

Product brochure

Eaton 9390 UPS

20-160 kVA



Powering Business Worldwide

Innovative design delivers industry-leading power performance

The Eaton® 9390 is a double-conversion uninterruptible power system (UPS) that resolves all utility power problems and supplies clean, continuous, uninterruptible power to connected equipment. Whether you're selecting a UPS for a branch office, manufacturing floor, medical facility, or data center, there's a 9390 model that delivers just the right combination of performance and price for your needs.

Features and Benefits

- Transformer-less design
 - Increased efficiency over transformer-based UPSs
 - Smaller footprint and higher power density
 - Lower installation and shipping costs
- Flexible Installation
 - Mount directly next to a wall or even in a corner.
 - Completely accessible for service and maintenance from front panel
 - Top and bottom cable entry
- Voltage Options
 - Conventional 208V and 480V for standard US system designs
 - Available 400V for higher efficiency US system designs
- Powerware Hot Sync
 - Easily expand system capacity
 - Sync parallel configurations without fail-prone control wires
- Advanced Battery Management
 - Cyclical battery charging increases service life of batteries, reducing total cost of ownership
 - Sophisticated battery condition monitoring, testing, and alerts identify potential problems before they affect your load
- Low Total Harmonic Distortion
 - Low input THD ensures compatibility with extended backup power sources (generators).
 - Low output THD provides clean pure power to operate the load safely and efficiently
- Complete line of system accessories
 - Battery cabinets
 - Integrated distribution cabinets
 - Integrated accessory cabinets



20-80 kVA

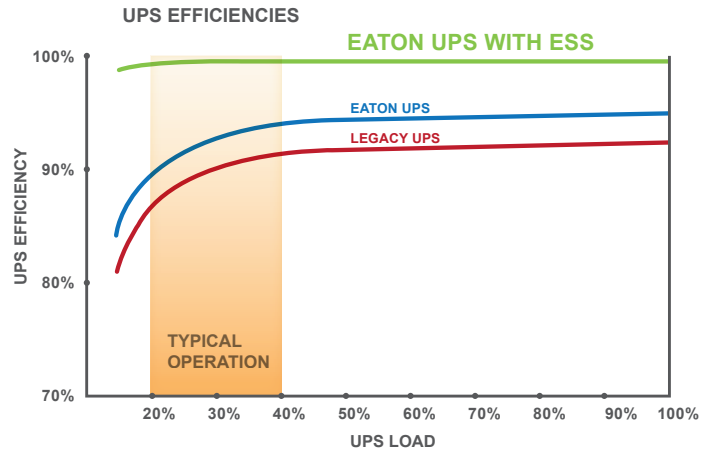


100-160 kVA

High efficiency options reducing costs and wasted energy

Energy Saver System

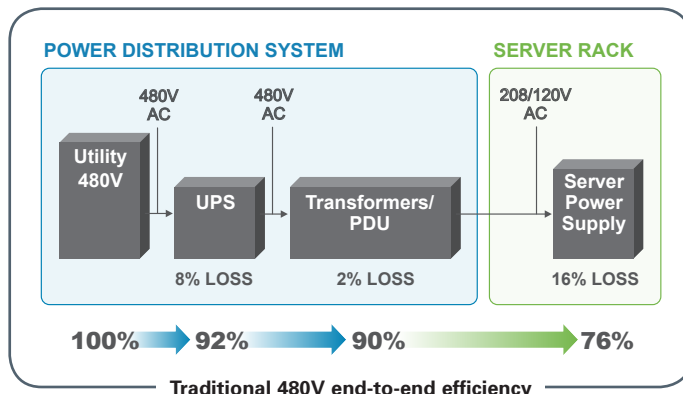
The 9390 has delivered excellent energy efficiency since its introduction to the market, helping facilities save thousands in energy costs over traditional UPS designs. Now with the available Energy Saver System (ESS), the 9390 achieves over 99 percent efficiency no matter how large or small the load. This additional energy savings is achieved through advanced power core technology, and continues to provide the load with maximum protection. Unlike traditional "eco" modes, ESS is not just a utility bypass. The load is always protected. Learn more at Eaton.com/ESS and see how much money you can save with our UPS efficiency calculator.



ENERGY SAVER SYSTEM VS. LEGACY UPS

	50 kW	125 kW	250 kW
<i>(energy + demand) per kW hr</i> ELECTRIC COSTS	\$0.11	\$0.11	\$0.11
LEGACY UPS EFFICIENCY	92.5%	92.5%	93%
EATON ESS UPS EFFICIENCY	99%	99%	99%
3-YEAR ANNUAL ENERGY SAVINGS	145 MW hr	363 MW hr	670 MW hr
3-YEAR ANNUAL CO₂ SAVINGS	104 METRIC TONS	261 METRIC TONS	481 METRIC TONS
ANNUAL ELECTRICAL COST SAVINGS*	\$15,972	\$39,929	\$73,715

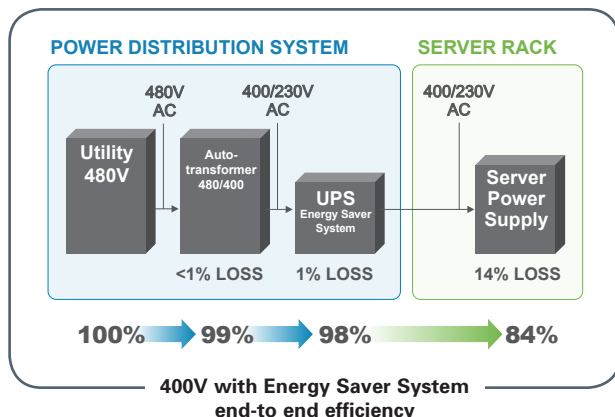
* Includes savings realized through minimizing UPS energy losses and reduced cooling requirements.



