Uninterruptible Power Supply (UPS)

Introduction

In the twenty-first century, most business is digital business. Whether for-profit or nonprofit, public or private, work is driven by technology that enables the speed and convenience a modern enterprise demands.

This consumer's expectation is an "always-on" experience. If the expectation is violated, downtime comes with consequences measured in both tangible and intangible costs. Lost revenue and reputational damage are but two outcomes. To preempt such harm, companies turn to a UPS — with onboard batteries and power conditioning hardware — as an essential line of defense. Panduit's new UPS is tailored to protect our customer's critical applications.

This document will outline UPS technologies and terms, aiming to make the reader more comfortable and conversant with UPS.

Description of Content

As the UPS was developed and released, both engineering and product management created extensive training materials about the power market, UPS 101 topics, UPS components, and more. This document is intended as a complement and companion to this material. It will serve as a partial summary for some of these subjects but must be shorter in length to allow for specificity and quicker reading. For complete technical specs and guidance, readers should refer to the official specifications and training materials.

UPS Basics

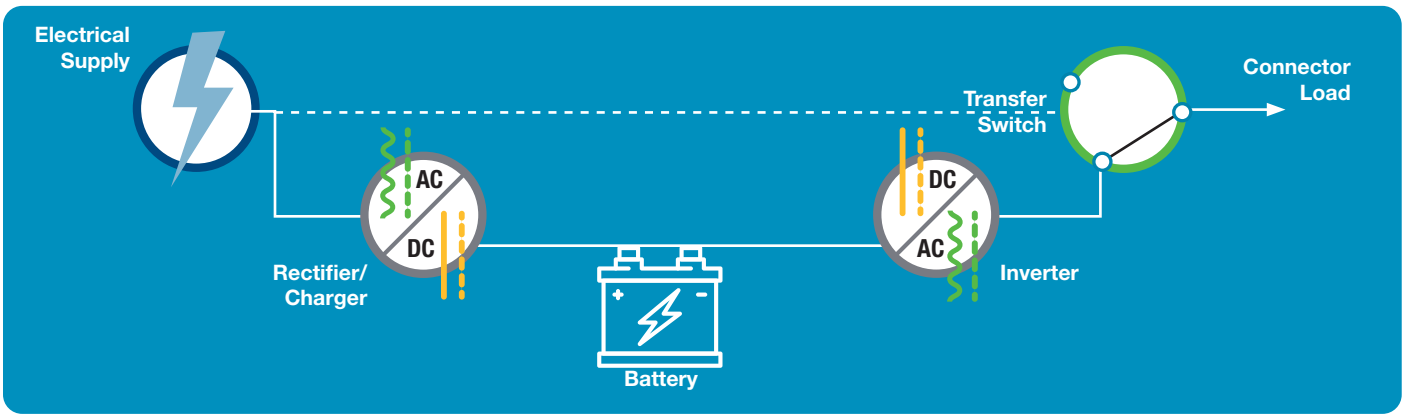
UPS Technology

Most UPS sold in B2B markets are of two types: Line Interactive or Double Conversion, which is also called an *Online* UPS.

Of the two, **double conversion** is superior because it isolates hardware from the fluctuations of the electrical grid. Source electricity is rarely "clean" and power supplies can be sensitive to common anomalies like voltage spikes, transients, and noise. A double conversion UPS corrects all power inconsistencies and ensures all power supplies see a perfect electrical sine wave. As the nickname implies, the battery is always "online." There's no transfer time in the event the battery becomes the primary source.

Line interactive UPS are popular and economical. As a tradeoff, this style only compensates for select power anomalies--not the full gamut of potential problems. They are most equipped to "buck and boost" voltage irregularities, However, they transfer to the battery in milliseconds—fast enough to satisfy the most sensitive of power supplies.

Double Conversion Line Diagram



Interactive Line Diagram

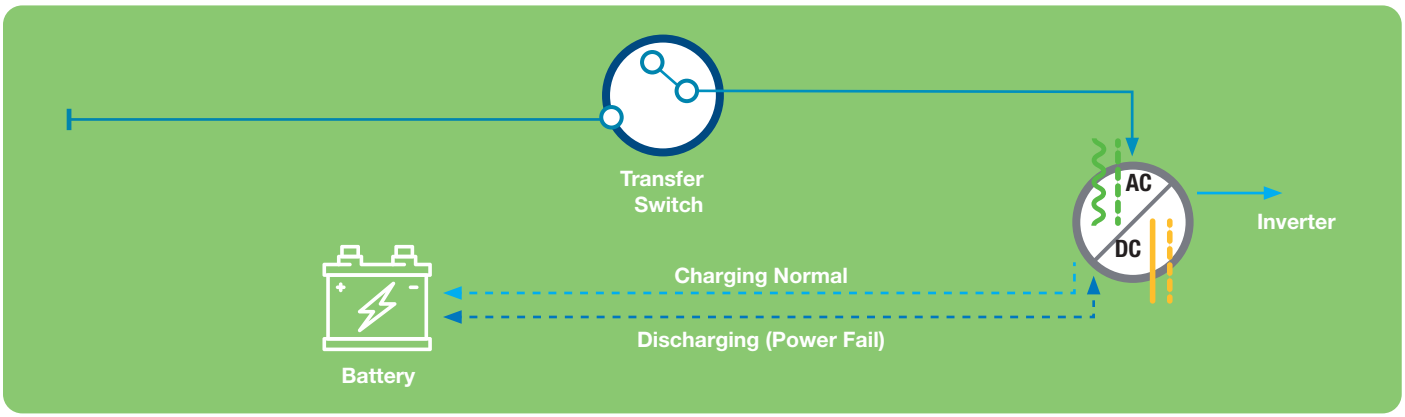


Figure 1

While the line interactive vs. double conversion decision is often driven by cost, another consideration is the quality of utility power. In the US, certain geographies have demonstrably better power service. If this is true for a particular buyer, a line interactive model may be perfectly suitable. However, for anything mission-critical, there's no substitute for a double conversion UPS.

UPS Segments

UPS are not one-size-fits-all. Their capacities and technologies are driven by consumer segments who design IT real estate around a critical power load measured in kilowatts (kW) or megawatts (mW).

Large and Centralized

A centralized UPS is a cornerstone of large data centers:

- Enterprise **on-premise data centers,** where facilities are typically sized in the 100s of kilowatts (kW) and sometimes megawatts (mW = 1000 kW).
- **Hyperscale data centers** — those of Meta, Microsoft, Amazon, Google, and others — are of immense multi-megawatt scale.
- **Colocation data centers** are commonly designed to achieve megawatt capacities.

Centralized UPS Hallmarks

- Designed as **monolithic** and **industrial** with higher voltage inputs (like 480V in North America)
- Supported by **strings of batteries** in a discrete battery room
- Deployed in **redundant approaches** — N+1, N+2, 2N — where loads are shared during normal operation and ready to shoulder the entire load should a failure occur

These UPS are extensive and expensive enough that they're often sold with a factory-witness test, where the end user travels to the manufacturer's site to see their exact model under various stress tests.

While large data centers receive a lot of attention, there are substantially more UPS opportunities that require smaller capacities and demand more flexibility.

Row-Based

Innovations in the 2000s popularized a variety of UPS that install in the white space next to the server cabinets. These UPS championed modularity and scalability; unlike the monolithic, fixed-capacity variety, users grew into this UPS as their business demanded. Adding power modules became simpler and instantly increased capacity; batteries became easily replaceable; top power feeds to the UPS eliminated the need for a raised floor.

This style championed the modern data center maxim of modular and scalable and succeeded in giving legacy facilities a new lease on life.

Row-Based UPS Hallmarks

- Form factor and appearance resembles a typical server cabinet
- Often have a fixed total capacity (80kW) that a customer can "grow into" by adding distinct power modules
- Distribution from the UPS can be via in-row panelboards or rackmount devices

This row-based design remains popular today, typically using UPS modules between 8kW and 12kW and being featured prominently in Edge applications.

