

# Power Innovations

POWERING LIFE



# UPQ

**A NEW STANDARD FOR A NEW DECADE**

# UPQ: Uninterruptible Power Quality

**Uninterruptible Power Quality™ (UPQ) is an unprecedented new standard that began with traditional UPS technologies and moved forward to address critical modern power issues.** Power Innovations' UPQ™ technology is a necessity for today's electronic and electric equipment. Traditional UPS systems focus on backup power; UPQ technology focuses primarily on the critical issues of power quality and management, while still providing backup when power outages occur. UPQ systems provide perfect, quality power to connected equipment. Each family of products can be customized to meet the power needs of various applications and industries in size and specifications, as well as to be configured for global power requirements.

Power quality is today's number one power issue. Superior power quality is essential for today's sensitive electronic equipment, while at the same time, the power being supplied by utilities is constantly decreasing in quality and availability. Since power demand exceeds supply -- and the gap is widening -- there are wide fluctuations in the quality of available power.

In a June 1999 article in Datatech, Ronald P. Lafferty indicates, "There are two unfortunate realities of the electronics age; the utility companies simply cannot provide clean, consistent power demanded by sensitive electronics, and the customer is ultimately responsible for the health and safe operation of his equipment."

UPQ technology incorporates additional features and functions not found in conventional UPS systems.

- UPQ technology assures perfect power to connected equipment regardless of the quality or source of incoming power.

- UPQ systems are always online (multi-stage conversion) and provide many advantages that make them the only choice for today's applications.

- UPQ systems continue to run when other systems shutdown due to the fact that UPQ systems accept a wider range of input power variation (up to double) before utilizing batteries.

- UPQ systems are more efficient than traditional UPS systems resulting in smaller space requirements, less heat generation, longer backup times, and lower operating costs.

- UPQ systems can operate whether or not batteries are connected. Without batteries, UPQ systems become isolation, regulation, conditioning, filtering, and conversion units.

- UPQ systems incorporate advanced battery management features that expand battery dependability and life expectancy.

The result is **perfect power, extended equipment life, zero downtime, and overall cost savings.**

# Q-Series

## SMALL-SCALE SYSTEMS



Q-500-700-1000 Standalone



Q-RFL 700-1000



Q-RFL 2000-3000

From desktop to rack mount solutions, with unbeatable performance and reliability the Q-Series is the ideal solution. This family of products comes in 500 VA through 3 kVA systems with either 120 or 230 volt input / output configurations.

These compact systems are designed to offer UPQ technology in easy to use modular configurations. The Q-Series come in a standalone, desktop, or rack mount configuration. Rack systems can be configured for vertical mounting by simply adding optional handles and retractable feet. The Q-RFL (rack front loadable systems) accommodate any RETMA rail kit through a patented universal rail receiver. The sides of the Q-RFL systems will allow for ½ and 1 "U" rail alignment adjustments.

The modular and patent pending design of the rack-mount systems allows the batteries to be serviced from the front while the system is operating. Exchanging, replacing, or adding batteries while the UPQ system is in operation avoids untimely shutdown and keeps connected equipment continually protected.

The Q-series is easily adaptable for OEM integration. These dynamic systems can be modified for customers' existing product lines or conveniently attached to their equipment in a panel-mount configuration. Currently UPQ systems are certified and integrated into a variety of applications, including medical.

The front display of the Q-Series is the most

ergonomic and full featured system in the industry. The desktop version provides full status monitoring of all functions (including power flow and load) at a glance. No need to push buttons to view status. The Q-RFL version provides the user with an additional LCD readout for more detailed reporting.

The Q-Series provides advanced battery management. The variable current controlled charger allows the system to accommodate battery needs.

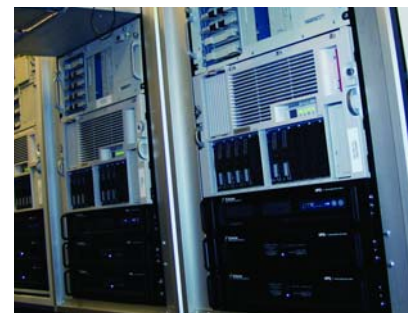
Q-Series systems are designed for maintenance-free operation and require very little attention from the user. The system's CPU monitors all functions including internal ambient and component temperatures. If a system fault is detected, the system will re-route the power through an internal by-pass circuit and shutdown the inverter for corrective action without ever losing power to the connected load. While in by-pass mode, the Q-series will maintain filtered and conditioned power to the load.

