Standard compressor packs

Application software for pCO[1], pCO[2], pCO[3], pCO[xs]

ENG

User manual

Manual version: 2.6 del 01/04/09
Programm code: FLSTDMFC0A

LEGGI E CONSERVA QUESTE ISTRUZIONI
READ AND SAVE THESE INSTRUCTIONS

Technology & Evolution

LEGGI E CONSERVA QUESTE ISTRUZIONI

READ AND SAVE THESE INSTRUCTIONS

We wish to save you time and money!
We can assure you that the thorough reading of this manual will guarantee correct installation and safe use of the product described.

IMPORTANT WARNINGS

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

This appliance has been manufactured to operate risk-free for its specific purpose, as long as:
it is installed, operated and maintained according to the instructions contained in this manual;
the environmental conditions and the voltage of the power supply correspond to those specified.
All other uses and modifications made to the device which are not authorised by the manufacturer are considered incorrect.
Liability for injury or damage caused by the incorrect use of the device lies exclusively with the user.
Please note that this unit contains powered electrical devices and therefore all service and maintenance operations must be performed by specialist and qualified personnel who are aware of the necessary precautions.
Disconnect the machine from the mains power supply before accessing any internal parts.
Disposal of the parts of the controller:
The controller is made up of metal and plastic parts and contains a lithium battery. All these parts must be disposed of according to the local standards in force.

CONTENTS

1. The program

1.1. Main new features in version 2.0

New functions:

1. Compressors inverter management improve with neutral zone manage
2. Fan inverter management improve

1.2. Main characteristics

The FLSTDMFC0A "Compressor pack" application software for pCO^2 / pCO^1 / pCO^3 / pCO^{XS} provides the complete management of a compressor pack, with the following characteristics:

Main functions

- Control of the suction pressure of the compressors;
- Control of the condensing pressure (compressor discharge);
- Management, depending on the number of outputs available, of up to six compressors, with up to three load steps (a total of four outputs for each compressor), and up to sixteen fan steps;
- Condensation and evaporation set points that can be altered according to the external conditions (only on PGD0);
- Complete alarm management and logging;
- Programming of time bands with variation of the set point;
- Connection to a supervisor / telemaintenance serial line by analogue modem or GSM;
- Send SMS to cellular phones.

Devices controlled:

- compressors;
- condensation fans;
- auxiliary pump.

Programming:

- Display and control of the values measured, by external LCD, PGD0 or Built-in terminal;
- Parameters organised into three levels of security;
- Multi-language management: English, Italian, French, German, Spanish, Russian (only on PGD0);
- Possibility to configure all the unit parameters by hardware key;
- Possibility to configure the main unit parameters via serial line.

Warnings: *The information contained in this manual is valid starting from version 1.8 of the application software. From version 1.5 on, the application software* ***is not*** *compatible with BIOS versions prior to 3.57 and BOOT versions prior to 3.01.*

1.3. Compatible hardware

The program is compatible with the following devices:

- pCO^{XS}, codes PCO100*;
- pCO^1 SMALL, pCO^1 MEDIUM, codes PCO100*;
- pCO^2 SMALL, pCO^2 MEDIUM, pCO^2 LARGE, codes PCO200*;
- pCO^3 SMALL, pCO^3 MEDIUM, pCO^3 LARGE,
- PCOT* 4x20 LCD display for panel installation and wall-mounting;
- PCOI* 4x20 LCD display for panel installation;
- PGD0* semi-graphic display;
- Built-in LCD display fitted on the pCO^{XS} and pCO^2 boards.

2. The user terminal

The system features a terminal with LCD (4 rows by 20 columns). Three types are available:

- "Built-in" on the board with just 6 buttons;
- external LCD (connected using a telephone cable) with 15 buttons;
- external PGD0 (connected using a telephone cable) with semi-graphic functions.

All these terminals can be used to perform all the operations allowed by the program. The user terminal displays the operating conditions of the unit at all times, and can be used to modify the parameters. It can also be disconnected from the main board, and does not need to be connected for operation.

2.1. LEDs under the buttons

The LEDs are found on all terminals, except on the pCOXS built-in. They are beneath the buttons and their meanings are the following:

Button	Display	LED colour	Description
ON/OFF	External	green	unit on (ON)
ENTER	External	yellow	instrument powered correctly
ALARM	External	red	alarms active; flashing if the causes of an alarm are no longer present
ENTER	Built-in	yellow	unit on (ON)
PROG	Built-in	green	the page displayed does not belong to the Menu branch
ESC	Built-in	green	the page shown belongs to the Menu branch
ALARM	Built-in	red	alarms active; flashing if the causes of an alarm are no longer present

Table .2.1

2.2. Display

The display used has 4 rows x 20 columns. The information relating to operation is displayed on pages called screens.
The user can move around the screens using the buttons on the terminal, described as follows:
- if the cursor is positioned in the top left corner (Home), you can press the UP/DOWN keys to call up the following screens associated with the selected loop;
- if a screen includes fields for setting the values, pressing the ENTER button moves the cursor to these fields.

Once having reached the field for setting the desired value, the value can be modified, within the set limits, by pressing the UP/DOWN buttons. Having set the desired value, to save it press the ENTER button again.

```
+--------------------+
|Home          Row0  |
|              Row1  |
|              Row2  |
|              Row3  |
+--------------------+
```

2.3. 15-key PCOT*, PCOI* OR PGD*I external terminal

Layout of the buttons on the pCO external terminal:

Fig. 2.1

How to use the keys on the external terminal

Button	Function	Description
menu	MENU	Pressed in all loops except for the Constructor loop, it returns to main screen in the Menu branch (M0) If pressed in the Constructor loops, you return to the screen selected by the constructor. the Menu branch displays the status of the unit and the reading of the control probes
	MAINTENANCE	Goes to the first screen in the maintenance branch (A0) The maintenance branch is used to check the status of the devices, the status of the modem, to carry out maintenance and calibration, and manually control any devices.
	PRINTER	Displays the alarm log.
I/O	INPUTS AND OUTPUTS	Displays the status of digital and analogue inputs and outputs and the input-output configuration.
	CLOCK	Displays/sets the clock and the time bands.
set	SETPOINT	Used to set the set point and differentials.
prog	PROGRAM	Used to set the various operating parameters (thresholds, delays etc.).
menu + prog	MENU+PROG	Pressing these buttons at the same time accesses the unit configuration.
info ?	INFO	Displays the version of the application software and other information on the unit.
	RED	No function associated.
	BLUE	No function associated.

Table .2.2

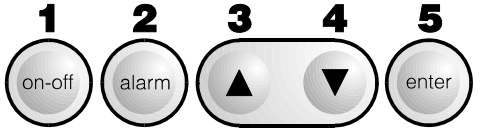


Fig. 2.2

Functions of the silicon rubber buttons:

1. ON/OFF: switches the unit on and off.
2. ALARM: to view the alarms on the display, cancel them and silence the alarm buzzer
3. UP ARROW: It has two functions,

- to scroll the previous screens of the same branch when the cursor is in the home position;
- and to increase the value of a setting field when the cursor is on it; however, if it is a selection field, pressing the arrow button displays the previous associated text.

4. The DOWN ARROW has two functions:

- to scroll the subsequent screens of the same branch when the cursor is in the home position;
- and to decrease the value of a setting field when the cursor is on it;
- if, however, it is a selection field, pressing the arrow button displays the next associated text.

5. ENTER: lets you move the cursor between the home position and the setting or selection fields and store the set parameters.

2.4. BUILT-IN DISPLAY BUTTONS (for pCO² or pCO^{XS}) AND PGD0*F

Layout of the buttons on the Built-in and PGD keypads:

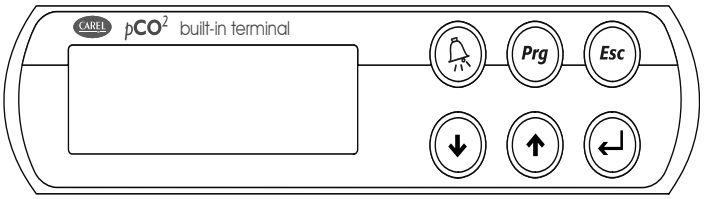


Fig. 2.3

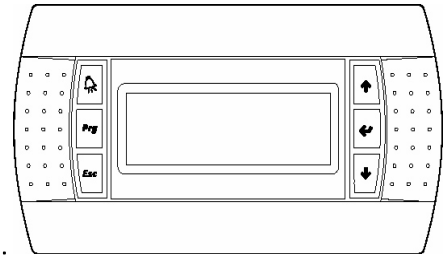


Fig. 2.4

Terminal buttons

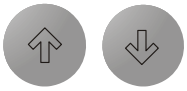
Button	Function	Description
	ALARM	Has the same functions as the button on the external terminal.
	UP- DOWN	Have the same functions as on the external terminal.
	ENTER	The button has the same functions as the button on the external terminal, while the LED underneath the button indicates that the unit is on.
	ESC	Returns to the previous branch.
	PROG	Accesses the menu screens for entering the various sub-branches.

Table 2.3

As you can see in the figure in this paragraph, the Built-in and PGD0 displays have only 6 buttons; the functions of the others are implemented as described below.
The unit can be switched on-off from screen M5 in the main branch, enabled only if a 6-button terminal is connected.
To access the branches of the software, press the PROG button to display the list of the various branches.
To enter these branches, scroll the items using the UP and DOWN buttons until highlighting the desired branch, then confirm by pressing Enter.

Menù

- s-Set point
- i-input/output
- p-user
- a-maintenance
- c-manufacturer
- k-clock
- f-info
- q-history
- m-on-off Unit
- u- unit change

For the correct operation of the PGD0 with 6 buttons, the pLAN address of the pCO* needs to be set to 1 and the pLAN address of the PGD0 to 32. See "Setting the pLAN address" in the pCO* and PGD0 manuals

3. Starting the unit

3.1. Selecting the language for displaying the screens

The application software allows the language of the user interface to be changed at power on. The first screen, after the initial autotest phase, displays the current language, which can be changed by pressing ENTER. If no button is pressed, after a few seconds the main screen M0 is displayed (without changing the language). The language can also be changed any time after.

3.2. First start-up

When you have checked the connections between the cards and terminals, power up the pCO card/s*.
On power-up, the software automatically installs the default values chosen by CAREL for the configuration parameters.
When starting for the first time, the following operation is not required.

3.2.1. Initialising the parameters in the permanent memory

This section tells you how to reset default values to return to the initial conditions.
CAUTION! This procedure irreversibly deletes any programming performed by the user, the main log and the "counters" for the devices.
These are the steps:

1. press the MENU + PROG buttons: the password setting screen is displayed. This screen prevents access to the configuration branch by unauthorised persons;
2. Enter the password (default 1234), and press ENTER to confirm;
3. Move to the last row: "INITIALISATION ->", and press ENTER;
4. Press the UP key. Screen V3 comes up;
5. Press ENTER and UP, the message "PLEASE WAIT" will be displayed for a few seconds.

This operation deletes the permanent memory and enters the default values defined by Carel. The default values differ depending on the type of board used. If some standard values are not correct for the required application, the user can always change them by accessing the screen or from the supervisor, making the unit customised according to the specific application.
All the data set is stored in permanent memory, to prevent it being lost when the unit is not powered. Using the WINLOAD program, the permanent memory can be read and saved to file for subsequent programming. In this way, different configurations can be modified, read and saved for different models of unit using one board.

3.3. Updating the software

The software on the pCO* boards can be programmed or copied in two ways: using the hardware keys or using a computer.

3.3.1. Hardware key

There are two types of hardware keys. One per the pCO^2 family (code PCO201KEY0 1 Mbyte version - PCO202KEY0 2 Mbyte version) and one for the pCO^1 family (code PCO100KEY0).
These are used to make an exact copy of the contents of the pCO*, complete with the values of the parameters, or to copy the contents of the key to the pCO*, thus programming it.
NB. There is no programming key for the pCO^{XS} controller.
For further information, refer to the instruction sheet included in the packaging of the hardware key.

3.3.2. Updating the software by computer

The software resident on all pCO* controllers can be updated using a PC.
For this purpose, CAREL provides the WinLoad32 program and a special kit, code PC485KIT00 (RS232-RS485 converter)
For the installation of the WinLoad32 program, see the web site http://ksa.carel.com.
The pCO* controller can be connected directly to the PC using the serial port used for the pLAN or via the optional RS485 serial port used for the "supervisor" connection.
The pCO controller can be connected to a modem using the optional RS232 serial port and thus to Winload32 via a remote connection.
For further information on how to install and use Winload32, see the on-line help or contact CAREL.

3.4. Basic configuration

According to the board used and the number of inputs per compressor (screen C3), the number of compressors set can vary from 1 to 6, with between 1 and 3 load steps, for a total of 4 outputs per compressor, and between 1 and 16 fan steps. In addition, the compressors and the fans can be configured for PWM speed controllers or inverters. The program checks the type of board that it is working with, and makes the inputs and outputs that can actually be used available.
For the pCO[1] controllers, check that the dipswitches on the board for the configuration of the type of analogue inputs are positioned correctly; for more information, see the pCO[1] manual.

Number of compressors and fans

The first step involves accessing the screen C4 "CONFIGURATION" to set the number of compressors, fans and load steps to be managed.

On the external terminal:

→ ENTER MANUFACTURER PASSWORD 

Go to CONFIGURATION then press 

Use UP and DOWN 

to scroll the screens until reaching C4

The number of compressors to be managed with the suction probe can be set directly by the user (screen C4), who must bear in mind the number of relay outputs available, depending on the model: 5 pCOXS outputs; 8 Small outputs; 13 Medium outputs; 18 Large outputs. The pCO*, depending on the board used, can manage from a minimum of 1 compressor to a maximum of 6, with the same or different capacities.
The number of condenser fans available ranges from 1 to 16.
After having set/modified the number of controlled devices on screen C4 (compressors, fans, load steps), it is recommended to update the configuration parameters for the outputs on screens E0,E1,..,E9, Ea, Eb.

Output configuration

After having accessed screen C4, press 

once to return back one level

Devices
Input positions
OUTPUT POSITIONS → } use 

to place the cursor on OUTPUT POSITIONS and press 

Associate the relays to the devices managed based on the selected configuration (C4). [The system will automatically search for the first free position in the digital outputs; otherwise the user can scroll the list using the UP - DOWN buttons].
The user can decide which relays to use for the various devices (e.g. first a compressor then a load step then a fan and so on), without needing to modify the electrical system and in any case freely deciding upon the use of the outputs.
Once having completed this operation, proceed to the configuration of the digital inputs:
NOTE: for configuration with the Built-in or PGD0 terminal, follow the procedure explained while referring to the corresponding buttons.

Input configuration

To go back one level, press MENU once.

Devices
INPUT POSITIONS → } then 

Output positions

The user can decide which inputs to use for the various safety devices.
Example:
If input 6 is used for the compressor thermal overload, simply go to the screen D0, move to the row "Thermal comp.1 ID:00" and choose number 6 from the possible free inputs.
Note: the software does not allow two devices to be connected to the same input. To reverse two devices, a free input needs to be used (also see input configuration, CONFIGURATION section).
The user can decide if the inputs are normally closed (when an alarm is present the contact is open) or normally open (when an alarm is present the contact is closed) (screen G0). In addition the type of compressor safety devices connected to the inputs can be defined. The possible choices are as follows:

Language selection

The user can set the display language in two ways. The first way it to press ENTER at power on; this function can be disabled by setting the parameter on screen V3.
The second is accessed from the main screen M0, pressing PROG (for the Built-In or PGD0 terminal, press PROG and go to the row "USER: →" and press ENTER), then enter the password (default 0). The P1 screen is displayed; press ENTER until the desired language appears.
The software currently manages six languages (Italian, English, French, German, Spanish and also Russian, but only for the PDG0 terminal).

Unit ON/OFF

There are various ways to activate or deactivate the controller and the management of the various devices with related alarms (in order of priority):

1. From the alarm: the screen Pe can be used to select if a faulty probe alarm turns the unit off or not;
2. From the supervisor: the screen Pe is used to enable the unit to be switched off from the supervisor;
3. From digital input (if configured, C8) in addition to the screen G1, the logic can be selected (NO or NC);
4. From the keypad: if enabled on the screen B1, pressing the ON-OFF button turns the unit on or off. For Built-in or PGD0 terminals, to switch the unit on-off simply go to the main screen M1 and press the UP button, then select whether to switch the unit on or off;
5. From screen B1: the unit can be turned off or on.

3.5. Meaning of the inputs / outputs

As the inputs and outputs of the software are completely configurable, the physical connection of the inputs and outputs changes according to which devices are configured; also see the tables on the different configurations that can be set. You can see the layout of the inputs and outputs in the inputs/outputs branch.

3.5.1. Table of analogue inputs

The tables below describe the type of the probes that can be connected to the inputs and their characteristics.
The suction and discharge probes can also be configured for the inputs B7, B8 on the pCO2 Medium and Large boards (screens Ca-Cb).

Analogue inputs

Input	Description	Type of probes can be connected
B1	Suction pressure / temperature probe	CAREL NTC temperature probes (-50T105°C; R/T 10 kÙ at 25°C), Pressure probe with voltage signal (0 to 1 V), Pressure probe with voltage signal (0 to 10 V), Pressure probes with current signal (0 to 20 mA), Pressure probes with current signal (4 to 20 mA), Pressure probe with voltage signal (0 to 5 Volt, only on pCO[1] - pCO[XS], , pCO[3])
B2	Discharge pressure / temperature probe	
B3	Input configured by software	CAREL NTC temperature probes (-50T100°C; R/T 10 kW at 25°C), Probes with current signal (0…20 mA)
B4	Input configured by software	CAREL NTC temperature probes (-50T100°C; R/T 10 kW at 25°C), Probes with current signal (0…20 mA)
B5	Input configured by software	Used as a digital output
B6	Input configured by software	CAREL NTC temperature probes (-50T100°C; R/T 10 kW at 25°C), Probes with current signal (0…20 mA)
B7	Input configured by software	CAREL NTC temperature probes (-50T100°C; R/T 10 kW at 25°C), Probes with current signal (0…20 mA)
B8	Input configured by software	CAREL NTC temperature probes (-50T100°C; R/T 10 kW at 25°C), Probes with current signal (0…20 mA)
B9	Input configured by software	Used as a digital output
B10	Input configured by software	

Tab. 3.1

When using a pCO1 controller, check that the dipswitches used on the board for the configuration of the type of analogue inputs are positioned correctly; for further information refer to the pCO1 installation manual.

Analog output

Outputs	Description
Y1	Fan controller
Y2	Compressor controller
Y3	PWM fan controller (only on pCO[1]-pCO[XS])
Y4	

Table 3.2

4. pLAN

The software is structured for work with only one board and with a pLAN board connected between. One possibile configuration could be betweeen two standard compressor pack , low and medium temperature, that use pLAN network to get only one teminal shared.
Anther solution could be divide the control between two board, menaging the compressor on the first board and the fan on the second board.
That use is necessary when you haven't enought I/O in only one board, or is necessary install a board for the fan near the battery of capacitor and by pLAN (only tree wire) link to the first board near the compressor.

Devices:

Board 1	Board 2
Probe suction	Probe discharge
Alarm probe suction	Alarm probe discharge
Main pressostat hi and low	Manage prevent discharge
Safety on single compressor	Safety in single fan
Digital output compressor	Digital output fan
Inveter compressor	Inveter fan
Setpoint compressor change from DIN	Setpoint fan change from DIN
Enable from digital input	

For enable this function will be necessary addressing the board and enable the parameter Multiboard (costructor mask C2).
The pLAN network could be compose from any hardware compatible with the software.
An example could be to use a pCO3 large board for the compressor and one pCOxs for the fan.
See the follow PLAN network shema:

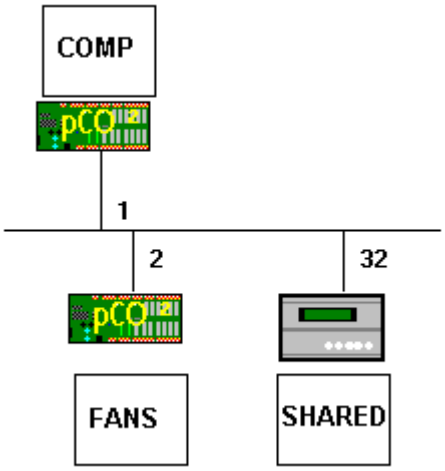


Fig. 4.1

On the main mask will be visible:
Address pLAN of the board
Compressor State
Fan State
Probe suction state
Probe discharge state

Note 1: Every pCO* will have his serial board for the communication with the supervisor.
Note 2: For the pLAN addressing and the hardware connection will see the manual of pCO*.

4.1. Terminal use in pLAN

By only one external terminal shared is possible control all the board in pLAN.
For change unit with 14 keys terminal is necessary push the key INFO. The software will go on mask f0.
If you use a keyboard with 6 keys yuo need to go on the main menù and enter on "change unit".
With the terminal Built_In is not possible see the data of another board.

5. General Settings

5.1. Proportional band

Proportional band control calculates, based on the parameters (SP, DF and the number of devices set), the various points of activation and deactivation of the devices, so as the various starts and stops are positioned proportionally within the differential band. Figure .1 shows the activation of the steps for a system with 4 loads. By setting the parameters listed above, every single step has a differential of DF/No. steps.

