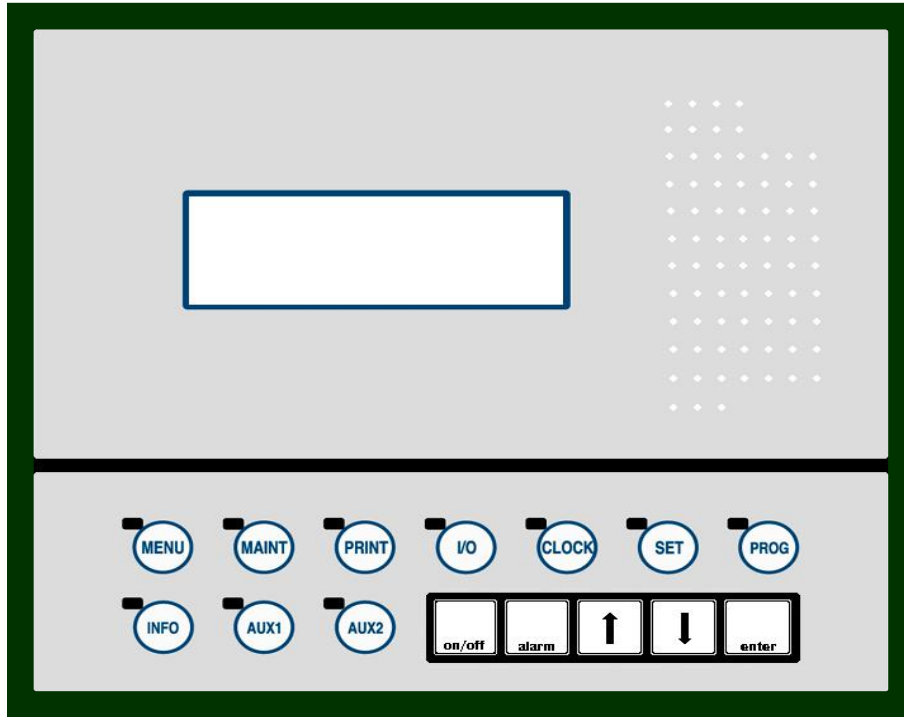


PROGRAMMABLE CONTROLLER



OR

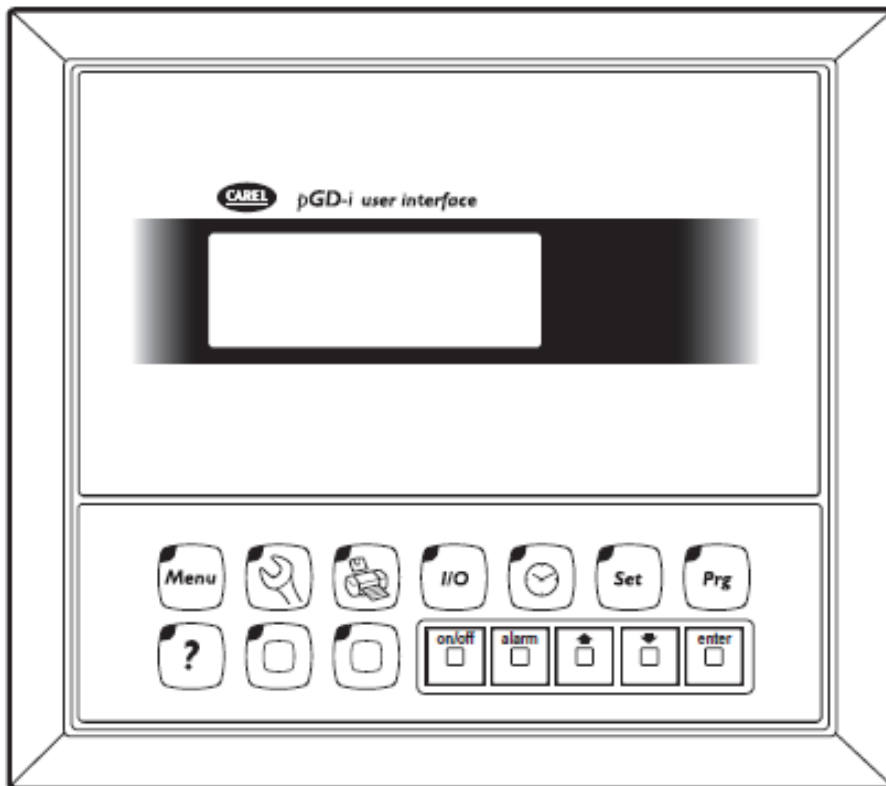


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OPERATOR INTERFACE

Function of the Polycarbonate Covered Buttons with LED's



Returns you to the main display from anywhere in the program



Displays the maintenance information of each device (working hours)



Allows you to access the displays concerning the printer (Not used)



Allows you manual control of all systems (resets to AUTO on power off)



Real time clock settings, night/day settings, dual channel light settings (optional)



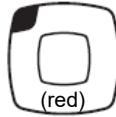
Allows you to set the controlling set points



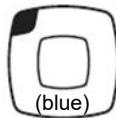
Allows you to set the main working parameters (startup delays, redundancy, defrost settings, door heater adjustments, etc.)



This screen gives program version number and information to the user.

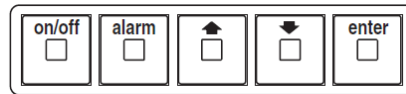


Aux 1 allows you to enter digital input/output setup



Aux 2 allows you to enter control offsets for sensors and analog controls

Function of the Square Buttons



1. on/off: turns the system on and off. This will include the room lights, outlets, refrigeration, heating, and humidity control. The green LED lit behind the button indicates that the unit is ON.

WARNING: DISCONNECT ALL SYSTEM POWER BEFORE SERVICING ANY EQUIPMENT!

2. alarm: by pressing this button you can display the active alarms, reset them manually or silence the buzzer. The red LED indicates at least one alarm condition has occurred.
3. Up Arrow: moves upward through the program windows and increases the values of the control parameter when the cursor is in a parameter field (no backlight).
4. Down Arrow: moves downward through the program windows and decreases the values of the control parameter when the cursor is in a parameter field (no backlight).
5. Enter: moves the cursor between parameter fields and confirms the set data. The yellow LED indicates power is applied to the controller.

Display

Features

- 4 lines
- 20 characters per line
- 5 mm character height
- LED indicator

Connection

The display unit is connected to the control board by a 6-wire standard phone cord of up to 1,000 feet in length.

Note: A short, special phone cord is supplied with the controller. Connect a standard 6-wire phone cord expansion to the end of this cord. **DO NOT REPLACE THE SPECIAL CORD as this cord is reversed from the normal phone cord. The control will not work if only a standard phone cord is used.**

STARTING UP AND OPERATING THE CONTROL

Key: MENU

Pressing the **MENU** key will display the following screen. The **MENU** screens are display screens only to change set points the values must be entered at the corresponding screens. To view screens progressively, use the down arrow key.

MENU 1

SYSTEM STATUS	
PRODUCT:	0.0°C
Humidity:	0%RH
PRODUCT 2:	0.0°C

Displays product temperatures, humidity and system status.
The first line could read the following.

- “SYSTEM STATUS”—Unit is operating normally.
- “USING PROD SENSOR”—The air temperature sensor has failed. Unit is maintaining the air temperature using the product sensor.
- “SENSOR FAIL MODE”—Air temperature sensor and product temperature sensor(s) have failed. Unit is operating based on “Cool On” and “Heat On” set points—see the System Setup 9 screen.

Note: Humidity and product 2 temperature will only be displayed if an additional sensor is installed and the sensors are enabled on Humidity Setup 3 and System Setup 3 screens, respectively.

MENU 2

Air Temp:	0.0°C
Cool: 0%	Deh: 0%
Heat: 0%	Hum: 0%
C1:OFF	C2:OFF

Displays system demands.

The bottom line is used to show the status of the compressors/heaters and could show the following conditions:

C1/C2: ON when air temperature is above the room temperature set point.

C1/C2: OFF when air temperature is at or below the room temperature set point.

HT1/HT2: ON when the auxiliary heaters are on.

C1/C2: DF when the system is in a defrost cycle.

C1/C2: ERR when the compressor alarm is active.

Note: C2 will display only if there are 2 compressors.

MENU 3

```
Current Set Points
Temp:  0.0°C
Hum:   0.0% Lts:  0%
SUN 00/00/00 00:00
```

Displays the current set points of the system. The humidity (Hum) and lighting (Lts) set points will only be displayed if each one is enabled.