Additional features include:

- Fused modular branch circuits
- DC Start
- Auto frequency tracking
- Serviceable air filters
- Selectable manual or autostart modes
- Full UPQnet-agent II compatibility
- Battery packs for extended backup times

[View product specifications on page 14.](#)

Predictable, pure electric power is a necessity. Without clean, consistent power, today's technologies cannot function properly, and operations and services are compromised or cease. "The services that Altris delivers to its customers require 24/7 uptime." Power Innovations Q-Series UPQ systems deliver that needed quality and reliability.



The Q-RX Series is designed to meet the most extreme shock, vibration, temperature, and humidity standards. Clean, consistent power for rugged environments is essential to mission critical operations. The Q-RX has been around the world in many diverse applications and under the most rigorous and extreme conditions and has exceeded expectations of quality, efficiency, performance, and reliability.

This rugged product line has been tested and proven to meet and exceed military standards for shock, vibration, temperature, and humidity.

- The Q-RX meets or exceeds MIL-STD-167 for shipboard vibration over a range exceeding 4/50Hz. The vibration tests, both operational and non-operational deliver up to 2g forces for 2/4 hours.

- The Q-RX meets or exceeds MIL-STD-810E for shock. In each axis, multiple positive and negative shocks are induced up to 30g forces for levels ranging from 2g to 30g.

- Q-RX systems will operate in freezing temperatures of  $-22^{\circ}$  Fahrenheit ( $-30^{\circ}$  C), sweltering temperatures up to  $140^{\circ}$  Fahrenheit ( $60^{\circ}$  C), and even in condensing humidity.

The Q-RX systems are available in 1, 2, and 3 kVA models. Q-RX systems are part of the Q-Series and offer all of the modular features and functionality.

View product specifications on page 14.



Baker Hughes' mobile vehicles are designed to be self-contained and self-sufficient as they traverse extreme rugged terrain. To insure that reliable power is accessed from any location in the world, Baker Hughes uses Power Innovations UPQ solutions.

# Q-RX

## RUGGED SYSTEMS



Standard Cannon Interconnects



Q-RX 700-1000



Q-RX 2000-3000 R

# Q-MS

## MID-SCALE SYSTEMS



Q-MS 5-6 kVA



Q-MS 8-10 kVA



Q-MS 15 kVA

## Q-MS Series

The Power Innovations Q-MS Series bridges the gap between small and large-scale systems. These mid-scale systems come in 5 kVA through 15 kVA models and provide many of the functions and features of the Q-LS Series in a smaller, more economical configuration. Q-MS systems have small footprints, unmatched reliability, and backup times that can be scaled by adding additional battery packs.

Q-MS systems are compatible with all combinations of North American and international input configurations (i.e. single phase hot/neutral/ground and split phase hot/hot/ground). Three-phase input is an option on 10 kVA and 15 kVA models. All models provide a completely isolated single-phase output. For use in a wide range of applications, the Q-MS Series can be set up with either single or dual-voltage power outputs to allow the user to operate more than one type of equipment without having to add additional UPQ systems. If one piece of electronic equipment runs on 120 volts and another runs on 220 / 230 / 240 volts, the Q-MS system can seamlessly handle both pieces of equipment at the same time.

UPQ systems were used to flawlessly deliver sound to more than three billion television viewers and listeners around the world during the 2002 Salt Lake City winter Olympic opening and closing ceremonies.

## Mid-Scale Systems

Not only are Q-MS systems self-contained and easy to operate, but they are designed for ease of maintenance and service. Through a combination of fault lights and an LCD display, each unit's self-diagnostics provide a visual view of the system's operating status.

Whether or not an external power source is connected, Q-MS systems can be started from batteries and still provide perfect quality power to attached equipment. The Q-MS Series utilizes phase control technology to regulate the DC bus voltage to provide fast, efficient, direct battery charging. With multiple stages of isolation, Q-MS systems protect connected equipment from the harmful effects of incoming power surges, sudden bursts of power, or electrical noise created by other equipment in the surrounding area.

Q-MS systems are IP and SNMP managed for remote monitoring and control.

[View product specifications on page 15.](#)



Critical power applications require the highest levels of performance, reliability, flexibility, and serviceability. The Q-LS series of UPQ technology meets all of these requirements. The Q-LS Series is the Power Innovations flagship product line that combines all of the features and flexibility of UPQ technology. Power Innovations offers several options to accommodate client and industry needs, as well as the flexibility to customize for specific power input and output requirements. With a range of 10 kVA to 400 kVA scalable models, Q-LS systems meet all large power needs.