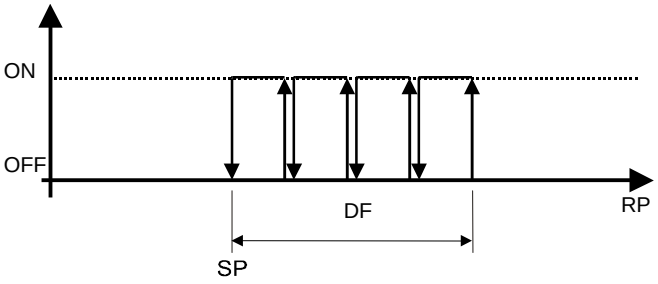


Fig 4.1

Key:

SP	Set point: compressors (S2); fans (S1)
DF	Differential: compressors and fans (S8)
RP	Pressure read

5.1.1 Proportional and Integral control (PI)

To eliminate the steady-state error between the controlled value and the set point, typical of proportional control, a Proportional and Integral strategy (P+I) can be used.
This strategy helps overcome situations of stalemate in which the working point remains steadily at a value other than the set point.
PI control adds the Integral action to Proportional control. This action, when a control error persists, has an increasing effect over time on the overall control action.
The parameter that defines the Integral action is the Integral time. The default value is 600 s (10 min).
The Integral time corresponds to the time taken by the Integral action, **with a constant error**, to balance the Proportional action.
The lower the Integral time, the faster the response of the control.
For further information, refer to classical control theory.
Note: Make sure the Integral time is not set too low, otherwise the control may become unstable.
The following figure highlights the difference between Proportional control and Proportional plus Integral control (with inverter):

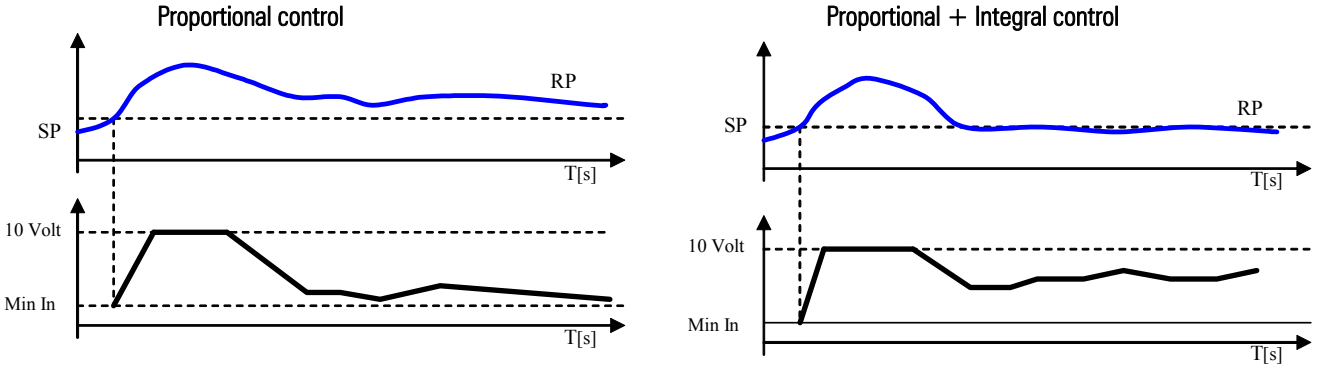


Fig. 5.2

Key:

RP	Pressure read
SP	Setpoint
T	Time
Min In	Minimum controller output value

5.2. Dead zone

This control determines a zone around the setpoint in which no device is activated or deactivated. The purpose of this function is to minimise and stabilise pressure changes in the system. The devices are activated when the measured value exceeds the limit to the right (measured value greater than SP + DZN, see figure 4.3). The number of devices to be activated varies according to the time elapsed outside of the dead zone. The first device will start immediately, while the others will wait the set time between starts.
Similarly, the devices are stopped when the measured value falls below the limit to the left of the dead zone (measured value less than the setpoint), and remains there for a period equal to the time between device stop requests. In this case too, the first device stops immediately, while the others wait the delay time between stops (also see the paragraph on **Times**). The program will switch the devices on according to the start-up logic configured and the availability of the devices

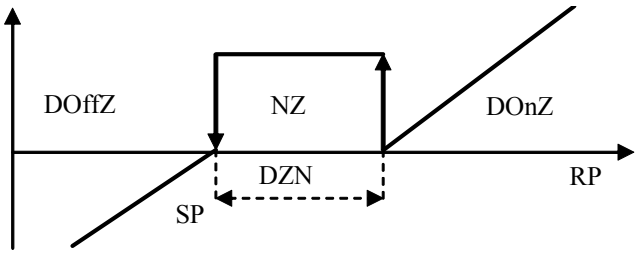


Fig. 4.3

Key:

DOffZ	Device deactivation zone
DOnZ	Device activation zone
NZ	Dead zone
DZN	Dead zone differential
RP	Suction pressure read
SP	Set point

5.1.2 Compressor dead zone with variable times

The time between calls varies, depending on how far the pressure deviates from the dead zone. In particular, the activation / deactivation time of the outputs decreases as the distance from the dead zone increases. To set this function, the following parameters must be configured:

- **Maximum** compressor on time (PL);
- **Minimum** compressor on time (PL);
- Pressure differential within which the time varies (Pn);
- **Maximum** compressor off time (Pm);
- **Minimum** compressor off time (Pm)

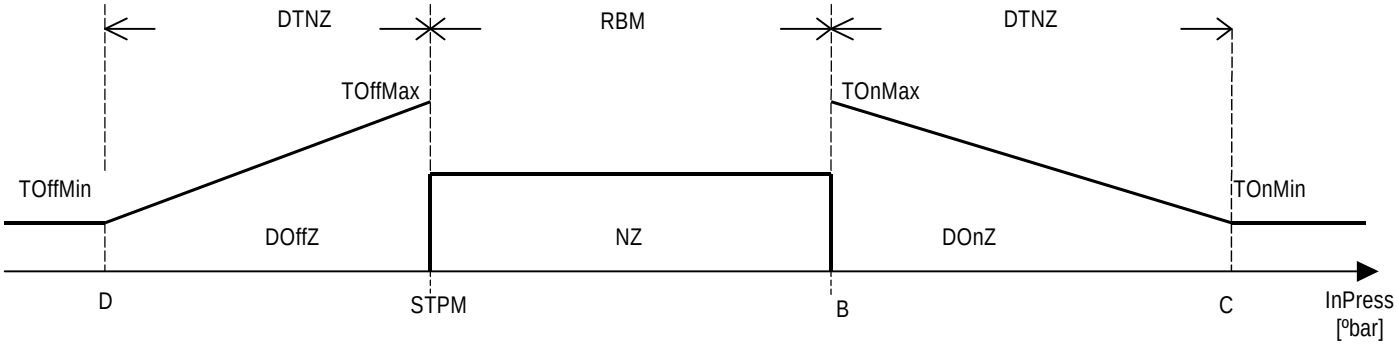


Fig. 4.4

Key:

InPress	Suction pressure
SP	Control set point (S2)
RBM	Control band (S8)
NZ	Dead zone
DOnZ	Device activation zone
DOffZ	Device deactivation zone
DTNZ	Differential within which the time varies
TOnMax	Maximum compressor on time (PL)
TOnMin	Minimum compressor on time (PL)
TOffMax	Maximum compressor off time (Pm)
TOffMin	Minimum compressor off time (Pm)

In the activation phase, the following cases are possible:

1	Pressure equal to point B	→	same call time as TOnMax
2	Pressure between point B and point C	→	call time between TOnMax and TOnMin
3	Pressure greater than or equal to point C	→	same call time as TOnMin

In the deactivation phase, on the other hand, the following cases are possible:

1	Pressure equal to point SP	→	same call time as TOffMax
2	Pressure between point SP and point D	→	call time between TOffMax and TOnMin
3	Pressure less than or equal to point D	→	same call time as TOffMin

N.B. To make the device call time constant in the activation phase, simply set the times TOnMax and TonMin to the same value. Similarly in the deactivation phase, set the times TOFFMax and TOFFMin to the same value.

6. Compressor management

The program can manage compressors with the same capacity or with different capacities. Each compressor is associated with digital inputs used for the safety devices, and outputs used to enable activation and, where necessary, capacity control.

Inputs used
- Suction pressure
- Digital inputs dedicated to the compressor safety devices
- General suction pressure switch
- General discharge pressure switch

Parameters used
- type of inputs configured
- number of compressors
- number of load steps
- enable compressor inverter
- type of rotation
- type of control (dead zone or inverter)
- compressor times
- compressor setpoint
- compressor differential

Outputs used
- compressors
- load steps
- compressor speed control

In the default configuration, dead zone control is activated, settable on screen G5, with FIFO rotation (G5). For a description of dead zone or proportional band operation, see the corresponding paragraph.

6. General settings

6.1.1 Types of compressor safety devices

Manufacturer branch, general parameters, screen C3.
Each compressor can have a maximum of four types of safety devices; these are:

	Type	Description	Delay	Reset
A	Generic	Safety only	Settable (Po)	Settable (G2)
B	Thermal overload + Oil differential	Thermal overload	Settable (Po)	Settable (G2)
		Oil differential	Delayed (P4)	manual
C	Thermal overload + High/low pressure switch	Thermal overload	Settable (Po)	Settable (G2)
		High/low pressure switch	Immediate	Settable (G2)
D	Thermal overload + Oil differential + high/low pressure switch	includes all three previous types of alarm		

Table 5.1

6.1.2 Number of compressor

In on costructor, general parameter, mask C4.
The standard compressor could manage until max 12 compressor.
In particular, if you select a number of compressor greather than six, is possibile comfigure only one safety for compressor and only one output.
If the numer of compressor is grather is not possibile use compressor of different power.

6.1.3 Compressor management without inverter

This can be configured with or without capacity control.
Parameters used for ON-OFF control:
- number of load steps
- number of compressors
- load step times
- compressor times

The compressors are managed by the unit based on a setpoint and a differential, settable on screen S1, and on the value read by the suction probe.
In the default configuration, dead zone control is activated, settable on screen G5, with FIFO rotation (G5), respecting the various compressor times (see the corresponding paragraph).
For a description of dead zone or proportional band operation, see the corresponding paragraph.

6.1.4 Compressor management with inverter

Manufacturer branch, configuration screen C5.
If control is configured with inverter, no capacity control can be used and at least one compressor must be configured.

Parameters used

- enable inverter (C5)
- offset inverter (S6)
- time to reach 100% inverter output (S6)
- minimum inverter opening compressor (G9)
- min time on compressor with inverter (TA)
- min time off compressor off inverte (TA)
- min time on betweeen comressor start with inverter (TB)
- maximum start request time (Pl)
- minimum start request time (Pl)
- maximum stop request time (Pm)
- minimum stop request time (Pm)
- differential pressure within which the time varies (Pn)

Description of Operation:
The compressor inverter can be activated on the screen (C5), if no load steps are configured on screen C4.
A lower limit can be set for the inverter on screen G9.
The compressor under inverter has a min time safety, see the rleative section
The inverter is managed as follows: dead zone control and proportional band control.

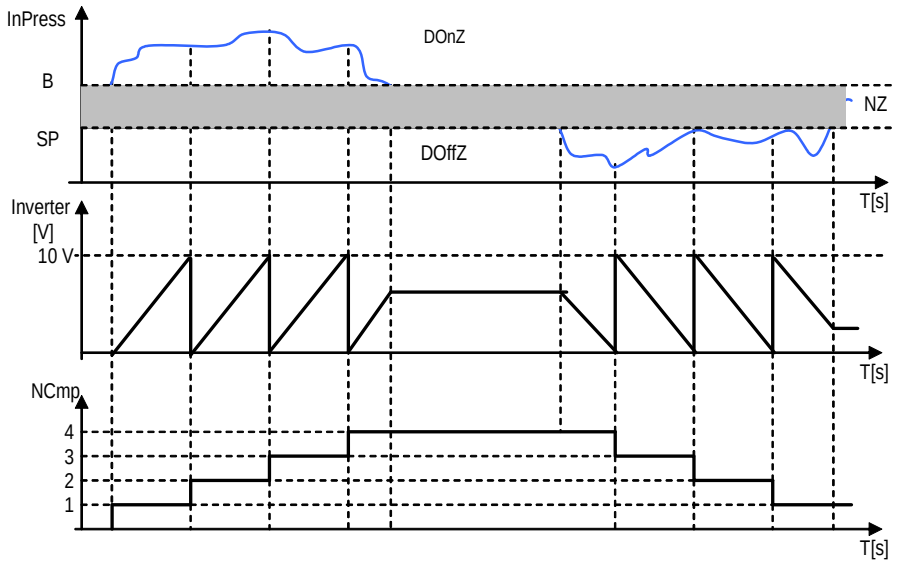
Dead zone control: The inverter is set on the first compressor, which will always be the first on and the last off. This control requires an offset to be set for the control of the inverter, screen S6, the setpoint (SP) and the inverter ramp time. Three zones are defined: DOnZ on zone, NZ dead zone and DOffZ off zone. Wherein the program behaves differently (see figure 5.1).
In the activation zone DOnZ the compressors are started as follows:

- compressor 1, which is managed by the inverter, is activated as soon as there is demand;
- the compressor 1 inverter output is increased;
- if the inverter output reaches 10 volts, a compressor is started, respecting the rotation and the times;
- once the compressor starts, the inverter output immediately returns to the minimum value.
- the compressor 1 inverter output is increased and the cycle restarts;
- while the request remains, all the compressors are started, one after the other.

In the dead zone NZ, the inverter output undergoes no variation, and no compressors are started or stopped.
In the deactivation zone DoffZ the compressors are stopped as follows:

- the inverter output is gradually brought to the minimum value;
- one compressor is stopped, respecting the rotation and the times;
- once the compressor stops, the inverter output immediately returns to the maximum value;
- the compressor 1 inverter output is decreased and the cycle restarts.

If the deactivation request remains, all the compressors are turned off, one after the other. The last one to turn off will be No. 1. The speed the inverter output changes depends on the "inverter ramp time" parameter, screen (S6), setpoint branch.



Key:

InPress	Suction pressure
B	Setpoint + differential
SP	Suction setpoint
DOnZ	Activation zone
DOffZ	Deactivation zone
NZ	Dead zone
T [s]	**Maximum** compressor off time (Pm);
Inverter	Inverter status
NCmp	Number of compressors on

Fig 5.1

6.1.5 Proportional band control

This control requires an offset to be set for the control of the inverter, screen S6, to be added to the setpoint SP and an RBI inverter ramp differential, screen S9. If the value read by the suction probe is less than or equal to the AC offset point + suction setpoint, the inverter output will be 0. The inverter will have a value proportional to the value of the suction probe between point A and point C (setpoint + differential). If the value measured by the suction probe is greater than or equal to point C, the inverter will be at the maximum of its capacity. The control is not associated with any compressors and can work without compressors being configured.

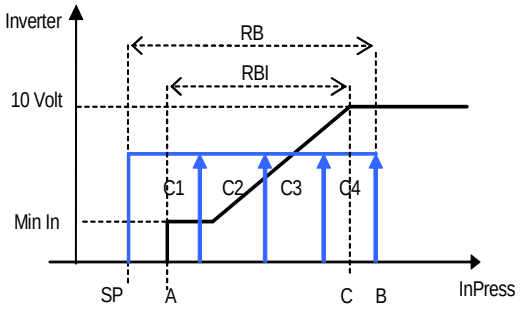


Fig 5.2

Key:

RB	Compressor differential
RBI	Inverter differential
SP	Suction setpoint
A	Suction setpoint + inverter offset
C	A + inverter differential
B	Suction setpoint + compressor differential
Min In	Minimum value of the inverter control output
InPress	Suction pressure

6.1.6 Capacity control parameters

Controlling the capacity of a compressor means distributing the load or capacity into a series of steps. This is not valid for single cylinder compressors. On the other hand, for multi-cylinder compressors, applying the load steps distributes the load within the same compressor, according to requirements. This is used to reduce the number of compressor starts, optimising the operation and life of the devices.

Number of load steps – Manufacturer branch, configuration screen C4.

One, two or three load steps can be selected, with a maximum of 4 relays per compressor. This parameter is displayed only if there is at least one free output per configured compressor, and if the "Compressor Inverter" functions have not been enabled at the same time.

Capacity controls logic – Manufacturer branch, general parameters, screen G8.

If the load steps are sued, this parameter selects the operating logic of the outputs dedicated to the load steps. Normally energised (NC, Copeland logic) or normally de-energised (NO, Feeders logic).

Manufacturer branch, general parameters, screen G7.

If the parameter is set for **CppCppCpp** mode, the software gives priority to the complete start of the individual compressor; while if the parameter is set for **CCCppppppp** start mode, the software will first switch on all the compressors, and then control the load steps. Otherwise if the parameter is set for **pCppC FULL,** refer to: phase-compressor stop, from starting at compressor not in full capacity (100%)".

Compressor stop mode with load steps -

Manufacturer branch, general parameters, screen G7.

If the parameter is set in **pppppppCCC** mode during the deactivation phase of the compressors, first all the load steps are deactivated and then the corresponding compressors. This procedure is useful to limit the number of stops and starts of the compressors, so as to extend the life of the devices.

If the parameter is set in **ppCppCppC** mode when the compressors are being stopped, priority goes to the complete stop of the individual compressor, so as to more frequently alternate which compressors are started (obviously only with FIFO rotation).

6.1.7 Compressor rotation

Manufacturer branch, general parameters, screen G5.

The rotation of the compressors balances the number of operating hours and starts of the compressors.

Rotation occurs only among the compressors and not among the capacity controls.

The rotation function automatically excludes any compressors with active alarms or waiting for times.

If a compressor is stopped due to an alarm or disabling signal, another will be immediately started so as to provide the required capacity.

Three different types of rotation can be set:

LIFO rotation

The first compressor to start will be the last to stop.

- Power-up: C1,C2,C3,C4,C5,C6,...,C8.
- Power-down: C8,C7,C6,C5,C4,C3,...,C1.

FIFO rotation

The first compressor to start will be the first to stop.

This behaviour may lead, at the initial stage, to considerable differences in the operating hours of the compressors, however, the hours are very similar to each other in steady state.

- Power-up: C1,C2,C3,C4,C5,....C8
- Power-down: C1,C2,C3,C4,C5,.....C8.

Timed rotation

The compressor with the lowest number of operating hours will be started. Vice-versa when stopping, that is, the compressor with the highest number operating hours is stopped.

6.1.8 Type of proportional compressor control

Manufacturer branch, general parameters, screen G6.
Parameter visible only if the proportional band is enabled.
Control may be proportional or proportional + integral. See the paragraph on Proportional and Integral control (PI) 4.1.1.

6.1.9 Number of compressors forced on with probe 1 fault

Manufacturer branch, general parameters, screen Gb.
In the event of a suction probe fault or not connected alarm, this parameter indicates the number of compressors forced on, so as to ensure minimum cooling/operation of the installation.

6.2 Compressors with different capacities

At times it is useful to have different capacity compressors in the same installation.
These allow more load steps and therefore finer control. Screen Ci is used to set the rotation of different capacities. Once the capacity of the individual compressors has been defined (screens De and Df), the software will calculate the maximum capacity. Based on the requirements of the installation and the compressors available (without alarms or timers), the software will calculate the most suitable combination to satisfy the requirement. Whenever the requirement changes, the software recalculates the most suitable combination. The combination will always be greater than or equal to the requirement. Currently, the software does not manage compressors with different capacities, with capacity control or inverters. If two compressors have the same capacity, the compressor with the lower index will always be the first to start.

6.2.1 Proportional band control with different capacity compressors

Based on the pressure, the setpoint and the differential, the software will proportionally calculate the capacity required to bring the pressure back near the setpoint.
At the setpoint + differential the requirement will be at the maximum value, while it will be null for pressure values around or less than the setpoint.

$$Capacity\_required = \frac{Max\_Capacity \times (Setpoint - press)}{Differential}$$

6.2.2 Dead zone control with different capacity compressors

The software will calculate the maximum number of combinations possible with the compressors available.
At certain intervals of time (see the paragraph Compressor dead zone with variable times), the software will call a sequence with a higher capacity.
In the deactivation phase, the opposite will occur, while in dead zone no compressors will be started or stopped.
An increase in the requirement will correspond to a different combination.

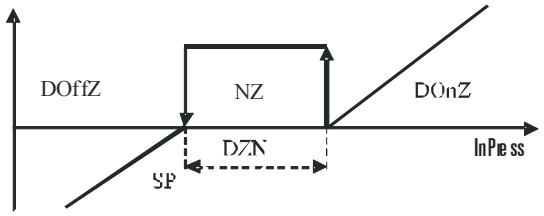


Fig 5.3

Key:

DOffZ	Device deactivation zone
DOnZ	Device activation zone
NZ	Dead zone
DZN	Dead zone differential
InPress	Suction pressure read
SP	Set point: compressors (S2); fans (S1)

6.2.3 Example of compressors with different capacities

The following example looks at an installation featuring 3 compressors with different capacities, using proportional band control. As can be seen, there are 8 possible combinations available.

Set point 1,0 Bar
Differential 2,0 bar

Pressure [bar]	Requirement [kW]	Comp1 [5 kW]	Comp2 [7 kW]	Comp3 [15 kW]	Total active capacity [kW]
1.1	1.35	X			5
1.5	6.7		X		7
1.8	10.8	X	X		12
2	13.5			X	15
2.1	14.85			X	15
2.4	18.9	X		X	20
2.5	20.25		X	X	22
3	27	X	X	X	27

Table 6.2

6.2.4 Enable compressors from the screen

Maintenance branch, screen BG.
A compressor can be temporarily disabled from the control sequence.
This function is very useful when needing to perform maintenance on an individual compressor.
The alarms of the disabled compressor will also be disabled.

6.3 Compressor timers

The following is a list of all the time parameters used for compressor management.

Maximum start request time (dead zone) -
User branch, screen (PL).
In the activation zone DonZ, the call time decreases when moving away from the dead zone; in this way, the compressor calls are more frequent and the pressure returns more quickly into the dead zone. Near the point b (setpoint + differential) the time will be equal to the maximum on time TOnMax .

