W OEM	VAL_INI_LIM_TEMP_IMP_CALOR	Fan	°C	0	60.0	Setpoint for control of maximum outlet temperature in HEATING mode (winter)
84	84	R/W OEM	VAL_DIF_LIM_TEMP_IMP_CALOR	Fan	°C	0	20.0	Differential for control of maximum outlet temperature in HEATING mode (winter)
89	89	R/W OEM	SET_C_EVAP_VEXT	Fan	bar/C	0	100.0	Evaporation control setpoint for outdoor fan
90	90	R/W OEM	BANDA_C_EVAP_VEXT	Fan	bar/C	0	100.0	Evaporation control band for outdoor fan
91	91	R/W OEM	SET_C_COND_VEXT	Fan	bar/C	0	100.0	Condensation control setpoint for outdoor fan
92	92	R/W OEM	BANDA_C_COND_VEXT	Fan	bar/C	0	100.0	Condensation control band for outdoor fan
93	93	R/W	SET_BAJ_TEMP	Alarm	°C	0	60.0	Lower limit of low inlet water temperature
94	94	R/W	SET_ALT_TEMP	Alarm	°C	0	60.0	Upper limit of high inlet water temperature
95	95	R/W	SET_BAJ_TEMP_EXT	Alarm	°C	0	60.0	Lower limit of low outdoor air temperature
96	96	R/W	SET_ALT_TEMP_EXT	Alarm	°C	0	60.0	Upper limit of high outdoor air temperature
97	97	R	SET_POINT_TEMP_CAL	Status	°C			Setpoint calculated depending on the compensation of the outdoor temperature
98	98	R	TEMP_CAL_BEXT_C1	Analog input	°C	-99.0	99.0	Temperature calculated for the outdoor coil
100	100	R	TEMP_CAL_BINT_C1	Analog input	°C	-99.0	99.0	Temperature calculated for the indoor coil
107	107	R/W	VAR_ANALOGICA_AUX_PVPRO_1	Special		-99.9	99.9	Analogue variable No.1 saved for the PVPRO
108	108	R/W	VAR_ANALOGICA_AUX_PVPRO_2	Special		-99.9	99.9	Analogue variable No.2 saved for the PVPRO
109	109	R/W	SET_HAB_RES_TEMP_EXT	Regulation	°C	-99.0	99.0	Setpoint for electrical heaters enabling due to the low outdoor temperature
110	110	R/W OEM	DIF_TEMP_RENOVACION_CAL	Service	°C	0	9.9	Temperatures differential for the calculated renovation
111	111	R	T_P_BP_C1	Analog input	bar	-99.0	99.0	
112	112	R	T_P_AP_C1	Analog input	bar	-99.0	99.0	
115	115	R	TEMP_CAL_BP_C1	Analog input	°C	-99.0	99.0	
116	116	R	TEMP_CAL_AP_C1	Analog input	°C	-99.0	99.0	
119	119	R	TEMP_ASP_C1	Analog input	°C	-99.0	99.0	
121	121	R/W	A50_SH_SET_msk	Service	°C	-72.0	324.0	
122	122	R	A10_SH_SH	Status	°C	-72.0	324.0	
123	123	R/W	SET_TEMP_EXT_DES	Defrost	°C	0,0	50,0	Mandatory value for starting the defrosting by difference with outdoor temp. , if the outdoor temp. is lower to this value
124	124	R/W	A83_SH_SET_2ND_msk	Service	°C	-72.0	324.0	
125	125	R	A68_SH_SH_2ND	Status	°C	-72.0	324.0	
127	127	R/W	SET_POINT_TEMP_AGUA_FRIO	Comands	°C	10.0	20.0	Temperature setpoint of the water in COOLING mode
128	128	R/W	SET_POINT_TEMP_AGUA_ CALOR	Comands	°C	35.0	55.0	Temperature setpoint of the water in HEATING mode
129	129	R/W	MIN_SET_POINT_TEMP_AGUA_ FRIO	Regulation	°C	0	50.0	Minimum temperature setpoint of the water in COOLING mode
130	130	R/W	MAX_SET_POINT_TEMP_AGUA_ FRIO	Regulation	°C	0	50.0	Maximum temperature setpoint of the water in COOLING mode
131	131	R/W	MIN_SET_POINT_TEMP_AGUA_ CALOR	Regulation	°C	0	50.0	Minimum temperature setpoint of the water in HEATING mode
132	132	R/W	MAX_SET_POINT_TEMP_AGUA_ CALOR	Regulation	°C	0	55.0	Maximum temperature setpoint of the water in HEATING mode
133	133	R	TEMP_IMP_C1	Analog input	°C	-99.0	99.0	

