ESIE18-19A

Service Manual

Roof Top Controller

Application software
UATYQ20~115A (BA-FC2-FC3) Y1



Issue 12/18

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1 GENERAL

1.1 Version log

Version code	Description	Date
ESIE18-19	Document release	17/12/2018
ESIE18-19A	Page 6: 1.3 Controller functions Page 14: 2.5.2 Network component addressing Page 16: 3.1.2 Software addressing of the pCO* boards (no. 4 & 5) Page 31/32: 5.1.1 List of inputs and outputs Page 35: 6.3.2 Control logic of supply and return plug-fans on temperature setpoint Page 36: 6.3.3 Dampers management Page 38: 6.4.1.2 Free cooling (below image) Page 41: 6.4.2.5 Free heating (first paragraph below image) Page 49: 6.6.6.4 External air damper control logic during defrost Page 71: 7.6.6 Plug fan branch (last paragraph) Page 72: 7.6.6 Plug fan branch Page 76: 7.7 User menu (last 2 paragraphs) Page 77: 7.7 User menu (first 4 paragraphs) Page 89: 7.10 Setpoint menu (last 2 paragraphs) Page 96: 8 Alarms (from row AL21) Page 97: 8 Alarms (AL27 & AL28) Page 103: 10.6 Activation of control logic of supply and return plug-fans on temperature setpoint	06/05/2019

1.2 Purpose of the manual

This manual was drafted with the purpose of giving the information required for using the roof top unit controller. As reader's contributions are welcome, feel free to report mistakes or to specify parts that require more in-depth explanations.

1.3 Controller functions

The software is designed to control roof top units, including cooling only and heat pump configurations, in their different versions, different operating modes and secondary functions. The controller is also set up to be interfaced with BMS control systems via some of the most popular communication protocols.
This software allows to manage units up to 4 compressors, two electrical heaters, one hot water coil, one humidifier, one heat recovery and the dampers for external, expulsion or recirculation air.

1.4 Symbols

Below is a description of the main symbols used in this manual.



Danger symbol - take extreme care.



Warning symbol - important information.



Note symbol - suggestions and advice.

1.5 Abbreviations

Below is a list of the main abbreviations used in this manual. Any additional abbreviations will be illustrated in the relevant sections.

Abbreviation	Meaning
C1	Compressor 1, circuit 1
C2	Compressor 2, circuit 1
C3	Compressor 1, circuit 2
C4	Compressor 2, circuit 2
Cdh	No. of active compressors during dehumidification cycle
Damp%	Percentage damper opening
DCO_2	Air quality differential
DCs	Differential for summer setpoint offsetting
DCw	Differential for winter setpoint offsetting
DEH	Differential for electric heater adjustment
DenFCH	Differential required for enabling free cooling/free heating
DFH	Free heating differential
DHWV	Differential for hot water valve registration
Dpcond	Condensing pressure differential
Dpevap	Evaporation pressure differential
DSFC	Differential for modulating the free cooling damper
DSFH	Differential for modulating the free heating damper
DTc	Cooling differential
DTh	Heating differential
DTmLs	Max. air temperature differential in delivery line (summer mode)
DTmLw	Max. air temperature differential in delivery line (winter mode)
DUR	Relative ambient humidity differential
EAD	External air damper
EN amb	Ambient enthalpy
EN est	External enthalpy
k	Fan nozzle constant
HWV	Hot water valve
n	No. of fans
$NZCO_2$	Neutral air quality zone
OFC	Free cooling offset
OFH	Free heating offset
OfsEH	Offset for electric heater adjustment
OfsHWV	Offset for hot water valve registration
Q	Air flow
R1	Electric heater 1
R2	Electric heater 2
Set EN	Enthalpy setpoint
SpC	Summer or cooling setpoint
$SPCO_2$	Air quality setpoint
Spcond	Condensing pressure setpoint
SPdfr	Variable defrost input threshold
SPdfrf	Forced defrost input threshold
Spevap	Evaporation pressure setpoint
SpH	Winter or heating setpoint

SPnodfr	Defrost de-activation threshold
SpQ	Air flow setpoint
SpUR	Relative ambient humidity setpoint
Ta	Ambient temperature or return temperature
Tae	External air temperature
Tm	Delivery temperature
TmLs	Max. temperature in delivery line (summer mode)
TmLw	Max. temperature in delivery line (winter mode)
URa	Relative ambient or return humidity
URae	Relative external air humidity
ZN	Neutral zone or dead zone
ZNUR	Neutral zone for relative ambient temperature
Δp	Air pressure differential

2 SYSTEM HARDWARE

This chapter describes the constituting parts of the system, its accessories, if any, their connection and their functions.

This chapter provides basic information on the controller software. For additional information, refer to the documentation supplied by the controller Manufacturer in the following website: http://www.carel.com

2.1 Hardware parts

The controller consists of an I/O board featuring a micro processor controller and an internal memory. The board may be supplied with various interface cards for communication with the control systems.
The user interface consists of a backlit LCD monitor intended for panel mounting. A wall-mounted remote terminal is available as an accessory.

2.2 I/O board

The I/O pCO Large board (Figure 2-1) has 10 analogue inputs (6 universal and 4 passive inputs), 18 digital inputs, 6 analogue outputs and 18 digital outputs.



Figure 2-1 - I/O Large board

As regards the electrical supply connections and the connection of the board inputs and outputs, refer to the wiring diagram of the unit and the manual supplied by the board manufacturer.

2.3 User Interface

The user interface (Figure 2-2) consists of a backlit LCD monitor with 4 lines and 20 columns, intended for panel mounting. The display features 6 buttons to surf the software menus and to set the operating parameters.



Figure 2-2 - User Interface

Below is a description of the functions of the buttons.



This button, referred to as "arrow up" ↑ in the rest of the manual, is pressed to scroll the screens of the various branches and to edit (increase) the values in the various fields.



This button, referred to as "arrow down" ↓ in the rest of the manual, is pressed to scroll the screens of the various branches and to edit (reduce) the values in the various fields.



This button, referred to as "Enter" in the rest of the manual, confirms the selection made for accessing the various branches and for editing the parameters.



This button, referred to as "Alarm" in the rest of the manual, is pressed to view and to clear the active alarms, if necessary.



This button, referred to as "Prg" in the rest of the manual, is pressed to gain access to the software menu.



This button, referred to as "Esc" in the rest of the manual, is pressed to exit the current screen and to go back to the previous screen level.

2.4 Serial boards for connection to control systems

The controller is fitted with two Slave serial boards for connection to BMS control systems:

- a built-in serial board (BMS2 port) operates according to the Modbus RTU protocol;
- a housing for an additional serial board (BMS1 port), capable of fitting different boards depending on the selected communication system and protocol.

2.4.1 Built-in serial board (BMS2 port)

The pCO controller has a built-in RS485 serial board in the BMS2 port which only operates with the Modbus RTU protocol. The communication parameters of this board are enabled and set up using the relevant control screen, as instructed below.

2.4.2 Additional serial boards (BMS1 port)

Below is a description of the additional serial boards for the BMS1 port in the controller. One board from those available may be selected:

- serial board RS485 featuring Modbus RTU or Carel protocols;
- LON FTT10 board with Lonworks protocol;
- pCO WEB board with Ethernet interface for SNMP, BACnet™ over IP, ftp, http protocols;
- serial board RS232 for connection to a GSM modem.

2.4.2.1 Serial board RS485 featuring Modbus RTU or Carel protocols

Serial board RS485 can be used for connection to monitoring and remote assistance systems. It is designed for communication with the controller through the Modbus RTU protocol or the Carel protocol.

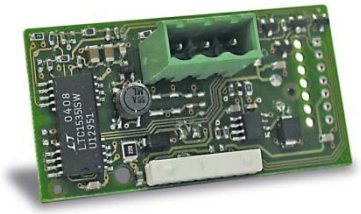


Figure 2-3 - Serial board PCOS0004850

2.4.2.2 Serial board pCO WEB (Ethernet)

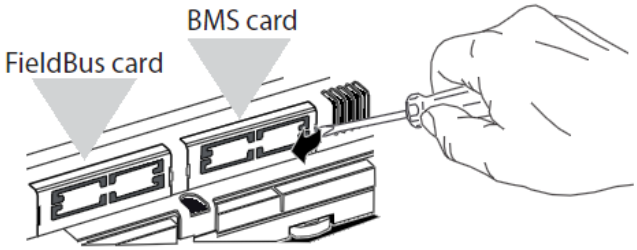
Another option for serial communication is the use of HVAC protocols based on the Ethernet physical standard by means of board PCO1000WB0.
This serial board is designed to connect to local LAN or Internet networks through SNMP, BACnet™ over IP, ftp, http, Modbus over IP protocols.



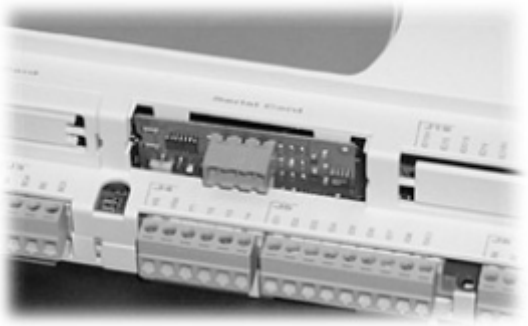
Figure 2-4 - Serial board PCO1000WB0

2.4.2.3 Installation of additional serial board

The serial board needs to be installed in the “BMS card” slot in the controller board where a comb connector is provided. Below is a description of the procedure to be followed for serial board installation in the BMS1 slot.



With the help of a flat head screwdriver remove the cover on the controller marked as “BMS card”.



When installing the serial board, snap it onto the two plastic supports that are integral with the pCO controller box.

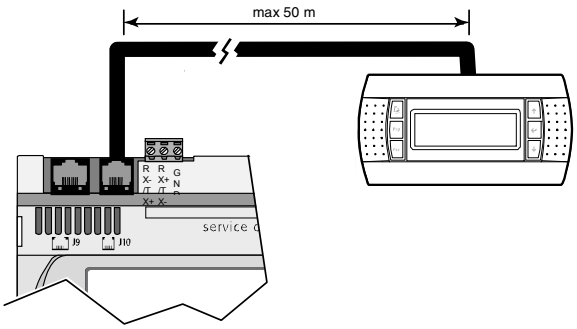


After inserting the board, the cover must be put back in place making the exposed board connector match the pre-cut hole in the cover.

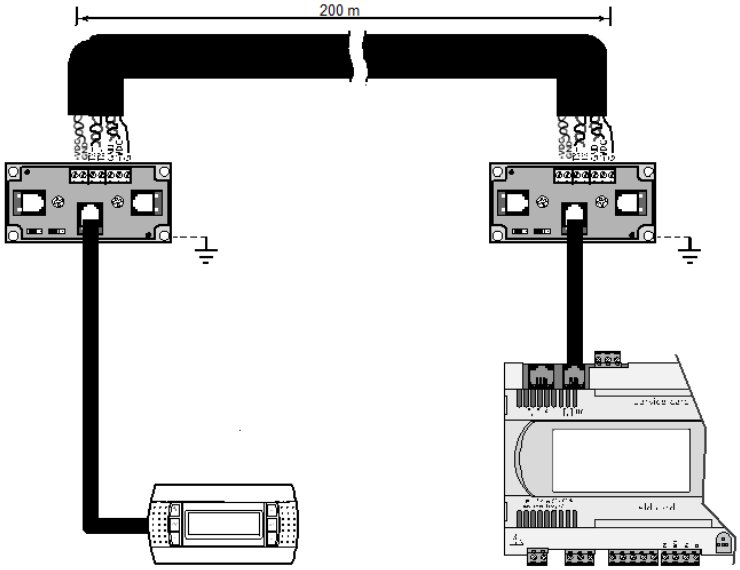
For additional information on how to install the serial boards, refer to the controller manufacturer's manuals.

2.5 pLAN local network

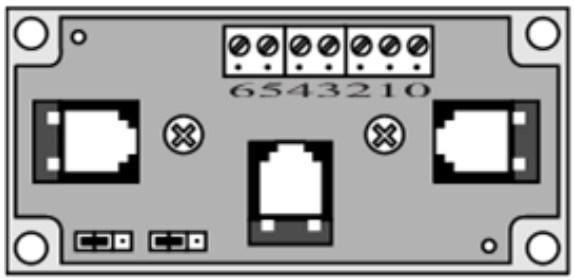
The pLAN local network allows the various components making up the system to communicate with each other.
The number of elements making up the system varies according to its complexity: the “basic” one consists solely of an I/O board and a terminal for management of units with one or two compressors, while the most “complex” one has several units, each with its own terminal, which communicate with each other, and a terminal for the entire system.
Each element can be identified in the network by its serial address, which is attributed through a software procedure.
The connections between the pLAN network and the various boards are implemented using a two-core, shielded and braided cable, having a min. cross-section of 0.5 sq.mm. Refer to the wiring diagram of the unit for the connections and the type of cable.
The connection must be made as follows: the terminals “RxTx+” and “RxTx-“ of the devices to be networked must be placed in parallel, and the cable shielding must be connected to the corresponding “GND” terminals.
If the distance between the terminal and the pCO board that powers it is less than 50 m, the terminal can be powered directly through a 6-way telephone cable.



If the terminal connection distance is over 50 m, but no longer than 200 m, 3 pairs of braided wires should be used, enclosed in a shielding having a cross-section of at least 0.5 sq.mm and T-switches (Carel code TCONN6J000), as shown in the figure.



The pLAN network communicates through standard RS485 serial with baud-rate of 65.2 kbit/s. It uses the Carel Multimaster protocol and can have a maximum extension of 500 m using T-switches for remoting.



T-switch

The cable connections must be made as indicated in the table below.

AWG24 cable (powered), cross-sect. 0.5 sq.mm		
Terminal	Function	Cable connection
0	Earth	Shield
1	+ VRL (30 Vdc)	First cable pair A
2	GND	Second cable pair A
3	Rx/Tx-	Third cable pair A
4	Rx/Tx+	Third cable pair B
5	GND	Second cable pair B
6	+ VRL (30 Vdc)	First cable pair B

2.5.1 Connection of several units to a pLAN local network

If several units are installed serving one single location, they can be monitored, and their operating status viewed, with one shared display whose network address is “32”.
The pCO boards in each unit must be interconnected in the pLAN local network using connector J11. Refer to the manual of the pCO board for connection instructions.

2.5.2 Network component addressing

Each active network component is identified by its serial address. The I/O boards and the interface terminals are active components.
The address of the I/O boards and of the 6-button PGD0 terminal is allocated following a dedicated software procedure. Below are the addresses that need to be set up in boards and terminals.

Unit no.	1		2		3		4		5		6		7		8	
I/O board address	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Private (dedicated) terminal address	17		19		21		23		25		27		29		31	
shared terminal address	32															

It’s possible to link in local network up to 8 units, each one with its own private display and shared display.
If one “shared” terminal is used for all the units in the network, the address will be “32”. If the configured network has 8 units and 8 terminals, one of the options below has to be selected:

- all private terminals (one for each unit);
- add max. 8 units to the network so that address 32 will be free for a shared terminal.

The main Menu screen appearing on the terminals shows the address of the connected board on the bottom RH side.
If the unit configuration is such that an additional board is used as expansion board, the address for this will be "2" for the unit 1, “4” for the unit 2, and so on.

3 PROGRAMMING OF PCO

This chapter provides basic information for controller programming and addressing. For additional information, refer to the documentation supplied by the controller Manufacturer in the following website: http://www.carel.com

Board programming means uploading the software in the controller board. The software may be uploaded in different ways, as illustrated below.

3.1 Software addressing of terminals and boards

3.1.1 Addressing of the 6-button PGD terminal

The 6-button PGD terminal is addressed via software.
To start the procedure, power the terminal and press the “arrow up”, “arrow down” and “Enter” buttons simultaneously for five seconds, after which the screen in the figure below appears.

```
Display address
setting ...     17
I/O Board address: xx
```

When the “confirm arrow” button is pressed, the cursor will move to under the terminal addressing field.
The “arrow up” and “arrow down” buttons can be used to change the address of the terminal.
In the figure, the address of the terminal is “17” (terminal of board n°1).
After correctly setting the address of the terminal, this must be confirmed with the “confirm arrow” button and the cursor will move onto the field for selecting the address of the board to which the terminal refers.
Again using the “arrow up” and “arrow down” buttons, you can change the reference to the board of which the terminal shows the parameters.
In the figure, the address of the board is “1”.
The 6-button PGD terminal addressing procedure is now finished. Press any button except “confirm arrow” to exit configuration mode. Press the “enter” button to enter configuration of the terminals in the network described in the next chapter.

3.1.2 Software addressing of the pCO* boards

The pCO board does not have microswitches for setting the pLAN address. The address must be set with a special procedure.

1. Supply power to the pCO*.
2. Prepare a terminal with address “0” following the procedure described below.

Premere contemporaneamente i tasti UP, DOWN e Enter per entrare nella schermata per il cambio dell'indirizzo del terminale.

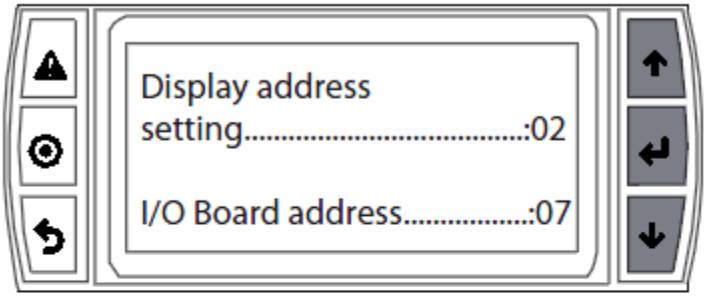
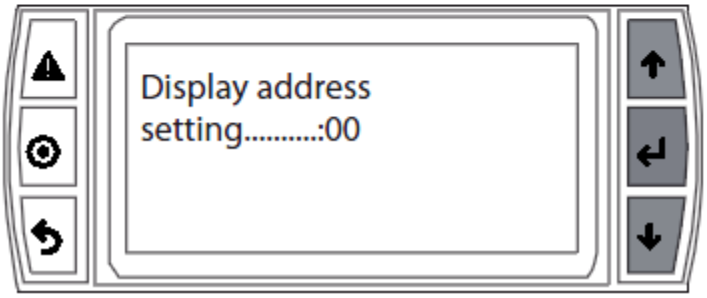
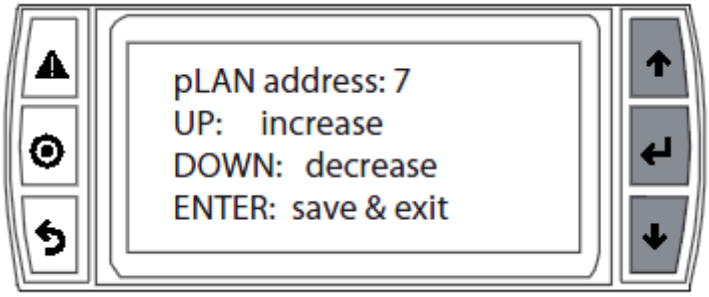


Fig. 6.e

Impostare l'indirizzo del display a 0 per impostare la connessione punto-punto. Confermare con Enter.



3. Disconnect any other devices from the pCO* that are connected in pLAN (e.g. plug out connector J11).
4. Power the pCO* by pressing the "arrow up" and "Alarm" buttons simultaneously. Release the buttons when on the display appears the message "SELF TEST, PLEASE WAIT";
5. After a few seconds, the following screen appears:

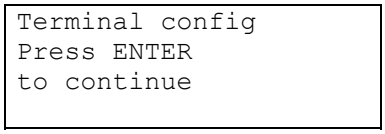


6. If you wish to change the address, use the "arrow up" and "arrow down" buttons and then press "Enter" to confirm.
7. Set the address of the pCO* board according to the installation requirement.

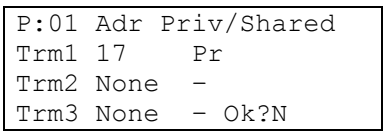
3.1.3 Procedure for the identification of the list of terminals for the pCO* boards in the network

This procedure is used to enable the terminal(s) envisaged in the network to display the parameters of the I/O boards present.
Management of the network includes the possibility of enabling a terminal for displaying the parameters of a given board, in which case it is a private terminal, or of several boards, in which case it is a shared terminal.
A pCO* board can communicate with three terminals at the most and only one of those can be configured as shared terminal, while the other two must be configured as private terminals.
The procedure for configuring the terminals in the network through the 6-button terminals is a continuation of the procedure for addressing them.

The previous section describes the procedure for giving an address to the terminal, at the end of which, when the “enter” button is pressed, the user enters the procedure for addressing the terminals in the network, and the screen shown in the figure appears.

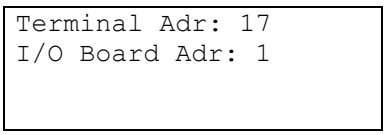


After pressing the “enter” button, the screen shown in the next figure appears.



P:	indicates the address of the connected board.
Addr:	indicates the column where the terminal addresses must be selected.
Priv/Shared:	indicates the column where whether the terminal will be private or shared must be selected.
Trm1-2-3:	these are the terminals to be configured.
None:	this is where the address of the terminal to be managed must be selected using the arrows. After selecting the address of the terminal, press the “confirm arrow” or “enter” button, according to whether it is a six-button or fifteen-button terminal, to go to the next field.
--:	for each addressed terminal, indicate whether it is private “Pr” or shared “Sh” in the fields of this column. Select with the arrows and confirm with the "enter" button.
Ok?N:	after completing the selection, when the cursor is positioned under letter "N" it will be changed to "Y" using the arrows. The configuration is confirmed by pressing the "enter" button.

When the “confirm arrow” button is pressed, the cursor moves onto the field for setting the address of the first terminal “adr” and “trm1”.
For uniformity of use of the addresses and with what was previously set in the address of the terminal, the value to be entered is “17”.
After confirming assignation of the terminal to address “17” through the “confirm arrow” button, for displaying the I/O board with address “1”, the cursor will move under the column in which the characteristic of the terminal will be assigned.
On confirming with the “confirm arrow” button, the cursor moves into the second line for configuration of a possible second terminal.
As the software gives the possibility of having several units connected together and therefore assignation of the “Pr” or “Sh” characteristic, that is, display of the parameters of the board with address “1”, this can also be carried out from a possible shared terminal.
If there are no other terminals, use the “confirm” arrow button to go through all the fields provided without changing them - “None” and “—” - up to the last field “Ok?No” where, using the “arrow up” or the “arrow down” buttons, option “No” must be converted to “Yes” in order to confirm the selections you have made.
After setting “Yes”, confirm with the “confirm arrow” button, and the software will automatically exit the procedure for configuring the terminals in the network.
Starting the procedure for configuring the terminals in the network through a fifteen-button terminal is slightly different.
The command for entering the procedure is the same as for the six-button terminal, that is, pressing the “arrow up”, “arrow down” and “enter” buttons at the same time. After five seconds, the screen shown in the figure will appear.



The address of the terminal set through the microswitches appears in the first line.
The address of the connected I/O board appears in the second line.
With the adopted assignation of addresses, the values that should appear are those shown in the figure.
After confirming with the “enter” button, the screen shown in the figure appears.

```
Terminal config
Press ENTER
to continue
```

From this point on, the procedure continues as for six-button terminals.

3.1.4 Network error messages

During operation of a network, connection and communication problems between the components may occur, in which case they will appear on the terminal of the network alarm screens; to resolve the problems, see the “Network troubleshooting” section.

```
I/O Board xx faulty
```

This screen appears if a power board with address “xx” is either not working or not connected to the network or there are communication problems.

```
NO LINK
```

This screen appears if a terminal does not receive messages from the network (synchronisation signals) for a time longer than 10 seconds. This alarm corresponds to the turned-off green LED of the addressing board.

3.1.5 Network status

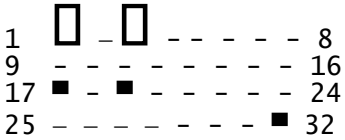
During operation of the network, its status can be seen. All the terminals and connected power boards are displayed on a special screen with symbols; the position of the symbol identifies their address.
To access the network status screen, press the same buttons used to access the terminal addressing screens for at least 10 seconds.
The following screen appears.

```
NetSTAT 1- - - - - - 8
T: xx  9 - - - - - -16
Enter 17 - - - - - -24
To EXIT 25 - - - -  32
```

T: xx: this is the address of the active terminal.
Enter to EXIT: press the "Enter" button to exit the network status screen.

The "-" in each line represents an available address.
If the address belongs to a terminal, the ■ symbol appears instead of “–”; if it belongs to a power board, the “ □” symbol appears**.**

Example 1



In the network, there are two I/O boards with address 1 and 3, two private terminals with address 17 and 19, and there is also a shared terminal with address 32.

For additional information and details on the features, connections, programming and other issues concerning the pCO boards, please refer to the manual supplied by the manufacturer.

3.2 Files to be uploaded for controller programming

The files listed below must be uploaded following one of the methods specified for correct controller operation:

- application file in binary format (.bin);
- file containing the languages to be uploaded in .iup format (at least one language is mandatory).

Additionally, we firmly recommend (although it is not mandatory) to upload the following files too:

- file containing the unit parameters in .dev format. This file needs to be uploaded for automatic setup of the unit parameters, i.e. without entering the values manually;
- file for log creation; file containing public variables in .pvt format and log configuration file in .lct format;
- BIOS relating to the board in binary format (.bin) - only when the board BIOS requires updating.

We also do recommend (although it is not mandatory) updating the board BIOS when the existing BIOS version is obsolete for the new board supplied with the software.
BIOS does not require updating if the BIOS version in the board is aligned or is more recent than the software version. Refer to the information above to verify the BIOS version of your board.

The unit parameters must be entered manually if programming is implemented without uploading the .dev file. This manual does not provide sufficient information to carry out this operation because parameter entry depends on the unit model and the fitted accessories. For this reason, reference must be made to the list of unit parameters and/or to the Default programming procedure. We recommend contacting our Service Department.

When a controller board fitted in an installed unit is programmed, all the saved data and parameters are overwritten. We therefore recommend writing down at least the following parameters at the end of this manual: the setpoints (Setpoint menu), the machine model (screen V1), the unit serial number (screen C01), the hours of operation of the unit and the compressors (Maintenance menu) as well as any other edited parameter.

3.3 Bios and boot check

To check the version of the bios and boot in the pCO boards, press the Alarm and Enter buttons simultaneously for at least 3 seconds and use the arrow buttons to select “SYSTEM INFORMATION”. A screen appears showing the version of the BOOT and BIOS fitted in the board and the size of the board memory.

```
BOOT V 4.01  13/04/06
BIOS V 3.92  11/04/06
>2+2MB  <
APP. CRC: __________
```

3.4 Programming using a Smart Key

The Carel code in the programming key is PCOS00AKY0. Later in this manual the key will be referred to as “Smart Key”.
The Smart Key enables software configurations to be transferred from computers to pCO controllers and vice versa.
The connection to the pCO is made directly through a telephone connector, whereas a USB PCOS00AKC0 converter must be used with the computer.
The Smart Key is powered through the USB port of the computer or directly from the pCO board, so a power supply unit is not required.



Programming key

The USB converter is needed to connect the Smart Key to the computer.



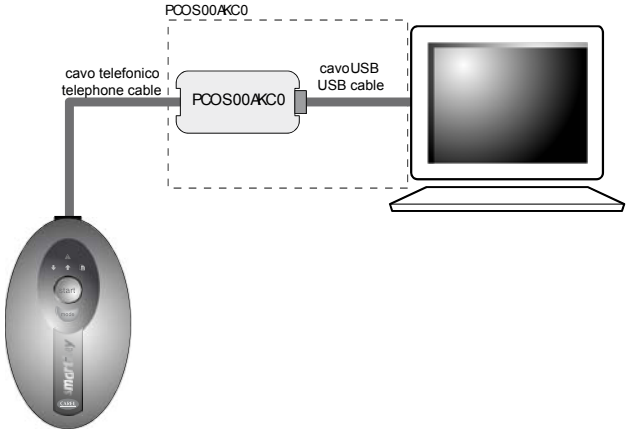
USB converter for Smart Key

In addition to a USB port the computer needs to have VCP drivers to operate the converter. When the converter is connected to a USB port in the personal computer for the first time, the system detects the new hardware and asks you to install the VCP drivers for serial port management. You should now select the path of the directory where the drivers are present.
If the drivers are installed correctly, the system automatically detects a new COM port.
If several adapters are connected to the same computer, the port assigned by the system must be checked.
To carry out all the Smart Key read, write and configuration operations, a special “pco_manager” program must be used.

WARNING

Do not connect adapter PCOS00AKC0 to the telephone connector of the pCO as this may cause irreversible damage to the computer and to the pCO. For pCO programming with the computer use the CVSTDUTLF0 converter.

The illustration below shows the connection of the programming key to the computer using the converter and the USB serial port.



Smart Key connection to the computer

As explained above, the key can be programmed with a computer through the "pco_manager" program.
The functions enabled when the key is used can be set with the "pco_manager" program.
The table below provides a list of the functions that are set up in the key.

Type	Function	Mode button
B	Update software from key to pCO (bios, applications, parameters, etc.)	Disabled
C	Copy software from pCO to pCO (bios, parameter application software, etc.)	Switch key from write to read mode
D	Reading of log data	Disabled
E	Read history data and pCO software (bios, application software, parameters, etc.)	Disabled
F	Reading of µChiller3 log data	Disabled

The key is purchased in read/write mode (type C) so that it can be used immediately to transfer the software from one pCO board to another.
The key can be set up with various functions, which contribute to making the best use of it in different applications.

When the key is plugged into a computer, the arrow symbols take different meanings, as listed in the table.

↑	Flashing	Waiting for connection to the PC
↑ □ ↓	Alternating	Data transfer in progress during connection with the PC

For more in-depth information on key programming, see the documents provided with the "pco_manager" programme.

Once the required function has been set and the key has been correctly programmed, the key can be used with the pCO controller.

Prior to connecting the key to the telephone connector, instead of the terminal, power must be cut out to the board.
When it is switched on again, all the symbols light up briefly and the buzzer sounds. A few minutes are required before the key is fully operational.
During this time the symbol ↑ flashes. At the end of this time, the pCO board enters programming mode and the start button, which is now lit and steady, can be pressed to start data transfer.

WARNING

If the key type is "B" or "C" (write mode), pressing the Start button causes immediate deletion of the software uploaded to the pCO.

When the key is plugged into a pCO, the buttons and the symbols have the functions listed in the table.

↑	Flashing: the key is connecting to the pCO board. During this stage, which may last a few seconds, the ***start*** button is disabled.
Start	Flashing: the key has detected the pCO and it is checking login authorisations.
start + ↑	Lit and steady: press the start button to start software writing in the pCO.
start + ↓	Lit and steady: press the start button to start reading the pCO software.
start +	Buttons/symbols ON and steady: pressing of the Start button causes reading of the pCO history data.
Mode	Lit and steady: for the type “C” key, after being pressed for 1 second, it switches from read to write.

With a type “C” key, the “***mode***” button is pressed for 1 second to switch from read to write and vice versa. The symbols ↑ (write to pCO) and ↓ (read pCO) take different functions based on the selected mode.
If the key is not type “C”, the “***mode***” button is disabled and OFF.
The “***Start***” button triggers the reading or writing process, which is indicated by the corresponding symbol flashing (↑ or ↓) with a frequency that is proportional to the progress status.
After completion of this operation, the buzzer sounds intermittently for 20 seconds. When the “***Start***” button is pressed again, the buzzer sounds once more, but the command is not executed again. To repeat the operation, the key needs to be disconnected.
In the event of an error, the symbol ⚠ is switched on in combination with other LEDs. The table below indicates the causes of the problem.