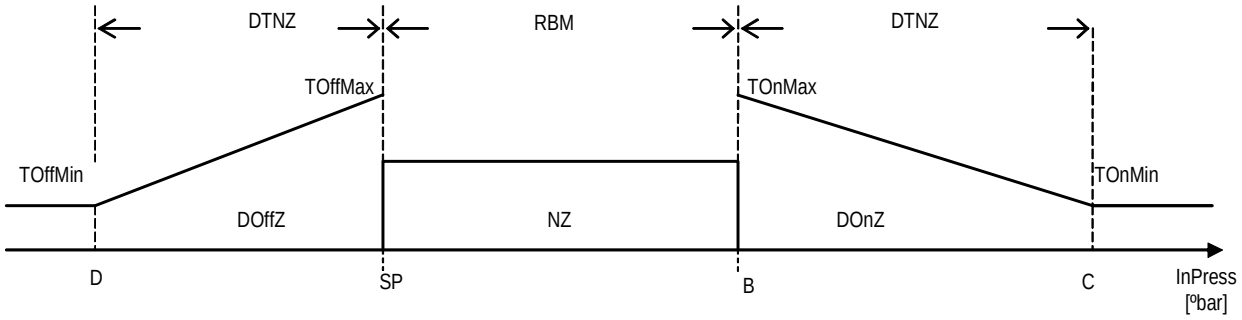


Fig. 5.4

Minimum start request time (dead zone) -
User branch, screen (PL).
The compressor call time equals the minimum start request time TOnMin if the pressure InPress exceeds the threshold point C given by the setpoint SP + differential RBM + differential within which the time varies DTNZ

Maximum stop request time (dead zone) -
User branch, screen (PL).
Near the setpoint SP, the compressor stop request time will be equal to the maximum off time TOffMax .

Minimum stop request time (dead zone) -
User branch, screen (PL).
The compressor stop time equals the minimum stop request time TOffMin if the pressure InPress falls below the threshold given by the setpoint SP minus differential within which the time varies DTNZ

Time between stop requests with HP prevent active -
Manufacturer branch, general parameters, screen T1.
Stop delay between one compressor and the next, if the high pressure prevention (prevent) function is active.
This applies both in the dead zone and in the proportional band.

Minimum compressor ON time. –
Manufacturer branch, general parameters, screen T2
Sets the minimum time the compressors stay on, that is, once activated, must remain on for the time set by this parameter.

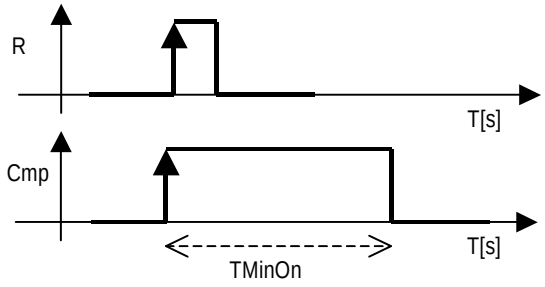


Fig. 5.5

Key:

R	Compressor call
Cmp	Compressor
TMinOn	Minimum ON time
T	**Maximum** compressor off time (Pm);

Time min ON compressor under inverter. - Branch constructor, timing mask "TA".
Determine min time ON of compressor 1 in the case of inverter configuration , so, one time enabled , will stay ON for the min time setting
Time min OFF compressor under inverter. Branch constructor, timing mask "TA".
Set the min OFF time of compressor 1 in the case of configuration inverter, so , when you stop, the system don't restart if the time from last OFF isn't passed

Minimum compressor OFF time - Manufacturer branch, general parameters, screen T2
Sets the minimum time the compressors stay off. The devices are not started again if the minimum time selected has not elapsed since the last stop.

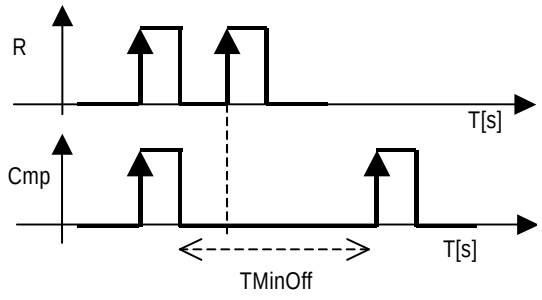


Fig. 5.6

Key:

R	Compressor call
Cmp	Compressor
TMinOff	Minimum OFF time
T	**Maximum** compressor off time (Pm);

Minimum time between starts of different compressors (proportional band) -
Manufacturer branch, general parameters, screen T3.
This represents the minimum time that must elapse between when one device starts and the next. This parameter allows simultaneous starts to be avoided

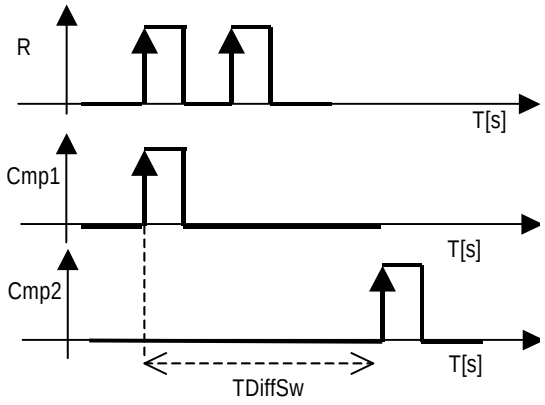


Fig. 5.7

Key:

R	Compressor call
Cmp1	Compressor 1:
Cmp2	Compressor 2:
TDiffSw	Minimum time between starts of different compressors
T	**Maximum** compressor off time (Pm);

Minimum time between power ups of same compressor -
Manufacturer branch, general parameters, screen T4
Sets the minimum time that must elapse between two starts of the same device.
This parameter limits the number of starts per hour. If, for example, the maximum allowable number of starts per hour is 10, to guarantee this limit simply set a value of 360 seconds.

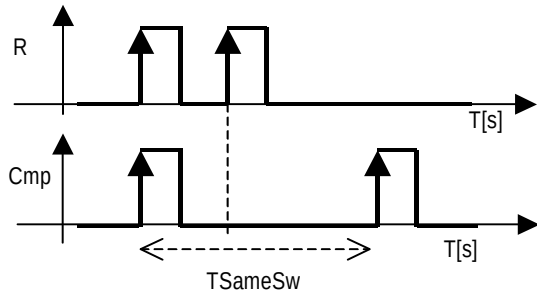


Fig. 5.8

Key:

R	Compressor call
Cmp	Compressor
TSameSw	Minimum time between power ups of same compressor
T	**Maximum** compressor off time (Pm);

Time min between same compressor under inverter - Branch costructor, time mask "TB".
Determine the minimum time that elapse between two start of the same compressor under inverter.
Allow of limit the number of start-up every hour.

Minimum time between load step activation for the same compressor -
Manufacturer branch, general parameters, screen T5.
The parameter is present only if load steps have been selected, screen C4.
This is the minimum time that must elapse between the activation of two load steps, or alternatively between when the compressor starts and the activation of capacity control. It prevents the compressor from starting at full capacity.

7. Fan management

Employed Inputs:
- Discharge pressure probe
- Digital inputs dedicated to the fan safety devices
- General discharge pressure switch

Control parameters used:
- Number of fans
- Fan setpoint
- Fan differential
- Minimum fan setpoint limit
- Maximum fan setpoint
- Enable prevent HP
- Fan time settings
- Type of rotation
- Type of control
- Enable fan inverter
- Fan inverter offset
- Fan inverter differential
- Minimum inverter output
- Inverter speed up

Outputs used
- Condenser fans
- Condensation fans speed controller

7.1 General settings

7.1.1 Types of fan safety devices

Manufacturer branch, device configuration parameters, screen CK.
There are two types of safety devices for the fans
- A thermal overload for each fan step. This has immediate activation and manual reset, and only affects the specific fan
- One main fan thermal overload. This has immediate activation and manual reset, and is display only. It is very useful if there are few inputs available, or alternatively when using inverter control only.

7.1.2 Fan management without inverter

The operation of the fans depends on the operation of the compressors (if at least 1 is configured) and the value read by the discharge temperature or pressure probes. In the default configuration, proportional band control is activated, which can be set on the screen (Gc) with FIFO rotation (Gc), respecting the various time settings.

7.1.3 Fan management with inverter

Manufacturer branch, configuration screen C5
Parameters used:
- Enable fan inverter
- Fan inverter offset
- Fan inverter differential
- Minimum inverter output
- Inverter speed up

The fan inverter can be set on screen C5.
A minimum value can be set for the inverter (manufacturer branch, general parameters screen G9).
To assist the start of the inverter, a time can be set, expressed in seconds, during which the inverter is operated at 100%. This parameter is called Speed Up (manufacturer branch, times, screen T8).

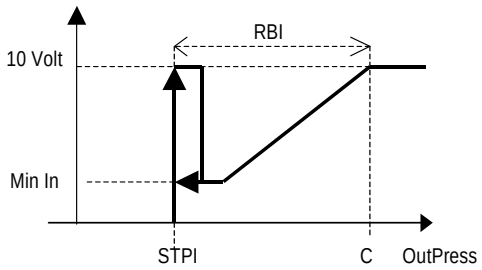


Fig. 6.1

Key:

DOffZ	Device deactivation zone
STPI	Fan inverter setpoint
RBI	Inverter differential
Min In	Minimum inverter output
C	Fan setpoint + differential
OutPress	Supply press.:

The management of the inverter varies depending on the type of control performed: *dead zone control or proportional band control.*

Dead zone control

This control requires the setting of a deviation S4 from the setpoint, and the inverter activation time, in screen (S7), setpoint branch.
The inverter is set on the first fan, which will always be the first to start and the last to stop.
Three zones are defined: activation zone DOnZ, dead zone NZ and deactivation zone DOffZ, in which the program behaves differently (see the figure).
In the activation zone DOnZ, the fans are started as follows:

- Fan 1, which is managed by the inverter, is activated as soon as there is demand;
- The inverter output is increased;
- if the inverter output reaches 10 volts, a fan is started, respecting the rotation and the times;
- If the request continues, all the other fans are started, respecting the rotation and the times.

In the dead zone NZ, the inverter output does not undergo any variation, and no fans are started or stopped.
In the deactivation zone DOffZ, the fans are stopped as follows:

- The inverter output is gradually brought to the minimum value;
- If the stop request continues, all the fans are stopped, respecting the rotation and the times.

The last fan to switch off will be fan 1.

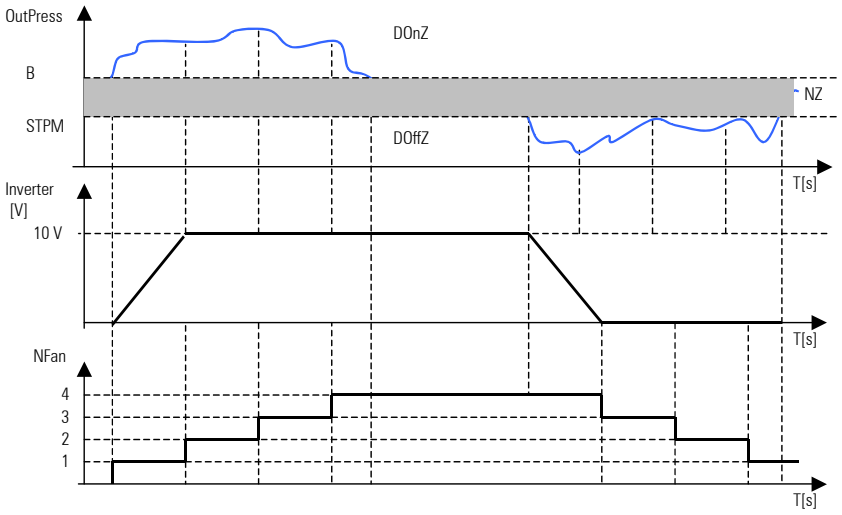


Fig. 6.2

Key:

OutPress	Supply press.:
B	Setpoint + differential
STPM	Supply setpoint
DOnZ	Activation zone
DOffZ	Deactivation zone
NZ	Dead zone
T [s]	**Maximum** compressor off time (Pm);
Inverter	Inverter status
NFan	Number of fans on

Proportional band control

The control requires the setting of a deviation S4 from the setpoint, found on the setpoint branch screen (S7), and of an inverter differential RBI on screen S9. If the value measured by the discharge probe is less than or equal to point A (setpoint value + inverter offset) of Fig. 6.3, the inverter output will be 0. Between point A and point C (setpoint + differential), the value of the inverter output will be proportional to the value read by the discharge probe, and in any case not less than the minimum inverter output MinIn. If the value measured by the discharge probe is greater than or equal to point C, the inverter will be at the maximum of its capacity. The control is therefore not associated with any fan and can work even without fans being configured. For the management of the fan steps, see paragraph "

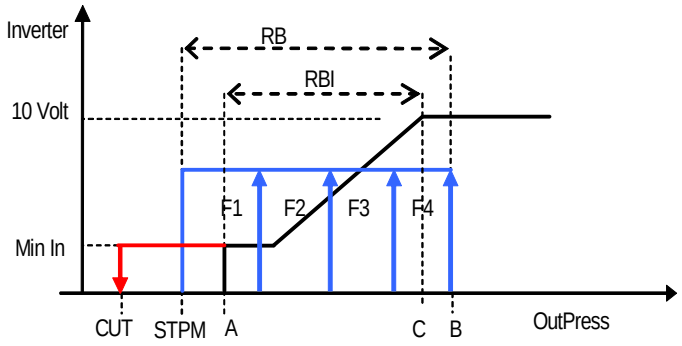


Fig. 6.3

Key:

RB	Fan differential
RBI	Inverter differential
CUT	CutOFF inverter fan
STPM	Discharge setpoint
A	Discharge setpoint + Offset
C	Inverter setpoint + inverter differential
B	Discharge setpoint + Fan differential
Min In	Minimum value of the inverter control output
OutPress	Supply press.:

7.1.4 Fan rotation -

Manufacturer branch, general parameters, screen Gc
The rotation of the fans is aimed at balancing the number of operating hours and starts of the different fans.
Rotation automatically excludes any fans with active alarms.
If a fan is stopped due to an alarm, another will be immediately started so as to provide the required capacity.
Two different types of rotation can be set: *no rotation or FIFO rotation*.

No Rotation
The first fan to start will be the last to stop.
- Power-up: Fan1, Fan2, Fan3, Fan4.
- Power-down: Fan4, Fan3, Fan2, Fan1.

FIFO rotation
The first fan that to start will be the first to stop.
This behaviour may cause, in the initial phases of operation, large differences between the operating hours of the various fans, however over time the values will tend to equal out..
- Power-up: Fan1, Fan2, Fan3, Fan4.
- Power-down: Fan1, Fan2, Fan3, Fan4.

7.1.5 Various fan parameters
Fan control
Manufacturer branch, general parameters, screen Gc
It can be either the dead zone (see paragraph 4.2 Dead Zone) or proportional band (see paragraph 4.1 Proportional Band) control).
Proportional plus integral control
Manufacturer branch, general parameters, screen G6.
Parameter visible only if the proportional band is enabled.
Both Proportional control only or Proportional + Integral is available, see the paragraph Proportional **and Integral control (PI)**
CutOFF
Branch constructor, time mask T8.
Parameter visible only if enable invertef fan.
For a stable of the unit controlled is necessary set a offset that delay the off of the inverter. Can be visualize in bar or in degree (°C)
can be used in a proportional regulation plus integral

Number of fans forced on with probe 2 fault
Manufacturer branch, general parameters, screen Gd
In the event of a discharge probe fault or not connected alarm, this parameter indicates how many fans are forced on.

7.2 Fan time settings
Time between start requests (dead zone)
Manufacturer branch, times, screen T6.
Displayed only if the fan dead zone is enabled.
Represents the time between different fan start requests in the activation zone DonZ.

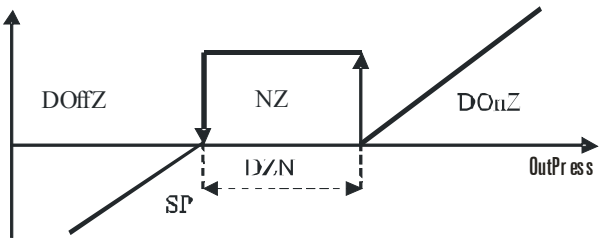


Fig. 6.4

Key:

DOffZ	Device deactivation zone
NZ	Dead zone
DOnZ	Device activation zone
DZN	Dead zone differential
OutPress	Suction pressure read
SP	Fan setpoint

Time between stop requests (dead zone)
Manufacturer branch, times, screen T6.
Displayed only if the fan dead zone is enabled
Represents the time between required stops different fans in the deactivation zone DOffZ

Minimum time between starts of different fans
Manufacturer branch, times, screen T7.
This represents the minimum time that must elapse between when one device starts and the next. This parameter is used to avoid starts that are too close together. It is useful with proportional band fan control.

Speed Up time
Manufacturer branch, times, screen T8.
To assist the start of the inverter, a time can be set, expressed in seconds, during which the inverter is operated at 100%.

7.3 PWM-PPM management

On the pCO1-pCOxs boards, the analogue output Y3 can be used as a PWM or PPM output. Device configurations, screen C5.
This output is used to drive phase control modules that directly control the fan speed.
The output, depending on how it is configured, can generate a pulse width modulation (PWM) or pulse position modulation (PPM) signal.
Two graphs that illustrate the two modes are shown in figure 6.5.
In the first graph, it can be seen that the request is 80% of the maximum value, while in the second it is 50%.

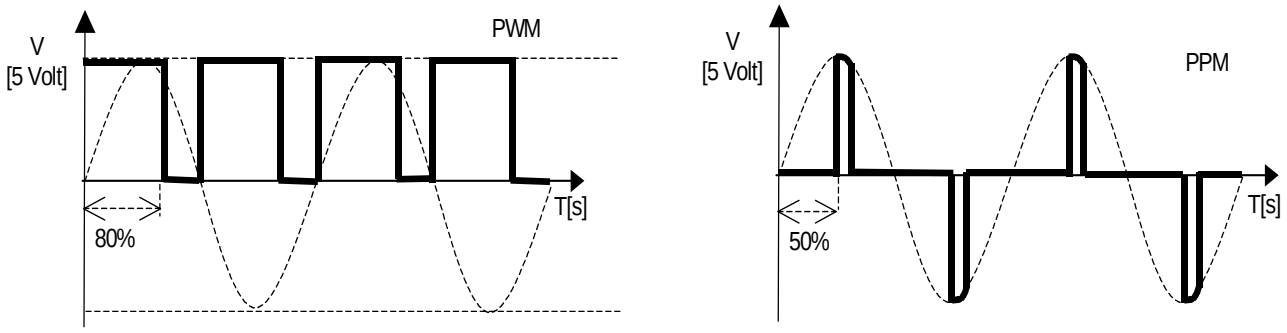


Fig. 6.5

Note: To configure output Y3 as PWM, simply set the pulse width to zero (screen Ga); while to set it for PPM mode, the recommended pulse width value is 2.5 ms.

The PWM signal controls, for example, the CAREL FCS* series, CONVONOFF, CONV0/10A0 modules.
The PPM signal controls, for example, the CAREL MCHRT*** series modules.

IMPORTANT: the power supply to the pCO1- pCOxs (G and G0) and the MCHRTF*** board must be in phase. If, for example, the power supply to the pCO*-module system is three-phase, make sure that the primary of the power transformer on the pCO1- pCOxs board is connected to the same phase that is connected to terminals N and L on the speed control board; consequently, do not use 380 Vac / 24 Vac transformers to supply the controller if phase and neutral are used to directly supply the speed control boards. Connect the earth terminal (where envisaged) to the earth on the electrical panel.

ON/OFF fan management (code CONVONOFF0)

The CONVONOFF0 modules convert the PWM signal sent from terminal Y3 on the pCO1- pCO^{XS} to an ON/OFF signal, so Y3 can be used to control a relay. Switching power 10A at 250 Vac in AC1 (1/3 HP inductive)

PWM to 0 to 10 Vdc (or 4 to 20 mA) conversion board for fans (code CONV0/10A0)

The CONV0/10A0 modules convert the PWM signal sent from terminal Y3 on the pCO1- pCO^{XS} to a standard 0 to 10 Vdc signal
(or 4 to 20 mA signal).

Calculation of the minimum and maximum fan speed -

Manufacturer branch, general parameters, screen Ga.
This procedure should only be performed if fan speed control boards are used (code MCHRTF*0*0). It must be stressed that if the ON/OFF modules (code CONVONOFF0) or the PWM - 0 to 10 V converters (code CONV0/10A0) are used, the "Min. triac" parameter should be set to zero, and the "Max. triac" parameter to the maximum value.
Given the range of different motors existing on the market, the voltages supplied by the electronic board that correspond to the minimum and maximum speed can be set.
For this purpose (and if the default values are not suitable), proceed as follows:

1. Set the fan inverter to always On. Force inverter parameter, screen Br, maintenance branch.
2. Set "Max triac" and "Min triac" to zero.
3. Increase "Max triac" until the fan operates at a speed considered sufficient (make sure that, after having stopped it, it starts rotating if left free);
4. "Copy" this value to the "Min triac" parameter; this sets the voltage corresponding to the minimum speed;
5. Connect a voltmeter (set for 250 V, AC) between the two "L" terminals (the two external contacts).
6. Increase "Max triac" until the voltage stabilises at around 2 Vac (inductive motors) or 1.6, 1.7 Vac (capacitive motors);
7. Once the optimum value is found, it should be seen that even when increasing "Max triac", the voltage no longer decreases.
8. Do not increase "Max triac" any further, so as to avoid damaging the motor;
9. Set the force inverter parameter back to AUTO.

The operation is now complete.

8. Various settings

8.1 Fan time bands

Clock branch, screens K1, K2 and K3.
If the system is fitted with a clock (optional on the pCO[1] and pCO[XS], standard on the pCO[2]), the time bands function can be enabled.
Up to four different time bands, with their respective four different Offsets, to be added to the compressor setpoint can be set.
Based on the current time and the time band set, the software will use the corresponding offset setpoint.
Outside of the time bands, the software will use the main setpoint (S2).
The final setpoint will in any case always be influenced by the offset from digital input and/or the presence of the electronic valve.

