



INSTALLATION, OPERATION, AND MAINTENANCE MANUAL AND DDC SYSTEM USER MANUAL FOR INDIRECT AND INDIRECT/DIRECT EVAPORATIVE COOLING UNITS

ATTENTION: READ THIS MANUAL AND ALL LABELS ATTACHED TO THE UNIT CAREFULLY BEFORE ATTEMPTING TO INSTALL, OPERATE OR SERVICE THESE UNITS! CHECK UNIT DATA PLATE FOR TYPE OF GAS AND ELECTRICAL SPECIFICATIONS AND MAKE CERTAIN THAT THESE AGREE WITH THOSE AT POINT OF INSTALLATION. RETAIN FOR FUTURE REFERENCE.

FOR YOUR SAFETY

The use and storage of gasoline or other flammable vapors and liquids in open containers in the vicinity of this appliance is hazardous.



FOR YOUR SAFETY

If you smell gas:

1. Open Windows
2. Don't touch electrical switches.
3. Extinguish any open flame.
4. Immediately call your gas supplier.

WARNING: Improper installation, adjustment, alteration, service or maintenance can cause property damage, injury or death. Read the installation, operating and maintenance instructions thoroughly before installing or servicing this equipment.

WARNING

Install, operate and maintain unit in accordance with manufacturer's instructions to avoid exposure to fuel substances or substances from incomplete combustion which can cause death or serious illness. The state of California has determined that these substances may cause cancer, birth defects, or other reproductive harm.

INSTALLER'S RESPONSIBILITY

Installer Please Note: This equipment has been tested and inspected. It has been shipped free from defects from our factory. However, during shipment and installation, problems such as loose wires, leaks or loose fasteners may occur. **It is the installer's responsibility to inspect and correct any problems that may be found.**



SECTION I - FOREWARD

As is the case with any fine piece of equipment, care must be taken to provide the proper attention to the operation and maintenance details of this machine.

This manual **along with the burner IOM (if applicable)** has been prepared in order for you to become well-acquainted with those details, and in doing so, you will be able to give your Indirect or Indirect/Direct Evaporative Cooling System the care and attention which any piece of equipment needs and deserves.

It is the customer's and installation personnel responsibility to determine if the unit is equipped with all of the safety devices required for the particular application. Safety considerations include the accessibility of the unit to non-service personnel, the provision of electrical lockout switches, maintenance procedures and automatic control sequences. Clearly mark all emergency shutoff devices.

Table of Contents

Section I: Foreword, Table of Contents, and Important Notice	2
Section II: General Information	3
Section III: Installation.....	4
Section IV: Pre-Start Up	9
Section V: Unit Start Up.....	10
Section VI: Unit Shut Down.....	11
Section VII: Troubleshooting Guide.....	12
Section VIII: Maintenance Schedule and Lubrication Requirements.....	18
Section IX: Replacement Parts.....	20
Section X: Aztec DDC System User Manual	21

IMPORTANCE NOTICE

Aztec assumes no responsibility for loss or damage in transit; therefore, you should protect yourself by following these instructions:

Bill Of Lading

Save your bill of lading. It is a contract, and you will need it, provided you have to file a loss or damage claim. Remember, claims are outlawed after nine months.

Loss In Transit

Before you sign for this shipment, check against the bill of lading, also the transportation company's delivery ticket. Make sure that you get the exact total of articles listed. Should the delivery ticket show more or less items than are offered, then the carrier's agent must mark the difference on your freight bill before you sign.

Visible Damage In Transit

If anything is damaged, accept the shipment only if the carrier's agent places a notation on your freight bill explaining the nature and extent of damage. Upon inspection of article, make claim to the delivering carrier.

Concealed Damage In Transit

Sometimes transit damage is not noticed until the goods are unpacked. In such cases, notification to the carrier must be made within fifteen (15) days of receipt of shipment. In such cases, save the packages and packing material, then notify the transportation company at once, and request an inspection. When the inspector calls, have him make out and leave a "concealed" bad order report. He is obliged to give one to you. Insist on it.

Disposition Of Damaged Articles

Never return damaged articles to us. They are the property of the transportation company when the claim is filed. They will give you disposition instructions.

Packing

We comply with the packing requirements of the transportation companies, and your bill of lading proved that everything was in good condition when shipped. That bill of lading contract requires them to deliver in perfect condition.

SECTION II - GENERAL INFORMATION

A. Purpose

The purpose of this manual along with the burner IOM (if applicable) is to present a guide for proper installation, maintenance, and operation of the Indirect or Indirect/Direct Evaporative Cooling System, and to supplement, **but not to replace**, the services of qualified field service personnel to supervise the initial start-up and adjustment of the unit. Persons without previous experience with large commercial and industrial equipment should not attempt the initial adjustment and checkout procedure which is essential before such installations may be considered ready for operation. This manual should be made readily available to all operating personnel as an aid in troubleshooting and proper maintenance. Due to the custom nature of this equipment, not all possibilities are addressed in this manual. The customer or installer can obtain specific unit information from the local sales representative or by contacting the factory directly.

WARNING: Failure to comply with general safety information may result in extensive property damage, severe personal injury or death.

B. Shipping

Base Indirect or Indirect/Direct Evaporative Cooling units are shipped completely assembled where shipping limitations or job specifications allow. Any optional accessories shipped separately are shipped as assembled sections. Any wired accessories which have been disassembled for separate shipment require no additional conduit or wire for field reassembly. All wire leads will be tagged for ease of reconnection in the field.

If the unit and/or accessories cannot be installed immediately, they should be stored in a clean dry environment. If this is not possible and the unit must be stored outdoors, it should be protected from the weather with tarpaulins or plastic coverings. Do not assume that simply covering a unit will keep insects, dust and condensation out

of the unit and critical components. Rotate the fan(s) monthly. Prior to beginning installation of a unit that has been in storage for weeks or months, the unit and its components should be closely inspected.

Shipments are made F.O.B. Dallas, Texas by flat-bed truck. The unit is securely strapped, tied, and blocked to prevent shipping damage. All shipments are checked by an inspector before they are accepted by the carrier. Parts that are shipped unmounted are noted on the bill of lading. These parts, where feasible, are packaged and shipped with the units. Upon receipt of shipment, all units should be checked against the bill of lading to insure all items have been received. All equipment (and any optional accessories) should be checked carefully for physical damage in the presence of the carrier's representative. If parts are missing or damage has occurred, a claim should be filed immediately with the carrier.

All Indirect or Indirect/Direct Evaporative Cooling Systems are given a complete operations test and control circuit checkout before shipment. Copies of the wiring diagram, piping diagram and bill of material are included with each unit shipped. If correspondence with the factory is necessary, please provide the unit model and serial number.

C. Optional Factory Service

Periodic service on any piece of mechanical equipment is necessary for efficient operation. A nationwide service support network is available to provide quick and dependable servicing of make-up air, heating, ventilating, or air handling types of equipment. Factory start-up service is also available which includes the presence of a service engineer to supervise the initial start-up and adjustment of the equipment and provide instructions for the owner's maintenance personnel in proper operations and maintenance. Consult factory for quotations on start-up or periodic service.

SECTION III - INSTALLATION

All electrical connections must conform to the current edition of ANSI/NFPA No. 70 National Electrical Code and applicable local codes. The following recommendations are not intended to supplant any requirement of federal, state, or local codes having jurisdiction. Authorities having jurisdiction should be consulted before installations are made. Local codes may require additional safety controls and/or interlocks.

All installations in airplane hangers must be in accordance with current ANSI/NFPA No. 409. All installations in public garages must be in accordance with current NFPA No. 88A and NFPA No. 88B.

A. Handling the Equipment

As explained previously, the basic unit is designed for shipping in one piece where shipping limitations allow. Some optional accessories may require field mounting.

The Indirect or Indirect/Direct Evaporative Cooling System has been designed for rigging and handling through the use of special lifting lugs installed on the top and/or sides of each unit. When unloading and setting the unit, use the lifting lugs provided as shown in Drawing #C000737 or move the equipment on rollers. Hooks, jacks, or chains must not be used around the casing, main control panel or exterior mounted controls.

During transit, unloading and setting of the unit, bolts and nuts may have become loosened. It is recommended that all nuts and set screws be tightened. Turn fan shaft by hand to make certain that blower does not rub against blower housing, and that set screws are tight. If units are not set immediately, cover all openings that might be exposed to the weather.

Open the cover on the electrical control box located on the unit. Inspect all wire terminals and wiring terminations to ensure that all connections are tight.

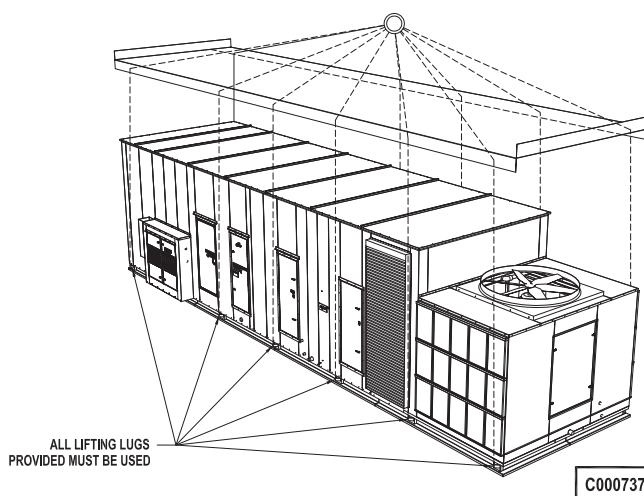
Rotate fans monthly.

IMPORTANT: Lift and install the modules or sections of a unit separately. Flange connections provided between modules or sections are not structural and damage will occur if any attempt is made to lift modules that have been flanged together.

See the specification sheet and submittal drawing for unit or section weight and to determine proper orientation for each section.

When unloading sections and/or units or moving equipment to its final location, exercise care to avoid distortion. Lift sections and/or units only by the lifting lugs provided and follow the procedures as outlined below.

RIGGING AND MOUNTING DATA - INDIRECT OR INDIRECT/DIRECT EVAPORATIVE COOLING UNITS



WARNING: To insure that a proper unit lift is made, lift unit approximately 24 inches and verify proper center of gravity lift point. To avoid dropping of unit, reposition lifting point if unit is not level. Failure to properly lift unit could result in death or serious injury or possible equipment or property-only damage.

A spreader bar must be used to span over the unit for each pair of lifting lugs provided in order to avoid overstressing and damaging the unit's structure. Position the unit over the roof curb, platform or mounting pad and slowly lower into place. Once the unit is in place, carefully remove lifting cables and spreader bars. Do not allow the crane's hook, the spreader bars or lifting cable to fall on the unit.

B. Locating the Unit

Prior to locating the unit, authorities having jurisdiction should be consulted before installations are made. Approval permits should be checked against the unit received.

If in doubt regarding the application of this appliance, consult the factory.

Locate the unit exactly level. Special attention should be given to the duct, electrical, water, and fuel connection points. The minimum clearance to combustible material must be maintained as listed in Table 1.

Table 1

Minimum clearance to combustible material, also consult local codes and regulations.

Clearances to Combustible Material	
	Horizontal Units
Front*	36 inches
Rear	6 inches
Right	6 inches
Left	6 inches
Top	12 inches
Floor	6 inches

*Consider control side as front of unit.

**Optimum clearance for coil removal would be equivalent to cabinet width.

Make a visual inspection to insure no damage has occurred to the unit during installation.

C. Curb Mounted Units

Outdoor units can be supplied with an optional roof curb. The curb greatly facilitates installation thereby reducing installation costs. All connections to the unit: duct, piping, electrical power and control wiring can be made through the roof opening. The curb may be shipped prior to unit shipment. All curbs are shipped un-assembled from the factory.

Use extreme caution in handling the curb. Proper handling and positioning will assure a water-tight curb unit installation.

Re-check approval prints prior to installation. Be sure that there are no obstructions to ducting and that proper planning has been exercised in connection of piping and/or electrical services.

The curb assembly may be bolted or welded to either trusses or roof decking; however, connection to roof trusses is recommended. The curb is designed to carry the weight of the unit. Additional support is required for certain applications.

Placement of the curb is critical in squareness and leveling. Shims for leveling must be applied to the curb; application of shims to the unit will tend to destroy the sealing effect after installation. Make sure sealing tape is in place before unit is set. Be careful not to allow gaps where two pieces of sealing tape meet. A bubble level must be used in the leveling process. Measure across diagonals to check for squareness. Allowable tolerance is 1/4" difference between diagonal measurements. Double-check approval prints before setting the unit.

Upon completion of setting the curb, apply roofing material and flashing as required. Refer to your unit roof curb drawing.

D. Location of Accessories

Where applicable, standard or optional accessories will be placed inside the fan section of the unit for shipment, and must be removed and installed by the mechanical or electrical contractor. Remotely located discharge or inlet dampers must be equipped with an end switch and interlocked to insure maximum design opening before starting and running circuits may be energized.

Field constructed intake accessories should be properly designed to minimize the entry of rain and snow.

Adequate building relief must be provided, so as to not over-pressurize the building, when the unit is operating at its rated capacity. This can be accomplished by taking into account, through standard engineering methods, the structure's designed infiltration rate, by providing properly sized relief openings, by interlocking a powered exhaust system, or by a combination of these methods.

E. Electrical Connections

WARNING: Open all disconnect switches and secure in that position before wiring unit. Failure to do so may result in personal injury or death from electrical shock.

WARNING: Controls must be protected from water. Do not allow water to drip on the ignition system.

NOTE: Before installing any wiring, check the unit rating plate for supply power rating.

All electrical connections must conform to the current edition of: ANSI/NFPA No. 70 National Electrical Code and applicable state and local codes.

Since shipment of unit may require disassembly after factory check and test, reconnection of some electrical devices will be required in the field. Connect electrical wires (supplied in factory furnished conduit) to appropriate terminals. All leads are tagged to facilitate field connections. See wiring diagram provided with equipment. Complete all wiring to any optional accessories as shown on unit bill of material and electrical wiring diagram as required before applying voltage to the unit.

If damper actuators require field wiring, make sure the gasket and cover are securely mounted and assembly is watertight.

Entry location for all field-installed and control wiring is through the control panel.

If optional disconnect is not furnished with the unit, the field provided disconnect must be of the proper size and voltage. Refer to unit rating plate for minimum circuit ampacity and voltage. The disconnect must be installed in accordance with Article 430 of the current edition of ANSI/NFPA No. 70 National Electrical Code.

Check the supply voltage before energizing the unit. The maximum voltage variation should not exceed $\pm 10\%$. Phase voltage unbalance must not exceed 2%.

NOTE: Should any original wire supplied with the unit have to be replaced, it must be replaced with wiring material having a temperature rating of at least 105° C.

F. Field Piping

Water Piping

All water piping must be in accordance with project specifications and the requirements outlined in any applicable local, state, and national codes. Refer to drawing #C000751 for typical piping.

Insert a manual shut-off valve in the water supply line required for the unit's indirect evaporative section and, if provided, the direct evaporative section for each unit. Complete the piping to each section's 3/4" make-up water inlet.

Proper water quality and environmental conditions will give you long service life from your cooling tower and direct evaporative cooling unit. Significant deviation from "normal" conditions may have a bearing on longevity of the equipment.

"Normal" circulating water chemistry falls within the following limits:

- pH between 6.5 and 8.0.
- Chlorides (expressed as NaCl) below 750 ppm.
- Calcium (expressed as CaCO₃) below 1200 ppm - except in arid climates where the critical level for scale formation may be much lower.
- Sulfates below 5,000 ppm – if calcium exceeds 1200 ppm, sulfates should be limited to 800 ppm (less in arid climates) to prevent scale formation.
- Sulfides below 1 ppm.
- Silica (expressed as SiO₂) below 150 ppm.
- Iron below 3 ppm.
- Manganese below 0.1 ppm.
- No organic solvents.
- No organic nutrients which could promote growth of algae or slime.
- Chlorine (from water treatment) below 1 ppm free residual for intermittent treatment, below 0.4 ppm free residual for continuous chlorination.

Insert a manual shut-off valve in the drain line from each unit's indirect evaporative section and, if provided, the direct evaporative section's drain and indirect coil.

Interconnect the lines from each unit's indirect evaporative section and, if provided, the direct evaporative section's drain and indirect coil.

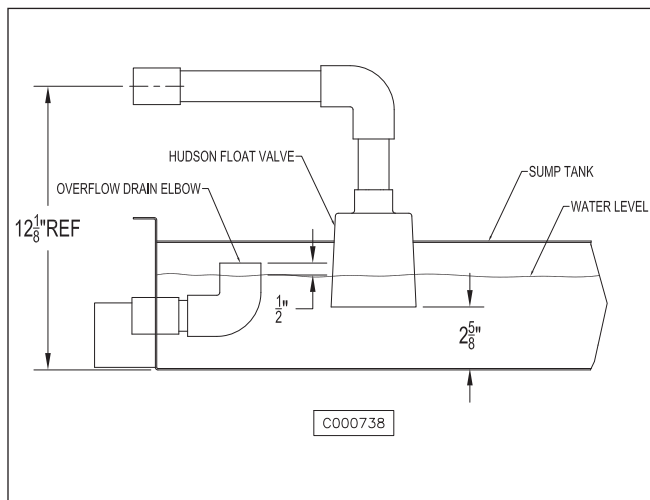
NOTE: The indirect evaporative section and, if provided, the direct evaporative section of every air handling unit are provided with an adjustable bleed valve that is plumbed to each section's overflow stand pipe. System drainage for the constant water bleed from each evaporative section must be provided.

Units are provided with a freeze protection and automatic drain down kit, install the solenoid valves in the following manner:

1. Install the normally closed and, if provided, the 1/2" or 3/8" normally open water fill line drain solenoid valve in the water supply line at a point not subject to freezing temperatures and complete the piping to the make-up water inlet connection provided on each unit.

2. Install a manual shut-off valve and the factory provided normally open solenoid valve in the line from the unit's indirect cooling coil and the indirect and direct evaporative section's sump drain connection.
3. Interconnect the line from the unit's indirect cooling coil and the indirect and direct evaporative section's sump drain connection to the indirect and direct evaporative section's overflow connection to form a common drain line and plumb to an appropriate drain. Install a P-Trap in the common drain line from the unit's indirect evaporative section and, if provided, the direct evaporative section drain and overflow connections. Provide the P-Trap height as shown in Drawing #C000659B.
4. For colder climates; be sure to provide means to completely drain the indirect cooling coil and the indirect and direct evaporative section sumps for freeze protection.
5. Solenoid valves, in addition to those referenced above may be provided in some applications. Refer to the wiring and piping diagrams provided with the unit for installation information.

Before electrically activating any section of the unit, fill the indirect evaporative section's and, if provided, the direct evaporative section's sump with water. Check the water level in the sump(s) and verify the setpoint level will not cause the sump to overflow. See Drawing #C000738 below for recommended float level adjustment. Adjust the height of sump water fill and level control valve (if necessary) based on variations of water supply line pressure. The depth of the water in the sump should be 1/2" below the top of the sump's overflow stand pipe.



