Chapter 4 Initial Configuration of an AKC 55

AKC 55 configuration is easy using the keypad and display, and even easier using a PC with Danfoss AKA 65 Network Interface software connected to the controller. This chapter describes configuration from the AKC 55 keypad. You can easily adapt these instructions for the PC keyboard and mouse after reading Chapter 7, “Using AKA 65 Software on Your PC.”

We will address configuration of each area of a supermarket control system in this section of the manual. Initial configuration for equipment start-up may be limited to such items as are necessary to check out the mechanical equipment or provide basic service. The configuration can be changed or added to at any time later.

Check battery

If you did not install the AKC 55, consult Chapter 3-1 and make sure that the battery enable jumper has been set to the “ON” position; if you do not, your configuration will be lost whenever power to the controller is interrupted.

Authorization codes

When the AKC 55 is turned on for the first time, the Main Menu will appear as at left below:

Before you can enter configuration information, you must select Authorization and enter a valid authorization code and account code. Using the right arrow, move the cursor to Authorization and press ENTER. The Authorization Menu will appear as at right above, with the cursor in the Auth field.

When you have entered the access code and account number given to you by the system owner, you will see the words Authorization accepted appear briefly in reverse video at the very bottom of the screen.

After initial configuration, you will be able to make changes by several different avenues, which are discussed in Chapter 5, “Using the System.”

Using menus

To select from any AKC 55 menu, first use the arrow keys to move the cursor to the item you want, then press the ENTER key. You can use the EXIT key to retrace
Selection of Units and Language

Before using the system, you may wish to change the language used on the screens, the units used for pressure and temperature, or the date and time format. These settings will be for the local PC only, and will not affect the display at the AKC 55s in the system. To change the displayed units, select Store Information from the main menu and then choose Units/Languages. In the Configuration Units/Languages screen, select the language you want to see in the controller screens, then select either psi or bar for pressure; either °F or °C for temperature; and either % or fc (footcandles) for light level.
Chapter 4 - 1  Configuring Refrigeration

There are two “routes” you may need to navigate to begin configuring refrigeration. One begins by selecting Refrigeration from the Main menu, and the other by selecting Configuration.

Starting with a Partially Configured AKC 55

If the AKC 55 you are working with was supplied with a rack, the controller may have been partially configured by the rack manufacturer. In that case, when you select Refrigeration from the Main Menu, the AKC 55 will display the Refrigeration Menu (left). It lists the rack or racks that are partly configured. If you want to change or add to the configuration of one of these racks, move the cursor to the rack name and press ENTER. The Rack menu (right) will appear. In this example, only one rack has been previously configured.

Select Configure Rack and the Configure Rack menu appears.
Now select the type of information you want to supply. We’ll cover a typical category right after we talk briefly about the other “route” configuration may take.

Starting with a Completely Un-configured AKC 55

If the AKC 55 you are working with has no refrigeration configuration at all, select Refrigeration from the Main menu, and the Rack Configuration menu will appear (left). The only selection which can be made from this screen is Add Rack. Selecting Add Rack takes you to the Configure Rack, Rack Info screen (right).

Navigation and making changes

The Configure Rack A screen shown at right above has information fields that can be changed by any user with a proper authorization code. To make changes, use the arrow keys to move the cursor to the field you want to change.

Entering numerals

To enter numerals for a field like No of suction groups, use the numeral keys on the controller keypad., then press ENTER.

Entering labels

Labels are entries that you need to spell out. The Rack label field contains a label one character in length. The Oil type field is also a label field, but it is 9 characters long, allowing you to spell out a word or words indicating the oil type, for example, “Mineral.”

To enter a label, place the cursor on the field, then press the +/- key. This action toggles the function of the arrow keys so that the UP and DOWN arrows scroll through the alphabet and all the other possible characters. Once the character you want in that space appears, use the RIGHT arrow to move to the next space (when the field has more than one space). Again, use the UP and DOWN arrows to reach the character you want. When all the characters in the field are as you want them, press ENTER to save the entry.

Constrained fields

The Rack label field is a constrained field. It will only accept an upper case letter, even though lower case letters appear as you scroll through the characters. The No of suction groups field is an example of a constrained field. It will only accept a
single numeric character from 0 to 5. The reason is that 5 is the limit of the controller’s capacity for suction groups on a single rack. Note that in the case of this particular field, entering a 0 (zero) will pop up a warning box letting you know that a zero response here will eliminate the suction groups already configured and will delete all information stored for the rack; you will be asked to confirm the entry.

Selecting from list boxes

The next pair of illustrations shows how the controller uses list boxes.

The list box appears, as shown at left above, when you move the cursor to the field and then press the +/- key (or, at your PC, right click). Then, using the UP and DOWN arrow keys, you can move the cursor to make a selection. In the example at right, R404A has been chosen. The cursor actually stayed in the same position, but the “window” moved.

When you have put the list box’s cursor on the selection you want, press ENTER to save your selection.

Some list boxes contain only two choices (for example, Yes and No in the Monitor phase loss field). Some may contain many choices. When that is the case, one of the lines in the box will contain three dots. When the cursor is moved to the three dots, additional choices appear.

Now that we understand navigation and making changes, we can go on to a discussion of each of the configuration screens.

Configuring Rack Info

In the rack Info screens, the following are the fields, and their possible contents:

**Rack label**  (Upper case letters, A to Z) The “name” of the rack.

**2 stage system**  (List box: Yes, No)

**No of suction groups**  (0 to 5) Note that for a rack with existing configuration, entering and confirming a 0 will cause deletion of all existing rack information.

**Refrig type**  (List box) The kind of refrigerant.
Oil type (9 characters, not constrained)
Monitor phase loss (List box: Yes, No) Whether or not there will be a digital input from a phase loss monitor.
Generate input for each [appears only after a Yes answer to the preceding question] (List box) Whether there is a phase loss input for each rack or each suction group.
Shutdown phase loss [appears only after a Yes answer to the Monitor phase loss question] (List box: Yes, No)

When all of the items on the Rack Info screen have been configured, press MENU to return to the Main Menu.

Adding a Rack
There is only one way to add a rack. From the Main Menu select Configuration, then Refrigeration, and the Rack Configuration screen appears. At the bottom left of the screen are the words >> Add Rack<<. Move the cursor there and press ENTER. A new Rack Info screen will appear.

Notice that the Rack Label field contains the letter B by default, since the previously configured rack was rack A. You can change the default label if you want.

Configuring Suction Info
To configure a suction group, press MENU to return to the Main Menu, then select Configuration, then Refrigeration. The Rack Configuration screen appears as at left above. Select the rack and a Configure Rack menu appears (as at left below) .
Once at suction configuration menu shown at right above, select the suction group you want to configure and press ENTER. The Suction Info screen for that group will appear as at left below. As you configure, questions may appear that are not included on the default screen. The screen at left below shows all the possible lines revealed.

The fields and their contents are as follows:

**Suction I.D.**

(2 label fields: the first is a list box: A to Z; the second is 9 characters not constrained) This is the identification you wish to assign to the suction group. The entry will modify the screen title. For example, if you enter a B in the first field and **Low Temp** in the second, the right portion of the screen title for the configuration and status screens for this group will read **Low Temp AB**.

**PSIG target**

(-50.0 to 50.0) The pressure that the controller will
maintain, subject to capabilities of mechanical equipment, for this suction group.

<table>
<thead>
<tr>
<th align="left"><strong>PSIG Safety cutout</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td align="left">(-50.0 to 150.0) The gauge pressure at which the controller will stop the compressors in this suction group.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th align="left"><strong>Adaptive suction control</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td align="left">(List box)</td>
</tr>
<tr>
<td align="left"><strong>None</strong></td>
</tr>
<tr>
<td align="left"><strong>AKC 55</strong></td>
</tr>
<tr>
<td align="left"><strong>AKC 16x</strong></td>
</tr>
<tr>
<td align="left"><strong>Sensor</strong></td>
</tr>
<tr>
<td align="left"><strong>Dynamic</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th align="left"><strong>Bd-Pt</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td align="left">(For the first group, to the left of the hyphen, 01 to 99; for the second group, to the right of the hyphen, 1 to 8). The board and point address of the fixture sensor used by the adaptive control algorithm. (Does not appear when dynamic adaptive control is selected.) Note that board and point numbers use a different format with AK2 modules. See the AK2 I/O user manual for more information.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th align="left"><strong>Temp target</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td align="left">(-50.0 to 100.0) The temperature that the adaptive control algorithm will seek to maintain in the fixture. (Does not appear when dynamic adaptive control is selected.)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th align="left"><strong>Range +/-</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td align="left">(0.0 to 100.0) The dead band around the temperature target. As long as the fixture temperature remains in this range, the suction pressure target will not be modified. (Does not appear when dynamic adaptive control is selected.)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th align="left"><strong>Maximum pressure float</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td align="left">(0 to 99.9) The number of psig that the adaptive algorithm will be allowed to cumulatively add or subtract from the suction pressure target.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th align="left"><strong>Post defrost delay</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td align="left">(0 to 60) The number of minutes after termination of defrost during which there will be no target adjustment. (Does not appear when <strong>Sensor</strong> is selected as the type of adaptive control.)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th align="left"><strong>Allow float below target</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td align="left">(List box: Yes, No) Determines whether or not the adaptive algorithm will be allowed to adjust suction pressure below the target if fixture temperature is above target temperature + range.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th align="left"><strong>Night setback</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td align="left">(List box: Yes, No) Determines whether or not suction pressure will be offset according to a schedule to be specified in the following lines.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th align="left"><strong>Setback from time</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td align="left">(Time field) The start time for night setback.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th align="left"><strong>Setback to time</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td align="left">(Time field) The ending time for night setback.</td>
</tr>
</tbody>
</table>
Setback days  (Days selection field) The days on which night setback will be effective.

Setback holidays  (Holidays selection field) The holiday numbers on which night setback will occur. Holiday numbers are defined in Store Info configuration.

At the bottom right of the Suction Info screen are the words “PG DN” for more. Use the controller’s PG DN key to reach the next screen; shown at left is the default screen in which not all the questions and fields appear; the screen on the right shows all the fields.

The fields and their contents are as follows:

- **Monitor suction temp**  (List box: Yes, No)
- **Display superheat temp**  (List box: Yes, No)
- **Monitor desuperheat temp**  (List box: Yes, No)
- **Close AKV valves during rack shutdown**  (List box: Yes, No)
- **Only when suction is above target by**  (0 to 999.9) Number of psig above target when AKV valves will be closed during rack shutdown.
- **Delay time**  (0 to 45) Number of seconds after suction pressure reaches target + the number specified in the preceding field that AKV valves will be closed.
- **Rack on AKC 55 address**  (0 to 15) The address of the AKC 55 controlling the rack that serves these AKV valves.

Press EXIT to return to the Configure Rack Menu and continue refrigeration configuration.

Configuring two-stage systems and de-superheaters

If (and only if) a rack is configured as a two-stage system, the suction configuration
for each suction group will include a special page for the low side. The screen looks like this:

![Screen Image]

The fields and their contents are as follows:

- **Is this 2-stage low side** (List box: Yes, No) Is this the low side of the two?
- **Low side shutdown:** (List box: Yes, No) Whether or not to shut down the low side compressors when high side reaches a specified suction pressure.
- **High side suct. PSI** (-99.0 to 200.0) The high side suction pressure at which the low side will be shut down.
- **Control desuperheater** (List box: Yes, No) Whether or not de-superheater control is implemented on this rack.
- **Controlling sensor** (List box:)
  - **Desuper In AA:** Control is based on a sensor monitoring the liquid in temperature at the de-superheater.
  - **Desuper Out AA:** Control is based on a sensor monitoring the liquid out temperature at the de-superheater.
  - **Suction Temp AA:** Control is based on a sensor monitoring suction temperature.
- **Desuperheating temp Range +/-** (-50.0 to 200.0)
- **(1.0 TO 10.0)**

Configuring compressors

To begin configuring compressors, select **Compressors** from the Configure Rack menu. The first page of the screen looks like this:
The fields and their contents are as follows:

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of compressors</td>
<td>(0 to 9)</td>
</tr>
<tr>
<td>Proof type</td>
<td>(List box:) The means by which proof of compressor operation is monitored.</td>
</tr>
<tr>
<td></td>
<td>None: No proof</td>
</tr>
<tr>
<td></td>
<td>OI: A digital input (on-off input) is used for proof.</td>
</tr>
<tr>
<td></td>
<td>CT: A current transformer is used for proof.</td>
</tr>
<tr>
<td></td>
<td>Bitzer: Proof is obtained from a Bitzer electronic module.</td>
</tr>
<tr>
<td>Reset Bitzer with RO</td>
<td>(List box: Yes, No) Whether or not Bitzer compressors are reset by a digital output (relay output).</td>
</tr>
<tr>
<td>Compressor size</td>
<td>(1 to 500) The capacity of the compressor.</td>
</tr>
<tr>
<td>No. of unloaders</td>
<td>(0 to 4) The number of compressor unloader stages.</td>
</tr>
<tr>
<td>Unloader capacity %</td>
<td>(1 field per unloader: 0-99) The percent of capacity shed by the respective unloader.</td>
</tr>
<tr>
<td>Inverter control</td>
<td>(List box:) Type of variable speed control.</td>
</tr>
<tr>
<td></td>
<td>None: No inverter control</td>
</tr>
<tr>
<td></td>
<td>VO: An inverter is controlled by an analog output (variable output).</td>
</tr>
<tr>
<td></td>
<td>VLT: A Danfoss VLT adjustable frequency drive is used.</td>
</tr>
<tr>
<td>Inverter min. speed</td>
<td>(1.0 to 150.0) The minimum percentage of rated speed at which the inverter will run the compressor.</td>
</tr>
<tr>
<td>Inverter max speed</td>
<td>(1.0 to 150.0) The maximum percentage of rated speed at which the inverter will run the compressor.</td>
</tr>
<tr>
<td>RPM at max speed</td>
<td>(1 to 9999) The RPM that will be displayed at maximum percentage.</td>
</tr>
<tr>
<td>Inverter max resets</td>
<td>(0 to 10) The number of resets after which the inverter will be put in override.</td>
</tr>
<tr>
<td>Inverter proof delay</td>
<td>(0-99) The number of seconds without proof that must elapse before an inverter reset occurs.</td>
</tr>
</tbody>
</table>
Min time between resets  (0 to 99)  The number of seconds that must elapse before second and subsequent inverter resets.

Configuring other compressors in the suction group

Paging down, you will find a page for each compressor in the suction group. These subsequent screens will have only questions pertaining to the individual compressors, not the rack questions found at the top of the screen for compressor number one.

Compressor oil and safety information

After basic operating data has been entered for all compressors, paging down will produce this screen:

The fields and their contents are as follows:

**Oil control**  (List box: Yes, No)  Whether or not oil control is implemented.

**Type of oil monitor**  (List box:)

- **Sensor Input**: An analog input (sensor input) is used to monitor oil pressure.
- **On/Off**: A digital input (on-off input) is used to monitor an oil pressure switch.
- **Copeland**: A Copeland oil monitor is used.

**Lockout comp on oil fail**  (List box: Yes, No)  Whether or not compressors will be locked out when an oil failure is detected.

**Low oil pressure diff**  (0 to 50)  The oil pressure differential, when an analog sensor input is used, that will cause compressor shutdown.

**Oil pressure delay**  (0 to 255)  When an analog sensor is used, the number of seconds after oil failure is detected before compressors are reset.

**No of oil reset attempts**  (0 to 10)  After oil failure is detected, the number of reset attempts before compressors are locked out.

**Min time between resets**  (0 to 60)  After a reset (whether successful or not) the
Monitor comp disch temp
(List box: Yes, No) Whether or not compressor discharge temperature is monitored.

Stop comps on high temp
(List box: Yes, No) Whether or not compressors are to be shut down on high discharge temperature.

Cutout
(0.0 to 300.0) The discharge temperature at which compressors are to be cut out.

Cutin
(0.0 to 300.0) After a cut-out on high discharge temperature, the discharge temperature at which compressors are to be cut in.

Stop comps on low temp
(List box: Yes, No) Whether or not compressors are to be cut out on low discharge temperature.

Lockout
(0 to 255) The number of minutes that must elapse before a lockout on low discharge temperature. (See note on next field).

below
(0 to 300) The temperature that discharge must be below for the time specified in the preceding field before lockout on low discharge temperature occurs.

Note: If discharge temperature rises above the setpoint, the time for lockout will restart from zero.

Disch pressure safety
(List box: Yes, No) Whether or not compressors are to be cut out on high discharge pressure.

Cutout
(0.0 to 500.0) The discharge pressure at which compressors are to be cut out.

Cutin
(0.0 to 500.0) After a cut-out on high discharge pressure, the discharge pressure at which compressors are to be cut in.

Unload before cutout
(List box: Yes, No) Whether or not compressors are to be unloaded before being cut out.

Neutral Zone control
The next page of compressor configuration deals with neutral zone control. Basically, neutral zone control acts to bring the current pressure toward target pressure more quickly the greater the difference between the two. The screen looks like this:

![Neutral Zone Control Screen]

Neutral Zone control
The next page of compressor configuration deals with neutral zone control. Basically, neutral zone control acts to bring the current pressure toward target pressure more quickly the greater the difference between the two. The screen looks like this:

![Neutral Zone Control Screen]
The default settings are as shown in the screen above. It is recommended that the values not be changed without a thorough understanding of the algorithm. A thorough explanation of neutral zone control is available as an appendix to this manual.

Compressor capacity staging patterns

Paging down from the neutral zone screen reveals the compressor staging pattern screen:

In the default screen, the staging pattern is **Auto**, for automatic staging, and there is no selection for **Steps**. The controller will stage capacity in the smallest steps available.

When there are a large number of steps, manual staging can be used to eliminate needlessly small steps and compressor cycling.

To use manual staging, select Manual from the pattern list box, then specify the number of steps you want. The display that results will show a row compressor icons for each stage. A compressor’s unloaders are represented by the small rectangles to the right of the compressor icon.

In the sample screen, compressors are all 20 HP and each has 2 unloaders. Each unloader is 33% of compressor capacity. These settings were determined on the configuration page for each compressor.

Stage #1 is fixed at zero capacity and cannot be changed.

To change stage #2 or any higher stage, move the cursor to a compressor icon and press enter. You will notice that the “piston” in the icon moves. When it is up, the compressor is on. If there are unloaders on a compressor, subsequent clicks on the compressor icon will turn the unloader steps on, one at a time. The small rectangles will change color to indicate that the step is on. When all steps are on for a compressor, the next click on the icon will turn everything off.
As you change a stage’s capacity, the number in the right column of the screen will change for that stage, giving the total horsepower you have selected for that stage. You can change the number of steps at any time.

Configuring evaporators

To begin configuration of evaporators, return to the Configure Rack menu and select **Evaporators**. Or, from the Main Menu (which you can always reach with the MENU key) select Configuration, Refrigeration, the particular rack, and Evaporators. The evaporator menu will initially look like as on the left below, with no evaporators listed, but as soon as you enter a number in answer to the top question, and select from the **Type** list box for some of the evaporators, the screen will look something like the one at right:

There are six kinds of evaporator control shown. In this manual, we will discuss the configuration of AKC 55 circuits and AKC 16x circuits. For the other types of evaporators, please see the manuals on the individual controllers. In the future, when a Danfoss Case Control manual is created, we will remove the AKC 16x material from this manual.

First, the changeable fields in the Evaporator Menu (shown above on the right) are as follows:

- **Number of circuits** (1 to 40) The number of circuits in the suction group. (List box:)
  - **Dewpoint** A dewpoint sensor or sensors will be used for anti-sweat control.
  - **Calc Dewpoint** Dewpoint for anti-sweat control will be calculated using the values of relative humidity and temperature sensors.
- **Dewpoint sensor to use** [If Dewpoint has been selected] (List box: How anti-
sweat control dewpoint will be determined if a dewpoint sensor is used.

Min Dewpoint: The lowest-reading of a number of dewpoint sensors will be used.

Max Dewpoint: The highest-reading of a number of dewpoint sensors will be used.

Average: The average of a number of dewpoint sensors will be used.

Dewpoint 1: A single dewpoint sensor will be used for control.

[others]: Other dewpoint sensors, if they exist, will be listed also.

Humidity sensor to use:

If Calc Dewpoint has been selected (List box:) How dewpoint will be determined if a humidity sensor is used.

Min Humidity: The lowest-reading of a number of humidity sensors will be used.

Max Humidity: The highest-reading of a number of humidity sensors will be used.

Average: The average of a number of humidity sensors will be used.

Inside RH 1: A single humidity sensor will be used for control.

[others]: Other humidity sensors, if they exist, will be listed also.

Type

(List box:) [for each individual evaporator] the type of evaporator control.

AKC 55/SUBC: A subcooler controlled as an AKC 55 circuit.

AKC 55: The circuit is controlled by the AKC 55’s algorithms.

AKC 16x: Control is at the fixture by AKC 161 or AKC 164 Smart Case Controllers.

EKC: Control is at the fixture by EKC 201 controllers.

Deg Master: Control is at the fixture by Hill/PHOENIX Degree Master controllers.

DCU: Control is at the fixture by DCU case controllers.

Case lights button

In the lower left corner of the screen body is a button, CASE LIGHTS. Selecting this button and pressing ENTER will open the configuration screen for a case lights override switch. The screen at left below appears (with the list box closed) when the CASE LIGHTS button is activated. The fields on the screen and their meanings are as follows:

Type of override switch

(List box)

Disabled: There is no override switch configured.

On/Off: A two-position override switch allows the lights to be switched on or off.

On/Auto:
Off/Auto: Choices are OFF or automatic operation. On/Auto/Off: All three choices are available with a three position switch being installed.

Dewpoint for anti-sweat control will be calculated using the values of relative humidity and temperature sensors.

Configuring AKC 55 subcooling circuits

When subcooler valves are controlled directly by the AKC 55 (that is, when an AKC 165 Subcooling Controller is not used) configuration begins by selecting AKC 55/SUBC in the Type column for the circuit on the Evaporator Menu, then moving the cursor to the word Setup for that evaporator and pressing ENTER. A screen like the one at left below will appear. The same screen with all its fields revealed appears as at right.
The fields are as follows:

**Number of valves**  
(0 to 2) The number of valves used for subcooling.

**Number of stages**  
(1 to 3) With one valve, there can be only 1 stage of subcooling. With two valves, there can be two stages (one valve open or two). If there are two valves feeding subcoolers of different capacities, then there can be three stages (only valve 1 open, only valve 2 open, or both valves open).

**Cutin setpoint**  
(0.0 to 120.0, each stage has a separate setpoint) The temperature at which the subcooling stage will become active. Temperature is measured by a sensor at the liquid outlet of the subcooler.

**Cutout setpoint**  
(0.0 to 110.0, each stage has a separate setpoint) The temperature at which the subcooling stage will shut down.

**Minimum ON time**  
(0 to 255) The minimum time in minutes each stage must remain active after being cut in.

**Minimum OFF time**  
(0 to 255) The minimum time in minutes each stage must remain off after being cut out.

### Configuring AKC 55 refrigeration circuits

If there is not a distributed controller at the fixture (AKC 161, AKC 164, Degree Master, or DCU), refrigeration can be controlled directly by the AKC 55. Configuration of such circuits starts by selecting **AKC 55** in the **Type** column for the circuit on the Evaporator menu, then moving the cursor to the word **Setup** for that evaporator and pressing ENTER. A screen like the one at left below will appear. The same screen with all its fields revealed appears as at right.

