pCO^3 universal stage controller

ENG

User manual

Manual version: 1.0 of 03/04/08
Program code: FLSTDmIU0F

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Contents

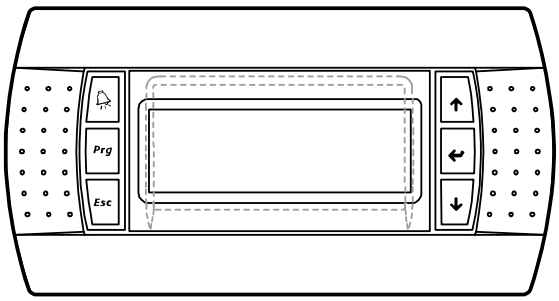
1. FEATURES OF THE PROGRAM

The program, compatible with the pCO^3 medium and pGD1 terminal (6 or 15 buttons), can manage up to 12 devices, on 10 digital outputs and/or 2 analogue outputs, with one or two probes.
The main characteristics of the system are the following:

- display and control of the values measured;
- the number and type of devices controlled can be configured;
- alarms highlighted on the display and by audible signal (buzzer);
- configuration parameters (number of devices, times, etc.) and operating parameters (set point, differential, etc.) can be set, with password-protected access;
- printouts of alarms and, periodically, the status of the main unit variables;
- energy saving by time band settings (secondary set point);
- connection to supervisor/telemaintenance serial line (Carel or Modbus protocol)

2. USER INTERFACE

2.1 6-button pGD1 terminal



ALARM | UP
PRG | ENTER
ESC | DOWN

Fig. 2.a

Symbol	Button	Description
	ALARM	Displays the alarms, manually resets the alarms and mutes the buzzer. If the button is lit up (red), it means that at least one alarm is active.
	UP ARROW	If the cursor is in the top left corner, scrolls the screens in the same group upwards; if the cursor is in a setting field, increases the value.
	DOWN ARROW	If the cursor is in the top left corner, scrolls the screens in the same group downwards; if the cursor is in a setting field, decreases the value.
	ENTER	Moves the cursor from the top left corner to the setting field. In this position, confirms the set value and moves to the next parameter
Prg	PROGRAM	Accesses the sliding menu to select the group of parameters to be displayed/set (access to the parameters is confirmed by pressing Enter)
Prg + Esc	PROGRAM + ESC	Sets the default value

Tab.2.a

2.2 15-button pGD1 terminal

Fig.2.b

Button		Description
Menu	MENU	Displays the values measured by probe 1 and 2, as well as their conversion, from pressure to temperature values
	MAINTENANCE	Sets the language, accesses the values corresponding to the counters, the manual operation of the devices connected, and the calibration of the probes
	PRINTER	Accesses the group of parameters for managing the printer (where featured)
I/O	INPUTS & OUTPUTS	Displays the status of the inputs and outputs, both digital and analogue
	CLOCK	Displays/sets the clock and the time bands with set point variation
Set	SET POINT	Displays and sets the set point
Prg	PROGRAM	Accesses the settings of the various operating parameters (protectors, thresholds) and unit configuration parameters
Menu + Prg	MENU + PROGRAM	Sets the default value
?	INFO	Not used
(RED button)	HEATING	Not used
(BLUE button)	COOLING	Not used

Tab. 2.b

Silicone rubber buttons

Button		Description
on/off	ON/OFF	Switches the unit on/off
alarm	ALARM	Displays the alarms, manually resets the alarms and mutes the buzzer. If the button is lit up (red), it means that at least one alarm is active.
	UP ARROW	If the cursor is in the top left corner scrolls the screens in the same group upwards; if the cursor is in a setting field, increases the value.
	DOWN ARROW	If the cursor is in the top left corner scrolls the screens in the same group downwards; if the cursor is in a setting field, decreases the value.
enter	ENTER	Moves the cursor from the top left corner to the setting field. In this position, confirms the set value and moves to the next parameter

2.3 Display

Key:

Compressor on

Compressor off

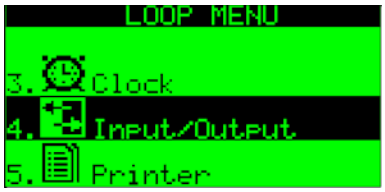
Fan on

Fan off

Initial setup

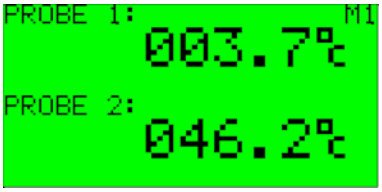
Whenever the pCO[3] is powered up, all the LEDs on the display light up, and the CAREL logo is displayed for a few seconds, after which the probe readings are displayed and only the LEDs relating to operation are on.

Display menus - *Prg* button



If one of the two probes has not been selected (P1 or P24=ABSENT) the symbol "---" is displayed instead of the reading.

The ↑/↓ buttons are used to display the corresponding temperature reading (°C or °F, according to P39), range -30/50 °C.



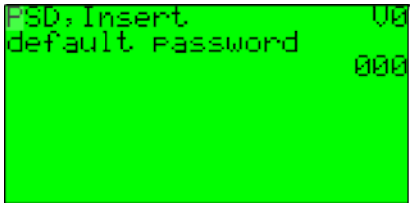
Installing the default values

Automatic

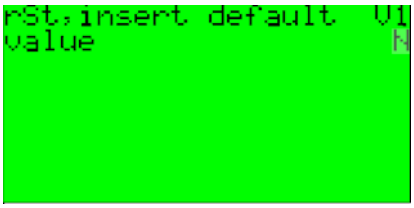
the software features a function that automatically installs the default values when the board is powered up;

Manual (recommended)

press the MENU + ESC buttons together for one second, until the following screen is shown



type 55 and confirm by pressing ENTER, then select Y to reset the values.



3. LIST OF INPUTS / OUTPUTS

3.1 Analogue inputs

	pCO³ Medium	
Reference	Description	Connectable devices
B1	Probe 1	NTC and pressure probes (0/1 Vdc, 0/5 Vdc, 0/10 Vdc, 4/20 mA)
B2	Probe 2	NTC and pressure probes (0/1 Vdc, 0/5 Vdc, 0/10 Vdc, 4/20 mA)
B3	Set point variation / ambient air temperature	NTC (According to Probe 1 type / NTC)
B4	Remote ON/OFF	On/Off

Tab. 3.a

3.2 Digital inputs

	pCO³ Medium
Reference	Description
ID1	Shutdown device 1 / High pressure switch 1 / antifreeze
ID2	Shutdown device 2 / High pressure switch 2 / antifreeze
ID3	Shutdown device 3 / High pressure switch 3 / antifreeze
ID4	Shutdown device 4 / High pressure switch 4 / antifreeze
ID5	Shutdown device 5 / High pressure switch 5 / antifreeze
ID6	Shutdown device 6 / High pressure switch 6 / antifreeze
ID7	Shutdown device 7 / High pressure switch 7 / antifreeze
ID8	Shutdown device 8 / High pressure switch 8 / antifreeze
ID9	Shutdown device 9 / High pressure switch 9 / antifreeze
ID10	Shutdown device 10 / High pressure switch 10 / antifreeze
ID11	Shutdown fan inverter(Shutdown device 11/ fan inverter)
ID12	Low pressure switch/flow switch

Tab. 3.b

3.3 Digital outputs

	pCO³ Medium
Reference	Description
DO1	Device 1
DO2	Device 2
DO3	Device 3
DO4	Device 4
DO5	Device 5
DO6	Device 6
DO7	Device 7
DO8	General alarm
DO9	Device 8
DO10	Device 9
DO11	Device 10
DO12	--
DO13	--

Tab. 3.c

3.4 Analogue outputs

	pCO³ Medium
Reference	Description
Y0	Device 11 / Fan inverter
Y1	Compressor inverter

Tab. 3.d

4. LIST OF PARAMETERS

Below is a list of the parameters, divided by family, and the corresponding access password.
Note: some screens (display operating hours, reset hours, manual operation, probe limits etc.) are only visible if the corresponding device, probe or function have been enabled.

