



CM3500 Series Controller

Installation and Operation Manual

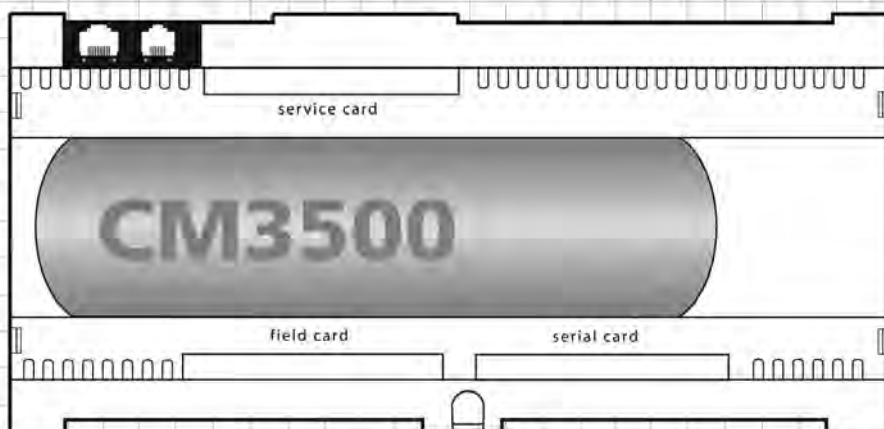
Advanced program capabilities.

Separate user interface.

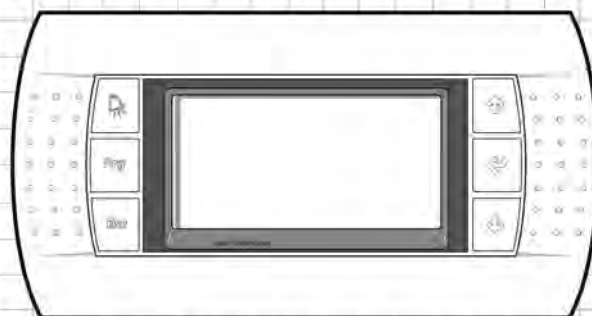
Multiple communication interface options:

- LonWorks®
- BACnet™ Ethernet
- BACnet™ MS/TP
- Modbus®

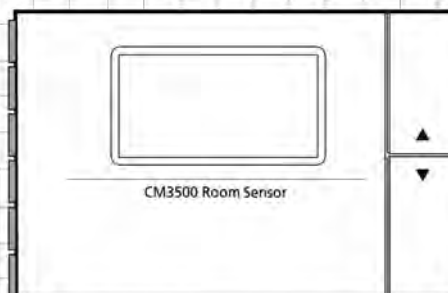
Precise temperature and humidity control.



CM3500 Controller



CM3500 User Interface



CM3500 Room Sensor

CAUTION

CAUTION - ONLY TRAINED, QUALIFIED PERSONNEL SHOULD INSTALL AND/OR SERVICE CLIMATEMASTER EQUIPMENT. SERIOUS INJURY, DEATH AND PROPERTY DAMAGE CAN RESULT FROM IMPROPER INSTALLATION/SERVICE OF THIS EQUIPMENT. HIGH VOLTAGE ELECTRICAL COMPONENTS AND REFRIGERANT UNDER PRESSURE ARE PRESENT.

LIMITED WARRANTY. The goods manufactured by seller are warranted to be free from all latent defects in material and workmanship which may be disclosed under normal use and service within two years from date of shipment. In order for warranty to be valid, a START-UP REPORT must be completed and returned to the factory. If the report is not sent back, warranty will be voided on the equipment. If it is found that the goods contained defects at the time such goods were furnished by the seller, seller will either repair or replace the defective part or parts at sellers option. This warranty to repair or replace is the exclusive remedy and is expressly limited to the materials furnished by the seller. All replacements or repairs shall be F.O.B. Oklahoma City, OK. The seller shall not be liable for labor cost incurred in diagnosing the problem, in removal or replacement of the part or parts so repaired or replaced. Accordingly, seller shall not be liable for any consequential damages, whether to person or property, caused by defects in goods. This warranty does not apply to any goods which may have been repaired or altered in any way outside of our factory, so as to affect its stability in our judgment, nor does this warranty apply to any goods which have been subjected to misuse, negligence or accident. This warranty is in lieu of all other warranties, expressed or implied, including any implied warranty of merchantability, and extends only to the original purchaser.

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1. - Installation

1.1 - Humidity and Temperature Control Package

Your ClimateMaster controller is designed for precise monitoring and control of air temperature and relative humidity (RH) within a conditioned environment.

This CM3500 control system is easy to install and operate. It features a wall-mountable remote display terminal which allows you to view and adjust set points and modes of operation. It also indicates the operating status of major components inside of the DOAS unit.

Most sensors and inputs have been factory-installed and wired inside of the DOAS unit. In most cases, you need only mount and wire the supply air temperature sensor and the remote display. The terminal, which is simply an interface tool, contains no sensors. You do not need to install it in the space. If purchased with your system, remote room sensors may require mounting as well.

1.2 - Sensor Installation

Your controller is provided with a duct-mount supply air temperature sensor. It may also come with one or multiple remote room sensors depending on what option was selected when the equipment was ordered.

1.2.1 - Duct-Mount Sensor

A duct-mount sensor is normally used when continuous blower operation is desired or required. A duct-mount sensor helps ensure consistent temperature and humidity levels throughout the space. One drawback of this sensor is that it relies on a continuous stream of air moving past it. Using a duct-mount sensor with a non-continuous blower may lead to short-cycling of the refrigeration compressor.

Install the duct-mount sensor in the supply air duct downstream from an auxiliary heater (if used). Do not mount the sensor in a section of duct where false readings may occur due to dead air regions, solar heat gain or thermal losses in winter. Do not mount the sensor where water is likely to drip on it. Liquid moisture may damage the humidity sensing element in the sensor. Run two, 18 gauge (0-500 feet) or two, 24 gauge (0-100 feet) wires from the sensor to the labeled terminal strip in the control panel of the DOAS unit. See your wiring schematic for connection details. Note that undersized wiring will cause inaccurate sensor readings. Do not run sensor wiring adjacent to or in the same conduit as wires carrying more than 24 VAC.

1.2.2 - Remote Room Sensor(s)

ClimateMaster DOAS units ordered with the room reset of supply air temperature (RRSAT) option are supplied with a remote room sensor. Up to four of these sensors may be wired to the system.

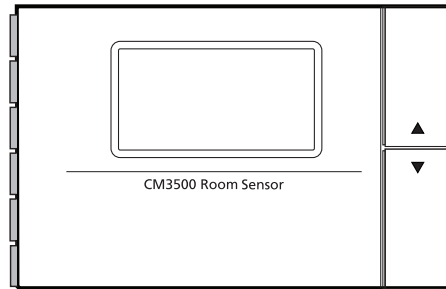


Figure 1

This wall-mountable display is an IP30 rated device. Ambient conditions must be between 32.0°F and 120.0°F and less than 85% RH. The controller's RS485 serial interface communicates via three-way plug-in terminals. Use a twisted pair plus shielded cable, 20-22 AWG. Total length of the network must not exceed 1,500 feet. The capacitance between the wires must not exceed 90 pF/M. See your wiring schematic for connection details. Note that undersized wiring will cause inaccurate sensor readings.

These remote devices require a separate 24Vac 50/60HZ 1.5VA power connection. Provide a dedicated 250mA fuse for each sensor. Use a class 2 safety transformer with a minimum rating of 4VA. If the sensor is wired to F1 and F2 of the DOAS unit control panel terminal, G0 must be connected to F2.

Do not run sensor wiring adjacent to, or in the same conduit as wires carrying more than 24 VAC.

1.3 - Auxiliary Air Heating Control Wiring

Note: You must use the ClimateMaster CM3500 control system to interlock the room heating system. This prevents wide fluctuations in room air temperature. It also prevents the heater from trying to heat the room while the DOAS unit is running in the cooling mode.

1.3.1 - Auxiliary Heating - Dry Contact Closure

The standard ClimateMaster CM3500 Controller provides a dry contact closure to operate the auxiliary space heating. The contact closes to energize a heater (by others) which has its own control transformer.

Run two wires from the thermostat terminal blocks on the heater to the labeled terminal strip on the control panel of the DOAS unit. See your wiring schematic for connection details.

1.3.2 - Auxiliary Heating - Proportional Signal

As an option, ClimateMaster will provide a proportional 0-10 VDC direct-acting signal to modulate a heating coil control valve or other auxiliary modulating heater. Most proportional valves have either three or four terminals for field-installed wiring.

- Four-terminal valves have two terminals for 24 VAC power and two terminals for the signal input.
- Three-terminal valves have one terminal for the “hot” 24 VAC input, a second terminal for the “positive” signal input and a third, common terminal for the “neutral” 24 VAC input and the “negative” signal input.

You must follow the instructions included with the valve cut sheet. Observe the proper polarity or you may damage both the valve and the controller. See the unit wiring schematic for information on signal wire connection points.

1.4 - Wiring for Ventilation Air

ClimateMaster DOAS units have a set of dry contacts to interlock with a field-supplied exhaust blower. The contacts close during the occupied mode to energize this blower.

See your wiring schematics and the DOAS unit’s installation and operation manual for more details on installing and controlling ventilation air intakes.

1.5 - Mounting the Remote Terminal

The remote terminal must be located in a dry, non-corrosive environment. Operating conditions must be between 0.0°F and 140.0°F and less than 90% RH. Moisture or chemicals can damage the circuitry of the display. The display can either be affixed directly to the DOAS unit (indoor models only) or located up to 20 feet away using the cable that came with the display.

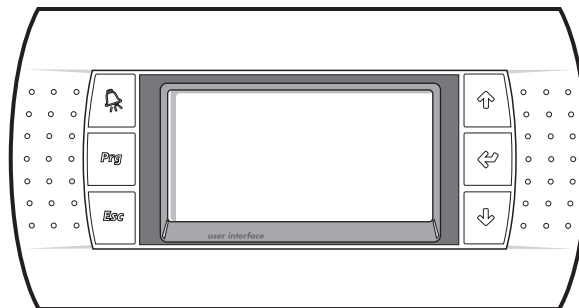


Figure 2

1.5.1 - Installing the Remote Terminal

The remote terminal is an IP40 device and is powered through the cable provided. If a longer length is required, a standard 24 AWG, 6 conductor phone cable may be used up to 150 feet. For location of the sensor up to 1,500 feet, use 22 AWG, 3 twisted pair cable. See your wiring schematic for connection details. Pull the cord and connector through the hole in the back of the mounting bracket. Attach the bracket to the wall. After plugging the cord into the back of the remote display, feed any extra wiring back into the hole of the mounting bracket and gently snap the remote display into the bracket.

Caution: Do not run the remote terminal wiring in the same conduit as, or adjacent to wires carrying over 30 volts!

Using and Adjusting the Remote Display

1.6 - Overview

ClimateMaster's CM3500 microprocessor controller is a powerful, flexible controller with many useful features including:

- Display of room air temperature, relative humidity and refrigerant pressures;
- Display of equipment operating status such as dehumidification, cooling, and heating modes;
- Display of alarms or abnormal conditions such sensor failures or tripped safety controls;
- An optional seven-day occupancy timer which can control outdoor air dampers;
- A convenient, easy-to-understand person/machine interface, which allows the operator to view and change set points and time schedules. This interface or "remote terminal" can be installed up to 1,500 feet away from the DOAS unit.

