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Congratulations on your purchase of a new Peak+ System! This guide is intended for the person(s) responsible for maintaining the system, the building owner, and the end-use customer.

Peak+ patented system has incorporated 21st century computer technology to design a state-of-the-art evaporative cooling system that makes efficient use of water to help your rooftop HVAC equipment operate at its most efficient levels.

With care, your Peak+ system will extend the life of your air conditioning equipment, while reducing electrical consumption and HVAC equipment maintenance for years to come. Although there are just a few parts that need regular care, it is important that you follow the instructions herein to maintain optimum performance, and to protect your warranty.

Should you encounter any problems with your Peak+ System, please contact the installing contractor or your HVAC service maintenance provider immediately. In the event they are not available, please call us at (901) 382-7809, and our service staff will be glad to help you.

Thank you again for your Peak+ purchase.

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INTRODUCTION

This manual describes the various components that make up the Peak+ System and the processes to properly maintain these items for your system to operate at optimal efficiency.

Components:

- Booster Pump and/or Backflow Device (If Applicable)
- Water Treatment System: Ion Based Softener or Salt Free Treatment (If Applicable)
- In-line particulate water filter
- Water pressure gauges
- Water Expansion Tank
- Insulated flexible water lines and water line fittings
- Solenoid valves
- EZ-Frame™ assemblies with evaporative media
- Spray nozzles located inside EZ-Frame™ assemblies
- Transformers, fuses, and fuse blocks
- Peak+ Controller
- Temperature sensors, Current Transducers, Weather Station, and Water pressure sensors

The Peak+ System is a proprietary evaporative cooling system that works with virtually any existing air-cooled condensing unit. The System utilizes two key components to efficiently precool the ambient air temperature before it flows across the condenser coils:

- EZ-Frames™
- Peak+ controller

EZ-Frame™: Each EZ-Frame™ houses several spray nozzles that evenly spray water across the surface of the permeable evaporative media, located at the back of the frame. The evaporative media traps water particles until they are evaporated into the air. As the ambient air is pulled through the frame the water is evaporated, cooling the air before it flows across the condenser coils. The condensing unit operates at a new cooled temperature with greater efficiency. A mesh screen at the front of the frame catches large debris from flowing across the condenser coils while the evaporative media catches finer dirt particles, protecting the condenser coil and reducing maintenance.

EZ-Frames™ are secured to the side of the condensing unit with magnets and can easily be removed by disconnecting the Push-To-Connect fitting at the water inlet connection and firmly pulling the frame off the side of the unit.

