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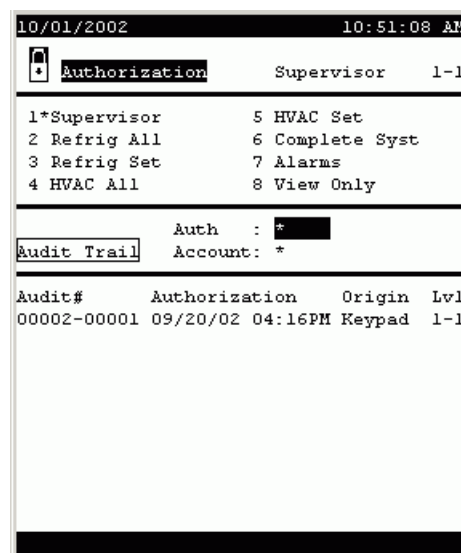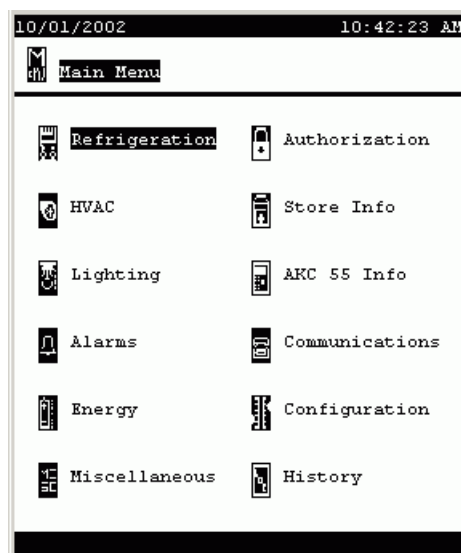
Before you can enter configuration information, you must select **Authorization** and enter a valid authorization code and account code. Using the right arrow, move the cursor to **Authorization** and press ENTER. The Authorization Menu will appear as at right above, with the cursor in the **Auth** field.

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

your steps level by level.

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.
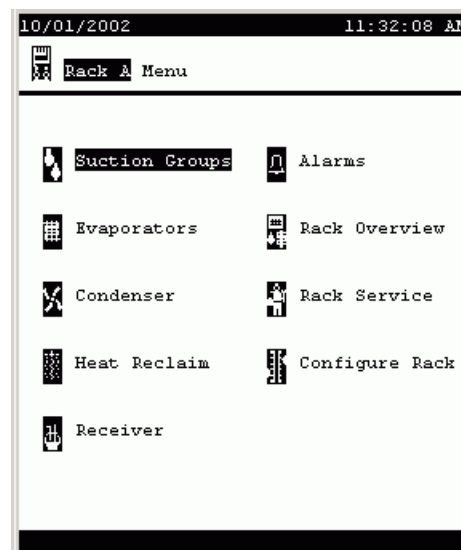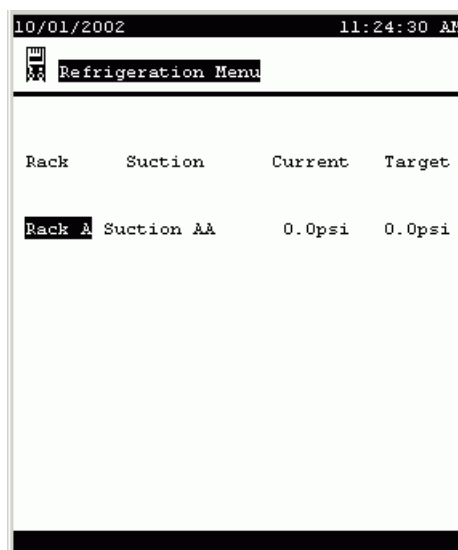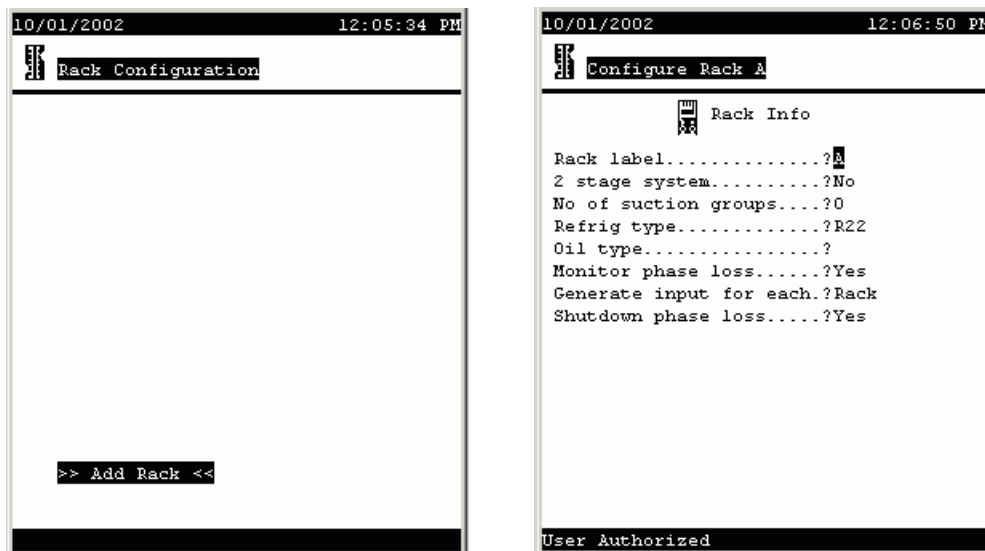

Select **Configure Rack** and the Configure Rack menu appears.

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).

```
10/01/2002              12:05:34 PM
▓▌ Rack Configuration








           >> Add Rack <<

```

```
10/01/2002              12:06:50 PM
▓▌ Configure Rack A

           ▤  Rack Info

Rack label..............?A
2 stage system..........?No
No of suction groups....?0
Refrig type.............?R22
Oil type................?
Monitor phase loss......?Yes
Generate input for each.?Rack
Shutdown phase loss.....?Yes




User Authorized
```

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 thefield, then press the +/- key. This action toggles the function of the arrow keys so that the UP and DOWN arrows scroll through thealphabet 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.
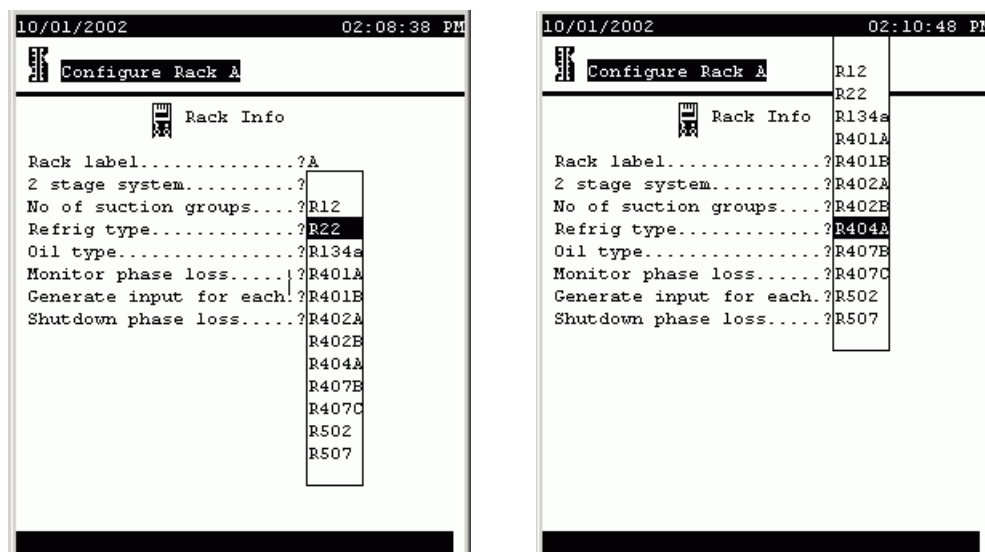
The list box appears, as shown at left above, when you move the cursor to the field and then press the +/- key (or, at your PC, right click). Then, using the UP and DOWN arrow keys, you can move the cursor to make a selection. In the example at right, R404A has been chosen. The cursor actually stayed 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:

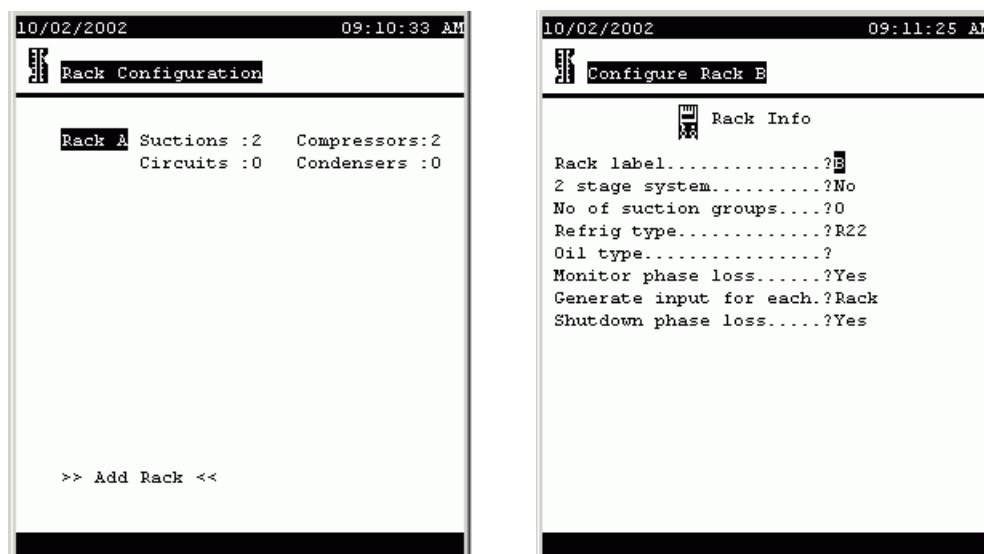|	
Rack label	(Upper case letters, A to Z) The "name" of the rack.
2 stage system	(List box: Yes, No)
No of suction groups	(0 to 5) Note that for a rack with existing configuration, entering and confirming a 0 will cause deletion of all existing rack information.
Refrig type	(List box) The kind of refrigerant.

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.
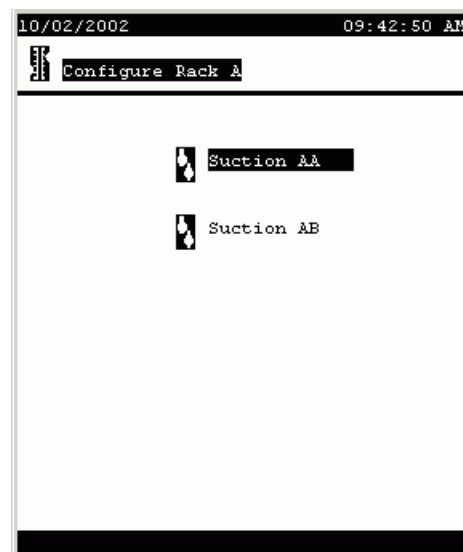
Adding a Rack

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.

```
10/02/2002                09:10:33 AM
🎛 Rack Configuration

  Rack A Suctions :2   Compressors:2
         Circuits :0   Condensers :0









  >> Add Rack <<
```

```
10/02/2002                09:11:25 AM
🎛 Configure Rack B

            📟 Rack Info

Rack label..............?B
2 stage system..........?No
No of suction groups....?0
Refrig type.............?R22
Oil type................?
Monitor phase loss......?Yes
Generate input for each.?Rack
Shutdown phase loss.....?Yes
```

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) .

```
10/02/2002              09:41:32 AM
 ▊ Configure Rack A

   ▊ Rack Info        ▊ Receiver

   ▊ Suction Info     ▊ Heat Reclaim

   ▊ Compressors      ▊ Alarms

   ▊ Evaporators      ▊ Board & Points

   ▊ Condensers
```

```
10/02/2002              09:42:50 AM
 ▊ Configure Rack A


   ▊ Suction AA


   ▊ Suction AB
```
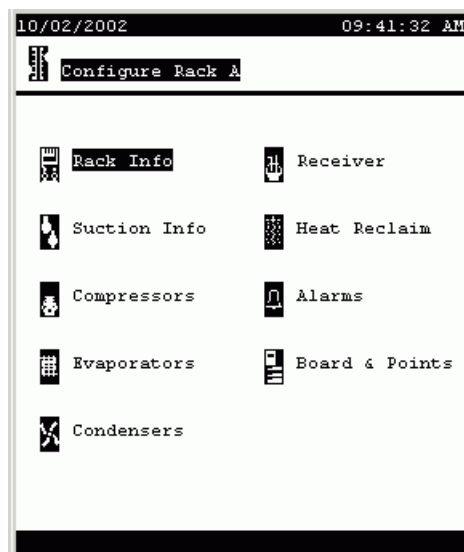
Once at suction configuration menu shown at right above, select the suction group you want to configure and press ENTER. The Suction Info screen for that group will appear as at left below. As you configure, questions may appear that are not included on the default screen. The screen at left below shows all the possible lines revealed.

```
10/02/2002              10:19:21 AM
 ▊ Configure Rack A   Suction AA

          ▊ Suction Info

Suction I.D.............?A  Suction
PSIG target.............?   0.0psi
PSIG Safety cutout......?   0.0psi
Adaptive suction control?None




Night setback...........?No

                    "PG DN" for more
```

```
10/02/2002              10:23:07 AM
 ▊ Configure Rack A   Suction AA

          ▊ Suction Info

Suction I.D.............?A  Suction
PSIG target.............?   0.0psi
PSIG Safety cutout......?   0.0psi
Adaptive suction control?AKC 55
Bd-Pt...................?00-0
Temp target.............?   0.0°F
Range +/-...............?   2.0°F
Maximum pressure float..? 4.0 psi
Post defrost delay......?20 min
Allow float below target?No
Night setback...........?Yes
Pressure differential...?  3.0psi
Setback from time.......?12:00 AM
Setback to time.........?12:00 AM
Setback days............?SMTWRFA
Setback holidays........?12345678
                    "PG DN" for more
```

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.
PSIG Safety cutout	(-50.0 to 150.0) The gauge pressure at which the controller will stop the compressors in this suction group.
Adaptive suction control	(List box)
	None: No adaptive suction control.
	AKC 55: Target pressure is adjusted based on discharge temperature of a single fixture.
	AKC 16x: Adaptive control of individual evaporators by an AKC 164 or AKC 161 Smart Case Controller.
	Sensor: Target pressure is adjusted based on any sensor on the AKC 55 I/O network
	Dynamic: The AKC 55 analyzes the performance of every case on each individual circuit, and adjusts target pressure intelligently by using the case sensor that varies most from the setpoint.
Bd-Pt	(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.
Temp target	(-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.)
Range +/-	(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.)
Maximum pressure float	(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.
Post defrost delay	(0 to 60) The number of minutes after termination of defrost during which there will be no target adjustment. (Does not appear when **Sensor** is selected as the type of adaptive control.)
Allow float below target	(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.
Night setback	(List box: Yes, No) Determines whether or not suction pressure will be offset according to a schedule to be specified in the following lines.
Setback from time	(Time field) The start time for night setback.
Setback to time	(Time field) The ending time for night setback.