Key: SET

Note: If the password protection is used the following screen will be displayed before allowing access to the SET POINTS screens. On initial start up there is no password protection, the passwords are set in the PARAMETERS group. If no password protection is used the “ENTER PASSWORD” screen will not be displayed.

```
ENTER PASSWORD
      0000
WRONG PASSWORD
```

Press the ENTER key to move the cursor to the four-digit password. Use the Up or Down Arrow key to increase or decrease the number. When the correct password is displayed press the ENTER key to enter the password. If the correct password was entered the corresponding screen will be displayed. If a wrong password was entered “WRONG PASSWORD” will be displayed on the bottom line. The password can be re-entered or press the MENU key to return to the System Status screen.

SET 1

```
Room Set Points 1
Temperature>  4.0°C
SCHEDULE >DISABLED
Goto Schedule >
```

Temperature: This is the room air temperature set point.

Note: If the schedule is enabled the temperature will be set through the ramp and soak schedule.

SCHEDULE: See the next page for a description of this variable.

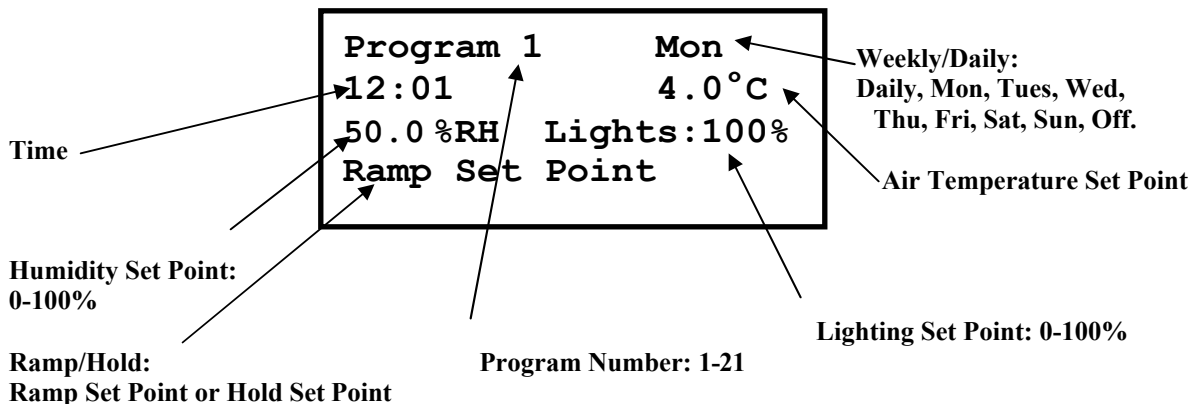
Ramp and Soak Programming

SET 1

```
Room Set Points 1
Temperature > 4.0°C
SCHEDULE > ENABLED
Goto Schedule >
```

Press the ENTER key until the cursor moves to the schedule field. Use the Up or Down arrow key to enable the schedule. Once the schedule is enabled, the “Goto Schedule” variable is displayed. Pressing the Down Arrow key while in the “Goto Schedule” field will display the Ramp and Soak configuration screen.

RAMP & SOAK



Program: Sets the number of the program to be configured. There is a maximum of 21 programs.

Weekly/Daily: Sets the day which a program should be in effect. Setting this variable to “Daily” will put that program in effect every day of the week. If “Daily” is used, all other programs need to be set to “Daily” or “Off”.

Time: Time which the Air Temperature Set Point(s) will take effect.

Air Temperature Set Point: The controller will control the condensing unit(s) and heater(s) to attain the room air temperature set point.

Humidity Set Point: The controller will control the humidify/dehumidify units, if installed, to this humidity set point. It will be visible only if humidity is enabled via the Humidity Setup 3 screen—see page 19.

Lighting Set Point: Percentage of light outputs that should be enabled. See Lighting Setup on page 13.

Also, digital outputs would need to be configured for lighting—see Digital Outputs on page 21.

Ramp/Hold: Sets the program number to be a ramp or a hold program. See the example on the following page for a description of the ramp and hold functions.

Note: If Daily is selected on the Program #1 screen programs 1 through 21 will repeat each day. Any unused programs will have to be turned off

Ramp and Soak Example

The following example will ramp from 4.0°C to 10.0°C every Monday from 06:00 to 12:00. The temperature will remain at 10.0°C until Wednesday at 06:00 when it will begin ramping the set point down to 4.0°C at 12:00 Wednesday. The set point will remain at 4.0°C until Friday at 06:00 when it will begin ramping the set point up to 10.0°C at 12:00 Friday. The set point will remain at 10.0°C until Sunday at 06:00 when it will begin ramping the set point down to 4.0°C at 12:00 Sunday. The temperature set point will remain at 4.0°C until the schedule repeats Monday at 06:00.

It is recommended to fill out the Ramp and Soak worksheet on page 39 of this manual before programming the ramp and soak functions of the controller.

Program #	Daily/Weekly	Time	Temp.	Humidity	Lights	Ramp/Hold
1	Mon	6:00	4.0°C	N/A	N/A	Ramp
2	Mon	12:00	10.0°C	N/A	N/A	Hold
3	Wed	6:00	10.0°C	N/A	N/A	Ramp
4	Wed	12:00	4.0°C	N/A	N/A	Hold
5	Fri	06:00	4.0°C	N/A	N/A	Ramp
6	Fri	12:00	10.0°C	N/A	N/A	Hold
7	Sun	06:00	10.0°C	N/A	N/A	Ramp
8	Sun	12:00	4.0°C	N/A	N/A	Hold
9	Off			N/A	N/A	
10	Off			N/A	N/A	
11	Off			N/A	N/A	
12	Off			N/A	N/A	
13	Off			N/A	N/A	
14	Off			N/A	N/A	
15	Off			N/A	N/A	
16	Off			N/A	N/A	
17	Off			N/A	N/A	
18	Off			N/A	N/A	
19	Off			N/A	N/A	
20	Off			N/A	N/A	
21	Off			N/A	N/A	

SET 2

Note: The following screen will only be visible if Humidity is enabled.

<p>Room Set Points 2</p> <p>Humidity> 50.0%RH</p>
--

Humidity: Relative Humidity (RH) set point.

SET 3

Note: The following screen will only be visible if Lights are enabled.

```
Room Set Points 3
Lights>100%
```

Lights: Lighting set point.

SET 4

```
Alarms-Air Temp
High Temp> 70.0°C
Low Temp> -70.0°C
Delay> 120 sec
```

High Temp: An alarm will occur if the room air temperature exceeds this set point.

Low Temp: An alarm will occur if the room air temperature goes below this set point.

Delay: The continuous time above high or below low alarm settings before alarm activates.

Note: The High and Low Air Temperature Alarms provide an early warning prior to the product temperature alarm. They should be set to allow the normal rise and fall of the air temperature during normal operation. High ambient temperature and heavy door use may require a longer Alarm Delay. The alarm DELAY is the amount of time in seconds that the temperature must be above or below the alarm set point for the alarm to activate.

SET 5

```
Alarms-Product Temp
High Temp> 70.0°C
Low Temp> -70.0°C
Delay> 120 sec
```

SET 6

```
Alarms-Product Temp2
High Temp> 70.0°C
Low Temp> -70.0°C
Delay> 120 sec
```

High Temp: An alarm will occur if the product temperature exceeds this set point.

Low Temp: An alarm will occur if the product temperature goes below this set point.

Delay: The continuous time above high or below low alarm settings before alarm activates.

Note: The SET 6 screen will be applicable to rooms equipped with two product temperature sensors.

Note: Product alarms will shut down the condensing units or heat generating components (fans, lights, receptacles) on most configurations. Refer to digital output #7 on the wiring diagram.

SET 7

Note: The following screen will only be visible if the Humidity is enabled in the Parameter section.

```
Alarms-Humidity
High RH> 100.0°C
Low RH>  0.0°C
Delay> 120 sec
```

High RH: An alarm will occur if the room relative humidity exceeds this set point.

Low RH: An alarm will occur if the room relative humidity goes below this set point.

Delay: The continuous time above high or below low alarm settings before alarm activates.

SET 8

```
Power Reset Alarm
Enabled
```

If the "Power Reset Alarm" is enabled, the alarm will occur 10 seconds after power up. The room will be controller per the configuration even if this alarm has occurred. It does not affect the control of the room. It is meant only to record a power interruption to the controller.

KEY: PROG

The PROG key is used to configure the system. Proportional set-up and light control are also set here if present on the system. Press the PROG key, then press the ENTER key to move to the desired field. Press the Down arrow key to enter the desired set up function.

