REZNOR

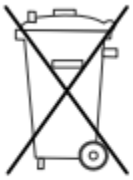
CLIMANAGER Control

Packaged Air Conditioning Unit Controller

40-230 kW standard systems
Up to 300 kW energy recovery

NORTEK™
GLOBAL HVAC

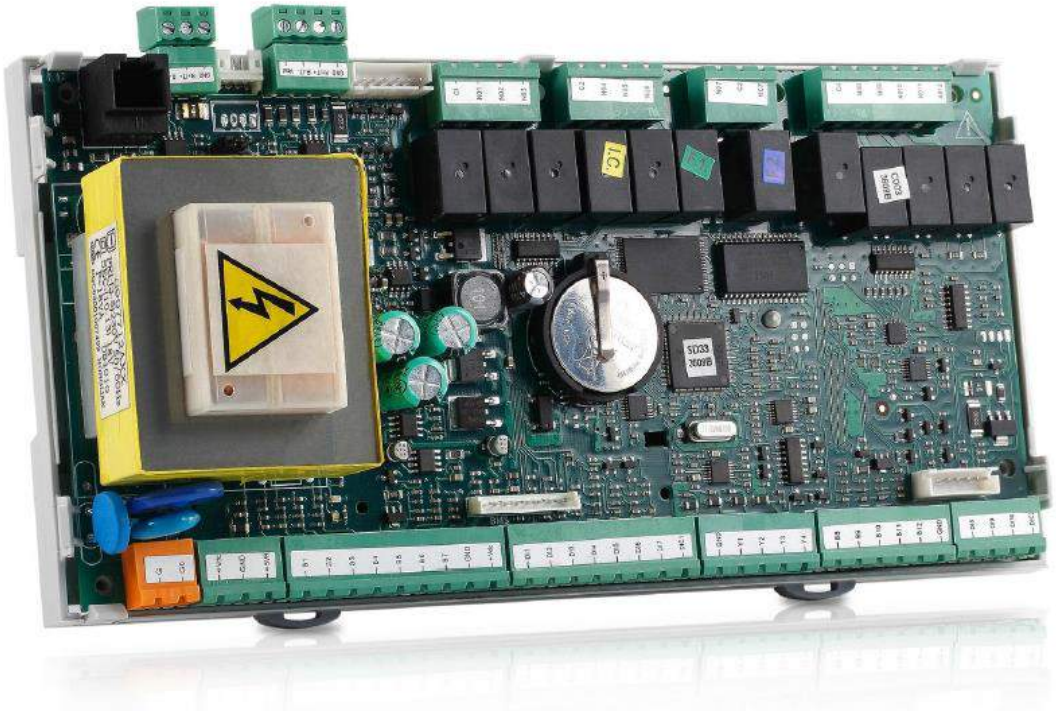
Contents



INFORMATION FOR USERS ON THE CORRECT HANDLING OF WASTE ELECTRICAL AND ELECTRONIC EQUIPMENT (WEEE)

In reference to European Union directive 2002/96/EC issued on 27 January 2003 and related national legislation, please note that:

1. WEEE cannot be disposed of as municipal waste and such waste must be collected and disposed of separately.
2. The public or private waste collection systems defined by local legislation must be used. In addition, the equipment can be returned to the distributor at the end of its working life when buying new equipment.
3. The equipment may contain hazardous substances: the improper use or incorrect disposal of such may have negative effects on human health and on the environment.
4. The symbol (crossed-out wheeled bin) shown on the product or on the packaging and on the instruction sheet indicates that the equipment has been introduced onto the market after 13 August 2005 and that it must be disposed of separately.
5. In the event of illegal disposal of electrical and electronic waste, the penalties are specified by local waste disposal legislation



1. GENERAL DESCRIPTION

The electronic control software CLIMANAGER has been specifically developed for the management of the Air Handling Units designed by Reznor. This software serves the market requirements in terms of energy management, operation simplicity and installations maintenance.

> ⚠ Please, read carefully the information in this manual before handling the control of the unit.

Any parameter modification must be carried out by a qualified technician authorised by Reznor. In case of improper handling or wrong connection the unit may operate incorrectly ore even suffer irreversible damage. Reznor is not responsible for the effects of any mishandling or unauthorised modification of operating parameters, in which case the warranty may be voided.

Main specifications of electronic board:

- Microprocessor 32 bits 24Mhz
- Programmable Flash Memory 2MB;
- RAM Memory 512kB;
- 3 Serial bus:
  - pLAN (PC, pGD, pCO)
  - BMS Monitoring
  - Fieldbus (field terminals)
- Voltage supply 230 Vac
- BMS plug-in card
- Real time clock RTC (possibility of working schedule)
- Operation conditions: -10ºC/+60°C

The interface between the human and the unit can be performed through the following terminal:

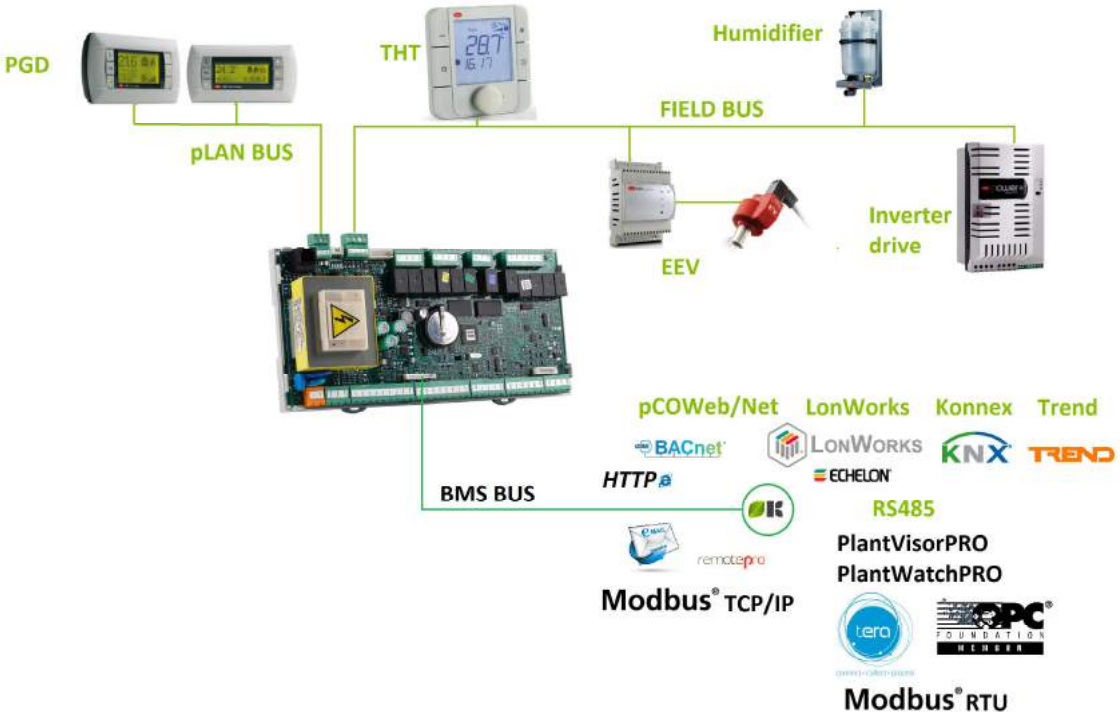
Connection by termina/pLAN

- Semigraphic Display PGD1: remote installation up to 50 m, for longer distances 2 TCONN cards and shielded wire are needed, up to 200 m.

Connection by MODBUS

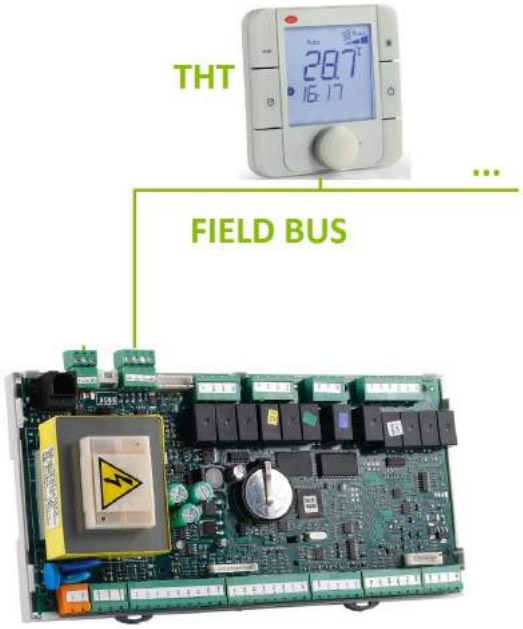
- Graphic Display PGD Touch: remote installation up to 500 m.

The next figure shows the pLAN and Field Bus.

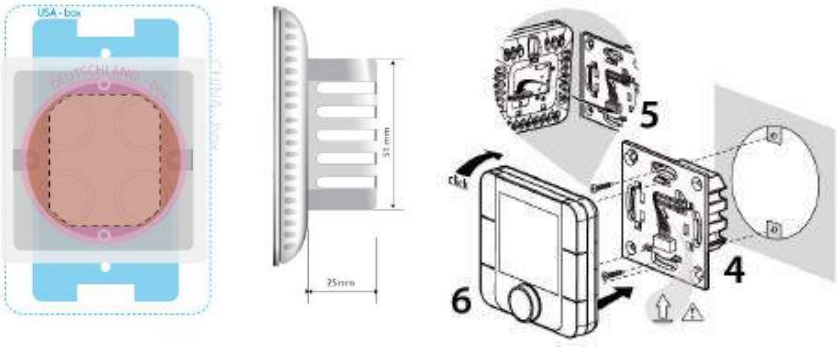


2.- TH-TUNE TERMINAL

The TH-Tune terminal is a user terminal with temperature and humidity ambient sensors integrated. The terminal shows a generic alarm when this takes place in the unit. It is possible to set up a scheduled working mode from the terminal. The voltage supply is 24Vac/dc or 230Vac.



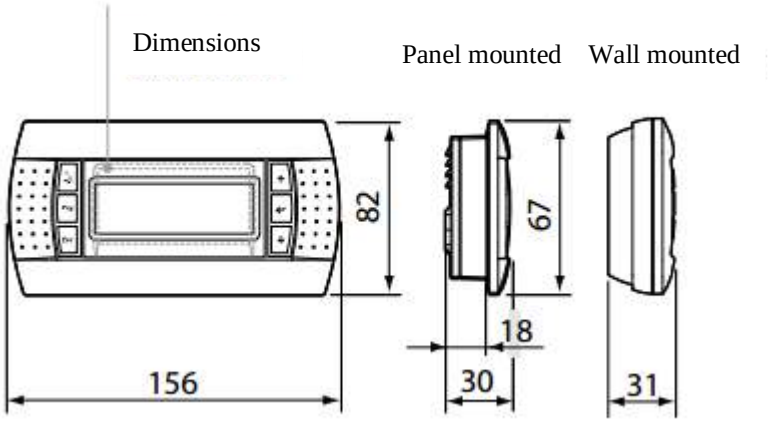
Possible mounting in wall or panel:



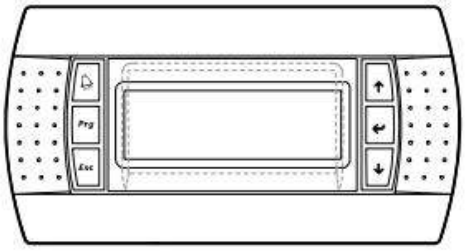
3.- PGD TERMINAL

The terminal PGD1 is a semi-graphic device designed to offer higher versatility and extensive customisation possibilities. It is green blacklighted with a resolution of 132x64 pixels. The voltage supply is provided by the electronic board by means of 6 wires connection with RJ12 jackl or external voltage source 18/30Vdc protected by external fuse of 250mA (maximum power of 1.2W).

The next figure shows the dimensions for panel and wall mounted display.



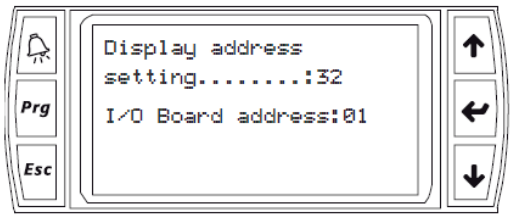
In next figure and table show the features of the six buttons.