18.4. Integer variables

Carel Address	Modbus record	Read / Write	Variable	Parameter type	UOM	Min. value	Max. value	Description
1	209	R/W	MODO_FUNCIONAMIENTO	Comands				Selection of operating mode (3=COOLING, 4=HEATING)
3	211	R/W OEM	TIPO_EQUIPO	Configuration				Selection of the type of unit (0=air-air, 1=water-air, 2: air-water)
4	212	R/W OEM	TIPO_MAQUINA	Configuration				Selection of the type of machine (0=only cooling, 1=rev. heat pump)
5	213	R/W OEM	NUM_CIRCUITOS	Configuration				Number of circuits installed (1=1 circuit)
6	214	R/W OEM	NUM_COMPRESORES	Configuration				Number of compressors installed (1=1 comp. / 2=2 comp)
7	215	R/W OEM	NUM_RESISTENCIAS	Configuration				Number of stages of electrical heaters installed (0=No, 1=1 stage)
8	216	R/W OEM	TIPO_VENT_INT	Configuration				Type of water pump (1=std, 4=electronic)
9	217	R/W OEM	TIPO_VENT_EXT	Configuration				Type of outdoor fan (1=centrif., 2=radial , 3=2-speeds,4=electronic)
11	219	R	CURRENT_MINUTE	Status	min	0	59	Clock setting: minutes
12	220	R	CURRENT_HOUR	Status	h	0	23	Clock setting: hour
13	221	R	CURRENT_DAY	Status		0	31	Clock setting: day
14	222	R	CURRENT_MONTH	Status		1	12	Clock setting: month (1: January ... 12: December)
15	223	R	CURRENT_YEAR	Status		0	99	Clock setting: year
16	224	R/W	NEW_MINUTE	RTC		0	59	Clock setting: new minute
17	225	R/W	NEW_HOUR	RTC		0	23	Clock setting: new hour
18	226	R/W	NEW_DAY	RTC		0	31	Clock setting: new day
19	227	R/W	NEW_MONTH	RTC		0	12	Clock setting: new month
20	228	R/W	NEW_YEAR	RTC		0	99	Clock setting: new year
21	229	R	N_ARR_V_INT_H	Status				Number of starts of the water pump (high level)
22	230	R	N_ARR_V_INT_L	Status				Number of starts of the water pump (low level)
23	231	R	N_ARR_COMP1_H	Status				Number of starts of compressor 1 (high level)
24	232	R	N_ARR_COMP1_L	Status				Number of starts of compressor 1 (low level)
25	233	R	N_ARR_COMP2_H	Status				Number of starts of compressor 2 (high level)
26	234	R	N_ARR_COMP2_L	Status				Number of starts of compressor 2 (low level)
31	239	R	N_ARR_RES1_H	Status				Number of starts of electrical heater No. 1 (high level)
32	240	R	N_ARR_RES1_L	Status				Number of starts of electrical heater No. 1 (low level)
35	243	R	N_HOR_VINT_H_X	Status				Operating hours of the water pump (high level)
36	244	R	N_HOR_VINT_L_X	Status				Operating hours of the water pump (low level)
37	245	R	N_HOR_COMP1_H_X	Status				Operating hours of compressor 1 (high level)
38	246	R	N_HOR_COMP1_L_X	Status				Operating hours of compressor 1 (low level)
39	247	R	N_HOR_COMP2_H_X	Status				Operating hours of compressor 2 (high level)
40	248	R	N_HOR_COMP2_L_X	Status				Operating hours of compressor 2 (low level)
45	253	R	N_HOR_CAL_ELEC1_H_X	Status				Operating hours of electrical heater No. 1 (high level)
46	254	R	N_HOR_CAL_ELEC1_L_X	Status				Operating hours of electrical heater No. 1 (low level)
49	257	R	N_DES_C1_H	Status				Number of defrosting procedures (high level)
50	258	R	N_DES_C1_L	Status				Number of defrosting procedures (low level)
53	261	R	N_SEG_ULT_DES_C1	Status				Number of seconds of the final defrosting procedure
55	263	R	MODO_ON_OFF	Status		0	2	View the operating mode
56	264	R	ESTADO_MAQUINA	Status				Unit state (0=OFF, 1=ON, 2=OFF rem, 3=OFF clock, 4=OFF eco)
57	265	R	NUM_AL	Status				Number of active alarms
58	266	R	INFO_EQUIPO_1	Status		0	99	View the type of unit, machine and electrical heaters
59	267	R	INFO_EQUIPO_2	Status		0	99	View the number of compressors, outdoor & indoor unit type
65	273	R/W OEM	TIME_FILTRO1	Service	sec	0	99	Timing for the probe filter
66	274	R/W OEM	DT_FILTRO1	Service	°C	0	90	Difference for the probe filter
67	275	R/W OEM	TIPO_DIN5	Configuration				Digital input set-up 5 (2=flow controller)
68	276	R/W OEM	TIPO_DIN6	Configuration				Digital input set-up 6 (0=cooling/heating,)

