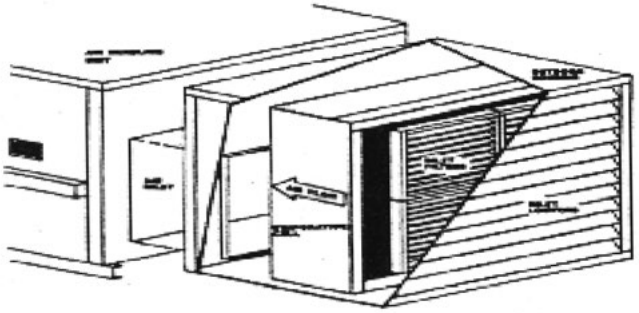
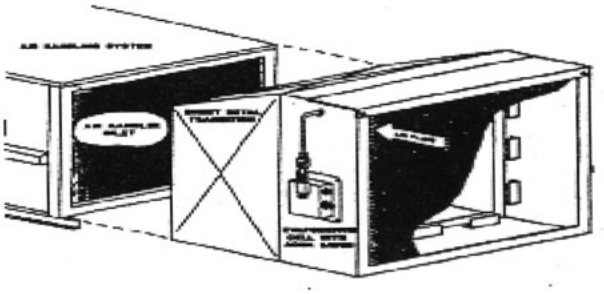
CELLCOOL EVAPORATIVE COOLING MODULE

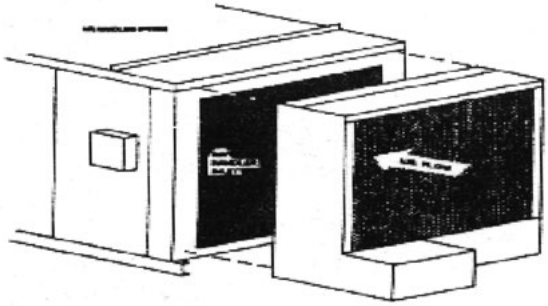
Installation, Operation, and Maintenance Manual



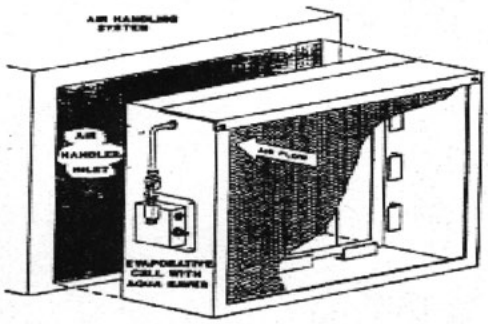
CellCool in Outdoor Cabinet



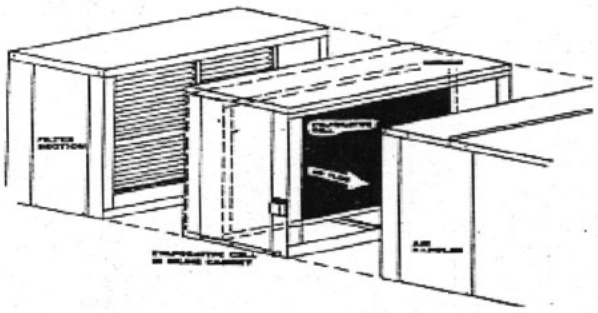
CellCool with Transition



CellCool with Sump



CellCool Direct Mount



CellCool in Inline Cabinet

PLEASE READ ENTIRE DOCUMENT BEFORE PROCEEDING WITH INSTALLATION.

TABLE OF CONTENTS

I. Theory of Operation

A. General

The Energy Saver (ES) CellCool evaporative cooling module is our most versatile product. It is designed and manufactured to attach to the fresh air intake of new or existing air handling equipment and utilizes the airflow of the air handler. CellCool evaporative cooling modules are also popular as retrofits in many types of evaporative systems where the original wet section has failed primarily due to rust and corrosion or ineffective water distribution. They can be enclosed in a metal housing with pre-filters and louvers. A full line of "bolt on" CellCool evaporative cooling module units are available for manufactures' gas fired and make up air units including: Reznor, Modine, Sterling, Weatherite and many others. ES has considerable OEM experience in manufacturing units for other manufacturers. Our unique use of industrial grade 3/16" ABS extruded polymer for wet section construction and careful attention to design detail separates this product from the competition. The evaporative cooling system is a superior answer to meet all of your needs and consists of the following features:

- All CellCool evaporative cooling modules are designed and manufactured as single or multiple cell arrangements depending on the CFM and customer requirements.

