
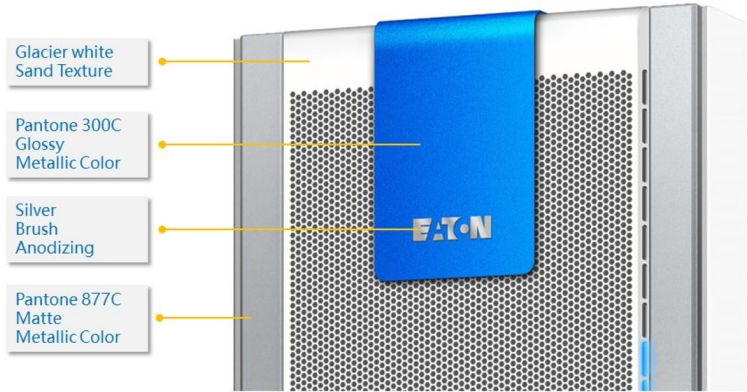


# Eaton® 93PR 400kVA Modular UPS Technical Specification

Model	400kVA
Catalog	93PR-400
Outlook	 <p>(default: GLACIER WHITE)</p>
Color Spec	
UPM Rating (all operating modes)	60kVA/60kW pf1.0 @40°C
UPS Rating (all operating modes)	420kVA/420kW pf1.0 @40°C
Configurable Upgradability	60kVA*N (1≤N≤7)
Parallel Capability	4x parallel, could extend to 8x with factory customization.
UPS Topology	SiC Hybrid IGBT Module; Three level Topology
Performance classification	VFI-SS-111, IEC62040-3
UPM Dimensions: W x D x H (mm)	439 x 700 x 173.4 (4U height) 590 x 980 x 325 (Packaged)
UPM Weight	39kg Net, 44kg Gross, Modules shipped separately
UPS Dimensions: W x D x H (mm)	900 x 1100 x 2069
Frame Weight (kg)	550kg
Degree of protection	IP20, with front door washable dust filter
Cabinet color theme	Default: Eaton White, Optional: Black, RAL 9005
Internal Switchgear (Optional)	Maintenance Bypass Switch Rectifier Input Switch, Bypass Input Switch, Output Isolation Switch, Bypass Backfeed Contactor

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Standard Configuration	<p>The diagram illustrates the internal circuitry of the UPS. It features a 'Rectifier Input' on the left, which feeds into a bridge rectifier (represented by two blue diodes) and a DC-link capacitor (orange square). This DC-link is connected to an inverter stage (represented by a blue square with a plus sign). The output of the inverter is connected to the 'Output' terminal. A 'Bypass Input' is also shown, which can be switched to the 'Output' terminal via a 'Bypass Input Switch' (BIS). The 'Output' terminal is also connected to an 'Output Switch' (OS) and an 'Output Monitor Switch' (OIS). The 'Integrated MBS' (Monitoring and Bypass Switch) is shown as a yellow dashed box containing the 'MBS' (Monitoring and Bypass Switch) and 'MIS' (Monitoring and Inverter Switch) components. The 'UPS' is labeled on the left side of the diagram.</p>
Cable entry	Bottom/Top entry
Ventilation	Rear exhaust
Accessories (Optional)	Top Chimney Kits Load Sync Box

## ENVIRONMENT

Ambient storage temperature	Range of -25 to +55°C in the protective package
Ambient service temperature	0 to +40°C full load continuously
Maximum service altitude	1000m above sea level. Maximum 2000m with 1% de-rating per each additional 100m above
Relative humidity	5 to 95%, no condensation allowed
Acoustic noise at 1m	69.4dBA @100% Load 65.5dBA @ 80% Load
Electromagnetic Compatibility	Immunity and emission to IEC/EN 62040-2 C3 C3

## USER INTERFACE & COMMUNICATIONS

Display	7" Touchscreen Color display and 4 separate summary LEDs for system status, door mounted LED bars for long range view of system status
Standard Communication Ports	3x Mini-Slot, 1x EPO input (NC or NO), 1x Relay output (NO/NC), 5x Building Alarm inputs, 1x USB Host, 1x USB Slave, 1x RS232 Service Port
Connectivity (Optional)	Web/SNMP Relay/RS232 Industrial Relay PXGMS Industrial Gateway Card support SNMP/Modbus/BACnet

