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READ ALL INSTRUCTIONS CAREFULLY before attempting to install or operate the CSX C-Store Controller.

SAVE THIS INSTRUCTION MANUAL — This instruction manual contains important operating instructions for the CSX C-Store Controller.
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1 Overview

The CSX Controller is a refrigeration, HVAC, and lighting controller specially designed for complete control of small convenience stores (or C-store) and other small format buildings in the 3000-5000 square foot range. The CSX Controller is capable of monitoring and controlling all systems crucial to the efficient operation of a C-store, including:

- **Refrigeration** - Up to four condensing units, including control of both refrigeration and defrost, and monitoring of discharge air temperature.
- **HVAC** - Up to four rooftop HVAC units, each of which may have up to two stages of heat and cool, including humidity control and monitoring of ambient air temperature, supply temperature, humidity.
- **Lighting** - Up to eight circuits of lighting, allowing separate scheduling for canopy lights, store lights, exterior & sign lights, cooler lights, etc.
- **Door Switch Monitoring & Alarming** - Up to five door switch inputs, for alarming when cooler doors are left open.
- **Anti-Sweat Control** - Provides pulse control of anti-sweat heaters on cooler glass doors, based on the temperature and relative humidity of the indoor air.
- **Product Temperature Monitoring & Alarming** - Up to five product temperature inputs, for alarming when dairy, produce, or other perishable products are above their optimal temperatures.
- **Fuel Pumps** - Scheduled activation and deactivation of fuel pumps to prohibit dispensing during hours when the store is closed.
- **Power Consumption Monitoring** - Up to two circuits of power monitoring.

1.1. Overview of CSX Documentation

The CSX Controller is based on CPC’s DCX controller platform. The CSX, like all DCX-based controllers, is shipped with a set of user documents: a DCX Installation and Operation Guide, which covers the basics of setting up the DCX hardware (including mounting, sensor wiring, and expansion board networking); an I/O Setup Sheet, which shows the input and output connections that must be made to the control unit and its expansion boards; and an Application Guide, which for the CSX is the CSX Controller Application Guide (this manual).

The CSX Controller Application Guide has several chapters, each of which individually describes and explains the programming of a function of the CSX software (such as refrigeration or lighting control). Some of these chapters may refer to functions that do not exist on your site’s CSX; this is because CPC hides all screens related to functions not used by your site prior to shipping. You may ignore any chapters in this manual that do not pertain to enabled functionalities on your CSX.

The CSX Controller Application Guide also has a chapter specifically dedicated to operating the CSX after installation, including viewing and acknowledging alarms, performing overrides, and cycling through status screens.
OBSOLETE
2 CSX Operation and Navigation

This section is an overview of the CSX’s front-panel display interface and how to navigate through the various screens in the CSX software.

2.1. The CSX Keypad

![Figure 2-1 - The CSX Keypad](image)

Figure 2-1 shows the screen and the six-button keypad on the CSX unit. The screen and keypad are the primary way a user interacts with the CSX system (the other method is with the CSX Supervisory System).

Each of the six buttons on the keypad serves a different general function:

- **Alarm (Bell) Button** - The button with the bell icon is the Alarm Button. The button has a red LED behind it that lights the button when an alarm becomes active on the system. Pressing this button will display a list of active alarms (if lit) or a list of alarms that have recently occurred but have been cleared (i.e. the Alarm Log).

- **Prg Button** - The Prg button is used to change configuration. When you press Prg from a status screen, the CSX will display a set of configuration screens that the user may use to change set points or other settings. Whenever you are on a screen where the Prg button has a function, the green LED behind the button will be lit.

- **Esc Button** - The Esc button is primarily used to cancel actions or navigate back to the previous screen or the home status screen. In general, if you become lost in the CSX’s interface, pressing the Esc button a few times will take you back to the home screen. Whenever you are on a screen where the Esc button has a function, the green LED behind the button will be lit.

- **Up and Down Arrow Keys** - The up and down arrow keys serve two functions. They are used in navigation to cycle up and down through the various status screens and configuration screens, and they are also used to change the values of configurable fields.

- **Enter Key** - The key with the arrow pointing left is called the Enter key. As you navigate through configuration screens on the CSX, the Enter key is used to tell the CSX there are fields on the current screen you’d like to make changes to. While you are changing values on a configuration screen, pressing the Enter key cycles between configurable fields on a configuration screen. After you have used the up and down arrow keys to select the desired value of a field, pressing the Enter key confirms and saves the change you have made, and moves the cursor to the next field in sequence.

2.2. The CSX Status Screens

The CSX provides a series of status screens to show how its various systems are operating. Each of the CSX’s major functions—HVAC control, condensing unit control, light control, fuel pump scheduling, product temp, door switch, anti-sweat (PMAC panel) monitoring, dehumidification control, and power monitoring—has its own status screens showing the current state of its control inputs and outputs.

When the CSX is “at rest” (i.e. if it has been left alone with no key presses for at least five minutes), it displays its first status screen, which is the HVAC Status Screen. From this screen, you may cycle through the other status screens using the up and down arrow keys. Table 2-1 shows all of the status screens in the CSX and how to read them.

The CSX Keypad
Note that your CSX has been specially tailored to your site’s configuration, so you may find some status screens missing that do not pertain to functions used at your site.

<table>
<thead>
<tr>
<th>Status Screen</th>
<th>Description</th>
</tr>
</thead>
</table>
| **HVAC Status** | The HVAC Status screen shows the current indoor air temperature reading and current state for each of the four possible HVAC units. The state of the HVAC unit appears below the temperature, and will be one of the following:  
  - **Cool** - One or more cool stages are ON.  
  - **Heat** - One or more heat stages are ON.  
  - **Fan** - Fan is on, but no heat or cool stages are active (occurs when fan is set to Always ON).  
  - **Dots (...)** - System at rest (no cool, heat, or fan activity).  
    Dashes "--" in both the temperature and HVAC state fields indicate the HVAC unit is currently unconfigured or not used. |
| **Lighting Status** | The three Lighting Status screens show the current state of the eight lighting circuits controlled by the CSX: Floor Lights, Cooler Lights, Sign Lights, and Canopy Lights 1-5. Each circuit will display “ON” if the lights are ON, and “OFF” if the lights are OFF.  
  The first Lighting Status screen shows the status of the Floor, Cooler, and Sign Lights.  
  The second Lighting Status screen shows the status of Canopy Light circuits 1-3.  
  The third Lighting Status screen shows the status of Canopy Light circuits 4-5, and is only visible if these circuits are being used. |
| **Fuel Dispenser Power** | The Fuel Dispenser Power Status screen shows whether the power to the fuel dispensers is ON or OFF. If ON, fuel dispensing is currently enabled. If OFF, fuel dispensing is currently disabled. |
| **Cooler** | The two Cooler Status screens show the current discharge air temperature, the control set point, and the state of each of the four cooler circuits controlled by the CSX. The state of the cooler appears directly below the set point, and will be one of the following:  
  - **Sat** - Set point is satisfied, and no refrigeration or defrost is active.  
  - **Refr** - Refrigeration is ON in this cooler.  
  - **Defr** - The cooler is in defrost mode.  
    Dashes "---" in a cooler circuit’s Temp, Setpt, and State fields indicate the cooler is unconfigured or unused. |
| **Product Temp** | The Product Temperature Status screen shows the current value of product temperature probes in the coolers. |

| Table 2-1 - CSX Status Screen Descriptions |
2.2.1. Configuration Screens and How To Change Configuration

From any status screen shown in Table 2-1, pressing the Prg button will bring up a set of configuration screens related to the same function. For instance, when the HVAC Status Screen is visible, pressing Prg will cause the first in a series of HVAC configuration screens to be displayed.

A configuration screen is any screen that contains changeable settings (or fields) that affect the operation of one or more of the CSX’s basic functions. Configuration screens for HVAC will allow you to specify set points, occupied and unoccupied time schedules, and other important settings.

Section 3 through Section 14 of this manual are dedicated to explaining how to use configuration screens for each of the CSX functions to correctly program the CSX.

2.3. Security and Logging In

Viewing status screens, set points, system time and date, or alarms does not require any special security level. However, to perform higher level functions like change set points, the user must first enter a four-digit password.

The CSX prompts the user for a password whenever a user first attempts to change a set point on a configuration screen. If the correct password is entered, the user is considered “logged in,” and changes to the CSX configuration will be allowed. If the correct password is not entered, no changes will be allowed, and the CSX will continue to prompt the user to enter a password every time a change is attempted.

While the user is logged in, if no keypress are made on the CSX keypad for at least five minutes, the user is automatically “logged out,” and the display will return to the HVAC Status screen. Any further changes to CSX configuration will require a new login.