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.

```
10/02/2002              02:38:20 PM
  🔳 Configure Rack A    Low Temp AA

            🔳 Suction Info

Monitor suction temp....?Yes
Display superheat temp..?No

Monitor desuperheat temp?No

Close AKV valves
   during rack shutdown.....? No
```

```
10/02/2002              02:39:27 PM
  🔳 Configure Rack A    Low Temp AA

            🔳 Suction Info

Monitor suction temp....?Yes
Display superheat temp..?No

Monitor desuperheat temp?No

Close AKV valves
   during rack shutdown.....? Yes
Only when suction is above
   target by................? 5.0  psi
Delay time...................? 45  sec
Rack on AKC 55 address......? 0
```

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:

```
10/04/2002                    10:14:49 AM

 ▓ Configure Rack A   Low Temp AA

             ▓  Suction Info


Is this 2-stage low side?Yes

Low side shutdown:
Shutdown on hi suct PSI.?Yes
High side suct. PSI.....?  60.0psi
Shutdown on hi suct temp?Yes
High side suct. temp....?█100.0█°F

Control desuperheater...?Yes
Controlling sensor......?Desuper In AA
Desuperheating temp.....?  80.0°F
Range +/-...............?   2.0°F



                    "PG DN" for more
```

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:	
Shutdown on hi suct PSI	(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	(-50.0 to 200.0)
Range +/-	(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:

```
10/02/2002                    03:30:09 PM
┃ Configure Rack A   Low Temp AA

              Compressors

No. of compressors......?▮
Compressor type.........?Reciprocating
Proof type..............?Bitzer
Reset Bitzer with RO....?No
Compressor 1 size.......? 20.0
No. of unloaders........?4
Unloader capacity %:
#1: 20    #2: 20    #3: 20    #4: 20

Inverter control........?VO
Inverter min. speed.....? 50.0
Inverter max speed......?100.0
RPM at max speed........?1000
Inverter max resets.....? 3
Inverter proof delay....?10 sec
Min time between resets.?30 sec
                        "PG DN" for more
```

The fields and their contents are as follows:

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

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:

```
10/02/2002                    03:31:23 PM
 ▓ Configure Rack A    Low Temp AA

          ▓  Compressors

Oil control.............?Yes
Type of oil monitor.....?Sensor Input
Lockout comp on oil fail?Yes
Low oil pressure diff...? 5.0psi
Oil pressure delay......?60  sec
No of oil reset attempts? 3
Min time between resets.? 5  min
Monitor comp disch temp.?Yes
Stop comps on high temp.?Yes
 Cutout: 240.0°F  Cutin : 230.0°F
Stop comps on low temp..?Yes
 Lockout:90 min  below  40.0°F for 1min
Disch pressure safety...?Yes
 Cutout: 325.0psi Cutin : 275.0psi
Unload before cutout....?Yes
```
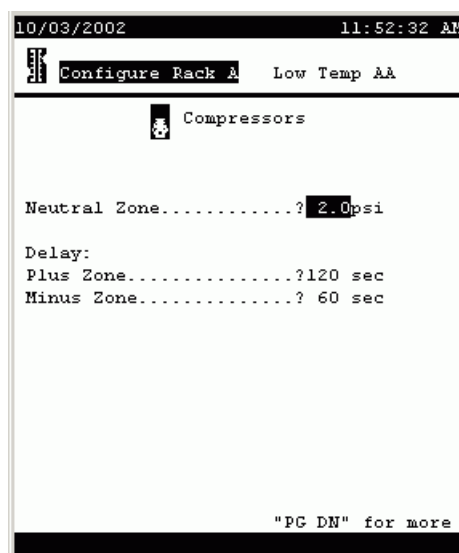
The fields and their contents are as follows:

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

|	
	number of minutes that must elapse before another reset attempt.
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 comrpessors 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 comrpessors 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 comrpessors 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:


```
10/03/2002                    11:52:32 AM

   Configure Rack A    Low Temp AA

              Compressors


Neutral Zone............? 2.0 psi

Delay:
Plus Zone...............?120 sec
Minus Zone..............? 60 sec




                    "PG DN" for more
```

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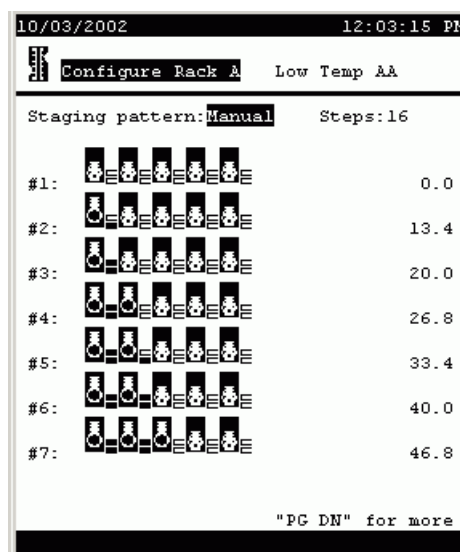
In the default screen, the staging pattern is **Auto**, for automatic staging, and there is no selection for **Steps**. The controller will stage capacity in the smallest steps available.

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:

```
05/30/2003              10:39:35 AM
▓ Configure Rack C   Suction CA

        ▦  Evaporators

    Number of Circuits? 0
Dewpoint method.......? Dewpoint
Dewpoint sensor to use? Dewpoint 1












( Case Lights )
```

```
05/30/2003              10:42:01 AM
▓ Configure Rack A   Low Temp AA

        ▦  Evaporators

    Number of Circuits? 40
Dewpoint method.......? Dewpoint
Dewpoint sensor to use? Dewpoint 1

        Name          Type
Subcooler AA1   AKC 55/SUBC   >Setup<
Circuit AA2     AKC 55        >Setup<
Circuit AA3     AKC 16x       >Setup<
Circuit AA4     EKC           >Setup<
Circuit AA5     DEG MASTER    >Setup<
Circuit AA6     DCU           >Setup<
Circuit AA7     AKC 55        >Setup<
Circuit AA8     AKC 55        >Setup<
Circuit AA9     AKC 55        >Setup<
Circuit AA10    AKC 55        >Setup<

( Case Lights )      "PG DN" for more
```

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.
Dewpoint method	(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/PHOE-NIX 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.

```
05/30/2003      Alarm!      11:50:25 AM
 ▒ Rack Configuration


 Case Lights Override

  Type of override switch..? Disabled
                             On/Off
                             On/Auto
                             Off/Auto
                             On/Auto/Off
```

```
05/30/2003                  11:53:20 AM
 ▒ Rack Configuration


 Case Lights Override

  Type of override switch..? On/Off

  Revert to auto with timer? Yes
    Timeout after  60  minutes



Name             Bcast Bd-Pt  On

Case Lights ON  No    00-0  Voltage
```

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.

```
05/30/2003              04:07:55 PM
 ▒ Configure Rack A   Low Temp AA

        ▦ Evaporators


 Number of valves........? 1

 Stage 1:
 Cutin setpoint..........?50.0 °F
 Cutout setpoint.........?45.0 °F






 Minimum ON time.........?  0 min
 Minimum OFF time........?  0 min
```

```
05/30/2003      Alarm!      04:21:56 PM
 ▒ Configure Rack A   Low Temp AA

        ▦ Evaporators


 Number of valves........? 2
 Number of stages........?3
 Stage 1:
 Cutin setpoint..........?120.0°F
 Cutout setpoint.........?110.0°F
 Stage 2:
 Cutin setpoint..........?50.0 °F
 Cutout setpoint.........?45.0 °F
 Stage 3:
 Cutin setpoint..........?50.0 °F
 Cutout setpoint.........?45.0 °F

 Minimum ON time.........?222 min
 Minimum OFF time........?255 min
```

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:

box, multi-deck, single deck, service, etc.

Fixture Name   (List box) There is a large selection of common fixture names for each of the fixture types that can be selected above, and there is a selection **User Def.** After making that selection, you will be able to spell out your own name on the following line.

Enter user defined name   (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.

Monitor box door   (List box: Yes, No) Whether or not a box door switch will be monitored (appears for boxes only).

Shutdown when door open   (List box: Yes, No) Whether or not to shut down refrigeration when the box door is open.

No case/box sensors   (0 to 15) The number of sensors in this fixture or circuit.

Temperature control   (List box: Yes, No) Whether or not temperature contol will be used.

Controlling sensor   (List box:)
Min Temp The lowest of the sensors in the fixture or on the circuit will be used for temperature control.
Max Temp The highest of the sensors in the fixture or on the circuit will be used for temperature control.
Average The average of all the sensors in the fixture or on the circuit will be used for temperature control.
[circuit names] The name of each sensor will be listed, and any can be selected. That sensor, then, will be used for temperature control.

Target: (-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.

Type of defrost   (List box) Various types of defrost can be chosen:
None, **Hot Gas**, **Time Off**, **Air**, or **Electric**.

Drip down delay   (1 to 600) The number of seconds that refrigeration will remain off after termination of defrost.

Termination type   *[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.
Defrost sensor There is a dedicated defrost temperature sensor that will be used to terminate defrost.
Disch air snsr The fixture discharge air sensor will be used to terminate defrost at a set temperature.
On/Off Input An electrical switch (such as a Klixon®

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:

```
10/07/2002                  01:00:16 PM

   Configure Rack A    Low Temp AA

              Evaporators

Use min defrost time....?Yes
Minimum defrost time....?30
Antisweat control.......?Yes
ON when dewpoint above..? 40.0°F
Cycle above dewpoint....? 30.0°F
Antisweat cycle time....? 20 min
Fan control.............?Yes
Fans on during defrost..?Yes
Stop fan on high temp...?Yes
Fan stop temp...........? 50.0°F
Fan delay control.......?Yes
Start fan on time.......?Yes
Delay time.............. 15 min

Monitor door position...?Yes

                   "PG DN" for more
```

[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

	of 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 alalog 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.
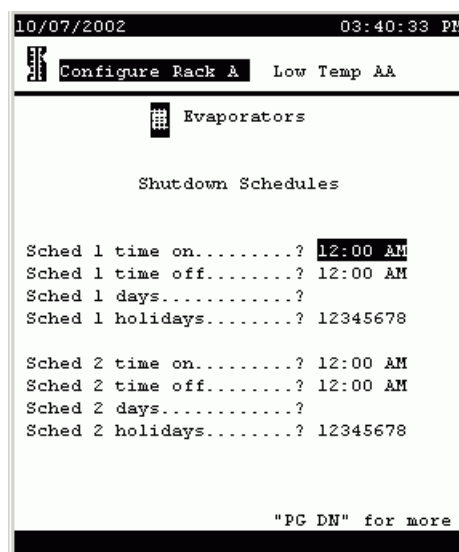
```
10/07/2002              01:02:39 PM

 Configure Rack A    Low Temp AA

        Evaporators

No of defrosts per day..?12
Defrost duration........? 30 min
Defrost start time:
#1: 12:00 AM #2: 12:00 AM #3: 12:00 AM
#4: 12:00 AM #5: 12:00 AM #6: 12:00 AM
#7: 12:00 AM #8: 12:00 AM #9: 12:00 AM
#10:12:00 AM #11:12:00 AM #12:12:00 AM
Allow defrost skip......?Yes
Min time between defrost?  1 hours
Override on dewpoint....?Yes
Don't skip when DP above?  50.0°F
Dual Temp control.......?Yes
 Alt target: 35.0°F  Range: 2.0°F
Dual Temp relay needed..?Yes
Num of shutdn schedules.?0
Generate shutdown OI....?Yes
                    "PG DN" for more
```

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, tThe 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)

Alt target, Range (-50.0 to 150.0, 1.0 to 20.0) The second temperature and range for a dual temperature evaporator.

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):

```
10/07/2002                   03:40:33 PM
 ▐▌ Configure Rack A   Low Temp AA

          ▐▌ Evaporators

          Shutdown Schedules


  Sched 1 time on.........? 12:00 AM
  Sched 1 time off........? 12:00 AM
  Sched 1 days............?
  Sched 1 holidays........? 12345678

  Sched 2 time on.........? 12:00 AM
  Sched 2 time off........? 12:00 AM
  Sched 2 days............?
  Sched 2 holidays........? 12345678



                      "PG DN" for more

```

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.

```
┌─────────────────────────────────┐   ┌─────────────────────────────────┐
│10/07/2002          01:03:23 PM  │   │10/07/2002          01:05:13 PM  │
│▓ Configure Rack A   Low Temp AA │   │▓ Configure Rack A   Low Temp AA │
│                                 │   │                                 │
│       ▦ Evaporator Alarms       │   │       ▦ Evaporator Alarms       │
│                                 │   │                                 │
│  Low Temperature      Disabled  │   │  Low Temperature      Log Only  │
│                                 │   │   If below   50.0°F for 15  min │
│  High Temperature     Disabled  │   │  High Temperature     Normal    │
│                                 │   │   If above   50.0°F for 15  min │
│                                 │   │   Delay after defrost for  60 Min│
│  Dual Temp                      │   │  Dual Temp                      │
│  Low Temperature      Disabled  │   │  Low Temperature      Disabled  │
│                                 │   │   If below   50.0°F for 15  min │
│  High Temperature     Disabled  │   │  High Temperature     Critical  │
│                                 │   │   If above   50.0°F for 15  min │
│                                 │   │  Key switch override  Yes       │
│   Select misc. point  Not configured│   Select misc. point  Not configured│
│   Delay after override for 60 min│   │   Delay after override for 60 min│
│  Box door open        Disabled  │   │  Box door open        Normal    │
│                                 │   │   If open for         15  min   │
│  Door open position   Disabled  │   │  Door open position   Log Only  │
│                                 │   │   If above   50.0%  for 15  min │
└─────────────────────────────────┘   └─────────────────────────────────┘
```

Each alarm has three fields:

[Alarm level]   (List box)

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.

```
10/08/2002                    02:57:49 PM
   Configure Rack A

              Condensers

Condenser type..........?None
```

```
10/08/2002              03:34:24 PM
   Configure Rack A

            Condensers

Condenser type..........?Air Cooled
Number of fans..........? 6
Fan staging.............?Individual
Monitor stages..........?Individual

Control sensor..........?Pressure
Monitor dropleg temp....?Yes
Control method..........?Target
Target control type.....?Ramp together
Ramp stages if ambient <   0.0°F +/-1.0



Target..................? 150.0psi

                        "PG DN" for more
```

```
10/11/2002              10:52:12 AM
   Configure Rack A

            Condensers

Condenser type..........?Air Cooled
Number of fans..........? 6
Fan staging.............?Individual
Monitor stages..........?Individual

Control sensor..........?Sat Cond Temp
Monitor dropleg temp....?Yes

Target control type.....?Ramp together
Ramp stages if ambient <   0.0°F +/-1.0
Min sat. cond temp......?  60.0°F
Max sat. cond temp......? 117.0°F
Condenser Delta T.......?  15.0°F


Heat reclaim offset.....?Yes    20.0psi
                        "PG DN" for more
```

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	(0 to 12) The number of condenser fans.
Fan staging	(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 calaculated 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 calaculated 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:

```
10/08/2002                    03:16:15 PM
┃┃ Configure Rack A

          ⬚ Condensers

High pressure bypass....?▊275.0▊psi
Monitor inlet temp......?Yes

Fan inverter control....?VO
Min speed...............?25.0
Max speed...............?100.0
RPM at max speed........?1000
Inverter max resets.....?3
Inverter reset delay....?300 sec
Inverter proof delay....?20  sec




                      "PG DN" for more
```
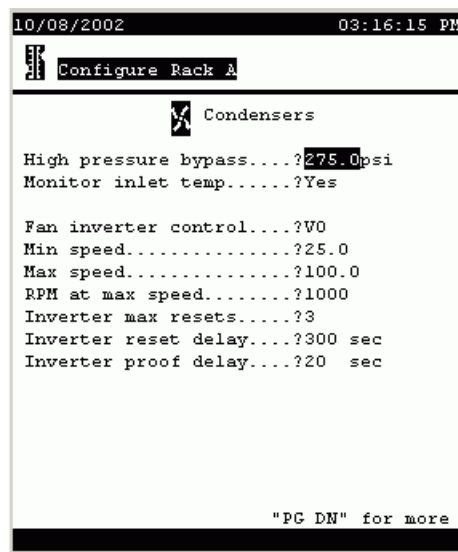
The field information is as follows:

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).

```
10/08/2002              03:17:02 PM
 ⯐ Configure Rack A
           ⯐ Condensers
Split condenser.........?Yes
Split based on..........?Ambient
Control method..........?1valve/1split
Split when below........? 50.0°F
Split deadband..........?  4.0°F
Drop fans...............?None
Split on heat reclaim...?No



Split pressure override.?Yes
Cut in:200.0psi   Cutout:275.0psi

                      "PG DN" for more
```

```
10/08/2002              04:47:16 PM
 ⯐ Configure Rack A
           ⯐ Condensers
Split condenser.........?Yes
Split based on..........?Ambient
Control method..........?3valve/3split


    Setpoint  Level 1  : 52.0°F
              Level 2  : 42.0°F
              Level 3  : 32.0°F
              Deadband :  4.0°F

Split pressure override.?Yes
Cut in:200.0psi   Cutout:275.0psi

                      "PG DN" for more
```

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.
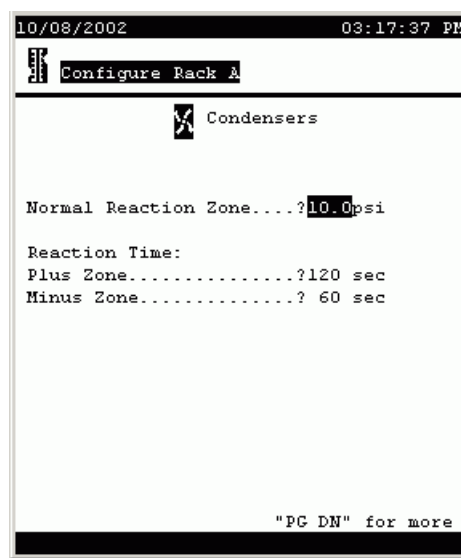
Drop fans (List box: Even, Odd) (Only with single split valves) Which fans are dropped when condenser is split.