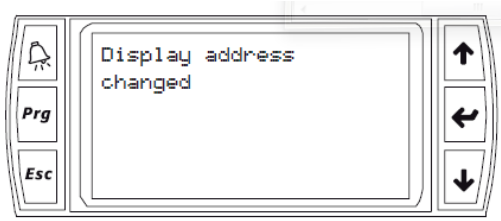
- *Alarm*	display the list of active alarms.
Prg - *Prg*	enter the main menu tree.
Esc - *Esc*	return to then higher lever screen.
↑ - *Up*	scroll a list upwards or increase the value shown on the display.
↓ - *Down*	scroll a list downwards or decrease the value shown on the display.
↵ - *Enter*	enter the selected submenu or confirm the set value.

INSTALLING THE PGD1 TERMINAL

The address of the terminal can be set in the range between 0 and 32; addresses from 1 to 32 are used by the PLAN protocol while address 0 identifies the Local terminal protocol, used for point-to-point connections without graphics and to configure the pCO. The default address is 32. The address can only be set after having powered the terminal via the RJ12 connector. To access configuration mode, press the UP, DOWN and ENTER ↑, ↓, ↵ buttons together for at least 5 seconds; the terminal will display a screen similar to the one shown below, with the cursor flashing in the top left corner.

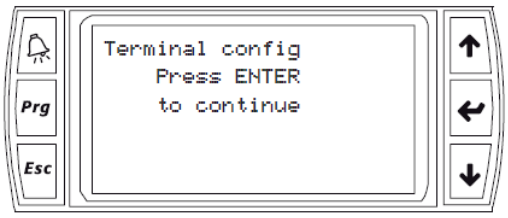


To change the address of the terminal ("Display address setting"), proceed as follows. Press the ENTER button once: the cursor will move to the "Display address setting" field. Select the desired value using the UP and DOWN buttons, and confirm by pressing ENTER again. If the value selected is different from the value previously saved, the following screen will be displayed and the new value will be saved to the permanent memory.

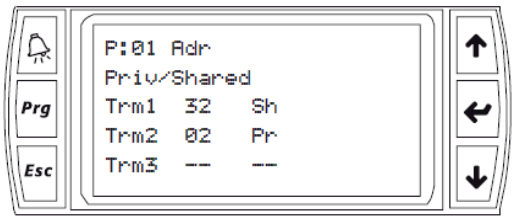


If the address field is set to 0, the terminal communicates with the pCO board using the Local terminal protocol and the "I/O Board address" field is no longer shown, as it has no meaning. To change the list of terminals (private and shared) associated with a pCO board, proceed as follows:

-enter configuration mode (see above) by pressing the UP, DOWN and ENTER buttons together for at least 5 seconds.
-press the ENTER button twice: the cursor will move to the "I/O Board address" field.
-select the address of the desired pCO board and confirm by pressing ENTER.
The pCO will then enter the configuration procedure, showing a screen similar to the one below.



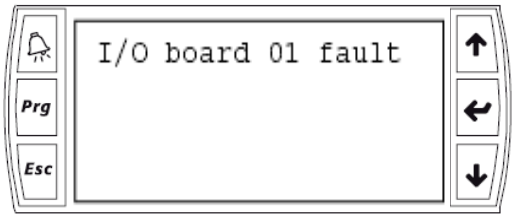
Press ENTER again: the configuration screen will be displayed, similar to the one below.



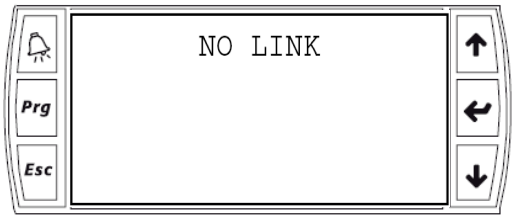
Change the configuration of the terminals as required. The ENTER button is used to move the cursor from one field to another, while the UP and DOWN buttons change the value of the current field. P:xx shows the address of the selected pCO board (in the example shown in the figure, this is board 1).

To exit the configuration procedure and save the data, select the "Ok?" field, set "Yes" and confirm by pressing ENTER. During the configuration procedure, if the terminal remains inactive (no button is pressed) for more than 30 seconds, the pCO board automatically exits the procedure without saving any changes.

If during operation the terminal detects the inactivity of the pCO board whose output it is displaying, it cancels the display completely and then shows a message similar to one below.



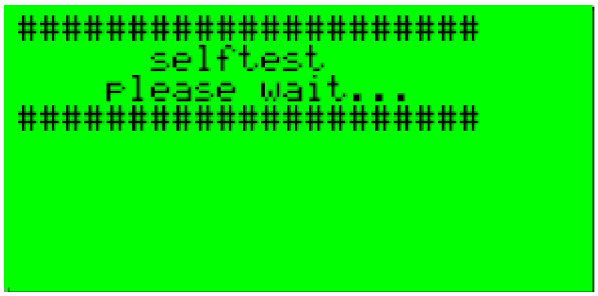
If the terminal detects the inactivity of the entire pLAN network, that is, it does not receive any message from the network for 10 consecutive seconds; it cancels the display completely and shows the following message:



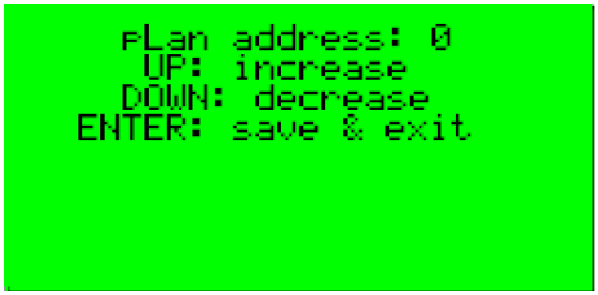
Setting de pCO board address

To complete the installation procedure, set the pLAN address of the pCO board; the pCO3 / pCO5 controllers do not have dipswitches for setting the pLAN network address: the pLAN address can be set from any pGD1 terminal.

1. Set address 0 on the terminal (see the previous sections for details on how to select the address).
2. Power down the pCO.
3. Disconnect any pLAN connections to other controllers from the pCO.
4. Connect the terminal to the pCO.
5. Power up the pCO, pressing the UP and ALARM buttons together on the terminal. After a few seconds, the pCO runs the start-up sequence and the display shows a screen similar the following:



6. From the moment when the screen is displayed, wait 10 seconds and then release the buttons.
7. The pCO interrupts the start-up sequence and shows a configuration screen similar to the following:

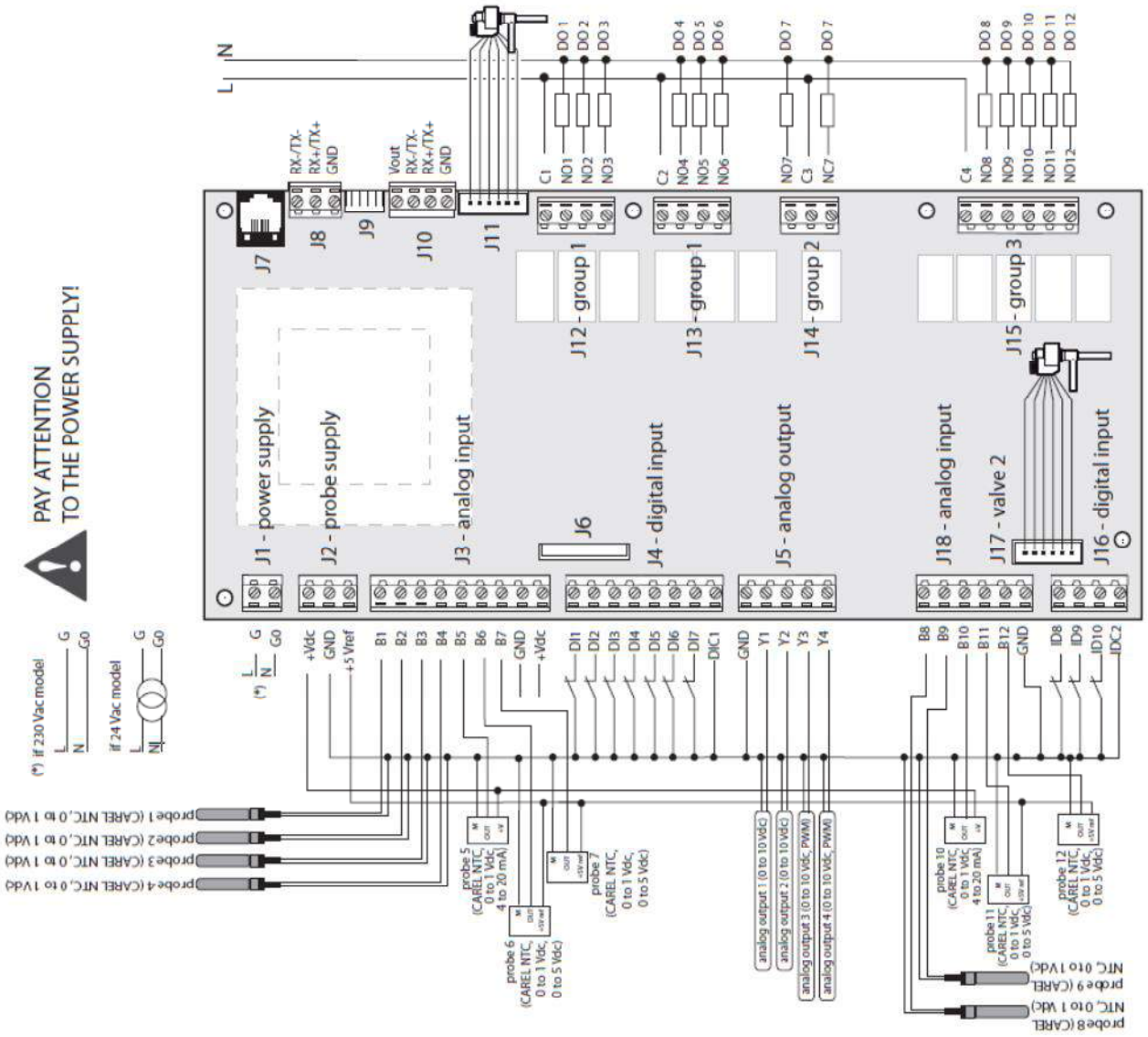


Then change the pLAN address using the ↑ and ↓ buttons on the terminal.
8. Confirm the address by pressing ↵: the pCO completes the start-up sequence and uses the address specified.

Important: if the settings have not been made correctly, the text and the images on the display will be shown in an incorrect and unorderly manner.

4. INPUT/OUTPUT DESCRIPTION

The next figure shows a general connection of the board. For the connection of any particular unit, please consult the wiring diagram provided with the unit. A table with the kind of inputs and outputs is also showed.



Inputs/Outputs – CLIMANAGER			
Analog inputs	12	B1 to B4	NTC, 0 - 1 Vdc
		B8, B9	NTC, 0 - 1 Vdc
		B5, B10	NTC, 0 - 1 Vdc, 4-20 mA
		B6, B7	NTC, 0-5 Vdc
		B11, B12	NTC, 0-5 Vdc
Digital inputs	10	ID1 - ID2	Free Voltage / High speed DI
		ID3 - ID10	Free Voltage
Analog outputs	4	Y1 - Y2	0-10 Vdc
		Y3 - Y4	PWM, 0-10 Vdc
Digital outputs	12	NO1 to NO6	SPST (5 A)
		DO7	SPDT (5 A)
		NO8 a N12	SPST (5 A)

A description of possible inputs/outputs for the hardware and software is carried out in the following list:

Analog inputs

- NTC probes: Supply, external, mixing and return or ambient temperature.
- Active probes: Supply, external and return or ambient relative humidity (0-1V or 4-20mA)
- Air quality probes: CO2 or VOC 0-10 V sensors.

Digital inputs

- High pressure switch
- Low pressure switch
- Thermal relay of compressors, discharge klaxon, external fan klixon
- Antifreeze coil, humidifier alarm, gas burner, filter switch, electrical heaters alarm, smoke alarm, flood detector, remote ON/OFF, remote COOLING/HEATING, air flow switch
- Supply and return fan alarms.

