

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 Engineering's Limited Warranty is included with the Terms and Conditions that are sent with every Order Acknowledgement. For questions regarding the Limited Warranty, contact Cambridge Engineering's 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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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.

⚠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 the National Electrical Code (NEC), NFPA 70E 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 sheets 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 Personal Protective Equipment (PPE) in accordance with NFPA 70E or other country-specific requirements 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 Engineering. After uncrating unit, verify 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 fans, motors, heat exchanger, dampers 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.

NOTES: 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 submittal drawings 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; is sufficient to continuously support the full perimeter of base and cross members; and minimizes 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.

AIR HANDLER AND STAND ALONE INSTALLATION:

1. All installation should be performed in accordance to local and state codes and with proper permits.
2. Measure both Stage 1 and Air Handling Unit (AHU) for correct sizes. Immediately contact Cambridge Engineering if unit's openings do not match.
3. Check for proper air flow direction.

NOTE: DO NOT install Stage 1 unit backwards to ensure full performance capabilities.

4. Remove media pads carefully before setting Stage 1 in place to prevent damage.
5. Lift or set Stage 1 in place. Make sure the Stage 1 module covers the entire air inlet opening.
6. Install permagum or weather tight factory approved adhesive/sealant between sections for a tight seal with no air leaks and to prevent galvanic corrosion from dissimilar metals touching.
7. Fasten Stage 1 in place with the self-drilling screws provided with unit. Use pre-punched mounting holes around the top and side flanges of Stage 1 module.

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

8. Check for air leakage. Air leakage will lower the efficiency.
9. Check that Stage 1 is level for proper water transfer through system.
10. Check that the sump pump has a good seal to floor.
11. Reinstall media per the installation instructions located on side of pads or per Munters Installation Guide.
(Page 8)

PLUMBING / FILL AND DRAIN VALVES:

1. All installation should be performed in accordance to local and state codes and with proper permits.
2. Make-up water connection is ½" FPT.
3. Install 3-way fill valve under the roof line (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. Cambridge Engineering can provide covers at an added price.

Auto Drain with Freeze Protection (Optional)