<table>
<thead>
<tr>
<th>Status Screen</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Door Switch Status</td>
<td>The Door Switch Status screen shows the current state of the door switch inputs. “OPN” signifies an open door, while “CLS” indicates a closed door.</td>
</tr>
<tr>
<td>Cooler Anti-Sweat</td>
<td>The Cooler Anti-Sweat Status screen shows the current temperature and relative humidity readings for the indoor air, the calculated dew point based on these readings, and the current pulse percentage of the anti-sweat heaters. The real-time ON/OFF status of the anti-sweat heaters is indicated by a blinking asterisk in the lower right corner of the screen. When this asterisk is visible, the heaters are currently ON; when not visible, the heaters are currently OFF.</td>
</tr>
<tr>
<td>Dehumidifier Status</td>
<td>The Dehumidifier Status screen shows the current humidity of the indoor air, the dehumidification set point, and whether dehumidification is ON or OFF. If the Dehumidifier field shows neither ON or OFF, dehumidification is currently unconfigured or unused.</td>
</tr>
<tr>
<td>Power Monitor</td>
<td>The Power Monitor Status screen shows the current value of power transducer circuits 1 and 2, in kilowatts. Note if circuit #2 is not being used, it will not appear on this screen.</td>
</tr>
<tr>
<td>System Time/Date</td>
<td>The System Time/Date screen shows the current time and date kept by the CSX internal clock, as well as the current value of the outside (ambient) temperature (if available).</td>
</tr>
</tbody>
</table>
2.4. **System Overrides**

While the CSX front panel screen and keypad are used for most configuration functions, the CSX has designated digital inputs that can be connected to buttons for an operator to use to override certain CSX functions without using the keypad.

### 2.4.1. HVAC 1-4 Force

Each rooftop HVAC unit follows a schedule to determine whether the building is occupied (OPEN) or unoccupied (CLOSED). HVAC units typically are programmed to allow the building to be warmer in the summer or colder during the winter during unoccupied hours.

To prevent this from happening, you can force an HVAC unit to operate in occupied mode when the schedule calls for it to be in unoccupied mode. Press and hold one of the four **HVAC Force** override buttons for one second, and the HVAC unit will operate in occupied mode for a short period of time.

The override will time out after a programmed period of time, and the HVAC will return to unoccupied mode. You may also manually cancel an override by pressing the button for five seconds.

### 2.4.2. Inside Light (I-Light) Button

The main indoor lights and the lights in the refrigerated cases are classified as “indoor lights” in the CSX system. These lights follow a schedule that turns the lights OFF during unoccupied building hours.

To override indoor lights ON when the schedule calls for them to be OFF, press the Indoor Light (I-LIGHT) override button for one second. The override will time out after a programmed period of time, and the lights will turn OFF. You may also manually cancel an override by pressing the button and holding for five seconds.

### 2.4.3. Outside Light (O-Light) Button

The canopy lights and the sign lights outside the building are classified as “outdoor lights” in the CSX system. These lights follow a schedule that turns the lights OFF during unoccupied building hours.

To override outdoor lights ON when the schedule calls for them to be OFF, press the Outdoor Light (O-LIGHT) override button for one second. The override will time out after a programmed period of time, and the lights will turn OFF. You may also manually cancel an override by pressing the button and holding for five seconds.

### 2.4.4. Fuel Pump Override

The main shutoff for the fuel dispensers follows an ON/OFF schedule to lock the pumps OFF during hours when the store is closed. The pumps may temporarily be overridden ON by using the Fuel Pump Override Button.

To override the fuel pumps ON, press and hold the button for one second. The override will time out after a programmed period of time, and the pumps will turn OFF. You may also manually cancel an override by pressing the button and holding for five seconds.

### 2.4.5. Alarm Silencer

The CSX can be configured to close a relay on the control unit or on an expansion board whenever an alarm occurs in the CSX. This relay can be used to operate a flashing light or buzzer to notify store personnel of the alarm condition.

The Alarm Silencer button may be used to “silence” alarm notification devices connected to the CSX’s alarm relay output. To silence the alarm annunciation, press and hold the Alarm Silencer button for one second. The annunciator will remain silenced for a programmed period of time or until the alarm condition is fixed.
Note that when the alarm annunciator is silenced in this manner, it is silenced only for the alarms that are currently active. New alarms that occur after the alarm silencer has been pressed, or active alarms that are cleared and then re-occur, will cause the alarm relay to CLOSE again. If this occurs, the Alarm Silencer button may be pressed again to re-silence the annunciator.
# 3 HVAC Setup

## 3.1 Overview of CSX HVAC Control

The CSX may control up to four HVAC rooftop units, each of which may have up to two stages of heating and up to two stages of cooling. The CSX also provides dehumidification using the rooftop unit’s cooling stages (not available with heat pump HVAC units).

### 3.1.1 Heat/Cool Control

The CSX controls heating and cooling for an HVAC unit by comparing the indoor air temperature with its programmed heat and cool control set points. The CSX begins heating mode when the indoor air temperature falls below its heat control set point. Likewise, the CSX begins cooling mode when the indoor air temperature rises above the cool control set point. When the CSX is in heating or cooling mode, it will activate the HVAC’s heat or cool stages in an effort to satisfy its heat or cool set point. When this set point is satisfied, it will deactivate the stages as needed until no heat or cool stages are active.

#### 3.1.1.1 Minimum On/Off Times

When a CSX activates a heat or cool stage, it follows a set of programmed Minimum ON and Minimum OFF set points. When first activated, it must remain ON for at least the duration of the programmed Minimum ON delay (default 30 seconds). Likewise, when deactivated, it must remain OFF for the duration of the programmed Minimum OFF delay.

### 3.1.2 Fan Control

The fan for each HVAC unit may be controlled in either of two modes: Always On, or Automatic. In Always On Mode, the fan remains on at all times, regardless of whether or not any heat or cool stages are active. In Automatic Mode, the fan is active only when heat or cool stages are active, and is OFF when no heat or cool stages are active (after a 60 second delay).

### 3.1.3 Occupied/Unoccupied Scheduling

The CSX may be programmed to use a different pair of heating and cooling set points during times when the site is unoccupied.

Unoccupied times are determined by a weekly schedule, which is shared by all HVAC units controlled by the CSX. This schedule defines the start of occupied mode and the start of unoccupied mode for every day of the week. The CSX follows this schedule to determine whether to use the occupied or unoccupied set points.

Unoccupied mode can be manually overridden by a switch or from the front panel. The manual override forces the CSX to use the occupied set points for a programmed period of time (default one hour). When the override time is over, the CSX will cancel the override and use the schedule to determine which mode to operate in.

### 3.1.4 Minimum Supply Temp

If a supply temperature probe is present for an HVAC unit, the CSX may be programmed with a minimum supply air temperature set point. If the unit’s supply air temperature falls below this set point, the CSX will begin deactivating cooling stages to keep the supply temperature from dropping any lower. Cool stages deactivated in this manner will be allowed to reactivate when the supply air temperature rises above the set point.
3.2. Programming HVAC Control

Programming HVAC control for the CSX generally involves specifying heat and cool set points, minimum supply temp set points, occupied and unoccupied schedule times, and other settings for each HVAC unit to be controlled.

CSX HVAC control also depends on the presence of correctly wired inputs and outputs. The inputs required for your site are listed on the I/O Configuration Sheet supplied for the site by CPC. Refer to the DCX Controller Installation Manual (P/N 026-1901) for information about wiring inputs and outputs.

The process of programming HVAC set points begins at the HVAC Status Screen. This is the default screen for the CSX and should be the first screen shown when a CSX is booted up. Figure 3-1 is a map of all the screens related to HVAC setup and how to navigate them. The remaining sections in this chapter explain the significance of each field on the screens and how to change their values.

Figure 3-1 - HVAC Navigation Map
3.2.1. Occ/Unoc Status

This screen shows the current occupied and unoccupied status of all four HVAC units. Units that are not set up in the system software (because they have not yet been programmed or because they don’t exist) will be displayed on this screen as “N/A.”

**Overriding an HVAC Unit to "Occupied"**

An Unoccupied HVAC unit can be overridden to Occupied from this screen. To override an HVAC unit, press ENTER until the cursor is on the “Unoccupied” field of the unit you wish to override, and press the DOWN ARROW key. The screen will display the unit as Occupied, and will keep the HVAC unit in the Occupied state for an amount of time equal to the Force Occupied Time Period (see Section 3.2.2., HVAC Config).

3.2.2. HVAC Config

**Force Occupied Time Period [0 - 300 minutes][60 minutes]**

The HVAC Config screen has one editable field, called the Force Occupied Time Period field. The value of Force Occupied Time Period determines how long a manual HVAC override on any unit will cause it to be overridden to “Occupied.”

3.2.3. HVAC 1 Setpoints

**Heat Occ [0° — 97°F][70°F]**

The Heat Occupied set point is the temperature set point for heating control. When the air temperature falls below this level, the CSX will begin activating heating stages in an attempt to bring the temperature back up above the set point. The Heat Occupied set point may be any value from 0 to 97 degrees Fahrenheit, but must always be at least 2 degrees below the Cool Occupied set point.