1.7 - Remote Terminal Troubleshooting

The remote terminal allows the operator to monitor the operation of the DOAS unit and view the alarm screens and history to insure proper DOAS unit operation. It is important that the remote terminal remains functional for safe and efficient unit operation. If you think the remote terminal is not functioning correctly, refer to the table in Section 1.7.1 that follows.

1.7.1 - Troubleshooting the Remote Terminal

Problem	Solution
No LEDS lit on the remote terminal No power is getting to the remote terminal.	Check field wiring between remote terminal and controller.
Remote terminal shows: "NO LINK" The display address has been altered.	Press the UP, ENTER and DOWN keys together for 4 seconds and set the display address to 32.
Red alarm LED is lit. The system has experienced an alarm and is waiting for it to be acknowledged.	Press ENTER from the Alarm Screen. If the red LED stays lit, clear the alarm condition and then press ENTER from the Alarm Screen.

If the remote terminal is not functioning after review of the above, consult ClimateMaster's Technical Service Department at (405) 745-6000.

2 - IAQ Controller Details

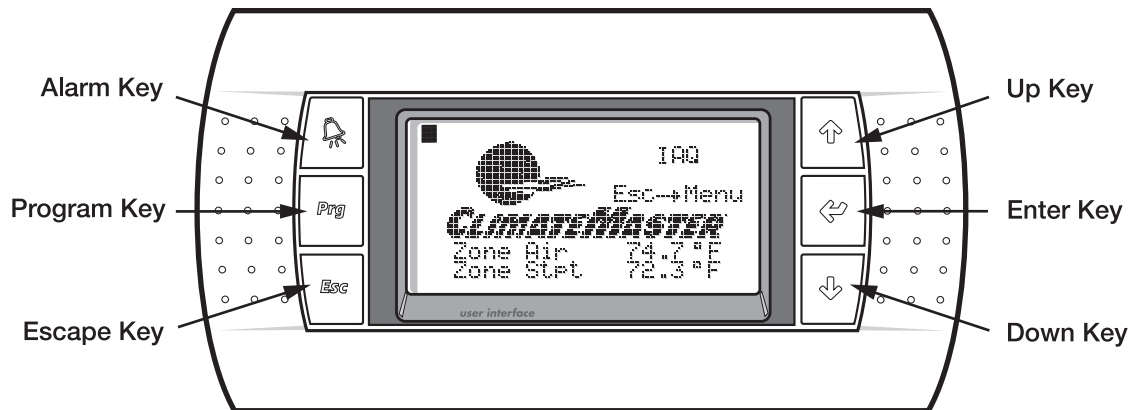


Figure 3

2.1 - Menu Overview and General Instructions

Your ClimateMaster CM3500 Controller is pre-programmed and configured at the factory for use in the application you have specified. The remote terminal allows the operator to monitor the operation and adjust the setpoints of the DOAS unit. The remote terminal has an LCD screen and 6 keys. The keys on the left hand side of the remote terminal, top to bottom, are the ALARM key shown as an alarm bell, PROGRAM key abbreviated “Prg” and the ESCAPE key abbreviated “Esc.” The keys on the right hand side of the remote terminal, top to bottom, are the UP key shown as an up arrow, the ENTER key shown as a left arrow and the DOWN key shown as a down arrow. Pressing the Esc key from the MAIN MENU will display the unit’s menu selections. Pressing Esc from any other screen will take you back one screen, while pressing ENTER will select that screen. If setpoints or selections can be altered on a screen, the ENTER key will cycle through those items. Once the cursor is over an item, the UP and DOWN arrow keys will modify the setting. Numeric values will require that the ENTER key be pressed to accept the value. An “on” or “off “ selection will be altered as soon as the UP or DOWN keys are pressed.

To view the alarms from any menu, simply press the ALARM key. The UP and DOWN keys will show any active alarm. Any time an alarm is triggered, the red LED behind the ALARM key will light. This LED will remain on until the alarm is acknowledged. Alarm acknowledgement and history instructions are shown on the main Alarm Screen. To escape from the alarm screens, press the Esc key.

Screens which display a small up arrow in the upper right and a small down arrow in the lower left are part of a series of screens which can be accessed by pressing either the UP or DOWN arrow keys. If the operator has not pressed a key for 5 minutes, the remote terminal will return to the Home Screen.

2.2 - Main Menu

Pressing the Esc key from the Home Screen displays the MAIN MENU. This menu allows the operator to modify the TEMPERATURE SETTINGS set a Temporary Occupancy, change the Occupancy Schedule and view the Unit Revision. To return to the Home Screen, press the Esc key.



Figure 4

2.2.1 - Temperature Settings

The temperature settings for your unit can be modified from this menu. Select the appropriate item with the UP and DOWN keys and press the ENTER key to select. To return to the MAIN MENU, press the Esc key.

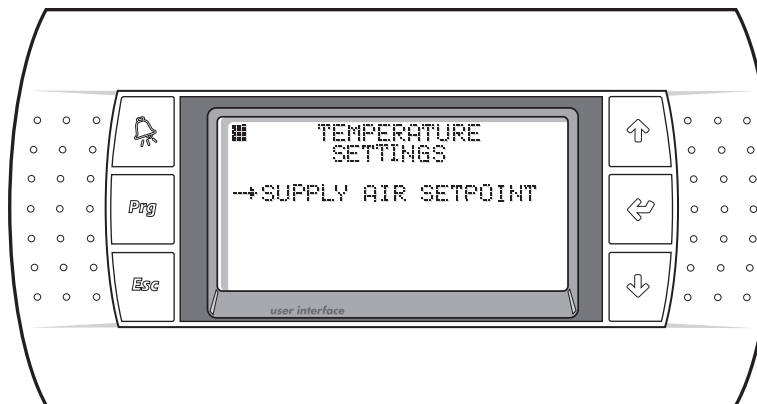


Figure 5

2.2.1.1 - Supply Air Temperature Setpoint

This screen will only be shown if the room reset of leaving air temperature (RRLAT) option is not selected. This screen allows the supply air temperature setpoint to be modified. The value of the setpoint ranges from 45.0°F to 99.9°F with a 72.0°F default. To modify the setpoint, press the ENTER key and use the arrow keys until the desired setting is shown. Pressing the ENTER key will now change the setpoint. To return to the TEMPERATURE SETTINGS MENU, press the Esc key.



Figure 6

2.2.1.2 - Zone Reset Setpoints

In the Room Reset of Leaving Air Temperature (RRLAT) mode of operation, the supply air temperature setpoint is modified based upon the actual zone air temperature, the zone air temperature setpoint and the high and low limits which are set on this screen. This mode requires the remote room sensor be installed in the conditioned space. For operation of the remote room sensor, see Section 2.2.1.3. As the zone air temperature increases above the zone air setpoint, the Leaving Air Temperature (LAT) setpoint is continuously modified to achieve a faster return to setpoint. The same logic applies to a decrease under setpoint. The high and low limits make up the band of the possible zone air temperature setpoint.

In this mode, the Home Screen and the Analog Output Screen will display the actual zone air temperature instead of the supply air temperature. This screen will only be shown if the RRLAT option is selected. This screen allows the Zone Reset Setpoint as well as the High and Low Limits to be modified. The value of the Zone Reset Setpoint ranges from 55.0°F to 95.0°F, with a default of 72.0°F. To modify the setpoint, press the ENTER key and use the arrow keys until the desired setting is shown. Pressing the ENTER key will now change the setpoint. The value of the High Limit ranges from 40.0°F to 140.0°F, with a 90.0°F default and the value of the Low Limit ranges from 35.0°F to 70.0°F, with a 60.0°F default. To return to the TEMPERATURE SETTINGS MENU, press the Esc key.

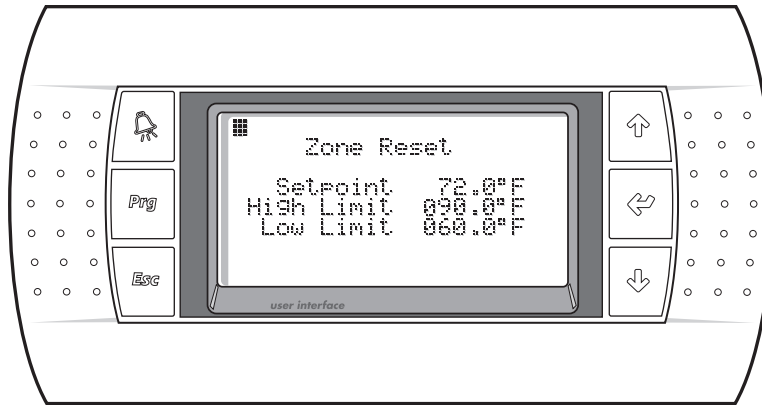


Figure 7

2.2.1.3 - Operation of the Remote Room Sensor

The remote room sensor supplied with the RRLAT option will allow modification of the Zone Air Setpoint. This can only be changed on the remote room sensor assigned as address 2. Pressing the UP or DOWN buttons will display and flash the current setpoint. Pressing the UP or DOWN buttons again will change the setpoint in 0.1°F increments. Pressing and holding down these buttons will allow for a faster scroll of the setpoint. The last displayed value will become the setpoint after a few moments. The setpoint will assume the value of the last device to modify it, either the remote room sensor or the remote terminal.

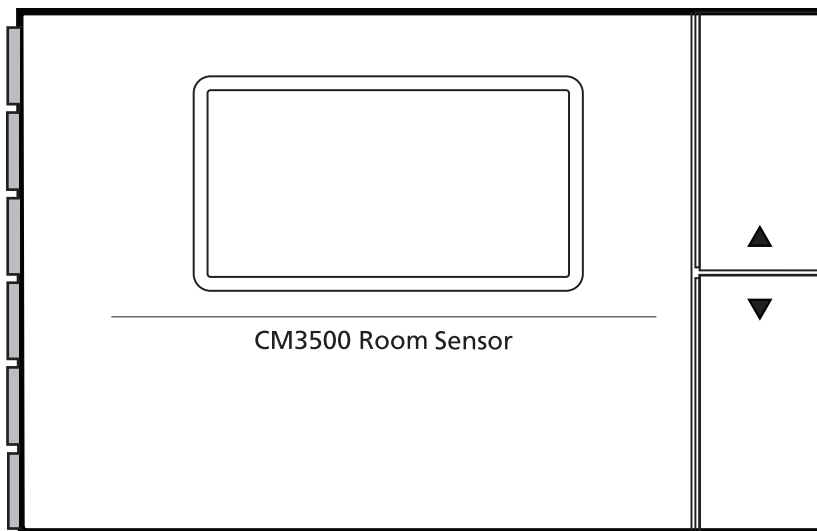


Figure 8

The remote room sensor displays the occupancy status of the unit. A house icon is shown to the left of the temperature. If it is empty, the unit is in the un-occupied mode. If a figure of a person is displayed within the house icon, the unit is in the occupied mode. The remote room sensor can also be used to override the occupancy of the unit for a few hours. Press the SLEEP button, symbolized as a crescent moon on the left side of the sensor, fourth button from the top. This will display “1” and the crescent moon. The unit will

now be occupied for one hour. Pressing the button multiple times will allow for up to nine hours of occupancy. To cancel the occupancy set from the remote room sensor, simply press the SLEEP button again, or set the hours to zero. When the crescent moon icon disappears, the occupancy override is cancelled.

