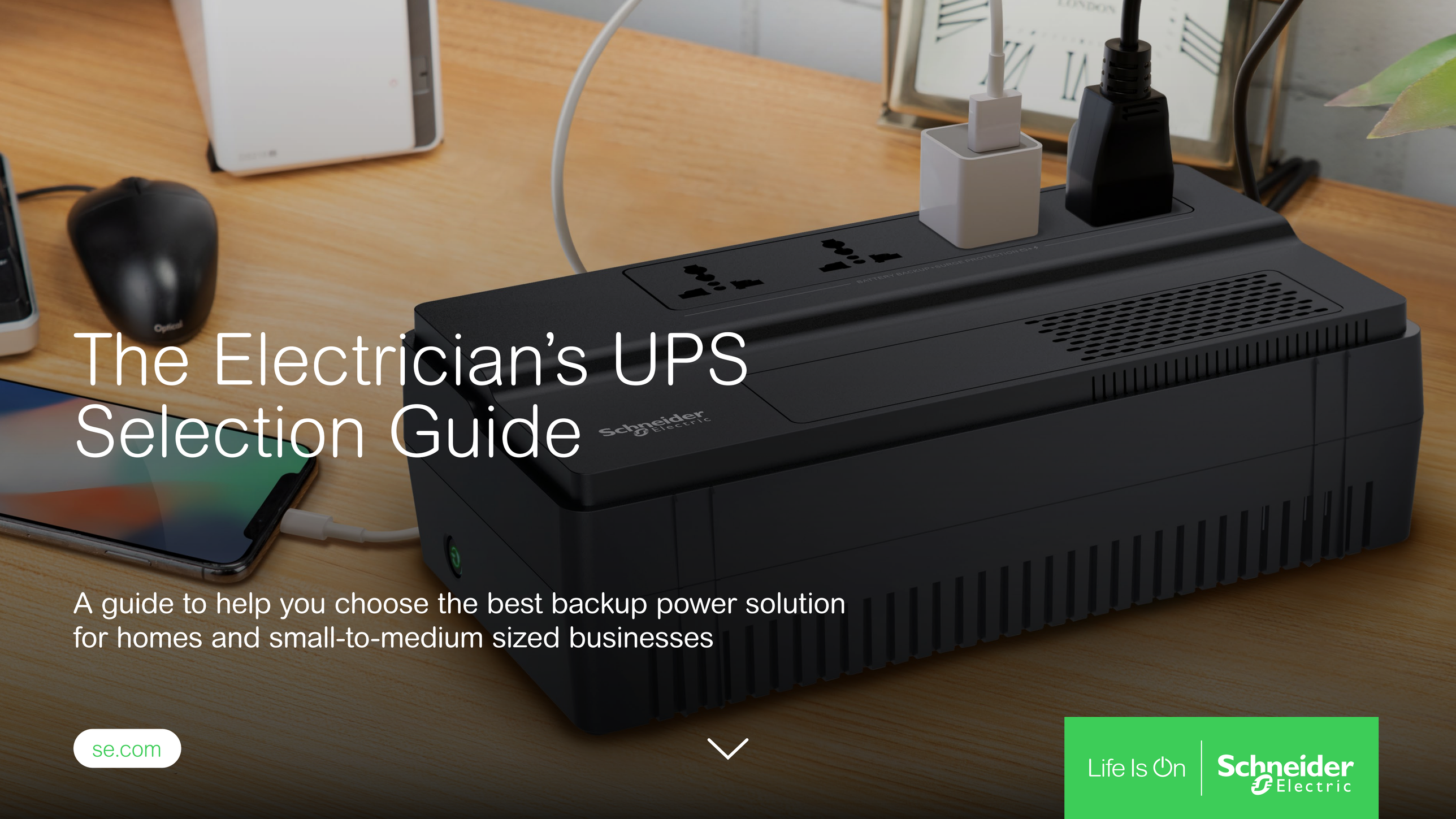

The Electrician's UPS Selection Guide

A guide to help you choose the best backup power solution for homes and small-to-medium sized businesses