For remote cooling towers, supplied either by Aztec or others, plumb the supply and return lines from the cooling tower to the coil inlet and outlet connections provided on the indirect cooling coil in each Aztec unit.

Building Pressure Transducer Piping (PT-13)

Pipe the high side to a location inside the building that will not be affected by air movement. Pipe the low side to the atmosphere, positioned so it will not be affected by the wind and not exposed to the elements. Be sure that all tubing is clean and clear of any debris before installing tubes on the transducer.

G. Duct Connection

Install duct work with adequate flexible connections to isolate vibration from the duct work. All duct work should have taped or caulked seams. Duct work should be properly sized so as not to inhibit airflow. This information should be cross-checked with the position of support beams and stand pipes to insure that clearance dimensions coincide with those of the unit.

H. Field Wiring and Remote Control Installation

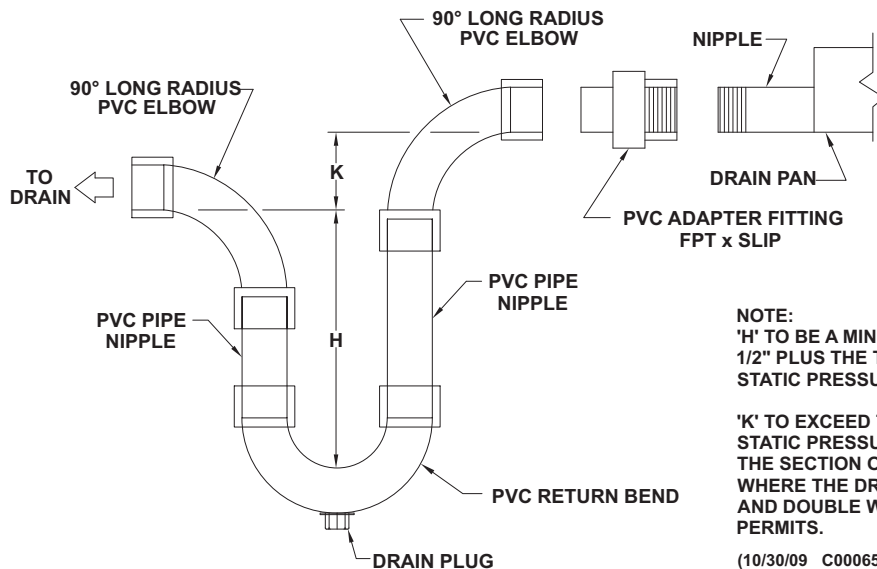
1. Connect the power lines to the line side of the main disconnect switch.
2. Mount and wire remote control panel, thermostats, temperature sensors, and any other field installed controls as indicated on the unit control wiring diagram.
3. Connect the wires to the appropriate field wiring terminals as indicated on the unit control wiring diagram.
4. Field wiring shall have a temperature rating of at least 105°C. The minimum size of the supply cable circuit shall be sufficient for the maximum ampacity of the unit.

I. Locating Temperature Controls

The room or outdoor sensors should be mounted where they will not be subjected to direct impact of the heated air or radiant heat from the sun. The side of building columns away from the heater or interior walls are usually the location best suited for mounting thermostats.

Controls with outdoor sensors require that the outdoor sensor be shielded from direct radiation from the sun. Unit mounted sensors are factory located and mounted.

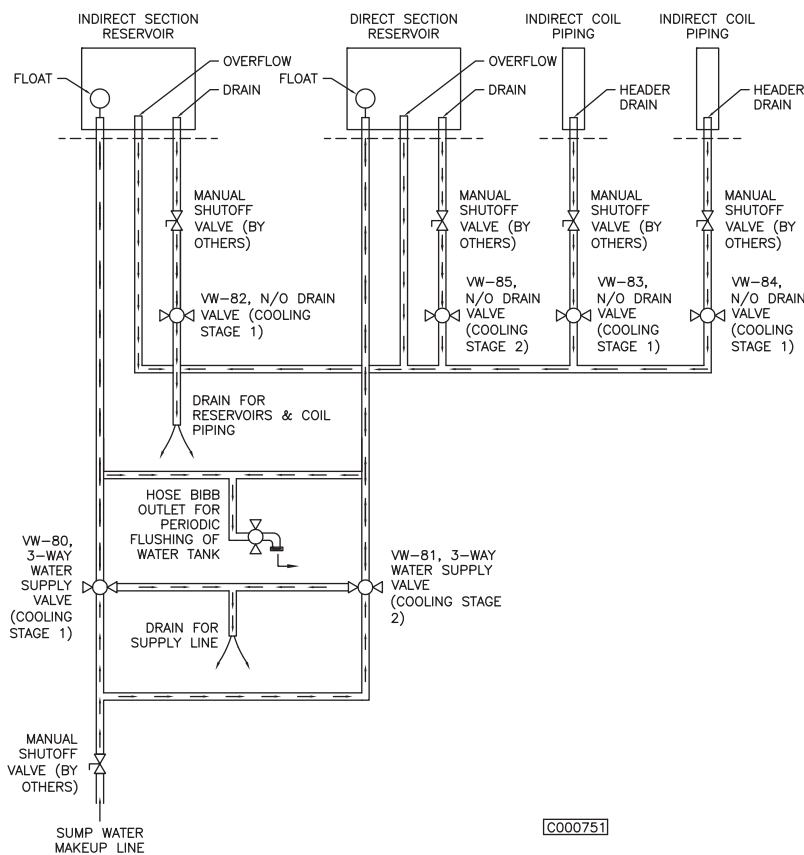
SUGGESTED P-TRAP DESIGN FOR CONDENSATE DRAIN PANS UNDER A NEGATIVE PRESSURE



NOTE:
 'H' TO BE A MINIMUM OF 1/2" PLUS THE TOTAL SYSTEM STATIC PRESSURE ("W.C.).

'K' TO EXCEED THE NEGATIVE STATIC PRESSURE IN "W.C. OF THE SECTION OF THE UNIT WHERE THE DRAIN IS INSTALLED AND DOUBLE WHEN SPACE PERMITS.

(10/30/09 C000659B)



EQUIPMENT LEGEND:

- VW-80, 3/4" NPT N/C 3-WAY VALVE FOR INDIRECT SUMP WATER MAKEUP.
- VW-81, 3/4" NPT N/C 3-WAY VALVE FOR DIRECT SUMP WATER MAKEUP.
- VW-82, 1" OR 1-1/2" NPT N/O SOLENOID VALVE FOR INDIRECT SUMP DRAIN LINE.
- VW-83, 3/8" NPT N/O SOLENOID VALVE FOR DRAINING INDIRECT COOLING COIL.
- VW-84, 3/8" NPT N/O SOLENOID VALVE FOR DRAINING ADDITIONAL INDIRECT COOLING COIL (ONLY EQUIPPED ON LARGER SIZE UNITS).
- VW-85, 1" OR 1-1/2" NPT N/O SOLENOID VALVE FOR DIRECT SUMP DRAIN LINE.

NOTES:

- ORDER OF CONNECTIONS SHOWN IN THIS DIAGRAM MAY NOT CORRESPOND TO ACTUAL ORDER OF CONNECTIONS ON THE UNIT CASING.
- ARROWS INDICATE DIRECTION OF WATER FLOW.
- P-TRAP IN MAIN DRAIN LINE IS REQUIRED.
- TO PREVENT THE WATER MAKEUP LINE FROM FREEZING, IT IS RECOMMENDED THE SOLENOID VALVE BE LOCATED BELOW THE ROOF LINE OF THE FACILITY OR BE INSULATED AND HEAT TAPED.
- SUGGESTED MANUAL SHUTOFF VALVES FOR ISOLATING AND BY-PASSING EACH SOLENOID VALVE FOR MAINTENANCE PURPOSES ARE NOT SHOWN IN THIS PIPING SCHEMATIC.
- LARGER UNITS MAY HAVE TWO (2) SOLENOID VALVES FOR DRAINING THE UNIT'S TWO (2) INDIRECT COOLING COILS.

MAINTENANCE:

IT IS RECOMMENDED THAT THE SUPPLY PIPING SYSTEM INCLUDE ONE HOSE BIBB OUTLET, CONVENIENTLY LOCATED IN THE ROOF, TO FACILITATE PERIODIC FLUSHING OF THE WATER TANKS.

DRAIN:

A GATE VALVE MAY BE ATTACHED DIRECTLY TO THE UNIT. DRAIN PIPING OF WASTE WATER MUST MEET LOCAL CODES. IN SOME CASES, IT IS CONVENIENT TO CARRY THE DRAIN LINE DOWN INTO THE BUILDING WITH THE VALVE LOCATED AT AN ACCESSIBLE POINT TO FACILITATE FREQUENT TANK DRAINING.

C000751

SECTION IV - PRE START-UP

Do not attempt start-up without completely reading and understanding this manual, along with the Burner IOM (if applicable).

Pre Start-Up

The owners representative or equipment operator should be present during start-up to receive instructions on care and adjustments of the equipment.

All equipment has been factory tested, adjusted, metered and inspected to meet conditions set at the time the order was placed. Only minimal adjustments should be required. All information in this service manual is typical. All products are semi-custom and changes may occur.

CAUTION: Line side of disconnect may be energized. Follow proper “lockout/tagout” procedures.

NOTE: All servicing and adjustments of the Indirect or Indirect/Direct Evaporative Cooling unit should be performed by a qualified service engineer.

Perform a visual inspection, internally and externally, to make sure no damage has occurred, that unit is level, and that everything is secure. This inspection is very important and should be completed with greatest care given to detail. A good pre-start inspection will insure against possible unit damage on start-up and will save valuable analysis time.

1. Check that the physical condition of the unit exterior is acceptable.
2. Check that the insulation inside of unit is properly secured.
3. Remove all shipping blocks, brackets and bolts from supply fan base with optional isolation base.
4. Check all terminals for loose connections and inspect all wiring terminations to insure that all crimped connections are tight.
5. Check set screws on all fans for tightness.
6. Check voltage supplied to disconnect switch; the maximum voltage variation should not exceed $\pm 10\%$. Phase voltage unbalance must not exceed 2%.
7. Check thermostat(s) for normal operation.
8. Check to ensure all manual reset safety devices have been reset and limits are in the normal operating position.
9. Check that system duct work is installed and free from obstructions.
10. Check that fans turn free in housing.
11. Check that the area in and around the unit is clear of debris or containers of flammable liquids.
12. Check that all piping connections, particularly unions, are tight and installed correctly.

13. Check that all accessories requiring field wiring have been properly installed and wired.
14. Check that filters, filter stops, accessories and ship loose items are installed correctly.
15. Motor overload relay setting (if applicable) should match the motor's nameplate full load amperage.
16. Check that dampers and linkages are free to move, and that linkages are tight.
17. **Do not run the pump without water in the sump of the indirect evaporative section cooling tower and, if provided, the direct evaporative cooling section.**
18. All float and liquid levels and bleed off rate are pre-set at the factory during final equipment testing and quality control inspection. However, these settings should be verified at the job site.
19. Depending on local water pressure, a pressure regulating valve may be required to stabilize the make-up water flow and the operation of the water fill and level control valve in the unit's indirect evaporative section and, if provided, the direct evaporative section.

This equipment has been tested prior to shipment. However, during transit control setpoints can change, and wiring can come loose. Do not assume controls are defective until all associated setpoints and wiring are checked.

If you do not have the optional BACview 6 (KP-01) keypad display it will be difficult to troubleshoot any alarm that may occur on the unit. To reset most alarms on the I/O FLEX 6126 Controller (UC-01) without a BACview 6 keypad display, simply turn the power off and back on at the unit disconnect. If you have a BACview 6 keypad display the alarm can be reset remotely or at the I/O FLEX 6126 Controller.

Suggested Tools and Instruments

Volt/Ohm Meter	Thermometer
Tachometer	Ammeter
Manometer (0-10" W.C.)	Microammeter
Standard Hand Tools	D.C. Volt Meter
Refrigeration Gauges (if applicable)	BACview 6

SECTION V - UNIT START-UP

Before attempting to start the unit read and understand the sequence of operations and electrical schematic, and the Burner IOM (if applicable).

WARNING: During installation, testing, servicing and troubleshooting of this product, it may be necessary to work with live electrical components. Have a qualified licensed electrician or other individual who has been properly trained in handling live electrical components to perform these tasks. Failure to follow all electrical safety precautions when exposed to live electrical components could result in death or serious injury.

Make sure all doors and service panels have been closed or replaced.

Check the indirect evaporative section's and, if provided, the direct evaporative section's sump low water level recirculating pump shutoff switch. The low level switch contact will be normally closed when the sump is filled with water. As this switch is not field repairable, replace if found defective.

Turn main disconnect switch off. Check the incoming line voltage to match unit rating plate rating. If voltage is over $\pm 10\%$ of nameplate rating or phase voltage unbalance is over 2%, notify contractor or power company.

Fans Are Enabled And Disabled By The Following:

MRT Expert or MDT Expert With A BACview (KP-01):
To **enable** the fans go to “Unit Modes” and enter [MANUAL], this mode will enable the fans.

To also **enable** the fans go to “Unit Modes” and enter [AUTO], this mode has four different functions that control the fans and unit operation. They are a Time Clock, Heating and Cooling Night Setbacks, and signal from an external source to an auxiliary digital input.

To disable the fans go to “Unit Modes” and enter [OFF].

NOTE: A BACview or PC is required to change Unit Modes.

If power supply meets requirements, turn main disconnect switch on and enable fans. Damper opens (if applicable). Blower fan turns on.

Disable the fans. Check supply blower for proper rotation.

NOTE: To change rotation of the cooling fan motor controlled by motor starter, simply interchange any two (2) of the line leads of the motor starter for three (3) phase motors. On single phase motors refer to motor nameplate. To change the rotation of any three phase motor controlled by a Variable Frequency Drive (VFD), interchange any two (2) of the load leads of the VFD.

Enable the fans. Check for proper blower rpm. Check that all motor amp draws do not exceed rating plate ratings and overloads are set to motor rating plate amps.

Cooling is Enabled By The Following:

MRT Expert or MDT Expert With A BACview (KP-01):
To **enable** the cooling, scroll through the “**Setpoints**” menu in the BACview and enter the desired room **Cooling Occupied and Unoccupied Setpoints**.

If the system’s airflow and static pressure are in accordance with the project specifications, check for water carryover from the direct evaporative section’s cooling media, if applicable. If carryover is observed; close, in small increments, the water flow balancing valve provided in the direct evaporative section’s recirculating pump riser until water carry over is eliminated. The leaving air side of the direct evaporative media should be damp from top to bottom.

NOTE: If adjustment is required, allow sufficient time to lapse between each, small incremental adjustment to the water flow balancing valve to permit stabilization of the evaporative media to the new water flow rate before making another adjustment.

The evaporative media may foam for a period following initial startup. Leave the water bleed off valve fully open until the foaming ceases. The water bleed off valve can then be re-adjusted to approximately 3 – 6% of the evaporative media’s water recirculation rate. The actual amount of bleed off required is dependent on the quality of water used and the rate of evaporation. As climate conditions change, the rate of evaporation may increase, thereby requiring an increase in the bleed off rate. It is recommended that the bleed

off rate be set for the condition of maximum water evaporation. An indication of insufficient bleed off is a uniform buildup of minerals on the entering air face of the evaporative media. If this condition is observed, increase the rate of bleed off until the mineral deposits dissipate. Repeated drying of the cooling media will also cause the rapid buildup of insoluble deposits.

Cooling Tower Setup: The water flow for cooling tower has been factory set and should require only minimal adjustments in the field. Use same steps for adjusting water flow, bleed-off rate, and initial foaming as listed above for direct evaporative section. The water flow over the cooling tower media is intended to be much higher flow rate than the direct evaporative media. It is common to have water carryover off of the media although the carryover is normally confined within the cooling tower section. If adjustment is deemed necessary; there are ball valves located in the inlet plenum to adjust water flow. Make small adjustments and make sure all of the inlet filters are in place and access panel is closed while unit stabilizes with each new setting.

Check all dampers for proper operation, and that the linkage does not bind and also see “Sequence of Operation” for damper control modes.

Disable the fans.

Safety Controls Check All

Firestats – These limit controls are not adjustable and are checked at the factory. Reset the red button(s) to be sure they are ready for operation. Contact factory if these switches fail to reset.

SECTION VI - UNIT SHUTDOWN

A. Extended Shutdown —

1. Disable the cooling for 30 seconds, then disable the fan.
2. Open the main electrical disconnect switch.
3. If the unit is to remain idle for an extended period, the blower and motor shafts should be rotated by hand to spread the grease over the bearings.
4. Drain sump(s) and shut-off all water valves.

B. Emergency Shutdown ONLY —

1. Open the main electrical disconnect switch.

SECTION VII - TROUBLESHOOTING GUIDE

The following is a simplified list of possible problems and typical causes and remedies. However, it does not cover all possibilities, and is intended as a guide only. You might also need to reference the Burner IOM if applicable.

WARNING: Many of the steps listed on the following pages require electrical cabinet and blower access while the unit is powered. High voltage and moving parts are present, and these steps should be performed by qualified service personnel. If any of the controls requiring manual reset were at fault this is an indication of a problem with the system that should be investigated.

Fan and Cooling Mode

Symptom	Cause	Remedy
<p>A. Supply air fan or cooling tower exhaust fan does not operate.</p>	<ol style="list-style-type: none"> 1. Low or no voltage. 2. Circuit breaker open or fuse(s) blown. 3. Customer interlock not closed or connected. 4. Fan is disabled. 5. Field installed controls open. 6. Freeze protection (Low Discharge Temperature) tripped. 7. BO-1 on UC-01 not energized (if applicable). 8. BO-4 on UC-01 not energized. 9. Damper motor not operating, it's end switch is not making, or the damper is binding. 10. Overload Protection on motor VFD and /or starter tripped. 11. Motor bearings seized. 12. Motor may be burned or incorrectly wired. 13. Motor overheating. 	<ol style="list-style-type: none"> 1. Check power source 2. Check and replace. 3. Close or connect customer interlock. 4. Enable the fan. 5. Check field installed controls for proper settings. 6. See sequence of operations. 7. See sequence of operations. 8. See sequence of operations. 9. Check for power at damper motor and that end switch has been wired correctly to the N.O. (normally open) contact. Check that the linkage is clear and not binding. 10. Push reset button and check amps. 11. Check and/or replace. 12. Turn off power and check motor and wiring. 13. Check motor amp draw.
<p>B. Inlet air damper or Return air/Outside air dampers operation not functioning properly (see sequence of operation for damper control).</p>	<ol style="list-style-type: none"> 1. Damper motor and/or end switch not wired correctly or defective. 2. Dampers binding and/or loose. 3. Building Pressure Transducer (PT-13). 4. Building Pressure Transducer (PT-13). 5. Building Pressure Transducer (PT-13). 6. Unit Control Module (UC-01) defective. 7. Unit Control Module (UC-01) not wired correctly. 8. Two position switch defective. 9. Damper motor defective. 	<ol style="list-style-type: none"> 1. Check wiring and/or replace end switch. 2. Check and/or replace. 3. Check and/or replace components. See section on troubleshooting PT-13. 4. Check wiring. 5. Install correctly. See section on troubleshooting PT-13 and manufacturer's cut sheet. 6. Check and/or replace. Contact Factory. 7. Check wiring. 8. Check and/or replace. 9. Check and/or replace.