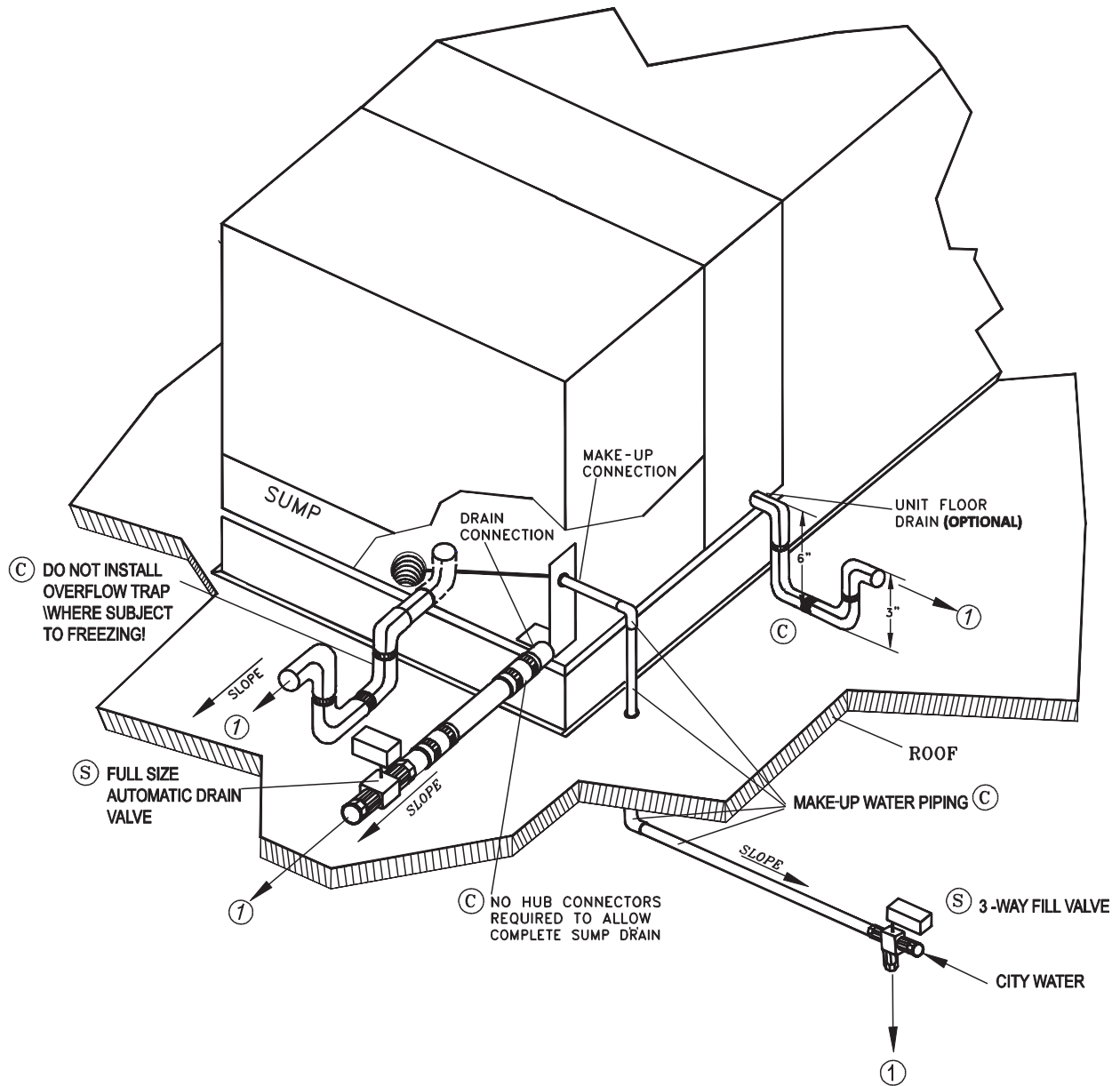
Install two-way drain valve (supplied by Cambridge Engineering, as an option, and installed by Contractor) on the sump's drain connection. Install 3-way fill valve (supplied by Cambridge Engineering, as an option, and installed by Contractor) under the roof-line with port "AB" piped to the make-up water connection from the sump. Port "A" is piped to 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 a 24-hour time clock, the drain valve will open allowing for 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." This allows 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.

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

FILL AND DRAIN VALVE SCHEMATIC:

DRAIN, OVERFLOW AND MAKE-UP WATER PIPING FOR AUTODRAIN WITH FREEZE PROTECTION



(1) TO APPROVED DRAIN WITH AIR GAP
SLOPE 1/4" PER FOOT

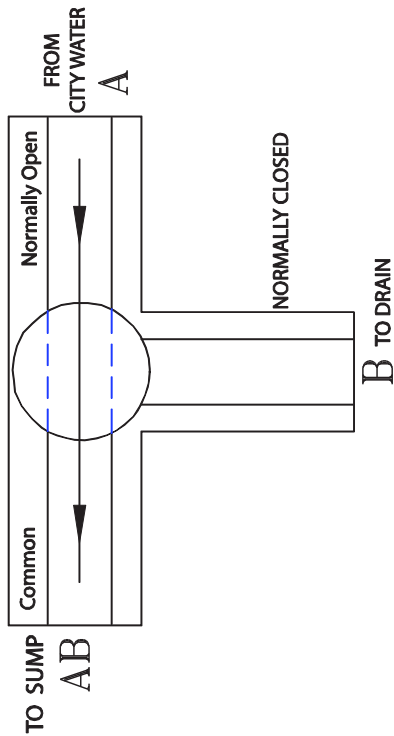
(C) BY CONTRACTOR
(S) BY CAMBRIDGE ENGINEERING (OPTIONAL)

