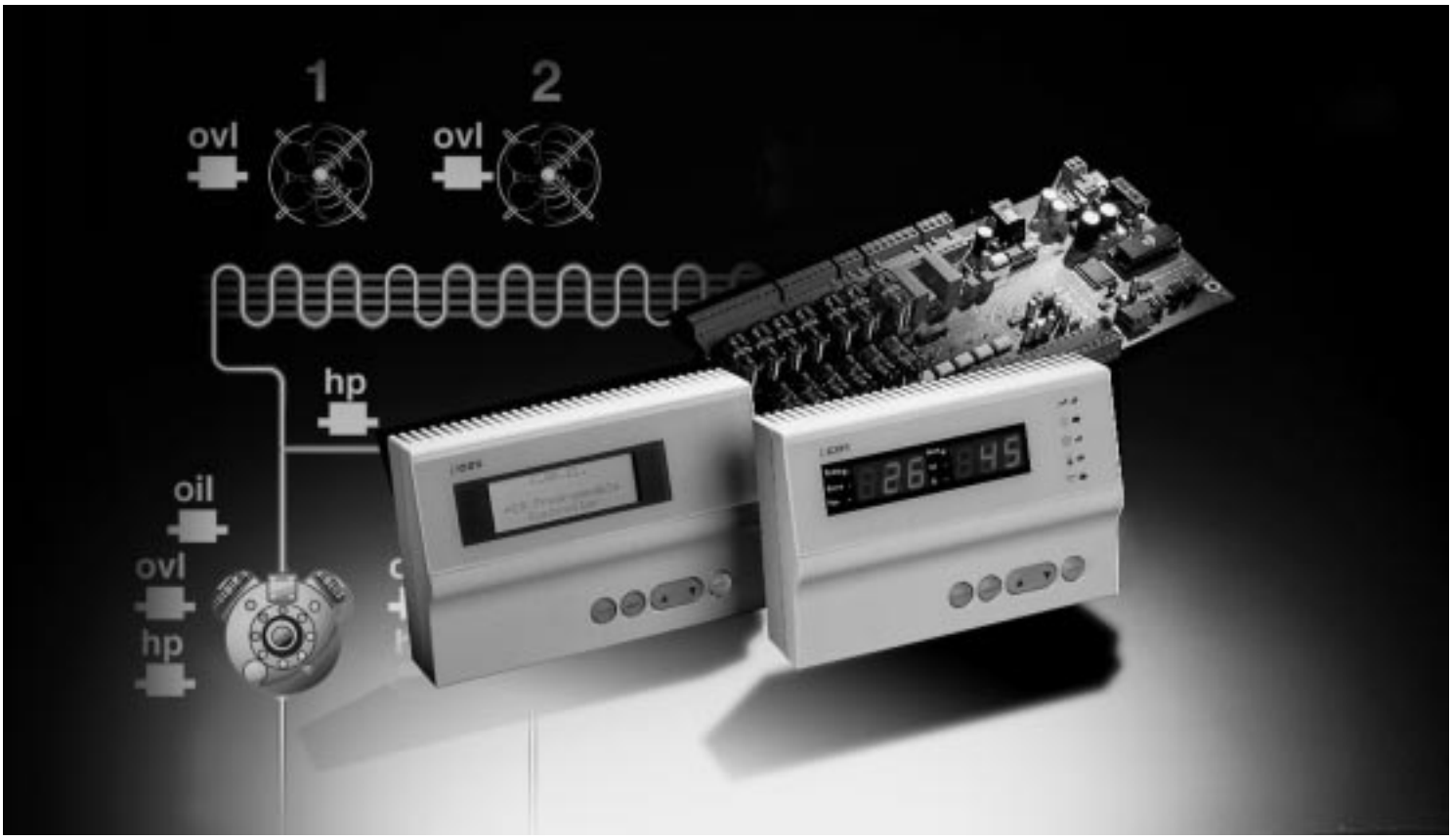
pCO: universal stage controller



User guide

Program code: **EPSTDEIU0A**

Rif.: 96EM

CAREL
Technology & Evolution

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1 DETAILS OF THE PROGRAMME

The programme allows full management of a refrigerator plant.
The characteristics of the system are as follows:
- display and control of the measured quantities;
- possible configuration of the number and type of control devices;
- display of alarms activated by the LED display and their audible signals by means of a buzzer;
- programming of the configuration parameters and of some operative parameters with access protected by a password;
- modification of the basic operation parameters (setpoints, differentials, alarm thresholds, timing);
- LED display of the active functions;
- print of the alarms picked up and, at intervals, the state of the main variables of the machine;
- time band programming makes it possible to operate the devices controlled by the probe 1 from a second setpoint (secondary) so as to save energy during the programmed hours and days;
- connection with a supervisory/remote controlled maintenance serial line according to the RS422/RS485 standard and the Carel's communication system.

2 USER INTERFACE

2.1 Terminal unit: front panel view with front door closed

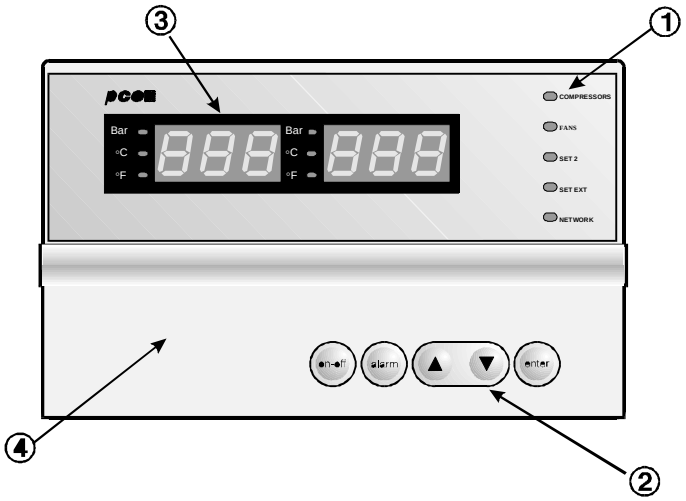


Fig. 1

Figure 1 references

1. External function-indicator LEDS
2. External rubber buttons
3. LED display
4. Front windows

2.2 Silicone rubber external buttons

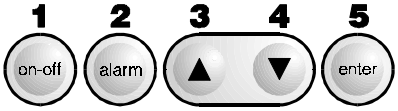


Fig. 2

References Fig. 2

1. *On/off* button: turns on and off the unit. The green LED that lights up in the button shows the state of the machine:
   - if the LED is Off the unit is Off;
   - the intermittent LED indicates that the unit has been turned off by a supervisor or a remote control through a digital input;
   - if the LED is on the unit is On.
2. *Alarm* button: it is used to display the alarms, to reset them manually and silence the buzzer.
   When the button lights up (red), at least one alarm has been detected.
3. The arrow pointing *upwards* sets the values of the control parameters (it does not light up), or to disable manul procedure.
4. The arrow pointing *downwards* sets the values of the control parameters (it does not light up), or to disable manual procedure.
5. *Enter* button: to scan the messages on the display. The button is continuously alight (yellow light) and indicates that the current is On.

2.3 Front view with front door open

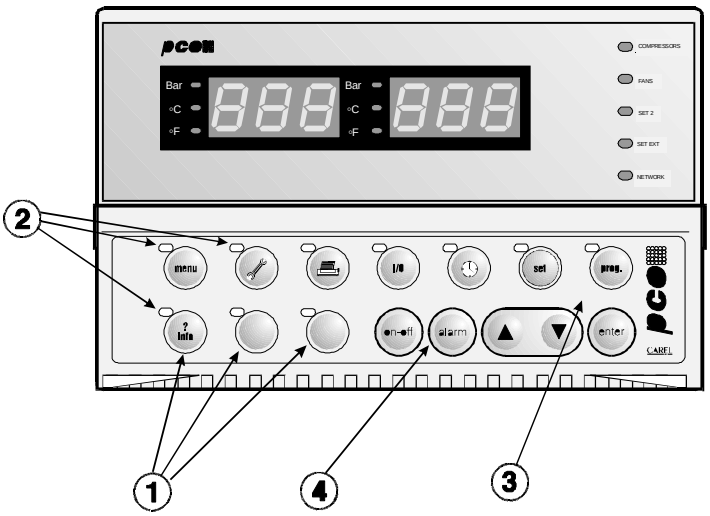


Fig. 3

Figure 3 references

1. Polycarbonate - coated mechanical buttons
2. Function indicator LEDs
3. Adhesive polycarbonate (provided upon request)
4. Silicone rubber buttons.

2.4 Use of the buttons

displays the values measured by the probe 1 and 2 and, moreover, displays the conversion of these values, from pressure values to temperature values

allows access to the values related the hour counters, operated manually to the connected devices and allows the adjust of the probes

gives access to the group of parameters for the operation of the printer control (as required)

displays the status of inputs and outputs (both digital and analog)

allows the display/programming of the clock (if present) and of the relevant time range with setpoint variation

allows the display and selection of the setpoint

allows the setting of both of the different operation parameters (protections, thresholds) and the parameters concerning the configuration of the unit

displays the version of the application programme

The LEDs beside the listed buttons light up when pressed, and remain in this condition until any one of the above-mentioned buttons is pressed.

2.5 Display

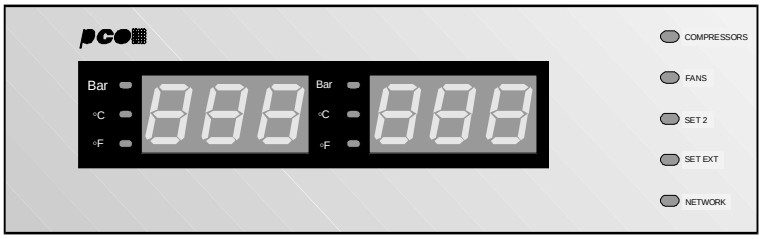


Fig. 4

Features

- number of digits: 6
- colour: green
- height: 13mm
- number of side indicator LEDs: 5
- number of LEDs indicating the displayed function: 3+3

2.6 Function indicator LEDs

The 5 LEDs placed beside the display have the following meaning:

1. On LED — at least one device, controlled by the probe 1, is active;
   Flashing action — at least one device, controlled by the probe 1, is in timing phase, that is its has been required, but it remains off as long as its timing is fulfilled;
   Off LED — no device, managed by the probe 1, is active;
2. On LED — at least one device, managed by the probe 2, is active;
   Off LED — no LED, managed by the probe 2, is active;
3. On LED — night setpoint is active (sepoint 2);
4. On LED — indicates that the setpoint variation is coming from an analog input (external setpoint);
5. On LED — indicates that the communication with the supervisory network is active;

The 6 LEDs placed in the display indicate the unit of measure of the values detected by the two linked probes (selections made in the programming-code branch):

barpressure;
°C temperature;
°F in degrees Fahrenheit
Obviously only one of the 3 indicated LEDs can be on.

3 LIST OF PARAMETERS

All the bold-faced parameters are described from page 12 on

On the following tables there are two *Default* columns: on the right one there are the factory set parameters, decided by the Carel engineerings (see on page 21). On the left one the user may write its own.

Maintenance button

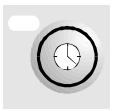
Code	*Description*	*Default*		*Rating*	*Units of measure*
t1	device 1 operating-hour display (only if device 1 is enabled)			0÷999999	h
t2	device 2 operating-hour display (only if device 2 is enabled)			0÷999999	h
t3	device 3 operating-hour display (only if device 3 is enabled)			0÷999999	h
t4	device 4 operating-hour display (only if device 4 is enabled)			0÷999999	h
t5	devices operating-hour display (only if device 5 is enabled)			0÷999999	h
t6	device 6 operating-hour display (only if device 6 is enabled)			0÷999999	h
t7	device 7 operating-hour display (only if device 6 is enabled)			0÷999999	h
t8	device 8 operating-hour display (only if device 8 is enabled)			0÷999999	h
t9	device 9 operating-hour display (only if device 9 is enabled)			0÷999999	h
t10	device 10 operating-hour display (only if device 10 is enabled)			0÷999999	h
t11	device 11 or fan-inverter operating-hour (only if fan-inverter or device 11 is enabled)			0÷999999	h
t12	device 1/valve inverter operating-hour display (only if device 1/valve inverter is enabled)			0÷999999	h
PSt	access password to the parameters below		0	0÷999	
th	device operating-hour threshold (only if there is at least one device)		0	0÷999	hx1000
r1	reset of the device 1 operating-hour number		0	0→disable 1→enable	
r2	reset of the device 2 operating-hour number (only if device 2 is enabled)		0	0→disable 1→enable	
r3	reset of the device 3 operating-hour number (only if device is enabled)		0	0→disable 1→enable	
r4	reset of the device 4 operating-hour number (only if device 4 is enabled)		0	0→disable 1→enable	
r5	reset of the device 5 operating-hour no. (only if device 5 is enabled)		0	0→disable 1→enable	
r6	reset of the device 6 operating-hour no. (only if device 6 is enabled)		0	0→disable 1→enable	
r7	reset of the device 7 operating-hour no. (only if device 7 is enabled)		0	0→disable 1→enable	
r8	reset of the device 8 operating-hour no. (only if device 8 is enabled)		0	0→disable 1→enable	
r9	reset of the device 9 operating-hour no. (only if device 9 is enabled)		0	0→disable 1→enable	
r10	reset of the device 10 operating-hour no.(only if device 10 is enabled)		0	0→disable 1→enable	
r11	reset of the device 11 or fan inverter operating-hour no. (only if device 11 or fan inverter is enabled)		0	0→disable 1→enable	
r12	reset of the device 1/valve inverter operating hour no. (only if device 1/valve inverter is enabled)		0	0→disable 1→enable	
n1	device 2 manual operation (only if device 1 is enabled)		0	0→disable 1→enable	
n2	device 2 manual operation (only if device 2 is enabled)		0	0→disable 1→enable	
n3	device 3 manual operation (only if device 3 is enabled)		0	0→disable 1→enable	
n4	device 4 manual operation (only if device 4 is enabled)		0	0→disable 1→enable	
n5	device 5 manual operation (only if device 5 is enabled)		0	0→disable 1→enable	
n6	device 6 manual operation (only if device 6 is enabled)		0	0→disable 1→enable	
n7	device 7 manual operation (only if device 7 is enabled)		0	0→disable 1→enable	
n8	device 8 manual operation (only if device 8 is enabled)		0	0→disable 1→enable	
n9	device 9 manual operation (only if device 9 is enabled)		0	0→disable1→enable	
n10	device 10 manual operation (only if device 10 is enabled)		0	0→disable 1→enable	
n11	device 11 or fan inverter manual operation (only if device 11 of fan inverter is enabled)		0	0→disable 1→enable	
n12	device 1/valve inverter manual operation (only if device 1/valve inverter is enabled)		0	0→disable 1→enable	
CL1	Probe 1 calibration (only if P21>0)		0	-5.0÷5.0	°C/F°/bar
CL2	probe 2 calibration (only if P24>0)		0	-5.0÷5.0	°C/F°/bar
CL3	probe 3 calibration (only if P22=1)		0	-5.0÷5.0	°C/F°