- The units are designed for ease of installation, utilizing quality components with minimal maintenance and long life span to provide the end user an outstanding value to cost ratio.

- Energy Saver offers the Microprocessor Regulated Water Supply Systems (MPR), which eliminates the need for pumps, floats or sumps.

- All units are also available with recirculating pump systems. The recirculating pump systems may be self-contained utilizing the cell base or may be supplied with a separate external tank.

B. Detailed Description

1. Media

The media is a cross-fluted pad of cellulose materials impregnated with insoluble salts, rigidifying saturates, and wetting agents, and provides at least 123 square feet of evaporative surfaces per cubic foot of media. Pads have less than 0.26 inches water column air pressure drop at 500 FPM face velocity when wet, and develop a saturation efficiency of not less than 93% at 500 FPM face velocity. Design is typically targeted for 450 FPM and maximum design specification is 500 FPM.

Glaspad may be specified as an optional media material. The cross-fluted pad material consists of large glass fibers bound together by inorganic, non-crystalline fillers and is approved with a UL 900, Class 2 rating up to 12" depth. This media material, when used in conjunction with fire rated ABS, gives the media housing assembly a fire resistance rating.

2. Media Water Distribution System

The water distribution plumbing and interconnections are schedule 40 PVC or copper tubing with solid brass fittings where applicable.

Water distribution over the pad sections is through 100% polyester cloth fiber hose and includes a half round PVC spray distribution cover over the entire media length. The water distribution system is easily accessible from outside of the unit. In the instance of inline cabinet mounted systems, an access door is provided for ease of access and maintenance. The polyester distribution hose has ten (10) perforations per foot and has water supplied on each end of this distribution hose to ensure equal wetting across the media.

3. Wet Media Housing

Media housing is constructed of, at a minimum, 3/16" thick, industrial grade, high impact ABS, corrosion proof, and UV resistant extruded polymer. All exterior surfaces are painted with a UV resistant acrylic coating to increase protection from the sun. The bottoms of all media cases include a drain fitting, located as defined by application or installed by end user.

4. Water Control Systems (two options)

Media housing is constructed of, at a minimum, 3/16" thick, industrial grade, high impact ABS, corrosion proof, and UV resistant extruded polymer. All exterior surfaces are painted with a UV resistant acrylic coating to increase protection from the sun. The bottoms of all media cases include a drain fitting, located as defined by application or installed by end user.

a. CellCool evaporative control module, Water Metering Device, consits of the following properties:

Microprocessor regulated water delivery systems is such that, the system will deliver sufficient water to the media when "on" and during the "off" cycle the media will not dry to a point that mineral build-up is promoted.

120 volt or 24 volt activated, continuous duty solenoid valve, normally closed with brass body. Valve to provide positive shut-off when de-energized and allows full flow when energized. The valve withstands 180°F and 150 psi. operating pressure. Plastic bodied valves are not allowed.

A Water Flow-Adjustment Valve supplied for each cell is brass ball valve. On appropriate applications a brass needle valve is used for lines smaller than 3/8".

b. Recirculating Pump System (RPS) consists of the following properties:

Corrosion proof sump constructed of, at a minimum, 3/16" thick, industrial grade, UV resistant, high impact ABS extruded polymer.

Option: Grade 304 Stainless Steel Sump
Grade 316 Stainless Steel Sump

Dual purposes, submersible pump capable of running waterless for 24 hours without failure.

Bleed-off system is built in and adjustable up to 20% of the pump's maximum flow rate to accommodate hard water conditions.