SECTION VII - TROUBLESHOOTING GUIDE *continued*

Fan and Cooling Mode *continued*

Symptom	Cause	Remedy
C. There is no voltage at cooling relays (RE-34) and/or (RE-33) and fan is enabled.	<ol style="list-style-type: none"> 1. Cooling mode is disabled. 2. Variable Frequency Drive (FD-01) not running. 3. Air flow switch is open. 4. Cooling Changeover and/or Economizer Setpoints not set correctly. 5. BO-2 and/or BO-3 are not energized. 	<ol style="list-style-type: none"> 1. Enable the cooling mode. 2. Check VFD for faults. 3. Check for proper airflow. Adjust and/or replace switch. 4. Change to correct setpoints. See sequence of operation. 5. See sequence of operation.
D. Cooling relays (RE-34) and/or (RE-33) are energized and condensing unit or chiller are not on (if applicable).	<ol style="list-style-type: none"> 1. Cooling relays (RE-34) and/or (RE-33) are not closed. 2. Cooling relays (RE-34) and/or (RE-33) contacts are not wired correctly. 3. Compressors or chiller water pump is not running. 	<ol style="list-style-type: none"> 1. Check and/or replace. 2. Correct wiring. 3. See Troubleshooting Guide provided with condensing section or chiller.
E. Unit's discharge air flow rate has decreased or is below nameplate rating.	<ol style="list-style-type: none"> 1. Unit's supply air inlet filters are blocked or dirty. 2. System's external static pressure has increased or is higher than specified. 3. Building's exhaust fans are not operating or building's relief openings are not properly sized. 4. Direct evaporative cooling media is obstructed, dirty, or damaged. 5. VFD ramped down. 	<ol style="list-style-type: none"> 1. Clean or replace filters. 2. Correct or contact factory representative. 3. Power up exhaust fans or correct relief opening size. 4. Clean or replace media as required. 5. See sequence of operation.
F. Recirculating pump in direct or indirect evaporative section does not operate or the volume of water being recirculated is not sufficient.	<ol style="list-style-type: none"> 1. Water level in indirect or direct evaporative section sump is low. 2. Low sump water level switch is defective. 3. Customer interlock not closed or connected. 4. Recirculating pump may be internally grounded or have heat damage. 5. Pump basket screen is blocked. 6. BO-2 and/or BO-3 not energized. 7. Multiplex resistors are burnt. 	<ol style="list-style-type: none"> 1. Fill to proper level. 2. Check and/or replace. 3. Close or connect customer interlock. 4. Turn off power and check pump and wiring. 5. Clean screen if necessary. 6. See sequence of operation. 7. Check and/or replace.
G. White mineral deposits collecting on face of media in indirect or direct evaporative section.	<ol style="list-style-type: none"> 1. Water bleed rate is too low. 2. Low recirculating water flow rate. 	<ol style="list-style-type: none"> 1. Increase water bleed rate by opening the adjustable bleed valve provided. Minimum bleed off rate is 3-6% of the total water flow being recirculated. 2. Open the water flow balancing valve provided in the direct evaporative section's recirculating pump riser. The media is essentially self-cleaning with a water flow rate of 1.5 – 2 GPM per square foot of media pad top area. If water flow is increased, be sure to check again for water carry over.

SECTION VII - TROUBLESHOOTING GUIDE *continued*

Fan and Cooling Mode *continued*

Symptom	Cause	Remedy
H. Uneven water distribution over evaporative media surface.	<ol style="list-style-type: none"> 1. Evaporative media and/or media water distribution pad damaged or partially blocked. 2. Media water distribution header or orifices plugged. 	<ol style="list-style-type: none"> 1. Remove media and distribution pad. Clean and/or replace. 2. Remove media water distribution pad and clean header and orifices.
I. Water being carried over from the direct evaporative section.	<ol style="list-style-type: none"> 1. Localized media face velocity exceeding 500 FPM. 2. Evaporative media is damaged. 3. Too much recirculating water. 4. Average media face velocity exceeds 500 FPM. 5. Uneven water distribution over evaporative media. 	<ol style="list-style-type: none"> 1a. Inlet air filters are partially obstructed – Clean or replace filters as required. 1b. Inlet face of media is partially obstructed – Clean or replace evaporative media as required. 2. Check both faces of evaporative media for damage. Replace as required. 3. Adjust water flow rate to evaporative media until carryover stops by slowly closing the water flow balancing valve in the recirculating pump's riser. 4. Decrease air flow through air handler. 5. Clean evaporative media and/or water distribution header and/or orifices.
J. Cooling not functioning properly.	<ol style="list-style-type: none"> 1. UC-01 and/or relays not wired correctly or defective. 2. Setpoint is lower than design conditions. 3. Check outside wet bulb temperature. 4. Non uniform air flow across the face of the evaporative media in the direct evaporative section. 5. Incorrect water flow over direct section's evaporative cooling media. 6. Building exhaust air relief fan(s) are not operating. 7. Ventilation openings are closed or not properly sized. 8. Media pads are not uniformly wet. 9. Water flow rate from cooling tower pump has decreased. 10. Water temperature from cooling tower has increased. 	<ol style="list-style-type: none"> 1. Check wiring and/or replace bad components. 2. Adjust setpoints on BACview or with PC. 3. Abnormally high wet bulb temperatures will decrease performance. 4. Clean and/or replace dirty or damaged air filters. Check evaporative media for damage on entering and leaving air surfaces. Replace if necessary. 5. Open the water flow balancing valve provided in the direct evaporative section's recirculating pump riser. The recommended flow rate is 1.5 – 2 GPM per square foot of media pad top area. If water flow is increased, be sure to check again for water carry over. 6. Check power source. Close or connect interlock to operate fan(s). 7. Open for proper relief air flow. Check job specifications for proper sizing. 8. Check and clean evaporative media, water distribution pad, water distribution header and orifices. 9. Check pump and piping from tower to indirect cooling coil for blockage. 10. Check media in cooling tower for damage and also check water recirculation rate.

SECTION VII - TROUBLESHOOTING GUIDE *continued*

Fan and Cooling Mode *continued*

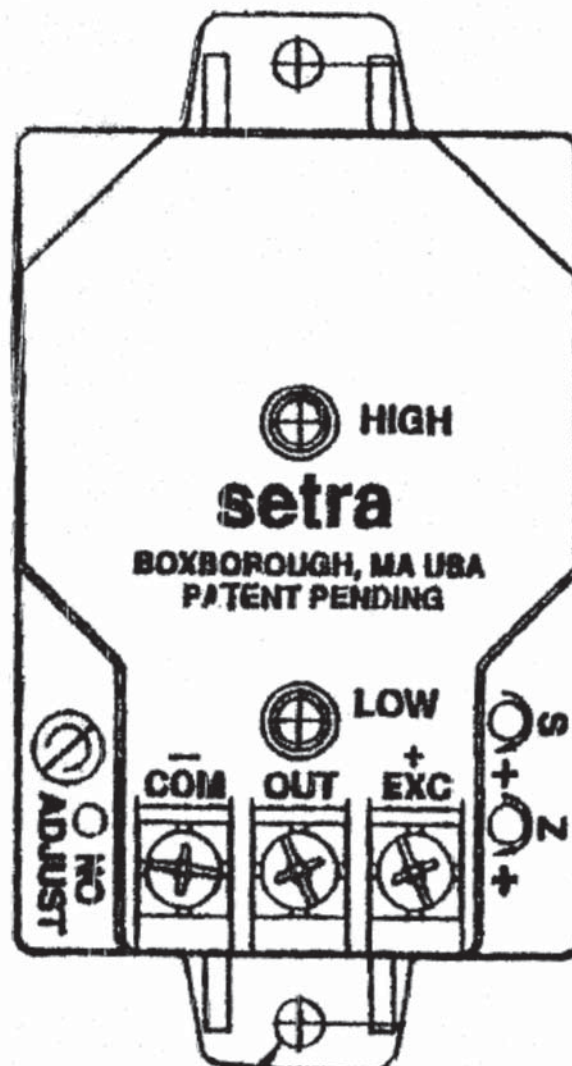
Symptom	Cause	Remedy
K. Excess water flow from the indirect or direct evaporative section's sump into the system drain.	<ol style="list-style-type: none">1. Check if adjustable water bleed off valve is open too far and bleed off rate is excessive.2. Verify that water level in indirect and direct evaporative section's sump is correct.3. Indirect or direct evaporative section's sump water fill and level control valve defective.	<ol style="list-style-type: none">1. Minimum bleed off rate is 3-6% of the total water flow being recirculated.2. Water level in the sump should be 1/2" below the top of the sump's overflow standpipe. See drawing #C000738 (in Section III - Installation) for reference.3. Repair or replace valve.

SECTION VII - TROUBLESHOOTING GUIDE *continued*

To Calibrate the Building Pressure Transducer (PT-13)

1. Remove the tubes at the Low and High pressure fittings.
2. The voltage at -COM and OUT should be 2.5 VDC. If not, adjust Z (do not adjust S).
3. **Make sure the Low and High fittings are clean and clear (do not insert any sharp objects into the pressure fittings). Make sure the tubing is also clean, clear of any debris and then reinstall the tubes on the transducer. It is very important that the High tube be placed inside the building, and positioned so that air movement does not affect it. The Low side should be to atmosphere, and positioned so it is not exposed to the weather.**
4. With the use of a BACview 6 (KP-01) place the unit in the Building Pressure mode. (See the DDC Control System User Manual).
5. The voltage at -COM and OUT will vary between 0 to 5 VDC. 0 VDC means the building is in a negative pressure and should open the Outside Air and close the Return Air damper. 5 VDC means the building is in a positive pressure and should open the Return Air Damper and close the Outside Air Damper.

PT-13		
SETRA P/N	MESTEX P/N	RANGE
26510R1WBABT1C	68.0330.69	± .1 IN WC



SECTION VII - TROUBLESHOOTING GUIDE *continued*

MULTIPLEXED VOLTAGE CHART (FOR INDIRECT/DIRECT SYSTEMS ONLY)

RESISTOR VALUE	RESISTOR ID	SWITCH CLOSED	OHMS IN CIRCUIT	VOLTS DC
1000	RS1	RS1,2,3,4	0	0
2000	RS2	RS2,3,4	1000	0.83
4020	RS3	RS1,3,4	2000	1.42
8060	RS4	RS3,4	3000	1.87
MULTIPLEXED VOLTAGE VALUES		RS1,2,4	4020	2.22
		RS2,4	5020	2.5
		RS1,4	6020	2.72
		RS4	7020	2.91
		RS1,2,3	8060	3.07
		RS2,3	9060	3.21
		RS1,3	10060	3.33
		RS3	11060	3.43
		RS1,2	12080	3.53
		RS2	13080	3.61
		RS1	14080	3.67
		NONE	15080	3.74
		UNPLUGGED	NA	4.98

IN-3	SW-11	RS-04	CLG STG 2 FLOAT SWITCH	= 2.91
	SW-10	RS-03	CLG STG 1 FLOAT SWITCH	= 3.43
	JUMPER	RS-02	NOT USED AT THIS TIME	= 3.61
	JUMPER	RS-01	NOT USED AT THIS TIME	= 3.67

CHECK ALL TERMINAL CONNECTIONS FOR TIGHTNESS

The DC voltage is to be checked at the UC-01 board.

When the cooling stage 1 float switch (SW-10) is energized, the contacts will close and the VDC at IN-3 & GND will be 3.43.

When the cooling stage 2 float switch (SW-11) is energized, the contacts will close and the VDC at IN-3 & GND will be 2.91.

When both the cooling stage 1 and 2 float switches (SW-10 & SW-11, respectively) are energized, the contacts will close and the VDC at IN-3 & GND will be 1.87.

SECTION VIII - MAINTENANCE SCHEDULE AND LUBRICATION REQUIREMENTS

WARNING: Failure to comply with the general safety information may result in extensive property damage, severe personal injury or death.

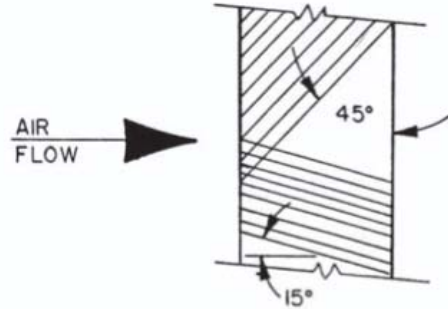
Periodic maintenance is essential to the efficient operation and extended service life of this equipment. Failure to provide maintenance as recommended may void the equipment warranty.

A. Maintenance Schedule

1. Daily
 - a. Check gauges, monitors, instruments and equipment settings.
2. Monthly
 - a. Check all set screens on fan and motor assemblies.
 - b. Check all valves, piping and connections for leaks.
 - c. Inspect filters and pump screens. Clean or replace as necessary.
 - d. Check all dampers, damper actuators and linkages. Adjust, lubricate and tighten if necessary.
 - e. Ensure that there are no obstructions blocking the air supply or discharge to the unit.
 - f. Inspect the area and make sure that no combustible or hazardous material has been stored within the clearances shown on the unit nameplate.
 - g. Check and clear all air sensing tubes and fittings. **CAUTION: To prevent damage to the unit, remove tubes from switches and transducers before using compressed air to blow through tubing.**
3. Quarterly
 - a. Complete the monthly maintenance schedule.
 - b. Check voltages and amp draw on main fan motor.
 - c. Check the operation of all safety controls individually.
 - d. **Check that the battery in (UC-01) has 3 VDC. Do not remove or replace battery with the power turned off to the control.**
 - e. Inspect all evaporative media and coil(s). Clean if necessary.
 - f. Inspect all orifices in water distribution system. Clean if necessary.
 - g. Flush sediment and debris from Cooling Tower and Direct Evaporative Cooling Section sump(s).
4. Off Season or Yearly
 - a. Complete the monthly and quarterly maintenance schedule.
 - b. Inspect all fan wheels and props. Clean if necessary.
 - c. Check that all fan wheels and props are securely set on the motor shaft.
 - d. Inspect all electrical components, connections and terminals. Clean and tighten where necessary.
 - e. Lubricate fan motor(s) as directed by motor manufacturer.
 - f. Inspect fan motor(s) wiring for loose connections.
 - g. Lightly oil all door latches.
 - h. Check that cabinet is weathertight, replace door gaskets and recaulk as necessary.

WARNING: DO NOT OPERATE THE SUPPLY FAN OR COOLING TOWER FAN IN THE AIR HANDLER'S INDIRECT EVAPORATIVE SECTION DURING ANY CLEANING OF THE UNIT'S EVAPORATIVE MEDIA.

CAUTION: The evaporative media has a definite polarity and must be installed correctly to give trouble free results. Proper installation is that the 45° flutes slope toward the air entering side. The 15° flutes slope down toward the leaving air side. See drawing below.



NOTE: Keep screened air intakes clear of obstructions at all times.

B. Lubrication Instructions

Item	Manufacturer	Bearing Type
All 3 phase fan motors (1 HP to 100 HP) ODP, TEFC	US., Baldor or equal	Single row ball bearings
<i>Recommendation: See following note.</i>		
All 1 phase motors (Fractional HP) ODP, TEFC or TEAO	Century, G.E., or equal	Bronze sleeve bearings
<i>Recommendation: See following note.</i>		
Fractional HP single phase, ODP or TEFC	Century, G.E. or equal	Bronze sleeve bearings
<i>Recommendation: See following note.</i>		
Dampers	Factory or equal	Sleeve
<i>Recommendation: See following note.</i>		

1. Blower Motors – Some motors require lubrication while others do not. Those that require lubrication can be identified by the presence of grease plugs in the motor casing at each end. Motors that do not have grease plugs cannot be greased and are lubricated for the life of the motor bearing.

Lubrication of motors should be done while the motor is warm and at a standstill. Remove and clean all grease plugs and insert a grease fitting in the upper hole in the motor casing at each end. (Viewed as if motor were sitting horizontally on its base). There may be one or two plugs in each end casing of the motor. Add a small amount of a clean, good grade ball bearing grease, such as Exxon Polyrex EM or equal, with a low pressure grease gun. Run the motor five minutes before removing the grease fittings and replacing the plugs.

CAUTION: An excess of grease will overheat the bearings.

NOTE: On totally enclosed fan cooled (TEFC) motors, the rear end fan housing must be removed to expose the grease plugs.

2. Dampers – Dampers should be inspected monthly (**daily in icy or snowy weather**) for securely fastened linkages, and smooth operation. If dampers are binding or excessively noisy, then lubrication may be required. Place one drop of #20 wt. machine oil on each blade bearing, and linkage ball joint. Do not over lubricate, and wipe any excess from the area. Be sure to note that dampers over 49 inches long have intermediate bearings which require lubrication. On outdoor models with factory supplied discharge dampers, you will need to remove the top cover to access the damper bushings. Replace cover and caulk as necessary.

C. Air Filters

All filter banks should be equipped with a manometer or differential pressure switch to indicate when the filters are dirty. Filters should be replaced when the differential pressure across them reaches the manufacturer's recommended final value. Dirty filter elements should be replaced with a clean element of the same type and size. In addition, the factory not only suggests, but insists, that air filters be **checked every 30 days (daily in icy or snowy weather)** and replaced with new filters (throw-away type) or cleaned (washable type) as required. Cleanable filters should be given new application of filter coating after washing to maintain optimum filter performance.

The frequency of cleaning and replacing air filters applies twelve months of the year, **where blowers are used for year round ventilation.**

D. Evaporative Media and Coils

To attempt to clean evaporative media, add one (1) cup of tri-sodium phosphate (TSP) to the sump and operate recirculating pump for at least 30 minutes or until deposits have disappeared. Drain sump. Fill the sump with fresh water and operate the recirculating pump for 30 minutes to rinse the media. Drain sump. Fill the sump with fresh water before placing unit back into operation.

Coil surfaces must be kept clean of dirt and lint in order to operate at rated efficiency. Coils should be inspected on a regular basis and cleaned as required.

CAUTION: Solutions used to clean coils must not be corrosive to metals or materials used in the manufacture of this equipment. If cleaning solutions are applied through means of high pressure spray, care must be taken to avoid damaging the coil fins. Always follow the manufacturer's warnings and directions for the coil cleaner you are using.

E. Gaskets

Gaskets are used on doors, inspection covers, some filter racks, and some outdoor air dampers. Inspect gaskets periodically and repair or replace as required.

F. Caulking

Inspect unit and add caulking as required.

G. Casing

Periodic cleaning of the casing is recommended to remove dirt, grease and any corrosive substances that may harm the finish. Rusted or corroded spots should be cleaned and repainted.

H. Support Means

Inspect the entire unit support means to be sure everything is firmly in place.

SECTION IX - REPLACEMENT PARTS

Replacement parts may be ordered from the factory Parts Department at 214-638-6010. The Parts Department can also be reached by email at parts@mestex.com. When parts are ordered, MODEL NUMBER, SERIAL NUMBER, FACTORY ORDER (F.O.) and PART NUMBERS are required.

