

E-SERIES

Evaporative Cooling

TECHNICAL MANUAL

⚠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.



LIMITED WARRANTY

Cambridge Air Solutions Limited Warranty is included with the Terms and Conditions that are sent with every Order Acknowledgement. For questions regarding the Limited Warranty, contact Cambridge Air Solutions Customer Service Group at 1-800-473-4569 during the hours of 8:00 a.m. to 5:00 p.m. Central Time, Monday through Friday.

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TECHNICAL MANUAL

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NEED UPDATED
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E-SERIES DIRECT EVAPORATIVE COOLING (DEC)

GENERAL INFORMATION:

Cambridge Air System's E-Series Direct Evaporative Coolers are custom fabricated air handlers.

They use evaporative cooling to meet specific usage and dimensional requirements. Use this manual to install, start-up, operate and maintain the E-Series models. A careful review of this manual will help minimize installation, start-up, and maintenance difficulties.

Operating Environment

The unit is designed for outdoor applications. When considering the placement of the E-Series, it is important to consider the operating environment. The acceptable temperature range for unit operation is -10°F to 115°F.

⚠CAUTION:

Do not subject the unit to temperatures above 140°F / 60°C..

NOTE: Careful consideration is also required if the unit will be installed within a coastal temperate zone. Additional protective coatings may be necessary to prevent corrosion.

SAFETY CONSIDERATIONS:

Throughout this manual are Warnings, Cautions and Notes to alert the installing contractors, service and maintenance personnel of potential hazards that could result in personal injury, death or serious damage to property or equipment.

Your personal safety and the proper operation of this machinery depend on the careful observance of all Warnings, Cautions and Notes:

⚠WARNING:

Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

⚠CAUTION:

Indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury, or to alert against unsafe practices.

NOTE: Indicates a situation that could result in equipment or property damage, or provides important information on installation considerations.

⚠WARNING:

Proper Field Wiring and Grounding Required!
All field wiring MUST be performed by qualified personnel. Ensure all field wiring and grounding is accomplished in full accordance with National Electrical Code (NEC) and local/state electrical codes. Failure to do so may pose FIRE or ELECTROCUTION hazards resulting in death or serious injury.

⚠WARNING:

Personal Protective Equipment (PPE) Required!
Installing/servicing this unit could result in exposure to electrical, mechanical and chemical hazards.

- Before installing/servicing this unit, technicians MUST wear all recommended Personal Protective Equipment (PPE) for the specific work being undertaken.

ALWAYS refer to appropriate Safety Data Sheets (SDS) sheets and OSHA guidelines for proper PPE.

- When working with or around hazardous chemicals, ALWAYS review appropriate SDS and OSHA guidelines to ensure compliance with safety standards for personal exposure levels, proper respiratory protection and handling recommendations.
- If there is a risk of arc or flash, technicians MUST put on all PPE in accordance with the National Electrical Code (NEC) for arc flash protection, PRIOR to servicing the unit.
- Failure to follow recommendations could result in death or serious injury.

RECEIVING:

Upon receipt, examine units carefully for in-transit damage or missing components as detailed in packing list. If damaged, report damage(s) to trucking company, take pictures, and contact Cambridge Air Solutions.

After uncrating unit, verify that it is the proper size and that all loose parts are included.

NOTE: Inspect the exterior and interior of the equipment carefully for any damage that may have occurred during shipment. Verify shipped loose parts are complete and undamaged. Ensure there is no damage to protruding exterior components such as door handles, disconnect switch handle, etc. or to internal components such as pumps, media, filters, louvers and drains.

INSTALLATION:

⚠WARNING:

Do not remove unit from shipping skid until it is at the installation location. Moving these units when not properly secured to the skid can result in personal injury or death and can seriously damage the unit.

⚠WARNING:

To prevent injury or death, and damage to unit, ensure the lifting capacity of the moving equipment exceeds the weight of the unit by an adequate safety margin.

NOTE: Ensure all local building and electrical codes are fully complied with in installing the unit.