⚠ + ↑ + ↓	Flashing	Communication error: no reply from pCO or firmware version of key incompatible.
⚠ + ***mode***	Lit	Password error or incompatible key type
⚠ + ***mode***	Flashing	Key type incompatible
⚠ + ***start*** + ↑ + ***buzzer***	Flashing and intermittent ***buzzer***	The write command has not occurred correctly.
⚠ + ***start*** + ↓ + ***buzzer***	Flashing and intermittent ***buzzer***	The read command has not occurred correctly.
⚠ + ***start*** + + ***buzzer***	Flashing and intermittent ***buzzer***	The log data read command has not occurred correctly.
⚠ + ↑	Lit	One or more necessary files are missing from the key.
⚠ + ↑ + ***start***	Lit and ***start*** flashing	Incompatibility between bios file and pCO hardware.

⚠ + ↑ + ***mode***	Lit and ***mode*** flashing	Incompatibility between software application files and pCO hardware.
⚠ + ↑ + 📄	Symbols ON and 📄 flashing	Incompatibility between log configuration and pCO hardware.
⚠ + 📄	Lit	Space insufficient for log reading.
⚠ + ↓ + 📄	Lit	Log data missing from pCO board.
⚠	Lit	Key type not programmed.

WARNING

The key must not be plugged out while data is being written on it. The file being transferred may be lost and the corresponding space is not restored. To restore the initial capacity, all the files must be fully deleted. With a type "C" key, it is enough to carry out a new read cycle.

3.5 Programming using the pCO Manager

The controller board may be programmed using the pCO Manager. This piece of software, which is supplied free of charge by Carel, is designed to interface a personal computer and the controller board using a USB, a-b type cable, if the board is provided with a USB Slave port, a USB-RS485 converter or a USB pLAN converter. Refer to the instruction manual for pCO Manager operation for additional information.

3.6 Programming using a USB pen drive

Controllers supplied with a USB Host (master) port can be programmed using a USB pen drive and the controller display.
A USB pen drive must be available, containing at least the following files:

- application file in binary format (.bin);
- file containing the languages to be uploaded in .iup format (at least one language is mandatory).

Additionally, we firmly recommend (although it is not mandatory) to upload the following files too:

- file containing the unit parameters in .dev format. This file needs to be uploaded to set up the unit parameters without entering the values manually;
- file for log creation; file containing public variables in .pvt format and log configuration file in .lct format;
- BIOS relating to the board in binary format (.bin) - only when the board BIOS requires updating.

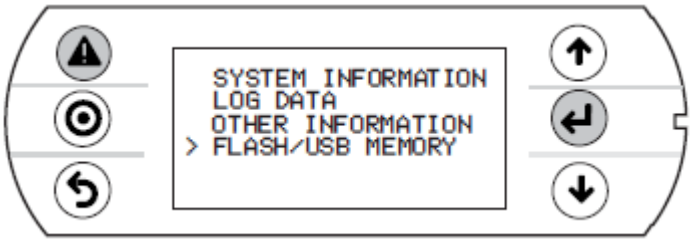


We also do recommend (although it is not mandatory) updating the board BIOS when the existing BIOS version is obsolete with respect to the new board supplied with the software.
BIOS does not require updating if the BIOS version in the board is aligned or is more recent than the software version. Refer to the information above to verify the BIOS version of your board.

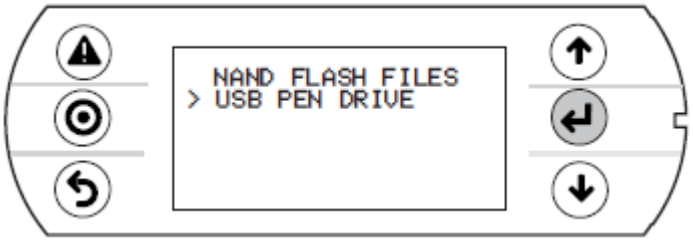
The USB pen drive cannot be used to update the board BOOT. This operation needs to be performed following one of the procedures described above.
All files must be stored in the same directory.

The pCO5+ board can only read files stored in either the root directory of the pen drive or in a level one directory.

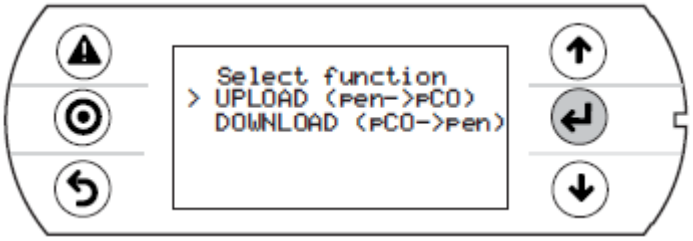
After fitting the pen drive into the USB Host port in the board, press the Alarm and Enter buttons simultaneously for at least 3 seconds. The menu below appears with text in English:



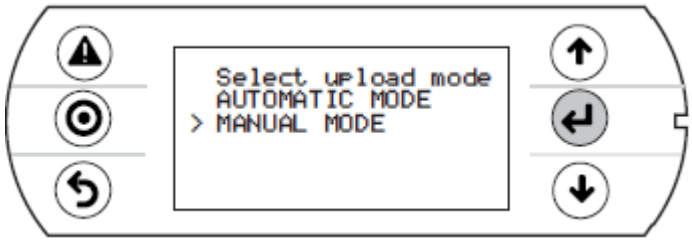
Click the arrow buttons to move the cursor to “FLASH/USB MEMORY” and then press Enter.



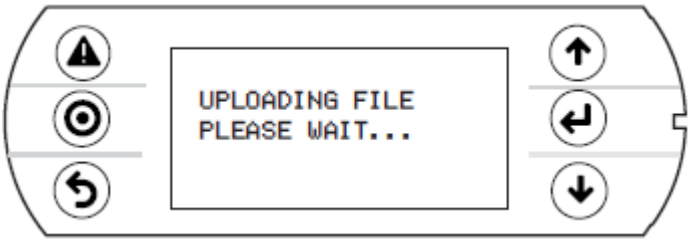
Click the arrow buttons to move the cursor to “USB PEN DRIVE” and then press Enter.



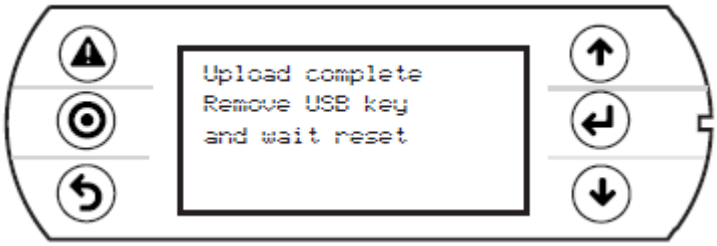
Click the arrow buttons to move the cursor to “UPLOAD (pen → pCO)” and then press Enter.



Click the arrow buttons to move the cursor to “MANUAL MODE” and then press Enter.
Press the ENTER button to select the files that need to be uploaded into the controller. An asterisk “*” appears on the left-hand side of the file.
Select all the desired files and press the Prg button to start the upload. The following screen appears:



After upload completion, the following screen appears:



Take out the USB pen drive and wait for the board rebooting.

3.7 Advanced history and log files

If log generation files were uploaded into the board, as described above, some operating variables of the unit are logged whenever each programmed event occurs. The log can be read directly on the unit display as it is controlled directly by the board BIOS.

3.7.1 Access to logs from the unit display

This branch can be accessed from any screen by pressing the “Alarm” and “Enter” buttons simultaneously for a few seconds, which causes the following screen to appear.

```
  SYSTEM INFORMATION
> LOG DATA
  OTHER INFORMATION
  -
```

Press the arrow buttons to move the cursor to the “LOG DATA” item and press Enter to confirm.
If the file for log recording was not uploaded in the controller memory, this screen appears:

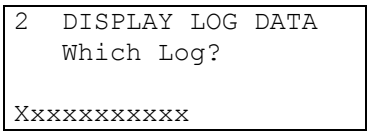
```
NO LOG DATA
   PRESS
   [MENU] OR [ESC]
```

On the other hand, if the history management file was uploaded correctly, the following screen appears.

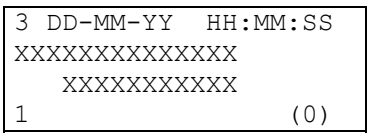
```
1  DISPLAY LOG DATA
    Which memory?

EXPANSION MEMORY
```

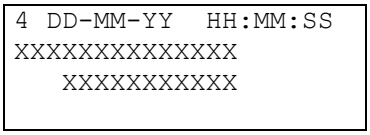
The first level shows the memory where the logs are stored: the records in the history log can be read.
Select the memory you want to read using the arrow buttons and then enter the second level by pressing the "Enter" button to confirm.



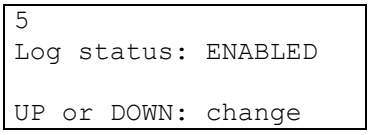
Once in the second level, the system requests selection of the history to read.
The history log can be examined by event, i.e. parameters are recorded when an alarm triggers or an operating cycle gets started, or by cyclic records, i.e. parameters are recorded at predefined intervals.
The last line shows the name of the history log, access to which is gained by pressing the Enter button.
Use the arrow up and arrow down buttons to go from an event-based log to a cyclic log, and vice versa.



When the event-based log is selected, access is gained to the third level. The above screen is an example of this.
The first line shows the date and time of the event.
In the second and third lines, there is text that indicates the event. Since there is not much room for the description and it only appears in English, the text includes the number of the corresponding alarm screen.
The fourth line shows whether the record refers to alarm activation or resetting. The example in the figure shows status “1” which comes from “(0)”, so it refers to activation. Status “0” coming from “(1)” refers to alarm resetting.
Click the arrow up on this screen to move on to the next event; click the arrow down to move back to the previous event; and click the Enter button to move on to the next level where the values recorded at the time of the event can be viewed.

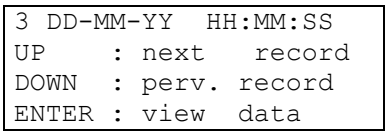


The screens of the fourth level show the values recorded at the time of occurrence of the event displayed in the relevant screen of the previous level.
The first line in the screen shows the same time and date as the previous screen, which refers to the time the event was recorded.
The second and third lines describe the variable recorded with reference to the corresponding screen.
The last line shows the recorded value.
From this screen, all the values of the records made at the time of occurrence of the event to which they refer can be scrolled using the up arrow and down arrow buttons.
A click on the "Enter" button gives access to the fifth level.

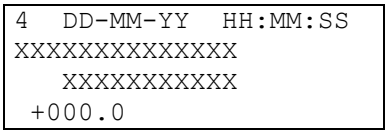


At the fifth level, which is common for both types of record, the records can be “ENABLED” or “DISABLED” using the arrow buttons.
The records must be disabled when they need to be stopped to prevent loss of significant values, which may be overwritten.

The second level gives access to the event-based history log and to the cyclic frequency-based history log. In this case, a click on the Enter button from the second level gives access to the third level, a typical screen of which is shown below.



The first line shows the date and time of the record. The arrow up and arrow down buttons are pressed to access the next record and the previous record respectively. The "Enter" button is clicked to access the values recorded at the selected date and time.



The first line in the screen of the fourth level shows the date and time of the records, which are the same as those in the previous level.
The second and third lines describe the variable recorded with reference to the corresponding screen.
The last line shows the recorded value.
From this screen, you can scroll all the recorded values with the arrow up and arrow down buttons.
A click on the "Enter" button gives access to the fifth level, which is the same as that described for the event-based records.

3.7.2 Log downloading and analysis using a personal computer

Logs can be downloaded onto a personal computer using the pCO Manager software. Refer to the User Manual of the pCO Manager for a description of the download procedure.
Alternatively, logs can be downloaded onto a USB pen drive following the procedure described above for board programming. The only difference is selection of the item “Download (pCO-pen)” followed by the log file to be downloaded.
In both cases a log in .csv format is downloaded. This is then read with the pCO Log Converter software by Carel.

3.8 Check of network operating status

Three LEDs are featured on the pCO boards showing the operating status of the network. The table below explains the function of each LED.

LED	STATUS	DESCRIPTION
Red and green Yellow	OFF ON	The controller has acknowledged a software application running in the pLAN network.
Red Green and yellow	OFF ON	The controller is connected to a pLAN and is working correctly.
Red and green Yellow	OFF ON flashing	Low level operation (pCO* communication with PC): terminal disconnected or BIOS incorrect or application software incorrect
Yellow and red Green	OFF ON flashing	Low level operation (pCO* communication with PC): BIOS or application software incorrect or Upload/Download in progress
Red, green and Yellow	ON pulse	Transient operation: pCO* start-up or boot upgrade completed.
Green Red and yellow	OFF	Terminal disconnected: copy from pen drive in progress

4 HARDWARE TROUBLESHOOTING AND ANALOGUE INPUT INSPECTION

This chapter illustrates the most frequent hardware faults and gives some information on their possible causes and solutions. It also describes the procedure to be followed to check the analogue inputs in the controller board.

4.1 Network faults

Below is a list of the main problems which may occur in a line.

Problem	Possible causes and solutions
The terminal buzzer sounds for no reason. When it stops sounding, the display is cleared (hardware reset).	- The same address has been given to several components. Check the configuration of the addresses. One or more terminals have the address set to "0". Check the configuration of the addresses. - The network connections have not been made correctly. - The data lines (tx+ / rx+ and/or tx- / rx-) may be short-circuited to earth or disconnected. Check the connections. - A pCO board may be damaged.
Although it is powered, the display of some terminals fails to show data.	Access the configuration procedure pages. If the address field is "-" in the “I/O board Adr” line, the terminal has not been configured. Configure the terminal.
The alarm screen appears showing "NO LINK".	- The terminal is not receiving signals from the network, the connections are disconnected. Check all the connections to the network. There are no network components connected to the terminal.
The “I/O board xx fault” alarm message appears.	- The power board with address "xx" is not working properly. Check the LEDs of the corresponding serial addressing board.
The green LED fails to come on in the pCO* board.	- The board involved is not receiving the network signal: the connections are incorrect. Check all the connections. There are no other components connected to the network.
The green LED in the pCO* board switches on and off periodically.	- Go back to the first item.
The unit will not get started (network detection LED on the pCO* off, LCD off, other LEDs off).	Check that the network is energised.

4.2 Other faults

Problem	Possible causes and solutions
When the unit is switched on, the line LEDs or the three pLAN LEDs are ON or either no texts or random texts appear on screen.	- Problems are detected in the Flash Memory. Contact our Service Department.
Incorrect reading of incoming signals.	- Check the calibration of the inputs (as per program). - Check that the pCO* and the probes are powered correctly. - Separate the power supply to the digital inputs from the power supply to the pCO* using a 24 Vac/24 Vac transformer of at least 12 VA. - Check that the wires in the probes are connected correctly. - Check that the probe cables are at a sufficient distance from possible sources of electromagnetic interference such as power cables, cable contactors with high voltages and with devices connected having high starting current draw. - In the event of a probe error or a pCO* conversion error, refer to the "Analogue input testing" section.

Problem	Possible causes and solutions
Questionable alarm message from digital input	- Go to the relevant screen in the I/O branch and check the status of the input. - Check for voltage on the input involved between terminal "C" and corresponding terminal "Cn". If 24V is measured, the input is closed; if 0V is measured, the input is open (the controller normally outputs an alarm signal when the input is open).
The controller repeatedly continues to go into Watchdog mode (it switches off and then on again as though there were a power cut for a few seconds or randomly activates some digital or analogue outputs).	- Check that power cables are not placed close to the controller. - Check that the sizing of the power transformer is correct.
The user terminal is blocked (no response on pressing the buttons)	- Check that the terminal is not disconnected. If it is, plug it back in place and switch the controller off and on again with the terminal connected.

4.3 Analogue input testing

Analogue inputs are used to read 0/1V or 0/10V voltage signals, current value 0/20 mA or 4/20 mA, or signals varying their ohm value as the temperature changes.
The sections below provide instructions for checking, through signal reading, that the sensor is working properly or the input is being read correctly.

4.3.1 Active voltage probes

To check correct operation of the active voltage probes, normally used for temperature or humidity measurements, using a voltmeter take a measurement between the “GND” terminals and the “Bn” terminal for the input connected to the probe to be checked; starting from this voltage value, it is possible to check its correspondence with the quantity measured by means of the general formula:

$$(FS_{max} – FS_{min}) / S_{max} \times V_{mis} + FS_{min} = T_{mis}$$

where:
FS_{max} = temperature value read by the probe at the admissible input signal peak;
FS_{min} = temperature value read by the probe at the min. admissible input signal value corresponding to 0V;
S_{max} = Maximum voltage value allowed by the input.
V_{mis} = voltage value measured in Volt;
T_{mis} = temperature value read on the controller.

Example: Use a probe having an operating range between 0°C and 100°C, and a signal between 0V and 1V. Take the measurement between terminal “GND” and the connected input 150 mVdc: the temperature read by the controller is calculated as follows.

(100 – 0) / 1 x 0.15 + 0 = 15°C

4.3.2 Active current probes

Correct operation of the probes normally used for measuring pressures in live conditions is checked by placing a voltmeter between the “GND” terminals and the “Bn” terminal of the relevant input. The value of current is calculated indirectly based on the probe signal.
To make the calculation, use the formula I = V / R, where the input impedance “R” is 50 ohm.
The pressure value Ps that the probe is sending is calculated as instructed below.

$$(FS_{max} – FS_{min}) / 0.016 \times (V_{mis} / 50 – 0.004) + FS_{min} = Ps$$

where:

FS_{max} = pressure value read by the probe at the admissible input signal peak;
FS_{min} = pressure value read by the probe at the min. input signal admissible value;

V_{mis} = voltage value measured in Volt;
Ps = pressure value read on the controller.

Example: Use a probe having an operating range between 0 and 30 bar, and a signal between 4 and 20 mA. Take the measurement between terminal “GND” and the connected input 630 mVdc: the pressure read by the controller is calculated as follows.

(30 – 0) / 0.016 x (0.63 / 50 – 0.004) + 0 = 16.1 bar

4.3.3 “NTC” and PT1000 passive probes

Probe types NTC, high temperature NTC and PT1000 are often installed to read the temperature. These probes change the value of their electrical resistance whenever the temperature value changes.
The read value can be found by disconnecting the probe from the input and measuring its resistance with a multimeter.

NTC probes

°C	Kohm	°C	Kohm	°C	Kohm
-20	67.74	4	22.99	28	8.94
-16	55.95	8	19.40	32	7.72
-12	46.48	12	16.55	36	6.69
-8	38.75	16	14.12	40	5.82
-4	32.43	20	12.09	44	5.08
0	27.28	24	10.38	48	4.44

High temperature NTC probes

°C	Kohm	°C	Kohm	°C	Kohm
15	78.29	50	18.08	85	5.34
20	62.37	55	14.99	90	4.56
25	50.00	60	12.48	95	3.91
30	40.34	65	10.44	100	3.37
35	32.73	70	8.78	105	2.91
40	26.71	75	7.41	110	2.59
45	21.92	80	6.28	115	1.19

NTC PT1000 probes

°C	Kohm	°C	Kohm	°C	Kohm
15	1058.5	50	1194.0	85	1328.0
20	1077.9	55	1213.2	90	1347.0
25	1097.3	60	1232.4	95	1366.0
30	1116.7	65	1251.6	100	1385.0
35	1136.1	70	1270.7	105	1403.9
40	1155.4	75	1289.8	110	1422.9
45	1174.7	80	1308.9	115	1441.7

5 INPUTS AND OUTPUTS

This chapter contains a list of the controller I/O (inputs and outputs). Inputs and outputs are used according to the actual configuration of the unit.

5.1.1 List of inputs and outputs

The table below lists all the inputs and outputs featured in the controller.

		Main board	Expansion board
Analogue inputs	**U1**	Differential pressure in air delivery line to fans	
	U2	Differential pressure in air return line from fans	
	U3	Pressure in circuit 1	
	U4	Temperature in air delivery line	
	U5	Temperature in air return line (ambient)	
	U6	Pressure in circuit 2	
	U7	Humidity in air return line (ambient)	
	U8	External air temperature	
	U9	Air quality probe (CO2)	
	U10	External air relative humidity	
Digital inputs	**ID 1**	Freeze protection	
	ID 2	Dirty filters alarm	
	ID 3	Summer/Winter	
	ID 4	Main fan overload switch	
	ID 5	Remote ON/OFF	
	ID 6	Thermal overload switch in heater 1	
	ID 7	Low pressure alarm in circuit 1 from pressure switch	
	ID 8	Overload switch in compressor 1 (comp. 1, circuit 1)	
	ID 9	Low pressure alarm in circuit 2 from pressure switch	
	ID 10	Overload switch in compressor 2 (comp. 2, circuit 1)	
	ID 11	Overload switch in heater 2	
	ID 12	Air flow switch	
	ID 13	High pressure alarm in circuit 1 from pressure switch	
	ID 14	High pressure alarm in circuit 2 from pressure switch	
	ID 15	Overload switch in compressor 3 (comp. 1, circuit 2)	
	ID 16	Overload switch in compressor 4 (comp. 2, circuit 2)	
	ID 17	Serious external alarm	
	ID 18	External warning message	
Digital outputs	**NO1**	Compressor 1, circuit 1	
	NO2	Condenser fan in circuit 1	
	NO3	Compressor 2, circuit 1	
	NO4	Compressor 2, circuit 2	
	NO5	Heater in condensate tray	
	NO6	Compressor 1, circuit 2	
	NO7	Main fan	
	NO8	Alarm	
	NO9	Heater 1	
	NO10	Heater 2	
	NO11	Auxiliary digital output	
	NO12	Cycle reversing valve in circuit 1	
	NO13	Unit in heat pump mode	
	NO14	Condenser fan in circuit 2	

	NO15	Free cooling/heating enabled	
	NO16	Cycle reversing valve in circuit 2	
	NO17	Heating valve status	
	NO18	Humidifier ON/OFF control	
Analogue outputs	**Y1**	External air damper	Heat recovery analogue output
	Y2	Supply plug-fans	Modulating control in humidifier
	Y3	Axial fans circuit 1	Hot water coil valve
	Y4	Return plug-fan	
	Y5	Axial fans circuit 2	
	Y6	Recirculation air damper	

6 CONTROLLER LOGIC

This chapter describes the logic of the controller fitted in roof top units.
The unit you have purchased may not be provided with all the functions illustrated in this manual, because each unit is configured differently and has different accessories fitted.

6.1 General

The main purpose of the controller installed in the unit is to preserve the temperature and humidity conditions in the place which is served by the roof top unit within the operating limits of the unit, as specified in the technical book.
Depending on the unit configuration, the controller fulfils its purpose using different devices fitted in both the aeraulic and refrigerant circuits. The controller also continuously checks that the unit operating parameters are within the specified safety limits so as to prevent breakage of the unit and hazardous situations for both people and the environment.



All the illustrated functions refer to correctly installed units, as specified in the documentation supplied by the Manufacturer.



The parameters provided in this manual are indicative: their actual value may change in function of the unit configuration and the type of installation.

6.2 Unit switch-on

The unit is in OFF mode when it is supplied with electricity, but it is not enabled for operation.
In this condition the controller displays the values read by the analogue inputs and the status of the digital inputs and outputs. All the outputs are not automatically enabled by the controller, except for alarm outputs, if any, as described later on.
The unit is switched on in one of the following ways:

- using the keyboard;
- by time slots, where enabled;
- by the control system, only in cases where a BMS control system is enabled.

All the OK signals must be enabled if the unit is to be switched on. If at least one of the OK signals above is missing, the unit will fail to get started.

6.2.1 Keyboard-controlled switch-on

The keyboard can be used to either start or stop the unit on condition that the remote ON/OFF digital input is closed (ref. to unit wiring diagram).
First, make sure that the digital ON/OFF input is closed. Its status is viewed on screen I8 in the “Inputs/Outputs” menu. Go to the main screen, press the Prg button, select the “Unit ON/OFF” option in the menu and press Enter to confirm. Screen "N0" appears on the display.
Press the "Enter" button to change the status of the unit: if the unit is off, it turns on, and vice versa.
If the time slots are enabled, the unit only gets started if the current time slot is one of those enabled for unit switch-on.
If a control system is used to monitor the unit, the unit gets started after receiving an OK signal via a serial line.

6.2.2 Time-zone-controlled switch-on

The software is used to control unit switch-on and switch-off based on weekly and daily time slots.
Weekly time slots are designed to set the days in the week when the unit is either on or off. At midnight the controller checks the status of the unit programmed for the next day and either starts or stops the unit based on the required setting.
A daily time slot can be set for days in which the unit is expected to be operational. More specifically, the system enables setting of the summer and winter operating setpoints both inside and outside a daily time slot in addition to activation of the unit on/off out of the scheduled time. The time slots are enabled and programmed in the “Clock” menu of the controller.

The time slots can be used to either start or stop the unit on condition that the remote ON/OFF digital input is closed (ref. to unit wiring diagram). Additionally, the daily time slots of screen K2 in the “Clock” menu must be enabled. If weekly programming is enabled, the unit must be on a day programmed for unit switch-on in screens K6 and K7 of the “Clock” menu.
If a control system is used to monitor the unit, the unit gets started after receiving an OK signal via a serial line.
Refer to the section relating to the “Clock” menu for the programming of the time slots.

6.2.3 Switch-on through an ON/OFF digital input

The unit can either be started or stopped using a digital input on condition that it has been switched ON using the keyboard (ref. to relevant section). The unit gets started as soon as the ON/OFF digital input is closed.
If the time slots are enabled, the unit only gets started if the current time slot is one of those enabled for unit switch-on.
If a unit control is used to monitor the unit, the unit only gets started after receiving an OK signal via a serial line.

6.2.4 Switch-on using the control system

The unit can either be started or stopped using the control system on condition that it has been switched ON using the keyboard and the ON/OFF digital input is closed (ref. to relevant sections). The unit gets started as soon as the control system changes the status of the machine status digital variable. The digital variable is included in the list of variables in the control system.

6.3 Ventilation management

Unit start-up firstly causes the activation of the ventilation system.
After ventilation is started on the delivery side and, where provided, on the return side, the controller authorises start-up of the other components, depending on the temperature regulation requirement.
When the unit is switched off, the fans are last to stop after the delay time set on the controller has elapsed.

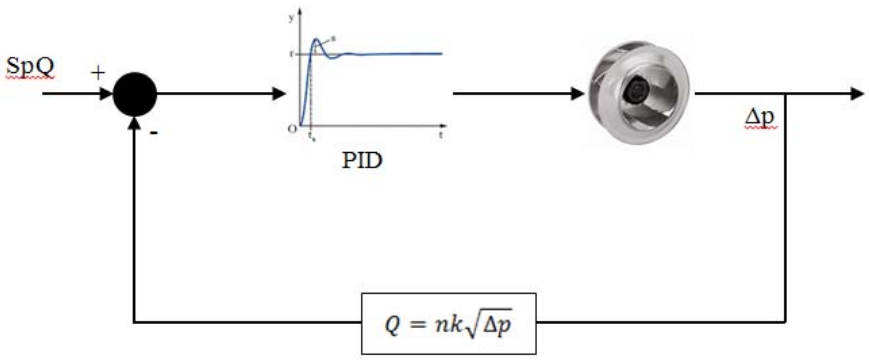
6.3.1 Air flow control system

The controller allows to manage the airflow rate, both on supply and return side, if the unit is provided with plug-fans featuring an EC brushless motor.
The unit controller commands the fans through a 0-10V analogue signal for the delivery line and a 0-10V analogue signal for the return line, where provided. If multiple fans are fitted in the delivery and return lines, these are controlled in parallel by one signal.
The main purpose of the air flow control system is to keep the air flow constant and as close as possible to the stored setpoint. The air flow is calculated by the software starting from the differential air pressure, as measured at the nozzle, using the formula below:

$$Q = nk\sqrt{\Delta p}$$

where:
Q = flow rate expressed in cu.m/h;
n = number of fans;
k = typical fan nozzle constant;
Δp = difference in Pa air pressure, as measured at the fan nozzle.

The controller uses a closed loop PID controller (inc. back action) to adjust the signal sent to the fans in such way that the air flow rate in the system reaches and stays at the setpoint value stored.



The differential pressure value at the fan nozzle is measured by air pressure differential probes.
The 0/10V control signal is sent to the fans only after closing of the digital output that controls the main ventilation system.
When the unit off command is given, the digital output of the main ventilation system is opened on condition that the fan analogue signal is set to zero.

6.3.2 Control logic of supply and return plug-fans on temperature setpoint

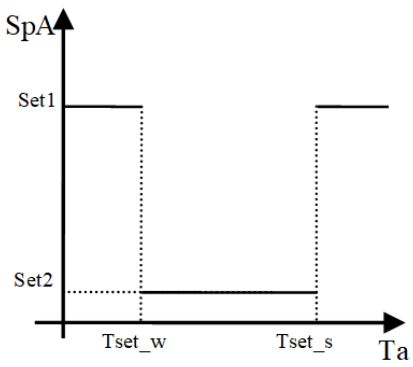
For units equipped with plug-fans on supply airflow and, if requested by the configuration, also on return airflow, the control allows to set different logics when the air temperature has reached the setpoint (Tset_s in summer e Tset_w in winter):

1. No changes on supply (return) airflow. This function keeps the same airflow to the value Aset_1 also when the unit has reached the setpoint ;
2. Decrease supply (return) airflow. This function adjusts and keeps the airflow to the new set Aset_2 until a different request by temperature regulation (see chapter 6.4);

3. logic must be activated only for full recirculation unit.

3. Supply plug-fan switch-off. This function switches plug-fans off and keeps them off until a different request by temperature regulation (see chapter 6.4).

The main purpose of logics 2 and 3 is to reduce the electric consumption for the plug-fans when there is no need of temperature regulation.
The logic 3. can be activated only for full recirculation unit and AND IF the return probe is installed directly in the conditioned room. Indeed, for units with dampers, the fans switching-off doesn't allow the immission of external air in the conditioned ambient.
The new airflow set for logic 2 is settable only within a factory set range.



6.3.3 Dampers management

6.3.3.1 Control logic of dampers

This software allows to set two different logics for dampers (if presents) management: “PROPORTIONAL” or “LINEAR”.

“PROPORTIONAL” logic drives the dampers in order to provide to the airflow an area, compared to the fully open area, equals to the required opening percentage.

Tutte le unità dotate di serrande sono settate di default con la gestione di tipo PROPORZIONALE.

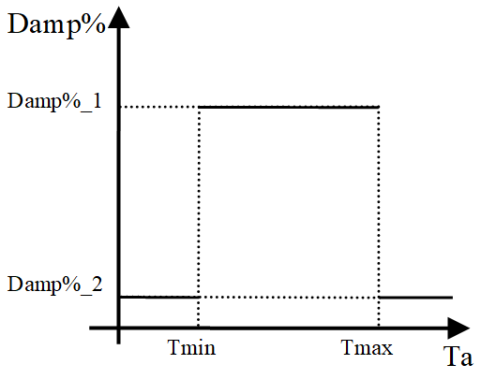
“LINEAR” logic drives the dampers so that the opening angle of the blades is equal to the requested opening percentage.