Printer button

Code	*Description*	*Default*		*Rating*	*Units of measure*
Pr1	immediate printing request (only if P42=1)		0	0→disable 1→enable	
Pr2	selection of the cyclic printing time (only if P42=1)		60	0÷999	min

I/O button

Code	*Description*	*Default*		*Rating*	*Units of measure*
Ai1	display of the value detected by the probe 1			-99÷99.9	°C/F°/bar
Ai2	display of the value detected by the probe 2			-99÷99.9	°C/F°/bar
Ai3	selection with a potentiometer of the probe 1 setpoint (only if P21=1) or display of the ambient air temperature (only if P21=0 and if P22=1)			-99÷99.9	°C/°F/bar
Ai4	display of the remote on/off state			0→off; 1→on	
i1	state of the device 1 lock alarm			0→off; 1→on	
i2	state of the device 2 lock alarm			0→off; 1→on	
i3	state of the device 3 lock alarm			0→off; 1→on	
i4	state of the device 4 lock alarm			0→off; 1→on	
i5	state of the device 5 lock alarm			0→off; 1→on	
i6	state of the device 6 lock alarm			0→off; 1→on	
i7	state of the device 7 lock alarm			0→off; 1→on	
i8	state of the device 8 lock alarm			0→off; 1→on	
i9	state of the device 9 lock alarm			0→off; 1→on	
i10	state of the device 10 lock alarm			0→off; 1→on	
i11	state of the device 11 or fan-inverter lock alarm			0→off; 1→on	
i12	state of the low pressure/flow regulator alarm			0→off; 1→on	
Ao1	display of the state of the fan inverter			0÷10.0	volt
Ao2	display of the state of the device 1/valve			0÷10.0	volt
o1	state of the device 1			0→off; 1→on	
o2	state of the device 2			0→off; 1→on	
o3	state of the device 3			0→off; 1→on	
o4	state of the device 4			0→off; 1→on	
o5	state of the device 5			0→off; 1→on	
o6	state of the device 6			0→off; 1→on	
o7	state of the device 7			0→off; 1→on	
o8	state of the device 8			0→off; 1→on	
o9	state of the device 9			0→off; 1→on	
o10	state of the device 10			0→off; 1→on	



Clock button

Code	*Description*	*Default*		*Rating*	*Unit of measure*
C1	hour display (only if P41=1)			0÷23	h
C2	minute display (only if P41=1)			0÷59	min
C3	day display (only if P41=1)			1÷31	
C4	month display (only if P41=1)			1÷12	
C5	year display (only if P41=1)			0÷99	
PSC	password that allows the access to the subsequent param. (only if P41=1)		0	0÷999	
C6	hour selection (only if P41=1)		0	0÷23	h
C7	minute selection (only if P41=1)		0	0÷59	min
C8	day selection (only if P41=1)		0	1÷31	
C9	month selection (only if P41=1)		0	0÷99	

C10	year selection (only if P41=1)		0	0÷99	
C11	range-beginning hour with secondary set (only if P41=1)		0	0÷23	h
C12	range-end hour with secondary set (only if P41=1)		24	0÷24	h
C13	Sunday with secondary set (only if P41=1)		0	0→no; 1→yes	
C14	Monday with secondary set (only if P41=1)		0	0→no; 1→yes	
C15	Tuesday with secondary set (only if P41=1)		0	0→no; 1→yes	
C16	Wednesday with secondary set (only if P41=1)		0	0→no; 1→yes	
C17	Thursday with secondary set (only if P41=1)		0	0→no; 1→yes	
C18	Friday with secondary set (only if P41=1)		0	0→no; 1→yes	
C19	Saturday with secondary set (only if P41=1)		0	0→no; 1→yes	
C20	half an hour exclusion (only if P41=1)		0	0÷7	
C21	exclusion beginning (only if P41=1)		0	C11÷C12	h
C22	exclusion end (only if P41=1)		0	C21÷C12	h

Setpoint button

Code	*Description*	*Default*		*Rating*	*Unit of measure*
Sd1	display of the probe 1 actual setpoint (enabled code in case of setpoint control through analog input or if a secondary setpoint is present or, finally, when the compensation is active)			St3÷St4	°C/°F/bar
St1	selection of probe 1 setpoint (only if P1>0 and P4>0)		2.5	St3÷St4	°C/°F/bar
St2	selection of probe 2 setpoint (only if P24>0 and P27>0)		16.0	St5÷St6	°C/°F/bar
Si1	setpoint selection of the probe 1/valve inverter (only if P20=1 and P14=1)		2.5	St3÷St4	°C/°F/bar
Si2	selection of fan inverter setpoint (only if P35=1)		16.0	St5÷St6	°C/°F/bar
PSS	password that allows access to the subsequent parameters		0	0÷999	
St3	selection of the probe 1 minimum setpoint (only if P1>0)		0	-99÷99.9	°C/°F/bar
St4	selection of probe 1 maximum setpoint (only if P1>0)		5.0	-99÷99.9	°C/°F/bar
St5	selection of probe 2 minimum setpoint (only if P24>0)		10.0	-99÷99.9	°C/°F/bar
St6	selection of probe 2 maximum setpoint (only if P24>0)		24.0	-99÷99.9	°C/°F/bar
St7	secondary setpoint selection (only if at least a device of the circuit 1 is present)		3.0	-99÷99.9	°C/°F/bar
d1	probe 1 differential selection (only if P1>0)		0.5	0÷20.0	°C/°F/bar
d2	probe 2 differential selection (only if P24>0)		2.0	0÷20.0	°C/°F/bar
d3	device 1/valve inverter differential (only if P1>0 and P14=1)		1.0	0÷20.0	°C/°F/bar
d4	selection of the fan inverter differential (only if P35=1)		2.0	0÷20.0	°C/°F/bar
Sr1	step of the device 1 inverter (only if P20=1 and P14=0)		0.2	0÷10.0	Volt
Sr2	selec. of the probe 1 inverter deviation (only if P20=1 and P14=0)		0	0÷20.0	°C/°F/bar
Sr3	minimum aperture of the device 1 inverter (only if P20=1)		0	0÷10.0	Volt
Sr4	minim. Aperture of the device 1 inverter always applied (only if P20=1)		0	0→disable 1→enable	
SH1	threshold of high for the probe 1 (only if P1>0)		5.0	-99÷99.9	°C/°F/bar
SL1	threshold of low for the probe 1 (only if P1>0)		1.0	-99÷99.9	°C/°F/bar
SH2	threshold of high for the probe 2 (only if P24>0)		20.0	-99÷99.9	°C/°F/bar
SL2	threshold of high for the probe 2 (only if P24>0)		0	-99÷99.9	°C/°F/bar
dH1	alarm delay of high for the probe 1 (only if P1>0)		0	0÷999	min
dL1	alarm delay of high for the probe 2 (only if P24>0)		0	0÷999	min
dH2	alarm delay of low for the probe 2 (only if P24>0)		0	0÷999	min
dL2	alarm delay of low for the probe 2 (only if P24>0)		0	0÷999	min
SC	compensation setpoint (only if P21=1)		25.0	-99÷99.9	°C/°F/bar
dC	compensation differential (only if P21=1)		5.0	-50.0÷50.0	°C/°F/bar
dt	delta of compensation (only if P21=1)		2.0	-99÷99.9	°C/°F/bar

Programming button

Code	*Description*	*Default*	*Rating*	*Unit of measure*
PSn	password that allows access to the programming branch	0	0÷999	
P1	probe 1 type	3	0→absent 1→active 2→passive 3→keller	
P2	probe 1 lower range (only if P1=3)	-0.5	-0.5÷30	bar
P3	probe 1 higher range (only if P1=3)	7	-0.5÷30	bar
P4	probe 1 device number (only if P1>0)	5	0÷11	
P5	operating probe 1 devices with active broken-probe alarm (only if P1>0 and P4>0)	0	0÷P4	
P6	number of voltage variations (see explanation)	0	0÷3	
P7	logic of voltage variations (only if P1>0 and P4>0 and P6>0)	0	0→n.excit. 1→n.deen.	
P8	minimum time between compressor starting and voltage variations (only if P1>0 and P4>0 and P6>0)	10	0÷999	sec
P9	full/par activation of volt. Variations (only if P1>0 and P4>0 and P6>0)	0	0→full 1→partial	
P10	turn on minim. time of the probe 1 devices (only if P1>0 and P4>0)	60	0÷999	sec
P11	turning off minim. Time of the probe 1 devices (only if P1>0 and P4>0)	120	0÷999	sec
P12	min. time between probe 1 device turning on (only if P1>0 and P14=1)	10	0÷999	sec
P13	minimum time between probe 1 same device turning on “Anti-court cycle” (only if P1>0 and P4>0)	360	0÷999	sec
P14	regulation with neutral zone or lateral band of probe 1 circuit (only if P1>0 and P4>0)	0	0→neutral z. 1→lat. band	
P15	type of regulat. of the probe 1 circuit (only if P1>0 and P4>0 and P14=1)	0	0→P 1→P+I	
P16	integrat. time of the primary circuit (only if P1>0 and P4>0 and P15=1)	600	300÷900	sec
P17	time between turning on requests of the probe 1 devices (only if P1>0 and P4>0 and P14=0)	20	0÷999	sec
P18	time between turning off requirements of the probe 1 devices (only if P1>0 and P4>0 and P14=0)	10	0÷999	sec
P19	rotation enabling of the probe 1 devices (only if P1>0 and P4>1)	1	0→ disabled 1→FIFO 2→time	
P20	inverter enabling of the device no. 1/valve (see explanation)	0	0→disable 1→enable	
P21	analog input enabling for setpoint variation (only if P1>0 and P4>0 and P22=0)	0	0→disable 1→enable	
P22	enabling of the air temperature probe (only if P21=0)	0	0→disable 1→enable	
P23	enabling of probe 1 compensation (only if P1>0 and P4>0 and P21=0 and P22=1)	0	0→disable 1→enable	
P24	probe 2 type	3	0→absent 1→active 2→passive 3→keller	
P25	probe 2 lower range (only if P24=3)	0	-0.5÷30	bar
P26	probe 2 higher range (only if P24=3)	30	-0.5÷30	bar
P27	probe 2 device number (only if P24>0)	5	0÷11	
P28	min. time betw. Turning on of the probe 2 devices (if: P1=1 or P1=2, P4>0, P21=0 and P22=1)	2	0÷999	sec
P29	regulation with neutral zone or lateral band of the probe 2 circuit (only if P24>0 and P27>0)	1	0→neutral z. 1→lat. Band	
P30	type of regulat. of the probe 2 circuit (only if P24>0 and P27>0 and P30=1)	0	0→P 1→P+I	
P31	integration time of the sec. circuit (only if P24>0 and P27>0 and P31=1)	600	300÷900	sec
P32	time between turning on request of the probe 2 devices (only if P24>0 and P27>1 and P30=0)	20	0÷999	sec
P33	time between turning off requests of the probe 2 (only if P24>0 and P27>1 and P30=0)	10	0÷999	sec
P34	rotation enabling of the probe 2 devices (only if P24>0 and P27>1)	1	0→disable 1→enable	
P35	enabling of fan inveter	0	0→disable 1→enable	
P36	alarm delay of low pressure/flow regulator (only if P4>0 and/or P27>0)	40	0÷999	sec
P37	enabling of self-starting procedure	1	0→disable 1→enable	
P38	type of cooling gas (refrigerant)	1	0→not sel. 1→R22 2→R134a 3→NH3 4→R404a	

P39	°C or °F display		0	0→°C;→°F	
P40	remote on/off selection		0	0→disable 1→enable	
P41	clock enabling		0	0→disable 1→enable	
P42	printer enabling		0	0→disable 1→enable	
P43	identification number		1	0÷999	
P44	automatic or manual reset alarms		0	0→autom. 1→manual	
P45	time delay at the intervention of alarm relay		0	0÷999	min
P46	enabling OFF key		0	0→disable 1→enable	
P47	serial communication baud-rate		0	0→1200 1→2400 2→4800 3→9600 4→19200	
P61	circuit 1 devices switch off mode		0	0→full 1→partial	
P62	cold/warm		0	0→cold 1→warm	

Info button

Code	*Description*	*Default*		*Rating*	*Unit of measure*
If1	programme version				

4 ALARM DESCRIPTION

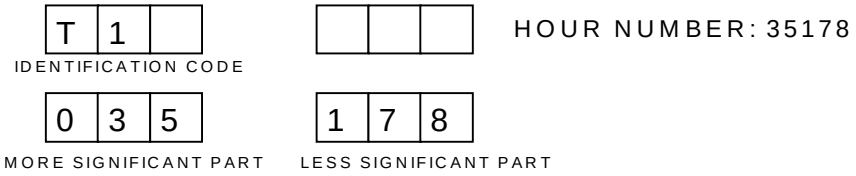
How to manage the *Alarms*, you have to refer to the parameter **P44** at page 18

Alarm button

Code	*Description*	*Effect*	*Verify*
AL 1	Exceeded threshold of the device 1 operation hours	Only signalling	Threshold and hour number
AL 2	Exceeded threshold of the device 2 operation hours	Only signalling	Threshold and hour number
AL 3	Exceeded threshold of the device 3 operation hours	Only signalling	Threshold and hour number
AL 4	Exceeded threshold of the device 4 operation hours	Only signalling	Threshold and hour number
AL 5	Exceeded threshold of the device 5 operation hours	Only signalling	Threshold and hour number
AL 6	Exceeded threshold of the device 6 operation hours	Only signalling	Threshold and hour number
AL 7	Exceeded threshold of the device 7 operation hours	Only signalling	Threshold and hour number
AL 8	Exceeded threshold of the device 8 operation hours	Only signalling	Threshold and hour number
AL 9	Exceeded threshold of the device 9 operation hours	Only signalling	Threshold and hour number
AL 10	Exceeded threshold of the device 10 operation hours	Only signalling	Threshold and hour number
AL 11	Exceeded threshold of the device 11 or fan inveter operation	Only signalling	Threshold and hour number
AL 12	Exceed. hour threshold of the device 1/valve inverter	Only signalling	Threshold and hour number
AL 13	Not operating Eeprom	Only signalling	*Reset manufacture values and turn the pCO off.* If when turning on again AL13 remains, replace the *board*
AL 14	Probe 1 is not connected or does not operate	See page 15	Connections of probe 1
AL 15	Probe 2 is not connected or does not operate	See page 15	Connections of probe 2
AL 16	Detection of high-pressure switch/antifreeze	Device complete stop	Wiring of the digital inputs 1÷10
AL 17	Detection of low-pressure/switch/flow regulator	Device complete stop	Wiring of the digital input 12
AL 18	Stop of the device 1	Device 1 Stop and inverter of the device 1	Wiring of the digital input 1
AL 19	Stop of the device 2	Stop of the device 2	Wiring of the digital input 2
AL 20	Stop of the device 3	Stop of the device 3	Wiring of the digital input 3
AL 21	Stop of the device 4	Stop of the device 4	Wiring of the digital input 4
AL 22	Stop of the device 5	Stop of the device 5	Wiring of the digital input 5
AL 23	Stop of the device 6	Stop of the device 6	Wiring of the digital input 6
AL 24	Stop of the device 7	Stop of the device 7	Wiring of the digital input 7
AL 25	Stop of the device 8	Stop of the device 8	Wiring of the digital input 8
AL 26	Stop of the device 9	Stop of the device 9	Wiring of the digital input 9
AL 27	Stop of the device 10	Stop of the device 10	Wiring of the digital input 10
AL 28	Stop of the device 11 or stop of the fan inverter	Stop of the device 11	Wiring of the digital input 11
AL 29	Probe 1 threshold of high is exceeded	Only signalling	Wiring of the probe 1 and verification of the threshold of high
AL 30	Probe 1 threshold of low is exceeded	Only signalling	Wiring of the probe 1 and verification of the threshold of low
AL 31	Probe 2 threshold of high is exceeded	Only signalling	Wiring of the probe 2 and verification of the threshold of high
AL 32	Probe 2 threshold of low is exceeded	Only signalling	Wiring of the probe 2 and verification of the threshold of low
AL 33	The number of devices being selected exceed the outputs actually available	Only signalling	Number of selected devices
AL 34	Probe 3 is not connected and does not operate	Stop of compensation	Wiring of the probe 3
AL 35	Clock board is broken or not connected	Stop of the time band	Board connection

5 DESCRIPTION OF PARAMETERS

t1÷t12 - time display of the devices
These parameters indicate the number of working hours of every device. When displaying these parameters, the identification number alternate, every two seconds, with the number of working hours of the device corresponding to the code.