Take the following factors into consideration before selecting the location of installation:

- Ensure sufficient clearance, per the submittal, to allow easy access for maintenance and system operation.
- Unit must be installed on a level foundation that allows for proper flow of condensation into internal drains, sufficient to support continuous to full perimeter of base and cross members, and minimize deflection of unit base frame to no more than 1/16th “ (1.6mm) over the length and width of unit.

⚠WARNING:

To prevent injury or death, disconnect electrical power source before completing connection to the unit. All wiring must comply with National Electrical Code (NEC) and state and local requirements. Outside the United States, the national and or local electrical requirements of other countries shall apply.

The installing contractor must connect appropriate power wiring to the terminal block or non-fused, unit-mounted disconnect in the power section of the unit control panel.

⚠WARNING:

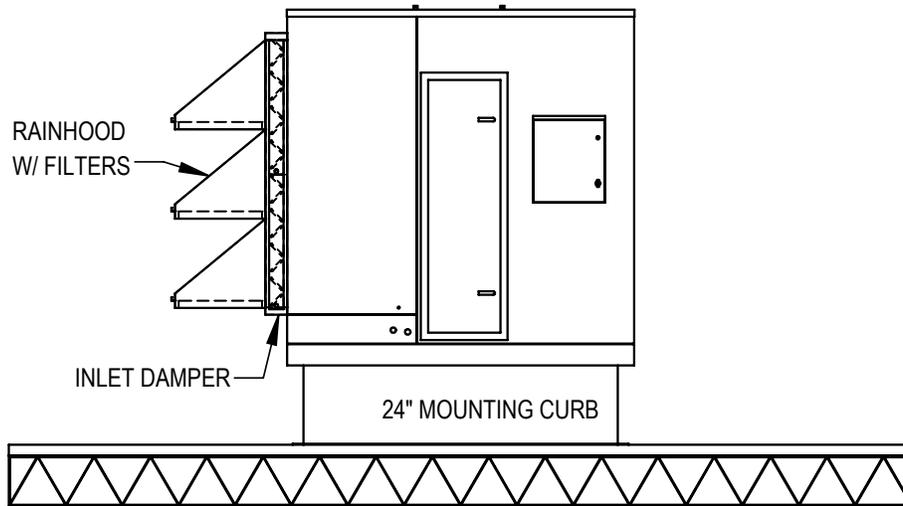
During installation, testing, servicing, and troubleshooting of this product, it may be necessary to work with live electrical components. To prevent injury or death due to electrocution, take extreme care when performing service procedures with electrical power energized. Have a qualified licensed electrician or other individual who has been properly trained in handling live electrical components perform these tasks. Failure to follow all safety precautions when exposed to live electrical components could result in death or serious injury.

1. All installation should be performed in accordance to local and state codes and with proper permits.
2. Measure the unit for correct sizes compared to the submittal. Immediately contact Cambridge Air Solutions if the unit's openings do not match.
3. Check for proper air flow direction.
4. Set the unit in place. Make sure the unit covers the entire air inlet opening.
5. Fasten the unit in place with the self-drilling screws provided with the unit.

NOTE: Take care not to drill or screw into sump tank.

6. Check for air leakage. Air leakage will lower the efficiency of the unit.
7. Check that the unit is level for proper water transfer through the system.
8. Check that the sump pump has a good seal to the floor.

Roof Top Configuration – E-Series



Fan Discharge Connections

To ensure the highest fan efficiency, duct turns and transitions must be made carefully, minimizing air friction losses and turbulence. Proper ductwork installation, as outlined by such organizations as Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA), should be followed closely.

PLUMBING / FILL AND DRAIN VALVES:

1. All installation should be performed in accordance to local and state codes and with proper permits.
2. The make-up water connection is ½" FPT.
3. Install a 3-way fill valve under the roof (in a conditioned space) to keep the pipe from freezing (see attached schematic).
4. The 2-way drain valve can be installed outdoors or indoors under the roof line in a frost-free environment. See schematic below. If the 2-way drain valve is installed outdoors (above the roof level), valve cover(s) are required.