400 volt

In addition to conventional (208V and 480V) voltage capabilities, the 9390 now has the ability to support direct-connect 400/230 Vac for powering directly to the IT rack. This capability allows for the deployment of a UL/CE rated UPS that can protect and distribute 400/230 Vac directly to IT racks without an additional step-down transformer. Some of the efficiencies and benefits of this alternative voltage powering are:

- Elimination of the step-down 480-208V transformer lowers heat losses, saves valuable floor space, and significantly reduces capital expenditure
- Higher voltage directly to IT equipment allows it to operate at higher efficiency (no changes required, as virtually all servers are rated to operate at up to 240 Vac)
- No changes to power distribution equipment since connectors and circuit breakers already exist with these ratings
- End-to-end efficiency of a 400V system design can be up 8% higher than that of a traditional 480V system.
- Learn more about 400V system design at Eaton.com/400volt



Scalable architecture meets your current and future load requirements

The 9390 supports up to 160 kVA to deliver power protection for small branch offices to large corporate data centers and communication networks. Up to four equivalent 9390 modules can be paralleled for additional capacity or redundancy, without having to utilize a central bypass cabinet. In all paralleling configurations, each UPS module operates independently yet is completely synchronized with the others. Parallel UPS modules can provide N+1, N+2 or greater redundancy.

Powerware Hot Sync technology: The culmination of power reliability

Eaton's patented Powerware Hot Sync technology enables multiple UPSs to share the load equally, eliminating the transfer time when shifting the load from one module to the other. The load share control algorithms maintain adjustments to variations in the output power requirements.

When two or more UPSs operate in parallel for capacity and redundancy, Hot Sync addresses the two primary concerns of load sharing and selective tripping. To address these concerns for reliability – the degree of autonomy and the complexity of implementation – Hot Sync combines digital signal processing and an advanced control algorithm to provide automatic load sharing and selective tripping in a parallel system, as well as complete autonomy of the modules and a skillfully simple implementation.

Powerware Hot Sync wireless paralleling technology for capacity or redundancy

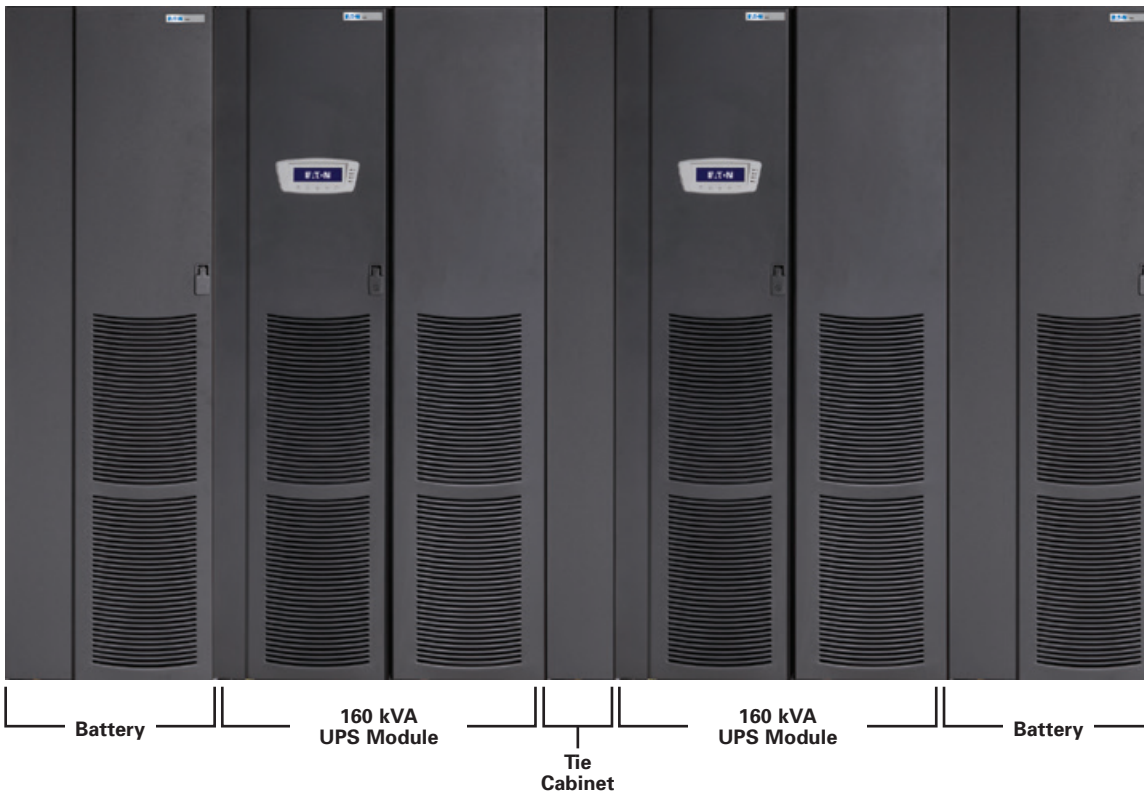
This two-module system shown below can be configured as 160 kVA N+1 redundant (320 kVA capacity with 36-inch tie cabinet). The width of this configuration is a compact 164.6 inches.