**Cool Occ [2° — 99°F][73°F]**

The Cool Occupied set point is the temperature set point for cooling control. When the air temperature rises above this level, the CSX will begin activating cooling stages in an attempt to bring the temperature back down below the set point. The Cool Occupied set point may be any value from 2 to 99 degrees Fahrenheit, and must always be at least 2 degrees above the Heat Occupied set point.

**Heat Unocc [0° — 97°F][61°F]**

The Heat Unoccupied set point is used in place of the Heat Occupied set point during unoccupied building times (determined by the HVAC schedule). The Heat Unoccupied set point may be any value from 0 to 97 degrees Fahrenheit, but must always be at least 2 degrees below the Cool Unoccupied set point.
Cool Unocc [2° — 99°F][81°F]

The Cool Unoccupied set point is used in place of the Cool Occupied set point during unoccupied building times (determined by the HVAC schedule). The Cool Unoccupied set point may be any value from 2 to 99 degrees Fahrenheit, but must always be at least 2 degrees below the Heat Unoccupied set point.

3.2.4. HVAC 1 Setup

HVAC 1 Installed [Yes/No] [No]

The HVAC 1 Installed field tells the CSX whether HVAC unit #1 exists. If this field is set to "No," the CSX suspends all controlling and alarming related to HVAC unit #1. If this field is set to "Yes," the CSX will control HVAC unit #1 and generate alarms.

The default setting for HVAC 1 Installed is "No," so if this HVAC unit does not exist, you do not need to change any field values related to HVAC 1.

HVAC 1 Fan [Always On/Auto] [Auto]

The HVAC 1 Fan field sets the mode of operation for HVAC unit #1’s fan. If set to “Always On,” the fan will be ON constantly even when no heat or cool stages are active. If set to “Auto,” the fan will activate only when stages are active.

Heat Pump [Yes/No] [No]

The Heat Pump field tells the CSX whether or not the HVAC unit is a heat pump style unit. If this field is set to “Yes,” dehumidification control is disabled for HVAC unit #1, since the CSX is not capable of activating a heat pump’s cool stage for use in dehumidification. If this field is set to “No,” dehumidification control may be used.

3.2.5. HVAC 1 Setup 2

Supply Temp

This read-only field shows the current value of HVAC unit #1’s supply air temperature. If this input is not present for this unit, this field will be blank. The Supply Temp field is provided as a reference to use while programming the other supply-air-temp-related fields in this screen.

Min Supply T [0°—99°F][40°F]

The Minimum Supply Temp is the lowest allowable supply air temperature for HVAC unit #1. If the measured supply air temperature is lower than this set point, the CSX will temporarily roll back cooling until the supply air temperature rises to an acceptable level.

Supply Temp [Enable/Disable][Disable]

The CSX will only use the minimum supply air temperature feature if the Supply Temp field is set to Enable. When set to “Enable,” the CSX will check the minimum supply air temperature, and limit the unit’s cooling capacity when the supply air temperature falls below the Minimum Supply Temp set point. When set to “Disable,” the CSX will take no action.

3.2.6. HVAC 2, 3, and 4 Setpoints
and Setup

The Setpoints and Setup screens for HVAC units #2, #3, and #4 are identical to the screens for HVAC #1, which are explained in **Section 3.2.3.**, **Section 3.2.4.**, and **Section 3.2.5.** Refer to these sections to set up these HVAC units.

### 3.2.7. HVAC Sched 1 and HVAC Sched 2

HVAC Sched 1 and HVAC Sched 2 are the screens where you set up the weekly occupied/unoccupied schedule for all four HVAC units. Screen 1 shows schedule times for Monday through Wednesday. Screen 2 shows schedule times for Thursday through Sunday.

Each day of the week has a pair of times. The times in the Occ column indicate the times at which the unit will switch to Occupied mode. The times in the Unocc column indicate the times at which the unit will switch to Unoccupied mode.

To change the times, press Enter to cycle through the hours and minutes fields of each time, and use the arrow keys to change the numbers. Use 24-hour format to enter the times (i.e. if entering 10:00 p.m., the time should be entered as 22:00, not 10:00).
OBSOLETE ObsolEte
4 CSX Light Schedules

4.1. Overview of CSX Light Schedule Control

The CSX provides scheduled ON/OFF control of indoor floor lights, cooler lights, sign lights, and up to five separate circuits of canopy lights. Each can be activated and deactivated based on their own weekly ON/OFF schedule, or they may also be set to Always ON.

Light schedule control is slightly different based on whether the lights are indoor or outdoor.

4.1.1. Indoor Light Control

Floor lights and cooler lights are classified as indoor lights. The control of indoor lights differs from outdoor lights in that they may be turned ON and OFF only by schedule.

4.1.1.1. The I-Light Override

Both floor and cooler lights may be overridden using a digital input called the Indoor Light (or I-Light) Button. Pressing this button or switch will override floor and cooler lights ON for a pre-programmed period of time.

4.1.2. Outdoor Light Control

Sign lights and canopy lights are classified as outdoor lights. Outdoor lights are slightly different from indoor lights in that they may turn ON and OFF either by schedule or by light sensor.

4.1.2.1. Light Sensor Control

If sign or canopy lights are configured to turn ON or OFF based on the value of a light sensor, the CSX compares the reading of an outdoor light level sensor input to a set of ON and OFF set points. A measured light level below the ON set point will turn the lights ON, while any light level reading above the OFF set point will turn the lights OFF.

Schedule and light level sensor control may be combined for a single light circuit. A typical application for C-stores is to turn ON based on the light sensor and OFF based on the schedule. This would result in outdoor lights coming ON only when dark enough to be necessary, and OFF when the store closes.

4.1.2.2. The O-Light Override

All sign and canopy lights may be overridden using a digital input called the Outdoor Light (or O-Light) Button. Pressing this button or switch will override outdoor lights ON for a pre-programmed period of time.

4.2. Programming CSX Light Schedule Control

Programming light schedule control for the CSX generally involves entering ON and OFF schedule times, entering light level sensor set points for outdoor lighting, and other configuration parameters for each light circuit.

CSX light schedule control also depends on the presence of correctly wired inputs and outputs. The inputs required for your site are listed on the I/O Configuration Sheet supplied for the site by CPC. Refer to the DCX Controller Installation Manual (P/N 026-1901) for information about wiring inputs and outputs.

Figure 4-1 - Lighting Status Screen
The process of programming light schedule set points may begin at any one of the three Lighting Status Screens (Figure 4-1). Figure 4-2 is a map of all the screens related to light schedule setup and how to navigate them. The remaining sections in this chapter explain the significance of each field on the screens and how to change their values.
4.2.1. Light Control Screens 1, 2, and 3

The three Light Control Screens (Light Control 1, Light Control 2, and Light Control 3) allow you to choose whether to manually turn a light circuit ON or OFF or to have the lights controlled automatically by schedule and/or light level sensor.

When a field in the Light Control Screens is set to Auto, the lights will use their schedule and/or light level sensor to determine whether it should be ON or OFF. Otherwise, the lights will be ON when the Floor Lights field is set to ON, and OFF when the Floor Lights field is set to OFF.

**Floor Lights [Auto, ON, OFF] [Auto]**

The Floor Lights field allows you to choose whether to manually turn the floor lights ON or OFF or to have the floor lights controlled by schedule.

**Cooler Lights [Auto, ON, OFF] [Auto]**

The Cooler Lights field allows you to choose whether to manually turn the cooler lights ON or OFF or to have the cooler lights controlled by schedule.

**Sign Lights [Auto, ON, OFF] [Auto]**

The Sign Lights field allows you to choose whether to manually turn the sign lights ON or OFF or to have the sign lights controlled by schedule and/or light level sensor.

**Canopy 1 Lights [Auto, ON, OFF] [Auto]**

The Canopy 1 Lights field allows you to choose whether to manually turn canopy #1’s lights ON or OFF or to have the lights controlled by schedule and/or light level sensor.

**Canopy 2, 3, 4, and 5 Lights [Auto, ON, OFF] [Auto]**

The remaining canopy light fields (Canopy 2 - Canopy 5) have the same function as the Canopy 1 Lights field, except they control the operation of canopies #2 through #5.

4.2.2. Light Force Time

**Light Force ON and OFF Duration [1 — 500 minutes] [60 minutes]**

The Light Force ON and OFF Duration sets the amount of time an override of any of the Lighting Control circuits will last, whether it be a command from the I-Light or O-Light override button (see Section 2.4.2 and Section 2.4.3) or from the Light Control screens (see Section 4.2.1).
4.2.3. Floor Lights

The Automatic Control field allows you to select whether the floor lights will always be ON or will be controlled by schedule. If this field is set to Automatic Control, the floor lights will follow the schedule programmed for the floor lights. If this field is set to Always ON, the floor lights will remain ON 24 hours a day.