Auto Drain with Freeze Protection (Optional)

Install a two-way drain valve on the sump's drain connection. Install a three-way fill valve under the roof-line with port "AB" piped to the make-up water connection from the sump. Port "A" is piped to the city water supply and port "B" is piped to an approved roof drain. (See attached drawing.)

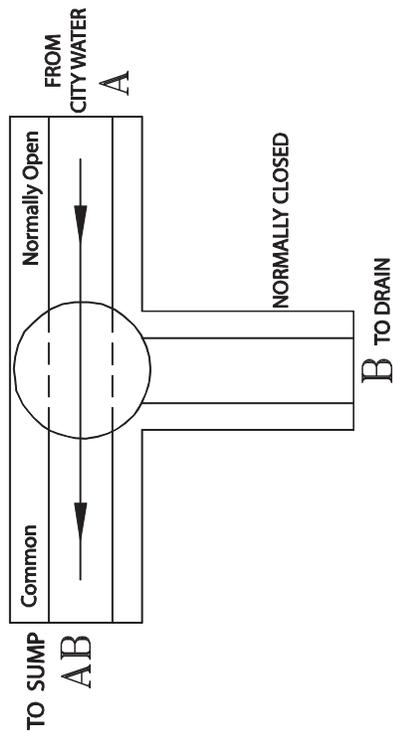
During normal operation of the unit the drain valve will be shut and the fill valve is open from port "A" to port "AB" letting city water enter the sump. Water level is adjusted and controlled by a float assembly to a level ½" inch below the overflow. On a freeze signal or a signal from the 24-hour time clock, the drain valve will open allowing the sump to drain. Simultaneously, the fill valve will shut off the city water, closing port "A" to port "AB" but will open port "AB" to port "B," thus allowing the remaining water in the exposed pipe from the valve to the sump to drain to keep the pipe from freezing. A low-water cut off switch will protect the pump(s) from running dry.

During installation, relocate the freeze stat bulb (located inside the electric control panel) to the outside of the enclosure to ensure correct temperature readings.

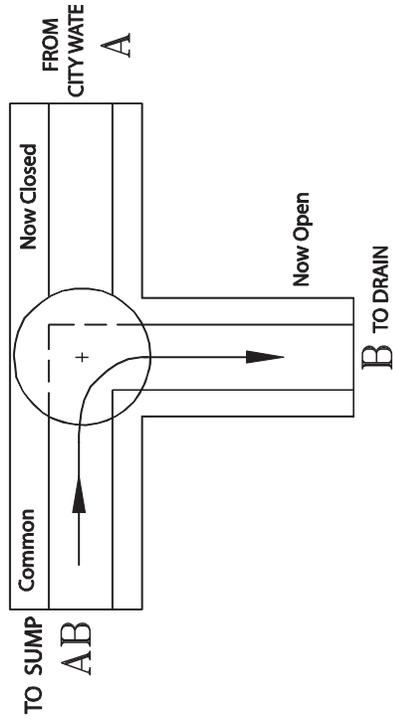
FILL VALVE SCHEMATIC:

NOTE: ALL PLUMBING, PIPING, AND FIXTURES EXTERNAL TO UNIT ARE TO BE FURNISHED AND INSTALLED BY OTHERS UNLESS OTHERWISE INDICATED.

