



The Vertiv 2017 Power Outage Study



THE VERTIV 2017 POWER OUTAGE STUDY

Introduction

We reexamined our collection of 2017 outages and compiled the results in this Vertiv Power Outage Study.

In our digital society, the reliable flow of electricity is paramount. Sometimes it helps to be reminded that even in our advanced culture, the constant flow of electricity cannot be guaranteed.

We reexamined our collection of 2017 outages and charted the results in this report. Unlike the monthly publications, this analysis digs into the data more, breaking it down to provide added insight and comparison.

We invite you to read and evaluate the results.

Methodology

Starting in December 2015, we began to identify and report on power outages from public news sources. These have been compiled each month from online searches across the United States. Details garnered within the news source were recorded. Care was taken to reduce duplication of an outage's impact across multiple news outlets, as often happens in larger events that achieve public notoriety. We feel this reporting strategy results in a more conservative tabulation.

Terminology

We will rely on several terms in this report, defined as follows:

Event/Incident: The situation which caused an outage to be reported. It may have affected a local, regional or wider geographic area. Events provide insight into the prevalence of outages without examining the impact of the occurrence.

Impact/establishments: The magnitude of the occurrence as it relates to the outage's effect on households and businesses.

Reason: A categorization of what caused the outage. We standardized some of these for tabulation purposes. See our monthly reports with the occurrences links for additional granularity.

Summary

For calendar year 2017 (January 1 – December 31), we reported 797 unique incidents that impacted approximately 19,435,845 establishments. These ranged from the small outages, such as an unfortunate squirrel that shorted out the neighborhood transformer, to the large-scale impact of a Category 5 hurricane. Many of us probably remember most of the devastating storms that impacted outage results over the year.

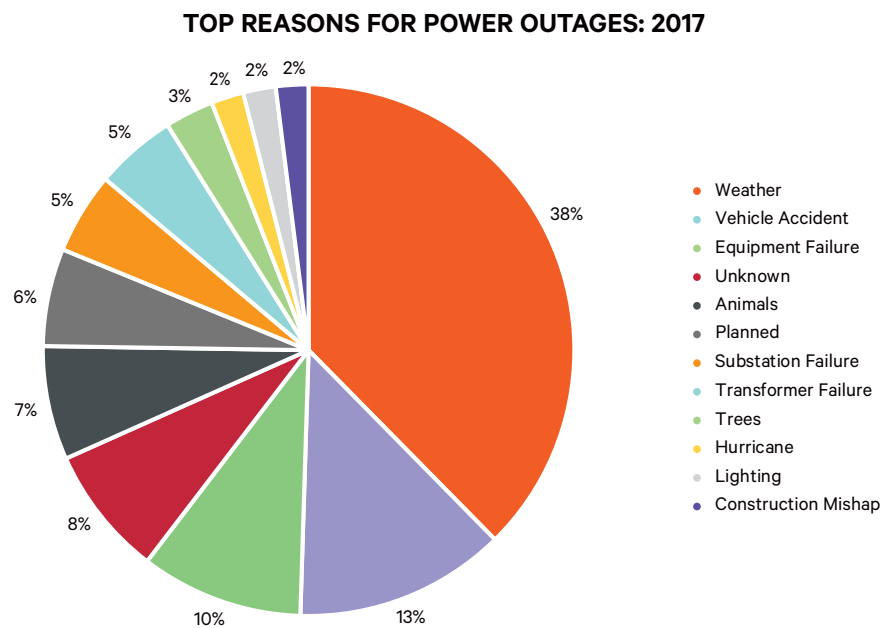
We would be remiss if we did not state that outage history doesn't predict exact future patterns. Still, there is much we can learn from what happened in the past, and take the necessary precautionary steps to minimize the impact in the future.