Float assembly consists of a brass compression connection, plastic or brass main body, and Polypropylene float.

Internal plumbing is schedule 40 PVC minimum.

Option: Copper

5. Microprocessor Based Auto Drain / Flush Fill Option

This system is designed to automatically drain and flush the recirculating sump. It is interlocked with the pump cycle and is adjustable in accordance with the different needs at the job site.

6. Microprocessor Based Auto-Freeze Protection Option

This system automatically drains both water line and recirculating sump when the outdoor temperature drops below the set point on an adjustable thermostat. The system consists of two 24-volt solenoid valves operated in conjunction with an adjustable thermostat. Valve #1 shuts off the main water supply and Valve #2 opens the main drain line, so the entire system can drain to the sewer or proper drainage area. All valves are supplied.

7. Inline or Outdoor Cabinet Type Housing (when supplied)

Housing is constructed of, at a minimum, 18 gauge, galvanized steel or equivalent. The cabinet interior surface is coated with a moisture resistant coating. All welds are protected by a zinc rich coating. The cabinet exterior can be coated with an optional weather resistant coating.

8. Inlet Louver Option

Inlet louvers, at a minimum, 18 gauge galvanized steel. When limited to free area velocities of 600 FPM, pressures drop will not exceed 0.10" WG. Units are manufactured of galvanized steel and airflow tested in accordance with AMCA Standard 500-75.

9. Air Filter Options

Air filters are available in both 1" and 2" thick sizes. One inch or two inch filters may be either disposable, or permanent. Disposable filters pass ASHRAE Standard 52-76, are Class 2 approved and tested according to UL Standard 900. One inch or two inch permanent filters are of aluminium media, designed to be used in conjunction with a water-soluble dust adhesive for ease of cleaning. NOTE: If 1" or 2" disposable filters are selected, the louvered inlet option must be used to protect the filter media.

10. Transitions (when supplied)

The transition is of welded construction consisting of, at a minimum, 18 gauge, galvanized steel. All welds are protected by a zinc rich coating.

11. Electrical Controls (for cabinet based systems)

The transition is of welded construction consisting of, at a minimum, 18 gauge, galvanized steel. All welds are protected by a zinc rich coating.

a. Standard

Electrical wires from the water control system terminate in a rain tight (3R) type enclosure on the exterior of the metal cabinet. No controls (such as relays or motor starters) are included. MPR units have a transformer mounted in the above identified enclosure. The transformer is 115, 208 and 230 volts on input and 24 volts on output.

b. Other options that may be added to any control set-up are:

- Adjustable thermostat to disable the MPR or RPS at a preset ambient temperature.
- Low voltage control panel for indoor use with thermostat and speed control.
- Low voltage control of all aspects and options for energy management or building management systems.

II. Receiving and Unpacking

The CellCool evaporative cooling module is shipped assembled. When two or more module cells are being installed on the same air handler, generally only one MPR water control system is required. However, on certain individually controlled units, additional MPR water control systems are provided. On CellCool evaporative cooling module's with the recirculating water control systems, each unit contains the sump, pump and valve except where central sump systems are specified and delivered.

In addition to the CellCool evaporative cooling module and MPR water control system, an install kit is enclosed containing drain fittings, compression fittings, screws, washers and installation instructions.

CAUTION: When unpacking the unit, ensure that no parts are accidentally discarded or lost.

Visually inspect the unit for obvious defects or damage. All units are thoroughly inspected prior to leaving the Energy Saver manufacturing facility. Should any defect or damage be noted, claims for damages should be filed with the carrier and notification sent to Energy Saver.

III. Installation

A. Mounting Instructions

NOTE: Any obstacles in the way such as electrical disconnect boxes or electrical lines need to be relocated or sheet metal adapters may need to be fabricated in order to obtain proper installation.

Prepare the opening, when possible, by removing any louvered panels or wire screens. Remove any other unnecessary (non structural) sheet metal screws around the outside of the opening so the CellCool evaporative cooling module will fit flush against the unit.