Digital outputs

- Supply and return fan
- Compressors
- External fans star and delta connection
- Electrical heaters, humidifier, gas burner
- General alarm
- Unit status

Analog outputs

- Proportional fans
- 3 ways valve for cooling and heating.
- Humidifier

- Proportional heat wheel.

By means of the Field-Bus in RS485 and MODBUS protocol some field devices can be connected.

- Energy meter
- Supply and return electronic fans
- Th-Tune user display
- Electronic expansion valve drivers

The pLAN net allows the connection of terminal PGD1 and interconnection between boards. Different units in the same pLAN net can be controlled by the same PGD1.

All the inputs/outputs in the board are configurable. In order to have a particular description of how those are set in each unit, refer to the electrical wiring diagram provided with the unit.

5. START-UP PROCEDURE AND WORKING MODES

Check that all the connections are properly carried out before starting the unit up. By means of the electrical wiring diagram provided by the manufacturer, check whether the components are properly placed and connected, especially the safety elements such as the magnetothermal switchs and the general switch.

To start the unit up, check that every magnetothermal switch is closed and activate the general switch. For the unit's stat-up it is necessary a control thermostat or to connect the CLIMANAGER regulation maintenance control.

The unit's start/stop can be carried out through the control, in the general menu screen by means of a remote start/stop (see the unit electrical diagram), or by programmed working Schedule.
Once the general cut-off switch is closed, if the contactors' coils are activated all the elements will start up. Verify the rotation direction of the elements. The compressors and the fans' motors are provided with a phase control relay in the head-end. The basic model (standard) only detects phase and rotation direction failure. In addition the sophisticated model (optional) detects phase imbalance, undervoltage or overvoltage. If all the parameters are correct, the compressors will rotate in the correct direction.

If any component rotates in the opposite direction to that desired, disconnect the electrical power by cutting off the general switch and swap the phases until every component rotates in the suitable direction.

WORKING MODES

The basic working modes that can be set are the following:

- Cooling + Free-Cooling
- Heating + Free-Heating
- Energy recovery systems
  - Standard Active Energy Recovery
  - Active+ Energy Recovery
  - Turbo mode Active Energy Recovery
  - Dynamic Energy Recovery
- Ventilation.
- Air quality control.
- Humidity control.

Cooling mode

In cooling mode the unit removes the heat load in order to achieve the temperature in the return or ambient probe. It can be controlled by proportional or PID method. A dead zone can be set with the proposal of maintaining the control temperature within established limits. The set-point values depend on the schedule or the set point manually set. In order to remove the heat load the cooling coil and the free-cooling can be used.

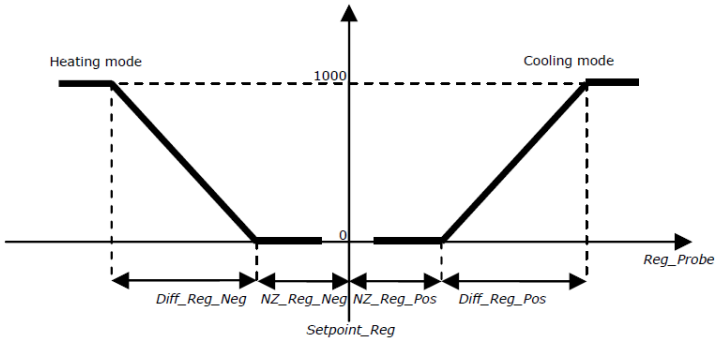
Heating mode

In heating mode the unit produces the heat load in order to achieve the temperature in the specified control probe. It can be controlled by proportional or PID method. A dead zone can be set with the

proposal of maintaining the control temperature within established limits. The set-point values depend on the schedule or the set point manually set. In order to produce the heat load the heating coil, the free-cooling, the electrical heaters or the gas burner can be used.

Temperature control

The temperature can be controlled in modes proportional (P, PI, PID) or proportional plus dead zone. In next figure is shown the proportional regulation.

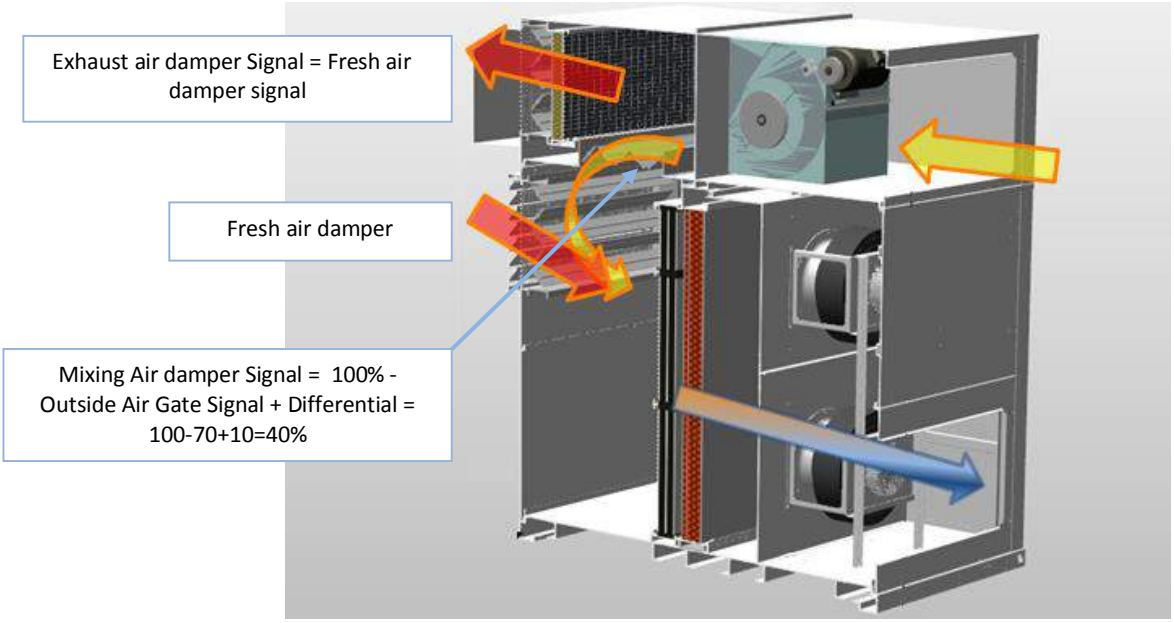


With this type of control, when return temperature reaches the set point, all the heating and cooling elements are off. All the heating or cooling elements will be on when reaching set point + differential.

It is possible to set compensation elements, i.e when the temperature of the return or ambient probe is colder than the set point in cooling mode or warmer than the set point in heating mode. In such cases the elements available can perform in order to compensate the temperature. For example if the temperature is too cold the free-cooling could compensate with warm air to achieve the desired temperature.

Free-cooling/Free-heating

It is the working mode that makes possible to take advantage of the outside air conditions when they are more favourable than those of return, this way in winter it is useful in buildings with a great inner charge which call for a certain degree of cooling (therefore the premises cooling is required instead of the heating). The dampers disposal in the unit is shown schematically in the following figure. The control of the dampers will allow the action of the free-cooling/free-heating.

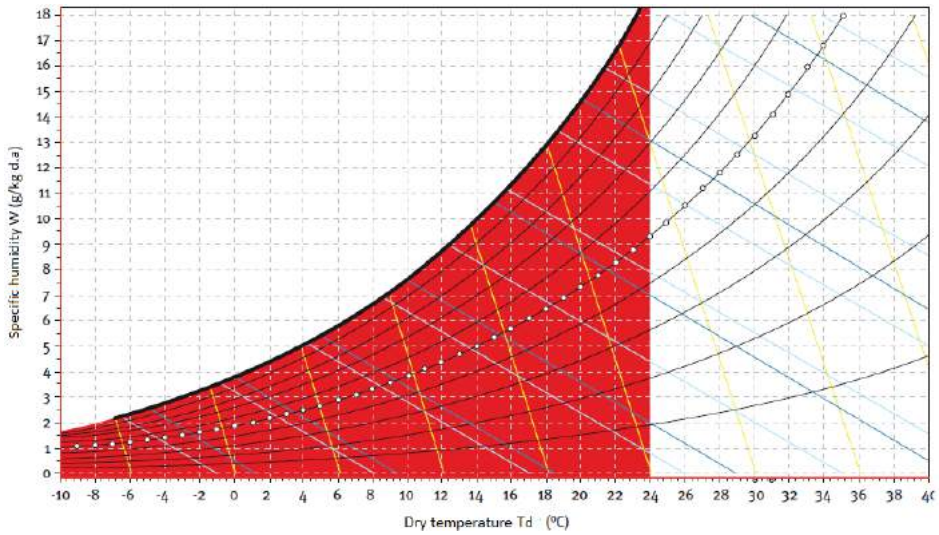


There are three possibilities of Free-cooling/Free-Heating:

- Thermal
- Enthalpy
- Improved Enthalpy Control

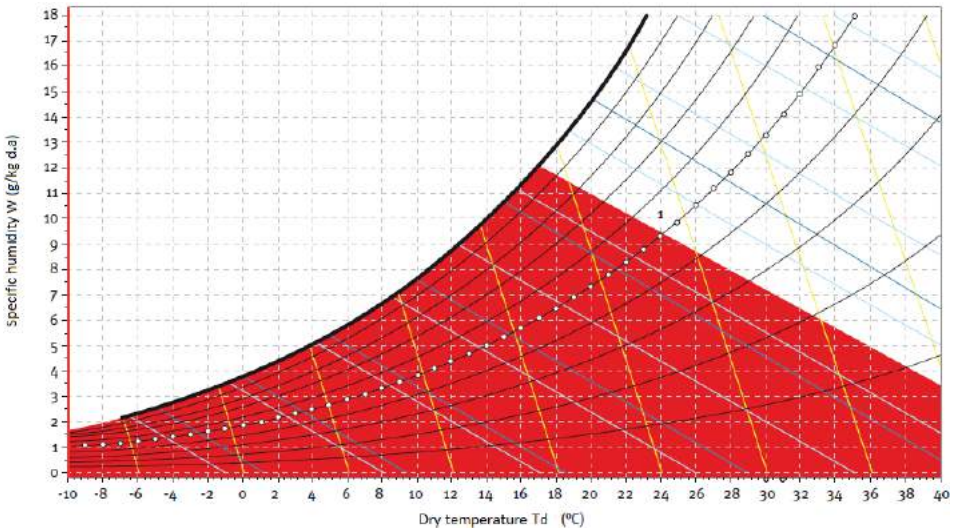
These types only differ in the way in which the outside and the return conditions are measured, with the Thermal form as the simplest one.

- Thermal: it requires outside and return or ambient temperature sensors. In cooling mode the external temperature must be lower than that of the return minus an activation free-cooling differential (Gfc13), in case of heating mode the external temperature must be higher than the return plus the differential. The opening of the external air damper is controlled proportionally to the difference between the return or ambient temperature and the set point. The modulating differential is set by the manufacturer.



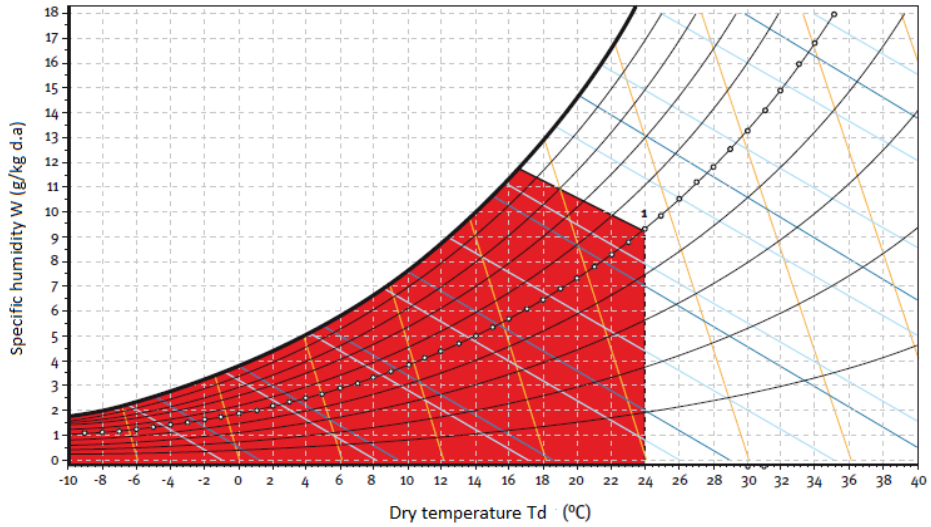
External conditions where the thermal free-cooling actuates. Internal conditions 24 °C and 50% of relative humidity. Source: (Guía Técnica de Ahorro y recuperación de energía en instalaciones de climatización, IDAE 2010).