PROG 1

```
Technician Menu
Config Setup..... >
Control Setup.... >
Lighting Setup... >
```

Note: If the password protection is used the following screen will be displayed before allowing access to the CONFIG SET POINTS screens. On initial start up there is no password protection the passwords are set in the PARAMETERS group. If no password protection is used the “ENTER PASSWORD” screen will not be displayed.

```
ENTER PASSWORD
      0000

WRONG PASSWORD
```

Press the ENTER key to move the cursor to the four-digit password. Use the Up or Down Arrow key to increase or decrease the number. When the correct password is displayed press the ENTER key to enter the password. If the correct password was entered, the corresponding screen will be displayed. If a wrong password was entered, “WRONG PASSWORD” will be displayed on the bottom line. The password can be re-entered or press the MENU key to return to the System Status screen.

System Setup 1

```
System Setup 1
  System Delay> 0sec
  Door Al Delay> 0min
  Comp Al Delay> 0min
```

System Delay: Delay system start after power up or after the on/off button is pressed.

Door Al Delay: Amount of time the door can remain open before the Door Ajar Alarm is activated. This setting only applies if digital input 7 for door alarm is enabled.

Comp Al Delay: Delay before alarms are enabled after the compressor has been switched on by the controller. This setting only applies if digital input 3 or 5 for compressor alarm(s) is enabled.

System Setup 2

Alarm Buzzer: Enables/Disables the keypad Alarm Buzzer and the “Glb. Alarm”. digital output.

Ring Back: Amount of time, in minutes, that the buzzer will be silent after an alarm has been acknowledged and remains active.

System Setup 3

```
System Setup 3
PRODUCT 2 SENSOR
DISABLED
```

Enables/Disables the 2nd product temperature sensor.

Note: A sensor must be connected to the product 2 input of the control board or a sensor failure alarm will activate.

System Setup 4

```
System Setup 4
Defrost Schedule
1 06:00 3 12:00
2 18:00 4 23:59
```

Real time defrost schedule. The RTC defrost is enabled on Setup Screen 6 in the Factory Setup Screens. Selecting the (RTC) will allow for real time based defrosting, instead of run time defrost when the SYS Option is selected. The system may be programmed for 4 defrost cycles every 24 hour period.

System Setup 5

```
System Setup 5
Units>Centigrade
Change set points
To Fahrenheit
```

Change Units.

Note: If the user changes temperature units, all set points and bands must be verified in terms of the new unit. If the parameters have changed, then they must be re-entered.

System Setup 6

Protocol:

- 1) NLSUP RS485—PlantVisor communication viaRS485
- 2) NLSUP RS232—PlantVisor communication viaRS232
- 3) MODBUS—MODBUS(RTU) via RS485
- 4) WINLOAD—Factory use only

Baud Rate: Speed of communications—1200, 2400, 4800, 9600 or 19200baud

Ident Number: Network identification number—0 to 200.

System Setup 7

```
System Setup 7
Passwords
Level 1>    0 SetPts
Level 2>    0 Config
```

There are 2 levels of passwords. Level 1 allows the editing of set points and level 2 allows the editing of configuration parameters.

Note: The use and selection of Passwords are **RECOMMENDED** to protect the system from intentional or inadvertent tampering. If passwords are not utilized, there will not be password prompting during programming. This is very dangerous as the factory settings, designed to protect personnel and property, are left exposed to tampering.

System Setup 8

```
System Setup 8
Exhaust Fan
Low Limit > 0.0°C
High Limit> 0.0°C
```

Low Limit: Exhaust Fan output will be de-energized if the air temperature set point is below this set point.

High Limit: Exhaust Fan output will be de-energized if the air temperature set point is above this set point.

Note: This setting only applies to the EX. FAN output (if selected). The exhaust fan will operate only when the room set point is above the low limit and below the high limit.

System Setup 9

Sensor Fail: Enables (On) or disables (Off) sensor failure control. If the air temperature sensor and the product temperature sensor(s) fail, the unit will be controlled via the Cool On and Heat On variables.

Cool On: Amount of time that cooling will be enabled if all sensors have failed.

Heat On: Amount of time that heating will be enabled if all sensors have failed. If the unit is not configured with heating, it will remain off for this amount of time.

System Setup 10

```
System Setup10

ir Type>10k Therm
```

Air Type: Select air sensor type

- 10k Therm – 10,000 ohm Thermistor (Standard, shown with 2 wires on the wiring diagram)
- 1k RTD – 1,000 ohm RTD (optional, shown with 3 wires on the wiring diagram)

Control Setup 1

```
Control Setup 1
                Bands
Type Int  HT CL
Temp>P    0s  1  1C
```

Type: P—Proportional control only (does not include Int time)

P+I—Proportional plus Integral control (includes Int time)

Int: Integral time for both heating and cooling. Larger number slows the response time

HT: Proportional constant for heating. Larger number takes longer for output to switch to heating

CL: Proportional constant for cooling. Larger number takes longer for output to switch to cooling

Control Setup 2

```
Control Setup 2
Ramps      Start  End
Cooling>   0%    100%
Heating>   0%    100%
```

Cooling: Sets range of cooling from lowest output (Start %) to highest output (End %)

Heating: Sets range of heating from lowest output (Start %) to highest output (End %)

```
Control Setup 3
                Bands
Type Int  HU DH
Temp>P    0s  1  1%
```

CONTROL SETUP 3 AND 4 NO LONGER USED FOR HUMIDITY/DEHUMIDITY CONTROL

Type: P—Proportional control only (does not include Int time)

PI—Proportional plus Integral control (includes Int time)

Int: Integral time for both heating and cooling. Larger number slows the response time

HU: Proportional constant for humidification

DH: Proportional constant for dehumidification

Lighting Setup 1

```
Lighting Setup 1
Enable>ON/OFF
Stage 1> 20%
Stage 2> 40%
```

Enable: Enables/Disables the lighting control.

Stage1/Stage 2: Percent above which the Light 1/Light 2 output will be energized.

Lighting Setup 2

```
Lighting Setup 2
Stage 3> 60%
Stage 4> 80%
Stage 5> 100%
```

Stage3/Stage 4/Stage 5: Percent above which the Light 3/Light 4/Light 5 output will be energized.

Note: See the Ramp and Soak example for an example of the Lighting control.

KEY: Prog 2 - Factory Setup Menu

Note: To enter the factory Setup Screens press the PROG key then press the ENTER key to move the cursor to the Config Setup field. Then press the MENU and SET keys SIMULTANEOUSLY. Then press the DOWN arrow key to display the following screens.

```
Factory Setup
Cool Setup..... >
Heat Setup..... >
Humidity Setup... >
```

Move the cursor to the desired field; use the Down arrow key to enter fields.

Cool Setup 1

```
Cool Setup 1
Minimum ON> 0s
Minimum OFF> 0s
```

Minimum ON: Minimum time a compressor must stay ON (seconds).

Minimum OFF: Minimum time a compressor must stay OFF (seconds).

Cool Setup 2

```
Cool Setup 2
Time Between> 0s
Rotation>OFF
Rotation Time> 12h
```

Time Between: Minimum time between compressor 1 ON and compressor 2 ON (seconds).

Rotation: Enables/Disables time rotation of the compressors.

Rotation Time: Length of compressor run time between rotation periods (hours).

Cool Setup 3

<p>Cool Setup 3 Comp Type>One C2 Fan>Cont. Switch Temp> 0.0°C</p>
--

Comp Type:

- One--One stage of cooling only.
- Two--The controller will operate two compressors. The first compressor will come on based on the stage 1 parameters—see Cool Setup 4, and the second compressor will come on based on the stage 2 parameters—see Cool Setup 5.
 - NOTE: IF Comp Type is set to Two, you must enable cooling 1 and cooling 2 in Cool Setup 10
- Hi/Lo--The system runs only one compressor at a time and switches between the two units, as the room temperature reaches the Switch temp set point.

C2 Fan:

- CONT—Evaporator fan operates continuously.
- DEMAND—Evaporator fan cycles with heating or cooling.

Switch Temp: Visible only if Comp type is set to Hi/Lo.

Compressor 1 runs when air temp is above the switch temp and compressor 2 runs when air temp is below the switch temp

Cool Setup 4

<p>Cool Setup 4 Stage 1 SP: 4.0°C On> 0.2°C = 4.2°C Off> -0.2°C = 3.8°C</p>

On: Energize stage 1 cooling relay when the room temperature reaches the Set Point + “On” offset.

Off: De-energize stage 1 cooling relay when the room temperature reaches the Set Point + “Off” offset.

Cool Setup 5

<p>Cool Setup 5 Stage 2 SP: 4.0°C On> 1.0°C = 5.0°C Off> 0.0°C = 4.0°C</p>
--

On: Energize stage 2 cooling relay when the room temperature reaches the Set Point + “On” offset.

Off: De-energize stage 2 cooling relay when the room temperature reaches the Set Point + “Off” offset.

Cool Setup 6

Enable: Enable/Disable defrost sequence.