The fields are as follows:

**Fixture Type**  
(List box) Various types of fixture can be selected:
<table>
<thead>
<tr>
<th><strong>Fixture Name</strong></th>
<th>box, multi-deck, single deck, service, etc.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Enter user defined name</strong></td>
<td>(Label) The name of a user-defined fixture. Any of the characters in the AKC 55 character set can be used, including upper and lower case letters and symbols.</td>
</tr>
<tr>
<td><strong>Monitor box door</strong></td>
<td>(List box: Yes, No) Whether or not a box door switch will be monitored (appears for boxes only).</td>
</tr>
<tr>
<td><strong>Shutdown when door open</strong></td>
<td>(List box: Yes, No) Whether or not to shut down refrigeration when the box door is open.</td>
</tr>
<tr>
<td><strong>No case/box sensors</strong></td>
<td>(0 to 15) The number of sensors in this fixture or circuit.</td>
</tr>
<tr>
<td><strong>Temperature control</strong></td>
<td>(List box: Yes, No) Whether or not temperature control will be used.</td>
</tr>
<tr>
<td><strong>Controlling sensor</strong></td>
<td>(List box: )</td>
</tr>
<tr>
<td>Min Temp</td>
<td>The lowest of the sensors in the fixture or on the circuit will be used for temperature control.</td>
</tr>
<tr>
<td>Max Temp</td>
<td>The highest of the sensors in the fixture or on the circuit will be used for temperature control.</td>
</tr>
<tr>
<td>Average</td>
<td>The average of all the sensors in the fixture or on the circuit will be used for temperature control.</td>
</tr>
<tr>
<td>[circuit names]</td>
<td>The name of each sensor will be listed, and any can be selected. That sensor, then, will be used for temperature control.</td>
</tr>
<tr>
<td><strong>Target:</strong></td>
<td>(-99.0 to 150.0 [target] 1.0 to 20.0 [range] The target temperature and the range about the target, used in temperature control. The range is the amount above or below target that the actual sensor temperature is allowed to change before a control action is taken.</td>
</tr>
<tr>
<td><strong>Type of defrost</strong></td>
<td>(List box) Various types of defrost can be chosen: None, Hot Gas, Time Off, Air, or Electric.</td>
</tr>
<tr>
<td><strong>Drip down delay</strong></td>
<td>(1 to 600) The number of seconds that refrigeration will remain off after termination of defrost.</td>
</tr>
<tr>
<td><strong>Termination type</strong></td>
<td>[Defrost time settings made on the pages that follow must also be considered. If a minimum defrost time is used, that time must elapse regardless of the settings made on this page. If a defrost duration is specified, either that time must elapse OR the requirements set on this page must be satisfied for defrost to terminate.] (List box) Various termination strategies are listed.</td>
</tr>
<tr>
<td>Defrost sensor</td>
<td>There is a dedicated defrost temperature sensor that will be used to terminate defrost.</td>
</tr>
<tr>
<td>Disch air snsr</td>
<td>The fixture discharge air sensor will be used to terminate defrost at a set temperature.</td>
</tr>
<tr>
<td>On/Off Input</td>
<td>An electrical switch (such as a Klixon®</td>
</tr>
</tbody>
</table>
is wired to a digital input (on-off input) and will be used to terminate defrost.

**None**: Defrost is terminated strictly on time.

**Hot gas return**: Hot gas defrost is terminated when a return air sensor reaches a setpoint.

**Termination temp** (-99.0 to 200.0) The defrost temperature sensor value at which defrost will terminate.

**Term.relay for each case** (List box: Yes, No) Whether or not there is a termination relay for each case.

**Term.relay for each case** (List box: Yes, No) Whether or not there is a termination input each case.

Paging down produces the next page:

[Defrost time settings made on this and the following pages work with the termination settings on the preceding page. If a minimum defrost time is used, that time must elapse AND the settings for defrost termination temperature or switch must be satisfied. If a defrost duration is specified, either that time must elapse OR the requirements set on this page must be satisfied for defrost to terminate.]

The fields are as follows:

**Use min defrost time** (List box: Yes, No) Whether or not minimum defrost time will be used.

**Minimum defrost time** (1 to 180) The number of minutes defrost must be on before termination.

**Antisweat control** (List box: Yes, No) Whether or not anti-sweat heaters will be controlled by the AKC 55. When you configure an evaporator and answer Yes to the anti-sweat control question, a relay output is created which is then wired to a relay controlling the anti-sweat heaters. The name
The relay output will be “Antisweat” + the name of the evaporator or circuit, then the rack, suction group, and circuit number (for example, Produce AA3).

**ON when dewpoint above** (0.0 to 100.0) The dewpoint above which anti-sweat heaters will be on constantly.

**Cycle above dewpoint** (0.0 to 100.0) The dewpoint above which anti-sweat heaters will be cycled. Cycling will occur unless the dewpoint rises above the setpoint specified in the previous line.

**Antisweat cycle time** (2 to 999) The time interval on which anti-sweat cycling is based.

**Fan control** (List box: Yes, No) Answer Yes if fans are to be controlled during and after defrost. If you answer No, fans will run continuously during both refrigeration and defrost.

**Fans on during defrost** (List box: Yes, No) The answer determines whether or not fans will run during defrost.

**Stop fan on high temp** (List box: Yes, No) Whether or not fans are to be stopped when temperature rises above a setpoint to be specified in the next line.

**Fan stop temp** (-58.0 to 99.9) The temperature at which fans will be stopped.

**Fan delay control** (List box: Yes, No) A Yes answer will cause fans to remain off after defrost termination for a specified period of time or until a specified temperature is reached. The time or temperature is determined by the next two questions.

**Start fan on time** (List box: Yes, No) The answer determines whether or not fan delay ends after a specified time.

**Delay time** (0 to 20) The number of minutes before fans start after defrost terminates.

**Fan starting temp** (-58.0 to 99.9) The temperature at which fans will be started after fan delay, if fans are not started on time.

**Monitor door position** (List box: Yes, No) Whether or not an analog sensor input is created to monitor the position of the door. This sensor reads in percent and will be seen on the status screen for the circuit. An alarm can be based on it.
Configuring Defrost

Defrost configuration begins on the next setup page for an evaporator circuit.

The fields are as follows:

- **No of defrosts per day**: (0 to 12) The number of defrosts each day.
- **Defrost duration**: (1 to 180) The number of minutes after which defrost will terminate, if termination has not occurred on a setting configured in the previous screen. Often called “fail-safe” defrost time.
- **Defrost start time**: (time of day; one field for each of the number of defrosts configured in the first line of the screen) The time each defrost will initiate.
- **Allow defrost skip**: (List box: Yes, No) When Yes is selected, the AKC 55 has the ability to determine, based on analysis of current and accumulated data, to determine if each defrost is needed. When a defrost is not needed, it is not initiated, thus reducing energy cost and enhancing product life.
- **Min time between defrost**: (1 to 255) Minimum number of hours between defrosts.
- **Override on dewpoint**: (List box: Yes, No) Whether or not to override defrost skipping on a dewpoint setting (next question).
- **Don’t skip when DP above**: (1.0 to 3276.0) Defrost will occur regardless of skipping calculations whenever dewpoint is above this setting.
- **Dual Temp control**: (List box: Yes, No) A Yes answer allows the circuit to be used in two temperature ranges and creates a digital input for changeover of temperature range.
- **Alt target, Range**: (-50.0 to 150.0, 1.0 to 20.0) The second temperature and range for a dual temperature evaporator.
- **Dual Temp relay needed**: (List box: Yes, No)
**Num of shutdn schedules**  (0 to 8)  The number of shutdown schedules that will be entered on the page(s) immediately following this one.

**Generate shutdown OI**  (List box: Yes, No)  Whether or not a digital input (on-off input) will be configured by which refrigeration can be shut down for cleaning or other service.

**Shutdown schedules**  Paging down, we reach the shutdown page(s):

![Shutdown Schedules](image)

There are two schedules per page. Each schedule has a field for time on, time off, days (of the week) and holidays. **AM** and **PM** are entered by selecting the first character, using the +/- key to toggle the arrow keys to edit mode, then using the up or down arrow to change the character to A or P as needed. The same means is used to select the days of the week (once the cursor is placed in the space to the right of the question) and holidays.

Holidays are given dates when Store Info is configured.

**Configuring evaporator alarms**  Evaporator alarms are configured on the last page for each evaporator. The right illustration shows the screen when it is opened for the first time. The right illustration shows the screen with all of its fields revealed. Additional information will be found in section (Chapter 4-5) on alarms.
Each alarm has three fields:

**Alarm level**

- **Disabled**: The alarm is deactivated, but any settings remain in memory, so that they will be at hand when the alarm is reactivated.
- **Log only**: When the alarm occurs, the fact will be recorded in memory, but the alarm will not be communicated beyond the AKC 55 (over telephone line or network).
- **Normal**: When the alarm occurs, it will be communicated beyond the AKC 55 one time over telephone line or network, to the locations specified in the alarm routing screen.
- **Critical**: When the alarm occurs, it will be communicated beyond the AKC 55 multiple times to each destination defined in the alarm routing screen at the interval set in the alarm routing screen (from 10 to 99 minutes; the default is every 10 minutes).
- **Delete**: The alarm settings will no longer appear on the screen.

**Trip value**

(for temperatures, -999.9 to 999.9; for %, 0 to 999.9)

The level at which the alarm timer begins. As long as the value remains beyond the alarm limit, the timer will continue to accumulate. Whenever the value falls within the alarm limit, the timer will be reset to zero.

**Trip time**

(0 to 999) The number of minutes that must expire (with the alarm value beyond the trip value) before an alarm occurs. Whenever the value falls within the alarm limit, the timer will be reset to zero.

---

**Configuring condensers**

Condensers are configured by selecting **Condensers** on the Configure Rack menu, and can be either air-cooled or evaporative; the two types have very different...
screens. At top center below is shown the condenser screen when you first open it, and at lower left is shown the same screen after Air Cooled has been selected as the type, and before changes; finally, at lower right below is shown the configuration screen for air-cooled condensers when Sat Cond Temp is selected as the Control sensor. The change to saturated condensing temperature control strategy causes several of the following questions to be replaced by new questions. Not all the fields discussed in the following explanation occur on the screen at one time.

Aircooled condensers

There are five configuration pages for aircooled condensers. In the first page are the following fields (refer to the illustration at right, above):

**Condenser type**

(List box:) This section deals with condenser configuration when the selection Air Cooled is made in this field.

**None:** There is to be no condenser control by the AKC 55.

**Evaporative:** There are evaporative condensers that
are controlled by the AKC 55. Discussed in the next section of the manual.

**Air Cooled:** The AKC 55 is controlling air-cooled condensers. The remainder of this section (this screen and the next four) pertains to this selection.

### Number of fans

**Fan staging**

(0 to 12) The number of condenser fans.

(List box:)

**Individual:** Fans will be turned on and off individually to create a number of stages equal to the number of fans.

**Paired:** Fans will be turned on and off in pairs to create a number of stages equal to half the number of fans.

### Monitor stages

(List box:)

**Individual:** Fans will be monitored individually with a digital input (on-off input) created for each fan.

**Paired:** Fans will be monitored in pairs with a digital input created for each pair.

### Control sensor

(List box)

**Pressure:** A pressure sensor will be used to control the condenser fans. An analog input (sensor input) will be created for the sensor.

**Dropleg Temp:** A temperature sensor placed on the dropleg will be used to control the condenser fans. An analog input (sensor input) will be created for the sensor.

**Sat Cond Temp:** Control will be based on saturated condensing temperature as computed from a pressure sensor on the discharge header or drop leg. An analog input (sensor input) was automatically created for the suction group.

### Monitor dropleg temp

(List box: Yes, No) Whether the drop leg temperature will be monitored. A Yes answer here will create an analog input (sensor input) for the drop leg temperature sensor. (Appears only if control is not by dropleg temperature.)

### Control method

(List box:)

**Target:** The condenser fans will be controlled to maintain a target pressure, dropleg temperature, or saturated condensing temperature, depending on which strategy is selected by the answer to the **Control sensor** question above.

**Cutin Cutout:** The condenser will be controlled by cut-in and cut-out based on target pressure, dropleg temperature, or saturated condensing temperature, depending on which strategy is selected by the answer to the **Control sensor** question above. If Cutin Cutout is selected, the next page will provide for selection of cut-in and cut-out setpoints. The page is not shown here, but is straightforward.
**Target control type**

*Please read about all of the possible answers:*

(List box:)

- **Ramp together**: Where there is variable speed fan motor control, fans will come on in stages at minimum speed, then all will be ramped up together.
- **Ramp stages**: Where there is variable speed fan motor control, each stage will be brought on and ramped up. When a stage is at maximum speed and additional fan capacity is needed, the stage will be dropped to minimum speed and the next stage brought on at minimum speed, then ramped up as required.
- **Neutral Zone**: Danfoss Neutral Zone control will be used. This is a strategy that operates to move current value closer to target more rapidly the farther away the current value is from target. If you select **Neutral Zone** here, you will cause the next page answer on inverter control to change to **None**. That will in turn lock this selection to one between **Rate of change** and **Neutral Zone**, since those strategies apply to installations without variable speed fans. If you change equipment strategies, or select **Neutral Zone** in error, first change the **Target control type** here to **Rate of Change**, then go to the next page and change **Fan inverter control** to the appropriate variable speed control, either **VO** or **VLT**, to restore the variable speed choices here.

- **Rate of change**: What?
  
  **Ramp stages if ambient** (-99.0 to 150.0, +/- 0.0 to 9.9) If Ramp together is selected, the strategy will change to ramp stages if the ambient temperature is less than this setpoint.

- **Min sat. cond temp** (0.0 to 200.0) The target minimum saturated condensing temperature that the controller will strive to maintain. Target is calculated by adding outside temperature and the condenser’s design temperature differential.

- **Max sat. cond temp** (0.0 to 200.0) The target maximum saturated condensing temperature that the controller will strive to maintain. Target is calculated by adding outside temperature and the condenser’s design temperature differential.

- **Condenser Delta T** (0.0 to 25.0) The condenser delta-T furnished by the condenser manufacturer.

- **Target** (0.0 to 500.0 for pressure sensors; 0.0 to 200.0 for temperature sensors) The value that the control algorithm will seek to maintain with the selected strategy.

The next page has settings for high pressure bypass and for inverter control, if used. The page is reached by using PG DN.
The screen looks like this:

![Screen Image]

The field information is as follows:

**High pressure bypass** (0.0 to 500.0) The pressure at and above which all fans will be run, and at full speed if variable speed motor control is used. (When high pressure bypass occurs, a service technician is required to clear the bypass by using the appropriate button in the status screen.)

**Monitor inlet temp** (List box: Yes, No) Whether the condenser inlet temperature is to be monitored.

**Fan inverter control** 
*Please see notes on Neutral Zone selection in the section on the first condenser configuration screen.*

(List box:)
- **None**: No variable speed drive is controlled.
- **VO**: An analog output, also known as a VO (variable output) point on a Danfoss I/O module will control the variable speed drive.
- **VLT**: A Danfoss VLT or AKD variable frequency drive will be used for motor control.

**Min speed** (1.0 to 150.0) The minimum percentage of the maximum RPM that the fan motors will be run. Insure that the entries on this screen are within the manufacturer’s specifications.

**Max speed** (1.0 to 150.0) The maximum percentage of the maximum RPM that the fan motors will be run. Insure that the entries on this screen are within the manufacturer’s specifications.

**RPM at max speed** (1 to 6000) The RPM at the maximum percentage specified in the previous setting.

**Inverter max resets** (10 to 10) The maximum number of inverter resets,
after which a subsequent reset condition will place the inverter in override.

**Inverter reset delay**
(1 to 600) The number of seconds that must elapse between inverter reset attempts.

**Inverter proof delay**
(1 to 600) The number of seconds without proof before an inverter reset is attempted.

**Split condenser control**
Split condenser configuration is done on the next page of the Configure Condenser screens. When there is one valve and one split, the screen appears as at left below; when there are two or three valves, the screen at right appears (with the appropriate number of setpoints).

**Split condenser**
(List box: Yes, No) Whether the condenser is split.

**Split based on**
(List box:)
- **Ambient**: Control is based on ambient temperature.
- **Discharge**: Control is based on discharge pressure.

**Control method**
(List box:)
- **1valve/1split**: A single valve, when closed, limits refrigerant flow to a part of the condenser, providing two stages (usually 50%-100%).
- **2valve/2split**: Two valves are used to provide three stages (usually 50%-75%-100%).
- **2valve/3split**: Two valves are used to provide four stages (usually 25%-50%-75%-100%).
- **3valve/3split**: Three valves are used to provide four stages (usually 25%-50%-75%-100%).

**Split when below**
(0.0 to 100.0) (Only with single split valves) The temperature below which the condenser will be split.

**Split deadband**
(0.0 to 25) (Only with single split valves) The deadband above the previous setpoint in which “unsplitting” cannot occur.

**Drop fans**
(List box: Even, Odd) (Only with single split valves) Which fans are dropped when condenser is split.
Split on heat reclaim: (List box: Yes, No) (Only with single split valves) Whether or not condenser will be split when heat reclaim is on.

Split pressure override (List box: Yes, No) Whether or not split function will be overridden.

Cut in (0.0 to 500.0) The pressure below which split condenser operation is allowed.

Cutout (0.0 to 500.0) The pressure above which split condenser operation is disallowed.

Reaction zone and time If control method is Target, the next page of condenser configuration has neutral zone control parameters for the PI control algorithm.

The fields are as follows:

[Informed adjustment of these settings is best done by Danfoss-trained technicians.]

**Normal Reaction Zone**
(0.1 to 60.0) The range of pressure on either side of the target in which the condenser control algorithm reacts with normal sensitivity.

**Plus Zone**
(10 to 900) The PI algorithm sensitivity when current control sensor value is above the normal reaction zone.

**Minus Zone**
(10 to 900) The PI algorithm sensitivity when current control sensor value is above the normal reaction zone.

Enviroguard systems The next page is for setpoints that will be used with a Tyler Enviroguard® system:
The fields and contents are as follows:

**Enviroguard**
(List box: Yes, No) Whether or not an Enviroguard system is being used.

**Subcooling target**
(0.0 to 100.0) The desired subcooling.

**Deadband**
(0.0 to 100.0) The deadband above the target and below the target in which there will be no control actions.

**Min sat. cond temp**
(0.0 to 100.0) The saturated condensing temperature below which the system pressure regulator will be off.

**Min subcooling temp**
(-99.9 to 99.9) The subcooling temperature below which the system pressure regulator will be off.

**Elevation (rack to cond)**
(0 to 3000) The total drop distance from condenser to the rack.

**Open SPR if discharge**
(0.0 to 200.0) The pressure differential above target at which the system pressure regulator will open.

**Bleed valve**
(List box: Yes, No) Whether or not there is a bleed valve.

**Delay after SPR**
(0 to 10) The number of minutes that must elapse after the system pressure regulator is turned on before the bleed relay is energized.

**Evaporative condensers**
Returning to the first page of condenser configuration (from the Main Menu: Configuration, Refrigeration, (select the rack), Condensers. Select Evaporative for the condenser type. The screen will appear as shown below.
The fields are as follows:

**Condenser type**

(List box:) This section deals with condenser configuration when the selection **Evaporative** is made in this field.

None: There is to be no condenser control by the AKC 55.

Evaporative: There are evaporative condensers that are controlled by the AKC 55. The remainder of this section (this screen and the next four) pertain to this selection.

Air Cooled: The AKC 55 is controlling air-cooled condensers. The configuration of air-cooled condensers is covered in the preceding section of this manual.

**Number of pumps**

(0 to 2) The number of coolant pumps.

**Daily rotation**

(List box: Yes, No) Whether or not pumps will rotate.

**Monitor stages**

(List box: Individual, Paired, None)

Individual: Fans will be monitored individually with a digital input (on-off input) created for each fan.

Paired: Fans will be monitored in pairs with a digital input created for each pair.

None: Fans will not be monitored.

**Control sensor**

(List box)

Pressure: A pressure sensor will be used to control the condenser fans. An analog input (sensor input) will be created for the sensor.

Dropleg Temp: A temperature sensor on the drop leg will be used to control the condenser fans. An analog input (sensor input) will be created for the sensor.

**Monitor dropleg temp**

(List box: Yes, No) (Appears if control is by pressure)

Whether the drop leg temperature will be monitored. A Yes answer here will create an analog input (sensor input) for the drop leg temperature sensor.
### Control method

<table>
<thead>
<tr>
<th>Control sensor question above.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Target</strong></td>
</tr>
<tr>
<td><strong>Cutin Cutout</strong></td>
</tr>
</tbody>
</table>

### Target control type

#### Ramp together:
Where there is variable speed fan motor control, all fans will be brought on in stages at minimum speed, then ramped up in speed as a group.

#### Ramp stages:
Where there is variable speed fan motor control, each stage will be brought on and ramped up to maximum speed. When additional capacity is required, fans will be reduced to minimum speed and an additional stage brought on, then all will be ramped up together, and so on.

#### Neutral Zone:
Danfoss Neutral Zone control will be used. This is a strategy that operates to move current value closer to target more rapidly the farther away the current value is from target. If you select **Neutral Zone** here, you will cause answer on inverter control on the second page following to change to **None**. That will in turn lock this selection to one between **Rate of change** and **Neutral Zone**, since those strategies apply to installations without variable speed fans. If you change equipment strategies, or select **Neutral Zone** in error, first select **Rate of Change** here, then go to the second page following and change **Fan inverter control** to the appropriate variable speed control, either **VO** or **VLT**, to restore the variable speed choices here.

#### Rate of change:
A control strategy that simulates PID control.

### Ramp stages if ambient

<table>
<thead>
<tr>
<th>Ramp stages if ambient</th>
</tr>
</thead>
<tbody>
<tr>
<td>(-99.0 to 150.0, +/- 0.0 to 9.9)</td>
</tr>
</tbody>
</table>

### Target

<table>
<thead>
<tr>
<th>Target</th>
</tr>
</thead>
<tbody>
<tr>
<td>(0.0 to 500.0 for pressure sensors; 0.0 to 200.0 for temperature sensors)</td>
</tr>
</tbody>
</table>
### Inverter settings;
**Freeze protection;**
**Dump valve**

The next page deals with inverter settings, if the condenser fans are variable speed, and with freeze protection and dump valve operation.
Fan inverter control

[List box:]

**None:** No variable speed drive is controlled.

**VO:** An analog output, also known as a VO (variable output) point on a Danfoss I/O module will control the variable speed drive.

**VLT:** A Danfoss VLT or AKD variable frequency drive will be used for motor control.

**Min speed**

(1.0 to 150.0) The minimum percentage of the maximum RPM that the fan motors will be run. Insure that the entries on this screen are within the manufacturer’s specifications.

**Max speed**

(1.0 to 150.0) The maximum percentage of the maximum RPM that the fan motors will be run. Insure that the entries on this screen are within the manufacturer’s specifications.

**RPM at max speed**

(1 to 6000) The number of RPM at the maximum speed specified in the preceding setting.

**Inverter max resets**

(10 to 10) The maximum number of inverter resets, after which a subsequent reset condition will place the inverter in override.

**Inverter reset delay**

(1 to 600) The number of seconds that must elapse between inverter reset attempts.

**Inverter proof delay**

(1 to 600) The number of seconds without proof before an inverter reset is attempted.

**High pressure bypass**

(0.0 to 500.0) The pressure at and above which all fans will be run, and at full speed if variable speed motor control is used. (When high pressure bypass occurs, a service technician is required to clear the bypass by using the appropriate button in the status screen.)
Choose Control Settings

**Freeze Protection**
(List box: Yes, No) Whether or not freeze protection control is implemented.

**Freeze prot temp cutout**
(-99.0 to 99.9) The outside ambient temperature at and below which evaporative cooling will be locked out.

**Freeze prot temp cutin**
(-99.0 to 99.9) The outside ambient temperature at and above which evaporative cooling will be allowed to run.

**Dump Valve**
(List box: Yes, No) Whether or not a dump valve is controlled.

**Dump on schedule**
(List box: Yes, No) Whether or not the dump valve will be controlled by a schedule to be entered on the following page(s).

**Num of dump schedules**
(1 to 8) The number of effective dump schedules to be entered on the following page(s).

**Dump on freeze protect**
(List box: Yes, No) Whether or not the dump valve will be activated at the freeze protect setpoint.

**Override pump on frz prot**
(List box: Yes, No) When the pump is on because of high discharge pressure, whether or not to shut down the the pump at the freeze protect setpoint.

**Water flow monitor**
(List box: Yes, No) Whether or not there is a water flow monitor.

### Dump Schedules
The next page allows entry of the first four dump schedule. A subsequent page will be added if there are more than for schedules. Schedules have been explained in the earlier section on evaporator (defrost) configuration. The screen is not shown here.

### Receiver Configuration
To configure the receiver, return to the Configure Rack menu, put the cursor on **Receiver**, and press ENTER. The screen is as shown below.

![Screen for configuring the receiver](image_url)

**Surge control**
(List box: Yes, No) Whether or not surge control will
Cutin
(0.0 to 100.0) The temperature at which the surge valve cuts in.

Cutout
(0.00 to 100.0) The temperature at which the surge valve closes.

Liquid level sensor type
(List box:)

Sensor input: An analog sensor is used for liquid level.
On/Off input: A digital sensor is used for liquid level.
None: There is no liquid level sensor monitored.

Heat reclaim configuration

To configure heat reclaim, return to the Configure Rack menu, put the cursor on Heat Reclaim, and press ENTER. The screen is as shown below.

Heat reclaim
(List box: Yes, No) Whether or not heat reclaim is present and controlled.

Num of stages
(1 or 2) The number of stages of heat reclaim.
(List box:)

Stage 1 type
Water Ht: The stage is used for heating water.
HVAC: The stage heats HVAC supply air.

