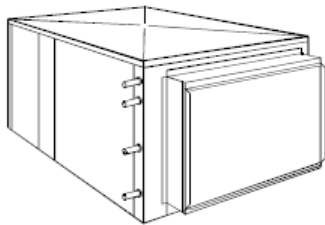




**Application, Operation and Maintenance Manual  
OA Series DOAS Units**

UNT Microprocessor Controller





## CAUTION

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

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



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# 1. Installation

## 1.1. Humidity and Temperature Control Package

ClimateMaster's UNT® controller is designed for precise monitoring and control of air temperature, relative humidity (RH), and optional water temperature within a conditioned environment.

This control system, manufactured by Johnson Controls, is easy to install and operate. It features an oversized LCD display, the Zone Terminal®, which allows you to view and adjust set points and modes of operation. It also indicates the operating status of major components inside of the dehumidifier.

Most sensors and inputs have been factory-installed and wired inside of the dehumidifier. You need only mount and wire the combination temperature/humidity sensor and the Zone Terminal, or "ZT." The ZT, which is simply an interface tool, contains no sensors. You do not have to install it in the room you wish to dehumidify.

## 1.2. Sensor Installation

Your controller is provided with either a wall-mount or a duct-mount temperature/humidity sensor, depending on which was selected when the equipment was ordered.

### 1.2.1 Wall-Mount Sensor

A wall-mount sensor is normally used in residential swimming pool applications, where intermittent blower operation is often desired. A wall-mount sensor helps ensure that consistent temperature and humidity levels are maintained in the "comfort zone" (zero to six feet above the pool deck). One drawback of this sensor is that the hottest, most humid air will rise toward the ceiling when the blower shuts off. Skylights and high windows may fog up even though the air in the comfort zone is being maintained at the desired conditions.

Another drawback of a wall-mount sensor is that if it gets splashed with water, it may temporarily send false readings to the dehumidifier.

If your dehumidifier was ordered with a wall-mount humidity and temperature sensor, mount the sensor about five feet above floor on an interior wall with natural air circulation. Avoid the following locations:

- Areas where the sensor could get splashed, such as near a pool, hot tub, or other moisture source.

- Hot spots near concealed heating pipes, warm air ducts, supply register outlets, or sources of solar radiation.
- Cold spots due to a cold wall or drafts from stairwells, doors, windows, or supply register outlets.
- Dead spots such as behind doors or in corners where room air cannot circulate freely.

Run four 18 gauge (0-500 feet) or four 24 gauge (0-100 feet) wires from the sensor to the labeled terminal strip in the control panel of the dehumidifier. See your wiring schematic for connection details. Note that undersized wiring will cause inaccurate sensor readings.

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

### **1.2.2 Duct-Mount Sensor**

A duct-mount sensor is normally used in commercial swimming pool and industrial applications, where continuous blower operation is often desired. A duct-mount sensor helps ensure consistent temperature and humidity levels throughout the space. One drawback of this sensor is that it relies on a continuous stream of air moving past it. Using a duct-mount sensor with a non-continuous blower may lead to short-cycling of the refrigeration compressor.

Install the duct-mount sensor in the return air duct *upstream* from any outdoor air intakes.

Do not mount the sensor in a section of duct where false readings may occur due to dead air regions, solar heat gain, or thermal losses in winter.

Do not mount the sensor where water is likely to drip on it. Liquid moisture may damage the humidity sensing element in the sensor.

Run four 18 gauge (0-500 feet) or four 24 gauge (0-100 feet) wires from the sensor to the labeled terminal strip in the control panel of the dehumidifier. See your wiring schematic for connection details. Note that undersized wiring will cause inaccurate sensor readings.

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

### **1.2.3 Water Temperature Sensor**

ClimateMaster dehumidifiers ordered with the pool water heating option are supplied with a water temperature sensor which has been factory-wired and installed on the



water piping inside the dehumidifier. To ensure accurate water temperature control, water must continuously circulate through the dehumidifier.

As an option, ClimateMaster will provide this temperature sensor and an aquastat well for field-installation in the main pool water return line. If this option was chosen when the order was placed, please read the following directions:

Screw the well into an adapter fitted into the pool water piping. The well is equipped with a 1/2" MPT connection.

Install the sensor *upstream* from the dehumidifier or any auxiliary pool water heaters.

The sensor must be installed in a location where it will accurately sense the pool water temperature. This means you must have continuous water flow at the sensor location.