Use:

- SYS—The defrost cycles will occur based on DF Cycle time set in the Cool Setup 7 screen.
- Set the time of day for defrost in the Config Set 4 screen. Type:
- Electric—Defrost output is enabled and the Hot Gas output is disabled during defrost.
- Hot Gas—Defrost output is enabled and the Hot Gas output is enabled during defrost.

Set Point: The defrost cycle will not be initiated if the room temperature is above this set point at the moment the defrost attempts to initiate.

Cool Setup 7

```
Cool Setup 7-Defrost
DF Cycle> 6hrs
DF Duration> 36min
DF Fan delay> 2min
```

DF Cycle: Number of hours between defrosts.

DF Duration: Maximum number of minutes allowed for defrost. Defrost duration can be less if defrost termination signal (see Cool Setup 8, End Def Type) is received prior to this maximum duration

DF Fan delay: Number of minutes for the fan to remain OFF before turning back ON after a defrost cycle.

Cool Setup 8

```
Cool Setup 8-Defrost
End Def Type>
Digital Input
End Def Temp>16.0°C
```

End Def Type:

- Digital Input—Defrost ended with a switch such as a “Klyxon”.
- Evap Sensor—Defrost ended by evaporator temperature sensor.

End Def Temp: Temperature which defrost will end if the End Def Type is set to Evap Sensor. (Note, this setting is ignored if End Def Type is set to Digital Input or if Evap Sensor is not installed)

Cool Setup 9

```
Cool Setup 9
Force Rotation>OFF
Force Defrost1>OFF
Force Defrost2>OFF
```

Force Rotation: Manually change from current compressor to other compressor (only if Rotation is set to ON in Cool Setup 2)

Force Defrost1: Manually enable defrost on cooling circuit 1.

Force Defrost2: Manually enable defrost on cooling circuit 2.

Note: The Force Defrost1/2 defrost cycles will follow the defrost parameters set on Cool Setup 6 & 7 and terminate automatically when end conditions are met.

Cool Setup 10

```
Cool Setup 10
Cooling 1> Enabled
Cooling 2> Disabled
```

Cooling 1: Enable/Disable the COOL 1 and Fan 1 outputs.

Cooling 2: Enable/Disable the COOL 2 and Fan 2 outputs.

Heat Setup 1

```
Heat Setup 1
Door Heat > 10°C
```

Door Heat: Enables door frame heater (DOOR HEAT output) when the room temperature is below this set point.

Heat Setup 2

```
Heat Setup 2
Stage 1 SP 4.0°C ON
>-0.5 C = 3.5°C OFF >
0.0 C = 4.0°C
```

On: Energize HEAT 1 output when the room temperature reaches the Set Point + “On” offset.

Off: De-energize HEAT 1 output when the room temperature reaches the Set Point + “Off” offset.

Heat Setup 3

```
Heat Setup 3
Stage 2 SP 4.0°C
ON >-2.0 C = 2.0°C
OFF > 0.0 C = 4.0°C
```

On: Energize HEAT 2 output when the room temperature reaches the Set Point + “On” offset.

Off: De-energize HEAT 2 output when the room temperature reaches the Set Point + “Off” offset.

Heat Setup 4

Heat Setup 4			
Stage 3	SP	4.0°C	
ON	>-3.0 C =	1.0°C	
OFF	> 0.0 C =	4.0°C	

On: Energize HEAT 3 output when the room temperature reaches the Set Point + "On" offset.

Off: De-energize HEAT 3 output when the room temperature reaches the Set Point + "Off" offset.

Heat Setup 5

Heat Setup 5			
Stage 4	SP	4.0°C	
ON	>-4.0 C =	0.0°C	
OFF	> 0.0 C =	4.0°C	

On: Energize HEAT 4 output when the room temperature reaches the Set Point + "On" offset.

Off: De-energize HEAT 4 output when the room temperature reaches the Set Point + "Off" offset.

Humidity Setup 1

Humidity Setup 1			
Humidify	SP	50.0%	
ON	> -5.0% =	45.0%	
OFF	> 0.0% =	50.0%	

On: Energize humidifier relay (HUMID output) when the room temperature reaches the Set Point + "On" offset.

Off: De-energize humidifier relay (HUMID output) when the room temperature reaches the Set Point + "Off" offset.

Humidity Setup 2

Humidity Setup 2			
Dehumidify	SP	50.0%	
ON	> 5.0% =	55.0%	
OFF	> 0.0% =	50.0%	

On: Energize de-humidifier relay (DEHUMID output) when the room temperature reaches the Set Point + "On" offset.

Off: De-energize de-humidifier relay (DEHUMID output) when the room temperature reaches the Set Point + "Off" offset.

Humidity Setup 3

```
Humidity Setup 3
Humidifier>Enabled
Dehumidifier>Enabled
```

Humidifier: Enable/Disable the humidifier.
Dehumidifier: Enable/Disable the de-humidifier.

Humidity Setup 4

```
Humidity Setup 4
Enable Temp. > 2°C
Sensor Type > 4-20Ma
```

Enable Temp: Humidifier and de-humidifier are disabled below this set point.

*NOTE: Enable Temp should always be set above 0°C.

```
Digital Inputs 1
Active If      Input
3.OFF >open   Close
4.OFF >open   Close
```

Key: AUX1

```
DIGITAL I/O SETUP
Digital Inputs >
Digital Outputs >
```

This screen allows the configuration of the Digital Inputs/Outputs. While in the “DIGITAL INPUTS” field press the **down arrow** key to get to the following digital input screens. While in the “DIGITAL OUTPUTS” field press the **up and down arrow keys at the same time** to get to the digital output screens.

Note: The following digital inputs provide the user with the ability to monitor the system for alarm conditions as listed below. Additional components may have to be added to monitor the system for alarm conditions.

Note: Digital inputs #1 and #2 are not configurable.

Digital Inputs 1

```
Digital Inputs 1
Active If      Input
3.OFF >open   Close
4.OFF >open   Close
```

“Active if” indicates what condition will result in an alarm (“open” or “close”) “Input” indicates current status of the associated digital input
Note: when “if” matches “Input”, alarm will sound after appropriate alarm delay (see Config Setup)

-
- 3. **OFF**: The first configurable digital input is the **C1 AL** or the **compressor 1 alarm**. If this input is not activated it will display **OFF**. The input can be set for a "NORMALLY OPEN" or "NORMALLY CLOSED" input device by changing the "if" column.
 - 4. **OFF**: The second configurable digital input is the **AIRFL1** or the **air flow 1 alarm**. If this input is not activated it will display **OFF**. The input can be set for a "NORMALLY OPEN" or "NORMALLY CLOSED" input device.

Digital Inputs 2

Digital Inputs 2		
	Active if	Input
5. OFF	>open	close
6. OFF	>open	close

- 5. **OFF**: The third configurable digital input is the **C2 AL** or the **compressor 2 alarm**. If this input is not activated it will display **OFF**. The input can be set for a "NORMALLY OPEN" or "NORMALLY CLOSED" input device.
- 6. **OFF**: The fourth configurable digital input is the **AIRFL2** or the **air flow 2 alarm**. If this input is not activated it will display **OFF**. The input can be set for a "NORMALLY OPEN" or "NORMALLY CLOSED" input device.

Digital Inputs 3

Digital Inputs 3		
	Active if	Input
7. OFF	>open	close
8. OFF	>open	close

- 7. **OFF**: The fifth configurable digital input is the **DOOR** or the **door ajar alarm**. If this input is not activated it will display **OFF**. The input can be set for a "NORMALLY OPEN" or "NORMALLY CLOSED" input device.
- 8. **OFF**: The sixth digital configurable input is the **water** alarm. If this input is not activated it will display **OFF**. The input can be set for a "NORMALLY OPEN" or "NORMALLY CLOSED" input device.

Digital Inputs 4 (only available on PCO Medium controller)

Digital Inputs 4		
	Active if	Input
9. OFF	>open	close
10. OFF	>open	close

- 3. **OFF**: The seventh digital configurable input is the **SMOKE** alarm. If this input is not activated it will display **OFF**. The input can be set for a "NORMALLY OPEN" or "NORMALLY CLOSED" input device.
- 4. **OFF**: The eighth digital configurable input is the **HUM AL** or the **humidity alarm**. If this input is not activated it will display **OFF**. The input can be set for a "NORMALLY OPEN" or "NORMALLY CLOSED" input device.

Digital Inputs 5 (only available on PCO Medium controller)

```
Digital Inputs 5
Active if Input
11.OFF >open close
```

5. OFF: The ninth digital configurable input is the **DRAIN** alarm if this input is not activated it will display **OFF**. The input can be set for a “NORMALLY OPEN” or “NORMALLY CLOSED” input device.