Cutin setpoint
(-99.0 to 200.0) The temperature at which the stage will be turned on.

Cutout setpoint
(-99.0 to 200.0) The temperature at which the stage will be turned off.

Stage 2 type
[The same choices as for Stage 1 type and setpoints are offered.]

Flush Cycle
(List box: Yes, No) Whether or not there is to be a flush cycle.

Flush Cycle Start Time
(Time of day) The time at which the flush cycle will be initiated.

Flush Cycle Duration
(10 to 20) The number of minutes the flush cycle will run.

Lockout on low head pres
(List box: Yes, No) Whether or not heat reclaim will
Lockout Pressure
(-99.0 to 500.0) The low head pressure at which heat reclaim will be locked out.

Lockout on liquid level
(List box: Yes, No) Whether or not heat reclaim will be locked out on low refrigerant level.

Liquid level sensor type
(List box:)

Sensor input: An analog sensor is used for liquid level.
On/Off input: A digital sensor is used for liquid level.
None: There is no liquid level sensor monitored.

Liquid %
(-99.0 to 99.9) The liquid level, as a percentage of receiver volume, at and below which heat reclaim will be locked out.

Refrigeration alarms configuration
As refrigeration configuration changes, alarms are automatically created (but not enabled) for the analog and digital inputs created. Trip levels and time limits can be set for these alarms by selecting Alarms from the Configure Rack menu and pressing ENTER.

The Configure Rack Alarms menu looks like the illustration at left below:

The set of alarms that are created automatically as you proceed with configuration of a rack is shown in the menu; by selecting one of the menu items (in this case Suction), the alarms for that part of the rack are presented. The first page of suction alarms is shown at right above. One of the list boxes has been opened to reveal its options.

For each alarm, the first line contains an alarm type, the name of the point the alarm is based on, and the point’s address. The second line contains the alarm action setting (Critical, Normal, Log only, or Disabled), the trip level setting (if based on an analog (sensor) input), and the time setting. If the action is set to Disabled, the level and time settings will not appear (but are retained in memory), as is the case with all
in the example screen except the last alarm (High Temperature Suction Temp AA).

There are five times when alarms are not generated for refrigeration temperatures: (1) during keyswitch overrides; (2) during the delay after override; (3) during defrost; (4) during the delay after defrost; and (5) when alarms have been suspended. The two delay periods are defined in the refrigeration configuration screen for the each circuit.

The meanings of the alarm action settings are as follows:

<table>
<thead>
<tr>
<th>Alarm Levels</th>
<th>Critical</th>
<th>Normal</th>
<th>Log Only</th>
<th>Disabled</th>
<th>Delete</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>When conditions have been at or have gone beyond the alarm’s trip level for the set time, the alarm will occur. The alarm will dial out repeatedly at the interval set in the routing screen (from 10 to 99 minutes with a default value of 10 minutes).</td>
<td>When conditions have been at or have gone beyond the alarm’s trip level for the set time, the alarm will occur. The alarm will dial out once.</td>
<td>When conditions have been at or have gone beyond the alarm’s trip level for the set time, the alarm will occur. There will be no dialout, but the occurrence will be logged in the system as an active alarm.</td>
<td>The alarm is deactivated and will not occur or dial out; its configuration, if any, will remain in memory, so that if it is set to Critical, Normal, or Log Only, the same trip level and time will appear in the screen.</td>
<td>The alarm’s configuration will be deleted from memory.</td>
</tr>
</tbody>
</table>

You can change the alarm action setting by selecting the field and scrolling to the action you want (move the cursor to the field, then press the +/- key, then use the arrow keys to scroll through the settings, then press ENTER).

Standard alarms are the alarms that are automatically created during configuration of refrigeration, HVAC, and other parts of the control and monitoring network. (You can also custom configure up to three miscellaneous alarms on any point in the network. Miscellaneous alarms are covered later in this section.)

If a standard alarm is based on an on/off input, you can change the alarm action setting and the time setting. The time setting can range from 1-255 seconds, minutes, or hours.

For an alarm based on a sensor input, in addition to the action setting and time setting, you can change the sensor level. For the second alarm in the screen shown, the sensor level could be anywhere in the range from -999.9 to 999.9 psi.
System alarms

Configuration of system alarms, which concern operation of the controller and network, will be covered in a later section of this manual.

Board & Points configuration

To configure board & points information for refrigeration, return to the Configure Rack menu, put the cursor on **Board & Points**, and press ENTER. The screen is as shown below. For AK2 module board & point configuration, refer also to the AK2 I/O user manual.

Navigation

Notice that at the bottom of each of the Board & Points screens there is a row of icons. Select one of these and you will be taken to the Board & Point configuration page for a particular type of input or output. From left to right, the icons represent the following:

- Digital outputs (relay outputs)
- Analog inputs (sensor inputs)
- Digital inputs (on-off inputs)
- Analog outputs (variable outputs)
- Other controllers (AKC 16x, EKC, Degree Master, and DCU case controllers; VLT drives and Bitzer compressor interface)

<table>
<thead>
<tr>
<th>Name</th>
<th>Bcast</th>
<th>On</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fan Inv Reset A No</td>
<td>00-0</td>
<td>N-Closed</td>
</tr>
<tr>
<td>Fan Inv Brake A No</td>
<td>00-0</td>
<td>N-Closed</td>
</tr>
<tr>
<td>Louvers Cond A No</td>
<td>00-0</td>
<td>N-Closed</td>
</tr>
<tr>
<td>Fan Ford Fan A No</td>
<td>00-0</td>
<td>N-Closed</td>
</tr>
<tr>
<td>Cond Fill Liv A No</td>
<td>00-0</td>
<td>N-Closed</td>
</tr>
<tr>
<td>Surge Valve A No</td>
<td>00-0</td>
<td>N-Closed</td>
</tr>
<tr>
<td>Cond Dump Liv A No</td>
<td>00-0</td>
<td>N-Closed</td>
</tr>
<tr>
<td>Cond Fan A1 No</td>
<td>00-0</td>
<td>N-Closed</td>
</tr>
</tbody>
</table>

**Board & Points Relay outputs (Digital outputs)**

**Name**

(15 characters, any) The name of the load connected to the digital output (relay output). The default names for the outputs automatically added during configuration of refrigeration are shown, and will suffice in many applications. They can be edited character by character (put the cursor on the field, press +/- to enter edit mode; then use the left and right arrow keys to move from space to space and the up and down arrow keys to select the character for that space. When the name appears as you want it, press ENTER).

**Bcast**

(List box:)

10/10/2002 01:12:18 PM
No: The value of the point will not be broadcast to be used in logic on other controllers.

Send: The value of the point (whether it is ON or OFF) will be available on the host network for use by other controllers. Be sure that each sending Board-Point combination is unique throughout the system. (If the controller at address #01 is sending from its Bd-Pt address 1-02, then no other controller can have an output at its Bd-Pt address 1-02 sending.

Rec: The value of the point is being received from another controller on the host network. You must enter, in the Bd-Pt fields, the Bd-Pt address of the sending point.

Bd-Pt
First enter the address of the RO board and point to which the load is wired, or, in the case of a received broadcast point, enter the board and point address of the sending point.

On
(List box:)
N-Closed The load on this point is wired through its normally closed contacts.

N-Open The load on this point is wired through its normally open contacts.

SORT
At the bottom of the body of the screen (above the icons, on the same line as “PG DN” for more is the SORT field. By default, sort mode is on, and entries will be sorted by Bd-Pt address; if sort mode is turned off, points from then on will be listed in order of creation. The sorting occurs when you press EXIT and will be apparent the next time you enter the screen.

Board & Points
Sensor inputs
(Analog inputs)
Name
(Label field; any 15 characters) The name of what is being measured by the analog input (sensor input). The default names for the sensors automatically added during configuration of refrigeration are shown, and will suffice in many applications. They can be edited character by character (put the cursor on the field, and press +/- to enter edit mode; then use the left and right arrow keys to move from space to space and the up and down arrow keys to select the character for that space. When the name appears as you want it, press ENTER).

Bcast
(List box:)
No: The value of the point will not be broadcast to be used in logic on other controllers.
Send: The value of the point will be available on the host network for use by other controllers. Be sure that each sending Board-Point combination is unique throughout the system. (If the controller at address #01 is sending from its Bd-Pt address 1-02, then no other controller can have an output at its Bd-Pt address 1-02 sending.
Rec: The value of the point is being received from another controller on the host network. You must enter, in the Bd-Pt fields, the Bd-Pt address of the sending point.

Bd-Pt
Enter the Bd-Pt address to which the sensor is wired, or, in the case of a received broadcast point, enter the board and point address of the sending point.

Type
(List box:)
AKS 32-100 Danfoss pressure sensor, 0 to 100 psig.
AKS 32-200 Danfoss pressure sensor, 0 to 200 psig.
AKS 32-500 Danfoss pressure sensor, 0 to 500 psig.
PHOTO-OD-1 Danfoss indoor-outdoor photocell with type AKS 21 temperature sensor.
PHOTO-ID Danfoss indoor photocell.
PT1000 Danfoss temperature sensor.
DPS100 Danfoss dew point sensor.
ECI TP-1 ECI temperature sensor type TP-1.
ECI TP-2 ECI temperature sensor type TP-2.
NOVAR Novar temperature sensor.
THERM3 Danfoss THERM3 low and medium range temperature sensor.
THERM3-HT Danfoss high range THERM3 temperature sensor.
EMHS3 Danfoss humidity sensor, indoor, with temperature sensor.
EMHS4 Danfoss humidity sensor, outdoor.
1-6 Volts A user-supplied linear-response sensor with 1 to 6 Volt output.
0-5 Volts A user-supplied linear-response sensor with 0 to 5 Volt output.
1-2 Volts A user-supplied linear-response sensor with 1 to 2 Volt output.
CTTS Com-Trol temperature sensor.
CPC501-1121 CPC type 501-1121 temperature sensor.
Elm Elm temperature sensor.
HGM CHAN Provides channel information for a multi-zone Yokogawa leak detector.
HGM LEAK Provides refrigerant ppm for the channel given by HGM CHAN.
10A CT Danfoss 10A current transformer.
150A CT Danfoss 150A current transformer.
200A CT Danfoss 200A current transformer.
Percent Any 1 to 10 Vdc sensor (readout 0 to 100%).
Leak Danfoss leak sensor.

SORT
At the bottom of the body of the screen (above the icons, on the same line as “PG DN” for more is the SORT field. By default, sort mode is on, and entries will be sorted by Bd-Pt address; if sort mode is turned off, points will be listed from then on in the order in which they were created. The sorting occurs when you press EXIT and will be apparent the next time you enter the screen.

Board & Points
On-off inputs
(Digital inputs)

10/11/2002 03:38:55 PM

Configure Board & Points

On-Off Inputs

<table>
<thead>
<tr>
<th>Name</th>
<th>Bd-Pt</th>
<th>On</th>
</tr>
</thead>
<tbody>
<tr>
<td>phase loss A</td>
<td>No</td>
<td>0c-0</td>
</tr>
<tr>
<td>fan thru proof A</td>
<td>No</td>
<td>0c-0</td>
</tr>
<tr>
<td>fan thru fault A</td>
<td>No</td>
<td>0c-0</td>
</tr>
<tr>
<td>Cond Fan A1</td>
<td>No</td>
<td>0c-0</td>
</tr>
<tr>
<td>Cond Fan A2</td>
<td>No</td>
<td>0c-0</td>
</tr>
<tr>
<td>Cond Fan A3</td>
<td>No</td>
<td>0c-0</td>
</tr>
<tr>
<td>Cond Fan A4</td>
<td>No</td>
<td>00-0</td>
</tr>
<tr>
<td>Cond Fan A5</td>
<td>No</td>
<td>00-0</td>
</tr>
</tbody>
</table>

SORT: On

Name

(Label field; any 15 characters) The name of the load sensed by the digital input (on-off input). The default names for the inputs automatically added during configuration of refrigeration are shown, and will suffice in many applications. They can be edited character by character (put the cursor on the field,
press +/- to change to edit mode; then use the left and right arrow keys to move from space to space and the up and down arrow keys to select the character for that space. When the name appears as you want it, press ENTER).

**Bcast**

(List box:)

- **No**: The value of the point will not be broadcast to be used in logic on other controllers.
- **Send**: The value of the point (whether it is ON or OFF) will be available on the host network for use by other controllers. Be sure that each sending Board-Point combination is unique throughout the system. (If the controller at address #01 is sending from its Bd-Pt address 1-02, then no other controller can have an output at its Bd-Pt address 1-02 sending.
- **Rec**: The value of the point is being received from another controller on the host network. You must enter, in the Bd-Pt fields, the Bd-Pt address of the sending point.

**Bd-Pt**

First enter the address of the RO board and point to which the load is wired, or, in the case of a received broadcast point, enter the board and point address of the sending point.

**On**

(List box:)

- **Voltage**: The point will be read as ON if it senses a voltage. It will read OFF when it senses no voltage.
- **No Voltage**: The point will be read as ON if it senses no voltage. It will read OFF when it senses voltage.
- **Latching**: The point will be read as ON when it first senses a momentary voltage. It will continue to read on when the voltage is no longer present. The point will read OFF after voltage is applied again. This setting is often used for push-button or other momentary-contact sensing.

**SORT**

At the bottom of the body of the screen (above the icons, on the same line as “PG DN” for more is the SORT field. By default, sort mode is on, and entries will be sorted by Bd-Pt address; if sort mode is turned off, points will be listed from then on in the order in which they were created. The sorting occurs when you press EXIT and will be apparent the next time you enter the screen.

Board & Points
Variable outputs
(Analog outputs)
### Name
The name of the load being driven by the variable output. The default names for the variable outputs automatically added during configuration of refrigeration are shown, and will suffice in many applications. They can be edited character by character (put the cursor on the field, press +/- to enter edit mode; then use the left and right arrow keys to move from space to space and the up and down arrow keys to select the character for that space. When the name appears as you want it, press ENTER).

### Bd-Pt
Enter the Bd-Pt address to which the load is wired.

### Range
(List box; two variable output ranges are available, depending on the drive requirements:)
- **0-10 Volts**
- **0-5 Volts**

### SORT
At the bottom of the body of the screen (above the icons, on the same line as “PG DN” for more is the SORT field. By default, sort mode is on, and entries will be sorted by Bd-Pt address; if sort mode is turned off, points will be listed from then on in the order in which they were created. The sorting occurs when you press EXIT and will be apparent the next time you enter the screen.

### Board & Points

### Other controllers
When you select the “Other Controllers” icon and press ENTER, a menu is presented that allows selection of any of six types of other controllers that can be nodes on the control system I/O network.
AKC 16x circuits
Board & Points

You will also see these icons at the bottom of any of the Other Controllers screens. Selecting the first one, whether from the menu or from the bottom of the screen, produces the related configuration screen. Here’s the one for AKC 16x Smart Case Controllers:

The fields and contents are:

**Name**  
(Label field; any 15 characters) The name of the evaporator being controlled by the AKC 16x. (AKC 16x refers to AKC 161, AKC 164, or AKC 165 controllers, whichever is configured on each node.) The default names for the AKC 16x circuits automatically added during configuration of refrigeration are shown, and will suffice in many applications. They can be edited character by character (put the cursor on the field, press +/- to change to edit mode; then use the left
and right arrow keys to move from space to space and the up and down arrow keys to select the character for that space. When the name appears as you want it, press ENTER).

**Address**
(0 to 99) The address set on the rotary address switches on the Smart Case Controller. The installer should provide a list with the address for each fixture. If such information is not available, obtain the address by removing the waterproof rubber plugs over the address switches and reading the address. Consult section 3-8 in chapter 3 of this manual for location of the switches.

**Init**
(Init button field) Use in accordance with the following explanation of network re-scan and initialization.

**Network Re-scan and Initialization**
After the Smart Case Controllers have been configured and addressed, you need to re-scan the network so that they are recognized, then initialize them. You must perform the following steps:

1. From the Main Menu, select **Communications**.
2. From the Communications Menu, select **I/O Network**.
3. From the I/O Network Menu, select **Re-scan**. Re-scanning the network can take several minutes. After the re-scan, return (via the Main Menu) to the AKC 16x Board & Points Configuration Screen, and
4. Put the cursor on the **Init** field and press ENTER.

**Navigation**
Notice that at the bottom of each of the Other Controllers screens there is a row of icons. Select one of these and you will be taken to that type of “other controller.”

From left to right, the icons represent the following:
- AKC 16x Smart Case Controllers
- EKC fixture controllers and monitors
- Degree Master case controllers
- VLT adjustable frequency drives
- Bitzer variable speed compressors
- DCU case controllers

**EKC circuits Board & Points**
Board & Points configuration for EKC controllers begins by selecting EKC from the Configuration Board & Points menu. Our example shown below has only one circuit. If EKC has been selected as the circuit type for more than one circuit in the suction group, this screen will show a list of all of those EKC circuits.
The fields and contents are:

**Name**  
(Label field, any 15 characters) The name of the evaporator being controlled by the EKC. The default names for the EKC circuits automatically added during configuration of refrigeration are shown, and will suffice in many applications. They can be edited character by character (put the cursor on the field, press +/- to change to edit mode; then use the left and right arrow keys to move from space to space and the up and down arrow keys to select the character for that space. When the name appears as you want it, press ENTER).

**Address**  
(0 to 99) The address set on the EKC. EKC addresses are set using the buttons on the EKC. The installer should provide a list with the address for each fixture. If such information is not available, obtain the address at the fixture from the EKC by using the buttons.

**Init**  
(Init button field) Use in accordance with the following explanation of network re-scan and initialization.

Network Re-scan and Initialization  
After the EKCs have been configured and addressed, you need to re-scan the network so that they are recognized, then initialize them. You must perform the following steps:

1. From the Main Menu, select **Communications**.
2. From the Communications Menu, select **I/O Network**.
3. From the I/O Network Menu, select **Re-scan**. Re-scanning the network can take several minutes. After the re-scan, return (via the Main Menu) to the EKC Board & Points Configuration Screen, and
4. Put the cursor on the **Init** field and press ENTER.
Upload (Button field) Placing the cursor on this field and pressing ENTER will cause information programmed at the fixture on the EKC to be uploaded to the AKC 55 controller.

Wink (EKC) Wink (Button field) Placing the cursor on this field and pressing ENTER will cause this individual EKC to blink its display for a short time so that its fixture can be identified.

Degree Master Board & Points

After Degree Master controllers have been configured and addressed (in accordance with the Danfoss manual *Degree Master in AKC 55 Systems* (literature number RS.8B.F1.22 (or update), code number 084R9897) you need to re-scan the network so that they are recognized, then initialize them. This is done from the Degree Master Controls Board & Points screen. From any Configuration Board & Points, Other Controllers screen, select the Degree Master Icon and press ENTER. This screen appears. Our example shows only one circuit, but every configured Degree Master circuit will be listed.

The fields and contents are:

**Name** (Label field: any 15 characters) The name of the evaporator being controlled by the Degree Master. The default names for the Degree Master circuits automatically added during configuration of refrigeration are shown, and will suffice in many applications. They can be edited character by character (put the cursor on the field, press +/- to change to edit mode; then use the left and right arrow keys to move from space to space and the up and down arrow keys to select the character for that space. When the name appears as you want it, press ENTER).

**Address** (0 to 99) Enter an address from 1 to 99 that is unique
Locate Procedure

When a new Degree Master is added to the AKC 55 system, or when there has been a service replacement, you must use the “Locate Procedure” so that the AKC 55 will recognize the Degree Master.

Follow this procedure:

1) Enter an address from 1 to 99 that is unique among the Degree Masters in the system.
2) Select Locate and press ENTER or click with your mouse.
3) A message will appear requesting that you press the service pin.
4) You have 10 minutes to go to the particular Degree Master you are working with and depress the service pin. The service pin (or button) is located beneath the upper right corner of the square white label on the Degree Master.
5) Use a pencil (or other instrument that will fit through the access hole) to depress the service button and keep it depressed for five seconds.

It will take the AKC 55 from 10 to 15 seconds to complete the location process, after which a message box will appear on the AKC 55 telling you that the process has been successful. This process must be repeated for each new or replacement Degree Master.

Activating the service pin from the display

After starting the locate procedure from the AKC 55 keypad, it is possible to activate the service pin from the Degree Master’s display. Press and hold both buttons for 3 seconds. When the Degree Master enters the service mode, the display will change to “RS” with an up arrow on the left and a down arrow on the left. Pressing the lower button will now activate the service pin. The down arrow will change to an asterisk as confirmation. Be careful not to press the upper button. Doing so will reset the Degree Master.

Initialization

After the Locate procedure, Select Init and press ENTER or click with your mouse. The initialization procedure, during which configuration data is copied from the AKC 55 to the Degree Master, will take about 10-15 seconds.

Wink

Wink All Degree Master is a toggle (first ENTER turns on, second turns OFF) that will cause all the Degree Masters on the network to flash their node numbers repeatedly. If a unit does not wink its number, test its function with the handheld remote control (in accordance with the Degree Master manual). If the unit is functioning to control the fixture, troubleshoot its network connection and addressing.

VLT and AKD drives

To configure Board & Points for Danfoss VLT and AKD variable frequency drives, select the variable speed drive icon (fourth from the left) on any Configure Board & Points Other Controllers screen and press ENTER. The screen looks like this (though you see only one here, all configured VLT drives will be listed.)
The fields and contents are:

**Name**
(Label field: any 15 characters) The name of the compressor being controlled by the VLT. The default names for the system’s VLTs that were automatically added during configuration of refrigeration are shown, and will suffice in many applications. They can be edited character by character (put the cursor on the field, press +/- to change to edit mode; then use the left and right arrow keys to move from space to space and the up and down arrow keys to select the character for that space. When the name appears as you want it, press ENTER).

**Locate**
(Button field) Each VLT must be located by the AKC 55. Place the cursor on the **Locate** field and press ENTER. Then, when instructed by a pop-up box on the AKC 55 screen, go to the VLT and press the service pin. The AKC 55 will then read the VLT address, which will appear on the screen to the right of the **Locate** field.

DCU circuits
Board & Points Section to be added.
### Chapter 4 - 2 Configuring HVAC

To begin configuring HVAC, select **Configuration** from the Main Menu, then **HVAC**. If there are no units configured, the screen looks as at left below. If one or more units are already configured, a “menu” screen will appear that lists all the units, as at right below. In the example, one unit of each possible type has been added. In practice, this would be a very unlikely store.

To add a new unit, simply put the cursor on the **No. of HVAC Units** field and increase the number by one. A new unit will appear with a default name, which will at least temporarily be “Unit n”, where n is the new total number of units up to that line. There are instructions below on how to change the name.

The fields in the HVAC Configuration Menu Evaporator Menu (shown above on the right) are as follows:

- **No. of HVAC Units**: (0 to 40) The number of controlled HVAC units of all types in the store.
- **No. of phase loss monitors**: (0 to 40) The number of phase loss monitors available for use by HVAC control. A phase loss monitor can be used more than once.
- **No. of humidity sensors**: (0 to 5, except that the combined number of humidity and dewpoint sensors cannot exceed 5). The number of humidity sensors used for control.
- **No. of dewpoint sensors**: (0 to 5, except that the combined number of humidity and dewpoint sensors cannot exceed 5). The number of dewpoint sensors used for control.
- **Name**: (Label field, any 15 characters) The name of the HVAC unit. The field can be edited character by character (put the cursor on the field, press +/- to change to edit mode; then use the left and right arrow keys to move from space to space and the up and down arrow keys to select the character for that
space. When the name appears as you want it, press ENTER).

**Type**

- **AHU**: The unit is a built-up system with an air handling unit.
- **RTU**: The unit is a packaged rooftop unit.
- **RTC**: The unit is controlled by a Danfoss RTC board.
- **SC4**: The unit is a Seasons 4 Smart Coil packaged rooftop system.
- **CT-65**: The unit is controlled by a Danfoss or ECI ClimaTECH 65 controller.
- **CT-1024**: The unit is controlled by a Danfoss or ECI ClimaTECH 1024 controller.

**<Setup>**

(Button field) Used to enter the configuration screens for the individual HVAC units.

**<Setup>**

(Button field) Used to enter the configuration screens for the individual HVAC units.

**RTU Configuration**

When you press the **<Setup>** button for an RTU unit, the menu that appears looks like this:

![RTU Configuration Menu](image)

From this menu, you can enter the configuration screens for each of the components of the HVAC unit.

**RTU fan configuration**

There are two pages for fan configuration:
Fan type

(List box:)

1-Speed: The unit has a single-speed fan.
2-Speed: The unit has a two-speed fan.