EVALUATING EVENTS AND INCIDENTS

1. Reasons for Power Outages

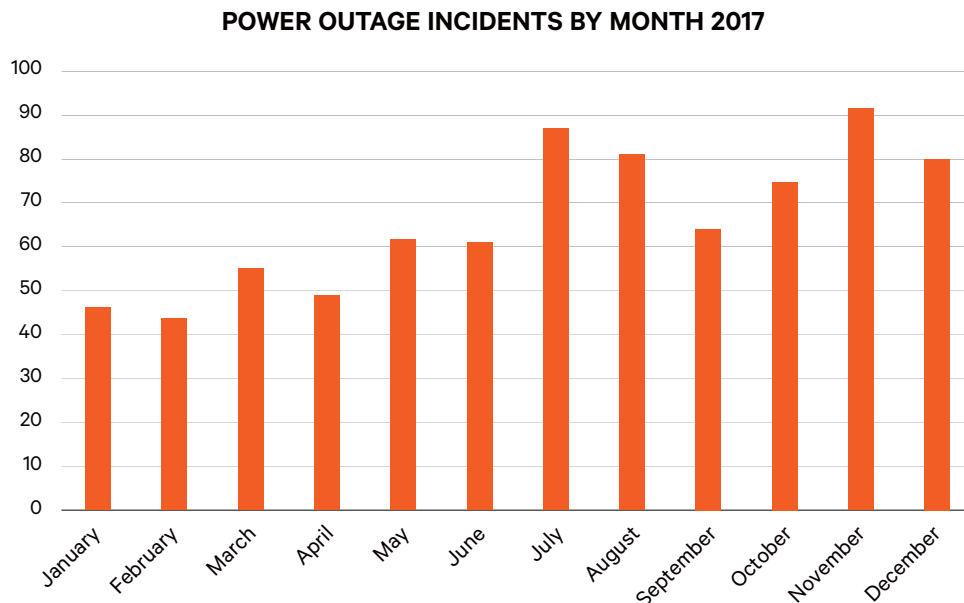
Our first analysis explores the top reasons given for an outage. The leading culprit at 38% of all outages is the weather category (storms, rain, snow and wind, separating out hurricanes). By nature, these usually affect a larger metro region or even multiple states. Vehicle accidents rate second at 13%, which often involve a collision with a utility pole. Unlike weather patterns, vehicle accidents impact a localized area. General electrical equipment failures (not including transformers or substation failures) ranks third. These include electrical equipment failings within an establishment. Making the top five is the “unknown” category at 8%. We believe this is due, in part, from the need to investigate the true cause of the outage, which at the time of reporting may not be clear.

This chart highlights the top twelve causes of outages during 2017.



2. Outage Incidents by Month

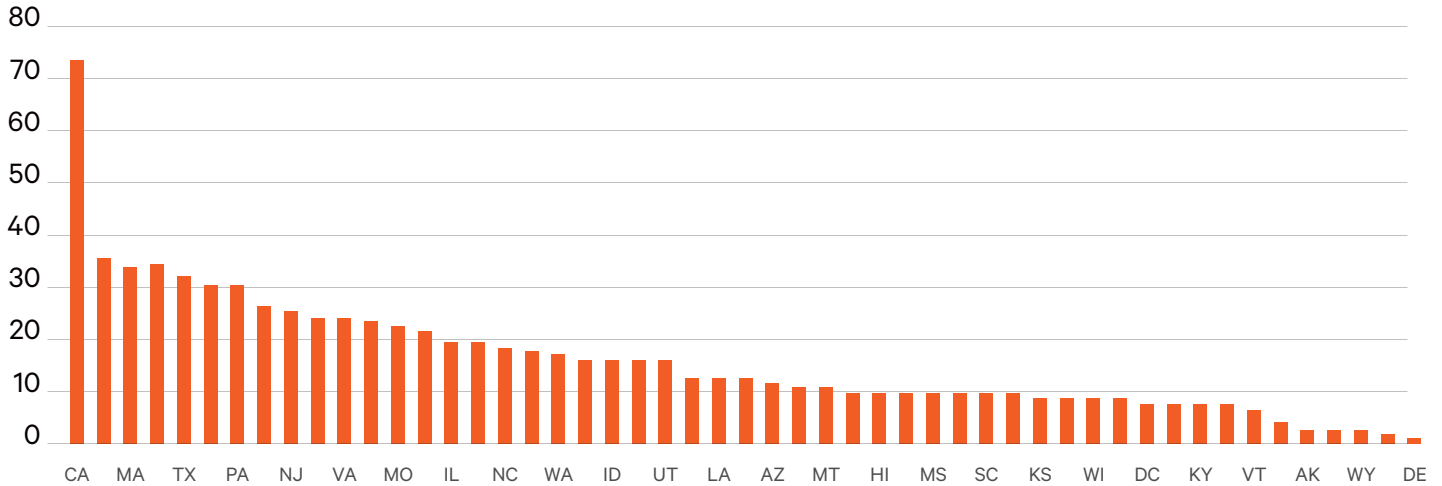
In evaluating outage events by month, we see from the chart that November and July stand tallest. Remember, this is reflective of the event not the impact of the outage. In November, we identified numerous reports of wind and vehicle accidents, while July amounted more from rain, flooding and wind storms.