4.2.4. Floor Schedule 1 and Floor Schedule 2

Each day of the week has a pair of times. The times in the ON column indicate the times at which the floor lights will switch ON. The times in the OFF column indicate the times at which the floor lights will switch OFF.

To change the times, press Enter to cycle through the hours and minutes fields of each time, and use the arrow keys to change the numbers. Use 24-hour format to enter the times (i.e. if entering 10:00 p.m., the time should be entered as 22:00, not 10:00).

4.2.5. Cooler Lights, and Cooler Schedule 1 & 2

The Cooler Lights, Cooler Schedule 1, and Cooler Schedule 2 screens are identical to the Floor Lights screens explained in Section 4.2.3. and Section 4.2.4., except the Cooler screens affect the operation of the cooler lights. Refer to the Floor Lights screen descriptions for programming information.

4.2.6. Sign Lights

The Automatic Control field allows you to select whether the sign lights will always be ON or will be controlled by schedule. If this field is set to Automatic Control, the sign
lights will follow the schedule programmed for the sign lights. If this field is set to Always ON, the sign lights will remain ON 24 hours a day.

**Turn ON By [Sensor/Schedule] [Schedule]**

The Turn ON By field determines what control scheme the CSX will follow to activate the sign lights. There are two options:

- **Schedule** - The sign lights will turn ON as specified by the sign lights’ weekly schedule.
- **Sensor** - The sign lights will turn ON when the light level sensor reads a light level below the ON set point.

**Turn OFF By [Sensor/Schedule] [Schedule]**

The Turn OFF By field determines what control scheme the CSX will follow to deactivate the sign lights. There are two options:

- **Schedule** - The sign lights will turn OFF as specified by the sign lights’ weekly schedule.
- **Sensor** - The sign lights will turn OFF when the light level sensor reads a light level above the OFF set point.

4.2.7. Sign Sched 1 and Sign Sched 2

The two screens below the Sign Lights screen are where the weekly ON/OFF schedule for the sign lights is programmed. Screen 1 is where the schedules for Monday through Wednesday are programmed. Screen 2 is where the schedules for Thursday through Sunday are programmed.

Each day of the week has a pair of times. The times in the ON column indicate the times at which the sign lights will switch ON. The times in the OFF column indicate the times at which the sign lights will switch OFF.

To change the times, press Enter to cycle through the hours and minutes fields of each time, and use the arrow keys to change the numbers. Use 24-hour format to enter the times (i.e. if entering 10:00 p.m., the time should be entered as 22:00, not 10:00).

4.2.8. Sign Light Sensor Setup

This screen is shown only if either or both of the Turn ON By or Turn OFF By fields in the Sign Lights screen were set to “Sensor.”

**Light Level**

This read-only field shows the current value of the light level sensor input. This is provided as a reference as you program the ON and OFF light level set points.

**ON Set Point [0 — 999] [10]**

The ON Set Point is the light level at which the sign lights will turn ON if the Turn ON By field in the Sign Lights screen is set to “Sensor.”

**OFF Set Point [0 — 999] [20]**

The OFF Set Point is the light level at which the sign lights will turn OFF if the Turn OFF By field in the Sign Lights screen is set to “Sensor.”

4.2.9. Canopy 1-5 Lights, Canopy 1-5 Schedules, and Canopy 1-5 Light Sensor Setup
**Screens**

All screens related to canopy lights—Canopy 1-5 Lights, Canopy 1-5 Sched 1, Canopy 1-5 Sched 2, and Canopy 1-5 Light Sensor Setup—are identical in function to the sign light screens explained in Section 4.2.6., Section 4.2.7., and Section 4.2.8. Refer to these sections for canopy light schedule and sensor setup instructions.
5 CSX Fuel Dispenser Control

5.1. Overview of CSX Fuel Dispenser Control

Fuel dispenser control in the CSX is a very simple scheduled ON/OFF control scheme for activating and deactivating on-site fuel pumps. The CSX controls a single relay output that is tied to the main shutoff for all fuel dispensers on-site. This output is turned ON and OFF based on a weekly schedule of ON/OFF times.

Fuel dispenser control also supports use of a manual override switch, or Fuel Button. The Fuel Button allows store personnel to override the fuel dispensers ON for a brief period of time.

5.2. Programming CSX Fuel Dispenser Control

Programming fuel dispenser control for the CSX simply involves entering ON and OFF schedule times that correspond to the store’s occupied and unoccupied times.

CSX fuel dispenser control also depends on the presence of correctly wired inputs and outputs. The inputs required for your site are listed on the I/O Configuration Sheet supplied for the site by CPC. Refer to the DCX Controller Installation Manual (P/N 026-1901) for information about wiring inputs and outputs.

The process of programming the schedule of operation for fuel dispensers begins at the Fuel Dispenser Status screen (Figure 5-1). Figure 5-2 is a map of all the screens related to fuel dispenser schedule setup and how to navigate them. The remaining sections in this chapter explain the significance of each field on the screens and how to change their values.

![FUEL DISPENSER NAVIGATION MAP](image)

**Figure 5-2 - Fuel Dispenser Navigation Map**

5.2.1. Fuel Dispenser Power

Programming fuel dispenser control for the CSX simply involves entering ON and OFF schedule times that correspond to the store’s occupied and unoccupied times.

The Automatic Control field tells the CSX whether you want the fuel dispensers to always be ON or to follow the fuel dispenser’s ON/OFF schedule. Setting this field

![FUEL DISPENSER POWER](image)

**Figure 5-3 - Fuel Dispenser Power Status Screen**

**Automatic Control [Automatic Control/ Always ON] [Automatic Control]**

The Automatic Control field tells the CSX whether you want the fuel dispensers to always be ON or to follow the fuel dispenser’s ON/OFF schedule. Setting this field...
to “Automatic Control” will enable scheduled control of the pumps. Setting this field to “Always ON” will leave the pumps ON 24 hours a day.

**Fuel Dispenser [Auto/ON/OFF] [Auto]**

The Fuel Dispenser field provides a means of manually overriding the state of the fuel dispenser output without using the Fuel Button override input. If you wish to manually turn the fuel dispenser ON or OFF for a period of time, change the value of this field to ON or OFF. Otherwise, if you want the CSX to resume following the ON/OFF schedule, set this field to Auto.

An ON or OFF override performed in this manner will time out after a number of minutes equal to the “Light Force ON and OFF”

### 5.2.2. Fuel Dispenser Schedule 1 and Fuel Dispenser Schedule 2

<table>
<thead>
<tr>
<th>Schedule</th>
<th>ON</th>
<th>OFF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monday</td>
<td>08:00</td>
<td>22:00</td>
</tr>
<tr>
<td>Tuesday</td>
<td>08:00</td>
<td>22:00</td>
</tr>
<tr>
<td>Wednesday</td>
<td>08:00</td>
<td>22:00</td>
</tr>
<tr>
<td>Thursday</td>
<td>08:00</td>
<td>22:00</td>
</tr>
<tr>
<td>Friday</td>
<td>08:00</td>
<td>22:00</td>
</tr>
<tr>
<td>Saturday</td>
<td>08:00</td>
<td>22:00</td>
</tr>
<tr>
<td>Sunday</td>
<td>08:00</td>
<td>22:00</td>
</tr>
</tbody>
</table>

To change the times, press Enter to cycle through the hours and minutes fields of each time, and use the arrow keys to change the numbers. Use 24-hour format to enter the times (i.e. if entering 10:00 p.m., the time should be entered as 22:00, not 10:00).
6 CSX Cooler Control

6.1. Overview of CSX Cooler Control

The CSX is capable of controlling refrigeration, defrost, and alarming for up to four single condensing units. Refrigeration control is achieved by measuring the discharge air temperature, comparing it with the programmed temperature set point, and activating or deactivating an refrigeration output (which may be a compressor contactor or a solenoid valve). Cooler control also supports scheduled defrosts, defrost termination by sensor or thermostat, and high and low case temperature alarms.

6.1.1. Refrigeration Control

The refrigeration output is turned ON and OFF based on a comparison between an input—the discharge air temperature—and two set point parameters—a temperature set point and a dead band.

The dead band forms a zone of temperatures around the temperature set point within which the cooler temperature is considered to be within acceptable limits. When refrigeration is OFF, the discharge air temperature must rise above the temperature set point plus one-half the dead band value in order to turn refrigeration ON. Once ON, the temperature must fall below the temperature set point minus one-half the dead band value before refrigeration will be deactivated.

6.1.2. Defrost Control

Each cooler may be programmed with up to six scheduled defrost periods. During a defrost period, refrigeration is locked OFF, and a relay is CLOSED to allow activation of defrost heaters (if present). A defrost period lasts for a programmed amount of time, but may be terminated based on the value of an analog defrost termination sensor or by a contact closure from a digital thermostat-style termination sensor.