6.3.3.2 Minimum opening of recirculation damper

The software allows to set a minimum opening for the recirculation air damper. The minimum opening for recirculation air damper ensures a minimum airflow through the damper. This minimum airflow allows better and more trustable reading of the return air temperature probes, specially for two dampers units.

6.3.3.3 Reduction of minimum external air damper opening based on outdoor air temperature

This software allows to optimize minimum external air damper opening when the outdoor air temperatures are at inconvenient values. This function allows to use a different set for the minimum opening of the external air damper when the outdoor temperature is above or bellow the desired range defined by the temperatures Tmin e Tmax (usually reducing the opening). This different set for the external air damper will not affect the behavior of the unit during freecooling, freeheating or CO2 control. Recirculation air damper and expulsion air damper will have respectively an opposed and a concordant behavior.



6.3.4 Automatic acquisition of air flow value as setpoint

The controller features the option of acquiring and recording the value of the analogue signal sent to the fans for an interval of time. This enables calculating an average value of the signal which is stored and can be used automatically if the air differential pressure probe, which is normally used to adjust the air flow, is alarmed. In other words, even if the air differential pressure probe is alarmed, the fans continue to operate thanks to the average fan command signal, i.e. the calculated average of the air flow.
This function is enabled in the Manufacturer menu when the acquisition interval time is set. Acquisition is started in the User menu.
Automatic acquisition runs on a continuous basis. So, to store and make available the correct value in the event of a pressure probe alarm, recording must be stopped once the preset time interval has elapsed.

6.3.5 Manual operation

Manual operation may be selected as an alternative to the air flow control system. This is how it is possible to directly set, within the expected limits, the value of the command signal to be sent to the fans, as an alternative to setting the air flow value.
The controller displays the unit air flow without controlling it, however.
Manual operation is selected at the time of unit start-up to run some tests concerning the air flow in the system.

6.3.6 Fan overload switch alarm

The controller checks that the digital input of the fan overload switch in both the delivery and return (where provided) lines is closed.
If it is not, the fans are stopped after a delay of a few seconds. If the fans on the delivery line are alarmed, the entire unit is stopped following an overload switch alarm of the fans in the delivery line. If the alarm affects the fans in the return line (where provided), the overload switch alarm of the fans in the return line is activated, but the unit is not stopped.

6.3.7 Air flow alarm

The controller checks that the digital input connected to the air flow switch of the fans in the delivery line is closed.
If it is not, the fans are stopped after a delay of a few seconds and the entire unit is stopped too following an air flow alarm.

6.4 Temperature regulation system

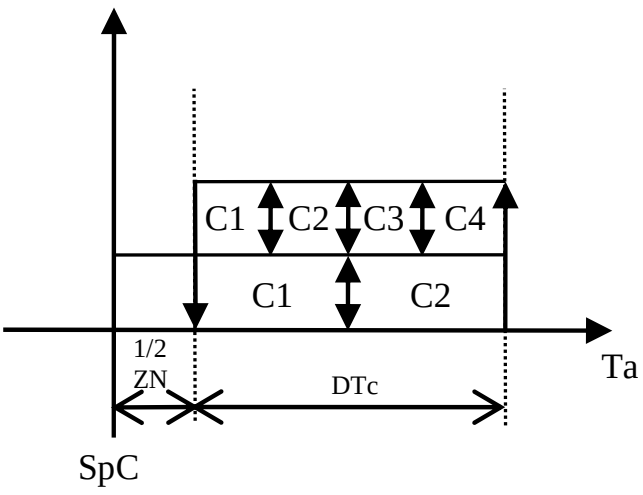
One of the major purposes for which a roof top unit is designed is to safeguard the preset temperature and humidity conditions in the cooled/heated location. To fulfil this purpose, the unit is supplied with devices (fans, compressors, dampers, ancillary batteries, electric heaters, heat recovery unit) based on its configuration. Below is a brief list of the primary functions of the temperature regulation system in a roof top unit.
The ambient temperature and its setpoint are displayed in the main controller screen. If an ambient humidity probe is fitted, the main screen also shows the humidity value and its setpoint.

6.4.1 Air cooling

The units cool the air using compressors or a free cooling system - this applies to units featuring a damper module.

6.4.1.1 Compressor cooling

The compressors used for the cooling cycle are activated proportionally as the ambient temperature (Ta) rises with respect to the summer setpoint (SPc) and within the cooling differential (DTc), which is divided in equal parts depending on the number of compressors fitted in the unit. A “dead zone” (ZN) may be envisaged within which the controller does not activate the compressors. The software manages the dead zone in such way that half of the dead zone value (1/2 ZN) is between the summer setpoint and the beginning of the cooling differential.

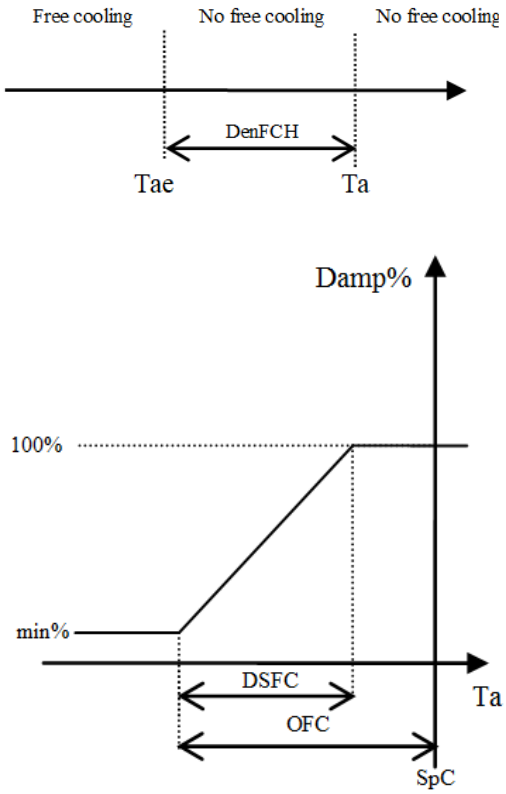


The controller automatically starts the compressors when the unit is in operation and there are no active alarms affecting either the entire unit or the compressors that are to be started. Compressors are started in sequence so as to minimise inrush currents.
After a settable delay to unit start-up, the air flow switch input must get closed so that the controller can enable the compressors. If the input of the air flow switch opens during unit operation, the air flow alarm triggers after a settable delay, which causes the unit and the compressors to stop.

The compressor controller described above is purely proportional, so it has an intrinsic defect: the error, i.e. the distance between the setpoint and the ambient temperature, tends to zero, but never reaches it. If you wish to have a more accurate temperature control, the PI (proportional and integral) controller can be enabled so as to successfully achieve the setpoint to the detriment of a possible under elongation, i.e. the temperature may drop below the stored setpoint for a span of time. This option is designed for the controller to override activation of the next step (compressor) after the integral time has elapsed in cases when the activation of some compressors leads to a deadlock and the ambient temperature setpoint is not achieved.

6.4.1.2 Free cooling

In units equipped with an external air damper the controller can use the external air conditions, where these are favourable in terms of temperature or enthalpy depending on the set control mode, to cool ambient air by properly managing opening of the external air damper.



Temperatures conditions requested to activate free cooling and damper management are reported in the first picture.
The figure graphically shows the conditions required for free cooling activation and damper management.
If the temperature of the external air is lower than the ambient temperature minus the differential for free cooling/free heating enabling (DenFCH), the unit is enabled for free cooling operation.
Damper modulation occurs within the free cooling differential (DFC). Dampers control logic during free cooing differential (DFC) are reported in the second picture. Starting from its min. value, damper opening begins at the summer setpoint (SpC) minus the free cooling offset (OFC): it reaches its max. value at the summer setpoint (SpC) minus the free cooling offset (OFC) plus the modulation differential of the free cooling damper (DSFC).
Opening of the external air damper can be limited by the evaporation pressure value during winter operation. This function is illustrated in a dedicated section.

The setup values given to the parameters above help to control the priority of the cooling devices according to the combinations below:

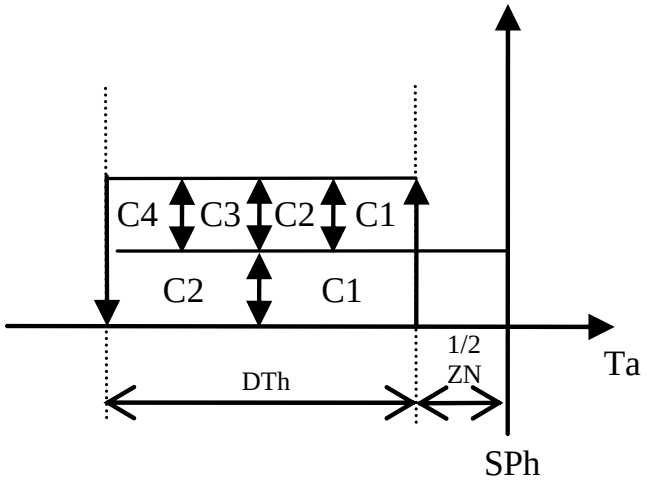
- the free cooling damper is opened first; the compressors are only started after the damper has achieved its max. opening, if the ambient air temperature setpoint is not met;
- compressors are started first; the free cooling damper is only opened if the ambient air temperature setpoint is not met;
- the free cooling damper and the compressors are started in parallel.

6.4.2 Air heating

Units featuring a heat pump warm the air using compressors. Alternatively, all units can be supplied with heating devices such as electric coils or hot water coils with a modulating valve.

6.4.2.1 Compressor heating

The compressors used for the heating cycle are activated proportionally as the ambient temperature (Ta) drops with respect to the winter setpoint (SPh) and within the heating differential (DTh), which is divided in equal parts depending on the number of compressors fitted in the unit. A “dead zone” (ZN) may be envisaged within which the controller does not activate the compressors. The software manages the dead zone in such way that half of the dead zone value (1/2 ZN) is between the winter setpoint and the beginning of the cooling differential.

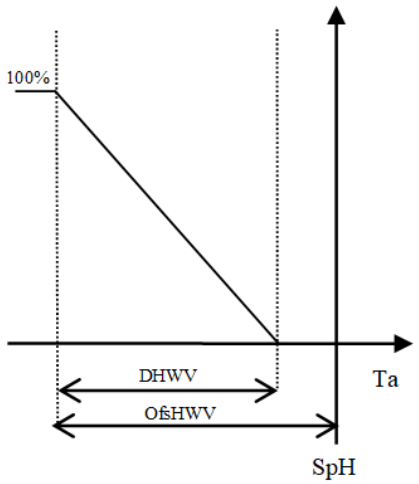


The controller automatically starts the compressors when the unit is in operation and there are no active alarms affecting either the entire unit or the compressors that are to be started. Compressors are started in sequence so as to minimise inrush currents.
After a settable delay to unit start-up, the air flow switch input must get closed so that the controller can enable the compressors. If the input of the air flow switch opens during unit operation, the air flow alarm triggers after a settable delay, which causes the unit and the compressors to stop.

The compressor controller described above is purely proportional, so it has an intrinsic defect: the error, i.e. the distance between the setpoint and the ambient temperature, tends to zero, but never reaches it. If you wish to have a more accurate temperature control, the PI (proportional and integral) controller can be enabled so as to successfully achieve the setpoint to the detriment of a possible over elongation, i.e. the temperature may rise above the stored setpoint for a span of time. This option is designed for the controller to override activation of the next step (compressor) after the integral time has elapsed in cases when the activation of some compressors leads to a deadlock and the ambient temperature setpoint is not achieved.

6.4.2.2 Hot water coil heating

Heating with a hot water coil is controlled by means of a water modulating valve. The controller manages opening of the valve within its corresponding differential (DHWV).
The max. valve opening value is determined by an offset (OfsHWV) against the winter operating setpoint (SpH). In this way it is possible to manage the coil as the main air heating component or as an additional component to the compressors or electric heaters.

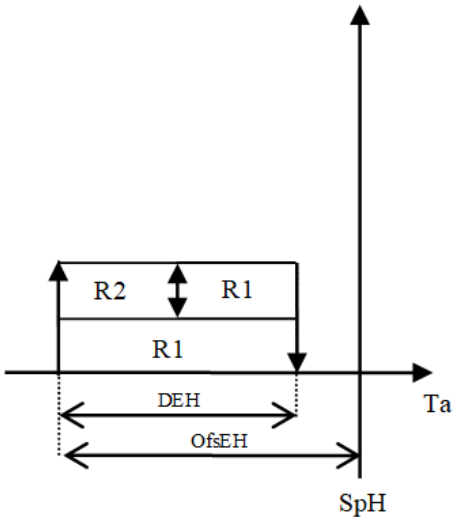


6.4.2.3 Heating with a gas-fuelled generator

Gas-fuelled generators, where fitted, are modulating type, so they are managed as illustrated above for the modulating valve in the hot water coil. The output signal from the controller and the adjustment parameters are the same as the hot water valve.
The generator is supplied with an independent controller that is used to manage its start-up, stop and safety devices.

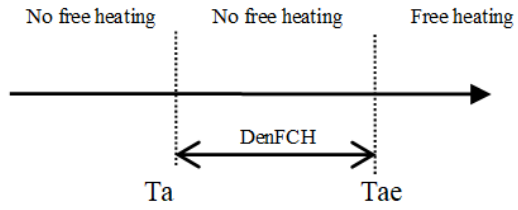
6.4.2.4 Heating with electric heaters

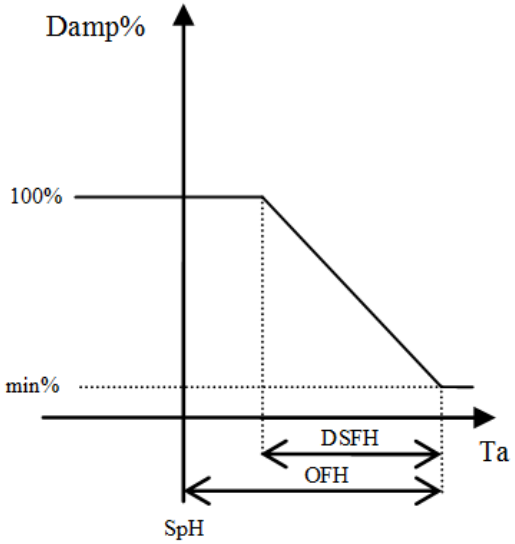
Alternatively or complimentary to the compressors and the hot water coil, the controller can manage up to two groups of electric heaters.
As already explained about management of water coil opening, the heaters too are started within the corresponding differential (DEH) and they are fully activated as soon as the offset value (OfsEH) against the winter setpoint (SpH) is achieved.



6.4.2.5 Free heating

In units equipped with an external air damper the controller can use the external air conditions, where these are favourable in terms of temperature, to cool ambient air by properly managing opening of the external air damper.
Damper modulation is implemented within the free heating differential (same value as free cooling), and it must be set with an offset with respect to the winter operating setpoint.





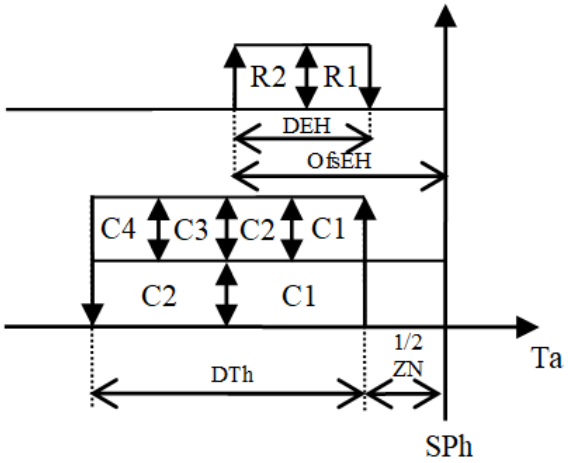
Temperatures conditions requested to activate free heating and damper management are reported in the first picture.
The figure graphically shows the conditions required for free heating activation and damper management.
If the temperature of the external air is higher than the ambient temperature plus the differential for free cooling/free heating enabling (DenFCH), the unit is enabled for free heating operation.
Damper modulation occurs within the free heating differential (DFH). Dampers control logic during free heating differential (DFH) are reported in the second picture. Starting from its min. value, damper opening begins at the winter setpoint (SpH) plus the free heating offset (OFC): it reaches its max. value at the winter setpoint (SpH) plus the free heating offset (OFH) minus the modulation differential of the free heating damper (DSFH).
Opening of the external air damper can be limited by the evaporation pressure value during winter operation. This function is illustrated in a dedicated section.

The setup values given to the parameters above help to control the priority of the cooling devices according to the combinations below:

- the free heating damper is opened first; the compressors are only started after the damper has achieved its max. opening, if the ambient air temperature setpoint is not met;
- compressors are started first; the free heating damper is only opened if the ambient air temperature setpoint is not met;
- the free heating damper and the compressors are started in parallel.

6.4.2.6 Combined management of heating devices

If the unit is provided with multiple heating devices, such as a heat pump with a hot water coil, the controller can control these heating devices individually or in combined operation.
Combined management of multiple heating devices is implemented by superimposing the activation differentials of the devices, keeping the winter setpoint as reference. The figure below shows an example of superimposed operation of heat pump compressors and 2 steps of electric heaters.

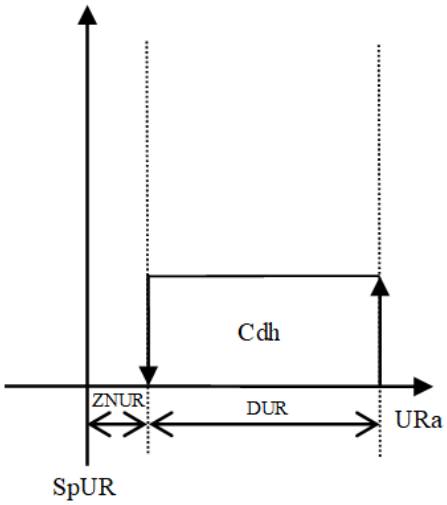


6.4.3 Ambient air humidity regulation

The controller can control air dehumidification and humidification in cases when an ambient humidity probe is fitted. Humidity regulation is proportional and its setpoint and differential are set by the controller.

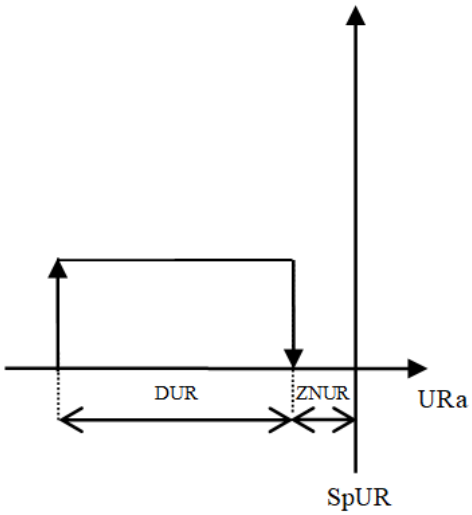
6.4.3.1 Air dehumidification

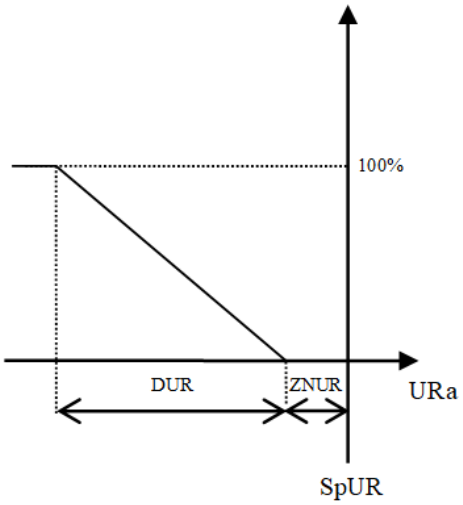
Air dehumidification is a function normally required in summer, in other words when the unit is running in cooling mode.
If dehumidification is required, the controller overrides compressor activation even if the air temperature has achieved the preset setpoint.
The number of compressors required for dehumidification must be set in the Manufacturer branch.
When compressor override causes the temperature to drop below the setpoint, and to prevent over cooling of the air, the controller starts the heating devices (e.g. electric heaters or the hot water coil), where fitted, to warm the air and to keep the desired temperature in the room.
The humidity controller is ON/OFF type, meaning that the compressors enabled for the dehumidification cycle (Cdh) are started when the humidity value reaches the setpoint (SpUR) plus the neutral zone (ZNUR) and the humidity differential (DUR). On the other hand, they are disabled when the humidity value drops below the setpoint.
In cases where cooling and dehumidification are required simultaneously, the controller activates the highest between the number of cooling and dehumidification compressors in order to meet the greatest demand.
The controller keeps the enabled compressors active even after the temperature reaches the stored setpoint. However, if the temperature drops below the setpoint, the controller enables the heating devices according to the offset and differential parameters referred to the summer setting, and not to the winter setting, as is normally the case with heating. When the value resulting from the subtraction of the setpoint and 85% of the differential summer band is achieved, the hot water valve and the compressors enabled for the dehumidification cycle are stopped. Compressor overriding for dehumidification is started up again as soon as the air temperature reaches the summer setpoint minus 15% of the summer band.



6.4.3.2 Air humidification

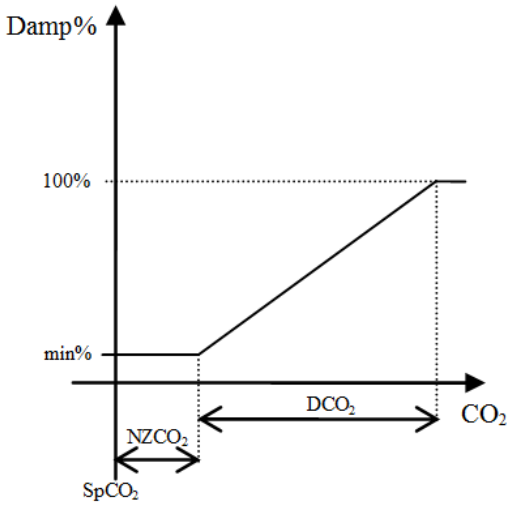
The controller manages signals that are used to control an external humidifier, which is either ON/OFF or modulating type.
When the ON/OFF digital output is used for management, the OK signal to the humidifier is output when the ambient relative humidity (URa) is smaller than the setpoint value (SpUR) minus the neutral zone (ZNUR), if any, and the corresponding differential (DUR). The humidifier is disabled as soon as the ambient relative humidity reaches the setpoint value minus the neutral zone, if any.
When the analogue output is used for management, the humidifier receives the ok signal when the relative humidity value measured in the room is lower than the setpoint (SpUR) minus the value of the neutral area (ZNUR), if any. The humidifier command signal increases proportionally within the differential (DUR). The humidifier is disabled as soon as the ambient relative humidity reaches the setpoint value minus the neutral zone, if any.





6.4.4 Ambient air quality control

If the unit is supplied with an external air damper, the controller is designed to control the air change in the room, keeping the external air damper at a min. fixed opening.
If the unit features an air quality probe, the controller can manage the min. air change as well as a greater air change based on the value of the air quality measured.
This is a key function in rooms where people's traffic changes during the day (e.g. shopping malls, movie theatres).



After enabling the air quality probe, the damper opening control is proportional. The damper starts opening at its min. opening value as soon as the air quality setpoint ($SpCO_2$) plus the neutral zone ($NZCO_2$), if any, is exceeded and it reaches its max. opening at the air quality setpoint ($SpCO_2$) plus the air quality differential (DCO_2).

6.4.5 Damper opening control in function of condensing/evaporation pressure

In damper-equipped units, notably in some operating modes (e.g. washing cycle with compressors running, management of air quality with compressors running), the request for external air damper opening may cause the ingress of an excessive flow of air from the outside, which in some cases may undermine the refrigerant circuit in the unit, both in summer and winter operating mode.
To prevent alarms from triggering in the refrigerant circuit, damper opening is controlled in function of a condensing pressure threshold, when operating in summer mode, and an evaporation pressure threshold in winter mode.

- In summer mode, when the condensing pressure achieves the threshold value set in the controller, opening of the external air damper is limited according to the condensing pressure and may be modulating within a specific opening range that is set in the controller. This range is smaller than the standard opening range (from min. to 100%) to reduce the return of external air.
- In winter mode, when the evaporation pressure achieves the threshold value set in the controller, opening of the external air damper is limited according to the evaporation pressure and may be modulating within a specific opening range that is set in the controller. This range is smaller than the standard opening range (from min. to 100%) to reduce the return of external air.

6.4.6 Heat recovery

If the unit is supplied with a static heat recovery unit, the controller can handle heat recovery, which helps reducing energy consumption when the unit runs with frequent air changes and large energy consumption levels.
The controller checks the operating conditions of the unit and manages the dampers in such way as to recover a portion of heat from the expulsion air and to transfer it to the external air.
In summer mode, the condition required to enable heat recovery is met when the external air temperature is higher than the expulsion air temperature. In winter mode, the condition required to enable heat recovery is met when the external air temperature is lower than the expulsion air temperature.
Heat recovery is activated by means of an analogue output and a digital input during management of damper opening.
When the conditions for recovery are met, the dampers are managed by the controller in such way that the expulsion air and the external air flow through the static recovery unit.
The signal output to the dampers is related to the value set in the parameter indicating the necessary external air amount. The signal may therefore be fixed, if there is no air quality probe fitted, or, if the unit is provided with an air quality probe, the external air damper opening signal may be variable up to a max. value.
As soon as the conditions for free cooling or free heating are met, the signal that the external air damper in the heat recovery unit sends to the bypass damper is switched with the help of the digital output.

6.5 Summer to Winter mode switching

The unit is switched from summer (cooling) to winter (heating) operating mode in three different ways, depending on the setting in screen C6 of the Manufacturer menu. Switching may be commanded using the keyboard, a digital input and/or automatically.

6.5.1 Summer to Winter mode switching using the keyboard

The keyboard can be used for switching on condition that the unit is turned to OFF. Press the Prg button and select “Win/Sum” in the menu using the arrows. Finally, press the Enter button to confirm. Screen R0 appears if mode switching using the keyboard is enabled.
A click on the Enter button changes the unit status on exclusive condition that the unit is turned to OFF and automatic mode switching is not enabled in screen C6 of the Manufacturer menu.

6.5.2 Summer to Winter mode switching using a digital input

Mode switching using a digital input takes place by opening and closing of a dedicated digital input in the controller.
If the input is open, summer mode is enabled; if it is closed, winter mode is enabled.
If mode is switched with the unit ON, the controller stops any active device (compressors, heaters, etc.), except for the fans in the delivery and return lines (where fitted), and it restarts them automatically as soon as switching is completed, based on the load requirements.
Access to the “Win/Sum” menu is not possible when mode switching is enabled using the digital input.

6.5.3 Automatic Summer to Winter mode switching

Automatic switching from winter to summer mode takes place when the ambient air temperature is above the summer setpoint; automatic switching from summer to winter mode takes place when the ambient air temperature drops below the winter setpoint.
As the operating mode is switched with the unit ON, the controller stops any active device (compressors, heaters, etc.), except for the fans, and it restarts them automatically as soon as switching is completed, based on the load requirements.



Automatic mode switching is successful if the winter setpoint is smaller than the summer setpoint. If this is not the case, the controller shows a warning message on screen.

6.6 Compressor and refrigerant circuit operation

The controller is designed to control the operation of the refrigerant circuit fitted in the unit, to prevent potential hazardous conditions due to an increase of the condensing pressure or a reduction of the evaporation pressure, to protect its components and to report malfunctioning, if any.

6.6.1 Compressor switch-on and switch-off

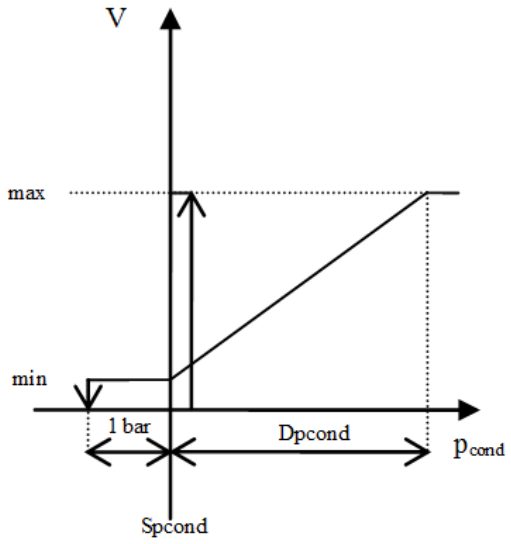
The controller enables and disables the compressors based on the request coming from the temperature regulation system, as illustrated in the relevant section.
Compressors actually get started when ventilation is active, in other words after a settable delay after start-up of the fan installed in the delivery line. The controller enables the compressors one at a time so as to reduce inrush currents in the unit.
Once the request from the temperature regulation system is fulfilled, each compressor is switched off after its min. operating time has elapsed. This min. operating time requirement is not met in cases where a serious alarm triggers with the compressor or the refrigerant circuit. Similarly, a compressor can be restarted after a preset time has elapsed so as to limit the number of compressor start-ups per hour.
The controller constantly monitors compressor operation by means of digital and analogue inputs. The main safety devices fitted in the compressors are those to monitor high and low pressures and the thermal overload protectors.
Serious alarms leading to a compressor stop - even before the min. operating time has elapsed - are the high pressure alarm, the low pressure alarm, and the thermal overload switch alarm.
After stopping, each compressor can be started up again on condition that the min. stop time has elapsed and, in any case, after the min. time between two consecutive start-ups has elapsed.

6.6.2 Compressor alternation and power equalisation

Compressor alternation can be enabled to keep a balance in the number of hours of operation.
Alternation is based on the FIFO principle (First In First Out). The first compressor on is also the first off. Similarly, the first compressor off is the first on.
Units featuring four compressors - connected in pairs - have a power equalisation function which is designed to start the compressors in the two circuits in an alternating manner, thus balancing power in the two refrigerant circuits. Compressors get started as follows: one compressor in the first circuit followed by one in the second, then the second compressor in the first circuit followed by the second compressor in the second circuit.

6.6.3 Condensation control

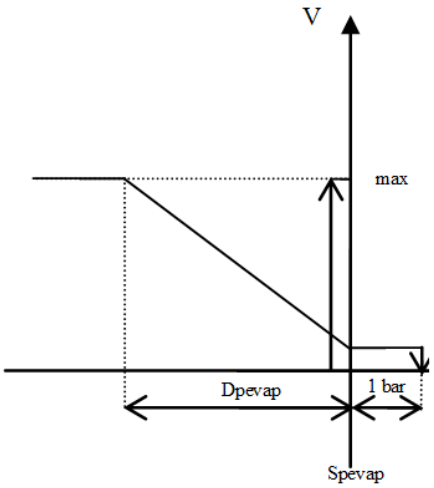
The controller is designed to manage two monitoring options of the fans fitted in the heat exchanger on the source side, and to monitor the condensing pressure during operation in cooling mode.
The first option consists in managing the fans in the heat exchanger on the source side according to an ON/OFF logic: the fans on the source side are started by closing the corresponding digital output as soon as the condensing pressure exceeds the threshold setpoint stored in the controller.
The second option consists in managing the fans in the heat exchanger on the source side according to a modulating logic: the 0-10V control signal in the fans (V) is modulated proportionally to the condensing pressure. As soon as the condensing pressure exceeds the setpoint (Spcond), the controller engages the digital output and, at the same time, forces the analogue output to its max. for a preset time, otherwise known as speed-up time. In this way, the signal proportionally follows the pressure variation within the corresponding differential (Dpcond).
The control signal of the fans may range between the min. and max. setpoints.
If the condensing pressure drops below the setpoint, the analogue output preserves the min. setpoint value.
When the condensing pressure setpoint, reduced by 1 bar, is reached, the controller zeroes the analogue output and disables the digital output.
Two separate setpoints and differentials can be set for operation with two active compressors or with one compressor active in each refrigerant circuit. The set-up logic does not change. If the unit features two refrigerant circuits, the fans in each circuit are controlled independently, however the setpoints and the differentials are the same for both circuits.