- Enthalpy: it requires outside and return or ambient temperature/humidity probes. The working principle in this case is based on the enthalpy instead of the temperature as in the previous case. The external enthalpy must be lower or higher, in cooling or heating mode respectively, than the return enthalpy. The activation enthalpy differential can be set in the same parameter (Gfc13). The set point of the unit is based now on the temperature and the relative humidity.



External conditions where the pure enthalpy free-cooling actuates. Internal conditions 24 °C and 50% of relative humidity. Source: (Guía Técnica de Ahorro y recuperación de energía en instalaciones de climatización, IDAE 2010).

- Improved: it requires outside and return or ambient temperature/humidity probes. In the improved enthalpy free-cooling/free-heating both of the two previous cases must be fulfilled, i.e the external enthalpy and temperature must be lower or higher, in cooling or heating modes respectively, than the return temperature and enthalpy.

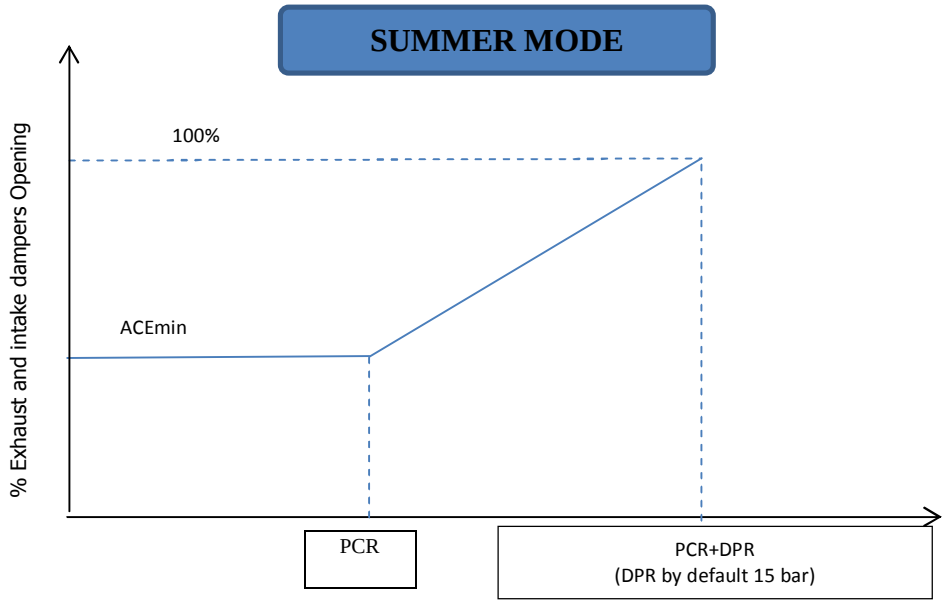


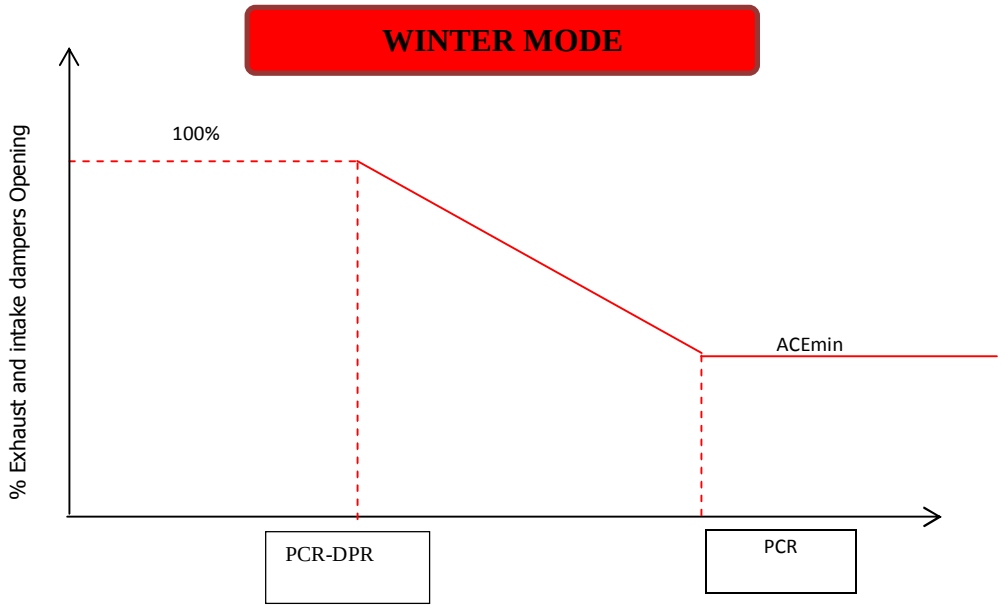
External conditions where the improved enthalpy free-cooling actuates. Internal conditions 24 °C and 50% of relative humidity. Source: (Guía Técnica de Ahorro y recuperación de energía en instalaciones de climatización, IDAE 2010).

Recovery Energy Modes

There are four possibilities mutually exclusive. The configuration will be carried out by the manufacturer depending on the type of unit.

- Standard Active Energy Recovery: This mode aims to make use of the exhaust air to increase the energetic efficiency of the unit. The working principle is based on the flowing of the exhaust air through the external heat exchanger to make it work in better conditions. There are two possibilities, firstly a recovery compressor dimensioned approximately for a 20% of the nominal power of the unit and the enhanced active energy recovery, with a compressor dimensioned approximately for a 50% of the nominal power of the unit compressors. Both of them follow the same working logic. The recovery circuit working mode (cooling/heating) will be the same of the unit and the start of the compressor shall require a minimum opening of the exhaust damper in order to ensure enough flow through the heat exchanger (Ha03). Then, depending on the demand of heating/cooling removal or supply the energy recovery circuit will work within a differential of the regulation band (Ha31 and Ha39). In the case of enhanced recovery compressor a minimum opening of 50% in the exhaust damper is mandatory, for standard compressor a 20% is enough. If the required conditions are fulfilled the recovery circuit will have priority over the other circuits.
- Active+ Energy Recovery: This mode is similar to the standard active energy recovery but using a Digital Scroll compressor instead of a conventional compressor. This option will allow optimising the capacity of the circuit. The minimum opening of the exhaust damper can be reduced because of the capacity regulation of the compressor so the energetic efficiency of the unit will be improved.
- Turbo Energy Recovery: This is not a real energy recovery mode but a way of using the whole power available in the unit. As in the previous modes, taking advantage of the better conditions of the exhaust air the unit will produce the maximum cooling or heating capacity in the most efficiency way. In this case the dampers are controlled according to the pressure of the external heat exchanger, condenser in cooling and evaporator in heating mode. The dampers will be open to the minimum opening required (Ha03) and they will be proportionally controlled according to the parameters established in Gfc12 as shown in the following figures.





- Dynamic Recovery: This mode allows for an improvement in the unit energetic efficiency by means of the use of subcoolers in the liquid line of the circuits, which provides greater cooling capacity without additional compressors.

Ventilation

In ventilation mode there is not supply or removal of heat, i.e the cooling or heating elements are not used. In this case the exhaust and intake dampers are fully open and just the fans are working.

Air quality control

By using CO2 and/or VOC sensors the quality of the ambient air can be controlled. A set point can be set for the maximum CO2 and VOC. If the values read by the sensors are below the set points the exhaust and intake dampers will be at the minimum opening. A differential is established in order to control proportionally the opening of the dampers. Fans will be working according to the current mode. In the case of free-cooling/free-heating at the same time than air quality control de opening of the dampers will be the maximum required by any of the two modes.

Fans management

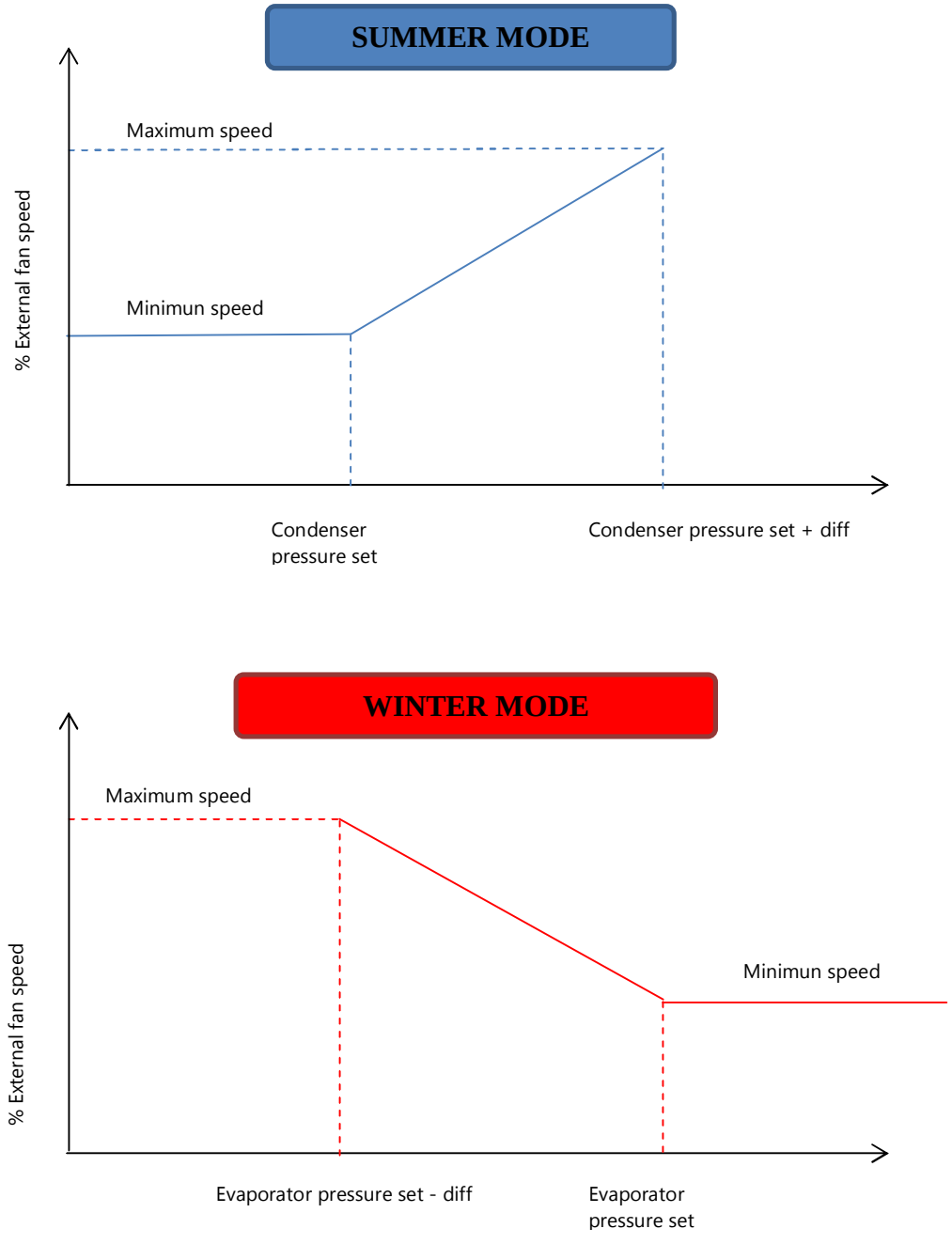
CLIMANAGER^{TM} platform can manage supply and return fans with ON/OFF mode or with constant flow mode if those are electronic. When electronic fans are available those are connected to the fieldbus and controlled by Modbus protocol and the flow is maintained controlling the rotational speed. In both cases there are available digital inputs for detection of fan alarm. Different flow set can be established for cooling or heating operations.