Fan control OPEN hours

(List box:)

Continuous: The fan will run continuously during open hours. Store open hours are defined in the Store Info screens.
On demand: The fan will run on demand during open hours. “On demand” means that the fan will run whenever conditions calling for heating, heat reclaim, cooling, dehumidification, or venting are met.

Fan control CLOSED hours

(List box:)

Continuous: The fan will run continuously during closed hours. Store closed hours are defined in the Store Info screens.
On demand: The fan will run on demand during closed hours. “On demand” means that the fan will run whenever conditions calling for heating, heat reclaim, cooling, dehumidification, or venting are met.

Post delay

(0 to 60) The number of minutes that the fan will run after the last stage of heating, cooling, etc. is turned off.

Monitor phase loss

(List box: Yes, No) Whether or not a phase loss monitor will be monitored.

Shutdown on phase loss

(List box: Yes, No) Whether or not the unit is to be shut down when its phase loss detector input is on.

Which phase loss

(List box: ) All available phase loss monitors are shown.

Shutdown on smoke detect

(List box: Yes, No) Whether or not the unit is to be shut down when its smoke detector is on.

Shutdown on fire alarm

(List box: Yes, No) Whether or not the unit is to be shut down when a monitored fire alarm is detected.
No of return sensors

Controlling sensor

(0 to 5) The number return air temperature sensors.

(List box:)

Min Temp: Control will be based on the lowest value of all of the return air temperature sensors.

Max Temp: Control will be based on the highest value of all of the return air temperature sensors.

Average: Control will be based on the average of all the return air sensors.

Return Air 1-1 (etc.): (each return air temperature sensor will be available as a choice in the list) Control will be based on the single selected sensor.

No of supply sensors

Controlling sensor

(0 to 5) The number supply air temperature sensors.

(List box:)

Min Temp: Control will be based on the lowest value of all of the supply air temperature sensors.

Max Temp: Control will be based on the highest value of all of the supply air temperature sensors.

Average: Control will be based on the average of all the supply air sensors.

Supply Air 1-1 (etc.): (each supply air temperature sensor will be available as a choice in the list) Control will be based on the single selected sensor.

RTU cooling configuration

RTU cooling is configured after selecting cooling from the RTU configuration menu.

Number of zone sensors

Controlling sensor

(0 to 5) The number of zone sensors in the area of the store served by this HVAC unit.

(List box)

Min Temp: Control will be based on the lowest value of all temperature sensors in the unit’s zone.

Max Temp: Control will be based on the highest
value of all of the temperature sensors in the unit’s zone.

**Average:** Control will be based on the average of all the temperature sensors in the unit’s zone.

**Zone Temp 1-1** (etc.): (each zone temperature sensor will be available as a choice in the list) Control will be based on the single selected temperature sensor.

**Num of cooling stages**
(0 to 6) The number of cooling stages in this HVAC unit.

**Target temp. for stage**
(0.0 to 99.9) A separate field for each of the stages in the unit.

**Range +/-**
(0.0 to 9.9) The range selected creates a dead band. For example, if the target is 72 and the range is 2, the stage will come on at 74, and will not be turned off until the temperature reaches 70.

**Pre delay for stage**
(0 to 60) The number of minutes that must elapse after target plus range is reached before the stage will come on. There is one field for each stage.

**Post delay for stage**
(0 to 60) The number of minutes that must elapse after target - range is reached before the stage will be turned off. There is one field for each stage.

---

RTU cooling configuration, page 2
Refer to the screen above.

**Ambient temp lockout:**
(List box: Yes, No) Whether or not there is to be a lockout based on low ambient temperature.

**No cooling below**
(0.0 to 100.0) The ambient temperature below which cooling will be locked out.

**Range +/-**
(0.0 to 9.9) The range selected creates a dead band. For example, if the lockout is 50 and the range is 2, cooling will be locked out at 48 and will be allowed on at 52.
<table>
<thead>
<tr>
<th><strong>Default fan Speed</strong></th>
<th>(List box: High Speed, Low Speed) The fan speed for cooling. A different fan speed can be chosen for dehumidification when it is configured.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Max suction press safety</strong></td>
<td>(List box:) Lists every configured pressure sensor. Any may be selected. Only the suction pressure for the cooling compressors in this rooftop should be used.</td>
</tr>
<tr>
<td><strong>No cooling above</strong></td>
<td>(0.0 to 100.0) The pressure value of the sensor selected on the previous line at and above which cooling will be cut out. Cooling will not cut in again until the pressure falls below this value and the pre delay specified on the preceding page has elapsed.</td>
</tr>
<tr>
<td><strong>Freeze protection</strong></td>
<td>(List box:)</td>
</tr>
<tr>
<td>Sensor Input</td>
<td>There is a leaving air temperature for each stage of cooling, near the coil. At and below the setpoint (next line), the cooling stage will be turned off.</td>
</tr>
<tr>
<td>On/Off Input</td>
<td>A single digital input that when ON will turn off all stages of cooling in the RTU.</td>
</tr>
<tr>
<td>None</td>
<td>There is no freeze protection to configure.</td>
</tr>
<tr>
<td><strong>Setpoint</strong></td>
<td>(0.0 to 50.0) The temperature, as measured by the sensor input indicated above, at and below which a stage of cooling will be turned off.</td>
</tr>
<tr>
<td><strong>Night setback</strong></td>
<td>(List box: Yes, No) Whether or not the cooling setpoints are to be raised by an offset (next line) during scheduled times (next page) when cooling requirements are not as critical; for example, when the building is closed.</td>
</tr>
<tr>
<td><strong>Night setback offset</strong></td>
<td>(0.0 to 50.0) The amount by which the cooling setpoint (set on previous page) is to be raised when night setback schedules (next page) are in effect.</td>
</tr>
<tr>
<td><strong>Override switch</strong></td>
<td>(List box: Yes, No) Whether or not there is a switch to override night setback.</td>
</tr>
<tr>
<td><strong>Override duration</strong></td>
<td>(0 to 1439) The number of minutes after, activation of the override switch, that night setback will be overridden.</td>
</tr>
<tr>
<td><strong>Num of schedules</strong></td>
<td>(0 to 8) The number of cooling night setback schedules. Schedules are entered on the following page(s) reached by using the PG DN key.</td>
</tr>
</tbody>
</table>

**RTU Heating configuration**

Heating configuration for rooftop units begins with selection of **Heating** from the rooftop configuration menu.
Number of zone sensors (0 to 5) The number of zone sensors for the rooftop. Changing this number will also change the number of zone sensors in the first line of the first cooling configuration screen.

Controlling sensor (List box:)
- **Min Temp**: Control will be based on the lowest value of all temperature sensors in the unit’s zone.
- **Max Temp**: Control will be based on the highest value of all of the temperature sensors in the unit’s zone.
- **Average**: Control will be based on the average of all the temperature sensors in the unit’s zone.
- **Zone Temp 1-1** (etc.): (each zone temperature sensor will be available as a choice in the list) Control will be based on the single selected temperature sensor.

Num of heat reclm stages (0 to 2) The number of stages of heat reclaim in the rooftop.

Target temp. stage 1 [There will be a target and delays for each stage configured] (0.0 to 100.0) The target temperature for the heat reclaim stage.

Pre delay: (0 to 60) The number of minutes after target minus range is reached before the stage will be turned on.

Post delay: (0 to 60) The number of minutes after target plus range is reached that the stage will be turned off.

Range +/- (0.0 to 9.9) The range applied to target prior for control actions. See preceding two settings.

Auxiliary Heat type (List box:)
- **Staging**: Auxiliary heat is staged.
- **None**: There is no auxiliary heat.
- **Analog valve**: Auxiliary heat is regulated by a modulating valve.

Fan speed (List box: High Speed, Low Speed) The fan speed for
heating.

Night setback
(List box: Yes, No) Whether or not there is to be a night setback for heat.

Night setback offset
(0.0 to 50.0) The amount by which the heating setpoint (set on previous page) is to be lowered during times when night setback is scheduled.

Override switch
(List box: Yes, No) Whether or not there is a night setback override switch.

Override duration
(0 to 1439) The number of minutes after operation of the override switch that night setback will be overridden.

Num of schedules
(0 to 8) The number of night setback schedules. Schedules are entered on the last page(s) reached by using the PG DN key.

High supply temp lockout
(List box: Yes, No) Whether or not heating is to be locked out above a supply air temperature to be specified on the following line.

Lockout above
(0.0 to 999.9) Above this temperature plus deadband (next field) heating will be shut down.

Deadband
(0.0 to 50.0) The number of degrees above the lockout setting where heating will be shut down. Also, the number of degrees below the lockout setpoint where heating will be allowed after being locked out.

Num of aux heat stages
(0 to 5) The number of auxiliary heating stages in this HVAC unit.

Target temp. for stage
(0.0 to 99.9) A separate field for each of the stages in the unit.

Range +/-
(0.0 to 9.9) The range selected creates a dead band. Heat will cut in at target minus range, and cut out at target plus range.
Pre delay for stage (0 to 60) The number of minutes that must elapse after target plus range is reached before the stage will come on. There is one field for each stage.

Post delay for stage (0 to 60) The number of minutes that must elapse after target minus range is reached before the stage will be turned off. There is one field for each stage.

Lockout aux ht. in setbk (List box: Yes, No) Whether or not auxiliary heat is to be locked out during hours when setback is effective.

Ambient heat lockout (List box: Yes, No) Whether or not heat is to be locked out based on ambient temperature.

No heat above (0.0 to 100.0) Auxiliary heat will be locked out above this temperature plus range (next line). Heat will be allowed on again when ambient temperature has fallen to lockout minus range.

Range +/- (0.0 to 9.9) The range selected creates a dead band around the lockout temperature. Heat will be locked out at lockout temperature plus range, and once locked out will be allowed on at ambient lockout minus range.

RTU Heating auxiliary heat configuration, p2: analog valve strategy With an analog gas valve selected, the second heating page looks instead like this:

```
Aux heat target temp.......? 60°F
Pre Delay..................? 60 min
Post delay..................? 60 min
Lockout aux ht. in setbk? Yes
Amb heat lockout............? Yes
No heat above..............? 0.0°F
Range +/-....................? 2.0°F
Lowincare Position.........? 0.0 %
Lowincare Duration........? 0 min
Max valve opening..........? 95.0 %
Min valve opening.........? 25.0 %
Degrees to max opening...? 4°
```

Aux heat target temp (-50.0 to 100.0) The temperature you want to maintain at the zone sensor.

Pre delay (0 to 60) The number of minutes that must elapse after target plus range is reached before the analog valve will open.

Post delay (0 to 60) The number of minutes that must elapse after target minus range is reached before the analog valve will be closed.

Lockout aux ht. in setbk (List box: Yes, No) Whether or not auxiliary heat is to be locked out during hours when setback is effective.

Ambient heat lockout (List box: Yes, No) Whether or not heat is to be
No heat above
(0.0 to 100.0) Auxiliary heat will be locked out above this temperature plus range (next line). Heat will be allowed on again when ambient temperature has fallen to lockout minus range.

Range +/-
(0.0 to 999.9) The range selected creates a dead band around the lockout temperature. Heat will be locked out at lockout temperature plus range, and once locked out will be allowed on at ambient lockout minus range.

Low Fire Position
(0.0 to 100.0) The percentage of valve opening when ignition occurs.

Low Fire Duration
(1 to 20) The number of minutes the valve will be maintained at low fire duration before beginning to modulate.

Max valve opening
(50.0 to 100.0) Sets the maximum valve opening allowed.

Min valve opening
(0.0 to 75.0) Sets the maximum valve opening allowed.

Degrees to max opening
(0 to 6) The number of degrees of rotation of the valve spindle from minimum to maximum percentage.

RTU dehumidification configuration
Begin by selecting Dehumidify from the Configure RTU menu.

Dehumidification type
(List box: None, Cooling, Dessicant Whl) The type of dehumidification used.

Rclm heat during dehumid
(List box: Yes, No) Whether or not heat reclaim is allowed during dehumidification.

Aux heat during dehumid
(List box: Yes, No) Whether or not auxiliary heat is allowed during dehumidification.

Control dehumid. on
(Dewpoint: Dehumidification will be controlled based on a specified dewpoint target. A dewpoint sensor is required.)
Humidity: Dehumidification will be controlled based on a specified humidity target. A humidity sensor is required.

Calc Dewpt: Dehumidification will be controlled based on a specified dewpoint target, which will be compared with a dewpoint calculated from zone temperature and humidity. Both zone temperature and humidity sensors must be installed.

Control sensor

(List box, if controlled by dewpoint or humidity only, and if there are multiple sensors:)

Min Humidity or Min dewpoint: Control will be based on the lowest-reading of a group of sensors.

Max Humidity or Max dewpoint: Control will be based on the highest-reading of a group of sensors.

Average: Control will be based on the average of a group of sensors.

Dewpoint 1-1 (etc.) Any single dewpoint sensor can be selected.

Humidity 1-1 (etc.) Any single humidity sensor can be selected.

Control humidity sensor

(List box similar to the preceding; appears only when using Calc Dewpt as the control strategy.)

Control temp sensor

(List box similar to the preceding; appears only when using Calc Dewpt as the control strategy.)

Target

(0.0 to 100.0) The control target in percent relative humidity or dewpoint degrees depending on the strategy chosen above.

Target differential

(0.1 to 15.0) The differential forms a deadband above and below the target in which no control actions are taken. Dehumidification will be turned on at target plus differential and turned off at target minus differential.

Pre delay for stage

(0 to 60) (Not present when dessicant wheel is configured) The number of minutes that must elapse after target plus range is reached before the stage will come on. There is one field for each stage.

Post delay for stage

(0 to 60) (Not present when dessicant wheel is configured) The number of minutes that must elapse after target minus range is reached before the stage will be turned off. There is one field for each stage.

Cooling low limit

(0.0 to 100.0) If zone temperature is below this limit, dehumidification will be disallowed.
Fan speed (List box: Low Speed, High Speed) The fan speed during dehumidification.

Monitor outside humidity (List box: Yes, No) Whether or not to monitor outside humidity on status screens for this RTU.

Monitor wheel rotation (List box: Yes, No) (Present only when dessicant wheel is configured) Whether or not the dehumidification target is to be raised by an offset (next line)

Night setback (List box: Yes, No) Whether or not the dehumidification target is to be raised by an offset (next line) according to a schedule or schedules on the next page(s).

Night setback offset (0.0 to 100.0) The amount by which the dehumidification setpoint (set on previous page) is to be raised during night setback hours (as set on the following schedule page).

Num of schedules (0 to 8) The number of night setback schedules desired on the following schedule page(s).

RTU Air Damper configuration For air damper configuration, select Air Damper from the Configure RTU menu.
Air Damper
(List box: Yes, No) Whether or not there is a controlled air damper.

Ambient temp lockout
(List box: Yes, No) Whether or not the air damper is to be locked out based on ambient temperature.

No air damper below
(0.0 to 100.0) The air damper will be locked out below this temperature minus range (next line). The air damper will be allowed to open again when ambient temperature has risen to lockout plus range.

Range +/-
(0.0 to 9.9) The range selected creates a dead band around the lockout temperature. The air damper will be locked out at lockout temperature minus range, and once locked out will be allowed to open at ambient lockout plus range.

Num of schedules
(0 to 8) The number of schedules that will be created (below, and on following pages if needed) for air damper operation.

RTU Alarms configuration
Alarms can be for any of the following, in accordance with the Appendix on alarms.
High zone temp
for each configured zone
Low zone temp
for each configured zone
High humidity
for each configured RH sensor
High supply temp
HVAC fan down
for each fan speed
HVAC phase loss
for this unit’s phase loss detector
HVAC smoke
for this unit’s smoke detector
HVAC fire
for this unit’s fire detector

RTU Board & Points configuration
See the Appendix on Board & Points
AHU Configuration

When you press the <Setup> button for an AHU unit, the menu that appears looks like this:

![AHU Configuration Menu](image)

Only the fan and outside air coil configuration for AHUs is different from configuration for RTUs that was presented in the previous section.

AHU fan configuration

There are two pages for AHU fan configuration:

![AHU Fan Configuration Page 1](image)

**Fan type** (List box:)

1-Speed: The unit has a single-speed fan.

2-Speed: The unit has a two-speed fan.

Variable VO: Fan speed is variable, with a drive controlled by an analog output board (variable output board).

Variable VLT: A variable speed fan is controlled by a Danfoss VLT adjustable frequency drive.
**Fan control OPEN hours** (List box:)
- **Continuous**: The fan will run continuously during open hours. Store open hours are defined in the Store Info screens.
- **On demand**: The fan will run on demand during open hours, whenever heating, cooling, dehumidification, or venting is called for.

**Fan control CLOSED hours** (List box:)
- **Continuous**: The fan will run continuously during hours when the store is not open. Store open hours are defined in the Store Info screens.
- **On demand**: The fan will run on demand during hours when the store is not open, whenever heating, cooling, dehumidification, or venting is called for.

**Post delay**
(0 to 60) The number of minutes the fan will run after the last stage of heating, cooling, dehumidification, or venting is turned off.

**Heat ramp up if LAT >**
(40.0 to 150.0) When heating is on, fan speed will be ramped up when LAT (leaving air temperature) is greater than this setpoint.

**Cool ramp up if LAT <**
(40.0 to 70.0) When cooling is on, fan speed will be ramped up when LAT (leaving air temperature) is less than this setpoint.

**Dehm ramp up if LAT <**
(30.0 to 60.0) When dehumidification is on, fan speed will be ramped up when LAT (leaving air temperature) is less than this setpoint.

**Speed:**
- **Inverter**
  Min: (0.0 to 70.0) Max: (50.0 to 130.0) The highest and lowest percent of rated maximum speed (last line on the screen) that the inverter will be allowed to drive the fan motor.

- **Heating**
  Min: (10.0 to 100.0) Max: (50.0 to 130.0) The highest and lowest percent of rated maximum speed (last line on the screen) that the inverter will be allowed to drive the fan motor when heating is on.

- **Cooling**
  Min: (10.0 to 100.0) Max: (50.0 to 130.0) The highest and lowest percent of rated maximum speed (last line on the screen) that the inverter will be allowed to drive the fan motor when cooling is on.

- **Dehumidification**
  Min: (10.0 to 100.0) Max: (50.0 to 130.0) The highest and lowest percent of rated maximum speed (last line on the screen) that the inverter will be allowed to drive the fan motor when dehumidification is on.

- **Rpm at max speed**
  (1 to 9999) The rated maximum speed of the fan motor, from the data plate.

**Second page**

**Reaction Time**
(1 to 20) This setting together with the next regulate the sensitivity of speed control. These should be left at the default settings and should only changed by a Danfoss-trained technician.
<table>
<thead>
<tr>
<th>Parameter</th>
<th>Setting/Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Algorithm Interval</strong></td>
<td>(1 to 15) This setting together with the preceding one regulate the sensitivity of speed control. These should be left at the default settings and should only be changed by a Danfoss-trained technician.</td>
</tr>
<tr>
<td><strong>Inverter max resets</strong></td>
<td>(0 to 10) The number of reset attempts, when proof is not detected, before the variable speed drive will be placed in override.</td>
</tr>
<tr>
<td><strong>Inverter reset delay</strong></td>
<td>(0 to 600) The number of seconds that must elapse between resets.</td>
</tr>
<tr>
<td><strong>Inverter proof delay</strong></td>
<td>(0 to 600) The number of seconds that must elapse after proof is not detected, before a reset attempt.</td>
</tr>
<tr>
<td><strong>Monitor phase loss</strong></td>
<td>(List box: Yes, No) Whether or not phase loss will be monitored.</td>
</tr>
<tr>
<td><strong>Shutdown on phase loss</strong></td>
<td>(List box: Yes, No) Whether or not the unit is to be shut down when its phase loss detector input is on.</td>
</tr>
<tr>
<td><strong>shutdown on smoke detect</strong></td>
<td>(List box: Yes, No) Whether or not the unit is to be shut down when its smoke detector is on.</td>
</tr>
<tr>
<td><strong>shutdown on fire alarm</strong></td>
<td>(List box: Yes, No) Whether or not the unit is to be shut down when a monitored fire alarm occurs.</td>
</tr>
<tr>
<td><strong>No of return sensors</strong></td>
<td>(0 to 5) The number of return air temperature sensors.</td>
</tr>
<tr>
<td><strong>Controlling sensor</strong></td>
<td>(List box:)</td>
</tr>
<tr>
<td><strong>Min Temp</strong></td>
<td>Control will be based on the lowest value of all of the return air temperature sensors.</td>
</tr>
<tr>
<td><strong>Max Temp</strong></td>
<td>Control will be based on the highest value of all of the return air temperature sensors.</td>
</tr>
<tr>
<td><strong>Average</strong></td>
<td>Control will be based on the average of all the return air sensors.</td>
</tr>
<tr>
<td><strong>Return Air 1-1</strong></td>
<td>(etc.): (each return air temperature sensor will be available as a choice in the list) Control will be based on the single selected sensor.</td>
</tr>
<tr>
<td><strong>No of supply sensors</strong></td>
<td>(0 to 5) The number of supply air temperature sensors.</td>
</tr>
<tr>
<td><strong>Controlling sensor</strong></td>
<td>(List box:)</td>
</tr>
<tr>
<td><strong>Min Temp</strong></td>
<td>Control will be based on the lowest value of all of the supply air temperature sensors.</td>
</tr>
<tr>
<td><strong>Max Temp</strong></td>
<td>Control will be based on the highest value of all of the supply air temperature sensors.</td>
</tr>
<tr>
<td><strong>Average</strong></td>
<td>Control will be based on the average of all the supply air sensors.</td>
</tr>
<tr>
<td><strong>Supply Air 1-1</strong></td>
<td>(etc.): (each supply air temperature sensor will be available as a choice in the list) Control will be based on the single selected sensor.</td>
</tr>
</tbody>
</table>

**AHU outside air coil configuration**

When outside air coils are configured, the first cooling screen looks like this:
Number of zone sensors  
(0 to 5) The number of zone sensors in the area of the store served by this HVAC unit.

Controlling sensor  
(List box)  
Min Temp: Control will be based on the lowest value of all temperature sensors in the unit’s zone.  
Max Temp: Control will be based on the highest value of all of the temperature sensors in the unit’s zone.  
Average: Control will be based on the average of all the temperature sensors in the unit’s zone.  
Zone Temp 1-1 (etc.): (each zone temperature sensor will be available as a choice in the list) Control will be based on the single selected temperature sensor.

Num of cooling stages  
(0 to 6) The number of cooling stages in this HVAC unit. Includes the number of outside air coils.

Num of outside air coils  
(0 to 2) The number of outside air coils in this HVAC unit.

Consider dewpoint  
(List box: Yes, No) If Yes is chosen, the leaving air temperature at the outside air coil needs to be less than outside dewpoint for the coil to be active.

OA Coil LAT low limit  
(20.0 to 60.0) The leaving air temperature at and above which outside air coils are enabled.

Enable OA Coil #1 above  
(40.0 to 95.0) (Question is repeated for OA coil #2, if present) The leaving air temperature at and above which the named outside air coil 1 is enabled.

Target temp. for stage  
(0.0 to 100.0) (One target per cooling stage excluding outside air coil stages) The target temperature that you want the first stage to maintain at the zone sensor.

Range +/-  
(0.0 to 9.9) The range selected creates a dead band. For example, if the target is 72 and the range is 2, the stage will come on at 74, and will not be turned off until the temperature reaches 70.
**Pre delay for stage**  
(0 to 60) (One setting per cooling stage.) The number of minutes that must elapse after target plus range is reached before the stage will come on.

**Post delay for stage**  
(0 to 60) (One setting per cooling stage.) The number of minutes that must elapse after target - range is reached before the stage will be turned off. There is one field for each stage.

**RTC configuration**

The Danfoss RTC control board can function as a stand-alone or as a node on the I/O network of an AKC 55 system. To begin configuration, select RTC as the type of unit in the Configure HVAC menu. A menu for the unit is then presented by the system. Selecting Fan from the unit brings up the first fan configuration page, shown on the left below; the second page is shown at the right.

**Fan type**

(List box:)

1-Speed: Single-speed fan.

Variable VO: Fan speed is variable, with a drive controlled by the RTC board’s analog output (variable output).

**Fan control OPEN hours**

(List box:)

Continuous: The fan will run continuously during open hours. Store open hours are defined in the Store Info screens.

On demand: The fan will run on demand during open hours, whenever heating, cooling, dehumidification, or venting is called for.

**Fan control CLOSED hours**

(List box:)

Continuous: The fan will run continuously during hours when the store is not open. Store open hours are defined in the Store Info screens.

On demand: The fan will run on demand during hours when the store is not open, whenever heating, cooling, dehumidification, or venting is called for.
Post delay (0 to 60) The number of minutes the fan will run after the last stage of heating, cooling, dehumidification, or venting is turned off.

