LS 1.x.x Series Controller

Operations Manual for

LS Units

Backlit LCD User Interface

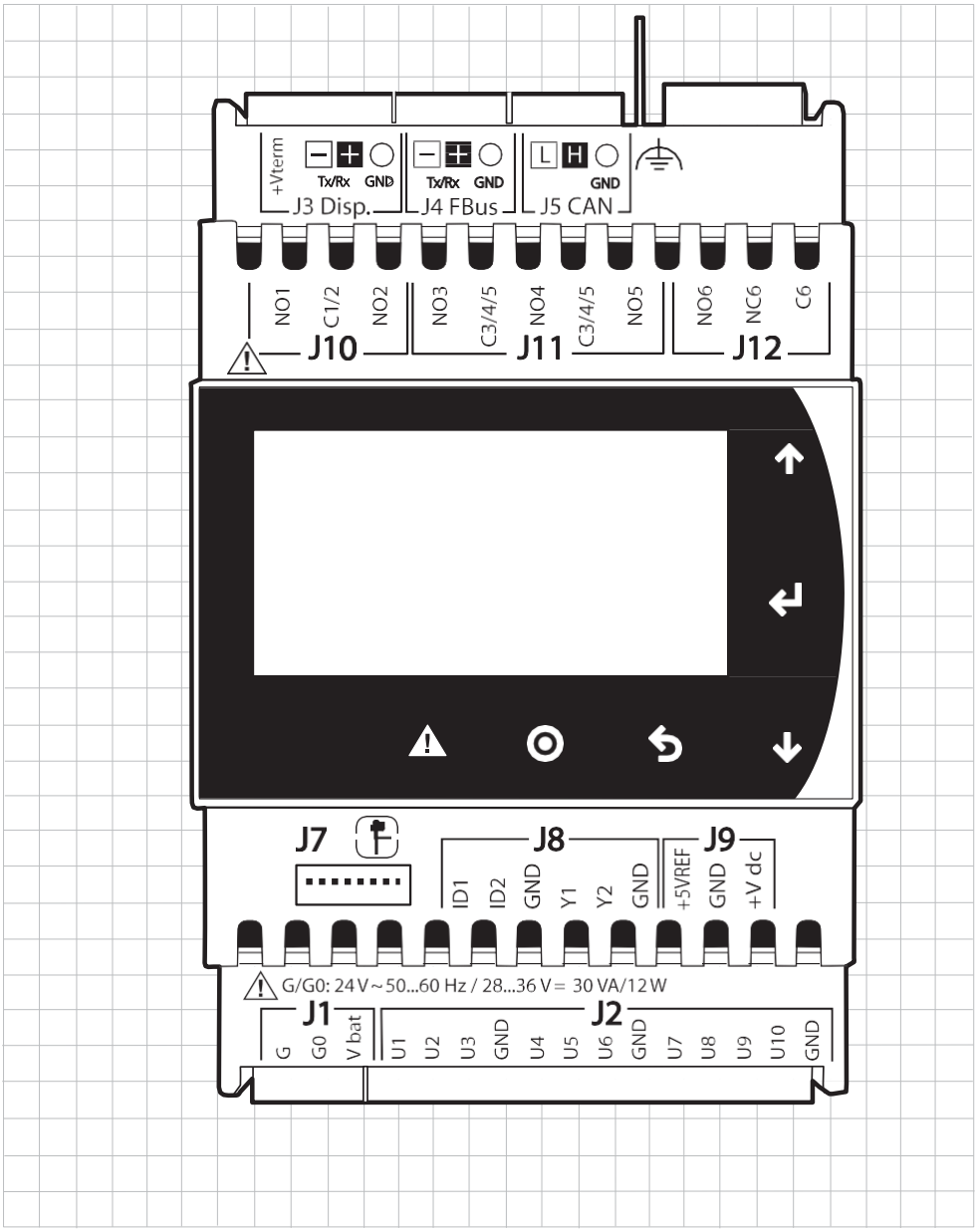
Custom programming for complex dehumidification temperature & humidity control

Multiple communication options:

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

Alarm history retention

Integral remote access capability



⚠ DANGER

ONLY TRAINED, QUALIFIED PERSONNEL SHOULD INSTALL AND/OR SERVICE DESERT AIRE 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.

Desert Aire

Dehumidification Equipment Standard Limited Warranty

Desert Aire warrants the dehumidifying unit to be free from defects in materials and workmanship subject to the terms, conditions and limitations stated herein.

TERMS

Desert Aire warrants all components (except as noted) for a period of one (1) year from the date of shipment contingent on validation of unit startup by Desert Aire Service. Upon connection of the unit to Desert Aire's AireGuard™ remote access system via onboard Ethernet connection the warranty is extended one additional year for a total warranty period of two (2) years from date of shipment. This requires validation of unit start up by Desert Aire Service. This warranty shall be limited to the supply of new or rebuilt parts for the part which has failed because of defects in workmanship or material, and does not include the cost of labor, transportation or other costs not herein provided for. Replaced parts are warranted only for the remaining portion of the original warranty period.

CONDITIONS

The warranty is subject to the following conditions:

1. The unit must be properly installed and maintained in accordance with the Desert Aire "Installation and Operation Manual" provided with each unit and/or other documentation provided.
2. **The Start-Up Report must be completed and returned to Desert Aire Service for evaluation. If no deficiencies are identified, a Warranty Validation Letter will be issued that provides all warranty dates and coverage. If installation or start-up deficiencies are present, these must be corrected and communicated to Desert Aire in order to activate warranty.**
3. This warranty shall not apply to any part that has been tampered with, or has been subject to misuse, negligence or accident. A warranty can be obtained for altered equipment but only with written consent from Desert Aire.
4. The following parts and components are excluded from the warranty: belts, filters, driers, fuses, pulleys and refrigerant.
5. Refrigerant coils or other components that corrode due to improperly balanced pool chemistry or corrosive air quality will not be warranted.

6. All replacements or repairs will be FOB Germantown, WI.
7. This warranty shall be null and void if defects or damages result from unauthorized opening of the refrigerant circuit, tampering with factory set controls, or operating outside the original design conditions.
8. Desert Aire shall not be liable for labor costs incurred in diagnosing the problem, or the removal or replacement of the part or parts being repaired.
9. Desert Aire must preauthorize all warranty coverage described herein.

Extended Warranty:

Your Desert Aire unit may have extended warrantees beyond this Standard Limited Warranty document.

Extended warrantees are only available at the time of the purchase of the original equipment. These extended warrantees are covered under a separate document and their terms and conditions are separate from this document. It is mentioned in this document for informational purposes only. Any Extended Warranties will be identified on the Warranty Validation Letter.

Any and all incidental or consequential damages are expressly excluded from this warranty. Some states do not allow the exclusion of incidental or consequential damages for personal injury, so the above limitations may not apply to you for certain damages. This warranty gives you specific legal rights, and you may also have other rights, which vary from state to state. No person or representative is authorized to make any warranty or assume any liability not strictly in accordance with the aforementioned.

Inquiries regarding warranty matters should be addressed to:

Desert Aire LLC

c/o Service Manager

N120 W18485 Freistadt Road
Germantown, WI 53022

PH: (262) 946-7400

E-MAIL: service@desert-aire.com

Additional copies of this manual can be purchased for a nominal fee from Desert Aire. Desert Aire also posts the most current revision of our I/O Manuals on our website. For a digital copy of the I/O Manual for your unit revision, please submit request to the contact information listed above.

Product Warning for the State of California

WARNING: Cancer and Reproductive Harm - www.P65Warnings.ca.gov

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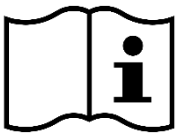
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1. Safety – ISO 7010 – Signs

1.1. Classification

	*Mandatory action required where ignoring mandatory action can result in property damage, significant injury, and / or death.*		*Prohibited Action. You must never perform the action shown or described.*
	*General Hazard warning where if the corresponding precautions are not taken it could result in significant property damage, severe injury and / or death.*		*Important additional information and advice for user.*

1.2. Information

	*Before operating equipment read these instructions carefully. They contain safety instructions and hazard warnings that must be complied with. Failure to follow instructions can result in significant property damage, severe injury and / or death.*

1.3. Prohibition

	*Never operate the equipment with doors or covers removed. Access to hazardous voltage and moving parts can result in significant property damage, severe injury, and / or death.*
	*Equipment contains flammable gas. No smoking, no open flames, and no sparks. Ignoring this warning can lead to fire or explosion.*

1.4. Mandatory

	*Lock Electrical Disconnect Switch or Circuit Breaker supplying the equipment when opening any access doors or covers. Follow Lock Out - Tag Out protocol when servicing equipment.*
	*Disconnect all incoming sources of power before opening any access doors or covers on the equipment.*

1.5. Hazard Warnings

	***WARNING:** This equipment contains hazardous voltage and live electrical parts. Contact with these parts can result in severe injury or death. Take all necessary precautions to avoid contact with live parts.*

2. Installation

2.1. Introduction

	***WARNING:*** *Equipment contains live hazardous voltage. Do not attempt any electrical work if you are not a qualified/ licensed electrician or technician.*
	*Use this manual in conjunction with the I/O Manual for proper installation of all sensors and connected equipment.*

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

This *LS 1.x.x* control system is easy to install and operate. The controller features an internal display terminal (IDT). This display allows viewing and adjustment of the unit's sensors and setpoints. It also indicates the operating status of major components inside the dehumidifier. The *LS 1.x.x* controller also has the ability to control auxiliary equipment such as pool water or tower water pumps and auxiliary heating devices for optimum energy efficiency.

Most sensors and devices have been factory-installed and wired inside the dehumidifier. In most cases, only connection to a remote condenser, electrical power and an Ethernet connection to the facilities computer network are required.

The *LS 1.x.x* control system may require some sensor and input/output connections based on the options selected. Consult the Swim Aire I/O Manual along with this document for proper sensor installation. Also refer to the field connections diagram provided with the unit for wiring details and hardware requirements.

The control system includes a web page which allows a virtual display terminal to be accessed from any device on the computer network. Simply browse to the IP address or hostname assigned to the dehumidifier, enter the appropriate credentials, [user – Desert-Aire, password – 18485] and select the DISPLAY tab. Logging is also available from this web page.

The *LS 1.x.x* controller also features optional building automation access. This includes options for network connections including LonWorks, BACnet IP, BACnet MS/TP, ModBus RTU and ModBus IP.

2.2. Humidity and Temperature Sensors

The *LS 1.x.x* control system will contain two humidity and temperature sensors. The zone/room sensor will monitor the conditioned room. The supply air sensor will monitor the supply air to the room.

2.2.1. Zone Humidity and Temperature Sensor

The zone humidity and temperature sensor is vital to the control of the unit and determines the modes of operation. This sensor can either come pre-installed near the return air duct connection of the unit, or it can come in a wall-mount kit that will be installed in the room to be controlled. See the I/O Manual for details on sensor installation location and the field connections diagram for wiring details and hardware requirements. In either case it should be ensured that the sensor is connected and communicating properly. See section 3.3.3.3.2 Analog Inputs (Figures 79-86) and Figure 79 for screens to verify the sensor is reading correctly. It is recommended to verify the sensor reading with a separate device. See section 4.3.2 Humidity and Temperature Sensor Alarm Table & Troubleshooting for issues with sensor readings.

2.2.2. Supply Humidity and Temperature Sensor

The supply humidity and temperature sensor is vital to the control of the unit and can alter the performance of the unit based on its readings. This sensor can either come pre-installed in the fan box near the supply duct connection, or it can come with a duct mount kit that gets installed in the supply duct. See the I/O Manual for details on sensor installation location and the field connections diagram for wiring details and hardware requirements. In either case it should be ensured that the sensor is connected and communicating properly. See section 3.3.3.3.2 Analog Inputs (Figures 79-86) and Figure 82 for screens to verify the sensor is reading correctly. See section 4.3.2 Humidity and Temperature Sensor Alarm Table & Troubleshooting for issues with sensor readings.

2.3. Auxiliary Air Heating Control Wiring

Note: You must use the Desert Aire *LS 1.x.x* control system to control or interlock with the room heating system. This prevents the heater from trying to heat the room while the dehumidifier is running in cooling mode.

2.3.1. Auxiliary Heating – Dry Contact Closure

The standard Desert Aire *LS 1.x.x* Controller provides a dry contact closure to operate the auxiliary space heater. The contact closes to energize a heater (may be supplied by others) which has its own power source. See the field connection diagram for connection details. See section 6.1.1.2 Heating Mode for details on Heat control.

2.3.2. Auxiliary Heating – Proportional Signal

Desert Aire will provide a proportional 0-10 VDC direct-acting signal to modulate an auxiliary heater. This signal can be used to control a modulating heater (Electric, Gas, Hot Water Coil, etc.). The signal can be set for Direct or Reverse acting. The signal can also be set for 2-10VDC. See section 3.4.4.2.3 Aux Heat Tuning (Figures 72-73) for settings screens. The control signal can be set for 'Direct' or 'Reverse' acting and also for 2-10VDC.

2.4 Water Temperature Sensors

Desert Aire dehumidifiers ordered with the pool water heating or tower water condenser options are supplied with two water temperature sensors and two immersion wells. The temperature sensors will read the inlet and outlet water temperatures. For pool heating options this will be used to control the pool heat operation. For tower water condensers this will be used to monitor the condenser water temperature. To view the status of the pool water temperature sensors see section 3.4.4.3.2 Analog Inputs (Figures 79-86) Figure 86.

2.5 A2L Relay

In compliance with UL 60335-2-40, the dehumidifier is equipped with refrigerant detection sensors wired to a dry relay contact (both a normally open and normally closed contacts are provided). If a leak is detected, the relay will energize and the contact will make or break depending on which it is wired to. This contact must be wired to the building emergency system based on local requirements. See the field connection diagram for wiring details. When this relay is active, the compressor will be locked out and the supply fans will be overridden to run. An alarm will also be triggered in the controller.

2.6 Smoke Alarm

The dehumidifier is equipped with a set of terminal blocks for interlocking with a smoke alarm (alarm provided and installed by others). The contacts must break when smoke is present. This will shut off the blower and compressors. See the dehumidification wiring diagram for connection details.

2.7 Additional Inputs and Outputs

The controller is equipped with additional digital inputs and digital and analog outputs. These inputs/outputs are optional and will need to be enabled by the factory or the Desert Aire Service Team. These inputs/outputs will not affect unit performance until they are enabled or the jumper is removed. See the field connection diagram for wiring details.

2.7.1 Digital Inputs

The additional digital inputs that can be connected to the controller are the following.

- Remote On/Off Switch – This is similar to the System On/Off switch and will place the unit in standby. If this input is used, it should be coordinated with the system on/off switch. There is no software enable for this switch. If the factory provided jumper is removed this input will need to be connected.
- Emergency Off Switch – This will trigger an alarm in the unit and stop the unit from operating. There is no software enable for this switch. If the factory provided jumper is removed this input will need to be connected.
- Standby/Roof Access Switch – The roof switch will disable selectable components. See Figures 31 and 32 for Roof Switch setup. This option will need to be enabled in the software to operate. A jumper has also been provided by the factory.
- Occupancy Contact – This will place the unit in Occupied or Unoccupied. The Occupied and Unoccupied modes will select different airflows for the unit as well as setpoints. The digital input does not need to be enabled to operate (remove factory jumper), but "Allow Setback" will need to be enabled. See Figure 27 for setup.

2.7.2 Digital Outputs

The additional digital outputs that can be connected to the controller are the following.

- Occupied Contact – This relay will close when the unit is in Occupied mode, and open when the unit is in unoccupied mode. This input can be wired to an external exhaust fan or damper.
- Remote Alarms Contact – A normally open and normally closed contact is provided for the Alarms. This relay will energize when the unit is in alarm and deenergize when all alarms are cleared. Any alarm can trigger this output. This output can be wired to the building emergency system.
- Enable Pool Aux Heat Contact – This output will energize when there is a call for auxiliary pool heat. See section 6.1.2 for pool heat control. This output can be wired to an auxiliary pool heater.
- Enable ROC Contact – This output will be energized when the compressor is on and the unit is running in cooling mode. This output can be connected to a remote condensing unit.
- Enable Tower Pump Contact – This output will be energized when the compressor is on and the unit is running in cooling mode. This output can be connected to a tower

water pump for a water cooled unit.

- Enable Pool Pump Contact – This output will be energized when there is a call for pool heating. This output can be connected to a pool pump.

2.7.3 Analog Outputs

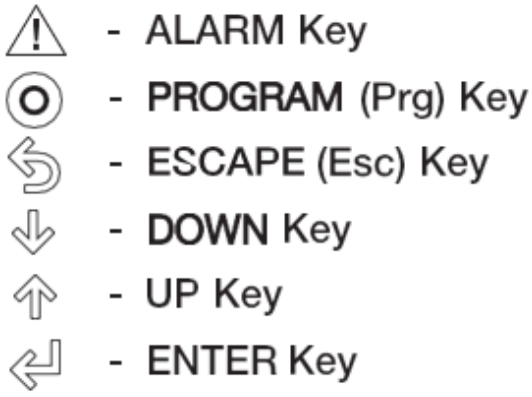
The additional analog outputs that can be connected to the controller are the following.

- 0-10VDC Modulating ROC Signal – This output will modulate 0-10VDC based on required condensing demand. This is controlled by a PID loop where there is a discharge pressure setpoint, and the process variable is the discharge pressure. This signal can be connected to a remote condensing unit.
- 0-10VDC Modulating Humidify Signal – This output will modulate 0-10VDC based on the required humidify demand. This is controlled by a PID loop that uses the zone relative humidity setpoint and the zone relative humidity as the process variable. This signal can be connected to a separate humidifier unit.

3. LS Controller Details

3.1 Menu Overview and General Instructions (Figure 1)

Your Desert Aire controller is pre-programmed and configured at the factory for use in the application you have specified. The internal display terminal allows the operator to monitor and adjust the setpoints of your Desert Aire system. The IDT has an LCD screen and six keys. These keys are labeled as below:



The Home Screen (Figure 1) displays the Desert Aire logo and shows the dehumidifier status, Zone, Network, or Lead Unit temperature and relative humidity and the operational state of the fan, compressor and air heating. The unit type is displayed in the upper right of the screen indicating LS and the tonnage. Below this line, “Esc → Menu” indicates that if the **Esc** key is pressed, the Main Menu will be displayed. Pressing **Esc** on any other screen will take you back one screen. The “Prg → Stpt” indicates that if the **Prg** key is pressed, the setpoints can be changed. The “↑↓ → Help” indicates that if the **UP** or **DOWN** keys are pressed, the help screens will be shown. The **UP** or **DOWN** keys will now scroll through the help screens.