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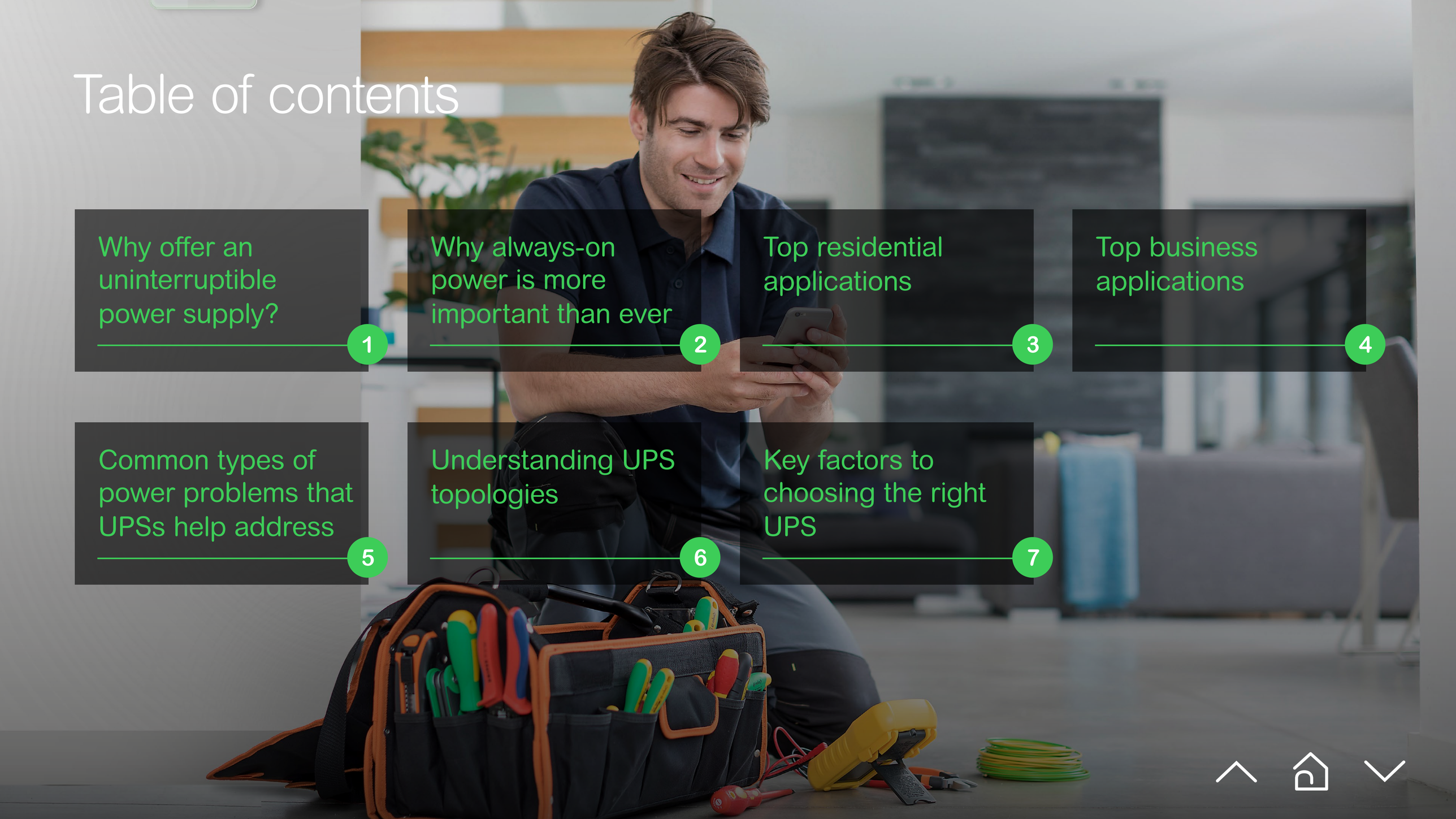


Why offer an uninterruptible power supply?

As an electrician, your customers look to you for advice and solutions to keep their homes and businesses running. An uninterruptible power supply (UPS) is an important tool toward that goal, providing backup power and surge protection for connected equipment. This guide explains UPS technology and applications, along with options to meet a range of customer needs.