Cabinet-Based

Cabinet-based UPS are popular in locations removed from the controlled environment of a data center or server room. "Closet" is a popular descriptor, but warehouses, distribution centers, kiosks, and retail stores are candidates for a cabinet UPS. Such locations are commercial properties, which lack a dedicated IT room and infrastructure for a large UPS.

The workload is local to the facility, with capacities less than those found in purpose-built IT rooms. 1-3kVA UPS resonates in this arena, as only 120V may be available where the UPS is to be installed.

Cabinet-Based UPS Hallmarks

- A closet on a hospital floor.
- A cluster of servers used by an academic researcher.
- A wall mount cabinet in retail store.
- A cabinet in a K-12 school,
- All of the above can be considered "edge" applications.

Panduit UPS

Americas

Today's North American offering addresses the cabinet-based segment in both topologies (Line interactive, Double Conversion) and battery types (VRLA and Lithium Ion).

EMEA

EMEA's offer contains both single phase and three phase models with standalone capacities ranging from 1kVA to 20kVA. The three-phase models are also equipped with paralleling functionality. Here are two examples of this function:

- (3) 10kVA modules to address a 30kVA load requirement (in place of a standalone 30kVA UPS)
- (3) 10kVA modules to address a 20kVA requirement, leaving one module in place for redundancy

Theatre Comparison Table —Americas & EMEA, APAC

Theatre	Electrical Inputs	Standalone Capacity Range	Maximum Capacity with Paralleling	Topologies & Batteries	UPS Input Types	UPS Outlet Types
NA/LAT	**Single Phase**	1kVA-10kVA	N/A. Cannot parallel	**Line Interactive:** Lithium-ion only **Double Conversion:** VRLA only	5-15P, 5-20P, L5-30P, L6-30P, Hardwire Terminal Block (single phase)	5-15R, 5-20R, L5-30R, L6-30R, Hardwired
EMEA & APAC	Single and Three Phase	1kVA-20kVA	80kVA	**Double Conversion:** Lithium Ion and VRLA	Schuko CEE 7/ EU1-16P and BS1363A; Hardwire terminal block (single phase); Hardwire terminal block (three phase)	C13, C19, Hardwired

Figure 2

Paralleling Connection Examples

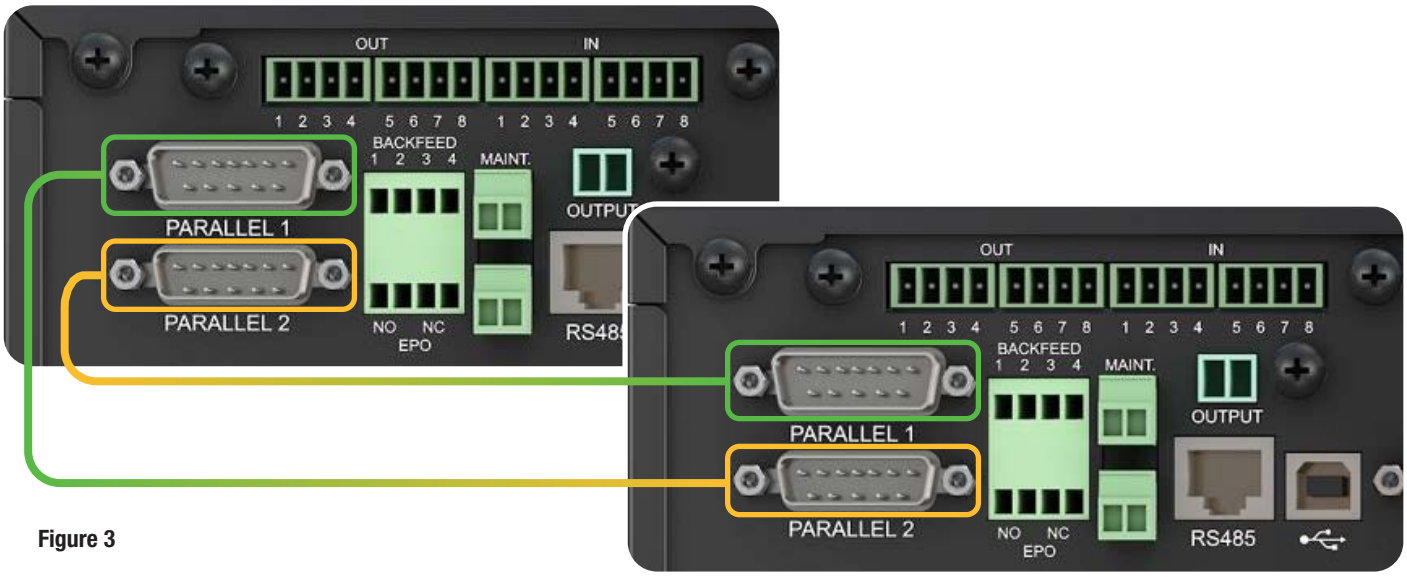


Figure 3

Choosing a UPS

While electrical engineering is complex, the initial tenets of UPS are simple. We arrive at a basic design by asking the following questions:

- What is the size of the IT load (in kVA/kW)?
- How critical is the IT load? How would a customer quantify downtime in terms of lost revenue or other metrics?
- How much UPS capacity should be built-in for future growth (usually expressed as a %)?
- If the utility supply fails, how long should the batteries run?
- What voltage is available in the room where the UPS will be installed?
  - For example, does the customer expect the UPS to connect to a common wall outlet?

These answers give a baseline for an initial specification to be refined.

UPS + Rack Power Distribution

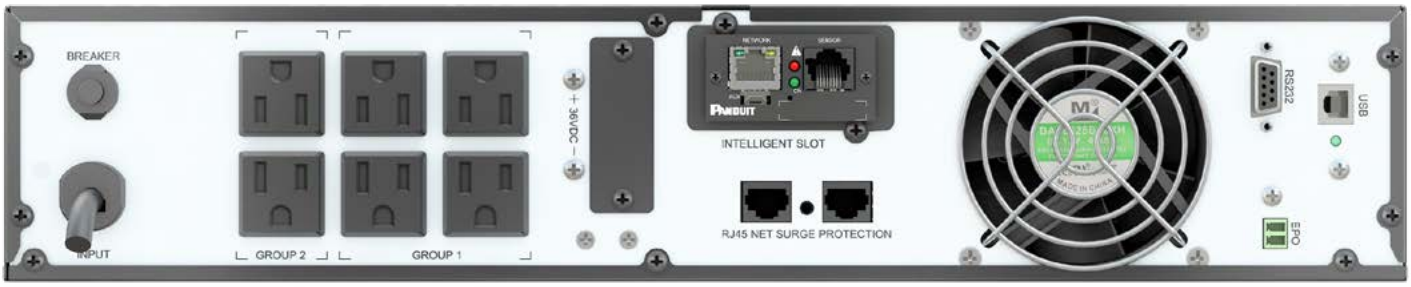


Figure 4

For smaller installations, a UPS can serve as both a UPS and a PDU. Consider a 1kVA U01N11V, seen in **Figure 4**. It's equipped with (6) 5-15R outlets. If a customer has six or fewer pieces of hardware to power, a PDU may not be necessary; the hardware can be powered directly by the outlets on the UPS. Also, when using a wallmount cabinet, space is a premium; a UPS + PDU may not fit.

In a full size cabinet, (6) rack PDUs could connect here too, but given the small 1kVA capacity, that's not recommended.

Inputs & Outputs (Plugs & Outlets)

PDU nomenclature includes terms like C13, C14, L5, L6, C19, and C20. UPS uses the same language.

Consider the diagram below, marrying Panduit's U05N11V UPS with a P42B17M PDU:

- The PDU has (1) L6-30P plug
- The UPS has (4) L6-30R receptacles
  - The PDU terminates at one of these receptacles
- The UPS also has an L6-30P plug
  - The customer's facility team must provide an L6-30 receptacle for the UPS

Pairing UPS/PDU with racks/cabinets, accessories, sensors and connectivity, a customer receives an integrated package that can accelerate their rollouts.