The Q-LS Series is easy to service and maintain.

- The Q-LS Series incorporates a plug-and-play modular system for easy exchange and servicing of critical power components.
- The Q-LS Series identifies any system error or malfunction through self-diagnostics that pinpoint the area of concern down to individual printed circuit board or module level.

Through advanced battery cycling and management design, the Q-LS Series extends battery life and performance. The Q-LS 10 through 30 models are available with internal batteries, making them completely self-contained. The battery banks on these systems are easily accessible through patented, removable modules for easy service or replacement.

With advanced system and error monitoring, the Q-LS Series incorporates multiple levels of system status reporting, error detection, and alerting. Alert and status screens can be ported and managed through multiple levels of communication including Ethernet, RS232, SDS, and contact closures.

These amazingly quiet systems have power feeds on the top, bottom, and sides of each unit to provide multiple options for connectivity. They

are IP and SNMP managed for remote monitoring and control.

The Q-LS Series UPQ technology allows for a 25% input fluctuation without the need to use battery resources. Q-LS systems run when non-UPQ systems have switched to limited battery power.

The Q-LS Series technology eliminates current inrush to protect input sources and circuits. The Q-LS Series technology provides low input current distortion to protect and minimize power fluctuations, harmonics, and faults induced back into the feed circuits. Nearby equipment is protected from being inadvertently damaged or compromised.

The Q-LS Series can be customized to site input and output requirements, and has the flexibility to deliver multiple voltage output levels. This allows various equipment configuration standards to be powered simultaneously. The Q-LS can also be used as an inline voltage and frequency converter for any combinations of 50 Hz, 60 Hz, and 400 Hz.

Through its multiple output options, the Q-LS series can provide customized internal PDU (Power Distribution Panel) options that incorporate branch circuit breakers, circuit monitoring, and twist-lock disconnects. The need for additional PDU systems is eliminated, saving money and space.

UPQ systems have built-in features to protect the equipment from user error by identifying installation and operational errors. These systems will either autocorrect or inhibit improper use or connectivity.

All Q-LS Series systems incorporate internal manual by-pass breakers for service and maintenance. This eliminates the need for additional service by-pass equipment.

View product specifications on pages 16-17.

# Q-LS

## LARGE-SCALE SYSTEMS



Q-LS 10-60 kVA



Q-LS 80-160 kVA



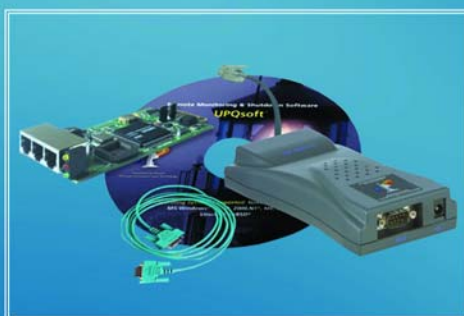
Q-LS 240-320 kVA



# Management & Control

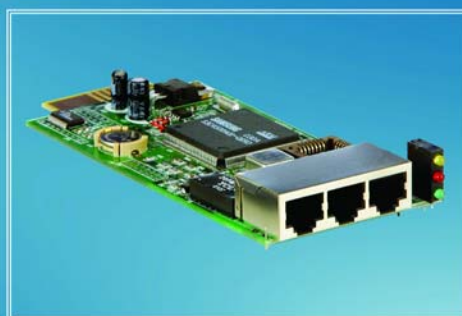
## UPQsoft

UPQ System Management & Control



## UPQnet-agent II

Power Management & Control



## EnterprisePlus

Environmental Power Management & Control



# UPQ System Management & Control

## UPQsoft

UPQsoft is Power Innovations' smart UPQ™ (Uninterruptible Power Quality) system monitoring and control software for Windows, NetWare, UNIX/Linux, and other environments. It provides a real-time view of the current status of UPQ systems within a standalone or networked environment. Displayed in a variety of graphical and table formats, the data provided gives administrators an always-current picture of the quality of power being supplied to connected equipment. It also provides a comprehensive history of power-related events and UPQ system activity.

In addition to local or remote monitoring of variables such as event time, input and output voltage, input frequency, load, battery level, and internal temperature, UPQsoft can send alerts and warning messages via e-mail or pager when predetermined power thresholds are crossed. Additionally, it gives administrators the ability to perform tests and turn UPQ systems on and off. It also provides a comprehensive log of applications and files that were open when power events occurred, allowing administrators to perform disaster recovery operations.