When the number of working hours of a given device exceeds the working hour threshold (th), AL 1 ÷ AL 12 are activated. ***Caution*:** when the analog outputs dedicated to the fan inverter and to the device 1/valve inverter are used (parameters t11 and t12), the displayed working hours refer to the calculation with the corresponding outputs at a value higher than 0 volt.

th - hour threshold of the devices
When the device working hours exceed this value, an alarm signal is produced, indicating that maintenance of the concerned device is needed. If this parameter is given the value 0 the control is automatically excluded.
Caution. selection must be done in h per 1000.

n1÷n12 - manual operation of the devices
These parameters allow the manual activation of every device, i.e. without timing and rotation, and independently of the values measured by the probes. The sole support of the control through manual operation is the alarm management. The manual activation of the inverter devices makes it possible to force their analog outputs to the value of 10 volts. The manual procedure can be activated only if the unit is Off. Therefore, all the parameters no.1÷no.12 are not enabled if the unit is On. The flashing LED of the menu indicates that the manual procedure is active. If, after pressing the menu button, the enter button is kept pressed for more than 2 seconds, all the manual procedure is deactivated. In any case, the manual procedure comes automatically to an end after 30 minutes.

CL1, CL2, CL3 - calibration of the probes
These parameters allow the software calibration of the probes. The value given to these parameters is actually added (positive value) or subtracted (negative value) to the measures detected by the respective probes. The offset of calibration may be changed from -3 to +3 with the accuracy of the tenth. The CL3 parameter is visible only when the relative probe (P22=1) has been selected.

Pr1 - request of immediate printing
This parameter allows a print of the unit main data such as values detected by the probes, active devices and the most important programmed data.

Pr2 - cyclic printing time
The parameter indicates the cyclic printing time, i.e. the period between two successive periodic printings.

Ai3 - meaning of the analog input B3 (see fig. 30).
Allows the display of the value detected by the third analog input that can be have two meanings:
- variable setpoint using a potentiometer (P21=1);
- if the parameter P21=0 and P22=1 then the detected value represents the temperature probe of the ambient air (necessary for controlling the setpoint compensation).

i11 - digital input ID11 (see fig. 30).
The parameter allows the display of the state of the digital input no.11. This input can represent:
- the lock of the device no.11 if it has been previously selected;
- the lock of the fan inverter if the device no.11 has not been selected.

C11=C12 - selection of the beginning and ending time of the reduced setpoint.
The parameter C11 allows the selection the beginning of the time bands with setpoint reduced; the parameter C12 makes it possible to select the ending time. Examples:
- Time band during the day. C11=12, C12=16: the reduced setpoint is active from 12:00 a.m. to 3:59 p.m.;
- Time band between two successive days. C11=14, C12=9: the reduced setpoint is active from 2:00 p.m. to 8:59 a.m. of the following day;
- C11=C12: the reduced setpoint is active throughout the whole day (24 hours).

IMPORTANT: absolutely do not select the value C11=C12=0.

C20= selection of the day with exclusion of the time band.
The parameter allows the exclusive of the time band with secondary setpoint for a selected day. The beginning time (C21) and the ending time (C22) are programmable. The data that can be selected are the following:
0 exclusion of the time band not enabled;
1 exclusion of the time band with secondary set for the day of Monday;
2 exclusion of the time band with secondary set for the day of Tuesday;
3 exclusion of the time band with secondary set for the day of Wednesday;
4 exclusion of the time band with secondary set for the day of Thursday;
5 exclusion of the time band with secondary set for the day of Friday;
6 exclusion of the time band with secondary set for the day of Saturday;
7 exclusion of the time band with secondary set for the day of Sunday.

C21 - beginning of the time band exclusion.
The beginning time of time band exclusion with secondary set is required (see parameter C20).

C22 - end of the time band exclusion.
The ending time of the time band exclusion with secondary set is required (see parameter C20).
Caution: *do no enable at the same time the bands with reduced setpoint and the regulation of the setpoint from analogic setpoint because both options have priority over the selected setpoint.*

St3, St5 - minimum setpoint
Establish the minimum value that can be selected for the setpoint. The use of this parameter does not allow the end to select a probe 1 setpoint lower than the value indicated by St3 and a probe 2 setpoint lower than the value indicated by St5.

St4, St6 - maximum setpoint
Establishes the maximum value that can be selected for the setpoint. The use of this parameter does not allow the end to select a probe 1 setpoint higher than the value indicated by St4 and a probe 2 setpoint higher than the value indicated by St6.

St7 - secondary setpoint
Allows to select the secondary setpoint, that is valid when the time bands are enabled.

d1, d2 - device differentials
These parameters establish the values of the differentials of the devices managed by the probe 1 and 2 (inverters excluded).

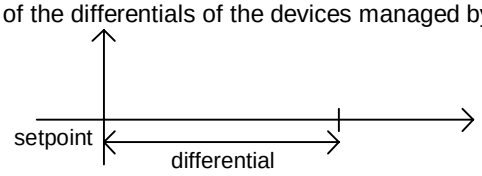


Fig. 5

d3, d4 - inverter differentials
Differential, in addition to the active setpoint of the relevant circuit, represents the other value which can be used to calculate the limit switch point of the inverter, i.e. the measured value to which corresponds an output of 10 volts.

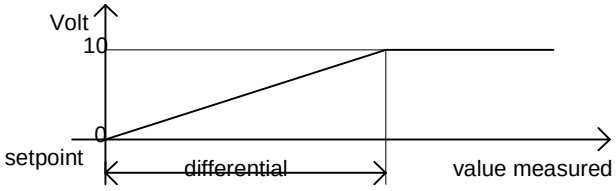


Fig. 6

when either d3 or d4 are involved, the differential refers to the device 1/valve inverter or to the fan inverter respectively. These parameters are visible only if the outputs for the inverter (P20=1 and P35=1) are provided for; furthermore, in the case of the circuit 1/valve inverter, the side band control must be selected (P14=1).

Sr1 - inverter step of the device no.1 (see fig. 14).
The parameter is visible only when the presence of the inverter on the device no.1 has been selected, and also if when the type of control is based on neutral zone. It establishes the increment and decrement of the device no.1 inverter (see parameter P20).

Sr2 - deviation of the device no.1 inverter (see fig. 14).
The parameter is visible only when the presence of the inverter on the device no.1 has been selected, and also when the type of control is based on a neutral zone. It is indispensable for the calculation of the inverter insertion into the device no.1 (see parameter P20).

Sr3 - minimum opening of the device 1/valve inverter.
The parameter is visible only when the presence of the inverter on the device no.1/valve has been selected. This parameter makes it possible to apply a minimum voltage at the inverter/valve output. Therefore, this value is forced when the conditions involve the application of a voltage value lower than the minimum value selected.

Sr4 - minimum aperture of the device 1/valve inverter continuously applied.
The parameter is visible only when the presence of the inverter on the device no.1/valve has been selected (parameter P20). If the parameter SR4 is 1, the minimum aperture of the device 1/valve inverter (parameter Sr3) is applied even if in case of alarm presence on this device or when (if P14=0) compressor 1 is Off. Only when the unit is Off the output of the inverter/valve remains 0 in all cases.

SH1, SH2 - alarm threshold of high
It represents the threshold of high of the probe 1 and 2 respectively. When the value detected by the probe exceeds the selected value the alarm is activated.

SL1, SL2 - alarm threshold of low
It represents the threshold of low of the probe 1 and 2 respectively. When the value detected by the probe falls below the selected value the alarm is activated.

P1, P24 - type of probes
The parameters makes it possible to specify the type of probes being used. The following selections are available.
0 probe is absent;
1 active temperature probe (-1V dc ÷ 1V dc);
2 temperature NTC probe;
3 pressure Keller probe 4-20 mA (Keller).
Depending on the selection it is necessary to connect the probes to the analog input B1 and B2 (passive temperature probes) or B5 and B6 (pressure probes or temperature probes of the active type).

P2, P25 - probe lower range
These parameters are necessary when non-Carel probes have been selected (Keller probes or 4-20 mA probes). They represent the lower operating limit of the respective probes. For instance, to the 4mA could correspond the 0 bar value, and so the 0 value must be attributed to the parameter.

P3, P26 - probe upper range
These parameters are necessary only when non-Carel probes have been selected (Keller probes or 4-20 m/A probes). They represent the upper operating limit of the respective probes. For instance, to the 20 mA could correspond the value of 30 bar, and so the value “30” must be attributed to the parameter.

P4 - probe 1 device number
The parameter represents the number of devices controlled by the probe 1 (except possible voltage control). The device number may range from 0 to 11. When 11 devices are selected, it is not possible to connect any device to the secondary circuit (except the fan inverter).

P5 - number of devices operating with probe 1 out of order
When occurring the alarm of broken or not connected probe 1 (AL14), the parameter P5 indicates the minimum number of the circuit devices which are On.

P6 - number of voltage regulation
If the devices controlled by the probe 1 are compressors, it is possible to select the presence or not of one, two or three stages of voltage regulation. If up to 5 compressors have been selected (P4=5), it is possible to use only one stage of voltage regulation; while if up to 3 compressors have been selected (P4=3), it is possible to use 2 stage of voltage regulation; while if up to 2 compressors have been selected (P4=2), it is possible to use 3 stage of voltage regulation. This parameter is displayed only if P1>0 and P4>0 and if the functions “Device 1 Inverter” and “Neutral Zone” have been not enabled at the same time (P14=0 and P20=1).
Therefore the parameter is displayed in the following cases: P1>0, P4>0, P14=0, P20=0;
P1>0, P4>0, P14=1, P20=1.

P7 - logic of the voltage regulations
When voltage regulations are used, through this parameter it is possible to choose the operation logic of the outputs dedicated to the voltage regulations (normally excited or normally de-energised).

P8 - minimum time between the turning on of successive voltage regulations of the same compressor.
It sets the minimum time needed between two successive voltage regulations, or between the starting of the compressor and the respective voltage regulation. The parameter is present only if the regulations have been selected (P6>0).

P9 - logic of the voltage regulations turning on - full or partial
FULL: the ON sequence is COMP.1 → PARZ.1 → COMP2 → PARZ.2 etc...While the OFF sequence is PARZ.2 → COMP2 → PARZ.1 → COMP.1
PARTIAL:in the ON sequence the capacity control will be activated as soon as all the compressors are On. In the OFF sequence the compressors are turned Off when the all capacity controls are already Off.

P10 - turning on minimum time of the probe 1 devices
It sets the turning on minimum time of the circuit 1 devices. As a consequence, when all the circuit devices have been activated, they must remain ON for the same length of time as the one selected by the above-mentioned parameter.

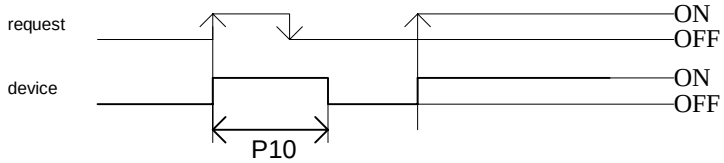


Fig. 7

P11 - turning off minimum time of the probe 1 devices
It sets the turning off minimum time of the circuit 1 devices. When after the last turning off the selected minimum has not elapsed, the circuit 1 devices are not turned on again.

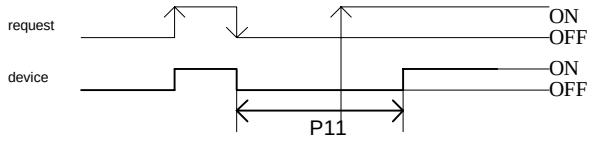


Fig. 8

P12 - minimum time between successive probe 2 devices
It represents the minimum time (in seconds) that must elapse between the turning on of a device and the turning on of the subsequent device controlled by the probe 1. This parameter allows to avoid simultaneous starting of the devices.

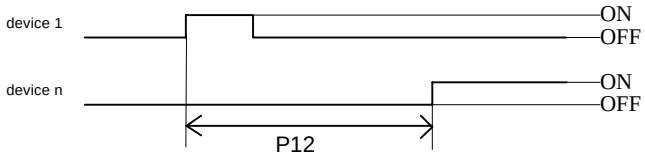


Fig. 9

P13 - minimum time between successive turning on of the same device of the probe 1
It sets the minimum time (in seconds) that must elapse between successive turning on of the device, independently of the detected measurement and of the setpoint. Selecting this parameter it is possible to restrict the turning on number per hour. For example, if the maximum allowed number of insertions is 10, selecting a value of 360 seconds allows to stay within established this limit.

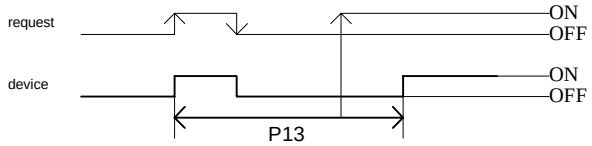


Fig. 10

P14, P29 regulation with “lateral band” or “neutral zone”
They indicate the activation of the connected devices.
In lateral band the devices are positioned proportionally within the controlled zone.
Example with 3 devices on a single circuit.