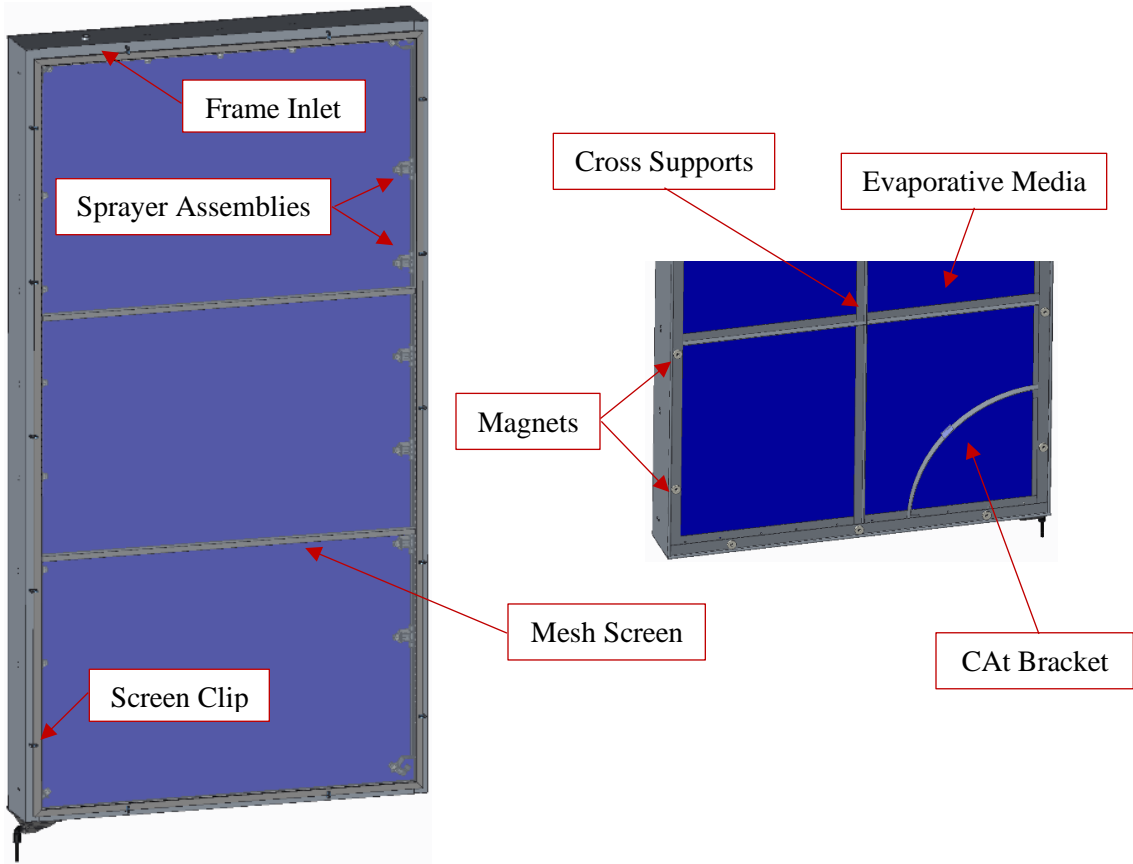


Figure 1. EZ-Frame™ components front (left) & back (right)

Peak+ controller: The Peak+ controller monitors several data points and is programmed to spray when certain conditions are met to optimize water usage and decrease the water runoff. The controller also records real time data to analyze the efficiency of the system. Several alarms can be triggered by the controller should components of the system fail. There are two buttons on the controller that are important for the maintenance of the system: The *Test-Spray Button* and the *On/Off Switch*. For more information on operating the Peak+ controller, refer to the Peak+ Controller Operating Manual.

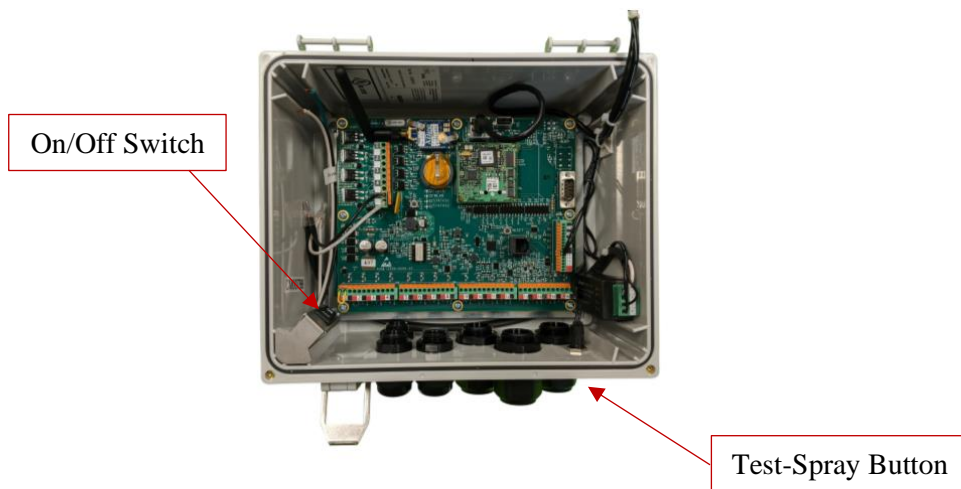


Figure 2. Peak+ controller

ROUTINE MAINTENANCE CHECKLIST

Monthly:

- ✓ Check the evaporative media for dirt and salt build up. Clean, as necessary.
- ✓ Conduct a test spray. Check sprayers and all water line connectors for leaks.
- ✓ Check EZ-Frames™ for standing water, particulate build-up, residue, and organic growth. Clean as necessary using approved methods and materials.
- ✓ Check the in-line filter gauges.
- ✓ Clean or replace in-line filter cartridge or bag if needed.
- ✓ Check the brine tank for salt (if applicable). Add Manufacturer approved pellet type salt as necessary.
- ✓ Check booster pump operation (if applicable).