3-WAY VALVE FILLING SUMP

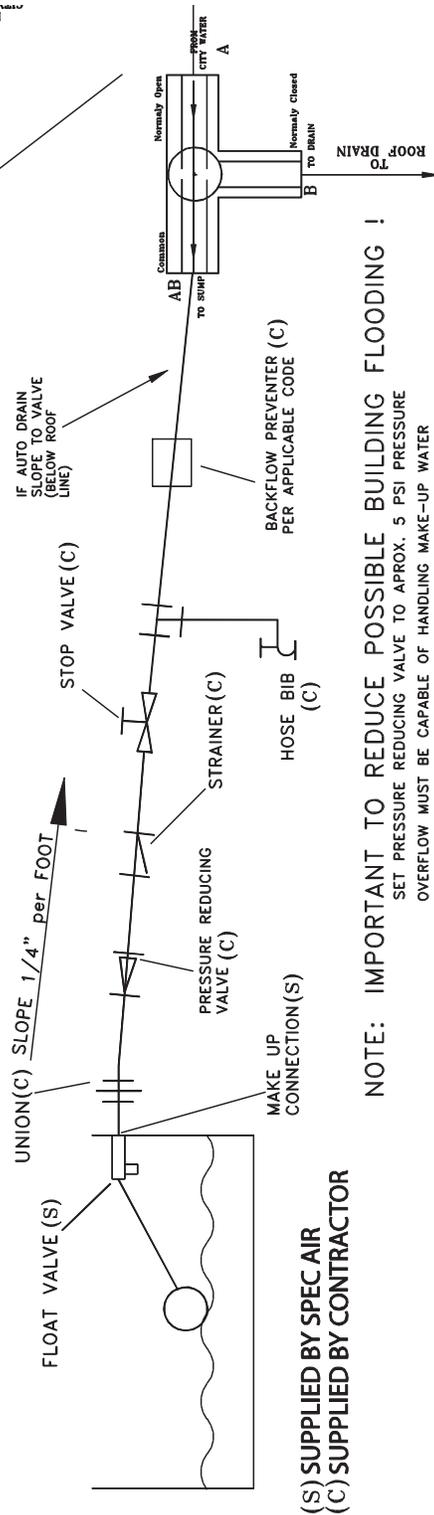


3-WAY VALVE SHUTTING OFF CITY WATER & DRAINING EXPOSED PIPE



SUGGESTED MAKE UP WATER PIPING

PROVIDED BY INSTALLER (FLOAT VALVE BY SPEC-AIR)



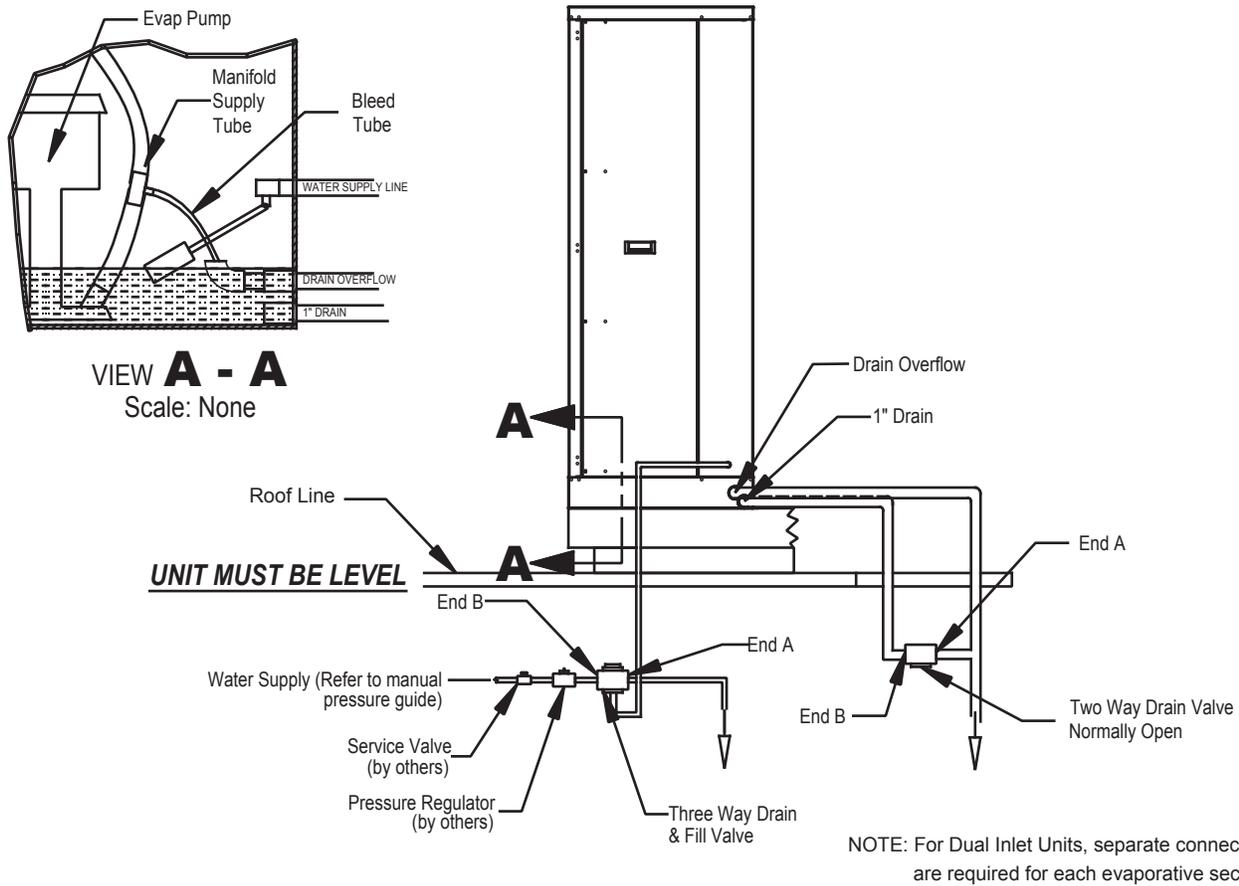
(S) SUPPLIED BY SPEC AIR
(C) SUPPLIED BY CONTRACTOR