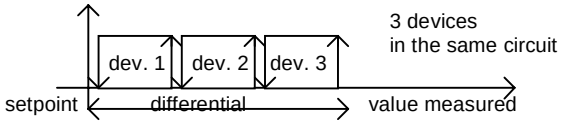


Fig. 11

In neutral zone there is a zone where no device is activated or deactivated.
The activation point of the devices is when the detected measure exceeds the neutral zone (detected measure>set+differential). The number of the devices to be activated depends on the time elapsed in this condition. The device switch off takes place when the detected measure goes down below the neutral zone (detected measure <set), and in this case too it depends on the time. See timing P17, P32 and P18, P33.

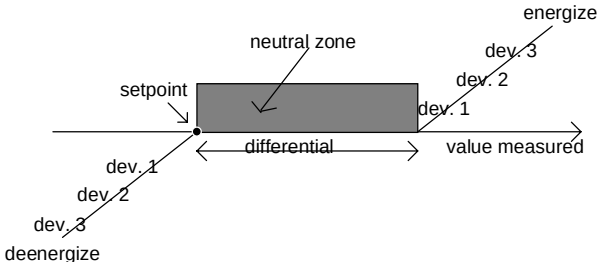


Fig. 12

P15, P30 - regulation type
Indicate the regulation of the circuit 1 and 2 respectively. This parameter is valid only when the control with lateral band of regulation is chosen (P14=1 and P29=1). The regulation may be Proportional or Proportional + Integral.

P16, P31 - integration time
Indicate the time of integration when a Proportional + Integral type of control has been chosen (P15=1 and P30=1).

P17, P32 - time between requests of switch on
The two parameters allow, respectively, the selection of time between the successive requests of switch on of the devices controlled by the probe 1 and 2.
These parameters are present only if the control of the devices is of neutral-zone type.

P18, P33 - time between turn off requests
The two parameters allow, respectively, the selection of time between the successive requests of turn Off of the devices controlled by the probe 1 and 2. These parameters are present only if the control of the devices is of the neutral-zone type.

P19 - selection of the device rotation
This parameter allows you select the rotation type
0= disabled rotation: the last IN is the first OFF.
1= "FIFO" rotation: the first IN is the first OFF; the devices switch off in starting order.
2= "time" rotation: the first ON device is the one with the lower operation time, the first OFF device is the one with the higher operation time.

P20 - selection of the device no. 1/valve inverter
Enables the presence of the inverter on the device no.1, controlled by the probe 1, or of a 0-10 volt valve, depending on the presence of neutral-zone or lateral-band regulation. The parameter is displayed only if P1>0 and P4>0 and if the functions “Number of circuit 1 voltage control” and “Neutral Zone” have not been enabled at the same time (P6>0 and P14=0). Therefore the cases in which the parameter is displayed are: P1>0, P4>0, P6=0, P14=0;
P1>0, P4>0, P6>0, P14=1.

case 1 - presence of lateral-band regulation
The control involves the selection of a setpoint (SI1) and a differential (d3). When the value detected by the probe 1 is less than or the same as the value of the valve setpoint, there are 0 volts at the output dedicated to this device. As the value detected by the probe 2 deviates from the set point, the analog output increases in proportion to the deviation, and reaches 10 volts when the detected value is the same or higher compared to the setpoint + differential.

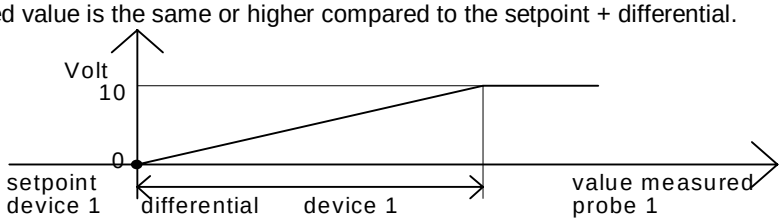


Fig. 13

case 2 - presence of neutral-zone regulation
The control requires the solution of a deviation (Sr2) from the setpoint.
The output of the device 1 inverter increases when the reading of the probe 1 exceeds the value of the neutral zone setpoint St1 + the display of the device 1 inverter (Sr2). The decrease takes place when the probe 1 reading is below the value of the neutral-zone setpoint. In the zone included between the neutral-zone set point and the neutral zone setpoint + deviation of the device 1 inverter, the inverter output does not change at all; for this reason the zone is called neutral zone of the inverter. The output of the inverter increases/decreases at each cycle of the programme - i.e. about every second - of a value that can be selected named inverter step (Sr1).

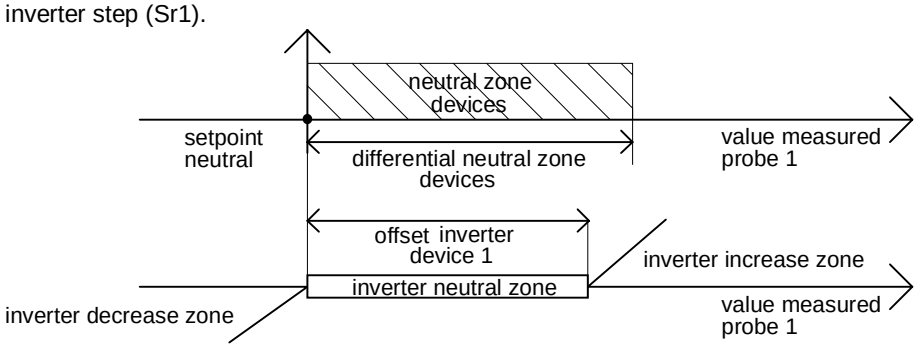


Fig. 14

Caution: when the device no.1/valve inverter is enabled and the regulation takes place with neutral zone, the activation of the devices occurs as follows:
- the device no.1, which is controlled by the inverter, is activated as soon as turn on is needed;
- if the request remains, the output of the device no.1 inverter is increased;
- if the request is still present, and the output of the inverter reaches 10 volts, the other devices are required one at a time, with rotation (when selected) and according to the timing.

The turn off stage occurs as follows:
- the inverter output is decreased;
- when the inverter output has already reached 0 volts, the other devices turn off, one at a time, according to the timing and rotation;
- the last device being turned off is the no.1.

P21 - selection of the analog input through setpoint variation (see fig. 30)
The sepoint of the devices managed by the probe 1 can be selected by means of a potentiometer connected to the B3-AVSS terminals. This is possible if the parameter P21 equals 1. The table shows some analog-inspect resistive values (ohm) to be given to obtain the respective values in bar, in °C or in °F depending on the unit of measure of choice.

bar/°C/°F	Kohm	bar/°C/°F	Kohm	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 - enabling of the probe of the external air (see figure 30)
This parameter enables the presence of a temperature probe of the external air and also allows to compensate the probe 1 set-point. This parameter is present only if the probe 1 measures the temperature.

P23 - enabling of the probe 1 compensation
If the parameter P22 is active (P22=1), then it is possible to enable the procedure of compensation (cooling or er). This procedure allows the setpoint variation of the primary circuit according to the values read by the external-air temperature probe.
More precisely, a proportional quantity is added (or deducted) to the setpoint of the primary circuit according to the selected compensation delta and with variation of the external air temperature between two values set by a setpoint and a compensation differential. The maximum value that can be added (or deducted) to the setpoint of the primary circuit is the same as the compensation delta (see fig. below).

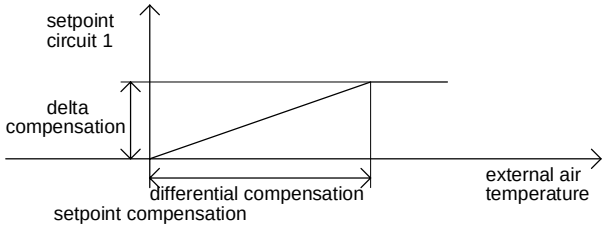


Fig. 15

P27 - number of probe 2 devices
This parameter allows to set the number of devices controlled by the probe 2. The devices can range from 0 to 11, but this parameter depends also on the number of devices controlled by the probe 1 (parameter P4).
This mean that if no device controlled by the probe 1 is connected, the devices controlled by the probe 2 can be 11 at most, but, if the devices controlled by the probe 1 are 11, no device can be controlled by the probe 2.

P34 – device rotation selection
The parameter allows you to enable the rotation of the devices being controlled by the probe 2.
The rotation being implemented is of the “FIFO” type: the first ON is the first OFF

P35 - enabling of fan inverter
The fan inverter can be enabled by this parameter.
Enabling the control of fan inverter involves the selection of a setpoint inverter (SI2) and a differential inverter (d4). When the value detected by the probe 2 is less than or the same as the value of the setpoint inverter, the output dedicated to this device shows 0 volts.
As the value detected by the probe 2 deviates from the setpoint inverter, the analog output increases in proportion to the deviation until it reaches the value of 10 volts when the measured value is equal to or greater than the setpoint inverter + differential inverter.

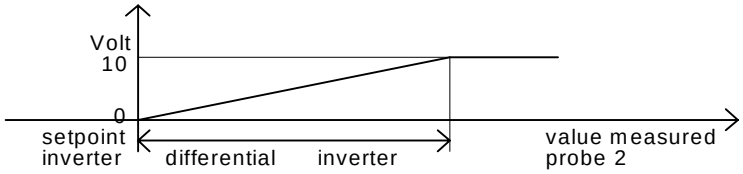


Fig. 16

P37 - enabling of the autostart
Allows the selection of the autostart procedure. When the procedure is enabled, if the unit is in the On state before a black-out, after the black-out period, the On state is automatically restored.

P38 - type of freon
It allows to enable the type of freon used in the plant where the programme is installed.
0 No selection
1 R22
2 R134a
3 NH3 (ammonia)
4 R404a

P39 - °C or °F
Defines the unit of measure.
0 temperature in degrees Celsius (centigrades)
1 temperature in degrees Fahrenheit
When changing measurement system, automatic conversion of the values measured on the analog inputs is given.
Caution: *the automatic conversion does not take place for the parameters. The user must update them when changing them*

P40 - remote on/off selection
If the value of the parameter is 1, it is possible to use the forth analog input (B4) to turn On or Off the unit:
open contact → unit off *closed contact* → unit on

P41 - clock enabling
In case the clock board is used this parameter must be 1, otherwise it is not possible to have access to the clock branch.

P42 - printer enabling
In case of connection to a serial printer this parameter must be 1, otherwise it is not possible to have access to the printer branch.

P43 - identification number
The parameter allows the setting of the unit identification number (useful only in case of connection to a system of supervision and/or remote assistance).

P44 - alarms with automatic or manual reset
P44=0 ⇒ automatic. In the event that one or more alarm conditions are detected, pCO acts as following:
- red LED behind key “alarm” lit;
- buzzer activated;
- alarm relay (changed over relay, normally energized) opens

Pressing key “alarm” silences the internal buzzer and pCO displays the list of alarm codes. *If the causes of the alarm are no longer activated, every locked out device starts normal functioning and pCO acts as following:*
- alarm relay closes (from NO a NC);
- the buzzer, if it has not been silenced yet by pressing key “alarm”, is de-activated;
- red LED behind key “alarm” blinks.

If in this stage new alarms come up, pCO re-acts the inital procedure. The red LED, while blinking, informs the user that alarm situations have been detected and that, now, they are no longer actived.
The codes of such alarms are memorized so the user is able to see these situations by means of key “alarm”; if, after visualizing them, the user presses again key “alarm” they are definitely cancelled and red LED is de-activated.

P44=1 ⇒ manual. In the event that one or more alarm conditions are detected, pCO acts as following:
- red LED behind key “alarm” lit;
- buzzer activated;
- alarm relay NC contact (change over relay, normally energized) opens

Pressing key “alarm” silences the internal buzzer and pCO displays the list of alarm codes. If the alarm conditions are no longer actived, the red LED blinks to inform that alarms has been detected but now they are no longer “true”. In this situation alarm relay keeps the contact open to signal what happened. If now new alarms come up, pCO re-acts the initial procedure.
Devices are locked out until the user cancels alarm messages from memory:
This is achieved by pressing key “alarm” while alarm codes are visualized in the display. If the reasons of the alarms situations are effectively gone, pCO acts as following:
- alarm relay closes NC contact (from NO a NC);
- the buzzer, if it has not been silenced yet by pressing key “alarm”, is de-activated;
- red LED behind key “alarm” is turned off.

Otherwise, if the alarm conditions are still actived, pCO re-acts the initial procedure.

P45 - delay on energizing alarm relay
The parameter allows the user to set a delay (minutes) between the detection of an alarm and the activation of the alarm relay (digital output no.11). If P45 is zeroed, alarm relay acts immediately.

P46 - disabling key “On-Off”
The parameter disables the functioning of key “On-Off” to turn the unit off. If P46 is zeroed, the user is able to turn the unit On and Off by means of the relative key, otherwise if P46 is equal to 1, key “on-off” allows only to turn the unit on (it never stops).

P47 - serial communication baud-rate
This parameter permits to select the serial communication baud-rate. When the RS485 serial board is connected it is possible to choose the data transmission speed :
0 1200 baud
1 2400 baud
2 4800 baud
3 9600 baud
4 19200 baud.

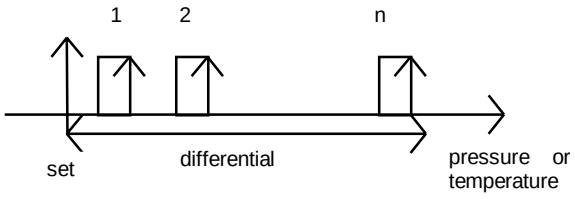
P61 - circuit 1 devices switch off mode
If P61=1, during the switch-off phase of the devices belonging to the circuit 1, first all the capacity-controllers and then the respective compressors are switched off. This procedure is useful when a reduction of the number of compressor switch on/off is required so as to protect their lifetime.
If P61=0, during the switch off phase current consumption is chosen.

example : If in the unit there are
3 compressors (P4)
2 compressor capacity controllers (P6)
P61= 1
are selected and furthermore all the devices are switched on, when the switch off of the devices is needed, first all the capacity controllers and only afterwards the compressors will be switched off. Therefore, the situation could occur in which 3 compressors are switched on at the 33% of their capacity.

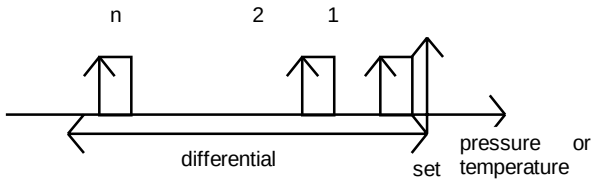
Step	claim	device	total number of devices switched on
1	on	compressor 1 on	1 compressor
2	on	capacity control 1compressor 1 on	1 compressor + 1 capacity control
3	on	capacity control 2 compressor 1 on	1 compressor + 2 capacity controls
4	on	compressor 2 on	2 compressors + 2 capacity controls
5	on	capacity control 1 compressor 2	2 compressors + 3 capacity controls
6	on	capacity control 2 compressor 2	2 compressors + 4 capacity controls
7	on	compressor 3 on	3 compressors + 4 capacity controls
8	off	capacity control 2 compressor 1 off	3 compressors + 3 capacity controls
9	off	capacity control 1 compressor 1 off	3 compressors + 2 capacity controls
10	off	capacity control 2 compressor 2 off	3 compressors + 1 capacity controls
11	off	capacity control 1 compressor 2 off	3 compressors
12	off	compressor 1 off	2 compressors
13	on	capacity control 1 compressor 3 on	2 compressors + 1 capacity control

P62 - cold/warm
With this parameter it will be possible to decide whether these devices belonging to the circuit 1 are used to obtain cold (P62=0; e.g. compressors) or warm (P62=1; e.g. boilers).