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 funtion 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.

```
10/08/2002                    03:17:37 PM

  Configure Rack A

             Condensers


Normal Reaction Zone....?10.0psi

Reaction Time:
Plus Zone...............?120 sec
Minus Zone..............? 60 sec




                          "PG DN" for more
```

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) (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:

```
10/09/2002                09:19:58 AM

Configure Rack A

              Condensers

Enviroguard.............?Yes
Subcooling target.......?15.0  °F
Deadband................?0.1   °F
Min sat. cond temp......?60.0  °F
Min subcooling temp.....?5.0   °F
Elevation (rack to cond)?30    ft
Open SPR if discharge 50.0 psi > Target

Bleed valve............?Yes
Delay after SPR.........?5  minutes
```

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 temperatuare 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 regulatorr 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.

```
10/08/2002                    03:02:56 PM
 ▌ Configure Rack A

          ▓ Condensers

Condenser type.........?Evaporative
No of pumps............?2
Daily rotation.........?Yes
Monitor stages.........?None
Control sensor.........?Pressure

Monitor dropleg temp....?Yes
Control method.........?Target
Target control type.....?Ramp stages




Target.................? 150.0psi


                         "PG DN" for more

```

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: 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	(List box:) **Target**: The condenser fans will be controlled to maintain a target pressure or dropleg 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 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, 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	(-99.0 to 150.0, +/- 0.0 to 9.9) If the ambient temperature is below setpoint minus range, ramping will be by stages. When ambient reaches setpoint plus range, all fans will ramp together.
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.

```
10/08/2002                    03:05:16 PM
██ Configure Rack A
_____
              ▓ Condensers

Pump cutin..............?140.0psi
Pump cutout.............?120.0psi



Louver control enabled..?Yes
Louver cutin............?115.0psi
Louver cutout...........?105.0psi
Enable sump control.....?Yes
Sump level empty........? 20.0%
Sump level full.........? 90.0%
Sump level top off......? 50.0%
Fill Valve..............?Yes

Monitor inlet temp......?Yes

                    "PG DN" for more
_____
```
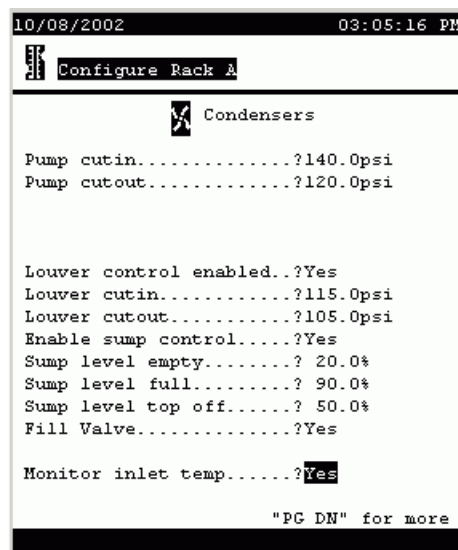
Pump cutin	(0.0 to 500.0) The pressure at which the pump will be turned on.
Pump cutout	(0.0 to 500.0) The pressure at which the pump will be turned off.
Louver control enabled	(List box: Yes, No) Whether or not louvers are to be controlled.
Louver cutin	(0.0 to 500.0) The pressure at which louvers will be opened.
Louver cutout	(0.0 to 500.0) The pressure at which louvers will be closed.
Enable sump control	(List box: Yes, No) Whether or not the sump is controlled.
Sump level empty	(0.0 to 100.0) The percentage of fill at which the sump is considered empty.
Sump level full	(0.0 to 100.0) The percentage of fill at which the sump is considered full.
Sump level top off	(0.0 to 100.0) (Requires fill valve control) The percentage of fill at which the fill valve will open and top off will begin.
Fill valve	(List box: Yes, No) Whether or not the sump fill valve is controlled.
Monitor inlet temp	(List box: Yes, No) Whether or not the inlet temperature is monitored.

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.

```
10/10/2002                    11:35:36 AM
▐▌ Configure Rack C
──────────────────────────────────────
            ✗ Condensers

Fan inverter control....?[VO ]
Min Speed:150.0Max Speed:150.0
RPM at max speed........?6000
Max no. resets..........?10
Inverter reset delay....?600 sec
Inverter proof delay....?600 sec
High pressure bypass....?275.0psi
Freeze Protection.......?Yes
Freeze prot temp cutout.? 99.9"F
Freeze prot temp cutin..? 99.9"F
Dump Valve..............?Yes
Dump on schedule........?Yes
Num of dump schedules...?8
Dump on freeze protect..?No
Overide pump on frz prot?No
Water flow monitor......?No
                  "PG DN" for more
──────────────────────────────────────
```

Fan inverter control   *[Please see notes on Neutral Zone selection in the first evaporative 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 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.)

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.
Overide 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.

```
10/10/2002                 01:05:57 PM
▓ Configure Rack A

        ▓  Receiver

Surge control...........?Yes
Cutin...................?65.0 °F
Cutout..................?70.0 °F
Liquid level sensor type?Sensor Input




```

Surge control   (List box: Yes, No) Whether or not surge control will

be implemented.

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.

```
10/10/2002                    01:37:23 PM

 ▐▌  Configure Rack A

                 ▓  Heat Reclaim

Heat reclaim............?Yes
Num of stages...........?2
Stage 1 type............?Water Ht
Cutin setpoint..........? 120.0°F
Cutout setpoint.........? 140.0°F
Stage 2 type............?Water Ht
Cutin setpoint..........? 120.0°F
Cutout setpoint.........? 140.0°F
Flush Cycle.............?Yes
Flush Cycle Start Time..?12:00 AM
Flush Cycle Duration....?10 min
Lockout on low head pres?Yes
Lockout Pressure........? 100.0psi
Lockout on liquid level.?Yes
Liquid level sensor type?Sensor Input
Liquid %................? 20.0
```

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.

Stage 1 type (List box:)

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

	be locked out when head pressure is below a setpoint to be entered on the next line.
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:
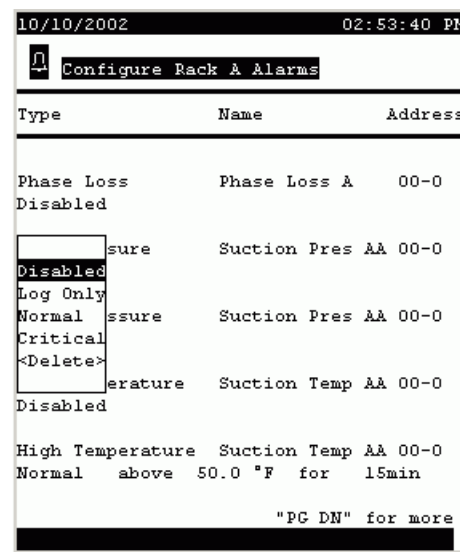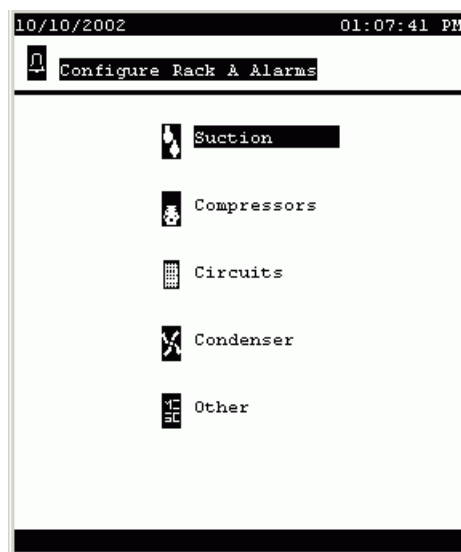
The set of alarms that are created automatically as you proceed with configuration of a rack is shown in the menu; by selecting one of the menu items (in this case **Suction**), the alarms for that part of the rack are presented. The first page of suction alarms is shown at right above. One of the list 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 Temperatuare 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:

Alarm Levels

Critical 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).

Normal When conditions have been at or have or have gone beyond the alarm's trip level for the set time, the alarm will occur. The alarm will dial out once.

Log Only 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.

Disabled 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.

Delete The alarm's configuration will be deleted from memory.

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).

What You Can Change in a Standard Alarm

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)

```
10/10/2002              01:11:18 PM

  ▯▯ Configure Rack A Board & Points

         ▯ Relay Outputs


Name           Bcast Bd-Pt  On

Fan Inv Reset A No    00-0   N-Closed
Fan Inv Bpass A No    00-0   N-Closed
Louvers Cond A  No    00-0   N-Closed
Fan Fwrd Run A  No    00-0   N-Closed
Cond Fill Vlv A No    00-0   N-Closed
Surge Valve A   No    00-0   N-Closed
Cond Dump Vlv A No    00-0   N-Closed
Cond Fan Al     No    00-0   N-Closed

   SORT:On            "PG DN" for more

        ▯  ▮  ▯  ▯  ▯
```
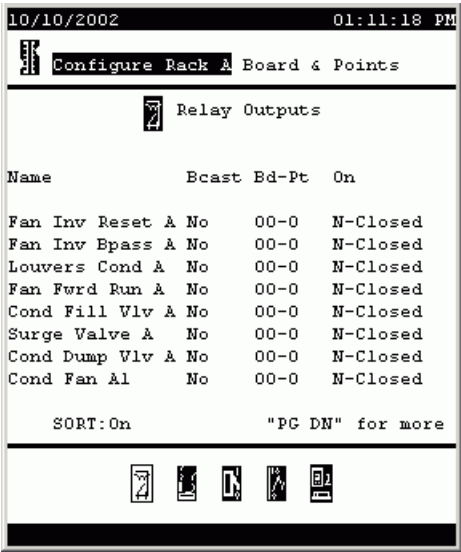
Board & Points
Relay outputs
(Digital outputs)

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:)

	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)

```
10/10/2002        Alarm!         04:17:07 PM

   Configure Rack A Board & Points

              Sensor Inputs


Name               Bcast Bd-Pt   Type

Inside Temp        No    00-0     PT1000
Disch Press A      No    00-0     AKS32-500
Dropleg Temp A     No    00-0     PT1000
Cond Sump Lvl A    No    00-0     EMHS3
Inlet Temp A       No    00-0     PT1000
Liquid Lvl % A     No    00-0     0-5 Volts
Hotwater A1        No    00-0     PT1000
Hotwater A2        No    00-0     PT1000


    SORT:On              "PG DN" for more
```

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 temperataure 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 Rack A Board & Points

            N  On/Off Inputs


Name            Bcast Bd-Pt  On

Phase Loss A     No    00-0   Voltage
Fan Inv Proof A  No    00-0   Voltage
Fan Inv Fault A  No    00-0   Voltage
Cond Fan A1      No    00-0   Voltage
Cond Fan A2      No    00-0   ┌─────────┐
Cond Fan A3      No    00-0   │Voltage  │
Cond Fan A4      No    00-0   │No Voltage│
Cond Fan A5      No    00-0   │Latching │
                             └─────────┘
    SORT:On            "PG DN" for more

      ▓  ▓  N  ▓  ▓
```
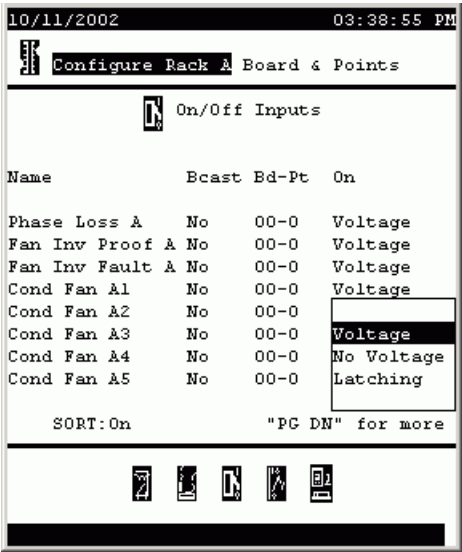
Name (Label field; any 15 characters) The name of the load sensed by the digital input (on-off input). The default names for the inputs automatically added during configuration of refrigeration are shown, and will suffice in many applications. They can be edited character by character (put the cursor 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)

```
10/10/2002        Alarm!         04:21:34 PM
  Configure Rack A Board & Points

            Variable Outputs


Name                    Bd-Pt  Range

Fan Inverter A          00-0   0-10 Volts








    SORT:On


```
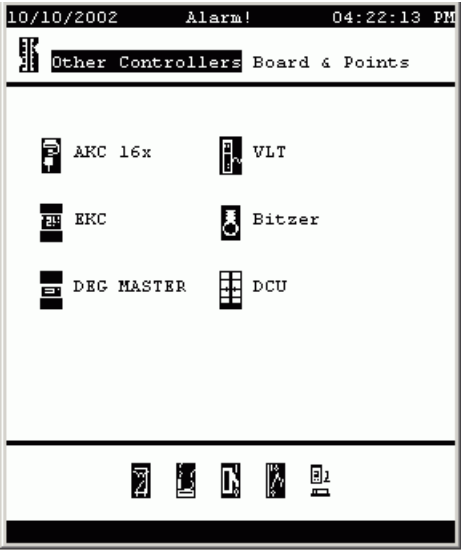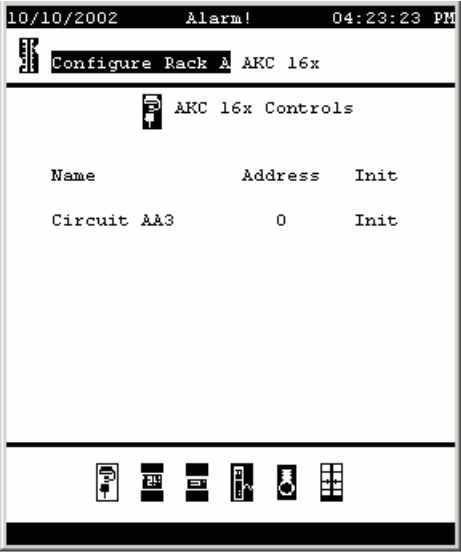
Name   (Label field; any 15 characters) The name of the load being driven by the variable output. The default names for the variable outputs automatically added during configuration of refrigeration are shown, and will suffice in many applications. They can be edited character by character (put the cursor 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.

```
10/10/2002        Alarm!        04:22:13 PM

    ▌  Other Controllers Board & Points
    ▔▔▔▔▔▔▔▔▔▔▔▔▔▔▔▔▔▔▔▔▔▔▔▔▔▔▔▔▔▔▔▔▔▔

         ▣  AKC 16x        ▣  VLT


         ▣  EKC           ▣  Bitzer


         ▣  DEG MASTER    ▣  DCU



    ▔▔▔▔▔▔▔▔▔▔▔▔▔▔▔▔▔▔▔▔▔▔▔▔▔▔▔▔▔▔▔▔▔▔
         ▣  ▣  ▣  ▣  ▣

    ▇▇▇▇▇▇▇▇▇▇▇▇▇▇▇▇▇▇▇▇▇▇▇▇▇▇▇▇▇▇▇▇▇▇
```

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:

```
10/10/2002        Alarm!        04:23:23 PM

    ▌  Configure Rack A AKC 16x
    ▔▔▔▔▔▔▔▔▔▔▔▔▔▔▔▔▔▔▔▔▔▔▔▔▔▔▔▔▔▔▔▔▔▔
              ▣  AKC 16x Controls


      Name              Address   Init

      Circuit AA3          0      Init






    ▔▔▔▔▔▔▔▔▔▔▔▔▔▔▔▔▔▔▔▔▔▔▔▔▔▔▔▔▔▔▔▔▔▔
         ▣  ▣  ▣  ▣  ▣  ▣

    ▇▇▇▇▇▇▇▇▇▇▇▇▇▇▇▇▇▇▇▇▇▇▇▇▇▇▇▇▇▇▇▇▇▇
```

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.
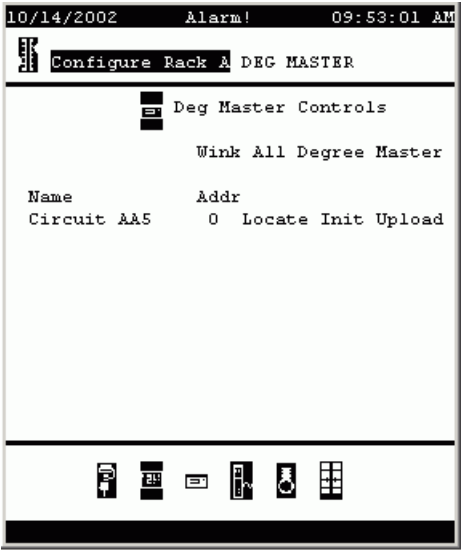
Network Re-scan and Initialization

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-secan, 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.
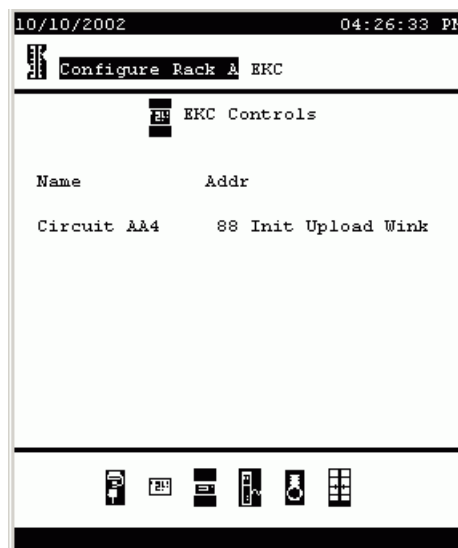
The fields and contents are:

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-secan, return (via the Main Menu) to the EKC Board & Points Configuration Screen, and
4. Put the cursor on the **Init** field and press ENTER.

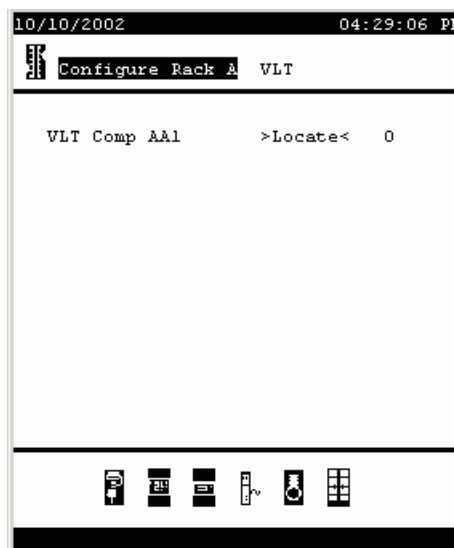| | **Upload** | (Button field) Placing the cursor on this field and pressing ENTER will cause information programmed at the fixture on the EKC to be uploaded to the AKC 55 controller. |
| Wink (EKC) | **Wink** | (Button field) Placing the cursor on this field and pressing ENTER will cause this individual 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 |

		among the Degree Masters in the system.
	Locate	(Locate button field) See the explanation "Locate and Init" below.
	Init	(Init button field) See the explanation "Locate and Init" below.

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 Board & Points

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.