Quarterly

- ✓ Check air pressure in bladder tanks (if applicable).
- ✓ Check all solenoid valves and water connections for leaks.
- ✓ Check the water spray patterns for irregularities. Clean or replace the spray nozzles as necessary.

SEASONAL START-UP AND SHUT-DOWN

Seasonal Start-Up:

Before inspecting the system for functionality, follow the installation guide procedure for flushing the water system.



CAUTION! Before turning the water on to the system, **FLUSH ALL LINES THOROUGHLY!** Failure to do so can cause debris to clog strainers in solenoid valves and orifices in the sprayer heads inside the EZ-Frames™.

Perform the following procedure to flush the system (typ. each unit):

- 1) Connect the tubing to the unit branch line.
- 2) Open the water supply valve and flush for 2 minutes.
- 3) Close the water supply valve and connect the tubing from the main water supply to the solenoid valves.
- 4) Connect the tubing from the solenoid valves to the EZ-Frames™, stopping short of the final connection to the EZ-Frame™ inlet.
- 5) Open the main water supply valves and set the Peak+ controller to “Test Spray” (see below).
- 6) Allow the water to run for 2 minutes on each channel.
- 7) Exit the “Test Spray” mode.
- 8) Make the final connections to the EZ-Frame™.

To enter “Test Spray” mode:

- 1) Ensure the water supply and power to the controller are turned on.
- 2) Press and hold the button on the right side underneath the controller for 10 seconds.
- 3) Press the button momentarily to cycle to the second channel.
- 4) To cancel “Test Spray” mode immediately, momentarily press the button, otherwise the spray will shut off after a set period (usually 120 seconds this can be changed as needed).

Next, re-enter “Test Spray” mode and visually inspect the condition of the screen and EZ-Frame™, all plumbing/tubing for leaks, and the condition of the spray pattern from each nozzle as outlined elsewhere in this guide. Clean nozzles, as needed, by backflushing them with the respective housing in-between sprays.

Seasonal Shut-Down:

Follow the “Winterization” procedure below.

Ensure that any low spots in the tubing or building outdoor plumbing system are not trapping any water which may freeze during the cold season. Blowing out lines with compressed air is the preferred method of draining the tubing/plumbing system.

After ensuring all water has been drained from the entire system, proceed to re-connect all fittings before leaving the job site. Failure to do so may result in insects, dust, or foreign object debris collecting in the fittings in the ensuing cold season. Upon the system start-up, this debris may clog the sprayers.

Winterization:

- 1) Close all incoming water supply valves.
- 2) Drain down all water lines exposed to the cold weather.
- 3) Blow out the supply water lines with compressed gas such as air or nitrogen.
- 4) Blow out the water lines to each evaporative cooling system component with compressed gas such as air or nitrogen.
 - While the lines are under pressure from the compressed gas, enter “Test Spray” mode on each controller in sequence to open all the valves.
- 5) Remove the screen from each EZ-Frame™.
- 6) Remove the lowest sprayer or undo the lowest tubing fitting in each frame and allow any remaining water to drain.
- 7) Replace the sprayers and/or reconnect all tubing, and then replace all the screens.
- 8) Open all valve boxes and remove the solenoid valve drain plug to drain any remaining water.
- 9) Replace the valve drain plugs and reinstall the valve box covers.
- 10) Latch all controller covers and screw down in place
 - **Remember to leave power in the “ON” position inside all controllers (masters and clients). Doing so preserves the memory backup batteries and allows proper data collection throughout the cold season.**
- 11) Remove and drain any water filters exposed to the cold weather and replace the filters when thoroughly cleared of water
- 12) Drain all water softener equipment if its exposed to the cold weather.
- 13) Drain all pumps and pump related equipment such as pressure tanks and anti-hammer devices if they are exposed to the cold weather. Pumps will have a drain plug in the front of the casing at the lowest point; ensure it is removed for drainage of the pump.
- 14) Ensure any other exposed equipment or water lines not described above are completely free of water.
- 15) Ensure any supply water supply valves remain closed after winterizing the evaporative cooling system.

