

Preventing IT Heat Disasters

Backup Air Conditioners for Small to Mid-Size Server Rooms and Network Closets

A Guide for IT Managers

IT managers with small to mid-size server rooms and network closets know their equipment is especially vulnerable to overheating during air-conditioning outages, yet frequently they do not have a backup cooling system in place.

Such equipment rooms are often located in leased space within general-use office buildings, whose temperature is controlled by the building's central air conditioning system. Here, most lease agreements prevent installation of a permanent backup system, which usually requires cutting an opening in an outer wall or the roof and, in many cases, interior walls.

At the same time, continuing to operate with no backup system at all, or relying on out-of-date solutions such as electric fans, risks heat-caused equipment failure and possible damage, as well as system downtime.

Fortunately, a class of commercial portable air conditioners, also called portable spot coolers, can solve this problem by providing IT managers with backup air conditioning that does not require lease-prohibited construction. This paper will examine the advantages of using such portable air conditioners as backup systems.

Air-Conditioning Outages Likely to Increase

If current predictions hold true, rising average temperatures and more frequent periods of severe hot weather, as well as

Preventing Heat Disasters

growing IT equipment-room heat densities, will likely put greater stress on air-conditioning systems, resulting in an increased number of outages.

In addition, as businesses become more and more dependent on IT equipment for critical everyday operations such as Internet transactions, internal and external e-mail, IP telephones, etc., they are less able to bear the cost of even short periods of downtime, including those caused by scheduled maintenance outages.

The Challenges of Not Having a Backup Air Conditioner

Without a backup air conditioner, it is almost impossible to avoid having a certain amount of downtime. Although air-conditioning outages can occur any time, they often occur during the hottest weather, when systems are most stressed. During these periods of severe heat, in the absence of air conditioning, IT equipment can heat up very fast, leaving only a short window of time in which to act.

Servers contain a company's valuable data, but when they are overheated they will usually shut down before any serious harm is done to them or data is lost. The most sensitive pieces of equipment, however, are the network routers. These handle internal and external data transmissions, including e-mail and IP telephones. If they heat up too much, they may become permanently damaged and need to be replaced entirely, often at considerable cost.

In a heat emergency, one tempting solution is to use portable evaporative coolers, also called swamp coolers. Since these work by evaporation, however, they add significant amounts of humidity to the air and are therefore not generally suitable for use in IT equipment rooms.

Another solution, often resorted to in the past but still not unheard of today, is to open doors and use electric fans to bring in outside air. This assumes, however, that cross-ventilating doors are available, and that leaving such doors open will not create a security problem. It also assumes that the air outside is cooler than it is inside and relatively low in humidity, neither of which is necessarily the case during heat waves, when outages are most likely to occur.

Moreover, especially with the higher heat densities of today's IT equipment, fans can provide only partial, temporary relief at best. They can often keep the temperature from rising as quickly as it would otherwise, but they usually can't prevent the inevitable. When the temperature inside the server room

Preventing Heat Disasters

reaches a critical level, the only real solution is to shut all the equipment down and wait for the air conditioning to be repaired. This of course may take hours or, in the worst cases, a day or longer. In the meantime, business activities that depend on the IT equipment are brought to a halt.

Air-Conditioning Backups: A Historical Perspective

In the early days of IBM mainframes, which put out very large amounts of heat, the vendor provided both an air conditioning system and a redundant backup system as part of a total package.

With the transition to server technology and the development of large data centers containing dozens of server racks, dedicated air conditioners and N+1 or N+2 redundant backup systems became the rule, as they still are.

On the other hand, many companies with a relatively small number of servers and whose air conditioning was supplied by the building's central cooling system, did not at first feel the need for a dedicated backup system. As long as downtime was not excessive, the lack of a backup was not a problem.

Yet as IT and telecom applications have continued to proliferate in the general business world, not only has the number of servers and routers used by a typical company grown, but the heat density of that equipment has also grown. Accordingly, air conditioning and air-conditioning backups have today become critical factors for even smaller server and telecom rooms.

The Solution: Portable Air Conditioners as Backup Systems

The introduction of a relatively new class of commercial portable air conditioners, also called portable spot coolers, has given IT managers of smaller server and telecom rooms a convenient way of solving their air-conditioning backup problems.

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

Preventing Heat Disasters

Portable air conditioners are self-contained units, containing both a compressor and evaporator coil. Cold refrigerant flows from the compressor into the evaporator coil. A fan blows over the coil, pushing cold air out. A second fan pushes exhaust hot air out through the system's built-in flexible ducting, usually to the empty 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.

Benefits of Portable Air Conditioners

The most important benefit of portable air conditioners is that they allow quick and easy installation that does not violate most lease agreements and does not normally require prior approval of the building owner. Installation usually consists of no more than rolling a unit in, removing a drop-ceiling panel and positioning the exhaust duct in the space where the panel was.