Menu screens allow the user to select from a series of actions. The action that is capitalized on the screen is selected by pressing the **ENTER** key. To cycle through the selections on a menu screen, use the **UP** and **DOWN** keys.

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 require that the **ENTER** key be pressed to accept the value. An “on” or “off” selection is altered as soon as the **UP** or **DOWN** keys are pressed.

When an alarm is triggered, the red LED behind the **ALARM** key will light and remain on until the alarm is reset.

To view the alarms from any menu, simply press the **ALARM** key. If no alarm is active, the display will state “NO ALARMS”. If an alarm is present, it will be displayed. See section 4.1 Alarm Menu (Figures 106-108) for further information on the alarm screens.

Screens which display a small **UP** arrow in the upper right and a small **DOWN** arrow in the lower right 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 an hour, the remote terminal will return to the Home Screen.

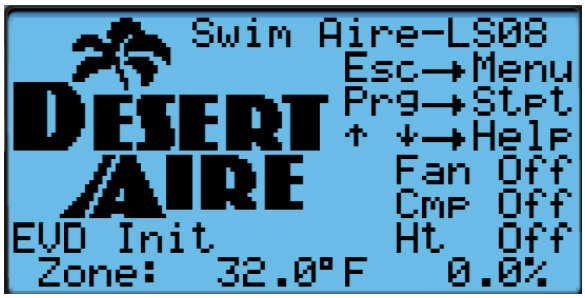


Figure 1

3.2 Zone Setpoints (Figures 2-6)

Pressing the **Prg** key from the Home Screen displays the ZONE SETPOINTS screen of Figure 2. This menu displays the standard adjustable temperature and humidity setpoints specific to the unit. If the unit is setup for "Allow Setback" then the top of the screen will display "STANDARD OCCUPIED" rather than "STANDARD". At the bottom of the screen the current values of the room temperature and humidity are displayed.

To return to the MAIN MENU, press the **Esc** key.

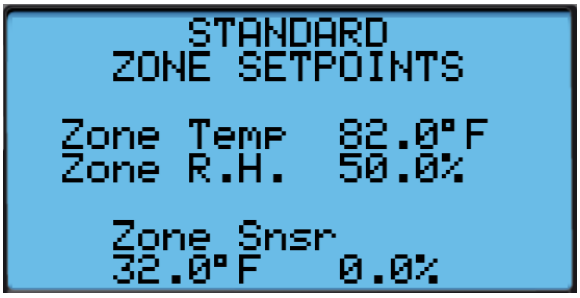


Figure 2

If the unit is configured to "Allow Setback" then pressing the **DOWN** key will display the screen of Figure 3. Here the Standard Unoccupied setpoints are adjustable.

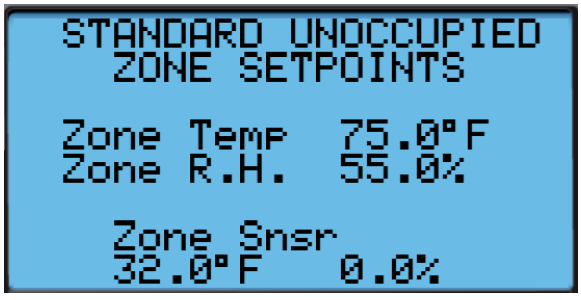


Figure 3

If the unit is configured to use setpoints taken from another Desert Aire Lead Unit, then the screen of Figure 4 will be displayed in place of the ZONE SETPOINTS screen. Here the lead unit's setpoints are displayed and can only be changed by the Lead Unit.

To return to the MAIN MENU, press the **Esc** key.

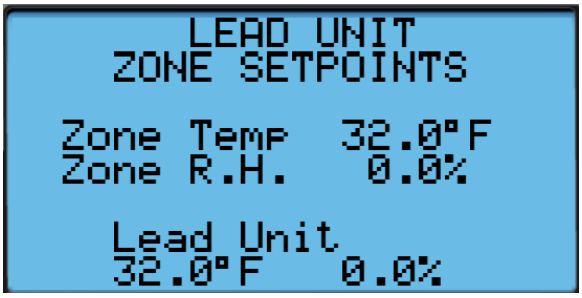


Figure 4

If the unit is configured to use setpoints sent by a BMS system, then the screen of Figure 5 will be displayed in place of the ZONE SETPOINTS screen. Here the Network Zone Temperature and Humidity setpoints are adjustable from this screen. These setpoints will also be adjustable though Modbus or BACnet protocol points depending on the BMS option installed. If "Allow Setback" is enabled, then there will be a Network Occupied and Network Unoccupied zone setpoints screen.

To return to the MAIN MENU, press the **Esc** key.

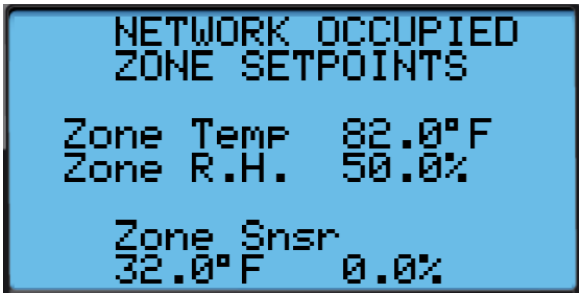


Figure 5

If the pool heating option is configured, then the screen of Figure 6 will appear by pressing the **DOWN** key. The Pool Water Setpoint and Differential are adjustable towards the top of the screen. The Pool Inlet and Outlet water temperatures are displayed towards the bottom of the screen.

To return to the MAIN MENU, press the **Esc** key.

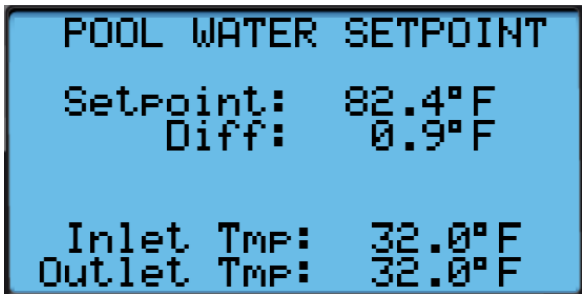


Figure 6

3.3 Main Menu (Figure 7)

Pressing the **Esc** key from the Home Screen displays the MAIN MENU (Figure 7). This menu allows the operator to select the UNIT STATUS, SCHEDULE MENU, SERVICE MENU or UNIT REVISION screens.

To return to the Home Screen, press the **Esc** key.

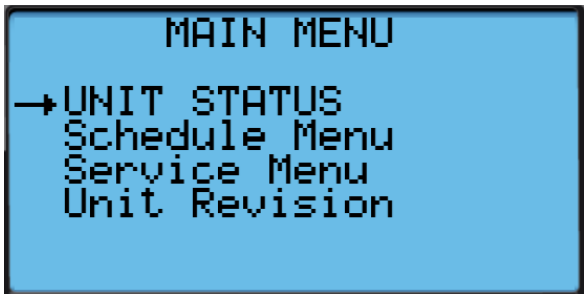


Figure 7

3.3.1 Unit Status (Figure 8-13)

Selecting the Unit Status from the MAIN MENU displays a text explanation of the unit. The 'ROC Available' or 'ROC Unavailable' is shown on the first line of this display. A water flow switch or a jumper will determine if a remote condenser is available for heat rejection. The airflow mode status is shown on the second line. This can be either 'Occupied', 'Unoccupied', or 'Airflow 2'. The state of the blower is shown on the third line. The Unit Status will show one of the following states on the fourth line:

- Zone Satisfied
- Heating Req.
- Cooling Req.
- Dehum Req.
- Dehum & Heat
- Dehum & Cool
- Unit Standby
- Low Air Flow
- Low Suct Pr
- EVD Init
- Alarm
- Dwpt. Lock
- Enth. Lock

The fifth line displays if the compressor is on or off. The sixth line will indicate if the compressor is waiting for its non-short cycling timer to time out and the time left before a restart is available. The seventh line displays the time and date.

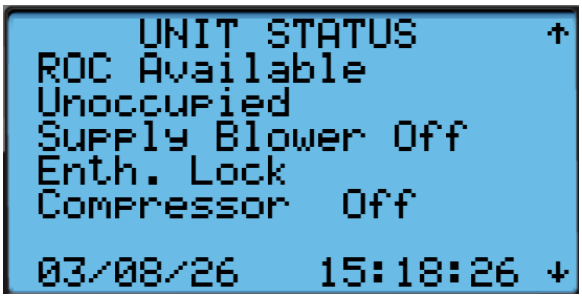


Figure 8

Pressing the **DOWN** key will display the ExV STATUS screen of Figure 9. From this screen the status of the ExV is displayed. At the top of the screen the superheat is displayed. Towards the bottom left the current steps, position in percentage, and ExV status are displayed. Towards the bottom right the suction pressure, suction temperature, and evaporation temperature are displayed.

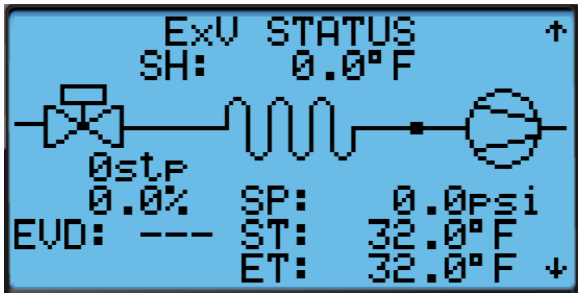


Figure 9

Pressing the **DOWN** key will display the EMV-RHT STATUS screen of Figure 10 if the unit is equipped with an air cooled or water-cooled condenser. Towards the bottom left the current steps, position in percentage, and EVD status is displayed. On the right the supply air temperature, discharge pressure, liquid temperature, condensing temperature and subcooling are displayed.

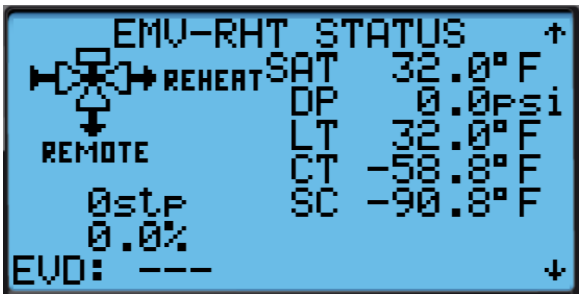


Figure 10

Pressing the **DOWN** key will display the EMV-RHT STATUS screen of Figure 11 if the unit is equipped with a Pool Condenser. Towards the bottom left the current steps, position in percentage, and EVD status are displayed. On the right the supply air temperature, discharge pressure, liquid temperature, condensing temperature, subcooling, pool water inlet and pool water outlet temperatures are displayed.

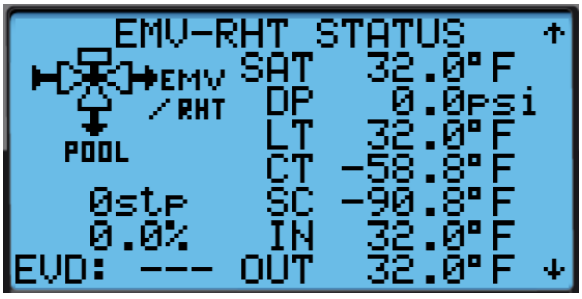


Figure 11

Pressing the **DOWN** key will display the MODBUS STATUS KEY screen of Figure 12. This screen is a key for the Modbus Status screen defining the symbols of the screen of Figure 13. See section 4.3.1 Modbus Device Alarm Table for the required actions of each status.

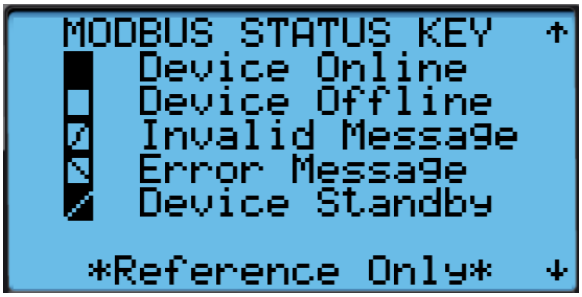


Figure 12

Pressing the **DOWN** key will display the MODBUS STATUS screen of Figure 13. This screen will display the status of all connected Modbus devices (sensors, fans, actuators). The symbol displayed will correlate to the status key shown in Figure 12.

To return to the MAIN MENU, press the **Esc** key.

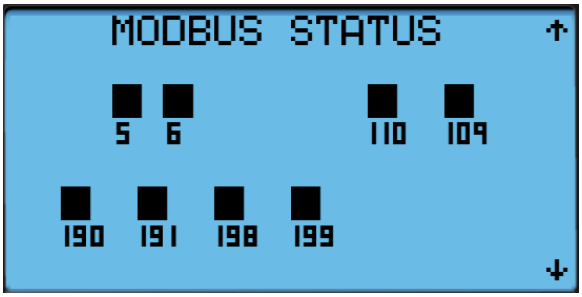


Figure 13

3.3.2 Schedule Menu (Figure 14)

Select the SCHEDULE MENU from the MAIN MENU to enable a schedule to place the dehumidifier in the occupied, unoccupied, or Airflow 2 mode. See Figure 14. To enable a schedule, select Yes, and press **ENTER**. The schedule will need to be set before this will have an effect on the unit. Pressing the **Prg** key from this menu allows the date and time to be modified.

To return to the MAIN MENU, press the **Esc** key.



Figure 14

3.3.2.1 Time Settings (Figure 15-16)

This screen sets the time, date and day of week in the controller. At the top of the screen the format for time and date can be adjusted if desired (MM/DD/YY or DD/MM/YY). Below this the date can be adjusted along with the time and day. All times are set in the 24 hour format.

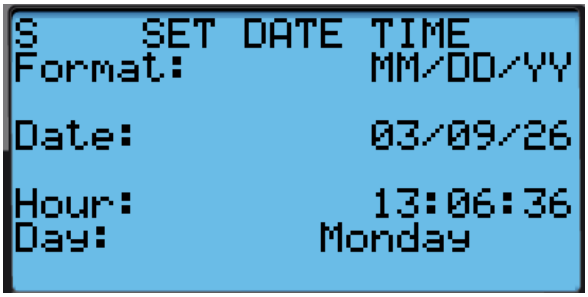


Figure 15

Pressing the **DOWN** key will display the screen of Figure 16. From this screen the time zone can be adjusted. When the time zone is adjusted the date and time set in the controller will shift depending on the selected time zone.

To return to the OCCUPANCY SCHEDULE, press the **Esc** key.



Figure 16

3.3.2.2 Daily Events (Figure 17)

This is where each day's events are set. Four Daily Events are possible. Check the boxes on the left to enable an event. Set the time in the 24 hour format and then select 'Occupied', 'Un-Occupied' or 'Airflow 2'. Save this data at the bottom of this screen by selecting 'Yes' and pressing **ENTER**.

Once a day is entered, these settings can be copied to any other day by selecting the day to copy, setting the Copy To: the appropriate day, and then selecting Ok? to 'Yes'. Modify these days as appropriate.

To return to the OCCUPANCY SCHEDULE MENU, press the **Esc** key.

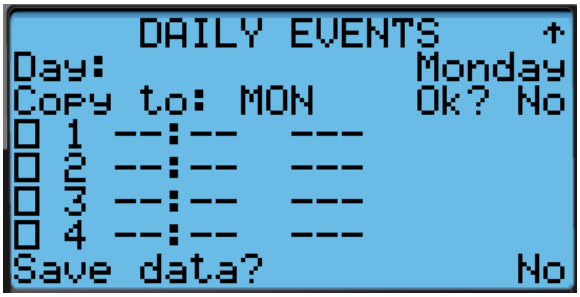


Figure 17

3.3.2.3 Vacation Periods (Figure 18)

The Vacation Periods will allow three sets of vacation to keep the dehumidifier in 'Occupied', 'Un-Occupied', or 'Airflow 2'. Set the range of days that this will occur, and the Start Date/ End Date for that holiday.

To return to the OCCUPANCY SCHEDULE MENU, press the **Esc** key.

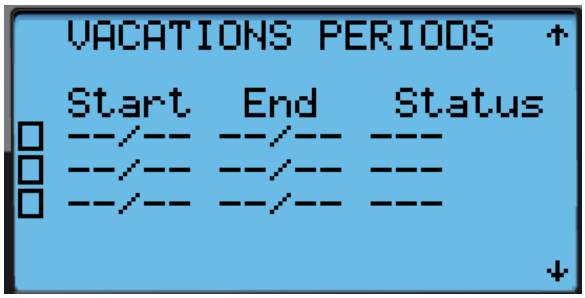


Figure 18

3.3.2.4 Special Days (Figure 19)

Also available are 6 special days where the full day can be set for either 'Occupied', 'Un-Occupied', or 'Airflow 2'.

To return to the OCCUPANCY SCHEDULE MENU, press the **Esc** key.

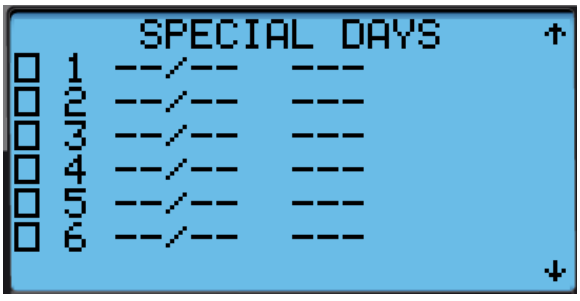


Figure 19

3.3.2.5 Temporary Occupancy (Figure 20)

This screen allows the unit to be manually set to Occupied for a preset amount of time. Press the **ENTER** key and enter the hours you would like the unit to be temporarily in the occupied mode. Press the **ENTER** key again and enter the minutes you would like the unit to be temporarily in the occupied mode. Press the **ENTER** key again and the cursor will begin blinking over the 'Set temp Occ' message. Press the **UP** and **ENTER** keys to turn the override on. The dehumidifier will now be 'Occupied' for this period of time. When the override expires, the screen will again display Set Temp Occ, and the dehumidifier will return to its normal state.

To return to the OCCUPANCY SCHEDULE MENU, press the **Esc** key.

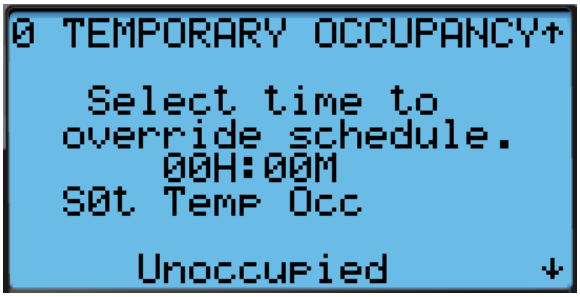


Figure 20

3.3.3 Service Menu (Figures 21-22)

Selecting the SERVICE MENU will display the Login Screen (Figure 21). Enter the service password, 1234, and press **ENTER**.