6.6.4 Evaporation control

In units with a heat pump, which operate in heating mode, the controller is designed to manage two monitoring options of the fans installed in the heat exchanger on the source side, and to monitor the evaporation pressure, as explained for condensation control.
The first option consists in managing the fans in the heat exchanger on the source side according to an ON/OFF logic: the fans on the source side are started by closing the corresponding digital output as soon as the evaporation pressure drops below the threshold setpoint stored in the controller.
The second option consists in managing the fans in the heat exchanger on the source side according to a modulating logic: the 0-10V control signal in the fans (V) is modulated proportionally to the evaporation pressure. As soon as the evaporation pressure drops below the setpoint (Spevap), the controller engages the digital output and, at the same time, forces the analogue output to its max. for a preset time, otherwise known as speed-up time. In this way, the signal proportionally follows the pressure variation within the corresponding differential (Dpevap).

The control signal of the fans may range between the min. and max. setpoints.
If the evaporation pressure rises above the setpoint, the analogue output preserves the min. setpoint value. When the evaporation pressure setpoint, increased by 1 bar, is reached, the controller zeroes the analogue output and disables the digital output.
Two separate setpoints and differentials can be set for operation with two active compressors or with one compressor active in each refrigerant circuit. The set-up logic does not change. If the unit features two refrigerant circuits, the fans in each circuit are controlled independently, however the setpoints and the differentials are the same for both circuits.



6.6.5 High and low pressure alarm prevention function

The function to prevent high and low pressure alarms is intended to prevent high pressure alarms in summer mode or low pressure alarms in winter mode, thus avoiding a complete refrigerant circuit stop.
The function to prevent a high pressure alarm in summer mode requires that a compressor in the concerned circuit is switched off as soon as the condensing pressure threshold is reached. The compressor is restarted when the condensing pressure value drops below the threshold setpoint reduced by the reset differential stored in the controller.
Similarly, the function to prevent a low pressure alarm in winter mode requires that a compressor in the concerned circuit is switched off as soon as the condensing pressure threshold is reached. The compressor is restarted when the condensing pressure value exceeds the threshold setpoint increased by the reset differential stored in the controller.

6.6.6 Defrosting

During operation in heat pump mode, defrosting is the process used to remove any frost that may build up on the coil on the source side.
The software includes different defrosting procedures, which are illustrated below. Variable defrost is enabled by default.

6.6.6.1 Pressure-driven defrost

Defrosting is enabled after a settable delay time, as soon as the evaporation pressure drops below the “start defrost” threshold. Another defrost threshold is provided - the “forced defrost” threshold -, whose value is lower than the previous threshold: this threshold causes defrosting to get started without waiting for the “start defrost” delay.
In units featuring two refrigerant circuits defrosting can be run simultaneously in the two circuits or separately, i.e. one circuit at a time. If one circuit is running a defrost cycle, defrosting in the other circuit is disabled. So, the defrost cycle in the first circuit must be completed before the second circuit can be defrosted.
Defrosting requires that the refrigerant circuit be reversed: the unit switches from heat pump operation to cooling mode. During the defrost cycle the fans in the external coil are disabled, which causes the condensing pressure to increase and the temperature in the external coil to rise, thus melting the frost that had built on it.
As soon as the “end defrost” pressure threshold is reached, the controller switches operation back to heat pump mode and restarts the fans in the external coil. Where the “end defrost” pressure threshold fails to be reached, the defrost cycle ends after a max. time in any case.
Each circuit can start the defrost cycle after the min. time between two consecutive defrost cycles has elapsed.

6.6.6.2 Temperature-driven defrost

Temperature-driven defrost follows the same operating principle as pressure-driven defrost, the only difference being that the defrost threshold is expressed as a temperature value - not a pressure value - and it is compared with the evaporation temperature.

6.6.6.3 Variable defrost

In conditions of low external air temperature the evaporation pressure of the unit reaches, on average, quite low values that are close to the “start defrost” threshold. In other words, when defrosting is managed by either pressure or temperature, the unit runs frequent defrost cycles, which results in reduced energy efficiency.
Variable defrost helps improve the overall efficiency of the unit. The defrost cycle is started exclusively when the heat exchange of the external coil is actually reduced due to the build-up of frost on the coil.
A circuit defrost cycle is started as soon as the following conditions are met simultaneously:

1) the evaporation temperature is either inferior or equal to the defrost threshold (SPdfr), which is calculated dynamically according to the temperature of the external air for longer than the “start defrost” delay;
2) the external air temperature is either inferior or equal to the defrost deactivation threshold (SPnodfr);
3) the time between two consecutive defrost cycles has elapsed in the concerned circuit.

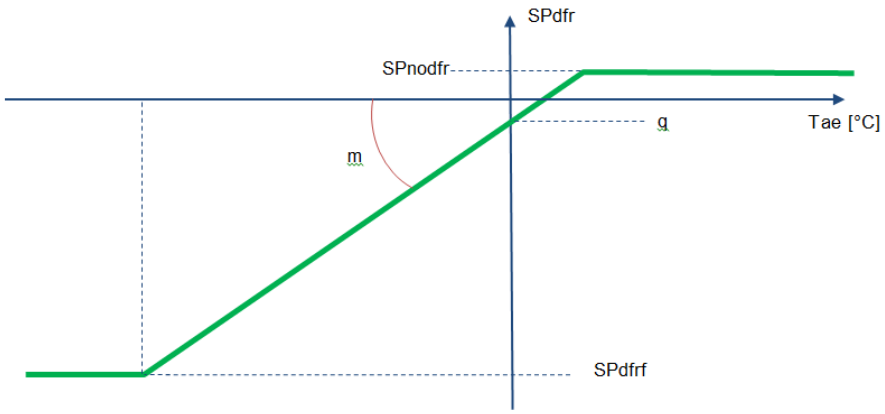
On the other hand, if the evaporation temperature is inferior to the forced defrost threshold (SPdfrf) for longer than the “start forced defrost” delay, the defrost cycle is started without waiting for the time between two consecutive defrost cycles to have elapsed.
The defrost threshold (SPdfr) is calculated as follows:

$$SPdfr = (1 - m)T_{ae} - q$$

where:

- T_{ae} is the temperature of the external air, as measured by the dedicated probe;
- m is the angular coefficient of the straight line;
- q is the intercept, i.e. the “start defrost” temperature setpoint that corresponds to an external air temperature value of 0°C.

Parameters “m” and “q” are set on the controller.



As is the case with pressure- or temperature-driven defrost, units featuring two refrigerant circuits can run the defrost cycle either simultaneously in the two circuits or separately.
In this case too, the defrost cycle requires that the refrigerant cycle be reversed: the unit switches from heat pump operation to cooling mode and this happens again with just one compressor ON in the circuit. The fans in the external coil are disabled during the defrost cycle, which causes the condensing pressure to increase and the temperature in the external coil to rise, thus melting the frost that had built on it.
As soon as the “end defrost” pressure threshold is reached, the controller switches off one compressor in the defrosting circuit and then waits for a settable time - the “dripping” time - until water is dripped from the external coil. Finally, it resumes operation in heat pump mode and restarts the fans in the external coil. Where the “end defrost” pressure threshold fails to be reached, the defrost cycle ends after a max. time in any case.
Each circuit can start the defrost cycle after the min. time between two consecutive defrost cycles in the circuit has elapsed.

6.6.6.4 External air damper control logic during defrost

In order to increase room comfort and to improve the performance of the refrigerant circuit when the unit is performing a defrost in heat pump mode, this software allows to enable the complete closing of the external air damper. When the unit end the defrost and come back to heating mode, the temperature regulation (see paragraph 6.4) will take again the control of the external air damper opening.

6.6.7 Compressor alarms

The alarms that may affect the compressors are those related to high pressure, low pressure and the thermal overload protectors in the electric motors.

6.6.7.1 High pressure alarms

A high pressure alarm may be generated by either a pressure transducer or a high pressure switch, in this sequence. A transducer high pressure alarm triggers when the condensing pressure in summer mode exceeds the high pressure threshold setpoint stored in the controller. This alarm stops all the compressors in the circuit. If the pressure drops below the stored reset differential, the controller automatically resets the alarm and restarts the compressors in the circuit running a max. number of attempts within a given interval of time, after which the alarm must be reset manually.
If the pressure continues to rise and exceeds the threshold, thus causing the high pressure switch to trip, the digital input of the high pressure protector opens: the controller immediately stops the compressors and reports an alarm, both in summer and winter mode. If the compressors are connected in pairs, opening of the digital input causes both compressors in the pair to stop, if they are both in operation: where they are not, the running compressor is stopped and the other is prevented from getting started.
The controller enables manual resetting of the high pressure alarm when the corresponding input closes, in other words when the high pressure switch that has tripped is reset manually.

6.6.7.2 Low pressure alarms

A low pressure alarm may be generated by either a pressure transducer or a low pressure switch, in this sequence. A transducer low pressure alarm triggers when the evaporation pressure in winter mode drops below the low pressure threshold setpoint stored in the controller. This alarm stops all the compressors in the circuit. If the pressure rises above the stored reset differential, the controller automatically resets the alarm and restarts the compressors in the circuit for a max. number of attempts within a given interval of time, after which the alarm must be reset manually.
If the pressure continues to drop and goes below the threshold after which the low pressure switch trips, opening of the digital input of the low pressure alarm causes the corresponding compressor to stop after a preset delay, both in summer and winter mode. If the compressors are connected in pairs, opening of the digital input causes both compressors to stop, if they are both in operation: where they are not, the running compressor is stopped and the other is prevented from getting started.
A low pressure alarm generated by a pressure switch in summer mode must be reset manually after the input has closed. In winter mode, on the other hand, resetting is automatic and controlled, meaning that a preset number of attempts are run within a preset interval of time to reset the alarm.
Low pressure alarms are bypassed during the defrost cycle.

6.6.7.3 Compressor thermal overload protector alarms

Opening of the thermal overload protector input causes the connected compressor to instantly stop. The alarm is reset manually after closing of the input.

6.6.8 Hot gas circuit in external coils

In some unit models featuring a heat pump the pipes installed at the bottom of the external coils are used for the transit of hot gas coming from the compressor delivery line which is designed to keep the bottom part of the coil defrosted. This helps the water outflow during the defrost cycle and keeps the water fluid in the condensate tray - water would otherwise freeze when the temperature of the external air drops below 0°C.
The transit of hot gas in this circuit is controlled by a solenoid valve whose coil is enabled/disabled for a settable time by one digital output in the controller when the temperature of the external air drops below the threshold setpoint stored in the controller.

6.7 Secondary functions

Below is a description of the controller secondary functions.

6.7.1 Dirty filters alarm

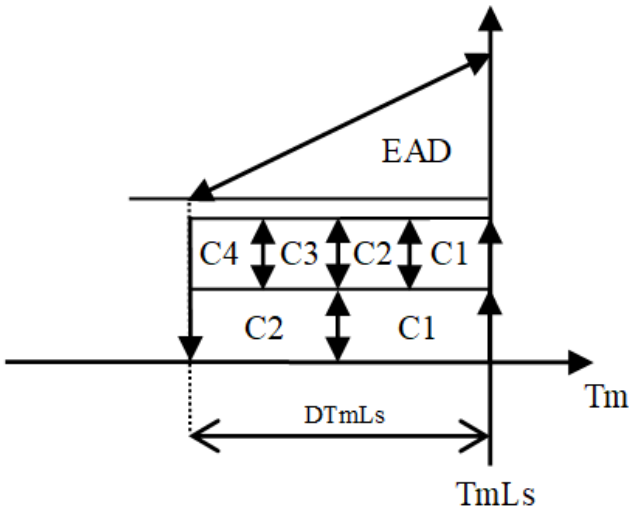
If the unit is supplied with a filter differential pressure switch, the “dirty filters” alarm, which warns about excessive air filter fouling, is enabled when the digital input connected to the filter differential pressure switch is opened.
This is not a serious alarm: it is merely a warning message which does not cause any devices in the unit to stop.

6.7.2 Washing function

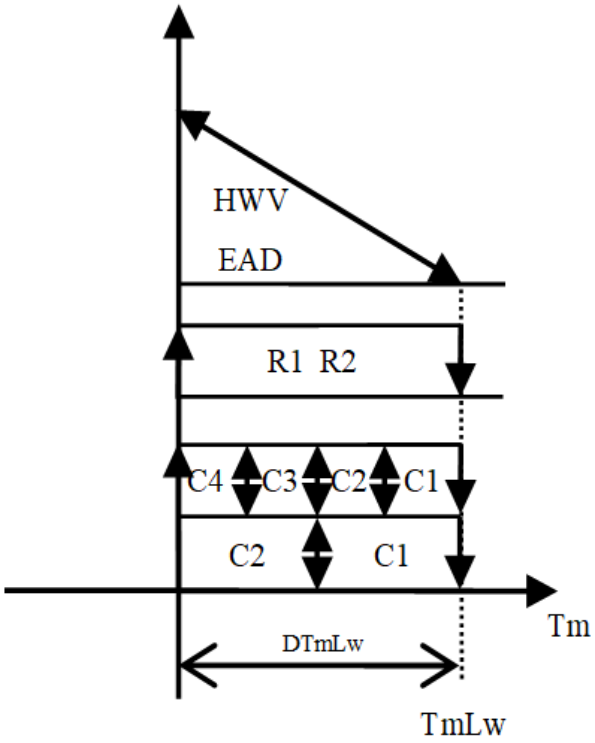
When a unit equipped with dampers is started, the air change (washing) can be overridden for a preset time whose value is stored in the controller. When this function is enabled, the controller fully opens the ejection and external air dampers and closes the recirculation damper.
When this function is active, it is possible to enable/disable temperature control.
When washing is active, the main screen shows a flashing button reading “Enter → Suspend”, which is designed to suspend the procedure by a click on the Enter button before the washing time has elapsed.
Opening of the external air damper can be limited by the condensing pressure in summer mode and the evaporation pressure in winter mode, as explained above.

6.7.3 Limitation of air delivery temperature

Temperature control always refers to the ambient temperature. However, to avoid situations of temperature discomfort in the room, the software controls a min. and max. air temperature value in the delivery line.
In summer mode the controller manages the min. value of the air temperature in the delivery line. If this temperature drops within the corresponding differential, the controller starts switching off the compressors progressively, where they are active, and closes the external air damper gradually, where it is fitted and open, until the min. value is reached, after which all the compressors are switched off and the external air damper, if fitted, is closed completely.

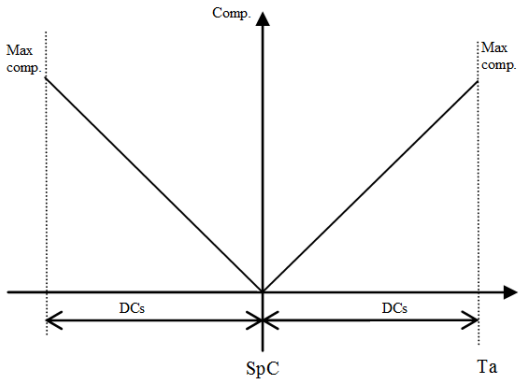


Similarly, in winter mode the controller manages the max. value of the air temperature in the delivery line. If this temperature rises within the corresponding differential, the controller starts switching off the compressors progressively, where they are active, and closes the external air damper gradually, where it is fitted and open, until the max. value is reached, after which all the compressors are switched off, the external air damper, if fitted, is completely closed, the electric heaters are switched off, and the hot water valve is completely closed.

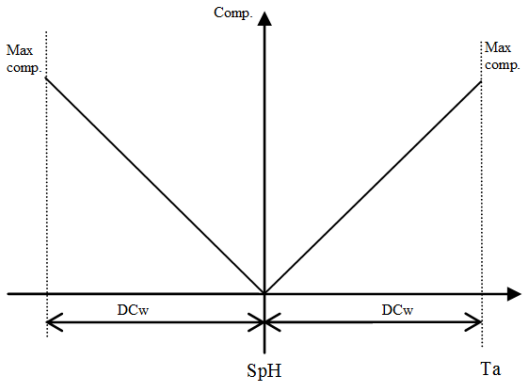


6.7.4 Setpoint offset

The setpoint offset function is designed to change the summer or the winter setpoint value depending on the external air temperature with the purpose of maximising the unit energy efficiency or to enhance comfort in the ambient.
Summer offsetting is controlled by a differential which may be either positive or negative. The summer setpoint is offset proportionally to the gap between the actual external air temperature and the corresponding setpoint. The system also allows setting of the max. offset value, i.e. the max. setpoint variation within the offset differential. If the differential setpoint is positive, the summer setpoint increases as the air temperature rises; on the other hand, if the differential is negative, the summer setpoint decreases as the air temperature rises.



Similarly, winter offsetting is controlled by means of an external air temperature setpoint and a differential which may be either positive or negative. The winter setpoint is offset proportionally to the gap between the actual external air temperature and the corresponding setpoint. The system also allows setting of the max. offset value, i.e. the max. setpoint variation within the offset differential. If the differential setpoint is positive, the winter setpoint increases as the air temperature decreases; on the other hand, if the differential is negative, the winter setpoint decreases as the air temperature drops.



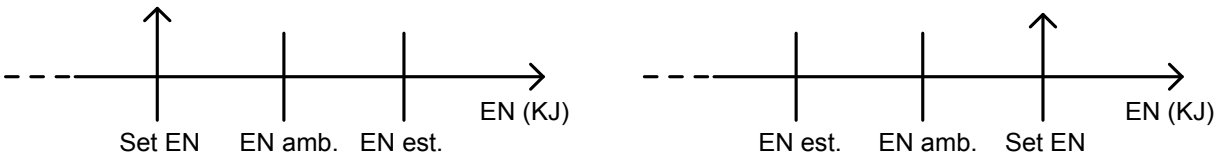
If you do not wish to use winter offsetting alone, and want to keep summer offsetting active, the winter offset setpoint must be entered with a value below the values that the air temperature is supposed to reach in winter.

If you do not wish to use summer offsetting alone, and want to keep winter offsetting active, the summer offset setpoint must be entered with a value above the values that the air temperature is supposed to reach in summer.

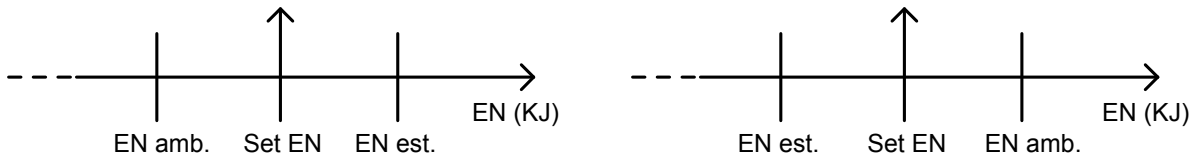
6.7.5 Enthalpy-based free cooling/free heating

The software can control the temperature and humidity of the air in the room.
When probes are fitted to measure the temperature and humidity of both ambient and external air, and the dampers are installed, free cooling and free heating can be managed by enthalpy instead of by temperature.
When enthalpy-based management is enabled, the controller calculates the enthalpy setpoint based on the temperature and humidity control setpoints: it calculates the values of the ambient and external air enthalpy using the corresponding temperature and humidity probes.
Once these values are known, the following cases may be observed.

1) External enthalpy (EN est) is greater than ambient enthalpy (EN amb), which, in turn, is higher than the enthalpy setpoint (Set EN). Alternatively, external enthalpy (EN est) is smaller than ambient enthalpy (EN amb) which, in turn, is smaller than the enthalpy setpoint (Set EN). In these cases enthalpy-based free cooling is not efficient, so the dampers cause switching to other functions.

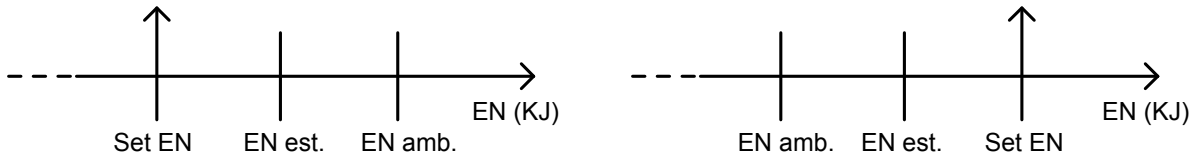


2) Internal enthalpy (EN amb) is smaller than the enthalpy setpoint (Set EN), which, in turn, is smaller than external enthalpy (EN est). Alternatively, internal enthalpy (EN amb) is greater than the enthalpy setpoint (Set EN) which, in turn, is greater than external enthalpy (EN est). Enthalpy-based free cooling is efficient in these cases: damper opening will be controlled according to the gap between the ambient enthalpy and the enthalpy setpoint. Free cooling remains active as long as the ambient enthalpy value equals the enthalpy setpoint.



3) Internal enthalpy (EN amb) is greater than external enthalpy, which, in turn, is higher than the enthalpy setpoint. Alternatively, internal enthalpy is smaller than external enthalpy which, in turn, is smaller than the enthalpy setpoint. Enthalpy-based free cooling is efficient in these cases when the difference

between the measured enthalpy values is greater than the activation differential. Free cooling is active as long as the ambient enthalpy value equals the external enthalpy value, increased (first case) and reduced (second case) by the differential for enthalpy free cooling.



6.7.6 Hot water anti-freeze function in coil

The software manages the hot water coil during the heating cycle and in cases when special conditions may cause the water contained in the coil to freeze.
The anti-freeze function to prevent water in the coil from freezing is enabled when the unit is not running and the air temperature in the delivery line is close to 0°C. If this condition occurs, the controller opens the 3-way valve according to the value set in the controller and it simultaneously enables the digital output of the water circulation pump (outside the unit).
This function remains active until the air temperature in the delivery line reaches the threshold that activates the anti-freeze function and the corresponding differential.

The anti-freeze function can also be activated by an external command which causes opening of the digital input ID1 both with the unit ON and OFF (keyboard-controlled operation). In this case too, the hot water valve is opened and the digital output of the water circulation pump (outside the unit) is enabled.
If a digital input has set the unit to OFF mode, the anti-freeze function cannot be enabled by digital input.

6.7.7 Management of heater in condensate tray

The software manages activation of a digital output that controls the heater fitted in the condensate tray in order to prevent freezing of the water that stagnates in the tray and in its drain.
This digital output is enabled as soon as the external air temperature drops below the threshold setpoint in the controller; it is disabled when the external air temperature rises above the threshold setpoint in the controller plus the corresponding differential.

6.7.8 Maintenance

The controller features functions that are specifically designed for machine maintenance, such as the unit and compressor hour meters and the option to calibrate the probe reading parameters in the unit and to test the digital outputs in the controller. For a detailed description of these functions refer to the specific section in the Maintenance menu.

6.7.9 Maintenance alarms

The controller records the hours of operation of the unit and of each compressor. If the hours of operation exceed the threshold recorded in the Maintenance menu, a maintenance alarm is generated by the controller. This alarm does not cause the unit to stop, but warns about the need for scheduled maintenance, as specified in the Instruction Manual for Installation, Use and Maintenance.

6.7.10 Alarm history

All the triggered alarms are stored in the alarm history. For a detailed description of these functions refer to the specific section in the Alarm History menu.

7 CONTROLLER SCREENS

7.1 General

The controller screens are designed to view the operating status of the unit and its components and to set the operating parameters.
The parameters and settings provided in this manual are mere examples. So, the values you will find in your unit may be different from those specified in this manual as they vary according to the unit size and configuration.



Refer to the parameters list of your unit and/or to the Default programming procedure for the parameters currently stored in each unit.

7.2 Software branches

The software is structured into menus giving access to a number of branches, each of which features one or multiple screens that have different access levels, either free or password-protected. A click on the Prg button in the home screen of the controller gives access to the following menu (screen Q0).

Italiano	English	Español
ON/OFF unità	Unit ON/OFF	ON/OFF unidad
Costruttore	Manufacturer	Constructor
Utente	User	Usuar
Setpoint	Setpoint	P.Consig.
Orologio	Clock	Reloj
Ingressi/Uscite	Input/Output	Entrad/Salidas
Storico	History	Histor.
Manutenzione	Maintenance	Mantenimiento
Selezione unità	Unit selection	Selecc.unidad
Estate/Inverno	Summer/Winter	Ver./Inv.

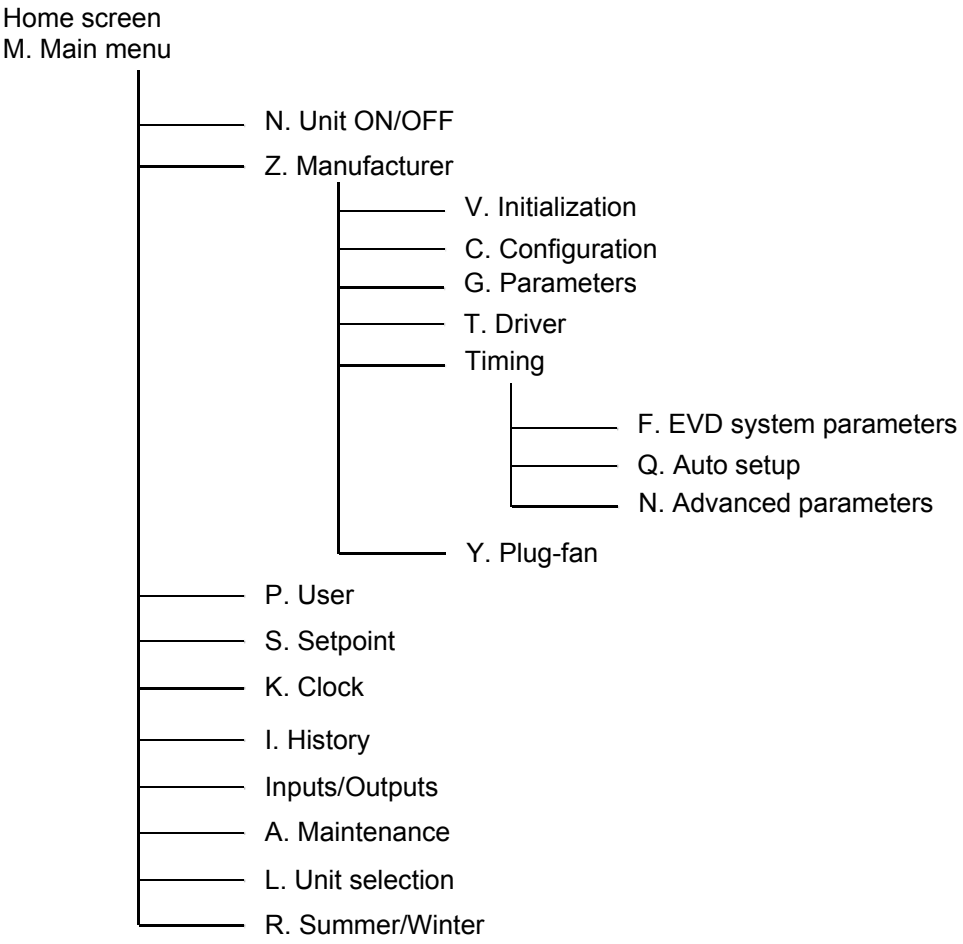
The menus are scrolled using the arrow buttons ↑ ↓. The selected menu is highlighted and marked with an arrow.

Menu Q0	Menu Q0	Menu Q0
☐ Costruttore	☐ Manufacturer	☐ Constructor
☐ Setpoint	☐ Setpoint	☐ P.Consig

A click on the Enter button gives access to the selected menu.

7.2.1 Screen tree

Below is the screen tree showing all the featured sub menus.



7.3 Screen structure

Each screen has 4 lines and 20 columns, which contain either text or parameters.

```
Limite setpoint   P3
temperatura
Superiore    ■28.0°C
Inferiore     18.0°C
```

The first line in the screen normally shows the screen title and the screen identification alphanumerical code on the right-hand side.
The flashing cursor is positioned in the top LH corner of the screen. If the screen contains editable fields, click the Enter button to move the flashing cursor ■ to the settable fields in the screen. After setting the desired value or selecting the desired option using the arrow buttons, click the Enter button to confirm and move on to the next field, if necessary. Click the Esc button if you do not want to confirm the change.
The screens are scrolled using the arrow buttons. A click on the Esc button takes you back to the previous level.

7.4 Home screen and main menu

As soon as the screen is switched on, the display shows the home screen M1 (the screen code is not displayed).

Set 27.0°C 50.0% U01	Set 27.0°C U01	Set 27.0°C 50.0% U01
27.0°C 50.0%	**27.0°C 50.0%**	**27.0°C 50.0%**
OFF DA TAST. 10:30	OFF BY KEYB. 10:30	OFF P/TECL. 10:30

The first line in the screen shows the setpoints of the ambient temperature and humidity. The address of the unit is displayed on the right-hand side. For instance, U01 means that the address of the board fitted in the controller unit is pLAN1.
The second line shows the values of the ambient temperature and humidity measured by the controller probes, expressed in degrees and percentage.
The last line in the screen shows the status of the unit on the left and the current time on the right.

The other screens in the main branch can be scrolled using the arrow buttons. These are view-only screens and they summarise the operating status of the unit:

- □ indicates that the function is not enabled;
- ■ indicates that the function is enabled.

Unità in ESTATE M2	Unit in SUMMER M2	Unid. en VERANO M2
Fasce orarie □	Time slot □	Franj.horar. □
Deumidifica □	Dehumidify □	Deshumecta □
Compensazione □	Compensation □	Compensación □

The screen shows whether the unit is running in summer or winter mode, according to the set time slots, in dehumidification mode and whether setpoint compensation is active based on the external air temperature.

M3	M3	M3
Sbrinamento □	Defrost □	Desescharche □
Freecooling □	Freecooling □	Freecooling □
Freeheating □	Freeheating □	Freeheating □

The screen shows whether the unit is running a defrost cycle and whether free cooling or free heating is enabled.

Compressore 1 □ M4	Compressor 1 □ M4	Compresor 1 □ M4
Compressore 2 □	Compressor 2 □	Compresor 2 □
Compressore 3 □	Compressor 3 □	Compresor 3 □
Compressore 4 □	Compressor 4 □	Compresor 4 □

The screen shows the enabled compressors in the unit.

Prevent □ M5	Prevent □ M5	Prevenc □ M5
Limite mandata □	Supply limit □	Limite impuls. □
Antigelo -	Antifreeze -	Antihiel -

The screen shows whether the “prevent”, “supply limit” temperature and “anti-freeze” functions are enabled.

Funzionamento M6	Operation M6	Operación M6
ventilatori plug-fan	Plug-fan	Ventilad.Plug-fan
Mandata Automatico	Delivery Automatic	Impulsión
Ripresa Automatico	Return Automatic	Automatico
		Retorno Automatico

This screen only appears if the air flow control in the unit has been enabled: it shows the active controller for the fans in the delivery and return lines.

M7	M7	M7
Res.vasca cond. ☐	Cond.tray heater ☐	Res.tina cond. ☐

This screen only appears if the heater in the condensate tray in the unit has been enabled: it shows whether the heater is enabled.

M8	M8	M8
Gest.lavaggio ☐	Washing mng. ☐	Gestion lavado ☐

This screen only appears if a damper module is installed in the unit: it shows whether washing management is enabled.