Contact the Technical Services Department at 214-638-6010 for all warranty issues. All warranty parts will be shipped freight allowed from the factory by normal ground service. Warranty parts must be returned prepaid within 30 days. Credit will be issued if part is complete, defective, and returned on time. Filters, and fuses are not covered under warranty.

Dealer/Contractor Name: _____

Address: _____

City: _____

State: _____ Zip: _____ Ph: _____

SECTION X - AZTEC DDC SYSTEM USER MANUAL

Table of Contents

Overview	22	Unit Resets	35
Networking.....	23	Cooling Stage 1 Starts Reset.....	35
DDC System Default Settings	23	Cooling Stage 2 Starts Reset.....	35
Unit Operating Modes.....	25	Cooling Stage 1 Runtime Reset.....	35
MRT-Expert Controls	25	Cooling Stage 2 Runtime Reset.....	35
Unit Off Mode.....	25	Electrical Usage/Demand Reset	35
Unit Manual Mode.....	25	Satisfaction Rating Timers Reset	35
Unit Auto Mode	25	Alarms Reset.....	35
Scheduling Time Clock.....	25	Multiplexed Inputs.....	36
Cooling Night Setback.....	27	Clock Set	36
Auxiliary Unit Enable	27	Duct Furnace (IFD) Control	36
MDT-Expert Controls.....	27	Diagnostics – Critical Alarms.....	37
Unit Off Mode.....	27	Freeze Alert.....	37
Unit Manual Mode.....	27	Zone Sensor Failure.....	38
Unit Auto Mode	27	Supply Air Sensor Failure.....	38
Scheduling Time Clock.....	27	Cooling Stage 1 Water Level Failure	39
Auxiliary Unit Enable	28	Cooling Stage 2 Water Level Failure	39
Ventilating and Cooling Operating Modes	29	Diagnostics – Non-Critical Alarms.....	40
Ventilation Mode.....	29	Unit Off/Fan On.....	40
Cooling Mode	29	Unit On/Fan Off.....	40
Energy Savings Mode	29	Clogged Filter.....	41
General Cooling Control.....	29	Cooling Stage 1 Maintenance	41
Variable Frequency Drive Operation.....	30	Cooling Stage 2 Maintenance	41
Main Supply Fan VFD Control.....	30	Glossary	41
Cooling Tower Fan VFD Control	30	Menu Selection Tree for BACview	42
Manual Override.....	30	Modstat.....	42
Mixed Air Damper Control Modes	31	Unit Setup HOTKEY - 9.....	42
Mixed Air Temperature Control.....	31	Unit Modes HOTKEY - 2	43
Building Pressure Control.....	31	Unit Setpoints HOTKEY - 3	43
Percentage of Outside Air Control.....	31	Status Menu HOTKEY - 4	44
Automatic Economizer	31	Unit Resets HOTKEY - 6.....	44
100% Outside Air.....	32	Alarms HOTKEY - 1	44
Automatic Fill and Drain Control.....	32	Alarm Configuration	44
General Fill and Drain Operation.....	32	Schedules HOTKEY - 7.....	44
User-Specified Schedule.....	32	Clockset HOTKEY - 0.....	45
Runtime Odometer.....	32	Electrical Usage and Demand HOTKEY - 5.....	45
Outside Air Temperature to Drain Sump(s)	32	Comfort Index HOTKEY - 8.....	45
Manual Override.....	32	Overrides.....	45
Electrical Demand and Usage Monitoring	33	Appendix I.....	46
Comfort Index and Satisfaction Rating	33	10,000 Ohm Thermistor Output Curve	46
Comfort Index.....	33	Appendix II.....	47
Satisfaction Rating	33	I/O Flex 6126 Controller Specifications	47
Freezestat.....	34	Appendix III.....	48
Clogged Filter	34	Typical Wiring Schematic	48
		Appendix IV	49
		Typical Wiring Schematic	49

OVERVIEW

A glossary has been provided to assist the reader in understanding distinctive terms and phrases. These terms and phrases appear in italics.

The Aztec Digital Control System is designed to give the user the ultimate in unit performance and operational flexibility, adaptability, and reliability in a user-friendly package.

The Aztec DDC system accepts single or multiple units on the system network. Each unit ships with a BACview remote. The operating parameters for individual units may be input through the BACview. A PC may also be connected to the network. This allows the user to configure each unit separately, or all units can be configured simultaneously. A controls contractor can provide assistance in networking.

Local access port connection for *BACview.*

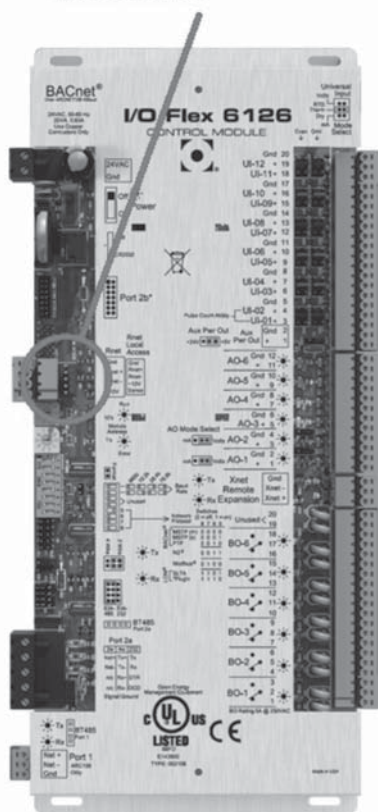


Figure 1

The BACview ships with a cable. One end of the cable consists of a pre-wired black screw terminal connector while the other end consists of a 5-pin red-tipped plug.

For MRT and MRT-Expert systems, plug the pre-wired black screw terminal connector into the back of the BACview and plug the 5-pin red-tipped plug into the

bottom of the room sensor. Because the room sensor is hard-wired to the controller via the Rnet port on the left-hand side of the controller and the BACview is connected to the room sensor via the plug connection on the bottom of the room sensor, this creates a communications link between the BACview and the controller without having to directly wire the BACview to the controller.

It is easy to move the BACview between the location of the room sensor in the space and the unit's location without having to do any additional wiring. Simply unplug the BACview from the bottom of the room sensor in the space and take it to where the unit is located. Then, plug the BACview into the Local Access Port on the controller as shown in Figure 1. To go from where the unit is located to the room sensor in the space, unplug the BACview from the Local Access Port and take it to the room sensor. Then, plug the BACview into the bottom of the room sensor.

For MDT and MDT-Expert systems, simply plug the BACview into the Local Access Port on the controller as shown in Figure 1 as a room sensor is not provided with these systems.

If there are multiple units at the jobsite, the BACview can easily be unplugged from one unit and plugged into another. For this reason, it is not recommended to hardwire the BACview into the Rnet port on the left-hand side of the controller because it sacrifices the convenience of portability.

Operational modes include time scheduling, filter monitoring, and multiple damper control and temperature control schemes. All of these modes provide the maximum in unit operational flexibility.

The diagnostic capabilities of the Aztec DDC system ensure swift response to abnormal unit conditions. An alarm is generated anytime a conflict exists between the operational parameters and actual unit operation. An indication of trouble is displayed at the BACview and system PC in text format. In the Diagnostics section of this manual you will find a list of all alarms and possible causes and solutions.

All of the features of the Aztec DDC system are designed to provide the user with real time information. At any time the user can display all of the operational parameters, make changes, if necessary, and observe the various temperature, pressure, and damper readings. The system's diagnostic capabilities provide the user with up to the minute status reporting. (BACview service module or WebCTRL internet connection is required for these features.)

NETWORKING

The DDC system is adaptable to a variety of different network architectures and protocols. Each controller has built-in protocol translation and can be configured for operation on ARCnet156 or EIA-485 communication networks. See Appendix II for specific controller specifications.

The DDC system can be connected to most 3rd party building automation systems. Some systems may require the use of special routers, interfaces, or other network communication devices. LON systems require

a special adapter card that must be ordered with the unit. Ethernet systems require an interface that can be ordered with the unit or sourced from a networking vendor.

The BACnet device instance number for the controller is 24000 + the rotary address setting. The default address for all Aztec DDC units is 16, therefore the BACnet instance number is 24016. The DDC controller will not function if the rotary address setting is incorrect.

DDC SYSTEM DEFAULT SETTINGS

The following is a list of Aztec DDC controller defaults. These are the default operating parameters set at the factory prior to shipment.

Unit Configuration		
ITEM	DEFAULT	RANGE
Unit Network Address	16	00 – 99 (rotary switches)
Unit Enable	OFF	AUTO – OFF – MANUAL
3rd Party Zone Temperature Control Enable	No	No – Yes
Supply Fan VFD Operation	As specified	1 = Supply Air Temperature Control, 2 = Building Pressure Control
Mixed Air Damper Operation	As specified	1 = Building Pressure Control, 2 = Mixed Air Temperature Control, 3 = % Outside Air Control
Control System	As specified	MRT (modulating room temperature control) – MDT (modulating discharge temperature control)
Stage 2 Cooling Installed	As specified	No – Yes

DDC SYSTEM DEFAULT SETTINGS *continued*

Cooling Configuration		
ITEM	DEFAULT	RANGE
Fill/Drain Schedule Enable	No	No – Yes
Cooling Stage 1 (Indirect) Fill/Drain Schedule	1	1 = Monday, 2 = Tuesday, 3 = Wednesday, 4 = Thursday, 5 = Friday, 6 = Saturday, 7 = Sunday
Cooling Stage 2 (Direct) Fill/Drain Schedule	1	1 = Monday, 2 = Tuesday, 3 = Wednesday, 4 = Thursday, 5 = Friday, 6 = Saturday, 7 = Sunday
Cooling Stage 1 Fill/Drain Duration	15 minutes	Unrestricted
Cooling Stage 2 Fill/Drain Duration	15 minutes	Unrestricted
Cooling Stage 1 Drain Time	1	1 = 1:00 AM (use 24 hour format)
Cooling Stage 2 Drain Time	2	2 = 2:00 AM (use 24 hour format)
Cooling Stage 1 Runtime Drain Trip	100 hours	Unrestricted
Cooling Stage 2 Runtime Drain Trip	100 hours	Unrestricted
Cooling Stage 1 Maintenance Alarm Enable	No	No – Yes
Cooling Stage 2 Maintenance Alarm Enable	No	No – Yes
Cooling Stage 1 Maintenance Alarm Trip	2,200 hours	Unrestricted
Cooling Stage 2 Maintenance Alarm Trip	2,200 hours	Unrestricted

Temperature Setpoints		
ITEM	DEFAULT	RANGE
Unoccupied Zone Setpoint	100°F	40°F — 130°F
Occupied Zone Setpoint	73°F	40°F — 130°F
Cooling Economizer Setpoint	55°F	40°F — 130°F
Supply Air Temperature Setpoint	70°F	40°F — 130°F
Cooling Stage 2 Interstage Differential	2°F	2°F — 10°F
Minimum Supply Air Temperature Setpoint	55°F	55°F — 130°F
Maximum Supply Air Temperature Setpoint	75°F	55°F — 130°F
Mixed Air Temperature Setpoint	55°F	30°F — 90°F
Freezestat Setpoint	45°F	35°F — 80°F
Outside Air Temperature to Drain Sump(s)	36°F	35°F — 80°F

Economizer Configuration		
ITEM	DEFAULT	RANGE
Outside Air Temperature Trip for Economizer	65°F	50°F – 90°F
Outside Air Temperature for Heating/Cooling Changeover	55°F	40°F – 130°F

Pressure Setpoints		
ITEM	DEFAULT	RANGE
Building Pressure Setpoint	0.00" W.C.	-0.100" W.C. – +0.100" W.C.

DDC SYSTEM DEFAULT SETTINGS *continued*

Outside Air Setpoints		
ITEM	DEFAULT	RANGE
% Outside Air Setpoint	20%	0% – 100%
Minimum % Outside Air Setpoint	20%	0% – 100%

VFD Speed Setpoints		
ITEM	DEFAULT	RANGE
Supply Fan VFD Minimum Speed	25%	5% – 100%
Cooling Tower VFD Minimum Speed	50%	5% – 100%

UNIT OPERATING MODES

There are three different modes that control the unit operation:

- Off
- Manual
- Auto

There are also two different methods for controlling the operating modes:

- an intelligent room sensor and BACview panel with LCD display
- an internet-based WebCTRL interface or other 3rd party building automation system

Controlling the operating modes is accomplished via the BACview panel (KP-01) with LCD display. A detailed description of the function of these modes follows.

MRT-Expert Controls

The Aztec MRT-Expert, modulating room temperature control provides full information regarding unit operation and allows the user to adjust all operational parameters using the BACview panel. See the Menu Selection Tree for BACview section of this user manual for instructions that show how to change parameter values via the BACview.

AdaptAire units configured for MRT-Expert controls will have a fixed discharge temperature of 70°F if the room temperature sensor is disconnected or otherwise fails to communicate with the unit control module.

Unit Off Mode

Off Mode is the default unit operational mode. To place the unit in Off Mode scroll through the UNIT MODES menu tree, locate the AUTO/OFF/MANUAL branch, and select OFF. This will place the unit in the OFF mode. The OFF mode prevents the fans and cooling from starting. This mode will override the Time Clock and Night Setback functions.

Unit Manual Mode

Manual Mode allows the supply fan and cooling tower fan to operate regardless of the Time Clock or Night Setback functions. Cooling functions use the Occupied Setpoints. To place the unit in Manual Mode scroll through the UNIT MODES menu tree, locate the AUTO/OFF/MANUAL branch, and select MANUAL. This will place the unit in the MANUAL mode.

Unit Auto Mode

Auto Mode has three different functions that control the supply fan, cooling tower fan, and general unit operation: the time clock, cooling night setback, and a signal from an external source to an auxiliary digital input. To place the unit in Auto Mode scroll through the UNIT MODES menu tree, locate the AUTO/OFF/MAN branch, and select AUTO. This will place the unit in the AUTO mode. This activates the three Auto mode functions.

Scheduling Time Clock

The primary Auto Mode function is the Time Clock Schedule. The Time Clock function allows the user to schedule the operational times of the unit. There are four different schedules available: 24 hour continuous operation, daily, holiday, and override. The daily schedule can be programmed for up to 4 separate On/Off events with any combination of days. The daily schedule sets the typical On/Off times for the unit. The holiday schedule can be programmed for up to 12 separate On/Off events with any combination of days. The holiday schedule sets the Off times for holidays and other shutdown periods. The override schedule can be programmed for up to 2 separate On/Off events with any combination of days. The override schedule sets the On times that will override the holiday schedule. This scheduling system allows the user to program a diverse array of On/Off operations. The Aztec DDC system has no preset operational schedule.

UNIT OPERATING MODES *continued*

To set the operational times of the unit scroll through the SCHEDULES menu tree, and locate the desired Daily, Holiday, or Override branch. Enter the days and times for the unit to operate. In the Daily or Override section these times should correspond to the desired “on” times for the unit’s operation. In the Holiday section these times should correspond to the desired “off” times for the unit’s operation. **For any schedule to function the Use tab must be set to yes.**

To set the time clock function for **24 hour continuous operation**, scroll through the menu tree and locate the SCHEDULES page. Set the 24 Hr Operation to yes. Enter the Daily section of the menu and set the Use tab to yes. Finally select the days for 24 hour operation.

See the CLOCK SET section of this manual for setting the time, date and Daylight Savings function.

The following instructions demonstrate how to set up a sample schedule using the BACview remote. An example of a typical schedule would be to have the unit On Monday through Friday from 6:00 AM to 5:00 PM, except during the week of Thanksgiving when the unit will be Off. The unit will run each weekday during the Thanksgiving shutdown from 8:00 AM until noon while a maintenance crew is in the building. The maintenance crew will come in at 5:00 AM on Monday to complete preliminary tasks in preparation for the week. We will use this sample schedule as our guide in programming the sample schedule. Refer to the Menu Selection Tree for BACview section of this manual for more information about the BACview buttons, hotkeys, and menus.

The sample schedule and instructions below are just a guide; you may skip the rest of the Scheduling Time Clock section of this manual if you are already comfortable programming daily, holiday, and override schedules. Simply determine what schedule you want the unit to operate on and set the schedule in the BACview accordingly.

1. Use the FN + 7 hotkey to jump directly to the Schedules screen of the menu tree. While holding the FN key, press the 7 key, and the Schedules screen will appear. The BACview may prompt you for the User password. The default password is 0000.

```
Unit Schedules      24hr Operation?[ No]
  Fri 28-Sep-2012 12:13pm
  →Daily      →Holiday      →Override
  [→Prev]    [→Home] [→ClockSet] [LOGOUT]
```

2. Navigate to the Daily field and press the Enter button. The screen will show a blank daily schedule.

```
Daily Sch 1-      Use?[ NO] Stat:OFF (24hr)
Start Time 0 : 0      Stop Time 0 : 0
DAYS: MON - - - - -
  [→Prev]    [→Next]    [→Home]    [LOGOUT]
```

3. To enable the Daily schedule, set the Use field to Yes. The Stat field indicates whether the schedule on that screen is currently active, so you may see either ON or OFF in this field. Navigate to the Start Time field and set the start time for 6:00 AM. Be aware that times are programmed in a 24 hour format. For example, 2:00 PM would be programmed as 14:00, which will show up on the BACview screen as “14 : 0”.
4. Navigate to the Stop Time field and set the stop time for 5:00 PM (17:00 in the 24 hour format).
5. Navigate to the Days fields, making sure the cursor surrounds the first hyphen ([-]). Press the Enter button and then press the link key that corresponds to INCR on the screen. The field will now show MON, indicating that this schedule will be active every Monday from 6:00 AM to 5:00 PM. Repeat this process for each of the remaining Days fields, except for SAT and SUN. Your screen should now look like this:

```
Daily Sch 1-      Use? YES Stat: ON (24hr)
Start Time 6 : 0      Stop Time 17 : 0
DAYS: MON TUE WED THU [FRI] - -
  [→Prev]    [→Next]    [→Home]    [LOGOUT]
```

6. The week of Thanksgiving for 2012 is from Sunday, November 18th to Saturday, November 24th. We want the unit to operate each weekday from 8:00 AM to 12:00 PM while the maintenance crew is in the building during this week. We will need to set up a few Holiday schedules to accomplish this. Since the unit normally runs from 6:00 AM to 5:00 PM on weekdays, we need to set the Off periods in the Holiday schedules. The Off period we want to schedule then is from 6:00 AM to 8:00 AM and 12:00 PM to 5:00 PM. We will use 10 Holiday schedules to accomplish this (two for each weekday).
7. Navigate back to the Schedules screen using the FN + 7 hotkey. Move the cursor to select the Holiday field and press Enter. Set the start time to 6:00 AM and the stop time to 8:00 AM. Remember, the Holiday schedules represent the period during which the unit is to be OFF. Set the Month field to 11 (November) and the Day field to 19 (Monday, the first weekday that week). Your screen should now look like this:

```
Holiday Sch 1- Use? YES Stat: ON (24hr)
Start Time 6 : 0      Stop Time 8 : 0
Month: 11 (1-12) Day: [19] (1-31)
  [→Prev]    [→Next]    [→Home]    [LOGOUT]
```


UNIT OPERATING MODES *continued*

- Press the link key corresponding to the Next field on the screen. This will take you to Holiday Schedule 2. Set the start time for Holiday Schedule 2 to 12:00 PM and the stop time to 5:00 PM. Set the Month field to 11 (November) and the Day field to 19 (Monday, the first weekday that week). Your screen should now look like this:

```
Holiday Sch 2- Use? YES Stat:OFF (24hr)
Start Time 12 : 0 Stop Time 17 : 0
Month: 11 (1-12) Day: [19] (1-31)
[→Prev] [→Next] [→Home] [LOGOUT]
```

Repeat this step for the 20th, 21st, 22nd, and 23rd (Tuesday, Wednesday, Thursday, and Friday) using Holiday Schedules 3 through 10, then proceed to the next step.