For example, assuming time bands with the following values, the results below can be obtained:

Hours/Minutes	Offset	Set point	Result
06:00	- 0,2	1.0 bar	from 06:00 to 07:00 the setpoint will be 0.8 bar
07:00	-0,1	1.0 bar	from 07:00 to 10:00 the setpoint will be 0.9 bar
10:00	+0.0	1.0 bar	from 10:00:00 to 17:00:00 the setpoint will be 1.0
17:00	+0,1	1.0 bar	from 17:00:00 to 06:00:00 the setpoint will be 1.1

Table 8.1

In the case of a modulating setpoint, the offsets regarding the different bands will alter the setpoint limits.

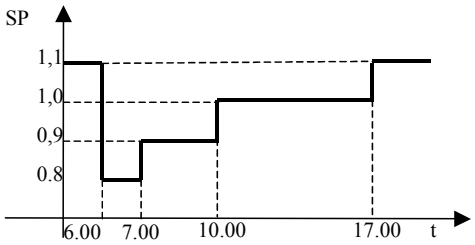


Fig. 7.1

Key:
SP Set point
t time

8.2 Fan time bands

Clock branch, screens K6 e K7
If the system has a clock (option on pCO[1] and pCO[XS], standard on pCO[2] and pCO[3]), you can enable the function time bands on fan.
Sometimes is necessary reduce the power of the fan for limit the noise. The bands of fan allow to increment the set of fan reducing the number of start-up.
Looking the band and the time, the software will calcolate the offset to sum at the fan set.
Out the band selected the software will use the main set point (Sd).
The final set point will depend from the digital input offset and/or from the electronic valve.

Esempio:

START TIME	END TIME	OFFSET	SET POINT	RESULT
20:00	07:00	1,0 bar	16,0 bar	From 20:00 to 07:00 the set is 17.0 bar
				From 07:00 to 20:00 the set is 16.0 bar

Tab.8.2

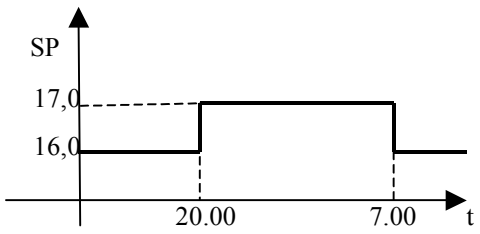


Fig. 8.1

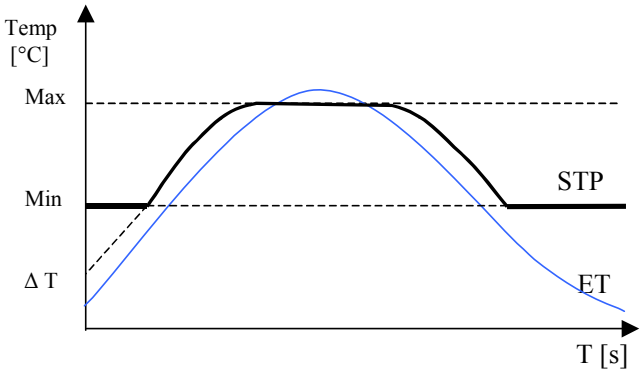
Legend:
SP Setpoint
t time

In modulating setpoint case the offset relative to different time bands will modify the limit of setpoint.

8.3 Modulating condensation setpoint

User branch, screen Pt. In order to cut power costs, it is useful to have a condensation temperature as low as possible. The condensation setpoint can be tied to the external temperature value plus a settable offset Dh. You have to enable the external temperature (probe B6) and set several parameters in order to get this function:

- Modulating setpoint PT enabling,
- Offset to be added to the external temperature, expressed in Celsius Pt,
- Lower limit of the condensation setpoint Sd,
- Upper limit of the condensation setpoint Sd,
- Setpoint unit of measure. Parameter "Pq" [°C] or [bar].



Key:

ET	Outside temperature
STP	Fan setpoint
Max	Maximum allowable setpoint
Min	Minimum allowable setpoint
AT	Offset to be added to the external temperature

Fig. 7.2

By enabling the modulating setpoint, fan inverter operation will be associated with the external temperature.

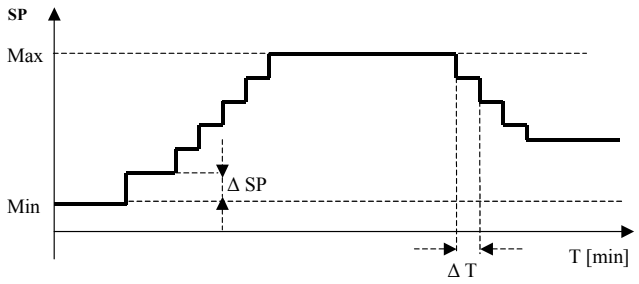
8.4 Modulating evaporation setpoint

User branch, screen Pr.

Sometimes in a supermarket it can be useful to provide the management of the compressor pack information about the status of the entire system. In fact, the system terminals (counters, cold rooms, display cases) could even operate with a higher evaporation temperature in certain conditions, thus cutting operating costs. An external device will calculate whether, and by how much, the evaporation setpoint of the pack is to change, and consequently the evaporation temperature. This device will communicate the calculated setpoint to the pCO through the supervisor line.

The pCO will have safety devices in order to prevent possible errors:

- Enabling the modulating evaporation setpoint Pr,
- Minimum setpoint (it will have the same values as the classic setpoint),
- Maximum setpoint,
- Setpoint unit of measure. Parameter "Pq" [°C] or [bar],
- Maximum allowable change of the setpoint "Pr",
- Recovery time "Pq".



Key:

SP	Evaporation setpoint
T	Time
Max	Minimum setpoint value
Min	Minimum setpoint value
AT	Recovery time
ASP	Maximum allowed change to the setpoint

Fig. 7.3

Every 5 minutes the supervisor can increase the setpoint by a variable offset no higher than the maximum allowable change "Pr", and however no higher than the maximum allowable setpoint "S2". The evaporation setpoint will start from the minimum setpoint "S2" every time the card is turned on. If the supervisor goes offline for more than 20 minutes (fixed time), the setpoint starts to gradually drop (recovery time "Pq") until it reaches the minimum setpoint.

8.5 Setpoint change from supervisor

Constructor branch device configuration mask C9

The parameter mean if in the system is avaible of the double tecnology: mechanical valve and electronic valve. If in the system are avaible electronic valve and mechanical valve , from supervisor (variable 168) it is possible to decide how work the system with a different setpoint based on the type of valve used worky.Typically using electronic valve the system can work with a different pression of evapotation and condensation with a great energy saving, This function can be used for changing the set from supervisor without working directly on the setpoint. The offset can be find on the branch set point on the mask "Sb and Sc"

8.6 Change setpoint from digital input

Constructor branch device configuration mask Ck.
Enabling this function is possible, closing the digital input, adding a offset at the setpoint of compressor and/or the fan (mask "Sb,Sc").
This function is necessary when you want change the working point.
Can work with the time zone and the setpoint modulation.

8.7 Manual device operation

Maintenance branch, screens Bh, Bi, Bj, Bk, Bn, Bm, Bp, Br
The individual devices can be activated manually, ignoring the times and the rotation, and independently from the temperature control functions. The only support provided in manual operation is the alarm management function.
The manual activation of the speed controllers sets the corresponding outputs to the maximum value.
When even just one manual procedure is enabled on the main screen M0, the message ">>Manual oper.<<" is displayed.
If the card turns off and turns back on, manual activation ends.
Warning: Use this function with care! Operating the devices manually may cause damage to the installation!

8.8 Auxiliary pump management

Manufacturer branch, device configuration, screen C6.
In some systems, a liquid level pump needs to be operated when the installation is on. The operation of the pump is therefore related solely to the unit ON status. This digital output can also be used as a system on signal.

- Always ON
- With unit ON
- With compressor ON
- With fan ON

If you set two pumps is possible to set a rotation pump by the time or the start-up using the parameter on the mask Gj.
Some example of use can be: signal life of PCO, pump liquid level. You can set the delay on OFF system and the time of rotation between the devices. Note: There are no safety protection for this device.

8.9 Type of refrigerant

Manufacturer branch, device configuration, screen Ch.
By selecting the type of refrigerant used in the installation, the software will automatically calculate the conversion of the pressure to degrees centigrade and degrees Fahrenheit. The following table lists the types of gas managed:

Refrigerant	Complete name
R22	Chlorodifluoromethane
R134a	Tetrafluoroethane
R290	Propane
R600	Butane
R600a	2-methyl propane (isobutane)
R717	Ammonia (NH3)
R744	Carbon dioxide (CO2)
R404A, R407C, R410A, R507C	Mixes of gases

Table 7.2

The same screen is used to select whether to convert the dew point or the boiling point.

8.10 Auxiliary probe management

Manufacturer branch, device configuration screen Ce, input configuration Dh, Di.
The software can manage up to six auxiliary probes. Their positions can be set and they depend on the free inputs and the type of card used.
They are:

Sensor:	pCO2 small	pCO2 medium-large	pCO1 small	pCO1 medium	pCOxs
Room temperature	B3	B3, B6, B7, B8	B3, B4	B3, B4, B7, B8	B3, B4
Outside temperature					
General temperature					
Suction temp.					
Gas leak probe	B3	B3, B6, B7, B8	B3, B4	B3, B4	---
Electrical absorption					---

Table 8.3

The gas leak and electrical absorption probes are active (4-20mA) and their limits can be set on the screens Cf, Cg.
If the general probe is configured, its name can be personalised on the screen Ce.
The suction temperature probe is used to calculate the superheat and generate an alarm, if necessary.
Once the probes are enabled, the value read can be seen in the I/O branch.

8.11 Energy consumption control function

Function not available on the pCOxs.
To monitor and manage energy consumption, the power consumption sensor must be enabled on screen Ce.
A CT must be connected to input B3 to measure the instant power. Go to screen Cf to set the limits.
The software shows, on screens Ad, Ae, Af, Ag, Ah:

- The current daily consumption in kWh;
- The current monthly consumption in MWh;
- The current annual consumption in MWh;
- The consumption of the previous day in kWh;
- The consumption of the previous month in MWh;
- The consumption of the previous year in MWh;
- The current consumption in the band set in the user branch, screen (Ph);
- The total consumption in MWh.

The user can enter two start and end count times, and the C-day consumption (corresponding to the period between the start and end) and the C-night consumption (period between end and start) can then be displayed.
For example, if the start time is set to 07.00 and the end time to 20.00, the C-day consumption is the band between 07.00 and 20.00.
At 20.00 the C-night count starts and the C-day value is saved.
The day next, at the start time, the daytime count starts, C-night is saved, C-day is reset and the C-day consumption starts counting again. Likewise for C-night. The consumption is displayed for the current band and for the same band on the previous day.

8.12 Calculate estimated efficiency function

Function available only if the clock card is fitted.
Manufacturer branch, device configuration, screen Cj.
The application can calculate an estimate of the efficiency; to do this, the user needs to set four parameters:
- TeVirt: Evaporation temperature of the gas in the compressor pack (screen Pi);
- DEff Te: Change in efficiency of the compressor pack per °C of evaporation temperature (it is recommended to leave the default of 3%, screen Pi);
- TcVirt: Condensing temperature of the gas in the compressor pack (screen Pj);
- DEff Tc: Change in efficiency of the compressor pack per °C of condensing temperature (it is recommended to leave the default of 2% screen Pj).

The software automatically calculates the estimate of the increase in efficiency (screen A7).

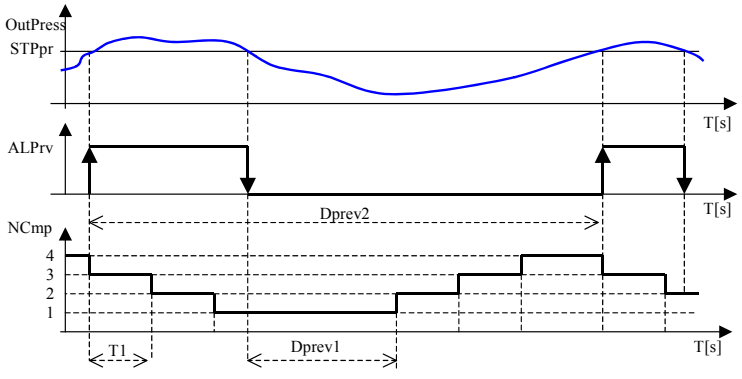
$$DEff\% = DEffTe^{*} (Te - TeVirt) + DEffTc^{*} (Tc - TcVirt)$$

As well as the instant value, the daytime average (DEff%-day), night-time (DEff%-night), daily, monthly and annual averages can be displayed (screens A8, A9, Aa, Ab), calculated using this ratio:

$$\text{(current value)} = \text{(previous value)} / \text{(total unit of time considered)}.$$

8.13 Prevent high discharge pressure

Manufacturer branch, general parameters, screen G3 and screen P9.
In order to prevent the activation of the general high pressure switch (total shutdown of the compressors, with manual reset), a prevention function can be enabled by setting a pre-alarm threshold; this function gradually decreases the capacity of the unit. The high pressure prevention (Prevent HP) function is only enabled during the activation and deactivation of the compressors and their load steps. If the discharge pressure exceeds the threshold set (screen G3), the activation of any compressors is disabled and a prevent alarm is generated. In addition, observing the time set on screen T1, all the compressor load steps are deactivated gradually
If the condensing pressure falls below the Prevent threshold, any other compressor start requests are ignored, for a set time called prevent time 1 (screen P9).
If between the start of two prevent cycles a time less than prevent time 2 (screen P9) elapsed, the "Excessive prevent frequency" alarm is generated.
The "Excessive prevent frequency" alarm (display only) is resets automatically, if, within prevent time 3 (screen P9), the Prevent function is not activated again. This alarm can be reset manually by the user at any time.



Key:

OutPress	Supply press.
T	Time
NCmp	Number of suction steps required
ALPrv	High pressure prevention alarm
STPpr	Prevent HP activation threshold
T1	Time between compressor stops with prevent HP active
Dprev1	Step activation delay after end prevent HP (prevent time 1)
Dprev2	Minimum time for activation of high prevent frequency alarm (prevent time 2)

Fig 7.4

9. Alarm management

The unit manages all the procedures relating to the individual alarms: action, delays, resets and corresponding signals. When an alarm is activated, the devices are affected accordingly, where featured, and the following actions are performed simultaneously: LED on, buzzer on (external terminal), screen displayed and saving of the event.
To monitor the active alarm simply press the ALARM button, and use the UP/DOWN buttons to scroll any other active alarms. To reset the relay and delete the alarms in the memory, first display the alarm screen and then press the ALARM button again.
The alarm from digital input arises when there is no voltage at the corresponding terminal if the parameter "input logic" is configured as normally closed. Manufacturer branch, general parameters, screen G0.

9.1. Alarms with automatic reset

When one or more automatic reset alarms are detected, these are signalled by:

- red LED under the ALARM button on;
- buzzer active (with external terminal) ;
- change of status of the alarm relay (the logic can be set in the manufacturer branch, general parameters, screen G4), if enabled (manufacturer branch, unit configuration, screen C6).

Pressing the ALARM button mutes the buzzer and displays the active alarm screens.
If the cause of the alarms is resolved, the devices that have shutdown will restart normal operation, and the status of the signal devices changes:

- the alarm relay changes status;
- the buzzer, if not silenced by pressing the ALARM button, stops;
- the red LED under the ALARM button flashes.

If, in this situation, new alarms are activated, the initial situation will return.
The red LED flashing informs the user that there have been active alarms during the day and that the causes have now passed. To display the codes of the alarms that were activated, simply take a look at the alarm log (press the MENU or PROG button on the Built-In or PGD0 terminal, alarm log branch).

9.2. Alarms with manual reset

When one or more manual reset alarms are detected, these are signalled by:

- red LED under the ALARM button on;
- buzzer active (with external terminal) ;
- change of status of the alarm relay, if enabled.

Pressing the ALARM button mutes the buzzer and displays the active alarm screens. If the cause of the alarms has been resolved, the red LED stays on to inform the user that alarms have been activated during the day, and to press the ALARM button to reset this situation. In this situation, the alarm relay remains in an alarm condition. If, in this situation, new alarms are activated, the initial situation will return..
The devices remain off until the user deletes the alarm messages.
The messages are deleted by pressing the ALARM button when the alarm messages are displayed. If the causes no longer exist, the status of the signal devices changes:

- the alarm relay changes status (switches according to the set logic);
- the buzzer, if not silenced by pressing the ALARM button, stops;
- the red LED under the ALARM button goes off.

If, on the other hand, the cause of the alarms is still present, the initial situation will return.

9.3. Semiautomatic alarms

The low pressure switch alarm is a semiautomatic alarm. It acts as an alarm with automatic reset, however if it is activated at least 5 times within a set time (default 10 minutes), it becomes an alarm that must be reset manually.

9.4. Alarm relay

The user may decide whether to configure the alarm relay simply by enabling it (C6) and choosing which relay to assign to the alarm (Eb).
If enabled, a delay time can be set (screen P5) between the activation of an alarm and the change in the status of the signal relay.
If the time is set to 0, the activation of the alarm relay is immediate..

9.5 Table of alarms

Code	Alarm description	Generated by	Action performed	Type of reset	Delay	Note
AL001	Common fan thermal overload	DIN	/	manual	no	display only
AL002	Common oil differential	DIN	/	manual	Settable	display only
AL011	Klixon thermal overload/generic compressor 1	DIN	Comp.1 OFF	Settable	Settable	
AL012	Klixon thermal overload/generic compressor 2	DIN	Comp.2 OFF	Settable	Settable	
AL013	Klixon thermal overload/generic compressor 3	DIN	Comp.3 OFF	Settable	Settable	
AL014	Klixon thermal overload/generic compressor 4	DIN	Comp.4 OFF	Settable	Settable	
AL015	Klixon thermal overload/generic compressor 5	DIN	Comp.5 OFF	Settable	Settable	

Code	Alarm description	Generated by	Action performed	Type of reset	Delay	Note
AL016	Klixon thermal overload/generic compressor 6	DIN	Comp.6 OFF	Settable	Settable	
AL021	High/low pressure switch comp.1	DIN	Comp.1 OFF	Settable	no	
AL022	High/low pressure switch comp.2	DIN	Comp.2 OFF	Settable	no	
AL023	High/low pressure switch comp.3	DIN	Comp.3 OFF	Settable	no	
AL024	High/low pressure switch comp.4	DIN	Comp.4 OFF	Settable	no	
AL025	High/low pressure switch comp.5	DIN	Comp.5 OFF	Settable	no	
AL026	High/low pressure switch comp.6	DIN	Comp.6 OFF	Settable	no	
AL031	Oil differential comp.1	DIN	Comp.1 OFF	manual	settable	
AL032	Oil differential comp.2	DIN	Comp.2 OFF	manual	settable	
AL033	Oil differential comp.3	DIN	Comp.3 OFF	manual	settable	
AL034	Oil differential comp.4	DIN	Comp.4 OFF	manual	settable	
AL035	Oil differential comp.5	DIN	Comp.5 OFF	manual	settable	
AL036	Oil differential comp.6	DIN	Comp.6 OFF	manual	settable	
AL041	Liquid level	DIN	/	manual	settable	
AL042	General suction pressure switch	DIN	All comp. OFF	automatic	no	
AL043	High freq. Low pressure switch intervention	DIN	All comp. OFF	manual	no	frequency settable
AL044	General supply pressure switch	DIN	All comp. OFF	Settable	no	
AL051	Comp. maintenance 1	system	/	manual	no	display only
AL052	Comp. maintenance 2	system	/	manual	no	display only
AL053	Comp. maintenance 3	system	/	manual	no	display only
AL054	Comp. maintenance 4	system	/	manual	no	display only
AL055	Comp. maintenance 5	system	/	manual	no	display only
AL056	Comp. maintenance 6	system	/	manual	no	display only
AL061	Low Supply Pressure	AIN	All fans OFF	automatic	settable	
AL062	High Supply Pressure	AIN	All fans ON	automatic	no	
AL063	Low Suction Pressure	AIN	All comp. OFF	automatic	settable	
AL064	High Suction Pressure	AIN	All comp. ON	automatic	settable	
AL065	Suction probe broken or disconnected	AIN	Settable comp. no. ON	manual	30 seconds	power at 100% compressor inverters
AL066	Supply probe broken or disconnected	AIN	Settable fan no. ON	manual	30 seconds	power at 100% fan inverters
AL067	B3 probe broken or disconnected	AIN	/	automatic	30 seconds	display only
AL068	B6 probe broken or disconnected	AIN	/	automatic	30 seconds	display only
AL069	B7 probe broken or disconnected	AIN	/	automatic	30 seconds	display only
AL071	Number of digital inputs exceeded	system	/	automatic	no	display only
AL072	Number of devices exceeded	system	/	automatic	no	display only
AL073	Clock card or battery worn out	system	Time bands OFF	manual	no	
AL074	B4 probe broken or disconnected	AIN	/	automatic	30 seconds	display only
AL075	B8 probe broken or disconnected	AIN	/	automatic	30 seconds	display only
AL081	Fan 1 Thermal cutout	DIN	Fan 1 OFF	manual	no	
AL082	Fan 2 Thermal cutout	DIN	Fan 2 OFF	manual	no	
AL083	Fan 3 Thermal cutout	DIN	Fan 3 OFF	manual	no	
AL084	Fan 4 Thermal cutout	DIN	Fan 4 OFF	manual	no	
AL085	Fan 5 Thermal cutout	DIN	Fan 5 OFF	manual	no	
AL086	Fan 6 Thermal cutout	DIN	Fan 6 OFF	manual	no	
AL087	Fan 7 Thermal cutout	DIN	Fan 7 OFF	manual	no	
AL088	Fan 8 Thermal cutout	DIN	Fan 8 OFF	manual	no	
AL089	Fan 9 Thermal cutout	DIN	Fan 9 OFF	manual	no	
AL090	Fan 10 Thermal cutout	DIN	Fan 10 OFF	manual	no	
AL091	Fan 11 Thermal cutout	DIN	Fan 11 OFF	manual	no	
AL092	Fan 12 Thermal cutout	DIN	Fan 12 OFF	manual	no	
AL093	Fan 13 Thermal cutout	DIN	Fan 13 OFF 13	manual	no	
AL094	Fan 14 Thermal cutout	DIN	Fan 13 OFF 14	manual	no	
AL095	Fan 15 Thermal cutout	DIN	Fan 13 OFF 15	manual	no	
AL096	Fan 16 Thermal cutout	DIN	Fan 13 OFF 16	manual	no	
AL097	Refrigerant gas leak	DIN	/	automatic	settable	display only
AL098	Prevent high discharge pressure	AIN	Compressors OFF	automatic	no	
AL099	Compressors off due to Prevent HP	AIN	Compressors OFF	automatic	no	
AL100	Excess Prevent Frequency	AIN	/	settable	no	display only
AL101	Superheat low	AIN	/	manual	settable	display only
AL111	Termic klixon/generic compressor 11	DIN	OFF comp.11	settable	settable	
AL112	Termic klixon/generic compressor 12	DIN	OFF comp.12	settable	settable	

9.6. Alarm log

The alarm log is used to save the operating status of the standard compressor pack when the alarms are generated. Each record represents an event that can be displayed from the list of all the events available in the memory. The log proves useful in solvign problems and faults because it can suggest possible causes and solutions for the problems

If no clock card is fitted (optional on the pCO^1, pCO^{XS} and pCO^C, standard on the pCO^2), the BASIC log only displays the alarm message.