BOOSTER PUMP MAINTENANCE

Ensure that the pump is properly boosting the pressure of the water to the set point. If pump is showing an error, consult the manual included or contact Peak+ with the error code. Shut down pump before initiating the winterization of the system.

WATER TREATMENT MAINTENANCE

For sites with hard water Peak+ provides two water treatment solutions. 1) An Ion-exchange water softener and 2) a salt free water treatment. Identify which water treatment solution is installed (if any) and follow the corresponding instructions below.

Ion Exchange Water Softener:

For systems with ion-exchange water softeners, check the salt level on the brine tank monthly. Add pellet type softening salt as necessary. Peak+ recommends replacing the in-line water filter at least once a year, but the in-line water filter maintenance section should be used to determine whether a filter needs replacement. Refer to the manufacturer provided manual included with the softener for further details on how it functions, troubleshooting procedures, etc.

Salt Free Water Treatment:

For systems with salt free water treatment, the water treatment is a part of the in-line water filter. The in-line water filter will need to be replaced once the water treatment beads have been dissolved. In the core of the filter cartridge there are water treatment beads that dissolve into the water and inhibit the calcium from adhering to surfaces, keeping the evaporative media clean. Peak+ recommends replacing the in-line filters containing the water treatment every two months, but the water treatment level should be checked on the filters monthly to determine the frequency of replacement. Frequency will vary by season but should never be longer than 4 months between replacements.

IN-LINE WATER FILTER MAINTENANCE

Maintaining the In-Line Filter:

Put all Peak+ systems on the rooftop in spray test mode or open the bleed valve nearest the in-line filter (on the discharge side). Just prior to and just after the in-line filter you will find water pressure gauges. Check both water gauges. If the leaving water gauge is 5 psi less than the entering water gauge, shut off water lines and check the filter compartment. The filter is located inside the filter housing.

Maintenance of the in-line filter is as follows:

- 1) Isolate housing and relieve pressure, then remove the filter cartridge or bag filter from the housing. May need to use filter wrench or strap wrench to loosen housing.
- 2) Rinse out housing.
- 3) Check filter for wear and debris. If the filter supplied is reusable, clean with high pressure water and reinstall. If the filter is not reusable and visibly worn, replace with new. Make note of filter model number for future replacements.
- 4) Open drain valve downstream of filter and flush lines after reinstallation of filter and prior to running Peak+ system.



Figure 3. 20" filter housings (4.5" on left, and 2.5" shown on right)



Figure 4. Pleated Filter Cartridges



Figure 5. Bag filter and SS housing



Figure 6. Filter Assembly Installed with water pressure gauges

Bag Filter Housings:

For stainless steel bag filter housings, there are two different style lids, one with a v-band clamp (left), and the larger one with a hinged wingnut lid (below).

For the V-band, rotate handle counter-clockwise until loose enough to pull apart, and lift lid off to access the bag filter. For the Wing nut housing, loosen the 2 nuts for the notched part of the lid and rotate away from the lid, then loosen the 3rd wing nut and rotate the lid open.



Figure 7. Bag Filter Housing with V-Band Clamp Lid



Figure 8. Bag filter housing with hinged wing nut lid

BLADDER TANK MAINTENANCE

Required maintenance of the bladder tank is simply a quarterly check of the air pressure on the air bladder. The procedure for this process is as follows:

- 1) Isolate the bladder tank from the water supply.
- 2) Drain the water from the bladder tank.
- 3) Remove the cap on top of the bladder tank.
- 4) Using an air pressure gauge, check the air tank's pressure.
- 5) Ensure that the tank's air pressure is 5 PSI below incoming water pressure.
- 6) Close the drain down valve.
- 7) Slowly turn on the water supply.



Figure 9. Bladder Tanks (indoor and outdoor version shown).

EZ-FRAME™ MAINTENANCE

Cleaning the Evaporative media

Under normal conditions, routine cleaning of the evaporative media can be performed while the EZ-Frame™ is attached to the unit. Pressure washing is NOT recommended and may damage the screen, evaporative media, or the EZ-Frame™. Lightly rinse the media with water.