 MAINTENANCE button

Ref.	Par.	Description	Range	Default	UOM	User value
		15-button terminal MAINTENANCE button	6-button PGD1 or Built-in terminal PRG and MAINTENANCE button in the menu			
A0		Display information on the software installed				
A1	t1	Display device 1 operating hours	0 to 999999		h	
A1	t2	Display device 2 operating hours	0 to 999999		h	
A1	t3	Display device 3 operating hours	0 to 999999		h	
A1	t4	Display device 4 operating hours	0 to 999999		h	
A1	t5	Display device 5 operating hours	0 to 999999		h	
A1	t6	Display device 6 operating hours	0 to 999999		h	
A1	t7	Display device 7 operating hours	0 to 999999		h	
A2	t8	Display device 8 operating hours	0 to 999999		h	
A2	t9	Display device 9 operating hours	0 to 999999		h	
A2	t10	Display device 10 operating hours	0 to 999999		h	
A2	t11	Display device 11/fan inverter operating hours	0 to 999999		h	
A3	t12	Display device 1 inverter/valve operating hours	0 to 999999		h	
A4	PSt	Password for accessing the subsequent parameters	0 to 999	22		
A5	th	Device operating hour threshold	0 to 999	0	hx1000	
A6	r1	Reset device 1 operating hours	N→deactivate Y→activate	N		
A6	r2	Reset device 2 operating hours	N→deactivate Y→activate	N		
A6	r3	Reset device 3 operating hours	N→deactivate Y→activate	N		
A6	r4	Reset device 4 operating hours	N→deactivate Y→activate	N		
A6	r5	Reset device 5 operating hours	N→deactivate Y→activate	N		
A6	r6	Reset device 6 operating hours	N→deactivate Y→activate	N		
A6	r7	Reset device 7 operating hours	N→deactivate Y→activate	N		
A7	r8	Reset device 8 operating hours	N→deactivate Y→activate	N		
A7	r9	Reset device 9 operating hours	N→deactivate Y→activate	N		
A7	r10	Reset device 10 operating hours	N→deactivate Y→activate	N		
A7	r11	Reset device 11/fan inverter operating hours	N→deactivate Y→activate	N		
A7	r12	Reset device 1 inverter/valve operating hours	N→deactivate Y→activate	N		
A8	n1	Device 1 in manual operation (if the unit is off)	N→deactivate Y→activate	N		
A8	n2	Device 2 in manual operation (if the unit is off)	N→deactivate Y→activate	N		
A8	n3	Device 3 in manual operation (if the unit is off)	N→deactivate Y→activate	N		
A8	n4	Device 4 in manual operation (if the unit is off)	N→deactivate Y→activate	N		
A8	n5	Device 5 in manual operation (if the unit is off)	N→deactivate Y→activate	N		
A8	n6	Device 6 in manual operation (if the unit is off)	N→deactivate Y→activate	N		

A8	n7	Device 7 in manual operation (if the unit is off)	N→deactivate Y→activate	N		
A9	n8	Device 8 in manual operation (if the unit is off)	N→deactivate Y→activate	N		
A9	n9	Device 9 in manual operation (if the unit is off)	N→deactivate Y→activate	N		
A9	n10	Device 10 in manual operation (if the unit is off)	N→deactivate Y→activate	N		
A9	n11	Device 11 or fan inverter in manual operation (if the unit is off)	N→deactivate Y→activate	N		
Aa	n12	Device 1 inverter/valve in manual operation (if the unit is off)	N→deactivate Y→activate	N		
Ab	CL1	Probe 1 calibration	-5.0 to 5.0	0	°C/F°/bar/Psi	
Ab	CL2	Probe 2 calibration	-5.0 to 5.0	0	°C/F°/bar/Psi	
Ac	CL3	Probe 3 calibration	-5.0 to 5.0	0	°C/°F	

Tab. 4.a

PRINTER button

Ref.	Par.	Description	Range	Default	UOM	User value
		15-button terminal PRINTER button	6-button PGD1 or Built-in terminal PRG and PRINTER button in the menu			
H0	Pr1	Request immediate printout	N→deactivate Y→activate	N		
H1	Pr2	Cyclical print time setting	0 to 999	60	Min.	

Tab. 4.b

I/O button

Ref.	Par.	Description	Range	Default	UOM	User value
		15-button terminal I/O button	6-button PGD1 or Built-in terminal PRG and INPUT/OUTPUT button in the menu			
I0	Ai1	Display value measured by probe 1	-99 to 99.9		°C/°F/bar/Psi	
I0	Ai2	Display value measured by probe 2	-99 to 99.9		°C/°F/bar/Psi	
I0	Ai3	Display value measured by probe 3 or set point variation for probe 1	-99÷99.9		°C/°F/bar/Psi	
I0	Ai4	Display remote On/Off status	D.IN closed= Off D.IN open= On	On		
I1	i1	Status of device shutdown alarm 1	Off→On	Off		
I1	i2	Status of device shutdown alarm 2	Off→On	Off		
I1	i3	Status of device shutdown alarm 3	Off→On	Off		
I1	i4	Status of device shutdown alarm 4	Off→On	Off		
I1	i5	Status of device shutdown alarm 5	Off→On	Off		
I1	i6	Status of device shutdown alarm 6	Off→On	Off		
I1	i7	Status of device shutdown alarm 7	Off→On	Off		
I2	i8	Status of device shutdown alarm 8	Off→On	Off		
I2	i9	Status of device shutdown alarm 9	Off→On	Off		
I2	i10	Status of device shutdown alarm 10	Off→On	Off		
I2	i11	Status of device shutdown alarm 11 / fan inverter	Off→On	Off		
I2	i12	Status of the low pressure alarm/flow switch	Off→On	Off		
I3	Ao1	Status of device 1/fan inverter	0.0 to 10.0		volt	
I3	Ao2	Status of device 1 inverter/valve	0.0 to 10.0		volt	
I4	o1	Status of device 1	Off→On			
I4	o2	Status of device 2	Off→On			
I4	o3	Status of device 3	Off→On			
I4	o4	Status of device 4	Off→On			
I4	o5	Status of device 5	Off→On			
I4	o6	Status of device 6	Off→On			
I4	o7	Status of device 7	Off→On			
I5	o8	Status of device 8	Off→On			
I5	o9	Status of device 9	Off→On			
I5	o10	Status of device 10	Off→On			
I5	o11	Status of device 11	Off→On			

Tab. 4.c

CLOCK button

Ref.	Par.	Description	Range	Default	UOM	User value
		15-button terminal	6-button PGD1 or Built-in terminal			
		CLOCK button	PRG and CLOCK button in the menu			
K0	PSC	Password for accessing the subsequent parameters	0 to 999	22		
K1	C6	Hour setting	0 to 23	0	h	
K1	C7	Minutes setting	0 to 59	0	min	
K1	C8	Day setting	1 to 31	0		
K1	C9	Month setting	0 to 99	0		
K1	C10	Year setting	0 to 99	0		
K2	C11	Time band start hours with secondary set point (if P41=Y)	0 to 23	0	h	
K2	C12	Time band end hours with secondary set point (if P41=Y)	0 to 24	24	h	
K2	C13	Enable Sunday with secondary set point (if P41=Y)	0→no; 1→yes	0		
K2	C14	Enable Monday with secondary set point (if P41=Y)	0→no; 1→yes	0		
K2	C15	Enable Tuesday with secondary set point (if P41=Y)	0→no; 1→yes	0		
K2	C16	Enable Wednesday with secondary set point (if P41=Y)	0→no; 1→yes	0		
K2	C17	Enable Thursday with secondary set point (if P41=Y)	0→no; 1→yes	0		
K3	C18	Enable Friday with secondary set point (if P41=Y)	0→no; 1→yes	0		
K3	C19	Enable Saturday with secondary set point (if P41=Y)	0→no; 1→yes	0		
K3	C20	Exclude daily time band (if P41=Y)	0 to 7	0		
K3	C21	Start daily time band exclusion (if P41=Y)	C11 to C12	0	h	
K3	C22	End daily time band exclusion (if P41=Y)	C21 to C12	0	h	