Inputs & Outputs (Plugs & Outlets) — Continued

Panduit UPS models, depending on the SKU, are assembled with the following receptacle types
Note: HW = hardwired connection

OUTPUT RECEPTACLES

- (2)C13 + (2)C19, HW (4)
- (2)L6–30R + HW (4)
- (4)5–20R + (1)L5–30R (4)
- (4)L6–30R (2)
- (6)5–15R (8)
- (6)5–20R (2)
- (8)C13 (8)
- (8)C13 + (1)C19 (4)
- HW (3P+N+PE) (6)

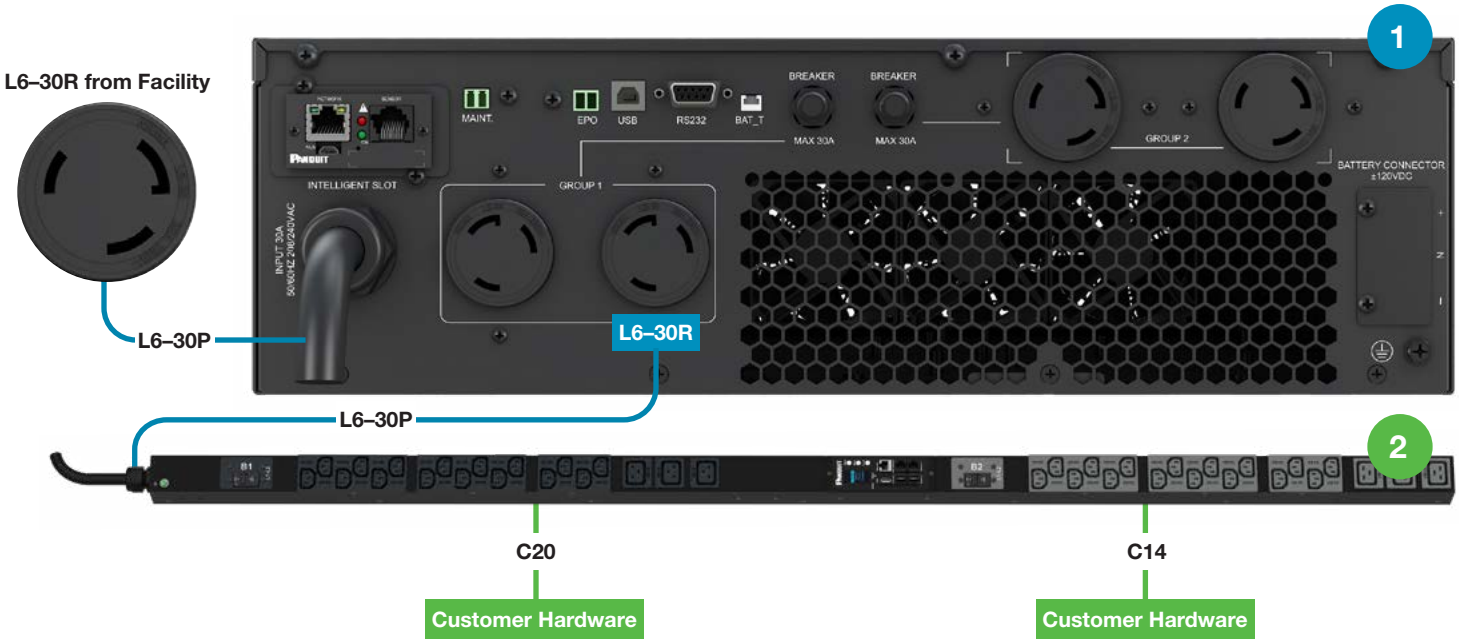


Figure 5

Common Plug & Outlet Types

The U05N11V has an L6-30P input cord, which connects to a facility electrical source; the maximum power the cord can supply is 5kW. However, the UPS is equipped with (4) L6-30R outlets, all of which can support a 5kW PDU. Even though there's 20kW worth of power connections, the UPS has only 5kW of available power.

Users must be aware of their available capacity and how their decisions affect how power is consumed and distributed. Panduit can facilitate this insight through intelligent infrastructure—the network cards within the UPS/PDU and oversight provided through the next gen DCIM Cloud-based software.

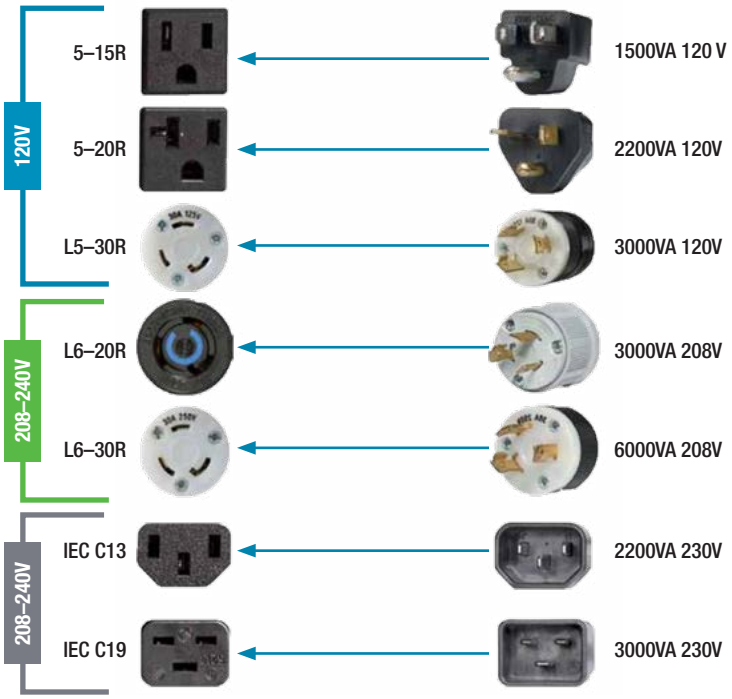


Figure 6 **Note:** Must de-rate VA capacity by 20% by code.

Battery Considerations

VRLA batteries have long been the default selection in the UPS world. Lithium-ion has recently become a viable alternative, offering long-term improvements operationally and economically. Lithium-ion is more expensive DAY ONE, so prospects will need to consider the total cost of ownership (TCO) over a longer horizon. Since consumers often expect UPS to last ~10 years, this argument could resonate with the right prospect.

Batteries have many complex considerations. But there are chief battery concerns for UPS customers, which include the following:

Convenience: batteries should be easily replaceable by the user

Hot-swappable: batteries should be replaceable without powering down the UPS

Lifecycle: if they're operated according to recommendations, batteries should achieve the advertised useful life

Customers can prolong their battery life and confidence by keeping the batteries within the recommended temperature range and by following maintenance schedules.

Runtime

Batteries exist to keep critical applications running in the event of a utility failure. UPS prospects operate across various industries with diverse business requirements. While we can generalize runtime requirements across an industry, runtime requests are highly variable. Consider one request where a prospect's only hardware was a cellular gateway and a fiber modem. The estimated power load was a scant 30 watts; however, the runtime request was 24 hours!

With smaller UPS installations, customers will usually lack a generator. In larger commercial facilities, a generator is more likely to be present.

It's important to discuss the considerations and tradeoffs around extended runtime requests; A user will eventually experience diminishing returns. More batteries mean more overhead—service, preventative maintenance, replacements, inventory, and record keeping. Over a UPS' useful life, the upfront cost of a generator may be offset by the ongoing annual costs of service and battery replacements.

Panduit's VRLA batteries support the addition of battery modules and, thus, extended runtimes. Lithium-ion batteries are not expandable.