Heat ramp up if LAT > (40.0 to 150.0) When heating is on, fan speed will be ramped up when LAT (leaving air temperature) is greater than this setpoint.

Cool ramp up if LAT < (40.0 to 70.0) When cooling is on, fan speed will be ramped up when LAT (leaving air temperature) is less than this setpoint.

Dehm ramp up if LAT < (30.0 to 60.0) When dehumidification is on, fan speed will be ramped up when LAT (leaving air temperature) is less than this setpoint.

Aux Heat ramp up if LAT > (0.0 to 100.0) When heating is on, fan speed will be ramped up when LAT (leaving air temperature) is greater than this setpoint.

Speed:
Inverter Min: (0.0 to 70.0) Max: (50.0 to 130.0) The highest and lowest percent of rated maximum speed that the inverter will be allowed to drive the fan motor.

Heating Min: (10.0 to 100.0) Max: (50.0 to 130.0) The highest and lowest percent of rated maximum speed that the inverter will be allowed to drive the fan motor when heating is on.

Cooling Min: (10.0 to 100.0) Max: (50.0 to 130.0) The highest and lowest percent of rated maximum speed that the inverter will be allowed to drive the fan motor when cooling is on.

Dehumidification Min: (10.0 to 100.0) Max: (50.0 to 130.0) The highest and lowest percent of rated maximum speed that the inverter will be allowed to drive the fan motor when dehumidification is on.

Speed control increment (0.0 to 20.0) The increment, in percent, by which variable speed is increased when called for by an increase in load.

Speed control decrement (0.0 to 20.0) The decrement, in percent, by which variable speed is decreased when called for by a decrease in load.

Variable Output range (List box:)
0-5 Volts: Sets the RTC board’s analog output for a variable speed drive requiring 0-5 volts.
0-10 Volts: Sets the RTC board’s analog output for a variable speed drive requiring 0-10 volts.

RTC fan, page 2

Reaction Time (1 to 20) This setting together with the next regulates the sensitivity of speed control. These should be left at the default settings and should only changed by a Danfoss-trained technician.

Algorithm Interval (1 to 15) This setting together with the preceding one regulate the sensitivity of speed control. These should be left at the default settings and should only changed by a Danfoss-trained technician.

Inverter max resets (0 to 10) The number of reset attempts, when proof is
Inverter reset delay  
0 to 600  The number of seconds that must elapse between resets.

Inverter proof delay  
0 to 600  The number of seconds that must elapse after proof is not detected, before a reset attempt.

Monitor phase loss  
(List box: Yes, No) Whether or not phase loss will be monitored.

Shutdown on phase loss  
(List box: Yes, No) Whether or not the unit is to be shut down when its phase loss detector input is on.

Shutdown on smoke detect  
(List box: Yes, No) Whether or not the unit is to be shut down when its smoke detector is on.

Shutdown on fire alarm  
(List box: Yes, No) Whether or not the unit is to be shut down when a monitored fire alarm occurs.

RTC Cooling configuration  
Select Cooling from the configuration menu for an HVAC unit of type RTC:

Num of cooling stages  
0 to 3  The number of cooling stages in this HVAC unit.

Control cooling using  
(List box:)

- **Return Air**: Cooling will be controlled to satisfy a return air target temperature.
- **Average**: Cooling will be controlled to satisfy an average zone temperature target.
- **High**: Cooling will be controlled to satisfy a zone target temperature for the highest of a number of zone temperature sensors.
- **Zone 1 (etc.)**: (each supply zone temperature sensor will be available as a choice in the list) Control will be based on the single selected sensor.

Target differential  
0.1 to 100.0  The differential selected creates a control dead band around the target temperature. For example, if the target is 72 and the range is 2, the

Not detected, before the variable speed drive will be placed in override.
stage will come on at 74, and will not be turned off until the temperature reaches 70.

**Target temp. for stage:**
(0.0 to 99.9) A separate field for each of the stages in the unit.

**Pre delay for stage**
(0 to 15) The number of minutes that must elapse after target plus range is reached before the stage will come on. There is one field for each stage.

**Post delay for stage**
(0 to 15) The number of minutes that must elapse after target minus range is reached before the stage will be turned off. There is one field for each stage.

**Humidity adjusts target:**
(List box: Yes, No) Whether or not humidity will adjust the cooling target temperature.

**Humidity sensor**
(List box:)
- **Average:** Cooling target modification will be based on an average of two humidity sensors.
- **High:** Cooling target modification will be based on the highest of two humidity sensors.
- **Zone 1** (etc.): (each zone humidity sensor will be available as a choice in the list) Cooling target modification will be based on the single selected sensor.

**Dynamic offset**
(-99.9 to 99.9) The number of degrees by which humidity can adjust the target temperatures. Within the range of humidity limiting the offset, a linear relationship will exist between humidity and offset. (see also next two parameters).

**No offset <**
(-99.9 to 99.9) The relative humidity below which there will be no offset of target temperature.

**Full >**
(-99.9 to 99.9) The relative humidity above which the maximum offset of target temperature by humidity will be applied.

**Ambient temp lockout**
(List box: Yes, No) Whether or not cooling is to be locked out below a set ambient temperature (next line).

**No cooling below**
(0.0 to 100.0) The ambient temperature below which cooling will be locked out.

**Night setback**
(List box: Yes, No) Whether or not the cooling setpoints are to be raised by an offset (next line) when the store is closed according to a schedule or schedules configured in the Store Info screens.

**Night setback offset**
(-50.0 to 50.0) The amount by which the cooling setpoint (set on previous page) is to be raised during store closed hours (as set in the Store Info screen).

**Minimum ON time**
(0 to 60) The minimum number of minutes cooling must run after being turned on before being turned off.

**Minimum OFF time**
(0 to 60) The minimum number of minutes cooling must remain off after being turned off before being turned on.
RTC Heating configuration

Num of heating stages: (0 to 3) The number of stages of heat in the unit.
Control heating using: (List box:)
  - **Return Air**: Heating will be controlled to satisfy a return air target temperature.
  - **Average**: Heating will be controlled to satisfy an average zone temperature target.
  - **Low**: Heating will be controlled to satisfy a zone target temperature for the lowest of a number of zone temperature sensors.
  - **Zone 1 (etc.)**: (each supply zone temperature sensor will be available as a choice in the list) Control will be based on the single selected sensor.

Target differential: (0.1 to 100.0) The differential selected creates a control dead band around the target temperature. For example, if the target is 72 and the range is 2, the stage will come on at 70, and will not be turned off until the temperature reaches 72. The pre-delay and post-delay must also be satisfied.

Target temp. for stage: (-50.0 to 99.9) A separate field for each of the stages in the unit.

Pre delay for stage: (0 to 15) The number of minutes that must elapse after target plus range is reached before the stage will come on. There is one field for each stage.

Post delay for stage: (0 to 15) The number of minutes that must elapse after target minus range is reached before the stage will be turned off. There is one field for each stage.

Ambient temp lockout: (List box: Yes, No) Whether or not heating is to be locked out above a set ambient temperature (next line).

No heat above: (0.0 to 100.0) The ambient temperature above which heating will be locked out.

Night setback: (List box: Yes, No) Whether or not the heating...
Night setback offset

(-50.0 to 50.0) The amount by which the heating setpoint (set on previous page) is to be lowered during non-scheduled hours (as set in the Store Info screens).

Minimum ON time

(0 to 60) The minimum number of minutes heating must run after being turned on before being turned off.

Minimum OFF time

(0 to 60) The minimum number of minutes heating must remain off after being turned off before being turned on. See preceding two settings.

RTC dehumidification configuration

There are two pages of dehumidification configuration settings:

**Dehumidification type** (List box: None, Cooling) The type of dehumidification used.

**Aux heat during dehumid** (List box: Yes, No) Whether or not auxiliary heat is allowed during dehumidification.

**Control dehumid. on** (List box:)

- **Humidity**: Dehumidification will be controlled based on a specified humidity target. A humidity sensor is required.
- **Calc Dewpt**: Dehumidification will be controlled based on a specified dewpoint target, which will be compared with a dewpoint calculated from zone temperature and humidity. Both zone temperature and humidity sensors must be installed.

**Control dehumid. using** (List box, if controlled by dewpoint or humidity only, and if there are multiple sensors:)

- **Average**: Control will be based on the average of a group of sensors.
- **High**: The high value of a group of sensors will be
Zone 1 (etc.): Any single humidity sensor or combination of sensors will be used.

**Target**
(0.0 to 100.0) The humidity or dewpoint value desired at the controlling sensor or combination specified above.

**Target differential**
(0.1 to 15.0) The differential forms a deadband above and below the target in which no control actions are taken. Dehumidification will be turned on at target plus differential and turned off at target minus differential.

**Pre delay for stage**
(0 to 60) The number of minutes that must elapse after target plus range is reached before the stage will come on. There is one field for each stage.

**Post delay for stage**
(0 to 60) The number of minutes that must elapse after target minus range is reached before the stage will be turned off. There is one field for each stage.

**Cooling low limit**
(0.0 to 100.0) The temperature at and below which dehumidification is disallowed.

**Night setback**
(List box: Yes, No) Whether or not the dehumidification target is to be raised by an offset (next line) during store closed hours according to a schedule or schedules in the Store Info screens.

**Night setback offset**
(0.0 to 100.0) The amount by which the dehumidification setpoint (set on previous page) is to be raised during store closed hours according to a schedule or schedules in the Store Info screens.

---

**RTC Air Damper configuration**
You will use one of two pages, depending on whether economizer control is used:

**Air Damper**
(List box: Yes, No) Whether or not there is a controlled air damper.

**Control method**
(List box:)

---

<table>
<thead>
<tr>
<th>10/13/2002 09:59:51 AM</th>
<th>10/29/2002 04:00:13 PM</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Air Damper</strong></td>
<td><strong>Air Damper</strong></td>
</tr>
<tr>
<td>..........................? Yes</td>
<td>..........................? Yes</td>
</tr>
<tr>
<td><strong>Control method</strong></td>
<td><strong>Control method</strong></td>
</tr>
<tr>
<td>..........................? Run ON</td>
<td>..........................? Economizer</td>
</tr>
<tr>
<td><strong>Ambient temp lockout</strong>? Yes</td>
<td><strong>Enthalpy</strong></td>
</tr>
<tr>
<td><strong>Cooling low limit</strong></td>
<td><strong>Humidity sensor to use</strong></td>
</tr>
<tr>
<td>..........................? 35.0 °F</td>
<td>..........................? Average</td>
</tr>
<tr>
<td><strong>Use CO2 override</strong></td>
<td><strong>Enthalpy differential</strong>? 0.0 BTU/lb</td>
</tr>
<tr>
<td>..........................? Yes</td>
<td><strong>Use CO2 override</strong></td>
</tr>
<tr>
<td><strong>Target CO2 Amount</strong></td>
<td>..........................? Yes</td>
</tr>
<tr>
<td>..........................? 1000 ppm</td>
<td><strong>Target CO2 Amount</strong></td>
</tr>
<tr>
<td><strong>Damper Controlled by</strong>? Relay Output</td>
<td>..........................? 1000 ppm</td>
</tr>
<tr>
<td><strong>Min Damper Position</strong></td>
<td>..........................? 10.0 %</td>
</tr>
<tr>
<td>..........................? 100.0 %</td>
<td><strong>Max Damper Position</strong></td>
</tr>
<tr>
<td><strong>Variable Output range</strong>? 0-10 Volts</td>
<td>..........................? 100.0 %</td>
</tr>
<tr>
<td><strong>Reaction Time</strong></td>
<td>..........................? 8</td>
</tr>
<tr>
<td>..........................? s</td>
<td><strong>Algorithmic Interval</strong></td>
</tr>
<tr>
<td><strong>Algorithmic Interval</strong></td>
<td>..........................? 10</td>
</tr>
</tbody>
</table>
Fan ON: The damper will be open whenever the fan is on.

Economizer: Economizer control will be used, based on either humidity or enthalpy.

Schedule: The air damper will be operated according to a schedule or schedules (entered on the next page).

CO2 Ctrl: The air damper will be operated based on the CO2 level in the HVAC unit’s zone.

Ambient temp lockout [appears when any control method except economizer is used] (List box: Yes, No) Whether or not the air damper is to be locked out based on ambient temperature.

No air damper below [appears when any control method except economizer is used and question above is answered Yes] (0.0 to 100.0) The air damper will be locked out below this temperature.

Control economizer on (List box:) (appears only if economizer control is selected)

Humidity: The air damper will be controlled based on humidity.

Enthalpy: The air damper will be controlled based on calculated enthalpy.

Humidity sensor to use (List box:)

Average: Enthalpy or humidity control will be based on the average of two zone humidity sensors.

High: Enthalpy or humidity control will be based on the highest of two humidity sensors.

Zone 1 (etc.): (each zone humidity sensor will be available as a choice in the list) Enthalpy or humidity control will be based on the single selected humidity sensor.

Lockout if outside above (0.0 to 100.0) The air damper will be locked out (shut) if the outside temperature is above this setting.

Enthalpy differential (-99.9 to 99.9) In enthalpy control, when outside enthalpy is less than inside enthalpy by this differential, the damper will be allowed to open.

Use CO2 override (List box: Yes, No) Whether or not damper control is to be overridden based on CO2 content of inside air.

Target CO2 amount (0 to 2000) When CO2 override is enabled, the CO2 level at which the damper is allowed open to bring in fresh air.

Damper Controlled by (List box:)

Variable Out: The damper is modulated by the RTCs analog output (variable output).

Relay Output: The damper is opened by a digital output (relay output).

Min Damper Position (0.0 to 100.0) When a variable out is controlling, the minimum percentage of damper opening allowed.

Max Damper Position (0.0 to 100.0) When a variable out is controlling, the maximum percentage of damper opening allowed.
Variable Output range
(List box:) When a variable out is controlling, the minimum percentage of damper opening allowed.

0-5 Volts: Sets the RTC board’s analog output for an output over the range 0-5 volts.

0-10 Volts: Sets the RTC board’s analog output for an output over the range 0-10 volts.

Reaction Time
(1 to 99) This setting, together with the next, determines the sensitivity of variable output control. It should be adjusted only by a Danfoss-trained technician.

Algorithm Interval
(1 to 15) This setting, together with the previous one, determines the sensitivity of variable output control. It should be adjusted only by a Danfoss-trained technician.

RTC schedules
The RTC schedules screen(s) allow entry of schedules for operation of the rooftop.

RTC alarm configuration
Alarms can be for any of the following, in accordance with the Appendix on alarms.
- Cooling failure
- Heating failure
- Sensor discard
- Power failure
- Filter (elapsed)
- Filter (runtime)
- HVAC smoke for this unit’s smoke detector
- HVAC fire for this unit’s fire detector

Sensor alarms can be set for any of the zone or humidity sensors, for any relay output, or for any digital input (on-off input).

RTC I/O Points configuration
These are configured in a manner unlike the Board & Points entries for other devices. Select RTC I/O Points from the RTC configuration menu and the first screen, Relay Outputs, appears.
Notice the set of icons across the bottom of the screen. These will allow you to reach the other configuration screens and to initialize the RTC. From left to right, the icons represent Relay Outputs (digital outputs), Sensor Inputs (analog inputs), On-off Inputs (digital inputs), Variable Outputs (analog outputs), and finally, RTC Controls (RTC Address and Init).

### Configuring RTC I/O

**Relay Outputs**

Here are the fields for Relay Outputs:

**Point**

(1 to 8) The number of the point.

**Name**

(Label field, contents depend on system configuration) The name of the point. The names are fixed, since the hardware points on the RTC board are dedicated, and can control only a single type of device as follows:

- Point 1: Fan
- Point 2: Economizer
- Point 3: Cool 1
- Point 4: Cool 2
- Point 5: Cool 3
- Point 6: Heat 1
- Point 7: Heat 2
- Point 8: Heat 3

**On**

*(List field:)*

- N-Open: The point is wired through normally open contacts.
- N-Open: The point is wired through normally open contacts.

### Configuring RTC I/O

**Sensor Inputs**

Here is the screen for sensor inputs, reached with the second icon from left:
**Point (1 to 8)** The number of the point.

**Name** (Label field, contents depend on system configuration)

The name of the point. The names are fixed, since the hardware points on the RTC board are dedicated, and can serve only for the listed devices. The names always appear as in the illustration above, whether the sensor is used or not.

**Config** (List field, one for each point:)

Yes: The sensor is configured. It should be installed if this answer is given, or the configuration should be changed.

No: The sensor is not configured. Its value can not be used by the controller.

Rec: The sensor value is to be received from another node (other than this RTC board) on the AKC 55 I/O network. The board and point that is broadcasting the value must be given in the next column.

**AKC 55 Bd-Pt** (Address field) If the sensor value is received from another node on the AKC 55 I/O network, enter here the address of the point that is to be received.

---

<table>
<thead>
<tr>
<th>Point</th>
<th>Name</th>
<th>Config</th>
<th>AKC 55 Bd-Pt</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Zone 1 Humidity</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>DO2 Sensor</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Outside Humidity</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Zone 1 Temp</td>
<td>Rec 00-0</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Zone 2 Temp</td>
<td>Rec 00-0</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Outside Temp</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Supply Air Temp</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Return Air Temp</td>
<td>No</td>
<td></td>
</tr>
</tbody>
</table>

**Configuring RTC I/O on-off inputs**

Here is the screen for on-off (digital) inputs, reached with the third icon from left. Note that the screen is divided in two parts: the upper half deals with inputs available on the RTC board, and the lower half shows inputs that can be received from other nodes on the I/O network. The names appear whether or not the points are configured or used.
First, the RTC Inputs:

**Pt#**
(1 to 8) The number of the point.

**Name**
(Label field, not changeable) The name of the point.

The names are fixed, since the hardware points on the RTC board are dedicated, and can serve only for the listed devices. The names always appear as in the illustration above, whether the input is used or not.

**Config**
(List field, one for each point:)

**Yes:** The input is configured. It should be wired if this answer is given, or the configuration should be changed.

**No:** The input is not configured. Its state can not be used by the controller.

**Rec:** The input value is to be received from another node (other than this RTC board) on the AKC 55 I/O network. The board and point that is broadcasting the state of the input must be given in the next column.

**AKC 55 Bd-Pt**
(Address field) If the input state is received from another node on the AKC 55 I/O network, enter here the address of the point that is to be received.

In the lower half of the screen, the AKC 55 Inputs:

**Name**
(Label field, not changeable) The name of the point.

The RTC board’s software can only use the listed inputs from the AKC 55 I/O network. The names always appear as in the illustration above, whether the input is used or not.

**Bcast**
(List field, one for each point:)

**No:** The input is not configured or its state is not to be used by the controller.

**Rec:** The input value is to be received from another node (other than this RTC board) on the AKC 55 I/O network. The board and point that is broadcasting the
state of the input must be given in the next column.

**On**

**(List field:)**

**Voltage:** The input state will read ON when the point senses voltage.

**No Voltage:** The input state will read ON when the point senses no voltage.

**Bd-Pt**

**(Address field)** If the input state is received from another node on the AKC 55 I/O network, enter here the address of the point that is to be received.

Configuring RTC I/O variable outputs

Here is the screen for variable (analog) outputs, reached with the fourth icon from left. The names appear if the points are configured.

![Variable Outputs Screen](image)

<table>
<thead>
<tr>
<th>Points</th>
<th>Name</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Fan Speed V0</td>
<td>0-10 Volt</td>
</tr>
<tr>
<td>2</td>
<td>CO2 Controlled V0</td>
<td>0-3 Volts</td>
</tr>
</tbody>
</table>

**(Pt#)**

(1 or 2) The number of the point.

**(Name)**

(Label field, not changeable) The name of the point. The names are fixed, since the hardware points on the RTC board are dedicated, and can serve only for the listed outputs. The names always appear as in the illustration above, whether the input is used or not.

**(Range)**

(List field, one for each point:)

**0-10 Volt:** The output will supply 0-10 Volts.

**0-5 Volts:** The output will supply 0-5 Volts. The input is configured. It should be wired if this

**RTC Address and Init**

Select the right-most icon on the Configure RTC I/O points screen, and you will see this screen:
In the field labeled address, give the RTC an address from 0 to 99 that is unique among all the RTC nodes on the I/O network for this AKC 55. Remember that there can be only 40 HVAC units per AKC 55.

Any time an RTC node is changed or added, the network must be re-scanned and re-initialized.

After addressing and re-scanning, put the cursor on the Init field and press ENTER. The initialization process will take a few seconds, with a success or failure confirmation message appearing briefly across the bottom of the screen. When successful, configuration is complete.

Danfoss supplies two models of ClimaTECH HVAC controller, the ClimaTECH 65 and the ClimaTECH 1024. Configuration of these two controllers proceeds in the same way. The ClimaTECH 1024 has a larger control capacity.

The ClimaTECH configuration menu appears below:
There are two fan configuration screens, depending on whether the fan is fixed speed or variable speed.

**Fan type**  
(List box: Fixed Speed, Variable VO)  Fans can be single or 2-speed fixed, or variable speed. ClimaTECH controllers have only one analog (variable) output. If you select variable speed here, you will not be able to control an analog gas valve, if any, as a modulating valve.

**Airflow control**  
(List box:)  
**Continuous**: The fan will run continuously.  
**On Demand**: The fan will run only when cooling, heating, or dehumidification is called for.

**High Speed Fan Assignment**  
Fixed speed fans may be 2-speed. Enter, in the **Stage** field for cooling, dehumidification, heat reclaim, and
auxiliary heat, the stage at which you want fan operation to change to high speed.

**Variable Speed Fan**
A setpoint and range are configured for cooling, dehumidification, and heating. The range defines a deadband on either side of the setpoint in which no control action is taken.

- **Setpoint:** (-40.0 to 150.0)
- **Range:** (-40.0 to 150.0)

**Min fan speed**
(0.0 to 100.0) The minimum percentage of rated fan speed allowed.

**Heat + Dehumid fan speed**
(0.0 to 100.0) The percentage of rated fan speed during dehumidification or heating.

**Shutdown on fire alarm**
(List box: Yes, No) [Functional only if the fire alarm has dry contacts wired to a digital input on the ClimaTECH controller or is being broadcast by the AKC 55. The fan will be shut down on occurrence of a fire alarm.]

**Monitor phase loss**
(List box: Yes, No) Whether or not a phase loss detector is monitored.

**Which phase loss monitor**
(List box: All configured phase loss detectors) Select the phase loss detector to monitor.

**Shutdown on phase loss**
(List box: Yes, No) Whether or not the fan is to be shut down on detection of a phase loss by the monitored detector.

**Climatech cooling configuration**

- **Num of cooling stages**
  (0-6) The number of cooling stages in the HVAC unit.
- **Occupied setpoint**
  (0.0 to 150.0) The cooling setpoint during operating hours as configured in the Store Info screen.
- **Unoccupied setpoint**
  (0.0 to 150.0) The cooling setpoint during store closed hours as configured in the Store Info screen.
- **Lockout below ambient**
  (0.0 to 150.0) The outside ambient temperature below which cooling will be locked out.
Delay between stages (0 to 99) The number of minutes after the start of a cooling stage before the next stage can start. Also, the minimum on time for every stage.

ClimaTECH heating configuration

There are two pages of settings for heating configuration:

<table>
<thead>
<tr>
<th>Setting</th>
<th>Configuration 1</th>
<th>Configuration 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Num of heat rclm stages</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Occupied setpoint</td>
<td>0.0°F</td>
<td>0.0°F</td>
</tr>
<tr>
<td>Unoccupied setpoint</td>
<td>0.0°F</td>
<td>0.0°F</td>
</tr>
<tr>
<td>Lockout above ambient</td>
<td>0.0°F</td>
<td>0.0°F</td>
</tr>
<tr>
<td>Delay between stages</td>
<td>1 min</td>
<td>1 min</td>
</tr>
<tr>
<td>Heat reclaim flush start</td>
<td>01:00 AM</td>
<td></td>
</tr>
<tr>
<td>Flush duration</td>
<td>10 min</td>
<td></td>
</tr>
<tr>
<td>Analog gas valve</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Temperature difference</td>
<td>0.0°F</td>
<td></td>
</tr>
<tr>
<td>Min valve opening</td>
<td>05</td>
<td></td>
</tr>
<tr>
<td>Valve delay</td>
<td>0 sec</td>
<td></td>
</tr>
</tbody>
</table>

Num of heat rclm stages (0 to 4) The number of heat reclaim stages.

Occupied setpoint (0.0 to 150.0) The heat reclaim setpoint during operating hours as configured in the Store Info screen.

Unoccupied setpoint (0.0 to 150.0) The heat reclaim setpoint during store closed hours as configured in the Store Info screen.