What is a UPS?

UPSs offer backup power protection for connected devices. Their onboard batteries instantly provide clean backup power and surge protection for plugged-in, sensitive equipment whenever power is interrupted or fluctuates outside safe levels. This means businesses can remain up and running, and homeowners can keep working and learning from home — without interruption — during outages and brownouts.

Why should electricians offer a UPS?

Your customers look to you to provide safe, reliable electrical installations they can trust to power their homes and businesses. UPSs offer you another opportunity to help ensure safe and reliable backup power for your customers' critical equipment, even during a power outage.

UPSs can also help protect your customers' connected devices from the millisecond-long power fluctuations that could add up to expensive repairs or replacement bills.

Adding UPSs to your portfolio can be a great way to support your customers while building your business's reputation and profits.

Why always-on power is more important than ever

Residential

Today, more of us aren't just living in our homes — we're working and learning in them, too. UPSs can give your customers confidence that office and school connections will remain stable, even during a power outage.

More homeowners also are turning to smarter home systems. Lighting, thermostats, window blinds, and even garage doors now can be controlled remotely with mobile apps from anywhere in the world. Backup power solutions help ensure all these connected devices are protected and continue to operate through almost any power irregularity.

Traditional homes can also benefit from backup power solutions that keep internet routers, major appliances, pumps, and home medical equipment running.

Small-to-medium businesses

Smaller business operations are becoming more digital and cloud-based, so maintaining network connections is more important than ever. Point-of-sale equipment, climate control, lighting, and accounting all can make a difference in whether and how long these companies can operate during power disturbances. Restaurants, retailers, pharmacies, and hotels all can benefit from the business-continuity benefits UPSs can offer.

2 hours

Average power outage in the United States

Source: U.S. Energy Information Administration

249

The median number of power outages per year in the European Union.

Source: 2018 European Commission Study

Top residential applications

Home electronics and security systems

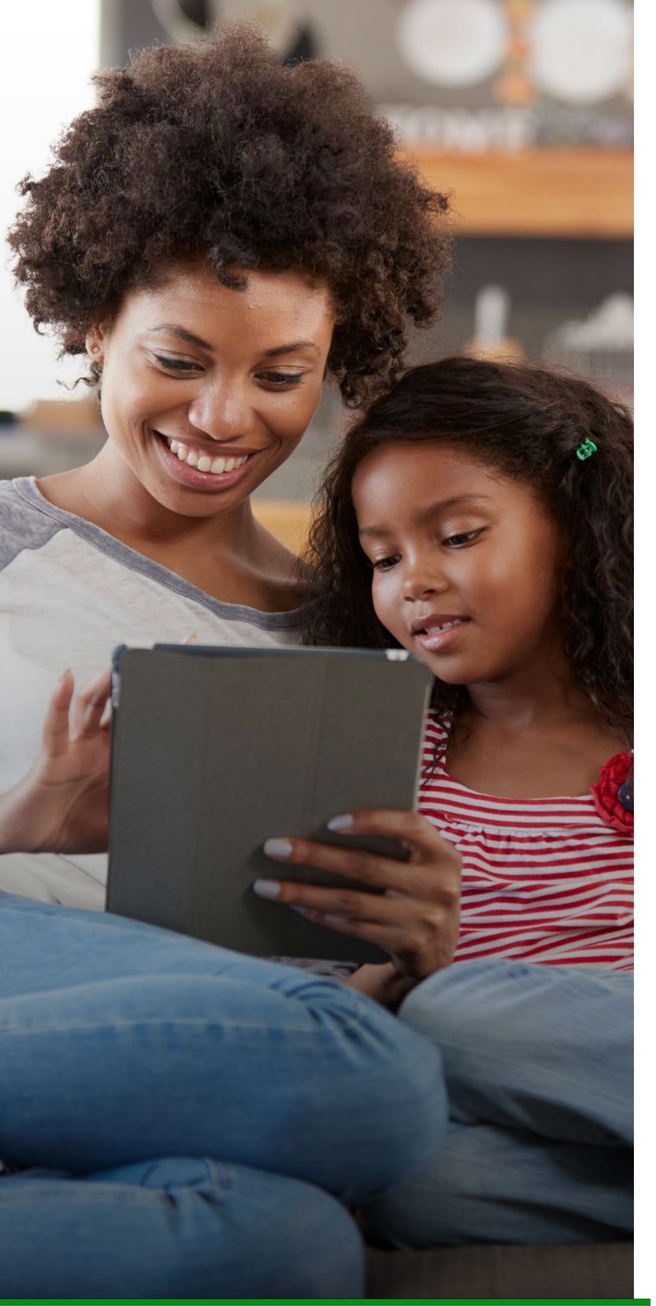
Modems and routers have become the essential hubs for our digital lives. They provide internet connections for laptops, mobile devices, and entertainment systems. This makes them essential for maintaining communications with work, school, family, and friends. Security systems can include 24/7 video surveillance equipment that also could benefit from backup power protection.