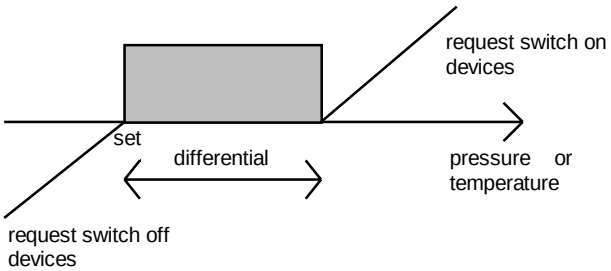
- *proportional band*
- *cold*



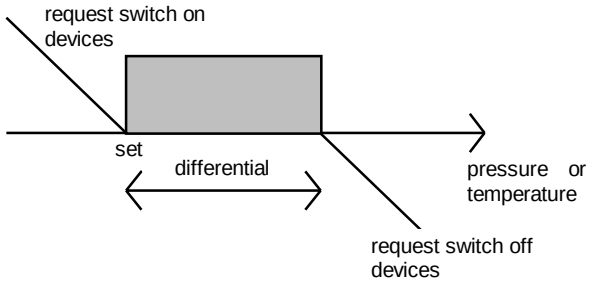
- *proportional band*
- *warm*



- *neutral zone*
- *cold*



- *neutral zone*
- *warm*



AL13 - not working EEPROM
In case of an EEPROM failure (chip within the device) this signal is activated. Skilled technicians are needed.

AL14, AL15, AL34 - not working probe
The relevant probe is broken or is not connected. Check the wiring and functioning of the probe.
If AL14 is present the devices programmed with the P5 parameter are forced to switch on, and the inverter of the device no.1/valve, if enabled, is forced to 10 volts. The remaining devices can be switched on according to the value measured by the probe 1. If AL15 is present all the devices connected to the circuit 2 are forced to switch on and the fan inverter is forced to 10 volts.
If AL34 is present, the compensation (if enabled) does not work. These alarms can be operated only manually, and so they do not reset until the user does not press the alarm button the pCO terminal in order to clear the alarms.

AL16 - high pressure switch/antifreeze
AL16 given the high pressure alarm if the pCO controls a Refrigerator Plant (see pp. 32-33) or it gives the antifreeze alarm if the pCO controls a Chiller (see pp. 34-35).

AL17 - low pressure switch/flow controller
AL17 gives the low pressure alarm, if the pCO controls a Refrigerator Plant (see pp. 32-33) or it gives the flow controller alarm if the pCO controls a Chiller (see pp. 34-35).

AL33 - incorrect selected device number
If the sum of the device number of the primary and secondary circuit and of the voltage controls exceeds the number of outputs really available, the ALL33 alarm is produced.

PSt, PSC, PSS, Psn - password
These four codes refer to the Password of the Maintenance, Clock, Setpoint and Programming branches respectively.
For each of the listed branches, the number to be set in order to have access to the successive parameters is:
- 022 (Maintenance, Clock, Setpoint);
- 055 (Programming).

The selected value of the password is always reset when other parameters are visualized.

Main display: Menu
After pressing the Menu button the probe 1 reading is displayed on the left side of the display whereas on the right side of the display the probe 2 reading is displayed. If one of two probes has not been selected (P1=0 and/or P24=0), the following symbol "----" appears instead of the reading.
The LED located on the left of each display lights up near to the unit of measure (bar; ºC or ºF) used by the probe selected. If at least one of the connected probes is a pressure one, by pressing the *menu* key the correspondent temperature value (ºC or ºF according to the different value imposed to P39 parameter) is displayed. The conversion table has been compiled according to the different types of Freon. The range used for the conversion between pressure and temperature is -30÷50ºC.

Lamp-Test initial
Wherever the pCO is fed, the display switches on all its LEDs and the following figure "8.8.8. 8.8.8." is displayed for a few seconds. After the Lamp-Test the probe readings are displayed and only the LEDs needed for the functioning are switched on. During this procedure it is possible to verify if all the LEDs are working.

Selection of the negative parameters
Many parameters that can be selected from the terminal can have negative values. When these parameters are included between "-99" and "-10" it is not possible to select the decimal value. Therefore the whole value without decimal is always accepted. From the supervisor, on the contrary it is also possible to select the decimal value.
For this reason when selecting from the supervisor negative parameters with values ranging -99 and -10 it is necessary to select exclusively values with 0 as decimal part.

Installation of the Default Values
automatic installation: in the software a control is implemented that carries out the automatic installation of the default values when the initial program loading is done or when the EPROM is substituted for another different version (verify the version and date reported on the EPROM label);
manual installation: if the user wants to reprogram the machine*, he must put it into the OFF state*. Afterwards *he must press simultaneously the MENU+PROG buttons* till "rST 0" appears, then press ▲ or ▼ button, the symbol "8.8.8. 8.8.8." is displayed, all the LEDs stay alight for a few seconds and in the meantime the software installs the default values.

6 CONNECTIONS

For an exhaustive description of the hardware and of the installation procedure please refer to the "User manual" of the pCO, available on request.

6.1 Hardware architecture

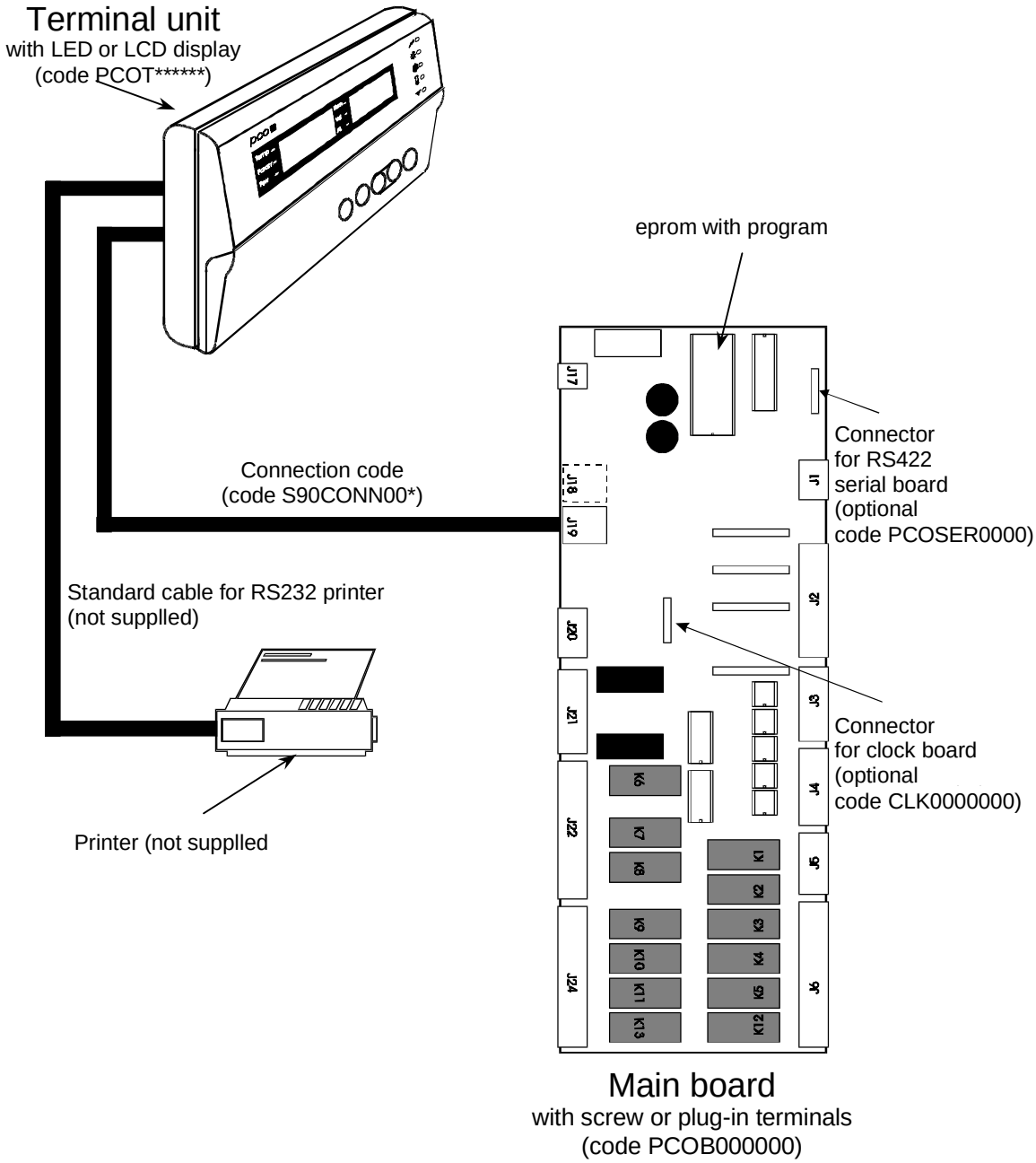


Fig. 17

The hardware architecture is as follows:
1. User TERMINAL unit with keypad, display and LEDs. **The connection of the user terminal unit to the main board is not necessary for the controller operation; it can be used for the initial programming of the main parameters.**
2. A MAIN BOARD with a unit set to be connected to the controlled devices.
3. Connection cable between the terminal unit and the main board.
4. Connection cable between the terminal unit and the serial printer (to be provided by the customer).
5. Serial printer (to be provided by the customer).

6.2 Main board - layout

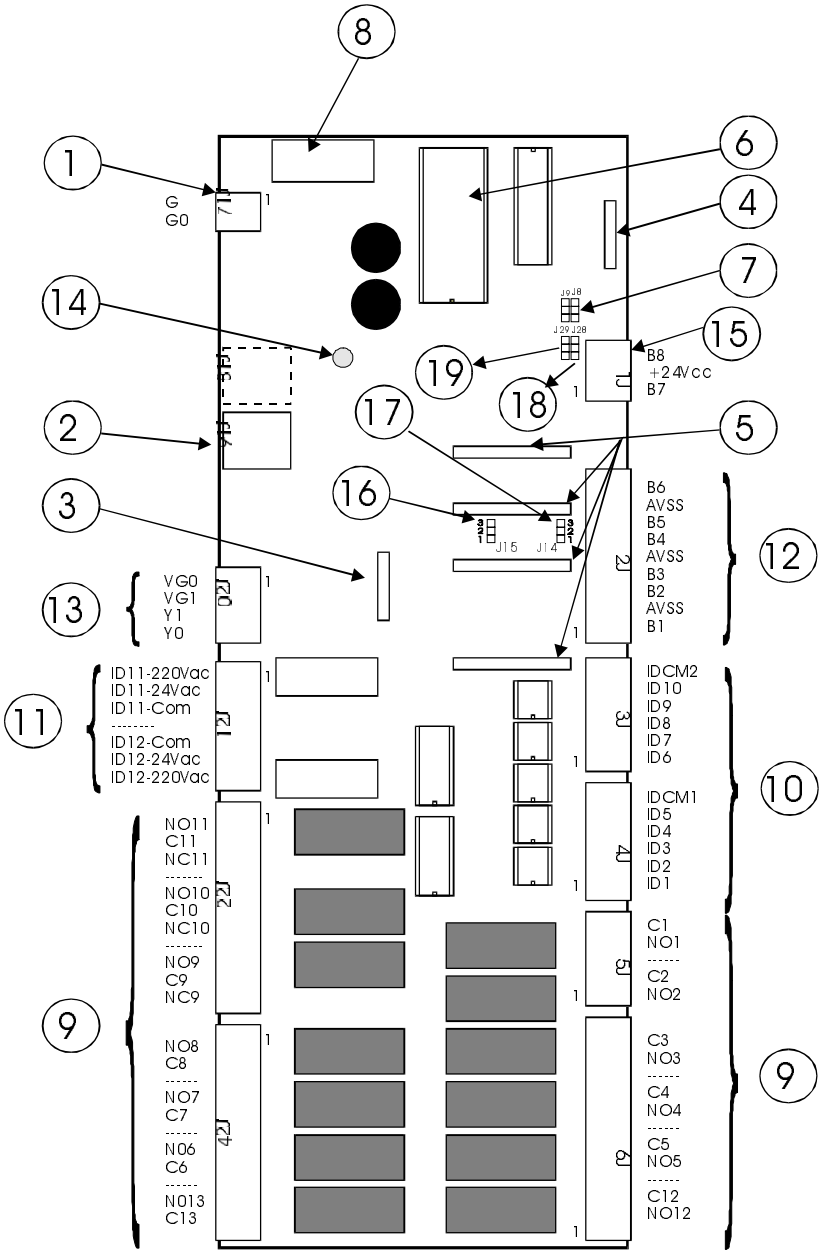


Fig. 18

The main board (code PCOB000***) is the basic core of the controller and includes 4 different areas:

- microprocessor and memories of the unit
- terminal blocks necessary to interface the pCO to the controlled devices
- connectors necessary to interface pCO to the remote terminal unit, to the real-time clock board, and to the local and supervisory network.