3. Outage Incidents by State

A breakdown of the outage events by geographic state displays the greatest number occurring in California. This may not be a total surprise given their geographic size, population and diverse landscape. Somewhat surprisingly, Michigan tracks in second. This state took a beating in 2017 from adverse weather and equipment failures. Midwest and northern states tend to rank high. We believe a per capita ranking will be helpful in the future.

OUTAGE INCIDENTS REPORTED BY STATE 2017



EVALUATING THE IMPACT OF POWER OUTAGES

Let us turn our attention to the impact of electrical power outages. For this examination, we identified the impact of households and businesses. One quickly notices the difference between the event and impact results. In most every case, the value is based on a metered location, versus extrapolating to individuals affected. We feel this aligns with the way electricity is delivered. Some data points were filtered to assist in the evaluation.

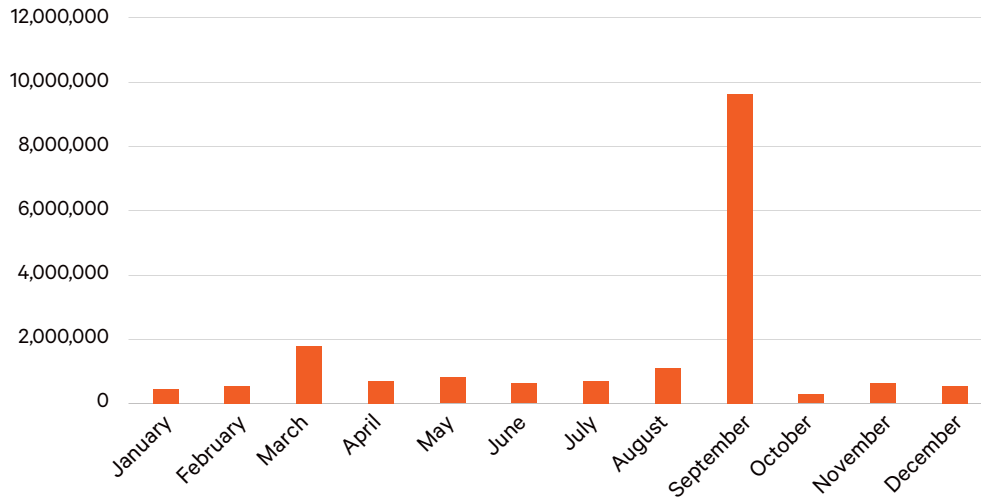
1. Outage Impact By State and Month

During 2017, the country experienced several crippling storms and events, lead my hurricane Irma. Unfortunately, storms of this magnitude cover large swaths of geography. The first chart lists the top affected states along with the impact and reason. Notice that 5 of the 10 are from the effects of two hurricanes and all 10 were weather related. Alone, these ten affected over 11 million households and businesses.