The 9390 achieves optimum reliability and flexibility with the following design features:

- Unlike other paralleling techniques, there is no system-level single point of failure
- Hot Sync systems are capable of paralleling for both redundancy and capacity
- By using a peer configuration as opposed to a master-slave configuration, Hot Sync ensures that each module is operating independently
- No added circuitry or components are required to be switched in to operate in parallel
- With thousands of successful systems installed globally, Hot Sync is a proven technology
- The output of multiple UPSs remains in phase so that static transfer switches connected between the separate distribution paths may change state seamlessly when necessary

Each parallel unit operates with its own battery string – if any unit goes offline or is taken down for maintenance, the remaining units support the load fully with their battery capabilities. If any battery string fails, the remaining strings continue to support the load – thus eliminating a key potential single point of system failure.

Typical Powerware Hot Sync configuration:



"The units' efficiency definitely played a role in our selecting the 9390 ... ESS will pay for itself within the year."

**- Tim Cooper,
data center
facilities
manager,
Travelport**

Flexible installation options expedite deployment and save valuable space

The 9390 offers the smallest footprint of any UPS in its class—35 to 50 percent smaller than competitive units. Cabling can enter the UPS from either the top or bottom of the cabinet to provide easier and flexible installation. And since the compact 9390 cabinet can be installed against back and side walls, you have more location options, installation is fast and easy, deployment cost is lower, and you save valuable data center space.

Weight

At \$.30 per pound, the 9390 averages a cross-country freight savings of over \$630. With a transformerless design, Eaton UPS solutions meet or exceed virtually all floor loading standards. And with this lower weight, units can be moved without heavy capital equipment and can fit in all standard freight elevators.

Retrofit applications

The 9390 is perfect for retrofit operations. When an existing UPS is exceeding capacity but has no room to expand, or when the service contract is expiring, the existing UPS can be removed and replaced with a 9390 that offers more power in less space.

Serviceability and accessibility

Being a pre-wired, integrated module, the 9390 saves time and cost of installation and cabling expenses because of standard top or bottom entry design. And with front access, the 9390 can be placed in a corner or against a wall—easily available for service and saving valuable space.

Big power, small footprint

EATON 9390
Weight = 580 pounds
18.9 x 31.6 in.

Competition's
Weight = 2700 pounds
32.5 in. x 34.9 in.



Service Plans

Eaton 9390 UPS Service Plans	PowerTrust™ Value	ProActive	PowerTrust	PowerTrust Preferred	Flex Contracts
Parts and Labor for Electronics	●	●	●	●	Custom Service Contracts
Parts and Labor for Batteries	○	○	○	○	
5x8 Onsite Corrective Maintenance	●				
24x7 Onsite Corrective Maintenance		●	●	●	
Next Business Day Response	●				
Eight-Hour Response		●	●	●	
Four-Hour Response		○	○	○	
Two-Hour Response		○	○	○	
5x8 UPS Preventive Maintenance Visit	One per year	○	One per year		
24x7 UPS Preventive Maintenance Visit	○	One per year	○	Two per year	
Battery Preventive Maintenance Visit	○	○	One per year	Two per year	
eNotify Remote Monitoring Service	●	●	●	●	
Discounted Spare Parts Kit, T&M, and Upgrades		30%	30%	30%	

- Included feature
- Optional

Proven warranty and support services

Customers consistently rank Eaton services number one in quality. Eaton's comprehensive, world-class service solutions are designed to improve costs, uptime, reliability, power quality and safety. And with 240 field technicians in North America and 1,200 international authorized service providers, Eaton has more service personnel than any other UPS manufacturer.

The standard factory warranty covers:

- System warranty: One year parts / 90 days labor
- Battery warranty: Two years parts / 90 days labor

Extensive service options for enhanced reliability

For support beyond the warranty period, Eaton offers enhanced service options including onsite startup, corrective and preventive maintenance, battery solutions, training, remote monitoring and factory spare parts and upgrades. Customizable three-phase UPS services packages allow customers to select the plan that provides the right combination of system uptime, convenience and value.

Performance features to maximize compatibility

Low input current THD enhances generator compatibility

Electronic devices and UPSs are built with some components that are non-linear. When voltage is applied to a circuit constructed of non-linear components, the circuit may not respond linearly (current may not follow the voltage in a linear manner). These components may even create frequencies other than the fundamental applied frequency (60 Hz).