Circuito 1 M9	Circuit 1 M9	Circuito 1 M9
Prevent L.P. ☐	Prevent L.P. ☐	Prevent L.P. ☐
Circuito 2	Circuit 2	Circuito 2
Prevent L.P. ☐	Prevent L.P. ☐	Prevent L.P. ☐

This screen only appears if the low pressure prevention function is enabled: it shows whether the function for the prevention of the low pressure alarm in circuit 1 and circuit 2 is enabled.

7.5 Unit ON/OFF menu

Access to the Unit ON/OFF menu from the home screen is gained by pressing the Prg button, after which select the “Unit ON/OFF” item and press Enter to confirm. Screen "N0" appears on the display.

Stato unità N0	Unit status N0	Estad unid. N0
OFF DA TASTIERA	OFF BY KEYBOARD	OFF POR TECLADO
ENTER per	Press ENTER for	ENTER par
- ACCENDERE -	- SWITCH ON -	- ENCEDER -

Press the "Enter" button to change the status of the unit: if the unit is off, it turns on, and vice versa.
If the time slots are enabled, the unit only gets started if the current time slot is one of those enabled for unit switch-on.
If the unit is switched on by a control system, the unit actually gets started
after receiving an OK signal via a serial line.
The digital ON/OFF input must be closed for actual unit start-up.
The unit will not get started if one of the systems above does not output the necessary OK signal.

7.6 Manufacturer menu

Access to the Manufacturer menu is for the Factory and Service technicians only.



WARNING!
The parameters in the Manufacturer menu must not be changed for any reason whatsoever without written authorisation from the unit Manufacturer. Any improper or unauthorised parameter changes may cause serious damage to the unit and its components and may instantly void the warranty with which the machine is supplied.



The parameters in the Manufacturer menu can only be changed if the unit is switched OFF (OFF on the keyboard or digital input, where enabled).

Access to the Manufacturer menu from the home screen is gained by pressing the Prg button, after which select the “Manufacturer” item and press Enter to confirm. Screen "Z0" appears on the display.

Inserire password Z0 0000 	Insert manuf. password Z0 0000 	Insertar password Z0 0000 

To access the Manufacturer menu, it is necessary to enter the Manufacturer password; the default password is 0100.
After entering the correct password, the sub menu of the Manufacturer branch appears, which shows 6 items: Initialization, Drivers, Plug fan, Configuration, Parameters and Timing.

Menu costruttore Z1 ☐ Configurazione ☐ Parametri ☐ Tempistiche	Manufacturer menu Z1 ☐ Configuration ☐ Parameters ☐ Timing	Menu constructor Z1 ☐ Configuración ☐ Paràmetros ☐ Tiempos

Menu costruttore Z1 ☐ Inizializzazione ☐ Drivers ☐ Plug fan	Manufacturer menu Z1 ☐ Initialization ☐ Drivers ☐ Plug fan	Menu constructor Z1 ☐ Inicialización ☐ Drivers ☐ Plug fan

Below is a description of the screens and parameters stored in the various branches or sub menus of the Manufacturer menu.

7.6.1 Initialization branch

Access to the initialization branch is only required to change the Manufacturer password or to install default parameters.
Select the item “Initialization” in screen Z1 and press the Enter button to enter the Initialization branch. Screen "V0" appears on the display.

Inserire nuova password V0 0000 	Insert new password V0 0000 	Insertar nueva password V0 0000 

Enter the new password and press Enter to change the password.



We recommend that the default password not be changed because the risk is that you can no longer access the protected menus if you forget the new password.
If the password is changed, we recommend writing the new password down in the Notes pages at the end of this manual.

V1 Installare valori di default N ABCDEFGH1234565	V1 Installing default values N ABCDEFGH1234565	V1 Instalar valores predeterminado N ABCDEFGH1234565

The third line of the screen is used to install the controller default parameters. Installation of the default parameters causes the existing programmed values in the board to be lost. After default value installation, the controller requests switch-off and re-start.



WARNING!
Installation of the default parameters causes all the existing programmed values in the board to be lost. As a consequence, the board must be re-programmed manually.

The fourth line in the screen is used to set the unit model.

7.6.2 Configuration branch

The Configuration branch is used to set up the unit and to enable the featured accessories.
Select the item “Configuration” in screen Z1 and press the Enter button to enter the Configuration branch. Screen "C0" appears on the display.

Num.compressori C0	Compressor num. C0	Num.compresores C0
2 compressori	2 compressors	2 compresores
Numero circuiti 1	Circuit number 1	Num. circuitos 1

This screen is used to configure the number of compressors and refrigerant circuits featured in the unit.
The second line in the screen is used to set the number of compressors featured in the unit.
The third line in the screen is used to set the number of refrigerant circuits featured in the unit.

Ab.rot.comp. S C1	En.comp.rot. Y C1	Ha.rot.comp. S C1
Potenza equalizz. N	Power equalization N	Potencia equaliz. N
Pompa calore S	Heat pump Y	Bomba calor S
Logica vlv.inv. N.A.	Rev.valve logic N.A.	Logica vlv.inv. N.A.

This screen is used to set the alternation logics of both compressors and refrigerant circuits, to enable operation in heat pump mode, and to configure the control logic of the cycle reversing valve.
The first line in the screen is used to enable compressor alternation.
The second line in the screen is used to enable alternating compressor start-up in the two circuits when these are twinned.
The third line in the screen is used to enable the heat pump function.
The fourth line in the screen is used to set the logic of the digital output of the cycle reversing pump in heat pump units. The possible selections are: NO (normally open) and NC (normally closed).

Valvola caldo N C2	Heat valve S C2	Vàlvula calor N C2
Num.resistenze 2	Heater number 2	Num.resistenc. 2
Risc.via RESISTENZE	Heat by HEATER	Calef. RESISTENC.

This screen is used to enable and to configure additional heating devices.
The first line in the screen is used to enable the valve that controls the hot water coil.
The second line is used to set the number of electric heaters fitted in the unit.
In the third line the device used for integral heating is set up.

Abilita post riscaldamento in deumidifica: Cr N	Enable post heating during dehumidification: Cr N	Permitir post heating durante la deshumidificaciòn: Cr N
Abil.risc.estivo N	En.summer heating: N	Habil.calef.verano:N

This screen is used to enable the method to manage the heating cycle in dehumidification and summer operating modes.
The third line is used to enable pre-heating during the dehumidification cycle, i.e. activation of the supplementary heating device when the unit is running in dehumidification mode.
The fourth line is used to enable heating mode when the unit is running in summer mode. If this mode is disabled and heating is required while the unit is running in summer mode, the controller does not take any action.

Regol.vent.cond. C3	Cond.fan reg.type C3	Regul.vent.cond. C3
DA PRESSIONE	BY PRESSURE	POR PRESIóN
Tipo MODULANTE	Type MODULATING	Tipo MODULANTE

This screen is used to set the reference unit of measure for the condensation fan control, the type of fan control and the defrost mode.
The second line is used to set the reference unit of measure for the control of fans in the external coil.
The third line is used to set the control mode of fans in the external coil.

Tipo sbrinamento C3B SCORREVOLE Tipo sonda: PRESSIONE	Defrost type C3B SLIDING Probe type: PRESS.	Tipo descon. C3B POR PRESIóN Tipo MODULANTE Deses.en PRESION

This screen is used to set the defrost mode and the reference probe for defrost control.

Tipo C3C Refrigerante R410A	Type C3C Refrigerant R410A	Tipo C3C Refrigerante R410A

This screen is used to set the refrigerant type in the unit.

C4 Freecooling est. - Freeheating inv. - Freecooling inv. -	C4 Sum.Freecooling - Win.Freeheating - Win.Freecooling -	C4 Freecooling ver. - Freeheating inv. - Freecooling inv. -

This screen is used to enable free cooling and free heating.
The second line is used to enable free cooling in summer mode.
The third line is used to enable free heating in winter mode.
The fourth line is used to enable free cooling in winter mode.

Controllo C5 Freecooling e freeheating inverno in TEMPERATURA	Freecooling and C5 winter freeheating control in TEMPERATURE	Control C5 Freecooling y freeheating inv. en TEMPERATURA

This screen is used to set the free cooling and free heating mode by selecting one of the following options:

- Temperature: the mode is managed based on the difference between ambient and external air temperature;
- Enthalpy: the mode is managed based on the difference between ambient and external air enthalpy.

The fourth line is used to set the control mode of free cooling and free heating.

Selezione C6 Est/Inv. AUTOMATICO Gestione umidità N	Summer/winter C6 selection AUTOMATIC Humidity management N	Selección C6 Ver./Inv. PANEL Gestiòn humed. S

This screen is used to set either manual or automatic management of the shift from summer to winter and to enable humidity management.
The second line is used to set the shift from summer to winter either manually (using the keyboard) or automatically.
The fourth line is used to enable management of dehumidification and humidification.

Sonda temperatura C7 interna Tipo NTC	Internal C7 temperature probe Type NTC	Sonda temperatura C7 interna Tipo NTC

This screen is used to set the type of ambient temperature probe.
The fourth line is used to set the probe type.

Sonda temperatura C8 esterna S Tipo NTC	Enable external C8 temperature probe Y Type NTC	Sonda temperatura C8 externa S Tipo NTC

This screen is used to enable the external air temperature probe and to set its type.
The second line is used to enable the external air temperature probe.
The fourth line is used to set the probe type.

Sonda temperatura C9 mandata S Tipo NTC	Enable supply C9 temperature probe Y Type NTC	Sonda temperatura C9 Impuls. S Tipo NTC

This screen is used to set the type of probe measuring the air temperature in the delivery line.
The fourth line is used to set the probe type.

Sonda umidità Ca interna S Ab.allarme S Tipo 0-1 V	Enable internal Ca humidity probe Y Enable alarm Y Type 0-1 V	Sonda humed. Ca interna S Activar alarma S Tipo 0-1 V

This screen is used to enable the ambient humidity probe and the corresponding alarm, and to set the probe type.
The second line is used to enable the ambient humidity probe.
The third line is used to enable the alarm associated to the ambient humidity probe. The alarm is enabled when the humidity value measured by the probe is outside the range recorded in screen Cb.
The fourth line is used to set the probe type.

Limiti sonda Cb umidità interna Min 0.0%Ur Max 100.0%Ur	Internal humidity Cb probe limits Min 0.0%RH Max 100.0%RH	Limit. sonda Cb humed. interna Min 0.0%Ur Max 100.0%Ur

This screen is used to set the operating range of the ambient humidity probe.
The third line is used to set the min. humidity threshold measured by the probe.
The fourth line is used to set the max. humidity threshold measured by the probe.

Sonda umidità Cc esterna S Ab.allarme S Tipo 0-1 V	Enable external Cc humidity probe Y Enable alarm Y Type 0-1 V	Sonda humed. Cc externa S Activar alarma S Tipo 0-1 V

This screen is used to enable the external humidity probe and the corresponding alarm, and to set the probe type.
The second line is used to enable the ambient humidity probe.
The third line is used to enable the alarm associated to the ambient humidity probe. The alarm is enabled when the humidity value measured by the probe is outside the range recorded in screen Cd.
The fourth line is used to set the probe type.

Limiti sonda Cd umidità esterna Min 0.0%Ur Max 100.0%Ur	External humidity Cd probe limits Min 0.0%RH Max 100.0%RH	Limit. sonda Cd humed. externa Min 0.0%Ur Max 100.0%Ur

This screen is used to set the operating range of the external humidity probe.
The third line is used to set the min. humidity threshold measured by the probe.
The fourth line is used to set the max. humidity threshold measured by the probe.

Sonda qualità Ce aria CO2 S Tipo 0-10 V	Enable CO2 air Ce quality probe Y Type 0-10 V	Sonda calidad Ce aire CO2 S Tipo 0-10 V

This screen is used to enable the air quality probe and the CO_2 probe, and to set the probe type.
The second line is used to enable the air quality probe.
The fourth line is used to set the probe type.

Limiti sonda CO2 Cf	CO2 air quality probe limits Cf	Limit. Sonda CO2 Cf
Limite min 0000ppm	Min limit 0000ppm	Limite min 0000ppm
Limite max 2000ppm	Max limit 2000ppm	Limite max 2000ppm

This screen is used to set the operating range of the air quality probe.
The third line is used to set the min. CO_2 threshold measured by the probe, expressed in parts per million.
The fourth line is used to set the max. CO_2 threshold measured by the probe, expressed in parts per million.

Sonda cond./sbrin.1 Cg S Tipo 4-20 mA	En.cond/defr.1 probe Cg Y Type 4-20 mA	Sonda cond./deses.1 Cg S Tipo 4-20 mA

This screen is used to enable the pressure probe in refrigerant circuit 1, and to set its type.
The second line is used to enable the pressure probe.
The fourth line is used to set the probe type.

Sonda cond./sbrin.1 Ch	Cond/defr.1 probe limits Ch	Limit. sonda cond./deses.1 Ch
Min 00.0bar	Min 00.0bar	Min 00.0bar
Max 45.0bar	Max 45.0bar	Max 45.0bar

This screen is used to set the operating range of the pressure probe in refrigerant circuit 1.
The third line is used to set the min. pressure threshold measured by the probe.
The fourth line is used to set the max. pressure threshold measured by the probe.

Sonda cond./sbrin.2 Ci S Tipo 4-20 mA	En.cond/defr.2 probe Ci Y Type 4-20 mA	Sonda cond./deses.2 Ci S Tipo 4-20 mA

This screen is used to enable the pressure probe in refrigerant circuit 2, where fitted, and to set its type.
The second line is used to enable the pressure probe.
The fourth line is used to set the probe type.

Sonda cond./sbrin.2 Cj	Cond/defr.2 probe limits Cj	Limit. sonda cond./deses.2 Cj
Min 00.0bar	Min 00.0bar	Min 00.0bar
Max 45.0bar	Max 45.0bar	Max 45.0bar

This screen is used to set the operating range of the pressure probe in refrigerant circuit 2.
The third line is used to set the min. pressure threshold measured by the probe.
The fourth line is used to set the max. pressure threshold measured by the probe.

Abilita recupero calore Ck N ----	Enable heat recovery Ck N ----	Habilit recuper. calor Ck N ----

This screen is used to enable heat recovery in units featuring this function.
The second line is used to enable heat recovery.
The third line is used to set the heat recovery type. The only type features in these units is cross-flow heat recovery.

Serranda by-pass Cq Tipo ANALOGICO Posizione SERRANDA AGGIUNTIVA	By-pass damper Cq type ANALOG Position ADDITIONAL DAMPER	Obturad. by-pass Cq Tipo ANALOGICO Posiciòn COMP. ADICIONAL

This screen is used to enable the bypass damper in units featuring this damper, and to select the control type and whether to manage the damper as an additional damper or as a damper on the heat recovery unit.

Recupero calore Cn Logica uscita dig. N.C.	Heat Recovery Cn Digital output Logic N.C.	Recuper. calor Cn Logica salida dig. N.C.

This screen is used to set the logic of the digital output for the heat recovery unit, if digital control of the bypass damper has been set in the Cq screen.
The fourth line in the screen is used to set the logic of the digital output for the heat recovery unit. The possible selections are: NO (normally open) and NC (normally closed).

Recupero calore Co Min.vel.rotore 020% Min.apert.serr. 030%	Heat recovery Co Whell min speed 020% Dmp.min.open 020%	Recuper. calor Co Min.vel.rotor 020% Min.apert.comp. 020%

This screen is used to set the min. running speed of the rotary heat recovery unit or min. opening of the recovery damper, depending on the heat recovery unit set in the Ck screen.
The second line in the screen is used to set the min. running speed of the rotary heat recovery unit (function not in use).
The fourth line in the screen is used to set min. opening of the recovery damper.

Recupero calore Cp Sonda regolazione TEMPERATURA MANDATA	Heat recovery Cp regulation probe BY SUPPLY TEMP	Recuper. calor Cp Sonda regulación TEMPERATURA IMPULS.

This screen is used to set the reference unit of measure for heat recovery management.
The fourth line in the screen is used to set the reference unit of measure according to which heat recovery is managed. The possible selections are: ambient temperature, temperature in the delivery line, and ambient enthalpy.

Abilitazione Cl Drivers EVD400 N	EVD400 drivers Cl enabled N	Habilitación Cl Drivers EVD400 N

This screen is used to enable the EVD400 driver for electronic expansion valve management. The corresponding parameters are set in a dedicated branch of the Manufacturer menu.

Cm Scheda orologio S	Cm Clock board Y	Cm Tarjeta reloj S

This screen is used to enable the clock board. Boards pCO3 and pCO5+ have a standard clock board.

Abilitazione Cy Scheda 2: S C.A.M.: 100 C.A.R.: 100	Board 2 Cy enable: Y C.A.M.: 100 C.A.R.: 100	Habilitar Cy Tarjeta 2: S C.A.M.: 100 C.A.R.: 100

This screen is used to enable the expansion board in units requiring one. It is also used to set the calibration coefficients of the air flow rate in both delivery and return lines, in units where the air flow rate control is enabled, in cases when the air flows need to be rectified following, for instance, a measurement made with a certified instrument.
The second line in the screen is used to enable the expansion board.
The third line in the screen is used to set the calibration coefficient of the air flow in the delivery line. For instance, 110 means that the value of the air flow rate in the delivery line measured by the unit is multiplied by 1.1.
The fourth line in the screen is used to set the calibration coefficient of the air flow in the return line. For instance, 095 means that value of the air flow rate in the return line measured by the unit is multiplied by 0.95.

Dati unità C01	Unit data C01	Datos unidad C01
Matricola: 10012345	Serial n.: 10012345	N.de serie: 10012345
Data coll.: 01/01/18	Test data: 01/01/18	Data ens.: 01/01/18
Collaudatore: 0000	Tester: 0000	Ensayador: 0000

This screen is used to set the unit serial number, the factory acceptance testing date and the tester ID.
The second line is used to set the unit serial number.
The third line is used to set the factory acceptance testing date.
The fourth line is used to set the identification number of the tester who carried out factory acceptance testing.

7.6.3 Parameters branch

The Parameters branch is designed for the setting of the main operating parameters of the unit.
Select the item “Parameters” in screen Z1 and press the Enter button to enter the Parameters branch. Screen "G0" appears on the display.

Regolazione G0	Temperature G0	Regulación G0
Temperatura P+I	Regulationn P+I	temperatura P+I
Tempo integrazione	Integration time	Tiem. Integraciòn
reg. P+I 600s	on reg. P+I 600s	reg. P+I 600s

This screen is used to select the type of temperature controller. The possible selections are: P (Proportional) or P+I (Proportional + Integral).
The second line in the screen is used to select the temperature controller type.
The fourth line in the screen is used to set the integral time on condition that controller P+I is selected in the second line.

Compensazione G1	Setpoint G1	Compensación G1
Setpoint N	Compensation N	pconsig. N

This screen is used to enable offsetting of the ambient temperature setpoint in function of the external air temperature.
The second line in the screen is used to enable offsetting of the temperature setpoint.

G2	G2	G2
Pressione atm.	Atmosferic pressure	presión atm.
per calcolo	for enthalpy	para calc.
entalpia 1000mbar	calculation 1000mbar	entalpia 1000mbar

This screen is used to set the value of the atmospheric pressure required to calculated the enthalpy. This setpoint is effective exclusively if enthalpy free cooling is enabled.
The fourth line in the screen is used to set the value of the atmospheric pressure.

Setpoint G3	Defrost setpoint G3	Consig. G3
sbrinamento		desescarche
Inizio 04.0bar	Start 04.0bar	Inicio 04.0bar
Fine 28.5bar	Ending 28.5bar	Fin 28.5bar

This screen is used to set the pressure setpoints relating to defrost start and end when pressure-controlled defrost is enabled in screen C3.
The third line in the screen is used to set the pressure setpoint to start defrost if pressure-controlled defrost is set in screen C3B. This value does not have to be set if variable defrost is selected, as the threshold for defrost start is calculated dynamically, as described above.
The fourth line in the screen is used to set the pressure setpoint for defrost end.

Off vent.princ. G4	Main fan OFF G4	Off vent.princ. G4
durante sbrin. N	in Defrost N	durante desesc. N
Circuiti in	Circuits in	Circuit. en
sbinam.contemp. N	contemp.defrost N	desdesc.contemp N

This screen is used to select the de-activation of the air treatment fans during the defrost cycle and simultaneous defrosting of the refrigerant circuits.
The second line in the screen is used to enable switch-off of the air treatment fans during the defrost cycle.
The fourth line in the screen is used to enable simultaneous defrosting of the refrigerant circuits in units featuring two circuits.

Sbrinam.contemp. G5 Fine sbrinamento CONTEMPORANEA	Contemp.defrost G5 Defrost end CONTEMPORARY	Desesc.contemp. G5 Fin desesc. CONTEMPORàNEO

This screen is only displayed if simultaneous circuit defrosting is enabled in screen G4. It is used to set the defrost end mode in units featuring two refrigerant circuits when simultaneous defrosting of both circuits is enabled in screen G4.

Num.compressori G6 in deumidifica 2	Dehumidification G6 compressor number 2	Num.compresores G6 en deshumecta. 2

This screen is used to set the number of compressors that need to be enabled for the dehumidification cycle.

Ventilatore di G7 cond.2 comp.attivi Setpoint 12.0bar Diff. 10.0bar	Condenser fan G7 Setpoint 12.0bar Diff. 10.0bar	Ventilador de G7 cond.2 comp.activos PConsig. 12.0bar Dif. 10.0bar

This screen is used to set the setpoint and the differential for condensation control when both compressors are enabled in the refrigerant circuit.
The third line in the screen is used to set the pressure setpoint for condensation control.
The third line in the screen is used to set the pressure setpoint for condensate control.

Ventilatore di G7a cond.1 comp.attivo Setpoint 12.0bar Diff. 0.5bar	Condenser fan G7a With 1 compr.active Setpoint 12.0bar Diff. 0.5bar	Ventilador de G7a cond.1 comp.activo PConsig. 12.0bar Dif. 0.5bar

This screen is used to set the setpoint and the differential for condensation control when one compressor only is enabled in the refrigerant circuit.
The third line in the screen is used to set the pressure setpoint for condensation control.
The third line in the screen is used to set the pressure setpoint for condensate control.

Ventilatore di G8 evap.2 comp.attivi Setpoint 12.0bar Diff. 05.0bar	Evaporation fan G8 With 2 compr.active Setpoint 12.0bar Diff. 05.0bar	Ventilador de G8 evap.2 comp.activos PConsig. 12.0bar Dif. 05.0bar

This screen is used to set the setpoint and the differential for evaporation control when both compressors are enabled in the refrigerant circuit (heat pump units only).
The third line in the screen is used to set the pressure setpoint for evaporation control.
The fourth line in the screen is used to set the pressure differential for evaporation control.

Ventilatore di G8a evap.1 comp.attivo Setpoint 12.0bar Diff. 0.5bar	Evaporation fan G8a With 1 compr.active Setpoint 12.0bar Diff. 0.5bar	Ventilador de G8a evap.1 comp.activo PConsig. 12.0bar Dif. 0.5bar

This screen is used to set the setpoint and the differential for evaporation control when only one compressor is enabled in the refrigerant circuit (heat pump units only).

The third line in the screen is used to set the pressure setpoint for evaporation control.
The fourth line in the screen is used to set the pressure differential for evaporation control.

Vent.est.2 comp. G9	Ext.fans 2comp. G9	Vent.est.2 comp. G9
Velocità max a 07.5V	Max speed at 07.5V	Veloc. max a 07.5V
Velocità min a 02.0V	Min speed at 02.0V	Veloc. min a 02.0V
Tempo speed up 003s	Speed up time 003s	Tiem. Speed up 003s

This screen is used to set the min. and max. speed of the fans featured in the external coil, which is expressed as the voltage at the controller output, and the speed-up time during which the fan controller output is overridden to its max. value as soon as the condensation control is started. These parameters are used when both compressors are enabled in the refrigerant circuit.
The second line in the screen is used to set the voltage which corresponds to the max. speed of the fans in the external coil.
The third line in the screen is used to set the voltage which corresponds to the min. speed of the fans in the external coil.
The fourth line in the screen is used to set the speed-up time of the fans.

Vent.est.1 comp. G9a	Ext.fans 1comp. G9a	Vent.est.1 comp. G9a
Velocità max a 04.0V	Max speed at 04.0V	Veloc. max a 04.0V
Velocità min a 04.0V	Min speed at 04.0V	Veloc. min a 04.0V
Tempo speed up 003s	Speed up time 003s	Tiem. Speed up 003s

This screen is used to set the min. and max. speed of the fans featured in the external coil, which is expressed as the voltage at the controller output, and the speed-up time during which the fan controller output is overridden to its max. value as soon as the condensation control is started. These parameters are used when only one compressor is enabled in the refrigerant circuit.
The second line in the screen is used to set the voltage which corresponds to the max. speed of the fans in the external coil.
The third line in the screen is used to set the voltage which corresponds to the min. speed of the fans in the external coil.
The fourth line in the screen is used to set the speed-up time of the fans.

Ab.prev.all.HP S Ga	En.HP alr.prev. S Ga	Hab.HP al.prev. S Ga
Setpoint 38.5bar	Setpoint 38.5bar	PConsig. 38.5bar
Diff. 04.0bar	Diff. 04.0bar	Dif. 04.0bar
Ritardo output 003s	Output delay 003s	Retardo output 003s

This screen is used to enable the function designed to prevent high pressure alarms in summer mode and the corresponding parameters. This function overrides the switch-off of one compressor as soon as a specific high pressure threshold is reached in order to prevent high pressure alarms from triggering.
The first line in the screen is used to enable the function.
The second line in the screen is used to set the condensing pressure setpoint, having reached which a compressor is switched off.
The third line in the screen is used to set the condensing pressure differential which enables restarting of the switched-off compressor as soon as the condensing pressure reaches the setpoint minus the differential.
The fourth line in the screen is used to set the delay to compressor switch-off when the pressure setpoint recorded in the second line is reached.

Ab.prev.all.LP S Ga1	En.LP alr.prev.Y Ga1	Hab.LP al.prev.S Ga1
Setpoint: 2.5bar	Setpoint: 2.5bar	Consigna: 2.5bar
Diff.: 2.0bar	Diff.: 2.0bar	Dif.: 2.0bar
Ritardo output: 003s	Output delay: 003s	Demora salida: 003s

This screen is used to enable the function designed to prevent low pressure alarms in winter mode and the corresponding parameters. This function overrides the switch-off of one compressor as soon as a specific low pressure threshold is reached in order to prevent low pressure alarms from triggering.
The first line in the screen is used to enable the function.
The second line in the screen is used to set the evaporation pressure setpoint, having reached which a compressor is switched off.

The third line in the screen is used to set the evaporation pressure differential which enables restarting of the switched-off compressor as soon as the evaporation pressure reaches the setpoint plus the differential.
The fourth line in the screen is used to set the delay to compressor switch-off when the pressure setpoint recorded in the second line is reached.

All.alta p.in CO Ga2	High p.alr.in CO Ga2	All.alta p.en CO Ga2
Soglia: 39.5bar	Threshold: 39.5bar	Umbral: 39.5bar
Diff.: 4.0bar	Diff.: 4.0bar	Dif.: 4.0bar
Tent.: 3 Int.: 60min	Retr.: 3 Int.: 60min	Tent.: 3 Int.: 60min

This screen is used to set the parameters required for the high pressure alarm generated by the transducer (AL74 for circuit 1 and AL76 for circuit 2) in summer mode. As soon as the high pressure threshold is reached, the compressors in the concerned circuit are switched off instantly and the high pressure alarm generated by the transducer is displayed. Alarm resetting is automatic, controlled type, in other words the alarm is reset automatically by running the number of attempts recorded in the fourth line of the screen within the time span set in the fourth line of the screen. After the max. number of attempts, the alarm must be reset manually. Units featuring two refrigerant circuits have the parameters in both circuits.
The second line in the screen is used to set the pressure threshold after achieving which a high pressure alarm triggers, generated by the transducer.
The third line in the screen is used to set the pressure differential which is designed to reset the alarm as soon as the pressure drops below the threshold value minus the differential.
The fourth line in the screen is used to set the number of attempts and the time span required for automatic alarm resetting.

Al.bassa p.in HP Ga3	Low p.alr.in HP Ga3	Al.baja p.en HP Ga3
Soglia: 2.0bar	Threshold: 2.0bar	Umbral: 2.0bar
Diff.: 2.0bar	Diff.: 2.0bar	Dif.: 2.0bar
Tent.: 3 Int.: 60min	Retr.: 3 Int.: 60min	Tent.: 3 Int.: 60min

This screen is used to set the parameters required for the low pressure alarm generated by the transducer (AL75 for circuit 1 and AL77 for circuit 2) in winter mode. As soon as the low pressure threshold is reached, the compressors in the concerned circuit are switched off instantly and the low pressure alarm generated by the transducer is displayed. Alarm resetting is automatic, controlled type, in other words the alarm is reset automatically by running the number of attempts recorded in the fourth line of the screen within the time span set in the fourth line of the screen. After the max. number of attempts, the alarm must be reset manually. Units featuring two refrigerant circuits have the parameters in both circuits.
The second line in the screen is used to set the pressure threshold after achieving which a low pressure alarm triggers, generated by the transducer.
The third line in the screen is used to set the pressure differential which is designed to reset the alarm as soon as the pressure rises above the threshold value plus the differential.
The fourth line in the screen is used to set the number of attempts and the time span required for automatic alarm resetting.

Ventilatori di Condensazione binati Gb N	Condensation fan in binary mode? Gb N	Ventilad. de condensación binati Gb N

This screen is used to select simultaneous operation of the fans in the external coil.
The third line in the screen is used to enable simultaneous operation of the fans in the external coil. If it is not enabled, the fans in the two refrigerant circuits operate separately, each driven by the corresponding control signal.

All.LP da pressost.Gd	LP alr.from switch Gd	Al. LP interuptor Gd
Limit.ne all.me LP S	Lp alarm limit Y	Limit.alarma LP S
N°interventi 03	N°interventions 03	N°intervenc. 03
Intervallo 30m	Delay 30m	Intervalo 30m

This screen is used to set the parameters of the low pressure alarm generated by the pressure switch in winter mode. In summer mode the low pressure alarm generated by the pressure switch can only and exclusively be reset manually and activates a serious alarm.
The second line in the screen is used to set automatic resetting of the low pressure alarm for a limited number of times.

The third line in the screen is used to set the number of attempts required for automatic low pressure alarm resetting within the time span recorded in the next line.
The fourth line in the screen is used to set the time span during which the attempts are run for automatic low pressure alarm resetting.

Gest.lim.serr. Ge	Damper lim.mng. Ge	Gest.lim.obtur. Ge
Funz.estivo	Summer mode	Operación verano
Soglia cond.:36.5bar	Cond.thresh.:36.5bar	Límite cond.:36.5bar
Diff.: 2.0bar	Diff.: 2.0bar	Diferencial: 2.0bar

This screen is used to set the thresholds at which the function to limit opening of the external air damper in summer mode is engaged. The external air damper opens according to the CO_2 concentration (CO_2 probe fitted) or the washing function. Opening is limited when the condensing pressure exceeds the pressure threshold recorded in the screen, proportionally to the differential.
The second line in the screen is used to set the condensing pressure threshold after achieving which opening of the external air damper is limited.
The second line in the screen is used to set the condensing pressure differential after achieving which opening of the external air damper is limited.