Note: Pressing the up or down arrow key while in the respective digital output field enables the selection of the following digital output configurations—N/A, Cool 1, Cool 2, Hot Gas 1, Hot Gas 2, Fan 1, Fan 2, Defrost 1, Defrost 2, Heat 1, Heat 2, Heat 3, Heat 4, Humid, Dehumid, Door Heat, Ex. Fan, Glb. Alarm, P1 HI AL, P1 LO AL, AIR HI AL, AIR LO AL, Light 1, Light 2, Light 3, Light 4, Light 5, Comp. 1 On, Comp. 2 On.

Consult the factory for a sequence of operation for these selections.

Digital Outputs 1

```
Digital Outputs
#1: Cool 1
#2: Hot Gas 1
#3: Fan 1
```

Example screen: There are 3 other screens in addition to this one enabling the configuration of digital output 1 through 13 except 7 which is reserved for the global alarm output. Note that the controller installed may have fewer outputs

Key: AUX2

Pressing the Auxiliary 2 key will display the following screens:

AIR TEMPERATURE SENSOR CALIBRATION

```
Sensor Setup 1
AIR TEMPERATURE
CALIBRATION> 0.0°C
ACTUAL      > 0.0°C
```

NOTE: CHANGING AIR TEMPERATURE CALIBRATION AFFECTS THE OPERATION OF THE ENVIRONMENTAL ROOM! Increasing the air sensor reading increases the cooling runtime, resulting in colder temperatures due to the controller reading higher temperatures at the sensor.

CALIBRATION: Allows calibration of the air temperature (control) sensor.
ACTUAL: Displays the current sensor reading with the CALIBRATION offset included.

PRODUCT 1 & 2 TEMPERATURE SENSOR CALIBRATION

```
Sensor Setup 2
PRODUCT TEMP
CALIBRATION> 0.0°C
ACTUAL      > 0.0°C
```

```
Sensor Setup 3
PRODUCT 2 TEMP
CALIBRATION> 0.0°C
ACTUAL      > 0.0°C
```

CALIBRATION: Allows calibration of the product temperature sensor and product 2 sensor (if used).
ACTUAL: Displays the current sensor reading with the CALIBRATION offset included.

EVAPORATOR TEMPERATURE AND HUMIDITY SENSOR CALIBRATION

```
Sensor Setup 4
EVAPORATOR TEMP
CALIBRATION> 0.0%RH
ACTUAL      > 0.0%RH
```

```
Sensor Setup 5
ROOM HUMIDITY
CALIBRATION> 0.0%RH
ACTUAL      > 0.0%RH
```

CALIBRATION: Allows calibration of the Evaporator and/or Humidity sensor (if used).
ACTUAL: Displays the current sensor reading with the CALIBRATION offset included.

Note: The above screens will only be active if Evap Sensor (Defrost End Type) or RH control has been selected.

ANALOG OUTPUT #1

```
Analog Output
1.TEMP. VALVE
MODE  LOW  HIGH
DIR   0.0  10.0Vdc
```

ANALOG OUTPUT #2

```
Analog Output
2.TEMP. VALVE
MODE  LOW  HIGH
DIR   0.0  10.0Vdc
```

MODE:

- DIR—0-100% output = “LOW” to “HIGH” Vdc output.
- REV—0-100% output = “HIGH” to “LOW” Vdc output.

LOW: The lowest voltage that the controller will output.
HIGH: The highest voltage that the controller will output.

ANALOG OUTPUT #3

ANALOG OUT #3	
PRODUCT TEMP	
SCALE LOW	-20.0°C
SCALE HIGH	100.0°C

PRODUCT TEMP: Allows to change output from product temp to air temp measurement.

SCALE LOW: Adjust low temperature that corresponds to 0V output.

SCALE HIGH: Adjust high temperature that corresponds to 10V output.

Key: CLOCK

Pressing the **CLOCK** key will display the following screens.

CLOCK 1

```
REAL TIME CLOCK
Key UP/DN to view
```

Press up or down arrow to view or change the clock settings

CLOCK 2

```
Real Time Clock
Day   > MON
Time  > 12:00
Date  > 01/01/20
```

This screen allows the user to set the real time clock. It displays the actual time, date and day-of-week. To set the weekday, current time and date, press the **ENTER** key to move to the field that requires modification. Use the **ARROW UP** and **ARROW DOWN** keys to adjust the value. Use the **ENTER** key to leave the field.

Key: I/O

Pressing the I/O key will display the following screens:

Note: The following screens and parameters are for *MANUAL* testing of the devices listed. For normal operation, all devices should be set to *AUTO* mode. Press *ENTER* to move. When mode is changed to *HAND*, the position can be changed from *OFF* to *ON* to control the device manually. Changing position while in *AUTO* has no affect since system logic takes over in *AUTO* mode.

MANUAL CONTROL #1

```
Manual Control 1
      MODE POS
Fan 1>AUTO >OFF
Defrost 1>AUTO >OFF
```

MANUAL CONTROL #2

```
Manual Control 2
      MODE POS
Fan 2>AUTO >OFF
Defrost 2>AUTO >OFF
```

MANUAL CONTROL #3

```
Manual Control 3
      MODE POS
Cool 1>AUTO >OFF
Cool 2>AUTO >OFF
```

MANUAL CONTROL #4

```
Manual Control 4
      MODE POS
Humid 1>AUTO >OFF
Dehumid 1>AUTO >OFF
```

MANUAL CONTROL #5

```
Manual Control 5
      MODE POS
T.Valve 1>AUTO > 0%
T.Valve 2>AUTO > 0%
```

MANUAL CONTROL #6

```
Manual Control 6
      MODE POS
Lights>AUTO > 0%
```

MANUAL CONTROL #7

```
Manual Control 7
      MODE POS
Lights 1>AUTO >OFF
Lights 2>AUTO >OFF
```

MANUAL CONTROL #8

```
Manual Control 8
      MODE POS
Lights 3>AUTO >OFF
Lights 4>AUTO >OFF
```

MANUAL CONTROL #9

```
Manual Control 9
      MODE POS
Lights 5>AUTO >OFF
Lights 6>AUTO >OFF
```

MANUAL CONTROL #10

```
Manual Control 10
      MODE POS
Lights 7>AUTO >OFF
Lights 8>AUTO >OFF
```

MANUAL CONTROL #11

```
Manual Control 11
      MODE POS
Lights 9>AUTO >OFF
Lights 10>AUTO >OFF
```

Key: MAINT

Pressing the maintenance key will display the following screens:

MAINT 1

Run Hours 1	
Fan 1:	0hr
Comp 1:	0hr
Defrost 1:	0hr

Displays the total run hours for the fan 1, compressor 1 and defrost 1 that are connected to relay outputs (0-32767hours). The total run hours can be reset to 0 by entering the field and pressing the **SET** key.

MAINT 2

Run Hours 2	
Fan 2:	0hr
Comp 2:	0hr
Defrost 2:	0hr

Displays the total run hours for the fan 2, compressor 2 and defrost 2 that are connected to relay outputs (0-32767hours). The total run hours can be reset to 0 by entering the field and pressing the **SET** key.

MAINT 3

Run Hours 3	
Humidifier:	0hr
Dehumidifier:	0hr

Displays the total run hours for the Humidifier and Dehumidifier that are connected to relay outputs (0-32767hours). The total run hours can be reset back to 0 by entering the field and pressing the **SET** key.

Note: Run hours for the Humidifier and Dehumidifier will only be displayed if they are enabled—see “Humidity Setup 3”.

MAINT 4

Run Hours 4	
T.Valve 1:	0hr
T.Valve 2:	0hr

Displays the total run hours for the heat 1/2 unit that is connected to analog outputs (0-32767hours). The total run hours can be reset back to 0 by entering the field and pressing the **SET** key.

ALARMS

During normal operation, should an alarm occur, the ALARM button will **glow red** and an **audible buzzer** will sound to indicate the presence of the alarm. Pressing the ALARM button once will silence the buzzer. Pressing it again will bring up the first alarm screen. Successive presses of the ALARM button will bring up each alarm screen in sequence until the final screen indicating “NO MORE ALARMS”. Pressing the ALARM button on the final screen then returns you to the screen that was being displayed when the alarm sounded. Most alarms are self-explanatory. The air temperature alarm provides an early warning of temperature variations beyond the user set limits, this can occur if the door is left open too long, to silence this alarm close the door and depress the ALARM button which will delay the air alarms and allow the room temperature to come back into its proper range. The product temperature alarm will shut the system down for safety reasons. The control panel will remain active. To reset the product temperature alarm, set the high or low product temperature alarm set points above or below the Product temperature. Set the product temperature alarm set points back to the user’s original settings once the system resumes its normal operation.