Tab. 4.d

SET POINT button

Ref.	Par.	Description	Range	Default	UOM	User value
		15-button terminal	6-button PGD1 or Built-in terminal			
		SET POINT button	PRG and SET POINT button in the menu			
S0	Sd1	Current set point	St3 to St4		°C/°F/bar/Psi	
S1	St1	St1 setting (probe 1 set point)	St3 to St4	2.5	°C/°F/bar/Psi	
S2	St2	St2 setting (probe 2 set point)	St5 to St6	16.0	°C/°F/bar/Psi	
S3	Si1	Probe 1 / valve inverter set point setting (only if P20=Y and P14=proportional band)	St3 to St4	2.5	°C/°F/bar/Psi	
S4	Si2	Fan inverter set point setting (only if P35=Y)	St5 to St6	16.0	°C/°F/bar/Psi	
S5	PSS	Password for accessing the subsequent parameters	0 to 999	22		
S6	St3	Minimum set point, probe 1	-99 to 99.9	0	°C/°F/bar/Psi	
S6	St4	Maximum set point, probe 1	-99 to 99.9	5.0	°C/°F/bar/Psi	
S7	St5	Minimum set point, probe 2	-99 to 99.9	10.0	°C/°F/bar/Psi	
S7	St6	Maximum set point, probe 2	-99 to 99.9	24.0	°C/°F/bar/Psi	
S8	St7	Secondary set point	-99 to 99.9	3.0	°C/°F/bar/Psi	
S9	d1	Probe 1 differential	0 to 20.0	0.5	°C/°F/bar/Psi	
Sa	d2	Probe 2 differential	0 to 20.0	2.0	°C/°F/bar/Psi	
Sb	d3	Device 1 / valve inverter differential	0 to 20.0	1.0	°C/°F/bar/Psi	
Sc	d4	Fan inverter differential (only if P35=Y)	0 to 20.0	2.0	°C/°F/bar/Psi	
Sd	Sr1	Device 1 inverter step (only if P20=Y and P14=dead zone)	0 to 10.0	0.2	Volt 10	
Sd	Sr2	Device 1 inverter deviation setting (only if P20=Y and P14=dead zone)	0 to 20.0	0	°C/°F/bar/Psi	
Se	Sr3	Minimum device 1 inverter signal (only if P20=Y)	0 to 10.0	0	Volt	
Sf	Sr4	Minimum device 1 inverter signal always applied (only if P20=Y)	0→deactivate 1→activate	0		
Sg	SH1	High threshold, probe 1	-99 to 99.9	5.0	°C/°F/bar/Psi	
Sg	SL1	Low threshold, probe 1	-99 to 99.9	1.0	°C/°F/bar/Psi	
Sh	SH2	High threshold, probe 2	-99 to 99.9	20.0	°C/°F/bar/Psi	
Sh	SL2	Low threshold, probe 2	-99 to 99.9	0	°C/°F/bar/Psi	
Si	dH1	High alarm delay, probe 1	0 to 999	0	min	
Si	dL1	Low alarm delay, probe 1	0 to 999	0	min	
Sj	dH2	High alarm delay, probe 2	0 to 999	0	min	
Sj	dL2	Low alarm delay, probe 2	0 to 999	0	min	
Sk	SC	Compensation set point (only if P22=Y, P23=Y)	-99 to 99.9	25.0	°C/°F	
Sk	dC	Compensation differential (only if P22=Y, P23=Y)	-50 to 50.0	5.0	°C/°F	
Sk	dt	Compensation delta (only if P22=Y, P23=Y)	-99 to 99.9	2.0	°C/°F	

Tab. 4.e

PROGRAMMING button

Ref.	Par.	Description	Range	Default	UOM	User value
		15-button terminal PROGRAMMING button	6-button PGD1 or Built-in terminal PRG and PROGRAMMING button in the menu			
P0	PSn	Password to access the programming branch	0 to 999	55		
P1	P1	Type of probe 1	NTC 0/1Vdc 0/10Vdc 4/20 mA 0/5Vdc Absent	4/20 mA		
P1	P2	Minimum value of probe 1 (active probe)	-0.5 to 30	-0.5	Bar/Psi	
P1	P3	Maximum value of probe 1 (active probe)	-0.5 to 30	7	Bar/Psi	
P1	P4	Number of probe 1 devices (only if P1≠Absent)	0 to 11	5		
P2	P5	Probe 1 devices forced on with active probe fault alarm (only if P1≠Absent and P4>0)	0 to P4	0		
P2	P6	Number of load steps	0 to 3	0		
P2	P7	Load step logic (only if P1≠Absent, P4 and P6>0)	n. energ. / n. de-energ.	(N.C.)		
P3	P8	Minimum time between activation of load steps on same compressor (only if P1≠Absent, P4 and P6>0)	0 to 999	10	s	
P3	P9	Compressor/load step activation (only if P1≠Absent, P4 and P6>0)	complete / partial	complete		
P4	P10	Minimum on time for probe 1 devices (only if P1≠Absent and P4>1)	0 to 999	60	s	
P4	P11	Minimum off time for probe 1 devices (only if P1≠Absent and P4>1)	0 to 999	120	s	
P5	P12	Minimum time between starts of probe 1 devices (only if P1≠Absent, P4>1 and P14=proportional band)	0 to 999	10	s	
P5	P13	Minimum time between starts of same probe 1 device (only if P1≠Absent and P4>0)	0 to 999	360	s	
P6	P14	Control with dead band or proportional band for probe 1 devices (only if P1≠Absent and P4>0)	dead z. / prop. band	dead zone		
P6	P15	Type of control for probe 1 devices (only if P1≠Absent, P4>0 and P14=proportional band)	P P+I	- (P)		
P7	P16	Integral time for management of probe 1 circuit (only if P1≠Absent, P4>0 and P15=P+I)	300 to 900	600	s	
P8	P17	Time between start requests for probe 1 devices (if P1≠Absent, P4>1 and P14=dead zone)	0 to 999	20	s	
P8	P18	Time between stop requests for probe 1 devices (if P1≠Absent, P4>0 and P14=dead zone)	0 to 999	10	s	
P9	P19	Enable rotation of probe 1 devices (only if P1≠Absent and P4>1)	not enable. FIFO time	FIFO		
Pa	P20	Enable device 1/valve inverter	N→deactivate/ Y→activate	N		
Pb	P21	Enable analogue input for set point variation (only if P1≠Absent, P4>0 and P22=N)	N→deactivate/ Y→activate	N		
Pc	P22	Enable outside air temperature probe B3 (only if P21=N)(only if P21=N, P1=NTC)	N→deactivate/ Y→activate	N		
Pd	P23	Enable compensation on probe 1 (only if P1≠Absent, P4>0, P21=N and P22=Y)	N→deactivate/ Y→activate	N		
Pe	P24	Type of probe 2	NTC 0/1Vdc 0/10Vdc 4/20 mA 0/5Vdc Absent	4/20 mA		
Pe	P25	Minimum value of probe 2 (active probe)	-0.5 to 30	0	Bar/Psi	
Pe	P26	Maximum value of probe 2 (active probe)	-0.5 to 30	30	Bar/Psi	
Pe	P27	Number of probe 2 devices (only if P24≠Absent)	0 to 11	5		
Pf	P28	Minimum time between starts of probe 2 devices (if P24≠Absent and P27>0)	0 to 999	2	s	
Pg	P29	Control with dead band or proportional band for probe 2 devices (only if P24≠Absent and P27>0)	dead z. / prop. band	dead zone		
Pg	P30	Type of control for probe 2 devices (only if P24≠Absent, P27>0 and P29=proportional band)	P P+I	P		
Ph	P31	Integral time for management of probe 2 circuit (only if P24≠Absent, P27>0 and P29=dead zone)	300 to 900	600	s	
Pi	P32	Time between start requests for probe 2 devices (only if P24≠Absent, P27>1 and P29=dead zone)	0 to 999	20	s	

Pi	P33	Time between stop requests for probe 2 devices (only if P24≠Absent, P27>0 and P29=dead zone)	0 to 999	10	s	
Pj	P34	Enable rotation of probe 2 devices (only if P24≠Absent and P27>1)	N→deactivate/ Y→activate	Y		
Pk	P35	Enable fan inverter	N→deactivate/ Y→activate	N		
Pl	P36	Low pressure / flow switch alarm delay (only if P4 and/or P27>0)	0 to 999	40	s	
Pm	P37	Enable autostart procedure	N→deactivate/ Y→activate	Y		
Pn	P38	Select type of refrigerant (only if P1≠Absent or NTC)	Not used R22 R134a NH3 R404a	R22		
Po	P39	Select display in °C or °F	°C °F	°C		
Po	P40	Select remote ON/OFF	N→deactivate/ Y→activate	N		
Po	P41	Enable secondary set point	N→deactivate/ Y→activate	N		
Po	P42	Enable printer	N→deactivate/ Y→activate	N		
Pp	P43	Serial address	0 to 999	1		
Pq	P44	Select alarms with automatic or manual reset	auto manual	auto		
Pr	P45	Alarm relay activation delay	0 to 999	0	min	
Ps	P46	Enable OFF button from unit on	N→deactivate/ Y→activate	N		
Pp	P47	Serial communication speed	1200 2400 4800 9600 19200	19200	baud	
Po	P48	Display in Bar or Psi	Bar Psi	BAR		
Pp	P51	Communication protocol	Carel Modbus	Carel		
Pu	P61	Probe 1 device deactivation mode	complete partial	complete		
Pu	P62	Select operating mode for probe1 devices (cool/heat)	cool heat	cooling		

Tab. 4.f

INFO button

Ref.	Par.	Description				
		Not used				

Tab. 4.g

(BLUE button) COOLING button

Ref.	Par.	Description				
		Not used				

Tab. 4.h

(RED button) HEATING button

Ref.	Par.	Description				
		Not used				

Tab. 4.i

5. DESCRIPTION OF THE PARAMETERS

PSt, PSC, PSS, PSn, PSD - password

The codes listed refer to the passwords of the Maintenance, Clock, Set point, Programming and Reset unit branches; these need to be entered to be able to access the subsequent parameters, specifically:

- 022 = maintenance, clock, set point;
- 055 = programming, reset unit

Note: *after modifying the parameters, switch the unit off for a few seconds and then back on again, to load the new settings.*

t1 to t12 - Display device hours

These values indicate the number of operating hours for the individual devices.
When the operating hour threshold is exceeded (th), this is signalled by alarms AL 001 to AL0 12.
Note: *when the fan inverter and device 1/valve inverter analogue outputs are used (parameters t11 and t12), the operating hours displayed refer to the count when the corresponding outputs have a value above 0 volts.*

th - Device operating hour thresholds

Once having exceeded this value, in the thousands of hours, a signal is displayed indicating the need for maintenance on the device in question. Assigning the value 0 disables the function.

n1 to n12 - Manual device operation

These screens are used to manually operate the individual devices bypassing the protection times, the rotation function and the values measured by the probes, yet while maintaining the related alarm management.
Note: *This function is visible and can only be activated if the unit is OFF.*
The LED flashing on the Menu button (display with 15 buttons) indicates that is the manual procedure has been activated.
If, after having pressed the Menu button, the "Up" or "Down" button is pressed for more than 2 seconds, the procedure is deactivated.
In any case, it ends automatically after 30 minutes.