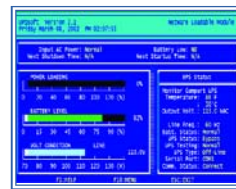
## UPQsoft/ClientSNMP

UPQsoft/ClientSNMP is a powerful server and/or workstation utility that works in conjunction with the Power Innovations UPQnet-agent II to allow shutdown options from selectable UPQ systems within a Windows network. The software can be configured to automatically save all files, shutdown the operating system before battery backup is depleted, and turn off the UPQ system. The result is a safe, automatic, system shutdown in the event that there is a loss of power.

## UPQsoft/ViewSNMP

UPQsoft/ViewSNMP is software that interfaces with Power Innovations' UPQnet-agent II. It allows users to monitor and manage any UPQ system (or multiple UPQ systems) from anywhere via the Internet or dial-up connection.

UPQsoft/ViewSNMP's powerful management and monitoring capabilities use simple network management protocol (SNMP) and include comprehensive logs of UPQ system activity and power events. Through the UPQnet-agent II, UPQsoft/ViewSNMP can alert administrators to events via e-mail or pager. It also provides the ability to turn UPQ systems on or off remotely.



UPQsoft for NetWare



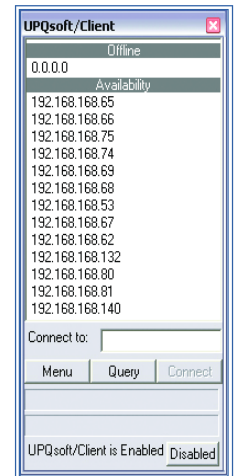
UPQsoft for Windows



UPQsoft for Linux



ViewSNMP Screen



ClientSNMP Screen

# Power Management & Control



## UPQnet-agent II

The UPQnet-agent II is a Web server that hosts a Web page, which is programmed to manage and control all of the features of a UPQ and connected site equipment. Using internal SNMP protocol the UPQnet-agent II can communicate with and enable all of the "get", "set", and "trap" features of the SNMP protocol.

The UPQnet-agent II is also capable of providing remote monitoring through a video surveillance system. By connecting small USB cameras to the UPQnet-agent II, video images can be viewed and managed. Camera control includes both pan and tilt functions and can be managed from a single screen.

Through the flexibility of the UPQnet-agent II, programmable and configurable responses can be determined and set by the user to allow such functions as text messaging, pages, and conditional decision trees. Acceptable inputs include Ethernet, dial-up modem, RS232, USB, and RF.

The UPQnet-agent II is customizable to any site and any network through its programmable IP, MASK, and gateway addresses. Security protocol is implemented in the UPQnet-agent II to allow secure operation.

UPQ Information Screen



Config Screen



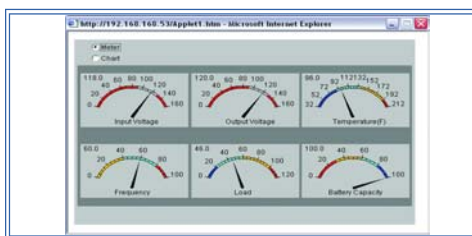
Remote Control Screen



Event & Data Log Screen



Current Status Screen



Meter Screen

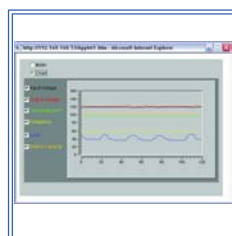


Chart Screen

# Environmental Power Management & Control



## EnterprisePlus

The EnterprisePlus is the most complete and powerful enterprise enabling tool available. This device allows flexible, complete power and environmental monitoring and management for sites of all sizes.

The EnterprisePlus utilizes eight power control circuits to control and monitor the connected load. These circuits allow sequencing of loads during a power up or a shutdown, as well as individualized remote ON/OFF capabilities. More importantly, the EnterprisePlus enables intelligent load shedding so that critical loads can be maintained and managed longer in emergency conditions or for necessary shutdown during power conservation shifts. The EnterprisePlus can also facilitate requests to reduce power use by specified percentages. If loads are changed or degraded, this device notifies the system administrator of potentially compromising conditions.