The user remains logged in for 30 minutes after the password is entered. During this time, the Login screen reads "Logged In For" and the seconds left before the password expires. To login without entering the password, while this message is shown, press the **Prg** key.

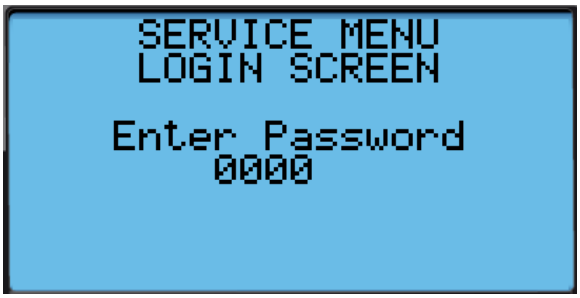


Figure 21

The SERVICE MENU gives access to COMMISSIONING, TUNING MENU, I/O STATUS, SENSOR OFFSETS, DIAGNOSTICS, MEMORY OPTIONS, and CLEAR OVERRIDES shown in Figure 22.

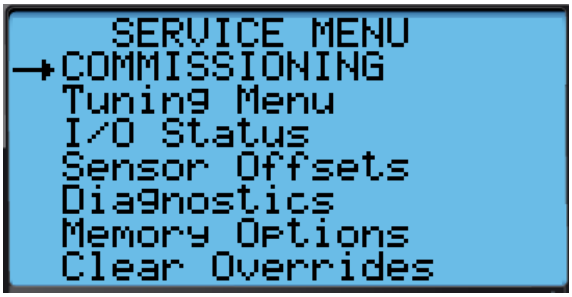


Figure 22

To return to the MAIN MENU, press the **Esc** key.

3.3.3.1 Commissioning Menu (Figure 23)

Selecting the COMMISSIONING MENU from the Service Menu displays the COMMISSIONING MENU of Figure 23. This menu allows the operator to select the CONFIGURATION, NETWORK CONFIG, SYSTEM SETUP, AIRFLOW MENU, COMMISSIONING TESTS, MOTOR PHASING, and BMS SETUP.

To return to the Service Menu, press the **Esc** key.

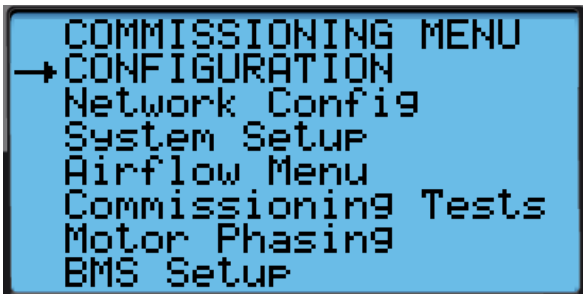


Figure 23

3.3.3.1.1 Configuration (Figures 24-32)

Selecting CONFIGURATION from the Commissioning Menu displays the UNIT SETUP screen of Figure 24. From this screen the Unit, Compressor, Supply Fan, and Aux Heat can be set to 'On/Auto' (Enabled) or 'Off' (Disabled).

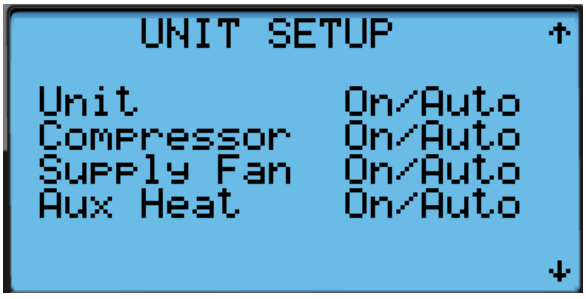


Figure 24

Pressing the **DOWN** key will now display the BLOWER SETUP screen of Figure 25. This screen allows the Supply Blower to be set for CONTINUOUS or AUTOMATIC. If the blower is set to Continuous the fan will run whenever the unit is on. If the blower is set to Automatic the fan will run when there is a call for cooling, dehumidification, heating, or occupancy.

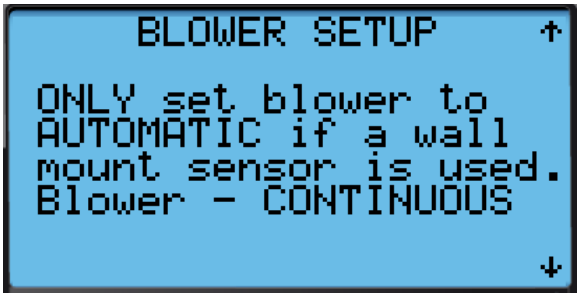


Figure 25

Pressing the **DOWN** key will now display the CONDENSER SETTINGS screen of Figure 26. This screen allows the user to enable the remote condenser by checking the box at the bottom 'ROC Installed'. There is also a 'Make Delay' and 'Break Delay' setting that is adjustable. If a water cooled condenser is installed these Make/ Break delays are applied to the condenser flow switch on input ID10. If an air cooled condenser is installed ID10 will be a jumper.

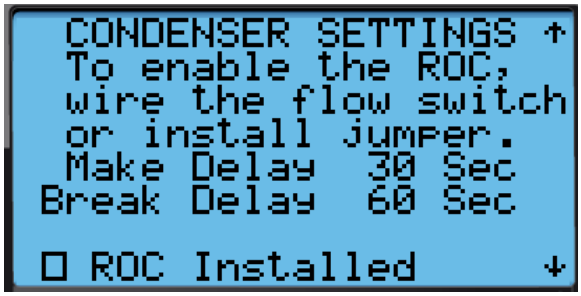


Figure 26

Pressing the **DOWN** key will now display the CONFIGURATION screen of Figure 27. This screen allows the user to select where the unit will receive its zone sensor data and setpoints. If the units are sharing a zone sensor the Lead-Unit Control box should be checked. If the unit receives the zone data from a BMS sensor then the Network Sensor check box should be checked. When using a BMS sensor the Net Heartbeat Enable check box should be checked and the Heartbeat delay should be coordinated with the BMS system to ensure that the unit is receiving data. If the unit will receive setpoints from BMS, the Network Setpoints box should be checked. If the unit will use both Occupied and Unoccupied setpoints the Allow Setback box should be checked.

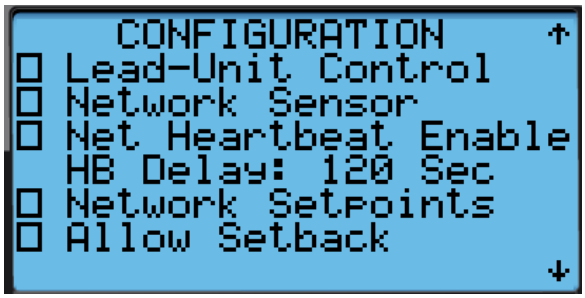


Figure 27

If ‘Allow Setback’ has been enabled then pressing the **DOWN** key will display the OCCUPIED STATUS screen of Figure 28. From this screen the status of the Occupied inputs is viewable. At the top the scheduled occupancy input is displayed. Directly below the occupancy digital input (ID13) is displayed, then the Network Occupied input, and then the temporary occupied input. At the very bottom the option to override occupancy is adjustable.

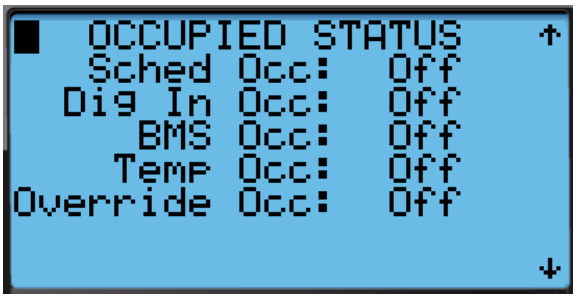


Figure 28

Pressing the **DOWN** key will display the AIRFLOW 2 SETTINGS screen of Figure 29. This screen allows Airflow 2 to be enabled by checking the ‘Airflow 2 Enable’ check box. Airflow 2 is an additional CFM setpoint that can be scheduled or timed by checking the appropriate check box.

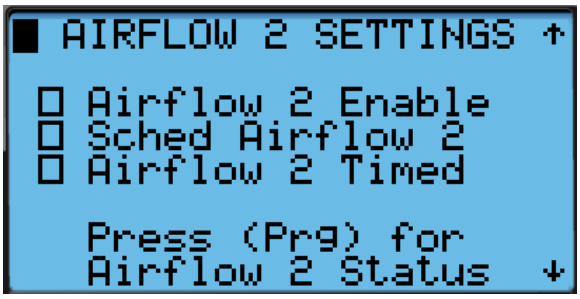


Figure 29

Pressing the **Prg** key from the screen of Figure 29 will display the screen of Figure 30. From this screen the status of Airflow 2 is displayed. At the top Airflow 2 can be overridden to On. Directly below is the status of Airflow 2 being called by BMS is displayed, then the status of Airflow 2 being called by the schedule. Below that, Airflow 2 can be cancelled. If Airflow 2 has been set to ‘Timed’ then the remaining time is displayed at the bottom of the screen.

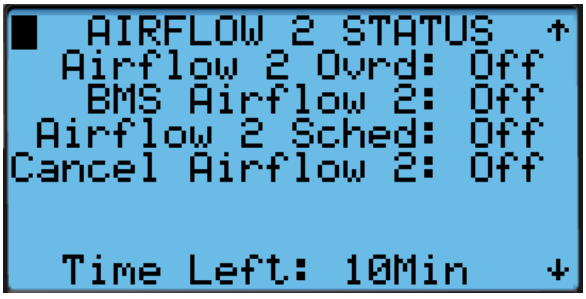


Figure 30

If the unit is enabled with a Roof Switch then pressing the **DOWN** key will display the screen of Figure 31. From this screen the status of the roof switch is displayed. At the top the status of the digital input is displayed. Directly below the status of the BMS roof input is displayed, and then the ability to override the roof switch to force open is settable by checking the check box. At the bottom the status of the roof is displayed.

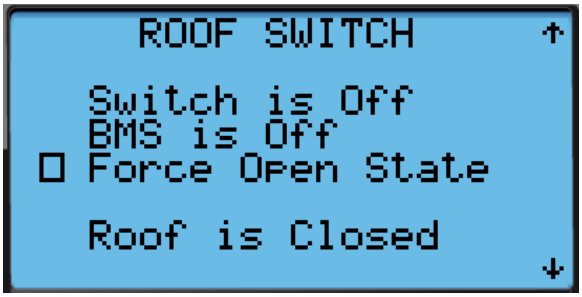


Figure 31

Pressing the **DOWN** key will display the screen of Figure 32. From this screen the device that will be locked out when the roof is open can be selected by checking the check box next to the associated component.

Press the **Esc** key to return to the COMMISSIONING MENU.

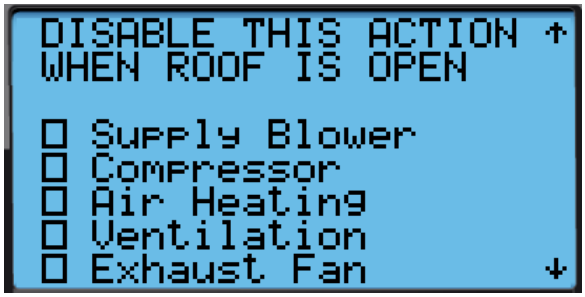


Figure 32

3.3.3.1.2 Network Config (Figures 33-35)

Selecting NETWORK CONFIG from the Commissioning Menu displays the NETWORK CONFIG screen of Figure 33. From this screen the controller IP address is viewable and settable. At the top of the screen the network can be set to 'Off', 'Static' or 'DHCP/AutoIP'. The 'Off' setting will disable network connectivity of the controller. The 'DHCP/AutoIP' will connect the controller to the network and wait for a router to assign an IP address. The 'Static' setting will allow the user to set the IP address, Mask, Gateway, and DNS server fields. After any changes the 'Update Config' needs to be set to 'Yes'.

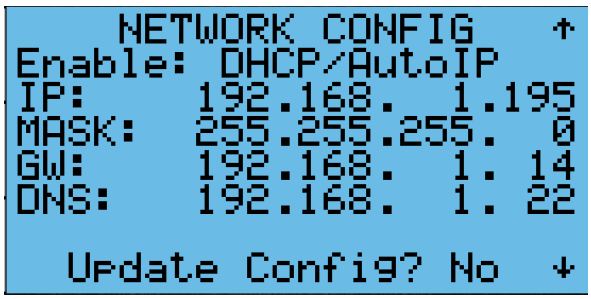


Figure 33

Pressing the **DOWN** key will display the screen of Figure 34. From this screen, the Unit-Tag (controller hostname) can be set. The Unit-Tag in the middle of the screen can be adjusted to any eight-character letter/number combinations with dashes allowed. No other special characters are available. After the unit tag is adjusted check the box 'Set Unit Tag' to write the new unit tag to the controller and then check the box 'Get Unit Tag' which will display the newly set unit tag towards the bottom of the screen.

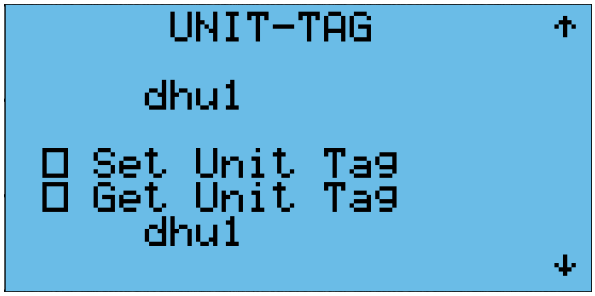


Figure 34

Pressing the **DOWN** key will display the LEAD UNIT-TAG screen of Figure 35. If the unit has been configured to use a lead unit for its setpoints and sensor, then the Lead Unit Tag will need to be adjusted to match the Unit-Tag set in the lead unit controller. Below the settable lead unit tag is a confirmation displaying the unit tag the controller will look for on the network. At the bottom of the screen the zone temperature and humidity are displayed. If the unit is correctly configured then the text will state 'Lead Unit' and display the zone temperature and humidity being read from the lead unit.

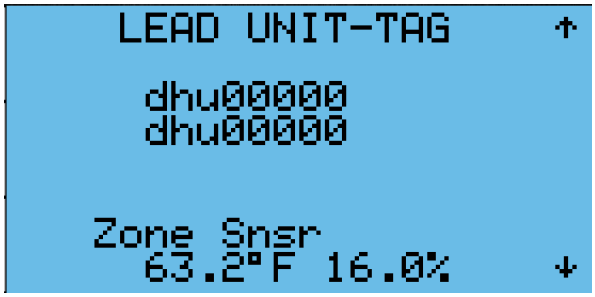


Figure 35

3.3.3.1.3 System Setup (Figures 36-40)

Selecting SYSTEM SETUP from the Commissioning Menu displays the SYSTEM SETUP screen of Figure 33. From this screen the lead lag system can be setup. If the unit is the lead unit in the system then the number of units in the system can be set at the top of the screen along with the type of control. If the control is set for 'Sequence' then the lead lag control will cycle on and off compressors based on how they are entered in system setup (e.g. Lead unit will turn on first, then lag 1, then lag 2, etc.). If the control is set for 'Run-Time' then the lead lag system will select the unit with the lowest runtime as the next compressor to start when there is a demand. The rest of this screen is informational.

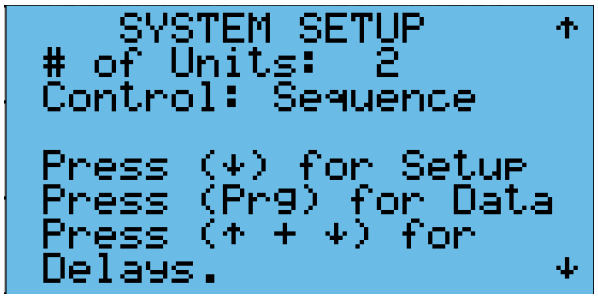


Figure 36

Pressing the **DOWN** key will display the screen of Figure 37. From this screen the lead lag system can be viewed or adjusted. On a lead unit the lag unit tags will need to be entered on this screen so that the lead unit can share and receive data. On a lag unit this screen will be display only and no unit tags can be adjusted. If there are over 5 units in the lead lag system an additional screen will be displayed with unit tags for lag units 6 through 10.

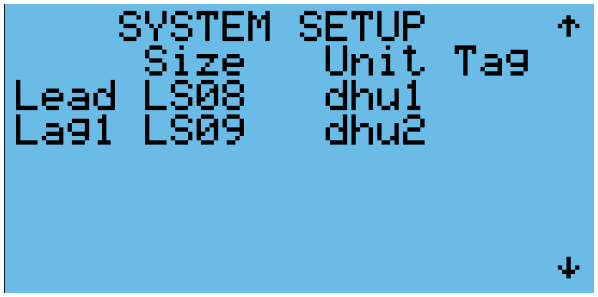


Figure 37

Pressing the **Prg** key from the screen of Figure 36 will display the screen of Figure 38. From this screen the run time for all the compressors in the lead lag system is displayed. If there are over 5 units in the lead lag system an additional screen will be displayed.

Press **Esc** to return to the screen of Figure 36.

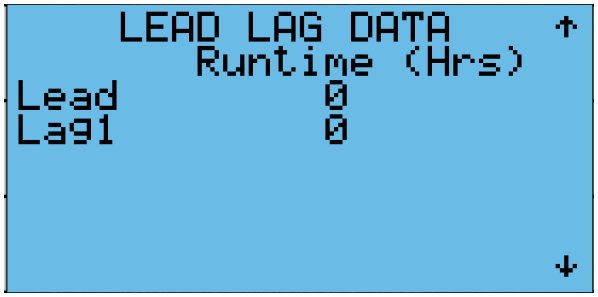


Figure 38

Pressing the **DOWN** key from the screen of Figure 38 will display the screen of Figure 39. From this screen the status of the compressors in the lead lag system are displayed. From left to right the compressor on/off status is displayed, then the compressor alarm status is displayed, and lastly the status of the compressor being off due to timing (the in-between-starts delay on the compressor) is displayed. If there are more than 5 units in the lead lag system a second screen will be displayed.

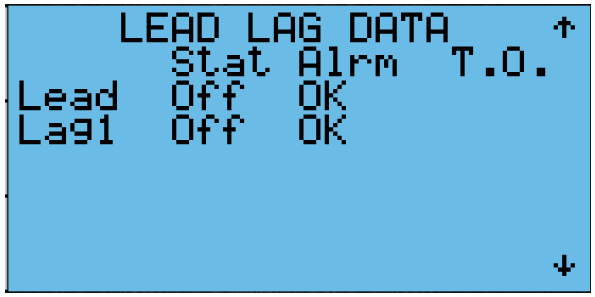


Figure 39

Pressing the **UP + DOWN** key on the screen of Figure 36 will display the screen of Figure 40. From this screen the compressor on/off delays can be adjusted. If there is a call for a compressor to start, the first compressor will turn on right away. Then after that if the call is still present, the system will wait a settable amount of time before turning on the next stage. The same is true when the call for a compressor goes away, the unit will wait a settable amount of time before turning off the next stage of compressor. If there are more than 5 units in the lead lag system an additional screen will be displayed.

