

How to Avoid IT Equipment Overheating—in Winter

*Keeping Server and Telecom Closets
Cool in Heated Buildings*

*A Guide for Facility Managers, IT Managers
and Mechanical Contractors*

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

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

Increasingly, electronics equipment is housed in a converted closet. 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 closet'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 frequently installed in a server closet 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.

How to Avoid IT Equipment Overheating—in Winter

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

Especially because the electronics equipment itself is heat-generating, and the server closet it is housed in is very small, the temperature can quickly rise. Unless adequate air conditioning is provided, there is a high risk of heat-caused equipment failure and possible costly damage. For many businesses, system downtime can be even costlier.

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

This paper will examine the benefits of using such spot air conditioners to keep server and telecom closets cool, even when the rest of the building is heated.

Growth in the Use of Server and Telecom Closets

Today, businesses of all types and sizes depend more and more on computers and associated electronics equipment for a wide range of their 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 are often storing in server or telecom closets.

The Danger of Not Having Dedicated Air Conditioning

In the majority of cases, it is virtually impossible to maintain a server or telecom closet without some kind of 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 ambient temperature than the human occupants of a building. As a

How to Avoid IT Equipment Overheating—in Winter

result, even during the summer months, when the building's main air-conditioning system is on, electronics equipment may not receive adequate cooling to ensure long-term reliability. Although there may be no outward signs of overheating and the equipment may not fail immediately, even moderately excessive heat can shorten its life cycle.

More importantly, if the air-conditioning system is turned down during off-hours, on weekends or on holidays, the temperature in equipment rooms can quickly soar. If the equipment runs 24 hours a day, 7 days a week, as is often the case, it can easily be affected.

For most 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 need to be replaced, 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, resulting in additional costs.

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 to be a convenient, space-saving way of housing them, especially for their branch or satellite offices, sales offices, etc.

Until recently, providing server closets with dedicated air conditioning has most commonly been accomplished with the same type of precision-cooling systems that were originally developed for larger server rooms. When used to cool smaller

How to Avoid IT Equipment Overheating—in Winter

spaces such as server closets, however, precision-cooling systems are less efficient. They also have other drawbacks, including their large size, high cost of installation and limited placement flexibility.

The Solution: Self-Contained Spot Air Conditioners

The introduction of a relatively new class of self-contained commercial air conditioners, called spot air conditioners or spot coolers, provides a convenient, more efficient and more cost-effective alternative to precision-cooling systems.

There are two basic types of spot air conditioners: air-cooled and water-cooled. Water-cooled air conditioners are more efficient than air-cooled ones, but they use high-pressure water lines that can leak. Consequently, like evaporative coolers, they are usually considered unsuitable for use with electronics equipment. For the purposes of this paper, the terms “spot air conditioners” or “spot coolers,” which are used interchangeably, refer only to air-cooled systems.

How Spot Air Conditioners Work

Conventional air conditioners, including precision-cooling systems, consist of two separate units, one containing a compressor and the other an evaporator coil.

Self-contained spot air conditioners, on the other hand, combine both a compressor and evaporator coil in a single unit. Within the unit, cold refrigerant flows through copper tubing from the compressor 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 collects in a small condensation tank, which can be emptied manually or, with most models, automatically via a pump.

Portable Vs. Ceiling-Mounted

Spot air conditioners are available in both portable as well as ceiling-mounted models.

Even though portable models are primarily designed for applications where they can be quickly and easily moved, they are often used in permanent installations as well.

How to Avoid IT Equipment Overheating—in Winter

A major advantage of portable spot air conditioners is their small size. This makes them ideal for use in applications where space is at a premium, such as small to medium-size server rooms.

Most server closets, however, do not have even the small amount of floor space that a portable spot air conditioner requires. In such cases, a ceiling-mounted model is usually the only practical choice.

Benefits of Ceiling-Mounted Spot Air Conditioners

The benefits of ceiling-mounted spot air conditioners include:

- Quick and easy installation
- Low cost
- Flexible placement of air supply and return

Most importantly, ceiling-mounted spot air conditioners are quick and easy to install. Unless there are special circumstances, a typical installation usually takes two installers working together only about four hours.

Ceiling-mounted spot air conditioners are considerably smaller than precision-cooling systems, so they are easier to fit into the limited crawl space found above most server closets.

Unlike precision-cooling systems, which have a separate compressor and evaporator cabinet, spot air conditioners consist of only a single, precharged unit. This means that they do not require sweating or brazing of copper connecting tubes or refrigerant charging, as precision-cooling systems do, both of which procedures add significantly to installation costs.

In addition, ceiling-mounted spot air conditioners are available in 115 V models, whereas precision-cooling systems are generally offered only in 230 V configurations, potentially increasing installation costs still further.

Ceiling-mounted spot air conditioners are also available in smaller capacities than precision-cooling systems, making them a closer match for the cooling requirements of server closets, and therefore a more efficient and cost-effective solution.

Another advantage of ceiling-mounted spot 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.

How to Avoid IT Equipment Overheating—in Winter

Ceiling-mounted spot 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.

What to Look for in a Ceiling-Mounted Spot Air Conditioner

When choosing a ceiling-mounted spot air conditioner, here are four important things to look for:

Quality of manufacturing: 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.

Verified performance: When comparing performance specifications, check to see if the manufacturer has its equipment evaluated by a nationally recognized, independent testing laboratory such as ETL or UL.

How to Avoid IT Equipment Overheating—in Winter

Unlike the ETL Listed or UL Listed marks, which are safety certifications, the ETL Verified mark is a performance certification.

ETL Verified means that the equipment in question has been independently tested and found to perform at the levels the manufacturer says it will, using actual performance data, not calculated data.

This type of performance verification is another indicator of high quality.

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 Spot Air Conditioners

MovinCool, the world's largest manufacturer of commercial spot air conditioners, offers a complete line of 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 spot-cooling systems for many different applications. For more information, visit MovinCool's Web site at <http://www.movincool.com>.