Each load is monitored by voltage, current, and power. If the system requires more than eight controlled loads, the outputs can be scaled up in increments of eight. The EnterprisePlus allows the monitoring and control of environmental conditions

(i.e., temperature, humidity, water levels, fire, smoke, etc.) through a wide range of analog and digital sensors. Digital and analog sensor capability is also expandable.

The EnterprisePlus incorporates USB ports to allow video monitoring, as well as control and management of other USB devices. The EnterprisePlus provides flexible means to manage point-to-point connectivity by incorporating multiple levels of communication and expandability through RS232, Ethernet, USB, and I<sup>2</sup>C compatible ports. The EnterprisePlus utilizes dual power inputs for system fault tolerances and redundancies, giving the user the option of selecting an input for maintenance and service of an important feed and/or redundancy protection in the event of an input failure.

Security in the EnterprisePlus has been carefully addressed to allow programmable or remote lockout with multiple levels of IP and password protection. The 150-function display allows total monitoring and assessment of all functions. These same user friendly ergonomic displays are replicated in the remote management software screens.

# Q/Q-RX Series Technical Specifications



Q-500    Q-700    Q-1000    Q-2000    Q-3000

Output					
Capacity (VA)	500	700	1,000	2,000	3,000
Capacity (watts)	350	470	700	1,400	2,000
Current (peak amp) 120/230 VAC	5 / 2.2	6.4 / 3	9.1 / 4.3	18.2 / 8.7	27.3 / 13
Waveform	High resolution, pure sign wave				
Outlets Q/Q-RFL	3 / 6		4 / 4		
Input					
Current (max amp) 120/230 VAC	6 / 2.2	8 / 4	12 / 5	20 / 10	30 / 16
Power factor	> .95				
Frequency	50/60 Hz (auto) / 45-65 Hz (inverter phase lock range)				
General					
UPQ power conditioning topology	Dual stage isolation / high frequency, true on-line digital sine wave				
Desktop configuration	Yes				
Rack mount configuration	Yes				
Voltage Regulation					
Input voltage range:					
-Full load without using battery	North America 80 to 140 VAC International 165 to 270 VAC				
-Half load without using battery	North America 75 to 140 VAC International 160 to 270 VAC				
Output voltage regulation	± 2%				
Isolation					
Common-mode noise rejection	Yes				
Normal-mode noise rejection	Yes				
Suppression					
IEEE 587/ANSI 62.41 3KA/6KV	170V normal mode (L to N) / 230V common mode (L+N to G)				
-Surge let-through (North America)					
IEEE 587/ANSI 62.41 3KA/6KV	340V normal mode (L to N) / 450V common mode (L+N to G)				
-Surge let through (International)					
Joules (energy absorption)	300				
Peak surge current (amps)	80,000				
Multi-stage protection	Yes				
Normal & common mode certified	Yes				
Conditioning	Yes				
Output total harmonic distortion	< 3% under linear load, < 5% under non-linear load				
Output frequency regulation	50/60 Hz ± 0.1 Hz (except the synchronization to line during brownout)				
Input frequency range	45-65 Hz				
High Frequency On-Line Inverter					
Inverter driver frequency	50 kHz				
Overload capacity	> 110% continuous				
Crest factor	3:1				
Transfer time	Zero				
Efficiency	> 85%				
UPQ to bypass/bypass to UPQ	Zero cross transfer, < 4 ms (2 ms minimum)				
Battery					
Full-load run time	> 5 minutes				
Half-load run time	> 15 minutes				
DC voltage	24 VDC	36 VDC	72 VDC	96 VDC	
Recharge time	5 to 8 hours				
Recharge current (amps)	1.5				
Hot-swappable	Rack				
Front panel removal	Rack				
Physical					
Q-RFL WxDxH	19 x 17.5 x 3.5 in (48 x 44.5 x 9 cm)				
Q-RFL weight lbs/kg	40 / 18	46 / 21	33 / 15 Inverter		
Q-RFL battery pack weight in lbs/kg	30 / 14 (optional)	40 / 18	66 / 30	77 / 35	
<sup>2</sup> Q-Standalone WxDxH	5.5 x 17 x 7.5 in (14 x 43 x 19 cm)		7.5 x 20 x 13 in (19 x 50 x 32 cm)		
<sup>2</sup> Q-Standalone weight in lbs/kg	27 / 12	33 / 15	70 / 32	79 / 36	