CL1, CL2, CL3 – Probe calibration

These parameters are used to calibrate the probe readings, increasing (positive value) or decreasing (negative value) the values measured. The calibration offset can be set from -5 to +5, with precision to the tenth.

Pr1 - Request immediate print

This parameter is used the print the main data relating to the unit, such as the values measured by the probes, the active devices and the set point.

Pr2 - Cyclical print time setting

Indicates the cyclical print time, that is, the period set between one print cycle and the next.

Ai3 – Select analogue input B3

Parameter used to select the function of the third analogue input, between:

- set point variation, using an external resistor or potentiometer (P21=Y), or
- room temperature probe (set point compensation, P21=N and P22=Y)

i1 to i12 – Status of the digital inputs

Parameter used to display the status of the digital inputs.

C11 - C12 – Select start and end time bands with secondary set point

Examples of time band start and end hours

- C11=12, C12=16: the secondary set point is active from 12:00 to 15:59 (time band);
- C11=14 C12=9: the secondary set point is active from 14:00 to 08:59 the next day (time band straddling two days);
- C11=C12: the secondary set point is active for the entire day (daily time band).

IMPORTANT: *never set C11=C12=0.*

C20 - Exclude daily time band

The parameter is used to exclude the time band with the secondary set point for one or more selected days, where, respectively, C21 corresponds to the start hours and C22 to the end hours, with the following settings:

0 exclude time band not enabled;
1 Monday;
2 Tuesday;
3 Wednesday;
4 Thursday;
5 Friday;
6 Saturday;
7 Sunday;

C21 – C22 Select start and end time band exclusion with secondary set point

Examples of start and end time band exclusion times

- C21=12, C22=16: the secondary set point is inactive from 12:00 to 15:59 (time band);
- C21=14 C22=9: the secondary set point is inactive from 14:00 to 08:59 the next day (time band straddling two days);
- C21=C22: the secondary set point is not active for the entire day (daily time band).

Important: *do not enable time bands with the reduced set point and set point control from analogue input together.*

St3, St5 - Minimum set point
Minimum value allowed for the set point.
Note: Do not set the probe 1 set point below the value of St3 and the probe 2 set point below the value of St5.

St4, St6 - Maximum set point
Maximum value allowed for the set point.
Do not set the probe 1 set point above the value of St4 and the probe 2 set point above the value of St6.

St7 - Secondary set point
Secondary set point setting, that is valid when the time bands are enabled.

d1, d2 - Probe 1 and 2 device differentials
Settings of the differentials for the devices managed by probe 1 and 2 (excluding the inverters).

Fig. 5.a

d3, d4 - Inverter differentials
Operating range of the 0/10 Vdc outputs, respectively, device 1/valve and fans.

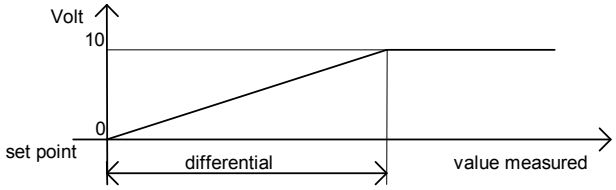


Fig. 5.b

Note: *control with proportional band must be selected for the circuit 1/valve inverter (P14=proportional band)*.

Sr1 - Device 1 inverter step
Establishes the inverter output increase and decrease values for device no. 1.

Sr2 - Device 1 inverter deviation
This parameter is fundamental for calculating the point where the inverter is activated for device no. 1.

Sr3 - Minimum device 1 / valve inverter output voltage
A minimum voltage can be applied to the inverter / valve output if the conditions require the application of a lower value than Sr3, overriding it with this value.

Sr4 - Minimum device 1 / valve inverter output voltage always applied
Setting Sr4 = 1, the value Sr3 is applied even when an alarm is present on this device or when there is no activation request.

SH1, SH2 - High alarm threshold
These values represent the high alarm threshold, for probe 1 and 2 respectively.

SL1, SL2 - Low alarm threshold
These values represent the low alarm threshold, for probe 1 and 2 respectively.

P1, P24 - Type of probes
Parameters used to select the type of probes, on B1 and B2 respectively, from the following options:
0 NTC temperature probe
1 0-1V pressure probe
2 0-10V pressure probe
3 4-20 mA pressure probe
4 0-5Vdc pressure probe
5 probe absent

P2, P25 – Minimum value of probe 1 and 2
Minimum value setting for the active probes.

P3, P26 – Upper limit probes 1 and 2
Maximum value setting for the active probes.

P4, P24 - Number of probe 1 and 2 devices

Select the number of devices managed, respectively, by probe 1 and 2 (0 to 11, excluding load steps).
Setting 11 devices means the load steps and the device 1/valve inverter are not managed.

NOTE:with 11 enalble devices it is not possible to have unloaders or inverter device 1/ valve.
On the follow table the management for the devices lag to probe 2 (fans).

	5 devices (DESABLE inverter fan)	5 devices (ENABLE inverter fan)
Device 1	Fan 1 (analog output Y1 - 0/5 Vdc)	Inverter fan (analog output Y1 - 0/10 Vdc)
Device 2	Fan 2 (relay 11)	Fan 2 (relay 11)
Device 3	Fan 3 (relay 10)	Fan 3 (relay 10)
Device 4	Fan 4 (relay 9)	Fan 4 (relay 9)
Device 5	Fan 5 (relay 7)	Fan 5 (relay 7)
Device 6		Fan 6 (relay 6)

P5 - Number of devices forced on with probe 1 fault

If probe 1 is not connected or faulty (AL014), this parameter indicates the minimum number of devices forced on.

P6 - Number of load steps

If the devices managed by probe 1 are compressors, one, two or three capacity-control stages can be selected, according to the outputs available.

P7 - Load step logic

If load steps are enabled, the operating logic of the dedicated outputs can be selected (normally energised or de-energised).

P8 - Minimum time between activation of load steps on same compressor

This establishes the minimum time that must elapse between the activation of two load steps on the same compressor.

P9 - Load step activation in complete/partial mode

COMPLETE MODE: the activation sequence is COMP. 1 → STEP 1 → COMP. 2 → STEP 2 etc...
while the deactivation sequence is STEP 2 → COMP. 2 → STEP 1 → COMP. 1
PARTIAL MODE: activation COMP. 1 → COMP. 2 → STEP 1 COMP. 1 → STEP 1 COMP. 2
Deactivation: STEP 2 COMP. 1 → STEP 1 COMP. 1 → COMP. 2 → COMP. 1

P10 - Minimum on time for probe 1 devices

Sets the minimum operating time (in seconds) for the devices in circuit 1. Once activated, these must remain on for this minimum time set.

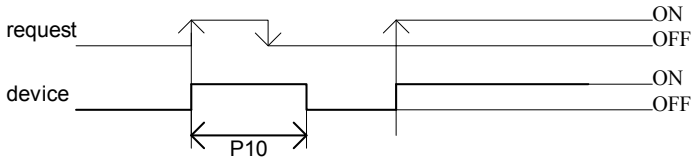


Fig. 5.c

P11 - Minimum off time for probe 1 devices

Sets the minimum off time for the devices in circuit 1. If since last shutdown the minimum time has not yet elapsed, the devices managed by probe 1 cannot be started.

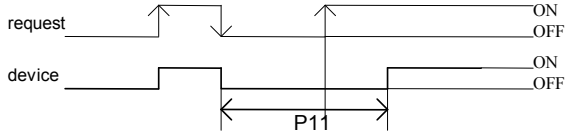


Fig. 5.d

P12 - Minimum time between starts of probe 1 devices

Represents the minimum time that must elapse between the activation of one device and the next, managed by probe 1, to avoid simultaneous starts.

Fig. 6.e

P13 - Minimum time between starts of same probe 1 device

Establishes the minimum time that must elapse between two activations of the same device, regardless of the value measured and the set point, thus limiting the number of activations per hour.
If, for example, the maximum number of activations per hour allowed is 10, simply set a value of 360 seconds to ensure this limit is observed.