NOTE: IMPORTANT TO REDUCE POSSIBLE BUILDING FLOODING !

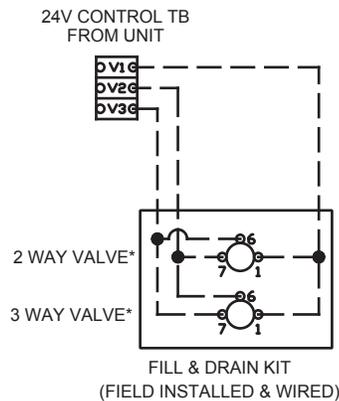
SET PRESSURE REDUCING VALVE TO APPROX. 5 PSI PRESSURE
OVERFLOW MUST BE CAPABLE OF HANDLING MAKE-UP WATER FLOW RATE.
TO SET: BLOCK FLOAT VALVE OPEN AND LOWER PRESSURE UNTIL OVERFLOW WILL HANDLE FULL MAKE-UP WATER FLOW RATE.

FILL AND DRAIN VALVE SCHEMATIC

Drain, Overflow and Make-Up Water Piping for Autodrain with Freeze Protection



FILL & DRAIN KIT WIRING SCHEMATIC



NOTE: *Wiring may change if pumps provided by others.
**All wiring must comply with local and national electrical codes.

ELECTRIC PANEL / WIRING:

The pump and low level switches are wired to a J-Box in the DEC module.

Wiring to the control panel is pre-wired and coiled up in the Electrical Control Enclosure for termination in the field.

Factory-supplied power and control wiring are to be field-connected to the terminal strip located in the Jbox-mounted on the DEC.

NOTE: Power is supplied and installed by others.

- All installations should be performed in accordance to local and state codes and with proper permits.
- Wire the unit according to approved submittals and the wiring diagram.