Run two 18 gauge (0-500 feet) or two 24 gauge (0-100 feet) wires from the sensor to the labeled terminal strip in the control panel of the dehumidifier. See your wiring schematic for connection details. Note that undersized wiring will cause inaccurate sensor readings.

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

### **1.3. Auxiliary Air Heating Control Wiring**

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

#### **1.3.1 Auxiliary Heating - Dry Contact Closure**

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

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

#### **1.3.2 Auxiliary Heating - Proportional Signal**

As an option, ClimateMaster will provide a proportional 0-10 VDC direct-acting signal to modulate a heating coil control valve or other auxiliary modulating heater.

Most proportional valves have either three or four terminals for field-installed wiring.

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

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

#### **1.4. Auxiliary Pool Water Heating Control Wiring (NOT CURRENTLY AVAILABLE)**

A properly-sized ClimateMaster dehumidifier equipped with the pool water heating option can maintain the pool water temperature under normal conditions. However, like *any* refrigerated dehumidifier, the ClimateMaster may require days to heat a recently-filled pool by itself. For this reason, you should install an auxiliary pool heater.

ClimateMaster dehumidifiers ordered with the water heating option are provided with a set of dry contacts for controlling an auxiliary pool water heater. The dehumidifier will be the primary source of water heating. If it cannot keep up with the demand for pool heat, the ClimateMaster controller will then energize the auxiliary water heater.

Run two wires from the thermostat circuit of the water heater to the labeled terminal strip on the control panel of the dehumidifier. See your wiring schematic for connection details.

**Note:** Do not use the aquastat mounted on the auxiliary heater for temperature control. This can lead to excessive water temperature fluctuation. It may also permanently prevent the dehumidifier from heating pool water if the set point of the heater aquastat is higher than the water heating set point of the dehumidifier.

#### **1.5. Wiring for Ventilation Air**

Building codes require that commercial buildings have provisions for bringing in outdoor air for ventilation. As an option, ClimateMaster dehumidifiers can be equipped with outdoor air intakes:

- The simplest intake option is a duct flange on the top of the dehumidifier. The louvers, filters, preheater (if necessary), damper and actuator must be field-provided and installed.
- Another option is a factory-installed intake box with a flanged duct connection which houses filters, a damper, and a motorized actuator. A preheater (if necessary) must be field-provided and installed.

- For outdoor dehumidifiers, ClimateMaster offers the same intake box with a weather hood and bird screen.

How you configure and wire the outdoor air accessories depends on which of these options was ordered. However, any building which brings in outdoor air for ventilation also requires an exhaust blower or dampers.

Exhaust blowers are particularly important for swimming pool dehumidifiers, where the space should be maintained at a neutral or slightly negative pressure. Positive space pressure can drive chlorine-laden moisture into insulation, building materials, and adjacent rooms.

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

See your wiring schematics and the Installation and Operation Manual of the dehumidifier for more details on installing and controlling ventilation air intakes.

## 1.6. Mounting the Zone Terminal

The Zone Terminal display unit **must** be located in a dry, non-corrosive environment. Moisture or concentrated pool chemicals can damage the circuitry of the ZT. The ZT can either be affixed directly to the dehumidifier or located up to 500 feet away.

### 1.6.1 Installing the ZT

Use 24 gauge telephone wire to connect to a ZT up to 50 feet away from the dehumidifier. If the ZT is connected up to 500 feet from the controller, install 18 AWG wire. The ZT requires 3 conductors.

Label both ends of the three wires F1, F2, and F3 respectively and connect one end to the matching terminal block inside the dehumidifier electrical box (see unit wiring diagram for point-to-point connection details). At the Zone Terminal location connect the supplied RJ-11 phone connector to the wiring. Observe the correct wiring color code as shown on the label attached to RJ-11 connector. Pull the cord and connector through the hole in the back of the mounting bracket. Attach the bracket to the wall. After plugging the cord into the back of the ZT, feed any extra wiring back into the hole of the mounting bracket and gently snap the ZT into the bracket.

