

How to Prevent IT Equipment from Overheating—in Winter

Using Self-Contained, Ceiling-Mount Air Conditioners to Keep Server Rooms and Telecom Closets Cool in Heated Buildings

In cold-weather months, when HVAC equipment switches to heating instead of cooling, IT equipment can suffer.

Today, many businesses face a new challenge that may take them by surprise: Keeping the heat-sensitive IT equipment in their server room or telecom closet cool during cold-weather months, when the building is heated.

As businesses and organizations of all types have come to rely more and more on electronics equipment such as servers and telecom switches, this problem has become critical.

Increasingly, electronics equipment is housed in a converted closet or other small room. The equipment is susceptible to malfunctioning or damage due to overheating, so keeping it cool is essential. If the building is still in the design stage, the equipment room's cooling requirements can be taken into account and a dedicated air-conditioning system specified, yet for one reason or another, this is often overlooked.

In the case of many existing buildings, a company's electronics equipment is installed during a period of warm or mild weather. At that time, the building's central air conditioning may seem to provide adequate cooling, and no further thought is given to air conditioning.

As the weather turns cool, however, and the building's HVAC system switches to heating instead of cooling, the situation can dramatically change.

Since the electronics equipment itself is heat-generating, and the server room or closet it is housed in is usually small, the temperature can rise very quickly. Unless adequate air conditioning is provided, there is a high risk of heat-caused

equipment malfunctioning, failure or possible costly damage. For many businesses, system downtime can be even costlier.

In such situations, precision-cooling systems or mini-splits have been the traditional solution. Especially for server rooms and closets, however, these can have significant drawbacks. Fortunately, a new class of self-contained, ceiling-mount air conditioners now offers a more efficient and cost-effective alternative.

This paper will examine the benefits of using ceiling-mount air conditioners to keep server rooms and closets cool, even when the rest of the building is heated.

Growth in the Use of Server Rooms and Closets

Computers and associated electronics equipment are essential to a wide range of business activities, including general operations, accounting, Internet transactions, internal and external e-mail, IP telephones, hotel pay-per-view and satellite television systems, etc.

As a result, businesses are using many more pieces of electronics equipment than ever before, which they often house in dedicated server rooms or closets.

The Danger of Not Having Dedicated Air Conditioning

In the vast majority of cases, it is virtually impossible to maintain a server room or closet without dedicated air conditioning.

Sometimes the potential for electronics equipment to become overheated is not immediately apparent and can easily be ignored. To prevent an emergency from occurring later on, however, it is essential to understand the dangers involved, so that the proper precautions can be taken before it becomes too late.

Electronics equipment usually requires a cooler temperature than is normally comfortable for the human occupants of a building. As a result, even during the summer months, when the building's main air-conditioning system is cooling mode, electronics equipment may not be kept cool enough to ensure long-term reliability. Although there may be no outward signs of overheating and the equipment may not fail immediately, even moderate amounts of heat can significantly shorten its life cycle.

Server rooms and closets require dedicated air conditioning systems that operate 24/7.

More importantly, if the air-conditioning system is turned down during off-hours, on weekends or on holidays—or worse, if it is turned to heating mode in cold-weather months—the temperature in an equipment room can quickly soar. If the equipment runs 24 hours a day, 7 days a week, as is often the case, it can easily be adversely affected.

For the majority of businesses, servers are their most important pieces of equipment, because they contain the company's critical data. Luckily, when servers heat up too much, they will usually shut themselves down in time to prevent possible damage or data loss.

Even more sensitive to heat, however, are network routers. These handle a company's internal and external data transmissions, including e-mail and IP-telephone communications. If they overheat, they can sustain permanent damage and require replacement, often at considerable cost.

Furthermore, a failure of either a server or a network router can result in system downtime. When this happens, all business activities that depend on the equipment are brought to a standstill, with sometimes devastating results.

System downtime due to equipment overheating can cause severe damage to a business.

