Eaton 93PM 100-400 kW UPS Technical Specification

Manufacturer's declaration in accordance with IEC 62040-3

IEC 62040-3 Subclause	MODEL RATING (pf 1.0)	100 kW	150 kW	200 kW	250 kW	300 kW	350 kW	400 kW
	Model catalogue reference	93PM-100(400)	93PM-150(400)	93PM-200(400)	93PM-250(400)	93PM-300(400)	93PM-350(400)	93PM-400(400)
	Number of UPM's (Uninterruptible Power Modules)	2 UPM's	3 UPM's	4 UPM's	5 UPM's	6 UPM's	7 UPM's	8 UPM's
	UPS options:	Top air exhaust kit (for installing against the wall), internal maintenance bypass (MBS), Synchronization control interface, plywood package (freight)						
	Upgradeability	up to 400 kW						-
	External paralleling	Up to 4 units with HotSync technology						
5.1.1	UPS topology	Double conversion, 3-level IGBT converters						
5.3.4	UPS performance classification	VFI-SS-111						
MECHANICAL								
	UPS dimensions (width x depth x height)	1618 mm x 920 mm x 1968 mm 1618 mm x 1120 mm x 1968 mm (with top air exhaust kit)						
	Shipping weight	720 kg	785 kg	850 kg	915 kg	980 kg	1045 kg	1110 kg
	Installed weight	680 kg	745 kg	810 kg	875 kg	940 kg	1005 kg	1070 kg
	UPS Cable entry	Top / bottom entry						
	UPS Degree of protection	IP20 (EN60529), with front door mounted washable dust filter						
	UPS colour	Black, RAL 9005						
	Mean time to repair (MTTR)	< 30 minutes						
ENVIRONMENTAL								
4.1.4	Ambient UPS storage temperature range	-15 °C to +55 °C in the protective package						
4.2.1.1 and 5.4.2.2 h	Ambient operating temperature range UPS	0 to +40 °C The maximum rate of temperature change shall be limited to 1.67 °C over 5 minutes (20 °C/hour), based on the ASHRAE standard 90.1-2013						
	External battery	+ 20 °C to + 25 °C recommended for optimized battery life time						
4.2.1.1	Relative humidity range	5 to 95%, no condensation allowed. There shall be at least a 1.0 °C difference between the dry bulb temperature and the wet bulb temperature, at all times, to maintain a non-condensing environment.						
4.2.1.2	Operating altitude	1000 m above sea level at 40 °C Maximum 2000 m with 1% de-rating per each additional 100m above 1000m						
	RoHS/WEEE compliancy	Yes						
EFFICIENCY								
5.3.2 r and 6.4.1.6	Efficiency in double-conversion, rated linear load							
	100% load	96,3 %	96,3 %	96,3 %	96,3 %	96,4 %	96,4 %	96,4 %
	75% load	96,4 %	96,4 %	96,5 %	96,5 %	96,6 %	96,6 %	96,7 %
	50% load	96,3 %	96,3 %	96,5 %	96,5 %	96,5 %	96,5 %	96,7 %
	25% load	95,0 %	95,0 %	95,4 %	95,4 %	95,6 %	95,6 %	95,9 %

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	MODEL RATING (pf 1.0)	100 kW	150 kW	200 kW	250 kW	300 kW	350 kW	400 kW
	Heat dissipation in double conversion							
	100% load	3842 W	5763 W	7684 W	9605 W	11203 W	13071 W	14938 W
	75% load	2801 W	4201 W	5440 W	6801 W	7919 W	9239 W	10238 W
	50% load	1921 W	2882 W	3627 W	4534 W	5440 W	6347 W	6825 W
	25% load	1316 W	1974 W	2411 W	3014 W	3452 W	4027 W	4275 W
	No load	965 W	1325 W	1685 W	2045 W	2405 W	2765 W	3125 W
	Efficiency in ESS, rated linear load							
	100% load	99,0 %	99,0 %	99,0 %	99,0 %	99,0 %	99,2 %	99,3 %
	75% load	98,9 %	98,9 %	99,0 %	99,0 %	99,0 %	99,2 %	99,2 %
	50% load	98,6 %	98,6 %	98,8 %	98,8 %	98,8 %	99,0 %	99,1 %
	25% load	97,7 %	97,7 %	98,2 %	98,2 %	98,4 %	98,7 %	98,7 %
	Efficiency in stored energy mode, up to	95 %						