## ELECTRICAL INPUT CHARACTERISTICS

Earthing system compatibility	TN, TN-S, TN-C, TN-C-S, TT (Three-phase, four-wire + PE)
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Model	400kVA
Earthing system compatibility	(Three-phase, three-wire (no neutral required optional) + PE)
Rated input voltage and voltage tolerance	Rectifier: 230/400Vac nominal Tolerance: (-15%, +20%)  Bypass: 230/400Vac nominal Tolerance: 196/340 – 253/438V (-15%, +10% of nominal)
Operating frequency / tolerance	50 or 60Hz; Tolerance 40-72Hz
Input current distortion	<3% THD (Linear load condition at rated input current)
Input power factor	>0.99pf @ 20-100% load, >0.95 @ 10-20% load
Inrush current	<50A
Rectifier ramp-up, rectifier start and load step	<100% of rated current. Rectifier ramp-up 10A/s (default), configurable, min.1A/s
Number of input phases	3 phases + Neutral* (3-wire version not require neutral)
Rated rectifier input current @ 400V @Battery Fully Charged	627A @420kW
Bypass input current (rms @ 400V) Recommended/Maximum	607A (420kW)
<b>ELECTRICAL OUTPUT CHARACTERISTICS - NORMAL MODE</b>	
Rated output voltage	230/400, three phases
Output voltage variation	<1% static load, 2% with 20ms recovery from 100% load step
Crest factor	3:1
Rated output frequency	50Hz (default) or 60Hz
Output frequency variation	+/-0.1Hz with slew rate 1Hz/s
Total output voltage distortion	<1% linear load, <5% non-linear load
Short circuit capability	2xIn @60kW
Fault clearing capability (without bypass)	180A*N gL/gG fuse (N stands for installed UPM number)
Overload capacity without bypass @40°C	420kW (60kWx7) 1h >102-110% load 10min >111-125% load 60 Secs >126-150% load 300ms >150% load
Overload capacity with bypass	Continuous >100-115% load, 10ms 1000% load *Selected external Bypass fuses or breaker may limit the overload capability
Load power factor range	0.8 lagging to 0.8 leading without de-rating
Range of frequency sync with bypass	±4Hz as default. User settable 0.5 to 5 Hz
Output Phase Displacement	Support
<b>ELECTRICAL OUTPUT CHARACTERISTICS - STORED ENERGY MODE</b>	
Transfer to/from stored energy	No break
Rated output voltage	230/400Vac, three phases
Output voltage variation	<2% static load, 4% with 20ms recovery from 100% load step
Crest factor	3:1

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Model	400kVA
Rated peak output voltage	325V, +/-20V
Rated output frequency	50Hz (default) or 60Hz
Output frequency variation	±0.005Hz (single module), ±0.07Hz (Parallel system)
Total output voltage distortion	5%
Short circuit capability	2 x In per module
Load power factor range	0.8 lagging to 0.8 leading without de-rating
Number of output phases	3 Phase + Neutral

EFFICIENCY (Input/Output)		60kW X 7
Efficiency, Double Conversion Mode @ 400V/50Hz @ Input V <sub>THD</sub> <1%	100% load:	96.8%
	75% load:	97.0%
	50% load:	97.2%
	25% load:	96.8%
Heat Dissipation, Double Conversion Mode @ 400V/50Hz @Battery Fully Charged	100% load:	14.0kW
	75% load:	10.0kW
	50% load:	6.1kW
	25% load:	3.5kW
Linear Load Efficiency, ESS Mode @ 400V/50Hz	100% load:	99.2%
	75% load:	99.2%
	50% load:	99.0%
	25% load:	98.4%

BYPASS CHARACTERISTICS	
Automatic bypass	Static bypass switch, continuously rated, no break transfer
Automatic bypass nominal rating	Maximum 420kW
Automatic bypass thyristor i <sup>2</sup> t value	1201250 A <sup>2</sup> s
Back-feed protection (Optional)	Internal back-feed contactor
Separate bypass input feed	Standard (single feed cable links fitted on site)
Manual bypass switch (internal)	Standard

ESS (Energy Saver System) MODE CHARACTERISTICS	
Performance classification	VFD, transferring to VFI (Double Conversion mode) if limits are exceeded
Transfer time to double conversion	Mains available: No break (0ms), Mains failure: 2ms typical
Acceptable output voltage variation	±10% of nominal voltage
Acceptable output freq. variation	±3Hz
UPS Audible Noise	<65dBA @ 1m in 25°C ambient temperature
Storm Detection	UPS locks into double-conversion mode when three power line disturbances have forced the unit to double-conversion three times (user adjustable) within a one-hour period (user adjustable)
High Alert mode	UPS will stay on double conversion for one hour (user adjustable), after which the unit will automatically return to operate in ESS mode

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Model	400kVA
Battery nominal voltage	3.8VPC x 128 cells = 486.4VDc (LiB) 420kW (60kWx7)
Float charge voltage	4.2VPC x 128 cells = 537.6 Vdc (LiB) 420kW (60kWx7)
End of Discharge Voltage	3.2VPC x 128 cells = 409.6 Vdc (LiB) 420kW (60kW x7)
Battery technology	Certified Lithium-ion battery
Stored energy time	No limitation within allowable ambient temperature.
Charging current (Default/Maximum)	Single UPM default 25A, configurable, max 40A per UPM
Restored energy time to 90%	Typically, 10 x Discharge time
Battery recharge profile	Advanced Battery Management (ABM®) = 90% resting,10% floating/charging
LiB cut off voltage	3.2VPC x 128 cells = 409.6 Vdc (LiB)
Battery cold start	Support
Common battery	2x UPS support common battery
Battery Trip	+48V Shunt trip by default, +24 retrofittable by factory
Battery Auxiliary	Standard Equipped

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