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

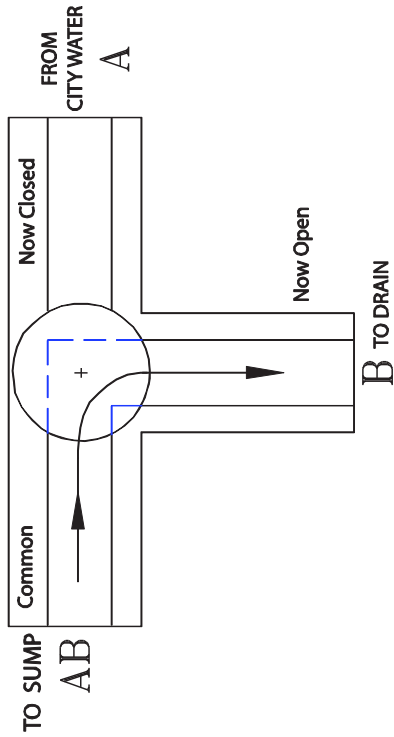
FILL VALVE SCHEMATIC:

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

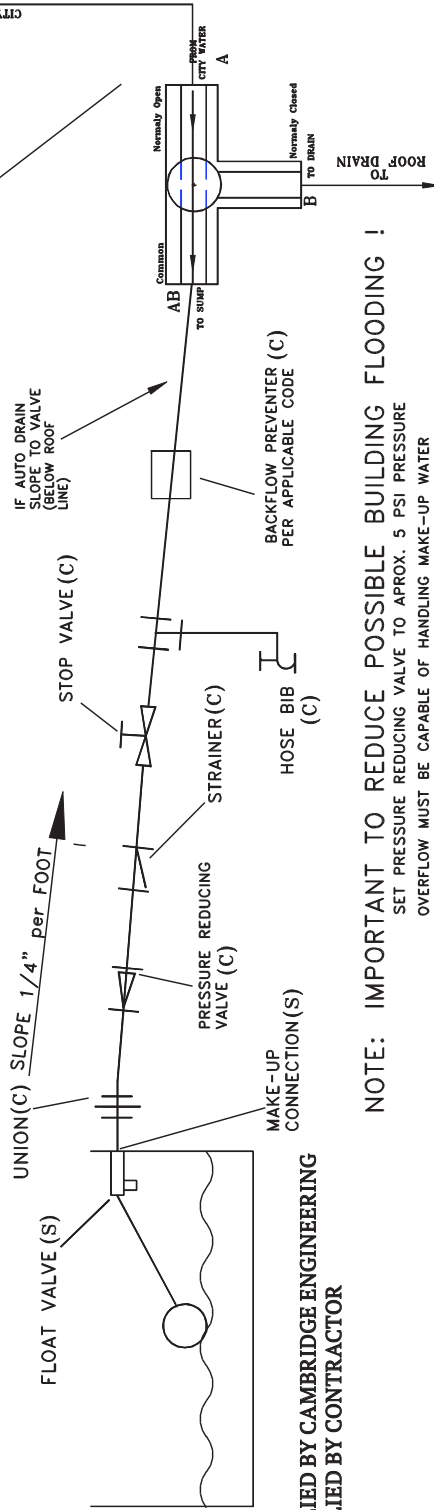


3-WAY VALVE SHUTTING OFF CITY WATER & DRAINING EXPOSED PIPE



SUGGESTED MAKE-UP WATER PIPING

PROVIDED BY INSTALLER (FLOAT VALVE BY CAMBRIDGE ENGINEERING):



(S) SUPPLIED BY CAMBRIDGE ENGINEERING
(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.

ELECTRIC PANEL / WIRING:

Base Model: Pump and low level switch are wired to a J-Box in the module.

Option A: Cambridge Engineering furnished NEMA 3R panel; single phase power installed by others. Panel includes factory-wired pump contactor, circuit breaker, pump switch and disconnect switch. Panel is shipped loose for mounting. Panel is UL labeled.