- Since the maintenance crew will be in the building at 5:00 AM on Monday, we will need an override schedule to override part of the Holiday schedule we just created. Navigate back to the Schedules screen using the FN + 7 hotkey. Move the cursor to select the Override field and press Enter. Set the start time to 5:00 AM and the stop time to 8:00 AM. Remember, the Override schedules override the Holiday schedules and represent the period during which the unit is to be ON. Set the Month field to 11 (November) and the Day field to 19 (Monday, the first weekday of Thanksgiving week in 2012). Your screen should now look like this:

```
Holiday Sch 2- Use? YES Stat:OFF (24hr)
Start Time 5 : 0 Stop Time 8 : 0
Month: 11 (1-12) Day: [19] (1-31)
[→Prev] [→Next] [→Home] [LOGOUT]
```

- Press the link key corresponding to the Home field on the screen to return to the Home screen. The sample schedule is programmed and the unit will automatically turn on and shut off based on the daily, holiday, and override schedules.

Cooling Night Setback

The Cooling Night Setback function automatically cycles the unit “on” if the room temperature rises above the Cooling Setback temperature setpoint and the unit is scheduled to be “off”. If the unit is scheduled to be “off” and the Cooling Setback function turns the unit “on”, the unit will be cycled off once the room air temperature has fallen 2°F below the Cooling Setback setpoint. This function toggles binary outputs BO-1 (main supply fan start/stop), BO-2 (stage 1 cooling pump start/stop) and BO-4 (cooling tower fan start/stop). The default for the Cooling Setback setpoint is 100°F. To change the Cooling Setback setpoint scroll through the SETPOINTS menu tree, locate the Cooling Setback setpoint and enter a new temperature. The allowable temperature range is 40°F - 130°F.

Auxiliary Unit Enable

The Auxiliary Unit Enable function overrides all other Auto Mode functions and cycles the unit into operation. This function is activated whenever a contact is closed between terminals 229 and 230 on the unit’s terminal strip located in the unit’s main control panel. Cooling functions use the Night Setback Setpoints. See the Typical Wiring Schematic section of this manual for more information. This function can be used with a twist timer, toggle switch, door switch, exhaust fan interlock, or any other dry contact to override the time clock schedule.

MDT-Expert Controls

The Aztec MDT-Expert, modulating discharge temperature control provides full information regarding unit operation and allows the user to adjust all operational parameters using the BACview panel. See the Menu Selection Tree for BACview section of this user manual for instructions that show how to change parameter values via the BACview.

Unit Off Mode

Off Mode is the default unit operational mode. To place the unit in Off Mode scroll through the UNIT MODES menu tree, locate the AUTO/OFF/MANUAL branch, and select OFF. This will place the unit in the OFF mode. The OFF mode prevents the fans and cooling from starting. This mode will override the Time Clock function.

Unit Manual Mode

Manual Mode allows the supply fan and cooling tower fan to operate regardless of the Time Clock function. To place the unit in Manual Mode scroll through the UNIT MODES menu tree, locate the AUTO/OFF/MANUAL branch, and select MANUAL. This will place the unit in the MANUAL mode.

Unit Auto Mode

Auto Mode has two different functions that control the supply fan, cooling tower fan, and general unit operation: the time clock and a signal from an external source to an auxiliary digital input. To place the unit in Auto Mode scroll through the UNIT MODES menu tree, locate the AUTO/OFF/MAN branch, and select AUTO. This will place the unit in the AUTO mode. This activates the two Auto mode functions.

Scheduling Time Clock

The primary Auto Mode function is the Time Clock Schedule. The Time Clock function allows the user to schedule the operational times of the unit. There are four different schedules available: 24 hour continuous operation, daily, holiday, and override. The daily schedule can be programmed for up to 4 separate On/Off events with any combination of days. The daily schedule sets the typical On/Off times for the unit.

UNIT OPERATING MODES *continued*

The holiday schedule can be programmed for up to 12 separate On/Off events with any combination of days. The holiday schedule sets the Off times for holidays and other shutdown periods. The override schedule can be programmed for up to 2 separate On/Off events with any combination of days. The override schedule sets the On times that will override the holiday schedule. This scheduling system allows the user to program a diverse array of On/Off operations. The Aztec DDC system has no preset operational schedule.

To set the operational times of the unit scroll through the SCHEDULES menu tree, and locate the desired Daily, Holiday, or Override branch. Enter the days and times for the unit to operate. In the Daily or Override section these times should correspond to the desired “on” times for the unit’s operation. In the Holiday section these times should correspond to the desired “off” times for the unit’s operation. **For any schedule to function the Use tab must be set to yes.**

To set the time clock function for **24 hour continuous operation**, scroll through the menu tree and locate the SCHEDULES page. Set the 24 Hr Operation to yes. Enter the Daily section of the menu and set the

Use tab to yes. Finally select the days for 24 hour operation.

See the CLOCK SET section of this manual for setting the time, date and Daylight Savings function.

See the MRT-Expert Controls section of the manual for a step-by-step walkthrough guide that demonstrates how to program a schedule via the BACview interface.

Auxiliary Unit Enable

The Auxiliary Unit Enable function overrides all other Auto Mode functions and cycles the unit into operation. This function is activated whenever a contact is closed between terminals 229 and 230 on the unit’s terminal strip located in the unit’s main control panel. Cooling functions use the Occupied Setpoints. See the Typical Wiring Schematic section of this manual for more information. This function can be used with a twist timer, toggle switch, door switch, exhaust fan interlock, or any other dry contact to override the time clock schedule.

The MDT-EXPERT control does not support the night setback functions.

VENTILATING AND COOLING OPERATING MODES

The Aztec DDC controller automatically switches between the ventilating and cooling modes of operation. The previous sections described the Cooling Setback operation. This section concentrates primarily on the Occupied operating modes.

Ventilation Mode

Ventilation Mode occurs when the fan is running but the unit is not providing cooling.

The ventilation mode is dependent on the room (MRT-Expert) or outside air (MDT-Expert) temperature relative to the room or outside air temperature setpoint. The relationship between these values is described in the Cooling Mode section of this manual.

Cooling Mode

During the Occupied Cooling mode, Cooling Stage 1 is activated whenever the room or outside air temperature is 2°F above the Occupied Zone setpoint and is deactivated at the Occupied Zone setpoint.

Cooling Stage 2 is activated whenever the room or outside air temperature is 2°F above the Occupied Zone setpoint plus the Cooling Stage 2 Interstage Differential setpoint (the default value is 2°F and is user-configurable via the BACview) and is deactivated 2°F above the Occupied Zone setpoint.

During the Unoccupied Cooling mode (MRT-Expert systems only), Cooling Stage 1 is activated whenever the room or outside air temperature is at the Cooling Night Setback setpoint and is deactivated 2°F below the Cooling Night Setback setpoint.

Cooling Stage 2 is activated whenever the room or outside air temperature is at the Cooling Night Setback setpoint plus the Cooling Stage 2 Interstage Differential setpoint and is deactivated at the Cooling Night Setback setpoint.

Energy Savings Mode

The Energy Savings Mode will automatically disable the cooling if the outside air temperature is below the Cooling Economizer setpoint. This function is similar to an inlet duct thermostat. The cooling will cycle back on if the outside air temperature rises 3°F above the Cooling Economizer setpoint.

To change the desired cooling economizer temperature scroll through the SETPOINTS menu tree, locate the Cooling Economizer setpoint, and enter a new temperature. The default for this setpoint is 55°F. The allowable temperature range is 40°F - 130°F.

General Cooling Control

For MRT-Expert control systems, the cooling will cycle on and off as required to maintain a constant temperature. The cooling outputs (BO-2 & BO-3) can be protected by an anti-cycle timer which has a 3 minute off / 3 minute on delay. The anti-cycle timer is enabled by default. To disable the anti-cycle timer, scroll through the UNIT SETUP menu tree using the BACview, locate the Use Clg Anti-Cycle Timer field, and set its value to No.

To change the desired cooling room temperature of an MRT-Expert control system, scroll through the SETPOINTS menu tree using the BACview, locate the Occ Zone Stpt, and enter a new temperature. The allowable temperature range is 40°F - 130°F.

For MDT-Expert control systems, the cooling will cycle on and off as required to maintain a constant discharge temperature.

For MRT-Expert control systems, the controller cycles the cooling on and off to maintain the supply air temperature within a defined operating window. This window defines the maximum and minimum discharge temperatures.

To change the desired cooling discharge temperature of a MDT-Expert control system, scroll through the SETPOINTS menu tree using the BACview, locate the Supply Air Temp Stpt, and enter the desired temperature. The allowable temperature range is 40°F - 130°F.

To change the desired minimum supply or discharge air temperature scroll through the SETPOINTS menu tree, locate the Min Sup Air Temp Stpt, and enter a new temperature. This temperature must not be greater than the Max Sup Air Temp Stpt. The allowable temperature range is 40°F - 130°F. This sets the lowest discharge air temperature that will leave the unit.

To change the desired maximum supply or discharge air temperature scroll through the SETPOINTS menu tree, locate the Max Sup Air Temp Stpt, and enter a new temperature. This temperature must not be less than the Min Sup Air Temp Stpt. The allowable temperature range is 40°F - 130°F. This sets the highest discharge air temperature that will leave the unit.

If the maximum and minimum discharge temperature setpoints are set for the same temperature, the supply air temperature will be the same as the setpoint regardless of the room temperature setpoint or actual room temperature.

VARIABLE FREQUENCY DRIVE OPERATION

The Aztec DDC system features a variable frequency drive (VFD) to control the main supply fan motor and an optional VFD to control the cooling tower fan motor. The DDC controller modulates the speed of the main supply fan motor and cooling tower fan motor based on the unit modes as configured via the BACview. Unless otherwise specified during ordering, all units ship from the factory with supply air temperature control as the default control mode for both the main supply fan VFD and the optional cooling tower fan VFD.

Main Supply Fan VFD Control

The supply fan speed varies based on one of two modes: supply air temperature control or building pressure control.

In supply air temperature control mode, the supply fan speed varies based on the supply air temperature. The controller modulates the output to the supply fan VFD using a PID loop that compares the supply air temperature to the supply air temperature setpoint.

The controller will modulate the speed of the main supply fan motor to maintain the supply air temperature between the minimum and maximum supply air temperature setpoints.

The main supply fan VFD will modulate the supply fan motor toward its minimum speed as the supply air temperature falls to the minimum supply air temperature setpoint. The main supply fan VFD will modulate the supply fan motor toward its maximum speed as the supply air temperature rises to the maximum supply air temperature setpoint.

In building pressure control mode, the controller modulates the output to the supply fan VFD using a PID loop to maintain the building pressure at the building pressure setpoint.

As the building pressure rises above setpoint, the controller signals the VFD to decrease the speed of the main supply fan motor, thereby decreasing the building pressure until the building pressure equals the building pressure setpoint.

As the building pressure falls below setpoint, the controller signals the VFD to increase the speed of the main supply fan motor, thereby increasing the building pressure until the building pressure equals the building pressure setpoint.

The main supply fan VFD will modulate the supply fan motor toward its minimum speed as the building pressure approaches the Building Pressure setpoint. The main supply fan VFD will modulate the supply fan motor toward its maximum speed as the building pressure falls to the Building Pressure setpoint.

Cooling Tower Fan VFD Control

The cooling tower fan speed varies based on the supply

air temperature. The controller modulates the output to the cooling tower fan VFD using a PID loop that compares the supply air temperature to the supply air temperature setpoint.

The controller will modulate the speed of the cooling tower fan motor to maintain the supply air temperature between the minimum and maximum supply air temperature setpoints.

As the supply air temperature rises to the supply air temperature setpoint, the cooling tower fan motor and stage 1 circulating pump are enabled. As the supply air temperature rises above the supply air temperature setpoint plus the Cooling Stage 2 Interstage Differential setpoint, the stage 2 circulating pump is enabled.

As the supply air temperature rises above setpoint, the controller signals the VFD to increase the speed of the cooling tower fan motor, thereby increasing the evaporative cooling effect of the media.

As the supply air temperature falls below setpoint, the controller signals the VFD to decrease the speed of the cooling tower fan motor. Then, the cooling tower fan motor and cooling outputs are disabled until a call for cooling is present again.

The cooling tower fan VFD will approach its minimum speed as the supply air temperature approaches the minimum supply air temperature setpoint. The cooling tower fan motor and cooling outputs are disabled until a call for cooling is present again.

Manual Override

The administrator password for the BACview is required in order to use the manual overrides.

The supply fan VFD analog control output (AO-2) and the cooling tower fan analog control output (AO-3) can be controlled manually via the OVERRIDES branch of the BACview menu tree by adjusting the speed of each fan motor as a percentage of full speed. First, set the desired supply fan speed percentage. Then, toggle the "Lock SF VFD (AO-2)?" field to YES. The controller will now force the supply fan VFD to drive the supply fan motor at this percentage of full speed until the "Lock SF VFD (AO-2)?" field is toggled to off. The same process can be repeated for the cooling tower fan analog output (AO-3) if the unit is equipped with the optional cooling tower VFD.

WARNING: Manually overriding the supply and cooling tower fan motor analog outputs disables automatic motor speed modulation functions and may result in poor unit performance as the variable frequency drive(s) will not be able to modulate the motor(s) to optimize performance as environmental conditions change.

MIXED AIR DAMPER CONTROL MODES

There are three different modes that control the unit damper operation: Mixed Air Temperature, Building Pressure, and Percentage of Outside Air control. These operating modes are selected through the menu tree of the BACview or PC. Not all damper modes are available on all units.

The mixed air dampers also have an economizer function to reduce energy consumption based on outside air conditions, thereby improving unit efficiency. The economizer function is described at the end of the Mixed Air Damper Control Modes section of this manual.

Outside air dampers will remain closed during the unoccupied period if the supply fan is off or if the room temperature is less than 45°F and the supply fan is running.

Mixed Air Temperature Control

Mixed Air Temperature control varies the percentages of outside air and return air to maintain a constant mixed air temperature.

To place the damper operation in Mixed Air Temperature mode scroll through the menu tree, locate the UNIT MODES branch and select MA Temp Ctrl. Next, scroll through the menu tree, locate the SETPOINTS branch, select Mixed Air, and enter the desired temperature. The allowable range is 30°F - 90°F.

Building Pressure Control

Building Pressure control varies the percentages of outside air and return air to maintain a constant pressure within the space. A pressure transducer measures the pressure within the space relative to the pressure exterior to the space and transmits a corresponding signal to the Aztec DDC controller. The controller compares this signal to the desired building pressure setpoint and uses a PID loop to modulate the outside air and return air dampers to maintain the specified building pressure.

To place the damper operation in Building Pressure mode scroll through the menu tree, locate the UNIT MODES branch and select Bldg Pres Ctrl. Next, scroll through the menu tree, locate the SETPOINTS branch, select Bldg Pressure Stpt, and enter the desired pressure. The allowable range is -0.100" W.C. to +0.100" W.C.

NOTE: If the Supply Fan Operation and Mixed Air Damper Operation modes are both set to Building Pressure control, the Mixed Air Damper Control mode will automatically switch from Building Pressure control to Percentage of Outside Air Control. To select Building Pressure control for Mixed Air Damper Operation mode, you must change the Supply Fan Operation mode to Supply Air Temperature control.

Percentage of Outside Air Control

To place the damper operation in Percentage of Outside Air mode scroll through the menu tree, locate the UNIT MODES branch and select % Outside Air Ctrl. Next, scroll through the menu tree, locate the SETPOINTS branch, select % OA Setpoint and enter the desired percentage open for the outside air dampers. The damper actuators will drive the outside air dampers open to the Min % OA setpoint or the % OA setpoint, whichever is greater.

Automatic Economizer

The unit operates in economizer mode when the outside air dry bulb temperature is below 65°F and the outside air enthalpy is below 25 btu/lb-m. Once these conditions are satisfied, the outside air dampers begin to modulate open to provide free cooling in the space. The outside air temperature economizer setpoint and outside air enthalpy economizer setpoint are adjustable via the SETPOINTS branch of the menu tree in the BACview.

The DDC controller calculates the outside air enthalpy automatically based on the outside air dry bulb temperature and the outside air relative humidity. The automatic economizer overrides mixed air temperature control and percentage of outside air control but does not override building pressure control or the 100% outside air function.

100% OUTSIDE AIR

The 100% Outside Air function automatically opens the outside air dampers and closes the return air dampers. This function is activated whenever a contact is closed between the appropriate terminals on the unit's terminal strip located in the unit's main control panel.

See the Typical Wiring Schematic and Multiplexed Input sections of this manual for more information.

The 100% Outside Air function overrides all other damper control functions.

AUTOMATIC FILL AND DRAIN CONTROL

General Fill and Drain Operation

The automatic fill and drain binary outputs for cooling stages 1 and 2 (BO-5 and BO-6, respectively) are controlled independently of each other. The fill and drain valves are controlled via either a user-specified schedule or a runtime odometer. Switching between these control modes is accomplished through the provided BACview device. The Cooling Stage 1 and 2 Water Level Failure Alarms are disabled when cooling stages 1 and 2 are drained as commanded by the user-specified schedule or runtime odometer.

The binary outputs are energized by default to hold the fill valve open and the drain valve(s) closed during normal unit operation. Once the DDC controller calls for a drain cycle (based on the user-configurable schedule), the binary outputs will be de-energized for a minimum of 15 minutes (user-configurable via the BACview) to allow the unit ample time to drain its sump(s).

Once the drain cycle is complete, the outputs will energize and the fill cycle will begin, filling the sump(s) with water. With the drain cycle complete and the supply air temperature rising, the outputs will energize and the fill cycle will begin when the zone or supply air temperature is within 5°F of the zone or supply air temperature setpoint. This temperature deadband is user-configurable via the BACview. The outputs remain energized until the next time the drain cycle begins.

User-Specified Schedule

The DDC controller will drain the sump(s) when the current date and time match the user-programmed date and time (user-configurable via the BACview) as long as the unit is in the unoccupied mode. For example, the indirect section (stage 1) could be programmed to drain every Monday morning at 1:00 AM and the direct section (stage 2) every Monday morning at 3:00 AM, so as not to interfere with cooling demands during the occupied period.