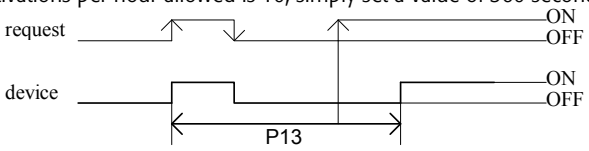


Fig. 5.f

P14, P29 - Control with proportional band or dead zone

Used to select the activation mode for the connected devices.
If proportional band is selected, the differential is divided into equal parts based on the number of devices being managed.
Example with 3 devices in a single circuit.

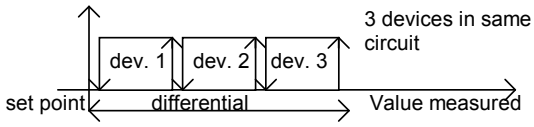


Fig. 5.g

With dead zone control, depending on the situation, no device is activated or deactivated inside the differential.
The activation point is reached when the value measured exceeds the dead zone, while the number of devices activated varies, depending on the time elapsed in this situation.
Deactivation, on the other hand, occurs when the value measured falls below the set point, and in this case too, depends on the time elapsed (see the related times).

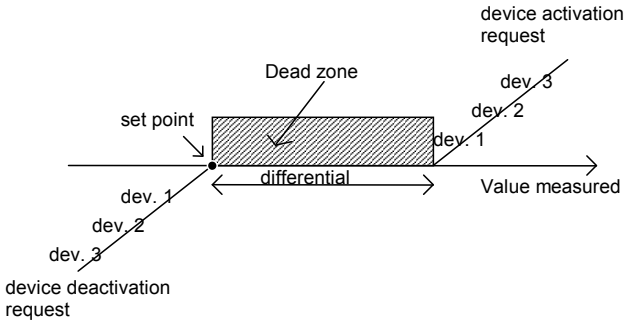


Fig. 5.h

P15, P30 - Type of control

Indicates the type of control applied (Proportional or Proportional + Integral), for circuit 1 and 2 respectively.

P16, P31 - Integral time

These parameters indicate the integral time, for circuit 1 and 2 respectively, with Proportional + Integral control.

P17, P32 - Time between start requests

Minimum time between successive requests to activate the devices managed by probe 1 and 2 respectively.

P18, P33 - Time between stop requests

As above, however referring to successive deactivation requests.

P19, P34 - Select device rotation

This parameter used to select the type of rotation, from the following options:
- disabled: the last device on is the first to stop.
- FIFO: the first device on is the first to stop.
- by time: the first device to start is the one with the lowest operating time, while the first to stop is the one with the highest operating time.

P20, P35 - Select device 1 / valve inverter

This parameter enables the inverter on device 1, controlled by probe 1 (dead zone), or alternatively a 0-10 Volt valve (proportional band).

situation 1 – Proportional band control

A set point (Si1) and differential (d3) need to be set, then when the value measured by probe 1 is less than or equal to the set point, the output relating to this device will be 0 volts. As the value gradually increases, the analogue output is increased proportionally, until reaching 10 volts when the value read is greater than or equal to (set point + differential).

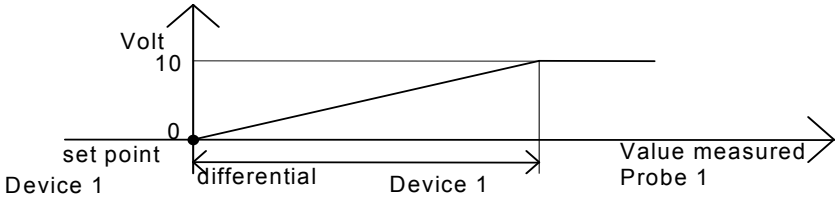


Fig. 5.i

situation 2 - Dead zone control

A deviation (Sr2) from the set point needs to be set.
The inverter output for device 1 is increased when the reading of probe 1 exceeds the set point St1 plus the deviation Sr2.
The output is decreased, on the other hand, when the reading of probe 1 is below the set point St1.
In the zone between these two situation, the inverter output remains unchanged.
The inverter output is increased/decreased each program cycle, that is, around every second, by the value Sr1.

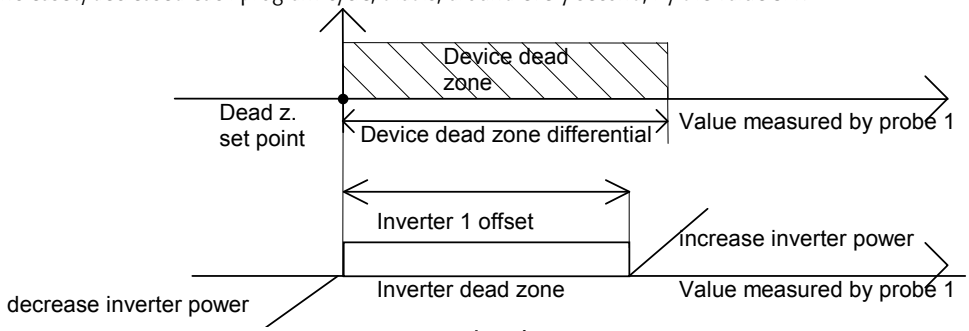


Fig. 5.l

Important: when the device 1 / valve inverter is enabled and dead zone control is active, the activation sequence will be as follows:

- device 1 is activated as soon as there is a start request;
- if the request persists, the inverter output for device 1 is increased;
- if the request is still present, and inverter output reaches 10 volts, other devices are activated one at a time, with rotation (if selected) and observing the set protection times.

The deactivation sequence is:

- the inverter output is decreased;
- when the inverter output is 0 volts, the other devices are deactivated one at a time, observing the set protection times and rotation;
- the last device to stop is device number 1.

P21 - Enable analogue input for set point variation

The set points of the devices managed by probe 1 can be changed using a potentiometer connected to terminals B3 and AVSS. The table below describes some resistance values (ohm) to be attributed to analogue input in order to achieve the corresponding values in psi, bar, °C or °F, depending on the required unit of measure.

Psi/bar/°C/°F	KOhm	Psi/bar/°C/°F	KOhm	Psi/bar/°C/°F	KOhm
-20	67.71	0	27.28	20	12.09
-15	53.39	5	22.05	25	10.00
-10	42.25	10	17.96	30	8.31
-5	33.89	15	14.68	35	6.94

P22 - Enable outside air temperature probe

Enables the use of an outside air temperature probe for the compensation of set point St1.

P23 - Enable compensation on probe 1

When parameter P22 is active, the compensation procedure can be enabled (in cooling) to vary set point St1 based on the value read by the outside air temperature probe.
More precisely, set point St1 is adjusted by adding (or subtracting) a proportional value based on the set compensation delta and the change in the outside air temperature, between two values defined by a compensation set point and differential. The maximum value that can be added (or subtracted) is equal to the compensation delta, see the figure.

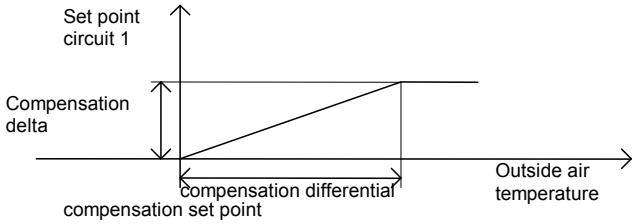


Fig. 5.m

P37 - Enable autostart procedure

This parameter enables the autostart procedure, that is, if the unit is ON before a power failure, when power returns it starts automatically.

P38 - Type of gas

Sets the type of gas used in the system.
- No selection
- R22
- R134a
- NH3
- R404a

P39 – Select °C or °F

Selects the unit of measure for the temperature:
- °C (Centigrade)
- °F (Fahrenheit)

Note: when switching from one unit to the other, the values measured are automatically converted.

P40 - Remote ON/OFF enabling signal

Used to switch the unit on and off using a remote signal connected to input B4, with the following logic:
contact open → unit off
contact closed → unit on

P41 – Enable secondary set point

Enables secondary set point so also the time band.

P42 - Enable printer

Enables the printer branch.

P43 – Serial address

Sets the identification number for the unit if connected to a supervisory and/or telemaintenance system.

P44 – Select alarms with automatic or manual reset

P44⇒AUTOMATIC
When one or more alarms are detected, the following occur:
- red LED on the "alarm" button lights up;
- buzzer on;
- alarm relay activated.

Pressing the "alarm" button mutes the buzzer and displays the alarm code/codes.
If the cause of alarm is no longer active, any devices that were previously deactivated resume normal operation, and the unit behaves as follows:
- the alarm relay changes status;
- the buzzer, if not muted by pressing the "alarm" button, is deactivated;
- the red "alarm" button LED flashes.

If in this situation other alarms are activated, the same sequence is repeated.
The alarm codes are stored in the memory, and can be displayed by pressing the "alarm" button and then the UP and/or DOWN arrows; if pressing the "alarm" button again, these are deleted and the red LED is switched off.