Fig. 18 **references, *page 22***

1. Power supply terminal 24V~50-60 Hz 15VA or 24V ⎓ 10W (see note on page 28)
2. Telephone-type terminal for connective to the user terminal unit (MMI-Man Machine Interface)
3. Real-time clock board (optional)
4. RS422/RS485 optoinsulated board (optional) for connection to a serial line of supervision/telemaintenance
5. Pin strip for analog-input adopter board (eventually available upon request only)
6. EPROM with application program
7. Jumpers to select the local network communication mode

J8 in position 1-2 allows the connection of the board to a terminal unit or, possibly, to the supervisory; in position 2-3 only the connection to the local network is enabled

J9 in position 1-2 enables the supervisor to reset the pCO board, in position 2-3 makes the pCO board independent of the reset action of the supervisor

The interface pCO boards by Carel have both jumpers in position 1-2

Caution: in this EPROM not exists the local network" management

8. Fuse 230 V~, 2A delayed
9. Digital outputs (commutable power 2300VA, 10A/230V~):

NO(n): Normally open contact output (n)

NC(n): Normally closed contact output (n)

Common contact output (n)

10. Digital inputs (24V~, 10mA)

ID(n): Digital inputs 1÷10

IDCM1: Common reference for digital inputs 1÷5

IDCM2: Common reference for digital inputs 6÷10

11. Digital inputs (230V~, 10mA)

ID11, ID12: Digital inputs 11 and 12

ID11R, ID12R: common reference for the digital inputs ID11 and ID12 respectively

12. Analog inputs

B(n): Analog input 1÷6 (8 for boards with 8 analog inputs, code PCOB000***1)

AVSS: Common reference of the analog inputs B(n)

13. Analog outputs 0÷10 V ⎓

Y(n): Analog outputs 1 and 2

VG1: External power supply for analog outputs (24V~ or 24V ⎓)

VG0: Reference for power supply and analog output signals Y0 and Y1

14. Power indicator LED

15. Analog inputs

B(n): analog inputs 7 and 8

+24 Vcc: power supply for external active probes 24V ⎓ (n) current

16. Jumper J15 to select the analog input B6 in 0÷1 V ⎓ or 4÷20 mA (1-2=4÷20 mA, 2-3=0÷1 V ⎓)
17. Jumper J14 to select the analog input B5 in 0÷1 V ⎓ or 4÷20 mA (1-2=4÷20 mA, 2-3=0÷1 V ⎓)
18. Jumper J28 to select the analog input B7 in 0÷1 V ⎓ or 4÷20 mA (1-2=4÷20 mA, 2-3=0÷1 V ⎓)
19. Jumper J29 to select the analog input B8 in 0÷1 V ⎓ or 4÷20 mA (1-2=4÷20 mA, 2-3=0÷1 V ⎓)

7 MEANING OF THE INPUTS AND OUTPUTS

Power supply

CONNECTOR	SIGNAL	DESCRIPTION
J17 – 1	G	Power supply + 24 V ⎓ 10 W or 24V~50/60 Hz 15 VA (see note on page 28)
J17 – 2	G0	Power supply reference
J1 – 2	+24	Power supply for external active probes 24 V ⎓ (max. power that can be supplied: 80mA

Connection with terminal unit

CONNECTOR	SIGNAL	DESCRIPTION
J19	Terminal unit	6-way telephone cable connection with terminal unit

Analog inputs

CONNECTOR	SIGNAL	DESCRIPTION
J2 – 1	B1	Probe 1 (only when the probe is of the NTC passive type)
J2 – 2	AVSS	Common analog inputs
J2 – 3	B2	Probe 2 (only when the probe is of the NTC passive type)
J2 – 4	B3	Potentiometer for setpoint variation / Ambient air temperature (optional)
J2 – 5	AVSS	Common analog inputs
J2 – 6	B4	Remote on/off (optional)
J2 – 7	B5	Probe 1 (only when the probe is of the 0-1 volt active type or is a 4-20 mA pressure probe - check pin-strip J14)
J2 – 8	AVSS	Common analog inputs
J2 – 9	B6	Probe 2 (only when the probe is of the active type 0-1 volts or is a pressure probe 4-20 mA - check pin-strip J15)

Digital inputs

CONNECTOR	SIGNAL	DESCRIPTION
J4 – 1	ID1	Device 1 lock /Pressure switch of high pressure / antifreeze
J4 – 2	ID2	Device 2 lock / Pressure switch of high pressure / antifreeze
J4 – 3	ID3	Device 3 lock / Pressure switch of high pressure / antifreeze
J4 – 4	ID4	Device 4 lock / Pressure switch of high pressure / antifreeze
J4 – 5	ID5	Device 5 lock / Pressure switch of high pressure / antifreeze
J4 – 6	IDCM1	Digital common inputs ID1-ID5
J3 – 1	ID6	Device 6 lock / Pressure switch of high pressure / antifreeze
J3 – 2	ID7	Device 7 lock / Pressure switch of high pressure / antifreeze
J3 – 3	ID8	Device 8 lock / Pressure switch of high pressure / antifreeze
J3 – 4	ID9	Device 9 lock / Pressure switch of high pressure / antifreeze
J3 – 5	ID10	Device 10 lock / Pressure switch of high pressure / antifreeze
J3 – 6	IDCM2	Digital common inputs ID6-ID10
J21 –1	ID11-230Vac	Common digital input ID11 – 230 V~ or 24 V~
J21 – 2	ID11-24Vac	Fan inverter lock – 24 V~ digital input
J21 – 3	ID11 - Com	Fan inverter lock – 230 V~ digital input
J21 – 4		Not connected
J21 – 5	ID12 - Com	Common digital input ID12 – 230 V~ or 24 V~
J21 – 6	ID12-24 Vac	Low pressure switch/flow switch – 24 V~ digital input
J21 – 7	ID12-230 Vac	Low pressure switch / flow switch – 230 V~ digital input

Digital outputs

CONNECTOR	SIGNAL	DESCRIPTION
J22 – 1	NO11	General alarm - contact normally open
J22 – 2	C11	Common general alarm
J22 – 3	NC11	General alarm - contact normally closed
J22 – 4		Not connected
J22 – 5	NO10	Device 10 - contact normally open
J22 – 6	C10	Common device 10
J22 – 7	NC10	Device 10 - contact normally closed
J22 – 8		Not connected
J22 – 9	NO9	Device 9 - contact normally open
J22 – 10	C9	Common device 9
J22 – 11	NC9	Device 9 - contact normally closed
J24 – 1	NO8	Device 8 - contact normally open
J24 – 2	C8	Common device 8
J24 – 3		Not connected
J24 – 4	NO7	Device 7 - contact normally open
J24 – 5	C7	Common device 7
J24 – 6		Not connected

J24 – 7	NO6	Device 6 - contact normally open
J24 – 8	C6	Common device open
J24 – 9		Not connected
J24 – 10	NO13	Not connected
J24 – 11	C13	Not connected
J6 – 1	NO12	Device 11 - contact normally open
J6 – 2	C12	Common device 11
J6 – 3		Not connected
J6 – 4	NO5	Device 5 - contact normally open
J6 – 5	C5	Common device 5
J6 – 6		Not connected
J6 – 7	NO4	Device 4 - contact normally open
J6 – 8	C4	Common device 45
J6 – 9		Not connected
J6 – 10	NO3	Device 3 - contact normally open
J6 – 11	C3	Common device 3
J5 – 1	NO2	Device 2 - contact normally open
J5 – 2	C2	Common device 2
J5 – 3		Not connected
J5 – 4	NO1	Device 1 - contact normally open
J5 – 5	C1	Common device 1

Analog ouputs 0-10 Vdc

CONNECTOR	SIGNAL	DESCRIPTION
J20 – 1	VG0	Reference signal Y0
J20 – 2	VG1	Reference signal Y1
J20 – 3	Y1	Compressor inverter
J20 – 4	Y0	Fan inverter

8 CONNECTION OF THE INPUTS

Digital inputs

- from ID1 to ID10, 24V~ 50/60 Hz or 24 V ⎓
- ID11 and ID12, 230V~ or 24V~ max. 50/60 Hz

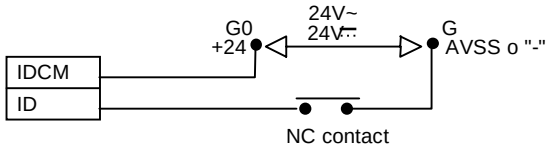
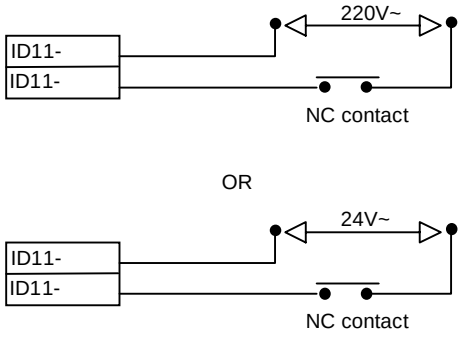


Fig. 19 (**for pCO terminal block, see Fig. 18)**



***Note**: do not connect any additional devices to the inputs Idn (e.g. relay coils for remoting the signal to other instruments).*

The pressure switch of the general high pressure/antifreeze must be connected in series to all the other lock contacts of the circuit 1 devices, capacity controls included (see ж). Unlike the other device lock contacts, the contact of the device no. 11 is either 230 Vac or 24 Vac; therefore it can not be connected in series to the pressure switch of high general pressure / antifreeze. The device no. 11 is locked however by general high pressure switch / antifreeze (see ж).

Analog inputs

- from B1 to B4 for probes NTC Carel
- B5 and B6 for active-voltage probes (0÷1V ⎓) or current probes (4÷20 mA) selectable by jumper

Types of probes that can be connected to the analog inputs

Output active temperature probes (3-wire probes)

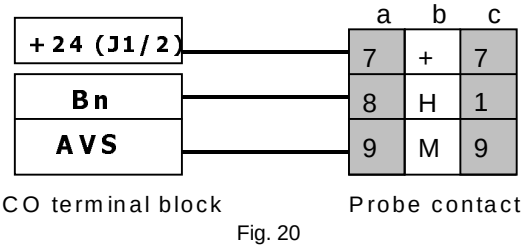


Fig. 20

Temperature Probes
SST00A00/1 (a)
SST00A0420 (a)

NOTE: the +24 terminal can supply max. 80mA.

Temperature NTC Carel probes (2-wire probes)

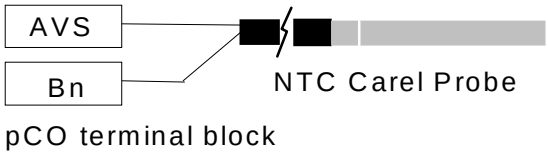


Fig. 21

Temperature NTC C.AR.EL. probes	
NTC0150000	NTC0600A00
NTC0350000	NTC120W000
NTC015W000	SSWNTC0000
NTC030W000	SSDNTC0000
NTC060W000	

The two cables of the NTC probes are equivalent because they have no polarity. Therefore it is not necessary to comply with a special order when connecting them to the terminal block.

Pressure probes (2-wire probes)

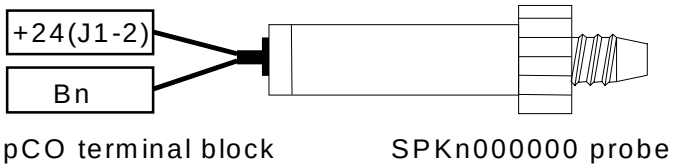


Fig. 22

Pressure probes
SPK1000000 (-0.5÷7bar) SPK2500000 (0÷25bar) SPK3000000 (0÷30bar)
Bn ⇒ White wire = pressure active output **+24 Vdc ⇒ Brown wire = power supply**

Note: at the terminal +24 a maximum of 80 mA is available.

Configuration of the B5 and B6 analog inputs

As previously mentioned the analog inputs B5 and B6 can receive either probes with voltage output signals (-1÷1 V ⎓) or probes with current output signals (4÷20mA).

Fig. 23

Pin-strip J14 refers to the input B5, while pin-strip J15 refers to the input B6 (see Fig. 18 page 22).

9 CONNECTION OF THE OUTPUTS

- 11 relay digital outputs, 8 of which with normally open contacts (NO1÷NO8) and 3 with changeover contacts (NO9÷NO11).
- 2 optoinsulated analog outputs 0-10 V ⎓ (Y0, Y1).

Analog outputs

Digital outputs

Fig. 24

The terminals used for analog output power supply (VG0 e VG1), can be connected directly to the terminals used to supply pCO interface card (see א).
The card is suitable to be installed in electric panels by fastner and screw, but its particular mechanical dimension allows it to be used for DIN rail mounting, by means of the optional DIN rail adapters and the metallic case (optional) provided by Carel.

9.1 Power supply

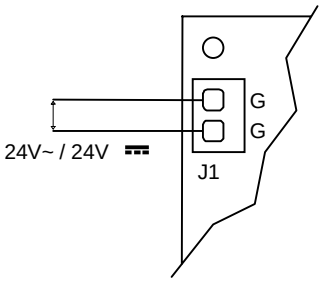


Fig. 25

pCO can be powered by:
24 V ⎓ +10% - 15% 10W
24 V~ +10% - 15% 50/60 Hz 15 VA

IMPORTANT: *When installing the unit, use a minimum 50 VA transformer.* ***The transformer must power only the pCO and not other possible devices****. If the transformer secondary is grounded, check that the same ground cable corresponds to the cable arriving to the control and is connected to the G0 terminal.*

9.2 Connection between terminal unit and main board

The connection between the terminal and the main board is performed by means of a 6-way telephone cable supplied by Carel.

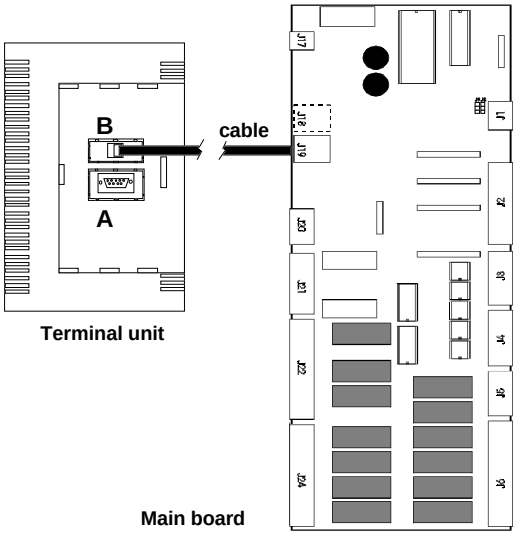


Fig. 26

The connection is carried out by plugging the telephone connector into the terminal J19 of the main board and into the terminal B of the terminal unit. Plug the connector thoroughly into the terminal until a click is heard.
To unplug the connector, push gently the prominent plastic tab and remove the cable.

Carel serial connection have three different lengths:

S90CONN002: length 0.8 m
S90CONN000: length 1.5 m
S90CONN001: length 3 m

The main board can operate also in the absence of the terminal unit; **do not disconnect and then connect the terminal to the main board before about 5 seconds have elapsed** (if the operation is carried out when the unit is ON).

9.3 Installation of EPROM

Before connecting / disconnecting the EPROM, power off the pCO board. For a proper functioning of the system, the EPROM must be connected into its socket on the **main board**, keeping a correct alignment **of the notch on the surface of the EPROM with the corresponding notch on the socket**.
To be sure, check that the glazed side of the EPROM coincide with the glazed side of the socket or with the reference notch serigraphed on the board.
Connect the EPROM to the corresponding main board socket so that all the pins are properly inserted into their seats.

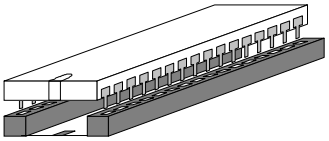


Fig. 27 Position of the EPROM

When removing the EPROM do not touch the SMD electronic components mounted on the board in the internal space of the socket. ***Caution: using the EPROM and the pCO main board***

Electrical damages of the electronic components are usually due to **electrostatic charges** induced by the user. The utmost care is needed when using these components, and particularly:

- before handling any electronic component or card, touch a ground reference (avoiding to touch the materials is not enough, as a discharge of 10000 V, a common event in the presence of static electricity, causes an arc of about 1 cm)
- materials should be left as long as possible inside their original packaging. If it is necessary to take a main board from a packaging, transfer the product into an antistatic packaging without touching the back side of the board with the hands
- absolutely do not use plastic bags, polystyrene or non-antistatic sponges
- take out of the original antistatic packaging one EPROM at a time
- do not touch the pins of the EPROM.

