Eaton 93PS Marine 8-40kW UPS Technical Specification

Manufacturer's declaration in accordance with IEC 62040-3

IEC 62040-3 Subclause	MODEL RATING (1.0 p.f.)	8-20 kW	8-40 kW
	Model catalogue reference	93PS-M-XX(20)-YY-	93PS-M-XX(40)-YY-
	Number of power modules (UPM)	1	2
	UPS options	Internal maintenance bypass switch (MBS) External battery cabinets Internal transformers External transformers Earth fault monitoring 24 V Emergency power off interface	
	Upgradability	Yes, up to 20kW	Yes, up to 40kW
	External paralleling	Up to 4 units with HotSync technology	
5.1.1	UPS topology	Double conversion	
5.3.4	UPS performance classification	VFI-SS-111	

MECHANICAL

	UPS dimensions (width x depth x height)	356 x 875 x 1370 mm *)	503 x 975 x 1810 mm
	Weight, UPS and internal transformers		
	UPS	112 kg	207 kg
	UPS + INPUT TX	252 kg	407 kg
	UPS + OUTPUT TX	202 kg	382 kg
	UPS + INPUT + OUTPUT TX	342 kg	582 kg
	Weight, UPM (power module)	28 kg (< 25 kg w/o fan panel & DC capacitors)	
	Small External Battery Cabinet dimensions (width x depth x height)	356 x 875 x 1370 mm *)	
	Large External Battery Cabinet dimensions (width x depth x height)	537 x 971 x 1745 mm	
	UPS Cable entry	Rear, Bottom	
	UPS Degree of protection	IP 23	
	UPS colour	Industrial grey; RAL 7035	
	Mean Time To Repair (MTTR)	< 8 minutes (UPM) / < 15 minutes (UPS)	

*) height 1500 mm with wall mount

ENVIRONMENTAL

6.5.5	Acoustic noise at 1 m, in 25 °C ambient temperature, without internal transformers	< 60 dBA in double conversion < 47 dBA in ESS
4.1.4	Ambient UPS storage temperature range	- 25 °C to + 55 °C indoors in the protective package

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4.2.1.1 and 5.4.2.2 h	Ambient service temperature range UPS Battery	0 °C to + 45 °C without output power derating at sea level + 20 °C to + 25 °C recommended for optimized battery life time
4.2.1.1	Relative humidity range	5 to 95%, no condensation allowed
4.2.1.2	Maximum service altitude	1000 m (3300 ft) above sea level at 40 °C Maximum 2000 m (6600 ft) with 1 % derating per each add. 100 m
	RoHS/WEEE compliancy	Yes

EFFICIENCY

5.3.2 r and 6.4.1.6	Efficiency in double-conversion, rated linear load 100% load 75% load 50% load 25% load	8 kW 95.9% 95.5% 94.5% 91.5%	10 kW 96.1% 95.8% 95.1% 92.5%	15 kW 96.0% 96.1% 95.8% 94.3%	20 kW 95.8% 96.1% 96.1% 95.2%	30 kW 96.1% 96.1% 95.9% 94.6%	40 kW 95.7% 96.1% 96.2% 95.5%
	Heat dissipation in double conversion 100% load 75% load 50% load 25% load	8 kW 328 W 270 W 220 W 170 W	10 kW 390 W 315 W 245 W 188 W	15 kW 600 W 489 W 315 W 214 W	20 kW 840 W 585 W 390 W 240 W	30 kW 1170 W 878 W 615 W 405 W	40 kW 1720 W 1170 W 760 W 450 W
	Efficiency for optional input transformer 100% load 75% load 50% load 25% load	8 kW 96.8% 97.2% 97.2% 96.0%	10 kW 96.8% 97.2% 97.2% 96.0%	15 kW 96.8% 97.2% 97.2% 96.0%	20 kW 96.8% 97.2% 97.2% 96.0%	30 kW 97.1% 97.6% 97.8% 97.1%	40 kW 97.1% 97.6% 97.8% 97.1%
	Heat dissipation for optional input transformer 100% load 75% load 50% load 25% load	8 kW 89 W 58 W 39 W 28 W	10 kW 111 W 73 W 49 W 35 W	15 kW 167 W 109 W 73 W 52 W	20 kW 222 W 146 W 97 W 69 W	30 kW 302 W 188 W 115 W 76 W	40 kW 403 W 250 W 153 W 101 W
	Efficiency for optional output transformer 100% load 75% load 50% load 25% load	8 kW 96.5% 96.8% 96.6% 94.9%	10 kW 96.5% 96.8% 96.6% 94.9%	15 kW 96.5% 96.8% 96.6% 94.9%	20 kW 96.5% 96.8% 96.6% 94.9%	30 kW 96.8% 97.3% 97.5% 96.6%	40 kW 96.8% 97.3% 97.5% 96.6%
	Heat dissipation for optional output transformer 100% load 75% load 50% load 25% load	8 kW 93 W 64 W 45 W 34 W	10 kW 117 W 80 W 57 W 42 W	15 kW 175 W 120 W 85 W 64 W	20 kW 233 W 160 W 113 W 85 W	30 kW 320 W 203 W 125 W 85 W	40 kW 427 W 270 W 167 W 113 W