A maximum number of 150 events can be saved.

Once the maximum number of events has been reached, the new events overwrite the oldest ones.

The alarm log can be deleted completely in screen B2, maintenance branch. When the default values are installed, also the alarm log is completely deleted.

The alarm log screen can be accessed by pressing the PRINT button, or entering from the main menu, and has the following layout:

```
+--------------------+
¦N°001 15:45 10/09/04¦
¦Reset manuale allar.¦
¦                    ¦
¦LP:+01.5b  Hp:+15.5b¦
+--------------------+
```

For each alarm, the following data are saved, corresponding to the standard compressor pack at the moment the alarm occurred:

- chronological number of the event (0 to 150);
- time;
- date;
- alarm test;
- suction pressure;
- supply pressure.

The chronological event number indicates the “seniority” of the event with respect to the 150 available storage slots. The alarm number 001 is the first event after the BASIC log was enabled, and consequently the oldest.

If you move the cursor onto the chronological number, you can run through the alarm log, from 0 to 150, using the arrow keys.

If, for example, 15 alarms are saved, from position 001 pressing the down arrow has no effect.

If 15 alarms have been saved, in position 015, pressing the up arrow has no effect.

10. The supervisor network

The pCO* sistema controllers can be connected to the most common supervisory systems, using suitable interface cards and protocols.
In this application program, the following data is exchanged with the supervisor:

- The status of the: inputs/outputs;
- Alarms present and active
- Alarms present and active alarms;
- Enabling of devices, various managements, etc.

Moreover, it is possible to modify an entire set of parameters, such as setpoint, differentials, times, unit status, reset alarms etc. Also see the chapter "Supervisor communication variables".

10.1. Serial cards

For connection to supervisor systems, the pCO* is designed to support the main and most commonly-used communication standards.
As a result, connection cards are available for the following standards:

Type of board	pCO² code	pCO¹-pCO^{XS} code
RS485 serial connection card, optically-isolated	PCO2004850	PCO1004850
RS232 serial connection card, not optically-isolated	PCO200MDM0	PCO100MDM0

Table 9.1

The user can, depending on specific needs, decide whether to install the supervisor system connection card, so as to send all the parameters set in the pCO.
In addition, an external GATEWAY is available for communication with the BACNET protocol.

10.2. Communication protocols

The pCO* line of controllers supports and integrates three communication protocols into the unit's operating system; these CAREL, MODBUS and GSM MODEM.
To enable the correct operation of these communication protocols, as well as installing the proper serial card, a number of parameters need to be set, such as the identification number of the pCO*, and enabling the function (screens V0 and V1). Then choose the desired communication protocol.
Each pCO* must have the address set so that:

- There are NO other devices with the same address on the same serial line
- The addresses of the pCO* on the same serial line must be set in progressive order, starting from 1.

For further information, refer to the corresponding manual or contact CAREL.

10.3. Other protocols

10.3.1. GSM protocol

Selecting the GSM protocol allows SMS messages to be sent to and received from GSM telephones. In fact, using a GSM modem the pCO* boards send an SMS message to the selected telephone in the event of alarms, and can receive messages from the telephone at any time. The user can modify all the read-write parameters available to the supervisor (see the table of Supervisor variables).
Setting the *GSM Modem* protocol in screen V1 enables screens Ai, B3, B4 and a parameter in screen B2, to send a test SMS. In screen Ai, the status of the GSM modem can be checked and the quality of reception from the GSM network as a percentage. Screen B3 is used to set the number of the GSM cellular phone to send the text message to, and the password (for remote supervisors or receiving SMS).
In screen B4, the user can customise the SMS message sent.
On each event alarm, an SMS is sent to the cellular phone number set in screen B3, containing:

- The name of the application;
- A short message that can be customised by the user;
- Alarm text;
- Time;
- Date;
- Chronological number of the event (0 to 150);
- Suction pressure;
- Supply pressure.

For the syntax of the SMS message sent to the pCO* and the use of the above table, refer to the manual: *GSM modem protocol for pCO2 (code+030220330).*

N.B.: When the GSM protocol is active, no calls can be made from the remote supervisor to the pCO* board.

Receiving an SMS from a GSM phone

An SMS can be sent from a GSM phone to the pCO*.
For example, a command can be sent to reset an alarm or change the value of the setpoint.
The messages sent must use the following format:

.pCO2.PWD.Type1.Index1.Value1…. … … … .TypeN.IndexN.ValueN with N<=11

where:

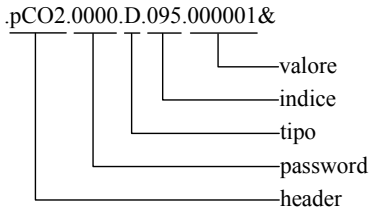
pCO2 = Message header.
PWD = Access password; this must be 4 ASCII characters and coincide with the remote access password. If the password is 0001, PWD will be '0001'.
Type*i* = Type of the i-th variable to be set; this is **1** character, and may be either 'A', 'I' or 'D', respectively Analogue, Integer or Digital variable.
Index*i* = Index of the i-th variable to be set; this must contain **3** consecutive characters made up of the numbers '0' to '9'.
If, for example, the index of the variable is 132, Index will be '132'.
Value*i* = Value to be set for the i-th variable; this must always be made up of **6** characters, the first being the sign, and the others the numbers from '0' to '9'.
If, for example, the value of the variable is 12, Value will be '000012' or alternatively '+00012'.
If, on the other hand, the value of the variable is –243, Value will be '-00243'.
For analogue variables, the value sent is the effective value of the variable multiplied by 10. For example, the value '-00243' corresponds to –24.3. For digital variables, the possible values are '000000' or alternatively '000001'.
N = the number of variables to be set in a single SMS message. The maximum number, so as to not exceed the threshold of 160 characters per message, is 11.

WARNINGS

The SMS message must not contain spaces. The message starts with a dot. The fields in the message are separated by dots. The message ends with the character '&', not preceded by a dot.

EXAMPLE:

To reset the alarms in the software with = 0000, the SMS message must be made up as follows:



To set the suction setpoint, which is index 5, to the value +2.4 bar with an SMS message, the message must be as follows: pCO2,0000.A.005.+00240&.

11. User interface

The screens are divided into 4 categories.
- **NOT password-protected** screens: these screens show the values read by the probes, the alarms, the operating hours of the devices, the time and the date, and can be used to set the setpoint and the clock.
- **USER** screens, password-protected (0000, modifiable): these are used to set the main functions (times, setpoints, differentials, alarms) for the devices connected.
- **MAINTENANCE** screens, password-protected (0000, modifiable): these are used to run periodical checks on the devices, calibrate the probes connected, modify the operating hours and manually operate the devices.
- Password-protected **MANUFACTURER** screens (password 1234, modifiable): these are used to configure the system, enable the main functions and select the devices connected.

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

The first screen (A0, S0…) is the one displayed when pressing the corresponding button, then the arrow buttons are used to scroll to the others. The codes (Ax, Bx, Cx…) appear in the top right corner of the screens, making them easier to distinguish. The PSW symbol indicates screens where you are required to enter passwords. The columns in the table represent the branches of screens.

11.1. Password

Some branches are protected by password. The default values of these passwords are:

Branch	Value
User	0
Maintenance	0
Manufacturer	1234

Table 10.1

Once the password is entered, it remains in the memory until automatically returning to the main screen, so as to make it easier to move around within the same branch.

Tree of screens

menu		I/O		set	prog	menu + prog		
M0	A0	I0	K0	S0	**PSW** P0		**PSW** C0	
M1	A1	I1	K1	S1	P1		C1	
M2	A2	I2	K2	S2	Pq	CONF. →	DEV.	INPUT P.	OUTPUT P.
M3	A3	In	K3	Sd	P2		C3	D0	E0
M4	A4	I3	K4	**PSW** S5	P3		C4	D1	E1
M5	A5	I7		S6	Pl		Ci	D2	E2
	A6	I9		S7	Pm		C5	D3	E3
	A7	Ia		S8	Pn		C6	D4	E4
	A8	Ib		S9	Po		C7	D5	E5
	A9	Ic		Sb	P4		C8	D6	E6
	Aa	Id		Sc	P5		Ck	D7	E7
	Ab	Ie		Sa	P6		C9	D8	E8
	Ac	If			P7		Ca	D9	E9
	Ad	Ig			P8		Cb	Da	Ea
	Ae	Ih			P9		Cc	Db	Eb
	Af	Ii			Pa		Cd	Dc	Ec
	Ag	Ij			Pb		Ce	Dd	
	Ah	Ik			Pc		Cf	De	
	Ai	Il			Pu		Cg	Df	
	PSW B0	Im			Pd		Ch	Dg	
	B1				Pe		Cj	Dh	
	B2				Pf			Dj	
	B3				Pg	PARAM. →	G0		
	B4				Ph		G1		
	B5				Pi		G2		
	B6				Pj		G3		
	B7				Pr		G4		
	B8				Ps		G5		
	B9				Pt		G6		
	Ba				Pk		G7		
	Bb						G8		
	Bc						G9		
	Bd						Ga		
	Be						Gf		
	Bf						Gg		
	Bg						Gb		
	Bh						Gc		
	Bi						Gh		
	Bj						Gd		
	Bk						Ge		
	BL					TIMES →	T1		
	Bm						T2		
	Bn						T3		
	Bo						T4		
	Bp						T5		
	Bq						T6		
	Br						T7		
	Bs						T8		
						INITIAL. →	V0		
							V1		
							V2		
							V3		
							V4		

Table 10.2

12. List of parameters

This table contains the list of all the parameters that appear on the screens, with the corresponding description.
Parameter: string as it appears in the screen;
Type: (R) read-only, (R/W) read/write;
Pos.: position of screen in the application, screen index;
Description: brief description of the parameter;
UOM.: unit of measurement of value in question;
Range: range of values that parameter can be given;
Default: factory-set value of the parameter.

Note: column available for the user's notes.

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

Table of parameters

Parameter	Type	Screen position	Description	UOM	Range	Default	Note
MAIN SCREENS			15-button terminal MENU button 6-button terminal ESC button				
Suction press.	R	M0	Pressure measured by the intake sensor on the compressors (suction), pressing ENTER displays the value in degrees Celsius or Fahrenheit.	bar	Screen Cc		
Discharge press.	R	M0	Pressure measured by the outlet sensor on the compressors (discharge), pressing ENTER displays the value in degrees Celsius or Fahrenheit.	bar	Screen Cd		
Intake time	R	M0	Temperature measured by the intake sensor on the compressors (suction), pressing ENTER displays the value in degrees Celsius, Fahrenheit or bar	°C/°F	-40T120°C		
Discharge temp.	R	M0	Temperature measured by the outlet sensor on the compressors (discharge), pressing ENTER displays the value in degrees Celsius, Fahrenheit or bar	°C/°F	-40T120°C		
Unit Status	R	M0	Unit status (ON, OFF from alarm, OFF from supervisor, Restart after Blackout, OFF from remote input, OFF from button, >>Manual oper.<<, Install. default, OFF from screen.)		1, 2,…, 9		
Gas type	R	M0	Type of gas used in the installation			R404a	
N°	R	M0	Address unit visible at the moment		1,….6		
Compressor status	R	M1,M6	Status compressor 1,2,…,12				
Control status	R	M1,M6	Type and status of compressor control				
Fan Status	R	M2	Fan status				
Control status	R	M2	Type and status of fan control				
Fan inverter status	R	M3	Fan inverter status	%	0…100		
Compressor inverter status	R	M3	Compressor inverter status	%	0…100		
Auxiliary room temperature probe	R	M4	Auxiliary room temperature probe	°C	-40T90°C		
Auxiliary outside temperature probe	R	M4	Auxiliary outside temperature probe	°C	-40T90°C		
Auxiliary probe for gas leak	R	M4	Auxiliary probe for detecting gas leak	ppM			
Start-up unit?	R/W	M5	Used to switch the unit on if using a 6-button terminal		No/Yes		
MAINTENANCE SCREENS			15-button terminal, MAINTENANCE button 6-button terminal, PROG button and MAINTENANCE in the menu				
Compressor working hours 1,2,..12	R	A0, A3	Displays the operating hours of compressors 1,2,..12, saved every 3 hours	hours	0…999999		
Fan working hours	R	A5	Displays the operating hours of fans are saved every 3 hours	hours	0…999999		
Instant Delta efficiency	R	A7	Displays the instant efficiency value of the installation	%	0…99.9		
Delta efficiency Current daily Current monthly Current annual	R	A8	Displays the current daily, monthly and annual efficiency	%	0…99.9		
Delta efficiency Daily old Monthly old Yearly old	R	A9	Displays the daily, monthly and annual efficiency before the current efficiency	%	0…99.9		
Delta efficiency 00:00 C-day 00:00 C-day current 25.5%	R	Aa	Indicates the time band in which the current daily efficiency percentage is calculated and displays the current daily efficiency percentage	%	0…99.9		
Delta efficiency 00:00 C-day 00:00 Cday old 25.5%	R	Ab	Indicates the time band in which the previous daily efficiency percentage is calculated and displays the previous daily efficiency percentage and previous night-time efficiency percentage	%	0…99.9		

Parameter	Type	Screen position	Description	UOM	Range	Default	Note
Electrical absorption instant value:	R	Ac	Displays the instant power consumption value	kW	0…9999		
Electr. absor. Daily current Monthly current Yearly current	R	Ad	Displays power consumption current daily (kW), current monthly (MW) and current annual (MW)	kW, MW	0…999999		
Electr. Absor.: Daily old Monthly old Yearly old	R	Ae	Displays power consumption previous daily (kW) monthly (MW) annual (kW)	kW, MW	0…999999		
Electrical absorption total	R	Af	Displays the total power consumption (MW)	MW	0…999999.999		
Electr. Absor.: 00:00 C-day 00 C-day current	R	Ag	Indicates the time band in which the current daily power consumption is calculated and displays the current daily power consumption as a percentage	kW	0…9999		
Electr. Absor.: 00:00 C-day 00:00 C-day : C-night:	R	Ah	Indicates the time band in which the daily and night-time power consumption is calculated and displays the daily power consumption as a percentage and the night-time power consumption as a percentage	kW	0…9999		
GSM MODEM Status: Field:	R	Ai	GSM modem: GSM status and signal reception, expressed as a percentage				
Insert maintenance password:	R/W	B0	Enter maintenance password		0…9999	0	
Keyborad On/Off enable	R/W	B1	Enable ON/OFF from the keypad		Yes/No	Yes	
Switch-Off unit:	R/W	B1	Enable unit ON/OFF from the screen		Yes/No	Yes	
Delete Hystorical Alarms:	R/W	B2	Deletes the alarm log		Y/N	N	
SMS test sending:	R/W	B2	Used to send a test SMS if the GSM modem is enabled		Y/N	N	
Phone number:	R/W	B3	GSM modem telephone number settings. Displayed if the GSM modem is enabled		20 digits, settable by the user	0	
Modem password:	R/W	B3	GSM modem password settings. Displayed if the GSM modem is enabled		0…9999	0	
SMS text	R/W	B4	Customised SMS message. Displayed if the GSM modem is enabled		Settable message		
Alarm compressor hour meter threshold	R/W	B5	Max compressor operating hour threshold setting. Once the threshold is exceeded, an alarm is activated	Hours	1…999000	1000000	
Alarm fan hour meter threshold	R/W	B6	Max fan operating hour threshold setting. Once the threshold is exceeded, an alarm is activated	Hours	1…999000	1000000	
Compressors time counters reset: 1,2,..12	R/W	B7,B8	Used to reset the individual hour counter for the compressors		Y/N	N	
Fans time counters reset:	R/W	B9	Used to reset the individual hour counter for the fans		Y/N	N	
Electr. Absor.: Daily reset: Monthly reset: Yearly reset:	R/W	Ba	Reset daily power consumption count, reset monthly power consumption count, reset annual power consumption count		Y/N	N	
Electr. Absor.: Total reset:	R/W	Bb	Reset total power consumption count		Y/N	N	
Electr. Absor.: C-Day reset: C-night reset:	R/W	Bb	Reset daily power consumption count Reset night-time power consumption count		Y/N	N	
Delta efficiency total Reset :	R/W	Bc	Reset total efficiency		Y/N	N	
Last maintenance date:	R/W	Bd	Set last maintenance date day month year		(1…31) (0…23) (0…99)		
Unit type:	R/W	Bd	Set type of compressor pack		LT / NT		
Probes calibration Suction : : Outlet:	R/W	Be	Suction probe calibration Discharge probe calibration	bar	-99.9…99.9	0	
Probes calibration Probe gas:	R/W	Bf	Gas probe calibration	ppM	-9.9…9.9	0	
Probes calibration Probe ext:	R/W	Bf	Outside probe calibration	°C	-9.9…9.9	0	
Enabling compressors	R/W	Bg	Temporarily disables the operation of an individual compressor		Y/N	Y	
Compressor 1,2,.12	R/W	Bh,Bi, ..,Bm	Manually operate compressors 1,2,...6 This action does not shut the unit down		Y/N	N	
Step 1 :	R/W	Bh,Bi, ..,Bm	Manually operate step 1 on compressor 1,2,...6 This action does not shut the unit down		Y/N	N	
Step 2 :	R/W	Bh,Bi, ..,Bm	Manually operate step 2 on compressor 1,2,...6 This action does not shut the unit down		Y/N	N	

Parameter	Type	Screen position	Description	UOM	Range	Default	Note
Step 3:	R/W	Bh,Bi, ..,Bm	Manually operate step 3 on compressor 1,2,...6 This action does not shut the unit down		Y/N	N	
Fan power ON Fan 1,2,…,16	R/W	Bn,Bp, Bq	Manually operate fan 1,2,...16		Y/N	N	
Manual operation Comp. inverter: **Fan inverter:**	R/W	Br	Manually operate the inverters at 100% for the compressors and fans		AUTO /MAX	AUTO	
Enter new password	R/W	Bs	Enter a new maintenance password		0…9999	0	
INPUT/OUTPUT SCREENS			15-button terminal, INPUT/OUTPUT button 6-button terminal PROG button and INPUT/OUTPUT in the menu				
Probes inputs: **Press. Suction** **Press. Discharge**	R	I1	Status of the suction and discharge probes	bar/ °C / F	Screen Cc and Cd		
Probes input **Room temp.:** **Outside temp.:**	R	I2	Status of room temperature and outside temperature auxiliary probe	°C	-40T120°C		
Probes input **gas leak**	R	I2	Status of auxiliary probe for detecting gas leak	ppM	screen Cg		
Probes input **Intake time** **Superheat**	R	In	Status of real intake temperature auxiliary probe Superheat is calculated between saturated temperature (converted from pressure) and intake temperature	°C	-40T120°C		
Probes input **Gen Probe**	R	In	Status of generic gas auxiliary probe (the name depends on the Ce screen)	°C	-40T120°C		
B3 probe input Electrical absorpt. instant value	R	I3	Displays probe B3: instant power consumption, if enabled	kW	Screen Cf		
Inverter **Y1 :Fans** **Y2:Compressors**	R	I7	Fan inverter status Compressor inverter status		0…1000		
Digitals outputs **K1,k2..k18:**	R	I9,Ia, .Ie	Status of digital outputs 1 to 18		(O) = open (C) = closed		
Inputs config. **B4,b5..b6 :**	R	If	Status of analogue inputs used as digital b4,b5,..b6		(O) = open (C) = closed		
Inputs config. **ID1,ID2,..ID18**	R	Ig,Ih,..Il	Status of digital inputs ID1, ID2,.. ID18		(O) = open (C) = closed		
Config. inputs b9, b10	R	Im	Status of analogue inputs used as digital b9, b10		(O) = open (C) = closed		
CLOCK SCREENS			15-button terminal, CLOCK button 6-button terminal, PROG button and CLOCK in the menu				
Change hour	R/W	K0	Set hour, minutes		(0…23), (0…59)		
Change date	R/W	K0	Set day, month, year		(1…31), (1…12), (0…99)		
Daily time zones with setpoint variation enabled:	R/W	K1	Enable time band with set point variation		Y/N		
Schedule 1,2,..,4 **00h 00m**	R/W	K2	Set time band 1,2,...4 hours minutes		(0…23), (0…59)	7	
Set 1,2,..,4	R/W	K2	Setpoint during time band (1,2,...4)		min-max comp. set		
Clock not installed	R	K4	Display				
SETPOINT SCREENS			15-button terminal, SETPOINT button 6-button terminal, PROG button and SETPOINT in the menu				
Compressor **DEAD ZONE**	R	S0	Type of compressor control (dead zone, proportional band)				
Compressor **Set.** **Diff.**	R	S0	Current working setpoint, in bar or degrees centigrade Differential	bar / °C			
Fans **PROPORTIONAL BAND**	R	S1	Type of fan control (dead zone, proportional band)				
Fans **Set.** **Diff.**	R	S1	Current working setpoint, in bar or degrees centigrade Differential	bar / °C			
Compressors **DEAD ZONE Setpoint settings**	R/W	S2	Compressor setpoint	bar / °C	min-max comp. set	1.0	