10 CONNECTION OF THE OPTIONAL BOARDS

10.1 Serial printer

It is possible to use the serial printer only if the pCO terminal with the following code is available:
PC0T00SL60 terminal unit with 6-digit LED display.
This terminal unit is equipped with a dedicated 9-pole male connector (connector **A**, Fig. 28).
It is possible to use the serial printer only if the pCO terminal with the following code is available: PC0T00SL60 terminal unit with 6-digit LED display.
This terminal unit is equipped with a dedicated 9-pole male connector (connector **A**), for connection to the printer through a 9/25-pole **serial cable for printer** (9 poles on the pCO side, 25 poles on the printer side). The printer must be with communication serial port **RS232**. The printer must be programmed with the following data:
- 1200 bauds; - no parity; - 8 data bits; - 1 or 2 stop bits.

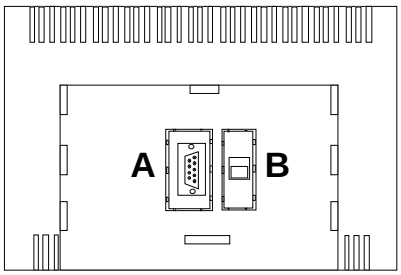
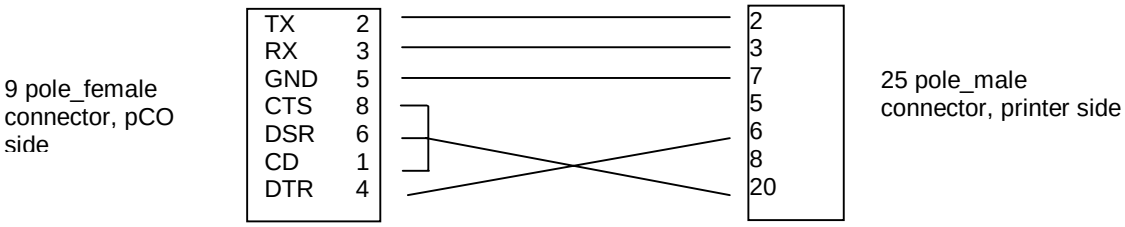


Fig. 28. Rear part of the pCO's unit

Serial cable for printer



10.2 Clock board

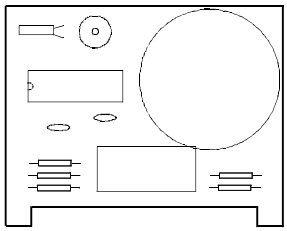


Fig. 29. Clock board

This figure shows the real time clock board (code **CLK0000000**) which allows to display date and time. This board is necessary when a time-band control action is required.
In case of power failure, a rechargeable lithium battery (45 mA/h; max. recharge time=12 h) will make the board work for more than one month.

11 USEFUL ADVICE FOR A CORRECT INSTALLATION

Do not mount the boards in places with the following features:

- Wide and quick ambient temperature variations
- Relative humidity higher than 85%
- Strong vibrations and shocks
- Direct exposure to jets of water
- Places where explosives or flammable gaseous mixtures are present
- Exposure to dust (dust forms a corrosive patina that produced could oxidize the unit and reduce the insulation)
- Exposure to aggressive gases or pollutants such as sulphuric or ammoniacal gases, saline mists, etc., with ensuing corrosion and/or oxidation
- High magnetic fields and/or radiofrequencies (do not place the units near transmitting antennas)
- pCO exposure to direct solar irradiation and weathering.

A wrong power supply connection can seriously damage the system:

1. Use a proper cable lug. Screw down every screw and push the cable lug through it, and then fasten the screw. Afterwards, tighten slightly the wire to be sure it has been properly fastened.
2. Keep the cables of the probe signals and of the digital inputs as fare as possible from power cables and inductive loads in order to avoid possible electromagnetic noises. **Do not put into the same cable ducts (the ones of the electric cables included) power cables and probe cables.** Do not install the probe cables immediately near power devices (magnetothermic contactor, etc.). Reduce as far as possible the route of the sensor cables and avoid spiral-shaped routes that go round power devices. Use screened cables to correct the probes (min. dia. being 0.5mm^2).
3. Do not touch the board electronic components to avoid electrostatic charges (extremely dangerous) from the operator to the components (see notes on page 30).
4. If the transformer secondary is grounded, check that the ground cable itself corresponds to the cable arriving to the controller and reaching the terminal **G0**.
5. To mount the board inside the electrical panel use the 6 metallic mounting hardware supplied with the board connecting them to the main electrical panel earth. Metallic mounting hardware must be fixed to the metallic holes on the board.
6. Separate the digital-input power supply from the power supply of the pCO.
7. Do not fix the cables to the terminals of the PCOB***B** boards pushing excessively on the terminal itself thus bending the pCO board.

12 APPENDIX A: TROUBLESHOOTING

The unit does not start (the mains presence LED on the main board is off, the LCD is off, the other LEDs are off).

Check:

a) the mains;
b) that after the 230V~ - 240V~ power transformer there are 24V~;
c) that the 24V~ power connector has been correctly plugged in;
d) the fuse of protection (Fig. on page 18);
e) the proper connection between the terminal unit (if present) and the main board.

At the start-up one of the following conditions occur:

alarm LED indicator ON;
no messages or random messages on the LCD;
buzzer ON.

Check:

a) EPROM polarity (see Fig.);
b) the pins of the EPROM (do not bend them when inserting the EPROM into its socket);
c) the microprocessor chip: if damaged, call the Maintenance Service.

Wrong input signal reading

Check:

a) the probe connection;
b) the distance of the cables carrying the probe signals from possible noise sources (e.g. power cables, contactors, high voltage cables and cables with devices that are connected with high absorption at starting);
c) input calibration (by program);
d) the proper power supply to the main board and the probes;
e) the separation of the power supply of the digital inputs from the power supply of the pCO.

EEprom failure alarm

a) Contact the Maintenance Service

Uncertain alarm signal from digital input:
Check:
a) the input alarm signal - detect voltage between the "C" common terminal and the digital input terminal indicating the "Cn" alarm. If voltage is present (24V~ or V ⎓, according to the power supply being used for the digital inputs) the contact of the connected alarm device is closed. If voltage is 0V~ or 0V ⎓ (see above) the contact is open. If not differently stated, the controller gives alarm whenever the contacts are open.

Wrong reading of the input signals:
Check:
a) the probe connection (see page 26 and following);
b) the distance of the probe cables from possible electromagnetic noise sources (e.g. power cables, contactors, high voltage cables and cables connected to high absorption at starting);
c) the presence of a high thermic resistence between the sensor and the probe socket. If required, add some paste or conductive oil to the sockets;
d) in case of probe error or conversion error of the pCO, the verifications depend on the type of probe.

Active temperature/humidity probes with -1V-1V**/÷**1V1V signal: measure the probe signal between the terminals Bn and AVSS with a voltmeter. The correspondence between voltage and value should be 10 mV ⎓ every °C/20% RH.
For example: when reading 230 mV ⎓ (0.2 V ⎓) the probe sends out a signal corresponding to 20 °C/20% RH; using the same logic, 0 mV ⎓ correspond to 0 °C/0% RH.
Pressure probes: in case of errors in the reading of these probes, check:
- that analog inputs accept 4-20 mA signals (see **Fig.** on page 35).
- the limits set via software correspond to the probes being used.

Measuring with a voltmeter the voltage at the terminals Bn and AVSS your indirectly obtain the current of the probe signal, since the input impedance is 50 ohms (I=V/R).
The "Ps" (pressure) value can be obtained as follows (SB=Scale Bottom):
PS = (Vmeas./50 - 0,004) (SBmax. - SBmin.)/0.016 + SBmin.
Example: the probe used has a SBmin. = -0.5 Bar/SBmax. = 7 Bar; the read voltage equals Vmeas. = 0.5 V ⎓.
The Ps pressure that the probe is measuring is:
Ps = (0.5/50 - 0.004) x (7 - (-0.5)) / 0.016 + (-0.5) = 2.3 Bar
- Check that the capillary probe is not clogged.

NTC probes: the probe signal is an ohm value that depends on temperature.
The table below shows different resistance values at different temperatures. Disconnect the probe at the interface input and measure the resistance at its terminal thus inferring the corresponding temperature value from the table below:

°C	Kohm	°C	Kohm	°C	Kohm
-20	67.71	0	27.28	20	12.09
-15	53.39	5	22.05	25	10.00
-10	42.25	17	17.96	30	8.31
-5	33.89	15	14.68	35	6.94

The pCO turns On and off repeatedly (watch-dog) or it activates some digital and/or analog outputs.
Check:
a) power cables: they should be far from the main board microprocessors;
b) the proper size of the power transformer (not supplied by Carel, see note on page 27);
c) the metallic mounting hardware must be used when mounting the main card to the electrical panel.

Failure of the serial connection to the local supervisor
Check:
a) the presence and proper connection of the serial board code PCOSER0000;
b) correct setting of the identification number of the pCO unit;
c) codes of the serial cables used in the system;
d) proper connection of the serial cables, according to the Carel diagram in the supervisory manual;
e) disconnection of the serial cables.

Failed connection to the remote supervisor
Check:
a) power supply to the Gateway (if any) and of the modems;
b) Gateway correct programming procedure (if any);
c) if the modem used is suitable for Carel serial network.

User terminal does not work (locked keypad)
Check:
a) the terminal has probably been disconnected and then connected without waiting for 2-3 seconds (see page 28). If so, turn the pCO Off and On again with the terminal connected;
b) check that the EPROM has been correctly inserted.

13 APPENDIX B: CONNECTIONS

Connection of the pCO to the other devices.

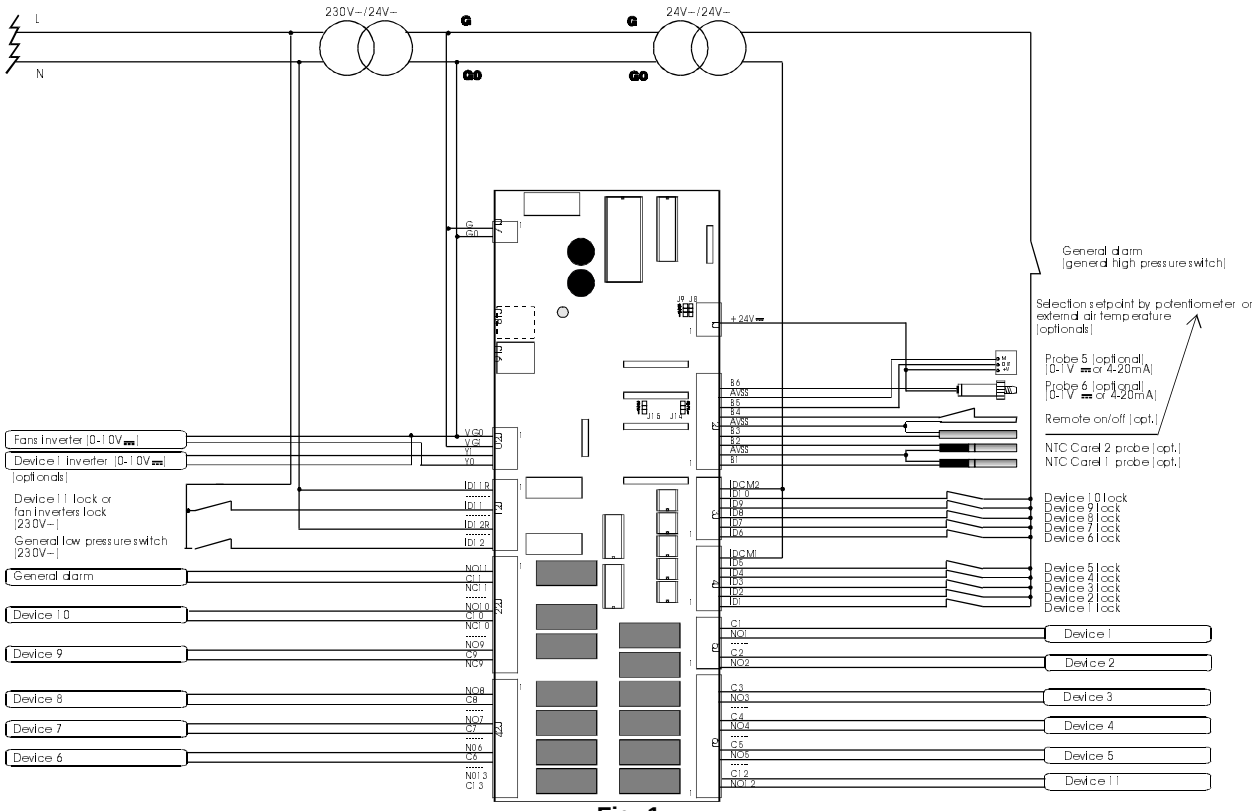


Fig. 1

CAUTION: Separate by means of a transformer 24V~/24V~ 12VA the power supply of the digital inputs from the power supply of the pCO board.