2017 TOP POWER OUTAGES BY STATE

ST	IMPACT	REASON
FL	6,300,000	Hurricane Irma
CA	1,500,000	Hurricane Irma
MA	1,500,000	Weather - Wind
PR	1,300,000	Hurricane Irma
MI	1,000,000	Wind
TX	336,000	Hurricane Harvey
SC	270,000	Hurricane Irma
ME	220,000	Wind
TN	188,000	Storms
WI	175,000	Storms

2017 OUTAGE IMPACT BY MONTH

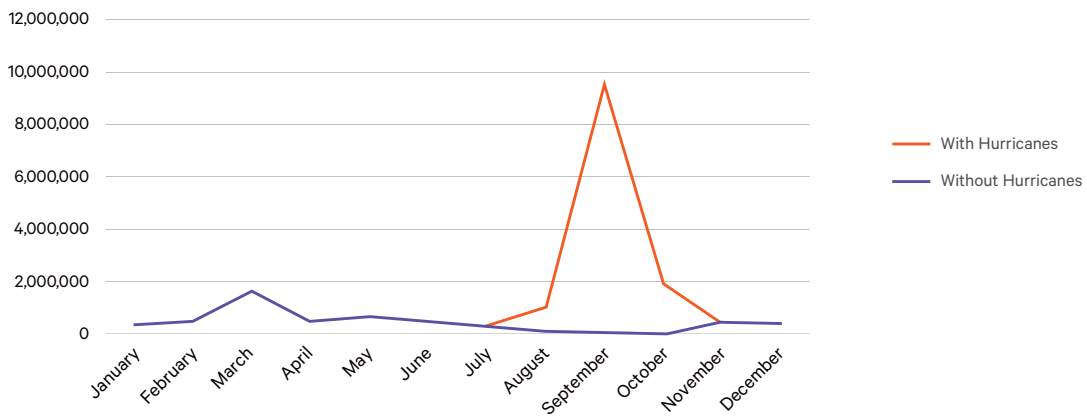


The second chart reveals the total impact by month regardless of what caused the outage. As we might suspect, hurricane prone September dominates the results.

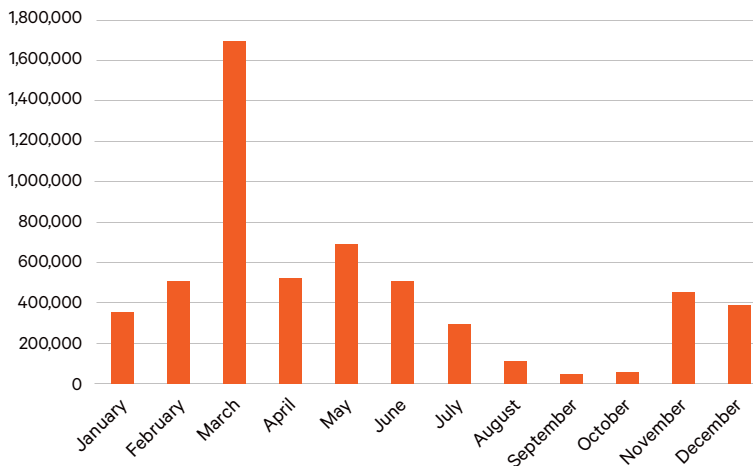
2. Effects of Weather on Outage Impact

It will help to focus more on just weather. We know from personal experience that adverse weather taxes our electrical grid. A strong hurricane that hits land can bring unusual devastation. This scenario played out in 2017 as much of the Atlantic seaboard took it on the chin from Harvey, Jose and Maria. But, given the intensity and direction, it was Irma which caused the most damage. In this evaluation, we compared weather related outages by month with and without the hurricane effect. Doing so allows us to better understand the real magnitude of weather-related power outages.