The return fan can be replaced by exhaust fans; these fans can be Centrifugal, Radial or Plug-Fan, using analog or digital outputs.

The operating logic of exhaust fan is:

- Mixing damper fully closed (0%), exhaust damper fully open: speed 100 %
- Mixing damper 30% closed, exhaust damper 70% open: 70% speed

The external fans are controlled according to the pressure in the external coils of the main circuits. These fans can be set as ON/OFF, star/delta connection or electronic fans controlled with an analog output. In cooling mode the fans will be controlled according to the condenser pressure. A set point will be set to switch on and off the fan and a differential to control proportionally between the set point and the set point plus the differential. When the unit is working on heating mode the controlled pressure is the evaporation one. A set point is set to switch on and off and a differential to control proportionally between the set and the set minus the differential. Those parameters can be modified in Gfc10 and Gfc11. See the following figure where this working mode is shown.

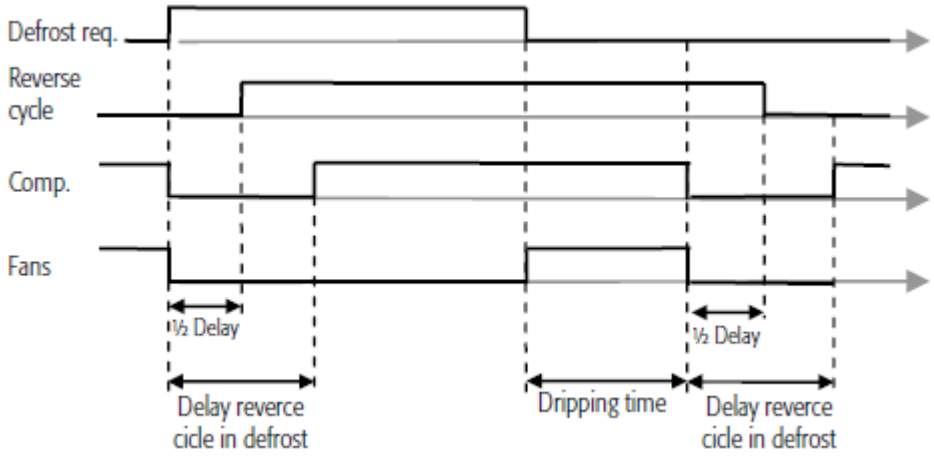


Defrost management

During heat pump operation on air/water units, the outside coil works as an evaporator. If the outside temperature is low, ice may form in the coil, consequently reducing the efficiency of the unit. In this case, the defrost function should be activated. Defrost activation depends on the value read by the reference probe (evaporation pressure) and a delay set (Gfc17) from when the activation threshold (Gfc15) is exceeded.

The defrost ends when the reference probe (condensation pressure) value exceeds the end defrost threshold (Gfc16); in any case, the defrost must last a minimum time and a maximum (Gfc17).

The defrost function involves the reversing of the circuit operating cycle. During the defrost, the condenser fans are forced OFF to assist defrosting. The "dripping" function can also be set, which involves operating the fans at 100% for a certain time (Gfc18) after the end of the defrost. If the dripping time is zero, then this phase is not performed. A time can be set (Gfc18) to reverse the cycle at the start and end of the defrost procedure. Then the compressors are switched off for the set time and the cycle is reversed half way through the time. A minimum time can be set (Gfc18) between the end of one defrost and the start of the next. A second set for forced defrost can be established if a defrost is required during this time. The following figure shows how the various components in circuit and the defrost phases are managed:



If there are multiple condensing circuits, the following defrost modes are managed (Ha13):

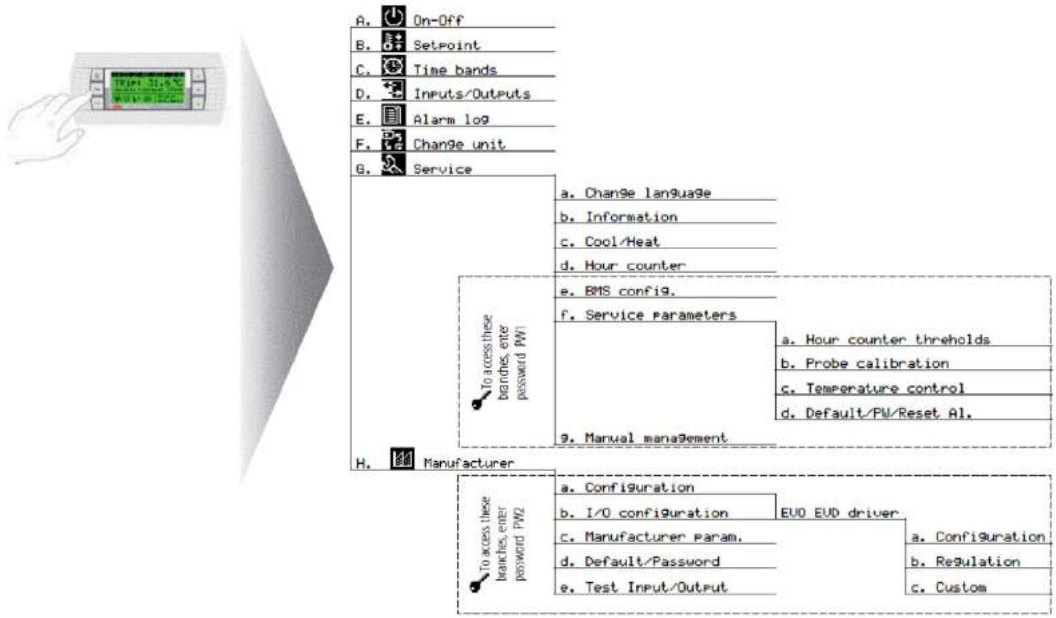
- ☐ Single condenser type: if one circuit requires defrosting, the entire unit goes into defrost mode. The circuits that do not require defrosting reverse the cycle yet the compressors remain off.
- ☐ Separated condenser type: the first circuit that requires defrosting goes into defrost mode. The other circuits remain in heat pump mode and cannot call a defrost until the defrost in progress ends.

Humidity control

CLIMANAGER^{TM} platform can manage a humidifier device by means of a proportional or ON/OFF signal to the driver of the device. It is also able to receive a digital input as an alarm of the humidifier. The humidity set point must be set in the set points screen.

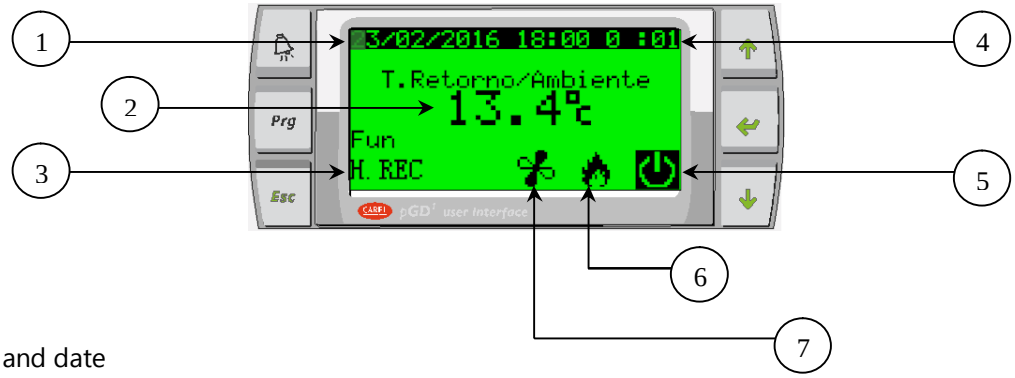
6. MENUS MANAGEMENT

The menus are set as shown in following figure:



Main display

The following figure shows an example of the main screen, highlighting the fields and icons used:



1-Time and date
2-Return or ambient temperature
3-Working mode

H. REC: Standard mode with or without energy recovery.

 Turbo mode

 Ventilation mode

4-PLAN address.
5-Status ON/OFF

 Unit status OFF

 Unit status ON

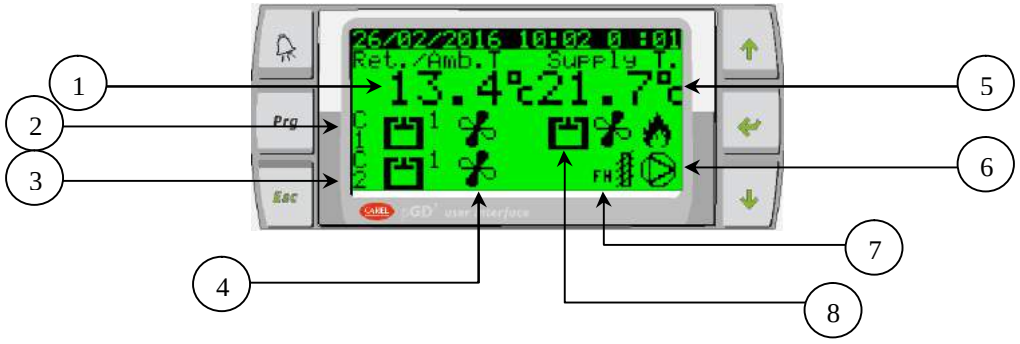
6-Cooling/Heating mode.

 Heating mode.

 Cooling mode.

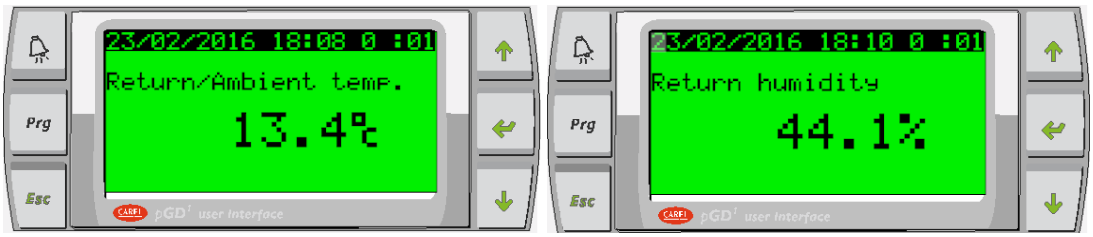
7-Supply fan status.

By pressing the down arrow the information of the circuits will be shown.



1-Return or ambient temperature
2-Status of compressors in circuit 1
3-Status of compressors in circuit 2
4-External fans status
5-Supply temperature
6-Flooding pump status
7-Free-cooling/Free-heating status
8-Status of compressor in recovery circuit

By pressing again the down arrow the sensors installed in the unit will be shown. If the electronic fan is connected the flow will be also shown. Two examples can be seen in the following figures.



Note: The number of screens and the information on the quick menu depends on the configuration of the unit.

Basic working actions

The basic working actions for the management of the unit are explained below.

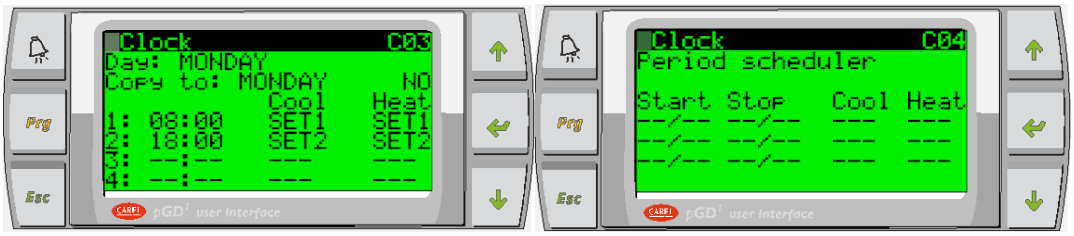
-ON/OFF: For the start-up of the unit, first ensure that the remote digital input for ON/OFF (see electrical drawing) is closed. Then, press PRG and press enter to A. On/Off Unit. The status of the

unit will be shown on this screen. Press down arrow to the next screen and press enter to switch the status between SWITCH OFF/ SWITCH ON, press enter to confirm and exit to the main menu.

