

# Eaton 93PM 30-50kW UPS Technical Specification

CONSTRUCTION	30kW	40kW	50kW
Model	93PM-30(50)	93PM-40(50)	93PM-50(50)
Rating (all operating modes)	30kVA/30kW	40kVA/40kW	50kVA/50kW
Upgradability	50kW		-
UPS Topology	Double Conversion, IGBT Converters, three level Inverter		
Performance classification	VFI-SS-111		
UPS Dimensions: W x D x H (mm)	560 x 914 x 1876		
Weight (kg) without batteries	288		
Weight (kg) with integrated battery	579 (with 3 Strings) 676 (with 4 Strings) 773 (with 5 Strings) 870 (with 6 Strings)	676 (with 4 Strings) 773 (with 5 Strings) 870 (with 6 Strings)	
Degree of protection	IP21, with front door washable dust filter		
Cabinet colour	Black, RAL 9005		
Switchgear (internal)	Standard Input Breaker, Standard Battery Breaker and Standard Maintenance Bypass Switch		
Cable entry	Bottom/Front or Rear, optional Top entry kit		
ENVIRONMENT			
Ambient storage temperature	Range of -25 to +55°C in the protective package		
Ambient service temperature	Power electronics part: 0 to +40°C without de-rating Battery part: +5 to 25°C without reducing battery life		
Maximum service altitude	1000m above sea level. Maximum 2000m with 1% de-rating per each additional 100m above 1000m		
Relative humidity	5 to 95%, no condensation allowed		
Acoustic noise at 1m	<60dBA at 100% load		
Electromagnetic Compatibility	Immunity and emission to IEC/EN 62040-2		
USER INTERFACE & COMMUNICATIONS			
Display	7" Touchscreen Colour 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, 1x RS232 Service Port		
Optional Communication Ports	Mini-Slot cards: Web/SNMP, Relay/RS232, Industrial Relay, ModBus, Power Xpert		
ELECTRICAL INPUT CHARACTERISTICS			
Earthing system compatibility	TN, TN-S, TN-C, TN-C-S, TT (Three-phase, four-wire + PE)		
Rated input voltage and voltage tolerance	<u>Rectifier:</u> 230/400Vac nominal (220/380, 240/415 Selectable) Tolerance: 196/340–276/480V (-15%, +20%) at 100% load 138/240–276/480V (-40%,+20%) at 50% load without battery discharge  <u>Bypass:</u> 230/400Vac nominal (220/380, 240/415 Selectable) Tolerance: 196/340 – 253/438V (-15%, +10% of nominal)		
Operating frequency / tolerance	50 or 60Hz; Tolerance 40-72Hz		
Input current distortion (Linear load condition at rated input current)	<4.5% THDi	<3% THDi	
Input power factor	0.99pf		
Inrush current	<100% of rated current. Rectifier ramp-up 10A/s (default), configurable, min.1A/s		
Number of input phases	3 phases + Neutral		
Rated rectifier input current @ 400V	46A rms	61A rms	76A rms
Max. rectifier input current @ 400V	95A rms	95A rms	95A rms
Bypass input current (rms @ 400V) Recommended/Maximum	44A/52A	59A/70A	74A/87A
ELECTRICAL OUTPUT CHARACTERISTICS - NORMAL MODE			
Rated output voltage	220/380, 230/400, 240/415Vac, three phase		
Output voltage variation	<1% static load, 4% with 50ms 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		

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Total output voltage distortion	<1% linear load, <5% non-linear load		
Short circuit capability	180A, 400ms (4 x In)	180A, 400ms (3 x In)	180A, 400ms (2.5 x In)
Overload capacity without bypass	10min >102–110% load, 1min >111–125% load, 10sec 126-150% load, 300ms >150% load		
Overload capacity with bypass	Continuous >100–125% load, 10ms 1000% load *Selected external Bypass fuses or breaker may limit the overload capability		
Fault clearing capability	35A gG fuse		
Load power factor range	0.8 lagging to 0.8 leading without de-rating		
Range of frequency synchronisation with bypass	±4Hz as default. User settable 0.5 to 5 Hz		

### ELECTRICAL OUTPUT CHARACTERISTICS - STORED ENERGY MODE

Transfer to/from stored energy	No break		
Rated output voltage	220/380, 230/400, 240/415Vac, three phase		
Output voltage variation	<2% static load, 4% with 50ms recovery from 100% load step		
Crest factor	3:1		
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	180A, 400ms (4 x In)	180A, 400ms (3 x In)	180A, 400ms (2.5 x In)
Overload capability	10min >102–110% load, 1min >111–125% load, 300ms >125% load		
Load power factor range	0.8 lagging to 0.8 leading without de-rating		
Number of output phases	3 Phase		

### EFFICIENCY (Input/Output)

Linear Load	100% load:	96.6%	96.5%	96.3%
Efficiency, Double	75% load:	96.6%	96.6%	96.6%
Conversion Mode	50% load:	96.1%	96.5%	96.6%
@ 400V/50Hz	25% load:	94.0%	95.1%	95.7%
Heat Dissipation,	100% load:	1020W	1440W	1850W
Double Conversion	75% load:	765W	1020W	1275W
Mode @ 400V/50Hz	50% load:	585W	700W	850W
	25% load:	450W	490W	537W
Linear Load	100% load:	99.0%	99.1%	99.2%
Efficiency, ESS Mode	75% load:	99.0%	99.0%	99.1%
@ 400V/50Hz	50% load:	98.5%	98.9%	99.0%
	25% load:	97.5%	98.1%	98.3%

### BYPASS CHARACTERISTICS

Automatic bypass	Static bypass switch, continuously rated, no break transfer
Automatic bypass nominal rating	50kW
Automatic bypass thyristor $i^2t$ value	25,000 A <sup>2</sup> s ( $T_{vj} = 25^{\circ}\text{C}$ , 8,3 to 10 ms), 18,000 A <sup>2</sup> s ( $T_{vj} = 130^{\circ}\text{C}$ , 8,3 to 10 ms)
Back-feed protection	Standard 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 frequency variation	±3Hz
UPS Audible Noise	<47dBA @ 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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BATTERY			
Battery nominal voltage	432V (36 x 216 Cells) for internal batteries, 432V (36 x 12V, 216 Cells) or 480V (40 x 12V, 240 Cells) for external batteries		
Float charge voltage	216 x 2.30V = 497V or 240 x 2.30V = 552V		
Maximum charge voltage	216 x 2.35V = 508V or 240 x 2.35V = 564V		
Internal batteries nominal Ah capacity	9Ah or 7Ah (C10)		
Battery technology	Valve Regulated Lead Acid, 5 or 10 year design life		
Stored energy time	See separate information		
Charging current (at full load)	Default 12A, configurable: Maximum 16.5A		
Restored energy time to 90%	Maximum 10 hours for internal batteries		
Battery recharge profile	Advanced Battery Management (ABM®) = 90% resting,10% floating/charging		
Battery cut off voltage	1.67 to 1.75 VPC, Configurable or automatic (load adaptive)		
Battery start option	Yes, standard		
Internal Battery Run Times			
3 x 36 x 9Ah Batteries	5 min	-	-
4 x 36 x 9Ah Batteries	12 min	7 min	5 min
5 x 36 x 9Ah Batteries	16 min	10 min	7 min
6 x 36 x 9Ah Batteries	20 min	14 min	10 min

Note: Battery times are approximate and vary depending on age and temperature. Values quoted after full 5 discharge cycles, at +25°C