The bottom left button on the remote room sensor flips the large temperature and small humidity display to the large humidity and small temperature display for a few seconds. This allows the humidity to be displayed in a larger font.

All of the other buttons on the left of the remote room sensor are disabled for this application. Pressing them will display an icon of a lock. The remote room sensor will flash “ALr” to indicate that an alarm has occurred. The display of the current alarm must be done from the remote terminal. The remote room sensor will flash “oLn” to indicate that the sensor is offline from the controller.

To change the internal setable parameters of the remote room sensor, see Section 3.5.

2.2.2 - Unoccupied Settings

This screen will only be shown if the Zone Reset and the Unoccupied Control is selected in the Factory Configuration Screen. These setpoints will only be used in the unoccupied mode. The range of the Cooling Setpoint is from the current Heating Setpoint setting to 95.0°F with a default of 65.0°F. The range of the Heating Setpoint is from 40.0°F to the current Cooling Setpoint setting with a default of 85.0°F. To modify the setpoint, press the ENTER key and use the arrow keys until the desired setting is shown. The range of the Unoccupied Humidity Setpoint is 20.0% to 99.9%, with a default of 60.0%. To modify the setpoint, press the ENTER key and use the arrow keys until the desired setting is shown. To return to the TEMPERATURE SETTINGS MENU, press the Esc key.

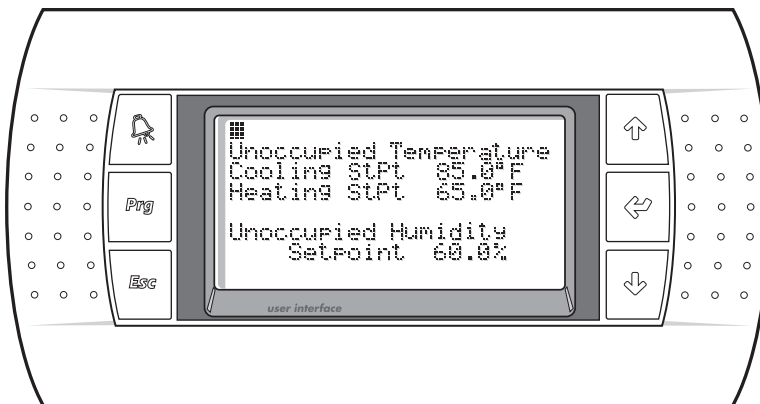


Figure 9

2.2.3 - Temporary Occupancy

This screen allows the operator to set the unit into occupied mode for a preset amount of time. Press the ENTER key and enter in the hours and minutes you would like the unit to be temporarily in the occupied mode. When the cursor is blinking over the “Press Prg to set” message, pressing the Prg key will override the schedule and allow the unit to be temporarily occupied. The screen will now show “Override On.” To clear this occupied override, set the hours and minutes to zero and press the Prg key. The screen will now show “Override Off.” To return to the MAIN MENU, press the Esc key.

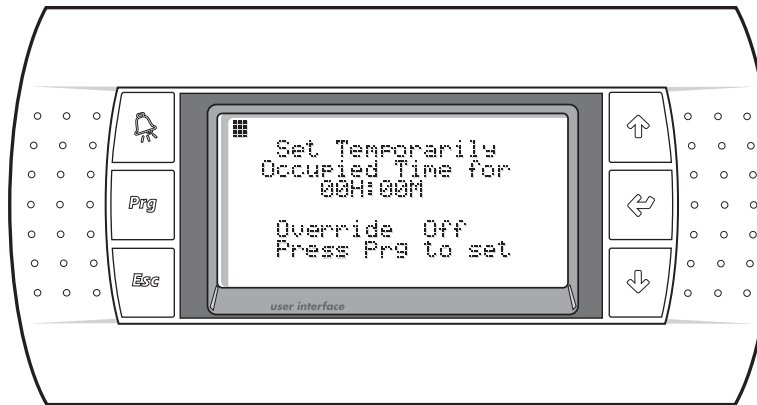


Figure 10

2.2.4 - Occupancy Schedule

Selecting the SCHEDULE SETUP from the MAIN MENU takes you to the OCCUPANCY SCHEDULE MENU. This menu allows you to access and adjust the Schedule Options, Temporary Holidays, Annual Holidays and Time settings. To return to the MAIN MENU, press the Esc key.

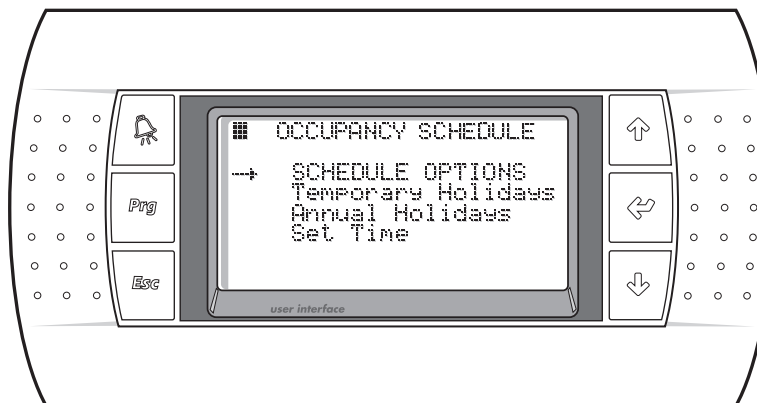


Figure 11

2.2.4.1 - Schedule Options

This screen selects the number of occupancy schedules to be active. Setting at least one allows the occupancy schedule timing to be set from the Current Schedule Screen. If the number of active schedules is left at zero, no occupancy scheduling will be active. To return to the OCCUPANCY SCHEDULE MENU, press the Esc key.

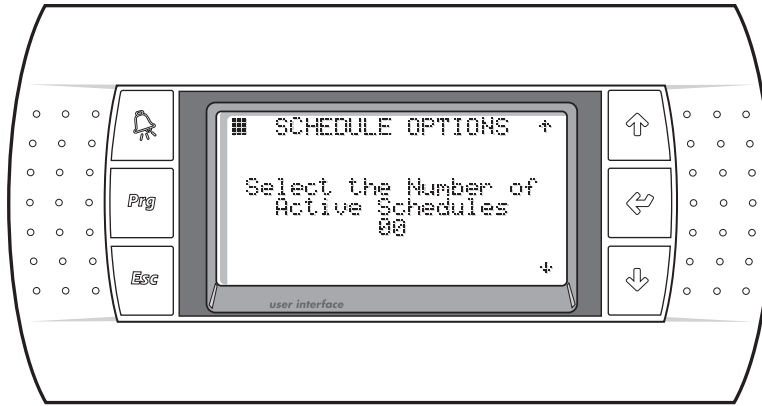


Figure 12

2.2.4.1.1 - Current Schedule

This screen sets the occupancy timing for the selected day of the week (DOW) at the bottom of the screen. Select the schedule to modify the start time and stop time. This is the time band that the unit will be in the occupied mode. All times are set in the 24 hour format. As the DOW is selected, the UP and DOWN keys allow for Monday, Tuesday, Wednesday, Thursday, Friday, Saturday, Sunday and any holiday to be occupied during that time. Up to 10 schedules can be active at any time. These allow for different start and stop times on various days of the week, weekends or programmed holidays. To return to the OCCUPANCY SCHEDULE MENU, press the Esc key.

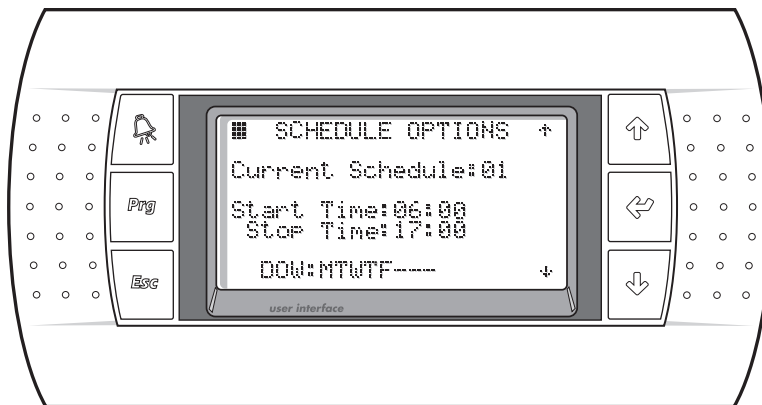


Figure 13

2.2.4.2 - Temporary Holidays

The Temporary Holiday settings are for holidays that change dates from year to year, such as Memorial Day or Thanksgiving. Up to 10 different temporary holidays can be set from this screen. Select the number to assign to the Annual Holiday and then select the Start Date and the End Date for that holiday. To return to the OCCUPANCY SCHEDULE MENU, press the Esc key.

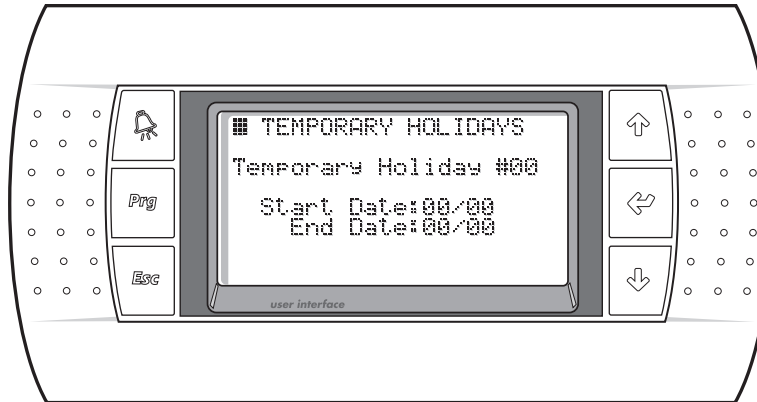


Figure 14

2.2.4.3 - Annual Holidays

The Annual Holiday settings are for holidays with dates that remain constant year to year, such as New Years Day and the 4th of July. Up to 10 different annual holidays can be set from this screen. Select the number to assign to the Annual Holiday and then select the Start Date and the End Date for that holiday. To return to the OCCUPANCY SCHEDULE MENU, press the Esc key.

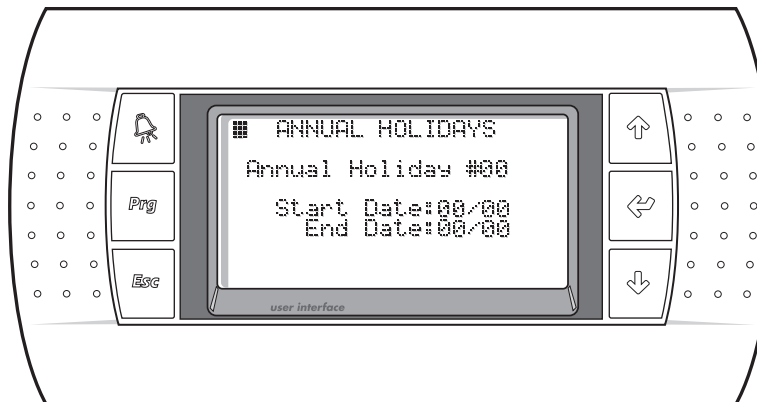


Figure 15

2.2.4.4 - Set Time

This screen allows the time, date and day of week to be set. To modify these settings, press the ENTER key until the cursor is over the appropriate item and use the arrow keys until the desired setting is shown. All times are set in the 24 hour format. Pressing the ENTER key will step to the next item. If any item was modified, the message “Enter to Set” will be shown. Press the ENTER key to change the time and date. To return to the OCCUPANCY SCHEDULE MENU, press the Esc key.