Gest.lim.serr. Gf	Damper lim.mng. Gf	Gest.lim.obtur. Gf
Funz.invernale	Winter mode	Operación invierno
Soglia evap.:07.0bar	Evap.thresh.:07.0bar	Límite evap.:07.0bar
Diff.: 2.0bar	Diff.: 2.0bar	Diferencial: 2.0bar

This screen is used to set the thresholds at which the function to limit opening of the external air damper in winter mode is engaged. The external air damper opens according to the CO_2 concentration (CO_2 probe fitted) or the washing function. Opening is limited when the evaporation pressure drops below the pressure threshold recorded in the screen, proportionally to the differential.
The third line in the screen is used to set the evaporation pressure threshold after achieving which opening of the external air damper is limited.
The fourth line in the screen is used to set the evaporation pressure differential after achieving which opening of the external air damper is limited.

Gest.lim.serr. Gg	Damper lim.mng. Gg	Gest.lim.obtur. Gg
Ritardo uscita: 030s	Exit delay: 030s	Demora salida: 030s
Min.serr.a.e.: 01.0V	Min.ext.damper:01.0V	Min.obt.a.e.: 01.0V
Max.serr.a.e.: 03.0V	Max.ext.damper:03.0V	Max.obt.a.e.: 03.0V

This screen is used to set the parameters relating to the limits for external air damper opening in both summer and winter mode.
The second line in the screen is used to set the delay before the limits for external air damper opening are enabled.
The third line in the screen is used to set the min. signal value relating to the external air damper when the limits for damper opening are enabled.
The fourth line in the screen is used to set the max. signal value relating to the external air damper when the limits for damper opening are enabled.

7.6.4 Timing branch

The Timing branch is designed for the setting of the main operating ties and delays of the unit.
Select the item “Timing” in screen Z1 and press the Enter button to enter the Timing branch. Screen "T0" appears on the display.

Minimo tempo Off T0	Compressor T0	Mínimo tiempo Off T0
compressore 0180s	min.OFF time 0180s	compresor 0180s
Minimo tempo On	Compressor	Mínimo tiempo On
compressore 0120s	min.ON time 0120s	compresor 0120s

This screen is used to set the compressor times.
The second line in the screen is used to set the min. compressor OFF time.
The fourth line in the screen is used to set the min. compressor ON time.

Tempo tra On T1 stesso comp. 0300s Tempo tra On diversi comp. 0030s	Time between ON T1 same comp. 0300s Time between ON differ.comp. 0030s	Tempo ent/On T1 mismo comp. 0300s Tiemp ent/On distin.comp. 0030s

This screen is used to set the compressor times.
The second line in the screen is used to set the min. time elapsing between two consecutive start-ups of a compressor.
The fourth line in the screen is used to set the min. time elapsing between two consecutive start-ups of two different compressors.

Ritardo allarme T2 bassa pressione 0003s	Low press alarm T2 Delay 0003s	Retardo alarma T2 Baja presión 0003s

This screen is used to set the delay in the activation of the low pressure alarm.
The third line in the screen is used to set the delay in the low pressure alarm.

Ritardo allarme T3 Flussostato Partenza 030s Regime 005s	Flowswitch alarm T3 delay Start 030s Running 005s	Retardo alarma T3 flujostato Arranque 030s Régim. 005s

This screen is used to set the delay in the activation of the air flow alarm.
The third line in the screen is used to set the delay in the air flow alarm upon unit start-up.
The fourth line in the screen is used to set the delay in the air flow alarm at operating speed.

Ritardo Off T4 ventil.princ. 240s Ritardo partenza compressore 060s	Main fan T4 delay off 240s Delay compressor running 060s	Retardo Off T4 ventil.princ. 240s Retardo arranque compresor 060s

This screen is used to set the delay in the switch-off of air treatment fans immediately after the unit switch-off, and the delay in the start-up of the first compressor after the start-up of the main fan.
The second line in the screen is used to set the delay in the switch-off of the air treatment fans after the unit is switched off.
The fourth line in the screen is used to set the delay in the start-up of the first compressor in the unit after the main fan gets started.

Off forzato T5 compressore durante inizio/fine sbrinamento 000s	Compressor T5 forced OFF on start / end defrost 000s	Off forzado T5 Compresor durante inicio/fin desescarche 000s

This screen is used to set the compressor stop time upon cycle reversal during the defrost cycle. If this time is set to 0, cycle reversal to defrost mode will take place with one compressor ON in the circuit; if the time setpoint is greater than zero, the compressors in the circuit will be switched off before cycle reversal to defrost mode.
The fourth line in the screen is used to set the compressor stop time upon cycle reversal during the defrost cycle.

Ritardo allarme T6 filtro 030s	Filter alarm T6 delay time 030s	Retardo alarma T6 filtro 030s

This screen is used to set the delay in the activation of the filters dirty alarm, which is calculated from the time when the alarm signal is received by the controller.
The second line in the screen is used to set the delay in activation of the filters dirty alarm.

7.6.5 Drivers branch

This software version does not feature the Drivers branch screens.

7.6.6 Plug Fan branch

The Plug fan branch is designed to configure plug type fans or inverter-controlled fans on both the delivery and return sides, where fitted, and to set the main parameters required to implement air flow control.
Select the item “Plug fan” in the menu and press the Enter button to enter the Plug Fan branch. Screen "Y0" appears on the display.

Gestione ventil. Y0	Fan control Y0	Control ventil Y0
Plug-fan mandata S	Plug-fan supply Y	Plug-fan impulsión S
N°ventilatori 1	N°fans 1	N°ventiladores 1

This screen is used to enable the presence of plug fans on the air delivery side or inverter-controlled fans, and to set the number of fans.
The second line in the screen is used to enable the plug fans on the air delivery side.
The third line in the screen is used to set the number of fans on the air delivery side.

Gestione ventil. Y1	Fan control Y1	Control ventil Y1
Plug-fun ripresa S	Plug-fan return Y	Plug-fan returno S
N°ventilatori 1	N°fans 1	N°ventiladores 1

This screen is used to enable the presence of plug fans on the air return side or inverter-controlled fans, and to set the number of fans.
The second line in the screen is used to enable the plug fans on the air return side.
The third line in the screen is used to set the number of fans on the air return side.

Sonda pressione differenziale Y2	Differential pressure probe Y2	Sonda de presión differencial Y2
Tipo 0-10 V	Type 0-10 V	Tipo 0-10 V
Min.0000 Max.2500Pa	Min.0000 Max.2500Pa	Min.0000 Max.2500Pa

This screen is used to set the type of probe to measure the air differential pressure, which is the same on both the delivery and return sides, and the probe range.
The third line in the screen is used to set the type of probe measuring the air differential pressure.
The fourth line in the screen is used to set the min. and max. value range of the probe measuring the air differential pressure.

Vent.Plug-fan Y3	Plug-fan Y3	Vent.Plug-fan Y3
Cost.K mandata 0350	Costant K supp. 0350	Const.K impuls. 0350
Costante K in ripresa 0350	Return Costant K 0350	Constante K en returno 0350

This screen is used to set the K constants of the fan nozzles both on the delivery and return sides.
The second line in the screen is used to set the K constant of the fan nozzle on the air delivery side.
The fourth line in the screen is used to set the K constant of the fan nozzle on the air return side.

Vent.Plug-fan Y4	Plug-fan Y4	Vent.Plug-fan Y4
Lim.portata mandata	Supply flow limits	Límite flujo impuls.
Minima 001000m3/h	Minimum 001000m3/h	Mínimo 001000m3/h
Massima 030000m3/h	Maximum 030000m3/h	Máximo 001000m3/h

This screen is used to set the min. and max. value range of the air flow on the delivery side.
The third line in the screen is used to set the min. air flow on the delivery side.
The fourth line in the screen is used to set the max. air flow on the delivery side.

Vent.Plug-fan Y5	Plug-fan Y5	Vent.Plug-fan Y5
Lim.portata ripresa	Return flow limits	Límite flujo retur.
Minima 001000m3/h	Minimum 001000m3/h	Mínimo 001000m3/h
Massima 030000m3/h	Maximum 030000m3/h	Máximo 001000m3/h

This screen is used to set the min. and max. value range of the air flow on the return side.
The third line in the screen is used to set the min. air flow on the return side.
The fourth line in the screen is used to set the max. air flow on the return side.

Allarme Sonda pre.Y6	Diff.al pressure Y6	Alarma sensor de Y6
Differenziale AB.	probe alarm EN.	pres.diferencial AB.
Seg.le minimo 000%	Min.signal 000%	Señal mínimo 000%
Seg.le massimo 100%	Max.signal 100%	Señal máximo 100%

This screen is used to enable the alarm triggered by the air differential pressure probe, and to set the min. and max. value range for probe reading. If a probe is also fitted on the return line, the alarm and the corresponding value range will be equally set for this probe too.
The second line in the screen is used to enable the alarm triggered by the air differential pressure probe.
The third line in the screen is used to set the min. signal of the air differential pressure probe below which the probe alarm triggers.
The fourth line in the screen is used to set the max. signal of the air differential pressure probe above which the probe alarm triggers.

Lim.segn.mandata Y7	Supply man.mode Y7	Lím.señ.imp.en Y7
in fun.to manuale	signal limits	operación manual
Seg.le minimo 05.0V	Min.signal 05.0V	Señal mínimo 05.0V
Seg.le massimo 10.0V	Max.signal 10.0V	Señal máximo 10.0V

This screen is used to set the min. and max. range of the fan control signal on the air delivery side when the fan speed is controlled manually.
The third line in the screen is used to set the min. signal of fans on the air delivery side in manual mode.
The fourth line in the screen is used to set the max. signal of fans on the air delivery side in manual operation.

Lim.segn.ripresa Y8	Return man.mode Y8	Lím.señ.ret.en Y8
in fun.to manuale	signal limits	operación manual
Minimo 01.0V	Minimum 06.0V	Mínimo 01.0V
Massimo 10.0V	Maximum 10.0V	Máximo 10.0V

This screen is used to set the min. and max. range of the fan control signal on the air return side when the fan speed is controlled manually.
The third line in the screen is used to set the min. signal of fans on the air return side in manual mode.
The fourth line in the screen is used to set the max. signal of fans on the air return side in manual operation.

Vent.Plug-fan Y9	Plug-fan Y9	Vent.Plug-fun Y9
Set automatico S	Automatic set Y	PConsig.automát. S
Ritardo acquis.one	Acquisition delay	Retardo adquisición
0060m	0060m	0060m

This screen is used to enable the function for automatic acquisition of the air flow rate and the time span for air flow rate acquisition required to calculate the average.
The second line in the screen is used to enable the function for automatic air flow rate acquisition.
The fourth line in the screen is used to set the acquisition time of the air flow rate in order to calculate the average.

Gestione ventila.Y10	Fan logic on Y10	Gestion del ventil.0
in Setpoint	on Setpoint	en Setpoint
Tipo: NO	Mode: N	Tipo: NO

If the unit is provided supply plug-fans (as well as return plug-fan), the screen enables to activate the switch off of the fans or the reduction of the airflow rate, once the cooling/heating demand is satisfied.

If “Fan logic on Setpoint” is set to “SWITCH OFF” a” warning” appears (see below), that asks a confirmation for the activation of the function. In negative case, the controller set automatically the value “N”. The variable “Fan logic on Setpoint” is set to “N” by default.

Attenzione!Solo per unità senza serrande e con sonda in amb. Proseguire? -	Warning!Only for uni without dampers and With ambient probe. Continue? -	Atencion!Solo para unid.sin compuertas con sens.de ambien Continuar? -

Portata aria Y11 mand. in Setpoint: Massima: 010000m³/h Minima: 010000m³/h	Supply Airflow Y11 on Setpoint: Maximum: 010000m³/h Minimum: 010000m³/h	Flujo de suminis. Y11 en Setpoint: Maxima: 010000m³/h Minimo: 010000m³/h

The screen allows to set the limitations of the airflow rate of the supply EC fans, once the summer/winter set is reached.
In the third row it ‘s possible to set the maximum airflow rate allowed in the screen S9 of the Setpoint menu.
In the fourth row it’s possible to set the minimum airflow rate allowed in the screen S9 of the Setpoint menu.

Portata aria Y12 ripr. in Setpoint: Massima: 010000m³/h Minima: 010000m³/h	Return Airflow Y12 on Setpoint: Maximum: 010000m³/h Minimum: 010000m³/h	Flujo de regreso Y12 en Setpoint: Maxima: 010000m³/h Minimo: 010000m³/h

The screen allows to set the limitations of the airflow rate of the return EC fans, once the summer/winter set is reached.
In the third row it ‘s possible to set the maximum airflow rate allowed in the screen S10 of the Setpoint menu.
In the fourth row it’s possible to set the minimum airflow rate allowed in the screen S10 of the Setpoint menu.

7.7 User menu

The User menu is designed to set the unit parameters for temperature regulation, for ventilation management, and for communication with the supervisory controls.
Select the item “User” in the menu and click Enter to access the User branch: screen P0 appears on the display.

Inserire P0 Password 0000 	Insert user P0 password 0000 	Insertar P0 password 0000 

Access to the menu requires entry of a password: the default password is 0300.

Abilitazione P1 Compressore 1 S Compressore 2 S	Compressor P1 enabling Compressor 1 Y Compressor 2 Y	Habilitación P1 Compresor 1 S Compresor 2 S

Abilitazione P2 Compressore 3 S Compressore 4 S	Compressor P2 enabling Compressor 3 Y Compressor 4 Y	Habilitación P2 Compresor 3 S Compresor 4 S

The screens are used to enable and disable the compressors in circuits 1 (screen P1) and circuit 2 (screen P2) separately. For instance, the compressors in one circuit are disabled when maintenance is required, but the unit must not be switched off completely.

Limite setpoint P3 temperatura Superiore 35.0°C Inferiore 15.0°C	Temperature P3 setpoint limit High 35.0°C Low 15.0°C	Límite Pconsig. P3 temperatura Superior 35.0°C Inferior 15.0°C

This screen is used to set the min. and max. value range of the ambient temperature setpoint.
The third line in the screen is used to set the min. ambient temperature setpoint.
The fourth line in the screen is used to set the max. ambient temperature setpoint.

Banda regol.temp. P4	Temp.regul.band P4	Banda regul.temp. P4
Estate 02.0°C	Summer 02.0°C	Verano 02.0°C
Inverno 02.0°C	Winter 02.0°C	Invierno 02.0°C
Zona neutra 00.0°C	Dead zone 00.0°C	Zona neutral 00.0°C

This screen is used to set the regulation differentials of the ambient temperature in summer and i winter, and the neutral zone.
The second line in the screen is used to set the regulation differential of the ambient temperature in summer.
The third line in the screen is used to set the regulation differential of the ambient temperature in winter.
The fourth line in the screen is used to set the neutral zone.

Compens. estiva P5	Summer compens. P5	Compens. verano P5
Temp.esterna 30.0°C	Ext.temp. 30.0°C	Temp.externa 30.0°C
Diff. 05.0°C	Diff. 05.0°C	Dif. 05.0°C
Max compens. 05.0°C	Max compens. 05.0°C	Màx compens. 05.0°C

This screen is used to set the parameters for the offsetting of the ambient temperature setpoint in summer.
The second line in the screen is used to set the external air temperature required for the activation of setpoint offsetting in summer.
The third line in the screen is used to set the setpoint offsetting differential.
The fourth line in the screen is used to set the max. setpoint variation when the offsetting function is enabled.

Compens. Inv. P6	Winter compens. P6	Compens. Inv. P6
Temp.esterna 00.0°C	Ext.temp. 00.0°C	Temp.externa 00.0°C
Diff. 05.0°C	Diff. 05.0°C	Dif. 05.0°C
Max compens. 05.0°C	Max compens. 05.0°C	Màx compens. 05.0°C

This screen is used to set the parameters for the offsetting of the ambient temperature setpoint in winter.
The second line in the screen is used to set the external air temperature required for the activation of setpoint offsetting in winter.
The third line in the screen is used to set the setpoint offsetting differential.
The fourth line in the screen is used to set the max. setpoint variation when the offsetting function is enabled.

Limite minimo P7	Supply temp. P7	Límite mínimo P7
temperatura mandata	minimum limit	temperatura impuls.
Setpoint 12.0°C	Setpoint 12.0°C	PConsig. 12.0°C
Diff. 03.0°C	Diff. 03.0°C	Dif. 03.0°C

This screen is used to set the min. delivery temperature value, below which the controller trips and disables the cooling devices in summer mode.
The third line in the screen is used to set the min. temperature value in the delivery line.
The fourth line in the screen is used to set the differential value at which the disabled devices are enabled again.

Limite massimo PA	Supply temp. PA	Límite màximo PA
temperatura mandata	maximum limit	temperatura impuls.
Setpoint 43.0°C	Setpoint 43.0°C	PConsig. 43.0°C
Diff. 03.0°C	Diff. 03.0°C	Dif. 03.0°C

This screen is used to set the max. delivery temperature value, above which the controller trips and disables the heating devices in winter mode.
The third line in the screen is used to set the max. temperature value in the delivery line.
The fourth line in the screen is used to set the differential value at which the disabled devices are enabled again.

Antigelo durante PB OFF unità Set T.mandata 2.0°C Diff.T.mandata 0.5°C	Antifreeze during PB unit OFF Supply T.set 2.0°C Supply T.diff. 0.5°C	Antihiel durante PB OFF unid. Set T.impuls. 2.0°C Dif.T.impuls. 0.5°C

This screen is only displayed if the hot water coil is enabled as the heating device. It is used to set the temperature threshold in the air delivery line at which the hot water coil anti-freeze procedure gets started, and the differential beyond which the procedure stops when the unit is in OFF mode.
The third line in the screen is used to set the temperature threshold in the air delivery line at which the hot water coil anti-freeze procedure gets started.
The fourth line in the screen is used to set the differential value at which the alarm is enabled again automatically.

Antigelo durante PC OFF unità Apertura valvola 030%	Antifreeze during PC unit OFF Valve opening 030%	Antihiel durante PC OFF unid. Apertura Vàlvula 030%

This screen is only displayed if the hot water coil is enabled as the heating device. It is used to set opening of the water valve when the hot water coil anti-freeze procedure is enabled with the unit in OFF mode.
The fourth line in the screen is used to set opening of the water valve when the hot water coil anti-freeze procedure is enabled.

Soglia temp. P8 interna estiva Superiore 35.0°C Inferiore 15.0°C	Summer internal P8 temp.threshold High 35.0°C Low 15.0°C	Umbral temp. P8 interna verano Superior 35.0°C Inferior 15.0°C

This screen is used to set the max. and min. value of the ambient temperature in summer mode. When the max. limit is exceeded, alarm AL06 triggers to warn about high ambient air temperature; when the temperature drops below the min. limit, alarm AL07 triggers to warn about low ambient air temperature.
The third line in the screen is used to set the max. ambient temperature value.
The fourth line in the screen is used to set the min. ambient temperature value.

Soglia temp. P9 interna invernale Superiore 35.0°C Inferiore 15.0°C	Winter internal P9 temp.threshold High 35.0°C Low 15.0°C	Umbral temp. P9 interna inverno Superior 35.0°C Inferior 15.0°C

This screen is used to set the max. and min. value of the ambient temperature in winter mode. When the max. limit is exceeded, alarm AL06 triggers to warn about high ambient air temperature; when the temperature drops below the min. limit, alarm AL07 triggers to warn about low ambient air temperature.
The third line in the screen is used to set the max. ambient temperature value.
The fourth line in the screen is used to set the min. ambient temperature value.

Ritardo allarme Pa alta/bassa temp.interna 030min Abil.flussostato S	Alarm delay Pa Internal High/Low temperature 030min Enable flowswitch Y	Retardo alarma Pa alta/baja temp.interna 030min Habil.flujostato S

This screen is used to set the delay in the activation of the high and low ambient air pressure alarms in both summer and winter mode, and to enable the air flow switch.
The third line in the screen is used to set the delay in the activation of the high and low air ambient temperature alarms.
The fourth line in the screen is used to enable the air flow switch.

Limite Pb setpoint umidità Superiore 80.0%Ur Inferiore 25.0%Ur	Humidity Pb setpoint limit High 80.0%rH Low 25.0%rH	Límite Pb PConsig humedad Superior 80.0%HR Inferior 25.0%HR

This screen is used to set the humidity setpoint range.
The third line in the screen is used to set the max. humidity setpoint.

The fourth line in the screen is used to set the min. humidity setpoint.

Banda reg.umidità Pc	Humid.regul.band Pc	Banda reg.humedad Pc
Estate 05.0%HR	Summer 05.0%rH	Verano 05.0%HR
Inverno 05.0%HR	Winter 05.0%rH	Inviern 05.0%HR
Zona neutra 05.0%HR	Dead zone 05.0%rH	Zona neutra 05.0%HR

This screen is used to set the differentials and the neutral zone for humidity regulation in summer mode and in winter mode.
The second line in the screen is used to set the differential for humidity regulation in summer mode.
The third line in the screen is used to set the differential for humidity regulation in winter mode.
The fourth line in the screen is used to set the neutral zone for humidity regulation both in summer and in winter mode.

Abilitazione Pd	Heaters enabling Pd	Habilitación Pd
Resistenza 1 N	Heater 1 N	Resistenc. 1 N
Resistenza 2 N	Heater 2 N	Resistenc. 2 N

This screen is used to enable and disable the electric heater banks no. 1 and 2.
The third line in the screen is used to enable electric heater bank no. 1.
The fourth line in the screen is used to enable electric heater bank no. 2.

Resistenze Pe	Heaters Pe	Resistenc. Pe
Offset 04.0°C	Offset 04.0°C	Offset 04.0°C
Diff. 02.0°C	Diff. 02.0°C	Dif. 02.0°C

This screen is used to set the offset for full activation of the electric heaters and their regulation differential.
The third line in the screen is used to set the offset for full activation of the electric heaters.
The fourth line in the screen is used to set the regulation differential of the electric heaters.

Reg.valv.caldo Pf	Heat valve regul. Pf	Reg.valv.calor Pf
Offset 3.0°C	Offset 03.0°C	Offset 03.0°C
Diff. 2.0°C	Diff. 02.0°C	Dif. 02.0°C

This screen is used to set the offset for full activation of the modulating valve in the hot water coil and their regulation differential.
The third line in the screen is used to set the offset for full activation of the modulating valve on the heating side.
The fourth line in the screen is used to set the regulation differential of the modulating valve on the heating side.

Qualità aria CO2 Pg	CO2 air quality Pg	Calidad aire CO2 Pg
Setpoint 700ppm	Setpoint 0700ppm	PConsig. 0700ppm
Diff. 100ppm	Diff. 0100ppm	Dif. 0100ppm
Zona neutra 000ppm	Neutral zone 000ppm	Zona neutra 000ppm

This screen is used to set the parameters required for managing the ambient air change based on the air quality.
The second line in the screen is used to set the CO_2 concentration setpoint, expressed in parts per million (ppm), after achieving which ambient air change is started.
The third line in the screen is used to set the CO_2 concentration differential, expressed in parts per million (ppm), which serves as reference for setting the opening percentage of the air change damper.
The fourth line in the screen is used to set the neutral zone for setting the opening percentage of the air change damper.

Freecool/heating Ph Differenziale in temperatura 3.0°C	Temperature Ph freecool/heating activation delta 03.0°C	Delta Ph freecool/heating in temperatura 03.0°C

This screen is used to set the air temperature differential for temperature-based regulation of free cooling/free heating.
The third line in the screen is used to set the air temperature differential for temperature-based regulation of free cooling/free heating.

Freecool/heating Pi Differenziale in entalpia 001.0Kcal/Kg	Enthalpy Pi freecool/heating differential 001.0kcal/kg	Freecool/heating Pi Diferencial en entalpia 001.0kcal/kg

This screen is used to set the air temperature differential for enthalpy-based regulation of free cooling/free heating.
The fourth line in the screen is used to set the air temperature differential for enthalpy-based regulation of free cooling/free heating.

Serr.freecooling Pj (Setpoint estivo) Offset -02.0°C Diff. 02.0°C	Freec.shutter Pj (summer setpoint) Offset -02.0°C Diff. 02.0°C	Comp.freecooling Pj (PConsig. verano) Offset -02.0°C Dif. 02.0°C

This screen is used to set the offset with respect to the summer setpoint and the regulation differential of the damper for temperature-based free cooling control.
The third line in the screen is used to set the offset with respect to the summer setpoint for temperature-based free cooling control.
The fourth line in the screen is used to set the air temperature differential for temperature-based summer free cooling regulation.

Serr.freeheating Pk (Setpoint invernale) Offset 04.0°C Diff. 02.0°C	Freeh.shutter Pk (winter setpoint) Offset 04.0°C Diff. 02.0°C	Comp.freeheating Pk (PConsig. invierno) Offset 04.0°C Dif. 02.0°C

This screen is used to set the offset with respect to the winter setpoint and the regulation differential of the damper for temperature-based free heating control.
The third line in the screen is used to set the offset with respect to the winter setpoint and the regulation differential of the damper for temperature-based free heating control.
The fourth line in the screen is used to set the air temperature differential for temperature-based free heating regulation.

Minima apertura Pl serr.esterna 30% Apertura invernale serr.esterna NORMALE	External shutter Pl minimum opening 30% Winter ext.shutter start-up NORMAL	Mínima apertura Pl comp.externa 30% Apertura invierno comp.externa NORMAL

This screen is used to set the min. opening value of the external air damper and the damper opening mode in winter mode.
The third line in the screen is used to set min. opening of the external air damper.
The fourth line in the screen is used to set the damper opening mode in winter mode.

Pl0 Minima apertura serr.ricircolo 30%	Pl0 Recirculation damper minimum 30% opening	Pl0 Mínima apertura comp.recircula. 30%

This mask allows to set the minimum opening for the recirculation air damper.

Gestione serrande Pl1 Tipo: PROPORZIONALE	Dampers control Pl1 Mode: PROPORTIONAL	Control compuerta Pl1 Tipo: PROPORCIONAL

This mask allows to set the dampers control logic. “PROPORTIONAL” or “LINEAR” logic can be selected. “PROPORTIONAL” is the factory set value.

Chiusura serranda Pl2 A.E. in defrost: Abilita: SI	Closing A.E. Pl2 damper in defrost Enable: YES	Cierre de compuer Pl2 ta de A.E.en defrost Permittir: SI

This screen allows to enable the closure of the external air damper once the units in heat pump mode starts the defrost.

T.est.rid.A.E.: Pl3 45.0 T.inv.rid.A.E.: -05.0	T.sum.red.O.A.: Pl3 45.0 T.win.red.O.A.: -05.0	T.ver.red.A.E.: Pl3 45.0 T.inv.red.A.E.: -05.0

The screen allows to define the temperature range inside which the minimum external damper opening is set to the value defined in the screen `Pl`.
Outside this range, the minimum external damper opening is set to the value defined in the screen `Pl4`.

Pl4 %aper.serr.A.E in limitazione temp: 000%	Pl4 %open.damp.O.A in temp. limitation: 000%	Pl4 %aper.red.A.E.: en temp.restricción: 000%

The screen allows to set the minimum external damper opening once the outdoor temperature has value inside the range defined in screen `Pl4`.

Pm Forza freecooling all’accensione (lavaggio) N	Pm Force freecooling at startup (Washing) N	Pm Forzar freecooling al encender (lavado) N

This screen is used to enable the washing function, i.e. Free cooling overriding upon unit start-up, in order to change the ambient air.
The fourth line in the screen is used to enable the washing function.

Durata forzatura Po Lavaggio 030min Regol.temp./umidità durante forzatura N	Washing Po Forcing time 030min Temperature regul. during forcing N	Durac. forzado Po Lavado 030min Regul.temperatura durante forzado N

This screen is used to set the washing cycle time and to enable temperature and humidity regulation during this cycle.
The second line in the screen is used to set the washing cycle time.
The fourth line in the screen is used to either enable or disable temperature and humidity regulation during the washing cycle.

Sbrinamento Pn Rit.2 sbrin. 020min Rit.inizio 000min Tempo max 006min	Defrost Pn Del.2 defrost 020min Start delay 000min Maximum time 006min	Desescarche Pn Ret.2 desesc. 020min Ret.inicio 000min Tiemp màx 006min

This screen is used to set the delay between two consecutive defrost cycles, the delay before defrost is started as soon as the defrost conditions are met, and the max. defrost cycle time.
The second line in the screen is used to set the delay before the defrost cycle gets started.
The third line in the screen is used to set the delay between two consecutive defrost cycles.
The fourth line in the screen is used to either enable or disable the max. defrost cycle time.

Attivazione Pw recupero calore Delta temp. 04.0°C Diff. 01.0°C	Heat recovery Pw activation Delta temp. 04.0°C Diff. 01.0°C	Activación Pw recuper. calor Delta temp. 04.0°C Dif. 01.0°C

This screen is used to set the temperature difference between external air and ambient air, which is required for heat recovery activation, and the temperature differential required for modulating recovery damper opening.
The third line in the screen is used to set the temperature difference between external air and ambient air, which is required for heat recovery activation.
The fourth line in the screen is used to set the temperature differential required for modulating recovery damper opening.

Temp.regol.recup. Px Diff. 07.0°C Zona neutra 01.0°C Diff.ZN 01.0°C	HR temp.regul. Px Differential 07.0°C Neutral zone 01.0°C Diff.NZ 01.0°C	Temp.regul.recup. Px Dif. 07.0°C Zona neutra 01.0°C Diff.ZN 01.0°C

Sbrin.recupero Pz Setpoit -02.0°C Diff. 07.0°C Rit. 05m	HR defrost Pz Setpoint -02.0°C Differential 03.0°C Delay 05m	Deses.recuper. Pz PConsig. -02.0°C Dif. 03.0°C Rit. 05m

The parameters in screens Px and Pz are not used by the controller.

Abilitazione Pp ON/OFF remoto S ON/OFF da superv. N ON dopo blackout S	Enable remote Pp on/off S Supervisor on/off N ON after blackout S	habilitac. Pp ON/OFF remoto S ON/OFF de superv. N ON tras apagón S

This screen is used to enable unit ON/OFF remotely, unit ON/OFF from the supervisory control and automatic unit restart after a main power blackout.
The second line in the screen is used to enable unit ON/OFF remotely through a digital input.
The third line in the screen is used to enable unit ON/OFF from the BMS supervisory control.
The fourth line in the screen is used to enable automatic unit restart after a main power blackout.

Numero identif. Pq per rete BMS1 001 Baud rate 19200bps Protocollo CAREL	Ident.number Pq for BMS1 net 001 Baud rate 19200bps Protocol CAREL	Numero identific. Pq para red BMS1 001 Baud rate 19200bps Protocolo CAREL

This screen is used to configure the parameters required for communication with a supervisory control using controller port BMS1.
The second line in the screen is used to set the network address of the unit.
The third line in the screen is used to set the communication baud rate.
The fourth line in the screen is used to set the communication protocol.

Numero identif. Pq1 per porta BMS2 001 Baud rate: 19200bps Protocollo: MODBUS	Ident.number Pq1 for BMS2 door 001 Baud rate: 19200bps Protocollo: MODBUS	Numero identific.Pq1 para red BMS2 001 Baud rate 19200bps Protocolo MODBUS

This screen is used to configure the parameters required for communication with a supervisory control using controller port BMS2.
The second line in the screen is used to set the network address of the unit.
The third line in the screen is used to set the communication baud rate.
The fourth line in the screen shows the communication protocol: it is always MODBUS.