6.1.2.1. Auto-Calculate Defrost Time Feature

When several refrigerated cases are in heated defrost at the same time, it can cause site power usage to sharply increase, which might result in the site exceeding its demand power limit (and likewise increasing its electricity rates). That’s why it is often beneficial to stagger defrost times between coolers to keep them from being in defrost at the same time.

The CSX has an automatic defrost time calculation feature that makes staggering defrost times easier. The user simply enters the number of times per day the cooler will defrost, and the time of day at which the first defrost will occur. The CSX can then schedule the remaining defrost periods so that each one occurs at equal intervals. By entering a different time of day for the first defrost for each cooler, each cooler’s defrost periods will occur at different times.

Example: Cooler #1 and Cooler #2 both require four defrost periods per day. Cooler #1 is programmed with a first defrost time of 00:00 (midnight). Using CSX’s auto-calculation feature, Cooler #1’s defrost schedule sets up defrosts to occur at 00:00, 06:00, 12:00, and 18:00. To keep defrost times from overlapping, Cooler #2 is programmed with a first defrost time of 00:30 (12:30 a.m.). CSX’s auto-calculation feature will then set up Cooler #2’s defrost schedule as follows: 00:30, 06:30, 12:30, and 18:30. This way, both Coolers #1 and #2 have defrost times spaced 6 hours apart that do not overlap each other.

6.1.2.2. Manual Defrosts

In addition to scheduled defrosts, defrosts may also be started and ended manually from the CSX front panel. Defrosts that are initiated manually are identical to scheduled defrost periods:
they last the same amount of time, and they may be terminated by sensor. Both manual and scheduled defrost periods may be manually terminated from the CSX front panel.

6.1.3. Alarm Control

Each cooler may be programmed with high and low temperature alarm set point thresholds. The alarm “set points” programmed in cooler control are actually entered as numbers of degrees above or below the temperature set point. For example, the default high and low alarm set point thresholds are both set to 5°F. This means alarms will be generated when the cooler temperature is 5°F above the temperature set point or 5°F below the set point.

A delay time must also be programmed for alarm control. The delay time specifies the amount of time the case temperature must be above or below the alarm thresholds before an alarm will be generated.

6.2. Programming CSX Cooler Control

Programming the CSX to control coolers generally involves specifying a temperature set point and dead band, choosing alarm threshold settings, scheduling defrost times, and setting up defrost durations and termination set points.

CSX cooler control also depends on the presence of correctly wired inputs and outputs. The inputs required for your site are listed on the I/O Configuration Sheet supplied for the site by CPC. Refer to the DCX Controller Installation Manual (P/N 026-1901) for information about wiring inputs and outputs.

The process of programming coolers may begin at any one of the two Cooler Status Screens (Figure 6-1). Figure 6-2 is a map of all the screens related to cooler control setup and how to navigate them. The remaining sections in this chapter explain the significance of each field on the screens and how to change their values.
Figure 6-2 - Cooler Control Screen Navigation Map
6.2.1. Cond 1-4 Temp

This read-only field shows the current value of the cooler’s discharge air temperature input.

Cond 1-4 State

This read-only field shows the current state of the cooler. The message in this field may be any of the options listed below:
- **Sat** - The temperature set point has been satisfied, and refrigeration is OFF.
- **Refr** - Refrigeration is ON.
- **Defr** - A defrost cycle is active; refrigeration is OFF, and the defrost output is ON.

**Force Defr ON [Yes/No] [No]**

The Force Defrost ON field is where you may manually initiate a defrost cycle for this cooler. To begin a defrost cycle, change the field value to “Yes” and press Enter. You should see the Cond State field on this screen change from “Defr” to either “Refr” or “Sat,” depending on whether the discharge air temperature is above the temperature set point.

**Force Defr OFF [Yes/No] [No]**

The Force Defr OFF field allows you to manually terminate a defrost cycle for this cooler. To end an active defrost cycle, change the field value to “Yes” and press Enter. You should see the Cond State field on this screen change from “Defr” to either “Refr” or “Sat,” depending on whether the discharge air temperature is above the temperature set point.

6.2.2. Is Cond 1-4 Installed?

This screen has a single Yes/No field labeled “Is Cond <cooler number> Installed?” If the CSX will be controlling a cooler that corresponds to this number, this field should be set to “Yes” so that all inputs related to this cooler will be displayed on the status screen and all necessary refrigeration and defrost algorithms are enabled.

If the CSX will not be controlling a cooler that corresponds to this number, this field should be set to “No.”

6.2.3. Cond 1-4 Setup

**Temp**

This read-only field shows the current value of the discharge air temperature for this cooler. It is provided as a reference for programming the set point and dead band.

**Set Point [-99°F—99°F] [30°F]**

The Set Point is the discharge air temperature the CSX will try to achieve during refrigeration control. The Set Point works along with the Dead Band to determine the discharge air temperatures that will cause refrigeration to activate or deactivate.
**Dead Band [-99°F—99°F][4°F]**

The Dead Band is the range of values equally above and below the Set Point within which the cooler air temperature is considered to be acceptable. Refrigeration switches from OFF to ON when the discharge air temperature rises above the Set Point plus one-half the Dead Band, and switches from ON to OFF when the discharge air temperature falls below the Set Point minus one-half the Dead Band.

### 6.2.4. Cond 1-4 Alarm

**Cond 1-4 Alarm [DIS/EN] [DIS]**

The Cond 1-4 Alarm field enables or disables cooler temperature alarms. If this field is set to “DIS,” alarms will be disabled. If this field is set to “EN,” alarms will be enabled.

**Hi Alarm Dlt [00°—99°F][5°F]**

The High Alarm Delta represents the number of degrees above the Set Point the cooler air temperature must be before a high temperature alarm will be generated.

**Lo Alarm Dlt [00°—99°F][5°F]**

The Lo Alarm Delta represents the number of degrees below the Set Point the cooler air temperature must be before a low temperature alarm will be generated.

**Alarm Delay [0—99 minutes][30 minutes]**

The alarm delay is the number of minutes the cooler air temperature must be in the alarm range (defined by the high and low alarm deltas) before an alarm will be generated.

### 6.2.5. Cond 1-4 Defr Setup 1

**Term Type [Timed, Dig, Temp] [Timed]**

The Termination Type specifies how a defrost cycle for this cooler will terminate. There are three options:

- **Timed** - A defrost cycle will last for the entire timed duration without being terminated by a sensor.
- **Dig** - A contact closure from a digital defrost termination sensor will cause the defrost cycle to terminate.
- **Temp** - An analog temperature sensor will measure case temperature during defrost. If this sensor measures a temperature above the Term Temp set point, the defrost cycle will end.

**Term Temp [-999°F—999°F][40°F]**

This field is enabled only if “Temp” is chosen as the means of terminating defrost in the Term Type field. The Term Temp field sets the temperature at which defrost will be terminated for this cooler.

### 6.2.6. Cond 1-4 Defr Setup 2

**Num Defr [0 - 6] [0]**

The Num Defr field tells the CSX how many scheduled defrost cycles will occur each day.

**Defr Length [0—500 minutes] [20 minutes]**

The Defr Length field sets the amount of time a defrost cycle will last for this cooler (provided it is not terminated by sensor).
Alarm Delay [0—500 minutes] [60 minutes]

The Alarm Delay field allows you to generate an alarm if a defrost cycle lasts longer than a certain amount of time. This may be used to notify if a cooler’s termination sensors are taking longer than expected to terminate defrost, or it may be used to safeguard against error conditions that might cause a defrost cycle to last longer than its programmed Defrost Length.

6.2.7. Cond 1-4 Defr Setup 3

Defr Time1 [00:00—23:59] [00:00]

The Defr Time1 field is the time when the first defrost cycle of the day will occur for this cooler. The value of this field is used by the CSX’s auto-calculate feature to fill in the rest of this cooler’s defrost schedule with times spaced at equal intervals.

Auto Calculate Defrost Times? [Yes/No] [No]

Setting this field to Yes and pressing Enter will cause the CSX to fill in this cooler’s defrost schedule with a number of defrost times equal to the Num Defr field (see Section 6.2.6.), each of which is spaced apart an equal number of hours starting from the first defrost time specified in the Defr Time1 field.

Note: this calculation is only made once for each time you set this field to Yes. Changing the value of the Defr Time 1 or Num Defr fields does not automatically adjust the other defrost times in the schedule. If you change any of these parameters, return to this field and select Yes to recalculate the defrost times.

6.2.8. Cond 1-4 Defr Sched 1 and Cond 1-4 Defr Sched 2

Figure 6-10 - Condensing Unit Defrost Schedule Setup Screen

The two Condenser 1-4 Defrost Schedule screens are where the schedule times for the cooler’s defrost cycles are entered. Screen 1 contains the time fields for defrost cycles 1 through 3, while Screen 2 contains the fields for cycles 4 through 6.