Press **Esc** to return to the screen of Figure 36.

Press **Esc** again to return to the COMMISSIONING MENU.

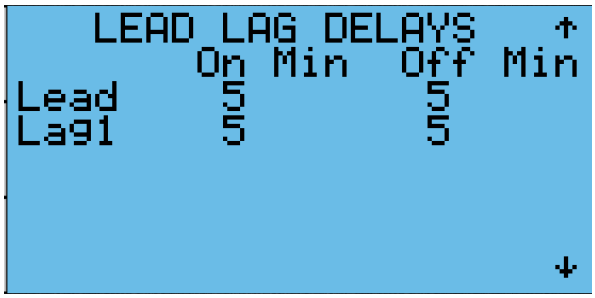


Figure 40

3.3.3.1.4 Airflow Menu (Figure 41)

Selecting AIRFLOW MENU from the Commissioning Menu displays the AIRFLOW MENU screen of Figure 41. From this screen, the SUPPLY FAN SETUP, and DAMPER SETUP screens are selectable. If enabled, the FILTER ALARM SETUP screens will also be selectable.

Press **Esc** to return to the COMMISSIONING MENU.

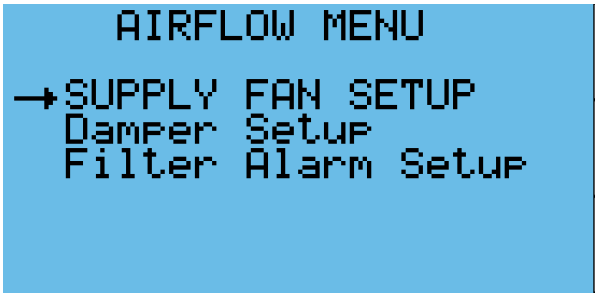


Figure 41

3.3.3.1.4.1 Supply Fan Setup (Figures 42-44)

Selecting SUPPLY FAN SETUP from the AIRFLOW MENU will display the screen of Figure 42. From this screen the Occupied, Unoccupied, and Airflow 2 CFM setpoints are all adjustable. If 'Allow Setback' and 'Airflow 2' are not enabled, then the unit will operate off a single CFM setpoint.

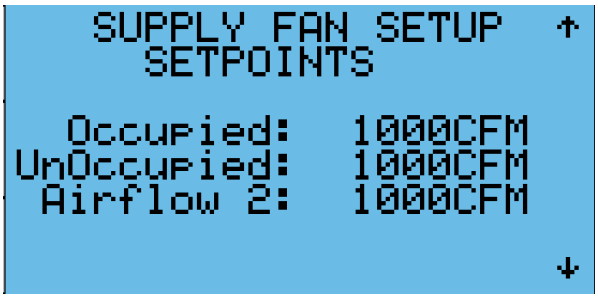


Figure 42

Pressing the **DOWN** key will display the screen of Figure 43. From this screen the PID terms for the Airflow control loop are all adjustable. Below the PID terms the current airflow and airflow setpoint are displayed along with the supply fan speed command.

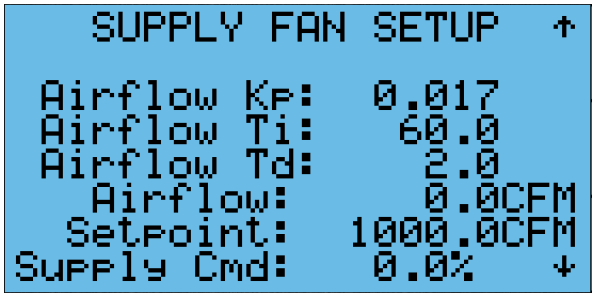


Figure 43

Pressing the **DOWN** key will display the screen of Figure 44. From this screen the supply fans can be manually controlled with a settable manual speed command.

Press the **Esc** key to return to the Airflow Menu.

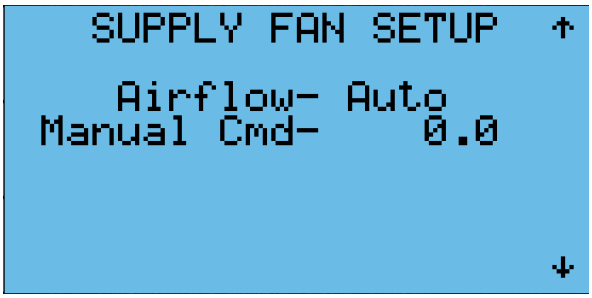


Figure 44

3.3.3.1.4.2 Damper Setup (Figures 45-47)

Selecting DAMPER SETUP from the AIRFLOW MENU will display the screen of Figure 45. From this screen the Occupied, Unoccupied and Airflow 2 damper position can be set for the outside air damper. If 'Allow Setback' and 'Airflow 2' are not enabled, then a single damper position will be settable.

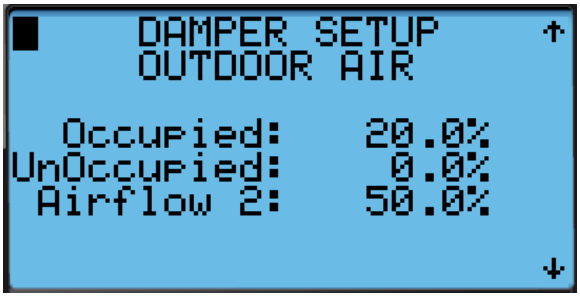


Figure 45

Pressing the **DOWN** key will display the screen of Figure 46. From this screen the PID terms for the evaporator bypass damper control loop are adjustable towards the top of the screen. Below the PID terms the evaporator differential pressure is displayed. Below that the differential pressure setpoint is adjustable. At the bottom the damper position is displayed.

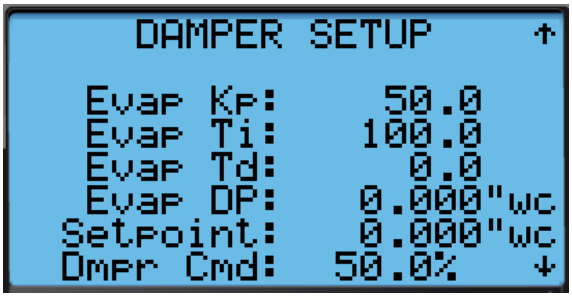


Figure 46

Pressing the **DOWN** key will display the screen of Figure 47. From this screen the outdoor air and evaporator bypass damper manual positions can be enabled and set.

Press the **Esc** key to return to the AIRFLOW MENU.

Press the **Esc** key again to return to the COMMISSIONING MENU.

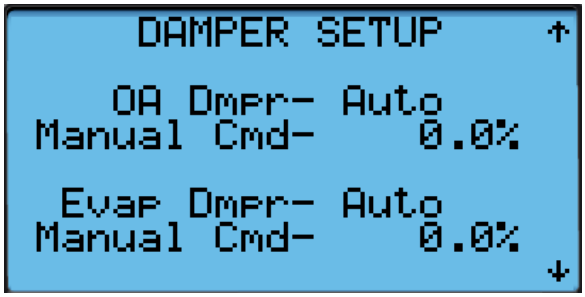


Figure 47

3.3.3.1.4.3 Filter Setup (Figures 48-49)

If Outdoor Air Filter monitoring has been enabled, then selecting FILTER ALARM SETUP from the AIRFLOW MENU will display the screen of Figure 48. From this screen the outdoor air filter alarm setpoint is adjustable towards the top of the screen along with the differential. Below the filter differential pressure is displayed and at the bottom of the screen the filter alarm status is displayed.

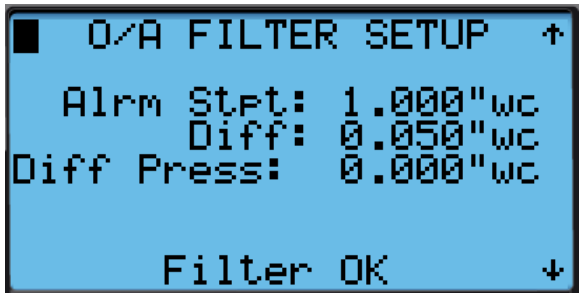


Figure 48

If Return Air Filter monitoring has been enabled, then pressing the **DOWN** key will display the R/A FILTER SETUP screen of Figure 49. From this screen the return air filter alarm setpoint is adjustable towards the top of the screen along with the differential. Below the filter differential pressure is displayed and at the bottom of the screen the filter alarm status is displayed.

Press the **Esc** key to return to the AIRFLOW MENU.

Press the **Esc** key again to return to the COMMISSIONING MENU.

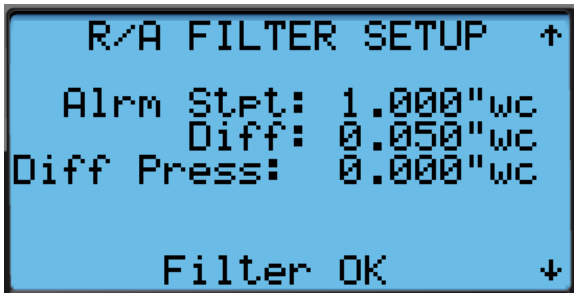


Figure 49

3.3.3.1.5 Commissioning Tests (Figures 50-56)

Selecting COMMISSIONING TESTS from the COMMISSIONING MENU will display the COMMISSIONING TEST REHEAT CONDENSER screen of Figure 50. From this screen the unit can be overridden to run in the reheat condenser towards the top of the screen. Directly below the superheat is displayed. In the middle of the screen 'Start Test' can be selected to start recording data. When selected this will say 'Testing' and the 5 minute timer will start counting down. After 5 minutes has elapsed and data has been recorded a message will display at the bottom of the screen stating 'For Test Data Press (Prg)'.

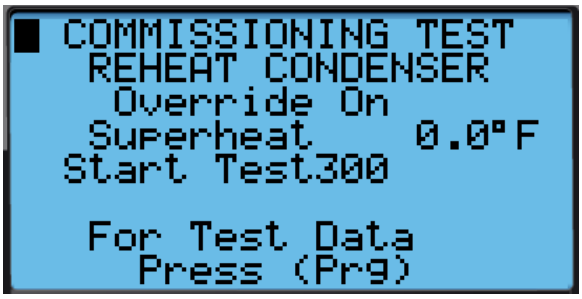


Figure 50

Pressing the **DOWN** key will display the COMMISSIONING TEST COOL CONDENSER screen of Figure 51. This screen has the same functionality as the screen of Figure 50, but the override at the top will override the unit to run in the remote (cooling) condenser.

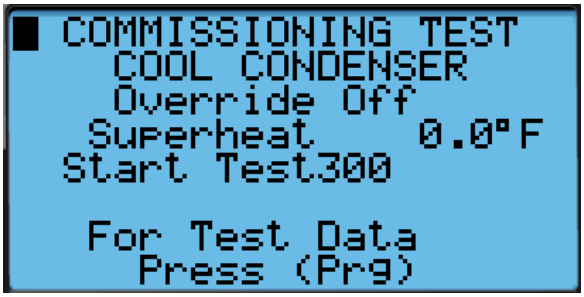


Figure 51

If a Pool Condenser has been installed, then pressing the **DOWN** key will display the COMMISSIONING TEST POOL CONDENSER screen of Figure 52. This screen will have the same functionality as the screen of Figure 50, but the override at the top of the screen will override the unit to run in the pool condenser.

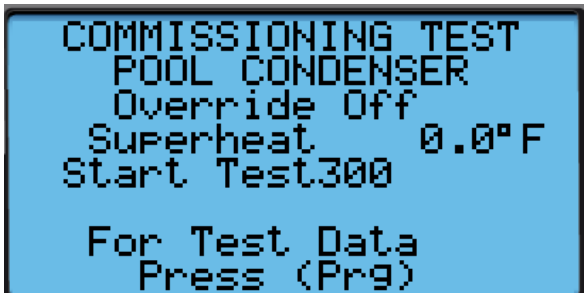


Figure 52

Pressing the **DOWN** key will display the COMMISSIONING TEST HEAT screen of Figure 53. This screen has the same functionality as the screen of Figure 50 but the override at the top will override the unit to run in heating mode.

Press the **Esc** key to return to the COMMISSIONING MENU.

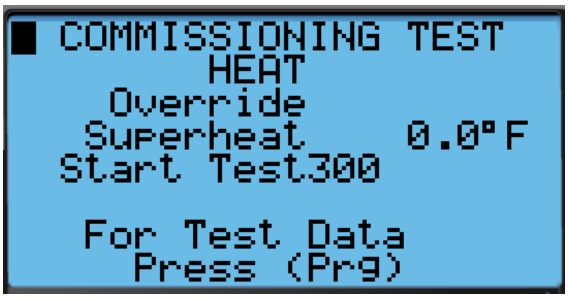


Figure 53

If the **Prg** key is pressed from the screen of Figure 50, 51, 52, or 53 when the text 'For Test Data Press (Prg)' is displayed then the screen of Figure 54 will be displayed. On this screen the recorded superheat average, low and high values over a 5-minute period are displayed towards the top of the screen. Directly below the same values for subcooling are displayed.

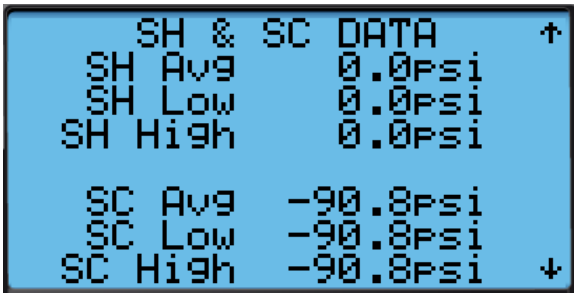


Figure 54

Pressing the **DOWN** key will display the screen of Figure 55. From this screen the average value over a 5 minute period for the suction pressure, discharge pressure, liquid pressure, suction temperature, discharge temperature, liquid temperature, and off evaporator temperature are all displayed.

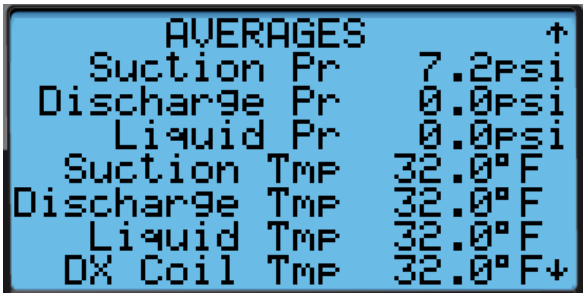


Figure 55

Pressing the **DOWN** key will display the screen of Figure 56. From this screen the average value over a 5-minute period for the supply air temperature, pool inlet temperature, pool outlet temperature, tower water inlet temperature, and tower water outlet temperature are all displayed.

Press the **Esc** key to return to the COMMISSIONING TEST screen.

Press the **Esc** key again to return to the COMMISSIONING MENU.

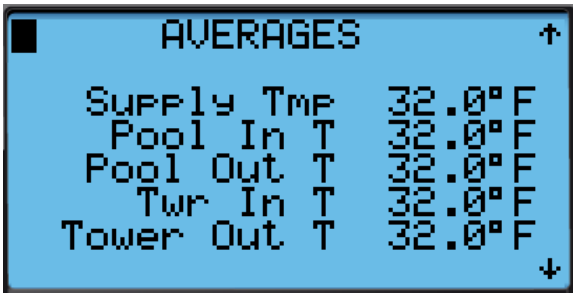


Figure 56

3.3.3.1.6 Motor Phasing (Figure 57)

Selecting MOTOR PHASING from the COMMISSIONING MENU will display the screen of Figure 57. From this screen the compressor motor can be overridden to turn on for three seconds and then turn off by selecting 'Phase Compressor'. The discharge pressure and suction pressure are displayed below to confirm the motor phasing is correct.

Note – discharge pressure should increase and suction pressure should decrease if phased correctly

Press the **Esc** key to return to the COMMISSIONING MENU.

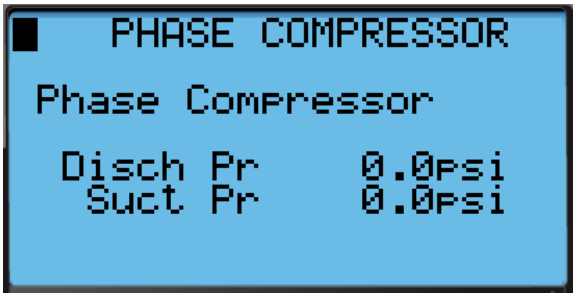


Figure 57

3.3.3.1.7 BMS Setup (Figure 58-65)

Selecting BMS SETUP from the COMMISSIONING MENU will display the screen J25 BMS2 SETUP shown in Figure 58. From this screen the J25 port can be programmed for the following BMS options; Modbus RTU, BACnet, LON, or Cloudgate. After a change is made the controller will need to be power cycled.

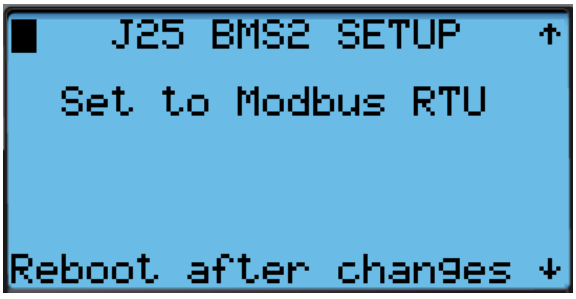


Figure 58

If Modbus RTU has been selected on the screen of Figure 58 then pressing the **DOWN** key will display the screen of Figure 59. From this screen the Modbus RTU settings can be adjusted. At the top the address can be set, then the Baudrate, then the Parity and finally the stop bits. Cycle power after any changes.

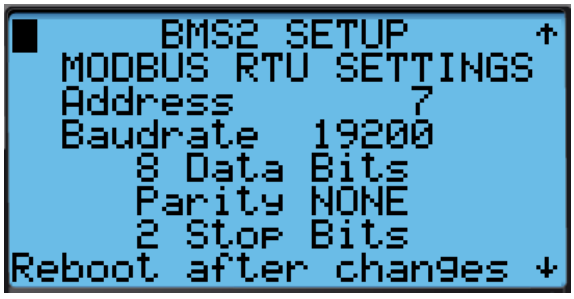


Figure 59

If BACnet has been selected on the screen of Figure 58 then pressing the **DOWN** key will display the screen of Figure 60. From this screen the BACnet MS/TP settings can be adjusted. At the top the station address can be set, then the Baudrate, then the Max Masters can be adjusted and finally the device ID. Cycle power after any changes.