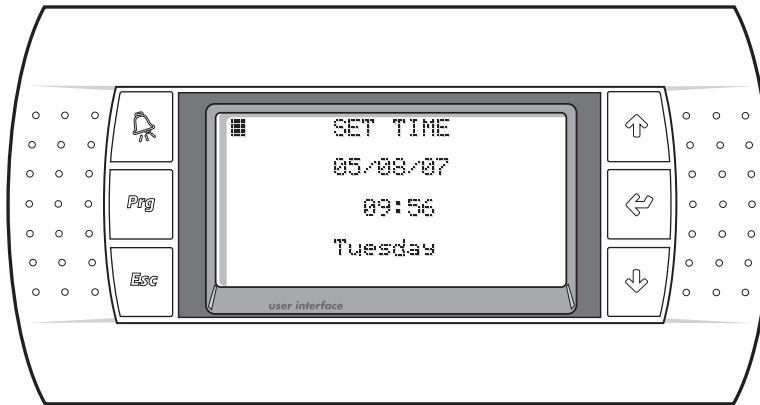


Figure 16

2.2.5 - Unit Revision

The Unit Revision Screen shows the version of the application program that is running along with the release date of the software. This information should be passed to ClimateMaster in the event a service call is necessary. The SERVICE MENU and Factory Configuration are accessible ONLY from this screen.

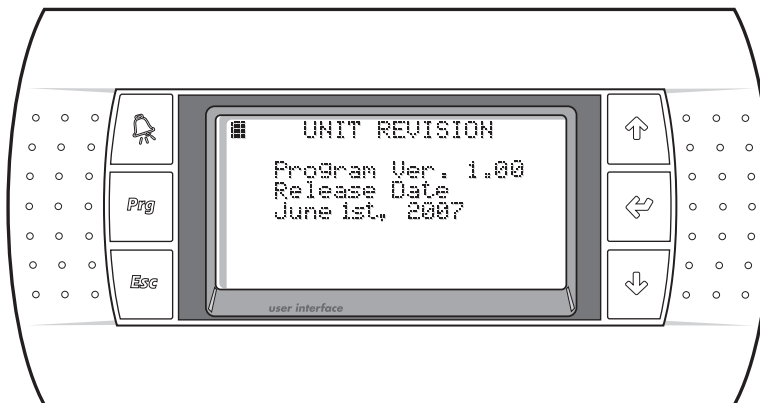


Figure 17

Press the UP and DOWN keys at the same time to display these menus. To return to the MAIN MENU, press the Esc key.

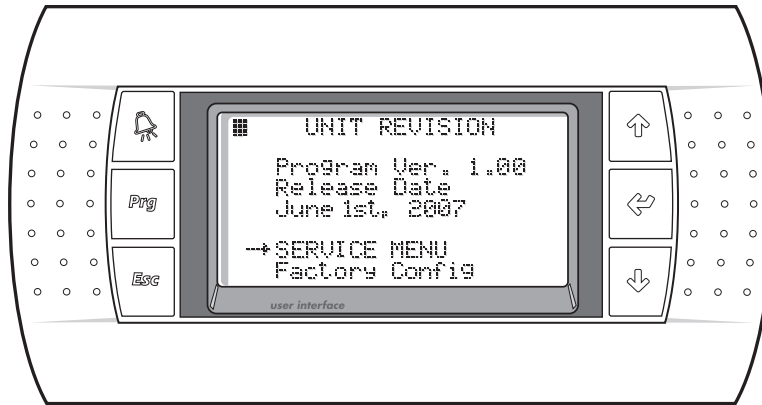


Figure 18

2.3 - Service Menu

Selecting the SERVICE MENU will display the Login Screen. Enter the service password, 1234, and press ENTER. The SERVICE MENU allows the Unit Status, Parameter Settings, Sensor Offsets and Pressure Cutouts to be accessed. To return to the Unit Revision Screen, press the Esc key. The password is bypassed for 5 minutes after it is first entered. This is displayed on the Login Screen with the text, “Still Logged In, Press PRG to Enter.” To re-enter the SERVICE MENU without entering the password, just press the Prg key.



Figure 19

2.3.1 - Unit Status

Selecting Unit Status from the MAIN MENU allows for the Modes & Time, Outside Air Dewpoint, Outside Air Temperature and I/O Status to be accessed. To return to the SERVICE MENU, press the Esc key.

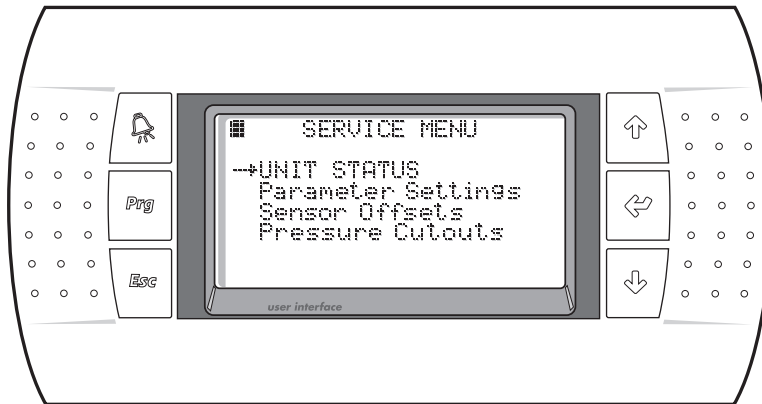


Figure 20

2.3.1.1 - Modes & Time

Selecting Modes & Time from the SERVICE MENU displays a text explanation of the unit. The Occupied mode either Occupied or Un-Occupied is shown as well as the unit status. The Unit Status will show one of the following states: Unit Off, Unconditioned Air, Unit Cooling, Dehumidifying, Unit Heating or Low Air Flow. The Compressor On/Off, Auxiliary Heat On/Off and current date and time will also be shown. To return to the Unit Status Screen, press the Esc key.

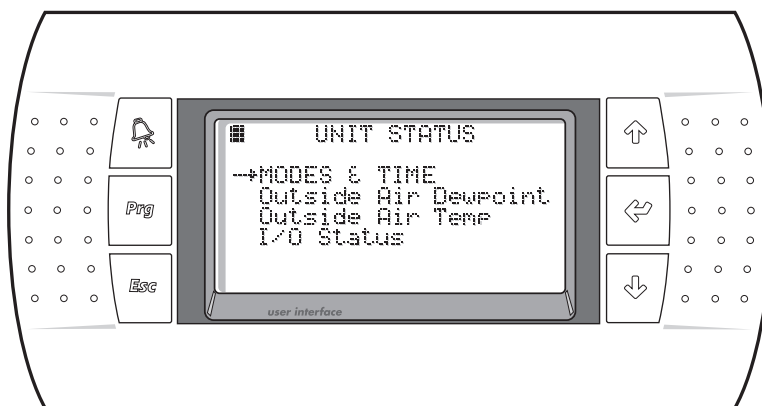


Figure 21

2.3.1.2 - Outside Air Dewpoint

The factory set Outside Air Dewpoint Setpoint and Deadband can be modified on this screen. The factory setpoint for the Dewpoint and Deadband is preset before the controller is shipped. Modification to these settings should only be done by a trained technician. To modify these setpoints, press the ENTER key until the desired setpoint is selected and use the arrow keys until the desired setting is shown. The range of the Outside Air Dewpoint is 0.0° to 99.9°F with a default of 60.0°F. The range of the Deadband is 0.0° to 9.9°F with a default of 3.0°F. The Actual Outside Air Dewpoint is shown for reference. Pressing the ENTER key will now change the setpoint. To return to the Unit Status Screen, press the Esc key.

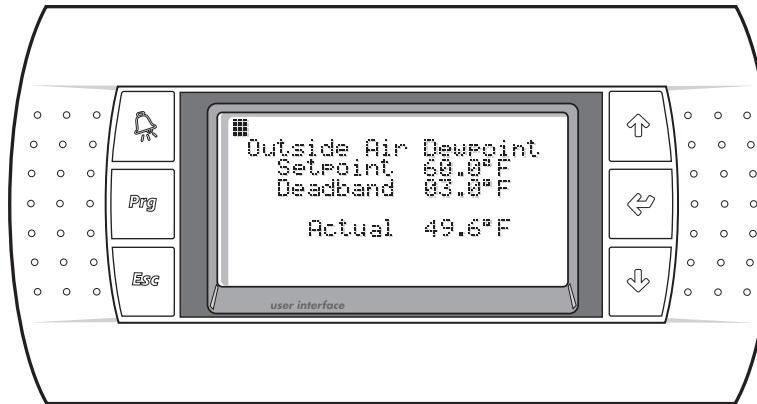


Figure 22

2.3.1.3 - Outside Air Temperature Setpoints

This screen shows the Cooling and Heating Setpoints as well as the Deadband to be used for each. The range of the Cooling Setpoint is from the current Heating Setpoint setting to 95.0°F, with a default of 70.0°F. The range of the Heating Setpoint is from 40.0°F to the current Cooling Setpoint setting with a default of 68.0°F. To modify the setpoint, press the ENTER key and use the arrow keys until the desired setting is shown. Pressing the Enter key will now change the setpoint. The range of Deadband is 0.0° to 9.9°F, with a default of 1.0°F. The Actual Outside Air Temperature is shown for reference. Pressing the ENTER key will now change the setpoint. To return to the Unit Status Screen, press the Esc key.

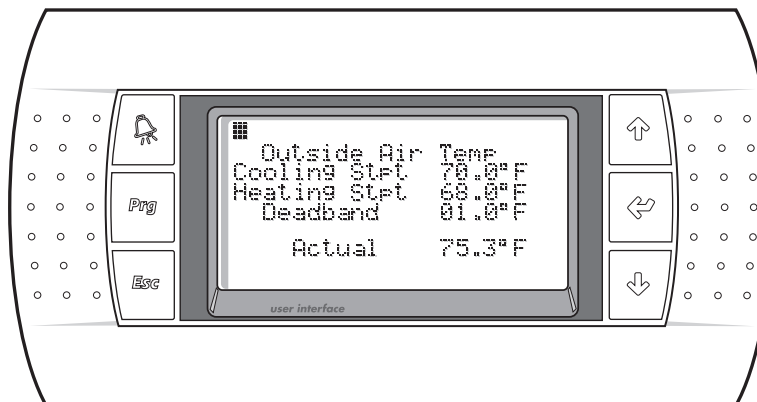


Figure 23

2.3.1.4 - I/O Status

Selecting the I/O Status from the SERVICE MENU allows for the Digital Inputs, Analog Inputs, Digital Outputs, Analog Outputs and Room Sensor Data display. To return to the Unit Status Screen, press the Esc key.