Remove media from casing before attempting to mount the cell. Mounting the cell in any other fashion than that described in this manual may void the warranty. Notice the red dye on the top of the leaving airside of the media. Be sure to reinstall the media in the same position. Failure to do so will result in water carryover into the air-handling unit and may affect other warranties.

1. Cell Mounting

NOTE: It is important that the top of the CellCool evaporative cooling module be level when installed to ensure even distribution of water over the media.

(1) Hold the cell in position over the opening to observe any interference. On multiple cell units place all units in position to verify that the proper cell is in the proper position.

In addition to the mounting screws along the casing, it is necessary to support large CellCool evaporative cooling module by placing supports (customer supplied) beneath them. This includes CellCool evaporative cooling modules with large single pads over 48 inches long, and those with two or three media pads in the same cell.

The spacing of supports beneath the CellCool evaporative cooling module varies with the length of the unit. A 12” wide support should be centered beneath a single-pad cell. When installing cells with two pads, space three supports. Two-pads units will need 12” wide supports. On units more than 120” long, 20” wide supports are required. In addition to sheet metal, supports may also be constructed of materials such as wood or angle iron.

(2) Just before mounting each individual cell, apply liberal amounts of silicone or equal caulking / construction compound to the mounting surface of the cell. Take care to note, which is the mounting surface. It is the opposite surface from the media access surface.

(3) Place the case against the opening edges.

a) Center the cell over the opening.

b) Locate the center of the top flange of the cell.

c) Fasten the casing at this point to the condenser section using a supplied Tek screw and a fender washer.

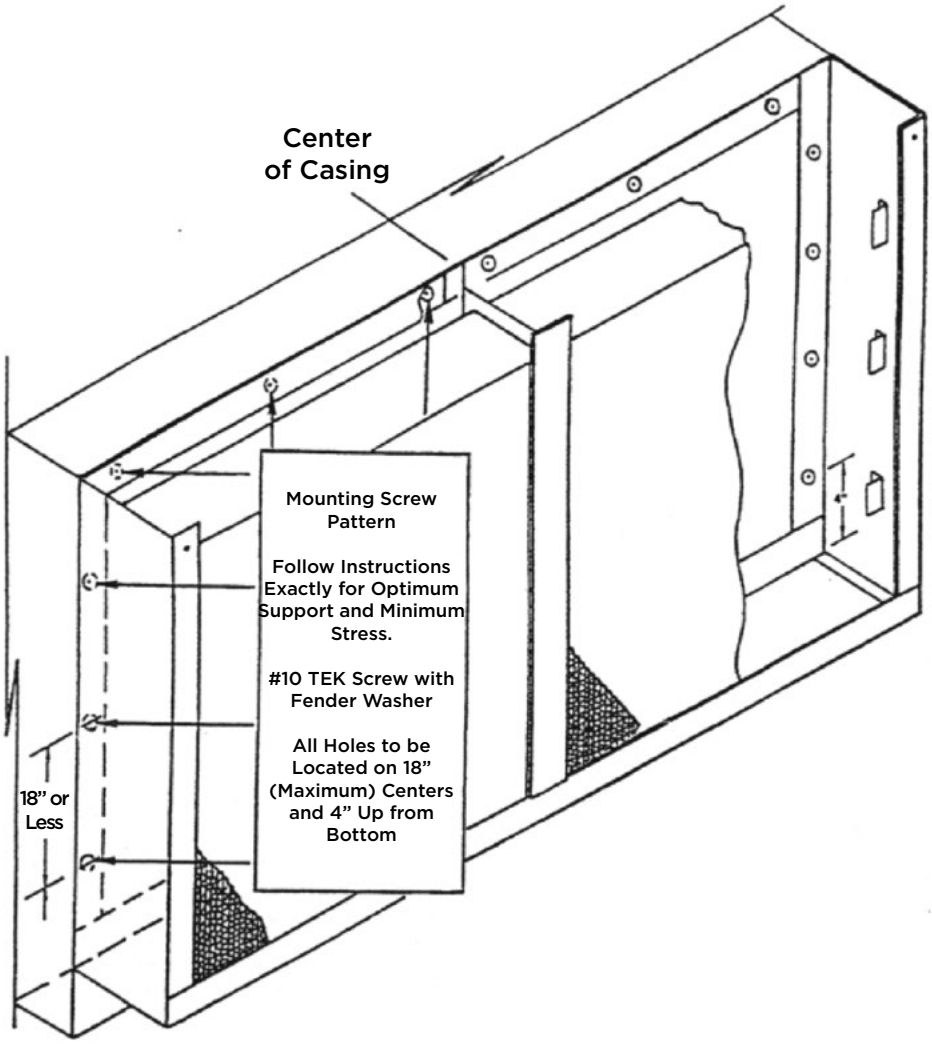
d) Ensure that the cell is level.