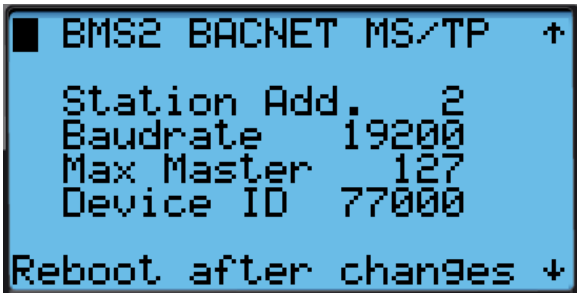


Figure 60

If LON has been selected on the screen of Figure 58 then pressing the **DOWN** key will display the screen of Figure 61. From this screen the LON settings can be viewed. These settings should not be adjusted without consulting the Desert Aire service team.

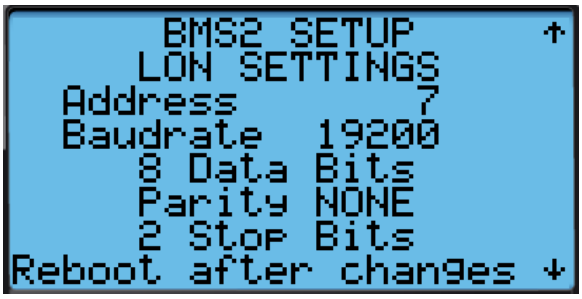


Figure 61

If Cloudgate has been selected on the screen of Figure 58 then pressing the **DOWN** key will display the screen of Figure 62. From this screen the Cloudgate settings can be viewed. These settings should not be adjusted without consulting the Desert Aire service team.

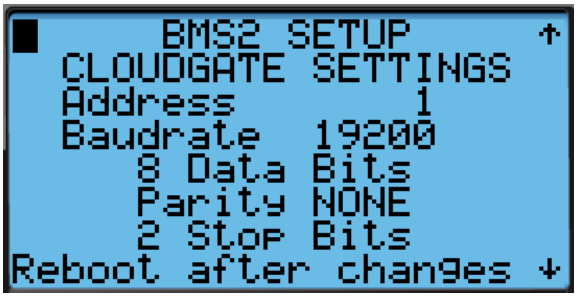


Figure 62

Pressing the **DOWN** key will display the screen of Figure 63. From this screen the Ethernet port can be set to Modbus TCP/IP or BACnet. After a change is made the controller will need to be power cycled.

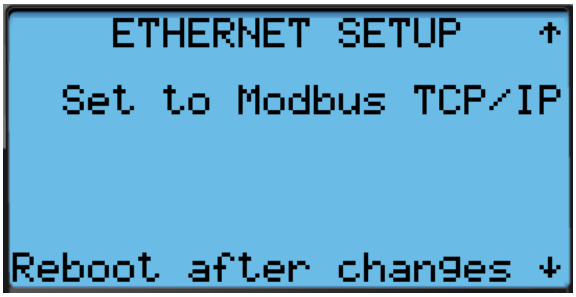


Figure 63

If BACnet is selected on the screen of Figure 63 then pressing the **DOWN** key will display the screen of Figure 64. From this screen the BACnet IP settings are adjustable. Towards the top, the Device ID is settable and directly below, the port is settable. Power cycle after any changes.

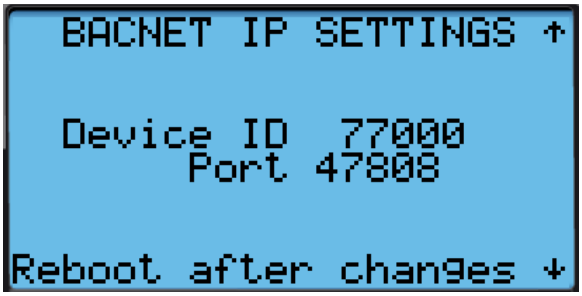


Figure 64

If a BMS1 card has been enabled, then pressing the **DOWN** key will display the screen of Figure 65. The BMS1 card will only allow for communication with a Cloudgate device. A screen similar to the screen of Figure 62 will be displayed when pressing the **DOWN** key. The settings of this screen should not be adjusted without consulting the Desert Aire service team.

Press the **Esc** key to return to the COMMISSIONING MENU.

Press the **Esc** key again to return to the SERVICE MENU.

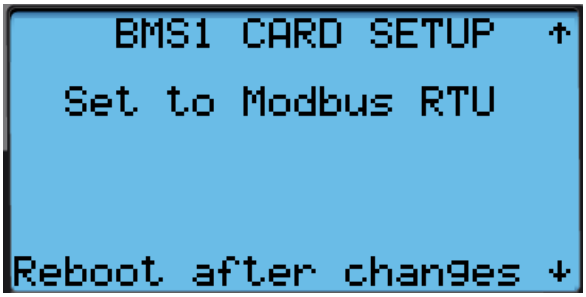


Figure 65

3.3.3.2 Tuning Menu (Figure 66)

Selecting the TUNING MENU from the SERVICE MENU will display the screen of Figure 66. From this screen the ZONE TUNING, REHEAT TUNING, AUX HEAT TUNING, and POOL TUNING screens are all selectable.

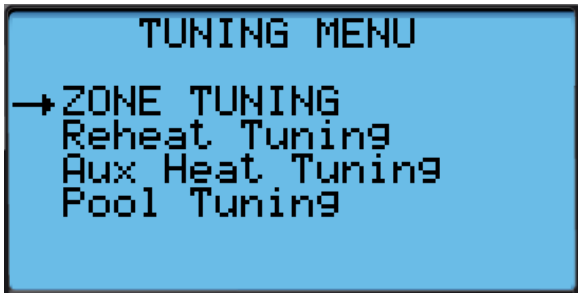


Figure 66

3.3.3.2.1 Zone Tuning (Figure 67-69)

Selecting ZONE TUNING from the TUNING MENU will display the screen of Figure 67. From this screen the relative humidity deadband and differential are both adjustable towards the top of the screen. Displayed on the bottom half of the screen is the relative humidity setpoint, dehumidification on setpoint and dehumidification off setpoint.

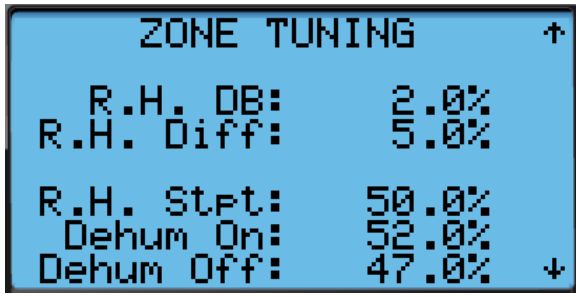


Figure 67

Pressing the **DOWN** key will display the screen of Figure 68. From this screen the cooling deadband and differential are both adjustable towards the top of the screen. On the bottom half of the screen the temperature setpoint, cooling on setpoint and cooling off setpoint are all displayed.

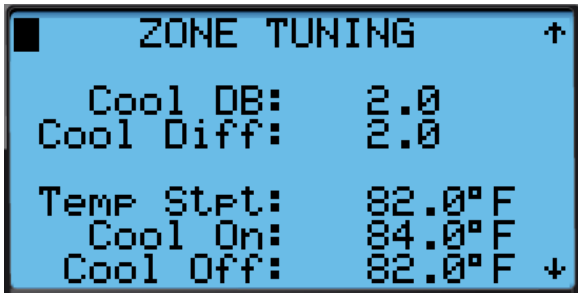


Figure 68

Pressing the **DOWN** key will display the screen of Figure 69. From this screen the heating deadband and differential are both adjustable towards the top of the screen. On the bottom half of the screen the temperature setpoint, heating on setpoint, and heating off setpoint are all displayed.

Press the **Esc** key to return to the TUNING MENU.

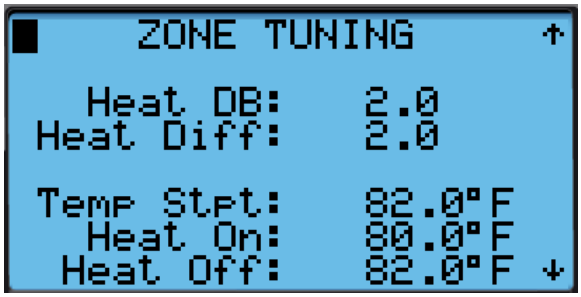


Figure 69

3.3.3.2.2 Reheat Tuning (Figures 70-71)

Selecting REHEAT TUNING from the TUNING MENU will display the screen of Figure 70. From this screen the PID terms for the 3-way reheat valve are all adjustable towards the top of the screen. On the bottom half of the screen the supply air temperature, supply air temperature setpoint, and reheat valve command are all displayed.

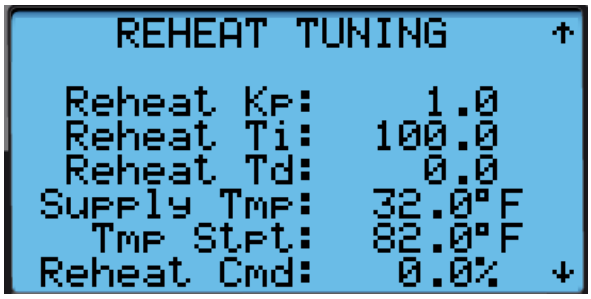


Figure 70

Pressing the **DOWN** key will display the screen of Figure 71. From this screen the reheat valve supply air temperature command, and discharge pressure command are displayed. If the discharge pressure starts to increase above a predetermined high value the reheat valve will start to move towards the reheat condenser to try and prevent a high pressure event. The 'Reheat Cmd' displayed below will take the larger of these two demands. Towards the bottom of the screen the reheat valve can be manually set with an adjustable manual position.

Press the **Esc** key to return to the TUNING MENU.

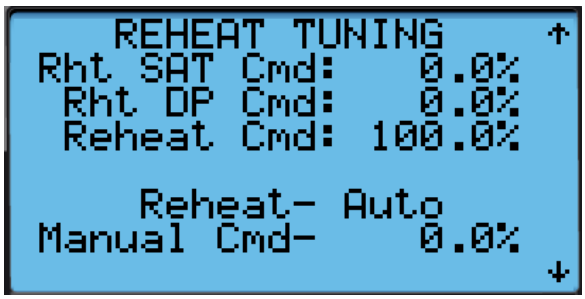


Figure 71

3.3.3.2.3 Aux Heat Tuning (Figures 72-73)

Selecting AUX HEAT TUNING from the TUNING MENU will display the screen of Figure 72. From this screen the PID terms for the auxiliary heating control loop are all adjustable towards the top of the screen. On the bottom half of the screen the supply air temperature, supply air temperature setpoint, and auxiliary heating command are all displayed.

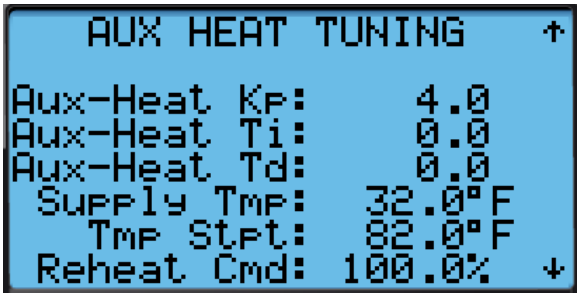


Figure 72

Pressing the **DOWN** key will display the screen of Figure 73. From this screen the auxiliary heat can be set for direct or inverse control as well as a 0-10VDC or 2-10VDC control signal towards the top of the screen. On the bottom half of the screen the auxiliary heat can be manually enabled and a manual command can be set.

Press the **Esc** key to return to the TUNING MENU.

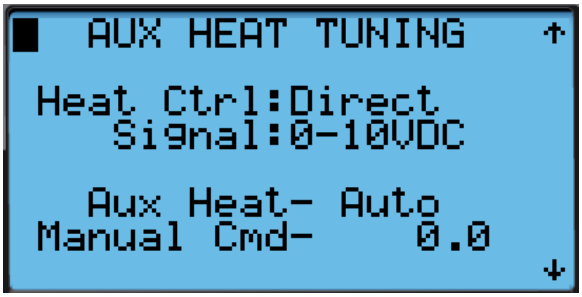


Figure 73

3.3.3.2.4 Pool Tuning (Figure 74)

Selecting POOL TUNING from the TUNING MENU will display the screen of Figure 74. From this screen the pool water setpoint and differential are displayed towards the top of the screen. Directly below the pool stage deadband and pool auxiliary heat deadband are both adjustable.

Press the **Esc** key to return to the TUNING MENU.

Press the **Esc** key again to return to the SERVICE MENU.

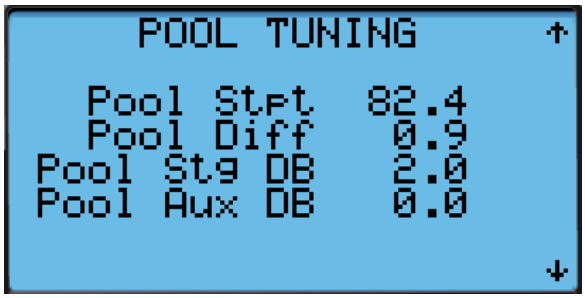


Figure 74

3.3.3.3 I/O Status (Figure 75)

Selecting I/O STATUS from the SERVICE MENU will display the screen of Figure 75. From this screen the DIGITAL INPUTS, ANALOG INPUTS, DIGITAL OUTPUTS, and ANALOG OUTPUTS screens are all selectable.

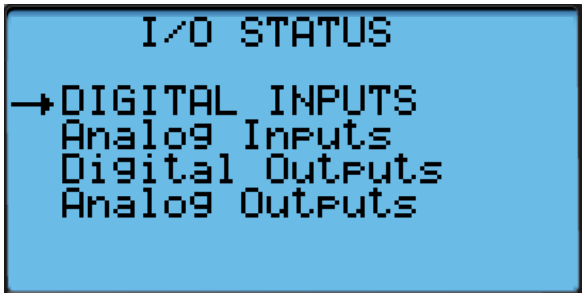


Figure 75

3.3.3.3.1 Digital Inputs (Figures 76-78)

Selecting DIGITAL INPUTS from the I/O STATUS menu will display the screen of Figure 76. From this screen the status of the following digital inputs are displayed from top to bottom as follows:

- ID1 - High & Low Pressure Switch (OK/FLT)
- ID2 - Compressor Overload (OK/FLT)
- ID3 - A2L Refrigerant Detection Sensor (OK/FLT)
- ID4 - System On/Off Switch (On/Off)
- ID5 - Remote On/Off Switch (On/Off)

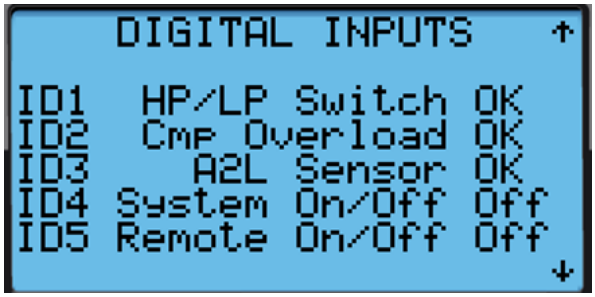


Figure 76

Pressing the **DOWN** key will display the screen of Figure 77. From this screen the status of the following digital inputs are displayed from top to bottom as follows:

- ID6 - Smoke Alarm Input (OK/FLT)
- ID7 - Low Voltage/Phase Monitor (OK/FLT)
- ID8 - Emergency Off Contact (OK/FLT)
- ID9 - Pool Flow Switch (On/Off) – If option enabled
- ID10 - Tower Water Flow Switch (On/Off) – If option enabled

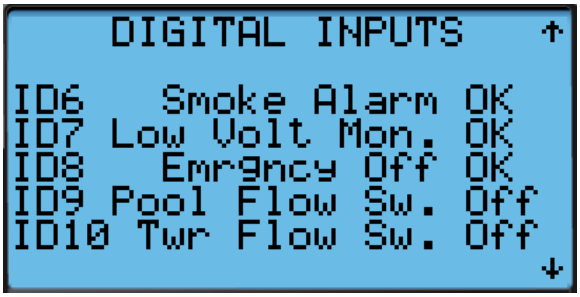


Figure 77

Pressing the **DOWN** key will display the screen of Figure 78. From this screen the status of the following digital inputs are displayed from top to bottom as follows:

- ID11 - Roof/ Standby Switch (On/Off) – If option enabled
- ID12 - Condensate Float Switch (OK/FLT) – If option enabled
- ID13 – Occupancy Input (On/Off)

Press the **Esc** key to return to the I/O STATUS menu.

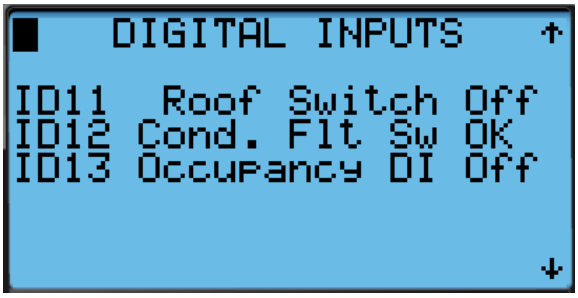


Figure 78

3.3.3.3.2 Analog Inputs (Figures 79-86)

Selecting ANALOG INPUTS from the I/O STATUS menu will display the screen of Figure 79. From this screen the zone sensor data is displayed. Towards the top of the screen the zone temperature, relative humidity, and dewpoint are displayed. Towards the bottom of the screen a zone sensor status is displayed. See section 4.3.2 Zone & Supply Sensor Alarm Table for the required actions per given status. On the bottom of the screen is text that states 'Press (Prg) for Data'. This will show additional sensor data.

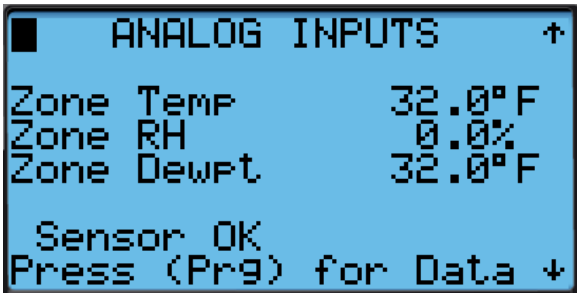


Figure 79

Pressing the **Prg** key will display the screen of Figure 80. From this screen additional data from the zone sensor is displayed. From top to bottom the additional data is as follows:

- Temperature
- Relative Humidity
- Dewpoint
- Absolute Humidity
- Mixing Ratio
- Wet Bulb Temperature
- Enthalpy

Press the **Esc** key to return to ANALOG INPUTS.