Example Alarm Screen

<p>** ALARM ** 00/00 00:00 AIR FLOW LOSS 1 Check Blower, Belts</p>
--

List of Alarms

1	EEPROM FAILURE
2	AIR FLOW LOSS 1
3	AIR FLOW LOSS 2
4	ROOM TEMP HIGH ALARM
5	ROOM TEMP LOW ALARM
6	PRODUCT TEMPERATURE HIGH ALARM
7	PRODUCT TEMPERATURE LOW ALARM
8	ROOM HUMIDITY HIGH ALARM
9	ROOM HUMIDITY LOW ALARM
10	COMPRESSOR 1 HIGH/LOW PRESSURE
11	COMPRESSOR 2 HIGH/LOW PRESSURE
12	HI-LIMIT HUMIDISTAT WATCH PERSONAL SAFETY
13	DRAIN PAN ALARM
14	WATER ALARM
15	DOOR AJAR ALARM
16	SMOKE DETECTION SYSTEM OFF
17	ROOM TEMPERATURE SENSOR FAILURE
18	PRODUCT TEMPERATURE SENSOR ALARM
19	POWER RESTART
20	PRODUCT 2 TEMPERATURE LOW ALARM
21	PRODUCT 2 TEMPERATURE HIGH ALARM
22	PRODUCT 2 TEMPERATURE SENSOR FAILURE

POWER FAILURE ALARM

Located to the right of the user terminal is a battery switch for the power failure alarm. The switch is a three-way rocker with the center position being off. The top position is to test the battery. When power is applied to the control the buzzer will sound indicating the battery is ok. The bottom position is on. The buzzer will sound when power is lost to the control.



Test Position



OFF Position



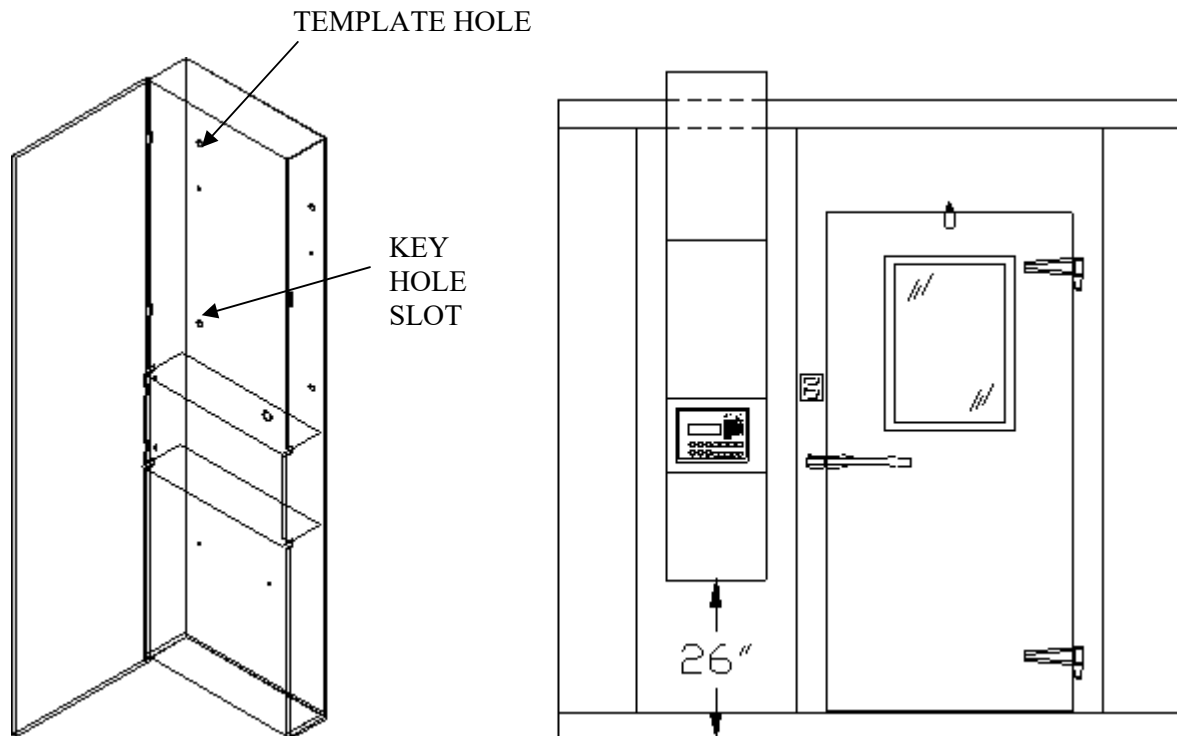
ON Position

HARDWARE TECHNICAL INFORMATION

MOUNTING THE CONTROL PANEL

There are two 1/4" diameter holes found 26" above the keyholes in the back wall of the control panel enclosure. These holes make a built in template.

1. Select the approximate location of the control panel. Stand the control panel on the floor, against the wall of the walk-in cooler. Move the control panel to the left or right until it is in the desired horizontal position.
2. Find the highest two holes in the upper rear of the control panel enclosure. Mark the location of these two holes on the walk-in panel. This will locate the screw location for the keyhole slots.
3. Move the control panel aside. Screw the provided screws into the walk-in panel, stopping approximately 1/8" short of being tight.
4. Lift the control panel up so that the screw heads slide into the keyhole slots. This will locate the control panel 26" off the floor and hold it there while the other four screws are installed.
5. Make sure the control panel is level. Install two screws into the top template holes and two in the bottom holes of the control panel enclosure.



Installation

Anchoring the Control

The controller should be installed on a DIN rail. To fasten the unit, press it lightly against the rail. The rear tabs will click into place, locking the unit to the rail. Removing the unit is just as simple, using a screwdriver through the release slot to lever and lift the spring tabs at the bottom of the unit. The unit will rotate away from the DIN rail bottom first, then be lifted so the top fixed tabs clear the DIN rail.

CONTROLLER TYPES

There are two sizes of programmable logic controller used in the control panels, small and medium. The controller size used depends on the number of inputs and outputs required for a particular room. The software program installed will vary to match the controller size, though functionally the controls and interface screens are the same regardless of controller size.