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

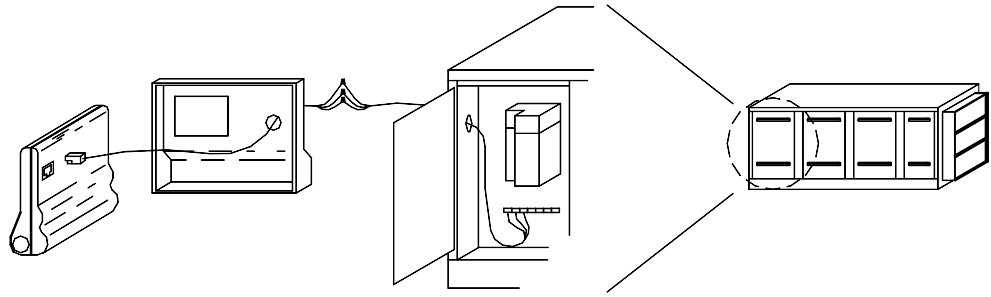


Figure 1. Connecting the ZT to the Dehumidifier.

If you must remove the Zone Terminal from the bracket, insert a large flat-blade screwdriver between the bracket and the bottom of the ZT. While prying upward and outward, gently pull the ZT from its bracket.

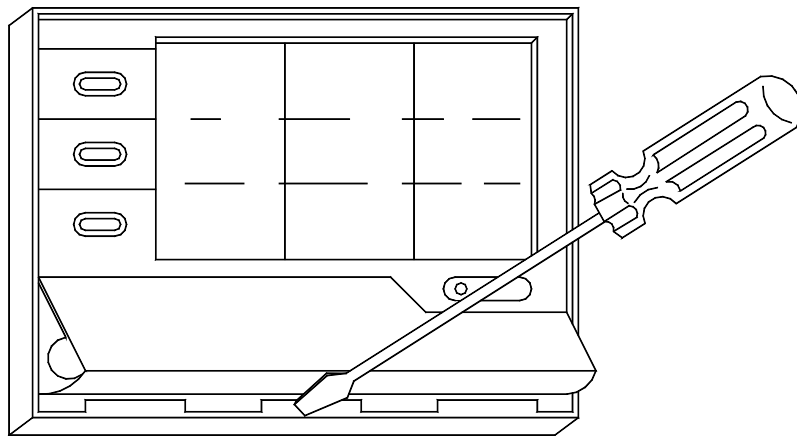


Figure 2. Removing the Zone Terminal from its Mounting Bracket

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## 2. Using And Adjusting The Controller

### 2.1. Overview

The standard ClimateMaster microprocessor controller, the Johnson Controls Metasys, is a powerful, flexible controller with many useful features, including:

- Display of room air temperature, relative humidity, and pool temperature;
- Display of equipment operating status such as dehumidification, cooling, and pool water heating modes;
- Display of alarms on abnormal conditions such as sensor failures or tripped safety controls;
- An optional seven-day occupancy timer which can control outdoor air dampers (if used) to bring in fresh air when the pool room is occupied;
- A convenient, easy-to-understand person/machine interface, which allows the operator to view and change set points and time schedules. This interface, or "Zone Terminal," can be installed up to 500 feet away from the dehumidifier.

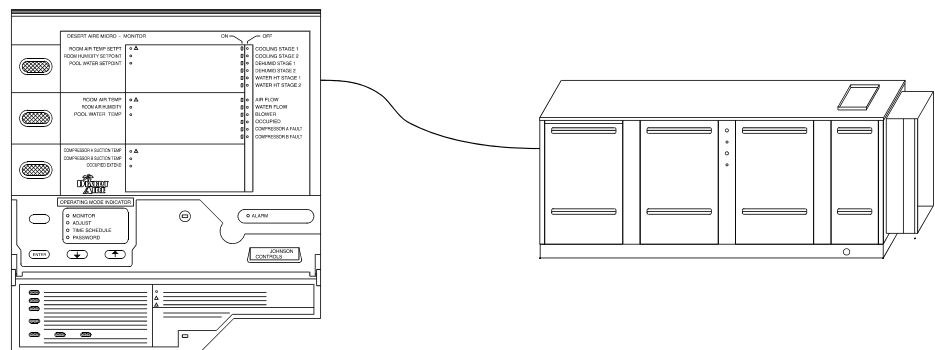


Figure 3. The ClimatMaster Zone Terminal.

## 2.2. Reading Data and Adjusting Set Points

The Zone Terminal allows the operator to monitor and adjust the setpoints of the ClimateMaster dehumidifier. The ZT display area, shown in Figure 6 is divided into three sections. Each of the sections has a selector button, which lets the user scroll through each point located in the display item list. As the user presses the display key, the display cursor dot shows which point is being monitored.