Beginning from the top of the EZ-Frame™, use a hose and apply water with a side to side motion at a 45° angle through the screen and into the evaporative media (Figure 10). Once the media has been rinsed thoroughly make sure the soiled water at the bottom of the EZ-Frame™ drains clear through the drain. If the drains become clogged, use pressurized water to clear debris in the drain tubing until the water can adequately drain to the nearest condensate drain.

In extreme conditions, the EZ-Frame™ may need to be pulled from the unit and the screen removed. Starting on the back side of the EZ-Frame™, lightly rinse using a side to side motion at a 45° angle toward the bottom of the assembly (Figure 11). Turn the EZ-Frame™ around and repeat the rinse from the front side, making sure the soiled water drains clear through the drain.

The above procedure needs to be done in regular intervals during Evaporcool operation. Local conditions will ultimately dictate frequency: typically, cleaning is performed once per month. Do not let material continually build up on the media, as it is harder to remove if allowed to accumulate.



Figure 10. Cleaning the screen with a hose (front of the EZ-Frame™)



Figure 11. Cleaning the evaporative media with a hose (rear of the EZ-Frame™)

Removal of the EZ-Frames™ From the HVAC Unit

To remove the EZ-Frames™ from the HVAC unit, follow the steps below to protect the equipment. Frames may need to be removed to service the HVAC unit or for maintenance of the Peak+ System.

- 1) Shut off the water supply at the HVAC unit.
- 2) Decouple the flexible water line at the inlet of the EZ-Frame™ you are servicing. Push the releasing collar on the fitting on top of the EZ-Frame™ and pull the hose from the fitting. Disconnect drain line if necessary.
- 3) Remove the EZ-Frame™ by grabbing one corner and pulling the magnets free from the HVAC unit.

Reattachment of the EZ-Frames™ to the HVAC unit

Reverse the steps listed above. After the water supply is turned back on, initiate a test spray of the Peak+ System and check the water inlet connections for leaks. Ensure Drain line is reinserted (if applicable).

SCREEN MAINTENANCE

Removal of the screens from the EZ-Frames™

To remove the screen, rotate all but the bottom latches out of the way (Figure 12), tilt the top of the screen towards you, then lift the screen slightly and pull toward you.

To replace the screen, ensure the bottom latches are in their upright position, and gently tilt and lower the screen so that the latches hold the bottom part of the screen against the EZ-Frame™. Then, one at a time, rotate the latches into position to hold the screen in place.

DAMAGED SCREENS: Upon removal of the screen, inspect for damage of the screen material and the screen frame and crossbar (if present). If there are any holes in the screen or any bent framing, they will need to be replaced. Standard fiberglass screen material and aluminum screen framing hardware (both available at most hardware stores) are used to repair the screen.

HARD WATER SCALING BUILDUP: Perform a visual inspection of the screen, both front and back. Water scaling should be clearly visible if present. Follow the cleaning procedure using water from a hose first. If that does not remove the scaling, take the flat side of a carpenter's blade (or pocket-knife) and gently scrape both sides of the screen where the scaling is present. Follow up by cleaning the screen with a hose.



Figure 12. Removal of the screen

SPRAYER MAINTENANCE

The sprayer assembly (Figure 13) consists of several parts. The most important parts for maintenance are the sprayer housing (Part #: 5024), check valve (Part #: 5028), and spray nozzle (Part #: 5025, 5026, or 5027). The check valve inserts into the spray nozzle before connecting to the sprayer housing with a ¼ turn. There are a few tasks to perform in the maintenance of the sprayer assembly.