Parameter	Type	Screen position	Description	UOM	Range	Default	Note
Fans PROPORTIONAL BAND Change Setpoint	R/W	Sd	Fan setpoint	bar / °C	min-max fan set	15.5	
Insert setpoint password:	R/W	S5	Enter setpoint password		0…9999	0	
Compressors Inv. Offset :	R/W	S6	Compressor inverter offset setting	bar / °C	min-max comp. set		
Climb up inverter time:	R/W	S6	Time taken by the inverter to reach full output	s	0…999	10	
Fans Inverter Offset:	R/W	S7	Fan inverter offset setting	bar / °C	min-max fan set		
Climb up inverter time:	R/W	S7	Time taken by the inverter to reach full output	s	0…999	10	
Compressor differential Fans	R/W	S8	Settings compressor differential fan differential	bar / °C	0…20.0	0.5	
Inverter differential Compressors Fans	R/W	S9	Settings compressor inverter differential fan inverter differential	bar / °C	0…99.9	0.5	
Compressors auxiliary offset setpoint	R/W	Sb	Auxiliary compressor setpoint offset. Used to change the setpoint from digital input or electronic valve	bar / °C	-99.9…99.9	0	
Fans auxiliary offset setpoint	R/W	Sc	Auxiliary fan setpoint offset. Used to change the setpoint from digital input or electronic valve	bar / °C	-99.9…99.9	0	
Insert new password:	R/W	Sa	Enter a new setpoint password		0…9999	0	
SCREENS USER			15-button terminal, PROG button 6-button terminal, PROG button and USER in the menu				
Insert user password:	R/W	P0	Enter user password		0…9999	0	
Current language: ENGLISH press ENTER to change language	R/W	P1	Based on the configuration installed, the language used on the screens can be changed ITALIAN, ENGLISH, FRENCH, GERMAN, SPANISH, and (only PGD0) RUSSIAN		5 languages		
bar/°C setpoint setting	R/W	Pq	Configure the setpoint in degrees centigrade or pressure	bar / °C	bar / °C	bar	
Setpoint compressors Min Max	R/W	P2	Upper and lower limit of the compressor setpoint	bar / °C	-95T95 or –5T70	0.1 2.5	
Setpoint fans Min Max	R/W	P3	Upper and lower limit of the fan setpoint	bar / °C	-95T95 or –5T70	1.0 25.0	
Dead zone regulation comps Max time Min time	R/W	PL	Maximum time and minimum time for compressor start in dead zone	s	0…9999	60 20	
Dead zone regulation comps Max time Min time	R/W	Pm	Maximum time and minimum time for compressor stop in dead zone	s	0…9999	60 10	
Dead zone Delta pressure within which the time changes	R/W	Pn	Pressure differential within which the compressor start-stop time is proportional to the suction pressure	bar	0…99.9	0.5	
Delay alarm compressor input	R/W	Po	Generic/compressor thermal overload alarm delay	s	0…99	0	
Alarms Oil diff. delays Startup:	R/W	P4	Oil differential alarm delay (if configured) alarm times at compressor start	s	0…360	120	
Alarms Oil diff. delays running :	R/W	P4	Oil differential alarm delay (if configured) alarm times with compressor in stable operation	s	0…99	10	
Alarms relay delay	R/W	P5	Change in alarm relay status delay	s	0…999	1	
LP auto->man change 5 alarms within:	R/W	P5	On the fifth activation, within the set time, the low pressure alarm from pressure switch changes from automatic to manual reset.	m	0…999	10	
Suction alarm high thresh.:	R/W	P6	Suction probe alarm: high threshold setting	bar / °C	-95T95 or -0.5 to 7.0 bar	4.0	
Suction alarm Differential	R/W	P6	Suction probe alarm: differential setting	bar / °C	0…99,9	0.5	
Suction alarm Delay	R/W	P6	Suction probe alarm: delay setting	s	0…999	1	
Suction alarm low thres.:	R/W	P7	Suction probe alarm: low threshold setting	bar / °C	-95T95 or -0.5 to 7.0 bar	0.5	
Suction alarm Differential	R/W	P7	Suction probe alarm: differential setting	bar / °C	0…99.9	0.5	
Suction alarm Delay	R/W	P7	Suction probe alarm: delay setting	s	0…9999	1	

Parameter	Type	Screen position	Description	UOM	Range	Default	Note
Discharge alarm High thres.:	R/W	P8	Discharge probe alarm: high threshold setting	bar / °C	-95T95 or 0T30	20.0	
Discharge alarm Differential	R/W	P8	Discharge probe alarm: differential setting	bar / °C	0…99.9	1.0	
Discharge alarm Delay	R/W	P8	Discharge probe alarm: delay setting	s	0…9999	1	
HP discharge Prev Time prevent11:	R/W	P9	Time within which the start requests are ignored after a prevent HP has been activated	m	0…99	5	
HP discharge Prev Time prevent2:	R/W	P9	If two prevent cycles occur within this time, an excessive prevent frequency alarm is generated	m	0…9999	6	
HP discharge Prev Time prevent3:	R/W	P9	If no prevent alarms are activated in this period, the excessive prevent frequency alarm is reset automatically	m	0…99	30	
Discharge alarm Low thres.:	R/W	Pa	Discharge probe alarm: low threshold setting	bar / °C	-95T95 or 0T30	2.0	
Discharge alarm Differential	R/W	Pa	Discharge probe alarm: differential setting	bar / °C	0…99.9	1.0	
Discharge alarm Delay	R/W	Pa	Discharge probe alarm: delay setting	s	0…999	1	
Liquid level al. Delay:	R/W	Pb	Liquid level alarm delay	s	0…999	90	
Alarm gas detec. Threshold:	R/W	Pc	Refrigerant leak detector alarm threshold	ppM	99.9…99.9	50.0	
Alarm gas detec. Different.:	R/W	Pc	Refrigerant leak detector alarm differential	ppM	9.9…9.9	2.0	
Alarm gas detec. Delay:	R/W	Pc	Refrigerant leak detector alarm delay	m	0…99	3	
Sheat low alarm Thresh.	R/W	Pu	Low superheat alarm low threshold setting	°C	-95T95	5.0	
Sheat low alarm Differential	R/W	Pu	Low superheat alarm differential setting	°C	0…99.9	2.0	
Sheat low alarm Delay	R/W	Pu	Low superheat alarm delay setting	s	0…9999	300	
Blackout startup delay enabled:	R/W	Pd	Enable delay at start-up after blackout.		Y/N	N	
Blackout startup delay time:	R/W	Pd	Used to diversify the start times with multiple units, when power returns after a blackout	s	0…9999		
Swich OFF unit OFF by supervisor	R/W	Pe	Enable ON/OFF from supervisor		Y/N	N	
Probe disconnected:	R/W	Pe	Enable unit OFF due to probe disconnected		Y/N	N	
Elect. absor. start sampling Daily : Monthly:	R/W	Pf	Start sampling daily, monthly power consumption hours, minutes		0…23 0…59 0…31	23	
Elect. absor. start sampling yearly:	R/W	Pg	Start sampling yearly power consumption		1…12	12	
Elect. absor. Start daily zone	R/W	Ph	Start sampling power consumption at hour, minutes		0…23 0…59	8	
Elect. absor. Zone day end:	R/W	Ph	End sampling power consumption at hour, minutes		0…23 0…59	20	
Evaporator Evap. temp.	R/W	Pi	Evaporation temperature	°C	-99.9 Set. comp °C	-265	
Delta Eff. Evap.	R/W	Pi	Evaporator efficiency	%	0…99	3	
Condenser Cond. temp.	R/W	Pj	Condensing temperature	°C	Fan set °C…999	430	
Delta Eff. Cond	R/W	Pk	Condenser efficiency	%	0…99	2	
Compressors Modulating setpoint	R/W	Pr	Enable compressor modulating setpoint from supervisor		Y/N	N	
Compressors Max Delta change	R/W	Pr	Maximum change to the setpoint allowed to supervisor	bar / °C	0T99.9	0.1	
Compressors Setpoint reduct. time with supervisor offline	R/W	Ps	Delay between one setpoint change and another with supervisor offline	s	0T99.9	20	
Condensation Modulating setpoint	R/W	Pt	Enable fan modulating setpoint		Y/N	N	
Condensation Outside temp. offset	R/W	Pt	Offset to be added to outside temperature to get fan setpoint	bar / °C	0T99.9	0.1	
Enter new password	R/W	Pk	Enter a new user password		0…9999	0	

Parameter	Type	Screen position	Description	UOM	Range	Default	Note
SCREENS MANUFACTURER			15-button terminal MENU + PROG button 6-button terminal, PROG button and MANUFACTURER in the menu				
Password Manufacturer	R/W	C0	Enter manufacturer password		0…9999	1234	
CONFIGURATION	→						
pLAN multischeda	R/W	C2	Enable multiboard mode: compressor on board1, fan on board 2		S/N	N	
Type of safety devices per compressor	R/W	C3	Set the type of safety devices per compressor: 1: Generic 2: Thermal overload + Oil differential 3: Thermal overload + High/low pressure switch 4: Thermal overload + High/low pressure switch + Diff. Oil		4	1	
Config. number of fans	R/W	C4	Set number of fans		0…16	4	
Config. number of compressors	R/W	C4	Set number of compressors		0…6	3	
Config. number of Load steps	R/W	C4	Set number of load steps		0…3	0	
Compressors of different capacities	R/W	Ci	Enable compressors with different capacities		Y/N	N	
Compressor inverters	R/W	C5	Enable compressor inverters if configured without load steps		Y/N	N	
Fan inverters	R/W	C5	Enable control of fans with inverters		Y/N	Y	
Fan inverters 0…10V (Y1)	R/W	C5	Type of output used for fan inverters. Only on pCO[1], pCO[XS]		0…10V (Y1)/ PWM (Y3)		
Enable alarm relay	R/W	C6	Enable alarm relay		Y/N	Y	
Enable auxiliary pump	R/W	C6	Enable auxiliary pump management		Y/N	N	
Enable clock card	R/W	C6	Enable clock card if pCO[1], pCO[XS]		Y/N	Y	
Enable inputs Gen. pressure switch Gen. LP pressure switch HP	R/W	C7	Enable inputs: general low pressure switch general high pressure switch		Y/N	Y	
Enable ON/OFF inputs from Dig. Input	R/W	C8	Enable ON/OFF of units from digital input, has priority over that of keypad		Y/N	N	
Enable inputs Liquid level	R/W	C8	Enable liquid level alarm from digital input (display only).		Y/N	Y	
Enable inputs Common oil diff.	R/W	Ck	Enable common oil differential alarm		Y/N	N	
Enable inputs Com. fan thermal overload	R/W	Ck	Enable common fan thermal overload alarm (display only).		Y/N	N	
Enable inputs Setpoint change from DIN	R/W	Ck	Enable change of setpoint from digital input. The setpoint changes depending on the offsets entered on the screens Sb, Sc		Y/N	N	
Enable electronic expansion valve:	R/W	C9	Enable expansion with the help of the electronic valve		Y/N	N	
Type of NTC suction probe	R/W	Ca	Defines type of suction probe		NTC, 0…1 V, 0…10 V, 0…20 mA, 4…20 mA, 0…5 V	4…20mA	
input no. B1	R/W	Ca	Position of the suction probe: B1 or B7 only for pCO2 Medium or Large		B1/B7	B1	
Type of NTC discharge probe	R/W	Cb	Defines type of discharge probe		NTC, 0…1 V, 0…10 V, 0…20 mA, 4…20 mA, 0…5 V	4…20mA	
input no. B2	R/W	Cb	Defines the position of the discharge probe: B2 or B8 only for pCO2 Medium or Large		B2/B8	B2	
Suction pressure probe	R/W	Cc	Suction probe full scale setting	bar	-10.0…40.0	-0.5…7	
Discharge pressure probe	R/W	Cd	Discharge probe full scale setting	bar	-10.0…40.0	0…30	
Customise name General probe	R/W	Ce	General probe name setting (11 characters)			GEN. TEMP	

Parameter	Type	Screen position	Description	UOM	Range	Default	Note
B6 Outside temp.:	R/W	Ce	For enabling external temperature probes		Y/N	N	
B7 settable:	R/W	Ce	For enabling general probes or gas probe		Y/N	N	
Power consumption Min - Max	R/W	Cf	Probe full scale setting for power consumption		Y/N	N	
Gas leak Min - Max	R/W	Cg	Gas leak detection probe full scale setting		-999.9…999.9	0	
Refrigerant conversion	R/W	Ch	Type of refrigerant used See relevant paragraph.		R22,R134a, R404a,R407c, R410a,R507, R290,R600, R600a,R717, R744	R404a	
Enable efficiency control	R/W	Cj	Enables efficiency control of the compressor pack		Y/N	N	
POSITION OF INPUTS	→						
Inputs comp 1,2…12 thermal overload	R/W	D0, D1,.., D5, Dj, Dk	Position of the digital inputs used as thermal overload for compressor 1,2,…12		0…23		
Inputs comp 1,2…,6 Oil differential	R/W	D0 D1,.., D5	Position of digital inputs used as oil differentials compressor 1,2,..,6		0…23		
Inputs comp 1,2…,6 HP/LP pressure switch	R/W	D0 D1,.., D5	Position of digital inputs used as HP/LP pressure switch compressor 1,2,..,6		0…23		
Card pos.: Thermal overload fan 1,2,…,16	R/W	D6, D7,.., Da	Position of digital inputs used as safety devices for fans 1,2,…,16		0…23		
Card pos.: ON/OFF digital input	R/W	Db	Position of the ON/OFF digital input on the card Parameter can be seen only if enabled		0…23		
Card pos.: Liquid level alarm	R/W	Dc	Position of the liquid level alarm on the card Parameter can be seen only if enabled		0…23		
Card pos.: Gen. LP pressure switch: Gen. HP pressure switch:	R/W	Dd	Position of high and low pressure switches on the card Parameters can be seen only if enabled.		0…23		
Card pos.: Common oil differential	R/W	De	Position of the common oil differential on the card Parameter can be seen only if enabled		0…23		
Card pos.: Common fan thermal overload	R/W	Df	Position of the common fan thermal overload on the card Parameter can be seen only if enabled		0…23		
Card pos.: Setpoint change from dig. input	R/W	Dg	Position of the digital input for setpoint change on the card Parameter can be seen only if enabled		0…23		
Card pos.: Room temp.	R/W	Dh	Position of the room temperature probe on the card If "—", probe disabled		B3,B4, B6,B7,B8	--	See Parag. 8.10
Card pos.: External temp.:	R/W	Dh	Position of the external temperature probe on the card If "—", probe disabled		B3,B4, B6,B7,B8	--	See Parag. 8.10
Card pos.: General temp.:	R/W	Dh	Position of the general temperature probe on the card If "—", probe disabled		B3,B4, B6,B7,B8	--	See Parag. 8.10
Card pos.: Suction temp.	R/W	Di	Position of the suction temperature probe on the card If "—", probe disabled		B3,B4, B6,B7,B8	--	See Parag. 8.10
Card pos.: Gas leak	R/W	Di	Position of the gas leak probe on the card If "—", probe disabled		B3,B4, B6,B7,B8	--	See Parag. 8.10
Card pos.: Power consumpt.	R/W	Di	Position of the power consumption probe on the card If "—", probe disabled		B3,B4, B6,B7,B8	--	See Parag. 8.10
POSITION OF OUTPUTS	→						
Comp.1,2,..12 relay no.	R/W	E0, E1, E2, E5	Position of compressor 1,2,…,6 digital outputs on the card		0…(8-13-8)		
Load step1 relay no.	R/W	E1, E2, E5	Position of load step 1 of compressor 1,2,…,6 digital outputs on the card		0…(8-13-8)		
Load step2 relay no.	R/W	E1, E2, E5	Position of load step 2 of compressor 1,2,…,6 digital outputs on the card		0…(8-13-8)		
Load step3 relay no.	R/W	E1, E2, E5	Position of load step 3 of compressor 1,2,…,6 digital outputs on the card		0…(8-13-8)		
Card pos.: Fan 1,2,..,6 relay no.	R/W	E6, E7, .., Ea	Position of fan 1,2,…0.16 digital outputs on the card		0…(8-13-8)		
Card pos.: Alarm relay no.:	R/W	Eb	Position of the alarm digital output on the card		0…(8-13-8)		
Card pos.: Aux. pump no.	R/W	Ec	Position of the auxiliary pump on the card		0…(8-13-8)		

Parameter	Type	Screen position	Description	UOM	Range	Default	Note
PARAMETERS	→						
Logic digital inputs: N.A. = No alarm	R/W	G0	Digital input logic setting. Normally opened: the contact is open in non-alarm conditions		N.O. / N.C.	N.C.	
Logic ON/OFF from digital input	R/W	G1	Remote ON/OFF logic setting. Normally opened: unit in OFF position from digital input		N.O. / N.C.	N.O.	
Type of compressor alarms reset thermal overload	R/W	G2	Type of thermal overload/general alarm reset belonging to single compressor. Automatic: the compressor re-starts when alarm stops. Can be see if the parameters are enabled		auto / manual	manual	
Type of compressor alarms reset HP/LP pressure switch	R/W	G2	Type of high/low pressure switch reset belonging to single compressor. Automatic: the compressor re-starts when alarm stops. Can be see if the parameters are enabled		auto / manual	manual	
Prevent high discharge pressure	R/W	G3	Enables high suction pressure prevention		disabled / enabled	Disabled	
Set point	R/W	G3	High suction pressure prevention setpoint	bar	0…99	18.0	
Alarm relay logic:	R/W	G4	Alarm relay logic. Can be seen if the alarm relay is enabled		Normally closed / open	Normally open	
Comp. rotation	R/W	G5	Type of compressor rotation		LIFO, FIFO, timed	FIFO	
Comp. control	R/W	G5	Type of control to be used with compressor management		Proportional band / Dead zone	Dead zone	
Type of control Compressor:	R/W	G6	Type of compressor control: (P) Proportional or (P+I) Proportional is integral. Can be seen only if Proportional Band is enabled		P / P+I	P	
Integr. time (only P+I)	R/W	G6	Integral time of P+I control	s	0…999	600	
Comp. start mode	R/W	G7	Compressors start mode CppCppCpp, CCCppppppp or pCppC FULL		CppCppCpp / CCCppppppp / pCppC FULL	CppCppCpp	
Comp. deactivation mode	R/W	G7	Compressors deactivation mode ppCppCppC or ppppppCCC		ppCppCppC/ ppppppCCC	ppCppCppC	
Load steps logic:	R/W	G8	Sets whether the load step solenoids are: normally energised (closed), de-energised (open) with compressor on		Normally closed / open	Normally closed	
Minimum compressor inverter opening	R/W	G9	Minimum compressor inverter opening setting	%	0…100	0	
Minimum fan inverter opening	R/W	G9	Minimum fan inverter opening setting	%	0…100	0	
PWM speed controller Max. Triac:	R/W	Ga	Value directly linked to the maximum Triac voltage threshold Only on pCO[1], pCO[XS]	%	0…100	75	
PWM speed controller Min. Triac:	R/W	Ga	Value directly linked to the minimum Triac voltage threshold	%	0…100	25	
PWM speed controller Pulse amplitude:	R/W	Ga	Pulse amplitude given to Triac. Only on pCO[1], pCO[XS]	ms	0…10.0	2.5	
Comp 1,2,…6 power	R/W	Gf Gg	Power of single compressor. Used to control compressors having different capacities.	kW	0…5000	0	
Number of compressors forced on with probe fault	R/W	Gb	If there is a faulty or disconnected suction probe alarm, it forces no. compressors that are on. They are in any case controlled by single alarms and by general pressure switches.		0…6	1	
Fan rotation	R/W	Gc	Type of fan rotation. FIFO rotation (the first to turn on is the last to turn off).		Disabled / FIFO	FIFO	
Fan control	R/W	Gc	Type of fan control: Proportional band or Dead zone		Proportional band / Dead zone	Proportional band	
Type of fan control	R/W	Gh	Type of fan control: (P) Proportional or (P+I) Proportional is integral. Can be seen only if Proportional Band is enabled		P / P+I	P	
Integr. time (only P+I)	R/W	Gh	Integrating time of P+I control	s	0…999	600	
Number of fans forced on with probe fault:	R/W	Gd	If there is a faulty or disconnected discharge probe alarm, it forces no. fans that are on. They are in any case controlled by single alarms and by general pressure switches.		0…16	2	
Controlled fans with comnpressors off enable	R/W	Gi	Controlled fans with comnpressors off enable		N/S	N	
Type of general discharge pressure switch reset	R/W	Ge	Type of general high pressure switch reset		Automatic / manual	Auto	