MEDIA COOLING PADS OPERATING INSTALLATION:



Munters

Engineering Bulletin EB-OI-0906
**MEDIA ORIENTATION
 INSTRUCTIONS**

IMPORTANT

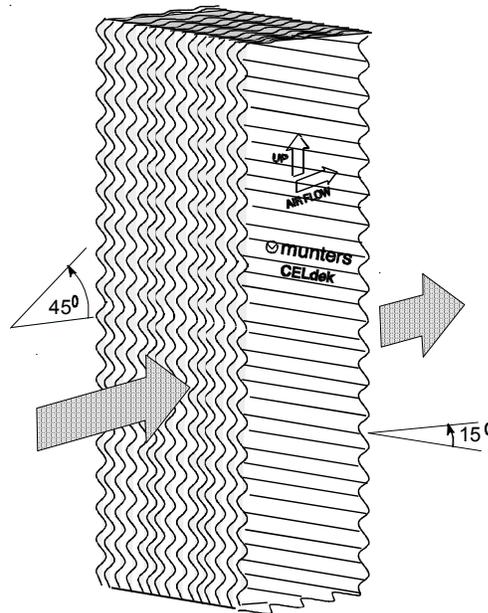
Installation

In order to get the best performance from your Munters cooling pads, they must be installed properly. If you have purchased a pad with two equal angles, they can be installed in either direction. Depending on the application, pads are manufactured with special angle combinations. Those having combinations of 15° x 45° or 30° x 45° are made to direct more water toward the air entering side of the pads. If installed backwards, the pads may not work properly.

Munters pads must always be installed with the steeper flute angle sloping down toward the air entering side. The reasoning is simple, the steeper angle puts more water on the entering side of the pad where the air is hot, dry, and dusty and extra water it is needed most. The unequal angles also counteract the tendency of the air to push the water toward the air leaving side of the pad.

CELdek "New Pad" Odor

CELdek is made from materials similar to those used in paints, carpets, paneling and wallpaper. CELdek pads must be flushed with water to remove the new construction odors. If you find the smell of the new paper to be objectionable, you should run water over the pad for 2-5 hours without the fan running. Change the water often, using bleed off or dump cycles. If the odor continues after one or two days, call Munters customer service. Please have full details of when and from whom the pad was purchased.



Caution

Do not expose CELdek® evaporative cooling pads to sparks, open flame, welding spatter, temperatures in excess of 350° F, or other sources which may ignite the paper. GLASdek® will not readily ignite, unless exposed to a direct flame or extremely high temperatures for an extended period of time.

Test Results for ASTM-E84 Standard Method of Test for Surface Burning Characteristics of Building Materials

PRODUCT	Flame Spread Index	Smoke Density
CELdek	450	420
GLASdek	0	20
Mi-T-Dark®, DRIFdek®, & COOLdek®	15	745

The data and suggestions contained herein are based on information Munters believes to be reliable. They are offered in good faith but without guarantee, as conditions and methods of use are beyond our control. We recommend that the prospective user determine the suitability of our media and suggestions before adopting them on a commercial scale.

For more information Contact Munters Corporation, HumiCool Division 239-936-1555
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START-UP CHECKLIST

Once the air handler has been assembled, installed, and piped, attention must be directed to individual components for proper operation. Before operating the unit, complete the Pre Start-up checklist. Sign and send copy to Cambridge.

NOTE: Follow all Manufacturers' Guides for Pre Start-Up. The following is a guide only.

1. Remove any debris from the unit interior.
 - a. Remove all foreign material from the drain pan and check drain pan opening and condensate line for obstructions.
 - b. Ensure the unit has been installed level.
 - c. Ensure the damper operator motors and connecting linkage has been installed.
 - d. Verify the damper operation and linkage alignment.
 - e. Check that the air filters are in place and positioned properly.
 - f. Close and secure all unit access doors
2. If differential pressure switch is provided on filter rack, adjust per system requirements.
3. Inspect electrical connections to the unit and unit controllers.
 - a. Connections should be clean and secure.
 - b. Compare the actual wiring with the unit diagrams.
 - c. Reference the appropriate controller manual for more details about starting units with factory mounted controls.
4. Ensure all piping, connections, vents and drains have been connected properly
5. Ensure supply and return air ducts have been connected properly.
6. Check piping and valves for leaks.
7. Fill sump tank with water and adjust float to ½" below overflow drain.
8. Check that the fill and drain valve are installed and wired to the 24-hour timer and freeze stat. Set the 24-hour fill and drain timer to local time. The drain and refill feature is factory set to turn off the sump for 1 hour between 4 am to 5 a.m., and is manually adjustable to User's requirements.
9. Turn power to unit on and check for any electrical shorts.
 - a. Measure and record the motor voltage and amperage on all phases to ensure proper operation. The readings should fall within the range given on the motor nameplate.
 - b. Check fan rotation and correct if necessary.
 - c. Check all interlocks to be sure that connected components work per plans and specifications.
10. Check that line and sump pump voltages and amperages as per the nameplate.
11. Confirm the time delay has been set to 1 minute on the sump pump(s).
12. Verify the low water level float switch located in sump is working properly and will turn the pump(s) on.
13. Start-up the fan per manufacturer's instructions. After both the fan and sump are running and operating properly, check that water is not being carried over into the airstream from the media pads or sump.
14. Cycle damper actuators to ensure they open and close freely.