e) Run a Tek screw in at about 4" up from the bottom of each side.

f) There are now three screws.

g) Continue mounting the cell with screws no more than 18" apart on top and side flanges.

h) DO NOT run screws through the bottom flange.



2. Transition Mounting

Transition may be supplied with the CellCool evaporative cooling module system. Transitions and ducting are of sheet metal and have flanges like the CellCool evaporative cooling module cells. The mounting of the transition should proceed exactly as described in III A 1 above for the cell mounting. The cell then mounts to the transition as described above.

3. Cabinet Mounting

Cabinet systems, whether in line or outdoor style, have a CellCool evaporative cooling module unit premounted internal to the cabinet. The cabinet has access doors on one or both sides. Metal flanges are provided for mounting the cabinet on the leaving airside of the cabinet. In most applications, the CellCool evaporative cooling module unit is a reverse airflow unit (service from the leaving air side). This being true because there are access doors and often there is other equipment mounted on the entering airside of the cabinet.

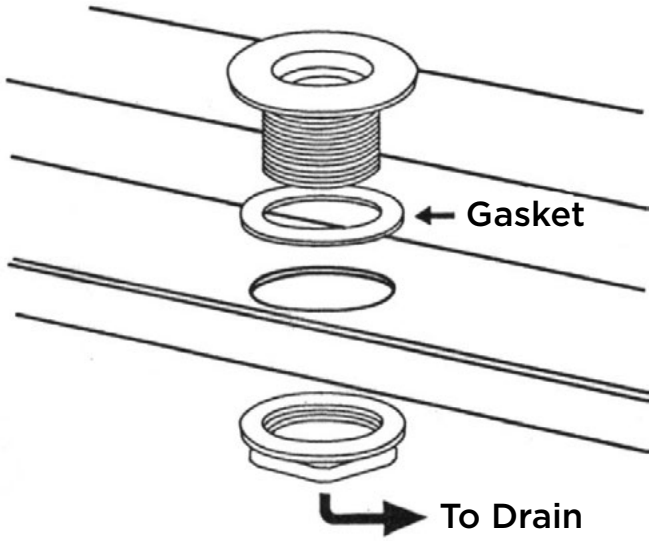
Consideration should be given when mounting the MPR. The MPR should be mounted exposed to the incoming air environment. This is to allow the MPR to adjust its timing to varying temperature conditions.

Where recirculating systems are used, the sump, pump, and valves are also located internal to the cabinet for ease of access through the access doors.

B. Install Drain Fittings

Drill a hole in the bottom of the case, at the lowest point if there is one, for attaching the drain fitting. The figure shows installation of the drain fitting provided.

Run a drain line from the unit to dispose of wastewater, piping into the ground, sewer, condensate return from the evaporator section, or some other disposal location. The bleed off and overflow drain from the recirculating unit should be installed in the same manner.



Reinstall the media pad in the casing, reversing the steps outlined under the pad removal section in “Maintenance.”