Porta BMS2 Pq2 N.bit: 8 Parità: NONE Stop bit: 1	BMS2 door Pq2 N.bit: 8 Parity: NONE Stop bit: 1	Puerta BMS2 Pq2 N.bit: 8 Parity: NONE Stop bit: 1

This screen is used to configure the parameters required for communication with a supervisory control using controller port BMS2.
The second line in the screen is used to set the number of communication bits.
The third line in the screen is used to set the parity of communication.
The fourth line in the screen shows the number of communication stop bits.

Pu	Pu	Pu
Visualizza maschera	Show language	Visualiza màscara
lingua all'acc. N	mask at start-up N	idioma al enc. N

This screen is used to enable viewing of the language selection screen in the software when the controller is initialised.
The second line in the screen is used to enable viewing of the language selection screen in the software when the controller is initialised.

Vent.Plug-fan P00	Plug-fan P00	Vent.Plug-fan P00
Param.PID mandata	Supply PID param.	Param.PID impulsión
P= 0700m3/h	P= 0700m3/h	P= 0700m3/h
I= 0060s D =00.0s	I= 0060s D =00.0s	I= 0060s D =00.0s

This screen is used to set the parameters required to control the plug fans or the inverter-controlled fans installed on the air delivery line. The fan controller is a PID controller with settable parameters.
The third line in the screen is used to set the proportional gain.
The fourth line in the screen is used to set the integral time and the derivative time.

Vent.Plug-fan P01	Plug-fan P01	Vent.Plug-fan P01
param.PID ripresa	return PID param.	Param.PID returno
P= 0700m3/h	P= 0700m3/h	P= 0700m3/h
I= 0060s D =00.0s	I= 0060s D =00.0s	I= 0060s D =00.0s

This screen is used to set the parameters required to control the plug fans or the inverter-controlled fans installed on the air return line. The fan controller is a PID controller with settable parameters.
The third line in the screen is used to set the proportional gain.
The fourth line in the screen is used to set the integral time and the derivative time.

Vent.Plug-fan P02	Plug-fan P02	Vent.Plug-fan P02
Acquisizione autom.	Automatic acquisit.	adquisición automát.
portata aria S	air flow Y	flujo de aire S
Mand.---% Ripr.---%	Deli.---% Ret. ---%	Impu.---% Ret. ---%

This screen is used to set the parameters required for automatic control of the air flow rate setpoint, where this was enabled in screen Y9 of the Manufacturer menu.
The third line in the screen is used to start automatic acquisition of the air flow rate.
The fourth line in the screen shows the acquired values that are used when the differential pressure probes are alarmed.

Set sbrinamento P03	Set defrost P03	Set descongelat. P03
Set forzato: -21.0°C	Forced: -21.0°C	Set forzado: -21.0°C
Set no sbr.: 10.0°C	Disable: 10.0°C	Set no desc. :10.0°C

This screen is only displayed if variable defrost is enabled. It is used to set the temperature setpoint required for the activation of forced defrosting and the de-activation of defrosting.

Par.sbrinamento P04	Defrost param. P04	Par.descongelat. P04
Param.m: 00.2	Param.m: 00.2	Param.m: 00.2
Param.q: 12.0	Param.q: 12.0	Param.q: 12.0

This screen is only displayed if variable defrost is enabled. It is used to set the "m" and "q" parameters required to calculate the setpoint for defrost starting.

Ritardi sbrinam. P05	Defrost delays P05	Retrasos descon. P05
Ingresso: 030s	Start: 030s	Entrada: 030s
Forzato: 010s	Forced: 010s	Forzado: 010s

This screen is only displayed if variable defrost is enabled. It is used to set the delay before switching to the defrost cycle and the delay in forced defrosting activation.

Ritardi sbrinam. P06	Defrost delays P06	Retrasos descon. P06
Rit.OFF comp.2 030s	Del.OFF comp.2: 030s	Ret.OFF comp.2 030s
Rit.ON comp.2: 010s	Del.ON comp.2: 030s	Ret.ON comp.2: 010s
Sgocciolamento: 020s	Dripping: 010s	Gotear: 020s

This screen is only displayed if variable defrost is enabled. It is used to set the delay before switching to the defrost cycle and the delay in forced defrosting activation.

Resist. sbrinam. P07	Defrost heaters P07	Resist. descong. P07
Abilita: S	Enable: Y	Permitir: S

This screen is used to enable activation of the heaters during the defrost cycle, where fitted.

Abil.resistenza vasca condensa P08	Condensate tray Heater enable P08	Permitir resist. Tina de condensado P08
Con unità ON: S	With unit ON: Y	Con unidad ON: S
Con unità OFF: S	With unit OFF: Y	Con unidad OFF: S

This screen is used to enable activation of the heater designed for condensate tray warming, where fitted.
The third line in the screen is used to enable activation of the heater designed for condensate tray warming when the unit is switched to ON.
The fourth line in the screen is used to enable activation of the heater designed for condensate tray warming when the unit is switched to OFF.

Resist.vasca condensa P09	Condensate tray heater P09	Resist.tina de condensado P09
Set aria est.:-1.0°C	Ext.air set: -1.0°C	Set aire ext.:-1.0°C
Differenziale: 1.0°C	Differential: 1.0°C	Diferencial: 1.0°C

This screen is used to set the parameters required to enable the heater designed for condensate tray warming, where fitted.
The third line in the screen is used to set the external air temperature below which the heater is activated.
The fourth line in the screen is used to enable the heater OFF differential.

Messa a regime P10	Starting up P10	Reiniciando P10
Abilita: N	Enable: N	Permitir: N
Durata: 030min	Period: 030min	Duración: 030min

This screen is used to enable the function that brings units supplied with dampers to a steady state, and to set the time required to bring the unit to a steady state.
The second line in the screen is used to enable the function to bring the unit to a steady state.
The third line in the screen is used to set the time required to bring the unit to a steady state.

Nuova Pv Password utente 0000	New user Pv password 0000	Nueva Pv password usuar. 0000

This screen is used to set a new password for the User menu.

We recommend that the default password not be changed because the risk is that you can no longer access the protected menus if you forget the new password.
If the password is changed, we recommend writing the new password down in the Notes pages at the end of this manual.

7.8 Maintenance menu

The Maintenance menu is designed to view the unit data, the featured software and controller type, and the hours of operation of the main unit components. The password-protected area in the menu is used to set the thresholds of the hours of component operation, to reset the hour meters, to calibrate the probes fitted in the unit, to reset the alarm history, and to test the controller outputs.
Select the item “Maintenance” in the menu and click Enter to access the Maintenance branch: screen Ax appears on the display.

Lingua corrente Ax ITALIANO premere tasto ENTER per cambiare	Current language: Ax ENGLISH press ENTER to change language	Idioma actual Ax ESPAÑOL pulsar tecla ENTER para cambiar

This screen is used to select the language of the controller, from those available. Press Enter to set a new language.

Dati unità Ay Matricola: 12345678 Data coll.: 01/01/18 Collaudatore: 0653	Unit data Ay Serial n.: 12345678 Test data: 01/01/18 Tester: 0653	Datos unidad Ay N.de serie: 12345678 Data ens.: 01/01/18 Ensayador: 0653

The screen shows the following unit data: the serial number, the factory acceptance test date, and the ID of the tester who has carried out FAT.

Roof Top A0 Codice:FLBB0mRT0E Ver.:3.0 01/03/18 ABCDEFG1234567	Roof Top A0 Code:FLBB0mRT0E Ver.:3.0 01/03/18 ABCDEFG1234567	Roof Top A0 Código:FLBB0mRT0E Ver.:3.0 01/03/18 ABCDEFG1234567

The screen shows the code, version and release date of the software as well as the unit model.

A1 Bios: 6.44 08/12/17 Boot: 5.02 30/03/13	A1 Bios: 6.44 08/12/17 Boot: 5.02 30/03/13	A1 Bios: 6.44 08/12/17 Boot: 5.02 30/03/13

The screen shows the version and date of both controller board BIOS and BOOT.

Hardware A2 installato Scheda :pCO5+ Tipo :LARGE	Installed A2 pCO board Board :pCO5+ Type :LARGE	Hardware A2 instalado Tarjeta:pCO5+ Tipo :LARGE

The screen shows the model and type of controller board.

Ore funzionamento A3 Unità 000000h	Working hours A3 Unit 000000h	Horas func. A3 Unid. 000000h

The screen shows the hours of unit operation.

Ore funzionamento A4 Comp.1 000000h Comp.2 000000h	Working hours A4 Compressor 1 000000h Compressor 2 000000h	Horas func. A4 Comp.1 000000h Comp.2 000000h

The screen shows the hours of operation of compressors 1 and 2.

Ore funzionamento A5	Working hours A5	Horas func. A5
Comp.3 000000h	Compressor 3 000000h	Comp.3 000000h
Comp.4 000000h	Compressor 4 000000h	Comp.4 000000h

The screen shows the hours of operation of compressors 3 and 4.

Inserire A6 Password 0000 	Insert mainten. A6 password 0000 	Insertar A6 password 0000 

The other screens in the menu are password-protected. A password must therefore be entered to move on to the next screens. The default password is 0200.

Soglia tempo A7 funzionamento Unità 010000h	Working time A7 threshold Unit 010000h	Umbral tiem. A7 funcionamient Unid. 010000h

Soglia tempo A8 funzionamento Comp.1 010000h	Working time A8 threshold Compressor 1 010000h	Umbral tiem. A8 funcionamient Comp.1 010000h

Soglia tempo A9 funzionamento Comp.2 010000h	Working time A9 threshold Compressor 2 010000h	Umbral tiem. A9 funcionamient Comp.2 010000h

Soglia tempo Aa funzionamento Comp.3 010000h	Working time Aa threshold Compressor 3 010000h	Umbral tiem. Aa funcionamient Comp.3 010000h

Soglia tempo Ab funzionamento Comp.4 010000h	Working time Ab threshold Compressor 4 010000h	Umbral tiem. Ab funcionamient Comp.4 010000h

These screens are used to set the thresholds relating to the hours of operation of the unit and the compressors, after which the maintenance alarm of either the unit or compressors triggers.

Reset contaore Ac Unità N	T.count.reset Ac Unit N	Reset cont. H. Ac Unid. N

Reset contaore Ad Compressore 1 N Compressore 2 N	T.count.reset Ad Compressor 1 N Compressor 2 N	Reset cont. H. Ad Compresor 1 N Compresor 2 N

Reset contaore Ae Compressore 3 N Compressore 4 N	T.count.reset Ae Compressor 3 N Compressor 4 N	Reset cont. H. Ae Compresor 3 N Compresor 4 N

These screens are used to reset the hour meters in the unit and the compressors.

Calibrazione Af sonda temperatura Int. 0.0 00.0°C Man. 0.0 00.0°C	Temperature Af probe setting Int. 0.0 00.0°C Sup. 0.0 00.0°C	Calibración Af sonda temperatura Int. 0.0 00.0°C Man. 0.0 00.0°C

Calibrazione Ag sonda temperatura Est. 0.0 00.0°C	Temperature Ag probe setting Ext. 0.0 00.0°C	Calibración Ag sonda temperatura Est. 0.0 00.0°C

These screens are used to rectify the values measured by the temperature probes of the ambient air, the air in the delivery line and the external air. We recommend that the value measured by a probe be rectified exclusively if the deviation from the measurement taken by a certified instrument exceeds 0.5°C.

Calibrazione Ah sonda umidità Int. 0.0 00.0%Ur Est. 0.0 00.0%Ur	Humidity Ah probe setting Int. 0.0 00.0%rH Ext. 0.0 00.0%rH	Calibración Ah sonda humed. Int. 0.0 00.0%HR Est. 0.0 00.0%HR

This screen is used to rectify the values measured by the temperature probes of the ambient air and the external air. We recommend that the value measured by a probe be rectified exclusively if the deviation from the measurement taken by a certified instrument exceeds 0.5%.

Calibrazione Ai sonda sbrinamento S.1 0.0 00.0bar S.2 0.0 00.0bar	Defrost Ai probe setting S.1 0.0 00.0bar S.2 0.0 00.0bar	Calibración Ai sonda desescarche S.1 0.0 00.0bar S.2 0.0 00.0bar

This screen is used to rectify the values measured by the pressure probes in circuits 1 and 2. We recommend that the value measured by a probe be rectified exclusively if the deviation from the measurement taken by a certified instrument exceeds 0.2 bar.

Calibrazione Aj sonda qualità aria CO2 00 0000ppm	Air quality Aj probe setting CO2 00 0000ppm	Calibración Aj sonda calidad aire CO2 00 0000ppm

This screen is used to rectify the value measured by the air quality probe. We recommend that the value measured by a probe be rectified exclusively if the deviation from the measurement taken by a certified instrument exceeds 30 ppm.

Offset sonde DRV1 Ak S1 0.0barg S2 0.0 °C S3 0.0 °C	Drv.1 probes offs.Ak S1 0.0barg S2 0.0 °C S3 0.0 °C	Offset sond. Drv1 Ak S1 0.0barg S2 0.0 °C S3 0.0 °C

Offset sonde DRV2 Al S1 0.0barg S2 0.0 °C S3 0.0 °C	Drv.2 probes offs.Al S1 0.0barg S2 0.0 °C S3 0.0 °C	Offset sond.Drv2 Al S1 0.0barg S2 0.0 °C S3 0.0 °C

This screen is used to rectify the values measured by both pressure and temperature probes in circuits 1 and 2, which are connected to the EVD drivers of the electronic expansion valve, where fitted. We recommend that the value measured by a probe be rectified exclusively if the deviation from the measurement taken by a certified instrument exceeds 0.2 bar or 0.5°C.

Cancellazione Am storico allarmi N	Alarm history Am delete N	Cancelación Am histór ic alarm. N

This screen is used to reset the alarms history.



WARNING!
Resetting of the alarms history is an irreversible operation which causes all the alarms recorded in the History menu up to that moment to be lost.



WARNING!
The following screens are used to enable the controller digital outputs manually and to start the unit components individually for operational testing purposes. If this operation is performed incorrectly, serious damage may be caused to the components or to the unit.

Test DOut	An	DOut test	An	Test DOut	An
Ventil.principale	N	Main fan	N	Ventil.principal	N
Compressore 1	N	Compressor 1	N	Compresor 1	N
Compressore 2	N	Compressor 2	N	Compresor 2	N

This screen is used to manually enable the digital outputs of the fans installed on the delivery line and of compressors 1 and 2.

Test DOut	Ao	DOut test	An	Test DOut	Ao
		Main fan	N		
Compressore 3	N	Compressor 1	N	Compresor 3	N
Compressore 4	N	Compressor 2	N	Compresor 4	N

This screen is used to manually enable the digital outputs of compressors 3 and 4.

Test DOut	Ap	DOut test	Ap	Test DOut	Ap
Valvola invers.1	N	Reversing valve 1	N	Vàlvula invers.1	N
Valvola invers.2	N	Reversing valve 2	N	Vàlvula invers.2	N

This screen is used to manually enable the digital outputs of the cycle reversing valves in circuits 1 and 2.

Test DOut	Aq	DOut test	Aq	Test DOut	Aq
Resistenza 1	N	Heater 1	N	Resistenc. 1	N
Resistenza 2	N	Heater 2	N	Resistenc. 2	N

This screen is used to manually enable the digital outputs of the electric heater banks 1 and 2.

Test DOut	Ar	DOut test	Ar	Test DOut	Ar
Umidificatore	N	Humidifier	N	Humidificador	N
Vent.assiale 1	N	Vent.axial 1	N	Vent.axial 1	N
Vent.assiale 2	N	Vent.axial 2	N	Vent.axial 2	N

This screen is used to manually enable the digital outputs of the dehumidifier and the condensing fans in circuits 1 and 2.

Test DOut	Ar2	DOut test	Ar2	Test DOut	Ar2
Res.vasca condensa	N	Cond.tray heater	N	Res.tina cond.	N
Uscita NO11 HP	N	NO11 output HP	N	Salida NO11 HP	N

This screen is used to manually enable the digital outputs of the condensate tray heater and auxiliary output NO11.

Calibrazione	Az	Diff. pressure	Az	Calibraciòn	Az
sonda press.diff.le		probe setting		sonda press.dif.cial	
Mandata 000	00000Pa	Deliv. 000	00000Pa	Impuls 000	00000Pa
Ripresa 000	00000Pa	Return 000	00000Pa	Returno 000	00000Pa

If the unit features plug fans or inverter-controlled fans, including air flow rate control, the screen can be used to rectify the values measured by the air differential pressure probes in the delivery and return lines. We recommend that the value measured by a probe be rectified exclusively if the deviation from the measurement taken by a certified instrument exceeds 10 Pa.

Uscita NO11 HP A10	NO11 output HP A10	Salida NO11 HP A10
T aria est.: 10.0°C	Ext.air T: 10.0°C	T aire ext.: 10.0°C
Tempo ON: 120s	ON time: 120s	Tiempo ON: 120s
Tempo OFF: 480s	OFF time: 480s	Tiempo OFF: 480s

This screen is used to set the parameters required to control auxiliary output NO11.
The second line in the screen is used to set the external air temperature threshold below which the auxiliary output is activated.
The third line in the screen is used to set the activation time of the auxiliary output when at least one compressor is ON.
The fourth line in the screen is used to set the de-activation time of the auxiliary output when at least one compressor is ON.

uscita NO11 HP A11	NO11 output HP A11	Salida NO11 HP A11
Tempo ON con compr.	ON time with compr.	Tiempo ON con
OFF: 060s	OFF: 060s	Compr.OFF: 060s
Attiva in freddo: N	Enable in cool.: N	Permitir en frio: N

This screen is used to set the parameters required to control auxiliary output NO11.
The third line in the screen is used to set the activation time of the auxiliary output when all compressors are OFF.
The fourth line in the screen is used to set activation of the auxiliary output when the unit is in cooling mode (summer).

Uscita NO11 HP A12	NO11 output A12	Salida NO11 HP A12
Logica: N.C.	Logic: N.C.	Logica: N.C.
Attiva in sbrin.: N	Active in defrost: N	Activa en desc.: N

This screen is used to set the parameters required to control auxiliary output NO11.
The second line in the screen is used to set the logic of the output. The possible selections are: NC (normally closed) and NO (normally open).
The third line in the screen is used to set activation of the auxiliary output during the defrost cycle.

Inserire nuova password Aw	Insert new password Aw	Insertar nueva password Aw
0000	0000	0000

This screen is used to set a new password for the Maintenance menu.

We recommend that the default password not be changed because the risk is that you can no longer access the protected menus if you forget the new password.
If the password is changed, we recommend writing the new password down in the Notes pages at the end of this manual.

7.9 Clock menu

The Clock menu is designed to set the current date and time and to enable and set the time slots in password-protected screens.
Select the item “Clock” in the menu and click Enter to access the Clock branch: screen K0 appears on the display.

Orologio K0	Clock K0	Reloj K0
Ora 10:30	Hour 10:30	Hora 10:30
Data 01/01/18	Date 01/01/18	Fech 01/01/18
Lunedì	Monday	Lunes

This screen is used to set the date and time: the day is selected automatically.

Inserire K1 password 0000 	Insert K1 password 0000 	Insertar K1 password 0000 

Enter the password and press the Enter button: the default password is 0001.
The following screens appear where the time slots can be set.

Abilita fasce K2 orarie giornaliere N Abilita off unità da fascie: N	Daily time zone K2 enable: N Unit OFF by time zone enable: N	Habil.franjas K2 horario laboral N Habil. OFF unidad de franja: N

This screen is used to enable the daily time slots (second line) and switching off the unit outside the time slots (fourth line).

Fasce orarie K3 giornaliere Inizio 08:00 Fine 18:00	Daily time zone K3 Start 08:00 Ending 18:00	Fr. horarias K3 diario Inicio 08:00 Fin 18:00

This screen is used to set the start and end time of the daily time slot.

Fasce orarie K4 Funzionamento estivo Set interno 27.0°C Set esterno 30.0°C	Time zone K4 Summer working Internal set 27.0°C External set 30.0°C	Fr. horarias K4 Funcionamento verano Set interno 27.0°C Set externo 30.0°C

This screen is used to set the summer operating setpoints within and outside the time slot.

Fasce orarie K5 Funz.invernale Set interno 20.0°C Set esterno 16.0°C	Time zone K5 Winter working Internal set 20.0°C External set 16.0°C	Fr. horarias K5 Func.invierno Set interno 20.0°C Set externo 16.0°C

This screen is used to set the winter operating setpoints within and outside the time slot.

Abilita OFF K6 unità da fascia settimanale N	Unit OFF K6 by week time zone enable N	Habil. OFF K6 unid. de franja semanal N

This screen is used to enable weekly programming of the unit switch-on.

Fasce orarie K7 Lun N Mar N Mer N Gio N Ven N Sab N Dom N	Time zone K7 Mon N Tue N Wed N Thu N Fri N Sat N Sun N	Fr. Horarias K7 Lun N Mar N Mie N Jue N Vie N Sab N Dom N

This screen is used to set the days in the week on which the unit is ON (S) or OFF (N).

Inserire K8 password 0000 	Insert K8 password 0000 	Insertar K8 password 0000 

This screen is used to change the Clock menu password. After setting the new password, press Enter to confirm.

We recommend that the default passwords not be edited, otherwise access to password-protected branches may be prevented if they are not remembered.
If the password is changed, we recommend writing the new password down in the Notes pages at the end of this manual.

7.9.1.1 Examples of time slot programming

Below are two examples of time slot programming.

Example 1 The unit is required to operate all days:

- from 7 a.m. to 8 p.m. with a summer setpoint equal to 26.0°C and a winter setpoint equal to 21.0°C;
- from 8 p.m. to 7 a.m. with a summer setpoint equal to 30.0°C and a winter setpoint equal to 15.0°C.

The fans in the unit are required to be enabled continuously.
Based on the requirements above, screens K2 though K7 have to be set as follows.

Abilita fasce K2	Daily time zone K2	Habil.franjas K2
orarie giornaliere S	enable: Y	horario laboral S
Abilita off unità	Unit OFF by time	Habil. OFF unidad
da fascie: N	zone enable: N	de franja: N

Fasce orarie K3	Daily time zone K3	Fr. horarias K3
giornaliere		diario
Inizio 07:00	Start 07:00	Inicio 07:00
Fine 20:00	Ending 20:00	Fin 20:00

Fasce orarie K4	Time zone K4	Fr. horarias K4
Funzionamento estivo	Summer working	Funcionamento verano
Set interno 26.0°C	Internal set 26.0°C	Set interno 26.0°C
Set esterno 30.0°C	External set 30.0°C	Set externo 30.0°C

Fasce orarie K5	Time zone K5	Fr. horarias K5
Funz.invernale	Winter working	Func.invierno
Set interno 21.0°C	Internal set 21.0°C	Set interno 21.0°C
Set esterno 15.0°C	External set 15.0°C	Set externo 15.0°C

Abilita OFF K6	Unit OFF K6	Habil. OFF K6
unità da fascia	by week time zone	unid. de franja
settimanale N	enable N	semanal N

The parameters in screen K7 must not be entered as the weekly time slots are disabled.

Example 2 The unit is required to operate Monday through Friday, from 7:30 a.m. to 7:30 p.m. with a summer setpoint equal to 24.0°C and a winter setpoint equal to 20.5°C. Additionally, the unit is required to be OFF from 7:30 p.m. to 7:30 a.m. and on Saturdays and Sundays.
Based on the requirements above, screens K2 though K7 have to be set as follows.

Abilita fasce K2	Daily time zone K2	Habil.franjas K2
orarie giornaliere S	enable: Y	horario laboral S
Abilita off unità	Unit OFF by time	Habil. OFF unidad
da fascie: S	zone enable: Y	de franja: S

Fasce orarie K3	Daily time zone K3	Fr. horarias K3
giornaliere		diario
Inizio 07:30	Start 07:30	Inicio 07:30
Fine 19:30	Ending 19:30	Fin 19:30

Fasce orarie K4	Time zone K4	Fr. horarias K4
Funzionamento estivo	Summer working	Funcionamento verano
Set interno 24.0°C	Internal set 24.0°C	Set interno 24.0°C
Set esterno 30.0°C	External set 30.0°C	Set externo 30.0°C

Fasce orarie K5 Funz.invernale Set interno 20.5°C Set esterno 15.0°C	Time zone K5 Winter working Internal set 20.5°C External set 15.0°C	Fr. horarias K5 Func.invierno Set interno 20.5°C Set externo 15.0°C

Abilita OFF K6 unità da fascia settimanale S	Unit OFF K6 by week time zone enable Y	Habil. OFF K6 unid. de franja semanal S

Fascia oraria K7 Lun S Mar S Mer S Gio S Ven S Sab N Dom N	Time zone K7 Mon Y Tue Y Wed Y Thu Y Fri Y Sat N Sun N	Fr. Horarias K7 Lun S Mar S Mie S Jue S Vie S Sab N Dom N

7.10 Setpoint menu

Select the item “Setpoint” in the menu with the arrow buttons and click Enter to access the Setpoint branch: screen S0 appears on the display.

Setpoint S0 Temp. **Est 27.0°C**	Temperature S0 setpoint **Sum 27.0°C**	P consig. S0 Temp. **Ver 27.0°C**

Screen S0 is used to set the ambient temperature setpoint in summer mode. The setpoint value must be within the max. and min. values stored in the P3 screen of the User menu.
If time slots are enabled, the setpoint cannot be edited on this screen. This operation is possible from the dedicated screen in the Clock menu.

Setpoint S1 Temp. **Inv 20.0°C**	Temperature S1 setpoint **Win 20.0°C**	P consig. S1 Temp. **Inv 20.0°C**

Screen S1 is used to set the ambient temperature setpoint in winter mode. The setpoint value must be within the max. and min. values stored in the P3 screen of the User menu.
If time slots are enabled, the setpoint cannot be edited on this screen. This operation is possible from the dedicated screen in the Clock menu.

Setpoint S2 umidità **Est 50.0%**	Humidity S2 setpoint **Sum 50.0%**	P consig. S2 humedad **Ver 50.0%**

Screen S2 is used to set the ambient humidity setpoint in summer mode. The setpoint value must be within the max. and min. values stored in the Pb screen of the User menu.

Setpoint S3 umidità **Inv 50.0%**	Humidity S3 setpoint **Win 50.0%**	P consig. S3 humedad **Inv 50.0%**

Screen S3 is used to set the ambient humidity setpoint in winter mode. The setpoint value must be within the max. and min. values stored in the Pb screen of the User menu.

The following screens only appear if the unit is supplied with an air flow rate control system.

Vent.plug fan S4 Forzatura funzion.to a portata manuale N	Plug fan S4 Manual forced flow operation N	Plug fan S4 Operaciòn de flujo forzado manual N

Screen S4 is used to enable manual overriding of the air flow rate relating to the fans installed on the delivery and return lines.

Setpoint S5 Portata aria mandata **009000m³/h**	Setpoint S5 Delivery air flow **009000m³/h**	PConsig. S5 Flujo aire impuls. **009000m³/h**

Screen S5 is used to set the air flow rate relating to the fans in the delivery line within the max. and min. values stored in screen Y4 of the “Plug fan” menu.

Lettura S6 Portata aria mandata **008900m³/h**	Reading S6 Delivery air flow **008900m³/h**	Lectura S6 Flujo aire impuls. **008900m³/h**

Screen S6 is used to read the instant air flow rate relating to the fans fitted on the delivery line.

Setpoint S7 Portata aria ripresa **008500m³/h**	Setpoint S7 Return air flow **008500m³/h**	PConsig. S7 Flujo aire returno **008500m³/h**

Screen S7 is used to set the air flow rate relating to the fans in the return line, where fitted, within the max. and min. values stored in screen Y5 of the “Plug fan” menu.

Lettura S8 Portata aria ripresa **008900m³/h**	Reading S8 Return air flow **008900m³/h**	Lectura S8 Flujo aire returno **008900m³/h**

Screen S8 is used to read the instant air flow rate relating to the fans fitted on the return line.

S9 Setpoint portata aria mandata in set: 010000m³/h	S9 Setpoint supply airflow on set: 010000m³/h	S9 Setpoint del flujo suministro en set: 010000m³/h

The screen allows to define the new airflow rate setpoint for supply EC fans, if in the screen Y10 of the Manufacturer menu is enable the function “DECREASE”.

S10 Setpoint portata aria ripresa in set: 010000m³/h	S10 Setpoint return airflow on set: 010000m³/h	S10 Setpoint del flujo regreso en set: 010000m³/h

The screen allows to define the new airflow rate setpoint for return EC fans, if in the screen Y10 of the Manufacturer menu is enable the function “DECREASE”.

7.11 Inputs/Outputs menu

The screens in the Inputs/Outputs menu show the values measured by the probes and the status of the controller inputs and outputs. They are also used to enable/disable some protections of the EVD drivers of the electronic expansion valves, where fitted.
Select the item “Inputs/Outputs” in the menu with the arrow buttons and click Enter to access the Inputs/Outputs branch: screen I0 appears on the display.

Sonda temperatura I0 Interna 00.0°C Esterna 00.0°C	Temperature probe I0 Intake 00.0°C External 00.0°C	Sonda temperatura I0 Interna 00.0°C Externa 00.0°C

This screen shows the temperature of ambient air (internal) and the external air.

Sonda temperatura I1	Temperature probe I1	Sonda temperatura I1
Mandata 00.0°C	Supply 00.0°C	Impuls. 00.0°C

This screen shows the air temperature in the delivery line.

Sonda umidità I2	Humidity probe I2	Sonda humedad I2
Interna 00.0%Ur	Intake 00.0%rH	Interna 00.0%HR
Esterna 00.0%Ur	External 00.0%rH	Externa 00.0%HR

This screen shows the humidity of ambient air (internal) and the external air.

Sonda I3	Probe I3	Sonda I3
Sbrinam.1 00.0°C	Defrost 1 00.0°C	Desesc.1 00.0°C
Sbrinam.2 00.0°C	Defrost 2 00.0°C	Desesc.2 00.0°C

This screen shows the evaporation pressure in circuits 1 and 2 - units featuring a heat pump only - if temperature-based defrosting is enabled.

Sonda I4	Probe I4	Sonda I4
Pressione 1 00.0Bar	Pressure 1 00.0Bar	Presión 1 00.0Bar
Pressione 2 00.0Bar	Pressure 2 00.0Bar	Presión 2 00.0Bar

This screen shows the pressures in refrigerant circuits 1 and 2. In summer mode the screen shows the condensing pressure, while in winter mode the evaporation pressure is displayed.

Sonda I5	Air quality probe I5	Sonda I5
qualità aria		calidad aire
CO2 0000ppm	CO2 0000ppm	CO2 0000ppm

This screen shows the CO_2 concentration, as measured by the air quality probe, where fitted.

Entalpia I6	Enthalpy I6	Entalpía I6
Interna 000.0	Internal 000.0	Interna 000.0
Esterna 000.0	External 000.0	Externa 000.0
Espessa in kcal/kg	expressed in kcal/kg	medida en kcal/kg

This screen shows the measured enthalpy of both internal and external air, where enthalpy-based free cooling is enabled.

Setpoint I7	Enthalpy I7	Pconsig. I7
entalpia 000.0	setpoint 000.0	entalpia 00.0
(rispetto ai set di T. e U. in kcal/kg	(Among set of Temp. and Hum.in kcal/kg)	(respecto al pc de T.y U. en kcal/kg)

This screen shows the setpoint, expressed as an enthalpy value, which is calculated starting from the temperature and humidity setpoints stored in the Setpoint menu, where enthalpy-based free cooling is enabled.