If you used the Auto-Calculate feature back in Section 6.2.7., these two screens will be filled in with defrost times for all the defrost cycles numbered in the Num Defr field. Defrost times above the specified number of cycles will be blanked out (appearing as "--:--"). Any of the defrost times shown may be changed (by editing the hours and minutes fields) to any value between 00:00 and 23:59. Use the Enter key to cycle through the fields, and the up and down arrow keys to change values.
7 CSX Product Temperature Monitoring

7.1. Overview of CSX Product Temperature Monitoring

Product Temperature Monitoring in the CSX controller is designed to monitor the internal temperature of products within coolers and other food cases on-site, and generate alarms when product temperature is too high or too low. Product Temperature Monitoring is designed to ensure food products are kept at temperature levels required to maximize food safety and freshness.

CSX measures product temperature by reading the value of a special temperature probe that mimics the thermal properties of food. The product temperature probe is insulated so that its readings will be relatively equal to the internal temperatures of one pound of meat or dairy. When placed in a refrigerated case, its temperature readings should be sufficiently close to the other food products in the case.

The CSX compares the value of each product temperature probe with a set of high and low set points. If these set points are exceeded, the CSX will generate an alarm. No further control actions occur as a result of this alarm.

7.2. Programming CSX Product Temperature Monitoring

Programming product temp monitoring for the CSX simply involves entering the high and low alarm set points for each product temperature input connected to the CSX control unit.

The inputs required for product temperature monitoring are listed on the I/O Configuration Sheet supplied for your site by CPC. Refer to the DCX Controller Installation Manual (P/N 026-1901) for information about wiring inputs and outputs.

The process of programming the set points for product temperature inputs begins at the Product Temp Status screen (Figure 7-1). Figure 7-2 is a map of all the screens related to product temperature setup and how to navigate them. The remaining sections in this chapter explain the significance of each field on the screens and how to change their values.
7.2.1. Prod Temp 1-5 Setpts

![Product Temperature Setup Screen](image)

**Alarm [Enable/Disable] [Disable]**

The Alarm field enables or disables high and low temperature alarming for this product temperature input. Setting this field to “Disable” will suspend all alarming related to this input. “Enable” will allow both high and low temperature alarming.

**Alarm Hi [-99°—99°F] [99°F]**

The Alarm Hi set point is the temperature reading at or above which a high temperature alarm will be generated.

**Alarm Lo [-99°—99°F] [-99°F]**

The Alarm Lo set point is the temperature reading at or below which a low temperature alarm will be generated.

**Alarm Delay [0—999 minutes] [30 minutes]**

The Alarm Delay is the number of minutes a product temperature probe value must be above a Hi set point or below a Lo set point before an alarm will be generated.
8 CSX Door Switch Monitoring

8.1. Overview of CSX Door Switch Monitoring

The CSX may monitor up to five digital door switch inputs. Door switch monitoring is designed to generate an alarm when a freezer or refrigerated case door has been open for longer than a programmed period of time. The alarm notification allows store personnel to react and close the door to prevent unnecessary energy expense or product loss.

8.2. Programming CSX Door Switch Control

Programming door switch control for the CSX simply involves entering the alarm delay time period for the door switch alarms and specifying for each input whether the CSX will alarm when OPEN or CLOSED.

CSX door switch control also depends on the presence of correctly wired door switch inputs. The inputs required for your site are listed on the I/O Configuration Sheet supplied for the site by CPC. Refer to the DCX Controller Installation Manual (P/N 026-1901) for information about wiring inputs and outputs.

The process of programming the door switch alarms begins at the Door Switch Status screen (Figure 8-1). Figure 8-2 is a map of all the screens related to door switch monitoring setup and how to navigate them. The remaining sections in this chapter explain the significance of each field on the screens and how to change their values.

![Door Switch Control Navigation Map](image)

**Figure 8-2 - Door Switch Control Navigation Map**

8.2.1. Door Switch Delay

**Door Switch Setup**

| Alarm Delay: 030 min |

![Door Switch Setup Screen](image)

**Figure 8-3 - Lighting Status Screen**

Alarm Delay [0—500 minutes] [30 minutes]

The Alarm Delay field sets the amount of time a door switch input must be in an alarm state (either OPEN or CLOSED, depending on how door switch alarming is programmed) before an alarm will be generated.
8.2.2. Door Switch Alarm

This screen contains five fields, numbered 1 through 5, that correspond to each of the five possible door switch inputs. These fields determine whether the switch contacts must be OPEN or CLOSED to generate an alarm.

To change the door switch input alarm states, use the arrow keys to change the value of the 1-5 fields to either “O” (alarm when OPEN) or “C” (alarm when CLOSED).

![Door Switch Alarm Table]

*Figure 8-4 - Door Switch Alarm*
9 CSX Anti-Sweat Control

9.1. Overview of CSX Anti-Sweat Control

The CSX’s anti-sweat heater control feature allows for pulse modulated control of anti-sweat heaters on glass door cases or windows. The CSX measures the dew point of the indoor air and varies the percentage of ON time in the heaters accordingly, providing more heater ON time when the dewpoint is high and less when dewpoint is low. As a result, the site’s anti-sweat heaters operate more efficiently, consuming significantly less power than traditional 100% ON anti-sweat heater applications.

9.1.1. How the Set Points Work

The CSX uses these set point values as shown in the graph in Figure 9-1. When the dewpoint is at or below the Minimum Dew Point set point, the heaters will operate at the percentage specified in the Minimum Pulse Percentage set point. When the dewpoint is in between the minimum and maximum set point, the PMAC II’s pulse percentage varies between the Minimum Pulse Percentage and 100% (the higher the dewpoint, the higher the pulse percentage). Finally, if the dewpoint meets or exceeds the Maximum Dew Point set point, the heaters will operate at 100%.

9.1.2. How Percentages are Interpreted Into ON Times

The percentage corresponds to the amount of time in every twenty second time period the heaters will be ON. For example, if the CSX is operating anti-sweat heaters at 30%, the heat will be ON for six seconds (30% of twenty seconds) and OFF for the remaining 14 seconds. This ON/OFF cycle repeats every twenty seconds, with the ON time adjusting itself based on new readings from the indoor temperature and humidity sensors.

9.2. Programming CSX Anti-Sweat Control

Programming anti-sweat control for the CSX involves entering the high and low dew point set points, and the minimum pulse percentage.

CSX anti-sweat control also depends on the presence of correctly wired inputs and outputs. The inputs required for your site are listed on the I/O Configuration Sheet supplied for the site by CPC. Refer to the DCX Controller Installation Manual (P/N 026-1901) for information about wiring inputs and outputs.

The process of programming the schedule of operation for fuel dispensers begins at the Fuel Dispenser Status screen (Figure 9-2). Figure 9-3 is a map of all the screens related to fuel dis-
penser schedule setup and how to navigate them. The remaining sections in this chapter explain the significance of each field on the screens and how to change their values.

The ON time statistics that appear on this screen may be cleared from the Anti-Sweat Clear On Times screen (see Section 9.2.3).

### 9.2.2. Anti-Sweat Setpoints

#### Max Dew Point [20 — 99°F] [80°F]

The Maximum Dew Point is the dew point level which, when met or exceeded by the indoor air, will cause the anti-sweat heaters to be on 100% of the time.

#### Min Dew Point [01 — 80°F] [20°F]

The Minimum Dew Point is the dew point level which, when met or exceeded by the indoor air, will cause the anti-sweat heaters to be on at the Minimum Pulse Percentage.

#### Minimum Pulse Percentage [0 — 99%] [20%]

The Minimum Pulse Percentage is the lowest possible ON time percentage for the anti-sweat heaters. It is recommended the Minimum Pulse Percentage be set above 0% in order to minimize wear on the anti-sweat heater elements due to heat expansion.

### 9.2.3. Anti-Sweat Clear ON Times

From this screen, you may clear the aggregated ON time statistics on the Anti-Sweat On Time Statistics screen (Section 9.2.1.). Press the ENTER key, use the arrow keys to change the “Clear ON-TIME Arrays” to YES, and press

---

**Figure 9-3 - Fuel Dispenser Navigation Map**

**Figure 9-4 - Anti-Sweat On Time Statistics**

The Anti-Sweat On Time Statistics screen is a read-only screen that shows the aggregated ON time percentages for the current hour, current day, current week, and current month. Dashes in any of the fields on this screen indicate there is not enough data collected since the last time the ON times were cleared. In other words, if ON times were cleared less than a month ago, the Month field will display a series of dashes until it gathers a month’s worth of data.
ENTER again. The ON time statistics will be cleared and the screen will show dashes "---" in the Hour, Day, Week, and Month fields. The CSX will begin aggregating new data starting with the hour in which the ON time clearing was performed.
OBSOLETE
10 CSX Dehumidification Control

10.1. Overview of CSX Dehumidification Control

The CSX uses the HVAC units’ cool stages to dehumidify the indoor air. The CSX performs dehumidification control by comparing the indoor air relative humidity with its programmed humidity set point. If the humidity rises above the set point, the CSX will activate the first stage of cool for all eligible HVAC units to begin dehumidification. These cool stages are activated separately from the CSX’s cooling or heating control programs, and therefore it may bring on a stage of cool in an HVAC unit even when the cooling set point is satisfied or when one or more heat stages are on. The cool stages remains on until the relative humidity set point is satisfied, at which point it turns off.