	Efficiency for optional output autotransformer load		8 kW	10 kW	15 kW	20 kW	30 kW	40 kW
		100% load	96.1%	96.1%	96.1%	96.1%	96.1%	96.1%
		75% load	96.2%	96.2%	96.2%	96.2%	96.4%	96.4%
		50% load	95.7%	95.7%	95.7%	95.7%	96.2%	96.2%
		25% load	93.2%	93.2%	93.2%	93.2%	94.3%	94.3%
	Heat dissipation for optional output autotransformer load		8 kW	10 kW	15 kW	20 kW	30 kW	40 kW
		100% load	104 W	130 W	195 W	260 W	390 W	520 W
		75% load	76 W	95 W	143 W	190 W	270 W	360 W
		50% load	57 W	72 W	108 W	143 W	190 W	253 W
		25% load	45 W	57 W	85 W	113 W	143 W	190 W

ELECTRICAL CHARACTERISTICS

INPUT

5.2.1.a and 5.2.1 b	Rated input voltage	380 V; 400 V; 415 V 208 V – 690 V with optional input transformer					
	Voltage tolerance						
	Rectifier input	338 to 480 V					
	Bypass input	rated voltage -15% / +10%					
	Input transformer	+/- 10 %					
5.2.1 c and 5.2.1 d	Rated input frequency	50 or 60 Hz, user configurable					
	Frequency tolerance	40 to 72 Hz					
5.2.2 a and 5.2.2 b	Number of input phases						
	Rectifier input	3 phases + neutral					
	Bypass input	3 phases + neutral					
	Transformer input	3 phases					
5.2.2 d	Input power factor	8 kW	10 kW	15 kW	20 kW	30 kW	40 kW
	double conversion, rated load	1.00	1.00	1.00	1.00	1.00	1.00
	With optional input transformer	0.95	0.95	0.95	0.95	0.97	0.97
5.2.2 c	Rated input r.m.s. current	8 kW	10 kW	15 kW	20 kW	30 kW	40 kW
	380 V	13 A	16 A	24 A	32 A	48 A	63 A
	400 V	12 A	15 A	23 A	30 A	46 A	61 A
	415 V	12 A	15 A	22 A	29 A	44 A	58 A
	With optional input transformer						
	208 V	24 A	30 A	45 A	60 A	89 A	119 A
	230 V	22 A	27 A	41 A	54 A	81 A	108 A
	380 V	13 A	16 A	25 A	33 A	49 A	65 A
	400 V	12 A	16 A	23 A	31 A	46 A	62 A
	415 V	12 A	15 A	22 A	30 A	45 A	60 A
	440 V	11 A	14 A	21 A	28 A	42 A	56 A
	480 V	10 A	13 A	19 A	26 A	39 A	52 A
	690 V	7 A	9 A	14 A	18 A	27 A	36 A

5.2.2 f	Maximum input r.m.s. current	8 kW	10 kW	15 kW	20 kW	30 kW	40 kW
		15 A	19 A	29 A	38 A	57 A	76 A
	With optional input transformer	30 A	36 A	51 A	65 A	95 A	125 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	< Rated input current (input filter components only)					

	In-rush current with transformer	8 kW	10 kW	15 kW	20 kW	30 kW	40 kW	8+8 kW	10+10 kW	15+15 kW	20+20 kW
		320 A	320 A	320 A	320 A	420 A	420 A	420 A	420 A	420 A	420 A

5.2.2 k	AC power distribution system compatibility	TN, TT, IT (4-wire)
	Rectifier ramp-up, rectifier start and load step	5 A/s (default), configurable. Minimum 1 A/s.
	Back feed protection	Yes, for rectifier and bypass lines