Runtime Odometer

The DDC controller will drain the indirect section when the cumulative stage 1 runtime reaches the Cooling Stage 1 Runtime Trip setpoint and will drain the direct section when the cumulative stage 2 runtime reaches the Cooling Stage 2 Runtime Trip setpoint, as long

as the unit is in the unoccupied mode. If the unit is in the occupied mode when the trip point is reached, the sump(s) will drain the next time the unit switches to unoccupied mode. The runtime trip setpoint for each stage of cooling can be set via the BACview. The factory-default value for the Cooling Stage 1 and 2 Runtime setpoints is 100 cumulative hours of runtime. Once the drain cycle is complete, the outputs will energize and the fill cycle will begin, filling the unit with water. The outputs remain energized until the next time the drain cycle begins.

Outside Air Temperature to Drain Sump(s)

If the outside air temperature falls below the OA Temp to Drain Sump(s) setpoint (the default is 36°F and is user-configurable via the BACview), the cooling stage 1 and 2 fill/drain binary outputs (BO-5 and BO-6) will de-energize and the fill and drain valves will return to their normally closed and normally open positions respectively. The sump(s) will drain. The Cooling Stage 1 and 2 Water Level Failure alarms will be disabled. The DDC controller will neither re-energize the binary outputs nor re-enable the alarms until the outside air temperature rises 5°F above the OA Temp to Drain Sump(s) setpoint.

Manual Override

The administrator password for the BACview is required in order to use the manual overrides.

The off/on state of the fill and drain outputs (BO-5 and BO-6) can be controlled manually via the OVERRIDES branch of the BACview menu tree to induce manual fill and drain cycles. Toggle the "Lock Stg 1 FI/Drn (BO5)?" field to ON (fill) or OFF (drain) to force the cooling stage 1 fill and drain output on or off depending on the desired state. To enable this change and lock the output in the desired state, toggle the No/Yes field from NO to YES. Once any manual fill/drain cycles are complete, unlock the outputs by toggling the No/Yes field of the binary output from YES to NO. The same process can be repeated for the stage 2 fill and drain output (BO-6).

WARNING: Manually overriding these binary outputs disables all automatic fill and drain functions described in this section and could result in severe damage to the equipment.

ELECTRICAL DEMAND AND USAGE MONITORING

A current transducer monitors the instantaneous amp draw of all loads in the unit and inputs that information to the DDC controller via a 4-20 mA DC signal. The control program multiplies the instantaneous amp draw by the unit design voltage to calculate the instantaneous demand in kilowatts (kW). Cumulative electrical usage is calculated by multiplying the instantaneous demand by the unit runtime. The DDC controller retains the following information in memory and stores the data as BACnet readable points (contact factory for Aztec DDC Points List).

• Instantaneous Demand	kW
• Peak Demand Today	kW
• Peak Demand Yesterday	kW
• Peak Demand Month to Date	kW
• Peak Demand Last Month	kW
• Peak Demand Year to Date	kW
• Peak Demand Last Year	kW
• Usage Today	kWh
• Usage Yesterday	kWh
• Usage Month to Date	kWh
• Usage Last Month	kWh
• Usage Year to Date	kWh
• Usage Last Year	kWh

A reset function is provided on the ELECTRICAL DEMAND branch of the BACview menu tree to allow the operator to reset all electrical usage and demand data to zero.

Usage and demand data cannot be recovered once they are purged from the system via reset.

COMFORT INDEX AND SATISFACTION RATING

The Comfort Index (CI) and Satisfaction Rating (SR) features of the control program allow the operator to make an at-a-glance assessment of unit performance via the BACview.

Comfort Index

The DDC controller calculates the Comfort Index using the ratio of the absolute value of the zone temperature (MRT-Expert) or supply air temperature (MDT-Expert) minus the zone or supply air temperature setpoint to the zone or supply air temperature setpoint.

$$CI = \left(1 - \frac{|zone\ or\ SA\ temperature - zone\ or\ SA\ temperature\ setpoint|}{zone\ or\ SA\ temperature\ setpoint} \right) \times 100$$

For example: in an MRT-Expert system, if the zone temperature is 75°F and the zone temperature setpoint is 73°F, the Comfort Index would be as follows:

$$CI = \left(1 - \frac{|75°F - 73°F|}{73°F} \right) \times 100 = 97.3\%$$

As the zone or supply air temperature approaches the zone or supply air temperature setpoint, the Comfort Index will increase, reaching 100% when the temperature equals the setpoint.

Satisfaction Rating

The DDC controller calculates the Satisfaction Rating as the ratio of the satisfied runtime to the total unit runtime. The satisfied runtime is defined to be the amount of time during which the zone temperature is less than or equal to the zone temperature setpoint plus 2°F (MRT-Expert) or the supply air temperature less than or equal to the supply air temperature setpoint plus 10°F (MDT-Expert).

$$SR = \frac{satisfied\ runtime}{total\ runtime} \times 100$$

For example, if the zone or supply air temperature has been below the zone or supply air temperature setpoint for 1337 hours and the unit has been on for 1400 hours, the Satisfaction Rating would be as follows:

$$SR = \frac{1337\ hours}{1400\ hours} \times 100 = 95.5\%$$

Periodically check the Comfort Index and Satisfaction Rating values via the BACview to ensure the unit is operating effectively. Low percentages for either of these points could indicate an suboptimal setpoint configuration.

Verify that all setpoints on the SETPOINTS branch of the BACview menu tree are reasonable and that no values were entered into the system incorrectly as this may negatively impact unit performance.

FREEZESTAT

The Freezestat function automatically cycles the unit off if the supply air temperature drops below the Freezestat setpoint for 3 continuous minutes. On all units there is an initial 8-minute delay prior activation. The Freezestat function prevents the unit from starting. The default for this setpoint is 45°F. To change the Freezestat setpoint scroll through the menu tree, locate the SETPOINTS

branch of the BACview menu tree, select Freezestat SP, and enter a new temperature. The allowable temperature range is 35°F - 80°F.

The Cooling Stage 1 and 2 Water Level Failure alarms are disabled while the Freezestat alarm is active.

CLOGGED FILTER

An optional clogged filter switch is required for this function. The Clogged Filter function automatically notifies the user of a dirty filter condition. A Clogged Filter indication will appear on the BACview. This function is activated whenever a contact is closed

between terminals 227 and 228 on the unit's terminal strip located in the unit's main control panel. See the Typical Wiring Schematic section of this manual for more information.

UNIT RESETS

This section should assist the user in resetting alarms and cycle counters which have been displayed on the BACview.

WARNING: Activating a reset purges and renders irretrievable all previously accumulated data for that particular status feature.

Cooling Stage 1 Starts Reset

To reset the record of the number of times cooling stage 1 has cycled on, scroll through the menu tree, locate the UNIT RESETS branch and select Cooling Stage 1 Starts Reset. Press the Enter key. The word OFF should flash. Now press the INC key and the word ON should flash on the display. Press the Enter key again and ON should stop flashing. Repeat this process so the word OFF is displayed and not flashing. The Cooling Stage 1 Starts value has now been reset to zero and the Cooling Stage 1 Starts function has been rearmed.

Cooling Stage 2 Starts Reset

To reset the record of the number of times cooling stage 2 has cycled on, scroll through the menu tree, locate the UNIT RESETS branch and select Cooling Stage 2 Starts Reset. Press the Enter key. The word OFF should flash. Now press the INC key and the word ON should flash on the display. Press the Enter key again and ON should stop flashing. Repeat this process so the word OFF is displayed and not flashing. The Cooling Stage 2 Starts value has now been reset to zero and the Cooling Stage 2 Starts function has been rearmed.

Cooling Stage 1 Runtime Reset

To reset the record of the length of time cooling stage 1 has been running, scroll through the menu tree, locate the UNIT RESETS branch and select Cooling Stage 1 Runtime Reset. Press the Enter key. The word OFF should flash. Now press the INC key and the word ON should flash on the display. Press the Enter key again and ON should stop flashing. Repeat this process so the word OFF is displayed and not flashing. The Cooling Stage 1 Runtime value has now been reset to zero and the Cooling Stage 1 Runtime function has been rearmed.

Cooling Stage 2 Runtime Reset

To reset the record of the length of time cooling stage 2 has been running, scroll through the menu tree, locate the UNIT RESETS branch and select Cooling Stage 2 Runtime Reset. Press the Enter key. The word OFF should flash. Now press the INC key and the word ON should flash on the display. Press the Enter key again and ON should stop flashing. Repeat this process so the word OFF is displayed and not flashing. The Cooling Stage 2 Runtime value has now been reset to zero and the Cooling Stage 2 Runtime function has been rearmed.

Electrical Usage/Demand Reset

To reset the record of the electrical usage and demand, scroll through the menu tree, locate the UNIT RESETS branch and select Electrical Usage and Demand Reset. Press the Enter key. The word OFF should flash. Now press the INC key and the word ON should flash on the display. Press the Enter key again and ON should stop flashing. Repeat this process so the word OFF is displayed and not flashing. The Electrical Usage and Demand values have now been reset to zero and the Electrical Usage and Demand function has been rearmed.

Satisfaction Rating Timers Reset

To reset the satisfaction rating timers (the satisfied time timer and total runtime timer), scroll through the menu tree, locate the UNIT RESETS branch and select Satisfaction Rating Timers Reset. Press the Enter key. The word OFF should flash. Now press the INC key and the word ON should flash on the display. Press the Enter key again and ON should stop flashing. Repeat this process so the word OFF is displayed and not flashing. The Satisfaction Rating timer values have now been reset to zero and the Satisfaction Rating function has been rearmed.

Alarms Reset

To reset all active alarms, scroll through the menu tree, locate the Unit Resets branch and select Alarm. Press the Enter key. The word OFF should flash. Now press the INC key and the word ON should flash on the display. Press the Enter key again and ON should stop flashing. Repeat this process so the word OFF is displayed and not flashing. The alarm has now been cleared and the Alarm RS function has been rearmed. See the **Menu Selection Tree for BACview** section of this manual for more information about navigating the BACview menus.

Always change the Alarm Reset parameter to OFF after resetting the alarms.

If the Alarms Reset parameter was left in the ON state continuously, the alarms can still trigger on alarm conditions, however, to reset the alarms from this state you must move change the Alarm Reset parameter to OFF, then ON, then OFF again. Otherwise, the alarms will not reset and you will not be alerted if an alarm that was previously triggered happens to trigger again during the period the alarm remained active.

A history of alarms can be viewed on the Alarms screen of the BACview. To view the alarms history, locate the Alarms page in the BACview menu tree. The alarms history shows active alarms, alarms that have returned to normal, and manually cleared alarms.

MULTIPLEXED INPUTS

DDC controllers are designed with a finite number of inputs and outputs. Multiplexing expands the functionality of the controller by allowing multiple devices to effectively share the same input. This is usually accomplished by connecting resistors, either in a series or parallel configuration, to an analog input. A switch is used in conjunction with each resistor. When a switch is closed, the resistance at the controller input changes. This allows the controller to identify which switch has closed. The controller is programmed to associate each different resistance with a specific function. **The Aztec DDC system uses a multiplexed input only on units equipped two stages of cooling.**

The user is notified of the low water level condition through the BACview. The indirect and direct section pumps are each equipped with a float switch and the controller can enable/disable cooling stages 1 and 2 individually based on sensed water levels in each section of the unit. A stage of cooling can only be enabled if its corresponding low water level float switch is closed. The resistance measured at the controller input (UI-03) changes state based on which switches are closed, as shown in the following table.

Resistance at UI-03 as a Function of Float Switch States		
Cooling Stage 1 Low Water Level Float Switch (SW-10)	Cooling Stage 2 Low Water Level Float Switch (SW-11)	Resistance at Controller Input (UI-03)
Closed	Closed	0 Ω
Open	Closed	4.02 kΩ
Closed	Open	8.06 kΩ
Open	Open	12.08 kΩ

CLOCK SET

The Clock Set function is used to set the current time and date as well as enabling Daylight Saving Time. To set the clock scroll through the menu tree, locate the CLOCKSET branch, select Date, and enter a new date and time. Select DST to enable Daylight Saving Time. Daylight Saving Time is the default. For

your convenience Daylight Saving Time has been preprogrammed for the next several years. To reset the starting and ending DST dates scroll through the DST menu tree, locate the desired year, and enter a new date. **If your area does not subscribe to Daylight Saving Time, set the AMOUNT value to 000.**

DUCT FURNACE (IFD) CONTROL

For Aztec units equipped with an IFD-160, 320, or 480, the Aztec DDC controller outputs a 0-5 VDC signal from AO-4 (supply air temperature control output), which is then input to the IFD DDC controller at IN-1. The IFD DDC controller then outputs 0-10 VDC to the modulating gas valve motor to control the burner.

For Aztec units equipped with an IFD-800 or 1120, the Aztec DDC controller outputs a 0-10 VDC signal from AO-4, which is then input directly to the modulating gas valve motor to control the burner.

Based on the duct furnace size, the controller outputs the maximum 5 or 10 VDC (as described in the preceding paragraphs in this section) from AO-4 when the supply air temperature is 2°F below the supply air temperature setpoint. The controller modulates the output downward to 0 VDC as the supply air temperature increases to 2°F above the supply air temperature setpoint.

Refer to the IFD Series Duct Furnaces Installation, Operation, and Maintenance Manual for detailed information about duct heater operation.

DIAGNOSTICS – CRITICAL ALARMS

This section should assist the user in troubleshooting critical alarms that have been displayed on the BACview. These faults require the operator to correct the condition and reset the alarm before normal unit operation resumes.

Alarm	Cause	Remedy
A. Freeze Alert.	<ol style="list-style-type: none"> 1. Low supply air temperature. 2. Sensor circuit or the sensor itself is shorted. 3. Sensor circuit or the sensor itself is open. 	<ol style="list-style-type: none"> 1. Wait for the supply air temperature to rise above the Freezestat setpoint. Reset the alarm via the UNIT RESETS menu tree in the BACview. 2. Unplug the input jack from the controller. Did the display change to -40°F or less? <ol style="list-style-type: none"> a. No. There is a short in the controller input. Replace the controller. b. Yes. Disconnect the sensor wiring at the sensor. Connect an ohmmeter to the sensor. If it is shorted replace the sensor. At 77°F the resistance should be 10KΩ. See thermistor output curve for other temperatures. If it is not shorted, there is a short in the wiring between the sensor and the input plug. Determine cause and rectify. Refer to Appendix II for a typical 10KΩ thermistor output curve. 3. Jumper the input for the sensor. Did the display change to 150°F or more? <ol style="list-style-type: none"> a. No. There is an open in the controller input. Replace the controller. b. Yes. Disconnect the sensor wiring at the sensor. Connect an ohmmeter to the sensor. If it is open replace the sensor. At 77°F the resistance should be 10KΩ. See thermistor output curve for other temperatures. If it is not open, there is a break in the wiring between the sensor and the input plug. Determine cause and rectify.

DIAGNOSTICS – CRITICAL ALARMS *continued*

<p>B. Zone Sensor Failure. The zone sensor has failed to communicate usable data to the controller for more than 6 seconds.</p>	<ol style="list-style-type: none"> 1. Room sensor disconnected. 2. Short in room sensor wiring. 	<ol style="list-style-type: none"> 1. Is the zone temperature as displayed on the UNIT STATUS branch of the BACview menu tree less than 0°F? <ol style="list-style-type: none"> a. Yes. The room sensor is disconnected. Reconnect the room sensor by verifying that no wires have come loose and that the terminal block connectors that bring the wires from the room sensor to the controller are also securely in place. b. No. Continue. 2. Is the zone temperature as displayed on the UNIT STATUS branch of the BACview menu tree greater than 200°F? <ol style="list-style-type: none"> a. Yes. There is a short in the room sensor wiring. Determine cause of short and rectify. b. No. There is a problem with the room sensor electronics. Contact factory.
<p>C. Supply Air Sensor Failure. The supply air sensor is providing the controller with invalid temperature data.</p>	<ol style="list-style-type: none"> 1. Sensor circuit or sensor itself shorted. 2. Sensor circuit or sensor itself open. 	<ol style="list-style-type: none"> 1. Unplug the input jack from the controller. Did the display change to -40°F or less? <ol style="list-style-type: none"> a. No. There is a short in the controller input. Replace the controller. b. Yes. Disconnect the sensor wiring at the sensor. Connect an ohmmeter to the sensor. If it is shorted replace the sensor. At 77°F the resistance should be 10KΩ. See thermistor output curve for other temperatures. If it is not shorted, there is a short in the wiring between the sensor and the input plug. Determine cause and rectify. Refer to Appendix II for a typical 10KΩ thermistor output curve. 2. Jumper the input for the sensor. Did the display change to 150°F or more? <ol style="list-style-type: none"> a. No. There is an open in the controller input. Replace the controller. b. Yes. Disconnect the discharge air temperature sensor wiring at the sensor. Connect an ohmmeter to the sensor. If it is open replace the sensor. At 77°F the resistance should be 10KΩ. See thermistor output curve for other temperatures. If it is not open, there is a break in the wiring between the sensor and the input plug. Determine cause and rectify.

DIAGNOSTICS – CRITICAL ALARMS *continued*

<p>D. Cooling Stage 1 Water Level Failure.</p>	<ol style="list-style-type: none"> 1. Low water level in indirect sump. 2. Fill valve closed and/or drain valve open. 	<ol style="list-style-type: none"> 1. Rectify water level. See recommended float level adjustment in the Aztec Installation, Operation, and Maintenance section of this manual. The depth of the water in the sump(s) should be half an inch below the top of the sump's overflow stand pipe. 2. Check valve positions and wiring. <ol style="list-style-type: none"> a. The fill valve should be open when BO-5 is energized (as indicated by the illuminated LED). If the fill valve is closed, check the wiring. If the wiring is correct, then the valve is bad. Replace the fill valve. b. The drain valve should be closed when BO-5 is energized (as indicated by the illuminated LED). If the drain valve is open, it is malfunctioning and the wiring should be verified. If the wiring is correct, then the valve is bad. Replace the drain valve.
<p>E. Cooling Stage 2 Water Level Failure.</p>	<ol style="list-style-type: none"> 1. Low water level in direct sump(s). 2. Fill valve closed and/or drain valve open. 	<ol style="list-style-type: none"> 1. Rectify water level. See recommended float level adjustment in the Aztec Installation, Operation, and Maintenance section of this manual. The depth of the water in the sump(s) should be half an inch below the top of the sump's overflow stand pipe. 2. Check valve positions and wiring. <ol style="list-style-type: none"> a. The fill valve should be open when BO-6 is energized (as indicated by the illuminated LED). If the fill valve is closed, check the wiring. If the wiring is correct, then the valve is bad. Replace the fill valve. b. The drain valve should be closed when BO-6 is energized (as indicated by the illuminated LED). If the drain valve is open, it is malfunctioning and the wiring should be verified. If the wiring is correct, then the valve is bad. Replace the drain valve.

DIAGNOSTICS – NON-CRITICAL ALARMS

This section should assist the user in troubleshooting critical alarms that have been displayed on the BACview. These faults require the operator to correct the condition and reset the alarm before normal unit operation resumes.