Because the CSX cannot operate a cool stage for dehumidification in a heat pump HVAC unit, all HVAC units designated as heat pumps are not used for dehumidification (refer to Section 3.2.4., HVAC 1 Setup, to see how to designate an HVAC unit as a heat pump).

10.1.1. Add Heat Feature

Because dehumidification uses cool stages, it is possible to overcool the indoor air during active dehumidification. Therefore, dehumidification control may be programmed to read the supply air temperature of each HVAC unit and activate a heat stage if the supply temp falls below a set point. This will counteract the cooling effect of dehumidification and keep the indoor air temperature from dropping too low.

10.2. Programming Dehumidification Control

Programming dehumidification control for the CSX generally involves specifying a relative humidity set point and add heat set points for each HVAC unit.

CSX dehumidification control also depends on the presence of correctly wired inputs and outputs. The inputs required for your site are listed on the I/O Configuration Sheet supplied for the site by CPC. Refer to the DCX Controller Installation Manual (P/N 026-1901) for information about wiring inputs and outputs.

![Dehum Status Screen](image)

Figure 10-1 - Dehum Status Screen

The process of programming dehumidification set points begins at the Dehum Status Screen (Figure 10-1). Figure 10-2 is a map of all the screens related to dehumidification setup...
and how to navigate them. The remaining sections in this chapter explain the significance of each field on the screens and how to change their values.

10.2.1. Dehum Setup

**Enable [Yes/No] [Yes]**

The Enable field enables or disables dehumidification control for the site. “Yes” enables dehumidification, while “No” disables it.

**Setpoint [0—99%][26%]**

The Setpoint is the relative humidity level you wish to maintain in the store. When the measured indoor relative humidity rises above this level, dehumidification will become active and the first stage of all eligible HVAC cool stages will activate.

**Dehumidifier**

This read-only field shows whether dehumidification is currently active. If this field displays “ON,” dehumidification is currently active. If the field displays "OFF," dehumidification is not active.

10.2.2. Dehum Add Heat Setpts

**Add Heat Set Points 1-4 [0°F—60°F] [53°F]**

The four Add Heat Set Point fields in this screen represent the set points for HVAC units 1-4 that will cause a heat stage to activate during dehumidification if the supply temperature falls below the set point. This helps prevent overcooling during dehumidification due to cool stages being ON.
11 CSX Power Monitoring

11.1. Overview of CSX Power Monitoring

The CSX can monitor the power usage from up to two separate circuits. For each circuit, the CSX displays the current power usage and keeps track of peak power usage and average power usage for both the current day and the current month.

11.2. Programming CSX Power Monitoring

Programming power monitoring for the CSX simply involves setting up the power transducer for each circuit so that the CSX will interpret its output voltage signal as the correct number of kW.

The power transducer inputs required for your site are listed on the I/O Configuration Sheet supplied for the site by CPC. Refer to the DCX Controller Installation Manual (P/N 026-1901) for information about wiring these inputs.

The process of programming power monitoring begins at the Power Monitor Status Screen (Figure 11-1). Figure 11-2 is a map of all the screens related to power monitoring status and setup, and how to navigate them. The remaining sections in this chapter explain the significance of each field on the screens and how to change their values.

Figure 11-1 - Power Monitoring Status Screen

![POWER MONITOR]

Ckt 1 = 0012.0 kW
Ckt 2 = 0014.0 kW

Figure 11-2 - Power Monitor Navigation Map

11.2.1. Power 1-2 Peak

The Power 1-2 Peak screen shows the highest power usage level for the circuit measured during the current day and the current month. The Day field shows the highest daily value along with the time of day the peak occurred. The Month field shows the highest recorded value in the current month along with the time and date the peak occurred.

Figure 11-3 - Power Peak Screen

![POWER 1 PEAK]

Day: 0012.0 kW 00:01
Month: 0012.0 kW 11:38
01/17/01
11.2.2. Power 1-2 Average

The Power 1-2 Average screen shows the average power usage level for the circuit for the current day and the current month.

The daily average is a “running average” calculated by averaging together all power transducer readings sampled during the day, and recalculating the average every time a new sample is taken.

The monthly average is an average of the daily average for each day of the month, and is recalculated at the end of every day to include the new daily average.

11.2.3. Power 1-2 Scaling

The Power 1-2 Scaling screen is where the output range for the circuit’s power transducer is specified so that the CSX can correctly translate a power transducer’s output voltage as a kW reading.

Power transducer scaling is achieved by modifying four settings:

- **Min KW** - the lowest possible kW reading, which corresponds to the lowest voltage signal that will come from the power transducer. Min KW is usually set to 0 kW.
- **Max KW** - the highest possible kW reading, which corresponds to the highest voltage signal that will come from the power transducer. This value must be set to the maximum power value that is unique to your power transducer (refer to the transducer’s installation instructions to determine this value). Max KW can be anywhere from 0-999 kW, and defaults to 100 kW.
- **Min V** - the lowest possible output voltage from the power transducer, which corresponds to the lowest possible measured kW. For the transducers supplied by CPC, the Min V should remain on its default value (0 V).
- **Max V** - the highest possible output voltage from the power transducer, which corresponds to the highest possible measured kW. For the transducers supplied by CPC, the Max V should remain at its default value (5 V).
Setting the CSX System Date and Time

To view the system date and time in the CSX, use the arrow keys to locate the System Time & Date screen. This screen will show the time, date, and day of the week (Sunday through Saturday).

If the time, date, or day of the week need to be changed, press **Prg** to access the Time/Date Config screen (*Figure 12-1*).

**Figure 12-1 - System Time/Date Screen**

Press Enter to move the cursor to any of the time, date, or day of the week fields on this screen, and use the up and down arrow keys to adjust their values.

Using Daylight Savings Time

The Auto Adj DST field in the Time/Date Config screen determines whether the CSX will automatically adjust the time for daylight savings time (DST) switch-overs.

When this field is set to “Yes,” the CSX will follow the standard schedule for switching over to DST (DST will begin on the first Sunday in April and end on the last Sunday in October). When this field is set to “No,” the CSX will not observe DST.
13 CSX General System Setup

All CSX settings and functions that are not directly related to control or monitoring of C-store functions are grouped together in a series of screens called the General System Setup.

Some of the settings included in the General System Setup are:

- Setting temperatures to be displayed in Fahrenheit (°F) or Celsius(°C),
- Configuring modem or direct network connection with the CSX Supervisory System,
- Redefining the point locations or functions of certain optional analog inputs, and
- Entering offset adjustments to correct variances in temperature sensor, humidity sensor, power transducer, and light level sensor readings.

13.1 Programming CSX General System Setup

To begin programming CSX General System Setup, locate the General Setup screen (Figure 13-1), which is on the same level as the CSX status screens. When this screen is visible, press the Prg key to begin programming.

Figure 13-3 - Version Info Screen

This read-only screen shows the version of the CSX software loaded in this unit, as well as the date of the version’s release.

Figure 13-2 - General System Setup Navigation Map

13.1.1. Version Info

Figure 13-1 - General Setup Home Screen

Press Prg key to enter General System Setup
13.1.2. Temp Units

TEMPERATURE UNITS: FAHRENHEIT

This field selects which temperature unit will be used when displaying temperatures on status screens, and how temperature control set points will be shown and interpreted.

If you change the value of this field, note that though temperature input values will immediately be displayed in status screens in the newly selected unit, temperature set points will not be converted. Therefore, if a heating set point was set to 69°F, and the units were changed to Celsius, the set point would be 69°C. This set point and all the others would have to be changed manually to its Celsius equivalent.

13.1.3. Supervisor Type

SUPERVISOR SETUP
Type: Modem
Address: 001

The Type field determines the method the CSX will try to use when communicating with a PC running the CSX Supervisory System. There are three options:

- Modem - The CSX communicates with an off-site PC using an external modem, which is connected to the CSX’s RS-232 Serial Card.
- RS-485 - The CSX communicates with an on-site PC using an RS-485 network interface.
- Modbus - (Currently not used) The CSX communicates with an on-site PC using a Modbus network interface.

If “Modem” is selected, the screen will prompt you to move to the next screen to enter the phone number the remote PC is connected to.