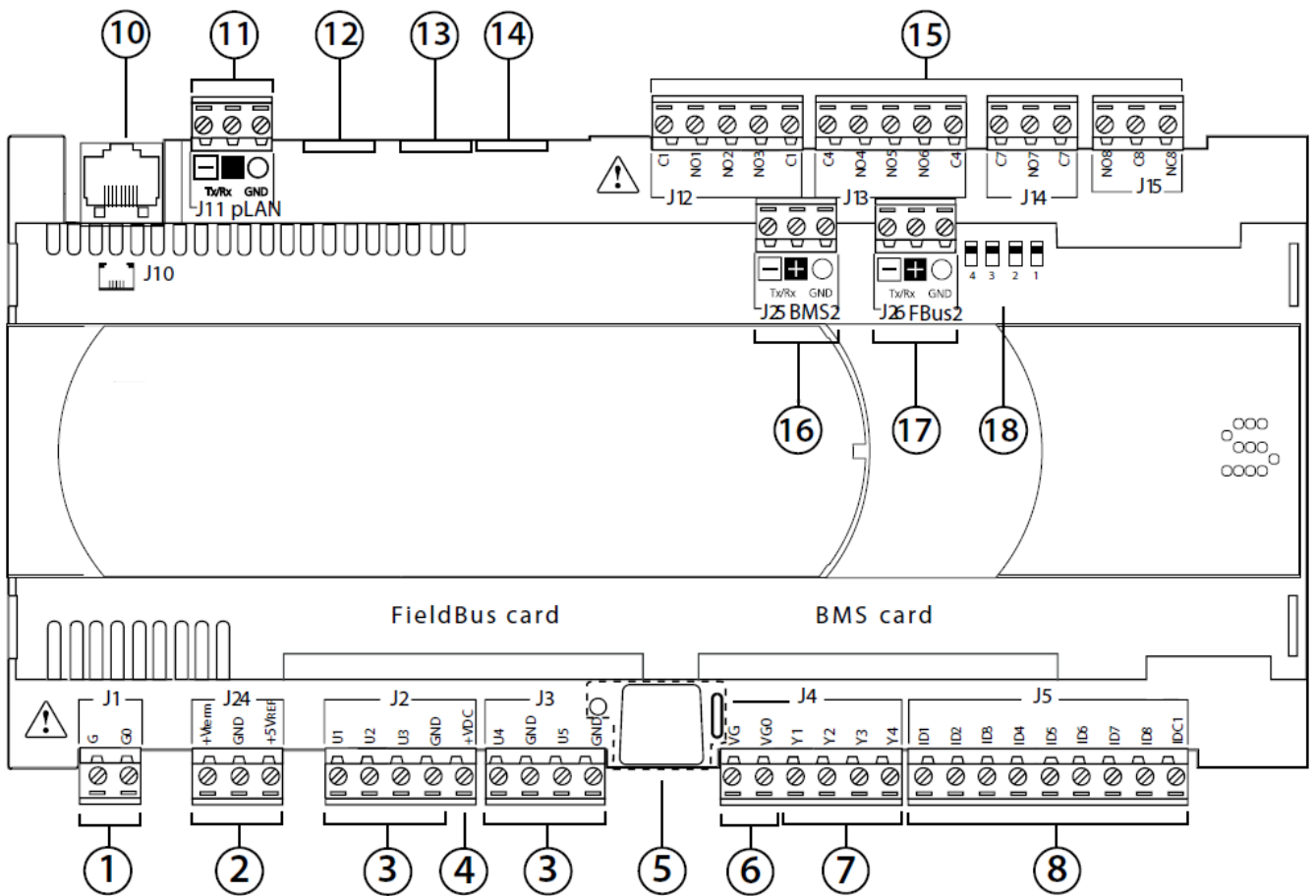


Figure 1a. PC05+ Small Controller

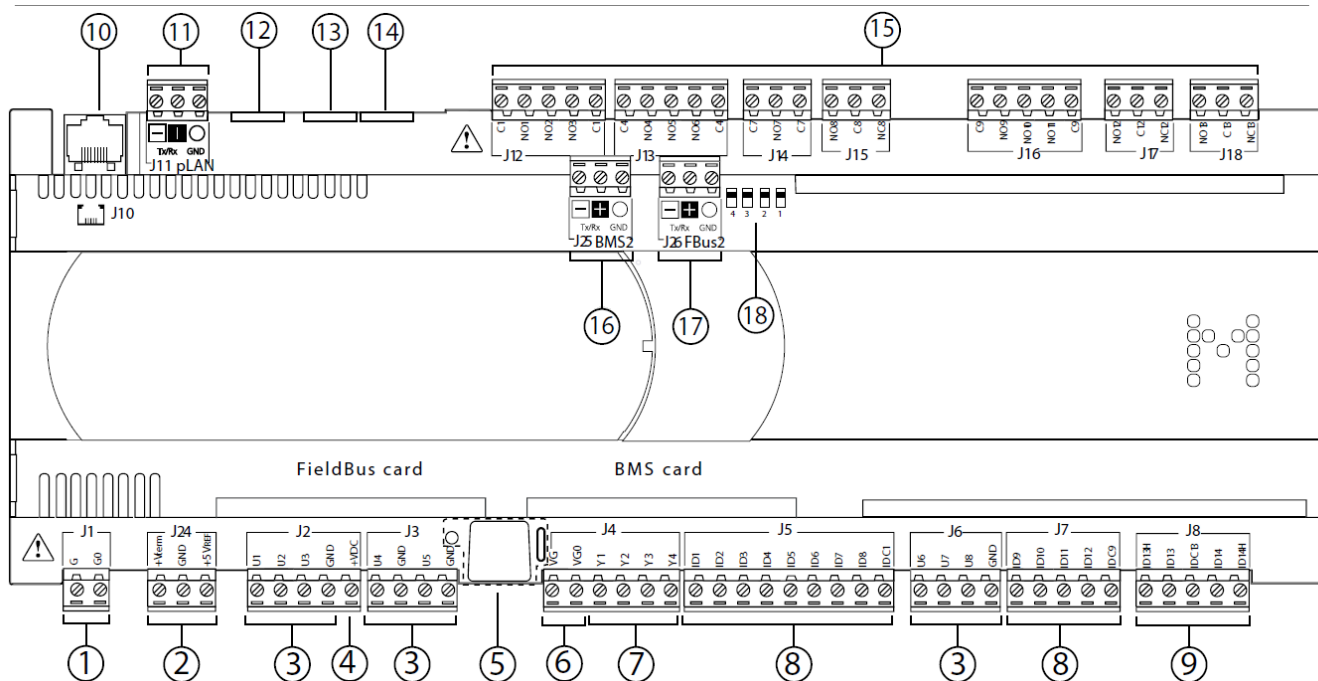


Figure 1b. PC05+ Small Controller

1. power supply connector [G (+), G0 (-)]
2. +Vterm: power to additional terminal, +5VREF: 5Vdc power to probes
3. universal inputs/outputs (U..., GND)
4. Power to active probes (24Vdc)
5. Button and display for pLAN address, Status LEDs
6. VG: 24VAC input for analog outputs (see item 7), VG0: 0VAC reference for analog outputs
7. 0/10Vdc analog outputs (Y...)
8. digital inputs(ID...), 24Vac/Vdc
9. digital inputs, 230Vac (IDH...) or 24Vac/Vdc (ID...)
10. pLAN telephone connector for terminal (display) or downloading software via Smart Key (service only)
11. pLAN plug-in connector
12. Reserved (unused)
13. Reserved (unused)
14. Reserved (unused)
15. Relay digital outputs
16. BMS2 connector (RS-485)
17. Fieldbus2 connector
18. Fieldbus/BMS selector microswitch

Installation warnings - destination and connection environments

Avoid installing the boards in environments with the following characteristics:

- relative humidity over 90%
- strong vibrations or bumps
- exposure to continuous jets of water
- exposure to aggressive and polluting environments (e.g.: sulphuric and ammoniac gases, saline mists, fumes) with consequent corrosion and/or oxidation
- high levels of magnetic and/or radio-frequency interference (thus avoid installing the unit near transmitting antennae)
- exposure to direct sunlight and the elements in general
- wide and rapid fluctuations in ambient temperature
- environments where explosives or flammable gases are present
- exposure to dust (formation of corrosive patina with possible oxidation and reduction of insulation)

The following warnings must be respected for correct connection:

- power supply different from that specified can seriously damage the system;
- use cable plugs suitable for the terminals being used. Loosen each screw and insert the cable plug, then tighten the screws. At the end of the operation lightly tug the cables to check that they are tight;
- separate as much as possible the probe signal and digital input cables from the inductive load and power cables, to avoid possible electromagnetic disturbance. Never use the same channelling (including that used for the electrical cables) for the power cables and probe cables. Avoid the probe cables being installed in the immediate vicinity of power devices (contactors, circuit breakers or the like);
- reduce the length of the sensor cables where possible and avoid spiralling around power devices. The probe connection must be made using shielded cables (minimum cross section for each lead: 0.5 mm²);
- avoid touching or nearly-touching the electronic components on the boards, to avoid (extremely dangerous) electrostatic discharges from the user to the components;
- if the power supply transformer secondary is earthed, check that the ground wire corresponds to the lead connected to terminal G0 in the controller;
- separate the power supply to the digital outputs from the power supply to the controller;
- do not fasten the cables to the terminals by pressing the screwdriver with excessive force, to avoid damaging the control.

Installing the user terminal

The connection between the user terminal and the controller is made using a 6-way telephone cable supplied by the manufacturer. To make the connection, simply insert the telephone connector in terminal J10 on the controller and in terminal B on the user terminal. Insert the connector fully into the terminal until it clicks into place. To remove the connector, simply press lightly on the plastic flap and remove the cable. The controller can also work without the terminal.

Do not disconnect and then reconnect the terminal to the controller without waiting for a minimum of 5 seconds (if the operation is performed with the unit on).

TECHNICAL SPECIFICATIONS OF THE CONTROLLER

General characteristics

Storage conditions	-40 TO 70°C; 90% rH non-condensing
Operating conditions	-40 TO 70°C; 90% rH non-condensing
Index of protection	IP20 (front panel only)
Control pollution situation	2
Class of protection against electric shock	to be incorporated in Class I and/or II appliances
PTI of insulating materials	PCB: PTI 250V; insulating material: PTI 175
Period of electric stress across insulating parts	Long
Type of relay action	1C
Type of disconnection or microswitching	microswitching
Category of resistance to heat and fire	category D (UL94 - V2)
Ageing specifications (operating hours)	80,000
Number of automatic operating cycles (excluding relays)	100,000 (EN60730-1); 30,000 (UL60730)
Software class and structure	Class A

In compliance with the limits set by the safety standards on electromagnetic compatibility, as listed in the declaration of conformity (see installation manual), the only sporadic malfunctions which may arise involve the indications on the display and the LEDs, which are automatically reset when the disturbance ceases.

Warning: for applications subject to strong vibrations (1.5mm pk-pk 10/55 Hz), clamps should be used to fasten the cables connected to the controller, around 3cm from the connectors.