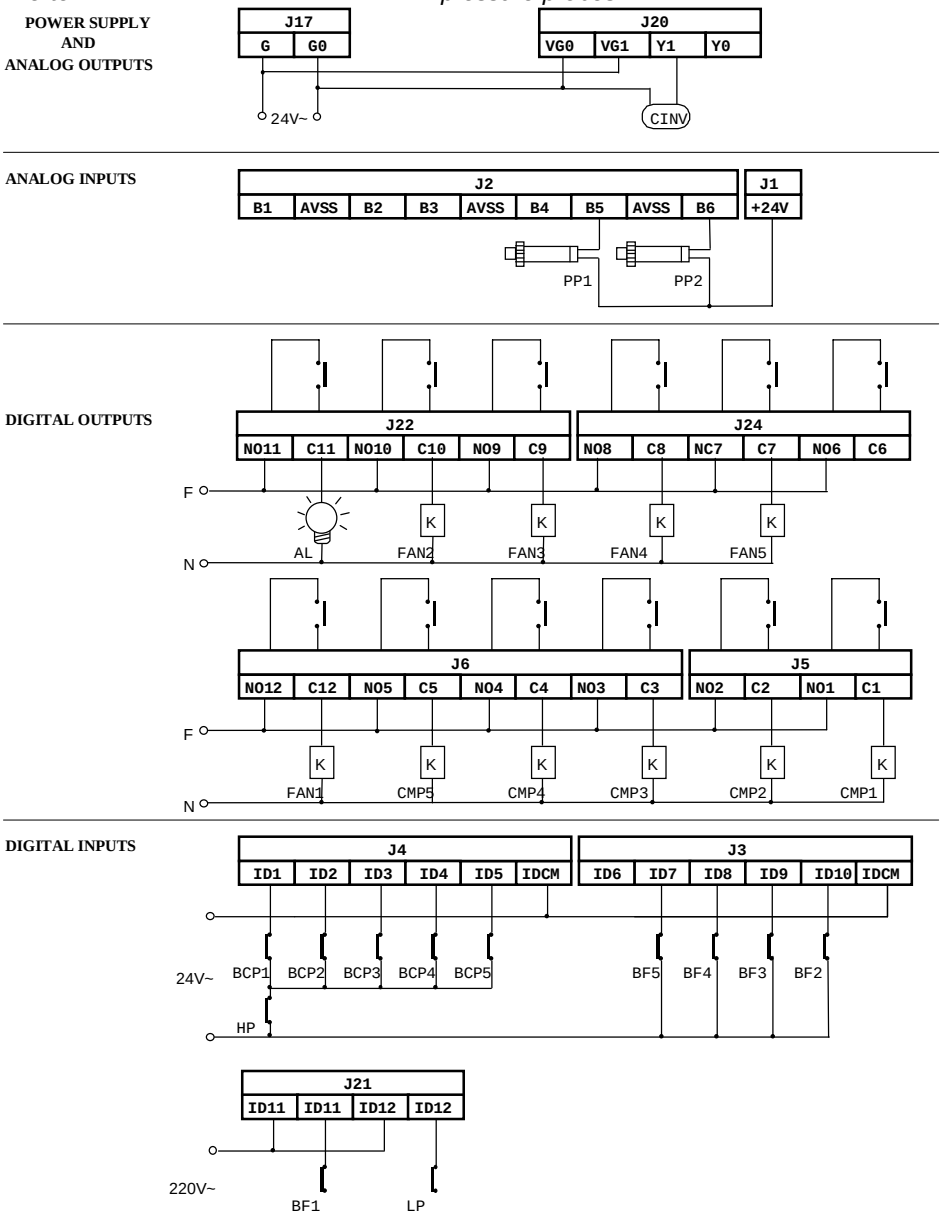
N.B.: IF CAPACITY CONTROLS ARE USED IN CIRCUIT 1, the relative digital input must be short circuited to 24V because they are switched off in the event that an alarm locks the relevant compressor (detected by its own digital input).
In particular situation, capacity controllers can be de-energized after the compressor output; if it is necessary to avoid that delay, the user must connect the compressor alarm signal to the digital inputs used to detect the possible alarms relative to the unlouders.
In this way the compressor and all its capacity controllers are simultaneously switched off in the event of alarm condition.

14 APPENDIX C: EXAMPLES OF APPLIANCES

This versatile instrument can be differently programmed according to the characteristics of the plant to be managed. For this reason here the connection diagrams of some appliances are shown.

Refrigerator unit consisting of:

- *5 compressors*
- *1 compressor inverter*
- *5 fans*
- *2 pressure probes*

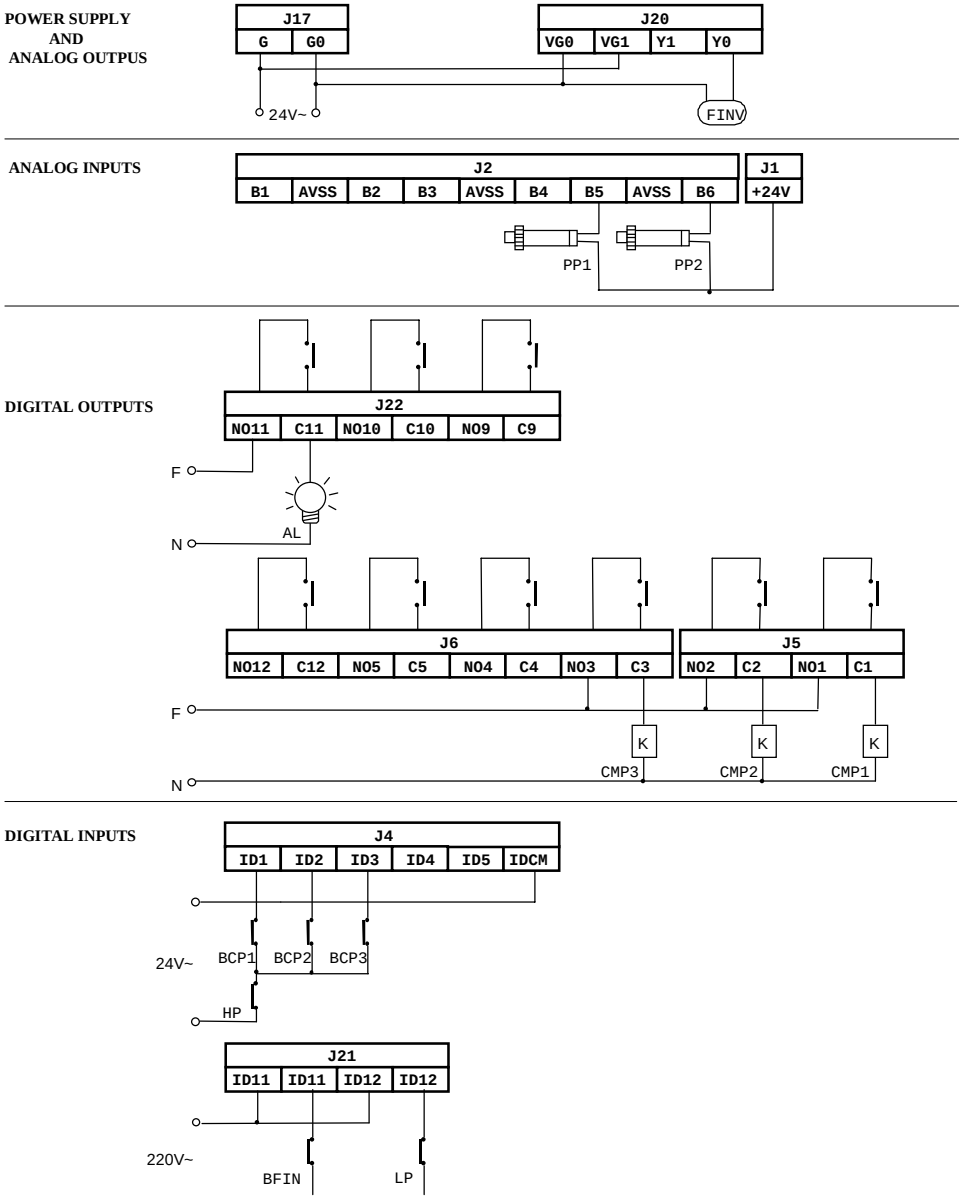


INPUTS		OUTPUTS	
BCP	compressor lock device	AL	General alarm
BF	fan lock device	CMP	Compressor
HP	general high pressure switch	FAN	Fan
LP	general how pressure switch	CINV	Compressor inverter (output 0÷10 volts / valve)
PP	pressure probe		

F	Phase	N	Neuter

Refrigerator unit consisting of:

- *3 compressors*
- *fans inverter*
- *2 pressure probes*

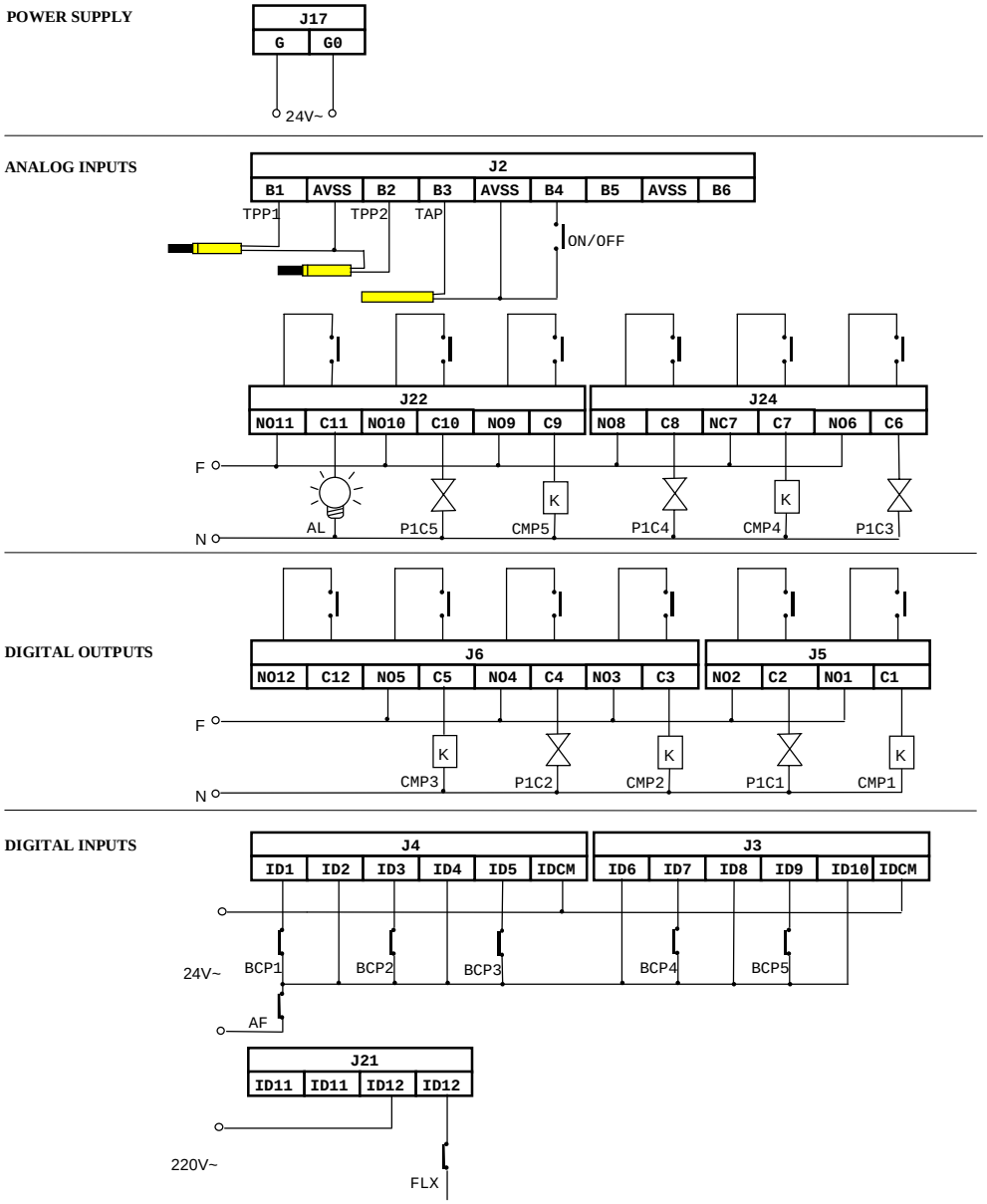


INPUTS		OUTPUTS	
BCP	Compressor lock device	AL	general alarm
BFINV	fans inverter lock device	CMP	compressor
HP	general high pressure switch	FINV	fans inverter (output 0¸10 volts) or RGF C.AR.EL.
LP	general low pressure switch		
PP	pressure probe		

F	Phase	N	neuter

Chiller unit consisting of:

- *5 Compressors*
- *1 Stage of voltage control for comp.*
- *remote On/Off from analog input*
- *2 NTC temperature probes*
- *1 External air temperature probe (compensation)*



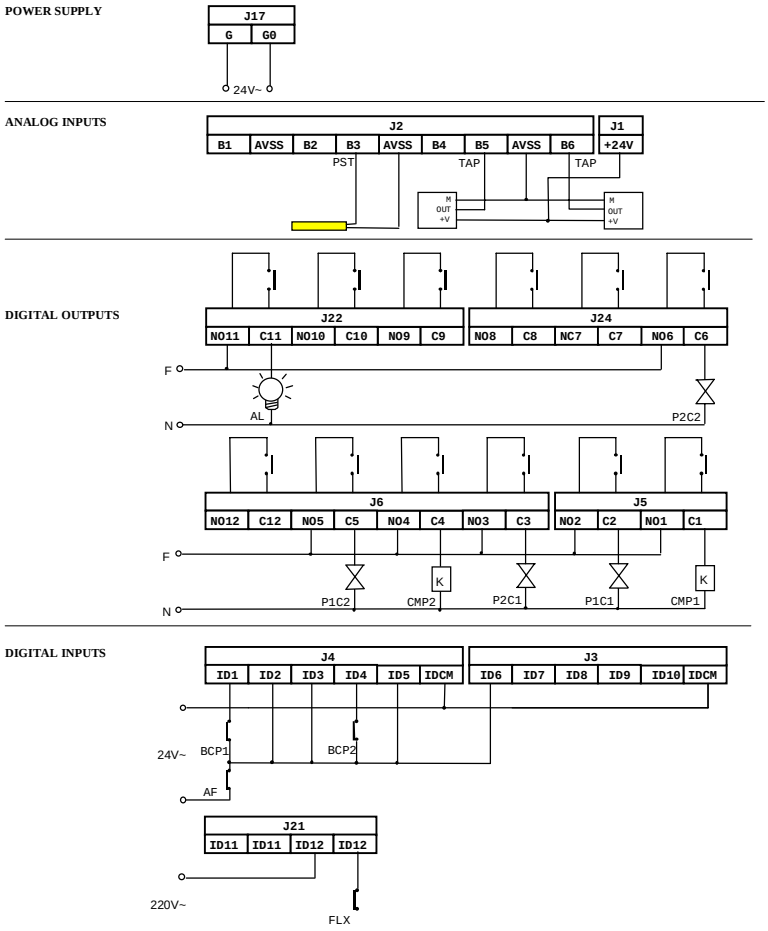
INPUTS		OUTPUTS	
AF	antifreeze lock	AL	General alarm
BCP	compressor lock device	CINV	Compressor 1/valve inverter
FLX	flow switch	CMP	Compressor
ON/OFF	On/Off remote input	P1C	First stage of voltage control
TAP	ambient air temperature probe		
TPP	temperature passive probe (IN/OUT)		

F	Phase	N	Neuter

Note: Fans must be electromechanically controlled by means of a contact of the contactor of its compressor, or they must be controlled through an external pressure switch (e.g. RFG or another pressure switch).

Chiller unit consisting of:

- *2 compressors*
- *2 stages of voltage control for comp.*
- *setpoint regulation from analog input*
- *2 temperature active probes: (chiller water input/output)*



INPUTS		OUTPUTS	
AF	Antifreeze lock	AL	general alarm
BCP	Compressor lock device	CINV	compressor 1 / valve inverter
FLX	flow switch	CMP	compressor
PST	Potentiometer for setpoint regulation	P1C	first stage of voltage control
TAP	Temperature active probes (IN/OUT)	P2C	second stage of voltage control

F	Phase	N	neuter

***Note**: Fans must be electromechanically controlled by means of a contact by the contactor of the relative compressor, or they must be controlled through an external pressure switch.*

15 APPENDIX D: MATERIALS AND CODES

pCO kit Universal Inserter: **PCOKITSTG0**

The kit includes:

Interface 8 screw fixed analog input connectors	PCOB000B21
Terminal pCO 6 digit LED	PCOT01SL60
Telephone connector 1.5m long	S90CONN000
Clock board	CLK0000000
EPROM with programme	EPSTDIIU0A

Optional:

Serial board	PCOSER0000
Serial board	PCOSER4850

Carel reserves the right to modify its products without prior notice.

Note:

CAREL

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