WEATHER IMPACT ON POWER OUTAGES



WEATHER IMPACT EXCLUDING HURRICANES

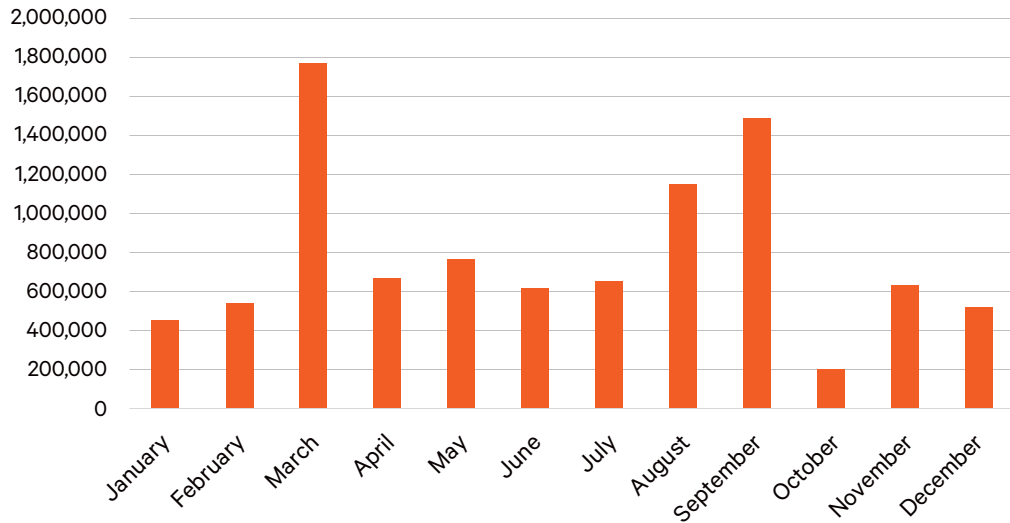


Extracting hurricanes from the weather analysis mix allows us to see the impact that March winds had on power outages.

3. Outage Impact With Weather Filtering

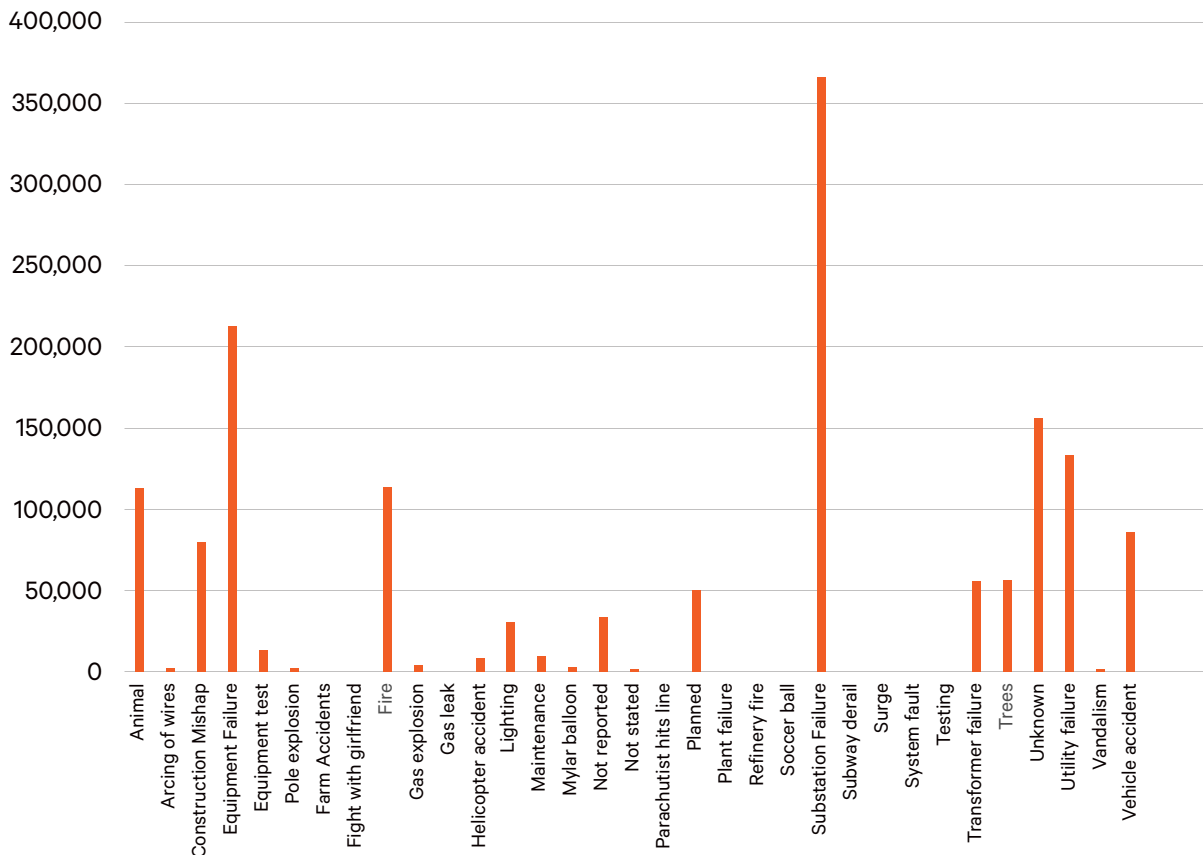
Another interesting analysis is to evaluate outages by month while filtering out the effects of only hurricane Irma (while keeping other storms and weather events). Examining this chart reveals how a windy March in the Midwest and northeast compared to other events, including non-Irma hurricanes.