RUNTIME GRAPHS FOR U01N11V + EBPS

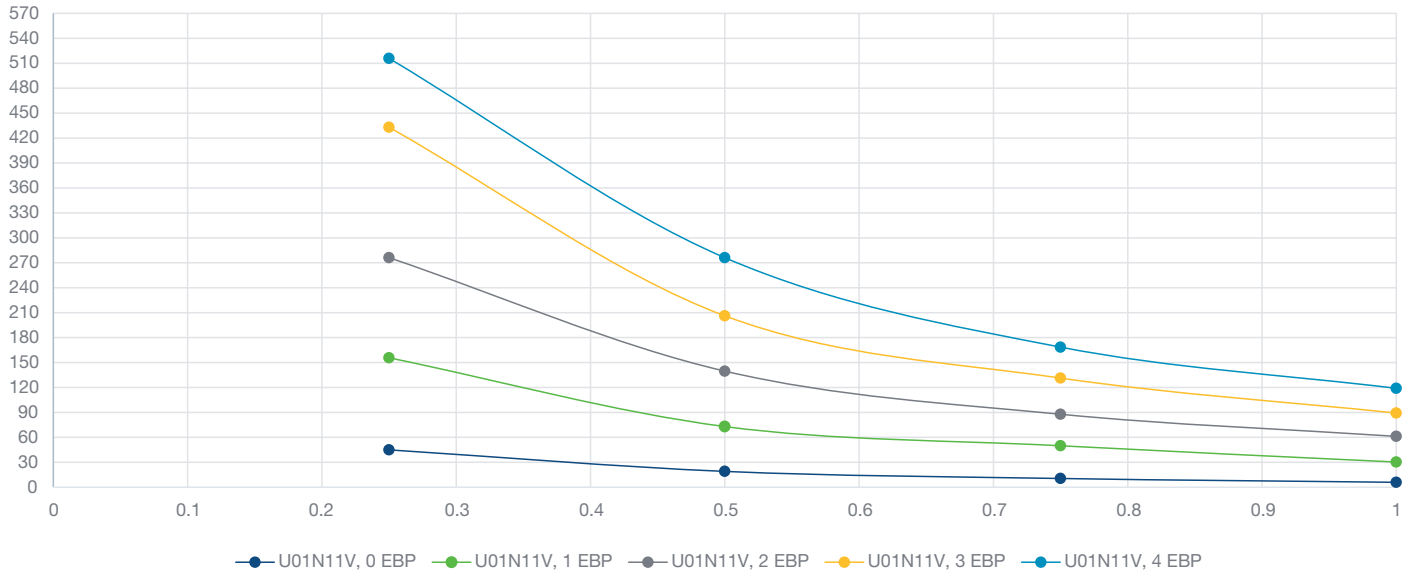


Figure 7. Runtime charts (X Axis = Power Load %; Y Axis = Runtime Mins

Runtime — Continued

RUNTIME EXCERPT FROM 1-3KVA MANUAL

BATTERY					
Battery type		VRLA			
Typical recharge time		4-6 hrs.			
Battery voltage		24 VDC	36 VDC	48 VDC	72 VDC
Battery quantity × capacity		2 × 12 V/9 Ah	3 × 12 V/9 Ah	4 × 12 V/9 Ah	6 × 12 V/9 Ah
Charging current (max.)		2A			
Backup time	Full load	2.7 min.	6 min.	4.28 min.	4.6 min.
	Half load	10.9 min.	19.1 min.	13.5 min.	14.1 min.
Expected Battery Life (years)		3-5 yrs.			
Internal Replacement Cartridge		UVC024	UVC036	UVC048	UVC072
Maximum External Battery Pack (EBP) quantity		4 units			

Figure 8

Monitoring, Sensors & Software

While all items in an electrical chain are important, a UPS serves an especially critical role. As such, many customers want constant visibility. The UPS provides several avenues to do so.

Network Management Card (NMC)

The most common interface is through Panduit's intelligent network management card (NMC)—available on all "N" model UPS (like U05N11V). The network card package includes a web server, serving a browser-based interface (UI) over HTTP or HTTPs. The UI displays salient values like voltage, power, battery charge, and alarm conditions (like UPS on bypass). The UI also recreates the popular one-line diagram seen on the local display.

The NMC's most advanced functionality is intelligent shutdown, where the UPS can initiate a graceful power-off of IT hardware in the event of power loss. This technology allows users to prioritize their most important applications and save battery capacity by shutting down less critical servers.

The NMC is also fitted with a Micro-USB port to enable a terminal/command line (CLI) session between a user and the UPS. Network administrators are known to favor the command line interface.

Beyond its standalone functions, installing an NMC unlocks two additional capabilities:

- Inclusion of environmental or security sensors with the UPS
- Connectivity to other software—like BMS, DCIM or other programs charged with monitoring many devices in addition to UPS

Figure 9. Network Card (NMC)

Figure 10. NMC Web Interface

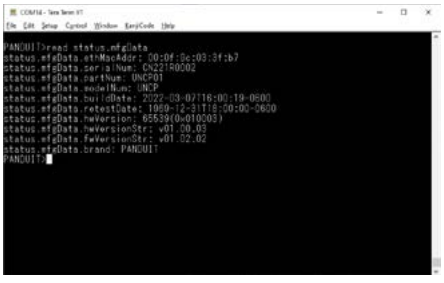


Figure 11. Command Line Interface

Monitoring, Sensors & Software — Continued

Connected Sensors

A Panduit UPS with a network card can become more than a UPS; it becomes a window into thermal conditions and security events. The NMC sensor port supports G5 temp/humidity sensors (EA001, EB001, EC001). Using the EF001 sensor hub, the single port expands to (3), allowing for more combinations. For a customer, one network port and one IP address unlocks value beyond one UPS. One network card, for example, could provide temp sensing across multiple cabinets.

mPOWER USE CASE

- **A customer buys 10 Panduit UPS and configures the first model with precise network settings and alarm thresholds.**
- **The customer wants to duplicate these settings across the remaining 9 UPS.**
- **The customer downloads the configuration file from the first model.**
- **The customer uploads the configuration file to mPower, which pushes the settings to the remaining 9 models.**

Figure 12

mPower

mPower is a complimentary entry level program, capable of monitoring up to 100 UPS. mPower presents a web dashboard like the NMC interface, visualizing data and alarms across all Panduit UPS. It is outfitted with functions for customers' Day 1 and Day 2 tasks, some of which are described here.

CONFIGURATION

Any network device needs configuration to function optimally and to comply with customer network practices. mPower provides this utility.

MONITOR

Once the UPS are configured, mPower will poll the devices frequently for their critical values and display them within the dashboard

MANAGE

Networked devices require occasional "maintenance" like firmware updates. mPower facilitates these updates.

DCIM Cloud-based Software

The NMC also enables SNMP connectivity. A ubiquitous network protocol, SNMP has long been featured with network management systems (NMS), building management systems (BMS), or DCIMs like Panduit's Cloud-based software. Such software uses SNMP to communicate with the UPS, ingesting critical values and making that data visible, alarmable, trendable, and reportable.

Figure 12

Power devices like UPS and rack PDUs are ideal entry points for a DCIM software. Smaller capacity UPS are frequently deployed in a distributed fashion—across a building, a campus of buildings, or a regional geography. Though the installations are distributed, users often need to monitor all devices in a single pane of glass. The software provides this visibility, intuitively organizing UPS, PDU, and other hardware so users understand their physical and logical relationships. And the built-in advantages of cloud computing (ease of updates, hardened security, flexibility, inexpensive, subscription pricing) are present from the beginning.