Ingressi digitali I8	Digital input I8	Entradas digital. I8
01:CCC 07:CCC	01:CCC 07:CCC	01:CCC 07:CCC
04:CCC 10:CCC	04:CCC 10:CCC	04:CCC 10:CCC

Ingressi digitali I9 13:CCC 16:CCC	Digital input I9 13:CCC 16:CCC	Entradas digital. I9 13:CCC 16:CCC

The screens show the status of the controller digital inputs: C = closed; O = open.

Compressor 1 OFF Ia Compressor 2 OFF Compressor 3 OFF Compressor 4 OFF	Compressor 1 OFF Ia Compressor 2 OFF Compressor 2 OFF Compressor 4 OFF	Compresor 1 OFF Ia Compresor 2 OFF Compresor 3 OFF Compresor 4 OFF

This screen shows the status of compressors - only the compressors fitted in the unit are displayed.

Vent.cond.1 OFF Ib Vent.cond.2 OFF Valv.inv.1 OFF Valv.inv.2 OFF	Cond.fan 1 OFF Ib Cond.fan 2 OFF Rev.valve 1 OFF Rev.valve 2 OFF	Vent.cond.1 OFF Ib Vent.cond.2 OFF Valv.inv.1 OFF Valv.inv.2 OFF

This screen shows the status of the condensing fans and the cycle reversing valve in circuits 1 and 2.

Vent.princ. OFF Ic Umidificatore OFF	Main fan OFF Ic Humidifier OFF	Vent.princ. OFF Ic Humidificador OFF

This screen shows the status of the fans on the delivery line (main fans) and the de-humidifier, where fitted.

Resistenza 1 OFF Id Resistenza 2 OFF	Heater 1 OFF Id Heater 2 OFF	Resistenc. 1 OFF Id Resistenc. 2 OFF

This screen shows the status of the heaters in banks 1 and 2, where fitted.

Serr.esterna 000% Ie Valvola caldo 000%	Ext.damper 000% Ie Heat Valve 000%	Comp.externa 000% Ie Vàlvula calor 000%

This screen shows the percentage opening of the external air damper and of the hot water valve, if fitted.

Vent.cond.1 000% If | Vent.cond.2 000% |	Cond.fan1 000% If | Cond.fan2 000% |	Vent.cond.1 000% If | Vent.cond.2 000% |

This screen shows the percentage associated to the signal for fan control in the heat exchanger on the source (external) side in circuits 1 and 2.

Ig Umidificatore 000%	Ig Humidifier 000%	Ig Humidificador 000%

This screen shows the percentage associated to the signal for de-humidifier control, if enabled.

Modem GSM Ih Stato: Modem stand-by. Numero in chiamata 0	External modem Ih State: Modem stand-by. Number on calling: 0	Modem externo Ih Estad: Modem stand-by. Número en llamada 0

This screen shows the status of the GSM modem, where fitted, and the priority order of the contact numbers in the telephone book.

Recupero calore Ii	Heat recovery Ii	Recuper. Calor Ii
Serranda by-pass Off	By-pass damper Off	Compuert by-pass Off

Recupero calore Ii	Heat recovery Ii	Recuper. Calor Ii
Serr.by-pass 000%	By-pass damper 000%	Comp.by-pass 000%

This screen shows the two status options of the heat recovery bypass damper, where fitted: ON/OFF and modulating.

Vent.Plug-fan IT	Plug-fan IT	Vent.Plug-fan IT
Segnale	Signal	Señal
Mandata 000%	Delivery 000%	Impuls. 000%
Ripresa 000%	Return 000%	Retorno 000%

This screen shows the percentages associated to the control signals of the fans installed in the delivery and return lines, if plug fans or inverter-controlled fans are featured.

Vent.Plug-fan Iu	Plug-fan Iu	Vent.Plug-fan Iu
Segnale sonde press.	Signal pres.probe	Señal sondas press.
Mandata 00000Pa	Delivery 00000Pa	Impuls. 00000Pa
Ripresa 00000Pa	Return 00000Pa	Retorno 00000Pa

This screen shows the percentages measured by the air differential pressure transducers in the delivery and return lines, if plug fans or inverter-controlled fans are featured.

Sbrinamento Iv1	Defrost Iv1	Descongelation Iv1
T.evap.: -xx.x°C	Evap.T.: -xx.x°C	T.evap.: -xx.x°C
Set sbrin.: -xx.x°C	Defr.set.: -xx.x°C	Set desc.: -xx.x°C
Countdown: xxx s	Countdown: xxx s	Countdown: xxx s

Sbrinamento Iv2	Defrost Iv2	Descongelation I21
T.evap.: -xx.x°C	Evap.T.: -xx.x°C	T.evap.: -xx.x°C
Set sbrin.: -xx.x°C	Defr.set.: -xx.x°C	Set desc.: -xx.x°C
Countdown: xxx s	Countdown: xxx s	Countdown: xxx s

These screens are only displayed if variable defrost is enabled. They are used to view the evaporation temperature, the calculated defrost setpoint, and the count down before defrost starting, in circuits 1 and 2 respectively.

Iz	Iz	Iz
Uscita aus.NO11: OFF	Aux.output NO11: OFF	Salida aux.NO11: OFF
Res.vasca cond.: OFF	Cond.tray heater:OFF	Res. tina cond.: OFF

This screen shows the status of auxiliary output NO11 and of the heater for condensate tray warming.

7.12 History menu

The screens in the History menu shows the last 150 alarms detected by the controller.
Select “History” in the menu and press Enter to access the History branch. The screen showing the last active alarm appears on the display. Use the supplied arrows to scroll the other stored alarms.

N°001 10:30 01/04/18
High pressure
Circuit 1
T: 27.0°C U: 50.0%Ur

The first line in the screen shows the progressive alarm number, the time and date on which the alarm was recorded.
The second and the third lines in the screen show the alarm message.
The fourth line in the screen shows the ambient temperature and humidity at the time of alarm activation. Ambient humidity is only displayed if the corresponding probe is enabled.

7.13 Summer/Winter menu

The Summer/Winter menu screen is designed to switch heat pump units from summer (cooling) to winter (heating) mode.
Select the item “Summer/Winter” in the menu and click Enter to access the Summer/Winter menu: screen R0 appears on the display.

Unità in R0 - ESTATE - ENTER per - INVERNO -	Unit in R0 - SUMMER - Press ENTER for - WINTER -	Unid. en R0 - VERANO - ENTER par - INVIERNO -

A click on the Enter button changes the unit status. This is feasible on exclusive condition that the unit is turned to OFF and automatic mode switching is not enabled in screen C6 of the Manufacturer menu.
Access to the R0 screen is not possible when mode switching is enabled using the digital input.

7.14 Unit Selection menu

The Unit Selection menu screen is designed to select the displayed unit when several units are connected through a local p-LAN network. This operation is feasible from the display having network address 32.
Select the item “Unit Selection” in the menu and click Enter to access the Unit Selection menu: screen L0 appears on the display.

Unità n. 01 L0 ENTER per cambiare unità controllata	Present unit n.01 L0 Press ENTER to change controlled unit	Unid. N. 01 L0 ENTER para cambiar unid. controlada

The first line shows the unit address. Click Enter to display a different unit.

8 ALARMS

When an alarm is activated, the red LED in the Alarm button flashes on the display and the corresponding alarm digital output is enabled.
A click on the Alarm button causes the last active alarm to appear on the display. All the other alarms, if any, are scrolled ad viewed using the arrow buttons. The alarm screen below is given for the sake of exemplification.

AL70	AL70	AL70
Sonda U9 guasta o disconnessa	U9 probe broken or disconnected	Sonda U9 averia o desconect.

Each alarm is identified by an “ALxx” code, where “xx” is a progressive number displayed on the top right-hand side of the alarm screen and the alarms history.
Press the Alarm button for at least 2 seconds to reset an active alarm. If the alarm is reset, the alarms screen disappears and the red LED in the Alarm button goes out if no other alarms are active. Please note that the alarm can be reset exclusively if the condition causing it has been cleared.

WARNING!
An alarm should be reset manually only after checking the alarm cause and solving the problem that caused it.
Incorrect alarm resetting may cause serious damage to the unit and its components.

The alarms history stores the last 150 active alarms. Access to the history is gained from the corresponding menu.
Below is a list of all the alarms managed by the software, their main causes, some guidelines for their resolution, the reset type, and service to the unit and its devices.

The type of alarm reset is described in the “RESET” column:

- A = automatic, that is, when the alarm condition disappears the alarm resets automatically;
- AC = automatic and controlled, i.e. the alarm is reset automatically for a number of times within a given interval, after which it has to be reset manually;
- M = manual reset using the keyboard or the supervisory control. The date and time at which the alarm was reset are recorded for each alarm in the alarms history.

The “UNIT OFF” column indicates whether or not the alarm stops the unit:

- Yes = the alarm stops the unit.
- No = the alarm does not stop the unit and only disabled the concerned devices.

CODE	DESCRIPTION	MAIN CAUSE POTENTIAL	RESOLUTION OF THE PROBLEM	RESET	UNIT OFF	DEVICES SWITCHED OFF
AL01	Thermal overload switch in compressor 1	The thermal overload switch in compressor 1 has tripped.	Check the operating conditions. Check the motor wiring and the power absorption. Check the electric motor fitted in the compressor. Check the discharge temperature. Check the thermal overload switch.	M	No	Compressor 1
AL02	Thermal overload switch in compressor 2	The thermal overload switch in compressor 2 has tripped.	Check the operating conditions. Check the motor wiring and the power absorption. Check the electric motor fitted in the compressor. Check the discharge temperature. Check the thermal overload switch.	M	No	Compressor 2

CODE	DESCRIPTION	MAIN CAUSE POTENTIAL	RESOLUTION OF THE PROBLEM	RESET	UNIT OFF	DEVICES SWITCHED OFF
AL03	High pressure in circuit 1	A high pressure alarm has triggered in refrigerant circuit 1 generated by the high pressure switch.	Check the operating conditions. Check the condensing pressure. Check the refrigerant level. Check the condensation fans. Manually reset the high pressure switch before resetting the alarm on the display. Check for correct operation of the high pressure switch.	M	No	All compressors in circuit 1
AL04	High pressure in circuit 2	A high pressure alarm has triggered in refrigerant circuit 2 generated by the high pressure switch.	Check the operating conditions. Check the condensing pressure. Check the refrigerant level. Check the condensation fans. Manually reset the high pressure switch before resetting the alarm on the display. Check for correct operation of the high pressure switch.	M	No	All compressors in circuit 2
AL05	Antifreeze alarm	Digital input 1 opens.	Check the operating conditions.	A (3)	No	Compressors - summer mode only
AL06	The high temperature threshold was exceeded.	The ambient temperature exceeds the max. setpoint limit.	Check the operating conditions.	A	No	None
AL07	The low temperature threshold was exceeded.	The ambient temperature is below the min. setpoint limit.	Check the operating conditions.	A (3)	No	None
AL08	Low pressure in circ. 1 - summer mode	A low pressure alarm has triggered in refrigerant circuit 1 - summer mode - generated by the low pressure switch.	Check the operating conditions. Check the evaporation pressure. Check the refrigerant level. Check the evaporation fans. Check for correct operation of the low pressure switch.	M	No	All compressors in circuit 1
AL09	Low pressure in circ. 2 - summer mode	A low pressure alarm has triggered in refrigerant circuit 2 - summer mode - generated by the low pressure switch.	Check the operating conditions. Check the evaporation pressure. Check the refrigerant level. Check the evaporation fans. Check for correct operation of the low pressure switch.	M	No	All compressors in circuit 2
AL10	Low pressure in circ. 1 - winter mode	A low pressure alarm has triggered in refrigerant circuit 1 - winter mode - generated by the low pressure switch.	Check the operating conditions. Check the evaporation pressure. Check the refrigerant level. Check the evaporation fans. Check for correct operation of the low pressure switch.	M	No	All compressors in circuit 1
AL11	Low pressure in circ. 2 - winter mode	A low pressure alarm has triggered in refrigerant circuit 2 - winter mode - generated by the low pressure switch.	Check the operating conditions. Check the evaporation pressure. Check the refrigerant level. Check the evaporation fans. Check for correct operation of the low pressure switch.	M	No	All compressors in circuit 2
AL12	Compressor 1 maintenance	The threshold relating to the hours of operation of compressor 1 has been exceeded.	Check for compressor operation.	M (1)	No	None
AL13	Compressor 2 maintenance	The threshold relating to the hours of operation of compressor 2 has been exceeded.	Check for compressor operation.	M (1)	No	None
AL14	Unit maintenance	The threshold relating to the hours of operation of the unit has been exceeded.	Check the unit and perform routine maintenance.	M (1)	No	None
AL15	Main fan thermal overload switch/interlock	A thermal overload switch has tripped in one of the main fans (air delivery).	Check the operating conditions. Check the motor wiring and the power absorption. Check the electric motor fitted in the fan. Check the thermal overload switch.	M	Yes	All
AL16	Dirty filter	The dirty filer pressure switch has tripped: this indicates a greater head loss in the air filters than the stored threshold.	Clean or replace the air filters. Check the dirty filter pressure switch for correct calibration and operation.	M	No	None

CODE	DESCRIPTION	MAIN CAUSE POTENTIAL	RESOLUTION OF THE PROBLEM	RESET	UNIT OFF	DEVICES SWITCHED OFF
AL17	Not used					
AL18	Flow switch alarm	The air flow switch has tripped: it indicates a lower air differential pressure than the calibration setpoint, in other words an air flow rate failure.	Check the operating conditions (air flow rate and discharge head). Check the air delivery fans for correct operation. Check the air distribution system. Check the air flow switch for correct calibration and operation.	M	Yes	All
AL19	Clock board malfunctioning or missing	The controller cloak board is malfunctioning.	Power the unit controller down and up again; if the alarm persists, replace the controller board.	M	No	None, but time slot management does not work.
AL20	Summer setpoint < winter setpoint	The summer setpoint of the ambient temperature is inferior to the winter setpoint. Alternatively, the winter setpoint is higher than the summer setpoint, and the summer/winter mode shift is enabled to “automatic”.	Set the summer and winter temperature setpoints correctly.	A	Yes	All
AL21	Probe U1 malfunctioning or disconnected	The value measured by probe U1 (differential air pressure of fans in delivery line) is outside the operating range.	Check the operating conditions. Check the probe setpoint range stored in the controller. Test the probe: if it does not work correctly, replace it. Check the electrical connection of the probe. Check the input of the controller board.	M	No	All devices and functions whose setting is connected to the probe
AL22	Probe U2 malfunctioning or disconnected	The value measured by U2 (differential air pressure of fans in return line) is outside the operating range.	Check the operating conditions. Check the probe setpoint range stored in the controller. Test the probe: if it does not work correctly, replace it. Check the electrical connection of the probe. Check the input of the controller board.	M	No	All devices and functions whose setting is connected to the probe
AL23	Probe U6 malfunctioning or disconnected	The value measured by probe U6 (differential air pressure of fans in circuit 2) is outside the operating range.	Check the operating conditions. Check the probe setpoint range stored in the controller. Test the probe: if it does not work correctly, replace it. Check the electrical connection of the probe. Check the input of the controller board.	M	No	All devices and functions whose setting is connected to the probe
AL24	Probe U7 malfunctioning or disconnected	The value measured by probe U7 (air humidity in return line) is outside the operating range.	Check the operating conditions. Check the probe setpoint range stored in the controller. Test the probe: if it does not work correctly, replace it. Check the electrical connection of the probe. Check the input of the controller board.	M	No	All devices and functions whose setting is connected to the probe
AL25	Probe U4 malfunctioning or disconnected	The value measured by probe U4 (air temperature in return line) is outside the operating range.	Check the operating conditions. Check the probe setpoint range stored in the controller. Test the probe: if it does not work correctly, replace it. Check the electrical connection of the probe. Check the input of the controller board.	M	No	All devices and functions whose setting is connected to the probe
AL26	Probe U3 malfunctioning or disconnected	The value measured by probe U3 (condensing pressure in circuit 1) is outside the operating range.	Check the operating conditions. Check the probe setpoint range stored in the controller. Test the probe: if it does not work correctly, replace it. Check the electrical connection of the probe. Check the input of the controller board.	M	No	All devices and functions whose setting is connected to the probe

CODE	DESCRIPTION	MAIN CAUSE POTENTIAL	RESOLUTION OF THE PROBLEM	RESET	UNIT OFF	DEVICES SWITCHED OFF
AL27	Probe U8 malfunctioning or disconnected	The value measured by probe U8 (external air temperature) is outside the operating range.	Check the operating conditions. Check the probe setpoint range stored in the controller. Test the probe: if it does not work correctly, replace it. Check the electrical connection of the probe. Check the input of the controller board.	M	No	All devices and functions whose setting is connected to the probe
AL28	Probe U5 malfunctioning or disconnected	The value measured by probe U5 (air temperature in return line) is outside the operating range.	Check the operating conditions. Check the probe setpoint range stored in the controller. Test the probe: if it does not work correctly, replace it. Check the electrical connection of the probe. Check the input of the controller board.	M	No	All devices and functions whose setting is connected to the probe
AL29	Thermal overload switch in heater 1	The thermal overload switch in the heaters featured in bank 1 has tripped.	Check the operating conditions (air flow rate and temperature). Check the heater wiring and the power absorption. Check the thermal overload switch.	M	No	Heaters in bank 1
AL30	Thermal overload switch in heater 2	The thermal overload switch in the heaters featured in bank 2 has tripped.	Check the operating conditions (air flow rate and temperature). Check the heater wiring and the power absorption. Check the thermal overload switch.	M	No	Heaters in bank 2
AL31	A serious general alarm has been output by the digital input. System OFF	The digital input associated to a serious external alarm has been opened.	Check the cause leading to opening of the digital input.	M	Yes	All
AL32	A non serious general alarm has been output by the “System ON” digital input.	The digital input associated to a non serious external alarm has been opened.	Check the cause leading to opening of the digital input.	M	No	None
AL33	Thermal overload switch in compressor 3	The thermal overload switch in compressor 3 has tripped.	Check the operating conditions. Check the motor wiring and the power absorption. Check the electric motor fitted in the compressor. Check the discharge temperature. Check the thermal overload switch.	M	No	Compressor 3
AL34	Thermal overload switch in compressor 4	The thermal overload switch in compressor 4 has tripped.	Check the operating conditions. Check the motor wiring and the power absorption. Check the electric motor fitted in the compressor. Check the discharge temperature. Check the thermal overload switch.	M	No	Compressor 4
AL35	Compressor 3 maintenance	The threshold relating to the hours of operation of compressor 3 has been exceeded.	Check for compressor operation.	M (1)	No	None
AL36	Compressor 4 maintenance	The threshold relating to the hours of operation of compressor 4 has been exceeded.	Check for compressor operation.	M (1)	No	None
AL37-AL65	Not used					
AL66	WARNING Circuit 1 in Prevent	The condensing pressure in circuit 1 - summer mode - is higher than the Prevent value.	Check the operating conditions. Check the refrigerant level.	A (3)	No	One compressor in circuit 1
AL67	Warning Circuit 2 in Prevent	The condensing pressure in circuit 2 - summer mode - is higher than the Prevent value.	Check the operating conditions. Check the refrigerant level.	A (3)	No	One compressor in circuit 2
AL68	Differential probe in delivery line	The differential air pressure probe in the delivery line has detected a value outside the min. and max. setpoints stored in controller screen Y6.	Check the air flow rate in the delivery line. Check the air distribution system. Check for correct operation of the differential air pressure probe and correct positioning of the pipes for pressure measurement.	A (3)	No	None

CODE	DESCRIPTION	MAIN CAUSE POTENTIAL	RESOLUTION OF THE PROBLEM	RESET	UNIT OFF	DEVICES SWITCHED OFF
AL69	Differential probe in return line	The differential air pressure probe in the return line has detected a value outside the min. and max. setpoints stored in controller screen Y6.	Check the air flow rate in the return line. Check the air distribution system. Check for correct operation of the differential air pressure probe and correct positioning of the pipes for pressure measurement.	A (3)	No	None
AL70	Probe U9 malfunctioning or disconnected	The value measured by probe U9 (CO_2 probe) is outside the operating range.	Check the operating conditions. Check the probe setpoint range stored in the controller. Test the probe: if it does not work correctly, replace it. Check the electrical connection of the probe. Check the input of the controller board.	M	No	All devices and functions whose setting is connected to the probe
AL71	Probe U10 malfunctioning or disconnected	The value measured by probe U10 (external air relative humidity) is outside the operating range.	Check the operating conditions. Check the probe setpoint range stored in the controller. Test the probe: if it does not work correctly, replace it. Check the electrical connection of the probe. Check the input of the controller board.	M	No	All devices and functions whose setting is connected to the probe
AL72	Board 2 LAN disconnected	Communication has been disrupted with the controller expansion board.	Check that the expansion board is powered correctly. Check the connection between the expansion board and the controller board. Check the communication parameters.	M	No	All devices and functions whose setting is connected to the probes plugged into the expansion board
AL73	B1 in board 2 malfunctioning or disconnected	The value measured by probe B1 in the expansion board is outside the operating range.	Check the operating conditions. Check the probe setpoint range stored in the controller. Test the probe: if it does not work correctly, replace it. Check the electrical connection of the probe. Check the input of the controller board.	M	No	All devices and functions whose setting is connected to the probe
AL74	Circuit 1 High pressure from cooling transd. Tent.: x/y	A high pressure alarm has triggered in refrigerant circuit 1 - cooling mode - generated by the pressure transducer. The display shows trip “x” out of the max. number “y” of trips, after achieving which the alarm must be reset manually.	Check the operating conditions. Check the condensing pressure. Check the refrigerant level. Check the condensation fans. Manually reset the high pressure switch before resetting the alarm on the display. Check for correct operation of the high pressure switch.	AC	No	All compressors in circuit 1
AL75	Circuit 2 High pressure from cooling transd. Tent.: x/y	A high pressure alarm has triggered in refrigerant circuit 2 - cooling mode - generated by the pressure transducer. The display shows trip “x” out of the max. number “y” of trips, after achieving which the alarm must be reset manually.	Check the operating conditions. Check the condensing pressure. Check the refrigerant level. Check the condensation fans. Manually reset the high pressure switch before resetting the alarm on the display. Check for correct operation of the high pressure switch.	AC	No	All compressors in circuit 2
AL76	Circuit 1 Low pressure from heating transd. Tent.: x/y	A low pressure alarm has triggered in refrigerant circuit 1 - heat pump mode - generated by the pressure transducer. The display shows trip “x” out of the max. number “y” of trips, after achieving which the alarm must be reset manually.	Check the operating conditions. Check the condensing pressure. Check the refrigerant level. Check the condensation fans. Manually reset the high pressure switch before resetting the alarm on the display. Check for correct operation of the high pressure switch.	AC	No	All compressors in circuit 1

CODE	DESCRIPTION	MAIN CAUSE POTENTIAL	RESOLUTION OF THE PROBLEM	RESET	UNIT OFF	DEVICES SWITCHED OFF
AL77	Circuit 2 Low pressure from heating transd. Tent.: x/y	A high pressure alarm has triggered in refrigerant circuit 2 - heat pump mode - generated by the pressure transducer. The display shows trip "x" out of the max. number "y" of trips, after achieving which the alarm must be reset manually.	Check the operating conditions. Check the condensing pressure. Check the refrigerant level. Check the condensation fans. Manually reset the high pressure switch before resetting the alarm on the display. Check for correct operation of the high pressure switch.	AC	No	All compressors in circuit 2
AL78	WARNING Circuit 1 in Prevent low pressure	The evaporation pressure in circuit 1 - winter mode - is lower than the Prevent value.	Check the operating conditions. Check the refrigerant level.	A (3)	No	One compressor in circuit 1
AL79	WARNING Circuit 2 in Prevent low pressure	The evaporation pressure in circuit 2 - winter mode - is lower than the Prevent value.	Check the operating conditions. Check the refrigerant level.	A (3)	No	One compressor in circuit 2

(1) maintenance alarms must be reset in screens Ac-Ad-Ae of the Maintenance menu: they are not reset by clicking the Alarm button.

(2) Alarms relating to the EVD drivers in circuits 1 and 2 must be reset in screens Au and Av of the Maintenance menu respectively: they are not reset by clicking the Alarm button.

(3) The alarm is reset automatically: it is deleted from the list of the active alarms by pressing the Alarm button for at least 2 seconds.

9 QUICK GUIDE

Below is a quick guide of the main controller functions.

Keyboard-controlled unit switch-on and switch-off
In the Main screen → Prg → select the "Unit On/Off" menu → Enter → Enter to switch the unit on or off.

Editing the summer temperature setpoint
In the Main screen → Prg → select the "Setpoint" menu → Enter → Screen S0: Enter → Edit the summer setpoint → Enter to confirm.

Editing the winter temperature setpoint
In the Main screen → Prg → select the "Setpoint" menu → Enter → → once → Screen S1: Enter → Edit the winter setpoint → Enter to confirm.

Editing the summer humidity setpoint
In the Main screen → Prg → select the "Setpoint" menu → Enter → → twice → Screen S2: Enter → Edit the humidity setpoint → Enter to confirm.

Editing the winter humidity setpoint
In the Main screen → Prg → select the "Setpoint" menu → Enter → → three times → Screen S3: Enter → Edit the humidity setpoint → Enter to confirm.

Editing the air flow rate setpoint in the delivery line
Unit featuring air flow rate control in the delivery line
In the Main screen → Prg → select the "Setpoint" menu → Enter → → five times → Screen S5: Enter → Edit the air flow rate in the delivery line → Enter to confirm.

Editing the air flow rate setpoint in the return line
Unit featuring air flow rate control in the return line
In the Main screen → Prg → select the "Setpoint" menu → Enter → → seven times → Screen S6: Enter → Edit the air flow rate in the return line → Enter to confirm.

Editing the setpoint and differential for electric heater activation
Units featuring enabled electric heaters
In the Main screen → Prg → select the "User" menu → Enter → Key in the User password → ↓ until screen Pe appears → Enter → Edit the setpoint or the differential for electric heater activation → Enter to confirm.

Editing the CO_2 concentration setpoint (air quality)
Units featuring dampers and enabled CO_2 probe
In the Main screen → Prg → select the "User" menu → Enter → Key in the User password → ↓ until screen Pg appears → Enter → Edit the CO_2 concentration setpoint → Enter to confirm.

Washing function (override free cooling upon unit start-up)
Units featuring free cooling
In the Main screen → Prg → select the "User" menu → Enter → Key in the User password → ↓ until screen Pm appears → Enter → Enable/disable free cooling overriding upon unit start-up → Enter to confirm.
↓ to move to the Po screen → Enter → Edit the washing cycle time → Enter → Enable/disable the temperature and humidity control during the washing cycle → Enter to confirm.

Viewing active alarms
Press the Alarm button (red bell) when it is lit.
↓ to scroll the active alarms.

Enable/disable remote ON/OFF, ON/OFF from supervisory control or after power blackout
In the Main screen → Prg → select the "User" menu → Enter → Key in the User password → ↓ until screen Pp appears → Enter → Enable/disable the desired functions → Enter to confirm.

Selection of summer/winter mode switching procedure
In the Main screen → Prg → select the "Manufacturer" menu → Enter → Key in the Manufacturer password → Select "Configuration" → Enter → ↓ until screen C6 appears → Enter → Select the summer/winter mode switching procedure → Enter to confirm.

Keyboard-controlled summer/winter mode switching

Unit in OFF mode and keyboard-controlled summer/winter switching enabled in screen C6 of the Manufacturer menu

In the Main menu → Prg → select the “Sum/Win.” menu → Enter → Enter to change the unit status.

10 PROCEDURES REQUIRED TO ENABLE ACCESSORIES SUPPLIED WITH THE UNIT

Below is a description of the procedures required to enable the accessories supplied with the unit.



WARNING!
The accessories supplied with the unit must be installed and enabled by qualified personnel, following the instructions provided in this manual and in the wiring diagram of the unit.

10.1 Electric heaters

After making the electric connection of the control signals in the electrical heaters (either 1 or 2 banks), go to screen C2 in the Manufacturer → Configuration menu and enable the number of the featured electrical heater banks (1 or 2) in the second line. The third line in the screen automatically shows “HEATERS”.
Then go to the Pd screen in the User menu and enable the heaters. Then go to the Pe screen in the User menu, if necessary, to edit the heater offset and regulation differential. Finally, enable activation of the electrical heaters i defrost mode, where required, on screen P07 i the User menu.

10.2 Air quality probe

After making the electric connection of the air quality probe, and with the probe energised, go to screen Ce in the Manufacturer → Configuration menu, enable the probe and set the probe signal type. When the next screen appears - Cf -, set the min. and max. limits for the probe, expressed in ppm.
Finally, go to screen Pg in the User menu and enter the air quality setpoint, the differential and the neutral regulation zone.

10.3 Additional pCO WEB serial board on BMS1 port for BACnet or Modbus/IP protocols



Below is a simplified version of the procedure. If problems occur or in-depth information is needed, refer to the manual of the pCO WEB serial board.

After fitting the pCO WEB serial board on the controller board, as described above, go to screen Pq in the User menu and set the communication parameters between the serial board and the controller board. Normally, pCO WEB boards have the default parameters below.

- Network address: 1
- Baud rate: 19200 bps
- Protocol: Carel or Modbus.

Check that the LED in the pCO WEB board indicating communication between the serial board and the controller board is green, i.e. communication between the pCO WEB board and the controller board occurs correctly.
Then connect the Ethernet cable to the pCO WEB board. The LED in the pCO WEB board indicating communication between the board and the network goes green. Click the Alarm and Enter buttons on the display simultaneously for at least 3 seconds. Then use the arrows and move the cursor on “OTHER INFORMATION”, after which click Enter. Use the arrows to move the cursor on “PCOWEB/NET CONFIG” and press Enter. Now, move the cursor on “PCOWEB settings” with the arrows and press Enter. A loop of screens appears showing the IP address of the pCO WEB board (if the DHCP is enabled), the IP address of the net mask, the IP address of the gateway, the IP address of DNS1 and DNS2, the ID and type of BACnet. The parameters described can be edited, after which the configuration must be saved in the last screen of the loop.

10.4 Built-in Modbus RS485 serial board in BMS2 port

Serial Modbus RS485 communication in the BMS2 port of the controller is enabled at all times.
After connecting the serial cable coming from the supervisory control, screen Pq1 in the User menu can be used to set the communication baud rate (default 19200 bps), whereas the protocol is preset as Modbus. The next screen - Pq2 - is used to set the bit number, the parity and the communication stop bit.

10.5 Remark relating to supervisory control protocols

The chapter on hardware illustrates the different options to connect the unit controller to supervisory controls. Based on the serial board used, different management protocols are available, as described above.
The list of variables in the supervisory control is provided in a separate document.



If two management protocols are used simultaneously, the variables in the supervisory control can be read with both protocols. Similarly, both protocols can be used to write variables which have write access.

10.6 Activation of Control logic of supply and return plug-fans on temperature setpoint

To activate the control logic described in chapther 6.3.2 enter in Manufactorer Menu → Plug Fan Branch → Screen Y10.

For units with dampers: it's possible only to set to "DECREASE".

For full recirculation unit: set to "DECREASE" or "SWITCH OFF". If "SWITCH OFF" is set, a confirmation message appears: accept only if the return probe is installed directly in the conditioned room.

If the control logic "DECREASE" is set, then set the airflow in the Setpoint Menu → Screen S9 e S10.