Electrical specifications

Power supply (controller with terminal connected)	24Vac 50/60 Hz or 28-36Vdc, +10/-15% Maximum input: 45VA/30W
Terminal block	with male/female removable connectors; maximum voltage: 250Vac; cable c.sect. (mm ²): min 0.5 - max 2.5
CPU	32 bit, 100MHz
Non-volatile memory (FLASH)	9 MB (2MB BIOS + 7MB application program) + 4MB memory log file
Buffer memory T (EEPROM)	13 kB
Parameter Memory P (EEPROM)	32 kB (not visible from pLAN)
Period of electric stress across insulating parts	Long
Working cycle of the control with applications of average complexity (s)	0.2s (typical)
Battery	3Vdc Lithium button battery (24x3 mm), code CR2430

Universal inputs/outputs (U...)

Maximum number	Small: 5 Medium: 8
Type	<p>Analog inputs:</p> <ul style="list-style-type: none"> • NTC (-50 to 90°C; R/T 10kΩ±1% at 25°C) • RTD or PT1000(-100 to 200°C; R/T 1000Ω±1% at 0°C) • 0-1Vdc, 0-5Vdc, or 0-10Vdc (100mA max) <p>Digital inputs (non-optically isolated):</p> <ul style="list-style-type: none"> • Voltage-free contacts • Fast digital inputs (voltage-free, 10mA max, 2kHz max) <p>Analog outputs (non-optically isolated)</p> <ul style="list-style-type: none"> • 0 to 10Vdc (2mA max) • PWM (0/3.3Vdc output, 2mA max, 100-2kHz)
Analogue input accuracy	+/-0.3% fs
Time constant for each input	0.5 s
Classification of measuring circuits	Category I (IEC EN 61010-1)

WARNING: At power on, universal inputs/outputs are short circuited to GND for about 500ms up to the end of the configuration.

Digital inputs (ID..., IDH...)

Type	<p>optically-isolated inputs</p> <p>ID...: 24Vac (+10/-15%) 50/60 Hz or 28-36Vdc (+10/-20%), or 230Vac 50/60 Hz.</p> <p>IDH...: 230Vac (+10/-15%) 50/60Hz</p> <p>**5mA current draw on 24Vac/Vdc and 230Vac inputs</p>	
Maximum no.	8, 14, on the: SMALL, MEDIUM boards respectively, according to the combinations shown below:	
Board size	no. optically-isolated inputs at 24Vac 50/60 Hz or 24Vdc	no. optically-isolated inputs at 24Vac/Vdc or 230Vac 50/60 Hz
SMALL	8	none
MEDIUM 2	8 + 4	2
minimum normally-open digital input detection time (open-closed-open) in AC and DC (ms)	200	
minimum normally-closed digital input detection time (closed-open-closed) in AC and DC (ms)	400	

Analog outputs (Y...)

Maximum number and type	0/10Vdc optically-isolated outputs (Y1... Y4)
Power supply on VG(+) and VG0(-)	external 24Vac (+10/-15%) or 28-36Vdc
Accuracy	+/-2% Full scale
Resolution	8 bit
Analogue outputs settling time	from 1s (slew rate 10V/s) to 20s (slew rate 0.5V/s), selectable via software
Maximum load	1 k Ω (10mA)

Digital outputs (NO..., NC...)

Type	Electromechanical relay
Maximum # (Small, Medium)	8, 13
Groups (common voltage required inside group)	Small: 1...3, 4...6, 7, 8 Medium: 1...3, 4...6, 7, 8, 9...11, 12, 13
Changeover contacts (qty, relay #s)	Small: 1 (8) Medium: 3 (8, 12, 13)
Relay Nameplate Information	SPDT, 2000VA, 250Vac, 8A resistive
Certification	UL60730: 2A resistive, 250Vac, 30,000 cycles pilot duty C300, 240Vac, 30,000 cycles

Controller plastic case

Mounting	Can be mounted on DIN rail according to DIN 43880 and EN 50022 standards
Material	Technopolymer
Flame Retardancy	V2 (according to UL94) and 850°C (according to IEC 60695)
Temperature for ball pressure test	125°C
Creeping current resistance	$\geq 250V$
Color	White RAL 9016

TECHNICAL SPECIFICATIONS OF THE DISPLAY TERMINAL

Material (Case)	combination of ABS and polycarbonate
Material (Keypad)	Silicone rubber + ABS
Self-extinguishing rating	UL94 V0, UL approved
Color	RAL 7032 (grey/beige)
Operating temperature	-20 to 60°C (-4 to 140°F), 90% RH non-condensing
Power supply	from the PCO via telephone cable (18/30Vdc w/ 250mAT fuse)
Maximum power input	1.5W
Storage conditions	-20 to 70°C (-4 to 158°F) 90% RH non-condensing
Index of protection	IP55 front panel for panel installation, UL type 1
Environmental pollution	Normal
Classification according to protection against electric shock	to be incorporated in Class I and/or II devices
PTI of the insulating materials	250V
Period of electric stress across insulating parts	Long
Category of resistance to heat and fire	category D
Immunity against voltage surges	category I

NTC sensors

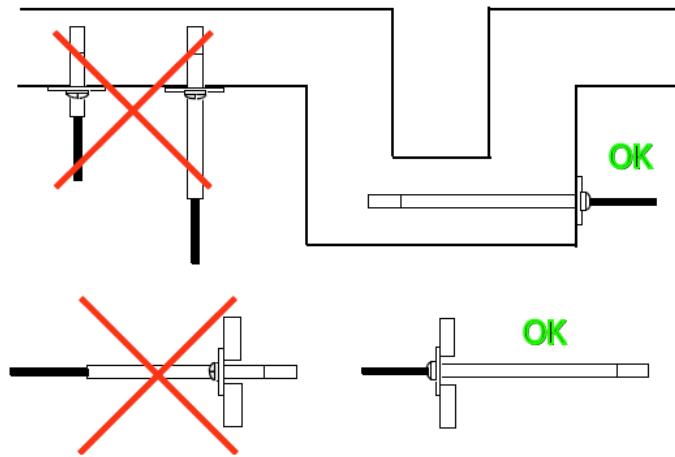
°C kOhm	°C kOhm	°C kOhm	°C kOhm
-20 67.71	0 27.28	20 12.09	40 8.52
-15 53.39	5 22.05	25 10.00	45 4.91
-10 42.25	10 17.96	30 8.31	50 4.16
-5 33.89	15 14.68	35 6.94	55 3.53

SENSOR LOCATION

The location of the sensors is very important. All sensors should be positioned away from electromagnetic noise. The product temperature sensor should be immersed in glycerin or other suitable medium that thermally simulates the product. The glycerin well/product sensor is normally mounted on the wall near the door and should be mounted at a height that will best reflect the product storage height, normally 40” above the floor. For optimum temperature control the air temperature sensor should be mounted at a location, out of the direct discharge of the evaporator coil, which best reflects the median temperature of the room. If the sensor lead is not long enough, the lead may be extended using 18-gauge wire. The humidity sensor should be mounted at a height that will best reflect the product storage height, normally 40” above the floor, with the sensor tip placed at a downward angle so condensation cannot collect in the sensor (see below). It is critical that the humidity sensor is located out of any direct air stream or discharge from devices; evaporators, door openings, humidifiers, dehumidifiers, heat from lights, etc. If the sensor lead is not long enough, the lead may be extended using 18-gauge wire. After the sensors are mounted, seal the hole in the wall where the leads were fed with silicone sealant to prevent airflow through the hole.

For best results, please observe the following guidelines:

- Install the probe at a location where humidity, temperature and pressure conditions are representative of the environment or process to be measured. Avoid the following: (a) Close proximity of the probe to a heating element, a cooling coil, a cold or hot wall, direct exposure to sun rays, etc. (b) Close proximity of the probe to a steam injector, humidifier, direct exposure to precipitation, etc. (c) Unstable pressure conditions resulting from excessive air turbulence.
- When installing the probe on a wall, do not place the probe right above a heat producing device of instrument such as a transmitter or an Ethernet adapter (warm air tends to rise).
- If possible, choose a location that provides good air movement at the probe: air velocity of at least 1 meter/second (200 ft/ minute) facilitates adaptation of the probe to changing temperature.
- When installing the probe through a wall, immerse as much of the probe as possible in the environment to be measured.



Position the probe so as to prevent the accumulation of condensation water at the level of the sensor leads. Install the probe so that the probe tip is looking downward. If this is not possible, install the probe horizontally.

Depending on the probe model, a probe holder (mounting flange with a compression fitting) can facilitate installation through a wall.

Future maintenance can be made easier by providing next to the probe a calibration access orifice. During maintenance, this permits the insertion of a reference probe (calibrator). The calibration access orifice should have the same size as the orifice used to install the probe and can be equipped with a probe holder.



RAMP AND SOAK WORKSHEET

Program #	Daily/Weekly	Time	Temp.	Humidity	Lights	Ramp/Hold
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						