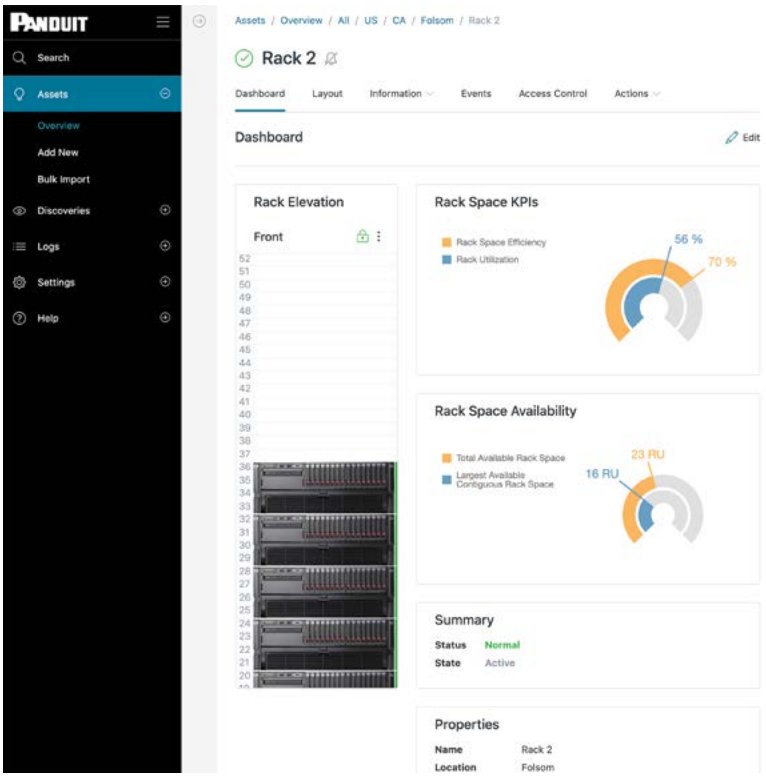


Figure 14

Common Components & Terms

STATIC BYPASS Any electromechanical device can fail. If a UPS experiences an internal fault, a static bypass will pass source power directly to the connected hardware. The source electricity will not get "stuck" inside the UPS.	**PANDUIT CONNECTIONS** The Panduit UPS is equipped with static bypass if the unit experiences a fault or failure. Also, using the display, the user can initiate the bypass mode.
MAINTENANCE BYPASS A maintenance bypass is initiated manually by the user for physical maintenance—like repairs, battery replacements or replacing the entire UPS. It differs from a static bypass in that it is initiated by the user and it would allow the physical removal of the UPS while allowing power to reach the hardware.	**PANDUIT CONNECTIONS** EMEA three-phase units can be sold with UMB20K maintenance bypass switch, which serves as both a power distribution module and a bypass switch.
WRAP-AROUND BYPASS This bypass is facilitated through an external panel or assembly. This bypass routes the electrical source around the UPS versus going through it. This is an additional layer of protection for the concerned customer.	**PANDUIT CONNECTIONS** Wrap around bypass is facilitated through external panels and is not a product Panduit sells.
PARALLELING Paralleling means combining distinct UPS modules to achieve more than a single UPS can do on its own, IE: • Paralleling UPS to achieve additional capacity. IE – installing (4) 10kW UPS to address 40kW (since Panduit doesn't have a standalone 40kW UPS today). • Paralleling UPS to achieve redundancy in the case a module fails—installing (2) 10kW UPS, backing up a 10kW total load. If (1) module fails, the other takes over.	**PANDUIT CONNECTIONS** EMEA three-phase units can be paralleled. Single phase units cannot be paralleled.
BATTERY TECHNOLOGIES The distinctions between VRLA and Lithium Ion are well-documented, but customer discussions will center on first-cost, ongoing costs, service requirements, and lifecycle/disposal.	**PANDUIT CONNECTIONS** UPS are available with each battery type.
EXTENDED BATTERY UPS have curves noting battery runtimes at certain power levels. UPS will have a base runtime with the included batteries, which can be increased with further battery modules. There are physical limitations to the number of battery modules a UPS can support.	**PANDUIT CONNECTIONS** Only VRLA models are capable of adding external battery packs.

Common Components & Terms — Continued

SHUTDOWN TECHNOLOGY/LOAD SHEDDING

Batteries have a finite runtime. Customers will have different expectations for availability based on their business needs. Intelligent shutdown (sometimes called load shedding) is facilitated through onboard software where users can gracefully shutdown certain physical or virtual servers that they deem less significant to the business. Taking this action extends battery runtime for the more critical workloads (such as a core switch).

PANDUIT CONNECTIONS

UPS with network cards have embedded software to facilitate shutdown.There are two techniques—**agent-based and agentless**

EMERGENCY POWER OFF (EPO)

In a data center, a master EPO is commonly a big red button behind a protective sheath. In the event of an emergency, an EPO cuts power to all connected devices. A customer may prefer a UPS to be tied into the EPO circuit, or it may be dictated by local codes to protect fire responders.

PANDUIT CONNECTIONS

All UPS are equipped with a terminal block to wire into an EPO circuit.

EFFICIENCY MODES

Data center efficiency goals affect UPS designs. Many models contain onboard intelligence to improve their performance called “ECO” modes, which are generally unique to the supplier. Among other things, these modes reduce the heat generated by the UPS, which is important in small, confined spaces.

PANDUIT CONNECTIONS

One of the UPS operating modes is “ECO.” These modes can be adjusted from the onboard display.

HARDWIRED CONNECTIONS

Electrical equipment will inevitably require electricians. With UPS, this is especially true at higher capacities. Electricians will have to hardwire the INPUT electrical source to the UPS in lieu of using plugs and receptacles. Hardwiring is also possible for OUTPUT connections. Consider a row of 10 racks. In this example, it may be impractical for 10 or 20 PDUs to be powered from the UPS modules. It may then be more effective for an electrician to hardwire a breaker panel from the UPS output.

PANDUIT CONNECTIONS

In the US, the 6 and 10kVA models requires a hardwired INPUT connection. The 6kVA and 10kVA models also have hardwired OUTPUT connections (in addition to L6-30Rs). The EMEA three phase models require hardwired INPUT connection and OUTPUT connections.

CONNECTIVITY

Many users prefer UPS with network cards to monitor and alarm against critical values. Similar to PDUs, these UPS will require initial network configuration and will be subject to ongoing firmware updates.

PANDUIT CONNECTIONS

“N” model UPS have a network card for ethernet connectivity AND Micro USB connection. In addition, the UPS includes other communication interfaces like RS232 and USB, the latter of which is reserved for factory service.

Common Components & Terms — Continued

GENERATOR HARMONIZATION

It's unlikely that smaller kVA applications will be backed up by a generator. However, installs that use 10, 15, 20 kVA UPS may have site-based generators. A generator replaces utility power, ensuring the UPS batteries aren't drained. A UPS will transfer to battery when the frequency (60 Hz in North America) drops below a defined threshold.

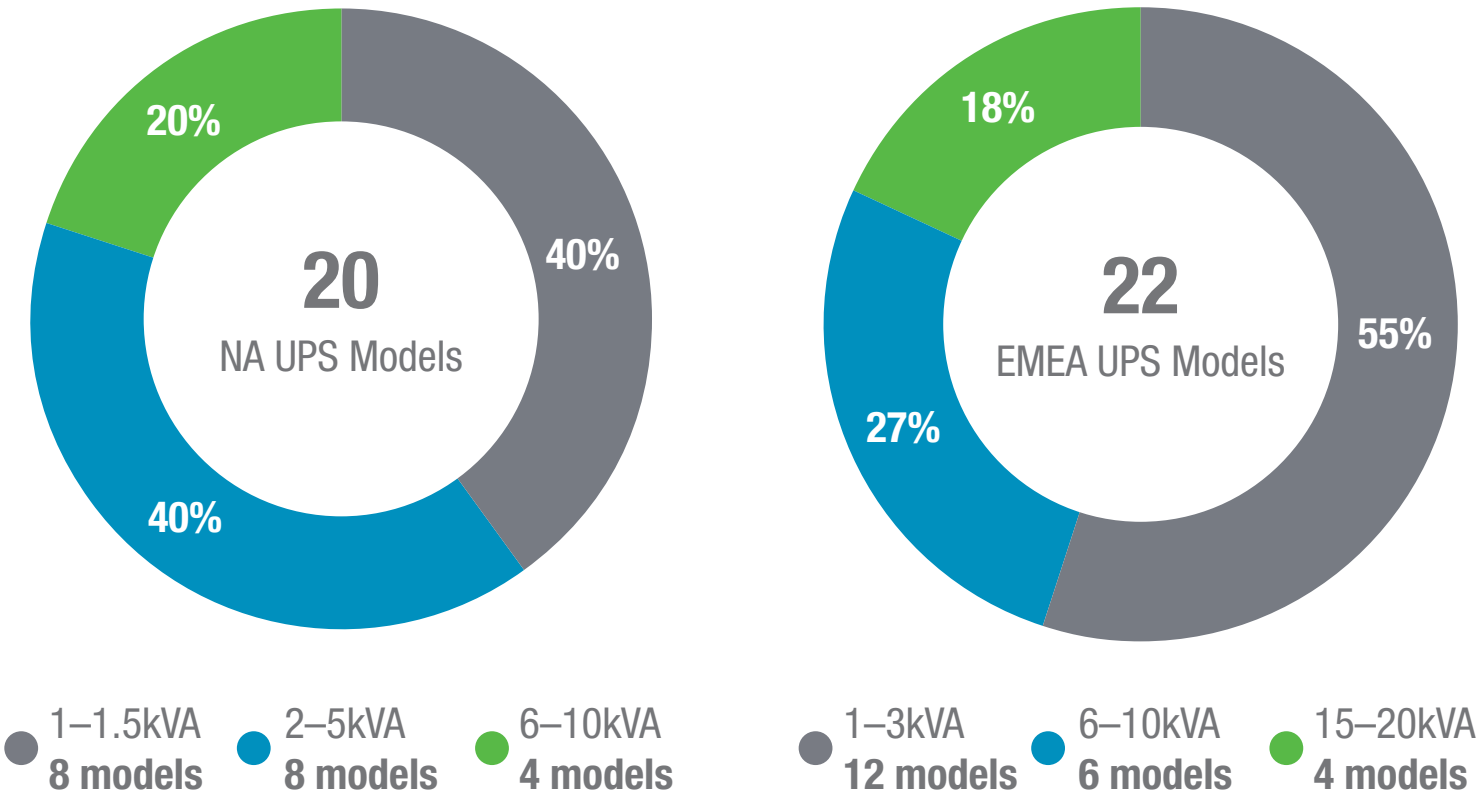
Generators have a frequency range. If its window is too wide, a line interactive UPS may go back-and-forth between source and battery or may stay on battery permanently. A double conversion UPS is constantly rectifying (AC-DC) and inverting (DC-AC) with the inverter always on. As such, this topology is preferred when generators are in the power scheme.