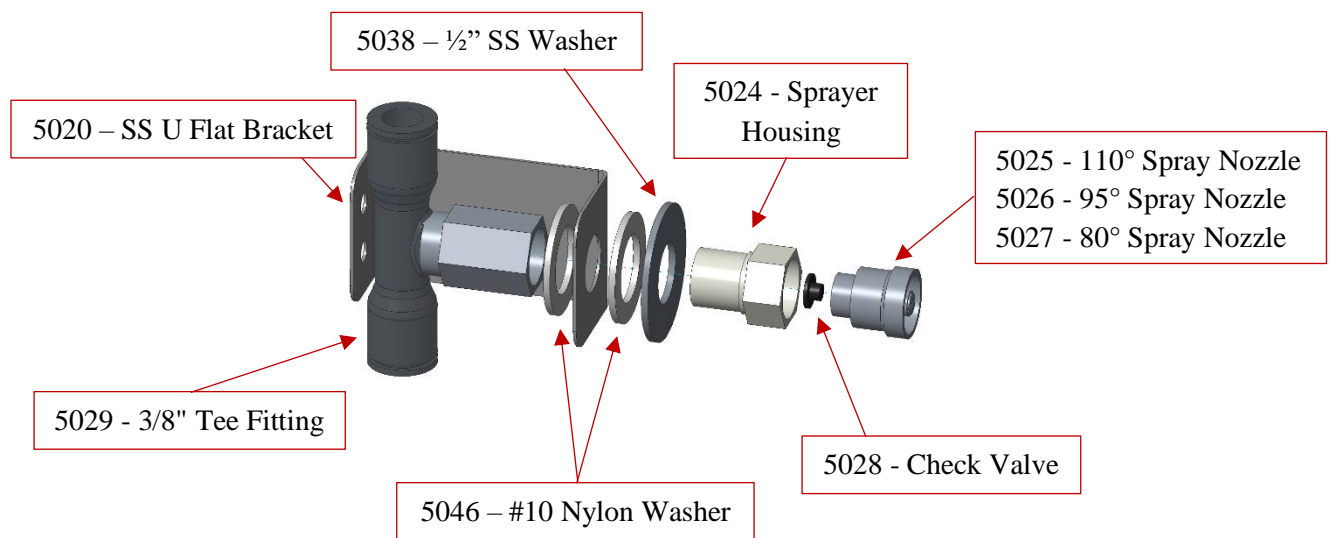


Figure 13. Typical Side Sprayer Assembly


INCOMPLETE SPRAY PATTERN: Remove any spray nozzle that is not “fanning” a spray fully. Remove the check valve and check the spray nozzle for any blockage. Unblock the spray nozzle using a reverse spray of water from the sprayer housing. Replace the check valve and the spray nozzle into the EZ-Frame™. If there are a lot of sprayers that need to be cleaned, it may be faster to use compressed air to blow them all out.


Check the spray pattern to verify the spray nozzle has been unclogged. If the blockage remains, repeat the process until spray nozzle is unclogged. If the spray nozzle remains clogged or is pitted, replace the spray nozzle. There are three different angle spray nozzles used in the Peak+ System: 80°, 95°, and 110°. Note the sprayer angle imprinted on the front of the spray nozzle or refer to the sprayer layout included in the Peak+ Equipment Manual.


SPRAY ANGLE INWARD/OUTWARD: A proper spray angle will send the mist directly between the screen and the pad when the HVAC unit is in operating mode. If any part of any individual sprayer is spraying directly onto the screen or onto the pad, it needs to be realigned.

While firmly gripping the metal sprayer bracket (do NOT apply force to the white plastic sprayer itself), bend or torque the sprayer so that the mist is properly aligned. To rotate the sprayer, a wrench of appropriate width can be used on the stainless-steel body. Never attempt to change a sprayer angle by manipulating the white sprayer itself.

SPRAYER POST-ACTIVATION DRIP: A sprayer should quickly stop dripping after the valve box closes, courtesy of the check valve. If a sprayer is continuing to stream water at low pressure after the valve box closes, a check valve may have become dislodged (or was not installed). Remove the spray nozzle and inspect the check valve. Clean or replace the check valve and reinsert the spray nozzle into the sprayer assembly.