```
10/14/2002              12:24:09 PM          10/14/2002              12:14:14 PM

 ⬚ HVAC Configuration                         ⬚ HVAC Configuration

No. of HVAC Units: 0                         No. of HVAC Units: 6
                                             No. of phase loss monitors:█1
                                             No. of humidity sensors   : 1
                                             No. of dewpoint sensors   : 1

                                                                    Stages
                                             Name        Type      Cool  Heat
                                             Unit 1      RTU    <Setup>  0    0
                                             Unit 2      AHU    <Setup>  0    0
                                             Unit 3      RTC    <Setup>  0    0
                                             Unit 4      SC4    <Setup>  0    0
                                             Unit 5      CT-65  <Setup>  0    0
                                             Unit 6      CT-1024 <Setup> 0    0
```

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	[for each individual listed HVAC unit] (List box:)
		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.

RTU
Configuration

When you press the **<Setup>** button for an RTU unit, the menu that appears looks like this:
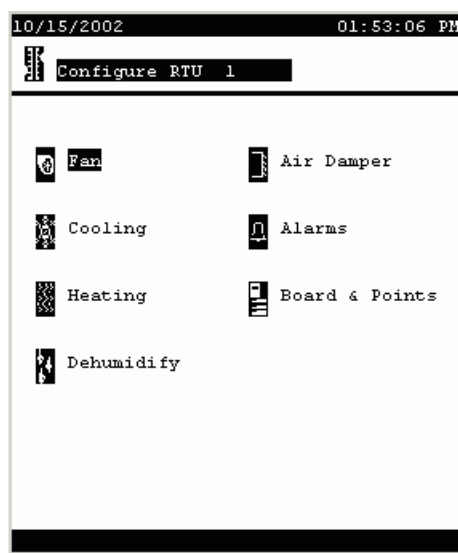
From this menu, you can enter the configuration screens for each of the components of the HVAC unit.

RTU fan
configuration

There are two pages for fan configuration:

```
10/15/2002              09:00:34 AM      10/15/2002              02:16:01 PM
 ┃┃ Configure RTU  1        Fan ◙        ┃┃ Configure RTU  1         Fan ◙

 Fan type...............?2-Speed
 Fan control OPEN hours..?Continuous
 Default fan speed.......?High Speed
 Fan control CLOSED hours?Continuous
 Default fan speed.......?Low Speed
 Post delay.............? 2 min
                                          Monitor phase loss......?Yes
                                          Which phase loss monitor?Phase Loss 1
                                          Shutdown phase loss.....?Yes
                                          Shutdown on smoke detect?Yes
                                          Shutdown on fire alarm..?Yes

                                          No. of return sensors...?2
                                          Controlling sensor......?Return Air 1-1

                                          No. of supply sensors...?2
                                          Controlling sensor......?Supply Air 1-1
                        "PG DN" for more
```

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.

Fan configuration
page 2

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

```
10/15/2002                    09:02:44 AM
  ▌ Configure RTU  1          Cooling 🖄

Number of zone sensors..?2
Controlling sensor......?Zone Temp 1-1
Num of cooling stages...?2



Target temp. for stage:
 #1: 74.0°F  #2: 74.0°F

Range +/-...............?  1.0°F
Pre delay for stage:
 #1: 1 min   #2: 1 min

Post delay for stage:
 #1: 1 min   #2: 1 min

                        "PG DN" for more
```

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.

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.

```
10/16/2002                    08:38:57 AM

    Configure RTU  1          Cooling


Ambient temp lockout....?Yes
No cooling below........?  40.0°F
Range +/-...............?   2.0°F
Default fan speed.......?High Speed
Max suction press safety?Suction Pres AA
No cooling above........?  85.0psi
Freeze Protection.......?Sensor Input
Setpoint................?  35.0°F

Night setback...........? Yes
Night setback offset....?   5.0°F
Override switch.........? Yes
Override duration.......?  60 min
Num of schedules........?    1



                    "PG DN" for more
```

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.

Default fan Speed	(List box: High Speed, Low Speed) The fan speed for cooling. A different fan speed can be chosen for dehumidification when it is configured.
Max suction press safety	(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.
No cooling above	(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.
Freeze protection	(List box:)
	Sensor Input: 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.
	On/Off Input: A single digital input that when ON will turn off all stages of cooling in the RTU.
	None: There is no freeze protection to configure.
Setpoint	(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.
Night setback	(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 require-ments are not as critical; for example, when the building is closed.
Night setback offset	(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.
Override switch	(List box: Yes, No) Whether or not there is a switch to override night setback.
Override duration	(0 to 1439) The number of minutes after, activation of the override switch, that night setback will be overrid-den.
Num of schedules	(0 to 8) The number of cooling night setback sched-ules. Schedules are entered on the following page(s) reached by using the PG DN key.

RTU Heating
configuration

Heating configuration for rooftop units begins with selection of **Heating** from the rooftop configuration menu.

```
10/15/2002                09:04:56 AM

▓▌ Configure RTU  1          Heating ▓

Number of zone sensors..?2
Controlling sensor......?Zone Temp 1-1
Num of heat rclm stages.?1
Target temp. stage 1....? 72.0°F
 Pre delay: 0min Post delay: 0min


Range +/-...............?  1.0°F
Auxiliary Heat type.....?Staging
Fan speed...............?High Speed
Night setback...........?Yes
Night setback offset....?  5.0°F
Override switch.........?Yes
Override duration.......?  60 min
Num of schedules........?   1
High supply temp lockout?Yes
Lockout above:150.0°F Deadband:  2.0°F

                  "PG DN" for more

```

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 rclm 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 thelast 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.

RTU Heating auxiliary
heat configuration, p2:
 staging strategy

```
10/15/2002                09:05:44 AM

  ▐▌ Configure RTU  1        Heating ▐▌


Num of aux heat stages..? 2
Target temp. for stage:
  #1: 69.0°F  #2: 69.0°F

Range +/-...............?  1.0°F

Pre delay for stage:
  #1: 0 min   #2: 0 min

Post delay for stage:
  #1: 0 min   #2: 0 min


Lockout aux ht. in setbk? Yes
Ambient heat lockout....? Yes
No heat above...........? 70.0°F
Range +/-...............?  2.0°F
                     "PG DN" for more
```

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:

```
10/29/2002                    11:00:24 AM

 ▓  Configure RTU  1          Heating ▓


   Aux Heat target temp....?  -50.0"F
   Pre delay...............?  60 min
   Post delay..............?  60 min

   Lockout aux ht. in setbk?  Yes
   Ambient heat lockout....?  Yes
   No heat above...........?    0.0"F
   Range +/-...............?    2.0"F
   Low Fire Position.......?    0.0 %
   Low Fire Duration.......?  3 min
   Max valve opening.......?  95.0 %
   Min valve opening.......?  25.0 %
   Degrees to max opening..?  4"F



                         "PG DN" for more
```

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

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 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.

```
10/15/2002                    09:07:37 AM

   Configure RTU  1        Dehumidify

Dehumidification type...?Cooling
Rclm heat during dehumid?No
Aux heat during dehumid.?No


Control dehumid. on.....?Calc Dewpt

Control humidity sensor.?Average
Control temp sensor.....?Average
Target..................? 50.0°F
Target differential.....?  2.0°F
Pre delay for stage:
  #1:  1 min  #2:  1 min

Post delay for stage:
  #1:  2 min  #2:  2 min

Cooling low limit.......?  68.0°F
                      "PG DN" for more
```

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
(List box:)
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 temperatuare 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.

RTU dehumidification
configuration, page 2

```
10/15/2002                09:08:32 AM

    ▌  Configure RTU  1     Dehumidify  ▌


    Fan speed...............? Low Speed

    Monitor outside humidity? Yes



    Night setback...........? Yes
    Night setback offset....? 2.0   °F
    Override switch.........? No

    Num of schedules........? 1




                        "PG DN" for more

```

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.

```
10/15/2002                09:09:37 AM

   Configure RTU 1      Air Damper


Air Damper..............? Yes

Ambient temp lockout....? Yes
No air damper below.....? 35.0 °F
Range +/-...............?  2.0 °F

Num of schedules........? 0
```

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 temperatuare.
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 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.
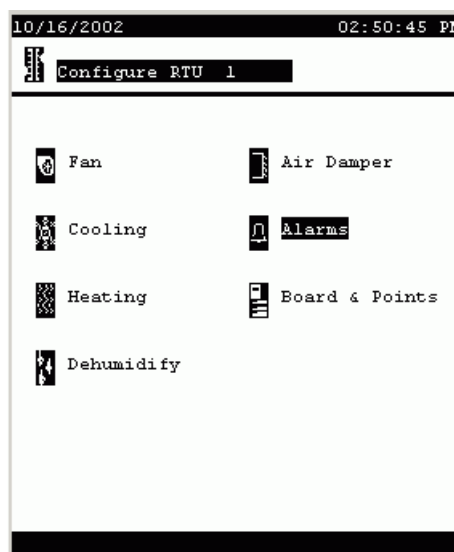
High zone temp	for each configured zone
Low zone temp	for each configured zone
High humidity	for each configured RH sensor
High supply temp	
HVAC fan down	for each fan speed
HVAC phase loss	for this unit's phase loss detector
HVAC smoke	for this unit's smoke detector
HVAC fire	for this unit's fire detector

RTU Board & Points
configuration

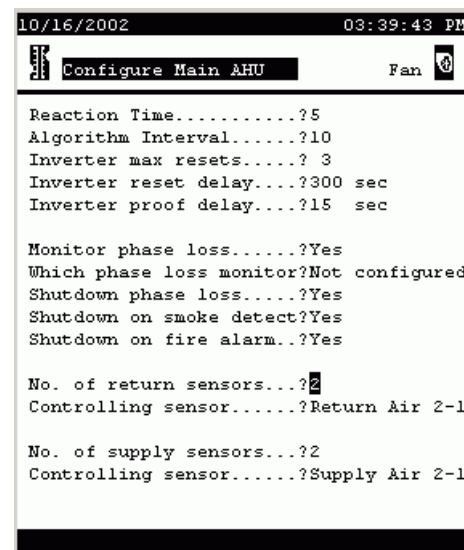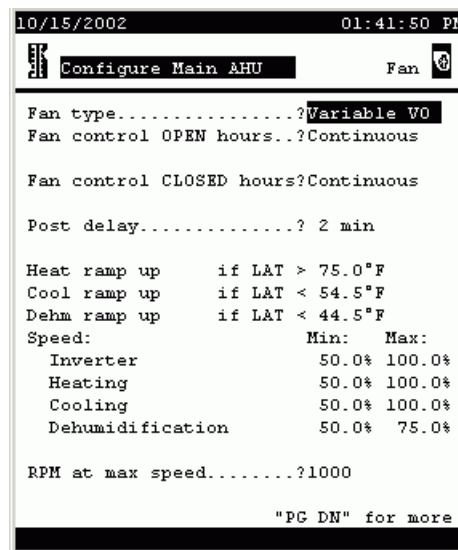See the Appendix on Board & Points

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

```
10/16/2002                    02:50:45 PM

 ▓  Configure RTU  1
 ─────────────────────────────────────

      ▓ Fan              ▓ Air Damper

      ▓ Cooling          ▓ Alarms

      ▓ Heating          ▓ Board & Points

      ▓ Dehumidify

```

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

AHU fan
configuration
There are two pages for AHU fan configuration:

```
10/15/2002               01:41:50 PM

 ▓ Configure Main AHU        Fan ▓

Fan type...............?Variable VO
Fan control OPEN hours..?Continuous

Fan control CLOSED hours?Continuous

Post delay..............? 2 min

Heat ramp up      if LAT > 75.0°F
Cool ramp up      if LAT < 54.5°F
Dehm ramp up      if LAT < 44.5°F
Speed:                   Min:   Max:
  Inverter               50.0% 100.0%
  Heating                50.0% 100.0%
  Cooling                50.0% 100.0%
  Dehumidification       50.0%  75.0%

RPM at max speed........?1000

                      "PG DN" for more
```

```
10/16/2002               03:39:43 PM

 ▓ Configure Main AHU        Fan ▓

Reaction Time...........?5
Algorithm Interval......?10
Inverter max resets.....? 3
Inverter reset delay....?300 sec
Inverter proof delay....?15  sec

Monitor phase loss......?Yes
Which phase loss monitor?Not configured
Shutdown phase loss.....?Yes
Shutdown on smoke detect?Yes
Shutdown on fire alarm..?Yes

No. of return sensors...?2
Controlling sensor......?Return Air 2-1

No. of supply sensors...?2
Controlling sensor......?Supply Air 2-1
```

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.

	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 not detected, before the variable speed drive will be placed in override.
	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.
	No of return sensors	(0 to 5) The number of return air temperature sensors.
	Controlling sensor	(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	(0 to 5) The number of supply air temperature sensors.
	Controlling sensor	(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.

AHU outside air coil configuration

When outside air coils are configured, the first cooling screen looks like this:

```
10/30/2002                    01:33:46 PM
  ▓▌ Configure Main AHU      Cooling ▓

Number of zone sensors..?2
Controlling sensor......?Average
Num of cooling stages...?4
Num of outside air coils?2
Consider dewpoint.......?No
OA Coil LAT low limit...?40.0°F
Enable OA Coil #1 above.?50.0°F
Enable OA Coil #2 above.?70.0°F
Target temp. for stage:
 #1: 74.0°F  #2: 74.0°F

Range +/-...............?  1.0°F
Pre delay for stage:
 #1: 1 min   #2: 1 min  OA1: 1 min
OA2: 1 min
Post delay for stage:
 #1: 1 min   #2: 1 min  OA1: 1 min
OA2: 1 min
                    "PG DN" for more
```

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 1is 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.

```
10/15/2002                09:42:28 AM
  ▓ Configure RTU  2            Fan ◙

Fan type.................?Variable VO
Fan control OPEN hours..?Continuous
Fan control CLOSED hours?On Demand
Post delay..............? 2
Heat ramp up     if LAT > 75.0°F
Cool ramp up     if LAT < 54.5°F
Dehm ramp up     if LAT < 44.5°F
Aux Heat ramp up if LAT > 65.0°F
Speed:                  Min:   Max:
  Inverter              50.0% 100.0%
  Heating               50.0% 100.0%
  Cooling               50.0% 100.0%
  Dehumidification      50.0%  75.0%
  Aux Heat                    100.0%
Speed control increment.?5
Speed control decrement.?2
Variable Output range...?0-10 Volts

                   "PG DN" for more
```

```
10/17/2002                09:01:25 AM
  ▓ Configure Main AHU          Fan ◙

Reaction Time...........?5
Algorithm Interval......?10
Inverter max resets.....?10
Inverter reset delay....?300 sec
Inverter proof delay....?600 sec

Monitor phase loss......?Yes
Which phase loss monitor?Not configured
Shutdown phase loss.....?Yes
Shutdown on smoke detect?Yes
Shutdown on fire alarm..?Yes

No. of return sensors...?2
Controlling sensor......?Return Air 2-1

No. of supply sensors...?2
Controlling sensor......?Supply Air 2-1
```

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 an 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

not detected, before the variable speed drive will be placed in override.

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:

```
10/15/2002                09:46:40 AM

   Configure RTU  2         Cooling

Num of cooling stages...? 2
Control cooling using...? Return Air
Target differential.....? 1.0  °F
Target temp. for stage:
 #1: 74.0°F  #2: 74.0°F
Pre delay for stage:
 #1: 1 min   #2: 1 min
Post delay for stage:
 #1: 1 min   #2: 1 min
Humidity adjusts target.? Yes
Humidity sensor.........? Average
Dynamic offset..........?   0.0°F
No offset <  45.0% full >  55.0%
Ambient temp lockout....? Yes
No cooling below........?  40.0°F
Night setback...........? Yes
Night setback offset....?   5.0°F
Minimum ON time.........:  0 min
Minimum OFF time........:  0 min
```

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

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 humidty 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

```
10/15/2002                   09:47:45 AM

   Configure RTU  2         Heating

Num of heating stages...? 2
Control heating using...? Return Air
Target differential.....? 1.0  °F

Target temp. for stage:
 #1: 69.0°F  #2: 69.0°F
Pre delay for stage:
 #1: 0 min   #2: 0 min
Post delay for stage:
 #1: 0 min   #2: 0 min

Ambient heat lockout....? Yes
No heat above...........?  70.0°F
Night setback...........? Yes
Night setback offset....?   5.0°F


Minimum ON time.........:  0 min
Minimum OFF time........:  0 min
```

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

setpoints are to be lowered 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 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.control actions. See preceding two settings.

RTC dehumidification configuration

There are two pages of dehumidification configuration settings:

```
10/15/2002            09:50:26 AM
  ▮ Configure RTU  2     Dehumidify ▮

Dehumidification type...?Cooling

Aux heat during dehumid.?No
Control dehumid. on.....?Calc Dewpt
Control dehumid. using..?Average




Target.................? 50.0°F
Target differential.....?  2.0°F
Pre delay for stage:
  #1:  1 min  #2:  1 min

Post delay for stage:
  #1:  2 min  #2:  2 min

Cooling low limit.......?  68.0°F
                  "PG DN" for more
```

```
10/15/2002            09:50:58 AM
  ▮ Configure RTU  2     Dehumidify ▮






Night setback...........? Yes
Night setback offset....? 2.0   °F
```

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 temperatuare 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

used.

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:


```
10/15/2002              09:59:31 AM

 ▒ Configure RTU  2    Air Damper ▒

Air Damper..............? Yes
Control method..........? Fan ON
Ambient temp lockout....? Yes
No air damper below.....? 35.0 °F




Use CO2 override........? Yes
Target CO2 Amount.......? 1000 ppm
Damper Controlled by....? Relay Output
```

```
10/29/2002              04:00:18 PM

 ▒ Configure RTU  2    Air Damper ▒

Air Damper..............? Yes
Control method..........? Economizer


Control economizer on...? Enthalpy
Humidity sensor to use  ? Average

Enthalpy differential...? 0.0  BTU/lb
Use CO2 override........? Yes
Target CO2 Amount.......? 1000 ppm
Damper Controlled by....? Variable Out
Min Damper Position.....? 10.0  %
Max Damper Position.....? 100.0 %
Variable Output range...? 0-10 Volts
Reaction Time...........? 8
Algorithm Interval......? 10
```

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

	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 humidty 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 overriden 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.
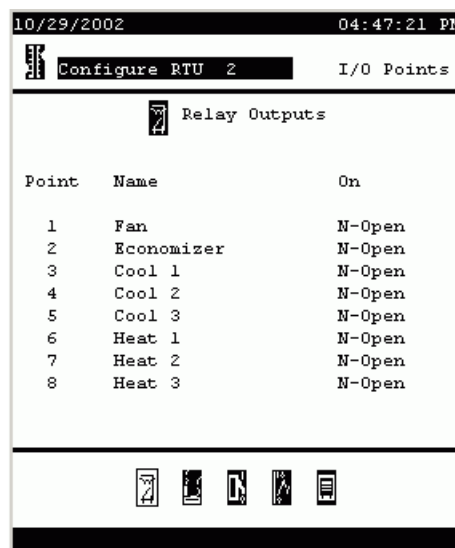
Notice the set of icons across the bottom of the screen. These will allow you to reach the other configuration screens and to initialize the RTC. From left to right, the icons represent Relay Outputs (digital outputs), Sensor Inputs (analog inputs), On-off Inputs (digital inputs), Variable Outputs (analog 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:

```
10/31/2002                    10:57:38 AM

    Configure RTU  2            I/O Points

              Sensor Inputs

                                    AKC 55
   Point Name                  Config  Bd-Pt

       1    Zone 1 Humidity    Yes
       2    CO2 Sensor         Yes
       3    Outside Humidity   Yes
       4    Zone 1 Temp        Rec      00-0
       5    Zone 2 Temp        Rec      00-0
       6    Outside Temp       No
       7    Supply Air Temp    No
       8    Return Air Temp    No
```

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.

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.