⚠WARNING:

Whenever power is interrupted, the 24-hour clock must be reset to local time.

If there is water carryover from the media pads perform the following procedure:

15. Check for proper positioning of media pads on the sides of the pads are arrows marking the direction of air flow. If media pads are correctly positioned then check for air bypassing between the media pads and their frames. If air is bypassing, then place a strip of foam gasketing between the media pads and side channel to compress the media pads and fill the gap.
16. After twenty (20) minutes observe media for complete wetting and check that there are no dry streaks. Open balancing valve to increase water flow and close valve as necessary to reduce water flow to media pads. (Initial factory-set position of valve is ½ open).

17. After running the unit for (1) week adjust factory pre-set bleed valve(s). This process allows the pump to discharge the concentration of solids in the water. The bleed valve is located on the discharge portion of the pump and is connected to a 3/8" drain tube. The drain tube should always be positioned inside the overflow drain. Use the following procedure to set bleed valve:

- i. Completely turn the bleed valve(s) open. This allows the pump to discharge the concentration of solids in the water.
- ii. Close the bleed valve(s) and count the number of turns required.
- iii. Set bleed valve(s) to ½ open position.
- iv. Check that bleed lines(s) are connected to overflow drain.
- v. Increase water flow rate if there are scale deposits on the media pads. Check for water carryover afterwards and adjust if necessary.
- vi. If there are dry streaks in the media then remove distribution header and any debris blocking the distribution holes.

- b. Open or close the valves to check for proper operation.
- c. Drain lines should be open.

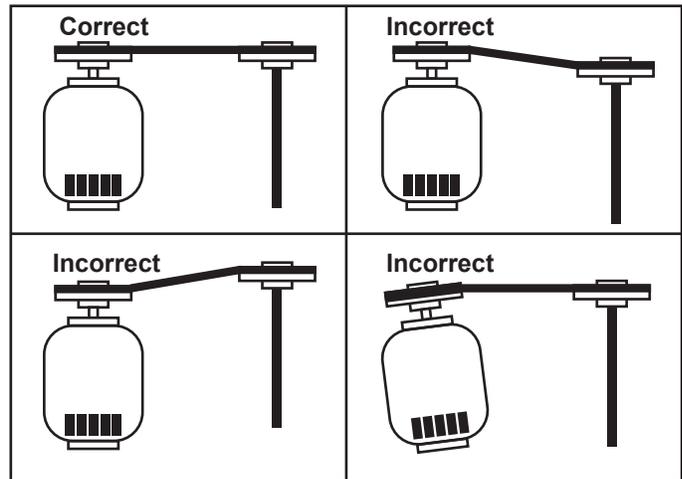
18. Leave this manual with the unit.

Conductivity/Total Dissolved Solids (TDS) Controller

Start up the controller per manufacturer's Installation & Operation Manual (IOM), based on the recommendations of your local water quality expert to ensure proper water quality in the evaporative cooling units.