Smart home applications

Many homeowners have come to value the convenience and savings that smart thermostats, lighting systems, and other such devices now provide. Backup power can help maintain and protect their operation through any power irregularity.

Pumps

Pumps serve vital purposes in many homes. They deliver well water to sink taps, keep basements dry, and circulate pool water to keep it clean. A UPS will keep pumps powered during an outage to ensure these vital functions are maintained.



Top residential applications

Window blinds and garage doors

Motorized blinds and shutters now can open and close automatically, aiding both temperature control and security. Backup power can keep them operating, even during storm-related outages. Some automatic garage doors also might need backup power protection to operate when grid-connected power goes down.

Medical equipment

A power outage could become life-threatening if critical medical equipment is affected. Remote health monitors, respirators, tube-feeding devices, and medical beds require power protection to ensure patient well-being.

Major appliances

It's easy to see the need for backup power for refrigerators and freezers to prevent food spoilage when the power goes down. But UPSs also protect against power surges, which has become more important as most appliances now feature sensitive onboard electronics. Dishwashers, washing machines, furnaces, and water heaters all can be damaged without this protection.

Top business applications

Business continuity

Simply keeping the doors open depends on reliable power supplies for many businesses, including:

Specialized, critical equipment such as cooking appliances and refrigeration for bakeries, restaurants, and supermarkets.

Point-of-sale systems connected to the internet that aid retailers in such vital tasks as tracking inventories, managing customer information, and processing sales.

Enterprise applications aiding business accounting and customer relationship management require 24/7 connectivity to keep operations running.

37%

of small-to-medium sized businesses lost revenue due to computer-related downtime.