P44⇒MANUAL
See the initial sequence for P44⇒AUTOMATIC
In this case, if the causes of alarm are no longer present, the alarm relay remains active and the outputs affected are deactivated until the alarm codes are deleted, by pressing the "alarm" button again.
Same behaviour as P44⇒AUTOMATIC if new alarms are activated.

P45 - Alarm relay activation delay

A delay time can be set between the activation of an alarm and activation of the alarm relay.
If set to 0, the relay is activated immediately.

P46 - Enable ON/OFF button

This parameter is used to enable the operation of the ON/OFF button to switch the unit off.
If P46= 0, the unit can be switched on or off using the button; vice-versa, if set to 1, the unit can only be switched on.

P47 - Serial communication baud rate

This parameter used to select the baud rate for serial communication, between the following values:
- 1200 baud
- 2400 baud
- 4800 baud
- 9600 baud
- 19200 baud

P48 - Bar or Psi

Defines the unit of measure for the pressure values:
- Bar
- Psi

Note: when switching from one unit to the other, the values measured on the analogue inputs are automatically converted.

P51 - Type of protocol

This parameter is used to select the type of communication protocol:
- Carel
- Modbus

P61 - Device deactivation mode in circuit 1

If P61=Partial, during the deactivation phase first all the load steps are deactivated, and then the corresponding compressors. This procedure is useful when wanting to limit the stops and starts of the compressors, so as to extend their working life.
If P61=Complete, during the deactivation phase, the priority is given to energy saving.

Example: if the unit is set with:
3 compressors (P4)
2 load steps per compressor (P6)
N.O. load step logic (P7)
P61= partial
When all the devices are on and a deactivation request is sent, first all the load steps will be deactivated and only after that the compressors. Consequently, the situation may arise in which 3 compressors are operating at 33% capacity, see the following table.

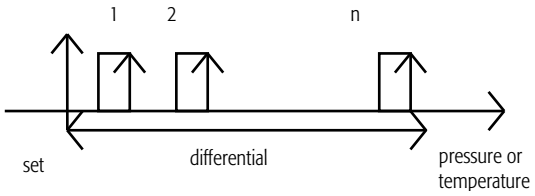
Step	Request	Device	Total number of devices on
1	activation	start compressor 1	1 compressor
2	activation	start load step 1 compressor 1	1 compressor + 1 load step
3	activation	start load step 2 compressor 1	1 compressor + 2 load steps
4	activation	start compressor 2	2 compressors + 2 load steps
5	activation	start load step 1 compressor 2	2 compressors + 3 load steps
6	activation	start load step 2 compressor 2	2 compressors + 4 load steps
7	activation	start compressor 3	3 compressors + 4 load steps
8	deactivation	stop load step 2 compressor 1	3 compressors + 3 load steps
9	deactivation	stop load step 1 compressor 1	3 compressors + 2 load steps
10	deactivation	stop load step 2 compressor 2	3 compressors + 1 load step
11	deactivation	stop load step 1 compressor 2	3 compressors
12	deactivation	stop compressor 1	2 compressors
13	activation	start load step 1 compressor 3	2 compressors + 1 load step

P62 – Select operating mode for probe1 devices

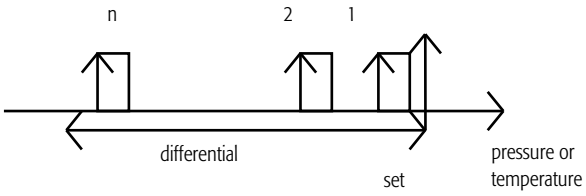
This parameter is used to decide whether the devices in circuit 1 are used to cool (P62=cool; e.g. compressors) or heat (P62=heat; e.g. boilers).

Fig. 6.o

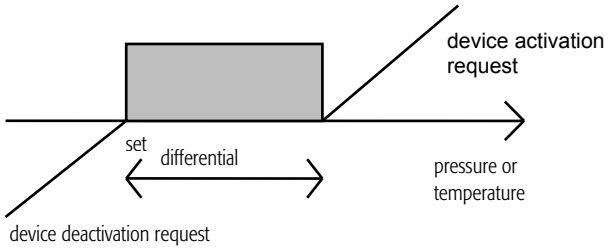
- *lateral band*
- *cooling*



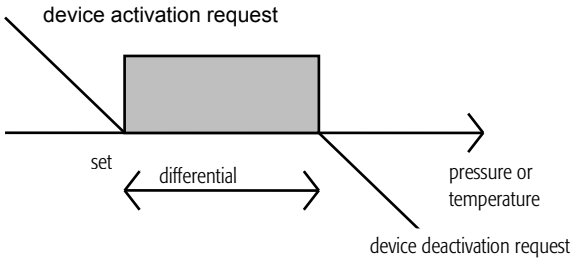
- *lateral band*
- *heating*



- *dead zone*
- *cooling*

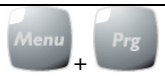


- *dead zone*
- *heating*



6. SCREENS

The following table shows the list of the screens in the program, divided by family.
The codes (Mx, Ax, Hx, …) are displayed in the top right corner of the display, to simplify identification.

ESC	PRG→ MAINTENANCE	PRG→ PRINTER	PRG→ INPUTS/ OUTPUTS	PRG→ CLOCK	PRG→ SET POINT	PRG→ PROGRAMMING	PRG + ESC
							
M0	A0	H0	I0	**PSC** K0	S0	**PSn** P0	**PSD** V0
M1	A1	H1	I1	K1	S1	P1	V1
	A2		I2	K2	S2	P2	
	A3		I3	K3	S3	P3	
	Pst A4		I4	K4	S4	P4	
	A5		I5		**PSS** S5	P5	
	A6				S6	P6	
	A7				S7	P7	
	A8				S8	P8	
	A9				S9	P9	
	Aa				Sa	Pa	
	Ab				Sb	Pb	
	Ac				Sc	Pc	
					Sd	Pd	
					Se	Pe	
					Sf	Pf	
					Sg	Pg	
					Sh	Ph	
					Si	Pi	
					Sj	Pj	
					Sk	Pk	
						Pl	
						Pm	
						Pn	
						Po	
						Pp	
						Pq	
						Pr	
						Ps	
						Pt	
						Pu	

7. TABLE OF ALARMS AND SIGNALS

Below is a list of the main alarm codes and signals, with the action performed by the controller and the check to be performed for resetting the alarm

ALARM button

Code	Description	Action	Check
AL001	Device 1 operating hours exceeded	Signal	Threshold and number of hours
AL002	Device 2 operating hours exceeded	Signal	Threshold and number of hours
AL003	Device 3 operating hours exceeded	Signal	Threshold and number of hours
AL004	Device 4 operating hours exceeded	Signal	Threshold and number of hours
AL005	Device 5 operating hours exceeded	Signal	Threshold and number of hours
AL006	Device 6 operating hours exceeded	Signal	Threshold and number of hours
AL007	Device 7 operating hours exceeded	Signal	Threshold and number of hours
AL008	Device 8 operating hours exceeded	Signal	Threshold and number of hours
AL009	Device 9 operating hours exceeded	Signal	Threshold and number of hours
AL010	Device 10 operating hours exceeded	Signal	Threshold and number of hours
AL011	Device 11 / fan inverter operating hours exceeded	Signal	Threshold and number of hours
AL012	Device 1 / valve inverter operating hours exceeded	Signal	Threshold and number of hours
AL014	Probe 1 not connected or faulty	Activation of probe 1 outputs, see P5	Probe 1 connections
AL015	Probe 2 not connected or faulty	Activation of probe 2 outputs	Probe 2 connections
AL016	High pressure switch / antifreeze	All devices shutdown	Digital input wiring
AL017	Low pressure switch / flow switch	All devices shutdown	Digital input wiring
AL018	Shutdown device 1	Device 1 and dev. 1 inverter shutdown	Digital input wiring
AL019	Shutdown device 2	Device 2 shutdown	Digital input wiring
AL020	Shutdown device 3	Device 3 shutdown	Digital input wiring
AL021	Shutdown device 4	Device 4 shutdown	Digital input wiring
AL022	Shutdown device 5	Device 5 shutdown	Digital input wiring
AL023	Shutdown device 6	Device 6 shutdown	Digital input wiring
AL024	Shutdown device 7	Device 7 shutdown	Digital input wiring
AL025	Shutdown device 8	Device 8 shutdown	Digital input wiring
AL026	Shutdown device 9	Device 9 shutdown	Digital input wiring
AL027	Shutdown device 10	Device 10 shutdown	Digital input wiring
AL028	Shutdown device 11 / fan inverter	Device 11 shutdown	Digital input wiring
AL029	High threshold exceeded for probe 1	Signal	Threshold and value read
AL030	Low threshold exceeded for probe 1	Signal	Threshold and value read
AL031	High threshold exceeded for probe 2	Signal	Threshold and value read
AL032	Low threshold exceeded for probe 2	Signal	Threshold and value read
AL033	The number of the devices selected is greater than the outputs available	Signal	Number of devices selected
AL034	Probe 3 not connected or faulty	Stop compensation	Probe 3 connections
AL035	Internal clock fault	Time bands deactivated	Disable time bands or send board for testing

Tab. 7.a

8. SUPERVISOR

The unit can be connected, following the installation of the serial board, to a supervisory/telemaintenance system, setting the main corresponding parameters (serial address, baud rate, protocol).