Parameter	Type	Screen position	Description	UOM	Range	Default	Note
Pump management ON with	R/W	Gj	Device used like on for the pumps		Always On/ Unit On/ Comps On/ Fans On	Always On	
Time rotation	R/W	Gj	Time rotation between pumps	h	0…999	0	
Delay Off	R/W	Gj	Dalay off pump after require off	s	0…9999	0	
TIMES	→						
Time between requests to turn off compressors with prevent active	R/W	T1	Time between requests to turn off compressors with high pressure prevention active.	s	0…999	30	
Minimum time compr. ON:	R/W	T2	Minimum same compressor on-time	s	0…9999	10	
Minimum time compr. OFF:	R/W	T2	Same compressor minimum OFF time	s	0…9999	120	
Min. time between different compressor starts :	R/W	T3	Minimum time between two ON requests of different compressors. They prevent simultaneous starts	s	0…9999	20	
Min. time between same compressor starts:	R/W	T4	Minimum time between two actual power ups of same compressor	s	0…999	360	
Tempi comp with inverter Min ON	R/W	TA	Min time ON compressor under inverter	s	0…999	10	
Temp comp with inverter Min OFF	R/W	TA	Min time OFF compressor under inverter	s	0…999	10	
Tem comp with inverter Min. time between two start	R/W	TB	Time min between two ON compressor under inverter	s	0…999	5	
Time between requests to turn off fans	R/W	T6	Minimum time between two subsequent deactivation requests of different fans. Can be seen only if dead zone is set	s	0…999	2	
Minimum time between different fan activations:	R/W	T7	Minimum time between different requests to turn fans on. It prevents simultaneous starts	s	0…999	5	
Fan inverter speedup time	R/W	T8	Fan inverter Speedup time that can be seen only if fan inverter is set	s	0…999	2	
Inverter vent. CutOFF	R/W	T8	Set CutOFF inverter fan. Necessary with PI.	bar /°C	0…99,9	1.0	
INITIALISATION	→						
Supervisor Comunication speed	R/W	V0	Supervisor configuration. Speed of communication with the supervision system.	baud	0…5	19200	
Identification	R/W	V0	Supervisor configuration. Identification number of the pCO^2 card for the serial supervision network.		1…200	1	
Type of protocol	R/W	V1	Protocol type setting: CAREL Supervisor, Modbus Supervisor or GSM Modem		1…3	CAREL	
New password Manufacturer:	R/W	V2	Lets you change the password for entering the manufacturer branch		0…9999	1234	
Maintenance :	R/W	V2	Lets you change the password for entering the maintenance branch		0…9999	0	
User:	R/W	V2	Lets you change the password for entering the user branch		0…9999	0	
Display the message for changing the language on start-up	R/W	V3	Lets you enable/disable the display of the language change screen when the card starts		Y/N	Y	
Installation of default values:	R/W	V4	Lets you delete all of the permanent memory and reset the default settings		Y/N	N	

Table 11.1

13. Supervisor communication variables

The pCO* can be connected to a local or remote supervisor/telemaintenance system for managing the unit.
The accessories available for the pCO* boards include an optional RS485serial communication card.
In this version of the software, the baud rate can be set to: 1200, 2400, 4800, 9600 or 19200 bps.
The variables sent and received by the supervisor are shown in the tables below, with reference to the following key:

9.6.1	Read	Send from the pCO* to the supervisor
R/W	Read- Write	Received and sent from the pCO* to the supervisor

Analogue variables

Flow	INDEX	Description
R	1	Suction pressure
R	2	Discharge pressure
R	3	Value of analogue output 1
R	4	Value of analogue output 2
RW	5	Compressor setpoint
RW	6	Compressor differential
RW	7	Fan setpoint
RW	8	Fan differential
R	9	Voltage supplied to the pCO² board
RW	10	Max compressor setpoint
RW	11	Min compressor setpoint
RW	12	Max fan setpoint
RW	13	Min fan setpoint
RW	14	High suction pressure alarm threshold
RW	15	High suction pressure alarm differential
RW	16	Low suction pressure alarm threshold
RW	17	Low suction pressure alarm differential
RW	18	High discharge pressure alarm threshold
RW	19	High discharge pressure alarm differential
RW	20	Low discharge pressure alarm threshold
RW	21	Low discharge pressure alarm differential
R	22	Compressor activation point
R	23	Compressor deactivation point
R	24	Fan deactivation point
RW	27	Fan inverter setpoint
RW	28	Fan inverter differential
RW	30	Calibration of probe 1
RW	31	Calibration of probe 2
RW	32	Compressor inverter setpoint
RW	33	Compressor inverter differential
RW	34	Theoretical compressor suction temperature
RW	35	Theoretical outlet temperature
RW	36	Incoming evaporator efficiency delta
RW	37	Outgoing efficiency delta
RW	38	Current efficiency
RW	39	Current daily efficiency
RW	40	Current night-time efficiency
RW	41	Current annual efficiency
RW	42	Previous daily efficiency
RW	43	Previous monthly efficiency
RW	44	Previous annual efficiency
R	45	Current daily efficiency with time band
R	46	Previous daily efficiency with time band
R	47	Previous night-time efficiency with time band
R	48	Instant consumption
R	49	Current daily energy consumption (x 1000)
R	50	Current daily energy consumption (x 1000)
R	51	Current monthly energy consumption (x 1000)

Flow	INDEX	Description
R	52	Current monthly energy consumption (x 1,000,000,000)
R	53	Current annual energy consumption (x 100)
R	54	Annual energy consumption (x 1000)
R	55	Previous daily energy consumption (x 100)
R	56	Previous daily energy consumption (x 1000)
R	57	Previous monthly energy consumption (x 1000)
R	58	Previous monthly energy consumption (x 1,000,000,000)
R	59	Previous annual energy consumption (x 1000)
R	60	Previous annual energy consumption (x 1,000,000,000)
R	61	Total energy consumption (x 100)
R	62	Total energy consumption (x 1000)
R	63	Total energy consumption (x 1000)
R	64	Energy consumption over period of time (x 100)
R	65	Energy consumption over certain period of time (x 1000)
R	66	Daily energy consumption (x 100)
R	67	Daily energy consumption (x 1000)
R	68	Night-time energy consumption (x 100)
R	69	Night-time energy consumption (x 1000)
R	70	Start hours for sampling daily energy consumption
R	71	Start minutes for sampling daily energy consumption
R	72	Start month for sampling daily energy consumption
R	73	Start year for sampling daily energy consumption
R	74	Start minutes for energy consumption zone
R	75	Start hours for energy consumption zone
R	76	End minutes for energy consumption zone
R	77	End hours for energy consumption zone
R	78	Room temperature sensor
R	79	Suction temperature sensor
R	80	General temperature sensor
R	81	External Temperature probe
R	82	Refrigerant sensor
RW	83	Refrigerant sensor threshold
RW	84	High discharge pressure pre-alarm setpoint
R	85	Value read by probe B6
R	86	Value read by probe B7
R	87	Value read by probe B3
R	88	Gas suction temperature
R	89	Converted gas suction temperature
R	90	Actual comp. setpoint converted into temperature
R	91	Actual fan setpoint converted into temperature
RW	92	Modulating setpoint from supervisor
RW	93	Maximum compressor modulating setpoint
RW	94	Minimum fan modulating setpoint
RW	95	Compressor suction temperature
RW	96	Max setpoint delta modulation compressor (Delta)
RW	101	CutOff ventilatori

Digital variables

Flow	INDEX	Description
R	2	Presence of expansion board
R	3	Status of fan 1
R	4	Status of fan 2
R	5	Status of fan 3
R	6	Status of fan 4
R	7	Status of compressor 1
R	8	Status of load step 1 - compressor 1
R	9	Status of load step 2 - compressor 1
R	10	Status of compressor 2
R	11	Status of load step 1 - compressor 2
R	12	Status of load step 2 - compressor 2
R	13	Status of compressor 3
R	14	Status of load step 1 - compressor 3
R	15	Status of load step 2 - compressor 3
R	16	Status of compressor 4
R	17	Status of load step 1 - compressor 4
R	18	Status of load step 2 - compressor 4
R	19	Status of compressor 5
R	20	Status of load step 1 - compressor 5
R	21	Status of load step 2 - compressor 5
R	22	Status of compressor 6
R	23	Status of load step 1 - compressor 6
R	24	Status of load step 2 - compressor 6
R	25	Status of digital input 1
R	26	Status of digital input 2
R	27	Status of digital input 3
R	28	Status of digital input 4
R	29	Status of digital input 5
R	30	Status of digital input 6
R	31	Status of digital input 7
R	32	Status of digital input 8
R	33	Status of digital input 9
R	34	Status of digital input 10
R	35	Status of digital input 11
R	36	Status of digital input 12
R	37	Status of digital input 13
R	38	Status of digital input 14
R	39	Status of digital input 15
R	40	Status of digital input 16
R	41	Status of digital input 17
R	42	Status of digital input 18
R	45	Status of load step 3 - compressor 1
R	46	Status of load step 3 - compressor 2
R	47	Status of load step 3 - compressor 3
R	48	Status of load step 3 - compressor 4
R	49	Status of load step 3 - compressor 5
R	50	Status of load step 3 - compressor 6
R	51	Status of digital input 7 expansion
R	52	Status of digital input 8 expansion
RW	94	Silent buzzer
RW	95	Reset alarms
RW	96	Confirm hour setting
RW	97	Confirms minutes setting
RW	98	Confirms day setting
RW	99	Confirms month setting
RW	100	Confirms year setting
R	101	Unit on
RW	102	Input logic
RW	103	Alarm control logic
RW	104	Enable compressor inverter

Flow	INDEX	Description
RW	105	Enable fan inverter
RW	106	Enable ON/OFF from digital input
RW	108	Request entry of default values
RW	110	Capacity control logic
RW	111	Select ON/OFF from supervisor
RW	112	Enable ON/OFF from supervisor
RW	113	Enable liquid level alarm
R	114	Status of fan 5
R	115	Alarm: thermal overload on fan 5
R	116	Enable ON/OFF from the keypad
RW	117	Enable alarm relay
RW	118	Enable restart delay after a Blackout
R	119	Status of digital output 1
R	120	Status of digital output 2
R	121	Status of digital output 3
R	122	Status of digital output 4
R	123	Status of digital output 5
R	124	Status of digital output 6
R	125	Status of digital output 7
R	126	Status of digital output 8
R	127	Status of digital output 9
R	128	Status of digital output 10
R	129	Status of digital output 11
R	130	Status of digital output 12
R	131	Status of digital output 13
R	132	Status of digital output 14
R	133	Status of digital output 15
R	134	Status of digital output 16
R	135	Status of digital output 17
R	136	Status of digital output 18
RW	138	Enable electronic expansion valve
RW	139	Enable outside air temperature probe
RW	155	Enable preventive control
R	157	Status of fan 6
R	158	Status of fan 7
R	159	Status of fan 8
R	160	Status of fan 9
R	161	Status of fan 10
R	162	Status of fan 11
R	163	Status of fan 12
R	164	Status of fan 13
R	165	Status of fan 14
R	166	Status of fan 15
R	167	Status of fan 16
RW	168	Enable setpoint with EXV
RW	175	Confirm hour setting
R	176	Enable general probe
RW	177	Setpoint setting (1=bar)
RW	178	Enable compressor modulating setpoint
RW	179	Enable fan modulating setpoint
R	185	Status compressor 7
R	186	Status compressor 8
R	187	Status compressor 9
R	188	Status compressor 10
R	189	Status compressor 11
R	190	Status compressor 12
R	191	Status pump 1
R	192	Status pump 2

Alarms sent to the supervisor

Flow	INDEX	Description
R	53	Alarm: thermal overload compressor 1
R	54	Alarm: thermal overload compressor 2
R	55	Alarm: thermal overload compressor 3
R	56	Alarm: thermal overload compressor 4
R	57	Alarm: thermal overload compressor 5
R	58	Alarm: thermal overload compressor 6
R	59	Alarm: high/low pressure compressor 1
R	60	Alarm: high/low pressure compressor 2
R	61	Alarm: high/low pressure compressor 3
R	62	Alarm: high/low pressure compressor 4
R	63	Alarm: high/low pressure compressor 5
R	64	Alarm: high/low pressure compressor 6
R	65	Alarm: oil diff. pressure compressor 1
R	66	Alarm: oil diff. pressure compressor 2
R	67	Alarm: oil diff. pressure compressor 3
R	68	Alarm: oil diff. pressure compressor 4
R	69	Alarm: oil diff. pressure compressor 5
R	70	Alarm: oil diff. pressure compressor 6
R	71	Alarm: service hour threshold exceeded comp 1
R	72	Alarm: service hour threshold exceeded comp 2
R	73	Alarm: service hour threshold exceeded comp 3
R	74	Alarm: service hour threshold exceeded comp 4
R	75	Alarm: service hour threshold exceeded comp 5
R	76	Alarm: service hour threshold exceeded comp 6
R	77	Alarm: thermal overload on fan 1
R	78	Alarm: thermal overload on fan 2
R	79	Alarm: thermal overload on fan 3
R	80	Alarm: thermal overload on fan 4
R	81	Liquid level alarm
R	82	Alarm: general low pressure from switch
R	83	Alarm: general high pressure from switch
R	84	Alarm: low discharge pressure from probe
R	85	Alarm: high discharge pressure from probe
R	86	Alarm: low suction pressure from probe
R	87	Alarm: high suction pressure from probe
R	88	Alarm: max. number of configurable inputs exceeded

Flow	INDEX	Description
R	89	Alarm: max. number of configurable peripheral units exceeded
R	90	Alarm: clock defective or battery exhausted
R	91	Defective input probe or disconnected alarm
R	92	Defective output probe or disconnected alarm
R	93	Clock alarms
R	137	Refrigerant leak
R	140	Alarm: thermal overload on fan 5
R	141	Alarm: thermal overload on fan 6
R	142	Alarm: thermal overload on fan 7
R	143	Alarm: thermal overload on fan 8
R	144	Alarm: thermal overload on fan 9
R	145	Alarm: thermal overload on fan 10
R	146	Alarm: thermal overload on fan 11
R	147	Alarm: thermal overload on fan 12
R	148	Alarm: thermal overload on fan 13
R	149	Alarm: thermal overload on fan 14
R	150	Alarm: thermal overload on fan 15
R	151	Alarm: thermal overload on fan 16
R	152	Operation blocked by discharge high pressure pre-alarm
R	153	Compressors turned off by pre-alarm
R	154	High frequency of pre-alarm
R	169	High frequency of low pressure switch intervention pre-alarm
R	170	B3 probe broken or disconnected
R	171	B6 probe broken or disconnected
R	172	B7 probe broken or disconnected
R	173	Alarm: common fan thermal overload
R	174	Alarm: common oil diff. pressure compressors
R	180	Low Superheat alarm
R	181	Alarm offline board 1
R	182	Alarm offline board 2
R	183	Alarm present board 1
R	184	Alarm present board 2

Integer variables

Flow	INDEX	Description
RW	11	Hour setting
RW	12	Minute setting
RW	13	Day setting
RW	14	Month setting
RW	15	Year setting
R	16	Current hour
R	17	Current minute
R	18	Current month
R	19	Current year
R	20	Current day
RW	21	Oil diff. pressure alarm delay in service
RW	22	Type of inputs per compressor
RW	23	Number of compressors
RW	24	Number of fans
RW	25	Number of load steps
R	26	Fan inverter status 1 (0 - 1000)
R	27	Compressor inverter status 2 (0 - 1000)
R	28	Type of board connected (1= pCOxs,10= Large,11 = Medium,12 = Small
R	29	Status of the unit (0= Unit ON, 1= OFF from alarm, 2= OFF from Supervisor, 3= Re-start after Blackout, 4= OFF from input Remote, 5= OFF from button, 6= Manual op., 7= Install. Default, 8= OFF from screen 9=PREVENT IN PROGRESS
R	30	Type of probe connected to suction
R	31	Type of probe connected to delivery
R	32	Bios version
R	33	Bios date
R	34	Boot version
R	35	Activation date
RW	36	Compressor integration time in proportional operation
RW	37	Maximum delay of compressor activation (dead zone)
RW	38	Maximum delay of compressor deactivation (dead zone)
RW	39	Compressor minimum operation time
RW	40	Compressor minimum OFF time
RW	41	Min. time between different Compressors
RW	42	Minimum time between starts by a single compressor
RW	43	Delay between load steps
RW	44	Delay of fan activation (dead zone)
RW	45	Delay of fan deactivation (dead zone)
RW	46	Minimum time between starts of different fans
RW	47	Oil diff. pressure alarm delay at start-up
RW	48	Liquid level alarm delay
RW	49	Minimum compressor speed
RW	50	Minimum fan speed
RW	51	Number of compressors forced on with probe B1 damaged
RW	52	Number of fans forced on with probe B2 damaged
RW	53	Compressor on hours alarm threshold x1000
R	54	Operating hours of compressor 1 - Digits > 1000
R	55	Operating hours of compressor 1 - Digits < 1000
R	56	Operating hours of compressor 2 - Digits > 1000
R	57	Operating hours of compressor 2 - Digits < 1000
R	58	Operating hours of compressor 3 - Digits > 1000
R	59	Operating hours of compressor 3 - Digits < 1000
R	60	Operating hours of compressor 4 - Digits > 1000
R	61	Operating hours of compressor 4 - Digits < 1000
R	62	Operating hours of compressor 5 - Digits > 1000
R	63	Operating hours of compressor 5 - Digits < 1000
R	64	Operating hours of compressor 6 - Digits > 1000
R	65	Operating hours of compressor 6 - Digits < 1000
R	66	Operating hours of fan 1 - Digits > 1000
R	67	Operating hours of fan 1 - Digits < 1000
R	68	Operating hours of fan 2 - Digits > 1000
R	69	Operating hours of fan 2 - Digits < 1000
R	70	Operating hours of fan 3 - Digits > 1000
R	71	Operating hours of fan 3 - Digits < 1000
R	72	Operating hours of fan 4 - Digits > 1000
R	73	Operating hours of fan 4 - Digits < 1000
RW	74	Fan on hours alarm threshold x1000
R	75	Version of the application
R	76	Operating hours of fan 5 - Digits > 1000
R	77	Operating hours of fan 5 - Digits < 1000
R	78	Delay in restart after a blackout
R	79	Type of device connected to input 1
R	80	Type of device connected to input 2
R	81	Type of device connected to input 3
R	82	Type of device connected to input 4
R	83	Type of device connected to input 5
R	84	Type of device connected to input 6
R	85	Type of device connected to input 7
R	86	Type of device connected to input 8
R	87	Type of device connected to input 9
R	88	Type of device connected to input 10
R	89	Type of device connected to input 11
R	90	Type of device connected to input 12
R	91	Type of device connected to input 13
R	92	Type of device connected to input 14
R	93	Type of device connected to input 15
R	94	Type of device connected to input 16
R	95	Type of device connected to input 17
R	96	Type of device connected to input 18
R	97	Type of device connected to output 1
R	98	Type of device connected to output 2
R	99	Type of device connected to output 3
R	100	Type of device connected to output 4
R	101	Type of device connected to output 5
R	102	Type of device connected to output 6
R	103	Type of device connected to output 7
R	104	Type of device connected to output 8
R	105	Type of device connected to output 9
R	106	Type of device connected to output 10
R	107	Type of device connected to output 11
R	108	Type of device connected to output 12
R	109	Type of device connected to output 13
R	110	Type of device connected to output 14
R	111	Type of device connected to output 15
R	112	Type of device connected to output 16
R	113	Type of device connected to output 17
R	114	Type of device connected to output 18
R	115	Compressor thermal overload input alarm delay
RW	116	Type of refrigerant
R	118	Number active fun
RW	119	Diff pressure of change neutral zone
RW	120	Time min. request ON compressor in neutral zone
RW	121	Time min. request OFF compressor in neutral zone

14. Default configurations

The software manages a different installation, depending on the board installed.
The following shows the configurations for each type of board.
In any case, the position of the digital inputs/outputs for the various functions can be modified.
In common, the configurations have:

- Alarm relay;
- Suction probe
- Discharge probe
- General high pressure switch
- General low pressure switch.