Alarm	Cause	Remedy
<p>A. Unit Off/Fan On. The controller has not activated the unit enable output to start the fan, but the fan status input is receiving a signal that the fan is running. This alarm resets automatically once this conflict is resolved.</p>	<p><i>If the fan is running:</i></p> <ol style="list-style-type: none"> 1. Controller's supply fan start/stop output (BO-1) is energized. 2. Controller's supply fan start/stop output (BO-1) is shorted. 3. The unit enable relay (RE-57) and/or main airflow switch (PS-10) is energized. 4. Main airflow switch's (PS-10) normally-open contact is closed. 5. Continuity at the controller between the fan status terminals (226 and 227). <p><i>If the fan is not running:</i></p> <ol style="list-style-type: none"> 1. Main airflow switch's (PS-10) normally-open contact is closed. 2. There is a short in the wiring between the fan status terminals (226 and 227). 	<ol style="list-style-type: none"> 1. There is a problem with the controller. Contact factory. 2. Contact factory. 3. There is a short in the wiring. Determine cause and rectify. 4. Replace main airflow switch. 5. There is a short in the wiring between these terminals. Determine cause and rectify. <ol style="list-style-type: none"> 1. Replace main airflow switch. 2. Determine cause and rectify
<p>B. Unit On/Fan Off. The controller has activated the unit enable output to start the fan, but the fan status input is not receiving a signal that the fan is running. This alarm resets automatically once this conflict is resolved.</p>	<p><i>If the fan is running:</i></p> <ol style="list-style-type: none"> 1. The BACview is indicating that another existing alarm condition is preventing the fan from running. 2. The unit enable relay (RE-57) and/or main airflow switch (PS-10) is energized. 3. Main airflow switch's (PS-10) normally-open contact is closed. 4. There is an open in the wiring between the fan status terminals (226 and 227). <p><i>If the fan is not running:</i></p> <ol style="list-style-type: none"> 1. The BACview is indicating that another existing alarm condition is preventing the fan from running. 2. Controller's supply fan start/stop output (BO-1) LED is lit. 3. Unit enable relay (RE-57) is energized or its normally open contact is closed. 4. VFD tripped out on an overload fault (the LCD on the VFD will display an "F_PF" message). 	<ol style="list-style-type: none"> 1. Determine cause and rectify. 2. There is a short in the wiring. Determine cause and rectify. 3. Replace main airflow switch. 4. Determine cause and rectify. <ol style="list-style-type: none"> 1. Determine cause and rectify. 2. Replace controller. 3. There is an open in the wiring. Determine cause and rectify. 4. Determine cause, rectify, and reset.

DIAGNOSTICS – NON-CRITICAL ALARMS *continued*

<p>C. Clogged Filter. The filter air pressure switch has closed between the appropriate terminals on the unit's terminal strip located in the unit's main control panel indicating a clogged filter. This alarm resets automatically once this conflict is resolved.</p>	<ol style="list-style-type: none"> 1. Filters are dirty. 2. Airflow switch sensing tubes are obstructed. 3. Airflow switch setpoint improperly set. 4. Short in the wiring between the control terminal strip and the airflow switch. 	<ol style="list-style-type: none"> 1. Clean or replace filters. 2. Clear obstruction. 3. Adjust airflow switch setpoint such that the airflow switch's normally open contact closes once the supply fan VFD reaches its minimum speed. 4. Find the clogged filter switch on the electrical schematic and identify the control panel terminals to which it is connected. Disconnect the wire from these terminals.
<p>D. Cooling Stage 1 Maintenance. This alarm requires a manual reset once it has been acknowledged by the operator.</p>	<ol style="list-style-type: none"> 1. The runtime for cooling stage 1 has surpassed the cooling stage 1 maintenance trip setpoint (default value is 2,200 hours, user-configurable via the BACview). 	<ol style="list-style-type: none"> 1. Refer to the Aztec Installation, Operation, and Maintenance (IOM) Manual for a complete list of maintenance procedures and the recommended maintenance schedule. Conduct any required maintenance to ensure continued efficient operation of the unit. This includes following the procedure in the IOM Manual for removing mineral deposits from the evaporative media and checking the piping for leaks, as well as ensuring that all electrical components are operating correctly and that wires are connected securely to the correct terminals. Reset the alarm (hotkey FN + MUTE) on the BACview.
<p>E. Cooling Stage 2 Maintenance. This alarm requires a manual reset once it has been acknowledged by the operator.</p>	<ol style="list-style-type: none"> 1. The runtime for cooling stage 2 has surpassed the cooling stage 2 maintenance trip setpoint (default value is 2,200 hours, user-configurable via the BACview). 	<ol style="list-style-type: none"> 1. Refer to the Aztec Installation, Operation, and Maintenance (IOM) Manual for a complete list of maintenance procedures and the recommended maintenance schedule. Conduct any required maintenance to ensure continued efficient operation of the unit. This includes following the procedure in the IOM Manual for removing mineral deposits from the evaporative media and checking the piping for leaks, as well as ensuring that all electrical components are operating correctly and that wires are connected securely to the correct terminals. Reset the alarm (hotkey FN + MUTE) on the BACview.

GLOSSARY

BACview – The BACview is a four line by forty character display used to change setpoints and monitor the unit's operation.

Cooling Stage 1 – The first stage of cooling is the indirect cooling coil.

Cooling Stage 2 – The second stage of cooling is the direct evaporative media.

PID loop – Proportional, Integral, and Derivative loops are a common control scheme used in modulating HVAC systems.

WebCTRL – A web-based graphical user interface that provides the user access to the unit via the internet.

MENU SELECTION TREE FOR BACVIEW

This section will assist the user in navigating the menu functions of the control program. For convenience Hotkeys are provided to allow the user to jump directly to a specific menu heading. Simply press and hold the FN key. While holding the FN key, press the number key of the desired menu, and it will appear. The number key associated with the menu heading is shown below. Links to other menu headings are also available by pressing one of the 4 keys located directly below the screen.

Special Functions:

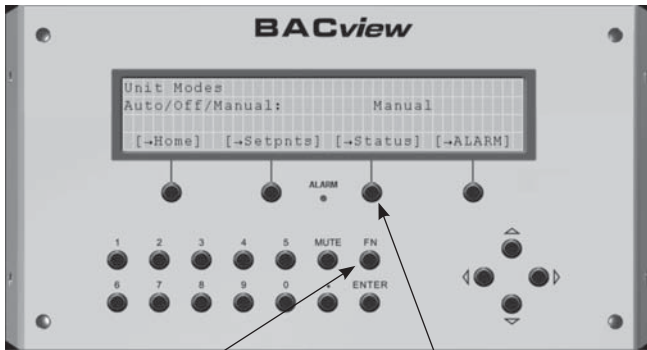
FN + MUTE = Clear Alarms

FN + period = Module Status (MODSTAT)

FN + 9 = Configuration

Access to the Unit Setup page requires the User or Admin Password. Changes to the Unit Setup page after the unit leaves the factory can adversely affect unit operation in the field. Changes to the PID Loop settings are only visible when logged in using the Admin Password. Do not make changes to the parameters on this page without first contacting the factory.

The default User Password is 0000. The default Admin Password is 1111.



Function key

Link keys

The following procedure describes how to change an operational parameter of the unit via the BACview. In this example, we will use the Unit Modes screen to change the unit mode from Off to Manual.

1. The Home screen shows "Aztec Contact Information" on the first line of the backlit display. From the Home screen, press the MODES link key that corresponds to the Unit Modes screen. The link keys are located just below the backlit display as shown in the previous figure.
2. The Unit Modes screen will appear on the backlit display. The unit ships from the factory with the Auto/Off/Manual parameter set to Off. To change this parameter to Manual or Auto, use the arrow keys to move the cursor so that "Off" is selected. When "Off" is selected by the cursor, it will appear on the screen surrounded by brackets: "[Off]".

3. Press the ENTER button. "Off" will flash on the screen, indicating that this value is now editable. Use the link keys corresponding to INCR and DECR to scroll through the available parameter values, which are Auto, Off, and Manual. Set the value of the parameter to Manual and press the ENTER button.
4. Once the system has accepted this new parameter value, the unit will run continuously in Manual mode.

Modstat

The modstat (module status) screen allows the user to check the program version number and whether the programs are initialized and running. If the red error LED is flashing on the module, a modstat is a useful troubleshooting tool. Perform the modstat by pressing and holding the FN key and then pressing the period key and then releasing both keys at the same time. Scroll down until you see the following message:

2 PRGs initialized. 2 PRGs running.

If this message is not visible anywhere on the modstat screen (after scrolling through the whole screen), contact the factory to troubleshoot the issue with the unit control module. There is likely an issue with the unit control module that is preventing the unit from functioning correctly.

The name of the main control program and its version number can also be seen on the modstat screen, for example:

Application Software Version: aztec6126_032813

For networking purposes, the device instance number can also be accessed via the modstat function, for example:

Device Instance: 0024016

Unit Setup HOTKEY - 9

- Control System
 - o MRT (modulating room temperature)
 - o MDT (modulating discharge temperature)
- SA Temp Ctrl PID P-Gain
- SA Temp Ctrl PID I-Gain
- SA Temp Ctrl PID D-Gain
- Bldg Pres Ctrl PID P-Gain
- Bldg Pres Ctrl PID I-Gain
- Bldg Pres Ctrl PID D-Gain
- Bldg Pres Ctrl PID Interval
- Mxd Air PID P-Gain
- Mxd Air PID I-Gain
- Mxd Air PID D-Gain
- Mxd Air PID Interval
- Econ PID P-Gain
- Econ PID I-Gain

MENU SELECTION TREE FOR BACVIEW *continued*

- Econ PID D-Gain
- Econ PID Interval
- 2nd Clg Stage Installed? No / Yes
- Current Xducer Range 0 – 200 amps
 - o # of Wire Wraps #
 - o Volts #
 - o 3-Phase? No / Yes
- Login
- Home
- Userpw
- Bacnet

NOTE: PID loop settings are only visible on the Unit Setup screen when logged into the BACview as an Admin. When logged in as a User, the PID loop settings will not be visible but the other configuration items will be.

Unit Modes HOTKEY - 2

- Auto/Off/Manual
 - o Auto
 - o Off
 - o Manual
- Zone Temp Type
 - o Aztec Supplied
 - o 3rd Party
- Supply Fan VFD Mode
 - o SA Temp Control
 - o Bldg Pressure Control
- MA Damper Mode
 - o Bldg Pressure Control
 - o MA Temp Control
 - o % Outside Air Control
- Home
- Stpnts
- Status
- Alarm

Unit Setpoints HOTKEY – 3

ITEM	RANGE
Occ Zone Stpt	40°F – 130°F
Unocc Zone Stpt	40°F – 130°F
Supply Air Temp Stpt	40°F – 130°F
Min Sup Air Temp Stpt	55°F – 130°F
Max Sup Air Temp Stpt	55°F – 130°F
Freezestat Stpt	35°F – 80°F
Sup Fan VFD Min Speed	5 – 100%
Clg Twr VFD Min Speed	5 – 100%
Reset Stage 1 Counter	No – Yes
Stg 2 Interstage Differential	2°F – 10°F
Reset Stage 2 Counter	No – Yes
Drain Twr Sump based on [p]	Runtime / Schedule
Drain Stg 1 [p] at [r] o'clock (24hr)	[p] = Mon, Tues, Wed, Thurs, Fri, Sat, Sun [r] = 0 – 23 o'clock
Drain Stg 1 after [p] hrs of runtime for [r] minutes	[p] = 0 – 99 hours, [r] = 0 – 999 minutes
Drain Stg 2 [p] at [r] o'clock (24hr)	[p] = Mon, Tues, Wed, Thurs, Fri, Sat, Sun [r] = 0 – 23 o'clock
Drain Stg 2 after [p] hrs of runtime for [r] minutes	[p] = 0 – 99 hours, [r] = 0 – 999 minutes
OA Temp to Drain Sump(s)	35°F – 80°F
Bldg Pressure Stpt	-0.100" W.C. – +0.100" W.C.
Mixed Air Temp Stpt	30°F – 90°F
Econ Enable	
• OAT < [p]°	[p] = 50°F – 90°F,
• OAH < [r]% RH	[r] = 0 – 100%
OA Damper Min % Open	0 – 100%
Damper % Open Stpt	0 – 100%
Alrm Config	
Prev	
Home	
Sched	
Overrides	

MENU SELECTION TREE FOR BACVIEW *continued*

Clockset HOTKEY – 0

- Time hh:mm:ss
- Date dd-mm-yy
- Previous
- DST
 - o Start Time hh:mm
 - o Amount 060
 - o Beg Mar 11 2012 End Nov 04 2012
 - o Beg Mar 10 2013 End Nov 03 2013
 - o Beg Mar 09 2014 End Nov 02 2014
 - o Beg Mar 08 2015 End Nov 01 2015
 - o Beg Mar 13 2016 End Nov 06 2016
 - o Beg Mar 12 2017 End Nov 05 2017
 - o Beg Mar 11 2018 End Nov 04 2018
 - o Beg Mar 10 2019 End Nov 03 2019
 - o Beg Mar 08 2020 End Nov 01 2020
 - o Beg Mar 14 2021 End Nov 07 2021
 - o Previous

Electrical Usage and Demand HOTKEY – 5

The Electrical Usage Menu displays up-to-the-minute electrical usage data.

- Instantaneous Demand kW
- kWh Today kWh
- kWh Yesterday kWh
- kWh Month to Date kWh
- kWh Last Month kWh
- kWh Year to Date kWh
- kWh Last Year kWh
- Peak Demand Today kW
- Peak Demand Yesterday kW
- Peak Demand Month to Date kW
- Peak Demand Last Month kW
- Peak Demand Year to Date kW
- Peak Demand Last Year kW
- Prev
- Home

Comfort Index HOTKEY – 8

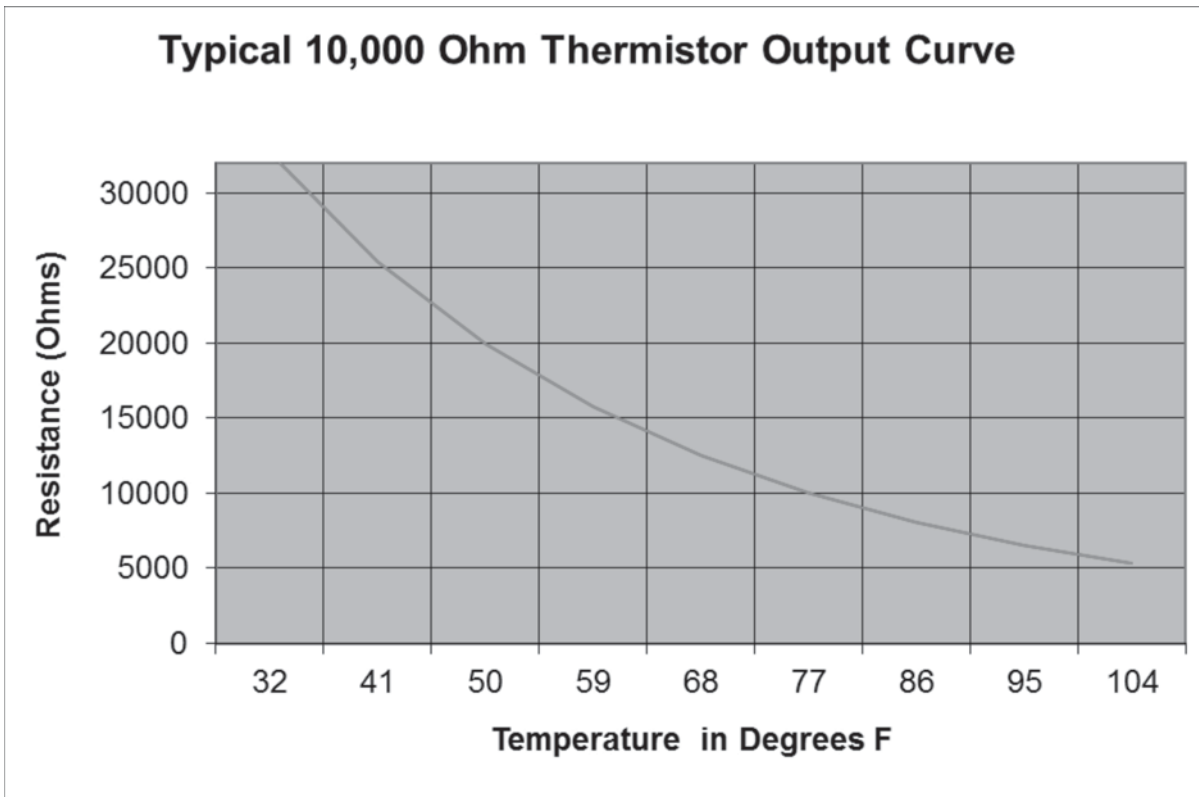
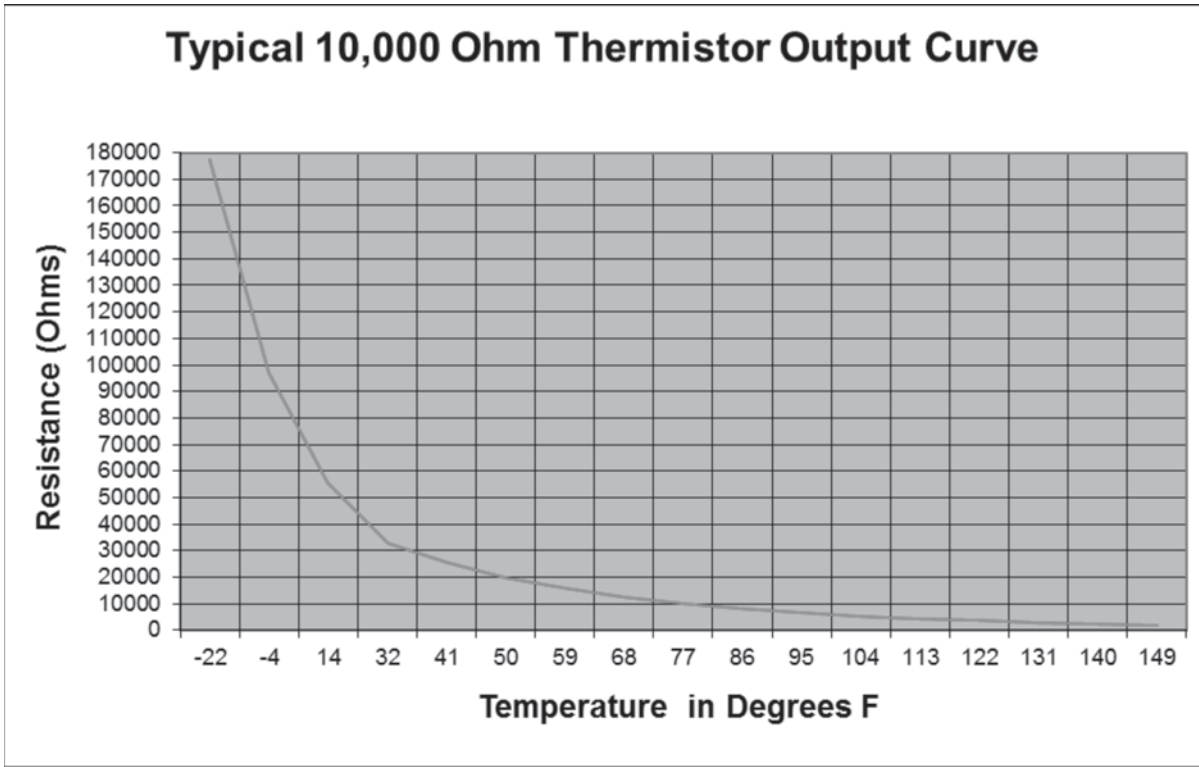
- Comfort Index %
- Satisfaction Rating %
- Reset SR Timers Off / On
- Prev
- Home

Overrides HOTKEY – 8

- Binary Outputs
- Lock Stg 1 Pump (BO2) No / Yes
- Lock Stg 2 Pump (BO3) No / Yes
- Lock Stg 1 FI/Drn (BO5) No / Yes
- Lock Stg 2 FI/Drn (BO6) No / Yes
- Analog Outputs
- Lock Damper (AO1) %, No / Yes
- Lock SF VFD (AO2) %, No / Yes
- Lock CT VFD (AO3) %, No / Yes
- Keypad
- Prev
- Home
- Keypad
- Status

APPENDIX I

10,000 Ohm Thermistor Output Curve



APPENDIX II

I/O Flex 6126 Controller Specifications

Power Requirements

24VAC \pm 10%, 20VA (26VA with BACview attached)

Network Communication

BACnet (ARCNET and MS/TP), Modbus RTU, or N2 bus at up to 76.8K baud or 156K baud over ARCnet. LonWorks and Ethernet using plug-in communications board.