Keeping Electronics Equipment Cool: A Historical Perspective

At the start of the computer era, when mainframe computers were the rule, only the largest companies could afford them. Mainframes, which generated very large amounts of heat, were housed in their own large rooms. They were cooled by dedicated air-conditioning systems, which were supplied by the computer manufacturer as part of a total equipment package.

With the introduction of server technology, dedicated server rooms were still required. To keep them air-conditioned, specialized precision-cooling systems were developed.

Today, companies of all sizes use servers, and many of them have found closets or other small rooms to be a convenient, space-saving way of housing them, especially for their branch or satellite offices, sales offices, etc.

Until recently, providing server rooms or closets with dedicated air conditioning has most commonly been accomplished with either mini-split or precision-cooling systems. Both of these alternatives have significant disadvantages, however.

Mini-splits, which are designed for comfort cooling, do not generally have the high sensible-cooling capacity necessary for computer equipment, so using them wastes energy. Also, mini-splits have an outside condensing unit that adds to installation

The popularity of server rooms and closets presents new cooling challenges.

and maintenance costs, as well as an inside evaporator unit that takes up wall space, which is at a premium in most server rooms or closets.

At the other end of the spectrum are precision-cooling systems, which were originally developed for large server rooms. When used to cool smaller spaces, however, precision-cooling systems are less efficient. Traditionally precision-cooling units have been split systems, although some do not require the condensing unit to be located outside. They also have other drawbacks, however, including their large size, high cost of installation and limited placement flexibility.

Self-contained, ceiling-mount air conditioners are a cost-effective way of cooling server rooms and closets.

The Solution: Self-Contained, Ceiling-Mount Air Conditioners

The introduction of a relatively new class of self-contained, ceiling-mount air conditioners provides a convenient, more efficient and more cost-effective alternative to precision-cooling systems and mini-splits.

How Self-Contained Air Conditioners Work

Conventional air conditioners consist of two separate units, one containing a condenser and the other an evaporator coil.

Self-contained air conditioners, on the other hand, combine both a condenser and evaporator coil in a single unit. Within the unit, cold refrigerant flows through copper tubing from the condenser to the evaporator coil. A fan blows over the coil, pushing cold air out. A second fan pushes hot exhaust air out through the system's built-in flexible ducting, which is usually directed into the crawl space above a drop ceiling. Excess moisture removed from the air is automatically pumped out to a drain or, in the case of portable units, can also be disposed of manually.

For applications where there is no available space to direct the hot exhaust air into, self-contained, water-cooled units are now available.

Portable Vs. Ceiling-Mount

Self-contained air conditioners are available in both portable and ceiling-mount models.

Even though the portable models, called spot air conditioners, are primarily designed for applications where they

can be quickly and easily moved, they are often used in permanent installations as well.

A major advantage of portable spot air conditioners is their small size. This makes them ideal for use in cases where space is limited.

Many server rooms and closets, however, do not have even the small amount of floor space that a portable spot air conditioner requires. For these applications, a ceiling-mount model is usually the only practical choice.

Benefits of Self-Contained, Ceiling-Mount Air Conditioners

The benefits of self-contained, ceiling-mount air conditioners include:

- Low cost
- Quick and easy installation
- No outside condensing unit to install and maintain
- Flexible placement of air supply and return
- Easy connection to building control and fire alarm systems

Self-contained, ceiling-mount conditioners are most notable for their low cost and quick, easy installation. Unless there are special circumstances, a typical installation usually takes two installers working together only about four hours.

Self-contained, ceiling-mount air conditioners are considerably smaller than precision-cooling systems, so they are easier to fit into the limited crawl space found above most server rooms and closets.

Unlike precision-cooling or mini-split systems, which have a separate condenser and evaporator cabinet, self-contained, ceiling-mount air conditioners consist of only a single, precharged unit. This eliminates the cost of installing an external condensing unit, which usually involves penetrating a wall or the roof, sweating or brazing the copper connecting tubes and charging the refrigerant. The cost of maintaining an external condensing unit is also eliminated.

In addition, whereas precision-cooling systems are generally offered in only 230-V configurations, some self-contained, ceiling-mount air conditioners are available in 115-V models, potentially reducing installation costs still further.