	<p>CAUTION! Never touch the orifice of the sprayer or attempt to service the sprayer by inserting any object into the orifice. Doing so may damage the sprayer and require purchase of a replacement.</p>
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	<p>NOTICE: Sprayers wear with use! A visual inspection of spray pattern and the sprayer orifice is generally enough to determine if the orifice is pitted or worn away. In this case, the sprayer must be replaced.</p>
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	<p>NOTICE: Three different angle sprayers are used in the Peak+ System. The angle of sprayer must be noted when ordering replacement parts. If the angle of the sprayer to be replaced is unknown, Peak+ can assist in determining which type it is.</p>
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REPLACING EVAPORATIVE MEDIA

Evaporative media Installation: Method

- 1) It is highly recommended that the frame be removed from unit for proper media installation.
- 2) Squarely lay the media on top of the EZ-Frame™. Starting from the top, firmly secure the media onto the Velcro™.
- 3) From the bottom of the frame, stretch the media taught across the length of the frame and firmly secure the media to the bottom of the frame.
- 4) Make your way back up the sides pulling the media taught and firmly securing with the Velcro™.
- 5) Avoid pulling the media off the Velcro™ as much as possible to limit the amount of wear and tear on the media.

Retrofitting EZ-Frames™ to Velcro™ Media Attachment

Peak+ utilizes two methods of attaching the evaporative media to the EZ-Frames™: rivets (on older models), and Velcro™ strips (on newer models). Below is the procedure to install the Velcro™ strips to hold the media in place, either as a replacement to the rivets, or to repair existing Velcro™ strips. The installation procedure can be performed in the field, with the EZ-Frame™ removed from the HVAC unit and placed flat on a workable surface.

Velcro™ Installation: Method

- 1) Remove existing media. Remove any rivets that held evaporative media or Velcro™ in place (on older models) and any loose/damaged Velcro™ strips.
- 2) Clean the plastic thoroughly where you will be attaching the Velcro™ with isopropyl alcohol (use a scraper to remove any adhesive from the frame, if present).
- 3) Place two pieces of the supplied Velcro™ in each corner, 1.5" from each edge (Figure 14). Try and keep the edge of the Velcro™ as close to the outside edge as possible ensuring 100% surface adhesion of the rectangular piece of Velcro™. Install Velcro strips along all 4 sides of the frame no more than 3" apart.
- 4) On the cross supports, place one piece in the center of all support sections, as seen in the example below. Orient the Velcro™ in line with the stiff edge of the angle.
- 5) Punch 2- 1/8" diameter holes through all Velcro™ strips and frame extrusion. Use 1/8" Aluminum rivets to secure to frame.

OR...

Secure Velcro to frame support with (2) low-profile stainless-steel #7-10 pan head self-tapping screws, $\frac{1}{2}$ " in length or less.