These frequencies (harmonics) occur in odd multiples of 60 Hz. The degree of occurrence is called total harmonic distortion (THD). If the power source can't respond to all frequencies demanded by the circuit, then further distortion of the applied voltage may occur—creating more complication. Every UPS produces a level of harmonics. Unchecked, harmonics can reduce overall power factor, cause sensitive devices to malfunction, prematurely age equipment, and cause screens and displays to flicker.

To avoid these negative effects, the 9390 uses a special input circuit that keeps current THD at less than 4.5% at full load—without compromising efficiency. As a result, the 9390 transfers maximum power between the source and protected load and is exceptionally compatible with multiple power sources, especially auxiliary generators.

Power factor performance maximizes compatibility and meets high power factor load requirements

Power factor (PF) describes the slight phase shift between voltage applied to a circuit and current that the circuit draws in response to the applied voltage. The maximum power factor possible is unity (1.0), or no phase shift between the voltage applied and the circuit current response—maximum transfer of power between source and load. However, in the real world, the UPS must be able to accept power from and deliver power to circuits that have a wide range of power factors.

Older or worn equipment often results in lower power factor readings. Some new servers operate at unity power factor. Lightly loaded facilities such as brand new data centers, can often show leading power factor readings.

On output, the ultra high-speed switching pulse width modulation (PWM) inverter enables the 9390 to provide its full rated power capability to the load, down to 0.9 leading power factor without de-rating.

Double-conversion design offers highest available protection

Unlike other commercially available UPS technologies, the double-conversion design completely isolates output power from all input power anomalies and delivers 100% conditioned, perfect sine wave output—regulating both voltage and frequency, providing protection from all nine common power problems.

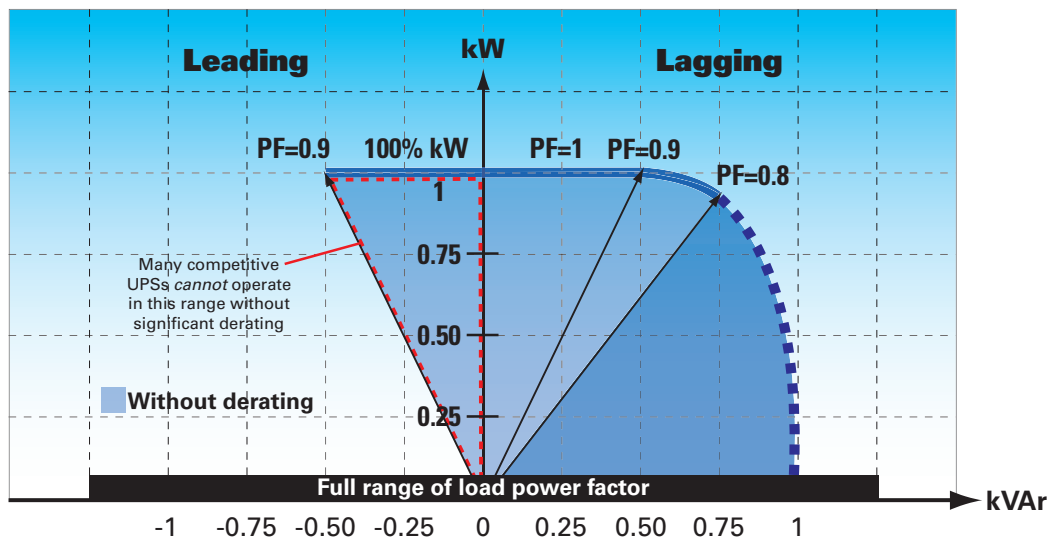
Due to the 9390's built in high-efficiency capability, it operates in a consistent, efficient status without compromising power protection. Even when presented with the most severe power problems, power output remains stable with the 9390. Output voltage THD is held within two percent of nominal specification for linear loads, within five percent for non-linear loads—making the 9390 ideal for supporting equipment that is sensitive to a distorted voltage input as a result of harmonic loads. In the event of a utility power failure, there is no delay transferring to backup power.

Advanced battery management optimizes battery performance and service life

The 9390 UPS offers innovative technologies to maximize the health and service life of its internal and external batteries:

- ABM technology uses a unique three-stage charging technique that significantly extends battery service life and optimizes recharge time when compared to traditional trickle charging
- Temperature-compensated charging monitors battery temperature and adjusts the charge rate accordingly, which properly charges the battery and greatly extends battery life
- An integrated battery management system tests and monitors battery health and remaining lifetime, providing user notification to guide preventive maintenance

Load power factor range chart



Connectivity options for up-to-date system status and integration

Enhanced communication capabilities

The 9390 UPS is equipped with a variety of standard communications features for network connectivity and remote management applications, including:

- RS-232 serial port
- Four X-Slot® communication bays
- Relay output contacts
- Two programmable signal inputs
- Remote emergency power-off (REPO)

Easy network connectivity and monitoring

Modbus® card

The Modbus card is an X-Slot device that allows continuous, real-time monitoring of the 9390 through a Building Management System (BMS) or industrial automation system.

Relay interface cards

The relay interface card for the X-Slot enables remote UPS shutdown and provides isolated dry contact Form-C relay outputs for utility failure, low battery, UPS alarm/OK, and on bypass.