```
10/31/2002                    10:59:22 AM
┃
▓  Configure RTU  2          I/O Points

              ▌  On/Off Inputs

RTC Inputs:                       AKC 55
Pt# Name           Config   On       Bd-Pt
 1  Fan            Yes   Voltage
 2  Cool 1         No    Voltage
 3  Cool 2         No    Voltage
 4  Smoke Det      Rec   No Voltage 00-0

AKC 55 Inputs:
 Name              Bcast    On       Bd-Pt
 Override          Rec   Voltage    00-0
 Smoke Stat 3      No    No Voltage 00-0
 Phase Loss 3      Rec   Voltage    00-0


        ▓   ▌   ▐   ▌   ▤
```

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

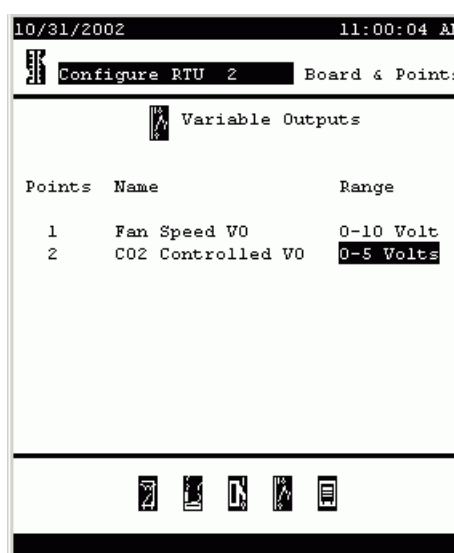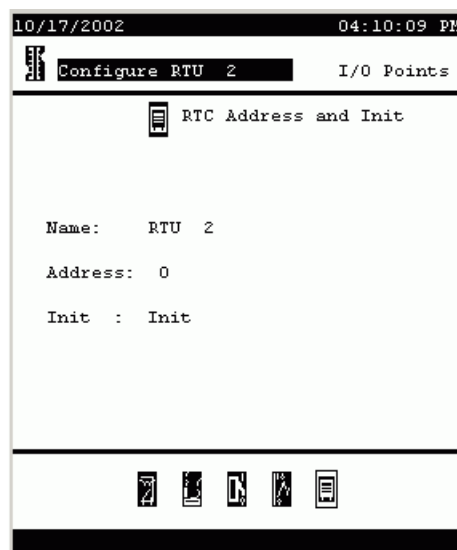| | state of the input must be given in the next column. |
On	(List field:)
	Voltage: The input state will read ON when the point senses voltage.
	No Voltage: The input state will read ON when the point senses no voltage.
Bd-Pt	(Address field) If the input state is received from another node on the AKC 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.


```
10/31/2002                    11:00:04 AM
    ▉ Configure RTU  2      Board & Points

              ▉ Variable Outputs

  Points   Name                 Range

     1     Fan Speed VO         0-10 Volt
     2     CO2 Controlled VO    0-5 Volts


           ▉  ▉  ▉  ▉  ▉
```

Pt#	(1or 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 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:

```
10/17/2002                    04:10:09 PM
  Configure RTU  2          I/O Points

            RTC Address and Init


   Name:    RTU  2

   Address:  0

   Init  :  Init
```

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.

ClimaTECH configuration

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:

```
10/18/2002                    09:10:10 AM
  ▛ Configure Unit 6
  ─────────────────────────────────────────

     ⊙ Fan            ▯ Economizer

     ▦ Cooling        ∩ Alarms

     ▨ Heating        ◐ Schedule

     ◪ Dehumidify     ▤ Board & Points


  ───────────────────────────────────────
```
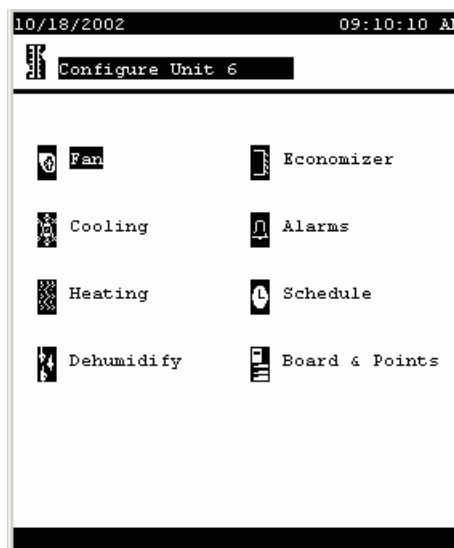
There are two fan configuration screens, depending on whether the fan is fixed speed or variable speed.

```
10/15/2002            10:25:51 AM
  ▛ Configure CT RTU 5       Fan ⊙

Fan type................? Fixed Speed
Airflow control.........? Continuous

High Speed Fan Assignment
                   Stage
Cooling...........?   0
Dehumidification..?   0
Heat reclaim......?   0
Auxilary heat.....?   0




Shutdown on fire alarm..?Yes
Monitor phase loss......?No
```

```
10/15/2002            10:27:11 AM
  ▛ Configure CT RTU 5       Fan ⊙

Fan type................? Variable VO
Airflow control.........? Continuous

Variable Speed Fan
System              Setpoint    Range
Cooling...........?   0.0°F    0.0°F
Dehumidification..?   0.0°F    0.0°F
Heating...........?   0.0°F    0.0°F



Min fan speed...........?  50%
Heat + Dehumid fan speed?  50%

Shutdown on fire alarm..?Yes
Monitor phase loss......?Yes
Which phase loss monitor?Not configured
Shutdown phase loss.....?Yes
```

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


```
04/25/2002                    14:16:14

   Configure Unit 1         Cooling


Num of cooling stages...? 4

Occupied setpoint.......?    0.0°F
Unoccupied setpoint.....?    0.0°F

Lockout below ambient...?    0.0°F

Delay between stages....? 1  min
```

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:

```
10/15/2002              10:29:14 AM
 ╫╫ Configure CT RTU 5    Heating ▓

Num of heat rclm stages.? 2

Occupied setpoint.......?    0.0°F
Unoccupied setpoint.....?    0.0°F

Lockout above ambient...?    0.0°F

Delay between stages....? 1  min


Heat reclaim flush start? 01:00 AM
Flush duration..........? 10  min



                      "PG DN" for more
```

```
10/18/2002              01:52:39 PM
 ╫╫ Configure CT RTU 5    Heating ▓

Num of aux heat stages..? 1

Occupied setpoint.......?    0.0°F
Unoccupied setpoint.....?    0.0°F

Lockout above ambient...?    0.0°F

Delay between stages....? 1  min


Analog gas valve........? Yes
Temperature difference..?    0.0°F
Min valve opening.......?   0%
Valve delay.............?  0 sec
```

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.

Danfoss

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

```
10/15/2002                10:31:23 AM
   Configure CT RTU 5    Dehumidify


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

```
10/15/2002                    10:32:15 AM

   Configure CT RTU 5    Economizer

Economizer..............? Yes

Outside ambient target..? 0.0   °F

Outside dewpoint target.? 0.0   °F
```

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 target 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.

```
10/15/2002                    10:36:08 AM

   Configure CT RTU 5 Alarms

Type

Alarm delay.............? 15   min

High zone temp   Normal    above   85.0 °F
Low zone temp    Normal    below   40.0 °F

No Airflow            Normal
Phase Loss            Critical
Inverter failure      Normal
Fire                  Critical

AKC 55 Inputs:
HVAC fire         Fire Stat        00-0
Normal               On   for    15min
```

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.

Danfoss

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

```
10/15/2002                 10:38:25 AM
    Configure CT RTU 5      I/O Points

            Relay Outputs

                    Stage
Name            1  2  3  4  5  6

Fan             0
Economizer      0
Cooling         0  0
Dehumidify      0  0
Heat Reclaim    0  0
Aux Heat        0  0
```

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

```
10/15/2002                    10:39:56 AM
┌──────────────────────────────────────┐
│ ▌ Configure CT RTU 5        I/O Points│
│                                        │
│            ▐ Sensor Inputs             │
│                                        │
│ Zone temp group #.......?  1           │
│ Inside dewpt group #....?  1           │
│ Humidity sensor.........? ▐DP▌         │
│                                        │
│         Point    Type      Function    │
│ Zone 1  0        None      Control     │
│ Zone 2  0        None      Control     │
│ Zone 3  0        None      Control     │
│ Zone 4  0        None      Control     │
│ Alarm 1 0        None                  │
│ Alarm 2 0        None                  │
│ Alarm 3 0        None                  │
│ Alarm 4 0        None      "PG DN" for more │
│                                        │
│          ▨  ▣  ▧  ₩                    │
│                                        │
└──────────────────────────────────────┘
```
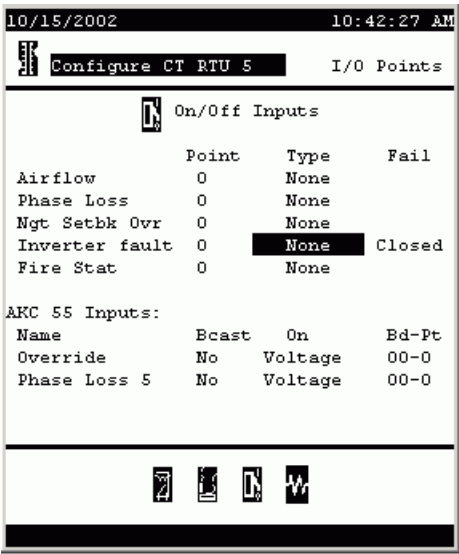
Zone temp group #   (0 to 99) The group to which this ClimaTECH unit belongs for zone temperature. Several ClimaTECH units in a network can be controlled by a single sensor wired to one of them. If this feature is not used, leave group number set to 0.

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.

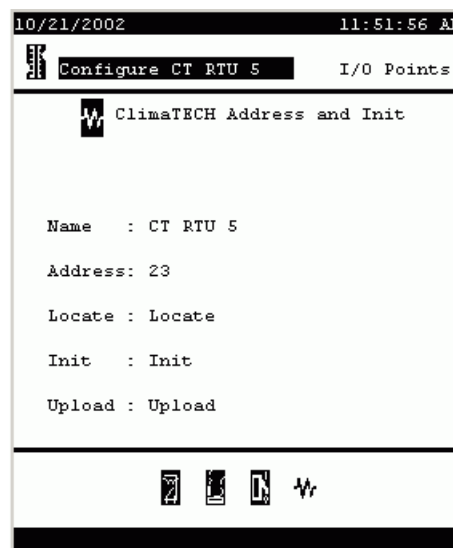ClimaTECH
on-off input
configuration

```
10/15/2002                    10:42:27 AM

▓ Configure CT RTU 5      I/O Points

        �▫ On/Off Inputs

              Point     Type      Fail
Airflow         0       None
Phase Loss      0       None
Ngt Setbk Ovr   0       None
Inverter fault  0       None    Closed
Fire Stat       0       None

AKC 55 Inputs:
Name          Bcast    On      Bd-Pt
Override        No    Voltage   00-0
Phase Loss 5    No    Voltage   00-0


        ▓ ▓ ▓ ▓
```

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 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:

```
10/21/2002                11:51:56 AM
┃┣ Configure CT RTU 5      I/O Points

        ┻ ClimaTECH Address and Init


   Name   : CT RTU 5

   Address: 23

   Locate : Locate

   Init   : Init

   Upload : Upload


            ▨  ▧  ▨  ᐱ
```

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.

```
10/15/2002              01:53:06 PM
▐▌ Configure RTU  1

  ▐◉▌ Fan          ▐▌ Air Damper

  ▐▌ Cooling       ▐▌ Alarms

  ▐▌ Heating       ▐▌ Board & Points

  ▐▌ Dehumidify
```

```
10/15/2002              10:11:05 AM
▐▌ Configure S4 Unit 4         Fan ◉

 Motor delay time........?10 sec

 Monitor phase loss......?Yes
 Which phase loss monitor?Not configured
 Shutdown phase loss.....?Yes
 Shutdown on smoke detect?No
 Shutdown on fire alarm..?Yes
```
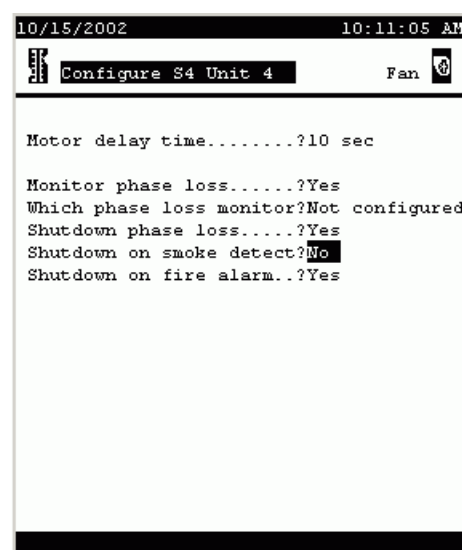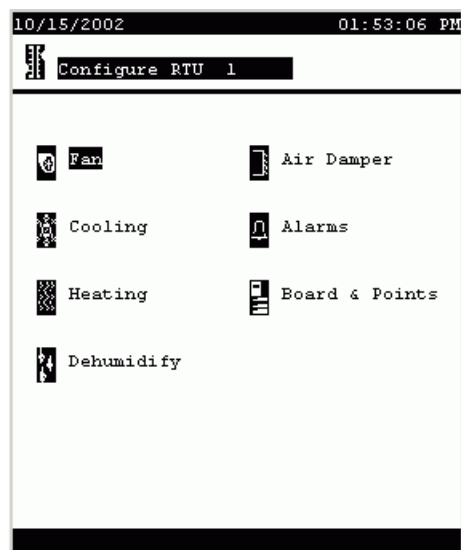
Motor delay time	(5 to 255) The fan motor runs continuously at low speed. When there is a call for cooling, heating, or dehumidification, the fan switches to high speed after the motor delay set here elapses.
Monitor phase loss	(List box: Yes, No) Whether or not a phase loss detector is to be monitored.
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

```
10/15/2002                    10:12:56 AM

  Configure S4 Unit 4        Cooling

Number of zone sensors..?3
Controlling sensor......?Zone Temp 4-1
Num of cooling stages...?Four
Setpoint................? 74.0°F
Range +/-...............?  1.0°F

Ambient temp lockout....?Yes
No cooling below........? 40.0°F
Range +/-...............?  2.0°F
Minimum run time........?2 min
Delay between stages....?3 min
Night setback...........?Yes
Night setback offset....?  5.0°F
Override switch.........?Yes
Override duration.......?60  min
Num of schedules........?1


                     "PG DN" for more
```

No of zone sensors	(0 to 5) The number of zone temperature sensors.
Controlling sensor	(List box:)
	Min Temp: Control will be based on the lowest value of all of the zone temperature sensors.
	Max Temp: Control will be based on the highest value of all of the zone temperature sensors.
	Average: Control will be based on the average of all the zone temperature sensors.
	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.
Num of cooling stages	(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.
Setpoint	(0.0 to 100.0) The desired temperature at the controlling sensor.
Range +/-	(-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.
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 for the lockout. Cooling 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 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 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).