Carel Address	Modbus record	Read / Write	Variable	Parameter type	UOM	Min. value	Max. value	Description
69	277	R/W OEM	TIPO_REFRIGERANTE	Configuration		4: R410A		Refrigerant type (0=R22, 1=R134A, 2=R404A, 3=R407C, 4=R410A)
70	278	R/W OEM	TIME_MAX_DUR_DES_MIN	Defrost	sec	60	600	Max. length of time for the defrosting due to minimum pressure/temp.
71	279	R/W OEM	TIME_MAX_DUR_DES_DIF	Defrost	sec	60	600	Maximum length of time for the defrosting due to the difference between evaporation temperature and outdoor T
72	280	R/W OEM	TIME_RET_INICIO_DES	Defrost	sec	0	240	Initial defrosting time
73	281	R/W OEM	TIME_MIN_DUR_DES	Defrost	sec	10	120	Minimum defrosting time
74	282	R/W OEM	TIME_MAX_DUR_DES	Defrost	min	1	20	Maximum defrosting time
75	283	R/W OEM	NUM_RES_DESESCARCHE	Defrost		0	1	Electrical heaters during defrosting operations (0: 0; 1: 1)
77	285	R/W OEM	TIME_MIN_OFF_COMP	Compressor	sec	0	360	Minimum stop time for a compressor
78	286	R/W OEM	TIME_MIN_ON_COMP	Compressor	sec	0	360	Minimum operating time for a compressor
79	287	R/W OEM	TIME_MIN_ON_ON_COMP	Compressor	sec	0	360	Minimum time between start-up of the same compressor
80	288	R/W OEM	TIME_MIN_ON_ON_ COMP_DIST	Compressor	sec	0	60	Minimum time between start-up of various compressors
81	289	R/W OEM	TIME_RET_COMP_TRAS_ VINT	Compressor	sec	0	120	Delay the start of compressors after start of the water pump
83	291	R/W OEM	TIME_INTEGRACION	Fan	sec	0	999	Integral time for proportional + integral control (P+I)
84	292	R/W OEM	TIME_OFF_VINT_FRIO	Fan	sec	0	120	Delay in stopping the compresor after stopping the water pump in COOLING mode
85	293	R/W OEM	TIME_OFF_VINT_CALOR	Fan	sec	0	120	Delay in stopping the compresor after stopping the water pump in HEATING mode
86	294	R/W OEM	TIME_RET_AL_BP	Alarm	sec	0	240	Delay in low pressure alarm
87	295	R/W OEM	TIME_RET_AL_TERM_VINT	Alarm	sec	0	60	Delay in alarm of iwater pump thermal
88	296	R/W	TIME_RET_AL_TEMP	Alarm	min	0	99	Delay in high/low temperature alarm
89	297	R/W	LANGUAGE	Regulation				Selection of the language of the software installed on the mPC board (0: Spanish; 1: French; 2: English; 3: Italian)
92	300	R/W	TIME_INT_C_EVAP_VEXT	Fan	sec	0	999	Integration time for P+I control for outdoor unit evap.control
93	301	R/W	TIME_INT_C_COND_VEXT	Fan	sec	0	999	Integration time for P+I control for outdoor unit cond. control
94	302	R/W	DESCONEXION_NUM_ COMPRESORES	Comands		0	NUM_ COMPRESORES	Nb of compressor stages to disconnect
95	303	R/W	DESCONEXION_NUM_ RESISTENCIAS	Comands				Nb of electrical heater st. to disconnect (0: 0%; 4: 100%)
96	304	R/W	MAX_APERTURA_ COMPUERTA	Configuration	%	0	100	Maximum opening of the outdoor air damper
97	305	R/W	VAR_ENTERA_AUX_ PVPRO_1	Special		-999	999	Integer variable No.1 saved for the PVPRO
98	306	R/W	VAR_ENTERA_AUX_ PVPRO_2	Special		-999	999	Integer variable No.2 saved for the PVPRO
99	307	R/W	TIME_ON_AUTOSTART	Regulation	sec	5	999	Automatic start time after blocking
100	308	R/W OEM	TIME_ON_VEXT_INI_DES	Defrost	sec	0	120	Outdoor fan connection time in the defrosting start
101	309	R/W	NUM_WO_DIG_1	Configuration	---	0	9	Work Order Number of unit - DIGIT 1
102	310	R/W	NUM_WO_DIG_2	Configuration	---	0	9	Work Order Number of unit - DIGIT 2
103	311	R/W	NUM_WO_DIG_3	Configuration	---	0	9	Work Order Number of unit - DIGIT 3
104	312	R/W	NUM_WO_DIG_4	Configuration	---	0	9	Work Order Number of unit - DIGIT 4
105	313	R/W	NUM_WO_DIG_5	Configuration	---	0	9	Work Order Number of unit - DIGIT 5
106	314	R/W	NUM_WO_DIG_6	Configuration	---	0	9	Work Order Number of unit - DIGIT 6
107	315	R/W	NUM_WO_DIG_7	Configuration	---	0	9	Work Order Number of unit - DIGIT 7
108	316	R/W	NUM_WO_DIG_8	Configuration	---	0	9	Work Order Number of unit - DIGIT 8
111	319	R/W	MIN_APERTURA_ COMPUERTA	Regulation	%	0	100	Minimum opening of the outdoor air damper
114	322	R/W	NUM_INTERCAMBIADOR_ PLACAS	Configuration	---	1	2	Number of plate exchanger in air-water unit
115	323	R/W	A17_EVV_POSITION_ PERCENT_SHOW	Status	---	0	100	
116	324	R/W	A66_EVV_POSITION_ PERCENT_SHOW	Status	---	0	100	