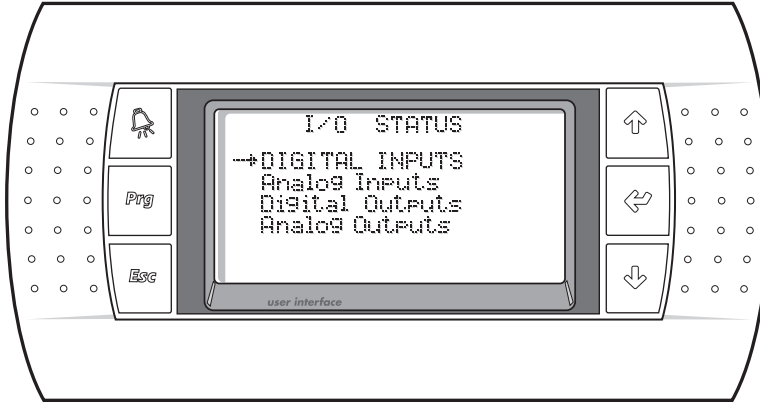


Figure 24

2.3.1.4.1 - Digital Inputs (Binary)

The Digital Inputs Screen will show the state of the contacts wired into the port J5 of the controller. This screen is provided for troubleshooting of the control system. Input Point ID1 will show the status of the Air Flow Switch, “On” if air flow is present and “Off” if there is no air flow. Input Point ID3 will show the status of the Digital Occupied Contact, “On” if this contact is made and “Off” if this contact is open. Input Point ID4 will show the status of the General Fault Contact, “On” if a general fault exists and “Off” if no general fault exists. To return to the I/O Status Screen, press the Esc key.

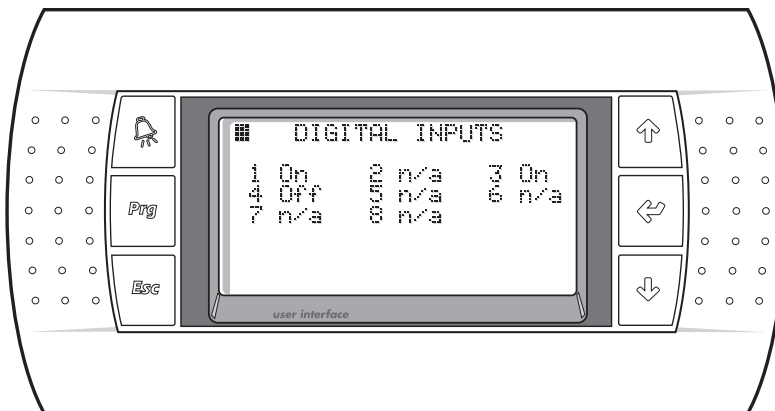


Figure 25

2.3.1.4.2 - Analog Inputs

The Analog Inputs Screen shows the current readings of the Suction Pressure, Discharge Pressure, Outside Air Humidity, Outside Air Temperature and the Supply Air Temperature. If your unit comes standard with dual refrigerant circuits, the Suction Pressure and Discharge Pressure of circuit B is also displayed. This screen is provided for troubleshooting of the control system. To return to the I/O Status Screen, press the Esc key.

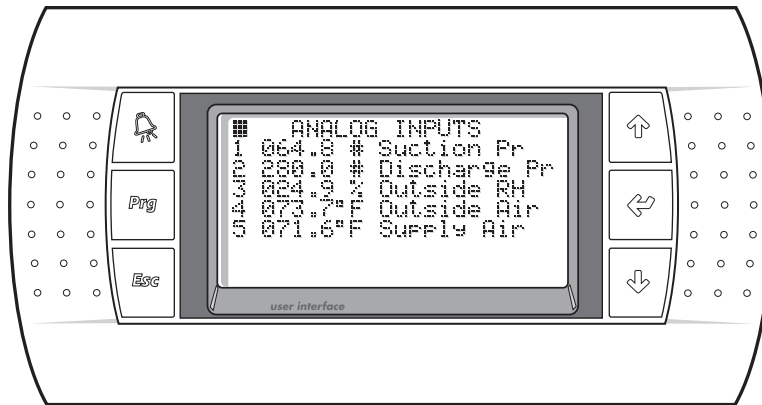


Figure 26

2.3.1.4.3 - Digital Outputs (Binary)

The Digital Output Screen will show the state of the relays wired into port J12 of the controller. This screen is provided for troubleshooting of the control system. To return to the I/O Status Screen, press the Esc key.

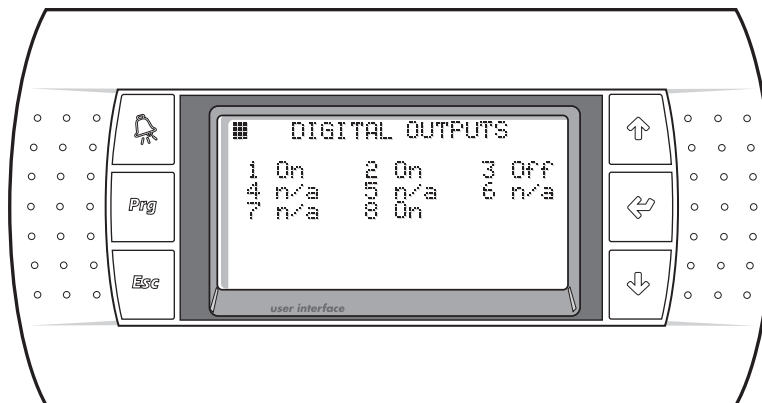


Figure 27

2.3.1.4.4 - Analog Outputs

The Analog Output Screen shows the current readings of the Hot Gas Command on Y1 and the Auxiliary Heating Command on Y2. If your unit comes standard with a heat wheel VFD for freeze protection, then the VFD Command is shown on Y3. This screen will also show the Supply Air Temperature or the Zone Temperature since it relates to the Hot Gas and Auxiliary Heat Commands. The calculated Dewpoint is also shown on this screen. This screen is provided for troubleshooting of the control system. To return to the I/O Status Screen, press the Esc key.

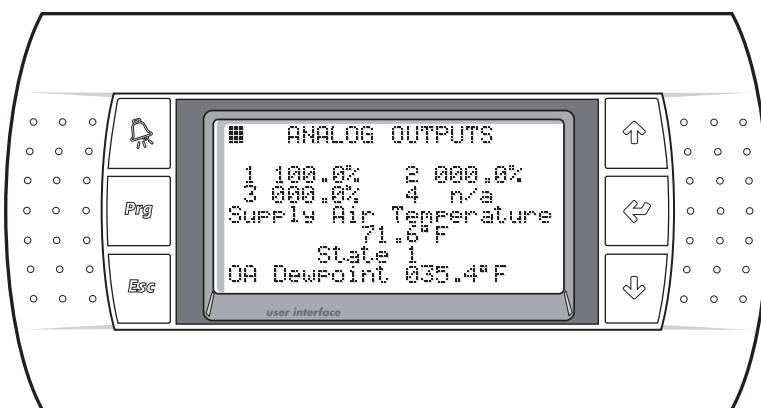


Figure 28

2.3.1.4.5 - Room Sensor Data

This screen is only shown if the RRLAT option is selected in the Factory Configuration of the unit. The Remote Room Sensor Temperature and Humidity Readings wired into the system are shown on this screen by address. The average of these sensors is shown as well. This screen is provided for troubleshooting of the control system. To return to the I/O Status Screen press the Esc key.

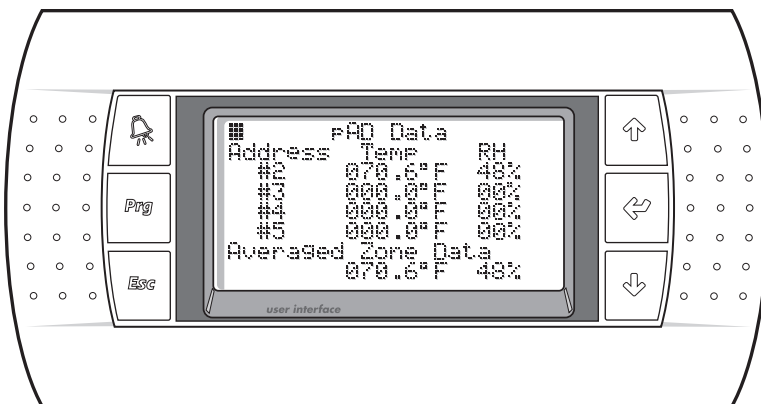


Figure 29

2.3.2 - Parameter Settings

Selecting the Parameter Settings from the SERVICE MENU allows for the Hot Gas, Auxiliary Heat, Unoccupied Deadbands, Zone Reset and Heat Wheel control parameters to be accessed. To return to the SERVICE MENU, press the Esc key.

2.3.2.1 - Hot Gas Control

This screen allows the Hot Gas PI Gain (or Proportional Band) and Reset (or Integral) to be modified for loop tuning. The range of the Gain is from 0.0° to 999.9°F. The range of the Reset is 0.0° to 999.9° F. To modify these setpoints, press the ENTER key and use the arrow keys until the desired setting is shown. Pressing the ENTER key will now change the setpoint. To return to the Parameter Settings, press the Esc key.



Figure 30

2.3.2.2 - Auxiliary Heat Control

This screen allows the Auxiliary Heat PI Gain (or Proportional Band) and Reset (or Integral) to be modified for loop tuning. The range of the Gain is from 0.0° to 999.9°F. The range of the Reset is 0.0° to 999.9° F. To modify these setpoints, press the ENTER key and use the arrow keys until the desired setting is shown. Pressing the ENTER key will now change the setpoint. To return to the Parameter Settings, press the Esc key.



Figure 31

2.3.2.3 - Unoccupied Deadbands

This screen will only be shown if the Unoccupied Control is selected in the Factory Configuration Screen. These deadbands will only be used in the unoccupied mode. The Cooling and Heating Deadband is used to prevent short cycling and is added to the Cooling Setpoint and subtracted from the Heating Setpoint. The Humidity Deadband is added to the Setpoint. To modify the Deadbands, press the ENTER key and use the arrow keys until the desired setting is shown. Pressing the ENTER key will now change the deadbands. The range of both Deadbands is 0.0° to 9.9°F. To return to the Parameter Settings, press the Esc key.

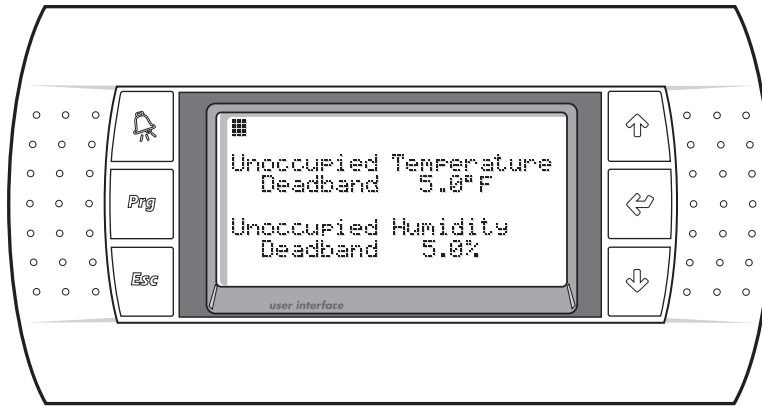


Figure 32

2.3.2.4 - Room Reset of Leaving Air Temperature Control

This screen will only be shown if the Room Reset option is selected. This screen allows the Zone Reset PI Gain (or Proportional Band) and Reset (or Integral) to be modified for loop tuning. The range of the Gain is from 0.0° to 99.9°F. The range of the Reset is 0.0° to 999.9° F. To modify these setpoints, press the ENTER key and use the arrow keys until the desired setting is shown. Pressing the ENTER key will now change the setpoint. To return to the Parameter Settings, press the Esc key.