Source: Infrascale survey of 500 small and medium size business executives

Top business applications

Safety and security systems

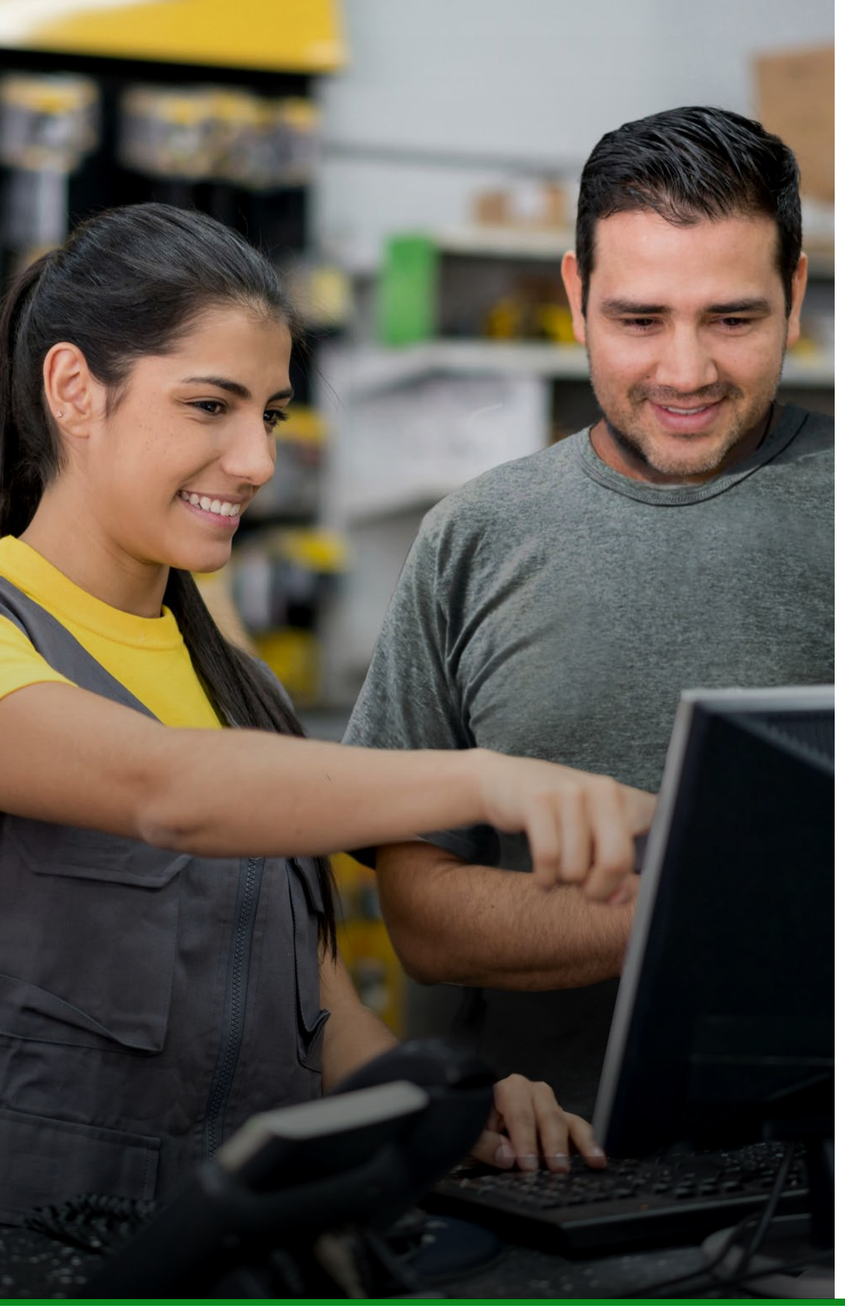
Safety and security systems are important to any business in some cases, even more so when the power goes out.

- Security cameras and alarms need to remain available through any outage.
- Fire alarms and smoke extraction equipment are vital to occupant safety.
- Emergency lighting systems must be able to illuminate when the connected power grid goes down.

Heating and cooling systems

Heating, ventilation, and air conditioning (HVAC) equipment also benefits from backup-power attention.

- System shutdowns during an outage can lead to uncomfortably hot or cold conditions for both employees and customers.
- Proper cooling also can be critical to maintaining inventories for bakeries, restaurants, and other food service businesses.



Common types of power problems that UPSs help address

Transient
Transients cause momentary variations in current, voltage, or frequency which can be the most damaging type of power disturbance.

Interruption
Power interruptions present a complete loss of supply voltage or load current and can result in loss of data or damage to sensitive equipment.

Sag
This reduction of alternating current (AC) voltage at a given frequency is usually caused by heavy power draw at startup or by system faults.

Swell
The reverse of a sag, a swell is characterized by an increase in AC voltage. High-impedance neutral connections and sudden load reductions are common sources.

Overvoltage
An extended power swell or spike that can be transient or permanent – and it also can be hazardous. These are common in seasonal regions where communities reduce power usage during off-season.

Undervoltage
The result of long-term problems that create sags is undervoltage. This includes temporary decreases in power lasting up to over a minute. Undervoltages are also called brownouts.

Common types of power problems that UPSs help address

Waveform distortion
This event is an unexpected change in current and voltage waveforms as they pass through a device. There are five types of waveform distortions:

- Direct current (DC) offset
- Harmonics
- Interharmonics
- Notching
- Noise

Frequency variation
These changes in AC current flows may occur with heavily loaded generators or poor power infrastructure. They have the biggest impact on sensitive devices that rely on steady regular cycling of power over time.