Address [001 — 200] [001]

If “RS-485” or “Modbus” is selected in the Type field, you must assign the CSX a unique RS-485 or Modbus network number. This number must be different from the PC’s network number and all other devices that share the same network.

If the “network” consists of just the CSX unit and the PC running the CSX Supervisory System, assign one of them the number “001” and the other “002.”
13.1.3.2. Modem Setup

**Password [0000-9999] [0001]**

The Password field is the four-digit password the CSX will send to the CSX Supervisory System over the modem to log in and begin transmission of data. This password must match the password set up in the CSX Supervisory System in order for the CSX to be allowed to log in.

**Phone Number [20-character string] [Blank]**

The Phone Number is the number that will be dialed when the CSX has alarms to report to the CSX Supervisory System. The Phone Number may be up to 20 characters long, and each character can be set to a digit (0-9) or one of five special characters: "# (pound sign)", "* (asterisk)", ", (comma)", "@ (at sign)", and "^ (caret)".

A comma in the Phone Number represents a one-second pause. For example, a phone number of "9,18005551212" will result in the modem dialing 9, waiting for one second, and then dialing 18005551212. Commas may be stacked to make longer pauses (i.e. a "9,,," is a 9 followed by a four-second pause.

13.1.4. Optional I/O 1 and Optional I/O 2

The Optional I/O screens are where the functions of the inputs connected to the universal analog inputs on the CSX control unit are specified.

These fields are pre-configured for your site before shipment, and should not be altered unless instructed to do so by CPC.

13.1.5. HVAC Temp Offset

The HVAC Temp Offset screen is where the measurements taken by the indoor air temperature and supply temperature sensors for HVAC units #1 through #4 may be adjusted. This allows you to calibrate sensors whose readings may be off by a few degrees, resulting in more accurate temperature input values.

The Room and Supply fields in the four numbered columns represent the number of degrees currently being added to the values of the indoor air (room) temperature and supply temperature input values. These fields may be set to any number from -99° to 99°.
13.1.6. Cond Temp Offset

The Cond Temp Offset screen is where the measurements taken by the discharge air temperature sensors for condensing units #1 through #5 may be adjusted. This allows you to calibrate sensors whose readings may be off by a few degrees, resulting in more accurate temperature input values.

The fields in the four numbered columns represent the number of degrees currently being added to the values of the cooler discharge air temperature input values. These fields may be set to any number from -99° to 99°.

13.1.7. Product Temp Offset

The Product Temp Offset screen is where the measurements taken by the product temperature sensors may be adjusted. This allows you to calibrate sensors whose readings may be off by a few degrees, resulting in more accurate temperature input values.

The fields in the five numbered columns represent the number of degrees currently being added to the values of the product temperature input values. These fields may be set to any number from -99° to 99°.

13.1.8. Power Sensor Offset

The Power Sensor Offset screen is where the measurements taken by the power transducers may be adjusted. This allows you to calibrate sensors whose readings may be off by a few degrees, resulting in more accurate temperature input values.

The fields in the two numbered columns represent the number of kW currently being added to the values of the power transducer inputs. These fields may be set to any number from -99 kW to 99 kW.

13.1.9. Sensor Offsets

The Sensor Offsets screen is where the measurements taken by the indoor humidity sensor, the light level sensor, and the ambient (outdoor) temperature sensor may be adjusted. This allows you to calibrate sensors whose readings may be off by a few degrees, resulting in more accurate temperature input values.

- **Humidity**: [-99%—99%] [0%]
  
The Humidity Sensor offset is the number of percentage points currently being added to the indoor relative humidity sensor value.

- **Light Level**: [-99—99 ft-candles] [0 ft-candles]
  
The Light Level Sensor offset is the number of foot-candles currently being added to the light level sensor value.
Ambient Temperature [-99°F—99°F] [0°C]

The Ambient Temperature offset is the number of degrees currently being added to the ambient temperature sensor value.

13.1.10. Change Password

To change the password from the Change Password screen, the CSX will prompt you to press Enter. Upon pressing Enter, a prompt will appear showing the current password. Change the password using the up and down arrow keys to increase or decrease the value. When the desired password is shown, press Enter to save the change, and press Esc to return to the Change Password screen.

You must be logged into the CSX before you are allowed to change the password.
CSX Alarm Control

The CSX generates and logs alarms that indicate sensor failures, high enclosure temperatures, and unit reboots. The CSX announces active alarms by lighting the ALARM button on the front panel, showing the active alarm message on the front screen, and opening the relay on the CSX unit or expansion board that is designated as the ALARM relay.

14.1. How the CSX Displays Active Alarms

When one or more alarms are active in the CSX, the ALARM button on the CSX front panel will glow red. If the alarm has not already been viewed or cleared, the screen will display information about the active alarm that has most recently occurred (Figure 14-1).

The alarm message will give the date and time of the alarm occurrence, the status (either ACT for “active,” or OK if the alarm condition has returned to normal), and an “event description.” Table 14-1 lists the possible event descriptions:

<table>
<thead>
<tr>
<th>Alarm Message</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Board &lt;number&gt; Offline</td>
<td>The CSX is not communicating with one of its expansion boards.</td>
</tr>
<tr>
<td>Dial Out Failed</td>
<td>The CSX tried to dial out to the CSX Supervisory System software, but the dial-out failed.</td>
</tr>
<tr>
<td>Condenser &lt;number&gt; High Temp</td>
<td>The case temperature for the condensing unit has risen past its high-temperature alarm threshold.</td>
</tr>
<tr>
<td>Condenser &lt;number&gt; Low Temp</td>
<td>The case temperature for the condensing unit has fallen below its low-temperature alarm threshold.</td>
</tr>
<tr>
<td>Condenser &lt;number&gt; Temp Probe Broken</td>
<td>The discharge air temperature probe for this condensing unit is giving an invalid reading, due to either a bad connection or a broken sensor.</td>
</tr>
<tr>
<td>Condenser &lt;number&gt; Defrost Terminated at Max Time</td>
<td>This alarm occurs when a defrost cycle in a condensing unit with a termination sensor lasts for the entire defrost duration without being terminated by sensor. This can indicate either a potential problem with defrost heaters or with the termination sensor.</td>
</tr>
<tr>
<td>Product Temp &lt;number&gt; Hi</td>
<td>This alarm occurs when a product temperature probe value exceeds its high product temperature set point.</td>
</tr>
<tr>
<td>Product Temp &lt;number&gt; Lo</td>
<td>This alarm occurs when a product temperature probe value falls below its low product temperature set point.</td>
</tr>
<tr>
<td>Product Temp Probe &lt;number&gt; Broken</td>
<td>The product temperature probe is giving an invalid reading, due to either a bad connection or a broken sensor.</td>
</tr>
<tr>
<td>Door &lt;number&gt; Open</td>
<td>The door switch input has indicated the door has been OPEN for longer than the alarm time.</td>
</tr>
<tr>
<td>HVAC &lt;number&gt; Temp Probe Broken</td>
<td>The indoor air temperature sensor used for this HVAC unit is giving an invalid reading, due to either a bad connection or a broken sensor.</td>
</tr>
</tbody>
</table>

14.2. Clearing Active Alarms

Active alarms will clear themselves when the condition that caused the alarm returns to normal. When alarms clear themselves, the ALARM button will stop glowing red, but the alarm message will remain in the display until a user manually presses the Esc key to acknowledge the alarm.
Active alarms can also be manually reset as follows:

1. Press the Prg key. The screen that appears gives you two options: “Reset current alarms,” and “Reset alarm log.” Both options will be set to “No.”
2. Press the ENTER key to move the cursor to the Reset Current Alarms field.
3. Press the UP ARROW key to change the value of this field from NO to YES.
4. Press the ENTER key to perform the alarm reset.

Note: If the condition that caused the alarm still exists, the alarm will re-occur immediately after the manual reset.

14.3. The Alarm Log

The CSX controller logs the most recent 16 alarms in the order they occurred. The “logs” are simply records of the same alarm messages that appear on the display whenever an alarm is active (i.e. it contains the time and date of occurrence, the status, and the event description).

When an alarm is active and shown on the CSX display, you are actually looking at record #1 of the CSX alarm log, and therefore you do not need to do anything to access the alarm log. If no alarms are active, you may access the alarm log by pressing the ALARM button once.

To scroll through alarms in the alarm log, use the UP ARROW and DOWN ARROW keys. The UP ARROW key moves backward in the alarm log, while the DOWN ARROW key moves forward.

To exit the alarm log view, press Esc. The display will return to the Main Status Screen. If alarms are still active, the ALARM light will continue to glow red.

14.3.1. Clearing the Alarm Log

To erase all old logs in the CSX’s alarm log:

1. If necessary, press the ALARM button to access the alarm log.
2. Press Prg.

When finished, the screen should read “Event Description: No Alarms Present.” If alarms were still active when you performed the log clear out, they will reappear.