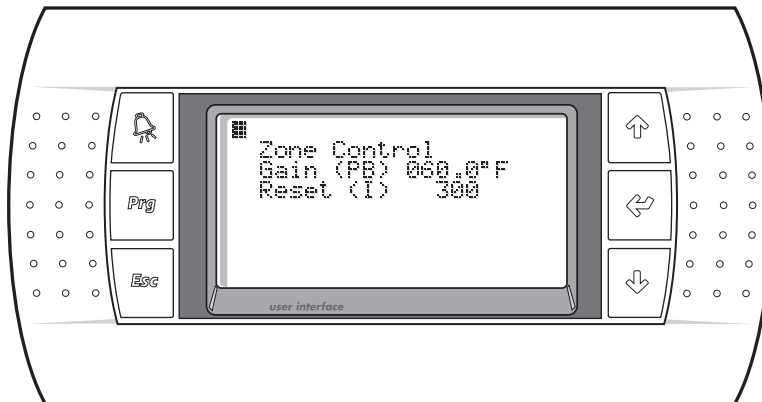


Figure 33

2.3.2.5 - Heat Wheel Control Setpoints (Figure 36)

This screen will only be shown if the Heat Wheel VFD option is selected in the Factory Configuration. This screen allows modification of the Heat Wheel PI Gain (or Proportional Band) and Reset (or Integral) for loop tuning. It also allows for modifying the Heat Wheel Humidity Setpoint, as well as displaying the Heat Wheel Humidity from the internal humidity sensor. The range of the Gain is from 0.0% to 99.9%. The range of the Reset is 0.0° 999.9° F. The range for the Setpoint is from 0.0% to 99.9%. To modify these setpoints, press the ENTER key until the desired setpoint is selected and use the arrow keys until the desired setting is shown. Pressing the ENTER key will now change the setpoint. To return to the Parameter Settings, press the Esc key.

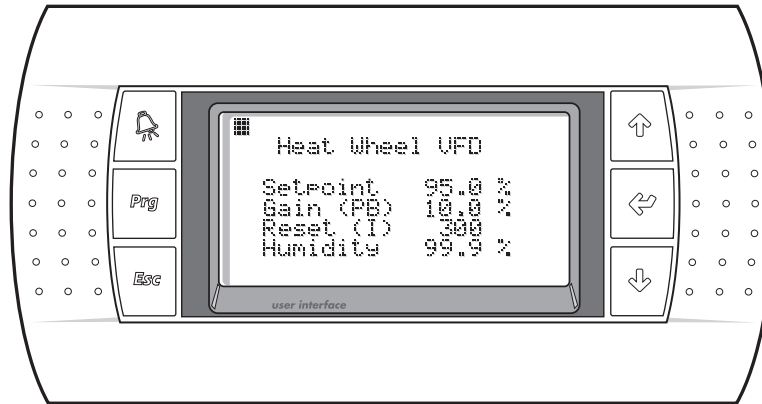


Figure 36

2.3.3 - Sensor Offsets

This screen allows the control values of the analog input points to be adjusted if calibration shows these devices to be inaccurate. The range of these offsets is from -99.9 to 99.9. Care must be used when applying an offset to an analog value as erratic operation can result. To modify the offsets, press the ENTER key until the desired offset is selected and use the arrow keys until the desired setting is shown. Pressing the ENTER key will now change the offset. To return to the SERVICE MENU, press the Esc key.

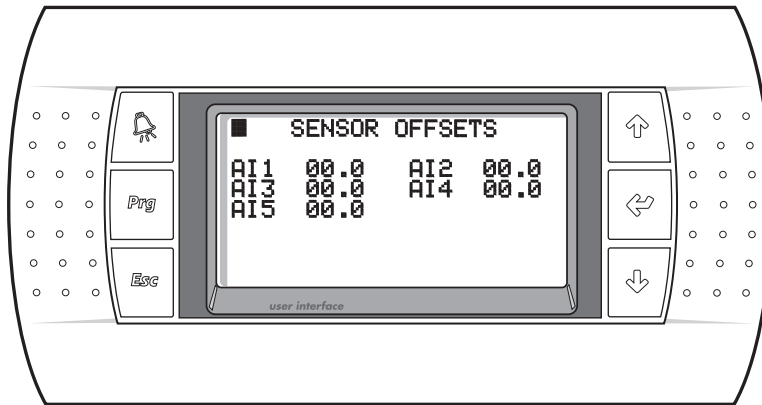


Figure 34

2.3.4 - Pressure Cutouts

This screen simply displays the Refrigerant Selection, High Discharge Pressure and Low Suction pressure cutout values for the appropriate refrigerant selected. The operator cannot change these settings. The Cooling Mode Low Pressure Trip is shown because if the unit is set as a heat pump, and the compressor is used for heating, the low pressure trip is varied based upon the glycol ratio. See Section 2.5.4 for details. To return to the SERVICE MENU, press the Esc key.

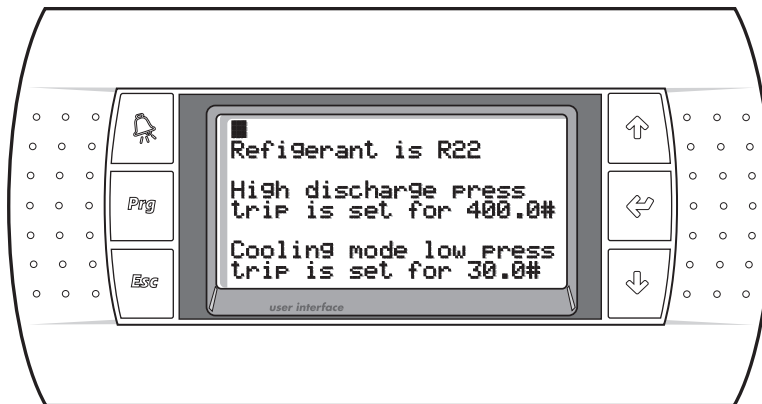


Figure 35

2.3.5 - Glycol Ratio

This screen will only be shown if the unit is set as a heat pump in the Factory Configuration. This screen allows modifying the percent of glycol in the water. The range of the setpoint is from 0% to 30% of glycol in the water. To modify this setpoint, press the ENTER key and use the arrow keys until the desired setting is shown. Pressing the ENTER key will now change the setpoint. Modification to the % of Glycol Setpoint will change the Suction Pressure Trip Setting the compressor will use when it is being used in the heating mode. The Trip Point Calculated as well as the Glycol Loop Temperature Limit is shown below the % of Glycol Setpoint. These are calculated values and cannot be modified from this screen. To return to the SERVICE MENU, press the Esc key.

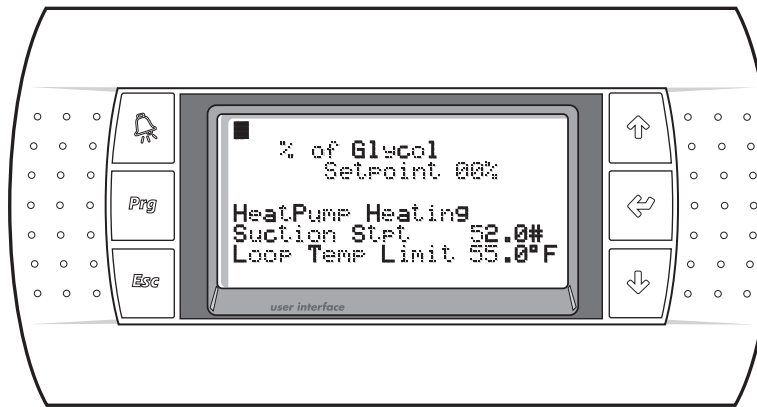


Figure 36

2.4 - Factory Configuration

Selecting Factory Configuration from the UNIT SETUP MENU takes you to the Login Screen. The factory configuration password, which is different than the service password, must be entered correctly to continue to the Factory Configuration Screen. The password is bypassed for 5 minutes after the password is first entered. This is displayed on the Login Screen with the text, "Still Logged In, Press PRG to Enter." To re-enter the Factory Configuration without entering the password, just press the Prg key.

The Factory Configuration is preset before the controller is shipped and changes to the configuration could cause damage to the unit. Modification to these settings should only be done by a factory trained technician.

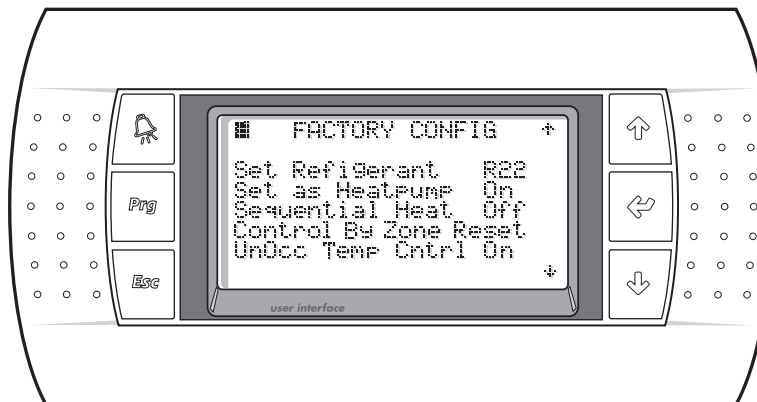


Figure 37

2.4.1 - Refrigerant

This option toggles between R-22 and R-410A to modify the High and Low Pressure Trip Points the compressor uses. To select this option, press the ENTER key and use the arrow keys until the desired setting is shown. The ENTER key will step to the next option. To return to the UNIT REVISION MENU, press the Esc key.

2.4.2 - Set as Heat Pump

Selecting this option to “On” will allow the unit to be used as a heat pump. To select this option, press the ENTER key and use the arrow keys until the desired setting is shown. The ENTER key will step to the next option. To return to the UNIT REVISION MENU, press the Esc key.

2.4.3 - Sequential Heating

Selecting this option to “On” will allow the Auxiliary Heating Analog Output to control the heater after the hot gas valve is running at 100%. To select this option, press the ENTER key and use the arrow keys until the desired setting is shown. The ENTER key will step to the next option. To return to the UNIT REVISION MENU, press the Esc key.

2.4.4 - Room Reset of Leaving Air Temperature Control

Selecting this option to “On” will use the remote room sensor(s) to modify the Supply Air Temperature. To select this option, press the ENTER key and use the arrow keys until the desired setting is shown. The ENTER key will step to the next option. To return to the UNIT REVISION MENU, press the Esc key.

2.4.5 - Unoccupied Control

Selecting this option to “On” will allow the unit to use the Unoccupied Temperature Setpoints as a night setback control for the Zone Reset of the SAT. To select this option, press the ENTER key and use the arrow keys until the desired setting is shown. The ENTER key will step to the next option. To return to the UNIT REVISION MENU, press the Esc key.