Option B: Cambridge Engineering furnished NEMA 3R Panel; three phase power installed by others. Panel includes factory-wired pump contactor, circuit breaker, pump switch, control transformer, and non-fused disconnect switch. Panel is shipped loose for mounting. Panel is UL labeled.

Option C: Cambridge Engineering furnished NEMA 3R panel mounted and wired by Cambridge Engineering on exterior of blank section. Note: Either Option A or Option B from above must be selected along with Option C.

NOTE : Power supplied and installed by others.

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

MEDIA COOLING PADS OPERATING INSTALLATION:



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

IMPORTANT

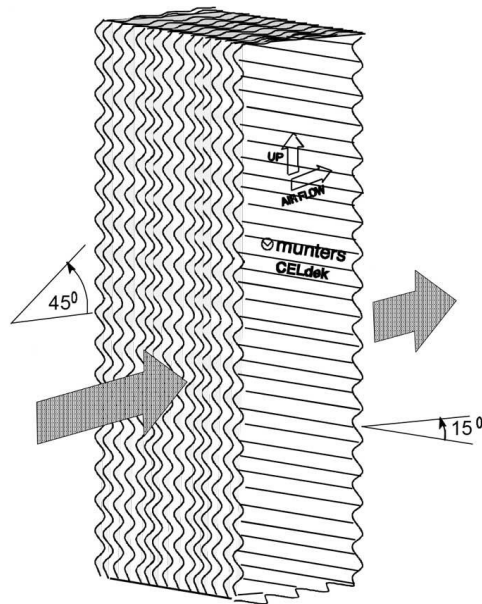
Installation

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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NOTE: SEE ADDITIONAL INFORMATION ON CARE OF MUNTERS MEDIA IN SUPPLEMENTAL INFORMATION.

INITIAL START-UP:

Procedure:

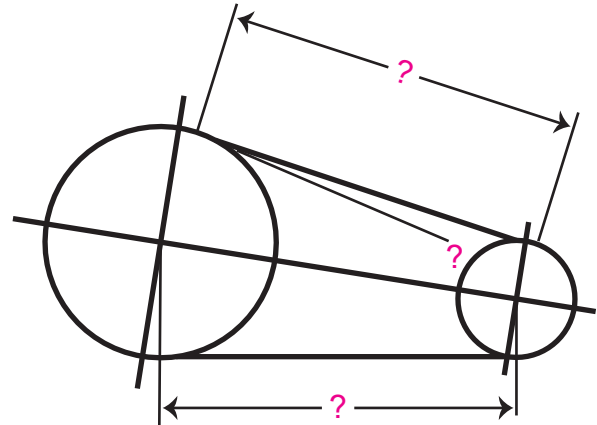
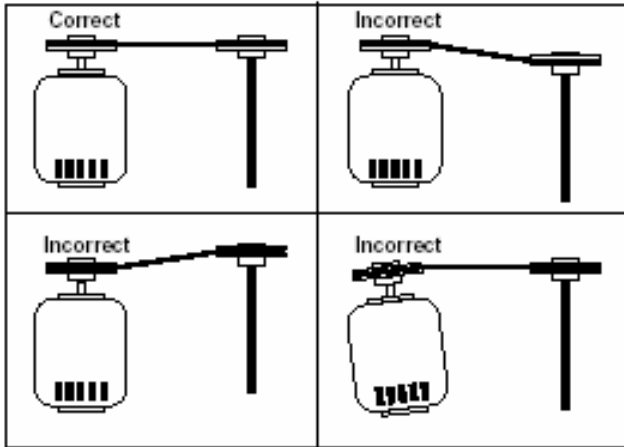
1. Turn unit disconnect switch to the “OFF” position and test to verify there is no electricity to the unit and ensure proper grounding. Inspect and tighten all electrical and wire terminals.
2. Check all wire and plumbing connections for proper installation.
3. Check the ducts and the fan for extraneous material (tools, small components, etc.)
4. Check that the wheel and drive assembly turns freely without rubbing.
5. Check that drives are tightened, properly aligned and tensioned.
6. “Bump the Assembly” - turn it on - then off, quickly. Check rotation.
7. Fill sump tank with water and adjust float to ½ inch below overflow drain.
8. Check for leaks in sump, water distribution piping, and float operation.
9. Install Cambridge Engineering furnished freeze thermostat sensing tube (located inside electric panel) to the outdoor ambient air. The 45°F factory setting is adjustable.
10. Check that the fill and drain valves 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. **WARNING:** Whenever power is interrupted, the 24-hour clock must be reset to local time.
11. Turn power to unit on and check for any electrical shorts.
12. Check that line and sump pump voltages and amperages as per the nameplate.
13. Confirm the time delay has been set to 1 minute on the sump pump(s).
14. Verify the low water level float switch located in sump is working properly.
15. 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.