C. Water Connections

1. General

NOTE: Unless unit is a recirculating type, see separate IOM manual for MPR operations before proceeding.

$$GPH = \frac{(1.2 \times CFM \times (\text{dry bulb} - \text{wet bulb})) \times EFFICIENCY}{10{,}000}$$

Instantaneous water for CellCool evaporative cooling module GPM = $\frac{GPH \times 4}{60}$

A quick estimate of water usage is as shown to the right. CellCool evaporative cooling module systems will typically have efficiencies of 0.93 for 12" media and 0.78 for 8" media. Pipe size is calculated based on instantaneous water needs (not average). MPR type water supply systems are recommended for use with the CellCool evaporative cooling module. If water pressure is over 60 lb., a pressure regulator must be installed to reduce the pressure to 40 to 50 lbs.

Install a water line of copper tubing from the domestic water supply to the water control housing (refer to the unit specifications for the specific tubing size required for your unit). Connect the water control holding to the bulkhead fitting(s) with copper tubing.

NOTE: This copper is to be supplied by the customer, and should meet local plumbing codes.

Water distribution tees are that brazed or soldered should be tested for plugged branches before further assembly. Strainers should be provided by the customer on units using ground water.

Softened or treated water is not recommended because there is such a wide variety of treatments and care should be taken not to dissolve the resins in the media or let salt deposits build.

The bulkhead fitting is connected to the water flow control valve with plastic tubing at the factory, and plastic tubing runs from the water flow control valve to the polyester soaker sack. This internal plastic tubing must not protrude into the air stream of the CellCool evaporative cooling module. Cold supply water can cause water vapor to condense on the tube, and these droplets could be picked up by the air stream and carried into the condenser.

Adjust the water flow control valve to minimize wastewater while ensuring that the entire media pad becomes wet during each ON period. Water flow should be adjusted at maximum airflow and wet bulb depression to assure complete wetting of the media at all operating conditions.

CAUTION: Do not continuously flood pad with water, as this will cause premature breakdown of the media.

2. Microprocessor Regulated Water Supply System (MPR)

NOTE: Unless unit is a recirculating type see separate instruction manual for MPR before proceeding.

The CellCool evaporative cooling module with MPR operates on supply line water pressure, and uses the same amount of water for evaporation as recirculating types; the bleed rate however is reduced approximately 80%.

3. Recirculating Systems

Water adjustments on recirculating systems consist of two steps. Float adjustment should be set so that the water is from 1 to 1-1/2" from the top of the overflow before the unit is ever started. It is 1" on large units and 1-1/2" on small units. Water flow to the pad is pre-set at the factory. If more water is needed for your particular situation, simply back off screw on water flow clamp.

An even flow from top to bottom of the pad with the least amount of water is all that is needed to assure maximum efficiency and life span.

a. Water and Drain Connections

Hook-up water supply to float valve compression fitting on the tank. A water valve should be installed at a convenient location to allow the water supply to be turned ON and OFF.

Run a drain line from the unit to dispose of wastewater, piping to ground, sewer, condensate return from evaporate section, or some other convenient disposal location.

NOTE: A bleed-off system has been provided. Its purpose is to eliminate a small quantity of water from recirculation and reduce scale build-up on the media pads. The bleed-off line must be routed through the stand pipe opening. Initially set bleed-off rate to give 15 to 18 fl. oz. per minute. Adjust rate accordingly based on mineral build-up on pad surface and water hardness.

Water adjustment on recirculating systems consists of four steps:

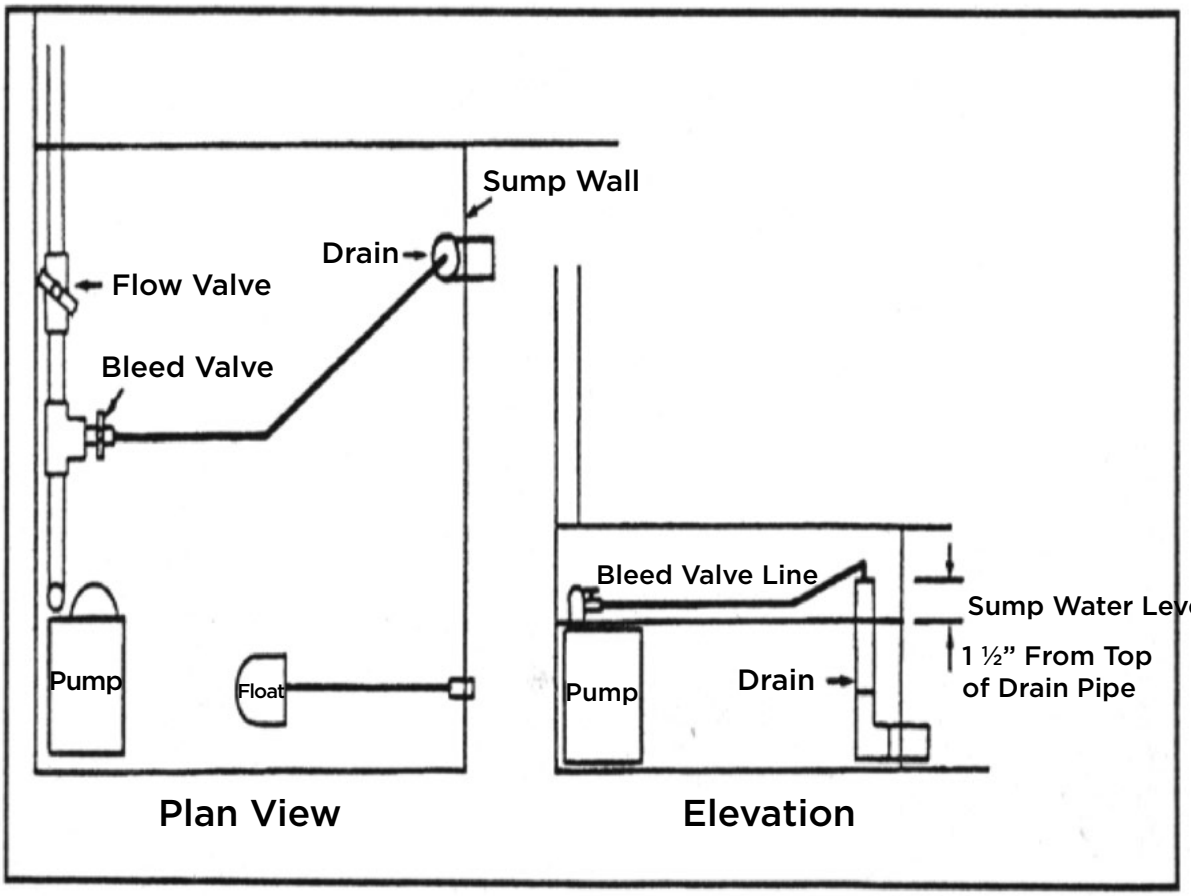
1. Turn water supply "ON". Check for good pressure and flow from float valve.

2. Float adjustment should be set so the water level in the sump is 1-1/2" below the top of the overflow tube when the unit is running.

3. Adjust the water flow by opening the flow valve on the pump outlet line, so the water rises up 1/4" to 1/2" in the water distributor hose. An even flow from top to bottom of pad with the least amount of water is all that is needed to assure maximum efficiency and pad life.

4. Adjust the bleed by opening the bleed valve 1/2 turn. This will be sufficient for most applications. If mineral deposits begin to show on the pad surface in less than 30 days, the bleed rate.

NOTE: The pump comes wrapped in a filter. Check for holes or damage before operation. An extra filter is supplied.



D. MPR Electrical Connections

NOTE: Installation and Maintenance Instructions for operating the MPR water control system can be found under a separate more detailed instruction bulletin.