2017 OUTAGE IMPACT WITHOUT IRMA



Looking at outage data devoid of weather issues allows additional categories to surface. Note, the tree category shown here amounts to the impact unrelated to major weather storms. In this view, we can see the results of substation and equipment failures. The substation data of 370,000 was exacerbated by a large hit on Los Angeles area during the torrid heat wave in July. The always fascinating disruptions from animals ranked fifth in this evaluation. It's interesting that the effects of our furry and slithering friends tallied higher than even accidents from vehicles. Some may be familiar with the practice of utilities conducting a planned outage. These situations are rather minimal, tallying a distant tenth.

2017 OUTAGE IMPACT BY REASONS EXCLUDING WEATHER



CONSIDERATIONS

It becomes apparent that power outages affect all of us in one way or another. Sometimes ramifications are minimal, while at other times they may be down right serious.

What can you do? Be proactive by protecting your business concerns using a comprehensive approach. Problems can occur inside or outside a facility.

Unlike many residential establishments, commercial customers take greater steps to minimize and prevent business disruption. Whether you depend on critical electronics in your home or office, maintaining and improving system availability needs ongoing attention. When you need a power solution to help your business, we are ready to help.

About Vertiv

Vertiv designs, builds and services critical infrastructure that enables vital applications for data centers, communication networks and commercial and industrial facilities. Vertiv supports today's growing mobile and cloud computing markets with a portfolio of power, thermal and infrastructure management solutions including the Liebert®, Chloride®, NetSure™ and Vertiv™ brands. For more information, visit Vertiv.com.



Downtime Costs For Data Centers

Since 2010, Vertiv has partnered with the independent Ponemon Institute to tabulate and report the costs and associated impact of downtime in the data center industry.

Our most recent project is the “2016 Cost of Data Center Outages Report”.

The average cost of a full data center outage has increased 38 percent since 2010. That’s just one of the findings of the latest Cost of Data Center Outages Report from the Ponemon Institute.

This Report documents the costs and causes of data center downtime by industry. Based on field reports from data centers across North America, it uses an activity-based costing model to account for direct, indirect and opportunity costs. The result is a true picture of the business cost of full and partial data center outages.

Read and download the [2016 report here](#). It is one of our Performance Benchmark series that address the most pressing challenges data center managers face.