Battery Charger	
Microprocessor controller	Yes
Expansion	Rack
Extended pack option	Rack
Connect/disconnect	Rack
Front Panel Display	
System status information	Yes
Inverter status	Yes
Bypass status	Yes
Load status	4 segment
Battery status	4 segment
Diagnostic status	Yes
Diagnostics	
POST	Yes
Bypass	Yes
Line to output sync	Yes
Battery status	Yes
Inverter error	Yes
AC input failure	Yes
Overload	Yes
Monitoring	
Remote shutdown	Yes
Remote diagnostics	Yes
Scheduled shutdown	Yes
Input voltage	Yes
Input frequency	Yes
Output voltage	Yes
Output frequency	Yes
Output load	Yes
Reporting	Yes
Graphing	Yes
Plotting	Yes
Auto Restart (Input Voltage)	
120 VAC	90-130 VAC
230 VAC	80-260 VAC
DC Start-up	Yes
Environment	
Audible noise	< 50 dBA at 1 meter
Temperature (MIL-STD-810)	-22° to 140° F (-30° to 60° C)
Relative humidity (MIL-STD-810)	0 to 95% non-condensing
<sup>1</sup> Vibration (MIL-STD-167)	4-50 Hz / 2 g
<sup>1</sup> Shock (MIL-STD-810E)	2 g to 30 g
Approvals	
<sup>2</sup> UL	Yes
<sup>2</sup> UL medical	Yes
<sup>2</sup> TUV	Yes
CE and CE medical	Yes
Warranty	1 year parts and labor
Protection	
Overload	> 110% full load / 15-20 sec delay
Over/under voltage at I/P, O/P	Inverter shutdown protection
Short circuit	Yes
Over temperature	Yes

<sup>1</sup> Specification of the RX only  
<sup>2</sup> Specification of the Q-Series only

# MS-Series Technical Specifications



	Q-MS 5	Q-MS 6	Q-MS 8	Q-MS 10	Q-MS 10 (3 phase)	Q-MS 15 (3 phase)
<b>Output</b>						
Capacity (VA)	5,000	6,000	8,000	10,000	10,000	15,000
Capacity (watts)	4,000	4,800	6,400	8,000	8,000	10,500
Current 120 / 220 (max amps)	38 / 19	44 / 22	58 / 29	72 / 36	72 / 36	96 / 48
Nominal voltage range	120 / 220 VAC (dual output configuration of 120 & 220 VAC is available)					
Frequency	50 or 60 Hz ± .1%					
Waveform	High resolution, pure sine wave					
Outlets	Terminal block					
<b>Input</b>						
Current (peak amps)	45	52	68	86	92	136
Power factor						0.7
Frequency	50 or 60 Hz ± 5%					
<b>General</b>						
UPQ power conditioning topology	Dual stage isolation, true on-line digital sine wave					
Desktop configuration	No					
Rack mount configuration	No					
CE approved	Yes					
<b>Voltage Regulation</b>						
Input voltage range: single phase	176 to 297 VAC				NA	
Input voltage range: three phase	NA				176 to 264 VAC 3w / 285 to 494 VAC 4w	
- Full load without using battery	± 20%					
- Half load without using battery	± 25%					
Output voltage regulation	± 1%					
<b>Isolation</b>						
Common-mode noise rejection	Yes					
Normal-mode noise rejection	Yes					
<b>Suppression</b>						
IEEE 587/ANSI 62.41 (North America)	Yes					
IEEE 587/ANSI 62.41 (International)	Yes					
Joules (energy absorption)	2,000					
Peak surge current (amp)	20,000					
Multi-stage protection	Yes					
Conditioning	Yes					
<b>High Frequency On-Line Inverter</b>						
Inverter driver frequency	20 kHz					
Overload capacity	> 110% continuous					
Crest factor	3:1					
Transfer time	Zero					
Efficiency	> 85%					
UPQ to bypass/bypass to UPQ	Zero cross transfer, < 4 ms (2 ms minimum)					
<b>Battery</b>						
Full load run time	> 5 minutes					
Half load run time	> 10 minutes					
DC voltage	192 VDC					
Recharge time	5 to 8 hours					
Recharge current	5A	5A	5 A or 10 A		5A	
Hot swappable	Yes, with external battery pack					
Front panel removal	No					
<b>Environmental</b>						
Maximum heat dissipation kW	.7	.85	1.2	1.5		1.9
Maximum heat dissipation BTU/hr	2,389	2,901	4,096	5,120		6,485
Operating temperature	32° to 104° F (0° to 40° C)					
Humidity	20-90% non-condensing					
Audible noise	< 45 dBA at 1 meter					
<b>Physical</b>						
WxDxH	9 x 23 x 27 in (230 x 578 x 685 mm)		19 x 33 x 13 in (480 x 340 x 845 mm)			19 x 15 x 35 in (480 x 380 x 885 mm)
Weight in lbs/kg (no battery)	179 / 81	194 / 88	291 / 132	293 / 133	417 / 189	474 / 215
Weight in lbs/kg (with internal battery pack)	265 / 120	280 / 127	377 / 171	380 / 172	NA	NA
Battery pack 1/2 WxDxH	9 x 23 x 27 in (230 x 578 x 685 mm) / 19 x 13 x 33 in (480 x 340 x 845 mm)					
Battery pack 1/2 weight	351 lbs (159 kg) / 717 lbs (325 kg)					