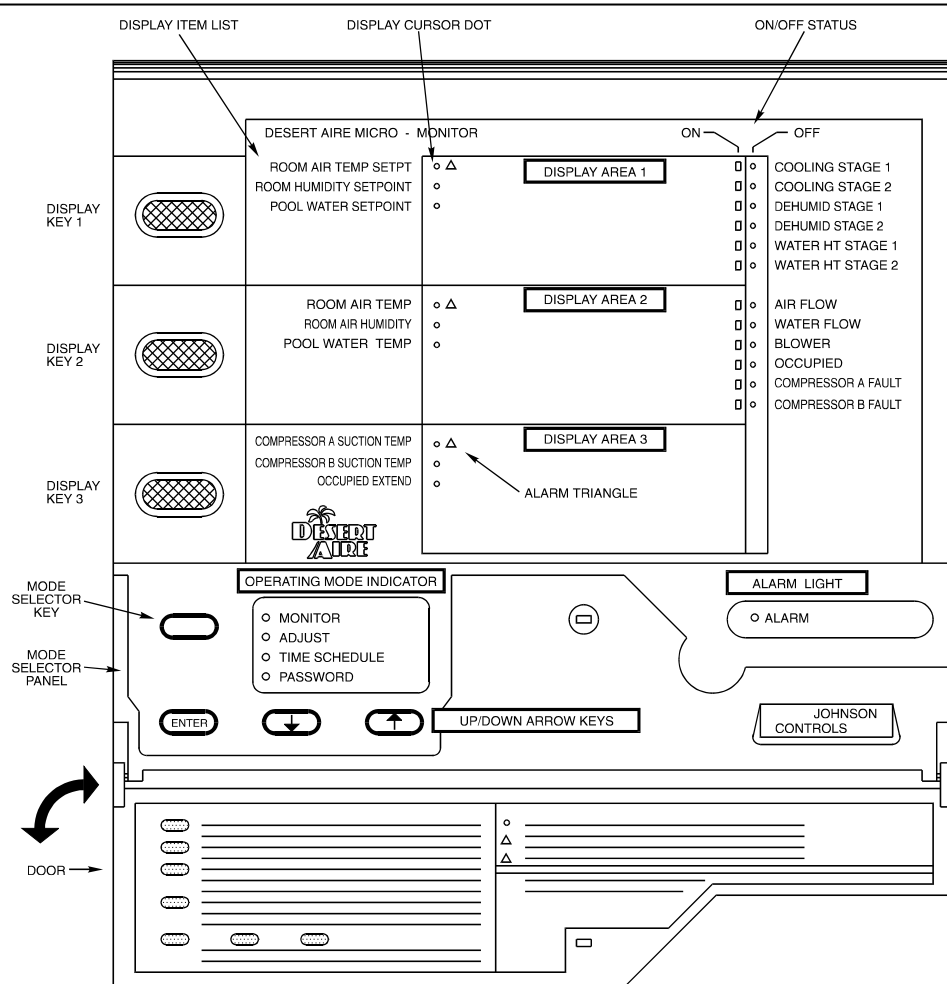


Figure 4. A Typical Zone Terminal.

**Display Area 1** is located at the top of the ZT. The following points are typically found in this display area (each ZT may vary slightly depending on the application):

- **Room Temperature**
- **Room Humidity**
- **Pool Water Temperature (optional)**

**Display Area 2** is located at the center of the ZT. The following points are typically found in this display area:

- **Air Heating Set Point**
- **Air Cooling Set Point**
- **Room Humidity Set Point**
- **Pool Water Inlet Temperature Set Point (optional)**

Note that the air heating set point must be set at the same temperature or lower than the air cooling set point to prevent wide temperature swings.

**Display Area 3** is located at the bottom of the ZT. The following points are typically found in this display area:

- **Air Heating Differential or Proportional Band**
- **Air Cooling Differential or Proportional Band**
- **Room Humidity Differential or Proportional Band**
- **Occupied Extend (optional)**

The Occupied Extend feature extends the regular time schedule on dehumidifiers equipped with an outdoor air intake option. The ClimateMaster controller can be programmed for the times the conditioned space will be occupied and will require code amounts of outdoor air. If a pool will be open late (for a meet, for example), the calendar does not need to be reprogrammed.