PANDUIT CONNECTIONS

Single-phase UPS can be configured in "generator mode," which allows the unit to operate in a wide frequency band (40hZ to 70hZ). However, operating in generator mode requires the user to de-rate capacity by 30%.

Figures & Charts

Figure 15



Figures & Charts — Continued

Possible External Battery Modules Per UPS Capacity

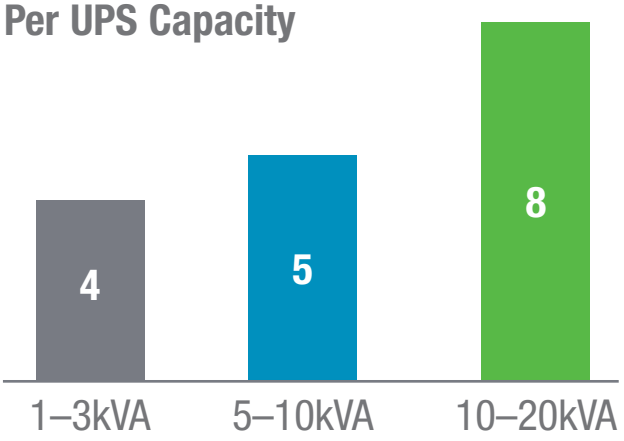


Figure 16

Comparing VRLA and Lithium Ion UPS

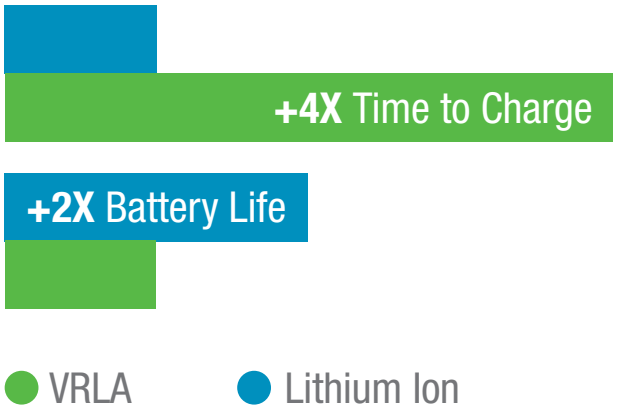


Figure 17

UPS Total Cost of Ownership Projections — MRSP, Battery Replacement, Battery Service