# LS-Series Technical Specifications



	Q-LS 10	Q-LS 20	Q-LS 30	Q-LS 40	Q-LS 50	Q-LS 60	Q-LS 80	Q-LS 100	Q-LS 120	Q-LS 160	Q-LS 240	Q-LS 320
<b>Output</b>												
Capacity (VA)	10,000	20,000	30,000	40,000	50,000	60,000	80,000	100,000	120,000	160,000	240,000	320,000
Capacity (watts)	8,000	16,000	24,000	32,000	40,000	48,000	64,000	80,000	96,000	128,000	192,000	256,000
Current (peak amp) per phase	43	87	130	174	218	260	348	432	520	693	1,000	1,300
Current (peak amp) 1 phase	130	260	390	520	650	NA						
Nominal voltage range (3 phase)*	220V $\Delta$ / 380V $\Delta$ / 460V $\Delta$ -- 208VY / 380VY / 400 VY / 415VY / 480 VY											
Nominal voltage range (1 phase)*	220 / 230 / 240 V, 1p2w or 1p3w						NA					
Frequency*	50, 60 or 400 Hz $\pm$ .1%											
Frequency tracking	$\pm$ 5% of the input frequency											
Power factor	> 0.8											
Waveform	High resolution, pure sign wave											
Outlets	Terminal block											
Single phase output	Yes						No					
3 phase output	Yes											
<b>Input</b>												
Current (amp) (208/120VAC)	36	72	108	144	180	216	288	360	432	576	767	1023
Current (amp) (415/380VAC)	18	36	54	72	90	108	144	180	216	288	432	576
Current (amp) (480/277VAC)	15	29	43	58	72	86	115	144	173	230	333	443
Current (max amp) (208/120VAC)	45	90	136	180	226	272	360	450	540	720	959	1279
Current (max amp) (415/380VAC)	22	45	68	90	113	136	180	225	270	360	544	728
Current (max amp) (480/277VAC)	18	36	54	72	90	109	144	180	216	288	416	554
Power factor (6 pulse rectifier)	.70 to .80											
Power factor (12 pulse rectifier)	.75 to .90											
Frequency*	50, 60 or 400 Hz $\pm$ 5%											
Input impedance of entire system	750 m ohm											
<b>General</b>												
Input and output impedance	5%											
UPQ power conditioning topology	Five-stage isolation with true on-line sign wave											
Remote power management	Yes											
<b>Voltage Regulation</b>												
Input voltage range:*	208 to 600 VAC											
- Full load without using battery	$\pm$ 20%											
- Half load without using battery	$\pm$ 25%											
Output voltage regulation	$\pm$ 1%											
<b>Isolation</b>												
Input to output isolation	Dielectric strength 5 kv, 120 dB common mode attenuation											
Common-mode noise rejection	Yes											
Normal-mode noise rejection	Yes											
<b>Suppression</b>												
IEEE 587/ANSI 62.41 (North America)	Yes											
IEEE 587/ANSI 62.41 (International)	Yes											
Joules (energy absorption)	2,200											
TVSS MOV joule rating	765 joules per phase											
TVSS low pass filter	750 Hz											
Peak surge current (amp)	20,000											
Multi-stage protection	Yes											
Reverse inverter impulse protection	54 joules without batteries											
IEC	62040-2											
FCC	Class A											
EN500091-1	Yes											
EN500091-2	Yes											
EN 60610 (leakage current)	< 1 mA											
CE approval	Yes											
Conditioning	Yes											
Output THD (linear load)	< 2%											
Current THD (6 pulse rectifier)	Maximum of 20%											
Current THD (12 pulse rectifier)	Maximum of 9%											
Input frequency range	50/60 Hz $\pm$ 7 Hz											