Environmental Monitoring Probe

The environmental monitoring probe (EMP) works with the 9390 and Power Xpert Gateway UPS card to remotely monitor ambient temperature and relative humidity of the remote environment. The EMP can also be configured to provide status of two additional contact devices such as smoke detectors or open-door sensors.

Power Xpert® Gateway Series cards

Power Xpert Gateway Series X-Slot cards provide Web-enabled, real-time monitoring of UPSs, PDUs and RPPs through standard onboard Web pages, Power Xpert software or third-party software.

Power Xpert meters

Power Xpert meters combine state-of-the-art technology with next-generation power diagnostics, data trending and performance benchmarking with a twist-and-click LCD display.

Centralized control and visibility

The 9390 UPS is shipped with the Eaton Software Suite CD. The software suite includes the following applications, as well as a user-friendly wizard to guide users through software selection and installation:

- Intelligent Power Manager and LanSafe® power management software
- PowerVision® UPS performance analysis and monitoring software (30-day trial version)
- NetWatch network monitoring software

Connectivity options



Power Xpert Gateway Card



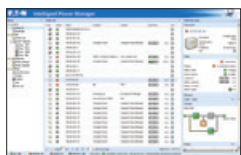
Modbus card



Relay Interface cards



Environmental Monitoring Probe



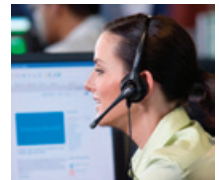
Intelligent Power Manager



Foreseer



PowerVision



eNotify

eNotify Remote Monitoring

Eaton's eNotify Remote Monitoring Service provides 24x7 real-time monitoring of the 9390 and battery systems and alerts both service technicians and the customer when a problem is detected. Proactive monitoring enables technical experts to respond immediately to more than 40 alarm conditions and, in many cases, resolve issues remotely with minimal or no downtime.

Additional eNotify benefits include:

- One-way outbound status and event e-mails for security and reliability
- Fast diagnosis and notification of critical alarms
- Monthly customer reports including power event logs and overall UPS and battery health summaries

Available Integrated Cabinets

A full line of unified power distribution accessories

Integrated Battery Cabinet (IBC)

Eaton offers two versions of battery cabinets which line-up and match the 9390; the IBC-S and the IBC-L, each offering a wide array of runtimes. See Eaton.com/9390 for options and runtime calculations.

Flexibility

- A variable battery bus accommodates 384 to 480V configurations, so the battery capacity can be matched to your exact runtime requirements – either a specific runtime, an extended runtime, an extension to an existing battery, or legacy battery installations
- Daisy chain up to four cabinets together for extended runtimes
- Remote configurations are available
- Front access only design and top/bottom cable entry provides installation flexibility and enhances servicing



IBC-S with door opened



IBC-L



40-80 kVA IDC Bypass/transformer/
distribution cabinet

Integrated Distribution Cabinet (IDC)

The Eaton IDC is specifically designed to compliment the 9390. With this optional cabinet, Eaton offers a complete, one-stop shop for power protection and distribution solutions that is easy to design, install, customize and manage – while delivering pay-as-you-grow scalability for future expansion.

Features

- Two, three or four-breaker maintenance bypass
- Transformer options up to K20
- (2) 42-pole panelboards
- Or
- (1) 42-pole panelboard and up to (3) 250A distribution breakers
- Or
- Up to (6) 250A distribution breakers
- Line and match or remote
- Casters and leveling feet
- Panelboards come with individual 225A main breaker
- Neutral rated for harmonic loads (200%)
- Distribution breakers are Eaton JG electronic trip
 - Two electronic sensors available 100A and 250A
 - 100A settings 40-100A trip (eight settings)
 - 250A setting 100-250A trip (eight settings)

Integrated Accessory Cabinets (IAC) for customizable configurations

Eaton offers several configurations of Integrated Accessory Cabinets (IAC) for use with the 9390 UPS.

The IAC is primarily available in two forms – either a 200 mm (8”) sidecar bolted to the UPS (maintenance bypass or tie) or a 570 mm (22.5”) free-standing cabinet (maintenance bypass, tie or distribution). The size of the IAC is primarily dependant on function and rating.

IAC-SB and IAC-B Maintenance bypass

Maintenance bypass configuration (MBP) and maintenance isolation (MIS) breakers enable power to completely bypass the UPS power module. The module can then be serviced safely or replaced without interrupting power to critical systems. An optional bypass breaker (BIB) and rectifier input breaker (RIB) provide a single wiring point input to the UPS as well as a convenient method for removing power from the UPS when using maintenance bypass to supply the load.