*Assume it is now 4:00 P.M. and the meet will last until 10:00 P.M. You must set the Occupied Extend timer for 6 hours.*

The right side of the ZT consists of On/Off status indicators. A "1" in the **on/off status area** indicates that an item is **on**. A "0" indicates that the item is **off**. The items are normally arranged as follows (each ZT may vary slightly):

Cooling Stage 1:	A "1" indicates that there is a demand for first stage cooling.
Dehumidification Stage 1:	A "1" shows that there is a demand for first stage dehumidification.
Water Heating Stage 1:	A "1" indicates a demand for first stage pool water heating, handled by the condenser inside of the dehumidifier.
Water Heating Stage 2:	A "1" indicates that there is a demand for second stage pool water heating. This is handled by an auxiliary water heater external to the dehumidifier.
Blower:	A "1" shows that the supply air blower is commanded on.
Occupied:	A "1" shows that the dehumidifier is in the occupied mode. This point controls the operation of the outdoor air intake damper and exhaust air blower.
Compressor Fault:	A "1" shows that one of the safety controls for the compressor has tripped.

Opening the door on the bottom of the ZT reveals the **operating mode indicator** section. The following items can be seen in this area:

- A. Monitor**
- B. Adjust**
- C. Time Schedule**
- D. Password**

#### **A. Monitor**

The *monitor* mode allows the user to scroll between and view any of the points in the *display area* or the *on/off status area*. Set points cannot be overridden in the *monitor mode*.

#### **B. Adjust**

The set points can only be changed in the *adjust* mode. To change set points press the *mode selector* key until the green LED next to the *adjust* field is illuminated. You can now change any adjustable set points.



Assume that the pool temperature set point is set at 79 °F, and you want to change its temperature set point to 82 °F.

1. Open the access door on the bottom of the ZT.
2. Press the *mode selector* key to move the green LED to the *adjust* field.
3. Press *display key 1* to move the black indicator dot to *water temperature set point*. You will notice that the large numerals in the first field will begin flashing.
4. Press the *up arrow* key to increase the set point to 82 °F.
5. Press the *enter* key. Note that your changes will not be saved unless you *enter* those changes.
6. To leave the *adjust* mode, press the *mode selector* key to move the green LED to the *monitor* position. The numerals will stop flashing and your new set points will be entered into the system.

Changing the set points may alter the evaporation rate of a pool or an industrial process, and can affect the moisture removal rate of the dehumidifier. Set points should be altered by qualified personnel only!

### **C. Time Scheduling**

The ZT has a time scheduling feature which allows you to program the times the conditioned space will be occupied. This feature controls the optional outdoor air intake on ClimateMaster dehumidifiers so that fresh air will be brought in only when the space is occupied.

While the standard ZT schedule is based upon a 7-day week, the occupancy times can be rescheduled for holidays or can be temporarily overridden on a daily basis.

Program the schedule by placing a special template over the display screen of the ZT.

The scheduling template is packaged with the Zone Terminal. In the event of a lost or misplaced template, there is an exact duplicate on page 20. Please do not cut it out of the manual, instead make a photocopy.

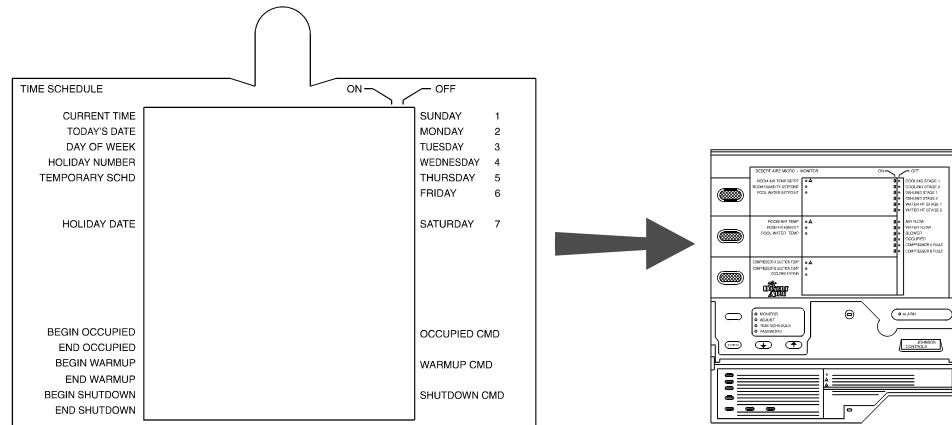


Figure 5. The Zone Terminal Time Scheduling Template.

