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INSTALLING CONDENSATE PUMPS

DISCOVER THE TOP FOUR MISTAKES MADE WHEN INSTALLING DUCTLESS MINI-SPLIT CONDENSATE PUMPS

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Condensate pumps for ductless mini-split and variable refrigerant-flow air-conditioning systems are very reliable. While installing the pump is seemingly simple, condensate pump installation shortcuts or mistakes can potentially affect the equipment performance. More importantly, it can lead to property damage on the very premises they were designed to protect. In fact, the majority of condensate pump failures, regardless of brand or model, are due to field installation errors.

There are many variations, but typically a mini-split condensate pump consists of a pump body, which is sometimes mounted remotely; a separate reservoir that includes a filter; switching mechanism to activate the pump; and sometimes an integral overflow switch. Some designs combine the reservoir and pump body into a single unit known as a monobloc pump. Many pumps include two cable connections, a 115-V or 230-V power connection, and an overflow switch cable, which is commonly wired into the air-conditioning equipment's communication cable to shut down the evaporator during an overflow event.

There are four common mistakes made when installing mini-split condensate pumps: omission of a pump, creating siphoning through improper hydraulics, incorrect wiring and poor pump selection.

PUMP OMISSION

The majority of mini-split evaporator installations do not require a condensate pump because the evaporator pan is drained by gravity. If a gravity drain line is appropriate, it is important to have an in-line trap to prevent unconditioned air or insect infiltration.

But when a gravity condensate line is not possible, the appropriate mini-split condensate pump must be installed to avoid the potential of a drain pan overflow.

SIPHONING

One very typical condensate pump installation error is the incorrect routing of the discharge line in such a way that it creates a siphon. The law of physics dictates that any time a drain hose rises above and then drops below the source of condensation, a potential pump-damaging siphoning effect is created. A siphon can also raise the decibel level of pump operation or restrict proper draining that sets the stage for an eventual overflow.

Sometimes running a drain hose higher than the source is unavoidable, because it must run in different elevations to avoid obstructions. In either case, knowingly or inadvertently creating siphon effects must be remedied with an air break installed in the drain hose.

Some condensate pump manufacturers offer an anti-siphoning device at no extra cost. Typically, an anti-siphoning device consists of a 2-in.-long molded plastic fitting with an integral

air intake that is installed in the pump's 1/4-in.-diameter discharge hose. It can be oriented horizontally or vertically and its omni-directional design prevents siphoning no matter what direction the drain hose is routed.

After the pump switches off, an anti-siphoning device prevents the pump from auto-siphoning and emptying itself, the reservoir and the connecting hose of water. This eliminates the potential of excessive noise, ineffective operation and overheating, which can cause premature pump failure. Water is necessary to lubricate and cool the pump and a small amount must stay inside the pump for it to operate reliably. The anti-siphoning device also eliminates costly, labor-intensive callbacks, troubleshooting and rerouting, the latter of which is problematic when inaccessible discharge hoses are recessed in walls or ceiling.

WIRING

Another common installation error is incorrectly wiring a condensate pump. Condensate pumps require line-voltage power that can be wired from the mini-split electrical terminal. Some pump brands might also have the ability to shut down the mini-split equipment if an evaporator pan overflow event begins to occur. Also, not every mini-split brand recommends shutting down the unit with a condensate pump, nor do they offer a diagram indicating how to wire the pump for shutting down the mini-split unit. To complicate matters; every mini-split manufacturer has different wiring diagrams for powering their equipment, making it impossible for one pump wiring diagram to accommodate all mini-split manufacturers.

PUMP SELECTION

Selecting the wrong pump is perhaps the most common installation mistake. Poorly matched pumps can adversely affect aesthetics, performance, noise, and ease of installation or maintenance.

Some pump manufacturer websites include an online, pump-selection software program to match any major minisplit brand and model with an appropriate pump. The user logs in the brand, model number, the lineset orientation (side or rear evaporator entry), the pump orientation (surface mounted or concealed) and the feet of head required. The selector responds with a choice of pumps that fit those parameters, as well as detailed installation descriptions and the relevant wiring diagrams.

Probably the most common selection mistake is choosing a large wall-mounted pump instead of a small, quiet and concealable mini-pump. Large wall-mounted pumps, especially those not necessarily designed for mini-split equipment, are not aesthetically pleasing, can draw unnecessary visual attention to the evaporator area and generally have much higher sound levels.