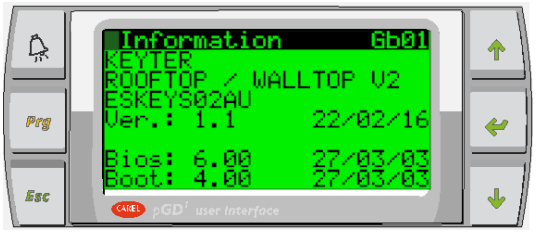
-SET POINT: For the change of the set point press PRG and enter to B. Setpoint. The current set point for heating mode and cooling mode are shown on the screens B01 and B02 respectively. Press enter on each screen to modify them.

-COOLING/HEATING: For the change of the mode check if the digital input for this purpose is enabled (See Gfc19). If it is not enabled press PRG, press enter to G. Service and then c. Summer/Winter (Gc01). Press enter to modify the mode and press ESC to go to the main screen. If the terminal TH-Tune is enabled and the change mode is set by screen, the mode can be modified from the TH-Tune.

-SCHEDULER: The schedule can be enabled by default from the TH-Tune. In order to enable the schedule management from de PGD, firstly the TH-Tune schedule management must be disabled (Gfc24). Then, enable the PGD management (Gfc19). Press PRG and press enter to C. Clock/Scheduler. Press up and down arrows to move to C02, C03 and C04 to establish the working hours of the unit.



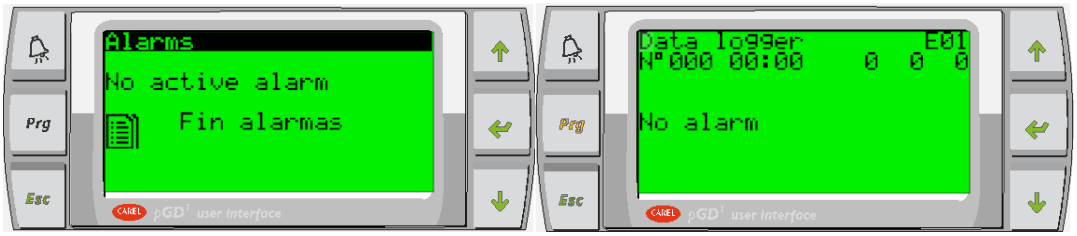
-SOFTWARE INFORMATION: The software information appears on the screen Gb01. To show this information, press PRG, go to G. Service, press enter and then b. Information. This information will be helpful during the customer service assistance. An example of the information screen in shown in the following figure.



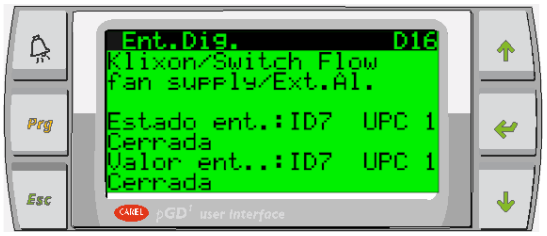
-LANGUAGE CHANGE: In order to change the language press PRG and go to G. Service, the press enter in a. Change language. Once in the screen Ga01 if different languages are available press enter to change it. Press down arrow to the next screen and then ESC to exit.

-ALARMS VISUALISATION: The active alarms will be shown by pressing the ALARM key. If there are several alarms at the same time, they can be seen by pressing up and down arrows. In order to reset the active alarms keep pressed the alarm key for some seconds, if the alarms are not active yet they will disappear from the screen. The alarms log can be accessed by pressing PRG and then E.

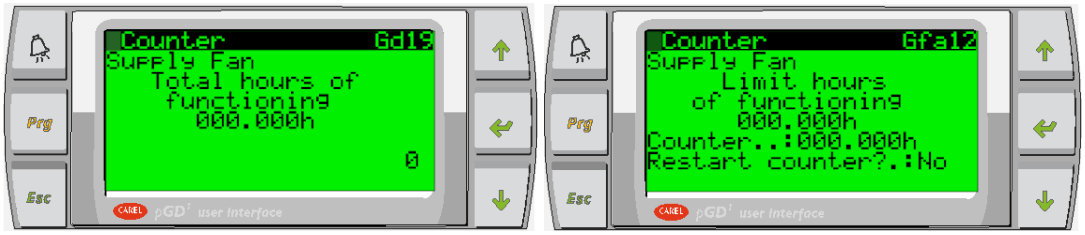
Data Logger. The alarms events are registered in the data log as well as the access to the Manufacturer and Service menus.



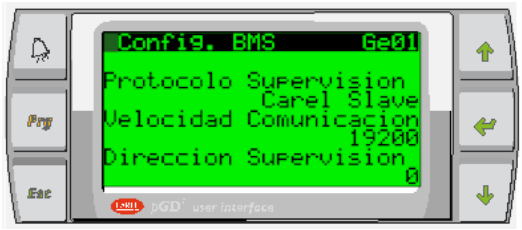
-INPUT/OUTPUT STATUS: The status of the inputs and outputs can be checked by pressing PRG and then D. Input/Output.



-WORKING HOURS COUNTER: The software is able to count the number of working hours of the devices as well as the starts. Press PRG, go to G. Service and d. Working hours. It is also possible to enable alarms regarding the number of working hours of the devices. In order to set the threshold of the alarms press PRG, go to G. Services, f. Service settings and a Working hour set. In the same menu it is possible to restart the counter of the devices when any of them is replaced.



-BMS CONFIGURATION: The settings of the supervisor bus can be managed in G. Service and then e. BMS Config. The bus speed, the protocol and the address can be modified in this screen. Except in the case of Carel protocol, the rest will be set as Modbus. In order to enable LonWorks protocol go to Ge02.



7. PARAMETER LIST

The following list of parameters is a default list of the working parameters of the units. Depending on the configuration of the unit, these parameters may change. Those only might be modified by qualified personnel. The configuration parameters must not be modified without the advice of the manufacturer.

Mask index	Screen text	Description	Default value	UOM
Gfc02	Dead Zone	Zone of the regulation ramp where the unit remains unactive.	1.0	ºC
Gfc04	High limit	Maximum supply temperatura allowed	45	ºC
Gfc04	Low limit	Minimum supply temperatura allowed.	5	ºC
Gfc04	Differential	Temperature differential for the buildup.	2	ºC
Gfc05	Reg. type:	Regulation type of the humidity	PROPORTIONAL	--
Gfc05	Dif.Humidity	Regulation differential of the humidity	20.0	%
Gfc05	Z.M.Humidity	Dead zone of the humidity regulation	0.0	%
Gfc08	Threshold	Threshold of the high pressure alarm by transducer	40	bar
Gfc08	Dif	Build up differential of the high pressure alarm	6	bar
Gfc08	Max retry number	Maximum number of retries until manual reset o the high pressure alarm	3	--
Gfc09	Threshold	Threshold of the low pressure alarm by transducer	3	bar
Gfc09	Dif	Build up differential of the low pressure alarm	5	bar
Gfc09	Max retry number	Maximum number of retries until manual reset o the low pressure alarm	3	--
Gfc09	Startup delay	Startup delay of the low pressure alarm	30	s
Gfc09	Running delay	Running delay of the low pressure alarm	10	s
Gfc10	Condensation	Set point to switch on the external fan in cooling mode	20	bar
Gfc10	Differ. Cond	Differential to control the fan speed in cooling mode	10	bar
Gfc10	Evaporation	Set point to switch on the external fan in heating mode	10	bar
Gfc10	Differ. Evap	Differential to control the fan speed in heating	4	bar
Gfc11	Min. Speed	Minimum speed of external electronic fan	0	%
Gfc11	Max. Speed	Maximum speed of external electronic fan	100	%
Gfc11	Time Max. Speed	Time at maximum velocity in startup	3	s
Gfc12	Cooling set	In turbo mode, pressure threshold for minimum opening of the exhaust damper in cooling mode.	20	bar
Gfc12	Heating set	In turbo mode, pressure threshold for minimum opening of the exhaust damper in heating mode.	10	bar
Gfc12	Cooling dif	In turbo mode, pressure differential to proportionally control the exhaust damper in cooling mode.	10	bar
Gfc12	Heating dif	In turbo mode, pressure differential to	4	bar

		proportionally control the exhaust damper in heating mode.		
Gfc13	Temp. diff:	Activation differential for the thermal free-cooling/free-heating.	No	--
Gfc13	Enthal. diff:	Activation differential for the enthalpic free-cooling/free-heating.	0	ºC
Gfc14	Setp:	Set point for CO2 level	400	ppm
Gfc14	Diff:	Differential to proportionally control the dampers according to the CO2 level	200	ppm
Gfc14	Setp:	Set point for VOC level	20	%
Gfc14	Diff:	Differential to proportionally control the dampers according to the VOC level	10	%
Gfc15	Start defrost	Start defrost threshold	4	bar
Gfc15	Forced start defrost	Forced defrost threshold	3.5	bar
Gfc16	End defrost	End defrost threshold	28	bar
Gfc17	Start delay	Defrost start delay	10	s
Gfc17	Minimum time	Minimum time for compressor working during defrost	1	min
Gfc17	Maximum time	Maximum time for compressor working during defrost	10	min
Gfc17	N. max for alarm	Maximum number of defrost finishing by time before alarm	3	--
Gfc18	Time between defrost	Time between two defrost	25	min
Gfc18	Reverse cycle	Time to reverse the cycle	20	s
Gfc18	Dripping time	Time to switch on the external fans when the defrost end threshold has been reached	30	s
Gfc18	Dripping power	Proportional fans power during the dripping time	50	%
Gfc19	PCO Schedule	Enable the chedule management from PGD	No	--
Gfc19	Cool/Heat by:	Enable the cooling/heating change mode.	Screen	--
Gfc19	Automatic change	Enable the cooling/heating automatic change.	No	--
Gfc20	By digit input:	Enable ON/OFF by digital input	No	--
Gfc20	By supervisor:	Enable ON/OFF by supervisor BMS	No	--
Gfc21	Priority Dig. Input	Gives priority to the ON/OFF by digital input	No	--
Gfc21	Priority Superv.	Gives priority to the ON/OFF by supervisor	No	--
Gfc22	Terminal Th-Tune	Enable the user terminal TH-Tune	Disabled	--
Gfc22	Modbus address Th Tune	Address of the Th-Tune in the field bus	20	--
Gfc22	Temp. ThTune:	Enable the use of the temperature sensor in the Th-Tune as ambient probe	No	--
Gfc22	Humidity. ThTune:	Enable the use of the humidity sensor in the Th-Tune as ambient probe	No	--
Gfc23	Baudrate	Communication speed of fieldbus	9600	--
Gfc23	Stop bit	Number of stop bit in the fieldbus	1	--
Gfc23	Parity mode	Parity of the fieldbus	NONE	--
Gfc24	Enable Schedule by TH-TUNE	Enable the Schedule management from Th-Tune	Yes	--
Gfc24	Min temp set:	Minimum temperature set point from Th-Tune	10	ºC
Gfc24	Max temp set:	Maximum temperature set point from Th-	30	ºC