IV. Maintenance

A. Media Maintenance

If excessive deposits begin to build-up on the media, the following is to be looked at:

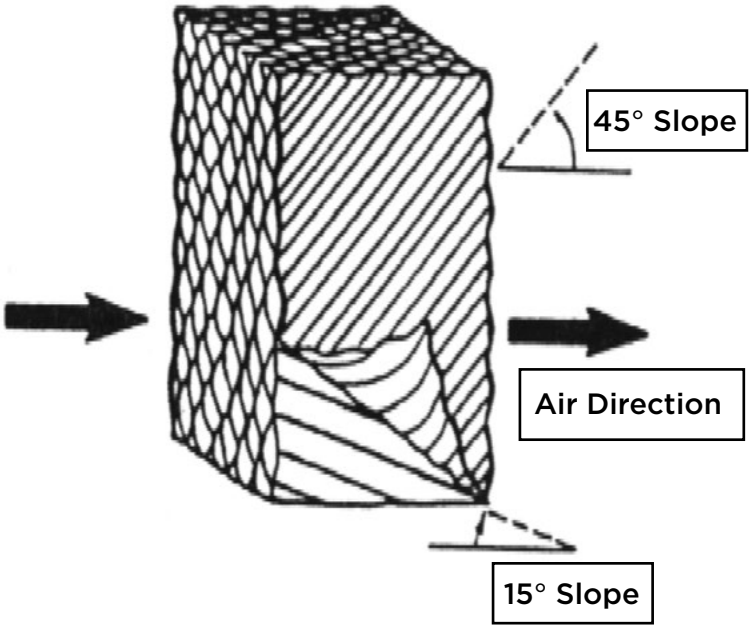
- If build-up occurs when using a MPR water supply system, there is not enough water flow on the media pad, adjust for more flow. In general, complete pad wetting prevents the pad from drying out and prevents build up of mineral deposits.

- If build-up occurs when using a Recirculating Pump Water Distribution System, increase the water bleed-off rate.

- If water is extremely hard, more frequent pad replacement may be necessary.

Note: The use of any scale remover is not recommended.

Note: If the media pad is removed from the case for cleaning, be sure that it is replaced properly. The media is designed for airflow in only one direction. Improper installation of the pad could cause water carry over.

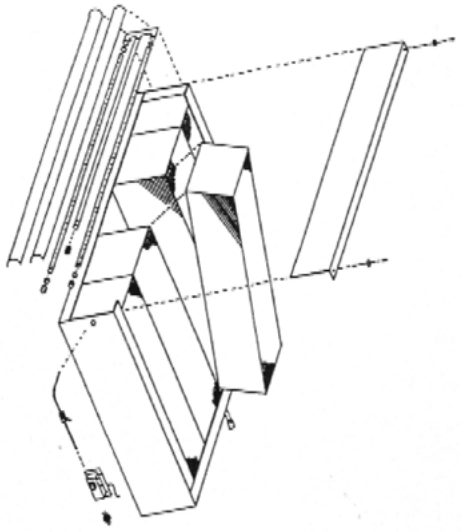


The leaving airside of the pad is marked across the top edge with red dye.

- If the media becomes clogged with contaminants or mineral deposits which cannot be removed by cleaning, or if the media losses its structural integrity such that it is restricting air flow, the media should be replaced.

B. Media Pad Removal (See diagram)

1. Remove cover.
2. Remove plastic soaker cover (Anti-Spray Half Tube).
3. Unhook soaker - leave water line connected.
4. Lift pad out of case.



C. Media Pad Installation

1. Place media pad into case noting that the red dye on pad is at the leaving air top of case.

2. Re-install soaker hose. If hose is plugged and cannot be cleaned, replace.

3. Install spray cover, half tube.

4. Slide case top into position and secure with screws.

CAUTION: Do not use an acid base cleaner, as this may damage the media.

D. Case & MPR Solenoid Valve Maintenance

Flush debris from the bottom of the case once a year.

If an MPR solenoid valve becomes plugged, back flush it with the existing water line.

E. Annual Shutdown

Visually inspect water distribution hose for any restrictions. Wash down the media with fresh water to flush out any accumulated particulate matter.

F. Winterization

Shut off water to system when operating temperature drops below 50°F. Drain water system to protect from freezing. Operate the MPR for 2 cycles to remove water from solenoid valve.

The media must be removed if ice or snowstorms are anticipated to prevent damage to the media caused be freezing and thawing.