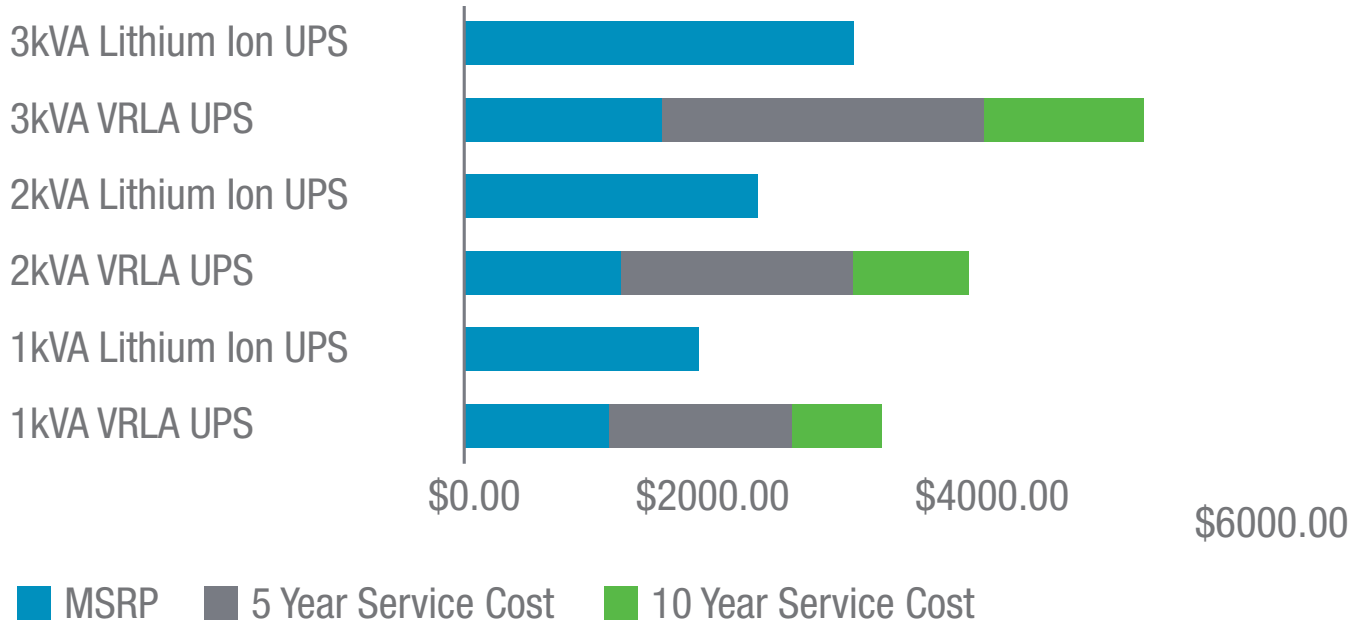


Figure 18

5 Year TCO Savings Range	10 Year TCO Savings Range
25%-28%	**42%-44%**

Figures & Charts — Continued

Max KVA by theatre

Figure 19

Max KVA by a Typical US "Wall" Outlet

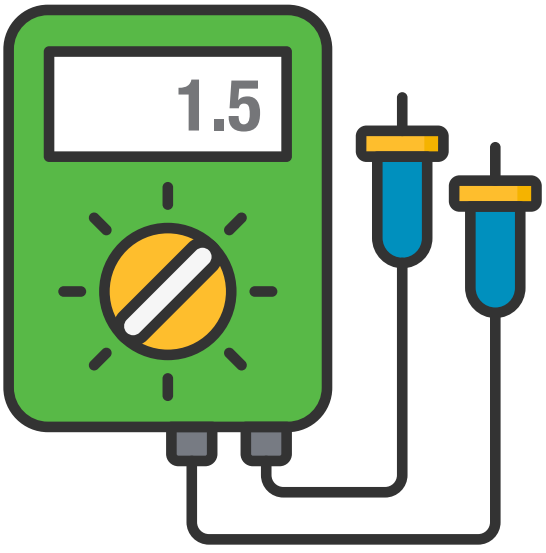


Figure 20

Comparing UPS Warranties

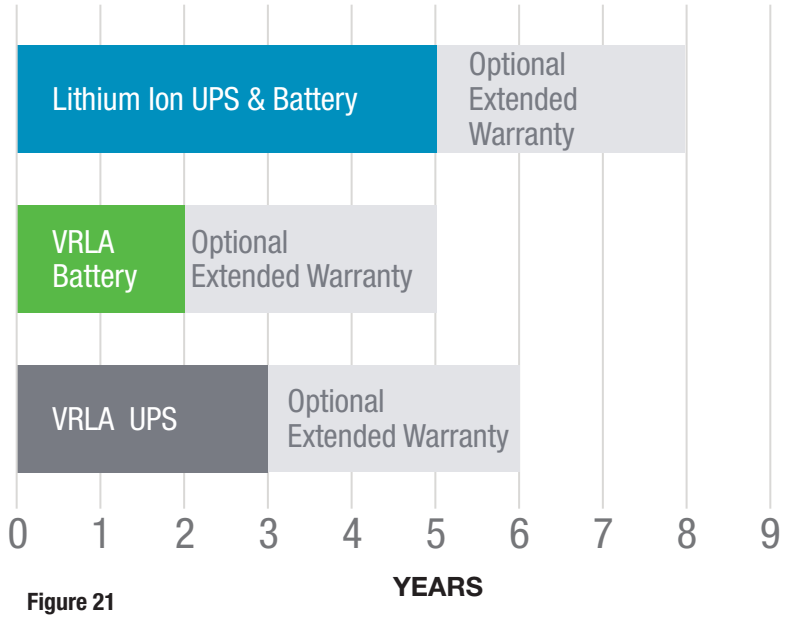
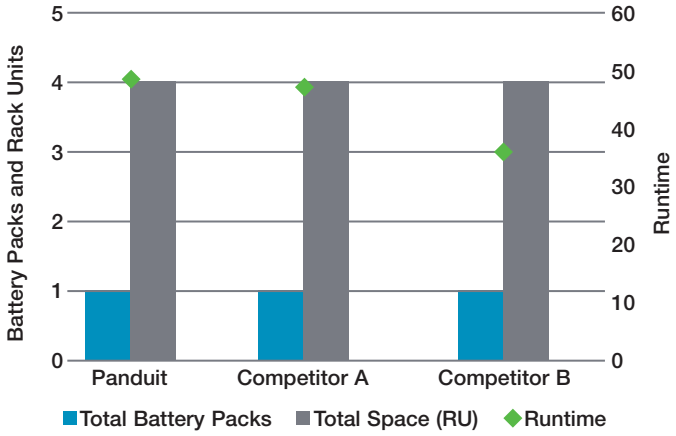


Figure 21

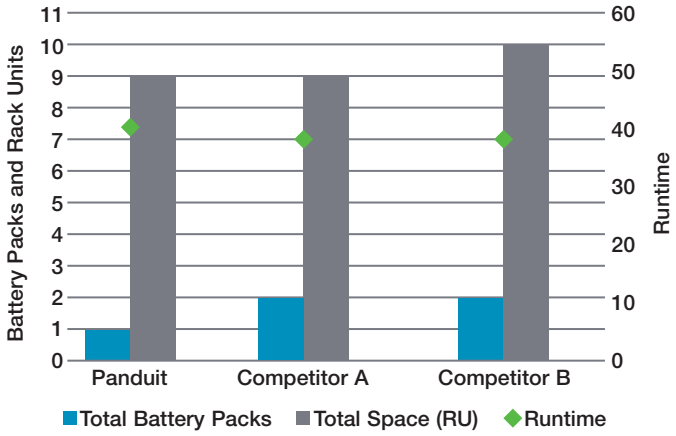
Competitive Comparisons

These charts compare Panduit solutions to select competitors for capacity and runtime scenarios. Each chart is unique by capacity, # of battery modules required, and the amount of rack space ("U") required. Thirty minutes is the runtime requirement for all scenarios, and the runtime estimate is found on the secondary vertical axis.

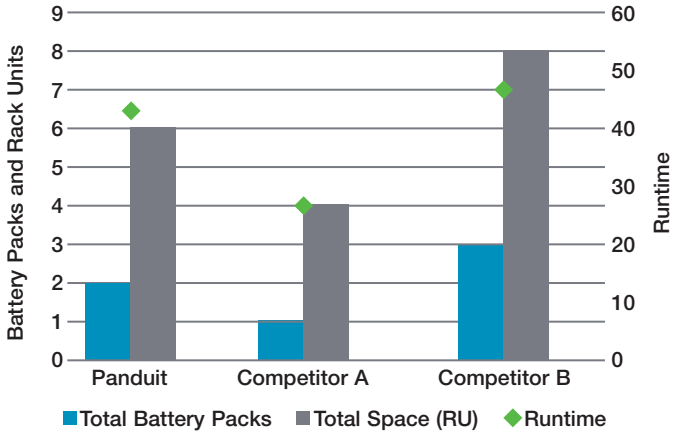
800VA on 1kVA UPS
(30 MINS DESIRED RUNTIME)



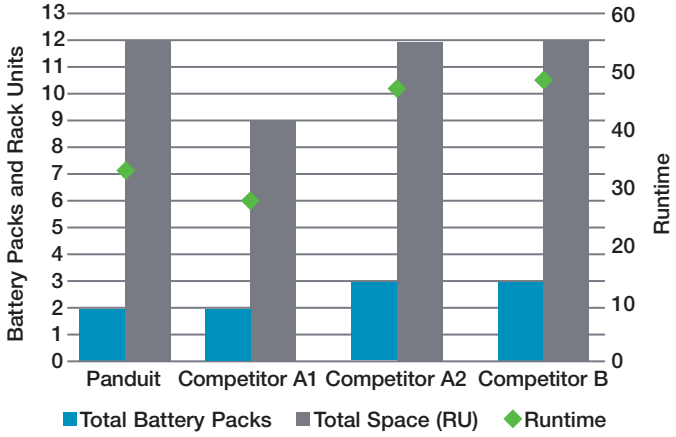
4.5kVA on 5kVA UPS
(30 MINS DESIRED RUNTIME)



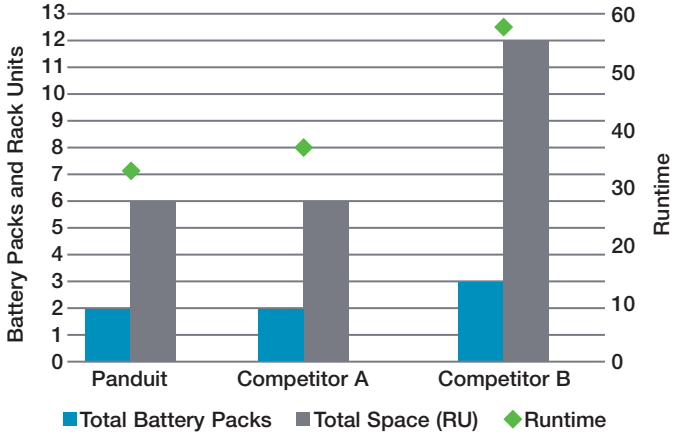
1.8kVA on 2kVA UPS
(30 MINS DESIRED RUNTIME)



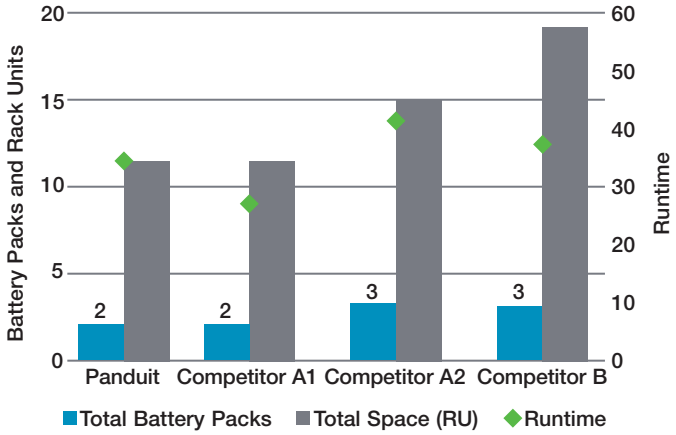
5.4kVA on 6kVA UPS
(30 MINS DESIRED RUNTIME)



2.7kVA on 3kVA UPS
(30 MINS DESIRED RUNTIME)



8kVA on 10kVA UPS
(30 MINS DESIRED RUNTIME)



UPS & PDU Combinations

Smaller deployments can use a UPS for battery backup and power distribution. In others, a UPS and PDU must be combined. These tables show possible pairings of UPS and PDU, where UPS outlets and PDU plugs match. Choices can then be narrowed by intelligence, number of outlets, or mounting preferences.