UNIQUE OUTAGE STORIES OF 2017

We chose to honor several unique outage occurrences from 2017. Vertiv picked out three from the monthly reports that contained interesting back-stories. We awarded each a medal of distinction, Bronze, Silver and Gold. See if you agree with our decisions.

The Bronze Medal Winner Goes To:



BRONZE: “It’s Always the Snake’s Fault”

In June, a North Carolina snake caused a major power outage when it wandered into a substation and started a fire that knocked out power to 8,000 customers. A spokesperson noted snakes have caused about 100 power outages every year across the six-state region. This frustrated utility is now working to retrofit 400,000 transformers with special fences, some even electric, to keep animals out, including snakes. We wish them good luck.

The Silver Award Goes To:



SILVER: “Lover’s Quarrel Creates Domino Effect”

Investigators in Florida say it started when a young couple’s argument escalated. The boyfriend allegedly grabbed his girlfriend’s purse, then proceeded to light it on fire. Apparently he had to get rid of it, so he threw it over the gate where he lives. Cue domino effect. The burning purse reportedly caused a palm tree to ignite, allowing flames to spread to a nearby utility electric box, which knocked out electric service around the neighborhood. The city valued the palm tree at \$3,000. No word on what they were arguing about or the value of the purse. The man was booked on one count of second-degree arson.

Our Gold Medalist Is:



GOLD: “Mischievous and Mayhem Create Hostage Situation”

In April, we identified reports of a Kentucky man who chopped down a utility pole near his home. This Paul Bunyan impersonator had plans to remove the pole’s transformer and sell it back to the power company. Authorities arrested the 40-year-old male on charges of first-degree criminal mischief and theft by unlawful taking. His arrest came after utility workers found a downed power pole while responding to a power outage. He claims he believed it was on his property and thus he had the right to the transformer. Rather than a big payday, he faces \$5,000 in fines. Ouch.

We Want to Hear From You:

Have a unique outage story to share? [Share it to us](#). You can win a Vertiv blanket or umbrella (hey, we got you covered).

SOLUTIONS FOR ALL YOUR POWER CHALLENGES

Whatever your need, whatever your size, Vertiv has innovative technologies that can minimize or prevent power problems from disrupting your productivity. Shown below are examples of our solutions.



Liebert® PST4

Home Office

The Liebert® PST4, 350-850VA, is an offline, single-phase UPS designed to provide power protection for home office computers, and home entertainment equipment.



Liebert® GXT4

Network, Small Business

Liebert® GXT4, 500-10,000VA is a single-phase UPS that offers true on-line protection to deliver continuous, high-quality AC power with no break when transferring to battery.

Liebert® ITA2, 8-10kVA is a three-phase UPS that provides a reliable, efficient and flexible power solution with a space-saving design. Place it in a rack or on the floor. Easy to install.



Liebert® ITA2

Small to Midsize

Liebert® EXM, 10-250kVA is a three-phase UPS that delivers efficient, reliable and flexible power protection. Scalable power and battery modules. Optional ancillaries to meet specific needs.



Liebert® EXM

Large Business, Colocation, Cloud

Liebert® EXL S1, 625-1200kVA is a monolithic, transformer-free UPS for large applications. It features optimized, industry-leading footprint, excellent operating efficiency and robust electrical protection to deliver superior TCO savings.



Liebert® EXL S1

Vertiv Services

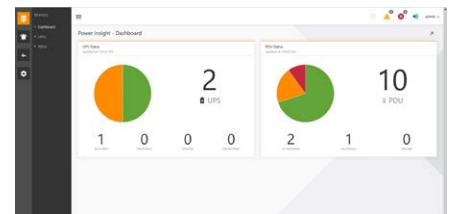
LIFE™ Services Remote Diagnostic and Preventative Monitoring: Provides remote diagnostics and preventive monitoring service for UPS equipment.

Monitoring

Vertiv™ Power Insight helps to maximize the investment you have already made in your Liebert® UPSs and can help to lower support costs as well as protect your valuable critical equipment.



LIFE™ Services



Vertiv™ Power Insight



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