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It is important to consider several categories when selecting the appropriate mini-split condensate pump. One popular mini-pump choice is a pump that is concealed by fitting into the lineset's protective duct covering. Elbow-shaped pumps are designed specifically for the elbow of lineset ducting where the duct makes a 90-degree turn toward the ceiling once it exits the side of the evaporator casing.

Pumps designed for installation inside lineset ducting are generally called surface mount pumps and are easier to clean and maintain as the reservoir is not located inside the mini-split evaporator. One popular mini-split pump is designed to fit inside the mini-split evaporator housing so it is completely concealed from view. The aforementioned two sizes of pumps typically accommodate capacities of up to 30,000 Btuh and 26-ft pumping head and between 30,000 Btuh and 60,000 and up to 49-ft pumping head.

SPECIALTY PUMPS/SITUATIONS

There are several specialty pumps and unique situations that warrant special considerations. For example, in a noise-sensitive area, such as a sleeping room, recording/broadcasting studio, or day care, the pump should be concealed in another room, attic space or other remote area to suppress any operational sounds.

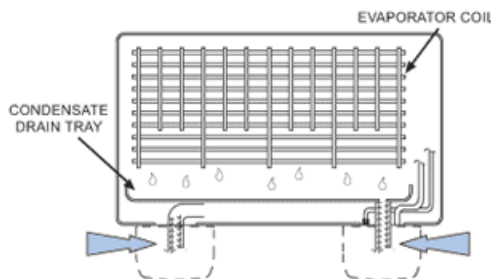
Operational noise is always a consideration whether a pump is installed in or near the evaporator or in a remote location. Generally pump decibels start in the mid-20s level (similar to a computer fan's noise level) but various brands and models can approach louder levels of 30 db and above.

While it is best to conceal a pump, sometimes an externally mounted pump is unavoidable. In this instance, a pump with an aesthetic encasement designed especially to best match a mini-split evaporator encasement's color and style appear like a coordinated attachment from the mini-split manufacturer rather than an add-on from another manufacturer. These external pumps are typically mounted to the bottom of the evaporator encasement and their synergistic design can help avoid drawing attention to the area.

A peristaltic pump is recommended for installations involving the potential for airborne dirt and grease accumulation, such as those in heavy industry, wood shops, food processing plants and other dirty environments. This type of accumulation can affect flow and create blockages. Unlike other pump methods, the condensate is contained inside transparent, flexible vinyl tubing, which isolates it from the pumping mechanism.

The process of peristalsis rotationally compresses the tubing causing the condensate to move through it. Most peristaltic pumps can run wet or dry and do not need filters that can potentially restrict flow when not periodically maintained. Peristaltic pumps run a high suction that enables remote-mounting capabilities of up to 40 ft from the evaporator, which also can make these a good choice for the aforementioned noise-sensitive environments.

TYPICAL PUMP LOCATIONS



Remote pumps have the selection challenge of switch activation. Some pump designs use a separate reservoir for mounting inside the mini-split with an internal float mechanism and electronic switch, which activates the pump and can also disable the mini-split system during an overflow incident. Other pump designs use a temperature-differential sensor switch that can be attached to the lineset to control pump operation.

Another common mistake installers make is operating a conventional condensate pump during construction, when prevalent airborne dust and dirt can clog pumps and their filters. A better solution is to inactivate the pump until construction has been completed and the building is operational.

Ceiling-mounted cassette evaporator coils, which are common in VRF systems, often come with their own condensate pump, however most of them have only a 14-in. head capacity. Additional head capacities need an add-on condensate pump designed for more head.

While the mini-split and VRF market is maturing in Asia and Europe, the growth of mini-splits in North America is accelerating exponentially. Consequently, most service technicians will someday be confronted with a minisplit installation, if they have not already. Mini-split condensate pump selection and installation is critical for providing indoor-air comfort and avoiding property damage from evaporator drain pan overflows.

Riley Archer is the Product Manager for Aspen Pumps at Rectorseal in Houston TX. Archer conducts free installation classes nationwide for wholesalers, association chapters and large contractors on the company's entire line of mini-split accessories, including condensate pumps. For more information, e-mail riley@rectorseal.com or visit www.rectorseal.com.

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