SC4 heating
configuration

```
10/15/2002                    10:14:56 AM

   Configure S4 Unit 4       Heating

Number of zone sensors..?3
Controlling sensor......?Zone Temp 4-1
Num of heat rclm stages.?2
Setpoint................? 72.0°F
Range +/-...............?  1.0°F
Num of aux heat stages..?4
Setpoint................? 69.0°F
Range +/-...............?  1.0°F
Ambient temp lockout....?Yes
No heat above...........? 70.0°F
Range +/-...............?  2.0°F
Minimum run time........?2 min
Delay between stages....?3 min
Night setback...........?Yes
Night setback offset....?  5.0°F
Override switch.........?Yes
Override duration.......?60  min
Num of schedules........?1
                        "PG DN" for more
```

No of zone sensors	(0 to 5) The number of zone temperature sensors.
Controlling sensor	(List box:)
	Min Temp: Control will be based on the lowest value of all of the zone temperature sensors.
	Max Temp: Control will be based on the highest value of all of the zone temperature sensors.
	Average: Control will be based on the average of all the zone temperature sensors.
	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.
Num of ht rclm stages	(0 to 4) The number of heat reclaim stages in the SC4 unit.
Setpoint	(0.0 to 100.0) The desired temperature at the control-ling sensor when heat reclaim 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.
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 (next line) 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

```
10/15/2002                    10:15:45 AM
┌─────────────────────────────────────────┐
│ ▓▓ Configure S4 Unit 4   Dehumidify  ▓▓ │
│                                          │
│ Num of stages...........?Four           │
│ Setpoint................?45%            │
│ Range +/-...............? 2%           │
│ Cooling low limit.......? 68.0°F       │
│                                          │
│ Ambient temp lockout....?Yes           │
│ No dehum below..........? 40.0°F       │
│ Range +/-...............?  2.0°F       │
│ Minimum run time........?2 min         │
│ Delay between stages....?3 min         │
│ Night setback...........?Yes           │
│ Night setback offset....? 2%           │
│ Override switch.........?▓Yes▓          │
│ Override duration.......?60  min       │
│ Num of schedules........?1             │
│ Seasons 4 password......?*****         │
│                                          │
│                         "PG DN" for more │
└─────────────────────────────────────────┘
```

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-

<table>
<tr><td>Override duration</td><td>ride switch wired to a digital input.
(0 to 1439) The number of minutes that control will be overridden after operation of the override switch.</td></tr>
<tr><td>Num of schedules</td><td>(0 to 8) The number of operating schedules entered on the following page(s).</td></tr>
<tr><td>Seasons 4 password</td><td>(5-character auth code) The password given by Seasons 4 to the equipment owner.</td></tr>
</table>

SC4condenser
configuration

```
10/15/2002                10:22:13 AM

   Configure S4 Unit 4    Condenser


Number of fans..........?Six

Minimum run time........?2 min

Liquid Temp Setpoint
 Stage 1:  60.0°F
 Stage 2:  75.0°F
 Stage 3:  90.0°F

 Range  :   1.0°F
```

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.

```
10/23/2002                11:51:17 AM
 ╫  Configure Lighting


          ╫  Lighting Zones


          ▣  Board & Points
```

```
10/23/2002                11:52:33 AM
 ╫  Configure Lighting Zones

     No. of Zones:12
     No. of Powerlink Panels    :1
     No. of Cutler-Hammer Panels:1
     Zones share photocells     :No


     Name          Type
     50% Sales     AKC55 >Setup<
     Zone 2        PWRLK >Setup<
     Zone 3        CUTLR >Setup<
     Zone 4        AKC55 >Setup<
     Zone 5        AKC55 >Setup<
     Zone 6        AKC55 >Setup<
     Zone 7        AKC55 >Setup<
     Zone 8        AKC55 >Setup<
     Zone 9        AKC55 >Setup<
     Zone 10       AKC55 >Setup<

                     "PG DN" for more
```

No. of Zones   (0 to 30) The number of lighting zones to be config-ured 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.

Zone name	(List box:) A great variety of typical names are included in the box that pops up, plus "User Def." that allows the next line.
User defined name	(Label box; any 11 characters)
Num of control relays	(0 to 6) The number of relays controlled by the lighting point.
Num of schedules	(0 to 8) The number of schedules for this point.
Photocell	(List box:)
	Inside: The point's photocell(s) are indoors.
	Outside: A single photocell is located outdoors.
	None: This point has no photocell.
Control sensor	(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.
	Photocell ID#1 (etc.): Each individual photocell is listed.
Control method	(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.
Enable failsafe schedule	(List box: Yes, No) Whether or not a schedule will "back up" in case the photocell fails.
Time on	(Time of day field) The time at which the pre-delay

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 to100) The number of percent from night to day.

Trip Level (0 to100) 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

```
11/06/2002                    09:43:39 AM

▓  Configure Lights


Pre delay...............?  2 min
Post delay..............?  2 min
Minimum ON time.........?120 min
Minimum OFF time........? 10 min

Enable dimmer output....?Yes
Target..................? 80 %
Minimum output..........?  0 %
Reaction Time...........?Normal
Override switch.........?Yes
Override duration.......?+00:02
Burglar override........?Yes
Pre delay...............?  0 min
Fire override...........?Yes




                         "PG DN" for more

```

Pre delay (0 to 120) When lights are off, the number of minutes that the lighting condition must be satisfied before lights will be turned on.

Post delay (0 to 120) When lights are on, the number of minutes that the lighting condition must be false before lights will be turned off.

Minimum ON time (0 to 255) When lights are turned on, the number of minutes that they must remain on before being turned off.

Minimum OFF time (0 to 255) When lights are turned off, the number of minutes that they must remain off before being turned on.

Enable dimmer output (List box: Yes, No) Whether or not a dimmer variable output will be controlled.

Target (0 to 100) The photocell level that the controller will

	seek to maintain by operation of the dimmer.
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 (lighting)

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.

```
11/06/2002              01:45:19 PM        11/06/2002              12:21:56 PM
  Configure Lighting Board & Points          Configure Lighting Board & Points

          Light Panel                              Cutler-Hammer 1

    Powerlink 1    Locate  Setup  0           Breaker #1   50% Sales
    Cutler-Hammer 1        Setup  1           Breaker #2   50% Sales
                                              Breaker #3   50% Sales
                                              Breaker #4   50% Sales
                                              Breaker #5   50% Sales
                                              Breaker #6   Not Config
                                              Breaker #7   Not Config
                                              Breaker #8   Not Config
                                              Breaker #9   Not Config
                                              Breaker #10  Not Config
                                              Breaker #11  Not Config
                                              Breaker #12  Not Config
                                              Breaker #13  Not Config
                                              Breaker #14  Not Config

                                                         "PG DN" for more
```

Place the cursor on the **Setup** field and pres 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.

```
11/06/2002              02:42:48 PM
 ▐ Energy Menu
 ▐▌
─────────────────────────────────────




              Utility Meter
            Demand Limiting
```

```
11/06/2002              02:43:21 PM
 ▐ Utility Meter Menu
 ▐▌
─────────────────────────────────────



          ▐ Meter Status

          ▐ Configure

          ▐ Meter History
```
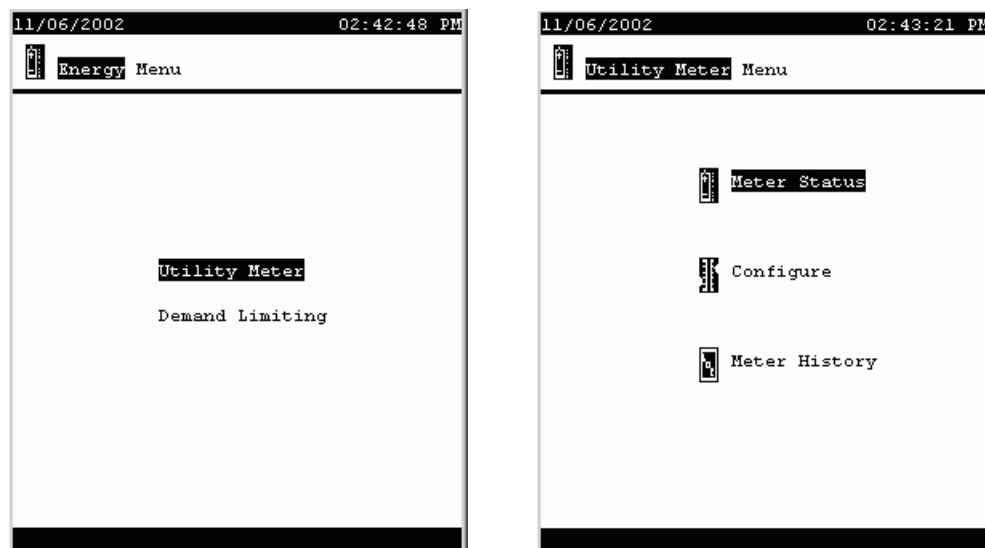
Continuing, select **Configure** from the Utility Meter Menu and press ENTER. Now the Utility Meter Configuration menu appears as shown below.

```
11/06/2002              02:44:02 PM
 ▐ Utility Meter Configuration
 ▐▌
─────────────────────────────────────


   No. of KWH Utility Meters? 2

   Name
   Meter #1           >Setup<
   Meter #2           >Setup<
```
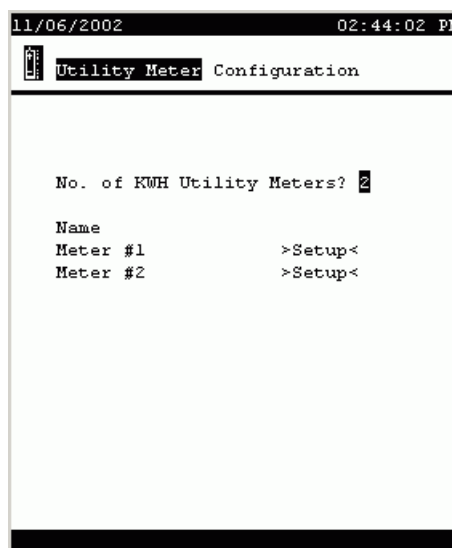
Enter the number of meters to be configured, and a list will appear. These are the fields:

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:

```
11/06/2002                02:45:22 PM

  Configure Meter #1




              Meter Setup


              Board & Points


```

```
11/06/2002                02:46:23 PM

  Meter Setup Meter #1

Number of CT sets.......?1
Amperage................?25A
Voltage (num phases)....?120/208(3)
Collect History.........?Yes
Use unit for demand lim.?Yes
Window size.............?15 min
Normal load 00 HRS......? 1000
Normal load 01 HRS......? 1000
Normal load 02 HRS......? 1000
Normal load 03 HRS......? 1000
Normal load 04 HRS......? 1000
Normal load 05 HRS......? 1000
Normal load 06 HRS......? 1000
Normal load 07 HRS......? 1000
Normal load 08 HRS......? 1000
Normal load 09 HRS......? 1000
Normal load 10 HRS......? 1000
Normal load 11 HRS......? 1000
                  "PG DN" for more

```

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:

```
11/06/2002                  02:47:44 PM

    ▓ Meter Setup Meter #1


    Maximum emergency load..? 1000
    Start shedding at.......? 90%
    Start restoring at......? 80%
    Enable coupling switch..?Yes
    Number of normal steps..? 0
    Num of emergency steps..? 0
    Normal
    Soft start begin level..? 0
    Coupling Begin Level....? 0
    Emergency
    Soft start begin level..? 0
    Coupling Begin Level....? 0
```

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:
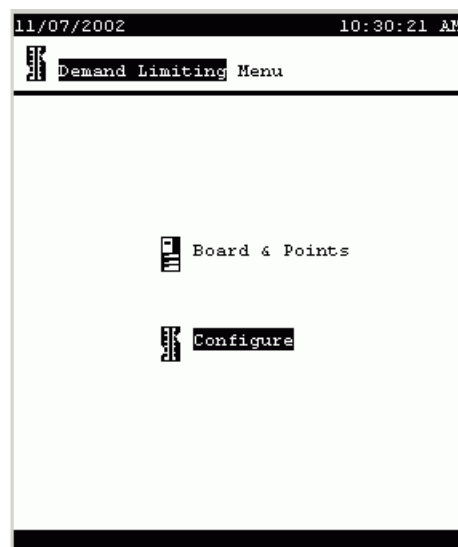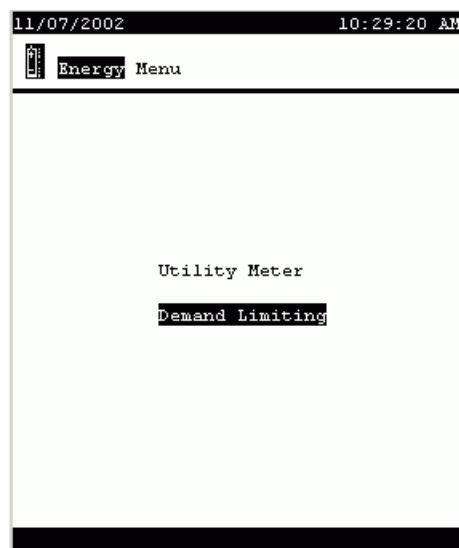
HVAC demand
limiting

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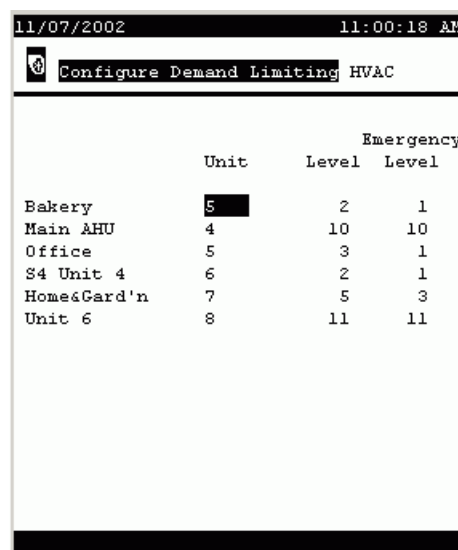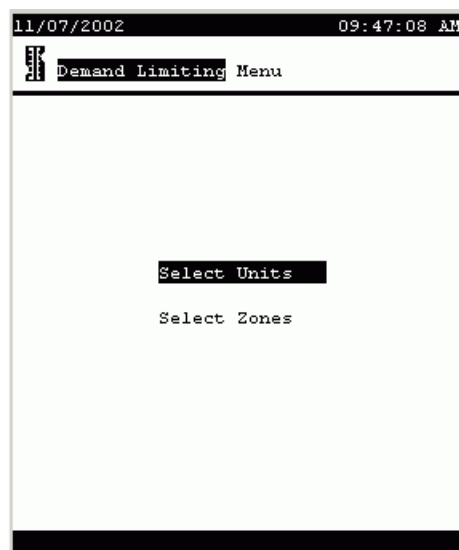
The fields on the demand configuration screen for HVAC (right) are:

[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 generator 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 "skeleton" 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 that 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:

```
04-0002G Alarm Config Menu    03:15:42 PM

    [I]  Alarm Configuration

    [icon] Refrigeration      [icon] Routing

    [icon] HVAC               [icon] Phone Numbers

    [icon] Miscellaneous      [icon] IP Network

    [icon] System             [icon] Printer

    [icon] Service            [icon] Modem

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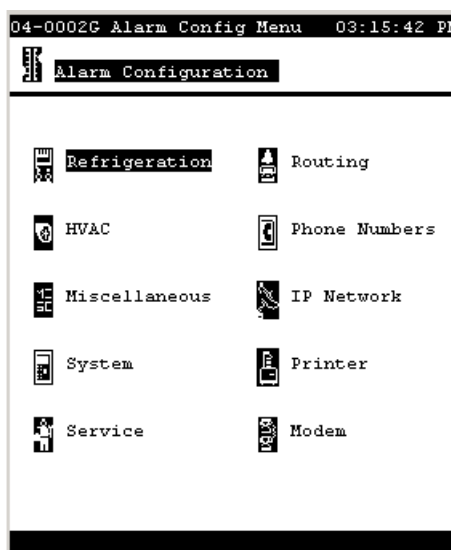
Configuring Refrigeration Alarms   If you select Refrigeration from the Configure Alarms menu, you will be presented with a screen listing each configured racks as at left below. Select one of the racks, and the alarms menu for that rack will appear, as at right below.