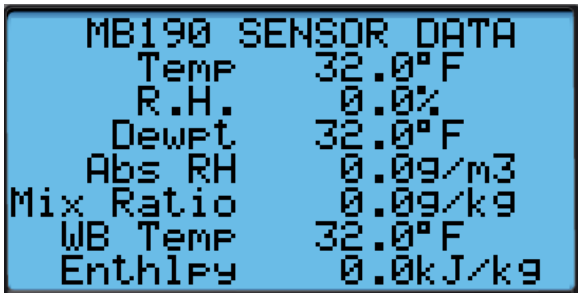


Figure 80

Pressing the **DOWN** key will display the screen of Figure 81. From this screen the supply sensor data is displayed. Towards the top of the screen the supply air temperature, relative humidity, and dewpoint are displayed. Towards the bottom of the screen a supply sensor status is displayed. See section 4.3.2 Zone & Supply Sensor Alarm Table for the required actions per given status. On the bottom of the screen is text that states 'Press (Prg) for Data'. This will show additional sensor data.

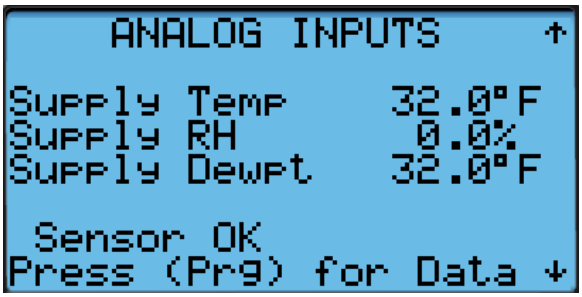


Figure 81

Pressing the **Prg** key will display the screen of Figure 80. From this screen additional data from the supply sensor is displayed. From top to bottom the additional data is as follows:

- Temperature
- Relative Humidity
- Dewpoint
- Absolute Humidity
- Mixing Ratio
- Wet Bulb Temperature
- Enthalpy

Press the **Esc** key to return to ANALOG INPUTS.

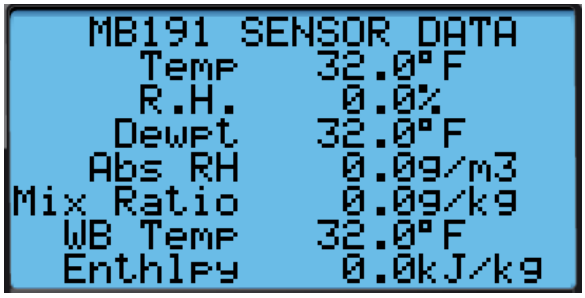


Figure 82

Pressing the **DOWN** key will display the screen of Figure 83. From this screen the status of the following sensors are displayed from top to bottom as follows:

- U1 - Evaporator Differential Pressure
- U2 - Outdoor Air Temperature
- U3 - Airflow Differential Pressure
- U4 - Off Evaporator Leaving Air Temperature

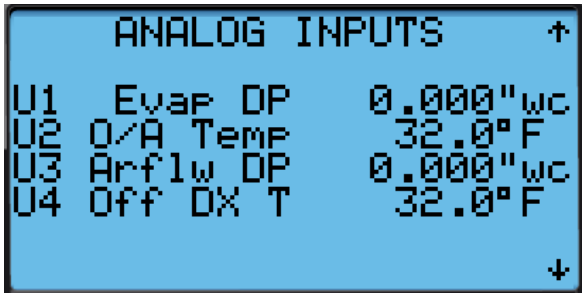


Figure 83

Pressing the **DOWN** key will display the screen of Figure 84. From this screen the status of the following sensors and calculations are displayed from top to bottom as follows:

- U6 - Discharge Pressure
- U7 - Discharge Temperature
- EVD1 S1 - Suction Pressure
- EVD1 S2 - Suction Temperature
- Calculated Suction Pressure to Temperature (Evaporation Temperature)
- Calculated Superheat

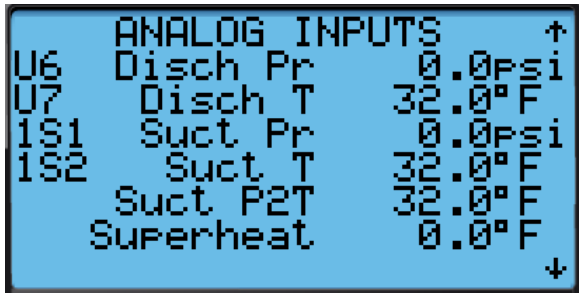


Figure 84

Pressing the **DOWN** key will display the screen of Figure 85. From this screen the status of the following sensors and calculations are displayed from top to bottom as follows:

- EVD1 S3 - Liquid Pressure
- EVD1 S4 - Liquid Temperature
- Calculated Liquid Pressure to Temperature (Condensing Temperature)
- Calculated Subcooling

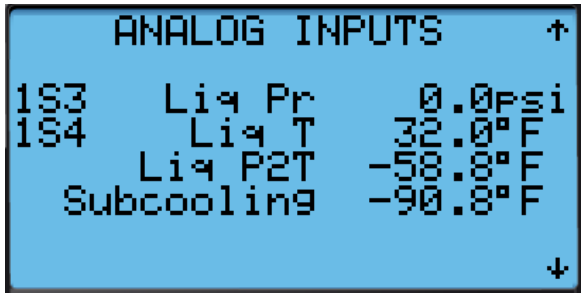


Figure 85

Pressing the **DOWN** key will display the screen of Figure 86. From this screen the status of the following sensors are displayed from top to bottom as follows:

- U8 - Outdoor Air Filter Differential Pressure
- U5 - Return Air Filter Differential Pressure
- c.pCOe U4 - Tower Water Inlet Temperature
- c.pCOe U5 -Tower Water Outlet Temperature
- EVD2 S2 - Pool Water Inlet Temperature
- EVD2 S4 - Pool Water Outlet Temperature

Press the **Esc** key to return to the I/O STATUS menu.

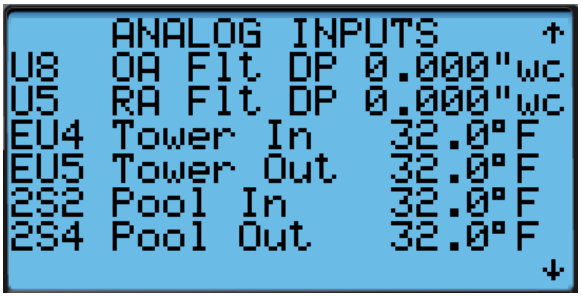


Figure 86

3.3.3.3.3 Digital Outputs (Figures 87-88)

Selecting DIGITAL OUTPUTS from the I/O STATUS menu will display the screen of Figure 87. From this screen the status of the following outputs are displayed from top to bottom as follows:

- NO1 – Compressor - On/Off Status
- NO2 - Bleed Solenoid 5 - On/Off Status
- NO3 - Bleed Solenoid 7 - On/Off Status
- NO4 - Bleed Solenoid 10 - On/Off Status
- NO7 – Occupancy - On/Off Status
- NO8 - Alarm Output - OK/FLT Status

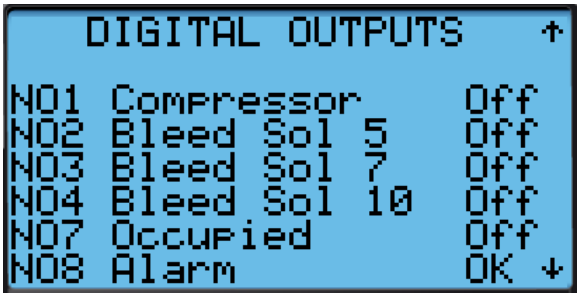


Figure 87

Pressing the **DOWN** key will display the screen of Figure 88. From this screen the status of the following outputs are displayed from top to bottom as follows:

- NO9 - Pool Auxiliary Heat - On/Off Status
- NO12 - Auxiliary Heat - On/Off Status
- NO13 - Remote Condenser Enable - On/Off Status
- c.pCOe NO1 - Water Pump - On/Off Status
- EVD2 NOA - Pool Pump - On/Off Status

Press the **Esc** key to return to the I/O STATUS menu.

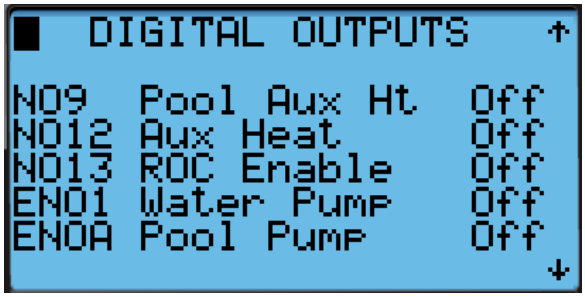


Figure 88

3.3.3.3.4 Analog Outputs (Figure 89)

Selecting ANALOG OUTPUTS from the I/O STATUS menu will display the screen of Figure 89. From this screen the status of the following outputs are displayed from top to bottom as follows:

- Modbus - Supply Fan Speed Command
- Y1 - Auxiliary Heat Command
- Y3 - Remote Condenser Speed Command
- Modbus - Evaporator Bypass Damper Command
- Modbus - Outdoor Air Damper Command

Press the **Esc** key to return to the I/O STATUS menu.

Press the **Esc** key again to return to the SERVICE MENU.

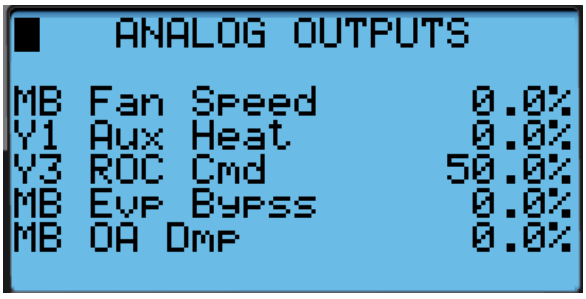


Figure 89

3.3.3.4 Sensor Offsets (Figures 90-93)

Selecting SENSOR OFFSETS from the SERVICE MENU will display the screen of Figure 90. From this screen the offsets for the following sensors are adjustable from top to bottom as follows:

- Zone Relative Humidity
- Zone Temperature
- Zone Dewpoint
- Supply Air Relative Humidity
- Supply Air Temperature
- Supply Air Dewpoint

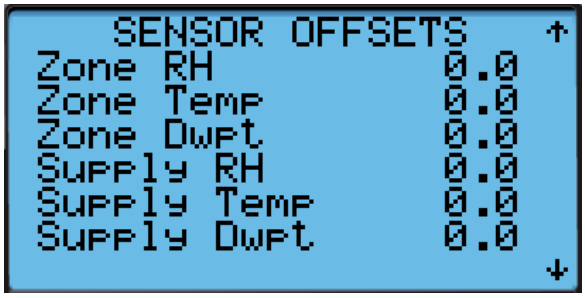


Figure 90

Pressing the **DOWN** key will display the screen of Figure 91. From this screen the offsets for the following sensors are adjustable from top to bottom as follows:

- Suction Pressure
- Discharge Pressure
- Liquid Pressure
- Suction Temperature
- Discharge Temperature
- Liquid Temperature

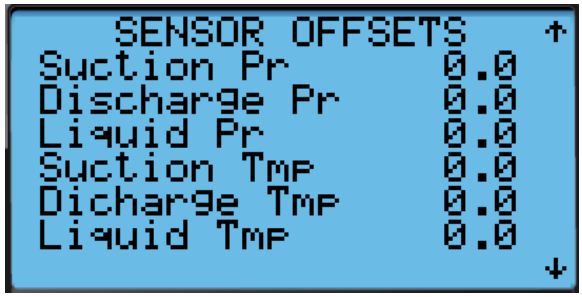


Figure 91

Pressing the **DOWN** key will display the screen of Figure 92. From this screen the offsets for the following sensors are adjustable from top to bottom as follows:

- Outdoor Air Temperature
- Off Evaporator Leaving Air Temperature
- Pool Inlet Temperature
- Pool Outlet Temperature
- Tower Water Inlet Temperature
- Tower Water Outlet Temperature

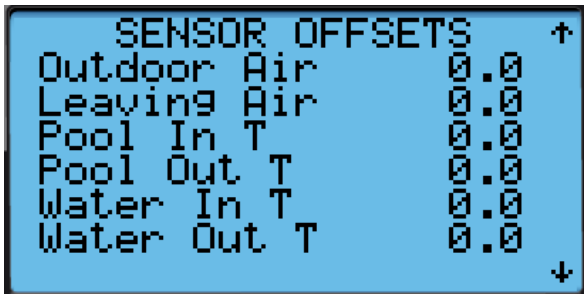


Figure 92

Pressing the **DOWN** key will display the screen of Figure 93. From this screen the offsets for the following sensors are adjustable from top to bottom as follows:

- Airflow Differential Pressure
- Evaporator Differential Pressure
- Return Air Filter Differential Pressure
- Outdoor Air Filter Differential Pressure

Press the **Esc** key to return to the SERVICE MENU.

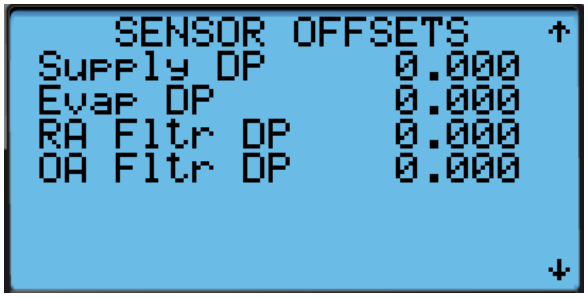


Figure 93

3.3.3.5 Diagnostics (Figure 94-100)

Selecting DIAGNOSTICS from the SERVICE MENU will display the screen of Figure 94. From this screen the unit can be overridden to run in the reheat condenser towards the top while the live readings of the suction pressure, discharge pressure, liquid pressure, superheat and subcooling are displayed below.

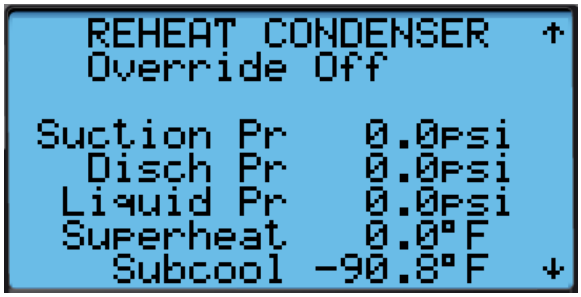


Figure 94

Pressing the **DOWN** key will display the screen of Figure 95. From this screen the unit can be overridden to run in the remote condenser towards the top while the live readings of the suction pressure, discharge pressure, liquid pressure, superheat and subcooling are displayed below.

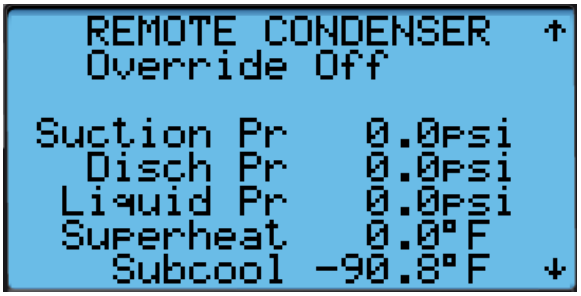


Figure 95

Pressing the **DOWN** key will display the screen of Figure 96. From this screen the unit can be overridden to run in the pool water condenser towards the top while the live readings of suction pressure, discharge pressure, liquid pressure, superheat and subcooling are displayed below.

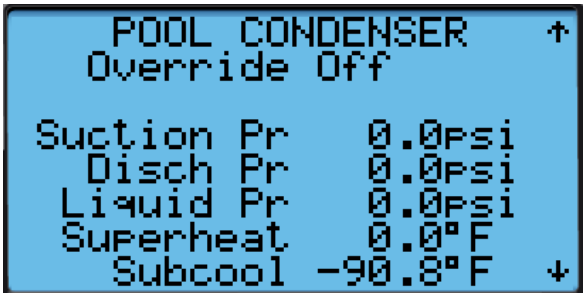


Figure 96

Pressing the **DOWN** key will display the screen of Figure 97. From this screen the unit can be overridden to run in heating mode with the manual heating command being settable towards the top. Below the live readings of the zone temperature, supply air temperature, airflow differential pressure and off evaporator leaving air temperature are displayed .

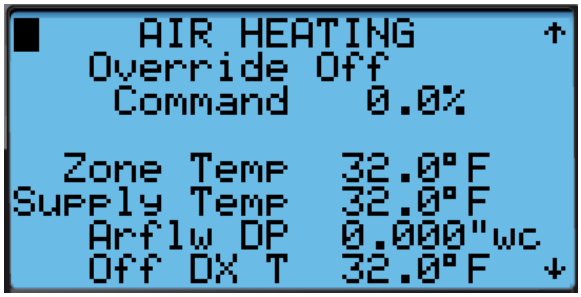


Figure 97

Pressing the **DOWN** key will display the screen of Figure 98. From this screen the status of the Evaporator Bypass Damper is displayed. At the top of the screen the damper can be set to Manual operation, and a manual command is settable. Directly below the current position of the damper is given as a percentage and in degrees. Below that, the damper can be commanded with four different commands. See table below for commands and functionality. On the very bottom, a damper status is displayed. See section 4.3.3 Damper Alarm Table & Troubleshooting for details.

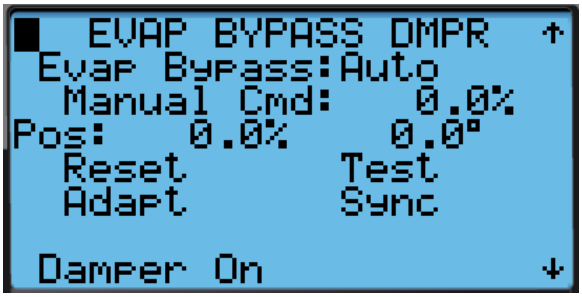


Figure 98

Pressing the **DOWN** key will display the screen of Figure 99. From this screen the status of the Outdoor Air Damper is displayed. At the top of the screen the damper can be set to Manual operation, and a manual command is settable. Directly below, the current position of the damper is given as a percentage and in degrees. Below that, the damper can be commanded with four different commands. See table above for commands and functionality. On the very bottom, a damper status is displayed. See section 4.3.3 Damper Alarm Table & Troubleshooting for details.