User Interface

Modulating room temperature control with intelligent room sensor and BACview LCD control panel.

Memory

1MB of flash memory and 1MB of non-volatile battery-backed RAM

Realtime Clock

Battery-backed to keep time in the event of power failure.

Temperature Operating Range

-20°F to 140°F, 10% to 95% RH non-condensing

Inputs/Outputs

12 Universal Inputs (UI-01 ... UI-12)

- Inputs 1 & 2
 - o Pulse
- Inputs 1 – 12
 - o Thermistor
 - o RTD
 - o 4 – 20 mA
 - o 0 – 10 VDC

6 Binary Outputs

- Relay contacts rated at 5A Resistive @ 250VAC
- LED indication

Network Communication

6 Analog Outputs

- Outputs 1 – 2
 - o 4 – 20 mA
 - o 0 – 10 VDC
- Outputs 3 – 6
 - o 0 – 10 VDC

Output Assignments - Analog

- AO-1 Damper Control
- AO-2 Supply Fan VFD Control
- AO-3 Cooling Tower VFD Control
- AO-4 DA Temp Control

Output Assignments - Digital

- BO-1 Supply Fan Start/Stop
- BO-2 Clg Stg 1 Pump Start/Stop
- BO-3 Clg Stg 2 Pump Start/Stop
- BO-4 Cooling Tower Fan Start/Stop
- BO-5 Clg Stg 1 Fill/Drain Start/Stop
- BO-6 Clg Stg 2 Fill/Drain Start/Stop

Input Assignments - Universal

- UI-01 Supply Air Temperature Sensor
- UI-02 Outside Air Temperature Sensor
- UI-03
 - o Non-multiplexed (1-stage units)
 - Clg Stg 1 Float Switch
 - o Multiplexed (2-stage units)
 - Clg Stg 1 Float Switch
 - Clg Stg 2 Float Switch
- UI-04 Mixed Air Temperature Sensor
- UI-05 Not used at this time
- UI-06 Building Pressure Transducer
- UI-07 Clogged Filter Status
- UI-08 Supply Fan Status
- UI-09 100% Outside Air Enable
- UI-10 Auxiliary Unit Enable
- UI-11 Current Transducer
- UI-12 Humidity Transducer

Input Assignments - Rnet

- RNET Room Air Temperature Sensor

APPENDIX III

I/O Flex 6126 Controller Battery Checkout

The battery on the unit control module retains the controller's memory in the event of power failure. The 10-year Lithium CR2032 battery provides a minimum of 10,000 hours of data retention during power outages. Remember to check the battery periodically (once a month or so) to verify that its voltage is approximately 3 VDC.

If the voltage is not approximately 3 VDC, replace the battery so that the controller's program is not lost during a power outage. Loss of the program will require the controller to be shipped back to the factory for reprogramming because the unit will not function without the program.

Make sure the controller is powered any time the battery is removed or the controller's memory may be lost.

Figure 2 shows the location of the battery on the controller.

Check once a month to verify that the charge of the battery is 3 VDC.

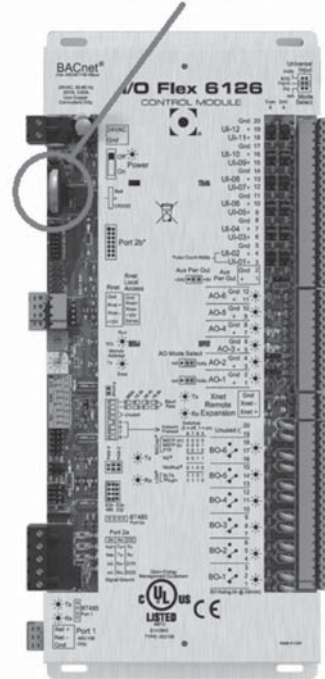
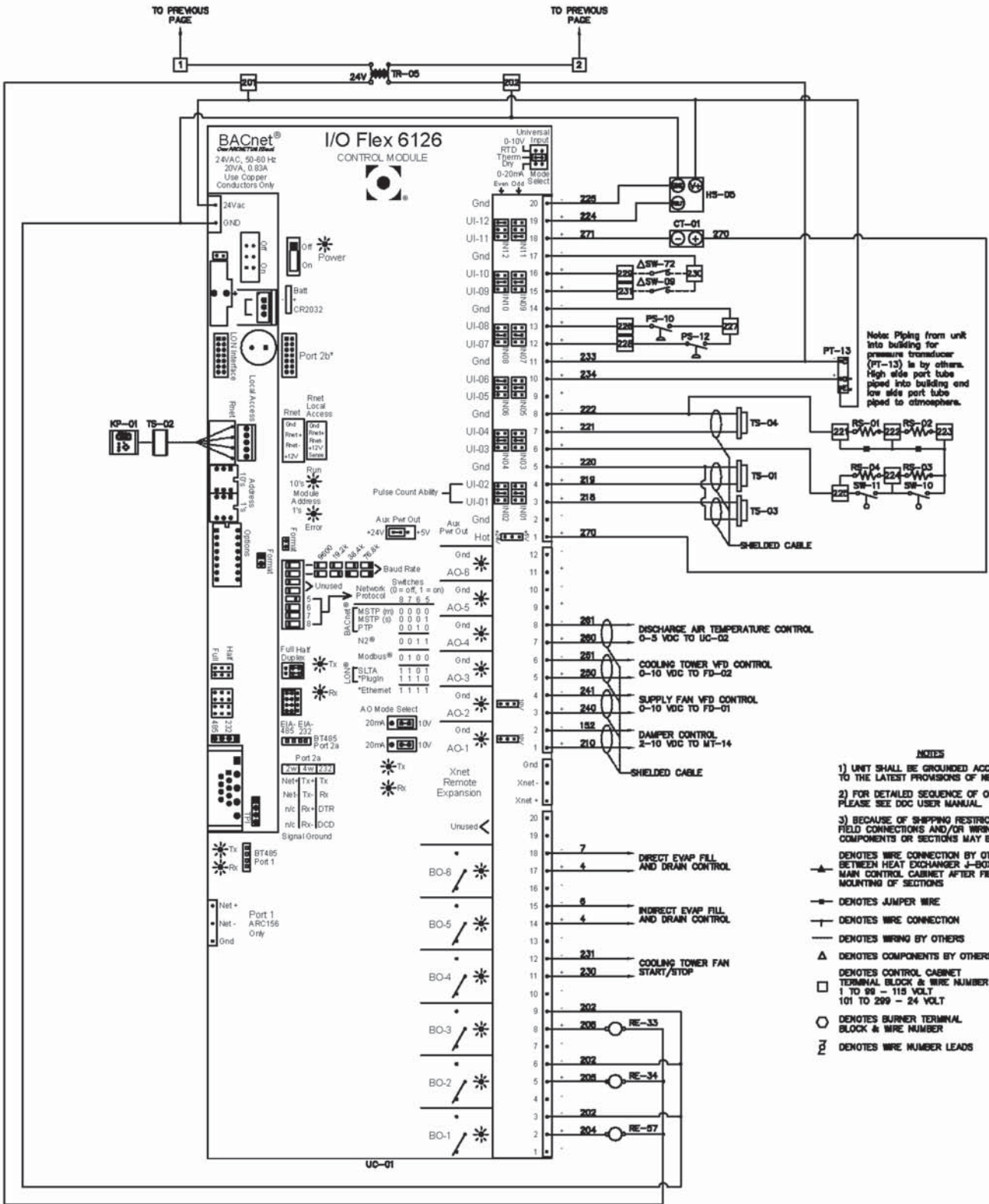
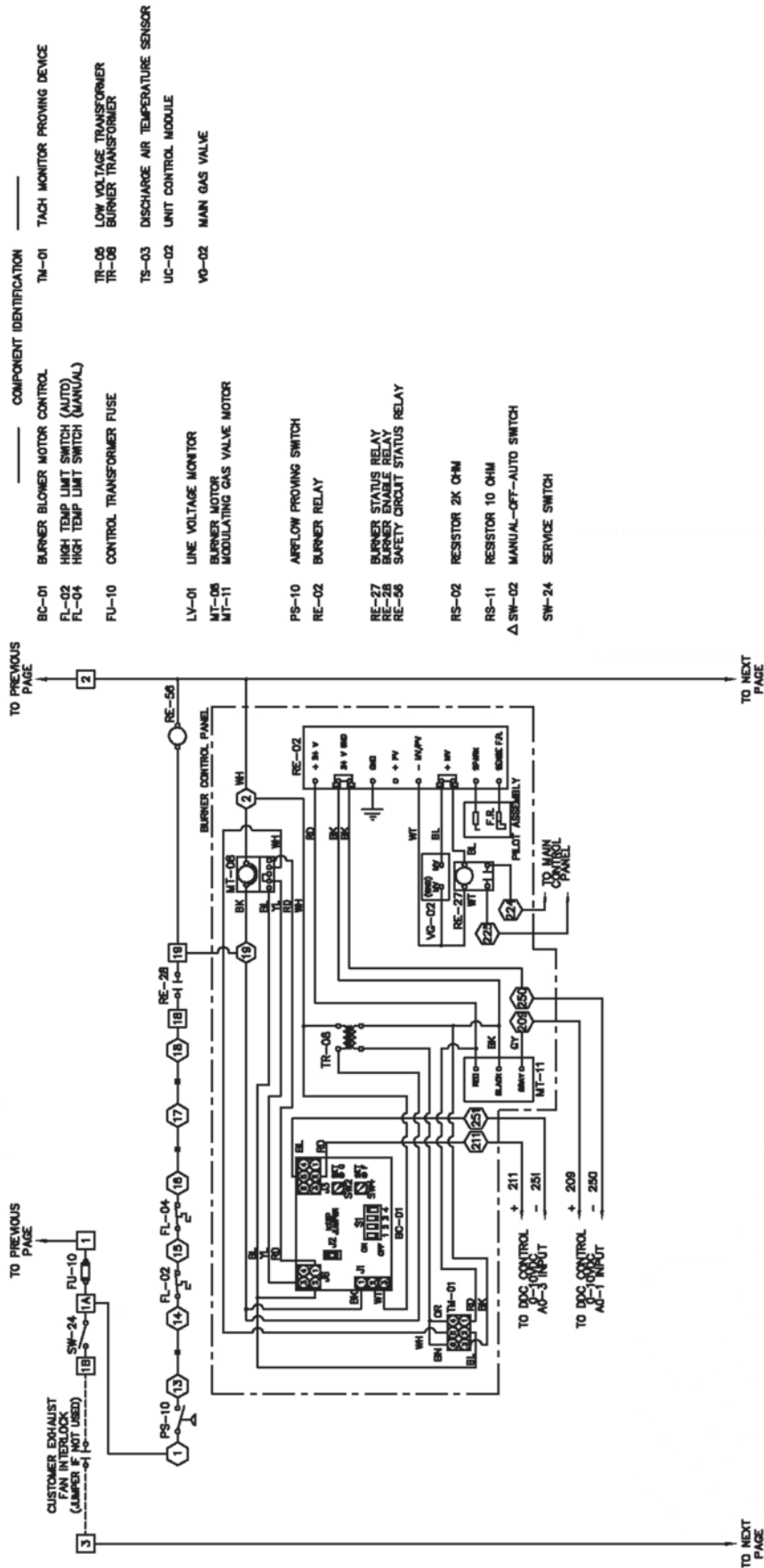


Figure 2

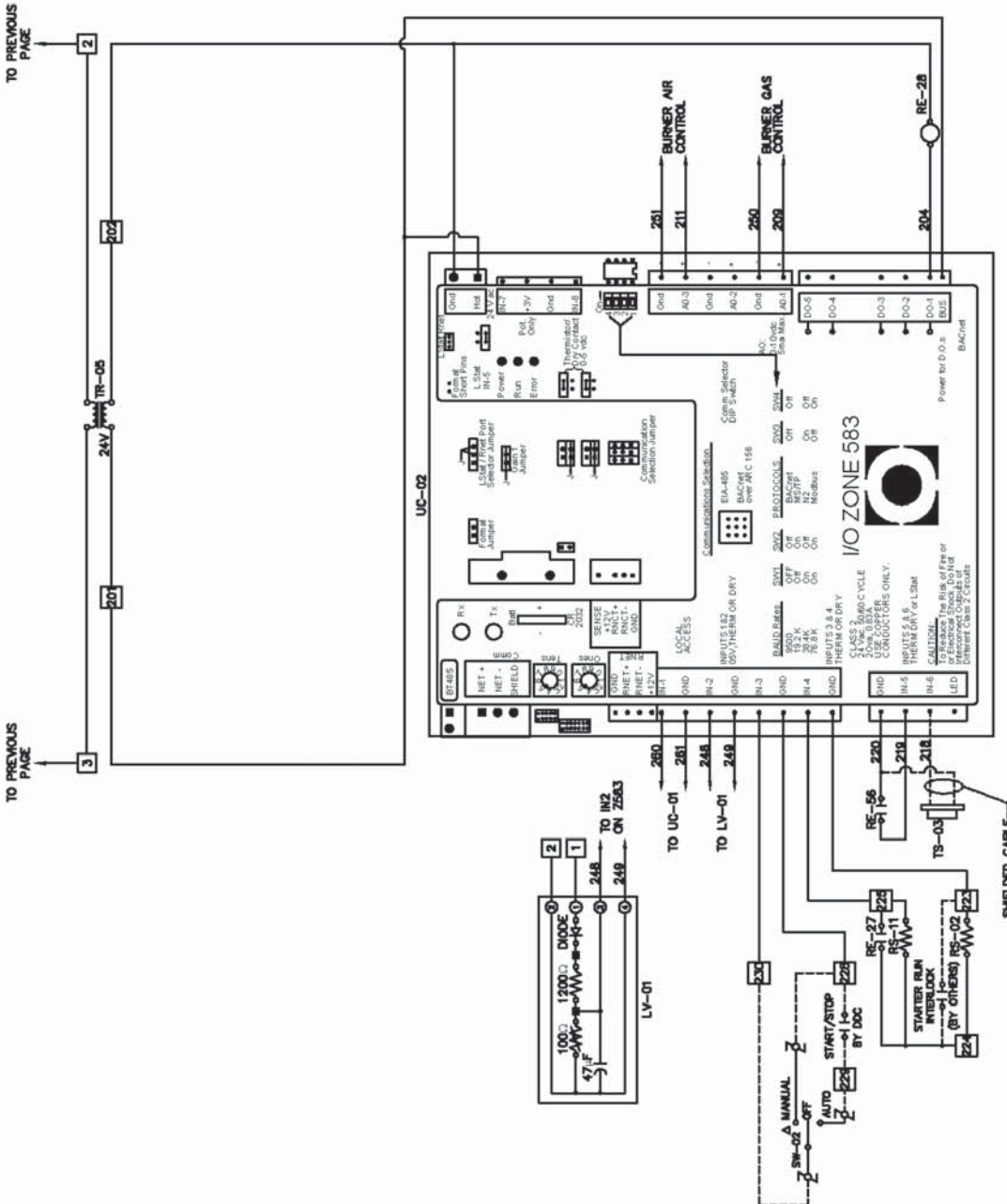




COMPONENT IDENTIFICATION	
BC-01	BURNER BLOWER MOTOR CONTROL
FL-02	HIGH TEMP LIMIT SWITCH (AUTO)
FL-04	HIGH TEMP LIMIT SWITCH (MANUAL)
FU-10	CONTROL TRANSFORMER FUSE
LV-01	LINE VOLTAGE MONITOR
MT-08	BURNER MOTOR
MT-11	MODULATING GAS VALVE MOTOR
PS-10	AIRFLOW PROVING SWITCH
RE-02	BURNER RELAY
RE-27	BURNER STATUS RELAY
RE-56	SAFETY CIRCUIT STATUS RELAY
RS-02	RESISTOR 2K OHM
RS-11	RESISTOR 10 OHM
△ SW-02	MANUAL-OFF-AUTO SWITCH
SW-24	SERVICE SWITCH
TN-01	TACH MONITOR PROVING DEVICE
TR-08	LOW VOLTAGE TRANSFORMER
TR-08	BURNER TRANSFORMER
TS-03	DISCHARGE AIR TEMPERATURE SENSOR
UC-02	UNIT CONTROL MODULE
VG-02	MAN GAS VALVE

TO PREVIOUS PAGE

TO PREVIOUS PAGE



NOTES

- 1) UNIT SHALL BE GROUNDED ACCORDING TO THE LATEST PROVISIONS OF NEC.
- 2) FOR DETAILED SEQUENCE OF OPERATION PLEASE SEE DDC USER MANUAL.
- 3) BECAUSE OF SHIPPING RESTRICTIONS FIELD CONNECTIONS AND/OR WIRING BETWEEN COMPONENTS OR SECTIONS MAY BE REQUIRED

- DENOTES WIRE CONNECTION BY OTHERS BETWEEN HEAT EXCHANGER J-BOX AND MAIN CONTROL CABINET AFTER FIELD MOUNTING OF SECTIONS
- DENOTES JUMPER WIRE
- DENOTES WIRE CONNECTION
- DENOTES WIRING BY OTHERS
- △ DENOTES COMPONENTS BY OTHERS
- DENOTES CONTROL CABINET TERMINAL BLOCK & WIRE NUMBER 1 TO 99 - 115 VOLT 101 TO 200 - 24 VOLT
- DENOTES BURNER TERMINAL BLOCK & WIRE NUMBER
- ⊞ DENOTES WIRE NUMBER LEADS

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4830 Transport Drive, Dallas, TX 75247
Phone: 214-638-6010
www.aztec-server-cooling.com