Self-contained, ceiling-mount air conditioners are also available in smaller capacities than precision-cooling systems, and have higher sensible cooling capacities than mini-split

Self-contained, ceiling-mount air conditioners easily fit into the crawl space above server room and closets.

systems. This makes self-contained, ceiling-mount air conditioners a closer match for the cooling requirements of server closets, and therefore a more efficient and cost-effective solution.

Another advantage of self-contained, ceiling-mount air conditioners is their high degree of flexibility. With precision-cooling systems, the supply register and return grill are in fixed positions on the evaporator cabinet. As a result, the cabinet must be installed directly above the location where cool air is needed. In some crawl spaces, obstructions such as light fixtures may make this difficult.

Self-contained, ceiling-mount air conditioners, on the other hand, use flexible air ducts for both supply and return. This allows the air conditioner itself to be conveniently placed anywhere in the crawl space, independent of where the supply and return need to be located. Also, the location of the supply and return can be easily changed whenever necessary, to eliminate any new hot spots that may result from changes in equipment configuration.

In addition, most self-contained units can be easily connected to building control and fire alarm systems, to provide remote monitoring and control as well as automatic safety shutoff capability.

What to Look for in a Self-Contained, Ceiling-Mount Air Conditioner

When choosing a self-contained, ceiling-mount air conditioner, here are some important things to look for:

For reliable, 24/7 cooling of IT equipment, an air-conditioning system must be built to the highest quality standards.

Reliability: Especially when critical electronics or telecom equipment is involved, air conditioning must be reliable. Look for a system that is built to the highest quality standards.

Specifically, check to see if the fan motors are fully enclosed in protective housings to prevent dust from building up. Dust that accumulates on the motors can absorb moisture, leading to corrosion or electrical shorts.

Next, look at the sheet-metal panels to see if they have stress-relief notches at the bends. Also, are the panels attached to the frame at load-bearing points by machine screws and weld nuts, or by lighter-duty sheet-metal screws? Is the weight of the fan housing supported by a sturdy, interior frame panel, or only by a lighter cover panel?

Another important area to pay attention to is the refrigeration unit itself. Is it hermetically sealed, or does it have

service valves, which are prone to leaks? Are the refrigerant pipes connected by reducers and expanders, or by pinching and brazing?

Pinching and brazing restricts the flow of the refrigerant, reducing cooling efficiency and long-term performance. In addition, the connections created using this method are weaker and more subject to vibration-caused stress cracks and subsequent leakage.

Such quality-oriented details are telling indicators of high-quality equipment that is designed and manufactured with long-term reliability in mind.

*Look for a
established
manufacturer
who will stand
behind their
product.*

Established manufacturer: Look for a company that has established itself for many years in the industry and stands out as a leading manufacturer of air-conditioning equipment. This is a good sign that the company will be around to support their equipment well into the future.

Also look for a company with a broad distribution base and a large number of dealers who will support and service their equipment throughout North America and globally.

MovinCool Self-Contained Air Conditioners

MovinCool, the world's largest manufacturer of self-contained commercial air conditioners, offers a complete line of ceiling-mount and portable models used in a variety of applications, including server and telecom closets, as well as other IT equipment rooms, data centers, etc. Within the air-conditioning industry, MovinCool enjoys a reputation for highest quality and reliability.

Dealers who specialize in spot air conditioners stand to lose significant profit if they have to replace a unit once it is installed. Such dealers consistently say they prefer MovinCool models, knowing they can always count on them to deliver the high levels of performance their customers demand.

MovinCool is a brand of DENSO, one of the world's largest manufacturers of automotive parts. As a principal supplier of advanced automotive technology, systems and components, including air conditioners, to all the of the world's major car manufacturers, DENSO's commitment to quality is paramount.

In the 1980s, DENSO pioneered the concept of workspace spot cooling to meet its own factory needs in Japan. Since then, MovinCool has developed a wide range of self-contained cooling systems for many different applications. For more information, visit MovinCool's website at <http://www.movincool.com>.