14.1. Default for pCOXS board

Inputs	Devices
1 input per fan	2 fans
1 input per compressor	2 compressors
	0 load steps
	Fan inverters

Signal	Type of analogue inputs	Description
B1	universal analogue input 1*	suction pressure probe
B2	universal analogue input 2*	Discharge pressure probe
B3	NTC analogue input 3	
B4	analogue input 4 NTC	

* NTC, 0 to 1 V, 0 to 20 mA, 4 to 20 mA, 0 to 5 V

Table .13.1

Signal	Type of analogue output	Description
Y1	Analogue output no. 1 0 to 10 V	Fan inverters
Y2	Analogue output no. 2 0 to 10 V	~~Compressor inverters~~
Y3	Analogue output no. 3 PWM	

Table .13.2

Signal	Type of digital inputs	Description
ID1	Digital input no. 1	Thermal overload comp. 1
ID2	Digital input no. 2	Thermal overload comp. 2
ID3	Digital input no. 3	Klixon thermal overload, fan 1
ID4	Digital input no. 4	Klixon thermal overload, fan 2
ID5	Digital input no. 5	General low pressure switch
ID6	Digital input no. 6	General high pressure switch

Table .13.3

Signal	Type of digital outputs	Description
NO1	Normally open contact, relay no. 1	Compressor 1:
NO2	Normally open contact, relay no. 2	Compressor 2:
NO3	Normally open contact, relay no. 3	Fan 1
NO4	Normally open contact, relay no. 4	Fan 2
NO5	Normally open contact, relay no. 5	General alarm

Table .13.4

14.2. Default for SMALL Pco1, Pco2 board

Inputs	Devices
1 input per fan	4 fans
1 input per compressor	3 compressors
Liquid level alarm	0 load steps
	fan inverters

Signal	Type of analogue inputs	Description
B1	universal analogue input 1*	suction pressure probe
B2	universal analogue input 3*	Discharge pressure probe
B3	universal analogue input 3*	
B4	passive analogue input 4 (NTC, PT1000, ON/OFF)	general low pressure switch
B5	passive analogue input 5 (NTC, PT1000, ON/OFF)	general high pressure switch

* NTC, 0…1 V, 0…10 V, 0…20 Ma, 4…20 Ma, 0…5 V(Pco[1])

Table .13.5

Signal	Type of analogue outputs	Description
Y1	Analogue output no. 1 0 to 10 V	Fan inverters
Y2	Analogue output no. 2 0 to 10 V	
Y3	Analogue output no. 3 PWM (only pCO[1])	

Table .13.6

Signal	Type of digital inputs	Description
ID1	Digital input no. 1	Thermal overload comp. 1
ID2	Digital input no. 2	Thermal overload comp. 2
ID3	Digital input no. 3	Thermal overload comp. 3
ID4	Digital input no. 4	Liquid level
ID5	Digital input no. 5	Klixon thermal overload, fan 4
ID6	Digital input no. 6	Klixon thermal overload, fan 3
ID7	Digital input no. 7	Klixon thermal overload, fan 2
ID8	Digital input no. 8	Klixon thermal overload, fan 1

Table .13.7

Signal	Type of digital outputs	Description
NO1	Normally open contact, relay no. 1	Compressor 1:
NO2	Normally open contact, relay no. 2	Compressor 2:
NO3	Normally open contact, relay no. 3	Compressor 3:
NO4	Normally open contact, relay no. 4	General alarm
NO5	Normally open contact, relay no. 5	Fan 4
NO6	Normally open contact, relay no. 6	Fan 3
NO7	Normally open contact, relay no. 7	Fan 2
NO8	Normally open contact, relay no. 8	Fan 1

Table .13.8

14.3. Default for pCO1, pCO2 MEDIUM board

Inputs	Devices
1 input per fan	4 fans
1 compressor thermal overload and 1 oil differential	4 compressors
Liquid level alarm	1 load step per compressor
ON/OFF from digital input	fan inverters

Signal	Type of analogue inputs	Description
B1	Universal analogue input 1*	Suction pressure probe
B2	Universal analogue input 2*	Discharge pressure probe
B3	Universal analogue input 2*	
B4	Passive analogue input 4 (NTC, PT1000, ON/OFF)	General low pressure switch
B5	Passive analogue input 5 (NTC, PT1000, ON/OFF)	General high pressure switch

* NTC, 0 to 1 V, 0 to 10 V, 0 to 20 mA, 4 to 20 mA

Table 13.9

Signal	Type of analogue inputs	Description
Y1	Analogue output no. 1 0 to 10 V	Fan inverters
Y2	Analogue output no. 2 0 to 10 V	
Y3	Analogue output no. 3 PWM (only pCO[1])	

Table 13.10

Signal	Type of analogue inputs	Description
ID1	Digital input no. 1	Thermal overload comp. 1
ID2	Digital input no. 2	Thermal overload comp. 2
ID3	Digital input no. 3	Thermal overload comp. 3
ID4	Digital input no. 4	Thermal overload comp. 4
ID5	Digital input no. 5	Oil differential 1
ID6	Digital input no. 6	Oil differential 2
ID7	Digital input no. 7	Oil differential 3
ID8	Digital input no. 8	Oil differential 4
ID9	Digital input no. 9	Liquid level
ID10	Digital input no. 10	ON/OFF from digital input
ID11	Digital input no. 11	Klixon thermal overload, fan 4
ID12	Digital input no. 12	Klixon thermal overload, fan 3
ID13	Digital input 13	Klixon thermal overload, fan 2
ID14	Digital input 14	Klixon thermal overload, fan 1

Table 13.11

Signal	Type of digital outputs	Description
NO1	Normally open contact, relay no. 1	Compressor 1:
NO2	Normally open contact, relay no. 2	Load step 1 compressor 1
NO3	Normally open contact, relay no. 3	Compressor 2:
NO4	Normally open contact, relay no. 4	Load step 1 compressor 2
NO5	Normally open contact, relay no. 5	Compressor 3:
NO6	Normally open contact, relay no. 6	Load step 1 compressor 3
NO7	Normally open contact, relay no. 7	Compressor 4:
NO8	Normally open contact, relay no. 8	Load step 1 compressor 4
NO9	Normally open contact, relay no. 9	General alarm
NO10	Normally open contact, relay no. 10	Fan 4
NO11	Normally open contact, relay no. 11	Fan 3
NO12	Normally open contact, relay no. 12	Fan 2
NO13	Normally open contact, relay no. 13	Fan 1

Table 13.12

14.4. Default for pCO2 LARGE board

Inputs	Devices
1 input per fan	4 fans
1 thermal overload, 1 oil differential, H/L pressure switch per compressor	5 compressors
Liquid level alarm	1 load step per compressor
	fan inverters

Signal	Type of analogue inputs	Description
B1	Universal analogue input 1*	Suction pressure probe
B2	Universal analogue input 2*	Discharge pressure probe
B3	Universal analogue input 3*	
B4	Passive analogue input 4 (NTC, PT1000, ON/OFF)	General low pressure switch
B5	Passive analogue input 5 (NTC, PT1000, ON/OFF)	General high pressure switch
B9	Passive analogue input 9 (NTC, PT1000, ON/OFF)	Klixon thermal overload, fan 1
B10	Passive analogue input 10 (NTC, PT1000, ON/OFF)	Klixon thermal overload, fan 2

Table .13.3

Signal	Type of analogue outputs	Description
Y1	Analogue output no. 1 0 to 10 V	Fan inverters
Y2	Analogue output no. 2 0 to 10 V	~~Compressor inverters~~

Table .13.14

Signal	Type of digital inputs	Description
ID1	Digital input no. 1	Thermal overload comp. 1
ID2	Digital input no. 2	Thermal overload comp. 2
ID3	Digital input no. 3	Thermal overload comp. 3
ID4	Digital input no. 4	Thermal overload comp. 4
ID5	Digital input no. 5	Thermal overload comp. 5
ID6	Digital input no. 6	Oil differential 1
ID7	Digital input no. 7	Oil differential 2
ID8	Digital input no. 8	Oil differential 3
ID9	Digital input no. 9	Oil differential 4
ID10	Digital input no. 10	Oil differential 5
ID11	Digital input no. 11	High-low pressure switch 1
ID12	Digital input no. 12	High-low pressure switch 2
ID13	Digital input 13	High-low pressure switch 3
ID14	Digital input 14	High-low pressure switch 4
ID15	Digital input 15	High-low pressure switch 5
ID16	Digital input 16	Liquid level alarm
ID17	Digital input 17	Klixon thermal overload, fan 4
ID18	Digital input 18	Klixon thermal overload, fan 3

Table .13.15

Signal	Type of digital outputs	Description
NO1	Normally open contact, relay no. 1	Compressor 1
NO2	Normally open contact, relay no. 2	Load step 1 compressor 1
NO3	Normally open contact, relay no. 3	Compressor 2
NO4	Normally open contact, relay no. 4	Load step 1 compressor 2
NO5	Normally open contact, relay no. 5	Compressor 3
NO6	Normally open contact, relay no. 6	Load step 1 compressor 3
NO7	Normally open contact, relay no. 7	Compressor 4
NO8	Normally open contact, relay no. 8	Load step 1 compressor 4
NO9	Normally open contact, relay no. 9	Compressor 5
NO10	Normally open contact, relay no. 10	Load step 1 compressor 5
NO11	Normally open contact, relay no. 11	/
NO12	Normally open contact, relay no. 12	/
NO13	Normally open contact, relay no. 13	/
NO14	Normally open contact, relay no. 14	General alarm
NO15	Normally open contact, relay no. 15	Fan 4
NO16	Normally open contact, relay no. 16	Fan 3
NO17	Normally open contact, relay no. 17	Fan 2
NO18	Normally open contact, relay no. 18	Fan 1

Table .13.16

15. Possible configurations

Number of inputs and outputs available for the type of board used:

Type of board	Number of digital inputs	Number of digital outputs
pCO^{XS}	6	5
pCO^1-pCO^2 SMALL	8	8
pCO^1-pCO^2 MEDIUM	14	13
pCO^2 LARGE	18 + 4 analogue inputs selected as ON/OFF	18

Table .14.1

The table does **not** include

1. Liquid level input
2. Common oil differential input
3. Common fan thermal overload input
4. Discharge pressure switch input
5. Suction pressure switch input
6. Input for ON/OFF from digital input
7. Input for setpoint variation from digital input
8. Alarm relay
9. Auxiliary pump

Key to the table

Cmp	Compressors
P	Load steps
Fan	Fans
Board ( )	Type of board recommended; in brackets is the recommended number of inputs per compressor
Free inputs	Inputs still available for the type of board
Outputs used	Number of relays used

The table below shows the most suitable board based on the devices configured.

Cmp	P	Fan	Board	Free inputs	Outputs used
0	0	0	pCO^{XS} (3)	6	0
0	0	1	pCO^{XS} (3)	5	1
0	0	2	pCO^{XS} (3)	4	2
0	0	3	pCO^{XS} (3)	3	3
0	0	4	pCO^{XS} (3)	2	4
0	0	5	pCO^{XS} (3)	1	5
0	0	6	SMALL (3)	2	6
0	0	7	SMALL (3)	1	7
0	0	8	SMALL (3)	0	8
0	0	9	MEDIUM (3)	7	9
0	0	10	MEDIUM (3)	6	10
0	0	11	MEDIUM (3)	5	11
0	0	12	MEDIUM (3)	4	12
0	0	13	MEDIUM (3)	3	13
0	0	14	LARGE (3)	8	14
0	0	15	LARGE (3)	7	15
0	0	16	LARGE (3)	6	16
1	0	0	pCO^{XS} (3)	3	1
1	0	1	pCO^{XS} (3)	2	2
1	0	2	pCO^{XS} (3)	1	3
1	0	3	pCO^{XS} (3)	0	4
1	0	4	pCO^{XS} (2)	0	5
1	0	5	SMALL (3)	0	6
1	1	0	pCO^{XS} (3)	3	2
1	1	1	pCO^{XS} (3)	2	3
1	1	2	pCO^{XS} (3)	1	4
1	1	3	pCO^{XS} (3)	0	5
1	1	4	SMALL (3)	1	6
1	1	5	SMALL (3)	0	7
1	1	6	SMALL (2)	0	8
1	1	7	MEDIUM (3)	6	9
1	1	8	MEDIUM (3)	5	10
1	1	9	MEDIUM (3)	4	11
1	1	10	MEDIUM (3)	3	12
1	1	11	MEDIUM (3)	2	13
1	1	12	LARGE (3)	7	14
1	1	13	LARGE (3)	6	15
1	1	14	LARGE (3)	5	16

Cmp	P	Fan	Board	Free inputs	Outputs used
1	1	15	LARGE (3)	4	17
1	1	16	LARGE (3)	3	18
1	2	0	pCO^{XS} (3)	3	3
1	2	1	pCO^{XS} (3)	2	4
1	2	2	pCO^{XS} (3)	1	5
1	2	3	SMALL (3)	2	6
1	2	4	SMALL (3)	1	7
1	2	5	SMALL (3)	0	8
1	2	6	MEDIUM (3)	7	9
1	2	7	MEDIUM (3)	6	10
1	2	8	MEDIUM (3)	5	11
1	2	9	MEDIUM (3)	4	12
1	2	10	MEDIUM (3)	3	13
1	2	11	LARGE (3)	8	14
1	2	12	LARGE (3)	7	15
1	2	13	LARGE (3)	6	16
1	2	14	LARGE (3)	5	17
1	2	15	LARGE (3)	4	18
1	3	0	pCO^{XS} (3)	3	4
1	3	1	pCO^{XS} (3)	2	5
1	3	2	SMALL (3)	3	6
1	3	3	SMALL (3)	2	7
1	3	4	SMALL (3)	1	8
1	3	5	MEDIUM (3)	8	9
1	3	6	MEDIUM (3)	7	10
1	3	7	MEDIUM (3)	6	11
1	3	8	MEDIUM (3)	5	12
1	3	9	MEDIUM (3)	4	13
1	3	10	LARGE (3)	9	14
1	3	11	LARGE (3)	8	15
1	3	12	LARGE (3)	7	16
1	3	13	LARGE (3)	6	17
1	3	14	LARGE (3)	5	18
2	0	0	pCO^{XS} (3)	0	2
2	0	1	pCO^{XS} (2)	1	3
2	0	2	pCO^{XS} (2)	0	4
2	0	3	pCO^{XS} (1)	1	5
2	0	4	SMALL (2)	0	6
2	0	5	SMALL (1)	1	7

Cmp	P	Fan	Board	Free inputs	Outputs used
2	0	6	SMALL (1)	0	8
2	0	7	MEDIUM (3)	3	9
2	0	8	MEDIUM (3)	2	10
2	0	9	MEDIUM (2)	3	11
2	0	10	MEDIUM (2)	2	12
2	0	11	MEDIUM (1)	3	13
2	0	12	LARGE (3)	4	14
2	0	13	LARGE (3)	3	15
2	0	14	LARGE (3)	2	16
2	0	15	LARGE (3)	1	17
2	0	16	LARGE (3)	0	18
2	1	0	pCO^{XS} (3)	0	4
2	1	1	pCO^{XS} (2)	1	5
2	1	2	SMALL (3)	0	6
2	1	3	SMALL (2)	1	7
2	1	4	SMALL (2)	0	8
2	1	5	MEDIUM (3)	5	9
2	1	6	MEDIUM (3)	4	10
2	1	7	MEDIUM (3)	3	11
2	1	8	MEDIUM (3)	2	12
2	1	9	MEDIUM (2)	3	13
2	1	10	LARGE (3)	6	14
2	1	11	LARGE (3)	5	15
2	1	12	LARGE (3)	4	16
2	1	13	LARGE (3)	3	17
2	1	14	LARGE (3)	2	18
2	2	0	SMALL (3)	2	6
2	2	1	SMALL (3)	1	7
2	2	2	SMALL (3)	0	8
2	2	3	MEDIUM (3)	7	9
2	2	4	MEDIUM (3)	6	10
2	2	5	MEDIUM (3)	5	11
2	2	6	MEDIUM (3)	4	12
2	2	7	MEDIUM (3)	3	13
2	2	8	LARGE (3)	8	14
2	2	9	LARGE (3)	7	15
2	2	10	LARGE (3)	6	16
2	2	11	LARGE (3)	5	17
2	2	12	LARGE (3)	4	18
2	3	0	SMALL (3)	2	8
2	3	1	MEDIUM (3)	9	9
2	3	2	MEDIUM (3)	8	10
2	3	3	MEDIUM (3)	7	11
2	3	4	MEDIUM (3)	6	12
2	3	5	MEDIUM (3)	5	13
2	3	6	LARGE (3)	10	14
2	3	7	LARGE (3)	9	15
2	3	8	LARGE (3)	8	16
2	3	9	LARGE (3)	7	17
2	3	10	LARGE (3)	6	18
3	0	0	pCO^{XS} (2)	0	3
3	0	1	pCO^{XS} (1)	2	4
3	0	2	pCO^{XS} (1)	1	5
3	0	3	SMALL (1)	2	6
3	0	4	SMALL (1)	1	7
3	0	5	SMALL (1)	0	8
3	0	6	MEDIUM (2)	4	9
3	0	7	MEDIUM (2)	3	10
3	0	8	MEDIUM (2)	2	11
3	0	9	MEDIUM (1)	4	12
3	0	10	MEDIUM (1)	3	13
3	0	11	LARGE (3)	2	14
3	0	12	LARGE (3)	1	15
3	0	13	LARGE (3)	0	16
3	0	14	LARGE (2)	2	17
3	0	15	LARGE (2)	1	18
3	1	0	SMALL (2)	2	6
3	1	1	SMALL (2)	1	7
3	1	2	SMALL (2)	0	8
3	1	3	MEDIUM (3)	4	9
3	1	4	MEDIUM (3)	3	10
3	1	5	MEDIUM (3)	2	11
3	1	6	MEDIUM (2)	4	12
3	1	7	MEDIUM (2)	3	13
3	1	8	LARGE (3)	5	14
3	1	9	LARGE (3)	4	15
3	1	10	LARGE (3)	3	16
3	1	11	LARGE (3)	2	17
3	1	12	LARGE (3)	1	18
3	2	0	MEDIUM (3)	7	9
3	2	1	MEDIUM (3)	6	10
3	2	2	MEDIUM (3)	5	11
3	2	3	MEDIUM (3)	4	12
3	2	4	MEDIUM (3)	3	13
3	2	5	LARGE (3)	8	14
3	2	6	LARGE (3)	7	15
3	2	7	LARGE (3)	6	16
3	2	8	LARGE (3)	5	17
3	2	9	LARGE (3)	4	18
3	3	0	MEDIUM (3)	7	12
3	3	1	MEDIUM (3)	6	13
3	3	2	LARGE (3)	11	14
3	3	3	LARGE (3)	10	15
3	3	4	LARGE (3)	9	16
3	3	5	LARGE (3)	8	17
3	3	6	LARGE (3)	7	18
4	0	0	pCO^{XS} (1)	2	4
4	0	1	pCO^{XS} (1)	1	5
4	0	2	SMALL (1)	2	6
4	0	3	SMALL (1)	1	7
4	0	4	SMALL (1)	0	8
4	0	5	MEDIUM (2)	3	9
4	0	6	MEDIUM (2)	2	10
4	0	7	MEDIUM (1)	5	11
4	0	8	MEDIUM (1)	4	12
4	0	9	MEDIUM (1)	3	13
4	0	10	LARGE (3)	0	14
4	0	11	LARGE (2)	3	15
4	0	12	LARGE (2)	2	16
4	0	13	LARGE (2)	1	17
4	0	14	LARGE (2)	0	18
4	1	0	SMALL (2)	0	8
4	1	1	MEDIUM (3)	3	9
4	1	2	MEDIUM (3)	2	10
4	1	3	MEDIUM (2)	5	11
4	1	4	MEDIUM (2)	4	12
4	1	5	MEDIUM (2)	3	13
4	1	6	LARGE (3)	4	14
4	1	7	LARGE (3)	3	15
4	1	8	LARGE (3)	2	16
4	1	9	LARGE (3)	1	17
4	1	10	LARGE (3)	0	18
4	2	0	MEDIUM (3)	4	12
4	2	1	MEDIUM (3)	3	13
4	2	2	LARGE (3)	8	14
4	2	3	LARGE (3)	7	15
4	2	4	LARGE (3)	6	16
4	2	5	LARGE (3)	5	17
4	2	6	LARGE (3)	4	18
4	3	0	LARGE (3)	10	16
4	3	1	LARGE (3)	9	17
4	3	2	LARGE (3)	8	18
5	0	0	pCO^{XS} (1)	1	5
5	0	1	SMALL (1)	2	6
5	0	2	SMALL (1)	1	7
5	0	3	SMALL (1)	0	8
5	0	4	MEDIUM (2)	2	9
5	0	5	MEDIUM (1)	6	10
5	0	6	MEDIUM (1)	5	11
5	0	7	MEDIUM (1)	4	12
5	0	8	MEDIUM (1)	3	13
5	0	9	LARGE (2)	3	14
5	0	10	LARGE (2)	2	15
5	0	11	LARGE (2)	1	16
5	0	12	LARGE (2)	0	17
5	0	13	LARGE (1)	4	18

Cmp	P	Fan	Board	Free inputs	Outputs used
5	1	0	MEDIUM (2)	6	10
5	1	1	MEDIUM (2)	5	11
5	1	2	MEDIUM (2)	4	12
5	1	3	MEDIUM (2)	3	13
5	1	4	LARGE (3)	3	14
5	1	5	LARGE (3)	2	15
5	1	6	LARGE (3)	1	16
5	1	7	LARGE (3)	0	17
5	1	8	LARGE (2)	4	18
5	2	0	LARGE (3)	7	15
5	2	1	LARGE (3)	6	16
5	2	2	LARGE (3)	5	17
5	2	3	LARGE (3)	4	18
6	0	0	SMALL (1)	2	6
6	0	1	SMALL (1)	1	7
6	0	2	SMALL (1)	0	8
6	0	3	MEDIUM (1)	7	9
6	0	4	MEDIUM (1)	6	10
6	0	5	MEDIUM (1)	5	11
6	0	6	MEDIUM (1)	4	12
6	0	7	MEDIUM (1)	3	13
6	0	8	LARGE (2)	2	14
6	0	9	LARGE (2)	1	15
6	0	10	LARGE (2)	0	16
6	0	11	LARGE (1)	5	17
6	0	12	LARGE (1)	4	18
6	1	0	MEDIUM (2)	4	12
6	1	1	MEDIUM (2)	3	13
6	1	2	LARGE (3)	2	14
6	1	3	LARGE (3)	1	15
6	1	4	LARGE (3)	0	16
6	1	5	LARGE (2)	5	17
6	2	0	LARGE (3)	4	18

Table .14.2

16. Glossary

Suction: pressure or temperature measured at the inlet to the compressors. It is an analogue value.
Proportional band: this defines a temperature (or pressure) zone around the set point within which the system manages the control devices.
Buzzer: audible buzzer fitted on the external terminals; this emits a sound in the event of alarms, or if the limits for setting the parameters are exceeded. The Built-in or PGD0 terminals are not equipped with it.
Differential: defines a hysteresis pressure (or temperature) value of the corresponding setpoint.
Step: this defines an area of the proportional band (temperature or pressure) inside which a device is on, and at the same time also defines the activation and deactivation values of the device.
HP: high pressure
Screen index: alphanumeric index located in the top right of every screen.
LP: low pressure
Outlet: pressure or temperature measured at the outlet to the compressors. It is an analogue value.
Screen: the page shown on the display of the terminal.
Branch – loop: series of screens that concern the same subject and that can be easily scrolled by pressing the arrow buttons; the branches are accessed by pressing one of the buttons on the terminal, which displays the first screen in the loop.
Range: range of values allowed for a parameter.
Set point: defines a pressure (or temperature) value to be met; the system activates or deactivates the devices until the measured value equals the setpoint.
Buffer (memory): memory on the board used to save the default values set by CAREL for all the parameters. Permanent memory even without power.
Upload: is the operation with which the application software is copied from the computer or programming key onto the pCO^1- pCO^{XS} - pCO^2 boards.
Analogue value: total value with decimal sign and point.
Digital value: value with only two sates.
Integer: integer without decimal point.

CAREL

CAREL S.p.A.
Via dell'Industria, 11 - 35020 Brugine - Padova
(Italy)
Tel. (+39) 049.9716611 Fax (+39) 049.9716600
http://www.carel.com - e-mail: carel@carel.com

Agency:

Cod. CAREL +030221991 Rel.2.6 dated 01/04/09