Supervisor variable list
Digital variables

Type	Index	Description	R/W
D	1	Dout1,DEVICE1	R
D	2	Dout2, DEVICE2	R
D	3	Dout3, DEVICE3	R
D	4	Dout4, DEVICE4	R
D	5	Dout5, DEVICE5	R
D	6	Dout6, DEVICE6	R
D	7	Dout7, DEVICE7	R
D	8	Dout9, DEVICE8	R
D	9	Dout10, DEVICE9	R
D	10	Dout11, DEVICE10	R
D	11	General Alarm	R
D	12	Status of COMPRESSOR1	R
D	13	Status of COMPRESSOR2	R
D	14	Status of COMPRESSOR3	R
D	15	Status of COMPRESSOR4	R
D	16	Status of COMPRESSOR5	R
D	17	Status of COMPRESSOR6	R
D	18	Status of COMPRESSOR7	R
D	19	Status of COMPRESSOR8	R
D	20	Status of COMPRESSOR9	R
D	21	Status of COMPRESSOR10	R
D	22	Status of COMPRESSOR11	R
D	23	Status of FAN1	R
D	24	Status of FAN2	R
D	25	Status of FAN3	R
D	26	Status of FAN4	R
D	27	Status of FAN5	R
D	28	Status of FAN6	R
D	29	Status of FAN7	R
D	30	Status of FAN8	R
D	31	Status of FAN9	R
D	32	Status of FAN10	R
D	33	Status of FAN11	R
D	34	Status of load step 1, compressor 1	R
D	35	Status of load step 2, compressor 1	R
D	36	Status of load step 1, compressor 2	R
D	37	Status of load step 2, compressor 2	R
D	38	Status of load step 1, compressor 3	R
D	39	Status of load step 2, compressor 3	R
D	40	Status of load step 1, compressor 4	R
D	41	Status of load step 1, compressor 5	R
D	42	Device 1 operating time overtime alarm	R
D	43	Device 2 operating time overtime alarm	R
D	44	Device 3 operating time overtime alarm	R
D	45	Device 4 operating time overtime alarm	R
D	46	Device 5 operating time overtime alarm	R
D	47	Device 6 operating time overtime alarm	R
D	48	Device 7 operating time overtime alarm	R
D	49	Device 8 operating time overtime alarm	R
D	50	Device 9 operating time overtime alarm	R
D	51	Device 10 operating time overtime alarm	R
D	52	Device 11 operating time overtime alarm	R
D	53	Exceeded hour threshold for device1/valve inverter	R
D	54	Probe 1 is not connected or faulty alarm	R
D	55	Probe 2 is not connected or faulty alarm	R
D	56	Probe 3 is not connected or faulty alarm	R
D	57	High pressure / antifreeze alarm	R

Type	Index	Description	R/W
D	58	Low pressure/ flow switch alarm	R
D	59	Stop device 1 alarm	R
D	60	Stop device 2 alarm	R
D	61	Stop device 3 alarm	R
D	62	Stop device 4 alarm	R
D	63	Stop device 5 alarm	R
D	64	Stop device 6 alarm	R
D	65	Stop device 7 alarm	R
D	66	Stop device 8 alarm	R
D	67	Stop device 9 alarm	R
D	68	Stop device 10 alarm	R
D	69	Stop device 11/fan inverter alarm	R
D	70	Probe 1 high threshold alarm	R
D	71	Probe 1 low threshold alarm	R
D	72	Probe 2 high threshold alarm	R
D	73	Probe 2 low threshold alarm	R
D	74	Number of devices selected incorrect alarm	R
D	76	Clock board faulty or not connected alarm	R
D	77	System status	R
D	78	CH_HOUR, Parameter used to set the hours	W
D	79	CH_MINUTE, Parameter used to set the minutes	W
D	80	CH_DAY, Parameter used to set the day	W
D	81	CH_MONTH, Parameter used to set the month	W
D	82	CH_YEAR, Parameter used to set the year	W
D	83	Compressor 1 Enabled	R
D	84	Load step 2 Enabled	R
D	85	Fan 1 Enabled	R
D	86	Compressor 2 Enabled	R
D	87	Load step 3 Enabled	R
D	88	Fan 2 Enabled	R
D	89	Compressor 3 Enabled	R
D	90	Load step 4 Enabled	R
D	91	Fan 3 Enabled	R
D	92	Compressor 4 Enabled	R
D	93	Load step 5 Enabled	R
D	94	Fan 4 Enabled	R
D	95	Compressor 5 Enabled	R
D	96	Load step 6 Enabled	R
D	97	Fan 5 Enabled	R
D	98	Compressor 6 Enabled	R
D	99	Load step 8 Enabled	R
D	100	Fan 6 Enabled	R
D	101	Compressor 7 Enabled	R
D	102	Load step 9 Enabled	R
D	103	Fan 7 Enabled	R
D	104	Compressor 8 Enabled	R
D	105	Load step 10 Enabled	R
D	106	Fan 8 Enabled	R
D	107	Compressor 9 Enabled	R
D	108	Fan 9 Enabled	R
D	109	Compressor 10 Enabled	R
D	110	Fan 10 Enabled	R
D	111	Compressor 11 Enabled	R
D	112	Fan 11 Enabled	R
D	113	Status of secondary set point selection LED	R
D	114	Probe 1, type of control	R/W
D	115	Probe 2, type of control	R/W
D	116	Device 1/valve Enabled	R
D	117	Enable rotation of devices connected to probe 1	R
D	118	Enable rotation of devices connected to probe 2	R
D	119	On/off from supervisor	R/W
D	120	°C or °F	R
D	121	Air temperature probe enabled	R
D	122	Pressure probe 1 enabled	R
D	123	Pressure probe 2 enabled	R

Type	Index	Description	R/W
D	124	Status of device 11	R
D	125	Circuit 1 devices deactivation mode	R/W
D	126	Cool/heat	R/W
D	127	Status of load step 3, compressor 1	R
D	128	Status of load step 3, compressor 2	R
D	129	Bar or Psi	R

Tab. 8.a

Integer variables

Type	Index	Description	R/W
I	1	FIXED VALUE (8)	R
I	2	NUMBER OF PHYSICAL DIGITAL INPUTS (0)	R
I	3	NUMBER OF PHYSICAL DIGITAL OUTPUTS (41)	R
I	4	NUMBER OF DIGITAL SET POINTS (82)	R
I	5	NUMBER OF PHYSICAL ANALOGUE INPUTS (3)	R
I	6	NUMBER OF PHYSICAL INTEGER INPUTS (0)	R
I	7	NUMBER OF PHYSICAL ANALOGUE OUTPUTS (2)	R
I	8	NUMBER OF ANALOGUE SET POINTS (17)	R
I	9	NUMBER OF INTEGER SET POINTS (39)	R
I	10	Most significant part of Device 1 operating hours	R
I	11	Most significant part of Device 2 operating hours	R
I	12	Most significant part of Device 3 operating hours	R
I	13	Most significant part of Device 4 operating hours	R
I	14	Most significant part of Device 5 operating hours	R
I	15	Most significant part of Device 6 operating hours	R
I	16	Most significant part of Device 7 operating hours	R
I	17	Most significant part of Device 8 operating hours	R
I	18	Most significant part of Device 9 operating hours	R
I	19	Most significant part of Device 10 operating hours	R
I	20	Most significant part of Device 1/valve inverter operating hours	R
I	21	Most significant part of Device 11/fan inverter operating hours	R
I	22	Least significant part of Device 1 operating hours	R
I	23	Least significant part of Device 2 operating hours	R
I	24	Least significant part of Device 3 operating hours	R
I	25	Least significant part of Device 4 operating hours	R
I	26	Least significant part of Device 5 operating hours	R
I	27	Least significant part of Device 6 operating hours	R
I	28	Least significant part of Device 7 operating hours	R
I	29	Least significant part of Device 8 operating hours	R
I	30	Least significant part of Device 9 operating hours	R
I	31	Least significant part of Device 10 operating hours	R
I	32	Least significant part of Device 1/valve inverter operating hours	R
I	33	Least significant part of Device 11/fan inverter operating hours	R
I	34	Current Day	R
I	35	Current Month	R
I	36	Current Year	R
I	37	Date/Time setting: Day	R/W
I	38	Date/Time setting: Month	R/W
I	39	Date/Time setting: Year	R/W
I	40	Current Hours	R
I	41	Current Minutes	R
I	42	Date/Time setting: Hours	R/W
I	43	Date/Time setting: Minutes	R/W
I	44	Low pressure delay time	R/W
I	45	Probe 1 number of devices	R
I	46	Probe 2 number of devices	R
I	47	Number of voltage variations	R
I	48	Unit status	R
I	49	Rotation type for probe 1 devices	R/W