1. Flip open the small door at the bottom of the ZT. Then, press the *mode selector* key until the green LED next to *time schedule* is illuminated.
2. Press *display key 1* until the *display cursor dot* in *display area 1* is next to current time. Use the *up arrow*, *down arrow*, and *enter* keys to set the current time.
3. Next, press *display key 1* until you reach the field labeled today's date. Use the *up arrow*, *down arrow*, and *enter* keys to set the current date. Once you have entered the time and date, you will not have to re-enter them again until you reset the clock for daylight savings time.
4. Now you are ready to program the 7-day weekly schedule. Press the *mode selector* key until the green LED next to time schedule is illuminated. Press *display key 1* until the *display cursor dot* in *display area 1* is next to day of week. Use the *up arrow*, *down arrow*, and *enter* keys to move to Sunday.
5. Next, press *display key 3* until you reach the field labeled begin occupied. Use the *up arrow*, *down arrow*, and *enter* keys to set the time the pool will open on Sunday.
6. Then, move to the end occupied field and enter the time that the pool will close on Sunday. Next, disable the shutdown mode by entering "24:00" in the begin shutdown field and "00:00" in the end shutdown field. Repeat this process for each day of the week.
7. The *warm-up* command will not be used for your application!

Although you will primarily use the 7-day schedule, there may be times when you need additional flexibility. If the space will be unused (during a holiday, for example)

you may want to prevent the dehumidifier from bringing in outdoor air. To do this, press the *mode selector* key until the green LED next to time schedule is illuminated.

1. Place the scheduling template over the face of the ZT. Press *display key 1* until the *display cursor dot* in *display area 1* is next to holiday number. Enter a holiday number (you can choose up to ten holidays), and then enter the holiday date.
2. Next, enter the begin and end occupied times. Finally, disable the shutdown mode by entering "24:00" in the begin shutdown field and "00:00" in the end shutdown field.

There may also be occasions when you must override the weekly schedule for only one day (due to a swim meet or unscheduled overtime, for example). To do this, place the scheduling template over the face of the ZT. Press the *mode selector* key until the green LED next to *time schedule* is illuminated.

1. Press *display key 1* until the *display cursor dot* in *display area 1* is next to *temporary schd.*
2. Enter the date you want the schedule overridden into the holiday date field. Next, enter the begin and end occupied times.
3. Finally, disable the shutdown mode by entering "24:00" in the begin shutdown field and "00:00" in the end shutdown field.

#### **D. Password**

The ZT can be protected with a three-digit password so that unauthorized users will not be able to change its set points. This feature, which must be set at the factory, is normally not used since it is inconvenient for the end users.


Time Schedule		On	Off
Current Time	  Cut Out This Area		Sunday 1
Today's Date			Monday 2
Day Of Week			Tuesday 3
Holiday Number			Wednesday 4
Temporary Schedule			Thursday 5
			Friday 6
			Saturday 7
Holiday Date			
Begin Occupied			Occupied Command
End Occupied			
Begin Warmup		Warmup Command	
End Warmup			
Begin Shutdown		Shutdown Command	
End Shutdown			

Figure 6. Copy of the Zone Terminal Scheduling Template.

## 2.2.1 Troubleshooting the Zone Terminal

<b>Problem</b>	<b>Solution</b>
Display stays blank after ZT is connected to main controller	No power is getting to the ZT. Check field wiring between ZT and controller
Display shows only dashes	ZT is not communicating with main controller. Check field wiring between ZT and controller.
Display shows "9999"	An entered number is too large to display.
Display shows "-9999"	An entered number is too small to display.
Display shows "Err 01"	Internal RAM or processor error.
Display shows "Err 02"	External RAM error.
Display shows "Err 03"	EPROM error.
Display shows "Err 04"	ROM error.
Display shows "Err 05"	Dead battery.
Display shows "Err 06"	Battery-backed RAM error.

For errors 01, 02, 03, 04, and 06; re-power the ZT several times by unplugging and reconnecting its phone jack connection. If the error persists, simultaneously press *display key 1* and the *down arrow* key to run the ZT diagnostics. All of the LCD segments light up if the ZT passes its self-test. If the ZT passes, press *display key 1* twice and follow the prompts.

For error 05; battery backup has been lost. A dead battery will cause the time schedules to be erased when power to the ZT is interrupted. However, the controller instructions are stored in nonvolatile memory and will not be harmed. Press *enter* to restart the ZT. Replace the battery with a Panasonic lithium or Ray-O-Vac BR2325 type battery.