```
04/07/2003          09:47:10 AM        04/07/2003          09:45:18 AM

  [I] Configure Rack Alarms              [I] Configure Rack C Alarms


                                              [icon] Suction
         [icon] Rack C
                                              [icon] Compressors
         [icon] Rack D
                                              [icon] Circuits

                                              [icon] Condenser

                                              [icon] Other

                                              [icon] Bitzer

```
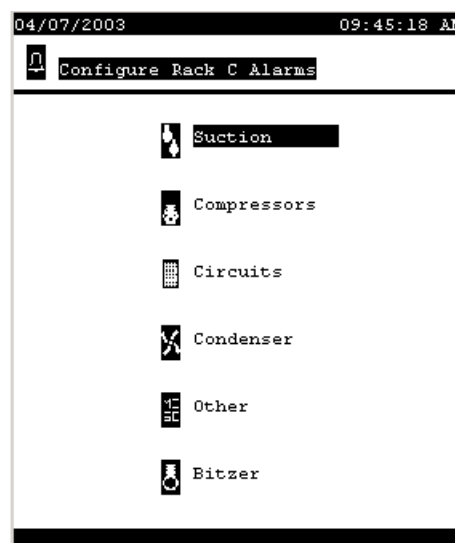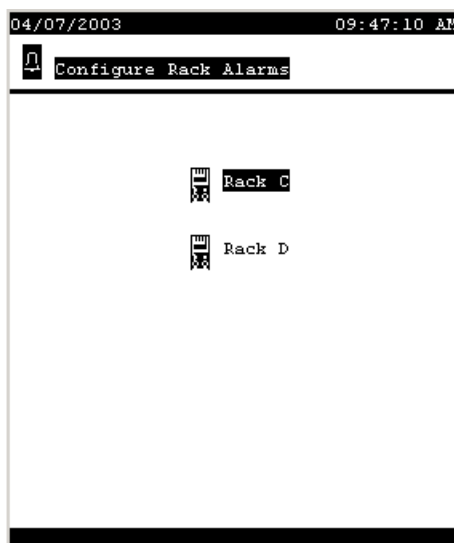
We will select Rack C, and another submenu will appear listing all the different parts of the system for which we can configure alarms. Note the last item on the menu at right above, "Bitzer." This appears only because when the compressor data was configured, Bitzer was selected as the answer to the 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:

```
04/07/2003                10:00:12 AM

 ⌂  Configure Rack C Alarms

Type              Name            Address


Alarms Suspended  Rack C             0
Disabled

Phase Loss        Phase Loss C    08-1
Disabled

Low Pressure      Suction Pres C  06-1
Disabled

High Pressure     Suction Pres C  06-1
Disabled

Low Temperature   Suction Temp C  06-5
Disabled

                           "PG DN" for more
```

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

returned to normal and then occurred again.

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 unneccessary 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."
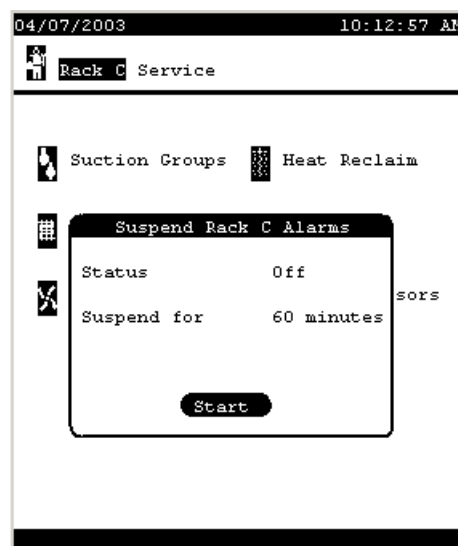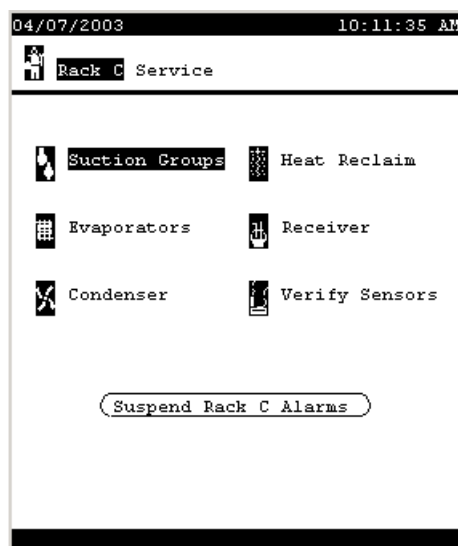
Configuring
Alarm settings

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 at 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**.

```
04/07/2003                    04:27:19 PM
 ꒰
   Configure Rack C Alarms

Type              Name          Address


Alarms Suspended  Rack C           0
Disabled

Phase Loss        Phase Loss C    ┌─── sec
Normal                 On   for   │ 1 min
                                  │    hour
Low Pressure      Suction Pres C  └───
Disabled

High Pressure     Suction Pres C  06-1
Disabled

Low Temperature   Suction Temp C  06-5
Disabled

                         "PG DN" for more
```

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:

```
04/08/2003            11:48:22 AM
 ꒰
   Configure Rack C Alarms

Type          Name          Address


Alarms Suspended  Rack C        0
Disabled

Phase Loss    Phase Loss C   08-1
Normal             On   for   1min

Low Pressure   Suction Pres C 06-1
Normal   below 50.0 psi for   30min

High Pressure  Suction Pres C 06-1
Disabled

Low Temperature Suction Temp C 06-5
Disabled

                "PG DN" for more
```

```
04/08/2003            11:54:20 AM
 ꒰
   Configure Rack C Alarms

Type          Name          Address


Alarms Suspended  Rack C        0
Disabled

Phase Loss    Phase Loss C   08-1
Normal             On   for   1min

Low Pressure   Suction Pres C 06-1
Normal   below  3.0 psi for   30min

High Pressure  Suction Pres C 06-1
Disabled

Low Temperature Suction Temp C 06-5
Disabled

                "PG DN" for more
```

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 numberal 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.

Types of suction alarms, listed

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**.
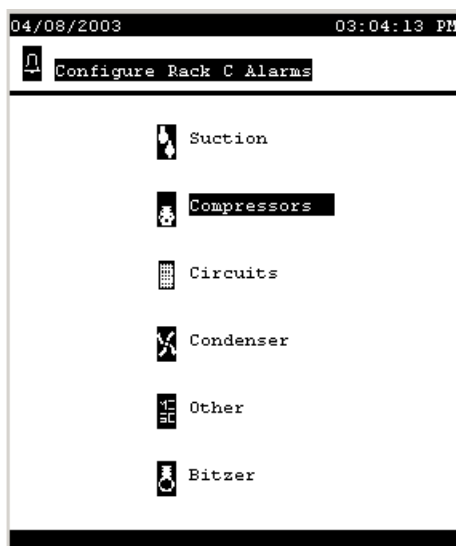
The first page of the compressor alarms screen appears as at right above. For a multi-compressor rack there will be several pages of alarms. The alarm types depend to some extent on the way rack configuration questions were answered. The alarms for the lead compressor will be listed first, and similar 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).
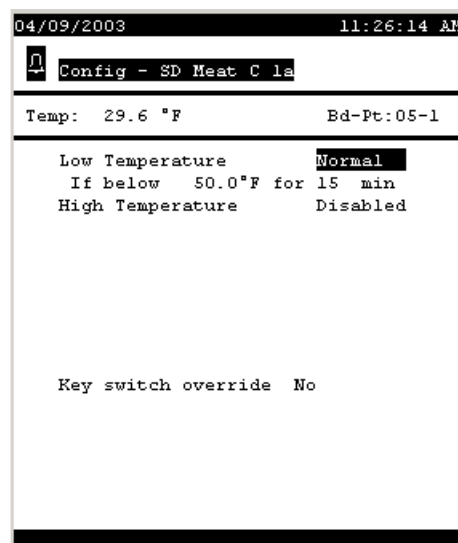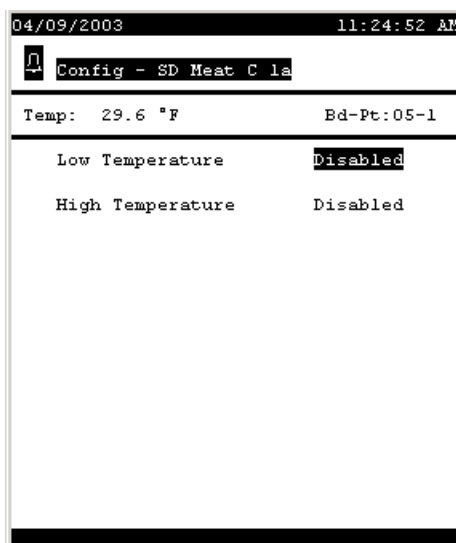
Configuring
Circuit alarms

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.

```
04/09/2003                11:19:29 AM
  ⌂ Configure Rack C Alarms
_____

              🔥  Suction

              ⬚  Compressors

              ▦  Circuits

              ✗  Condenser

              ⬚  Other

              ⬚  Bitzer

_____
```

```
04/09/2003                11:20:15 AM
  ⌂ Configure Evaporator Alarms
_____

              SD Meat C 1a
              SD Meat C 1b
              SD Meat C 1c
              Icream Bx C 2
              MD Meat C 3a
              MD Meat C 3b




_____
```
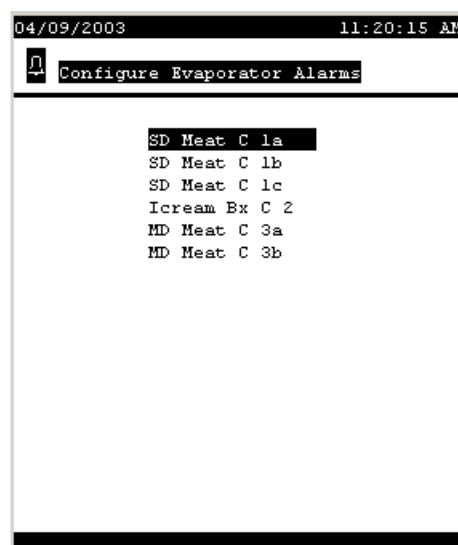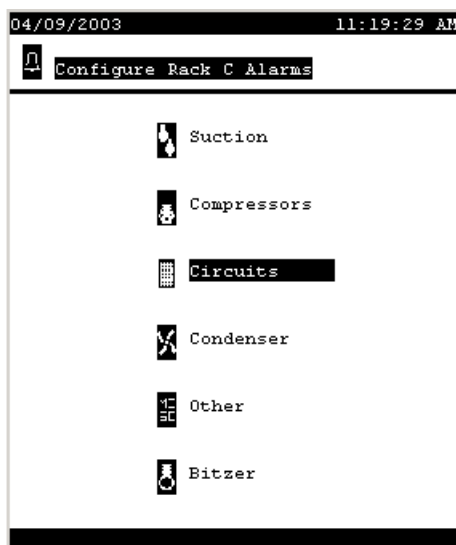
Alarms for AKC 55 circuits

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.

```
04/09/2003                11:24:52 AM
  ⌂ Config - SD Meat C 1a
_____
Temp:  29.6 °F            Bd-Pt:05-1

     Low Temperature      Disabled

     High Temperature     Disabled




_____
```

```
04/09/2003                11:26:14 AM
  ⌂ Config - SD Meat C 1a
_____
Temp:  29.6 °F            Bd-Pt:05-1

     Low Temperature      Normal
      If below   50.0°F for 15  min
     High Temperature     Disabled




     Key switch override  No

_____
```

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

answer has been changed to **Yes**:

```
04/09/2003          11:28:39 AM 04/09/2003          11:43:24 AM
 ⌂ Config - SD Meat C 1a          ⌂ Config - SD Meat C 1a

Temp:  29.6 °F        Bd-Pt:05-1   Temp:  29.6 °F        Bd-Pt:05-1

   Low Temperature      Normal        Low Temperature      Normal
    If below   17.0°F for 30  min      If below   17.0°F for 30  min
   High Temperature     Normal        High Temperature     Normal
    If above   38.0°F for 30  min      If above   38.0°F for 30  min
    Delay after defrost for  60 Min    Delay after defrost for  60 Min




   Key switch override  Yes           Key switch override  Yes
    Select misc. point  Not configured  Select misc. point  Not configured
    Delay after override for 99 min    Delay after override for 60 min
```

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:

```
04/09/2003                    03:18:28 PM
                                    Addr:
 ⬚ Config - Icream Bx C 2              1

    Case Type: AKC 164      Temp:  0.0°F

    Low case temp        Disabled

    High case temp       Disabled


    Low Superheat        Disabled
    Defrost exceeded     Disabled
    Fan start timeout    Disabled
    Drip pan clogged     Disabled
    Box door open        Disabled
    Power failure        Disabled
    Hardware failure     Disabled
    Sensor fail alarms   Disabled
    Key switch override  No


 Send to controller
```

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).
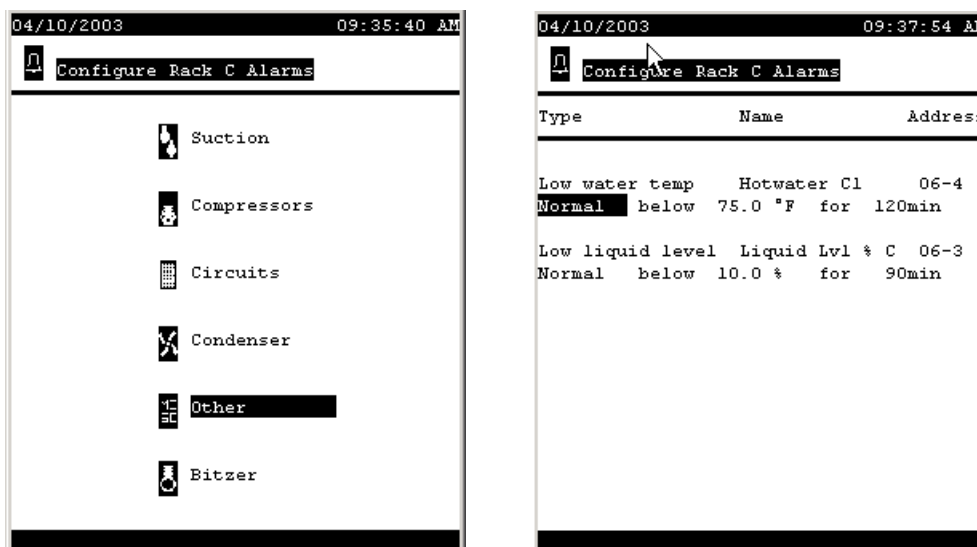**Inverter failure (if variable speed is configured and the inverter bypass is monitored)**
A digital alarm that can be enabled to occur when the inverter is in bypass for a specified time period (0-9999 seconds, minutes, or hours).
Cond fan failure
A digital alarm that can be enabled to occur when a 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:

```
04/10/2003              09:35:40 AM

 🔔 Configure Rack C Alarms


              🔩  Suction

              🔩  Compressors

              ▦  Circuits

              🔩  Condenser

              🔩  Other

              🔩  Bitzer
```

```
04/10/2003              09:37:54 AM

 🔔 Configure Rack C Alarms

Type            Name           Address


Low water temp    Hotwater C1     06-4
Normal    below   75.0 °F  for  120min

Low liquid level  Liquid Lvl % C  06-3
Normal    below   10.0 %   for   90min
```

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 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:
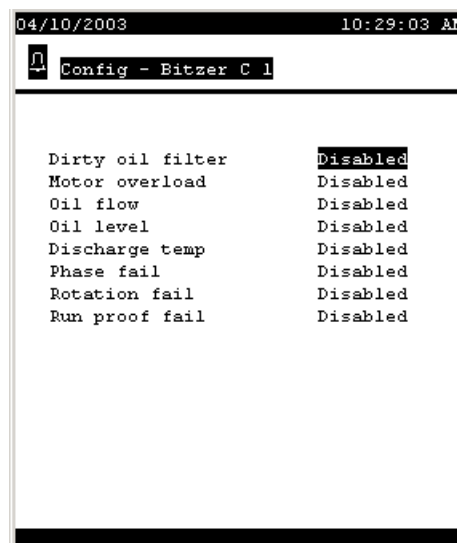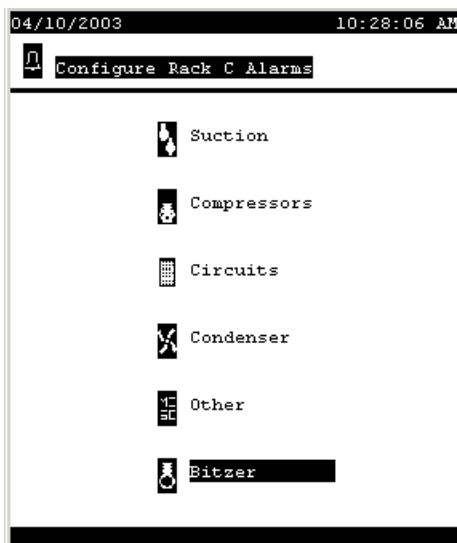
The setpoints for the embedded Bitzer alarms are fixed in the compressor electronics and are only monitored for occurrence by the AKC 55. The alarms are virtually self-explanatory. For further information, consult literature supplied by the compressor manufacturer.

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.
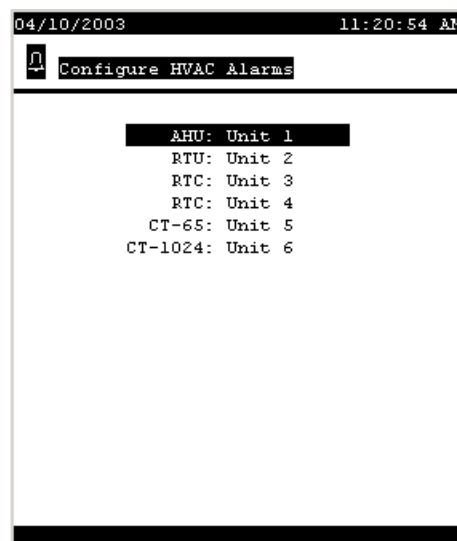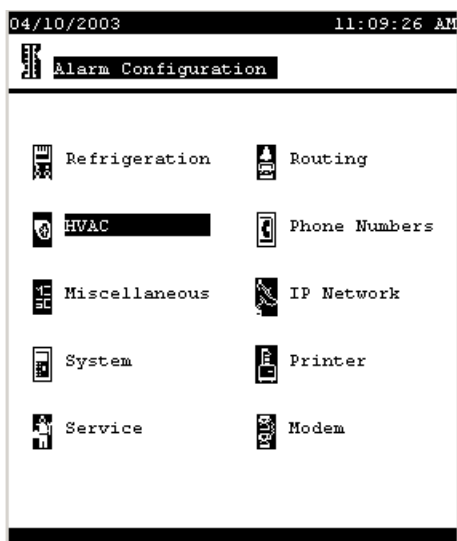
The unit types listed are as follows:

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.

CT65	ClimaTECH 65 HVAC controller.
CT1024	ClimaTECH 1024 controller

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.