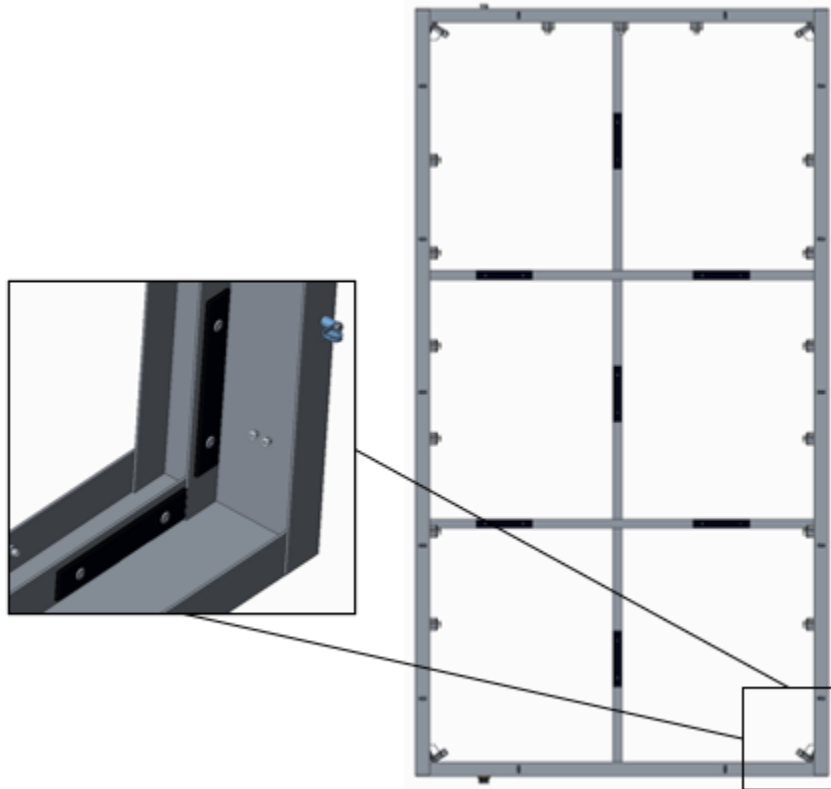


Figure 14. Velcro™ locations on a frame

IMPORTANT: The adhesive on the Velcro™ needs 24 hours for optimum adhesion. The evaporative media can be installed shortly after the Velcro™ is installed, but the frames should not be placed back on the HVAC unit for at least 24 hours. Not allowing this time for the adhesive to cure can result in the Velcro™ not properly adhering to the EZ-Frame™ and coming loose prematurely.

SOLENOID VALVE MAINTENANCE

The valve box contains an all brass, 24V, continuous duty, normally closed solenoid valve. Water connections are made through either side of the box (inlet and outlet), as specified on labels on either side. Each solenoid valve box is secured to the HVAC unit via magnets. NEMA enclosures may vary.

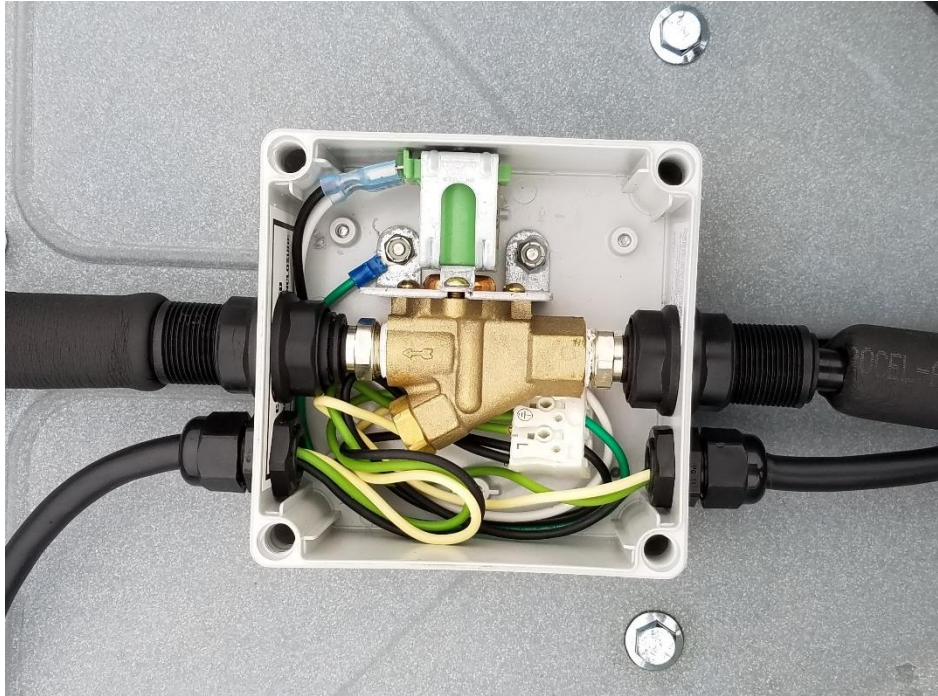


Figure 15. Valve Box (NEMA enclosure shown may vary)

Each solenoid valve should be checked periodically for leaks and that the wire connections are sound.

In areas where freezing temperatures are either possible or common, your Evaporcool system will need to be winterized. When winterizing, the drain plug should be removed, water allowed to drain, and then reinstalled. Be mindful of not losing the internal metal filter screen while removing the drain plug. Refer to page 8 of this guide for instructions on winterizing.

ORDERING REPLACEMENT PARTS

When worn or broken parts need to be replaced, or if spare parts are desired, please contact Peak+ for pricing and availability.



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IMPORTANT: The Peak+ System and any associated air-conditioning equipment may generate, use, and radiate radio frequency energy and, if not installed and used in accordance with the Peak+ System Installation Manual and Peak+ System Maintenance Guide, may cause radio interference.

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