Another outstanding benefit of portable air conditioners is their flexibility. Whenever necessary, they can be quickly and easily moved to a different location in the server room and their airflow redirected. This is particularly helpful if any new hot spots develop when equipment is added or racks are reconfigured.

Renting vs. Buying

Because installation is so fast and simple, portable air conditioners are popular as rental units for emergency use. In many cases this may be a completely satisfactory solution. However, the popularity of portable air conditioners extends to many more applications than just IT equipment rooms.

This means that if an outage occurs during a heat wave, when the demand for rentals is usually running high, there may be a significant delay before the dealer can arrive. It is also possible that dealers in a particular area will run out of units with the required cooling capacity and voltage. In addition, not all dealers have 24/7 service, which can be a problem if the outage occurs at night, on a weekend or on a holiday.

For companies who can't afford to gamble on a delay, having their own backup portable air conditioner may be a better solution. That way, when an outage occurs, the unit only has to be rolled in and hooked up. Such a procedure usually takes only

Preventing Heat Disasters

minutes to accomplish, but even so, if the outage occurs during off-hours, there is still some risk that equipment may shut down or suffer damage before company personnel can arrive.

For companies who can't tolerate any amount of downtime, on the other hand, the best solution is to install a portable air conditioner as a permanent backup, with the thermostat adjusted a few degrees above the maximum temperature allowed by the main air-conditioning system. With this kind of setup, if there is an air conditioning outage or other malfunction, the backup unit takes over automatically.

Direct benefits include:

- Eliminating the risk of equipment damage and system downtime
- Removing the stress and difficulty of having to deal with an emergency situation
- Eliminating emergency calls to IT personnel during off-hours
- Assuring peace of mind

4 Things to Look for in a Portable Air Conditioner

When choosing a portable air conditioner as a backup air-conditioning system, here are four important things to look for:

Quality of manufacturing: Above all, a backup air conditioner must be reliable. Look for equipment 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.

Also, examine the casters for their durability. Are they securely attached to the frame by a mounting plate and heavy-duty bolts, or only by the caster stem? The stem is a weak point that can bend and cause a caster to malfunction if it goes over a rough or uneven surface.

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?

Preventing Heat Disasters

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? Also, 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.

Finally, check the drain pan to see if it is fully insulated, not just powder-coated. This ensures that moisture will not come into contact with the metal surface of the pan, protecting it from corrosion and possible leaks.

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 equipment carries a performance-verification mark such as ETL Verified or UL Verified.

Unlike the ETL Listed or UL Listed marks, which are safety certifications, the ETL Verified and UL Verified marks are performance certifications.

ETL Verified or UL Verified means that the equipment 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 mark is another indicator of high quality.

Industry-standard measurements: Cooling capacity, measured in Btu/hr or tons (12,000 Btu/hr = 1 ton), is the most basic measure of an air conditioner's ability to cool a given space.

When choosing a portable air conditioner, be sure that the manufacturer's claimed cooling capacity has been arrived at following an industry-accepted standard from the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE), and not just an arbitrary one. Otherwise, the unit may provide inadequate cooling.

For portable spot air conditioners, the relevant ASHRAE Standard 128-1989 specifies ambient conditions of 95 °F at 60% RH. Unless this standard is used, the cooling capacity of

Preventing Heat Disasters

the equipment in question may be much lower than what is claimed.

Manufacturers of quality equipment, however, will adhere to this standard and clearly state that they have used these conditions when measuring cooling capacity.

Established manufacturer: Look for a company that stands out in the industry and has established itself for many years 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 Portable Air Conditioners

MovinCool, the world's largest manufacturer of commercial portable air conditioners, offers a complete line of models used in a variety of applications, including server and telecom rooms, network closets and other IT equipment rooms. Models are available with cooling capacities as high as 60,000 Btu/h (5 tons) and in all voltage ranges.

Within the air-conditioning industry, MovinCool enjoys a reputation for highest quality and reliability. Dealers who specialize in renting portable air conditioners, and who stand to lose significant profit if they have to replace a unit once it is delivered, consistently say they prefer MovinCool models for their rental fleets because they know they can always count on them to deliver the high levels of performance their customers demand.

MovinCool is a brand of DENSO, the world's second-largest manufacturer of automotive parts. As a Toyota Group company, DENSO's commitment to quality is paramount. DENSO is the principal supplier of advanced automotive technology, systems and components, including air conditioning, to Toyota and Lexus, in addition to being a major supplier to all the rest of the world's major car manufacturers.

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 portable and ceiling-mount air conditioning systems for many different applications. For more information, visit MovinCool at <http://www.movincool.com>.