ELECTRICAL CHARACTERISTICS

INPUT

5.2.1.a and 5.2.1 b	Rated input voltage	220/380 V; 230/400 V; 240/415 V						
	Voltage tolerance Rectifier input	rated voltage -20% / +20%						
	Bypass input	rated voltage -10% / +10%						
5.2.1 c and 5.2.1 d	Rated input frequency	50 or 60 Hz						
	Frequency tolerance	42 to 70 Hz						
5.2.2 a and 5.2.2 b	Number of input phases	3 phases + neutral + PE						
5.2.2 d	Input power factor	0,99pf at 100% load						
5.2.2 c	Rated rectifier input current	151 A	227 A	302 A	378 A	454 A	529 A	606 A
5.2.2 f	Maximum rectifier input current	190 A	285 A	380 A	475 A	570 A	665 A	760 A
	Bypass input current, recommended/maximum	144 A / 166 A	217 A / 249 A	289 A / 332 A	361 A / 414 A	433 A / 497 A	505 A / 580 A	577 A / 663 A
5.2.2 h and 5.2.2. i	Input current distortion at rated input current							
	Resistive load	< 3%						
	Non-linear load	< 5%						
5.2.2 e	In-rush current	<100% of rated current						
5.2.2 k	AC power distribution system compatibility	TN, TT, IT (4-wire)						
	Rectifier ramp-up, rectifier start and load step	Yes						
	Backfeed protection	Yes, for rectifier and bypass lines						

ELECTRICAL CHARACTERISTICS

OUTPUT

5.3.2 k	Output power rating	100 kVA	150 kVA	200 kVA	250 kVA	300 kVA	350 kVA	400 kVA
	Output power factor	pf 1.0	pf 1.0	pf 1.0	pf 1.0	pf 1.0	pf 1.0	pf 1.0

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5.3.2 f and 5.3.2 g	Number of output phases	3 phase + neutral + PE						
5.3.2 b	Rated output voltage	220/380 V; 230/400 V; 240/415 V, configurable						
5.3.2 b	Output voltage variation, steady state	< 1%						
5.3.2 i	Total voltage harmonic distortion 100% linear load 100% non-linear load	 < 1,5% < 3,0%						
5.3.2 q	Voltage unbalance at reference unbalanced load Phase displacement at reference unbalanced load	< 0,6% < 1,0 deg.						
5.3.2 j	Voltage transient (r.m.s) Recovery time to steady state	0% during transfer from stored energy to normal mode ±4% with 140 ms recovery from 100% load step						
5.3.2 c	Rated output frequency Output frequency variation	50 or 60 Hz, configurable ± 0,1 Hz						
5.3.2 d and 5.3.2 e	Maximum frequency range for synchronization with bypass Maximum synchronized phase error Maximum slew-rate when synchronizing	± 4 Hz as default. User settable ± 0,5 to ± 5 Hz. < 1° with static balanced load 0,4 Hz/s						
5.3.2 l	Overload capability @ 40 °C On inverter	10 min 110% load 60 s 125% load 10 s 150% load 300 ms >150% load						
	Overload capability @ 40 °C On inverter, stored energy mode	10 min 110% load 60 s 125% load 300 ms >125% load						
	Overload capability @ 40 °C On bypass	Continuous < 115% load 10 ms 1000% load						
5.3.2 m	Output current limitation, short-circuit capability	340 A, 400 ms	510 A, 400 ms	680 A, 400 ms	850 A, 400 ms	1020 A, 400 ms	1190 A, 400 ms	1360 A, 400 ms
5.3.2 o and 5.3.2 p	Load power factor, permitted range	From 0,8 lagging to 0,8 leading without de-rating						

