

Eaton 93E 400-500kVA UPS Technical Specification

CONSTRUCTION	400kVA	500kVA
Model	93E-400/400 (CTO: 9EV40)	93E-500/500 (CTO: 9EU50)
kVA/kW Rating (all modes)	400/360	500/450
Upgradability	-	-
UPS Topology	Double Conversion, IGBT Converters	
Performance classification	IEC62040-3	
UPS Dimensions: WxDxH (mm)	1600 x 820 x 1880	
Degree of protection	IP20, with front door mounted washable dust filter(IP 21 optional)	
Cabinet colour	Black, RAL 9005	
Cable entry	Bottom or Top	
Weight (kg) without batteries	1020	1044

ENVIRONMENT

Ambient storage temperature	Range of -15 to +55°C in the protective package	
Ambient service temperature	UPS: 0 to +40°C Battery (installed separately): +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 (ISO7779)	≤69.3dB @ 75% Load	≤70.4dB @ 75% Load
Electromagnetic Compatibility	Immunity and emission to IEC/EN 62040-2	

USER INTERFACE & COMMUNICATIONS

Display	Graphical LCD with blue backlight, 4x LEDs for notice and alarm	
Standard Communication Ports	2x Mini-Slot , 1x Emergency Power Off input (NC or NO), 3x Building Alarm inputs, 1x RS232 & 1x USB (exclusively for service tool use)	
Optional Communication Ports	Mini-Slot cards: Web/SNMP, Relay/RS232, Industrial Relay, ModBus	

ELECTRICAL INPUT CHARACTERISTICS

Power Distribution System compatibility	TN, TN-S, TN-C, TN-C-S, TT (Three-phase, four-wire + PE)	
Rated input voltage and voltage tolerance	Rectifier: 230/400Vac nominal (220/380, 240/415 Selectable) 116/201-276/478V (-50%, +20%) Bypass: 3 x 230/400V nominal (220/380, 240/415 Selectable) 207/359 – 253/438V (±10% of nominal, selectable up to ±20%)	
Operating frequency / tolerance	50 or 60Hz; Tolerance 42-70Hz	
Input current distortion	<5% THDi with 60% of rated linear load, <3% with rated linear load.	
Input power factor	0.99pf at 100% load	
Inrush current	≤120% of rated current for ≤2 cycles	
Number of input phases	3 phases + Neutral + PE (3 phase input)	
Rated rectifier input current (rms @ 400V)	601A	751A
Maximum rectifier input current (rms @ 400V)	628A	831A
Bypass input current (rms @ 400V) Recommended/Max	577/664A	722/830A

ELECTRICAL OUTPUT CHARACTERISTICS - NORMAL MODE

Rated output voltage	230/400 Vac, three phase, (220/380, 240/415 selectable)	
Output voltage variation	±1% Balanced static load, ±6% with 5ms recovery from 10% to 90% load step, ±5% Balanced dynamic load (EN62040-3)	
Crest factor	3:1	
Rated output frequency	50 Hz (default) or 60 Hz	
Output frequency variation (synchronised if applicable)	±4Hz (default) selectable from ±1Hz to ±4Hz, with slew rate 0.8Hz/sec	
Output frequency synchronised phase error at change of mode	Maximum of 2.5 degrees	
Total voltage distortion	<2% with linear load, <5% with non-linear load defined according to EN62040-3	
Short circuit capability, <400ms	1500A	2000A

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Overload capacity w/out bypass	102–125% load 10 minutes, 126–150% load 1 minute, >151% load 500ms at 40°C	
Overload capacity with bypass	115% load continuous, 1000% for 20ms at 40°C and ≤1000m altitude Note: Selected external Bypass fuses or breaker may limit the overload capability	
Load power factor range	0.7 lagging to 0.9 leading without de-rating	
Range of frequency synchronisation with bypass	0.8Hz/s	
ELECTRICAL OUTPUT CHARACTERISTICS - STORED ENERGY MODE		
Transfer to/from stored energy	No break	
Rated output voltage	230/400 Vac, three phase, (220/380, 240/415 selectable)	
Output voltage variation	±1% with Balanced static load, 0% during transfer from stored energy to normal mode, ±5% with 10ms recovery from 10% to 90% load step, ±5% Balanced dynamic load (EN62040-3)	
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	<2% with linear load, <5% with non-linear load defined according to EN62040-3	
Short circuit capability, <400ms	1500A	2000A
Overload capability	102–125% load 1 minute, 126–150% load 30 seconds, >151% load 500ms at 40°C	
Load power factor range	0.7 lagging to 0.9 leading without de-rating	
EFFICIENCY (Input/Output)		
Linear Load, 100% load:	95.5%	95.6%
Double 75% load:	96.0%	96.0%
Conversion Mode 50% load:	95.7%	95.7%
@ 400V/50Hz 25% load:	95.0%	95.0%
Heat Dissipation 100% load:	16963W	20711W
Double 75% load:	11250W	14063W
Conversion Mode 50% load:	8088W	10110W
@ 400V/50Hz 25% load:	4737W	5921W
Linear Load, 100% load:	98.5%	
ESS Mode 50% load:	97.5%	
BYPASS CHARACTERISTICS		
Automatic bypass	Static bypass switch, continuously rated*, no break transfer *bypass capable of 115% continuous load on 80-500kVA models	
Automatic bypass rating	400kVA	500kVA
Automatic bypass SCR i^2t value	1805,000 A ² s	1805,000 A ² s
Back-feed protection	Optional Internal back-feed contactor	
Separate bypass input feed	Standard	
Manual bypass switch (internal)	Not available	
ESS (Energy Saver System) MODE CHARACTERISTICS		
Performance classification	VFD, transferring to VFI (Double Conversion mode) if limits are exceeded	
Transfer Mains available:	No break (0ms)	
time to VFI Mains failure:	2ms typical, < 4ms max	
Acceptable voltage variation	±10% of nominal voltage	
Acceptable output freq variation	±4Hz	
High Alert mode	UPS will stay in double-conversion mode for one hour (user adjustable), after which the unit will automatically return to operate in ESS mode	
BATTERY		
Battery nominal voltage	480V(240 Cells)	
Float charge voltage	240 x 2.30V = 552V	
Maximum charge voltage	240 x 2.35V = 564V	
Battery cut off voltage	240 Cells = 1.67V/Cell	
Restored energy time to 90%	Maximum 10 hours recommended (dependant on battery size)	
Charging current (at full load)	80A(default), 160A(max)	100A(default), 200A(max)
Battery recharge profile	Advanced Battery Management (ABM [®]) = 90% resting, 10% floating/charging (typical)	