		Tune		
Gfc24	Min hum. set:	Minimum humidity set point from Th-Tune	30	%
Gfc24	Max hum. set:	Maximum humidity set point from Th-Tune	80	%
Gfc25	Enable anti-stratrification	Enable the possibility of stopping the supply fan in heating mode when the unit has reached the set point	No	--
Gfc25	Time OFF	Time to be off.	60	min
Gfc25	Time ON	Time to be on.	10	min
Gfc26	Threshold activation alarm high current	When energy meter is enabled the compressors can be switched off by high current		A
Gfc26	Threshold deactivation alarm high current			A
Gfc27	Threshold activation alarm high power	When energy meter is enabled the compressors can be switched off by high power		kW
Gfc27	Threshold deactivation alarm high power			kW
Gfc28	Al. Filter switch	Enable the filter switch alarm	Yes	--
Gfc28	En global alarm	Enable a digital output as global alarm	No	--
Gfc28	En status signal	Enable a digital output as unit status	No	--
Ha00	Master address	Address of the master board in the PLAN	1	--
Ha00	Slave address	Address of the slave board in the PLAN	2	--
Ha01	Fans type	Configuration of the supply and return fans	Supply+Return	--
Ha01	Supply fan type	Type of supply fan	T/N	--
Ha01	Supply fan off delay	Delay of the fan after switching off	60	s
Ha02	Return fan controlled by external damper	Enable the control of the return fan as exhaust fan	No	--
Ha02	On delay return fan	Delay with respect to the supply fan	10	s
Ha03	Circuit number	Number of circuits in the unit	2	--
Ha03	Comp per circ	Number of compressors per circuit	1	--
Ha03	Heat recovery	Enables heat recovery	Yes	--
Ha03	Min. Op. Damper	Minimum opening required of the exhaust damper for heat recovery compressor working	30	%
Ha04	On delay regulation after fans start	Time between the fans start and the regulation process	10	s
Ha04	Delay on compressor heat recovery	Delay before heat recovery compressor is able to switch on	30	s
Ha05	Thermal compressor 1 serially Circuit 1	Establish if the thermal relay of the compressor 1 in circuit 1 is in series with the high pressure switch	No	--
Ha05	Thermal compressor 2 serially Circuit 1	Establish if the thermal relay of the compressor 2 in circuit 1 is in series with the high pressure switch	No	--
Ha06	Thermal compressor 1 serially Circuit 2	Establish if the thermal relay of the compressor 1 in circuit 2 is in series with the high pressure switch	No	--
Ha06	Thermal compressor 2 serially Circuit 2	Establish if the thermal relay of the compressor 2 in circuit 2 is in series with the high pressure switch	No	--

Ha07	Thermal compressor 1 serially Circuit 3	Establish if the thermal relay of the compressor 1 in circuit 3 is in series with high pressure switch	No	--
Ha07	Thermal compressor 2 serially Circuit 3	Establish if the thermal relay of the compressor 2 in circuit 3 is in series with the high pressure switch	No	--
Ha08	Heat recovery comp. thermal relay seried	Establish if the thermal relay of the heat recovery compressor is in series with the high pressure switch	No	--
Ha09	Minimum On	Minimum ON time of the compressors	30	s
Ha09	Minimum Off	Minimum OFF time of the compressors	180	s
Ha09	Same compressor start	Time between two starts of the same compressor	180	s
Ha09	Two compressors start	Time between the start of two compressors	30	s
Ha10	External temp.	Enable external temperature	Yes	--
Ha10	Mixing temp.	Enable mixing temperature	No	--
Ha11	Devices rotation type	Establish the type of compressor rotation	FIFO	--
Ha13	Cond type	Establish if there is a single condenser of separated for each circuit	Separated	--
Ha13	Star/Delta delay	Delay for changing between star connection and delta of the external fans	2	s
Ha13	Fan circuit 1	Type of external fans	T/N	--
Ha14	Number of stages	Number of electrical heaters stages	0	--
Ha14	Gas burner supply temp	Enable the gas burner management	No	--
Ha15	En. 3 ways valve	Enable the 3 ways valve for the coolin/heating coils	No	--
Ha15	Heating support	Enable the heating support of the 3 ways valve	No	--
Ha15	Cooling support	Enable the cooling support of the 3 ways valve	No	--
Ha16	Smoke alarm	Enable the smoke alarm	No	--
Ha16	Acc:	Establish the action of the smoke alarm	Off system	--
Ha16	Flood alarm:	Enable a flood alarm by means of digital input	No	--
Ha16	Anti-freeze alarm	Enable anti-freeze alarm in the coil	No	--
Ha18	Indoor humidity	Enable a return humidity sensor	No	--
Ha18	Outdoor humidity	Enable an external huimidity sensor	No	--
Ha18	Supply humidity	Enable a supply huimidy sensor	No	--
Ha18	Mixing humidity	Enable a mixing humidity sensor	No	--
Ha19	Enable humidifier	Enable the humidifier device	No	--
Ha19	Humidifier	Establish the type of the humidifier	T/N	--
Ha20	Enable VOC probe	Enable air quality sensor VOC	No	--
Ha20	Enable CO2 probe	Enable air quality sensor CO2	No	--
Ha21	Dampers type	Establish the dampers configuration	Fresh air+mixing +exhaust	--
Ha21	Freecooling:	Establish the frecooling/freeheating type	Temperature	--
Ha21	En. Air quality mng	Enable the air quality management	No	--
Ha22	Regulation type	Establish the regulation type of the air quality	Prop	--

Ha22	Probe type	Establish the probe for the air quality regulation	CO2+VOC	--
Ha22	Enable cleaning	Enable the cleaning of the air	No	--
Ha23	Element position	Position of the dampers in the heating regulation ramp	1	--
Ha23	Offset	Dampers offset with respect to the previous element	0.0	ºC
Ha23	Differential	Differential of the dampers in the heating regulation ramp	2.0	ºC
Ha24	Enable free-heating when low temperature in supply probe	Enable the compensation by means of the dampers	Yes	--
Ha25	Element position	Position of the 3 ways valve in the heating regulation ramp	4	--
Ha25	Offset	3 ways valve offset with respect to the previous element	0.0	ºC
Ha25	Differential	Differential of the 3 ways valve in the heating regulation ramp	2.0	ºC
Ha26	Enable 3 ways when low temperature in supply probe	Enable the compensation by means of the 3 ways valve	Yes	--
Ha27	Element position	Position of the compressors in the heating regulation ramp	3	--
Ha27	Offset	Compressors offset with respect to the previous element	0.0	ºC
Ha27	Differential	Differential of the 3 ways valve in the heating regulation ramp	2.0	ºC
Ha28	Enable compressors when low temperature in supply probe	Enable the compensation by means of the compressors	No	--
Ha29	Element position	Position of the electrical heaters in the heating regulation ramp	4	--
Ha29	Offset	Electrical heaters offset with respect to the previous element	0.0	ºC
Ha29	Differential	Differential of the electrical heaters in the heating regulation ramp	2.0	ºC
Ha30	Enable electrical heaters when low temperature in supply probe	Enable the compensation by means of the electrical heaters	Yes	--
Ha31	Element position	Position of the heat recovery compressor in the heating regulation ramp	2	--
Ha31	Offset	Heat recovery compressor offset with respect to the previous element	0.0	ºC
Ha31	Differential	Differential of the heat recovery compressor in the heating regulation ramp	2.0	ºC
Ha32	Enable heat recovery compressor when low temperature in supply probe	Enable the compensation by means of the heat recovery compressor	No	--
Ha33	Element position	Position of the dampers in the cooling regulation ramp	1	--
Ha33	Offset	Dampers offset with respect to the previous element	0.0	ºC
Ha33	Differential	Differential of the dampers in the cooling regulation ramp	2.0	ºC
Ha34	Enable free-cooling when high temperature in supply probe	Enable the compensation by means of the dampers	Yes	--
Ha35	Element position	Position of the 3 ways in the cooling regulation ramp	2	--
Ha35	Offset	3 ways valve offset with respect to the previous element	0.0	ºC
Ha35	Differential	Differential of the 3 ways valve in the cooling regulation ramp	2.0	ºC
Ha36	Enable 3 ways valve when high	Enable the compensation by means of the 3	Yes	--

	temperature in supply probe	ways valve		
Ha37	Element position	Position of the compressors in the cooling regulation ramp	2	--
Ha37	Offset	Compressors offset with respect to the previous element	0.0	ºC
Ha37	Differential	Differential of the compressors in the cooling regulation ramp	2.0	ºC
Ha38	Enable compressors when high temperature in supply probe	Enable the compensation by means of the compressors	No	--
Ha39	Element position	Position of the heat recovery compressor in the cooling regulation ramp	2	--
Ha39	Offset	Heat recovery compressor offset with respect to the previous element	0.0	ºC
Ha39	Differential	Differential of the heat recovery compressor in the cooling regulation ramp	2.0	ºC
Ha40	Enable heat recovery compressor when high temperature in supply probe	Enable the compensation by means of the heat recovery compressor	No	--
Ha41	Delay filter alarm	Delay before filter switch alarm activation	60	s
Ha41	Delay supply fan alarm	Delay before the supply fan alarm activation	10	s
Ha41	Delay heater alarm	Delay before the electrical heaters alarm activation	60	s
Ha45	Num. Of serial probes connected	Number of the serial probes connected	0	--
Ha45	Enable energy meter	Enable the energy meter in the fieldbus	No	--
Ha46	Address	Address of the serial probe	128	--
Ha46	Type	Type of the serial probe	Temperature	--
Ha52	Current address	Current address of the supply fan in fieldbus	30	--
Ha52	New address	New address of the supply fan in the fieldbus	30	--
Ha53	Sensor low val	Lowest value of the pressure sensor in supply fan	0	Pa
Ha53	Sensor high val	Highest value of the pressure sensor in supply fan	1000	Pa
Ha54	Current address	Current address of the return fan in fieldbus	30	--
Ha54	New address	New address of the return fan in the fieldbus	30	--
Ha55	Sensor low val	Lowest value of the pressure sensor in return fan	0	Pa
Ha55	Sensor high val	Highest value of the pressure sensor in return fan	1000	Pa
Hc06	Min	Low temperature threshold to fix the dampers at minimum opening	5	ºC
Hc06	Max	High temperature threshold to fix the dampers at minimum opening	35	ºC
Hc06	Min	Minimum opening of the fresh air damper	30	%
Hc06	Max	Maximum opening of the fresh air damper	100	%
Hc09	Qn cooling	Nominal supply flow set in cooling mode		m3/h
Hc09	Qn heating	Nominal supply flow set in heating mode		m3/h
Hc09	Q minimum	Reduction percentage in modulating control of the supply fan flow	100	%
Hc09	Fan number	Number of supply fans	1	--
Hc09	Constant K	Experimental constant of the supply fan	260	--

Hc11	NZ dif	Neutral zone of the supply fan	40	Pa
Hc12	Dif. Increment	Minimum increment modulation of the supply fan	10	Pa
Hc12	T. max within zone of regulation		35	s
Hc12	T. max out of zone of regulation		35	s
Hc13	Dif. Decrement	Minimum decrement modulation of the supply fan	10	Pa
Hc13	T. max within zone of regulation		35	Pa
Hc13	T. max out of zone of regulation		35	Pa
Hc14	Qn cooling	Nominal return flow set in cooling mode		m3/h
Hc14	Qn heating	Nominal return flow set in heating mode		m3/h
Hc14	Q minimum	Reduction percentage in modulating control of the return fan flow	100	%
Hc14	Fan number	Number of return fans	1	--
Hc14	Constant K	Experimental constant of the return fan	260	--
Hc16	NZ dif	Neutral zone of the return fan	40	Pa
Hc17	Dif. Increment	Minimum increment modulation of the return fan	10	Pa
Hc17	T. max within zone of regulation		35	s
Hc17	T. max out of zone of regulation		35	s
Hc18	Dif. Decrement	Minimum decrement modulation of the return fan	10	Pa
Hc18	T. max within zone of regulation		35	Pa
Hc18	T. max out of zone of regulation		35	Pa

8. ALARM MANAGEMENT

When an alarm event takes place it is possible to set different actions like LED activation, digital output, screen alarm, etc. In order to check the current active alarms press the ALARM key and then the up and down arrows.

The alarms can be grouped in three categories:

- Serious alarm: the whole unit stops and thus, all the devices in the unit.
- Device alarm: only the device affected by the alarm will stop.
- Sign alarm: there is only a signal of alarm but any devices is deactivated.

	LED signal	Screen signal	Remote signal	Unit stop	Device stop
Serious alarm	YES	YES	YES	YES	YES
Device alarm	YES	YES	YES	NO	YES
Signal alarm	YES	YES	YES	NO	NO

In order to reset the alarms which are no longer active, press for some seconds the ALARM key. The type of alarm reset can be classified in:

- Manual reset: The alarm and thus, the affected devices are not built up until the alarm is manually reset.
- Automatic reset: Once the alarm event is deactivated the reset is automatically performed.
- Semiautomatic reset: This reset is automatic for a certain number of times. Once this number has been reached the alarm becomes manual.