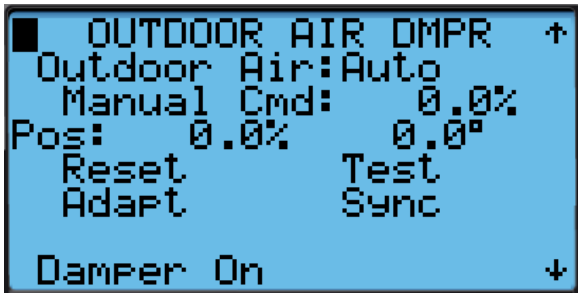


Figure 99

Pressing the **DOWN** key will display the screen of Figure 100. From this screen the status of the Supply Fan 1 will be displayed. Towards the top of the screen the speed in RPM and the power in Watts is displayed. Towards the bottom, the fan can be overridden to a manual command and a manual speed can be set. The screen of Figure 100 will be repeated for supply fans 2, 3, and 4 if they are equipped with the unit.

Press the **Esc** key to return to the SERVICE MENU.

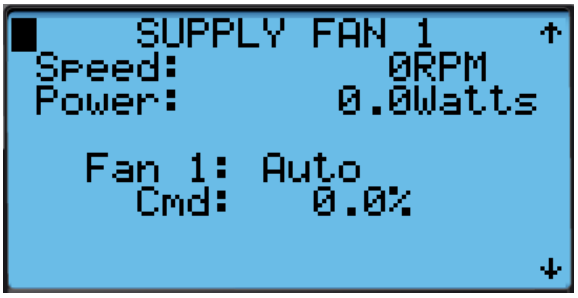


Figure 100

3.3.3.6 Memory Options (Figures 101-103)

Selecting MEMORY OPTIONS from the SERVICE MENU will display the screen of Figure 101. From this screen the user can export the Log files of the unit. This is a set of stored variables used for trending data of the unit. Towards the top of the screen the user is given the option to select writing the log files to either 'Internal Flash', or a 'USB Pen Drive'. At the bottom it states 'Press UP to write'. This will change to '...WRITING...' when selected and a message will display if there is an error in exporting the log files.

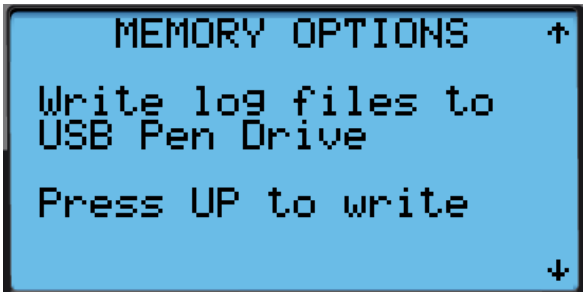


Figure 101

Pressing the **DOWN** key will display the screen of Figure 102. From this screen the setpoint.txt file can be exported. The setpoint.txt file is a file that contains all the retained user settings (example the zone temperature setpoint). Towards the top of the screen the user is given the option to select writing the setpoint.txt file to either 'Internal Flash', or a 'USB Pen Drive'. At the bottom it states 'Press UP to Export'. This will change to '...WRITING...' when selected and a message will display if there is an error in exporting the setpoint.txt file.

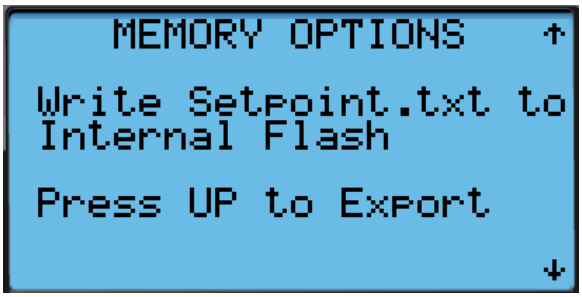


Figure 102

Pressing the **DOWN** key will display the screen of Figure 103. From this screen the setpoint.txt file can be imported. Towards the top of the screen the user is given the option to select reading the setpoint.txt file from either 'Internal Flash', or a 'USB Pen Drive'. At the bottom it states, 'Press UP to Import'. This will change to '...WRITING...' when selected and a message will display if there is an error in importing the setpoint.txt file.

Press the **Esc** key to return to the SERVICE MENU.

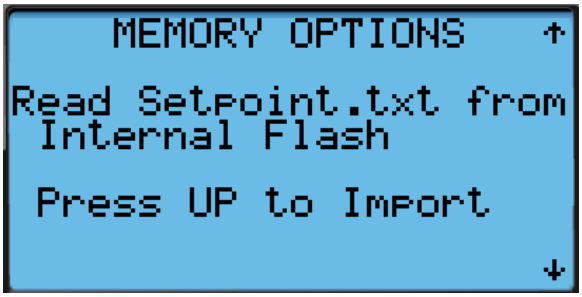


Figure 103

3.3.3.7 Clear Overrides (Figure 104)

Selecting CLEAR OVERRIDES from the SERVICE MENU will display the screen of Figure 104. From this screen all of the overrides in the unit can be disabled. In the middle of the screen select 'Clear' and press the **Up** key. The text will change to 'Clearing...' and then reset back to 'Clear' within 5 seconds. After this any override that was on will now be off. On the main screen the unit status will state 'Override On' if there is any override enabled in the unit.

Press the **Esc** key to return to the SERVICE MENU.

Press the **Esc** key again to return to the MAIN MENU.

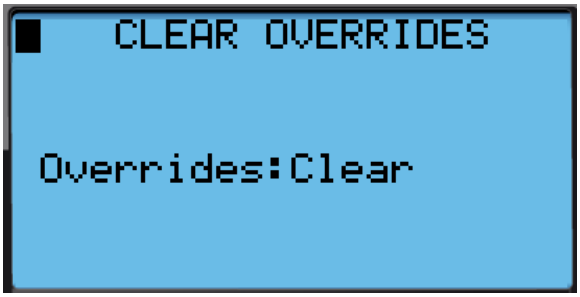


Figure 104

3.3.4 Unit Revision (Figure 105)

Selecting UNIT REVISION from the MAIN MENU will display the screen of Figure 105. From this screen the unit revision is displayed along with the revision date.

Press the **Esc** key to return to the MAIN MENU.

Press the **Esc** key again to return to the MAIN SCREEN.

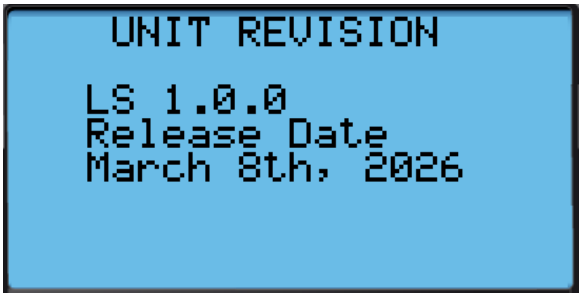


Figure 105

4. Alarms

4.1 Alarm Menu (Figures 106-108)

To view the alarms from any screen, simply press the **ALARM** key. If no alarm is active, the display will state NO ALARMS as shown in Figure 106.



Figure 106

When an alarm is triggered, the red LED behind the **ALARM** key will light and will remain on until the alarm is reset. If an alarm is present, pressing the **ALARM** key will display a screen similar to Figure 107. The triggered alarm will be displayed along with the time and date. Towards the bottom of the screen up to two sampled variables will be displayed that get recorded when the alarm is triggered. These samples only pertain to certain alarms where the data is useful.

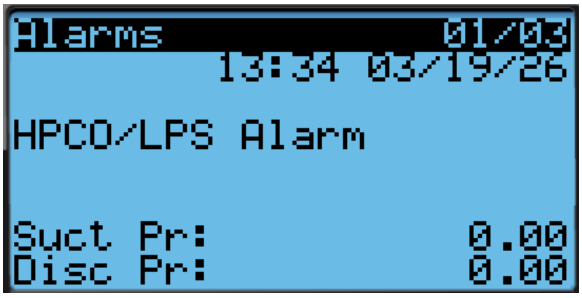


Figure 107

To reset the alarm, use the **DOWN** key until the reset instructions are shown. See Figure 108. Pressing the **ALARM** key for three seconds will reset all active alarms.



Figure 108

Alarms are either Automatic Reset or Manual Reset. Automatic Reset Alarms are alarms that allow the unit to return to operation once the alarm parameter has been returned to an

acceptable condition. The unit will restart automatically; however, the red Alarm LED will remain illuminated until acknowledged to alert the operator the alarm occurred. Manual Reset Alarms are alarms that stop the unit and/or circuit and do not restart until the alarm is acknowledged and the alarm condition is reset manually on the Alarm Screen. The red Alarm LED will stay illuminated until the alarm is acknowledged AND the alarm condition is reset.

To return to the home screen, press the **Esc** key.

4.2 Alarm Logs

The Alarm Data Logger Screen is accessible from the Alarm Reset screen (see Figure 109) by pressing the **Ent** key. This screen shows records of the alarm log. The bottom two lines will show the pertinent data that was recorded when the alarm occurred. Use the **UP** and **DOWN** keys to view other records.



Figure 109

To return to the Main Screen press the Esc key.

4.3 Alarm Tables

The table below is a summary of the Swim Aire Alarms. The “Type” and “Cause” are both described in the table along with associated “Actions” to try and resolve the alarm. For all cases the Desert-Aire Service Team should be contacted to try and resolve the alarm or to order replacement parts if required.

ALARM	***TYPE***	***CAUSE***	***ACTIONS***
Too Many Memory Writes	*AUTO RESET*	*Controller is writing to retain memory too frequently.*	- Wait for alarm to reset and/or power cycle controller - Update program or replace controller
Retrain Memory Write Error	*AUTO RESET*	*Controller had an error writing to retain memory*	- Replace controller
c.PCOe Offline	*AUTO RESET*	*Controller cannot communicate with c.pCOe card*	- Check wiring to c.pCOe and addressing of c.pCOe - Replace c.pCOe

c.PCOe Configuration Error	*AUTO RESET*	*Controller has an error communicating with c.pCOE card*	-Update program or replace controller
Multiple Low Suction Pressure Alarm	*USER RESET*	*Unit suction pressure has fallen below minimum allowed suction pressure more than the allowed number of times (default =3) within the allowable timeframe (default=1 hour).*	- Ensure unit has proper Airflow - Check low pressure settings in Factory Menu - Ensure sensor is reading correctly, replace if required. - Check unit charge and look for leaks
Discharge Pressure Alarm	*USER RESET*	*Unit Discharge Pressure has risen above maximum allowable discharge pressure*	- Ensure sensor is reading correctly, replace if required. - Ensure any optional condensers are correctly installed and all ball valves are open. - Measure pressure drop across components to look for blockage in system.
Compressor Overload Alarm	*USER RESET*	*Compressor overload has triggered an alarm.*	- Check the compressor wiring and terminal connections. - Measure resistance of Compressor windings and look for shorts to ground.
Supply Fans Overload	*USER RESET*	*All available supply fans have tripped an overload.*	- Check the fans power and control wiring. - Look for any airflow obstructions. - View fan alarm code if provided.
Zone Sensor Fault	*AUTO RESET*	*Zone sensor is either out of range, has a communication error, or has an internal error.*	- Check the sensor wiring and unit configuration. - View Sensor Alarm code, replace if required.
Supply Sensor Fault	*AUTO RESET*	*Supply sensor is either out of range, has a communication error, or has an internal error.*	- Check the sensor wiring and unit configuration. - View Sensor Alarm code, replace if required.
General Smoke Alarm	*USER RESET*	*Smoke Alarm/ General Alarm has triggered an alarm.*	- Check the Smoke/General Alarm digital input.
Low Voltage Phase Monitor Alarm	*AUTO RESET*	*Low Voltage Phase Monitor has triggered an alarm.*	- Check the LVM Alarm digital input. - Check the low voltage phase monitor indication LED.
Outdoor Air Filter Alarm	*AUTO RESET*	*Outdoor air filter differential pressure has risen above maximum allowable differential pressure.*	- Check conditions of filter and controller settings. - Confirm sensor readings accurate, replace if required

Return Air Filter Alarm	*AUTO RESET*	*Return air filter differential pressure has risen above maximum allowable differential pressure.*	- Check conditions of filter and controller settings. - Confirm sensor readings accurate, replace if required
A2L Sensor Alarm	*USER RESET*	*A2L sensor has triggered an alarm.* ***Note -*** *The alarm will stay active for 5 min after the sensor has cleared.*	- Check status of A2L Sensor digital input. - Check status of A2L Sensor indication LED, replace if required. - Check unit for leaks and follow safety requirements.
High Pressure Cut Out/ Low Pressure Switch Alarm	*USER RESET*	*The high pressure cut out switch or the low pressure switch has triggered an alarm.*	- Check status of HPS/LPS digital input. - Check refrigeration system for damage or issues.
Condensate Switch Alarm	*AUTO RESET*	*The condensate switch has triggered an alarm.*	- Check status of Condensate Switch digital input. - Check evaporator drain pan/ condensate plumbing for blockage
Emergency Off Switch Alarm	*USER RESET*	*Customer supplied Emergency Off switch has triggered an alarm.*	- Check status of Emergency Off Switch digital input.
Supply Fan 1 Alarm	*AUTO RESET*	*Supply Fan 1 has triggered an alarm.*	- Check the fan power and control wiring. - View fan alarm code if provided, replace if required.
Supply Fan 2 Alarm	*AUTO RESET*	*Supply Fan 2 has triggered an alarm.*	- Check the fan power and control wiring. - View fan alarm code if provided, replace if required.
Supply Fan 3 Alarm	*AUTO RESET*	*Supply Fan 3 has triggered an alarm.*	- Check the fan power and control wiring. - View fan alarm code if provided, replace if required.
Supply Fan 4 Alarm	*AUTO RESET*	*Supply Fan 4 has triggered an alarm.*	- Check the fan power and control wiring. - View fan alarm code if provided, replace if required.
Sensor Fault	*AUTO RESET*	*A sensor in the unit is out of range or has failed.*	- Check Sensor Fault Code or I/O Status for sensor readings - Check sensor wiring and readings, replace if required.

Critical Sensor Fault	*AUTO RESET*	*A critical sensor in the unit is out of range or has failed.*	- Check Sensor Fault Code or I/O Status for sensor readings - Check sensor wiring and readings, replace if required.
Pool Sensor Fault	*AUTO RESET*	*A pool sensor is out of range or has failed.*	-Check I/O Status for sensor readings. - Check sensor wiring and readings, replace if required.
Tower Water Sensor Fault	*AUTO RESET*	*A tower water sensor is out of range or has failed.*	-Check I/O Status for sensor readings. - Check sensor wiring and readings, replace if required.
Network Sensor Fault	*AUTO RESET*	*The BMS sensor had a communication failure.*	- Check BMS connections and settings.
Lead Unit Sensor Fault	*AUTO RESET*	*The Lead Unit sensor had a communication failure.*	- Check Lead Unit connections and controller settings.
No Useable Sensor Alarm	*USER RESET*	*All options for the space sensor have failed.*	- Check unit configuration and resolve appropriate sensor failure.
Outdoor Air Damper Alarm	*AUTO RESET*	*The outdoor air damper has triggered an alarm.*	- Check power and control wiring to damper actuator. - View damper alarm code, replace if required.
Evaporator Bypass Damper Alarm	*AUTO RESET*	*The evaporator bypass damper has triggered alarm.*	- Check power and control wiring to damper actuator. - View damper alarm code, replace if required.
EVD 1 Alarm	*AUTO RESET*	*Electronic Valve Driver 1 has an internal alarm active.*	- Check EVD alarm code, replace EVD if required.
EVD 1 Offline Alarm	*AUTO RESET*	*Electronic Valve Driver 1 has an offline alarm.*	-Check unit configuration, EVD wiring and addressing. - Replace if required.
EVD 2 Alarm	*AUTO RESET*	*Electronic Valve Driver 2 has an internal alarm active.*	- Check EVD alarm code, replace EVD if required.
EVD 2 Offline Alarm	*AUTO RESET*	*Electronic Valve Driver 2 has an offline alarm.*	-Check unit configuration, EVD wiring and addressing. - Replace if required.

4.3.1 Modbus Device Alarm Table

All Modbus devices connected to the controller will have a Modbus Status viewable on the MODBUS STATUS screen of Figure 13. If the controller detects an error with the Modbus communication of a particular device it will change the Modbus status of that device. The table below shows the required actions for a given Modbus status.

Status	Action
Device Online	- No action
Device Offline	- Check wiring and review configuration
Invalid Message	- Replace device
Error Message	- Replace device
Device Standby	- Review configuration

4.3.2 Humidity and Temperature Sensor Alarm Table & Troubleshooting

The Zone and Supply sensors will display a sensor status if there is an internal fault. This sensor status is displayed on the screens of Figure 79 and 81. The table below shows the required action for a given fault status.

Sensor Status	Action
Sensor OK	No Action
Temp Error	Replace Sensor Element
RH Error	Remove & Dry Sensor/Element
RH Fail	Replace Sensor Element
Cap Ref Err	Replace Sensor
Amb T Range	Replace Sensor
FW Mismatch	Replace Sensor
Dev Corrupt	Replace Sensor
Config Error	Replace Sensor
Coeff Error	Replace Sensor
Main Config Err	Replace Sensor
Voltage Fault	Replace Sensor
Memory Fault	Replace Sensor
Calb. Faul	Replace Sensor

4.3.3 Damper Alarm Table & Troubleshooting

The Dampers provided on the Swim Aire units are Modbus controlled devices that will store and register alarms, send data back to the controller, and read the commands given by the controller. The table below are the errors that the damper actuator can detect along with a description of what the error means.

Code	Description
Damper On	Damper functioning properly.
Damper Test	Damper is in a test sequence.
Gear Diseng.	The mechanical gear disengage button has been pressed.
Comm Err.	A communication error has occurred.
Range Err.	The damper can move further than its preset range.
Blocked Err.	The damper cannot move throughout full preset range.

The damper has built in functions that can be commanded by the controller shown on the screens of Figures 98 and 99. The table below shows the commands and a description of what they do.

Command	Function
Reset	Clears alarms stored in damper.
Test	Drives the damper to 0% & 100% to test range.
Adapt	Drives the damper to 0% & 100% and resets the 0% & 100% positions.
Sync	Takes current damper position and sets it as 0% position.

5. Hardware Details

5.1 Programmable Controller

The programmable controller is preprogrammed by Desert Aire for the control of your unit. The Desert Aire replacement part number for this controller is available by calling our parts department.

5.2 Low Pressure Transducer

The Suction Pressure Transducer is a 0.5 – 4.5 VDC to 0 – 250 psig ratio metric device. The body is brass with a 1/4 SAE female refrigerant connection. This transducer must be supplied with 4.5 to 5.5 VDC power from the black to green wires on the transducer. A display reading of 0.0 psig for the transducer indicates the device is disconnected or defective. To verify the output of the transducer, measure the DC voltage (should read between 0.5 to 4.5 VDC) from the white to green wires on the transducer and use this voltage in the following formula to determine the pressure (0-250 psig).

Pressure (psig) = (62.5) * (Vdc) – 31.25
Example, if Vdc is 2.50 VDC, then;
Pressure (psig) = (62.5) * (2.50) – 31.25 = > 156.25 – 31.25 => 125 psig

The Suction Pressure Transducer's replacement part number is available from Desert Aire by calling our parts department.