Features

- Two, three or four-breaker maintenance bypass
- No internal transformers
- Smallest cabinet ships bolted to UPS (IAC-SB)
- Large cabinet can be remotely located (IAC-B)

IAC-ST and IAC-T Tie Cabinet

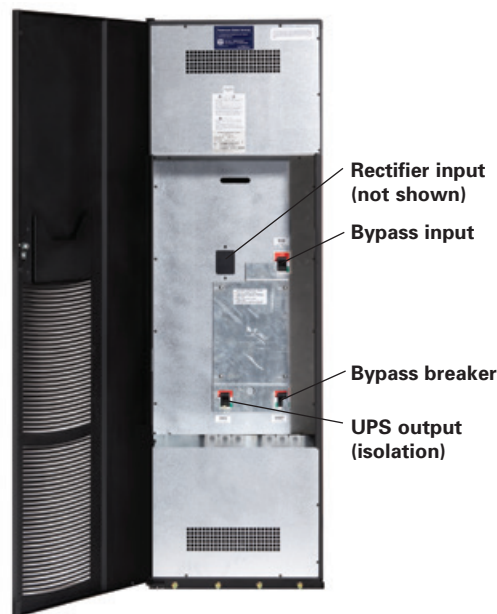
- Parallel UPS tie cabinet (redundant). See one-line diagram on next page.
- Two-breaker tie with maintenance bypass (IAC-T only)
- Two-breaker tie-with main output
- Two-breaker tie
- Wall-mounted maintenance bypass, tie and distribution panels are also available

IAC-D Distribution Cabinet

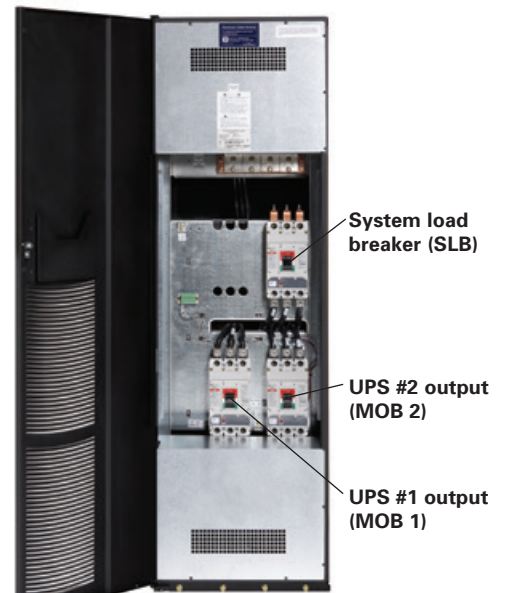
- Used to add (2) additional 42-pole panelboards
- Or
- (1) 42-pole panelboards and up to (3) 250A distribution breakers
- Or
- Up to (6) 250A distribution breakers
- Line and match or remote
- Casters and leveling feet
- Panelboards come with individual 225A main breaker
- Neutral rated for harmonic loads (200%)
- Distribution breakers are Eaton JG electronic trip
 - Two electronic sensors available 100A and 250A
 - 100A settings 40-100A trip (eight settings)
 - 250A setting 100-250A trip (eight settings)



80 kVA 208 & 480V IAC-SC
160 kVA 208V IAC-B



IAC-B Maintenance bypass (160 kVA)



IAC-T Parallel Tie Cabinet

ACCESSORY CABINET DIMENSIONS AND WEIGHT

Accessory cabinet	IBC-S	IBC-L	IAC-B	IAC-T
20-80 kVA (H x W x D, in)	73.7 x 22.5 x 31.6	73.7 x 42.7 x 31.6		73.7 x 22.5 x 31.6
20-80 kVA (weight)	Up to 2445 lb	Up to 4835 lb		Up to 540 lb
100-160 kVA (H x W x D, in)	73.7 x 22.5 x 31.6	73.7 x 42.7 x 31.6	73.7 x 22.5 x 31.6	73.7 x 22.5 x 31.6
100-160 kVA (weight)	Up to 2445 lb	Up to 4835 lb	Up to 700 lb	Up to 700 lb
Accessory cabinet	IAC-D	M90 MBS	MTC	IDC
20-80 kVA (H x W x D, in)	73.7 x 22.5 x 31.6	Up to 73 x 24 x 11.5	Up to 90 x 36 x 11.5	73.7 x 35.6 x 31.6
20-80 kVA (weight)	Up to 420 lb	Up to 500 lb	Up to 500 lb	1200 lb (maximum)
100-160 kVA (H x W x D, in)	73.7 x 22.5 x 31.6	Up to 90 x 36 x 11.5	Up to 90 x 36 x 11.5	73.7 x 42.7 x 31.6
100-160 kVA (weight)	Up to 420 lb	Up to 775 lb	Up to 775 lb	2185 lb (maximum)