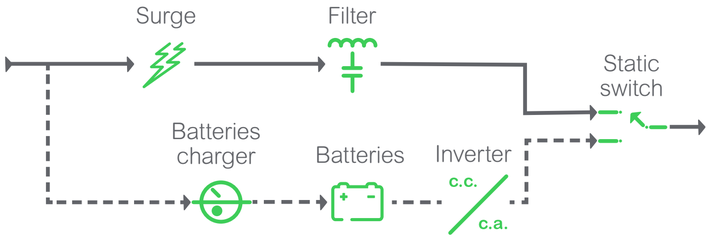
Voltage fluctuation
These are a series of voltage changes or cyclic variations of the voltage waveform envelope, generally below 25 Hz.

For more details, download The Seven Types of Power Problems white paper.

Understanding UPS topologies

Not every backup power application is alike. That's why different types of UPSs are available to meet a broad range of needs.

Standby



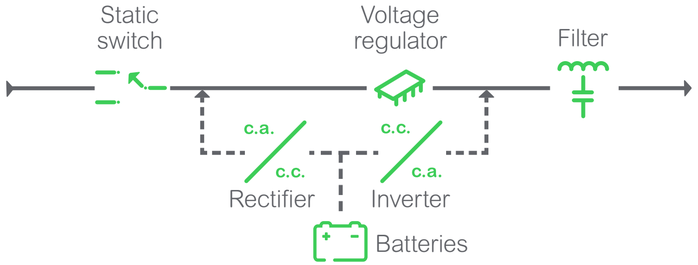
Standby UPSs allow equipment to use utility power until an outage or disturbance is detected. The connected load then switches to the battery.

Benefits – Low cost, best value for personal workstations

Limitations – Uses battery during brownouts. impractical over 2kVA

Features – Surge protection, battery backup

Line interactive



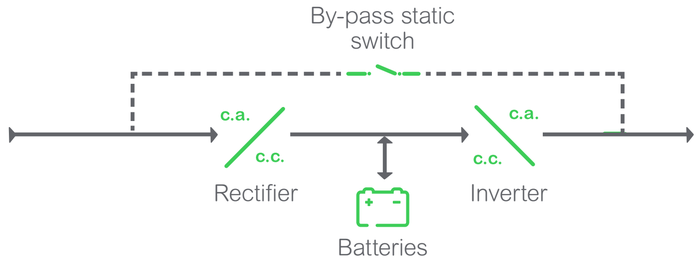
Line interactive UPSs include microprocessors to monitor incoming power quality. They can address under- and over-voltages without using the battery.

Benefits – High reliability, ideal for racks or distributed servers

Limitations – Impractical over 5kVA

Features – Surge protection, battery backup, voltage regulation, overvoltage protection, pure sine wave

Double conversion online



Double conversion online UPSs maintain consistent output regardless of the condition of incoming power sources. Incoming AC power is first converted to DC, and then separately converted back to AC for an interference-free power supply.

Benefits – Excellent voltage conditioning, ease of paralleling, well suited for ´+1 designs

Limitations – Expensive below 5kVA

Features – Surge protection, battery backup, voltage regulation, overvoltage protection, pure sine wave, double conversion online

Key factors to choosing the right UPS

Sizing of the UPS

Be sure to check the maximum watt and volt-ampere (VA) ratings for both the UPS you're selecting and the equipment it's intended to support. That connected equipment's ratings should not exceed the ratings of the UPS.

Runtime selection

Runtime refers to the amount of time a UPS can power connected equipment in the event of a power disruption. That runtime will vary based on how much equipment the UPS is called on to support. To maximize UPS runtime, it's important to make sure the unit is only providing power to your customer's most critical equipment.

Power factor

For both UPSs and connected computers, watt and VA ratings can differ significantly, but the VA rating will always be equal to or higher than the watt rating. The ratio of watts to VA is called the "power factor," and it's expressed as either a number (i.e., 0.8) or a percentage (i.e., 80%). To ensure the UPS's power factor stays within acceptable limits, be sure it has an output watt capacity 20%-25% higher than the total power drawn by any connected equipment.

Need some help? Access our product selector to find the most relevant UPS for your application.

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To learn more about our **UPS offer,** visit:

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