5.3 High Pressure Transducer

The Discharge or Liquid Pressure Transducer is a 0.5 – 4.5 VDC to 0 – 652 psig ratio metric device. The body is brass with a 1/4 SAE female refrigerant connection. This transducer must be supplied with 4.5 to 5.5 VDC power from the black to green wires on the transducer. A display reading of 0.0 psig for the transducer indicates the device is disconnected or defective. To verify the output of the transducer, measure the DC voltage (should read between 0.5 to 4.5 VDC) from the white to green wires on the transducer and use this voltage in the following formula to determine the pressure (0-652 psig).

Pressure (psig) = (163) * (Vdc) – 81.5
Example, if Vdc is 2.50 VDC, then;
Pressure (psig) = (163) * (2.50) – 81.5 => 407.5 – 81.5 => 326 psig

The Desert Aire replacement part number for the Discharge or Liquid Pressure Transducer is available by calling our parts department.

5.4 Air Temperature and Relative Humidity Sensors

These sensors are a communicating device which sends Modbus data out from address 190 or 191. If communication is lost from this device or the sensor is out of range, an alarm is activated. An alarm error code is also read from the sensor defined in Table 3. The Desert Aire replacement part number for these sensors are available by calling our parts department.

5.5 Differential Air Pressure Sensors

Depending on options selected, the unit can have the following differential air pressure sensors; Evaporator, Supply Fan, Return Air Filter, or Outside Air Filter.

These sensors can have the following ranges below which are selectable in the Factory Menu. The range will be set for the specific sensor range requirements.

-1.0 ”wc to 1.0 ”wc
0.0 “wc to 2.0 “wc
0.0 “wc to 5.0 “wc
0.0 “wc to 10.0 “wc
0.0 “wc to 20.0 “wc
0.0 “wc to 25.0 “wc

The output of these sensors is a 0.0 VDC to 5.0 VDC signal scaling between the minimum and maximum range in “wc selected. The Desert Aire replacement part number is available by calling our parts department.

5.6 Temperature Sensors

Depending on options selected, the unit can have the following temperature sensors; Outdoor Air, Evaporator Leaving Air, Discharge Line, Liquid Line, Suction Line, Tower Water Inlet, Tower Water Outlet, Pool Water Inlet, or Pool Water Outlet.

These temperature sensors are a resistive NTC Bulb type device with a 10 foot cable. The temperature range is -58.0°F 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 a reading of 687.3°F if the sensor is shorted. The Desert Aire replacement part number for the Temperature Sensors are available by calling our parts department.

6. Appendix

6.1 Sequence of Operation

The Swim Aire controller is optimized to maintain the temperature and relative humidity of pool room applications. The Swim Aire contains a refrigeration system that operates to control the zone temperature and humidity based off user adjustable setpoints. The refrigeration system contains various components to achieve proper performance. The general components are as follows; an evaporator coil that is used for cooling the process air and removing moisture, a condenser coil that is used to reheat the process air, an optional remote condensing coil that is used to reject heat from the process air, and a three way modulating valve that directs which condenser the system rejects heat to. If the pool water option has been selected an additional condenser is available to reject heat to the pool water for pool water heating applications.

6.1.1 Temperature Control

The Swim Aire unit has three sequences to control the temperature of the room based on the current conditions. The first control is Cooling Mode where the unit compressor is on and the three-way modulating valve is in the full remote condenser position. The second is Heating Mode where the refrigeration system may be on if there is a dehumidification call, and the three-way modulating valve will be in the full reheat condenser position. The auxiliary heater will be active in this mode. The third control is when the unit has a call for dehumidification only. Here the compressor will be on and the three-way modulating valve will modulate to control the supply air temperature.

6.1.1.2 Cooling Mode

The cooling mode is active when the zone temperature rises above the zone temperature setpoint plus the cooling deadband (adjustable). The cooling mode will deactivate when the zone temperature drops below the cooling on setpoint minus the cooling differential (adjustable). When the cooling mode is active the compressor will be on and the three-way modulating valve will be in the full remote condenser position. Figure 110 shows a graphic of this operation.

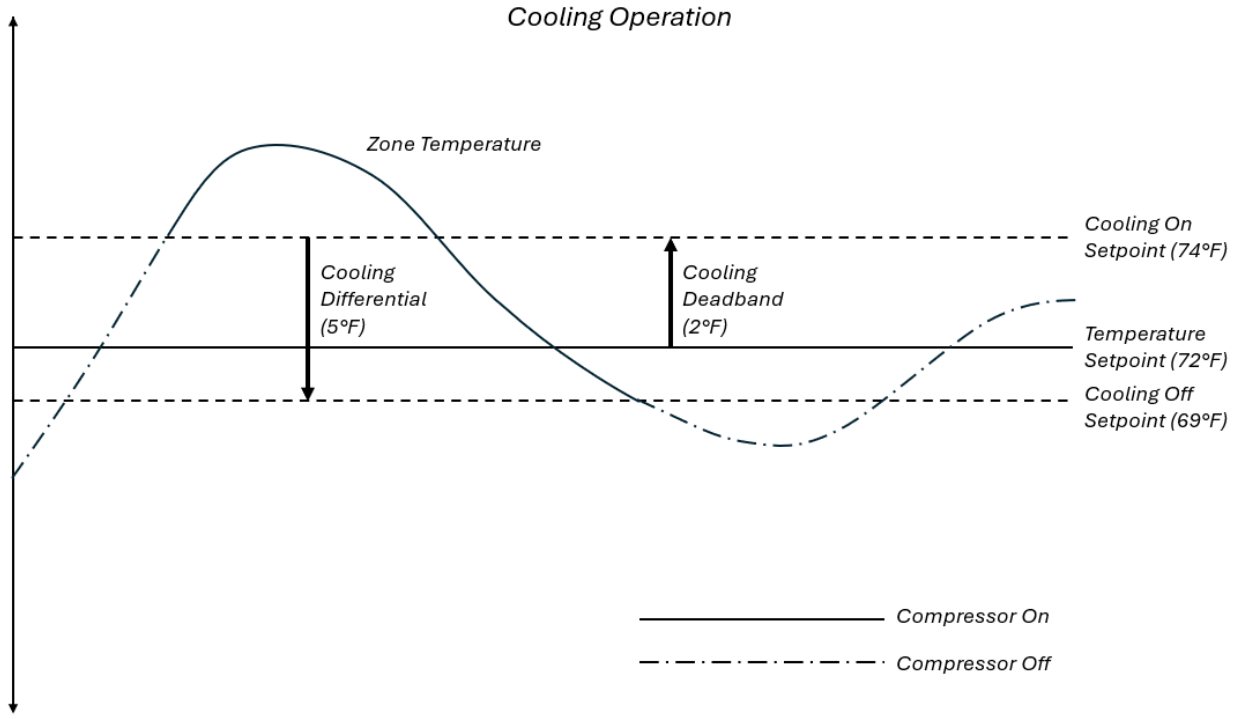


Figure 110

6.1.1.2 Heating Mode

The heating mode is active when the zone temperature falls below the zone temperature setpoint minus the heating deadband (adjustable). The heating mode will deactivate when the zone temperature rises above the heating on setpoint plus the heating differential (adjustable). When the heating mode is active the auxiliary heater will operate. If there is also a requirement for dehumidification, then the compressor will also be on and the three-way modulating valve will be in the full reheat condenser position. Figure 111 shows a graphic of this operation.

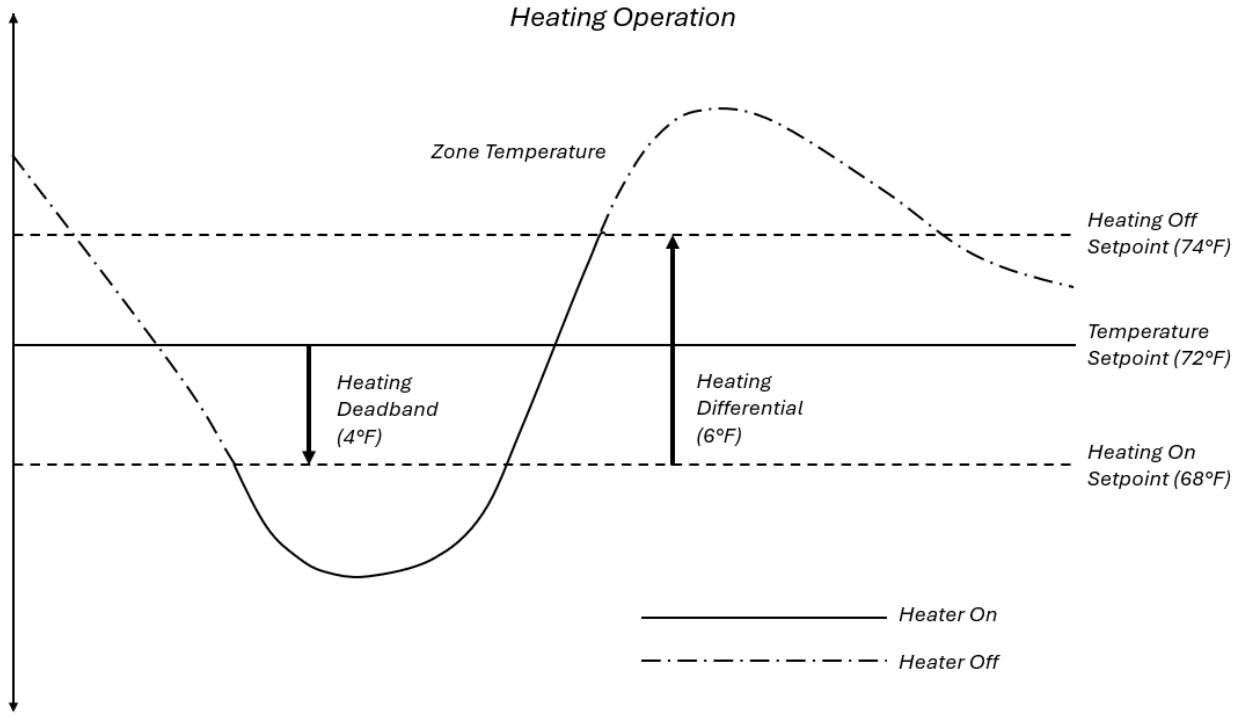


Figure 111

The auxiliary heater can either be provided with the unit by Desert Aire or be a separate piece of equipment. The Desert Aire controller is configured to both activate a dry contact based on zone temperature (shown in Figure 111) and send a 0-10VDC control signal for a modulating heater. The 0-10VDC control signal will be controlled by a PID loop where the zone temperature is the setpoint and the supply air temperature is the process variable. When the supply air temperature is below the zone temperature setpoint the output of this PID loop increases.

There is an included safety with the modulating heat control where the signal will automatically get driven down as the supply air temperature increases above 120°F and will be fully disabled (0VDC) when the supply air temperature is at or above 125°F.

6.1.1.3 Dehumidification mode Temperature Control

When the compressor is on due to a call for dehumidification, and the cooling/heating modes are not active as described above, then the unit will modulate the three-way valve to control the zone temperature. The three-way modulating valve will be controlled by a PID loop where the zone temperature setpoint is the setpoint, and the supply air temperature is the process variable. The valve will modulate between a minimum position (30% adjustable) and a maximum position (70% adjustable). The valve will move from the max position of 70% to 100% (full reheat) skipping the positions in-between if the output of the PID loop requires this. The same is true going from 30% to 0% (full cooling). If a call for cooling or heating occur during dehumidification the valve will move to the remote or reheat condenser accordingly.

6.1.2 Humidity Control

The Swim Aire unit controls the humidity of the room based on the current relative humidity read by the room sensor and the relative humidity setpoint. When the relative humidity rises above the setpoint plus the deadband (adjustable) the compressor will turn on and the unit will run in dehumidification mode. The three-way modulating valve will be controlled based on the temperature control described in section 6.1.1. When the relative humidity falls below the dehum on setpoint minus the differential (adjustable) the dehumidification mode will deactivate and the compressor will turn off. Figure 112 shows a graphic of this operation.

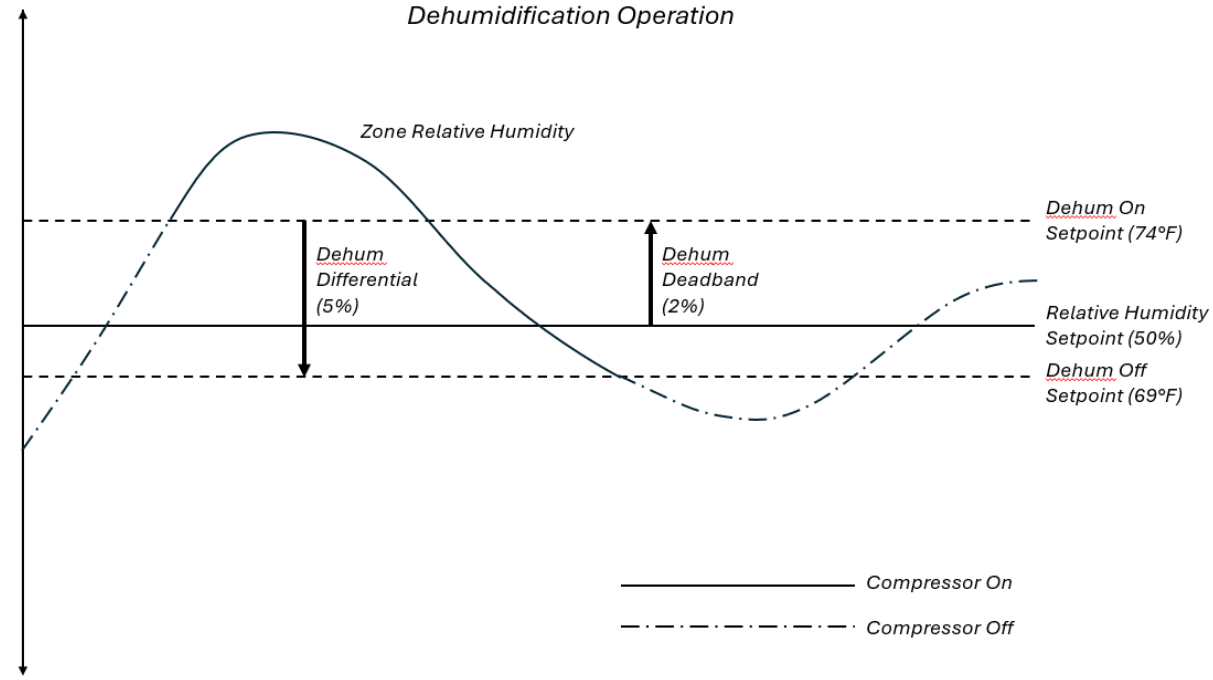


Figure 112

6.1.3 Pool Heat Control

The Swim Aire unit controls the pool heat by sensing the pool water inlet temperature to the dehumidifier and comparing this temperature to a pool water temperature setpoint. If the pool water falls below the pool water temperature setpoint and the compressor is on due to a call for either cooling or dehumidification, then the three-way valve will start to direct the hot gas towards the pool water condenser. As the pool water keeps falling past the pool water temperature setpoint plus the pool high heat deadband then the valve will move to a second position that will direct more hot gas towards the pool water condenser. This is the "High Pool Heat" operation. If the pool water temperature continues to drop past the pool high heat setpoint plus the pool auxiliary heater deadband then the unit will close a relay contact to trigger an auxiliary pool heater to operate. For all three stages of pool heat (Pool Heat, Pool High Heat, and Pool Auxiliary Heat) the pool water temperature will need to rise above the pool water temperature setpoint plus the pool heat differential. There is also a safety associated with this control where if the pool water temperature rises above the pool overtemperature setpoint the pool valve will automatically shut down. Figure 113 shows a graphic of how this works.

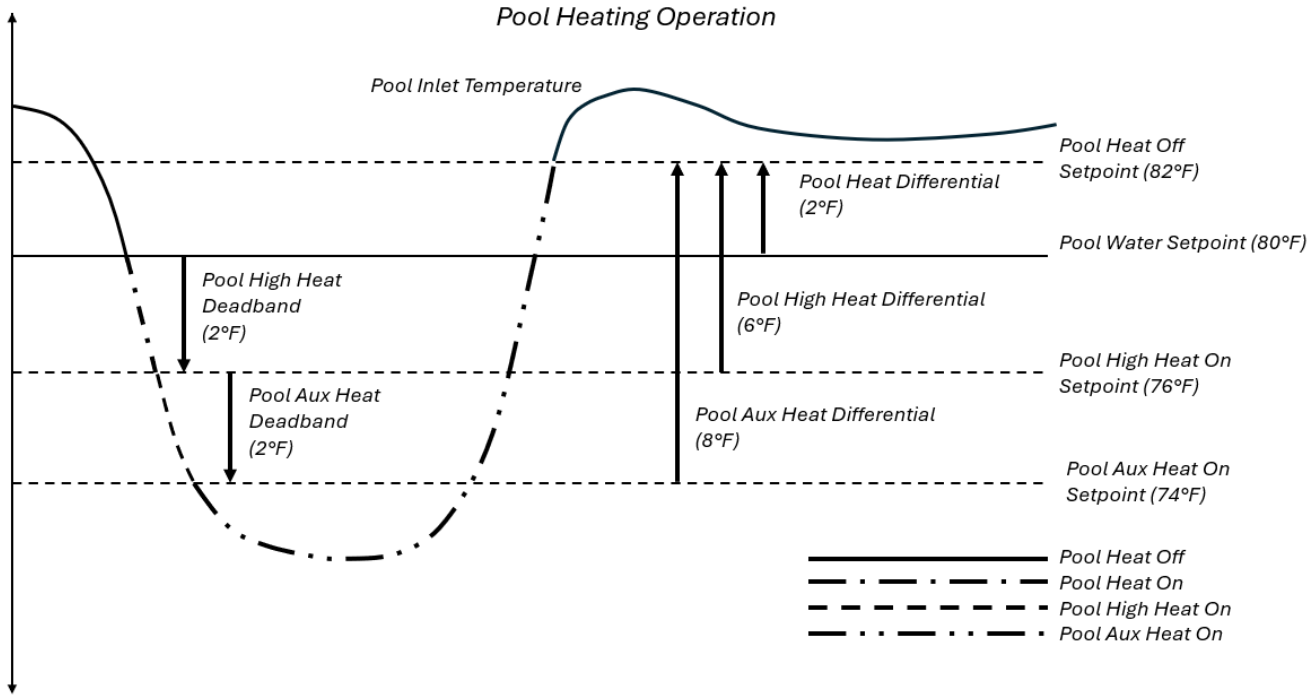


Figure 113



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