# LS-Series Technical Specifications

	Q-LS 10	Q-LS 20	Q-LS 30	Q-LS 40	Q-LS 50	Q-LS 60	Q-LS 80	Q-LS 100	Q-LS 120	Q-LS 160	Q-LS 240	Q-LS 320
<b>High Frequency On-line Inverter</b>												
Inverter design	Full bridge											
Inverter driver frequency	20 kHz											
Inverter regulation	50/60 Hz ± 0.1Hz											
Overload capacity	> 110% continuous											
Crest factor	3:1											
Transfer time	Zero											
Overall system efficiency	93%	93%	93%	93.50%	93.50%	94%	94.50%	94.50%	95%	95%	95%	95%
Efficiency	> 93%											
UPQ to bypass/bypass to UPQ	Zero cross transfer, < 4 ms (2 ms minimum)											
<b>Rectifier</b>												
6 pulse	110 µs single phase triggering											
12 pulse	6.4 kHz pulse width, 80 µs for 1.7 ms around 11 pulses											
Efficiency	98%											
Current limit (amp) (208/120VAC)	54	108	162	216	270	324	432	540	648	864	1296	1728
Current limit (amp) (415/380VAC)	27	54	81	108	135	162	216	270	324	432	629	845
Current limit (amp) (480/277VAC)	22	43	65	86	108	130	173	216	259	346	522	698
<b>Static Switch</b>												
Voltage range	173 VAC - 277 VAC (line to neutral)											
Frequency range	45 - 55 Hz / 55 - 65 Hz											
Efficiency	99.5%											
Transfer time – main to inverter	0 ms											
Transfer time – inverter to main	0 ms											
<b>Battery (standard configurations)</b>												
Full load run time (min/ext. pack)*	45 / A	45 / B	26 / B	18 / B	34 / 2-B	26 / 2-B	18 / 2-B	34 / 4-B	26 / 4-B	18 / 4-B	23 / 8-B	18 / 8-B
Half load run time (min/ext. pack)*	105 / A	105 / B	85 / B	45 / B	85 / 2-B	64 / 2-B	45 / 2-B	105 / 4-B	64 / 4-B	45 / 4-B	85 / 8-B	45 / 8-B
DC voltage	348 VDC											
Recharge time	5 to 8 hours											
Battery charger	Constant voltage with current limit											
Maximum recharge current (amps)	5	10	15	20	25	30	40	50	60	80	120	160
Boost charge	402 VDC											
Float charge	390 VDC											
Battery low voltage	320 VDC											
Battery low stop voltage	295 VDC											
Hot-swappable	Yes											
<b>Environmental</b>												
Maximum heat dissipation kW	.65	1.3	1.9	2.6	3	3.5	4.6	5.4	6.5	8.7	13	17.4
Maximum heat dissipation BTU/hr	2,219	4,437	6,485	8,875	10,240	11,947	15,701	18,432	22,187	29,696	44,373	59,392
Operating temperature	32° to 122° F (0° to 50° C)											
Humidity	0% - 90% non-condensing											
Audible noise	< 65 dBA at 1 meter						< 67 dBA at 1 meter					
Altitude	Less than 6,600 ft (2,000 m) above sea level											
De-rating temperature to altitude	39° F / 3,281 ft (4° C / 1,000 m)											
<b>Physical</b>												
WxDxH	21.5 x 32 x 63 in (550 x 800 x 1,600 mm)						43.5 x 32 x 63 in (1,100 x 800 x 1,600 mm)			87 x 32 x 63 in (2,200 x 800 x 1,600 mm)		
Weight in lbs (no battery)	550	660	882	1,058	1,213	1,500	1,808	2,094	2,600	3,200	4,300	5,400
Weight in kg (no battery)	250	300	400	480	550	680	820	950	1,180	1,450	1,950	2,450
Battery pack A/B WxDxH (26 Ah)	21.5 x 32 x 63 in (550 x 800 x 1,600 mm)											
Battery pack A/B weight (26 Ah)	882 lbs (400 kg) / 1,765 (800 kg)											
Battery pack C/D WxDxH (88 & 100 Ah)	43.5 x 32 x 63 in (1,100 x 800 x 1,600 mm)											
Battery pack C/D weight (88 & 100 Ah)	2,375 lbs (1,077 kg) / 2,500 lbs (1,134 kg)											

\* Customizable

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