BELT TENSION:

Proper belt tension is important for long belt life. Too much tension will place excessive loads on the belts and bearing, causing premature failure. Not enough tension will cause belts to slip generating dust and heat while reducing the belt life. Use a belt tension tool to check the belt's tension. Ideal belt tension is the lowest tension at which the belts will not slip under peak load conditions. Before starting the fan, recheck the alignment and realign the sheaves if necessary. New belts may stretch after installation, so recheck belt tension frequently during the first 24-48 hours of operation. Make drive inspections on a periodic basis. Never apply belt dressing.



NORMAL OPERATIONS:

Sequence of Operation:

1. Upon external signal the sump pump will energize and water will flow to the distribution header and over the media pads.

NOTE: For longer media pad life do not cycle the water flow over the media pads. The pump should run continuously (Variable air volume or cycling the fan are acceptable methods of temperature control).

If the pump has to be cycled, a wash down cycle component can be purchased to prevent the plating of solids on the media.

2. At the factory pre-set or customer-set time, the fill valve will close and the drain valve will open for one hour emptying the sump.

NOTE: This procedure is necessary to prevent algae and scale formation on the media pads.

MAINTENANCE:

Frequency of Maintenance

Spring Start-Up

1. Clean any scale or debris in the sump tank and sump pump.
2. Remove the distribution header and clean out the distribution holes that supply water flow to media pads. Inspect all wire connections for discolored and/or burned wires. Replace where necessary.
3. Check unit for proper grounding.
4. Inspect media pads and replace per manufacturer's recommendations.
5. Inspect and lubricate bearings. Use correct and adequate lubrication. Keep grease lines, connectors and lubrication tools clean and free of contamination.
6. Inspect and clean fan housing and impeller (no high pressure cleaners are to be used).
7. Check and adjust the following items:
 - a. Open make-up water valve allowing sump to fill with water and check for leaks.
 - b. Check float for operation and adjust to maintain water level at 3-1/4" depth.
 - c. Check the sump water level is 1/2" below the overflow level and the low water level switch is closed.
 - d. Clean any debris around the overflow intake.
 - e. Fully close bleed valve then fully open it counting the revolutions. Set to 50% open.
 - f. Check after the first month of operation and adjust if necessary to prevent solids from forming on the exchanger.
 - g. Inspect media pads and replace per manufacturer's recommendations.
 - 1) Inspect at bottom of heat exchanger for complete water coverage. Should see a steady flow of water across the complete exchanger
8. Follow 'Initial Start Up' procedures.

Monthly and Quarterly Maintenance

1. Inspect sump pump and water level. Adjust float valve if necessary.
2. Check media pads for scaling and adjust bleed valve as required.
3. Inspect for water carryover and leaks.
4. Inspect air flow making sure no outside air is bypassing media pads.
5. Check the belts and sheaves. Align as needed. Always replace all the drive belts, even if only one belt is worn. Replace the sheave if the grooves show signs of wear.
6. Verify the proper belt tension and drive alignment.
7. Clean the housing and wheel.
8. Check all bolts, nuts and set-screws are tightened.

Annual Shutdown for Winterizing

1. Disconnect the power supply.
2. Shut off manual water make-up valve to unit.
3. Drain sump. Pump removal is not necessary.
4. Clean any scale or debris in sump and sump pump area.

REFERENCES

Munters Engineering Bulletins (Available on the Cambridge Air Solutions web site)

- EB-CPR-0311 When do cooling pads need to be replaced?
- EB-IMT-100-0501 Inspection & maintenance for T-100 horizontal flow mist eliminator
- EB-OPI-0205 Media operating instructions
- EB-PMC-0305 Cooling pad checklist
- EB-WTM-0408 Water treatment advice for industrial applications with CELdek and GLASdek equipped evaporative coolers
- MB-ACC-205 Common algae treatment chemicals



**SCAN THIS CODE TO ACCESS OUR
“HOW-TO” SERVICE VIDEOS ONLINE.**

<https://www.cambridgeair.com/parts-service/how-to-service-videos>

Cambridge Air Solutions reserves the right to change specifications, modify the design and/or substitute equivalent materials without notice as the result of code requirements, product enhancements, ongoing research/development and vendor changes beyond our control.



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