ESS MODE CHARACTERISTICS		
	Transfer time to double-conversion	
	Mains available	No break
	Mains failure	< 2 ms in normal transfer conditions, < 10 ms maximum

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	MODEL RATING (pf 1.0)	100 kW	150 kW	200 kW	250 kW	300 kW	350 kW	400 kW
	Output voltage variation setting	±10% of nominal voltage, default						
	Output frequency variation setting	±4 Hz, default						
	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 on ESS.						
	Reactive power compensation	When enabled, allows compensating for the reactive power produced by the UPS or the load while operating on ESS mode.						
VMMS MODE CHARACTERISTICS								
	VMMS availability	Available for multi-module 93PM UPS system, both between internal modules and modules in an external parallel connected system.						
	VMMS operation	When load level per module is less than 55%, VMMS will automatically optimise the number of online modules for optimised operating efficiency. The extra UPMs will be set to ready state mode, capable to transfer online in < 2ms transfer time. The load will be fed in double conversion mode the entire time, even during and after a load step.						
	Redundancy level setting	Number of redundant online UPMs (system wide), configurable.						
	UPM module rotation	System will automatically rotate the ready state UPMs. Enabled by default, configurable.						
BYPASS								
	Type of bypass	Static						
	Bypass rating	400 kVA						
	Bypass voltage range	220/380 V; 230/400 V; 240/415 V tolerance -10% / +10% of rated voltage						
	Transfer time break	No break						
	Backfeed protection	Integrated as standard						
	Rated conditional short-circuit current, I_{cc} Static bypass	100 kA (internal ultra rapid fusing)						
	Internal static bypass ultra-rapid fuse	Bussmann 1400A 170M6417						
	Bypass fuse i^2t value Pre-arc i^2t Total clearing i^2t	 370 000 A^2s 2 450 000 A^2s						

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BATTERY CHARACTERISTICS		
5.4.2.2 d	Battery technology	12 V, VRLA
5.4.2.2 b	Battery quantity	36 to 40 battery blocks 216 to 240 cells per string
5.4.2.2 c	Battery voltage range	432 V (216 Cells) to 480 V (240 Cells)
5.4.2.2 f	Stored energy time	See separate declaration
5.4.2.2 o	Recharge profile	Advanced Battery Management (ABM®) = 90% resting,10% floating/charging (typical) OR float charge
5.4.2.2 q	End of discharge voltage	1.67 VPC to 1.75 VPC Configurable or automatic (load adaptive)
5.4.2.2 r	Charging current at nominal load	Configurable 0…29 A per UPM At > 40 kVA load per UPM, automatically limited to 16 A per UPM
	Battery start option	Yes
	Temperature compensated battery charging option	Yes
	Alternative backup power technologies	Wet cell batteries NiCd batteries Lithium-ion batteries Supercapacitors

COMMUNICATION CIRCUITS		
5.6	Display	Touchscreen LCD, 4x LEDs for notice and alarm, status LED light stripes
	Standard connectivity ports	3x Mini-Slot ports for optional cards, Device USB and Host USB, RS-232 service port, 1 x relay output, 5 x building alarm inputs and a dedicated EPO
	Optional	Mini-Slot cards: Web/SNMP, Industrial relay, ModBus card
	Complete list of indications and interface devices	See User's Manual

COMPLIANCE WITH STANDARDS		
IEC 62040-1	Safety Access	Restricted access
	Degree of protection	IP20; protection against medium sized foreign matter (incl. finger), protection against vertically dripping water.
IEC 62040-2	Electromagnetic Compatibility	
	Immunity	EMC Category C3
	Emissions	EMC Category C3

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