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

16. 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.
17. After twenty (20) minutes observe media for complete wetting and check that there are no dry streaks. Open balancing valve more 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).
18. After running Cambridge Engineering Stage 1 for (1) week adjust factory pre-set bleed valve(s). This process allows the pump to discharge the concentration of solids in the water. Bleed valve is located on the discharge portion of the pump and is connected to a 3/8” drain tube. Drain tube should always be positioned inside the overflow drain. Use the following procedure to set bleed valve:
 - a. Completely turn the bleed valve(s) open.
 - b. Close the bleed valve(s) and count the number of turns required.
 - c. Set bleed valve(s) to ½ open position.
 - d. Check that bleed lines(s) are connected to overflow drain.
 - e. Increase water flow rate if there are scale deposits on the media pads. Check for water carryover afterwards and adjust if necessary.
 - f. If there are dry streaks in the media then remove distribution header and any debris blocking the distribution holes.

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 base. Never apply belt dressing.



START-UP SHEET:

The "Start-up" Sheet is included as an attachment. Upon completion of "Start-up" send the completed sheet to Cambridge Engineering to activate the warranty. The warranty is void without the Start-up Sheet form completed and returned to Cambridge Engineering within 14 calendar days from start-up.

NORMAL OPERATIONS:

Sequence of Operation:

1. Upon receiving an 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:

Procedure:

Spring Start-up

1. Clean sump tank and sump pump.
2. Remove distribution header and clean out distribution holes that supply water flow to media pads.
3. Inspect all wire connections for discolored and/or burned wires. Replace where necessary.
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 contaminants.
6. Inspect and clean fan housing and impeller (no high-pressure cleaners are to be used).
7. 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 sign 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 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.

PARTS LIST (COMMON PARTS USED):

	Part #	Description
1.	9094-0004	Stainless steel sump pump
2.	9469-0002	Low water level switch
3.	9070-2004-05 ½"	Roberts float valve assembly
4.	9070-3003-05	Bleed valve
5.	9070-0006-08	Balancing water valves
6.	9401-4004	½ inch 3-way water fill valve
7.	9401-4003	2 inch 2-way water drain valve
8.	9401-4000SS	Fill and drain valve covers-Stainless Steel
9.	9477-0001	24 hour timer
10.	986180	Time Delay Relay
11.	9470-0003	GFCI

LINKS TO CRITICAL INFORMATION:

CAMBRIDGE ENGINEERING START-UP CHECKLIST

MUNTERS OPERATING INSTRUCTIONS

GOULDS PUMP LSP03 IOM

LINKS TO SUPPLEMENTAL INFORMATION:

MUNTERS CHECKLIST EB PMC- 0305

MUNTERS REPLACEMENT EB-CR-0311

WATER TREATMENT EB -WTM-0408

GRASSLIN 24- HOUR TIMER OPERATING INSTRUCTIONS

LIQUID LEVEL SWITCHES IM

TIMING RELAY

FREEZESTAT

TWO WAY VALVE SPECIFICATIONS

THREE WAY VALVE SPECIFICATIONS

ROBERTS FLOAT VALVE - GENERAL INSTALLATION GUIDELINES

WEIGHTS PAD EFFICIENCY TABLE.XLSX

Cambridge Engineering, Inc. 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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