19. TECHNICAL AND ELECTRICAL CHARACTERISTICS

microPC board	
ELECTRICAL FEATURES	
Power supply (controller with terminal connected)	230 Vac +10/-15% (by default) # 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.) 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
Input type: B1, B2, B3, B4	low temperature NTC: 10kΩ ± 0.1% to 25ºC; -50/90°C high temperature NTC: 50kΩ to 25ºC; 0/150°C input: 0/1 Vdc
Input type: B5	low temperature NTC: 10kΩ to 25ºC; -50/90°C high temperature NTC: 50kΩ to 25ºC; 0/150°C input: 0/1 Vdc and 4/20 mA
Input type: B6, B7	low temperature NTC: 10kΩ to 25ºC; -50/90°C high temperature NTC: 50kΩ to 25ºC; 0/150°C input: 0/1 Vdc 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
Analogue outputs	
Maximum number	3
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	Group 1 (1 to 6); Group 2 (7)
Electrical contacts (relays 1 to 7):	EN60730-1: NO 1(1)A 250Vac cos φ =0.4; 100,000 cycles UL-873: NO 1 A resistive 24 Vac, 30 Vdc; 100,000 cycles 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). Relays of the same group have basic isolation among themselves. The isolation between the various groups is double.
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 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	Category III (IEC EN 61000-4-5)
Dimensions: Length x Height x Depth	175 x 113 x 55 mm (10 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 Surface model: 86 x 142 x 23 mm or 142 x 86 x 23 mm

Notes :

ISO-9001

Order No.: 10108, 07.2015. Supersedes order No.: New

Manufactured for CARRIER Spain.
Printed in the European Union.