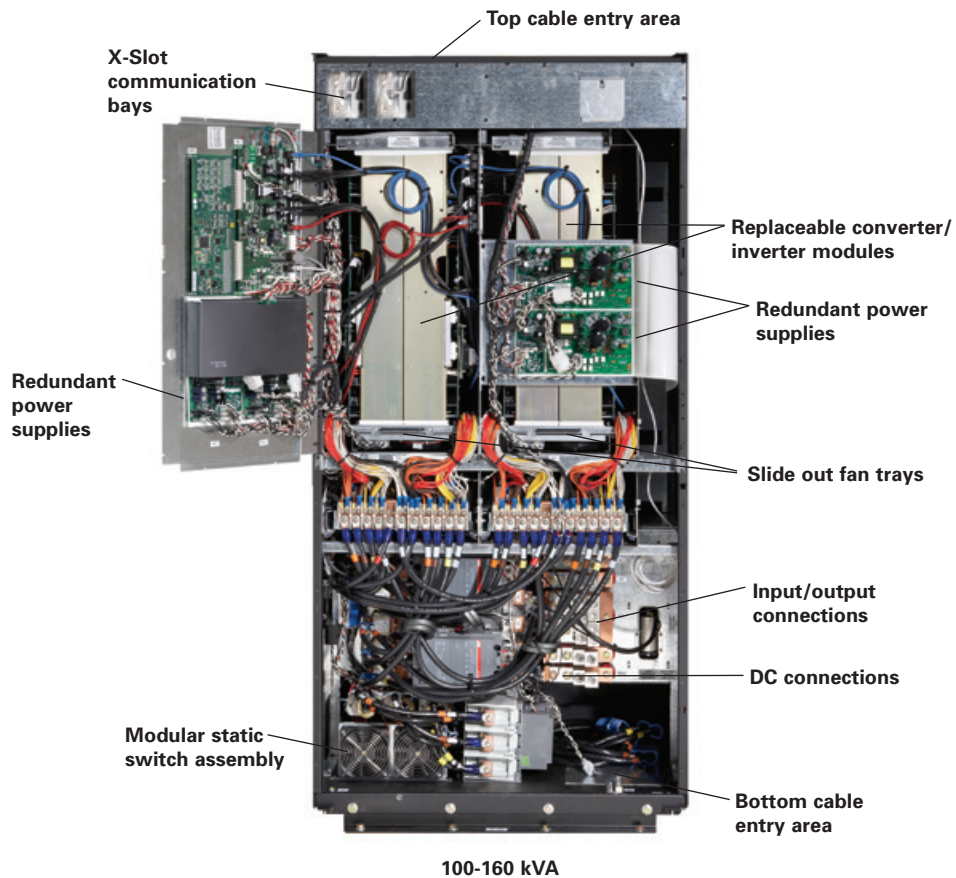
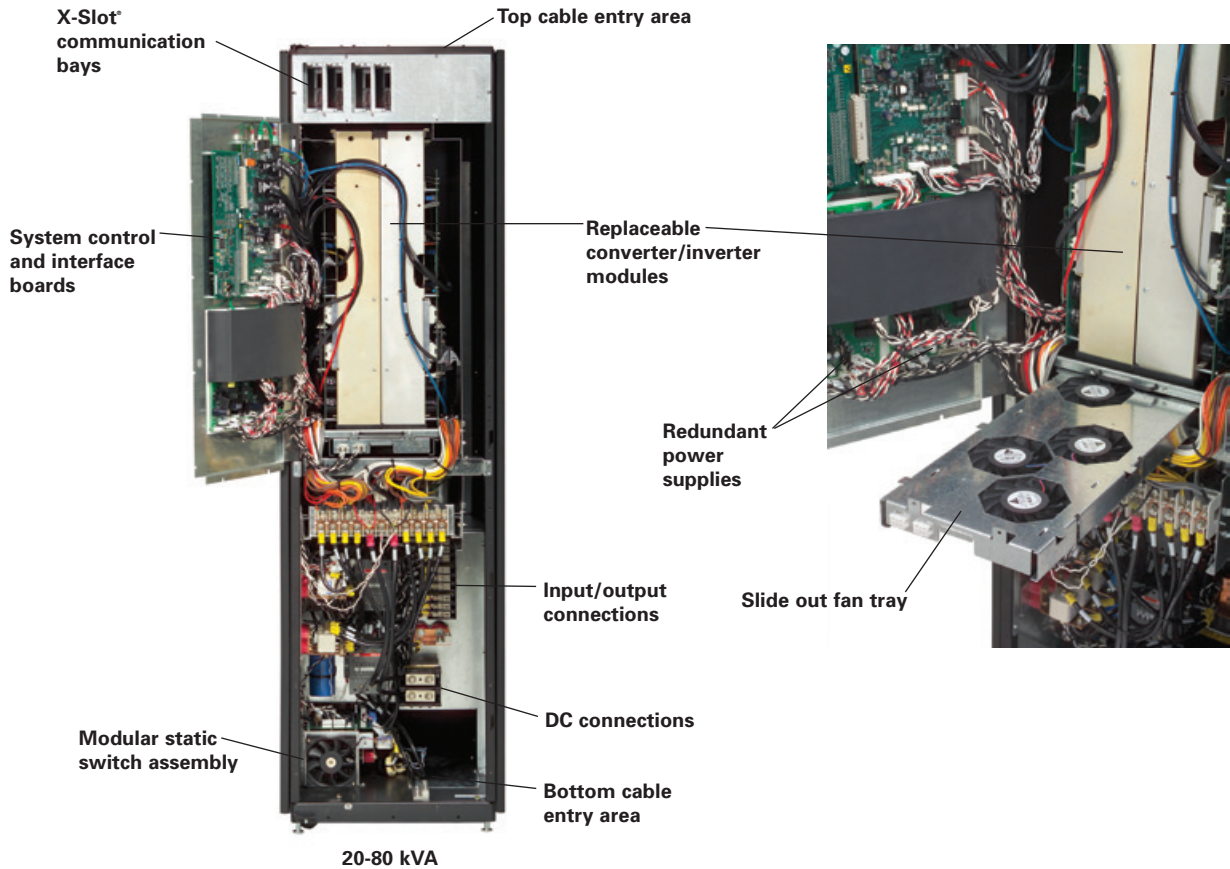
IDC TECHNICAL SPECIFICATIONS¹