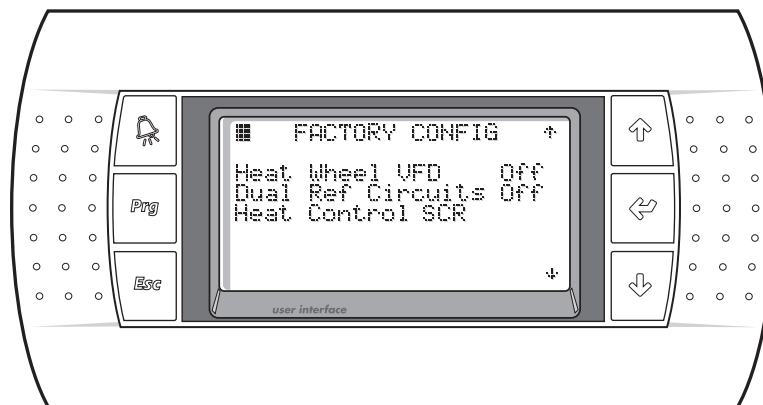


Figure 38

2.4.6 - Heat Wheel VFD

Selecting this option to “On” will allow analog output #3 (Y3) to control the Heat Wheel VFD to prevent freezing. To select this option, press the ENTER key and use the arrow keys until the desired setting is shown. The ENTER key will step to the next option. To return to the UNIT REVISION MENU, press the Esc key.

2.4.7 - Dual Refrigerant Circuits

Selecting this option to “On” will allow the use of the second refrigerant circuit on larger units. To select this option, press the ENTER key and use the arrow keys until the desired setting is shown. The ENTER key will step to the next option. To return to the UNIT REVISION MENU, press the Esc key.

2.4.8 - Room Reset of Leaving Air Temperature Control Settings

This screen will only be shown if the Room Reset is selected. It will determine how many remote room sensors are being used in the system for averaging the room temperature. If multiple humidity sensors are used, they can also be set to calculate averages from this screen. Enter the number of sensors the system uses to average these readings. To return to the UNIT REVISION MENU, press the Esc key.

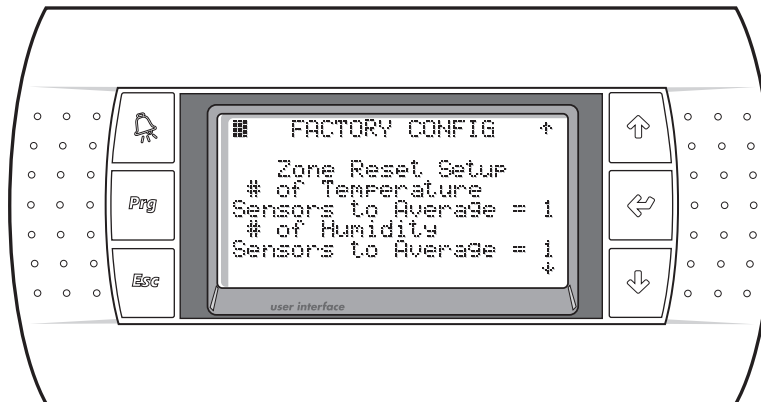


Figure 39

2.4.9 - Building Automation Communications

This screen allows the Building Automation Communications setting to be modified. The communication type can be selected as LONWORKS®, BACnet™ MSTP, BACnet™ EtherNET or ModBus® Slave. The correct serial card MUST be installed in the controller for the BMS communications to be active. In the ModBus® Slave mode, the baud rate and address will be displayed. The baud rate can be set to 1200, 2400, 4800, 9600 or 19200. The address should be set for the node number this DOAS unit is on the ModBus® network. To return to the UNIT REVISION MENU, press the Esc key.

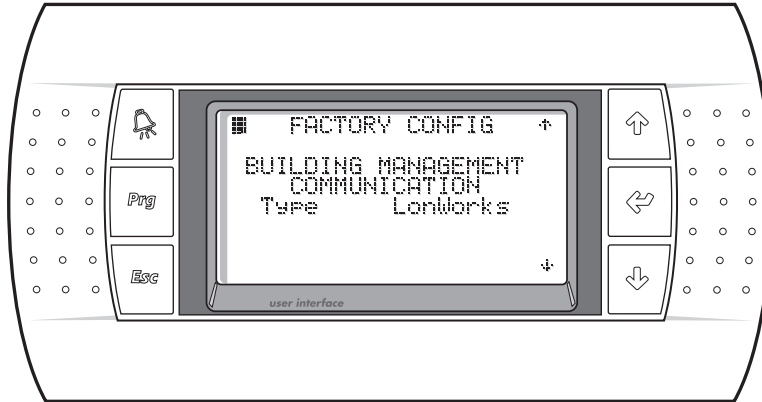


Figure 40

2.5 - Alarm Menu

2.5.1 - Alarm Screen

The ALARM MENU can be accessed anytime by pressing the ALARM button. The main alarm page includes the instructions for viewing and resetting the alarms, as well as a means to access the alarm history page. Pressing the ENTER button while viewing this alarm screen will reset any alarm that has returned to its safe state. Please note that active alarms can only be reset on this screen and not while the alarm is being displayed. Return to this screen and press the ENTER button to reset any alarm that has returned to its safe state. Any active alarm can be viewed by pressing the DOWN button from this page. If no alarm screen is shown, no alarms are active. To view the Alarm History Screen, press the ALARM button. To return to the home screen, press the Esc button.

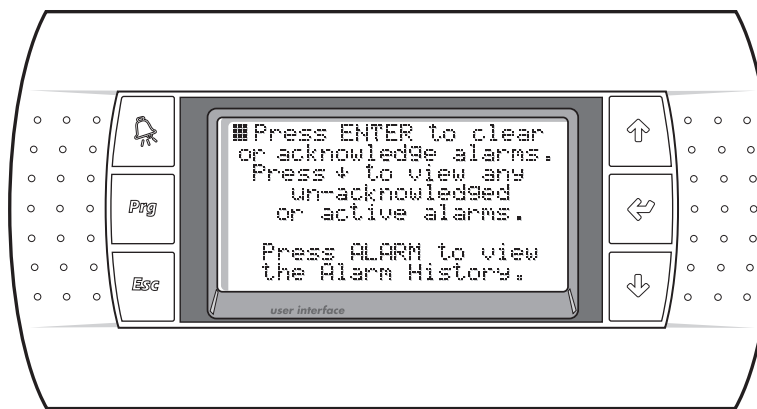


Figure 41

2.5.2 - Low Suction Pressure

The Low Suction Pressure Alarm will be active whenever the Suction Pressure falls below the Low Suction Pressure Trip Setpoint. In this state, the unit will stop and not restart until the Suction Pressure rises 30 psi above the Low Suction Pressure Trip Setpoint. Although the unit will restart automatically, the red ALARM led on the display will stay lit until the alarm is acknowledged.



Figure 42

A special case of the Low Suction Pressure Alarm activating is when the unit is selected as a heat pump and the compressor is used for heating. In this case, the Low Suction Pressure Setpoint is determined by the glycol ratio setting in the service setpoints. The Calculated Suction Pressure Setpoint is shown as well as the Loop Temperature Limit. In this state, the unit will stop and not restart until the suction pressure rises 20 psi above the Low Suction Pressure Trip Setpoint. Although the unit will restart automatically, the red ALARM LED on the display will stay lit until the alarm is acknowledged.

2.5.3 - General Fault

The General Fault Alarm will be active whenever the input from 7R is made. This alarm is a combination of the compressor and blower overload relays as well as the optional low voltage monitor, water overflow switch and a low water flow switch. Although the unit will restart automatically when these conditions clear, the red ALARM LED on the display will stay lit until the alarm is acknowledged.



Figure 43

2.5.4 - High Discharge Pressure

The High Discharge Pressure Alarm will be active whenever the Discharge Pressure rises above the High Pressure Trip Setpoint on the Factory Configuration Screen. In this state, the unit will stop and not restart until the alarm condition is reset manually on the Alarm Screen. The red ALARM LED on the display will stay lit until the alarm is reset.



Figure 44

2.5.5 - Multiple Low Pressure in Heat Pump Mode

This alarm is active only in the special case for the Low Suction Pressure Alarm. If the unit is selected as a heat pump and the compressor is used for heating, and the low suction pressure alarm occurs 3 times in any one hour period, this alarm will be active. In this state, the unit will stop and not restart until the alarm condition is reset manually on the Alarm Screen. The red ALARM LED on the display will stay lit until the alarm is reset. Note that on units with dual refrigerant systems, both Low Pressure Alarms are sensed for the protection of the heat exchanger.

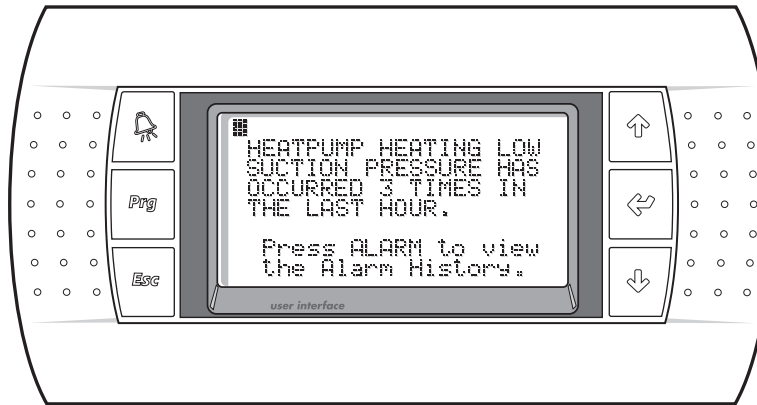


Figure 45

2.5.6 - High Discharge Pressure Circuit B

The High Discharge Pressure Alarm will be active whenever the Discharge Pressure rises above the High Pressure Trip Setpoint on the Factory Configuration Screen. In this state, the unit will stop and not restart until the alarm condition is reset manually on the Alarm Screen. The red ALARM LED on the display will stay lit until the alarm is reset.

2.5.7 - Low Suction Pressure Circuit B

The Low Suction Pressure Alarm will be active whenever the Suction Pressure falls below the Low Suction Pressure Trip Setpoint. In this state, the unit will stop and not restart until the Suction Pressure rises 30 psi above the Low Suction Pressure Trip Setpoint. Although the unit will restart automatically, the red ALARM LED on the display will stay lit until the alarm is acknowledged.

A special case of the Low Suction Pressure Alarm activating is when the unit is selected as a heat pump and the compressor is used for heating. In this case, the Low Suction Pressure Setpoint is determined by the glycol ratio setting in the service setpoints. The Calculated Suction Pressure Setpoint is shown as well as the Loop Temperature Limit. In this state, the unit will stop and not restart until the suction pressure rises 20 psi above the Low Suction Pressure Trip Setpoint. Although the unit will restart automatically, the red ALARM LED on the display will stay lit until the alarm is acknowledged.

2.5.8 - Outside Air Temperature Sensor Failure

The Outside Air Temperature Sensor Failure will be active if the outside air temperature sensor is in a shorted or open condition. In this state, the unit will stop and not restart until the alarm condition is cleared. The red ALARM LED on the display will stay lit until the alarm is acknowledged, even after the alarm condition is cleared to alert the operator the alarm occurred.