Lockout above ambient (0.0 to 150.0) The outside ambient temperature above which heat reclaim will be locked out.

Delay between stages (0 to 99) The number of minutes after the start of a heat reclaim stage before the next stage can start. Also, the minimum on time for every stage.

Heat reclaim flush start (Time of day field) The time for heat reclaim flush to begin each day.

Flush duration (0 to 99) The number of minutes’ duration for each heat reclaim flush.

Number of aux heat stages (0 to 4) The number of configured auxiliary heat stages in the HVAC unit.

Occupied setpoint (0.0 to 150.0) The zone temperature setpoint for auxiliary heat during operating hours as configured in the Store Info screen.

Unoccupied setpoint (0.0 to 150.0) The zone temperature setpoint for auxiliary heat during store closed hours as configured in the Store Info screen.

Lockout above ambient (0.0 to 150.0) The outside ambient temperature above which auxiliary heat will be locked out.

Delay between stages (0 to 99) The number of minutes after the start of an auxiliary heat stage before the next stage can start. Also, the minimum on time for every stage.
Analog gas valve

(List box: Yes, No) Whether or not the HVAC unit has a controlled analog gas valve. [ClimaTECH controllers have only one analog (variable) output. If a variable speed fan is configured, an analog gas valve cannot be, and vice versa.]

Temperature difference

(-40.0 to 150.0) The difference between supply air temperature and zone temperature.

Min valve opening

(0 to 100) The minimum percentage of valve opening when auxiliary heat is on.

Valve delay

(0 to 99) The number of seconds after the enabling relay turns on before the analog valve can open.

ClimaTECH dehumidification configuration

| Num of stages | 2 |
|----------------|
| Occupied setpoint | 0.0°F |
| Unoccupied setpoint | 0.0°F |
| Lockout below ambient | 0.0°F |
| Delay between stages | 1 min |
| Aux heat/dehumid lockout | No |

Num of stages

(0 to 6) The number of dehumidification stages.

Occupied setpoint

(-40.0 to 150.0) The dehumidification setpoint during operating hours as configured in the Store Info screen.

Unoccupied setpoint

(-40.0 to 150.0) The dehumidification setpoint during store closed hours as configured in the Store Info screen.

Lockout below ambient

(-40.0 to 150.0) The outside ambient temperature below which dehumidification will be locked out.

Delay between stages

(0 to 99) The number of minutes after the start of a dehumidification stage that must elapse before the next stage can start. Also, the minimum time each stage must run before being turned off.

Aux heat/dehumid lockout

(List field: Yes, No) Whether or not auxiliary heat is to be locked out when dehumidification is running. A yes answer here means that only heat reclaim can be used for reheating during dehumidification.

ClimaTECH economizer configuration
Economizer  (List box: Yes, No) Whether or not there is an economizer function in the HVAC unit.

Outside ambient target  (-40.0 to 150.0) The number of stages of auxiliary heat in the HVAC unit.

Outside dewpoint target  (0.0 to 150.0) The heat reclaim setpoint during store closed hours as configured in the Store Info screen.

ClimaTECH alarm configuration  ClimaTECH alarms are presented differently than most other alarms.

Alarm delay  (0 to 100) The number of minutes after an input reaches trip level that an alarm will be generated. All ClimaTECH alarms have a common alarm delay.

Each alarm has a setting (Normal, Critical, etc.) as explained in the Alarms appendix. A trip level (a temperature, pressure, etc., or on-off state) can be set for each alarm.
ClimaTECH schedule configuration

Because the ClimaTECH can function as a stand-alone, it contains its own schedules. They are set for each day and holiday in the same manner as lighting schedules. Refer to the lighting schedule section for information on setting. If all schedules are set to Relative, and the default zero settings are left for all schedules, then the HVAC unit will operate based on the store open hours set in the Store Info screens.

ClimaTECH I/O configuration

A ClimaTECH unit’s points must be allocated and assigned using the I/O points screens.

ClimaTECH relay outputs

A ClimaTECH 65 can have up to six analog (sensor) inputs, up to six digital (on-off) inputs, and up to five relay outputs. For a ClimaTECH 1024, these capacities are increased to 10, 10, and 24 respectively. It is the purpose of the I/O Points screens to allocate these. An input or output number, from 1 up to the limit of the controller, is entered under the stage number in the case of relay outputs.

ClimaTECH sensor inputs
Zone temp group # (0 to 99) The group to which this ClimaTECH unit belongs for zone temperature. Several ClimaTECH units in a network can be controlled by a single sensor wired to one of them. If this feature is not used, leave group number set to 0.

Inside dewpt group # (0 to 99) The group to which this ClimaTECH unit belongs for dewpoint. Several ClimaTECH units in a network can use a single sensor wired to one of them. If this feature is not used, leave group number set to 0.

Humidity sensor (0.0 to 150.0) The heat reclaim setpoint during store closed hours as configured in the Store Info screen.

Humidity sensor (List box: RH, DP) Whether a relative humidity or dewpoint sensor is used.

Point The sensor wired to each point. If the sensor is not used, leave the Point field set to 0.

Type (List box:) The type of input.

None
TP2
TP1
OI The input is an on-off input.

0-10 Volts This type can be used for any sensor whose output is linear from 0-10 Volts.

Function (List box: Control, Monitor) For zone sensors only, whether the point is being used for control or purely for monitoring.
The third icon from the left at the bottom of any ClimaTECH board & points screen brings up configuration for on-off inputs. At the top of the screen are inputs that may be wired to the ClimaTECH unit itself, and in the lower half are pertinent inputs wired to an AKC 55.

**Point**

The point assigned to each functional input. If the input is not used, leave the Point field set to 0.

**Type**

(List box:) The type of input. Only OI is a valid choice.

- **None**
- **TP2**
- **TP1**
- **OI** The input is an on-off input.
- **0-10 Volts** This type can be used for any sensor whose output is linear from 0-10 Volts.

**Fail**

(List box: Closed, Open) The type of signal that will be received if the drive has a fault.

---

ClimaTECH Address and Init

Select the rightmost icon on the Configure CT I/O points screen, and you will see this screen:
In the field labeled address, give the ClimaTECH node an address from 0 to 99 that is unique among all the ClimaTECH nodes on the I/O network for this AKC 55. Remember that there can be only 32 HVAC units per AKC 55.

After addressing, place the cursor on the Locate field and press ENTER. A message will appear asking you to press the service pin on the ClimaTECH controller. Go to the controller and depress the service pin.

After completing the Locate procedure, place the cursor on the Init field and press ENTER.

Uploading to the AKC 55
If the ClimaTECH controller is configured with a handheld remote control, the configuration data is stored locally. It is not stored in the AKC 55 until uploaded. This is accomplished by placing the cursor on the Upload field and pressing ENTER.

Seasons 4 Smart Coil HVAC Unit configuration
Smart Coil® packaged HVAC systems (manufactured by Seasons 4, Inc.) have some unique configuration requirements. For these units, select SC4 as the type on the Configure HVAC menu. At left below is the SC4 menu. At right is the screen for fan configuration.
Motor delay time (5 to 255) The fan motor runs continuously at low speed. When there is a call for cooling, heating, or dehumidification, the fan switches to high speed after the motor delay set here elapses.

Monitor phase loss (List box: Yes, No) Whether or not a phase loss detector is to be monitored.

Which phase loss monitor (List box) Select from any of the configured phase loss monitors.

Shutdown phase loss (List box: Yes, No) Whether or not the fan is to be shut down on detection of a phase loss.

Shutdown on smoke detect (List box: Yes, No) Whether or not the unit is to be shut down when its smoke detector is on.

Shutdown on fire alarm (List box: Yes, No) Whether or not the unit is to be shut down when a fire alarm monitor detects a fire alarm.
SC4 cooling configuration

<table>
<thead>
<tr>
<th>Configuration Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>No of zone sensors</td>
<td>(0 to 5) The number of zone temperature sensors.</td>
</tr>
<tr>
<td>Controlling sensor</td>
<td></td>
</tr>
<tr>
<td>Min Temp</td>
<td>Control will be based on the lowest value of all of the zone temperature sensors.</td>
</tr>
<tr>
<td>Max Temp</td>
<td>Control will be based on the highest value of all of the zone temperature sensors.</td>
</tr>
<tr>
<td>Average</td>
<td>Control will be based on the average of all the zone temperature sensors.</td>
</tr>
<tr>
<td>Zone Temp 4-1</td>
<td>(etc.) (each zone temperature sensor will be available as a choice in the list) Control will be based on the single selected sensor.</td>
</tr>
<tr>
<td>Num of cooling stages</td>
<td>(List box: None, Four) Of the four cooling stages in the unit, the number to be controlled by the AKC 55. Either all units are controlled or none are controlled.</td>
</tr>
<tr>
<td>Setpoint</td>
<td>(0.0 to 100.0) The desired temperature at the controlling sensor.</td>
</tr>
<tr>
<td>Range +/-</td>
<td>(-9.9 to 9.9) The range selected creates a dead band. For example, if the target is 72 and the range is 2, the stage will come on at 74, and will not be turned off until the temperature reaches 70.</td>
</tr>
<tr>
<td>Ambient temp lockout</td>
<td>(List box: Yes, No) Whether or not there is to be a lockout based on low ambient temperature.</td>
</tr>
<tr>
<td>No cooling below</td>
<td>(0.0 to 100.0) The ambient temperature below which cooling will be locked out.</td>
</tr>
<tr>
<td>Range +/-</td>
<td>(0.0 to 9.9) The range for the lockout. Cooling will be locked out at lockout minus range, and when locked out will be allowed on at lockout plus range.</td>
</tr>
<tr>
<td>Minimum run time</td>
<td>(0 to 20) The number of minutes that a stage must run before being turned off.</td>
</tr>
<tr>
<td>Delay between stages</td>
<td>(0 to 20) The number of minutes that must elapse after a stage is turned on before the next stage can be</td>
</tr>
</tbody>
</table>
Night setback (List box: Yes, No) Whether or not the cooling setpoints are to be raised by an offset (next line) during the times when cooling is not scheduled to be on according to a schedule or schedules (next page).

Night setback offset (-50.0 to 50.0) The amount by which the cooling setpoint is to be raised during night setback.

Override switch (List box: Yes, No) Whether or not there is an override switch wired to a digital input.

Override duration (0 to 1439) The number of minutes that control will be overridden after operation of the override switch.

Num of schedules (0 to 8) The number of operating schedules entered on the following page(s).

SC4 heating configuration

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>No of zone sensors</td>
<td>(0 to 5) The number of zone temperature sensors. (List box:)</td>
</tr>
<tr>
<td>Controlling sensor</td>
<td>Min Temp: Control will be based on the lowest value of all of the zone temperature sensors.</td>
</tr>
<tr>
<td></td>
<td>Max Temp: Control will be based on the highest value of all of the zone temperature sensors.</td>
</tr>
<tr>
<td></td>
<td>Average: Control will be based on the average of all the zone temperature sensors.</td>
</tr>
<tr>
<td></td>
<td>Zone Temp 4-1 (etc.): (each zone temperature sensor will be available as a choice in the list) Control will be based on the single selected sensor.</td>
</tr>
<tr>
<td>Num of ht rclm stages</td>
<td>(0 to 4) The number of heat reclaim stages in the SC4 unit.</td>
</tr>
<tr>
<td>Setpoint</td>
<td>(0.0 to 100.0) The desired temperature at the controlling sensor when heat reclaim is being used.</td>
</tr>
<tr>
<td>Range +/-</td>
<td>(0.0 to 9.9) The range selected creates a dead band. For example, if the target is 68 and the range is 2, the</td>
</tr>
</tbody>
</table>
stage will come on at 66, and will not be turned off until the temperature reaches 70.

Num of aux heat stages  
(0 to 4) The number of auxiliary heat stages in the SC4 unit.

Setpoint  
(0.0 to 100.0) The desired temperature at the controlling sensor when auxiliary heat is being used.

Range +/-  
(0.0 to 9.9) The range selected creates a dead band. For example, if the target is 68 and the range is 2, the stage will come on at 66, and will not be turned off until the temperature reaches 70.

Ambient temp lockout:  
(List box: Yes, No) Whether or not there is to be a lockout based on low ambient temperature.

No heat above  
(0.0 to 100.0) The ambient temperature above which heating will be locked out.

Range +/-  
(0.0 to 9.9) The range for the lockout. Heating will be locked out at lockout plus range, and when locked out will be allowed on at lockout minus range.

Minimum run time  
(0 to 20) The number of minutes that a stage must run before being turned off.

Delay between stages  
(0 to 20) The number of minutes that must elapse after a stage is turned on before the next stage can be turned on.

Night setback  
(List box: Yes, No) Whether or not the heating setpoints are to be raised by an offset during the times when cooling is not scheduled to be on according to a schedule or schedules (next page).

Night setback offset  
(0.0 to 50.0) The amount by which the heating setpoints are to be raised during night setback.

Override switch  
(List box: Yes, No) Whether or not there is an override switch wired to a digital input.

Override duration  
(0 to 1439) The number of minutes that control will be overridden after operation of the override switch.

Num of schedules  
(0 to 8) The number of operating schedules entered on the following page(s).
SC4 dehumidification configuration

Num of stages (List box: None, Four) Whether or not dehumidification is controlled in the SC4 unit. All SC4 units have four stages of dehumidification.

Setpoint (0 to 99) The percent desired relative humidity in the zone.

Range +/- (1 to 15) The range selected creates a dead band. For example, if the target is 45% and the range is 2, dehumidification will come on at 47, and will not be turned off until humidity reaches 43%.

Cooling low limit (0.0 to 100.0) The zone temperature below which dehumidification will be disallowed.

Ambient temp lockout: (List box: Yes, No) Whether or not there is to be a lockout based on low ambient temperature.

No dehum below (0.0 to 100.0) The ambient temperature below which dehumidification will be locked out.

Range +/- (0.0 to 9.9) The range for the lockout. Dehumidification will be locked out at lockout minus range, and when locked out will be allowed on at lockout plus range.

Minimum run time (0 to 20) The number of minutes that a stage must run before being turned off.

Delay between stages (0 to 20) The number of minutes that must elapse after a stage is turned on before the next stage can be turned on.

Night setback (List box: Yes, No) Whether or not the dehumidification setpoint is to be raised by an offset (next line) when dehumidification is not scheduled to be on according to a schedule or schedules (next page).

Night setback offset (0 to 99) The number of % by which the dehumidification setpoint is to be raised during night setback.

Override switch (List box: Yes, No) Whether or not there is an over-
ride switch wired to a digital input.

**Override duration**
(0 to 1439) The number of minutes that control will be overridden after operation of the override switch.

**Num of schedules**
(0 to 8) The number of operating schedules entered on the following page(s).

**Seasons 4 password**
(5-character auth code) The password given by Seasons 4 to the equipment owner.

---

**SC4 condenser configuration**

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| Number of fans | List box: None, Six, Eight | The number of HVAC condenser fans controlled in this unit. |
| Minimum run time | (0 to 60) The number of minutes that a stage must run before being turned off. |
| Liquid Temp Setpoint | (0.0 to 150.0, one setpoint per stage) The stage will be turned on at setpoint plus range and turned off after the stage above is turned off, at setpoint minus range. |
| Range | (0.0 to 150.0, one setpoint per stage) The stage will be turned on at setpoint plus range and turned off after the stage above is turned off, at setpoint minus range. |

**SC4 alarms configuration**
SC4 alarms are configured as are RTU alarms.

**SC4 board & points configuration**
SC4 board & points are configured as are RTU board & points.
Chapter 4 - 3  Lighting Configuration

Lighting configuration starts with selection of Configuration from the Main Menu. A simple lighting menu appears as at left below. First, select Lighting zones from the menu, and the screen at right is presented.

No. of Zones  
(0 to 30) The number of lighting zones to be configured on this AKC 55.

No. of Powerlink Panels  
(0 to 5) The number of Square D Powerlink® lighting panels to be configured.

No. of Cutler-Hammer Panels  
(0 to 5) The number of Cutler-Hammer Pow-R-Line C™ Switchboard lighting panels to be configured.

Zones share photocells  
(List box: Yes, No) Whether or not multiple photocells are to be shared.

Number of photocells  
(0 to 8) The number of photocells. (Appears only if photocell sharing is enabled by a Yes answer to the previous question.

Name  
(Label) The name of the zone as established on its first setup page.

Type  
(List box:)

AKC55: The zone is controlled by a relay output (digital output) on an AKC 55 I/O board.

PWRLK: The zone is controlled by a breaker or group of breakers in a Square D Powerlink® lighting panel.

CUTLR: The zone is controlled by a breaker or group of breakers in a Cutler-Hammer Pow-R-Line C™ Switchboard lighting panel.

AKC 55 lighting zone setup  
To begin configuration of an AKC 55 lighting zone, put the cursor on "Setup" and press enter. The first page of the setup screen is shown in the illustrations below: on the left for an inside photocell, and on the right for an outside photocell. In the screen
on the left, a user-defined zone name has been chosen. On the right, one of the listed zone names has been chosen.

<table>
<thead>
<tr>
<th>Zone name</th>
<th>(List box: ) A great variety of typical names are included in the box that pops up, plus “User Def.” that allows the next line.</th>
</tr>
</thead>
<tbody>
<tr>
<td>User defined name</td>
<td>(Label box; any 11 characters)</td>
</tr>
<tr>
<td>Num of control relays</td>
<td>(0 to 6) The number of relays controlled by the lighting point.</td>
</tr>
<tr>
<td>Num of schedules</td>
<td>(0 to 8) The number of schedules for this point.</td>
</tr>
<tr>
<td>Photocell</td>
<td>(List box:) Inside: The point’s photocell(s) are indoors. Outside: A single photocell is located outdoors. None: This point has no photocell.</td>
</tr>
<tr>
<td>Control sensor</td>
<td>(List box:) Min: The point has no photocell. Max: The photocell(s) for the point are inside. Average: The photocell(s) for the point are outside.</td>
</tr>
<tr>
<td>Control method</td>
<td>(List box:) Schd and photo: For this point to be on, two conditions have to be satisfied: (1) the schedule must be true; and (2) the photocell must be above trip level. Once those two conditions are satisfied, the pre-delay timer will start. Schd or photo: For this point to be on, either of two conditions must be satisfied: (1) the schedule must be true; or (2) the photocell must be above trip level. Once one of those two conditions is satisfied, the pre-delay timer will start.</td>
</tr>
<tr>
<td>Enable failsafe schedule</td>
<td>(List box: Yes, No) Whether or not a schedule will “back up” in case the photocell fails.</td>
</tr>
<tr>
<td>Time on</td>
<td>(Time of day field) The time at which the pre-delay timer will start.</td>
</tr>
</tbody>
</table>
timer for outside lights will start without the photocell having tripped.

**Time off**

(Time of day field) The time at which the post-delay timer for the outside lights will start without the photocell rising above trip level.

**Photocell range +/-**

(0 to 100) The number of percent from night to day.

**Trip Level**

(0 to 100) The level at which the photocell condition will be true and act to turn the lights on. (If multiple relays are configured, there will be one trip level per relay.)

**Always keep 1 relay on**

(List box: Yes, No) Whether or not one relay will always be on.

**Auto rotate selection**

(List box: Yes, No) Whether or not the one relay kept on will rotate among all the relays configured. Rotation takes place so that the same relay is not used when the zone cycles off.

---

**Lighting configuration page 2**

<table>
<thead>
<tr>
<th>Setting</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre delay</td>
<td>(0 to 120) When lights are off, the number of minutes that the lighting condition must be satisfied before lights will be turned on.</td>
</tr>
<tr>
<td>Post delay</td>
<td>(0 to 120) When lights are on, the number of minutes that the lighting condition must be false before lights will be turned off.</td>
</tr>
<tr>
<td>Minimum ON time</td>
<td>(0 to 255) When lights are turned on, the number of minutes that they must remain on before being turned off.</td>
</tr>
<tr>
<td>Minimum OFF time</td>
<td>(0 to 255) When lights are turned off, the number of minutes that they must remain off before being turned on.</td>
</tr>
<tr>
<td>Enable dimmer output</td>
<td>(List box: Yes, No) Whether or not a dimmer variable output will be controlled.</td>
</tr>
<tr>
<td>Target</td>
<td>(0 to 100) The photocell level that the controller will</td>
</tr>
</tbody>
</table>
Minimum output
(0 to 100) The minimum dimmer level.

Reaction time
(List box: Slowest, Slow, Normal, Fast, Fastest) The relative sensitivity of control to changes in photocell level.

Override switch
(List box: Yes, No) Whether or not there is an override switch assigned to the zone.

Override duration
(Time field: 00:00 to 23:59) The duration of an override when the override switch is used.

Burglar override
(List box: Yes, No) When this zone’s lights are turned off, whether they are to be turned on when a monitored burglar alarm is sensed.

Pre delay
(0 to 600) When this zone’s lights are off and a burglar override is called for, the number of minutes delay before the zone is turned on.

Fire override
(List box: Yes, No) When this zone’s lights are turned off, whether they are to be turned on when a monitored fire alarm is sensed. There is no pre-delay for fire alarms.

Lighting schedules are found on the next page(s).

Board & points configuration
Board and points configuration must be completed for all types of points. Do this in accordance with the appendix on board & point configuration.

Powerlink configuration
Configuration of Powerlink lighting zones configuration is the same as for the AKC 55 zones just discussed, except that the question Number of control relays is replaced with Number of control points. These panels also require board and point setup and initialization (see below).

Cutler-Hammer configuration
Configuration of Powerlink lighting zones configuration is the same as for the AKC 55 zones just discussed, except that the question Number of control relays is replaced with Number of control points. These panels also require board and point setup and initialization (see below).

Powerlink and Cutler-Hammer board & point configuration
Starting at the lighting configuration menu, select Board & Points, press ENTER, and when the Board & Points Relay Outputs configuration screen appears, select the rightmost icon at the bottom of the screen, and press ENTER. A menu will appear, like the one in the left illustration below.
Place the cursor on the **Setup** field and press ENTER, and the setup screen will appear as at right above. For each breaker, there is a list box with the names of the zone names that can be assigned to that breaker. Select the appropriate zone name for each configured breaker, and setup is complete.

**Locate procedure**

Powerlink panels require that you put the cursor on the **Locate** field and press enter. A popup box will appear on the screen instructing you to press the service pin on the breaker panel. You will have a few minutes to do this. Successful location will be indicated by a message in the dark field at the bottom of the screen.

Cutler-Hammer panels do not require the locate procedure.

### Chapter 4 - 4  

#### Energy Meter Configuration

An AKCESS system can monitor Danfoss-approved energy meters which have an Echelon interface. Each AKC 55 can monitor up to five meters. Each current source must have a dedicated meter.

**Installation**

After installing the energy meter and current transformers according to instructions provided by their manufacturer, the meter is connected to the AKCESS I/O network and becomes a node on the network after configuration. Only one of the meters connected to an AKC 55 can be used for demand limiting.

**Configuration**

To begin configuration of utility meters, select **Energy** from the main menu and press ENTER. The Energy Menu appears as at left below. Select **Utility Meter** and press ENTER, and the Utility Meter Menu appears as at right below.
Continuing, select **Configure** from the Utility Meter Menu and press ENTER. Now the Utility Meter Configuration menu appears as shown below.

Enter the number of meters to be configured, and a list will appear. These are the fields:

- **No of KWH Utility Meters** (0 to 5) The number of meters being configured
- **Name** (Label field, any 11 characters) Enter the name of the meter being configured.
- **>Setup<** (button field) Put the cursor here and press ENTER to begin setup.

When the setup button is pressed, the Configure Meter menu appears as at left below. When Meter Setup is selected from the menu, the first page of the Meter Setup screen appears as at right:
In the Setup screen, these are the fields. Note that with each answer, a box will appear in the center of the screen cautioning that proper meter function requires that the values entered here are the same as the values entered at the meter.

**Number of CT sets** (0 to 5) The number of meters sets of current transformers connected to this meter.

**Amperage** (List box: entries range from 25 to 3100 A) Select the amperage of the CTs.

**Voltage (num phases)** (List box: a complete selection of supermarket voltages with number of phases following each in parentheses. Pick the correct combination for this meter, inbutton field) Put the cursor here and press ENTER to begin setup.

**Collect History** (List box: Yes, No) Whether or not history is to be collected from this meter.

**Use unit for demand lim** (List box: Yes, No) Whether or not this meter is to be used for demand limiting.

**Window size** (List box: 15, 20, or 30 minutes) The window width is set to 15, 20, or 30 minutes. Every minute, the window “slides” forward so that it always contains the most recent period of time. Each minute the accumulated KW during that minute is recorded.