ELECTRICAL CHARACTERISTICS

OUTPUT

5.3.2 f	Number of output phases	3 phases + neutral
	Crest factor	3
5.3.2 b	Rated output voltage	380 V; 400 V; 415 V, configurable 208 V – 690 V with optional output transformer
5.3.2 b	Output voltage variation, steady state	< 1 % (< 3.5%, with optional transformer)
5.3.2 i	Total voltage harmonic distortion	
	100% linear load	< 1.5%
	100% non-linear load	< 3.5%
5.3.2 q	Voltage unbalance at reference unbalanced load	< 0.5%
5.3.2 j	Voltage transient (r.m.s) at 100% step load	4 %
	Recovery time to steady state at 100% step load	100 ms
5.3.2 c	Rated output frequency	50 or 60 Hz, configurable
	Output frequency variation	± 0.1 Hz (1 x UPM), ± 0.15 Hz (2 x UPM)
	Slew rate	0.8 - 1 Hz/s
5.3.2 d and 5.3.2 e	Maximum frequency range for synchronization with bypass	± 4 Hz (configurable 0.5 to 5 Hz)
	Maximum synchronized phase error	< 2° with static balanced load
	Maximum slew-rate when synchronizing	1 Hz/s

5.3.2 k	Rated output power	8 kW / 8 kVA	10 kW / 10 kVA	15 kW / 15 kVA	20 kW / 20 kVA	30 kW / 30 kVA	40 kW / 40 kVA

5.3.2 l	Inverter overload capability	Power rating 8-15 and 30 kW	Power rating 20 and 40 kW
		10 min ≤135% load 60 sec ≤155% load 10 sec ≤185% load 300 ms >186% load	10 min ≤110% load 60 sec ≤125% load 10 sec ≤150% load 300 ms >150% load
	Static bypass overload capability	20 ms 1000% load continuous 125% load	20 ms 1000% load continuous 125% load (output transformer 10 min 125% load)
5.3.2 m	Output current limitation, short-circuit capability *)	1 x UPM 72A, 300 ms	2 x UPM 144A, 300 ms
6.4.2.10.3 and 6.4.2.10.4	Fault clearing capability *)	1 x UPM Circuit breaker B10 / C6	2 x UPM Circuit breaker B25 / C10
5.3.2 o and 5.3.2 p	Load power factor Rated Permitted range	1.0 0.8 lagging to 0.8 leading	

*) without transformer

ESS MODE CHARACTERISTICS

	Transfer time to double-conversion Mains available Mains failure	 No break Typically 2 ms
	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	PS will stay on double-conversion for one hour (user adjustable), after which the unit will automatically return to operate on ESS.

BYPASS			
	Type of bypass	Static	
	Bypass rating	standard 20 kW	standard 40 kW
	Bypass voltage range	380 V; 400 V; 415 V tolerance -15% / +10% of rated voltage	
	Transfer time break	No break	
	Maintenance bypass	Optional	
	Bypass fuse i^2t value, Pre-arc i^2t Total clearing i^2t	standard 1000 A^2s 3700 A^2s	standard 1900 A^2s 7100 A^2s
	Required external bypass protective fuse, recommended rating	Circuit breaker C40	Circuit breaker C80
	Rated conditional short-circuit current, I_{cc} Static bypass Optional integrated maintenance bypass	100kA (internal ultra rapid fusing) 10kA (see User's and Installation Guide for protective fusing)	

BATTERY CHARACTERISTICS			
5.4.2.2 d	Battery technology	12 V, VRLA	
5.4.2.2 b	Battery quantity External	28-40 blocks per string	
5.4.2.2 c	Battery voltage External	336V – 480V	
5.4.2.2 f	Stored energy time	See separate declaration	
5.4.2.2 o	Recharge profile	ABM or float	
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	Charge current limit Default Load ≤80% Load >80%	1 x UPM 5A, configurable 1…25A 1…15A	2 x UPM 10A, configurable 2…50A 2…30A
	Battery start option	Yes	

COMMUNICATION CIRCUITS		
5.6	Standard connectivity ports	Mini-slot ports for optional cards, Device USB and Host USB, RS-232 service port, relay output, 5 building alarm inputs and a dedicated EPO, Web and SNMP card
	Complete list of indications and interface devices	See User's and Installation Guide

COMPLIANCE WITH STANDARDS		
IEC 62040-1	Safety Access	Operator access
	Degree of protection	IP 23 protection against medium sized foreign matter (incl. finger) protection against sprayed water up to 60 degree angle
IEC 62040-2	Electromagnetic Compatibility	
	Immunity	EMC Category C3
	Emissions	EMC Category C2
IEC 62040-4	Environmental Aspects - Requirements and Reporting	Yes
EN 50581		