```
04/10/2003              11:42:29 AM
  🔔 Configure Unit 1 Alarms

Type              Name          Address

High zone temp     Zone Temp 1-1   00-0
Normal    above  50.0 °F  for   15min

Low zone temp      Zone Temp 1-1   00-0
Normal    below  50.0 °F  for   15min

High humidity    Inside Humidity 20-1
Normal    above  50.0 %   for   15min

High supply temp  Supply Air 1-1   00-0
Normal    above  50.0 °F  for   15min

HVAC fan down      Fan AHU 1        00-0
Normal                  Off for   15min

                    "PG DN" for more
```

```
04/10/2003              11:46:11 AM
  🔔 Configure Unit 1 Alarms

Type              Name          Address

HVAC smoke        Smoke Stat 1     00-0
Normal            On   for    15min

HVAC fire         Fire Stat        00-0
Normal            On   for    15min
```

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).

RTC alarms

The following are alarms that appear uniquely for RTC systems, which also have alarms similar to those just presented:

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.

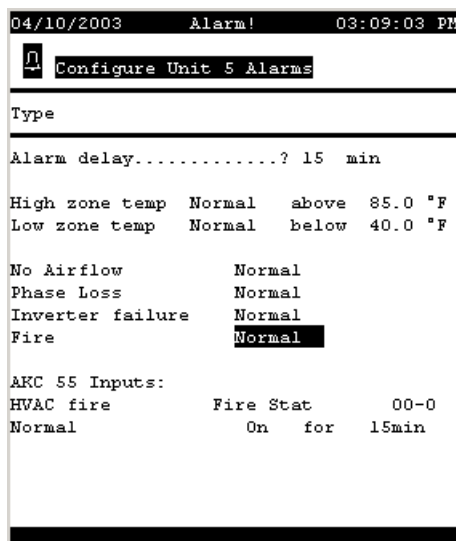**Sensor discard (if control based on two or more zone sensors)**

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

Alarm 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:

```
04/10/2003      Alarm!      03:09:03 PM
 ⏻ Configure Unit 5 Alarms

Type

Alarm delay............? 15  min

High zone temp  Normal    above  85.0 °F
Low zone temp   Normal    below  40.0 °F

No Airflow             Normal
Phase Loss             Normal
Inverter failure       Normal
Fire                   Normal

AKC 55 Inputs:
HVAC fire         Fire Stat        00-0
Normal             On    for    15min
```

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:
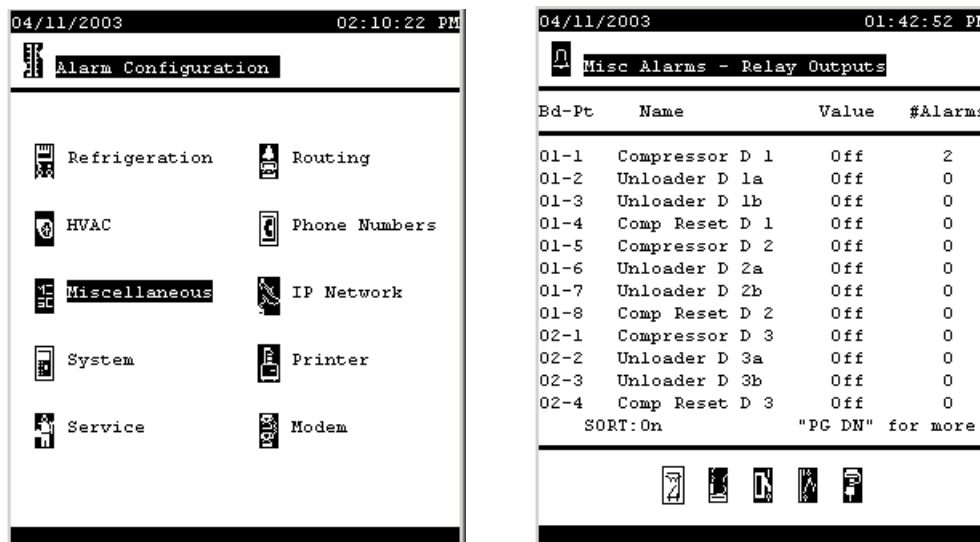
Before we go on to discuss configuring miscellaneous alarms for relay outputs, observe the icons at the bottom of the screen above right. The first icon represents relay outputs, the current screen. The others, from left to right, are in reverse video (unselected) and represent analog inputs, digital inputs, analog outputs, and casc 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 satements 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.

```
04/22/2003              12:18:01 PM
🔔 Misc Alarms - AKC 16x Controls

Addr   Name          Value    #Alarms

34   Prod Box D 4    34.1°F      0
35   Bakery Bx D 5   33.2°F      0
36   Fish Box D 6    34.4°F      0
37   Meat Prep D 7   53.0°F      0
38   Meat Box D 8    30.8°F      0
39   Dairy Box D 9   34.5°F      0
40   MD Dairy D 10a  32.7°F      0
41   MD Dairy D 10b  34.7°F      0
42   MD Dairy D 10c  33.1°F      0
43   MD Dairy D 11a  33.5°F      0
44   MD Dairy D 11b  33.2°F      0
45   MD Dairy D 11c  33.4°F      0
     SORT:On         "PG DN" for more
```

```
04/22/2003              12:20:03 PM
                              Addr:
🔔 Config - Meat Prep D 7        37

     Case Type:AKC 164   Temp: 53.0°F
Regulator Status:Normal Operation


Number of alarms: 0
```

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.

```
04/22/2003              12:22:12 PM
                              Addr:
🔔 Config - Meat Prep D 7        37

     Case Type:AKC 164   Temp: 53.0°F
Regulator Status:Normal Operation


Number of alarms: 1

1)Disabled
```

```
04/22/2003              12:23:06 PM
                              Addr:
🔔 Config - Meat Prep D 7        37

     Case Type:AKC 164   Temp: 53.0°F
Regulator Status:Normal Operation


Nu Disabled alarms: 1
   Log Only
1) Normal
   Critical
   <Delete>
```

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.
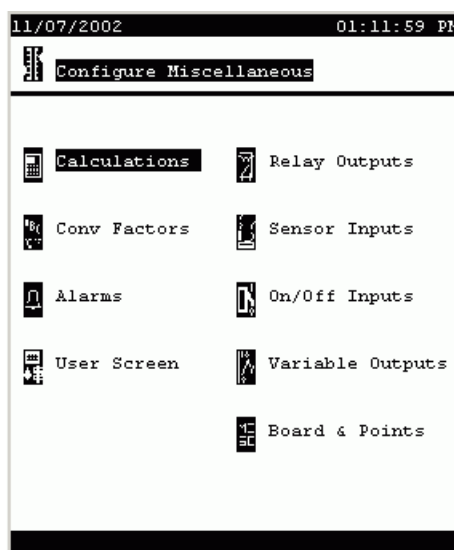
The calculated points feature of AKC 55 versions 1.00 and higher, first on the menu above, is a rich and very powerful set of tools. We will discuss it later in this section. The menu items will not be taken up in the order that they appear on the menu.

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. the 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. the 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. the 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:

Units:	psi, (bar), ^{o}F, (^{o}C), ppm, V, Amp, kw, kwh, Hz, gpm, fps, pH%
Min input:	0.0 - 10.0
Max input:	0.0 - 10.0
Min output:	0 - 3276.7
Max output:	0 - 3276.7

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:

```
11/08/2002              10:56:35 AM     11/08/2002   11-0501 (CFG)   04:58:16 PM
 ▯ Configure Calculations                ▯ Configure Calculations

Point  Description    Value  Status    Point  Description    Value  Status

                                        Ca-01 (OI)             On    Online
                                        Ca-02 (SI ppm)       1.0ppm  Error












New Calc: Ca-01                         New Calc: Ca-03
```

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

will be used in the logical statements in the next area, and the current value of each. The area by default has lines for two definitions, but it can be enlarged by selecting the horizontal divider line between it and the next field, pressing ENTER, and then selecting **Insert** from a popup box. You will see this done in a few pages during the presentation of our first example.

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.

Custom strategy example

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.

Creating the miscellaneous points
Sensor inputs

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:

```
11/12/2002   11-0103 (CFG)   11:43:37 AM

    Configure Misc. Sensor Inputs


No. of sensor inputs: 1

Name              Bcast Bd-Pt  Type

Compr Rm Leak     No    05-1   Leak
```

```
11/12/2002   11-0103 (CFG)   11:45:05 AM

    Configure Misc. Sensor Inputs


No. of sensor inputs: 2

Name              Bcast Bd-Pt  Type

Compr Rm Leak     No    05-1   Leak
Compr Rm Temp     No    05-2   PT1000
```

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.

```
11/07/2002                   01:13:45 PM

    Con      a-01 (OI)
         <Delete>
Units:  OI          Undo    Cancel
Style:  SI
        SI psi
Name Da SI °F  ition          Value
RO1     SI %      configured  ?(error)
        SI ppm
        SI V
if (fir SI Amp line)  Result  Value
  RO1   SI kw          Off    ?(error)
        SI kwh
  True  SI Hz          On      On
        SI gpm
        SI fps
        SI pH


 Current Value (? = Error): ?  On
```

```
11/08/2002                   11:09:08 AM

    Configure Ca-01 (OI)

Units:  OI          Undo    Cancel
Style:  Generic

Name Data Definition          Value
RO1        Not configured  ?(error)


if (first True line)  Result  Value
  RO1   __ __ __ __      Off    ?(error)

  True                   On      On


 Current Value (? = Error): ?  On
```

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.

```
11/12/2002  11-0502 (CFG)   02:09:52 PM

 ▓ Configure Ca-01 (OI)


<Insert> eric
<Delete>
         Definition          Value
RO          Not configured   ?(error)
OI
VO
SI Bar   True line) │Result│ Value
SI °F     __ __      Off   │?(error)
SI %                 ___
SI ppm               On    │  On
SI Amp
Number
Number Bar
Number °F
Delta °F
Schedule
     Current Value (? = Error): ?  On
```

```
11/12/2002  11-0502 (CFG)   02:11:29 PM

 ▓ Configure Ca-01 (OI)

Units: OI              │Undo│ │Cancel│
Style: Generic

Name│Data Definition        │  Value
SI1 │°F:    Not configured  │?(error)

if (first True line)   │Result│ Value
  SI1  __  __  __  __   │ Off  │?(error)
                         │ ___
  True                  │ On   │  On




     Current Value (? = Error): ?  On
```

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:


```
11/12/2002  11-0502 (CFG)   02:37:48 PM

 ▓ Configure Ca-01 (OI)

Units: OI              │Undo│ │Cancel│
Style: Generic

Name│Data Definition        │  Value
SI1 │05-2   Compr Rm Temp   │  0.0°F

if (first True line)   │Result│ Value
  SI1  __  __  __  __   │ Off  │?(error)
                         │ ___
  True                  │ On   │  On






     Current Value (? = Error): ?  On
```

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.

```
11/12/2002   11-0502 (CFG)   02:47:01 PM
   Configure Ca-01 (OI)

Units: OI                    Undo    Cancel
Style: Generic

Name Data Definition              Value
SI1  05-2    Compr Rm Temp        0.0°F
Num2    0.0°F                     0.0°F

if (first True line)      Result    Value
  SI1  ___ ___ ___ ___     Off    ?(error)
                           ___
  True                      On      On




         Current Value (? = Error): ?  On
```

```
11/12/2002   11-0502 (CFG)   02:59:51 PM
   Configure Ca-01 (OI)

Units: OI                    Undo    Cancel
Style: Generic

Name Data Definition              Value
SI1  05-2    Compr Rm Temp        0.0°F
Num2    90.0°F                    90.0°F

if (first True line)      Result    Value
  SI1  ___ ___ ___ ___     Off    ?(error)
  True                      On      On




         Current Value (? = Error): ?  On
```

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.

```
11/12/2002   11-0502 (CFG)   03:27:15 PM
   Configure Ca-01 (OI)

Units: OI                    Undo    Cancel
Style: Generic

Name Data Definition              Value
SI1  05-2    Compr Rm Temp        0.0°F
Num2    90.0°F                    90.0°F

if (first True line)      Result    Value
  SI1  ___ ___ ___ ___     Off    ?(error)
  True                      On      On




         Current Value (? = Error): ?  On
```

```
11/12/2002   11-0502 (CFG)   03:27:46 PM
   Configure Ca-01 (OI)

Units: OI                    Undo    Cancel
Style: Generic

Name Data Definition              Value
SI1  05-2    Compr Rm Temp        0.0°F

<Insert>

  SI1  ___ ___ ___ ___     Off    ?(error)
  True                      On      On




         Current Value (? = Error): ?  On
```

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.

The rules area   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 (OI) 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:

```
11/12/2002   11-0502 (CFG)   04:09:10 PM

[I]  Configure Ca-01 (OI)

Units: OI                    [Undo]    [Cancel]
Style: Generic

Name Data Definition                   Value
SI1  05-2    Compr Rm Temp             0.0°F
Num2   90.0°F                          90.0°F
SI3  05-1    Compr Rm Leak            0.0ppm
Num4  500.0                           500.0

if (first True line)       Result    Value
 SI1  >=   Num2 ___ ____    On      (false)
 True                       On        On




                  Current Value:    On
```

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:

```
11/12/2002   11-0502 (CFG)   04:21:12 PM

[I]  Configure Ca-01 (OI)

Units: OI                    [Undo]    [Cancel]
Style: Generic

Name Data Definition                   Value
SI1  05-2    Compr Rm Temp             0.0°F
Num2   90.0°F                          90.0°F
SI3  05-1    Compr Rm Leak            0.0ppm
Num4  500.0                           500.0

if (first True line)       Result    Value
 SI1  >=   Num2 ___ ____    On      (false)
 SI3  >=   Num4 ___ ____    On      (false)
 True                       Off       Off




                  Current Value:    Off
```

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:

```
11/12/2002   11-0102 (CFG)   10:36:30 AM

▓ Configure Misc. Relay Outputs
━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━

No. of relay outputs: 1

Name            Bcast Bd-Pt  On

Compr Rm EXFAN  No    04-7   N-Open   ▶



━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━
              ▤ ▥ ▦ ▧
```

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.
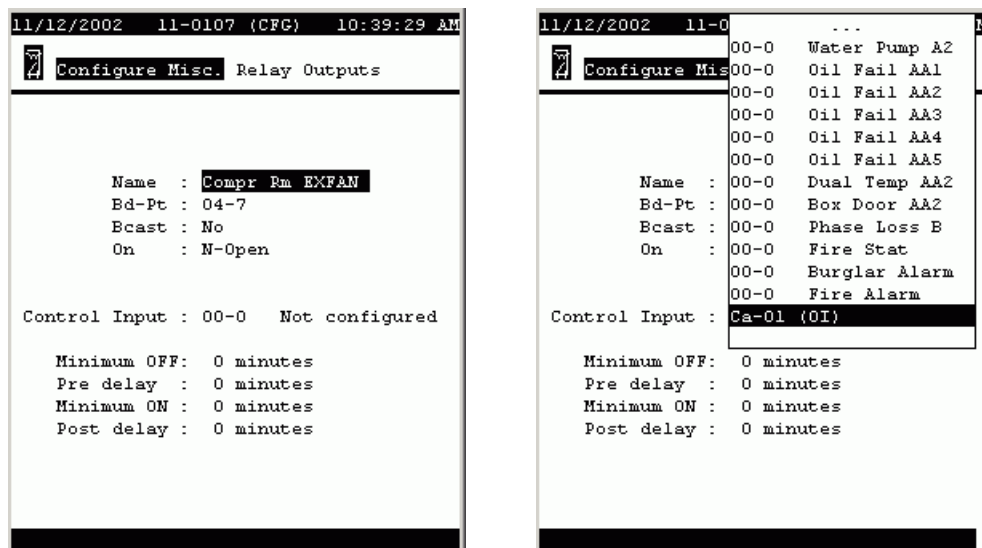
It is not necessary to change anything in the top half of this screen, which repeats the configuration we entered on the previous page (though we *could* change it here if we wanted). There are two things to add to configuration here.

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:
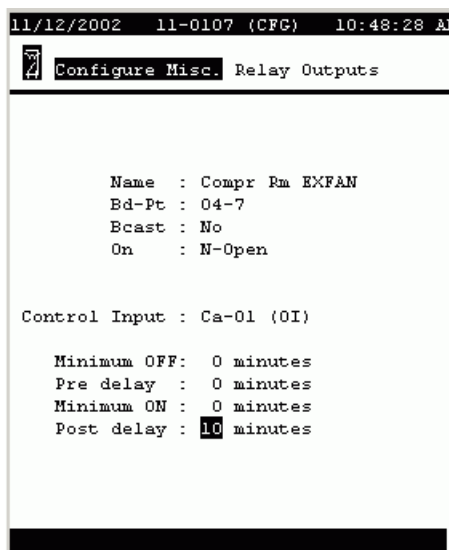
Completing that working example hopefully increased your comfort with calculated points. Now we will go through each of the fields and functions in order.

The heading fields   Here is the heading area of the calculated points screen:

```
Units: OI              Undo      Cancel
Style: Generic    |    Redo
```

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.