Alarm description	Reset	Delay	Action
Disconected probe	Automatic	No	Unit OFF
Low prove value	Automatic	60 min	None
High probe value	Automatic	60 min	None
Serial probe offline	Automatic	No	Unit OFF
Low pressure alarm	Semiautomatic	10 s	Circuit OFF
Low pressure switch alarm	Semiautomatic	10 s	Circuit OFF
Electrical heaters alarm	Manual	30 s	Electrical heaters OFF
Filter switch alarm	Automatic	30 s	None
Supply fan alarm	Manual	--	Unit OFF
Thermal overload alarm	Semiautomatic	No	Circuit OFF
Maximum number of working hours reached	Manual	--	None
Lock operating compressors by low mixing temperature	Automatic	No	All compressors OFF
High pressure switch alarm	Manual	No	Circuit OFF
High pressure alarm	Semiautomatic	No	Circuit OFF
Overcome alarm intensity	Automatic	No	All compressors OFF
Overcome alarm power	Automatic	No	All compressors OFF
TH-Tune offline	Automatic	--	None
TH-Tune probe not connected or	Automatic	--	Return probe activated

broken			
Fan. Ebmpapst n°	Manual	--	Unit OFF
Anti-freeze coil alarm	Automatic	--	None
Humidifier alarm	Manual	--	Humidifier off

9. BMS VARIABLES

The address of the BMS variables are shown in the following table. There are three types of variables, analog, integer and digital. The integer variables are treated in the same way than the analog but adding an offset of +208 to the address.

ANALOG VARIABLES				
BMS address	**Description**	**UOM**	**Read/Write**	**Name of the variable**
1	Air quality VOC Sensor	%	R	CAL_AIRE_VOC
2	Auto mode set point	---	R/W	CONSIGNA_AUTO
3	Confort heating set point	°C	R/W	CONSIGNA_CALOR_CONFORT
4	Eco heating set point	°C	R/W	CONSIGNA_CALOR_ECO
5	Confort cooling set point	°C	R/W	CONSIGNA_FRIO_CONFORT
6	Eco cooling set point	°C	R/W	CONSIGNA_FRIO_ECO
7	Humidity set point	%	R/W	CONSIGNA_HUMEDAD
8	Outdoor humidity	%	R	HUMEDAD_EXT
9	Supply humidity	%	R	HUMEDAD_IMP
10	Return humidity	%	R	HUMEDAD_INT
12	High pressure circuit 1	bar	R	PRESS_COND_CIRC_1
13	High pressure circuit 2	bar	R	PRESS_COND_CIRC_2
14	High pressure circuit 3	bar	R	PRESS_COND_CIRC_3
15	High pressure heat recovery circuit	bar	R	PRESS_COND_CIRC_REC
16	Outdoor temperatura	°C	R	TEMP_EXT
17	Supply temperatura	°C	R	TEMP_IMPULSION
19	Return/ambient temperature	°C	R	TEMP_RET_AMB
22	Exhaust/Fresh air damper	%	R	COMPUERTA_EXP_RENOV
INTEGER VARIABLES				
BMS address	**Description**	**UOM**	**Read/Write**	**Name of the variable**
1	Air quality CO2 Sensor	ppm	R	CAL_AIRE_CO2
2	Number of compressors working	--	R	WORK_COMP
3	Horas compresor 1 C1	hours	R	HORAS_C11
4	Horas compresor 1 C2	hours	R	HORAS_C12
5	Horas compresor 1 C3	hours	R	HORAS_C13

6	Horas compresor 2 C1	hours	R	HORAS_C21
7	Horas compresor 2 C2	hours	R	HORAS_C22
8	Horas compresor 2 C3	hours	R	HORAS_C23
9	Horas compresor CR	hours	R	HORAS_CR
10	Arranques compresor 1 C1	--	R	ARRANQUES_C11
11	Arranques compresor 1 C2	--	R	ARRANQUES_C12
12	Arranques compresor 1 C3	--	R	ARRANQUES_C13
13	Arranques compresor 2 C1	--	R	ARRANQUES_C21
14	Arranques compresor 2 C2	--	R	ARRANQUES_C22
15	Arranques compresor 2 C3	--	R	ARRANQUES_C23
16	Arranques compresor CR	--	R	ARRANQUES_CR
21	Actual supply fan flow L	--	R	CAUDAL_ACTUAL_IMP_L
22	Actual supply fan flow H	--	R	CAUDAL_ACTUAL_IMP_H
23	Actual return fan flow L	--	R	CAUDAL_ACTUAL_RET_L
24	Actual return fan flow H	--	R	CAUDAL_ACTUAL_RET_H
DIGITAL VARIABLES				
BMS address	**Description**	**UOM**	**Read/Write**	**Name of the variable**
1	Alarma global	--	R	GLOBAL_ALARM
2	Reset alarmas	--	R/W	RESET_ALARMS
3	Status of the supervisory system	--	R	ON_LINE
4	Supply fan alarm	--	R	ID_AL_KL_INT_CAUDAL_VENT_INT
5	Sistem On/Off	--	R	SysOn
6	Compressor 1 circuit 1	--	R	COMPRESOR1_CIRC1
7	Compressor 2 circuit 1	--	R	COMPRESOR2_CIRC1
8	Compressor 1 circuit 2	--	R	COMPRESOR1_CIRC2
9	Compressor 2 circuit 2	--	R	COMPRESOR1_CIRC2
10	Supply fan status	--	R	EST_VENT_INTERIOR
11	Heating/Cooling status	--	R	INV_VER
12	Compressor 1 circuit 3	--	R	COMPRESOR1_CIRC3
13	Compressor 2 circuit 3	--	R	COMPRESOR2_CIRC3
14	Compressor 1 recovery circuit	--	R	COMPRESOR1_CIRC_REC
15	Enable automatic heating/cooling	--	R/W	En_FRIO_CALOR_Auto
16	Invierno / Verano por pantalla	--	R/W	INV_VER_X_PANT
17	First power limit	--	R/W	LIMITE1
18	Second power limit	--	R/W	LIMITE2
19	Third power limit	--	R/W	LIMITE3
20	Fourth power limit	--	R/W	LIMITE4
21	Fith power limit	--	R/W	LIMITE5
22	Sixth power limit	--	R/W	LIMITE6

24	Alarma presostato de alta C1	--	R	ID_AL_PRESOST_ALTA_DESC_CIRC1
25	Alarma presostato de baja C1	--	R	ID_AL_PRESOST_BAJA_CIRC1
26	Alarma termico compresor 1 C1 / Klixon ventilador C1 / Rele Klixon descarga C1	--	R	ID_AL_TERMICO_COMPRE1_CIRC1
28	Alarma presostato de alta C2	--	R	ID_AL_PRESOST_ALTA_DESC_CIRC2
29	Alarma presostato de baja C2	--	R	ID_AL_PRESOST_BAJA_CIRC2
30	Alarma termico compresor 1 C2 / Klixon ventilador C2 / Rele Klixon descarga C2	--	R	ID_AL_TERMICO_COMPRE1_CIRC2
32	Alarma presostato de alta C3	--	R	ID_AL_PRESOST_ALTA_DESC_CIRC3
33	Alarma presostato de baja C3	--	R	ID_AL_PRESOST_BAJA_CIRC3
34	Alarma termico compresor 1 C3 / Klixon ventilador C3 / Rele Klixon descarga C3	--	R	ID_AL_TERMICO_COMPRE1_CIRC3
37	Alarma presostato de alta Circ. Recuperacion	--	R	ID_AL_PRESOST_ALTA_DESC_CIRC_REC
38	Alarma presostato de baja Circ. Recuperacion	--	R	ID_AL_PRESOST_BAJA_CIRC_REC
40	Estado desescarche C1	--	R	ACT_DESC_CIRC1
41	Estado desescarche C2	--	R	ACT_DESC_CIRC2
42	Estado desescarche C3	--	R	ACT_DESC_CIRC3
36	Electrical heaters alarm	--	R	ID_AL_QUEMA_RESIST
43	ON/OFF from supervisor	--	R/W	SUPERV_ONOFF
46	Antifreeze coil alarm	--	R	ID_AL_ANTIFREEZE_COIL

10. CONNECTIVITY AND SUPERVISION

The CLIMANAGER AHU platform is provided with the possibility of three kinds of connectivity ports used for different purposes.

-pLAN: Used for the communication within units on the same installation o with the PGD terminal.

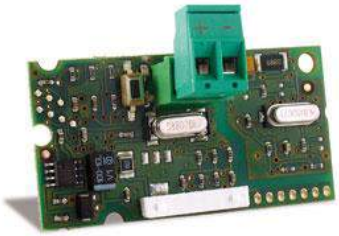
-Fieldbus: Used for the communication with field devices like energy meters, electronic expansion valves, driver for inverter compressors, etc.

-BMS: Used for the supervision of the unit. The protocols supported by this connectivity are explained in the following section. The supervision of the unit requires an optional card adapted for the protocol used.

Supervisory protocols

Most of the standard protocols used in the HVAC market are supported by the CLIMANAGER AHU platform. The most used are listed and briefly explained below; all of them require an additional card connected to the main board:

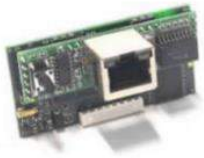
-Konnex: Standard protocol based in OSI for building management. The physical platform is shielded twisted pair.



-LonWorks: Created by Echelon Corporation and Motorola, with an open peer-to-peer architecture. The physical platform provided with the card is a shielded twisted-pair.

PCO10000F0 - LON serial card
PCO10001F0 - LON serial card Chiller Profile

-Bacnet: Created by ASHRAE, is a protocol with open peer-to-peer architecture and with flexible implementation. There are four possibilities for implementing this protocol, MS/TP, ARCnet, Ethernet, IP and LonTalk.



PCO1000WB0
Ethernet serial card

PCO1000BA0
BACnet MS/TP card

-Modbus: Created by Modicon (today Schneider Electric), open and simple protocol with easy development under any operating system and Master/Slave architecture. The supervisory system can be carried out on Ethernet (TCP/IP) or RS485 (RTU) platforms so a different card is needed in each case.

PCO1000WB0
Ethernet serial card

PCOS004850
RS485 serial card

11. INTEGRATED SUPERVISORY SYSTEMS

The CLIMANAGER AHU platform can be provided with four different types of integrated supervisory systems.

pCO Web

The pCO Web allows the supervision of one unit by means of previously explained protocols. It integrates a web server system which contains the HTML pages of the application. It offers the possibility of generating graphic reports as well as the possibility of upgrading the software of the main board. The LINUX integrated operative system allows the development of user applications.

Plant Watch PRO

It offers a new design to best meet the needs resulting from small to medium-sized installations.
The new hardware combined with 7 " touch screen display allows the different actors such as installers, maintainers, and store managers to control and optimize refrigeration and air conditioning in a simple and intuitive way, USB and Ethernet ports. Graphical reports can be saved as well as alarm relays can be activated. A maximum of 50 units in two lines can be monitored. Provided in two models: Wall and Panel, PlantWatchPRO can be used for various types of application. Its Graphic Web interface, allows remote access from PC, smartphone or tablet.

Plant Visor PRO

It is the supervisory and monitoring system that allows full control and optimization of refrigeration and air-conditioning of medium - large plants. It offers an intuitive interface and customizable

management and system configuration. PlantVisorPRO provides remote access to all the devices connected to it through its web interface. Two Ethernet ports are included, output relays for alarms, USB ports. It is capable of handling up to 300 units in two lines. Provided in two models:

-Box: CPU without monitor and keyboard.

-Touch screen: a device integrated with the CPU and the screen.

tERA

A plug&play: complete solution, immediately available. In a few steps, each system is reachable and all its information is available for analysis scalable solution: the infrastructure can be simply scalable to suit your needs thus modulating investments according to the real business. The proposed service is seamlessly integrated into the system control for simple and immediate management of the machines. Thanks to its GSM connectivity allows the remote access to the system. One tERA system allows the supervision of up to 10 units. Different plants can be configured by the user with different levels of accessibility. It allows the generation of graphical reports, alarm management and remote upgrading of the software.

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