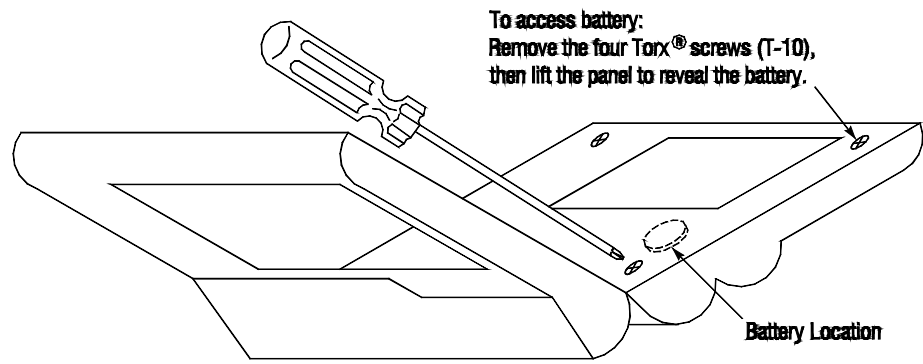


Figure 7. Replacing the Zone Terminal Battery.

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If the ZT fails its self-diagnostic test, consult the ClimateMaster Service Department at (405) 745-6000

OUTDOOR AIR TEMP/HUM SENSOR  
JOHNSON HE-6320-2  
FACTORY-INSTALLED IN O/A INTAKE

SUPPLY AIR TEMP SENSOR  
INSTALLED IN SUPPLY AIR  
DOWNSTREAM FROM AUX HEATER

OPTIONAL ZONE AIR TEMP SENSOR  
JOHNSON A99BC-25C  
FIELD-INSTALLED IN CONDITIONED SPACE  
(ZONE RESET OF SUPPLY AIR TEMPERATURE CONTROL UNITS)  
REFER TO I&O MANUAL FOR FIELD SENSOR  
INSTALLATION GUIDELINES.

SUPPLY AIRFLOW STATUS INPUT  
CLOSES DURING FLOW TO ENABLE  
AIR HTG, CLG, & DEHUM

FAULT STATUS INPUT  
CLOSES ON FAULT INITIATED BY  
EXTERNALLY INDUCED MALFUNCTION

OCCUPANCY CONTACT (FIELD PROVIDED WHERE  
ZONE TERMINAL TIMER IS NOT EMPLOYED)  
CLOSES ON OCCUPANCY TO  
ENABLE AIR HTG, CLG, & DEHUM

24 VAC POWER FROM  
TRANSFORMER 2

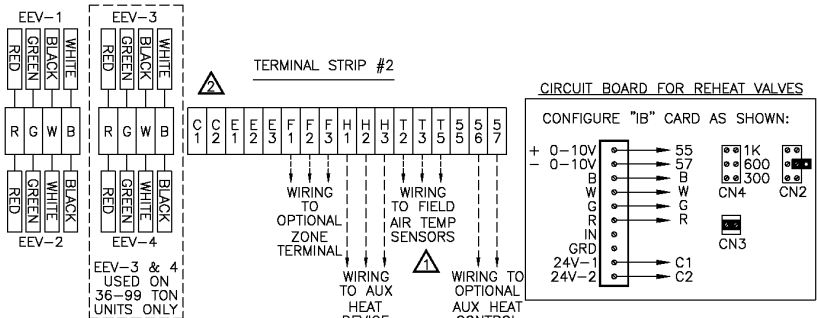
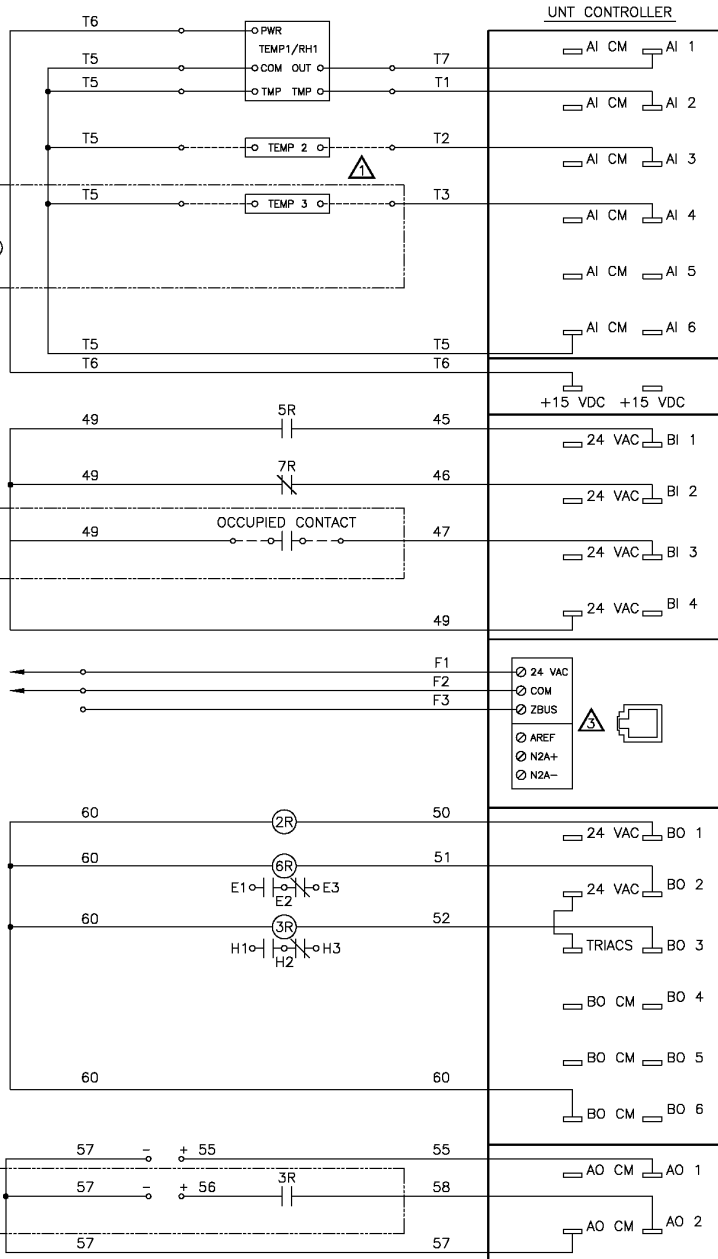
REFRIGERATION RELAY  
ENERGIZES ON CALL FOR  
COOLING OR DEHUMIDIFICATION