2.5.9 - Supply Air Temperature Sensor Failure

The Supply Air Temperature Sensor Failure will be active if the supply air temperature sensor is in a shorted or open condition. In this state, the unit will stop and not restart until the alarm condition is cleared. The red ALARM LED on the display will stay lit until the alarm is acknowledged, even after the alarm condition is cleared to alert the operator the alarm occurred.

2.5.10 - Room Reset Network Failure

The Room Reset Network Failure will be active if the remote room sensor is offline, or disconnected from the controller. In this state, the unit will be placed in SAT Control and continue to run in this mode with the alarm active. When the remote room sensor is back online with the controller, the unit will return to Zone Reset Control automatically. The red ALARM LED on the display will stay lit until the alarm is reset by the operator.

2.5.11 - Alarm History Screen

The Alarm History Screen is accessible from the Alarm Screen by pressing the ALARM button. This screen lists a history of alarm conditions by time and date which have existed on the unit. The most recent alarm will be displayed as 001 along with the Supply Air Temperature, Outside Air Temperature, Outside Relative Humidity, Suction Pressure, Discharge Pressure and the state of the unit when the alarm occurred. To access the history of alarms, press the DOWN button. The last 100 alarm conditions are saved in this history with the 101st being overwritten.

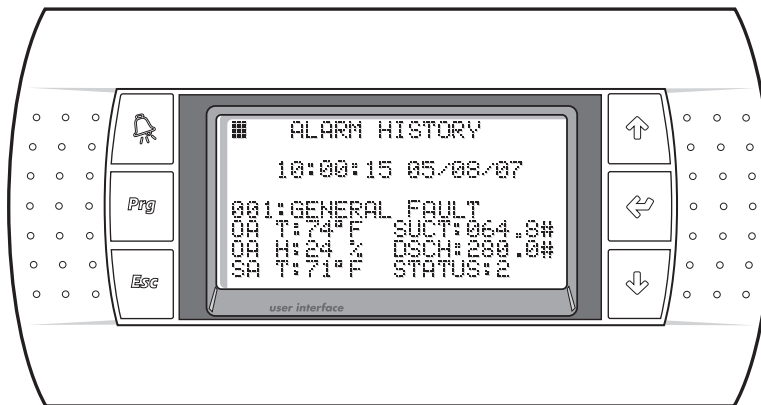


Figure 46

2.5.12 - Air Filter Service Required

The air filter service required failure will be active if the pressure differential across the air filter exceeds the normal pressure drop. An additional pressure switch is required to activate this condition. In this state the unit operation will continue and the controller will signal an alarm condition.

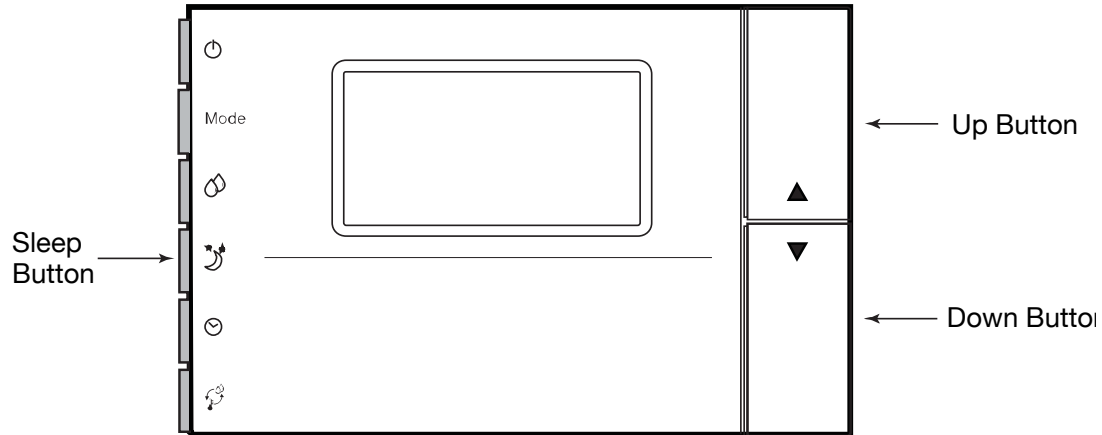


Figure 47

2.6 - Remote Room Sensor Configuration (Figure 47)

For zone reset controlled dehumidifiers, a sensor in the conditioned space is required. The remote sensor is used with the CM3500 to accomplish this. The remote room sensor is available as a temperature sensor to reset the supply air setpoint based on the conditioned space temperature. It is also available as a temperature and relative humidity sensor. In this configuration, un-occupied control in the conditioned space can also be accomplished.

Up to four room sensors can communicate data to the CM3500 controller. These will require addresses of 2, 3, 4 and 5. For installations requiring less than four room sensors, start the addresses from 2 and work up. The room sensor with address 2 will allow zone setpoint modification. The zone setpoint can be modified by using the UP and DOWN keys. Simply press one of these keys to display the setpoint. When the appropriate setpoint is displayed, wait a few seconds and the setpoint will be saved.

The remote room sensor with address 2 can also be used to temporarily override occupancy from one to nine hours. To override occupancy, press the SLEEP button on the left side of the remote room sensor. An icon showing a crescent moon and the number of hours the occupancy will be overridden is displayed. To increase the hours, press the SLEEP button until "0" (zero) hours is displayed. The temporary override will now end.

Additionally, any remote room sensor connected to the CM3500 will also display important information such as an alarm condition, the occupied mode and whether the room sensor network connection has failed. An alarm condition is displayed as "ALr" and will flash between the room temperature and "ALr." A bell icon will also blink on the display. The occupancy of the unit will be displayed as a house icon to the left of the room temperature. If the house icon is empty, the DOAS unit is in the unoccupied mode. If a human figure is in the house, the DOAS unit is in the occupied mode. If the network connection has failed, "oLon" is displayed to indicate the remote room sensor is off line.

3 - Hardware Details

3.1 - Programmable Controller

The programmable controller is preprogrammed by ClimateMaster for the control of your unit. Two types of controllers are used. The small unit is used for all single refrigeration circuit units and most dual refrigeration circuit units. A medium unit is required on units with a dual refrigerant circuit and/or if a VFD is used to prevent freezing of a heat wheel. The ClimateMaster replacement part number for both of these controllers is available by calling our customer service department.

3.2 - Remote Terminal

This wall-mountable remote display is an IP40 rated device. Operating conditions must be between 0.0° and 140°F and less than 90% RH. The remote display is powered through the cable provided. The maximum distance when using a 6 conductor phone cable is 150 feet, and 1,500 feet when using a 22 AWG 3 twisted pair cable. The ClimateMaster replacement part number for the remote terminal is available by calling our customer service department.

3.3 - Remote Room Sensor

The remote room sensor is an electronic device designed as an interface to supply temperature and/or humidity data from remote areas to the control system. The unit operates on an RS485 pLAN network. The ClimateMaster replacement part number for the remote room sensor is available by calling our service department.

The system's network addressing must be correctly set for the remote information to be sent to the control system. Generally, the controller itself is at address 1 and the first remote room sensor is at address 2. The second remote room sensor will be address 3, the third will be address 4 and the fourth will be address 5. The addresses are set in the PARAMETER MENU of the remote room sensor. Holding both the UP and DOWN buttons together for 4 seconds will display the PARAMETER MENU. While continuing to hold the UP button, press the button on the lower left of the remote room sensor to enter the menu. The settable parameters can now be seen using the UP or DOWN buttons. To modify a parameter, press the lower left button. The parameter value will now flash allowing the UP and DOWN buttons to modify it. When the values are correct, hold the lower left button to enter the modified values into the remote room sensor memory. Please refer to the remote room sensor instructions for further parameter definitions and product specifications.

3.4 - Suction Pressure Transducer

The suction pressure transducer is a 0.5 - 4.5 VDC to 0 - 250 psig ratiometric device. The body is brass with a ¼ SAE female refrigerant connection. This transducer must be supplied with 4.5 to 5.5 VDC power. A display reading of 0.0 psig for the transducer indicates the device is disconnected or defective. For this device to function, 5.0 VDC must be present on terminals 57 and 58. To verify the output of the transducer, measure the DC voltage (should read between 0.5 to 4.5 VDC) from terminal 59 to 57 and use this voltage in the following formula to determine the pressure (0-250 psig).

$$\text{Pressure (psig)} = (62.5)(V) - 31.25$$

Example, if $V = 2.50\text{VDC}$, then;

$$\begin{aligned}\text{Pressure (psig)} &= (62.5)(2.50) - 31.25 \\ &= 156.25 - 31.25 = 125 \text{ psig.}\end{aligned}$$

The suction pressure transducer's replacement part number is available from ClimateMaster by calling our customer service department.

3.5 - Discharge Pressure Transducer

The discharge pressure transducer is a 0.5 - 4.5 VDC to 0 - 652 psig ratiometric device. The body is brass with a ¼ SAE female refrigerant connection. This transducer must be supplied with 4.5 to 5.5 VDC power. A display reading of 0.0 psig for the transducer indicates the device is disconnected or defective. For this device to function, 5.0 VDC must be present on terminals 57 and 58. To verify the output of the transducer, measure the DC voltage (should read between 0.5 to 4.5 VDC) from terminal 60 to 57 and use this voltage in the following formula to determine the pressure (0-652psig).

$$\text{Pressure (psig)} = (163)(V) - 81.5$$

Example, if $V = 2.50\text{VDC}$, then;

$$\begin{aligned}\text{Pressure (psig)} &= (163)(2.50) - 81.5 \\ &= 407.5 - 81.5 = 326 \text{ psig.}\end{aligned}$$

The ClimateMaster replacement part number for the discharge pressure transducer is available by calling our customer service department.

3.6 - Supply Air Temperature Sensor

The supply air temperature sensor is a resistive NTC Bulb type device with a 10 foot cable. The temperature range is -58.0° to 212.0°F and the environmental rating is IP67. The failure mode of this device will display a reading of -623.3°F if the sensor is open and display a reading of 687.3°F if the sensor is shorted. The ClimateMaster replacement part number for the supply air temperature sensor is available by calling our customer service department.

3.7 - Outside Air Temperature and Relative Humidity Sensor

The outside air and humidity sensor is internally mounted in the air stream of the unit, behind the air filter. The failure mode of the temperature sensor internal to this device will display a reading of 137.6°F if the sensor is open and display a reading of -42.4°F if the sensor is shorted. This may seem reversed, but is accurate, as the readings have been scaled internally in the program and the device has a negative temperature coefficient. A reading of 0.0% humidity indicates a failure of the RH sensor. The ClimateMaster replacement part number for the outside air temperature and relative humidity sensor is available by calling our customer service department.

3.8 - Air Flow Switch

The air flow switch is internally mounted in the air stream of your DOAS unit. The ClimateMaster replacement part number for the air flow switch is available by calling our customer service department.

IOM Revision Log:

Date	Page #	Description
7 Oct, 2008	38	Air Filter Service Required Section Added
7 Oct, 2008	39	Remote Room Sensor Configuration Section Added
7 Oct, 2008	29	Heat Wheel Control Setpoints Section Added
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