9390 INTEGRATED DISTRIBUTION CABINET	
General characteristics	
Installation	Line up and match to UPS Front access only
Color	Same as UPS
Construction	NEMA 1 ventilated
Input voltage	208, 480V
Output voltage	
Isolation	208, 208/120V
Distribution	208/120V
Certification	
Safety	UL 1778
Markings	UL, cUL
User interface	
Cable entry	Top or bottom
Remote monitoring	Optional
Transformer option	
Electrostatic shield	Standard
Insulation	150°C Rise, Class H
Impedance	5% (maximum)
K-factor	K-1 (standard); K13, K20 (optional)
Compensation taps	2-FCAN, 4-FCBN standard
Overload protection	Standard

POWER DISTRIBUTION OPTION - PANELBOARD DISTRIBUTION	
Quantity	2 (maximum)
Voltage	208/120V
Main breaker	225A, 65 kAIC
Circuits	84 (maximum)
Distribution breakers	(in lieu of panelboards)
Quantity	6 (maximum)
Voltage	208/120V
Size	250A, 65 kAIC, adjustable trip
MAINTENANCE BYPASS OPTION	
Maintenance bypass	Optional; 2, 3 or 4 breaker configuration

1. Due to continuing product improvements, specifications are subject to change without notice.

A closer look inside the 9390



TECHNICAL SPECIFICATIONS¹

EATON 9390 UPS

UPS Rating (0.9 power factor)

kVA	20	30	40	50	60	80	100	120	160
kW	18	27	36	45	54	72	90	108	144

General characteristics

Efficiency	Up to 94% >99% with Energy Saver System
Parallel capability	Four modules with tie cabinet
Audible noise	<65 dBA @ 1 meter
Altitude (max)	2000m at 40°C , 104°F

Input characteristics

Voltage	208, 380, 400, 415, 480, 600 ²
Voltage range	+10% / -15% ³
Frequency range	55-65 Hz
Power factor	0.99 (min)
Input current distortion	<4.5% (no input filter required)
Soft start capability	Yes
Internal backfeed protection	Yes
Broadcast global support	Yes

Output characteristics

Voltage	208 ⁴ , 380 ⁴ , 400 ⁴ , 415 ⁴ , 480 ⁴ , 600 ⁵
Regulation	±1%
Inverter	PWM with IGBT switching
Voltage THD	<2% (100% linear load); <5% (non-linear load)
Load power factor range	Down to 0.9pf leading without de-rating
Heat dissipation (BTU/Hr x 1000/Hr)	80 kVA, 208V: 23.6 160 kVA, 208V: 47.3 80 kVA, 380-480V: 21.9 160 kVA, 380-480V: 43.8

Battery

Battery types	VRLA, AGM, Gel, Wet, Eaton batteries also available
Battery voltage	384-480V
Temperature compensation	Optional
Charging method	ABM Technology

Dimensions and weights

20-80 kVA modules	HxWxD: 73.7 x 18.9 x 31.6 in./1872 x 480 x 803 mm
100-160 kVA modules	HxWxD: 73.7 x 35.6 x 31.6 in./1872 x 904 x 803 mm
20-80 kVA modules	640 lb./290 kg (208V); 568 lb./258 kg (480V)
100-160 kVA modules	1,060 lb./481 kg (208V, 480V)

Serviceability

Back/side against wall installation	Standard
-------------------------------------	----------

Certification

Safety	UL1778, cUL
EMC	IEC62040-2 EN50091 Class A (restricted access)
Surge	ANSI C62, 41 Cat, A&B

Optional accessories

Module tie cabinet
External maintenance bypass
Integrated distribution cabinet
Isolation transformer

eNotify Remote Monitoring service option

24x7 remote monitoring of UPS and battery alarms, daily heartbeat check and monthly report required.

Communication options

Software compatibility - Intelligent Power Manager, FORESEER, Power Xpert Communications cards - Two communications bays standard. Four communication bays included.

The following connectivity options can be installed at any time:

- Modus Card
- Relay Interface Card (Use for AS400s)
- Industrial Relay Card (5A@120V)
- Hot Sync CAN Bridge Card provides CAN communications, isolated RS-485 port
- Environmental Monitoring Probe (EMP)
- Power Xpert cards

Remote inputs/outputs - two building alarms inputs and on summary alarm contact (5A@120V) standard

Four more building alarm inputs available with the Communications Expansion Option Remote panel - eight backlit status indicator lamps plus an audible horn

*See the Limited Factory Warranty for 9390 products for details. Batteries are warranted by the battery manufacturer and not by Eaton.

**Requires the Parallel Card option (RS-485 port) and requires an external 120V power supply to drive the remote monitor panel.

1. Due to continuing improvements, specifications are subject to change without notice.
2. 600V applications require an input transformer.
3. At full load without battery discharge.
4. Output transformers are required if the desired output voltage is not the same as the input voltage.
5. 600V applications require an output transformer.

Learn more at
powerquality.eaton.com

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