**Normal load nn HRS** (0 to 99999) Enter the upper demand limit you do not wish to exceed for the given hour of the day under normal operating conditions (when using normal power). There is one field for each hour of the day, from 00 to 23. This screen has two pages in order to list all the hours of the day.

Meter setup, continued (p3) Page down after entering normal load for every hour to finish configuration of the meter. The page looks like this:
The fields in the screen are these:

**Maximum emergency load** (0 to 99999) Enter the upper demand limit that you do not wish to exceed when the emergency generator is running.

**Start shedding at** (0 to 100) Enter the percent of maximum load at which you want to start shedding loads.

**Start restoring at** (10 to 80) Enter the percent of maximum load at which you want to start restoring loads which have been shed.

**Enable coupling switch** (List box: Yes, No) In installations where there are two transformers and/or two emergency generators, a coupling switch can be used to connect both loads to one source in case the other source fails.

**Number of normal steps** (0 to 10) The number of steps (levels) which you will allow to be shed under normal conditions.

**Num of emergency steps** (0 to 10) The number of steps (levels) which you will allow to be shed when the emergency generator is running.

**Normal**

**Soft start begin level** (0 to the number of normal steps set above, up to 10; if 8 normal steps are configured, for example, the upper limit of this entry is 8) This entry specifies the level down to which loads will be turned on when the emergency generator starts. A level will be added each minute unless the specified emergency load for shedding to start is reached.

**Coupling begin level** (0 to 99999) Enter the upper demand limit you do not wish to exceed for the given hour of the day under normal operating conditions (when using normal power). There is one field for each hour of the day,
from 00 to 23. This screen has two pages in order to list all the hours of the day.

**Emergency**

*Soft start begin level*  
(0 to the number of emergency steps set above, up to 10; if 8 emergency steps are configured, for example, the upper limit of this entry is 8) This entry specifies the level down to which loads will be turned on when the emergency generator starts. A level will be added each minute unless the specified emergency load for shedding to start is reached.

**Coupling begin level**  
(0 to 99999) Enter the upper demand limit you do not wish to exceed for the given hour of the day under normal operating conditions (when using normal power). There is one field for each hour of the day, from 00 to 23. This screen has two pages in order to list all the hours of the day.

**About soft starts**  
The effect of a soft start is to slowly add load to the generator after it starts. If for instance soft start begin level is set to 6, when the generator starts only refrigeration loads and loads assigned level 7 through 11 will be on. After one minute, if the load is below the “start shedding at” percentage of maximum emergency load, level 6 will be turned on. After another minute, the same decision will be made for level 5, and so on down to level one. If at any time the load reaches the “start shedding at” percentage, load shedding will begin again until the system reaches the “start restoring at” percentage.

**Configuring demand limiting**  
One utility meter per AKC 55 will allow configuration for demand limiting. Configuring demand limiting strategy is a two-step process. First you select the meter to be used for demand limiting and enter the parameters; then select the loads to be shed for limiting demand and give each a priority.

In order to use demand limiting, you must have a Danfoss-approved utility meter with Echelon interface and, if you are going to establish both normal and emergency load limits, you must wire and configure an on/off input for the automatic transfer switch. In addition, if the site has a coupling switch, you must wire and configure an on/off input for the coupling switch.

You may wish to read the section “How demand limiting works” that follows the section “Lighting demand limiting,” before you start configuration. Now return to the Energy menu (one good way is to return to the Main Menu (menu key), select Energy, then select **Demand Limiting**. From the Demand Limiting menu, select **Configure**. These two screens look like this:
HVAC demand limiting

When you put the cursor on **Configure**, the second page of the Demand Limiting Menu appears as at left below, offering two choices: **Select Units** (for HVAC) and **Select Zones** (for lighting). Choose **Select Units** and the screen at right (below) appears, and you can begin configuring HVAC demand limiting.

The fields on the demand configuration screen for HVAC (right) are:

- **[Name -- first column]** The name of the unit as it was assigned during configuration. Every configured HVAC unit will be listed.
- **Unit** The address of the AKC 55 which has the demand meter that will be used for demand limiting. This can be any AKC 55 in the network that has a meter configured for demand limiting.
- **Level** The priority for shedding under normal conditions. Levels are shed in ascending order: level 1, then level 2, and so on up to the highest level configured,
limited by the number of steps allowed. Levels above
the number of steps configured will not be shed unless
the meter configuration is changed. Since there are
only up to ten steps, loads assigned level 11 will never
be shed. It is recommended that loads which are not
to be shed are left at level 11, the default value.

**Emergency level**

The priority for shedding when the emergency genera-
tor is running.

If a load is assigned level 0 (zero) for either normal or emergency conditions, the load
will never come on under those conditions.

**Lighting demand limiting**

For lighting zones, the screen entries are the same, except that each relay will have its
own level, so there is first a setup menu listing each zone, then a page for each zone
listing all the relays for that zone.

**How Demand Limiting Works**

Utility demand is monitored every minute. Every minute, the most recent $n$ minutes
are averaged (where $n$ is the width of the configured window, 15, 20, or 30 minutes). If
the average reaches the configured “start shedding at” percentage of configured
maximum demand, step one (all lighting zones and HVAC units assigned to level 1)
will be turned off. After one minute, when the average is calculated again, if the
demand is still above the configured percentage of configured maximum demand,
level two will be shed, and so on.

When demand has dropped to the “start restoring at” level, the last level shed will be
restored, and then the others in descending order, so that the last load restored will be
the one which was shed first. Restoration will continue as long as the load remains
below the “start shedding at” percentage.

### Chapter 4-5 Configuring Alarms

Whenever you enter configuration information to program a given AKC55 system,
standard alarms are automatically created in the program. These alarms are “skel-
eton” in nature. This means that the alarms are now allocated in the program, but you
should inspect the alarm actions, trip levels, and time limits for each alarm and adjust
them accordingly to meet your unique requirements.

We will discuss, in detail, how to configure alarms for Refrigeration, HVAC, and
other points and sensors; then we will see how these alarms are “routed” through
the system.

The Configure Alarms menu

First, become authorized; then, from the main menu (below left) select **Configuration** and then from the Configuration menu, select **Alarms**. You will reach the Alarm Configuration Menu, shown below. There are other ways to reach an alarm configu-
ration screen, and as you become experienced with the system, you will learn them. For instance, if you are configuring refrigeration, alarm configuration for the particular rack you are working with will be available from the Configure Rack menu; likewise, HVAC and other configuration screens will present an alarm selection. Using the method just described, though, you will be able to reach the entire “world” of alarms from one menu. The Alarm Configuration menu looks like this:

Configuring Refrigeration Alarms

If you select Refrigeration from the Configure Alarms menu, you will be presented with a screen listing each configured racks as at left below. Select one of the racks, and the alarms menu for that rack will appear, as at right below.

We will select Rack C, and another submenu will appear listing all the different parts of the system for which we can configure alarms. Note the last item on the menu at right above, “Bitzer.” This appears only because when the compressor data was configured, Bitzer was selected as the answer to the proofing type question. Keep in mind that as we proceed through alarm configuration, the items that present them-
selves depend upon the configuration for the mechanical devices.

Select Suction and the first page of configuration for actual alarms appears:

![Configuration Page]

The fields and their meanings are as follows:

- **Type** (Label field) In the top line for each alarm, the leftmost column shows the type of alarm.
- **Name** (Label field) The name of input, either digital or analog, that trips the alarm. (See note at the end of the discussion of this screen about “Alarms Suspended” alarms.)
- **Address** (Label field) The board and point assignment of the input given under Name. This is where the input is physically wired. For example, the phase loss digital input, the second alarm in the screen shown above, is wired to point 1 on board 8. The suction pressure sensor (an analog input) for rack C is wired to point 1 on board 6.
- **Alarm Action** (List box) In the Type column, in the second line for each alarm, is the current alarm action setting. Initially, as shown above, all alarms are set to disabled as they are automatically created during configuration of refrigeration. The same is true of the alarms created for HVAC and other store systems. We can use this screen to change the alarm action levels. The choices in the list box are these:
  - **Disabled**: The alarm is deactivated and will not occur or dial out. Its configuration settings, if any, will remain in memory for future activation. All alarms are in this state initially until you change them. A description of each enabled alarm action follows....
  - **Log Only**: The occurrence of the alarm will only be logged by the system. There will be no dial out. The alarm will not retrip until its causative condition has...
Normal:  The alarm will occur when its causative condition has been true for the set time limit. At this action level, the alarm will dial out once. It will not dial out again until its causative condition has become false and then become true again for the set time limit.

Critical:  When the alarm’s causative condition has been true for the set time limit, the critical alarm will occur and dial out, and it will continue to dial out repeatedly as long as the causative condition remains true. Repetitive dialouts will occur at the interval specified in the Alarm Routing screen. (See also the section on Alarm Routing.)

Delete:  The alarm and its settings are removed from memory. Restoration of the alarm requires manual re-entry.

Alarms Suspended

The first alarm on the first page of every rack alarms screen is an Alarms Suspended alarm. This alarm occurs whenever alarms have been suspended by an operator using the Rack Service screen. When alarms are suspended, if the level of the Alarms Suspended alarm is set to an action other than Disabled, a single alarm will occur (and if the level is Critical or Normal, it will dial out) to indicate that the suspension has occurred. The number of minutes for the suspension can be set.

Suspending rack alarms

One common reason for suspending rack alarms is rack service requiring a partial or complete equipment shutdown. In such a case, pressures and temperatures could reach elevated levels, giving rise to many alarms. A technician would suspend alarms to forestall unnecessary communications to the store by monitoring personnel. An operator who wants to suspend alarms does not enter configuration screens to do so. To suspend alarms, it is only necessary to be authorized for refrigeration functions (or the higher Supervisor level). To suspend rack alarms, select Refrigeration from the Main Menu, then select the rack being serviced from the refrigeration menu, and then select Rack Service from the Rack menu. The Rack Service menu looks as at left below.
When the **Suspend Rack C Alarms** button is selected, a pop-up window appears as in the screen at right above. The only changeable field is the **Suspend for** field, which can be set to any value from 0 to 9999. A full description of the alarm suspension function will be found in chapter 5-2, "Using the Service Screens."

Configuring Alarm settings

Let's return to the Configure Rack C Alarms screen (shown at left below) and configure an actual alarm. Move the cursor down to the level field for the **Phase Loss** alarm. It currently reads **Disabled**. When you select the field, a list box appears showing all the levels that can be chosen for the alarm, as shown right below.

Notice that in the screen at right (above), we have moved the cursor to **Normal** in the list box. When we press ENTER, the level selection is complete, and a condition appears under the name of the alarm, as seen at left below.

After choosing an action level for the alarm, move the cursor to the next changeable field. Because we are configuring a digital alarm that is constrained to a value of **On**, the only remaining fields we can change are for the time. The numeric value can be
set to any number from 1 to 9999, and in our example we have entered 1. The field for the time units has a list box (as seen below) from which you can choose sec, min, or hour. For the Phase Loss alarm, 1 minute is an appropriate setting, so we leave the field reading min.

Analog alarms

Let’s now configure the Low Pressure alarm, which is an alarm for an analog value. Move the cursor to the action level field under the type description Low Pressure, open the list box, and select Normal. As with the Phase Loss alarm whose configuration was just described, a line of settings appears to the right of the action level, as shown in the screens shown below:

The screen at left above shows the default alarm pressure and time settings that appear as soon as the alarm action level is changed to something other than disabled. In the screen at right above we have moved cursor first to the pressure setting, where we changed the pressure to 3.0 psi from 50.0, and then to the time setting, where we raised the time to 30 minutes. The low pressure alarm will now occur whenever the suction pressure sensor for rack C reads below 3.0 psi for 30 minutes. Since it is set
for an action of Normal, the alarm will dial out only once. The timer will reset to 0 any time the pressure rises above 3.0 psi; only after the timer has reset in this manner can the alarm occur again.

Field limits and units for analog alarms

The numeric value field for an alarm based on an analog sensor (for instance, pressure, temperature, humidity, and light level) will accept values from -999.9 to 999.9. The units, which are selected in the Store Info configuration screen for Units/Languages, can be in either psi or bar for pressures, in either celsius or fahrenheit degrees for temperature, and in either footcandles or percentage for fotocells.

The time value field will accept any numerical from 0 to 9999, and the time unit can be seconds, minutes, or hours.

Disabling

If you wish, try disabling one of the alarms just configured, or any alarm you have set up. Then restore the alarm to the Log Only, Normal, or Critical action level. The default settings will not appear, but rather the settings you configured. This feature can be useful when you need to suspend only a few alarms on a rack. Remember, though, that the alarms will not automatically return to enabled status as do alarms suspended with the Suspend Alarms function on the service screen. (see chapter 5-2).

What alarms are needed?

The configuration process for refrigeration, HVAC, and lighting allocates alarms for every configured digital and analog sensor, and for each control output. Depending on your needs, not all alarms will be useful.

Frequently Asked Questions

FAQ #1 How do I determine what trip levels to use for high and low suction pressure alarms?

Start by considering the target pressure that is configured for the rack. Know the range of pressures that the rack will operate in when loads, product temperatures, defrosts, and other factors are working correctly. Then set the alarms at the upper (high pressure) and lower (low pressure) limits of that range. Start with conservative settings. If your settings are too tight on one end or both, and you are getting a large number of false alarms, make sure the system is operating safely for the product and equipment, then extend the alarm range gradually. If you don’t ever get any false alarms, the alarm parameters are probably too loose.

Remember that more or less temporary factors such as overloading, service, and cleaning can cause alarms to occur. Be careful to investigate any suspicious alarm that occurs when causative activities are going on in the store.

FAQ #2 Can you be more specific and perhaps give “thumb rules” for alarm settings?

OK, let’s assume that this particular rack is set for a target of 14 psi and is operating to your satisfaction with that setting. Typically we find that adding 10 psi to the target and setting the trip level for high suction pressure at 24 psi for 30 minutes is a good starting setting. If the suction pressure is more than 10 psi above target for a half hour, we should suspect that something is keeping the rack from making target pressure. One possible cause is an off-line compressor.
For the low suction pressure alarm, first look at the cut-out setpoint that has been configured for the rack. With a target of 14 psi, perhaps the cut-out is set at 2 or 3. If this is so, then a good setting for the low suction pressure alarm might be at the cut-out for 10 to 15 minutes.

The alarm types depend to some extent on the way rack configuration questions were answered. Listing all the types of suction group alarms, they are:

- **Alarms Suspended**
  As explained above, when this alarm is enabled, it will occur whenever alarm suspension for the suction group is activated in the service screen (see chapter 5-2). There is no time delay.

- **Phase Loss (if a phase loss sensor is configured)**
  A digital alarm that can be enabled to occur when the phase loss sensor is on for a specified time period (1-9999 seconds, minutes, or hours).

- **Low Pressure (if a suction pressure sensor is configured)**
  An analog alarm, set for a pressure from -999.9 to 999.9 psi or bar and a time limit of from 1 to 9999 seconds, minutes, or hours.

- **High Pressure (if a suction pressure sensor is configured)**
  An analog alarm, set for a pressure from -999.9 to 999.9 psi or bar and a time limit of from 1 to 9999 seconds, minutes, or hours.

- **Low Temperature (if a suction temperature sensor is configured)**
  An analog alarm, set for a temperature from -999.9 to 999.9 psi or bar and a time limit of from 1 to 9999 seconds, minutes, or hours.

- **High Temperature (if a suction temperature sensor is configured)**
  An analog alarm, set for a pressure from -999.9 to 999.9 psi or bar and a time limit of from 1 to 9999 seconds, minutes, or hours.

- **High desuperheat (if a suction temperature sensor is configured)**
  An analog alarm, set for a pressure from -999.9 to 999.9 psi or bar and a time limit of from 1 to 9999 seconds, minutes, or hours.

### Configuring Compressor Alarms

We will return now to the configuration screen for rack C alarms, and select **Compressors**.
The first page of the compressor alarms screen appears as at right above. For a multi-compressor rack there will be several pages of alarms. The alarm types depend to some extent on the way rack configuration questions were answered. The alarms for the lead compressor will be listed first, and similar alarms will follow for the other compressors on the rack. Listing all the types of alarms, they are:

**High Pressure (discharge pressure sensor)**
An analog alarm, set for a pressure from -999.9 to 999.9 psi or bar and a time limit of from 1 to 9999 seconds, minutes, or hours.

**Comp. short cycle (compressor digital sensor)**
A cycle digital alarm, with the trip level a number of cycles (0-9) in a specified time period (1 to 9999 seconds, minutes, or hours).

**Comp. oil failure (if an oil failure digital is configured)**
A digital alarm that can be enabled to occur when the oil failure sensor is on for a specified time period (1-9999 seconds, minutes, or hours).

**High oil resets (if an oil reset switch monitor is configured)**
A cycle digital alarm, with the trip level a number of cycles in a specified time period (1-9999 seconds, minutes, or hours).

**High Temperature (if a discharge temperature sensor is configured)**
An analog alarm set for a temperature from -999.9 to 999.9 degrees with a time limit from 1 to 9999 seconds, minutes, or hours.

**High inverter resets (if variable speed is configured and the reset is monitored)**
A cycle digital alarm, with the trip level a number of cycles (0-9) in a specified time period (1-9999 seconds, minutes, or hours).

**Inverter failure (if variable speed is configured and the inverter bypass is monitored)**
A digital alarm that can be enabled to occur when the inverter is in bypass for a specified time period (0-9999 seconds, minutes, or hours).

The third selection on the rack alarm configuration menu is **Circuits**. The types of alarms that present themselves depend upon whether the circuit is controlled by AKC 55 I/O directly, or by one of the various types of Danfoss case controller. After selecting Circuits from the rack alarms menu (shown once again at left) you will be presented with a list of configured evaporator circuits (which will vary greatly depending on what circuits you have configured). A list of typical circuits is shown at right.
Alarms for AKC 55 circuits

Select the first circuit on the list above. It turns out to be typical for circuits controlled directly by the AKC 55. Initially, the alarm screen looks as at left below.

Notice that the name of the circuit appears in the heading of the screen. Then there is an area where the current sensor temperature appears, along with the number of the I/O board and point to which the case temperature sensor is wired. At first, you see two alarms, both disabled.

In the screen at right above, we have enabled one of the alarms by changing its level to Normal. We have changed the default settings, 50° and 30 min, to more reasonable settings for the fixture. Enabling the alarm also caused the appearance further down the screen of a question about a Key switch override.

The following screens show the second alarm configured, and the key switch override
The answer has been changed to **Yes**:

<table>
<thead>
<tr>
<th>Temp: 29.6 °F</th>
<th>Hd-Pt: OS-1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low Temperature</td>
<td>Normal</td>
</tr>
<tr>
<td>If below 17.0°F for 30 min</td>
<td></td>
</tr>
<tr>
<td>High Temperature</td>
<td>Normal</td>
</tr>
<tr>
<td>If above 30.0°F for 30 min</td>
<td></td>
</tr>
<tr>
<td>Delay after defrost for 60 Min</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Temp: 29.6 °F</th>
<th>Hd-Pt: OS-1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low Temperature</td>
<td>Normal</td>
</tr>
<tr>
<td>If below 17.0°F for 30 min</td>
<td></td>
</tr>
<tr>
<td>High Temperature</td>
<td>Normal</td>
</tr>
<tr>
<td>If above 30.0°F for 30 min</td>
<td></td>
</tr>
<tr>
<td>Delay after defrost for 60 Min</td>
<td></td>
</tr>
</tbody>
</table>

Note that the second alarm is a high temperature alarm, and that it has an extra line in its configuration, **Delay after defrost**. If a delay other than zero is entered, the high temperature alarm will be disallowed following termination of defrost (provided defrost is monitored) for the specified number of minutes. The time unit can not changed. The time is always in minutes.

The key switch override is made functional by having a physical switch (usually operated by a key to prevent inadvertent operation or tampering) and by having configured a miscellaneous point for the switch, which is then wired to that point. The logic written for the miscellaneous point will prevent alarms, after the switch is operated, for the time specified as **Delay after override**. Such an override might be used for case cleaning, extensive re-stocking, or service.

### Configuring AKC 164 alarms

For circuits controlled by AKC 164 Smart Case Controllers, there are, in addition to the high and low temperature alarms discussed in the preceding section, a number of alarms embedded in the case controller that are received and processed by the AKC 55. The alarms are enabled and disabled through the AKC 55 and if enabled, will be dialed out by the AKC 55 when they occur. The alarm configuration screen for an AKC 164 circuit looks like this:
The embedded alarms and their meanings are as follows:

**Low Superheat**
Occurs when the difference between the inlet (liquid in) and outlet (gas out) temperatures sensors is too low. This could be caused by the evaporator being overfilled with liquid refrigerant. In response to this condition, the AKC 164 will tend to close the AKV electronic expansion valve.

**Defrost exceeded**
Occurs if an evaporator is configured to terminate defrost at a set temperature if the termination temperature was not reached before the specified time expired.

**Fan start timeout**
Occurs when the fan is configured to start at a specified temperature after termination of defrost, and the specified temperature is not reached before the time set for fan delay expires.

**Drip pan clogged**
Occurs when a clogged drain is sensed due to standing water in the fixture drip pan.

**Box door open**
(a door switch must be installed and connected to the AKC 164 for this alarm)
Occurs when the box door is open past the specified delay time.

**Power failure**
Occurs when the AKC 164 resumes operation following interruption of power.

**Hardware failure**
Occurs upon detection of one or more internal AKC 164 hardware failures. Replacement of the AKC 164 may be necessary.

**Sensor fail alarms**
Occur when the AKC 164 detects failure of one or more of its sensors.

Alarms for EKC, DCU
Degree Master,
and AKC 165 Subcooling controllers

Configuration of alarms for these controllers is not covered in this manual, but in the separate literature for the individual controllers.
Configuration of condenser alarms

The fourth selection on the rack alarm configuration menu is Condensers. Before configuring condenser alarms, if you are implementing condenser control, finish answering the condenser configuration questions. Depending on the type of condenser configuration, the alarms presented will differ.

For the most part, the alarms presented in this section will be similar to those already covered in the preceding sections on suction and compressor alarms. We have configured condenser control, including variable speed, so as to describe almost all the alarm types.

After selecting Condensers from the rack alarms menu (shown once again below left) you will be presented with the first page of a list of alarms for rack C’s condenser, as at right below.

We have shown above only the first page of alarms. Depending on the number of fans, there may be additional condenser fan failure alarms on a second page.

**High Pressure (discharge pressure sensor)**
This same alarm appears on the compressor alarms page, and you may have set it up already. It is an analog alarm, set for a pressure from -999.9 to 999.9 psi or bar and a time limit of from 1 to 9999 seconds, minutes, or hours.

**Hi Invert. resets (if variable speed is configured)**
A cycle digital alarm, with the trip level a number of cycles (0-9) in a specified time period (1 to 9999 seconds, minutes, or hours).

**Inverter failure (if variable speed is configured and the inverter bypass is monitored)**
A digital alarm that can be enabled to occur when the inverter is in bypass for a specified time period (0-9999 seconds, minutes, or hours).

**Cond fan failure**
A digital alarm that can be enabled to occur when a condenser fan is called to run and fails to show proof (digital monitor fails to read ON) within the time period specified in the alarm (1-9999 seconds, minutes, or hours).
Configuring “Other” rack alarms

Unless there are Bitzer compressors on the rack, the final selection on the rack alarms menu is Other. As is the case with other alarm configuration pages, the alarm must be enabled (its action level changed from Disabled to Log Only, Normal, or Critical) before the parameters are visible. The alarms are as listed below the screen illustrations:

- **Low water temp (if hot water heat reclaim is configured)**
  An analog alarm that occurs when water temperature is below a set temperature from -999.9 to 999.9 degrees for a period of 1 to 9999 seconds, minutes, or hours.

- **Low liquid level (if a liquid level sensor is configured)**
  An analog alarm that occurs when receiver liquid level has fallen below water temperature is below a set percentage (but values from -999.9 to 999.9 are allowed) degrees for a period of 1 to 9999 seconds, minutes, or hours.

Configuring Bitzer rack alarms

If the rack has Bitzer compressors with electronic interface, and the AKC 55 is configured to control the compressors, there will be a menu selection for Bitzer alarms. All special Bitzer alarms are embedded in the Bitzer compressor electronics. After selecting Bitzer from the rack alarms menu, it is then necessary to select the individual compressor. We have omitted the screen that lists the compressors from the illustrations below. The alarm types are shown below the screen illustrations:
The setpoints for the embedded Bitzer alarms are fixed in the compressor electronics and are only monitored for occurrence by the AKC 55. The alarms are virtually self-explanatory. For further information, consult literature supplied by the compressor manufacturer.