Tab. 8.b

Analogue variables

Type	Index	Description	R/W
A	1	Analogue input 1,Probe 1	R
A	2	Analogue input 2,Probe 2	R
A	3	Analogue input 3,Probe 3	R
A	4	Fan inverter value	R
A	5	Compressor inverter value	R
A	6	Probe 1 current set point	R
A	7	Select probe 1 set point	R/W
A	8	Select secondary set point	R/W
A	9	Select probe 1/valve inverter set point	R/W
A	10	Select fan inverter set point	R/W
A	11	Compensation set point	R/W
A	12	Select probe 2 set point	R/W
A	13	Probe 1 set point differential	R/W
A	14	Probe 2 set point differential	R/W
A	15	Low threshold for probe 1	R/W
A	16	Low threshold for probe 2	R/W
A	17	High threshold for probe 1	R/W
A	18	High threshold for probe 2	R/W
A	19	Probe 1 minimum set point	R/W
A	20	Probe 2 minimum set point	R/W
A	21	Probe 1 maximum set point	R/W
A	22	Probe 2 maximum set point	R/W
A	23	Device1/valve inverter differential	R/W
A	24	Fan inverter differential	R/W

Tab. 8.c

Modbus address

General rules:

- Digital variables: Modbus address = Carel address
- Analogue variables: Modbus address = Carel address
- Integer variables: Modbus address = Carel address+208

Examples:

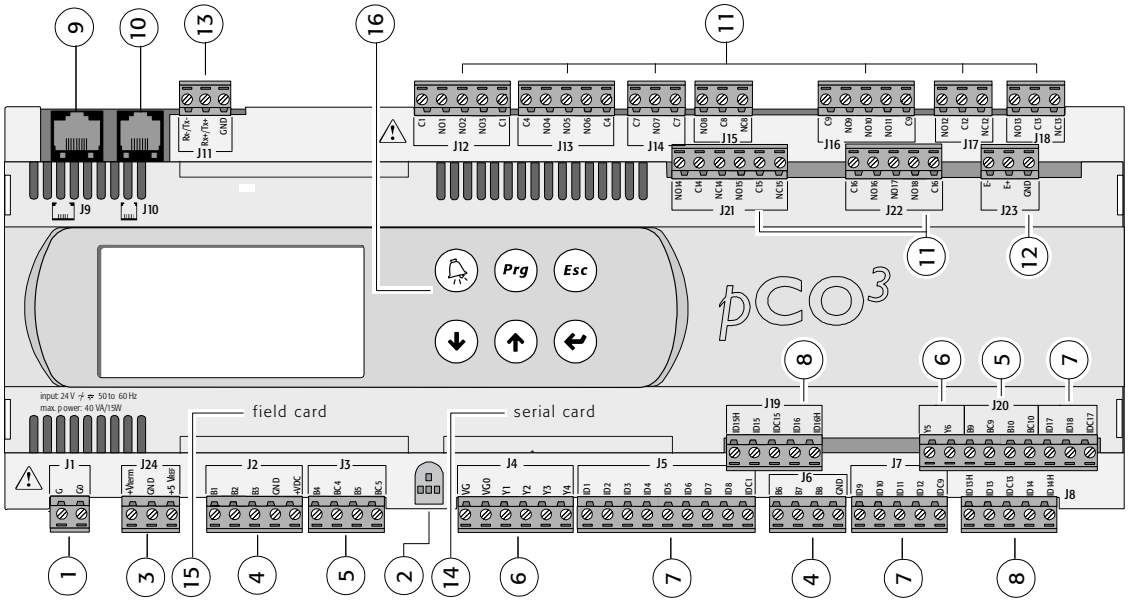
Addresses for slave no. 1

Type of Carel variable	Carel address	Type of ModBus variable	Modbus address
Digital	1	(Coil) Address	1
Digital	2	(Coil) Address	2
Digital	....	...	...
Digital	181	(Coil) Address	181
Digital	182	(Coil) Address	182
Analogue	1	(Register) Address	1
Analogue	2	(Register) Address	2
Analogue	...	...	...
Analogue	91	(Register) Address	91
Analogue	92	(Register) Address	92
Integer	1	(Register) Address	209
Integer	2	(Register) Address	210
Integer	...	...	...
Integer	116	(Register) Address	324
Integer	117	(Register) Address	325

Tab. 8.d

9. CONNECTIONS

The meaning of the connectors on the pCO³ board is illustrated below. For a complete description of the hardware and the installation procedure, see the pCO sistema "Installation and user manual" or alternatively the corresponding instruction sheet.



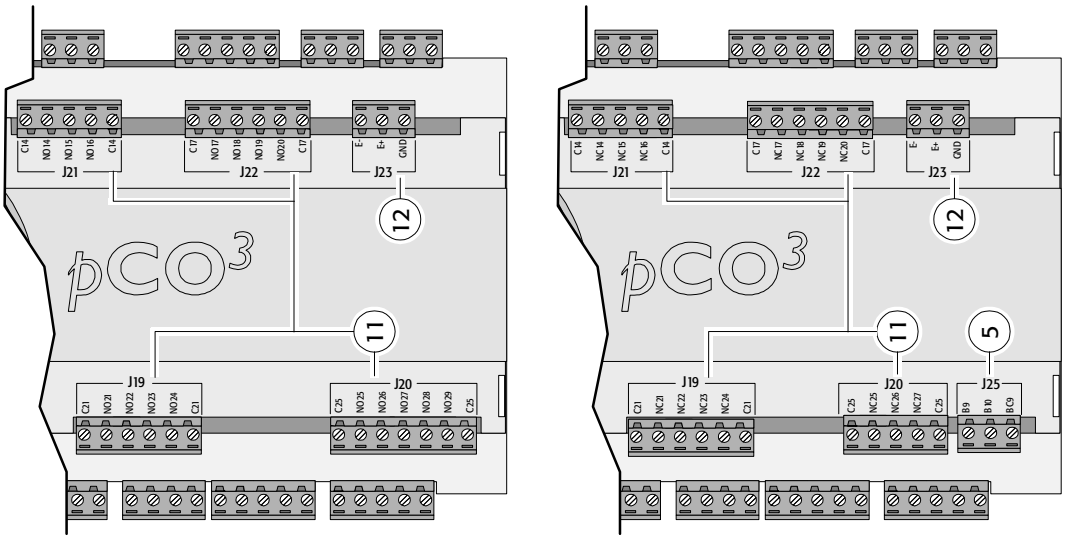


Fig. 9.a

Key:

1.	power supply connector [G (+), G0 (-)];
2.	yellow power LED and 3 status LEDs;
3.	additional power supply for terminal and 0/5 V ratiometric probes;
4.	universal analogue inputs (NTC, 0/1 V, 0/5 V ratiometric, 0/10 V, 4/20 mA);
5.	passive analogue inputs (NTC, PT1000, ON/OFF);
6.	0 to 10 V analogue outputs;
7.	24 Vac/Vdc digital inputs;
8.	230 Vac or 24 Vac/Vdc digital inputs;
9.	connector for the display terminal (external panel with direct signals);
10.	connector for all standard pCO* series terminals and for downloading the application program;
11.	relay digital outputs;
12.	I/O expansion board connector;
13.	pLAN network connector;
14.	cover for inserting the supervisor and telemaintenance option;
15.	cover for inserting the field card option;
16.	Built-In terminal (LCD, buttons and LEDs).

Carel reserves the right modify or change its products without prior warning.

Glossary

- **Proportional band:** temperature zone around the set point, inside which the system manages the operation of the control devices.
- **Built-in:** display housed on the front panel of the pCO board.
- **Buzzer:** audible buzzer fitted on the external terminals, activated in the event of alarms. The built-in terminals do not have a buzzer.
- **Default:** pre-defined values, for example the set point and proportional band, used automatically by the system without modifications made by the user.
- **Step:** area of the proportional band inside which a device is started and at the same time defines the activation and deactivation values for the device.
- **Manual:** manual operation (switch device On/Off or reset an alarm).
- **Screen:** page shown on the display.
- **Branch – loop:** series of screens that concern the same subject; the branch is accessed by pressing one of the buttons on the terminal, which displays the first screen in the loop.
- **Range:** interval of values that can be set.
- **Set point:** required value; the system activates the devices (heating/cooling) until the set point has been reached.
- **Dead zone:** zone between the set point and the proportional band, inside which there is no change to the status of the devices.

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