OCCUPANCY RELAY  
ENERGIZES WHEN SPACE IS OCCUPIED PER ZONE  
TERMINAL TIMER OR FIELD INSTALLED BI3 INPUT  
(DRY CONTACTS PROVIDED ON NON-WHEELED UNITS ONLY)

HEATING RELAY  
ENERGIZES ON CALL FOR HEATING VIA  
HEAT PUMP, SCR CONTROLLED ELECTRIC HEAT,  
GAS HEAT, OR AUX HEATING DEVICE BY OTHERS

SIGNAL TO ELECTRONIC REHEAT VALVES  
0-8 VDC SIGNAL INCREASES  
TO INCREASE SUMMER HEATING  
(HEAT PUMP IS 0-10 VDC SIGNAL)

SIGNAL TO AUX HEAT CONTROL (OPTIONAL)  
0-10 VDC SIGNAL INCREASES  
TO OPEN VALVE OR ENERGIZE  
SCR TO ITS MAXIMUM HEAT POSITION



- NOTES**
- ⚠ LAT CONTROL: INSTALL LAT TEMP SENSOR ONLY.
  - ⚠ ROOM RESET OF LAT: INSTALL BOTH TEMP SENSORS.
  - ⚠ ADDITIONAL BLOCKS AND JUMPERS MAY BE ADDED AS NECESSARY FOR MARKED DEVICES OR TERMINAL POINTS WITH MULTIPLE WIRES. UNUSED POINTS MAY BE REMOVED.
  - ⚠ ZONE TERMINAL AND N2 BUS MUST NOT BE CONNECTED SIMULTANEOUSLY. SEE I&O MANUAL FOR CONNECTION DETAILS.

**LEGEND**

—	FACTORY WIRING FROM COMPONENT TO T. STRIP
---	OPTIONAL OR MODEL DEPENDANT COMPONENTS
---	LOW VOLTAGE FIELD WIRING

REV.	DESCRIPTION	DATE	INITIALS	ECH #	TITLE	DESCRIPTION	SYSTEM	SCALE	SHEET	DATE	REV.
3	REMOVED OBSOLETE CONTROLS OPTIONS	06/16/06	AH	1201	HEAT PUMP DIGITAL CONTROL SCHEMATIC	STANDARD JCI MICROPROCESSOR CONTROLLER	2-99T HRZ	N/A	1	10/30/02	3
4	ADD LAT RESISTOR	10/30/02									
3	ADDED T4 NOTE	10/14/02									