HVAC alarm configuration

The navigational route to HVAC alarm configuration is as follows: from the Main Menu, select Configuration, then Alarms, then HVAC. The alarm configuration menu is shown at left below. When you select HVAC from the alarm configuration menu, a list menu headed Configure HVAC Alarms will appear. It will list every HVAC unit that you have configured. Such a list screen appears at right below. For this very unlikely store we have configured one unit of every type.

The unit types listed are as follows:

- AHU: Air handling unit. A built-up system.
- RTU: Rooftop unit. A packaged rooftop unit.
- RTC: Rooftop controller. Any HVAC system controlled by a Danfoss (networked or standalone) RTC board.
- SC4: Smart Coil (Seasons4) unit.
We will review each of the alarm types for AHU, RTU, and SC4 systems, which have almost identical alarm sets. Then we will discuss the alarms that appear only for RTC and ClimaTECH systems.

AHU, RTU, and SC4 alarms

These are typical alarms screens. None of the default parameters have been changed. In an actual store, you would probably adjust them.

<table>
<thead>
<tr>
<th>Type</th>
<th>Name</th>
<th>Address</th>
</tr>
</thead>
<tbody>
<tr>
<td>High zone temp</td>
<td>Zone Temp 1-1</td>
<td>00-0</td>
</tr>
<tr>
<td>Normal above</td>
<td>50.0 °F</td>
<td>for 15min</td>
</tr>
<tr>
<td>Low zone temp</td>
<td>Zone Temp 1-1</td>
<td>00-0</td>
</tr>
<tr>
<td>Normal below</td>
<td>50.0 °F</td>
<td>for 15min</td>
</tr>
<tr>
<td>High humidity</td>
<td>Inside Humidity</td>
<td>20-1</td>
</tr>
<tr>
<td>Normal above</td>
<td>50.0 %</td>
<td>for 15min</td>
</tr>
<tr>
<td>High supply temp</td>
<td>Supply Air 1-1</td>
<td>00-0</td>
</tr>
<tr>
<td>Normal above</td>
<td>50.0 °F</td>
<td>for 15min</td>
</tr>
<tr>
<td>HVAC fan down</td>
<td>Fan AHU 1-1</td>
<td>00-0</td>
</tr>
<tr>
<td>Normal</td>
<td>Off for 15min</td>
<td></td>
</tr>
</tbody>
</table>

RTC alarms

The following are alarms that appear uniquely for RTC systems, which also have alarms similar to those just presented:

<table>
<thead>
<tr>
<th>Type</th>
<th>Name</th>
<th>Address</th>
</tr>
</thead>
<tbody>
<tr>
<td>HVAC smoke</td>
<td>Smoke Stat 1</td>
<td>00-0</td>
</tr>
<tr>
<td>Normal</td>
<td>On for 15min</td>
<td></td>
</tr>
<tr>
<td>HVAC fire</td>
<td>Fire Stat</td>
<td>00-0</td>
</tr>
<tr>
<td>Normal</td>
<td>On for 15min</td>
<td></td>
</tr>
</tbody>
</table>

High zone temp

Occurs when zone temperature is above a set temperature -999.9° to 999.9° for a period of from 1 to 9999 seconds, minutes, or hours.

Low zone temp

Occurs when zone temperature is below a set temperature -999.9° to 999.9° for a period of from 1 to 9999 seconds, minutes, or hours.

High humidity

Occurs when zone humidity is above a set percentage (the field takes values from -999.9 to 999.9) for a period of from 1 to 9999 seconds, minutes, or hours.

High supply temp

Occurs when supply temperature is above a set temperature -999.9° to 999.9° for a period of from 1 to 9999 seconds, minutes, or hours.

HVAC fan down

A digital alarm that can be enabled to occur when the system fan is called to run and fails to show proof (digital monitor fails to read ON) within the time period specified in the alarm (1-9999 seconds, minutes, or hours).

HVAC smoke (if a smoke detector is configured)

A digital alarm that can be enabled to occur when a smoke detector reads ON for a specified time period (1 to 9999 seconds, minutes, or hours).

HVAC fire (if an HVAC fire stat is configured)

A digital alarm that can be enabled to occur when a fire stat monitor reads on for a specified time period (0-9999 seconds, minutes, or hours).
Zone hum fail
A digital alarm that can be enabled to occur when a zone humidity sensor failure is detected by the RTC for a time period specified in the alarm (1-9999 seconds, minutes, or hours).

Zone temp fail
A digital alarm that can be enabled to occur when a zone temperature sensor failure is detected by the RTC for a time period specified in the alarm (1-9999 seconds, minutes, or hours).

Supply temp fail
Similar to the preceding alarm.

Cooling failure
Occurs when supply temperature is above a set temperature -999.9° to 999.9° for a period of from 1 to 9999 seconds, minutes, or hours.

Heating failure
Occurs when supply temperature is above a set temperature -999.9° to 999.9° for a period of from 1 to 9999 seconds, minutes, or hours.

Sensor discard (if control based on two or more zone sensors)
Occurs at the specified time after one of the controlling sensors fails and the controller logic stops using the value of that sensor. The time setting can be from 1 to 9999 seconds, minutes, or hours. NOTE: if all zone sensors fail, control will be based on the return air sensor.

Power failure
A digital alarm that can be enabled to occur whenever power is restored (after being interrupted); the specified time period is (0-9999 seconds, minutes, or hours).

Filter (elapsed)
Occurs when the set number from 1 to 9999 seconds, minutes, or hours have elapsed. Useful when set for the system air filter life as a reminder to change the filter.

Filter (runtime)
Occurs when the set number from 1 to 9999 seconds, minutes, or hours have elapsed. Usually used Useful when set for the system air filter life as a reminder to change the filter.

Sensor discard (if control based on two or more zone sensors)
Occurs at the specified time after one of the controlling sensors fails and the controller logic stops using the value of that sensor. The time setting can be from 1 to 9999 seconds, minutes, or hours. NOTE: if all zone sensors fail, control will be based on the return air sensor.

Power failure
A digital alarm that can be enabled to occur whenever power is restored (after being interrupted) interrupted the inverter is in bypass for a specified time period (0-9999 seconds, minutes, or hours).

**ClimaTECH alarm configuration**

Alarms types for the two ClimaTECH HVAC controllers are the same, and all are embedded with a common time delay (which you can change) except the fire stat alarm (the fire stat is wired to an AKC 55 digital input board, not to the ClimaTECH controller; it is broadcast to the ClimaTECH over the AKC 55’s I/O network. The alarm configuration screen for a ClimaTECH controller is shown below:
Notice the common alarm delay at the top of the screen. It can be set to any number from 0 to 100. The units, minutes, can not be changed. The alarm types are:

**High zone temp**
Occurs when zone temperature is above a set temperature -999.9° to 999.9° for the specified alarm delay.

**Low zone temp**
Occurs when zone temperature is below a set temperature -999.9° to 999.9° for the specified alarm delay.

**No Airflow**
Occurs when zone humidity is above a set percentage (the field takes values from -999.9 to 999.9) for a period of from 1 to 9999 seconds, minutes, or hours.

**Phase Loss**
The ClimaTECH controller has a digital input to sense signals from the HVAC system’s phase loss detector. This alarm occurs when the phase loss input has sensed a phase loss for the specified alarm delay. of from 0 to 100 minutes.

**Inverter failure**
The ClimaTECH controller has a digital input to detect failure of the HVAC system’s inverter, if the system is a variable speed unit. This alarm occurs when the inverter has been called for for the specified alarm delay of from 0 to 100 minutes, and proof has not been sensed.

**Fire**
The ClimaTECH controller has a digital input to detect the HVAC system’s fire alarm. This alarm occurs when the fire input has been ON for the specified alarm delay. of from 0 to 100 minutes.

**HVAC fire (if an HVAC fire stat is configured)**
A digital alarm from the AKC 55 that can be enabled to occur when a fire stat monitor reads on for a specified time period (0-9999 seconds, minutes, or hours). This alarm is separate and distinct from the preceding one in that it does not originate from the ClimaTECH controller. It is presented on this screen because it pertains to the system whose alarms are being configured.

### Configuring Miscellaneous alarms

Returning now to the main Alarm Configuration Menu, the next item after HVAC is **Miscellaneous**. Using the the miscellaneous alarms screens, you can create custom
alarms to add to those automatically created as you configure the controller. This is a powerful feature of the AKC 55 with great flexibility. Every relay output and sensor will be listed in the miscellaneous alarm screens. Alarms can be configured here to be active on only specified days, too. You can also create multiple alarms for the same relay or sensor, with different time delays and action levels.

After you select Miscellaneous from the main Alarm Configuration Menu, you will see the first page of the first of five miscellaneous alarm list screens. It lists all the relay outputs in the system. The Alarm Configuration Menu and the Misc Alarms - Relay Output list screen are shown below:

Before we go on to discuss configuring miscellaneous alarms for relay outputs, observe the icons at the bottom of the screen above right. The first icon represents relay outputs, the current screen. The others, from left to right, are in reverse video (unselected) and represent analog inputs, digital inputs, analog outputs, and case controllers respectively. Selecting any one of these icons will take you directly to that area of configuration.

For each point selected, whether an output or input, up to 3 different alarm statements can be used, and each can be active on a time schedule. As an example, a meat prep room may be occupied only during certain hours; therefore, different alarm levels might be useful. An example follows for such a prep room controlled by an AKC 164 Smart Case Controller. The principles discussed here can also be applied to digital outputs, analog inputs, or any other kind of input or output.

Example
Misc. alarm.

In this example, the meat prep room is controlled by a Smart Case Controller. To find the temperature sensor, we must select the case controller icon once we have arrived at the first miscellaneous alarms screen shown at right above. The screen might appear as at left below.
Number of alarms field

In the first screen above, you can see by the highlight that we have already moved the cursor to the sensor we want to configure an alarm for. With the cursor there, when we press ENTER, the screen at right (above) appears. The cursor is by default on the Number of alarms field. We can enter any number from 0 to 3. We want to configure only one alarm. Entering 1 in the Number of alarms field produces the screen at left below.

Before proceeding, we must change the action level of the alarm from **Disabled** to one of the other levels. In the example at right above, we’re changing the level to **Normal**.
### Miscellaneous Points Configuration

Whenever you need to create a custom control strategy, or define an on/off input or sensor input not available through refrigeration, HVAC, or lighting configuration, you will need to configure one or more miscellaneous points.

You might use a miscellaneous relay output point for an exhaust fan, a dispenser that adds chemicals to an evaporative condenser, an oven, a produce fogger, or any other device that can’t or shouldn’t be treated like an ordinary refrigeration, HVAC, or lighting point.

Miscellaneous on/off inputs and sensor inputs can be used in defining the strategy for miscellaneous relay outputs. They may be monitored for history, and may be configured strictly for that purpose, or for alarms. Alarms can be created for any miscellaneous point. For sensor inputs, the AKCESS system allows custom conversion for non-Danfoss sensors that have a linear response.

**Starting Configuration**

The way you begin configuration of a miscellaneous point depends on whether there are any miscellaneous points already configured.

First, select **Miscellaneous** from the Main Menu. Select **Configuration**, and the Configure Miscellaneous Menu appears.

The calculated points feature of AKC 55 versions 1.00 and higher, first on the menu above, is a rich and very powerful set of tools. We will discuss it later in this section. The menu items will not be taken up in the order that they appear on the menu.

**Plan strategy first**

Before beginning configuration, plan your strategy. What types of points will you need to define? How many? If you need to develop a control strategy involving several inputs, outputs, and schedules, you may wish to look at the examples at the end of this section first, because it shows how on/off inputs, sensor inputs, schedules, and even other relay outputs, are used to create a custom control strategy for a relay output.

**Miscellaneous relay outputs**

You can configure up to 48 miscellaneous relay outputs per AKC 55. To configure a
miscellaneous relay output, select **Relay Outputs** from the Configure Miscellaneous menu. When the Configure Misc. Relay Outputs screen appears increase the number of relay outputs in the first line by 1 (or a higher number to match the number of outputs you want to configure). Edit the name of the input, then complete configuration by making a selection for each field for each new input. Enter the number of on/off inputs you want to configure.

A step-by-step configuration example for a miscellaneous relay output appears in the first example in the miscellaneous calculations section, which follows in a few pages.

**Miscellaneous Sensor Inputs**

You can configure up to 40 miscellaneous sensor inputs per AKC 55. To configure a miscellaneous sensor input, select **Sensor Inputs** from the Configure Miscellaneous menu. When the Configure Misc. Sensor Inputs screen appears increase the number of sensor inputs in the first line by 1 (or a higher number to match the number of inputs you want to configure). Edit the name of the input, then complete configuration by making a selection for each field for each new input. Enter the number of on/off inputs you want to configure.

A step-by-step configuration example for a miscellaneous sensor output appears in the first example in the miscellaneous calculations section, which follows in a few pages.

**Miscellaneous on/off inputs**

You can configure up to 40 miscellaneous on/off inputs per AKC 55. To configure miscellaneous on/off inputs, select **On/Off inputs** from the Configure Miscellaneous menu. When the Configure Misc. On/Off Inputs screen appears, increase the number of on/off inputs in the first line by 1 (or a higher number to match the number of inputs you want to configure). Edit the name of the input, then complete configuration by making a selection for each field for each new input. Enter the number of on/off inputs you want to configure.

A step-by-step configuration example for a miscellaneous on/off input appears in the second example in the miscellaneous calculations section, which follows in a few pages.

**Specifying Miscellaneous Conversions**

Miscellaneous conversions are used for sensors that have an output range or range-to-value relationship not already defined as one of the named “types” in the sensor input configuration list box. To configure a miscellaneous conversion, select **Conv. Factors** from the Configure Miscellaneous menu. The Configure Conversion Factors screen appears:

The field contents which may be selected, and the range of values for each, are as follows:

<table>
<thead>
<tr>
<th>Units</th>
<th>psi, (bar), °F, (°C), ppm, V, Amp, kw, kwh, Hz, gpm, fps, pH%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Min input</td>
<td>0.0 - 10.0</td>
</tr>
<tr>
<td>Max input</td>
<td>0.0 - 10.0</td>
</tr>
<tr>
<td>Min output</td>
<td>0 - 3276.7</td>
</tr>
<tr>
<td>Max output</td>
<td>0 - 3276.7</td>
</tr>
</tbody>
</table>

Select the units for the sensor reading, then, from data supplied by the manufacturer, enter the minimum and maximum input voltage and the values which correspond to
each. Remember that the custom conversion factor must be selected from the list box for the Sensor Type field during configuration of the sensor input that uses the conversion.

Miscellaneous calculations

Miscellaneous calculations are used to create custom logic. A calculated point created here can be used anywhere a board & point address can be referenced. The calculated points processor is a true boolean processor, with a full complement of argument types and operators. Examples follow this section. Right now, let’s investigate the screens one by one, as far as we can., in general.

If there are no calculations configured when you select Calculations from the Configure Miscellaneous menu, the seemingly unassuming screen below at left appears; when one or more calculated points have been configured, the screen is a list screen as at right below:

Every configured calculated point will be listed. The fields are as follows:

**Point**

(Ca-01 to Ca-96) The name of the calculated point.

**Description**

The type of point (OI or SI). If an SI, the description will usually include the units.

**Value**

The current value or state of the point. This will be on or off for OI points, and a value for SI points.

**Status**

(Online, Offline, Error)

**New Calc**

At the bottom left of the screen is a field with the number of the next unconfigured calculated point. To configure a new point, select this field and press ENTER.

**Point creation**

When you press ENTER with the cursor on the name of the next new calculated point, the configuration screen for that point opens, and looks like this:
The list box for the Units field is already open when the screen first displays, showing all the types of points that can be created, and for SI points, units. For the purpose of discussing the screen, let’s assume that we are creating an OI (a digital input). We select OI, the first item, from the list box. Now the screen looks like this:

The screen is divided into four areas, which from top to bottom are the following:

**Title area**
- The date and time at the very top, then the settings icon and screen title, in this case **Configure Ca-01 (OI)**.

**Heading area**
- The heading of the screen tells what type and style of point will be created. The fields are as follows:
  - Units
  - Style
  - Undo (button)
  - Cancel (button)

**Data definitions area**
- This area contains information that identifies points that are as follows:
  - Name: D01
  - Description: Not configured
  - Value: (error)
  - Units: V
  - Style: Generic
  - Data definition: Not configured
  - Value: (error)
  - If (first line): True
  - Default: (error)
  - Value: (error)

**Rules area**
- This area contains rules that define the behavior of the point.

Current Value (? = Error): ? On
Rules area

This is the area that will contain the logical statements that determine whether the point is on or off (OI) or the value (SI) that is used. At the bottom of the area is the current value of the result.

Let’s create a point now. Afterwards we will discuss each area and field in detail. It is important to plan the strategy first.

We want to control a compressor room exhaust fan. We want the fan to run whenever the compressor room temperature is 90°F or higher; we also want it to run in case of a refrigerant leak of 500 ppm or more. So let’s list the types and values we will need:

- **OI calculated point** to control the RO
- **SI °F misc SI** compressor room temperature
- **Num** 90 (the temperature setpoint)
- **SI ppm misc SI** leak detector sensor [see note]
- **Num** 500 (the leak ppm level)
- **RO** to control the fan

[Note: the leak sensor may not need to be configured as a miscellaneous sensor if there is a standard leak detector configured. Instead, we will just select SI ppm as the sensor type and then pick the sensor from the list that appears under data definitions.]

It is important to understand that only the OI will be created in the calculated points screen. The state of the OI will depend on the evaluation, at any time, of the logical statements that we are going to write. The other points (the RO and the two SIs) will be created as miscellaneous points.

Now we will create the first of the sensor inputs we will need, that for the leak detector. Exit to the Configure Miscellaneous menu and select **Sensor Inputs**. The configuration is straightforward for both of the sensors we need:
Writing the custom strategy

Navigate back to the Configure Ca-01 [or whatever number] screen now, which we will repeat on the left as it looks when it first comes up. After selecting OI as the type, the screen looks as shown at right. The type cannot be changed from OI unless Ca-01 is removed as the controlling point for the miscellaneous RO we created.

Notice the **Undo** and **Cancel** button fields in the heading of the screen. Undo will erase your last step if you make a mistake; Cancel will undo all changes, leaving the point as it was before you started to edit it.

In the Style field, select **Generic**.

Data definitions Name

Move to the data definitions area of the screen, and put the cursor over the first name, which by default says **RO1**. Toggle to edit mode and open the list box, and the screen will look as at left below. Select SI °F from the list box and press ENTER. Now the screen looks like the one at right below.
Move (right) to the next field and select the compressor room temperature (which we called **Comp Rm Temp** and assigned to Bd-Pt 05-2. Now the screen will appear as below:

Notice that after the selection is made, the value field for the sensor changes from `? (error)` to 0.0°F.

Still in the data definitions area, select the blank in the second line under Name and open the list box. This time, select **Number °F** from the list (be careful, there are several Number items). The screen will look as at left below. Move right to the data definition and change 0.0°F to 90.0°F, which is the temperature setpoint in the strategy we are creating, and the screen will appear as at right. Again, the value field has changed to reflect the value of the defined point.
In the same manner, we want now to define a sensor argument (SI ppm) for the leak sensor and a number argument (Number ppm) for the setpoint (500). It does not appear that there is any room left in the data definitions area, but we can easily expand it.

Select the heavy horizontal line at the bottom of the data definitions area, and it will appear as at left below. Toggle to edit mode, and as you can see at right, the opportunity to insert a new line presents itself.

Now press ENTER, and the new line appears. On the new line, create argument SI3, (an SI ppm) and define it by selecting the second miscellaneous SI we created, **Compr Rm Leak**. Finally, insert another new line and create argument NUM4 for the 500 ppm leak setpoint, and data definitions are complete.

When evaluating the logic in the rules area, the controller will go line by line in the rules area, and stop at the first statement that it finds true. We want the OI to be
normally off, but to be on whenever the temperature (SI1) is equal to or greater than 90°F (Num2) OR whenever the leak sensor (SI3) is equal to or greater than 500 ppm (Num4).

Writing rules

Notice that **SI1** already appears in the rules area on the first line. We could change it, if we wanted, to any of the other three arguments we have defined, but it is exactly where we need it.

Notice that there are several blank spaces to the right of **SI1**. These alternate between arguments and operators. Put the cursor on the first blank to the right of **SI1** and open the list box.

These are all mathematical operators appropriate to sensor inputs. We will select >= as the operator for this statement. Having done that, move one field to the right and select Num2 as the argument to complete the statement. The complete statement appears in the screen at right above (the statement is SI1 >= Num2).

The list box is open in the Result column because if the statement is true, we want the OI (which in turn controls the RO for the EXFAN) to be On, and the default result (as seen in the screen at left above) is Off. Now we change the result to On, and the entire line effectively says: **If SI1 >= Num2, Ca-01 (O1) will be On**.

The controller’s logic processor will stop at the first true statement and produce whatever result is in that statement’s result column.

The screen, with the first line complete in the rules area, looks like this:
Now go to the result column on the line with the word **True**, open the list box, select `<Insert>`, and press ENTER to add a line for the second statement, then add the condition for the leak detector. When you are finished, the screen will look like this:

The last statement effectively reads IF True, Off. This may seem strange at first, but remember that the controller is evaluating line by line. There must be one true statement (called the “else” statement by logicians). So the last line always states True with the result set to whatever state we want when none of the other conditions is true.

To summarize, the conditions read: “If SI1 is greater than or equal to Num2, turn on the OI. If SI3 is greater than or equal to Num4, turn on the OI. Under any other conditions, leave the fan off.” Another way to state the effect of this logic is: “If compressor room temperature is equal to or greater than 90, or refrigerant is sensed at 500 ppm or more, turn on the fan; else, turn off the fan.” This is exactly what we set out to do.
Creating the miscellaneous points relay output

Exit to the Configure Miscellaneous menu, and from there select **Relay Outputs** and press ENTER. The configuration screen for a relay output appears:

![Configuration screen for a relay output](image)

The first step in configuring a miscellaneous RO is to increase the field No. of relay outputs by 1. In this example, we're increasing 0 to 1 because this is the first miscellaneous RO to be configured. Here's what to do and where to do it:

- **Name**
  (Label, any 15 characters) Edit the field to read appropriately to the purpose.

- **Bcast**
  (List box: No, Send, Rec) Leave the Bcast field set to No. We are not going to use the point elsewhere on the network.

- **Bd-Pt**
  (Bd-Pt label) In the Bd-Pt field, enter the number of the board and terminals where the RO will be wired.

- **On**
  (List box: N-Closed, N-Open) Because the normal state of the fan will be off, we will wire through the normally open contacts for the output relay.

Notice the character > that is in reverse video in our example above. This is a button field, and when it is selected, ENTER will take you to the next page. Initially, the second page of this screen appears as at left below.
It is not necessary to change anything in the top half of this screen, which repeats the configuration we entered on the previous page (though we could change it here if we wanted). There are two things to add to configuration here.

**Control Input**

(List box: all configured OIs) Our new calculated OI is found at the bottom of the list. (Use the three dots at the top or bottom to move up or down the list.) a page at a time.

The other fields on the screen are timers. To keep the exhaust fan from cycling too rapidly when the temperature is hovering near the setpoint, we will set a 10 minute post delay. The finished screen looks like this:

Completing that working example hopefully increased your comfort with calculated points. Now we will go through each of the fields and functions in order.
The heading fields
Here is the heading area of the calculated points screen:

Units
We’ve discussed the Units field and its contents earlier. The contents specify the type of point being created, whether an OI or SI. The 13 kinds of SI are differentiated by the units in which their values are presented. There is one special selection you can make from the Units list box:

<Delete>
Use this button in the style box to delete the calculated point. Higher numbered points will remain in place. The deleted point will be the next new point made available for configuration.

Style
To understand the various styles of Calculated SI and OI points, we will give use the initial framework screens that display when each combination of Units and Style is selected. We will present them by style.

<Clear>
This button clears the configuration for the selection of a new style.

Generic
(OI, SI) The style we used for the example just completed.

Clone
(OI, SI) Offers a means of cloning any physical board & point to be used elsewhere in the system.

Schedule
(OI only) Used to create an OI that will be on or off according to a schedule.

Cut In/Out
(OI only)

Latch
(OI, SI) Once turned on by a true rule, the point will remain on until a physical switch (wired to an OI) is operated to turn it off.

Receive
(OI, SI)

Minimum
(SI only) The value will be the minimum of up to 5 SIs.

Maximum
(SI only) The value will be the maximum of a number of up to 5 SIs.

Average
(SI only) The value will be the average of up to 5 SIs.

Undo
The undo button will undo the last change you made before you pressed ENTER.

Cancel
The cancel button will clear all changes since you began editing the point.

Redo
The redo button appears after any undo or cancel, and reverses that action.