U01N11V, U01N11L, U02N11L: (6) 5–15R OUTLETS

Part Number	PDU Type	Rack Mount
P08D09M	MI	1U
P08E14M	MS	1U
P12B01M	Basic	1U
P12E20M	MS	0U HALF
P16B04M	Basic	0U HALF
P16D20M	MI	0U HALF

U02N11V: (6) 5–20R OUTLETS

Part Number	PDU Type	Rack Mount
P08D10M	MI	1U
P08E15M	MS	1U
P12B19M	Basic	1U
P12E21M	MS	0U HALF
P16B07M	Basic	0U HALF
P16D21M	MI	0U HALF

U03N11V, U03N11L: (1) L5–30R OUTLET, (4) 5–20R OUTLETS

Part Number	PDU Type	Rack Mount
5–20 PDUs		
P08D10M	MI	1U
P08E15M	MS	1U
P12B19M	Basic	1U
P12E21M	MS	0U HALF
P16B07M	Basic	0U HALF
P16D21M	MI	0U HALF
L5–30P PDUs		
P16B41M	Basic	2U
P16D12M	MI	2U
P16E17M	MS	2U
P18E23M	MS	0U MID
P22B09M	Basic	0U HALF
P24D23M	MI	0U MID

UPS & PDU Combinations — Continued

U05N11V — (4) L6–30R OUTLETS

U06N11V — (2) L6–30R OUTLETS PLUS (1) HARDWIRED OUTPUT

U10N11V — (2) L6–30R OUTLETS PLUS (1) HARDWIRED OUTPUT

Part Number	PDU Type	Rack Mount
P12B47M	Basic	1U
P16D14M	MI	2U
P16E19M	MS	2U
P20B16M	Basic	0U HALF
P24B15M	Basic	0U MID
P24D07M	MI	0U MID
P24E28M	MS	0U FULL
P24F01M	MPO	0U FULL
P24G01M	MSPO	0U FULL
P36E33M	MS	0U FULL
P36F15M	MPO	0U FULL
P36G18M	MSPO	0U FULL
P38D25M	MI	0U FULL
P42B17M	Basic	0U MID

U03N12V, U03N12L

U06N12V, U10N12V

These EMEA PDU models have detachable power cords.
Customer can replace existing cord to attach to C19 outlet on UPS (must buy separately)

Part Number	Model	PDU Input Plug Type	PDU Type	Rack Mount
P08E25M	U03N12L U03N12V U06N12V U06N12V	C19	MS	1U
P08G10M			MSPO	1U
P12B34M			Basic	1U
P12D36M			MI	1U
P16E27M			MS	0U HALF
P22B39M			Basic	0U HALF
P24D40M			MI	0U MID
P24E04M			MS	0U MID
P24G11M			MSPO	0U MID

UPS

Delivering Reliable Power Protection and Backup Power Efficiently

Quality & Reliability

Verified and validated using robust premium components

High Efficiency

Up to 98% in ECO mode and 98.5% efficiency in Line-interactive therefore reducing energy waste and the cost of operation

Intelligent Battery Management

Intelligent algorithm provides fast charging for the battery while and maximizing its lifespan

Integrated Wifi

Provides wireless network connectivity as well as direct connectivity for quick and easy configuration and activation for large deployments

Green Design

RoHS and Reach, CE/UL/ENERGY STAR® 2.0 compliant for North American units

Secure Remote Monitoring

Intelligent network card with PEN certification best industry security practice and intelligent swinghandle integration

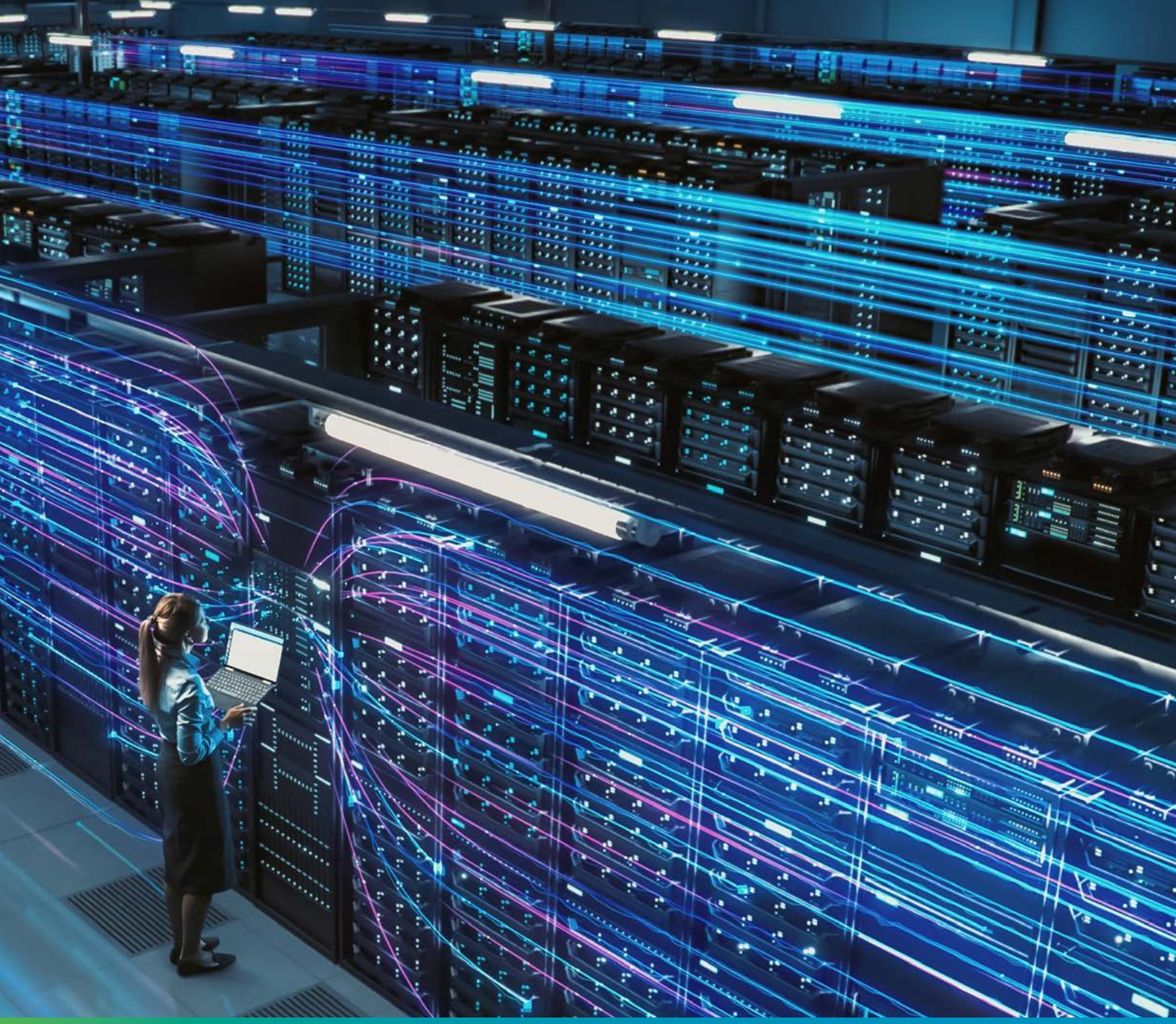
Lithium Batteries

5x Energy Density in 1/3 space, 3x Lifespan & Faster Charging than VRLA

Programmable Outlet Group

Smartload shed features with agentless shutdown saving more energy and extending the runtime for critical load

For more information, visit www.panduit.com/ups



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